

Environmental Noise Report

Proposed Residential Development,
Land Adjacent to Home Farm
Gresford Road
Llay
Wrexham

Date of Survey: Tuesday 18th November and Wednesday 19th November 2014

Date of Report: Thursday 4th December 2014

Reference: 6794E Rev 2

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1.0 General Information

1.1 Site Address

Land Adjacent to Home Farm
Gresford Road
Llay
Wrexham

1.2 Client Instructing Survey

Michael Cunningham Architects
202 Vanilla Factory
39 Fleet Street
Liverpool
L1 4AR

1.3 Date of Noise Survey

Tuesday 18th and Wednesday 19th November 2014

1.4 Survey Consultant

	Name	Position	Signature	Date
Prepared by	M S Hamer AMIOA	Acoustic Engineer		04/12/14
For and on behalf of: Sound Testing.Co.Uk Ltd				

1.5 Report Approval

	Name	Position	Signature	Date
Report Approval	M J M Howell MIOA	Acoustic Engineer		04/12/14
For and on behalf of: Sound Testing.Co.Uk Ltd				



2.0 Introduction

The survey and assessment described in this report was instructed by the client to assist with a planning application to construct 365 new build houses and one commercial unit on the land adjacent to Home Farm. There are concerns of road traffic noise during both day and night from the B5102 Straight Mile and industrial premises that operates twenty four hours a day.

2.1 An Environmental Noise Assessment

Soundtesting.co.uk Ltd have carried out an environmental noise assessment at the above site with noise levels measured externally in two positions over a twenty four hour period during a typical daytime and night time.

Dominant noise levels were measured, in particular; road noise from Straight Mile.

This report will state the measured noise levels, and will refer to guidance contained within Technical Advice Note 11: Noise (TAN 11), BS8233:2014, Sound Insulation and Noise Reduction for Buildings and WHO Community Noise Guidelines for recommended internal noise levels within living spaces.

3.0 Assumptions & Limitations

- a. All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building façade.
- b. The noise levels measured on site during the environmental noise survey are typical of the site.
- c. It is assumed that the technical data provided by glazing and ventilation manufacturers is up to date and correct.
- d. All distance attenuation calculations and noise maps have been carried out in accordance with CRTN (Calculation of Road Traffic Noise) and ISO 9613-2, using the CADNA-A noise modelling software; so as to more easily take account of the spread of noise across such a large area of space.



4.0 Criteria

The criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal noise levels.

4.1 Planning Guidance (Wales) Technical Advice Note 11: Noise (TAN 11)

TAN 11 is a guidance primarily used to determine whether or not a site is suitable for residential development in terms of the noise environment. It mainly focuses on the assessment of noise from transportation sources, i.e. road, rail and air traffic.

In order to assess the suitability of a site for residential development, TAN 11 uses a series of 'Noise Exposure Categories' (NEC's). These NEC's take into account the level of noise, and the dominant noise source at the site.

In Annex A of TAN 11, Noise Exposure Categories (NEC's) are defined for proposed residential developments affected by transport or mixed noise sources (where no one source is considered dominant) and recommends appropriate levels for exposure to different sources of noise as provided in Table 1.

Table 1: Definitions of Noise Exposure Categories for New Dwellings near Existing Noise Sources

Noise Exposure Categories	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should not be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be granted, for example because there are no alternative quieter available sites, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Noise guidance appropriate for this development (from TAN 11)

A recommended range of noise levels; provided in Table 2 show each of the four NEC's for dwellings exposed to road noise.

Table 2: Range of Noise Levels, $L_{Aeq,T}$ dB corresponding to the NEC's in Table 1

Noise Source	Noise Exposure Category			
	A	B	C	D
Road Noise				
07:00 – 23:00	<55	55 – 63	63 – 72	>72
23:00 – 07:00	<45	45 – 57	57 – 66	>66



4.2 BS 8233:2014 Sound Insulation and Noise Reduction for Buildings

BS 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice suggests the following noise levels:-

Table 3: BS 8233:2014 Recommended Internal Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline may be set in terms of SEL or L_{AFmax} depending on the character and number of events per night. Sporadic noise events could require separate values.

4.3 WHO Community Noise Guidelines

Table 4: A summary of the guidance noise levels can be found below:

Specific Environment	Critical Health Effect (s)	L_{Aeq} (dB)	Time base (hours)	L_{AFmax} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Figure 2 – (ref: WHO Community Noise Guidelines)



4.4 Local Authority Criteria

Paul Campini at Wrexham Council has requested that a noise assessment is carried out under the guidelines of Tan 11 due to the industrial estate near the North West side of the proposed development.

4.5 Criteria Summary

A noise map produced by CADNA noise mapping software will show the impact of noise on various house locations and will be compared to the NEC's as demonstrated in TAN 11. BS8233:2014 and WHO Community Noise Guidelines provide similar guidance relating to internal noise levels within living spaces as well as external spaces. WHO suggests maximum noise levels outside bedroom windows when required to be open for ventilation purposes. BS8233:2014 and WHO Community Guidelines will all be engaged and referred to within this report.



5.0 Site Description

The proposed development is to be constructed on farm land adjacent to Home Farm. North of the land is the B5103, Straight Mile. Straight Mile leads to a busy road junction at the west side of the land. Just further west of the junction is an industrial estate. It is understood that one of the industrial units operates twenty four hours a day and heavy goods vehicles deliver and collect at the unit into the night time.

Straight Mile is a busy road with consistent traffic flow which carries a mixture of cars and heavy goods vehicles. The heavy goods vehicles generally travelled in and out of the industrial estate.

Gresford Road runs south of the junction along the west side of the land. This road was generally used by cars travelling in and out of the housing estate west of the road.

The dominant noise levels were traffic noise from Straight Mile. At the time of the survey; the road surface was dry.

An aerial view of the site with measurement locations noted has been included in the appendix. (Ref: Google Maps).



6.0 Noise Measurement Procedure

Personnel Present

Martin Hamer AMIOA

6.1. Survey Equipment Used

Table 5

Manufacturer	Model	Serial No.	Description
Rion	NA28	00211583	Real Time Analyser Sound Level Meter
Rion	NL52	01032413	Real Time Analyser Sound Level Meter
Rion	NC74	35125832	Calibrator

Calibration

The sound level meter was calibrated with the field calibrator, to a level of 94.4 dB @ 1 kHz, prior to the commencement and on the completion of the survey in accordance with the manufacturer's instructions. No significant drift in calibration was observed. The meters used during the survey are precision grade class 1.

Calibration certificates are available on request.

6.2 Weather Conditions

During the day time measurement period the sky was full cloud cover with an average temperature of around 8°C. Wind was breezy with gusts up to 4.5ms⁻¹ blowing in a south easterly direction. During the night time measurement period the sky was full cloud cover and misty with an average temperature of 4°C – 5°C. There was little wind but with gusts up to 3.0ms⁻¹ blowing in a various directions.

6.3 Noise Measurement Procedure

The sound level meters were set to measure L_{A90} , L_{A10} , L_{Aeq} and L_{AFmax} in 5 minute periods, as well as A-weighted 1:1 octave spectrum analysis in order to identify the frequency characteristics of the noise.

Data charts can be found in the appendix.

Position 1

A microphone was positioned 20m from the edge of Straight Mile and 20m from Gresford Road in order to measure the traffic noise at the junction. The microphone was set on a pole at a reference height of 1.5m above ground level.

At position 1; audio WAV files were recorded of noises exceeding 80.0dB in order to identify the sources of L_{AFmax} levels.



Position 2

A microphone was positioned 20m from the edge of Straight Mile approximately 150m away from position 1 and the traffic junction in order to measure traffic flowing freely along Straight Mile. The microphone was set on a pole at a reference height of 1.5m above ground level.



7.0 Results

7.1 Results Analysis

Table 4 presents the measured results in L_{Aeq} day and night time periods.

Table 6: Comparison Chart

Monitoring position	Date	Time Period	Time Base T (hours)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
1	18/11/14 – 19/11/14	Daytime	16	62.0	-	53.3	64.7
1	18/11/14 – 19/11/14	Night time	8	56.8	56.3 – 77.2	44.1	58.8
2	18/11/14 – 19/11/14	Daytime	16	60.1	-	50.2	63.5
2	18/11/14 – 19/11/14	Night time	8	55.1	53.0 – 75.7	41.7	57.0

Table 6 demonstrates that the noise levels were higher at the traffic junction than when the traffic flowed freely.

At position 1; the L_{AFmax} measured during the night time (23:00-07:00) has been analysed. It is noted that the maximum measured L_{AFmax} is 77.2dB, which occurs at 02:50 during the night time period. L_{AFmax} 70.0dB is exceeded fifty six times during the night time period, and L_{AFmax} 60.0dB is exceeded thirty eight times.

At position 2; it is noted that the maximum measured L_{AFmax} is 75.5dB, which occurs at 03:15 during the night time period. L_{AFmax} 70.0dB is exceeded twenty seven times during the night time period, and 60.0dB is exceeded sixty seven times.

The frequency of the L_{AFmax} levels suggests that the cause was passing traffic during the night.

Noise samples and WAV files are available by request.

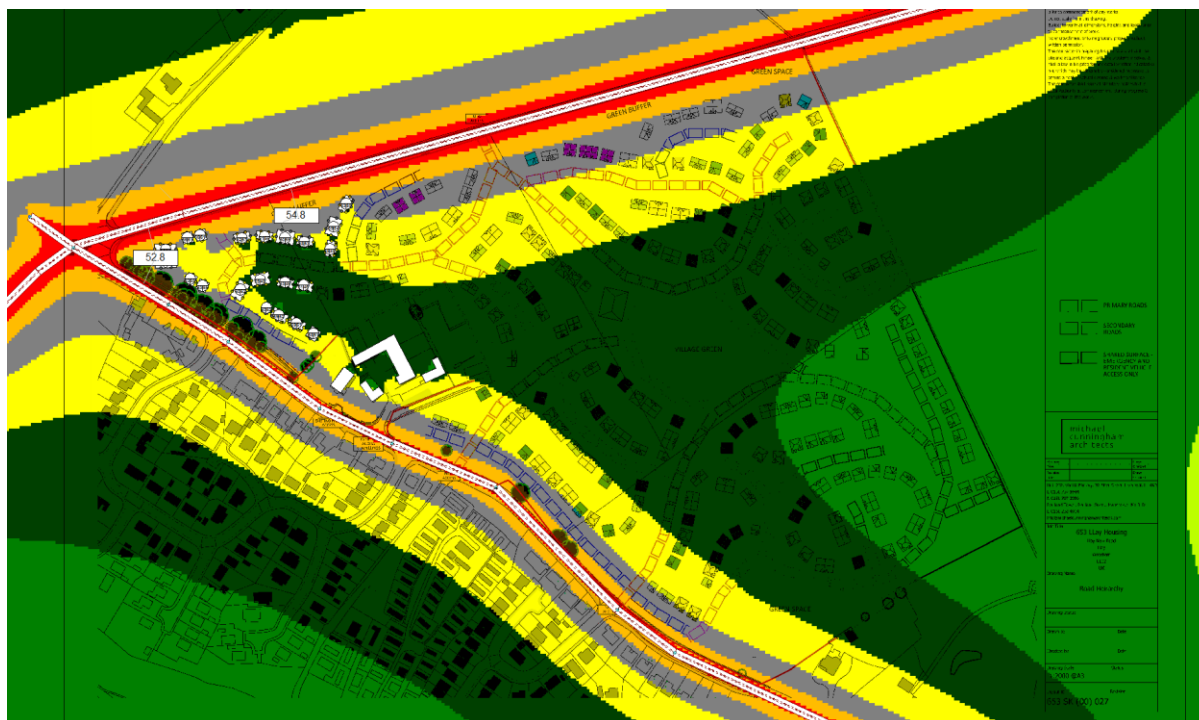
7.2 Calculation of Noise Levels and Noise Maps

The following noise maps have been calculated using CADNA modelling software based on the $L_{Aeq,T}$ results in Table 6. The CADNA noise model was calibrated directly by adjusting the effective sound power level of the roads, in the model, so as to obtain as close as match as possible to the measured reference levels at Locations 1 and 2. This method is more reliable and subject to lower uncertainty than using prediction methods based upon traffic flow data alone. For reference, the contours shown on the noise maps are based on a reference grid with a height above ground level of 1.5 metres and 'soft ground' propagation has been assumed.

Red –	60 to 64dBA
Orange –	55 to 59dBA
Grey –	50 to 54dBA
Yellow –	45 to 49dBA
Dark Green –	40 to 44dBA
Light Green –	35 to 39dBA



Night time Contours



7.3 Noise Map Analysis

The following analysis demonstrates the noise impact on houses built within the noise contours as calculated by CADNA compared with the guidance of TAN 11.

Table 7: Noise Contours Compared with Noise Exposure Categories

Noise Contours	Noise Exposure Category
Houses built in the Red Zone	C
Houses built in the Orange Zone	B/C
Houses built in the Grey Zone	B
Houses built in the Yellow Zone	B
Houses built in the Dark Green Zone	A
Houses built in the Light Green Zone	A

Table 7 demonstrates that houses constructed within Red, Orange, Grey and Yellow Zones currently fall short of Category A, and conditions should be imposed to ensure a level of protection against noise, however; noise need not be considered as a determining factor in granting planning permission on houses built within the Dark Green and Light Green Zones.

The following recommendations proceed on the basis that development for residential use has precedence and will be considered on the condition that suitable internal noise conditions can be achieved by means of a well-designed façade sound insulation strategy.



8.0 Recommendations

The following recommendations demonstrate that noise levels within habitable rooms are achievable in accordance with BS8233:2014 and WHO Community Noise Guidelines for Day time and Night time periods. A L_{AFmax} value of 77dB has been used to calculate glazing and ventilation for houses in the Red Zone only, therefore demonstrating a worst case in order to achieve planning.

The following recommendations for glazing and ventilation should be used as a guide; but not a definitive specification, as in a real world case noise levels at facades will alter depending on the angle to the road and barrier attenuation from other houses. The calculations have been based on all facades facing the road. Therefore, we would recommend further calculations be carried out at each house façade in order to provide a more definitive specification to each house after planning has been granted.

8.1 Houses in the Red Zone

Bedrooms in the Red Zone on the night time map.

The glazing in bedrooms is suggested to be Pilkington Optiphon 9.1mm/ 20mm argon/13.1 double glazed unit, or equivalent, in well-sealed frames and without trickle vents.

The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent or similar. It's recommended where possible to avoid installing ventilation systems on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

The ceilings in the bedrooms should consist of 2 x 12.5mm Soundbloc and 200mm mineral fibre insulation laid above.

Living/Dining Rooms in the Red Zone on the day time map.

The glazing in living rooms and dining rooms is suggested to be Pilkington Optiphon 6mm/ 16mm argon/6.8 double glazed unit, or equivalent, in well-sealed frames and without trickle vents.

The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent. It's recommended where possible to avoid installing ventilation systems on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

8.2 Houses in the Orange Zone

Bedrooms in the Orange Zone on the night time map.

The glazing in bedrooms is suggested to be Pilkington Optiphon 6mm/ 16mm argon/6.8 double glazed unit, or equivalent, in well-sealed frames and without trickle vents.

The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent. It's recommended where possible to avoid installing ventilation systems



on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

The ceilings in the bedrooms should consist of 2 x 12.5mm Soundbloc and 200mm mineral fibre insulation laid above.

Living/Dining Rooms in the Orange Zone on the day time map.

The glazing in living rooms and dining rooms is suggested to be 6mm/ 12mm /6 mm double glazed units, or equivalent, in well-sealed frames and without trickle vents.

The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent. It's recommended where possible to avoid installing ventilation systems on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

8.3 Houses in the Grey Zone

Bedrooms in the Grey Zone on the night time map.

The glazing in bedrooms is suggested to be 6mm/ 12mm /6 mm double glazed units, or equivalent, in well-sealed frames and without trickle vents.

The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent. It's recommended where possible to avoid installing ventilation systems on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

The ceilings in the bedrooms should consist of 1 x 12.5mm plasterboard and 200mm mineral fibre insulation laid above.

Living/Dining Rooms in the Grey Zone on the day time map.

The glazing in living rooms and dining rooms is suggested to be 6mm/ 12mm /6 mm double glazed units, or equivalent, in well-sealed frames and without trickle vents.

The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent. It's recommended where possible to avoid installing ventilation systems on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

8.4 Houses in the Yellow Zone

Bedrooms & Living/Dining Rooms in the Yellow Zone on the night time and day time map.

The glazing in all bedroom & living/dining rooms is suggested to be 6mm/ 12mm /6 mm double glazed units, or equivalent, in well-sealed frames and without trickle vents.



The ventilation can be a passive acoustic wall ventilation system such as Greenwoods MA3051Acoustic Wall Vent or a trickle vent. It's recommended where possible to avoid installing ventilation systems on the façade that face Straight Mile or Gresford Road. Installation should be on quieter façades that don't face the main roads.

The ceilings in the bedrooms should consist of at least 1 x 12.5mm plasterboard.

8.5 Houses in the Dark Green and Light Green Zones.

Bedrooms & Living/Dining Rooms in the Dark Green and Light Green zones on both day and night time maps.

The glazing and ventilation for both bedrooms and living rooms can be the same as houses in the Yellow Zone.

8.6 Notes on Ventilation

The glazing and ventilation suggestions have been calculated assuming the window is closed. However it must be noted that windows are suggested to be openable to provide rapid or purge ventilation or means of escape. Noise levels in habitable rooms will exceed the WHO recommended values with windows opened.



8.7 Calculation Methodology

The calculations and predicted levels are based on the existing external façade being brick/cavity/block construction.

The calculations are based on a typical furnished living room of 40m³ and a window area of 2.5m², and a typical furnished bedroom of 25m³ with a window area of 1.5m².

The calculations assume each room has a reverberation time of Rt 0.5s.

The predictions also have been calculated assuming the window is closed and without trickle vents, unless specifically included in the calculation tables.

8.8 Building Elements

Table 8 shows the expected performance of the glazing and ventilation detail.

Table 8: Table showing suggested Glazing and Ventilation

Element	Description [#]	$R_w/D_{n,e,w}$ (dB)	Octave Centre Frequencies (Hz) SRI / $D_{n,e}$ (dB)					
			125	250	500	1k	2k	4k
Glazing	Pilkington Optiphon 9.1mm/20mm argon/13.1mm	50	29	39	49	52	55	63
Glazing	Pilkington Optiphon 6mm/16mm argon/6.8mm	38	22	27	35	42	41	48
Glazing	6mm/12mm cavity/6mm BS6262-2:2005	-	23	18	29	39	33	40
Ventilation	Greenwoods MA3051 Acoustic Window Ventilator	55	48	46	49	54	65	-

**The selected units or products described have been used as a guide to form part of the specification. Other similar units or products can be used provided they can achieve the given minimum acoustic performance.*

Table 6 shows the SRI values of the building elements used within the calculations.

Table 9: Building Elements

Element	Source	R_w (dB)	Octave Centre Frequencies (Hz) SRI					
			125	250	500	1k	2k	4k
Walls/Facades	Brick /Cavity/Block	50	40	44	45	51	56	-



8.9 Expected Performance after Recommended Glazing & Ventilation

Table 10

Zone	Highest Level (dBA)	LAFmax	Results		
			LAFmax	Day	Night
Red	64	77	44.4	28	30
Orange	59	-	-	28	28
Grey	54	-	-	23	27
Yellow	49	-	-	18	25
Dark Green	44	-	-	13	20
Light Green	39	-	-	7	15

8.10 Uncertainty

While every endeavour has been taken to ensure the accuracy of measurements and subsequent calculations, all acoustic measurements and assessments are subject to a degree of uncertainty, estimated to be up to plus/minus 3 dB, when calculating internal noise levels in bedrooms and living rooms.



9.0. Conclusions

The noise maps demonstrate that in some house locations; “conditions should be imposed to ensure a commensurate level of protection against noise.”

The suggested glazing and ventilation in the recommendations section demonstrates that the recommended internal noise levels described in BS8233:2014 and WHO Noise Guidelines can be achieved in all bedrooms and living rooms.

10.0. References

Planning Guidance (Wales) Technical Advice Note 11: Noise (TAN 11)

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

World Health Organisation Guidelines: 1999

BS 7445-1: 2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

The Little Red Book of Acoustics – R. Watson & O Downey

www.google.co.uk/maps



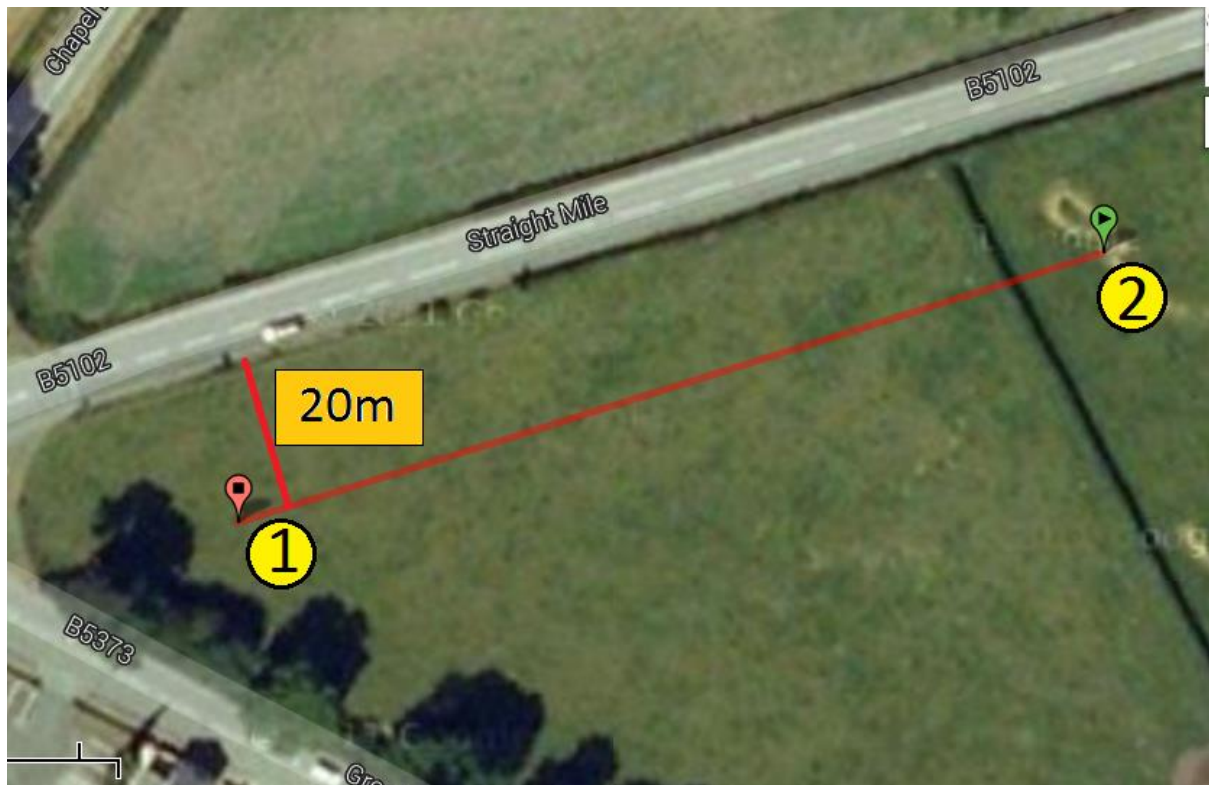
Appendix 1

Figure 1: Aerial view of proposed development





Figure 2: Aerial View Showing Monitoring Positions





Appendix 2

Email From Paul Campini to Mike Cunningham requesting the Noise Assessment

From: Paul Campini [<mailto:Paul.Campini@wrexham.gov.uk>]

Sent: 23 September 2014 11:35

To: Mike Cunningham

Subject: RE: Gresford Road, Llay

Hi Mike

I also discussed whether a noise assessment would be asked for in our response to a planning consultation. My colleagues explained that due to the industrial estate near the North Western corner of the development (assuming the map is orientated north to south) we would be asking for an assessment, known as a TAN 11 assessment. Again this is something that could be carried out by a consultant, which I have attached a list of in case it's of use to you.

Regards

Paul Campini

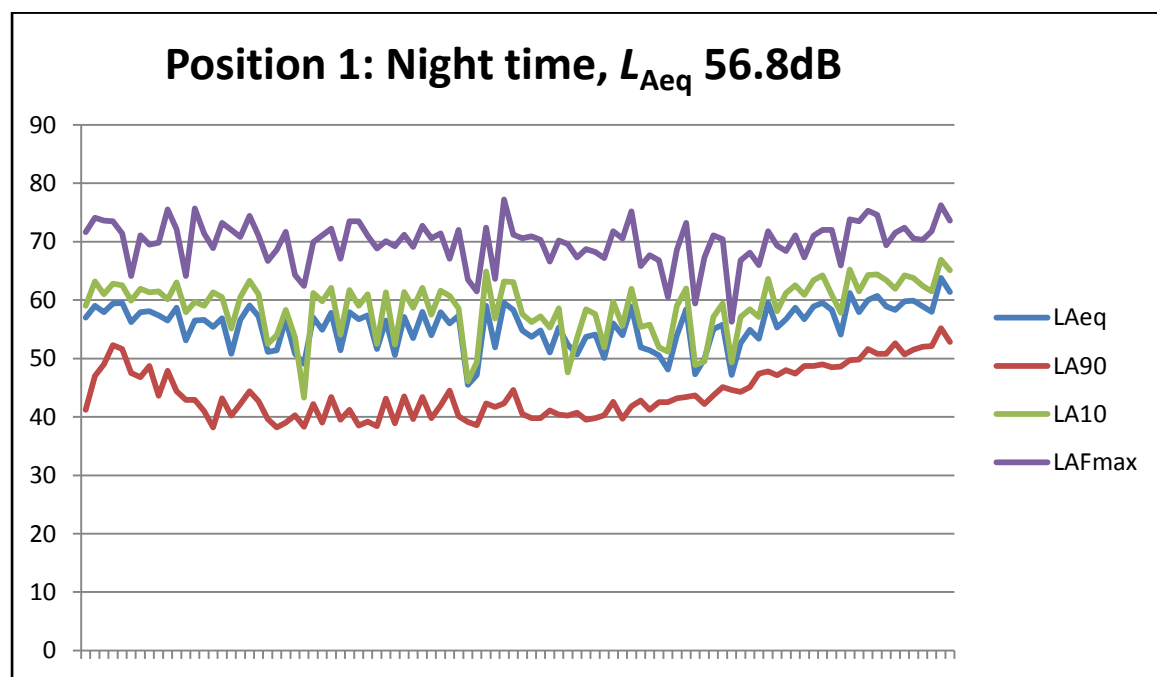
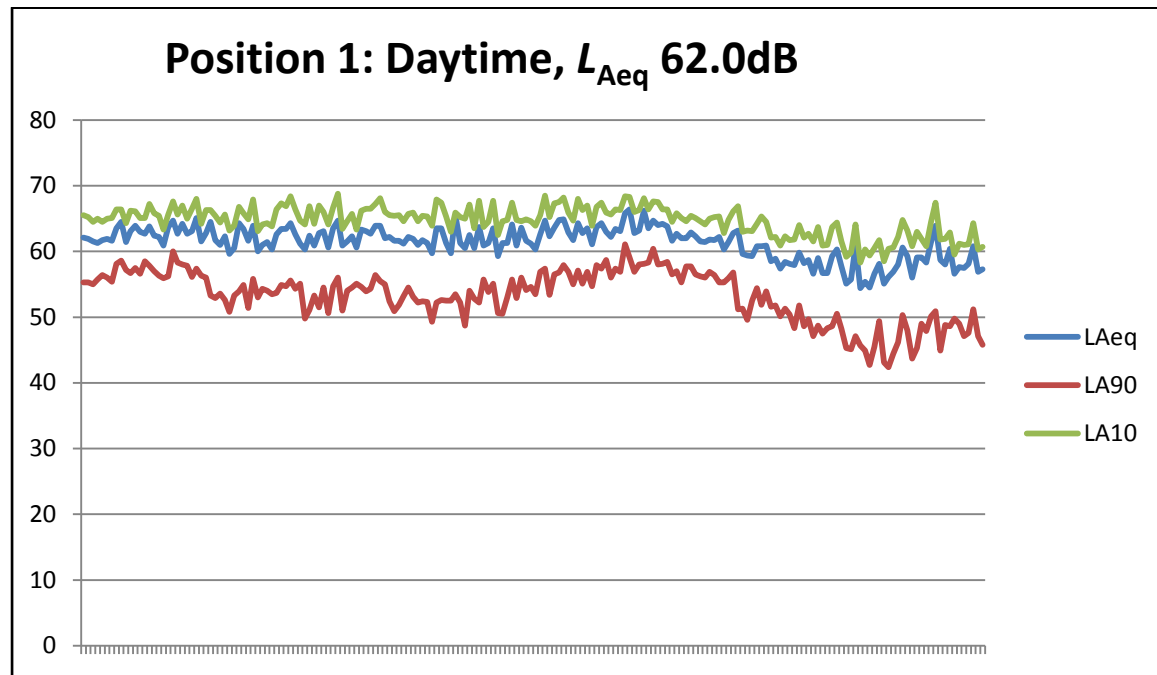
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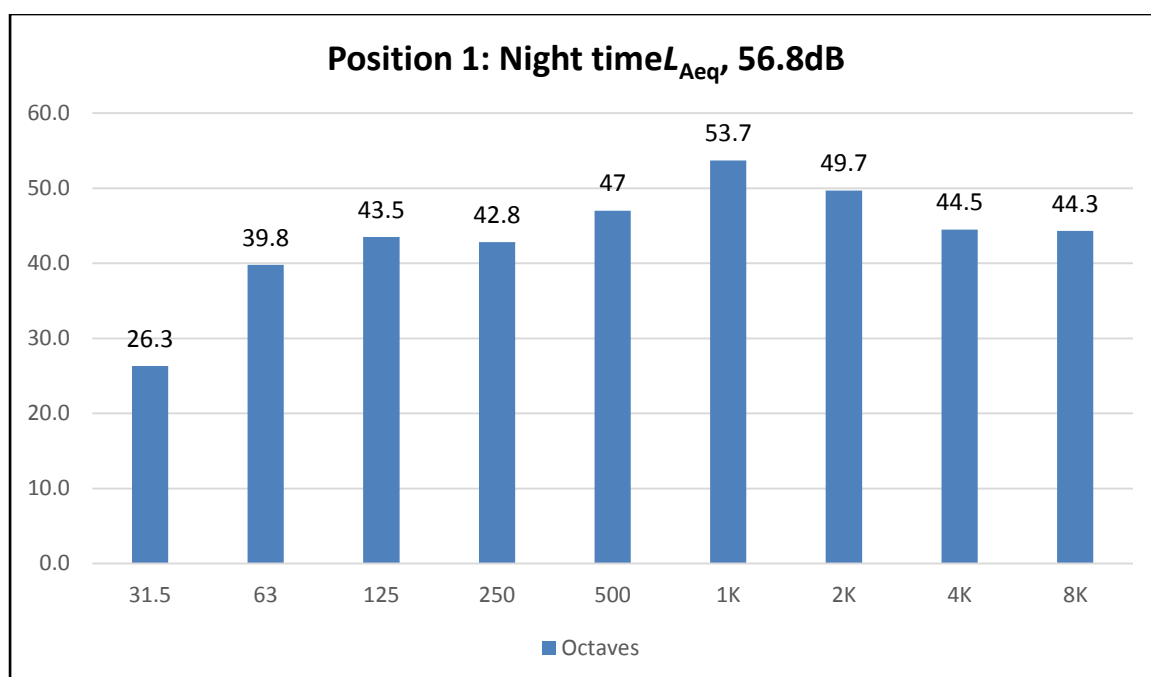
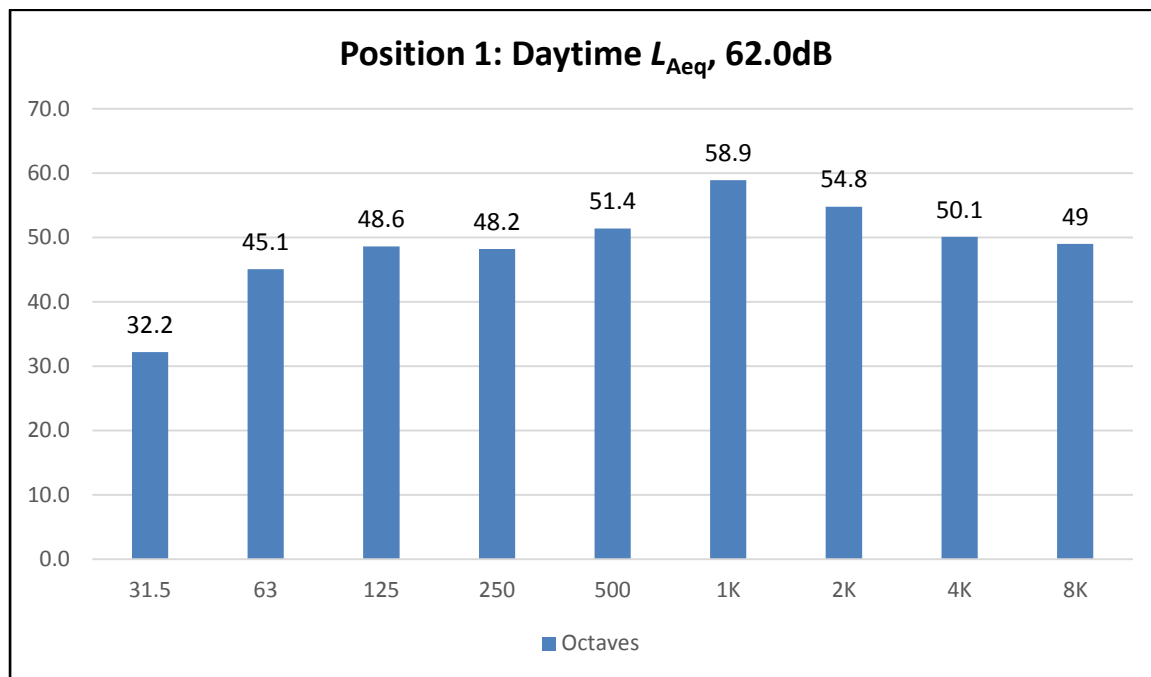
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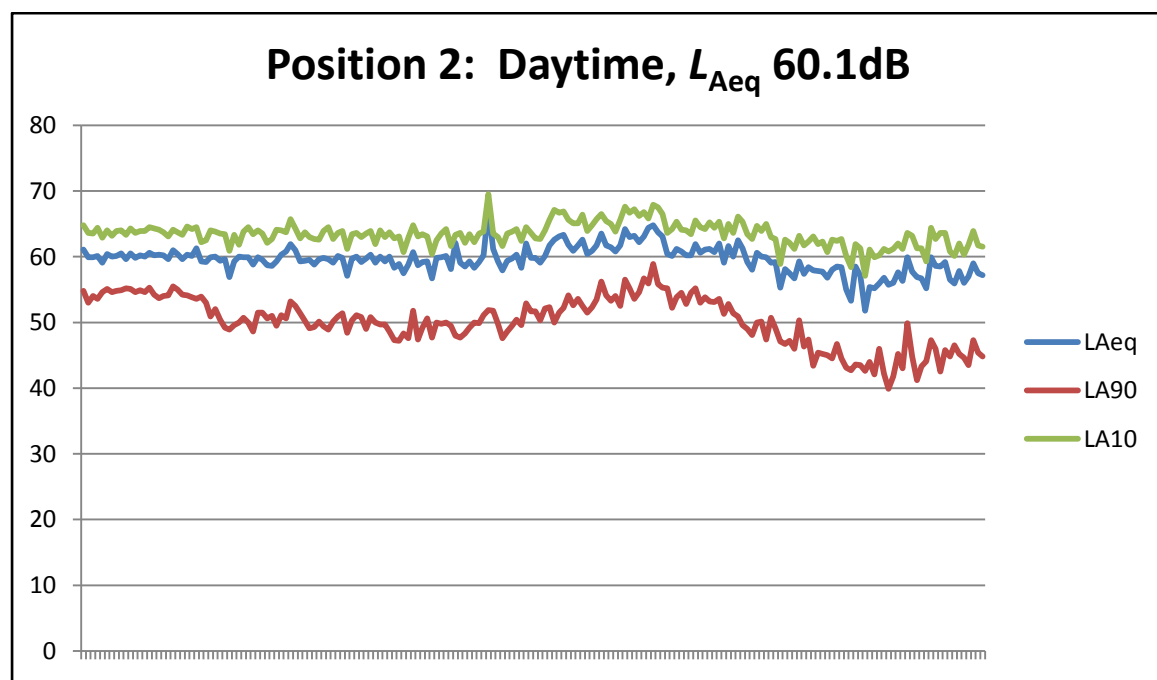
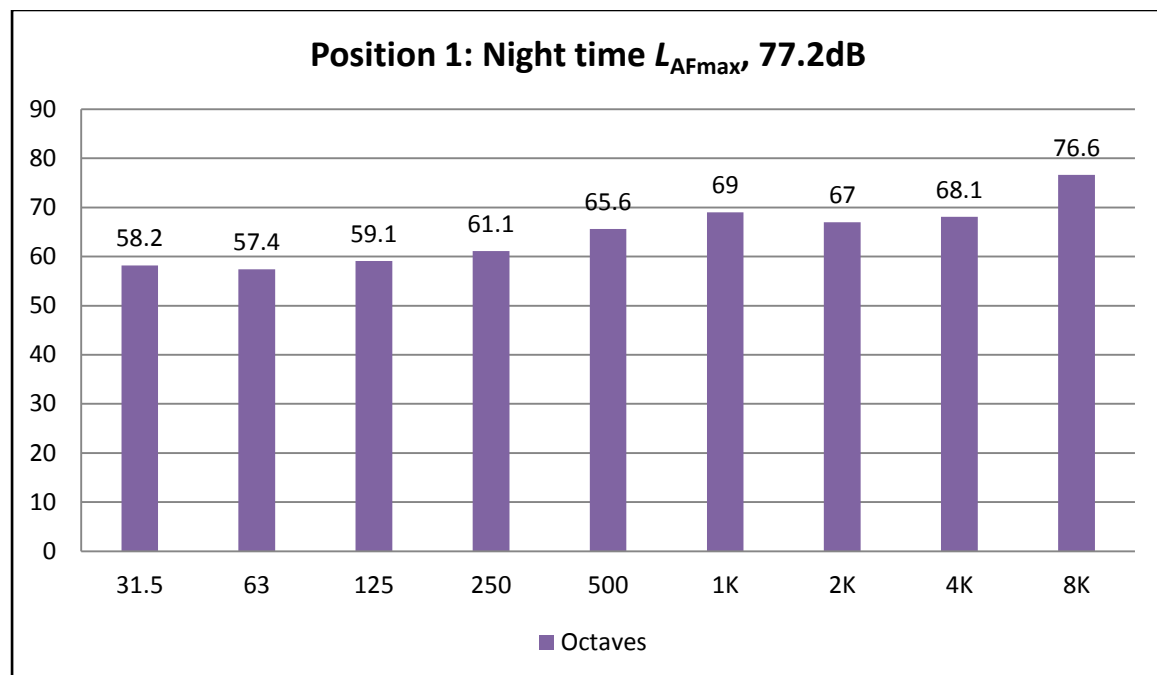
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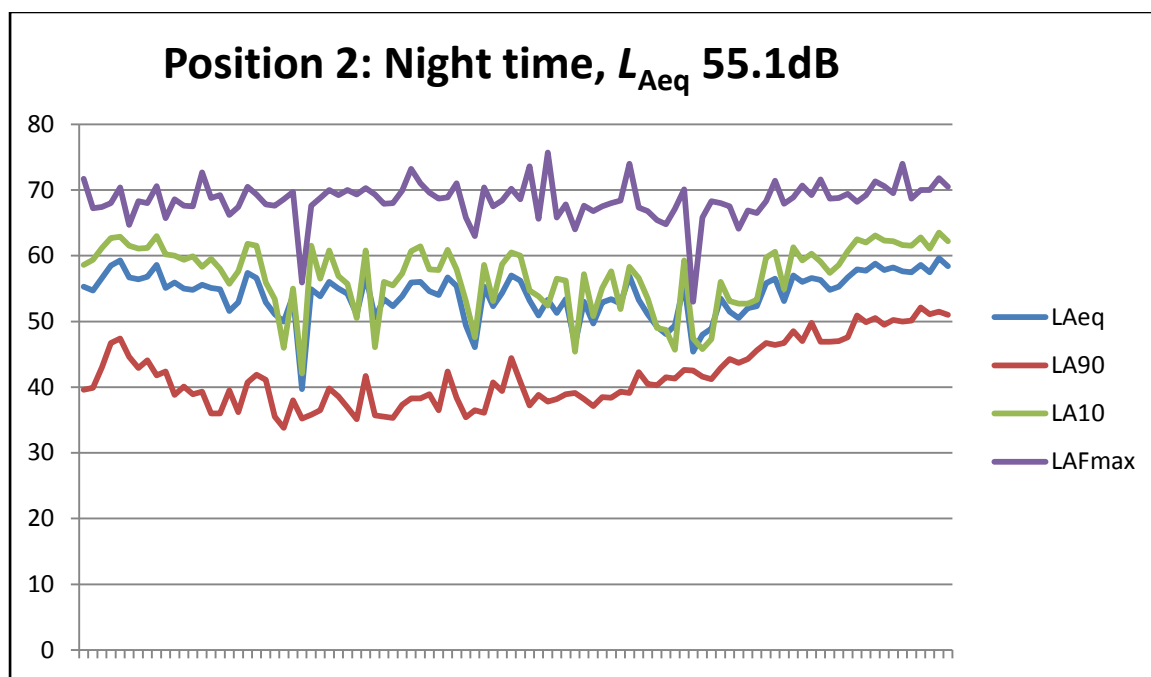


Measurement Results

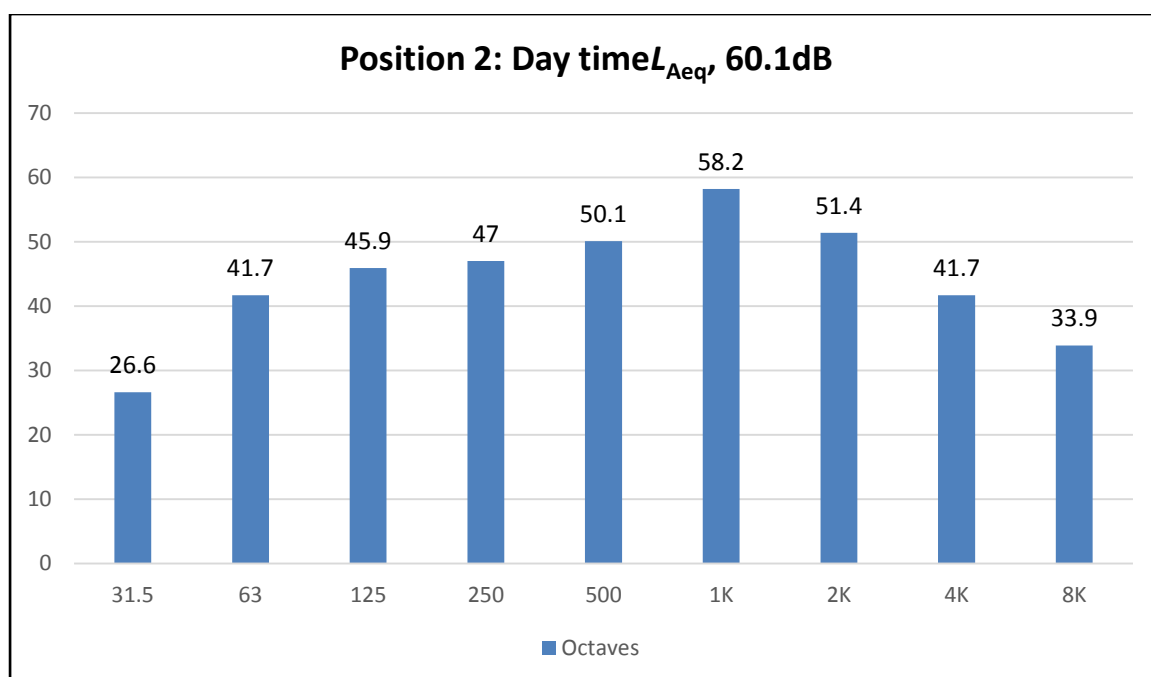


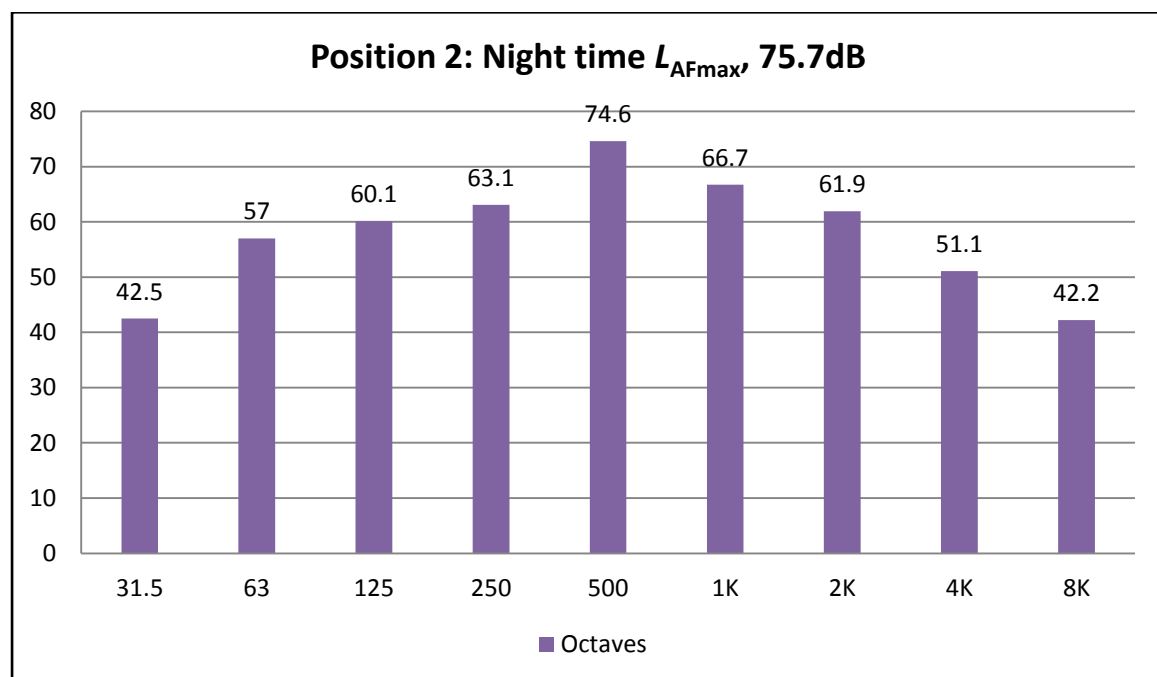
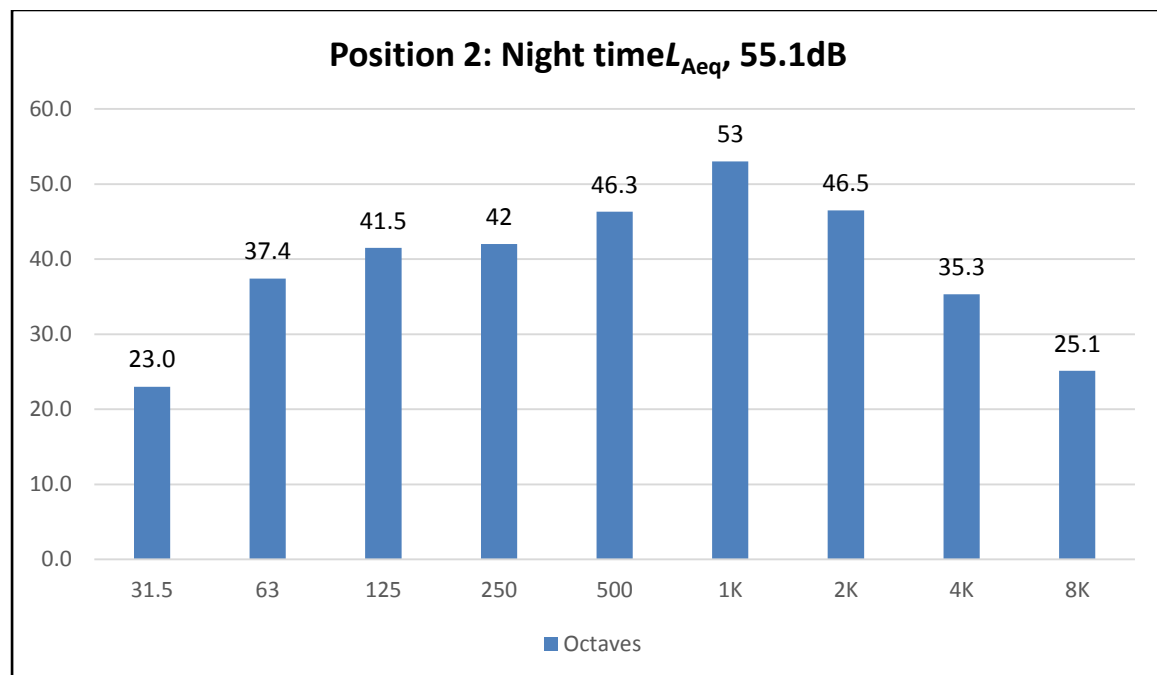
**A weighted 1:1 Octave Results,**





A weighted 1:1 Octave Results





More detailed measured data is available on request.