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Allen Gallery, Alton

Plant Noise Impact Assessment

Hampshire Cultural Trust

Revision 0

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1 Introduction

1.1.1 F1 Acoustics Company Limited has been appointed by the Hampshire Cultural Trust to provide a noise survey and impact assessment to accompany a planning application for the installation of two air source heat pump (ASHP) units and one air conditioning unit at the Allen Gallery, 10 - 12 Church Street, Alton, GU34 2BW.

1.1.2 This technical noise report contains an impact assessment of the noise emissions from the proposed HVAC plant on the nearest noise sensitive receptors. The assessment has been carried out in accordance with 'British Standard (BS) 4142: Methods for rating and assessing industrial and commercial sound' [1].

2 Acoustics Terminology

2.1 The range of audible sound is from 0 dB to 140 dB. The frequency response of the ear is usually taken to be about 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

2.2 For variable sound sources such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of the energy of a sound source would increase the overall sound by 3 dB(A). For example, if one item of machinery results in sound levels of 30 dB(A) at 10 m, then two identical items of machinery adjacent to one another would result in sound levels of 33 dB(A) at 10 m. The 'loudness' of a sound is a purely subjective parameter but it is generally accepted that an increase/decrease of 10 dB(A) corresponds to a doubling/halving in perceived loudness.

2.3 External sound levels are rarely steady but rise and fall according to activities within an area. In an attempt to produce a figure that relates this variable sound level to subjective response, a number of noise indices have been developed. These include:

L_{Amax}: This is the maximum sound level recorded over the measurement period.

L_{Aeq}: This is the 'equivalent continuous A-weighted sound pressure level, in decibels' and is defined in British Standard 7445: Description and measurement of environmental noise (BS 7445) [2] as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'.

The L_{Aeq} is a unit commonly used to describe sound from transport, construction and industrial premises and is the most suitable unit for the description of other forms of environmental sound. In more straightforward terms, it is a measure of energy within the varying sound levels. It is also the unit best suited to assessing community response.

L_{A10}: This is the sound level that is exceeded for 10% of the measurement period and gives an indication of the louder sound levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

L_{A90}: This is the sound level that is exceeded for 90% of the measurement period and gives an indication of the sound level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial sound.

3 Standards, Guidance and Policy

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

3.1.1 BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.1.2 The standard uses a rating level for sources of sound of an industrial and/or commercial nature and ambient, background and residual sound levels at outdoor locations to assess the likely effects of the sound on people and also provides methodology to determine these levels.

3.1.3 The main purposes of BS 4142 are for investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes.

3.1.4 The rating level for a source is calculated by adding a character correction to the specific sound level which has been measured, calculated and/or predicted at the dwelling or premises used for residential purposes. The character correction takes into account that 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.

3.1.5 The acoustic features that are considered for the character correction are tonality, impulsivity, Intermittency or other sound characteristics that are readily distinctive against the residual acoustic environment. BS 4142 provides three methods for determining the character correction; the subjective method; objective method for tonality; and reference method.

3.1.6 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:

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

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

A difference of around +5 dB 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.

3.1.7 The final estimate of the impact may need to be modified due to the context, all pertinent factors should be taken into consideration, including, the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; and the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

3.2 Association of Noise Consultants BS 4142:2014+A1:2019 Technical Note, Version 1.0, March 2020

3.2.1 The ANC Technical Note [3] on BS 4142:2014+A1:2019 has been published to attempt to address any content regarded as ambiguous, to offer additional ancillary advice in some instances where strict interpretation may not be possible and provide real life examples to illustrate the decision-making process. The guide recognises that there are many instances in the application of BS 4142 where professional judgement is required and where a range of interpretations is possible. The technical note has been designed for the reader to access the views of the members of the working group and is not intended to be definitive or prescriptive, rather it has been designed to complement BS 4142.

3.3 International Organization for Standardization 9613 ‘Acoustics: Attenuation of sound during propagation outdoors’, 1996

3.3.1 International Organization for Standardization 9613 (ISO 9613) Part 2 [4] provides a method for predicting acoustic propagation outdoors. The method is applicable in practice to a great variety of noise sources and environments. It is applicable, directly or

indirectly, to most situations concerning road or rail traffic, industrial noise sources, construction activities, and many other ground-based noise sources.

3.3.2 The method predicts the L_{Aeq} under meteorological conditions favourable to propagation from sources of known sound emission. These conditions are for downwind propagation or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night. Inversion conditions over water surfaces are not covered and may result in higher sound pressure levels than predicted from this method.

3.3.3 Calculations are made for each individual octave band from 63 Hz to 8 kHz. The calculation is summarised by:

$$L_{AT}\,(DW) = \Sigma\,[L_W + D_C - A_{div} - A_{atm} - A_{gr} - A_{bar} - A_{misc}]$$

(contributions are summed for each source and in each octave band)

Where:

L_{AT} (DW) = average 'A'-weighted downwind sound pressure level at receptor
L_W = sound power level of source*
D_C = directivity of the source*
A_{div} = attenuation due to geometric divergence*
A_{atm} = attenuation due to atmospheric absorption*
A_{gr} = attenuation due to ground effect*
A_{bar} = attenuation due to a barrier*
A_{misc} = attenuation due to miscellaneous other effects (e.g. woodland)*

*(per source and octave band)

3.3.4 The estimated accuracy for values of L_{AT} (DW) is stated as ±3 dB for a mean source / receptor height of up to 5 m and source / propagation separation distance of up to 1 km.

3.4 National Planning Policy Framework

3.4.1 The National Planning Policy Framework (NPPF) [5] came into place on 27th March 2012 with the latest version being published on 20th July 2021. The NPPF sets out the Governments planning policies for England and how these are expected to be applied.

3.4.2 The NPPF does not contain specific noise criteria but does contain the following statements with regard to noise impacts:

> "15. Conserving and enhancing the natural environment
>
> 174. Planning policies and decisions should contribute to and enhance the natural and local environment by:
>
> ...
>
> e) 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; and
>
> ...
>
> 185. 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 impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[65];
>
> 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;
>
> ...
>
> 65 See Explanatory Note to the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs, 2010)."

3.5 East Hampshire District Council

3.5.1 The East Hampshire District Local Plan: Joint Core Strategy [6], adopted in June 2014 contains the following relevant policy with regard to noise:

*"*CP27 POLLUTION

Development must not result in pollution which prejudices the health and safety of communities and their environments.

Developments that may cause pollution, and developments sensitive to pollution, will only be permitted if they are appropriately separated and designed to remove the risk of unacceptable impacts. Engineering or administrative controls may be required to provide sufficient protection to focus on reducing pollution at source.

…"

4 Site Description and Proposed Operation

4.1 Site Description

4.1.1 The installation of heating, ventilation and air conditioning (HVAC) plant is comprised of two external air source heat pump (ASHP) units on the southwestern corner of the Allen Gallery building at ground height and one air conditioning unit located on a small flat roof towards the centre of the Allen Gallery building.

4.1.2 The nearest noise sensitive receptors are St Lawrence Vicarage, Church Street to the northwest, the rear of properties on High Street to the southeast and Bellcroft, Vicarage Hill to the southwest.

4.1.3 A site layout plan with the location of all proposed plant and nearest noise sensitive receptors indicated is presented in Figure 1.

4.2 HVAC Plant Details

4.2.1 The HVAC plant is comprised of the following:

2x Mitsubishi Electric Ecodan PUZ-HWM140VHA(-BS) Monobloc Air Source Heat Pump
1x Daikin RZAG50A Outdoor Unit

4.2.2 The operational hours for the plant are 24 hours a day 7 days a week.

5 Baseline Noise Survey

5.1 Noise Survey Information

Unattended Baseline Noise Survey

5.1.1 To measure the existing ambient and background noise levels representative of the nearest NSRs, an unattended baseline noise survey was carried out. This noise survey was located in the rear garden of the Allen Gallery on the boundary with the St Lawrence Vicarage.

5.1.2 The unattended noise survey was undertaken between 14:00 on Monday 09/10/2023 and 11:45 on Tuesday 17/10/2023.

5.1.3 The microphone was installed at a height of 3 m above the ground and in a free-field location. The microphone was fitted with a weatherproof windshield. Data was logged in 15-minute periods with a fast time weighting.

5.1.4 No plant was operational on the assessment site during the noise survey.

5.1.5 The noise environment during the baseline noise survey was comprised of distant road traffic noise from the surrounding road network, birdsong and wind rustling the leaves in the surrounding trees.

5.1.6 The noise survey location is shown in Figure 1.

Equipment and Calibration

5.1.7 The instrumentation used for the noise survey was a Rion NL-52 Class 1 sound level meter (SLM) (F1AC-071) and associated Rion NC-75 Calibrator (F1AC-072). The SLM was configured to log 15-minute broadband and octave band measurements of the L_{Aeq}, L_{A90}, L_{A10}, and L_{Amax}.

5.1.8 The SLM had a field calibration check carried out prior to and immediately following the survey and no significant deviation was recorded. All instrumentation used has been calibrated to traceable national standards within two years.

Weather

5.1.9 The meteorological conditions were monitored throughout the duration of the noise survey. Periods of rain did occur during the survey period and where identified as

influencing the measured noise levels those periods were excluded from the assessment results, following the guidance provided within BS 4142.

5.2 Noise Survey Results

5.2.1 Details and a summary graph of the measured baseline sound level survey results are presented in Appendix A and a summary of the sound level results are provided in Table 5.1.

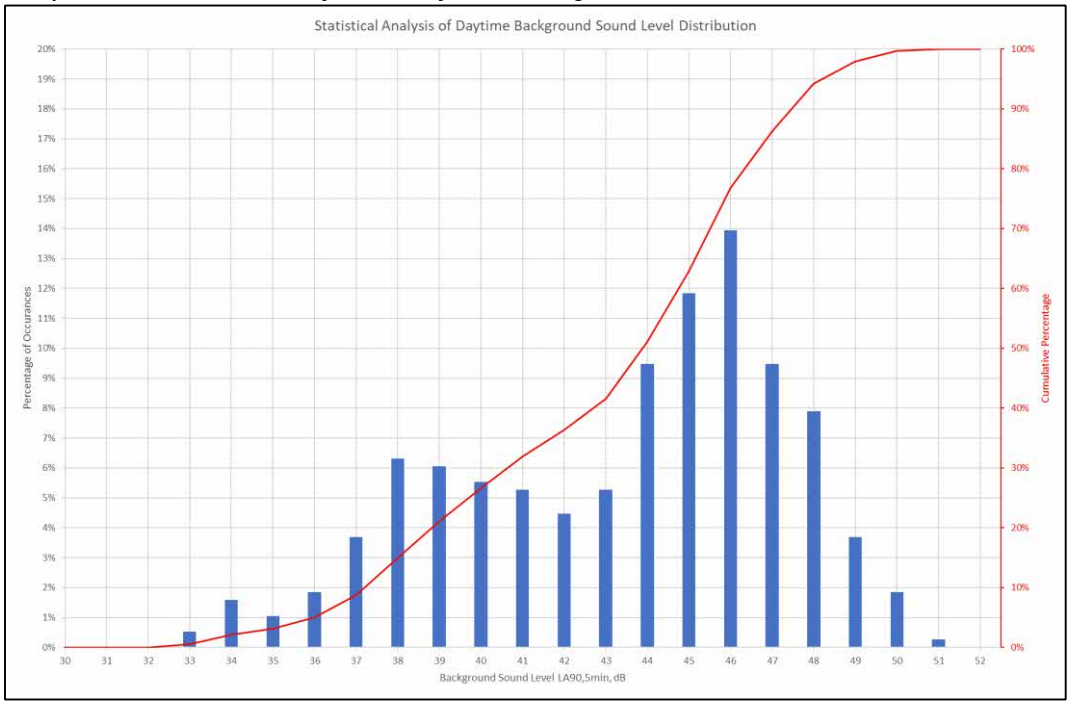
Table 5.1: Baseline Noise Survey Results Summary

Period		$L_{Aeq,T}$, dB	Range $L_{Amax,\ 15min}$ dB	$L_{A10,T}$, dB [1]	$L_{A90,T}$, dB [1]
Monday 09/10/2023	14:00 – 23:00	50	58 – 74	53	41
Monday 09/10/2023	23:00 – 07:00	44	46 – 74	40	29
Tuesday 10/10/2023	07:00 – 23:00	51	55 – 76	54	44
Tuesday 10/10/2023	23:00 – 07:00	44	48 – 74	42	32
Wednesday 11/10/2023	07:00 – 23:00	52	59 – 85	55	46
Wednesday 11/10/2023	23:00 – 07:00	Period excluded because of weather influence.			
Thursday 12/10/2023	07:00 – 23:00	Period excluded because of weather influence.			
Thursday 12/10/2023	23:00 – 07:00	Period excluded because of weather influence.			
Friday 13/10/2023	07:00 – 23:00	48	59 – 67	52	38
Friday 13/10/2023	23:00 – 07:00	43	47 – 76	40	29
Saturday 14/10/2023	07:00 – 23:00	52	59 – 80	55	43
Saturday 14/10/2023	23:00 – 07:00	43	45 – 82	39	27
Sunday 15/10/2023	07:00 – 23:00	51	59 – 91	53	41
Sunday 15/10/2023	23:00 – 07:00	44	45 – 72	42	31
Monday 16/10/2023	07:00 – 23:00	52	58 – 78	55	45
Monday 16/10/2023	23:00 – 07:00	43	47 – 70	43	33
Tuesday 17/10/2023	07:00 – 11:45	55	60 – 87	56	48
Average	07:00 – 23:00	50	-	53	43
Average	23:00 – 07:00	41	-	41	30

1 – Arithmetic average of measured 15-minute period data.

5.2.2 Graph 5.1 and 5.2 and Table 5.2 show the background noise level ($L_{A90,15min}$) distribution and statistical analysis for the daytime and night-time periods for the consideration of a representative background noise level to be used in the BS 4142 noise assessment.

Graph 5.1: Statistical Analysis of Daytime Background Sound Level Distribution



Graph 5.2: Statistical Analysis of Night-time Background Sound Level Distribution

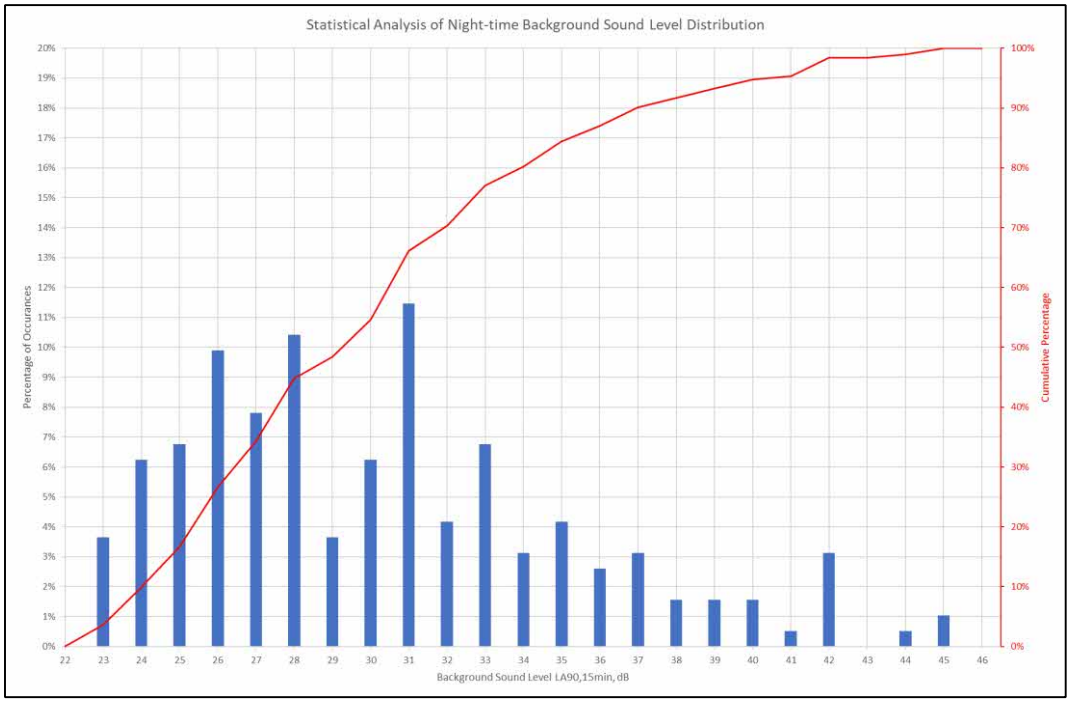


Table 5.2: Statistical Analysis of the Background Sound Level during the Daytime and Night-time Periods

Statistic	Daytime	Night-time
Range	33-51	23-45
Mean	43	30
Mode	46	31
Considered Representative Value	39	26

5.2.3 Based on the statistical analysis shown in Graph 5.1 and 5.2 and Table 5.2 the considered representative background sound level that will be used in the BS 4142 assessment for the daytime will be $L_{A90,15min}$ 39 dB and for the night-time will be $L_{A90,15min}$ 26 dB. The considered representative background sound levels will only be lower during the quietest 20 % of 15 minute periods based on the measured data.

5.2.4 The representative night-time background sound levels are considered in absolute terms to be low and therefore as per BS 4142 Clause 11, Subclause 1, an assessment based on absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background.

6 BS 4142 Noise Assessment

6.1 Assessment Methodology

6.1.1 A BS 4142 assessment requires the determination of the specific sound level, the sound level produced by the specific sound source(s) at the assessment location over a given reference time interval. The specific sound level is then adjusted for any characteristic features of the sound to give the rating level. The impact of the specific sound is then obtained by subtracting the background sound level from the rating level.

6.1.2 To determine the specific sound level from the HVAC plant at the nearest NSRs sound propagation predictions have been undertaken using ISO 9613 'Acoustics – Attenuation of sound during propagation outdoors' as implemented by SoundPLAN 9.0 sound modelling software.

6.1.3 Manufacturer supplied octave band noise data have been used to inform the predictions. The ISO 9613 predictions have taken into account the attenuation from building structures, fences, geometrical divergence, atmospheric absorption and ground effect between the plant and the nearest NSR.

6.1.4 Observations of the topography of the site and the surrounding area were made during the site visit and plans showing proposed topographical heights have been used to create a digital ground model.

6.1.5 Typical variable atmospheric conditions have been considered to be a temperature of 10°C and 70 % relative humidity for the assessment.

6.1.6 The attenuation from ground effect has been calculated based on soft ground for all areas.

6.1.7 ISO 9613 sound propagation predictions assume downwind propagation in all directions from all sources for the purposes of the noise predictions.

6.2 Noise Sources

6.2.1 The HVAC plant is comprised of two Mitsubishi Electric Ecodan PUZ-HWM140VHA(-BS) ASHP units and a Daikin RZAG50A Outdoor Unit.

6.2.2 The location of the proposed plant is shown in Figure 1.

6.2.3 During the daytime the assessment has considered all plant operating for 100 % of the time at 100% capacity during the 1-hour assessment period. During the night-time the assessment has considered all plant operating for 100 % of the time at 100 % capacity during the 15-minute assessment period.

6.2.4 Octave band sound pressure noise data and broadband sound power data for the HVAC plant has been obtained from the manufacturers and is presented in Table 6.1. The manufacturers' noise data is presented in Appendix B.

Table 6.1: Manufacturers' Sound Level Data

Plant	Broadband Sound Power Level, L_{AW}, dB	Octave Band Sound Pressure Level at 1 m, L_p, dB							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Mitsubishi Electric Ecodan PUZ-HWM140VHA (-BS) ASHP units	67.0	56.5	57.0	53.5	51.5	48.0	43.0	39.5	35.0
Daikin RZAG50A Outdoor Unit	63.0	-	66.5	63.0	62.5	58.0	51.5	46.0	40.0

6.3 Receptor Assessment Locations

6.3.1 The nearest NSRs to the proposed HVAC plant are St Lawrence Vicarage, Church Street to the northwest, the rear of properties on High Street to the southeast and Bellcroft, Vicarage Hill to the southwest.

6.3.2 Free-field noise predictions have been made at 1 m from the windows of the nearest NSRs that will be most affected by the HVAC plant.

6.4 BS 4142 Assessment Criteria

6.4.1 The impact of the specific sound is obtained by subtracting the representative background sound level from the rating level at the assessment location and considering the following as stated in BS 4142:

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

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

A difference of around +5 dB 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.

6.5 Specific Sound Level Prediction

6.5.1 The specific sound level of the HVAC plant at the nearest NSRs has been predicted using SoundPLAN 9.0 sound modelling software. The predicted broadband specific sound levels at each of the nearest NSRs is presented in Table 6.2, detailed octave band results are provided in Appendix C. The location of the receptors are presented in Figures 1 and 5, and a 3D render of the SoundPLAN model is provided in Figure 6 to illustrate the noise model source and receptor locations.

Table 6.2: Specific Sound Level Results

Noise Sensitive Receptor	Specific Sound Level, dB	
	Daytime $L_{Aeq,1hour}$, dB	Night-time $L_{Aeq,15min}$, dB
R1 – St Lawrence Vicarage, Ground Floor, East Facing	24	24
R1 – St Lawrence Vicarage, 1st Floor, East Facing	26	26
R2 – 4 High Street, Ground Floor, Northwest Facing	21	21
R2 – 4 High Street, 1st Floor, Northwest Facing	26	26
R3 - Bellcroft, Ground Floor, Northeast Facing	11	11
R3 - Bellcroft, 1st Floor, Northeast Facing	16	16

6.5.2 The specific sound levels are considered in absolute terms to be low and therefore as per BS 4142 Clause 11, Subclause 1, an assessment based on absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background.

6.6 Rating Level

6.6.1 Certain acoustic features, including tonality, impulsivity and intermittency, 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 a character correction should be added to the specific sound level to obtain the rating level.

6.6.2 BS 4142 gives three methods for assessing if a character correction should be applied. These are the subjective method; objective method for tonality; and reference method. This assessment will use the subjective method.

6.6.3 It is considered that the noise from the HVAC plant will not be intermittent, tonal or impulsive at the assessment locations because the specific sound levels are considered in absolute terms to be low and do not exceed the background sound level at all assessment locations during the day-time and night-time ensuring the plant is at worst barely audible. Therefore, no intermittency, tonality or impulsivity character corrections have been applied.

6.7 BS 4142 Assessment

6.7.1 BS 4142 assessments have been carried out for the assessment location most affected by the proposed plant for each of the nearest NSRs. A summary of the BS 4142 assessments are shown in Table 6.3.

Table 6.3: BS 4142 Assessment Summary - Daytime

Assessment Details	St Lawrence Vicarage, 1st Floor, East Facing	4 High Street, 1st Floor, Northwest Facing	Bellcroft, 1st Floor, Northeast Facing
Assessment Period	Daytime	Daytime	Daytime
Assessment Time Period (T)	1 hour	1 hour	1 hour
Representative Background Sound Level ($L_{A90,15min}$), dB	39	39	39
Predicted Specific Noise Level at the Noise Sensitive Receptor ($L_{Aeq,T}$), dB	26	26	16
Rating Level Correction, dB	0	0	0
Assessment Rating Level, dB	26	26	16
Excess of rating level over background sound level, dB	-13	-13	-23
Assessment outcome	An indication of the specific sound source having a low impact, depending on the context.	An indication of the specific sound source having a low impact, depending on the context.	An indication of the specific sound source having a low impact, depending on the context.

6.7.2 The BS 4142 assessments demonstrate that during the day-time the HVAC plant will have a less than low noise impact at the nearest NSRs as the rating level is predicted to be between 13 and 23 dB below the representative background sound level.

Table 6.4: BS 4142 Assessment Summary – Night-time

Assessment Details	St Lawrence Vicarage, 1st Floor, East Facing	4 High Street, 1st Floor, Northwest Facing	Bellcroft, 1st Floor, Northeast Facing
Assessment Period	Night-time	Night-time	Night-time
Assessment Time Period (T)	15 minutes	15 minutes	15 minutes
Representative Background Sound Level ($L_{A90,15min}$), dB	26	26	26
Predicted Specific Noise Level at the Noise Sensitive Receptor ($L_{Aeq,T}$), dB	26	26	16
Rating Level Correction, dB	0	0	0
Assessment Rating Level, dB	26	26	16
Excess of rating level over background sound level, dB	0	0	-10
Assessment outcome	An indication of the specific sound source having a low impact, depending on the context.	An indication of the specific sound source having a low impact, depending on the context.	An indication of the specific sound source having a low impact, depending on the context.

6.7.3 The rating sound levels are considered in absolute terms to be low and therefore as per BS 4142 Clause 11, Subclause 1, the assessment of the impact has considered the absolute levels as well as the margin by which the rating level exceeds the background.

6.7.4 The BS 4142 assessments demonstrate that during the night-time period the HVAC plant will have a less than low noise impact at the nearest NSRs as the rating level is predicted to be between 0 and 10 dB below the representative background sound level as well as being considered to be low level in absolute terms.

6.8 Uncertainty

6.8.1 BS 4142 requires uncertainty to be considered as part of the assessment.

6.8.2 All reasonable skill and care has been taken to accurately measure the ambient and background sound levels for the NSR assessment locations. The sound level meter was checked for calibration prior to and after both surveys and no significant deviation occurred. The weather conditions were suitable for noise monitoring and any periods influenced by unrepresentative weather conditions were excluded.

6.8.3 Uncertainty in the baseline ambient and background sound levels will be due to the length of the survey. The survey was carried out over a one-week period and will therefore provide a reasonable spread of results. It is considered that the measurements undertaken were appropriate for the location and context and any resulting uncertainty would not be unacceptable.

6.8.4 Manufacturers' noise data has been used for the source noise levels; it is therefore considered that any resulting uncertainty would not be unacceptable.

6.8.5 The computer sound modelling package SoundPLAN 9.0 follows the calculation procedure specified in ISO 9613-2, which is the prediction procedure recommended in BS 4142. This calculation methodology has an estimated accuracy of ±3 dB.

6.9 BS 4142 Assessment Results and Context

6.9.1 The results of the BS 4142 assessments show that it is likely that the specific sound sources from the HVAC plant will have a less than low impact on the nearest NSRs. Considering the context of location, hours of operation and the existing noise environment, the HVAC plant having a less than low noise impact is considered acceptable.

7 Summary and Conclusions

7.1.1 F1 Acoustics Company Limited has been appointed by the Hampshire Cultural Trust to provide a noise survey and impact assessment to accompany a planning application for the installation of two air source heat pump (ASHP) units and one air conditioning unit at the Allen Gallery, 10 - 12 Church Street, Alton, GU34 2BW.

7.1.2 This technical noise report contains an impact assessment of the noise emissions from the proposed HVAC plant on the nearest noise sensitive receptors. The assessment has been carried out in accordance with 'British Standard (BS) 4142: Methods for rating and assessing industrial and commercial sound'.

7.1.3 The installation of heating, ventilation and air conditioning (HVAC) plant is comprised of two external air source heat pump (ASHP) units on the southwestern corner of the Allen Gallery building at ground height and one air conditioning unit located on a small flat roof towards the centre of the Allen Gallery building.

7.1.4 The nearest noise sensitive receptors are St Lawrence Vicarage, Church Street to the northwest, the rear of properties on High Street to the southeast and Bellcroft, Vicarage Hill to the southwest.

7.1.5 To measure the existing ambient and background noise levels representative of the nearest NSRs, an unattended baseline noise survey was carried out.

7.1.6 To assess the noise impact of the HVAC plant on the nearest noise sensitive receptors a BS 4142 assessment has been carried out.

7.1.7 To determine the specific sound level from the HVAC plant at the nearest NSRs, sound propagation predictions have been undertaken using ISO 9613 'Acoustics – Attenuation of sound during propagation outdoors' as implemented by SoundPLAN 9.0 sound modelling software.

7.1.8 The result of the BS 4142 assessments show that it is likely that the specific sound sources from the HVAC plant will have a less than low impact on the nearest NSRs. Considering the context of location, existing sound environment and the low absolute specific and rating levels of the proposed plant it is considered that a less than low noise impact is considered acceptable.

7.1.9 Based on the BS 4142 noise impact assessment results there is no material reason why planning permission should not be granted for the proposed HVAC plant with respect to noise.

References

1. British Standards Institution. British Standard 4142+A1: Methods for rating and assessing industrial and commercial sound. 2014 + 2019.

2. British Standards Institution. British Standard 7445: Description and measurement of environmental noise. Part 1: Guide to environmental quantities and procedures. 2003.

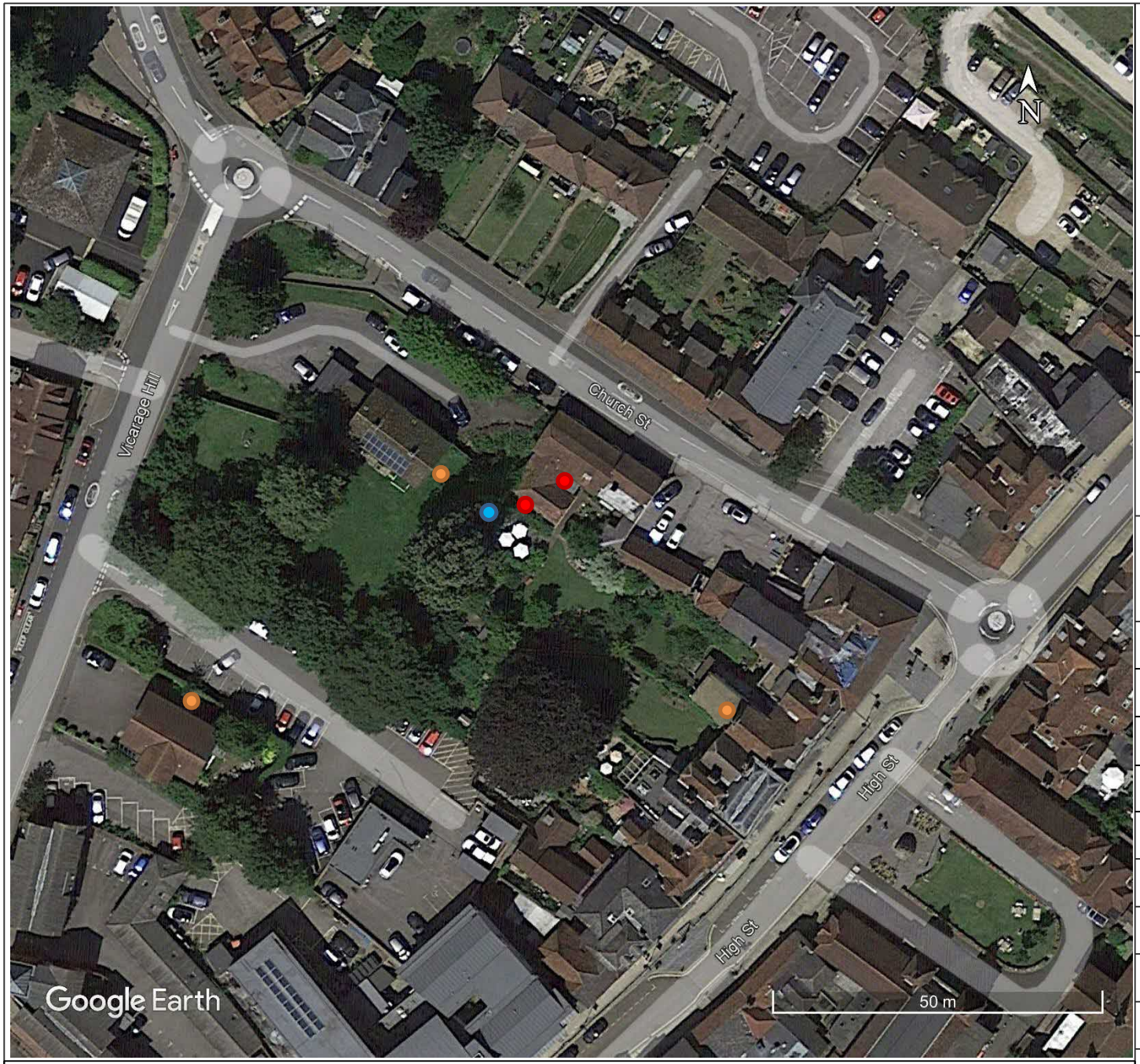
3. Association of Noise Consultants. BS 4142:2014+A1:2019 Technical Note Version 1.0. March 2020.

4. International Organization for Standardization. ISO 9613 'Acoustics: Attenuation of sound during propagation outdoors'. 1996.

5. Department for Communities and Local Government. National Planning Policy Framework: HMSO. March 2012.

6. The East Hampshire District Local Plan: Joint Core Strategy. June 2014.

Figures



Key

- Baseline sound level survey
- Predicted noise receptor locations
- Proposed plant locations

REV	DATE	D	R	DESCRIPTION
0	30/10/2023	RB	RM	Issue

F1 Acoustics
38 Briton Hill Road, South Croydon, Surrey, CR2 0JL
* info@f1acoustics.com (+44 1227 770 890 : f1acoustics.com

PROJECT:	Allen Gallery, Alton - Plant Noise Impact Assessment
CLIENT:	Hampshire Cultural Trust
TITLE:	Site Location, Nearest Noise Sensitive Receptors and Noise Survey Location
DATE:	30/10/2023
REVISION:	0
SCALE:	Not to scale.
DRAWING NO:	1884/1/0
FIGURE NO:	1
DRAWN BY:	Rupert Burton
REVIEWED BY:	Robert Miller

Key

Proposed plant locations

REV	DATE	D	R	DESCRIPTION
0	30/10/2023	RB	RM	Issue

F1 Acoustics
38 Briton Hill Road, South Croydon, Surrey, CR2 0JL
* info@f1acoustics.com (+44 1227 770 890 : f1acoustics.com

PROJECT:	Allen Gallery, Alton - Plant Noise Impact Assessment
CLIENT:	Hampshire Cultural Trust
TITLE:	Proposed Ground Floor Plan
DATE:	30/10/2023
REVISION:	0
SCALE:	Not to scale.
DRAWING NO:	1884/2/0
FIGURE NO:	2
DRAWN BY:	Rupert Burton
REVIEWED BY:	Robert Miller

Key

- Proposed plant locations

REV	DATE	D	R	DESCRIPTION
0	30/10/2023	RB	RM	Issue

F1 Acoustics
38 Briton Hill Road, South Croydon, Surrey, CR2 0JL
* info@f1acoustics.com (+44 1227 770 890 : f1acoustics.com

PROJECT:	Allen Gallery, Alton - Plant Noise Impact Assessment
CLIENT:	Hampshire Cultural Trust
TITLE:	Proposed First Floor Plan
DATE:	30/10/2023
REVISION:	0
SCALE:	Not to scale.
DRAWING NO:	1884/3/0
FIGURE NO:	3
DRAWN BY:	Rupert Burton
REVIEWED BY:	Robert Miller

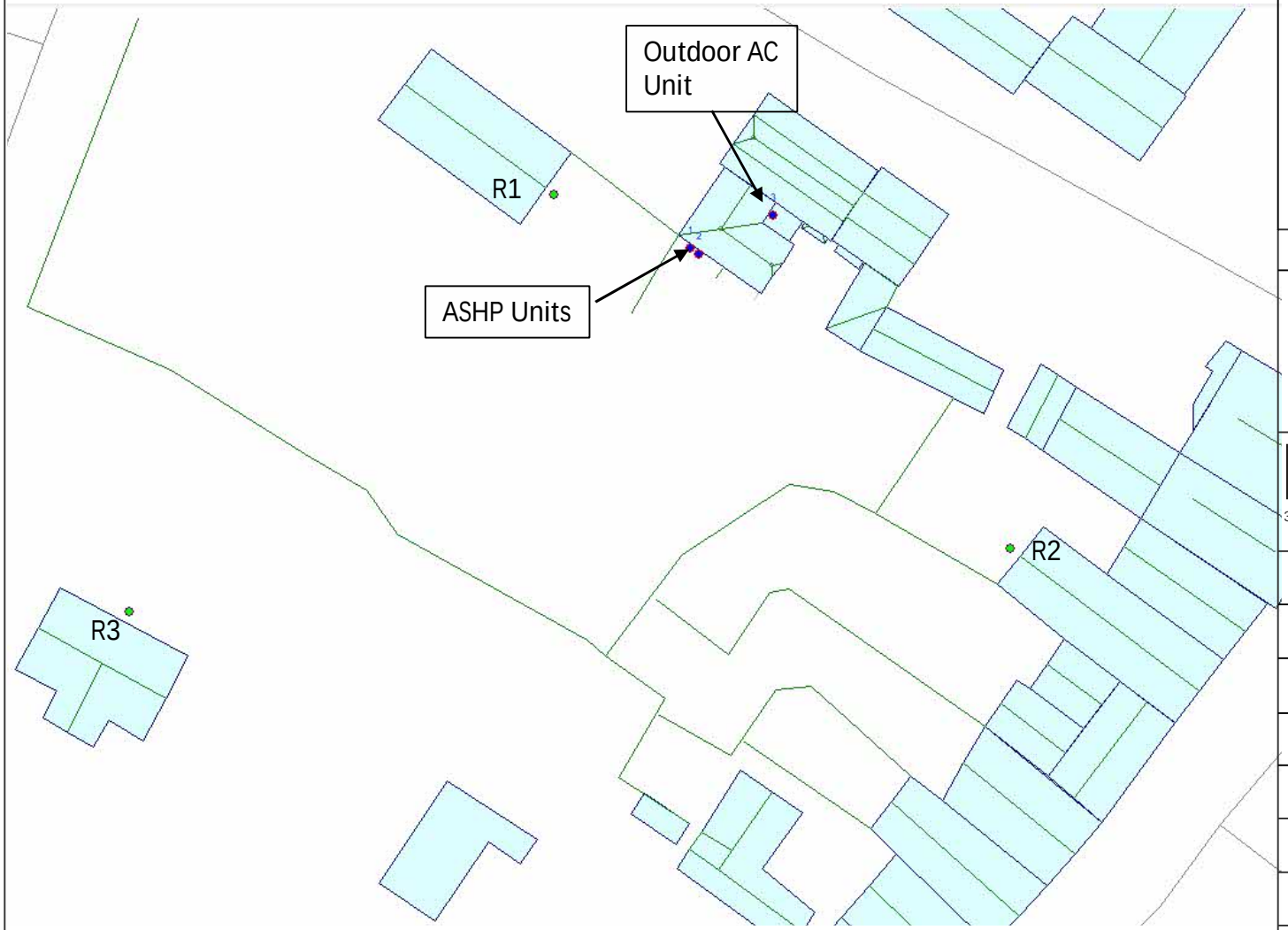
Key

- Proposed plant locations

REV	DATE	D	R	DESCRIPTION
0	30/10/2023	RB	RM	Issue

F1 Acoustics
38 Briton Hill Road, South Croydon, Surrey, CR2 0JL
* info@f1acoustics.com (+44 1227 770 890 : f1acoustics.com

PROJECT:	Allen Gallery, Alton - Plant Noise Impact Assessment
CLIENT:	Hampshire Cultural Trust
TITLE:	Proposed Roof Plan
DATE:	30/10/2023
REVISION:	0
SCALE:	Not to scale.
DRAWING NO:	1884/4/0
FIGURE NO:	4
DRAWN BY:	Rupert Burton
REVIEWED BY:	Robert Miller



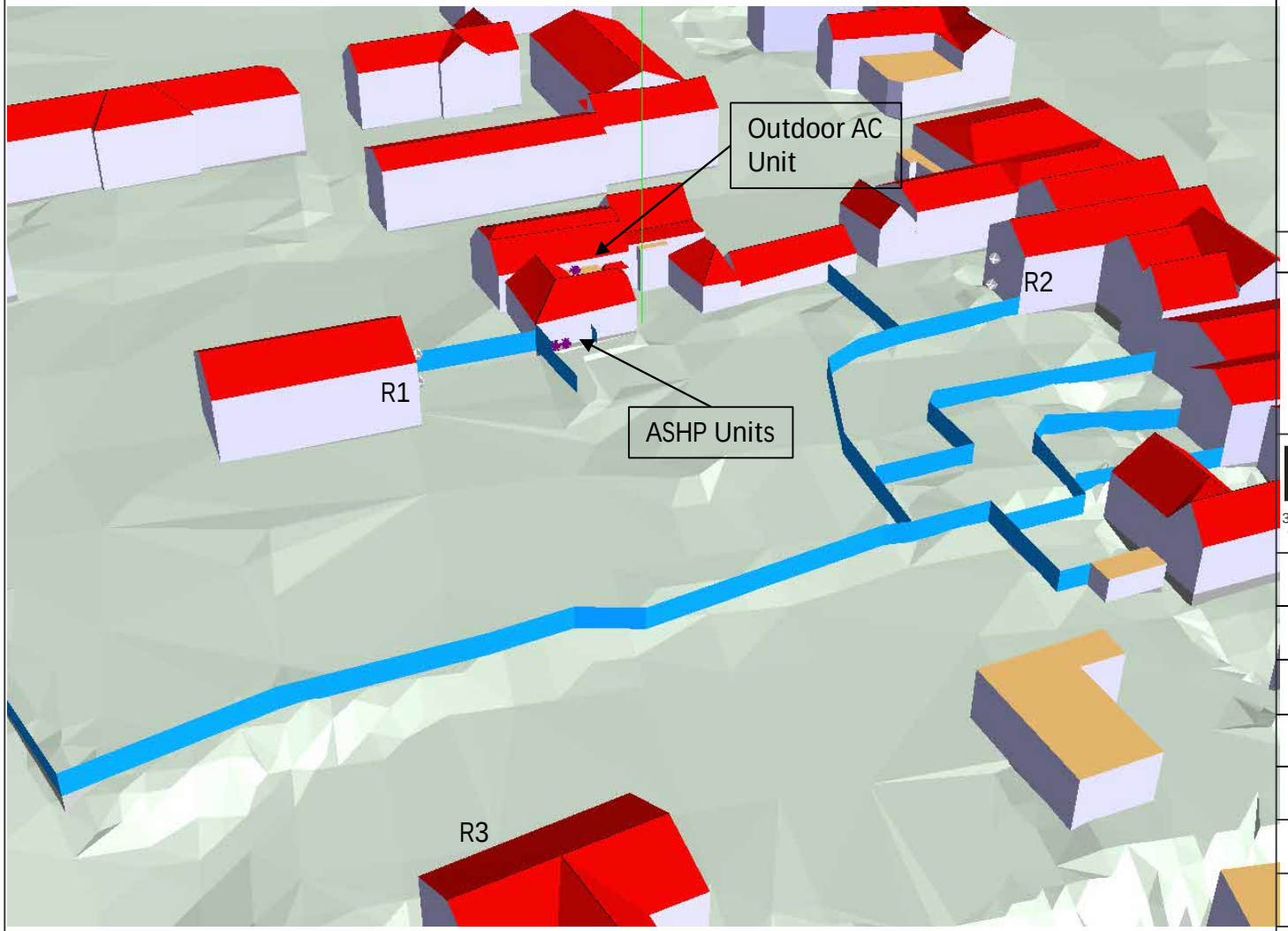
Key

R1 – St Lawrence Vicarage
R2 – 4 High Street
R3 – Bellcroft

REV	DATE	D	R	DESCRIPTION
0	30/10/2023	RB	RM	Issue

F1:Acoustics
38 Briton Hill Road, South Croydon, Surrey, CR2 0JL
* info@f1acoustics.com (+44 1227 770 890 : f1acoustics.com

PROJECT:	Allen Gallery, Alton - Plant Noise Impact Assessment
CLIENT:	Hampshire Cultural Trust
TITLE:	Noise Model Plan and Receptors
DATE:	30/10/2023
REVISION:	0
SCALE:	Not to scale.
DRAWING NO:	1884/5/0
FIGURE NO:	5
DRAWN BY:	Rupert Burton
REVIEWED BY:	Robert Miller



Key

R1 – St Lawrence Vicarage
R2 – 4 High Street
R3 – Bellcroft

REV	DATE	D	R	DESCRIPTION
0	30/10/2023	RB	RM	Issue

F1 Acoustics
38 Briton Hill Road, South Croydon, Surrey, CR2 0JL
* info@f1acoustics.com (+44 1227 770 890 : f1acoustics.com

PROJECT:	Allen Gallery, Alton - Plant Noise Impact Assessment
CLIENT:	Hampshire Cultural Trust
TITLE:	3D Noise Model Render
DATE:	30/10/2023
REVISION:	0
SCALE:	Not to scale.
DRAWING NO:	1884/6/0
FIGURE NO:	6
DRAWN BY:	Rupert Burton
REVIEWED BY:	Robert Miller

Appendices

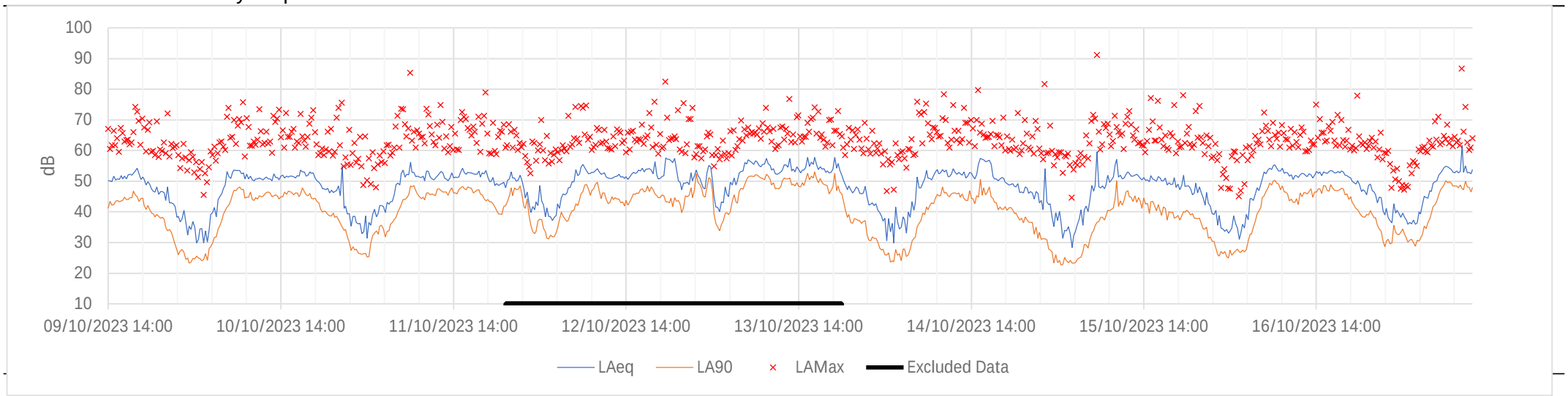
Appendix A

Baseline Sound Level Survey Summary

Appendix A: Unattended Noise Survey Summary

Project number: 1884
Project name: Allen Gallery, Alton
Survey location ID: 1
Start date & time: 09/10/2023 14:00
End date & time: 17/10/2023 11:45

Noise Level Data Summary Graph



Noise Survey Information

Instrumentation	ID	Make	Model
Sound Level Meter	F1AC-071	Rion	NL-52
Calibrator	F1AC-072	Rion	NC-75

Set-up personnel:	RB	
Collection personnel:	RB	
Field calibration check at start:	94.0	dB
Field calibration check at end:	93.9	dB
Microphone height:	3	m [*1]
Façade location:	No	[*2]
Measurement period (T):	15	minutes
Time weighting:	Fast	

[1] Height measured above local ground level.

[2] Façade location considered to be 1 m from a reflecting façade.

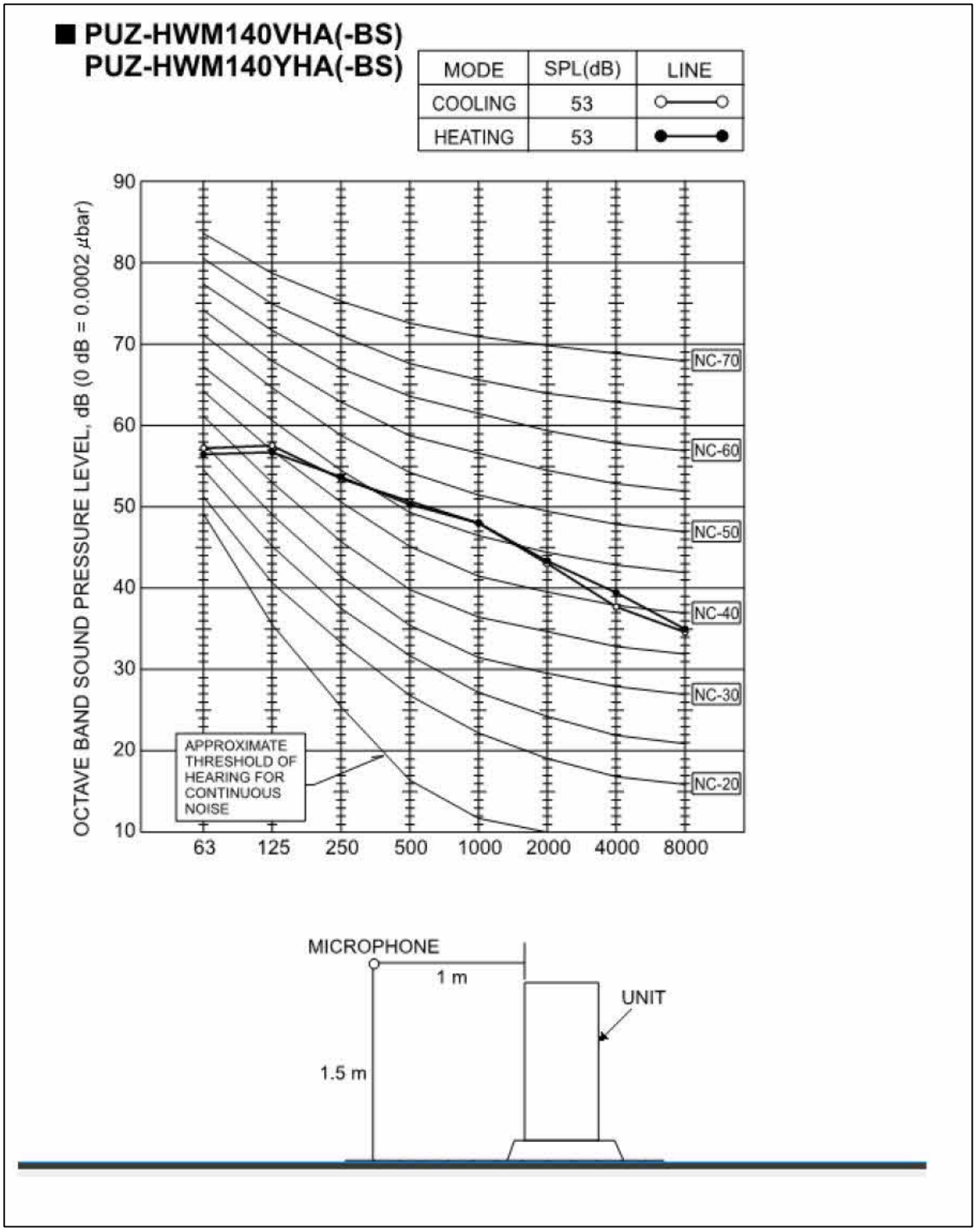
Photographs of Noise Survey Location

Noise survey microphone circled in red

Appendix B

Manufacturers' Noise Data

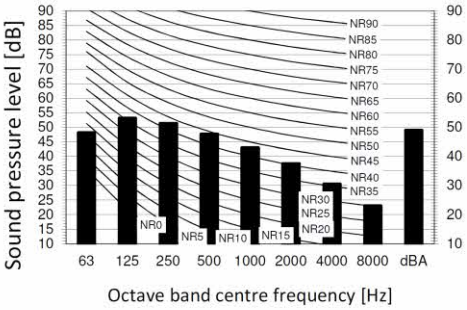
Mitsubishi Electric Ecodan PUZ-HWM140VHA (-BS) ASHP Unit



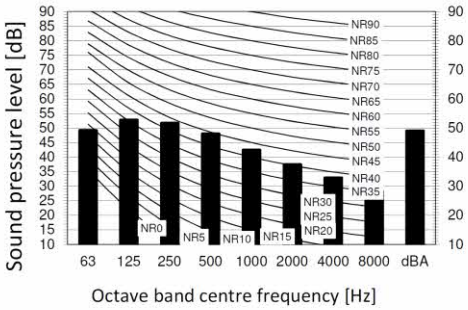
Daikin RZAG50A Outdoor AC Unit

RZAG50A

Cooling mode



Heating mode



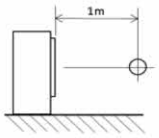
Legend

dBA = A-weighted sound pressure level (A scale according to IEC).

A Scale

B Fan speed: High

Location of microphone



Total dB

Cooling

A	B
dBA	49,0

Total dB

Heating

A	B
dBA	49,0

Notes

1 Operating noise varies depending on operation and ambient conditions.
2 The operation noise measuring method is in accordance with JISC9612.
3 Background noise already taken into account.
4 Operating conditions: power source 220-240 V/220 V 50/60 Hz; JIS standard
5 Measuring location: anechoic chamber

3D120184

Appendix C

Specific Sound Level Results

Appendix C: Detailed Specific Sound Level Prediction Results

Noise Sensitive Receptor	Floor	Broadband Plant Specific Sound Level $L_{Aeq,T}$, dB	Octave Band Specific Sound Level $L_{Zeq,T}$, dB							
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
R1: St Lawrence Vicarage, Church Street	Ground	24.2	35.2	31.9	26.8	22.1	16.6	12.3	7.1	0.8
	1st	26.0	35.9	33.0	28.3	24.0	18.1	15.8	10.0	2.1
R2: 4 High Street	Ground	21.3	27.4	24.1	21.8	17.9	15.4	14.1	7.6	-2.9
	1st	26.3	31.4	28.4	25.4	22.9	20.9	18.9	14.4	5.8
R3: Bellcroft, Vicarage Hill	Ground	11.0	25.0	20.3	13.8	9.0	2.5	-5.7	-12.7	-22.9
	1st	16.3	28.3	24.3	18.3	14.4	9.6	2.6	-4.5	-15.0