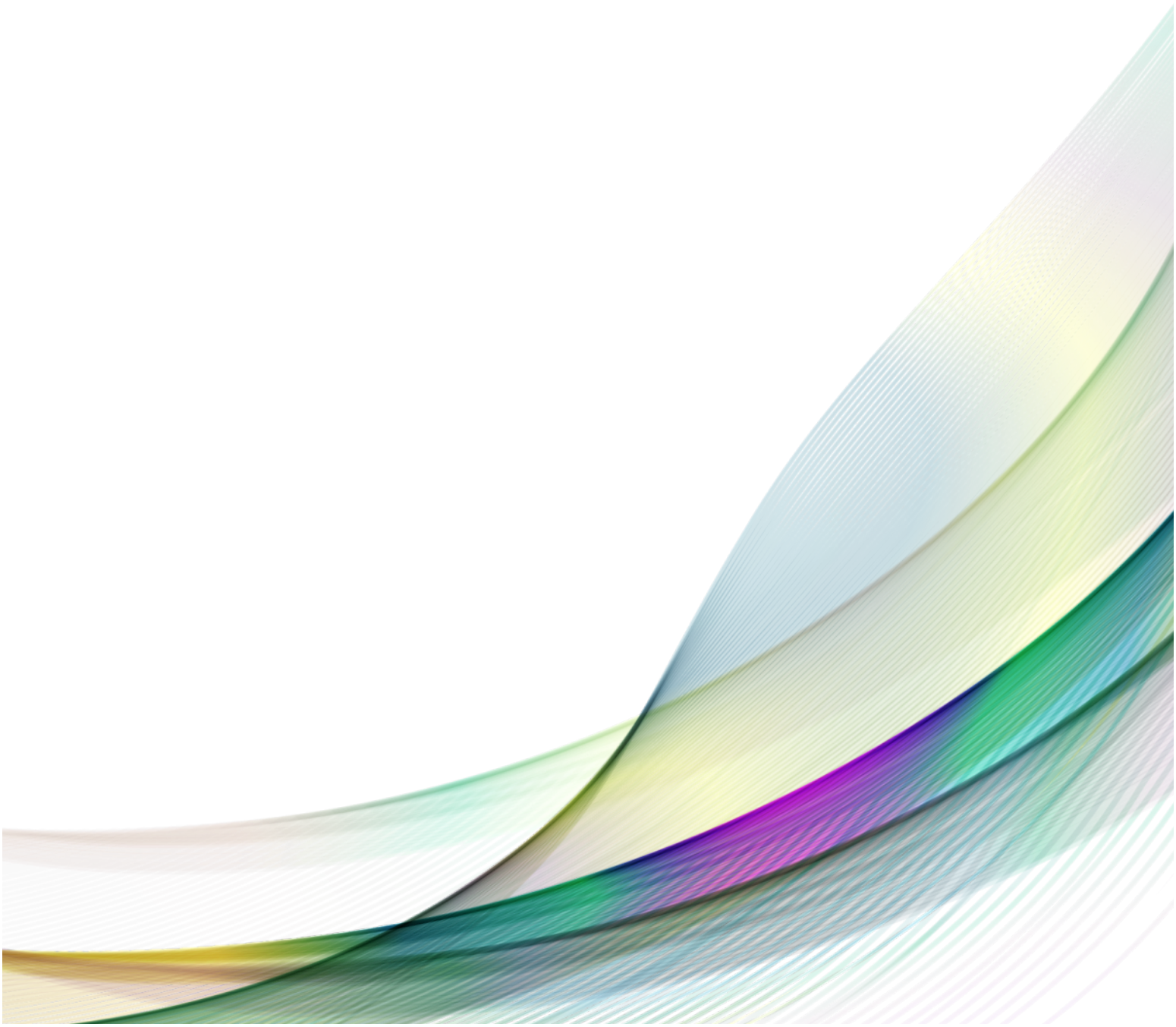
MACH GROUP

Environmental Acoustics

21 BELSIZE ROAD

Environmental Noise Assessment

Transformation Architects



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Document Reference: RP 200429 – 21 Belsize Road – BS4142 Assessment

Revision	Description	Author	Issued by	Issue Date
00	First Issue	SD	SD	18/05/2020

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1.0 INTRODUCTION

MACH has been appointed by Transformation Architects to undertake an environmental noise survey at 21 Belsize Road, NW6 4RX.

The development is an existing residential building which is to be extended. Part of the proposals is the addition of an air conditioning system and external unit. Therefore, the noise survey undertaken is required to assist with the following;

- Determine appropriate noise limits for building services plant such to protect neighbouring noise sensitive receptors.

1.1 Planning Conditions

At this time, it is understood the project at 21 Belsize Road has no planning conditions imposed by the local authority of Hampstead and Kilburn.

2.0 LEGISLATION FOR NOISE

2.1 National Planning Policy Framework (NPPF)

In March 2014 the Government published the National Planning Policy Framework (NPPF) for noise which sets out the Government's planning policies for England and how these are expected to be applied.

The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

With regards to noise the Framework states that 'Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

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

It also states that:

"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."

2.2 Noise Policy Statement for England (NPSE)

The aim of the Noise Policy Statement for England (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims: Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life

2.3 National Planning Policy Guidance - Noise

Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The current guidance contained in the NPPG is summarised in the table below. This advice has not changed since the introduction of the 2018 version of the NPPF.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 2.1: Noise exposure hierarchy

3.0 OVERVIEW OF RELEVENT GUIDANCE DOCUMENTS

3.1 Plant Noise Limits - BS 4142: 2014

BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

This assessment typically focuses on a comparative study against the existing typical background noise level, L_{A90}. Although in some cases the context of an absolute noise level in terms of $L_{Aeq,T}$ may be considered.

For this reason the typical L_{A90} noise levels and where required the ambient $L_{Aeq,T}$ noise levels will be reported.

4.0 ENVIRONMENTAL NOISE SURVEY

To establish the existing environmental noise levels on site, a noise survey was conducted between 11:30 on the 04/05/2020 and 07:30 on the 07/05/2020. The data used within the assessment was from 06/05/2020 00:00 to 07:30 on the 07/05/2020 due to increased wind levels prior to this. This window gives sufficient data with which to conduct the assessment.

4.1 Site Description

The site is located in an urban area of London and surrounded by residential areas. To the south is South Hampstead tube station. Hilgrove Road lies to the south and Finchley Road to the east. The proposed extension is on the same plot as the existing property.

4.1.1 Noise Climate

Noise Source	Time of Observation	Description
Hilgrove Road	09:00 – 10:30	Intermittent noise, dominant
Finchley Road	09:00 – 10:30	Intermittent noise, dominant
South Hampstead Rail Station	09:00 – 10:30	Intermittent
Belsize Road	09:00 – 10:30	Intermittent

Table 4-1: Subjective summary of noise sources

4.1.2 Nearest Noise Sensitive Receivers

Neighbouring noise sensitive receivers that may be affected by the development are listed below.

Type	Location	Distance from Site Boundary (m)
Residential	19 Belsize Road	3

Table 4-2: Nearest noise sensitive receivers

4.2 Noise Survey Methodology

A fixed microphone position was used record noise levels representative of typical operating hours of the development, the fixed long term meter set to measure consecutive 'A' weighted 5-minute time samples. Measurements have been taken in free-field conditions, or have been corrected where appropriate.

Measurement locations are shown in Figure 4.1 below. Appendix C of the report presents photographs taken during the noise survey, which help provide a good understanding of the site. The results of the environmental noise survey are provided within Section 5 of this report.

Figure 4.1: Measurement location map

5.0 RESULTS

5.1 Fixed Measurement Results

The following graph presents the noise levels recorded over the measurement period at the fixed location (F1).

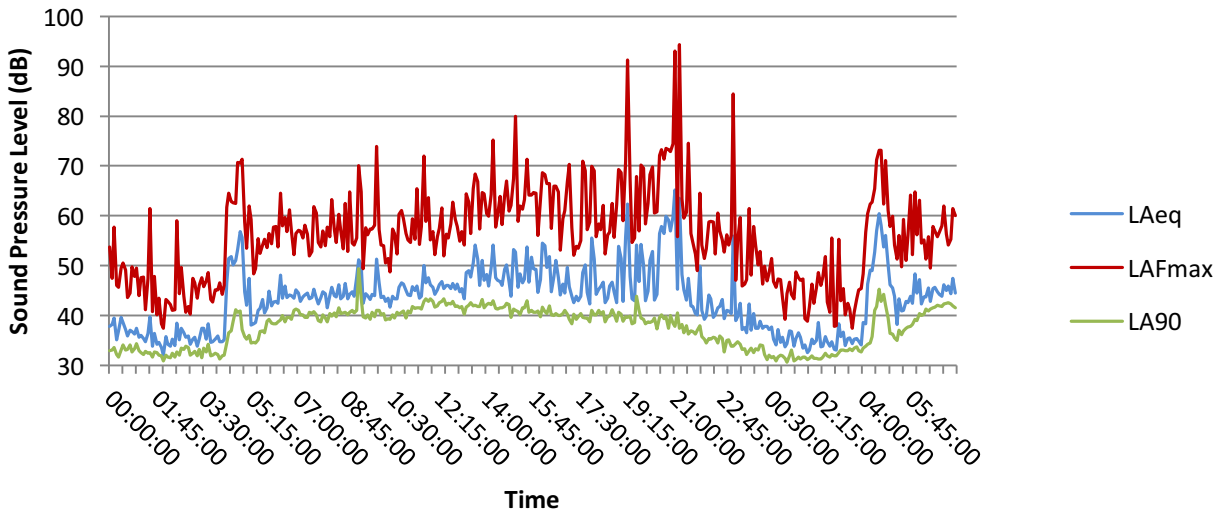


Figure 5.1: Sound pressure level at fixed location, F1

5.1.1 Summary of Background Noise Levels, L_{A90}

The table below presents measured noise levels of the L_{A90} values measured on site. These will be discussed further in the plant noise impact assessment to ensure a representative vale will be used in relation to the proposed operational hours. Appendix D shows histograms in which the mode values can be seen.

Date	Location	Period, T	Average	L_{A90} (dB)
06/05/2020 – 07/05/2020	Fixed 1	Daytime (16hour)	Mean	39
			Mode	40
			Median	40
			Min	31
		Night Time (8hour)	Mean	35
			Mode	32
			Median	33
			Min	31

Table 5-1: Summary of Fixed Location Measurement

6.0 BACKGROUND NOISE LEVEL

BS4142: 2014 states that '*in using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.*' BS4142 further states that '*a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either minimum or modal value*'. Hence BS4142 does not provide a black and white method of obtaining the assessment level for background noise.

The table above shows the minimum, maximum and modal L_{A90} occurring during the operational hours of the noise source. For the purposes of this assessment, the modal value has been used as a representative value for the background level. These levels are summarised in Table 6-1 below. Histograms of the L_{A90} values throughout the noise assessments are shown in Appendix D.

Location	Time Period	Mode (dB, L_{A90})	Maximum Rating Level (dB, $L_{ar,T}$)
F1	Daytime (07:00-23:00)	40	35
	Night-time (07:00-23:00)	32	27

Table 6-1: Summary of the maximum rating level targets at each location.

As there are no planning conditions at the moment, MACH have suggested a target of 5 dB below the background level. The maximum rating level is therefore shown in Table 6-1.

Additionally, MACH recommends the effects of the Covid-19 virus on the noise level measured should be considered. Noise levels in the area are reduced due to the national lockdown and resultant reduction in traffic flow, train activity etc. It can, therefore, be assumed the results shown above are an absolute worst case, and once normality returns, noise levels will see a slight increase.

7.0 NOISE BREAK OUT

Using the manufacturer data for mechanical plant units specified on site, locations and operational hours of plant have been provided by the client. MACH have completed an assessment of the noise break out from the proposed site. The results of this assessment are shown in the following sections.

7.1 Noise Source Locations

The proposals include installation of a single unit close to the brick boundary wall, the proposed locations of the units are highlighted in red in Figure 7-1 below.

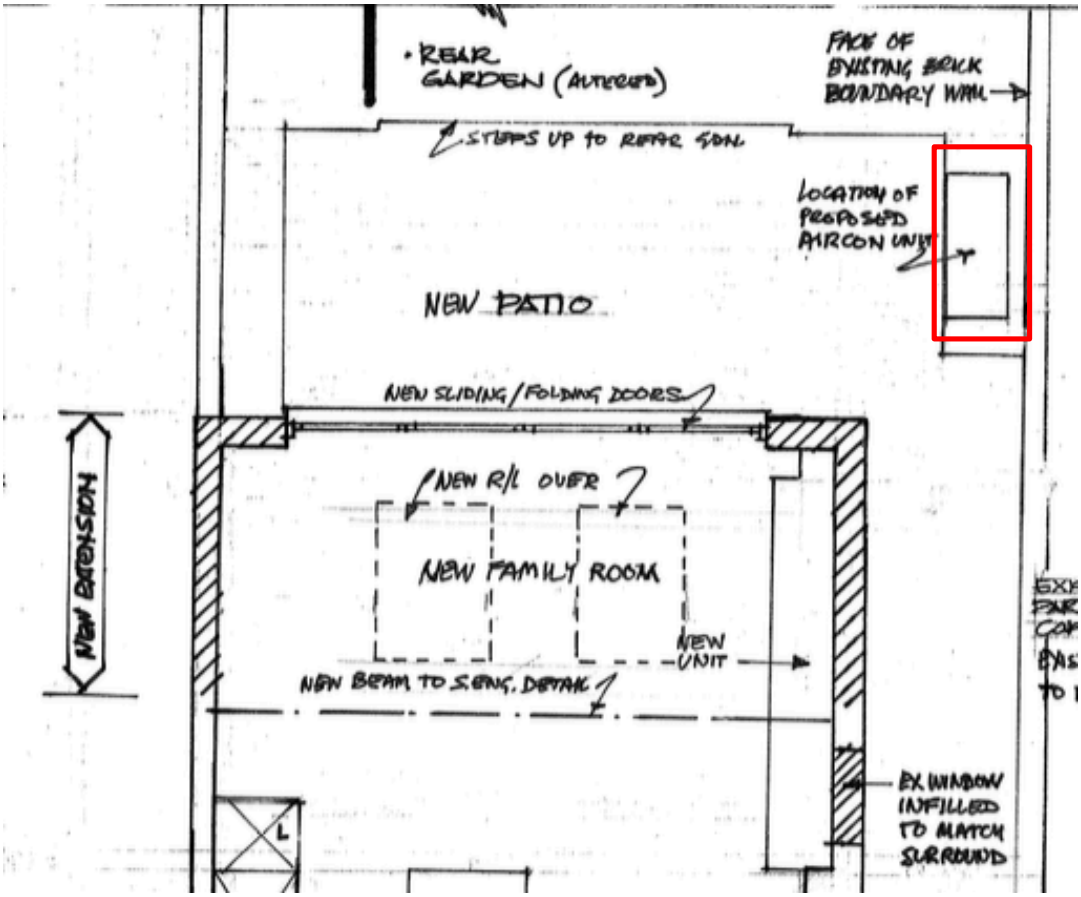


Figure 7-1 : General view of the proposed plant unit

7.2 Noise Sources

The operational hours of the equipment have been provided by Transformation Architects and are shown in Table 7.1 below.

Equipment	Type of Source	Sound Pressure Level Source	Day Time (07:00 – 23:00)	Night Time (23:00 – 07:00
PUMY – SP140	Point Source	Manufacturer Data	Operational*	Operational*

Table 7.1: Plant Equipment

*For the purposes of the calculations, the unit is assumed to be operational during the day and night as a worst case. MACH have been advised the unit will typically be used during the summer during hot periods.

BS4142 states that assessments of sound levels at noise sensitive receivers should be carried out over and hour during the day and 15 minutes during the night time. As the sources are not operational for longer than 1 hour during the day and 15 minutes during the night time, the following correction has been added to the respective sound levels to take this into account

$$A_{op} = 10\log_{10}\left(\frac{T}{T_o}\right)$$

Where T_o is the reference time and T is the operational time.

The following noise levels have formed the basis of assessment.

Description	Measurement Type	Duty Rate	Sound Power and Sound Pressure Levels at Octave Band Centre Frequencies, Hz							dB (A)
			63	125	250	500	1000	2000	4000	
Heating	SPL @ 1m	100 %	62	58	56	53	52	46	41	56
Cooling	SPL @ 1m	100 %	56	56	54	52	49	44	38	54

Table 7-2: Noise source – representative noise levels

7.3 Attenuation Requirements

MACH have been provided with acoustic information for an enclosure which should be installed in order to meet the rating level target shown in Table 7.4 below.

Description	Sound Reduction Indices at Octave Band Centre Frequencies, Hz						
	63	125	250	500	1000	2000	4000
Environ Lite Acoustic Enclosure	14	16	23	30	37	39	38

Table 7-3: Minimum Required Attenuation

7.4 BS4142 Assessment

The table below provides the calculated rating level at the nearest noise sensitive receptor, which is indicated in Section 4.1.2 The specific noise level has been established through calculation as provided in Appendix A.

Time Period	Location	Plant Noise Limit (dB $L_{Aeq,T}$)	Specific Noise Level (dB $L_{Aeq,T}$)	Acoustic Correction (dB)	Rating Level (dB $L_{Ar,T}$)	Assessment Outcome
Daytime (07:00 – 23:00)	19 Belsize Road	35	20	+0	35	-15
Night Time (23:00 – 07:00)		27	20	+0	27	-7

Table 7-4: BS4142: assessment outcome

As Table 7.4 above shows the specific noise level is -7 dB below the prevailing background level. This shows that the risk of complaint is low.

The specific noise level has been calculated over 1 hour during the day and 15 minutes during the night. The noise sources have been assumed to be operational throughout the entire of this period. Therefore, this assessment shows the worst-case outcome. No acoustic correction has been applied as the manufacturer data does not state the unit as being tonal in acoustic character.

8.0 CONCLUSION

An environmental noise survey was conducted 11:30 on the 04/05/2020 and 07:30 on the 07/05/2020. The data used within the assessment was from 06/05/2020 00:00 to 07:30 on the 07/05/2020 due to increased wind levels prior to this, and the following conclusions can be made:

- Road traffic along Hillgrove Road and Finchley Road were found to be the dominant noise source with some additional noise contribution from Belsize Road.
- The modal background noise levels on site during the day were measured to be 40 dB L_{A90} during the day and 32 dB L_{A90} during the night.
- Plant noise limits have been set at **5 dB below** the existing background noise levels, meaning **plant noise contributions should not exceed 35 dB $L_{Aeq,T}$ in the day and 27 dB $L_{Aeq,T}$ in the night.**
- MACH recommends the Covid-19 lockdown be taken into account. A national lockdown would have resulted in lower noise levels than normal.
- It is found that with the attenuation specified in Table 7-3, the proposed equipment it is predicted that the risk of complaints is low.

APPENDIX A - NOISE BREAK IN CALCULATION

MACH ACOUSTICS	Octave Band Centre Frequencies, Hz							
	63	125	250	500	1000	2000	4000	dB(A)
SWL Radiating from XXXXXX	70	66	64	61	60	54	49	63.9
Louver / breakout losses	0	0	0	0	0	0	0	
Other losses (screening, etc)	14	16	23	30	37	39	38	
Radiation Directivity	2	*(1 = free space, 2 = hemispherical, 4 = 1/4-sphere, 8= 1/8 sphere)*						
@ Distance (m)	3							
SPL @ Residence	38	32	23	13	5	-3	-7	20.2

Figure A.1: Shows the plant noise calculation for the proposed unit

Transmission Loss Data:

Transmission Loss — Environ ELV1.1.25AC Acoustic Enclosure							
Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascal's)							
63	125	250	500	1K	2K	4K	8K
14	16	23	30	37	39	38	39
Summary							
Transmission Loss Equates to an Overall Reduction of 26 dB(A)							

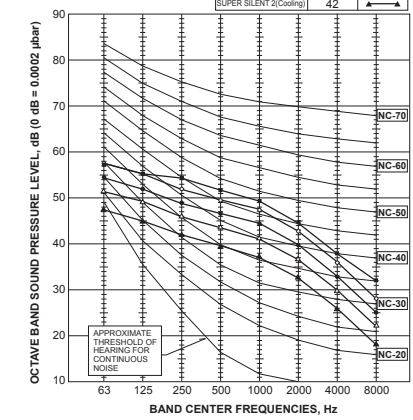
Figure A.2: Shows the transmission loss for the acoustic enclosure

APPENDIX B - MECHANICAL SERVICES NOISE DATA

4-6. NOISE CRITERION CURVES

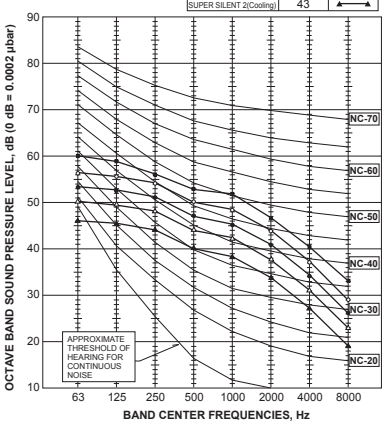
PUMY-SP112VKM.TH(-BS)
PUMY-SP112VKMR1.TH(-BS)
PUMY-SP112YKM.TH(-BS)
PUMY-SP112YKMR1.TH(-BS)

MODE	SPL(dB)	LINE
HEATING	54	
COOLING	52	
SILENT(Cooling)	49	
SUPER SILENT 1(Cooling)	46	
SUPER SILENT 2(Cooling)	42	



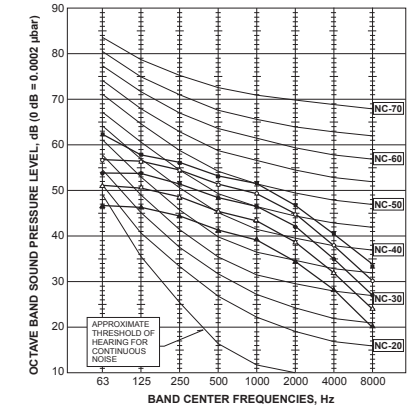
PUMY-SP125VKM.TH(-BS)
PUMY-SP125VKMR1.TH(-BS)
PUMY-SP125YKM.TH(-BS)
PUMY-SP125YKMR1.TH(-BS)

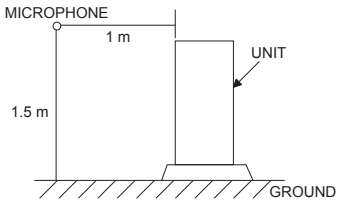
MODE	SPL(dB)	LINE
HEATING	56	
COOLING	53	
SILENT(Cooling)	50	
SUPER SILENT 1(Cooling)	47	
SUPER SILENT 2(Cooling)	43	



PUMY-SP140VKM.TH(-BS)
PUMY-SP140VKMR1.TH(-BS)
PUMY-SP140YKM.TH(-BS)
PUMY-SP140YKMR1.TH(-BS)

MODE	SPL(dB)	LINE
HEATING	56	
COOLING	54	
SILENT(Cooling)	51	
SUPER SILENT 1(Cooling)	48	
SUPER SILENT 2(Cooling)	44	





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APPENDIX C - ENVIRONMENTAL NOISE SURVEY METHODOLOGY

BS 7445:2003

Environmental noise measurements were conducted in accordance with BS 7445 "Description and measurement of environmental noise".

Measurement Equipment

Name	Serial Number	Last Calibrated	Certificate Number	Calibration Due
NTI Precision Sound Analyser XL2 TA	A2A-15207-E0	Nov-18	FL18-023	Nov-20
NTI Pre-amplifier MA220	7856	Nov-18	FL18-023	Nov-20
NTI Microphone Capsule MC230A	A16182	Nov-18	FL18-023	Nov-20
Svantek Acoustic Calibrator SV31	32531	Oct-19	133385	Oct-20

Table A.1 Shows the measurement equipment used throughout the noise survey.

The measurement equipment listed above was used during the survey, where all equipment complies with BS EN 60942:2003 i.e. a class 1 device

Meteorological Conditions

Date	Time (hh:mm)	Temperature (°C)	Wind Speed (m/s)	Conditions
04/05/20	00:00	10-11	1	Overcast
	06:00	11-16	4	Broken Clouds
	12:00	16-17	6	Broken Clouds
	18:00	8-15	7	Clear
05/05/20	00:00	7-8	5	Passing Clouds
	06:00	8-13	7	Partly Sunny
	12:00	14-15	8	Passing Clouds
	18:00	8-13	6	Sunny
06/05/20	00:00	6-7	3	Clear
	06:00	6-15	4	Passing Clouds
	12:00	15-19	4	Passing Clouds
	18:00	8-17	3	Sunny
07/05/20	00:00	4-8	1	Clear
	06:00	7-20	2	Sunny
	12:00	20-23	3	Sunny
	18:00	13-21	3	Sunny

Table A.2 Shows weather observed throughout the noise survey.

The above data has been taken from timeanddate.com (https://www.timeanddate.com/weather)

Site Photographs

Location	Image
Fixed Position	

Location	Image
Fixed 1	

Table A.3: Shows pictures of the noise survey.

APPENDIX D - HISTOGRAMS