

Berkshire Independent Hospital Reading

Environmental Noise Survey and Plant Noise Assessment

32215/PNA1 Rev2

2 June 2025

For:
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Environmental Noise Survey and Plant Noise Assessment 32215/PNA1 Rev2

Document Control

Rev	Date	Comment	Prepared by	Reviewed and Approved By	
2	02/06/2025	Assessed MRI Scanner			
			James Corbey Technical Assistant	Nick Russell Principal Consultant MIOA	
1	12/05/2025	Updated Plant Information			
			James Corbey Technical Assistant	Nick Russell Principal Consultant MIOA	
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Environmental Noise Survey and Plant Noise Assessment Report 32215/PNA1 Rev2

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1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Ramsay Healthcare to undertake a noise assessment for a site in Southcote, Reading.

The site, which is located off Swallows Croft, is proposing to install new external plant. Ramsay Healthcare is proposing to install 3No. condensers and a single chiller serving the proposed ancillary building with an MRI scanner.

Hann Tucker Associates has therefore been commissioned to undertake a detailed environmental noise survey at the site to establish baseline noise conditions as presented herein.

Suitable plant noise emission criteria based on the requirements of the Local Authority and the application of BS 4142: 2014 + A1:2019 have been established, and a plant noise impact assessment undertaken.

Measures required to mitigate noise impacts for the proposed development (when operational) have been discussed in context with relevant national & local planning policies, design standards and good practice guides.

2.0 Objectives

To undertake an environmental noise survey to establish the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at selected accessible positions.

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and the application of BS 4142: 2014 + A1:2019 and to minimise the possibility of noise nuisance to neighbours.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability.

To advise on noise control measures if required.

3.0 Acoustic Terminology

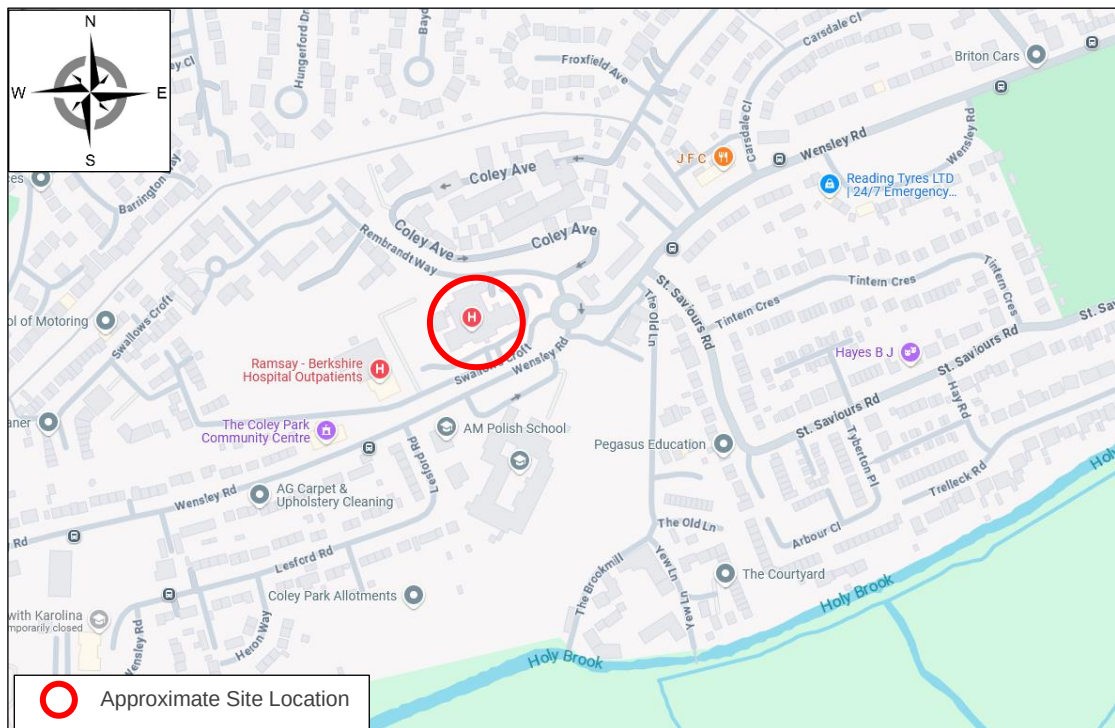
For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.



4.0 Site Description

4.1 Location

The site is located at Berkshire Independent Hospital, Swallows Croft, Coley Park, Reading, RG1 6UZ. The location is shown in the Location Map below.



Location Map (insert copyright info - see above)

The site falls within the jurisdiction of Reading Borough Council.

4.2 Description

The site is Berkshire Independent Hospital, comprising the surrounding ancillary buildings, the car park, and the main medical centre building, with a height of ground plus 2 storeys. The site lies within a predominantly residential area, with some commercial and educational buildings nearby. To the south of the site lies a primary school building, with a height of ground plus 1 storey, as well as some residential buildings along Wensley Road, with heights ranging from ground plus 1 storey to ground plus 4 storeys.

The site is surrounded to the east, north and west by residential buildings with heights ranging from ground plus 1 storey to ground plus 2 storeys. To the east of the site along Wensley Road lies some mixed-use buildings with a commercial ground floor and assumed residential upper floor. The mixed-use buildings have a height of ground plus 2 storeys. To the far west of the



site lies a railway line, and to the far south of the site lies a large green space.

The nearby road network includes Swallows Croft directly to the south and adjacent to the site, Wensley road to the south and east of the site, and Rembrandt Way to the north of the site.

The site is shown in the Site Plan below.



Site Plan (Imagery © 2025 Airbus, Maxar Technologies, Map Data © 2025)

5.0 Planning Policies, Standards & Guidance

5.1 Policies & Guides

In order to provide a suitable assessment a number of national planning policies have been considered.

All guidance used to form a noise impact assessment is taken from various standards, guidance, and Local Authority requirements as summarised below:

- Local Planning Policy
- British Standard 4142:2014 + A1:2019
- Statutory Noise Nuisance



Detailed information for relevant planning policies and guidance can be found within Appendix B.

5.2 Specific Local Authority Criteria

Reading Borough Council has responded with pre-application advice for the proposal of a new MRI unit and associated plant. The advice includes a section on “Environmental Protection – EN17, EN18” detailing a noise condition for the full planning application to assess the impact to neighbouring dwellings. The noise condition provided is as follows:

“No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the Local Planning Authority. The assessment shall be carried out for in accordance with BS4142:2014 methodology. The predicted specific sound level (LAeq,TR) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10dB below the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation.

The predicted rating level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.”

6.0 Baseline Noise Survey

6.1 Procedure

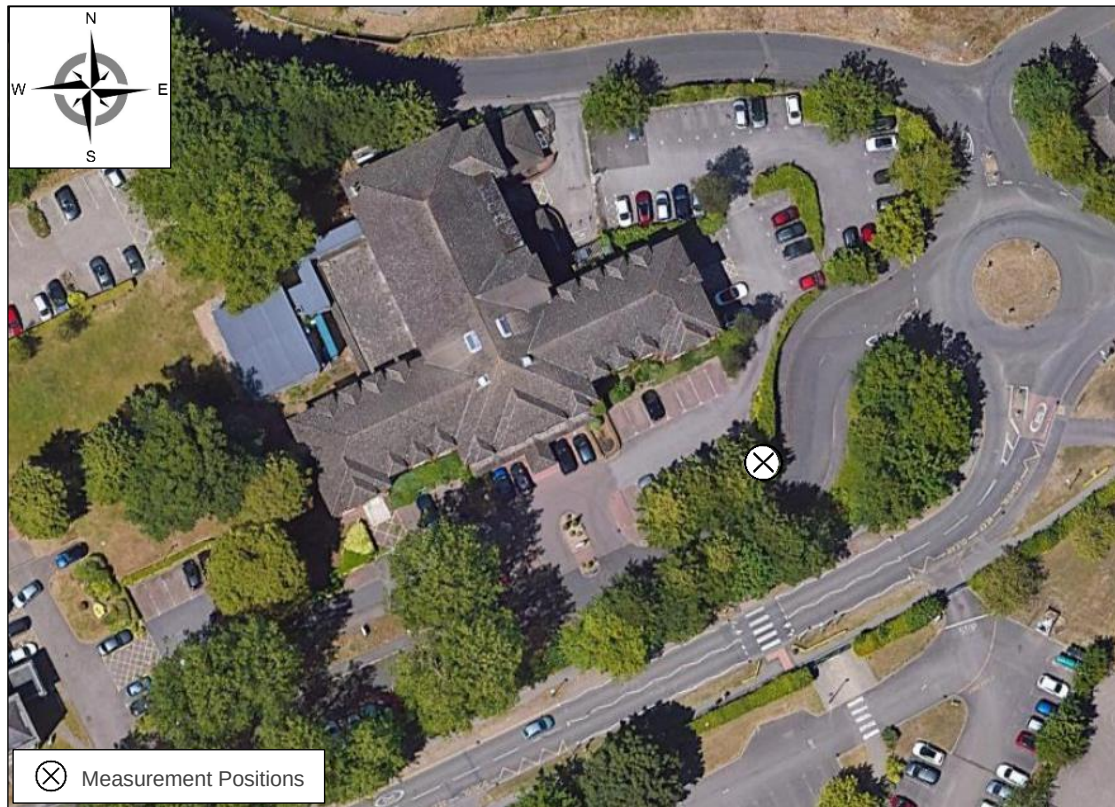
Fully automated environmental noise monitoring was undertaken by James Corbey from approximately 13:00 hours on Monday 17th March 2025 to 11:00 hours on Wednesday 19th March 2025, to establish existing baseline noise levels. Measurements were taken continuously of the A-weighted (dBA) L₉₀, L_{eq}, and L_{max} sound pressure levels over discrete 15-minute periods.

6.2 Measurement Position

The microphone was attached to a fence along the south-east boundary of the site, approximately 1.5 metres above the ground. The microphone was located approximately 1 metre from the roadside, and approximately 14 metres from the nearest façade. The microphone was considered to be in free-field conditions.



The position is shown on the plan below.



Plan Showing Measurement Positions (Imagery © 2025 Airbus, Maxar Technologies, Map Data © 2025)

6.3 Weather Conditions

For the unattended survey between Monday 17th March 2025 and Wednesday 19th March 2025, local weather reports indicated no notable periods of prolonged or heavy rainfall, with temperatures ranging from -5°C (night) to 17°C (day) and wind speeds less than 6 m/s. During our time on site, skies were clear wind conditions were calm and from a southerly direction, and road surfaces were dry.

6.4 Instrumentation

The instrumentation used during the survey is presented in the table overleaf:

Position	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 ½" Condenser Microphone	ACO Pacific	7052E	50282	Calibration on 08/01/2025
	Preamp	Larson Davis	PRM902	1828	Calibration on 08/01/2025

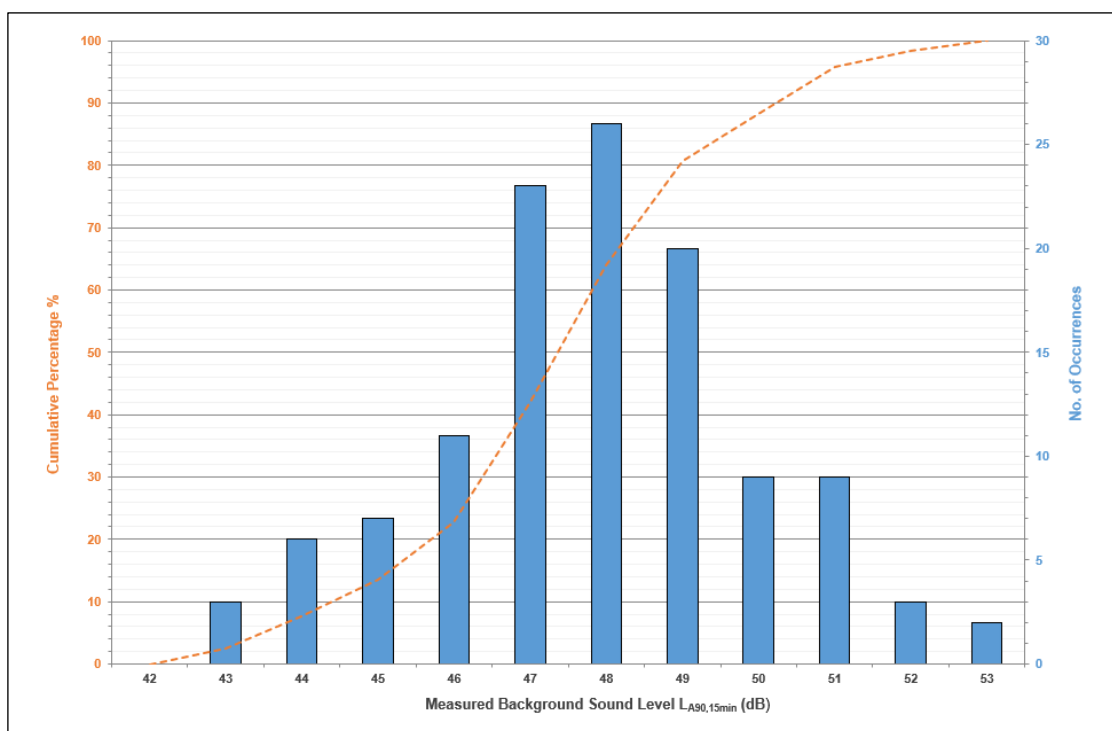


Position	Description	Manufacturer	Type	Serial Number	Calibration
	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3804	Calibration on 08/01/2025
-	Type 1 Calibrator	Bruel & Kjaer	4230	494325	Calibration on 26/07/2024

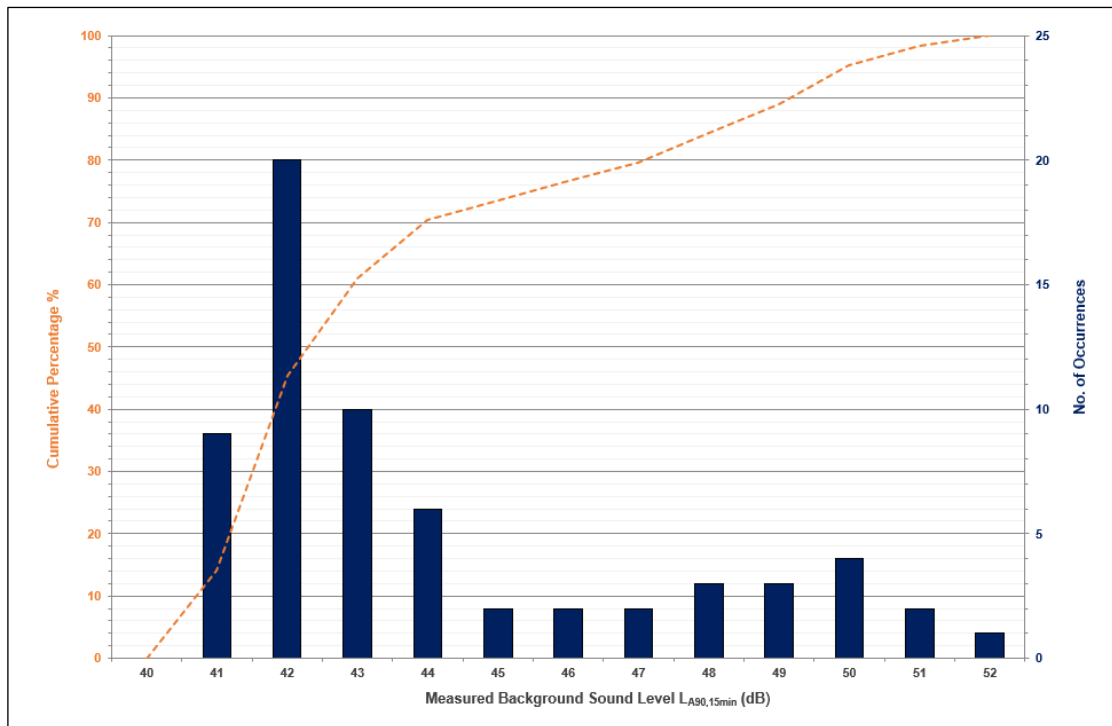
The sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant change was found to have occurred (no more than 0.1 dB). The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a windshield.

6.5 Results

The results have been plotted on Time History Graph 32215/TH1 enclosed presenting the 15-minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at the measurement position throughout the duration of the survey. BS 4142 states that “the background sound level must be reliable and suitably represent the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.” Taking this into account, the following histograms have been created which display the occurrence of each sound level (L_{A90}) for the daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods.



Statistical Analysis of Daytime Background $L_{A90,15min}$ Noise Levels (07:00-23:00)



Statistical Analysis of Night-time Background $L_{A90,15min}$ Noise Levels (23:00 – 07:00)

Based on the above plots the L_{A90} values presented below are considered to be the 'representative' background sound levels determined through statistical analysis of the 15-minute readings in line with BS 4142.

Representative Measured $L_{A90(15min)}$ Background Sound Level (dB re 2×10^{-5} Pa)	
Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
47	42

6.6 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by traffic noise from the nearby road network, and noise from the site car park.

7.0 Plant Noise Emission Criteria

Building services plant external noise emission levels will need to comply with local environmental authority requirements and statutory noise nuisance legislation.



Based on the results of the noise survey and the requirements of the Local Authority (as outlined in Section 5.2), we propose that the following plant noise emission criteria be achieved at 1 metre from both the nearest habitable window of a dwelling, with all plant operating simultaneously. The appropriate façade corrections have been applied to free-field conditions.

Plant Noise Emission Criteria (dB)			
Daytime (07:00 – 23:00 hours)		Night-time (23:00 – 07:00 hours)	
Specific Sound Level ($L_{Aeq,Tr}$)	Rating Level ($L_{Ar,Tr}$)	Specific Sound Level ($L_{Aeq,Tr}$)	Rating Level ($L_{Ar,Tr}$)
40	50	35	45

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality, or any intermittency. The rating level, $L_{Ar,Tr}$, should not exceed the background sound level L_{90} .

It should be noted that the above are subject to the final approval of the Local Authority.

8.0 Plant Noise Impact Assessment

8.1 Proposed Plant

We understand that the proposed external plant comprises a single chiller and 3No. inverter heat pumps, serving the proposed ancillary building, and internal plant comprising the single MRI unit. The plant items include a single ZCF 2280 Aqua Chiller, a single PUZ-M125VKA2 Mitsubishi Condenser, a single SUZ-M50VAR2 Mitsubishi Condenser, a single SUZ-M60VAR2 Mitsubishi Condenser, and a Siemens Magnetom Sola 1.5T MRI scanner.

8.1.1 Plant Location

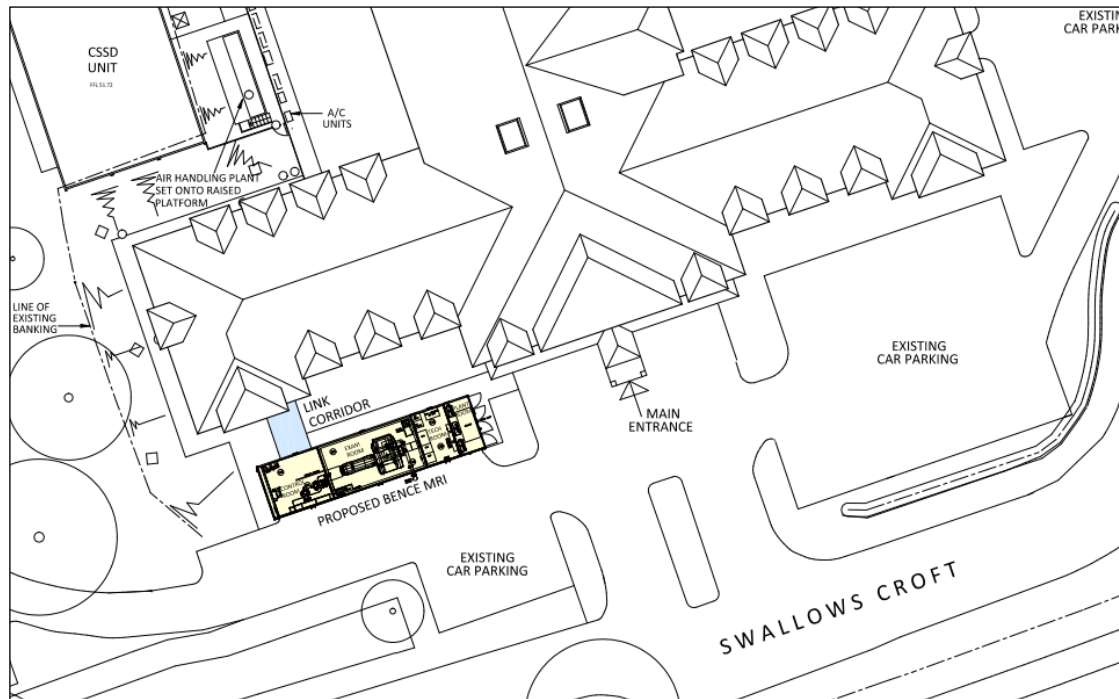
We understand that all the external plant is proposed to be located within a purpose-built plant room on the east side of the proposed ancillary building, and the MRI scanner is located internally within the exam room. We understand that the ancillary building with the MRI scanner is proposed to be located to the west of the front entrance of the main building, approximately 2 metres away from the façade, and will be positioned where there are currently parking spaces. We understand the plant room to be enclosed, with louvre doors and 3No. grilles along with east façade.

We understand the nearest noise sensitive receptor (habitable window) to be a residential

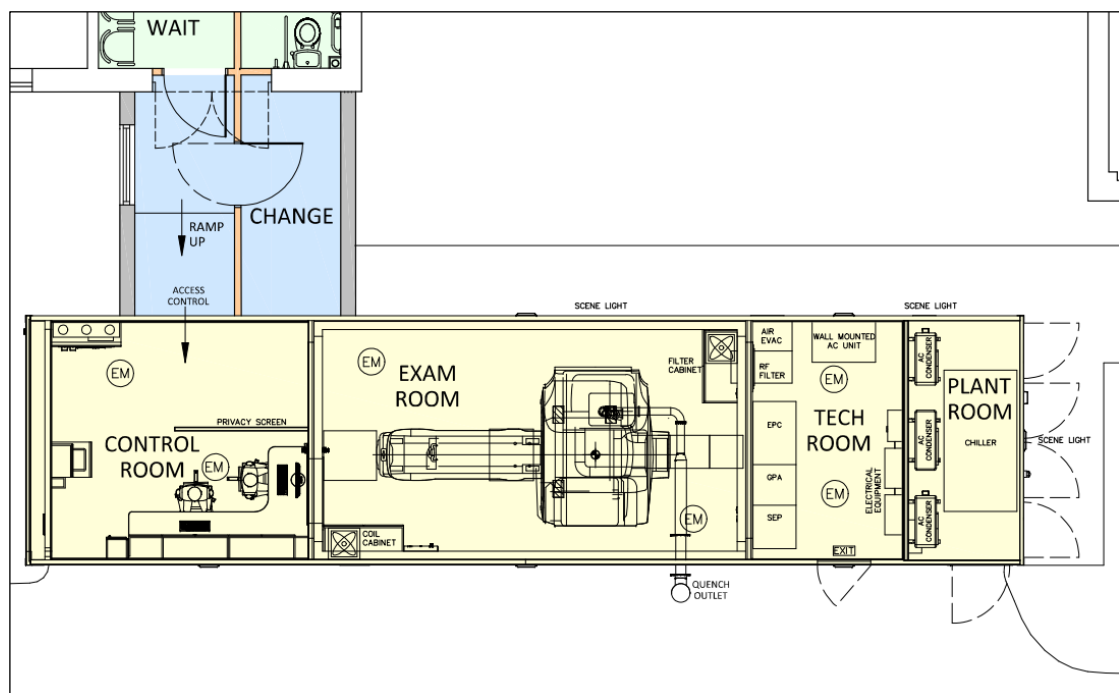


building approximately 70 metres to the south-west from the proposed plant location.

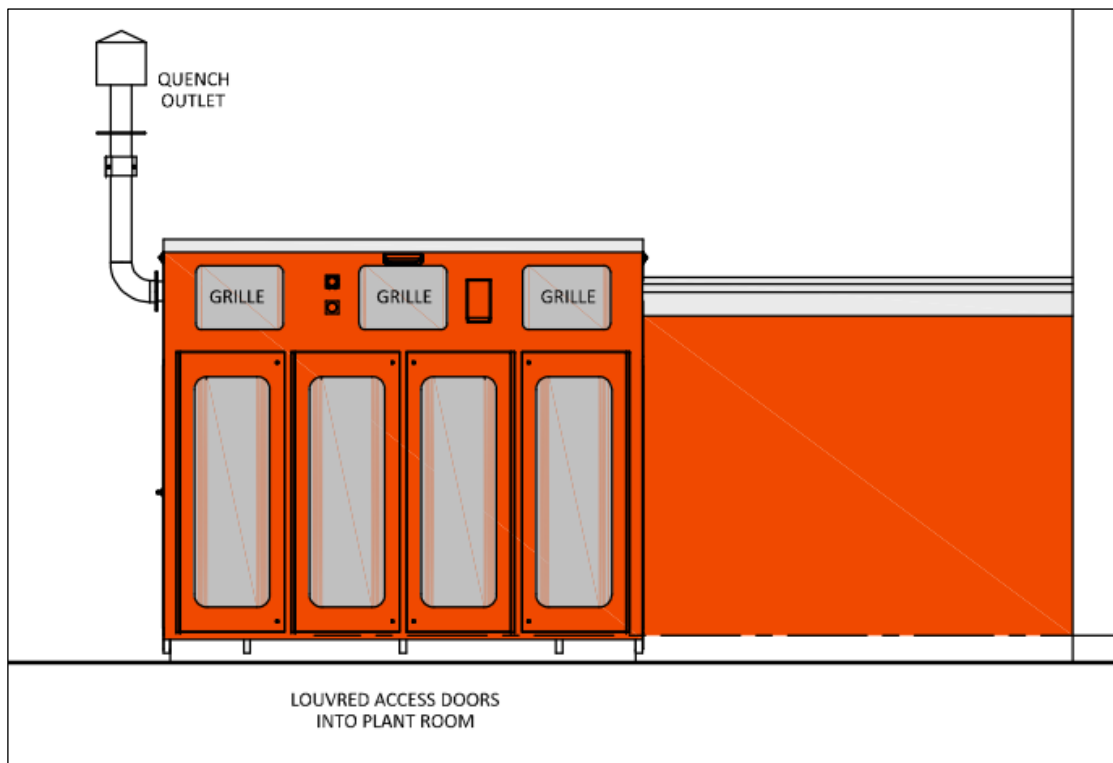
The proposed location, and proposed plant room layout is shown in the images below.



Drawing of Ancillary Building Location (Plan by hall needham limited)



Drawing of Ancillary Building & Plant Room Details (Plan by hall needham limited)



Elevation View of East Façade (Plan by hall needham limited)

8.1.2 Plant Operation

We understand that the proposed units will be operational during daytime (07:00 – 23:00) hours only.

8.1.3 Plant Noise Data

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Description	Sound Pressure Level (dB re 2×10^{-5} Pa) dBA
ZCF 2280 Aqua Chiller	55 dB @ 10 Metres
Plant Description	Sound Power Level (dB re 10^{-12} W) dBA
PUZ-M125VKA2	72
SUZ-M50VAR2	64
SUZ-M60VAR2	65
Plant Description	Sound Pressure Level (dB re 2×10^{-5} Pa) dB(A)
Siemens Magnetom Sola 1.5T, 8 hr Average	≤ 80.6 Within Exam Room



The manufacturer for the MRI scanner has stated in the Basic Planning Information document that if required, noise reduction should be realized based on the 8-hour average noise emissions. We understand that the noise emissions are measured within a typical MRI exam room, with noise absorption representative of hospital installations. We understand that the 8-hour average has already been amended with a typical on-time correction for downtime of the unit.

8.2 Initial Noise Impact Assessment

Based on the data provided in Section 8.1.3, calculations suggest that plant noise egress levels from the plant room at the nearby noise sensitive receptors mentioned in Section 8.1.1 may not be within the limits set out in Section 7.0 and would likely affect the nearby habitable windows. Further details regarding the exam room which houses the MRI unit are discussed in Section 8.4.2, and calculations will be made to determine the impact on the cumulative plant noise emissions.

For the plant room, a mitigation approach needs to be developed to reduce the level of plant noise egress in line with the criteria. These mitigation measures are discussed in Section 8.3.

8.3 Recommended Mitigation Measures

In order to control plant noise emissions in line with the proposed criterion, we recommend installing acoustic louvre doors on the east elevation of the ancillary building as shown in the drawings above. The atmospheric connection to the plant should be fitted with acoustic louvres which reduce the noise emissions by at least 20 dB and installed in accordance with our Specification for Acoustic Louvres (attached).

8.4 Plant Noise Impact Assessment

The following tables summarise our predictions of atmospheric noise emissions from the proposed plant, considering the recommended mitigation measures set out in Section 8.3, to the nearest noise sensitive residential window during daytime hours.

8.4.1 Plant Room to Nearest Residential Receptor

The following octave band noise data has been extrapolated from similar models of plant items due to the absence of octave band noise data available for these models. Therefore, the octave band noise data may not be completely accurate.



Cumulative Noise Emissions from Plant Room to Nearest Receptor	Sound Level at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
ZCF 2280 Chiller Sound Pressure Level	60	70	71	72	70	68	64	58	75
PUZ-M125VKA2 Sound Power Level	76	75	75.5	67	66	62	56	50	72
SUZ-M50VAR2 Sound Power Level	67	66	66.5	60	59	55	49	43	64
PUZ-M60VAR2 Sound Power Level	68	67	67.5	61	60	56	50	44	65
Recommended Mitigation	-7	-10	-13	-20	-21	-22	-21	-16	-
Cumulative Sound Pressure Level at 1 Metre from Radiating Wall of Plant Room	73	76	76	69	66	63	60	59	73
Distance Loss	-30	-30	-30	-30	-30	-30	-30	-30	-
Façade Correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Cumulative Noise Level at Receiver	40	43	43	37	34	31	28	27	40

8.4.2 Exam Room to Nearest Residential Receptor

We understand that the external building fabric of the exam room, which houses the MRI unit, is proposed to have the following wall and ceiling build-up:

- 12 mm Fire-resistant Board
- 12 mm Plywood
- 50 mm cavity containing timber framing with insulation of 0.462 W/m²K
- 12 mm Plywood
- 2 mm GRP Layer

Following correspondence with W.H. Bence Coachworks, we understand that an 'RF Cage' will be installed within the exam room, enclosing the proposed MRI unit. The 'RF Cage' will have a minimum 50 mm air gap between the external wall, and be composed of steel shielding, 2 layers of chipboard surrounding a timber frame containing a sheet of copper, a layer of plywood and a PVC laminate finish. An image of this typical 'RF Cage' wall buildup is provided in Appendix D. The full wall has been simulated in INSUL, and the sound insulation performance has been calculated to be approximately 44 Rw, with a -7dB conversion to Dw.

It is our experience that MRI units typically contain a large amount of variance within their sequences and noise levels during operation. Therefore, for robustness, the noise emissions used in our calculations will have a +15 dB(A) correction, which we believe should account for any operations which might run at high loads for extended periods of time.



Noise Emissions from MRI Scanner to Nearest Receptor	Sound Pressure Level (dB re 2x10⁻⁵ Pa) dBA
Siemens Magnetom Sola 1.5T (Applied Robustness Correction)	95
Wall Transmission Loss	-37
Distance Correction	-36
Façade Correction	+3
Noise Level at Receiver	25

The proposed MRI scanner, in conjunction with the estimated wall sound reduction, is more than 10 dBA below the cumulative noise from the other plant at the nearest residential receptor and will thus have a minimal impact on the overall assessment.

8.4.3 BS 4142:2014 Assessment

Results		Relevant Clause	Commentary
Calculated Specific Sound Level at Receptor	40 dB	-	Calculated in Section 8.4 and already includes losses from the proposed plant to the window.
Assessment made during the daytime		7.2	Only active during daytime hours.
Intermittency Correction	+3 dB	7.3.15	Plant anticipated to operate on intermittent cycles, an intermittency correction of +3dB is applied.
Acoustic feature correction	+3 dB	9.2	Due to no octave band data or on-site example sources for the chiller, a conservative correction of +3dB is applied.
Rating level at Nearest Receptor	46 dB	9.2	Calculated by adding acoustic feature corrections to the specific sound level.
Background sound level	50 dB	8.1.1 8.1.3 8.3	Typical background sound level measured at the proposed development site during the day. Adjusted to include façade reflections in parallel with calculated façade level at receptor.
Excess of rating over background sound level	-4 dB	11	
Assessment indicates low impact to residents		11	The Rating Level is 4.0 dB below the background noise level during the day indicating low impact in line with BS4142:2014.
Uncertainty of the assessment	Low	10	The background sound level is based on repeatable measurements made over the duration of a number of days. The measurements of noise from the industrial remained consistent throughout measurement period.

Our calculations indicate that the proposed plant, in conjunction with the proposed mitigation measures, should be capable of achieving a rating level of 4 dB below the background sound level at the nearest habitable window, which meets the requirements of the Local Authority



outlined in Section 5.2.

9.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's advice.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive habitable window.

The assessment indicates that the proposed plant, in conjunction with the recommended mitigation measures and proposed wall build-up, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential window.

Appendix A

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B

Planning Policies, Standards & Guidance

B.1 BS 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 *“Methods for rating and assessing industrial and commercial sound”*.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: *“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 noise can be obtained by the difference of the rating noise level and the background noise 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.”*

The determination of the “rating level” and the “background level” are both open to interpretation, depending on the context.

B.2 Statutory Noise Nuisance

S79(1)(g) of the Environmental Protection Act 1990 defines a statutory nuisance as “*noise emitted from a premises so as to be prejudicial to health or a nuisance*”. A duty is placed on the Local Authority to serve an abatement notice under S80 if it becomes satisfied that a statutory nuisance exists.

There is however no quantitative definition/objective method in determining statutory noise nuisance, and as such we are not able to definitively advise or determine on such matters. Noise nuisance is subjective and requires multiple factors to be considered, including but not limited to:

- Straining to hear something is *generally* considered not a nuisance, however,
- Noise level (of source and relative to background), timing, duration, type of noise, frequency, location, continuous or repetitive, all factor into judging nuisance.

To mitigate against, though not remove entirely, the risk of a statutory noise nuisance, a noise assessment should be undertaken by a Suitably Qualified Acoustician. Adoption of appropriate and relevant industry standards/guides can provide a structured framework for such assessments, improving the credibility of mitigation efforts. It is also important to also recognise that ongoing management (both active and passive) may also be necessary depending on the context of the situation.

Appendix C

Berkshire Independent Hospital

Specification for Acoustic Louvre

Acoustic louvres shall be installed to attenuate ventilation openings to the plant room containing the chiller and condensers.

Performance

The acoustic louvres shall be at least 300mm deep and provide, in their as-installed condition, the following minimum combined sound reduction indices (SRI's) when tested in accordance with BS 2750 Part 3 – 1980 (ISO 140 Part 3 – 1995).

Minimum Sound Reduction Index (dB)							
63	125	250	500	1K	2K	4K	8K
7	10	13	20	21	22	21	16

Construction

The louvre frame shall be constructed from a suitable gauge of galvanised mild steel, or aluminium, supporting louvre blades of like material. The acoustic material in the blades shall be packed to a density of not less than 45kg/m³ and be inert, rot and vermin proof, non-hygroscopic incombustible mineral fibre. This shall be faced with glass fibre cloth, or other approved infill protection membrane, and retained on the lower blade face by perforated galvanised mild steel or aluminium (not “expamet” or similar derivative) having a minimum thickness of 0.5mm fixed at 200mm (max) centres.

All junctions between the acoustic screen and adjacent structures shall be made good and sealed with a heavy grout and/or non-hardening dense mastic.

The supplier shall ensure that the assembled enclosure is designed and constructed to withstand site operating conditions such as wind and snow loads, etc., as appropriate, and is suitably weatherproofed.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.

Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

Appendix D

Typical RF Cage Wall Buildup

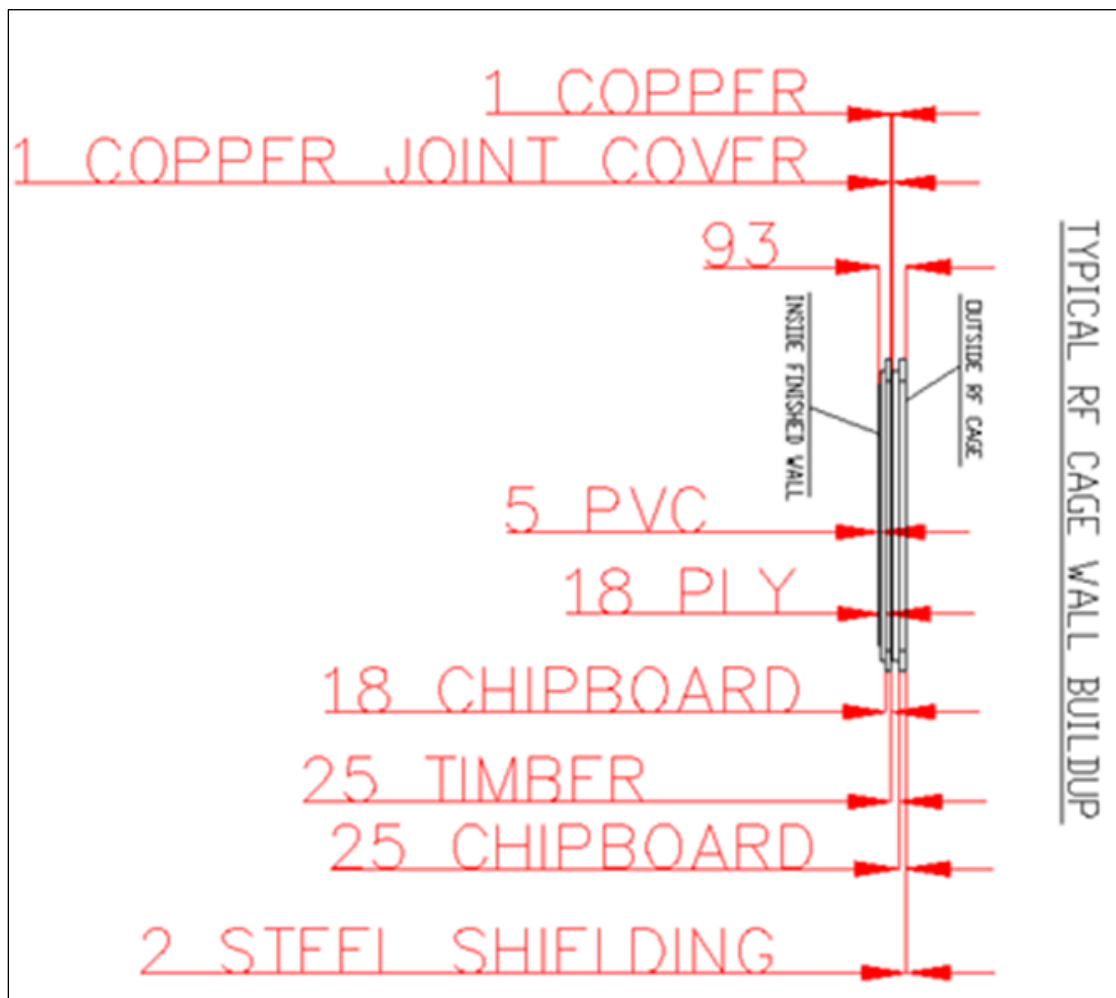


Image showing typical 'RF Cage', Buildup provided by W.H. Bence Coachworks

Appendix E

Time History Graphs

Berkshire Independent Hospital

Position 1

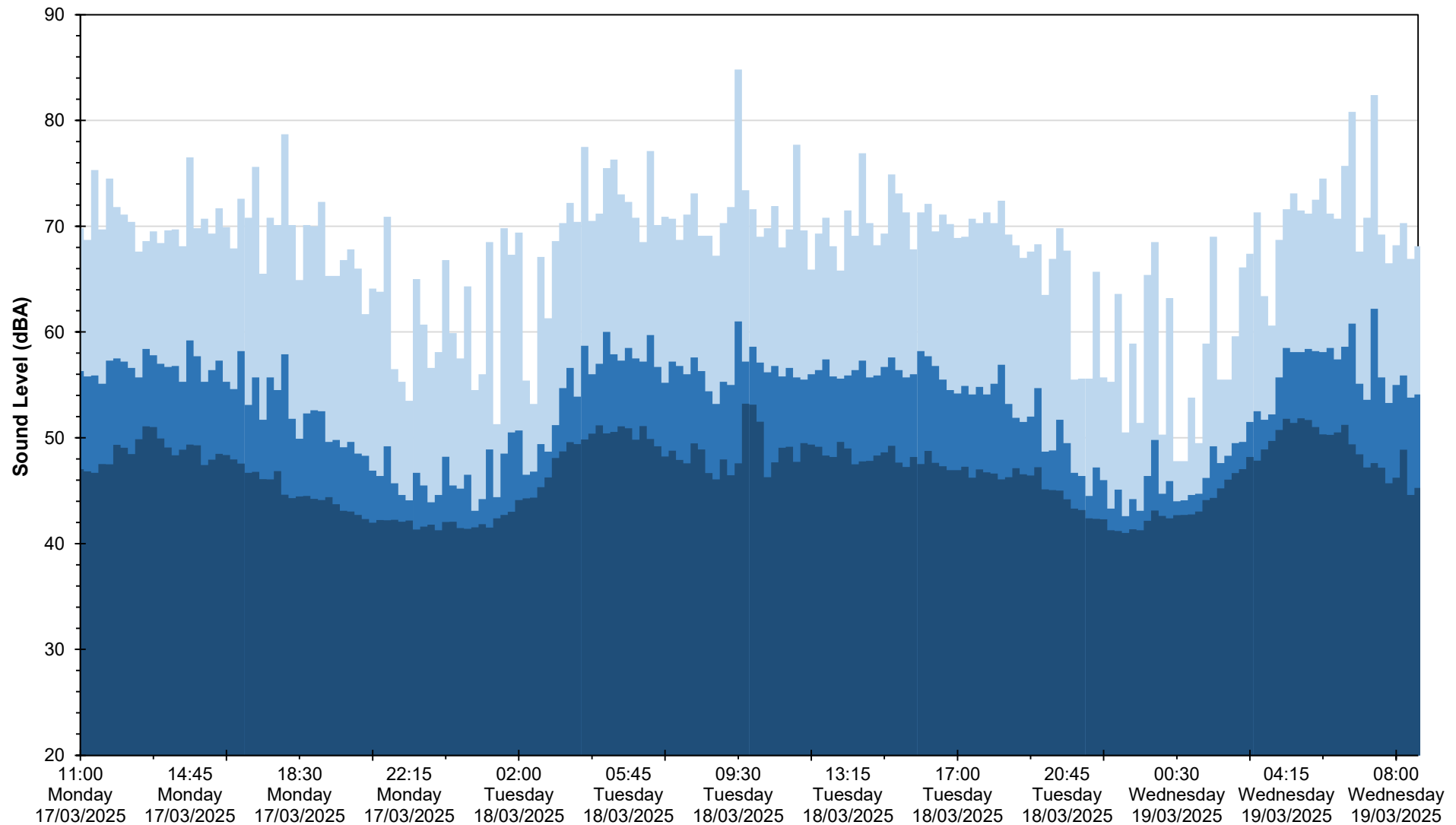
L_{eq} , L_{max} and L_{90} Noise Levels

Monday 17 March 2025 to Wednesday 19 March 2025

LA_{max}

LA_{eq}

LA₉₀



Date and Time

32215/TH1