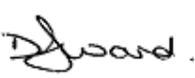
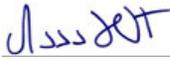


Tin House Farm Noise Assessment

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Tin House Farm

Noise Assessment

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1				

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Noise Assessment

Capabilities on project:
Environment

1 Introduction

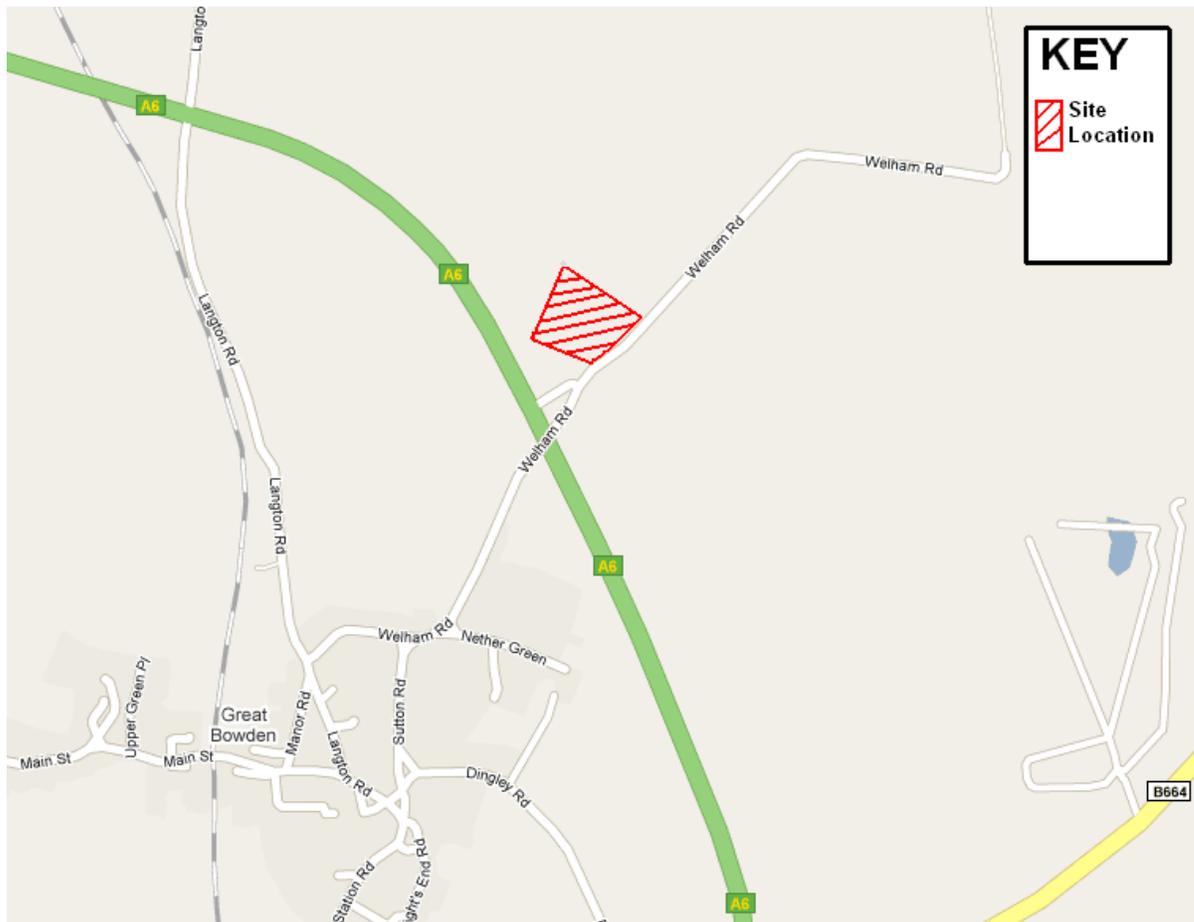
- 1.1 This report presents the findings of an acoustic study undertaken to determine the suitability and potential impact of the refuse vehicle depot and bulking of dry recyclable materials operations proposed at Tin House Farm and N P Timber Yard, Welham Lane, Great Bowden. A planning application has been submitted for the site for use of land for parking and storage of refuse vehicles and change of use of existing buildings to a vehicle workshop and for the bulking of dry recyclable materials.
- 1.2 Noise monitoring was undertaken at nearby noise sensitive receptors to determine the existing acoustic climate. The site is currently operational under a temporary licence; therefore noise monitoring of the operations activities was undertaken on site.
- 1.3 The noise sources in the area were road traffic noise from the A6 and Welham Lane, trains on Leicester to Kettering line, activities on the proposed site, and birdsong.
- 1.4 A BS 4142 assessment has been undertaken to assess the operational impacts of the noise on the local residents. Where necessary mitigation measures have been recommended in outline.
- 1.5 The impact of traffic generated by the proposed development has been assessed.
- 1.6 The following sections of the report contain descriptions of the measurement work undertaken, the results and a discussion of the relevant guidance. Abbreviations used in this report are defined in Appendix A and a glossary of acoustic terminology is provided in Appendix B.

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2 Site Description

- 2.1 The application site comprises two adjacent sites, Tin House Farm and a former timber yard (N P Timber), off Welham Lane which is located to the east of the A6 Market Harborough to Kettering Road. Access to the site is possible from each side of the carriageway. Access is possible to Great Bowden via a bridge over the A6, however this should only be used when refuse vehicles are collecting from the village.
- 2.2 The train line between Leicester and Kettering runs to the west of the site. The village of Great Bowden is located approximately 750 metres to the south west of the recycling centre. The surroundings of the site are agricultural with the large scale Marigold Mushroom Farm directly opposite the site.
- 2.3 The site was formally occupied by NP Timber and Allan Access. The site is now occupied by Focsa Services UK Ltd, operating under a temporary licence. The planning application covers the change of use of the two sites. The industrial operation consent for the Tin House Farm site would be changed to a refuse vehicle depot and machinery/ vehicle workshop. Allan Access Platform Services, which previously occupied Tin House Farm site have transferred their operations to part of the NP Timber site where a section of the existing L-shaped building and existing hard standing is used by them. The remainder of the L-shaped building will be used for the bulking of recyclable materials (paper, glass and cans). A site location plan is shown below in Figure 2.1 and an existing site layout in Figure 2.2.

Figure 2.1 Site Location



Capabilities on project:
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3 Assessment Methodology

3.1 This section of the report identifies the methodologies used to assess the potential impacts during the operation of the proposed development. Where necessary, the mitigation measures to reduce the impacts have been suggested in Chapter 6.

3.2 Noise Perception and Terminology

3.2.1 Between the quietest audible sound and the loudest tolerable sound, there is a ten million to one ratio in sound pressure (measured in pascals, Pa). Because of this wide range, a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

3.2.2 The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB L_A .

Table 3.1 Sound Pressure Level in dB L_A for Common Situations.

<i>Typical Noise Level, dB L_A</i>	<i>Example</i>
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2 m
50	Quiet office, no machinery Boiling kettle at 0.5 m
60	Normal conversation
70	Telephone ringing at 2 m Vacuum cleaner at 3 m
80	General factory noise level
90	Heavy goods vehicle from pavement Powered lawnmower, operator's ear
100	Pneumatic drill at 5 m
120	Discotheque – 1 m front of loudspeaker
140	Threshold of pain

3.2.3 The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy motorway, the noise level may vary over a range of 5 dB, whereas in a suburban area this may increase up to 40 dB or more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night-time noise levels will often be smaller and the levels significantly reduced compared to daytime levels. When considering environmental noise, it is necessary to consider how to quantify the existing noise (the ambient noise) to account for these second to second variations.

3.2.4 An indicator that is widely accepted as reflecting the underlying background noise level is the L_{A90} index. This is the noise level exceeded for 90% of the measurement period and generally reflects the noise level in the lulls between individual noise events. Over a 1-hour period, the L_{A90} will be the noise level exceeded for 54 minutes.

3.2.5 The equivalent continuous A-weighted sound pressure level, L_{Aeq} , is the single number that represents the average sound energy measured over a period. L_{Aeq} is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. It is commonly used to describe environmental noise from individual sources that vary in level over their operational cycle.

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- 3.2.6 The L_{AFmax} measurement indicator is the maximum instantaneous sound pressure level attained during the measurement period, measured with the 'Fast' response setting of the sound level meter. It is most commonly used to assess potential night-time sleep disturbance.
- 3.2.7 The index historically adopted by the government since the early 1970s to assess road traffic noise is the $L_{A10,1hr}$. This is the noise level exceeded for 10% of the measurement time, over a 1 hour period the L_{A10} will be the noise level exceeded for 6 minutes. However, the L_{Aeq} level is widely used in Europe for road traffic noise assessment and is consequently becoming more commonly used in the UK.
- 3.2.8 Time weighting determines how quickly the sound level meter responds to changes in noise level. The 'Fast' time weighting effectively averages the measured level over an eighth of a second, whereas the 'slow' weighting averages over 1 second. The 'Fast' time weighting most closely follows the response of the human ear to sound level changes and is most commonly specified for environmental noise measurement purposes (including the L_{AF10} , L_{AF90} and L_{AFmax} statistical indices).
- 3.2.9 Most environmental noise measurements and assessments are undertaken in the 'free-field', away from any existing reflecting surfaces (other than the ground). However, it is sometimes necessary to consider noise levels immediately external to a facade when considering the impact on residents inside properties and this normally requires the addition of up to 3 dB to the predicted (or measured) free-field level due to noise reflection from the facade. The assessment of road traffic noise in the UK, for example, is based on a predicted (or measured) 'facade' level (using the L_{A10} statistical index).
- 3.2.10 Human subjects, under laboratory conditions, are generally only capable of noticing changes in steady levels greater than 3 dB. It is generally accepted that a change of 10 dB in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of the noise level. (These findings do not necessarily apply to transient, non-steady or intermittent noise sources).

3.3 Terms of Reference

- 3.3.1 Assessment of noise impacts primarily involves the identification of potential sensitive receptors, including residences, educational establishments and hospitals and existing noise and vibration sources, together with consideration of the relevant national legislation and local planning issues. The following documents have been consulted:
- Planning Policy Guidance PPG 24, 'Planning and Noise'
 - 'Guidelines for Community Noise' World Health Organization, Geneva, 2000.
 - CRTN- Calculation of Road Traffic Noise
 - Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 HA 213/08 'Noise and Vibration'
 - BS 4142: 1997 'Method for Rating industrial noise affecting mixed residential and industrial areas'

3.4 Operational Noise Assessment Methods

3.4.1 PPG 24 Noise Exposure Category

- 3.4.1.1 Planning Policy Guidance PPG 24 'Planning and Noise'⁽¹⁾ was introduced by the Department of the Environment in 1994. Paragraph 1 on page 1 of PPG 24 indicates that it was issued to:

'...provide advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business ... It outlines some of the main considerations which local planning authorities should take into account in drawing up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources'

Capabilities on project:
Environment

3.4.1.2 PPG 24 in Annex 3 refers to the use of BS 4142 for the assessment of industrial noise affecting residential properties:

'The likelihood of complaints about noise from industrial development can be assessed, where the standard is appropriate, using guidance in BS 4142: 1997.'

3.4.2 World Health Organization

3.4.2.1 The World Health Organization's (WHO) 'Guidelines for Community Noise' ⁽²⁾ report for external daytime environmental noise levels (in a garden, for example) that;

'During the daytime, few people are seriously annoyed by activities with L_{Aeq} levels below 55 dB; or moderately annoyed with L_{Aeq} levels below 50 dB.....'

3.4.2.2 For night-time noise sources the WHO guidelines recommend a night-time (23.00-07.00) noise level of 45 dB $L_{Aeq,8h}$ 'outside bedroom windows' (for a reasonably steady noise source) and on a sleep disturbance basis (for intermittent or impulse noise) the guidelines state in Section 3.3 that:

'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night.....'

3.4.2.3 This bedroom internal maximum noise limit is repeated in BS 8233:1999⁽³⁾ and the WHO guidelines go on to further convert the internal limit to an external facade limit of 60 dB L_{AFmax} , for 'Outside bedrooms, sleep disturbance, window open, outdoor values'. This follows since an open window of a typical dwelling will provide approximately 15 dB reduction between internal and external noise levels. Consequently a noise level of 60 dB L_{AFmax} , external to an open bedroom window would lead to a resulting internal level of around 45 dB L_{AFmax} .

3.4.2.4 It should be noted that this advice is merely a guideline for assessing likelihood of environmental annoyance; the most recent National Noise Incidence survey found that 55% of the population of the UK currently live in dwellings exposed to daytime noise levels above 55 dB L_{Aeq} and 68% to night-time noise levels above 45 dB L_{Aeq} .

3.4.3 BS 4142: 1997 'Method for rating industrial noise affecting mixed residential and industrial areas'

3.4.3.1 BS 4142:1997 ⁽⁴⁾ provides guidance on the assessment of the likelihood of complaints relating to noise from commercial/ industrial activities. The Standard presents a method of rating noise levels by comparing the noise level of the new source (the Rating Level) with the existing background noise level in the area in the absence of the building services noise (the Background Noise Level).

3.4.3.2 The rating method according to BS 4142:1997 accounts for unusual acoustic features such as a whine, hiss, impulsive or irregular noise by the addition of a single 5 dB correction to the actual specific noise level of the source. The corrected Specific Noise Level is the Rating Level.

3.4.3.3 The BS 4142:1997 rating is determined by arithmetically subtracting the Background Noise Level from the Rating Level. A difference of around +10 dB or more indicates that complaints about noise are likely. A difference of +5 dB is said to be of marginal significance. If the Rating Level is more than 10 dB below the Background Noise Level it is a positive indication that complaints are unlikely.

Capabilities on project:
Environment

Table 3.2 BS4142 Assessment Criteria

Difference Between Rating and Background Noise Level	BS 4142 Assessment Method
-10	If the rating level is more than 10 dB below the measured background noise level, then this is a positive indication that complaints are unlikely.
+5	A difference of around +5 dB is of marginal significance.
+10	A difference of around +10 dB or more indicates complaints are likely.

3.4.3.4 The rating noise level is the measured or calculated specific noise level outside the nearest residential dwelling after being corrected for certain characteristics of the noise including tonality or impulsive content, which incur a penalty of 5 dB.

3.4.3.5 It should be noted however that the standard is not suitable for use where both the Background Noise Level and the Rating Level are very low. For the purpose of the standard, Background Noise Levels below about 30 dB and Rating Levels below about 35 dB are considered to be very low. In these instances a different assessment methodology is typically deemed to be more appropriate.

3.4.4 Road Traffic Noise

3.4.4.1 Noise from a stream of traffic is not constant; therefore, to assess the noise impact a single figure estimate of the overall noise level is necessary. The index adopted by the Government, in 'The Calculation of Road Traffic Noise' (CRTN)⁽⁶⁾ to assess traffic noise is $L_{A10,18h}$ which is the arithmetic mean of the noise levels exceeded for 10% of the time in each of the eighteen 1 hour periods between 06:00 and 24:00. A reasonably good correlation has been shown to exist between this index and residents perception of traffic noise over a wide range of exposures.

3.4.4.2 The CRTN methodology can be used to predict the Basic Noise Level (BNL) generated by a stream of traffic based on traffic flow, percentage of HGV, traffic speed, road gradient and road surface type. The proposed redevelopment does not include the modification of any of these factors on the roads surrounding the site with the exception of traffic flow and HGV percentage. Therefore the changes in traffic noise levels for the proposed development can be ascertained by comparing the BNL for the 'with' (Do Something) and 'without' (Do-Minimum) redevelopment scenarios.

3.4.4.3 The Design Manual for Road and Bridges (DMRB) Volume 11 Section 3 Part 7 HA 312/08 'Noise and Vibration' 2008⁽⁷⁾ provides a method of evaluating both the immediate and long term impact of abrupt changes in the 18-hour traffic flow (06.00-24.00) in terms of the effects on people and, principally, occupiers of residential property.

3.4.4.4 Individuals vary widely in their response to traffic noise, although the average or community response from a large number of people to the same level of traffic noise is fairly stable.

3.4.4.5 Consequently, a community average degree of annoyance can be related to the $L_{10,18h}$ traffic noise level. The annoyance caused by the existing traffic noise and the predicted future traffic noise is calculated, enabling the increase, or decrease in the percentage of people likely to be annoyed to be determined.

3.4.4.6 DMRB requires that an assessment is undertaken where an increase in road traffic flow of 25% or greater is predicted (equivalent to an increase or decrease in road traffic noise of approximately 1 dB).

3.4.4.7 This implies that road traffic flow increases of up to 25% offer no significant impact in environmental noise terms.

3.4.4.8 It is generally accepted that changes in road traffic noise levels of up to 3 dB are not widely perceptible, confirmed in Department for Transport document Transport Analysis Guidance Unit 3.3.2⁽⁸⁾:

Capabilities on project:
Environment

“For freely flowing traffic, a difference of about 3 dB in noise level is required before there is a statistically significant change in the average assessment of nuisance. The assessment of nuisance however could still be affected even if there is only a 1 dB change in the noise level if the change is associated with changes in the view of traffic, or if the change occurs suddenly.”

3.4.4.9 In order to assess the level of community disturbance from potential changes in local road traffic characteristics as a result of the proposed development, the following definitions of noise impact criteria have therefore been adopted, based on Table 3.1 in DMRB⁽⁷⁾. The change can be an increase or decrease of noise.

Table 3.3 Classification of Magnitude of Noise Impacts

Noise Change $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 - 0.9	Negligible
1.0 - 2.9	Minor
3.0 - 4.9	Moderate
5.0+	Major

Capabilities on project:
Environment

4 Baseline Situation

4.1 Existing Environment

4.1.1 An Environmental Health Officer (EHO) at Harborough District Council, Dave Moore was consulted and proposed monitoring locations and assessment methodology were discussed and agreed with him.

4.1.2 Monitoring locations were selected at the existing Noise Sensitive Receptors (NSRs) closest to Tin House Farm. The A6 is located to the west of the site. The train line between Leicester and Kettering runs further to the west of the site. The village of Great Bowden is located approximately 750 metres to the south west of the site.

4.2 Ambient Noise Monitoring

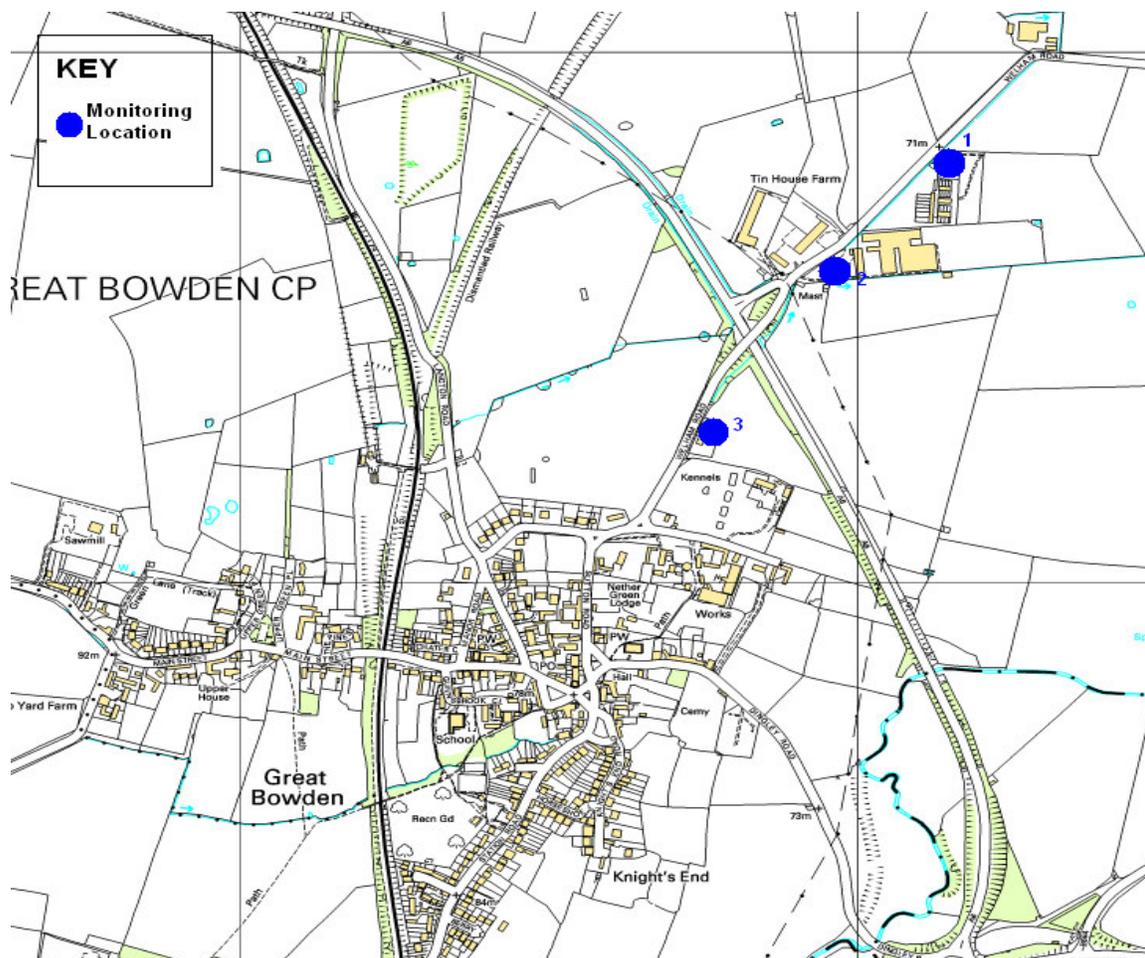
4.2.1 The ambient environmental noise levels were established by undertaking baseline noise surveys between the 10th and 11th December 2009. Monitoring locations are described below and visually identified in Figure 4.1.

Location 1 At Welham Lane Game Farm, approximately 275 metres north-east of Tin House Farm;

Location 2 At Marigold Mushroom Farm, opposite Tin House Farm; and

Location 3 At The Barn, Welham Road, approximately 300 metres south of Tin House Farm and south of the A6.

Figure 4.1 Baseline Monitoring Locations



Capabilities on project:
Environment

- 4.2.2 At location 1, the main noise sources were road traffic noise from the A6, local traffic on Welham Road, birdsong and train passes on the Leicester to Kettering line. During monitoring on the 11th December, glass tipping activity was clearly audible at 10:00 A.M.
- 4.2.3 At location 2, the main noise sources were road traffic noise from the A6, local traffic on Welham Road, birdsong and train passes on the Leicester to Kettering line. However during the morning monitoring on the 11th December, vehicles at Tin House Farm were clearly audible. Also, there was some noise from activities on Marigold Farm itself.
- 4.2.4 At location 3, the main noise sources were road traffic on the A6, birdsong and train passes on the Leicester to Kettering line. There were a number of vehicle passes on Welham Road during the monitoring. This is due to vehicles from Great Bowden accessing the A6.

4.3 Procedure

- 4.3.1 The noise monitoring survey was undertaken in compliance with BS 7445: 2003⁽⁷⁾. 'Description and measurement of environmental noise' using the following equipment and BS 414:1997
- B&K 2238 Type 1 Sound Level Meter s/n 2106193
 - B&K 4231 Sound Calibrator s/n 2326978
- 4.3.2 The calibration certificates for the equipment can be found in Appendix D.
- 4.3.3 Various A-weighted noise indicators were measured including the equivalent continuous noise level (L_{Aeq}) and statistical indices such as Background Noise Level (L_{AF90}) in 15-minute blocks
- 4.3.4 The calibration of the equipment was checked before and after each set of measurements and found to be within specified limits. All staff involved with noise measurements were competent, either being Members of the Institute of Acoustics or holding a Certificate of Competence in Environmental Noise Measurement.
- 4.3.5 At each location the microphone was positioned 1.5 metres above the ground, in free-field conditions.
- 4.3.6 Weather conditions during the monitoring period had no significant impact on the results obtained and were conducive to representative environmental noise measurements, with generally fair, overcast with low wind speeds.
- 4.3.7 The survey results are summarised in Tables 4.1 and 4.2 below

Capabilities on project:
Environment

Measurement Location	Start Date and Time	15 Minute Sound Pressure Level, dB			Comment
		L_{Aeq}	L_{A90}	L_{AFMAX}	
1	10/12/2009 16:19	53	50	68	Main noise from traffic on the A6, traffic on Welham road, train passes, birdsong and some activity from Tin House Farm
	11/12/2009 07:23	52	44	75	
	11/12/2009 10:02	48*	43	67	
2	10/12/2009 16:38	56	53	68	Main noise from traffic on the A6, traffic on Welham road, train passes and birdsong
	11/12/2009 07:42	55	50	73	
	11/12/2009 10:23	47	42	66	
3	10/12/2009 17:00	60	55	79	Main noise from traffic on the A6, traffic on Welham road, train passes and birdsong
	11/12/2009 08:01	61	50	81	
	11/12/2009 10:44	53	47	72	

All values are in dB re 20 μ Pa, Free-field

*Activity on Tin House Farm Audible

Table 4.1 Daytime Attended Measurements

Measurement Location	Start Date and Time	5 Minute Sound Pressure Level, dB			Comment
		L_{Aeq}	L_{A90}	L_{AFMAX}	
2	11/12/2009 05:55	46	42	64	Main noise from traffic on the A6, traffic on Welham road and birdsong

All values are in dB re 20 μ Pa, Free-field

Table 4.2 Night-time Attended Measurement

4.4 Noise Assessments

- 4.4.1 It is considered that these measurements represent the ambient noise levels surrounding Tin House Farm and at the nearest noise sensitive receptors.

4.5 Ambient Vibration Monitoring

- 4.5.1 There are currently no significant sources of vibration to the area. Consequently, ambient vibration monitoring has not been undertaken. It should be noted that annoyance due to vibration is not related to comparison of pre and post-development vibration levels, and pre-development vibration levels are not usually necessary to assess the likelihood of vibration damage or annoyance from any new vibration sources to be introduced to an area.

Capabilities on project:
Environment

5 Operational Impacts

5.1 Typical Activities on Site

5.1.1 Table 5.1 shows the activities and number of operating vehicles on the site and the times of day these activities will occur. We have been informed that each vehicle will leave and return to the site once per day. The tipping of glass and cans in to the bulking bays was witnessed to be the loudest activity on the site.

Activity	Number of times per day	Operating time and days
Street cleansing vehicles	12 (6 two way trips)	Monday to Friday
Trade vehicle	2 (1 two way trips)	Monday to Saturday
Refuse and Recycling vehicles (Domestic Rounds)	18 (9 two trips)	Tuesday to Friday
Refuse and Recycling vehicles (commercial Rounds)	14 (7 two way trips)	Mondays (not bank holidays)
Tipping of Glass on site (from domestic Rounds)	9 times per day	Tuesday to Friday
Tipping of Cans on site (from domestic Rounds)	9 times per day	Tuesday to Friday
Tipping of paper on site (from domestic Rounds)	9 times per day	Tuesday to Friday
Ground maintenance vehicles	8 (4 two way trips)	Monday to Friday
Vehicle Maintenance workshop	-	Monday to Friday
Moving glass, paper and cans with digger type vehicle	9 times for each recycle	During Tipping
Collection of bulked glass	40 vehicle trips (20 two way trips) per month	Monday to Friday

Table 5.1 Activities on site

5.2 Sound Exposure Levels.

5.2.1 A BS412 assessment was undertaken to predict the potential impact from the operation of noise from the site on the nearest residential dwellings and to determine the likelihood of complaints. As part of the noise assessment Sound Exposure Levels (LAEs) of the various activities on the site were measured at known distances on the site and at the nearest residential receptors. Table 5.2 below shows the measured SELs of the operational vehicles and typical activities on the site and Table 5.3

Capabilities on project:
Environment

Activity	Distance From Source	LAE (dB)	
		Worst-Case	Average
Paper Tipped	5 m	96	96
Cans Tipped	5 m	106	104
Glass Tipped	5 m	113	111
Glass Compacted	5 m	108	107
Paper Tipped at Marigold Farm	160 m	69	69
Can Tipped at Marigold Farm	160 m	70	70
Glass Tipped At Marigold Farm	160 m	70	70
Front Loader Reversing	5 m	89	89
Refuse Lorry Reversing	5 m	88	87
Refuse Lorry Idling	5 m	83	83
Refuse Lorry Pulling Away	5 m	91	89
Refuse Lorry Door Slamming	2 m	84	84

All values are single event sound exposure levels dB re 20 μ Pa²s

Table 5.2 Measured Sound Exposure Levels Site Operations

Activity	Distance From Source	LAE (dB)	
		Worst-Case	Average
Car Arriving at Site	10 m	71	70
Refuse Lorry Idling in Yard	60 m	68	66
Refuse Lorry Leaving Site	10 m	86	85
Two Refuse Lorries Leaving Site Together	10 m	87	87
Street Cleaning Vehicle Leaving Site	10 m	79	77
Refuse Lorry Idling at Gate	10 m	86	84
Refuse Lorry Manoeuvring in Yard	40-60 m	81	78
Trade Truck Leaving Site	10 m	73	73
Two Trade Trucks Leaving Site	10 m	75	75
Ground Maintenance Vehicle Leaving Site	10 m	71	71

All values are single event sound exposure levels dB re 20 μ Pa²s

Table 5.3 Sound Exposure Levels of Vehicles Entering Site in the Early Morning

Capabilities on project:
Environment

5.3 BS 4142 Assessment

5.3.1 Impacts at Marigold Farm

- 5.3.1.1 The measured sound exposure levels were used along with the event frequency information to calculate site activity equivalent continuous sound pressure levels (L_{Aeq}) at the receptor locations. These L_{Aeq} were calculated for a worst-case one hour period during the daytime and a worst-case 5 minute period during the night-time. The L_{Aeq} were then adjusted for distance to predict the levels at the appropriate receptor.
- 5.3.1.2 Table 5.4 details the daytime BS 4142 assessment at Marigold Farm for the can and glass tipping activities. This is the closest residential property to the site itself. The table shows the lowest measured daytime Background Noise Level at Marigold Farm of 42 L_{A90} . The calculated Specific Noise Levels from the tipping activities was 59 dB L_{Aeq} . BS 4142 states that a 5 dB penalty should be added to the measured specific noise level, to reflect the crashing sound associated with the tipping of the cans and glass. Due to this, rating level for tipping activities is 61 dB. This figure is 19 dB above the measured Background Noise Level suggesting that complaints would be likely as a result of the tipping activities.

	Tipping Activities
Background Noise Level L_{A90}	42
Specific Noise Level $L_{Aeq, 1hr}$	56
Rating Level	61
BS4142 Rating	+19 (Complaints Likely)

Table 5.4 BS 4142 Assessment at Marigold Farm for Tipping Activities

	Refuse Truck Leaving Site
Background Noise Level L_{A90}	42
Specific Noise Level $L_{Aeq, 5min}$	59
Rating Level	60
BS4142 Rating	+18 (Complaints Likely)

Table 5.5 BS 4142 Assessment at Marigold Farm for Refuse Vehicles Exiting Site

- 5.3.1.3 Early morning vehicle movements in and out of the site were also measured. Refuse trucks were identified as the noisiest of the vehicles operating on the site. These vehicles began to leave the site at 06:15. A time which would generally be considered part of the night-time. Table 5.5 shows a BS 4142 assessment for vehicles leaving the site. The conclusion of the assessment is that complaints are likely.
- 5.3.1.4 The paper tipping operation has not been included in this part of the assessment. This is due to the fact that the operation was not audible at the receptors and is typically a quieter activity than the tipping of cans and glass.
- 5.3.2 Impacts at Welham Lane Game Farm and The Barn
- 5.3.2.1 A worst case assessment has been undertaken to assess the likelihood of complaints at the two other identified NSRs, Welham Lane Game Farm and The Barn, Welham Lane.

Capabilities on project:
Environment

	Tipping Activities
Background Noise Level L_{A90}	43
Specific Noise Level $L_{Aeq, 1hr}$	49
Rating Level	54
BS4142 Rating	+11 (Complaints Likely)

Table 5.6 BS 4142 Predicted Assessment at Welham Lane Game Farm

	Tipping Activities
Background Noise Level L_{A90}	47
Specific Noise Level $L_{Aeq, 1hr}$	48
Rating Level	53
BS4142 Rating	+6 (Slightly More Than Marginal Significance)

Table 5.7 BS 4142 Predicted Assessment at The Barn, Welham Lane

- 5.3.2.2 From Table 5.6, a predicted BS 4142 assessment at Welham Lane Game Farm indicates that noise from the tipping activities suggests that complaints are likely due to the BS 4142 rating being 11 dB above the Background Noise Level. The residents at this property informed us during the survey that they had lodged a number of complaints due to noise from the recycling site.
- 5.3.2.3 Table 5.7 indicates that at The Barn, Welham Road, the predicted BS 4142 assessment for the tipping activities would result in a slightly more than marginal significance, due to the BS 4142 rating being 6 dB above the Background Noise Level. During the noise survey, a resident at this property informed us that operations at the site were audible despite existing background noise from the A6.
- 5.4 Noise from Local Roads**
- 5.5 The Transport Statement (TS) prepared by BWB Consulting Ltd compares the number of vehicle movements associated with the former use of the application site and the predicted the daily number of vehicles movements once the site is fully operational.
- 5.6 The vehicles enter the site via the former timber merchants' site access on Welham Lane. There is a one way loop within the site with the exit at the former Allen Access access on Welham Road. In order to ensure service vehicles would not unnecessarily route through Great Bowden, a routing plan will be implemented at the site, instructing drivers to use the A6 to get to the location of their rounds. Access to Great Bowden would be restricted to when refuse vehicle are collecting from the village only.
- 5.7 The depot will generate vehicle trips from two sources, journeys associated with staff travel to and from work and the trips associated with operational movements.
- 5.8 The TS has predicted that there will be a maximum of 90 two ways trips (45 vehicle drivers) vehicle movements per day associated with staff journeys to work.

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- 5.9 The TS has predicted the maximum number of operational vehicles departing in the morning and arriving back in the afternoon is 50 vehicles (100 two-way) trips. The consolidated Allan Access business will generate 33 two way vehicle movements per day.
- 5.10 The former use of the sites generated 127 two-way vehicle movements per day
- 5.11 Using CRTN⁽⁶⁾ methodology the Basic Noise Level (BNL) has been calculated based on the trip generation figures for both the depot and the former use of the site. Table 5.7 shows the estimated change in noise level and the percentage change in flows when comparing the proposed depot with the former use of the site

Table 5.7 Summary of traffic generation comparison for the former use and depot

Daily vehicle Trip Generation		% Change	Change in Noise Level (dB)
Former Use	Depot & Allen Access		
127	223	75.6	2.4

- 5.11.1 Minor adverse impacts are predicted based on the assessment criteria in Table 3.3 when comparing the predicted traffic generation for the proposed depot with the former uses of the application site. The traffic figures are based on maximum vehicle numbers, so are a worst case scenario.
- 5.11.2 It is generally accepted that changes in road traffic noise levels of up to 3 dB are not widely perceptible, as confirmed in Department for Transport Analysis Guidance.⁽⁶⁾

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6 Mitigation

6.1 Operational Activities on Site

- 6.1.1 To reduce the impact on Welham Game Farm and the properties to the north east of the site an acoustic barrier could be constructed along the north and west boundary of the site to screen the tipping area. The topography of the land is particularly flat in this area. Noise travels directly from the tipping bays across these fields and can be clearly heard at Welham Lane Game Farm. It can be assumed that if a barrier just breaks the line of sight, between the source and the receiver an approximate 5 dB reduction in the noise levels experienced at the receiver, when compared to the unmitigated scenario. However if the barrier completely screens the line of sight an approximate 10 dB reduction in the noise level can be expected at the receiver, when compared to the unmitigated scenario. The acoustic barrier needs to be a close boarded fence with no gaps and have a mass of at least 12 kg/m^3 .
- 6.1.2 The barrier would therefore require careful detail design in order to work effectively. The benefits would also be limited to the receptors in a north-easterly direction. Undertaking tipping operations inside a building could provide benefits in terms of noise reduction in all directions.
- 6.1.3 If possible, internalising the tipping operations would also reduce the amount of noise breaking out from the site. This type of activity is inherently noisy, any form of screening would be beneficial in terms of noise reduction.
- 6.1.4 Another method to reduce noise from activities on the site is to restrict the hours that tipping operations can occur. It is suggested that any noisy activity on the site such as tipping should not occur before 07:00. One possibility would be only to tip during the evening rush-hour period, when background noise levels in the area are at their highest due to traffic noise on the A6.
- 6.1.5 As can be seen from Table 5.5, the BS4142 rating level for refuse vehicles leaving the site concluded that complaints would be likely. A possible method to reduce this would be to relocate the entrance of the site to the north, behind where the tipping operation currently occurs. The entrance would be considerably further away from the existing Noise Sensitive Receptors, therefore reducing the noise levels at the receptor.
- 6.1.6 Another way of reducing noise during the morning period when staff vehicles are arriving at the site is to resurface the car park. Tyre interaction with the existing gravel surface will generate more noise than if the surface were to be smooth tarmac.
- 6.1.7 Road surfaces within the site itself should also be maintained to a good standard. This will reduce the noise from body rattle on larger vehicles when they drive over an uneven surface.
- 6.1.8 Some of the suggestions may not be possible for practical reasons. Others may require changes to site operation, to become fully effective. It is therefore recommended that a comprehensive noise mitigation plan be developed through consultation with the operator. Such an investigation is beyond the scope of this assessment..

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7 Summary & Conclusions

- 7.1 The existing noise levels of the site during operation have been considered and assessed,
- 7.2 In conclusion, without any mitigation, measured noise levels from the site and the BS 4142 assessment have indicated that complaints are likely at the nearest sensitive receptors. During the tipping activities, complaints are likely from Marigold Farm and from Welham Lane Game Farm. In fact it became apparent during the survey that the residents are complaining about the noise from the operation under the temporary licence.
- 7.3 People are more sensitive to noise from the refuse trucks leaving the site because of the early hour at which they depart. Measured noise levels of vehicles entering and leaving the site, in accordance with the BS 4142 assessment have indicated that complaints will be likely due to this activity. A marginal likelihood of complaints has been predicted at the Barn, Welham Road.
- 7.4 Due to the fact that there have been a number of complaints by local residents about noise from the site, it is suggested that some mitigation be put in place in order to reduce the impact on the residents.
- 7.5 Mitigation measures have been suggested as possibilities to reduce the amount of noise emanating from the site. This includes screening along the north-east boundary of the site, to absorb noise from tipping activities. Noise from early morning vehicles movements could be reduced by repositioning the entrance to the north of the site, behind where tipping operations are currently located. This would greatly increase the distance between vehicle movements and sensitive receptors. These options require more detailed analysis and discussion before the full extent of their potential benefits can be assessed.
- 7.6 Minor adverse impacts have been predicted as a result of the worst-case traffic assessment for the site. However an increase in noise less than 3 dB is not widely perceptible, as confirmed in Department for Transport Analysis Guidance. Therefore the impact from the increased traffic will not have detrimental effect in terms of noise.

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References

1. Planning Policy Guidance: Planning and Noise PPG 24, September 1994, Department of the Environment
2. Guidelines for Community Noise, World Health Organisation, 1999
3. British Standard BS 8233: 1999 'Sound insulation and noise reduction for buildings – Code of practice' British Standards Institution, 1999. ISBN 0 580 33009 5.
4. British Standard BS 4142: 1997 'Rating industrial noise affecting mixed residential and industrial areas'. British Standards Institution, 1997. ISBN 0 580 28300 3
5. Calculation of Road Traffic Noise, The Department of Transport and The Welsh Office, 1975 and 1988. ISBN 0 11 550847
6. Design Manual for Roads and Bridges Volume 11 Section 3 Part 7, HA 213/08, 2008 'Noise and Vibration' Highways Agency, 2008
7. BS 7445: 2003. 'Description and measurement of environmental noise'

Capabilities on project:
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Appendix A Abbreviations

AAWT	Annual average weekday traffic
BNL	Basic Noise Level
BS	British Standards
CRTN	Calculation of Road Traffic Noise
dB	Decibel
DMRB	Design Manual for Roads and Bridges
EHO	Environmental Health Officer
HGV	Heavy Goods Vehicle
Hz	Hertz
ISO	International Organisation for Standardisation
NSR	Noise Sensitive Receptor
Pa	Pascal
PPG	Planning Policy Guidance
ppv	Peak particle velocity
SEL	Sound Exposure Level
TA	Transport Assessment
VDV	Vibration dose value
WHO	World Health Organisation

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Appendix B Glossary of Acoustic Terms

dB	Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise i.e. whether is it high pitched, low pitched or with no distinct tonal character. These measurements are usually undertaken in octave or 1/3 octave frequency bands. If these values are logarithmically summed a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.		minutes within one hour, that level can be described as being exceeded for 10% of the measurement period. This is denoted as the $L_{A10,1hr} = x$ dB. The L_{A10} index is often used to describe road traffic noise whilst the L_{A90} , the noise level exceeded for 90% of the time, is the usual descriptor of the underlying background noise. L_{A1} in addition to L_{Amax} are common descriptors of construction noise.
dB L_A	Instead, the dB L_A figure is used, as this is found to relate better to the loudness of the sound heard. The dB L_A figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or 1/3 octave band values, before logarithmically summing them. As a result the single dB L_A value provides a good representation of how loud a sound is. It is common to see the A-weighted value identified by dB(A). This is an old description and should be avoided as it now conflicts with other SI unit nomenclature.	P.P.V	The Peak Particle Velocity is the maximum velocity which is recorded during a particular event and can refer to a particular orientation (vertical or horizontal) or to the maximum (units: mm/s).
L_{Aeq}	As almost all sounds vary or fluctuate with time it is helpful instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq, 07:00-19:00}$ for example, describes the equivalent continuous noise level over the 12 hour period between 7am and 7pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the $L_{Aeq, 07:00-19:00}$	VDV	Vibration Dose Value is a measure of vibration exposure; the fourth root of the integral, over the measurement period, of the fourth power of the frequency weighted time-varying acceleration (units: m/s)
L_{Amax}	The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.		
L_{An}	Another method of describing with a single value a noise level which varies over a given time period, is instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dB is exceed for say 6		

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Appendix C Calibration Certificates

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

Date of Issue: 10 March 2009

Certificate Number: AC/09/048/02



0801

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APPROVED SIGNATORIES

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VERIFICATION OF A SOUND LEVEL METER to BS7580 Part 1

FOR:	Faber Maunsell Lynnfield House Church Street Altrincham Cheshire, WA14 4DZ						
FOR THE ATTENTION OF:	Adam Mottershead						
CALIBRATION DATE:	9 March 2009						
TEST PROCEDURE:	CTP08 (Laboratory Manual)						
Sound Level Meter							
Manu:	Bruel & Kjaer	Model:	2238	Serial No:	2106193		
Microphone							
Manu:	Bruel & Kjaer	Model:	4188	Serial No:	2141095		
Preamp							
Manu:	Bruel & Kjaer	Model:	ZC0030	Serial No:	3525		
Associated Calibrator							
Manu:	Bruel & Kjaer	Model:	4231	Serial No:	2326978	Adaptor:	UC0210

Test Engineer (initial):

GP

Name: Gary Phillips

Certificate of Calibration

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Date of Issue: 10 March 2009

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SET-UP INFORMATION

The instrument was running software module BZ7125 version 1.1.1. The reference range, reference SPL, primary indicator range, pulse range and linearity range as specified by the manufacturer have been used. The instrument was adjusted to read 93.6 dB (A) in response to the associated calibrator. This reading was obtained from the calibration certificate of the calibrator, AC/09/048/01 and information in the manufacturer's instruction manual when the instrument is fitted with the supplied windshield.

MEASUREMENTS

The levels of self-generated noise were:

A: 12.7 dB

C: 17.0 dB

Lin: 23.0 dB

At the end of the tests the indication of the sound level meter in response to the associated sound calibrator was 93.7 dB (A) which corresponds to the following level at 101.325kPa:

Sound Pressure Level 93.7 dB (A)

This reading should be used henceforth to set up the sound level meter for field use.

THE SOUND LEVEL METER WAS VERIFIED ACCORDING TO THE PROCEDURE GIVEN IN BS7580: Part 1 1997 WITH THE FOLLOWING EXCEPTIONS:

The microphone corrections applied as specified in BS 7580: Part 1: 1997 were obtained from a frequency response measured by this Laboratory using the electrostatic actuator method. This response in isolation is not covered by our UKAS accreditation.

A stricter test than that specified 5.5.10 and 5.5.11 of BS 7580 has been used by not applying the low level signal.

STATEMENT OF RESULT:

THE SOUND LEVEL METER CONFORMS TO BS7580: PART1 1997

Instruments used in the verification procedure were traceable to National Standards. The method of acoustic calibration employed a standard sound pressure calibrator for the 1kHz test whilst the tests at 125Hz and 8kHz were performed by the electrostatic actuator method. The uncertainty of the Laboratory's 1kHz calibrator was ± 0.11 dB. The uncertainty of the standard calibrator is not included in the applied tolerances. It is assumed that the sound level meter was manufactured in accordance with BSEN60651: 1994 Type 1, and BSEN60804: 1994 Type 1.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. All measurement results are retained at the acoustic calibration laboratory for at least four years.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801
Date of Issue: 7 March 2008
Certificate Number: AC/08/41/01



0801

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APPROVED SIGNATORY

Name: Claire Lomax

Signed:



acoustic calibration laboratory

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CALIBRATION OF A SOUND CALIBRATOR

FOR: Faber Maunsell
Lynnfield House
Church Street
Altrincham
Cheshire
WA14 4DZ

FOR THE ATTENTION OF: Jonathan Mape

DESCRIPTION: Calibrator with housing for one-inch microphones and adaptor type UC0210 for half-inch microphones.

MANUFACTURER: Bruel & Kjaer

TYPE: 4231

SERIAL NUMBER: 2326978

DATE OF CALIBRATION: 7 March 2008

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial):

Name: Gary Phillips

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

Date of Issue: 7 March 2008

Certificate Number: AC/08/41/01

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MEASUREMENTS

The sound pressure level generated by the calibrator was measured using a calibrated, WS2P condenser microphone as specified in the certificate. The calibration was carried out with the calibrator in the half-inch configuration.

Five determinations of the sound pressure level, frequency and total distortion were made.

The results have been corrected to the reference pressure of 101.325kPa, using manufacturer's data.

RESULTS

Coupler configuration: Half-inch
Microphone type: Gras 40AG
Output level (dB re 20 μ Pa): 93.89 dB \pm 0.14dB
Frequency (Hz): 1000.04 Hz \pm 0.12Hz
Total Harmonic Distortion (%): 0.38 % \pm 0.29% (Not UKAS)

Average environmental conditions at the time of measurement and maximum deviation from the stated average:

Pressure: 100.307kPa \pm 0.005kPa
Temperature: 22.1°C \pm 0.2°C
Relative humidity: 38.0% \pm 0.3%

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

All measurement results are retained at the acoustic calibration laboratory for at least four years.