



Acoustic Associates

P E T E R B O R O U G H

**Environmental Noise Assessment for
Proposed Residential Development Site at
Kirk Gate, Whaplode, Spalding, Lincolnshire.**

CLIENT: D. Brown Building Contractors Ltd
Seas End Road
Moulton Seas End
Spalding
Lincolnshire
PE12 6LD

CONTACT: Mr Peter Pitt

REPORTED BY: Darren Marshall TechIOA, MIDiagE

CHECKED BY: Chris Gilbert MIOA, FIDiagE

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ACOUSTIC ASSOCIATES (PETERBOROUGH)

111 Spalding Road, Deeping St. James, Peterborough, PE6 8SD.

Tel: 01733 896 346

e-mail: info@aapb.co.uk Website: www.aapb.co.uk

SUMMARY

An environmental noise assessment has been carried out in support of the planning application for the proposed residential development on land fronting Kirk Gate, Whaplode, Spalding, on behalf of D. Brown Building Contractors Ltd.

The assessment has taken account of industrial noise emissions from Lincolnshire Field Products Ltd (LFP) adjacent to the site, and noise emissions from road traffic on High Road (A151), Church Gate and Kirk Gate. The assessment was carried out in accordance with the National Planning Policy Framework (NPPF) and other relevant noise standards and guidance.

The assessment shows that provided recommended noise mitigation measures are implemented, the noise impact on the proposed residential dwellings is likely to be an Observed Adverse Effect when assessed in accordance with National Policy Planning Guidance (NPPG).

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1 OBJECTIVES

- 1.1 To carry out an environmental *noise assessment in support of the planning application for the proposed residential development on land fronting Kirk Gate, Whaplode, Spalding, in accordance with the National Policy Planning Framework (NPPF - Reference 4), the Noise Policy Statement for England (NPSE - Reference 6), British Standard 4142:2014 (Reference 1) and World Health Organisation (WHO) Guidance (Reference 8).
- 1.2 Document the results and findings from the assessment in a technical report, including recommendations for suitable noise mitigation measures where necessary.

2 CONCLUSIONS

- 2.1 Acceptable daytime noise levels (below the threshold for moderate annoyance given in World Health Organisation (WHO) Guidance) can be achieved in living rooms of all the proposed residential dwellings provided recommendations within this report are implemented.
- 2.2 Acceptable night-time noise levels (below the threshold for sleep disturbance given in WHO Guidance) can be achieved in bedrooms of all the proposed residential dwellings provided recommendations within this report are implemented.
- 2.3 Noise levels within the amenity areas of all the proposed dwellings are likely to be below the level for “moderate annoyance” given in WHO Guidance values, when considering noise emissions from Lincolnshire Field Products Ltd (LFP) and road traffic.
- 2.4 The assessment in accordance with BS 4142 due to emissions associated with the movement and operation of incoming/outgoing agricultural vehicles & HGV's on the LFP site, within outdoor amenity areas and outside living rooms at the worst affected dwelling, is likely to be below the threshold for low impact during the daytime period, but above the threshold for significant adverse impact when assessed outside bedrooms during the night-time period. Methods for mitigating noise emissions are discussed further in Section 8.
- 2.5 Using the National Policy Planning Guidance noise exposure hierarchy, the assessment carried out shows that the noise impact on the proposed dwellings is likely to be an Observed Adverse Effect, when assessed during periods when industrial noise from LFP is present.

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

3 **RECOMMENDATIONS**

3.1 This report should be used in support of the Planning Application for the Proposed Residential Development on land fronting Kirk Gate, Whaplode, Spalding.

3.2 The following noise mitigation measures are required for this development:

- Glazing of the following specification should be installed in all bedrooms to all dwellings:

Sound Reduction R_w (dB)				
125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz
29	33	44	46	49

Recommended Glazing Specification for Bedrooms (minimum R_w 45 dB)

- Glazing of the following specification should be installed in all living rooms to all dwellings:

Sound Reduction R_w (dB)				
125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz
24	20	25	34	37

Recommended Glazing Specification for Living Rooms (minimum R_w 30 dB)

- It should be assumed that the bedroom windows to all dwellings must be kept closed to keep internal noise levels at reasonable levels. Any ventilation installed should achieve the following specification:

Sound Reduction D_{new} (dB)				
125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz
38	38	46	53	60

Recommended Ventilation Specification (minimum D_{new} 45 dB)

- Any ventilation installed should comply with Noise Insulation Regulations 1975 (Reference 10) and the Approved Document F (Reference 11). Alternatively, a 'whole house' ventilation system could be used.
- It is assumed that 1.8m (or higher) close-boarded fences be used to surround the amenity areas of the proposed dwellings, and 1.2m high walls with gated access fronting the dwellings, as detailed on site layout plan drawings supplied (Reference 12).

4 BACKGROUND

D. Brown Building Contractors Ltd wish to develop 3 new bungalows on land fronting Kirk Gate in Whaplode, Spalding. The site is situated adjacent to existing agricultural industry to the west in the form of Lincolnshire Field Products Ltd (LFP). The development site is located with High Road (A151) and Cross Street north of the site, Kirk Gate to the west, and Church Gate to the east. Acoustic Associates (Peterborough) were asked to undertake an environmental noise assessment of the proposed residential development site and this report documents the results of that assessment. The location of the site is shown in Figure 1 along with photographs taken of the monitoring locations in Figure 2.

5 POLICY, GUIDANCE AND STANDARDS

5.1 National Policy Planning Framework

The National Policy Planning Framework (Reference 4) states the following with respect to noise (para 123).

“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 – Reference 6) in order to explain what it means by “adverse impact”.

5.2 Noise Policy Statement for England and National Policy Planning Guidance

The NPSE has stated that the impact of noise be classified according to an “effect level” (shown in column 3 below). The National Policy Planning Guidance (NPPG – Reference 5) has clarified what this effect level below means in terms of its perception by people at receptors and what action should be taken (columns 1 and 4 in Table 1 below).

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 behaviour 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 behaviour 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 behaviour 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 behaviour 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 - National Policy Planning Guidance noise exposure hierarchy

5.3 World Health Organisation Guidance

5.3.1 The World Health Organisation (WHO) has published guidelines for community noise, as shown in Table 2 (Reference 8). 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

- 5.3.2 For impulsive noise, such as that associated with vehicle movements, WHO states *“For a good night sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AMax} more than 10-15 times per night”*.

5.4 British Standard BS 4142:2014

5.4.1 BS 4142 (Reference 1) is a standard which describes a method for assessing whether the ‘specific noise’ from an industrial source is likely to give rise to complaints from residents of the adjacent dwellings. The ‘specific noise’ levels are determined outside dwellings. The specific noise level is determined for reference time periods of 1-hour for the daytime (7am to 11pm) and 15 minutes for the night time. Tonal or impulsive characteristics of a noise are likely to increase the scope for complaints and this is taken into account by adding a value to the specific noise source level to obtain the ‘rating level’. The value may be between 0 and 9 dB depending on objective and subjective measures detailed in the standard.

5.4.2 BS 4142 requires that the rating Level of a noise is compared with the existing background noise ($L_{A90,T}$). Guidance given in the standard states the following regarding the difference between the rating Level and the background noise.

- A difference of 0 dB is indicative of a *“minor impact”*;
- A difference of +5 dB is indicative of an *“adverse impact”*;
- A difference of +10 dB is indicative of a *“significant adverse impact”*.

6 NOISE ASSESSMENT

6.1 Noise Sources

The proposed residential development site is subjected to noise from the following sources:

- Industrial noise from the LFP site, principally agricultural vehicle movements. This is of most concern during the early morning period. Other sources are audible during the daytime associated with vehicle maintenance.
- Traffic noise due to local traffic movements in the daytime and night-time, on Kirk Gate, Church Gate and High Road (A151).

6.2 Noise Measurements

6.2.1 Ambient and Background Noise Measurements

Attended daytime measurements of existing ambient and background noise levels were taken between 13:10 – 15:40 hours on Thursday 15th October 2015 at Monitoring Location 1 (see

Figure 1), on the proposed development site at a distance of 17m from the site boundary north of the site, 38m from the site boundary to the east, 30m from the site boundary to the south and approximately 40m from the façade to one of LFP's agricultural buildings to the west.

Attended night-time measurements of existing ambient and background noise levels were taken between 05:16 – 07:16 hours on Friday 24th July 2015. The noise monitoring location was in free field conditions at a height of 1.5m above ground level.

Short-term measurements were also taken on 15th October 2015 between 15:43 – 16:20 hours at Measurement Locations 2 & 3, associated with road traffic noise from High Road (A151) and Church Gate at a distance of approximately 1m from the roadsides and at a height of 1.5m above ground level.

Weather conditions during the 24th July 2015 were dry, overcast, approximately 13-14°C, with calm to light air wind speeds of between 0.4 – 0.9 m/s from the east. Conditions on the 15th October 2015 were dry with damp patches from light rain showers earlier, light cloud cover with few sunny spells, approximately 12°C and with an occasional light-breeze of between 3.6 – 4.5 m/s from NNE direction. Appendix 2 gives details of the noise instrumentation used and Figure 2 shows photographs taken of the monitoring locations.

6.3 Computer Noise Model of the Site and Surrounding Area

A computer noise model of the site and surrounding area was generated using Wolfel IMMI Computer Noise Modelling Software (Reference 7) which uses the methods given in ISO 9613 – 2 (Reference 3) to calculate noise levels given a topographical model of the site. The model was calibrated using the noise measurements taken on site of industrial noise. (See Figure 3 for night-time noise contours).

7 RESULTS

7.1 Measured Noise Levels

The results from the attended daytime ambient and background noise monitoring are documented in Appendix 3. The table shows 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 5 minute periods. The results from the attended night-time ambient and background noise monitoring are shown in graph form in Appendix 4. The graph illustrates the ambient, background and maximum noise levels during 1 minute periods. A breakdown of the most significant noise related events associated with the operation and movement of agricultural vehicles on the LFP site during the night-time period are documented in Appendix 5.

7.2 Background Noise Levels

Background noise levels ($L_{A90,T}$) were measured at locations deemed to be representative to the proposed residential development site, while excluding industrial emissions from the LFP site. Statistical analysis of the background noise levels measured were estimated to be $L_{A90,T}$ 49 dB(A) during the daytime period, and $L_{A90,T}$ 43 dB(A) during the night-time period. These levels have been used for the assessment in accordance with BS 4142.

7.3 BS 4142 Assessment

The predicted night-time specific noise levels from adjacent industry (Lincolnshire Field Products) at the locations of the proposed dwellings have been assessed using the 'subjective method' for rating noise emissions. The noise associated with the operation and movement of agricultural vehicles and HGV's on the LFP site is impulsive in character and clearly perceptible at the locations of the proposed dwellings. However, due to the noise being from vehicle related sources which are similar to the residual noise, a penalty for noise impulsivity (of +3 dB) being just perceptible has been used. For impulsive characteristics of noise BS 4142 states:

"A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

Taking the above into account, the assessment level is the difference between the background noise level and the rated noise level. For this BS 4142 states:

"A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context."

"A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context."

Table 3 documents the assessment results in accordance with BS 4142:

Location	Predicted Specific Noise Level $L_{Aeq,T}$ dB(A)	Predicted Specific Noise Level $L_{Aeq,T}$ dB(A) (with penalty rating of +3 dB for impulsivity)	Background ($L_{A90,T}$) Sound Level dB(A)	Rating Over Background Sound Level (dB)
Daytime				
Amenity area of worst affected dwelling	41	44	49	-5
Outside living room of worst affected dwelling	38	41	49	-8
Night-time				
Outside bedroom window of worst affected dwelling	52	55	43	+12

Table 3. – Assessment Results in Accordance with BS 4142

The daytime BS 4142:2014 assessment when assessed outside living rooms shows that the rating level does not exceed the background sound level which is indicative of the specific sound source having a low impact during the daytime period and unlikely to be a problem.

When considering the assessment during the night-time period outside of bedroom windows (facing towards the industrial noise sources), the excess of the rating level over the background sound level is +12 dB, which is indicative of this being a significant adverse impact, and at a level where complaints would be likely in accordance with BS 4142. It is therefore recommended that noise mitigation measures (as discussed in Section 8) are implemented to reduce the impact of noise emissions on the proposed residential dwellings. See Figure 3 for map of industrial noise contours during the night-time period.

7.4 Noise Levels within the Amenity Areas of the Proposed Dwellings

The average measured ambient noise level due to all sources was $L_{Aeq,T}$ 58 dB(A) (see Appendix 3). It is reasonable to assume that levels within the amenity areas will be below $L_{Aeq,T}$ 50 dB(A). This means that noise levels will be below the criterion level for “*moderate annoyance*” given in WHO Guidance values and therefore acceptable.

7.5 Calculated Noise Levels within Bedrooms of the Proposed Dwellings

Predictions have been carried out to determine the noise levels at 1m from the façades of the proposed dwellings. Table 4 shows the computer prediction of noise levels at 1m from the façades and at a height of 1.5m above ground level. Also included in the table is the predicted internal noise level within Bedrooms assuming partially open windows.

Location	Predicted Night-time Façade Noise Level dB(A)	Predicted Noise Level dB(A) within Bedrooms (Assuming Partially Open Windows)
1m from façade to Plot 1	51.6	36.6 – 41.6
1m from façade to Plot 2	51.8	36.8 – 41.8
1m from façade to Plot 3	50.8	35.8 – 40.8

Table 4. – Predicted Noise Levels within Bedrooms of Plots 1-3

It is shown in Table 4 that predicted noise levels within bedrooms to plots 1-3 exceed the value of 30 dB(A), given in World Health Organisation (WHO) guidance criteria as the limit value for 'sleep disturbance' inside bedrooms during the night-time. Mitigation measures are therefore proposed (see Section 8).

When proposing mitigation it is necessary to ensure that residents do not suffer sleep disturbance due to impulsive noise from passing vehicles (see Section 5.3.2). Given the results shown in Appendix 5, mitigation should protect against maximum noise levels of L_{Amax} 80 dB(A) outside bedroom windows.

7.6 Noise Policy Statement for England Assessment

Using the noise impact criteria from the Noise Policy Statement for England, the noise impact from the surrounding noise sources is likely to be above the "*Lowest Observed Adverse Effect Level*" but below the "*Significant Observed Adverse Effect Level*" when assessed at the worst affected proposed dwelling.

8 NOISE MITIGATION

In order to reduce noise emissions to the proposed dwellings a variety of potential noise control measures have been explored. These control measures are discussed below.

8.1 Mitigating noise emissions inside of dwellings

The noise levels inside bedrooms were calculated using a method approved by the Buildings Research Establishment.

The calculations were carried out for partially open windows and for closed windows. They determined that bedroom windows must be closed to prevent sleep disturbance.

- Alternative ventilation must be installed in bedrooms as this cannot be carried out by opening windows;
- Bedroom windows must have a glazing specification of at least R_w 45 dB. They must not have any ventilation openings in their walls unless these openings cumulatively achieve a rating of D_{new} 45 dB or more.
- For living rooms, a glazing specification of R_w 30 dB will suffice.

8.2 Boundary Walls/Fences to the Proposed Dwellings

Predictions within this report on noise levels at the dwellings assume that 1.2m high walls with gated access are constructed to the front of the proposed dwellings and that the amenity areas are enclosed by 1.8m (or higher) close-boarded fencing to each dwelling.

REFERENCES

1. *British Standard BS 4142:2014, Methods of rating and assessing industrial and commercial sound. (2014). BSI.*
2. *British Standard BS 8233, Guidance on sound insulation and noise reduction for buildings. (2014). BSI.*
3. *ISO 9613-2 Acoustics of sound during propagation outdoors, Part 2: General method of calculation. (1996). ISO.*
4. *National Policy Planning Framework. (2012). DCLG.*
5. *National Policy Planning Guidance. (2014). DEFRA.*
6. *Noise Policy Statement for England. (2010). DEFRA.*
7. *Wolfel IMMI Computer Noise Modelling Software. . (2014). www.woelfel.de.*
8. *World Health Organisation Guidance, Guidelines for Community Noise. (1999). WHO.*
9. *World Health Organisation, Night noise guidelines for Europe. (2009). WHO.*
10. *Noise Insulation Regulations; UKSI, 1975.*
11. *Document F Ventilation Regulations; thenbs, 2010.*
12. *Location & Site Layout Plans – Drawing No: O1G – Date: January 2015.*

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 = 15 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 Rating Level L_{Ar,T_r}	The dB L_{Aeq,T_r} of the noise sources being assessed at a site. 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

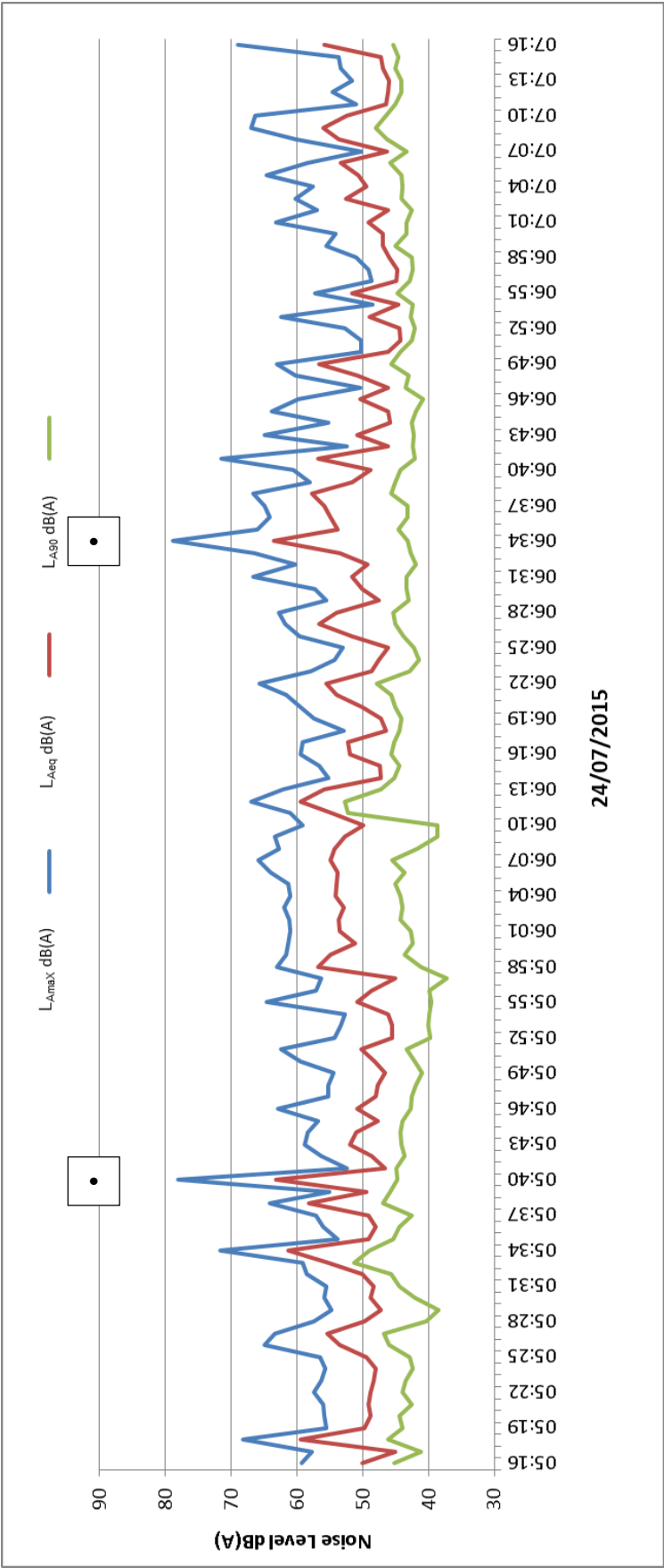
Type	Manufacturer	Description	Serial number	Last Calibration Date	Calibration Certificate No.
Svan 957	Svantek	Sound Level Meter	23893	13/11/2013	145669
GA 607	Castle	Sound Level Calibrator	043186	10/06/2014	148880
Nor 118	Norsonic	Sound Level Meter	31770	15/07/2015	155595
Type 4230	Brueel & Kjaer	Sound Level Calibrator	565324	15/07/2015	155596
Svan 945A	Svantek	Sound Level Meter	9485	22/05/2015	154602
Type 4231	Brueel & Kjaer	Sound Level Calibrator	2035091	22/05/2015	154601

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

Appendix 3 – Daytime noise measurement results at Monitoring Location 1

Date	Time (Hours)	Ambient Noise Level ($L_{Aeq,5min}$) dB(A)	Background Noise Level ($L_{A90,5min}$) dB(A)	Maximum Noise Level ($L_{Amax,5min}$) dB(A)	Comments
15/10/2015	13:10 – 13:15	53.8	47.9	67.3	Frequent agricultural traffic movement from incoming/outgoing tractor type vehicles towing trailers and occasional HGV's entering/exiting the Lincolnshire Field Products (LFP) site to the west. Frequent distant road traffic from High Road (A151) to the north. Occasional passing road traffic on Church Gate and Kirk Gate to the east and west of the development site. Distant military aircraft briefly audible at 13:17 & 13:23 hours. Occasional faint rustling of trees/leaves during quietest periods with no traffic. Intermittent banging/drilling (quite loud on several occasions) from adjacent LFP site building possibly from tractor maintenance taking place within building. Occasional movement of sliding shutter doors to LFP building audible at 13:54, 14:11 & 14:41 hours. Two tractors park with engines idling approximately 45m away between 13:34-13:38 hours. Distant raised voices from LFP site at 13:50 hours.
	13:15 – 13:20	59.1	47.1	77.3	
	13:20 – 13:25	57.1	50.2	67.6	
	13:25 – 13:30	58.6	49.3	74.1	
	13:30 – 13:35	53.7	49.2	70.0	
	13:35 – 13:40	56.4	48.4	66.8	
	13:40 – 13:45	55.7	46.3	72.4	
	13:45 – 13:50	54.8	48.8	72.7	
	13:50 – 13:55	56.4	48.8	72.3	
	13:55 – 14:00	57.0	49.4	67.7	
	14:00 – 14:05	50.7	47.5	60.5	
	14:05 – 14:10	68.9	47.3	90.4	Low flying military aircraft passes overhead at 14:07 hours.
	14:10 – 14:15	52.2	49.1	63.2	Frequent agricultural traffic movement from incoming/outgoing tractor vehicles and occasional HGV's entering/exiting the LFP site. Frequent distant road traffic from High Road (A151). Occasional passing road traffic on Church Gate and Kirk Gate. Intermittent banging/drilling from within LFP building audible at times. Distant light aircraft briefly audible at 14:49 hours.
	14:15 – 14:20	58.5	50.2	74.4	
	14:20 – 14:25	56.4	49.7	67.7	
	14:25 – 14:30	56.7	48.1	67.0	
	14:30 – 14:35	54.7	48.9	68.0	
	14:35 – 14:40	53.4	49.2	64.7	
	14:40 – 14:45	54.0	49.4	66.7	
	14:45 – 14:50	55.2	48.0	64.9	
	14:50 – 14:55	59.2	48.5	69.7	
	14:55 – 15:00	-	-	-	Monitoring temporarily aborted due to brief light rain shower.
	15:00 – 15:05	55.3	48.9	71.2	Frequent agricultural traffic movement from incoming/outgoing tractors and occasional HGV's entering/exiting the LFP site. Frequent distant road traffic from High Road (A151). Occasional passing road traffic on Church Gate and Kirk Gate. Intermittent banging/drilling from within LFP building audible at times. Distant light aircraft audible at 15:00 hours. Sliding of shutter doors to LFP building audible at 15:08 hours. Tractor parks approximately 50m away with engine idling between 15:12 – 15:15 hours.
	15:05 – 15:10	54.4	47.1	69.9	
	15:10 – 15:15	58.1	50.8	79.8	
	15:15 – 15:20	59.4	49.1	73.1	
	15:20 – 15:25	58.9	48.4	72.1	
	15:25 – 15:30	51.6	48.2	67.6	
	15:30 – 15:35	55.1	49.2	65.2	
	15:35 – 15:40	48.6	44.0	58.4	

Appendix 4 – Night-time noise measurement results at Monitoring Location 1



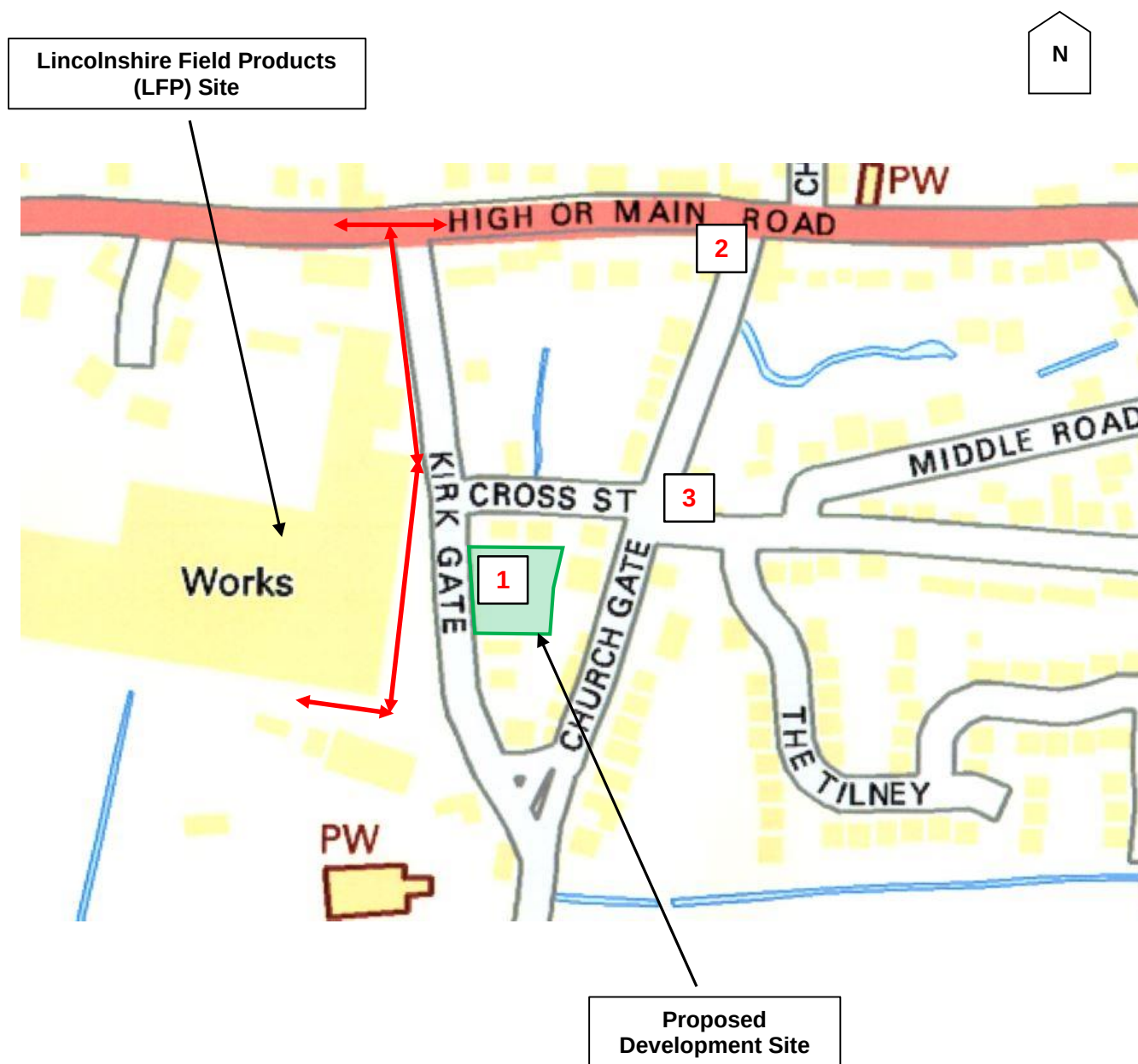
These maximum noise events were due to agricultural vehicles passing on Kirk Gate.

Appendix 5 – Breakdown of key night-time noise related events at Monitoring Location 1

Given below is a breakdown of the key night-time noise related events associated with the movement of incoming/outgoing agricultural vehicles operating on the Lincolnshire Field Products (LFP) site, from observations made during attended night-time noise monitoring at Monitoring Location 1.

Date	Time (Hours)	Agricultural vehicle passing on LFP site ramp access	Ambient Noise Level (L _{Aeq,1min}) dB(A)	Background Noise Level (L _{A90,1min}) dB(A)	Maximum Noise Level (L _{Amax,1min}) dB(A)	Comments
24/07/2015	05:15	Masey Ferguson 5455 Tractor	50.0	45.2	59.3	-
	05:18	Fendt 716 Tractor	59.5	46.1	68.2	-
	05:25	Agrifac Crop Sprayer	49.4	42.9	56.5	-
	05:26	JCB 3200 Tractor	53.5	46.0	65.0	Towing tanker
	05:32	John Deere 6320 651 Tractor	50.1	45.7	58.6	Towing loaded trailer
	05:33	Masey Ferguson 5460 Tractor	55.2	51.4	59.2	-
	05:34	White Transit Van	61.3	49.0	71.7	-
	05:38	Masey Ferguson 5455 Tractor	58.2	47.0	64.2	-
	05:40	John Deere Tractor	63.2	44.7	78.1	Non-site driving along Kirk Gate road towing large trailer
	05:42	Red Transit Van & White Car	48.6	43.7	56.3	-
	05:43	New Holland J6030 Tractor	52.0	44.1	58.8	-
	05:58	Fendt 724 Tractor & two Agrifac Crop Sprayers	48.6	43.7	56.3	Tractor towing tanker
	06:11	Fendt 724 Tractor	54.7	52.3	61.1	-
	06:12	Challenger MT765E Tractor & New Holland T6080 Tractor	59.5	52.7	66.9	-
	06:16	Fendt 716 Tractor	52.0	45.7	59.4	Tractor positioned with engine idling to south-east corner of site
	06:21	Fendt 724 Tractor & New Holland T6080 Tractor	54.0	45.7	61.6	-
	06:26	Passing car	51.7	43.8	59.6	-
	06:28	Fendt 716 Tractor	54.0	45.4	62.7	-
	06:34	John Deere 6215R Tractor	63.5	43.2	78.9	Non-site driving along Kirk Gate road towing large trailer
	06:38	John Deere 6320 653 Tractor & Fendt 716 Tractor	57.8	45.7	66.6	-
	06:55	Fendt 716 Tractor	51.7	44.8	57.3	-
	07:06	JCB Fast Trac 3200 Tractor	53.3	45.8	58.3	-
	07:08	Challenger MT765D Tractor	53.7	46.4	60.3	-

Figure 1 – Site location plan



= Proposed Development Site



= Route taken by incoming/outgoing agricultural vehicles & HGV's on LFP Site



= Measurement Locations 1-3

Figure 2 - Photographs of noise monitoring locations 1-3



Monitoring Location 1 (on proposed development site)



Monitoring Location 2 (adjacent to High Road)



Monitoring Location 3 (adjacent to Church Gate)

Figure 3 – Night-time Noise Contours (from industrial sources only)

