

6 July 2022

Jake Burgess
Sydney Zoo
PO Box 40
Doonside NSW 2767

Re: **Sydney Zoo Glow Event – Noise Verification Report**

Dear Jake Burgess

Introduction

RWDI has been commissioned by Sydney Zoo to prepare a Noise Verification Report to confirm that the operations of Sydney Zoo is compliant with the noise conditions of Approval (SSD 7228), specifically Conditions C32, C32A, C32C, and C32D as reproduced below:

Operational Noise Limits:

C32: *The Applicant shall ensure that noise generated by the operation of the Development does not exceed the noise limits in Table 3*

Table 3: Project Specific Noise Limiter (dB(A)) table:

Receiver Location	Day L _{Aeq,15min}	Evening L _{Aeq,15min}	10pm to 12 midnight L _{Aeq,15min}	Night (after midnight) L _{Aeq,15min}
Bungaribee, Eastern Creek	51	50	47	40
Place of residence at R1 (Great Western Highway)	57	50	50	30
S1 (Eastern Creek Primary School)	45	N/A	N/A	N/A

C32A: *The Applicant shall ensure that the L_{A10} (15 Minutes) noise generated from the use of the site as a function centre or by any temporary and community event held on site does not exceed the background noise level in any octave band centre frequency (31.5 Hz-8kHz inclusive) by more than 5dB between 7am and 12pm at the boundary of any affected residence.*



Noise Verification Report

C32C. *A Noise Verification Report must be submitted to the satisfaction of the Planning Secretary at the following stages of the Development:*

- a) within three months of the conclusion of the Sydney Zoo Light Festival 2021 event held at the site in July and August 2021 or an equivalent temporary and community event agreed to by the Planning Secretary; and*
- b) within three months of the conclusion of the first twilight concert event held at the site.*

C32D. *The Noise Verification Report required by Condition C32C must:*

- a) be prepared by a suitably qualified acoustic consultant, with qualifications and experience consistent with the technical eligibility criteria for membership to the Association of Australian Acoustical Consultants or the Australian Acoustical Society;*
- b) be prepared in consultation with Council;*
- c) include an analysis of compliance with the noise limits specified in Condition C32 and Condition C32A for any event held on site;*
- d) include an outline of management actions to be taken to address any exceedances of the limits specified in Condition C32 and Condition C32A and a timetable for the implementation of any required actions; and*
- e) describe contingency measures in the event management actions are not effective in reducing noise levels to an acceptable level.*

Condition C32C refers to a "Sydney Zoo Light Festival 2021" which was cancelled in 2021 due to COVID-19 restrictions. The equivalent temporary and community event held at Sydney Zoo assessed as part of this Noise Verification Report is the GLOW Light Festival, held 13 May to 18 June 2022.

Noise Monitoring

In order to assist with determining noise compliance, unattended and attended noise monitoring was completed.

During the process of organising access for noise monitoring, it was discovered that the residence at receiver location R1 (715 Great Western Highway, Eastern Creek) was demolished. Review of Nearmap aerial imagery confirmed that this residence was demolished sometime after December 2020.

Therefore, noise monitoring was only conducted at the Bungaribee, Eastern Creek receiver location at 26 Velocity Parade, Bungaribee. **Figure 1** presents the location of noise monitoring relative to Sydney Zoo.

Figure 1: Noise Monitoring Location





Unattended Noise Monitoring

Unattended noise monitoring was conducted between 13 May 2022 and 22 May 2022.

The noise monitoring equipment used for this measurement consisted of ARL environmental noise loggers set to A-weighted, fast response, continuously monitoring in 15-minute intervals. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{Amax} , L_{A10} , L_{A90} and L_{Aeq} levels of the ambient noise. L_{A10} and L_{A90} are the levels exceeded for 10% and 90% of the sample time. The L_{Amax} is indicative of maximum noise levels due to individual noise events. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

Table 1 presents the results of noise monitoring. As the event only occurs between 5.30pm and 9.30pm, only noise levels for the evening period have been considered. Values presented in **BOLD** have been rain affected. **Appendix A** presents the full noise monitoring charts.

Table 1: Unattended Noise Monitoring Results

Date	ABL	Leq
13 May 2022	44	51
14 May 2022	45	50
15 May 2022	46	50
16 May 2022	47	51
17 May 2022	49	52
18 May 2022	49	52
19 May 2022	50	54
20 May 2022	47	52
21 May 2022	48	52
22 May 2022	40	49



Attended Noise Monitoring

Attended noise monitoring was also conducted on the first night of opening. Attended measurements were conducted at the assessment location before the commencement of the event as well as during the event.

All attended measurements were conducted using an NTi Type XL2 sound level meter (SLM). This SLM is a type approved system offering Class 1 performance according to IEC 61672-1:2013 *Electroacoustics – Sound level meters – Part 1: Specifications* and has current with National Association of Testing Authorities, Australia requirements (NATA) calibrated and has current with National Association of Testing Authorities, Australia requirements (NATA) calibrated to IEC 61672-3:2013 *Electroacoustics – Sound level meters – Part 3: Periodic tests*. The A-weighting filter of the meter was selected, and the time weighting was set to “Fast”. The field calibration of the meter was checked before and after the measurements with a Brüel & Kjær Type 4231 sound level calibrator (SLC) and no significant drift was noted. This SLC is a Class 1 calibrator according to AS IEC 60942-2004 *Electroacoustics – Sound calibrators* and has been calibrated to the same Standard.

The NTi Type XL2 and Brüel & Kjær Type 4231 hold current laboratory calibrations in accordance with NATA and our in-house Quality Assurance Procedures.

Table 2 presents the results of attended noise measurements.

Table 2: Attended Noise Monitoring Broadband Results – 13 May 2022

Time	L _{Amax}	L _{Aeq}	L _{A90}	L _{AEQ} Contribution	Comments
4.45pm – 5.00pm	67	44	39	<29	Background noise controlled by distant road traffic noise – assumed to be heavy vehicle movements on Great Western Highway. L _{max} 67 dBA from passing vehicle on Velocity Parade. No noise from Sydney Zoo is audible/discernable.
6.20pm – 6.35pm	75	50	46	<36	Ambient noise dominated by insect noise. Background noise controlled by road traffic noise on Great Western Highway. L _{max} 75 dBA from resident’s child. No noise from Sydney Zoo is audible/discernable.



Table 3 presents the measured octave band levels at 26 Velocity Parade during the first night of the event.

Table 3: Attended Noise Monitoring Octave Band Results – 6.20pm 13 May 2022

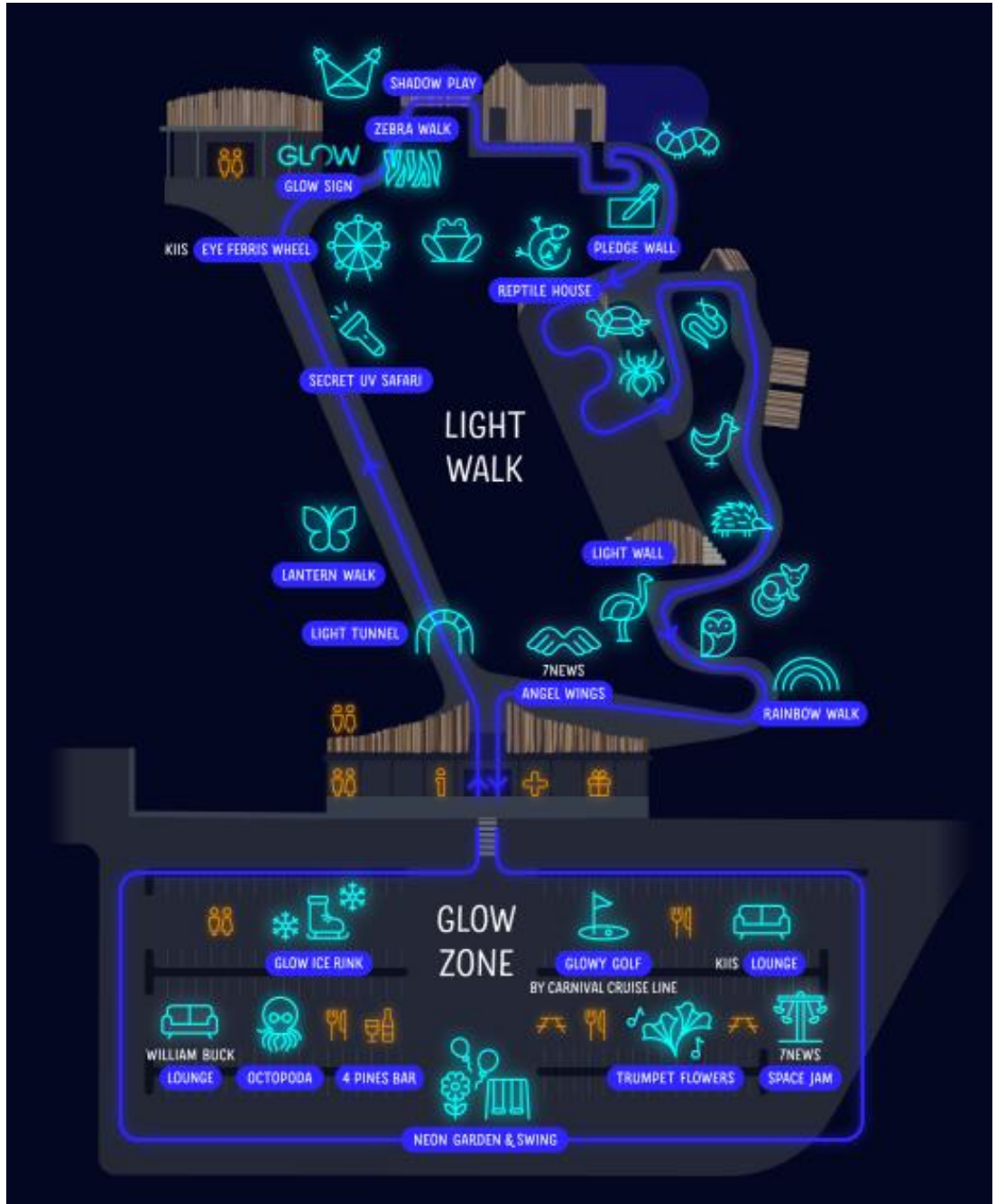
Description	Overall dBA	Octave Band Centre Frequency (Hz) dB								
		31.5	63	125	250	500	1K	2K	4K	8K
Measured Leq	50	60	60	55	47	44	43	45	40	23
Measured L90	44	56	55	45	41	40	38	36	37	16
Estimated Site Contribution	40	50	50	45	37	34	33	35	30	13

Furthermore, the site was inspected to identify any significant noise sources. Noise sources on site predominantly consisted for patrons speaking. A number of installations included speakers; however music levels were not significant enough to be audible at the sensitive receivers. These installations include:

- Space Jam;
- Trumpet Flowers; and
- Eye Ferris Wheel.

Figure 2 presents an event map and the location of the installations.

Figure 2: Event Map





Noise Assessment

The attended noise monitoring identified no significant noise sources at Sydney Zoo and determined that the noise from Sydney Zoo was not audible at the assessment location at Bungaribee.

The ambient noise environment at the assessment location was dominated by nearby insect noise, and road traffic noise from the Great Western Highway. Thus, the measured L_{Aeq} noise levels at this location would not be appropriate to compare the noise impact from the operation of the event.

The ABLs at these locations may be more appropriate but will be still quite conservative. When reviewing the results from the unattended noise monitoring, the measured ABL levels were consistently below the L_{Aeq} criteria of 50 dBA. Furthermore, review of audio recordings confirmed that the noise from Sydney Zoo was not audible at any point.

Table 4 provides a comparison of estimated broadband noise levels against the evening criteria.

Table 4: Broadband Noise Compliance (6.00pm-10.00pm) L_{Aeq}

Date	ABL	Est Site Contribution	Evening Criteria	Compliance
13 May 2022	44	<34	50	Yes
14 May 2022	45	<35		Yes
15 May 2022	46	<35		Yes
16 May 2022	47	<37		Yes
17 May 2022	49	<39		Yes
18 May 2022	49	<39		Yes
19 May 2022	50	<40		Yes
20 May 2022	47	<37		Yes
21 May 2022	48	<38		Yes
22 May 2022	40	<30		Yes

Table 4 confirms that the noise from the site complies with the broadband evening noise criteria and satisfies Condition C32 of the Project Approval.



As noise from Sydney Zoo is inaudible, it is expected that noise from the site when measured as an L_{A10} would not exceed the background noise level in any octave band by more than 5 dB. RWDI has referred to noise monitoring completed in 2015 by Wilkinson Murray as part of the EIS of Sydney Zoo (Wilkinson Murry Report 15286-N, November 2015) to determine the background octave band noise levels.

Table 5 provides a comparison of estimated octave band noise levels against the evening criteria of each octave band.

Table 5: Octave Band Noise Compliance (13 May 2022, 6.20pm) L_{Aeq}

Description	Overall dBA	Octave Band Centre Frequency (Hz) dB								
		31.5	63	125	250	500	1K	2K	4K	8K
Background (2020)	45	57	56	47	40	44	43	37	36	19
Criteria Background +5dB	50	62	63	54	45	47	46	41	38	28
Estimated Site Contribution	<40	<50	<50	<45	<37	<34	<33	<35	<30	<13
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 5 confirms that the noise from the site complies with the octave band evening noise criteria and satisfies Condition C32A of the Project Approval.



Conclusion

RWDI has prepared a Noise Verification Report to confirm that the operations of Sydney Zoo is compliant with the noise conditions of Approval (SSD 7228), specifically Conditions C32, C32A, C32C, and C32D. This Noise Verification Report was completed following the operation of a temporary and community evening (GLOW Light Festival 2022) as per Condition C32C-a.

RWDI confirms that the noise from the operation of GLOW Light Festival was compliant with Conditions C32 and C32A of the conditions of Approval. No further management or contingency measures is recommended or required.

As per Condition C32D.b, Sydney Zoo submitted this report to Blacktown City Council for review. The report was deemed appropriate by Blacktown City Council on 6 July 2022.

Peter Thang is suitably qualified to issue this Noise Verification Report as a Project Engineer of RWDI (formerly Wilkinson Murray Pty Ltd) with 4 years' experience in the field of acoustics and is a member of the Australian Acoustical Society (MAAS).

Further, this report underwent Quality Assurance processes, conducted by John Wassermann. John Wassermann is a Senior Technical Director of RWDI with 30 years' experience in the field of acoustics, as well as being a Charter Engineer (CPEng-Civil/Mech) and a member of the Australian Acoustical Society (MAAS)

Regards

A handwritten signature in black ink, appearing to read 'Peter Thang', written over a horizontal line.

Peter Thang
Project Engineer
RWDI