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SOUTH WEST WOOD PRODUCTS LTD, ASHCOTT RD, MEARE

NOISE MANAGEMENT PLAN

Technical Report: R6169-3 Rev 0

Date: 18th April 2016

For: South West Wood Products Ltd
Eclipse Works
Ashcott Road
Meare
Glastonbury
BA6 9SU

24 Acoustics Document Control Sheet

Project Title: South West Wood Products Ltd, Eclipse Works, Ashcott Road, Mere
Noise Management Plan

Report Ref: R6169-4 Rev 0

Date: 18th April 2016

	Name	Position	Signature	Date
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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Draft for Comment	Reuben Peckham	Steve Gosling

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1.0 INTRODUCTION

1.1 This is the Noise Management Plan (NMP) for the Eclipse Works at Glastonbury which is operated by South West Wood Products. The site processes virgin and end of life timber into various products. The site is partly covered by an environmental permit, SR2011No4 reference EPR/YP3297C. The NMP forms part of the environmental management control system to ensure that the operations meet the legislative requirements and operate to the high environmental standards.

1.2 This is an evolving document which is subject to ongoing review. This NMP supersedes the previous (dated April 2013).

1.3 The NMP seeks to ensure that all operations on the site are effectively managed to minimise the noise emission to the neighbouring residential community whilst acknowledging that the nature of the operations means that a degree of environmental noise emission is inevitable.

2.0 BACKGROUND

2.1 The Eclipse Works lies in the flat open countryside of the Somerset Levels which is a mixture of agricultural land, former peat workings and wooded areas. The Eclipse Works itself is a former processing site, primarily horticultural and flooring products, and is comprised of a variety of buildings and open yard areas. The site access is via Ashcott Road. Site boundaries comprise a mix of mature tree belts and open ground.

2.2 The nearest residential property, Eclipse House, is located 60m to the west, with their garden abutting the Works boundary with a boundary screen of leylandi. The next nearest residential properties are approximately 180m to the north on Ashcott Road. Further properties on Ashcott Road lie over 500m to the south. The centre of Meare village is over a kilometre to the north. Ham Wall, a National Nature Reserve, lies immediately to the south east of the site.

2.3 A variety of processes are undertaken at Eclipse Works which include grinding, chipping, shredding and screening to meet various technical product specifications. Some of the products are seasonal and their associated activities take place at corresponding times of the year, e.g. production of animal bedding in the winter months.

2.4 Plant used at the site that contributes to the generation of environmental noise emission, includes:

Loading shovels;
Telehandlers;
Screens;
Shredders;
Tractors
HGVs delivering and removing materials from the site.

3.0 NOISE IMPACT ASSESSMENT

3.1 An assessment of the noise impact assessment associated with the operations was undertaken by 24 Acoustics Ltd in April 2016. Detailed acoustic modelling was undertaken and this ranked the noise sources on the site in order of significance at the nearest residential properties. Table 1 below summarises these findings.

Top Yard		**Bottom yard**		**Screening- Evening**	
Doppstadt 635	37.0	Doppstadt 635	35.7	Chiefton Screen	33.9
Doppstadt 435	35.7	Doppstadt 435	35.7	McKlusky Screen	32.3
Chiefton Screen	33.9	Chiefton Screen	33.9	McKlusky ECS	30.4
McKlusky Screen	32.3	McKlusky Screen	32.3	Finlay Sc & ECS	24
Mob plant- day	32.1	Mob plant- day	32.1	Mob plant- evening	21.2
McKlusky ECS	30.4	McKlusky ECS	30.4		
Finlay Sc & ECS	24	Finlay Sc & ECS	24		
Total	**42.0**	**Total**	**41.6**	**Total**	**37.5**

Table 12: Noise Source Ranking

3.2 A number of noise control measures were undertaken in March and April 2016 in order to reduce plant noise levels to those described in the table above. These are listed below:

- Doppstadt 635 Shredder: an acoustically lined, double enclosure has been erected over the hammer mill and heavy duty rubber lining fitted and a large shroud / screen erected around the engine of the shredder;

- Doppstadt 435 Shredder: heavy duty rubber has been installed within the hammer mill;

- McKlusky Screen: a partial enclosure and insulated door has been installed over the engine.

3.3 As part of the noise management plan it is important to recognise the importance of maintaining these measures to ensure that the environmental noise level from the operations does not increase.

4.0 NOISE MANAGEMENT MEASURES

4.1 South West Wood Products will continue to adopt best practice measures, which seek to minimise noise associated with the site operations. The measures adopted include:

- Ensuring all plant and equipment is kept well maintained;
- Adopting methods which seek to reduce noise levels, such as siting plant with bunding (which can include stockpiles of processed or unprocessed materials) or buildings between the operating plant and sensitive properties where possible;
- Maintenance of access roads and vehicle manoeuvring areas;
- A speed limit of 10mph will be enforced;
- Operation of vehicle one way system (to minimise reversing);
- Switching off plant when not in use;
- No use of external tanoy systems; and
- Use of non-tonal reversing alarms on main plant operated at site;

4.2 In addition to the above the noisiest element of processing has been identified as the shredding operations and these shall be primarily restricted to the area to east of main building which meets the operational needs of the site with a location which benefits from maximum attenuation from existing buildings and bunding and will be limited between the hours of 08:00 and 18:00 Monday to Friday.

4.3 Specific noise control measures, such as the provision of acoustic enclosures, screens and barriers etc. will be maintained as appropriate to ensure that they continue to work efficiently.

5.0 NOISE MONITORING

5.1 All site staff will be responsible for reporting any noise problems to the site manager immediately.

5.2 The site has possession of its own noise monitoring instrumentation. Monthly checks on the main elements of operational noise from the plant will be undertaken and further surveys as necessary in response to complaints. Records of noise monitoring will be kept as part of the site diary, see Appendix A.

5.3 South West Wood Products operate a policy of responding to complaints from local residents. Any complaints associated with noise from site operations will be fully investigated and recorded by the site manager. Details of any mitigation or remedial actions taken in response to a complaint will be recorded as per the procedures in the management system and maintenance of the site diary, see Appendix B. This will include the actions to identify the source of noise and, where necessary and feasible, any potential to reduce the level of noise associated with the plant or take it out of service until the problem has been rectified. As appropriate the site manager will ensure that the Environment Agency is informed of these within 24 hours.

5.4 This NMP will be reviewed annually by the site manager or otherwise in response to a request from the Environment Agency, changed circumstances such as the operation of new processing techniques or substantiated noise complaints.

APPENDIX A: Noise Monitoring Record Log

Noise Monitoring Record Log:

Plant		Plant Location	
Date		Time	
Weather conditions		Wind speed & direction	
Additional activities		Monitoring period	
Distance from plant		Position e.g. to east	
Recorded Noise level and notes			

Signed:…….

APPENDIX B: Noise Complaint Log

Noise Complaint Log:

Date of Incident		Time of Incident		Weather conditions at time of incident	
Date of Complaint		Time of complaint			
Complainant					
Name		Address		Contact details	
Nature of Complaint					

Signed:…….

Details of Investigation				
Action Taken				
Future Actions				
Reporting[1]	Complainant	Site Staff	Management	EA

Signed:……. (Site manager)

[1] Confirm date, verbal or written.

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SOUTH WEST WOOD PRODUCTS LTD, ASHCOTT RD, MEARE

FINAL ENVIRONMENTAL NOISE INVESTIGATION, FOLLOWING NOISE CONTROL MEASURES

Technical Report: R6169-3 Rev 0

Date: 15th April 2016

For: South West Wood Products Ltd
Eclipse Works
Ashcott Road
Meare
Glastonbury
BA6 9SU

24 Acoustics Document Control Sheet

Project Title: South West Wood Products Ltd, Eclipse Works, Ashcott Road, Mere Final Environmental Noise Investigation, Following Noise Control Measures

Report Ref: R6169-3 Rev 0

Date: 15th April 2016

	Name	Position	Signature	Date
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For and on behalf of 24 Acoustics Ltd				

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EXECUTIVE SUMMARY

24 Acoustics Ltd has been retained by South West Wood Products to provide an assessment of the potential impact of noise from their operations at their site in Ashcott Road in Meare, near Glastonbury.

The assessment has been undertaken following detailed noise surveys both on the site and at a complainant's property. An acoustic propagation model of the operations has also been developed.

The assessment initially indicated that the noise impact from the operations is greater than that considered acceptable by the Environment Agency. As a result engineering noise control measures were applied to two shredders and one screener on the site and further evaluation and analysis was undertaken which identified that the noise emission from the site had reduced by between 2 and 3 dBA.

It is considered that there may be further scope to reduce the noise output from the engine of the Doppstradt 635 shredder, however, scope to reduce the noise output by any other means is considered very limited and it is 24 Acoustics' opinion that South West Wood Products have employed best available techniques to reduce the noise emission from the operations to as low as reasonably practicable.

It is worth noting that on the day of the survey (29th March 2016) the noise impact from dogs barking at the neighbouring kennels at 39 Ashcott Road was substantially greater than the noise impact from South West Wood Products' operations.

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been retained by South West Wood Products to provide an assessment of the potential impact of noise from their operations at their site at Eclipse Works off Ashcott Road in Meare, near Glastonbury.

1.2 This report presents the results and findings of the assessment, following noise surveys and observations undertaken on the site between February and April 2016. During this time a process of noise control has been undertaken and this report quantifies the extent of the noise impact before and after the works. All noise levels in this report are provided in dB relative to 20 µPa. A glossary of the acoustic terminology used is provided in Appendix A.

2.0 SITE DESCRIPTION AND OPERATION

2.1 The South West Wood Products site is located off Ashcott Road in Meare. The site recycles waste wood from the construction industry. Typical operations involve the import of waste wood material by HGV and then the shredding/ screening and removal of metals as appropriate. The final product material is also removed from site in bulk by HGV.

2.2 The site utilizes the following plant:

- Doppstadt 635 Shredder;
- Doppstadt 435 Shredder;
- McClusky 230 Screen and associated Eddy Current Separator;
- Finlay 883 Screen and associated Eddy Current Separator;
- Chiefton 1400 Screen;
- 3 JCB 437 Loading Shovels;
- 2 Hyundai 730 Loading Shovels;
- 1 JCB Telehandler.

2.3 Operations on the site are unrestricted, however, they typically operate from 07:00 hours Monday to Saturday with shredding operations commencing between 07:30 and 08:00 hours. Shredding operations usually cease around 17:30 hours, however, screening continues until approximately 21:00- 22:00 hours.

2.4 The site is located in a predominantly rural area, however, there are a number of other industrial operators within relatively close proximity. The nearest residential property to the site is 51 Ashcott Road, which bounds the site to the West. Complaints about noise, however, have been received from residents located further away to the north. Numbers 35- 43 Ashcott Road (5 properties) are located between 110 and 270 m (approximately) from the closest site boundary. Figure 1 shows an aerial image of the site and surrounding area.

2.5 The site is regulated by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2010 and Permit number EPR/YP3297EC. Section 3.3 of the Permit relates to noise and vibration and states the following:

> *Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including but not limited to those specified in any approved noise and vibration management plan, to prevent, or where that is not practicable, to minimise the noise and vibration.*

2.6 An approved noise management plan was produced by Land & Mineral Management Ltd on behalf of South West Wood Products Ltd in April 2013. This describes a number of noise management procedures which include matters of good practice (such as plant maintenance, site speed limits and use of white noise, rather than tonal reversing alarms). The plan also identifies shredding as the 'noisiest element' of the site operations and advises that this is primarily restricted to the area to the east of the main building which benefits from maximum attenuation from buildings and site bunding. The plan will be updated, in a separate report, to address the latest changes to the site and these noise impact assessments.

3.0 NOISE IMPACT ASSESSMENT CRITERIA

British Standard 4142:2014

3.1 British Standard 4142:2014 [Reference 1] provides a methodology for the assessment of commercial sound at (the exterior of) residential properties. The standard advocates a comparison between the prevailing typical L_{A90} background noise level and the L_{Aeq} source noise level. For rating purposes, if the noise source is tonal, or impulsive, in character, a rating correction of up to 15 dBA is applied. Several methods of determining the rating penalty are described. The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a 'significant adverse impact', depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise (sound) level, this is an indication of the specific sound source having a low impact (depending upon the context).

3.2 The context is important in this circumstance as it is 24 Acoustics' understanding that an industrial user has operated out of this site for many years and therefore there is some precedence of industrial noise from the site forming part of the prevailing ambient acoustic environment in the area.

4.0 SITE NOISE SURVEYS

4.1 A combination of long-term unattended and attended noise surveys/ subjective observations were undertaken on the site in February 2016 and again on 29th March and 12th April 2016. Long-term measurements were undertaken on the boundary with 37 Ashcroft Road between 18th and 26th February 2016. The measurements were undertaken in samples of five minutes using a Class 1 accuracy Rion NL31 sound level meter which was calibrated before and after the surveys using a Bruel and Kjaer Type 4231 acoustic calibrator. No drift in calibration was recorded. The monitor was installed on a tripod at a height of 1.2 m above local grade. A windshield was fitted. Figure 1 shows the survey location.

4.2 An environmental weather station was also installed during the long-term noise surveys. A weather vane and calibrated NRG 40C anemometer were installed on a pole near the microphone at a height of 3 m above local grade. This was time-synchronised with the sound level meter and recorded wind speed and direction during the surveys.

4.3 It was noted that the survey location was subject to noise from a range of sources in addition to some noise from South West Wood Products' operations. This included dogs barking from the adjacent kennels, other industrial/ agricultural operations, road traffic and aircraft movements. For this reason the unattended noise measurements were not a reliable means of determining the noise level from South West Wood Products' operations alone and the monitor was used to determine the prevailing background noise level at times when the plant was shutdown.

4.4 Attended noise measurements were undertaken, however, at the same location during the day on 26th February 2016. These were undertaken in samples of 5 minutes using a Class 1 accuracy Norsonic Nor-118 sound level meter which was calibrated before and after the surveys using a Bruel and Kjaer Type 4231 acoustic calibrator. These surveys (and subjective observations) were undertaken with a representative from South West Wood Products (Tom Dunn) and Environment Agency officer Alex Jenner in attendance.

4.5 Attended noise measurements of the site plant were undertaken on site on 18th February 2016. Sound pressure measurements were undertaken on individual plant items and this data used to obtain the sound power level of each item of plant (using standard acoustical theory). These measurements were undertaken in terms of the overall A-weighted and linear octave band sound pressure levels using a Class 1 accuracy Norsonic Nor-118 sound level meter which was calibrated before and after the surveys using a Bruel and Kjaer Type 4231 acoustic calibrator.

4.6 The attended noise measurements of site plant and noise measurements at the boundary with the complainant's property were repeated on 29th March 2016 and on 12th April 2016 following engineering noise control measures which were undertaken to the plant.

4.7 All measurements were made in accordance with BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 2].Calibration certificates of all instrumentation used is provided in Appendix B.

Noise Survey Results- Background Noise Levels

4.8 The results of the long-term unattended noise survey undertaken at the boundary with 37 Ashcroft Road are shown graphically in Appendix C together with the corresponding wind speed and direction data.

4.9 The background noise survey data has been filtered for the following meteorological conditions (to determine the appropriate representative background noise level during daytime operations):

- Average wind speed less than 5 m/s;
- Southerly component wind direction (generating favourable propagation from the site to the receptors);
- Data filtered for the lunch time period (between 13:00 and 14:00 hours) when the site is entirely shut down and the evening period (at 21:00 hours) when the site completely shuts down.

4.10 The corresponding background noise levels, under the conditions described above, are shown in Tables 1 and 2 below.

Date and Time	Wind speed (m/s)	Rain gauge	Wind direction	Background Noise Level, dB $L_{A90,\ 10\ min}$
20/02/2016 13:10	4.2	0	167	39
20/02/2016 13:20	4.9	0	172	36
20/02/2016 13:30	4.1	0	162	35
20/02/2016 13:40	3.6	0	162	37
20/02/2016 13:50	4.1	0	162	39
			Average	37.2
22/02/2016 13:00	3.8	0	209	39
22/02/2016 13:10	3.5	0	220	38
22/02/2016 13:20	3.9	0	208	37
22/02/2016 13:30	4	0	210	35
22/02/2016 13:40	4	0	208	36
22/02/2016 13:50	4.8	0	197	37
			Average	37
23/02/2016 13:30	1.6	0	226	32
23/02/2016 13:40	2	0	218	32
23/02/2016 13:50	2.5	0	215	32
			Average	32
25/02/2016 13:00	1.6	0	197	38
25/02/2016 13:10	2.3	0	207	33
25/02/2016 13:30	2.1	0	231	34
25/02/2016 13:50	2.9	0	223	34
			Average	35
			Representative Background Noise Level	**35**

Table 1: Background Noise Levels, 13:00- 14:00 hours (daytime operations)

Date and Time	Wind speed (m/s)	Rain gauge	Wind direction	Background Noise Level, dB $L_{A90,\ 10\ min}$
18/02/2016 21:00	0.4	0	206	28
19/02/2016 21:00	2.7	0	160	28
21/02/2016 21:00	2.7	0	156	28
22/02/2016 21:00	1.1	0	211	30
Representative Background Noise Level				**29**

Table 2: Background Noise Levels, 21:00 hours (evening operations)

Noise Survey Results- Site Noise Levels

4.11 The attended noise surveys undertaken during the day on 26th February were undertaken in slightly blustery wind conditions. Regardless, it was possible to establish, by careful observation of the noise data from the sound level during periods of still wind that the noise level from the site operations was consistently in the region of 47 dB L_{Aeq}. Subjectively the noise from the site (on this occasion and during observations undertaken on 18th February) identified that there was no noise with character that would attract attention (such as tones or impulsive characteristics).

Noise Survey Results- Plant Noise Surveys

4.12 The noise survey data recorded locally around each plant item was used to calculate the sound power level of each individual plant using standard acoustical theory. This data was then used to populate an acoustic propagation model of the plant (described in Section 5 below). The sound power levels of each plant item are provided in full in Appendix D and summarised in Table 3 below.

Plant	Sound Power Level, dBA
Finlay Screener & ECS	99
Doppstadt 365 Shredder	116
McKlusky Screen	109
Doppstadt 435	114
ECS adjacent to McKlusky Screen	101
Chiefton Screener	102
JCB Loader 437	98
Hyundai HL760	96
JCB Telehandler	91

Table 3: Summary of Derived Plant Sound Power Levels (Prior to Noise Control)

5.0 ACOUSTIC PROPOGATION MODEL

5.1 In order to quantify the noise emission from the site and to rank the dominant plant items within the operation an acoustic model of the operations has been developed. This has used the derived plant data reported in Section 4 above. Immi 2011 noise mapping software has been used and this has used the propagation methodology advocated in ISO 9613 [Reference 3] to calculate the noise level from the operations at the residential neighbours. The following propagation assumptions have been used:

- Ambient temperature of 10 degrees C;
- Relative humidity of 70%;
- Soft ground propagation (G=1) on land/ hard ground propagation (G=0) over water.

5.2 The model has considered the following operational conditions:

1. Daytime- all plant operating Dopstaadt 635 Shredder operating in 'front yard' all mobile plant operating;
2. Daytime- all plant operating Dopstaadt 635 Shredder operating in 'rear yard' all mobile plant operating;
3. Evening- screener/ ECS plant and 2 JCB loading shovels only operating.

5.3 Noise contour maps showing the propagation of noise across the site are provided in Figures 2-4 (reflecting each operational scenario). Table 4 below summarises the noise survey results at each receptor location.

Operational Scenario	Noise Level, dB $L_{Aeq, 1\ hour}$
1. Daytime- all plant operating, Dopstaadt 635 Shredder operating in 'front yard'	47
2. Daytime- all plant operating, Dopstaadt 635 Shredder operating in 'back yard'	47
3. Evening. Screens and 2 JCB loading shovels only operating	39

Table 4: Calculated Operational Noise Levels, 37 Ashcott Road (Prior to Noise Control)

6.0 INITIAL NOISE IMPACT ASSESSMENT

6.1 An assessment was undertaken to determine the level of noise impact from the operations at the proposed development site in accordance with the requirements of BS 4142.

6.2 BS 4142 states that certain acoustic features can increase the significance of impact of that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location a character correction should be applied to the specific sound level to determine the rating level. The rating correction is determined based upon the impulsivity and tonality of the sound noise level. The subjective method described in the standard describes the following rating corrections:

Tonality:	Tone just perceptible at receptor:	+ 2 dBA;
	Tone clearly perceptible at receptor:	+ 4 dBA;
	Tone highly perceptible at receptor:	+ 6 dBA.
Impulsivity:	Impulsivity just perceptible at receptor:	+ 3 dBA;
	Impulsivity clearly perceptible at receptor:	+ 6 dBA;
	Impulsivity highly perceptible at receptor:	+ 9 dBA.

6.3 The standard states that where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion. It also states that if intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

6.4 Noise from the operations was not considered characteristic or distinctive in nature and, therefore, it is considered that a rating correction in accordance with BS 4142 is not required. Tables 5-7 below summarise the BS 4142 noise impact assessment for the daytime (both Doppstadt 635 Shredder locations) and evening periods respectively.

	Noise Level
Typical Background Noise Level	35 dB $L_{A90,\ 1\ hour}$
Specific Source Noise Level,	47 dB $L_{Aeq,\ 1\ hour}$
Rating Character Correction	0
Rating Noise Level	47 dBA
BS 4142 Assessment Level	+12 dB

Table 5: Daytime, Doppstradt 635 Operating in Front Yard BS 4142 Noise Impact Assessment, 37 Ashcroft Road

	Noise Level
Typical Background Noise Level	35 dB L_{A90}
Specific Source Noise Level,	47 dB $L_{Aeq,\ 1\ hour}$
Rating Character Correction	0
Rating Noise Level	47 dBA
BS 4142 Assessment Level	+12 dB

Table 6: Daytime, Doppstradt 635 Operating in Rear Yard BS 4142 Noise Impact Assessment, 37 Ashcroft Road

	Noise Level
Typical Background Noise Level	29 dB L_{A90}
Specific Source Noise Level,	39 dB $L_{Aeq,\ 1\ hour}$
Rating Character Correction	0
Rating Noise Level	39 dBA
BS 4142 Assessment Level	+10 dB

Table 7: Evening, BS 4142 Noise Impact Assessment, 37 Ashcroft Road

6.5 The above assessment indicates that noise from the operation generated a significant adverse impact (depending on the context) at the garden of 37 Ashcroft Road. In this case the context is relevant as it is understood that the site has been occupied by noise-generating industry for many years.

6.6 Following these findings noise control measures to some plant were advised to South West Wood Products. These were implemented expediently and further assessment undertaken on 29th March 2016 and again on 12 April 2016. This is detailed in Section 7 below.

7.0 ENGINEERING NOISE CONTROL AND UPDATED NOISE IMPACT ASSESSMENT

7.1 Further attended noise surveys were undertaken on the plant and at the boundary with the complainant's property during the day on 29th March 2016 and 12th April 2016 (on the latter day with officers from the EA in attendance) following engineering noise control works which were undertaken on the Doppstadt shredders and the McKlusky Screen.

7.2 An inspection of the plant and discussion with representatives from South West Wood Products identified that the following noise control measures were undertaken.

- Doppstadt 635 Shredder: an acoustically lined, double enclosure has been erected over the hammer mill and heavy duty rubber lining fitted and a large shroud / screen erected around the engine of the shredder;
- Doppstadt 435 Shredder: heavy duty rubber has been installed within the hammer mill;
- McKlusky Screen: a partial enclosure and insulated door has been installed over the engine.

7.3 Photographs providing evidence of the noise control measures are provided in Figures 5-7.

7.4 The surveys were undertaken using the same instrumentation and methodology as derived above and the sound power levels derived accordingly. Table D2 in Appendix D provides the plant sound power levels following the modifications. This indicates the following reduction in noise levels:

- Doppstadt 635 Shredder: 7 dBA
- Doppstadt 435 Shredder: 6 dBA
- McKlusky Screen: 5 dBA

7.5 The acoustic model of the site operation has been updated (again using the same parameters as described above) and indicates the following noise levels.

Operational Scenario	Noise Level, dB $L_{Aeq, 1\ hour}$
1.Daytime- all plant operating, Doppstaadt 635 Shredder operating in 'front yard'	42
2.Daytime- all plant operating, Doppstaadt 635 Shredder operating in 'back yard'	42
3. Evening. Screens and 2 JCB loading shovels only operating	37

Table 8: Calculated Operational Noise Levels (following Noise Control Measures) 37 Ashcott Road.

7.6 The associated noise contours are shown in Figures 8- 10.

7.7 The calculations indicate that the overall noise level from the site operations has reduced by up to 5 dBA at the receptor location (depending upon the nature of the operation). This is a substantial reduction.

7.8 The noise impact has been updated in accordance with the methodology of BS 4142 as follows:

	Noise Level
Typical Background Noise Level	35 dB $L_{A90, 1\ hour}$
Specific Source Noise Level,	42 dB $L_{Aeq, 1\ hour}$
Rating Character Correction	0
Rating Noise Level	42 dBA
BS 4142 Assessment Level	+ 7 dB

Table 9: Daytime, Doppstradt 635 Operating in Front Yard BS 4142 Noise Impact Assessment (following noise control measures), 37 Ashcroft Road

	Noise Level
Typical Background Noise Level	35 dB L_{A90}
Specific Source Noise Level,	42 dB $L_{Aeq, 1\ hour}$
Rating Character Correction	0
Rating Noise Level	42 dBA
BS 4142 Assessment Level	+ 7 dB

Table 10: Daytime, Doppstradt 635 Operating in Rear Yard BS 4142 Noise Impact Assessment (following noise control measures), 37 Ashcroft Road

	Noise Level
Typical Background Noise Level	29 dB L_{A90}
Specific Source Noise Level,	37 dB $L_{Aeq, 1\ hour}$
Rating Character Correction	0
Rating Noise Level	37 dBA
BS 4142 Assessment Level	+ 8 dB

Table 11: Evening, BS 4142 Noise Impact Assessment (following noise control measures), 37 Ashcroft Road

7.9 The assessment indicates that the BS 4142 assessment level will be no greater than +8 dBA (during evening operations) and during the day will be no greater than + 7. It is considered that, given the context of the site (as long established in industrial use) this would generate an adverse impact, as defined in BS 4142.

7.10 BS 4142:2014 requires a statement of uncertainty to be provided. In this case the assessment has been undertaken both subjectively and objectively. There is usually an uncertainty of +/- 3 dB associated with an acoustic prediction model undertaken in accordance with ISO 9613, however, in this case the model has been validated using on –site measurements. The greatest uncertainty/ variability in the noise impact is believed to occur as a result of the wind direction, however, the assessment has been performed under downwind propagation conditions and is therefore considered to represent a worst case. As a result uncertainty associated with the assessment is considered to be minimised.

7.11 It is worth noting that at the time of attended surveys undertaken on site (around midday on 29th March and 12th April), which were both undertaken during light south-westerly wind conditions (providing near worst case downwind propagation conditions) the noise from the operations was audible at the complainant's property at 37 Ashcott Road but was barely measurable due to the influence of other sources of background noise. This was dominated by noise from barking dogs at the nearby kennels, by chickens at the complainant's property and by wildlife. A noise level of 51 dBA was measured at 37 Ashcott Road from barking dogs on 29th March. Using the BS 4142 methodology with a rating correction of + 6 dB for noise character would result in a BS 4142 assessment level of +22 dBA which is a substantially greater impact than that generated by South West Wood Products.

8.0 CONSIDERATION OF BEST AVAILABLE TECHNIQUES

8.1 24 Acoustics has been involved with the site at Ashcott Road since January 2016. Since that time three site visits have been made with three corresponding assessments of noise impact. The noise impact at 39 Aschott Road was originally determined to be + 12 dB (difference between the BS 4142 background noise level and the rating noise level) and, following substantial investment in noise control measures has now reduced to + 7 dB. At no point, however, was the impact subjectively considered to be at statutory nuisance level and whilst the noise is clearly audible at the property it is considered that the vociferous complaints received from the residents are not justified. It should be noted that BS 4142 is specifically not a tool for the assessment of nuisance. The noise impact from dogs boarding in the nearby boarding kennel is significantly greater.

8.2 The technical work undertaken has ranked all noise sources involved in the operation individually and this is shown in Table 12 below.

Top Yard		**Bottom yard**		**Screening- Evening**	
Doppstadt 635	37.0	Doppstadt 635	35.7	Chiefton Screen	33.9
Doppstadt 435	35.7	Doppstadt 435	35.7	McKlusky Screen	32.3
Chiefton Screen	33.9	Chiefton Screen	33.9	McKlusky ECS	30.4
McKlusky Screen	32.3	McKlusky Screen	32.3	Finlay Sc & ECS	24
Mob plant- day	32.1	Mob plant- day	32.1	Mob plant- evening	21.2
McKlusky ECS	30.4	McKlusky ECS	30.4		
Finlay Sc & ECS	24	Finlay Sc & ECS	24		
Total	**42.0**	**Total**	**41.6**	**Total**	**37.5**

Table 12: Noise Source Ranking

8.3 The noise source ranking indicates that the Doppstadt shredders remain the dominant source of noise emission from daytime operations and the Chiefton screen the dominant source noise emission in the evenings.

8.4 Potential measures that would reduce the noise impact on the neighbours at Ashcott Road are considered in Table 13 below.

Noise Control Measure	Consideration of Feasibility
Engineering noise control	Significant engineering noise control measures have been implemented on the Doppstadt shredders and the McKlusky screen and have resulted in a substantial reduction in the overall noise output from the site. The cost of this has been in the region of £25,000. It is considered that all practicable measures have been implemented and no further noise control is possible.
Replacement of plant	The plant used on site is all well maintained. It is considered that the cost of purchasing replacement plant is not viable from a business perspective and, regardless, would be unlikely to generate a significant reduction in noise level
Acoustic screening	The neighbouring properties are extremely well screened from the noise generating operations and it is considered that any additional screening provided would have negligible benefit.
House plant inside buildings	The cost of erecting buildings to house the plant would not be viable from a business perspective. In addition it would generate unacceptable operational constraints and this measure is therefore not viable
Site relocation	Suitable sites for the recycling of waste timber are rare (and likely to have residential neighbours at similar or even closer distances). The Ashcott Road site has been in (unconstrained) industrial use for many years, is located in a semi-industrial, semi- rural/ residential environment and is considered suitable on this basis. It is highly unlikely that any (better) suitable sites for the operation could be found. There would also be significant costs associated with planning, permitting and the relocation of the business to the new site.
Reduction in hours	The site accommodates specific requests from residents where practicable (for example if residents are to hold a party externally or a BBQ) and are proactive in promoting positive neighbourly relations wherever possible. A permanent reduction in working hours, however, would have a detrimental impact on the viability of the business and is not practicable.
Reduction in site throughput	This would have significant implications on the viability of the business and is not a practicable solution.
Provision of white noise reversing alarms	All mobile plant owned by the site are fitted with non-tonal reversion alarms
Effective Noise Management	All staff on site are aware of the proximity of neighbours and are trained to act accordingly. Measures are taken to manage the noise impact at all times given local circumstances (such as wind direction).

Table 13: Consideration of Noise Mitigation

8.5 On the basis of the rationale provided in Table 13 it is considered that the site is applying best available techniques to minimise the noise emission from the site. It is considered that there are no other measures that a reasonably available that could reduce the noise level further.

9.0 CONCLUSIONS

9.1 24 Acoustics Ltd has been retained by South West Wood Products to provide an assessment of the potential impact of noise from their operations at their site in Ashcott Road in Meare, near Glastonbury.

9.2 The assessment has been undertaken following detailed noise surveys both on the site and at a complainant's property. An acoustic propagation model of the operations has also been developed.

9.3 The assessment initially indicated that the noise impact from the operations is greater than that considered acceptable by the Environment Agency. As a result engineering noise control measures were applied to two shredders and one screener on the site and further evaluation and analysis was undertaken which identified that the noise emission from the site had reduced by around 5 dBA.

9.4 It is now considered that there is no scope to reduce the noise output by any other means is considered very limited and it is 24 Acoustics' opinion that South West Wood Products have employed best available techniques to reduce the noise emission from the operations to as low as reasonably practicable.

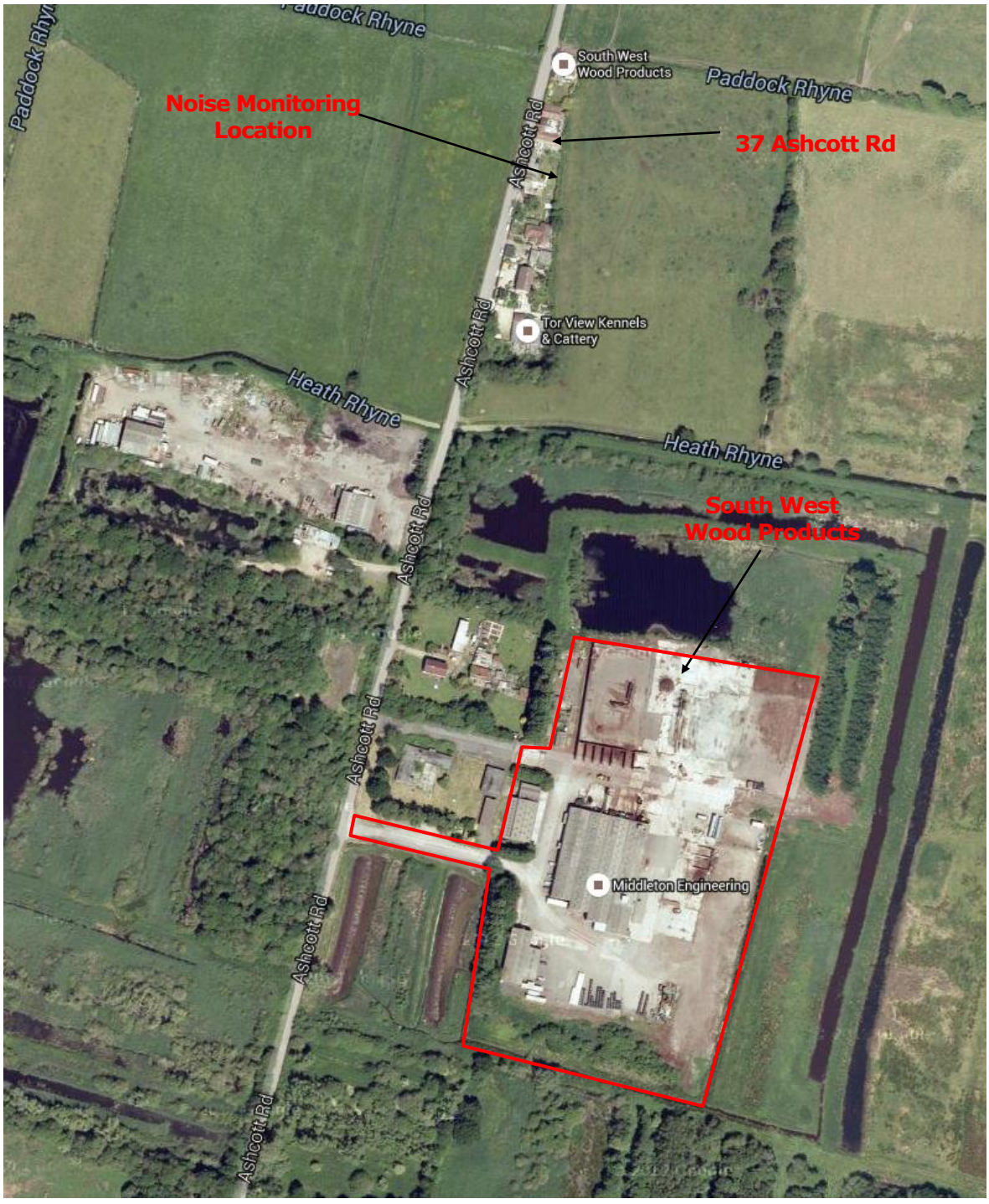
9.5 It is worth noting that on several days of observations, the noise impact from dogs barking at the neighbouring kennels at 39 Ashcott Road was substantially greater than the noise impact from South West Wood Products' operations.

REFERENCES

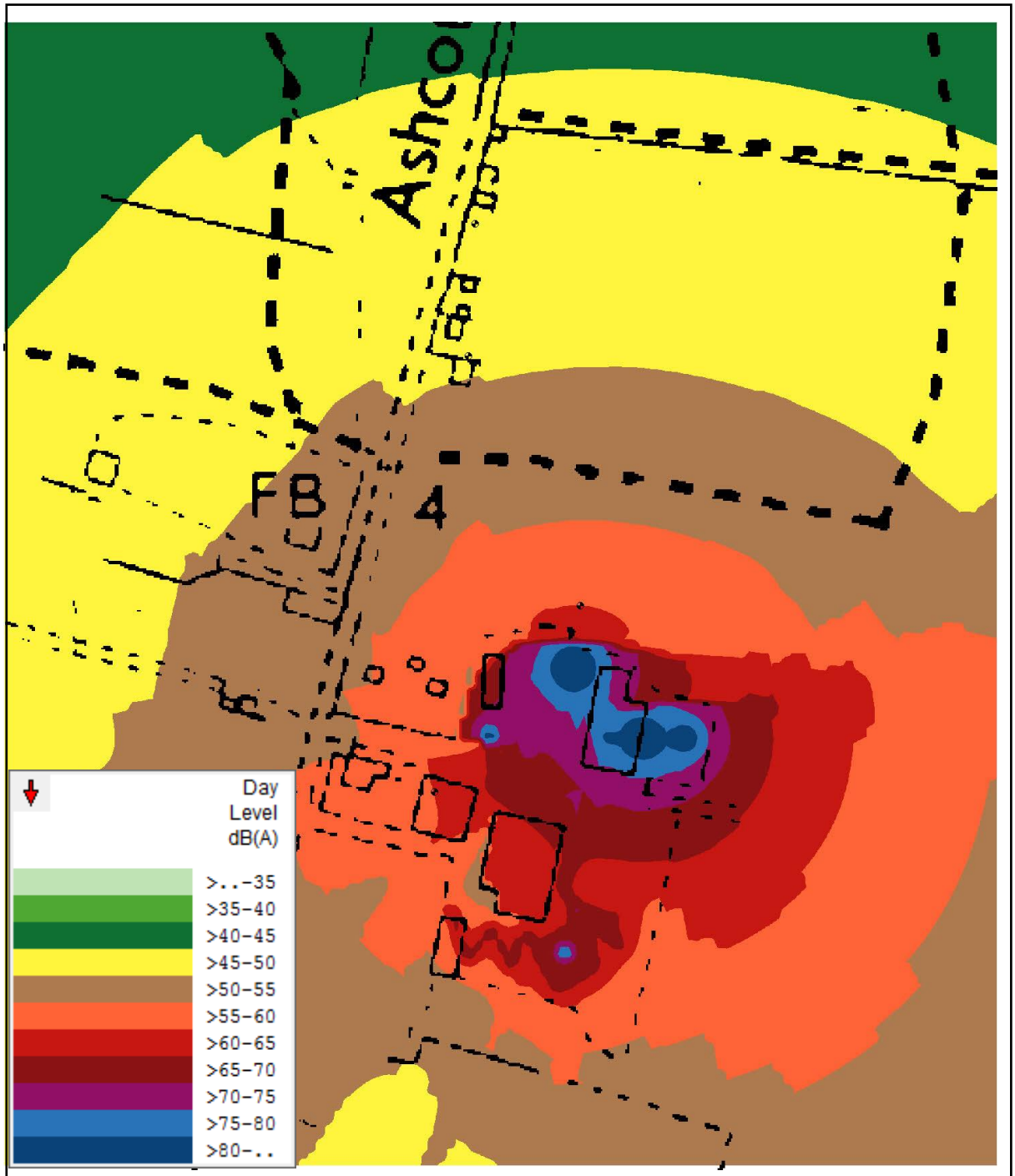
1. British Standards Institution. British Standard 4142: Methods for rating and assessing industrial and commercial sound, 2014.

2. British Standards Institution. BS 7445: 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use', 1991.

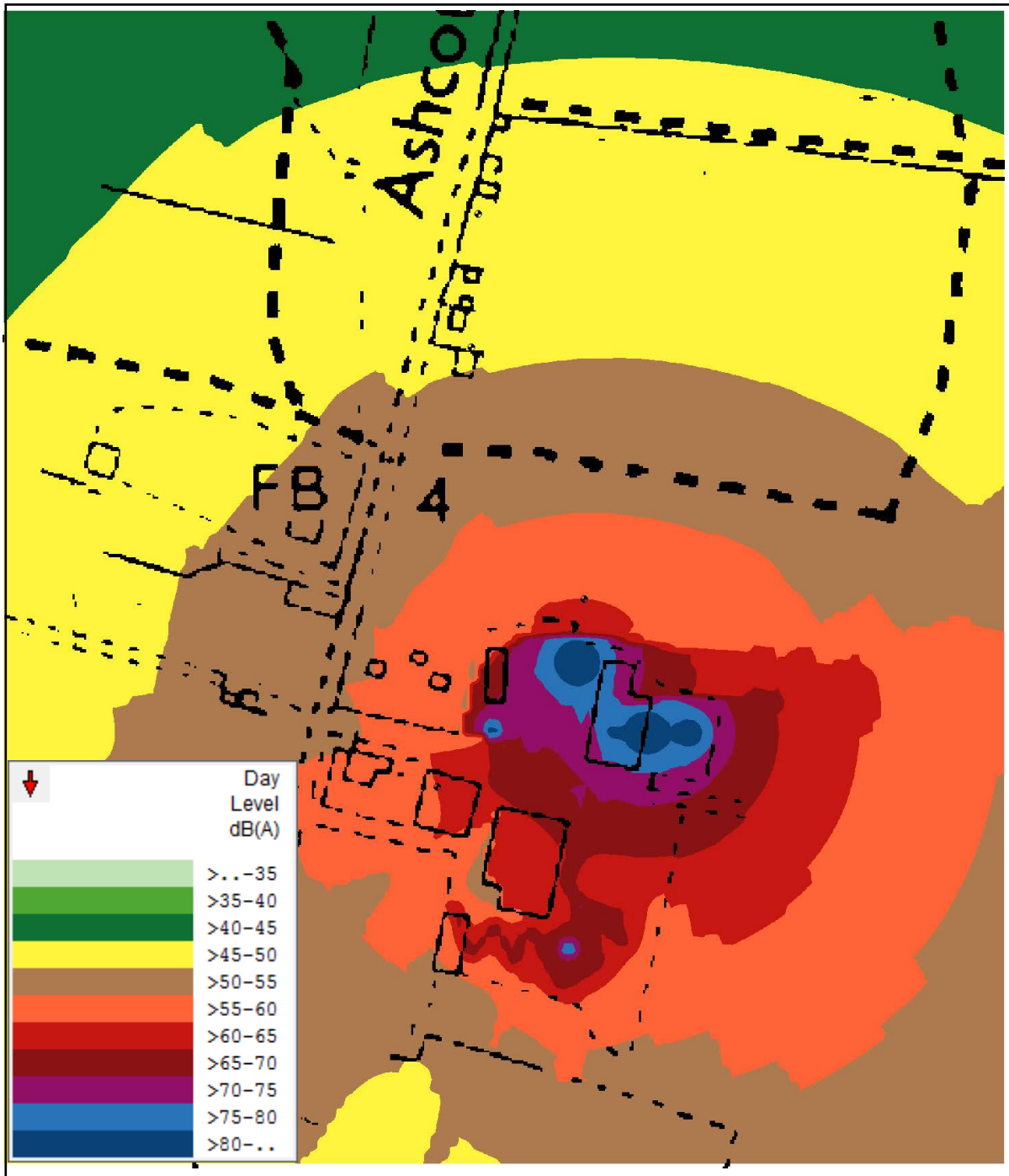
3. International Standards Institution. ISO 9613. Acoustics- Attenuation during Propagation of Sound Outdoors, Parts 1 and 2, 1993.



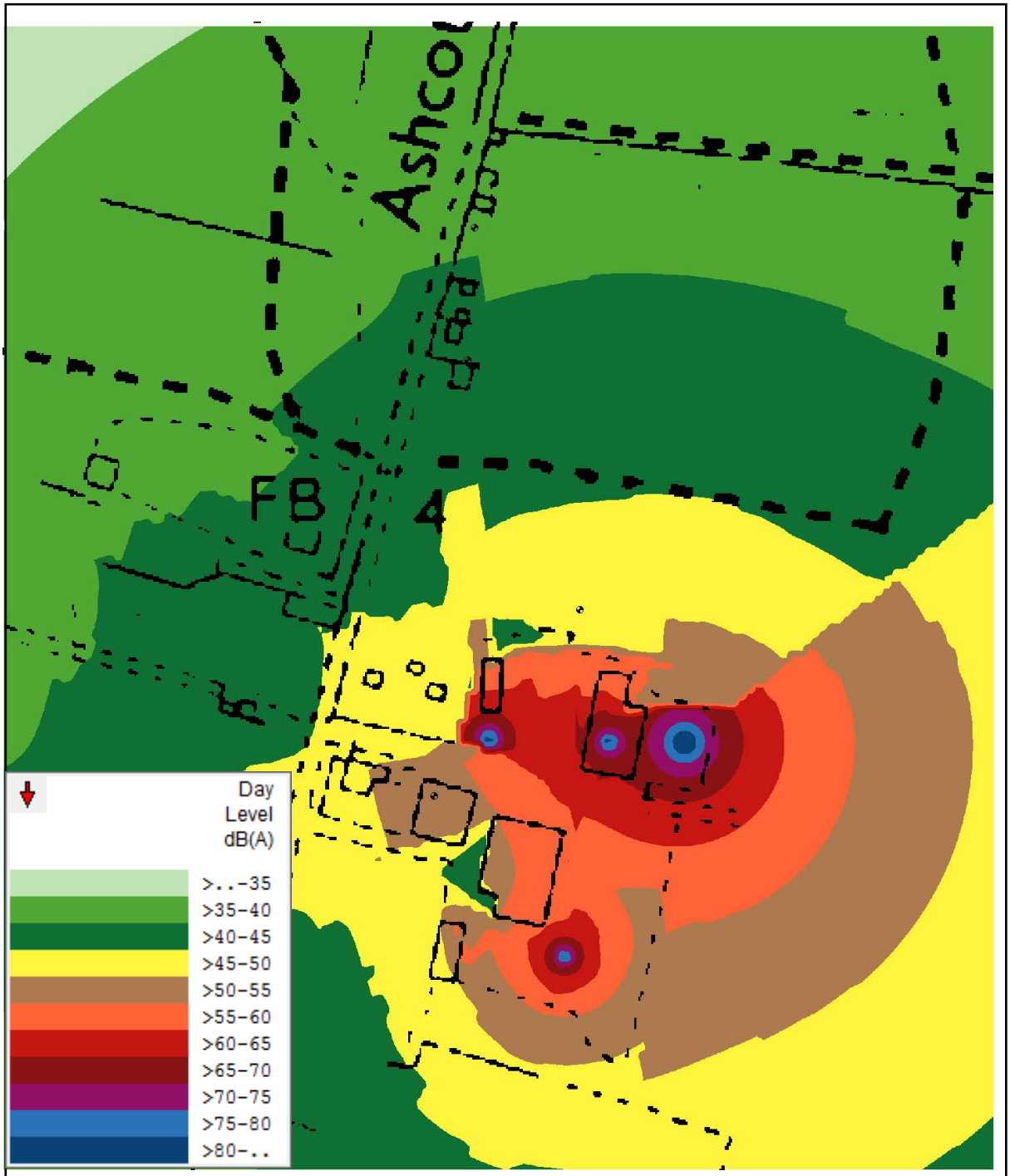
Project: South West Wood Products	**Title:** Site Location Plan and Noise Survey Location		24Acoustics
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A	
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2	



Project: South West Wood Products	**Title:** Site Noise Contours- Daytime, Doppstadt 635 in Front Yard (prior to noise control)	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** A
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2



Project: South West Wood Products	**Title:** Site Noise Contours- Daytime, Doppstadt 635 in Bottom Yard (prior to noise control)	
DWG No: Figure 3	**Scale:** N.T.S.	**Rev:** A
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2



Project: South West Wood Products	**Title:** Site Noise Contours- Evening (prior to noise control)	
DWG No: Figure 4	**Scale:** N.T.S.	**Rev:** A
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2

Rubber damping to hammer mill

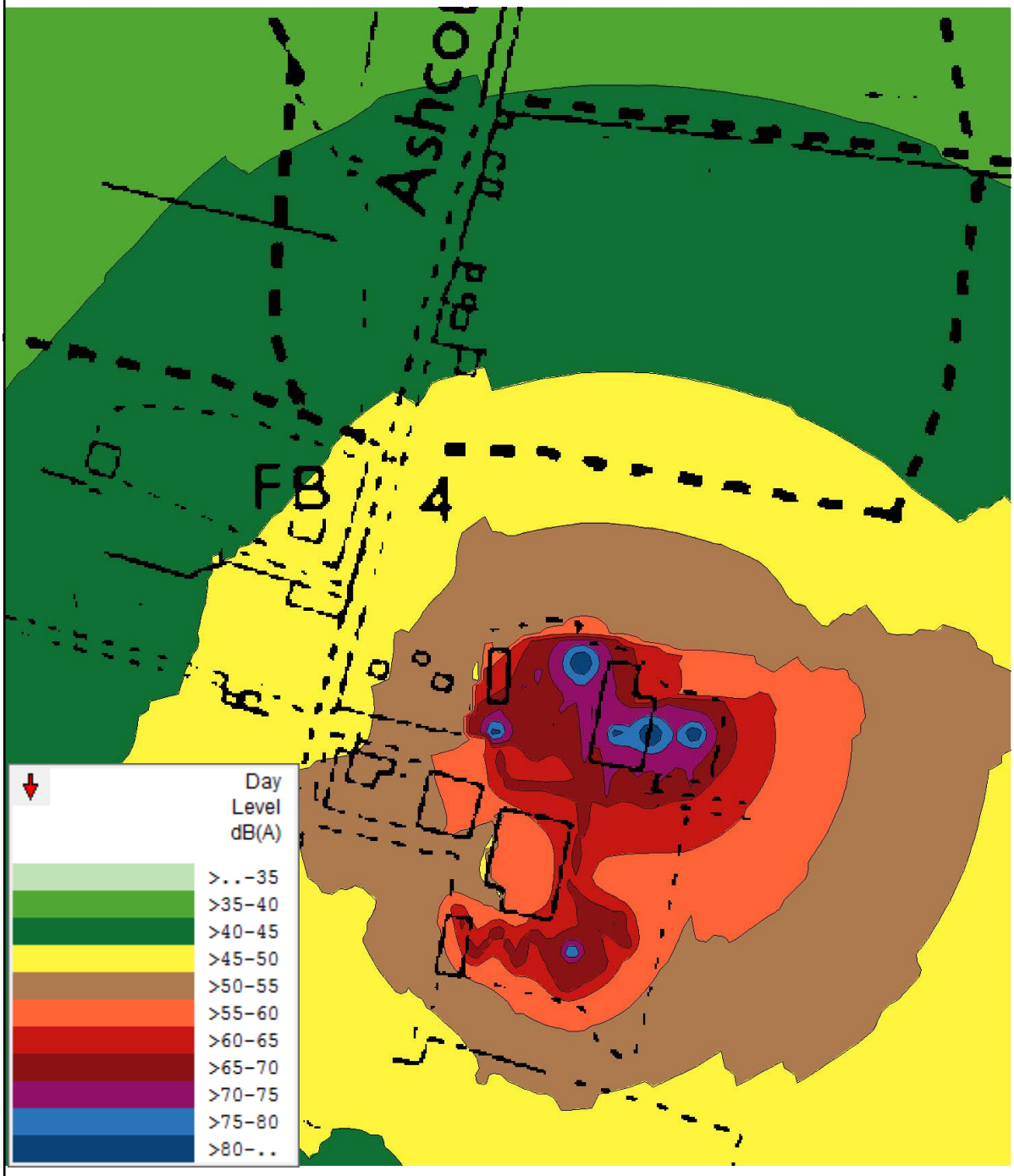
Absorbent enclosure around hammer mill

Acoustic screen around engine enclosure

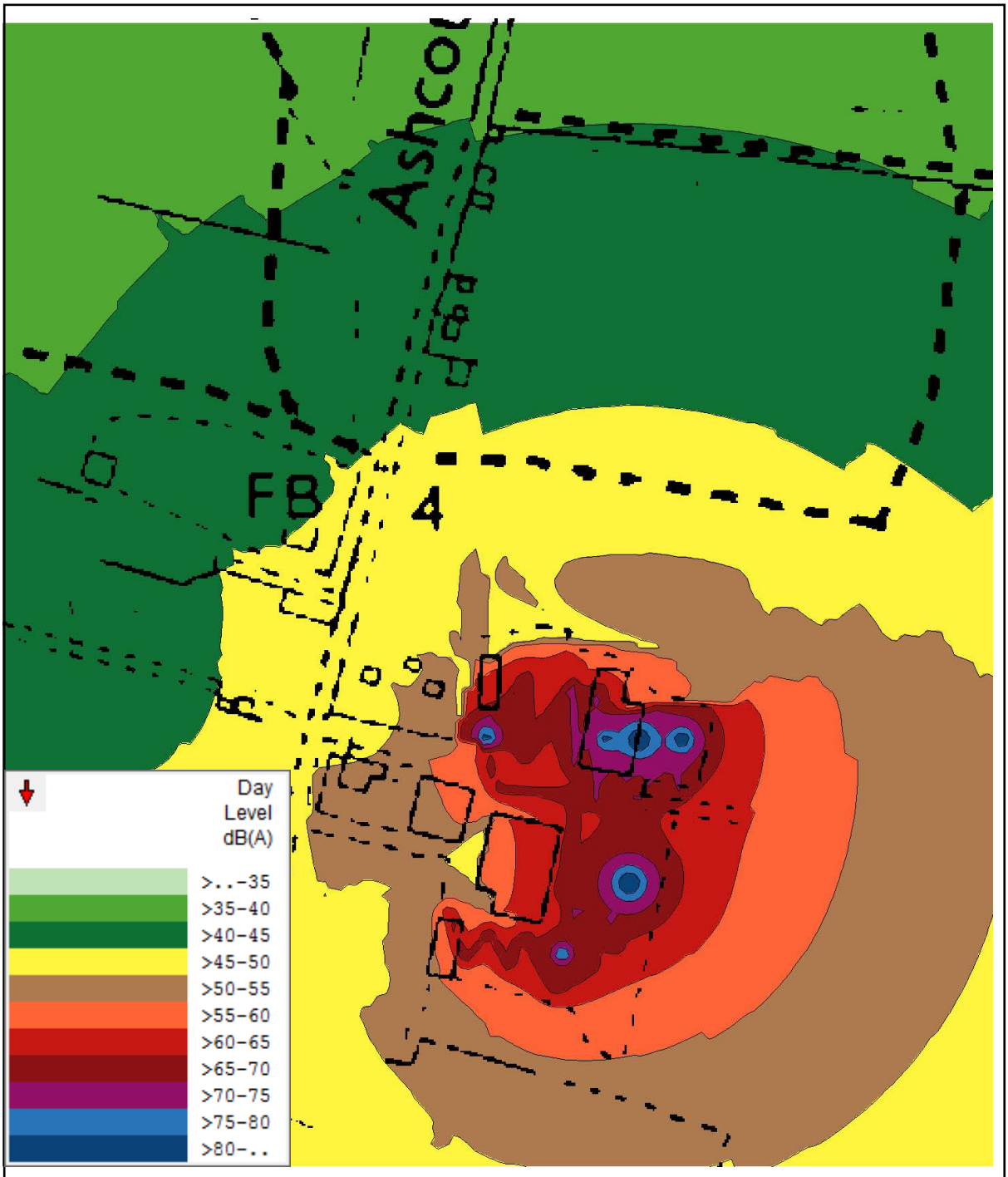
Project: South West Wood Products	**Title:** Noise Control Measures- Doppstadt 635 Shredder		24Acoustics
DWG No: Figure 5	**Scale:** N.T.S.	**Rev:** A	
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2	

Project: South West Wood Products	**Title:** Noise Control Measures- Doppstadt 435 Shredder		24Acoustics
DWG No: Figure 6	**Scale:** N.T.S.	**Rev:** A	
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2	

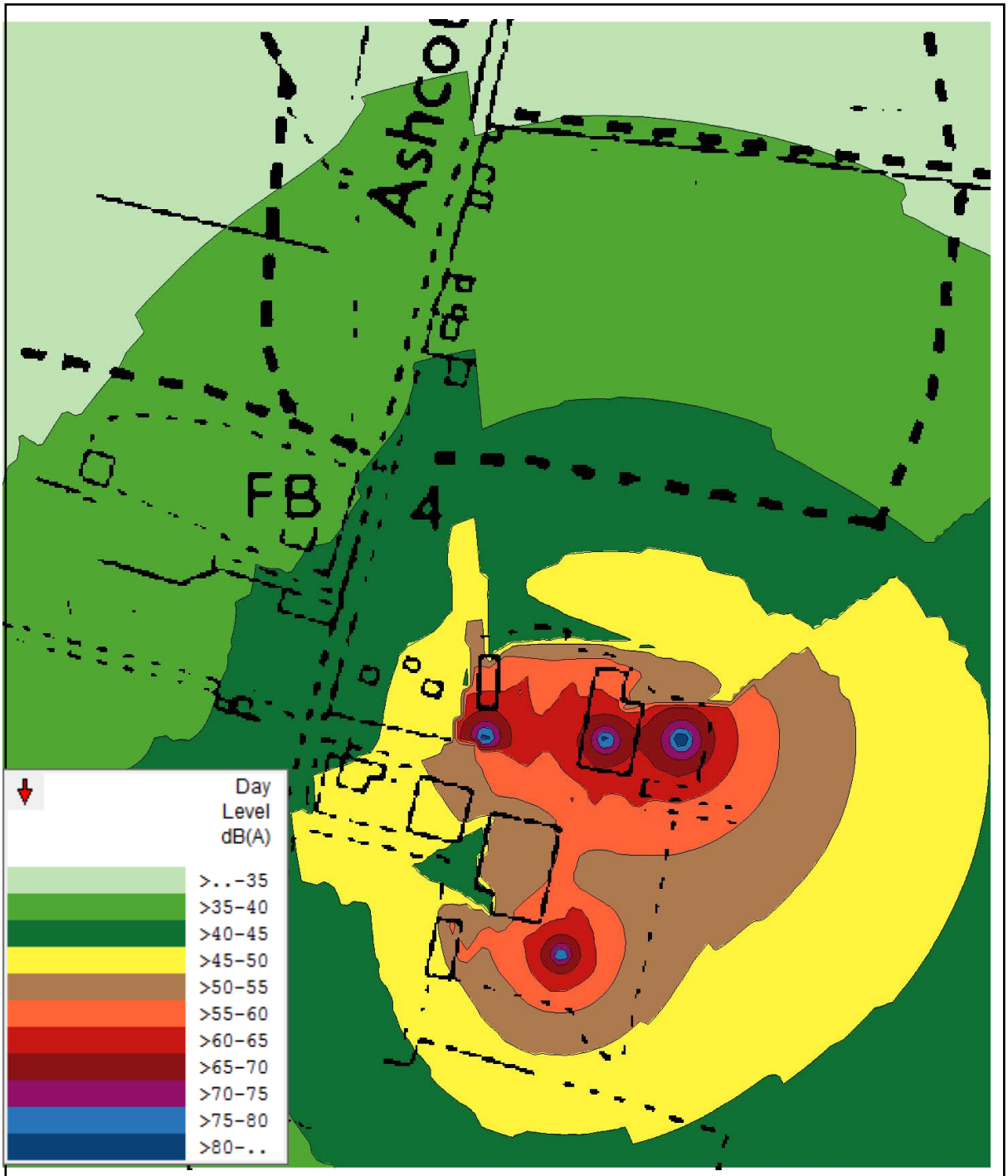
Project: South West Wood Products	**Title:** Noise Control Measures- McKlusky Screen	
DWG No: Figure 7	**Scale:** N.T.S.	**Rev:** A
Date: March 2016	**Drawn By:** RP	**Job No:** 6169-2



Project: South West Wood Products	**Title:** Site Noise Contours- Daytime, Doppstadt 635 in Top Yard (after noise control)		
DWG No: Figure 8	**Scale:** N.T.S.	**Rev:** A	
Date: April 2016	**Drawn By:** RP	**Job No:** 6169-2	



Project: South West Wood Products	**Title:** Site Noise Contours- Daytime, Doppstadt 635 in Bottom Yard (after noise control)	
DWG No: Figure 9	**Scale:** N.T.S.	**Rev:** A
Date: April 2016	**Drawn By:** RP	**Job No:** 6169-2



Project: South West Wood Products	**Title:** Site Noise Contours- Evening (following noise control)	
DWG No: Figure 10	**Scale:** N.T.S.	**Rev:** A
Date: April 2016	**Drawn By:** RP	**Job No:** 6169-2

APPENDIX A: Acoustic Terminology

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the " value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: Instrumentation Calibration Certificates

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

Date of Issue: 10 December 2015

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: TCRT15/1334

Page 1 of 3 Pages

Approved Signatory

M. Breslin [ ] K. Mistry [ ] J. Harriman [ ]

Customer	24 Acoustics Ltd Pepper Mill Barn Old Salisbury Lane Romsey Hampshire SO51 0GD			
Order No.	315760			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-31	01141958
	Rion	Firmware		1.045
	Rion	Pre Amplifier	NH-21	13603
	Rion	Microphone	UC-53A	307770
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002
Performance Class	1			
Test Procedure	TP 2.SLM 61672-3 TPS-49 *Procedures from IEC 61672-3:2006 were used to perform the periodic test.*			
Type Approved to IEC 61672-1:2002	No	Approval Number		
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003			
Date Received	08 December 2015	ANV Job No.	TRAC15/12188	
Date Calibrated	10 December 2015			

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2002 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002 and because the periodic tests of IEC 61672-3:2006 cover only a limited subset of the specifications in IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	20 November 2013	TCRT13/1363	ANV Measurement Systems

CERTIFICATE OF CALIBRATION

Certificate Number
TCRT15/1334

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-21 NL-31 Instruction Manual		
SLM instruction manual ref / issue	32006 09-04		
SLM instruction manual source	Manufacturer		
Internet download date if applicable	N/A		
Case corrections available	Yes		
Uncertainties of case corrections	No	See comment on page 3	
Source of case data	Manufacturer		
Wind screen corrections available	Yes		
Uncertainties of wind screen corrections	No	See comment on page 3	
Source of wind screen data	Manufacturer		
Mic pressure to free field corrections	Yes		
Uncertainties of Mic to F.F. corrections	No	See comment on page 3	
Source of Mic to F.F. corrections	Manufacturer		
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes		
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Lab Calibrator		
Calibrator adaptor type if applicable	NC-74-002		
Calibrator cal. date	03 December 2015		
Calibrator cert. number	UCRT15/1320		
Calibrator cal cert issued by Lab.	ANV Measurement Systems		
Calibrator SPL @ STP	94.02	dB	Calibration reference sound pressure level
Calibrator frequency	1001.88	Hz	Calibration check frequency
Reference level range	30 - 120	dB	

Accessories used or corrected for during calibration - Wind Shield WS-10
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End		
Temperature	22.76	22.96	± 0.20	°C
Humidity	40.6	40.2	± 3.00	%RH
Ambient Pressure	101.08	101.01	± 0.03	kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.0	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise	This test is currently not performed by this Lab.			
Microphone installed (if requested by customer) = Less Than		N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±		N/A	dB	

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	10.0	dB	UR	16.2	dB	UR	22.4	dB	
Uncertainty of the electrical self generated noise ±							0.12	dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Comments

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

CERTIFICATE OF CALIBRATION

Certificate Number
TCRT15/1334

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If any of the "Uncertainties of ....." are set to NO above, then the following applies.
No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator, or the manufacturer of the electrostatic actuator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of the measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of IEC 61672-1:2002.

Calibrated by: A Patel R 1

..... END .....

Additional Comments
None

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Date of issue 22 December 2015 Certificate N° 1512675

AV Calibration
2 Warren Court
Chicksands, Shefford
Bedfordshire SG17 5QB
U.K.
Tel: +44 (0)1462 638600
Fax: +44 (0)1462 638601
Email: lab@avcalib.co.uk
www.avcalibration.co.uk
Acoustics Noise and Vibration Ltd trading as AV Calibration

Page 1 of 3 Pages

Signed

G. Parry [ ] B. Baker [✓]

CLIENT	24 Acoustics Ltd Pepper Mill Barn Old Salisbury Lane Romsey SO51 0GD
F.A.O.	Linda Haskell
ORDER No	315760 Job No TRAC15/12353/05
DATE OF RECEIPT	17 December 2015
PROCEDURE	AV Calibration Engineer's Handbook section 3
IDENTIFICATION	Sound level meter Norsonic type 118 serial No 31529 connected via a preamplifier type 1206 serial No 30570 to a half-inch microphone type 1225 serial No 54988.
CALIBRATED ON	22 December 2015
PREVIOUS CALIBRATION	Calibrated on 30 October 2013 Certificate No. 1310496 issued by this laboratory.

The measurements detailed herein are traceable to units of measurement realised at the National Physical Laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1512675

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The sound level meter was set to frequency weighting A and adjusted to read correctly in response to a laboratory sound calibrator. This reading took into account manufacturers' information on the free-field response of the sound level meter.

The sound level meter was then tested, and its overall sensitivity adjusted as required.

An acoustic calibration at 1kHz was performed by application of a standard sound calibrator, whilst the tests at 125Hz and 8kHz were performed by the electrostatic actuator method.

The final sensitivity setting in calibration mode was -26.1 dB.

RESULTS

The sound level meter was found to conform to the type 1 requirements of BS EN 60651:1994* and BS EN 60804:1994* for those tests carried out.

The self-generated noise recorded was:

8.6 dB (A) 11.1 dB (C) 19.2 dB (Lin)

The expanded level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.22 dB.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the *Guide to the Expression of Uncertainty in Measurement* published by the International Organisation for Standards (ISO).

All measurement data are held at AV Calibration for a period of at least six years.

Typical case reflection factors specified by the manufacturer have been used for this verification.

The linearity range and primary indicator range specified in the manufacturer's handbook (dated November 2001) have been used.

The Norsonic 118 sound level meter design has successfully undergone pattern evaluation at Physikalisch-Technische Bundesanstalt (PTB). It was found to meet the requirements of BS EN 60651* and BS EN 60804* and was granted pattern approval as a Type 1 sound level meter.

No component of uncertainty for manufacturer-specified corrections has been included in the uncertainty budget and, in accordance with amendments to the standards, the measured values obtained during the verification have not been extended by any measurement uncertainty when assessing conformance to each standard.

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1512675

NOTES

*1 BS EN 60651:1994 and BS EN 60804:1994 were formerly numbered BS 5969:1981 and BS 6698:1986 respectively.

2 No suitable microphone frequency response information was supplied with the instrument. It was therefore measured by this laboratory using the electrostatic actuator method.

3 The instrument firmware version was 3.4.6238

4 All tests were carried out with the compensation filters set as follows; the verification is valid only for this case.

	Random	Windscreen	Preamp	Self-noise
Status	off	off	on	N/A
Screen marker			G	

5 The frequency weighting Z provided has been taken as equivalent to the Lin response in BS EN 60651:1994 for the purposes of this verification.

END

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Date of issue 02 September 2015 Certificate N° 1509489

AV Calibration
2 Warren Court
Chicksands, Shefford
Bedfordshire SG17 5QB
U.K.
Tel: +44 (0)1462 638600
Fax: +44 (0)1462 638601
Email: lab@avcalib.co.uk
www.avcalibration.co.uk
Acoustics Noise and Vibration Ltd trading as AV Calibration

Page 1 of 2 Pages

Signed

G. Parry [ ] B. Baker [ ]

CLIENT	24 Acoustics Ltd Pepper Mill Barn Old Salisbury Lane Romsey Hampshire SO51 0GD
F.A.O.	Linda Haskell
ORDER No	315756 Job No TRAC15/08235/01
DATE OF RECEIPT	26 August 2015
PROCEDURE	AV Calibration Engineer's Handbook section 2
IDENTIFICATION	Sound Calibrator Brüel & Kjær type 4231 serial number 2253117 with one-inch housing and adapter type UC 0210 for half-inch microphone
CALIBRATED ON	02 September 2015
PREVIOUS CALIBRATION	Calibrated on 04 August 2014, Certificate No. 07852 issued by this laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1509489

Page 2 of 2 Pages

MEASUREMENTS

The sound pressure level generated by the Sound Calibrator in its half-inch configuration, using the 94 dB setting, was measured three times using a B&K type 4134 microphone with the protective grid in position. The microphone sensitivity was traceable to National Standards.

RESULTS

The mean level of the calibrator output, corrected to the standard atmospheric pressure of 101.3 kPa using manufacturers' data, was

94.00 ± 0.13 dB rel 20 µPa

The fundamental frequency of the sound output was 1000 Hz ± 0.06 %, and its total distortion was (0.48 ± 0.04) %.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k*=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the *Guide to the Expression of Uncertainty in Measurement* published by the International Organisation for Standards (ISO).

During the measurements the laboratory environmental conditions were:

Temperature: 22 to 23 °C
Atmospheric pressure: 101.1 to 101.2 kPa
Relative humidity: 52 to 62 %

NOTE
The instrument was labelled "B&K 4231 A".

END

young CALIBRATION

CERTIFICATE OF CALIBRATION

ISSUED BY YOUNG CALIBRATION LIMITED

DATE OF ISSUE: 21/05/14 CERTIFICATE NUMBER: 37541

Young Calibration Ltd.

Unit 4, Ham Business Centre,
Brighton Road,
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Document : YCF/024
Issue Number : 1.8

Page 1 of 1 Page

Approved Signatory

□ A. Young
□ N. Mardon
■ M. Hindle

Customer:	24 Acoustics Ltd	Manufacturer:	NRG Systems
Customer Address:	Pepper Mill Barn Old Dalisbury Lane Romsey SO51 0GD	Model:	NRG #40 Rotating Cup Anemometer
		Serial Number:	1795-00184389
		Equipment Condition:	Used
		Nominal Calibration Range:	3 - 35 m/s
		Test Media:	Atmospheric Air
Customer's Reference No.:	315724	Laboratory Temperature:	24.1 to 25.0 °C
Date of Receipt:	09 May 2014	Laboratory Barometric Pressure:	1006.2 to 1007.2 mbar
YCL Project Number:	27039/1	Laboratory Relative Humidity:	40.3 to 43.8 % rh
Calibration Date:	21 May 2014	Calibration Procedure:	Procedure 53V
Calibration Performed By:	C. Millard	Reference Equipment:	Traceable to National Standards

Calibration Method

The unit under test (UUT) was mounted 140 mm from the end of a wind tunnel with the head aligned perpendicular to the flow direction and was calibrated against a laser doppler anemometer.

When stabilised conditions were observed, the measurement conditions were recorded. The air velocity was adjusted to the next condition, and once steady state conditions were achieved, the results were again recorded, this procedure being repeated until the calibration was complete. The results are derived from the average of at least 10 readings.

The "Air Velocity" readings are at actual test conditions as reported in the results below.

Calibration Results

	Air Velocity (m/s)	Air Density (kg/m^3)	UUT Reading (Hz)	Derived Velocity (m/s)
**	3.775	1.183	4.57	3.85
	6.669	1.184	8.14	6.58
	10.224	1.183	13.12	10.39
	20.592	1.173	26.42	20.57
	30.814	1.156	40.47	31.31

Air Temperature during test : 23.1 - 30.3 °C
Atmospheric Pressure during test : 1006.7 - 1006.8 mbarA
Relative Humidity during test : 42.3 - 43.3 % RH

N.B. A blockage correction factor has been applied to the actual "Air Velocity" to replicate measurement conditions of an open-air environment.
** indicates the minimum velocity for stable frequency output
The 'Derived Velocity' is from the manufacturer transfer function: m/s = 0.765*Hz + 0.355
The uncertainty of the above electrical measurements under laboratory conditions is ± 0.3Hz
The uncertainty of the above velocity measurements under laboratory conditions is ± 1.2% + 0.07m/s + instrument resolution
The uncertainty of the above air density measurements under laboratory conditions is ± 0.15%

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ISO 17025 requirements.

The uncertainties reported are not intended to indicate the repeatability of the instrument.

APPENDIX C: Noise and Meteorological Survey Results

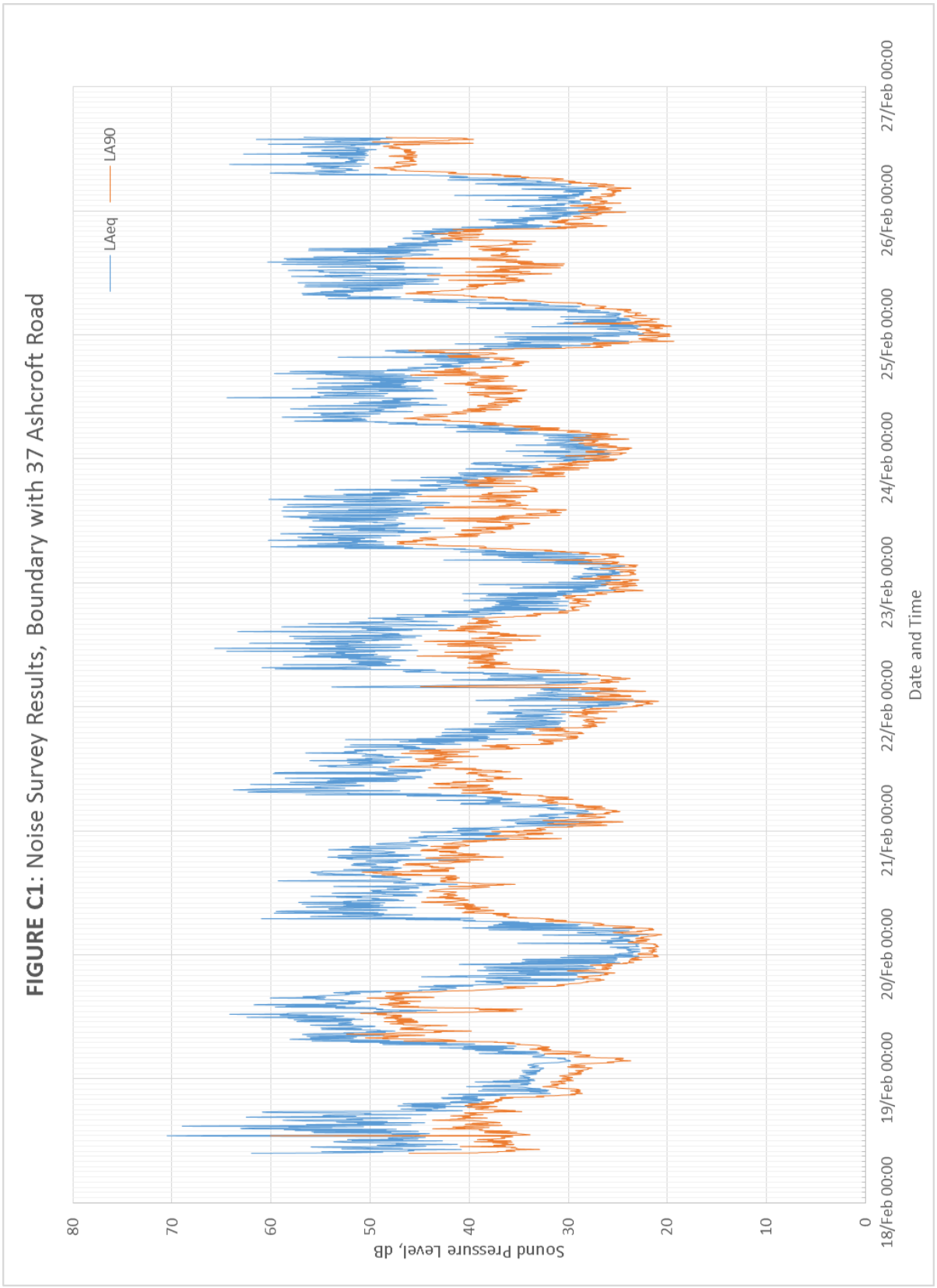

FIGURE C1: Noise Survey Results, Boundary with 37 Ashcroft Road

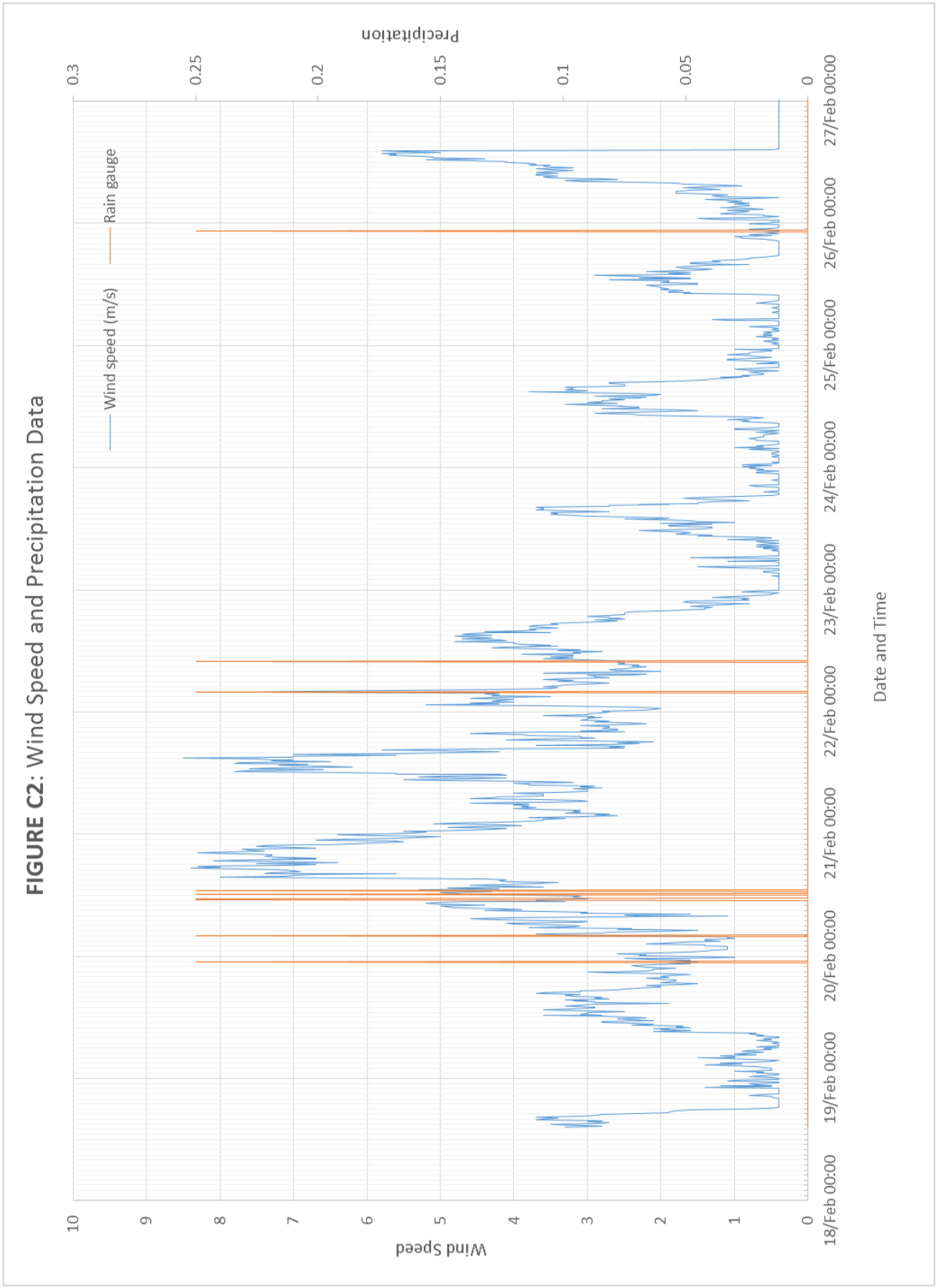

FIGURE C2: Wind Speed and Precipitation Data

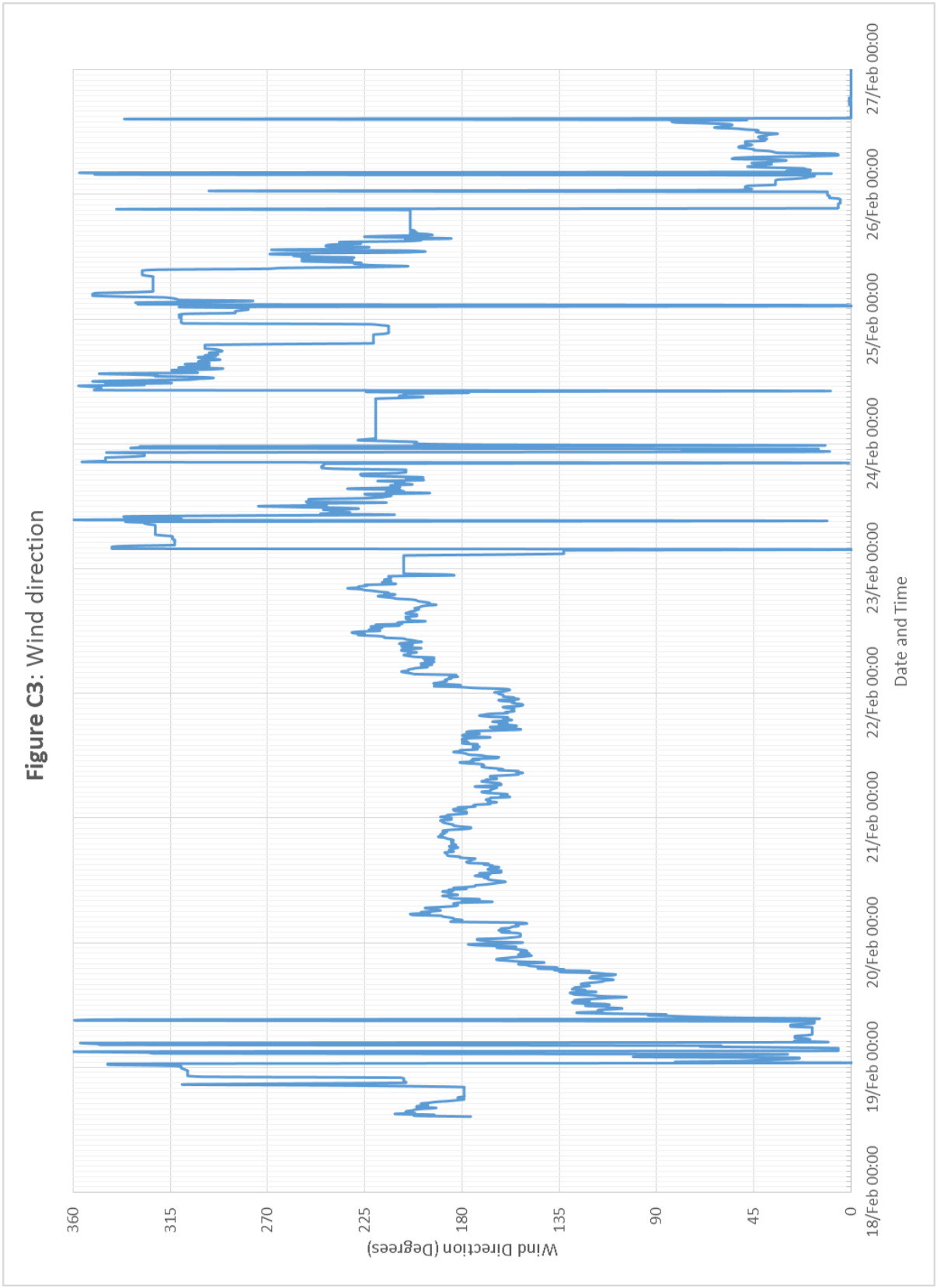

Figure C3: Wind direction

APPENDIX D: Plant Sound Power Levels

Plant	$L_{w\,A}$	Octave Band (Hz) and Sound Power Level, dB								
		31.5	**63**	**125**	**250**	**500**	**1.0 k**	**2.0 k**	**4.0 k**	**8.0 k**
Finlay Screen & ECS	99	102	109	102	94	96	94	91	86	80
Doppstadt 635 Shredder	116	108	126	120	114	114	110	106	102	96
McKlusky Screen	109	115	116	114	108	106	104	102	98	90
Doppstadt 435	114	111	119	119	108	112	109	107	104	96
ECS adjacent to McKlusky Screen	101	108	110	105	101	98	95	92	89	84
Chiefton Screener	102	100	110	106	101	97	94	93	93	90
JCB Loader 437	98	90	95	97	101	96	92	89	85	80
Hyundai HL760	96	100	102	108	94	92	89	86	81	75
JCB Telehandler	91	92	90	94	89	89	85	84	78	72

Table D1: Derived Plant Sound Power Levels, Prior to Engineering Noise Control Measures

Plant	$L_{w\,A}$	Octave Band (Hz) and Sound Power Level, dB								
		31.5	**63**	**125**	**250**	**500**	**1.0 k**	**2.0 k**	**4.0 k**	**8.0 k**
Doppstadt 635 Shredder	109	103	119	113	108	107	102	99	95	90
McKlusky Screen	104	108	108	110	104	103	99	95	90	84
Doppstadt 435	108	106	119	112	103	106	102	100	97	90

Table D2: Derived Plant Sound Power Levels, following Engineering Noise Control Measures

APPENDIX E: Noise Propagation Model Output

Operational Scenario, Plant and Sound Pressure Level, dB $L_{Aeq, 1\ hour}$							
			Day Bottom Yard			**Evening**	
Doppstadt 635	44.1		Doppstadt 635	43.1		McKlusky Screen	37
Doppstadt 435	41.8		Doppstadt 435	41.8		McKlusky ECS	30.4
McKlusky Screen	37		McKlusky Screen	37		Chiefton Screen	33.9
Chiefton Screen	33.9		Chiefton Screen	33.9		Finlay Sc & ECS	24
Mob plant- day	32.1		Mob plant- day	32.1		Mob plant- night	21.2
McKlusky ECS	30.4		McKlusky ECS	30.4			
Finlay Sc & ECS	24		Finlay Sc & ECS	24			
Total	**47**		Total	**47**		Total	**39**

Table E1: Summary of Dominant Noise-emitting Plant For Each Operation, 37 Ashcroft Road