24Acoustics

Armstrong House
3 Bassett Avenue
Southampton
SO23 7DS

T: 023 8155 5000
E: info@24acoustics.co.uk

TOWN AND COUNTRY PLANNING ACT 1990

(AS AMENDED BY THE PLANNING AND COMPENSATION ACT 1991)-

SECTION 147

APPEAL REFERENCE: APP/A1720/C/23/3336046

TITCHFIELD FESTIVAL THEATRE,
71- 73 St MARGARETS LANE, TICHFIELD, FAREHAM, PO14 4BG

PROOF OF EVIDENCE ON NOISE

R PECKHAM BENG MPHIL CENG MIOA

Technical Report: R10471-2 rev 3 (FINAL)

Date: 29th April 2024

For: Titchfield Festival Theatre
73 St Margarets Lane
Titchfield
Nr Fareham
PO14 4BG

CONTENTS **PAGE**

SUMMARY

I have been retained by Titchfield Festival Theatre (TFT) to provide technical advice and acoustic consultancy services in relation to the appeal against the planning enforcement notice served by Fareham Borough Council against TFT at their premises at 71- 73 St Margaret's Lane, Titchfield, PO11 4BG.

Fareham Borough Council consider that breach of planning permission occurred via material change of the land to theatre use to create the new Arden Theatre and associated spaces and have served a planning enforcement notice.

Paragraph 4 of the planning enforcement notice includes reasons relating to noise, as follows:

> *The development would result in a significant increase in noise from patrons arriving and leaving the building which would have an unacceptable adverse environmental impact on neighbouring occupants. Furthermore, in the absence of details of acoustic insulation measures for the building, the noise emanating from the building would have an unacceptable adverse environmental impact on neighbouring occupants.*

The existing Oak and Acorn Theatres have capacity for a total of 284 patrons. The Arden Theatre has capacity for 463. The net increase in capacity of 179 patrons will therefore result in relatively low levels of increased noise associated with road traffic movements and personnel arriving at and leaving the building. Whilst my experience of the site does not lead me to believe that this is strictly necessary, noise from patrons arriving and leaving the building could be managed via a noise management plan which could be enforced via a planning condition.

I have undertaken subjective and objective tests of the noise break-out from the Arden Theatre auditorium and rehearsal rooms. For the majority of the time I consider the noise impact to be relatively low but some activities, such as high level music and applause was noted to be audible at the nearest dwellings. As a result of these tests I have recommended that additional sound insulation is applied to roof of the Arden Theatre. These measures may all be enforced by condition.

A fallback position has been identified utilising a reduced capacity Arden Theatre. I have further considered the noise impact of the proposed/ existing operation relative to this and established that all aspects- external noise break-out, noise from access and egress and noise from traffic- will result in a negligible change.

It is my opinion that all points raised in Paragraph 4 of the enforcement notice may be satisfactorily addressed and that the operation of the Titchfield Festival Theatre site with the Arden Theatre and associated other spaces will not cause an adverse noise impact on the occupants of the neighbouring residential properties.

0 REUBEN PECKHAM – STATEMENT OF CAPABILITY AND EXPERIENCE

0.1 I am a principal consultant and director of 24 Acoustics Ltd. I hold an undergraduate degree in Engineering Acoustics and Vibration and a post-graduate research degree in Whole Body Vibration, both awarded by the Institute of Sound and Vibration Research at Southampton University. I am a corporate member of the Institute of Acoustics and am Chartered Engineer registered with the Engineering Council (Registration no 481083). 24 Acoustics Ltd is a full member of the Association of Noise Consultants.

0.2 I have in excess of 25 years' experience in industry, research and consultancy relating to engineering acoustics, noise and vibration. I have particular expertise and tend to specialise, within my consulting practice, in the assessment and control of noise and vibration from industrial sources. This includes within oil and gas installations (both offshore and onshore), ports, food and other manufacturing facilities, wind farms and power generation facilities (primarily gas powered and nuclear electricity generation sites).

0.3 Prior to joining 24 Acoustics Ltd in 2005, I held senior positions at two major multi-disciplinary engineering/ environmental consultancy companies.

0.4 I have presented expert evidence relating to noise, vibration and acoustics in planning appeals, public inquiries and courts of law (at Magistrates, County and High Court level) on many previous occasions.

1.0 INTRODUCTION

1.1 I have been retained by Titchfield Festival Theatre (TFT) to provide technical advice and acoustic consultancy services in relation to the appeal against the planning enforcement notice served by Fareham Borough Council against TFT at their premises at 71- 73 St Margaret's Lane, Titchfield, PO11 4BG.

1.2 It is my understanding that Fareham Borough Council consider that breach of planning permission occurred via material change of the land to theatre use (and specifically the new Arden Theatre) and an engineering operation to excavate and create an underground area beneath the theatre (this being in use for storage and an orchestra pit).

1.3 Paragraph 4 of the planning enforcement notice includes reasons relating to noise, as follows:

> *The development would result in a significant increase in noise from patrons arriving and leaving the building which would have an unacceptable adverse environmental impact on neighbouring occupants. Furthermore, in the absence of details of acoustic insulation measures for the building, the noise emanating from the building would have an unacceptable adverse environmental impact on neighbouring occupants.*

1.4 The impact of noise from the operation of the new Arden Theatre is, therefore, material to the appeal and this proof of evidence considers noise associated with vehicle movements, access and egress from patrons and staff and the break-out of noise from the inside of the venue and associated spaces.

1.5 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, PROPOSED DEVELOPMENT AND BACKGROUND

2.1 The appeal site is located at 71- 73 St Margarets Lane in Titchfield. There are a number of dwellings and commercial premises within the vicinity of the site.

2.2 An aerial image showing the location of the site and surroundings is provided in Figure 1.

2.3 The planning history of the site is set out in Section 3 of the Appellant's Statement of Case. For ease of reference the TFT building has been divided into three areas- A, B and C, as shown in Figure 2. Area A contains the Acorn and Oak Theatres (seating capacity of 96 and 188 respectively). Areas B and C (the subject of the enforcement notice) have planning permission for and have primarily historically been used for uses ancillary to the theatre theatrical storage/ warehouse use (Area B) and B8 storage/warehousing (Unit C). The new 463 seat Arden Theatre is located within Areas B and a small part of Area C.

2.4 There are two existing theatres, the Oak and Acorn Theatres with both matinee and evening performance occurring on some days. Productions at the Arden Theatre will not be held at the same time as the Oak or Acorn theatres.

2.5 Fundamentally, in noise terms, this means that the performance baseline scenario is the operation of the Acorn and Oak Theatres simultaneously with 284 patrons and associated vehicle movements and noise-break out from the two auditoria. The 'with development' scenario will be that associated with the operation of the Arden Theatre- 463 patrons and associated vehicle movements together with break-out of noise from the inside of the Arden Theatre.

2.6 Area C contains three new rehearsal spaces. Rehearsal space was previously provided in Area B. Figure 3 provides floor plans of the site.

3.0 SCOPE OF ASSESSMENT

3.1 It is my opinion that there is potential for impact from the following sources of noise associated with the operation of Arden Theatre:

- Break-out to outside from activity (speech and music, applause etc) within the Arden Theatre auditorium in Areas B and C and from within the rehearsal spaces in Area C;
- Road traffic/ car movements associated with the increase in vehicle movements accessing the site;
- Access and egress from patrons and staff using the site.

3.2 My proof of evidence has addressed the above issues and these are detailed below.

3.3 A fall back position has also been identified which, it is considered, TFT could lawfully adopt in the event that this appeal is unsuccessful. Area B has been in theatre use since October 2010 to the present day and it could be separated from Area C via a fire curtain or new wall to create a smaller capacity Arden theatre, with 341 seats in total. Further consideration has been given to the noise impact of the current/ proposed operation relative to this and is presented in Section 7 of my proof of evidence.

4.0 PLANNING AND NOISE IMPACT ASSESSMENT CRITERIA

4.1 The National Planning Policy Framework (NPPF) [Reference 1] states (paragraph 191) that planning policies and decisions should aim to:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*

- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

4.2 The NPPF refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to '*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*' which is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

4.3 The NPSE defines the concept of a '*significant observed adverse effect level*' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

4.4 The NPPF is supported by the Planning Practice Guidance (PPG) [Reference 3] with more specific guidance. It states that noise should be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment. It stresses the requirement for good acoustic design to be considered early in the planning process to ensure that the most appropriate and cost-effect solutions are identified from the outset.

4.5 The PPG expands further upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system. The table is reproduced below.

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observable Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/ or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extension and regular changes in behaviour and/ or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non auditory	Unacceptable Adverse Effect	Prevent

Table 1: PPG Noise Exposure Hierarchy

4.6 In general terms it is considered that a noise level with an effect level which is lower than SOAEL may be acceptable (providing the effect is mitigated to a minimum).

Local Policy

4.7 Policy D2 of the Fareham Plan [Reference 4] states development must ensure good environmental conditions for all new and existing users of buildings and external space. The policy goes on to state development proposals, including changes of use, will be permitted where they do not have an unacceptable adverse environmental impact on neighbouring occupants.

Objective Guidance

4.8 Fundamentally there is little objective guidance available to assess the impact of noise from music/ theatrical performance, from (low volume) road traffic movements and from access and egress of patrons (primarily speech). I have referred to various documents, however, which have some degree of relevance and support their use (and the use of other objective criteria where necessary). I have also referred to the noise impact assessments and technical criteria used in connection with the Fareham Live theatre planning application in 2020 (Fareham Borough Council Reference P/20/0055/FP) which was granted and hence the criteria acceptable to their environmental health department.

Auditorium Noise

4.9 The Institute of Acoustics' (IoA) Good Practice Guide on the Control of Noise from Pubs & Clubs [Reference 4] provides guidance for the assessment and control of noise affecting noise-sensitive properties from the public and private use of public houses, club, hotels, discotheques, restaurants, cafes, community or village halls and other similar premises.

4.10 The scope of the document extends to sources of noise which are relevant to TFT. This includes music, singing, public address systems, people in general, car parks and access roads etc.

4.11 The Titchfield Festival Theatre might be considered a community hall or an 'other similar premise' and therefore the guidance is considered to apply.

4.12 The guidance states that for premises where entertainment takes place on a regular basis, music and associated sources should not be audible inside noise sensitive properties at any time. The guidance does not attempt to provide an objective means of determining 'inaudible' and indeed, based upon experience, this is nearly impossible to provide in robust terms.

4.13 In 2020 Fareham Borough Council applied for planning consent to redevelop Ferneham Hall in Fareham into a multi-purpose venue. The planning application was supported by a noise impact assessment undertaken by Arup [Reference 5]. This stated (Section 4.1) that entertainment noise break-out noise level (L_{Aeq}) via new building elements should not exceed 15 dB below the typical lowest background noise level (L_{A90}) at the outside of the nearest noise sensitive receptor.

4.14 Planning consent was subsequently granted and Condition 3 of the planning consent related to noise, requiring compliance with the performance standards set in 4.1 of the Arup report. This is therefore clearly a performance standard that was acceptable to Fareham Borough Council at this time and should interalia also be acceptable to noise break-out from the Titchfield Festival Theatre. Furthermore, it is my professional opinion that this performance standard will almost certainly result in noise that is inaudible inside residential dwellings and is would therefore be compliant with the Institute of Acoustics' Good Practice Guide.

Road Traffic/ Car Movements

4.15 The IoA guidance touches on the issue of noise from car parks and access roads stating that noise from the same generally only becomes an issue when patrons are leaving a venue during the later part of the evening or at night but does not provide any objective means of analysis.

4.16 In the absence of the same I consider it appropriate to calculate the noise level from the increased car movements associated with the operation of the Arden Theatre and compare to the baseline scenario (the operation of the Oak and Acorn Theatres). As vehicle movements would generally occur over an hourly period before and after a performance it is appropriate to compare noise levels averaged over an hourly time period (as the $L_{Aeq,\ 1\ hour}$).

Access & Egress

4.17 Noise from access and egress I associate primarily with that of speech and chatter from patrons as they enter and leave the venue.

4.18 Again the Institute of Acoustics document addresses this as a potential source of disturbance but provides no means of objective assessment.

4.19 I consider a reasonable approach is to calculate the noise level associated with speech from patrons and compare to the baseline scenario (operation of the Oak and Acorn Theatres) and measured ambient noise levels at receptors ($L_{Aeq,\ 1\ hour}$ vs $L_{Aeq,\ 1\ hour}$).

5.0 SITE VISITS AND AMBIENT/ BACKGROUND NOISE SURVEYS

5.1 I have attended the theatre site on a number of occasions in the run up to this appeal, listed as follows:

- 15 February 2024, near full house production of Les Miserables at the Arden Theatre, with a 14 piece orchestra. I undertook subjective assessment of noise impact from access and egress and from noise break-out from the auditorium at receptor properties. I also undertook noise surveys within the Arden Theatre;

- 20th March 2024, break-out noise tests undertaken from the Arden Theatre and rehearsals spaces within Areas B and C. This is detailed in Appendix B.

5.2 As part of my assessment I have undertaken a background and ambient noise survey at a location acoustically equivalent to the nearest residential receptors to the theatre. This is detailed in Appendix C and the data used in the assessments shown in Section 6.

6.0 NOISE IMPACT ASSESSMENT

Auditorium Noise

6.1 As stressed above I attended a musical performance and undertook subjective observations of noise break-out from the Arden Theatre externally to the nearest residential receptors to the site. There was a reasonable level of ambient noise, particularly from distant road traffic using the A27, but also from local traffic and aircraft. However, noise break-out from the theatre was audible at times above this (albeit at a low level). Given the low level of the noise from the auditorium and the presence of relatively high levels of ambient noise it was not possible to undertake measurements externally. During these visits, however, I also undertook noise measurements internally within the theatre.

6.2 My subjective appraisal of the situation is that some noise is likely to be audible in external amenity areas and potentially internally when windows are open. I consider it unlikely to be audible when windows are closed.

6.3 In order to obtain a more scientific feel for the level of impact I undertook objective noise break-out tests from the auditorium during a site visit on the evening of 20 March 2024. This involved playing number of audio test signals through a powerful public address system in the theatre at high level, recording the noise level within the theatre and at the receptor properties. The level was sufficiently high such that the level at the receptors was sufficiently greater than the prevailing ambient noise level. From this I calculated a 'noise transfer function' in each octave frequency band and was able to calculate the $L_{Aeq,\ 1\ hour}$ noise level at receptors from typical operations within the theatre. The full methodology is reported in Appendix B. This was compared to the lowest measured $L_{A90,1\ hour}$ background noise level at receptors (as reported in Appendix C). Table 2 summarises the findings.

Receptor	Estimated Highest Theatre Noise Level, dB $L_{Aeq,\ 1\ hour}$	Background Noise Level, dB $L_{A90,\ 1\ hour}$	Difference between Theatre Noise Level & Background Noise Level, dB
St Margarets Cottage	36	37	-1
Kites Croft	35	37	-2
Heisei Acre	29	37	-8

Table 2: Lowest Recorded Background Noise Level at 10 pm and Arden Theatre Break-out Noise Level (at nearest receptor properties).

6.4 The calculations indicate that the noise level from activities within the Arden Theatre are currently slightly higher than desirable at times. It was clear that the dominant noise transfer path was via the roof structure. This comprises Panel Sell composite roof panels. The roof over area B (the auditorium area) comprises 100 mm PIR with 4 mm steel facings. The material over the stage (Area C) comprises 150 mm PIR with 4 mm facings. Their vendor data sheet, showing the sound insulation properties of the material, is shown in Appendix D.

6.5 These materials, which are composite steel panels, provide excellent thermal properties but offer relatively weak levels of sound insulation. The data sheet from Panel Sell indicates a weighted sound reduction index of 25 dB R_w. This is unlikely to vary significantly between the different thicknesses of material as the insulation used is extremely lightweight.

6.6 Increases in the sound insulation of the roof structure to provide the necessary level of attenuation can readily be achieved either via the addition of a suspended mass-barrier ceiling or via the installation of a secondary roof structure above (as space and other constraints will allow). I have calculated that the following modified structures will both provide the necessary level of sound insulation to the roof structure (giving a weighted sound reduction index of 48 dB R_w).

- Existing roof structure with 90 mm timber joists above, 100 mm mineral wool and 6 mm corrugated roof cladding;

- Existing roof structure with a suspended light steel grid with a cavity width of 90 mm 50 mm mineral wool and a 10 mm plasterboard finish.

6.7 These calculations have been undertaken using INSUL proprietary software. The associated data sheets are provided in Appendix E.

6.8 If this appeal is allowed, it is considered that the measures to upgrade the sound insulation of the roof structure may be enforced via condition with the work undertaken within an agreed timescale following the granting of planning consent. With these measures in place the noise level from all activities within the Arden Theatre will be at least 15 dBA below the background noise level and therefore compliant with the same performance standards accepted by Fareham Borough Council at Ferneham Hall and hence generally inaudible inside the nearest residential properties and therefore compliant with Institute of Acoustics' guidance.

Vehicular Noise Impact

6.9 The Theatre site utilises a number of different car parks in the area and this makes determination of the increase in number of vehicles using St Margaret's Road complex. It is also my understanding, from discussions with Tom Fisher from Paul Basham Associates (the Appellant's traffic consultant) that it is not possible to determine precise numbers of vehicles travelling to the theatre along St Margaret's Lane as some parking provision is provided elsewhere.

6.10 The increase in noise impact from traffic movements will, however, be directly proportional to the increase in number of theatre seats. The (existing and consented) Oak and Acorn Theatres have 284 seats between them and the Arden Theatre 463 seats. The Arden Theatre will not hold a production at the same time as either the Oak or Acorn Theatres. Therefore, the net increase in patrons accessing the site to attend a production at the Arden Theatre will be no more than 179.

6.11 An increase from 284 seat capacity to 463 capacity (with an implicit assumption that the average no of patrons per car would not change) would result in an increase in road traffic noise level of 2.2 dB $L_{Aeq,\ 1\ hour}$. Given the presence of significant levels of ambient noise in the area this is considered a small increase.

Access & Egress Noise Impact

6.12 There is potential for noise impact from speech from patrons as they arrive at and leave the venue. My site visit during the production of Les Miserables identified that patrons started arriving at the premises from around an hour before the start of the performance and generally all were off site within 30 minutes of the end of the performance (and hence typically at around 10.30 pm).

6.13 Patrons were noted to leave the premises expediently and walked to their parked cars in the garden centre opposite and to the Holiday Inn car park off Southampton Road. It could be expected that they might be in greater spirits on leaving the venue, however, no chat was observed at levels beyond a normal voice level and, whilst some speech was faintly audible at receptor locations, this was not at an adverse level.

6.14 As stressed above the Arden Theatre offers the potential to increase number of patrons accessing the site to attend a performance from 284 to 463. This could result in an increase in noise level from patrons speaking when arriving at/ leaving the site of 4.3 dB L_{Aeq}.

6.15 Consideration of the noise level relative to the ambient level may be more appropriate. In order to estimate the likely impact of this in objective terms calculations have been undertaken to determine the likely noise level at the nearest residential receptors from voices associated with patrons. Assuming a noise level of 60 dBA at a distance of 1 m from a voice with normal/ slightly raised vocal effort and 463 persons each talking over a 3 minute period over a total period of an hour as they vacate the premises vehicles would result in a noise level at Kites Croft of around 42 dB $L_{Aeq,\ 1\ hour}$ and 43 dB $L_{Aeq,\ 1\ hour}$ at St Margarets Cottage. This compares favourably with the lowest recorded ambient noise level of 44 dB $L_{Aeq,\ 1\ hour}$ at corresponding times.

6.16 It is considered that the noise from patrons will, at times, be audible within the grounds of the nearest receptor properties, however, this will be at a level which will not cause a significant adverse noise impact.

6.17 Human nature dictates that it is inevitable that there will be some tolerance to the above calculations. However, this is also a matter which may be effectively managed via the implementation of a noise management plan. If this appeal is allowed it is considered that the plan may be provided and enforced via a planning condition. It should, however, include the following:

- A public address announcement at the end of each performance asking patrons to leave quietly;
- 'Quiet please' signs at all building exits;
- The existing car park attendants should also be asked to speak to anyone making excess noise and generally act as ambassadors to ensure that patrons leave as quickly and as quietly as possible and effectively be the enforcers of the noise management plan.

6.18 It is therefore my professional opinion that the noise impact associated with noise from patrons arriving at and leaving the site is relatively minor and may be further effectively managed by TFT as required.

7.0 NOISE IMPACT RELATIVE TO THE 'FALLBACK' POSITION

7.1 As discussed in Section 3 of my proof, it is considered that a reduced size Arden Theatre (with a capacity of 341 seats) comprised within Area B could lawfully operate irrespective of the outcome of this appeal.

7.2 This would involve a maximum of 102 performances per year in the Arden Theatre in addition to the 140 already permitted in Unit A (The Oak and Acorn Theatres).

7.3 It is therefore also appropriate to consider the potential noise impact of the proposals that are the subject of this appeal relative to this fall back position. Each matter is detailed below.

External Noise Break-out from the Theatre Spaces

7.4 Any external noise break-out from Unit A (Oak and Acorn theatres) will be unchanged and, with the measures I have already described to upgrade the sound insulation of the roof of the Arden Theatre, there will be no noticeable increase in external noise breakout.

Vehicular Noise Impact

7.5 The full size Arden Theatre (as currently operating) contains 463 seats and the reduced sized (fall back position) Arden Theatre within Area B would contain 341 seats. It could therefore be expected that there would be 463/341= 1.36 more car movements relative to the fall back position. In noise terms this would result in a difference in noise level of 1.3 dB $L_{Aeq,\ 1\ hour}$. This is a negligible increase which would not be noticeable subjectively.

Access & Egress

7.6 Table 3 below shows the change in noise level that could be expected between the full sized (existing) and reduced sized (fallback) Arden theatres.

Receptor	**Noise Level, dB $L_{Aeq,\ 1\ hour}$ and Arden Theatre Status**	
	As Currently Operating Full Size- 463 seats	**Fallback Position Reduced Sized- 341 seats**
Kites Croft	42	42
St Margarets Cottage	43	41

Table 3: Estimated Noise Level from Access and Egress- Full Sized vs. Fallback Arden Theatre

7.7 The calculations indicate that the noise from access and egress would be 1 dB greater than the fallback position (and regardless still below the lowest recorded ambient noise level of 44 dB $L_{Aeq,\ 1\ hour}$). I consider this difference near negligible and one that would not be noticeable subjectively.

8.0 CONCLUSIONS

8.1 I have been retained by Titchfield Festival Theatre (TFT) to provide technical advice and acoustic consultancy services in relation to the appeal against the planning enforcement notice served by Fareham Borough Council against TFT at their premises at 71- 73 St Margaret's Lane, Titchfield, PO11 4BG.

8.2 Fareham Borough Council consider that breach of planning permission occurred via material change of the land to theatre use to create the new Arden Theatre and associated spaces and have served a planning enforcement notice.

8.3 Paragraph 4 of the planning enforcement notice includes reasons relating to noise, as follows:

> *The development would result in a significant increase in noise from patrons arriving and leaving the building which would have an unacceptable adverse environmental impact on neighbouring occupants. Furthermore, in the absence of details of acoustic insulation measures for the building, the noise emanating from the building would have an unacceptable adverse environmental impact on neighbouring occupants.*

8.4 The existing Oak and Acorn Theatres have capacity for a total of 284 patrons. The Arden Theatre has capacity for 463. The net increase in capacity of 179 patrons will therefore result in relatively low levels of increased noise associated with road traffic movements and personnel arriving at and leaving the building. Whilst my experience of the site does not lead me to believe that this is strictly necessary, noise from patrons arriving and leaving the building could be managed via a noise management plan which could be enforced via a planning condition.

8.5 I have undertaken subjective and objective tests of the noise break-out from the Arden Theatre auditorium and rehearsal rooms. For the majority of the time I consider the noise impact to be relatively low but some activities, such as high level music and applause was noted to be audible at the nearest dwellings. As a result of these tests I have recommended that additional sound insulation is applied to roof of the Arden Theatre. These measures may all be enforced by condition.

8.6 A fallback position has been identified utilising a reduced capacity Arden Theatre. I have further considered the noise impact of the proposed/ existing operation relative to this and established that all aspects- external noise break-out, noise from access and egress and noise from traffic- will result in a negligible change.

8.7 It is my opinion that all points raised in Paragraph 4 of the enforcement notice may be satisfactorily addressed and that the operation of the Titchfield Festival Theatre site with the Arden Theatre and associated other spaces will not cause an adverse noise impact on the occupants of the neighbouring residential properties.

REFERENCES

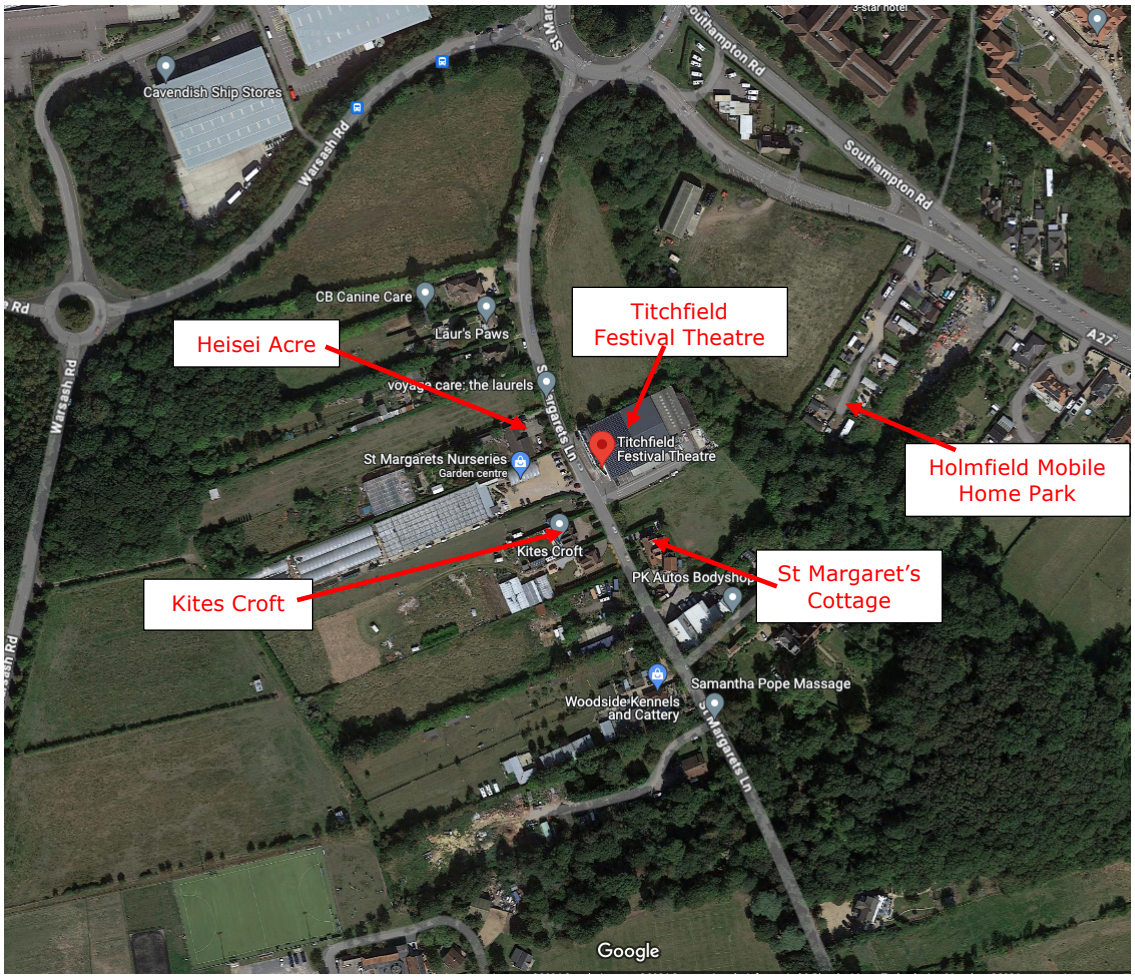
1. Ministry of Housing, Communities & Local Government, National Planning Policy Framework, December 2023.

2. DEFRA Noise Policy Statement for England 2010.

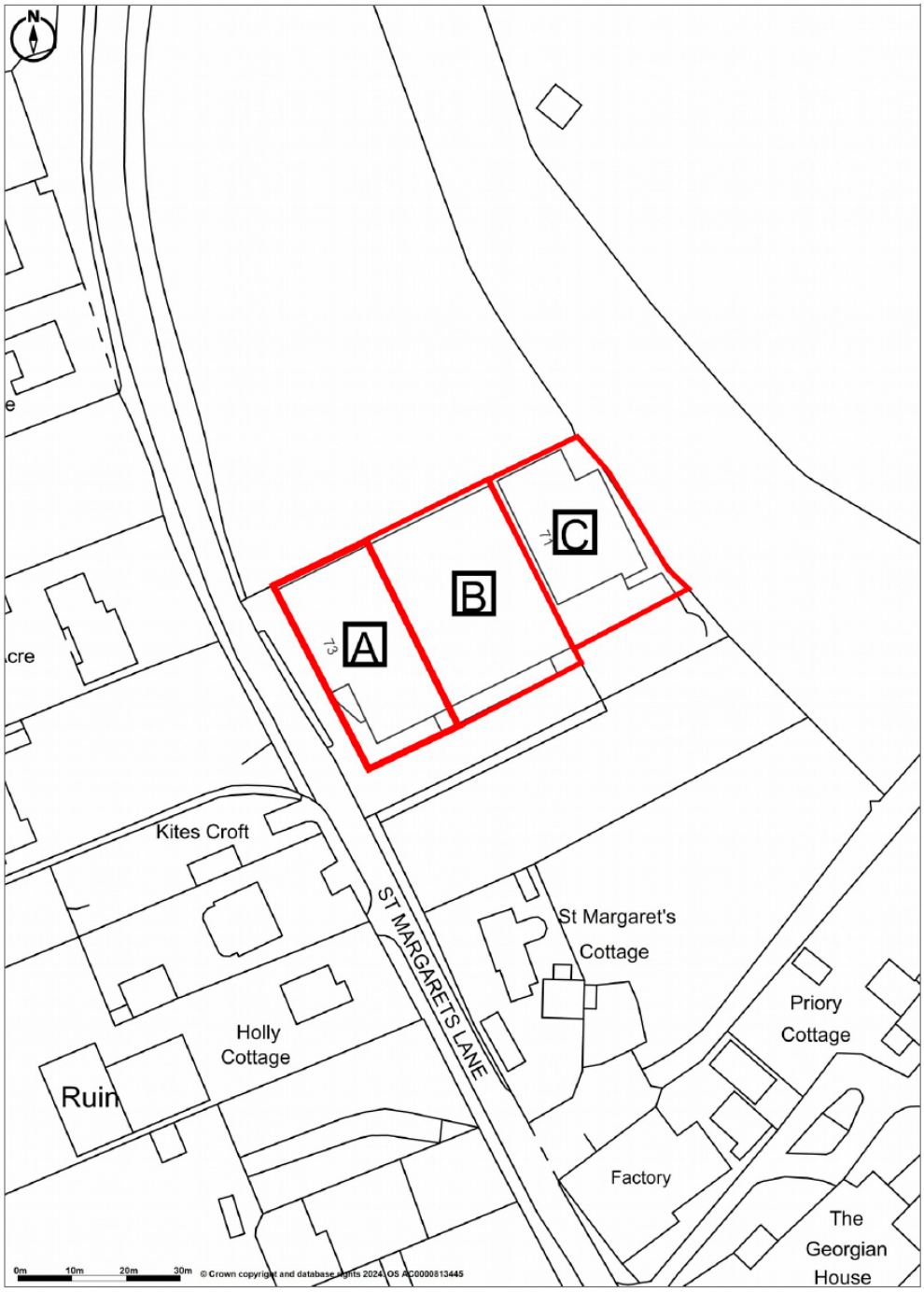
3. Department for Levelling Up, Housing and Communities & Ministry of Housing, Communities & Local Government, Planning Practice Guidance (PPG) July 2019.

4. Institute of Acoustics. Good Practice Guide on the Control of Noise from Pubs and Clubs, March 2003.

5. Arup. Ferneham Hall Redevelopment. Control of Building Noise Emissions R02, 16 December 2022.



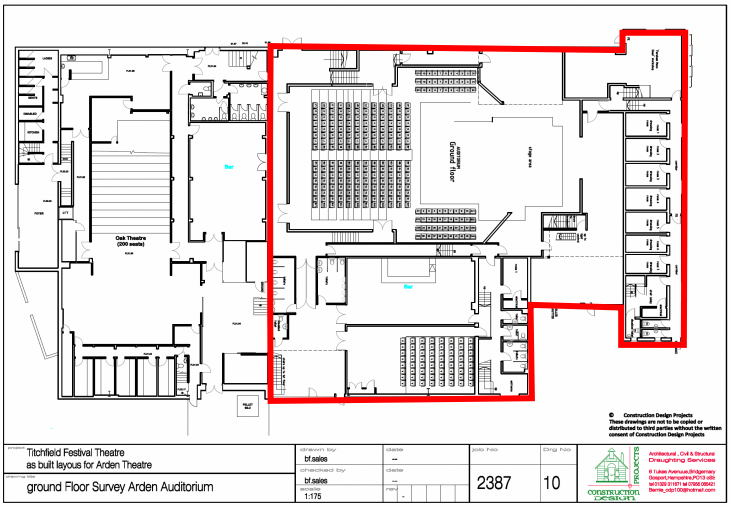
Project: Titchfield Festival Theatre	**Title:** Appeal Site Location		24Acoustics
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** -	
Date: April 2024	**Drawn By:** RP	**Job No:** 10471	

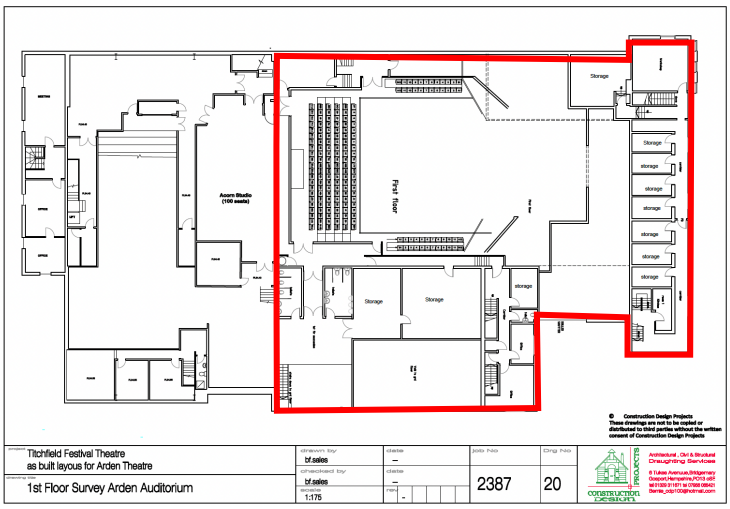


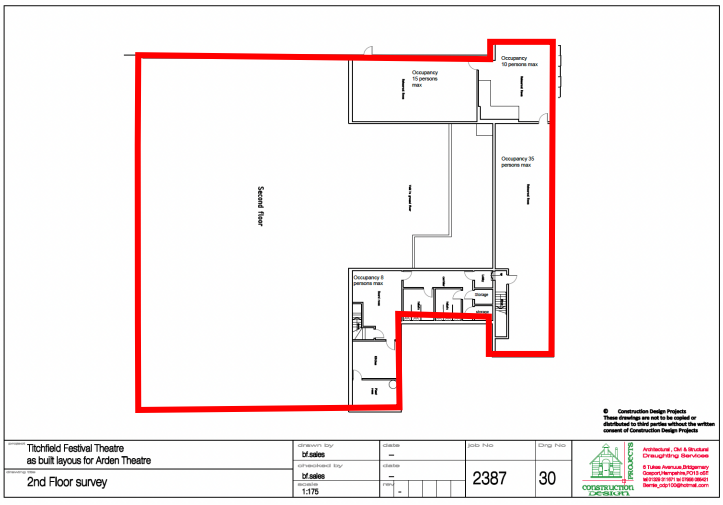
Promap LANDMARK INFORMATION

Plotted Scale - 1:1250. Paper Size – A4

Project: Titchfield Festival Theatre	**Title:** TFT Area Designation	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** -
Date: April 2024	**Drawn By:** RP	**Job No:** 10471







Project: Titchfield Festival Theatre	**Title:** TFT Floor Plans (Areas B and C highlighted)	
DWG No: Figure 3	**Scale:** N.T.S.	**Rev:** -
Date: April 2023	**Drawn By:** RP	**Job No:** 10471

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.

Weighted sound reduction index (Rw). This is laboratory measured value to identify the airborne sound insulation performance of a building element. It is a single figure value which characterises the airborne sound insulation of a material or building element over a range of frequencies. It is used for internal or external walls, ceilings/floors, windows, doors, or any separating element. The higher the Rw value, the better that element performs in reducing sound transmission.

APPENDIX B: AUDITORIUM & REHEARSAL ROOM NOISE BREAK-OUT TESTS

B1. Noise break out tests were undertaken between 22:00 and 00:00 hours on 20 March 2024. The weather during the tests was dry and still.

B2. A powerful sound source was set up in the Arden Theatre and replayed a broadband test signal at high level. Noise measurements were undertaken in terms of the Leq octave band noise level inside each space and at an external reference location at the site boundary. A comparison between the noise level inside and outside was undertaken to determine a 'transfer' function.

B3. The noise levels recorded in the Arden Theatre during the performance of Les Miserables on 15 February was used as source noise data and the transfer function referred to above then used to calculate the noise level from the auditorium at the reference location on the site boundary. Further calculations were then undertaken to estimate the noise level externally to each receptor property using standard acoustical propagation theory.

B4. All measurements were undertaken using Class 1 accuracy Norsonic Nor-118 sound level meters. The calibration certificates of the instrumentation used are provided in Appendix F.

APPENDIX C: BACKGROUND NOISE SURVEY REPORT

C1. Background noise surveys were undertaken on the site between 27th February and 5th March 2024 in order to quantify the ambient noise level at receptor properties. Measurements were undertaken on the southern boundary of the TFT site at a height of 1.5 m above local grade as shown in Figure B1 below. This location is considered to be acoustically equivalent of the nearest residential receptor properties to the site.

Figure B1: Background Noise Survey Location

C2: Measurements were undertaken using a Rion NL52 Class 1 accuracy sound level meter. Data was recorded in samples of 5 minutes in terms of the overall A-weighted and linear octave band L_{eq} and L_{A90} sound pressure levels.

C3: The instrumentation was calibrated before and after the survey using a Bruel and Kjaer Type 4231 acoustic calibrator. The calibration certificates of the instrumentation used are provided in Appendix F.

C4: The results of the survey are provided graphically in Figure C2 overleaf and are summarised below.

Time of Day	Date and Noise Level, dB							
	Tuesday 27 Feb		Wed 28 Feb		Thurs 29 Feb		Friday 1 March	
	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$
13:00	51	43	62	47	58	49	59	47
14:00	54	44	56	49	70	53	51	45
15:00	56	45	53	48	57	49	50	45
16:00	55	48	54	48	55	50	51	44
17:00	53	47	55	50	54	49	51	45
18:00	52	45	53	46	53	49	50	44
19:00	50	43	50	45	51	47	48	44
20:00	48	43	56	43	50	45	49	44
21:00	54	40	46	41	52	45	50	44
22:00	44	37	48	40	48	43	50	42

Table C1: Summary of Overall Noise Survey Results cont'

Time of Day	Date and Noise Level, dB					
	Sat 2 March		Sunday 3 March		Monday 4 March	
	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$	$L_{Aeq, 1\ hr}$	$L_{A90, 1\ hr}$
13:00	51	44	56	50	56	50
14:00	50	43	59	51	59	51
15:00	52	44	55	52	55	52
16:00	52	44	57	54	57	54
17:00	51	44	57	54	57	54
18:00	48	42	56	53	56	53
19:00	50	44	53	51	53	51
20:00	47	41	51	47	51	47
21:00	49	43	50	46	50	46
22:00	48	42	46	41	46	41

Table C1: Summary of Overall Noise Survey Results

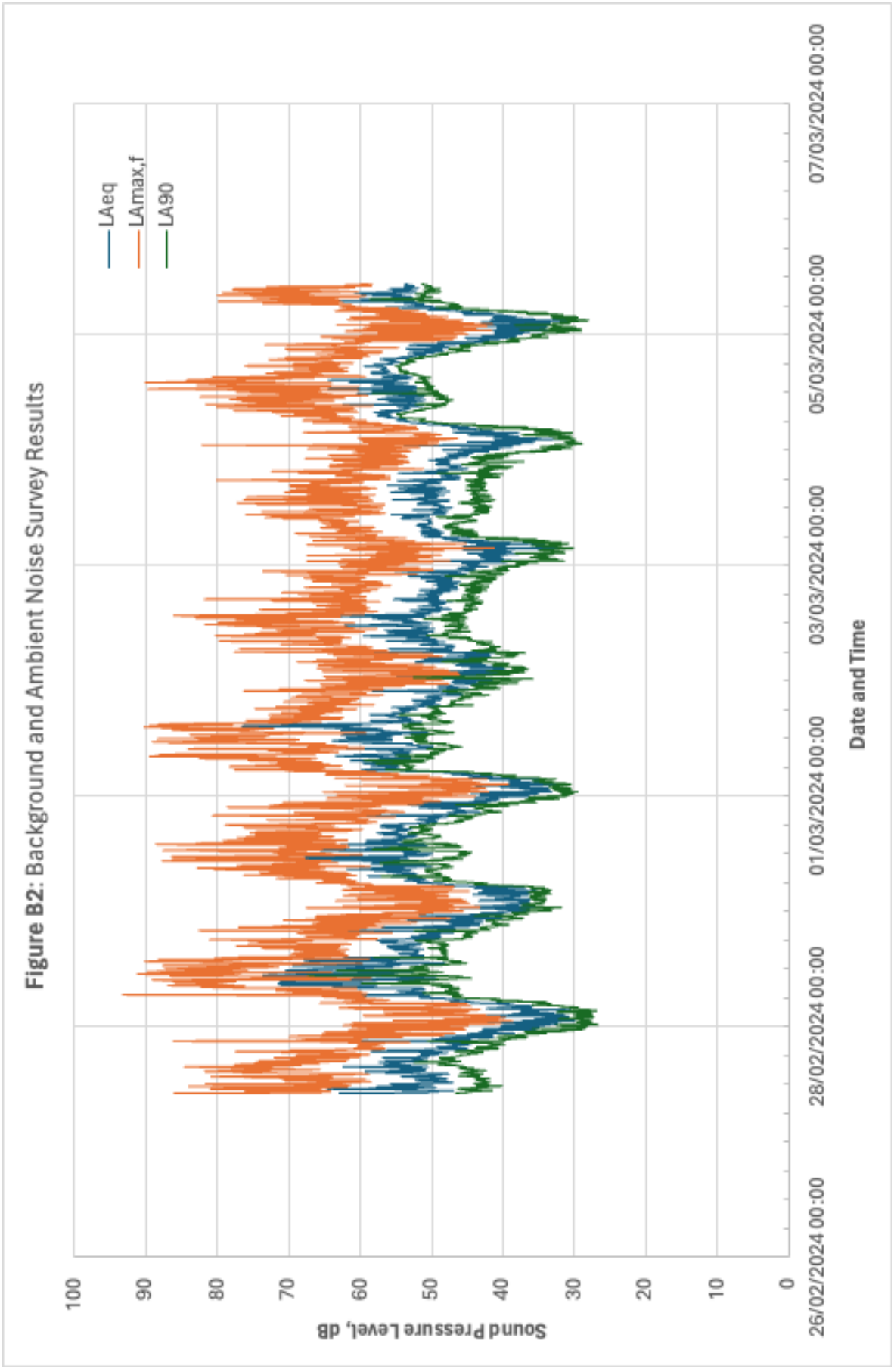
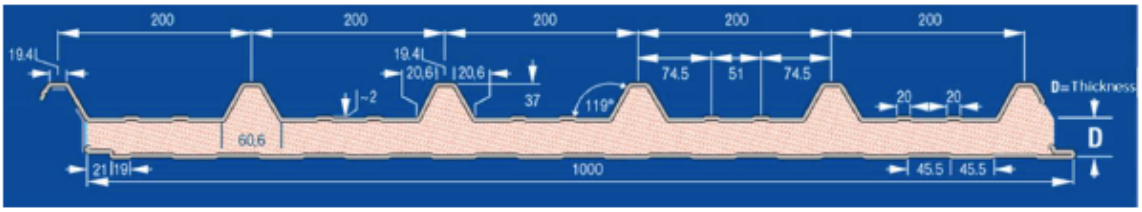


Figure B2: Background and Ambient Noise Survey Results

APPENDIX D: PANEL SELL ROOF DATA SHEET

panel sell

Tel. 020-3455-0451
info@panelsell.co.uk
www.panelsell.co.uk

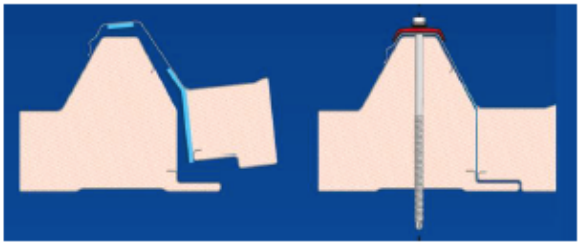


Roof Panel

Structure

- Trapezoidal profile
- Stock lengths 6.0m & 7.5m
  - Can produce to lengths required*
- Stock thicknesses 40mm & 80mm
  - 40mm + 37mm ridge = 77mm thick
  - 80mm + 37mm ridge = 117mm thick
  - Other thicknesses available*
- Manufacture tolerance DIN EN 14509
- PIR (polyisocyanurate) rigid foam
  - EU Fire Rating B-s2-d0 (EN-13501.1)
- 0.5/0.4mm galvanised steel sheets
  - Thicker steel sheets available*
- Polyester coating 25µm
  - Outer RAL7016 Anthracite grey
  - Inner RAL9002 Grey White
  - Other colours available*
- Lengths 2m min, 13.5m max
  - Shorter lengths available*
- Foam cutbacks available*
  - 50mm to 300mm (multiples of 50mm)

***attracts surcharges, minimum order applies**



Panel thickness	40mm	60mm	80mm	100mm	120mm	150mm
Weight (kg/m²)	11.9	12.7	13.4	14.2	14.9	16.1
µ-value	0.54	0.37	0.28	0.22	0.19	0.15

panel sell

Tel. 020-3455-0451
info@panelsell.co.uk
www.panelsell.co.uk

MANUFACTURING TOLERANCES:
DIN EN 14509
All materials used for panel production comply with technical standards and regulations.
The limit dimensions correspond to DIN EN 14509 - Appendix D.

Element length
Element length ≤ 3,000 mm ± 5 mm
Element length ≥ 3,000 mm ± 10 mm
Element width ± 2 mm
Element thickness
Element thickness ≤ 100 mm ± 2 mm
Element thickness ≥ 100 mm ± 2%
Longitudinal and transverse curvature
2 mm / m length, but not more than 10 mm
8.5 mm / m width for flat profiles h ≤ 10 mm
10 mm / m width with other profile depths h ≥ 10 mm

COATING LAYERS:
Outside: sheet steel 0.6 / 0.5 mm, strip galvanized 275 g / m² with 25 µm polyester coating
≥280 MPa or ≥320 MPa (according to DIN 18807 part 3)
Inside: sheet steel 0.5 / 0.4 mm, strip galvanized 275 g / m² with 25 µm polyester coating
≥280 MPa (according to DIN 18807 part 3)

SURFACE DESIGN:
Outside: trapezoidal profile 37/200 mm according to DIN 18807.
Inside: slightly lined (45.5 / 45.5 mm) for an additional charge
Inside just - but then in terms of production technology
limited optical restrictions possible.

INSULATION CORE:
Poly-isocyanurate rigid foam PIR WLS 023 approx. 96%
closed-cell, connected over the entire area to the steel cover layers

AIR SOUND INSULATION:
Rw (C; Ctr) 25 dB according to EN 14509: 2007

EXAMS:
- General building inspectorate approval as roof and wall panel, Z-10.4-658 DIBt Berlin.
- RAINLIGHTNESS from EN 14509, IFT Rosenheim.
- AIR PLANTABILITY according to EN 12865, EN 1027 u. prEN 15601, IFT Rosenheim

QUALITY MONITORING:
iS -engineering Darmstadt, TU Darmstadt, MFPA Leipzig

ASSOCIATION MEMBER:
FIW Munich, IBU Berlin, IFBS

FACTORY MONITORING:
ISO 9001: 2008, CE marking CSI 0497

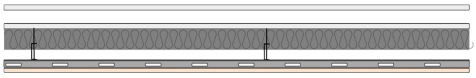
FIRE PROTECTION:
PIR B-s2; d0 according to test EN 13501.1
Euro Class B-s2; d0

APPENDIX E: ROOF SOUND INSULATION CALCULATIONS

Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
24 Acoustics Ltd - Key No. 1595
Job Name:
Job No.: Initials:Findwave2015
Date:08/04/2024
File Name:insul

Notes:



Rw 48 dB
C -4 dB
Ctr -11 dB

Mass-air-mass resonant frequency = =76 Hz

Panel Size = 2.7 m x 4.0 m

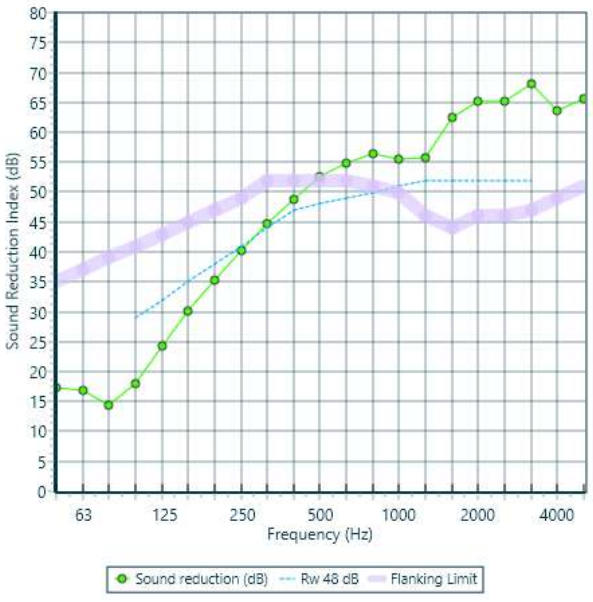
Partition surface mass = 26.3 kg/m²

System description

Panel 1 : 1 x 57.2 mm Annex 2 Polyisocyanurate Board Sandwich

Frame: Suspended Light Steel Grid (90 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 90 mm , 1 x Rockwool (33kg/m3) Thickness 50 mm
Panel 2 : 1 x 10 mm Plasterboard

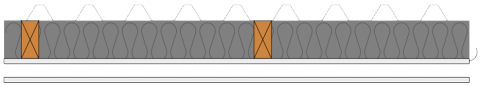
freq.(Hz)	R(dB)	R(dB)
50	17	
63	17	16
80	14	
100	18	
125	24	22
160	30	
200	35	
250	40	39
315	45	
400	49	
500	53	51
630	55	
800	56	
1000	55	56
1250	56	
1600	62	
2000	65	64
2500	65	
3150	68	
4000	64	65
5000	66	



Sound Insulation Prediction (v9.0.24)

Margin of error is generally within Rw ±3 dB
24 Acoustics Ltd - Key No. 1595
Job Name:
Job No.: Initials:Findwave2015
Date:08/04/2024
File Name:insul

Notes:



Rw 48 dB
C -5 dB
Ctr -12 dB

Mass-air-mass resonant frequency = =80 Hz

Panel Size = 2.7 m x 4.0 m

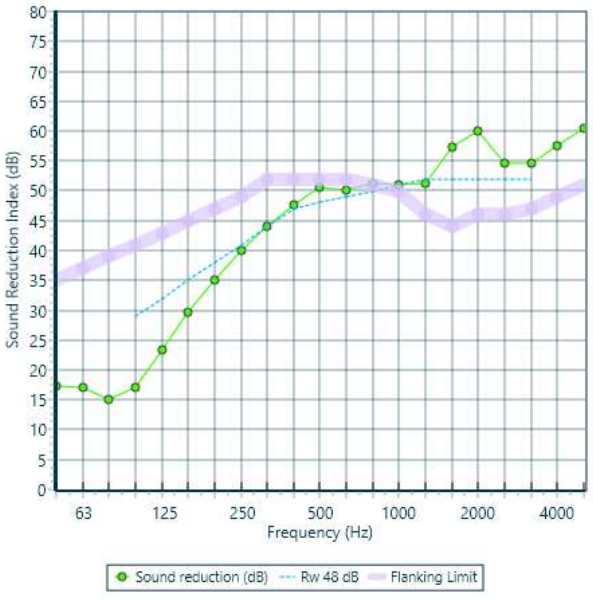
Partition surface mass = 27 kg/m²

System description

Panel 1 : 1 x 0.6 mm Roof Cladding ST7

Frame: Solid Joist (90 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 90 mm , 1 x Rockwool (33kg/m3) Thickness 100 mm
Panel 2 : 1 x 57.2 mm Annex 2 Polyisocyanurate Board Sandwich

freq.(Hz)	R(dB)	R(dB)
50	17	
63	17	16
80	15	
100	17	
125	23	21
160	30	
200	35	
250	40	38
315	44	
400	48	
500	51	49
630	50	
800	51	
1000	51	51
1250	51	
1600	57	
2000	60	57
2500	55	
3150	55	
4000	58	57
5000	61	



APPENDIX F: CALIBRATION CERTIFICATES

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

NVCal
NOISE & VIBRATION CALIBRATION SERVICES

IEC 61672-3:2006 Calibration

Procedures from IEC 61672-3:2006 were used to perform the periodic tests on **17th October 2022** for the following sound level meter:

Rion NL-52, serial number 00620966

The following tests were undertaken:

Acoustical signal tests of a frequency weighting	**PASS**
Electrical signal tests of frequency weightings	**PASS**
Frequency and time weightings at 1 kHz	**PASS**
Long-term stability	**PASS**
Level linearity on the reference level range	**PASS**
Level linearity including the level range control	**PASS**
Toneburst response	**PASS**
Peak C sound level	**PASS**
Overload indication	**PASS**

Calibration result

Sound level meter: Rion NL-52, serial 00620966
Performance Specification: IEC 61672-3:2006 Class 1
Date: 17th October 2022
Certificate Number: C00404

PASS

Approved Signatory: .....

Notes

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 was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of 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.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

NVCal
NOISE & VIBRATION CALIBRATION SERVICES

IEC 60942:2003 Calibration

Periodic tests were performed in accordance with procedures from Annex B of IEC 60942:2003 (using the Insert Voltage Technique) on **5th January 2024** for the following sound calibrator:

Brüel & Kjær 4231, serial number 2253117

Calibration result

Sound Calibrator: Brüel & Kjær 4231, serial 2253117
Performance Specification: IEC 60942:2003 Class 1
Date: 5th January 2024
Certificate Number: C00454

PASS

Approved Signatory: .....

Test results

Level		**93.91**	**dB** re 20 µPa	+/- 0.091 dB
		113.94	**dB** re 20 µPa	+/- 0.091 dB
Frequency	@ 94 dB	**999.974**	**Hz**	+/- 0.01 Hz
	@ 114 dB	**999.974**	**Hz**	+/- 0.01 Hz
Distortion	@ 94 dB	**0.34**	**%**	+/- 0.015 %
	@ 114 dB	**0.16**	**%**	+/- 0.011 %

Notes

As public evidence was available, from a testing organisation (PTB) responsible for approving the result of pattern evaluation tests, to demonstrate that the model of sound calibrator fully confirmed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to confirm to all the class 1 requirements of IEC 60942:2003.

This certificate provides traceability of measurement to the SI system of units and to units of measurements realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

NVCal
NOISE & VIBRATION CALIBRATION SERVICES

IEC 61672-3:2006 Calibration

Procedures from IEC 61672-3:2006 were used to perform the periodic tests on **25th November 2022** for the following sound level meter:

Norsonic Type 118, serial number 31615

The following tests were undertaken:

Acoustical signal tests of a frequency weighting	**PASS**
Electrical signal tests of frequency weightings	**PASS**
Frequency and time weightings at 1 kHz	**PASS**
Long-term stability	**PASS**
Level linearity on the reference level range	**PASS**
Level linearity including the level range control	**PASS**
Toneburst response	**PASS**
Peak C sound level	**PASS**
Overload indication	**PASS**

Calibration result

Sound level meter: Norsonic Type 118, serial 31615
Performance Specification: IEC 61672-3:2006 Class 1
Date: 25th November 2022
Certificate Number: C00409

PASS

Approved Signatory: .....

Notes

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 was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of 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.