



Noise Impact Assessment

Site Address: Alexander House, 205-207 Kings Road, Reading, RG1 4LS

Client Name: Archi-tekt Partnership

Project Reference No: NP-011091



Authorisation and Version Control

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Amendment History

Revision	Date	Summary of Amendments
01	03/05/2024	First Draft
02	08/05/2024	Inclusion of MCS-020 Criteria

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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment for the proposed 9 No. air source heat pumps ('ASHP') ('the Proposed Development') at Alexander House, 205-207 Kings Road, Reading, RG1 4LS ('the Site').

The applicant is preparing to submit a planning application to Reading Borough Council. This report has been prepared to accompany the planning application to be submitted to the Local Planning Authority ('LPA').

A noise survey has been undertaken to establish the prevailing background sound levels at the closest Noise Sensitive Receptors ('NSRs'). The report details the existing background sound climate and the predicted noise emissions associated with the proposed development. Measures required to mitigate noise impact from the proposed development have been recommended where necessary and 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:

- The LPA's technical guidance, specifically; '*Reading Borough Local Plan – Adopted November 2019 – EN17: Noise Generating Equipment*'.
- National Planning Policy Framework (2023).
- Noise Policy Statement for England (2010).
- BS4142:2014+A1:2019 – 'Methods for rating and assessing commercial and industrial sound'.
- MCS-020 'Planning Standards for Permitted Development Installations of Wind Turbines and Air Source Heat Pumps on Domestic Premises (2019)

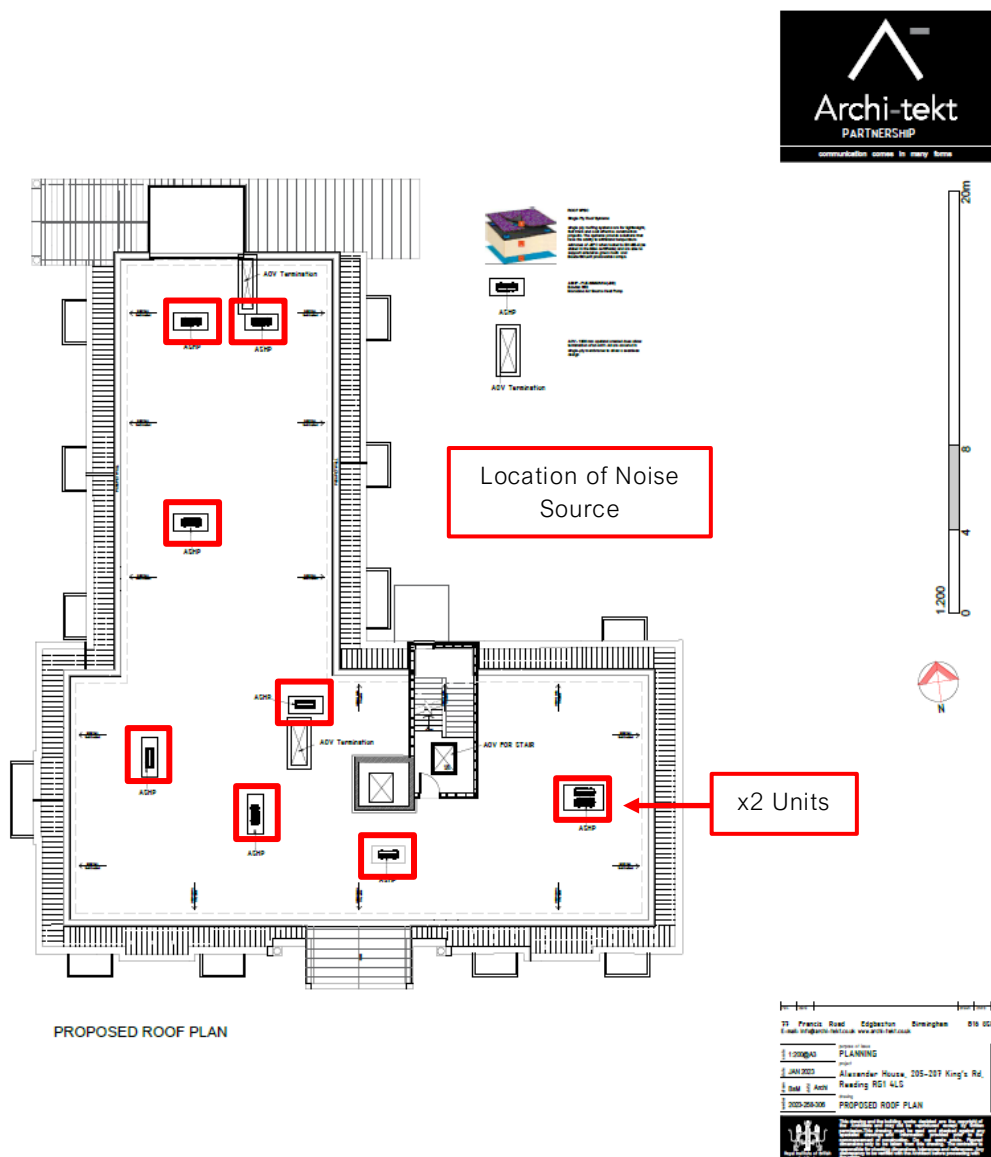
Further information on the legislation can be found in Appendix B.

1.2 Proposal Brief

The proposal is for the replacement of the existing gas boilers by 9 No. Mitsubishi PUZ-WM50VHA ASHP units.

NOVA Acoustics has been informed that the proposed units will be located on the roof, and they can operate at any time, including both day and night-time periods.

The figure overleaf shows the proposed development.



Drawing Ref Proposed Roof Plan from 'Archi-tekt Partnership'

Figure 1 – Proposed Development

1.3 Local Planning Authority & Background

Reading Borough Local Plan – Adopted November 2019 – EN17: Noise Generating Equipment' states that "where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor."

However, it is understood that for the installation of domestic ASHP units, the MCS planning standards are accepted by the LPA.

2. Environmental Noise Survey

2.1 Measurement Methodology

The following table outlines the measurement dates and particulars.

Location	Survey Dates	Measurement Particulars
MP1	28/04/2023 – 02/05/2023	Equipment mounted on a scaffolding pole at first-floor level and 1m distance from the building façade on Kings Road.
MP2	28/04/2023 – 02/05/2023	Equipment mounted on a lamp post at a height of 3.5m on Rupert Street

Table 1 – Measurement Methodology

The figure below outlines the site surroundings and measurement locations:



Figure 2 – Measurement Locations and Site Surroundings

2.2 Context & Subjective Impression

The site is a corner plot which is bounded on the South by King's Road, on the West by Rupert Street, on the North by a low-rise residential property and parking space, and on the East with a residential block.

Due to the proximity to the proposed site, the Noise Sensitive Receptors ('NSRs') highlighted in the figure above have been included in the assessment. It should be noted that only off-site receptors have been considered in the BS4142 assessment.

The acoustic environment is deemed to be moderate to high in level and the noise profile is dominated by road traffic noise emissions from Kings Road and its surrounding network at the front facades. However,

the noise profile at the rear is deemed low in level and dominated by sporadic traffic noise from Norwood Road.

During the monitoring set-up and collection, there were some construction works being undertaken on site. However, NOVA Acoustics Ltd was informed that no works were carried out during the weekend.

2.3 Environmental Noise Survey Results

Background Sound Level Analysis

The following section outlines the measured background sound levels that have been used as the baseline for the subsequent BS4142 noise assessment.

Background sound levels were derived via statistical analysis of the measured $L_{A90,15min}$ data. Background sound levels were chosen depending on the range and distribution of the recorded $L_{A90,15min}$ sound levels. Full noise survey time histories and histograms can be found in Appendix C. The typical lowest values are presented in the below table are used in the subsequent BS4142 noise impact assessment. Please note that the newly permitted furnace and associated plant was inactive throughout the entire environmental noise survey.

Location	Period	Typical Lowest Background Sound Level $L_{A90,T}$ (dB)
MP1	Day: 07:00 – 23:00	56
	Night: 23:00 – 07:00	44
MP2	Day: 07:00 – 23:00	52
	Night: 23:00 – 07:00	40

Table 2 – Background Sound Level Results Summary

3. Noise Impact Assessment

In the following section of the report, the impact of the noise emissions generated by the proposed development is assessed.

3.1 Noise Modelling Data & Specific Sound Levels

Sound Power Levels of External Noise Sources

The following table shows the 1/1 octave frequency band sound power levels for the proposed Mitsubishi PUZ-WM50VHA ASHP units that is used in the subsequent noise model. As detailed 1/1 octave band frequency data is not provided by the manufacturer, a noise spectrum from a similar source has been taken and calibrated to the maximum sound power level presented in the manufacturer's datasheet (found in Appendix E). Detailed calculations can be found in Appendix F.

Description	1/1 Octave Frequency Band (Hz, L _w , dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
1 No. Mitsubishi PUZ-WM50VHA	52	55	59	59	55	52	49	44	61

Table 3 – Sound Power Levels of Proposed ASHP Units

Noise Modelling

The noise model is based on the following settings and assumptions:

The following assumptions have been made within the SoundPlan 9.0 noise modelling software:

- To accurately model the land surrounding the Site, the topographical data has been taken from the EA's 'National LIDAR Programme' on the DEFRA Data Services Platform.
- For the purpose of the assessment, the ground between the source and receivers is considered to be acoustically 'hard' and it has been modelled according to the ground type.
- Octave band noise data was used to facilitate noise modelling in accordance with ISO 9613-2. ISO 9613-2 assumes a 'downwind' model to the NSRs.
- The sound map grid height has been set to the roof level, however, the noise levels used in the assessment have been taken from the most exposed point of each façade.
- The site and all other buildings and any intervening objects have been modelled according to measurements taken on-site, with Google Maps and those provided by the LIDAR data.
- The sound power levels shown in Table 3 have been inputted into the model.
- All fixed sources have been modelled as point source emitters located at 0.5m height.

The sound map showing the specific sound levels emission from the Site can be seen in the following figure.

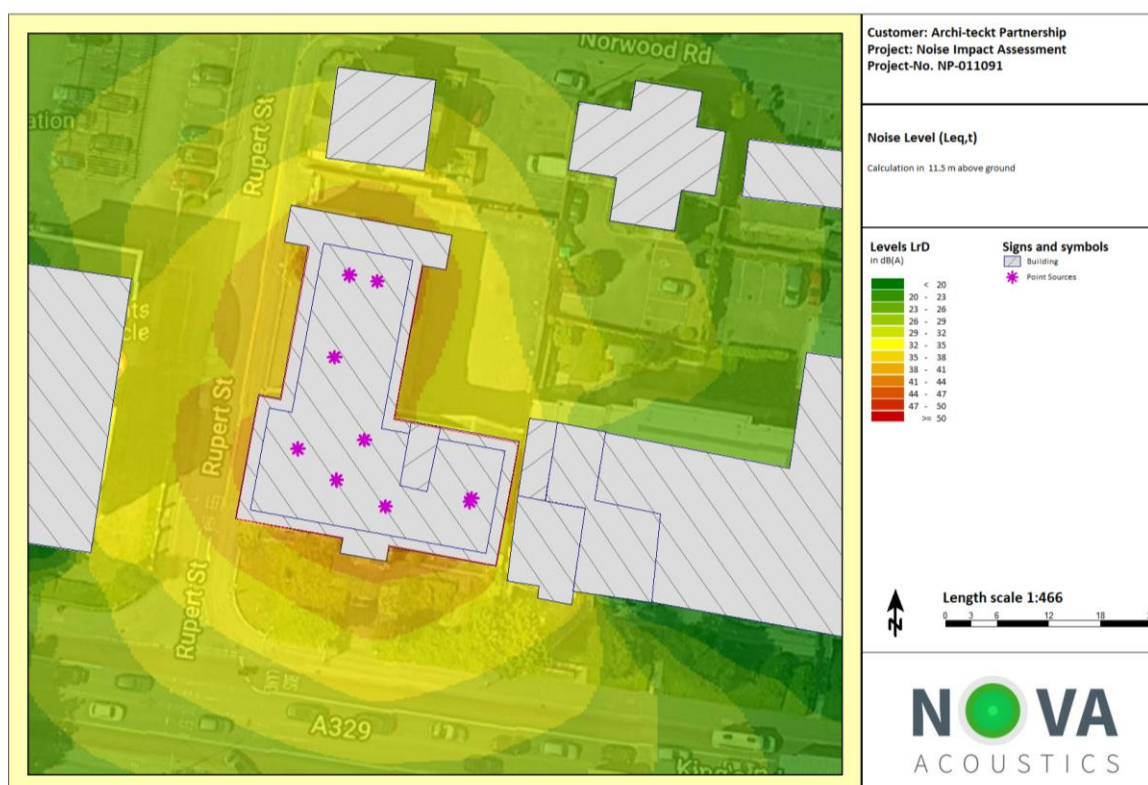


Figure 3 – Specific Sound Level Map

The table below shows a summary of the predicted specific noise levels at each one of the receivers under assessment.

Specific Sound Level (Leq)	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
NSR1(A)	20	23	26	25	21	17	13	4	26
NSR1(B)	23	24	27	27	23	20	16	8	29
NSR2	20	24	31	31	27	24	20	12	32
NSR3	16	15	15	14	10	6	1	0	15
NSR4	18	21	24	24	20	16	11	1	26

Table 4 – Specific Sound Level Summary

3.2 BS4142 Noise Impact Assessment

The BS4142 noise impact assessments are conducted at the most affected NSRs in the below tables.

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at NSR1(B) (L_{eq})	23	24	27	27	23	20	16	8	29
Acoustic Feature Correction	No acoustic features are expected to be distinguishable above the measured background noise level.								+0
Rating Sound Level ($L_{Ar,Tr}$)	Specific sound level + acoustic feature corrections.								29
Background Sound Level	MP2 typical lowest night-time $L_{A90,15min}$ – Table 2.								40
Exceedance	$L_{Ar,Tr} - L_{A90,15min}$								-11
BS4142 Assessment Outcome	Low impact, dependent on context.								
NPPF & NPSE Outcome	Noise Levels below the 'No Observed Effect Level' ('NOEL')								
LPA Criteria	The predicted rating sound level does not exceed the LPA Criteria (10dB below the background)								
Mitigation measures not required to achieve LPA's criteria									

Table 5 – Noise Impact Assessment – NSR1(B)

Description	1/1 Octave Frequency Band (Hz, dB)								Overall (dBA)
	63	125	250	500	1k	2k	4k	8k	
Specific Sound Level at NSR2 (L_{eq})	20	24	31	31	27	24	20	12	32
Acoustic Feature Correction	No acoustic features are expected to be distinguishable above the measured background noise level.								+0
Rating Sound Level ($L_{Ar,Tr}$)	Specific sound level + acoustic feature corrections.								32
Background Sound Level	MP2 typical lowest night-time $L_{A90,15min}$ – Table 2.								40
Exceedance	$L_{Ar,Tr} - L_{A90,15min}$								-8
BS4142 Assessment Outcome	Low impact, dependent on context.								
NPPF & NPSE Outcome	Noise levels below the No Observed Adverse Effect Level' ('NOAEL').								
LPA Criteria	The predicted Rating Sound Level exceeds the LPA Criteria (10 dB below the background) by 2 dBA.								
Mitigation measures are required to achieve the LPA's criteria									

Table 6 – Noise Impact Assessment – NSR2

As seen in the above tables, the resulting impact in accordance with BS4142 is considered to be low and below the NOAEL in accordance with the NPPF and NPSE at the most affected receptor locations.

However, the rating level does exceed the LPA's criteria at NSR2 during the night-time. At this location, the absolute specific sound level is 32dB and is highly unlikely to result in adverse impact inside noise sensitive spaces (i.e. bedrooms during the night-time). This is reflected by the predicted level being -8dB below the fairly low existing background sound level. Therefore, it is anticipated that additional mitigation measures are not necessary.

3.3 MCS-020 Assessment

The guidance within MCS-020 provides a simplified "10 Step" calculation methodology for assessing the noise from domestic ASHPs. Should the outcome of the assessment show that the cumulative noise level (assuming a nominal 40dB background sound level) fall below 42dB, then a detailed noise assessment is not required.

Based on the calculations in the previous section, the specific sound level associated with the proposed ASHP units is, at most, 32dB. These calculations are equivalent to "Step 6" in the MCS-020 guidance and fall 8dB below the assumed background sound level (40dB). As per Note 7 (Step 9) of the MCS-020 guidance, a correction of 0.6dB is applicable for this difference in noise level. This results in the following levels:

- $40dB + 0.6dB = 40.6dB$
- *Rounded up to 41dBA*

Following Step10, the final result of the assessment is 41dB. As this is below the permitted development level of 42dB, no further action is required.

4. Conclusion and Action Plan

The proposed ASHP units have been assessed against the requirements of BS4142 and the LPA's policies and guidance, and a mitigation scheme has been provided to reduce the noise impact from the site.

The BS4142 assessment has indicated that the predicted rating sound level will fall considerably below the measured background noise level (by at least 8dB) and, as such, the proposed development will cause 'low impact, dependant on context'. This is considered to be below the 'No Observed Adverse Effect Level' ('NOAEL') when assessed in accordance with the NPSE and NPPF.

In addition, the MCS-020 assessment indicates that the predicted cumulative level from all plant will not exceed the required criteria. Therefore, additional mitigation measures are not considered necessary.

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 (2023)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2023. 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 180e, 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 191 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 191 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 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 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 $L_{A,r,T}$ ‘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 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142 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, 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 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 +2dB is applicable for a tone which is “just perceptible”, +4dB where a tone is “clearly perceptible”, and +6dB where a tone is “highly perceptible”.

b) Impulsivity

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

c) Other Sound Characteristics

BS4142 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 +3dB can be applied.”

d) Intermittency

BS4142 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 +3dB 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 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.”

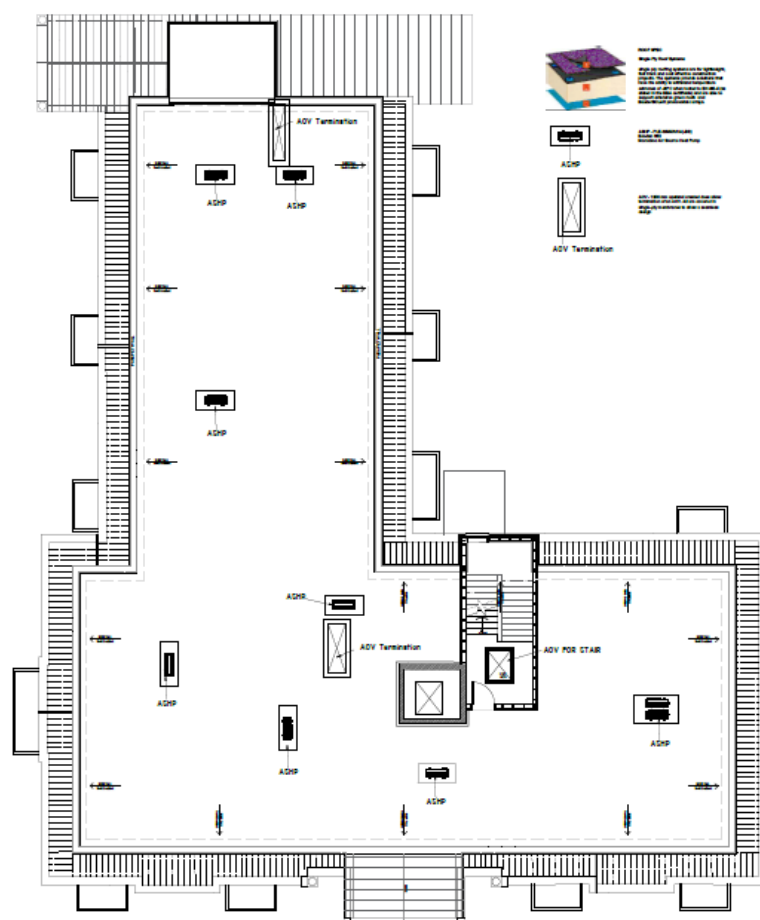
- “The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific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

Interpreting the guidance given in BS4142, 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 +10dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;
- A rating sound level that is +5dB 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 low impact and would therefore classify as No Observed Adverse Effect Level.
- At levels significantly below the measured background sound level (i.e. greater than 10dB), this is an indication of a No 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 – Site Plans



PROPOSED ROOF PLAN



Appendix D – Environmental Survey

D.1 – Time History Noise Data

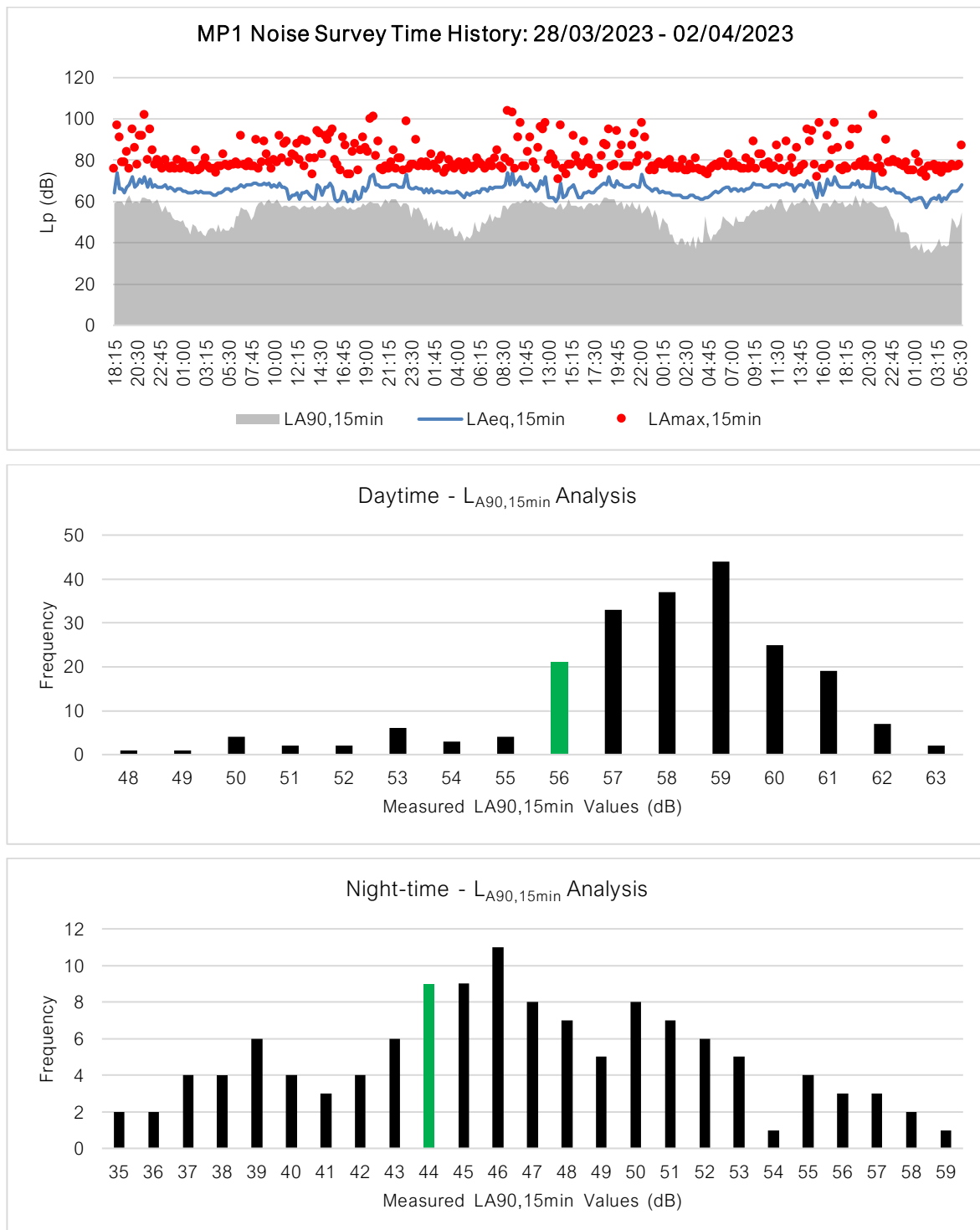


Figure 4 – MP1 Noise Survey Time History and Histograms

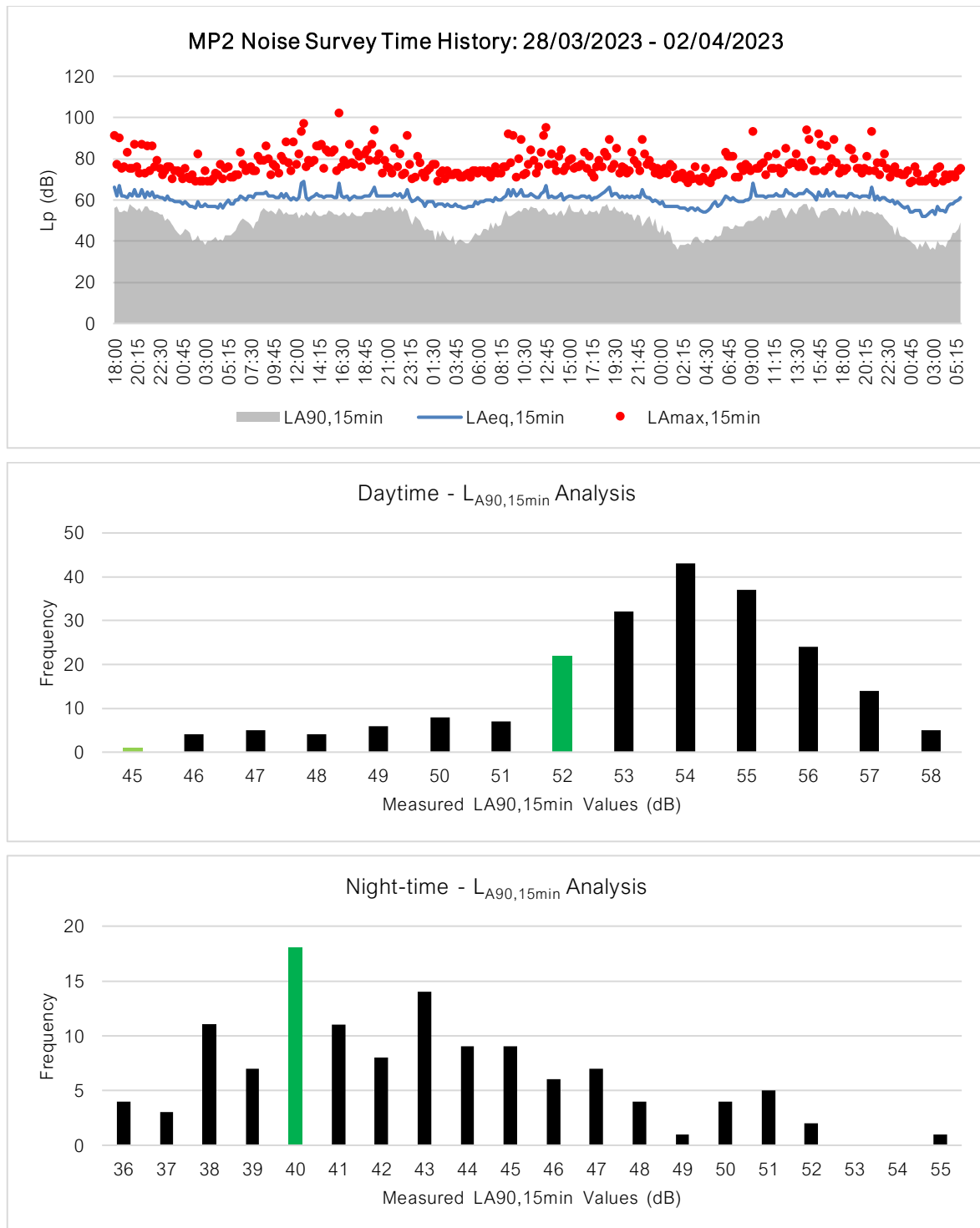


Figure 5 – MP2 Noise Survey Time History and Histograms

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
CESVA SC420 Class 1 Sound Level Meter	T238593	≤0.2
CESVA CB006 Class 1 Calibrator	901013	
CESVA SC420 Class 1 Sound Level Meter	T250680	≤0.2
CESVA CB006 Class 1 Calibrator	902441	

Table 7 – 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 ≤0.2 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 – Armstrong (Approx. 4.2km E of Site)				
Time Period	Air Temp (°C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
28/04/23 – 00:00 – 23:59	10.4 – 18.2	0.0 – 0.3	S	0.0 – 2.6
29/04/23 – 00:00 – 23:59	5.9 – 20.4	0.0	SE	0.0 – 0.8
30/04/23 – 00:00 – 23:59	6.1 – 16.9	0.0	SW	0.0 – 1.7
01/05/23 – 00:00 – 23:59	9.0 – 19.2	0.0 – 0.5	S	0.0 – 3.0
02/05/23 – 00:00 – 23:59	6.4 – 16.3	0.0	E	0.0 – 1.7

Table 8 – Weather Conditions

Appendix E – Manufacturers' Data Sheets

Heating

Product Information



PUZ-WM50VHA(-BS)

Ecodan R32

Monobloc Air Source Heat Pump

R32

Key Features:

- A+++ high efficiency system
- Ultra quiet noise levels
- Maintains full heating capacity at low temperatures
- Zero carbon solution
- MELCloud enabled

Key Benefits:

- Ultra low running cost
- Flexible product placement
- Confident and quick product selection
- Help to tackle the climate crisis
- Remote control, monitoring, maintenance and technical support



MELCloud



Manufactured in the UK



08-0202-09-01



ecodan
Renewable Heating Technology

ecodan.co.uk

Heating Product Information

PUZ-WM50VHA(-BS) Ecodan R32 Monobloc Air Source Heat Pump

OUTDOOR UNIT		PUZ-WM50VHA(-BS)
HEAT PUMP SPACE HEATER - 55°C	EP Rating	A++
	η_{hp}	129%
	SCOP (MCS)	3.24
HEAT PUMP SPACE HEATER - 55°C	EP Rating	A++
	η_{hp}	185%
	SCOP (MCS)	4.62
HEAT PUMP COMBINATION HEATER - Large Profile ¹⁾	EP Rating	A+
	η_{hp}	155%
HEATING ²⁾ (4-7W35)	Capacity (kW)	5.0
	Power Input (kW)	1.67
	COP	3.00
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA ³⁾	Pressure Level at 1m (dBA)	52
	Power Level (dBA) ⁴⁾	61
WATER DATA	Pipework Size (mm)	22
	Flow Rate (l/min)	14
	Water Pressure Drop (kPa)	12.0
DIMENSIONS (mm)	Width	950
	Depth	550±30 ⁵⁾
	Height	943
WEIGHT (kg)		71
ELECTRICAL DATA	Electrical Supply	220-240V, 50Hz
	Phase	Single
	Nominal Running Current (MAX) (A) ⁶⁾	4.64 (1.3)
	Fuse Rating - MCB Size (A) ⁷⁾	16
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)	R32 (GWP 675)	2.0 / 1.35

Notes:

¹⁾ Combination with EP123X Cylinder

²⁾ Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 30°C.

³⁾ Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN12116.

⁴⁾ Sound power level tested to BS EN12116.

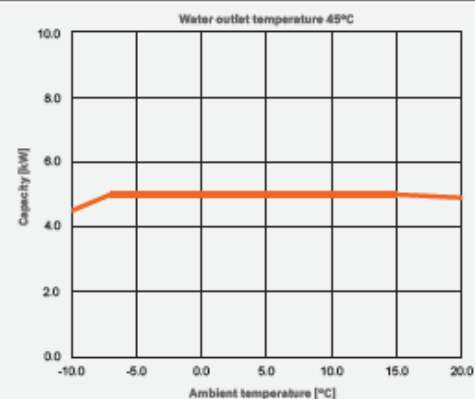
⁵⁾ Under normal heating conditions at outdoor temp: 7°C, outlet water temp 35°C.

⁶⁾ MCB Size BS EN60898-2 & BS EN60947-2.

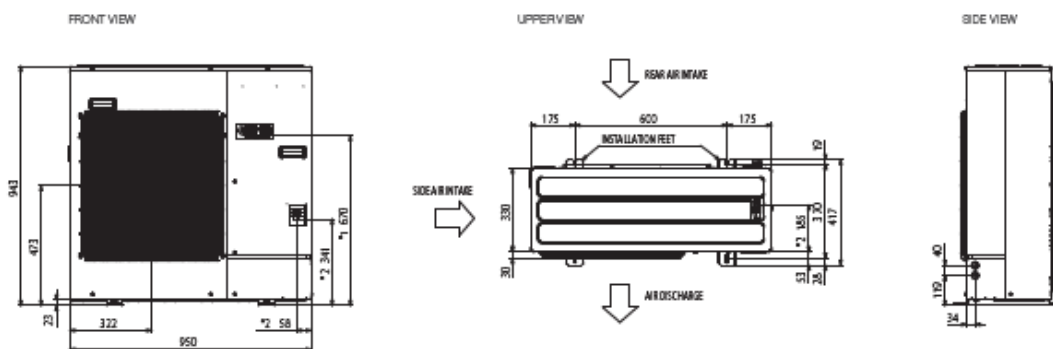
⁷⁾ GfA.

η_{hp} is the seasonal space heating energy efficiency (SEER) η_{hp} is the water heating energy efficiency

NOMINAL HEATING CAPACITY



PUZ-WM50VHA(-BS) DIMENSIONS



All dimensions (mm)



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Notes: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R123A (GWP:931), R454B (GWP:466), R1234ze (GWP:1) or R1234yf (GWP:4). These GWP values are based on Regulation (EU) No 517/2014 from 2014 (F-Gas Regulation). In case of Regulation (EU) No 517/2014, these are as follows: R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774) or R134a (GWP:1430).

Effective as of August 2020



Appendix F – Full Calculations

F.1 – Full Sound Power Calculations

Description	Item	Source Term	Parameter	dBA	1/1 Octave Frequency Band (Hz, dB)							
					63	125	250	500	1k	2k	4k	8k
Model / Unit	Valliant aeroTHERM plus 1	Global Lw dBA	Lw	61								
No. of	1		Typical Spectrum	92	83	86	90	90	86	83	80	75
			Corrected Spectrum	61	52	55	59	59	55	52	49	44
Data Type	Manufacturers Data		Total Lw	61	52	55	59	59	55	52	49	44



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