



Savills

Noise Impact Assessment

Old Cambus West Mains, Cockburnspath

11656201/NJM/R1 – 16th July 2021

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Document Control Sheet

Identification	
Client	Savills
Document Title	Noise Impact Assessment, Old Cambus West Mains, Cockburnspath
Client Reference	11656201/NJM/R1

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Configuration				
Version	Date	Author	Reason for Issue/Summary of Changes	Status
V1	16-Jul-21	N. MacDonald		FINAL

	Name	Job Title	Signature
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1. Introduction

- 1.1 Bureau Veritas was instructed by Savills on behalf F J Usher's Children's Trust to undertake a noise impact assessment for a proposed residential development in Old Cambus West Mains, Cockburnspath.
- 1.2 A glossary of acoustic terminology is included as Appendix A. The assessment criteria applicable to this site are reproduced in Section 3.
- 1.3 Scaled site plans of the proposed development were supplied by Savills. A copy of the proposed site plans can be found in Appendix C.
- 1.4 This assessment looks to establish the following:
 - Daytime background noise levels at the nearest sensitive receptors;
 - Impact of Industrial Noise.

2. Description of Site and Noise Sources

- 2.1 The proposed residential area is bounded by the A1107 road to the west, a rural access road to the south, TD Tree & Land Services LTD and R&K Drysdale to the east and site access to the north. The proposal is understood to consist of 2 dwelling houses.
- 2.2 TD Tree & Land Services Ltd. is a tree surgery and arboriculture contracting service, whereas R&K Drysdale is an agricultural business specialising in the growing of swede, kale and sprouts.
- 2.3 It is understood that the services provided by TD Tree & Land Services Ltd is predominately undertaken offsite. This was confirmed during our 3-hour site visit as no processes were witnessed or audible from the site. Furthermore, it is understood from the website that the opening hours are between 8am and 4pm, Monday to Friday, therefore, it is assumed there will be no impact from TD Tree & Land Services. However, if information arises that processes are undertaken out with opening hours, the assessment should be updated to reflect the potential impact.
- 2.4 Several processes are undertaken at R&K Drysdale, however, noise levels arising from HGV movements, reverse alarms and loading/unloading at R&K Drysdale were audible from site.
- 2.5 Ambient noise levels were measured at the proposed development site in order to establish typical background noise levels. During our site visit it was noted that the noise is dominated from distant road traffic and animal noise.

3. Criteria for Noise Assessment

- 3.1 Bureau Veritas have been commissioned to help with planning permission to undertake a noise impact assessment with a view to establishing whether the proposed development site is suitable for residential dwellings.
- 3.2 From experience it is considered that the assessment should conform to the following;
- BS 4142:2014+A1:2019, "Methods for rating and assessing industrial and commercial sound"
 - British Standard BS 8233: 2014, "Guidance on sound insulation and noise reduction for buildings";
 - WHO night noise guidelines for Europe.

Industrial Noise

- 3.3 BS 4142 sets out a method for assessing the likelihood of complaint from industrial noise. It compares the Rating Level of the noise source under investigation with the Background Sound Level. The Rating Level is obtained by measuring or predicting the Specific Noise Level from the source, in terms of $L_{Aeq,T}$, and applying a correction factor to account for the acoustic character of the noise.
- 3.4 The standard states that certain acoustic features can increase the significance of impact and hence a correction should be applied if the noise in question contains any tonality, impulsivity intermittency or has any other specific sound characteristics. The Background Sound Level is the $L_{A90,T}$ measured in the absence of the source.
- 3.5 The Background Sound Level ($L_{A90,T}$) is then arithmetically subtracted from the Specific Noise Level. The difference between the two is considered to reflect the likelihood of complaints. The standard states the following:
- "a) Typically, the greater this difference, the greater the magnitude of the impact.*
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) 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."

External and Internal Criteria

- 3.6 BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings," provides recommendations for the control of noise in and around buildings. The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings.
- 3.7 BS 8233:2014 suggests that an internal noise level of 30 dB $L_{Aeq,T}$ within bedrooms is desirable for the night-time, between 23:00 and 07:00. For living rooms and dining rooms, a design target of 35 dB and 40 dB $L_{Aeq,T}$ respectively is desired for the daytime, between 07:00 and 23:00.
- 3.8 BS 8233 further states that gardens should not exceed an upper limit of 55 dB L_{Aeq} with a noise level of 50 dB L_{Aeq} or less desirable. Please note these limits only apply to daytime noise levels.
- 3.9 Furthermore the World Health Organisation (WHO) "Guidelines for Community Noise," states that in dwellings, the critical effects of noise are on sleep, annoyance and speech interference. To protect the majority of people being awakened at night, noise events should not exceed 45 dB $L_{A,max}$.

4. Noise Survey

Background Noise Survey

- 4.1. Daytime background measurements were taken at the closest proposed location to the industrial works i.e. Plot 2 on the 15th July 2021.
- 4.2. The noise monitoring equipment was calibrated before and after the measurement surveys using an acoustic calibrator, which had itself been calibrated against a reference set traceable to National and International Standards. It is considered that no unusual events occurred during the survey periods and the measurement data are considered to be a true and a fair representation of the industrial and background noise levels. No significant drift in calibration level was observed.
- 4.3. The sound level meter was set to record a 1-hour (daytime) interval value for the measurement period for the day, for the L_{A90} , L_{Aeq} and L_{Amax} indices.
- 4.4. Ambient noise measurements were made in free-field conditions with the sound level meter mounted on a tripod 1.5m above local ground level. The weather was dry and sunny with a breeze of <5m/s and considered conducive to environmental noise monitoring. A protective windshield was also fitted to the microphone.
- 4.5. It was noted while on site that the ambient noise climate at nearest sensitive receptor is dominated by distant road traffic noise and animal noise. The measurement locations are displayed in Appendix C.
- 4.6. The results of the daytime ambient noise measurements are details in Table 5.1 below.

Table 5.1: Daytime Ambient Noise Levels

Date	Time	Duration	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFmax} (dB)	Notes
14-Jul-21	10:35	1hour	37.6	31.8	59.6	Distant Road traffic noise.

Industrial Noise Measurements

- 4.7. Short term industrial noise levels were taken at the property boundary and the approximate location of the nearest proposed façade. Short term measurements were taken to ensure that only noise levels from the industrial site were measured. These are highlighted in Appendix C. A summary of the measurements can be seen below. During the monitoring, HGV movements and alarms were faintly audible and almost continuous.

Table 4.2: Industrial Noise

Location	Duration	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFmax} (dB)	Notes
1	15sec	32.6	30.6	39.1	HGV Movements at boundary
2	15sec	34.1	31.4	39.9	HGV Movements at Façade

- 4.8. Night-time ambient noise monitoring was not required as it is understood that the industrial businesses do not operate between 23:00 and 07:00.

5. Discussion / Mitigation Measures

Criteria

- 5.1 Internal and external noise levels have been assessed with respect to the criteria taken from BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings". The criteria are summarised below.

Table 5.1: BS 8233:2014 Criteria

Location	Activity	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Living Room	Resting	35 dB $L_{Aeq,16hr}$	-
Dining Room/area	Dining	40 dB $L_{Aeq,16hr}$	-
Gardens	-	50-55 dB $L_{Aeq,16hr}$	-

- 5.2 The now surpassed, BS 8233:1999 stated that a partially open window, which allows ventilation provides approximately 10 – 15 dB(A) attenuation, for the purposes of this assessment we have assumed 13 dB(A) attenuation.

Industrial Noise Assessment

Industrial Noise – External Levels

- 5.3 Noise levels at the proposed site were measured to be 34.1 dB when only the HGV operations were audible.
- 5.4 Table 5.2 below shows the results of a daytime BS 4142 assessment for noise arising from the industrial property, R&K Drysdale at the closest proposed plot during the daytime.

Table 5.2: BS 4142 assessment

Results	Noise Level	Notes
Residual Sound Level (L_{Aeq})	37.6 dB	Taken from Table 4.1
Specific Sound Level (L_{Aeq})	34.1 dB	Highest noise level taken from Table 4.2
Character Correction	+3.0 dB	Correction added for impulsivity
Rating Level (L_{ArT})	37.1 dB	
Background Sound Level (L_{A90})	31.8 dB	Lowest Level from Table 5.1
Excess of rating over background sound level	+5.3 dB	Assessment indicates adverse impact . However, this does not include the context below.
Context	During the daytime, the desirable noise level for garden amenity as stipulated in BS8233 is 50 dB and it can be seen that the Specific Noise Level of the HGV operations is likely to meet this. The Specific Noise Level is lower than the Residual Noise Level and would suggest that the surrounding noise i.e. distant road noise and animal noise will mask the noise from the industrial site.	

*Note: All noise levels rounded to the nearest whole number in line with BS 4142 requirements

- 5.5 BS 4142 stipulates that "A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context."

- 5.6 Given the context and considering that garden amenity levels can be comfortably met and the fact the Residual Sound Level is higher than the Specific Level i.e. noise from distant road and animal noise will mask noise levels from the industrial site, it is considered that the impact of the Industrial unit will be low. Additionally, it is worthwhile noting that BS4142 is an external noise assessment and it can be argued that it is of greater importance to meet internal noise levels.

Industrial Noise – Internal Levels

- 5.7 The BS 4142 assessment described above only assesses external noise impacts, therefore an assessment of internal noise levels has also been undertaken and the levels benchmarked against the BS 8233 criteria.
- 5.8 As previously discussed, we have assumed a partially opened windows provides 13 dB of attenuation. Internal noise levels have been calculated for the proposed dwellings and the results are shown in the Table 5.3 below.

Table 5.3: Calculated Internal Noise Levels

	Tennent's Distribution Depot
External Level at Plot 6 $L_{Aeq,t}$ dB	34
Open Window Attenuation dB	-13
Internal Level $L_{Aeq,t}$ dB	21
Day-time BS 8233 Criteria $L_{Aeq,t}$ dB	35
Criteria Met?	✓

- 5.9 It can be seen from the table above that internal levels can be met with windows partially open for the industrial sources from the R&K Drysdale site.

6. Conclusions

- 7.1 Bureau Veritas have undertaken a noise impact assessment for a proposed residential dwellings at Old Cambus West Mains, Cockburnspath.
- 7.2 Background noise levels were measured on the 15th July 2021 in the absence of any industrial noise. Additionally, short term measurements of the R&K Drysdale industrial site were also captured at the proposed location. Noise levels from TD Tree & Land Services Ltd. were not audible or any processes witnessed whilst on site.
- 7.3 Using the background measurements, a BS 4142 assessment was undertaken to assess the impact of industrial noise. The assessment showed that the impact of the processes during HGV operations from R&K Drysdale was considered to have a low impact given the context i.e. the Specific Noise Level was at least 3 dB below the residual i.e. the distant road traffic and animal noise, which will help will mask the HGV operations. Furthermore, criteria stipulated within BS8223 i.e. external and internal noise levels were calculated to meet the desired noise limits.
- 7.4 The noise impact assessment therefore suggests that noise from the industrial site will have a low impact at the nearest noise sensitive receptors for the daytime.

Appendix A

Glossary of Acoustic Terminology

"A" Weighting (dB(A))	The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of the risk of damage to hearing due to noise.
Decibel (dB)	The range of audible sound pressures is approximately 2×10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB. Mathematically: Sound Pressure Level (dB) = $20 \log \{p(t) / P_0\}$ where $P_0 = 2 \times 10^{-5}$ Pa
Frequency (Hz)	The number of cycles per second, for sound this is subjectively perceived as pitch.
Frequency Spectrum	Analysis of the relative contributions of different frequencies that make up a noise.
$L_{eq}(T)$	The equivalent continuous sound level. It is that steady sound level which would produce the same energy over a given time period T as a specified time varying sound.
$L_{Amax}(T)$	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
L_{AE} or SEL	A measure of A-weighted sound energy used to describe noise events such as the passing of a train or aircraft; it is the A-weighted sound pressure level which, if occurring over a period of one second, would contain the same amount of A-weighted sound energy as the event. The relationship between $L_{Aeq}(T)$ and SEL is as follows: $L_{Aeq}(T) = 10 \log [\text{antilog } SEL_n/10 + \text{antilog } SEL_n/10 + \dots]$ Total time period in seconds where SEL_n is the measured single event level for a given event
$L_{A10,T}$	Road traffic noise level. The A-weighted sound pressure level of the residual noise in decibels exceeded for 10% of a given time interval.
$L_{A90,T}$	Background noise level. The A-weighted sound pressure level of the residual noise in decibels exceeded for 90% of a given time interval.
Noise	Unwanted sound.
Octave Band	A range of frequencies defined by an upper limit which is twice the lower limit. Octave bands are identified by their centre frequency.
R_{TRA} (dB)	The Traffic Noise Reduction Sound Insulation is derived by taking into account a typical spectrum of road traffic in town and city centres
R_W (dB)	The weighted sound reduction incorporates a correction for the ear's response and has been derived in accordance with BS 5821:1984.



Specific Noise	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
Rating Level, $L_{A,T}$	The specific noise level plus any adjustment for the character of the noise.
Ambient Noise	Totally encompassing sound in a given situation at any given time composed of noise from many sources, near and far.
Residual Noise	The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.



Appendix B

Schedule of Monitoring Equipment

Noise Equipment

Brüel and Kjær Sound Analyser Type 2260	Serial Number 2520445
Brüel and Kjær Microphone Type 4189	Serial Number 2719881
Brüel and Kjær Sound Level Calibrator Type 4231	Serial Number 2438977
Brüel and Kjær Sound Analysis Software BZ 7202 (version 2)	

Appendix C

Site Plan (not to scale)

