

NOISE IMPACT ASSESSMENT

Client: - RB Retail & Licensing

Project: - 46 Market Street, Eastleigh

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EXECUTIVE SUMMARY

Qt Acoustics were appointed to review the acoustic impact of the proposed kitchen ventilation plant at 46 Market Street, Eastleigh, Hampshire, SO50 5RB and so as to support a planning application and to avoid creating a detrimental noise impact on neighbouring noise sensitive properties.

Environmental noise monitoring of the site has been undertaken and representative noise levels have been recorded to allow assessment in accordance with local planning requirements. Noise level calculations have been performed to predict the noise rating level of the proposed mechanical services plant in relation to the local planning conditions for noise emission.

Relevant standards in the form of BS4142:2014+A1 and model planning conditions from Eastleigh Borough Council (EBC) have been considered. A comprehensive noise control package & acoustically beneficial plant layout has been selected in order to provide sufficient mitigation of the proposed plant so as to provide a low impact to neighbouring noise sensitive properties and comply with the model planning conditions.

1.0 Introduction

It is proposed to install new mechanical services plant on the rear rooftop of 46 Market Street, Eastleigh, Hampshire SO50 5RB to serve the proposed restaurant. The property is in a generally commercial area with some noise sensitive residential flats above the ground floor retail units and to the rear of the site.

Qt Acoustics have therefore been commissioned to undertake a detailed environmental noise assessment of the site in line with local planning conditions.

2.0 Objectives

The objectives of this assessment are:

- To establish, by means of environmental noise monitoring, the existing noise climate of the site.
- To measure the existing L_{A90} (background noise level) at a location representative of the noise climate currently experienced at neighbouring noise sensitive properties.
- To propose suitable noise emission criteria based on relevant Standards and Local Authority Requirements where present.
- To perform predicted noise level calculations of the proposed plant incorporating any acoustic mitigation measures to provide a detailed assessment of the noise impact on neighbouring noise sensitive properties and specifically in relation to local planning condition requirements.

This report presents the results of the noise survey and the subsequent impact assessment of the mechanical services plant with any associated acoustic mitigation measures.

3.0 Site Description

The site is located at 46 Market Street, Eastleigh, Hampshire, SO505RB and falls within the boundary of Eastleigh Borough Council (EBC). 46 Market Street is intended to be used as a restaurant with hot food prepared on-site and is intended to operate the essential kitchen ventilation plant between the hours of 11AM and 10PM Monday to Saturday and 11AM to 8PM on Sundays. The area surrounding the site is generally of commercial use with mixed retail, office and restaurant/take-away premises. Additionally there is a small quantity of residential use properties in the area. The nearest noise sensitive residential properties are:

- **Residential A** – 1st Floor 48 Market Street, Eastleigh, SO50 5RB Located adjacent to no. 46 and nominally 12-16 metres from the proposed plant location for No. 46.
- **Residential B** – Mitchell House, Mitchell Road, Eastleigh, SO50 9SD Located to the rear of no. 46 to the East and nominally 40 metres from the proposed plant location for No. 46.

Please see Appendix D for a map of the area.

4.0 Acoustic Criteria

EBC council has been consulted on preferred methodology for acoustic assessment and it has been agreed that assessment should be undertaken to BS4142:2014+A1:2019. EBC has advised the following: - "The Local Planning Authority's noise limit for premises is a Rating Level of at least five decibels below the background sound level determined using the technical methodology of the 2014 version of BS4142 and consideration of 15-minute intervals or hours that are potentially more disturbing such as rest and awaking time, and supper and breakfast for example. We do not necessarily ask for the lowest background sound level to be used, but often the mode or median of all data belies the potentially more disturbing times. We ask for inclusion of weekday and weekends in the assessment."

4.1 BS4142:2014+A1 "Methods for rating and assessing Industrial and commercial sound".

BS4142:2014 can be used to assess the likelihood of adverse impact as a result of a noise generating item. The standard provides guidance on how to:

- Assess the level of any adverse impact by identification of a "representative background noise level" for the period of plant operation and
- Methods to assess the "Rating Level" of the specific sound.

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level and specific sound source exceeds the background sound level and the context in which the sound occurs.

a) Typically the greater this difference, the greater the magnitude of impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

And

"Rating Level

Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level."

The standard continues to suggest the following corrections to the specific sound level in order to obtain a "Rating Level": -

Table 4.1.1 Rating Level Correction from BS4142:2014

Characteristic	Range	Correction	Subjective Assessment
Tonality	0 to +6 dB		
		0 dB	Not Perceptible
		+ 2 dB	Just Perceptible
		+ 4 dB	Clearly Perceptible
		+ 6 dB	Highly Perceptible
Impulsivity	0 to +9 dB		
		0 dB	Not Perceptible
		+ 3 dB	Just Perceptible
		+ 6 dB	Clearly Perceptible
		+ 9 dB	Highly Perceptible
Other	0 or 3dB		
		+ 3 dB	Distinctive Characteristic Present
Intermittency	0 or 3dB		
		+ 3 dB	Readily Distinctive Intermittency

Note: - All are considered in relation to existing residual acoustic environment.

5.0 Environmental Noise Survey

5.1 Instrumentation

The environmental noise survey was undertaken using the following equipment:-

NTI Audio XL2 Serial No. A2A-08390-E Class 1 integrating and data logging sound level meter conforming to the relevant sections of BS EN 61672-1:2013

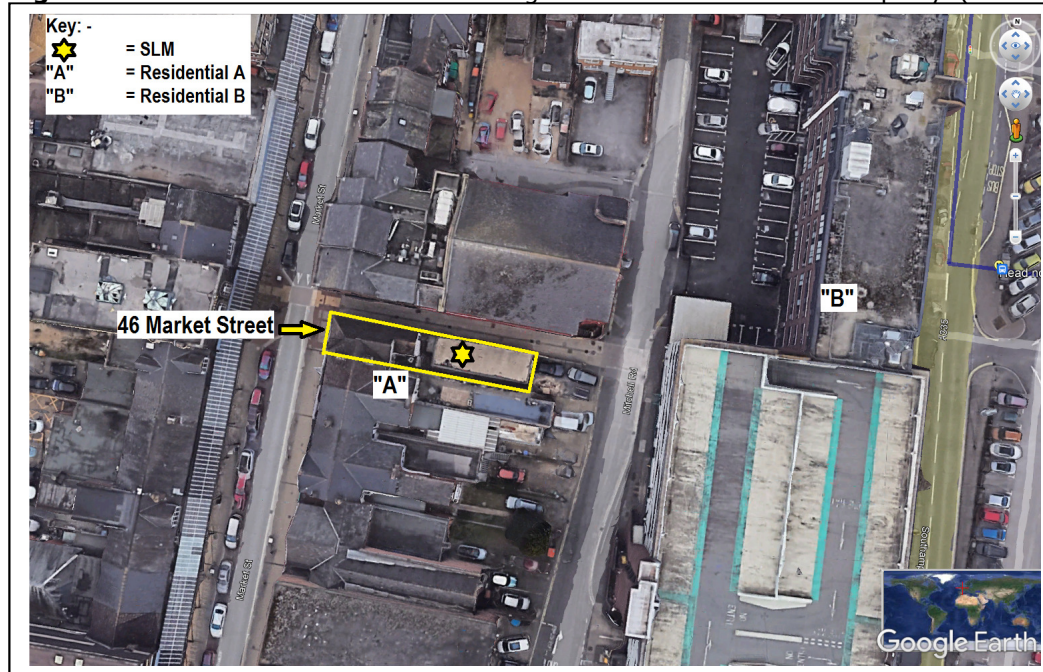
NTI Audio M2230 microphone monitoring assembly comprising of MA220 pre-amp and microphone capsule - class 1 conforming to the relevant sections of BS EN 61672-1:2013.

Full calibration certificates are provided within Appendix H.

5.2 Measurement Position

Our survey concluded that the nearest noise sensitive property is located on the first floor of 48 Market Street at location "A" on figure 5.2.1 below and adjacent to no. 46. The noise monitoring instrumentation was located at the rear of the property, on the 1st floor flat roof and in close proximity to the boundary of the restaurant and adjacent residential property "A". As such the noise monitoring position was in close proximity to the nearest neighbouring noise sensitive property and is considered to provide a representative background noise level.

Figure 5.2.1 – Position of Noise Monitoring and Nearest Residential Property. (NOTE: - SLM = Sound Level Meter)



Additional noise sensitive residential properties were identified in the area but are at a greater distance and/or benefit from being partially in the acoustic shadow of the surrounding buildings or topography.

5.3 Measurement Procedure

The noise monitoring equipment was configured to monitor consecutive 1 hour & 15 minute samples of the site noise level over a period of 66-hours. Measurements were logged concurrently for the ambient sound level ($L_{Aeq,T \min}$), background noise level ($L_{A90,T \min}$), $L_{A10,T \min}$ (Often used as a traffic noise percentile) and the instantaneous maximum noise level ($L_{Amax,T \min}$). The noise monitoring was an unattended test and as such the sound level meter was also configured to record a continuous audio sample of the entire test duration to assist with identification of any extraneous noise sources.

The microphone monitoring assembly was located at a height of 1.5 metres above first floor roof level and at a distance of nominally 5 metres from any neighbouring façade. The sound level meter manufacturer's windshield and bird spike assembly were used in order to minimise risk of external interference.

The environmental noise monitoring at the site was performed from 17:00 hours on Saturday 30th July 2022 to 11:00 hours on Tuesday 2nd August 2022. Due to extended periods of adverse weather the assessment period adopted is from 13:00 hours on Sunday 31st July through to 10:00 hours on Tuesday 2nd August.

A field calibration check of the sound level meter and microphone monitoring assembly was undertaken before and after the noise measurement. No deviation was recorded and a microphone sensitivity of 38.5 mV/Pa maintained.

The procedure, measurements and interpretation were all undertaken in accordance with BS7445, parts 1&2. All provided sound pressure level measurements are referenced to 2×10^{-5} Pa.

5.4 Weather Conditions

The noise monitoring period was without precipitation and the ground surface was dry. The weather conditions were recorded over the duration of the noise survey and indicated generally stable weather conditions suitable for test purposes. The details are provided below:-

Test	Temperature	Wind Speed	Wind Direction	Cloud Cover
	°C	m/s		%
Min	18	0.0	W	0%
Max	27	4.9	SE	75%

BS7445 indicates that weather conditions should provide wind speeds less than 5 m/s for representative noise data to be obtained. Analysis of the weather data log indicates that wind speeds above 5 m/s and intermittent precipitation was recorded on the 30th July, 31st July until 13:00 hours and after 10:00 hours on 2nd August and as such the data has been omitted. No other periods of high winds or precipitation were recorded. As such the prevailing weather conditions during the noise monitoring period used for assessment are deemed to be suitable for the purpose of noise testing and would not result in excessive external interference to measurement.

5.5 Site Noise Climate

The area surrounding 46 Market Street, Eastleigh is predominantly commercial retail, office and restaurant/take-away use with a small quantity of noise sensitive residential properties.

The main noise source within the area is traffic noise from surrounding roads.

Neighbouring commercial properties located in the area incorporate mechanical services ventilation, air-conditioning and refrigeration plant and is also considered a main noise source in the area.

Noise from over ground rail was not audible or detected during site visits but may have a low level contribution to the background noise level at times and from the main line rail track and station located nominally 80 metres away to the East.

Intermittent aircraft noise was identified and presumed from commercial flights from Eastleigh (Southampton) airport.

6.0 Measurement Result Summary

A 66-hour unattended noise test was undertaken at first floor roof level toward the rear of the property. The full results are provided in graphical and numerical format within Appendix B & C. A summary of the results is provided in table 6.1 below.

Table 6.1 Summary of Background Noise Levels – Day/Eve/Night

Time Period	Statistically Most Common Background Noise Level
	$L_{A90, Tmin}$
Day-Time (07:00-19:00 hrs) (T=60 min)	47 dB
Evening (19:00-23:00 hrs) (T=60 min)	43 dB
Night (23:00-07:00 hrs) (T=15 min)	39 dB
Ventilation Operating Period (11:00-22:00) (T=60 min)	47 dB

The installed ventilation fans are to be operated over restricted hours of 1100-2200 hours and so as to serve the restaurant opening hours and allow for prior preparation of foodstuffs.

In order to provide a “low Impact” to neighbouring noise sensitive properties, noise generated by the installed fan should provide a noise “Rating Level” better than 5dB below the statistically most common background noise level when extrapolated to the noise sensitive property and as defined by the assessment method set out within BS4142:2014 and EBC model planning condition. The following limiting noise rating levels at the nearest noise sensitive property can therefore be determined as: -

Table 6.2 – Limiting Noise Levels – EBC Model Planning Condition

Time Period	Plant Noise Limits
	$L_{Ar, Tmin}$
Day-Time (07:00-19:00 hrs) (T=60 min)	42 dB
Evening (19:00-23:00 hrs) (T=60 min)	38 dB
Night (23:00-07:00 hrs) (T=15 min)	34 dB
Ventilation Operating Period (11:00-22:00) (T=60 min)	42 dB

Where L_{AR} is the specific Sound Source Rating Level with any corrections for the character of the noise as defined within Table 4.2.1

7.0 Plant Noise Emission

The proposed kitchen ventilation system incorporates a supply and extract fan and is proposed to be installed with an acoustic mitigation package and installed generally in accordance with the proposed site layout plan drawing provided within Appendix E1.

This section summarises the proposed equipment with associated noise levels, layout and provides a noise impact assessment with reference to BS4142/EBC model planning conditions.

7.1 Mechanical Services Equipment

The equipment comprises of: -

7.1.1 The mechanical services plant consists of the of the following equipment:-

- **Item 1 Kitchen Extract Fan** – Systemair MUB 062 630D4 Multibox fan – 90 dB SWL(A) from outlet & 62 dB SWL(A) from the case radiated sound ¹. The plant item is located on the existing flat roof of the site toward the rear and nominally 12.6 metres from the nearest neighbouring property.
- **Item 2 Kitchen Supply Fan** – Systemair MUB 062 560D4 Multibox fan – 84 dB SWL(A) from outlet & 57 dB SWL(A) from the case radiated sound ¹. The plant item is located on the existing flat roof of the site toward the rear and nominally 11.9 metres from the nearest neighbouring property.

¹ The Manufacturer's published in-duct & case-radiated sound power levels in octave bands are provided within Appendix F.

7.2 Acoustic Mitigation Treatment – Proposed

7.2.1 Item 1 Kitchen Extract Fan

In order to reduce the noise emission from the kitchen extract fan it is proposed to install a duct-mounted attenuator onto the fan outlet. The attenuator should be sized appropriately for the required air volume and incorporate Melinex lining to the acoustic media so as to be suitable for cleaning and as protection against the grease-laden air of a kitchen extract system. In order to accommodate the attenuator; the duct system will be installed generally as per the attached site layout plan provided within Appendix E.

The attenuator should provide the following minimum specification and attenuation: -

ATT1	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Exhaust Air Attenuation - Minimum Insertion Loss (dB)	7	17	29	40	40	33	25	15

Performance typical of a 2100mm long 38% Free Area attenuator with Melinex.

7.2.2 Item 2 Kitchen Supply Fan

In order to reduce the noise emission from the kitchen supply fan it is proposed to install a duct-mounted attenuator onto the fan inlet. The attenuator should be sized appropriately for the required air volume. In order to accommodate the attenuator; the duct system will be installed generally as per the attached site layout plan provided within Appendix E.

The attenuator should provide the following minimum specification and attenuation: -

ATT1	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Exhaust Air Attenuation - Minimum Insertion Loss (dB)	7	15	27	42	46	45	38	29

Performance typical of a 1800mm long 33% Free Area attenuator

Additional Attenuation is to be installed on the room-side of the fan and so as to limit internal noise levels within the kitchen area but are not relevant to this assessment.

7.2.3 Item 3 Vibration Isolation

No direct vibration transmission path is present from the proposed mechanical services plant to vibration sensitive premises; in order to follow good practice guidelines and as per the Chartered Institute of Building Services Engineers guidelines the equipment is to be mounted on rubber type vibration isolation pads and the ductwork is to incorporate flexible duct connections so as to prevent transmission of motor/impellor vibration to the ducting.

7.3 Noise Impact Assessment – BS4142:2014

Equipment noise levels with the above proposed acoustic mitigation treatment, as detailed within section 7.2, and with plant located as per Appendix E have been calculated for the proposed periods of operation and extrapolated to the nearest noise sensitive properties; Residential A & Residential B. A full and detailed set of calculations are provided within Appendix G.

Our calculations indicate the following noise levels from the kitchen ventilation equipment once extrapolated to the neighbouring noise sensitive properties: -

Table 7.3.1 – Predicted Noise Levels at neighbouring property façade.

Noise Receptor	Predicted Noise Level $L_{Aeq,T}$ dB
	1100-2200 hrs
Noise Sensitive Residential “A”	35 dB(A)
Noise Sensitive Residential “B”	25 dB(A)

As such once the proposed acoustic mitigation treatment is installed the noise generated by the kitchen extract fan is a minimum of 12 dB(A) below the statistically most common background noise level for the period of proposed plant operation .

7.3.1 BS4142:2014 Impact Assessment – Noise Rating Level

Tonality: -

Qt Acoustics have undertaken background noise level monitoring at the site with spectral analysis to allow comparison with the frequency make-up of the equipment noise once extrapolated to the neighbouring noise sensitive premises. Our analysis indicates that the specific sound level of the proposed equipment exceeds the background noise level by 0.7dB in 1 octave band (125Hz), this is not considered to be sufficient to be audible. The specific sound level is otherwise quieter in all octave-bands when compared to the

background noise level over the plant operating periods. As such is considered to not be perceptible and attracts no Noise Rating Level penalty.

Impulsivity: -

The noise associated with the kitchen extract fan is not impulsive in nature and no Noise Rating Level penalty should be applied.

Intermittency: -

The fan will be operated continuously within the allocated time periods and is therefore not considered to be intermittent in nature and no Noise Rating Level penalty should be applied.

Other: -

The noise associated with the fan does not generate any other distinctive characteristic sufficient to attract a further Noise Rating Level penalty.

Cumulative Noise Rating Level: -

As such NO additional noise rating penalty is deemed to be necessary if assessed in accordance with BS4142:2014.

This would provide a Noise Rating Level of 12 dB below the typical background noise level recorded for the proposed equipment operating hours and as such is significantly better than the “Low Impact” category as detailed within BS4142:2014 and satisfies the requirements of EBC of being not less than 5 dB below the statistically most common background noise level.

As such this report clearly demonstrates compliance with the local authority requirements and provides a “Low Impact” to neighbouring noise sensitive properties with the incorporation of the proposed acoustic mitigation treatment.

8.0 Conclusions

Qt acoustics have performed environmental noise monitoring at the site in order to establish representative background noise levels for the proposed equipment operating periods. Relevant standards in the form of BS4142:2014+A1 and requirements from EBC have been considered. Our assessment therefore concludes that the proposed equipment complete with acoustic mitigation measures provides a low impact to neighbouring noise sensitive properties and is in compliance with the model planning conditions.

Appendix A. Glossary of Terms

Decibel (dB)

Adopted as the common unit of measurement in acoustics. The unit of the decibel is dimensionless and is used in acoustics for sound measurements to define the ratio between the measured pressure level and a reference pressure level – typically 2×10^{-5} N/m² or the threshold of hearing.

“A” Weighting

Arithmetic correction for different frequencies to closer represent the typical sensitivity of the human ear to sound. Suited to low level noises of around 40 phon (close to 40 dB(A)) and provides a simple single figure weighted indication of the perceived level of loudness by a human.

Noise Percentile Level - L_N

Statistical Analysis of the noise level where “N” can be from 0.1% to 99.9% and represents the noise level exceeded for “N” percent of the measurement time. Commonly used with “A-Weighting” as above and measured over a set period of time ‘t’ e.g. $L_{A99,15 \text{ min}}$ indicates the noise level exceeded for 99% of the measurement period of 15 minutes. See below for commonly used noise percentiles.

$L_{A90,t}$ or Background Noise Level

The A-Weighted noise level exceeded for 90% of the time ‘t’ and is referred to as the “background noise level” for BS4142 type noise assessments and quoted to the nearest whole dB.

$L_{A10,t}$

The A-Weighted noise level exceeded for 10% of the time ‘t’ and is referred to as the “traffic noise level”.

$L_{Aeq,t}$

The A-Weighted equivalent continuous sound pressure over the measurement period of time ‘t’ and is referred to as the “traffic noise level”.

$L_{Amax,t}$

The A-Weighted instantaneous maximum sound pressure that occurred during the measurement period of time ‘t’.

Assessment Position

Unless otherwise stated is a location 1 metre from the façade of the nearest noise sensitive property.

Specific Sound Source

The noise source being assessed within this report (typically the proposed equipment or mechanical services plant equipment).

Specific Sound Level

The equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval.

Ambient Sound Level

Equivalent continuous A-Weighted sound pressure level of the totally encompassing sound in a given situation at a given time at the assessment location over a given time interval.

Rating Level, $L_{ar,Tr}$

The Specific Sound Level with any adjustment for characteristic features of the sound such as tonality or impulsivity.

Residual Sound

The ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

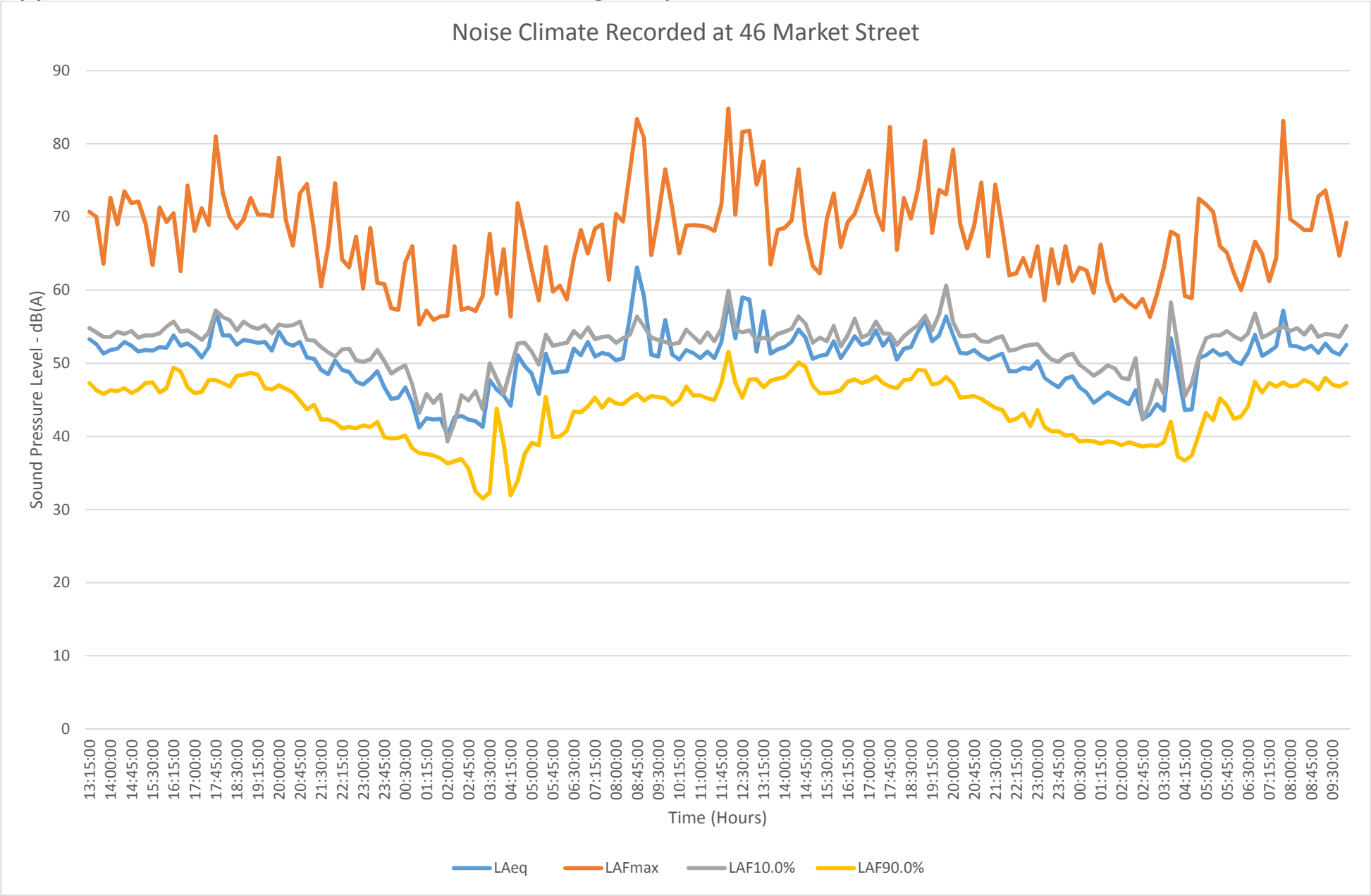
Appendix B. Table of Environmental Noise Monitoring Results

Start	Duration	L _{Aeq}	L _{AFmax}	L _{A 10}	L _{A 90}
31/07/2022	13:00:00	52.3	72.6	54.2	46.7
31/07/2022	14:00:00	52.3	73.5	54.2	46.5
31/07/2022	15:00:00	51.9	71.3	54.2	47
31/07/2022	16:00:00	52.8	74.3	54.9	47.7
31/07/2022	17:00:00	54.1	81	55.6	47.2
31/07/2022	18:00:00	53.1	72.6	55.4	48.3
31/07/2022	19:00:00	53	78.1	54.9	47.4
31/07/2022	20:00:00	52.3	74.5	55	45.3
31/07/2022	21:00:00	49.7	74.6	52.1	42.5
31/07/2022	22:00:00	48.2	67.3	51.3	41.3
31/07/2022	23:00:00	47.9	68.5	50.5	41.3
31/07/2022	23:15:00	48.9	61	51.8	42
31/07/2022	23:30:00	46.7	60.8	50.3	39.9
01/08/2022	23:45:00	45.1	57.5	48.6	39.7
01/08/2022	00:00:00	45.3	57.3	49.2	39.8
01/08/2022	00:15:00	46.7	63.8	49.7	40.1
01/08/2022	00:30:00	44.6	66	47.1	38.4
01/08/2022	00:45:00	41.2	55.3	43.2	37.7
01/08/2022	01:00:00	42.5	57.2	45.8	37.6
01/08/2022	01:15:00	42.3	55.9	44.6	37.4
01/08/2022	01:30:00	42.4	56.4	45.7	37
01/08/2022	01:45:00	40.1	56.5	39.3	36.3
01/08/2022	02:00:00	42.6	66	41.8	36.6
01/08/2022	02:15:00	42.8	57.3	45.6	36.9
01/08/2022	02:30:00	42.3	57.6	44.9	35.6
01/08/2022	02:45:00	42.1	57.1	46.2	32.5
01/08/2022	03:00:00	41.3	59.2	43.7	31.5
01/08/2022	03:15:00	47.7	67.7	50	32.3
01/08/2022	03:30:00	46.4	59.5	47.9	43.8
01/08/2022	03:45:00	45.6	65.6	45.8	39

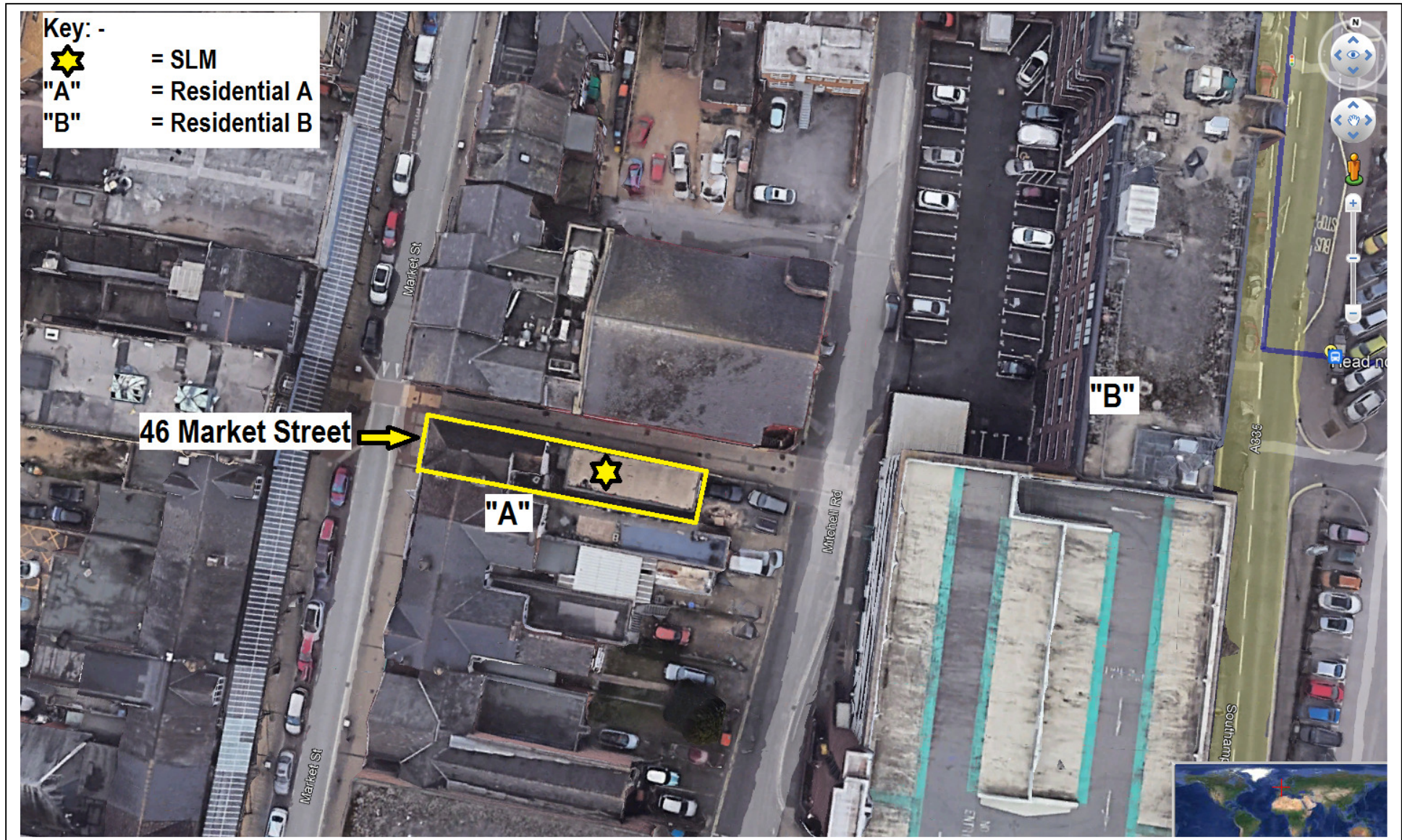
01/08/2022	04:00:00	44.2	56.4	49.2	31.9
01/08/2022	04:15:00	51.1	71.9	52.7	33.9
01/08/2022	04:30:00	49.6	67.5	52.8	37.6
01/08/2022	04:45:00	48.6	62.9	51.6	39.1
01/08/2022	05:00:00	45.8	58.6	49.8	38.8
01/08/2022	05:15:00	51.3	65.9	53.9	45.4
01/08/2022	05:30:00	48.7	59.8	52.4	39.9
01/08/2022	05:45:00	48.8	60.6	52.6	40
01/08/2022	06:00:00	48.9	58.7	52.8	40.8
01/08/2022	06:15:00	52	64.3	54.4	43.4
01/08/2022	06:30:00	51.1	68.2	53.5	43.3
01/08/2022	06:45:00	52.9	65	54.9	44.1
01/08/2022	07:00:00	51	70.4	53.4	44.8
01/08/2022	08:00:00	59.3	83.4	54.4	45.3
01/08/2022	09:00:00	52.9	76.5	53.2	45.3
01/08/2022	10:00:00	51.1	68.9	53.6	45.8
01/08/2022	11:00:00	54.6	84.8	56.3	46.6
01/08/2022	12:00:00	56.7	81.8	54	47.3
01/08/2022	13:00:00	53.8	77.6	54	47.8
01/08/2022	14:00:00	53.1	76.5	55.2	48.9
01/08/2022	15:00:00	51.6	73.2	53.5	46.2
01/08/2022	16:00:00	52.8	76.3	54.8	47.8
01/08/2022	17:00:00	53	82.3	54.1	47.3
01/08/2022	18:00:00	53.9	80.4	55.1	48.6
01/08/2022	19:00:00	54.4	79.2	56.9	47.7
01/08/2022	20:00:00	51.4	74.7	53.7	45.5
01/08/2022	21:00:00	50.5	74.4	53.1	43.7
01/08/2022	22:00:00	49.5	66	52.5	42.6
01/08/2022	23:00:00	48	58.6	51.4	41.3
01/08/2022	23:15:00	47.3	65.6	50.5	40.7
01/08/2022	23:30:00	46.7	60.9	50.2	40.7
02/08/2022	23:45:00	47.9	66	51	40.1
02/08/2022	00:00:00	48.2	61.2	51.3	40.2
02/08/2022	00:15:00	46.7	63.1	49.8	39.3

02/08/2022	00:30:00	46	62.7	49.1	39.4
02/08/2022	00:45:00	44.6	59.6	48.3	39.3
02/08/2022	01:00:00	45.3	66.2	48.9	39
02/08/2022	01:15:00	46	61.1	49.7	39.3
02/08/2022	01:30:00	45.4	58.5	49.3	39.2
02/08/2022	01:45:00	44.9	59.3	48	38.8
02/08/2022	02:00:00	44.4	58.3	47.8	39.2
02/08/2022	02:15:00	46.3	57.6	50.7	38.9
02/08/2022	02:30:00	42.4	58.8	42.3	38.6
02/08/2022	02:45:00	43	56.3	44.5	38.8
02/08/2022	03:00:00	44.4	59.4	47.7	38.7
02/08/2022	03:15:00	43.5	63.1	45.8	39.2
02/08/2022	03:30:00	53.4	68	58.3	42
02/08/2022	03:45:00	48.8	67.4	52.3	37.2
02/08/2022	04:00:00	43.6	59.2	45.5	36.7
02/08/2022	04:15:00	43.7	58.9	47.3	37.4
02/08/2022	04:30:00	50.7	72.5	50.9	40.2
02/08/2022	04:45:00	51.1	71.7	53.4	43.2
02/08/2022	05:00:00	51.8	70.7	53.8	42.2
02/08/2022	05:15:00	51.1	66	53.8	45.2
02/08/2022	05:30:00	51.4	65.1	54.4	44.2
02/08/2022	05:45:00	50.3	62.3	53.7	42.4
02/08/2022	06:00:00	49.9	60	53.2	42.7
02/08/2022	06:15:00	51.4	63.2	54.1	44.1
02/08/2022	06:30:00	53.9	66.6	56.8	47.5
02/08/2022	06:45:00	51	64.9	53.5	46
02/08/2022	07:00:00	54	83.1	54.5	47.2
02/08/2022	08:00:00	52	72.8	54.4	47.3
02/08/2022	09:00:00	52	73.6	54.1	47.5
02/08/2022	10:00:00	55.8	76.7	57.7	48.5

Appendix C – Environmental Noise Monitoring Graph

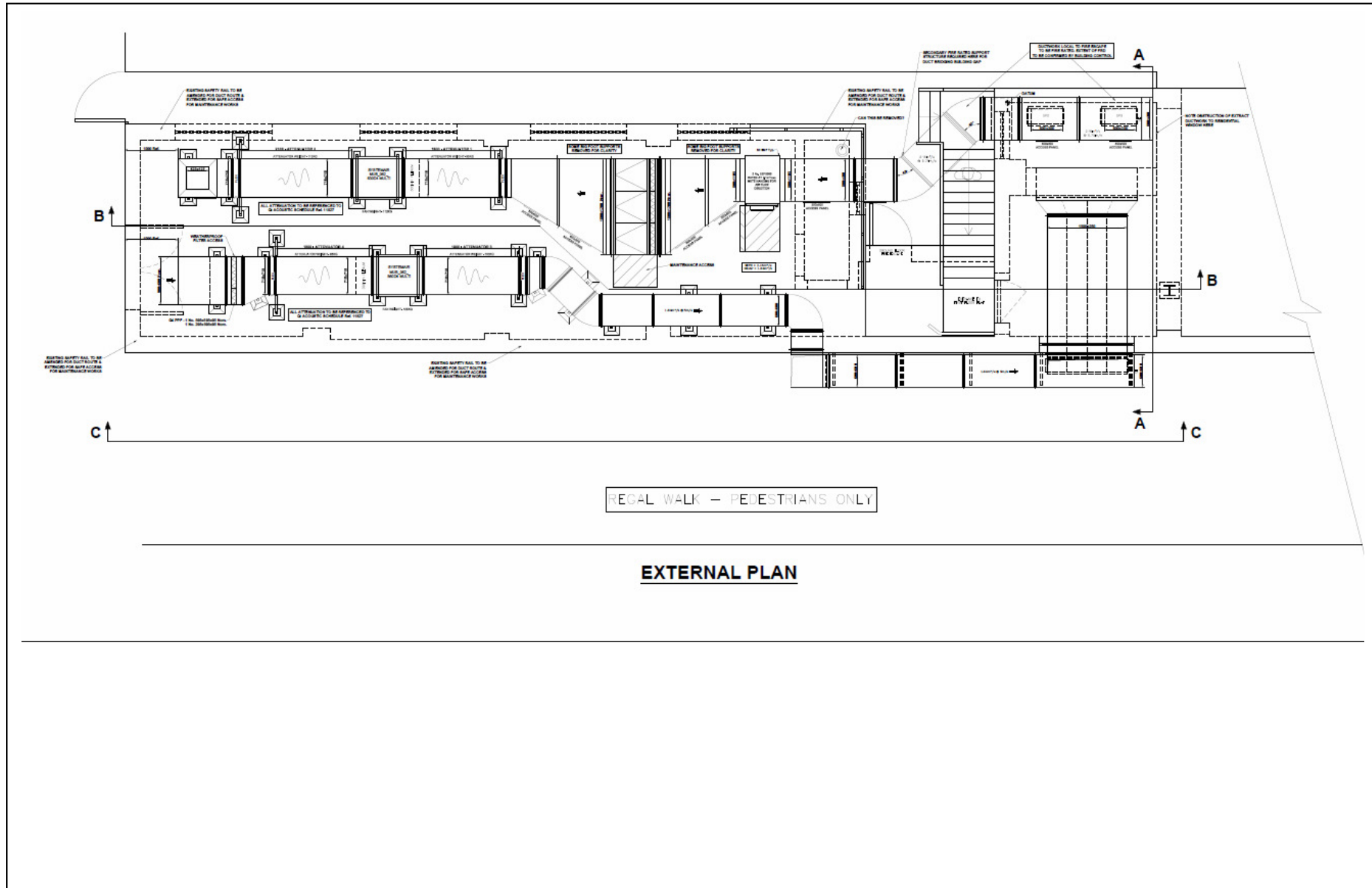


Appendix D – Location Plan – Site & Surrounding Area



Imagery © Google 2022

Appendix E –Site Plan (Rooftop) – Proposed Plant Positions



Appendix F – Manufacturer's Published Noise Data – Extract Fan



MUB 062 630D4 Multibox

Centrifugal box fan, insulated, flexible outlet

Item Number: 235398

Variant: 400V 3~ 50Hz - Straight air flow



- High efficient motor
- Speed-controllable via frequency converter
- Integral cold conductor (PTC)
- Low sound level
- Flexible airflow direction due to removable panels
- Installation in any mounting position
- Easy to maintain and reliable

Hydraulic data										
Required air flow		2.16 m³/s								
Required static pressure		650 Pa								
Working air flow		2.43 m³/s								
Working static pressure		821 Pa								
Air density		1.204 kg/m³								
Power		4423.0 W								
Fan control - RPM		1463 rpm								
Current		7.95 A								
SFP		1.822 kW/m³/s								
Control voltage		400.0 V								
Supply voltage		400 V								
Sound power level		63	125	250	500	1k	2k	4k	8k	Total
Inlet	dB(A)	60	76	80	83	84	81	77	69	89
Outlet	dB(A)	61	77	82	85	86	82	78	71	90
Surrounding	dB(A)	40	60	53	51	54	52	44	34	62
Sound pressure level at 3m (20m² Sabine)	dB(A)	-	-	-	-	-	-	-	-	55
Sound pressure level at 3m free field	dB(A)	-	-	-	-	-	-	-	-	41

Appendix F – Manufacturer's Published Noise Data – Supply Fan



MUB 062 560D4 Multibox

Centrifugal box fan, insulated, flexible outlet

Item Number: 235397

Variant: 400V 3~ 50Hz - Straight air flow

- High efficient motor
- Speed-controllable via frequency converter
- Integral cold conductor (PTC)
- Low sound level
- Flexible airflow direction due to removable panels
- Installation in any mounting position
- Easy to maintain and reliable



Hydraulic data

Required air flow	1.84 m³/s
Required static pressure	500 Pa
Working air flow	2.02 m³/s
Working static pressure	600 Pa
Air density	1.204 kg/m³
Power	2515.3 W
Fan control - RPM	1458 rpm
Current	4.51 A
SFP	1.248 kW/m³/s
Control voltage	400.0 V
Supply voltage	400 V

Sound power level		63	125	250	500	1k	2k	4k	8k	Total
Inlet	dB(A)	54	70	75	78	80	77	75	67	84
Outlet	dB(A)	55	72	76	79	81	78	76	68	86
Surrounding	dB(A)	34	54	47	46	49	48	42	32	57
Sound pressure level at 3m (20m² Sabine)	dB(A)	-	-	-	-	-	-	-	-	50
Sound pressure level at 3m free field	dB(A)	-	-	-	-	-	-	-	-	36

Appendix G – Acoustic Calculations Residential Property A – Extract & Supply Fan

Project: 46 Market Street - Eastleigh
 Ref: QT 11827
 Date: 08/11/2022
 Title: Calculation - Kitchen Vent to 1m from Nearest Residential Window (1st Floor Flat 48 Market Street).



Plant Item 1 - Kitchen Extract Fan Exhaust Duct- S&P MUB 062 630 D4					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Equation Used	m3/s	pa	63	125	250	500	1000	2000	4000	8000	Global (dB
1	Manufacturer's Published in-duct Fan SWL(A)		2.16	650	61.0	77.0	82.0	85.0	86.0	82.0	78.0	71.0	90.6
2	Duct Loss - 1m & 1 Bend				-0.8	-0.7	-1.3	-2.2	-3.2	-3.2	-3.2	-3.2	
3	End reflection of outlet to Atmosphere = 0.18 m2	Look up table			-9	-5	-1	0	0	0	0	0	
			Area	Angle									
4	Directivity Correction (Area) Metres & Angle	Look up table	0.18	90	1.0	2.0	2.0	0.0	-2.0	-7.0	-15.0	-15.0	
			Distance R1										
5	Distance loss to (metres) from Noise Sensitive Receptor	$L_p = L_w - 20 \times \text{Log}(r/r_1) - 11$	14.5		-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	
6	Directivity Correction (none)	0dB			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
7	SPL at Noise Sensitive Façade - dB(A)	1+2+3+4+5+6			18.0	39.1	47.5	48.6	46.6	37.6	25.6	18.6	52.7
8	Attenuation - Rectangular Attenuator - 2100mm				7	17	29	40	40	33	25	15	
9	A-Weighted SPL at Façade After Acoustic Mitigation	7-8			11.0	22.1	18.0	8.6	6.6	5.1	1.0	3.2	24.1

Plant Item 2 - Kitchen Extract Fan Breakout - Systemair MUB 062 630D4					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
10	Manufacturer's Published Plant Octave Band SWL(A) dB ref 10 ⁻¹² W				40.0	60.0	53.0	51.0	54.0	52.0	44.0	34.0	62.5
11	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG ₁₀ (R1)-11		11.6	-32.3	-32.3	-32.3	-32.3	-32.3	-32.3	-32.3	-32.3	
12	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
13	SPL at Façade	10+11+12			10.7	30.7	23.7	21.7	24.7	22.7	14.7	4.7	33.2

Plant Item 3 - Kitchen Supply Fan FAI Duct- S&P MUB 062 560 D4					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Equation Used	m3/s	pa	63	125	250	500	1000	2000	4000	8000	Global (dB
14	Manufacturer's Published in-duct Fan SWL(A)		1.84	500	54.0	70.0	75.0	78.0	80.0	77.0	75.0	67.0	84.6
15	Duct Loss - 2m				-1.6	-1.4	-0.6	-0.4	-0.4	-0.4	-0.4	-0.4	
16	End reflection of outlet to Atmosphere = 0.54 m2	Look up table			-9	-5	-1	0	0	0	0	0	
			Area	Angle									
17	Directivity Correction (Area) Metres & Angle	Look up table	0.54	90	2.0	2.0	0.0	-2.0	-7.0	-7.0	-15.0	-15.0	
			Distance R1										
18	Distance loss to (metres) from Noise Sensitive Receptor	$L_p = L_w - 20 \times \text{Log}(r1) - 11$	14.7		-34.3	-34.3	-34.3	-34.3	-34.3	-34.3	-34.3	-34.3	
19	Directivity Correction (none)	0dB			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
20	SPL at Noise Sensitive Façade - dB(A)	14+15+16+17+18+19			11.1	31.3	39.1	41.3	38.3	35.3	25.3	17.3	45.2
21	Attenuation - Rectangular Attenuator - 1500mm				7	15	27	42	46	45	38	29	
22	A-Weighted SPL at Façade After Acoustic Mitigation	20-21			4.1	16.3	12.1	-0.7	-7.7	-9.7	-12.7	-11.7	17.9

Plant Item 4 - Kitchen Supply Fan Breakout - Systemair MUB 062 560D4					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
23	Manufacturer's Published Plant Octave Band SWL(A) dB ref 10 ⁻¹² W				34.0	54.0	47.0	46.0	50.0	49.0	42.0	32.0	57.3
24	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		10.9	-31.7	-31.7	-31.7	-31.7	-31.7	-31.7	-31.7	-31.7	
25	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
26	SPL at Façade	23+24+25			5.3	25.3	18.3	17.3	21.3	20.3	13.3	3.3	28.6

31	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	7+13+20+26			19.6	40.4	48.1	49.3	47.2	39.7	28.7	21.1	53.5
32	Cumulative SPL at Noise Sensitive Façade - dB(A) WITH ATTENUATION	9+13+22+26			14.8	32.3	25.8	23.2	26.4	24.7	17.2	8.6	35.0
33	LA90 over plant Operating Period	Measured			24.0	31.6	38.6	39.5	41.4	36.6	27.6	17.0	47.0

Appendix G – Acoustic Calculations Residential Property B – Extract & Supply Fan

Project: 46 Market Street - Eastleigh
 Ref: QT 11827
 Date: 08/11/2022
 Title: Calculation - Kitchen Vent to 1m from Residential Window (Mitchell House, Mitchell Street).



Plant Item 1 - Kitchen Extract Fan Exhaust Duct- S&P MUB 062 630 D4					Octave Band Centre Frequency (Hz)								Global (dB)
Row Ref No.	Description	Equation Used	m3/s	pa	63	125	250	500	1000	2000	4000	8000	
1	Manufacturer's Published in-duct Fan SWL(A)		2.16	650	61.0	77.0	82.0	85.0	86.0	82.0	78.0	71.0	90.6
2	Duct Loss - 1m & 1 Bend				-0.8	-0.7	-1.3	-2.2	-3.2	-3.2	-3.2	-3.2	
3	End reflection of outlet to Atmosphere = 0.18 m2	Look up table			-9	-5	-1	0	0	0	0	0	
			Area	Angle									
4	Directivity Correction (Area) Metres & Angle	Look up table	0.18	90	1.0	2.0	2.0	0.0	-2.0	-7.0	-15.0	-15.0	
			Distance R1										
5	Distance loss to (metres) from Noise Sensitive Receptor	$L_p = L_w - 20 \times \log(r/r_1) - 11$	38		-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	
6	Directivity Correction (none)	0dB			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
7	SPL at Noise Sensitive Façade - dB(A)	1+2+3+4+5+6			9.6	30.7	39.1	40.2	38.2	29.2	17.2	10.2	44.4
8	Attenuation - Rectangular Attenuator - 2100mm				7	17	29	40	40	33	25	15	
9	A-Weighted SPL at Façade After Acoustic Mitigation	7-8			2.6	13.7	9.7	0.3	-1.8	-3.3	-7.4	-5.2	15.7

Plant Item 2 - Kitchen Extract Fan Breakout - Systemair MUB 062 630D4					Octave Band Centre Frequency (Hz)								Global (dB)
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	
10	Manufacturer's Published Plant Octave Band SWL(A) dB ref 10 ⁻¹² W				40.0	60.0	53.0	51.0	54.0	52.0	44.0	34.0	62.5
11	Distance correction to 1 metre from Noise Sensitive Receptor	$20 \times \log(R_1) - 11$		39	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8	
12	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
13	SPL at Façade	10+11+12			0.2	20.2	13.2	11.2	14.2	12.2	4.2	-5.8	22.7

Plant Item 3 - Kitchen Supply Fan FAI Duct- S&P MUB 062 560 D4					Octave Band Centre Frequency (Hz)								Global (dB)
Row Ref No.	Description	Equation Used	m3/s	pa	63	125	250	500	1000	2000	4000	8000	
14	Manufacturer's Published in-duct Fan SWL(A)		1.84	500	54.0	70.0	75.0	78.0	80.0	77.0	75.0	67.0	84.6
15	Duct Loss - 2m				-1.6	-1.4	-0.6	-0.4	-0.4	-0.4	-0.4	-0.4	
16	End reflection of outlet to Atmosphere = 0.54 m2	Look up table			-9	-5	-1	0	0	0	0	0	
			Area	Angle									
17	Directivity Correction (Area) Metres & Angle	Look up table	0.54	0	4.0	5.0	6.0	7.0	8.0	9.0	9.0	9.0	
			Distance R1										
18	Distance loss to (metres) from Noise Sensitive Receptor	$L_p = L_w - 20 \times \log(r/r_1) - 11$	38		-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	
19	Directivity Correction (none)	0dB			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
20	SPL at Noise Sensitive Façade - dB(A)	14+15+16+17+18+19			4.8	26.0	36.8	42.0	45.0	43.0	41.0	33.0	49.4
21	Attenuation - Rectangular Attenuator - 1500mm				7	15	27	42	46	45	38	29	
22	A-Weighted SPL at Façade After Acoustic Mitigation	20+21			-2.2	11.0	9.8	0.0	-1.0	-2.0	3.0	4.0	14.7

Plant Item 4 - Kitchen Supply Fan Breakout - Systemair MUB 062 560D4					Octave Band Centre Frequency (Hz)								Global (dB)
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	
23	Manufacturer's Published Plant Octave Band SWL(A) dB ref 10 ⁻¹² W				34.0	54.0	47.0	46.0	50.0	49.0	42.0	32.0	57.3
24	Distance correction to 1 metre from Noise Sensitive Receptor	$20 \times \log(R_1) - 11$		39	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8	
25	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
26	SPL at Façade	23+24+25			-5.8	14.2	7.2	6.2	10.2	9.2	2.2	-7.8	17.5
27	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	7+13+20+26			11.3	32.3	41.1	44.2	45.8	43.2	41.0	33.0	50.6
32	Cumulative SPL at Noise Sensitive Façade - dB(A) WITH ATTENUATION	9+13+22+26			5.7	22.2	16.5	12.9	15.8	14.1	8.1	5.1	24.9
33	LA90 over plant Operating Period	Measured			24.0	31.6	38.6	39.5	41.4	36.6	27.6	17.0	47.0

Target Rating = 42 dB L_{AR} for 11:00 to 22:00
Therefore Compliance with planning condition demonstrated

Appendix H – Sound Level Meter Calibration Certificates



Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

This model of sound level meter submitted for periodic testing successfully completed the applicable pattern-evaluation tests given in IEC 61672-2. The pattern approval certificate is available at www.nti-audio.com/XL2.

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2-TA	S/N	A2A-08390-E0
Firmware	V4.21		
Reference Level Range	mid		
Microphone Model	M2230		
Preamplifier	MA220	S/N	8286
Microphone Capsule	MC230A	S/N	A16875
Performance class	Class 1		
Customer Inventory Nr.			

Customer

QT Acoustics
59 Prospect Road
Ash Vale
Aldershot
GU12 5EL

Date 11 June 2021

Certificate UK-21-046

Results **PASSED**
(for detailed report see next pages)

Operator

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