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ENVIRONMENTAL
SOLUTIONS

Acoustic Survey and Assessment for Proposed residential development at, The Dog and Partridge, Hesketh Lane, Chipping, PR3 2TH.

Prepared for:

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1. Introduction

1.1. Martin Environmental Solutions has been commissioned to undertake a noise survey and an acoustic assessment to support planning applications for residential development at Dog & Partridge, Hesketh Lane, Chipping, PR3 2TH.

Site Location and Context

1.2. The site is located to the north of Hesketh Lane, to the east bordering the site is a dog kennelling facility. To the north and south are agricultural fields with additional properties along the road. The site is currently occupied by the former Dog and Partridge public house and out buildings.

1.3. It is the close proximity to the kennels and overall environmental sound that has raised concerns over sound levels and the request for this report.

2. Policy and Guidance

2.1. The impact of noise can be a material consideration in the determination of planning applications. The planning system has the task of guiding development to the most appropriate locations. It is recognised that on occasions it will be difficult to reconcile some land uses, such as housing, hospitals or schools, with other activities that generate high levels of noise. However, the planning system is tasked to ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development).

2.2. The Government's publication of the National Planning Policy Framework (NPPF), updated in July 2018, states that planning policies and decisions should prevent new and existing development from contributing to or being put at unacceptable risk from, of being adversely affected by unacceptable levels of noise pollution.

2.3. The Government have also issued the Noise Policy Statement for England (NPSE). The NPSE clarifies the Government's underlying principles and aims in relation to noise and sets a vision to promote good health and a good quality of life through the effective management of noise while having regard to the Government's sustainable development strategy. The NPSE aims to mitigate and minimise adverse impacts on health and quality of life through the effective management and control of noise.

2.4. The NPSE introduces the following terms although no sound levels are given to represent these many authorities including those within Lancashire have identified the sound level criteria in line with the World Health Organisation, BS8233:2014 and BS4142: 2014 levels. The terms introduced by the NPSE are:

NOEL – No Observed Effect Level (<30dB(A)inside <50dB(A) outside, 10dB below background)
LOAEL – Lowest Observed Adverse Effect Level (30-35dB(A) inside 50-55dB(A) outside, background to +5dB)
SOAEL – Significant Observed Adverse Effect Level (>35dB(A) inside, >55dB(A) outside, >+10dB above background)

2.5. The sound levels within the brackets of the previous paragraph are those determined by Lancashire authorities as appropriate levels to indicate the relevant effect levels represented by the NPSE. These levels are detailed with in the Lancashire Planning

Guidance document on noise which is in the process of being finalised and is currently used by a number of Lancashire authorities.

2.6. Other commonly used examples of standards utilised by Local Planning authorities for the consideration of noise impacts include comparison of the likely noise levels to be experienced at a development, with levels that have been recommended by the World Health Organisation (WHO) as Guidelines for the prevention of Community Noise Annoyance and within BS8233: 2014.

2.7. The WHO recommended noise levels for outdoor amenity areas (gardens) that should not be exceeded are 55dB(A) $L_{Aeq,16hr}$ in order to avoid 'Serious Community Annoyance or 50dB(A) $L_{Aeq,16hr}$ to avoid 'Moderate Community Annoyance' during the day. For indoor levels WHO set 35dB(A) $L_{Aeq,16hr}$ during the day to prevent Moderate Annoyance and 30 dB(A) $L_{Aeq,8hr}$ at night to prevent sleep disturbance.

2.8. The WHO guidance also recommends that maximum sound levels at night should not regularly exceed 45dB(A) within bedrooms to prevent sleep disturbance. Regularly is considered to be more than 10 times during any 8-hour night time period.

2.9. BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' also specifies desirable noise levels to be achieved inside dwellings.

2.10. BS 8233:2014 'Sound insulation and noise reduction for buildings – Code of Practice' also specifies desirable noise levels to be achieved inside dwellings. BS 8233 presents two levels, the first between the hours of 07:00 – 23:00 and the second between 23:00 -07:00.

2.11. The daytime period suggests internal noise levels of 35dB $L_{Aeq,16hr}$, for resting in living rooms and bedrooms while for night time a level of 30dB LAeq,8hr is recommended. Criteria for external areas mirrors that within the WHO guidance.

2.12. In addition, the recently published 'ProPG Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development' provides a 4-staged approach to undertaking a risk assessment in relation to anticipated sound levels at new residential development and the provision of mitigation measures. The guidance

is principally aimed at sites exposed predominantly to noise from transportation sources.

2.13. The first stage consists of an initial noise risk assessment, based on indicative day and night-time *noise* levels. Simple put the higher the ambient noise in an area the greater the impact. The levels given are shown below although it should be noted that these are in excess of both the Lancashire guidance, WHO and BS 8233: 2014.

Noise Risk Category*	Potential Effect if Unmitigated	Pre-Planning Application Guidance
0 – Negligible $L_{Aeq,16hr}$ <50dB $L_{Aeq,8hr}$ <40dB	May be noticeable but no adverse effect on health and quality of life	In this category the development is likely to be acceptable from a noise perspective, nevertheless a good acoustic design process is encouraged to improve the existing environment and/or safeguard against possible future deterioration and to protect any designated tranquil areas. A noise assessment may be requested to demonstrate no adverse impact from noise. Application need not normally be delayed on noise grounds.
1 – Low $L_{Aeq,16hr}$ 50-63dB $L_{Aeq,8hr}$ 40-55dB	Adverse effect on health and quality of life	In this category the development may be refused unless a good acoustic design process is followed and is demonstrated via a Level 1 Acoustic Design Statement which confirms how the adverse impacts of noise on the new development will be mitigated and minimised and that a significant adverse impact will not arise in the finished development. Planning conditions and other measures to control noise may be required.
2 – Medium $L_{Aeq,16hr}$ 63-69dB $L_{Aeq,8hr}$ 55-60dB L_{AFmax} >80dB**	Significant adverse effect on health and quality of life	In this category the development is likely to be refused unless good acoustic design process is followed and is demonstrated via a Level 2 Acoustic Design Statement which confirms how the adverse impacts of noise on the new development will be mitigated and minimised, and clearly demonstrates that a significant adverse noise impact will not arise in the finished development. Planning conditions and other measures to control noise will normally be required.
3 – High $L_{Aeq,16hr}$ >69dB $L_{Aeq,8hr}$ >60dB L_{AFmax} >80dB**	Unacceptable adverse effect of health and quality of life	In this category the development is very likely to be refused on noise grounds, even if a good acoustic design process is followed and is demonstrated via a Level 2 Acoustic Design Statement. Applicants are advised to seek expert advice on possible mitigation measures. Advice on the circumstances when the refusal of a new housing on noise grounds should normally be anticipated is included in the ProPG.

2.14. Stage 2, consists of a full assessment of the prevailing ambient noise and is required considered 4 elements to be considered:

I. Element 1 – Good Acoustic Design

II. Element 2 – Internal Noise Level Guidelines

III. Element 3 – External Amenity Area Nosie Assessment

IV. Element 4 – Assessment of Other Relevant Issues

2.15. A good acoustic design is implicit in meeting the requirements of the NPPF and can help to resolve many potential acoustic issues.

2.16. Details of the criteria considered suitable are provided above for both internal and external sound levels. Element 4 includes such issues as local and national policy, likely occupants, wider planning objectives.

3. The Assessment

3.1 Ideally an assessment of traffic noise should be taken over the periods 07:00 to 23:00 hours for daytime and/or 23:00 to 07:00 hours for night-time, and the overall figures then compared with the relevant guidance documents. However, it is rare to find ideal monitoring conditions within the Northwest to undertake such a prolonged period of monitoring and the site in question had no suitable location for leaving a sound level meter unattended for any period of time.

3.2 For road traffic, it has been found by experience that a good PPG24 value can be obtained by an alternative method of daytime averaging, as detailed in the '*Department for Transport- Welsh Office; Estimating Road Traffic Noise 1988'*. This method involves measuring the L_{A10} of the traffic noise between 10:00 and 17:00 hours in three separate 1-hour periods. From this data, an estimate can be made of both the 18-hour L_{A10} and then the 16-hour L_{Aeq}. This method is very useful in combating variable weather conditions since consistent conditions for 16-hours are fairly rare in the UK.

The formula are: $L_{A10(18hr)} = \sum 3x\ L_{A10(1hr)}/3 - 1dB$

$PPG24\ L_{Aeq(16hr)} = L_{A10(18hr)} - 2dB$

3.3 For night-time sound levels, the Transport Research Laboratory provides a method for converting the $LA10,_{18hr}$ level to the L_{night} level using the following formula.

$$L_{night} = 0.90 \times L_{A10(18hr)} - 3.77dB$$

3.3 The full results are provided within Appendix A, and have been used to calculate the $L_{Aeq,16hr}$ sound level at the property as 53.7dB and the $L_{Aeq,8hr}$ as 46.4dB. The monitoring position was located at the side of the road opposite the existing building on site.

3.4 All measurements were taken using a Cirrus, Optimus Green CR-171C, Type 1 sound level meter. The meter was calibrated before and after use and no significant deviation was identified. The calibration certificates are available on request. The weather at the time of the monitoring was dry, clear, cold and there was no wind.

3.4 An open window provides 15dB attenuation[1] and therefore the resulting sound level within the proposed properties will be 38.7dB(A) during the day and 31.4dB(A) during the night, with a maximum sound levels regularly exceeded of 70dB(A), identified as the maximum sound level during the monitoring period.

3.5 The measured levels are above those recommended within the guidance detailed above and as such it is recommended that further mitigation measures are required to ensure a suitable internal sound level in all habitable rooms to the property.

3.6 A standard 6/12/6 double glazing unit will provide a sound reduction, $R_w(C;C_{tr})$, of 33(-1;-3). Thus, for this project a reduction of 30dB when closed. This would be adequate to the protect the properties during the day and night from the average sound levels but would not ensure a maximum night-time level of 45dB(A) is not regularly exceeded.

3.7 By increasing the glazing specification to 6/6-16/6[2] Pilkington insulating glass unit a reduction of 34dB (R_w+ C_{Tr}) can be obtained thus, reducing the maximum sound level to be experienced to 45dB L_{Amax}. This glazing should be installed to the southern and eastern facades of the proposed development.

3.8 In order to be able to keep windows closed additional ventilation provision must be made for the property. As such it is recommended that a ventilation system is used incorporating acoustic trickle ventilators for all windows to habitable rooms to the proposed properties. The ventilators must achieve a similar of better performance to the windows when open and a number of suitable models are available from suppliers including the Greenwood DN Vent providing 34dB (C_{tr}) attenuation or the Titon, SF Xtra SA Ventilator providing 41dB (C_{tr}) attenuation. Other models and manufacturers area available.

3.9 In addition to the above exercise on-site monitoring was undertaken between the 15th-19th November 2018 at the side of the existing pub, to ascertain the impact from a general environmental noise and the adjacent kennel facility. Weather during this monitoring session varied with stronger winds being experienced over the weekend period.

[1] BS8233: 2014; Guidance on sound insulation and noise reduction for buildings
[2] http://assetmanager-ws.pilkington.com/fileserver.aspx?cmd=get_file&ref=8222&cd=cd

3.10 The meter was located on the patio by the entrance door to the residential accommodation on the first floor of the existing pub. The full results are contained within Appendix B and are summarised in the table below.

Start Time	End Time	Day	Duration	L_{Aeq}	L_{A90}	L_{AMax}
15/11/2018 17:52	15/11/2018 19:00	Thurs	01:07:08	43.3	34.5	73.0
15/11/2018 19:00	15/11/2018 23:00		04:00:00	38.5	25.2	61.7
15/11/2018 23:00	16/11/2018 07:00	Fri	01:48:04	33.1	20.7	56.8
16/11/2018 07:00	16/11/2018 19:00		01:11:14	45.5	32.8	77.0
16/11/2018 19:00	16/11/2018 23:00		04:00:00	41.7	29.7	65.8
16/11/2018 23:00	17/11/2018 07:00	Sat	08:00:00	37.6	25.6	68.5
17/11/2018 07:00	17/11/2018 19:00		12:00:00	49.9	38.3	97.2
17/11/2018 19:00	17/11/2018 23:00		04:00:00	44.1	33.8	67.8
17/11/2018 23:00	18/11/2018 07:00	Sun	08:00:00	49.6	31.0	82.7
18/11/2018 07:00	18/11/2018 19:00		12:00:00	49.0	36.6	75.4
18/11/2018 19:00	18/11/2018 23:00		04:00:00	42.8	27.1	64.5
18/11/2018 23:00	19/11/2018 07:00	Mon	08:00:00	39.9	23.2	70.2
19/11/2018 07:00	19/11/2018 18:20		11:20:38	48.8	38.5	75.8

3.11 All measurements were taken using a Cirrus, Optimus Green CR-171B, Type 1 sound level meter. The meter was calibrated before and after use and no significant deviation was identified. The calibration certificates are available on request.

3.12 Given a 15dB reduction for an open window the results from the monitoring show that the average sound levels recommended for internal environments will be achieved for both daytime and night-time. However, a review of the monitoring data identifies that the regularly exceeded maximum sound level was 70.5dB(A). As such the internal sound levels through an open window would exceed these values.

3.13 It is therefore recommended that any windows to habitable rooms facing north and west i.e. not onto the main road are fitted with standard double-glazing and suitable trickle ventilation to achieve a 30dB ($+C_{tr}$) sound reduction. Ensuring that night-time maximum levels are achieved in all properties.

3.14 A review of the audio which accompanied the monitoring undertaken has been carried out which confirms stronger winds over the weekend period. Also identified on the recording were short durations of dog barking presumably from the adjacent kennel

facility. These lasted less than 5-minutes at a time with a maxium of 3 occurrences during any day, with no occurrences during the evening and night-time periods. These are reportedly linked to times when the dogs are being fed/exercised. Sound levels experienced during these events reached 70dB(A).

3.15 This would result in sound levels of 37-40dB(A), R_w of 33dB (30 R_w + C_{tr}) over a short duration. Averaged over an hour this would equate to approximately 36.2-29.2dB over an hour and over the 12-hour daytime period 20.2-23.2dB(A). In addition, those windows facing the north will experience greater attenuation due to the angle of the building compared to the neighbouring site, while those to the west and south will be protected by the building itself. It has already been identified that those rooms to the eastern façade will have increased glazing specification.

3.16 Therefore, In-line with the guidance documented above the sound levels to be experienced would not result in an adverse impact on the proposed development.

3.14 For the external area BS8233:2014 and the World Health Organisation recommend a lower level of 50dB $L_{Aeq,16hr,}$ with an upper level of 55dB $L_{Aeq,16hr}$. However, BS8233:2014 identifies that it is not always possibly to obtain the levels and, in such situations, development should be designed to achieve the lowest practicable levels in external amenity areas.

3.15 The proposed development only has dedicated amenity areas for the dwellings in the far west of the site, with some general public open space for the rest of the development. Those amenity spaces to the west will be enclosed by 1.8m close boarded fencing, with a minimum density of 12Kg/m^2, and protected by the building itself. The fencing will provide approx. 15.4dB of attenuation from the road (Appendix 2), reducing sound levels within the gardens to 38.3dB $L_{Aeq,16hr}$.

3.16 Along the eastern boundary it is recommended that a 2m high close boarded fence is erected, providing approximately 21.2dB reduction to the ground floor properties and the public open spaces. Reducing any sound from barking dogs to below the recommended 50dB, al-be-it for the short duration of barking during feeding times.

4 Conclusions

4.1 Following monitoring undertaken on site the prevailing background sound level has been identified and impact from both the road to the south of the development and the kennels in the east assessed.

4.2 The assessment has identified the need for additional mitigation measures to ensure suitable internal and external sound levels are achieved in accordance with the relevant guidance documents discussed in Section 2 of the report.

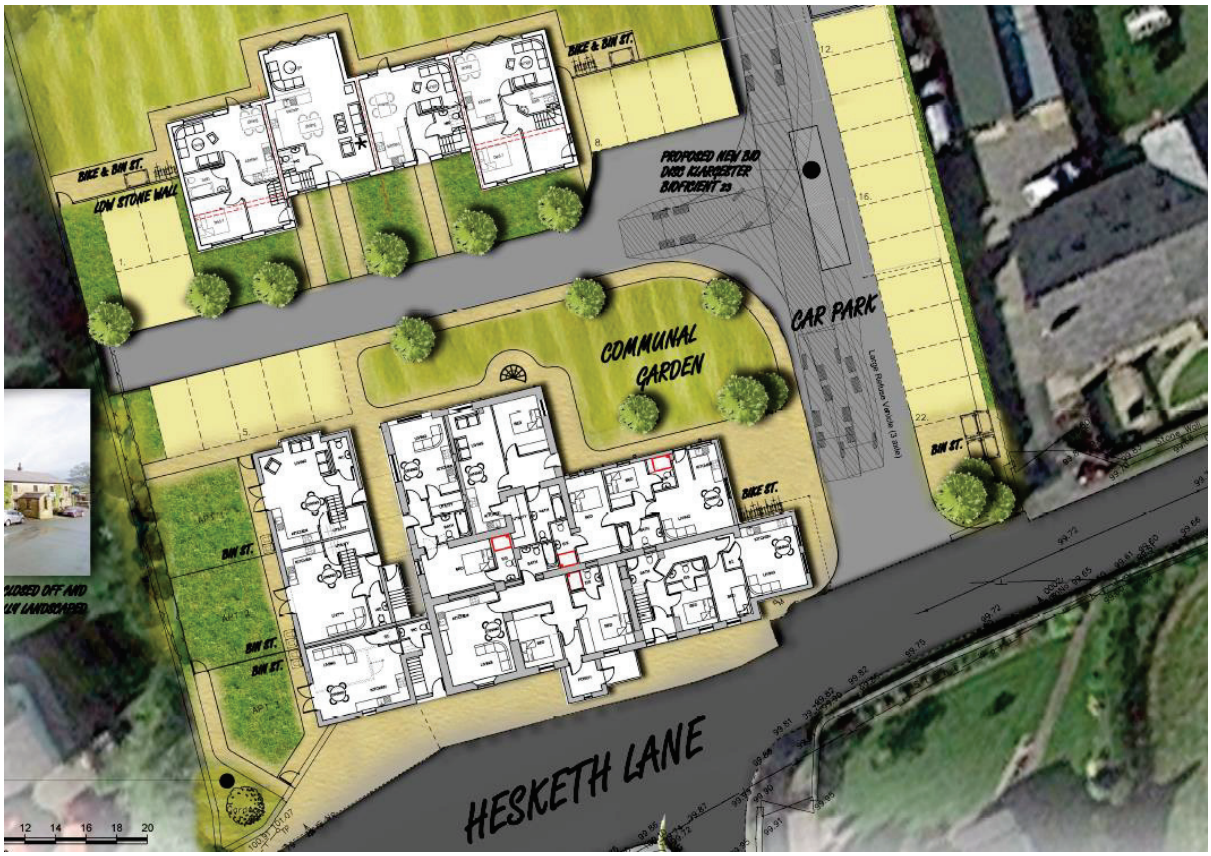
4.3 These mitigation measures include enhanced glazing specifications to the habitable rooms facing the southern and eastern boundaries of the development, with standard double-glazing unit to the other facades of the development. In addition to avoid the need to open windows suitable trickle ventilators are required to each window to match the specifications identified in Section 3 above.

4.4 For external amenity areas, in order to ensure the recommended sound levels are achieved a 1.8m high close boarded fence should be erected around the garden areas to the west of the site. while a 2m high close boarded fence should be erected along the eastern boundary in order to protect the public open space.

4.5 The above mitigation measures will ensure that suitable internal and external sound levels are achieved below those recommended within the guidance documents detailed above and as such a level of NOEL (No Observed Effect Level) would be experienced by future residents. The inclusion of the identified mitigation measure will ensure that no significant adverse impact is experienced as required by the National Planning Policy Framework and as such the development is in terms of noise acceptable.

Figure 1 – Aerial Photograph

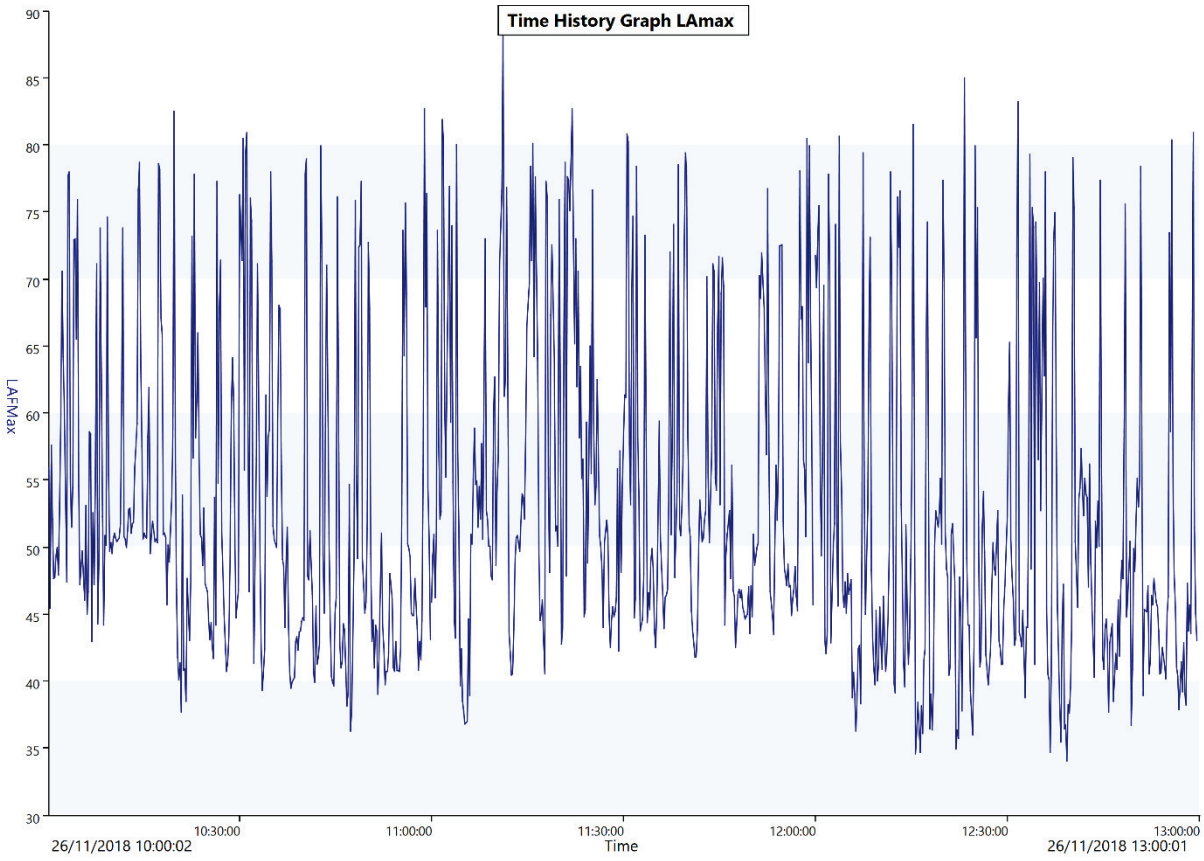
Figure 2 – Indicative Site Layout



Appendix 1 – Monitoring Results

Traffic Noise

Time	L_{Aeq} (dB)	L_{AMax} (dB)	L_{A10}(dB)
26/11/2018 10:00	58.9	82.7	56.4
26/11/2018 11:00	60.3	88.9	59.8
26/11/2018 12:00	58.5	85.0	54.0

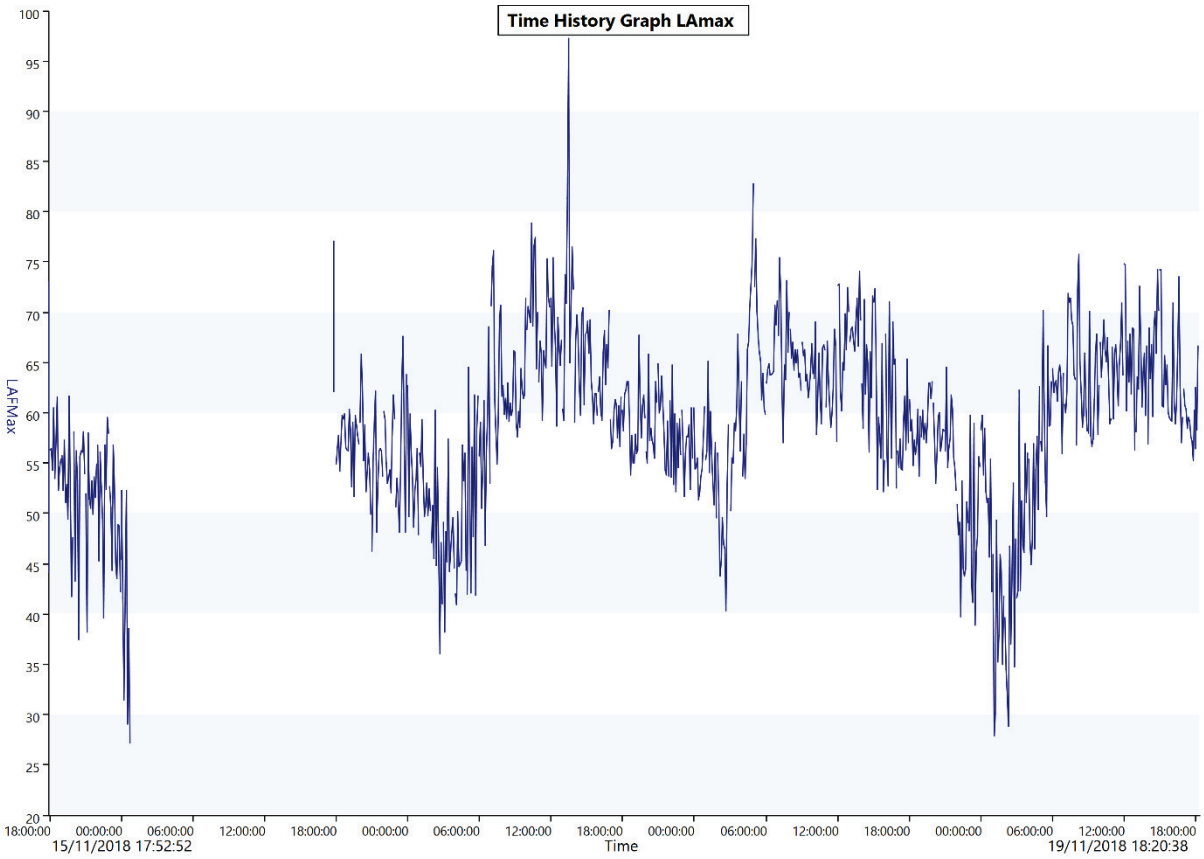


Long-term Env. Monitoring

Time	L_{Aeq} (dB)	L_{AMax} (dB)	L_{A90} (dB)
15/11/2018 18:00	43.0	61.5	34.2
15/11/2018 19:00	39.7	61.7	29.0
15/11/2018 20:00	38.3	58.1	26.2
15/11/2018 21:00	37.1	58.0	24.4
15/11/2018 22:00	38.5	59.6	23.3
15/11/2018 23:00	34.6	56.8	21.3
16/11/2018 00:00	29.9	52.3	20.3
16/11/2018 18:00	44.1	59.9	32.7

16/11/2018 19:00	43.1	60.3	31.7
16/11/2018 20:00	40.8	65.8	28.2
16/11/2018 21:00	40.1	62.1	28.9
16/11/2018 22:00	42.2	61.7	31.2
16/11/2018 23:00	39.3	67.6	27.7
17/11/2018 00:00	38.5	62.8	25.8
17/11/2018 01:00	35.5	59.3	24.6
17/11/2018 02:00	32.6	60.3	24.2
17/11/2018 03:00	32.5	57.3	26.6
17/11/2018 04:00	33.2	56.8	25.4
17/11/2018 05:00	36.0	64.6	26.4
17/11/2018 06:00	42.3	68.5	30.0
17/11/2018 07:00	47.8	76.1	36.4
17/11/2018 08:00	46.9	66.1	38.2
17/11/2018 09:00	47.5	71.3	39.4
17/11/2018 10:00	52.2	78.9	40.3
17/11/2018 11:00	48.9	75.3	39.9
17/11/2018 12:00	48.5	75.4	38.9
17/11/2018 13:00	55.8	97.2	38.0
17/11/2018 14:00	49.9	70.4	39.3
17/11/2018 15:00	47.8	69.3	38.4
17/11/2018 16:00	49.3	70.2	39.6
17/11/2018 17:00	45.9	61.6	37.3
17/11/2018 18:00	44.9	63.0	35.9
17/11/2018 19:00	44.5	67.8	36.0
17/11/2018 20:00	44.5	65.9	37.4
17/11/2018 21:00	44.4	64.9	34.4
17/11/2018 22:00	42.5	64.7	31.2
17/11/2018 23:00	42.1	60.5	33.4
18/11/2018 00:00	42.4	60.5	37.0
18/11/2018 01:00	40.9	65.2	30.7
18/11/2018 02:00	36.8	58.8	27.9
18/11/2018 03:00	43.7	67.8	35.0
18/11/2018 04:00	54.2	82.7	30.9
18/11/2018 05:00	53.6	77.3	35.5
18/11/2018 06:00	52.2	71.1	32.9
18/11/2018 07:00	52.2	75.4	36.9
18/11/2018 08:00	49.7	68.3	37.7
18/11/2018 09:00	47.3	67.1	38.3
18/11/2018 10:00	47.5	69.0	38.8
18/11/2018 11:00	48.4	68.3	39.2
18/11/2018 12:00	51.2	72.8	39.9
18/11/2018 13:00	53.2	74.2	40.3
18/11/2018 14:00	48.2	71.7	38.3

18/11/2018 15:00	46.1	72.3	37.6
18/11/2018 16:00	44.0	71.0	35.2
18/11/2018 17:00	42.3	65.3	31.9
18/11/2018 18:00	42.7	61.3	33.0
18/11/2018 19:00	44.8	63.1	37.0
18/11/2018 20:00	44.4	60.9	33.7
18/11/2018 21:00	41.9	64.5	31.0
18/11/2018 22:00	32.9	53.2	25.7
18/11/2018 23:00	38.1	59.7	26.6
19/11/2018 00:00	38.8	59.7	29.4
19/11/2018 01:00	27.6	49.4	22.8
19/11/2018 02:00	28.8	53.0	21.9
19/11/2018 03:00	34.7	62.3	25.5
19/11/2018 04:00	36.0	62.7	28.1
19/11/2018 05:00	42.3	70.2	29.8
19/11/2018 06:00	46.0	64.7	37.3
19/11/2018 07:00	49.9	71.8	39.7
19/11/2018 08:00	50.2	75.8	37.9
19/11/2018 09:00	45.9	70.1	35.9
19/11/2018 10:00	47.9	69.3	38.0
19/11/2018 11:00	48.7	70.9	41.0
19/11/2018 12:00	48.8	74.9	39.5
19/11/2018 13:00	47.7	72.6	38.8
19/11/2018 14:00	47.8	74.2	36.7
19/11/2018 15:00	51.5	74.3	41.8
19/11/2018 16:00	49.6	73.5	39.1
19/11/2018 17:00	46.2	62.4	37.8
19/11/2018 18:00	47.3	66.7	37.8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19/11/2018 18:20:38

Appendix B – Barrier Calculations

Barrier Attenuation Calculations

Barrier Attenuation has been calculated using the following formula:

$$10\ \log\left(3+\frac{40\delta}{\lambda}\right)$$

where; $\delta = path\ difference$

$\lambda = wavelength,$

$$\lambda = \frac{speed\ of\ sound\ (330\,m/s)}{frequency\ (Hz)}$$

Western boundary

Distance	= 9.6m
Distance source to barrier (wall)	= 7.6m
Distance barrier to receiver	= 2m
Height of source	= 0.5m
Height of receiver	= 1.5m
Height of Barrier	= 1.8m
Path difference	= 0.132757452
Attenuation	= 15.4dB

Public Open Space

Distance	=351m
Distance source to barrier (wall)	= 9m
Distance barrier to receiver	= 26m
Height of source	= 1m
Height of receiver	= 1.5m
Height of Barrier	= 2m
Path difference	= 0.531789728
Attenuation	= 21.2dB