Ambient Noise Survey

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Address:	106 Kings Henry's Road, Primrose Hill, London, NW3 3SL
Date:	06/11/2019

Version	1	2	3
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Executive Summary

An environmental noise survey has been undertaken at the proposed residential development at the 106 King Henry's Road, Primrose Hill, London NW3 3QR. The environmental noise survey has been requested in order to assess the current noise profile at the closest noise-sensitive receptor (NSR) to the development site pre-construction works. The results of the assessment can be found in the results summary.

1. Introduction

1.1 Overview

NOVA Acoustics Ltd has been commissioned to undertake a pre-works ambient noise level survey before the of the demolition of a mid-terrace house and the reconstruction of the house ('the Proposed Development') at 106 King Henry's Road, Primrose Hill, London NW3 3QR ('the Site').

The Applicant has submitted a full planning application 2017/6307/P ('the Application') to the local authority.

Accordingly, the following technical noise assessment has been produced to accompany the Application to the local authority.

This report details the results obtained during the ambient noise monitoring.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.2 Scope & Objectives

The scope of the noise assessment can be summarized as follows:

- Ambient sound monitoring survey to evaluate the prevailing sound levels incident on the Site;

1.3 Legislation, Policy and Guidance

This report is to be primarily based on the following legislation, policy and guidance.

- National Planning Policy Framework (2019)
- Noise Policy Statement for England
- The Environmental Protection Act, 1990
- IEMA Guidelines on Noise Impact Assessments
- ISO 9613-2 Attenuation of sound during propagation outdoors
- BS EN 12354-4 Building Acoustics

2. Site Description & Background Information

2.1 Site & Surroundings

The proposed site is located at 106 King Henry's Road, Primrose Hill, London NW3 3QR. The surrounding area is a mixture of residential developments and some minor commercial units. To the north, is a 'Co-op supermarket' which operates between 7:00 to 23:00, Monday to Sunday. Next to it, is 'Swans Dry Cleaners and Launderers' which operates between 08:00 to 18:30, Monday to Saturday. Adjacent to the south, runs 'King Henry's Road' and 'Lower Merton Rise Road', both providing medium traffic flow levels.

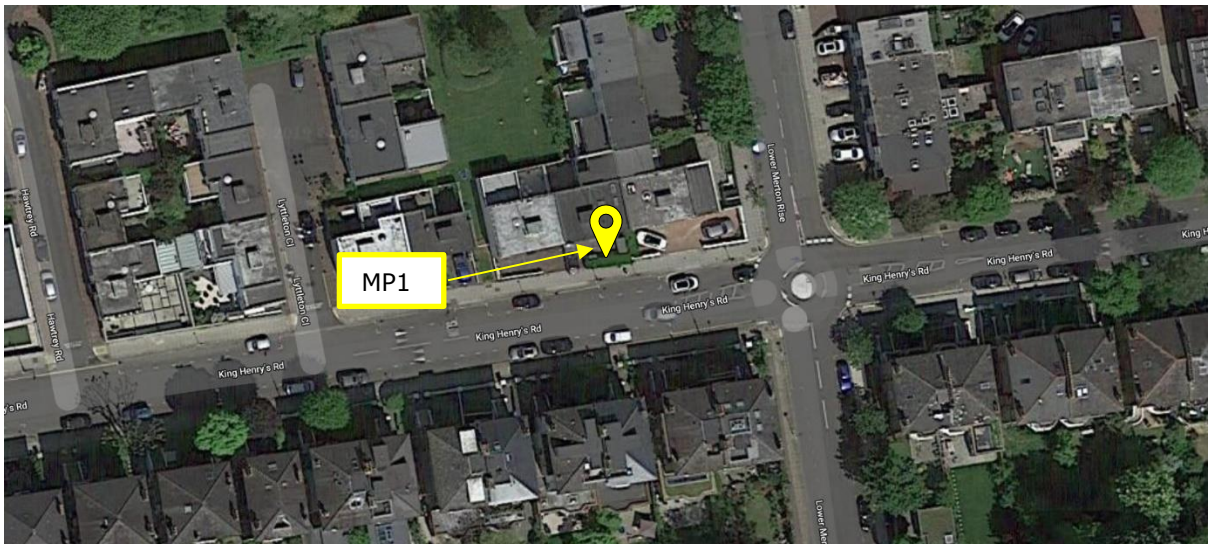


Figure 1.0 - Proposed Site

2.2 Background

The existing site is a mid-terrace house which is going to be demolished in order to build a new house with a new basement associated. Pre-construction/demolition noise monitoring has been requested by the client to ensure that if any concerns with regards to noise are raised as a result of the construction works they can be dealt with appropriately.

3. Environmental Noise Survey

In order to characterise the sound profile of the area of the proposed development, a long term 45-hour environmental sound survey was carried out from the 23rd to 25th of October 2019.

3.1 Measurement Methodology

For the long-term sound monitoring, the sound level meter was placed at 1st-floor level, protruding from a window of the proposed site. The microphone was positioned approximately 1m away from the building's façade. The monitoring position was chosen in order to collect representative sound levels of the area during the week day time and night time periods.

3.2 Measurement Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA SC420 Class 1 Sound level meter	T238593	≤0.5
CESVA CB006 Class 1 Calibrator	901013	

Table 1.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.5 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

3.3 Weather Summary

As the environmental noise survey was carried out over a long un-manned period no localized records of weather conditions were taken. However, during the setup and collection of the monitoring equipment, the weather was calm with no precipitation and wind speed lower than 5 m/s. All measurements have been compared with met office weather data of the area, specifically the closest weather station which is Toolong Weather Station. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather conditions 23/01/2019 – 25/01/2019 Toolong Weather				
Time period	**Air temp (^{0}C)**	**Rainfall mm/h**	**Prevailing Wind Direction**	**Wind Speed (m/s)**
23/10/2019 - 00:00 – 23:59	13.3 – 28.9	0.0	SE	0.1 – 5.4

24/10/2019 – 00:00 – 23:59	12.8 – 32.3	0.0	SSW	0.0 – 7.8
25/10/2019 - 00:00 – 23:59	7.0 – 18.8	0.0 – 15.6	WNW	1.2 – 10.6

Table 2.0 - Meteorological Data

3.4 Results

3.4.1 Summary Results

The following table shows a summary of the sound survey results; L_{Aeq}, L_{Amax}, L_{A90} and the L_{A10} for the measurement period.

Measurement Position MP1				
Measurement Time Period ('t')	**$L_{Aeq,t}$**	**$L_{Amax,t}$**	**$L_{A90,t}$**	**$L_{A10,t}$**
Day 1 - 23/10/19 - 15:30 - 23:00	55.0	80.0	52.0	56.0
Night 1 – 24/10/19 – 23:00 – 07:00	47.0	73.0	39.0	50.0
Day 2 - 24/10/19 - 07:00 - 23:00	58.0	87.0	53.0	61.0
Night 2 – 25/10/19 – 23:00 – 07:00	49.0	76.0	42.0	52.0
Day 3 - 25/10/19 - 07:00 – 15:30	60.0	89.0	56.0	62.0

Table 3.0 – Sound Survey Summary Results

3.4.2 Background Sound Level Summary Results

The following table shows a summary of the background sound level results during the measurement period.

Measurement Position MP1				
Measurement Period ('t')	**$L_{A90,t}$**	**Statistically most Repeated $L_{A90,t}$**	**Min. $L_{A90,t}$**	**Max. $L_{A90,t}$**
Day 1 - 23/10/19 - 15:30 - 23:00	45.0	40.0	39.0	48.0
Night 1 – 24/10/19 – 23:00 – 07:00	39.0	33.0	32.0	41.0
Day 2 - 24/10/19 - 07:00 - 23:00	53.0	47.0	42.0	56.0
Night 2 – 25/10/19 – 23:00 – 07:00	42.0	38.0	36.0	44.0
Day 3 - 25/10/19 - 07:00 - 15:30	49.0	49.0	44.0	55.0

Table 4.0 – Background Sound Level Summary Results

3.5 Subjective impression & Context

The acoustic environment of the site was found to be dominated by road noise from King Henry's Road and Lower Merton Rise Road. Furthermore, there were some noise emissions from works carried out at the development across King Henry's Road, but those were found intermittent and secondary when compared with the road noise. The subjective impression is further corroborated by the results in tables above, the sound profile of the area was considered moderate to low.

Appendix A – Acoustic Terminology

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). 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 20μPa.
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.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq 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. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

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. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

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).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source. A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

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 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB 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, BS4142:2014 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms.

Appendix B – Legislation, Policy and Guidance

This report is to be primarily based on the following legislation, policy and guidance.

National Planning Policy Framework (2019)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2019. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 170e, it states:

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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 180 states:

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; and
c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Noise Policy Statement for England

Paragraph 180 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision 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.

To achieve this vision the Statement identifies the following three aims:

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;*
- *Where possible, contribute to the improvement of health and quality of life.*

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

NOEL – No Observed Effect Level

This is 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. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

The Environmental Protection Act, 1990

Irrespective of planning consents, the Environmental Protection Act 1990 places a duty on the local authority to investigate complaints of noise nuisance made by a person living within its area. Where the local authority is satisfied that a statutory nuisance exists or is likely to occur or recur it must serve an abatement notice requiring abatement of the nuisance.

The Act does not define nuisance. The law only requires the investigating officer to be of the opinion that the effect of the noise on the average reasonable person would cause a nuisance or be prejudicial to health, e.g. preventing restful sleep.

There is no set level above which an intrusive noise may be considered a statutory nuisance and each case has to be considered on its merits. Matters to be considered include the level of the noise, its character, frequency of occurrence, time of occurrence and duration.

Nuisance has been defined in common law as *"an unlawful interference with a person's use or enjoyment of land, or of some right over, or in connection with it"*[1]. However, annoyance is not necessarily a nuisance as common law has defined annoyance as *"a wider term than nuisance, and if you find a thing which reasonably troubles the mind and pleasure, not of a fanciful person or of a skilled person who knows the truth, but of the ordinary sensible English inhabitant of a house- if you find there is anything which disturbs his reasonable peace of mind, that seems to be an annoyance, although it may not amount to physical detriment to comfort."*[2]

The WHO Guidelines Environmental Health Criterion 12 defines noise annoyance as *"a feeling of displeasure evoked by a noise"* the Criterion notes there are many factors involved in the evocation of this displeasure. These include spectral content, duration and time of day and non-acoustical factors such as the degree of control the receptor has over the noise, perceived necessity or economic considerations.[3]

References:

[1] Read v Lyons and Co. Ltd, 1945,

[2] Tod-Heatly v Benham, 1888 and Dennis & Others v Davies, 2009

2 World Health Organization, 1980

ISO 9613-2 Attenuation of sound during propagation outdoors

The ISO 1996 series of standards specifies methods for the description of noise outdoors in community environments. Part 2 of ISO 9613 is intended to enable noise levels in the community to be predicted from sources of known sound emission. The method is general in the sense that it may be applied to a wide variety of noise sources, and cover most of the major mechanisms of attenuation.

This standard provides guidance on the outdoor propagation of sound. It is widely used to establish the different attenuations that occur during the transmission of the sound from the sources to the receivers. The total attenuation is the sum of the following: geometrical divergence, atmospheric absorption, ground effect, barriers, and miscellaneous other effects.

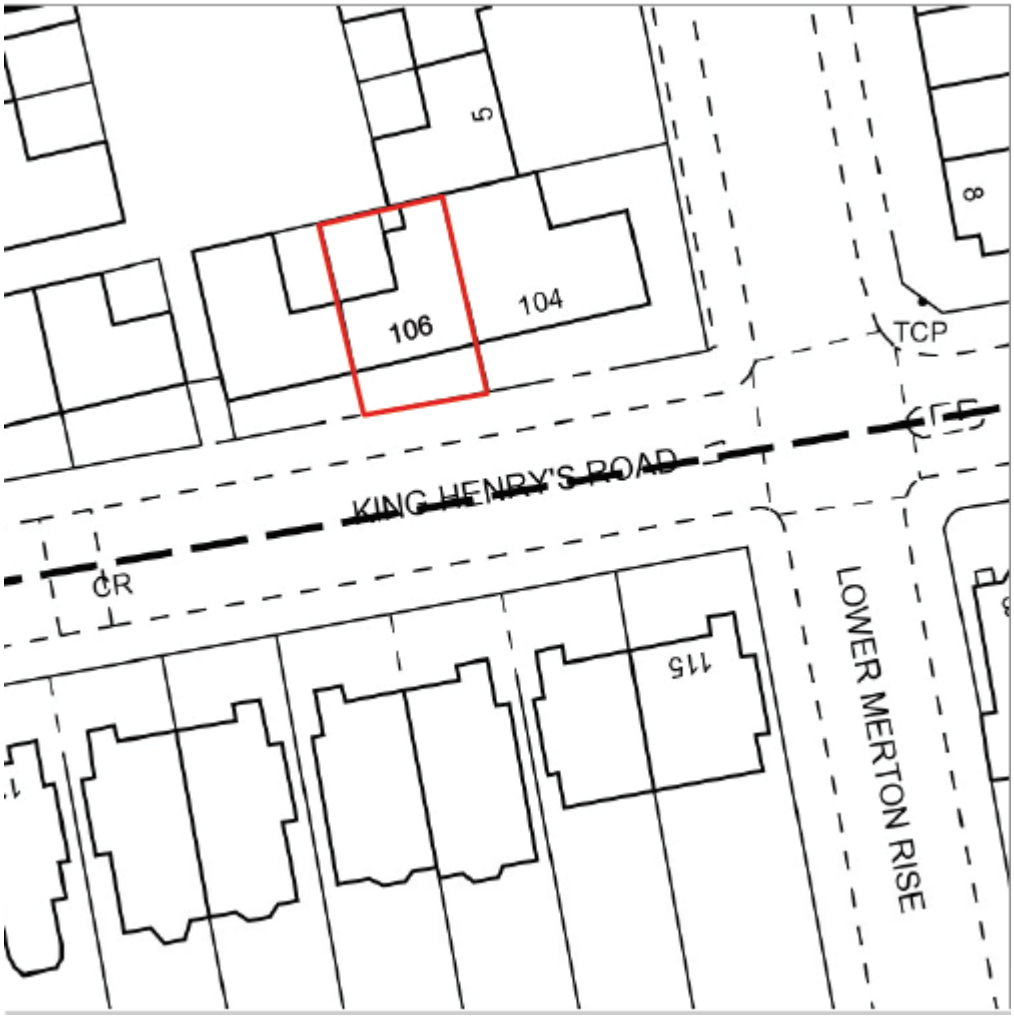
BS EN 12354-4 Building Acoustics

Estimation of acoustic performance of buildings from the performance of elements – Transmission of indoor sound to the outside

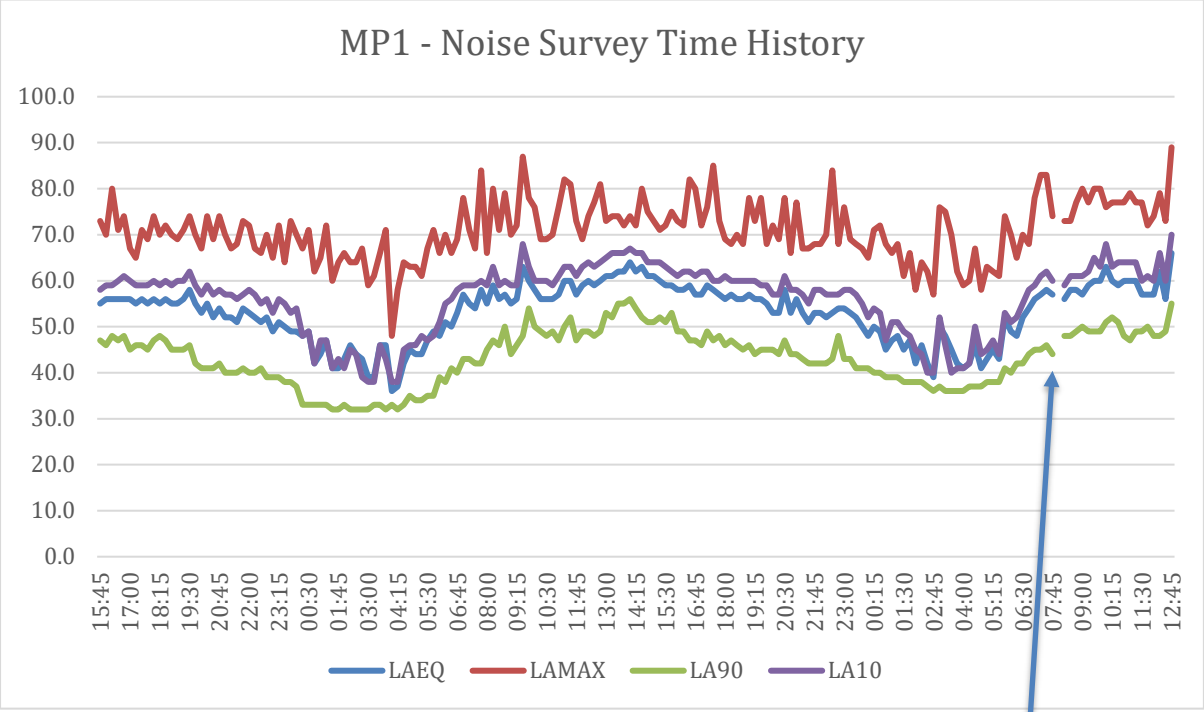
This European Standard describes a calculation model for the sound power level radiated by the envelope of a building due to airborne sound inside that building, primarily by means of measured sound pressure levels inside the building and measured data which characterize the sound transmission by the relevant elements and openings in the building envelope. These sound power levels, together with those of other sound sources in or in front of the building envelope, form the basis for the calculation of the sound pressure level at a chosen distance from a building as a measure for the acoustic performance of buildings.

Appendix C - Location Plan

Appendix D – Site Plans



Appendix E – Time History



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