



Noise Impact Assessment

Site Address: 5 Lower King Street, Royston, Herts, SG8 2AL

Client Name: Royston Museum Trust

Project Reference: NP-013079



Authorisation and Version Control

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Delivering sustainable development by promoting good health and well-being through effective management of noise.

Contents

1.	INTRODUCTION	4
1.1	Standards, Legislation, Policy & Guidance	4
1.2	Proposal Brief	4
1.3	Local Planning Authority & Background	5
2.	ENVIRONMENTAL NOISE SURVEY	6
2.1	Measurement Methodology	6
2.1	Context & Subjective Impression.....	6
2.2	Environmental Noise Survey Results.....	7
3.	BS4142 NOISE IMPACT ASSESSMENT	9
3.1	Proposed External Fixed Plant & Specific Sound Levels	9
3.2	BS4142 Noise Impact Assessment	9
3.3	Recommendations & Mitigation Measures	10
4.	CONCLUSION AND ACTION PLAN	11
	APPENDIX A – ACOUSTIC TERMINOLOGY	12
	APPENDIX B – STANDARDS, LEGISLATION, POLICY, AND GUIDANCE	13
	B.1 – National Planning Policy Framework (2024)	13
	B.2 – Noise Policy Statement for England (2010).....	13
	B.3 – BS4142:2014+A1:2019 – ‘Methods for rating and assessing industrial and commercial sound’	14
	APPENDIX C – LOCATION PLAN	18
	APPENDIX D – ENVIRONMENTAL SURVEY	19
	D.1 – Time History Noise Data	19
	D.2 – Surveying Equipment	19
	D.3 – Meteorological Conditions	19
	APPENDIX E – MANUFACTURER’S DATASHEETS.....	21
	APPENDIX F – FULL PROPAGATION CALCULATIONS.....	24

List of Figures

<i>Figure 1 – Proposed Development Layout</i>	<i>5</i>
<i>Figure 2 – Measurement Locations and Site Surroundings.....</i>	<i>6</i>
<i>Figure 3 – MP1 Daytime Background Sound Level Analysis</i>	<i>7</i>
<i>Figure 4 – MP1 Night-time Background Sound Level Analysis</i>	<i>7</i>
<i>Figure 5 – Proposed Location for Acoustic Absorption</i>	<i>10</i>
<i>Figure 6 – MP1 Noise Survey Time History.....</i>	<i>19</i>

List of Tables

<i>Table 1 – Measurement Methodology</i>	<i>6</i>
<i>Table 2 – Sound Power Levels of Proposed Heat Pumps</i>	<i>9</i>
<i>Table 3 – BS4142 Noise Impact Assessment.....</i>	<i>9</i>
<i>Table 4 – Surveying Equipment.....</i>	<i>19</i>
<i>Table 5 – Weather Conditions.....</i>	<i>20</i>
<i>Table 6 – Propagation Calculations – NSR1 (Daytime)</i>	<i>24</i>
<i>Table 7 – Propagation Calculations – NSR2 (Daytime)</i>	<i>24</i>
<i>Table 8 – Propagation Calculations – NSR3 (Daytime)</i>	<i>24</i>
<i>Table 9 – Propagation Calculations – NSR1 (Night-time)</i>	<i>25</i>
<i>Table 10 – Propagation Calculations – NSR2 (Night-time)</i>	<i>25</i>
<i>Table 11 – Propagation Calculations – NSR3 (Night-time)</i>	<i>25</i>

1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment for the installation of 2no. fixed plant units ('the proposed development') at 5 Lower King Street, Royston, Herts, SG8 2AL ('the site').

The applicant has submitted a planning application (ref. 25/01142/FP, 'the Application') to the Local Planning Authority (the 'LPA'), North Hertfordshire District Council. This report has been prepared to accompany the application and provides supplementary guidance regarding the suitability of the scheme.

A noise survey has been undertaken to establish the prevailing background sound levels at the closest noise-sensitive receptors ('NSRs'). This report details the existing background sound climate and the predicted noise emissions associated with the proposed development. Measures required to mitigate noise impact have been recommended where necessary and are assessed in accordance with the relevant performance standards, legislation, policy and guidance.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Standards, Legislation, Policy & Guidance

The following performance standards, legislation, policy and guidance have been considered to ensure good acoustic design in the assessment:

- National Planning Policy Framework (2024)
- Noise Policy Statement for England (2010)
- British Standard BS4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'

Further information on the legislation can be found in Appendix B.

1.2 Proposal Brief

It is proposed that 2no. fixed plant units are installed at the site, replacing the existing gas boiler system. The client has confirmed that operational hours are generally expected to remain unchanged, and are typically limited to daytime use between 09:00 and 16:00, Thursday to Sunday. However, this schedule is subject to variation depending on weather conditions, with opening hours extending on occasion to 22:00 on a weekly basis.

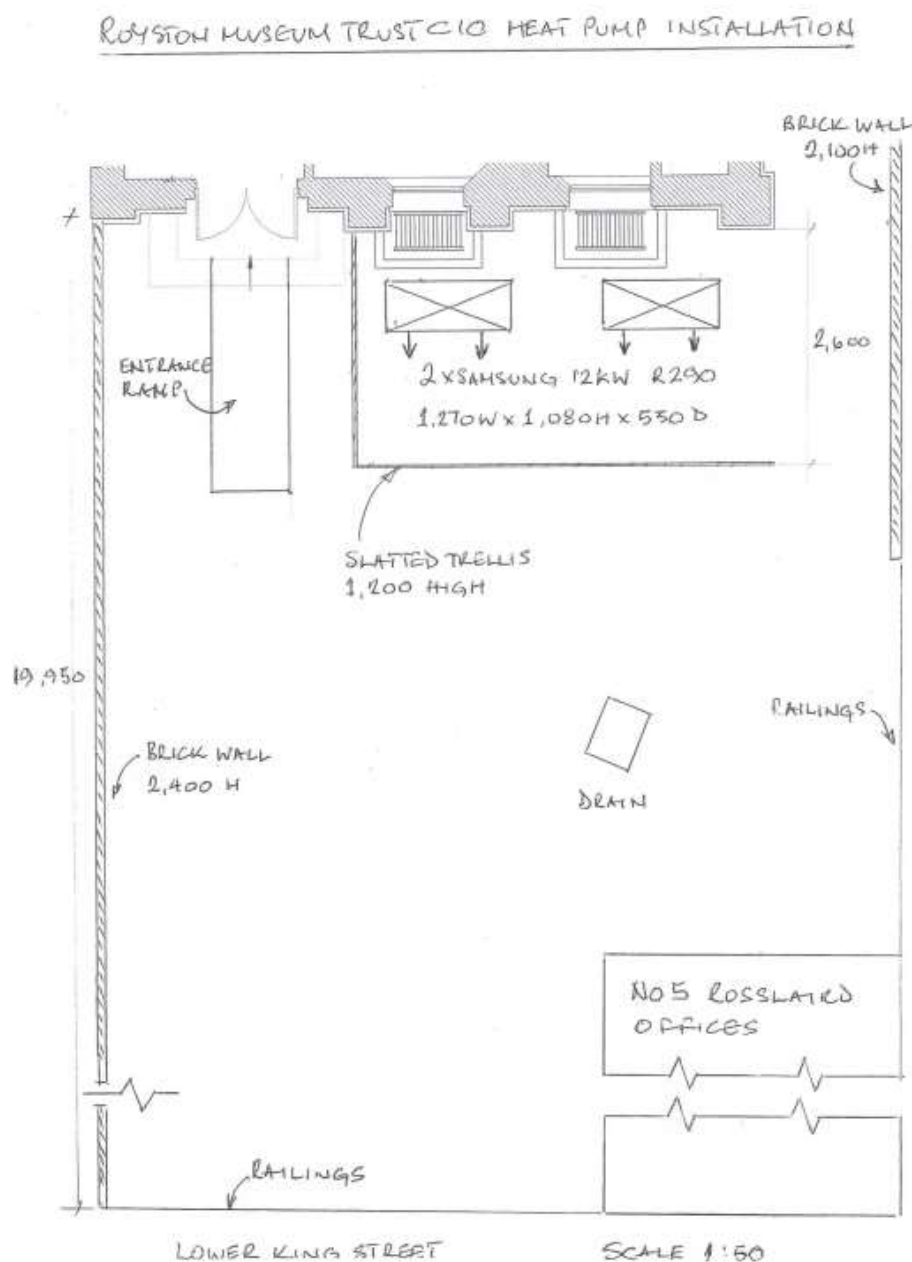
In addition, the proposed units are designed to operate during the night-time period to prevent freezing of components. Manufacturer information indicates that the units are capable of continuous operation at reduced output during the night. On this basis, it is considered that the plant may operate at any time, during both daytime and night-time periods, according to demand. The make and model of the plant units is as follows:

- Samsung EHS Gen 7: AE120CXYDEK/EU

The proposed units will be located at ground floor level along the eastern façade of the building. The nearest NSRs are identified as the residential dwellings situated directly north and south of the development site.

Although the units will not be housed within a formal enclosure, the drawings provided by the client indicate that a 1.2-metre-high timber slatted trellis fence is to be installed.

The following drawing provided by the client shows the proposed development layout.



1.3 Local Planning Authority & Background

The following has been stated by the LPA regarding noise from the development:

"The guidance suggests that where there is concern, that a noise impact assessment is carried out (BS4142 style). Given that the neighbour has raised concerns about noise and given that there is more than one can we obtain such an assessment. I would consider that prudent under the circumstances".

2. Environmental Noise Survey

2.1 Measurement Methodology

The measurement dates and particulars are outlined in the following table. Weather conditions during the environmental sound survey can be found in Appendix D.

Location	Survey Dates	Measurement Particulars
MP1	19-21/08/2025	Equipment mounted on a tripod within the development site close to the proposed location of the plant units. The microphone was positioned approximately 1.5m above the ground and at least 1m from any other large reflective surface. A 130mm diameter windshield was fitted to the microphone and the equipment was field calibrated before and after the survey with negligible drift noted.

Table 1 – Measurement Methodology

The site surroundings and measurement location are highlighted in the following figure:



Imagery ©2025 Airbus, Imagery ©2025 Airbus, Maxar Technologies, Map data ©2025

Figure 2 – Measurement Locations and Site Surroundings

2.1 Context & Subjective Impression

The proposed development site is situated within a mixed-use area off Lower King Street in Royston. The immediate area is predominantly residential in nature with commercial premises located further afield, however, the commercial uses are acoustically screened by the intervening residential properties.

It was found during the site visits that the acoustic environment is generally quiet, with the prevailing noise climate influenced primarily by traffic noise from the surrounding road network, along with intermittent activity from patrons visiting the development site.

The nearest noise-sensitive receptors (NSR1 and NSR2) are residential dwellings located immediately adjacent to the site to the northwest and northeast, at an approximate separation distance of 7m. A further residential dwelling (NSR3) is located approximately 15m to the southeast.

2.2 Environmental Noise Survey Results

Background Sound Level Analysis

The measured background sound levels that are used as the baseline for the BS4142 noise assessment are outlined in the following section. As previously stated, it is thought that the plant units could operate at any time during the daytime and night-time, and as such, the background noise levels are presented for both periods. The time history results can be found in Appendix D.

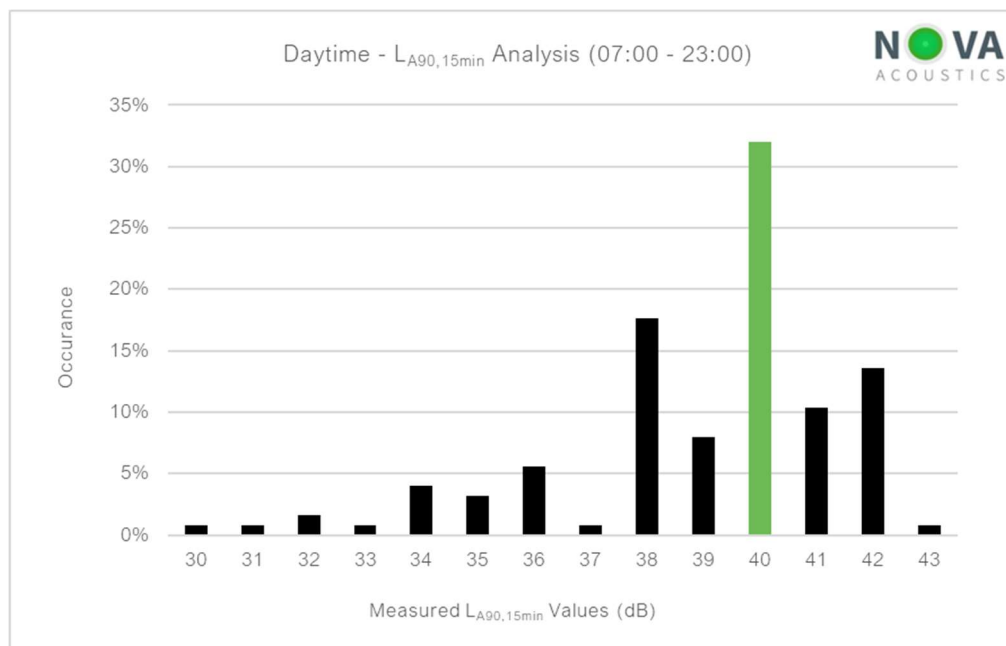


Figure 3 – MP1 Daytime Background Sound Level Analysis

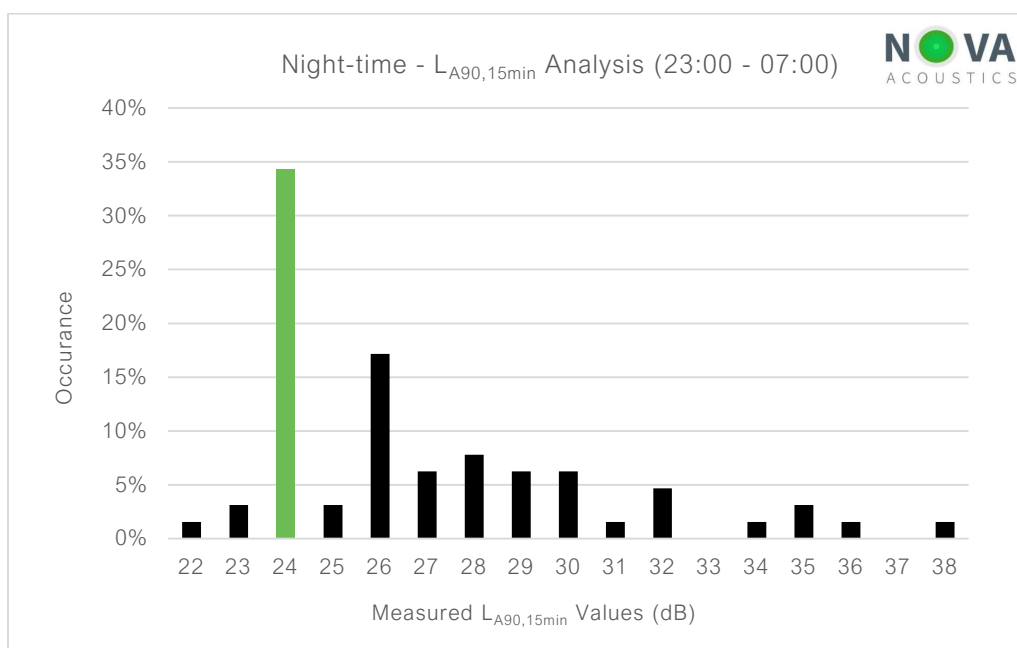


Figure 4 – MP1 Night-time Background Sound Level Analysis

As shown in Figures 3 and 4, the modal $L_{A90,15min}$ values were measured at **40dBA** during the daytime and **24dBA** during the night-time. These are thought to be representative of the lowest 'typical' background conditions at the NSRs.

It should be noted however that the night-time background noise measurement of **24dBA** is very low, and under such circumstances, the following is stated in BS4142:

"...the absolute sound levels may be as, or more, relevant than the margin by which the rating sound level exceeds the background sound level; this is particularly true at night."

Consequently, an absolute criterion is considered to be appropriate for the night-time assessment. Outdoor amenity areas are unlikely to be used during the night; therefore, the primary concern comes from achieving suitable internal levels within the bedrooms as to avoid sleep disturbance.

BS8233 prescribes a night-time internal ambient noise level within bedrooms of $\leq 30\text{dB } L_{Aeq,8h}$. Therefore, it is considered that an external noise limit of **33dBA** outside the nearest bedroom window is reasonable, which would ensure that internal noise levels do not exceed **20dBA**. At this level, noise from the plant units is unlikely to be audible against the prevailing noise climate within the rooms themselves and would therefore form a robust criterion. Whilst the BS8233 criterion is based upon anonymous transport sources, it is unlikely that any acoustic features would be perceptible within the NSR bedrooms at this level. Nonetheless, good acoustic design should still be implemented to reduce the likelihood of any tonality, intermittency and any other features not described.

3. BS4142 Noise Impact Assessment

In the following section of the report, the impact of the noise generated by the proposed plant units is assessed.

3.1 Proposed External Fixed Plant & Specific Sound Levels

The 1/1 octave frequency band sound power levels that are used in the subsequent calculations are shown in the following table. Noise levels are presented for both the daytime and night-time operating levels. Manufacturers datasheets can be found in Appendix E.

Description	1/1 Octave Frequency Band (Hz, L _w , dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
1 No. Samsung EHS Gen 7 R290: AE120CXYDEK/EU (Daytime)	62 ^[1]	62	65	57	53	48	45	46	60
1 No. Samsung EHS Gen 7 R290: AE120CXYDEK/EU (Night-time)	60	57	52	50	47	44	37	26	53 ^[2]

Notes:

[1] Value not presented in manufacturer data. As such, value is thought to represent 'typical' scenario.

[2] Unit running in 'Night Mode'. Specific data unavailable, therefore frequency data has been taken from measured sound pressure levels given in the manufacturer datasheet and adjusted to reflect the global value.

Table 2 – Sound Power Levels of Proposed Heat Pumps

3.2 BS4142 Noise Impact Assessment

The BS4142 assessments at the most affected NSRs are shown in the table below. Full calculations are included in Appendix F.

Description	Daytime			Night-time		
	NSR1	NSR2	NSR3	NSR1	NSR2	NSR3
Cumulative Specific Sound Level (L _{Aeq})	30	41	35	14	34	27
Acoustic Feature Correction	A +2 dB penalty is applied to account for the 'just perceptible' low frequency hum typically present in the noise emissions generated by heat pump units.					
Rating Sound Level (L _{Af,Tr})	32	43	37	16	36	29
Background Sound Level (L _{A90} / Proposed Criteria (see Section 2.2))	40			33		
Exceedance of Background	-8	+3	-3	-17	+3	-4
BS4142 Assessment Outcome	Low likelihood of adverse impact.					
NPPF / NPSE Assessment Outcome	Lowest Observed Adverse Effect Level ('LOAEL').					

Table 3 – BS4142 Noise Impact Assessment

3.3 Recommendations & Mitigation Measures

As can be seen in the assessment above, the rating noise levels are predicted to exceed the daytime and night-time background sound levels at NSR2 by 3dB. Whilst this suggests a 'Low Likelihood of Adverse Impact', given the sensitivity of the surrounding receptors, it is recommended that noise levels do not exceed the background sound level. This would ensure that 'low impact' would be achieved when assessed with BS4142, which would equate to 'No Observed Adverse Effect Level ('NOAEL') when assessed with the NPPF and NPSE.

To achieve this reduction, it is recommended that **one** of the following mitigation options is implemented:

1. The 1.2m tall trellis fencing which is proposed to be installed in front of the units should be substituted with 1.4m tall acoustic fencing. This must have the following attributes:
 - The fencing must have no holes or gaps.
 - The fencing must have a minimum surface mass of 15kg/m².
 - The fencing must have an absorptive inner surface to limit unwanted acoustic reflections.

An example product that would be suitable is the 'Noistop Essential' barrier from iKoustic.

2. Acoustically absorptive panelling should be installed on the walls behind the units to reduce acoustic reflections. The panelling should be installed from ground level to a minimum height of 1.5m (excluding windows) and must provide a minimum of Class C absorption. An example product range which is suitable for installation is the 'Quietstone Light' panel. The proposed location is shown in the figure below.

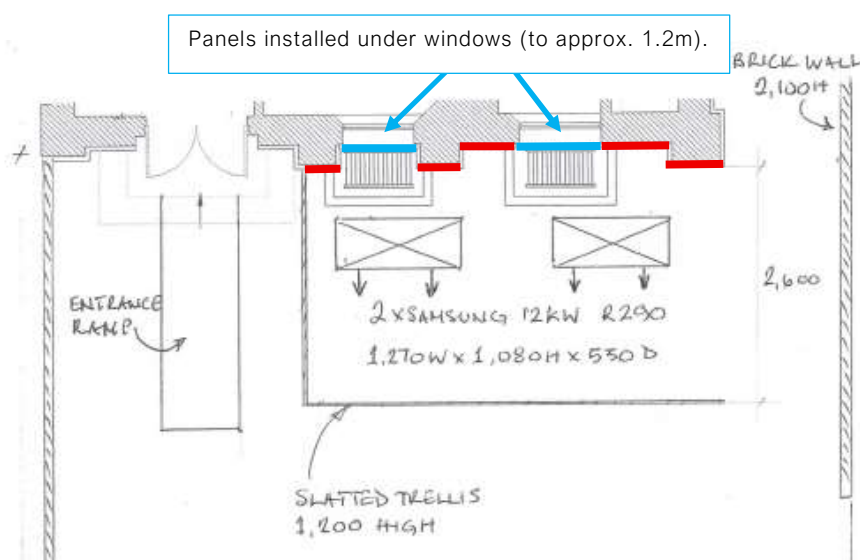


Figure 5 – Proposed Location for Acoustic Absorption

4. Conclusion and Action Plan

The noise emissions from the plant units have been assessed against the requirements of BS4142, and a mitigation scheme has been provided to ensure the criteria can be achieved.

Providing **one** of the mitigation options shown in Section 3.3 is implemented, the rating noise levels from the units are not predicted to exceed the background noise levels at any of the closest noise-sensitive receptors. This is classed as 'low impact' when assessed with BS4142, which equates to 'No Observed Adverse Effect Level' ('NOAEL') when assessed with the NPSE and NPPF.

It should be noted that the units must be set to operate on 'night mode' during all night-time periods. It is expected that this can be enforced via planning condition, if required.

The findings of this report will require written approval from the Local Authority prior to work commencing.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
Background Sound	Underlying level of sound over a period, T , which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T , has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for $N\%$ of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10 \log_{10} (p/p_0)^2$. Where: p is the root-mean-square sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Standards, Legislation, Policy, and Guidance

This report is to be primarily based on the following standards, legislation, policy and guidance.

B.1 – National Planning Policy Framework (2024)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2024. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 187e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 198 states:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 198 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

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

To achieve this vision the Statement identifies the following three 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;
- Where possible, contribute to the improvement of health and quality of life.

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that “significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development”.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: “all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.”

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. This can be related to the third aim above, which seeks: “where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

This is further expanded using the updated “Noise Exposure Hierarchy Table” which includes an additional level of impact referred to as the ‘No Observed Adverse Effect Level’ (‘NOAEL’). It is stated that at this level: *“noise can be heard, but does not cause any change in behaviour, attitude or other physiological response”*. In addition, noise at this level *“can slightly affect the acoustic character of the area but not such that there is a change in the quality of life”*.

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – BS4142:2014+A1:2019 – ‘Methods for rating and assessing industrial and commercial sound’

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"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. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

- a) subjective method;*
- b) objective method for tonality;*
- c) reference method."*

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) *Intermittency*

BS4142:2014 states that when the “specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time ... if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.”

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a ‘typical’ background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142:2014 states: “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”. An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- “Typically, the greater this difference, the greater the magnitude of the impact.”
- “A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”
- “A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”
- “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 negligible impact, depending on the context.”

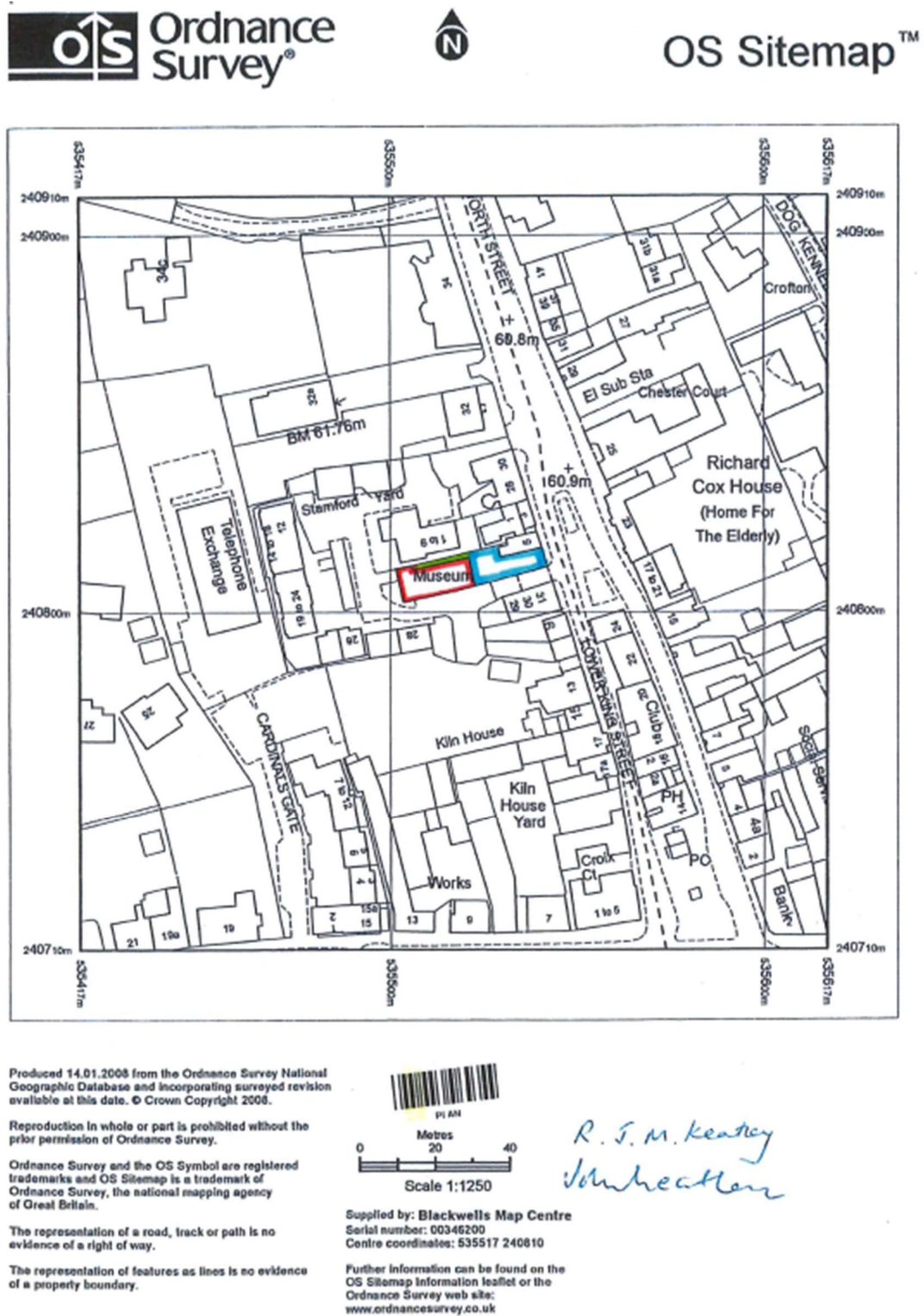
Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;

- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound 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 sound level does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact and would therefore be classified as No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

Appendix C – Location Plan



This official copy is incomplete without the preceding notes page.

Appendix D – Environmental Survey

D.1 – Time History Noise Data

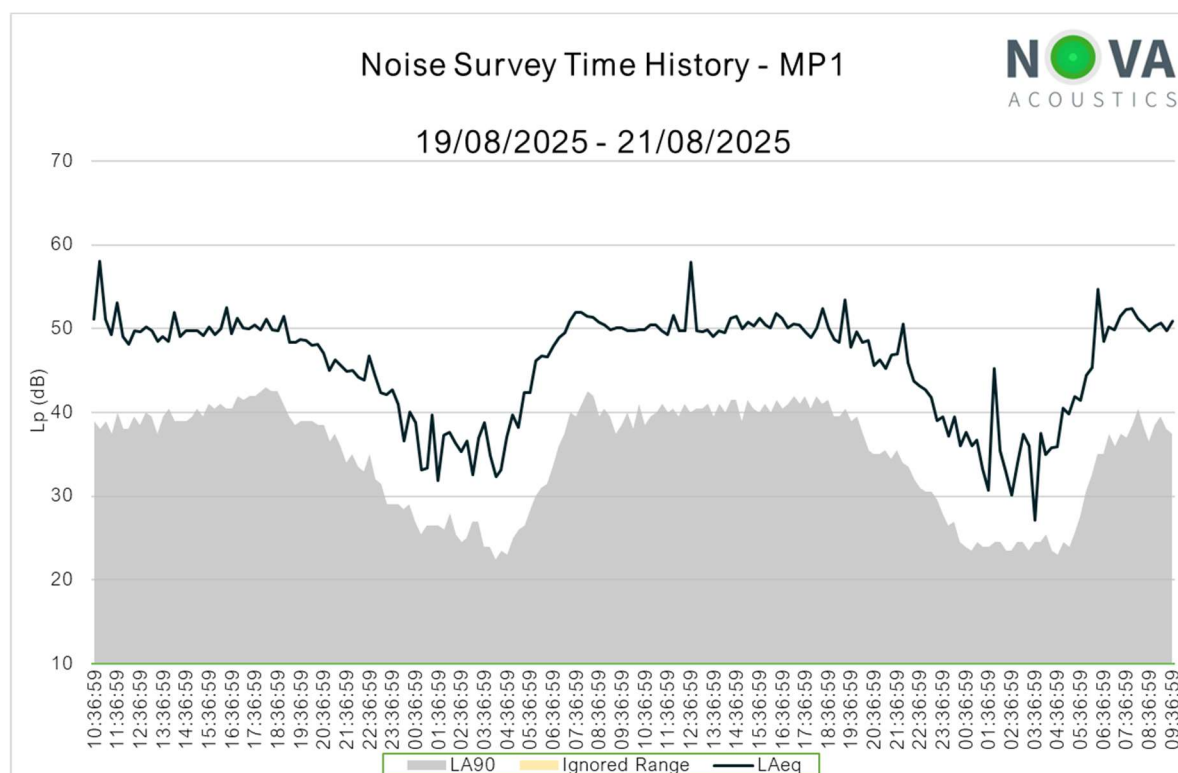


Figure 6 – MP1 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
CESVA SC420 Class 1 Sound Level Meter	T246452	≤0.1
Svantek SV33B Class 1 Calibrator	160892	

Table 4 – Surveying Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤ 0.1 dB. All sound level meters are calibrated every 24 months, and all calibrators are calibrated every 12 months by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 – Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localised records of weather conditions were taken. However, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values,

which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Royston (Approx. 880m NW of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
19/08/25: 00:00 – 23:59	14.8 – 24.4	0.0	ESE	0.0 – 2.4
20/08/25: 00:00 – 23:59	13.4 – 20.7	0.0	ESE	0.0 – 2.6
21/08/25: 00:00 – 23:59	8.9 – 19.7	0.0	E	0.0 – 2.5

Table 5 – Weather Conditions

Appendix E – Manufacturer's Datasheets

2no. Condensing Units:

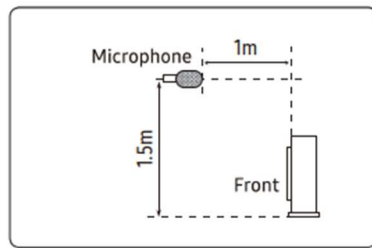
Summary

Capacity (kW)	Model	Sound Pressure dB(A)		Sound Power dB(A)	
		Heating	Cooling	Heating	Cooling
5.0	AE050CXYDEK/EU	41	41	55	55
8.0	AE080CXYDEK/EU	45	45	59	59
12.0	AE120CXYDEK/EU	47	47	60	60
16.0	AE160CXYDEK/EU	51	51	65	65
8.0	AE080CXYDGK/EU	45	45	59	59
12.0	AE120CXYDGK/EU	47	47	60	60
16.0	AE160CXYDGK/EU	51	51	65	65

Model Name		Indoor Unit		AE260CNWMGG/EU	AE260CNWMGG/EU	AE260CNWMGG/EU
		Outdoor Unit		AE080CXYDGK/EU	AE120CXYDGK/EU	AE160CXYDGK/EU
Outdoor Unit	Heat exchanger	Length		mm	986/957/928	1,216/1,187/1,159
		Rows	Quantity	EA	3	3
		Fin pitch		mm	1.5	1.5
		Passes	Quantity	EA	9-9	22-12
		Face area		m ²	0.79	1.17
		Stages	Quantity	EA	38	46
		Empty tubeplate hole	Quantity	EA	-	-
		Tube type		-	Ø7	Ø7
		Fin	Type	-	Corrugate	Corrugate
			Treatment	-	Anti Salt	Anti Salt
	Fan	Type		-	Propeller Fan	Propeller Fan
		Discharge direction		-	Horizontal	Horizontal
		Air Flow Rate	Heating	m ³ /min	65	95
			Cooling	m ³ /min	69	94
	Fan motor	Quantity		EA	1	1
		Quantity		EA	1	1
		Model		-	SIC-88FWJ-F1122-1	SIC-88FWJ-F1122-1
		Output		W	122	122
		Drive		-	Direct drive	Direct drive
		Speed	Steps	-	-	-
			Heating	rpm	550	590
			Cooling	rpm	510	580
	Sound Level	Sound Pressure Level	Heating	dB(A)	45	51
			Cooling	dB(A)	45	51
			Night Mode(3m)	dB(A)	35	35
		Sound Power Level	Heating	dB(A)	59	65
			Cooling	dB(A)	59	65

Sound Pressure level

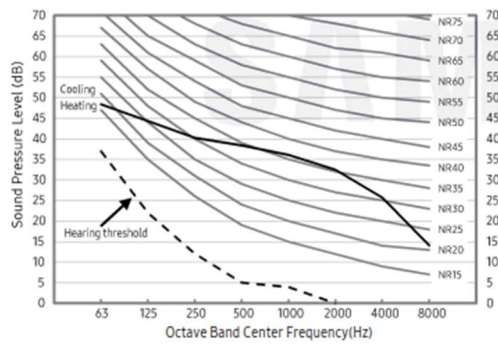
Unit: dB(A)



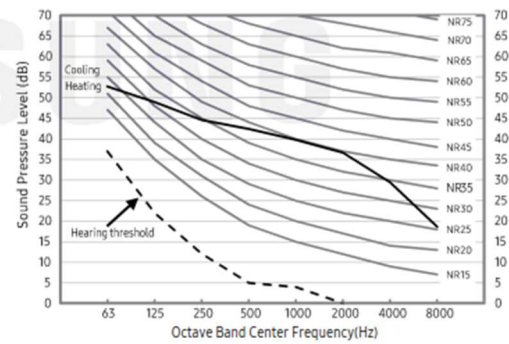
Model	Heating	Cooling
AE050CXYDEK/EU	41	41
AE080CXYDEK/EU	45	45
AE120CXYDEK/EU	47	47
AE160CXYDEK/EU	51	51

• NR Curve

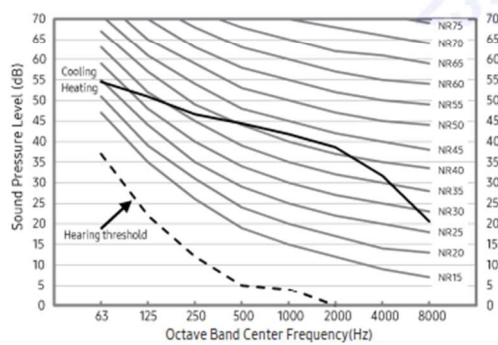
1) AE050CXYDEK/EU



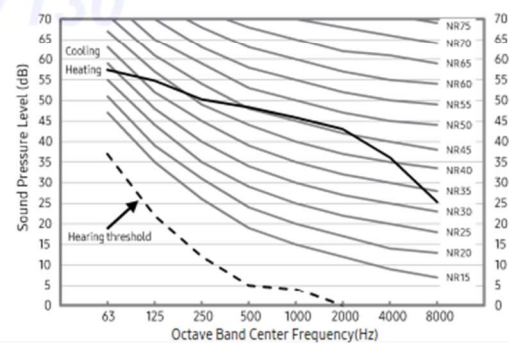
2) AE080CXYDEK/EU



3) AE120CXYDEK/EU



4) AE160CXYDEK/EU



Sound Power level

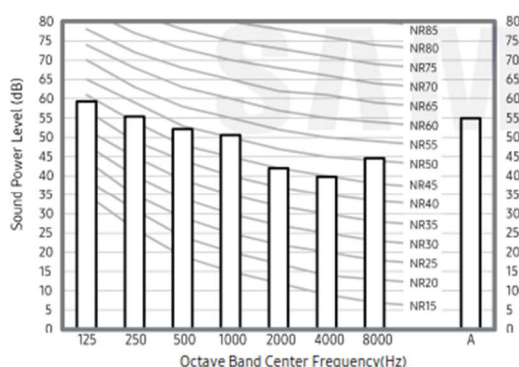
Unit: dB(A)

NOTE

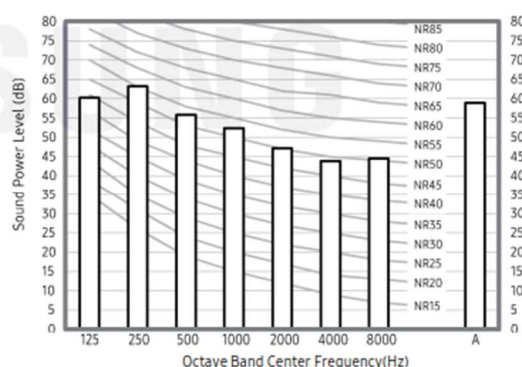
- Specifications may be subject to change without prior notice
 - Sound power level is an absolute value that a sound source generates.
 - dB(A) = A-weighted sound power level.
 - Reference power : 1pW.
 - Measured according to ISO 3741.
- NR Curve

Model	Heating	Cooling
AE050CXYDEK/EU	55	55
AE080CXYDEK/EU	59	59
AE120CXYDEK/EU	60	60
AE160CXYDEK/EU	65	65

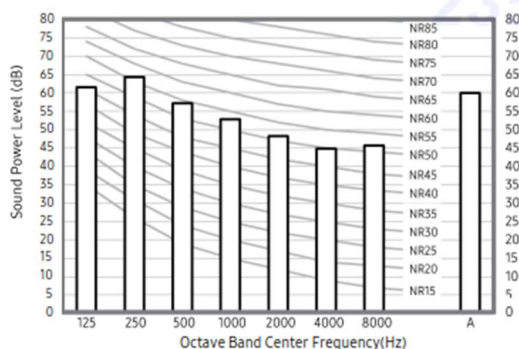
1) AE050CXYDEK/EU



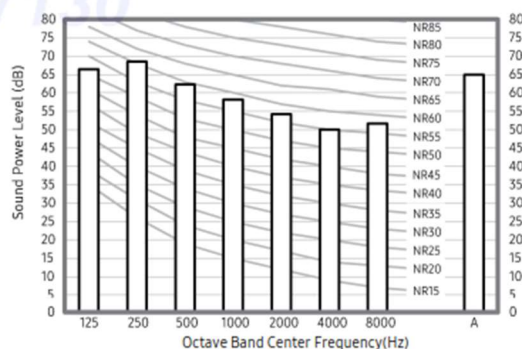
2) AE080CXYDEK/EU



3) AE120CXYDEK/EU



4) AE160CXYDEK/EU



Appendix F – Full Propagation Calculations

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Cumulative Sound Power Level (L_w)	65	65	68	60	56	51	48	49	63
Shielding (2.1m Tall Brick Wall)	-6	-8	-10	-12	-15	-18	-20	-20	--
Propagation Loss (7m, Q=4)	-22								--
Cumulative Specific Sound Level at NSR1 (L_{eq})	37	35	36	26	19	11	6	7	30

Table 6 – Propagation Calculations – NSR1 (Daytime)

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Cumulative Sound Power Level (L_w)	65	65	68	60	56	51	48	49	63
Shielding	N/A								--
Propagation Loss (7m, Q=4)	-22								--
Cumulative Specific Sound Level at NSR2 (L_{eq})	43	43	46	38	34	29	26	27	41

Table 7 – Propagation Calculations – NSR2 (Daytime)

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Cumulative Sound Power Level (L_w)	65	65	68	60	56	51	48	49	63
Shielding	N/A								--
Propagation Loss (15m, Q=4)	-28								--
Cumulative Specific Sound Level at NSR3 (L_{eq})	37	37	40	32	28	23	20	21	35

Table 8 – Propagation Calculations – NSR3 (Daytime)

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Cumulative Sound Power Level (L_w)	63	60	55	53	50	47	40	29	56
Shielding (2.1m Tall Brick Wall)	-13	-16	-19	-20	-20	-20	-20	-20	--
Propagation Loss (7m, Q=4)	-22								--
Cumulative Specific Sound Level at NSR1 (L_{eq})	28	22	14	11	8	5	-2	-13	14

Table 9 – Propagation Calculations – NSR1 (Night-time)

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Cumulative Sound Power Level (L_w)	63	60	55	53	50	47	40	29	56
Shielding	N/A								--
Propagation Loss (7m, Q=4)	-22								--
Cumulative Specific Sound Level at NSR2 (L_{eq})	41	38	33	31	28	25	18	7	34

Table 10 – Propagation Calculations – NSR2 (Night-time)

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Cumulative Sound Power Level (L_w)	63	60	55	53	50	47	40	29	56
Shielding	N/A								--
Propagation Loss (15m, Q=4)	-28								--
Cumulative Specific Sound Level at NSR3 (L_{eq})	35	32	27	25	22	19	12	1	27

Table 11 – Propagation Calculations – NSR3 (Night-time)



NOVA
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