NOISE IMPACT ASSESSMENT

Client: - Jaguar Building Services

Project: - Eisai, Hatfield

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Qt Acoustics Ltd
Whitecroft,
Prospect Road,
Ash Vale
Surrey,
GU12 5EL.
Tel: - 01252 444948
Email: - consult@qtacoustics.co.uk

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EXECUTIVE SUMMARY

Qt Acoustics were appointed to review the acoustic impact of the proposed replacement of air-cooled chiller plant to be installed at Eisai Europe Limited, EMEA Knowledge Centre, Mosquito Way, Hatfield, Hertfordshire, AL10 9SN and so as to support a planning application and to avoid creating a detrimental noise impact on neighbouring noise sensitive properties.

Environmental noise monitoring of the site has been undertaken and representative noise levels have been recorded to allow assessment in accordance with local planning requirements. Noise level calculations have been performed to predict the noise level of the proposed mechanical services plant in relation to the local planning conditions for noise emission.

Relevant standards in the form of BS4142:2014+A1:2019 and model planning conditions from the Welwyn Hatfield Borough Council (WHBC) have been considered. Our assessment indicates that the noise from the proposed replacement mechanical services plant complies with local planning policy requirements, provides a low impact to neighbouring noise sensitive properties and provides a level of betterment over the existing air-cooled chillers being replaced.

1.0 Introduction

It is proposed to install replacement air-cooled chiller mechanical services plant toward the Eastern boundary of the site located at Eisai Europe Limited, EMEA Knowledge Centre, Mosquito Way, Hatfield, Hertfordshire, AL10 9SN and so as to provide heat rejection for comfort cooling and thermal control of temperature critical manufacturing & storage process'. The proposed mechanical services plant is intended to replace old existing failing plant and is not a new addition to plant at the site.

As part of the intended project; the plant compound is to be extended, the existing plant compound has been identified as too small for the existing equipment to operate effectively and a significant loss of heat-rejection performance has been observed due to recirculation of air within the plant compound which has caused long-standing issues and equipment failure. As such, to rectify the identified issue, provide higher levels of efficiency/lower energy use, adopt "greener" refrigerant with lower cooling capacity and avoid plant failure the plant compound is proposed to be extended. The site is within an Industrial Park area with a large number of noise sensitive residential dwellings toward the South of the site area and new noise sensitive residential properties are currently being built toward the South-East of the site.

Qt Acoustics have therefore been commissioned to undertake a detailed environmental noise assessment of the proposed replacement mechanical services at the site and in line with local planning conditions.

2.0 Objectives

The objectives of this assessment are:

- To establish, by means of environmental noise monitoring, the existing noise climate of the site.
- To measure the existing L_{A90} (background noise level) at a location representative of the noise climate currently experienced at neighbouring noise sensitive properties.
- To propose suitable noise emission criteria based on relevant Standards and Local Authority Requirements where present.
- To perform predicted noise level calculations of the proposed plant incorporating any acoustic mitigation measures to provide a detailed assessment of the noise impact on neighbouring noise sensitive properties and specifically in relation to local planning condition requirements.

This report presents the results of the noise survey and the subsequent impact assessment of the mechanical services plant with any associated acoustic mitigation measures.

3.0 Site Description

The site is located at Eisai Europe Limited, EMEA Knowledge Centre, Mosquito Way, Hatfield, Hertfordshire, AL10 9SN and falls within the boundary of Welwyn Hatfield Borough Council (WHBC). The Eisai site is operated as a packaging and manufacturing centre with office space and as such will operate the air-cooled chillers for comfort cooling of offices and thermal control of the manufacturing environment. The air-cooled chillers are planned to operate 24-hours a day with reduced operating conditions during night-time hours when offices are vacant and manufacturing ceases. The area surrounding the site is generally of commercial use with noise sensitive residential currently located to the South at Parkhouse Court on Tamblin Way and new residential currently being constructed toward the South-East at the Comet Rise development located between Comet Way and Goldsmith Way.

The nearest noise sensitive residential properties are:

- Residential A – Parkhouse Court, Tamblin Way, Hatfield, AL10 9RQ located nominally 189 metres to the South of the proposed plant location.
- Residential B – Comet Rise development (Under construction), Hatfield, AL10 located nominally 190 metres to the South-East of the proposed plant location.

Please see Appendix D for a map of the area.

4.0 Acoustic Criteria

4.1 Welwyn Hatfield Borough Council Model Planning Condition

WHBC has been consulted on preferred methodology for acoustic assessment and has a standard model planning condition relating to mechanical services noise: -

"The applicant shall submit to, for approval in writing by the Local Planning Authority, details relating to a scheme to mitigate the noise from external plant and equipment.

The noise emitted from all external plant and equipment should not exceed the background noise level (LA90), at any time, at the closest residential neighbour.

The noise level must be achieved with the plant equipment running at a typical maximum load setting.

The plant shall be serviced regularly in accordance with manufacturer's instructions and as necessary to ensure that the requirements of the condition are always maintained.

Reason – to protect the occupants at the nearest receptor location from noise disturbance."

Further clarifications with WHBC confirmed that no noise rating level penalty need be applied where the plant noise is at or below the existing background noise level and that otherwise the procedures as per BS4142:2014+A1:2014 should be adopted including use of the statistically most common background noise levels for each time period.

4.2 BS4142:2014+A1:2014 "Methods for rating and assessing Industrial and commercial sound".

BS4142:2014+A1:2014 can be used to assess the likelihood of adverse impact as a result of a noise generating item. The standard provides guidance on how to:

- Assess the level of any adverse impact by identification of a "representative background noise level" for the period of plant operation
  And
  Methods to assess the "Rating Level" of the specific sound.

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level and specific sound source exceeds the background sound level and the context in which the sound occurs.

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

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

c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

d) 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."

And

"Rating Level
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."

The standard continues to suggest the following corrections to the specific sound level in order to obtain a "Rating Level": -

Table 4.1.1 Rating Level Correction from BS4142:2014

Characteristic	Range	Correction	Subjective Assessment
Tonality	0 to +6 dB		
		0 dB	Not Perceptible
		+ 2 dB	Just Perceptible
		+ 4 dB	Clearly Perceptible
		+ 6 dB	Highly Perceptible
Impulsivity	0 to +9 dB		
		0 dB	Not Perceptible
		+ 3 dB	Just Perceptible
		+ 6 dB	Clearly Perceptible
		+ 9 dB	Highly Perceptible
Other	0 or 3dB		
		+ 3 dB	Distinctive Characteristic Present
Intermittency	0 or 3dB		
		+ 3 dB	Readily Distinctive Intermittency

Note: - All are considered in relation to existing residual acoustic environment.

5.0 Environmental Noise Survey

5.1 Instrumentation

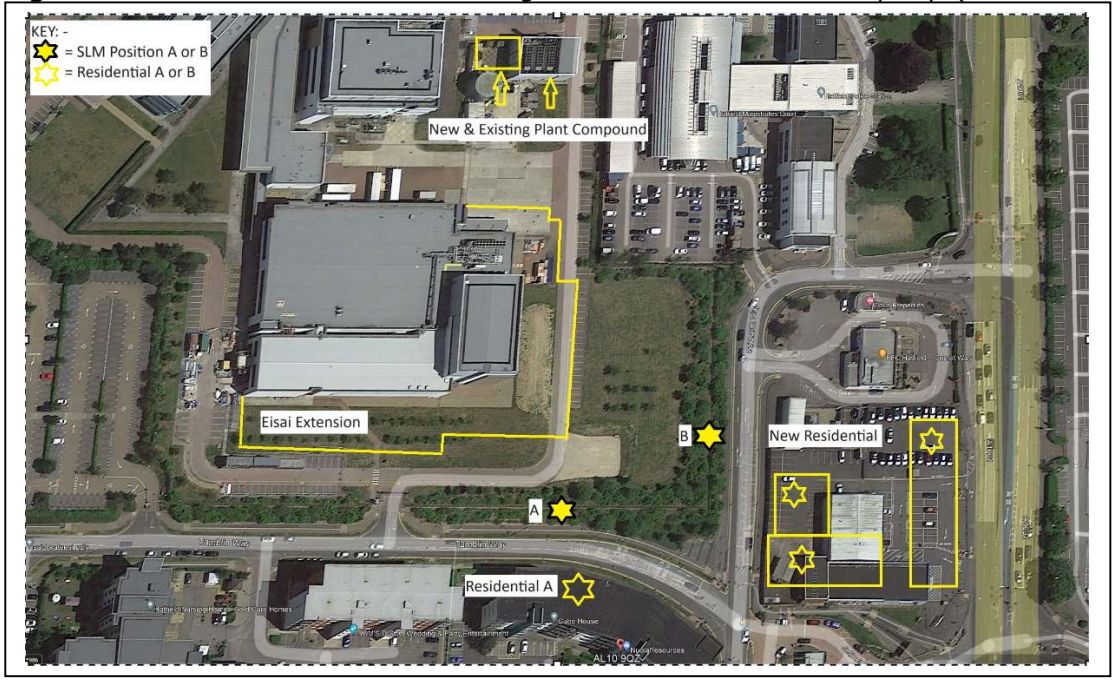
The environmental noise survey was undertaken using the following equipment: -
NTI Audio XL2 Serial No. A2A-08390-E Class 1 integrating and data logging sound level meter conforming to the relevant sections of BS EN 61672-1:2013
NTI Audio M2230 microphone monitoring assembly comprising of MA220 pre-amp and microphone capsule - class 1 conforming to the relevant sections of BS EN 61672-1:2013.

Full calibration certificates are provided within Appendix H.

5.2 Measurement Position

Our survey concluded that the nearest noise sensitive properties are to be located to the rear and Southerly most boundary of the site at Location "A" Parkhouse Court and Location "B" at Comet Rise. The noise monitoring instrumentation was located on the boundary of the Eisai site. The noise monitoring positions were in close proximity to the neighbouring noise sensitive properties, at a position similar distance from the main trunk road as the residential properties and are considered to provide a representative background noise level.

Figure 5.2.1 – Position of Noise Monitoring and Nearest Residential Property. (NOTE: - SLM = Sound Level Meter Monitoring Position)



Additional noise sensitive residential properties were identified in the area but are at a greater distance and/or benefit from being partially in the acoustic shadow of the surrounding buildings or topography.

5.3 Measurement Procedure

The noise monitoring equipment was configured to monitor consecutive 1 hour & 15 minute samples of the site noise level at 2 locations. Measurements were recorded at location A over a period of 85-hours and location B over a period of 85 hours. Measurements were logged concurrently for the ambient sound level ($L_{Aeq,T\ min}$), background noise level ($L_{A90,T\ min}$), $L_{A10,T\ min}$ (Often used as a traffic noise percentile) and the instantaneous maximum noise level ($L_{Amax,T\ min}$). The noise monitoring was an unattended test and as such the sound level meter was also configured to record a continuous audio sample of the entire test duration to assist with identification of any extraneous noise sources.

The microphone monitoring assembly was located at a height of 1.5 metres above ground level and at a distance of not less than 20 metres from any neighbouring façade. The sound level meter manufacturer's windshield and bird spike assembly were used in order to minimise risk of external interference.

The environmental noise monitoring at the site was performed from: -

- Location A - 14:00 hours on Friday 13th October 2023 to 03:00 hours on Tuesday 17th October 2023.*
- Location B – 13:30 hours on Friday 20th October 2023 to 02:45 hours on Tuesday 24th October 2023.*

* In close proximity to the measurement positions is a construction site at residential B and as such, for the purposes of day-time noise assessment, only day-time data from 13:00 hours to 19:00 hours on Saturday and 07:00 hours to 19:00 hours on Sunday have been used.

A field calibration check of the sound level meter and microphone monitoring assembly was undertaken before and after the noise measurement. No deviation was recorded and a microphone sensitivity of 39.3 mV/Pa maintained.

The procedure, measurements and interpretation were all undertaken in accordance with BS7445, parts 1 & 2. All provided sound pressure level measurements are referenced to $2x10^{-5}$ Pa.

5.4 Weather Conditions

The noise monitoring period was generally without precipitation and the ground surface was dry. The weather conditions were recorded over the duration of the noise survey and indicated generally stable weather conditions suitable for test purposes. The details are provided below: -

Location A

Test	Temperature	Wind Speed	Wind Direction	Cloud Cover
	°C	m/s	Degrees	%
Min	1	0.0	0	0%
Max	12	4.2	360	75%

Location B

Test	Temperature	Wind Speed	Wind Direction	Cloud Cover
	°C	m/s	Degrees	%
Min	5	0.0	0	25%
Max	16	3.5	360	75%

BS7445 indicates that weather conditions should be free of precipitation and wind speeds above 5 m/s. Brief showers were recorded on Friday 13th around 1800 hours and Saturday 21st October around 12:00 hours and the data has been omitted due to weather and construction noise.

No other periods of high winds or precipitation were recorded. As such the prevailing weather conditions during the noise monitoring period are deemed to be suitable for the purpose of noise testing and would not result in excessive external interference to measurement.

5.5 Site Noise Climate

The area surrounding the Eisai site is predominantly commercial retail and office use with a small quantity of noise sensitive residential properties.

The main noise source within the area is traffic noise from surrounding roads.

Neighbouring commercial properties located predominantly to the North and West of the site incorporate mechanical services plant and is also considered a main noise source in the area.

Noise from underground and over ground rail was not audible or detected during site visits and is unlikely to have influenced the noise climate of the site as the nearest train line station is nominally 1500 metres away.

Intermittent aircraft noise was identified and presumed from local commercial flights from Luton airport and Stanstead airport.

6.0 Measurement Result Summary

Two 85-hour unattended noise tests were undertaken at site boundaries in close proximity to residential A & B noise receptors. The full results are provided in graphical and numerical format within Appendix B & C. A summary of the results is provided in table 6.1 below.

Table 6.1 Residential A - Park House Court Summary of Background Noise Levels – Day/Eve/Night

Time Period	Statistically Most Common Background Noise Level
	$L_{A90, Tmin}$
Day-Time (07:00-19:00 hrs) (T=60 min)	50 dB
Evening (19:00-23:00 hrs) (T=60 min)	48 dB
Night (23:00-07:00 hrs) (T=15 min)	46 dB

Table 6.2 Residential B – Comet Rise (In Construction) Summary of Background Noise Levels – Day/Eve/Night

Time Period	Statistically Most Common Background Noise Level
	$L_{A90, Tmin}$
Day-Time (07:00-19:00 hrs) (T=60 min)	52 dB
Evening (19:00-23:00 hrs) (T=60 min)	52 dB
Night (23:00-07:00 hrs) (T=15 min)	46 dB

The proposed air-cooled chillers are proposed to be operated 24 hours a day with a night-time reduction in heat-rejection requirements.

In order to comply with the model planning condition provided by Welwyn Hatfield Borough Council the sound pressure level at the neighbouring noise sensitive properties should be below the statistically most common background noise level. The following limiting noise at the nearest noise sensitive properties can therefore be determined as: -

Table 6.3 – Limiting Noise Levels – Welwyn Hatfield Borough Council Model Planning Condition

Time Period	Plant Noise Limits	
	Residential A	Residential B
Day-Time (07:00-19:00 hrs) (T=60 min)	50 dB L_{Aeq}	52 dB L_{Aeq}
Evening (19:00-23:00 hrs) (T=60 min)	48 dB L_{Aeq}	52 dB L_{Aeq}
Night (23:00-07:00 hrs) (T=15 min)	46 dB L_{Aeq}	46 dB L_{Aeq}

7.0 Plant Noise Emission

The proposed mechanical services plant comprises of 3 off air-cooled chillers and is proposed to be installed generally in accordance with the proposed site layout plan drawing provided within Appendix E1. In order to facilitate the extension of the plant compound; the existing emergency generator system requires relocating nominally 5 metres to the West of the existing position. The generator is not moving any closer to noise sensitive properties and hence there is no change in noise impact of this alteration.

As part of the overall development of the site, Planning permission has recently been granted for an extension to the existing warehouse space under application reference no. 6/2022/1853/MAJ. This extension introduces a building between the chiller plant compound and the existing noise sensitive residents at Park House Court and provides a level of acoustic screening.

A new noise sensitive receptor is currently being constructed at Comet Rise and has been included within this assessment.

This section summarises the proposed equipment with associated noise levels, layout and provides a noise impact assessment with reference to WHBC model planning conditions and with additional consideration to local commercial units provided by reference to BS8233.

7.1 Mechanical Services Equipment

The equipment comprises of: -

7.1.1 The mechanical services plant consists of the of the following equipment: -

- **Item 1 Daikin EWAHC12TZSRC2 Air-Cooled Chiller** – 96 dB LWA[1]. The plant item is located at 1st floor level within the revised plant compound with visual screening provided by the weather louvre facade and nominally 198 metres from the nearest neighbouring property.
- **Item 2 Daikin EWAHC15TZSRC2 Air-Cooled Chiller** – 96 dB LWA[1]. The plant item is located at 1st floor level within the revised plant compound with visual screening provided by the weather louvre facade and nominally 189 metres from the nearest neighbouring property.
- **Item 3 Daikin EWAHC15TZSRC2 Air-Cooled Chiller** – 96 dB LWA[1]. The plant item is located at 1st floor level within the revised plant compound with visual screening provided by the weather louvre facade and nominally 189 metres from the nearest neighbouring property.

[1] The Manufacturer's published noise data is provided within Appendix F. For calculation purposes Qt Acoustics have adopted Sound Power Level data for greater accuracy but used the spectral sound pressure level noise data at 1 metre and as provided by the manufacturer to estimate the SWL spectral make-up.

The replacement air-cooled chillers have been carefully selected with noise emission being the priority. The air-cooled chillers have been selected to provide sufficient heat-rejection for day-time use & during periods of high ambient temperature and full occupation of the offices, labs and manufacturing areas and as such will typically not operate at full speed. During night-time periods, when the ambient temperature will be lower, offices not occupied and the manufacturing area not operational; the heat-rejection requirements are significantly lower and hence only 1 chiller would be required to operate to satisfy the heat-rejection required for the imposed building load. As such our calculations are based on only 1 chiller being operational at night-time, in practice the operator of the mechanical services plant may in due course assess if it is more efficient and quieter to operate 3 units at low speed at night once the equipment is installed.

7.1.2 Noise & Vibration Control Equipment

There is no direct vibration transfer path between the proposed equipment and neighbouring noise sensitive premises. It is however considered good practice to incorporate a form of vibration isolation for typical air-cooled chillers and so as to reduce vibration transfer into the user's premises. It is therefore intended to install the air-cooled chillers using manufacturer's provided spring type vibration isolators providing 25mm to 50mm static deflection when loaded and depending on the structural span of the floor structure.

The above spring vibration isolators should be appropriately selected for the weight of the equipment being supported and generally in keeping with the good practice guidance provided within the Chartered Institute of Building Services Engineers Guide B4:2016 "Noise & Vibration Control for Building Services Systems".

7.2 Noise Impact Assessment – BS4142:2014+A1:2019

Equipment noise levels with plant located as per Appendix E2 have been calculated for the proposed periods of operation and extrapolated to the nearest noise sensitive properties. A full and detailed set of calculations are provided within Appendix G.

Our calculations indicate the following noise levels from the proposed mechanical services equipment once extrapolated to the neighbouring noise sensitive properties: -

Table 7.3.1 – Predicted Noise Levels at neighbouring property façade – Residential A.

Time Period	Plant Noise Limits	Calculated Plant Noise
	$L_{Aeq, Tmin}$	$L_{Aeq, Tmin}$
Day-Time (07:00-19:00 hrs) (T=60 min)	50 dB L_{Aeq}	43 dB L_{Aeq}
Evening (19:00-23:00 hrs) (T=60 min)	48 dB L_{Aeq}	43 dB L_{Aeq}
Night (23:00-07:00 hrs) (T=15 min)	46 dB L_{Aeq}	39 dB L_{Aeq}

Table 7.3.2 – Predicted Noise Levels at neighbouring property façade – Residential B.

Time Period	Plant Noise Limits	Calculated Plant Noise
	$L_{Aeq, Tmin}$	$L_{Aeq, Tmin}$
Day-Time (07:00-19:00 hrs) (T=60 min)	52 dB L_{Aeq}	48 dB L_{Aeq}
Evening (19:00-23:00 hrs) (T=60 min)	52 dB L_{Aeq}	48 dB L_{Aeq}
Night (23:00-07:00 hrs) (T=15 min)	46 dB L_{Aeq}	43 dB L_{Aeq}

As such the proposed replacement mechanical services plant is a minimum of 3 dB(A) below the statistically most common background noise level for the period of proposed plant operation once extrapolated to the noise sensitive receptors.

7.2.1 BS4142:2014 Impact Assessment – Noise Rating Level

Tonality: -
Qt Acoustics have undertaken background noise level monitoring at the site with spectral analysis to allow comparison with the frequency make-up of the equipment noise once extrapolated to the neighbouring noise sensitive premises. Our analysis indicates that the specific sound level of the proposed equipment does not exceed the background noise level in any low or mid-frequency octave-band. Minor exceedance of the background noise level is expected in the 4kHz and 8kHz octave-bands but generally due to air-movement noise which is broad-band in nature and not tonal. As such no Noise Rating Level Penalty for tonality is considered appropriate.

Impulsivity: -
The noise associated with the mechanical services plant is not impulsive in nature and no Noise Rating Level penalty should be applied.

Intermittency: -
The air-cooled chiller's condenser unit fans and compressors are inverter speed controlled to slowly vary speeds in line with heat rejection load and as such will not regularly cycle on and off. Additionally, the difference between specific sound level and statistically most common background noise level will provide a level of masking of any residual intermittent operation when the units first start up or shut-down, typically low-speed start-up and shut-down are at least 10 dB quieter than the full speed operation assessed. As such no Noise Rating Level penalty should be applied.

Other: -
The noise associated with the equipment does not generate any other distinctive characteristic sufficient to attract a further Noise Rating Level penalty.

Cumulative Noise Rating Level: -
As such no additional noise rating penalty is deemed to be necessary if assessed in accordance with BS4142:2014.

This would provide a Noise Rating Level of not less than 3 dB below the typical background noise level recorded for the proposed equipment operating periods and as such is better than the "Low Impact" category as detailed within BS4142:2014.

7.2.2 Welwyn Hatfield Borough Council Model Planning Condition Assessment

The calculated specific noise level of the proposed mechanical services equipment is not less than 3 dB(A) below the statistically most common back-ground noise level for any plant operating period and as such is some 3 dB better than the WHBC model planning condition of "no greater than background".

7.2.3 Comparison With Existing Chillers

Qt Acoustics have undertaken sample noise level calculations of one of the existing chillers that is to be removed and during a forced short-term full-speed operation. It was not possible to configure sufficient building load to operate more than 1 unit at full speed at the time of testing and hence our calculations are based on near-field measurement of one unit and extrapolated to the neighbouring properties for all 3 units operating. Our calculations suggest that if all 3 existing chillers are to operate, neighbours located at the existing "Residential A" Park House Court would experience noise levels around 55 dB(A) during day-time hours or some 12 dB(A) higher than the proposed replacement equipment.

7.2.4 BS8233:2014 Noise Impact on Neighbouring Commercial Units.

BS8233:2014 is not specifically intended to be used for noise impact assessment purposes but can be useful as a secondary test to assess the likelihood of potential disturbance on non-noise-sensitive premises and their intended usage.

The neighbouring commercial units in close proximity to the proposed mechanical services plant are used as a Magistrates Court, likely to contain law courts and as such BS8233:2014 provides the following guidance for internal noise levels within the law court spaces: -

Table 7.2.3.1 - Typical Noise Levels in Non-Domestic Buildings BS8233:2014

Activity	Location	Design Range
		dB $L_{Aeq,\,T}$
Speech or telephone communications	Department Store Cafeteria, canteen, kitchen	50 - 55
	Concourse Corridor, circulation space	45 - 55
Study and work requiring concentration	Library, gallery, museum	40-50
	Staff/meeting room, training room	35-45
	Executive office	35-40
Listening	**Place of worship, counselling, meditation, relaxation**	**30-35**

NOTE: - All noise targets are inside the property. CIBSE Guide A also specifically suggests 30-35 dB(A) for Law Courts.

The proposed mechanical services plant is located nominally 47 metres from the nearest the commercial window and benefits from acoustic screening by the plant compound itself. Once extrapolated to outside of these windows our calculation indicates a specific noise level of 51 dB(A). The neighbouring commercial property benefits from acoustic trickle ventilators, assumed mechanical ventilation and the windows to this commercial property are non-openable and of a double-glazed configuration. As a worst-case assessment, a typical double-glazed window will provide 30 dB(A) or more noise reduction and thereby provide a calculated plant noise level of around 21 dB(A) within the neighbouring commercial property during day-time hours and as such is 9 dB better than the lowest noise level indicated as being suitable for a law court within BS8233/CIBSE Guide A. Additionally, it should be noted that during day-time periods, the typical occupation times of a law court, the specific noise level of the proposed plant is some 1 dB(A) below the pre-existing statistically most common background noise level and hence would not be the dominant noise source outside these windows.

As such this report clearly demonstrates compliance with the local authority requirements, provides a "Low Impact" to neighbouring noise sensitive properties if assessed to BS4142:2014+A1:2019 and will not impact on the neighbouring commercial law courts.

8.0 Conclusions

Qt acoustics have performed environmental noise monitoring at the site in order to establish representative background noise levels for the proposed equipment operating periods. Relevant standards in the form of BS4142:2014 and requirements from Welwyn Hatfield Borough Council have been considered. Our assessment therefore concludes that the proposed replacement equipment provides a low impact to neighbouring noise sensitive properties and is in compliance with the model planning conditions.

Appendix A. Glossary of Terms

Decibel (dB)
Adopted as the common unit of measurement in acoustics. The unit of the decibel is dimensionless and is used in acoustics for sound measurements to define the ratio between the measured pressure level and a reference pressure level – typically $2x10^{-5}$ N/m^2 or the threshold of hearing.

"A" Weighting
Arithmetic correction for different frequencies to closer represent the typical sensitivity of the human ear to sound. Suited to low level noises of around 40 phon (close to 40 dB(A)) and provides a simple single figure weighted indication of the perceived level of loudness by a human.

Noise Percentile Level - L_N
Statistical Analysis of the noise level where "N" can be from 0.1% to 99.9% and represents the noise level exceeded for "N" percent of the measurement time. Commonly used with "A-Weighting" as above and measured over a set period of time 't' e.g. $L_{A99,15\ min}$ indicates the noise level exceeded for 99% of the measurement period of 15 minutes. See below for commonly used noise percentiles.

$L_{A90,t}$ or Background Noise Level
The A-Weighted noise level exceeded for 90% of the time 't' and is referred to as the "background noise level" for BS4142 type noise assessments and quoted to the nearest whole dB.

$L_{A10,t}$
The A-Weighted noise level exceeded for 10% of the time 't' and is referred to as the "traffic noise level".

$L_{Aeq,t}$
The A-Weighted equivalent continuous sound pressure over the measurement period of time 't' and is referred to as the "traffic noise level".

$L_{Amax,t}$
The A-Weighted instantaneous maximum sound pressure that occurred during the measurement period of time 't'.

Assessment Position
Unless otherwise stated is a location 1 metre from the façade of the nearest noise sensitive property.

Specific Sound Source
The noise source being assessed within this report (typically the proposed equipment or mechanical services plant equipment).

Specific Sound Level
The equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval.

Ambient Sound Level
Equivalent continuous A-Weighted sound pressure level of the totally encompassing sound in a given situation at a given time at the assessment location over a given time interval.

Rating Level, $L_{ar,Tr}$
The Specific Sound Level with any adjustment for characteristic features of the sound such as tonality or impulsivity.

Residual Sound
The ambient sound remaining at the assessment location when the specific sound source is supressed to such a degree that it does not contribute to the ambient sound.

Appendix B. Table of Environmental Noise Monitoring Results – Location A

Date	Time	LAeq	LAF10.0%	LAF90.0%	LAFmax
13/10/2023	14:45:00	57	60.7	51.6	75.6
13/10/2023	15:00:00	56.9	58	51.6	77.6
13/10/2023	15:15:00	57.7	61.5	52.2	77.5
13/10/2023	15:30:00	57.1	61	51.7	71.1
13/10/2023	15:45:00	58.2	61.8	52.1	70.5
13/10/2023	16:00:00	59.1	62.4	52.3	76.3
13/10/2023	16:15:00	57.7	60.9	54	69.8
13/10/2023	16:30:00	58	62	52.2	69.5
13/10/2023	16:45:00	60	63.6	53.1	80.5
13/10/2023	17:00:00	58.9	61.7	52.4	74.6
13/10/2023	17:15:00	57.8	61.7	52.3	74.1
13/10/2023	17:30:00	56.1	59.9	51.4	68.3
13/10/2023	17:45:00	56.1	58.9	51.1	69.5
13/10/2023	18:00:00	57.2	61.7	51	70.3
13/10/2023	18:15:00	60.4	64.5	51.7	78.8
13/10/2023	18:30:00	60.9	64.4	56.1	72.5
13/10/2023	18:45:00	60.1	63.6	55.5	69.6
13/10/2023	19:00:00	59.4	63.1	54.7	73.9
13/10/2023	19:15:00	59	62.9	54.3	69.1
13/10/2023	19:30:00	58.8	60.8	55.6	69.7
13/10/2023	19:45:00	58.3	61.8	53.7	69.8
13/10/2023	20:00:00	57.4	60.9	53.5	67.8
13/10/2023	20:15:00	57.2	59.6	53.3	76
13/10/2023	20:30:00	57.6	61.1	53.1	69.7
13/10/2023	20:45:00	57.8	62.3	53	71.5
13/10/2023	21:00:00	57.1	60.5	52.1	70.6
13/10/2023	21:15:00	56.2	59.6	51.4	68.3
13/10/2023	21:30:00	55.6	59.5	50.2	69
13/10/2023	21:45:00	56.4	59.4	49.9	71.9
13/10/2023	22:00:00	55	58.1	49.3	68.7
13/10/2023	22:15:00	55.3	58.3	48.8	82.4
13/10/2023	22:30:00	53.7	55.4	48.6	66.5
13/10/2023	22:45:00	52.6	54.5	47.8	64.7
13/10/2023	23:00:00	53.7	56.6	48.6	67.6
13/10/2023	23:15:00	54.5	58	48.8	67.4
13/10/2023	23:30:00	53.9	55.6	48.6	70.9
13/10/2023	23:45:00	52.4	54	48.1	66.8
14/10/2023	00:00:00	51.9	53.6	48.5	64
14/10/2023	00:15:00	56.6	56.6	48.5	76.3
14/10/2023	00:30:00	52.6	54.1	48.1	66.5
14/10/2023	00:45:00	51.1	52.3	47.8	64.5
14/10/2023	01:00:00	49.5	50.3	47	65.1
14/10/2023	01:15:00	50.6	51.1	46.6	67.3
14/10/2023	01:30:00	51.1	51.5	46.3	70.1
14/10/2023	01:45:00	51.7	52.7	46.1	68.5
14/10/2023	02:00:00	49.8	50.5	46.1	65
14/10/2023	02:15:00	51.8	51.4	45.8	68
14/10/2023	02:30:00	48	48.9	46	62.3
14/10/2023	02:45:00	47.3	47.7	45.1	62.4
14/10/2023	03:00:00	47.4	47.9	44.9	63.7
14/10/2023	03:15:00	48.1	48	44.6	66
14/10/2023	03:30:00	47.3	47.4	44.8	65.6
14/10/2023	03:45:00	47.8	48.3	45.4	65
14/10/2023	04:00:00	50.2	48.7	45.2	68.4
14/10/2023	04:15:00	50.1	50.8	45	67
14/10/2023	04:30:00	51.2	51.3	45.6	67.8
14/10/2023	04:45:00	46.4	47.7	45	55.7
14/10/2023	05:00:00	49.1	48.2	45.2	66.4
14/10/2023	05:15:00	46.6	47.9	45.1	52.9
14/10/2023	05:30:00	45.6	47.1	44	53.1
14/10/2023	05:45:00	46.9	47.1	44.3	63.1
14/10/2023	06:00:00	46.6	47.5	44.7	61.2
14/10/2023	06:15:00	48.7	50.1	45	64.8

14/10/2023	06:30:00	50.3	51.3	45.3	66.2
14/10/2023	06:45:00	50.7	52.2	46.1	67.6
14/10/2023	07:00:00	52.7	55.9	46.3	69.6
14/10/2023	07:15:00	52	54.5	46.1	65.9
14/10/2023	07:30:00	49	50.5	47.3	60.4
14/10/2023	07:45:00	51	52	47.1	65.3
14/10/2023	08:00:00	55.2	59.4	47.6	70
14/10/2023	08:15:00	55	58.8	48	68.7
14/10/2023	08:30:00	54.8	57.6	48.8	68.7
14/10/2023	08:45:00	53.3	55.4	48.2	68
14/10/2023	09:00:00	55.2	58.8	49.5	67.9
14/10/2023	09:15:00	55.6	59.9	48.6	70.1
14/10/2023	09:30:00	55.7	58.8	48.6	74.9
14/10/2023	09:45:00	54.4	57.6	48.4	68.8
14/10/2023	10:00:00	56.1	59.2	49.2	69.3
14/10/2023	10:15:00	56.6	60.6	49.4	73.1
14/10/2023	10:30:00	55.1	56.4	48.4	74.4
14/10/2023	10:45:00	55.1	58.7	49.2	68.8
14/10/2023	11:00:00	54.4	57	49.2	69.2
14/10/2023	11:15:00	55.2	58.4	49.7	68.2
14/10/2023	11:30:00	55.1	58.2	48.6	72.5
14/10/2023	11:45:00	55.8	59.7	48.9	67.8
14/10/2023	12:00:00	55.1	59.1	48.8	74.1
14/10/2023	12:15:00	55.6	58.7	49.5	71.8
14/10/2023	12:30:00	54.4	58.1	48.8	67.8
14/10/2023	12:45:00	54.7	57.7	48.6	69.9
14/10/2023	13:00:00	55.2	57.7	49.7	67.6
14/10/2023	13:15:00	56.1	60.5	48.8	72.9
14/10/2023	13:30:00	55.6	59.7	48.7	71
14/10/2023	13:45:00	54.7	58.5	48.1	68.6
14/10/2023	14:00:00	55.6	60.1	48.1	68.2
14/10/2023	14:15:00	56.7	61.4	48.6	68.9
14/10/2023	14:30:00	55.5	59.1	48.4	72.1
14/10/2023	14:45:00	56.9	60.2	48.8	75.1
14/10/2023	15:00:00	55.9	59.7	49.5	70.4
14/10/2023	15:15:00	54.4	57.9	48.1	69.3
14/10/2023	15:30:00	56.7	61.5	47.9	71.5
14/10/2023	15:45:00	55.4	59.5	48.4	67.6
14/10/2023	16:00:00	54.5	58.6	48.1	68.2
14/10/2023	16:15:00	55.1	57.8	49.3	73
14/10/2023	16:30:00	56.1	60.4	49.1	69.2
14/10/2023	16:45:00	55.8	60.5	48.3	72.1
14/10/2023	17:00:00	56.6	61.3	48.5	70.8
14/10/2023	17:15:00	56.1	60.2	47.8	72
14/10/2023	17:30:00	54.2	57.1	47.4	69.4
14/10/2023	17:45:00	56.1	61	48.1	70
14/10/2023	18:00:00	54.9	58.4	48.2	67.2
14/10/2023	18:15:00	54.2	57.4	47.4	70.1
14/10/2023	18:30:00	56.3	61	48.4	73.9
14/10/2023	18:45:00	55.4	58.6	48.1	72.3
14/10/2023	19:00:00	54.7	58.4	47.9	68.3
14/10/2023	19:15:00	55.6	60.3	49.2	68.4
14/10/2023	19:30:00	55.1	58.7	49.1	68
14/10/2023	19:45:00	55.3	59.3	48.6	70.7
14/10/2023	20:00:00	56.2	61	47.7	68.6
14/10/2023	20:15:00	56.8	62.1	48.2	72.1
14/10/2023	20:30:00	55.9	60.1	47.9	70.8
14/10/2023	20:45:00	55.5	59.1	48.2	77.2
14/10/2023	21:00:00	55.4	59.6	49.4	68.2
14/10/2023	21:15:00	56	60.6	48.4	68.8
14/10/2023	21:30:00	52.9	54.9	47.7	67
14/10/2023	21:45:00	53	56.1	47.8	65.7
14/10/2023	22:00:00	56	59.6	48	72.7
14/10/2023	22:15:00	55	58.7	48.1	69.3

14/10/2023	22:30:00	55.4	59.6	48	68.2
14/10/2023	22:45:00	52.5	54.3	48.2	66.1
14/10/2023	23:00:00	52.9	54.8	47.4	67.1
14/10/2023	23:15:00	52.8	54.9	48	72.4
14/10/2023	23:30:00	52.9	55	47.7	71.4
14/10/2023	23:45:00	51.2	52.5	46.8	63.9
15/10/2023	00:00:00	48.7	49.3	46.4	62.6
15/10/2023	00:15:00	52.6	55.4	46.6	65.8
15/10/2023	00:30:00	53	51.8	45.7	75.5
15/10/2023	00:45:00	48.3	49.2	46.1	62.3
15/10/2023	01:00:00	50.3	51.6	46.1	64.6
15/10/2023	01:15:00	51.5	51.3	45.7	72.6
15/10/2023	01:30:00	51.2	52.8	45.8	67.1
15/10/2023	01:45:00	49.6	49.9	45.6	67.3
15/10/2023	02:00:00	49.8	49	45.3	66.6
15/10/2023	02:15:00	47.2	47.6	45.2	61.9
15/10/2023	02:30:00	70.8	47.8	45	102.8
15/10/2023	02:45:00	50.5	48.3	45.1	74.7
15/10/2023	03:00:00	47.9	48	45.3	62.8
15/10/2023	03:15:00	49.6	48.9	44.9	66.2
15/10/2023	03:30:00	46.7	47	44.6	65.8
15/10/2023	03:45:00	47.9	46.7	44.8	69
15/10/2023	04:00:00	48.4	47.9	45.6	63.6
15/10/2023	04:15:00	47	47.8	45.2	62.7
15/10/2023	04:30:00	46.8	47.1	45.2	61.6
15/10/2023	04:45:00	46.4	47.1	45.5	52
15/10/2023	05:00:00	48.7	48.4	45.4	65.8
15/10/2023	05:15:00	49.5	48.1	45.9	68.6
15/10/2023	05:30:00	48.2	49.7	45.9	60.6
15/10/2023	05:45:00	49.8	49.1	46.8	67.2
15/10/2023	06:00:00	48.5	49.6	47.1	60.4
15/10/2023	06:15:00	51.8	53.7	45.9	66.8
15/10/2023	06:30:00	54.9	55.2	46	74
15/10/2023	06:45:00	52.1	54.1	47.1	67.2
15/10/2023	07:00:00	51.8	53	47.2	66.8
15/10/2023	07:15:00	52.6	54.9	48	68.1
15/10/2023	07:30:00	51.1	53.3	47.7	69.3
15/10/2023	07:45:00	51.3	51	47.2	74.6
15/10/2023	08:00:00	52.4	54	47.3	68.8
15/10/2023	08:15:00	51.4	52.4	46.9	69.8
15/10/2023	08:30:00	54.2	58.7	47.6	70.7
15/10/2023	08:45:00	52.3	54.9	47.6	66.3
15/10/2023	09:00:00	52.7	55.8	47.7	67.5
15/10/2023	09:15:00	55.2	59.2	48.4	69.2
15/10/2023	09:30:00	53.8	55.2	50.5	67.2
15/10/2023	09:45:00	55.7	56.6	50.7	69.8
15/10/2023	10:00:00	54.5	55.2	51.1	68.6
15/10/2023	10:15:00	55.4	57	50.8	71
15/10/2023	10:30:00	53.9	54.5	50.2	70
15/10/2023	10:45:00	54.9	57.1	51.2	69.3
15/10/2023	11:00:00	55.1	56.7	51.3	67.9
15/10/2023	11:15:00	55.6	57.5	50.6	68
15/10/2023	11:30:00	54.9	57.1	50.5	69
15/10/2023	11:45:00	55.8	58.7	50.8	67.9
15/10/2023	12:00:00	54.4	56.9	50.2	68.2
15/10/2023	12:15:00	55.5	57.4	50.2	70.9
15/10/2023	12:30:00	55.4	58.9	50.3	67.3
15/10/2023	12:45:00	55.9	60.1	49.9	68.1
15/10/2023	13:00:00	57	60.9	51.1	76.7
15/10/2023	13:15:00	55.9	59.9	51.2	72
15/10/2023	13:30:00	56.2	59.7	51.2	67.5
15/10/2023	13:45:00	56	60.3	49.9	67.3
15/10/2023	14:00:00	54.9	58.7	48.8	66.9
15/10/2023	14:15:00	55.1	58.8	48.6	69.9

15/10/2023	14:30:00	56.4	59.7	50.2	70.4
15/10/2023	14:45:00	56.7	60.3	50.7	70.9
15/10/2023	15:00:00	56.8	60.6	50.2	72.9
15/10/2023	15:15:00	56.7	60.4	52	71.9
15/10/2023	15:30:00	57	59.7	51.8	70.9
15/10/2023	15:45:00	57	60.2	52	72.7
15/10/2023	16:00:00	55.5	58.6	50.6	70.3
15/10/2023	16:15:00	56.5	60.1	51.4	69.2
15/10/2023	16:30:00	56.8	59.8	51.2	71.6
15/10/2023	16:45:00	56.8	60.6	50.4	72.3
15/10/2023	17:00:00	56.2	60.2	50.5	69.2
15/10/2023	17:15:00	54.1	57.1	49.5	64.9
15/10/2023	17:30:00	54	56.6	48.9	68.1
15/10/2023	17:45:00	52.9	54	48.4	68.5
15/10/2023	18:00:00	52.8	54.2	48.1	67.1
15/10/2023	18:15:00	54.8	56.3	49.4	72.6
15/10/2023	18:30:00	54.6	57.4	50.5	65.6
15/10/2023	18:45:00	53.9	55.5	50.7	66
15/10/2023	19:00:00	55.5	58	51.6	68
15/10/2023	19:15:00	57.2	60	53.7	67.3
15/10/2023	19:30:00	57.5	59.1	54.9	66.4
15/10/2023	19:45:00	55.8	57.5	52.7	69.6
15/10/2023	20:00:00	56.6	57.7	53.7	67.6
15/10/2023	20:15:00	55.6	56	51.9	71.3
15/10/2023	20:30:00	55.8	56.9	50.7	78.6
15/10/2023	20:45:00	55.6	57.1	51.9	73.3
15/10/2023	21:00:00	53.1	54.4	50.7	64.3
15/10/2023	21:15:00	55.8	57.4	49.7	72.4
15/10/2023	21:30:00	51.9	52.9	48.4	68.1
15/10/2023	21:45:00	53.4	56.1	49	67.7
15/10/2023	22:00:00	52.6	54	49.3	68.3
15/10/2023	22:15:00	52.8	54.7	48.5	68.8
15/10/2023	22:30:00	53.2	54.4	48.3	70.4
15/10/2023	22:45:00	52	52.6	47.5	67.1
15/10/2023	23:00:00	53.7	54.5	48.4	73
15/10/2023	23:15:00	53	53.9	48.4	71.2
15/10/2023	23:30:00	53.4	53.4	47.8	68.9
15/10/2023	23:45:00	50.5	51	47.8	65.8
16/10/2023	00:00:00	51.7	51.9	47.7	69.6
16/10/2023	00:15:00	50.5	51.5	46.9	67.3
16/10/2023	00:30:00	50.5	51.9	46.2	66.8
16/10/2023	00:45:00	53.4	52.6	46.4	73.5
16/10/2023	01:00:00	49.7	50.2	45.7	66.1
16/10/2023	01:15:00	50.6	51.3	46.3	73.6
16/10/2023	01:30:00	50.4	51.6	45.7	66.7
16/10/2023	01:45:00	50	51.3	45.5	69.2
16/10/2023	02:00:00	49.1	50	45.3	65.5
16/10/2023	02:15:00	49.5	51	45.1	64.2
16/10/2023	02:30:00	48	49.5	44.7	63.9
16/10/2023	02:45:00	49.9	51.1	45.3	65.5
16/10/2023	03:00:00	50.9	52.4	46.1	67.1
16/10/2023	03:15:00	49.5	51.4	46.3	63.6
16/10/2023	03:30:00	50.5	52.5	45.9	65
16/10/2023	03:45:00	50.5	52.7	46.4	63.6
16/10/2023	04:00:00	51.3	53.5	47.8	58.4
16/10/2023	04:15:00	52.9	55.3	48.5	66.9
16/10/2023	04:30:00	53.5	55.1	48.8	70.8
16/10/2023	04:45:00	52.6	54.2	49.4	67
16/10/2023	05:00:00	53.8	54.9	50	73.3
16/10/2023	05:15:00	54.5	56.2	51.7	65.4
16/10/2023	05:30:00	56.8	58.5	52.8	72.1
16/10/2023	05:45:00	56.5	57.9	54.7	63.1
16/10/2023	06:00:00	57.1	58.3	55.2	64.3
16/10/2023	06:15:00	56.9	57.9	55.3	70.2

16/10/2023	06:30:00	56.7	57.6	55	66.7
16/10/2023	06:45:00	59.1	60.2	57.7	65
16/10/2023	07:00:00	61.3	62.5	59	73.8
16/10/2023	07:15:00	61.3	62.6	59.5	75.3
16/10/2023	07:30:00	62.5	64	59.9	71.6
16/10/2023	07:45:00	62.8	63.8	61.4	72.4
16/10/2023	08:00:00	62.7	64.1	61.1	72.1
16/10/2023	08:15:00	63.1	65.2	61.3	69.4
16/10/2023	08:30:00	62.6	64	61.1	70.6
16/10/2023	08:45:00	63.5	65	61.1	78.5
16/10/2023	09:00:00	62.8	64.5	60.5	76.9
16/10/2023	09:15:00	62.8	64.6	60.3	70.8
16/10/2023	09:30:00	61.6	63.2	59.6	68.9
16/10/2023	09:45:00	61.5	63.1	59.4	71.2
16/10/2023	10:00:00	61.8	63.7	57.6	80.3
16/10/2023	10:15:00	58.2	59.9	55.5	68.4
16/10/2023	10:30:00	57.5	59	54.8	68.6
16/10/2023	10:45:00	56.9	58.9	53.4	66.8
16/10/2023	11:00:00	55.5	57.4	52.6	66.1
16/10/2023	11:15:00	56.9	59.7	52	70.6
16/10/2023	11:30:00	56.9	60.6	51.6	68.5
16/10/2023	11:45:00	64.6	68.5	53.3	86
16/10/2023	12:00:00	57.7	61.1	51.8	73
16/10/2023	12:15:00	58.5	62	52.6	72.1
16/10/2023	12:30:00	57.9	61.2	52.5	72.3
16/10/2023	12:45:00	57.1	60.1	53	73.4
16/10/2023	13:00:00	59.4	62.4	52.4	76.2
16/10/2023	13:15:00	57.2	61	51.3	67.7
16/10/2023	13:30:00	57.2	61.1	52.1	69.9
16/10/2023	13:45:00	57	60.9	52	67.7
16/10/2023	14:00:00	57.2	59.6	53.6	68.3
16/10/2023	14:15:00	58.6	61.6	54.2	69.8
16/10/2023	14:30:00	59	62.2	54.1	74.8
16/10/2023	14:45:00	58.1	60.3	53.8	73.1
16/10/2023	15:00:00	58.8	61.3	54.8	68.1
16/10/2023	15:15:00	58.7	61	54.8	71.5
16/10/2023	15:30:00	58.6	61.7	54.6	70.1
16/10/2023	15:45:00	57.8	59.6	54	74.2
16/10/2023	16:00:00	58.1	61.3	54	72.5
16/10/2023	16:15:00	59.5	63	54.8	72
16/10/2023	16:30:00	58.5	61.5	54.5	71.7
16/10/2023	16:45:00	59	61.3	55.5	70.3
16/10/2023	17:00:00	59	62.3	55.2	72.4
16/10/2023	17:15:00	59.5	62.8	55.3	75.2
16/10/2023	17:30:00	58.5	60.9	55.8	66.3
16/10/2023	17:45:00	59.7	63	56	69.2
16/10/2023	18:00:00	59.1	61.8	55.3	70
16/10/2023	18:15:00	58.7	61.3	55.9	67.7
16/10/2023	18:30:00	58.2	60.3	55.2	66
16/10/2023	18:45:00	58.5	61.6	54.9	71.9
16/10/2023	19:00:00	58.5	61.4	55.1	68
16/10/2023	19:15:00	58.2	60.8	55.1	66.8
16/10/2023	19:30:00	57.1	59.3	54	67.5
16/10/2023	19:45:00	57.2	59.9	53.5	67.7
16/10/2023	20:00:00	58.2	61.4	53.9	73
16/10/2023	20:15:00	57.2	59.9	54	70
16/10/2023	20:30:00	57.9	61.7	53.4	68.5
16/10/2023	20:45:00	55.9	57.8	52.4	68.8
16/10/2023	21:00:00	56.4	58.3	52.5	70.1
16/10/2023	21:15:00	56.3	58	52.4	67.3
16/10/2023	21:30:00	56.6	59.5	52.9	68.1
16/10/2023	21:45:00	55.4	56.6	52.9	73.1
16/10/2023	22:00:00	55.5	56.6	52.6	69.6
16/10/2023	22:15:00	55.2	56.8	51.8	70

16/10/2023	22:30:00	55.6	57	51.5	69.4
16/10/2023	22:45:00	53.7	55	50.5	65.4
16/10/2023	23:00:00	54.9	55.6	50.2	77.6
16/10/2023	23:15:00	53	54.9	49.6	63.1
16/10/2023	23:30:00	53	53.5	48.3	69.3
16/10/2023	23:45:00	50.8	52	47.9	66.9
17/10/2023	00:00:00	53.4	53.3	48.7	75.6
17/10/2023	00:15:00	52.3	54	47.6	67.6
17/10/2023	00:30:00	51.1	52.6	46.5	66.6
17/10/2023	00:45:00	49.7	51.5	46.5	61.9
17/10/2023	01:00:00	50.1	51.9	46.1	63.7
17/10/2023	01:15:00	50.4	52.2	45.7	65.4
17/10/2023	01:30:00	50	52	46.1	65.1
17/10/2023	01:45:00	50.6	52.7	47	65.4
17/10/2023	02:00:00	51	52.9	46.9	64.2
17/10/2023	02:15:00	50.2	52	46.5	64.9
17/10/2023	02:30:00	50.2	52.2	45.7	64.8
17/10/2023	02:45:00	50.3	50.7	44.3	72.5
17/10/2023	03:00:00	50.3	51.7	46.4	64.6
17/10/2023	03:15:00	50.7	52	47.7	66
17/10/2023	03:30:00	49.8	51.8	46.6	57.2
17/10/2023	03:45:00	52.5	51.6	46.7	74.7

Appendix B. Table of Environmental Noise Monitoring Results – Location B

Date	Time	LAeq	LAF10.0%	LAF90.0%	LAFmax
20/10/2023	13:45:00	60.7	64.5	52.9	80.1
20/10/2023	14:00:00	62.7	65.2	54	81.5
20/10/2023	14:15:00	64.8	66.7	54.6	79.3
20/10/2023	14:30:00	60.4	64.4	53.4	75.8
20/10/2023	14:45:00	60.5	64.6	53.8	72.6
20/10/2023	15:00:00	59.7	63.6	53.3	73.2
20/10/2023	15:15:00	59.6	62.9	52.9	71.3
20/10/2023	15:30:00	59.6	62.3	53.1	71.9
20/10/2023	15:45:00	62.4	64.3	58.1	80.9
20/10/2023	16:00:00	61.2	64.8	53.3	76.6
20/10/2023	16:15:00	59.7	63.8	51.8	79
20/10/2023	16:30:00	59.5	63.6	52.7	70.7
20/10/2023	16:45:00	59.9	63.9	52.5	75.5
20/10/2023	17:00:00	62.5	64.9	53.2	88
20/10/2023	17:15:00	59.2	63.1	52.4	70.6
20/10/2023	17:30:00	58.8	62.3	52.5	70.5
20/10/2023	17:45:00	60.7	64.5	54.4	72.9
20/10/2023	18:00:00	60.4	64.4	54.7	73.3
20/10/2023	18:15:00	60	63.3	55.1	72.5
20/10/2023	18:30:00	59.7	63	54.7	75.9
20/10/2023	18:45:00	59.5	63.2	54	71.1
20/10/2023	19:00:00	60.3	63.3	54.2	76.6
20/10/2023	19:15:00	59.7	63.6	53.7	81.2
20/10/2023	19:30:00	59.2	62.7	54	78.4
20/10/2023	19:45:00	59.2	62.1	53.6	71
20/10/2023	20:00:00	59.9	63.8	53.4	71.9
20/10/2023	20:15:00	60.4	64.3	54.1	74.5
20/10/2023	20:30:00	58.8	61.9	53.3	71.2
20/10/2023	20:45:00	58.7	62.6	53.1	69
20/10/2023	21:00:00	58	60.7	52	71.1
20/10/2023	21:15:00	59.6	62.5	53.3	71.5
20/10/2023	21:30:00	58.6	62.9	52.7	70.9
20/10/2023	21:45:00	58.7	61.9	53.1	70.7
20/10/2023	22:00:00	58.7	62.2	50.4	75.3
20/10/2023	22:15:00	57.4	60.6	50.2	71.7
20/10/2023	22:30:00	57.4	60.1	50.2	70
20/10/2023	22:45:00	56.7	59.2	50	70.9

20/10/2023	23:00:00	55.9	58.9	49.5	69.6
20/10/2023	23:15:00	55.6	58.4	50.2	69.7
20/10/2023	23:30:00	55.9	58.2	50.1	71.2
20/10/2023	23:45:00	56.7	60.1	49.6	70.7
21/10/2023	00:00:00	56.5	58.9	49.9	75
21/10/2023	00:15:00	55.3	58.5	48.6	68.9
21/10/2023	00:30:00	54.9	58	48.2	70.3
21/10/2023	00:45:00	57.3	59.6	48.6	73.1
21/10/2023	01:00:00	58.7	60.2	49.1	83
21/10/2023	01:15:00	55.1	58.6	48	68.7
21/10/2023	01:30:00	53.4	56.3	47.4	67
21/10/2023	01:45:00	54.3	57	47.1	70.5
21/10/2023	02:00:00	53	56.2	47.7	65.9
21/10/2023	02:15:00	52	53.7	46.6	69.2
21/10/2023	02:30:00	52.7	56.2	45.8	69.3
21/10/2023	02:45:00	54.7	56.3	45.9	73.7
21/10/2023	03:00:00	50.9	53.4	45.9	65.8
21/10/2023	03:15:00	49.6	52.1	45.6	65.3
21/10/2023	03:30:00	50.6	53.3	46.1	66
21/10/2023	03:45:00	50.6	52.9	45.8	65.6
21/10/2023	04:00:00	51.2	53.1	46	68
21/10/2023	04:15:00	52.5	54.9	45.7	69.3
21/10/2023	04:30:00	50.8	52.4	45.8	68.6
21/10/2023	04:45:00	54.5	57.4	46.2	71.1
21/10/2023	05:00:00	50.1	52.6	46	63
21/10/2023	05:15:00	53.8	55.7	46.3	73.3
21/10/2023	05:30:00	49.6	51.7	46.1	62.2
21/10/2023	05:45:00	50.5	53.5	46.6	68
21/10/2023	06:00:00	51.3	53.9	46.5	70.5
21/10/2023	06:15:00	53.9	54.6	46.5	72.6
21/10/2023	06:30:00	53.3	56	48.3	65.2
21/10/2023	06:45:00	54.4	56.8	48.4	70.2
21/10/2023	07:00:00	54.3	57	48.9	68.8
21/10/2023	07:15:00	53.5	56.7	47.7	69.5
21/10/2023	07:30:00	54.5	57	47	70.8
21/10/2023	07:45:00	53	55.5	48.3	67.1
21/10/2023	08:00:00	55.2	58.6	49.7	66.4
21/10/2023	08:15:00	56.3	59.7	49.6	70.5
21/10/2023	08:30:00	55.5	57.8	49.3	69.4
21/10/2023	08:45:00	56.6	60.1	50.2	70.3
21/10/2023	09:00:00	59.3	62.9	52.3	72
21/10/2023	09:15:00	57.7	60.7	51.4	70.5
21/10/2023	09:30:00	57.6	60.4	51.7	71.2
21/10/2023	09:45:00	57.8	61.3	51.8	71.1
21/10/2023	10:00:00	67.1	65	51.9	91.3
21/10/2023	10:15:00	59	62.3	52	70.8
21/10/2023	10:30:00	59.4	63.4	51.2	72.8
21/10/2023	10:45:00	58.7	62.2	50.1	71.8
21/10/2023	11:00:00	59.4	63.8	51	75.3
21/10/2023	11:15:00	58.9	61.2	51.8	75.9
21/10/2023	11:30:00	60.3	63	51.4	76.1
21/10/2023	11:45:00	60.1	64.5	51.5	73.7
21/10/2023	12:00:00	60.6	65	51.1	73
21/10/2023	12:15:00	60.8	65.1	51.4	74
21/10/2023	12:30:00	60	64.6	51.7	75.2
21/10/2023	12:45:00	60.1	63.7	52.7	74.8
21/10/2023	13:00:00	59.8	63.2	52.1	72.7
21/10/2023	13:15:00	59.4	63.6	51.4	71.6
21/10/2023	13:30:00	59.2	62.9	51.7	70.4
21/10/2023	13:45:00	59.7	64	51.1	76.6
21/10/2023	14:00:00	60.1	64.2	51.9	72.5
21/10/2023	14:15:00	60.5	64.9	51.2	81.1
21/10/2023	14:30:00	59.5	63.5	52	70.3
21/10/2023	14:45:00	59	63.3	53.1	70.2

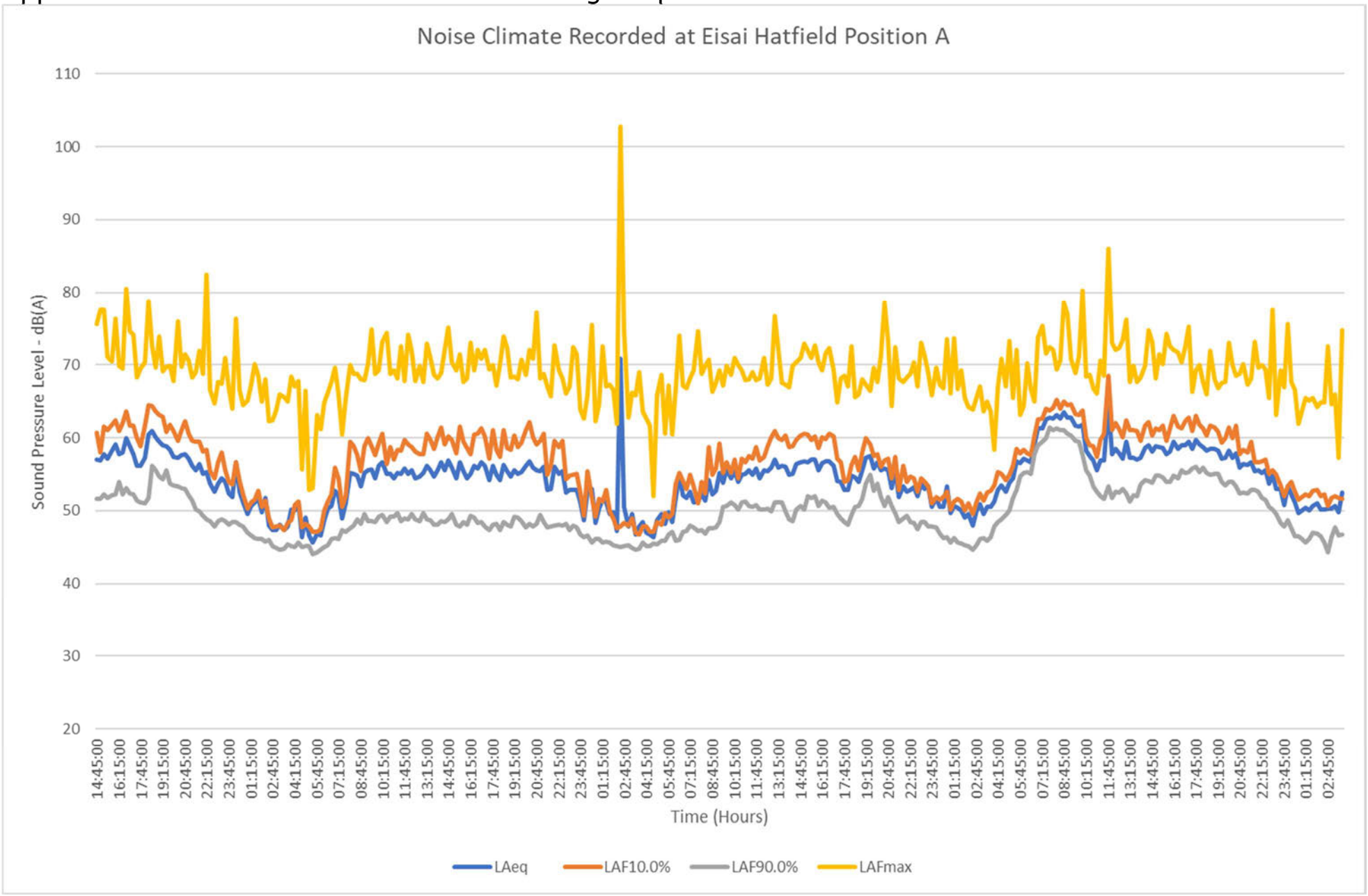
21/10/2023	15:00:00	61.2	64.1	55.7	73.3
21/10/2023	15:15:00	62.2	65.7	55.4	73.2
21/10/2023	15:30:00	61.3	64.3	54.5	78.1
21/10/2023	15:45:00	60.6	64.5	54.7	72.8
21/10/2023	16:00:00	61	64.1	55.8	71.3
21/10/2023	16:15:00	62.9	64.5	55.3	86.7
21/10/2023	16:30:00	60.1	63.9	54.9	72.1
21/10/2023	16:45:00	60.1	64	54.5	71.9
21/10/2023	17:00:00	60.4	62.7	55.6	77.8
21/10/2023	17:15:00	61.1	64.7	55.9	75.7
21/10/2023	17:30:00	63.8	65.2	55.1	87.2
21/10/2023	17:45:00	61.1	64.9	55.2	73.4
21/10/2023	18:00:00	61.2	63.7	55.2	82
21/10/2023	18:15:00	59.2	62.5	53.2	69.9
21/10/2023	18:30:00	59.4	63.5	52.2	70.8
21/10/2023	18:45:00	59.6	62.9	52.2	73.4
21/10/2023	19:00:00	62.6	65.3	52.2	84.3
21/10/2023	19:15:00	60.4	64.4	53	79.7
21/10/2023	19:30:00	59.1	63.1	52.4	70.8
21/10/2023	19:45:00	59.1	62.4	52.6	71.3
21/10/2023	20:00:00	60.1	64.7	52.8	71.6
21/10/2023	20:15:00	60.1	64	51.6	74.5
21/10/2023	20:30:00	59	62.1	50.8	73
21/10/2023	20:45:00	59	62.5	49.7	76.3
21/10/2023	21:00:00	58.5	62	51.3	70.8
21/10/2023	21:15:00	59.8	63.4	50.1	78.3
21/10/2023	21:30:00	59.5	62.8	49.5	77.6
21/10/2023	21:45:00	58.8	62.3	50.2	74.8
21/10/2023	22:00:00	56.9	59.5	49.5	69.7
21/10/2023	22:15:00	61.7	62.1	50.6	85.9
21/10/2023	22:30:00	57.6	61.5	50	70
21/10/2023	22:45:00	55.7	58.6	48.5	69.1
21/10/2023	23:00:00	56.3	60.6	48.5	67.1
21/10/2023	23:15:00	55.7	58.7	47.4	72
21/10/2023	23:30:00	54.3	57.1	47.8	70.6
21/10/2023	23:45:00	55.6	57.6	48	73.5
22/10/2023	00:00:00	55.3	57.8	49.4	69.7
22/10/2023	00:15:00	56.4	58.1	47.9	79.4
22/10/2023	00:30:00	54.9	57.8	47.7	70.5
22/10/2023	00:45:00	55	57.4	48	70.8
22/10/2023	01:00:00	54.6	58.4	47.8	69.5
22/10/2023	01:15:00	54.8	58.2	47.3	68.9
22/10/2023	01:30:00	53.6	55.7	47.5	70.8
22/10/2023	01:45:00	53.3	55.6	46.6	69.1
22/10/2023	02:00:00	53.3	54.2	45.9	71.5
22/10/2023	02:15:00	51.8	53.8	45.9	67.8
22/10/2023	02:30:00	51	52.4	45.6	70.5
22/10/2023	02:45:00	53.3	54.9	46.2	70.8
22/10/2023	03:00:00	51.3	53.4	45.7	70
22/10/2023	03:15:00	51.1	53.2	45.2	68.3
22/10/2023	03:30:00	53.3	54.7	44.9	73.2
22/10/2023	03:45:00	50.3	51.6	45.5	68.3
22/10/2023	04:00:00	50	51.5	45.5	65.9
22/10/2023	04:15:00	52.3	53.6	45.9	71.8
22/10/2023	04:30:00	50.6	52.4	45.9	65.4
22/10/2023	04:45:00	49.6	51.9	45.8	62
22/10/2023	05:00:00	49	50.3	45.3	64.9
22/10/2023	05:15:00	49.5	50.7	45.2	67.8
22/10/2023	05:30:00	50.4	51.7	45.4	68.4
22/10/2023	05:45:00	53	54.7	46.1	70.3
22/10/2023	06:00:00	49.2	51.3	46.3	61
22/10/2023	06:15:00	51.8	54.6	45.9	68.3
22/10/2023	06:30:00	52.8	53.7	47.6	71.9
22/10/2023	06:45:00	53.1	56.3	47.3	66.5

22/10/2023	07:00:00	53	55.4	48.4	68.2
22/10/2023	07:15:00	54.1	56.2	48.9	70.4
22/10/2023	07:30:00	55.6	57.1	49.5	69.6
22/10/2023	07:45:00	55.4	57.2	49.5	72.5
22/10/2023	08:00:00	53.9	56.7	49.5	66.7
22/10/2023	08:15:00	54.9	57.7	48.6	69.8
22/10/2023	08:30:00	54.7	57.7	49	68.5
22/10/2023	08:45:00	55	57.5	48.6	69.6
22/10/2023	09:00:00	55	57.8	48.4	72.3
22/10/2023	09:15:00	55.6	58.9	49	69.9
22/10/2023	09:30:00	57.5	57.8	48.6	84.6
22/10/2023	09:45:00	55.8	59.2	48.5	70.6
22/10/2023	10:00:00	56.6	58.9	48.7	73.1
22/10/2023	10:15:00	55.5	58.3	48.8	69.2
22/10/2023	10:30:00	57.8	61	50	71.6
22/10/2023	10:45:00	57.9	61.1	50.1	73.1
22/10/2023	11:00:00	57.3	60.3	49.5	74.1
22/10/2023	11:15:00	59.2	63.2	50.7	72.5
22/10/2023	11:30:00	58.7	62.8	50.4	73.4
22/10/2023	11:45:00	59.9	64.6	50.2	73.1
22/10/2023	12:00:00	59.3	64	51	72.7
22/10/2023	12:15:00	59	62.8	50.8	73
22/10/2023	12:30:00	59.9	63.9	51	75.1
22/10/2023	12:45:00	59.5	64.3	51	70.5
22/10/2023	13:00:00	59.6	63.3	51.8	79.8
22/10/2023	13:15:00	59.2	63.7	51.4	71.2
22/10/2023	13:30:00	58.6	62.1	51.8	71.8
22/10/2023	13:45:00	59	62.7	51.9	70.5
22/10/2023	14:00:00	59.9	64.7	51.8	70.5
22/10/2023	14:15:00	59.9	64.7	51.4	71
22/10/2023	14:30:00	59.6	64	52.4	71.1
22/10/2023	14:45:00	59.4	64.1	51.6	71.2
22/10/2023	15:00:00	61.2	63.6	51.3	87.2
22/10/2023	15:15:00	60.6	65.4	51.6	77.1
22/10/2023	15:30:00	59.5	64.2	52	72
22/10/2023	15:45:00	59.5	63.2	52.2	76.3
22/10/2023	16:00:00	59.5	63.4	52.6	72.3
22/10/2023	16:15:00	59.5	64.1	51.5	75.7
22/10/2023	16:30:00	60.2	64.8	53	71
22/10/2023	16:45:00	58.8	62.6	51.4	70.5
22/10/2023	17:00:00	59.4	63.6	50.7	72.7
22/10/2023	17:15:00	60	64.6	51.5	71.2
22/10/2023	17:30:00	58.9	62	51.7	77.7
22/10/2023	17:45:00	58.8	61.1	52.8	76.9
22/10/2023	18:00:00	59.5	62.2	53.6	78.6
22/10/2023	18:15:00	58.4	61	53.1	73.3
22/10/2023	18:30:00	58	60.3	53.8	73.8
22/10/2023	18:45:00	57.8	60.3	53.1	70.7
22/10/2023	19:00:00	59.2	62.4	53.5	72.2
22/10/2023	19:15:00	59.5	62.3	53.6	77.8
22/10/2023	19:30:00	58.6	61.4	53.7	74.2
22/10/2023	19:45:00	58	60.6	53.4	74.5
22/10/2023	20:00:00	58.9	61.9	54	69.4
22/10/2023	20:15:00	58.6	61.7	53.7	72.2
22/10/2023	20:30:00	57.5	59.7	52.6	75.8
22/10/2023	20:45:00	58.6	61.5	53	75.8
22/10/2023	21:00:00	57.7	60.3	51.9	71.3
22/10/2023	21:15:00	55.8	58.7	51.5	66.7
22/10/2023	21:30:00	57	59.3	51.5	71.2
22/10/2023	21:45:00	57.2	59.2	51.6	73.9
22/10/2023	22:00:00	56.2	59.3	51	68.9
22/10/2023	22:15:00	58	60.5	51.3	73.1
22/10/2023	22:30:00	55.8	58.4	50.4	69.6
22/10/2023	22:45:00	57.4	60.1	51.3	72

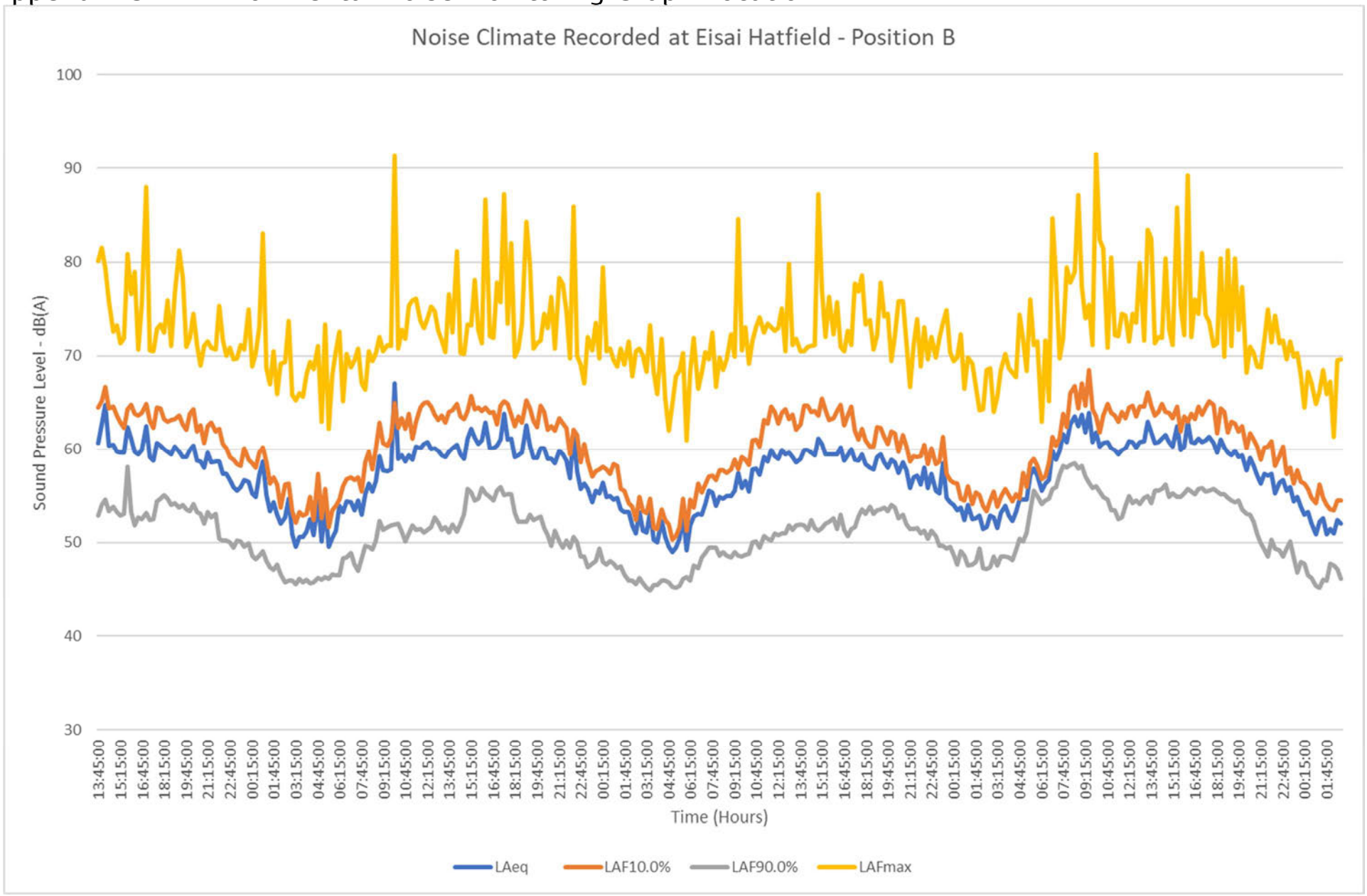
22/10/2023	23:00:00	55.6	58.4	50.7	69.8
22/10/2023	23:15:00	55.3	58.7	49.7	71.9
22/10/2023	23:30:00	58.5	61.4	49.7	73.5
22/10/2023	23:45:00	54.8	57.4	49.4	74.9
23/10/2023	00:00:00	54.3	56.7	49.6	70.4
23/10/2023	00:15:00	54	56.4	48.7	69.4
23/10/2023	00:30:00	53.5	56.3	47.7	69.8
23/10/2023	00:45:00	53.7	54.7	49.1	72.3
23/10/2023	01:00:00	52.4	54.5	48.6	66.5
23/10/2023	01:15:00	54	56	47.6	69.8
23/10/2023	01:30:00	52.5	54.1	47.7	69.2
23/10/2023	01:45:00	52.6	55.4	47.9	66.7
23/10/2023	02:00:00	52.9	55.1	49.4	64.2
23/10/2023	02:15:00	51.5	53.9	47.3	64.3
23/10/2023	02:30:00	51.7	53.4	47.2	68.5
23/10/2023	02:45:00	52.9	54.5	47.4	68.7
23/10/2023	03:00:00	52.7	55.5	48.5	64
23/10/2023	03:15:00	51.6	53.8	47.6	65.6
23/10/2023	03:30:00	53.2	54.9	48.5	68.5
23/10/2023	03:45:00	53.9	55.7	48.5	70.2
23/10/2023	04:00:00	52.9	55.1	48.4	68.7
23/10/2023	04:15:00	52.3	54.4	48.1	68.2
23/10/2023	04:30:00	53.3	55.2	49.2	67.7
23/10/2023	04:45:00	54.6	54.7	50.4	74.4
23/10/2023	05:00:00	54.6	57.5	50.1	71.7
23/10/2023	05:15:00	54.6	55.9	51.1	68.4
23/10/2023	05:30:00	57.2	58.5	53.4	76
23/10/2023	05:45:00	57.9	59	55.6	71.2
23/10/2023	06:00:00	57.2	58.2	55	71.5
23/10/2023	06:15:00	55.6	56.8	54.1	63
23/10/2023	06:30:00	56.3	57.1	54.5	71.6
23/10/2023	06:45:00	56.7	58.5	54.7	65.2
23/10/2023	07:00:00	59.8	61.4	55.7	84.7
23/10/2023	07:15:00	58.9	60.4	55.9	78.2
23/10/2023	07:30:00	59.8	61.3	57.3	69.7
23/10/2023	07:45:00	61.6	63.8	58.2	71.9
23/10/2023	08:00:00	60.8	62.4	58	79.4
23/10/2023	08:15:00	62.7	66	58.3	77.8
23/10/2023	08:30:00	63.5	66.8	58.5	79
23/10/2023	08:45:00	62.5	64.4	57.9	87.1
23/10/2023	09:00:00	63.7	67.1	58.2	77.3
23/10/2023	09:15:00	61.8	64.7	57.1	74
23/10/2023	09:30:00	63.9	68.5	56.4	75.4
23/10/2023	09:45:00	60.8	64.3	55.8	71.2
23/10/2023	10:00:00	61.8	63.5	56	91.5
23/10/2023	10:15:00	60.3	61.8	55.5	82.4
23/10/2023	10:30:00	60.7	63.6	54.9	81.4
23/10/2023	10:45:00	60.8	64.9	54.6	70.9
23/10/2023	11:00:00	60.1	63.9	53.5	80.5
23/10/2023	11:15:00	59.9	63.6	53.5	72.2
23/10/2023	11:30:00	59.5	63	52.5	72.1
23/10/2023	11:45:00	59.9	64	52.7	74.5
23/10/2023	12:00:00	60.1	63.4	53.9	74.3
23/10/2023	12:15:00	60.9	64.5	55	71.5
23/10/2023	12:30:00	60.8	64.7	54.2	74.5
23/10/2023	12:45:00	60.2	63.5	54.5	73.5
23/10/2023	13:00:00	60.8	64.6	54.1	79.9
23/10/2023	13:15:00	60.9	64.6	54.8	71.6
23/10/2023	13:30:00	63	66.1	55	83.4
23/10/2023	13:45:00	61.8	64.7	54.2	82.5
23/10/2023	14:00:00	60.7	63.6	55.6	71.3
23/10/2023	14:15:00	60.8	64	55.6	72
23/10/2023	14:30:00	61.2	64.9	55.7	71.9
23/10/2023	14:45:00	61.5	64	56.2	80.4

23/10/2023	15:00:00	60.8	63.9	54.9	72.9
23/10/2023	15:15:00	60.3	63.4	55.3	71.2
23/10/2023	15:30:00	62.5	64.6	54.9	85.8
23/10/2023	15:45:00	59.9	61.9	54.9	75.4
23/10/2023	16:00:00	60.3	63.5	55.3	72.2
23/10/2023	16:15:00	63	63	55.7	89.2
23/10/2023	16:30:00	60.8	63.8	55.5	72
23/10/2023	16:45:00	60.7	63.3	55.2	76
23/10/2023	17:00:00	61.2	64.6	55.7	74.5
23/10/2023	17:15:00	60.8	63.7	55.8	81
23/10/2023	17:30:00	61	64.5	55.5	74.4
23/10/2023	17:45:00	61.4	65.2	55.6	73.6
23/10/2023	18:00:00	60.7	64.8	55.7	71.1
23/10/2023	18:15:00	59.6	61.7	55.5	71.3
23/10/2023	18:30:00	61.1	64.4	55.2	80.4
23/10/2023	18:45:00	60.2	64	55.2	69.9
23/10/2023	19:00:00	59.6	61.8	54.8	81.2
23/10/2023	19:15:00	59.4	63	54.5	71.1
23/10/2023	19:30:00	59.8	62.8	54.3	80.4
23/10/2023	19:45:00	59.2	61.9	54.5	72.8
23/10/2023	20:00:00	59.4	62.5	53.6	77.3
23/10/2023	20:15:00	57.7	60.1	53.1	68.2
23/10/2023	20:30:00	59.1	61.7	53	71
23/10/2023	20:45:00	58.2	61.1	52.2	70.3
23/10/2023	21:00:00	57.2	60.3	50.9	68.9
23/10/2023	21:15:00	56.3	58.9	49.9	68.8
23/10/2023	21:30:00	57.4	60.2	49.3	71.6
23/10/2023	21:45:00	57.2	60.3	48.5	75
23/10/2023	22:00:00	57.4	60.9	50.3	71.4
23/10/2023	22:15:00	55.3	58.2	49.4	74.3
23/10/2023	22:30:00	56.4	59.3	49.2	71.3
23/10/2023	22:45:00	56.7	60.3	48.5	71.6
23/10/2023	23:00:00	55.6	57.4	49.4	69.6
23/10/2023	23:15:00	55.9	58	50.1	71.5
23/10/2023	23:30:00	54.4	56.3	48.4	69.9
23/10/2023	23:45:00	54.9	57.7	46.8	70.3
24/10/2023	00:00:00	53.8	56.5	47.9	67.9
24/10/2023	00:15:00	53	56.3	47.8	64.5
24/10/2023	00:30:00	53.3	55.7	46.5	68.3
24/10/2023	00:45:00	52	54.8	46.2	67.1
24/10/2023	01:00:00	50.9	54.2	45.4	64.9
24/10/2023	01:15:00	52.2	56.2	45.2	66.2
24/10/2023	01:30:00	52.6	54.8	46	68.5
24/10/2023	01:45:00	50.9	54	45.9	65.9
24/10/2023	02:00:00	51.5	53.6	47.8	67.3
24/10/2023	02:15:00	51	53.5	47.6	61.4
24/10/2023	02:30:00	52.4	54.5	47.2	69.5
24/10/2023	02:45:00	52	54.5	46.1	69.6

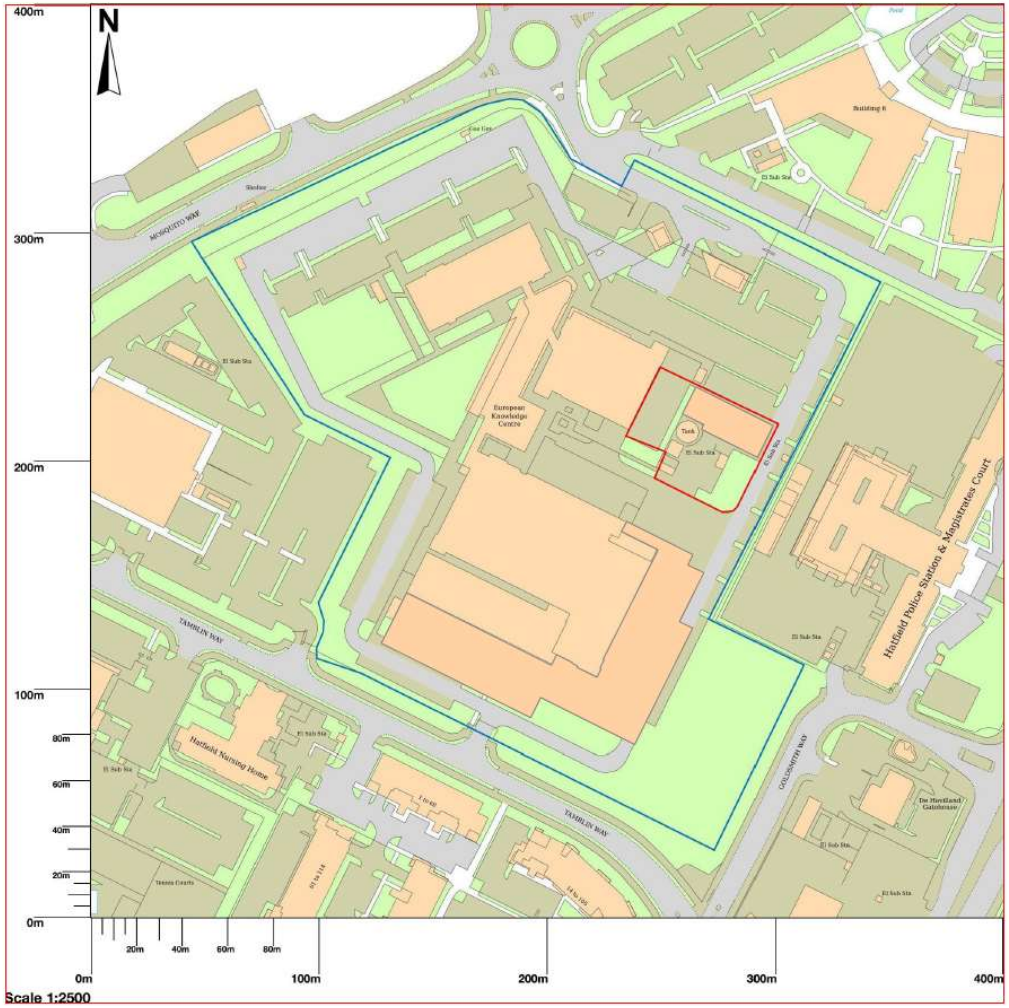
Appendix C – Environmental Noise Monitoring Graph Location A



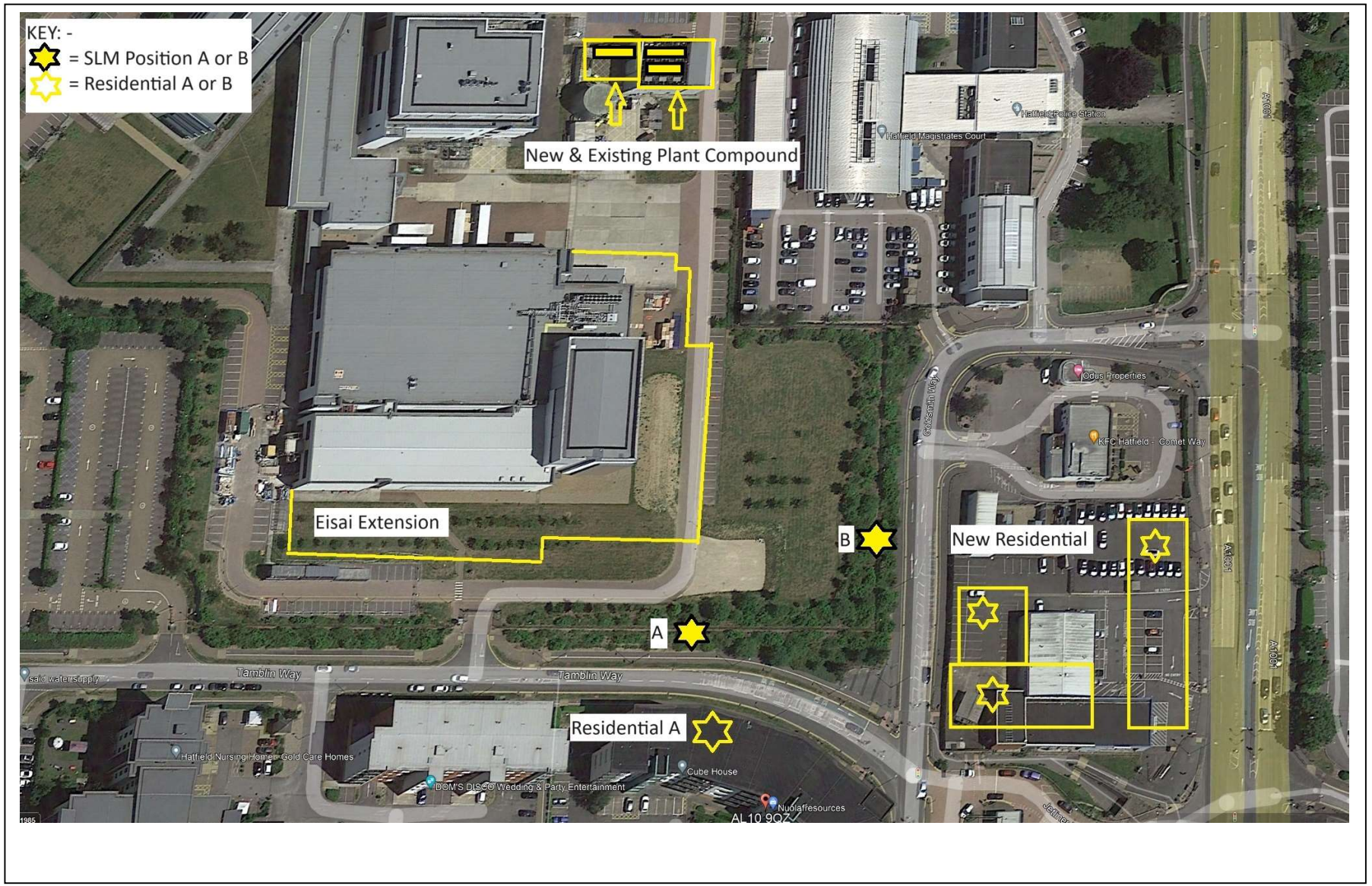
Appendix C – Environmental Noise Monitoring Graph Location B



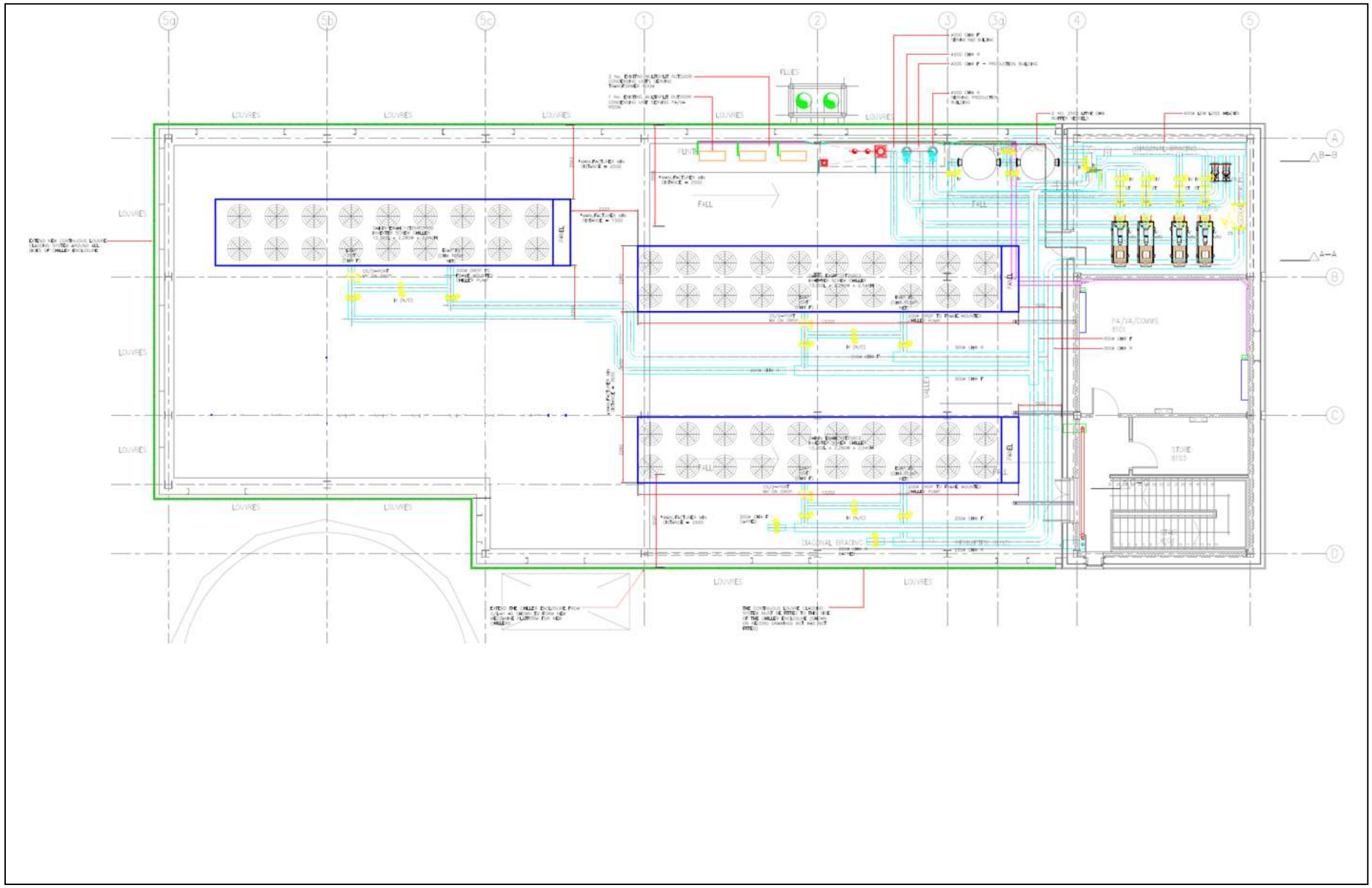
Appendix D1 – Location Plan – Proposed Site & Surrounding Area



Appendix D2 – Location Plan – Proposed Site & Surrounding Area



Appendix E –Site Plan - New Plant Compound & Proposed Plant Positions



Appendix F – Manufacturer's Published Noise Data – Daikin EWAHC12TZSRC2 Air-Cooled Chiller

DAIKIN

Technical Data Sheet

EWAHC12TZSRC2

Performances calculated according to EN14511-3:2018

Cooling mode performances

Cooling capacity	1147 kW	Evaporator water IN/OUT	10.50 °C / 5.50 °C
Power input	389.1 kW	Evaporator water flow	57.82 l/s
Cooling Efficiency EER	2.948 kW / kW	Evaporator pressure drops	59.1 kPa
		Ambient temperature	35.0 °C
IPLV.IP	5.350 kW / kW	Lw / Lp @ 10m	96 dB(A) / 63 dB(A)
SEER / ηs	5.25 / 207.0%	Evaporator fluid	Ethylene glycol 20%
SEPR	5.51	Evaporator fouling factor	1.76E-05.000 m2°C/W

Acoustic information

Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)

63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	db(A)
79.0	68.2	67.3	68.4	65.8	63.9	68.0	59.9	73.5

Values referred to Evap. IN/OUT 12/7°C and 35°C Amb., full load operation, standard unit configuration without options. Sound pressure level calculated from sound power level. Sound pressure in octave band is for information only and not considered binding.

Appendix F – Manufacturer's Published Noise Data – Daikin EWAHC15TZSRC2 Air-Cooled Chiller

DAIKIN

Technical Data Sheet

EWAHC15TZSRC2

Performances calculated according to EN14511-3:2018

Cooling mode performances

Cooling capacity	1423 kW	Evaporator water IN/OUT	10.50 °C / 5.50 °C
Power input	512.0 kW	Evaporator water flow	71.71 l/s
Cooling Efficiency EER	2.779 kW / kW	Evaporator pressure drops	55.5 kPa
		Ambient temperature	35.0 °C
IPLV.IP	5.710 kW / kW	Lw / Lp @ 10m	96 dB(A) / 63 dB(A)
SEER / ηs	5.42 / 213.8%	Evaporator fluid	Ethylene glycol 20%
SEPR	6.5	Evaporator fouling factor	1.76E-05.000 m2°C/W

SEER declared according to EN14825, fan coil application 12/7°C (inlet/outlet) water temperatures. SEPR declared according to EN14825:2018, high temperature process cooling application. Sound power level according to ISO 9614-1. IPLV.IP and seasonal efficiency data generally refer to standard unit without options

Acoustic information

Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)

63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	db(A)
78.2	72.5	71.3	70.7	71.2	62.4	60.1	59.0	73.0

Values referred to Evap. IN/OUT 12/7°C and 35°C Amb., full load operation, standard unit configuration without options. Sound pressure level calculated from sound power level. Sound pressure in octave band is for information only and not considered binding.

Appendix G – Acoustic Calculations
Residential Property A – Day-time & Evening

Project: Eisai Hatfield
Ref: QT 11880
Date: 02/11/2023
Title: Calculation - Chillers to 1m from Nearest Residential Window.

Plant Item 1 - Chiller 1 Daikin Option 1 EWAHC12TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
1	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.9	91.1	90.2	91.3	88.7	86.8	90.9	82.8	**103.4**
2	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
3	Plant Octave Band SWL(A) dB ref 10-12 W	1+2			75.9	75.1	81.2	88.3	88.7	87.8	91.9	81.8	**95.9**
4	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	Cumulative Plant Noise SPL dB Ref 10^{-12} W	3+4			75.9	75.1	81.2	88.3	88.7	87.8	91.9	81.8	
6	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		202	-57.1	-57.1	-57.1	-57.1	-57.1	-57.1	-57.1	-57.1	
7	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
8	SPL at Facade	5+6+7			21.8	21.0	27.1	34.2	34.6	33.7	37.8	27.7	**41.8**
9	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0.00052	-5	-5	-5	-5	-5	-5	-5	-5	
10	A-Weighted SPL at Facade	8+9			17.0	16.2	22.3	29.3	29.7	28.7	32.6	22.2	**36.8**

Plant Item 2 - Chiller 2 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
11	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
12	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
13	Plant Octave Band SWL(A) dB ref 10-12 W	11+12			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
14	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	Cumulative Plant Noise SPL dB Ref 10^{-12} W	13+14			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
16	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		193	-56.7	-56.7	-56.7	-56.7	-56.7	-56.7	-56.7	-56.7	
17	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
18	SPL at Facade	15+16+17			21.6	25.9	31.7	37.1	40.6	32.8	30.5	27.4	**43.4**
19	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0.00052	-5	-5	-5	-5	-5	-5	-5	-5	
20	A-Weighted SPL at Facade	18+19			16.8	21.1	26.9	32.3	35.7	27.8	25.4	22.0	**38.6**

Plant Item 3 - Chiller 3 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
21	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
22	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
23	Plant Octave Band SWL(A) dB ref 10-12 W	21+22			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
24	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
25	Cumulative Plant Noise SPL dB Ref 10^{-12} W	23+24			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
26	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		188	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	
27	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
28	SPL at Facade	25+26+27			21.8	26.1	31.9	37.3	40.8	33.0	30.7	27.6	**43.7**
29	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0.00052	-5	-5	-5	-5	-5	-5	-5	-5	
30	A-Weighted SPL at Facade	28+29			17.0	21.3	27.1	32.5	36.0	28.1	25.6	22.2	**38.8**

31	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	8+18+28			26.5	29.6	35.5	41.2	44.2	37.9	39.2	32.3	47.8
32	Cumulative SPL at Noise Sensitive Façade - dB(A) WITH ATTENUATION	10+20+30			21.7	24.9	30.7	36.4	39.3	33.0	34.1	26.9	42.9
33	Evening LA90 Spectral Content				28.5	34.9	38.1	42.6	45.1	39.3	25.6	14.0	48.4

Residential Property A – Night-Time

Project: Eisai Hatfield
Ref: QT 11880
Date: 02/11/2023
Title: Calculation - Chillers to 1m from Nearest Residential Window.

Plant Item 3 - Chiller 3 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
21	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
22	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
23	Plant Octave Band SWL(A) dB ref 10-12 W	21+22			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
24	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
25	Cumulative Plant Noise SPL dB Ref 10^{-12} W	23+24			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
26	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		188	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	
27	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
28	SPL at Facade	25+26+27			21.8	26.1	31.9	37.3	40.8	33.0	30.7	27.6	**43.7**
29	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0.00052	-5	-5	-5	-5	-5	-5	-5	-5	
30	A-Weighted SPL at Facade	28+29			17.0	21.3	27.1	32.5	36.0	28.1	25.6	22.2	**38.8**

31	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	28			**21.8**	**26.1**	**31.9**	**37.3**	**40.8**	**33.0**	**30.7**	**27.6**	43.7
32	Cumulative SPL at Noise Sensitive Façade - dB(A) WITH ATTENUATION	30			**17.0**	**21.3**	**27.1**	**32.5**	**36.0**	**28.1**	**25.6**	**22.2**	38.8
33	Night LA90 Spectral Content				**25.6**	**32.9**	**35.9**	**40.2**	**40.0**	**35.7**	**23.7**	**14.0**	44.9

Residential Property B – Day-Time & Evening

Project: Eisai Hatfield
Ref: QT 11880
Date: 02/11/2023
Title: Calculation - Chillers to 1m from Nearest Residential Window.

Plant Item 1 - Chiller 1 Daikin Option 1 EWAHC12TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
1	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.9	91.1	90.2	91.3	88.7	86.8	90.9	82.8	**103.4**
2	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
3	Plant Octave Band SWL(A) dB ref 10-12 W	1+2			75.9	75.1	81.2	88.3	88.7	87.8	91.9	81.8	**95.9**
4	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	Cumulative Plant Noise SPL dB Ref 10^{-12} W	3+4			75.9	75.1	81.2	88.3	88.7	87.8	91.9	81.8	
6	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		197	-56.9	-56.9	-56.9	-56.9	-56.9	-56.9	-56.9	-56.9	
7	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
8	SPL at Facade	5+6+7			22.0	21.2	27.3	34.4	34.8	33.9	38.0	27.9	**42.0**

Plant Item 2 - Chiller 2 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
9	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
10	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
11	Plant Octave Band SWL(A) dB ref 10-12 W	9+10			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
12	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
13	Cumulative Plant Noise SPL dB Ref 10^{-12} W	11+12			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
14	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		189	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	
15	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
16	SPL at Facade	13+14+15			21.8	26.1	31.9	37.3	40.8	33.0	30.7	27.6	**43.6**

Plant Item 3 - Chiller 3 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
17	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
18	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
19	Plant Octave Band SWL(A) dB ref 10-12 W	17+18			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
20	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
21	Cumulative Plant Noise SPL dB Ref 10^{-12} W	19+20			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
22	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		196	-56.8	-56.8	-56.8	-56.8	-56.8	-56.8	-56.8	-56.8	
23	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
24	SPL at Facade	22+23+24			21.4	25.7	31.5	36.9	40.4	32.6	30.3	27.2	**43.3**

25	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	8+16+24			**26.5**	**29.6**	**35.4**	**41.1**	**44.2**	**38.0**	**39.3**	**32.3**	**47.8**
26	Evening LA90 Spectral Content				**28.8**	**37.7**	**38.9**	**43.1**	**48.0**	**42.1**	**31.2**	**17.0**	**50.6**

Residential Property B – Night-Time

Project: Eisai Hatfield
Ref: QT 11880
Date: 02/11/2023
Title: Calculation - Chillers to 1m from Nearest Residential Window.

Plant Item 3 - Chiller 3 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
17	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
18	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
19	Plant Octave Band SWL(A) dB ref 10-12 W	17+18			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
20	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
21	Cumulative Plant Noise SPL dB Ref 10^{-12} W	19+20			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
22	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		196	-56.8	-56.8	-56.8	-56.8	-56.8	-56.8	-56.8	-56.8	
23	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
24	SPL at Facade	22+23+24			21.4	25.7	31.5	36.9	40.4	32.6	30.3	27.2	**43.3**
27	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	24			**21.4**	**25.7**	**31.5**	**36.9**	**40.4**	**32.6**	**30.3**	**27.2**	43.3
28	Night LA90 Spectral Content				**23.0**	**29.3**	**32.6**	**38.7**	**44.0**	**37.6**	**28.6**	**15.5**	46.2

Therefore Compliance with planning condition demonstrated

Appendix G – Acoustic Calculations Nearest Commercial Property

Project: Eisai Hatfield
Ref: QT 11880
Date: 02/11/2023
Title: Calculation - Chillers to 1m from Nearest Commercial Window.

Plant Item 1 - Chiller 1 Daikin Option 1 EWAHC12TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
1	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.9	91.1	90.2	91.3	88.7	86.8	90.9	82.8	**103.4**
2	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
3	Plant Octave Band SWL(A) dB ref 10-12 W	1+2			75.9	75.1	81.2	88.3	88.7	87.8	91.9	81.8	**95.9**
4	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	Cumulative Plant Noise SPL dB Ref 10^{-12} W	3+4			75.9	75.1	81.2	88.3	88.7	87.8	91.9	81.8	
6	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		46	-44.3	-44.3	-44.3	-44.3	-44.3	-44.3	-44.3	-44.3	
7	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
8	SPL at Facade	5+6+7			34.6	33.8	39.9	47.0	47.4	46.5	50.6	40.5	**54.6**
9	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0.078	-6	-6	-7	-9	-11	-13	-16	-19	
10	A-Weighted SPL at Facade	8+9			29.1	27.6	32.7	38.2	36.6	33.2	34.7	21.7	**42.9**

Plant Item 2 - Chiller 2 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
11	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
12	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
13	Plant Octave Band SWL(A) dB ref 10-12 W	11+12			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
14	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	Cumulative Plant Noise SPL dB Ref 10^{-12} W	13+14			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
16	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		46	-44.3	-44.3	-44.3	-44.3	-44.3	-44.3	-44.3	-44.3	
17	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
18	SPL at Facade	15+16+17			34.0	38.3	44.1	49.5	53.0	45.2	42.9	39.8	**55.9**
19	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0.078	-6	-6	-7	-9	-11	-13	-16	-19	
20	A-Weighted SPL at Facade	18+19			28.5	32.2	36.9	40.8	42.2	32.0	27.0	21.0	**45.8**

Plant Item 3 - Chiller 3 - Daikin EWAHC15TZSRC2					Octave Band Centre Frequency (Hz)								
Row Ref No.	Description	Option 1	R2	R1	63	125	250	500	1000	2000	4000	8000	Global (dB)
21	Manufacturer's Published Plant Octave Band SWL dB ref 10^{-12} W				101.3	95.6	94.4	93.8	94.3	85.5	83.2	82.1	**104.1**
22	dB(A) Correction				-26.0	-16.0	-9.0	-3.0	0.0	1.0	1.0	-1.0	
23	Plant Octave Band SWL(A) dB ref 10-12 W	21+22			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	**97.2**
24	No. off units		1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
25	Cumulative Plant Noise SPL dB Ref 10^{-12} W	23+24			75.3	79.6	85.4	90.8	94.3	86.5	84.2	81.1	
26	Distance correction to 1 metre from Noise Sensitive Receptor	20 x LOG(R1)-11		62	-46.8	-46.8	-46.8	-46.8	-46.8	-46.8	-46.8	-46.8	
27	Directivity Correction (+3 dB)				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
28	SPL at Facade	25+26+27			31.4	35.7	41.5	46.9	50.4	42.6	40.3	37.2	**53.3**
29	Attenuation - Natural Screening Effect of Building	Fresnel No. Calc	Path Diff =	0	-5	-5	-5	-5	-5	-5	-5	-5	
30	A-Weighted SPL at Facade	28+29			26.7	31.0	36.8	42.2	45.7	37.9	35.6	32.5	**48.5**

31	Cumulative SPL at Noise Sensitive Façade - dB(A) WITHOUT ATTENUATION	8+18+28			38.3	41.1	47.0	52.8	55.6	49.8	51.6	44.2	59.5
32	Cumulative SPL at Noise Sensitive Façade - dB(A) WITH ATTENUATION	10+20+30			33.0	35.4	40.6	45.4	47.6	39.9	38.5	33.1	51.1

Appendix H – Sound Level Meter Calibration Certificates

NTi AUDIO

Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

This model of sound level meter submitted for periodic testing successfully completed the applicable pattern-evaluation tests given in IEC 61672-2. The pattern approval certificate is available at www.nti-audio.com/XL2.

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2-TA	S/N	A2A-08390-E0
Firmware	V4.71		
Microphone Model	M2230		
Preamplifier	MA220	S/N	8286
Microphone Capsule	MC230A	S/N	A16875
Performance class	Class 1		
Customer Inventory Nr.			

Customer

QT Acoustics
59 Prospect Road
Ash Vale
Aldershot
GU12 5EL

Date 23 June 2023

Certificate UK-23-069

Results **PASSED**
(for detailed report see next pages)

Operator [redacted]
David Young

NTi Audio UK Ltd • Office 33C Julians Road • Stevenage
Hertfordshire, SG1 3ES, UK • uk@nti-audio.com