Naze Marine Holiday Park

Noise Assessment

4th October 2021

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1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned to prepare a Noise Assessment for the proposed variations to an existing Premises Licence associated with Naze Marine Holiday Park at The Poplars, Walton on the Naze, CO14 8HL ('the Site').

The following technical noise assessment has been produced to accompany a Licencing Application to Tendring District Council. This report details the existing background sound climate at the nearest receptors, as well as the sound emissions associated with amplified outdoor regulated entertainment activities at the Site.

This noise assessment considers the impact of outdoor regulated entertainment activities only.

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 and Objectives

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

- A baseline sound monitoring survey undertaken in the vicinity of the closest noise-sensitive receptors to the Site;
- Detailed sound modelling using the Cadna/A modelling suite and ISO9613[1] prediction methodology to predict sound levels at the closest noise-sensitive receptors to the Site;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the Code of Practice on Environmental Noise Control at Concerts[2].

[1] International Standards Organisation. ISO 9613-2:1996: Acoustics - Attenuation of sound during propagation outdoors - Part 1: Calculation of the absorption of sound by the atmosphere.
[2] The Noise Council, 1995. The Code of Practice on Environmental Noise Control at Concerts.

2. Assessment Framework

Entertainment Noise is typically assessed using the Noise Council's *Code of Practice on Environmental Noise Control at Concerts*. Furthermore, in the Scope of BS4142:2014+A1:2019, it states that the standard is not applicable to *"music and other entertainment"*, and the Scope of BS8233:2014 states that the standard does not *"provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building"*.

Therefore, an assessment of the music sound level at the nearest noise sensitive receptors has been undertaken in accordance with the assessment framework outlined in the following text.

2.1.1. Code of Practice on Environmental Noise Control at Concerts

For the daytime and evening period, 09:00 to 23:00, the Code of Practice on Environmental Noise Control at Concerts has been used. It is stated in the Code of Practice that the music sound level should not exceed the noise limits at 1 metre from the façade of any noise sensitive premises in accordance with the framework set out below in Table 1.

Table 1: Code of Practice on Environmental Noise Control at Concerts

Concert days per calendar year, per venue	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL should exceed 75 dB(A) over a 15-minute period
1 to 3	Other Urban and Rural Venues	The MNL should not exceed 65 dB(A) over a 15-minute period
4 to 12	All Venues	The MNL should not exceed the background noise level by more than 15 dB(A) over a 15-minute period

Furthermore, Note 5, as detailed in the Code of Practice on Environmental Noise Control at Concerts states that;

"…venues used for up to about 30 events per calendar year an MNL not exceeding the background noise by more than 5 dB(A) over a fifteen-minute period is recommended for events finishing no later than 23:00 hours".

It is therefore considered appropriate to assess the daytime and evening music noise level from Naze Marine Holiday Park, whereby the music noise level does not exceed the measured background noise level by more than 5 dB(A) over any 15-minute period.

3. Site Description

3.1. Site and Surrounding Area

The Site is an existing holiday park known as the Naze Marine Holiday Park, which is operated by Parkdean Resorts. The location of the outdoor regulated entertainment area (in red) and the nearest receptors can be seen below in Figure 1.

Figure 1: Plan of Site and Surrounding Area

There are residential receptors to the east of the outdoor regulated entertainment area, located off Hall Lane. The nearest noise-sensitive residential receptors are located some 150 m to the north-east and 200m to the south-east of the outdoor regulated entertainment area. For the purposes of this noise assessment, a selection of these residential receptors has been assessed, to give a cross-section of the likely impact from the outdoor regulated entertainment area.

3.2. Operations Overview

It is proposed to introduce amplified outdoor regulated entertainment events to the holiday park, on the basis that they finish no later than 23:00.

The variation of the Premises Licence contains outdoor areas that would be able to serve alcohol. The area identified below will be able to accommodate amplified regulated outdoor entertainment events, and this area forms the basis of this noise assessment.

FIGURE 2: PREMISES LICENCE PLAN

The regulated entertainment area will have a permanently installed PA System. From experience on similar sites operated by the Applicant, the sound system is likely to comprise a Formula Sound Automatic Volume Control noise limiting device installed, to ensure compliance with the recommended source noise limits. This noise limiting device **cannot** be overridden by the users of the PA System.

The PA System will consist of the following components:

- 2x FBT Shadow 112HC driver enclosures per side;
- 2x FBT Shadow 114S Subs; and
- 1x Formula Sound Automatic Volume Control.

4. Measurement Methodology

4.1. General

The prevailing noise conditions in the area have been determined by an environmental noise survey conducted between Friday 24th and Tuesday 28th September 2021.

The location at which the background sound measurements was undertaken was chosen on the basis of being representative of the nearest residential properties to the Site.

The measurement location is discussed below in Table 2, with a location plan indicating their respective locations shown overleaf in Figure 3.

Table 2: Measurement Position Description

Measurement Position	Description
MP1	Background sound measurements were undertaken on land associated with the Site, and considered representative of those residential receptors to the east of the outdoor regulated entertainment area. Whilst on Site, the following sound sources were noticed; natural sources, such as wind-induced vegetation sound, birdsong, plus general local activity and distant road traffic noise. The microphone was situated in proximity to the nearest residential receptor, a house west of Hall Lane which overlooks the green space north of the main buildings within the holiday park. Measurement was taken 1.5m above ground level.

FIGURE 3: MEASUREMENT POSITION

4.2. Weather Conditions

The long-term background sound survey was conducted where wind speeds remained below 5 m/s, with precipitation noted locally to have occurred at 12:00 on 26th September and 06:00 on the 27th September. Therefore, periods where inclement weather occurred have been removed from the data used to derive the typical baseline conditions, to ensure robustness.

4.3. Sound Indices and Procedure

4.3.1. Background

The background sound measurements were undertaken at microphone height of 1.5 metres above local ground level, away from reflecting surfaces, other than the ground, with a wind shield used throughout.

The parameters reported are the statistical indices $L_{A10,T}$ and the Background Sound Level, $L_{A90,T}$, as well as the Equivalent Continuous Sound Level, $L_{Aeq,T}$ and the Maximum Sound Pressure Level, L_{AFmax}. An explanation of the sound units presented is given in Appendix A.

The measured L_{Aeq}, L_{AFmax}, and L_{AF90} sound levels are presented as time histories in a graph in Appendix B. Furthermore, the statistical distribution of the measured background sound levels are presented in a graphical format in Appendix C.

4.4. Equipment

The sound measurement exercise was undertaken by a consultant certified as competent in environmental sound monitoring, and, in accordance with the principles of BS 7445[3].

The acoustic measurement equipment used during the sound survey conformed to Type 1 specification of British Standard 61672[4]. A full inventory of this equipment is shown in Table 3 below:

TABLE 3: INVENTORY OF SOUND MEASUREMENT EQUIPMENT

Measurement Position	Make, Model & Description	Serial Number
MP1	Rion NL-52 Sound Level Meter	00943282
	Rion NH-25 Preamplifier	0043298
	Rion UC-59 Microphone	07045
MP1	Cirrus CR:515 Acoustic Calibrator	72886

The sound measurement equipment used during the survey was field calibrated at the start and end of the measurement period. A calibration laboratory has calibrated the field calibrator used within the twelve months preceding the measurements. A drift of less than 0.1 dB in the field calibration was found to have occurred on the sound level meter. The microphone was fitted with a protective windshield for the entire measurement period.

4.5. Sound Survey Results

4.5.1. Background

The summarised results of the environmental sound measurements, during the day, evening and night-time periods, can be seen below in Table 4. Values have been rounded to the nearest whole number.

TABLE 4: SOUND MEASUREMENT RESULTS

Measurement Position	Period	Measurement Interval, T (minutes)	$L_{Aeq,T}$ (dB)	$L_{AF90,T}$ (dB)	$L_{AF10,T}$ (dB)	L_{AFmax} (dB)
MP1	Day	15	51	41	49	67
	Evening	15	43	38	44	57
	Night	15	44	31-35	41	56

[3] British Standard 7445: 2003: *Description and measurement of environmental noise*. BSI
[4] British Standard 61672: 2013: *Electroacoustics. Sound level meters*. Part 1 *Specifications*. BSI.

5. CALCULATIONS

5.1. Methodology

In order to calibrate the noise model, the source music noise levels measured at comparable entertainment areas at sites operated by the Applicant were input in the model. At those sites, the validation process indicated good correlation between the predicted and actual music noise levels at the nearest noise sensitive receptors, to within 1 dB.

Therefore, the validation of the noise model is considered robust for the purposes of predicting the sound emissions associated with amplified regulated entertainment activities at the Site.

The maximum Music Noise Level (MNL) at the entertainment area has been set, in order to achieve the requirements outlined in Section 2 at the nearest noise-sensitive receptors.

5.1.1. Calculation Process

Calculations were carried out using the software package CadnaA, which undertakes its calculations in accordance with guidance given in ISO9613-1:1993 and ISO9613-2:1996.

5.1.2. Assumptions

Given that the land between proposed development and nearest receptors is mixed, the ground factor has been set to 0.5 in the calculation software. Appropriate attenuation factor due to the built-up areas of the site has been included in accordance with ISO 9612-2 methodology. A reflection order of 3 has been considered in the model.

In order to accurately model the land surrounding the development, an AutoCAD DXF drawing was produced, which was based on data provided by the Ordnance Survey, along with topography data of the area obtain from Defra Survey Data.

It has been assumed that music being played in the identified entertainment area will be limited by the Formula Sound Automatic Volume Control noise limiter, as required.

5.1.3. Music Noise Level Summary

A summary of the calculated maximum music noise levels at the entertainment area, assessed at 10m from the stage, during the day and evening time periods, can be seen below in Table 5.

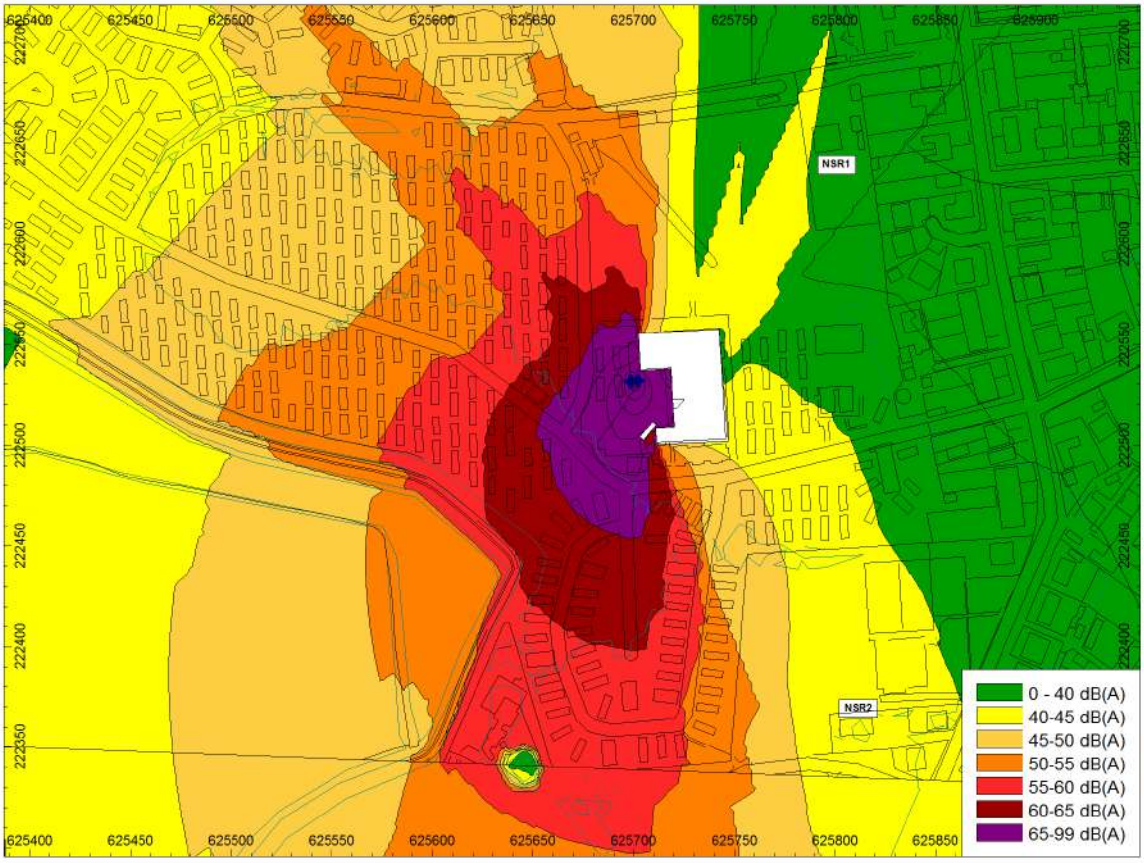
TABLE 5: PREDICTED MUSIC SOUND LEVEL SUMMARY

Area	Period	Music Noise Level (dB)
Entertainment Area	Day	88
Entertainment Area	Evening	85

5.1.4. Music Noise Level Map

As a worst-cases scenario, the sound map showing the evening time music noise level emissions from the Site can be seen below in Figure 4.

FIGURE 4: EVENING TIME MUSIC SOUND LEVEL MAP



6. Assessment

The predicted music sound level has been assessed in accordance with the Code of Practice Criteria, at all NSRs.

The resultant assessment summary, during the day and evening time periods, can be seen in Table 6 below.

Table 6: Daytime Music Sound Level Assessment Summary

NSR	Music Sound Level (dB)	Daytime Background Sound Level (dB)	CoP 09:00 to 23:00 Criteria	Excess of Music Sound Level over CoP Criteria Level (dB)
1	43	41	46	-3
2	46	41	46	0

It can be seen that the criteria outlined in the Code of Practice on Environmental Noise Control at Concerts has been met at nearest noise sensitive receptors during the daytime period.

The resultant assessment summary, during the evening time period, can be seen in Table 7 below.

Table 7: Evening Time Music Sound Level Assessment Summary

NSR	Music Sound Level (dB)	Evening Time Background Sound Level (dB)	CoP 09:00 to 23:00 Criteria	Excess of Music Sound Level over CoP Criteria Level (dB)
1	40	38	43	-3
2	43	38	43	0

It can be seen that the criteria outlined in the Code of Practice on Environmental Noise Control at Concerts has been met at nearest noise sensitive receptors during the evening time period.

As the proposed outdoor entertainment area will not operate after 23:00, no assessment has been undertaken during the night-time period.

7. Conclusion

inacoustic has been commissioned to prepare a Noise Assessment for the proposed variations to an existing Premises Licence associated with Naze Marine Holiday Park at The Poplars, Walton on the Naze, CO14 8HL.

Noise limits at nearest noise-sensitive receptors to the Site are suggested, based on the guidance contained within the Code of Practice on Environmental Noise Control at Concerts and having regard to the measured background sound levels at locations taken to be representative of the dwellings selected for this assessment.

The predicted music sound levels are presented for inspection and comparison with the suggested site noise limits at the dwellings.

Providing that the music sound level items do not exceed a level of L_{Aeq} 88 dB and 85 dB at 10m from the stage during the day and evening periods respectively, through the application of noise limiting device, the impact of sound from such sources is predicted to have an impact not exceeding the requirements of the Code of Practice on Environmental Noise Control at Concerts.

Since the Site would conform to the relevant requirements; it is recommended that noise should not be a constraint to the approval of this variation to the Premises Licence.

8. APPENDICES

8.1. Appendix A – Definition of Terms

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. 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.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} 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.

TABLE A1: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

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.

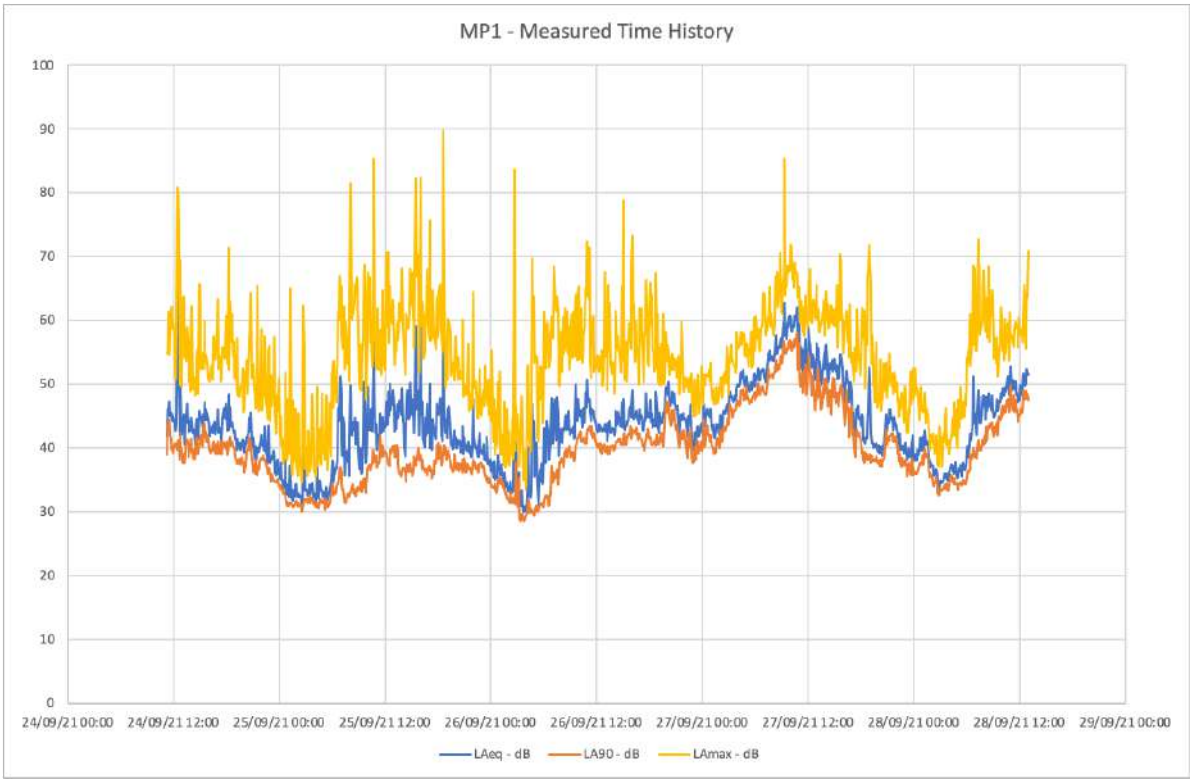
For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the 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.

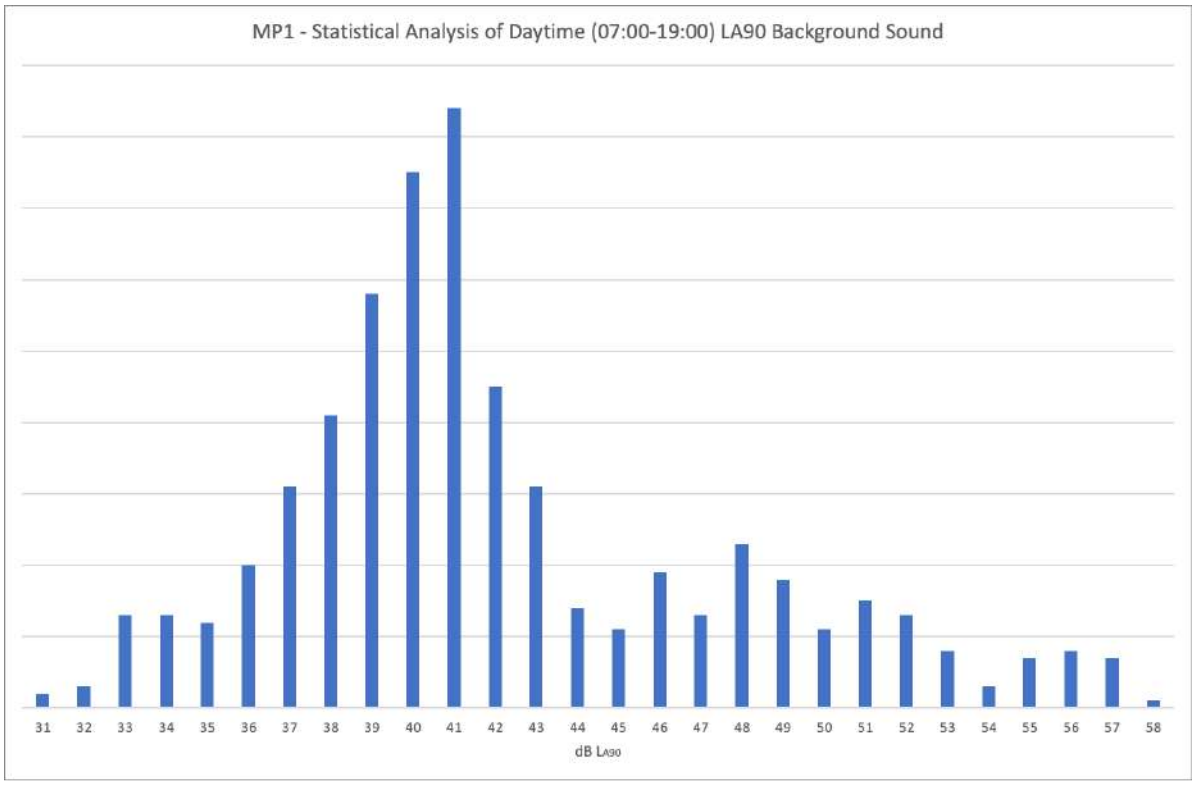
To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes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

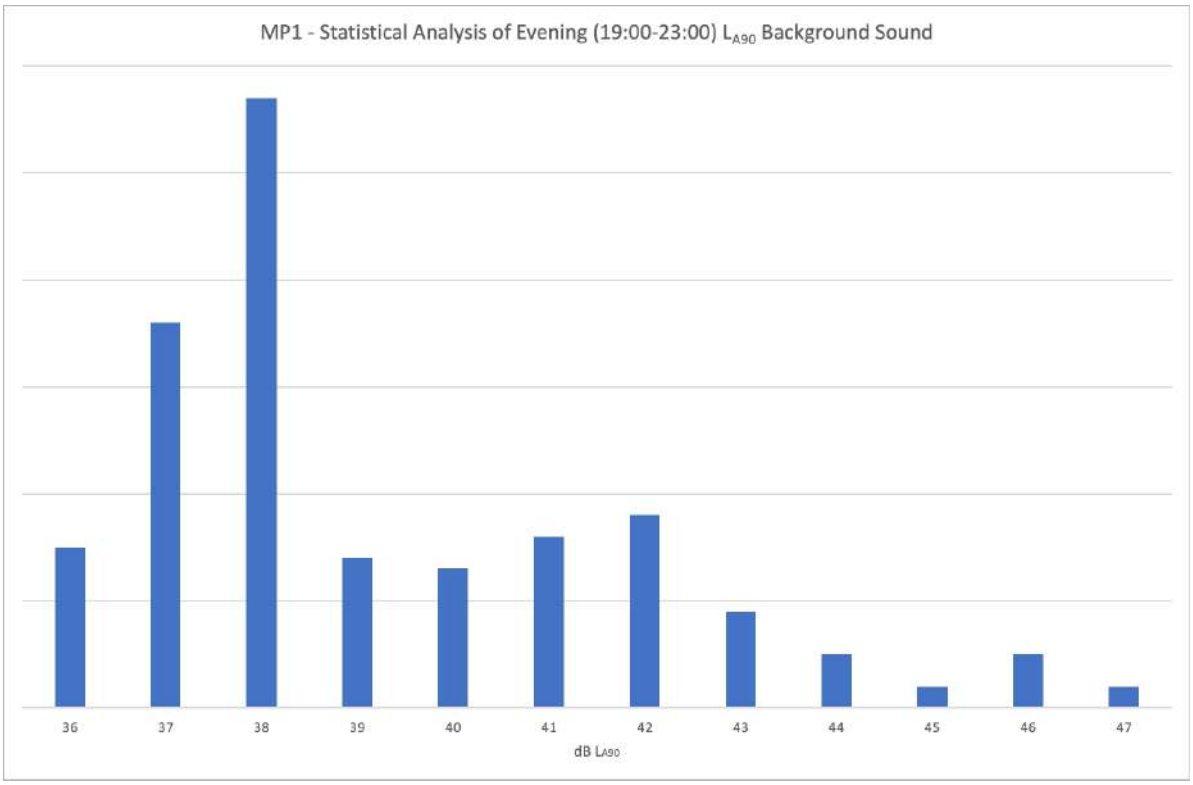
Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

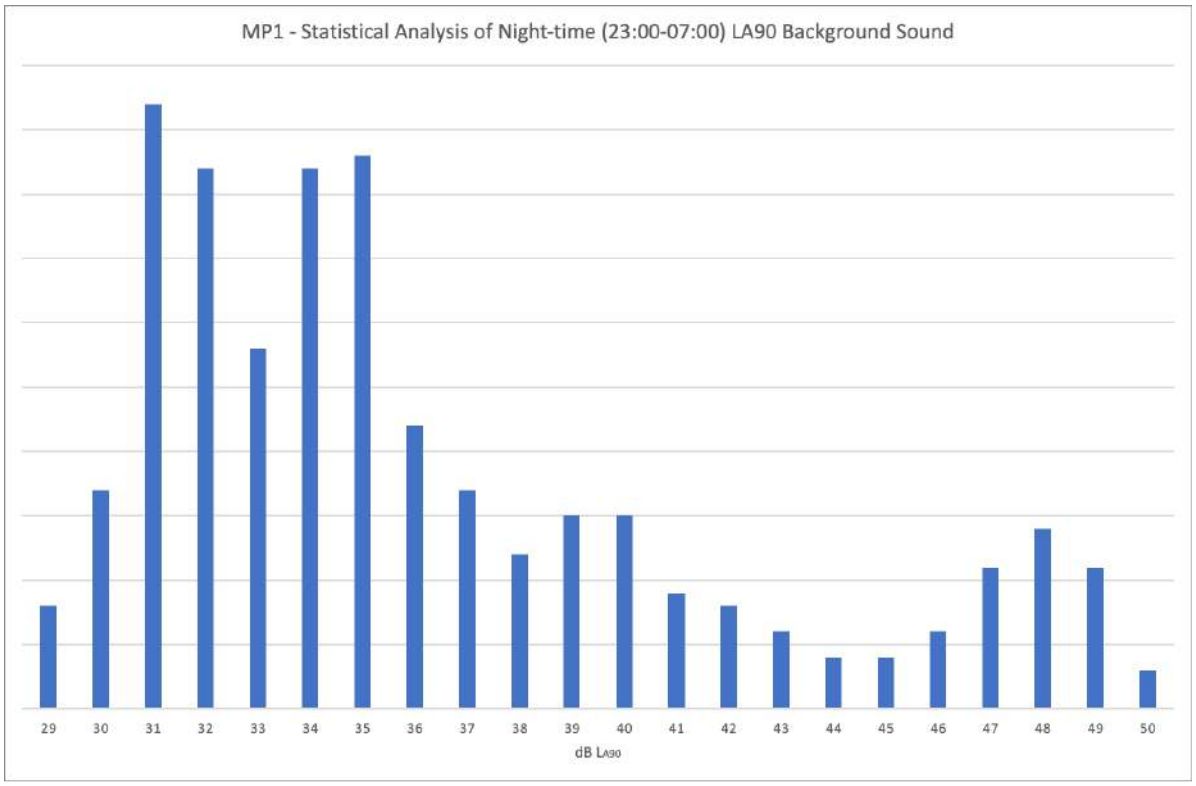
8.2. Appendix B – Sound Measurement Results



8.3. Appendix C – Statistical Analysis






MP1 - Statistical Analysis of Night-time (23:00-07:00) LA90 Background Sound
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