KP Acoustics Ltd.
info@kpacoustics.com
1 Galena Road, W6 0LT London, UK
+44 (0) 208 222 8778
www.kpacoustics.com

28226 21a-23 Brownlow Mews, Camden, London

Planning Compliance Report
Report 28226.PCR.01

Fiducia Interiors Limited
10 Golden Square
London
W1F 9JA

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Written by:	Checked by:	Approved by:
Daniel Stuart MIOA Senior Acoustic Consultant	**Marie Gauthier MIOA** Senior Acoustic Consultant	**Jacob Tyler MIOA** Senior Acoustic Consultant

KP acoustics

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1.0 INTRODUCTION

KP Acoustics Ltd has been appointed to assess compliance with planning with respect of noise impact form new external plant and from an external terrace at 21a-23 Brownlow Mews, London WC1N 2LA.

A 24-hour environmental noise survey has been undertaken on site to prepare a noise impact assessment in accordance with BS4142:2014 '*Method for rating and assessing industrial and commercial sound'* as part of the planning requirements of the Local Authority.

This report presents the methodology and results from the environmental survey, followed by calculations in accordance with BS4142 to provide an indication as to the likelihood of the noise emissions from the proposed plant unit installation having an adverse impact on the closest noise sensitive receiver. Mitigation measures will be outlined as appropriate.

2.0 SITE SURVEYS

2.1 Site Description

21a-23 Brownlow Mews is in a quiet, residential area. The surroundings primarily consist of Georgian and Victorian terraced houses. The street is narrow and often used for local traffic, with minimal through traffic. The area is relatively calm, with low ambient noise levels primarily from residents and occasional service vehicles. There are few commercial activities nearby, contributing to the overall quiet environment. Nearby, there are small green spaces and the larger Russell Square, which adds to the tranquil atmosphere.

Figure 2.1 Site Location Plan (Image Source: Google Maps)

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 15:20 on 14th May 2024 and 16:05 on 15th May 2024.

The environmental noise measurement position, proposed plant installation locations, and the closest noise sensitive receiver relative to the plant installations are described within Table 2.1 and shown within Figure 2.2.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a pole at 1.5m above the floor surface, and at least 1.5m from any other reflective surface within the rooftop.
2	Noise Measurement Position 2	The microphone was installed on a pole at 1.5m above the floor surface, on the south corner, and at least 1.5m from any other reflective surface within the rooftop
	Nearest noise sensitive receptors	Windows on the upper floors of the rear façade of houses on Doughty Street. No.46 is the closest receptor.
	Proposed plant installation location	Proposed plant installations are outlined in Section 5.1.

Table 2.1 Measurement positions and descriptions

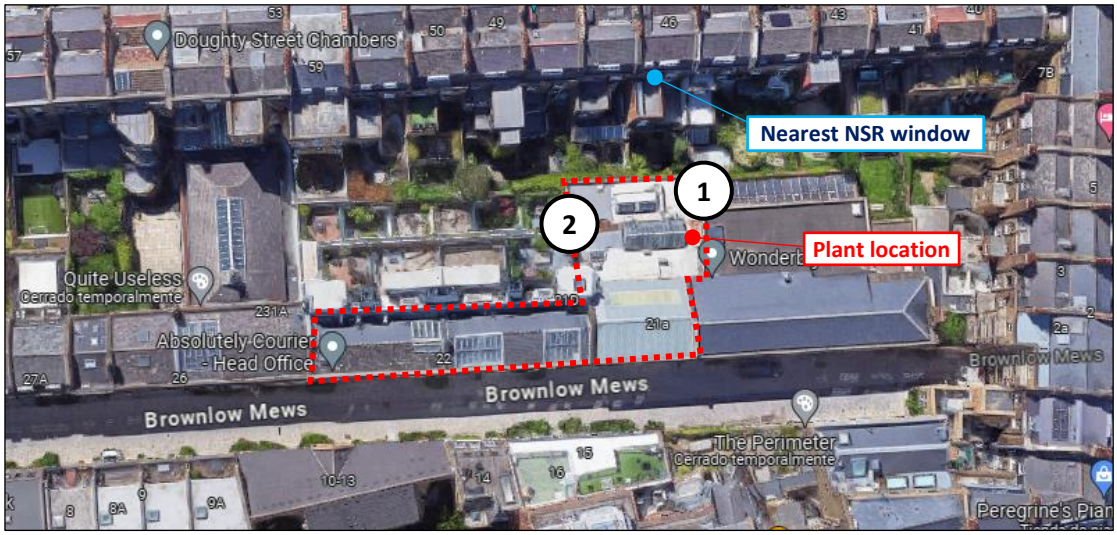

Figure 2.2 Site measurement positions (Image Source: Google Maps)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver and the proposed plant installation.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 26	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21130-E0	21/07/2022	UK-22-067
	Free-field microphone NTI Acoustics MC230A	A23541		
	Preamp NTI Acoustics MA220	11023		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 30	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21149-E0	04/08/2022	UK-22-079
	Free-field microphone NTI Acoustics MC230A	A23572		
	Preamp NTI Acoustics MA220	10997		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	05/06/2023	UCRT23/1739

Table 2.2 Measurement instrumentation

3.0 RESULTS

The $L_{Aeq:\,5min}$, $L_{Amax:\,5min}$, $L_{A10:\,5min}$ and $L_{A90:\,5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time histories in Figure 28226.TH1 and 28226.TH2.

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived based on the guidance of BS4142 Section 8.1.4 from the $L_{A90,5min}$ levels measured during the

environmental noise survey undertaken on site, as shown in 28226.Daytime L90.TH1 and 28226.Night-time L90.TH1 attached.

Time Period	Representative background noise level L_{A90} dB(A)	
	Position 1	Position 2
Daytime (07:00-23:00)	43	42
Night-time (23:00-07:00)	39	37

Table 3.1 Representative background noise levels

The measured ambient noise levels are shown in Table 3.2 below.

Time Period	Ambient noise level $L_{Aeq,T}$ dB(A)	
	Position 1	Position 2
Daytime (07:00-23:00)	52	54
Night-time (23:00-07:00)	44	47

Table 3.2 Ambient background noise levels (construction noise subtracted)

4.0 NOISE ASSESSMENT GUIDANCE

4.1 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'

British Standard BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*' describes a method 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, and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

This Standard compares the Rating Level due to the noise source/s under assessment for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) with the existing background noise level in terms of an L_{A90} when the noise source is not operating.

It should be noted that the Rating Level is the Specific Sound Level in question ($L_{Aeq,\ Tr}$), including any relevant acoustic feature corrections, as follows:

- **Tonality** – '*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible*'
- **Impulsivity** – '*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible*'
- **Intermittency** – '*If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied*'
- **Other sound characteristics** – '*Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied*'

Once the Rating Level has been obtained, the representative background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact, as follows:

- Typically, the greater this difference, 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 on the context
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context

NOTE: Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

4.2 Local Authority Guidance

The guidance provided by The London Borough of Camden for noise emissions of new plant in this instance is as follows:

The noise criteria, as per the Local Plan 2017 of London Borough of Camden, British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' should be considered as the main reference document for the assessment. The resultant 'Rating Level' would be considered as follows:

Period	**Assessment Location**	**Rating Level Acceptability Range**		
		Green: noise is considered to be at an acceptable level	**Amber:** noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development	**Red:** noise is observed to have a significant adverse effect.
Daytime (7:00-23:00)	Garden used for main amenity (free field) and Outside living or dining or Bedroom window (façade)	10dB below background	9 dB below and 5dB above background	5dB above background
Night-time (23:00-7:00)	Outside bedroom window (façade)	10dB below background and no events exceeding 57dB L_{Amax}	9db below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	5dB above background and/or events exceeding 88dB L_{Amax}

Table 4.1 Camden noise criteria for plant and machinery

4.3 Guidelines for Environmental Noise Impact Assessment Version 1.2 (November 2014)

There is no specific standard for assessment with regards to noise emissions from external amenity areas.

However, IEMA *Guidelines for Environmental Noise Impact Assessment Version 1.2 (November 2014)* provide suitable guidance which can be used in order to quantify the effects of changes in noise levels and have been used to indicate effects of the external areas.

To determine the overall noise impact, the aforementioned document presents the combination of magnitude and sensitivity criteria into a Degree of Effect matrix as shown in Table 4.1 with the corresponding descriptor in Table 4.2.

		IMPORTANCE/SENSITIVITY OF RECEPTOR			
		High	**Medium**	**Low**	**Negligible**
MAGNITUDE/ SCALE OF CHANGE	**Large**	Very Substantial	Substantial	Moderate	None
	Medium	Substantial	Substantial	Moderate	None
	Small	Moderate	Moderate	Slight	None
	Negligible	None	None	None	None

Table 4.1 Degree of effect matrix

Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB L_{Aeq} change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity
None	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals

Table 4.2 Effect descriptor

5.0 NOISE IMPACT ASSESSMENT

5.1 Proposed Plant Installations

It is understood that the proposed plant installation (as observed onsite) comprise the following units proposed to run daytime hours (07:00 to 23:00 hours).:

- 1 No. REYQ12U7Y1B Condenser Unit;
- 1 No. REYQ16U7Y1B Condenser Unit.

The proposed installation location for the proposed plant is as per Figure 2.2 above.

The noise emission levels as provided by the manufacturer for the units are shown in Table 5.1.

Unit	Descriptor	SPL (dB) at Octave Frequency Band (Hz)								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
REYQ12-U7Y1B	SPL at 1m	64	66	61	57	53	51	54	44	60
REYQ16-U7Y1B	SPL at 1m	67	68	64	62	55	52	53	47	63

Table 5.1 Plant Units Noise Emission Levels as provided by the manufacturer

5.2 Calculations

The rating level contribution predicted at the closest residential window from the proposed plant, with recommended noise control measures (see 5.3) is shown in Table 5.2. Detailed calculations are shown in Appendix B.

The rating level has been derived from the specific sound level accounting relevant acoustic feature corrections. In this case, as the specific sound level is more then 10dB below the background sound level and therefore no distinguishable tonal, impulsive or intermittent characteristics are expected and no corrections have been applied.

Receiver	[1] Rating Level at 1m From the Closest Noise Sensitive Window	[2] Background Sound Level (Position 1)	Difference [1] – [2]	Camden Council Rating Level Acceptability Range
46 Doughty Street Second floor rear window (07:00 to 23:00)	32 dB(A)	43 dB(A)	-11 dB(A)	"Green"

Table 5.2 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, the difference between the rating and background sound levels within the "green" acceptability of the Local Authority, providing that the mitigation measures outlined in Section 6 are implemented.

5.3 Noise Control Measures – Acoustic Enclosures

To control the noise emissions from the plant installation, we would recommend that an acoustic enclosure is installed according to the insertion loss specification as shown in Table 5.3.

Unit Ref.	Insertion Loss Levels (dB) in each octave frequency band (Hz)							
	63	125	250	500	1k	2k	4k	8k
REYQ12-U7Y1B and REYQ16-U7Y1B	1	8	14	20	29	28	23	16

Table 5.3 Insertion loss figures to be provided by acoustic enclosure

The relevant plant units must be completely enclosed for optimal noise reduction (including a top panel/weather hood). Ventilation openings for cooling must not compromise sound insulation. Doors, access panels, windows, ducts, and cable penetrations shall be treated so as to maintain the proposed acoustic specification when fully assembled.

The manufacturer/supplier will need to ensure that the enclosures can achieve the above specifications in-situ.

In instances where a manufacturer/supplier proposes an enclosure that deviates from this specification, KPA should be informed so that we may comment upon the acceptability.

5.3.1 Suitable Suppliers

We would recommend the following suppliers of the aforementioned enclosure:

- Environmental Equipment Corporation
- IAC
- Noico Ltd
- Waterloo Acoustics
- Allaway Acoustics
- Wakefield Acoustics
- Environ

5.4 Anti-Vibration Mounting Strategy

In the case of all plant units, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Appendix C outlines detailed advice in order to ensure that the system installer selects the appropriate anti-vibration mount for the installation.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

6.0 EXTERNAL AMENITY NOISE BREAKOUT

An assessment has been undertaken to determine the noise impact based on the newly proposed external roof terrace, proposed to be used during daytime hours only.

6.1 'IEMA' Noise Impact Assessment

The following assessment considers the changes in noise levels expected at the nearest residential receptor from the use of the roof terrace measured in our noise survey.

6.1.1 Proposals

We understand the terrace is small and serves an office. General use will entail giving occupants of the office an outdoor breakout space for quiet activities, to allow staff to get some fresh air or other activities.

However, to inform a worst-case assessment, up to 8no. persons have been accounted for on the terrace, speaking at a normal speech level. We expect this to be temporary and not last for more than 1 hour.

6.1.2 Calculations

On this basis of the proposals above, the noise contribution from the new terrace has calculated, as shown in Table 5.2 and detailed Appendix B2.

This activity level calculated [1] has been compared to the existing ambient noise level [2] measured onsite during the proposed extended operational hours. These have been summed to calculate the change in noise levels [3] expected due to the terrace in worst case use.

Description	[1] Worst Case Event Level at Receptor L_{eq}	[2] Ambient Level L_{eq}	[3] Logarithmic Sum of [1] & [2] $L_{eq,15mins}$	[3]-[2] Change in Level	'IEMA' Magnitude of Change – Highly Sensitive receiver	'IEMA' Magnitude of Impact
Event level of 1no. HGV leaving and 1no. HGV in a 15 mins period.	54dB(A)	52dB(A)	56dB(A)	+4 dB(A)	'Moderate'	'Small'

Table 5.2 IEMA Assessment for change in noise levels predicted from HGV movements

As shown in Table 5.2 above, the predicted worst-case change in sound levels equates a magnitude of impact of *"Small"* based on IEMA guidance.

6.2 Noise Management

In addition to the assessment above we understand suitable noise management strategies are to be incorporated.

We understand this would comprise the following.

- ensure the operational hours are adhered to;
- undertaking noisier activities inside where possible;
- establishing a feedback mechanism for residents to report excessive noise and address concerns promptly if particular noisy incidents are reported;
- ensuring proper use of the roof terrace, e.g. for conversations only and no amplified music;

6.3 Summary

As outlined in the assessments above, the noise impact based on the roof terrace proposals has been deemed to be low.

7.0 CONCLUSION

An environmental noise survey has been undertaken at Brownlow Mews, Camden WC1N 2LA, by KP Acoustics Ltd between 15:20 on 14/05/2024 and 16:05 on 15/01/2024. The results of the survey have enabled criteria to be set for noise emissions.

Manufacturer's noise data of proposed plant units has been used to obtain Specific and Rated Noise Level at the nearest noise sensitive receiver in accordance with British Standard BS4142:2014 for compliance with the London Borough of Camden requirements.

An assessment of the roof terrace has been undertaken, predicting the worst-case change in noise levels likely. Additionally noise management strategies have been discussed for this area. The assessment concludes the level of noise impact should be low should suitable noise management be implemented.

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B1

21a-23 Brownlow Mews

PLANT NOISE EMISSIONS CALCULATIONS

Source: Plant outlined below Receiver: NSR (indicated in report)	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
REYQ12U SPL at 1m	**64**	**66**	**61**	**57**	**53**	**51**	**54**	**44**	**60**
Correction due to surface reflections (2), dB	6	6	6	6	6	6	6	6	
Minimum attenuation provided by distance (15m), dB	-24	-24	-24	-24	-24	-24	-24	-24	
Minimum insertion loss provided by acoustic enclosure, dB	-1	-8	-14	-20	-29	-28	-23	-16	
Total SPL at reciever at this unit	45	40	29	19	6	5	13	10	28
REYQ16U SPL at 1m	**67**	**68**	**64**	**62**	**55**	**52**	**53**	**47**	**63**
Correction due to surface reflections (2), dB	6	6	6	6	6	6	6	6	
Minimum attenuation provided by distance (15m), dB	-24	-24	-24	-24	-24	-24	-24	-24	
Minimum insertion loss provided by acoustic enclosure, dB	-1	-8	-14	-20	-29	-28	-23	-16	
Total SPL at reciever at this unit	48	42	32	24	8	6	12	13	30
Total Specific Level of all Plant Unit Installations at Receiver	**50**	**45**	**34**	**26**	**11**	**9**	**16**	**15**	
BS4142 Acoustic Feature Corrections	0	0	0	0	0	0	0	0	
Total Rating Noise Level of all Plant Unit Installations at Receiver	**50**	**45**	**34**	**26**	**11**	**9**	**16**	**15**	**32**

Background Sound Level	***42***
Design Criterion	**32**

APPENDIX B2 External Amenity Space

21a-23 Brownlow Mews

EXTERNAL TERRACE CALCULATIONS

Source: Plant outlined below **Receiver: NSR (indicated in report)**	***Frequency, Hz***								***dB(A)***
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	
Normal speech noise levels, Sound Power Level*, dB	**57**	**61**	**63**	**68**	**69**	**65**	**54**	**43**	**72**
8No. Persons	9	9	9	9	9	9	9	9	
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Sound power to pressure level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Line source distance loss (1m to 3m), dB	-5	-5	-5	-5	-5	-5	-5	-5	
Point source distance loss (3m to 15m), dB	-14	-14	-14	-14	-14	-14	-14	-14	
Ballastrade screening	-4	-4	-3	0	0	0	0	0	
Total Level at Nearest Senstive Receptor	**35**	**39**	**43**	**50**	**51**	**47**	**36**	**25**	**54**

**reference: noise control in building services*

Ambient Sound Level	***52***