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## ANNEX 1: INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the  $L_{A10}$ , the noise level exceeded for 10% of the measurement period. The  $L_{A90}$  is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level,  $L_{Aeq}$ . This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as  $L_{A90(1hour)}$  and  $L_{A90(5mins)}$ . The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

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## ANNEX 2: GLOSSARY OF TERMS

Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds $s_1$ and $s_2$ is given by $20 \log_{10} (s_1/s_2)$ . The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$ .
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period $T$ . This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,F}$	A noise level index defined as the maximum noise level during the period $T$ . $L_{max}$ is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall $L_{eq}$ noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period $T$ . $L_{90}$ can be considered to be the 'average minimum' noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ( $L_{Aeq,T}$ ).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ( $L_{Aeq,T}$ )
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ( $L_{Aeq,T}$ )
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ( $L_{Ar,Tr}$ ).

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### ANNEX 3: LEGISLATION, POLICY AND GUIDANCE

#### National Policy: National Planning Policy Framework

1.1 The National Planning Policy Framework (NPPF) (February 2021) sets out the Government's economic, environmental and social planning policies for England. It attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

1.2 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 174:

*"Planning policies and decisions should contribute to and enhance the natural and local environment by: ...*

*preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability..."*

1.3 The NPPF goes on to state in paragraph 185 that:

*"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 potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

*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;*

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



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### Noise Policy Statement for England, 2010 (NPSE)

1.4 The NPSE seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long-term vision of Government noise policy:

1.5 "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".

1.6 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

1.7 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and

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

1.8 The NPSE extends these to the concept of a significant observed adverse effect level.

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

1.9 The NPSE notes:

*"it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".*



### Planning Practice Guidance (PPG) – Noise

- 1.10 The Government's PPG on noise provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.
- 1.11 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 1.12 The LOAEL is described in PPG as the level above which "noise starts to cause small changes in behaviour and / or attitude e.g. turning up the volume of the television, speaking more loudly, or, 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. Affects the acoustic character of the area such that there is a perceived change in the quality of life."
- 1.13 PPG identifies the SOAEL as the level above which "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."

### Acoustics Ventilation and Overheating Residential Design Guide

- 10.1 The Association of Noise Consultants' Acoustics, Ventilation and Overheating (AVO) Group produced the AVO Guide in 2020 for use by acoustics practitioners and those involved in the planning, development, design and commissioning of new dwellings.
- 10.2 The AVO Guide provides risk categories which can be used to assist designers to adopt an integrated approach to the acoustic design within the context of the ventilation and thermal comfort requirements.
- 10.3 For overheating, the AVO Guide provides thresholds where there is the potential that the noise causes a 'material change in behaviour'. The AVO Guide does not propose limits or onsets between risk categories though it does present a graphical illustration of the evolution between low, medium and high-risk categories. The AVO guidance levels are implemented as follows:



AVO Risk Category	External Noise Level, L <sub>Aeq,T</sub> dB	
	Daytime	Night-time
Negligible	< 50	< 45
Low	50 - 57	45 - 51
Medium	58 - 65	51 - 57
High	> 65	> 57

- 10.4 Based on the guidance, overheating should be considered at least for the medium and high categories. All ventilation across the development should provide adequate airflow, in compliance with Approved Document F.
- 10.5 Additionally, where windows need to remain closed to achieve the noise criteria they can still be opened for purge or rapid ventilation or indeed at the occupants' discretion.



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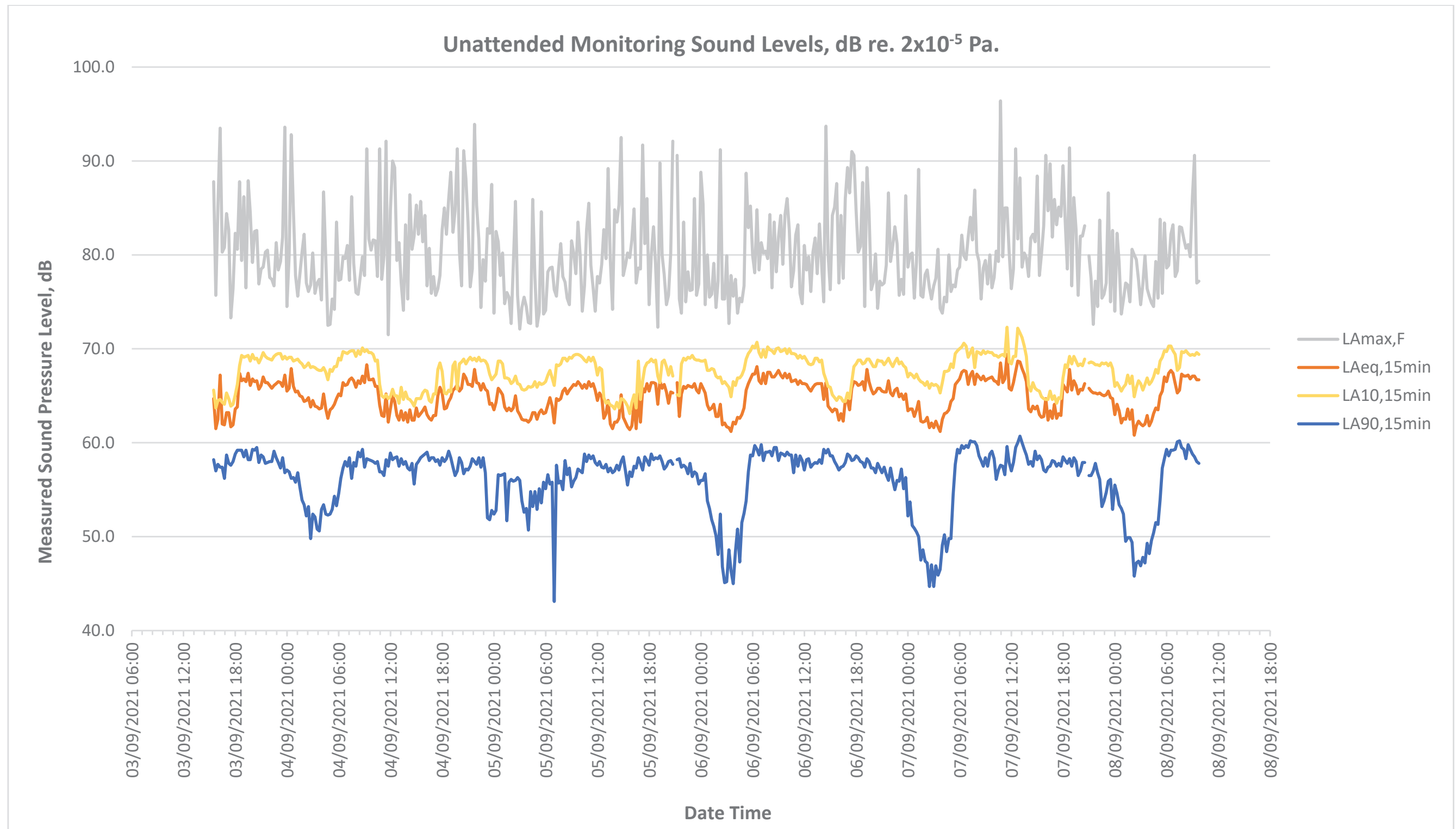
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### ANNEX 4: UNATTENDED SURVEY RESULTS – P1



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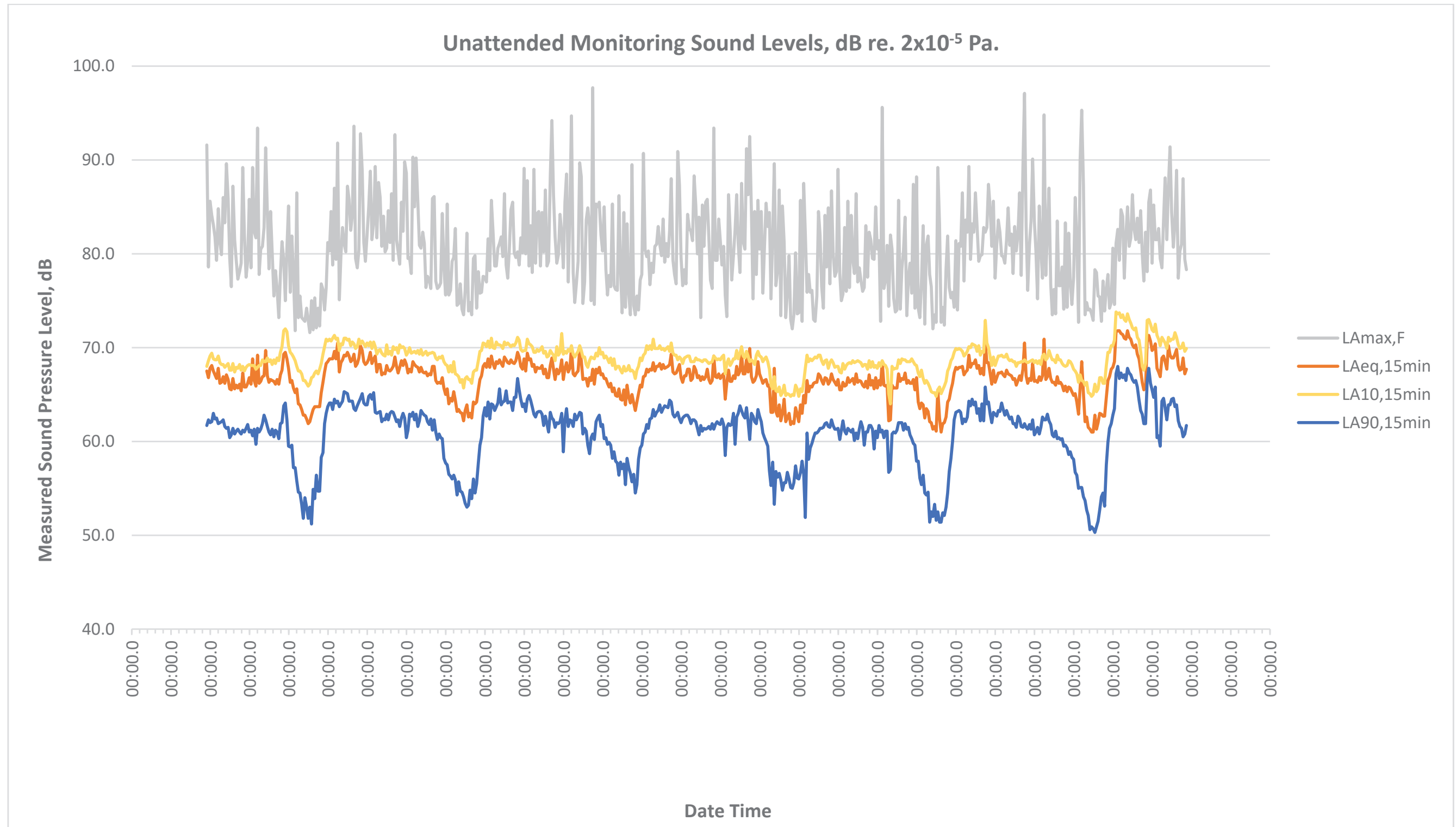
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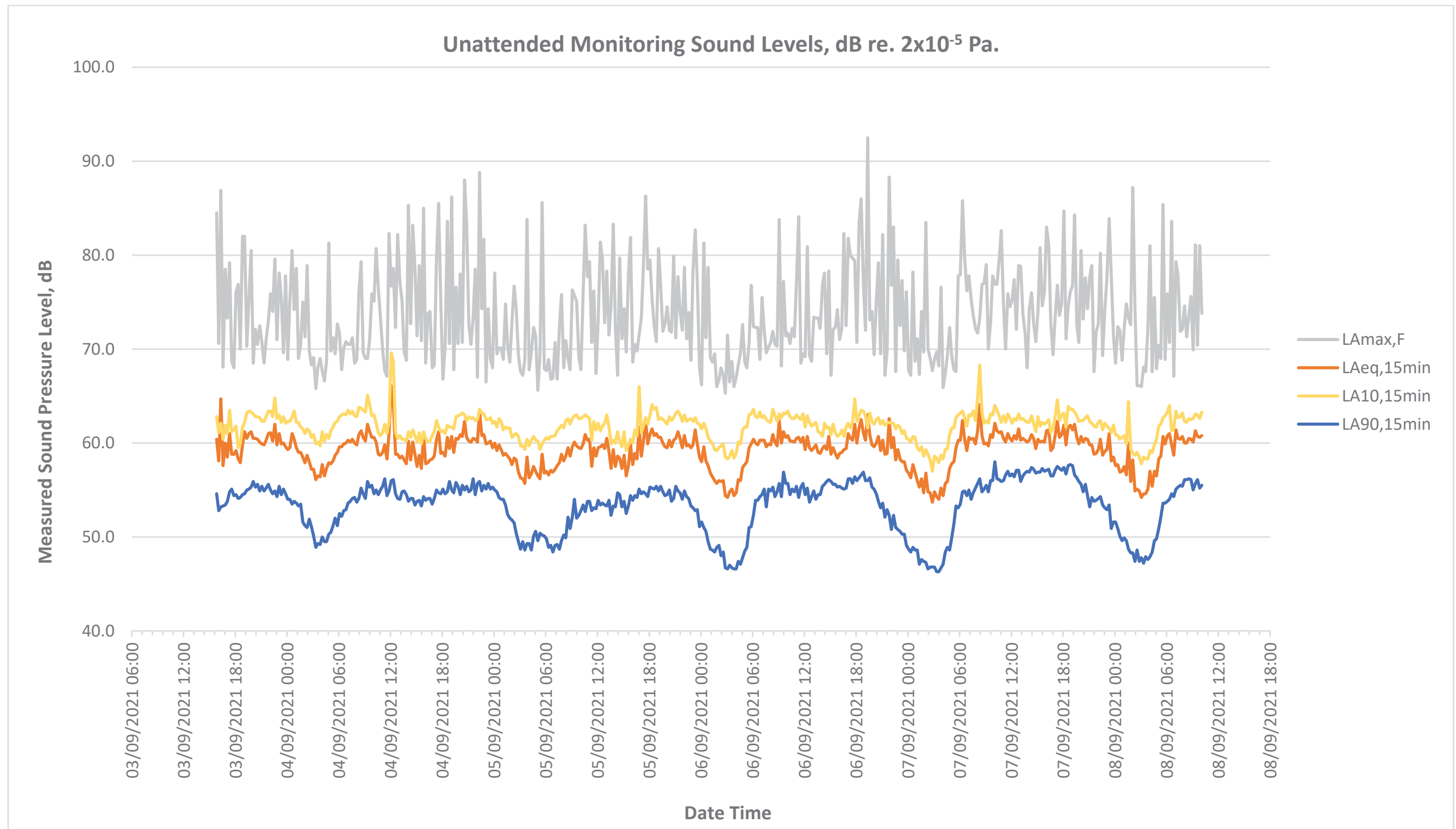
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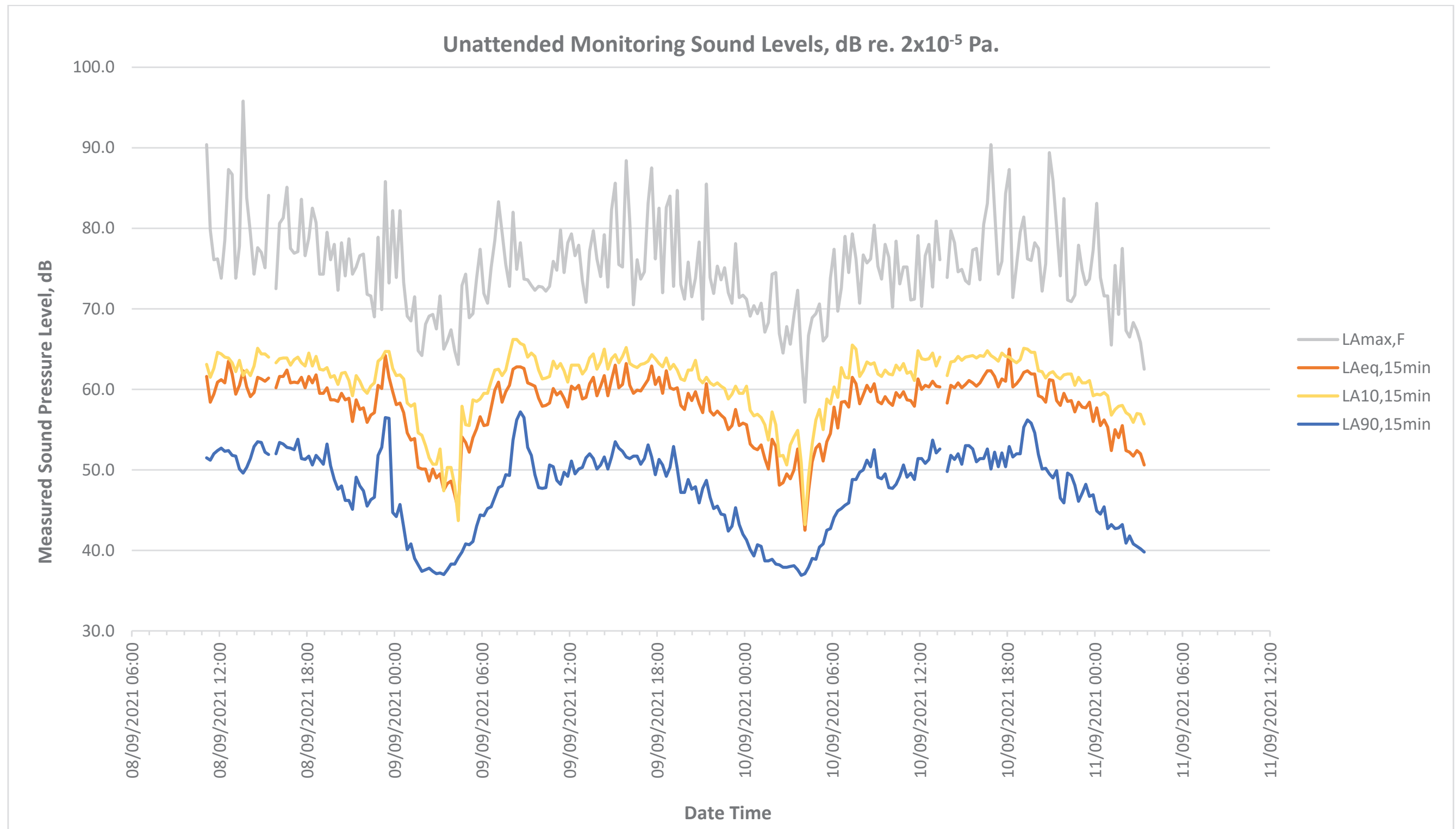
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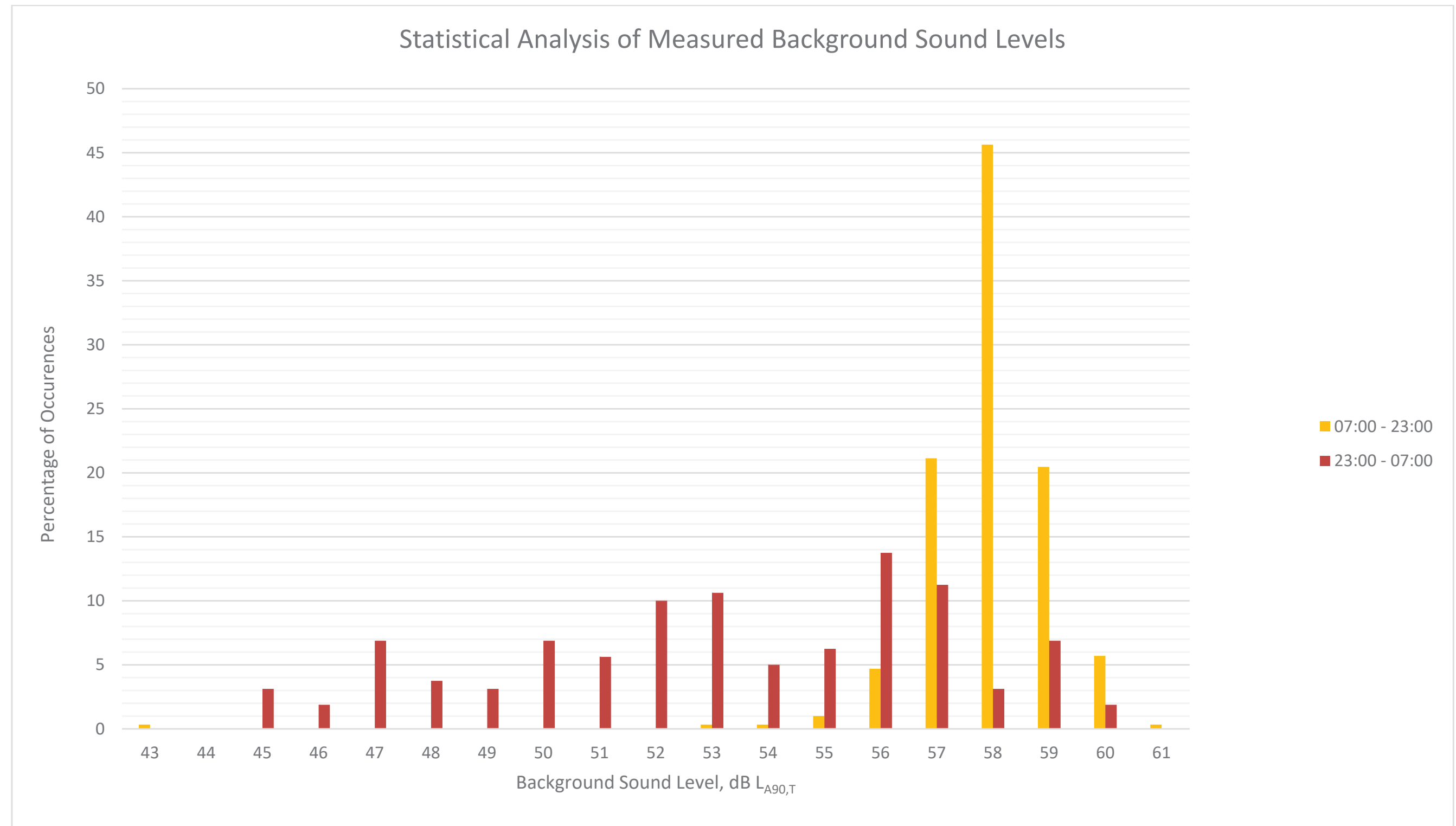
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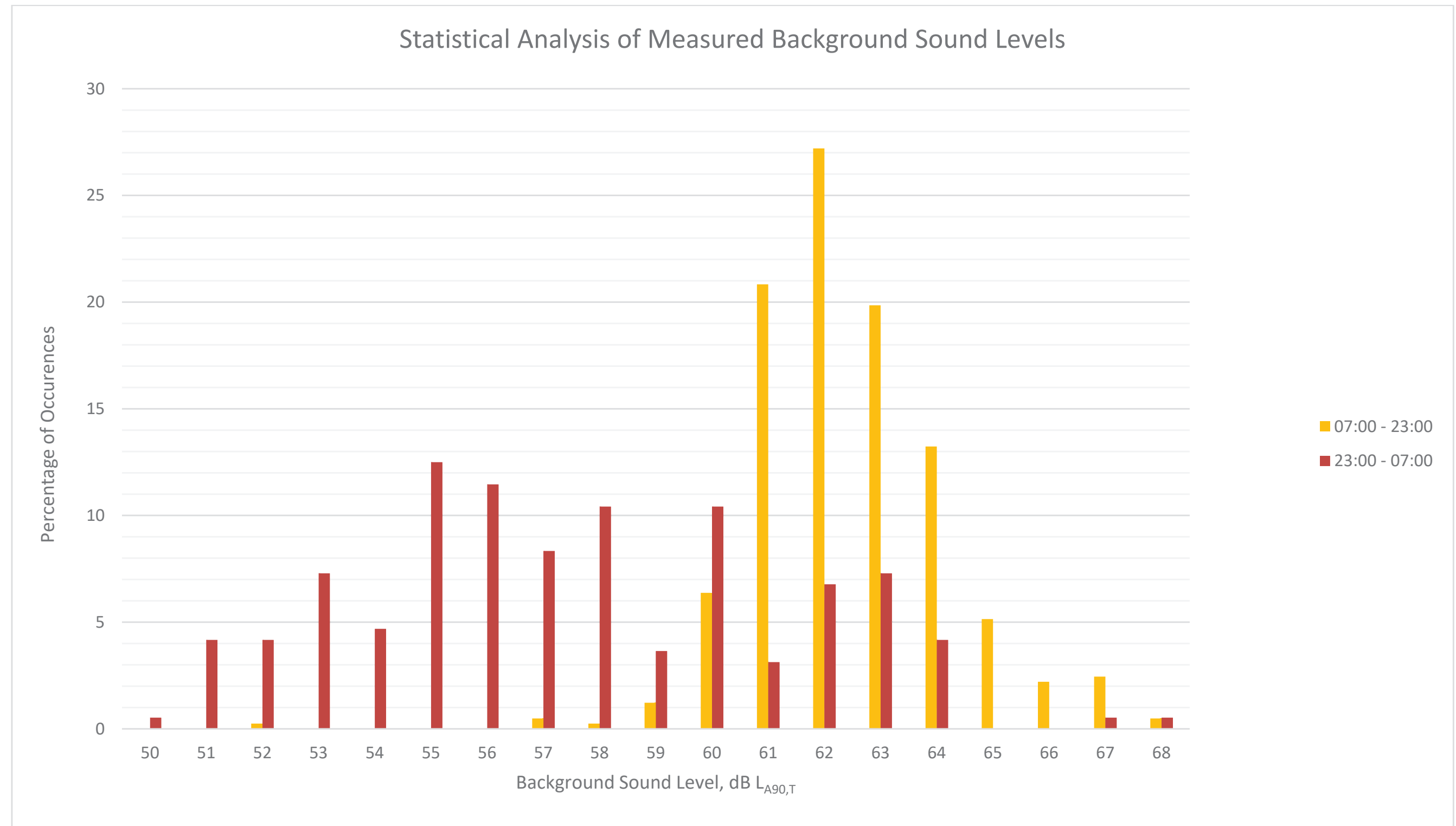
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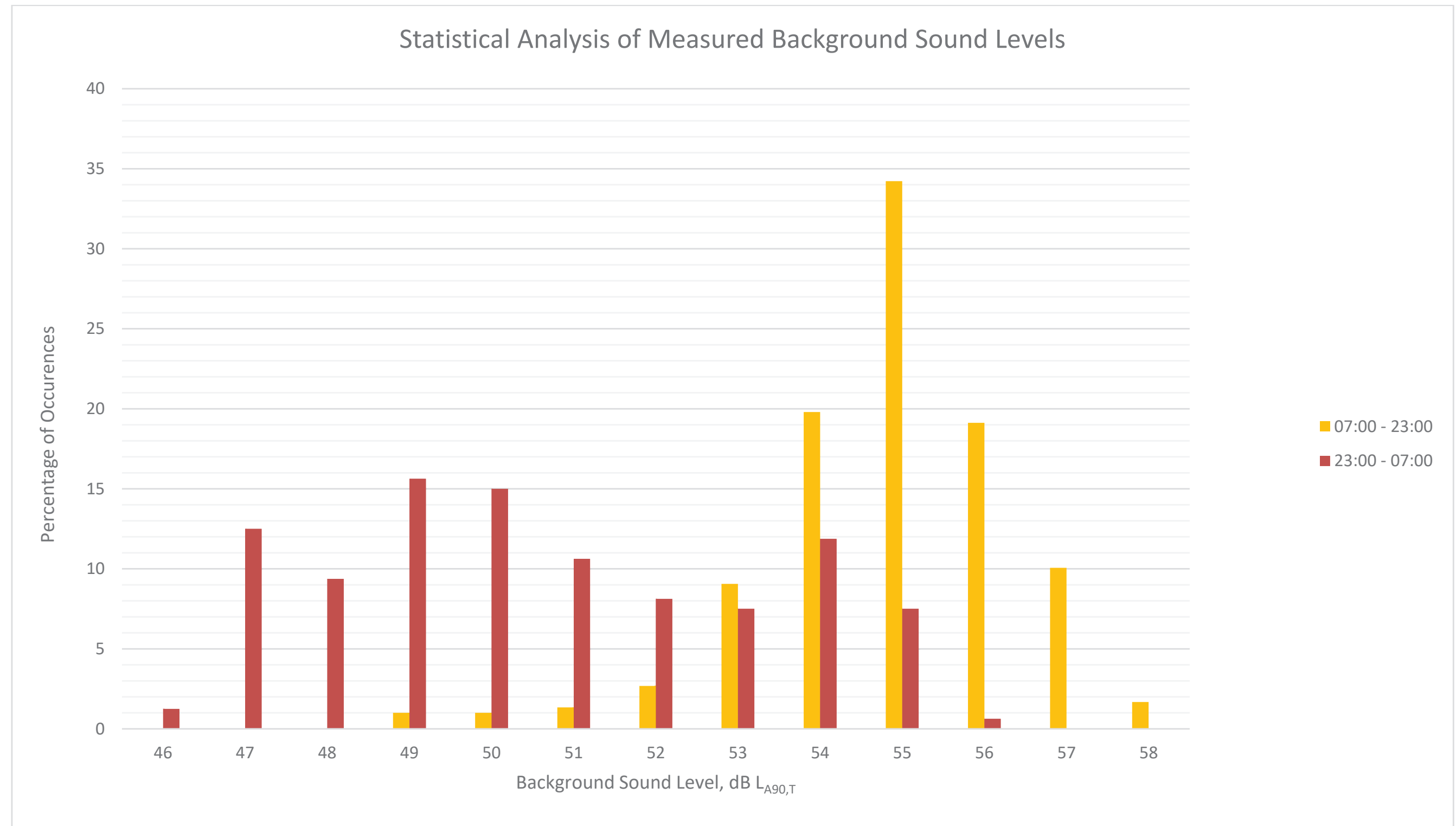
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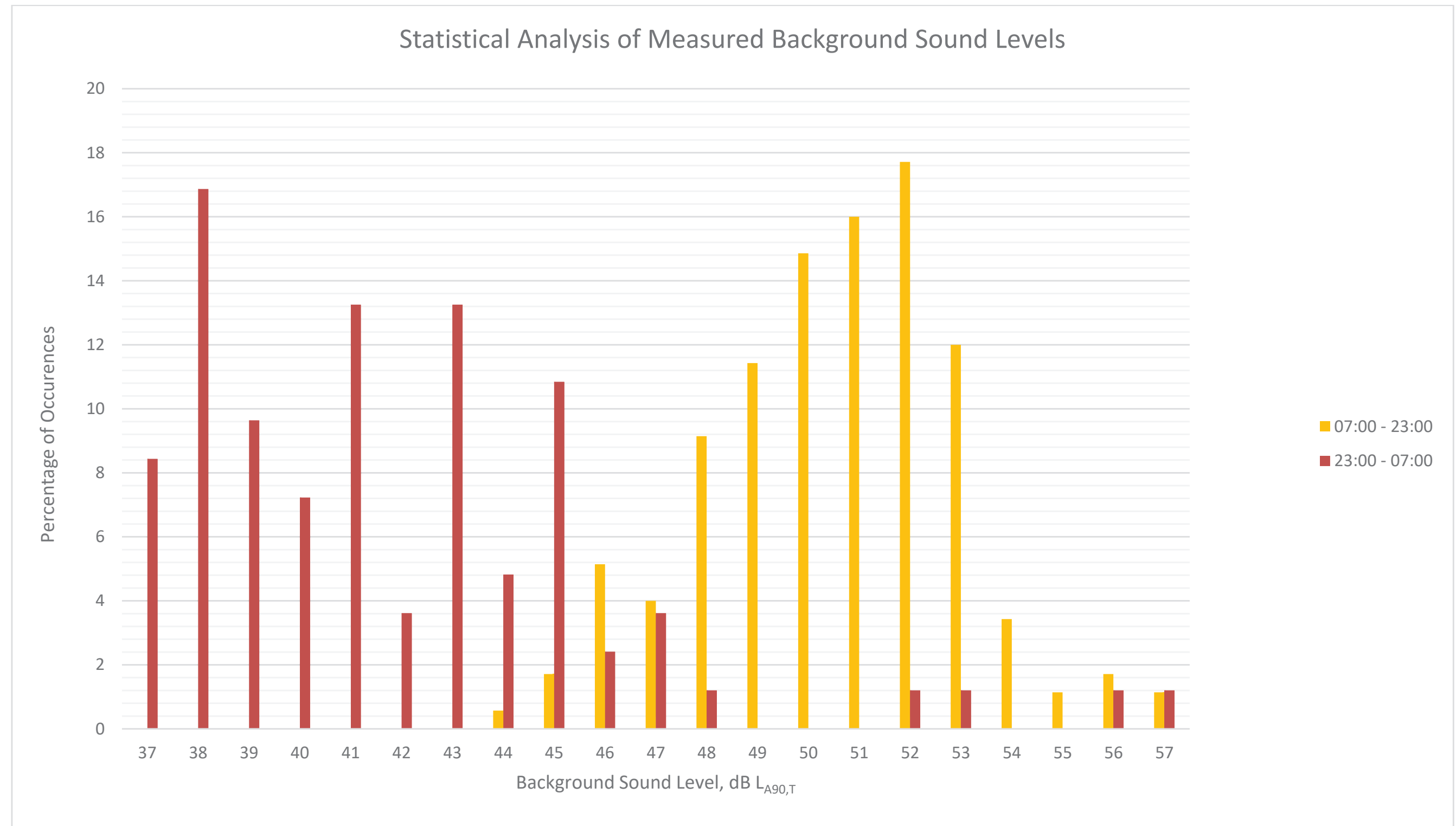
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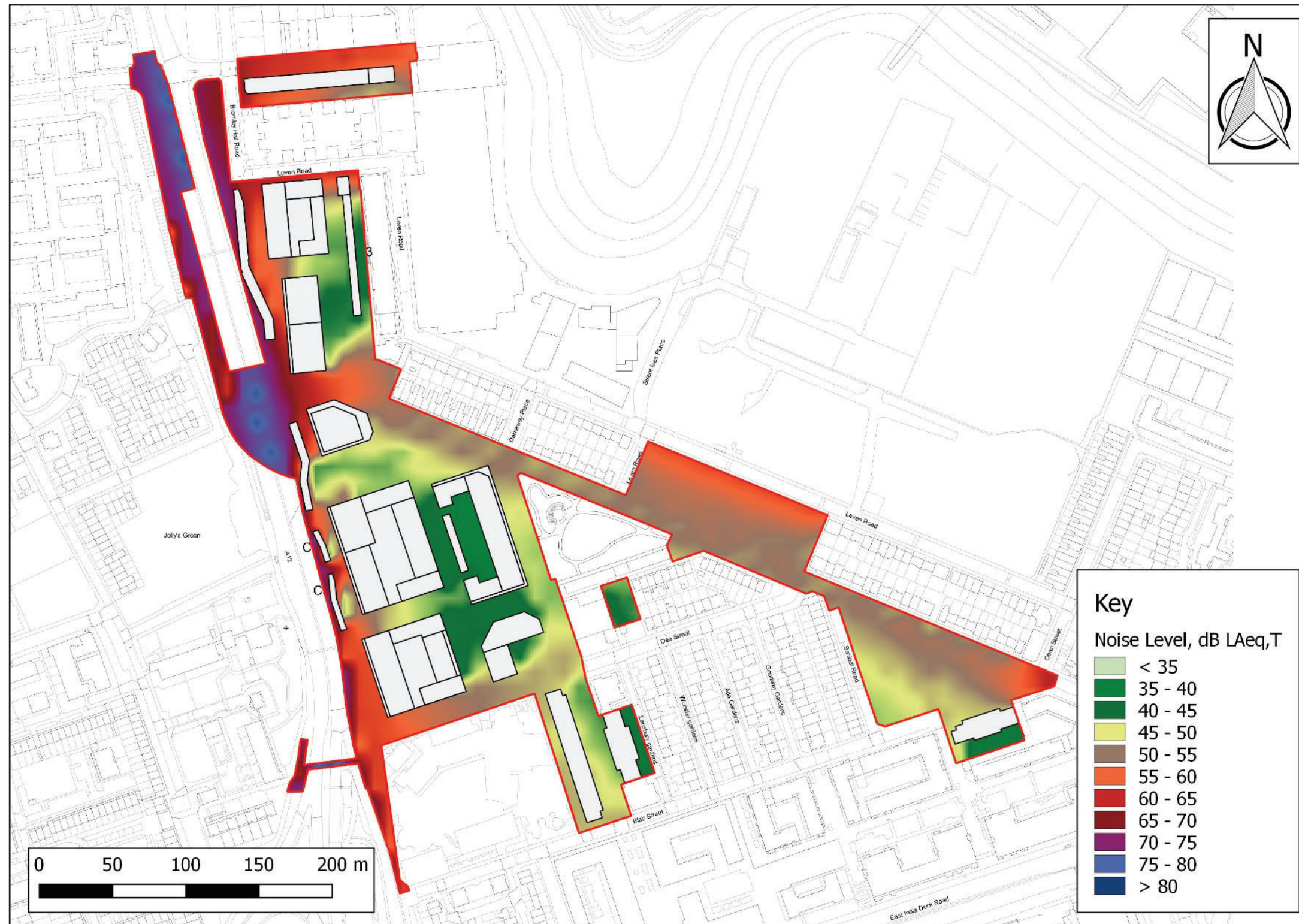
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## ANNEX 12: DAYTIME NOISE CONTOUR, 1.5M



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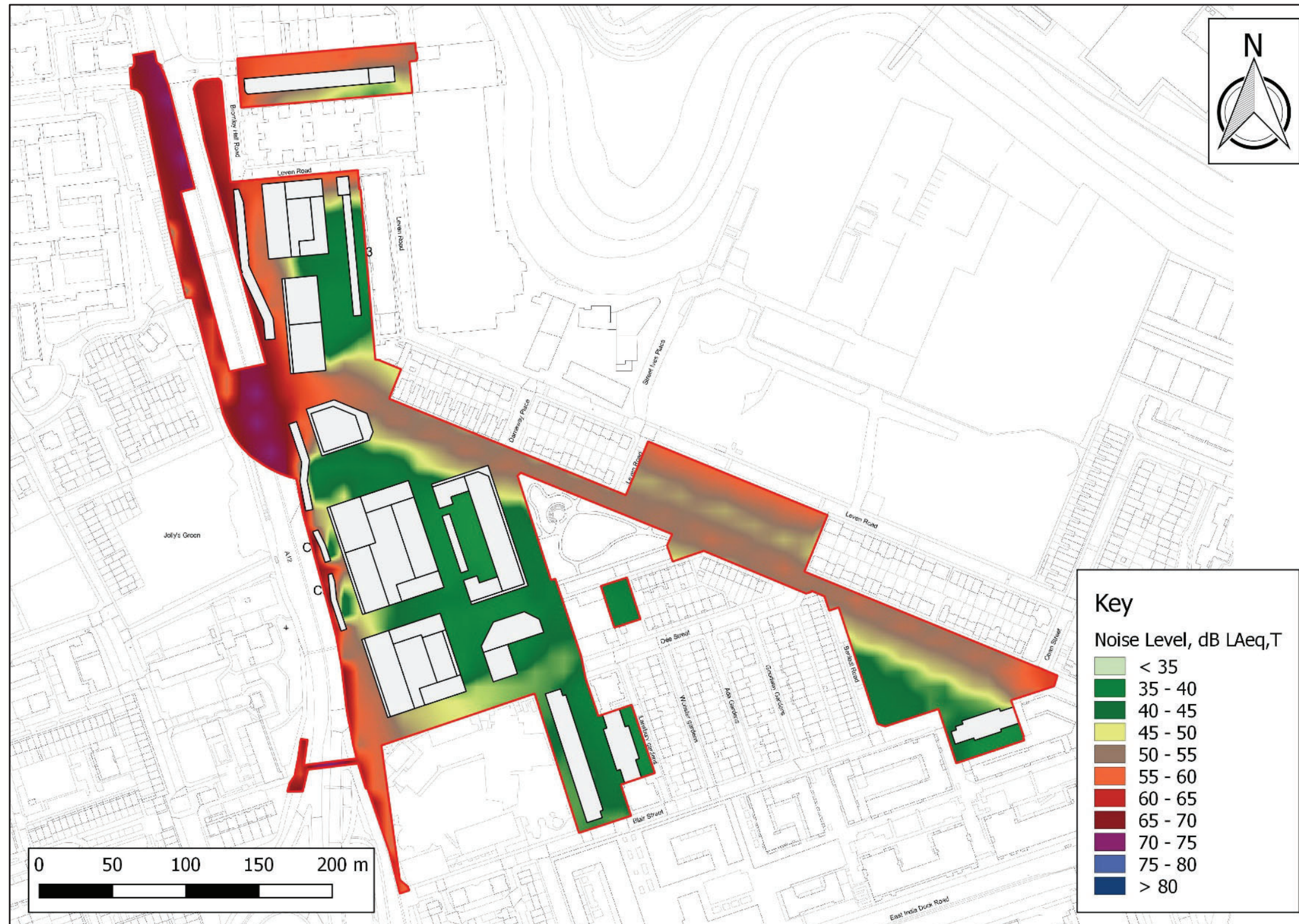
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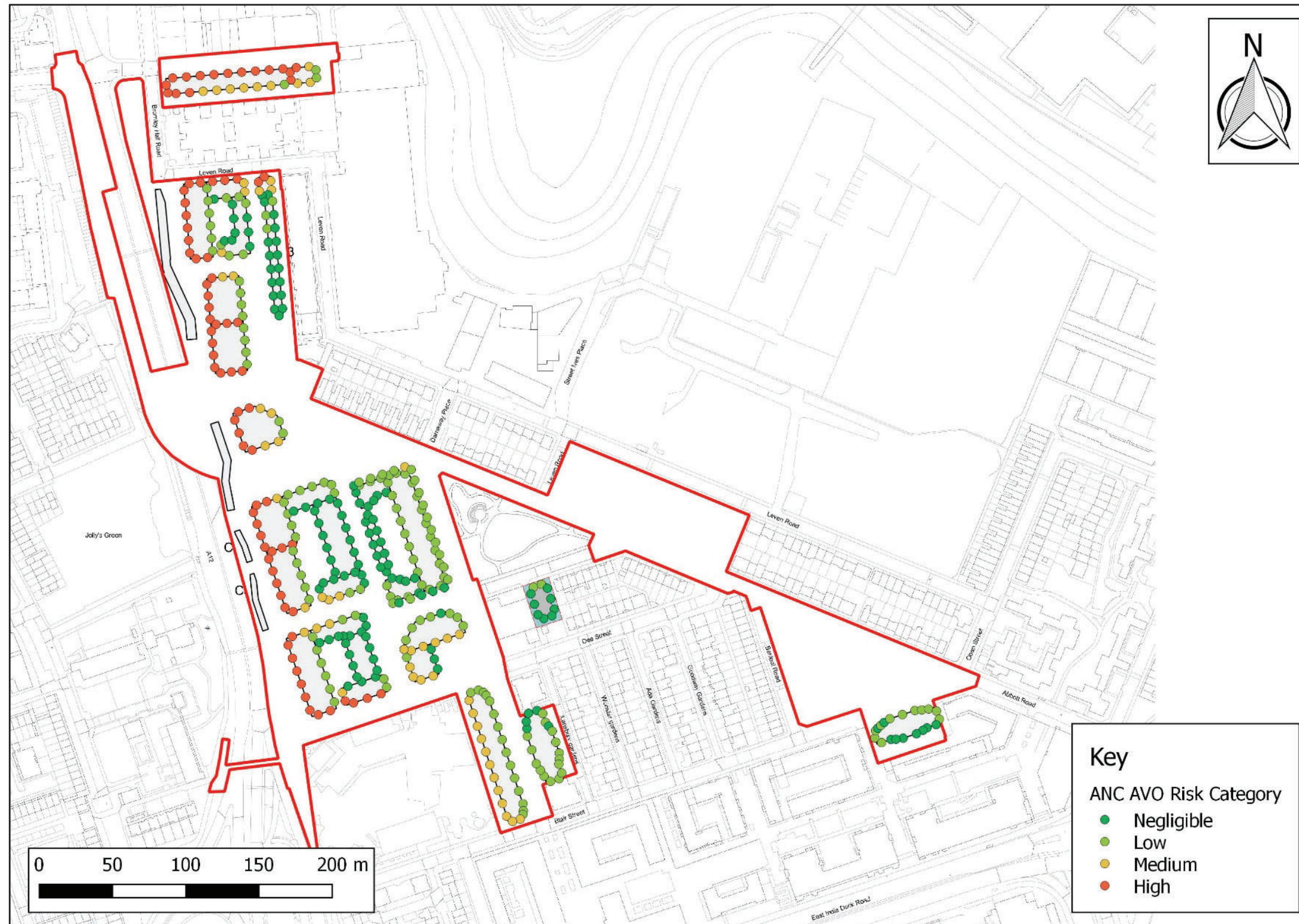
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## ANNEX 14: ANC ACOUSTICS VENTILATION AND OVERHEATING RISK CATEGORIES



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**ANNEX 15: TRAFFIC DATA**

Road Link	AAWT (2031)	
	Do Minimum	With Development
Abbott Road (East of Underpass)	6569	425
Abbott Road (East of Oban Street)	7903	5898
Leven Road	3778	4340
Oban Street	3278	4341
Bromley Hall Road	1087	1992
Lochnagar Street	2294	2847
Zetland Street	2004	1663
Abbott Road Underpass (One-Way)	4800	0
A1206 Preston's Road	21800	22004
A12 (Between Lochnagar Street and A13)	75806	77364
A12 (North of Lochnagar Street)	73080	74738
A12 On-slip from A13 (St. Leonards Road)	13896	13939
Trafalgar Way	2031	1956
Upper Bank Street	8883	8864
Poplar High Street	4368	4394
Saltwell Street	4289	4315
A1206 Cotton Street	24559	23642
A1261 Aspen Way (West of A12)	93914	93537
Blackwall Tunnell	85867	86483
Upper North Street (A13 to Cordelia Street)	5112	5225
Upper North Street (Cordelia Street to B140 St. Paul's Way)	6654	6633
B140-St. Paul's Way	10114	10326
Cordelia Street	2017	1936
Devons Road	8264	6752
Devas Street W of Purdy Street	8832	8852
Chrisp Street (South of Burcham Street)	10239	10972
Chrisp Street (North of Burcham Street)	10095	10433
Campbell Road	9263	8803
Devas Street (West of A12 junction)	4311	5953
Burcham Street/St Leonard Road	4019	4799
A13 (From A12/A13 interchange to Abbott Road)	50178	50656
A13 (West of A12/A13 interchange)	14404	14567
A1020 Leamouth Road	21215	22494
A13 (East of Leamouth Road)	25043	25050
A13 Newham Way (East of Abbott Road)	106272	105978
A1011 Silvertown Way (South of A13)	18037	18163
A12 Off-slip (St. Leonard Road from Blackwall Tunnel)	8655	8038
A102 On-slip (to Blackwall Tunnel)	7277	6866
A102 Off-slip (to A13 east and west)	11347	11885
A102 off-slip (to A13 west)	8480	7656
A102 on-slip (from A13 east)	11426	11773