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GJP Architects Ltd

24 hour background noise assessment at 62 Avenue Road, St John's Wood, NW8.

Prepared for:-

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Prepared by:

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CONTENTS

1.0 SUMMARY

The general noise climate appeared to be normal and representative with the exception of the building works being carried out at the nearby BAM construction site approximately 50 metres from measurement position 1 (see 5.3 of this report). This was audible during anytime from (circa) 08:00 to 17:00 on Friday 6th January, and 08:00 to 12:30 on Saturday 7th January. However, this was not the dominant noise source and was relatively irregular and intermittent.

At measurement position 1 / façade facing Avenue Road the dominant noise source was road traffic traversing Avenue Road. This continued to be the case for the duration of the 24 hour survey.

Measurement position 2 was more significantly affected by the construction noise, however the dominant noise source during the day was still road traffic traversing Avenue Road. During the night (23:00 – 07:00) it became apparent that some form of mechanical plant is situated on the roof of the property immediately behind the existing building and it appears to run 24 hours. It was not possible to confirm this during the day due to the masking effect of the traffic noise.

In the absence of the technical data for the proposed car lift we have shown that a car lift noise level of up to 68dB L_{Aeq} will mean that noise arriving at the nearest residential property due to the car lift's operation will not exceed the existing background noise levels monitored (L_{A90}).

A P Frisby

A R Raymond

2.0 INTRODUCTION

ADC was asked to carry out a 24 hour survey at 62 Avenue Road, St John's Wood to assess the affect of the proposed machinery due to be installed in a new build residential property at the referenced address.

This report begins by summarising assessment standards and, where appropriate, discusses alternative interpretations.

After a brief statement of survey details we discuss basic results and the resulting assessment. The feasibility of achieving the criteria is discussed along with any recommendations for mitigation.

3.0 ASSESSMENT STANDARDS

3.1 PPG24

The site is situated amongst an existing established residential area. We would therefore argue that the NEC categories of PPG24 do not really apply and, in this context, PPG 24 specifically cites BS4142 and BS8233.

3.2 BS8233

BS8233 is a wide-ranging document which covers many aspects of noise in buildings but includes recommended "Reasonable" and "Good" noise climates in its Table 5. Of most significance to environmental noise assessments are the levels given for living rooms and bedrooms.

The significant aspects are summarised below:

Environment Experiencing the Noise	Criterion	Implied Limit		
		L_{Aeq} (0700–2300)	L_{Aeq} (2300–0700)	L_{Amax} (2300–0700)
Living Rooms	Good Conditions Reasonable Conditions	30dB 40dB		
Bedrooms	Good Conditions Reasonable Conditions		30dB 35dB	45dB 45dB

Note that the standard accepts the widely used rule of thumb that, for a partly open window, the levels just outside will be 15dB higher than those just inside. In other words the reasonable daytime conditions and good night time conditions are consistent with PPG24. The dB L_{Amax} condition is equivalent to a level of 60 dB L_{Amax} just outside.

Note that BS8233 followed on from the World Health Organisation Guide to Community Noise (WHO Guide) with near-identical criteria presented. BS8233 does not explicitly specify the time period for the criteria but they are often taken as being 0700 to 2300 for daytime and 2300 to 0700 for night time

In quiet environments it will tend to be too lenient and in noisy environments it will tend to be too harsh. It is a useful indicator, however, of the basic character of the existing noise climate.

3.3 BS4142

BS 4142 was updated in 1997. The standard is very complicated but, basically, it describes methods for determining;

a) external noise level 'from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises'.

b) the background noise level, measured in the absence of any noise from the source in question, etc.

An involved method of comparing a) and b) is then described, the results of which lead to conclusions as to the likelihood of complaints.

First the measured noise level is corrected for the effect of the residual noise (a slightly different index to the background noise but still a descriptor of the noise which exists without the source in question). Secondly, and where applicable it is corrected for its duration, and any difference between measurement position and receiver position. This leads us to the specific noise level.

Where the noise source produces a tonal element, i.e. whines, hisses, hums, etc. then for assessment purposes, BS:4142 recommends that 5 dB(A) is added to the measured (or calculated) noise level. Similarly, where the noise source produces impulsive noises, for example bangs, clicks, clatters, etc. or where the noise is intermittent, BS:4142 recommends that 5 dB(A) is added. If both characteristics are present, only one adjustment is made and this is called the feature correction.

The Specific Noise Level and the feature correction leads us to the Rating Level. It is this that we compare with the background noise level.

According to BS: 4142, a Rating Level of:

a) 10 dB(A) or more above background is a positive indication that complaints are likely.

b) 5 dB(A) above background is of marginal significance.

c) 10 dB(A) below background is a positive indication that complaints are unlikely.

3.4 Other Criteria

We are not aware of any other criteria associated with this project.

4.0 POTENTIAL NEW NOISE SOURCES TO BE INTRODUCED

It is understood that the only equipment to be installed within the new development that is of any significance from a noise perspective is a car lift ("4 column high rise car parking platform").

This car lift is to be situated on the front façade of the development facing Avenue Road close to where the garage in the existing building is situated.

Noise data for this specific model of lift has not been made available as of yet and we will discuss this in more detail further on in the report.

Also proposed is an internal lift, but due to its location within the dwelling, this will not affect the external noise climate.

We have been informed that other than this, no further external noise sources are proposed, other than standard residential appliances such as boiler flues, and kitchen and bathroom extracts that you would find in any standard household

5.0 SURVEY DETAILS

5.1 Site times and Personnel

The survey was conducted during a continuous 24 hour period from 12:00pm Friday 6th January to 12:00pm Saturday 7th January by Andrew Frisby of ADC Acoustics Ltd.

5.2 Instrumentation

Instrumentation used was a Norsonic Nor-140. This is a precision grade sound level meter which holds a current calibration certificate and which was field-calibrated as necessary. The meter was set up to measure samples of varying duration in terms of dB L_{eq} , dB L_{max} and dB L_{90} in overall A-weighted terms, and in octave bands across the frequency range. See Definition of Acoustic Terms in the attached appendix.

5.3 Measurement Positions

The measurements are shown on the plan below.

The microphone was 1.5 m above ground and well away from other reflecting surfaces.

Measurement position 1 was approximately 6m from the front façade of the existing building at 62 Avenue Road. We will use this position to represent the noise levels at the nearest residential properties (both right and left from 62 Avenue Road).

Measurement position 2 was in the back garden of the existing building to monitor any unknown noise sources to which the rear façade may be exposed to.

5.4 Survey Conditions

Daytime weather conditions were as follows :-

Rain	:	none, dry roads
Cloud	:	50% moderate
Temperature	:	8 -10 Celsius
Wind	:	less than 5m/s, plus occasional gusts above this.

Evening weather conditions were as follows :-

Rain	:	none, dry roads
Cloud	:	50% moderate
Temperature	:	8 - 10 Celsius
Wind	:	less than 5m/s, plus occasional gusts above this.

Night time weather conditions were as follows :-

Rain	:	none, dry roads
Cloud	:	50% moderate
Temperature	:	7 - 9 Celsius
Wind	:	less than 5m/s, plus occasional gusts above this.

6.0 RESULTS AND DISCUSSIONS

6.1 Basic Results

The general noise climate appeared to be normal and representative with the exception of the building works being carried out at the nearby BAM construction site approximately 50 metres from measurement position 1. This was audible during anytime from (circa) 08:00 to 17:00 on Friday, and 08:00 to 12:30 on Saturday. However, this was not the dominant noise source and was relatively irregular and intermittent. It had no impact on the L_{A90} index which is the main one used in the calculations. See Definition of Acoustic Terms in Appendix 1.

At measurement position 1 / Façade facing Avenue Road the dominant noise source was road traffic traversing Avenue Road. This continued to be the case for the duration of the 24 hour survey.

Measurement position 2 was more significantly affected by the construction noise, however the dominant noise source during the day was still road traffic traversing Avenue Road. During the night (23:00 – 07:00) it became apparent that some form of mechanical plant is situated on the roof of the property immediately behind the existing building and it appears to run 24 hours. It was not possible to confirm this during the day due to the masking effect of the traffic noise. The L_{A90} readings from 23:00 to 07:00 are likely to be indicative of the noise levels affecting the rear façade due to this machinery, although due to the inner-city location of the site the background noise will also be made up of a significant proportion of distant traffic noise.

In both positions, emergency sirens severely affected the Lmax levels, and in some instances, the meter had to be moved slightly to allow residents of the existing building to enter/exit with their vehicles, which also had a similar effect. To combat this, we have calculated a logarithmic average of the L_{Amax} levels monitored.

Basic results for background/ambient noise were as follows:-

Measurement Position 1:

Time:	*Comments:*	*Index*	***dB(A)***
07:00 - 23:00	Daytime Average	Leq	**62**
		Lmax	**84**
		L90	**52**
23:00 - 07:00	Nighttime Average	Leq	**57**
		Lmax	**84**
		L90	**44**

Measurement Position 2:

Time:	*Comments:*	*Index*	***dB(A)***
07:00 - 23:00	Daytime Average	Leq	**48**
		Lmax	**64**
		L90	**45**
23:00 - 07:00	Nightime Average	Leq	**45**
		Lmax	**62**
		L90	**42**

As discussed in 4.0 we do not have the noise data for the specific lift type proposed.

Instead, we will look at the existing background noise levels (L_{A90}) at the nearest neighbour's location (measurement position 1) and work backwards to set allowable levels of noise that will not exceed these background levels at the nearest residential property.

Car Lift Assessment:

Car-Lift Daytime Assessment (07:00 - 23:00)	
Allowable increase on background noise at nearest residential property	0 dB(A)
Lowest recorded L90 (Background noise) at nearest residential property	46 dB L_{A90}
Approximate distance of proposed car lift to nearest residential property façade	10 m
Distance correction	20 dB
Distance correction + L90	66 dB L_{A90}
Assumed running time duration of car lift per single cycle	20 sec
Assumed number of operations per hour	4
Allowable noise level of car-lift @1m after distance correction and time weighting	82 dB L_{Aeq}
Is noise source intermittent/tonal?	Yes
Feature correction for intermittant source	5 dB
Allowable noise level of car lift @ 1m (time weighted, feature & distance corrected)	77 dB L_{Aeq}

Car-Lift Nighttime Assessment (23:00 - 07:00)	
Allowable increase on background noise at nearest residential property	0 dB(A)
Lowest recorded L90 (Background noise) at nearest residential property	41 dB L_{A90}
Approximate distance of proposed car lift to nearest residential property façade	10 m
Distance correction	20 dB
Distance correction + L90	61 dB L_{A90}
Assumed running time duration of car lift per single cycle	20 sec
Assumed number of operations per 5 minutes	1
Allowable noise level of car-lift @1m after distance correction and time weighting	73 dB L_{Aeq}
Is noise source intermittent/tonal?	Yes
Feature correction for intermittant source	5 dB
Allowable noise level of car lift @ 1m (time weighted, feature & distance corrected)	68 dB L_{Aeq}

6.2 Discussion of Results, Feasibility and Mitigation

As can be seen from the above tables, the lowest allowable noise level for the proposed car lift occurs during the 23:00 to 07:00 period; therefore this becomes the figure we shall use: 68 dB L_{Aeq} at 1m.

Provided the specific model of car lift to be installed does not exceed 68 dB L_{Aeq} at 1m this will mean that noise arriving at the nearest residential property due to the car lift's operation will not exceed the existing background noise levels monitored (The general noise climate appeared to be normal and representative with the exception of the building works being carried out at the nearby BAM construction site approximately 50 metres from measurement position 1 (see 5.3 of this report). This was audible during anytime from (circa) 08:00 to 17:00 on Friday 6th January, and 08:00 to 12:30 on Saturday 7th January. However, this was not the dominant noise source and was relatively irregular and intermittent.

At measurement position 1 / façade facing Avenue Road the dominant noise source was road traffic traversing Avenue Road. This continued to be the case for the duration of the 24 hour survey.

Measurement position 2 was more significantly affected by the construction noise, however the dominant noise source during the day was still road traffic traversing Avenue Road. During the night (23:00 – 07:00) it became apparent that some form of mechanical plant is situated on the roof of the property immediately behind the existing building and it appears to run 24 hours. It was not possible to confirm this during the day due to the masking effect of the traffic noise.

In the absence of the technical data for the proposed car lift we have shown that a car lift noise level of up to 68dB L_{Aeq} will mean that noise arriving at the nearest residential property due to the car lift's operation will not exceed the existing background noise levels monitored (L_{A90}).

6.3 Vibration

During the 24 hour survey there were no instances where vibration from nearby tube/train lines was noted. We therefore assume that vibration from external sources need not be considered.

With regards to the introduction of new vibration sources we recommend that the proposed car-lift is properly fitted with anti-vibration mounts to minimise the risk of any transference of vibrational energy to the surrounding structure / existing noise climate.

7.0 CONCLUSIONS/RECOMMENDATIONS

At measurement position 1 / façade facing Avenue Road the dominant noise source was road traffic traversing Avenue Road. This continued to be the case for the duration of the 24 hour survey.

Measurement position 2 was more significantly affected by the construction noise, however the dominant noise source during the day was still road traffic traversing Avenue Road. During the night (23:00 – 07:00) it became apparent that some form of mechanical plant is situated on the roof of the property immediately behind the existing building and it appears to run 24 hours. It was not possible to confirm this during the day due to the masking effect of the traffic noise.

In the absence of the technical data for the proposed car lift we have shown that a car lift noise level of up to 68dB L_{Aeq} will mean that noise arriving at the nearest residential property due to the car lift's operation will not exceed the existing background noise levels monitored (L_{A90}).

It is also important to note that the calculations were based on the quietest period of the entire night and as such represent a worst-case scenario which is unlikely.

We would suggest that a planning condition along the lines of "*…noise impact of any proposed mechanical equipment should be submitted and approved…*" would be more than adequate.

Appendix 1

Definition of Acoustic Terms

The Decibel

The decibel is the basic unit of noise measurement and is denoted dB. Technically, it is a means of expressing the difference in noise level between the measured noise and a standard level of noise. Most often the threshold of human hearing is used as the standard reference but is really should be stated. The threshold of human hearing is a sound pressure of 20μPa or a sound power of 1pW.

A sound pressure level or SPL should be expressed in dB(re. 20μPa). A sound power level or SWL should be expressed in dB(re. 1pW). If the reference levels are omitted, it will often (but not always) be safe to assume that they are referenced to the threshold of human hearing.

A-Weighting and dB(A)

The human hearing system responds differently to different frequencies. The A-weighting system takes account of this by emphasising mid and high frequencies more than low frequencies to give an overall level. An A-Weighted noise level, therefore, reflects the way normal, healthy hearing would perceive the overall level of the noise. The basic unit is dB(A), although other systems of expressing an A-weighted levels are discussed below.

Other weighting systems, such as C-Weighting, denoted dB(C), reflect the human hearing system's response at higher noise levels.

NR and NC Levels

NR curves and NC curves are a series of curves representing noise levels across the frequency range. A given noise climate has an NR level or NC level if it equals a point on the curve at any frequency. They are particularly, although by no means exclusively, used as a means of specifying noise limits in an indoor environment, for instance from mechanical services or traffic noise break-in from the outside. They are typically expressed as NR or NC followed by a number, e.g. NR40, NC55, etc.

Equivalent Continuous Sound Level, L_{eq}

This can be simplistically described as a way of expressing the average noise level.

The unit is dB L_{eq}. For A-weighted levels the unit is dB(A) L_{eq} or, in more modern units, dB L_{Aeq}.

Maximum Level, L_{max}

This is the maximum level reached (usually for a fraction of a second) in the measurement period.

The unit is dB L_{max}. For A-weighted levels the unit is dB(A) L_{max} or, in more modern units, dB L_{Amax}.

Statistical (Percentile) Levels, L_n

During a measurement of fluctuating noise, it is often useful to establish the levels exceed for a percentage of the time. L_n is the index representing the level exceeded for n% of the measurement period.

The unit is dB L_n. For A-weighted levels, the unit is dB(A) L_n or, in more modern units, dB L_{An}.

Common examples are as follows :-

dB L_{A90} is the A-weighted level exceeded for 90% of the time and is often used to describe the underlying background noise.

dB L_{A50} is the A-weighted level exceed for 50% of the time. Mathematically, it is the median, another kind of average.

dB L_{A10} is the A-weighted level exceeded for 10% of the time and has traditionally been used to describe the intermittent highs in the noise climate such as passing cars or aircraft.

Frequency Analysis

Here the audible frequency range is divided up into bands and the noise level is expressed in each frequency band from low pitches to high pitches.

Octave Band analysis is where the frequency range is divided into 8 bands from 63 Hz to 8kHz, or sometimes into 10 bands from 31.5 Hz to 16kHz.

1/3 Octave Band analysis provides more detailed subdivision into 24 bands from 50 Hz to 10kHz, or sometimes into 30 bands from 20Hz to 20kHz.

Narrow Band analysis takes this further with the possibility of many thousands of bands, possibly only 1Hz wide, or even less.

In all types of frequency analysis, the level in each band can be expressed in terms of L_{eq}, L_{max}, L_n, etc. as defined above.

Sound Insulation

Sound insulation is best expressed across the frequency range in octave bands or third octave bands. Often, however, in known environments such as domestic sound insulation and speech privacy, it is simpler to express the

sound insulation as a single figure. A higher value means better sound insulation.

The most common ways are dB D_{nTw}, dB R_w and $dB_{(mean\ 100\text{-}3150Hz)}$. The first two are ways of expressing average sound insulation, weighted to account for speech frequencies. The third is simply an un-weighted mean value.

The Building Regulations Approved Document E (ADE) routinely refer to $D_{nTw} + C_{Tr}$. The C_{Tr} term is a negative number which is used to modify the D_{nTw} value for the insulation properties at lower frequencies.

ADE also uses the L_{nTw} index for impact sound transmission. It is a measure of the level of noise in the room below a room in which a standard tapping machine is being used. It represents the impact sound transfer such as footfall noise, scraping chairs, washing machines, etc. A lower value means better insulation.

Reverberation Time

The most common measure of Reverberation Time is, effectively the time taken for sound from a steady source to decay by 60 dB after it has been abruptly cut off. In practice it is often difficult to measure a 60 dB decay and so decays of 30 dB, 20 dB, or even 10 dB are often used and adjusted pro rata, although the exact measure is not quite the same.

Reverberation Time is generally expressed as RT in seconds. We may, if we are being precise, add subscripts 60, 30, etc to show whether the basis of the measure is 60 dB decay, 30 dB decay, etc. E.g. the RT_{60} = 0.52s, the RT_{30} = 0.49s, etc.

RT can be expressed in octave bands or 1/3 octave bands across the frequency range, or at central frequencies such as 500 Hz or 1kHz.

Appendix 2

Raw Data

Position 1											
Time:	*Comments:*	*Index*	***dB(A)***	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
12:30 - 13:00		Leq	**62**	70	61	57	57	59	54	45	37
		Lmax	**79**	93	86	83	69	70	70	71	67
		L90	**52**	61	52	49	47	48	43	34	22
13:00 - 13:30		Leq	**62**	71	64	57	57	59	55	45	36
		Lmax	**81**	89	86	76	77	76	72	70	63
		L90	**53**	62	53	50	49	50	46	36	23
13:30 - 14:00	Battery change - Measurement duration 10 minutes - measured level assumed to be consistent for 30 minutes	Leq	**63**	71	66	58	58	60	56	47	37
		Lmax	**77**	89	87	75	73	71	68	61	55
		L90	**54**	63	54	51	50	51	47	37	24
14:00 - 14:30		Leq	**62**	70	62	57	57	59	55	46	37
		Lmax	**80**	89	81	77	78	72	74	67	61
		L90	**53**	62	54	50	49	50	45	35	23
15:00 - 15:30		Leq	**62**	71	65	58	57	59	55	47	39
		Lmax	**79**	94	89	80	75	72	67	64	64
		L90	**53**	62	54	51	49	49	44	35	21
15:30 - 16:00		Leq	**62**	71	62	58	57	59	55	47	40
		Lmax	**80**	91	83	86	78	72	65	65	66
		L90	**53**	63	55	51	49	50	46	36	24
16:00 - 16:30	1 emergency vehicle siren along road during measurement duration	Leq	**62**	70	63	57	58	59	54	46	37
		Lmax	**89**	86	87	79	88	86	72	67	66
		L90	**52**	62	54	50	48	49	44	34	22
17:00 - 17:30		Leq	**61**	69	61	58	57	58	53	44	35
		Lmax	**79**	88	81	78	78	71	69	65	58
		L90	**52**	62	53	51	49	48	43	32	21
17:30 - 18:00		Leq	**62**	70	63	60	57	59	54	45	37
		Lmax	**81**	87	84	86	77	71	68	68	59
		L90	**52**	62	53	49	48	49	43	33	21
18:00 - 18:30	1 emergency vehicle siren along road during measurement duration	Leq	**66**	71	67	60	58	63	60	48	37
		Lmax	**94**	90	93	88	79	93	88	77	57
		L90	**52**	63	52	49	48	49	44	32	21
19:00 - 19:30		Leq	**62**	70	65	60	58	59	54	46	37
		Lmax	**81**	92	89	84	79	73	71	65	58
		L90	**52**	59	51	48	47	49	43	32	20
19:30 - 20:00		Leq	**61**	67	62	58	56	59	54	45	35
		Lmax	**78**	83	84	78	74	73	66	66	57
		L90	**52**	59	52	49	48	49	43	32	20
20:00 - 20:30		Leq	**61**	68	60	56	56	58	53	43	35
		Lmax	**74**	86	78	71	69	70	64	61	67
		L90	**49**	58	50	47	46	46	40	28	17
21:00 - 21:30		Leq	**60**	67	59	54	54	57	52	42	33
		Lmax	**76**	88	79	76	74	72	65	64	58
		L90	**49**	56	48	46	45	46	40	27	16
21:30 - 22:00	User generated Lmax. Disregard.	Leq	**63**	68	63	62	60	59	54	47	40
		Lmax	**94**	99	92	95	92	89	83	80	74
		L90	**48**	55	48	46	44	45	39	27	18
22:00 - 22:30	1 emergency vehicle siren along road during measurement duration	Leq	**62**	67	60	55	58	60	53	43	34
		Lmax	**91**	87	86	77	88	90	77	66	59
		L90	**49**	56	49	47	45	46	39	27	18
23:00 - 23:30	1 emergency vehicle siren along road during measurement duration	Leq	**63**	67	58	53	55	61	55	43	32
		Lmax	**92**	91	85	73	86	91	84	68	55
		L90	**47**	55	47	45	44	44	38	26	18
23:30 - 00:00		Leq	**58**	65	56	53	53	56	51	40	31
		Lmax	**76**	85	81	82	71	68	64	54	57
		L90	**47**	54	47	44	43	44	37	25	18
00:00 - 00:30	User generated Lmax. Disregard.	Leq	**59**	64	55	52	54	56	52	40	31
		Lmax	**88**	81	74	70	87	84	79	61	64
		L90	**46**	53	47	44	43	43	37	24	18

01:00 - 01:30		Leq	**55**	60	53	49	50	52	48	38	28
		Lmax	**74**	81	77	70	72	69	65	62	57
		L90	**47**	51	51	45	43	41	42	34	23
01:30 - 02:00		Leq	**55**	62	53	50	50	52	47	43	35
		Lmax	**78**	83	78	73	75	69	71	70	64
		L90	**44**	51	44	42	40	40	34	25	17
02:00 - 02:30		Leq	**54**	61	50	48	49	52	47	41	30
		Lmax	**72**	81	67	63	68	68	63	59	51
		L90	**44**	50	44	42	40	40	34	26	16
03:00 - 03:30	Corrupted Measurement - Leq and Lmax	Leq	**-**	-	-	-	-	-	-	-	-
		Lmax	**-**	-	-	-	-	-	-	-	-
		L90	**43**	50	44	42	40	39	32	24	16
03:30 - 04:00		Leq	**54**	58	50	47	48	50	45	46	35
		Lmax	**73**	75	70	65	68	67	63	69	57
		L90	**42**	49	43	41	39	39	32	24	16
04:00 - 04:30		Leq	**53**	60	51	47	47	50	46	44	33
		Lmax	**71**	80	74	68	67	67	62	62	53
		L90	**42**	49	44	41	39	39	32	24	17
05:00 - 05:30		Leq	**54**	62	53	48	48	51	46	38	29
		Lmax	**71**	80	77	69	69	66	63	60	56
		L90	**41**	49	43	40	38	37	30	22	16
05:30 - 06:00		Leq	**52**	61	49	46	47	49	45	37	27
		Lmax	**69**	80	67	61	62	66	62	56	47
		L90	**42**	49	43	41	39	38	31	22	16
06:00 - 06:30		Leq	**57**	64	55	51	51	54	49	41	33
		Lmax	**76**	85	78	75	71	70	69	65	59
		L90	**43**	50	44	42	40	39	33	25	17
07:00 - 07:30		Leq	**58**	64	57	53	53	55	50	41	32
		Lmax	**76**	85	80	79	75	68	66	59	52
		L90	**46**	52	46	44	43	42	36	27	18
07:30 - 08:00	Construction work	Leq	**60**	71	61	56	55	57	53	44	34
		Lmax	**73**	88	76	69	72	66	63	64	58
		L90	**53**	61	55	52	49	49	45	37	24
08:00 - 08:30	Construction work	Leq	**61**	69	61	58	56	57	54	46	37
		Lmax	**77**	88	85	78	67	68	71	67	58
		L90	**53**	60	53	52	49	48	44	36	22
09:00 - 09:30	Construction work	Leq	**61**	70	62	58	56	58	54	46	37
		Lmax	**78**	91	90	81	68	68	67	66	64
		L90	**52**	60	53	51	48	49	44	36	22
09:30 - 10:00	Construction work	Leq	**61**	70	62	56	55	58	53	45	35
		Lmax	**75**	86	84	74	69	68	66	67	56
		L90	**52**	62	54	51	48	48	44	36	24
10:00 - 10:30	Battery change - Measurement duration 10 minutes - measured level assumed to be consistent for 30 minutes	Leq	**61**	69	61	56	56	58	53	45	37
		Lmax	**72**	84	76	70	69	67	62	62	60
		L90	**52**	61	53	49	48	49	44	36	25
11:00 - 11:30	Construction work	Leq	**61**	69	60	56	56	58	53	44	34
		Lmax	**78**	79	75	69	69	73	74	64	56
		L90	**52**	61	54	52	48	49	43	37	21
11:30 - 12:00	Construction work	Leq	**62**	70	63	57	56	59	54	45	35
		Lmax	**74**	85	85	68	67	68	64	66	57
		L90	**53**	63	54	51	49	50	45	35	23
12:00 - 12:30	Battery change - measurement corrupted	Leq	**-**	-	-	-	-	-	-	-	-
		Lmax	**-**	-	-	-	-	-	-	-	-
		L90	**-**	-	-	-	-	-	-	-	-

Position 2											
Time:	*Comments:*	*Index*	***dB(A)***	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
14:30 - 14:40		Leq	**49**	57	54	47	46	44	40	32	20
		Lmax	**61**	68	68	63	58	51	53	51	34
		L90	**46**	53	51	44	43	42	37	29	17
14:40 - 14:50		Leq	**48**	58	54	46	44	43	39	32	21
		Lmax	**49**	61	56	48	45	44	40	33	23
		L90	**47**	57	52	45	43	43	38	31	19
16:30 - 16:40	1 emergency vehicle siren along road during measurement duration	Leq	**49**	58	53	47	45	44	40	41	38
		Lmax	**69**	71	67	65	55	56	57	66	62
		L90	**46**	54	50	45	43	42	36	28	19
16:40 - 16:50		Leq	**49**	58	52	46	46	44	41	32	21
		Lmax	**61**	73	60	55	60	55	55	47	34
		L90	**46**	54	50	44	43	42	36	28	19
18:30 - 18:40		Leq	**47**	57	52	45	44	44	38	30	22
		Lmax	**57**	71	63	55	53	51	50	42	35
		L90	**45**	53	49	43	42	41	35	27	18
18:40 - 18:50	1 emergency vehicle siren along road during measurement duration	Leq	**49**	57	51	45	45	46	39	30	23
		Lmax	**68**	73	62	55	64	67	57	57	47
		L90	**45**	52	49	43	41	41	35	27	17
20:30 - 20:40		Leq	**46**	54	49	44	43	42	37	29	20
		Lmax	**57**	66	57	60	52	51	50	44	41
		L90	**44**	51	46	42	41	40	34	26	16
20:40 - 20:50		Leq	**47**	57	50	44	43	43	38	29	22
		Lmax	**58**	74	63	54	56	53	48	39	34
		L90	**44**	51	47	42	41	40	34	26	17
22:30 - 22:40		Leq	**52**	57	52	53	51	47	39	28	21
		Lmax	**70**	73	68	73	70	64	53	43	48
		L90	**44**	50	48	42	40	40	34	26	19
22:40 - 22:50		Leq	**45**	53	51	44	42	42	36	28	20
		Lmax	**55**	64	61	52	49	48	47	49	40
		L90	**43**	49	48	42	40	39	34	26	19
00:30 - 00:40	1 emergency vehicle siren along road during measurement duration	Leq	**48**	55	50	46	46	44	37	29	23
		Lmax	**70**	71	63	66	69	67	53	49	39
		L90	**43**	49	47	43	40	38	34	27	19
00:40 - 00:50		Leq	**44**	54	49	43	41	40	35	28	21
		Lmax	**56**	77	64	52	49	50	42	39	37
		L90	**42**	48	47	42	40	38	34	27	18
02:30 - 02:40		Leq	**45**	53	50	45	42	40	36	30	23
		Lmax	**56**	77	65	51	47	49	44	40	34
		L90	**43**	48	47	44	40	37	33	27	19
02:40 - 02:50		Leq	**44**	52	49	45	41	39	35	30	23
		Lmax	**54**	69	57	50	46	47	45	47	44
		L90	**42**	47	47	44	40	37	33	27	19

04:30 - 04:40		Leq	**45**	51	49	47	42	39	35	29	21
		Lmax	**62**	70	56	60	62	56	49	41	38
		L90	**43**	47	46	45	40	37	33	27	19
04:40 - 04:50		Leq	**43**	51	48	45	40	37	34	29	21
		Lmax	**49**	67	55	49	43	44	39	34	30
		L90	**42**	46	46	44	39	36	33	27	19
06:30 - 06:40		Leq	**45**	53	49	47	43	38	34	28	20
		Lmax	**58**	72	62	61	59	47	41	36	35
		L90	**42**	47	46	43	39	36	32	27	19
06:40 - 06:50		Leq	**44**	51	49	45	42	39	36	29	21
		Lmax	**56**	65	58	57	48	48	51	39	36
		L90	**42**	46	46	43	39	36	32	27	19
08:30 - 08:40	Construction work	Leq	**48**	60	52	46	45	43	39	33	28
		Lmax	**60**	69	65	56	50	53	53	51	49
		L90	**46**	54	51	45	44	41	37	29	19
08:40 - 08:50	Construction work	Leq	**49**	58	52	46	45	45	43	33	25
		Lmax	**63**	69	58	54	50	59	59	48	38
		L90	**46**	54	50	45	44	41	37	30	18
10:30 - 10:40	Construction work	Leq	**48**	57	51	46	45	43	41	36	28
		Lmax	**62**	71	62	53	53	51	56	56	50
		L90	**45**	53	49	45	43	41	36	27	18
10:40 - 10:50	Construction work	Leq	**48**	58	52	47	45	43	39	31	22
		Lmax	**58**	71	64	55	53	52	52	48	37
		L90	**45**	54	49	45	43	41	36	28	18
11:00 - 11:10	Construction work	Leq	**48**	58	52	47	45	43	39	32	25
		Lmax	**63**	80	64	60	61	54	55	51	43
		L90	**45**	54	50	45	43	40	36	27	18
11:10 - 11:20	Construction work	Leq	**50**	59	54	52	48	44	39	32	25
		Lmax	**66**	77	66	70	65	56	54	50	45
		L90	**46**	54	50	46	44	41	36	28	18