Noise Assessment

Travelling Showmen Site, Gors Road, Towyn

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1. Revision Register

Version	Changes from previous version	Issued by	Date
A	First Issue	NC	07/04/2017
B	Minor changes following comments	NC	24/04/2017

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3. Executive Summary

3.1 This report has been prepared in support of a planning application for a travelling showmen site located on Gors Road, Towyn.

3.2 Background noise levels were measured at the nearby noise sensitive receptors (residential properties) and the noise levels from the maintenance activities at the proposed site has been modelled.

3.3 An impact assessment was undertaken following the methodology of BS4142 and demonstrates a low risk of adverse noise effects during the potentially noisiest activities, for all existing residential properties. This assumes the activities are undertaken within the enclosed dry storage barn.

3.4 The existing noise levels from traffic noise at the proposed dwelling locations are at the most within Noise Exposure Category (NEC) B from the TAN11 guidance. TAN11 advises that for sites within NEC B:

'*noise should be taken into account when determine planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection*.'

3.5 Noise has been assessed in this report and the site is suitable for residential development and planning permission should not be refused on the grounds of noise.

4. Introduction

4.1 Apex Acoustics has been appointed to provide a noise assessment relating to a proposed travelling showmen site located on Gors Road, Towyn.

4.2 The proposed development consists of 13 park homes, a manager's house and a dry storage barn which can be used for maintenance of the showmen rides and vehicles. The site layout is shown in Figure 1.

Figure 1: Proposed site layout

4.3 The site is bounded to the north by the River Gele and to the east by Gors Road.

4.4 Nearby farm houses and residential properties are located to the north, east and south of the site.

4.5 The location of the nearest five existing noise sensitive receptors (residential receptors), the dry storage barn and the noise measurement locations are shown in Figure 2.

Figure 2: Site plan showing dry storage barn, nearby receptors and noise measurement locations (NMLs)

4.6 The purpose of this report is to assess:

- The impact of noise from the site 's proposed maintenance activities.
- The suitability of the site for residential development with regards to relevant planning guidance.

5. Planning guidance and standards

Technical Advice Note (Wales) 11, Noise - October 1997 (TAN11)

5.1 TAN11 (Reference 1) provides 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.

5.2 The note uses Noise Exposure Categories (NECs) to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources.

5.3 When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC as reproduced in Table 1 below.

Category	Description
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 1: TAN11 Noise Exposure Categories

5.4 A recommended range of noise levels is given in Table 2 for each of the NECs for dwellings exposed to noise from road, rail, air and mixed sources. Where

there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3 dB(A) above the recommended levels.

Noise Source	Time Period	TAN 11 NECs			
		A	B	C	D
Road Traffic	0700 - 2300	< 55	55-63	63-72	> 72
	2300 - 0700	< 45	45-57	57-66	> 66
Rail Traffic	0700 - 2300	< 55	55-66	66-74	> 74
	2300 - 0700	< 45	45-59	59-66	> 66
Mixed Sources	0700 - 2300	< 55	55-63	63-72	> 72
	2300 - 0700	< 45	45-57	57-66	> 66

Table 2: Noise levels corresponding to NECs for new dwellings $L_{Aeq,T}$ dB

5.5 With regards to noise from industrial and commercial developments TAN11 states that:

The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990

5.6 The BS4142 standard was updated in 2014 (ie. BS4142:2014) and this updated version is now the relevant guidance.

BS 4142 - Methods for rating and assessing industrial and commercial sound

5.7 BS 4142:2014 (Reference 2) describes methods for rating and assessing sound of an industrial and/or commercial nature in terms of the potential adverse impact on sound sensitive residential receptors.

5.8 The specific sound source of an industrial and/or commercial nature is rated and compared against the measured existing background sound environment.

5.9 The standard provide the following guidance in order to estimate the noise impact :

"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".

"Where the rating level does not exceed the background sound level, this is an indication of the specific source having a low impact, depending on the context".

5.10 The initial estimate of the impact can be reviewed to take consideration of other factors such as the context and uncertainties. For example, the standard states that the overall impact might be greater where the residual sound level is high, compared to an acoustic environment when the residual sound level is low.

6. Existing noise environment

6.1 A noise survey has been carried out to establish the background sound levels at the nearby receptors.

6.2 The survey was undertaken on 29th March 2017 during which time the weather was mostly dry and overcast with temperatures of 14 °C. There was some light rainfall noted during the survey which did not make a noticeable change to the measured levels.

6.3 The average wind speeds were below 2m/s throughout the measurement period with a maximum of 3.4m/s.

6.4 The noise measurement locations (NMLs) are shown in Figure 2.

6.5 At all measurement locations, the microphones were mounted 1.5m above ground level and were positioned more than 3m from any other reflecting surfaces.

6.6 NML1 was 10m from Gors Road and was selected to represent the noise impact on the development due to traffic noise form Gors Road.

6.7 NML2 was selected to represent the noise sensitive receptors to the east of the site, located on Gors Road.

6.8 NML3 was selected to represent the background sound levels at the noise sensitive receptor to the south west of the development.

6.9 NML4 was selected to represent the receptors on Towyn Way West, located to the north of development site.

6.10 At each noise measurement location, the dominant noise source was local road traffic.

6.11 The equipment used is listed in Table 3.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-04045-D2
Calibrator	Larson Davis Cal 200	11705
Sound Level Meter	NTi XL2	A2A-05832-E0
Calibrator	Larson Davis Cal 200	9462

Table 3: Equipment used

6.12 Both meters and calibrators have current calibration certificates traceable to national standards.

6.13 The measured free-field levels are summarised as Table 4.

NML	Measurement Period	$L_{A10,T}$ dB	$L_{Aeq,T}$ dB	$L_{Amax,s}$ dB	$L_{A90,T}$ dB
1	13:30 to 14:00	57	54	75	45
1	14:00 to 14:30	57	54	75	44
1	14:30 to 15:00	57	53	66	44
1	15:00 to 15:30	59	56	73	45
1	15:30 to 16:00	58	54	66	45
2	13:55 to 14:25	69	68	92	43
3	14:30 to 15:10	47	45	57	43
4	15:25 to 15:55	50	50	73	42

Table 4: Measured noise levels

6.14 The most significant existing noise sources affecting the proposed new residential development are road traffic noise on Gors Road (NML2).

Therefore, the calculation method of the overall daytime noise level, $L_{Aeq,\ 16\ hr}$ and night-time noise level, $L_{Aeq,\ 8\ hr}$ were calculated in accordance with CRTN and Transport Research Laboratory (Reference 3 and Reference 4). Appendix 1 provides details of the calculation steps.

6.15 The measured values of the L_{A10} for three consecutive hours are shown in Table 5 and the resulting calculated daytime $L_{Aeq,\ 16\ hr}$ and night-time $L_{Aeq,\ 8\ hr}$ noise levels are shown in Table 6.

Time Period	**Measured noise level, L_{A10} / dB**
First hour	57
Second hour	57
Third hour	58

Table 5: Measured L_{A10} over three consecutive hours**Parameter**	**$L_{Aeq,\ T}$ / dB**
Daytime, $L_{Aeq,\ 16\ hr}$	55
Night time, $L_{Aeq,\ 8\ hr}$	48

Table 6: Calculated daytime and night-time noise levels

7. Noise source levels

7.1 Within the maintenance area the noise levels and activities would be similar to vehicle maintenance, and could include angle grinding of metal, panel beating, orbital sanders, welding, cutting and paint spraying.

7.2 The HSE document 'Health and safety in motor vehicle repair and associated industries' (Reference 5) suggests noise exposure levels of up to 97dBA for these activities. It isn't clear if these are noise levels within the workshops or noise levels at some distance from the activity.

7.3 BS5228 (Reference 6) includes a database of noise levels from typical construction activities, which includes angle grinding of metal. The values for octave band levels at a distance of 10m are reproduced in Table 7.

Equipment	Octave band sound pressure levels at 10m						Total dB $L_{Aeq,1hr}$
	125	250	500	1k	2k	4k	
Angle grinder at 10m	51	52	60	70	77	73	80

Table 7: Noise levels due to angle grinding of steel

7.4 This would be considered as a point source and the sound power level, L_{wA} of the activity can be calculated using:

$$L_{wA} = L_{pA} + 20 \times \log (10) + 8 = 80 + 28 = 108 \text{ dB}$$

7.5 The reverberant level within the dry storage barn can be calculated using:

$$L_{pA} = L_{wA} + 10 \log (4/ R_c)$$

R_c is the room constant and if we assume the approximate dimensions of the dry storage barn as 40m x 20m and the roof construction with an absorption co-efficient of 0.1 (typical of a metal panel system) then Rc=80 and the calculation is:

$$L_{pA} = 108 + 10 \times \log (4 / 80) = 95 \text{ dB}$$

7.6 The predicted 95dB reverberant level due to angle grinding is worst-case and is just under the 97dB level suggested in the HSE document.

8. Noise predictions at nearby receptors

8.1 The building is assumed to have roller shutter doors, or equivalent hinged doors with a mass of 7kg/m^2; assuming steel with a 0.9mm thickness.

8.2 The estimate sound reduction of the roller shutter doors are taken from 'Woods practical guide to noise control' (Reference 7) and are shown in Table 8.

8.3 The sound reduction of the lightweight roof panels shown in the same table are taken from Kingspan acoustic data (Reference 8) and are representative of typical metal clad roofing panels.

8.4 The performance of the wall construction is modelled as 5dB better than the roof panel construction. This is a minimum performance requirement and can be achieved with cladding panels or masonry constructions.

Material	Sound reduction in octave bands					
	125	250	500	1k	2k	4k
Roller shutter	8	14	20	26	32	38
Wall Construction	18	23	24	22	39	42
Roof panels	18	19	20	17	35	38

Table 8: Sound reduction of dry storage barn constructions

8.5 The noise levels at the receptors have been predicted using proprietary software, CadnaA (Reference 9). The model used for noise propagation assumed outdoor propagation according to ISO 9613 (Reference 10).

8.6 The predicted specific sound level due to the proposed maintenance activities in the barn are shown in Table 9 for each assessed receptor.

Receptor	Specific sound level, $L_{Aeq,Tr}$ / dB
R1	34
R2	35
R3	32
R4	30
R5	31

Table 9: Predicted sound levels at the nearby residential receptors

8.7 The predicted noise contours are shown in Figure 3 and assumed a height of 1.5m above the ground.

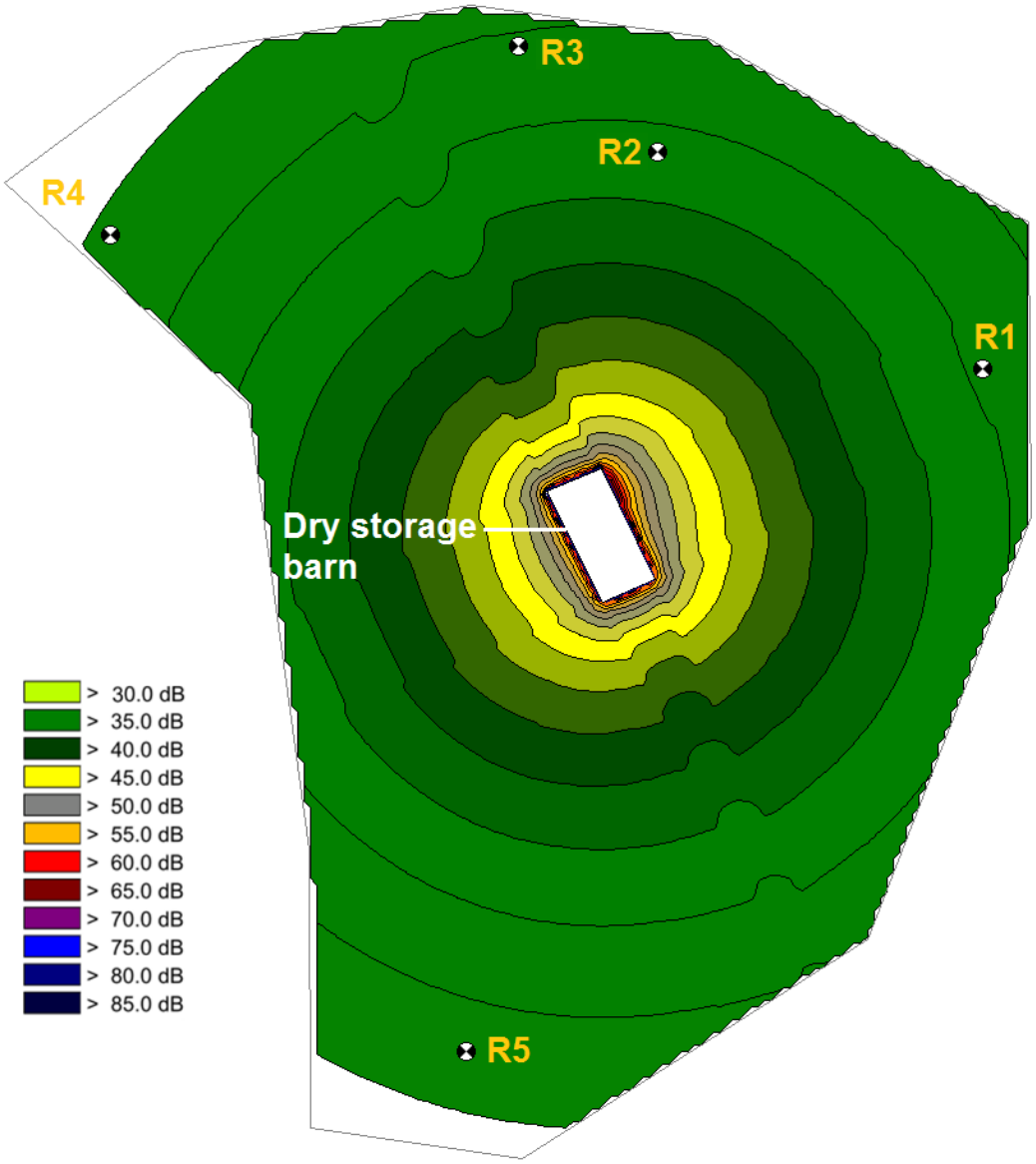

Figure 3: Noise contours due to noise break out from maintenance activities

9. Noise impact assessment for activities in storage barn

9.1 BS4142 compares the predicted rating level of the noise sources with the existing background sound levels at the receptors.

9.2 A rating penalty can be imposed for tonal, impulsive, intermittent or other characteristics, and the likely audibility of the characteristics.

9.3 The predicted noise levels are several dB below the existing background levels and any characteristics would be considered just audible. A penalty of +2dB for tonality and a penalty of +3dB for impulsivity are considered

appropriate. The resulting noise rating levels compared with background levels are summarised in Table 10.

Receptor	Specific sound level, $L_{Aeq,Tr}$ / dB	Rating level, $L_{Ar,Tr}$ / dB	Background sound level $L_{A90,T}$ / dB	Difference / dB	Source of Background level
R1	34	39	43	-4	NML1
R2	35	40	42	-2	NML2
R3	32	37	42	-5	NML4
R4	30	35	42	-7	NML4
R5	31	36	43	-7	NML3

Table 10: BS4142 impact assessment

9.4 The predicted rating levels are all below the measured background levels, which indicates a low risk of adverse noise effects without any additional mitigation.

9.5 The predicted levels and the assessment period assume suitable management of the spaces, which includes keeping doors closed during the noisy activities, and working during daytime hours.

9.6 For the context, predicted specific sound levels are low and predictions assume a worst-case assessment of the noisiest activities. These activities will be temporary in nature and are not expected to occur regularly.

9.7 With regards to uncertainty, the background sound levels at the site were measured at several locations and were very steady and consistent over the measurement period.

9.8 As the predicted rating levels are 2dB or more below the background levels, any variation due to uncertainty is unlikely to result in an adverse effect.

10. Site suitability for proposed new dwellings

10.1 The proposed new dwellings within the development are approximately 10m from Gors Road and the façade closest to the road would be exposed to 55dB

$L_{Aeq,16hr}$ of traffic noise. during the daytime and 48dB $L_{Aeq,8hr}$ of traffic noise during the night-time.(see Table 6)

10.2 This is within TAN11 NEC B, which states:

'*Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.*'

10.3 As the noise levels are at the most within NEC B and also other residential properties already exist along Gors Road, the site is suitable for residential development and planning permission should not be refused on the grounds of noise.

10.4 The predicted traffic noise levels do not include any contribution from barriers such as walls or fences located between the proposed dwellings and Gors Road and these would have a positive effect if they were included as part of the scheme.

12. Conclusion

12.1 An impact assessment was undertaken following the methodology of BS4142 and demonstrates a low risk of adverse noise effects during the potentially noisiest activities, for all existing residential properties. This assumes the activities are undertaken within the enclosed dry storage barn.

12.2 The existing noise levels from traffic noise at the proposed dwelling locations are at the most within Noise Exposure Category (NEC) B from the TAN11 guidance and planning permission should not be refused on the grounds of noise.

13. References

1. Planning Guidance (Wales), Technical Advice Note (Wales) 11, Noise – October 1997.
2. BS4142:2014 Methods for rating and assessing industrial and commercial sound
3. Calculation of Road Traffic Noise, Department of Transport, 1988
4. Transport Research Laboratory / Defra, Method for converting the UK road traffic noise index LA10, 18 hr to the EU noise indices for noise mapping, 2006.
5. Health and safety in motor vehicle repair and associated industries HSE, HSG261, ISBN 978 0 7176 6308 8
6. BS5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
7. Wood practical guide to noise control, Ninth Edition 2005, Ian Sharland
8. Acoustic Performance Guide, Insulated Roof, Wall & Façade systems, Kingspan, June 2005
9. CadnaA environmental noise modelling software, version 4.6, Datakustik GmbH.
10. ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.

14. Appendix 1: Calculation of daytime and night-time levels

Calculation of $L_{A10, 18hr}$ using CRTN shortened measurement procedure

14.1 The shortened measurement procedure outlined in CRTN, paragraph 43 can be used to calculate the $L_{A10,18hr}$ from measurements of the L_{A10} made over any 3 consecutive hours between 10:00 and 17:00. The measured values are shown in Table 5.

14.2 For the shortened measurement procedure, the arithmetic mean of the three noise levels shown is taken and the $L_{A10,18hr}$ calculated from the $L_{A10,3hr}$ as shown in the equation below:

$$L_{A10,18hr} = L_{A10,3hr} - 1 \text{ dB}$$

Calculation of $L_{Aeq, 16hr}$ from the $L_{A10, 18hr}$

14.3 The TRL use the following equations to determine day ($L_{Aeq, 12\ hr}$), evening ($L_{Aeq, 4\ hr}$) and night-time ($L_{Aeq, 8\ hr}$) noise levels from the equations below for different road types.

14.4 For non-motorway roads:

$$L_{day} = 0.95 \times L_{A10,18hr} + 1.44 \text{ dB}$$

$$L_{evening} = 0.97 \times L_{A10,18hr} - 2.87 \text{ dB}$$

$$L_{night} = 0.90 \times L_{A10,18hr} - 3.77 \text{ dB}$$

14.5 Day and evening levels can then be summed with an appropriate time weighting to determine the daytime $L_{Aeq,16hr}$.