

ACOUSTIC ASSESSMENT
HALLAM JOINERY – EGTON

November 2014



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ACOUSTIC ASSESSMENT – HALLAM JOINERY – EGTON - NYM

Background

Hallam joinery is located in commercial premises at the rear of Kirkdale Cottage, Egton.

Between 1987 and 2008 the premises functioned as a BATA Agricultural Store (Brandsby Agricultural Trading Association Ltd). The facilities were open between 08:00 and 18:00 when typically 40 to 50 vehicles/day would arrive for deliveries and collection of agricultural materials. The vehicles ranged from heavy goods vehicles through to vans and tractors and these were loaded with a diesel fork lift truck. The main delivery was by heavy wagon and took place at 05:30 am.

BATA ceased operation in 2008 due to the death of the owner but it was always intended that the premises should be used for commercial purposes and commercial rates have been paid continuously.

Hallam Joinery has occupied the premises for approximately 6 months.

Hallam Joinery

Hallam Joinery is operated by Mr Jack Hallam who is a sole trader and the only employee. He specializes in the maintenance of properties within the North York Moors National Park with particular emphasis on retaining and maintaining the character of properties to the standards required by the Park Authorities. The work involves the custom manufacturer of windows and doors and as such is specialized and demanding of a high level of skill. Much of his work is at the instigation of, or originates from, the NYM Park Authorities.

The joinery workshops are only used intermittently as a significant proportion of Mr Hallam's time is spent out at client's properties.

Complaints

An acoustic report should ideally provide an objective assessment of the environmental impact of a specific noise source but in this case an unusual noise complaint has been received which needs to be put into context.

There are two cottages and a house in close proximity to the Joinery. A noise complaint has been received from an occupant of one of the cottages. The individual concerned sold, installed and set up equipment for Mr Hallam and for several months was very supportive. There were no conflicts until the complainant decided to sell up and move back to Australia whereupon it is believed that he perceived the presence of a commercial enterprise located close to the cottage would seriously jeopardize a sale.

In the pursuance of this assessment several attempts were made to contact the complainant with a view to investigating the complaint in detail by installing monitoring equipment within his properties. Telephone calls were not answered and there was no response to messages left on the

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answerphone. It is known that the complainant was around at the time of some of the calls and it can only be assumed that there was an unwillingness to assist in the investigation.

For most of the duration of this assessment the complainant was absent but his dogs remain at the property and their barking introduced some difficulties in the measurement process.

The other residents living close to the joinery have both indicated separately that they have no issues whatsoever with any noise emanating from the Joinery.

Procedure

The variability in the activities at Hallam Joinery necessitated long term monitoring to determine the noise profile. Ideally a logging monitor would be used at the noise sensitive location but issues with barking dogs, other extraneous noise sources, weather conditions and security made this difficult.

The adopted approach was therefore:

- Install a logging sound level meter inside the Joinery over a two week monitoring period
- Support the internal noise profiling with a written log of the activities undertaken.
- Supplement the logging with simultaneous noise logging within the affected properties.
- Carry out specific tests to correlate the internal noise with environmental impact at the sensitive locations.
- Estimate the environmental impact from the internal noise levels.
- Carry out an environmental impact assessment

Noise logging was carried out in 1 minute intervals whereas during the specific activity tests 1 second time intervals were used.

Measurement logging results

The Joinery internal noise profile as measured over the two week period is shown in Figures 1 to 13 (blue traces).

A second logging meter was introduced on Sat 8th – Fig 6. Initially this was held in the Joinery office until Sunday at 11:30 when it was installed in the bedroom of Kirkdale Cottage. The bedroom faces onto the yard between the cottage and the Joinery. Data from the 2nd monitor is shown as orange traces in Figures 6 to 13.

The bedroom window is normally closed except on Fri 14th when the window was open in the early part of the day and closed at 11:00. There was no activity in the Joinery on this day and the traces, which do show some correlation, reflect the adverse weather conditions (wind and rain). For the remainder of the period when simultaneous monitoring was carried out there was no correlation whatsoever between the noise levels in the Joinery and the noise levels inside Kirkdale Cottage.



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Specific measurements

The logging sound level meters were set to log levels at 1 second periods. One remained in the Joinery at the same position used throughout for internal logging whilst the 2nd was located at 1 m from the façade of Kirkdale Cottage.

The tests focused on the noise from the main machinery which is in fixed positions. These are the most significant noise sources. It was beyond the scope of this assessment to include bench working although this is regarded as of secondary importance as the internal levels due to bench working are lower than the main machinery noise.

The principle results of the specific tests are shown in Figure 14.

Due to the barking dogs it was not possible to attend the external noise measurement and some external results were compromised by the arrival of a vehicle during the tests (see Fig14). This is not regarded as a problem as discussed below.

The most important observation of the specific measurements is that whilst the planing activity has a clearly identified impact on the environmental levels this is not the case for the cross cut saw and spindle moulder activities starting at ~11:37 even though the Joinery internal levels appear to be similar.

The explanation for this may be found in Fig 15 which shows the spectral data for the environmental noise. The planing activity noise is dominated by the 160 Hz and 315 Hz 1/3 octave bands and furthermore when the 160 Hz level is high the 315 Hz dips and vice versa. Previous experience suggests (but needs to be confirmed) that this is interaction between the planer blade pass and the dust extract system. These components are absent from the spindle moulder and cross cut saw noise.

Figure 15 is displayed over a longer time scale to illustrate the environmental issues with the barking dogs as soon as the instrument was attended.

Noise from within the joinery is attenuated by the building. Measurements of the attenuation were made by use of a 'pink' noise source located at the planer position and the 1/3 octave spectrum levels measured internally and environmentally. The difference between the internal level and the environmental level (referred to as the 'apparent building attenuation') are shown in Figure 16. Also shown in this diagram are the 'A' weighting corrections and the combined correction to enable the external level to be estimated from the internal linear levels (Fig 15). It is clear that the lowest overall attenuations occur in the 160, 315 and 400 Hz bands.

Returning to Figure 14, the chart also shows the difference between the planing internal noise and the environmental noise together with an average attenuation line of 32 dB.

The results of the tests may be summarized as follows:

- The greatest impact on the environment results from planing with dust extraction.
- An attenuation of 32 dB is the **minimum** reduction of the measured internal noise level when estimating the environmental impact.



BS4142 assessment

The assessment has been carried out at the façade of Kirkdale Cottage – Location A on Figure 0. The assessment is based on levels calculated from the internal levels within the joinery corrected by a minimum attenuation value determined from noise impact measurements during specific activities. The use of a minimum attenuation value ensures that the calculation represent a worst case scenario.

Noise levels within the joinery are very variable depending on the activity taking place. BS4142 allows some compensation for the variability by using a reference time period (daytime) of 1 hour. The data acquired over the two week monitoring period has been used to calculate the 1 hour Leq of the specific noise (joinery) at receptor A. The results are shown as red traces on Figures 1 to 13. Note that the level at any time on the trace provides the 1 hour Leq for the hour preceding that time.

Throughout the two week period the predicted levels at the receptor point vary between <20 dBA to a maximum of 44 dBA. A correction of -3 dB needs to be applied to correct for the proximity of the Cottage façade (1m) and at the highest level (planer noise) an acoustic feature penalty of +6 dB is incurred due to the tonal content of the noise (detectable by ear but refer also to Fig 15). The range of the specific noise over the two week period is therefore <20 dB to 47 dB.

The background level, (L90(A)), at the receptor was ascertained to be 30 dBA. This low level would be expected for a rural location.

BS4142 Assessment Summary		
	Minimum rating	Maximum rating
Background noise level	30 dB	30 dB
Reference time interval	1 hour	1 hour
Specific sound level	<20 dB	41 dB
Acoustic feature correction	0 dB	+ 6dB
Rating level	<20	47 dB
Excess of rating over background	< -10	17 dB
Expected reaction	None	Significant adverse
Applicable time	93% (marginal significance or less)	<4%

Whilst this assessment shows that there could be a significant adverse reaction to the highest specific noise levels, there is no allowance for either the duration of the high noise or the low absolute level.

An excess of rating over background of 3 dB is regarded as of marginal significance. In this case, the corresponding specific noise level would be 33 dB and the façade level would be 36 dBA. Figure 17 shows the cumulative distribution curves of the internal and predicted external levels which shows that 36 dBA is exceeded for only about 7 % of the time or <40 minutes per day. Therefore noise

levels greater than 'of marginal significance' occur on average for less than 40 minutes. The duration of planer noise averages out to only a few minutes each day.

Acoustic assessment - general

Whilst BS4142 'Methods for rating and assessing industrial and commercial sound' has long been used in an effort to provide an objective rating and assessment of the likelihood of complaints it has also been recognized as having serious shortcomings. In particular BS4142:2014 states:

'Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background.'

This is clearly the case in rural environments where any noise inevitably exceeds the background levels.

BS4142 also focuses on the assessment of specific noise sources that are effectively continuous (whether steady or cyclic) and occasional or intermittent noise is inadequately addressed except perhaps where sleep disturbance might be an issue.

The Institute of Environmental Management and Assessment published their guide 'Guidelines for Environmental Noise Impact Assessment in October 2014. These Guidelines identify all the factors that should be considered in an acoustic assessment but the emphasis is very much towards subjective rather than objective assessment.

Whereas BS412 attempts to provide a noise rating for the environmental noise outside a sensitive location, the IEMA places more emphasis on behavioural aspects e.g. the magnitude is described as 'Slight' and the 'Receptor perception = Non-intrusive' when:

'Noise impact can be heard but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.'

In this latter respect, the monitoring inside Kirkdale Cottage demonstrated beyond doubt that the impact in the cottage from the Joinery was negligible with the windows closed. With the windows open the impact would be unlikely to exceed the 'slight' rating.

BS4142 has indicated that an adverse impact might occur for short periods outside the property in the yard facing the Joinery but this area is used for access and is not regarded as an area where residents would spend recreational time. During the investigation human presence in the yard created much more significant noise disturbance from barking dogs than from the Joinery.

It was hoped to monitor the noise in the annex marked B in Figure 0. This is overspill sleeping accommodation for the complainant's property. It was not possible to do this due to failure of the complainant to respond to telephone calls but the internal noise levels should not differ substantially from those in Kirkdale Cottage as there are no windows facing the source. Some concern has been expressed that there may be flanking noise transmission between the wall of the Joinery and the annex through a linking support wall. If so this link can be severed. Furthermore the annex will not be affected during the night time period when it is most likely to be occupied.

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This acoustic assessment has been carried out at the request of the North York Moors Planning Authority in respect of an application for a change of use of commercial premises. The data gathered provides strong evidence to suggest that the acoustic impact of the Joinery is less than that of its previous use as an agricultural store which involved the many vehicle visits and loading with a diesel fork lift truck.

Mitigation

Whilst there is no evidence that any mitigation is necessary it is worth noting that there is scope for a reduction of noise emission from the Joinery should this prove necessary in the future.

The upper section of wall facing the residential properties is of corrugated metal construction and has a large number of ventilation gaps which appear to be covered by polythene sheet. The sound insulation of this wall could be significantly improved by closing the gaps and adding a section of stoothing wall faced with plasterboard.

It would be possible to construct an enclosure within the building to house the noisier equipment.

Acoustic assessment – summary and conclusions

In the opinion of the author there is no indication that the activities of the Joinery should result in any adverse reaction from a normal member of the public and environmental noise impact should not therefore adversely influence the Planning Application.

Considerations in arriving at this conclusion are summarized below.

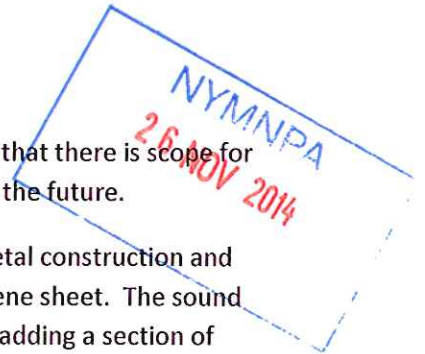
Although no 'original use' data is available it is strongly believed that the application for 'change of use' of the premises results in a lower environmental noise impact than that for which planning permission currently exists.

An assessment according to BS4142 shows that for very short periods the exceedance of the noise from the joinery over the background noise level could theoretically give rise to complaint but this is a case where the use of BS4142 is open to question. The absolute noise levels are low and the duration of any adverse levels is short. Typically the overall noise impact is no worse than normal domestic noise impact resulting from lawn mowers, motor vehicles, DIY and barking dogs etc.

Assessment using the IEMA 'Guidelines for Environmental Impact' indicates that the environmental noise impact is at worst 'slight'.

Inside the Cottages there is no evidence of any noise impact and the external areas mostly affected are not areas which require peace and quiet for recreational purposes.

The complaint that has been made comes from a resident who was originally very supportive of the Joinery but is now moving to Australia. He will not therefore be affected by any noise issues in the future but is concerned that the return of the premises to commercial use may jeopardize the sale of his property.



Other residents living close to the Joinery have dismissed noise as an issue and have given unsolicited support for the venture.

Geoff Taylor BEng, PhD, CEng, MIMechE, MIOA
GT Acoustics



Instrumentation

The primary instrumentation used in this investigation comprised Larson Davis Sound Level Meters – Types 820, 824 and 831.

All instruments are Type 1 Sound Level Meters. They are fully calibrated by a UKAS accredited calibration service and remain within the accepted calibration periods. Each instrument was checked calibrated before and after use.

Full details of the instrumentation are available on request.

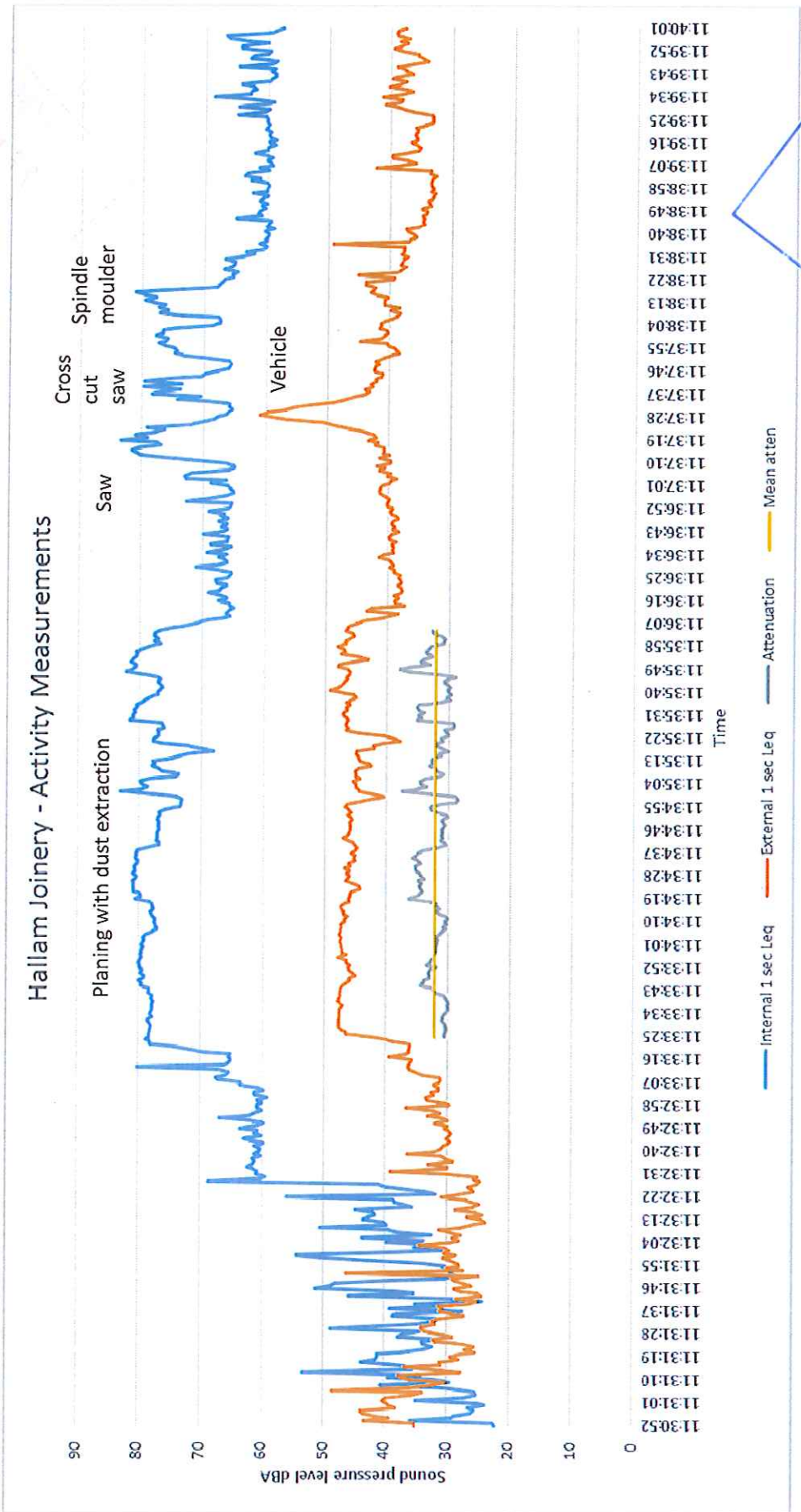
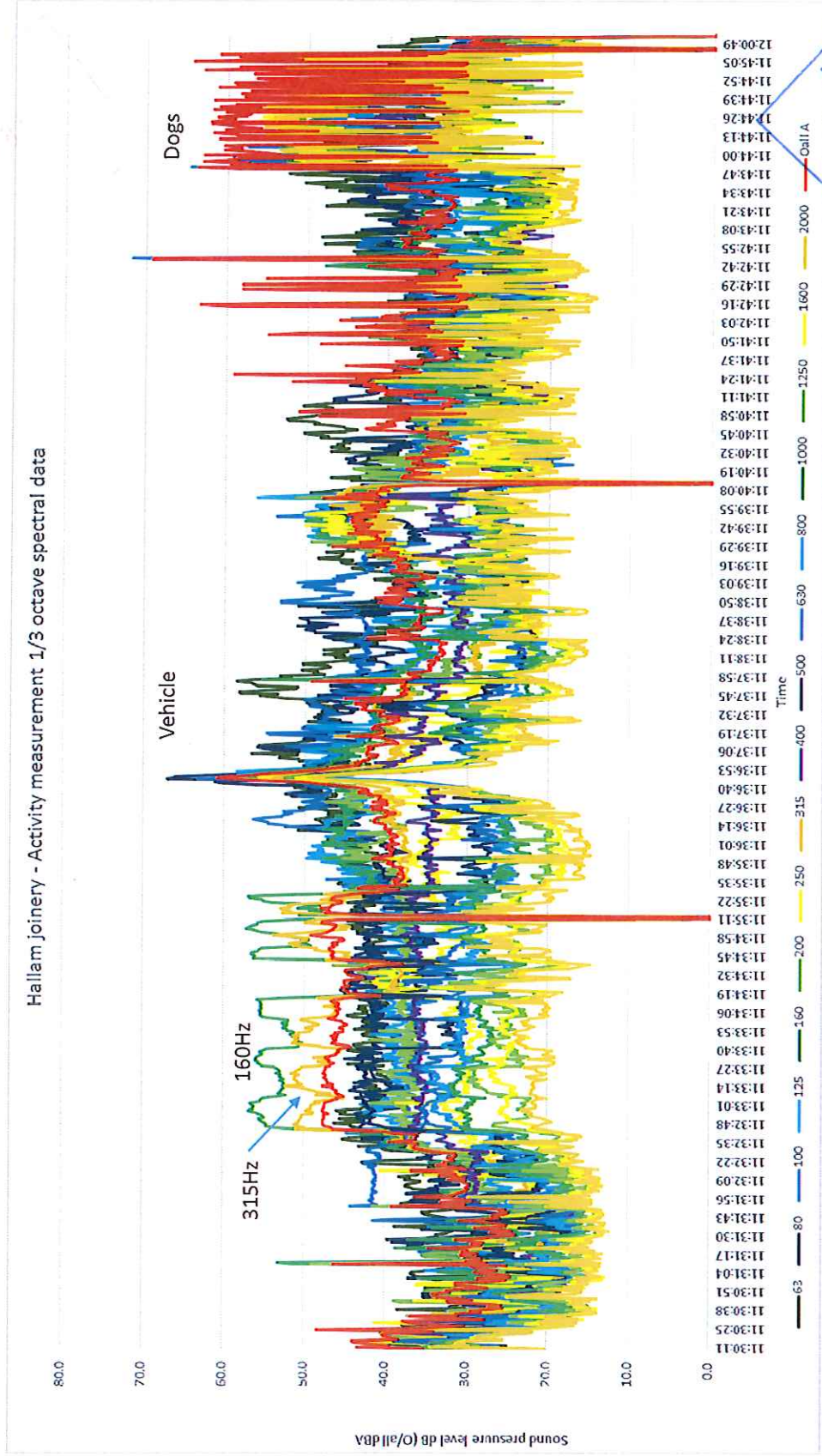
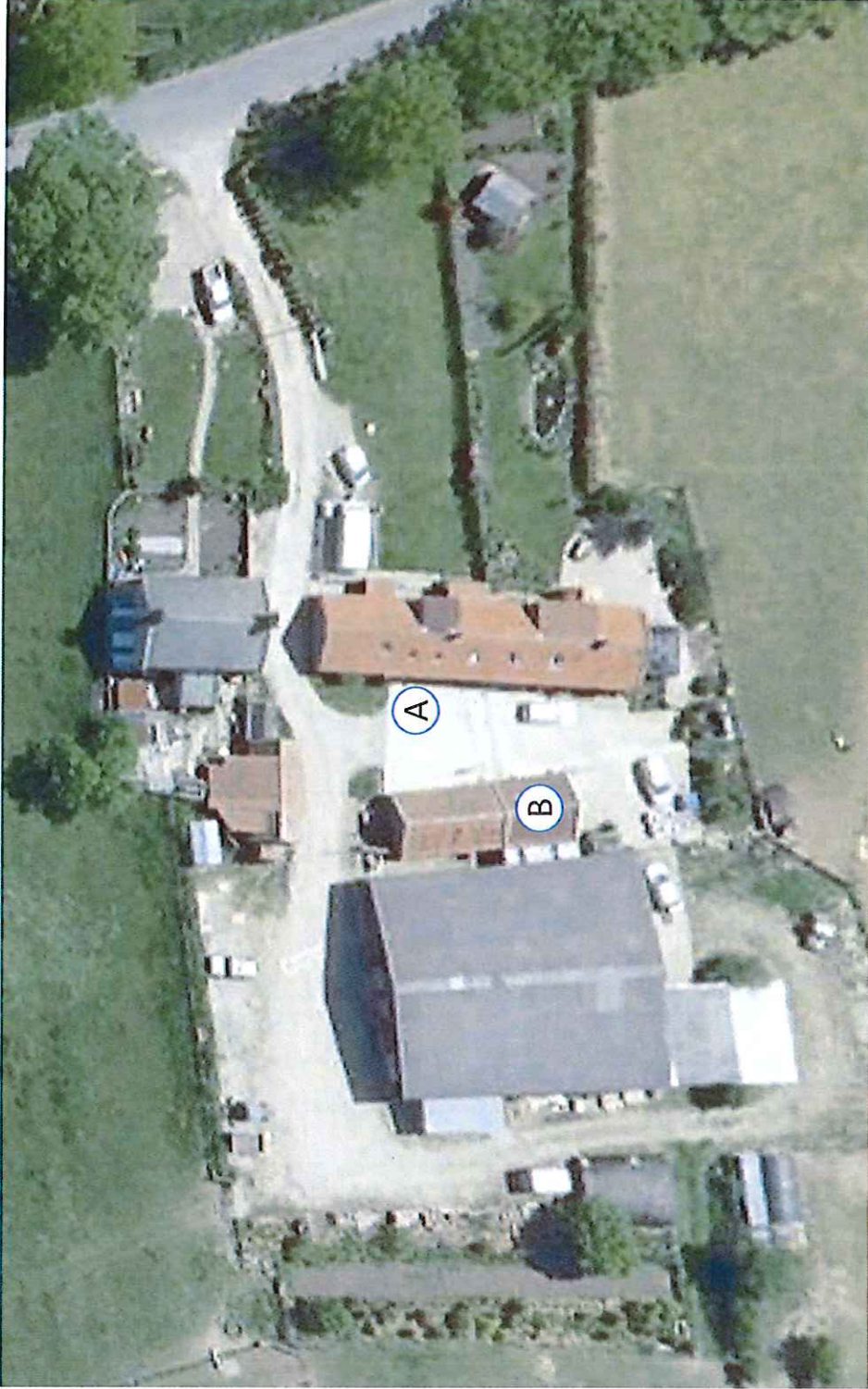


FIGURE 14 – INTERNAL AND EXTERNAL 1 SEC LEQ MEASUREMENTS DURING SPECIFIC ACTIVITIES



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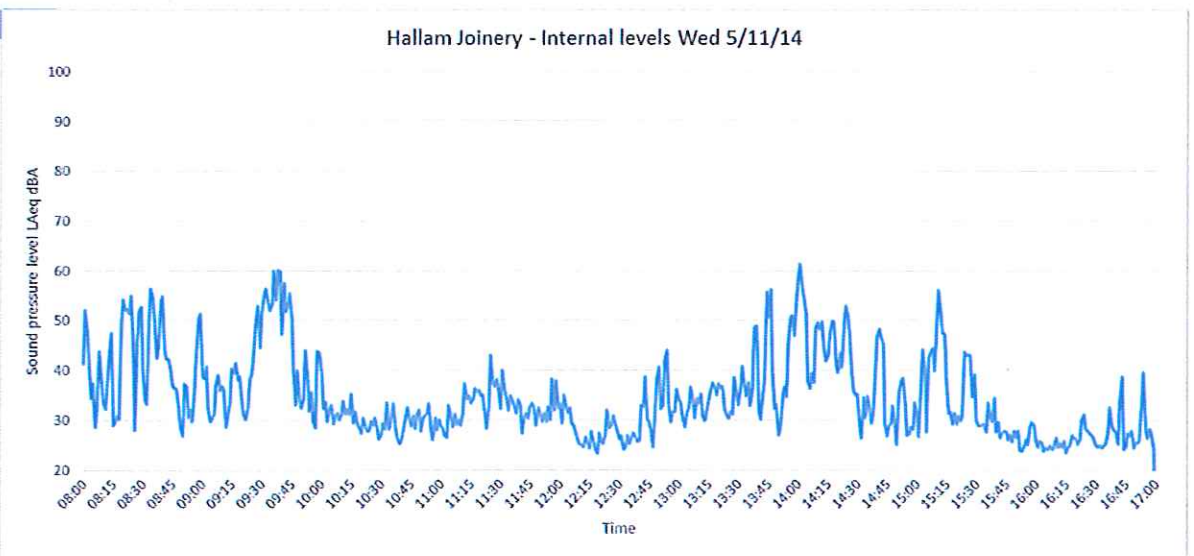
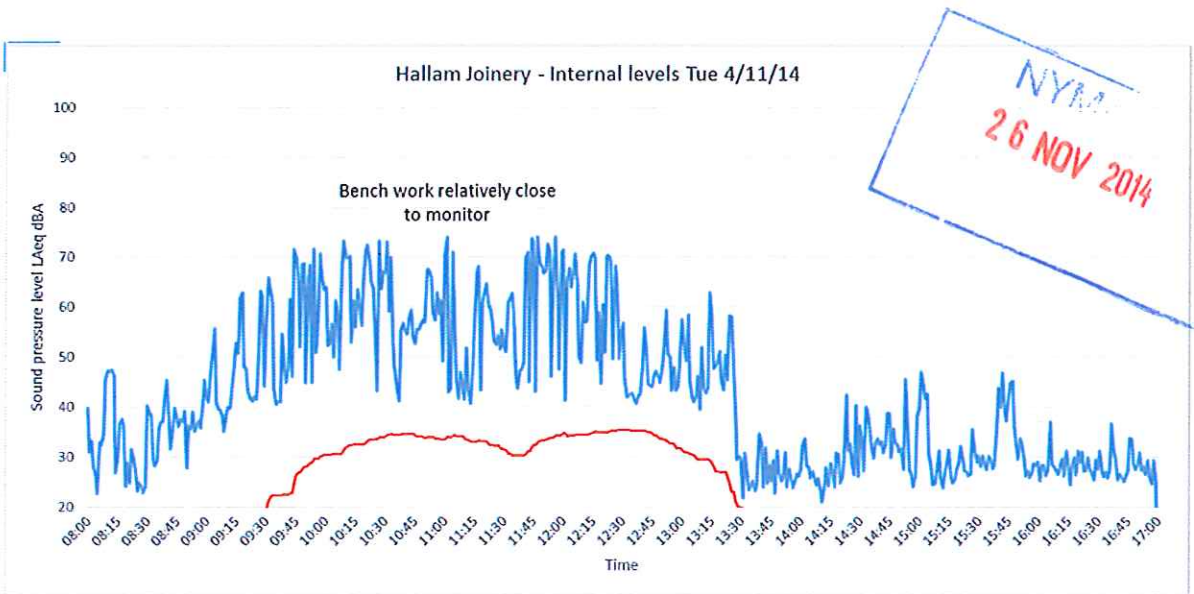
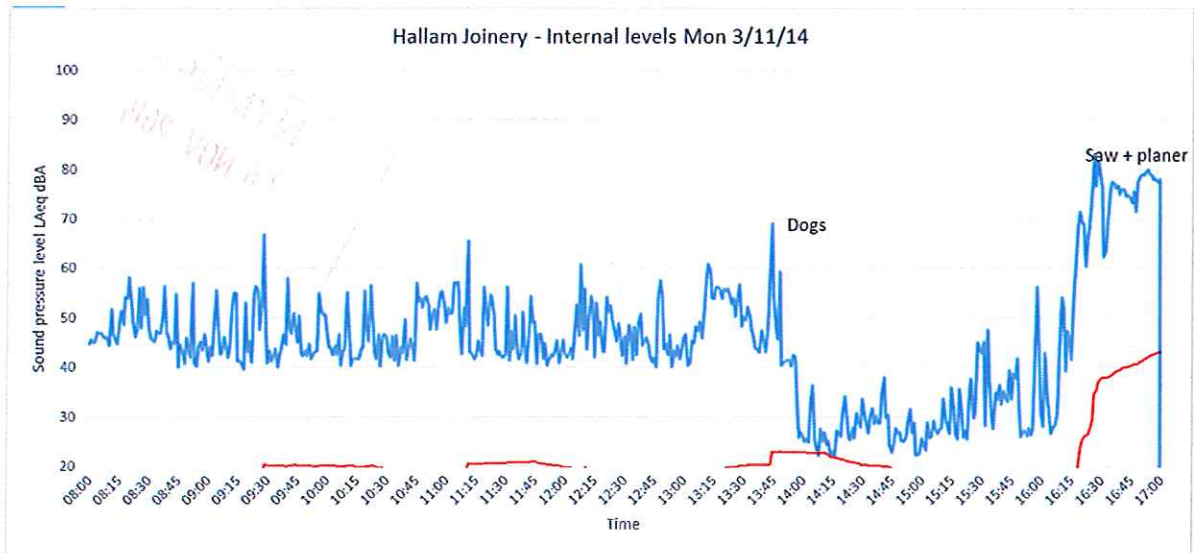
FIGURE 15 - 1/3 OCTAVE EXTERNAL SPECTRAL DATA FOR SPECIFIC ACTIVITIES



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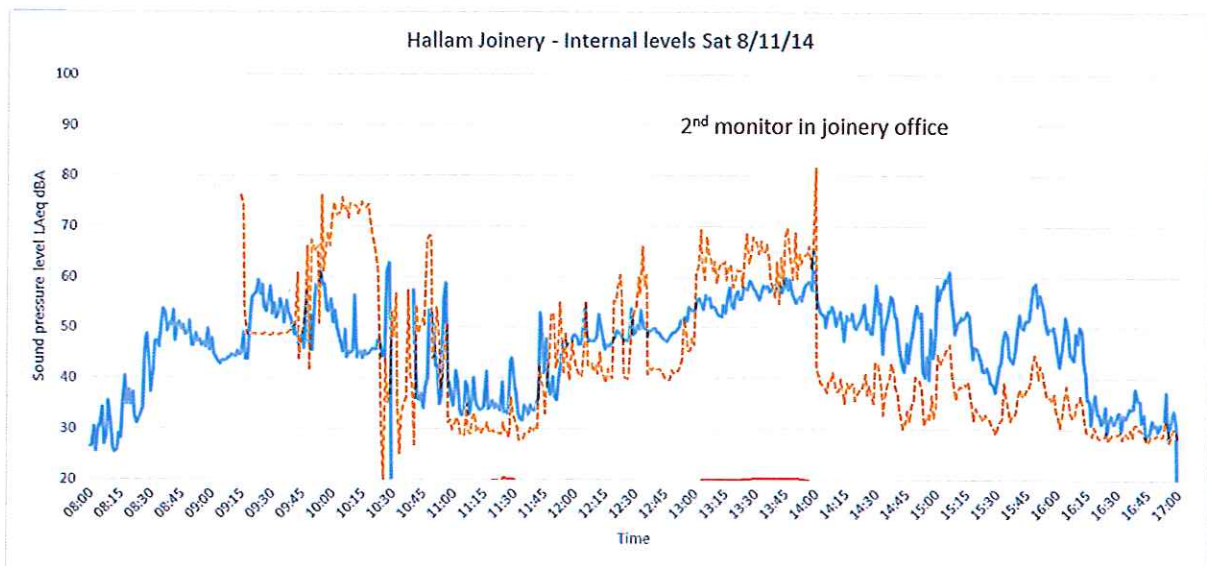
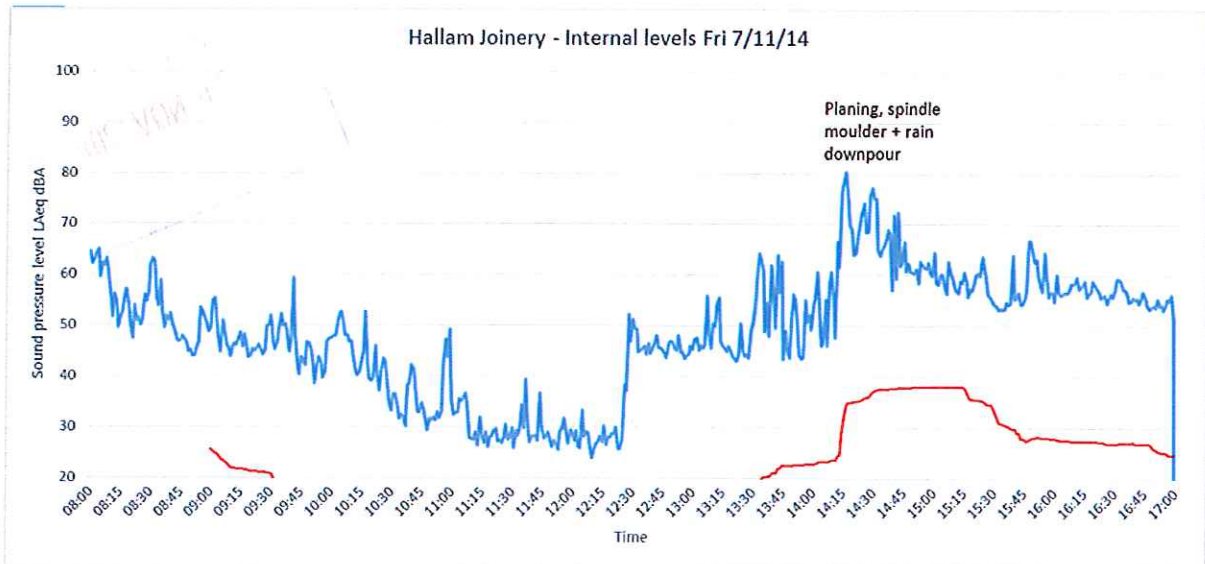
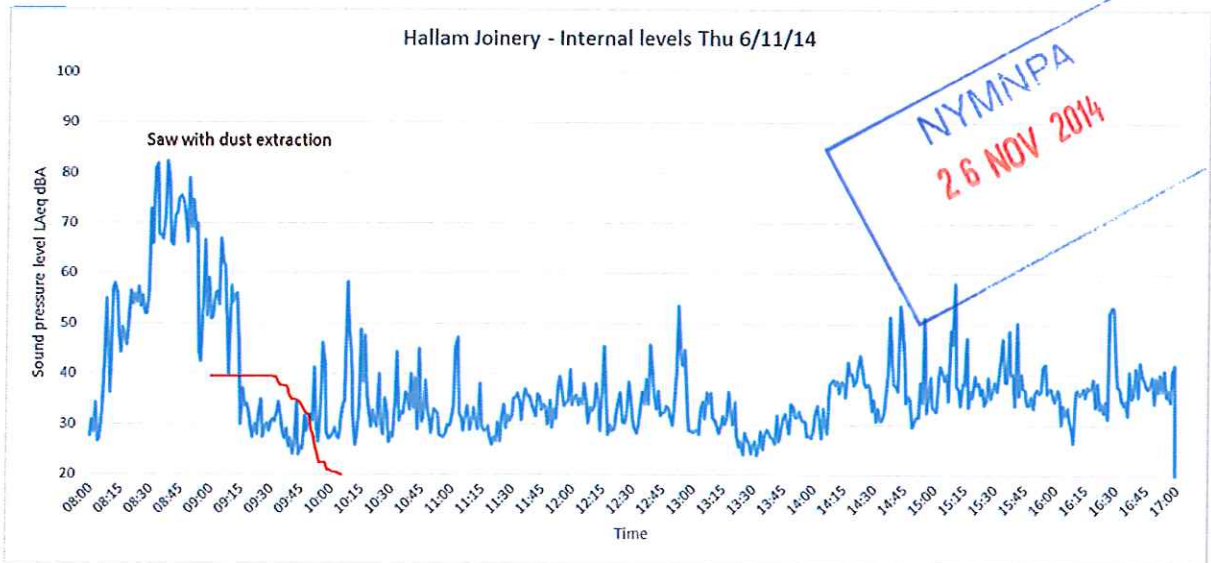
FIGURE 0 HALLAM JOINERY AND NEIGHBOURING PROPERTIES

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— Joinery internal noise level — Kirkdale internal noise level — External estimated Leq (1 hour)

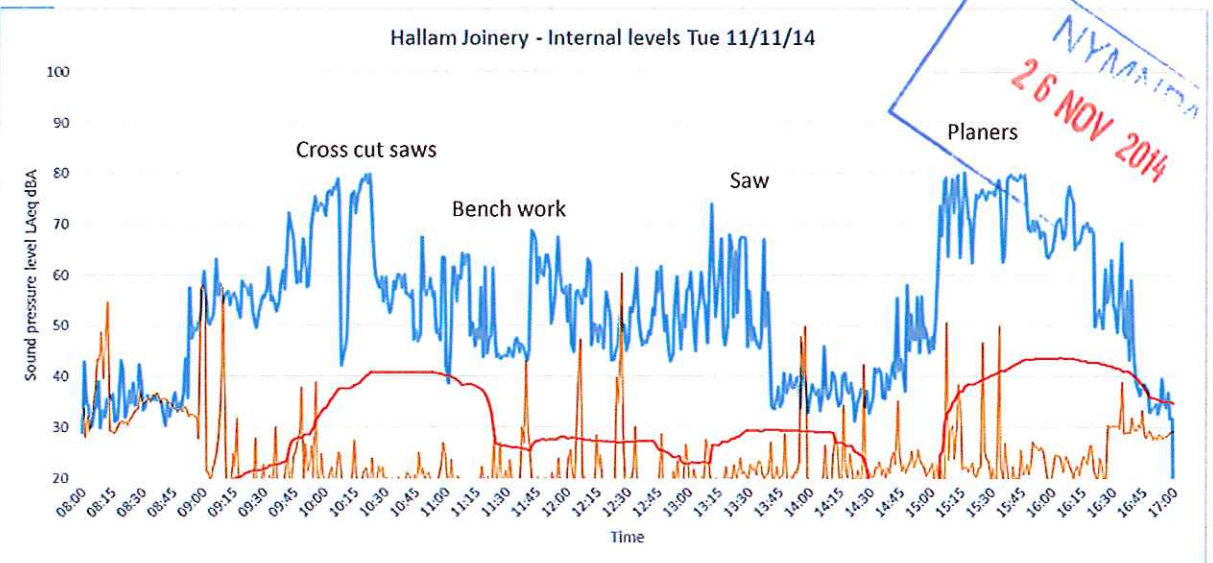
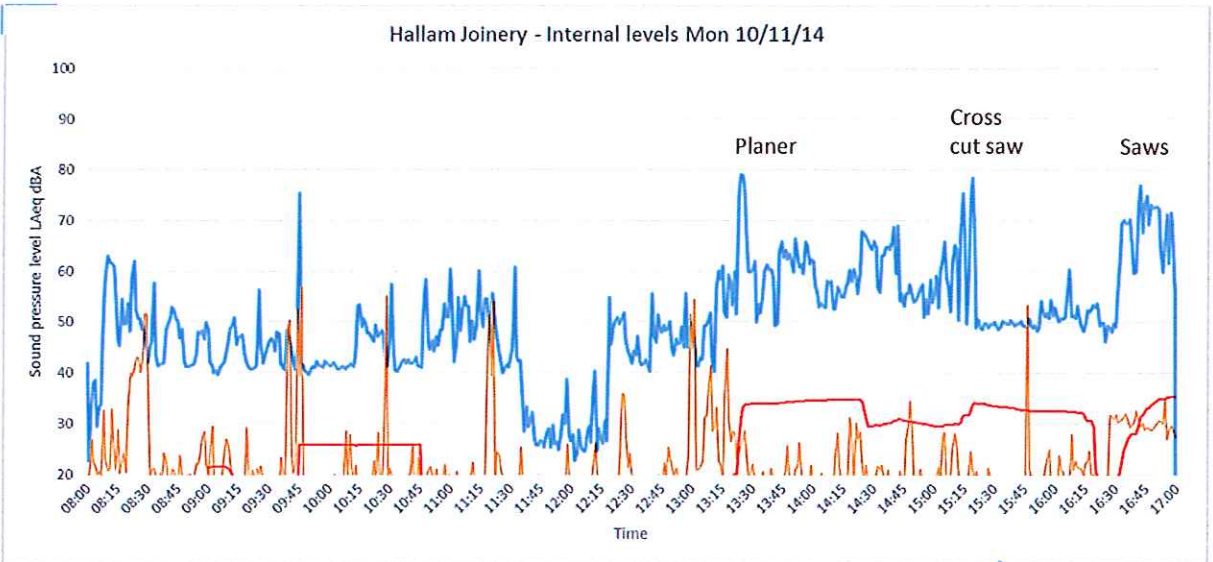
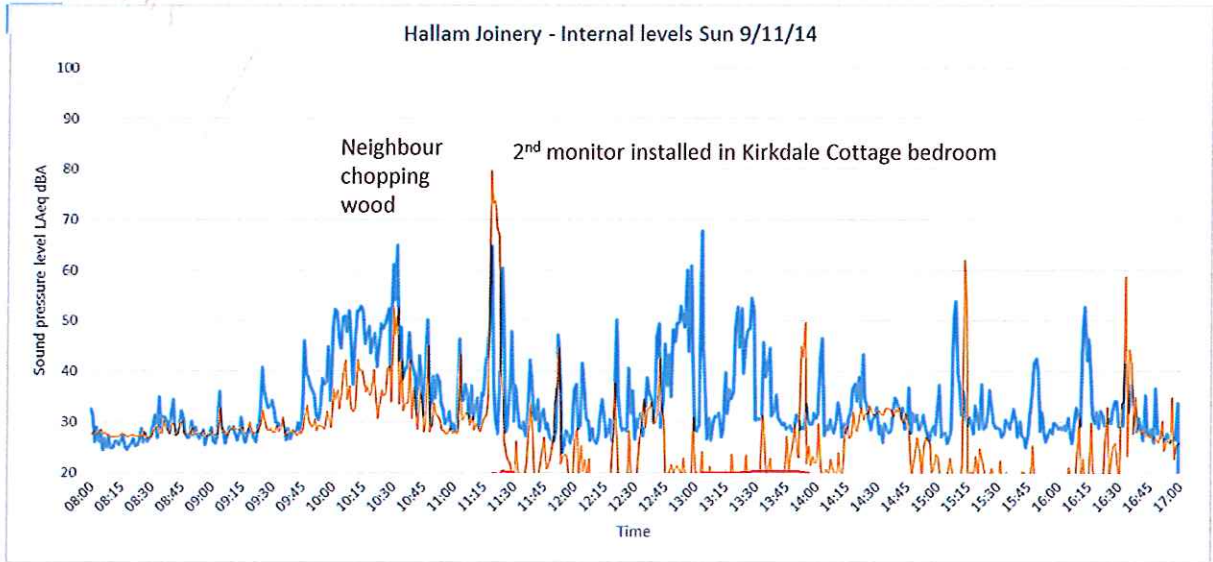
FIGURES 1 – 3 DAILY TIME HISTORIES



— Joinery internal noise level
 — Kirkdale internal noise level
 — External estimated Leq (1 hour)

FIGURES 4 – 6 DAILY TIME HISTORIES

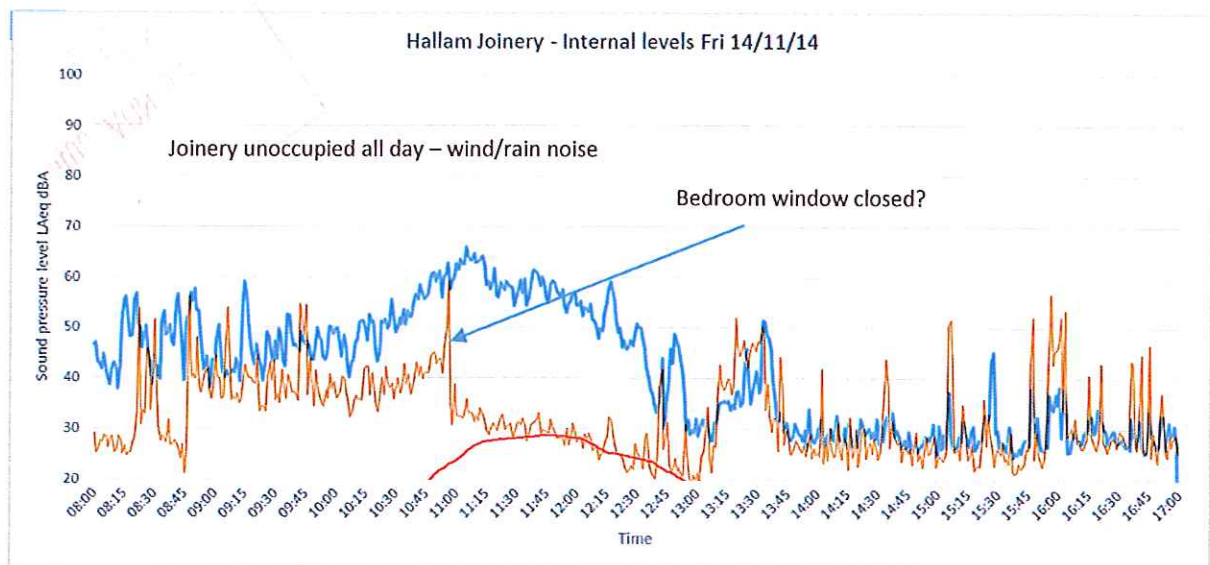
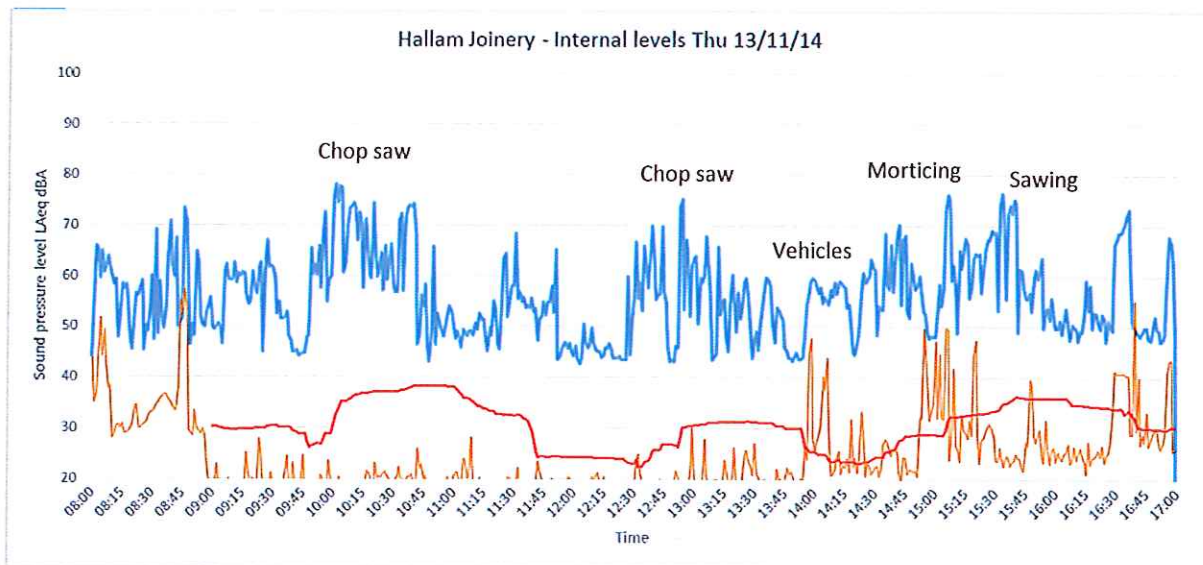
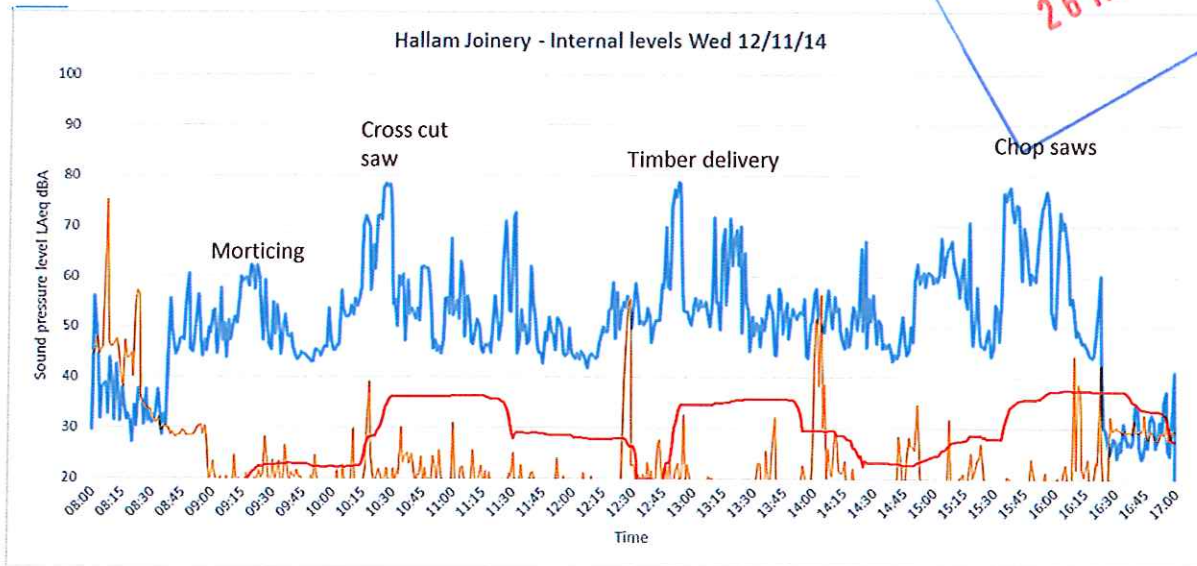
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— Joinery internal noise level — Kirkdale internal noise level — External estimated Leq (1 hour)

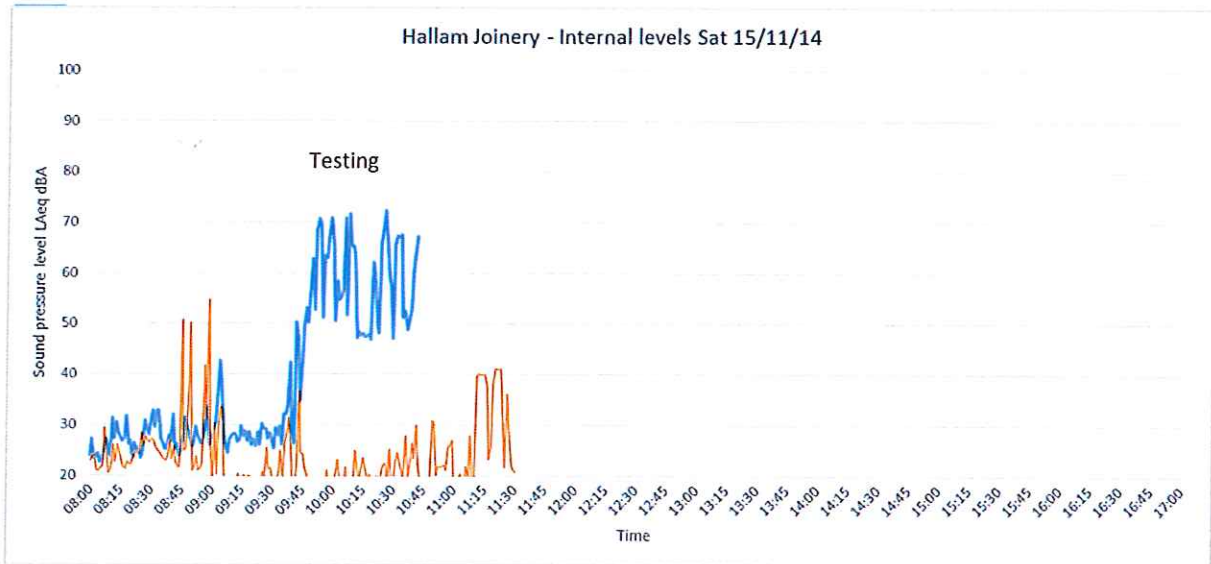
FIGURES 7 – 9 DAILY TIME HISTORIES

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— Joinery internal noise level — Kirkdale internal noise level — External estimated Leq (1 hour)

FIGURES 10 – 12 DAILY TIME HISTORIES



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— Joinery internal noise level — Kirkdale internal noise level — External estimated Leq (1 hour)

FIGURES 13 DAILY TIME HISTORIES

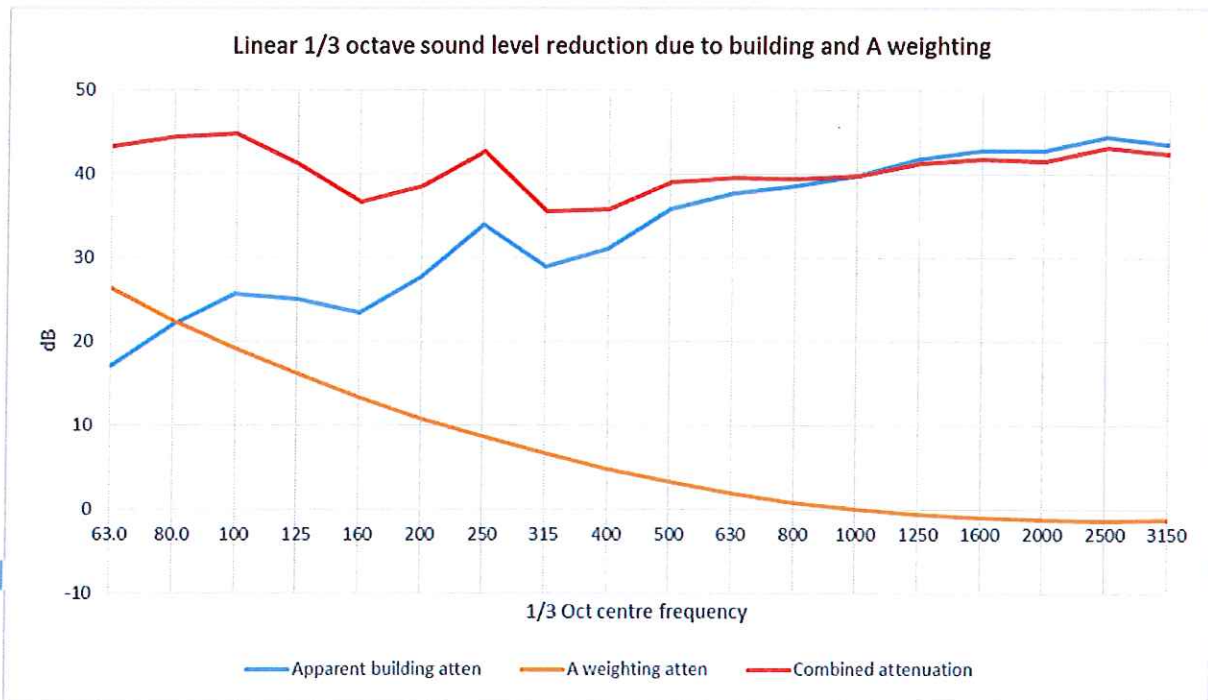


FIGURE 16 Conversion of internal linear octave levels to external 'A' weighted levels.

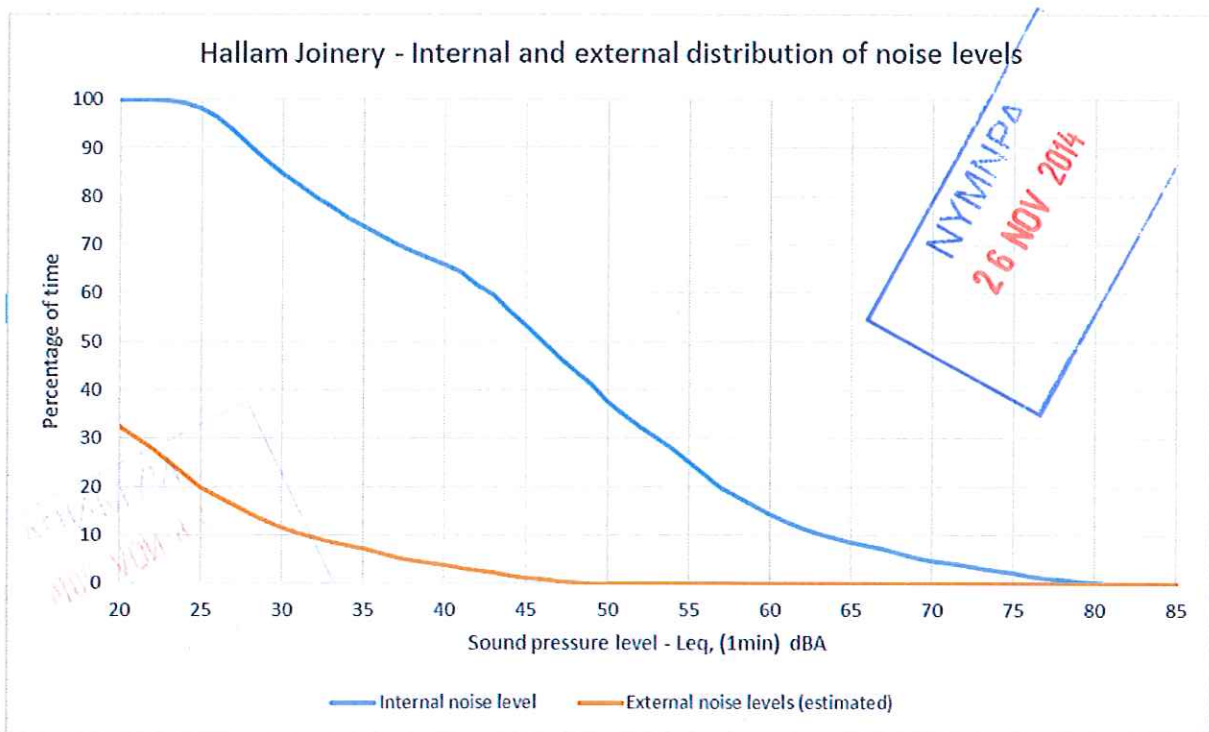


FIGURE 17 Internal and estimated external distribution of noise levels