

REPORT REFERENCE:

SA – 6595/Rev4

UPDATED SECTIONS

(1.6, 1.7.2, 11.4-11.9, 15.4, 15.5.2)

NOISE IMPACT ASSESSMENT

PRoPG Planning and Noise

British Standard 8233: 2014

World Health Organisation (WHO)

British Standard 6472 & 7385

British Standard 4866

CLIENT:

Vivid

SITE:

Land at Toynbee Road

Eastleigh

Hampshire

SO50 9DN

SURVEY DATES:

25th – 30th September 2020

Vibration 25th – 29th September 2020

Report By	
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1 EXECUTIVE SUMMARY

1.1 Instruction

Sound Advice Acoustics Ltd have been instructed by Vivid to undertake a background noise survey to British Standard 8233: 2014 to determine the impact of existing noise sources on the proposed accommodation scheme at Land at Toynbee Road, Eastleigh, Hampshire, SO50 9DN.

1.2 Scope of Report

The measurements will be undertaken in accordance with ISO 1996 – Part 2: 2017 to determine the existing background noise levels and British Standard 8233: 2014 will be used to determine the impact of existing traffic on the internal noise environment within the proposed residential dwellings. This report aims to establish the following:

- Existing background noise levels within the area;
- Assess the potential internal noise levels on the proposed rooms;
- Provide specifications for the ventilation and window glazing with the proposed rooms;
- Assess the vibration from the railway;

1.3 Summary of Results

1.3.1 Background Noise Levels

A 120 hour background noise survey was undertaken from 25th - 30th September 2020 at two positions at the front of the site and the rear of the site in order to establish the underlying background noise levels. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 52.3 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 48.6 dB at position 1. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 72.7 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 70.4 dB at position 2.

Assessment Position	Date Start	Date Finish	Daytime LAeq	Night Time LAeq
Position 1 Front	25/09/2020	30/09/2020	52.3	48.6
Position 2 Rear	25/09/2020	30/09/2020	72.7	70.4

1.4 Potential Façade Noise Levels

1.4.1 Daytime (07:00-23:00)

Time Period	Highest Potential Façade Noise Level	Noise Risk Category 2 - Medium
Average Daytime (07:00-23:00)	$L_{Aeq, 16 \text{ HOUR}}$ 69.0 dB	63 - 70 dB

1.4.2 Night Time (23:00-07:00)

Time Period	Highest Potential Façade Noise Level	Noise Risk Category 3 - High
Average Night Time (23:00-07:00)	$L_{Aeq, 16 \text{ HOUR}}$ 67.0 dB	> 60 dB
	Maximum (10 Times) – L_{Amax} 87.5 dB	>80 dB (10 Times in 8 Hours)

1.5 Risk Assessment

1.5.1 Daytime (07:00-23:00) – Position 1

Risk Assessment Category	Risk Assessment
2 – Medium	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

1.5.2 Night Time (23:00-07:00) – Position 1

Risk Assessment Category	Risk Assessment
3 – High	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

The above table demonstrates this site is located within Noise Risk Category 2 which suggests a medium level of risk for daytime levels and Noise Risk Category 3 which suggests a high of risk for night time levels. Therefore, further mitigation levels will be required at Stage 2.

1.6 Good Acoustic Design

Forman Homes have redesigned the site with acoustics in mind and are aware of the noise levels associated with the neighbouring railway line. To this extent, they have designed the internal layout of the properties facing the railway line and associated noise source, and positioned as little habitable rooms as is reasonably possible facing this source. Therefore, it has been considered that Forman Homes have taken every reasonable step to ensure the acoustic impact of noise from the neighbouring railway line is kept to a minimum.

1.7 Summary of Vibration

1.7.1 Results from Measured Vibration Levels

The following vibration levels have been assessed over a typical period between 25th – 29th September 2020. The following table summarises these results:-

Time Period	Vibration Dose Value m/s ^{1.75}			Peak Particle Velocity mm/s
	L	T	V	Resultant Vector
25 th September 2020 – 7 Hr	0.027	0.027	0.052	*1.28mm/s
26 th September 2020 – 16 Hr	0.026	0.026	0.058	1.05mm/s
27 th September 2020 – 16 Hr	0.026	0.026	0.055	.900mm/s
28 th September 2020 – 16 Hr	0.024	0.026	0.05	.825mm/s
25 th – 26 th September 2020 – 8 Hr	0.025	0.022	0.038	.675mm/s
26 th – 27 th September 2020 – 8 Hr	0.022	0.022	0.039	.675mm/s
27 th – 28 th September 2020 – 8 Hr	0.022	0.023	0.042	.750mm/s
28 th – 29 th September 2020 – 8 Hr	0.022	0.022	0.034	.700mm/s

Table 3 Summary of daily VDV and PPV

* Denotes Set Up

The vibration results indicate that vibration dose values (vdv) at the measurement locations are below 0.2 – 0.4 for daytime and night time periods. These values are below the range associated with ‘low probability of adverse comment’.

The maximum peak particle velocity recorded was found to be 1.28 mm/s at Location 1. In accordance with the guidance in BS7385, this value is below the limit at which cosmetic damage to building is likely.

The results of this vibration survey indicate that in accordance with the advice given in the appropriate standards, there is likely to be no concern of adverse comments from future occupants of their properties and no concern of cosmetic damage to buildings arising from vibration at this measurement location.

1.7.2 Building Vibration Transfer Risk Assessment

This assessment has concluded that based on the proposed foundation and construction methods, the conclusion would be on the border of a ‘Low to Medium Risk’ level of vibration transfer and that need for proprietary isolation of the foundations from the main structure should be considered as a precautionary measure at the design stage.

There are a range of other standards that can be considered and the following demonstrates these and their requirements and further gives guidance as to where this site is positioned within these criteria. These standards further confirm and underpin our recommendations made.

1.8 Glazing & Ventilation Specification

The development should be designed with an 8mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Mechanical Ventilation Heat Recovery (MVHR) unit or similarly approved to all the living room facades highlighted in red in section 9.16 of this technical report. The bedrooms should be designed with a 6mm glass / 16mm argon air gap / 6.8mm Pilkington optiphon glass double glazed windows and a Mechanical Ventilation Heat Recovery (MVHR) unit or similarly approved highlighted in red in section 9.16 of this technical report. The remainder of the development can utilise a standard 4mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Titon V25 standard canopy vent to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

The upgraded glazing for the bedroom facades highlighted in red in section 9.16 is necessary, in order that the night time L_{Amax} 45 dB criteria is achieved.

1.9 WHO Guidelines for Community Noise

The development proposes external living areas and therefore an assessment to the World Health Organisation's 'Guidelines for Community Noise' has been carried out. The guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a railway. The calculations have demonstrated that the garden areas of the proposed houses are likely to see noise levels below the lower guideline of 50 dB.

1.10 Conclusion

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed residential dwellings and satisfy the local council's requirements.

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2021, NPPF & NPSE.

Finally, it should be noted that Eastleigh Borough Council's representative for their Environmental Health Department have made comments in relation to our initial report and these are addressed within the appendix of this report.

2 INTRODUCTION

Sound Advice Acoustics Ltd have been instructed by Vivid to undertake a background noise survey to British Standard 8233: 2014 to determine the impact of existing noise sources on the proposed accommodation scheme at Land at Foreman Road, Ash, Aldershot, GU12 6BE.

Ambient noise levels were measured between 25th - 30th September 2020. This report by Sound Advice Acoustics Ltd gives the results of these measurements and an assessment in accordance with government planning guidelines and relevant standards together with mitigation measures as required.

With regards to external ambient noise, environmental noise levels are to be monitored at the site in accordance with British Standard 7445: 2003 'Description and measurement of environmental noise assessments and assessments made in-line with PProPG: Planning and Noise.

2.1 Planning Practice Guidance and Noise

March 2014 saw the publication of the Planning Practice Guidance for Noise (PPG-Noise) and this was subsequently updated in December 2014. The Planning Practice Guidance and Noise sets out details of how potential noise impacts should be evaluated.

'Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- ✓ *whether or not a significant adverse effect is occurring or likely to occur;*
- ✓ *whether or not an adverse effect is occurring or likely to occur; and*
- ✓ *whether or not a good standard of amenity can be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.'

In accordance with Stage 2: Full Assessment, Other Noise Sources, detailed calculations and assessments should be carried out pertaining to these as PPG Noise does not provide advice and guidance when taking these elements into consideration.

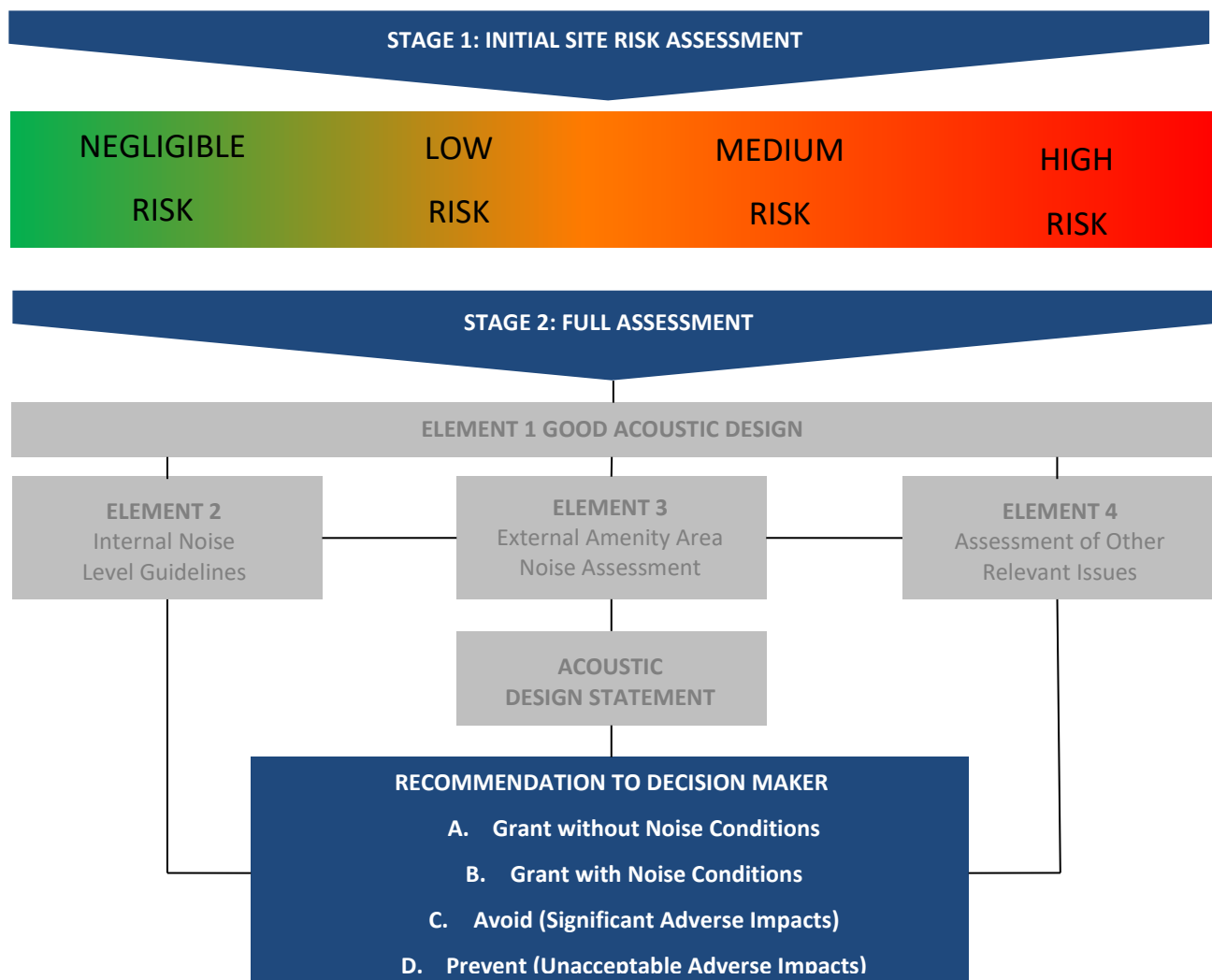
The Local Plan from Eastleigh Borough Council references BS8233: 2014 and therefore all calculations contained within this report will look to meet this criteria.

2.1.1.1 Professional Practice Guidance on Planning & Noise.

The Professional Practice Guidance (PRoPG) on Planning and Noise for New Residential Development was published in May 2017 by the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH). This document was developed in order to offer professional guidance on recommended strategies to the management of noise for use in the associated planning applications for specific sites. This furthermore, provides a numerical acoustic standard in accordance with the Government's planning and noise policies.

This document has been developed to ensure the developer adopts a good acoustic design process to ensure protection for future residents from the potential harmful effects from noise. The PRoPG denotes that it *'does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate'*.

The PRoPG adopts a twin-stage approach, firstly providing an 'Initial Noise Risk Assessment' of the proposed development site before undertaking a detailed approach of a noise impact assessment. The results from the initial noise risk assessment are an indication of the general acoustic environment of the proposed development and demonstrate how detailed the noise impact assessment will need to be in order to mitigate any acoustic issues.



2.2 British Standard 8233: 2014

Calculations are to be made in accordance with BS 8233: 2014 Sound Insulation and Noise Reduction for Buildings Code of Practice.

BS 8233: 2014 set the following parameters as target levels that should be designed to within rooms such as Living Rooms and Bedrooms.

Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important		
Objective	Typical situations	Design Range $L_{Aeq,t}$ dB
Typical noise levels for acoustic privacy in shared spaces	Living room	35 – 40
NOTE: See Noise control in building services [28] and BS EN ISO 3382.		

Indoor ambient noise levels for dwellings			
Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB L_{Aeq} 16 HOUR	--
Dining	Dining Room / Area	40 dB L_{Aeq} 16 HOUR	--
Sleeping (daytime resting)	Bedroom	35 dB L_{Aeq} 16 HOUR	30 dB L_{Aeq} 8 HOUR

Calculations and assessments are therefore to be carried out in order to satisfy the above requirements of BS8233: 2014.

2.3 National Planning Policy Framework 2021 (NPPF) and Noise Policy Statement for England 2010 (NPSE).

References and evaluations are to be made to the National Planning Policy Framework 2021 (NPPF) and the Noise Policy Statement for England 2010 (NPSE). The purpose of this document is to include all aspects of environmental noise within assessments i.e. environmental noise, neighbour noise and neighbourhood noise. Noise is to be considered alongside other relevant issues relating to the site and should not be considered in isolation, according to the NPSE.

There are several key phrases within the NPSE aims and these are discussed below.

“Significant adverse” and “adverse”

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

2.4 World Health Organisation ‘Guidelines for Community Noise’

In addition, calculations are to be made for the predicted daytime noise levels within the outdoor living area and assessments made against the recommended levels within the World Health Organisation’s ‘Guidelines for Community Noise’. In order to evaluate these levels accurately, the 3D modelling software CADNA A is to be adopted for the purpose of this assessment.

Finally, assessments and references are to be made to the World Health Organisation Night Time Noise Guidance 2009.

3 SITE LOCATION

Position of Site in Wider Area

The site is located in Eastleigh, Hampshire. The dominant noise source is rail traffic noise.



3.1 Proposed Development

The proposed development is shown below.



4 PROCEDURE

External noise levels were recorded over a typical period and analysis date extrapolated between 07:00 hrs 25th and 07:00 hrs on 30th September 2020 at positions 1 & 2 as detailed within this report.

Position 1 was located at the Southern boundary of the site in order to capture the noise levels associated with the background and Position 2 was located at the Northern boundary of the site in order to capture the railway noise levels. Sample measurements were recorded over continuous 15 minute samples and from this data the hourly LAeq daytime values have been evaluated. Sound Pressure Levels were recorded on the following setting along with a full octave band frequency analysis measured simultaneously and between 31.5 Hz and 16.0 kHz.

<u>Daytime 07:00 – 23:00</u>		<u>Night Time 23:00 – 07:00</u>	
L _{Aeq} 1 HOUR dB	L _{A10} 1 HOUR dB	L _{Aeq} 15 MINUTES dB	L _{A10} 15 MINUTES dB
L _{AMAX} 1 HOUR dB	L _{A50} 1 HOUR dB	L _{AMAX} 15 MINUTES dB	L _{A50} 15 MINUTES dB
L _{AMIN} 1 HOUR dB	L _{A90} 1 HOUR dB	L _{AMIN} 15 MINUTES dB	L _{A90} 15 MINUTES dB

Calculations have been made in accordance with BS 8233: 2014 'Sound Insulation and Reduction of Buildings - Code of Practice'. Recommendations were made for any additional acoustics measures to conform to these standards.

From the downloaded recorded results, the daytime and night time periods were assessed and used within the above calculations as L_{Aeq} 16 HOUR dB levels for daytime and L_{Aeq} 8 HOUR dB levels for night time. These are detailed within this report. All data averaged throughout the day has been done so on a logarithmic basis to give accurate L_{Aeq} 16 Hour dB daytime and L_{Aeq} 8 Hour dB night time noise levels.

Finally, it should be noted that calculations are carried out with façade levels corrected from the recorded noise levels to the calculated façade levels.

5 APPARATUS

The equipment was calibrated using a sound pressure level of 114.0 dB at an octave band centre frequency of 1000Hz with reference to $2 \times 10^{-5} \text{ Nm}^{-2}$ before and after the tests and the equipment set to have no inaccuracy greater than 0.2dB.

All the following equipment was calibrated in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates. Calibration schedules are implemented within Sound Advice Acoustics Ltd in accordance with UKAS directive LAB 23.

5.1 Rion noise meter s/n 00242696 environmental testing – Position 1

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Rion	NL-52	<u>00242696</u>	2 YEARS	10.06.2019	10.06.2021
12.5mm Microphone (with windshield)	Rion	UC-59	<u>06178</u>	2 YEARS	10.06.2019	10.06.2021
Microphone Pre – Amplifier	Rion	NH-25	<u>32724</u>	2 YEARS	10.06.2019	10.06.2021

5.2 140 noise meter s/n 1403140 environmental testing – Position 2

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	140	<u>1403140</u>	2 YEARS	05.04.2019	05.04.2021
12.5mm Microphone (with windshield)	Norsonic	<u>GRAS 40AE</u>	<u>114650</u>	2 YEARS	05.04.2019	05.04.2021
Microphone Pre – Amplifier	Norsonic	1201	<u>30327</u>	2 YEARS	05.04.2019	05.04.2021

Full calibration certificates are available upon request.

6 RESULTS

$L_{Aeq,t}$	The equivalent A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.
$L_{A90,t}$	The A weighted sound pressure level that is exceeded for 90% of the time period 5 minutes night time and 1 hourly daytime.
$L_{A50,t}$	The A weighted sound pressure level that is exceeded for 50% of the time period 5 minutes night time and 1 hourly daytime
$L_{A10,t}$	The A weighted sound pressure level that is exceeded for 10% of the time period 5 minutes night time and 1 hourly daytime
L_{Amax}	The maximum A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.
L_{Amin}	The minimum A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.

6.1 Downloaded results, and averages.

6.1.1 25th – 26th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	52.3	93.1	60.7	55.3	52.6	49.9	48.9	49.6	40.8	33.9	33.3	12.3
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	46.0	76.8	45.2	45.7	44.1	43.2	43.6	43.4	33.1	20.6	24.2	8.2

6.1.2 26th – 27th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	48.7	90.3	60.5	53.3	49.3	46.1	44.8	46.4	36.8	29.9	30.5	10.6
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	42.4	92.4	60.7	52.1	43.2	39.3	38.6	38.8	32.0	29.7	30.3	11.0

6.1.3 27th – 28th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	48.5	90.7	60.9	53.5	49.9	46.3	44.6	45.8	37.1	30.2	31.4	11.0
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	48.6	69.6	48.7	46.5	44.8	44.1	45.9	46.4	35.4	27.5	30.1	8.2

6.1.4 28th – 29th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	48.5	76.3	51.0	50.7	48.9	46.1	44.9	45.7	38.7	30.1	24.4	11.0
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	42.8	65.1	43.0	43.2	41.9	39.8	39.7	40.1	32.3	21.4	18.4	11.5

6.1.5 29th – 30th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	47.6	74.2	51.2	50.6	49.0	45.6	43.6	44.0	38.5	35.1	32.0	10.8
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	48.0	69.0	50.1	48.7	45.4	44.4	45.1	45.8	35.9	20.4	18.6	8.1

The following noise levels have been corrected for the highest recorded façade levels and used within the BS 8233: 2014 calculations - Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	52.3	93.1	60.7	55.3	52.6	49.9	48.9	49.6	40.8	33.9	33.3	12.3
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	48.6	69.6	48.7	46.5	44.8	44.1	45.9	46.4	35.4	27.5	30.1	8.2

6.1.6 25th – 26th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	72.7	113.2	68.5	65.8	60.5	62.3	60.4	60.2	60.9	70.7	55.8	55.8
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	70.4	115.5	61.1	64.1	59.4	63.5	60.3	58.7	59.5	68.1	50.5	46.5

6.1.7 26th – 27th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	64.9	100.0	65.0	62.8	58.0	57.7	56.3	56.4	55.6	61.2	54.0	40.3
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	47.8	69.3	63.3	55.1	45.7	43.1	42.8	42.6	38.3	41.8	26.4	20.6

6.1.8 27th – 28th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	51.9	71.3	62.3	55.2	47.9	47.6	47.2	49.2	41.0	41.8	25.7	18.0
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	61.4	103.1	52.8	53.2	50.9	56.0	52.6	53.5	53.1	57.5	45.1	49.2

6.1.9 28th – 29th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	70.8	106.6	61.5	65.3	60.0	60.9	59.3	59.4	61.7	68.2	56.1	56.4
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	62.2	100.2	55.2	56.8	53.9	56.4	56.2	54.3	54.4	57.8	45.5	42.0

6.1.10 29th – 30th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	72.7	111.3	62.2	66.4	59.2	61.0	60.3	60.0	62.6	70.4	59.7	57.2
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	64.9	103.5	55.8	56.1	56.0	59.6	56.9	56.0	56.8	61.2	48.4	48.6

The following noise levels have been corrected for the highest recorded façade levels and used within the BS 8233: 2014 calculations - Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmaz	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding LAmaz 16 HOUR	72.7	113.2	68.5	65.8	60.5	62.3	60.4	60.2	60.9	70.7	55.8	55.8
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding LAmaz 8 HOUR	70.4	115.5	61.1	64.1	59.4	63.5	60.3	58.7	59.5	68.1	50.5	46.5

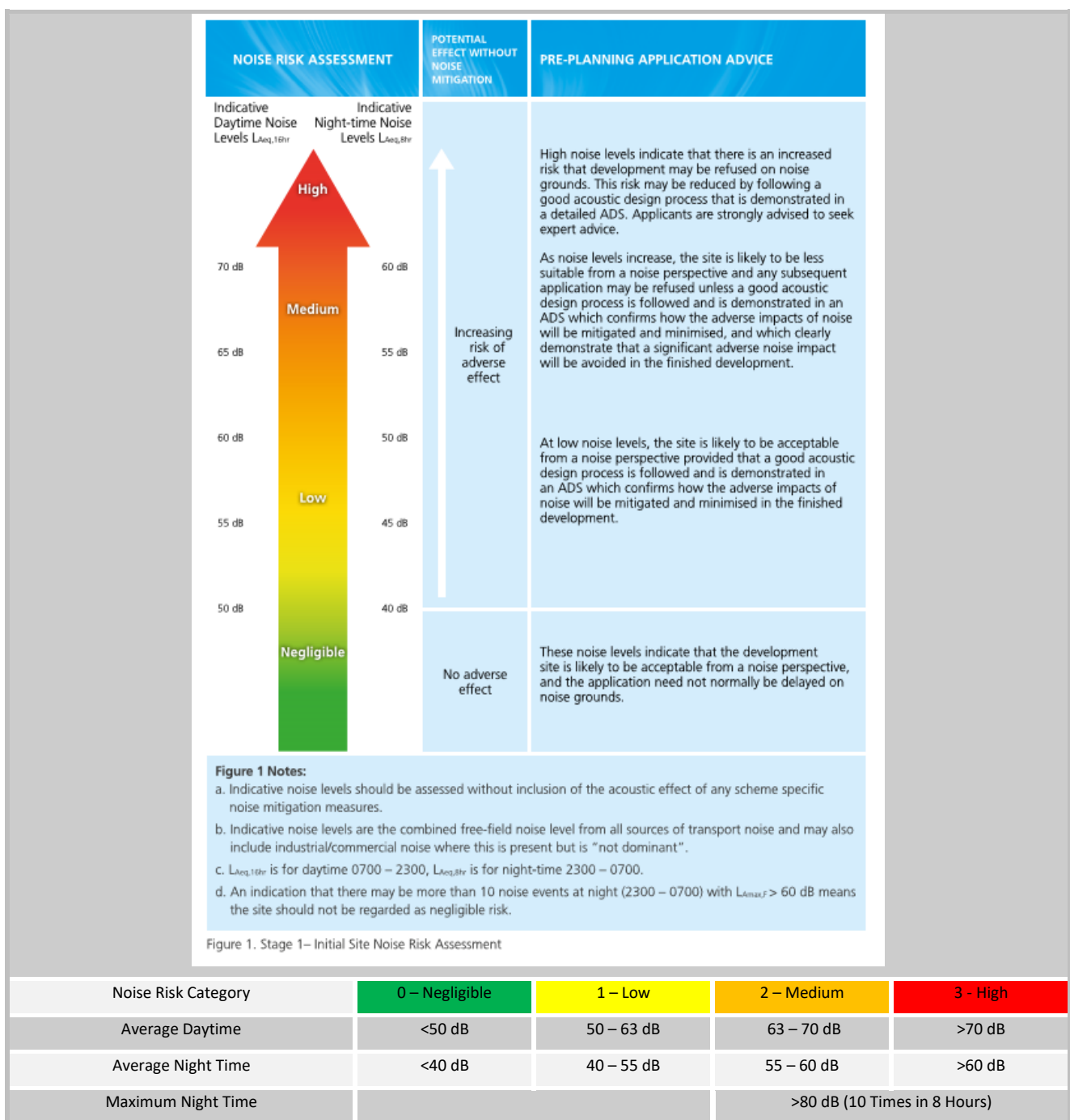
7 PROPG PLANNING & NOISE STAGE 1

7.1 Stage 1: Initial Site Noise Risk Assessment

The Stage 1, Initial Noise Risk Assessment, compares the recorded ambient noise levels obtained from the acoustic survey and correlates these against the risk scale within the Pro PG Document in order to evaluate any potential adverse effects the site is currently exposed to with regards to noise.

The outcome of the Stage 1 assessment will determine the level of detail required within Stage 2 in order to demonstrate suitable mitigations can be introduced to ensure continuing compliance with the relevant standards, local planning policies and Pro PG.

The following table demonstrates the Initial Risk Assessment Noise Levels as detailed within PROPG Figure.1:-



Based on the data collected from the aforementioned noise survey, the following PROPG Stage 1 assessments can be made:-

7.2 Potential Façade Noise Levels

7.2.1 Daytime (07:00-23:00)

Time Period	Highest Potential Façade Noise Level	Noise Risk Category 2 - Medium
Average Daytime (07:00-23:00)	$L_{Aeq, 16 \text{ HOUR}}$ 69.0 dB	63 - 70 dB

7.2.2 Night Time (23:00-07:00)

Time Period	Highest Potential Façade Noise Level	Noise Risk Category 3 - High
Average Night Time (23:00-07:00)	$L_{Aeq, 16 \text{ HOUR}}$ 67.0 dB	> 60 dB
	Maximum (10 Times) – L_{Amax} 87.5 dB	>80 dB (10 Times in 8 Hours)

7.3 Risk Assessment

7.3.1 Daytime (07:00-23:00) – Position 1

Risk Assessment Category	Risk Assessment
2 – Medium	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

7.3.2 Night Time (23:00-07:00) – Position 1

Risk Assessment Category	Risk Assessment
3 – High	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

The above table demonstrates this site is located within Noise Risk Category 2 which suggests a medium level of risk for daytime levels and Noise Risk Category 3 which suggests a high of risk for night time levels. Therefore, further mitigation levels will be required at Stage 2.

8 PROPG PLANNING & NOISE STAGE 2 - ELEMENT 1 – GOOD ACOUSTIC DESIGN

Given the size and orientation of the proposed site, it is recommended that the developer adopt, where practically possible, a good acoustic design which should include careful consideration of the positioning of the proposed properties together with thoughts being taken as to internal layouts to minimise noise sensitive rooms facing onto dominant noise sources within the local areas. Given the size of this development, every effort has already been made to minimise the acoustic impact from the surrounding areas.

Forman Homes have redesigned the site with acoustics in mind and are aware of the noise levels associated with the neighbouring railway line. To this extent, they have designed the internal layout of the properties facing the railway line and associated noise source, and positioned as little habitable rooms as is reasonably possible facing this source. Therefore, it has been considered that Forman Homes have taken every reasonable step to ensure the acoustic impact of noise from the neighbouring railway line is kept to a minimum.

9 ELEMENT 2 – INTERNAL NOISE LEVEL GUIDELINES

9.1 Discussion of Results

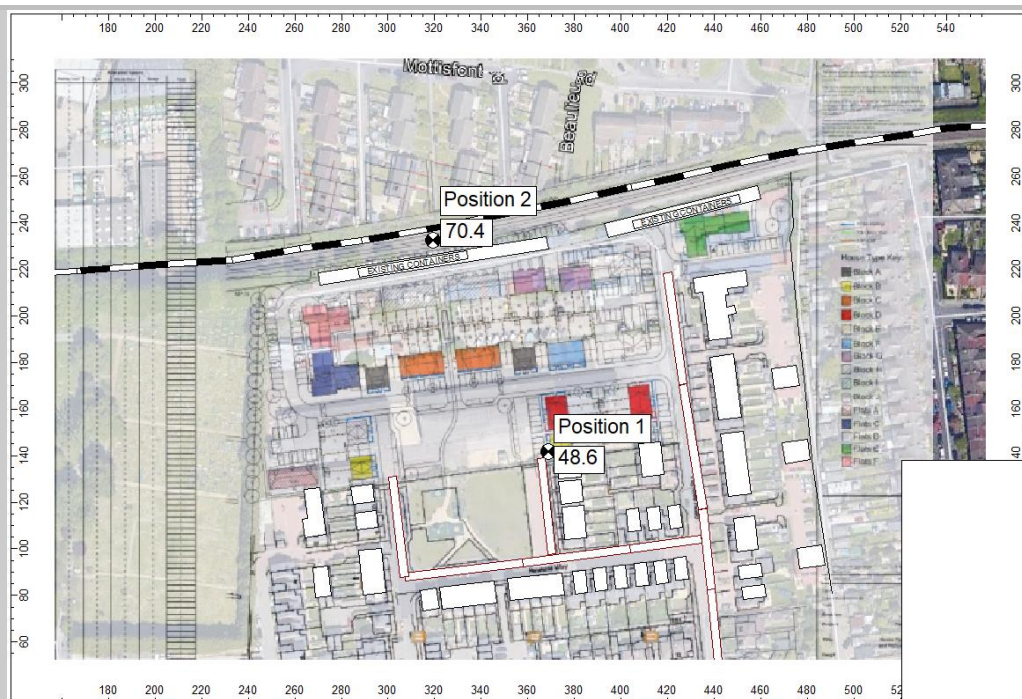
It can be seen from the attached graph and downloaded results that the external noise levels have followed the expected path and remained fairly constant throughout the day. The levels then gradually dropped off as the evening progressed and began to rise when morning traffic levels increased.

9.2 Existing Noise Levels – Daytime (07:00 – 23:00)



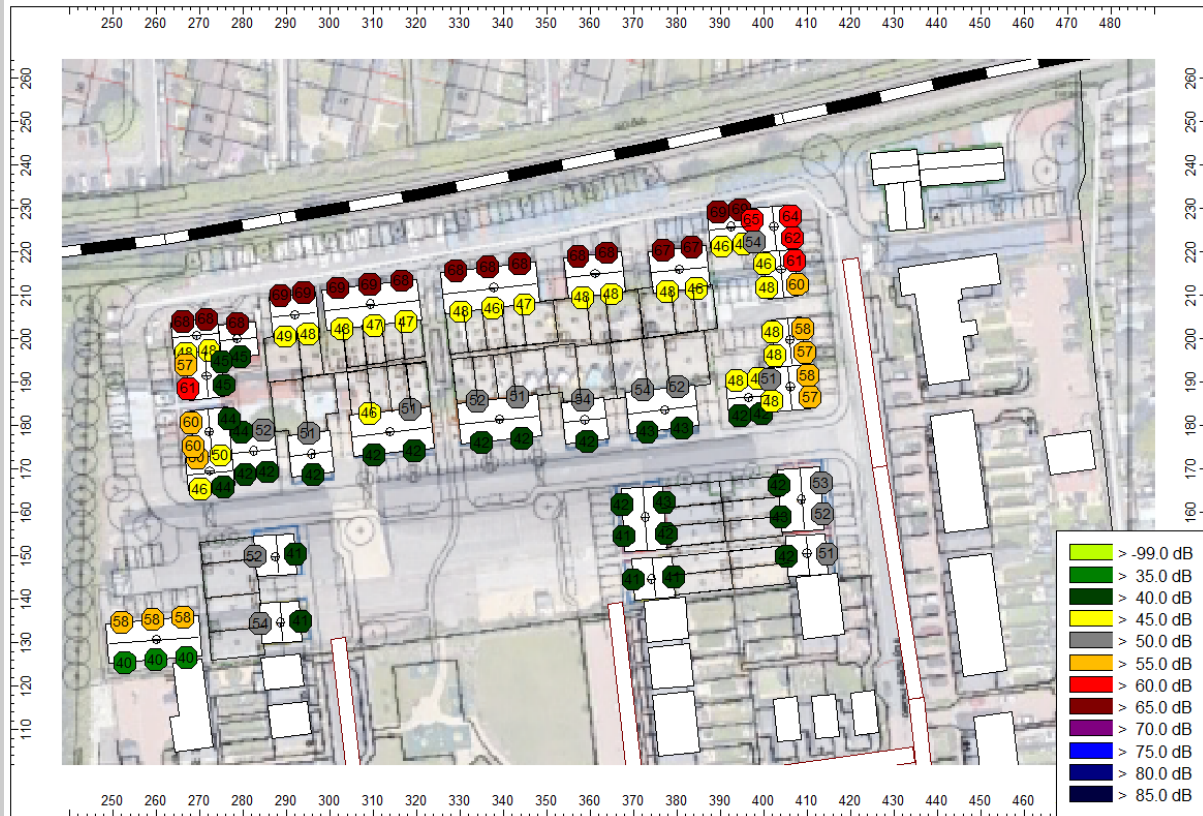
Daytime prior to development

9.3 Existing Noise Levels – Night Time (23:00 – 07:00)



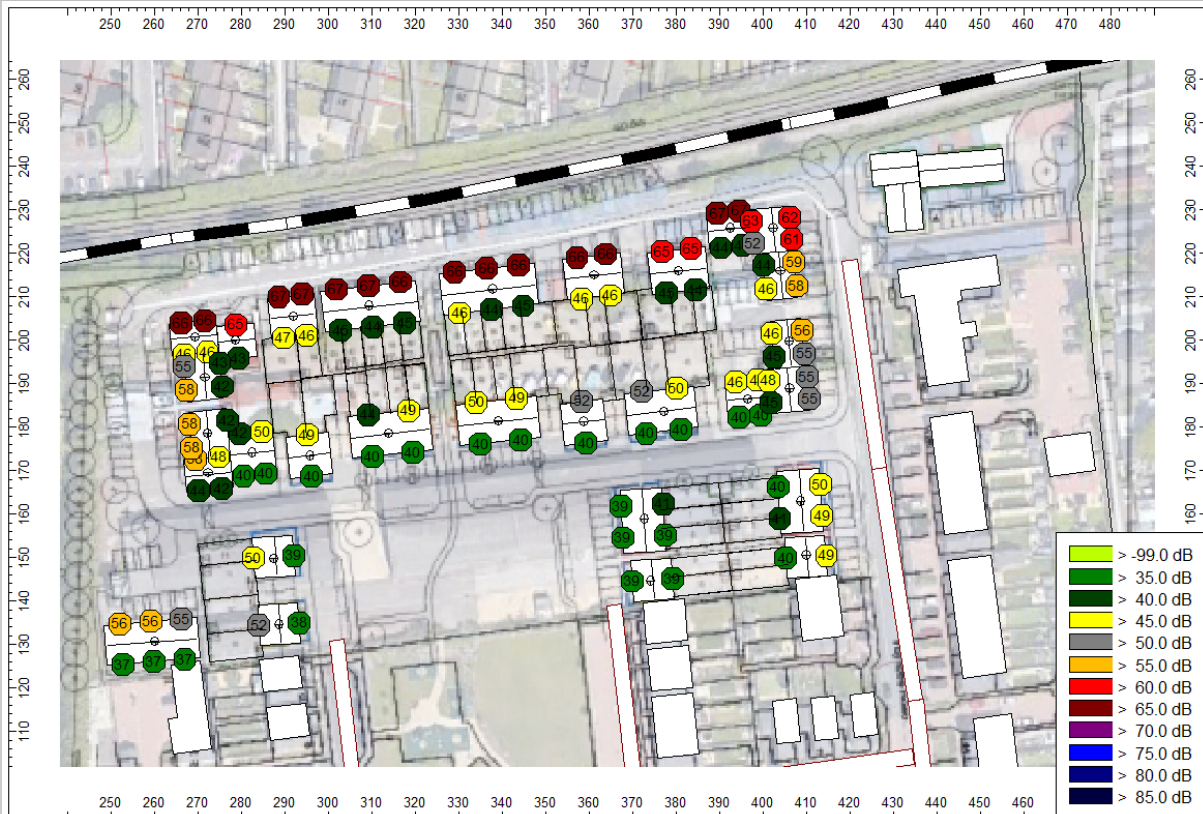
Night time prior to development

9.4 Proposed Noise levels – Daytime (07:00 – 23:00)



Daytime post development

9.5 Proposed Noise levels – Night Time (23:00 – 07:00)



Night time post development

9.6 Recommendations

For the purpose of this assessment, the corresponding façade levels will be used within the BS 8233: 2014 calculations in order to evaluate the worst case scenario and select the correct window specification.

Therefore, in order to achieve the required noise levels of $L_{Aeq\ 16\ HOUR}$ 35 dB for habitable rooms daytime and $L_{Aeq\ 8\ HOUR}$ 30 dB for Bedroom at night within the proposed, the following additional acoustic measures have been calculated.

It should be noted that the calculations have been made with the proposed windows closed. Additional calculations were made for the top floor due to the influence of sound transmission into the various rooms via the roof / ceiling i.e. an increased impeding façade. Inputted levels into the calculation sheets have been corrected for distance attenuation and free field in accordance with the aforementioned British Standard.

9.7 Calculation Procedure to BS 8233: 2014

The following calculations have been carried out in order to determine the required window and ventilation specification in order to meet the requirements of BS 8233: 2014.

9.8 Position 2 - Rear , Ground Floor - Lounge

Proposed Window Configuration			8 / 6 -16 / 4 with MVHR			
Façade corrected to daytime 69 dB & night time 67 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m2 and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where A=0.163V/T					
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Sf	10	10	10	10	10	10
Sr	0	0	0	0	0	0
Swi	3	3	3	3	3	3
Sew	7	7	7	7	7	7
Srr	0	0	0	0	0	0
S	10	10	10	10	10	10
A0	10	10	10	10	10	10
V	38	38	38	38	38	38
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	56.8	58.6	56.7	56.5	57.2	67.0
Night time Leqff	56.0	60.1	56.9	55.3	56.1	64.7
Dne	40.0	44.0	45.0	51.0	56.0	56.0
Rwi	22	21	28	38	40	47
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	28.0	34.0	40.0	45.0	49.0	49.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR		28.3	dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR		28.8	dB(A)

9.9 Position 2 – Rear, Top Floor - Bedroom

Proposed Window Configuration			8 / 6 -16 / 4 with MVHR			
Façade corrected to daytime 69 dB & night time 67 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m2 and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where A=0.163V/T					
Formula	$Leq2=Leqff+10log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10log(S/A)+3$					
	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Sf	7	7	7	7	7	7
Sr	9	9	9	9	9	9
Swi	1.6	1.6	1.6	1.6	1.6	1.6
Sew	5.4	5.4	5.4	5.4	5.4	5.4
Srr	9	9	9	9	9	9
S	16	16	16	16	16	16
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	56.8	58.6	56.7	56.5	57.2	67.0
Night time Leqff	56.0	60.1	56.9	55.3	56.1	64.7
Dne	40.0	44.0	45.0	51.0	56.0	56.0
Rwi	22	21	28	38	40	47
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	28.0	34.0	40.0	45.0	49.0	49.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	27.9		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	28.0		dB(A)

9.10 Position 2 – Rear , Ground Floor - Lounge

Proposed Window Configuration			4 / 6 -16 / 4 with V25 Canopy Vent			
Façade corrected to daytime 60 dB & night time 60 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m2 and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where A=0.163V/T					
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Sf	10	10	10	10	10	10
Sr	0	0	0	0	0	0
Swi	3	3	3	3	3	3
Sew	7	7	7	7	7	7
Srr	0	0	0	0	0	0
S	10	10	10	10	10	10
A0	10	10	10	10	10	10
V	38	38	38	38	38	38
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	47.8	49.6	47.7	47.5	48.2	58.0
Night time Leqff	49.0	53.1	49.9	48.3	49.1	57.7
Dne	35.9	37.6	36.3	31.8	36.8	40.4
Rwi	21	17	25	35	37	31
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	28.0	34.0	40.0	45.0	49.0	49.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	27.9		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	28.8		dB(A)

9.11 Position 2 – Rear, Top Floor - Bedroom

Proposed Window Configuration			4 / 6 -16 / 4 with V25 Canopy Vent			
Façade corrected to daytime 60 dB & night time 60 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m2 and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where A=0.163V/T					
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Sf	7	7	7	7	7	7
Sr	9	9	9	9	9	9
Swi	1.6	1.6	1.6	1.6	1.6	1.6
Sew	5.4	5.4	5.4	5.4	5.4	5.4
Srr	9	9	9	9	9	9
S	16	16	16	16	16	16
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	47.8	49.6	47.7	47.5	48.2	58.0
Night time Leqff	49.0	53.1	49.9	48.3	49.1	57.7
Dne	35.9	37.6	36.3	31.8	36.8	40.4
Rwi	21	17	25	35	37	31
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	28.0	34.0	40.0	45.0	49.0	49.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	26.5		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	27.3		dB(A)

9.12 Ventilation (D_{ne})

Octave Band Frequency	125	250	500	1000	2000	4000	D _{ne,w}
Titon V25 Canopy Vent	35.9	37.6	36.3	31.8	36.8	40.4	35.0

9.13 Glazing (R_{wi})

Octave Band Frequency	125	250	500	1000	2000	4000	R _w (C:Ctr)
6mm glass / 16mm argon air gap / 6.8mm Pilkington Optiphon glass	21.0	28.0	37.0	48.0	48.0	54.0	40 (-2,-6)
8mm glass / 6 - 16mm air gap / 4mm glass	22.0	21.0	28.0	38.0	40.0	47.0	33 (-1,-4)
4mm glass / 6 - 16mm air gap / 4mm glass	21.0	17.0	25.0	35.0	37.0	31.0	29 (-1,-4)

9.14 Walls (Non-Glazed Elements) (R_{ew})

Octave Band Frequency	125	250	500	1000	2000	4000	R _w
Minimum External Wall Attenuation	40.0	44.0	45.0	51.0	56.0	56.0	50

9.15 Roof (R_{rr})

Octave Band Frequency	125	250	500	1000	2000	4000	R _w
Minimum Value	28.0	34.0	40.0	45.0	49.0	49.0	43

NOTE:

The above are minimum construction attenuation values and should alternative methods be selected; these should be equal to or greater than the above corresponding values. Calculations carried out have indicated the following specifications should be installed for this site.

9.16 Glazing & Ventilation Assessment



PROPOSED VENTILATION AND GLAZING PLAN

8MM GLASS / 6 - 16MM AIR GAP / 4MM GLASS & MECHANICAL VENTILATION HEAT RECOVERY SYSTEM

The development should be designed with an 8mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Mechanical ventilation heat recovery unit or similarly approved to all the living room facades and the bedrooms should be designed with a 6mm glass / 16mm argon air gap / 6.8mm Pilkington optiphon glass double glazed windows highlighted in red above. The remainder of the development can utilise a standard 4mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Titon V25 standard canopy vent to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

The upgraded glazing for the bedroom facades highlighted in red in section 9.16 is necessary, in order that the night time L_{Amax} 45 dB criteria is achieved.

9.17 Night Noise Guidelines Europe 2009

The Night Noise Guidelines 2009 make direct reference to the World Health Organisations Guidelines for Community Noise 1999 with recommended guideline criteria of L_{Aeq} 30 dB indoors for continuous noise. The document goes on to explain that sleep disturbance correlates best with L_{Amax} and effects have been observed at 45 dB or less. This is particularly true if the background noise level is low. Noise events exceeding 45 dB(A) should therefore be limited.

Pro PG: Planning and Noise Appendix A 'Dealing with Noise Events' A.17 states that:-

Various studies have linked the L_{Amax} from individual noise events to behavioural awakenings. For example one study found that the "Probability of sleep stage changes to wake/S1 from railway noise increased significantly from 6.5% at 35 dB(A) to 20.5% at 80 dB(A) $L_{Amax,F}$ whilst another study concluded that "noise disturbance of sleep may be expected to become significant once the outdoor L_{Aeq} exceeds 55 dB provided peak noise levels do not exceed 75 to 80 dB. Higher L_{Aeq} values up to 60 dB may be allowed providing the peak levels do not exceed 85 dB, and the number of such events is less than about 20 per night". Based on these studies it can be concluded that at night (2300 - 0700 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building with partially open windows is above:

85 dB $L_{Amax,F}$ (where the number of events exceeding this value is ≤ 20);

or

80 dB $L_{Amax,F}$ (where the number of events exceeding this value is > 20).

Pro PG: Planning and Noise Appendix A 'Dealing with Noise Events' A.18 goes on to explain that:-

A.18 The main body of sleep research is consistent with a careful interpretation of the viewpoint set out in the World Health Organisation Guidelines which for the ordinary population is that:

- ✓ *Impacts on sleep can be detected from relatively low level maximum noise events, however the degree of resulting harm may not be significant.*
- ✓ *'Effects' on sleep (such as EEG awakenings and sleep stage changes) occur spontaneously in the general population many times per night regardless of any impacts due to noise.*
- ✓ *The smaller the number of noise events, the louder the maximum noise level that can be tolerated without adverse effects upon sleep; subject to an upper limit.*
- ✓ *At relatively low levels e.g. around 45 dB $L_{Amax,F}$ when sufficient number of such events take place during the night the adverse effects of individual noise events are likely to be limited to sleep disturbance in the form of changes in sleep state or perhaps some EEG awakenings.*
- ✓ *It normally requires noise levels higher than 45 dB $L_{Amax,F}$ before significant adverse effects such as behavioural awakenings, difficulty getting to sleep, premature awakening or difficulty getting back to sleep generally occur and the latest field research on and aircraft noise suggest that it requires internal L_{Amax} noise levels of around 65 dB before noise induced awakenings become distinguishable from spontaneous awakenings).*

Therefore the following tabulated results from the worst night have been calculated and demonstrate compliance with the requirements of Pro PG.

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES - Position 1				
Date / Time	LAeq	LAmix	L _{Amax,F} 80 - 85 dB	L _{Amax,F} > 85 dB
23:00 - 23:15	44.4	53.2		
23:15 - 23:30	58.2	85.9	85.9	85.9
23:30 - 23:45	68.1	96.3	96.3	96.3
23:45 - 00:00	43.9	49.3		
00:00 - 00:15	42.1	50.4		
00:15 - 00:30	41.2	53.6		
00:30 - 00:45	42.3	51.4		
00:45 - 01:00	42.5	58.3		
01:00 - 01:15	41.3	49.7		
01:15 - 01:30	42.5	50.5		
01:30 - 01:45	71.5	96.9	96.9	96.9
01:45 - 02:00	42.2	54.2		
02:00 - 02:15	80.8	112.1	112.1	112.1
02:15 - 02:30	43.0	50.4		
02:30 - 02:45	42.0	57.4		
02:45 - 03:00	42.9	51.6		
03:00 - 03:15	42.1	50.6		
03:15 - 03:30	42.4	51.5		
03:30 - 03:45	42.8	50.6		
03:45 - 04:00	42.5	50.2		
04:00 - 04:15	42.6	53.9		
04:15 - 04:30	66.1	88.4	88.4	88.4
04:30 - 04:45	66.7	89.0	89.0	89.0
04:45 - 05:00	65.2	83.5	83.5	
05:00 - 05:15	45.0	52.0		
05:15 - 05:30	44.5	50.6		
05:30 - 05:45	66.0	88.9	88.9	88.9
05:45 - 06:00	46.0	52.3		
06:00 - 06:15	46.9	58.6		
06:15 - 06:30	48.3	57.3		
06:30 - 06:45	48.9	63.3		
06:45 - 07:00	50.7	58.6		
Total Event Count			8	7
Pro PG Annex Event Quantity Criteria			>20	<20
Pro PG Criteria Assessment			Achieved	Achieved

With the proposed glazing and ventilation strategies implemented on this site, the following calculated internal levels have been evaluated accordingly:-

Item		Night Time (23:00-07:00)	Description
1	Recorded External Noise Level	70.4	Recorded Noise Level at the Monitoring Position
2	Calculated Highest Façade Level	67	Highest recorded façade level of the proposed development closest to the above associated monitoring position.
3	Façade Correction	-3.4	Difference between Recorded and Calculated (Item 1 and 2)
4	Calculated Façade Attenuation	-39.0	Calculated façade attenuation taken from the highest recorded LAeq 8 HOUR dB night time noise level, minus the highest calculated internal noise level taken from the BS 8233 calculations.
5	LMax 45 dB Criteria	45	LMax 45 dB Criteria taken from WHO Guidelines. BS 8233 does not reference LMax dB noise level criteria.
6	Calculated Façade Level Outside	84.0	Addition of Items 4 and 5 to give a resultant target level for the 11th Percentile
7	10 th Percentile Recorded LMax	87.5	10th Percentile Recorded LMax
8	LMax Criteria Achieved	NO	If Item 7 is less than 6, then the site is likely to be compliant. If not, further calculations are required

The above table demonstrates that the upgraded glazing and mvhr will result in the internal LMax 45 dB criteria not being achieved. Therefore, further BS 8233: 2014 calculations have been undertaken in order to demonstrate the effective required further 3.5 dB(A) reduction from upgrading the glazing.

This glazing should achieve the following minimum static insertion losses:-

Octave Band Frequency	125	250	500	1000	2000	4000	R _w (C:Ctr)
6mm glass / 16mm argon air gap / 6.8mm Pilkington optiphon glass	21.0	28.0	37.0	48.0	48.0	54.0	40(-2,-6)

Based on the BS 8233: 2014 calculations, the following table demonstrates the effectiveness of this upgrade and demonstrates compliance with the LMax 45 dB criteria. This upgraded glazing should be installed to those properties facing the railway and highlighted as Red within section 9.16 of this report.

Item		Night Time (23:00-07:00)	Description
1	Recorded External Noise Level	70.4	Recorded Noise Level at the Monitoring Position
2	Calculated Highest Façade Level	67	Highest recorded façade level of the proposed development closest to the above associated monitoring position.
3	Façade Correction	-3.4	Difference between Recorded and Calculated (Item 1 and 2)
4	Calculated Façade Attenuation	-45.1	Calculated façade attenuation taken from the highest recorded LAeq 8 HOUR dB night time noise level, minus the highest calculated internal noise level taken from the BS 8233 calculations.
5	LMax 45 dB Criteria	45	LMax 45 dB Criteria taken from WHO Guidelines. BS 8233 does not reference LMax dB noise level criteria.
6	Calculated Façade Level Outside	90.1	Addition of Items 4 and 5 to give a resultant target level for the 11th Percentile
7	10 th Percentile Recorded LMax	87.5	10th Percentile Recorded LMax
8	LMax Criteria Achieved	YES	If Item 7 is less than 6, then the site is likely to be compliant. If not, further calculations are required

9.18 Position 2 – Rear, Top Floor - Bedroom

Proposed Window Configuration			6mm glass / 16mm argon air gap / 6.8mm Pilkington optiphon glass with MVHR			
Façade corrected to daytime 69 dB & night time 67 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m2 and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where A=0.163V/T					
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Sf	7	7	7	7	7	7
Sr	9	9	9	9	9	9
Swi	1.6	1.6	1.6	1.6	1.6	1.6
Sew	5.4	5.4	5.4	5.4	5.4	5.4
Srr	9	9	9	9	9	9
S	16	16	16	16	16	16
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	56.8	58.6	56.7	56.5	57.2	67.0
Night time Leqff	56.0	60.1	56.9	55.3	56.1	64.7
Dne	40.0	44.0	45.0	51.0	56.0	56.0
Rwi	21.0	28.0	37.0	48.0	48.0	54.0
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	39.0	48.0	55.0	60.0	59.0	61.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)			LAeq 16 HOUR		22.1	
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)			LAeq 8 HOUR		21.9	
					dB(A)	
					dB(A)	

The proposed development will face onto the railway line and therefore the $L_{Amax\ 15\ minute}$ dB level has been further extrapolated to $L_{Amax\ 1\ minute}$ dB in order to more accurately predict the internal noise levels within these dwellings and also to provide a better standard of protection to future residents. The 10th percentile using the extrapolated method is $L_{Amax\ 1\ minute}$ 87.5 dB. Therefore, all calculations and assessments have used this value as a worst case scenario.

The following table demonstrates the results of the extrapolated data.

Time:	23:00-23:15	23:15-23:30	23:30-23:45	23:45-23:00	00:00-00:15	00:15-00:30	00:30-00:45	00:45-01:00	01:00-01:15	01:15-01:30	01:30-01:45	01:45-02:00	02:00-02:15	02:15-02:30	02:30-02:45	02:45-03:00	03:00-03:15	03:15-03:30	03:30-03:45	03:45-04:00	04:00-04:15	04:15-04:30	04:30-04:45	04:45-05:00	05:00-05:15	05:15-05:30	05:30-05:45	05:45-06:00	06:00-06:15	06:15-06:30	06:30-06:45
	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax	LAFmax
(2019-05-12 23:01:58.000)	51.5	53.2	53.1	51.0	46.7	50.4	49.5	53.6	48.7	50.0	50.8	49.7	115.5	50.2	48.3	51.2	52.9	51.1	51.8	50.8	50.5	91.8	49.3	52.9	52.0	52.5	49.9	51.7	52.3	53.1	54.8
(2019-05-12 23:02:58.000)	52.5	53.8	52.9	50.1	50.7	46.2	49.2	52.3	52.5	48.9	50.7	51.6	97.1	48.3	49.6	47.2	50.7	54.9	54.0	53.6	52.8	87.5	47.1	57.2	53.2	50.8	51.3	53.4	53.9	53.7	56.6
(2019-05-12 23:03:58.000)	51.3	48.3	49.8	50.1	52.5	51.4	52.0	49.5	49.3	53.2	50.3	50.0	50.8	48.8	50.9	55.0	54.0	53.8	49.4	51.2	50.4	53.0	48.1	53.4	55.0	49.7	52.8	55.5	52.5	56.8	56.6
(2019-05-12 23:04:58.000)	51.1	53.3	51.6	51.4	49.2	48.5	48.6	50.0	49.2	50.8	55.2	51.0	52.4	51.8	54.9	50.7	50.9	51.6	50.2	52.5	51.0	54.0	53.1	51.6	52.0	50.9	56.4	53.0	52.1	53.3	57.7
(2019-05-12 23:05:58.000)	52.6	50.7	52.4	50.0	48.4	52.0	47.0	48.2	53.1	51.7	52.6	51.1	50.9	51.3	52.7	52.2	47.9	48.2	50.8	48.6	55.6	51.2	54.1	50.4	52.2	52.0	54.7	53.0	52.0	55.6	56.0
(2019-05-12 23:06:58.000)	52.3	51.3	50.7	51.0	48.1	48.3	50.2	53.1	47.2	49.8	50.1	52.0	58.9	53.1	60.8	52.4	50.3	47.3	50.5	49.1	50.3	51.3	51.5	54.5	52.8	49.8	52.9	53.0	52.9	60.7	57.0
(2019-05-12 23:07:58.000)	51.1	51.2	52.0	52.7	51.4	49.7	52.6	48.1	48.4	47.9	100.3	49.1	50.2	51.4	51.3	49.3	50.1	50.1	52.8	47.9	49.1	49.8	65.3	54.5	52.3	53.1	50.2	52.5	54.8	55.9	55.5
(2019-05-12 23:08:58.000)	51.6	50.0	48.1	51.5	52.0	57.0	54.8	49.8	48.1	49.6	94.5	52.7	50.1	49.2	50.0	49.0	49.3	52.4	51.3	53.5	50.9	50.6	92.4	49.7	52.4	51.7	52.2	52.0	53.0	57.6	55.2
(2019-05-12 23:09:58.000)	51.5	50.2	49.6	50.0	53.8	51.5	49.5	52.3	48.8	52.4	51.1	50.5	50.3	45.2	49.2	45.5	48.9	50.7	51.1	50.7	50.4	51.3	49.6	51.1	53.0	51.2	52.7	55.7	52.7	53.6	55.2
(2019-05-12 23:10:58.000)	52.3	52.5	50.4	49.8	50.4	51.2	51.7	51.1	49.7	48.6	53.1	48.3	48.9	53.8	52.8	50.4	49.8	50.3	51.9	50.4	51.4	50.3	53.8	50.7	53.9	54.0	52.3	51.7	62.0	55.4	56.1
(2019-05-12 23:11:58.000)	51.6	49.7	52.8	52.0	49.2	50.0	52.2	51.0	46.7	53.3	51.1	48.4	48.5	52.9	50.6	51.8	48.6	50.9	52.1	51.5	50.5	51.6	54.6	50.7	52.0	51.0	54.8	52.8	54.6	53.8	54.1
(2019-05-12 23:12:58.000)	52.0	89.3	50.2	50.4	51.6	48.0	51.9	54.8	52.3	53.9	52.3	55.7	47.7	53.2	55.7	51.1	50.3	48.4	51.1	48.1	49.1	54.3	53.1	51.3	51.9	52.9	51.2	53.6	53.2	55.0	55.5
(2019-05-12 23:13:58.000)	56.6	56.5	99.7	49.9	52.7	47.7	48.3	51.0	50.6	51.6	50.4	57.6	49.7	50.5	49.5	50.8	49.6	51.4	49.7	47.8	51.6	52.6	54.7	52.2	55.4	51.3	92.3	53.4	55.6	57.6	54.8
(2019-05-12 23:14:58.000)	55.6	57.0	49.9	52.7	48.4	48.1	49.3	61.7	50.8	52.2	49.8	48.6	51.6	53.2	51.1	51.7	52.3	50.9	51.3	49.7	52.0	51.3	51.7	86.9	51.2	52.7	83.0	53.6	54.8	57.0	66.7
(2019-05-12 23:15:58.000)	52.9	50.9	52.2	49.9	48.7	47.4	52.6	51.3	50.2	52.2	53.7	55.0	51.8	52.6	49.7	52.3	51.4	50.6	52.4	51.3	57.3	48.2	49.6	85.2	51.5	53.8	62.7	52.1	54.7	55.4	53.9

10 ELEMENT 3 – EXTERNAL AMENITY AREA NOISE ASSESSMENT

10.1 Outdoor Living Areas

The World Health Organisation 'Guidelines for Community Noise' gives guidance as to desirable noise levels that should be achieved within outdoor living areas such as gardens, patios and verandas etc.

Table 1: Guideline values for community noise in specific environments, details the desirable target noise levels within various areas.

Outdoor Living Area	
Serious Annoyance, daytime and evening	$L_{Aeq\ 16\ HOUR}$ 55 dB
Moderate Annoyance, daytime and evening	$L_{Aeq\ 16\ HOUR}$ 50 dB

In order to evaluate the external noise levels within the proposed development, and to correctly and accurately select the precise required minimum screen heights, the 3D modelling software CADNA A is to be used. Initially, the site plan is to be overlaid onto Google Earth and then imported directly into CADNA A using the geometric co-ordinates.

From this, the monitoring positions and noise sources such as roads are added. The output noise levels from the roads are then increased until the monitored noise levels are achieved at the monitoring position. This model is then saved and used as a working 3D acoustic model of the site. The proposed buildings are then constructed on a 3D bases and receptors placed within the garden areas. The calculation software is then run to evaluate the garden levels within sample plots across the development. The following CADNA A screen shots demonstrate the existing sites working 3D model. The levels at the measurement position correlate with the measured daytime average levels detailed within this report.



The development has external living areas on the development and therefore this criteria / guideline would be appropriately considered within the proposed rear residential garden areas.



The guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a railway. The layout has been designed in order to allow for acoustics and minimise the noise levels within these outdoor living spaces. The calculation demonstrates the external living spaces in the garden areas are likely to see noise levels below the lower guideline of 50 dB.

11 VIBRATION ASSESSMENT

11.1 Assessment Criteria

Ground borne vibration needs to be assessed with regard to the likelihood of disturbance to humans and damage to building structure. With regard to human disturbance, vibration criteria are specified in terms of Vibration Dose Values (VDV) in accordance with BS 64721. The following table shows the VDV with various degrees of adverse comment, which may be expected in residential buildings.

For residential buildings	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
16 hr day 07:00 to 23:00	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6

Table 1 Vibration Dose Values (given in m/s^{1.75})

The vibration dose reflects the accumulated acceleration vibration value over a given time period, integrated by time on a root mean quad basis, hence the unit m/s^{1.75}.

Human beings have different sensitivity to vibration in different directions, and it is relevant to consider vibration in all three axes together as a resultant value.

In terms of the likelihood of damage to buildings, vibration is measured in peak particle velocity (ppv) mm/s and assessed in accordance with BS 73852. In this particular case, the main sources of vibration are trains and these are considered to cause transient vibration. The BS7385 standard states that for transient vibration, guide values at which cosmetic damage could occur to residential buildings are 15 mm/s at 4 Hz, rising to 20 mm/s at 15 Hz and rising further to 50 mm/s at 40 Hz and above for new buildings. These limits can be reduced by 50% for older buildings.

¹ BS 6472., Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)

¹ BS 7385., Evaluation and measurement for vibration in buildings

11.2 Measurements

11.2.1 Instrumentation

Vibration levels were recorded using a two-channel Vibrock V901 seismometer, serial number 1006, which was connected with two tri-axial transducers for measuring peak particle velocity and vibration dose value, simultaneously, at one chosen location. The vibration measuring equipment has a current calibration certificate.

11.2.2 Measurement locations

The site is approximately 2m away from the railway line. Subsequently, one representative measurement location was selected; Location 1 on the Northern boundary of the site.

The measurement sensors were placed on a large concrete slab, approximately 2m by 5m. Although it was not possible to establish the thickness of this slab, it is considered that this slab would be well adhered to the sub-soil.

11.2.3 Measurement Procedure

Ambient ground borne vibration levels were measured continuously for about 120 hours at the location 1 from approximately 16:00 hrs on 25th September to approximately 07:00 hrs on 29th September 2020. This period is considered to represent both the periods when the ambient conditions are quietest, i.e. night-time, and periods of peak railway traffic through daytime.

11.3 Results & Assessment of Vibration Measurements

The vibration monitor was set to record ppv and vdv and left unattended for the duration of the survey. Full measurement results are given in the appendix of this report.

25 th September 2020 – DAYTIME									
Ev 051	Vibration Dose Value						Peak Particle Velocity		
7 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.027	0.027	0.052				*1.28mm/s	16:09:13	25.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.013	0.014	0.029	0.013	0.014	0.028	*1.28mm/s	16:09:13	25.09.2020
Hour 2	0.013	0.012	0.027	0.016	0.016	0.033	.675mm/s	17:10:53	25.09.2020
Hour 3	0.014	0.013	0.027	0.018	0.017	0.036	.725mm/s	18:59:13	25.09.2020
Hour 4	0.013	0.013	0.024	0.019	0.019	0.038	.575mm/s	19:52:33	25.09.2020
Hour 5	0.013	0.013	0.026	0.02	0.02	0.04	.675mm/s	20:42:53	25.09.2020
Hour 6	0.013	0.013	0.023	0.021	0.021	0.041	.625mm/s	21:53:13	25.09.2020
Hour 7	0.013	0.013	0.024	0.022	0.021	0.042	.600mm/s	22:48:43	25.09.2020
*Denotes Set Up									

25 th – 26 th September 2020 – DAYTIME & NIGHT TIME									
Ev 052	Vibration Dose Value						Peak Particle Velocity		
8 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.025	0.022	0.038				.675mm/s	04:41:10	26.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.014	0.013	0.024	0.014	0.013	0.024	.550mm/s	23:07:10	25.09.2020
Hour 2	0.014	0.013	0.021	0.016	0.015	0.027	.525mm/s	00:08:50	26.09.2020
Hour 3	0.014	0.013	0.017	0.018	0.017	0.028	.175mm/s	01:49:40	26.09.2020
Hour 4	0.015	0.013	0.017	0.02	0.018	0.029	.175mm/s	02:41:50	26.09.2020
Hour 5	0.015	0.013	0.018	0.021	0.02	0.03	.150mm/s	03:00:10	26.09.2020
Hour 6	0.015	0.013	0.025	0.023	0.02	0.033	.675mm/s	04:41:10	26.09.2020
Hour 7	0.015	0.013	0.028	0.024	0.021	0.037	.675mm/s	05:31:00	26.09.2020
Hour 8	0.015	0.013	0.022	0.025	0.022	0.038	.475mm/s	06:58:40	26.09.2020

26 th September 2020 – DAYTIME									
Ev 053	Vibration Dose Value						Peak Particle Velocity		
16 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.026	0.026	0.058				1.05mm/s	12:51:30	26.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.013	0.013	0.033	0.013	0.013	0.033	.850mm/s	07:27:10	26.09.2020
Hour 2	0.013	0.013	0.023	0.016	0.015	0.035	.550mm/s	08:33:30	26.09.2020
Hour 3	0.013	0.013	0.027	0.017	0.017	0.038	.700mm/s	09:15:40	26.09.2020
Hour 4	0.013	0.013	0.026	0.019	0.018	0.04	.575mm/s	10:38:00	26.09.2020
Hour 5	0.013	0.013	0.027	0.02	0.02	0.042	.700mm/s	11:32:00	26.09.2020
Hour 6	0.013	0.013	0.042	0.021	0.02	0.05	1.05mm/s	12:51:30	26.09.2020
Hour 7	0.013	0.013	0.027	0.021	0.021	0.051	.625mm/s	13:34:40	26.09.2020
Hour 8	0.013	0.013	0.024	0.022	0.022	0.052	.550mm/s	14:41:20	26.09.2020
Hour 9	0.013	0.013	0.028	0.023	0.023	0.053	.775mm/s	15:31:50	26.09.2020
Hour 10	0.013	0.013	0.025	0.023	0.023	0.054	.600mm/s	16:09:50	26.09.2020
Hour 11	0.013	0.013	0.028	0.024	0.024	0.054	.625mm/s	17:31:10	26.09.2020
Hour 12	0.012	0.013	0.025	0.024	0.024	0.055	.525mm/s	18:09:30	26.09.2020
Hour 13	0.012	0.013	0.025	0.025	0.025	0.056	.575mm/s	19:20:40	26.09.2020
Hour 14	0.012	0.013	0.025	0.025	0.025	0.056	.550mm/s	20:29:00	26.09.2020
Hour 15	0.011	0.013	0.026	0.025	0.026	0.057	.650mm/s	21:51:30	26.09.2020
Hour 16	0.012	0.013	0.025	0.026	0.026	0.058	.775mm/s	22:17:20	26.09.2020
26 th – 27 th September 2020 – DAYTIME & NIGHT TIME									
Ev 054	Vibration Dose Value						Peak Particle Velocity		
8 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.022	0.022	0.039				.675mm/s	05:30:50	27.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.013	0.013	0.021	0.013	0.013	0.021	.375mm/s	23:04:00	26.09.2020
Hour 2	0.013	0.013	0.021	0.015	0.015	0.025	.400mm/s	00:12:30	27.09.2020
Hour 3	0.013	0.013	0.018	0.017	0.017	0.027	.150mm/s	01:00:10	27.09.2020
Hour 4	0.013	0.013	0.018	0.018	0.018	0.028	.200mm/s	02:40:20	27.09.2020
Hour 5	0.013	0.013	0.018	0.019	0.02	0.029	.150mm/s	03:00:10	27.09.2020
Hour 6	0.013	0.013	0.027	0.02	0.021	0.034	.650mm/s	04:53:50	27.09.2020
Hour 7	0.013	0.013	0.026	0.021	0.021	0.036	.675mm/s	05:30:50	27.09.2020
Hour 8	0.013	0.013	0.028	0.022	0.022	0.039	.650mm/s	06:12:30	27.09.2020

27th September 2020 – DAYTIME

Ev 055	Vibration Dose Value						Peak Particle Velocity		
16 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.026	0.026	0.055				.900mm/s	09:39:20	27.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.013	0.013	0.03	0.013	0.013	0.03	.725mm/s	07:14:50	27.09.2020
Hour 2	0.013	0.013	0.025	0.015	0.015	0.033	.550mm/s	08:33:20	27.09.2020
Hour 3	0.013	0.013	0.028	0.017	0.017	0.036	.900mm/s	09:39:20	27.09.2020
Hour 4	0.013	0.013	0.028	0.018	0.019	0.039	.675mm/s	10:40:50	27.09.2020
Hour 5	0.013	0.013	0.027	0.019	0.02	0.041	.575mm/s	11:37:40	27.09.2020
Hour 6	0.013	0.013	0.027	0.02	0.021	0.043	.550mm/s	12:23:50	27.09.2020
Hour 7	0.013	0.013	0.028	0.021	0.021	0.045	.600mm/s	13:39:30	27.09.2020
Hour 8	0.013	0.013	0.028	0.022	0.022	0.046	.650mm/s	14:43:20	27.09.2020
Hour 9	0.013	0.013	0.026	0.023	0.023	0.048	.575mm/s	15:09:30	27.09.2020
Hour 10	0.012	0.013	0.028	0.023	0.023	0.049	.700mm/s	16:09:10	27.09.2020
Hour 11	0.013	0.013	0.028	0.024	0.024	0.05	.750mm/s	17:00:20	27.09.2020
Hour 12	0.013	0.013	0.03	0.024	0.024	0.052	.700mm/s	18:44:10	27.09.2020
Hour 13	0.013	0.013	0.029	0.025	0.025	0.053	.825mm/s	19:48:10	27.09.2020
Hour 14	0.013	0.013	0.024	0.025	0.025	0.054	.575mm/s	20:53:10	27.09.2020
Hour 15	0.013	0.013	0.024	0.026	0.026	0.054	.675mm/s	21:13:40	27.09.2020
Hour 16	0.013	0.013	0.026	0.026	0.026	0.055	.650mm/s	22:01:50	27.09.2020

27th – 28th September 2020 – DAYTIME & NIGHT TIME

Ev 056	Vibration Dose Value						Peak Particle Velocity		
8 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.022	0.023	0.042				.750mm/s	04:28:50	28.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.013	0.013	0.024	0.013	0.013	0.024	.525mm/s	23:14:40	27.09.2020
Hour 2	0.013	0.013	0.023	0.016	0.016	0.028	.350mm/s	00:10:30	28.09.2020
Hour 3	0.013	0.013	0.021	0.017	0.017	0.03	.150mm/s	01:00:10	28.09.2020
Hour 4	0.013	0.013	0.021	0.019	0.019	0.032	.200mm/s	02:19:40	28.09.2020
Hour 5	0.013	0.013	0.021	0.02	0.02	0.034	.250mm/s	03:30:50	28.09.2020
Hour 6	0.013	0.013	0.024	0.021	0.021	0.036	.750mm/s	04:28:50	28.09.2020
Hour 7	0.013	0.013	0.03	0.021	0.022	0.04	.650mm/s	05:39:40	28.09.2020
Hour 8	0.013	0.013	0.027	0.022	0.023	0.042	.600mm/s	06:26:50	28.09.2020

28 th September 2020 – DAYTIME									
Ev 057	Vibration Dose Value						Peak Particle Velocity		
16 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.024	0.026	0.05				.825mm/s	15:17:40	28.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.012	0.013	0.03	0.012	0.013	0.03	.725mm/s	07:01:10	28.09.2020
Hour 2	0.012	0.013	0.021	0.014	0.015	0.032	.700mm/s	08:06:40	28.09.2020
Hour 3	0.012	0.013	0.024	0.016	0.017	0.034	.550mm/s	09:01:20	28.09.2020
Hour 4	0.012	0.013	0.027	0.017	0.018	0.037	.725mm/s	10:08:40	28.09.2020
Hour 5	0.012	0.013	0.025	0.018	0.02	0.039	.700mm/s	11:03:00	28.09.2020
Hour 6	0.012	0.013	0.028	0.019	0.02	0.041	.825mm/s	12:06:40	28.09.2020
Hour 7	0.011	0.013	0.025	0.019	0.021	0.043	.625mm/s	13:01:40	28.09.2020
Hour 8	0.011	0.013	0.027	0.02	0.022	0.044	.725mm/s	14:01:00	28.09.2020
Hour 9	0.012	0.013	0.029	0.021	0.023	0.046	.825mm/s	15:17:40	28.09.2020
Hour 10	0.012	0.013	0.021	0.021	0.023	0.047	.650mm/s	16:04:10	28.09.2020
Hour 11	0.012	0.013	0.025	0.022	0.024	0.048	.600mm/s	17:04:30	28.09.2020
Hour 12	0.012	0.013	0.022	0.022	0.024	0.048	.550mm/s	18:41:10	28.09.2020
Hour 13	0.012	0.013	0.021	0.023	0.025	0.049	.675mm/s	19:03:20	28.09.2020
Hour 14	0.012	0.013	0.021	0.023	0.025	0.049	.550mm/s	20:18:00	28.09.2020
Hour 15	0.012	0.013	0.024	0.024	0.026	0.05	.650mm/s	21:01:30	28.09.2020
Hour 16	0.012	0.013	0.023	0.024	0.026	0.05	.675mm/s	22:32:50	28.09.2020
28 th – 29 th September 2020 – DAYTIME & NIGHT TIME									
Ev 058	Vibration Dose Value						Peak Particle Velocity		
8 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
	0.022	0.022	0.034				.700mm/s	06:31:00	29.09.2020
1 Hour	X	Y	Z	X	Y	Z	Max	Time	Date
Hour 1	0.013	0.013	0.02	0.013	0.013	0.02	.500mm/s	23:13:40	28.09.2020
Hour 2	0.013	0.013	0.019	0.015	0.015	0.023	.150mm/s	00:00:10	29.09.2020
Hour 3	0.013	0.013	0.019	0.017	0.017	0.026	.175mm/s	01:47:00	29.09.2020
Hour 4	0.013	0.013	0.02	0.018	0.018	0.028	.150mm/s	02:00:10	29.09.2020
Hour 5	0.013	0.013	0.02	0.02	0.02	0.029	.250mm/s	03:17:50	29.09.2020
Hour 6	0.013	0.013	0.02	0.02	0.02	0.031	.150mm/s	04:00:10	29.09.2020
Hour 7	0.013	0.013	0.02	0.021	0.021	0.032	.175mm/s	05:37:10	29.09.2020
Hour 8	0.013	0.013	0.022	0.022	0.022	0.034	.700mm/s	06:31:00	29.09.2020

The vdv results are summarised in the table below for the daytime and night-time periods.

Time Period	Vibration Dose Value m/s ^{1.75}			Peak Particle Velocity mm/s
	L	T	V	Resultant Vector
25 th September 2020 – 7 Hr	0.027	0.027	0.052	*1.28mm/s
26 th September 2020 – 16 Hr	0.026	0.026	0.058	1.05mm/s
27 th September 2020 – 16 Hr	0.026	0.026	0.055	.900mm/s
28 th September 2020 – 16 Hr	0.024	0.026	0.05	.825mm/s
25 th – 26 th September 2020 – 8 Hr	0.025	0.022	0.038	.675mm/s
26 th – 27 th September 2020 – 8 Hr	0.022	0.022	0.039	.675mm/s
27 th – 28 th September 2020 – 8 Hr	0.022	0.023	0.042	.750mm/s
28 th – 29 th September 2020 – 8 Hr	0.022	0.022	0.034	.700mm/s
Table 3 Summary of daily VDV and PPV				

* Denotes Set Up

The above table demonstrates that no detrimental or structural vibration levels have been measured and therefore the probability of neighbouring building damage is low.

11.4 BS ISO 4866 & The ANC Red Book (3rd Edition) Guidelines

11.4.1 British Standard ISO 4866: 2010 (“BS4866”)

Mechanical vibration and shock –

Vibration of fixed structures –

Guidelines for the measurement of vibrations and evaluation of their effects on structures.

11.4.2 Scope of Document

This standard extends BS7385 but updates the original 1990 version of the standard. The document provides a similar table on the likely building response to standard vibration but also includes a useful classification in Appendix B.

11.4.3 Grouping of Buildings

Building Group	Building Type
1	Ancient or historical buildings built using traditional construction methods
2	Modern buildings and structures.

11.4.4 Structure Category

Category of Structure	Building Structure Type
1	Heavy industrial multi-storey buildings. Concrete or steel framed with concrete floors – Earthquake proof.
2	Timber framed building, or lightweight steel or concrete framed with concrete floors
3	Timber frame or single storey lightweight constructions with light steel cladding.
4	Two storey domestic houses traditional brick and block construction re-enforced concrete floors, block work.
5	Multi-storey residential buildings. In-situ concrete floors, lightweight construction.
6	Two storey domestic houses with traditional brick and block construction with lightweight timber floors
7	Pre-fabricated lightweight homes made from timber, often constructed off site.
8	Ruins or historic buildings.

11.4.5 Foundation Category

Foundation Type	Description of Foundation
A	Linked re-enforced piles, stiff concrete raft, linked timber piles or gravity retaining walls.
B	Independent re-enforced concrete piles, spread wall footing or timber piles and rafts.
C	Lightweight retaining walls, large stone footings, strip foundations, plate foundations or no foundations.

11.4.6 Types of Soil

Soil Type	Description of Soil Type
a	Unfissured rocks, fairly solid rocks or cemented sand.
b	Horizontally bedded soils, very firm or compacted non-cohesive soils.
c	Horizontally bedded soils, poorly compacted firm or moderately firm non-cohesive soils.
d	All types of sloping surfaces and potential slip planes.
e	Loose non-cohesive soils (sands, gravels, boulders etc.), soft cohesive soils, (clays) organic soils (peat).
f	Land fill type sites.

11.4.7 Site Specific Classification of Building

The site has been classified as 1/5/C/e

11.4.8 Classification of Buildings – Resistance to Vibration

The following table demonstrates the classification of buildings according to their resistance to vibration and the tolerance that can be accepted for vibrational effects as (Ce).

Level of Risk	Class of Building ^a	Structural Category								
		1	2	3	4	5	6	7	8	
		Categories of Foundation (upper case letter)				Type of Soil (lower case letter)				
High Risk	Vibration Decreasing (Down Table)	1	Aa							
		2	Ab	Aa	Aa	Aa				
		3		Ab, Ba	Ab, Ba	Ab	Aa, Ab			
		4		Ac, Bb	Bb	Ac	Ac, Ba, Bb			
Medium Risk		5		Bc	Ac		Bc	Ba		
		6		Af		Ad	Bd	Bb, Ca	Ba	
		7			Af	Ae	Be	Bc, Cb	Bb, Ca	
		8						Be, Cc	Bc, Cb	
		9		Bf				Cd	Bd, Cc	Aa
		10			Bf			Ce	Be, Cd	Ab
Low Risk		11				Cf	Cf		Ce	Ba
		12						Cf		Bc, Ca
		13							Cf	Bd, Cb, Cc
		14								Cd, Ce, Cf
^a High Class Number = High Degree of Protection Required										

11.5 Building Vibration Transfer Risk Assessment

The level of risk the proposed buildings could have on the amount of vibration that has the potential to be transferred through the building has been carried out in accordance with BS ISO 4866. In addition, the Association of Noise Consultants Red Book (3rd Edition) '*Measurement & Assessment of Groundborne Noise & Vibration*' has also been referred to. However, this guideline was published by the ANC and follows the procedures and assessment processes detailed within the aforementioned standard.

11.6 Implications

The results indicate that vibration dose values (vdv) at the measurement location are below 0.1 for both daytime and night-time. These values are below the range associated with 'low probability of adverse comment'.

The maximum peak particle velocity recorded was found to be 1.05 mm/s at the measurement position, in accordance with the guidance in BS7385, this value is below the limit at which cosmetic damage to building is likely.

11.7 Recommendations

The results of this ambient vibration survey indicate that whilst some vibration events may be perceptible, in accordance with the advice given in the appropriate standards, there is likely to be no concern of adverse comments from future occupants of the proposed housing and no concern of cosmetic damage to new buildings arising from vibration at this measurement location.

This assessment has concluded that based on the proposed foundation and construction methods, the conclusion would be on the border of a 'Low to Medium Risk' level of vibration transfer and that need for proprietary isolation of the foundations from the main structure should be considered as a precautionary measure at the design stage.

There are a range of other standards that can be considered and the following demonstrates these and their requirements and further gives guidance as to where this site is positioned within these criteria. These standards further confirm and underpin our recommendations made.

11.8 British Standard ISO 2631-1:1997 (“BS2631”)

Mechanical vibration and shock –

Evaluation of human exposure to whole body vibration – Part 1: General Requirements.

11.8.1 Scope of Document

This document defines the method for defining and measuring whole body vibration. More importantly, it defines between 0.5 and 80 Hz the level of vibration which is likely to be perceivable.

11.8.2 Comfort reactions to Vibration Environments

Acceleration (Peak) W_k Weighted	Perception of Whole Body Vibration (Sitting Down)
0.015 ms^{-2}	50 th Percentile of alert and fit persons can detect peak vibration at this magnitude
0.010 ms^{-2}	Median Perception of 0.15ms-1 lower interquartile range
0.020 ms^{-2}	Median Perception of 0.15ms-1 upper interquartile range

11.9 British Standard 6472-1:2008 (“BS6472”)

Guide to evaluation of human exposure to vibration in buildings –

Part 1: Vibration source other than blasting.

11.9.1 Scope of Document

This document provides guidance on predicting the human response to vibration in buildings over the frequency range 0.5 Hz to 80 Hz. This part of the standard describes how to determine the vibration dose value, VDV from frequency-weighted vibration measurements.

11.9.2 Vibration Dose Value Ranges for Adverse Comment

Place and Time (Residential Buildings)	Adverse Comment		
	Low Probability	Possible	Probable
Day Time – 16 Hour (07:00 to 23:00)	0.2 to 0.4 $\text{ms}^{-1.75}$	0.4 to 0.8 $\text{ms}^{-1.75}$	0.8 to 1.6 $\text{ms}^{-1.75}$
Night Time – 8 Hour (23:00 to 07:00)	0.1 to 0.2 $\text{ms}^{-1.75}$	0.2 to 0.4 $\text{ms}^{-1.75}$	0.4 to 0.8 $\text{ms}^{-1.75}$

11.9.3 Estimated Vibration Dose Value

Both BS2631 and BS6472 provide a formula to determine the Vibration Dose Value from the weighted acceleration values assuming the weightings shown in figure 1 of BS6472, (W_b) which is commonly defined as fourth root of the time integral of the fourth power of the acceleration after it has been frequency weighted.

11.10 DIN 4150 – Part 3: 1999 (“D4150”)

Structural vibration –

Part 3: Effects of vibration on structures.

11.10.1 Scope of Document

This standard provides a specific method of measuring and evaluating the effects of vibration on structures designed primarily for static loadings. It provides a useful table of vibration levels for evaluating the effect of short term vibration on buildings.

11.10.2 Guideline Values for Vibration Velocity – Short Term Effects

Type of Structure		Guideline Velocity Values		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz
1	Commercial Buildings	20 ms ⁻¹	20 to 40 ms ⁻¹	40 to 50 ms ⁻¹
2	Dwellings and Buildings of similar occupancy	5 ms ⁻¹	5 to 15 ms ⁻¹	15 to 20 ms ⁻¹
3	Sensitive Buildings	3 ms ⁻¹	3 to 8 ms ⁻¹	8 to 10 ms ⁻¹

11.11 Assessing vibration - A Technical Guideline: 2006 (“DEC”)

Department of Environment and Conservation’s (DEC) - Australia

Assessing Vibration – A Technical Guideline.

11.11.1 Scope of Document

The Department of Environment and Conservation in Australia produced a very useful document entitled “*Assessing Vibration – A Technical Guide*” in which provide guidance to the interpretation and use of BS6472. The document provides useful guidance on acceptable levels of vibration in residential properties, and though it was published in Australia, it is based on BS6472 which is very relevant for sites within the UK.

11.11.2 Acceptable Values for Continuous or Impulsive Vibration

Location of Measurements	Assessment period	Preferred Values		Maximum Values	
		z-axis	x and y axis	z-axis	x and y axis
Residential Properties	Day Time (07:00 to 23:00)	0.010 ms ⁻²	0.0071 ms ⁻²	0.020 ms ⁻²	0.014 ms ⁻²
	Night Time (23:00 to 07:00)	0.007 ms ⁻²	0.005 ms ⁻²	0.014 ms ⁻²	0.010 ms ⁻²

11.11.3 Acceptable Vibration Does Values for Intermittent Vibration

Location of Measurements	Assessment period	Preferred Values	Maximum Values
		z-axis	z-axis
Residential Properties	Day Time (07:00 to 23:00)	0.20 ms ^{-1.75}	0.40 ms ^{-1.75}
	Night Time (23:00 to 07:00)	0.13 ms ^{-1.75}	0.26 ms ^{-1.75}

11.11.4 Vibration Criteria Presented in Different Units

Location of Measurements Residential Properties	Assessment period	Preferred Values	Maximum Values
		z-axis	z-axis
rms Acceleration	Day Time (07:00 to 23:00)	0.010 ms^{-2}	0.020 ms^{-2}
	Night Time (23:00 to 07:00)	0.007 ms^{-2}	0.014 ms^{-2}
rms Velocity	Day Time (07:00 to 23:00)	0.20 mms^{-1}	0.40 mms^{-1}
	Night Time (23:00 to 07:00)	0.14 mms^{-1}	0.28 mms^{-1}
Peak Velocity	Day Time (07:00 to 23:00)	0.28 mms^{-1}	0.56 mms^{-1}
	Night Time (23:00 to 07:00)	0.20 mms^{-1}	0.40 mms^{-1}

12 ELEMENT 4 – ASSESSMENT OF OTHER RELEVANT ISSUES

12.1 The National Planning Policy Framework 2021 (NPPF)

The National Planning Policy Framework 2021 (NPPF) and assessments to the Noise Policy Statement for England 2010 (NPSE) should be made in conjunction with each other. Paragraphs 180 - 183 of the National Planning Policy Framework 2021 (NPPF) states the following:

Paragraph 185 Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Paragraph 186 Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications.

Paragraph 187 Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

Paragraph 188 The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities

The Noise Policy Statement for England gives various levels of effect as detailed within this report.

With the glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a conclusion of **NOEL – No Observed Effect Level**. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

13 ACOUSTIC DESIGN STATEMENT

Good Acoustic Design	Given the size and orientation of the proposed site, it is recommended that the developer adopted, where practically possible, a good acoustic design which should include careful consideration of the positioning of the proposed properties together with thoughts being taken as to internal layouts to minimise noise sensitive rooms facing onto dominant noise sources within the local areas.
Internal Noise Levels	Calculations have been carried out and assessments made to BS 8233: 2014 together with design specifications supplied for the required glazing and ventilation specifications required across the development to ensure compliance.
L _{Amax} dB Noise Levels	Assessments and calculations demonstrate that the L _{Amax} dB Levels are within the criteria set out within PROPG
External Living Areas	The calculations demonstrate the external living spaces surrounding the houses on page 42 are likely to see noise levels in excess of the upper guideline. The following calculation demonstrates the effects of installing a 2.5m acoustic screen as per the proposed illustrated locations. Levels are reduced to below that of the upper guideline level. With the exception of the single plot that has been highlighted in blue, which will still see noise levels in excess of the upper guideline of 55 dB, the development will achieve the required levels below that of the upper guideline.
NPPF & NPSE	With the glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a conclusion of NOEL – No Observed Effect Level . This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
OVERALL OUTCOME	NOEL – No Observed Effect Level

14 RECOMMENDATION TO DECISION MAKER

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed residential dwellings and satisfy the local council's requirements.

National Planning Policy Framework 2021 suggests that planning permission should be granted unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in the framework taken as a whole, or specific policies in the framework indicate the application should be restricted.

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2021, NPPF & NPSE and that, with regards to sound, planning permission can be granted using the following parameters.

As indicated in Section 2 of PRoPG, following the PRoPG approach will lead to the choice of one of four possible recommendations from the noise practitioner to the decision maker:

- A. Planning consent may be granted without any need for noise conditions;
- B. Planning consent may be granted subject to the inclusion of suitable noise conditions;
- C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid");
or
- D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

RECOMMENDATION TO DECISION MAKER

Grant with Noise Conditions

15 CONCLUSION

15.1 Summary of Results

15.1.1 Background Noise Levels

A 120 hour background noise survey was undertaken from 25th - 30th September 2020 at two positions at the front of the site and the rear of the site in order to establish the underlying background noise levels. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 52.3 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 48.6 dB at position 1. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 72.7 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 70.4 dB at position 2.

Assessment Position	Date Start	Date Finish	Daytime LAeq	Night Time LAeq
Position 1 Front	25/09/2020	30/09/2020	52.3	48.6
Position 2 Rear	25/09/2020	30/09/2020	72.7	70.4

15.2 Potential Façade Noise Levels

15.2.1 Daytime (07:00-23:00)

Time Period	Highest Potential Façade Noise Level	Noise Risk Category 2 - Medium
Average Daytime (07:00-23:00)	$L_{Aeq, 16 \text{ HOUR}}$ 69.0 dB	63 - 70 dB

15.2.2 Night Time (23:00-07:00)

Time Period	Highest Potential Façade Noise Level	Noise Risk Category 3 - High
Average Night Time (23:00-07:00)	$L_{Aeq, 16 \text{ HOUR}}$ 67.0 dB	> 60 dB
	Maximum (10 Times) – L_{Amax} 87.5 dB	>80 dB (10 Times in 8 Hours)

15.3 Risk Assessment

15.3.1 Daytime (07:00-23:00) – Position 1

Risk Assessment Category	Risk Assessment
2 – Medium	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

15.3.2 Night Time (23:00-07:00) – Position 1

Risk Assessment Category	Risk Assessment
3 – High	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

The above table demonstrates this site is located within Noise Risk Category 2 which suggests a medium level of risk for daytime levels and Noise Risk Category 3 which suggests a high of risk for night time levels. Therefore, further mitigation levels will be required at Stage 2.

15.4 Good Acoustic Design

Forman Homes have redesigned the site with acoustics in mind and are aware of the noise levels associated with the neighbouring railway line. To this extent, they have designed the internal layout of the properties facing the railway line and associated noise source, and positioned as little habitable rooms as is reasonably possible facing this source. Therefore, it has been considered that Forman Homes have taken every reasonable step to ensure the acoustic impact of noise from the neighbouring railway line is kept to a minimum.

15.5 Summary of Vibration

15.5.1 Results from Measured Vibration Levels

The following vibration levels have been assessed over a typical period between 25th – 29th September 2020. The following table summarises these results:-

Time Period	Vibration Dose Value m/s ^{1.75}			Peak Particle Velocity mm/s
	L	T	V	Resultant Vector
25 th September 2020 – 7 Hr	0.027	0.027	0.052	*1.28mm/s
26 th September 2020 – 16 Hr	0.026	0.026	0.058	1.05mm/s
27 th September 2020 – 16 Hr	0.026	0.026	0.055	.900mm/s
28 th September 2020 – 16 Hr	0.024	0.026	0.05	.825mm/s
25 th – 26 th September 2020 – 8 Hr	0.025	0.022	0.038	.675mm/s
26 th – 27 th September 2020 – 8 Hr	0.022	0.022	0.039	.675mm/s
27 th – 28 th September 2020 – 8 Hr	0.022	0.023	0.042	.750mm/s
28 th – 29 th September 2020 – 8 Hr	0.022	0.022	0.034	.700mm/s

Table 3 Summary of daily VDV and PPV

* Denotes Set Up

The vibration results indicate that vibration dose values (vdv) at the measurement locations are below 0.2 – 0.4 for daytime and night time periods. These values are below the range associated with ‘low probability of adverse comment’.

The maximum peak particle velocity recorded was found to be 1.28 mm/s at Location 1. In accordance with the guidance in BS7385, this value is below the limit at which cosmetic damage to building is likely.

The results of this vibration survey indicate that in accordance with the advice given in the appropriate standards, there is likely to be no concern of adverse comments from future occupants of their properties and no concern of cosmetic damage to buildings arising from vibration at this measurement location.

15.5.2 Building Vibration Transfer Risk Assessment

This assessment has concluded that based on the proposed foundation and construction methods, the conclusion would be on the border of a ‘Low to Medium Risk’ level of vibration transfer and that need for proprietary isolation of the foundations from the main structure should be considered as a precautionary measure at the design stage.

There are a range of other standards that can be considered and the following demonstrates these and their requirements and further gives guidance as to where this site is positioned within these criteria. These standards further confirm and underpin our recommendations made.

15.6 Glazing & Ventilation Specification

The development should be designed with an 8mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Mechanical Ventilation Heat Recovery (MVHR) unit or similarly approved to all the living room facades highlighted in red in section 9.16 of this technical report. The bedrooms should be designed with a 6mm glass / 16mm argon air gap / 6.8mm Pilkington optiphon glass double glazed windows and a Mechanical Ventilation Heat Recovery (MVHR) unit or similarly approved highlighted in red in section 9.16 of this technical report. The remainder of the development can utilise a standard 4mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Titon V25 standard canopy vent to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

The upgraded glazing for the bedroom facades highlighted in red in section 9.16 is necessary, in order that the night time L_{Amax} 45 dB criteria is achieved.

15.7 WHO Guidelines for Community Noise

The development proposes external living areas and therefore an assessment to the World Health Organisation's 'Guidelines for Community Noise' has been carried out. The guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a railway. The calculations have demonstrated that the garden areas of the proposed houses are likely to see noise levels below the lower guideline of 50 dB.

15.8 Conclusion

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed residential dwellings and satisfy the local council's requirements.

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2021, NPPF & NPSE.

Finally, it should be noted that Eastleigh Borough Council's representative for their Environmental Health Department have made comments in relation to our initial report and these are addressed within the appendix of this report.

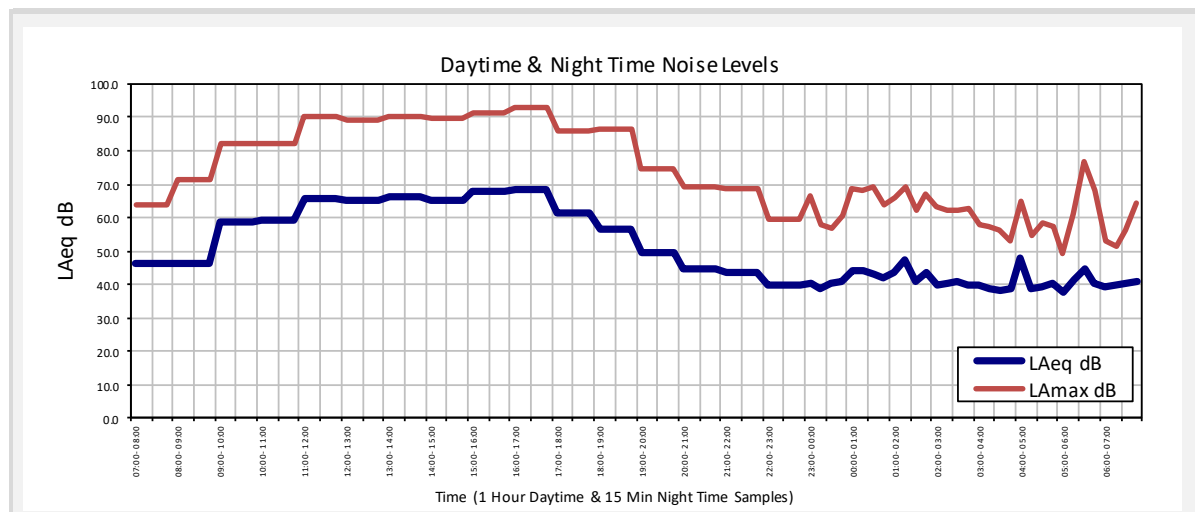
16 APPENDIX A - RESULTS

16.1 25th – 26th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT												
Octave Band Centre Frequency (Hz)												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Cor r esponding LAmx 16 HOUR	52.3	93.1	60.7	55.3	52.6	49.9	48.9	49.6	40.8	33.9	33.3	12.3
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Cor r esponding LAmx 8 HOUR	46.0	76.8	45.2	45.7	44.1	43.2	43.6	43.4	33.1	20.6	24.2	8.2

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Octave Band Centre Frequency (Hz)												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	46.5	63.8	55.2	54.7	52.0	51.7	51.4	52.7	43.3	27.9	26.5	8.2
08:00 - 09:00	46.3	71.1	53.6	53.3	49.0	49.3	48.0	48.9	40.5	29.3	31.1	9.1
09:00 - 10:00	58.6	82.3	57.0	54.2	50.6	49.0	48.7	49.7	44.7	40.3	39.6	16.1
10:00 - 11:00	59.4	82.0	56.6	53.2	49.4	48.9	49.2	50.0	40.2	31.0	30.2	10.1
11:00 - 12:00	65.5	90.3	62.5	56.1	55.7	52.3	49.9	50.4	41.8	35.1	34.2	12.6
12:00 - 13:00	64.9	89.2	62.2	56.4	55.4	51.3	50.3	50.3	41.1	34.5	33.5	13.4
13:00 - 14:00	66.1	90.5	63.8	57.4	51.5	50.0	49.3	50.0	40.6	36.1	34.9	13.7
14:00 - 15:00	65.0	89.9	62.2	55.9	52.5	49.1	49.0	49.7	40.4	34.2	33.5	12.5
15:00 - 16:00	67.6	91.4	65.5	59.1	56.2	51.5	49.9	50.3	42.0	36.4	36.5	15.2
16:00 - 17:00	68.6	93.1	66.7	60.2	56.1	52.6	50.8	50.8	42.4	36.7	36.8	15.4
17:00 - 18:00	61.6	85.9	59.7	54.9	52.6	51.0	49.5	50.0	40.0	31.7	31.5	12.4
18:00 - 19:00	56.7	86.3	54.5	51.8	51.7	48.5	47.9	49.2	38.1	27.2	26.4	9.5
19:00 - 20:00	49.4	74.4	50.9	50.6	52.1	48.7	48.1	48.1	36.9	23.1	21.4	8.6
20:00 - 21:00	44.8	69.1	47.8	50.2	47.3	46.1	46.3	47.7	40.3	32.3	26.5	9.1
21:00 - 22:00	43.3	68.9	47.9	48.7	45.8	44.9	44.5	45.8	35.0	22.1	21.5	8.6
22:00 - 23:00	39.9	59.7	45.0	46.0	45.7	43.8	42.7	43.6	32.9	17.8	15.1	8.1

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Octave Band Centre Frequency (Hz)												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	40.6	66.5	44.4	45.8	43.6	41.4	41.9	42.5	31.9	18.9	17.9	8.2
23:15 - 23:30	38.8	58.1	40.8	45.3	43.2	41.5	41.6	42.1	31.7	18.9	15.1	8.1
23:30 - 23:45	40.3	56.6	40.8	44.1	42.6	41.3	42.3	42.4	31.4	15.0	14.2	8.1
23:45 - 00:00	41.1	60.8	39.6	42.1	42.0	40.2	40.6	40.5	29.2	16.6	16.7	8.2
00:00 - 00:15	44.1	68.7	41.8	41.6	39.1	38.1	38.7	39.3	28.4	16.9	16.3	8.2
00:15 - 00:30	44.3	68.2	44.3	43.1	40.9	39.8	39.9	40.2	29.6	19.0	18.7	8.3
00:30 - 00:45	43.2	69.4	42.2	42.4	39.7	39.2	40.7	40.4	29.4	18.0	17.1	8.2
00:45 - 01:00	41.9	63.7	44.3	45.7	41.7	39.0	39.8	39.4	29.5	19.6	17.8	8.2
01:00 - 01:15	43.7	65.8	42.1	43.4	40.4	40.0	41.5	40.4	29.4	18.0	18.1	8.2
01:15 - 01:30	47.3	69.4	48.0	48.0	45.6	46.4	45.0	43.5	36.4	26.2	18.9	8.2
01:30 - 01:45	40.9	62.1	40.3	43.1	39.3	39.2	40.6	40.4	29.5	16.9	15.6	8.1
01:45 - 02:00	43.6	67.2	50.8	48.0	46.5	46.7	44.8	42.8	35.6	29.4	19.7	8.1
02:00 - 02:15	39.7	63.1	41.1	43.9	41.4	40.9	42.1	41.4	30.0	16.5	15.3	8.1
02:15 - 02:30	40.1	62.3	41.1	43.1	39.7	39.6	41.6	40.6	29.1	15.8	15.1	8.1
02:30 - 02:45	40.7	62.3	40.5	44.1	42.3	40.4	41.9	41.2	29.7	16.2	16.1	8.1
02:45 - 03:00	40.0	63.0	42.4	44.0	41.3	40.4	41.7	40.8	29.5	15.6	15.1	8.1
03:00 - 03:15	39.6	58.0	40.5	44.3	39.6	39.9	42.1	41.1	30.0	15.6	15.3	8.1
03:15 - 03:30	38.9	57.6	40.3	44.0	40.3	40.0	42.3	41.2	29.6	14.5	14.0	8.1
03:30 - 03:45	38.0	56.5	39.3	43.1	40.0	39.6	42.4	41.5	29.9	13.5	13.1	8.1
03:45 - 04:00	38.9	53.2	39.8	44.2	40.2	39.8	41.2	40.5	33.4	15.0	12.4	8.1
04:00 - 04:15	48.0	65.0	52.7	48.5	44.1	44.3	43.4	42.2	32.0	23.2	19.2	8.1
04:15 - 04:30	38.7	54.6	42.2	44.6	45.9	45.2	42.9	41.9	31.6	17.0	12.7	8.1
04:30 - 04:45	39.2	58.6	39.8	44.2	43.1	43.1	44.6	42.8	31.4	15.5	13.1	8.1
04:45 - 05:00	40.2	57.3	44.3	45.9	44.4	45.4	44.3	43.8	33.4	21.0	13.3	8.1
05:00 - 05:15	37.6	49.1	39.1	43.4	41.8	40.8	42.8	43.3	32.4	12.8	11.9	8.1
05:15 - 05:30	41.4	60.9	42.3	49.2	47.2	45.0	45.1	44.6	34.6	22.7	16.2	8.1
05:30 - 05:45	44.7	76.8	47.7	47.0	47.7	44.0	45.2	45.2	34.9	19.1	14.7	8.1
05:45 - 06:00	40.5	68.0	48.1	46.4	44.8	43.6	45.5	45.8	34.9	18.9	15.6	8.1
06:00 - 06:15	39.1	53.1	49.0	46.3	45.2	45.6	46.0	46.1	35.3	20.5	22.0	8.1
06:15 - 06:30	39.9	51.3	45.4	48.1	47.0	46.4	47.1	47.1	36.5	23.7	38.2	9.1
06:30 - 06:45	40.5	56.4	46.7	48.6	48.9	47.1	47.5	48.1	37.5	22.1	17.5	8.2
06:45 - 07:00	41.0	64.3	47.2	49.4	48.7	47.3	47.2	48.8	38.3	23.3	26.2	8.1

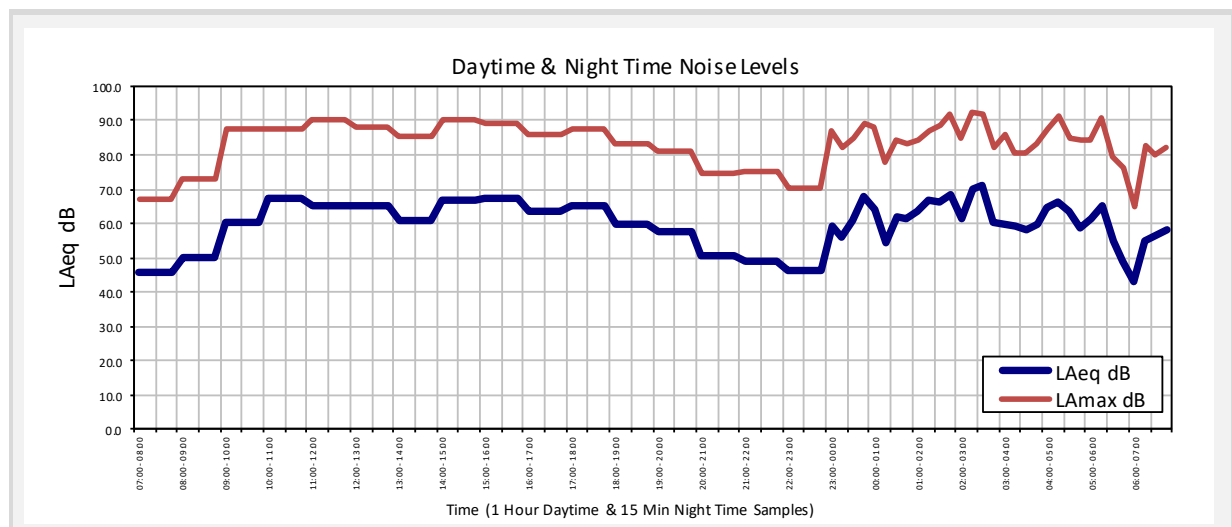


16.2 26th – 27th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	48.7	90.3	60.5	53.3	49.3	46.1	44.8	46.4	36.8	29.9	30.5	10.6
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	42.4	92.4	60.7	52.1	43.2	39.3	38.6	38.8	32.0	29.7	30.3	11.0

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	45.9	67.2	57.0	51.5	49.7	47.9	47.1	48.7	39.9	28.9	27.4	8.3
08:00 - 09:00	49.8	72.9	51.2	50.9	49.6	48.0	46.9	48.1	38.8	29.0	26.2	8.6
09:00 - 10:00	60.2	87.7	57.3	50.6	47.6	46.0	45.1	46.8	36.3	28.1	28.2	9.7
10:00 - 11:00	67.2	87.7	64.8	56.9	50.4	46.2	45.4	46.9	37.2	32.7	33.1	12.4
11:00 - 12:00	65.1	90.2	62.7	55.3	51.6	47.0	45.5	46.3	36.5	31.1	31.6	11.7
12:00 - 13:00	65.0	87.9	62.6	54.9	48.5	45.2	44.2	45.8	35.7	30.7	31.3	11.5
13:00 - 14:00	60.9	85.6	57.9	51.7	50.2	46.1	44.9	46.3	35.7	29.2	30.8	10.7
14:00 - 15:00	66.9	90.3	64.8	56.8	50.1	47.0	44.9	46.4	37.0	32.7	32.9	12.4
15:00 - 16:00	67.3	89.4	64.3	56.1	52.1	48.0	46.3	46.8	37.9	33.5	33.1	12.6
16:00 - 17:00	63.6	86.2	60.5	54.6	52.6	49.0	45.5	46.9	37.8	30.9	30.2	10.8
17:00 - 18:00	65.0	87.6	62.2	54.4	48.5	46.4	45.3	47.3	37.9	31.4	31.5	11.8
18:00 - 19:00	59.9	83.4	57.0	50.8	48.2	45.0	44.2	46.5	37.0	28.2	26.9	9.5
19:00 - 20:00	57.6	81.3	54.5	48.3	46.1	42.4	42.6	45.0	35.9	27.5	25.7	9.2
20:00 - 21:00	50.4	74.7	48.4	45.9	43.6	42.0	41.6	44.2	33.7	22.4	21.9	8.7
21:00 - 22:00	49.2	75.1	48.4	45.4	43.4	41.2	40.8	43.2	33.0	22.7	21.9	8.8
22:00 - 23:00	46.5	70.1	46.1	46.8	45.7	40.8	40.2	41.9	31.4	20.3	34.3	9.2

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	59.1	87.0	56.1	48.5	41.5	38.5	37.3	39.3	30.0	25.6	26.2	9.3
23:15 - 23:30	56.2	81.9	52.1	45.1	40.5	37.9	37.8	39.3	29.5	24.3	24.9	9.0
23:30 - 23:45	60.6	84.9	56.3	47.3	40.8	38.5	37.9	38.4	29.8	26.1	26.7	9.5
23:45 - 00:00	67.8	89.0	65.0	56.3	46.4	41.4	39.6	39.0	34.4	33.6	34.2	14.4
00:00 - 00:15	64.1	88.0	61.0	52.3	43.5	40.1	39.9	39.5	32.2	30.2	30.6	10.9
00:15 - 00:30	54.4	77.7	49.4	41.3	39.6	35.6	34.9	35.9	26.7	21.7	22.1	8.5
00:30 - 00:45	62.1	84.5	58.2	49.2	42.2	37.9	37.7	37.3	29.7	27.6	28.2	9.9
00:45 - 01:00	61.6	83.3	57.8	48.4	41.2	37.7	37.5	37.1	29.4	27.2	28.2	10.1
01:00 - 01:15	63.7	84.3	60.3	51.5	42.3	39.7	38.3	37.2	31.0	29.7	30.8	11.1
01:15 - 01:30	66.7	87.2	63.5	54.7	45.0	41.0	39.7	39.2	34.2	32.7	33.2	12.7
01:30 - 01:45	66.0	88.7	62.4	53.2	43.6	39.5	38.7	37.4	32.7	31.2	31.9	11.9
01:45 - 02:00	68.5	92.0	66.1	57.9	47.0	41.2	39.6	38.5	34.7	34.0	34.6	13.6
02:00 - 02:15	61.2	84.6	57.6	48.5	40.8	37.3	37.4	36.5	31.0	28.2	27.8	9.8
02:15 - 02:30	70.0	92.4	66.9	57.8	47.7	42.9	40.9	39.6	36.5	35.3	35.6	14.4
02:30 - 02:45	71.0	92.1	68.4	59.2	48.6	43.4	41.1	39.8	36.8	36.0	36.4	15.0
02:45 - 03:00	60.3	82.4	55.7	46.4	40.0	36.4	36.1	35.4	28.2	26.3	27.0	9.5
03:00 - 03:15	60.0	85.7	56.2	46.9	38.7	36.1	36.4	35.3	28.4	26.6	27.7	9.9
03:15 - 03:30	59.2	80.8	55.1	46.2	38.5	35.4	35.5	34.7	27.1	25.5	26.4	9.3
03:30 - 03:45	58.2	80.5	53.7	44.8	38.7	35.6	35.5	35.2	28.1	26.7	28.0	9.7
03:45 - 04:00	59.9	83.4	55.6	45.8	38.9	36.3	36.2	35.9	28.7	26.1	26.7	9.4
04:00 - 04:15	64.7	87.6	61.3	52.6	42.9	38.9	38.4	37.8	32.0	30.8	31.8	11.7
04:15 - 04:30	66.3	91.1	63.4	54.6	45.1	40.3	39.0	38.2	33.4	32.5	33.3	12.8
04:30 - 04:45	63.5	84.7	59.9	50.1	41.6	38.1	37.8	37.3	33.6	29.3	29.2	10.5
04:45 - 05:00	58.6	84.1	53.5	45.6	39.2	36.6	36.6	36.6	29.1	26.0	26.3	9.4
05:00 - 05:15	61.3	84.2	57.4	48.7	41.1	38.2	38.0	38.5	30.7	28.0	28.9	10.2
05:15 - 05:30	65.1	90.7	62.6	55.6	45.4	40.1	39.2	39.3	32.5	30.8	31.6	11.8
05:30 - 05:45	55.1	79.2	50.8	43.4	39.7	37.6	37.9	38.6	29.3	24.4	24.8	8.9
05:45 - 06:00	49.1	76.0	45.2	42.8	39.4	37.3	37.9	39.0	28.7	21.0	19.7	8.3
06:00 - 06:15	42.8	64.9	39.9	41.5	40.3	38.9	39.4	41.0	30.4	20.2	20.1	8.3
06:15 - 06:30	54.9	82.6	51.4	45.5	43.0	40.2	40.1	42.0	32.1	24.4	24.3	8.8
06:30 - 06:45	56.5	80.2	52.7	48.1	45.0	41.8	41.3	42.6	32.9	25.0	27.9	8.8
06:45 - 07:00	58.4	81.9	54.7	47.0	43.7	40.7	41.2	43.1	33.2	26.4	27.0	9.3

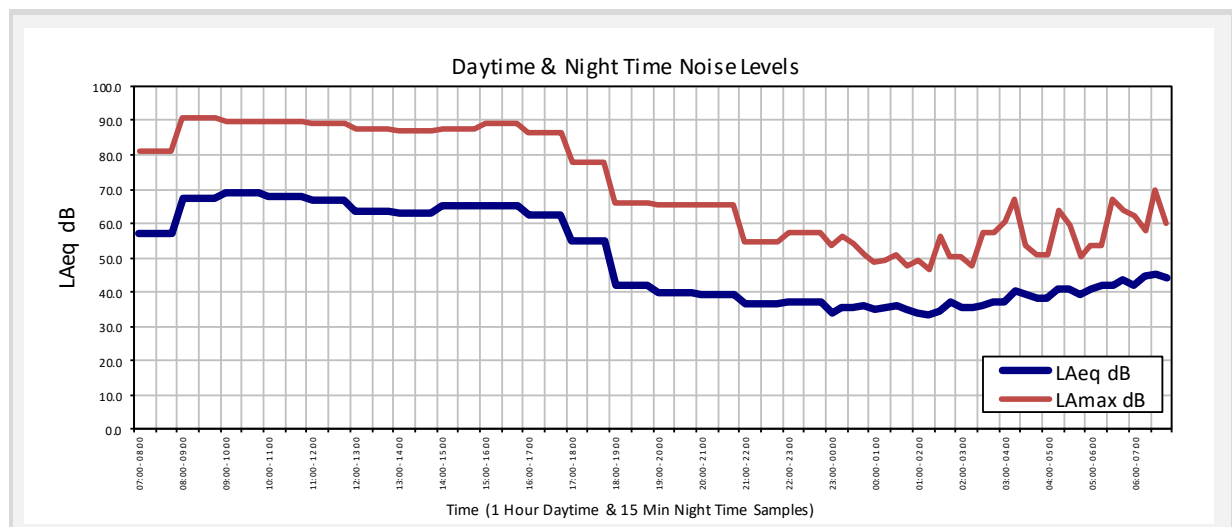


16.3 27th – 28th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Cor r esponding LAmx 16 HOUR	48.5	90.7	60.9	53.5	49.9	46.3	44.6	45.8	37.1	30.2	31.4	11.0
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Cor r esponding LAmx 8 HOUR	48.6	69.6	48.7	46.5	44.8	44.1	45.9	46.4	35.4	27.5	30.1	8.2

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	57.3	81.0	54.1	48.1	44.7	42.6	42.1	43.8	33.6	25.5	26.3	9.3
08:00 - 09:00	67.3	90.7	64.6	56.2	48.6	44.0	43.1	44.9	36.9	32.8	33.3	12.6
09:00 - 10:00	68.7	89.5	66.2	58.0	50.2	45.9	44.9	46.9	38.8	34.5	34.8	13.7
10:00 - 11:00	67.8	89.7	64.9	57.0	51.2	46.3	44.6	46.6	38.1	33.4	33.9	13.2
11:00 - 12:00	66.7	88.9	64.4	57.1	53.1	50.1	47.7	47.5	39.5	33.7	33.4	12.7
12:00 - 13:00	63.8	87.4	61.3	54.2	48.0	44.1	42.7	45.2	36.9	30.3	30.0	10.8
13:00 - 14:00	62.8	87.3	59.6	53.0	48.9	44.6	43.5	45.9	38.1	31.6	30.1	10.6
14:00 - 15:00	65.3	87.4	62.3	54.2	49.5	47.1	45.6	47.2	39.4	32.6	31.9	11.9
15:00 - 16:00	65.2	89.2	61.4	54.0	51.0	47.6	45.6	45.7	36.2	30.3	38.3	13.1
16:00 - 17:00	62.4	86.4	58.8	51.8	52.4	46.5	44.5	44.2	35.1	29.5	29.8	10.5
17:00 - 18:00	54.9	77.9	53.0	50.4	53.1	50.3	48.1	48.6	41.5	25.5	23.0	8.8
18:00 - 19:00	42.0	66.0	46.0	47.0	46.1	44.6	43.7	46.3	35.7	24.2	18.4	8.3
19:00 - 20:00	39.8	65.3	48.3	48.2	52.3	47.2	46.0	45.9	34.4	23.6	20.4	8.7
20:00 - 21:00	39.2	65.7	44.7	46.2	46.0	44.0	42.9	44.8	32.3	19.5	16.9	8.3
21:00 - 22:00	36.8	54.6	41.9	44.7	44.4	41.7	41.6	43.5	31.5	14.6	15.8	8.1
22:00 - 23:00	37.2	57.3	43.0	43.8	42.5	40.1	39.5	40.7	28.7	13.5	12.3	8.1

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	33.8	53.4	36.4	38.5	38.8	37.2	37.6	38.5	25.8	11.8	12.1	8.1
23:15 - 23:30	35.7	56.3	38.9	40.8	39.3	38.2	38.7	38.8	26.4	13.2	12.6	8.1
23:30 - 23:45	35.7	54.1	37.4	40.6	41.2	40.1	39.8	39.6	27.3	14.8	15.9	8.2
23:45 - 00:00	36.3	51.1	37.3	40.7	41.5	40.5	40.1	40.3	28.9	12.0	11.9	8.1
00:00 - 00:15	35.0	48.7	39.0	43.5	43.5	42.8	40.7	40.3	28.5	11.9	12.0	8.1
00:15 - 00:30	35.4	49.2	38.1	42.1	39.5	40.1	41.1	40.4	28.2	11.9	11.8	8.1
00:30 - 00:45	36.1	50.7	43.5	43.7	40.8	40.3	40.6	39.7	27.7	12.2	12.0	8.1
00:45 - 01:00	34.7	47.8	40.5	43.9	40.2	39.7	40.8	40.0	28.1	14.4	12.4	8.1
01:00 - 01:15	33.7	49.2	36.1	39.5	37.9	38.4	40.0	39.3	27.4	12.2	12.1	8.1
01:15 - 01:30	33.4	46.7	36.4	39.9	38.2	39.2	39.5	38.7	26.6	12.1	11.9	8.1
01:30 - 01:45	34.6	56.4	38.7	41.0	39.4	39.9	41.0	39.8	27.8	13.7	12.6	8.1
01:45 - 02:00	37.3	50.2	38.8	41.0	38.2	40.2	40.8	39.5	27.9	13.5	12.1	8.1
02:00 - 02:15	35.6	50.2	39.7	43.1	39.5	39.8	41.7	40.8	29.3	12.5	12.1	8.1
02:15 - 02:30	35.7	47.7	40.0	42.8	39.9	40.6	42.4	41.1	29.7	12.4	11.8	8.0
02:30 - 02:45	35.9	57.2	39.5	40.7	38.7	38.5	40.5	39.7	28.3	12.7	13.0	8.1
02:45 - 03:00	37.3	57.1	37.9	39.5	37.8	36.1	38.8	38.0	26.2	12.3	12.2	8.1
03:00 - 03:15	37.0	60.7	38.1	40.1	38.2	37.9	39.9	39.0	26.2	12.7	12.9	8.1
03:15 - 03:30	40.3	67.0	45.2	45.6	41.8	42.3	43.6	42.3	30.4	19.6	17.8	8.1
03:30 - 03:45	39.1	53.4	43.9	44.1	41.3	41.2	43.9	43.2	31.0	13.2	12.3	8.0
03:45 - 04:00	38.0	50.6	41.6	44.9	42.7	41.4	44.5	43.9	31.9	14.9	13.0	8.1
04:00 - 04:15	38.2	51.1	39.9	42.7	42.4	42.5	43.8	42.8	30.5	13.1	12.5	8.0
04:15 - 04:30	40.8	63.7	40.9	43.7	42.8	40.8	43.8	43.4	30.0	12.1	11.8	8.0
04:30 - 04:45	40.8	59.4	42.4	45.7	43.9	42.6	45.3	45.3	33.6	12.9	11.9	8.0
04:45 - 05:00	39.2	50.3	42.6	45.2	45.0	43.6	45.3	45.5	33.8	14.0	12.4	8.0
05:00 - 05:15	41.0	53.4	45.3	46.9	46.8	45.0	47.3	47.6	36.0	15.2	12.8	8.0
05:15 - 05:30	41.7	53.6	44.1	47.4	46.8	45.5	46.9	47.8	35.8	13.7	12.3	8.0
05:30 - 05:45	42.0	67.1	47.9	49.0	48.6	46.4	48.6	49.5	37.9	16.6	14.3	8.0
05:45 - 06:00	43.6	63.8	48.4	48.1	47.2	45.8	47.6	48.5	36.7	17.0	14.9	8.0
06:00 - 06:15	41.8	62.1	49.1	49.5	48.1	47.0	48.8	50.1	38.8	21.7	22.4	8.0
06:15 - 06:30	44.9	57.9	49.2	51.4	49.6	49.2	51.2	52.1	41.3	41.9	44.9	9.2
06:30 - 06:45	45.3	69.6	62.0	55.0	51.6	50.6	52.2	53.3	42.8	29.1	23.7	8.6
06:45 - 07:00	44.2	59.8	52.2	52.5	51.4	51.9	54.1	55.0	44.9	29.3	27.9	9.3

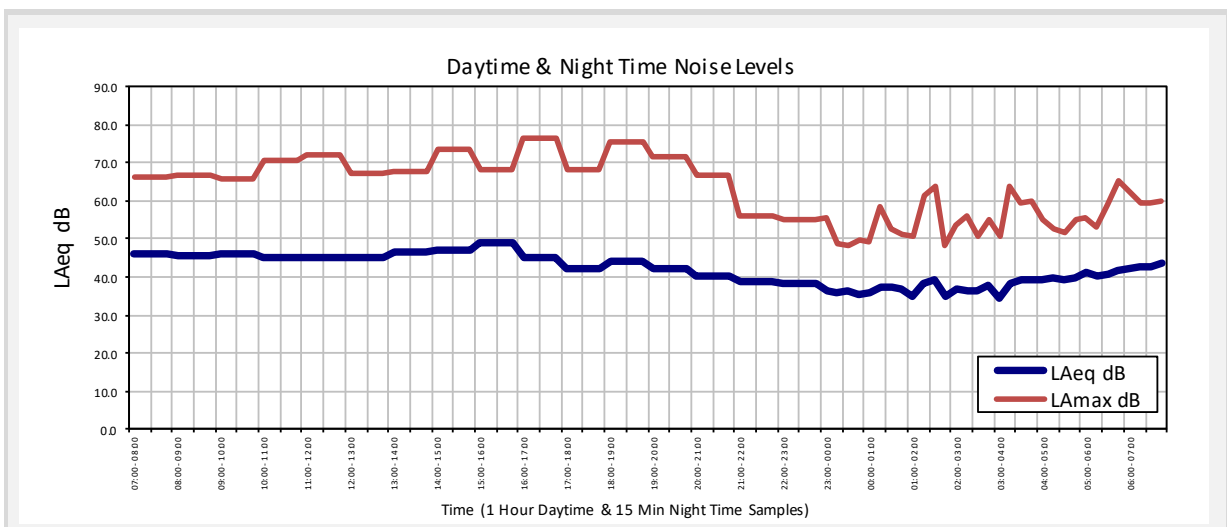


16.4 28th – 29th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	48.5	76.3	51.0	50.7	48.9	46.1	44.9	45.7	38.7	30.1	24.4	11.0
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	42.8	65.1	43.0	43.2	41.9	39.8	39.7	40.1	32.3	21.4	18.4	11.5

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	45.9	66.0	52.2	53.5	52.7	50.4	52.1	53.1	42.5	24.6	21.5	8.2
08:00 - 09:00	45.5	66.8	52.3	51.5	49.5	47.7	47.9	48.4	38.3	25.8	24.5	8.1
09:00 - 10:00	46.2	65.7	51.7	49.8	47.4	45.5	43.6	42.1	33.0	25.5	24.9	8.2
10:00 - 11:00	44.9	70.5	50.0	49.8	46.7	43.8	42.1	419	34.0	27.8	21.8	8.2
11:00 - 12:00	45.2	72.2	53.9	51.6	47.7	44.7	42.8	42.4	33.4	24.4	21.5	8.4
12:00 - 13:00	45.2	67.3	49.8	53.8	49.8	47.3	44.4	44.0	36.4	26.5	24.6	8.4
13:00 - 14:00	46.7	67.7	53.0	51.2	49.7	47.1	45.6	44.7	36.9	27.8	23.2	13.5
14:00 - 15:00	47.0	73.4	53.7	53.7	53.2	50.2	44.5	44.3	419	31.2	24.6	8.5
15:00 - 16:00	48.9	68.2	51.7	50.5	50.9	45.7	44.8	48.3	44.3	36.0	29.1	9.0
16:00 - 17:00	45.3	76.3	52.6	50.7	47.7	44.9	42.9	43.3	35.5	26.7	24.4	9.4
17:00 - 18:00	42.2	68.1	50.9	49.8	47.6	45.1	43.5	45.4	41.4	35.6	27.6	8.5
18:00 - 19:00	44.2	75.4	47.5	46.5	43.7	43.4	42.5	45.5	41.7	35.6	28.4	8.9
19:00 - 20:00	42.1	71.5	49.2	48.4	49.8	43.4	41.1	41.0	32.2	21.8	18.5	12.8
20:00 - 21:00	40.3	66.4	45.9	47.9	43.8	41.2	39.1	39.1	30.4	23.3	19.5	13.6
21:00 - 22:00	38.6	56.2	43.3	44.1	41.5	40.3	38.1	37.9	27.9	15.8	14.0	16.5
22:00 - 23:00	38.0	55.0	43.9	44.3	42.3	39.9	36.4	35.2	25.2	17.4	17.0	10.6

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	36.1	55.7	42.6	41.5	35.6	34.6	32.9	31.8	25.4	24.0	24.2	9.5
23:15 - 23:30	36.0	48.6	39.1	41.5	39.4	38.3	34.4	32.3	23.8	16.8	14.8	15.4
23:30 - 23:45	36.4	48.2	41.6	41.0	36.8	35.0	33.6	32.6	24.1	17.8	15.1	12.2
23:45 - 00:00	35.2	49.8	39.3	39.4	34.8	33.6	32.4	31.5	21.2	12.3	12.3	14.3
00:00 - 00:15	35.6	49.3	39.3	38.2	34.2	33.3	33.0	30.5	19.5	12.3	12.4	14.9
00:15 - 00:30	37.2	58.4	40.0	39.1	35.6	37.1	34.3	30.9	22.8	19.8	19.5	12.0
00:30 - 00:45	37.1	52.5	40.8	39.9	36.5	36.0	34.0	32.5	22.5	14.3	13.8	9.2
00:45 - 01:00	36.8	51.0	41.5	39.0	34.4	34.4	33.0	31.6	21.9	13.2	12.9	15.3
01:00 - 01:15	35.1	50.7	38.7	37.5	33.8	34.4	33.4	31.8	22.0	12.8	12.8	14.0
01:15 - 01:30	38.4	61.5	37.5	37.8	34.4	33.3	33.0	31.5	21.8	12.9	12.6	12.9
01:30 - 01:45	39.3	63.5	36.5	37.3	33.7	34.2	32.8	31.3	21.3	13.1	13.6	14.2
01:45 - 02:00	35.1	48.0	39.3	39.8	35.1	35.6	33.7	31.5	26.1	22.2	19.2	11.2
02:00 - 02:15	36.7	53.6	39.1	37.8	34.6	34.4	34.2	32.7	23.1	13.2	12.6	10.3
02:15 - 02:30	36.5	55.8	40.7	38.4	34.7	33.8	33.8	32.7	23.0	13.4	12.7	11.2
02:30 - 02:45	36.4	50.8	40.1	38.0	35.7	35.0	34.6	33.3	23.7	13.3	12.5	11.9
02:45 - 03:00	37.8	54.9	40.5	39.3	36.7	36.8	37.1	35.2	25.6	13.9	12.8	9.0
03:00 - 03:15	34.2	50.6	38.9	37.7	35.6	35.9	36.0	34.4	24.8	13.4	12.6	8.4
03:15 - 03:30	38.1	63.7	43.3	39.7	35.3	35.9	36.8	35.6	27.2	20.4	20.6	8.7
03:30 - 03:45	39.4	59.2	38.6	38.1	35.4	36.0	36.8	36.2	27.4	15.0	13.5	8.4
03:45 - 04:00	39.3	59.8	38.8	40.6	38.2	37.6	38.7	37.8	28.8	16.8	14.6	12.2
04:00 - 04:15	39.4	55.2	41.3	40.7	38.6	38.6	39.0	37.9	29.3	17.8	15.9	9.2
04:15 - 04:30	39.8	52.8	45.1	45.5	42.2	42.4	40.9	39.0	30.6	21.4	15.1	12.3
04:30 - 04:45	39.3	51.8	40.5	41.8	38.9	39.7	40.9	40.4	31.5	17.2	14.0	10.2
04:45 - 05:00	39.6	55.1	40.3	41.3	39.9	40.5	41.7	41.3	33.2	19.7	16.4	8.9
05:00 - 05:15	41.0	55.4	44.9	43.6	42.0	41.7	43.1	43.5	36.2	24.4	22.0	8.4
05:15 - 05:30	40.0	52.9	41.6	44.1	45.3	43.6	43.3	43.5	36.1	21.8	17.4	8.4
05:30 - 05:45	40.9	58.7	45.5	47.7	47.8	43.5	43.5	44.0	36.6	25.6	17.6	8.3
05:45 - 06:00	41.5	65.1	48.5	46.1	46.5	43.1	43.0	43.7	36.0	22.6	18.9	8.3
06:00 - 06:15	41.9	62.3	45.0	47.2	45.6	43.9	43.9	45.0	37.1	24.4	21.2	8.2
06:15 - 06:30	42.5	59.3	44.9	47.1	45.7	44.3	44.7	46.1	38.4	27.4	24.2	10.4
06:30 - 06:45	42.4	59.3	46.7	49.0	46.6	44.9	44.7	46.2	38.7	26.9	23.3	8.3
06:45 - 07:00	43.4	60.1	50.2	49.3	50.3	44.0	43.9	45.7	38.7	28.9	23.4	8.4

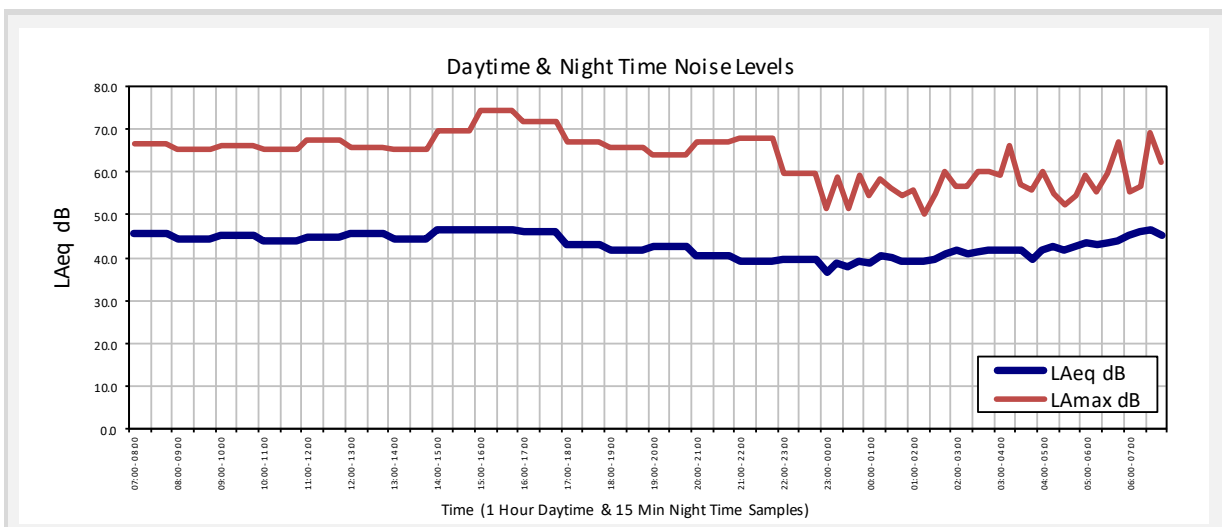


16.5 29th – 30th September 2020 Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	47.6	74.2	51.2	50.6	49.0	45.6	43.6	44.0	38.5	35.1	32.0	10.8
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	48.0	69.0	50.1	48.7	45.4	44.4	45.1	45.8	35.9	20.4	18.6	8.1

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	45.5	66.7	55.2	54.4	52.5	51.2	48.0	48.7	46.6	46.4	43.5	18.3
08:00 - 09:00	44.6	65.4	51.6	51.8	54.0	48.6	47.3	47.2	39.7	28.9	26.2	8.4
09:00 - 10:00	45.1	66.3	49.2	49.5	46.6	44.3	43.9	44.4	36.2	24.8	21.1	8.3
10:00 - 11:00	43.9	65.3	49.4	49.9	46.7	45.0	44.4	44.9	37.2	26.5	21.1	8.3
11:00 - 12:00	44.7	67.5	49.0	49.1	46.5	45.0	43.8	43.0	35.0	26.0	22.7	8.4
12:00 - 13:00	45.5	65.9	54.2	50.3	49.1	47.4	45.6	43.8	38.7	28.7	22.2	10.8
13:00 - 14:00	44.4	65.3	51.5	51.2	47.6	44.6	42.2	42.3	37.2	31.3	28.1	9.0
14:00 - 15:00	46.7	69.4	53.7	54.9	53.9	44.9	42.9	42.8	35.0	27.5	23.6	8.6
15:00 - 16:00	46.5	74.2	50.8	48.9	49.8	44.0	42.5	46.5	42.0	32.8	25.4	8.8
16:00 - 17:00	45.9	72.0	53.7	52.1	47.5	43.8	39.6	40.1	32.7	26.3	22.0	8.4
17:00 - 18:00	43.1	66.9	50.1	49.6	45.8	44.2	41.8	42.9	34.7	25.4	22.1	8.3
18:00 - 19:00	41.7	65.5	48.4	48.7	48.0	46.7	43.6	42.5	34.6	24.1	19.8	8.4
19:00 - 20:00	42.6	64.1	49.9	49.3	44.0	41.5	39.8	40.6	31.2	21.0	18.0	9.7
20:00 - 21:00	40.6	66.9	47.2	49.1	43.8	42.8	41.6	43.0	33.8	25.8	21.8	9.9
21:00 - 22:00	39.2	68.0	44.2	44.7	41.4	40.4	38.6	40.0	30.5	17.4	15.4	11.7
22:00 - 23:00	39.7	59.7	45.4	43.4	40.2	38.0	35.5	35.2	25.6	21.6	15.4	9.8

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	36.7	51.3	40.7	41.3	36.6	34.8	33.6	32.8	22.9	13.7	12.3	8.1
23:15 - 23:30	38.7	59.0	45.1	44.9	39.5	38.2	36.1	35.3	25.6	18.2	14.7	8.1
23:30 - 23:45	37.8	51.6	42.9	44.4	37.8	37.3	36.2	35.2	24.5	12.6	12.1	8.1
23:45 - 00:00	39.2	59.1	42.6	44.1	37.9	36.3	34.8	34.1	23.4	12.4	12.1	8.1
00:00 - 00:15	38.9	54.3	41.5	42.5	39.0	37.4	36.9	36.1	25.7	12.7	12.1	8.1
00:15 - 00:30	40.5	58.5	43.5	43.1	39.3	37.9	37.7	36.9	26.4	13.8	12.3	8.1
00:30 - 00:45	40.1	56.4	42.5	43.2	39.3	37.8	36.6	36.3	24.9	12.8	12.6	8.1
00:45 - 01:00	39.3	54.4	42.0	43.7	39.8	38.5	37.5	37.0	25.6	12.7	12.2	8.1
01:00 - 01:15	39.1	55.9	44.4	45.9	41.0	39.6	37.2	36.6	26.2	14.6	12.5	8.1
01:15 - 01:30	39.1	50.1	43.6	48.4	40.2	38.3	37.5	36.6	25.7	14.1	12.7	8.1
01:30 - 01:45	39.7	55.1	43.7	47.3	39.6	38.6	38.8	38.1	27.5	14.7	12.1	8.1
01:45 - 02:00	40.9	60.0	43.7	47.1	40.1	40.3	41.3	40.9	30.2	13.6	12.1	8.1
02:00 - 02:15	41.8	56.6	44.1	46.7	42.0	41.9	43.4	42.7	32.6	15.2	12.2	8.1
02:15 - 02:30	40.9	56.8	44.3	45.2	39.2	40.6	43.2	42.5	31.9	14.4	12.2	8.1
02:30 - 02:45	41.5	60.3	44.4	46.3	41.5	42.5	44.5	43.4	33.8	15.6	12.1	8.1
02:45 - 03:00	41.6	60.1	44.1	46.4	42.3	43.2	45.3	43.5	33.8	16.9	12.1	8.1
03:00 - 03:15	41.9	59.1	44.1	46.2	42.2	43.5	46.0	44.5	34.5	16.4	13.3	8.1
03:15 - 03:30	41.8	66.3	46.2	46.3	42.0	43.4	45.3	44.4	34.3	18.8	17.0	8.1
03:30 - 03:45	41.8	57.0	44.2	46.8	42.3	43.6	45.4	44.5	34.2	16.2	12.2	8.1
03:45 - 04:00	39.8	55.6	44.1	46.9	40.9	41.8	44.2	43.6	33.3	14.7	12.3	8.1
04:00 - 04:15	41.7	60.2	44.4	48.0	42.4	41.8	43.6	44.3	33.9	14.7	12.1	8.1
04:15 - 04:30	42.7	55.1	47.7	50.3	47.9	46.9	47.2	46.2	36.7	24.7	14.7	8.1
04:30 - 04:45	41.7	52.5	44.9	48.5	44.2	44.4	46.8	46.5	35.9	16.0	12.1	8.1
04:45 - 05:00	42.7	54.5	45.2	47.4	43.5	44.0	46.0	46.5	36.1	16.6	12.1	8.1
05:00 - 05:15	43.3	59.1	47.2	49.1	45.8	46.4	47.3	48.1	38.1	19.5	14.7	8.1
05:15 - 05:30	42.9	55.5	47.1	50.6	50.0	46.3	46.1	47.4	37.0	15.5	12.2	8.1
05:30 - 05:45	43.5	59.7	48.5	49.4	48.5	45.8	45.6	47.3	36.8	16.1	12.6	8.1
05:45 - 06:00	43.8	66.9	51.2	52.4	46.9	46.5	46.2	47.7	37.2	19.1	18.2	8.1
06:00 - 06:15	45.2	55.4	50.0	50.6	48.0	47.7	48.0	49.7	39.9	25.8	23.9	8.1
06:15 - 06:30	46.2	56.6	50.8	51.8	49.2	49.5	49.6	51.1	41.4	27.6	30.8	8.1
06:30 - 06:45	46.6	69.0	62.8	55.0	53.7	49.9	50.0	52.1	42.7	29.3	22.7	8.2
06:45 - 07:00	45.4	62.3	52.8	54.3	51.3	50.8	51.1	52.7	43.2	25.8	20.4	8.1

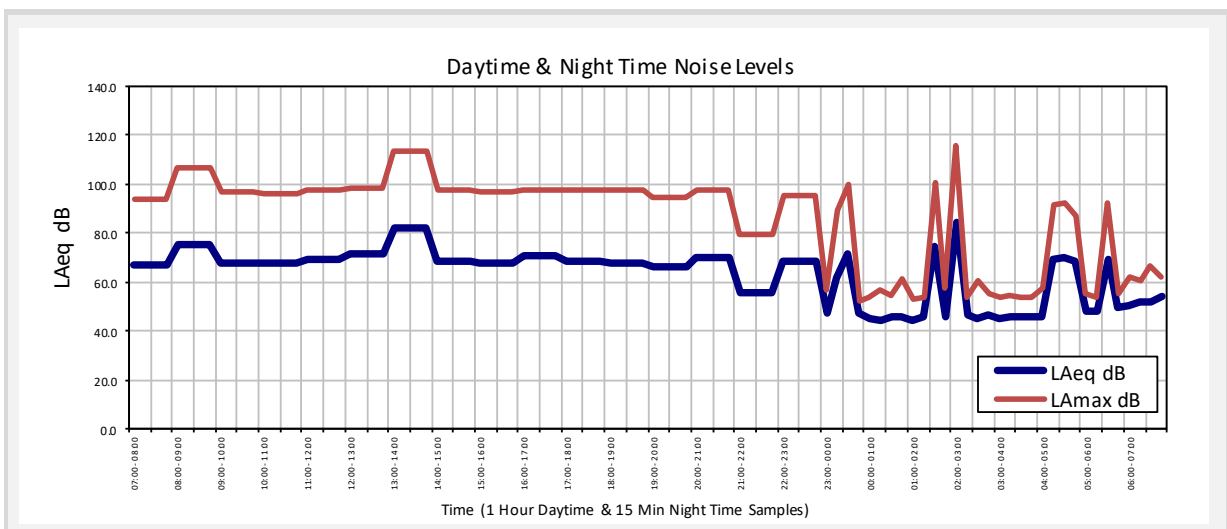


16.6 25th – 26th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	72.7	113.2	68.5	65.8	60.5	62.3	60.4	60.2	60.9	70.7	55.8	55.8
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	70.4	115.5	61.1	64.1	59.4	63.5	60.3	58.7	59.5	68.1	50.5	46.5

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	66.7	94.1	61.8	60.0	57.1	57.9	59.7	57.9	58.6	62.8	52.4	47.4
08:00 - 09:00	75.4	106.5	61.1	69.6	60.7	61.0	60.6	60.5	65.7	73.3	61.4	58.1
09:00 - 10:00	68.0	96.7	58.0	57.8	56.1	57.5	57.6	57.4	58.0	65.4	54.6	54.9
10:00 - 11:00	67.7	95.8	65.5	61.3	57.6	58.7	59.9	59.8	59.6	63.8	51.0	46.9
11:00 - 12:00	69.3	98.0	69.7	64.3	59.1	59.8	60.2	58.8	59.9	66.3	55.3	56.1
12:00 - 13:00	71.7	98.3	72.1	69.1	61.6	64.0	64.7	64.0	63.8	67.3	54.3	58.6
13:00 - 14:00	81.9	113.2	72.2	71.2	64.3	64.0	62.6	62.3	63.1	80.9	61.2	48.9
14:00 - 15:00	68.4	97.3	71.5	66.0	58.5	58.6	60.0	59.5	59.8	65.0	53.6	58.4
15:00 - 16:00	67.7	96.6	71.9	65.5	58.2	58.9	59.3	59.1	57.9	64.5	53.2	58.4
16:00 - 17:00	70.9	97.5	72.6	67.0	66.2	70.2	62.2	63.1	62.7	66.4	51.8	46.1
17:00 - 18:00	68.4	97.6	70.0	63.9	57.6	58.3	58.8	58.8	59.1	65.4	54.0	58.9
18:00 - 19:00	67.8	97.3	64.0	59.6	56.6	58.3	58.4	58.7	58.0	64.8	54.0	58.8
19:00 - 20:00	66.4	95.0	61.3	58.8	56.5	57.7	58.2	59.4	58.5	62.2	50.7	47.3
20:00 - 21:00	70.1	97.7	62.3	68.0	61.8	61.9	61.5	61.4	61.5	66.6	54.1	58.4
21:00 - 22:00	55.4	79.5	57.5	55.1	46.2	51.1	51.1	49.9	46.4	49.7	36.2	21.4
22:00 - 23:00	68.7	95.3	61.3	63.1	62.4	63.5	59.4	60.2	60.4	64.7	58.6	47.9

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	47.8	56.6	49.0	48.8	42.9	43.7	45.3	45.6	35.3	26.9	13.7	15.3
23:15 - 23:30	61.6	89.3	61.7	59.2	50.5	56.4	54.9	50.9	52.1	57.9	51.9	45.9
23:30 - 23:45	71.5	99.7	53.5	65.4	60.1	61.3	61.6	62.5	63.2	68.2	54.3	56.8
23:45 - 00:00	47.3	52.7	47.1	48.4	39.9	42.3	44.8	45.2	35.2	26.8	13.4	15.4
00:00 - 00:15	45.5	53.8	49.7	46.8	39.4	42.2	42.9	43.0	33.4	30.3	15.7	15.3
00:15 - 00:30	44.6	57.0	53.5	48.2	38.9	39.9	41.7	42.1	33.1	30.8	16.1	15.7
00:30 - 00:45	45.7	54.8	55.7	49.7	40.8	42.4	42.7	43.0	34.4	32.6	17.3	16.0
00:45 - 01:00	45.9	61.7	52.0	48.8	39.7	40.8	43.4	43.3	34.8	31.8	15.8	15.8
01:00 - 01:15	44.7	53.1	49.2	47.5	39.0	40.2	42.4	42.0	32.9	29.7	14.7	15.6
01:15 - 01:30	45.9	53.9	49.6	48.6	39.0	41.2	43.9	43.3	33.8	30.9	15.5	15.6
01:30 - 01:45	74.9	100.3	68.4	74.1	69.4	70.5	69.9	67.9	67.9	68.9	50.3	52.4
01:45 - 02:00	45.6	57.6	49.2	48.6	38.3	40.5	43.5	42.8	33.9	30.5	22.4	22.1
02:00 - 02:15	84.2	115.5	69.3	69.8	67.1	74.2	71.8	70.3	71.4	82.6	63.3	55.5
02:15 - 02:30	46.4	53.8	49.6	48.5	38.8	40.7	44.3	43.9	34.1	28.6	13.5	10.1
02:30 - 02:45	45.4	60.8	50.4	49.0	39.1	40.5	43.2	42.6	33.4	32.4	18.1	13.5
02:45 - 03:00	46.3	55.0	47.0	48.5	39.7	41.5	44.4	43.7	33.9	28.0	12.7	9.7
03:00 - 03:15	45.5	54.0	48.2	48.3	38.7	40.8	44.0	42.7	33.0	27.5	12.4	9.7
03:15 - 03:30	45.8	54.9	47.5	48.9	38.3	40.9	44.0	43.3	33.4	28.0	12.8	9.7
03:30 - 03:45	46.2	54.0	47.6	48.6	38.6	41.3	44.8	43.6	33.2	25.4	11.8	9.7
03:45 - 04:00	45.9	53.6	45.4	47.4	38.0	40.5	44.3	43.4	32.7	21.7	10.9	9.5
04:00 - 04:15	46.0	57.3	49.0	50.6	39.2	41.8	44.1	43.4	33.5	24.3	20.5	26.5
04:15 - 04:30	69.5	91.8	72.4	71.7	65.2	70.4	61.1	58.1	60.8	64.9	58.5	55.6
04:30 - 04:45	70.1	92.4	60.7	64.0	65.2	66.0	62.7	61.9	63.9	64.9	49.1	39.7
04:45 - 05:00	68.6	86.9	63.2	68.7	65.4	71.5	62.3	59.4	60.3	62.5	47.8	35.9
05:00 - 05:15	48.4	55.4	45.9	48.3	39.8	43.4	46.2	46.2	35.8	20.3	10.5	9.5
05:15 - 05:30	47.9	54.0	45.4	48.0	39.1	42.6	45.4	45.8	35.5	19.3	10.4	9.5
05:30 - 05:45	69.4	92.3	61.3	71.8	64.2	65.5	63.3	60.8	62.2	64.7	46.2	37.5
05:45 - 06:00	49.4	55.7	47.8	50.3	43.5	44.3	47.2	47.2	37.1	22.6	10.8	9.5
06:00 - 06:15	50.3	62.0	49.3	50.2	41.8	44.8	47.8	48.2	37.9	31.3	15.7	9.5
06:15 - 06:30	51.7	60.7	51.3	51.4	44.2	47.2	49.1	49.6	39.5	30.7	14.0	9.5
06:30 - 06:45	52.3	66.7	50.0	51.6	44.1	46.1	48.7	50.4	41.3	34.6	15.1	9.5
06:45 - 07:00	54.1	62.0	51.0	54.0	45.4	48.3	50.1	51.2	41.9	46.2	24.6	9.8

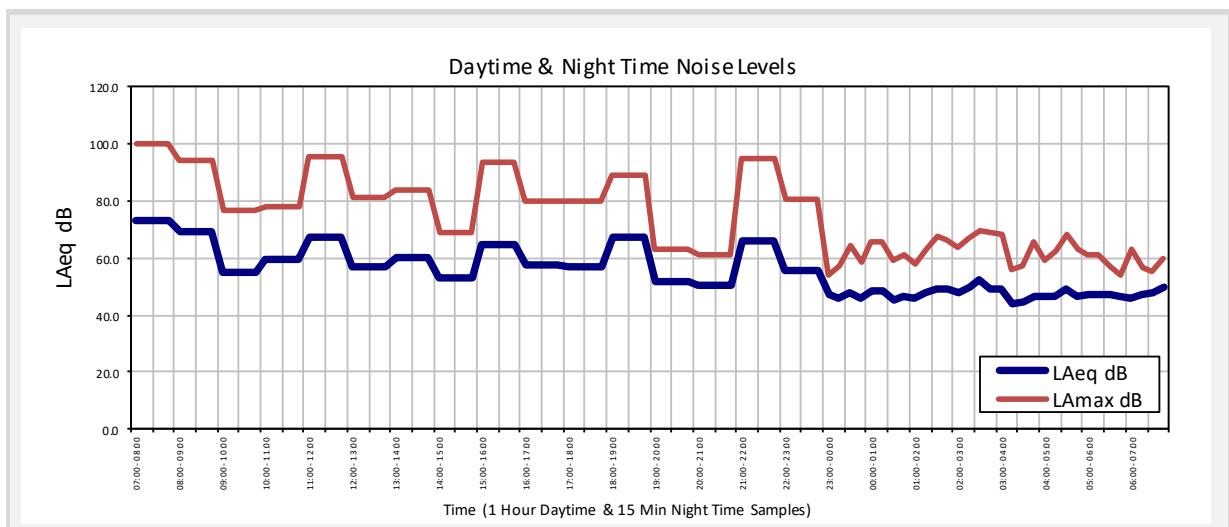


16.7 26th – 27th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	64.9	100.0	65.0	62.8	58.0	57.7	56.3	56.4	55.6	61.2	54.0	40.3
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	47.8	69.3	63.3	55.1	45.7	43.1	42.8	42.6	38.3	41.8	26.4	20.6

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	73.1	100.0	65.8	63.2	58.6	61.1	58.0	59.2	59.0	70.6	65.1	46.2
08:00 - 09:00	68.9	94.3	64.2	66.2	63.8	62.8	62.2	61.8	61.3	63.5	56.1	39.5
09:00 - 10:00	55.1	76.3	63.6	58.0	48.7	52.1	50.9	51.1	45.9	46.7	29.7	18.5
10:00 - 11:00	59.7	78.1	65.1	61.9	58.3	56.1	52.3	54.1	52.9	53.5	35.8	23.5
11:00 - 12:00	67.0	95.5	67.0	62.8	59.7	61.0	57.9	58.2	58.8	63.5	52.2	46.7
12:00 - 13:00	56.9	81.2	64.1	57.8	48.9	50.9	50.2	50.5	49.7	51.5	35.1	23.1
13:00 - 14:00	59.8	83.5	67.4	63.8	56.9	54.0	53.0	53.1	51.5	55.1	39.3	39.8
14:00 - 15:00	53.0	69.0	64.9	57.1	48.7	48.7	48.6	50.2	41.9	43.1	27.7	18.8
15:00 - 16:00	64.4	93.4	64.1	59.2	55.9	57.4	57.4	58.2	57.5	59.0	45.5	41.2
16:00 - 17:00	57.5	80.1	67.7	60.9	55.0	54.2	52.3	51.9	49.5	51.3	34.7	27.1
17:00 - 18:00	56.9	79.9	66.3	59.6	52.3	52.8	50.8	51.8	48.9	50.6	33.3	21.9
18:00 - 19:00	67.5	89.1	69.2	71.1	65.1	63.8	62.1	61.2	59.7	61.7	45.1	36.0
19:00 - 20:00	51.4	63.2	56.4	51.8	45.4	45.9	46.6	49.5	40.8	36.5	21.3	20.7
20:00 - 21:00	50.1	61.1	57.4	51.1	43.3	44.9	45.2	48.3	38.9	34.9	20.3	21.6
21:00 - 22:00	66.0	94.9	56.0	56.1	55.3	56.1	57.2	58.2	57.8	62.4	50.4	46.8
22:00 - 23:00	55.3	80.4	56.4	53.5	46.4	50.7	50.4	48.7	47.7	49.9	34.8	27.1

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	47.1	54.1	55.2	48.7	41.5	42.0	42.6	44.9	36.3	35.4	21.0	22.4
23:15 - 23:30	46.1	57.1	59.0	50.4	42.2	41.3	41.3	43.2	35.7	37.4	22.9	22.2
23:30 - 23:45	47.7	64.0	62.9	54.8	45.4	43.1	43.1	43.7	37.6	40.5	25.7	22.1
23:45 - 00:00	46.1	58.7	57.9	49.4	41.2	41.3	41.5	42.5	36.1	38.4	23.2	21.3
00:00 - 00:15	48.3	65.3	63.8	55.2	46.3	44.3	43.3	42.5	39.0	42.8	27.6	22.1
00:15 - 00:30	48.5	65.5	65.5	57.0	46.9	43.7	43.5	43.0	39.1	42.8	27.6	22.1
00:30 - 00:45	45.3	59.3	58.3	50.0	41.7	40.9	40.5	40.9	35.7	38.6	23.7	21.1
00:45 - 01:00	46.5	61.3	62.9	53.8	44.7	42.6	42.2	41.1	36.9	40.5	25.5	22.1
01:00 - 01:15	45.7	58.0	61.0	51.6	43.1	41.4	41.1	40.7	36.0	39.5	24.6	22.0
01:15 - 01:30	47.8	62.7	62.1	53.0	44.5	43.3	42.5	41.3	38.8	42.8	27.5	22.2
01:30 - 01:45	49.3	67.3	66.7	57.8	47.8	44.6	43.8	42.8	40.6	44.2	28.7	22.5
01:45 - 02:00	49.0	66.1	65.7	57.3	47.9	44.7	44.6	42.2	39.8	43.6	28.2	21.4
02:00 - 02:15	47.6	63.8	62.3	53.6	45.3	42.9	42.3	40.8	38.7	42.7	27.2	20.6
02:15 - 02:30	49.7	66.6	67.3	59.5	49.4	45.3	44.2	42.2	40.8	45.0	29.6	22.4
02:30 - 02:45	52.0	69.3	69.5	62.7	52.0	47.2	46.4	44.1	43.3	47.4	31.9	23.8
02:45 - 03:00	49.0	68.8	64.3	56.5	46.9	44.4	44.1	42.1	40.0	43.9	28.6	20.9
03:00 - 03:15	49.2	67.9	66.9	59.1	49.2	45.2	44.2	41.9	40.1	44.3	29.2	21.4
03:15 - 03:30	43.6	56.1	58.3	49.2	41.0	39.5	39.4	38.1	34.2	37.6	22.4	17.5
03:30 - 03:45	44.5	57.1	59.8	50.8	42.5	40.5	40.0	39.0	35.1	38.7	23.4	18.0
03:45 - 04:00	46.7	65.4	65.6	56.3	47.4	42.9	41.7	40.5	37.3	41.3	26.3	20.0
04:00 - 04:15	46.2	59.4	61.4	52.6	43.4	41.7	40.9	40.4	37.1	40.8	25.5	20.1
04:15 - 04:30	46.7	62.2	62.1	52.8	44.2	42.0	41.5	41.0	37.7	41.1	25.6	19.4
04:30 - 04:45	49.3	67.9	66.5	57.8	48.2	44.9	44.3	42.6	40.4	44.3	28.9	21.6
04:45 - 05:00	46.4	62.9	62.4	53.3	44.5	42.0	41.6	40.9	37.2	40.6	25.1	18.8
05:00 - 05:15	47.0	61.0	61.8	52.5	43.9	42.5	42.3	41.7	37.6	41.0	25.6	19.1
05:15 - 05:30	47.3	60.8	63.0	53.6	44.4	42.6	42.0	42.6	38.0	41.0	25.4	19.0
05:30 - 05:45	47.4	57.4	61.1	52.6	43.6	42.7	42.6	42.8	38.0	40.9	25.2	18.6
05:45 - 06:00	46.2	53.8	58.9	50.6	41.8	41.2	41.3	42.5	36.6	38.9	23.1	16.8
06:00 - 06:15	45.6	62.7	53.6	48.3	39.9	40.2	42.1	43.3	34.3	32.2	17.2	12.8
06:15 - 06:30	47.2	56.6	53.7	48.6	41.6	41.6	42.8	45.1	36.5	34.4	18.6	12.1
06:30 - 06:45	48.0	54.9	54.0	48.5	41.5	42.2	43.4	45.8	37.5	35.9	19.7	12.3
06:45 - 07:00	49.8	59.6	59.0	51.6	44.8	44.1	44.3	46.0	38.9	43.5	24.5	14.1

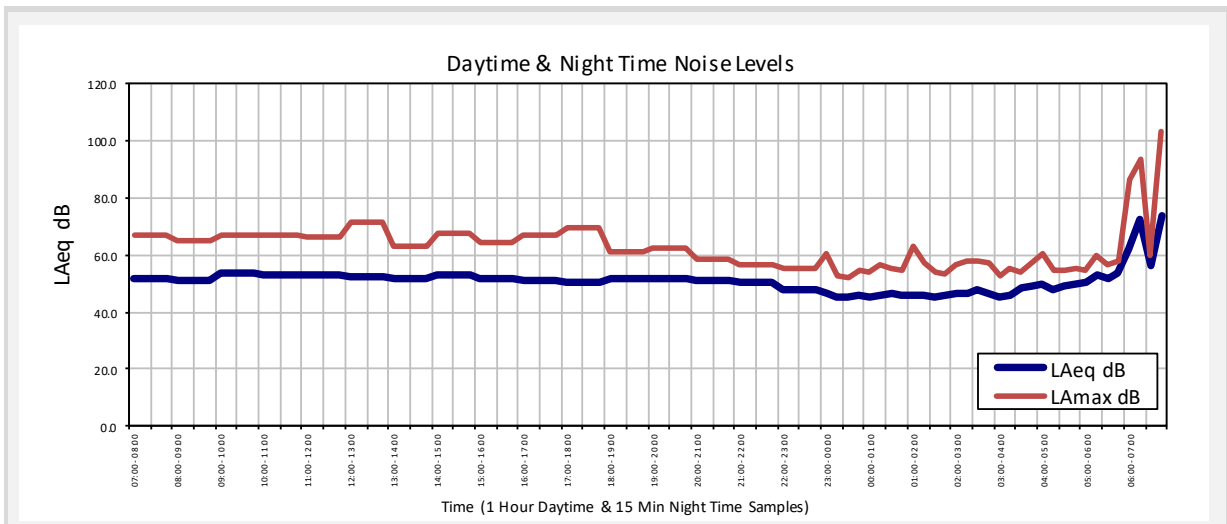


16.8 27th – 28th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Cor r esponding LAmx 16 HOUR	51.9	71.3	62.3	55.2	47.9	47.6	47.2	49.2	41.0	41.8	25.7	18.0
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Cor r esponding LAmx 8 HOUR	61.4	103.1	52.8	53.2	50.9	56.0	52.6	53.5	53.1	57.5	45.1	49.2

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	51.8	66.8	59.7	52.2	44.3	45.0	45.2	47.3	39.9	47.3	27.3	14.8
08:00 - 09:00	50.8	64.9	62.9	55.0	46.3	45.8	45.7	48.0	40.6	42.0	26.2	17.3
09:00 - 10:00	53.8	66.7	67.4	59.7	50.3	48.5	48.3	50.2	44.2	46.2	30.6	21.3
10:00 - 11:00	53.1	67.0	64.6	57.6	48.7	48.6	48.2	50.4	43.3	43.2	27.4	19.1
11:00 - 12:00	53.1	66.5	64.1	57.0	50.2	49.8	48.7	50.4	42.9	42.3	26.6	18.0
12:00 - 13:00	52.3	71.3	64.7	57.0	48.6	48.3	48.0	49.7	41.9	41.3	25.8	17.6
13:00 - 14:00	51.6	63.0	65.1	56.7	48.4	47.1	46.8	49.0	41.3	41.8	26.4	18.6
14:00 - 15:00	52.8	67.3	65.5	57.8	48.9	48.7	48.0	49.9	43.0	43.1	27.7	20.0
15:00 - 16:00	51.7	64.5	63.0	55.8	48.4	48.3	47.4	49.0	40.8	41.0	25.7	18.4
16:00 - 17:00	50.7	66.6	59.1	52.9	48.6	47.2	46.3	47.9	39.5	41.4	23.6	16.9
17:00 - 18:00	50.6	69.4	56.4	53.1	50.0	48.9	47.5	47.5	39.7	38.4	25.1	15.2
18:00 - 19:00	51.7	61.2	49.6	50.2	43.4	46.6	47.1	49.8	39.2	40.1	25.5	15.5
19:00 - 20:00	52.0	62.6	52.1	51.5	49.9	49.0	48.1	50.3	39.1	28.1	15.2	19.2
20:00 - 21:00	51.3	58.7	51.6	50.9	44.4	46.4	47.0	49.8	38.7	25.5	14.0	17.7
21:00 - 22:00	50.1	56.8	46.7	49.0	42.7	44.8	45.9	48.6	37.3	20.6	12.7	16.8
22:00 - 23:00	47.7	55.3	52.8	48.3	40.1	42.8	43.9	46.0	35.1	23.0	12.6	16.4

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	46.6	60.4	42.5	46.7	39.0	40.7	43.3	44.9	33.7	17.2	11.9	15.3
23:15 - 23:30	45.3	52.5	43.0	45.0	37.5	41.0	42.5	43.5	31.5	15.4	11.7	14.6
23:30 - 23:45	45.5	52.3	43.8	46.8	37.0	40.9	42.9	43.6	31.6	15.0	11.7	14.3
23:45 - 00:00	45.7	54.4	43.7	46.0	38.2	42.1	43.7	43.5	31.9	15.8	11.1	12.7
00:00 - 00:15	45.4	53.9	44.2	45.8	39.4	42.6	43.1	43.2	32.3	16.9	11.0	12.1
00:15 - 00:30	46.1	56.4	45.2	46.2	41.6	43.4	43.7	43.9	32.7	17.0	10.6	10.8
00:30 - 00:45	46.7	55.2	44.2	47.4	38.8	41.8	45.2	44.3	32.9	17.7	10.5	9.7
00:45 - 01:00	45.8	54.6	52.9	51.2	39.2	41.1	44.1	43.3	32.4	24.8	12.1	9.6
01:00 - 01:15	45.7	63.3	43.2	46.2	36.5	40.1	43.6	43.4	32.6	29.7	15.7	10.3
01:15 - 01:30	45.8	57.2	42.3	44.7	36.0	40.9	44.1	43.4	32.7	17.0	10.4	9.7
01:30 - 01:45	45.1	53.9	43.5	45.7	36.2	40.6	43.4	42.7	31.7	18.4	10.4	9.5
01:45 - 02:00	45.8	53.2	44.0	46.2	36.6	40.6	44.0	43.5	32.6	20.1	10.6	9.5
02:00 - 02:15	46.4	56.2	44.9	47.2	38.2	42.9	44.9	43.8	33.2	20.0	10.6	9.6
02:15 - 02:30	46.6	57.8	44.8	47.7	36.8	40.4	44.8	44.2	33.8	18.1	10.3	9.5
02:30 - 02:45	47.8	58.0	45.3	48.1	37.7	41.9	45.9	45.4	35.2	20.0	10.4	9.5
02:45 - 03:00	46.8	57.3	44.1	46.1	36.0	39.7	44.4	44.8	34.8	19.1	10.4	9.5
03:00 - 03:15	45.3	52.4	43.1	45.2	34.9	39.5	43.0	43.3	32.1	15.2	10.3	9.5
03:15 - 03:30	45.6	55.4	43.5	46.2	36.2	40.8	44.0	43.2	31.7	24.6	14.1	11.3
03:30 - 03:45	48.2	54.0	47.5	50.3	40.1	43.7	46.8	45.6	34.7	24.7	11.5	9.6
03:45 - 04:00	49.3	57.0	48.0	49.2	39.7	43.2	47.6	47.1	35.9	24.1	11.2	9.5
04:00 - 04:15	49.8	60.1	46.6	50.1	39.9	43.8	47.9	47.7	36.6	21.6	10.5	9.5
04:15 - 04:30	47.6	54.8	45.8	49.1	40.6	45.2	45.9	45.1	33.0	16.2	10.3	9.5
04:30 - 04:45	48.9	54.3	48.1	51.0	40.3	44.4	46.7	46.9	34.7	15.8	10.3	9.5
04:45 - 05:00	49.8	54.9	48.4	51.2	41.3	44.5	47.7	47.7	36.5	20.4	10.4	9.5
05:00 - 05:15	50.4	54.8	48.6	51.0	43.1	46.1	48.1	48.4	37.2	18.5	10.3	9.5
05:15 - 05:30	52.9	59.6	51.2	52.3	43.7	47.2	50.5	50.9	39.8	25.8	12.4	9.6
05:30 - 05:45	51.8	56.8	50.0	52.6	45.6	47.4	49.2	49.9	38.4	21.3	10.4	9.5
05:45 - 06:00	53.8	57.6	52.0	53.3	47.0	48.0	51.2	52.0	40.8	23.1	11.1	9.5
06:00 - 06:15	62.3	86.4	61.8	59.8	52.1	59.2	55.0	54.1	55.5	57.2	38.4	24.2
06:15 - 06:30	72.1	93.1	64.1	62.5	63.3	69.6	63.7	64.6	65.2	67.0	48.9	36.1
06:30 - 06:45	56.1	59.6	53.3	54.9	46.7	50.4	53.0	54.3	43.4	37.7	18.5	9.5
06:45 - 07:00	73.9	103.1	56.0	61.7	61.2	63.3	62.5	64.0	64.3	71.0	59.8	64.2

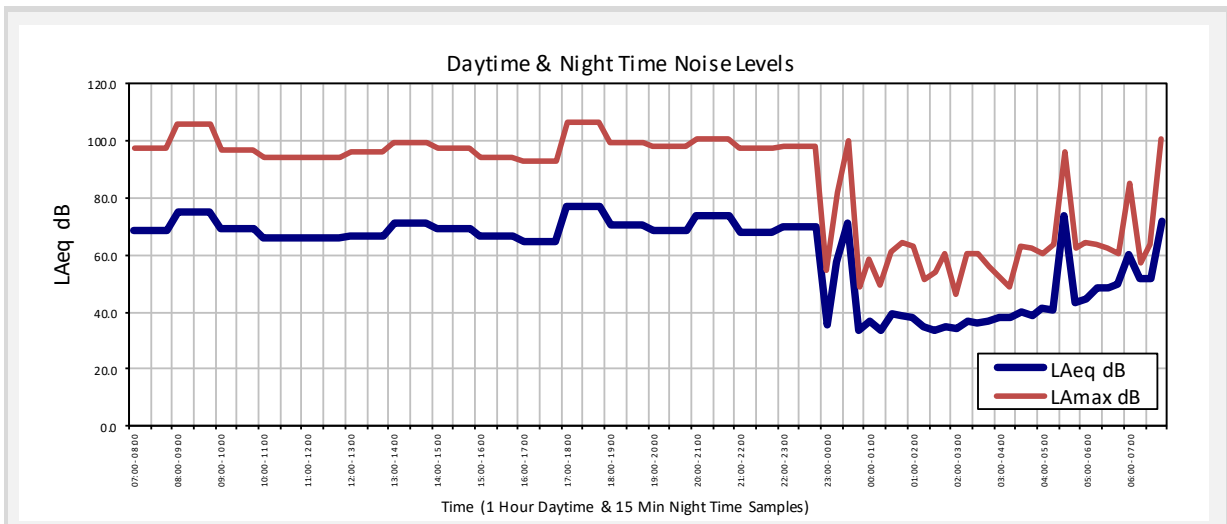


16.9 28th – 29th September 2020 Position 2

NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	70.8	106.6	61.5	65.3	60.0	60.9	59.3	59.4	61.7	68.2	56.1	56.4
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	62.2	100.2	55.2	56.8	53.9	56.4	56.2	54.3	54.4	57.8	45.5	42.0

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	68.8	97.5	59.3	59.2	57.1	59.4	58.0	59.7	58.5	65.9	54.2	58.8
08:00 - 09:00	74.8	105.8	62.9	69.9	63.7	60.6	59.8	60.5	65.5	72.6	59.9	53.9
09:00 - 10:00	68.8	96.7	61.7	59.8	57.2	59.5	57.0	57.1	59.2	66.2	55.2	59.2
10:00 - 11:00	65.9	94.1	56.8	61.7	55.7	56.0	55.2	56.9	58.7	62.0	51.3	56.7
11:00 - 12:00	65.6	94.0	59.3	61.2	56.0	56.0	56.1	57.0	57.8	62.1	49.2	45.1
12:00 - 13:00	66.6	95.9	56.8	59.1	55.9	57.2	57.3	57.7	57.3	63.4	52.4	57.1
13:00 - 14:00	71.1	99.2	65.5	69.0	62.9	64.6	64.2	63.0	63.0	67.0	54.4	58.2
14:00 - 15:00	69.2	97.1	66.3	68.0	64.4	67.1	62.2	60.5	60.4	65.1	52.7	47.8
15:00 - 16:00	66.5	94.3	58.0	58.1	55.8	57.5	57.6	58.0	58.0	63.0	51.4	53.7
16:00 - 17:00	64.5	93.0	58.1	62.9	54.1	55.7	56.7	57.4	56.6	60.3	47.8	49.4
17:00 - 18:00	77.1	106.6	66.4	72.1	60.6	60.0	59.6	59.7	67.3	75.2	62.8	56.2
18:00 - 19:00	70.2	99.3	55.7	58.9	57.9	60.1	60.6	60.7	61.1	67.1	56.2	57.9
19:00 - 20:00	68.4	97.7	55.8	56.5	55.7	57.2	57.9	59.3	58.4	65.5	54.2	58.6
20:00 - 21:00	73.7	100.4	59.9	65.3	61.8	59.0	59.0	59.6	65.1	71.4	57.8	51.7
21:00 - 22:00	67.8	97.5	56.3	56.8	54.7	56.8	57.4	58.2	58.2	64.9	53.8	57.4
22:00 - 23:00	69.8	97.6	60.0	60.6	63.3	64.3	58.9	59.3	60.2	66.9	57.1	57.7

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	35.3	54.8	44.6	49.6	38.8	36.8	33.0	30.5	20.7	17.0	15.8	21.0
23:15 - 23:30	57.7	81.7	62.2	59.3	47.3	56.6	52.9	49.0	50.0	52.2	34.5	24.2
23:30 - 23:45	71.3	99.9	51.6	59.2	60.7	61.0	61.8	62.4	64.1	67.6	54.8	53.8
23:45 - 00:00	33.7	48.5	44.8	41.4	34.0	32.5	31.4	30.1	21.6	20.1	15.7	20.8
00:00 - 00:15	36.8	58.6	44.1	40.8	32.6	31.2	31.4	31.1	31.3	27.6	15.7	20.2
00:15 - 00:30	33.6	49.5	44.9	42.0	32.1	31.5	31.5	30.0	21.7	20.3	15.4	20.1
00:30 - 00:45	39.3	60.9	45.6	44.2	35.0	35.2	33.1	33.2	30.3	34.3	20.0	19.5
00:45 - 01:00	38.8	64.1	46.5	43.5	33.4	33.8	33.8	34.7	28.4	32.4	17.0	18.9
01:00 - 01:15	37.9	62.7	46.8	42.8	33.0	32.9	33.6	32.7	28.0	32.2	18.3	19.5
01:15 - 01:30	34.6	51.4	43.6	40.2	32.4	32.3	32.5	31.0	23.0	21.2	14.8	19.2
01:30 - 01:45	33.8	54.0	41.2	39.0	32.0	31.6	31.6	30.1	22.3	21.0	16.8	22.4
01:45 - 02:00	34.8	60.3	40.7	38.0	30.7	33.5	32.5	31.2	22.6	22.3	17.4	23.1
02:00 - 02:15	33.9	45.9	41.8	39.7	31.6	32.0	32.2	29.8	21.8	20.4	18.4	24.0
02:15 - 02:30	36.7	60.3	44.5	42.2	32.5	32.7	34.6	33.3	24.9	23.4	18.1	23.6
02:30 - 02:45	36.3	60.5	45.8	42.6	32.4	32.2	33.9	32.6	25.2	25.6	17.8	22.7
02:45 - 03:00	37.0	55.9	45.4	43.1	33.0	33.1	35.2	33.9	25.0	21.2	17.8	22.9
03:00 - 03:15	38.3	52.2	46.1	43.3	33.7	33.8	37.0	35.0	25.8	20.2	17.0	22.1
03:15 - 03:30	38.3	48.5	42.2	39.8	33.0	33.6	36.6	35.3	26.0	21.4	16.7	22.1
03:30 - 03:45	39.7	62.7	42.3	39.7	32.6	33.8	36.3	35.4	29.6	32.3	18.5	21.8
03:45 - 04:00	39.0	62.4	42.9	40.2	32.8	33.6	36.9	36.1	27.7	25.3	16.8	21.4
04:00 - 04:15	41.2	60.6	42.7	41.1	34.6	35.5	39.4	38.0	29.8	27.3	17.6	21.6
04:15 - 04:30	40.9	63.4	44.3	41.9	35.7	36.2	39.2	37.7	29.5	26.9	16.8	21.3
04:30 - 04:45	73.7	95.8	66.3	69.7	66.9	70.0	69.4	66.4	65.9	68.1	49.9	38.9
04:45 - 05:00	43.0	62.1	49.1	45.9	36.5	37.2	41.2	39.8	32.1	29.3	17.8	22.1
05:00 - 05:15	44.7	64.1	44.3	42.8	36.6	38.6	42.1	41.1	34.6	35.1	19.2	18.9
05:15 - 05:30	48.2	63.4	49.4	48.0	39.8	41.3	45.3	44.7	38.8	38.2	21.6	17.0
05:30 - 05:45	48.3	62.6	47.6	49.5	44.7	42.9	45.5	45.3	38.7	33.9	18.0	17.8
05:45 - 06:00	49.9	60.1	50.6	49.9	45.6	43.7	46.6	47.2	40.6	33.9	18.0	18.3
06:00 - 06:15	59.8	85.0	64.8	61.0	47.9	54.6	54.6	51.6	52.5	54.9	40.9	26.0
06:15 - 06:30	51.4	57.2	49.8	50.8	42.7	45.2	47.7	49.1	41.9	35.5	18.1	17.6
06:30 - 06:45	51.5	63.5	50.2	51.0	43.3	46.0	48.0	49.2	41.5	35.8	18.8	13.7
06:45 - 07:00	71.7	100.2	56.3	63.2	61.6	62.8	63.8	62.8	63.2	68.1	58.6	54.1

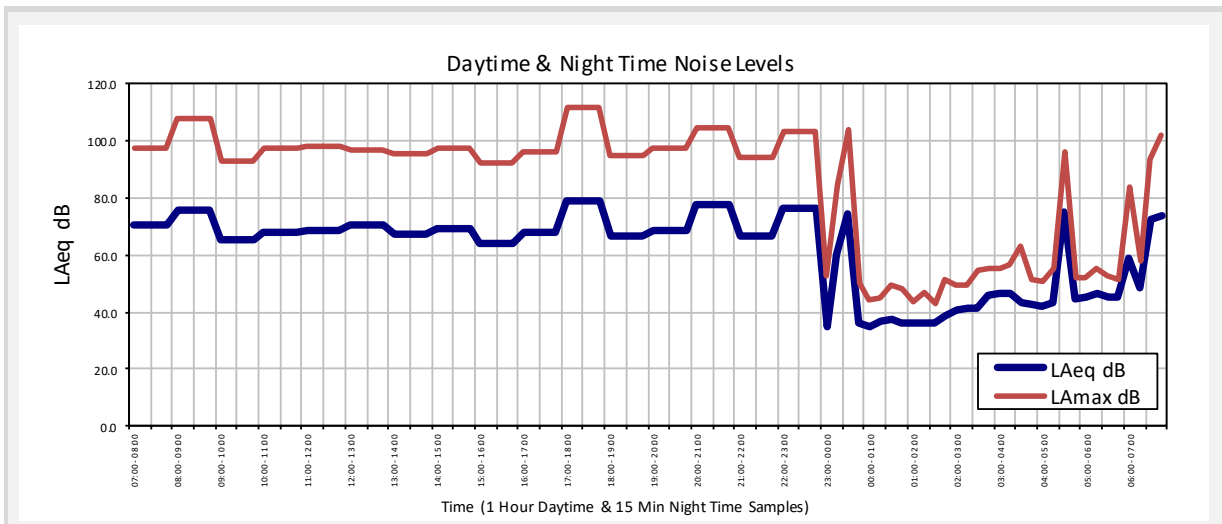


16.10 29th – 30th September 2020 Position 2

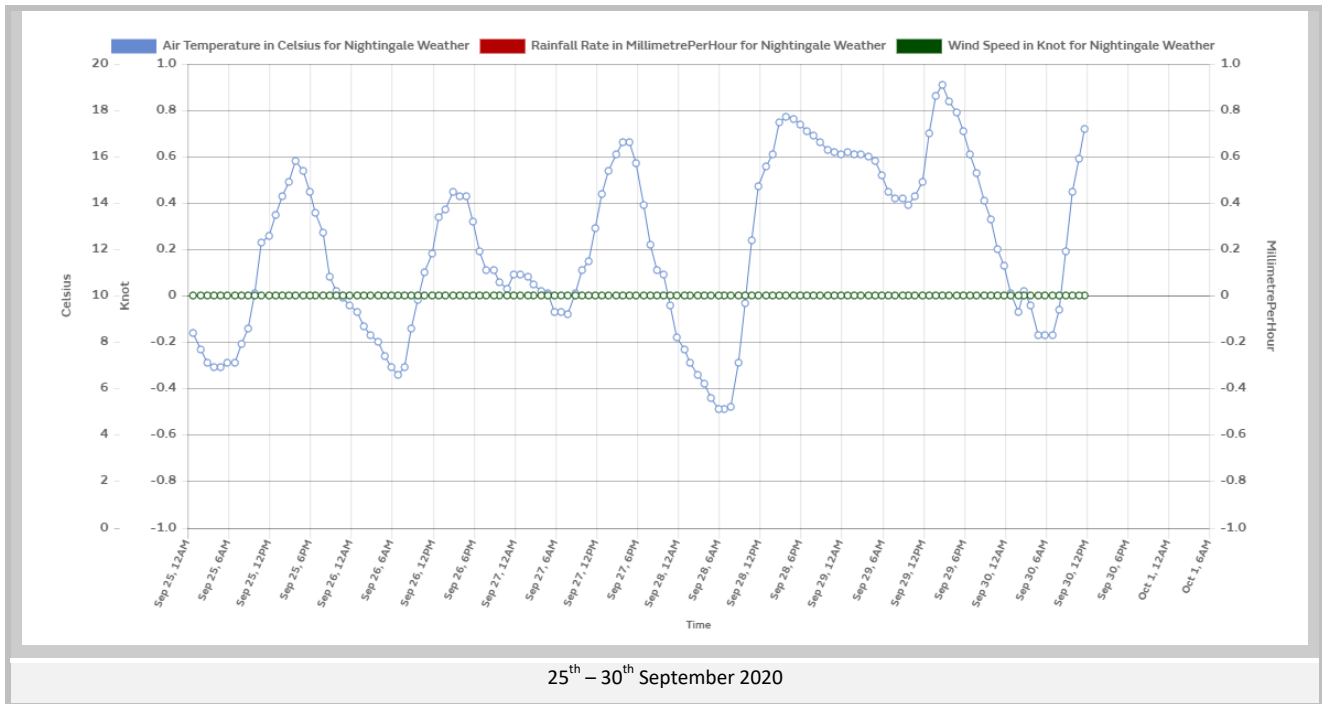
NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{Aeq} 16 HOUR & Cor r esponding L_{Amax} 16 HOUR	72.7	111.3	62.2	66.4	59.2	61.0	60.3	60.0	62.6	70.4	59.7	57.2
NIGHT TIME 23:00 - 07:00 L_{Aeq} 8 HOUR & Cor r esponding L_{Amax} 8 HOUR	64.9	103.5	55.8	56.1	56.0	59.6	56.9	56.0	56.8	61.2	48.4	48.6

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	70.3	97.3	62.2	62.7	63.3	66.2	60.9	612	619	66.6	55.8	57.8
08:00 - 09:00	75.8	107.4	61.1	69.6	61.1	60.4	60.2	612	65.7	73.7	61.7	59.9
09:00 - 10:00	65.5	92.6	58.8	60.5	57.4	59.0	59.0	57.2	57.7	61.3	50.8	46.4
10:00 - 11:00	68.0	97.3	56.3	57.4	55.6	58.7	58.4	58.4	58.8	65.0	54.1	57.3
11:00 - 12:00	68.7	97.9	57.1	56.9	55.9	58.0	58.8	58.6	58.8	65.8	54.4	58.7
12:00 - 13:00	70.1	96.4	65.0	66.0	62.6	64.7	63.8	62.3	62.4	65.5	53.7	49.1
13:00 - 14:00	66.9	95.4	57.7	64.3	58.6	59.6	60.1	59.6	59.9	62.1	50.0	46.5
14:00 - 15:00	69.0	97.5	68.3	74.9	62.0	62.7	610	60.8	59.5	65.2	53.7	59.1
15:00 - 16:00	64.0	92.2	59.6	64.8	56.2	56.9	59.9	57.0	56.3	58.8	42.5	36.0
16:00 - 17:00	67.6	96.1	56.9	59.8	56.1	57.5	59.0	59.0	58.5	64.2	52.3	57.5
17:00 - 18:00	79.1	111.3	61.3	68.6	59.0	61.1	618	63.1	68.7	77.2	65.6	62.5
18:00 - 19:00	66.6	94.6	58.2	58.9	56.2	58.0	60.6	58.5	57.5	62.7	52.8	48.3
19:00 - 20:00	68.5	97.3	65.3	64.4	58.0	60.5	59.3	58.4	59.0	65.5	54.6	58.7
20:00 - 21:00	77.7	104.1	60.0	64.7	56.7	59.4	59.9	614	67.9	75.8	62.9	58.1
21:00 - 22:00	66.8	94.1	57.7	58.6	56.0	57.8	59.9	57.7	58.7	63.0	52.6	48.0
22:00 - 23:00	76.4	102.9	64.8	61.8	60.1	62.0	59.5	60.4	60.9	74.8	67.4	58.4

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{Amax}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	35.1	52.5	42.8	42.6	33.6	32.9	30.7	29.7	20.5	15.3	27.8	34.1
23:15 - 23:30	60.0	84.3	57.4	56.3	48.0	58.0	54.3	50.2	52.0	55.7	39.1	35.2
23:30 - 23:45	74.4	103.5	53.0	58.3	59.2	63.2	63.9	62.8	64.8	71.8	60.9	61.0
23:45 - 00:00	36.2	49.8	45.2	44.6	35.2	34.5	34.3	33.0	24.1	18.7	13.1	16.8
00:00 - 00:15	35.1	44.0	45.5	44.0	35.8	34.0	32.9	31.9	22.9	16.1	12.9	16.8
00:15 - 00:30	36.5	45.0	46.3	44.5	37.2	35.1	34.3	33.2	25.2	16.7	12.5	16.1
00:30 - 00:45	37.4	49.1	47.8	45.2	36.5	34.9	35.2	34.3	26.2	19.8	12.6	15.5
00:45 - 01:00	36.1	48.0	46.9	45.6	36.7	34.9	33.4	33.3	24.0	16.5	11.9	14.6
01:00 - 01:15	36.4	43.6	46.5	45.4	37.5	35.2	33.8	33.5	24.5	16.2	11.6	13.8
01:15 - 01:30	36.2	46.9	48.2	47.0	37.1	35.3	33.4	33.0	25.0	17.8	11.3	13.3
01:30 - 01:45	36.0	43.2	49.3	47.9	36.7	35.2	33.5	32.9	23.8	14.7	10.7	11.3
01:45 - 02:00	38.6	51.2	50.0	48.1	37.1	36.1	36.4	35.4	27.0	22.9	11.1	12.2
02:00 - 02:15	40.4	49.6	48.3	46.9	38.4	38.0	39.2	37.1	26.6	14.5	11.3	13.5
02:15 - 02:30	41.2	49.1	48.6	46.7	38.1	37.5	39.7	38.3	28.3	17.1	11.4	13.5
02:30 - 02:45	41.6	54.6	49.2	46.4	36.4	36.9	40.3	38.6	28.9	18.5	11.1	12.7
02:45 - 03:00	45.9	55.4	48.1	48.6	38.9	39.9	44.5	43.0	33.9	21.6	10.8	11.4
03:00 - 03:15	46.6	55.5	47.7	48.1	39.7	40.4	45.6	43.5	34.4	22.5	10.4	9.6
03:15 - 03:30	46.5	56.3	47.7	47.8	39.2	40.2	45.3	43.6	34.2	22.4	10.5	9.6
03:30 - 03:45	43.5	63.3	46.5	45.9	38.6	39.4	42.0	40.4	31.2	28.8	16.0	12.3
03:45 - 04:00	42.7	51.2	49.4	47.6	40.0	38.9	41.3	39.6	30.4	20.3	10.4	9.5
04:00 - 04:15	42.2	50.6	48.2	46.5	37.8	37.9	40.5	39.5	30.0	17.9	10.3	9.5
04:15 - 04:30	43.0	55.4	49.1	47.8	40.3	39.2	40.7	40.4	31.2	20.4	10.5	9.5
04:30 - 04:45	74.7	96.2	66.8	68.8	68.5	71.7	69.4	67.2	67.6	69.2	50.2	40.9
04:45 - 05:00	44.7	52.2	49.1	48.2	40.5	40.6	42.9	42.0	32.2	19.1	10.3	9.5
05:00 - 05:15	45.1	52.1	49.8	48.1	40.8	41.3	43.0	42.5	33.0	22.0	10.5	9.5
05:15 - 05:30	46.3	55.3	52.2	50.0	43.6	43.1	43.6	43.7	35.0	28.4	14.4	10.1
05:30 - 05:45	45.3	52.4	51.6	50.2	49.2	42.4	41.8	43.0	33.9	20.7	10.4	9.5
05:45 - 06:00	45.5	51.5	51.8	49.7	43.5	41.6	41.3	43.6	34.8	23.6	10.9	9.6
06:00 - 06:15	59.0	83.8	64.8	59.2	49.6	56.2	55.1	51.0	50.5	54.0	37.2	26.2
06:15 - 06:30	48.6	57.7	53.6	51.1	44.9	44.1	45.0	46.1	37.4	35.4	20.9	9.8
06:30 - 06:45	72.6	93.2	59.6	57.7	64.5	69.7	62.8	65.0	65.9	67.7	49.0	33.7
06:45 - 07:00	73.4	101.8	57.1	61.4	61.6	62.8	61.9	63.0	63.9	70.8	59.0	60.1



17 APPENDIX B - ENVIRONMENTAL CONDITIONS



#END OF REPORT#