

Acoustic Associates Sussex Ltd

Noise Assessment

Discharge of Planning Conditions

Site: Austin Divall Steelwork, Unit J, Rudford Industrial Estate,
Ford, West Sussex

Client: **Austin Divall Steelwork Fabrication Limited**

Report by: Scott Castle BSc (Hons) CEnv, MCIEH PGDip: Acoustics MIOA

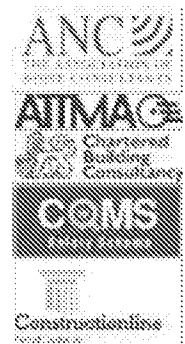
Date: 23/08/2019

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Issue 1



Acoustic Associates



Sound Insulation Testing Acoustic Design of Buildings BS 6169 BS 6824 Subject: Acoustics BS03

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Issue 1	23/08/2019	Original Issue
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1 Introduction

Acoustic Associates have been appointed to undertake an acoustic assessment relating to the steel fabrication workshop/factory located on the Rudford Industrial Estate at Ford, West Sussex. The assessment is a revisit, further to significant enclosure works occurring around the external steel storage yard.

The purpose of the assessment was as follows:

- Assess noise levels inside and outside the steel storage area and model how the sound is likely to propagate across the site with the newly constructed enclosure.
- Provide the findings of the assessment in a report format to consider the requirements of condition 8 of CM/12/18/PL

A class one sound level was left inside the newly enclosed yard at Austin Divall to record internal sound pressure levels between 15th and 19th August 2019. A test of the building fabric/envelope was also carried out whilst on site to determine how the new constructed building performs acoustically.

Specifically, the roller shutter door on the Southern wall was measured and found to have an R_w of 23.2 dB and the Southern wall an R_w of 36.2 dB. Values for the highest recorded single daytime hour and the highest recorded L_{Amax} level inside the enclosed yard have been used to populate the IMMI noise modelling software to determine how sound will propagate across the site with specific reference to the locations identified in condition 8 of 2 and 3 May Close.

The noise modelling software indicates that with the highest value of 101dB L_{Amax} applied, the predicted sound levels are 7.7dB below the requirements of condition 8. It should however be recognised that the L_{Amax} value applied is an instantaneous event which will not likely last longer than a single second, however it has been presented in the modelling software as a worst-case scenario to present a robust report. It follows that if the L_{Amax} figures used in the modelling meet the condition then sound pressure levels generated internally, lower than 101 dB which was recorded, will also meet the requirements of condition 8.

Condition 8 of CM/12/18/PL is therefore achieved and may be considered for discharge by the local planning authority.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

Austin Divall Steelwork Fabrication Limited were granted planning consent on 18th July 2018 to carry out works to enclose the external yard area (CM/12/18/PL). As part of the planning consent, condition 8 requires as follows:

“Mitigation measures detailed in para 10 of the Noise Assessment accompanying this application, ref J2407, dated 10-04-2018 by Acoustic Associates to be installed and checked by an acoustic consultant to ensure that the chosen methods for attenuation achieve the mitigation levels detailed in the report whereby the day time noise level at the nearest residential premises does not exceed 54 dB LAeq and these records shall be submitted to and approved by the Local Planning Authority. If the mitigation measures detailed in the said report fail to secure a reduction in noise levels to the stated limit then further measures shall be implemented with the written agreement of the Local Planning Authority. The approved development shall not be used until the noise limit is met.”

The condition therefore requires an assessment of the measures implemented which are now complete.

2.2 Previous Acoustic Report

An acoustic report dated 10/04/2018 and reference J2407 was previously issued to the client with recommendations for the site. As part of the previous report, noise modelling software was used, IMMI which predicts how sound will propagate across a site and faithfully replicates the methodology of ISO9613 in terms of barriers, reflections, ground attenuation etc.

2.2.1 Provenance of 54dB LAeq within Condition 8 of CM/12/18/PL.

Within the previous acoustic report, reference was made to 2 and 3 May Close, post enclosure works, having a predicted sound pressure level of 54dB LAeq using 113dB LAmax internally. With an enclosed site and a larger internal space, it is anticipated that the sound levels internally will decrease.

Condition 8 relates to 54dB LAeq being achieved in the daytime.

It was also noted that in the previous acoustic report, a recommendation had been made for the building fabric to achieve 35dB Rw.

2.3 Works Carried Out and Materials Used

Austin Divall previously operated from an open yard as seen in Figure 1 below.

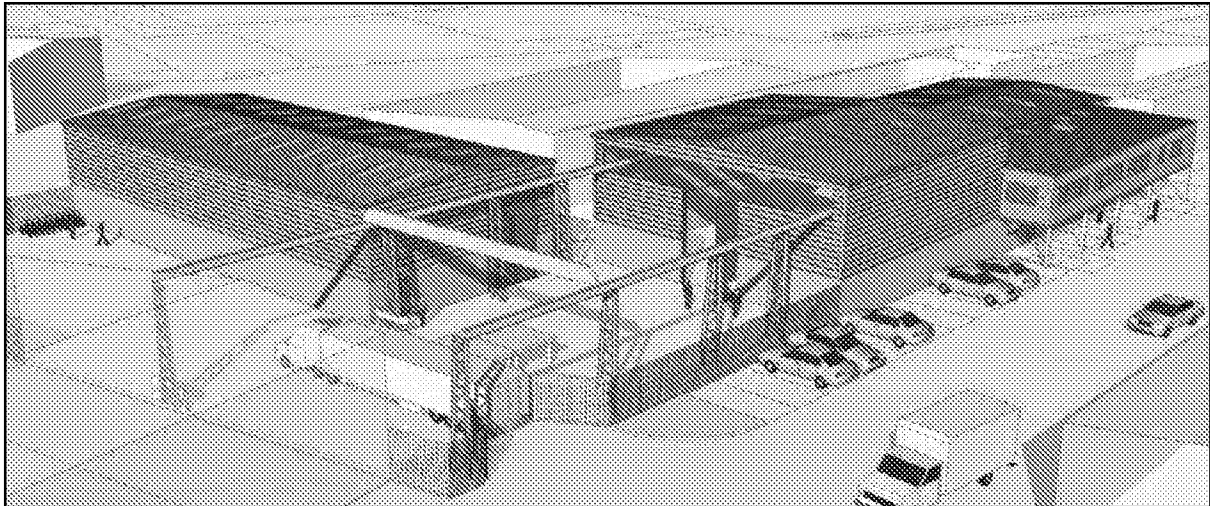


Figure 1. 3D View of site layout

As part of the mitigation measures to future proof the site, enclosure of the rear yard area was the chosen route to minimise the escape of sound through both the daytime and night time period. A night shift still operates at the site.

Discussion with the client identifies that the following significant improvements have been implemented since the last visit to the Austin Divall site. These are as follows:

- The crane motor which originally exhibited a whine has been overhauled and fixed.
- The Western Yard area used to store lengths of steel has now been enclosed with the ability for vehicular access and deliveries inside the enclosure. The crane operation is also fully enclosed and the steel storage is weatherproofed.
- Vehicles can access via the southern roller shutter door, unload and depart through the open Northern façade without the need for any reversing or additional vehicle manoeuvring.
- The enclosure structure has been designed to achieve 35dB Rw, with a combination of masonry and Kingspan type profile material. The masonry is 100mm brick on the outside, 100mm cavity filled with mineral wool and 100mm block work internally. The profile material is a 100mm insulated slab with twin layers of 2mm aluminium sheet.
- The original Western end of the factory has been retained with the works to steel occurring in the same position and the enclosed yard covering the storage area.
- In designing the enclosure to the yard area, 50% less rooflights were installed
- Management are continually review existing processes and this remains an ongoing process.
- Management do carry out subjective listening checks off site to determine the impact of the steel fabrication company.
- All mobile plant remains subject to regular examination.
- 03:00 hours remain the definitive end time for the night shift.
- An acoustic roller shutter door has been installed in the southern side of the enclosed building. The door is controlled by a silent electric motor and does not have any alarms associated with its opening or closure.

- External cutting is now carried out inside a purpose-built steel container as a result of reviewing external working practices.

It was also reported that there have not been any noise complaints received and that a resident had written to Austin Divall to state what an improvement in the soundscape there had been.

Figure 2 below show the improvements made to the site with the historic open steels yard on the left-hand side of Figure 2 and the new enclosed area in the remaining two images of Figure 2.

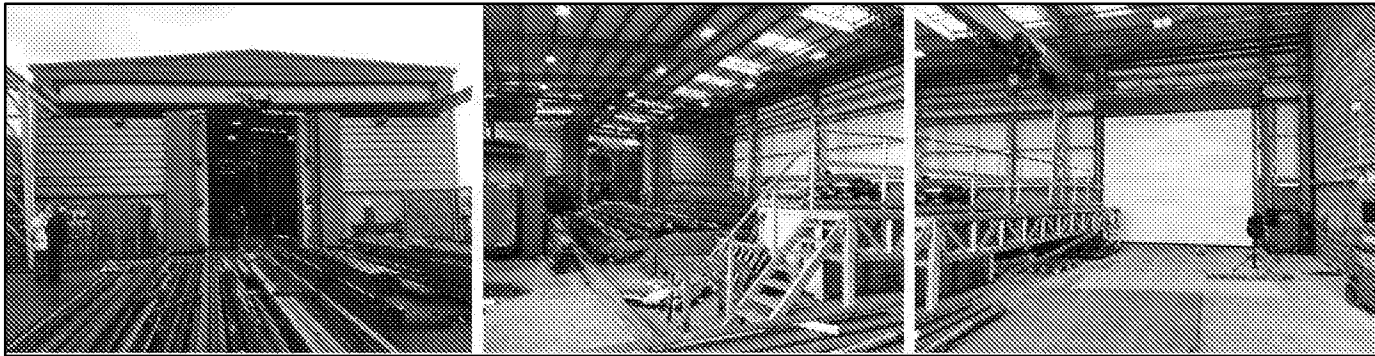


Figure 2. Comparison of Historic Storage yard and New Enclosed Storage Area (Roller Shutter Door on right).

2.4 Nearest Residential Receptors/Neighbours

For the purposes of the report and condition 8 of the decision notice, the residential properties at 2 and 3 May Close will be used. These are approximately 130m South of the Austin Divall Building.

3 Background Sound Survey Baseline Conditions & Results

3.1 Methodology

A revisit to the Austin Divall Site was carried out on 15th August 2019 and 21st August 2019 to carry out a test similar to a sound insulation test, where high levels of pink noise were generated inside the factory warehouse, with measurements taken inside and outside. Such a process, with the subtraction of background sound levels (externally), allows a determination of the building fabric acoustic properties.

Whilst attending site, a microphone survey was also set up inside the newly erected yard area to collate data over a number of days and be able to review the L_{Aeq} and L_{Amax} level generated both during the daytime and the night time. The survey was in place between 15th August and 21st August 2019.

With the performance of the building fabric established through testing, as well as the new internal sound levels measured, the previous IMMI noise model can be used to determine the new predicted sound levels at 2 and 3 May Close.

3.2 Background and Existing Noise Survey Details

Survey(s) carried out by	Scott Castle BSc (Hons) Env Health, MCIEH CEnvH PGDip Acoustics MIOA
Equipment Used	01db SIP95 Class 1 Sound Level Meter - 10492
Equipment Used	Castle Group Acoustic Calibrator – GA607-Serial.040430
Duration of Survey	Start 09:45 15/8/2019 / Stop 12:49 hours 19/8/2019
Height	2.2m above floor level.

Table 1. Survey Information

3.3 Noise Survey Results

A class one sound level meter (01dB SIP 95) was installed in the newly covered yard, approximately half way along the Southern facing wall to record sound levels. It is relevant to note that aside from the movement of steelwork which is done via crane in the storage yard area, the dominant noise source remains that of the workshop, which is located further East. The sound level meter was approximately 10.6m from the Eastern edge of the South facing door.

The daytime period, assumed to be 07:00 hours to 23:00 hours as per the British Standards has been assumed in line with condition 8.

Daytime - Hourly L_{Aeq} Sound Levels					
Hours	Thu	Fri	Sat	Sun	Mon
07:00		76.7	75.2	60.2	73.6
08:00		79.7	77.9	68.7	78.2
09:00		81	76.7	70.2	77.1
10:00		79.6	75.8	62.8	76.3
11:00	80.8	79.1	76.2	75	79
12:00	77.4	79.9	77.3	47.7	
13:00	79	77.8	73.7	46.5	
14:00	81.7	82	53.1	46.1	
15:00	81.3	74.3	48.6	47.4	
16:00	73.4	70.3	48	47.6	
17:00	74.3	68.4	51	46.9	
18:00	68.2	68.1	46.5	47.5	
19:00	68	67.3	44.6	45.7	
20:00	67.9	67.4	43.8	44.9	
21:00	66.9	67.5	41.9	43.9	
22:00	67.5	66.9	41.5	43.9	
Arithmetic Average	73.9	72.4	53.9	48.6	79.0
Log Average	77.1	77.1	72.7	65.2	77.2
Maximum Value	81.7	82	77.9	75	79

Figure 3. Measured $L_{Aeq,1\text{ hour}}$ periods for daytime operations

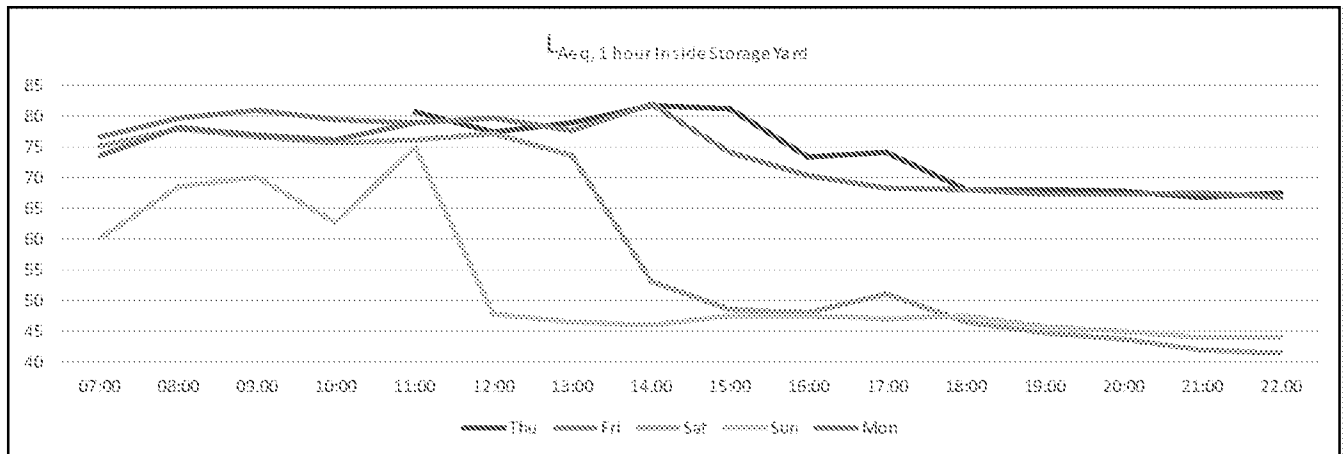


Figure 4. Time History Graph for L_{Aeq} 1 hour Sound Levels.

Figure 4 demonstrates normal operation for both Thursday and Friday as a complete day, with reduced operations for the Saturday and Sunday.

The worst case daytime single hour period was recorded as 82 dB $L_{Aeq,1 \text{ hour}}$, internally between 14:00-15:00 hours on the Friday 16th August 2019.

The highest **arithmetic** average daytime period recorded was that of the Thursday 15th August 2019 at 72.4 dB $L_{Aeq, 16 \text{ hour}}$. The **logarithmic** average was also reviewed for the complete Friday period indicating 77.1 dB $L_{Aeq, 16 \text{ hour}}$.

The highest L_{Amax} value generated internally, was also extracted from the survey data and was 100.8 dB, which is rounded to 101 dB for the purposes of the report. The review of the survey data used 1-minute periods, to ensure a fair coverage of both daytime and night time periods. The 101 dB L_{Amax} event occurred at 10:45 on the 16th August 2019.

It was noted that the previous acoustic report had focused on night time noise, so to allow a comparison between the 2018 internal measured data and the 2019 data, the 18:00 to 03:00 hours period was also examined and can be seen below in Figure 5. From the 2018 data on the right-hand side, 82dB $L_{Aeq, 1 \text{ hour}}$ was recorded as the maximum, whereas 68 dB $L_{Aeq, 1 \text{ hour}}$ has been recorded as the maximum inside the factory storage area, a 14dB reduction in sound levels.

Night time					Inside Factory		
Hours	Night 1	Night 2	Night 3	Night 4	Hours	Night 1	Night 2
18:00	68.2	68.1	46.5	47.5	18:00-19:00	77	78
19:00	68	67.3	44.6	45.7	19:00-20:00	78	79
20:00	67.9	67.4	43.8	44.9	20:00-21:00	79	82
21:00	66.9	67.5	41.9	43.9	21:00-22:00	78	78
22:00	67.5	66.9	41.5	43.9	22:00-23:00	76	78
23:00	68.3	61.2	41.6	43.4	23:00-24:00	78	77
00:00	67	59.4	41.9	43.2	00:00-01:00	78	76
01:00	68.3	43.4	44.8	43	01:00-02:00	78	77
02:00	68	42.4	47.5	43.3	02:00-03:00	78	77
03:00	64.4	42.2	44.3	43.9	03:00-04:00	63	66
Maximum	68.3	68.1	47.5	47.5			

Figure 5. Comparison of measured night time periods with 2018 data (right hand side) and 2019 data (Left Hand Side)

3.3.1 Summary of 2019 Survey Data

The highest recorded L_{Amax} level internally was 101 dB, measured in the enclosed yard/storage area.

The highest 1 hour period during the daytime period was recorded as 82dB $L_{Aeq, 1 \text{ hour}}$.

The highest average daytime 16 hour period was 77.1 dB $L_{Aeq, 16 \text{ hour}}$.

When contrasting the overnight working periods ie 18:00-03:00 hours, there was a 14dB reduction compared to the 2018 data when comparing 1 hour L_{Aeq} periods.

Notwithstanding the above data the higher readings of 82dB $L_{Aeq, 1 \text{ hour}}$ and 101dB L_{Amax} have been applied to the modelling process.

3.3.2 Measured Performance of the Building Envelope

As discussed above, a test to generate and broadcast high levels of pink noise from two speakers inside the covered steel storage area was carried out to determine how the building walls and south facing door would perform acoustically. The measurement positions were carried out at 1m from the façade both inside and outside the wall with the signal being broadcast and two background sound levels taken with the pink noise signal switched off. The door and wall measurement positions were separated by at least 13m in distance.

The results of the testing are seen in Figure 6 below which details that the walls are achieving 36.2dB R_w and the roller shutter door 23.2 dB R_w . In the previous acoustic report, it was recommended that the wall achieved 35dB and it is noted to exceed this.

Element	Description	$L_{Aeq, 30 \text{ seconds}}$
Door	Inside - Broadcast on	102
Door	Outside - Broadcast on	78.8
Door	Outside - External Background	52.9
Door	Corrected External Background	78.8
Door Performance		23.2
Wall	Inside- Broadcast On	101.5
Wall	Outside - Broadcast on	65.4
Wall	Outside - External Background	50.1
Wall	Corrected External Background	65.3
Wall Performance		36.2

Figure 6. Results of the Sound Insulation Test of the Southern Wall

3.3.3 Modelling Predictions

The inputs for the IMMI noise modelling software are as follows:

- Walls 36.2 R_w
- Doorway on Southern façade – 23.2 R_w
- Doorway measuring 5.9m x 4.9m high.
- Worst case hour – 82dB $L_{Aeq, 1 \text{ hour}}$
- Highest recorded L_{Amax} event 101 dB L_{Amax}

- The doorway to the North has been left as open without any insertion losses or attenuation applied.
- The Roof has been left as 25 Rw

To ensure a robust model, the modelling inputs have assumed sound pressure levels of 82dB (worst hour) and 101 dB (highest L_{Amax} event) as internal sound pressure levels, as it was noted that the requirement for 54dB L_{Aeq} was likely based on a L_{Amax} of 113dB. The reference measurement position, as determined by condition 8 has been highlighted in an orange cell within Figure 7 below showing predictions of both 27.3 dB for 82dB as a worst-case hour and 46.3 dB as the highest recorded L_{Amax} level. These are below the requirements for condition 8.

Modelling Predictions in L_{Aeq}		
Location	82dB Worst Case Hour	101 dB-Highest L_{Amax}
37 May Close	27	46
1 May Close	28	47
Waterford Cottage-Gd	28.3	47.3
Waterford Cottage1st	28.6	47.6
29 Cropthorne-1st	25.9	44.9
28 Cropthorne-1st	25.3	44.3
27Cropthorne-1st	24.9	43.9
1 Cropthorne-1st	24.7	43.7
2&3 May Close-1st	27.3	46.3

Figure 7. IMMI Noise Modelling Predictions with both Worst case hour and highest L_{Amax}

The predicted noise contours can be seen in Figures 8 and 9 below for worst case single hour and highest L_{Amax} level recorded.

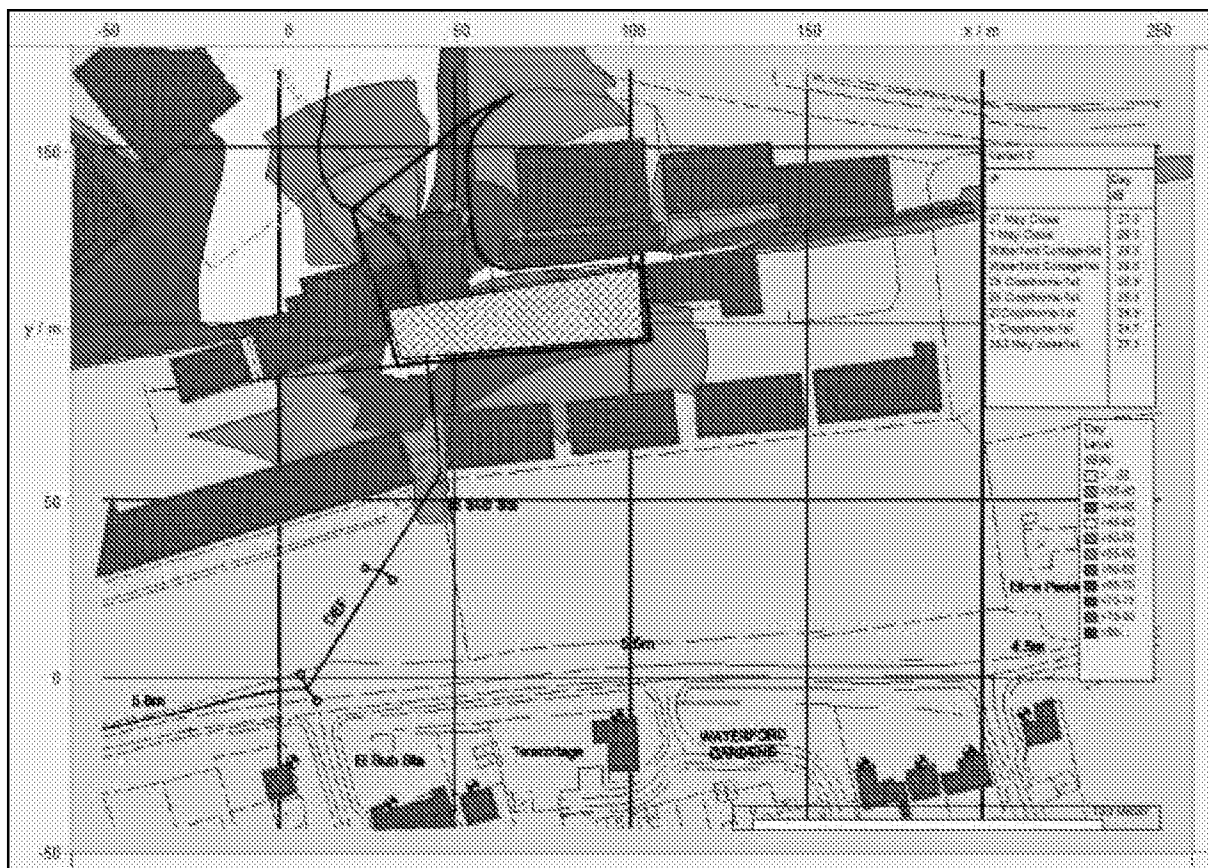


Figure 8. Predicted Noise Contours of 82 dB L_{Aeq} , 1 hour (Worst Case) measured internally

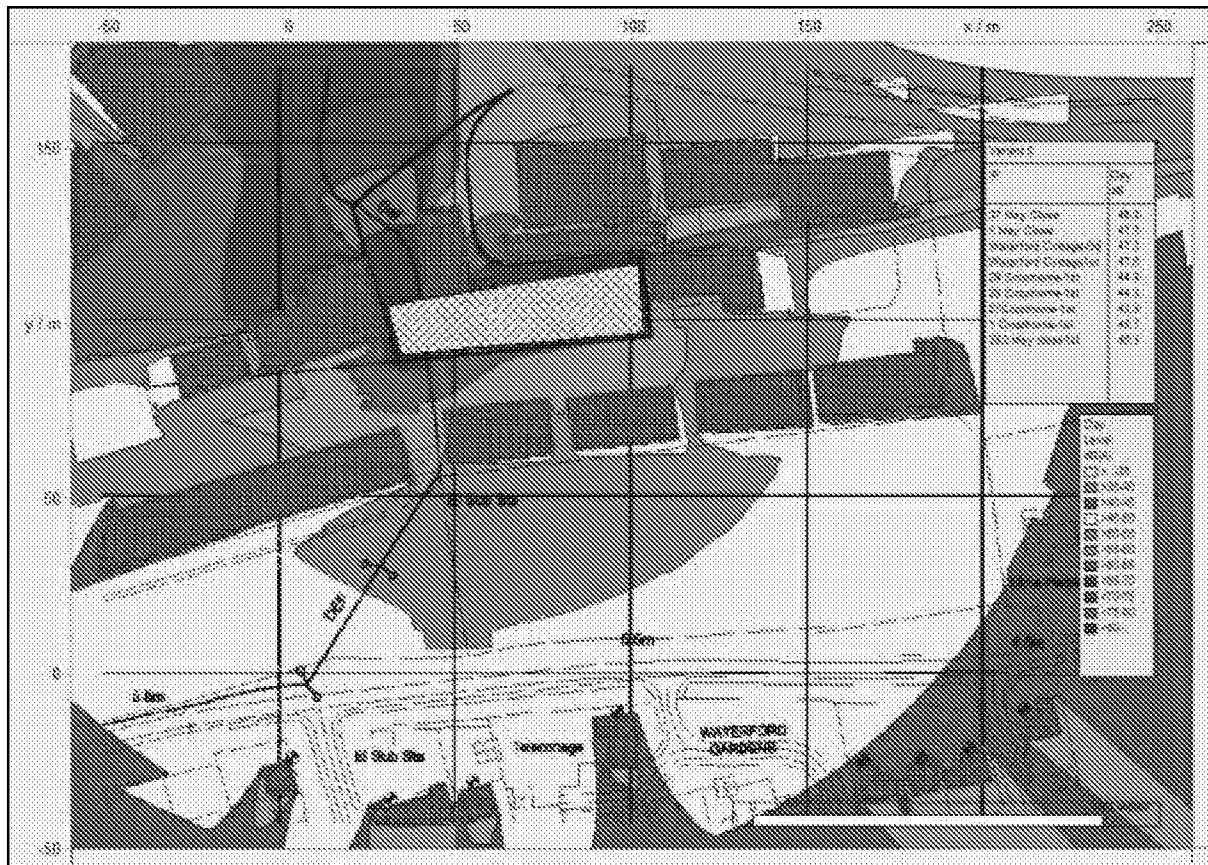


Figure 9. Predicted Noise Contours of 101 dB L_{Amax} measured Internally.

4 Discussion of Results

The works carried out to enclose the Western steel storage yard have been completed. Steel lengths are stored in a weather proof enclosure with the steel fabrication happening in the original Eastern workshop. The original Western end of the workshop with its brick piers was left in situ as well as the metallic twin doors.

The roller shutter door to the South allows vehicular deliveries to approach from the South and depart through the North opening. HGV's and deliveries of steels are off loaded via the overhead gantry crane.

The requirement of condition 8 was that the recommendations made in the original report were tested to ensure

“the day time noise level at the nearest residential premises does not exceed 54 dB L_{Aeq} and these records shall be submitted to and approved by the Local Planning Authority.”

The results of the internal monitoring of the new enclosed yard area have shown a reduction in sound levels, which is due to the larger space and the fact that the noisier activities remain contained within the workshop area, see Figure 2 above. The testing of the new roller shutter door and the new southern wall also show that these perform above the specification in the original acoustic report.

Entering the results of the recently measured data, through the IMMI noise modelling software and adding in the Southern roller shutter door indicate that the requirements of condition 8 have been achieved with 7.7dB below the requirement of 54dB L_{Aeq} for the daytime period.

5 Conclusion

A class one sound level was left inside the newly enclosed yard at Austin Divall to record internal sound pressure levels between 15th and 19th August 2019. A test of the building fabric/envelope was also carried out whilst on site to determine how the new constructed building performs acoustically.

Specifically, the roller shutter door on the Southern wall was measured and found to have an R_w of 23.2 dB and the Southern wall an R_w of 36.2 dB. Values for the highest recorded single daytime hour and the highest recorded $L_{A_{Max}}$ level inside the enclosed yard have been used to populate the IMMI noise modelling software to determine how sound will propagate across the site with specific reference to the locations identified in condition 8 of 2 and 3 May Close.

The noise modelling software indicates that with the highest value of 101dB $L_{A_{max}}$ applied, the predicted sound levels are 7.7dB below the requirements of condition 8. It should however be recognised that the $L_{A_{max}}$ value applied is an instantaneous event which will not likely last longer than a single second, however it has been presented in the modelling software as a worst-case scenario to present a robust report. It follows that if the $L_{A_{max}}$ figures used in the modelling meet the condition then sound pressure levels generated internally, lower than 101 dB which was recorded, will also meet the requirements of condition 8.

Condition 8 of CM/12/18/PL is therefore achieved and may be considered for discharge by the local planning authority.