



PREPARED: Wednesday, 22 March 2023

HAMPSHIRE HOUSE, CHANDLER'S FORD PLANNING COMPLIANCE REPORT

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LIST OF ATTACHMENTS

ASI2959/SP1	Indicative Site Plan
ASI2959/TH1	Environmental Sound Time Histories (MP1)
ASI2959/TH2	Environmental Sound Time Histories (MP2)
APPENDIX A	Acoustic Terminology
APPENDIX B	Acoustic Calculations

Project Ref:	ASI2959	Title:	Hampshire House, Chandler's Ford
Report Ref:	ASI2959.230322.PCR	Title:	Planning Compliance Report
Client Name:	Krypton Building Services		
Project Manager:	Alec Korchev		
Report Author:	Alec Korchev		
Clarke Saunders Acoustics Winchester SO22 5BE		This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.	

1.0 INTRODUCTION

- 1.1 Planning approval is being sought for the installation of new building services plant and an emergency generator serving a commercial building at Hampshire House, Chandler's Ford, SO53 3RY.
- 1.2 Clarke Saunders Acoustics has been commissioned by Krypton Building Services to conduct a sound assessment of the new plant in accordance with the planning requirements of Eastleigh Borough Council.
- 1.3 This report describes the assessment undertaken, including calculations, and its findings.
- 1.4 A glossary relevant to the terminology used in this report is presented in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 New building services plant is to be installed externally at ground floor level of the Site. Two condensing units and an emergency generator are intended to serve the commercial building. The condensing units are proposed to operate during office hours only (08:00 to 18:00 hrs) whilst the emergency generator is proposed to only operate in the event of a total power failure. In this scenario, the generator will operate continuously until power is restored. Regular testing of the generator will be conducted for up to two hours, once a month, during office hours.
- 2.2 The Site is located in Hampshire Corporate Park, in Chandler's Ford, Eastleigh. It is bound by Bournemouth Road to the east, Templars Way to the north, and by the remainder of Hampshire Corporate Park to the west and south. Following an inspection of the Site, the nearest and most affected sound sensitive premises are identified as residences along Conway Close, circa 200m to the northwest of the proposed plant location. These are shown in the attached indicative site plan AS12959/SP1.

3.0 LOCAL AUTHORITY REQUIREMENTS

- 3.1 Following discussions with Jon Pyke, Pollution Control Officer for Eastleigh Borough Council, it has been advised that an appropriate fixed plant sound emission criterion would be based on the predicted level being 10dB below the existing background sound pressure level when assessed at the nearest sound sensitive receptor.
- 3.2 No fixed criterion has been set for operational levels for the emergency generator, but rather a contextual discussion on the likelihood and regularity of impact has been advised.
- 3.3 Assessment of noise impacting nearby commercial receptors, is also to follow a contextual discussion on the impact on the facilities and amenity spaces, based on the actual and intended uses of the premises has been advised.

4.0 SURVEY PROCEDURE & EQUIPMENT

- 4.1 A survey of the background sound levels was undertaken at the locations shown in the attached site plan AS12959/SP1.
- 4.2 Measurements of consecutive 5-minute sound pressure levels, over various parameters were taken between 12:00 hours on Thursday 2 March and 11:00 hours on Thursday 9 March 2023.

- 4.3 The calibration of the sound monitoring equipment was verified before and after use. No significant calibration drift was detected.
- 4.4 The weather during the survey was generally dry with light winds which made the conditions suitable for environmental sound measurements. Weather records show periods of rainfall during the survey. These periods are shown in grey in the attached time histories and have been excluded from the assessment.
- 4.5 Measurements were made following procedures in BS 7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use*.

5.0 RESULTS & PLANT SOUND LIMITS

- 5.1 Figures ASI2959/TH1 and ASI2959 TH2 show the sound pressure levels as time histories logged at the survey positions.
- 5.2 The existing sound climate is determined by road traffic sound from the local road network, and local plant sound from the existing plant area influencing MP2 only.
- 5.3 The measured minimum background and average sound levels from the survey are shown in Table 1. Typical background sound levels are derived from the lowest 10th percentile of the data set.

MONITORING PERIOD	MP1 (CONWAY CLOSE)		MP2 (HAMPSHIRE HOUSE)	
	BACKGROUND L _{A90, 5MIN}	AVERAGE L _{Aeq, T}	BACKGROUND L _{A90, 5MIN}	AVERAGE L _{Aeq, T}
Daytime hours (07:00 to 23:00)	39 dB	58 dB	52 dB	61 dB
Night-time hours (23:00 to 07:00)	34 dB	50 dB	44 dB	58 dB
Office hours (08:00 to 18:00)	49 dB	61 dB	58 dB	67 dB

Table 1: Measured typical background and average sound levels [dB re. 20µPa]

- 5.4 Tonal sound is not expected from the selected plant units. The specific sound level that should not be exceeded at the nearest residential sound sensitive receptor should, therefore, be set to the proposed levels detailed in Table 2.

DAYTIME (07:00 TO 23:00 HOURS)	NIGHT-TIME (23:00 TO 07:00 HOURS)	OFFICE HOURS (08:00 TO 18:00 HOURS)
L _{Aeq} 29 dB	L _{Aeq} 24 dB	L _{Aeq} 39 dB

Table 2: Proposed sound limiting criteria at nearest residential property [dB ref. 20µPa]

6.0 PREDICTED SOUND IMPACT

6.1 PROPOSED PLANT

6.1.1 The proposed plant will be located at ground floor level on the southeast elevation of the Site. The selected plant to be installed has been confirmed as follows:

- 2 no. Samsung AM120AXVGGR condensing units; and
- 1 no. Kipor KF50 33KVA KDE37S generator.

6.1.2 The location of the plant area is shown in site plan ASI2959/SP1.

6.1.3 Sound levels for each unit have been confirmed by the manufacturer and are presented in Table 3.

PLANT ITEM	SOUND LEVEL
Samsung AM120AXVGGR	L _{W,A} 81 dB
Kipor KF50 33KVA KDE37S	L _{p,1 m} 72 dB

Table 3: Source plant sound data

6.2 PREDICTED SOUND LEVELS AT RESIDENTIAL RECEPTORS

6.2.1 Initial calculations indicate that the sound pressure levels predicted at the nearest receptor comply with the stated limits. This assumes that the two condensing units operate continuously during the assessment period and allows for contributions from the generator during typical testing conditions.

6.2.2 The overall prediction to the nearest residential premises is given in Table 4.

RECEPTOR	ASSESSMENT PERIOD	PREDICTED SOUND PRESSURE LEVEL	CRITERION
Conway Close	Office hours (08:00 to 18:00)	31 dBA	39 dBA

Table 4: Predicted sound levels at the nearest receptor

6.2.3 A summary of the calculations is presented in Appendix B.

6.3 PREDICTED SOUND LEVELS AT COMMERCIAL RECEPTORS

6.3.1 Several commercial premises are located in the vicinity of the proposed development. These include an ASDA petrol station and Wimpey Templars House. The ASDA petrol station has been excluded from this assessment in favour of the assumed office premises at Wimpey Templars House which represent a higher sensitivity use case.

6.3.2 Calculations show that sound levels, during these conditions will be circa 35 dBA at Wimpey Templars House. Historical CSA survey data along Bournemouth Road measured in 2019 has been referred to for context. This suggests that background sound pressure levels in the vicinity of Wimpey Templars House are in the order of circa $\geq L_{A90}$ 50 dB and highly affected by road traffic sound from Bournemouth Road. In this context, no impact is anticipated.

6.4 PREDICTED SOUND LEVELS DURING EMERGENCY CONDITIONS

- 6.4.1 Sound levels at the nearest residential and commercial premises have been predicted during emergency conditions, in effect only during a total power failure.
- 6.4.2 Calculations show that sound levels, during emergency conditions, will be circa 25 dBA at the nearest residential receptors at Conway Close. As the generator would likely operate continuously under these conditions, the predicted level has been compared to the typical background sound pressure level during night-time periods, 34 dBA.
- 6.4.3 Predicted sound levels would therefore be circa 9 dB below the typical background sound pressure levels. With reference to BS4142,¹ this is an indication of the plant having a low impact on nearby residential receptors, depending on context.
- 6.4.4 The emergency generator is only proposed to operate in the event of a total power failure in order to support laboratory equipment in Hampshire House. The likelihood of this occurring is expected to be consistent with the failure rate of the UK Power Network in this region.

7.0 UNCERTAINTY

- 7.1 For this robust assessment, and to demonstrate best practicable means for the scheme, the uncertainty in the assessment is considered and reported. This is not an indication of error but an acknowledgment of possible variability of the factors contributing to the assessment.
- 7.2 Measurements were taken at an acoustically equivalent location to the assessment position. This therefore represents a robust assessment of the background sound climate.
- 7.3 Any estimates or judgments required in selection of input data for the calculations on which this assessment is based erred on the side of caution, making pessimistic assumptions and choices, favouring sound power levels over sound pressure levels (where possible). This does not reduce uncertainty per se, but makes the conclusions below suitably robust.
- 7.4 Some screening is present between the source and receivers, however given the complexity in the screening no corrections have been included in the calculations. Though screening would be limited, it is expected that in-situ sound levels would be lower than those predicted within this assessment.

8.0 CONCLUSIONS

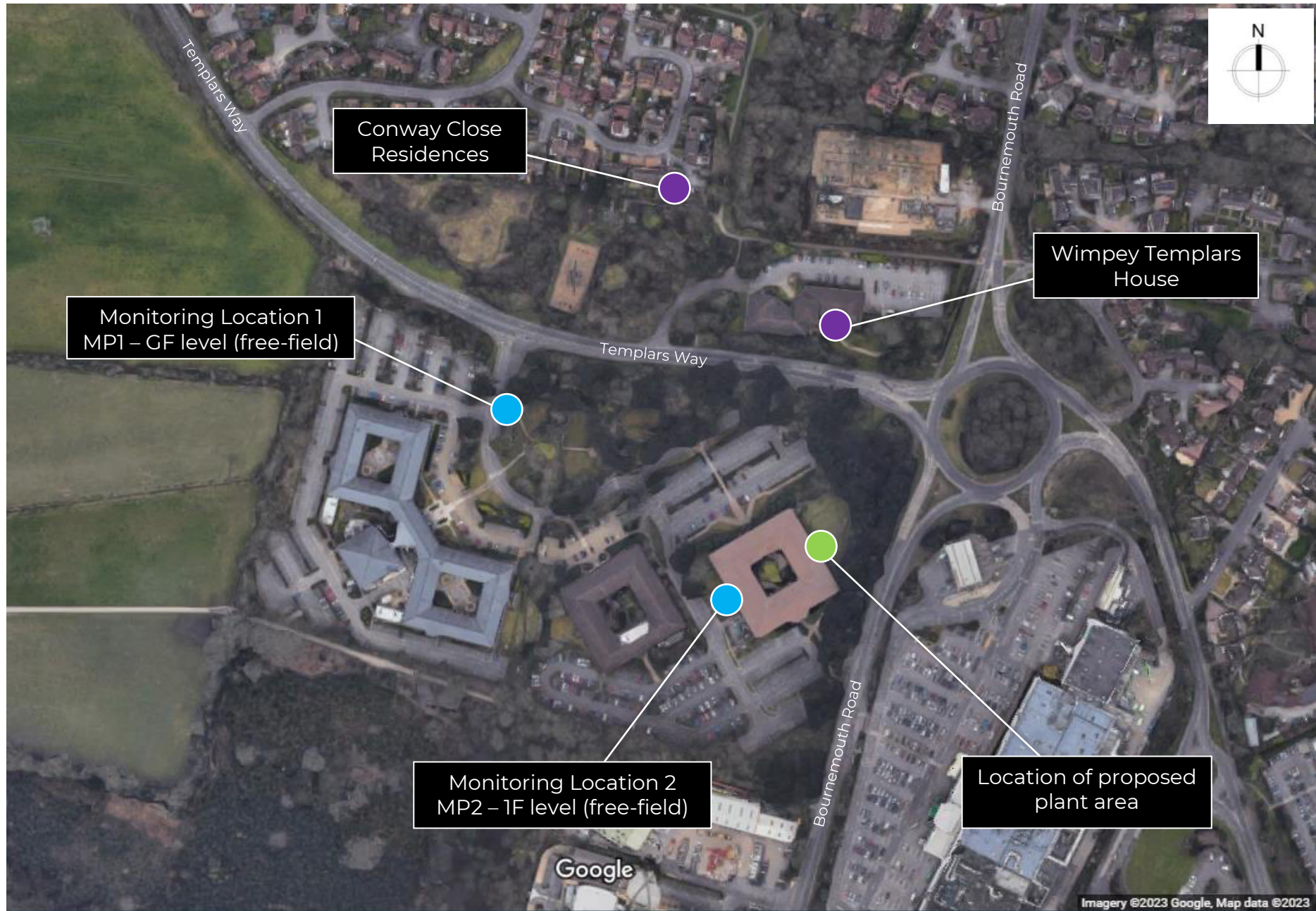
- 8.1 A sound assessment has been undertaken by Clarke Saunders Acoustics for the installation of new building services plant proposed at Hampshire House, Chandler's Ford.
- 8.2 Results of an environmental sound survey have established the current background sound climate, which has enabled limiting criteria to be set for the control of plant sound emissions to sensitive properties in accordance with the planning requirements of Eastleigh Borough Council.

¹ BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

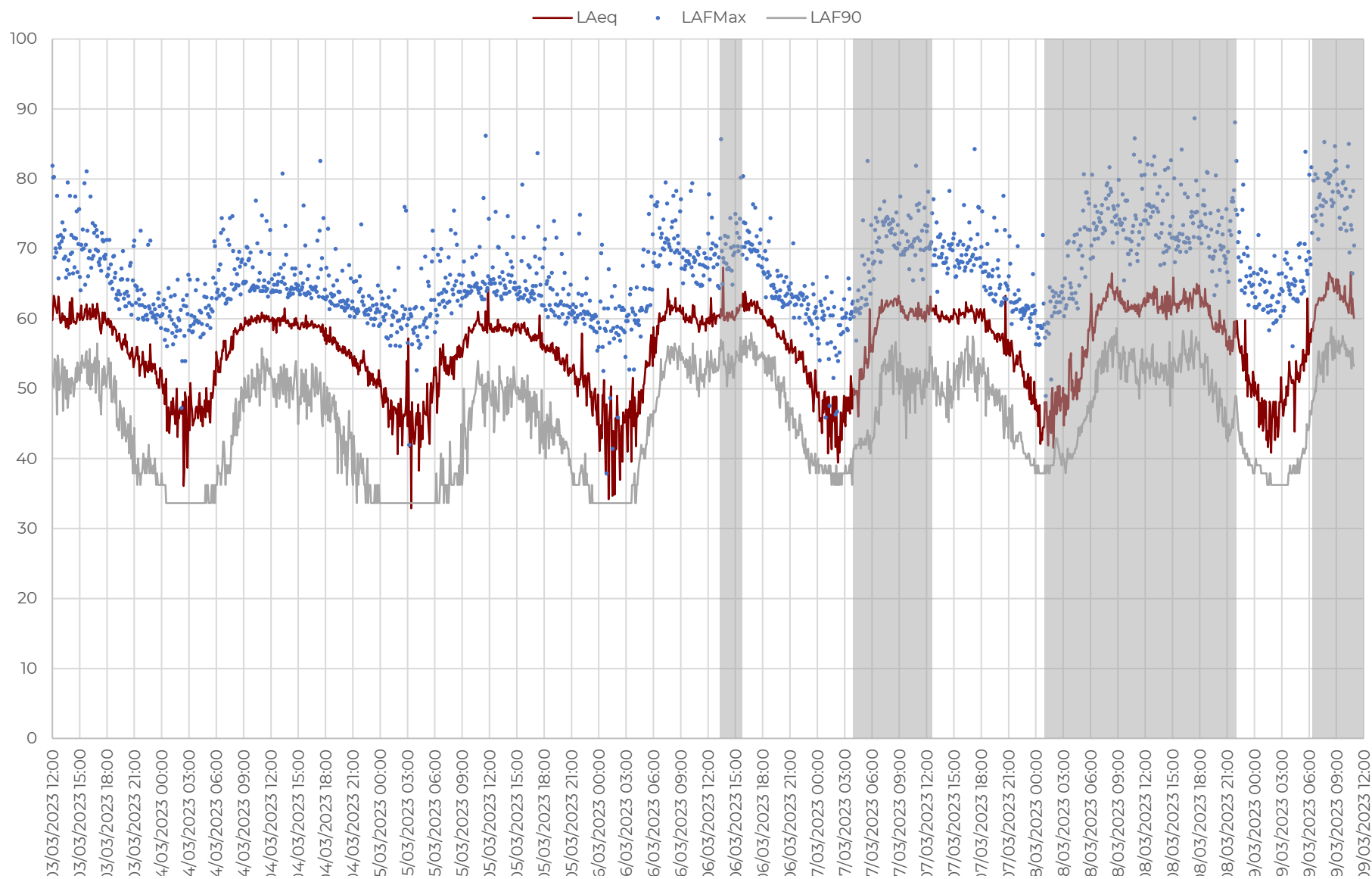
- 8.3 Data for the proposed Saumsung condensing units and Kipor generator has been used to predict the sound impact of the new plant on neighbouring properties.
- 8.4 Compliance with the requirements of Eastleigh Borough Council have been demonstrated for residential receptors and no further mitigation is required on this basis.
- 8.5 Impact on nearby commercial receptors has been considered. Predicted sound levels are expected to be over 10dB lower than the existing background and therefore unlikely to cause adverse impact.
- 8.6 Impact during emergency operation has been considered. The results of the calculations indicate a low impact for residential receptors during night-time hours.



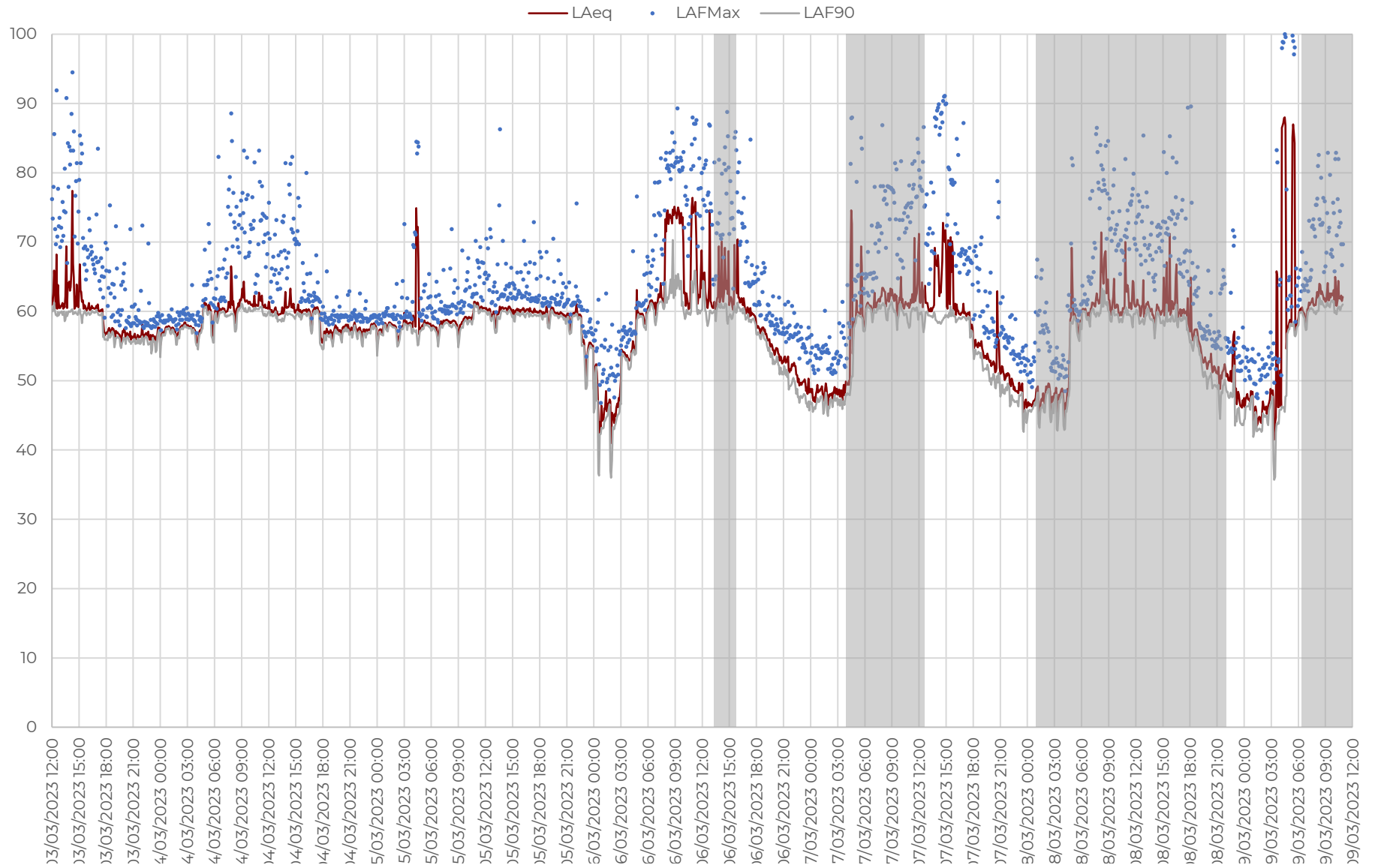
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CLARKE SAUNDERS ACOUSTICS



Hampshire House, Chandler's Ford
Environmental Sound Time History
Measurement Position 1
Figure AS12959/TH1



Hampshire House, Chandler's Ford
Environmental Sound Time History
Measurement Position 2
Figure AS12959/TH2



Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A .
L_{eq}:	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90}:	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max}:	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band.

APPENDIX A

ACOUSTIC TERMINOLOGY AND HUMAN RESPONSE TO BROADBAND SOUND

In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

APPENDIX B
AS12959 Hampshire House, Chandler's Ford
PLANT SOUND CALCULATIONS

Plant sound to Conway Close (Office Hours)		dB(A)
<u>VRF Units</u>		
Samsung AM120AXVGGR / EU (Single Figure)	LwA	81
Lw to Lp @ 1m	Q = 2	-8
Number of	2no	3
Distance Loss	217m	-47
	Subtotal	29
<u>Generator</u>		
Kipor KF50 33KVA KDE37S (Single Figure)	Lp @ 1m	72
Distance Loss	217m	-47
	Subtotal	25
Specific sound level at receptor $L_{eq\ 1hr}$		31
Plant sound limiting criteria		≤ 39

Plant sound to Wimpey Templars House (Office Hours)		dB(A)
<u>VRF Units</u>		
Samsung AM120AXVGGR / EU (Single Figure)	LwA	81
Lw to Lp @ 1m	Q = 2	-8
Number of	2no	3
Distance Loss	125m	-42
	Subtotal	34
<u>Generator</u>		
Kipor KF50 33KVA KDE37S (Single Figure)	Lp @ 1m	72
Distance Loss	125m	-42
	Subtotal	30
Specific sound level at receptor $L_{eq\ 1hr}$		36
Typical background sound pressure level		≥ 50

Plant sound to Conway Close (Emergency - night-time)		dB(A)
<u>Generator</u>		
Kipor KF50 33KVA KDE37S (Single Figure)	Lp @ 1m	72
Distance Loss	217m	-47
	Subtotal	25
Specific sound level at receptor $L_{eq\ 1hr}$		25
Typical background sound pressure level		34