

Development of former Goldthorpe School site: Noise Assessment

Warrior Developments Ltd

Echo Acoustics 5 April 2019

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EXECUTIVE SUMMARY

This report presents the results of an assessment of noise arising from the proposed development and operation of a Home Bargains store and a number of small retail/commercial units on the site of the former Goldthorpe school, Goldthorpe, West Yorkshire.

The assessment shows that the site is located in a town-centre location and is affected by traffic and general urban noise.

The assessment finds that general store/retail units' operational noise and customer vehicle noise is unlikely to give rise to significant noise in this busy, urban environment.

Occasional, short-term noise associated with deliveries to the store is considered the most likely cause for potential noise disturbance and appropriate noise control measures are recommended.

Conversely, the assessment suggests that the screening of urban noise by the new building will give rise to a significant improvement in the noise situation for the majority of the residential properties adjacent the site, for the majority of the time.

The assessment concludes that, with the provision of the recommended control measures, the development can be suitably integrated into the local environment and that noise need not be a reason for refusal of planning permission.

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1 INTRODUCTION

Echo Acoustics was commissioned by Warrior Developments Ltd to undertake an assessment of potential noise arising from the operation of “a 1,394 sq.m (gross) retail unit (Use Class A1) and a terrace of 5 No. A1 / A2 / A3 / A4 / A5 units (465 sq.m gross)” to be constructed on the site of the former Goldthorpe School, Goldthorpe, West Yorkshire.

- 1.1 The site is located in an urban area in the centre of Goldthorpe, at the junction of two busy roads, High Street and Barnsley Road; vehicles of every type use the roads and they are generally lined with a variety of commercial uses, some with residential use on the upper floors.
- 1.2 The two roads abound the western and north-western site boundaries respectively, with commercial uses along the north-eastern boundary mixed in with which are a number of residential properties. A church and local Post Office on Market Street adjoin the site's eastern boundary and the southern boundary adjoins the rear gardens of a row of bungalows; a local Asda food store is located on the site's south-western boundary. Noise from traffic on the surrounding roads and passers-by dominates the ambient noise situation.
- 1.3 The site and its surroundings are presented in Figure 1.

Figure 1: Site and its surroundings



- 1.4 The current plans indicate that, the site development will include a large, principal building with a number of small retail/commercial units located on the site's northern boundary with Barnsley Road.
- 1.5 It is our understanding that the store's operational hours will be 8:00am – 10:00pm Monday to Saturday and for 6 hours on a Sunday, between the hours of 10:00am and 5:00pm, yet to be decided. These hours would concur with the observed operational hours of the majority of the surrounding commercial premises, with the exception of fast-food outlets possibly; it is likely that the on-site retail/commercial nits will operate to similar hours. Delivery hours are intended to be 6:00am to 11:00pm.
- 1.6 The proposed site layout is presented in Figure 2.

Figure 2: Proposed layout (Rev C)



- 1.7 This report presents the results of a noise measurement survey and assessment of the potential impact of the store's operation on the adjacent noise-sensitive residential uses.
- 1.8 A Glossary of Acoustic Terminology is presented at Appendix A.

2 GUIDANCE

- 2.1 The assessment of the retail units noise was broadly undertaken using the guidance contained in BS 4142: 2014 *Methods for rating and assessing industrial and commercial sound*.
- 2.2 BS 4142 provides a method for determining the noise arising from an industrial or commercial site, defined as the site's 'specific' noise level ($\text{dB } L_{\text{Aeq}}$) to which is added a correction for tonal, impulsive or intermittent elements, to provide the site's 'rating' noise level ($\text{dB } L_{\text{Ar,Tr}}$).
- 2.3 The rating noise of the industrial or commercial activity under investigation is derived by applying a 'penalty' to tonal, impulsive and intermittent noises, as separate entities. The

simplest method is a subjective assessment with a sliding scale of up to +6 dB for tonal noise, up to +9 dB for impulsive noise and +3 dB for intermittency. The objective methods provided only allow for the assessment of tonal noise. The rating noise level is then compared with the 'background' (dB L_{A90} or 90th percentile) noise level as measured or calculated outside a building, usually a residential property.

- 2.4 The standard indicates significance of noise effects according to varying degrees of "adverse impact": a difference between the background noise and industrial ("rating" noise) of +10 dB *"is likely to be an indication of a significant adverse impact, depending on the context"* whilst *"a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context"* and that *"the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context"*.
- 2.5 The Standard includes a specific requirement that assessments should take account of "context" in determining the significance of any predicted impact, which is critical in providing a reasoned and pragmatic assessment, avoiding rigid adherence to limit values at the exclusion of any other considerations.

3 METHODOLOGY

- 3.1 The assessment incorporated a noise and measurement survey on Monday 1 April 2019, comprising measurement of both day and late evening (9:00pm to 11:00pm) ambient noise on the site.
- 3.2 Measurements were recorded at three locations, presented in Figure 2:
- Location 1 was at the south-eastern corner of the site behind the bungalows and Post Office. Day time and late evening measurements were recorded here.
 - Location 2 was at the rear of the western-most of the bungalows on Market Street. Day time and late evening measurements were recorded here.
 - Location 3 was close to Barnsley Road and in front of the (side) door to 5b Barnsley Road, an apparently residential property. Only daytime measurements were recorded at this location.

Figure 3: Noise monitoring locations



- 3.3 The noise measurement utilised a Casella CEL 633c, Class 1 integrating, averaging sound level meter and Bruell & Kjaer 2258 Class 1 integrating, averaging sound level

meter. The Casella meter was used for locations 2 and 3 and the B&K meter was used exclusively for location 1.

- 3.4 The meters recorded 15-minute noise samples, in the case of location 1, these were continuous, consecutive measurements during the daytime and evening whilst at locations 2 and 3, day time measurements were non-consecutive recordings and the evening measurements at location 2 were continuous, consecutive data recordings.
- 3.5 The meters mounted on a tripod with the tripod at a height of approximately 1.3 metres above the ground. All measurements were 'free-filed' i.e. free from the influence of reflected noise from walls and other vertical structures.
- 3.6 The weather during the survey was dry and cool with negligible wind during the daytime and still, windless conditions during the evening.

4 ASSESSMENT RESULTS / CALCULATIONS

- 4.1 The measurement data are presented in Table 1, with the 'median' 90th percentile noise level identified for each measurement period at each location; this data will be used in the BS 4142 assessment.
- 4.2 The BS 4142 reference period for assessment during the day time is given as 1 hour; in this instance, due to the variability of the noise from road traffic it was considerate suitable to utilise the average data for each measurement period at each location, and these values are also presented in Table 1.

Table 1: Measurement data

Location	Time	Elapsed time	Measured noise			
			L _{Amin}	L _{A90}	L _{Aeq}	L _{AFmax}
1	13:15	15:00	36.2	39.8	47.7	70.7
	13:30	15:00	37.0	39.7	47.4	65.9
	13:45	15:00	38.0	41.2	47.4	71.5
	14:00	15:00	36.8	40.8	48.7	65.6
	14:15	15:00	37.5	40.6	52.1	81.6
	14:30	15:00	36.6	40.0	48.8	75.7
	14:45	15:00	36.8	39.6	43.5	64.3
	15:00	15:00	36.5	39.4	43.2	59.9
			Median:	39.9	48.1	
	21:00	15:00	35.2	38.3	43.8	59.9
	21:15	15:00	32.8	36.7	40.3	53.2
	21:30	15:00	34.2	36.7	40.9	60.9
	21:45	15:00	32.2	35.9	39.5	51.9
	22:00	15:00	31.1	34.6	39.5	51.5
	22:15	15:00	31.5	35.5	40.2	50.7
	22:30	15:00	32.0	34.6	40.5	60.9
	22:45	15:00	30.9	34.1	38.7	47.6
			Median:	35.7	40.7	
2	13:15	15:00	41.0	44.5	49.8	64.8
	13:31	15:00	41.2	45.5	49.4	68.8
	14:30	15:00	43.8	46.5	50.4	67.3
			Median:	45.5	49.9	
	21:00	15:00	39.1	43.0	48.6	67.9
	21:15	15:00	36.8	42.0	47.7	61.8
	21:30	15:00	38.4	42.0	49.8	74.3
	21:45	15:00	36.5	40.5	46.8	61.1
	22:00	15:00	34.1	38.0	45.8	60.0
	22:15	15:00	33.0	38.5	46.4	64.1
	22:30	15:00	33.5	36.5	44.9	56.7
	22:45	15:00	33.1	36.5	44.5	56.0
			Median:	39.5	47.2	
3	13:48	11:17	44.7	48.5	56.4	76.2
	14:00	15:00	44.0	47.5	54.7	72.6
	15:00	15:00	44.1	47.5	55.4	72.8

	15:15	08:51	45.6	49.5	55.6	78.0
			Median:	48.0	55.6	

4.3 The general operation of the store and of the smaller retail/commercial units are unlikely to give rise to significant adverse noise impacts in this busy urban location; noise from the existing, surrounding commercial uses, mixed domestic noise and vehicle noise created a highly variable, at times significantly elevated, noise environment against which the slow movement of vehicles in the car park is likely to be significantly audible.

4.4 Deliveries, entailing the operation of medium-sized delivery vehicles, operating in close proximity to the rear of the bungalows, are likely to be the most significant cause of any noise effects.

4.5 The operation of fixed plant equipment, used principally for ambient space cooling and heating during store opening hours, is an additional potential cause of noise but as Home Bargains, the proposed end-user of the store, does not sell fresh or frozen produce, refrigeration plant equipment, that might operate overnight will not be required.

Delivery noise

4.6 With respect to the delivery noise, previous measurement of the arrival of a delivery vehicle (heavy goods vehicle), typical of the type of vehicle that might be operated by Home Bargains, showed the noise level to be **78 dB L_{Aeq} at 10 metres**. Measurement of delivery off-loading, taking approximately 25 minutes from arrival to completion, recorded a noise level to be **71.0 dB L_{Aeq} at 5.6 metres from the delivery ramp** of the vehicle. The nearest noise sensitive receptors for arrival of a vehicle will be approximately 10 metres and, for delivery off-loading from where the plans indicate goods will be off-loaded, will be the rear façade of the closest bungalow, approximately 30 metres away.

4.7 The delivery vehicle noise needs no adjustment but a distance-correction for the difference between the 5.6 metre off-loading measurement position and the 30 metre receptor location, assuming a 'point-source' of noise, calculated that the delivery off-loading noise would be 56.4 dB L_{Aeq}. The rattling of the cages produced a distinctive impulsive noise to which it was deemed appropriate to add a +3 dB 'character correction'. This produces a 'rating noise level' of **59.4 dB L_{Ar, Tr}**. Both the delivery vehicle arrival and off-loading give rise to noise that is more than 10 dB greater than the measured background noise level at Location 1 and, consequently, is a positive indication of an adverse effect.

4.8 However, the situation is complicated by two qualitative aspects; the first is that the proposed building will give rise to a significant reduction in noise, associated with vehicle movements and commercial activities on Barnsley Road and High Street, such that for the majority of the time, the ambient noise situation at the rear of the bungalows will be very significantly improved.

4.9 Conversely, this would give rise to a reduced 90th percentile noise levels at the bungalows against which, on paper, the store delivery noise would be predicted to have a greater impact.

- 4.10 On balance, it is suggested that the longer-lasting improvement in ambient noise for the rear areas the bungalows is of greater import than the limited disturbance from the delivery activities; evidently, not all residents might agree but, from an objective stand point, this seems a reasonable inference to draw.
- 4.11 Notwithstanding this, it is suggested that the bungalows should be protected from delivery noise as far as is reasonably practicable. This can be achieved by two means.
- 4.12 Firstly, by the provision of a 2.5 metre-high noise barrier along the rear garden boundaries of the bungalows and around the service yard, additionally protecting the rear of 5a and 5b Barnsley Road. The extent of this is indicated by the dashed tallow line in Figure 4.

Figure 4: Indicative extent of noise barrier



- 4.13 Secondly, it is recommended that a delivery and store Noise Management Plan be produced; this should include:
- The use of broad-band/white noise manoeuvring alarms.
 - Radios to be turned off prior to arrival at site.

- No excessive revving of engines.
- Vehicles to not be left with engines idling un-necessarily.
- No sounding of horns on site.

4.14 This list is not exclusive and the applicant may seek to add other conditions in, as appropriate. For example, in view of the setting, it would be appropriate for the Management Plan to control general employee activity noise in the rear yard, with respect to the movement of materials and depositing of waste etc.

Fixed plant equipment noise

4.15 The design and specification of any externally-mounted fixed plant equipment is currently unknown; it is likely that this will be located on the roof or at the rear of the building. Modern cartridge/cassette ambient cooling/heating heat exchangers are not particularly noisy in operation. However, as a purely precautionary measure, in order to prevent adverse noise effects, it is recommended that these units be mounted at ground level on the northern side of the building, facing Barnsley Road.

4.16 If this is not possible and they are located in such a position as to have line of sight of the bungalows, then they should be specified and designed to achieve a rating noise level 5 dB below the median evening 90th percentile level of 35.7 dB L_{A90} at location 1, namely a rating level of 30.7 dB $L_{Ar,Tr}$; it is not considered reasonably practicable or necessary to specify a level lower than this as that is a very low noise level for this neighbourhood. This should be relatively readily achievable, even if that necessitates the use of acoustic screening around the units, although it is considered unlikely that this will be necessary.

5 CONCLUSION

- 5.1 An assessment has been undertaken to determine the potential noise effects, on properties adjacent to the proposed Home Bargains store on the site of the former Goldthorpe school, West Yorkshire.
- 5.2 The assessment has shown that:
1. The noise associated with slow-moving vehicles in the car park is unlikely to have a significant effect in this busy town-centre location.
 2. The day time and evening operation of the small retail/commercial units on the northern boundary of the site are unlikely to have a significant effect in this busy town-centre location.
 3. The noise associated with deliveries between 6:00am and 11:00pm may give rise to occasional, short-lived noise disturbance affecting residential properties backing onto the service yard and its access road; control measure recommended, to reduce the likelihood of disturbance, include the provision of a 2.5 metre-high noise barrier (Figure 4) and a delivery and store Noise Management Plan.
 4. The assessment suggests that, beyond the occasional disturbance associated with deliveries, the construction of the store may improve the noise situation at the rear of the bungalows on Market Street, by screening traffic and general urban noise from High Street and Barnsley Road.
 5. Fixed plant equipment, operating during store opening hours only, has yet to be designed but it is recommended that this be installed at ground level on the store's northern façade or, where this is not possible, that the equipment should be designed and located so as to prevent disturbance to local residents. A recommended rating noise level of 30.7 dB $L_{A,Tf}$ has been calculated for noise from any such equipment affecting the rear facades of adjacent residential properties.
- 5.3 In conclusion, it is considered that the proposals for operation of the store may give rise to limited short-duration disturbance for local residents adjacent to the site, but would also improve the situation the noise situation for these properties for the majority of the time.
- 5.4 With the provision of the recommended control measures, the assessment concludes that the development can be suitably integrated into the local environment and that noise need not be a reason for refusal of planning permission.

6 APPENDICES

Appendix A: Glossary of Acoustic Terms

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals (μPa), the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A) / A-weighting: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change (in steady noise) of 3 dB(A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to halving or doubling the *loudness* of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A)¹.

L_{A10} : the 10th percentile noise level – a statistical parameter describing the noise level exceeded for 10% of the measurement period. In CRTN, the L_{A10} [18-hour] is based upon the $L_{10, 1h}$, the hourly 10th percentile level.

L_{A10} [18-hour]: The average of the values of the hourly L_{10} for each of the eighteen one-hour periods between 06:00 to 24:00 hours

$L_{Aeq,T}$: the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). L_{Aeq} is used to describe many types of noise and can be measured directly with an integrating sound level meter.

Noise: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

Sound / sound pressure: a fluctuation in air pressure over the static ambient pressure.

Sound pressure level: the sound pressure relative to a standard reference pressure of 20 μPa (20×10^{-6}) on the decibel scale.

¹ DEFRA, (1997). Planning Policy Guidance Note (PPG) 24 "Planning and noise". TSO, London