NOISE MANAGEMENT PLAN

HOTA: Outdoor Stage

Contents

Review Status				
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1. Noise Management Plan Considerations

Scope

This Noise Management Plan (NMP) details prevention and management measures for noise associated with the HOTA Outdoor Stage, day-to-day activities as well as indoor functions and open-air concerts and events. It provides an overview of the strategies, methods and controls implemented to manage noise emissions and developed in conjunction with operational recommendations outlined in the Environmental Noise Assessment by Marshall Day Acoustics, dated 13 July 2016 (reference: Rp 006 R01 2015187ML)

Noise Types

The specific noise types expected to be generated by the operation of the outdoor stage for this event are related to:

- Amplified audio emitted as part of activating the Outdoor Stage.
- Noise generated in the setting up and pulling down of the site.
- The operation of the loading dock.

Noise Sensitive Areas

The nearest noise sensitive areas identified in the Environmental Noise Impact Report (ENIR) conducted by CRG Acoustics are:

- Crombie Avenue
- The Promenade (Ise of Capri)
- Sunset Boulevard

Noise limits shall be in accordance with the Environmental Protection Act 1994 (EPA), specifically Section 440X Open Air Events which states:

- An occupier of a premises must not use, or permit the use of, the premises for an open-air event on any day –
    - Before 7am, if the use causes audible noise
    - From 7am to 10pm, if the use causes noise of more than 70dB(A); or
    - From 10pm to midnight, if the use causes noise of more than the lesser of the following
        - 50dB(A) or
        - 10dB(A) above the background noise level
- The above criteria will be met unless otherwise approved by Council, and/or where impacts are mitigated through suitable methods, as outlined in an approved NMP.

The ENIR provides guidance to the implementation and translation of EPA requirements to the management of noise levels when activating the Outdoor Stage. It states:

- Outdoor Events must remain between 85-100dB from the Front of House Mixing Desk dependant on the number of attendees of the event. This results in noise levels of between 32-76dB at the noise sensitive areas located on Crombie Ave.
- Noise generated as part of Event bump-in and bump-outs will see a higher-than-normal number of deliveries and movement around the area. The removal of this infrastructure will predominantly occur directly after the event with no amplified sound past 10pm. Loading dock activities will result in noise levels of 13-34dB. There are no default EPA noise-levels for loading dock noise emissions however every effort will be made by HOTA staff to ensure noise is kept at the lowest level possible.
- Indoor events taking place at the Outdoor Stage will generate noise outputs up to 89dB, which results in noise levels of 24-42dB at the noise sensitive locations. The noise of indoor Events will comply with EPA noise limits at all locations both day and night.

2. Event Details

The Outdoor Stage is located within HOTA, Home of the Arts Precinct at 135 Bundall Rd, Bundall. The external building and surrounding grassed areas are open to the public 24/7, except when closed off for event builds and during ticketed events.

HOTA's Outdoor stage venue is activated all year round and can be scaled between bespoke, intimate events to large scale events hosting up to 4,400 attendees. The number of events held per year that attract between 2000-4400 attendees is between 8-15 a year.

Events are designed with a range of configurations including but not limited to allocated seating, picnic style, cocktail style or standing room only and range from invite only, to free and ticketed. Ticketed events will typically require a site permitter to be installed to maintain the integrity of the ticketed event.

Programming of the Outdoor Stage includes but is not limited to community events, live music, performing arts, dance, physical theatre, cinema screenings, visual arts, talks, conferences, trade shows and corporate functions and events.

3. Roles & Responsibilities

The HOTA Programming & Presenter Services Department is responsible for ensuring compliance with the approved NMP to minimise the impact on neighbouring communities.

4. Noise Management Strategy

The image illustrates the typical layout of the standard permanent sound equipment for the Outdoor Stage, the location of the speakers and mixing desk and nearest noise sensitive area. The configuration is as follows:

- Line array are flown from external Outdoor Stage rigging points (both Low Frequency (LF) Enclosures and High Frequency (HF) Enclosures).
- Line arrays will be hung from mounting point 1 & 2 furthest from the façade.
- Speakers be focused north-north-west and elevated no more than 1.8m above ground level.
- Line Array system specs predominantly used for HOTA Outdoor Events are
    - L'Acoustics Kara modular line source (multiple configurations)
    - Frequency bandwidth: 55Hz to 20kHz
    - Each enclosure consists of: 2 x 8" neodymium LF Speakers / 3" neodymium HF Section.
    - Standard configuration: 28 x Kara Boxes (14 per side L+R) and 10 x SB118 sub boxes (5 per side L+R).

Further information regarding the primary sound system can be found at http://www.l-acoustics.com/products-kara-85.html or via HOTA Technical Services Department.

5. Noise Monitoring Procedure

HOTA will monitor noise levels in the following way:

- From a professional decibel reader (10 EaZy Class 1 system) to measure noise levels during the setup and operation of the event.
- From the Event FOH audio mixing desk located 30mtr directly in front of the stage to capture readings during sound checks and the Event and;
- From the Larson Davis 831 NMS045* noise monitoring device permanently installed along the boundary of HOTA Outdoor Stage precinct located alongside Ouyen St/ Crombie Ave. This noise measurement reader will continuously monitor noise levels during Bump In/Event Performance and Bump Out. (See below for equipment and management specifications)
- HOTA will engage external noise measurement services to perform onsite noise measurement readings when a risk assessment by the HOTA Event Manager deems necessary (Eg for a heavy metal music event ticketed to up to 4400 capacity).
- HOTA will engage an external Noise Measurement Company to provide additional supportive readings in future performances for the Outdoor stage should multiple complaints be raised for a recent performance. This will also trigger a recalibration of the Larson Davis 831 NMS045* noise monitoring device permanently installed along the boundary of HOTA Outdoor Stage.

*Larson Davis 831 NMS045 management and specifications:

- The Larson Davis 831 NMS045 is a noise monitoring device permanently installed along the boundary of HOTA Outdoor Stage precinct as per recommendation by Noise Management Services (NMS).
- The 4mtr high position is deemed the most suitable position as it provides a reference point relative to the current assessment position. The height also mitigates the risk of tampering or damage from unauthorised users.
- Installation at this altitude allows for better quality sound readings than at ground level which is mediated by ground effects.
- NMS have advised the levels on the HOTA installed Noise Measurement device have been calibrated in accordance with AS1055.
- The location of the device is labelled in the above map (pink).
- The device will send a text and/or email notification to the HOTA Event Manager when the level at the receiver exceeds the acceptable level determined by the Environmental Noise Assessment by Marshall Day Acoustics in that location. This ensures that HOTA meets the guidelines at Leq 70dB9A.
- Once a text/email is received, the Event Manager will immediately initiate a review of the device live level readings and the FOH Audio Operator readings at the mixing desk. All efforts will be made to immediately rectify the levels.
- Each noise measurement is recorded (over 5-minute periods) on a report and attached to the post event report in a centrally filed location within HOTA administration. The live audio recordings are stored and available for downloading.
- Noise monitoring maintenance and pre-event checks will be performed by the HOTA Production team prior to any auditory works being carried out on the venue. Calibration

checks can be performed daily and remotely utilising the G4 Larson Davis monitoring utility software.

- HOTA will engage with external noise measurement services to perform validation checks alongside the permanent infrastructure once every two years in accordance with NATA certification.

6. Noise Management Controls

Control Measures	Timing	Methodology	Responsible	Monitoring & Reporting	Performance Measure
General Event Planning					
Stipulation of the EPA regulations in artists contract	Contract Negotiation	As part of the artists contract	HOTA Producer or Venue Booking Coordinator	Negotiation with agent	Signed contract
Education on noise responsibilities for staff and subcontractors	Prior to event	As part of site induction for contractors and repeated at toolbox talks for staff, as required	HOTA Event & Production Manager	Signed induction and toolbox talk reports	All staff are aware of the noise control measures
Notify residents and stakeholders of upcoming events	6 Month Intervals	Resident Notification Procedure as described in section 7.	HOTA Event Manager	Snail-mail standard residential notification list Zendesk Reporting Complaint Register	Local residents are notified and aware of upcoming major outdoor events every six (6) months via letterbox drop, directing residents to a dedicated Outdoor Events page outlining all Outdoor event details.
Obtain pre-recorded set for the artist to understand dynamics and frequencies of impending performance.	Prior to event	Forms part of the production planning timeline	HOTA Production Manager	Provided by Hirer Technical manager	Files received prior to event date.

Control Measures	Timing	Methodology	Responsible	Monitoring & Reporting	Performance Measure
Onsite Noise Controls					
Where possible, speakers positioned 'inwards' from the stage and surrounds to reduce transmission of noise outside of venue	Bump-in	Speaker placement during bump-in to be maintained as per acoustic reports & L'Acoustics recommendations.	AV HOD Audio Engineer	HOTA Production Manager to brief all technical personnel at induction and monitor compliance	No complaints received from nearby residents or stakeholders
Where possible, speakers to be facing downward at 45-degree angle.	Bump-in	Speaker Placement during bump-in to be maintained as per acoustic reports and L'Acoustics recommendations.	AV HOD Audio Engineer	HOTA Production Manager to brief all technical personnel at induction and monitor compliance	No complaints received from nearby residents or stakeholders
Fold back speakers to be elevated and directed downward	Bump-in	AV HOD and Audio Engineers to be briefed on the content of the NMP.	AV HOD Audio Engineer	HOTA Production Manager to brief all technical personnel at induction and monitor compliance	No complaints received from nearby residents or stakeholders
All temporary structures to have 3 walls with the entrances facing towards the outdoor stage to	Prior to Event & Bump-in	Sitemap to stipulate suitable locations for infrastructure and distributed to contractors and stallholder prior to event	Production Manager	Bump-in overseen by Production Manager	No complaints received from nearby residents or stakeholders

Control Measures	Timing	Methodology	Responsible	Monitoring & Reporting	Performance Measure
guide noise inwards					
Rehearsals to be held between 9am – 6pm to minimise noise hazard	Prior to Event	Detailed rehearsal schedule to be communicated to acts. Stage manager to manage rehearsals according to allocated times.	Production Manager	Rehearsal schedule overseen by Production Manager	No complaints received from nearby residents or stakeholders
Bass noise to be kept down, where practical	Prior to Event	Sound engineer briefed on noise restrictions	Production Manager Audio Engineer	AV site induction signed	No complaints received from nearby residents or stakeholders
dB monitoring to be executed at regular intervals	During Event	Noise Monitoring Procedure to be followed	Production Manager Audio Engineer	dB Reader to be utilised and readings recorded on noise monitoring report and filed	No complaints received from nearby residents or stakeholders
No Amplified Noise or music after 10:00pm, excluding New Years Eve where the measures apply from 01.30 on the 1 January.	Pre-Event/ Event/Post-Event	No Amplified Music or noise to be present after 10pm in accordance with the Environmental Protection Act 1994	Production Manager/ Event Manager/ Audio Engineer	All operators briefed at site induction that amplified noise ceases at 10pm.	No complaints received from nearby residents or stakeholders
Onsite Noise Controls – Bump in /out & Loading Dock Operation					
Mandatory use of 2-way radios for all	Bump-out	Use of 2-way Radios by all staff	Production/ Event / Site Manager	Signed site induction report.	No complaints received from nearby

Control Measures	Timing	Methodology	Responsible	Monitoring & Reporting	Performance Measure
staff and contractors to reduce elevated voices		Include in site induction	& Contractors	Radio log signed by all staff provided with a radio.	residents or stakeholders
Restriction on usage of multiple vehicles simultaneously after 10pm	Bump-out	No more than 3 vehicles (incl. forklifts and trucks) to be operating onsite at the same time. Coordinate bump-out schedule to ensure minimal vehicles onsite simultaneously. Include in site induction	Production/ Event / Site Manager & Contractors	Signed site induction report. Bump-out activities overseen by Production Manager.	All operators licensed. No inappropriate use of vehicles or plant
Minimise vehicles and plant idling when not in use	Bump-out	Turn off vehicles and plant when not in use. Include in site induction	Site Manager & Contractors	Signed site induction report. Bump-out activities overseen by Event Manager.	All operators licensed. No inappropriate use of vehicles or plant
All plant and equipment to be maintained in proper manner to minimise noise emission	As required	Adhere to manufactures recommended maintenance schedules and prompt repair damaged or defective equipment	Asset & Facilities Manager	Maintenance logs available within vehicle for inspection	No complaints received from nearby residents or stakeholders

7. Resident Notification Procedure

To ensure the community is kept informed of the activities at HOTA with potentially increased noise levels, an event notification via a letter box drop will be distributed to residents in the immediate vicinity of HOTA once every 6 months.

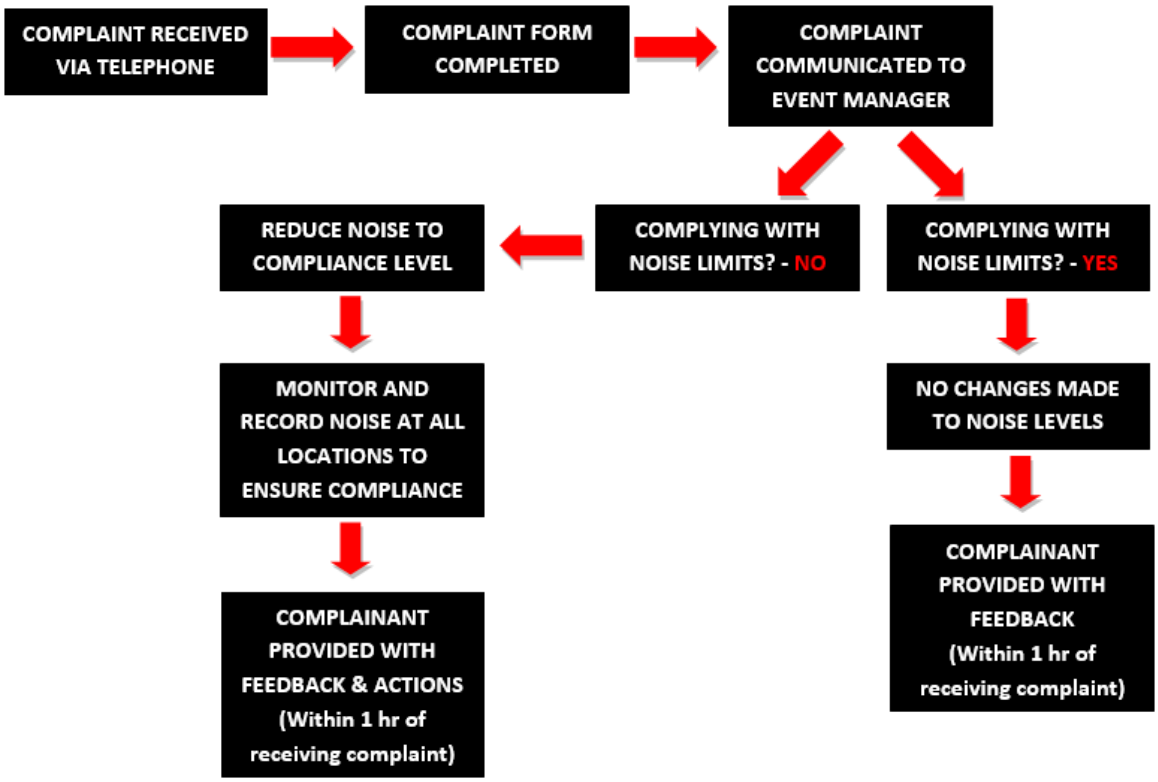
The HOTA Event Manager will coordinate a bi-annual resident notification letterbox drop introducing households to a specific page on our website outlining all upcoming events/times and details concerning the outdoor stage. The content of the webpage will include information related to noise, traffic, artists, event information and the HOTA contact number for complaints, questions and feedback.

The street and property numbers for the annual letterbox drop area are listed in detail and show on the map below:

Inga Ave – All Houses #2-25
Upton Street - #91-115
The Promenade - #60-77 (Isle of Capri)
Stanhill Drive #185-289 (Chevron Island)
Mercedes place #4-26
Crombie Ave (West) #65-73
Pisa Ct All Houses #1 - 14
Tima Ave – All Houses #1-11
Gibralter Drive - #87-110 (Isle of Capri)
Sunset Blvd - #32-72 (Surfers Paradise)
Upton Street #102-122
Daimler Drive #1-23
Crombie Ave (East) #2-14

8. Noise Complaint Procedure

The HOTA process for recording and handling of noise complaints is depicted in the following workflow:



HOTA will maintain a complaints hotline to receive and respond to feedback from the community. The hotline will be located within the main switchboard (07 5588 4000) and will be in operation during all outdoor main events. Staff in the box office and Hello Desk are trained on the complaint management procedure.

When a complaint is received via phone a written record is collected of the following information:

- Date and time of the complaint
- How the complaint was made (telephone, email, in person)
- Contact details
- Location of the complainant
- Event
- Nature of the complaint
- Details of any response or proposed follow up.

The person receiving the complaint will immediately communicate the details to the HOTA Event Manager via radio and/or phone.

The complaint will be added to the complaints database maintained by HOTA Visitor Services Department.

The Event Manager will immediately review the noise monitoring readings and environmental conditions (i.e. wind direction). If levels are non-compliant the Event Manager will work with the Client and Audio Operator to establish the best approach which causes the least impact on the event while lowering output to acceptable levels. Thereafter, noise levels will continue to be monitored and recorded.

Feedback of the outcome will be provided to the person who made the complaint by the HOTA staff member who took the complaint, to maintain a positive relationship with the community.

Noise monitoring reports and register of complaints will be kept in a central filing location.

9. Review Strategy

To ensure the effectiveness of the NMP and the implementation of the procedures, regular reviews will be conducted. The complete NMP will be reviewed every 2 years or sooner if any of the following occur:

- Noise issues arise frequently indicating the plan is not adequately managing the issues.
- Council regulations in relation to noise change
- New procedures in relation to noise management are developed.

Reviews on a smaller scale are conducted on an ad-hoc basis, which includes data review and incidents review. Data review will be an analysis of collected data, including noise monitoring reports and complaint forms. This review can be performed for internal use, i.e., to assess trends in relation to noise levels for certain event types or staff effectiveness in handling complaints.

Incident reviews may be conducted to establish the need for a change in an existing procedure, the need to develop a new procedure or by implementation of a process to address a recurring issue.

Any changes to the NMP will be communicated to relevant HOTA staff and contractors by a member of the HOTA Programming & Presenter Services Department.

10. Training

Training is an important factor in the effective execution of the procedures described in this plan. All senior staff and management contractors involved in an event must know the noise management policies and procedures prior to executing an event within the precinct to ensure they can relay the correct information to the relevant contractors and staff members. Contractors and staff are briefed on the procedures relevant to their function during site inductions and toolbox talks.

Due to the sensitive nature of handling complaints, Visitor Services staff in charge of manning the complaints hotline are required to have completed relevant training in relation to complaint

management. This will empower them with knowledge on effective communication techniques and dealing with conflicts.

11. NMP Exemption Application Process

For all other events, If the expected noise for HOTA Outdoor Stage Events is anticipated to exceed the criteria outlined in this NMP, HOTA will seek written approval from Council prior to the Event and implement additional control measures as required.

12. Appendix 1 – CRG Acoustic Report 2018

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Amplified Sound Noise Assessment,
Exhibition Lawn, Backstage Area, & Amphitheatre
"Gold Coast City Cultural Precinct"
135 Bundall Road, Surfers Paradise

ENVIRONMENTAL
NOISE IMPACT REPORT

Prepared For

The Arts Centre Gold Coast

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CRGACOUSTICS

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1 INTRODUCTION

This report is in response to a request for an acoustical assessment of amplified sound from three locations within the Gold Coast Cultural Precinct in Bundall.

The purpose of this assessment is to determine sound levels for the sound systems to be used for pre-recorded music live acts. We have been briefed by Arts Centre Management to assess noise to the requirements of the Environmental Protection Act 1994.

Hours of use are proposed to be between 7am and 10pm, 7 days per week.

Onsite testing was conducted to determine the allowable noise level at the venue to ensure compliance with the requirements of the Environmental Protection Act 1994.

2 NOISE LIMIT CRITERIA

As there is no specific criteria under Gold Coast City Council's City Plan (only the requirements of the "General Development Code" would apply, which are generic), the main guide to assessing noise from the Venue is Part 3B, Division 3, Section 440X of the Environmental Protection Act 1994 states the following:

440X Open-air events

(1) An occupier of premises must not use, or permit the use of, the premises for an open-air event on any day—

(a) before 7a.m, if the use causes audible noise; or

(b) from 7a.m. to 10p.m, if the use causes noise of more than 70dB(A); or

(c) from 10p.m. to midnight, if the use causes noise of more than the lesser of the following—

(i) 50dB(A);

(ii) 10dB(A) above the background level.

As the proposal is for music between 7am and 10pm, only Section 440X(1b) applies.

3 SUBJECT LOCATION AND SURROUNDS

Noise level testing was undertaken at three locations at the site as follows:

Exhibition Lawn
The Exhibition Lawn is located to the south of the Arts Centre building. The proposal is to provide amplified entertainment in the outdoor area through a PA system facing north-north-west seven days from 7:00am - 10:00pm. Entertainment may be in the form of pre-recorded music or a soloist or duo live act, similar to that provided in lounges in licensed Clubs.

Onstage Indoor Function
This indoor area is located behind the Amphitheatre stage area, and will be used for functions, in the form of pre-recorded music or a soloist or duo live act, similar to that provided in lounges in licensed Clubs. We are advised that this space will be used seven days from 7:00am to 10:00pm.

Main Amphitheatre
The main Amphitheatre are will be used for live performance, being a major performance venue on the Gold Coast. This facility will be used seven days from 7:00am to 10:00pm.

The noise sensitive receiver locations are as follows:

1. Detached dwellings to the south along Crombie Avenue. These dwellings are the nearest to the Venue and have full exposure. It is noted that background noise levels are relatively high at these dwellings due to road traffic noise on Bundall Road which is located to the west.
2. Detached dwellings to the southeast across a branch of the Nerang River on The Promenade and Gibraltar Drive. Whilst these dwellings are set back further from the Venue, background noise levels are lower than that experienced at Crombie Avenue.
3. Detached dwellings to the east on Sunrise Boulevard.
4. Detached dwellings to the north on Stanhill Drive.
5. Detached dwellings to the west on Upton Street. These dwellings are screened to the Venue by commercial buildings.

For the location of the venue and surrounding noise sensitive receivers refer to Figure No. 1 and Sketch No.1 at the rear of this report.

4 NOISE MEASUREMENT EQUIPMENT

The following equipment was used to record background, source and intrusive noise levels:

- Rion NC 73 Calibrator (SN10697011); and
- Rion 29E Octave Band Sound Analyser (SN10430686).

All equipment used in the assessment hold current NATA laboratory certification, and were field calibrated before and after the testing session. Field calibration details are as follows:

- Calibration before session: 94.0 dB; and
- Calibration after session: 94.0 dB.

Levels recorded were *"A"* Weight, *"Fast"* Response, as L_{10} and L_{90} descriptors.

5 MEASUREMENT LOCATIONS AND METHODOLOGY

Portable PA systems were installed at the Lawn and the Backstage area, with the in-house Amphitheatre also used. Each area was assessed alone, as it is not expected that more than one area would provide amplified sound at any given moment.

Levels were measured near the onsite speakers, and then at nearest noise sensitive premises offsite. Refer to Sketch No. 1 for the site layout and the location of the sound system speakers.

Intrusive and ambient noise levels were recorded at the following locations:

1. Intrusive levels at 3m from the outdoor Exhibition Lawn speakers, with speakers facing north-north-west;
2. Intrusive levels at 3m from Onstage Indoor Function PA speakers, with speakers facing south, and all doors closed, apart from one egress point via the Amphitheatre Stage side. It is noted that the space is reverberant (or 'echoic'), and therefore, given the high music source level and reverbant nature of the space, speakers could be aimed in any direction.
3. Intrusive levels at the mixing console position in the Amphitheatre. The permanent in-house PA speakers elevated above stage level to each side of the stage were used for the testing.
4. On the footpath at the intersection of Crombie and Inga Avenues.
5. In the open space to the eastern boundary of the dwelling at 76 The Promenade.
6. On the western side of the dwelling at 40 Sunset Boulevard overlooking the river.
7. In the open space at the southern end of Anembo Street, adjacent to 211 Stanhill Drive.
8. To the eastern side of the dwellings between 100 and 114 Upton Street.

Intrusive and background noise testing was conducted between 8.40pm and 10.20pm on Tuesday 5th December 2017.

For measurement locations refer to Figure No. 1 and Sketch No. 1 in Appendix A.

Weather conditions were overcast, a temperature of approximately 25ºC with a light breeze blowing towards the southeast at speeds of 0 – 1.5 ms^{-1}.

6 RESULTS AND CALCULATIONS

Amplified music noise levels from the three sources tested were not audible at the Upton Street dwellings. Similarly, noise from the Backstage area was only audible at the Crombie Avenue location, and not audible at the other assessment locations.

Test results and allowable source levels area as follows. Note that a 2 dB safety margin has also been applied to allow for meteorological effects in cooler months.

Crombie Ave Receiver

Source Level at 3m from LAWN AREA speakers	100	dB(A) L_{10}
Measured impact level at residential boundary	56	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	64	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-6	dB(A)
Allowable noise source level	104	at 3m from speakers

Source Level at 3m from ONSTAGE FUNCTION SPACE speakers	92	dB(A) L_{10}
Measured impact level at residential boundary	43	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	51	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-19	dB(A)
Allowable noise source level	109	at 3m from speakers

Source Level at AMPHITHEATRE sound console	92	dB(A) L_{10}
Measured impact level at residential boundary	54	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	62	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-8	dB(A)
Allowable noise source level	98	at sound console

The Promenade Receiver

Source Level at 3m from LAWN AREA speakers	100	dB(A) L_{10}
Measured impact level at residential boundary	58	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	66	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-4	dB(A)
Allowable noise source level	102	at 3m from speakers

Source Level at 3m from ONSTAGE FUNCTION SPACE speakers	92	dB(A) L_{10}
Measured impact level at residential boundary	Not Audible	

Source Level at AMPHITHEATRE sound console	92	dB(A) L_{10}
Measured impact level at residential boundary	50	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	58	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-12	dB(A)
Allowable noise source level	102	at sound console

Sunset Boulevard Receiver

Source Level at 3m from LAWN AREA speakers	100	dB(A) L_{10}
Measured impact level at residential boundary	43	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	51	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-19	dB(A)
Allowable noise source level	117	at 3m from speakers

Source Level at 3m from ONSTAGE FUNCTION SPACE speakers	92	dB(A) L_{10}
Measured impact level at residential boundary	Not Audible	

Source Level at AMPHITHEATRE sound console	92	dB(A) L_{10}
Measured impact level at residential boundary	42	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	50	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-20	dB(A)
Allowable noise source level	110	at sound console

Stanhill Drive Receiver

Source Level at 3m from LAWN AREA speakers	100	dB(A) L_{10}
Measured impact level at residential boundary	46	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	54	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-16	dB(A)
Allowable noise source level	114	at 3m from speakers

Source Level at 3m from ONSTAGE FUNCTION SPACE speakers	92	dB(A) L_{10}
Measured impact level at residential boundary	Not Audible	

Source Level at AMPHITHEATRE sound console	92	dB(A) L_{10}
Measured impact level at residential boundary	44	dB(A) L_{10}
Tonality / Impulsiveness correction	8	dB(A)
Corrected impact level	52	dB(A) L_{10}
Noise limit crtieria	70	dB(A) L_{10}
Exceedance of noise limit	-18	dB(A)
Allowable noise source level	108	at sound console

7 RECOMMENDATIONS

Based upon measured levels conducted onsite, applying a safety margin of 2 dB, and corrections for tonality and impulsiveness in accordance with Australian Standard AS1055 *"Acoustics-Description and measurement of environmental noise"*, we recommend the following for amplified entertainment at the venue:

Exhibition Lawn Area

- The venue can provide amplified entertainment in the Exhibition Lawn area between 7:00am - 10:00pm 7 days per week.
- Exhibition Lawn PA sound systems be limited to 102 dB(A) L_{10} at 3m from speakers.
- Exhibition Lawn Speakers be focused north-north-west in accordance with the attached sketch, and elevated no more than 1.8m above ground level.
- PA speakers be separated by no more than 3m.
- The Operator purchase a sound level meter to check that the music is limited to the allowable levels. This check should be undertaken at sound check for live entertainment.
- Live entertainment acts be advised of the sound limits, and that a sound level check will be undertaken at soundcheck, and that levels must not be increased from that set.

Onstage Indoor Function Space

- The venue can provide amplified entertainment in the Onstage Indoor Function space area between 10:00am - 10:00pm 7 days per week.
- Onstage Indoor Function space PA sound systems be limited to 109 dB(A) L_{10} at 3m from speakers.
- The Operator purchase a sound level meter to check that the music is limited to the allowable levels. This check should be undertaken at sound check for live entertainment.
- Live entertainment acts be advised of the sound limits, and that a sound level check will be undertaken at soundcheck, and that levels must not be increased from that set.

Main Amphitheatre

- The venue can provide amplified entertainment in the Amphitheatre area between 10:00am - 10:00pm 7 days per week.
- Amphitheatre PA sound systems be limited to 98 dB(A) L_{10} at Sound Control Console.
- The Operator purchase a sound level meter to check that the music is limited to the allowable levels. This check should be undertaken at sound check for live entertainment.

- Live entertainment acts be advised of the sound limits, and that a sound level check will be undertaken at soundcheck, and that levels must not be increased from that set.

8 DISCUSSION & CONCLUSIONS

This report is in response to a request for an acoustical assessment of amplified sound in three areas of the Bundall Cultural Precinct, being as follows:

- Exhibition Lawn area, located to the south of the Amphitheatre. Speakers will be aimed north-north-west, away from the residential area across Crombie Avenue;
- The Onstage Indoor Function space, being an enclosed space behind the Amphitheatre stage;
- The main Amphitheatre.

This assessment includes corrections to allow for the tonal and impulsive nature of music, with a 2 dB safety margin also included to allow for atmospheric effects in cooler months that affects sound propagation.

By controlling sound system levels to those specified in Section 6 above, noise impacts will comply with the requirements of Part 3B, Division 3, Section 440X of the *Environmental Protection Act 1994*.

CRGACOUSTICS

Figure No. 1: Subject Site Location and Surrounding Noise Sensitive Receivers, Measurement location show by arrows (Google Earth).

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Sketch No. 1: Entertainment Area Locations (not to scale).