Guild Living
Epsom Hospital

Environmental Noise Survey and Plant Noise Assessment Report

26691/PNA1/Rev2

19 December 2019

For:
Cast Real Estate
Black Bull Yard
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London
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Hann Tucker Associates

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Document Control

Rev	Date	Comment	Prepared by	Authorised by
2	19/12/2019	Project proposal description and drawing reference updated		
			Xiaoyi Li Assistant Consultant MSc, BA(Hons), TechIOA	Andrew Fermer Director BSc(Hons), MIOA
1	18/12/2019	Noise impact assessment updated	Xiaoyi Li Assistant Consultant MSc, BA(Hons), TechIOA	Andrew Fermer Director BSc(Hons), MIOA
0	17/06/2019	-	Xiaoyi Li Assistant Consultant MSc, BA(Hons), TechIOA	Andrew Fermer Director BSc(Hons), MIOA

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Contents

Attachments

1.0 Introduction

It is proposed to redevelop the south part of the site of Epsom General Hospital for Class C2 residential care use. This includes demolition of all existing buildings on the site and construction of 2No. buildings containing 306No. residential units with ancillary restaurant, retail, wellness centre and nursery.

Hann Tucker Associates has therefore been commissioned to undertake an environmental noise survey to determine the currently prevailing noise climate around the site, the results of which will be used to inform various aspects of the acoustic design and to support the planning application.

This report presents the methodology and findings.

This report will need to be revised once the planning conditions are available.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of a detailed survey the existing L_{Amax}, L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at selected “secure” on-site positions, using fully computerised unmanned monitoring equipment.

The environmental noise data will be presented in a combined report, with recommendations made for daytime and night-time plant noise emission limits, following liaison with the Local Authority.

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 with reference to the requirements of the Local Authority.

3.0 Site Description

3.1 Location

The site is located at 40 Woodcote Green Road and extends deeper into the southwest. The location is shown in the Location Map below.

Location Map (Map Data © 2019 Google)

The site falls within the jurisdiction of Epsom & Ewell Borough Council.

3.2 Description

The site is located within a mixed residential and commercial area. The site is bound by Woodcote Green Road on the southeast, and surrounded by a park to the south, suburban housing to the east and west and hospital buildings to the north. Subjectively, the dominant noise sources on site were considered to be nearby road traffic.

The site is shown in the Site Plan overleaf.

Site Plan (Map Data © 2019 Google)

4.0 Acoustic Terminology

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

5.0 Project Proposals

5.1 Proposed Plant

We understand the proposed plant are as detailed in Section 11 of this report.

5.2 Operating Hours

We understand that the operating hours of the proposed plant are as detailed in Section 11 of this report.

5.3 Drawings

Our acoustic analyses is based on the following drawings by Marchese Partners and commented by Hoare Lea.

Reference	Title	Date
18120_A2.07 (Rev K)	ROOF LEVEL	Reviewed by Hoare Lea on 12 November 2019
18120-MPI-XX-00-DR-A-20_001	LEVEL 00 FLOOR PLAN	20 December 2019
18120-MPI-XX-01-DR-A-20_002	LEVEL 01 FLOOR PLAN	20 December 2019

Reference	Title	Date
18120-MPI-XX-02-DR-A-20_003	LEVEL 02 FLOOR PLAN	20 December 2019
18120-MPI-XX-03-DR-A-20_004	LEVEL 03 FLOOR PLAN	20 December 2019
18120-MPI-XX-04-DR-A-20_005	LEVEL 04 FLOOR PLAN	20 December 2019
18120-MPI-XX-05-DR-A-20_006	LEVEL 05-08 FLOOR PLAN	20 December 2019
18120-MPI-XX-06-DR-A-20_007	LEVEL ROOF PLAN	20 December 2019
18120-MPI-ZZ-00-DR-A-20_100	EAST BUILDING - LEVEL 00	20 December 2019
18120-MPI-ZZ-01-DR-A-20_101	EAST BUILDING - LEVEL 01	20 December 2019
18120-MPI-ZZ-02-DR-A-20_102	EAST BUILDING - LEVEL 02	20 December 2019
18120-MPI-ZZ-03-DR-A-20_103	EAST BUILDING - LEVEL 03	20 December 2019
18120-MPI-ZZ-04-DR-A-20_104	EAST BUILDING - LEVEL 04	20 December 2019
18120-MPI-ZZ-05-DR-A-20_105	EAST BUILDING - LEVEL 05-08	20 December 2019
18120-MPI-ZZ-06-DR-A-20_106	EAST BUILDING - LEVEL ROOF	20 December 2019
18120-MPI-ZZ-00-DR-A-20_107	WEST BUILDING - LEVEL 00	20 December 2019
18120-MPI-ZZ-01-DR-A-20_108	WEST BUILDING - LEVEL 01	20 December 2019
18120-MPI-ZZ-02-DR-A-20_109	WEST BUILDING - LEVEL 02	20 December 2019
18120-MPI-ZZ-03-DR-A-20_110	WEST BUILDING - LEVEL 03	20 December 2019
18120-MPI-ZZ-04-DR-A-20_111	WEST BUILDING - LEVEL 04	20 December 2019
18120-MPI-ZZ-05-DR-A-20_112	WEST BUILDING - LEVEL 05-08	20 December 2019
18120-MPI-ZZ-06-DR-A-20_113	WEST BUILDING - LEVEL ROOF	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_200	SITE SECTIONS	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_201	BUILDING SECTION A-A´ & B-B´	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_202	BUILDING SECTION C-C´ & D-D´	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_203	BUILDING SECTION E-E´	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_300	ELEVATION 1-1	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_301	ELEVATION 2-2	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_302	ELEVATION 3-3	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_303	ELEVATION 4-4	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_304	ELEVATION 5-5	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_305	ELEVATION 6-6	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_306	ELEVATION 7-7 & 8-8	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_307	ELEVATION 9-9 & 10-10	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_308	ELEVATION 11-11	20 December 2019
18120-MPI-XX-ZZ-DR-A-20_309	ELEVATION 12-12 & 13-13	20 December 2019

6.0 Acoustic Standards and Guidelines

6.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

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

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level
This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *"all reasonable steps should be taken to mitigate*

and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development." The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

6.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (revised February 2019):

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Paragraph 180 also references the Noise Policy Statement for England. This document does not refer to specific noise levels but instead sets out three aims:

"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable

development.

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

6.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at http://planningguidance.planningportal.gov.uk/blog/guidance/. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

Perception	Examples of Outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

6.4 Local Authority Requirements

The site lies within the jurisdiction of Epsom & Ewell Borough Council. We have requested their advice concerning their requirements for setting atmospheric noise emission criteria for building service plant, but have not received a reply at the time of writing.

There does not appear to be any quantitative criteria regarding controlling plant noise emissions in the Epsom & Ewell's local planning documents; however, relevant policies are extracted from local planning documents and presented as below:

Core Strategy Policy CS 6 – Local Plan Core Strategy 2007

"Proposals for development should result in a sustainable environment and reduce, or have a neutral impact upon, pollution and climate change. The Council will expect proposals to demonstrate how sustainable construction and design can be incorporated to improve the energy efficiency of development - both new build and conversion.

In order to conserve natural resources, minimise waste and encourage recycling, the Council will ensure that new development … minimises the emission of pollutants, including noise, water and light pollution, into the wider environment …"

Section 5. Air Quality, Noise and Light Pollution – Revised Sustainable Design Supplementary Planning Document (adopted February 2016)

"An acoustic study will be required from development proposals / new uses that will generate noise with the potential to cause nuisance / harm, or are located in proximity to sources of significant noise. Examples of the former could include proposals for large retail uses located in proximity to residential properties, and the latter, proposals in proximity to a railway line. Residential developments in the town centres should be designed to comply with the standards in BS8233.

5.7 Under Section 79 of the Environmental Protection Act 1990, local authorities have a duty to take reasonably practicable steps to investigate complaints of statutory nuisance, including: "Noise emitted from premises so as to be prejudicial to health or a nuisance."

5.8 Minimising the adverse impacts of noise is a significant issue for the Borough Council. This is because most new development takes place within the existing urban area. This is particularly relevant in locations where there are a combination of different uses, such as residential accommodation, retail, employment and leisure uses. Recent developments in Epsom Town

Centre provide good examples of how of how this issue could be considered.

5.9 In that respect applicants are encouraged to enter into pre-application discussions with the Council to identify whether acoustic studies are required to support a proposal. The Council's Development Management team will work closely with the Environmental Health service to ensure that the impact/potential impact of noise pollution is mitigated."

6.5 BS 4142:2014

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.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to "No Observed Effect Level" as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of "low impact".

6.6 World Health Organisation Guidelines on Community Noise

BS8233:2014 is based upon the current World Health Organisation (WHO) guidance "*Guidelines on Community Noise".* A summary of the noise guidelines relevant to the proposed scheme is presented in the table below.

Residential Environment	Critical Health Effect(s)	L_{Aeq}	L_{AFmax}	Time Base
Outdoor living area	Serious annoyance, daytime and evening	55	-	07:00-23:00
	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

These WHO guidelines are based, in almost all cases, on the lower threshold below which the occurrence rates of any particular effect can be assumed to be negligible.

6.7 British Standard BS8233: 2014

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings" provides guidance for the control of noise in and around buildings.

BS8233:2014 Section 7.7.2 titled "Internal ambient noise levels for dwellings" states:

"In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	*Location*	*Desirable Internal Ambient Criteria*	
		07:00 - 23:00	*23:00 - 07:00*
Resting	*Living Rooms*	*35 dB $L_{Aeq,16hour}$*	-
Dining	*Dining Room/Area*	*40 dB $L_{Aeq,16hour}$*	-
Sleeping (Daytime Resting)	*Bedroom*	*35 dB $L_{Aeq,16hour}$*	*30 dB $L_{Aeq,8hour}$*

6.8 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB (or 10dB if tonal) below the minimum background $L_{90(15minutes)}$ at 1m from the nearest noise sensitive window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

7.0 Methodology

The survey was undertaken by Xiaoyi Li MSc BA(Hons) TechIOA, and assisted by Bo Ding PhD MSc BSc(Hons) AMIOA.

7.1 Unmanned Survey

7.1.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:00 hours on Tuesday 11 June 2019 to 12:00 hours on Thursday 13 June 2019.

During the periods we were on site the wind conditions were calm. The sky was generally clear. We understand that generally throughout the survey period the weather conditions were cloudy and rainy. These conditions are considered suitable for obtaining representative measurement results.

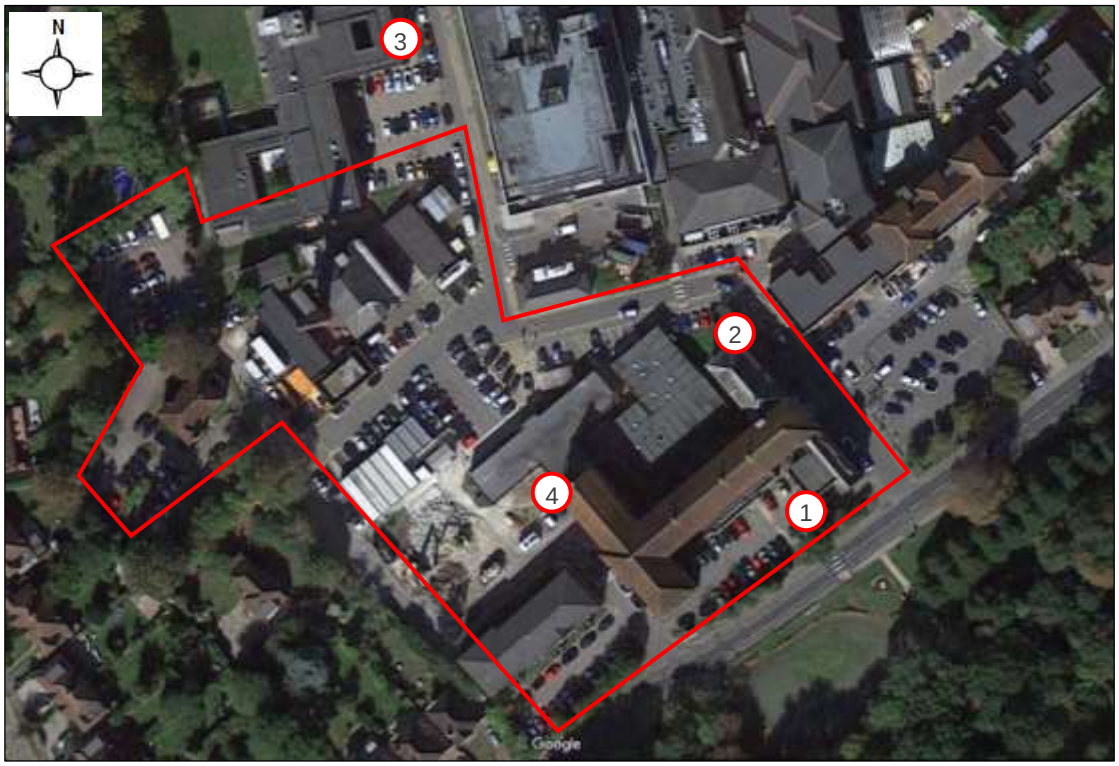
Measurements were taken continuously of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

7.1.2 Measurement Positions

The noise level measurements were undertaken at 4No. positions as described in the table below.

Position No	Description
1	The sound level meter was placed on the fire escape landing. The microphone was attached to a pole fixed on the fire escape handrail of Rowan House, approximately 1.8 metres from the wall, 6.5 metres above ground level and 12 metres from Woodcote Road. It overlooked Woodcote Green Road.
2	The sound level meter was placed on the fire escape landing. The microphone was attached to a pole fixed on the fire escape handrail of Rowan House, approximately 1.8 metres from the wall, 6.5 metres above ground level and 7 metres from road side. It overlooked the road junction on the northeast.
3	The sound level meter was placed on the roof of Epsom Hospital Langley Wing. The microphone was attached to a pole fixed on the roof handrail, approximately 1.5 metres above roof level, 12 metres above ground level and 7 metres from road side. It overlooked the road on the east.
4	The sound level meter was placed on the fire escape landing. The microphone was attached to a pole fixed on fire escape handrail of Rowan House, approximately 1.8 metres from the wall and 11 metres above ground level overlooking the car park.

The positions are shown on the plan below.



Site Plan Showing Unmanned Measurement Positions (Map Data © 2019 Google)

7.1.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Position 1 Type 1 ½" Condenser Microphone	ACO Pacific	7052E	67983	Calibration on 06/02/2019
Position 1 Preamp	Svantek	SV18	71464	Calibration on 06/02/2019
Position 1 Type 1 Data Logging Sound Level Meter	Svantek	971	80233	Calibration on 06/02/2019
Position 2 Type 1 ½" Condenser Microphone	ACO Pacific	7052E	68293	Calibration on 15/11/2018
Position 2 Preamp	Svantek	SV18	72276	Calibration on 15/11/2018
Position 2 Type 1 Data Logging Sound Level Meter	Svantek	971	72538	Calibration on 15/11/2018
Position 3 Type 1 ½" Condenser Microphone	PCB	377B02	135744	Calibration on 17/09/2018
Position 3 Preamp	Larson Davis	PRM902	4812	Calibration on 17/09/2018
Position 3 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3839	Calibration on 17/09/2018
Position 4 Type 1 ½" Condenser Microphone	PCB	377A02	101926	Calibration on 09/07/2018
Position 4 Preamp	Larson Davis	PRM902	3691	Calibration on 09/07/2018
Position 4 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3841	Calibration on 09/07/2018
Type 1 Calibrator	Larson Davis	CAL200	3082	Calibration on 08/08/2018

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.1 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

7.2 Manned Survey

7.2.1 Procedure

Fully manned environmental noise monitoring was undertaken from approximately 13:30 hours to 15:15 hours on 11 June 2019.

During the survey period the wind conditions were calm. The sky was generally clear. There was no rain and road surfaces were dry throughout the survey period.

Measurements were taken of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over periods of not less than 13 minutes in each hour. Atypical noises were excluded as far as reasonably possible. The noise levels measured are therefore assumed to be representative of the noise climate during the hour in which the measurements were taken.

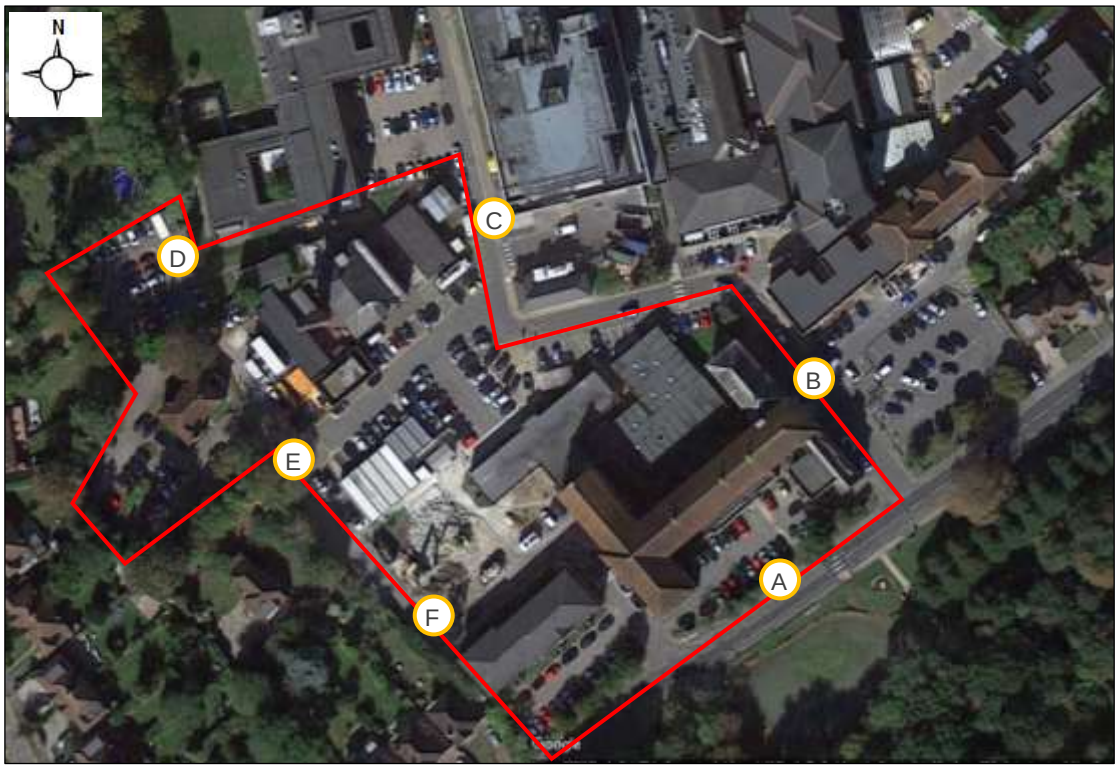
In addition, at each position typical L_{90}, L_{eq} and L_{max} octave band spectra (from 63Hz to 8kHz) were taken during the measurement period in order to gain a more detailed description of the prevailing noise climate.

7.2.2 Measurement Positions

The noise level measurements were undertaken at 6No. positions around the development site. The measurement position***s*** are described in the table below.

Position No	Description
A	The microphone was positioned on Woodcote Green Road at street level and fixed on a tripod approximately 1m above ground level and 1m from road side.
B	The microphone was positioned on the northeast boundary of the site at street level and fixed on a tripod approximately 1m above ground level and 1m from road side.
C	The microphone was positioned on the east boundary of the site at street level and fixed on a tripod approximately 1m above ground level and 1m from road side.
D	The microphone was positioned at the northwest corner of the site at street level and fixed on a tripod approximately 1m above ground level and 1m from road side.
E	The microphone was positioned on the southwest boundary of the site at street level and fixed on a tripod approximately 1m above ground level and 1m from road side.
F	The microphone was positioned at the south corner of the site at street level and fixed on a tripod approximately 1m above ground level and 1m from road side.

The positions are shown on the plan below.



Site Plan Showing Manned Measurement Positions (Map Data © 2019 Google)

7.2.3 Instrumentation

The instrumentation used during the manned survey is presented in the table below:

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	Bruel & Kjaer	4189	2650666	Calibration on 08/01/2019
Preamp	Bruel & Kjaer	ZC0026	-	Calibration on 08/01/2019
Type 1 Data Logging Sound Level Meter	Bruel & Kjaer	2260	2370433	Calibration on 08/01/2019
Type 1 ½" Condenser Microphone	Bruel & Kjaer	4189	3004879	Calibration on 19/09/2018
Preamp	Bruel & Kjaer	ZC0032	23396	Calibration on 19/09/2018
Type 1 Data Logging Sound Level Meter	Bruel & Kjaer	2250	3007292	Calibration on 19/09/2018
Type 1 Calibrator	Bruel & Kjaer	4231	2205779	Calibration on 13/09/2018

Each sound level meter was mounted on a tripod and was fitted with a Brüel and Kjær microphone windshield.

Each sound level meter was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.1 dB).

8.0 Results

8.1 Results of Unmanned Survey

The results have been plotted on Time History Graphs 26691/TH1 to 26691/TH4 enclosed presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

The following table presents the lowest measured L_{A90} background noise levels during the survey:

Position	Lowest Measured L_{A90} Background Noise Level (dB re 2 x 10^{-5} Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	32	28	28
2*	49	47	47
3	53	52	52
4	45	44	44

* Affected by existing plant serving neighbouring buildings, and do not represent true background levels

The following table presents the modal average of the measured L_{A90} background noise levels during the survey:

Position	Modal Average Measured L_{A90} Background Noise Level (dB re 2 x 10^{-5} Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	49	28	28
2*	54	49	49
3	55	52	52
4	49	45	45

*Affected by existing plant serving neighbouring buildings, and do not represent true background levels

The following table presents the measured $L_{Aeq,T}$ noise levels during the survey:

Position	Measured $L_{Aeq,T}$ Noise Level (dB re 2 x 10^{-5} Pa)	
	Daytime (07:00 – 23:00) Hours, $L_{Aeq,16hr}$	Night-Time (23:00 – 07:00) Hours, $L_{Aeq,8hr}$
1	63	54
2*	61	56
3	58	55
4	55	49

* Affected by existing plant serving neighbouring buildings

8.2 Results of Manned Survey

The fully manned survey A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound level measurements are recorded below.

Position	Time	Sound Levels dBA		
		L_{90}	L_{eq}	L_{max}
A	13:58 – 14:12 hours	50	68	86
	14:45 – 14:59 hours	51	68	84
B	14:14 – 14:27 hours	48	57	79
	15:02 – 15:15 hours	52	58	76
C	13:27 – 13:40 hours	46	59	82
	14:18 – 14:30 hours	46	60	88
D	14:02 – 14:16 hours	39	52	78
	14:45 – 14:59 hours	40	54	83
E	13:43 – 13:57 hours	43	52	73
	14:31 – 14:45 hours	44	51	67
F	13:30 – 13:44 hours	39	46	65
	14:30 – 14:43 hours	40	47	62

The following table presents the typical free-field worst case incident traffic noise levels for each façade / measurement position. The data may be used in subsequent analysis to establish sound performance specifications for each of the external building fabric elements.

Position	L_{eq} Sound Pressure Level (dB) @ Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
A	68	63	62	62	65	60	52	45	68
	70	64	64	63	65	61	54	51	68
B	64	59	57	54	52	49	42	38	57
	68	59	57	54	54	50	44	42	58
C	63	61	58	54	53	52	48	42	59
	63	61	59	59	52	51	48	44	60
D	56	53	49	46	47	44	43	36	52
	54	50	47	50	48	47	43	38	54
E	60	55	49	47	47	44	42	36	52
	66	54	49	47	46	41	37	32	51
F	55	49	45	43	41	39	35	29	46
	59	55	49	41	41	37	33	27	47

9.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise source at Position 1 was noted to be frequent and high-speed traffic on Woodcote Green Road; the dominant noise sources at Position 2 were noted to be nearby road traffic and operating plant opposite the road; the dominant noise source at Position 3 was noted to be traffic on the road to the east; the dominant noise source at Position 4 was noted to be nearby road traffic.

10.0 Plant Noise Emission Criteria

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

On the basis of the aforementioned guidance or policies and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window.

Position	Noise Emission Limit (dBA)		
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	24 hours
1	27	23	23
2*	44*	42*	42*
3	48	47	47
4	40	39	39

*Affected by existing plant serving neighbouring buildings, should be excluded in plant noise assessment

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

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

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

For life safety standby plant, only used in emergencies and occasional testing - e.g. smoke extract fans and life safety generators - relaxations of the internal and external criteria are normally acceptable but should comply with local authority and occupational requirements and must not interfere with internal audible emergency alarms.

11.0 Plant Noise Impact Assessment

We understand the proposed plant comprises the following:

Plant Description	Location	Qty	Plant Make	Model Number
ASHP's	Roof	2	Blue Box	Omicron Rev S4 HE LN 52.6
Restaurant Kitchen Extract Fan	Roof	1	Halton	PEU-05
Environmental Ventilation Extract Fans	Roof	8	Nuaire	AM43ES
Smoke Extract Fans	Roof	8	Colt	Non-standard

11.1 Plant Noise Data

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

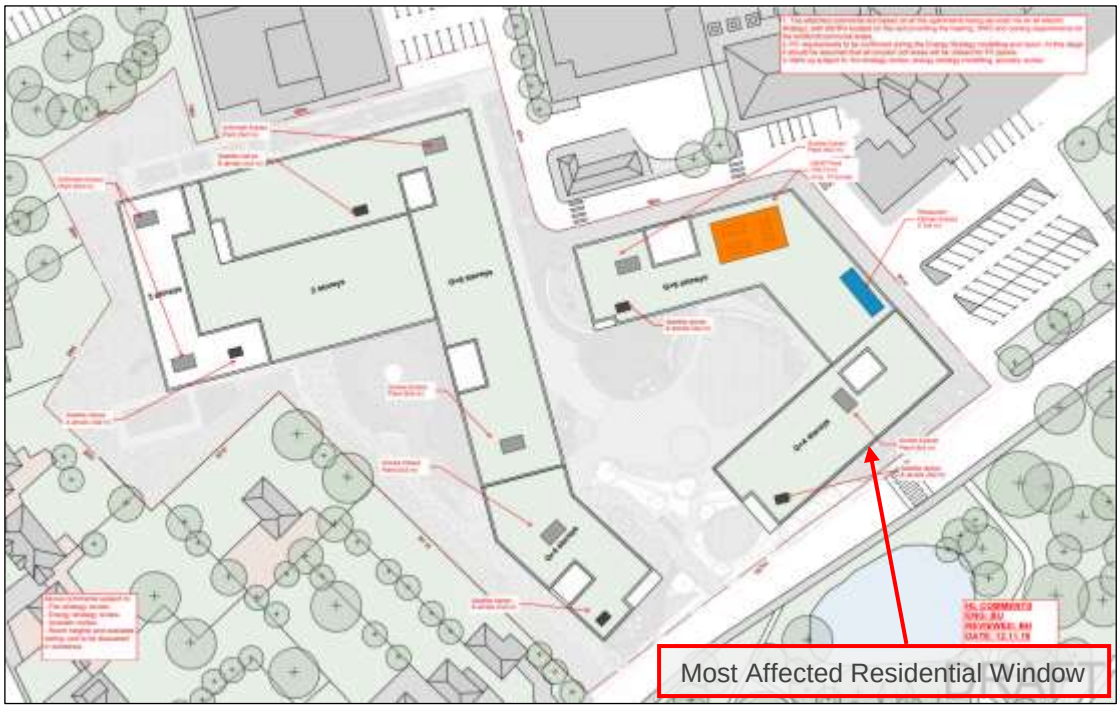
Plant Description	Sound Power Level (dB re 10^{-12} Watts) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
ASHP	91	81	81	86	85	84	79	77
Restaurant Kitchen Extract Fan (Induct Outlet)	-	90	88	89	87	84	79	73
Restaurant Kitchen Extract Fan (Breakout)	-	80	75	72	56	52	46	37
Environmental Ventilation Extract Fan – 100% speed (Induct Outlet)	80	84	79	82	76	75	75	60
Environmental Ventilation Extract Fan – 86.84% speed (Induct Outlet)	79	82	77	79	72	71	71	56
Environmental Ventilation Extract Fan – 100% speed (Breakout)	72	71	69	59	45	45	52	38
Environmental Ventilation Extract Fan – 86.84% speed (Breakout)	71	69	67	56	41	41	48	34
Smoke Extract Fan (Induct Outlet)	94	95	93	90	93	92	91	84

Halton have also provided the following built-in attenuator insertion losses for all air paths of the proposed restaurant kitchen extract fan.

Plant Description	Manufacturer's Built-in Attenuator Insertion Losses (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Restaurant Kitchen Extract Fan Built-in Attenuator	-	14	17	28	38	30	23	18

11.2 Location of Plant

We understand all new external plant units will be located on the roof as illustrated in the drawing overleaf.



Roof Plan Showing Roof Plant Arrangement and Most Affected Residential Window
(Ref. 18120_A2.07_Rev.K © Marchese Partners commented by Hoare Lea)

During our site visits, we identified a number of nearest and potentially most affected noise sensitive windows located at the residential part of the proposed development itself and surrounding residential and hospital building. According to results of the noise survey along with our calculations, the worst affected residential window is located on the 3rd floor of the southeast façade of the proposed development, approximately 8 metres from the closest roof plant item.

11.3 Mitigation Measures

In order to control plant noise emissions in line with the proposed criteria, we recommend building acoustic louvre screening around the ASHP's plant area, as specified below and at the end of this report.

In addition, we recommend the following mitigation measures for the proposed environmental ventilation extract fans:

- controlling fan speed to required duty (86.84%); and
- incorporating acoustic attenuators to the outlets (as specified below); and

- positioning the environmental ventilation extract fans at least 5.5 metres from any roof edge parapet walls.

We would also recommend the following mitigation measures for the proposed restaurant kitchen extract fan:

- upgrading the manufacturer's built-in attenuator to the attenuator specified below; and
- building acoustic louvre screening around the restaurant kitchen extract fan plant area, as specified below and at the end of this report.

Description	Minimum Required Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Acoustic Louvre Screening around ASHP's	7	7	10	17	29	30	27	21
Acoustic Louvre Screening around Restaurant Kitchen Extract Fan	7	8	13	23	37	33	29	29

The specifications for the acoustic louvre screens are enclosed at the end of this report.

Description	Minimum Required Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Environmental Ventilation Extract Fan Outlet Attenuator	10	20	35	48	50	50	50	37
Restaurant Kitchen Extract Fan Outlet Attenuator	14	25	39	50	50	50	50	49

11.4 Plant Noise Impact Assessment

We understand that all proposed normal plant units will potentially be operational 24 hours. The proposed smoke extract fans will only operate in the event of a fire and during routine testing.

11.4.1 Normal Plant Noise Impact Assessment

The following tables summarise our predictions of atmospheric noise emissions from the proposed normal roof plant to 1m from the nearest and most affected noise sensitive residential window.

ASHP's	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Sound Power Level	91	81	81	86	85	84	79	77	90
Correction for 3No.	+5	+5	+5	+5	+5	+5	+5	+5	
Barrier Correction	-14	-16	-19	-20	-20	-20	-20	-20	
Distance Correction (52m)	-46	-46	-46	-46	-46	-46	-46	-46	
Specified Acoustic Louvre Screening SRI	-7	-7	-10	-17	-29	-30	-27	-21	
Calculated Noise Level at 1m from Receptor	29	17	11	8	-5	-7	-9	-5	9

Restaurant Kitchen Extract Fan	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Induct Outlet Sound Power Level	-	90	88	89	87	84	79	73	90
Specified Attenuator Insertion Loss	-14	-25	-39	-50	-50	-50	-50	-49	
Directionality	+3	+4	+5	+6	+6	+6	+6	+6	
Distance Correction (0m to 1m)	-11	-11	-11	-11	-11	-11	-11	-11	
Outlet Sound Pressure Level at 1m from Plant	-	58	43	34	32	29	24	19	44
Breakout Sound Power Level	-	80	75	72	56	52	46	37	72
Distance Correction (0m to 1m)	-11	-11	-11	-11	-11	-11	-11	-11	
Specified Acoustic Louvre Screening SRI	-7	-8	-13	-23	-37	-33	-29	-29	
Breakout Sound Pressure Level at 1m from Plant	-	61	51	38	8	8	6	-3	47
Cumulative Sound Pressure Level at 1m from Plant	-	63	52	39	32	29	24	19	49
Barrier Correction	-17	-20	-20	-20	-20	-20	-20	-20	
Distance Correction (1m to 31m)	-19	-19	-19	-19	-19	-19	-19	-19	
Calculated Noise Level at 1m from Receptor	-	24	13	0	-7	-10	-15	-20	10

Environmental Ventilation Extract Fans (86.84% speed)	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Induct Outlet Sound Power Level	79	82	77	79	72	71	71	56	80
Specified Attenuator Insertion Loss	-10	-20	-35	-48	-50	-50	-50	-37	
Directionality	+2	+3	+4	+5	+6	+6	+6	+6	
Distance Correction (0m to 1m)	-11	-11	-11	-11	-11	-11	-11	-11	
Outlet Sound Pressure Level at 1m from Plant	60	54	35	25	17	16	16	14	40
Breakout Sound Power Level	71	69	67	56	41	41	48	34	61
Distance Correction (0m to 1m)	-11	-11	-11	-11	-11	-11	-11	-11	

Environmental Ventilation Extract Fans (86.84% speed)		Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Breakout Sound Pressure Level at 1m from Plant		60	58	56	45	30	30	37	23	50
Cumulative Sound Pressure Level at 1m from Plant		63	59	56	45	30	30	37	24	50
#1	Barrier Correction	-10	-12	-14	-17	-20	-20	-20	-20	
	Distance Correction (1m to 9m)	-14	-14	-14	-14	-14	-14	-14	-14	
	Calculated Noise Level at 1m from Receptor	39	33	28	14	-4	-4	3	-10	22
#2	Barrier Correction	-9	-12	-16	-20	-23	-25	-25	-25	
	Distance Correction (1m to 67m)	-30	-30	-30	-30	-30	-30	-30	-30	
	Calculated Noise Level at 1m from Receptor	24	17	10	-5	-23	-25	-18	-31	5
#3	Barrier Correction	-10	-12	-15	-18	-20	-20	-20	-20	
	Distance Correction (1m to 71m)	-31	-31	-31	-31	-31	-31	-31	-31	
	Calculated Noise Level at 1m from Receptor	22	16	10	-4	-21	-21	-14	-27	5
#4	Barrier Correction	-10	-12	-15	-18	-20	-20	-20	-20	
	Distance Correction (1m to 81m)	-32	-32	-32	-32	-32	-32	-32	-32	
	Calculated Noise Level at 1m from Receptor	21	15	9	-5	-22	-22	-15	-28	4
Cumulative Noise Level at 1m from Receptor		39	33	28	14	-4	-4	3	-10	22

The following table summarises our predictions of the cumulative atmospheric noise emissions from the proposed normal roof plant to 1m from the nearest and most affected noise sensitive residential window.

Plant Description	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
ASHP's	29	17	11	8	-5	-7	-9	-5	9
Restaurant Kitchen Extract Fan	-	24	13	0	-7	-10	-15	-20	10
Environmental Ventilation Extract Fans (86.84% speed)	39	33	28	14	-4	-4	3	-10	22
Cumulative Normal Roof Plant Noise Emission Levels at 1m from Receptor	40	34	28	15	0	-1	4	-4	23

Our calculations indicate that the proposed normal plant, in conjunction with the propose mitigation measures, should be capable of satisfying the policies of the Local Authority outlined in Section 9.0.

11.4.2 Emergency Plant Noise Impact Assessment

The following tables summarise our predictions of atmospheric noise emissions from the proposed smoke extract fans to 1m from the nearest noise sensitive residential window.

Smoke Extract Fans		Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Induct Outlet Sound Power Level		94	95	93	90	93	92	91	84	98
Grille End Reflection		-7	0	-1	0	0	0	0	0	
Directionality		+1	+2	+3	+4	+5	+6	+6	+6	
Distance Correction (0m to 1m)		-11	-11	-11	-11	-11	-11	-11	-11	
Outlet Sound Pressure Level at 1m from Plant		77	86	85	83	87	87	86	79	93
Breakout Sound Pressure Level at 1m from Plant		83	82	79	72	70	65	64	57	76
Cumulative Sound Pressure Level at 1m from Plant		84	87	86	83	87	87	86	79	93
#1	Barrier Correction	-10	-12	-14	-17	-20	-20	-20	-20	
	Distance Correction (1m to 9m)	-14	-14	-14	-14	-14	-14	-14	-14	
	Calculated Noise Level at 1m from Receptor	60	61	58	52	53	53	52	45	59
#2	Barrier Correction	-9	-12	-16	-20	-23	-25	-25	-25	
	Distance Correction (1m to 67m)	-30	-30	-30	-30	-30	-30	-30	-30	
	Calculated Noise Level at 1m from Receptor	45	45	40	33	34	32	31	24	40
#3	Barrier Correction	-10	-12	-15	-18	-20	-20	-20	-20	
	Distance Correction (1m to 71m)	-31	-31	-31	-31	-31	-31	-31	-31	
	Calculated Noise Level at 1m from Receptor	43	44	40	34	36	36	35	28	42
#4	Barrier Correction	-10	-12	-15	-18	-20	-20	-20	-20	
	Distance Correction (1m to 81m)	-32	-32	-32	-32	-32	-32	-32	-32	
	Calculated Noise Level at 1m from Receptor	42	43	39	33	35	35	34	27	41
Cumulative Noise Level at 1m from Receptor		60	61	58	52	53	53	52	45	59

Our calculations indicate that the noise emissions of the proposed smoke extract fans at the nearest and most affected residential window are approximately 27dB above the lowest measured daytime background $L_{A90,15mins}$ (32dBA), and 4dB lower than the measured daytime $L_{Aeq,16hour}$ (63dBA). According to the PPG guidance, it is likely that the noise impact of the proposed smoke extract fans would fall under the category of 'Observed Adverse Effect'. We understand, however, incorporating attenuators to the outlets of smoke extract fans would generally reduce the fan efficiency. Therefore, no mitigation measures have been recommended. This is, however, subject to the approval of the Local Authority.

12.0 Conclusions

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

Critical period L_{Amax}, L_{Aeq} and L_{A90} noise measurements along with relevant octave band sound spectra have been established by means of detailed fully manned daytime environmental noise survey at suitable street level locations around the site.

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

An assessment has been carried out to determine the plant noise emissions at the nearest and most affected noise sensitive residential window.

The assessment indicates that the proposed normal plant, in conjunction with the proposed attenuation, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential window, should therefore be acceptable to the Local Authority.

The assessment indicates that the noise emissions of the proposed smoke extract fans at the nearest and most affected residential window are approximately 27dB above the lowest measured daytime background $L_{A90,15mins}$ (32dBA), and 4dB lower than the measured daytime $L_{Aeq,16hour}$ (63dBA). According to the PPG guidance, it is likely that the noise impact of the proposed smoke extract fans would fall under the category of 'Observed Adverse Effect'. We also understand incorporating attenuators to the outlets of smoke extract fans would generally reduce the fan efficiency. Therefore, no mitigation measures have been recommended. This is, however, subject to the approval of the Local Authority.

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.

$L_{90,T}$ — L_{90} 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.

L_p — Sound Pressure Level (SPL) 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).

L_w — Sound Power Level (SWL) 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).

GUILD LIVING, EPSOM HOSPITAL

ACOUSTIC SPECIFICATION FOR

ACOUSTIC LOUVRE SCREENING

Acoustic louvre screening shall extend:

- continuously around all four sides of the proposed ASHP's plant area.

- from the roof up to a minimum height of 2000 mm above roof level, or equal to the highest part of the plant, whichever is the higher.

The louvre blades shall face in the direction opposite to that which would be conventional for weather louvers, such that the plant is not visible between the louvre blades when viewed from the noise sensitive receptor below.

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) at Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
7	7	10	17	29	30	27	21

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/m^3 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.

GUILD LIVING, EPSOM HOSPITAL

ACOUSTIC SPECIFICATION FOR

ACOUSTIC LOUVRE SCREENING

Acoustic louvre screening shall extend:

- continuously around all four sides of the proposed restaurant kitchen extract fan plant area.

- from the roof up to a minimum height of 2000 mm above roof level, or equal to the highest part of the plant, whichever is the higher.

The louvre blades shall face in the direction opposite to that which would be conventional for weather louvers, such that the plant is not visible between the louvre blades when viewed from the noise sensitive receptor below.

Performance

The acoustic louvres shall be at least 600mm 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) at Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
7	8	13	23	37	33	29	29

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/m^3 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.

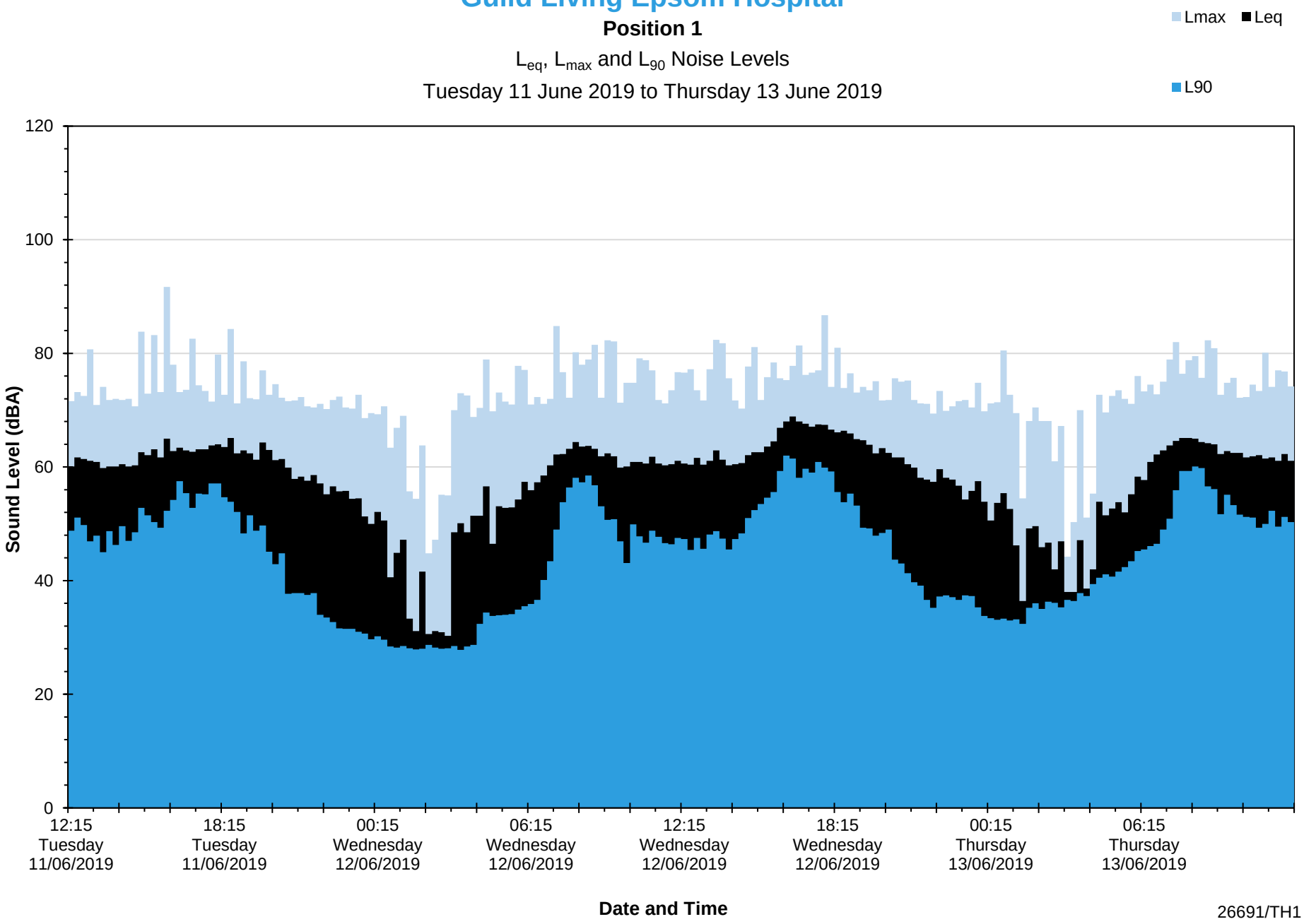
Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

Guild Living Epsom Hospital

Position 1

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

Tuesday 11 June 2019 to Thursday 13 June 2019



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Position 2

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

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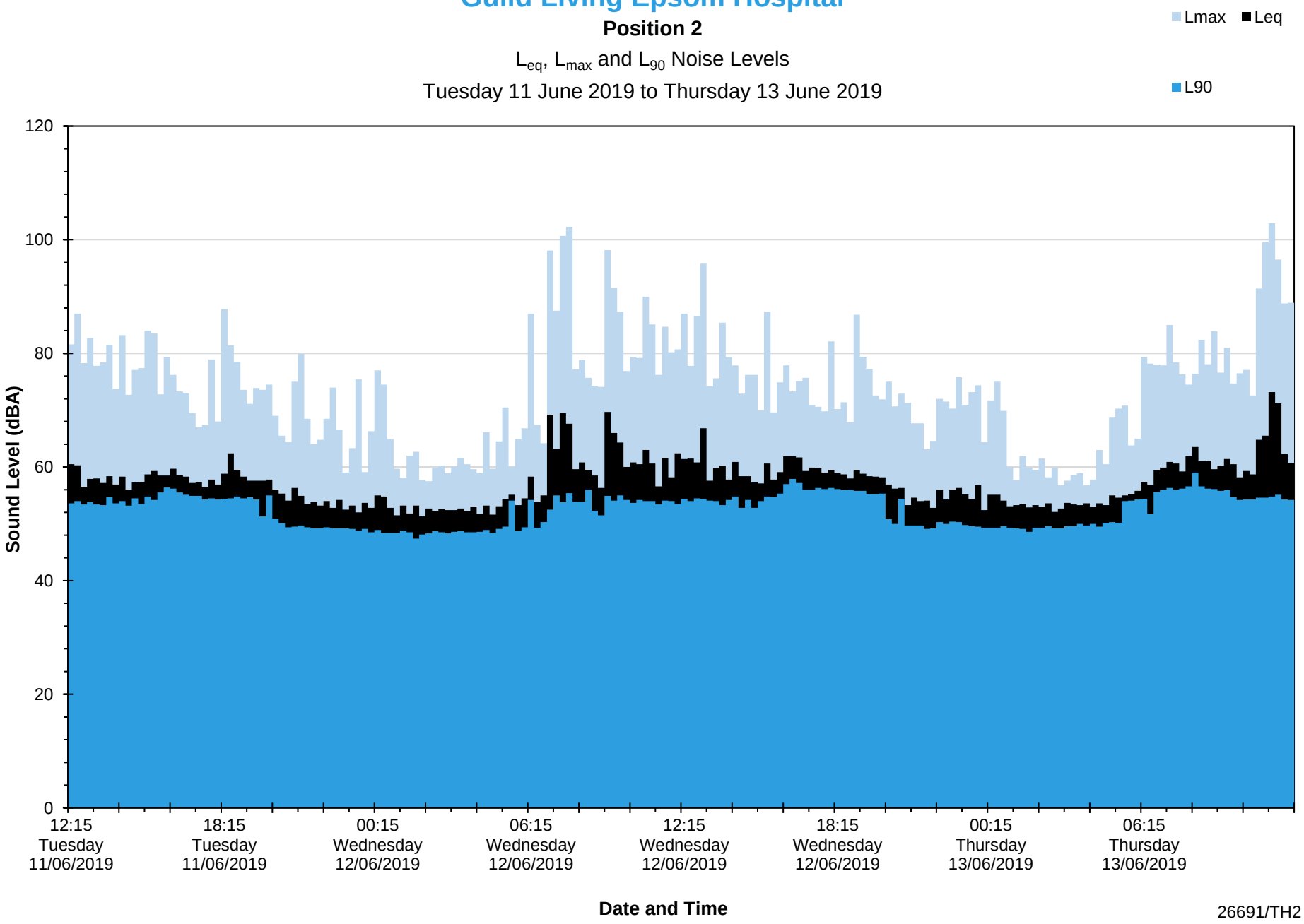

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Position 3

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

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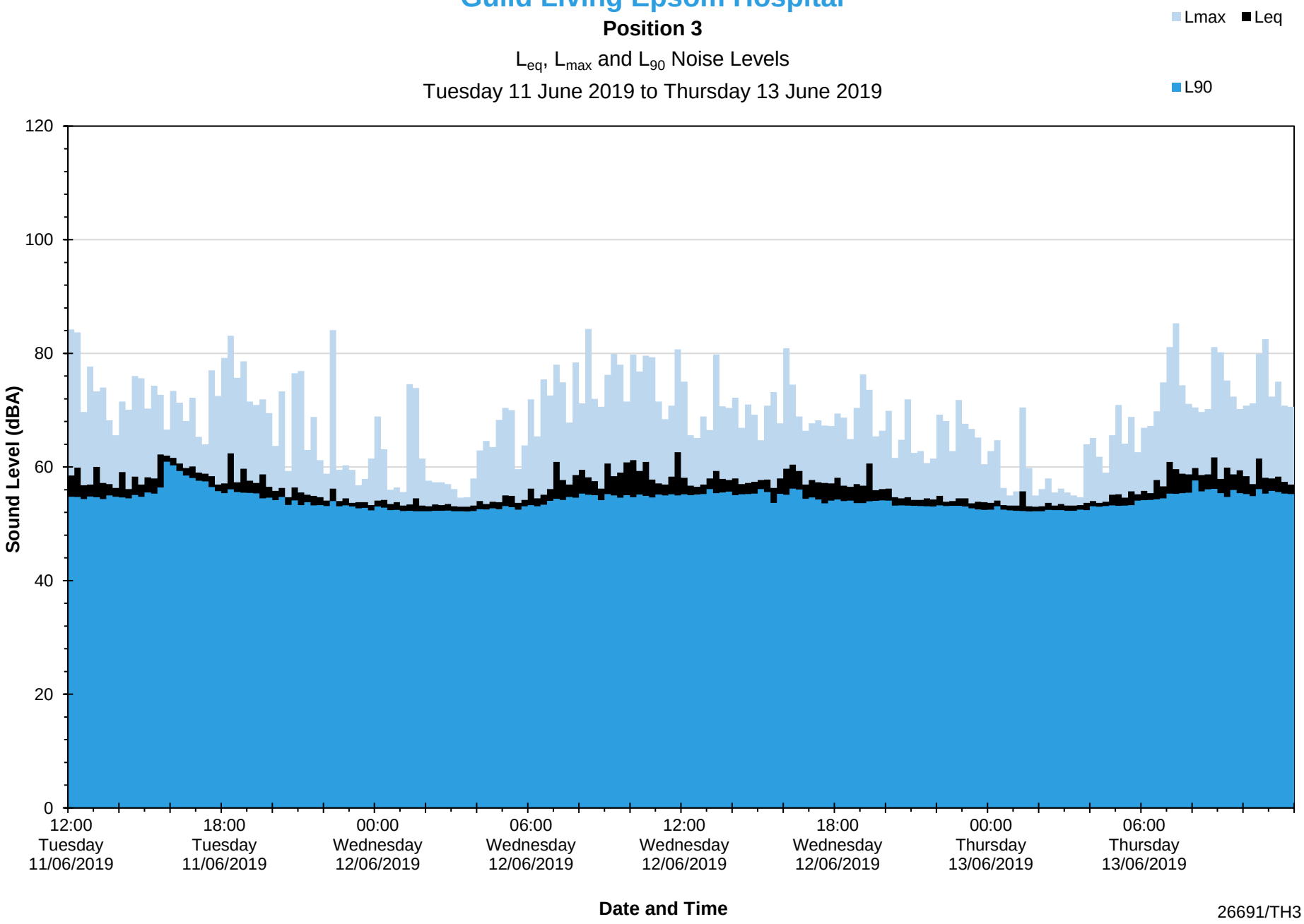

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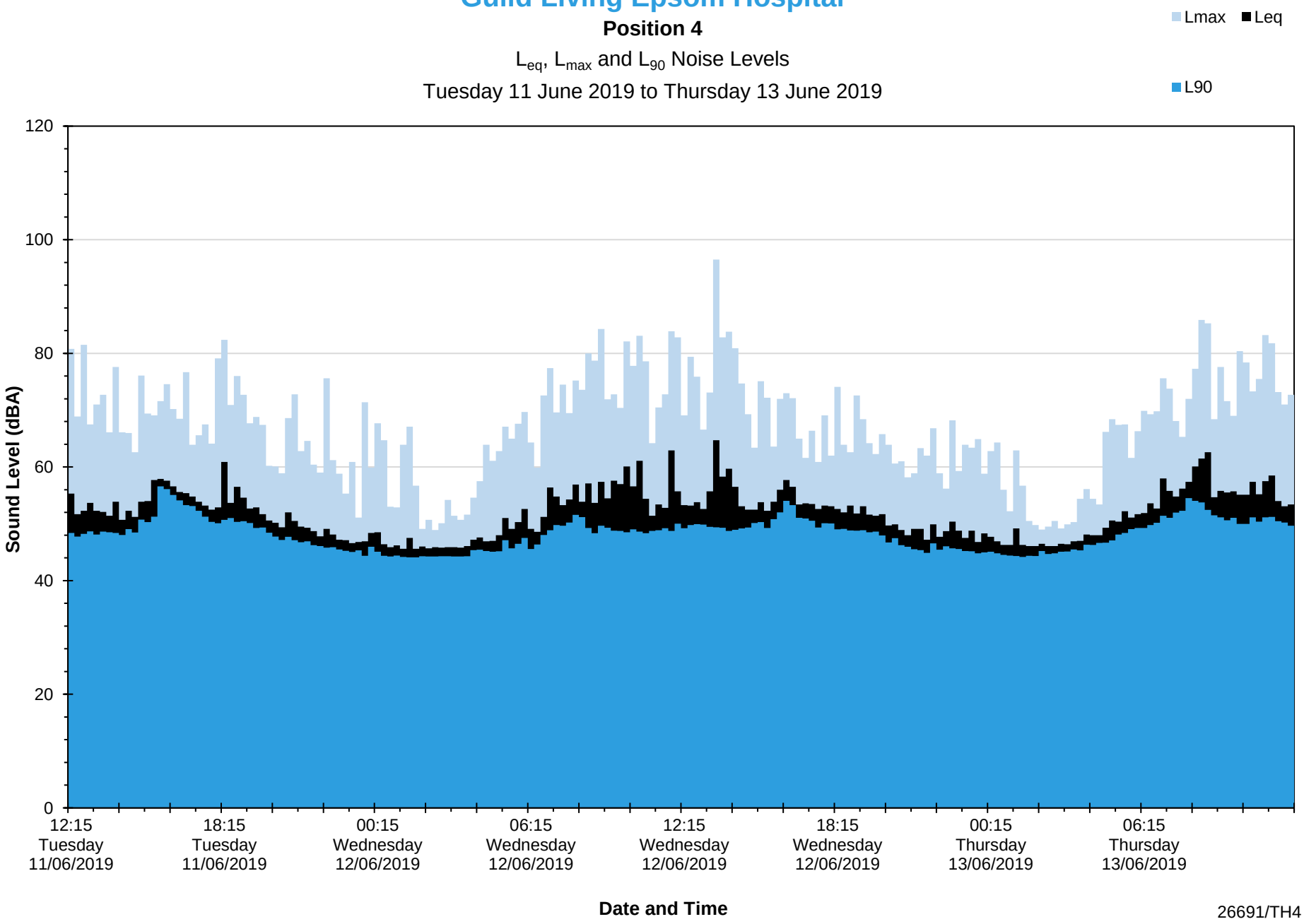
Position 4

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

Tuesday 11 June 2019 to Thursday 13 June 2019



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