



10 AND 12 BELMONT STREET

LONDON

PLANT NOISE ASSESSMENT

Technical Report: R8240-1 Rev 1

Date: 3rd December 2019



For: Designated Contractors Ltd
46 Great Marlborough Street
London
W1F7JW

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Project Title: 10 and 12 Belmont Street, London – Plant Noise Assessment

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been appointed to undertake an assessment of the potential noise impact from new plant at no. 10 and 12 Belmont Street, London to accompany a retrospective planning application. New air conditioning condenser units have been installed in the basement level lightwells at the rear of the properties. This noise assessment has included:

- Environmental noise monitoring;
- Consideration of noise affecting the site;
- Assessment of noise from new condensing plant.

1.2 This report presents the results of the assessment following site visits and an environmental noise survey undertaken between 28th February and 6th March 2019.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 μ Pa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

1.4 An aerial view and site location are shown in Figure 1.

2.0 SITE DESCRIPTION

2.1 The five-story terrace properties are located in a residential area in Camden. The front of the properties bound Belmont Street, which is a single carriageway with on-street parking. The rear of the properties face Mead Close, a restricted access road with associated parking and a play park.

2.2 Local road traffic is the dominant source of noise in the area.

2.3 The condensing units operate on demand over 24 hours, with a single unit serving each property. The units will be installed in the basement level light wells of 10 and 12 Belmont Street.

2.4 The nearest receptor to the unit serving no. 10 Belmont Street is 21a Ferdinand Street and is shown as Receptor 1 in Figure 2. The basement living room window of 21a Ferdinand Street opens into a light well, shared with 10 Belmont Street.

2.5 The nearest receptor to the unit serving no. 12 Belmont Street is no. 10 Belmont Street. The ground floor living room window of 10 Belmont Street overlooks the light well of 12 Belmont street.

- 2.6 Bedrooms overlook the rear light wells and are located to the first floor of both residential receptors.
- 2.7 Plant locations are shown in Figure 2.

3.0 CRITERIA

Local Authority Guidance

- 3.1 Full pre-application advice was not available prior to the application's submission, however, Senior Planning Officer John Diver advised 24 Acoustics to reference Camden's plant noise guidance within the Local plan and Amenity documents. 24 Acoustics has been advised that any divergence from these criteria should be outlined within the noise assessment for further consideration.
- 3.2 Camden Council's Local Plan (2017) [Reference 1] provides guidance on assessing noise from plant and machinery with reference to BS 4142 and displays plant noise Rating Levels in Table C of Appendix 3, reproduced below:

Existing Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Dwellings	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dB _{L_{Amax}}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L _{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dB _{L_{Amax}}

Table 1: Camden's Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

- 3.3 BS 4142:2014 [Reference 2] provides a method for rating the effects of industrial and commercial sound on residential areas.
- 3.4 The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.
- 3.5 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

- 3.6 Due to the retrospective nature of the application and limited space to relocate the units, Designated Contractors Ltd has agreed to employ bespoke enclosure designs to control noise from plant. With this mitigation strategy it has become appropriate to assess internal noise levels from plant within the closest affected habitable rooms.
- 3.7 BS 8233:2014 [Reference 3] provides design guidance for dwelling houses, flats and rooms for residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16 \text{ hour}}$ in living rooms and bedrooms during daytime periods (07:00 to 23:00 hours), 40 dB $L_{Aeq, 16 \text{ hour}}$ in dining rooms during daytime periods and 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms during night-time periods (23:00 to 07:00 hours).
- 3.8 It is considered that noise from plant should achieve a level 5 dBA lower than that in BS 8233, resulting in the following maximum internal plant noise levels:
- Daytime: Bedroom/Livingroom 30 dB L_{Aeq} ;
 - Night-time: Bedroom 25 dB L_{Aeq} .

4.0 ENVIRONMENTAL NOISE SURVEY

- 4.1 An environmental noise survey was undertaken between 28th February and 6th March 2019 to determine the prevailing background noise levels at the site.
- 4.2 Noise monitoring equipment was set up on the eastern façade of No. 27 Ferdinand Street, at a height of approximately 1.5 metres above ground level. This location is considered representative of the background noise levels at the rear façade of number 10 and 12 Belmont Street. The survey location is shown in Figure 1.
- 4.3 Background noise levels were measured using the following equipment:
- Rion precision sound level meter Type NL-32
 - Brüel & Kjær acoustic calibrator Type 4231
- 4.4 Noise measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq} , L_{90} and $L_{max,f}$ noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 4].
- 4.5 The instrumentation's calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards. All instruments were fitted with environmental weather shields during the surveys.
- 4.6 The weather during the survey was variable, with some periods of precipitation. Noise from nearby construction activity also affected measured noise levels during the daytime. Periods of rain and construction activity have been omitted from the following assessment. The results of the background noise survey are summarised in Table 2.

Date (2019)	Measured Typical Background Noise Level, dB	
	Daytime, LA90, 1 hour 07:00 – 23:00	Night-Time, LA90, 15 min 23:00 – 07:00
Thursday 28th February	45	35
Friday 1st March	44	38
Saturday 2nd March	45	40
Sunday 3rd March	46	38
Monday 4th March	45	36
Tuesday 5th March	45	42
Wednesday 6th March	45	-
Representative Value	44	35

Table 2: Summary of Measured Background Noise Levels.

- 4.7 24 Acoustics determines the typical background noise level to be the average level measured over the relevant period, minus one standard deviation.

5.0 PLANT NOISE ASSESSMENT

- 5.1 The plant will operate on demand during the daytime and night-time and consists of two Mitsubishi PURY-P112VKM3 condensing units, outlined as Unit 1 and Unit 2 in Figure 2. The units will be programmed to operate in a set-back mode during night-time periods (23:00 to 07:00 hours).
- 5.2 It is understood that the new plant does not exhibit any tonal or other distinctive noise characteristics. The manufacturer's noise data is summarised in Table 3.

Mitsubishi PURY-P112VKM3	Sound Pressure Level (dB) at One Metre Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Daytime (heating)	65	62	58	51	47	43	38	33	55
Night-time low noise mode	56	48	46	44	41	36	29	30	46

Table 3: Manufacturer's Maximum Sound Pressure Level Source Data

- 5.3 Preliminary calculations have indicated the need for additional attenuation in the form of an acoustic enclosure.
- 5.4 Due to space limitations, Designated Contractors Ltd has been in extensive contact with two enclosure manufacturers.

- 5.5 Manufacturer's data for the bespoke enclosure, proposed to plant in the shared light well of 10 Belmont Street (Unit 1), states the minimum transmission loss as shown in Table 4 (manufacturer's data sheet reference: 1911015-5).

Acoustic Enclosure, Minimum Transmission Loss, dB								
Unit	63	125	250	500	1k	2k	4k	8k
1	6	9	16	30	42	40	37	34

Table 4: Acoustic Enclosure, Minimum Insertion Loss, Unit 1 – 10 Belmont Street

- 5.6 The manufacturer of the enclosure associated with 12 Belmont street (Unit 2) has not provided an octave band performance, however, it is stated that the unit will produce noise levels in the order of 28 to 33 dB L_{Aeq} at 1 meter following the installation of the acoustic enclosure (manufacturer's data sheet reference: 1.1.25ACT3-1750M2).
- 5.7 Due to the retrospective nature of the planning application and proximity of the nearest windows, the above mitigation represents the best practical measures to control noise from plant. It is not possible to relocate the plant due to space restrictions elsewhere.
- 5.8 The most affected residential window from Unit 1 is at the basement level of 24a Ferdinand Street, at a distance of approximately 2m. The most affected residential window from Unit 2 is the ground floor living room of no. 10 Belmont Street, at a distance of approximately 5m, and is acoustically screened from the unit by the property's rear terrace.
- 5.9 With corrections for distance and the stated performance of the proposed enclosures, calculations have been undertaken to confirm the maximum plant noise levels at each receptor, as described in Table 5.

Receptor	Maximum Plant Noise Level, dB	
	Daytime, L_{Aeq}, 1 hour 07:00 – 23:00	Night-Time, L_{Aeq}, 15 min 23:00 – 07:00
24a Ferdinand Street	42	35
10 Belmont Street	38	30

Table 5: Predicted Maximum Plant Noise Levels

- 5.10 The calculations demonstrate that, with the mitigation measures set out above, noise levels from plant Unit 1 would not exceed the representative background noise level at the nearest receptor location (24a Ferdinand Street) during all periods and under continuous operation.

- 5.11 The calculations demonstrate that, with the mitigation measures set out above, noise levels from plant Unit 2 would be at least 5 dB below the representative background noise level at the nearest receptor location (10 Belmont Street) during all periods and under continuous operation,
- 5.12 It is relevant to note that the calculated noise levels are considered to be low and internal noise levels from plant will be lower still.
- 5.13 Typical attenuation provided by a partially open window is in the order of 15 dB. Applying this reduction to the calculated noise levels gives rise to internal plant noise levels as shown in Table 6.

Receptor	Calculated Internal Plant Noise Level, dB	
	Daytime, $L_{Aeq, 1 \text{ hour}}$ 07:00 – 23:00	Night-Time, $L_{Aeq, 15 \text{ min}}$ 23:00 – 07:00
24a Ferdinand Street (living room)	27	20
10 Belmont Street (living room)	23	15

Table 6: Calculated Internal Plant Noise Levels

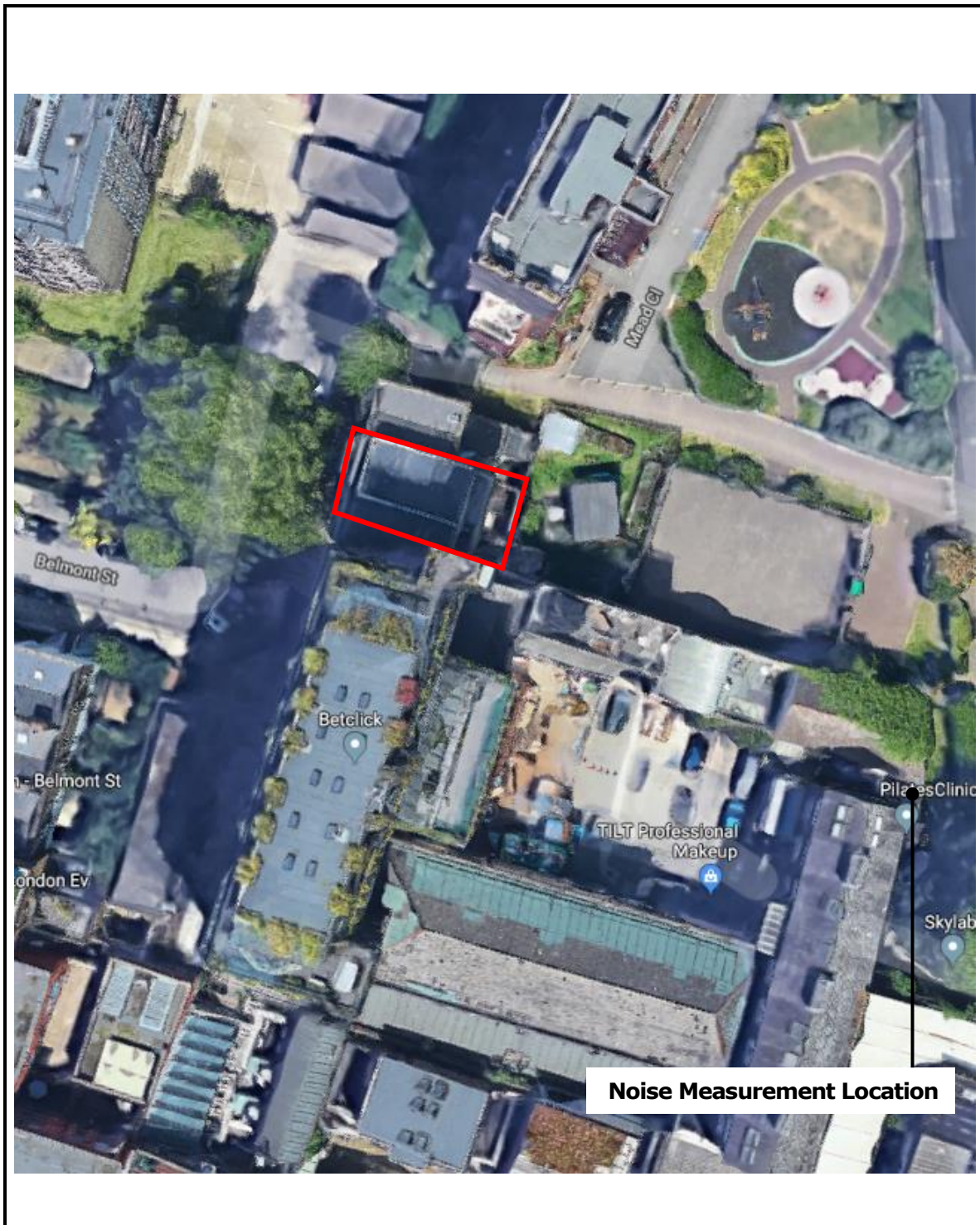
- 5.14 The noise levels inside bedrooms on the upper floors will be lower than the values in Table 6. The above internal plant noise levels are at least 5 dB below the maximum internal noise levels stated in BS 8233:2014 for living rooms (i.e. 35 dB L_{Aeq} , daytime) and bedrooms (i.e. 30 dB L_{Aeq} , night-time) and are therefore considered acceptable.
- 5.15 Based on the context of the site, the limitations of the area and the low predicted internal plant noise levels, noise from plant at the nearest receptor locations is considered acceptable and is in line with Camden's LOAEL to SOAEL plant noise limits.


6.0 CONCLUSIONS

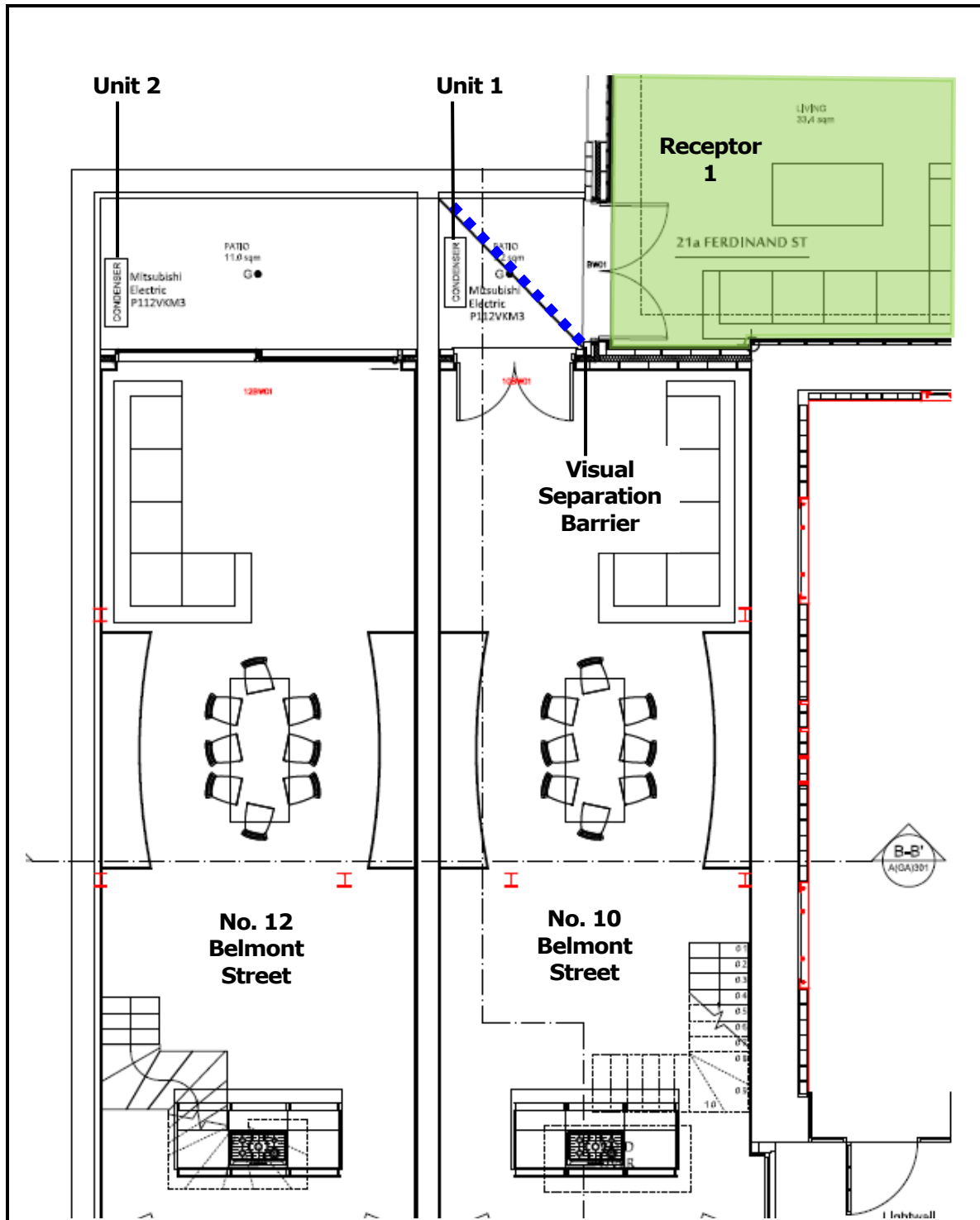
- 6.1 24 Acoustics Ltd has been instructed by Designated Contractors Ltd to undertake a noise impact assessment for new condensing units at 10 and 12 Belmont Street, Camden.
- 6.2 A noise survey has been carried out at the site to determine the prevailing background noise levels during daytime and night-time periods.
- 6.3 Calculations have determined that, with bespoke enclosures, noise from the units will not exceed the typical background noise level. Internal plant noise levels will also not exceed 5 dB below the recommended internal noise levels of BS 8233: 2014 at nearby residential properties. The new plant is therefore considered acceptable and in line with the local authority's guidance for new items of plant.


REFERENCES

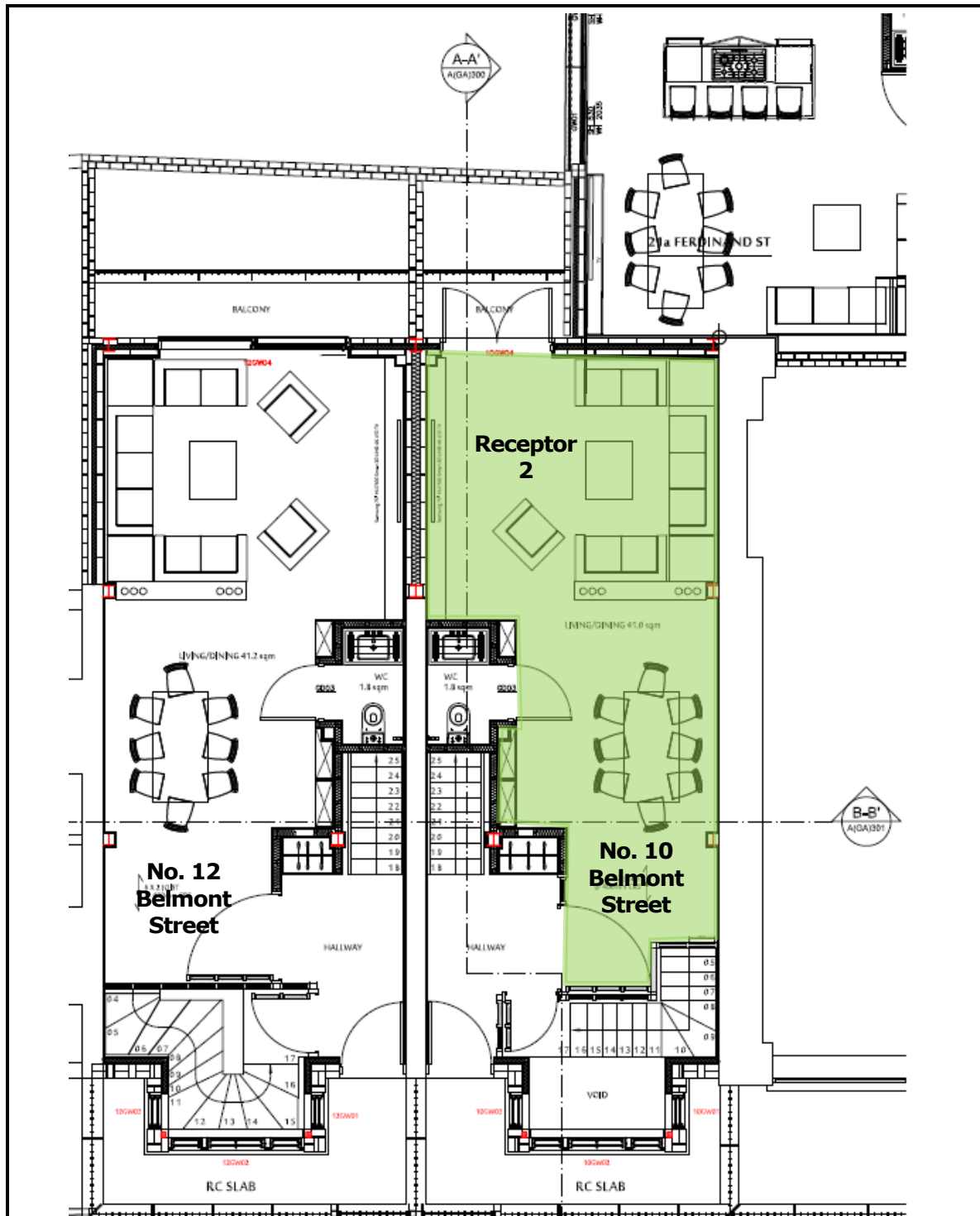
1. Camden Local Plan. Appendix 3: Noise Thresholds. 2017
2. British Standards Institution. British Standard 4142. Methods for Rating Industrial and Commercial Sound, 2014.
3. British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings, 2014.
4. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.




Project: 10 to 12 Belmont Street, London	Title: Aerial view and measurement location		
DWG No: Figure 1	Scale: N.T.S.	Rev: 0	
Date: October 2019	Drawn By: KE	Job No: 8240	



Project: 10 to 12 Belmont Street, London		Title: Basement Floor Plan		 24Acoustics
DWG No: Figure 2		Scale: N.T.S.	Rev: 0	
Date: October 2019		Drawn By: KE	Job No: 8240	



<p>Project: 10 to 12 Belmont Street, London</p>	<p>Title: Ground Floor Plan</p>		
<p>DWG No: Figure 3</p>	<p>Scale: N.T.S.</p>	<p>Rev: 0</p>	
<p>Date: October 2019</p>	<p>Drawn By: KE</p>	<p>Job No: 8240</p>	

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

- iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

- iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – MEASUREMENT RESULTS

**Measurement Results: 10 and 12 Belmont Street
28th February to 6th March 2019**

