Thornton Reynolds

T5281 – Holborn Links Estate, 22 Southampton Place

15th February 2024

PLANT NOISE ASSESSMENT

temple

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Document Control

Version No.	Date	Author	Reviewed	Approved
1.0	02/06/2023	Liam Boles	Sam Logan	Nigel Burton
2.0	15/02/2024	Sam Logan	Antony Gregson	Nigel Burton

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1 Executive Summary

1.1.1 Temple Group has been appointed by Thornton Reynolds Ltd to undertake a preliminary plant noise assessment for equipment proposed as a part of the redevelopment of 22 Southampton Place as well as a cumulative preliminary plant noise assessment to include adjacent redevelopments. The office development at 22 Southampton Place includes installation of condensers and extractor fans.

1.1.2 This report presents criteria for plant noise emission, the methodology, and results of an external noise survey undertaken at the site to establish the background noise levels in the area. These have been used to assess the impact of the proposed plant on the nearest noise sensitive receptors.

1.1.3 Camden Council's policy documents express their requirement that the external rating Level emitted from the building services plant to be lower than the background sound level by 10dB (15dB if tonal components are present) at the nearest noise sensitive receptors.

1.1.4 Based on the manufacturer's sound pressure level data, it is predicted that the noise emissions from 22 Southampton Place will be adequately controlled.

1.1.5 The cumulative effect from adjacent developments at the nearest noise sensitive receptor will achieve 12dB and 10dB below background noise levels during the day and night-time respectively. This will comply with Camden Council's noise limits and achieve a low impact (Green) during the day and night-time.

1.1.6 The cumulative calculations represent the worst case assessment as directionality of the sound propagation from the units was unable to be accounted for. In addition, during the night, the units would have night setback and silent mode settings enabled but no data has been provided by the manufacturer for the noise reduction associated with these settings. It is likely that these measures would achieve further attenuation.

2 Introduction

2.1.1 Proposals are in place to install new plant at 22 Southampton Place as part of the proposed development. Temple Group has been appointed to undertake a noise assessment for the new building services plant, that will be installed.

2.1.2 The purpose of the noise assessment is to assess the impact on nearby noise sensitive receptors and, where required, to provide outline mitigation measures for further noise attenuation. The assessment has been carried out in line with the guidance from Camden Council and relevant national standards.

2.1.3 The following sections of the report describe criteria for plant noise emissions, assessment methodology, external noise measurement methodology, along with results of the assessment of the proposed plant.

2.1.4 The acoustic terminology used in this report is explained in **Appendix A.**

3 Policy Standards and Guidance

3.1 Local Authority Requirements

Camden Local Plan 2017

3.1.1 Camden Council's Local Plan[1] was adopted by council on the 3rd of July 2017. It replaces the core strategy and Camden Development Policies as the basis for planning decisions and future development in Camden.

3.1.2 Policy A1 Managing the Impact of development states:

"The Council will seek to protect the quality of life of occupiers and neighbours. We will grant permission for development unless this causes unacceptable harm to amenity."

Noise and vibration levels are factors that are considered under Policy A1.

3.1.3 Policy A4 Noise and vibration states:

"The council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

- *Development likely to generate unacceptable noise and vibration impacts; or*
- *Development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development."

3.1.4 Appendix 3 of the Camden Local Plan 2017 sets out the noise thresholds for industrial and commercial noise sources, it states the following:

"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 10dB below background (15dB if tonal components are present) should be considered as the design criterion."

[1] London Borough of Camden, (2017): Camden Council Local Development Plan.

Table 1 - Camden Local Plan Appendix 3 Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

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 or events exceeding 88dB L_{Amax}

3.2 Standards and Guidance

British Standard 7445 – Description and Measurement of Environmental Noise

3.2.1 British Standard 7445 Part 1 (BS 7455-1:1991)[2] defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

3.2.2 The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site.

3.2.3 British Standard 7445 Part 2 (BS 7455-2:1991)[3] describes methods for the acquisition of data which provide descriptors that enable:

a) a description of the environmental noise in a specified area of land to be made in a uniform way;

[2] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 1: Guide to Quantities and Procedures'. BSI, London.
[3] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use'. BSI, London.

b) the compatibility of any land use activity or projected activity to be assessed with respect to existing or predicted noise; and

c) Using the data as a basis, authorities may establish a system for selecting the appropriate land use, as far as levels of noise are concerned, for a specified area, or the sources of noise – existing or planned – which are acceptable with respect to land use, existing or planned.

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

3.2.4 British Standard 4142:2014+A1:2019[4] describes methods to use outdoor sound levels to assess the likely effects of sound of an industrial and/or commercial nature on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

3.2.5 The standard requires determination of the following:

- Rating level - $L_{Aeq,Tr}$ sound level produced by the specific sound source at the assessment location with any adjustment added to the specific sound level if a tone, impulse or other acoustic characteristic occurs, or is expected to be present.
- Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T.
- T_r is the reference time interval over which the specific sound level is determined. This is 1-hour for daytime (07:00-23:00 h) and 15-minutes for night-time (23:00-07:00 h).

3.2.6 An estimate of the impact of the specific sound generated can be obtained by subtracting the measured background sound level from the rating level, and the following is considered:

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

b) A difference of around +10dB 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

[4] British Standards Institute (BSI), (2014+A1:2019): BS 4142 – Methods for rating and assessing industrial and commercial sound.

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.

3.2.7 The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the sound under investigation. A correction factor is added to this level to account for the acoustic character of the sound as follows:

- Tonality – A correction of up to 6dB depending on the prominence of tones;
- Impulsivity – A correction of up to 9dB depending on the prominence of impulsivity;
- Other sound characteristics – A 3dB correction may be applied where a distinctive acoustic character is present that is neither tonal nor impulsive;
- Intermittency – A 3dB correction may be applied where the specific sound has identifiable on-off conditions.

3.2.8 All pertinent factors should be taken into consideration when assessing the impact, including the following:

- 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-time.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor.

3.3 Consultation

3.3.1 On Wednesday 21st April 2021, Richard Budesha, a consultant at Temple, contacted the Camden Council noise team (RegulatoryServices@camden.gov.uk) via email. The correspondence summarised the proposed methodology for undertaking the noise survey and subsequent plant noise assessment. No response was received at the time.

4 The Site and its Surroundings

4.1.1 22 Southampton Place is located on the east side of Southampton Place, WC1A 2AL; between Barter Street, WC1A 2AL, and Bloomsbury Square, WC1A 2RA. The location of the site is indicated in **Figure 1** in **Appendix B**.

4.1.2 The site is close to Holborn station and the surroundings include residential and commercial use buildings. The nearest noise sensitive residential receptor to the proposed plant locations on 22 Southampton Place were noted to be the properties within 21 Barter Street within 8m of the edge of the roof of 22 Southampton Place. Additional residential receptors were identified as the flats above the businesses on the opposite side of Southampton Place; approximately 20m away from the proposed plant locations on the roof of 22 Southampton Place.

5 Proposed Plant

5.1.1 The client has proposed to install the following external plant (assumed to be operating 24/7):

22 Southampton Place

- 1 Roof-level Extraction Fan;
- 1 Ground-level Condenser (1 No. PUZ-ZM60VHA); and
- 4 Roof-level Condensers (2 No. PUMY-SP112VKM & 2 No. PUMY-SP140VKM).

5.1.2 **Figures 4 to 10** in **Appendix C** show the layout of the proposed plant at 22 Southampton Place.

5.1.3 Plant specification sheet data can be found in **Appendix D**, the data from which has been summarised below in **Table 2** and **Table 3**.

Table 2 - Condenser noise data during heating (Sound Pressure Level at 1m)

Model	Octave Band Sound Pressure Level (dB) at 1m							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
PUMY-SP112VKM	58.0	55.0	54.5	51.5	49.5	45.0	38.0	32.0
PUMY-SP140VKM	62.5	57.5	56.0	53.0	51.5	47.0	40.5	33.5
PUZ-ZM60VHA	53.0	52.0	52.5	44.0	43.0	39.0	43.5	27.0

Table 3 - Extract fan noise data at full speed (Sound Power Level)

Model	Octave Band Sound Power Level (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
No 22 Fan DE6-ES	75.0	68.0	67.0	53.0	54.0	43.0	38.0	32.0

6 Measured Background Noise Levels

6.1 Unattended Monitoring

6.1.1 An unattended environmental noise survey was carried out between Monday 10th May 2021 and Monday 17th May 2021 to obtain prevailing noise levels representative of the closest sensitive receptors to the site.

6.1.2 Measurement Position 1 (MP1) was located on the eastern edge of the roof of 22 Southampton Place, towards the residential properties on the opposing side of Southampton Place. Measurement Position 2 (MP2) was located on the western edge of the roof of 22 Southampton Place facing the nearest residential receptor on Barter Street. These locations were chosen to measure noise levels representative of those at the nearest/worst affected noise sensitive locations. The measurement microphone in each case was positioned at a height of approximately 2m above the roof level and 3.5m away from any reflective façade and are considered to be free-field measurements. The measurement positions are shown in **Figure 2** and **3** in **Appendix B**.

6.1.3 The noise monitors were set up to automatically store statistical and spectral data every 15 minutes during the measurement period. Continuous road traffic noise from High Holborn (A40) to the south and Bloomsbury Square to the north was observed to be the dominant noise sources. Occasional traffic moved along Southampton Place and sirens were heard to the west and on High Holborn during installation and collection of the monitors.

6.2 Equipment

6.2.1 The measurement equipment used is detailed in **Table 4**. The microphones were each fitted with a windshield and appropriate corrections applied. Field calibration checks were carried out prior to and post measurement with no significant variation observed. Calibration certificates are available upon request.

Table 4 – Survey Equipment

Manufacturer	Item	Type	Serial Number
RION	Sound Level Meter	NL-52	00410086
RION	Sound Level Meter	NL-52	00510141
RION	Calibrator	NC-74	34936353

6.3 Meteorological Conditions

6.3.1 To verify that periods of adverse weather conditions did not significantly impact the results, the local precipitation and wind speed levels were collected using Wundermap weather data from weather station EGLC at London City Airport, approximately 10 km from Southampton Place. No other weather stations closer had full data for the duration for the survey shown in **Figure 13** in **Appendix E**.

6.3.2 **Appendix E** shows the L_{A90} results and the precipitation and wind speed data for the duration of the survey. Periods of the survey in which wind speeds exceeded the recommended maximum limits of 5 m/s were removed in accordance with guidance set out in British Standard 4142 (BS 2014+A1:2019). It was established there were no periods of heavy precipitation during the survey.

7 Noise Survey Results

7.1 Unattended Measurement Results

7.1.1 In line with BS 4142:2014+A1:2019, representative typical background sound levels have been determined using statistical analysis of the continuous measurements. Day and night-time $L_{A90,15min}$ representative background sound levels measured during the unattended survey for each measurement position are presented in **Table 5**.

7.1.2 Full statistical measurement data is presented in **Figure 16 to 19** in **Appendix F** with spectral data available on request.

Table 5 - Representative typical background sound levels.

Measurement Position	Representative Receptor	Daytime (07:00-23:00) $L_{A90, 15mins}$	Night-time (23:00-07:00) $L_{A90, 15mins}$
MP1	Southampton Place	50dB	47dB
MP2	21 Barter Street	49dB	47dB

8 Assessment

8.1 Introduction

8.1.1 Due to the distance separation, screening from the building edge, and various types of plant, a 3D CadnaA noise model was prepared to predict the resultant noise levels at the identified sensitive receptors. A screenshot from the model is shown in **Figure 20** in **Appendix G**.

8.2 Plant Noise Assessment

8.2.1 The total noise level from all plant items operating simultaneously at worst case noise levels (during heating for condensers and fans operating at full speed) was calculated at 1m from the facades of the nearest noise sensitive receptors. Data collected from MP2 was used as it represented the closest sensitive receptor (21 Barter Street). The results are summarised in **Table 6.**

8.2.2 Calculations for the condenser units have been based on the manufacturer's measured octave band sound pressure level data at 1m.

Table 6 - BS4142 assessment of the closest residential receptor on the opposite side of Southampton Place, from MP2

Results		dBA (day)	dBA (night)	
Background Sound Level	$L_{A90,15mins}$	49	47	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, 15 minutes.
Assessment made for seven consecutive days; reference time interval is 15mins. The plant is proposed to be operating 24/7 as described in Section 4.				
Distance Attenuation	N/A	N/A	N/A	Considered in noise modelling software
On Time Correction	N/A	N/A	N/A	Considered in noise modelling software
Specific Sound Level	$L_{Aeq,T}$	35	35	Specific sound level at worst affected receptor calculated in CadnaA.
Acoustic feature correction	Tonality	0	0	1/3rd Octave band data not available.
	Intermittency	0	0	Normal use of the plant means that it is on constantly. As such, it is assumed that correction is not required.
	Impulsivity	0	0	Temple was not provided with information that the proposed plant will have impulsive sound features, but experience of similar equipment indicates that this is unlikely to be the case.
	Other Sound Characteristics	0	0	No other sound characteristics are known at this stage of the assessment.
Rating Level		35	35	Rating level including acoustic feature corrections
Excess of rating level over background sound level		-14	-12	The rating level is 14dB and 12dB below the day and night-time background sound levels respectively. The assessment indicates that the specific sound source is likely to have a low impact (Green) in line with Camden Council noise limits.
It should be noted that the above assessment assumes no correction for tonality, impulsivity, other distinctive acoustic character, or intermittency. Consequently, all sources should be controlled so that these issues are not present at noise sensitive locations or else corrections will need to be applied.				

8.3 Cumulative Plant Noise Assessment

8.3.1 The cumulative total noise level from all plant items operating simultaneously on 22 Southampton Place as well as adjacent redevelopments was calculated at 1m from the facades of the nearest noise sensitive receptors. Data collected from MP2 was used as it represented the closest sensitive receptor. It is predicted that after corrections, the cumulative rating level at the nearest noise sensitive receptor will be 37dBA, achieving the 12dB and 10dB below the background during the day and night-time respectively. This indicates that the

cumulative sound level is likely to have low impact (Green) in line with Camden Council noise limits.

8.3.2 As the design progresses, all sources should be selected and/or controlled such that tonality, impulsivity, or other distinctive acoustic characteristics are not present at noise sensitive locations.

8.3.3 Calculations undertaken have assumed omnidirectional radiation from all condenser units and therefore provide a worst-case assessment. In practice, the specific sound level is likely to be lower than stated at the nearest sensitive receptors due to the directionality of the units (which we were unable to account for in the model) and their layout (facing away from nearest sensitive receptors). Furthermore, the most significant plant item contributing to the cumulative noise level, is the ground floor condenser at the rear of 22 Southampton Place. This condenser has a night set back option which reduces the duty required at night and it also has an 'Outdoor unit silent mode setting'. The application of these measures in combination with the assumed directionality mean it is likely that in practice, the noise level is expected to be marginally more than 10dB below the background during the day and night-time and comply with the Camden Council criteria.

9 Conclusion

9.1.1 Temple Group has been appointed by Thornton Reynolds Ltd to undertake a preliminary plant noise assessment for equipment proposed as a part of the redevelopment of 22 Southampton Place.

9.1.2 Temple has undertaken an unattended noise survey and calculations of the rating noise level of the proposed mechanical plant which has been used to assess the effects of the proposed mechanical plant on the nearest noise sensitive receptors to the proposed development. This has been assessed in line with the Camden Council guidance and relevant national standards.

9.1.3 The assessment at 22 Southampton Place has predicted that the mechanical plant will be 14dB and 12dB below the typical background sound level at the nearest noise sensitive receiver during the daytime and night-time periods respectively. This complies with the Camden council criteria during the day and night.

9.1.4 The assessment indicates that the predicted cumulative rating noise level of the mechanical plant at 22 Southampton Place as well as the adjacent developments will be 12dB and 10dB below background levels during the day and night-time respectively. This complies with the Camden council criteria during the day and night.

9.1.5 The cumulative calculations represent the worst case assessment as directionality of the sound propagation from the units was unable to be accounted for. In addition, during the night, the units would have night setback and silent mode settings enabled but no data has been provided by the manufacturer for the noise reduction associated with these settings. It is likely that these measures would provide further attenuation.

Appendix A - Acoustic Glossary

Noise/Sound

Noise and sound need to be carefully distinguished. Sound is a term used to describe wave-like variations in air pressure that occur at frequencies that can stimulate receptors in the inner ear and, if sufficiently powerful, be appreciated at a conscious level. Noise implies the presence of sound but also implies a response to sound: noise is often defined as unwanted sound.

Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic, and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 20 µPa) and the threshold of pain is around 120 dB.

Frequency, Hz

Frequency is the number of occurrences of a repeating event per unit second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is usually divided up into octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency. The bands are described by their centre frequency value. In environmental acoustics the ranges typically used are from 63 Hz to 8 kHz.

A-weighting

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

Ambient sound

Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.

Ambient sound level ($LA_{eq,T}$)

Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.

Background sound level ($L_{A90,T}$)

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90 % of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Rating level

Specific sound level plus any adjustment for the characteristic features of the sound.

Reference time interval

Specified interval over which the specific sound level is determined. This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night-time from 23:00 h to 07:00 h.

Residual sound

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.

Residual sound level ($L_{Aeq,T}$)

Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.

Specific sound level

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval.

Specific sound source

Sound source being assessed.

Appendix B – Current Site Layout and Measurement Positions

Figure 1 - Current site layout is marked in orange and survey locations are labelled in red. Approximate position of the nearest noise sensitive receptors, 21 Barter Street & Properties on the other side of Southampton Place, are marked in yellow.

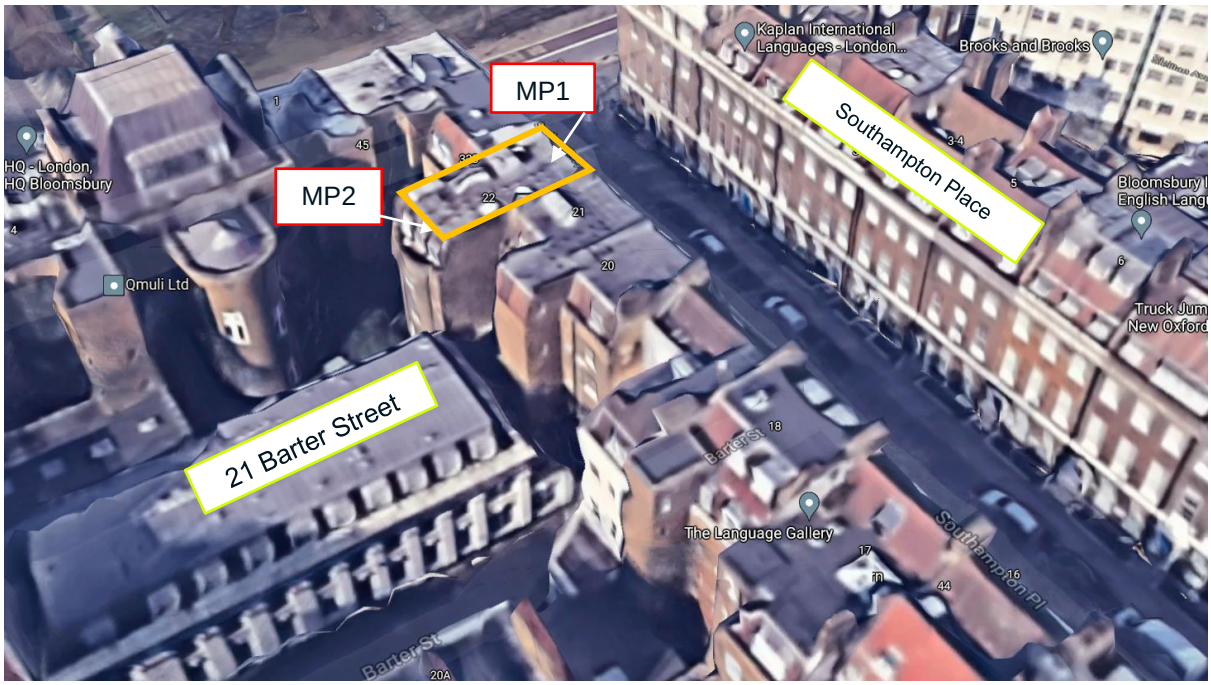
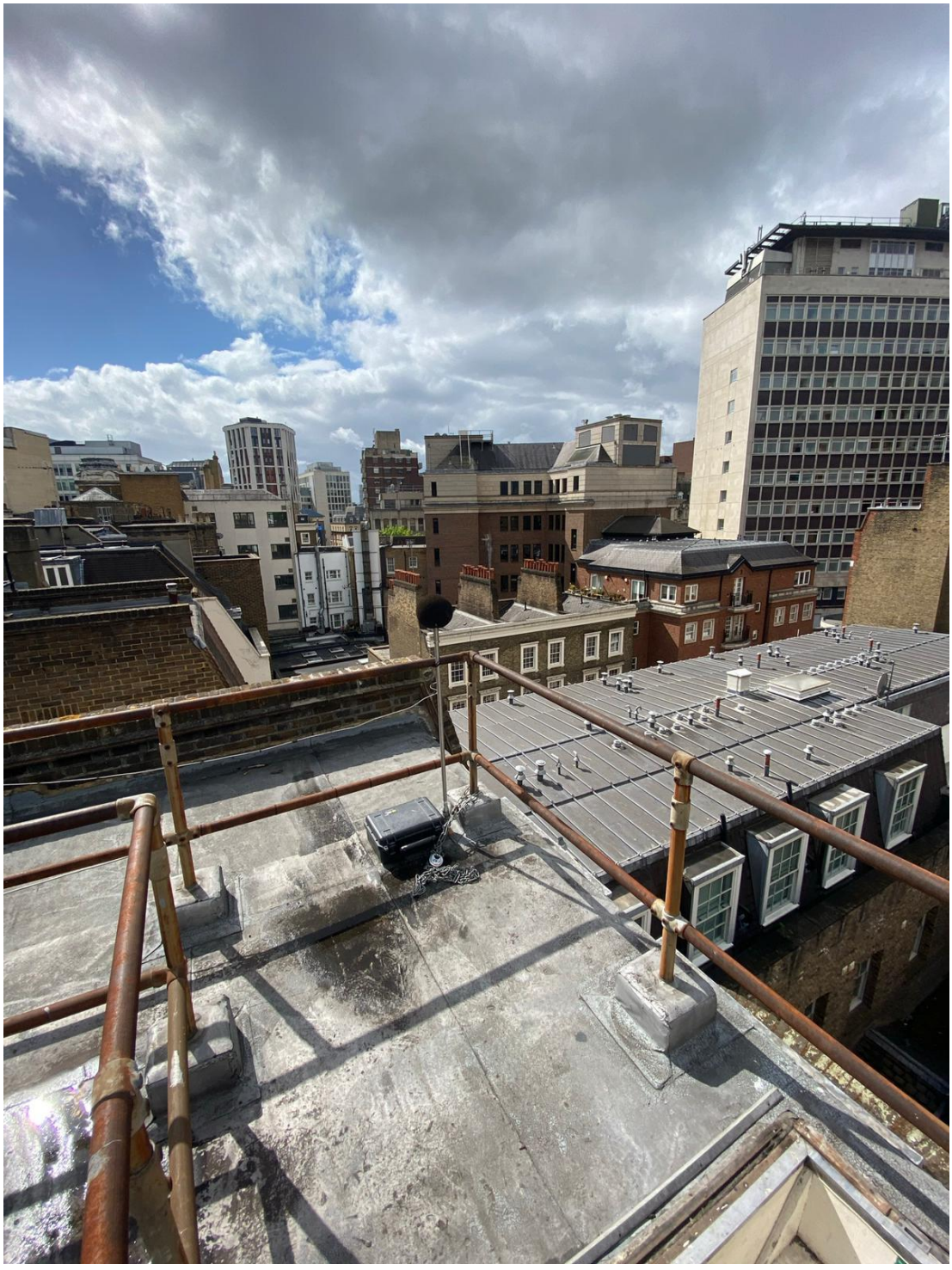


Figure 2 - Measurement Position 1 (MP1), Eastern boundary of 22 Southampton Place facing the residential receptors on the opposite side of Southampton Place.

Figure 3 - Measurement Position 2 (MP2), Western boundary of 22 Southampton Place facing towards the nearest residential receptor at the rear on Barter Street.



Appendix C – Layout of Proposed Plant

Figure 4 - Proposed Plant, Roof Level

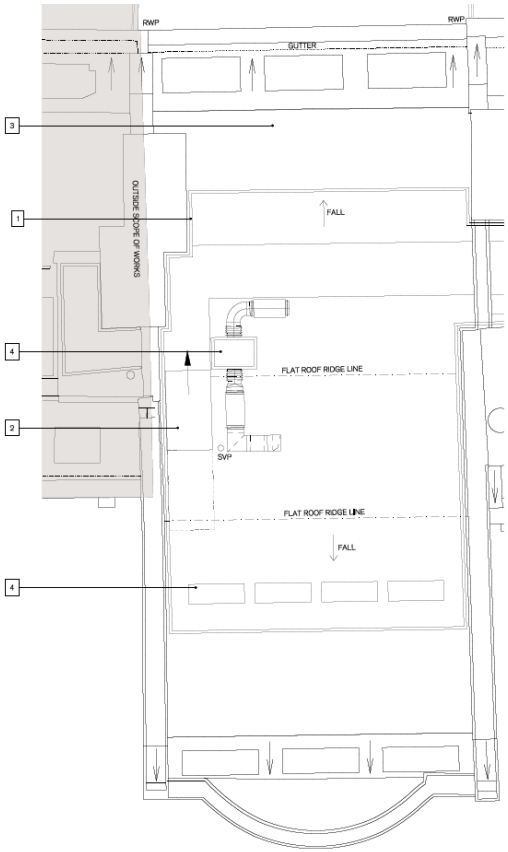


Figure 5 - Proposed Plant, Fourth Floor

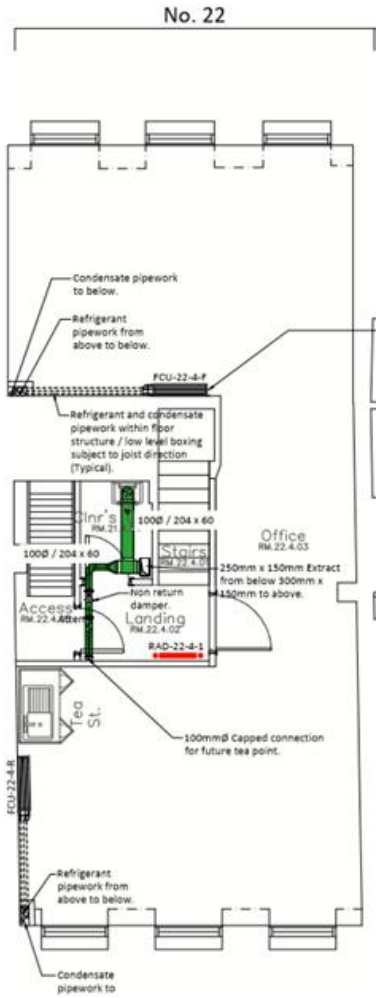


Figure 6 – Proposed Plant, Third Floor

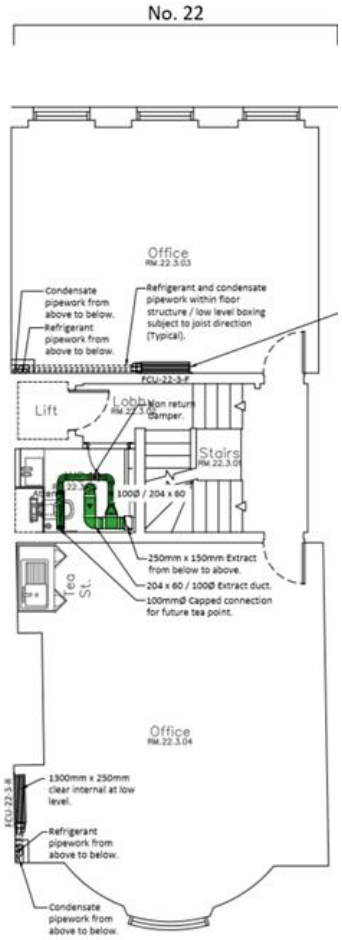


Figure 7 – Proposed Plant, Second Floor

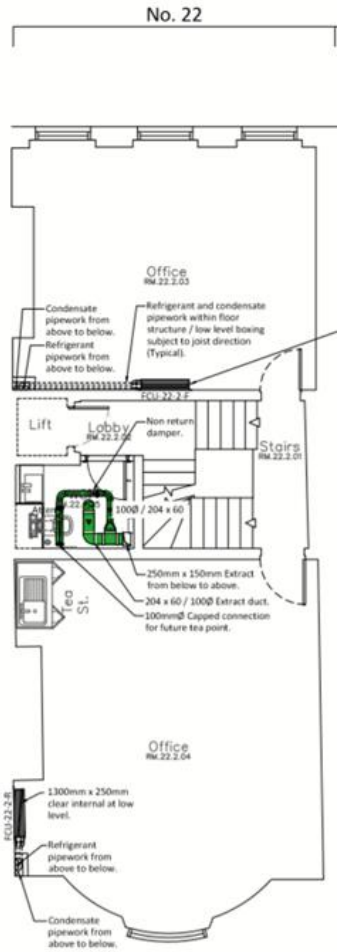


Figure 8 - Proposed Plant, First Floor

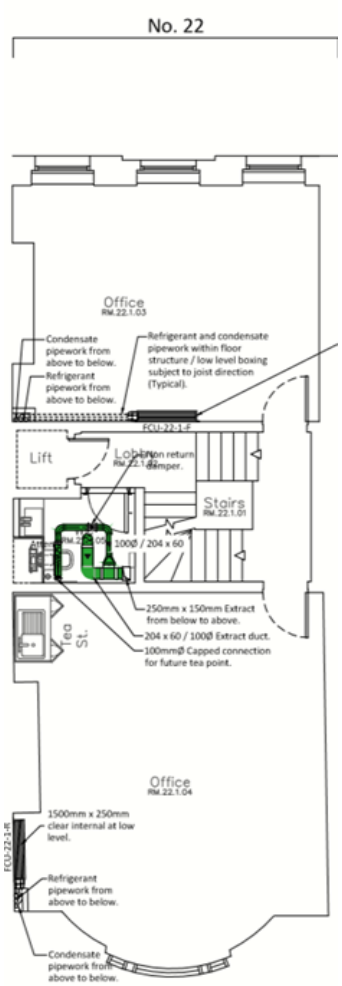


Figure 9 - Proposed Plant, Ground Floor

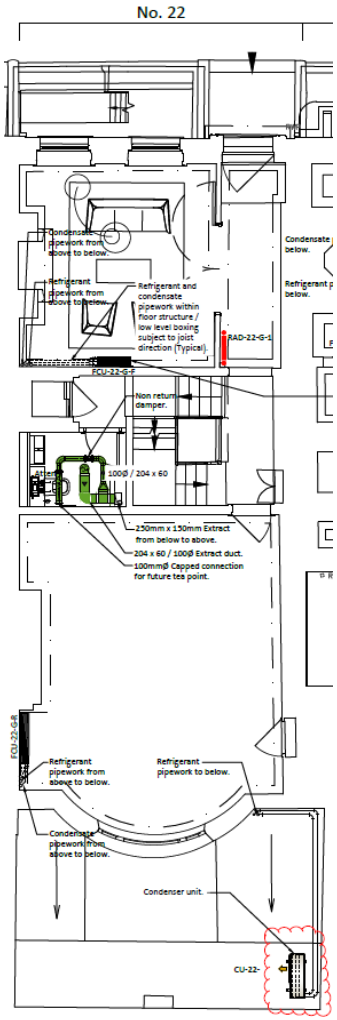
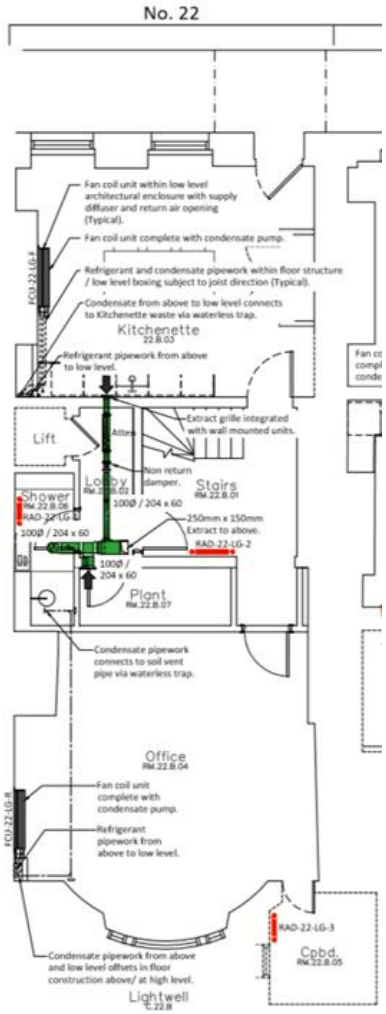


Figure 10 - Proposed Plant, Lower Ground Floor



Appendix D - Preliminary Plant Data

Figure 11 - No. 22 Extractor Fan

nuaire SUMMARY FAN DATA SHEET

Nuaire Limited, Western Industrial Estate, Caerphilly, CF83 1NA, United Kingdom. email:info@nuaire.co.uk
UK Commercial Enquiries T:029 2085 8200 UK Residential Enquiries T:029 2085 8500 International Enquiries T:+44.29 2085 8497

This data sheet produced on 07 May 2021 13:09 using software version 3.6.19.2088 - 12-Mar-2018

Technical Data

DE - DAVE Extract Fan with Ecosmart Control
Inline Centrifugal Extract Fan

Fan Code:	**DE6-ES**
Installation Manual Links:	611280
Required Duty:	175 l/s @ 150 Pa
Actual Duty:	328 l/s @ 527 Pa
Actual at Required Flow:	175 l/s @ 607 Pa
Velocity at Actual Duty:	2.611 m/s
When Speed Controlled to Required Duty (53.3%):	
Velocity at Required Duty:	1.393 m/s
Motor Input Power:	**0.082 kW**
Specific Fan Power:	**0.5 W/(l/s)**
Motor Efficiency:	0 %
Motor Input Power:	0.537 kW
Specific Fan Power:	1.6 W/(l/s)
Nominal Fan Speed:	1,710 RPM
Electrical Supply:	230 V 1 Phase 50 Hz
Motor Rating:	0.45 kW
Motor Current:	flc: 2.9 A
Motor Current:	sc: 2.9 A
Max. Operating Temp.:	40°C

Acoustic perfomance to ISO 13347 and AMCA 300.

Sound Power Levels re 1 pWatts (Hz):

	63	125	250	500	1k	2k	4k	8k	dBA
Induct Inlet	87	83	69	58	53	49	47	40	
Induct Outlet	87	83	69	58	53	48	44	37	
Breakout	71	63	60	43	40	29	24	18	36

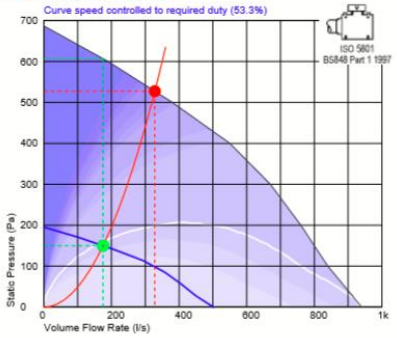
The above spectrums running speed controlled to required duty (53.3%). When running at full speed:

Induct Inlet	91	88	76	68	67	63	61	54	
Induct Outlet	91	88	76	68	67	62	58	51	
Breakout	75	68	67	53	54	43	38	32	43

dBA is hemi-spherical at 3 metres. For spherical deduct 3 dBA.
Values shown are for inlet Lw, outlet Lw sound power & breakout levels for: Installation Type D: ducted inlet, ducted outlet. Ratings include the effects of duct end correction.

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.

Performance Curve



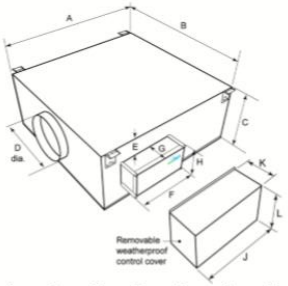
Specification

Dave high performance extract fan, standard case with patented 'Floating fan' construction. Single skin, with infill panels and manufactured from heavy gauge, corrosion resistant Aluzinc steel. The unit is suitable for internal or external mounting, in any orientation and incorporates a full length top or bottom access panel. The fan impeller and EC motors are selected to provide optimum performance and energy efficiency conforming to Part L regulations. Units are suitable for operation in ambient temperatures of up to 60°C (sizes 1-5), 40°C (sizes 6-7) and are Class L2 leakage. The unit shall be controlled by an integrated Ecosmart control mounted externally to the case. The fans shall have the following energy saving and operational functions integrally installed with in it, all components will be pre-wired and fitted by the manufacturer:

- Integral Frequency inverter/speed controller.
- Integral adjustable run-on timer.
- Maximum and minimum speed adjustment/setting (trickle and boost).
- Volt free run & failure/status indication.
- 0-10V BMS interface for remote operation.
- Multiple low voltage sockets for interconnection of sensors or fans.
- Background ventilation/trickle enable switch.

The unit is supplied with circular spigots and set of four mounting brackets. The Fan unit shall have a 5 year warranty. .

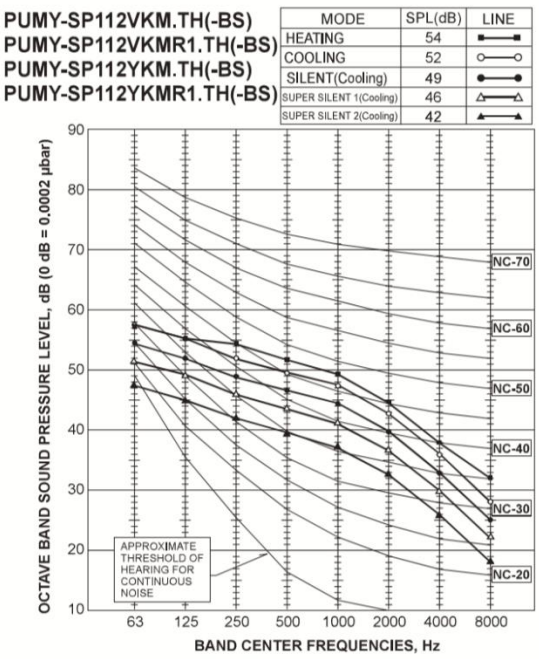
Fan Dimensions

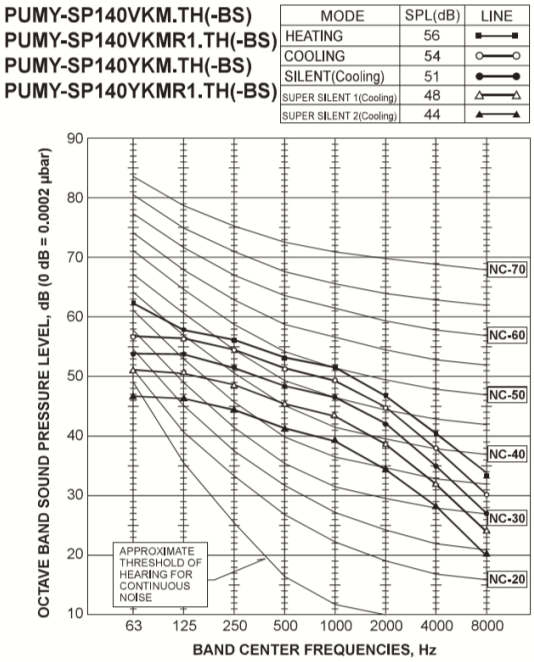


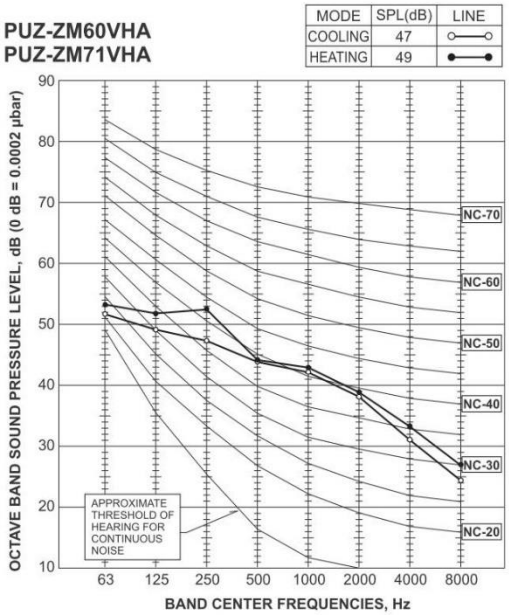
A	B	C	D	E	F	G	H	J
605	1,100	465	400	162	370	96	150	470
K	**L**	**kg**						
120	170	69						

The drawing is for dimensional purposes only. Dimensions in mm.

Figure 12 - Condensers







Appendix E – Measurement Data and Weather Data

Figure 13 - Wind Speed and Precipitation Values for the period 10/05/21 - 17/05/21

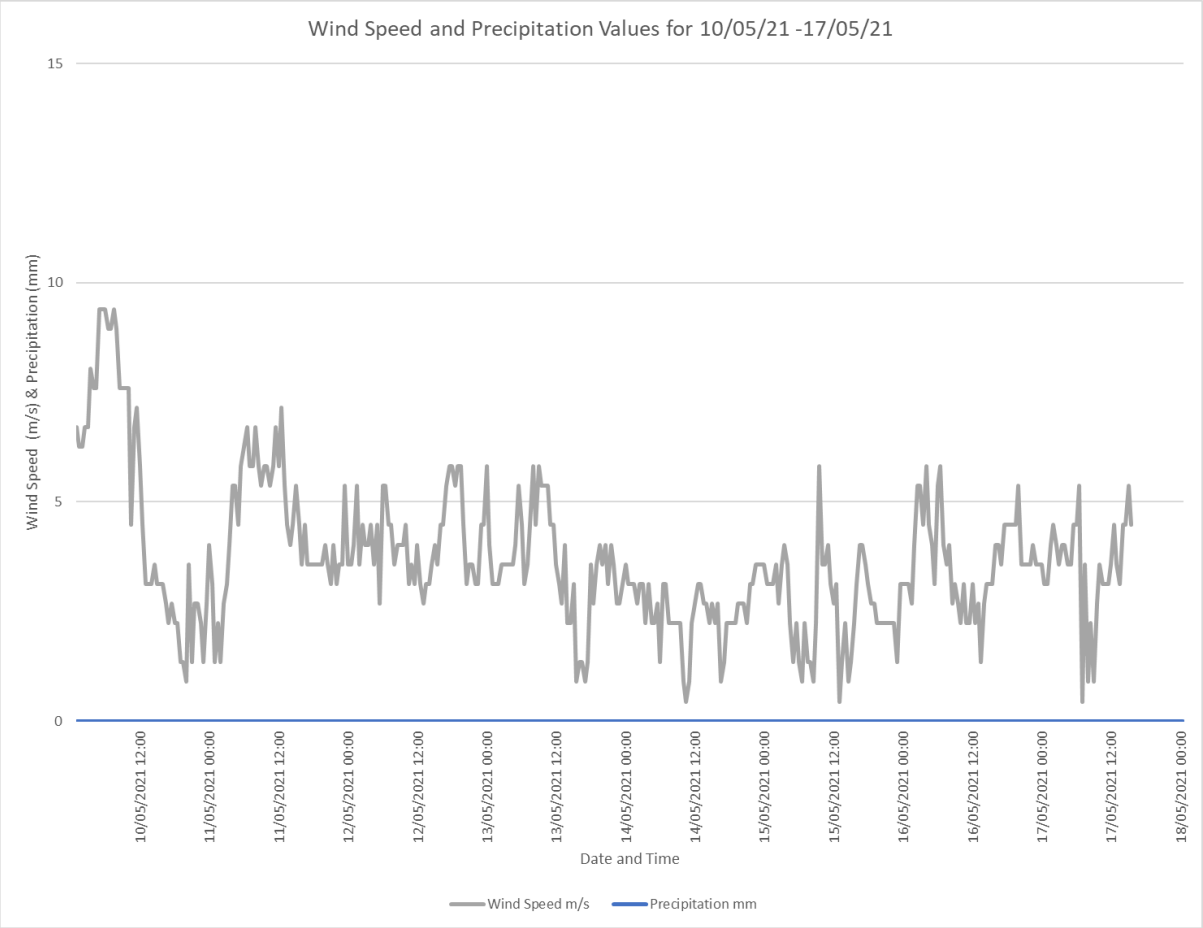


Figure 14 - L_{90} Values for the period 10/05/21 - 17/05/21

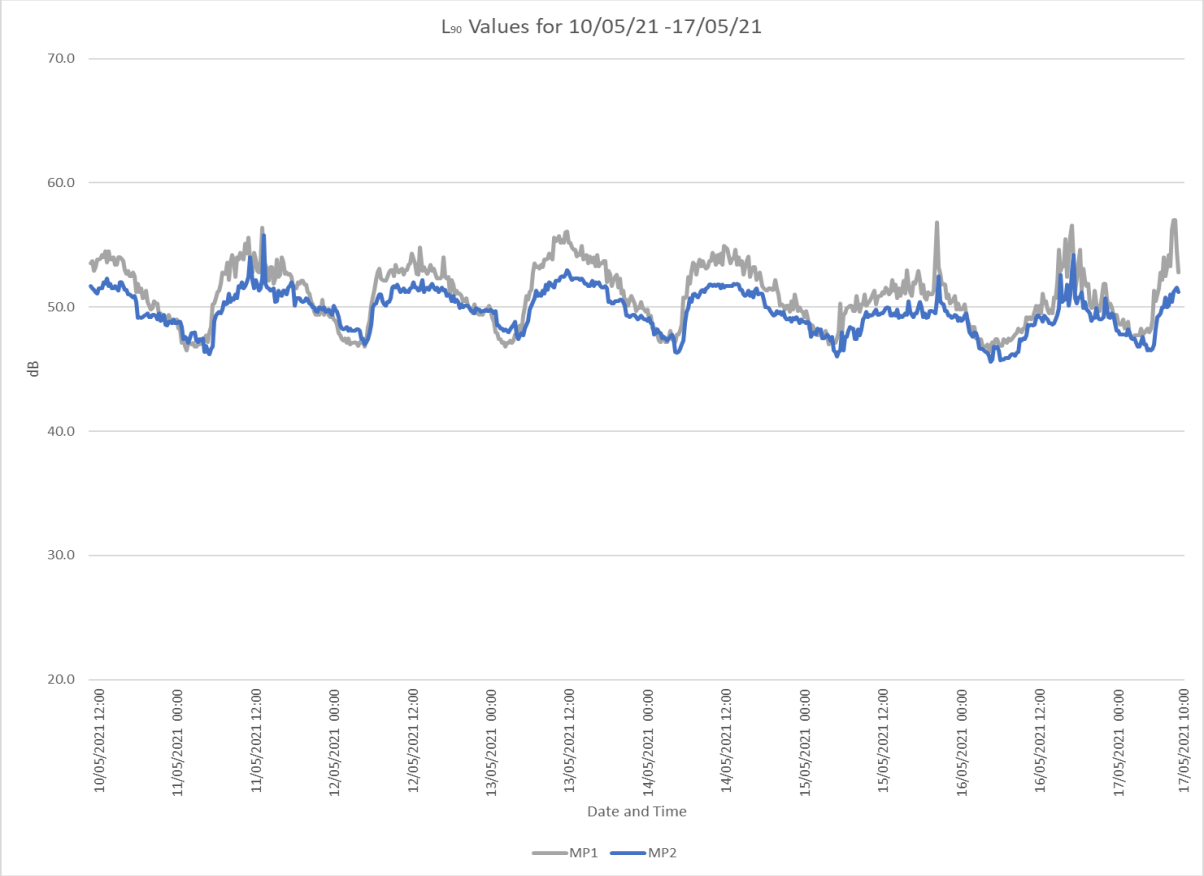
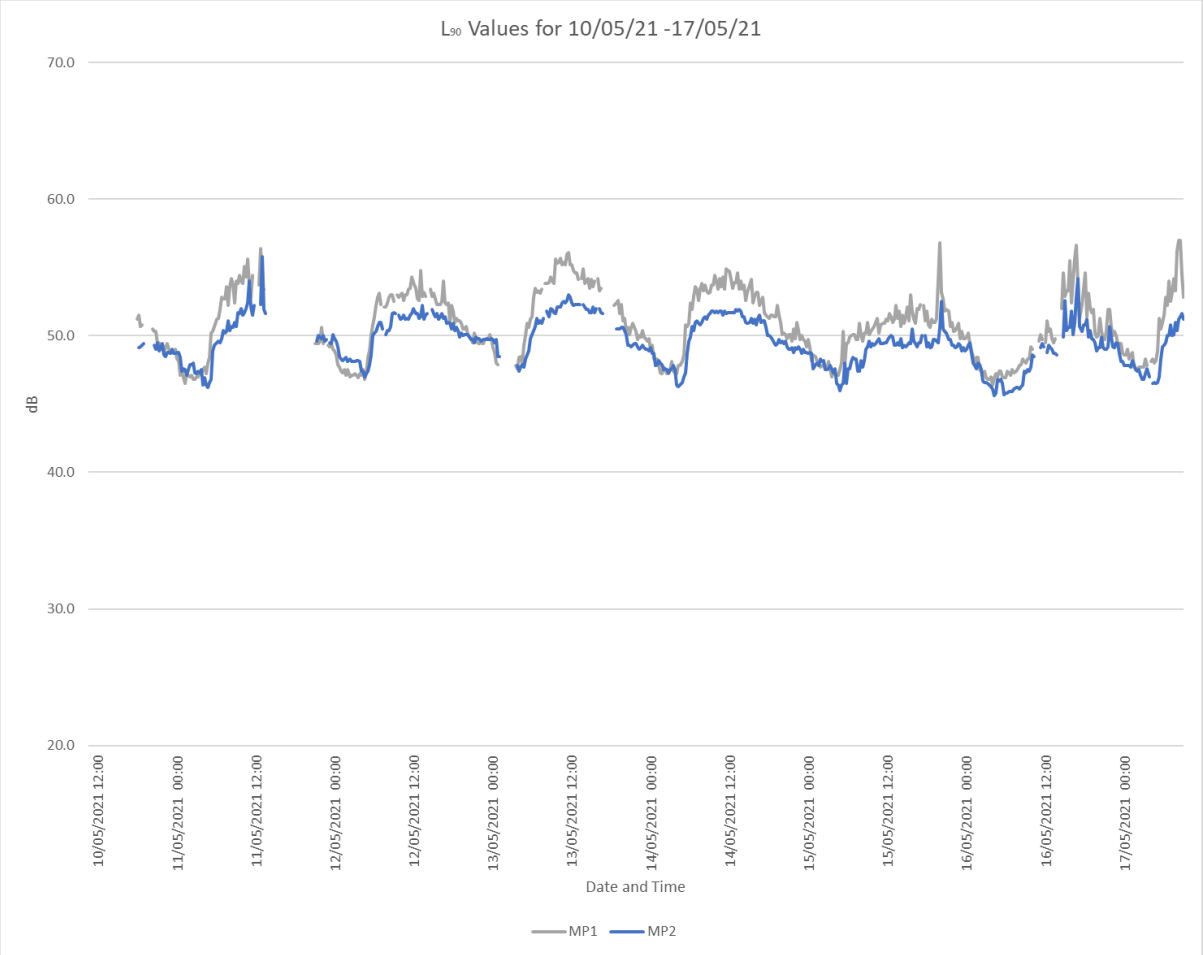


Figure 15 - L_{90} values for the period 10/05/21 - 17/05/21 with data removed when wind speed > 5m/s



Appendix F – $L_{A90, 15mins}$ Statistical Analysis

Figure 16 - Statistical analysis of the daytime (07:00-23:00) L_{A90} measurements to determine background sound level at MP1.

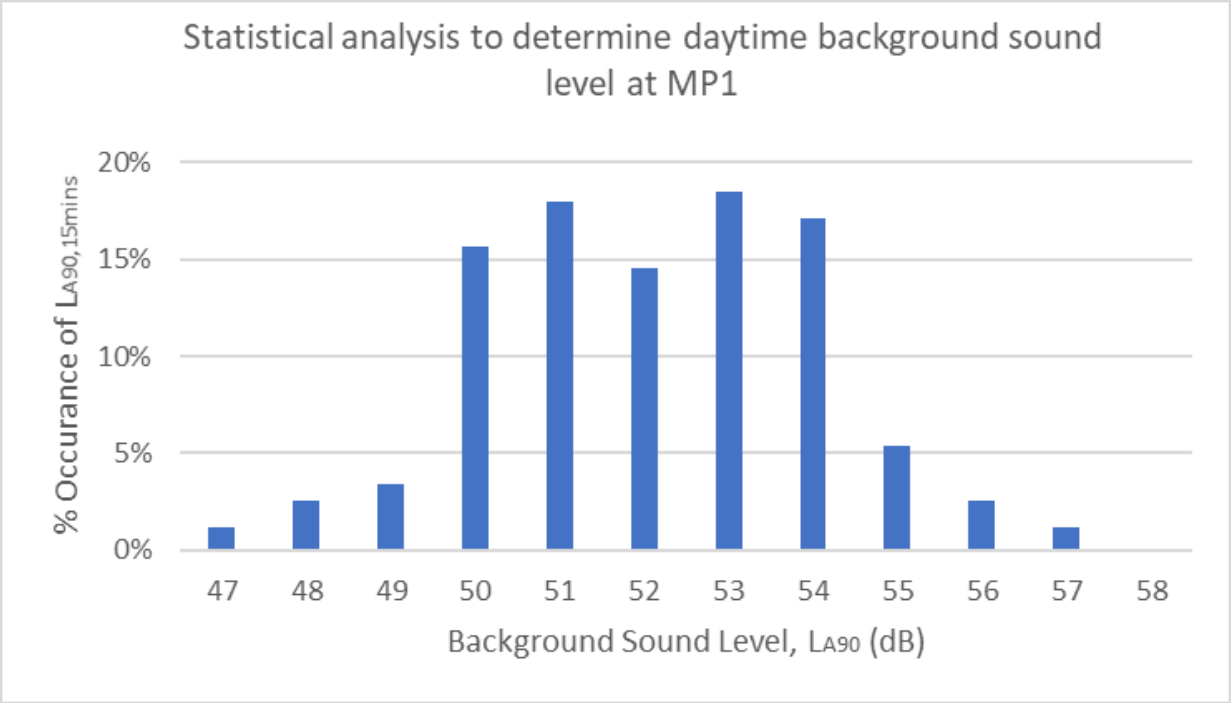


Figure 17 - Statistical analysis of the night-time (23:00-07:00) L_{A90} measurements to determine background sound level at MP1.

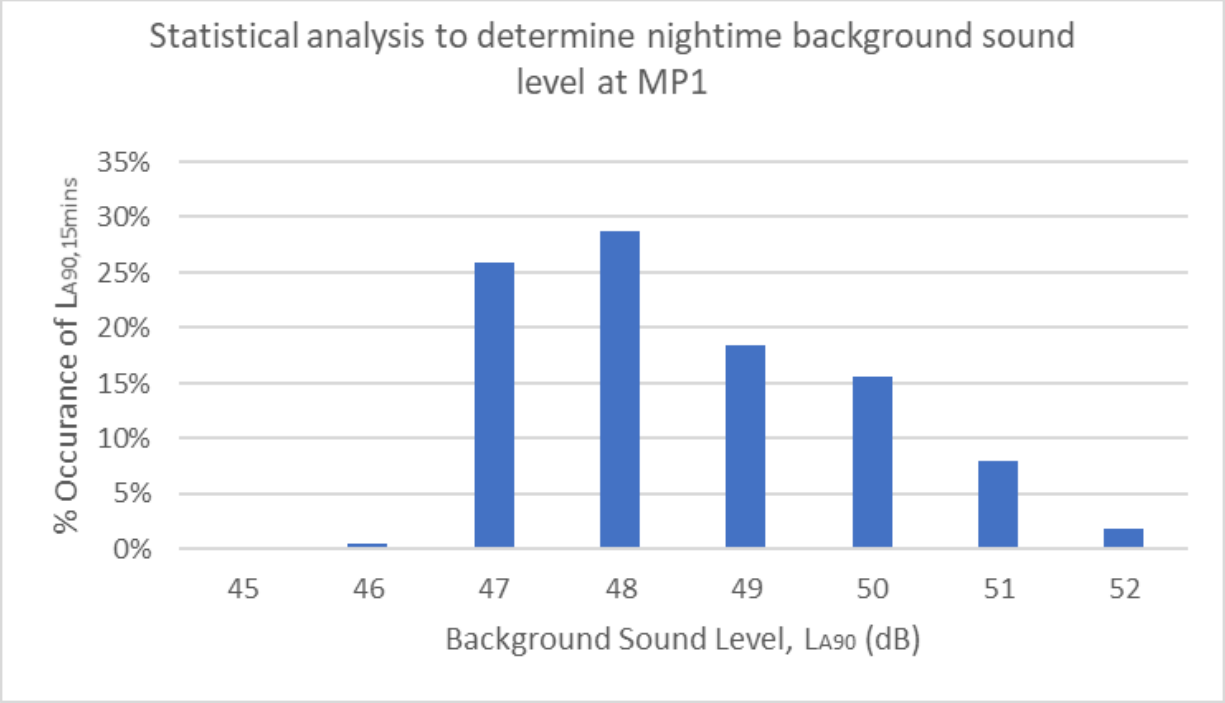


Figure 18 - Statistical Analysis of the daytime (07:00-23:00) L_{A90} measurements to determine background sound level at MP2.

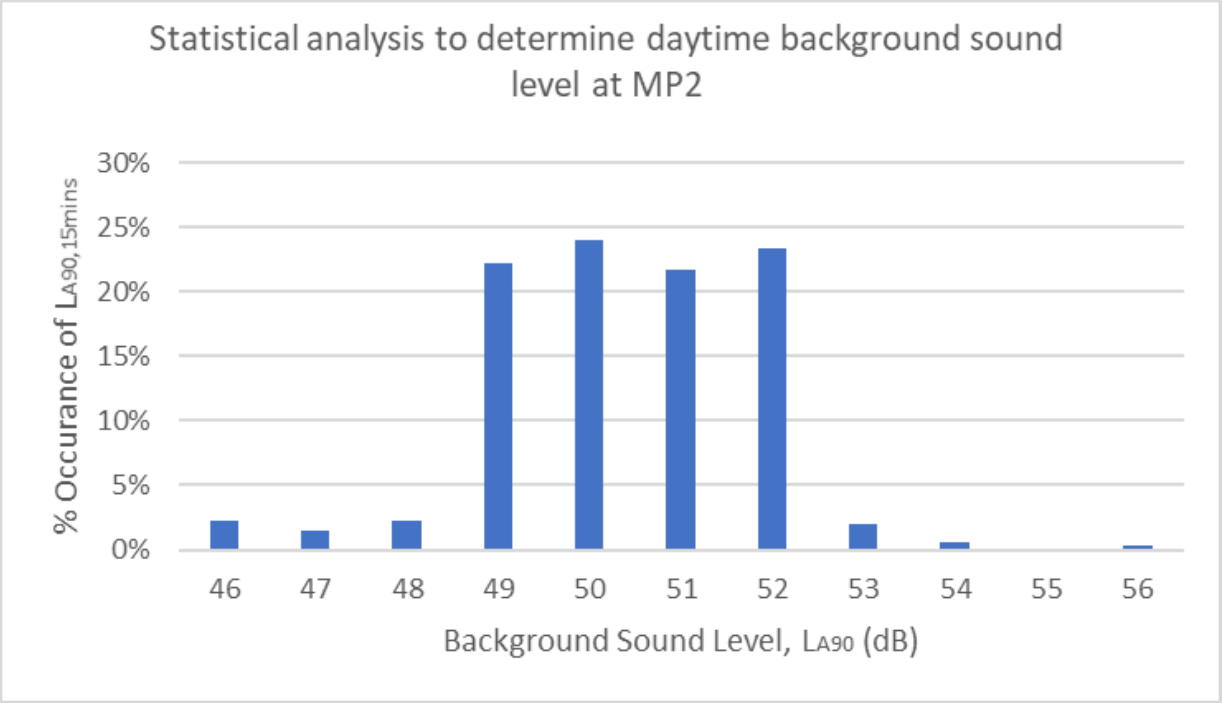
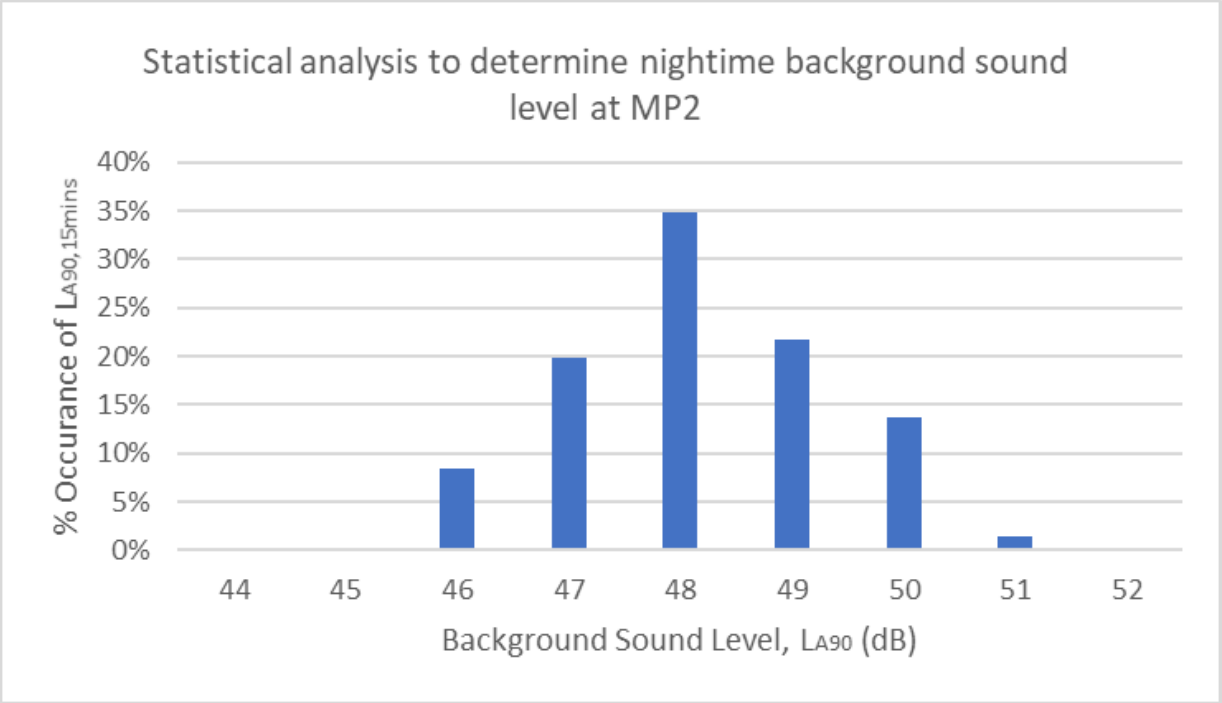
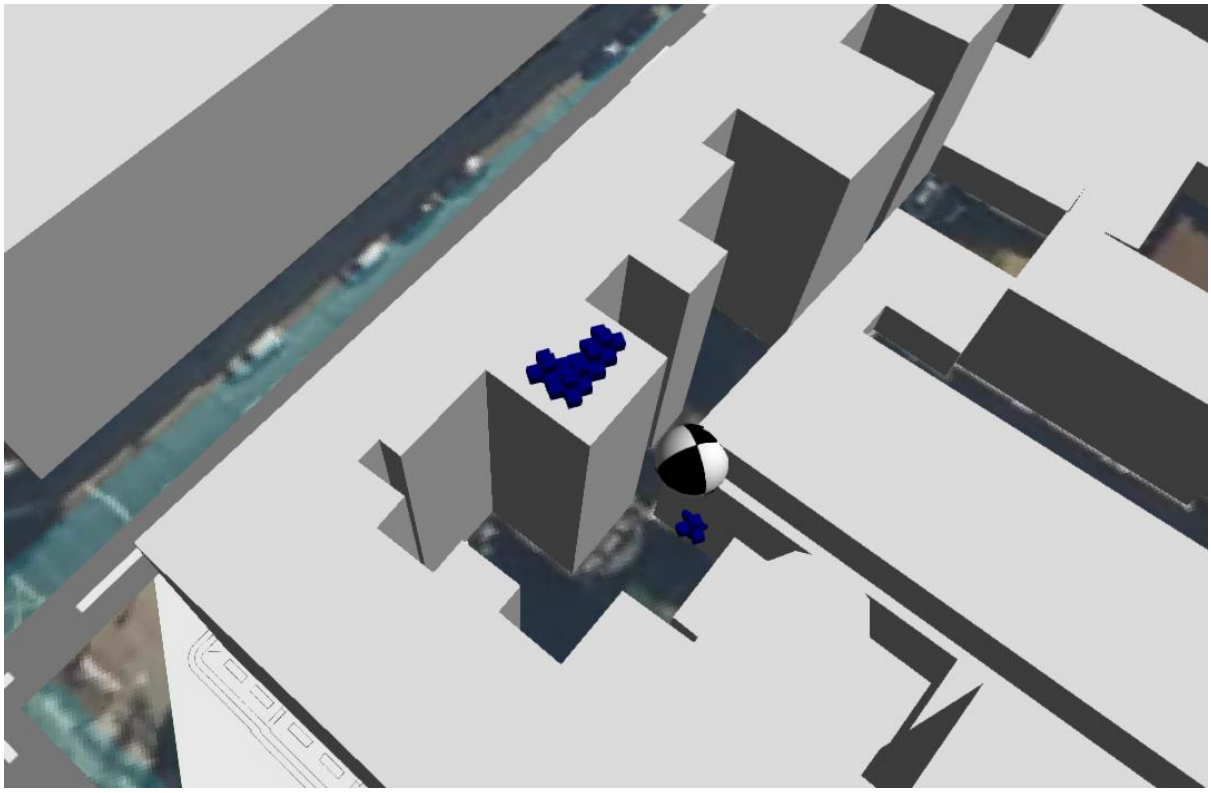


Figure 19 - Statistical Analysis of the night-time (23:00-07:00) L_{A90} measurements to determine background sound level at MP2.



Appendix G – CadnaA Model

Figure 20 - CadnaA Model Screenshot



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