Dice Environmental
Acoustics

181 Drury Lane and 12 Stukeley Street
Noise Impact Assessment

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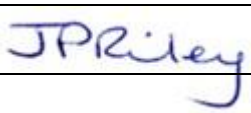
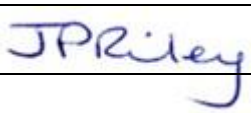
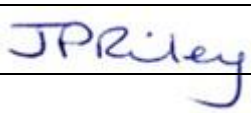
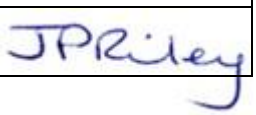
Signature				

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Executive Summary

Dice Environmental were commissioned by RDA Architects to undertake a Noise Impact Assessment to assess the impact of the proposed plant installations as part of a café development at 181 Drury Lane and 12 Stukeley Street, London WC2B 5QF.

Noise Surveys

An environmental noise survey has been completed to quantify the prevailing soundscape at the site. This comprised an unattended logging survey over a full weekend and weekday period to capture the background noise levels present at the site.

Plant Noise Assessment

A 3D CadnaA noise model has been constructed including the proposed noise sources. This has been used to predict the noise levels incident upon the facades of the nearby residential premises. The proposed plant consists of three heat pump units to be installed on the roof of 12 Stukeley Street. The results of the assessment indicate an exceedance of the councils local plan requirements of +11dB for the daytime period (07:00 – 23:00) at 1m from the nearest residential facades. Accordingly, mitigation will be required to reduce the noise levels to the lowest practicable in line with the relevant guidance and the criterion contained within Camden Council's Local Plan version June 2017. It is therefore recommended that the plant be situated within a full enclosed acoustic enclosure. The enclosure should be largely sealed, and free from holes on the front and side elements, with adequate air flow to the rear of the enclosure. The enclosure will require a minimum performance of 11dB and can be made from any suitable wood or brick material.

The assessment is based upon robust and worst-case assumptions and demonstrates that in principle, following the inclusion of the mitigation measures, the proposal would result in a low impact upon the surrounding noise sensitive properties.

1. Introduction

1.1. Background

Dice Environmental has been commissioned by RDA Architects, to provide a Noise Impact Assessment to assess the impact of the proposed plant installations as part of a café development at 181 Drury Lane and 12 Stukeley Street, London WC2B 5QF, to be referred to hereafter as "the site".

The site is located across Drury Lane and Stukeley Street, London, and has recently been granted permission for a change of use to a café. The development comprises the two separate adjoining premises, which are to be joined at the ground floor to form a single café with two shop fronts at both 181 Drury Lane and 12 Stukeley Street. The two floors above will be used as ancillary space, a kitchen space, office space and storage space. The proposed plans include the installation of 3 heat pump units to be mounted on the roof of the site.

The site comprises the 3-story premises at 12 Stukeley Street and a 2-story premises at 181 Drury Lane where the upper floor is occupied by a residential flat.

This assessment has been undertaken with due regard to the supplied planning layout shown on DRA Architects drawing Proposed plans 24.130.21 Rev PL2 (dated 21/01/2025). The site layout is shown in Figure 1 of Appendix III.

1.2. Limitations

All limitations of this report are presented in Appendix I.

1.3. Confidentiality

Dice Environmental has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Dice Environmental; a charge may be levied against such approval.

2. Assessment Methodology

2.1. National Planning Policy Framework

National Planning Policy Framework [1] states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Local planning authorities' plan-making and decision-taking should take account of the acoustic environment and in doing so consider:

- Whether or not significant adverse effect is occurring or is likely to occur
- Whether or not adverse effect is occurring or is likely to occur; and
- Whether or not a good standard of amenity can be achieved.

In line with the Explanatory Note of the Noise Policy Statement for England [2], this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

The Observed Effect Levels are as follows:

- Significant Observed Adverse Effect Level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- Lowest Observed Adverse Effect Level (LOAEL): This is the level of noise exposure above which adverse effects on health and quality of life can be detected;
- No Observed Adverse Effect Level (NOAEL): This is the level of noise exposure at which the noise is noticeable but has no effect at all on health or quality of life.
- No Observed Effect Level (NOEL): This is the level of noise exposure below which noise is not audible.

Table 1 summarises the noise exposure hierarchy, based on the likely average response.

Table 1: Noise exposure hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No effect	No observed effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable adverse effect	Prevent

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.

These factors include:

- The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise; and
- The spectral content and general character of the noise. The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.

More specific factors to consider when relevant:

- Where applicable, the cumulative impacts of more than one source should be taken into account, along with the extent to which the source of noise is intermittent and of limited duration.
- Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations.
- If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.2. British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

BS4142 [11] describes methods for rating and assessing sound of an industrial 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 processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial site.

The procedure detailed in the standard compares the measured or predicted noise level, 'the specific noise level', from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.

The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00-23:00): 1 hr; and,
- Night-time (23:00-07:00): 15 minutes.

There are a number of 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound under investigation as follows. These penalties vary in their weighting depending upon the severity of the acoustic feature, as follows:

Tonality

- +2 dB: where the tonality is just perceptible
- +4 dB: where the tonality is clearly perceptible
- +6 dB: where the tonality is highly perceptible

Impulsivity

- +3 dB: where the impulsivity is just perceptible
- +6 dB: where the impulsivity is clearly perceptible
- +9 dB: where the impulsivity is highly perceptible

Intermittency

- +3 dB: where the intermittency is readily distinctive against the acoustic environment

In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment.

BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

Assessment of the rating level relative to the background noise level can yield the following commentary:

- Typically, the higher the rating level is above the background sound level, the greater the magnitude of 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 is likely to be 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.

BS4142 includes the following text in relation to areas with low and very low noise levels:

> *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.*

2.3. Camden Council Local Plan

Camden Council's Local Plan, version June 2017 states a requirement of 10dB below the existing background noise level for industrial and commercial noise sources. The document states:

> *A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background.*

3. SURVEYS

3.1. Background and Ambient Noise Survey

Dice has conducted a background and ambient noise survey in order to measure the level of noise currently present across the site. The noise survey took place over the following period:

- 16:54 Friday 14th February 2025 to 12:24 Monday 17th February 2025

The following nosie measurement position was chosen:

- Noise Measurement Position 1 (NMP1): A background and ambient noise survey was undertaken within the boundary of the development on the roof of 12 Stukeley Street. The microphone was situated approximately 1.5m from the roof level and in free field conditions.

A summary of the measured sound pressure levels is presented in Table 2.

Table 2: Summary of measured background sound levels

Date Range	Period	Ambient sound level, $L_{Aeq,T}$, dB	Background sound level dB $L_{A90,T}$	
			Range	Typical*
14th Feb.- 17th Feb. 2025	Daytime (07:00-23:00)	53	47-50	49
	Night time (23:00-07:00)	49	46-49	47
*Based on modal values occurring within each stated time period				

The noise measurement position is shown in Figure 2 of Appendix III.

3.2. Noise Survey Conditions

The weather conditions during the noise surveys were conducive towards the measurement of environmental noise being fine and dry with wind speeds below 5 m/s. Specify weather conditions

The noise survey was completed using the following noise measurement equipment.

Table 3: Noise Measurement Equipment

Position	Description	Manufacturer & Type	Serial No.	Calibration Expiry
NMP1	Sound Level Meter	01dB Solo	65211	20th Jun. 25
	Pre-amplifier	01dB Metravib Pre21	15766	
	Microphone	01dB MCE 212	181856	
	Calibrator	01dB-Stell Cal21	84062	27th Jun. 25

The sound level meter was field-calibrated on site prior to and after the measurements were taken. No significant drift was witnessed.

4. Noise Impact Assessment

In order to accurately assess noise propagation across the site, a 3D noise model has been constructed using the modelling software CadnaA. The following assumptions, inputs and considerations have been included in the model:

- Terrain data taken from DEFRA Data Services Platform [14];
- Planning layout drawing as described in Section 1;
- Existing buildings that provide shielding from any of the noise sources;
- Noise data obtained from the manufacturer specification sheet has been used to successfully calibrate the model;
- Sound power levels for the RXF50D have been calculated based on the provided sound pressure levels assumed to be at 10m;
- A reflection order of 2 has been used in all calculations;
- Plant items will be operating approximately 75% in any one hour period during the daytime;
- A 1.5m acoustic screen has been included within the design;
- Building heights are as supplied by the client; and
- Noise levels generated using ISO 9613-1 [15] and ISO 9613-2 [16] as incorporated into CadnaA.

4.1. BS4142 Assessment

The following numerical assessments have been provided in accordance with BS4142 (British Standards Institution, 2019) to provide a comparison between rating sound levels of the activities associated with the 3 heat pump units located on the roof against the typical sound levels existing prior to development. The assessment has been undertaken for the daytime period associated with the operations of the proposal.

The client has provided details on the closest noise sensitive receptors (NSR's) to the proposed location for the heat pump units. These are residential flats located around the site. This has been shown in Figure 3 of Appendix III.

The client has provided details on the manufacturer and the specific models of the 3 proposed heat pump units as well as the specific locations where these are planned to be installed. The specification sheets provided by the manufacturer has been shown in appendix IV.

Figure 4 of Appendix III demonstrates the resultant noise levels at the proposed NSR's due to the calculated operations of the 3 heat pump units running simultaneously. The assessment has determined a specific sound level of 49dB as the highest value at 1m from the nearest residential façade located towards the northwest of the site. This figure has been used for the BS4142 assessments below.

Table 4 below identifies applicable acoustic penalties based on the proposed operations of the development.

Table 4: Identification of applicable acoustic penalties

Source	Penalty	Applicable?	Attributable Penalty	Comment
Heat pump units	Tonality	Y	+2	Heat pump units will emit a varied spectrum of noise with a slight tonal sound so the lowest penalty for tonality of +2 has been applied
	Impulsivity	N	-	-
	Intermittency	Y	+3	The units will not always be in operation so a +3 intermittency penalty has been applied
	Other Sound Characteristic	N	-	-

Table 5 demonstrates the difference between the rating level of noise associated with the proposal against the measured existing background noise level at the nearest noise sensitive dwelling.

Table 5: BS4142 Assessment of Proposed Development

Results	Day 07:00 to 23:00	Commentary
Background sound level, dB $L_{A90,T}$	49	Representative background sound levels at the NSR.
Council Criterion	10dB below background	In accordance with Camden Councils Local Plan
Revised background	39	10dB below background
Reference time interval	1-hour	In accordance with BS4142
Specific sound level, dB $L_{Aeq,T}$	45	Highest values at 1 meter from nearby residential facades calculated using noise data from the manufacturer and modelled using CadnaA.
Acoustic feature correction, dB	+5	A 5dB feature correction has been applied to account for tonal and intermittency features.
Rating level, dB $L_{Ar,Tr}$	50	Specific sound level plus acoustic feature correction.
Excess rating over background sound level	+11	Exceeds the BS4142 requirements.
Assessment indicates likelihood of *depending on context	The rating level of the three heat pump units in operation will exceed the representative background sound level at 1m from the nearest façade meaning that the adverse comment as a result of noise is likely.	

Results	Day 07:00 to 23:00	Commentary
Uncertainty of the assessment	Uncertainty was minimized by measuring over an extended period and at a location directly representative of the nearest proposed NSRs and measuring the main noise source 1m to remove any external interference.	

The 4142 assessment calculates that there is an exceedance of +11dB above Camden Council's local plan. Accordingly, it is recommended that the plant be situated within a full enclosed acoustic enclosure. The enclosure should be largely sealed, and free from holes on the front and side elements, with adequate air flow to the rear of the enclosure. The enclosure will require a minimum performance of 11dB and can be made from any suitable wood or brick material.

4.2. Statement of Uncertainty

Uncertainty has been considered as a limit to the accuracy of any noise assessment, including associated steps of measurement, calculation, or prediction. Factors have been considered to include (but not limited to) the following:

- The inherent accuracy limitation of methodology in Standards and guidance.
- Variability in meteorological conditions.
- The accuracy of sound source input data of a calculation.

It has been a requirement of the assessment standard BS4142 (British Standards Institution, 2019) to minimise uncertainty to a level commensurate with the intention of the assessment objective. Measures taken in this assessment to minimise uncertainty have included:

- Baseline sound levels have been measured over a reasonably long period and therefore provide a good indication of representative background and residual sound levels.
- Baseline sound level measurements undertaken in accordance with recognised Standards, using a tall environmental windshield and during acceptable weather conditions e.g. low wind speeds and precipitation.
- Field calibration checks were undertaken before and after measurements to record very low levels of equipment drift.
- The calculations have been conservative as not to under-predict the resulting impacts.

These measures have been considered to reduce uncertainty to a level considered not to have any significance to the outcome of this assessment.

4.3. Context

The numerical assessments in the above tables have highlighted an indication of an adverse impact at the proposed noise sensitive properties against the requirements of Camden Council's Local Plan during the daytime period.

It has been acknowledged that this assessment needs to be considered in context, following the requirements of BS4142 (British Standards Institution, 2019). The concept of "context" has been notably emphasised in Section 11 of BS4142 when considering numerical impacts established from applying the standard.

5. CONCLUSION

Dice Environmental has been commissioned by RDA Architects to provide a Noise Impact Assessment to support a cafe development at 181 Drury Lane and 12 Stukeley Street, London WC2B 5QF.

An environmental noise survey has been completed to quantify the prevailing noise environment. This comprised an unattended logging survey to capture the existing background noise levels at the site over a full weekend and weekday period.

A 41412 assessment has been carried out to determine the noise impact from the proposed heat pump units to be installed on the roof of 12 Stukeley Street on the nearby residential facades. The assessment indicated an exceedance of +11 dB for daytime, assuming all plant items are running 75% within any one-hour period. Accordingly, it is recommended that the plant be situated within a full enclosed acoustic enclosure. The enclosure should be largely sealed, and free from holes on the front and side elements, with adequate air flow to the rear of the enclosure. The enclosure will require a minimum performance of 11dB and can be made from any suitable wood or brick material..

The assessment is based upon robust and worst-case assumptions and demonstrates that in principle, following the inclusion of the mitigation measures, the proposal would result in a low impact upon the surrounding noise sensitive properties.

Appendix I – Limitations

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Dice Environmental and the Client as indicated in Section 1.2.
2. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
3. Dice Environmental cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by Dice Environmental is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Dice Environmental in this connection without their explicit written agreement there to by Dice Environmental.
4. Where a noise survey is required to inform the assessment, Dice Environmental will endeavour to ensure that all noise measurements taken are robust, representative and reliable in order to inform an accurate noise impact assessment. Where limitations or constraints exist which prevent a suitable noise survey being completed, Dice Environmental will take all reasonable steps to make the client fully aware of any such limitations or constraints with a view to achieving the best possible outcome for the client. Where additional sound surveys are required, over and above those specified in our scope of works, then Dice Environmental reserves the right to charge additional fees.
5. Where mitigation measures are specified in our report, it should be noted that these measures are relative to a specific sound source, both in terms of the measured sound pressure level and the character of the source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, Dice Environmental cannot be held responsible for any subsequent variations in the proposed mitigation performance.

Appendix II – Glossary of Acoustic Terminology

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character, and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsivity may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the Table A1.

Table A1: Typical Sound Pressure Levels

Sound Pressure Level dB(A)	Location/Example
0	Threshold of hearing
20-30	Quiet bedroom at night
30-40	Living room during the day
40-50	Typical office
50-60	Inside a car
60-70	Typical high street
70-90	Inside factory
100-110	Burglar alarm at 1m away
110-130	Jet aircraft on take off
140	Threshold of pain

Table A2: Terminology

Descriptor	Explanation
Ambient Noise	Encompassing sound, at a given place, being usually a composite of sounds from many sources near and far.
C_{tr}	Sound insulation performance spectrum adaptation term that accounts for the A-weighted urban traffic noise spectrum.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (20 μPa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with the 'A' frequency weighting to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$D_{n,e,w}$	Weighted element normalized level difference. A single-number quantity that describes the sound insulation of ventilators.
$L_{Aeq,\ T}$	A-weighted, equivalent continuous sound pressure level. L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' time-weighting response.
$L_{Ar,Tr}$	Sound rating level. The A-weighted L_{eq} sound level of an industrial noise during a specified time period, adjusted for tonal character and impulsivity.
L_{10} & L_{90}	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-Field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, this is measured outside and away from buildings.
Fast	A time-weighting used in the root mean square section of a sound level meter with a 125-millisecond time constant.
Pink Noise Spectrum	Noise whose power spectral density is inversely proportional to frequency.
Residual Noise	The ambient sound remaining when the specific sound is suppressed.
R_w	Weighted Sound Reduction Index. A single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements.
Slow	A time-weighting used in the root mean square section of a sound level meter with a 1000-millisecond time constant.
Specific Noise	Noise from the sound source under investigation as defined in BS4142, method for rating industrial noise affecting mixed residential and industrial areas.

Appendix III – Figures

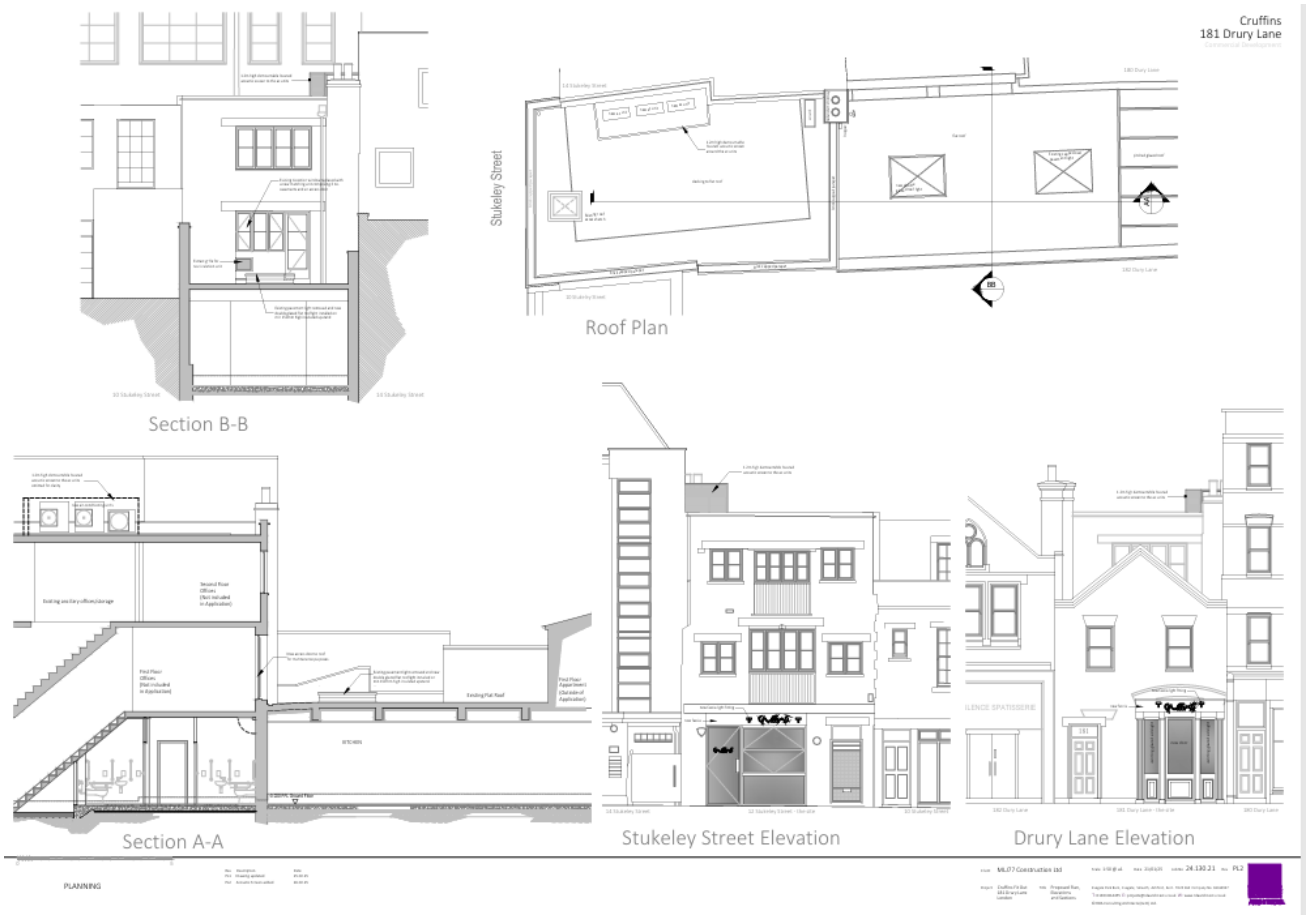


Figure 1 – Site Layout

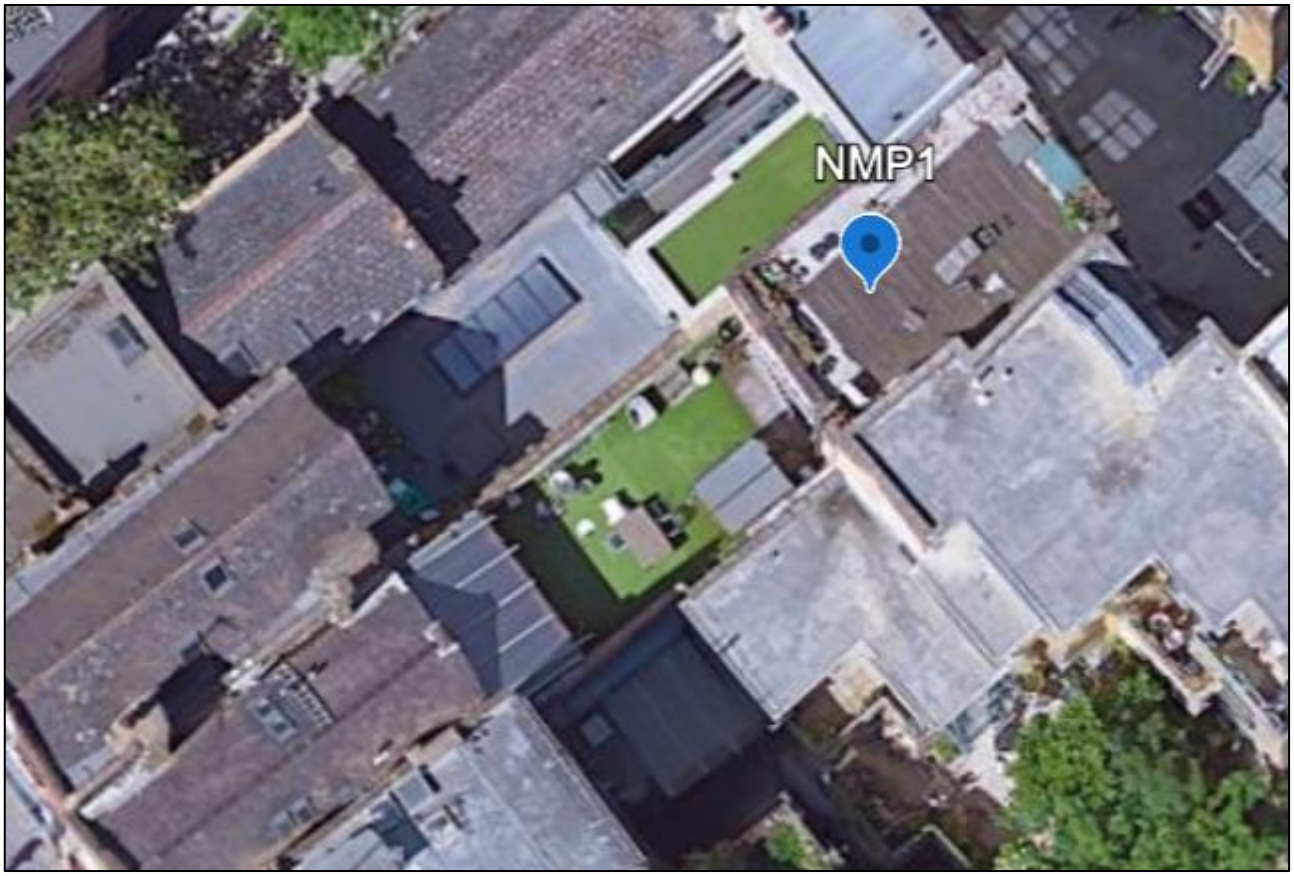


Figure 2 – Noise Measurement Position (NMP1)

Figure 3 – Closest noise sensitive receptors

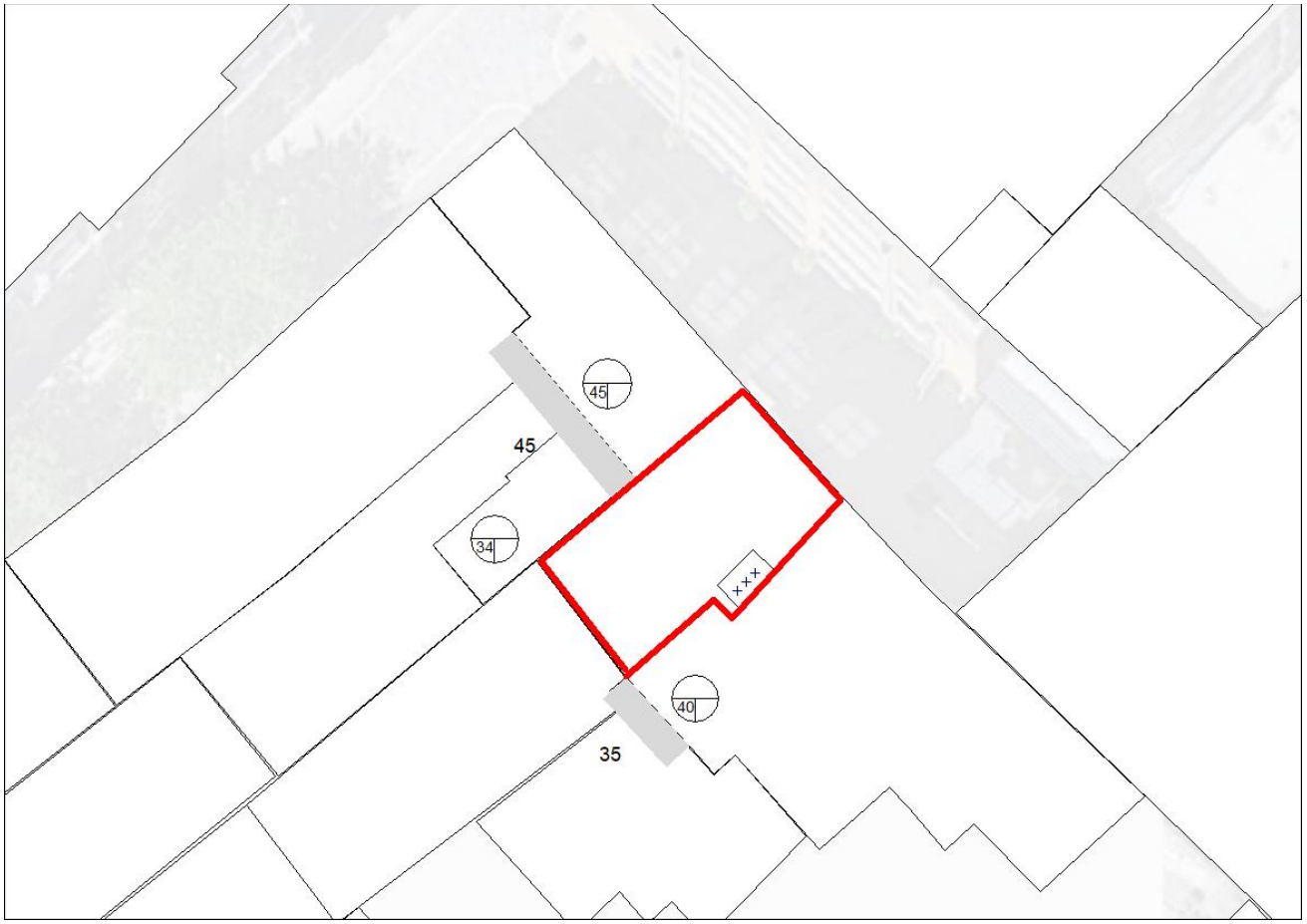
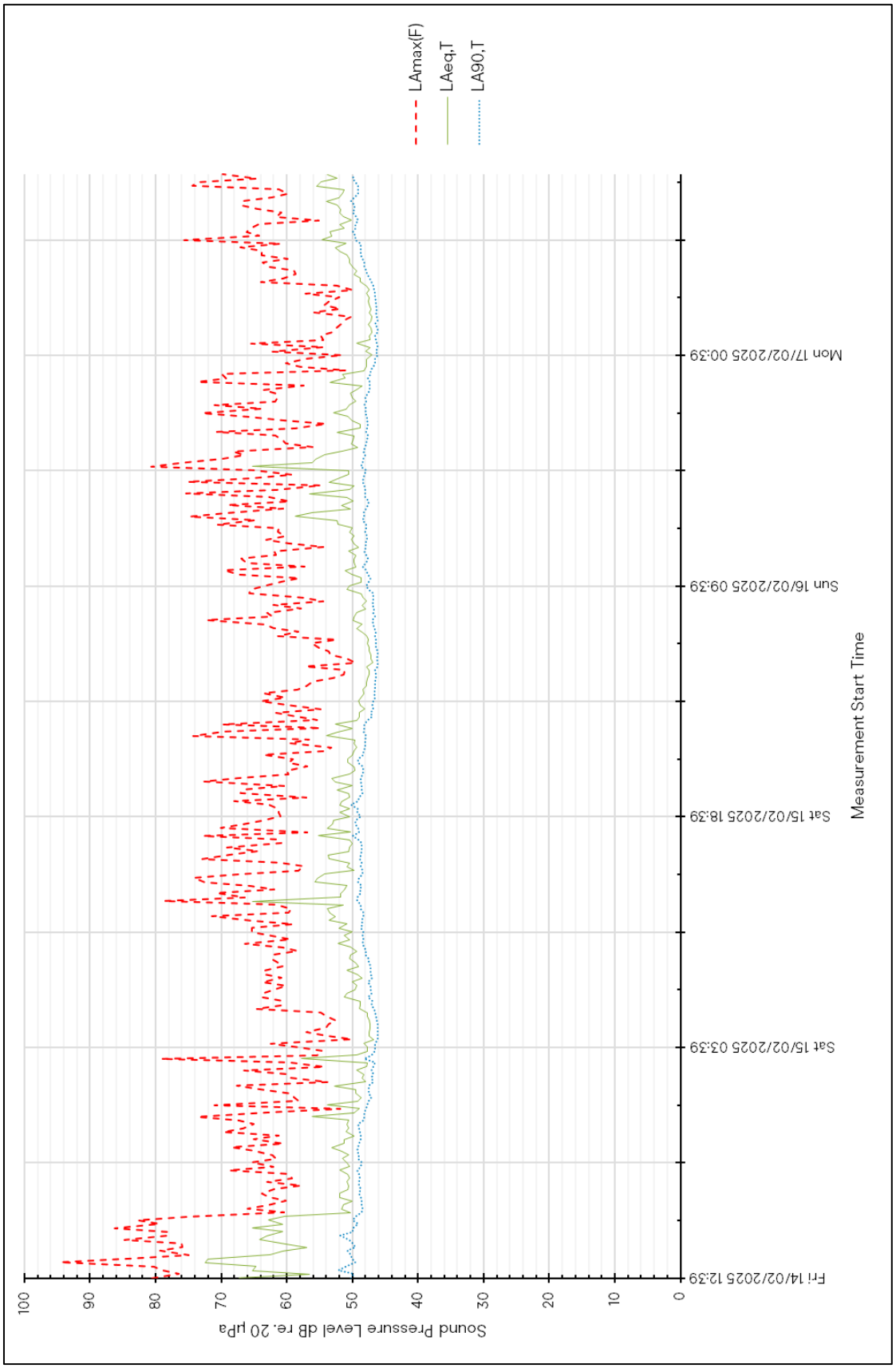


Figure 4 – Noise levels at 1m from residential facades

Appendix IV – Noise Survey Results and Manufacturer Data



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					RZASG71M2V1B	RZASG100M7V1B	RZASG125M7V1B	RZASG140M7V1B
Dimensions	Unit		Height	mm	770	990	990	990
			Width	mm	900	940	940	940
			Depth	mm	320	320	320	320
Weight	Unit			kg	60	70	70	78
Compressor	Type				Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor
Operation range	Cooling	Ambient	Min.	°CDB	-15	-15	-15	-15
			Max.	°CDB	46	46	46	46
	Heating	Ambient	Min.	°CWB	-15	-15	-15	-15
			Max.	°CWB	15.5	15.5	15.5	15.5
Sound power level	Cooling			dBA	65	70	71	73
	Heating			dBA			71 (1)	73 (1)
Sound pressure level	Cooling		Nom.	dBA	46	53	53	54
	Heating		Nom.	dBA	47	57	57	57

Manufacture Data sheet for RZASG125M7V1B and RZASG140M7V1B

					RXF20D5V1B	RXF25D5V1B	RXF35D5V1B	RXF42D5V1B	RXF50D5V1B	RXF50D6V1B	RXF60D5V1B	RXF71D5V1B
Dimensions	Unit		Height	mm	550	550	550	550	734	734	734	734
			Width	mm	658	658	658	658	870	870	870	870
			Depth	mm	275	275	275	275	373	373	373	373
Weight	Unit			kg	24.0	24.0	24.0	28.0	46	46	50	50
Compressor	Type				Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor
Operation range	Cooling	Ambient	Min.	°CDB	-10	-10	-10	-10	-10	-10	-10	-10
			Max.	°CDB	48	48	48	48	48	48	48	48
	Heating	Ambient	Min.	°CWB	-15	-15	-15	-15	-15	-10	-15	-15
			Max.	°CWB	18	18	18	18	18	18	18	18
Sound pressure level	Cooling		High	dBA	46.0	46.0	48.0	48.0				
			Nom.	dBA					47	47	49	52
	Heating		High	dBA	47.0	47.0	48.0	48.0				
			Nom.	dBA					49	49	49	52

Figure 5 – Manufacture Data sheet for RXF50D

Appendix V – Bibliography

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