



Residential Noise Survey

Client: Mr F Sadiq - Longwood Property Construction

Site Address: Land off Alexandra Road West,
Paddock,
Huddersfield,
HD3 4EX

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Executive Summary

A noise assessment has been carried out on behalf of Mr F Sadiq of Longwood Property Construction in support of planning application number 2015/62/91993/W. It is proposed that the existing cleared land on the site at Alexandra Road West, Paddock, Huddersfield, HD3 4EX be developed into a row of six back to back terrace houses. This report presents the results of the environmental sound survey and the following noise assessment that has been undertaken in order to assess the impact of road traffic noise to the northern façade, and mixed source/plant noise on the eastern and southern façade of the proposed development.

Glazing has been recommended for both the front and rear façades. For the front façade glazing with a minimum sound reduction for traffic noise of 36.9 dB R_{Tra} and 31.9 dB R_{Tra} have been recommended for the bedrooms and habitable rooms respectively. For the rear façade glazing with a minimum sound attenuation of 25.1 dB R_w and 20.1 dB R_w has been recommended for the bedrooms and all the habitable rooms respectively.

Ventilation with a minimum of 36.9 dB of attenuation has been recommended for all rooms that require ventilation.

The criteria of 55dB cannot practically be achieved in external areas to the front of the proposed development however installing a 2.5m fence around the perimeter will reduce sound levels to 58.1 dB which is 3.1 dB above the set criteria however it should be noted that surrounding houses in the area have external areas along Longwood Road without any barrier attenuation and that all future residents will be aware that external areas are adjacent to Longwood road and should expect higher external noise levels.

Moving external areas to the rear of the proposed development should provide 15 – 20 dB of attenuation due to shielding from the proposed dwellings, reducing external noise levels to approximately 32.5 dB which is within W.H.O Guidelines on community noise criteria.

1.0 Introduction

NOVA Acoustics Ltd has been commissioned by Mr F Sadiq - Longwood Property Construction to undertake a noise survey at the cleared land off Alexandra Road West, Paddock, Huddersfield, HD3 4EX hereafter named "Site". This assessment has been carried out in support of planning application 2015/62/91993/W, with specific reference to condition 9, to assess the noise ingress on the proposed site due to commercial activities and road traffic noise.

1.1 Objectives

The purpose of this report is to:

- Determine the existing noise climate at the proposed dwelling location due to commercial plant and road traffic noise ingress.
- Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the new residences (including ventilation).

1.2 Legislation, Policy and Guidance

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

[1] English Planning Policy on Noise Impact – NPPF and NPSE

The NPPF is the over-arching planning and policy document that applies to all new developments in England. The guidance and assessment criteria given (or referred to) in this document can therefore be applied to all standards in terms of assessing the suitability of granting planning permission with respect to noise impact.

The NPPF states that planning policies and decisions should aim to:

Avoid noise giving rise to significant adverse impact on health and quality of life as a result of a new development;

Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from new developments, including through the use of conditions.

Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions placed upon them because of changes in nearby land uses since they were established; and

Identify and protect areas of tranquillity, which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

With specific reference to noise impact, the NPPF document refers to the noise policy statement for England (NPSE). The NPSE provides guidance which enables decisions to be made regarding the acceptable noise burden to place on society, using three key phrases – the No Observed Effect Level

(NOEL), the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL).

In order to provide a consistent frame of reference (and to allow a view to be taken on the suitability of the application with reference to the relevant planning guidance), the levels criteria given in other relevant documents used in assessment will be re-framed in terms of the following:

NOEL: The level of noise impact below which no effect can be detected, and there would be no discernible negative effect on health or quality of life.

LOEL: The lowest level of noise impact which adverse effect on health or quality of life can be detected. Designing noise impacts to be less than or equal to LOAEL should see that any adverse effects on health or quality of life are negligible.

SOAEL: The level above which significant adverse effect to health and quality of life occur. Designs should always seek to avoid a noise impact, which would be categorised as SOAEL.

[2] BS8233: 2014

The BS8233-2014 "Sound insulation and noise reduction for buildings code of practice"; gives absolute noise limits for steady state anonymous noise (such as road traffic) inside residential properties. Table 1.0 outlines these target limits.

BS8233-2014 Target limits			
Activity	Location	07:00 – 23:00	23:00–07:00
Resting	Living Rooms	35dB LAeq,16Hour	-
Dining	Dining Room	40dB LAeq,16Hour	-
Sleeping	Bedroom	35dB LAeq,16Hour	30dB LAeq,8Hour

Table 1.0

[3] Calculation of Road Traffic Noise (CRTN)

To produce an accurate representation of the ambient noise incident on the development through the day, the short method of Calculation of Road Traffic Noise (CRTN) will be used to extrapolate the noise data acquired during the 3 hour measurement period. The shortened CRTN measurement procedure requires measurements of L10 over any three consecutive hours between 1000 and 1700 hours. Using L10 (3Hour) as the arithmetic mean of the three consecutive values of hourly L10, the current value of L10 (18Hour) can be calculated from the relation:

$$L_{10}(18\text{Hour}) = L_{10}(3\text{ Hour}) - 1 \text{ dB (A)}$$

In accordance with PPG24 a further 2dB is subtracted from the LA10,18Hour to gain the LAeq,16Hour daytime period 07:00 – 23:00. Currently the NPPF guidance gives no objective criteria to inform planning decisions, however the framework does quote the existing guidance to reference, such as the CRTN and other guidance including the WHO guidelines and BS8233: 2014 sound insulation and noise reduction for buildings – Code of practice. The previous guidance repealed in March 2012, Planning Policy Guidance 24 (PPG24), is still often applicable as it can quantify the exposure of a site to noise with regard to residential development.

[4] WHO Guidelines on Community Noise, 1999

This document provides useful criteria, which, together with BS 8233-2014 is widely used to assess the effect of nearby sound sources of different types, such as roads, motorways and commercial premises on

residential dwellings. In particular, the criterion for noise levels at external spaces of dwelling houses has been used. Table 2.0 outlines these target limits.

WHO 1999 Target limits		
Activity	Critical health effect	Noise Level
Outdoor Living	Serious annoyance, daytime and evening	55dB $L_{Aeq,16Hour}$
	Moderate annoyance, daytime and evening	50dB $L_{Aeq,16Hour}$
Dwelling Indoors	Speech intelligibility and moderate annoyance, daytime and evening	35dB $L_{Aeq,16Hour}$

Table 2.0

2.0 Site description

The site is located along Alexandra Road West, Paddock, Huddersfield, HD3 4EX. The proposed development is to erect 6 back to back two storey terrace houses on the site. The entrance to the site is positioned along Longwood road to the north which has moderate to high levels of traffic. To the east of the site is situated "Focus International" which operates out of crown house with opening hours of 09:00-17:00. Situated on the eastern façade of crown house are seven air conditioning units. The other surrounding area is primarily comprised of residential properties.

2.1 Noise sensitive receptors

The noise sensitive receptors are the terrace houses of the proposed development. The northern façade will be exposed to noise ingress from the road traffic and mixed sources along Longwood road. However rooms situated at the east and south of the proposed properties will be exposed to noise due to commercial air conditioning units from "Focus International" and mixed sources.

2.2 Background

Planning permission for the development of six back to back terrace houses has been granted however before any works can begin a sound survey with resulting mitigation measures must be undertaken to discharge condition nine on the planning application decision notice, Condition 9 is as follows:

9. Before development commences a report specifying the measures to be taken to protect the new residential properties from noise generated from the business activities at Crown House located to the south east of the proposed development, shall be submitted to and approved in writing by the Local Planning Authority. The report shall;

i. Determine the existing noise climate

ii. Predict the noise climate in gardens (daytime), bedrooms (night-time) and other habitable rooms of the development

iii. Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the new residences (including ventilation if required)

3.0 Environmental Sound Survey

In order to characterise the sound profile of the area of the proposed development, a short term four hour environmental sound survey was carried out from the 5th July 2016 from 11:47 – 15:30

3.1 Measurement locations

For the short term sound monitoring the sound level meter was placed at ground floor level, at the proposed eastern façade of the development. The sound level meter was set up approximately 1.5m from the ground and a further 3.5m minimum distance from any other reflecting surface.

The monitoring position was chosen in order to collect representative sound levels of the area during the weekday time period, which is expected to be the time of highest potential impact. This position was also representative of the sound levels at the NSR. The measurement position can be found in appendix C.

3.2 Measurement equipment

Piece of Equipment	Serial No
SVAN 977 Class 1 Sound Level Meter	34826
SVAN Class 1 Calibrator SV31	029791 - 1

Table 3.0

3.3 Weather summary

As the environmental noise survey was carried out over a short and manned period. During the monitoring period the weather conditions were suitable for the measurement. The wind speed was less than 5m/s with no precipitation occurring. All periods of elevated weather conditions have been excluded from the subsequent calculations and the temperature was in the range of 10-15 C°.

3.4 Results

Table 4.0 shows the LAeq, LMax, LA10 and the LA90 for the day-time period measured at the façade.

MP1	LAeq,t	LMax,t	LA10,t	LA90,t
Day 1 11:47 -13:30	62.1 dB	93.3 dB	53.2 dB	60.8 dB
Hour 1	64.3 dB	88.1 dB	59.8 dB	52.4 dB
Hour 2	57.1 dB	79.0 dB	59.7 dB	53.2 dB
Hour 3	59.0 dB	92.6 dB	60.5 dB	53.2 dB
Hour 4	64.5 dB	93.3 dB	58.4 dB	54.8 dB

Table 4.0

3.4.3 CRTN Analysis

Table 5.0 shows the hourly LA10 Measured at measurement position two as seen in appendix C. Table 6.0 shows the subsequent CRTN calculations.

Time	MP 1 LA10
Hour 1	59.8
Hour 2	59.7
Hour 3	60.5
Average	60.0 $L_{10,3\text{Hour}}$

Table 5.0

	MP 1
Average	60.0 $L_{A10,3\text{Hour}}$
- 1dB	59.0 $L_{A10,18\text{Hour}}$
-2dB	57.0 $L_{Aeq,16\text{Hour}}$

Table 6.0

3.5 Subjective impressions & context

Whilst on site the road traffic noise was moderate to high, with a relatively high number of vehicle passes. Upon inspection it was found that the noise emissions from the commercial plant units was minimal in both on and off phases, both of which occurred multiple times within the measurement period and the whole area was dominated by road traffic noise as can be seen in the measurement time history in appendix D. Providing adequate mitigation is installed the amenity of the future residents can be protected.

3.6 Uncertainty

Efforts have been taken to address the uncertainty in the measurement and calculation of the level of impact. The following points have been addressed:

- 1) The most exposed measurement position has been chosen to ensure a robust survey.
- 2) The ambient sound environment during the measurement period did not vary significantly.
- 3) The background measurement location was within close proximity to the proposed dwelling.
- 4) Meteorological conditions were appropriate for the measurement of environmental noise.
- 5) Short measurement time intervals were used to show short term increases in ambient sound levels.
- 6) All figures are rounded to the nearest 0.1dB.
- 7) The instrumentation used is class 1 and within calibration.
- 8) A in depth analysis of ambient sound levels has been undertaken to ensure the figure used is consistent across the monitoring period.
- 9) Approved standards have been used to complete any calculations.

4.0 Internal Noise Criteria

The internal noise criterion has been taken from BS8233:2014 and WHO Guidelines on community noise.

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35dB $L_{Aeq,16Hour}$	--
Dining	Dining Room	40dB $L_{Aeq,16Hour}$	--
Sleeping	Bedroom	35dB $L_{Aeq,16Hour}$	30dB $L_{Aeq,8Hour}$
Sleeping	Bedrooms	--	45 dB $L_{Amax,8hour}$

Table 7.0

4.1 Internal Noise Impact

Table 9.0 compares the measured noise levels on site with the target limits within the dwelling, thus allowing the composite sound reduction index to be calculated for the front and rear façade. It is assumed that traffic noise and plant noise at the front and rear façade of the proposed development will be significantly lower in the night time periods. Therefore if internal noise criteria can be met for day time noise levels then it should also be achieved in the night time periods.

The night-time levels used to predict the internal noise levels are taken from the day-time measurement. As the dominant source of noise is traffic, it can be expected that the most repeated value corresponds to a car pass-by. This pass-by will produce arguably the same maximum value during both day and night time, and thus is the reason why the most repeated L_{Amax} value measured during the 3-hour CRTN measurement has been used. A statistical analysis has been undertaken to calculate the most repeated L_{Amax} value, which is 64.0 dBA which occurred 15.07 % of all measured L_{Amax} values. To ensure a robust assessment is carried out a level of 73.0dB $L_{Amax,t}$ will be used, this value is toward the highest end of the more common occurring values.

Measurement position	Area	Period	Noise Levels Measured and corrected (dBA)	Level to be achieved	Composite SRI Required
Front facade	Living Room	Day time	63.9	35 dB $L_{Aeq,16Hour}$	28.9
	Dining Room	Day time	63.9	40 dB $L_{Aeq,16Hour}$	23.9
	Bedroom	Day time	63.9	35dB $L_{Aeq,16Hour}$	28.9
	Bedroom	Night time	63.9	30dB $L_{Aeq,8Hour}$	33.9
	Bedroom	Night Time	73.0	45dB $L_{Amax,8hour}$	28.0

Table 8.0

5.0 Recommendations

5.1 Façade Specification

The noise levels within the proposed dwellings will be dictated by the configuration, materials and elements of the façade. The non-glazed elements of the facade will contribute significantly to the reduction of ambient noise levels in combination with a good quality appropriate glazing specification. The prediction of the performance of the facade is based upon a construction of 200mm brick and is calculated within INSUL software, the expected performance is shown in table 9.0.

63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	Rw
41	44	42	47	55	63	68	53

Table 9.0

The ceilings on the top floor should consist of 100mm 45kg/m² fitted tightly between the 200mm roof joists and 2no. 15mm soundbloc plasterboard fixed to resilient bars to achieve a uniform sound reduction. The expected performance as predicted within INSUL software is shown in table 10.0.

63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	Rw
33	45	52	57	60	57	61	58

Table 10.0

Any other configuration in walls and ceilings that would achieve at least these insulation figures will be suitable for the development.

5.2 Specification of Glazing Units

Windows can be considered the weakest point of a façade in terms of noise reduction from external noise.

Bedrooms

Glazed elements installed in the bedrooms require a minimum sound reduction index value of 33.9 dB Rtra. The glazing unit shown in table 11.0 would provide a suitable sound reduction. *Any other window capable of providing an attenuation of 33.9 dB Rtra will be suitable.* The performance is specified for the whole window unit, including frame and other design features.

Glazing Type	Sound Reduction (Rw)	Sound Reduction (Rtra)
Double Glazing System 10mm / 12 mm / 6.4mm	40	34

Table 11.0

Living areas

Glazed elements installed in other living rooms require a minimum sound reduction index value of 28.9 dB Rtra. The glazing unit shown in table 12.0 would provide a suitable sound reduction. *Any other window capable of providing an attenuation of 28.9 dB Rtra will be suitable.* The performance is specified for the whole window unit, including frame and other design features.

Glazing Type	Sound Reduction (Rw)	Sound Reduction (Rtra)
Secondary Glazing System 10mm glass/ 12mm cavity/4mm	36	29

Table 12.0

The glazing system above will protect the amenity of the occupants of the dwellings against the extraneous noise. The glazing specifications have been taken from Pilkington optiphon range.

5.3 Specification of Ventilation

Considering windows open in the noise impact assessment providing a sound attenuation of 12dB, this would lead to internal noise levels as shown in Tables 13.0.

Measurement position	Area	Period	Noise Levels Measured	Open window	Internal noise levels	Noise Criteria	Level above criteria
Front facade	Bedroom	Night time	66.9 $L_{Aeq,8hour}$	- 12	54.9 $L_{Aeq,8hour}$	30 dB	24.9 dB
	Living Room	Day time	66.9 $L_{Aeq,16hou}$	- 12	54.9 $L_{Aeq,16hour}$	35 dB	19.9 dB
	Dining Room	Day time	66.9 $L_{Aeq,16hou}$	- 12	54.9 $L_{Aeq,16hour}$	40 dB	14.9 dB
	Bedroom	Night time	64.0 L_{Amax}	- 12	52.0 L_{Amax}	42 dB	10.0 dB
Rear facade	Bedroom	Night time	55.1 $L_{Aeq,8hour}$	- 12	43.1 $L_{Aeq,8hour}$	30 dB	13.1 dB
	Living Room	Day time	55.1 $L_{Aeq,16hour}$	- 12	43.1 $L_{Aeq,16hour}$	35 dB	8.1 dB
	Dining Room	Day time	55.1 $L_{Aeq,16hour}$	- 12	43.1 $L_{Aeq,16hour}$	40 dB	3.1 dB
	Bedroom	Night time	64.0 L_{Amax}	- 12	52.0 L_{Amax}	42 dB	10.0 dB

Table 13.0

To ensure adequate ventilation without noise impact, a wall mounted acoustic ventilation system with a minimum attenuation of 33.9 dB should be installed. This should be installed within habitable rooms. Either of the two ventilation units in table 14.0 or any system capable of providing the required attenuation and that complies with Part F of building regulations.

Model	Sound Attenuation level with the system open:
Titon mechanical ventilation Sonair F+	55dB
Simon trickle vents EHCS	38dB

Table 14.0

5.4 External areas

To protect the amenity of all future residents' external noise levels must fall within the criteria set out in W.H.O guidelines on community noise. This document advises external noise levels should fall within 50-55dB preferably 50 dB or below. The noise levels at the front of the property are too high to achieve an external area with appropriate noise levels. Thus it is advised that any garden areas are located at the rear of the dwelling.

6.0 Conclusions

An environmental noise survey and noise impact assessment has been undertaken at the proposed residential development at Alexandra Road West, Paddock, Huddersfield, HD3 4EX to assess the suitability of site. The measured ambient sound levels have allowed a BS8233:2014 noise assessment to be carried out.

Outline mitigation measures have been recommended in section 5.0, including glazing and ventilation. These recommendations should be sufficient to achieve the internal and external noise levels for the proposed development according to BS8233:2014 noise criteria. Written approval of the findings of this report is required from the Local Authority prior to works commencing.

Appendix A – Glossary & Terms

Acoustic environment: sound from all sound sources as modified by the environment

Ambient sound: totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far

Ambient sound level $L_a = LA_{eq,T}$: equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval

Background sound level, $LA_{90,T}$: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels

Equivalent continuous A-weighted sound pressure level, LA_{eq} : value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

Measurement time interval, T_m : total time over which measurements are taken

Rating level, $L_{Ar,Tr}$: specific sound level plus any adjustment for the characteristic features of the sound

Reference time interval, T_r : specified interval over which the specific sound level is determined

Residual sound: ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound

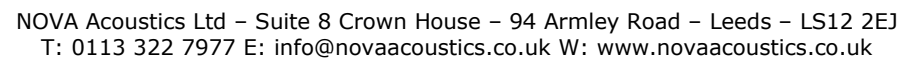
Residual sound level, $L_r = LA_{eq,T}$: equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T

Specific sound level, $L_s = LA_{eq,Tr}$: equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r

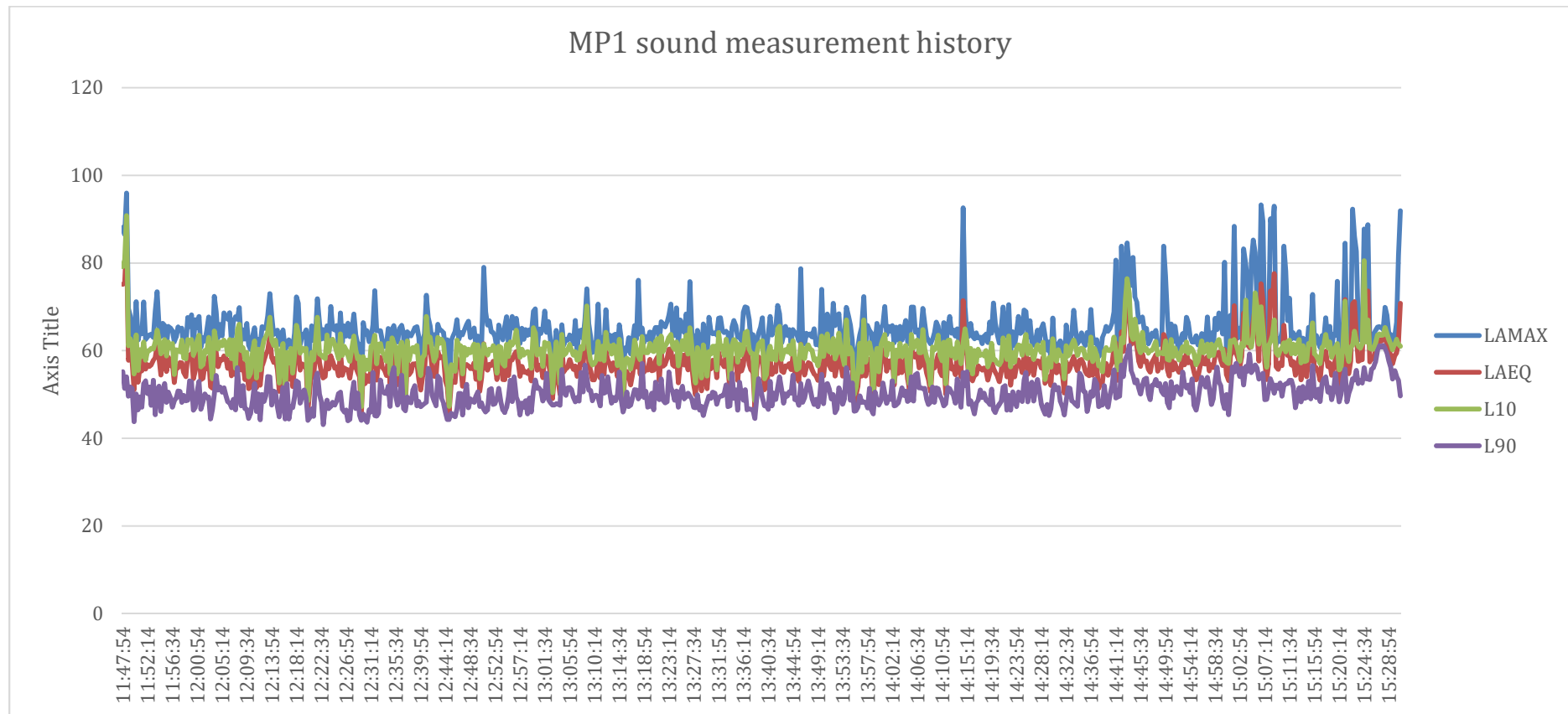
Specific sound source: sound source being assessed

Appendix B – Measurement Equipment

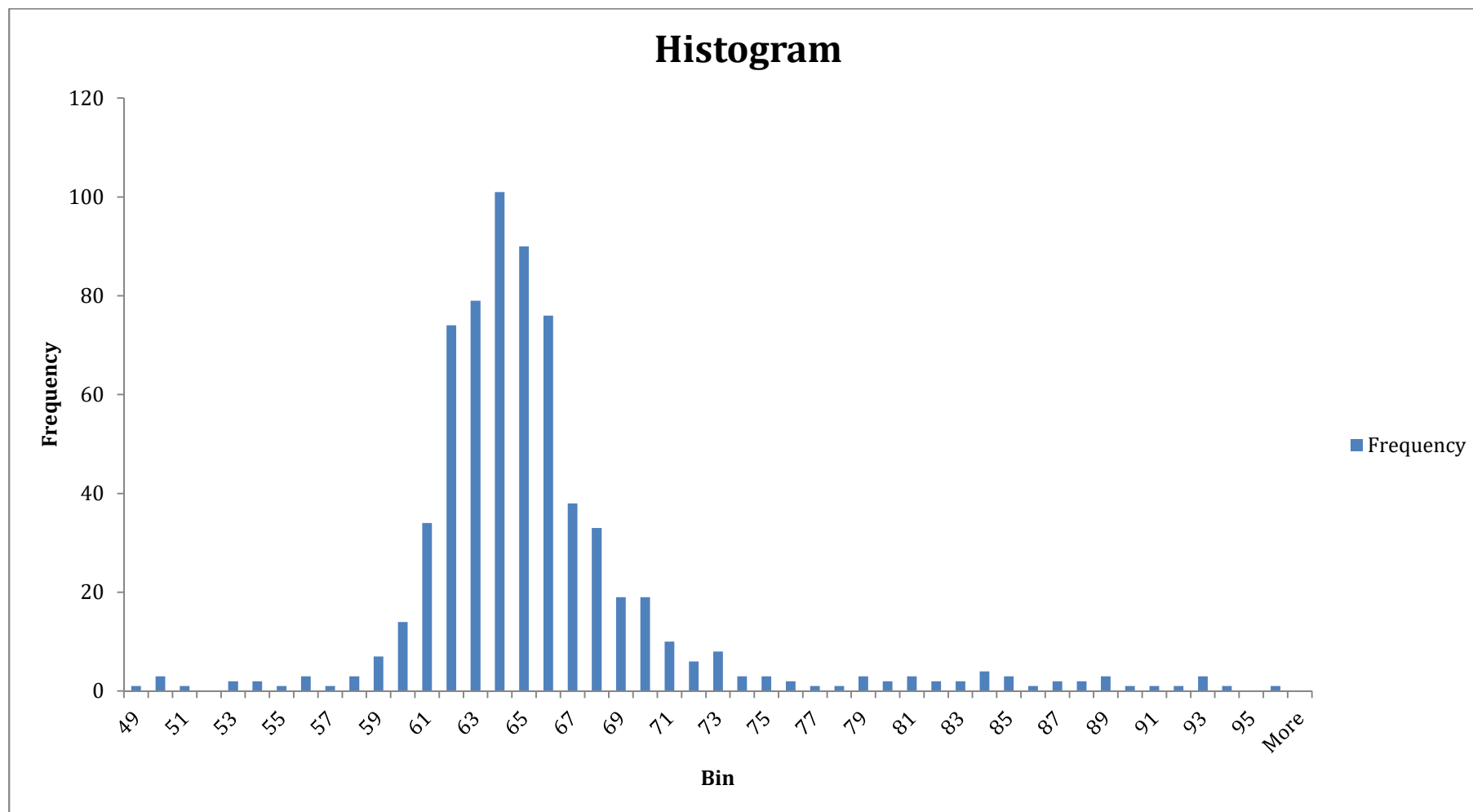
Piece of Equipment	Serial No	Pre calibration	Post calibration
SVAN 977 Class 1 Sound Level Meter	34826	- 0.38	-0.38
SVAN Class 1 Calibrator SV31	029791 - 1		



Appendix D – Sound Measurements



Statistical Analysis for calculation of most representative value of LAmax at the front façade MP1



Disclaimer

The opinions and interpretations presented in this report represent our best technical interpretation of the data made available to us. However, due to uncertainty inherent in the estimation of all parameters, we cannot, and do not guarantee the accuracy or correctness of any interpretation and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees.

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