



Sydney Opera House

The Forecourt Sound Management Conditions Review

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ABN 66 108 398 312

Document register details

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This document	The Forecourt – Sound Management Conditions Review
File name	SydneyOperaHouse_ForecourtConditionsReview_D.docx
Page count	12

Revision	Date	Prepared by	Approved by	Notes
A	2-Sep-25	L.Miranda	S.Willsallen	Internal review document
B	4-Sep-25	L.Miranda	S.Willsallen	For client consideration
C	12-Sep-25	L.Miranda	S.Willsallen	Amended with comments
D	9-Mar-26	L.Miranda	S.Willsallen	Amended with comments

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A. Introduction

The largest outdoor events within the public grounds of the Sydney Opera House are regulated by the conditions set in DA 445-10-2003 MOD 4. This consent includes provisions to manage sound impacts to nearby residents, specifically for concerts staged on the Western Broadwalk, Forecourt and during Australia Day concerts. The most recent amendment to this DA (MOD 4) was approved in October 2016.

The 2016 modifications were substantial in that they changed the way that sound levels were monitored. Measurements are now taken from designated locations within the Opera House site and using an average level rather than a maximum level recorded at the residential receivers. This has had the net effect of providing a simpler interface for operators while reducing the number of complaints compared to pre- 2016 levels.

To support improved sound management practices, a Sound Management Plan was prepared in 2016. This was reviewed in 2017 and again in 2020. This Sound Management Plan has been in place for all major outdoor events since this time.

While a number of different types of event are covered in DA 445-10-2003 MOD 4, this proposal is solely concerned with what falls under the 'Typical Forecourt Events designation..

This document reviews the impact of the MOD4 amendments, the current Sound Management Plan and current technology on improving sound impacts at nearby noise sensitive receivers.

Based on the demonstrated success of these measures, this report includes recommendations for further changes that would enable the Sydney Opera House to broaden its programming and offer a more diverse range of events to the community. Should there be any questions about this document, please do not hesitate to contact me.

Yours sincerely,



Luis Miranda Jofre PhD
Senior Consultant
Auditoria Pty Ltd

B. Current DA conditions related to sound

As mentioned above, the current DA conditions for 'Typical Forecourt Event's' (Forecourt events) related to noise emissions are included in condition 42 in DA 445-10-2003 MOD 4 in effect from October 2016. As mentioned in the Introduction, the conditions reviewed here are the ones related to Forecourt events nominated in DA 445-10-2003 MOD 4.

B.1 Current monitoring strategy

Large scale events, such as the ones staged at the Forecourt, generally require a monitoring location that continuously records levels which are relayed in real time to the noise monitoring staff and in turn to SOH staff, audio system operators and promoters. The approved Noise Management Plan (NMP) required by condition 45A, relies on an intermediate monitoring strategy in which the continuous noise monitoring station is within the main sound field of the event rather than next to the nearest noise-sensitive receivers. Extensive analyses were performed to arrive at the current Front of House (FoH) location to be used as the monitoring location. This was part of the amendments when modifying the DA conditions in 2016. The documents where these analyses are summarised can be supplied upon request. The primary reason for this change was the prescribed limits being too close to the existing background noise to be read unequivocally. Conditions 2A, 26, 42, 43, 45, 45A of the consent relate to the existing noise monitoring and management strategy

A typical Forecourt event setup with the monitoring location and nearest sensitive receiver is shown below.

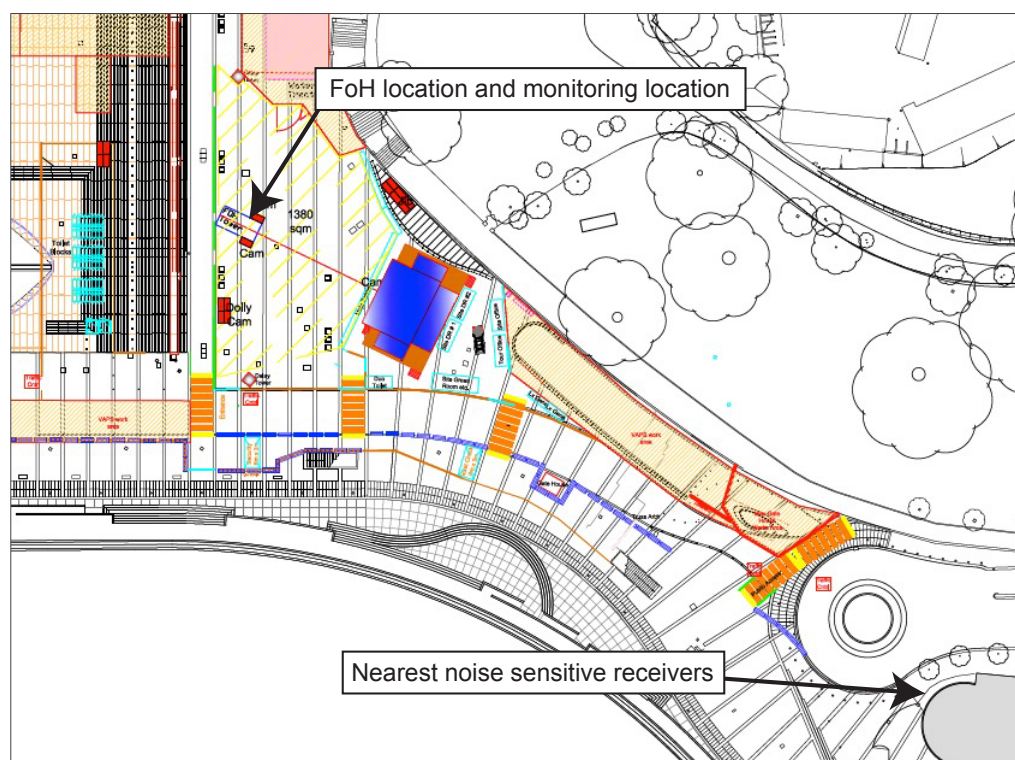


Figure 1. Typical Forecourt event setup.

B.2 Current noise and time limits

When measured at the location shown above, the following limits are in place according to Condition 42:

- A maximum of 92 dB(A) $L_{eq-5min}$
- A maximum of 102 dB(C) $L_{eq-5min}$

In terms of time limits, the following apply according to Condition 42:

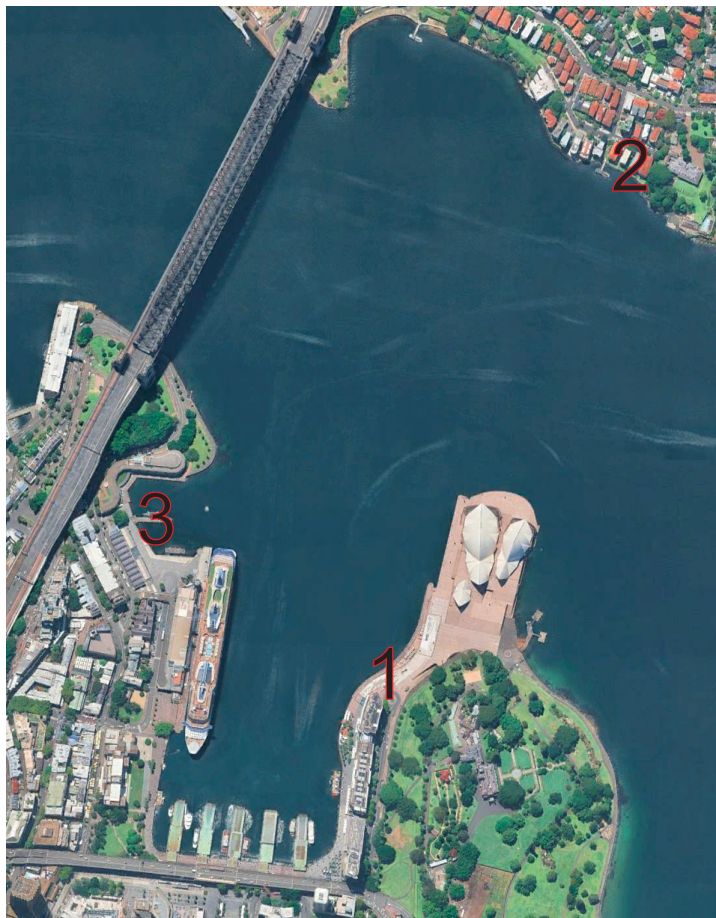
- Amplified music can only occur between the hours of 10 a.m. and 11 p.m.

An additional condition exists (Condition 43) in which the limits can be raised by 5 dB if the event does not last more than 4 hours and if all amplified music stops by 10 p.m.

C. Impacts to surrounding receivers based on exceedances and complaints

C.1 Description of nearest noise-sensitive receivers

The Sydney Opera House is located at Bennelong Point, which, with the exception of residences at 1 Macquarie Street, is situated at a considerable distance from noise-sensitive receivers. Historically, most of the complaints have originated from the residences at 1 Macquarie Street, which is to be expected based on the distance to the typical Forecourt event location. An overview of sites around the SOH are shown below.



1. Apartments and businesses on Macquarie Street
2. Residential areas on Kirribilli
3. Businesses and hotel on The Rocks and Dawes Point.

Figure 2. Locations of interest surrounding the Forecourt (Image: © Google Earth, Airbus).

As can be seen above, the Macquarie Street receivers are the closest at a distance of approximately 100 m to the edge of the event site. The residential area at Kirribilli is approximately 700 m away and mitigated by the sails. The nearest businesses in The Rocks are approximately 480 m away as is the nearest edge of the hotel on the other side of the harbour.

As part of the operational conditions, a report must be prepared for every event conducted on the Forecourt (Condition 45), which includes details of any exceedances as well as details of any complaints.

C.2 Complaints reporting and analysis

Condition 5 allows 5 events of up to 11 days and 3 events of up to 20 days, per annum (with no more than 99 days in total). It also included a 'one off' event in 2016 of 25 days. During these events, the Forecourt infrastructure remains in place so that concerts can be held each night of the event (if programmed).

The following 'events' have occurred since 2017. There were fewer events in 2020, 2021 and 2022 due to the Covid-19 pandemic.

- 2017:
 - Forecourt series – Paul Kelly, Lord, Homeground and Jack Johnson
- 2018:
 - Australia Day
 - The National
 - Invictus Games Opening Ceremony
- 2019:
 - Australia Day
 - John Butler & Missy Higgins
- 2020:
 - Australia Day
- 2021:
 - Australia Day
- 2022:
 - Australia Day
 - Live Nation Concert Series (8 concerts)
- 2023:
 - Australia Day
 - Live Nation Concert Series (12 concerts)
- 2024:
 - Australia Day
 - Live Nation Concert Series (13 concerts)
 - Thom Yorke (2 concerts)
- 2025:
 - Australia Day
 - March Concert Series (5 concerts)

Below we have considered the total number of complaints and exceedances for all Forecourt events since 2017.

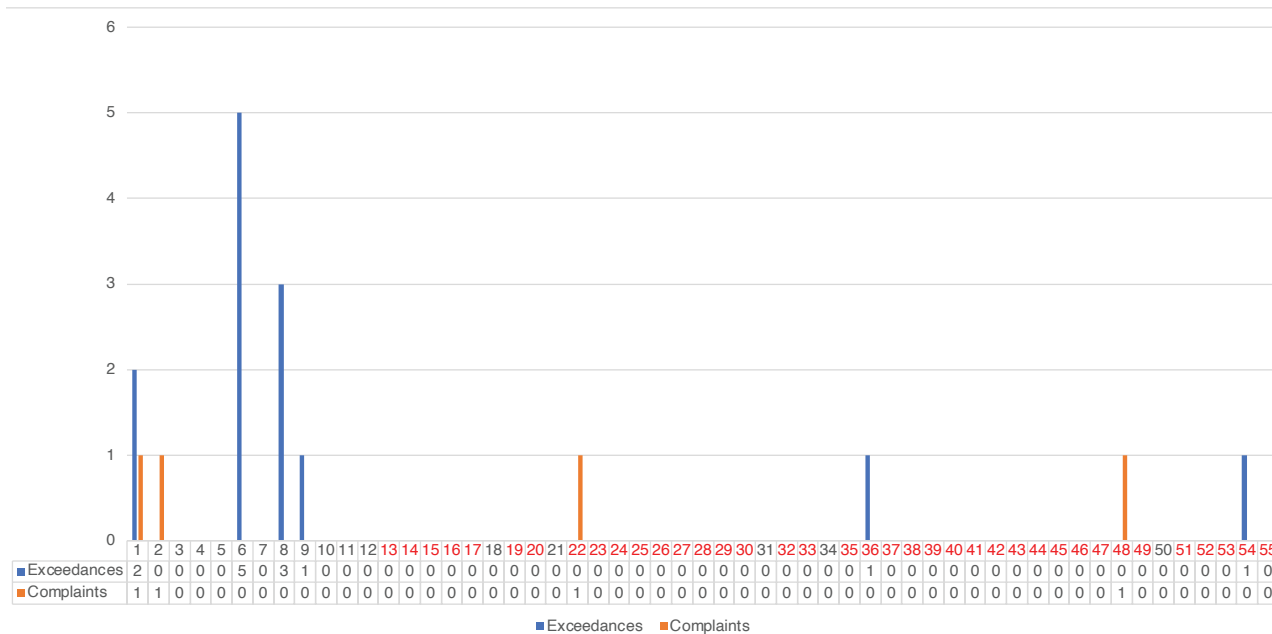
C.2.1 Complaints analysis

The complete series of events analysed has been given a number for easier identification. The full relationship of concerts is as per below.

<i>No.</i>	<i>Event</i>	<i>Date</i>
1	Paul Kely	Nov-17
2	Lorde	Nov-17
3	Homeground	Nov-17
4	Jack Johnson	Dec-17
5	Australia Day	Jan-18
6	The National	Feb-18
7	Invictus Games	Oct-18
8	Australia Day	Jan-19
9	JBT&MH	Feb-19
10	Australia Day	Jan-20
11	Australia Day	Jan-21
12	Australia Day	Jan-22
13	The Pixies	Dec-22
14	The Pixies	Dec-22
15	Jack Johnson	Dec-22
16	Jack Johnson	Dec-22
17	Jack Johnson	Dec-22
18	Emma Memma	Dec-22
19	5 Seconds of Summer	Dec-22
20	5 Seconds of Summer	Dec-22
21	Australia Day	Jan-23
22	Daniel Caesar	Dec-23
23	Daniel Caesar	Dec-23
24	The War on Drugs	Dec-23
25	The War on Drugs	Dec-23
26	Dermot Kennedy	Dec-23
27	Dermot Kennedy	Dec-23
28	Dermot Kennedy	Dec-23
29	Guy Sebastian	Dec-23
30	Guy Sebastian	Dec-23
31	Synthony	Dec-23
32	Ice House	Dec-23
33	Human Nature	Dec-23
34	Australia Day	Jan-24
35	Thom Yorke	Nov-24
36	Thom Yorke	Nov-24
37	Glass Animals	Nov-24
38	Glass Animals	Nov-24

No.	Event	Date
39	Troye Sivan	Nov-24
40	Troye Sivan	Nov-24
41	Tones & I	Nov-24
42	Missy Higgins	Dec-24
43	Crowded House	Dec-24
44	Crowded House	Dec-24
45	2 Door Cinema Club	Dec-24
46	Crowded House	Dec-24
47	Crowded House	Dec-24
48	Tina Arena	Dec-24
49	Brooke Fraser	Dec-24
50	Australia Day	Jan-25
51	Fontaines DC	Mar-25
52	Dan Sultan	Mar-25
53	PJ Harvey	Mar-25
54	New Order	Mar-25
55	New Order	Mar-25

The plot below shows the full history of complaints and exceedances. Events marked in red in the second graph show events where the Opera House has used Condition 43 and the additional 5 dB, for a finish before 10 p.m.



Since 2016 and with the implementation of the new noise management plan, there has been a total of four (4) complaints and thirteen sound (13) exceedances over fifty-five (55) staged events. This is a very low number considering the number of events. Over the last three years, in which events have been staged regularly, only two (2) complaints have been received.

It should be noted that the majority of the events have been run under the allowance of an extra 5 dB as per condition 43. The only events that have not been run in the last several years with this allowance are the Australia Day concerts where a higher level is not required.

This demonstrates that, even with the higher allowance, these events do not generate a high number of complaints.

It should also be noted that there have been no instances of concerts overrunning their finish time of 10 or 11 p.m.

D. The effectivity of current noise mitigation measures

It is clear that the measures in place to mitigate noise from events at the Forecourt have been a success, even if some of the years analysed had very few events due to COVID. As noted above, over the last three years, in which events have been staged regularly, only two (2) complaints have been received.

We believe this is a reflection of several factors:

- The SOH team has a clear understanding of the elements required to stage a successful event in terms of sound, including making production and promoters aware of the risks and opportunities related to sound system setup, understanding monitoring requirements and communicating requirements to audio suppliers.
- The process in place from the noise monitoring company which include communication with the SOH in terms of live monitor results, communication with operators in terms of early warning and communication with audio suppliers in terms of providing information to fine tune their setup.
- Audio suppliers engaged for the Forecourt events possess extensive experience with the venue and consistently deploy sound systems that improve the audience experience and limit impacts to nearby sensitive receivers.
- Advances in technology that allow less sound to be radiated from the back of the main PA and reducing impacts to neighbours. Systems like the L-Acoustics K2 and the d&b GSL and KSL (which are the most common used systems if not the only used systems) provide greater rejection towards the back than other PA systems used previously.
- The correct implementation of the SMP and its recommendations.
- While no formal assumptions are made about community sentiment, the low volume of complaints may suggest a level of awareness and acceptance of the nature, frequency and duration of events held at the Forecourt.

E. Proposal for new DA conditions

The Opera House is now seeking modifications to the conditions to facilitate a broader scope of programming on the Forecourt. At present, the sound conditions restrict performances to acts where lower audience sound levels are known to deliver an acceptable experience. This limitation has constrained the diversity of events that can be staged. The SOH would like to be able to open the Forecourt to a greater variety of acts to better serve its audience and allow for a wider spectrum of artists and genres, thus enhancing cultural accessibility and diversifying the target audiences.

We note that there is a recent interest from the NSW Government to evaluate proposals to increase vibrancy and, in particular, providing a greater variety of live music and large-scale events. This is included in the Cultural State Environmental Planning Policy (Cultural SEPP). As part of these reforms the *“Explanation of Intended Effect: Cultural State Environmental Planning Policy Proposed – changes to support events and activities in NSW”*, prepared by the Department of Planning, Housing and Infrastructure (DPHI) and dated November 2024, the Sydney Opera House is explicitly named as one of the key events sites that are under review. In that document, it is clearly stated that DPHI will review the current sound level limits as well as measurement methodology.

Given the demonstrated success of sound management policies implemented since 2016, it is considered appropriate to seek a DA amendment to the following sound management conditions as follows:

- it is proposed to delete condition 43, and to incorporate the sound levels in condition 43 into condition 42 as the standard levels for all 'Typical Forecourt Events'. This change would result in an increase of up to 5dB from the current limits to 97 dB(A) $L_{eq-5min}$ and 107 dB(C) $L_{eq-5min}$ when measured at the current monitoring location.

Since 2016, noise management for Forecourt events has been effective, with only two complaints over three years of regular events. This reflects strong operational practices, advanced implementation of sound technology, and adherence to the Sound Management Plan.

We believe the proposed amendments carry minimal risk. Several concerts already operate at the higher sound levels, although finishing by 10 p.m. The proposal to extend event times under consistent sound limits for all events would simplify programming and better align Forecourt events with audience expectations. Later headline starts also support the 24-hour economy by encouraging evening visitation and cultural activity in the city.

The proposed changes to the sound management measures in the Forecourt consent are, in summary:

- sound to be limited to 97dB(A) $L_{eq-5min}$ and 107 dB(C) $L_{eq-5min}$ (an extra 5dB).
- events to end at 11pm (not 10pm).
- bump out extended from midnight to 12:30am.

The proposal is strategically justified, aligning with State government goals.

F. Glossary

The following definitions are used through the document or have been considered when preparing this document and are included in this section as a reference for the reader.

Background noise – According to the NSW Industrial Noise Policy, the background noise is: ‘the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed’. This is typically described using the L_{90} descriptor.

Ambient noise – According to the NSW Industrial Noise Policy, the ambient noise is: ‘the all-encompassing noise associated within a given environment’. This evaluation would include noise from all sources in the environment. This is typically described using the L_{eq} descriptor.

L_{eq} – The L_{eq} descriptor is the average of levels (calculated in underlying energy units) over a measurement period.

L_{max} – The L_{max} descriptor is the maximum peak level at any time instance during the measurement.

L_n – The L_n , where n is a given percentile is the sound pressure level that is exceeded by the n percent of the level observations in a measurement period. If, for example, n is equal to 90, the figure represents the value over which 90 percent of the level observations in the period are over this level. Another way of thinking about it is, using the same 90 percent example, the highest level of the lowest 10 percent of the observations.

dB – Is the abbreviation for decibel, which is a unit of sound measurement. The decibel is a logarithmic unit and in this document is used to describe sound pressure levels. The reference for the logarithmic unit is 0.02 mPa.

dB(A) – The A-Weighted version of the sound pressure descriptor, is a spectral adjustment applied to the signal to make it more attune to the human hearing characteristics at medium sound levels.

dB(C) – The C-Weighted version of the sound pressure descriptor, is a spectral adjustment applied to the signal to make it more attune to the human hearing characteristics at high sound levels.