



**Environmental Noise Assessment For A
Proposed Residential Development At
Low Lane, Holbeach**

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SUMMARY

An environmental noise assessment has been carried out associated with a proposed residential development at Low Lane, Holbeach for Studio 11 Architecture Limited.

The assessment has taken account of noise emissions from road traffic on the A17.

The assessment carried out shows that provided the noise mitigation measures detailed within this report are implemented, the noise impact on the nearest residential premises is likely to be at the “*Lowest Observed Adverse Effect Level*”, when assessed in accordance with the Noise Policy Statement for England (NPSE – Reference 2).

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1 OBJECTIVES

- 1.1** To carry out an environmental noise assessment associated with the proposed residential development at Low Lane, Holbeach in accordance with the National Policy Planning Framework (NPPF - Reference 1), the Noise Policy Statement for England (NPSE - Reference 2) and other relevant standards.
- 1.2** To recommend solutions to any problems identified by the assessment.

2 CONCLUSIONS

- 2.1** Using the noise impact criteria from the Noise Policy Statement for England the assessment carried out shows that provided the noise mitigation measures detailed within this report are implemented, the noise impact on the nearest residential premises is likely to be at the “*Lowest Observed Adverse Effect Level*”.
- 2.2** Acceptable daytime noise levels (below the threshold for moderate annoyance given in the World Health Organisation (WHO) Guideline Values for Community Noise (Reference 3)) can be achieved in the living rooms of all of the proposed residential dwellings by installing double glazed windows and by installing mechanical ventilation within all of the plots (as detailed in Section 3.1).
- 2.3** Acceptable night-time noise levels (below the threshold for sleep disturbance given in the WHO Guidelines) can be achieved in the bedrooms of all of the proposed residential dwellings by installing double glazed windows and by installing mechanical ventilation within all of the proposed plots (as detailed in Section 3.1).
- 2.4** Noise levels in the amenity areas of all of the proposed dwellings are likely to be equal to or below the level where “serious annoyance” should be avoided in accordance with the WHO Guideline Values, provided the mitigation measures detailed within Section 7 of this report are implemented.

3 RECOMMENDATIONS

- 3.1** The following noise mitigation measures are required for this development
 - Double glazing fitted with compression seals and a minimum R_w Value of 30 dB should be built into all living rooms and bedrooms.
 - All of the living rooms and bedrooms on the proposed site should be acoustically ventilated with a mechanical ventilation system which complies with the Noise Insulation Regulations 1975 (Reference 6) and the Approved Document F (Reference 7). Alternatively, a ‘whole house’ ventilation system could be used.

*** See Appendix 1 for a Glossary of Terms**

- To reduce noise emissions within the amenity areas of the worst affected plots the 2m high acoustic barrier proposed on the Northern and Western boundaries of the site, will need to be increased to a height of at least 3.6m.

The potential reduction that could be achieved by implementing these mitigation measures are discussed further in Section 7 of this report.

4 **BACKGROUND**

The client plans to build 43 residential dwellings on a site at Low Lane, Holbeach. Acoustic Associates (Peterborough) have been contracted by Studio 11 Architecture Limited to carry out an environmental noise assessment to consider the effect of potential noise emissions emanating from road traffic on the A17. This report documents the results of that assessment. The location of the site is shown in Figure 1 and a drawing of the site showing the proposed plot layout is shown in Figure 2.

5 **POLICY, GUIDANCE AND STANDARDS**

5.1 **National Policy Planning Framework**

The National Policy Planning Framework (NPPF – Reference1) states the following with respect to noise (para 123). 1

“Planning policies and decisions should aim to:

avoid noise from giving rise to significant adverse impacts (27) on health and quality of life as a result of new development;

mitigate and reduce to a minimum other adverse impacts (27) on health and quality of life arising from noise from new development, including through the use of conditions;

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

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

The footnote 27 in the first two bullet points refers to the Noise Policy Statement for England (NPSE)¹ in order to explain what it means by “adverse impact”.

¹ Noise Policy Statement for England - Published March 2010 by DEFRA
Report No. SEM/J2885/15294-1

5.2 Noise Policy Statement for England

5.2.1 NPSE states the following in order to explain how noise impacts should be classified:

“There are two established concepts from toxicology that are currently being applied to noise impacts. 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.”

5.2.2 Having explained its criteria, NPSE states its aims thus.....

“The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.

The second aim of the Noise Policy Statement for England, mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The third aim of the Noise Policy Statement for England, where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise.”

5.2.3 NPSE goes on to explain what should happen if noise exceeds the LOAEL:

“.....where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

5.3 National Planning Practice Guidance

5.3.1 The National Planning Practice Guidance (NPPG – Reference 8) advises on how planning can manage potential noise impacts in new development. Table 1 below summarises the noise exposure hierarchy, based on the likely average response.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behavior or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behavior and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behavior and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behavior and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non auditory	Unacceptable Adverse Effect	Prevent

Table 1 – NPPG Summary of the Noise Exposure Hierarchy

5.4 World Health Organisation Guidance

5.4.1 The World Health Organisation (WHO – Reference 3) has published guidelines for community noise, as shown in Table 2. This WHO document gives guidance for the levels of noise both inside and outside of dwellings.

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

Note: The 'daytime' and 'night-time' periods are generally referred to as 0700 to 2300 and 2300 to 0700 hours respectively.

Table 2 – World Health Organisation Noise Guidance Levels (Reference 3)

5.4.2 In addition to the above the WHO in 2009 published guidelines for night-time noise outside dwellings (Reference 4). These state:

“.....an L_{night,outside} of 40 dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. L_{night,outside} value of 55 dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach..... L_{night,outside} of 40 dB is equivalent to the LOAEL for night noise.”

5.5 Noise Measurements

5.5.1 Ambient and Background Noise

Attended measurements of the existing ambient and background noise levels were taken at Monitoring Location 1 (see Figures 1 & 2) between 11:05 – 14:20 hours on Monday 10th November 2014 and between 22:53 hours on Monday 17th November 2014 – 00:38 hours on Tuesday 18th November 2014. The noise monitoring location was in a free field location, (approximately 12m from the roadside (Low Lane) and approximately 15m from the ditch between the proposed site and the A17) at a height of approximately 1.5 metres above ground level. Weather conditions during the measurement period on 10th November 2014 were dry, partial cloud cover, approximately 10°C with a light to moderate breeze typically 1 – 2m/s emanating from the south-east. Weather conditions during the measurement period on 17th

November 2014 were dry, mostly clear skies, approximately 7°C with a light breeze of <0.5m/s. Photographs of the monitoring location are shown in Figure 3.

5.5.2 Specific Noise

The following noise sources have been identified and considered as part of this environmental noise assessment:

- Road traffic noise on the A17. Measured data from Monitoring Location 1 has been used to calibrate the level from this noise source.
- Road traffic noise on Low Lane. This has not been included within the computer noise model as the road traffic on this road was so infrequent (ranging from 0 – 3 vehicle movements during each 15 minute daytime monitoring period and just two vehicle movements during the 105 minute night-time monitoring period).

The location of the A17 in relation to the proposed site is shown in Figure 1.

5.6 **Computer Noise Model of the Site and Surrounding Area**

A computer noise model of the site and surrounding area (see Figure 4) was generated using Wolfel IMMI Computer Noise Modelling Software (Reference 5) which uses the methods given in ISO 9613 –2 (Reference 4) to calculate noise levels across the site. The existing site, including the established earth bunding (estimated to be 2.5m above the ground level of the proposed site) was modelled and road traffic noise emissions from the A17 were input and calibrated using the measurements taken on site. The proposed residential premises were then input into the computer noise model which enabled the noise emissions across the site and surrounding areas to be calculated.

6 **RESULTS**

6.1 **Measured Noise Levels**

The results from the ambient and background noise monitoring are shown below in Tables 3 & 4 for the daytime and night-time periods respectively. The tables show the ‘energy average’ ambient noise level ($L_{Aeq,T}$), the background noise level ($L_{A90,T}$) and the maximum noise level ($L_{Amax,T}$) during 15 minute periods at Monitoring Location 1.

Date	Time (Hours)	Ambient Noise Level ($L_{Aeq,15min}$) dB(A)	Background Noise Level ($L_{A90,15min}$) dB(A)	Maximum Noise Level ($L_{Amax,15min}$) dB(A)	Comments
10/11/2014	11:05 – 11:20	57.8	52.9	65.6	Dominated by road traffic on the A17, tree leaves rustling and one car drove past on Low Lane
	11:20 – 11:35	57.8	51.9	67.8	Dominated by road traffic on the A17, light aircraft noise was occasionally audible, tree leaves rustling and three cars drove past on Low Lane
	11:35 – 11:50	57.4	51.1	64.7	Dominated by road traffic on the A17, tree leaves rustling and one van drove past on Low Lane and a Royal Mail vehicle also drove past and idled outside a number of the existing houses on Low Lane
	11:50 – 12:05	57.5	52.0	65.6	Dominated by road traffic on the A17, tree leaves rustling, aircraft noise was occasionally audible and two vehicles drove past on Low Lane
	12:05 – 12:20	58.5	53.4	66.2	Dominated by road traffic on the A17, tree leaves rustling, aircraft noise was occasionally audible and one car drove past on Low Lane
	12:20 – 12:35	58.0	52.5	67.2	Dominated by road traffic on the A17, tree leaves rustling, aircraft noise was occasionally audible and two cars drove past on Low Lane
	12:35 – 12:50	57.6	51.9	66.1	Dominated by road traffic on the A17, tree leaves rustling, aircraft noise was occasionally audible and two cars drove past on Low Lane
	12:50 – 13:05	57.4	49.3	67.1	Dominated by road traffic on the A17, tree leaves rustling and two vehicles drove past on Low Lane
	13:05 – 13:20	57.6	52.7	63.7	Dominated by road traffic on the A17, tree leaves rustling and no vehicles drove past on Low Lane
	13:20 – 13:35	57.8	52.0	65.7	Dominated by road traffic on the A17, tree leaves rustling and one vehicles drove past on Low Lane. Also noise from people talking for approximately 10 minutes
	13:35 – 13:50	57.4	51.0	64.4	Dominated by road traffic on the A17, tree leaves rustling and two vehicles drove past on Low Lane. Also noise from people talking for approximately 5 minutes
	13:50 – 14:05	57.9	53.4	66.9	Dominated by road traffic on the A17, tree leaves rustling and three vehicles drove past on Low Lane
	14:05 – 14:20	59.1	53.4	73.6	Dominated by road traffic on the A17, tree leaves rustling and one vehicles drove past on Low Lane

Table 3 – Daytime Noise Monitoring Results at Monitoring Location 1

Date	Time (Hours)	Ambient Noise Level ($L_{Aeq,15min}$) dB(A)	Background Noise Level ($L_{A90,15min}$) dB(A)	Maximum Noise Level ($L_{Amax,15min}$) dB(A)	Comments
17/11/2014	22:53 – 23:08	53.3	37.8	63.3	Dominated by road traffic on the A17. Vehicles drove past on Low Lane at 22:58 and 00:20 hours
	23:08 – 23:23	53.1	33.4	65.1	
	23:23 – 23:38	52.6	38.7	62.8	
	23:38 – 23:53	53.1	39.3	64.3	
	23:53 – 00:08	52.2	31.5	65.3	
	00:08 – 00:23	52.7	32.1	65.5	
	00:23 – 00:38	51.5	29.2	64.4	

Table 4 – Night-Time Noise Monitoring Results at Monitoring Location 1

6.2 Calculated Noise Levels Within the Amenity Areas of the Proposed Dwellings

The computer noise model was calibrated to a logarithmic average of the $L_{Aeq,15min}$ values at Monitoring Location 1 during both the daytime and night-time periods. The following table shows the computer prediction of noise levels within the outdoor amenity areas of all of the proposed plots during the daytime period. The predicted noise levels have been assessed at a height of 1.5m above the ground and 3.5m away from the building facades. The predictions are based upon the assumptions that all amenity areas will be surrounded by 1.8m high closed boarded fencing. The predicted noise levels include emissions from road traffic noise on the A17. Noise contours showing noise levels within all of the proposed amenity areas are shown in Figure 5.

Location	Predicted Daytime Outdoor Amenity Area Noise Level dB(A)
Amenity Area of Plot 1	58
Amenity Area of Plot 2	
Amenity Area of Plot 3	57
Amenity Area of Plot 4	56
Amenity Area of Plot 5	54
Amenity Area of Plot 6	52
Amenity Area of Plot 7	58
Amenity Area of Plot 8	
Amenity Area of Plot 9	
Amenity Area of Plot 10	
Amenity Area of Plot 11	
Amenity Area of Plot 12	
Amenity Area of Plot 13	
Amenity Area of Plot 14	
Amenity Area of Plot 15	
Amenity Area of Plot 16	
Amenity Area of Plot 17	
Amenity Area of Plot 18	
Amenity Area of Plot 19	
Amenity Area of Plot 20	57
Amenity Area of Plot 21	58
Amenity Area of Plot 22	57
Amenity Area of Plot 23	58
Amenity Area of Plot 24	
Amenity Area of Plot 25	57
Amenity Area of Plot 26	
Amenity Area of Plot 27	59
Amenity Area of Plot 28	
Amenity Area of Plot 29	
Amenity Area of Plot 30	58
Amenity Area of Plot 31	
Amenity Area of Plot 32	59
Amenity Area of Plot 33	
Amenity Area of Plot 34	
Amenity Area of Plot 35	55
Amenity Area of Plot 36	
Amenity Area of Plot 37	57
Amenity Area of Plot 38	58
Amenity Area of Plot 39	57
Amenity Area of Plot 40	58
Amenity Area of Plot 41	57
Amenity Area of Plot 42	58
Amenity Area of Plot 43	55

Table 5 - Predicted Daytime Noise Levels in the Amenity Areas of Plots 1 – 43

It can be seen that the predicted noise levels exceed 55 dB(A) within 39 of the 43 proposed plots, therefore in accordance with the WHO Guideline Values, in order to avoid the onset of

“serious annoyance” mitigation measures will need to be considered. This is discussed further in Section 7 of this report.

6.3 Calculated Noise Levels Within Living Rooms

Predictions have been carried out to determine the noise levels 1m from the worst affected building façade of the proposed dwellings during the daytime period. Based on the assumption that noise levels within rooms with a window partially open are typically 10–15 dB less than outside, the daytime levels within living rooms due to noise emissions from the road traffic noise source can be predicted. Table 6 shows the computer prediction of noise levels at 1m from the worst affected façade of Plots 1 – 43 at ground floor height (1.5m above the ground). Also included in the table is the predicted internal noise level within living rooms assuming partially open windows. As room layouts are not currently available, it has been assumed that living rooms will be situated on the worst affected building façade off each plot (worst case scenario).

Location	Predicted Daytime Façade Level dB(A)	Predicted Noise Level Within Living Rooms Assuming a Partially Open Window dB(A)
1m from Worst Affected Façade of Plot 1	59	44 - 49
1m from Worst Affected Façade of Plot 2	58	43 - 48
1m from Worst Affected Façade of Plot 3	57	42 - 47
1m from Worst Affected Façade of Plot 4	56	41 - 46
1m from Worst Affected Façade of Plot 5	54	39 - 44
1m from Worst Affected Façade of Plot 6	52	37 - 42
1m from Worst Affected Façade of Plot 7	58	43 - 48
1m from Worst Affected Façade of Plot 8		
1m from Worst Affected Façade of Plot 9	59	44 - 49
1m from Worst Affected Façade of Plot 10	58	43 - 48
1m from Worst Affected Façade of Plot 11		
1m from Worst Affected Façade of Plot 12		
1m from Worst Affected Façade of Plot 13		
1m from Worst Affected Façade of Plot 14	59	44 - 49
1m from Worst Affected Façade of Plot 15	58	43 - 48
1m from Worst Affected Façade of Plot 16	59	44 - 49
1m from Worst Affected Façade of Plot 17		
1m from Worst Affected Façade of Plot 18	58	43 - 48
1m from Worst Affected Façade of Plot 19		
1m from Worst Affected Façade of Plot 20	57	42 - 47
1m from Worst Affected Façade of Plot 21	58	43 - 48
1m from Worst Affected Façade of Plot 22	56	41 - 46
1m from Worst Affected Façade of Plot 23	58	43 - 48
1m from Worst Affected Façade of Plot 24		
1m from Worst Affected Façade of Plot 25		
1m from Worst Affected Façade of Plot 26		
1m from Worst Affected Façade of Plot 27	57	42 - 47
1m from Worst Affected Façade of Plot 28	59	44 - 49
1m from Worst Affected Façade of Plot 29		
1m from Worst Affected Façade of Plot 30	57	42 - 47
1m from Worst Affected Façade of Plot 31	56	41 - 46
1m from Worst Affected Façade of Plot 32	57	42 - 47
1m from Worst Affected Façade of Plot 33	59	44 - 49
1m from Worst Affected Façade of Plot 34		
1m from Worst Affected Façade of Plot 35		
1m from Worst Affected Façade of Plot 36	56	41 - 46
1m from Worst Affected Façade of Plot 37	57	42 - 47
1m from Worst Affected Façade of Plot 38	58	43 - 48
1m from Worst Affected Façade of Plot 39		
1m from Worst Affected Façade of Plot 40		
1m from Worst Affected Façade of Plot 41	57	42 - 47
1m from Worst Affected Façade of Plot 42	58	43 - 48
1m from Worst Affected Façade of Plot 43	64	49 - 54

Table 6 - Predicted Daytime Noise Levels Within Living Rooms of the Proposed Plots

Table 6 shows that in all of the proposed living rooms the level of 35 dB(A) regarded by WHO Guidance as the threshold for 'moderate annoyance' within dwellings during the daytime period is likely to be exceeded. For these rooms mechanical ventilation should be installed so that levels below 35 dB(A) can be achieved without the need to open windows. Assuming thermal double glazed windows with compression seals and a minimum R_w Value of 30 dB are fitted, then a reduction of at least 30 dB(A) is likely to be achieved, which should reduce the internal noise level within the worst affected living room (Plot 43) to 34 dB(A), which would be deemed to be an acceptable noise situation. Noise contours showing the predicted noise levels at a height of 1.5m above the ground (ground floor level) are shown in Figure 5.

6.4 Calculated Noise Levels Within Bedrooms

Predictions have been carried out to determine the night-time noise levels within bedrooms. Table 7 shows the computer prediction of noise levels at 1m from the worst affected façade of the proposed plots at first floor height (4m above the ground). Also included in the table is the predicted internal noise level within bedrooms assuming partially open windows. As room layouts are not currently available, it has been assumed that bedrooms will be situated on the worst affected building façade off each plot (worst case scenario).

Location	Predicted Night-Time Façade Level dB(A)	Predicted Noise Level Within Bedrooms Assuming a Partially Open Window dB(A)
1m from Worst Affected Façade of Plot 1	57	42 - 47
1m from Worst Affected Façade of Plot 2		
1m from Worst Affected Façade of Plot 3		
1m from Worst Affected Façade of Plot 4	55	40 - 45
1m from Worst Affected Façade of Plot 5	53	38 - 43
1m from Worst Affected Façade of Plot 6	51	36 - 41
1m from Worst Affected Façade of Plot 7	56	41 - 46
1m from Worst Affected Façade of Plot 8		
1m from Worst Affected Façade of Plot 9		
1m from Worst Affected Façade of Plot 10		
1m from Worst Affected Façade of Plot 11		
1m from Worst Affected Façade of Plot 12		
1m from Worst Affected Façade of Plot 13		
1m from Worst Affected Façade of Plot 14		
1m from Worst Affected Façade of Plot 15		
1m from Worst Affected Façade of Plot 16		
1m from Worst Affected Façade of Plot 17		
1m from Worst Affected Façade of Plot 18		
1m from Worst Affected Façade of Plot 19		
1m from Worst Affected Façade of Plot 20		
1m from Worst Affected Façade of Plot 21	57	42 - 47
1m from Worst Affected Façade of Plot 22	54	39 - 44
1m from Worst Affected Façade of Plot 23	56	41 - 46
1m from Worst Affected Façade of Plot 24		
1m from Worst Affected Façade of Plot 25	55	40 - 45
1m from Worst Affected Façade of Plot 26		
1m from Worst Affected Façade of Plot 27		
1m from Worst Affected Façade of Plot 28	56	41 - 46
1m from Worst Affected Façade of Plot 29		
1m from Worst Affected Façade of Plot 30	54	39 - 44
1m from Worst Affected Façade of Plot 31	53	38 - 43
1m from Worst Affected Façade of Plot 32	54	39 - 44
1m from Worst Affected Façade of Plot 33	56	41 - 46
1m from Worst Affected Façade of Plot 34		
1m from Worst Affected Façade of Plot 35		
1m from Worst Affected Façade of Plot 36	54	39 - 44
1m from Worst Affected Façade of Plot 37	55	40 - 45
1m from Worst Affected Façade of Plot 38		
1m from Worst Affected Façade of Plot 39		
1m from Worst Affected Façade of Plot 40	56	41 - 46
1m from Worst Affected Façade of Plot 41		
1m from Worst Affected Façade of Plot 42		
1m from Worst Affected Façade of Plot 43	59	44 - 49

Table 7 - Predicted Night-Time Noise Levels Within Bedrooms of the Proposed Plots

Table 7 shows that in all of the proposed bedrooms the level of 30 dB(A) regarded by WHO Guidance as the threshold for 'sleep disturbance' within dwellings during the night-time period is likely to be exceeded. For these rooms mechanical ventilation should be installed so that levels below 30 dB(A) can be achieved without the need to open windows. Assuming thermal double glazed windows with compression seals and a minimum R_w Value of 30 dB are fitted, then a reduction of at least 30 dB(A) is likely to be achieved, which would reduce the internal noise level within the worst affected bedroom (Plot 43) to 29 dB(A), which would be deemed to be an acceptable noise situation. Noise contours showing the predicted noise levels at a height of 4m above the ground (first floor level) are shown in Figure 6.

6.5 Noise Policy Statement for England Assessment

Using the noise impact criteria from the Noise Policy Statement for England, the noise impact from the road traffic noise sources is likely to be at the "*Lowest Observed Adverse Effect Level*", when assessed at the worst affected residential premises, provided the mitigation measures detailed in Section 7 of this report are implemented

7 NOISE MITIGATION

In order to reduce noise emissions to acceptable levels, the following noise mitigation measures will be required.

7.1 Reducing Noise Levels within the Amenity Areas

To reduce noise emissions within the amenity areas of the proposed plots, the proposed 2m high acoustic barrier on the northern and western boundaries (See image below) of the proposed site should be increased to a height of at least 3.6m.



Sketch 1 – Locations of Proposed Upgraded Acoustic Barriers

With the proposed acoustic barriers installed, the daytime noise levels within the worst affected amenity area should be reduced from 59 dB(A) to 55 dB(A). This is usually regarded as being an acceptable noise situation in accordance with the WHO Guidance.

In order to meet the predicted noise levels, the acoustic barrier used should be at least 3.6m in height.

Any material can be used to construct the acoustic barrier, provided it has a minimum surface density of 10 kg/m². This should give noise attenuation up to 20 dB.

Note: All gaps should be sealed, including the area between the ground and bottom of the barrier.

7.2 Window / Ventilation Requirements:

Double glazed windows fitted with compression seals and a minimum R_w Value of 30 dB should be built into all living rooms and bedrooms. All of the living rooms and bedrooms on the proposed site should be acoustically ventilated with a mechanical ventilation system which complies with the Noise Insulation Regulations 1975 (Reference 6) and the Approved Document F (Reference 7). Alternatively, a 'whole house' ventilation system could be used. There are several suppliers of acoustic ventilators, or whole house systems, for example, Passivent Ltd (see website: www.buildingproductdesign.com).

7.3 Design of Room Layouts

In order to further enhance the noise environment within the proposed plots, when proposed room layouts are drawn up consideration should be given to keeping bedrooms and living rooms away from the worst affected façades (those facing onto the A17). Wherever possible it would be beneficial to place bathrooms, hallways, landing and stairwells on these façades.

REFERENCES

- 1 National Policy Planning Framework (NPPF)
Published July, 2012 by Department for Communities and Local Government
ISBN: 978-1-4098-3408-3
- 2 Noise Policy Statement for England - Published March 2010 by DEFRA
- 3 World Health Organisation (WHO) – Guidelines for Community Noise.
Published 1999
- 4 ISO 9613 – 2:
Acoustics – Attenuation of sound during propagation outdoors.
- 5 Wolfel IMMI Computer Noise Modelling Software.
- 6 Noise Insulation Regulations, 1975: SI 1975:1763
- 7 Building Regulations Approved Document F – Ventilation
- 8 National Planning Practice Guidance (ID: 30: Updated 06 03 2014)

APPENDIX 1 – Glossary of Terms

Sound Pressure	The variation of ambient pressure that is detected by the ear as sound.
Noise	Unwanted sound
decibel (dB)	Ten times the logarithm of the square of the ratio of the Sound Pressure to a reference pressure (20 micro-Pascal's).
Sound Pressure Level (L_p)	The decibel version of the Sound Pressure.
A-Weighting	A frequency weighting which simulates the response of the ear. An A-Weighted Sound Pressure Level is denoted by L _{pA} and has units of dB(A)
L_{Aeq,T}	The value of the A-weighted sound pressure level, in decibels [dB(A)], of a continuous steady sound that within a specified time interval (T), for example 16 hours, has the same mean-square sound pressure as a sound that varies with time. Therefore, the average over a 16 hour period would be denoted as L _{Aeq,16h}
L_{Amax,T}	The maximum A-Weighted sound pressure level that was encountered during the measurement period.
L_{A90,T}	The A-Weighted sound pressure level that is exceeded for 90% of the time (T). This is usually used a measure of background noise.
Free Field	Where noise can propagate freely without any reflections from buildings etc.
Octave Band	A band of frequencies the upper limit of which is twice the lower limit. They are known by their centre frequency, e.g., 63, 125, 250, 500, 1000, 2000
NPSE Criteria	
NOEL	No Observed Effect Level
LOAEL	Lowest Observed Adverse Effect Level
SOAEL	Significant Observed Adverse Effect Level

BS 4142 Terms

T_r	The reference time interval over which an equivalent continuous A-weighted sound pressure is determined. Day time = 1 hour Night-time = 5 minutes
T_m	The measurement time interval over which measurements are taken.
Ambient Noise	Total sound in a given situation at a given time.
Residual Noise	The ambient noise remaining at a given position in a given situation when the specific noise is suppressed to a degree such that it does not contribute to the ambient noise.
Specific Noise Level	The dB L_{Aeq,T_r} of the noise sources being assessed at a site.
Insertion Loss	The difference in noise levels with, and without, a noise reducing device fitted.
Rating Level L_{Ar,T_r}	The specific noise level plus any correction (+5 dB) for the character of the noise, known as the Rating Level.
Assessment Level	Difference between Rating Level ($L_{Ar,T}$) and Background Noise ($L_{A90,T}$)
Sound Power Level (L_{WA})	The noise level from the source in terms of sound power, in dB(A).

APPENDIX 2 - Noise Instrumentation

Type	Manufacturer	Description	Serial Number	Last Calibration Date	Calibration Certificate No.
Svan 957	Svantek	Sound Level Meter	27517	18/02/2014	147055
GA 607	Castle	Sound Level Calibrator	039873	18/02/2014	147054

The calibration of the instrumentation was checked at the start and end of the tests and there was no significant drift.

FIGURE 1 – Location Plan of the Site



FIGURE 2 – Drawing of the Proposed Plot Layout

STUDIO 11 architecture



FIGURE 3 – Photographs of Monitoring Location 1

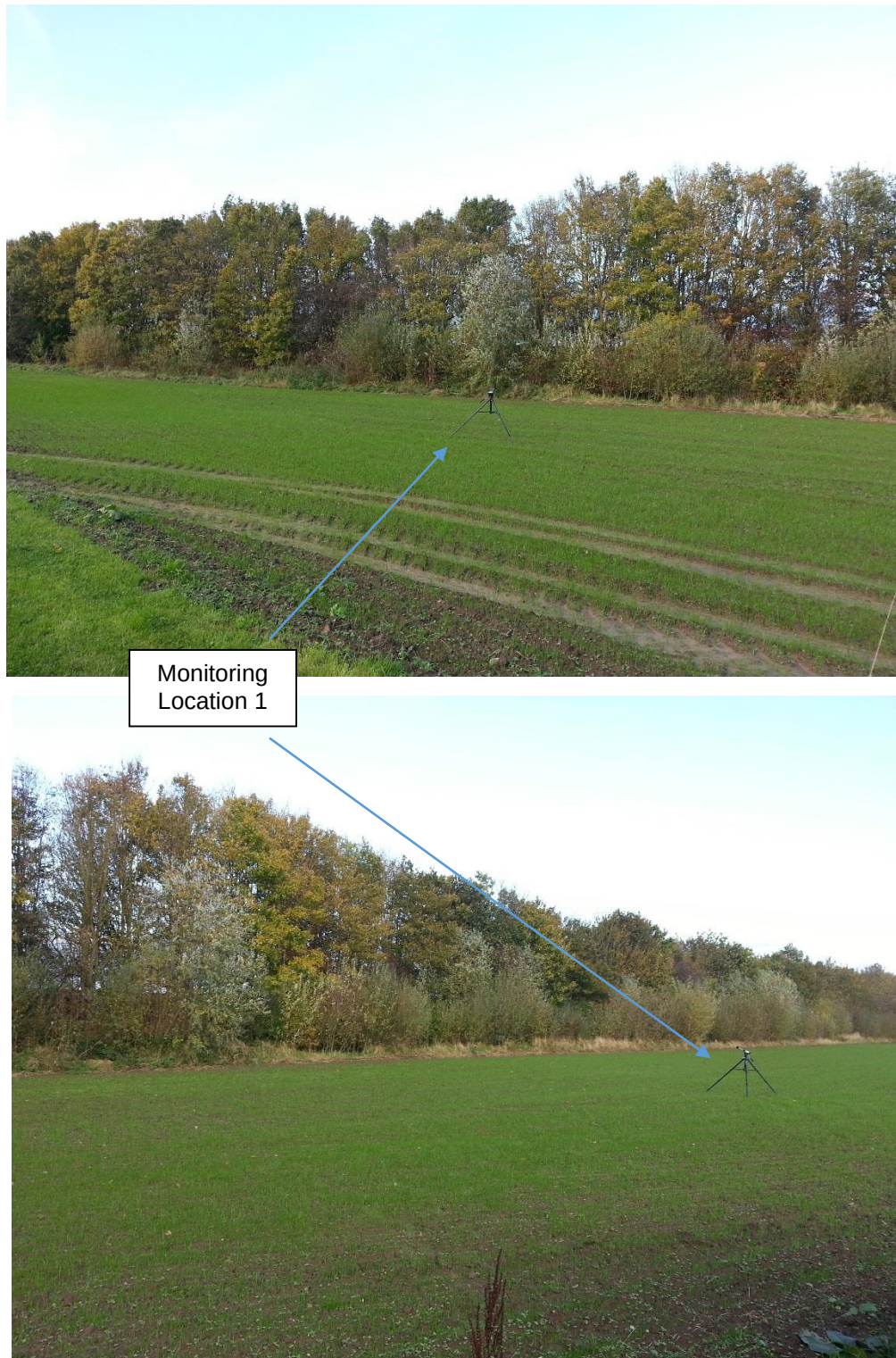
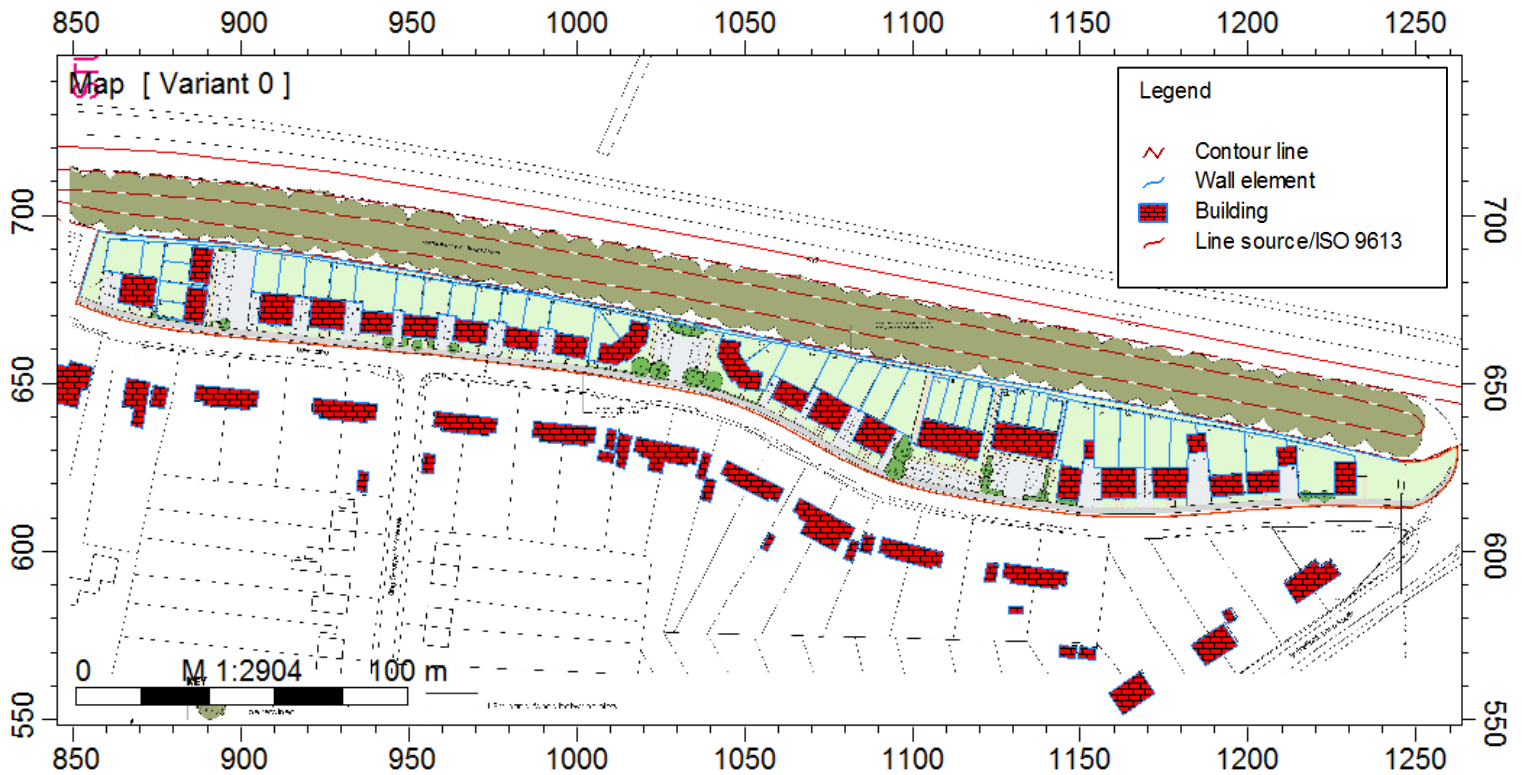
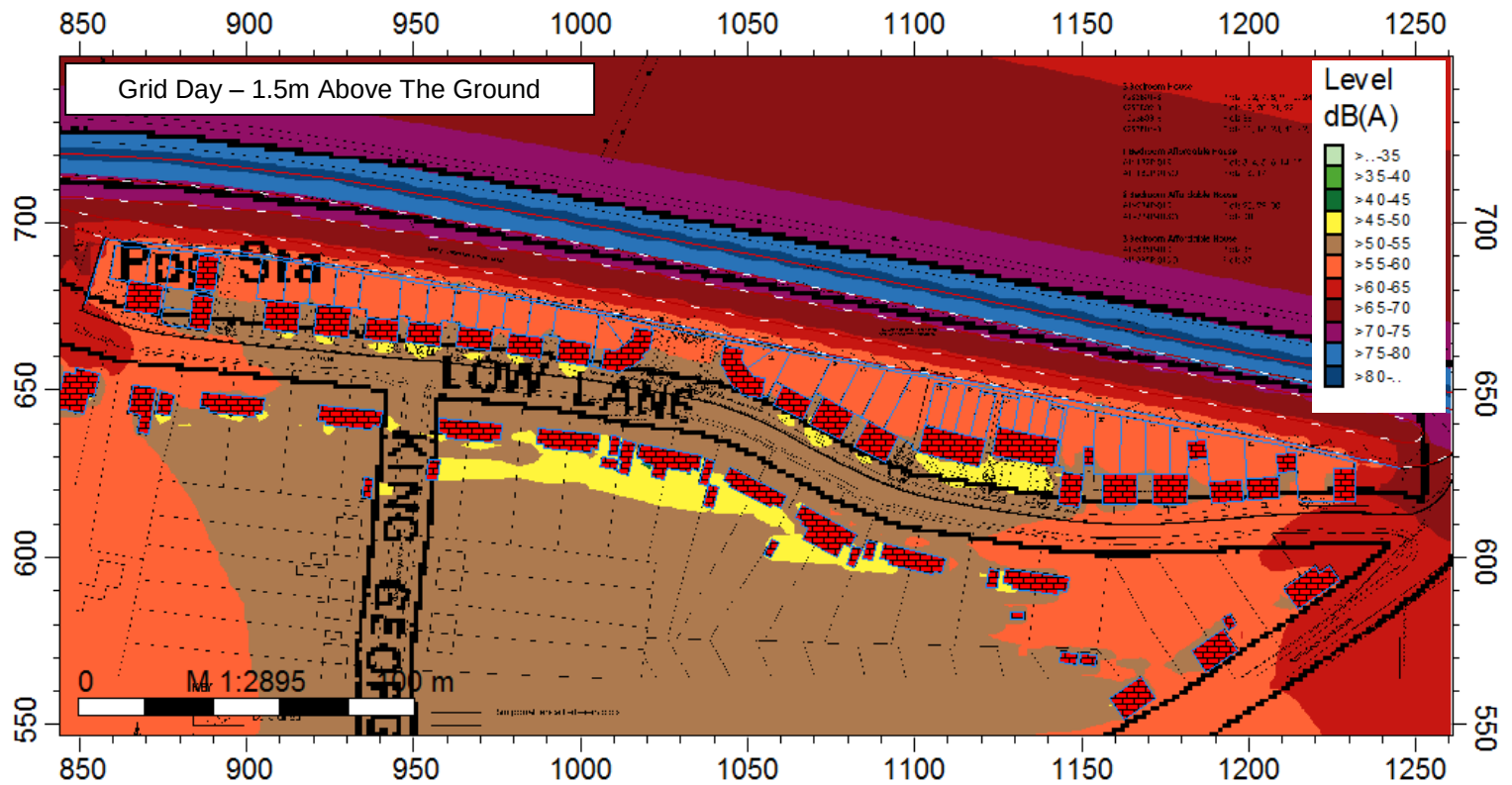


FIGURE 4 – Computer Noise Model of the Proposed Site



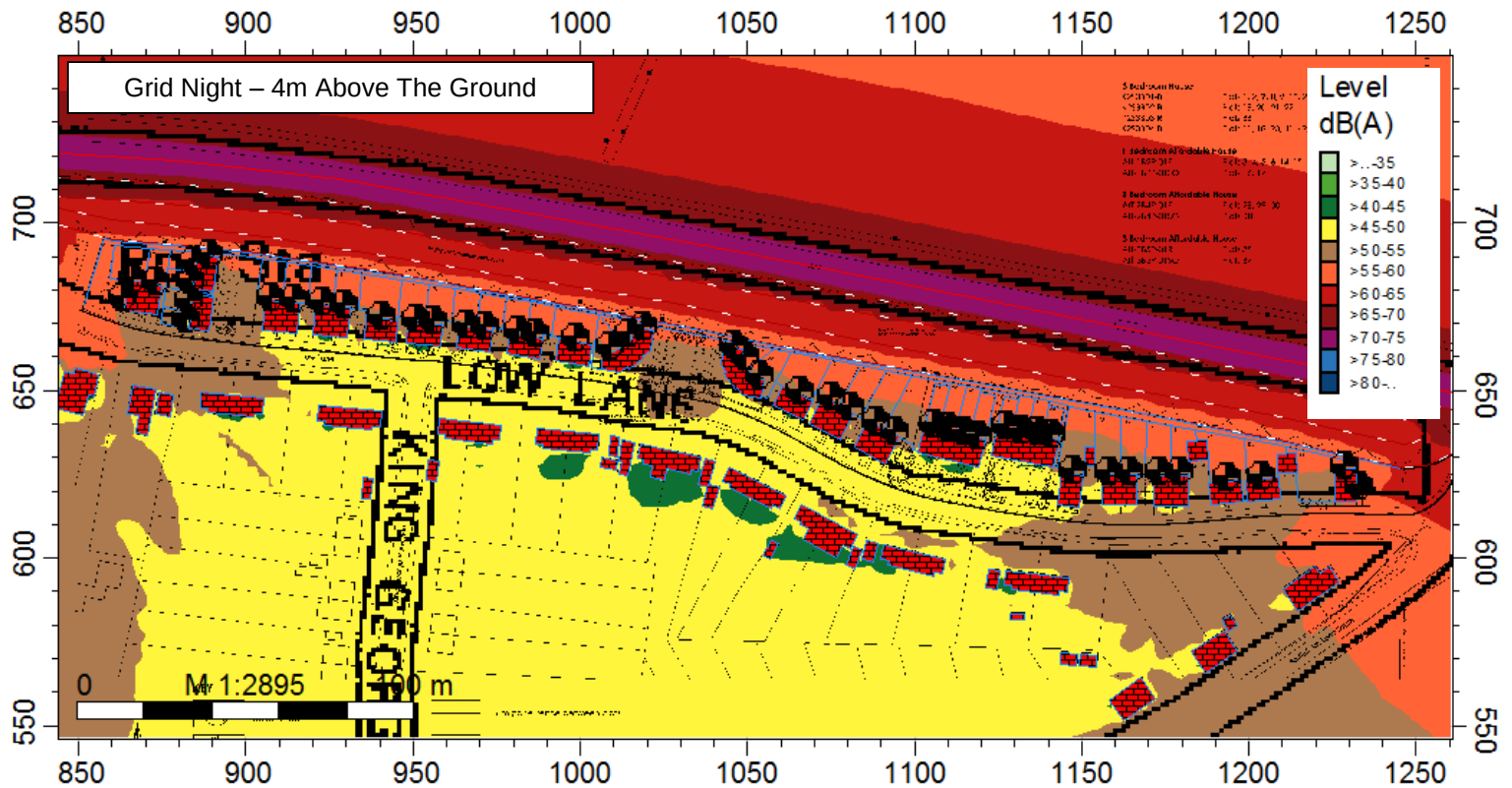
Company:	Acoustic Associates (Peterborough)
Project:	Low Lane, Holbeach
Handled By:	Stephen Marshall

FIGURE 5 – Daytime Noise Contours (1.5m Above Ground) – 2m Acoustic Barrier Installed



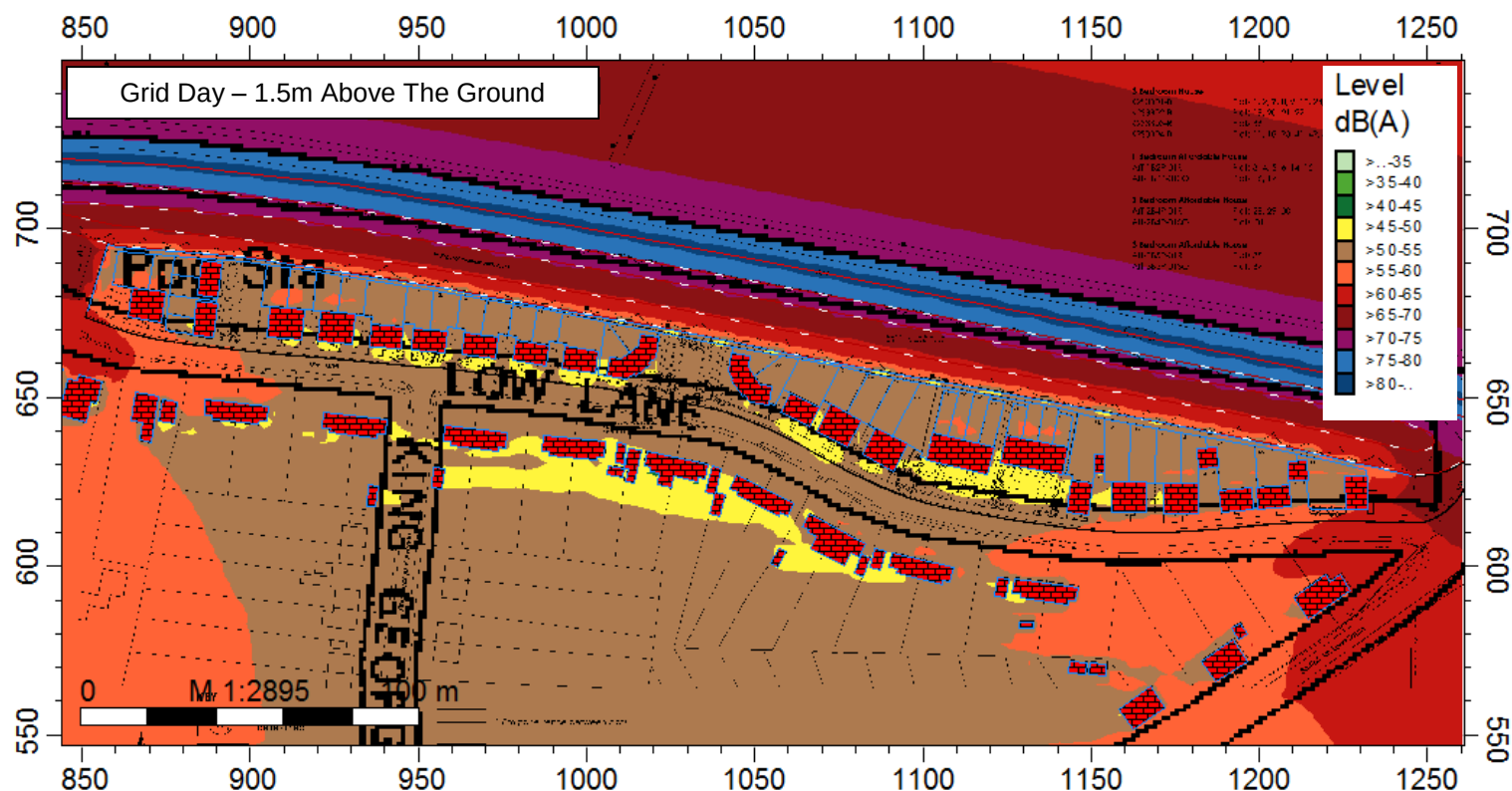
Company: Acoustic Associates (Peterborough)
Project: Low Lane, Holbeach
Handled By: Stephen Marshall

FIGURE 6 – Night-Time Noise Contours (4m Above Ground) – 2m Acoustic Barrier Installed



Company: Acoustic Associates (Peterborough)
 Project: Low Lane, Holbeach
 Handled By: Stephen Marshall

FIGURE 7 – Daytime Noise Contours (1.5m Above Ground) – 3.6m Acoustic Barrier Installed



Company: Acoustic Associates (Peterborough)
Project: Low Lane, Holbeach
Handled By: Stephen Marshall