

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 1656

14 March 2011

Litton Properties
2 Broome's Barn
BAKEWELL
DE45 1PF

TESCO STORE, HOYLAND
ENVIRONMENTAL NOISE IMPACT ASSESSMENT
ACOUSTIC CONSULTANCY REPORT 1656/ENIA/REV A

Revision	Date	Issued By	Checked By	Revision Notes
A	14/03/2011	Andy Pagett	Chris Middleton	General changes

1.0 **SUMMARY**

The proposal is to redevelop the site constructing a new foodstore with associated parking, service yard and fixed plant installations.

Acoustic Design Technology Limited have undertaken an environmental noise survey of background levels in the vicinity of the nearest noise sensitive properties.

BS 4142 *rating level* limits have been set for any new fixed plant installations.

Noise from the car park has been calculated and there should be a negligible noise impact on the surrounding dwellings.

Noise from the service yard and delivery vehicles has been calculated and the noise impact on surrounding noise sensitive properties should be acceptable with the proposed acoustic screening.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

The site is situated on Market Street, Hoyland, at the junction between Market Street and Wombwell Road, approximately 500m from the defined town centre.

The site was formerly occupied by the Market Street School, which has now been demolished, and the land is currently vacant.

The surrounding area to the east, south and west is residential, with semi detached houses surrounding the site in these directions, with the Hoyland Hall residential home at the south corner of the site. The area north west of the site on the opposite side of Wombwell Road is occupied by a large industrial estate.

The wider area is a mixture of residential development and farmland, with the A6195 Dearne Valley Parkway running around 400m north of the site, and the M1 motorway around 2.5km west of the site.

2.2 Proposed Development

The full planning application proposes the comprehensive redevelopment of the site to provide for a new foodstore with associated car parking and service yard as indicated on the planning drawings.

The service yard is to be surrounded by a solid timber acoustic screen extending to a height of up to 4 metres to provide acoustic protection to surrounding dwellings, particularly the houses on Kingswood Crescent and Cumberland Road.

2.3 Strategy for Noise Impact Assessment

Potential noise sources include:-

- i. noise from new fixed plant installations
- ii. noise from the car park
- iii. noise from the service yard, including delivery vehicle movements

Baseline noise data has been obtained by an environmental noise survey, and an assessment of the various potential noise sources has been undertaken as described in the following sections.

For clarity the various noise sensitive properties in the surrounding area have been categorised into environmentally sensitive receptors (ESR) as described below:

ESR	Location	Direction	Approximate distance from site boundary (metres)
1	Houses on Cumberland Close	South-east	25m
2	Houses on Kingswood Crescent	East	60m
3	Houses on Market Street	West	30m
4	Hoyland Hall residential home	South	20m

The above ESR represent the closest noise sensitive properties in each direction, with others located further from the site and in some cases screened by the intervening buildings.

2.4 Computer Model

In order to predict how the noise from the various sources will propagate around the site, a computer model has been constructed using Datakustik Cadna/A 4.0, set to calculate according to ISO 9613-2, using both direct and first-order-reflected rays. All buildings and barriers have been assumed to be acoustically reflective unless explicitly stated elsewhere. Ground absorption has been taken into account as applicable. All Cadna *receiver points* were set to first floor height.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Instrumentation

The environmental noise survey was undertaken using the following instrumentation:-

- i. Rion NL-31 Class 1 Sound Level Meter
- ii. Rion UC-53A ½ inch Microphone and Windshield
- iii. Rion NC-74 Microphone Calibrator

The sound level meter was calibrated at the beginning of the survey period, and the calibration checked at the end. No significant drift occurred.

3.2 Procedure

A fully manned environmental noise survey was undertaken between 02:00 hours and 09:00 hours on Thursday 03 March 2011.

Four measurement positions were selected in order to obtain representative measurements of the noise levels at the various ESR. These are shown on the attached site plan 1656/SP1 and described below:

- i. on the small car park at the end of Cumberland Close
- ii. in front of the house at the junction between Wombell Road and Kingswood Crescent
- iii. in front of the house at the junction between Wombell Road and Market Street
- iv. in front of the entrance to Hoyland Hall

At each measurement position the microphone was situated on a tripod approximately 1.2m above ground level and away from any acoustically reflective surfaces.

For each measurement, the L_{Aeq} , L_{Amax} and L_{A90} sound pressure levels were measured using a 10 minute sample period (the 04:00 - 05:00 measurement at position 1 was truncated to 5 minutes due to interference by members of the public)

3.3 **Results**

The measured data are assumed to be representative of the hourly period in which they were taken. The full results are presented on the attached tables T1 to T4 for measurement positions 1 to 4 respectively, with the minimum L_{90} for the PPG24 day and night periods summarised below:

Time period	Minimum $L_{90,10 \text{ mins}}$ dB(A) at measurement position			
	1	2	3	4
Day (07:00 - 09:00)	44	55	58	52
Night (02:00 - 07:00)	24	26	30	27

Please refer to Appendix A for explanation of the noise units and the A-weighting term used in this report.

3.4 Weather Conditions

Throughout the survey, the weather was dry with no more than a light breeze.

3.5 Description of Existing Noise Climate

The background (L_{A90}) noise levels at all positions were controlled by distant traffic and additional noise from the industrial estate to the north east during the early hours of the morning when the traffic flow was lower.

The average (L_{Aeq}) noise levels at all positions were controlled by mixed traffic on the local road network. The lower L_{Aeq} at position 1 is due to the much lower traffic flow on Cumberland Close, and the fact that it is screened from the more dominant roads by the surrounding buildings.

4.0 NOISE IMPACT ASSESSMENT (FIXED PLANT)

4.1 General Guidance

At this stage none of the major fixed plant installations have been selected, so it is not possible to undertake a noise impact assessment of specific equipment. Fixed plant should therefore be addressed using environmental noise limits that can be used in the future selection of plant.

In the absence of any specific guidance, it is normal to refer to the guidance of BS BS 4142 : 1997, which determines the likelihood of complaints by comparing the *rating* level of the plant (defined as the noise emissions from the plant, plus a 5 dB(A) penalty for any tonal or impulsive characteristics if applicable), with the typical *background* (L_{A90}) level at the nearest noise sensitive properties at the relevant time of operation.

The standard allows a wide field of interpretation in respect of the relationship between the rating level and background level, although in a telephone conversation with Lucy Allen of Barnsley Council on 10 March 2011, it was agreed that it would be appropriate to set a rating levels limit equal to the existing background levels. Additionally, as the scope of BS 4142 states that it is not applicable for *very low* background and rating levels, which are defined as 30 dB(A) and 35 dB(A) for the background and rating levels respectively, a lower limit of 35 dB(A) would be appropriate.

As the majority of fixed plant installations will operate 24 hours a day, the night-time scenario is the most critical, and as background noise levels drop to around or below 30 dB(A) at all measurement positions, a rating level of 35 dB(A) at all ESR would be an appropriate environmental noise limit for new fixed plant installations.

5.0 NOISE IMPACT ASSESSMENT (CAR PARK)

5.1 Basis of Assessment

There are no widely accepted UK standards for the assessment of noise from car parks, as the noise cannot be categorised as industrial or as free flowing traffic.

In the absence of a relevant British or International Standard for predicting car parking noise, the Bavarian LfU-2007 parking lot function incorporated into Cadna/A noise mapping software has been used to predict $L_{eq, 1 \text{ hour}}$ at the ESR.

The number of vehicle movements per hour has been assumed to be two movements per parking space per hour.

5.2 Noise Impact Assessment

The computer model predicts the following resultant noise levels at the ESR :

Predicted car parking noise level $L_{eq,1hour}$ dB(A) at ESR			
1	2	3	4
26	38	47	48

A comparison of the predicted levels in the above table with the otherwise prevailing background noise levels in Section 3.3 above reveals that car park noise levels fall below the day-time background levels.

During the evening, the car park noise emissions would be considerably lower as the volume of traffic reduces, with a corresponding reduction in background levels. On that basis it is reasonable to conclude that the noise impact of the car park should be negligible.

6.0 SERVICE YARD AND DELIVERIES

6.1 Basis of Assessment

Typical noise data for the principal noise sources associated with service yard operations recorded at similar supermarket service yards is set out in Appendix B.

6.2 Unloading Operations

The computer model predicts the following resultant noise levels at the ESR for a variety of typical service yard activities:

Activity	Predicted L _{eq,5mins} dB(A) at ESR			
	1	2	3	4
Unloading - lorry backed up to rubber surrounds	19	27	18	19
Unloading - lightweight plastic trolleys etc	17	29	28	15
Bulkhead mounted refrigeration unit	39	51	38	37

As the service yard operations can take place over periods of 1/2 to 3/4 hour it is appropriate to compare the resultant noise levels at dwellings with the background (L₉₀) noise levels.

Deliveries are to take place between 05:00 hours and 23:00 hours.

Reference to the above table reveals that noise from unloading operations is below the background levels in the attached tables 1656/T1-T4 during the delivery period, and the levels are all so low as to be outside the scope of BS 4142 as described in Section 4.1 above.

Additionally, resultant noise levels of up to 29 dB(A) outside dwellings generated by unloading activities would equate to levels of less than 20 dB(A) inside a room with the windows open for ventilation, which would almost certainly be inaudible. On this basis, the noise impact of unloading operations should be negligible.

From the beginning of the delivery period at 05:00 hours, comparing the predicted noise from the vehicle mounted refrigeration unit with the background levels at the most affected dwellings towards the northern end of Kingswood Crescent (ESR 2) results in a conclusion that the noise is *of marginal significance* when assessed using the methodology of BS 4142 : 1997.

Thus, with the benefit of the acoustic screen fence, it would be reasonable to conclude that the resulting noise impact of the proposed service yard should be acceptable.

6.3 Manoeuvres

The computer model predicts the following resultant noise levels at the ESR for the manoeuvring of a lorry within the service yard, including the reversing bleeper:

	Predicted $L_{eq,5mins}$ dB(A) at ESR			
	1	2	3	4
HGV manoeuvring	28	40	39	27

As the noise from the lorry manoeuvring is effectively a traffic noise source, blending into the normal road traffic on leaving the service yard, it is appropriate to compare the predicted levels with the $L_{Aeq,T}$ for existing local road traffic.

Reference to the attached tables 1656/T1 - T4 reveals that the existing $L_{eq, 10 mins}$ drop to the following levels during the night:

Minimum traffic noise levels $L_{eq,1hour}$ dB(A) at ESR			
1	2	3	4
33	49	51	39

A comparison of the predicted noise from the lorry manoeuvres with the above levels reveals that the noise from the lorries would be well below the existing traffic noise levels and should therefore go unnoticed.

FOR ACOUSTIC DESIGN TECHNOLOGY

APPENDIX A

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

dB(A) The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average person. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level.

When the noise being measured has a variable amplitude, such as traffic noise, it is necessary to qualify the basic dB(A) unit. This may be done using a statistical index L_n dB(A), where n is an integer between 1 and 99, and is the percentage of the sample time for which the stated dB(A) level is exceeded. In defining the use of the index, both the value of n and the length of the sample period must be stated.

L_{10} L_{10} , being the dB(A) level exceeded for 10% of the time, has been shown to be a good indicator for traffic noise intrusion, and is used in assessing the effect of traffic noise on residential or commercial premises.

L_{90} L_{90} is the dB(A) level exceeded for 90% of the time, and is used as a measure of background noise level, as it excludes the effects of occasional transient levels, such as individual passing cars or aircraft.

In addition to the statistical noise indices defined above, the following noise units are also used to define variable amplitude noise sources:

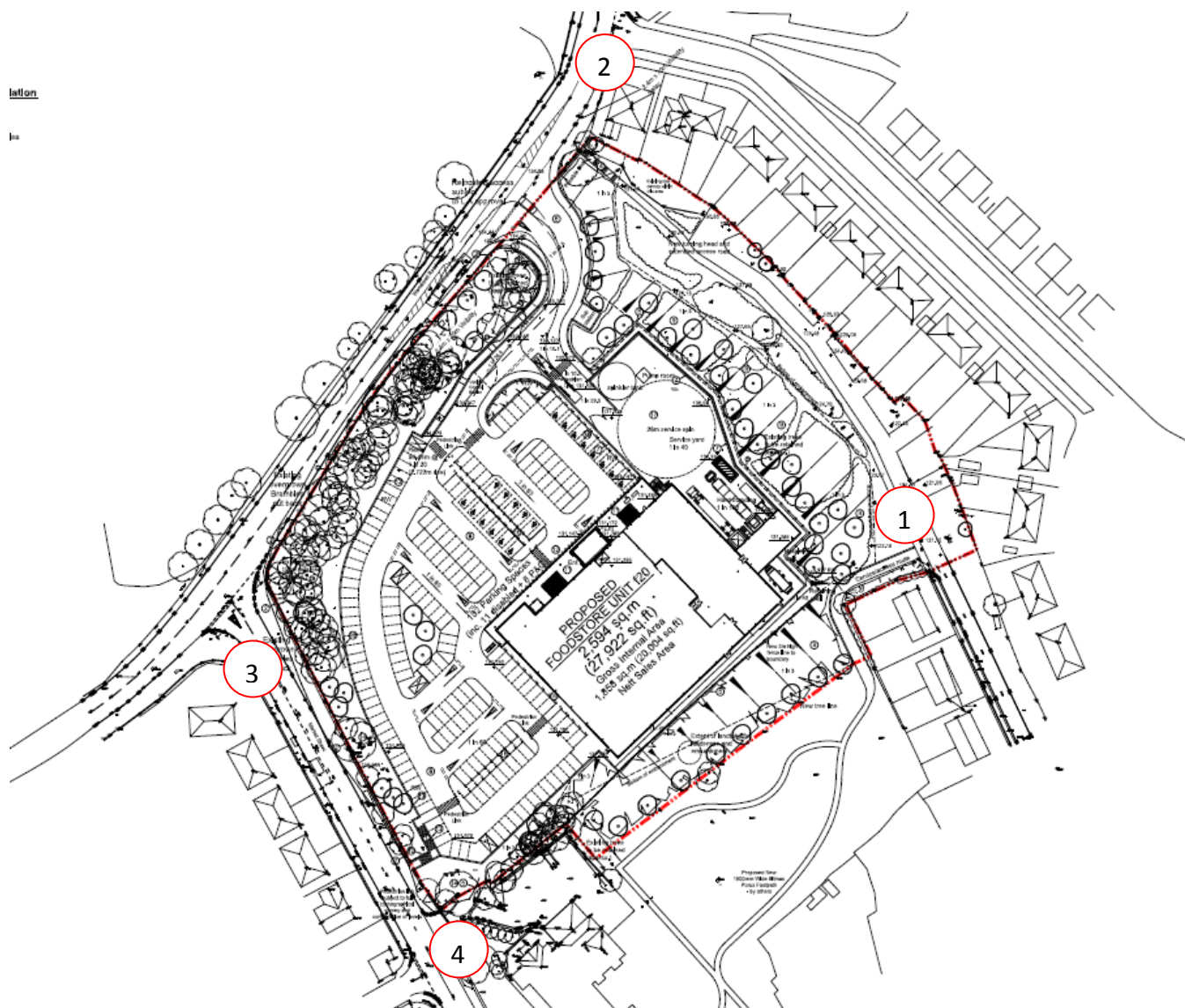
L_{eq} The L_{eq} is defined as the notional steady sound pressure level which, over a stated period of time, would contain the same amount of acoustical energy as the actual fluctuating sound measured over the same period - i.e.: it is a measure of the "average" noise level

L_{max} The L_{max} is the maximum sound pressure level recorded over the measurement period.

APPENDIX B

Service Yard Noise Data

Noise data: L_{eq}, 1 hour at 5m									
	63	125	250	500	1k	2k	4k	8k	dB(A)
Bulkhead mounted vehicle refrigeration unit	87	78	76	74	71	73	69	62	78
Unloading - lorry backed up to rubber surrounds	69	63	60	57	54	54	53	46	61
Unloading with lightweight plastic trolleys (bread etc)	62	58	55	54	54	54	52	46	60
HGV manoeuvring in service yard with reversing bleeper active	80	73	68	67	69	67	67	55	74



Description

Site plan showing measurement positions 1 - 4

Project

Tesco Store, Hoyland

Survey Date

03 March 2011

Drawing No.

1656/SP1



ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

MEASURED DATA FOR POSITION 1

Hourly Period	Sound pressure level / dB(A)		
	L _{eq} , 10 mins	L _{max}	L ₉₀
02:00 - 03:00	33	61	25
03:00 - 04:00	35	63	24
04:00 - 05:00	33	56	26
05:00 - 06:00	43	71	33
06:00 - 07:00	52	72	43
07:00 - 08:00	51	71	44
08:00 - 09:00	53	75	45

TABLE 1656/T1**MEASURED DATA FOR POSITION 2**

Hourly Period	Sound pressure level / dB(A)		
	L _{eq} , 10 mins	L _{max}	L ₉₀
02:00 - 03:00	49	74	27
03:00 - 04:00	54	80	26
04:00 - 05:00	62	83	29
05:00 - 06:00	69	83	46
06:00 - 07:00	69	83	48
07:00 - 08:00	71	83	55
08:00 - 09:00	72	84	62

TABLE 1656/T2

MEASURED DATA FOR POSITION 3

Hourly Period	Sound pressure level / dB(A)		
	$L_{eq, 10 \text{ mins}}$	L_{max}	L_{90}
02:00 - 03:00	51	70	30
03:00 - 04:00	59	77	33
04:00 - 05:00	56	73	33
05:00 - 06:00	63	88	41
06:00 - 07:00	64	77	48
07:00 - 08:00	68	79	57
08:00 - 09:00	69	78	60

TABLE 1656/T3**MEASURED DATA FOR POSITION 4**

Hourly Period	Sound pressure level / dB(A)		
	$L_{eq, 10 \text{ mins}}$	L_{max}	L_{90}
02:00 - 03:00	39	57	27
03:00 - 04:00	54	81	30
04:00 - 05:00	64	84	35
05:00 - 06:00	67	89	41
06:00 - 07:00	69	84	49
07:00 - 08:00	71	84	52
08:00 - 09:00	71	85	56

TABLE 1656/T4