Amalgamated Property Group

Anzac Park East Mixed Use Development

Noise Impact Assessment

September 2022

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Anzac Park East
Mixed Use Development
Noise Impact Assessment

Amalgamated Property Group

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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

Table of contents

Executive summary iii

1 Project background 1

1.1 Project description 1

1.2 Site zoning 2

2 Planning requirements 4

2.1 National Capital Plan Constitution Avenue and Anzac Parade Precinct Code 4

2.1.1 Noise management requirements 4

2.1.2 Permitted land use 4

2.2 ACT noise zone limits 5

2.3 Project-specific criteria 6

2.3.1 Noise intrusion 6

2.3.2 Noise emissions 8

3 Existing noise environment 9

3.1 Noise survey details 9

3.1.1 Noise monitoring locations 9

3.1.2 Equipment 10

3.2 Noise monitoring results 10

3.2.1 Attended noise monitoring 10

3.2.2 Unattended noise monitoring 11

3.2.3 Future road traffic noise 11

4 Noise intrusion assessment 13

4.1 Required noise reduction 13

4.2 Noise intrusion assessment for road traffic noise 13

4.2.1 Noise intrusion assessment for adjacent land use 14

5 Noise emissions 15

5.1 Commercial uses 15

5.1.1 Potentially noise sources 15

5.1.2 Currently proposed design – restaurant tenancies 15

5.2 Retail 16

5.3 Resident common areas 16

5.4 Waste management 16

5.5 Mechanical services plant 17

6 Conclusion 18

Executive summary

WSP has undertaken a noise impact assessment to support the Works Approval for a proposed mixed-use development at the Anzac Park East site, Parkes ACT.

The assessment has been prepared in reference to the Constitution Avenue and Anzac Parade Precinct Code detailed in the National Capital Plan, as well as criteria established in accordance with industry best-practice and noise assessment guidelines provided by the ACT Environment Protection Authority.

Noise intrusion into the proposed residential components of the proposed development have been assessed using measured noise data (from noise monitoring carried out by WSP at the project site between 1 to 8 March 2022) in addition to the Environment Protection Regulation Zone Noise limit to assess noise from adjacent land uses.

Preliminary road facing façade constructions of glazing achieving ≥ 30 dB $R_w + C_{tr}$ for bedrooms and ≥ 32 dB $R_w + C_{tr}$ for living rooms within Building A and B, have demonstrated that the nominated targets can be achieved. These are however subject to further assessment and optimisation during detailed design stage. Façade constructions of standard glazing and masonry should be capable of providing the required noise reduction for non-road facing façades in relation to the potential noise intrusion from adjacent land uses.

On potential noise emissions from possible noisy uses within the proposed development, possible future restaurant uses have been assessed and preliminary separating floor and façade constructions have been recommended to demonstrate that the nominated targets can be achieved.

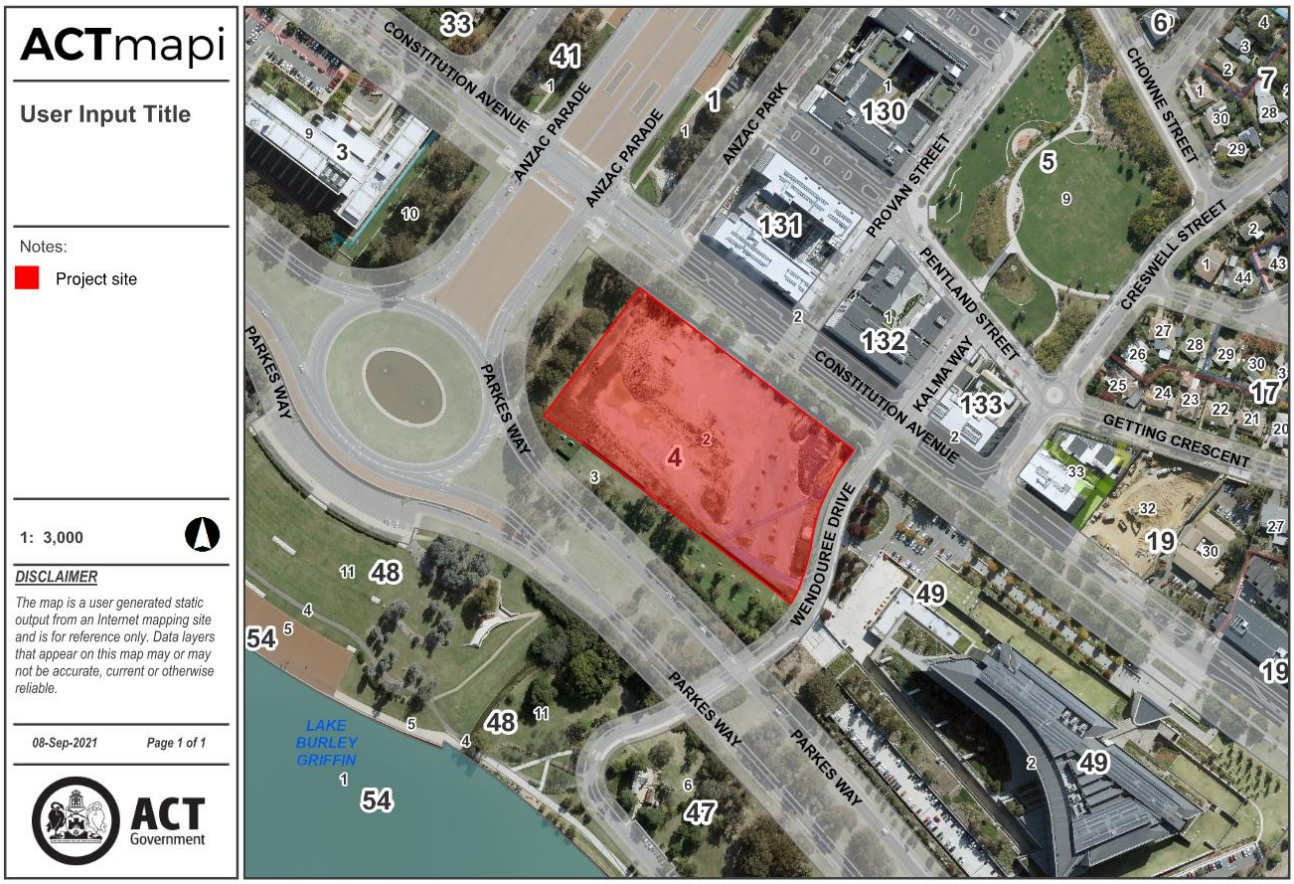
Further assessment is recommended to be undertaken during the detailed design stages to finalise the acoustic design and detailing to be implemented.

1 Project background

WSP Australia Pty Ltd (WSP) has been engaged by Amalgamated Property Group (the Client) to undertake a noise impact assessment to support the Works Approval for a proposed mixed-use development at the Anzac Park East site, Parkes ACT.

1.1 Project description

The project site is located at Block 4 Section 4 Parkes, as per the ACT Territory Plan and presented in Figure 1.1. The site holds National Significance being within the National Triangle and is bounded by Constitution Avenue, Wendouree Drive, Parkes Way and Anzac Parade.

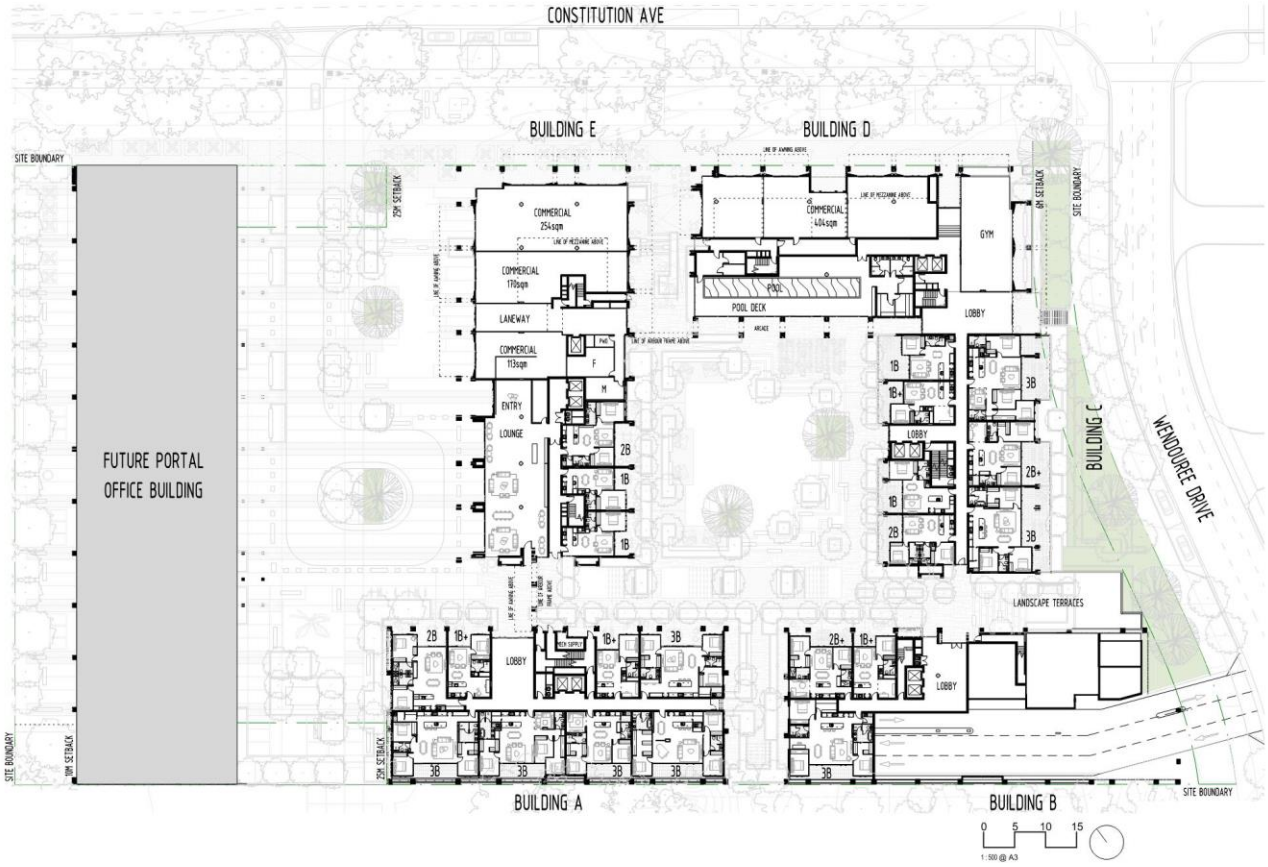


Source: ACTmapi accessed 13 July 2022

Figure 1.1 Aerial photograph indicating the location of the project site

Figure 1.2 shows the preliminary site plan of the proposed development. The Anzac Park East project is mixed-use development consisting of:

- 345 residential apartments over five individual buildings (Building A, B, C, D and E)
- Office tenancies on ground floor to level 8 of the Portal Building
- Residential and office car parking on two basement levels
- Commercial/ retail tenancies on level 1 (ground level) of Building D and E
- Resident amenities, including swimming pool and residential gym on level 1 (ground level) of Building D.



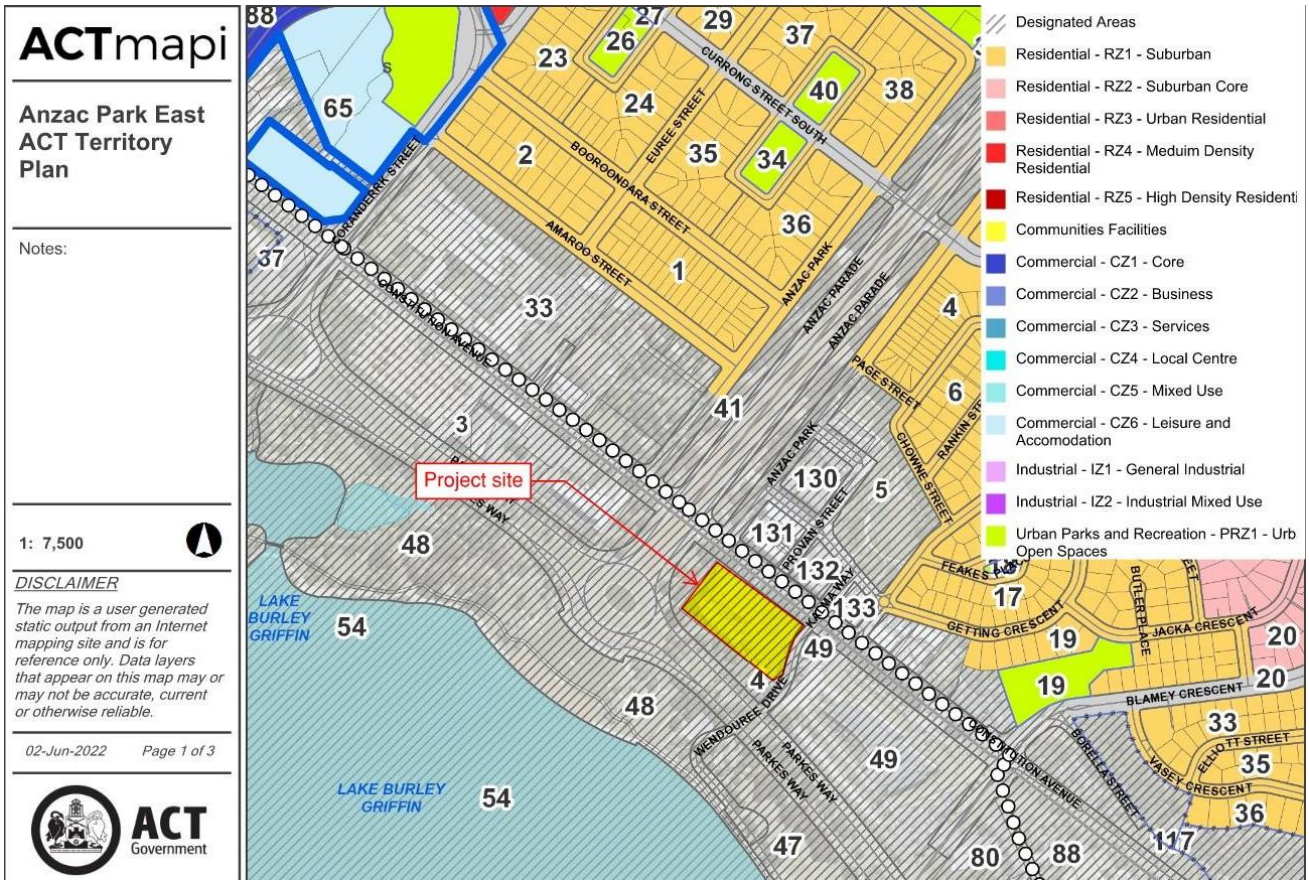
Source: DBI Design Architectural Drawings A-DA-2-211 Issue for DA, dated 7/09/2022

Figure 1.2 Floor plan of level 1 (ground) plan of proposed development

1.2 Site zoning

Based on the ACT Territory Plan, accessed from ACTmapi and reproduced in Figure 1.3, the proposed development is zoned as land designated as being in the Central National Area (Parliamentary Zone and other areas. Surrounding land uses of the project site include:

- Other land designated as being in the Central National Area
- Residential Zone (RZ) 1: Suburban
- PRZ 2: Suburban core
- Parks and Recreation Zone (PRZ) 1: Urban Open Space



Source: ACTmapi accessed 13 July 2022

Figure 1.3 ACT Territory plan excerpt indicating site location and surrounding land uses

2 Planning requirements

The relevant criteria applicable to the project site have been established in accordance with the following documents:

- The National Capital Plan (Australian Government National Capital Authority)
- The Environment Protection Regulation (ACT) 2005
- Australian Capital Territory Planning and Land Management Act 1988
- Noise Environment Protection Policy (ACT)
- ACT Territory Plan.
- AS/NZS 2107:2016 Acoustics – *Recommended design sound levels and reverberation times for building interiors* (AS 2107)
- AS 3671:1989 Acoustics – *Road traffic noise intrusion – Building siting and construction* (AS 3671).

2.1 National Capital Plan Constitution Avenue and Anzac Parade Precinct Code

The proposed development will be required to achieve the provisions of the Constitution Avenue and Anzac Parade (CAAP) Precinct Code detailed in Section 4.8 of the Consolidated National Capital Plan (NCP). The CAAP precinct comprises land between Constitution Avenue and Parkes Way, the Russell apex of the National Triangle, Anzac Parade, the Australian War Memorial, and various sites to the north of Constitution Avenue.

2.1.1 Noise management requirements

With regard to noise management requirements within the CAAP Precinct Code, clause 4.8.5 states that:

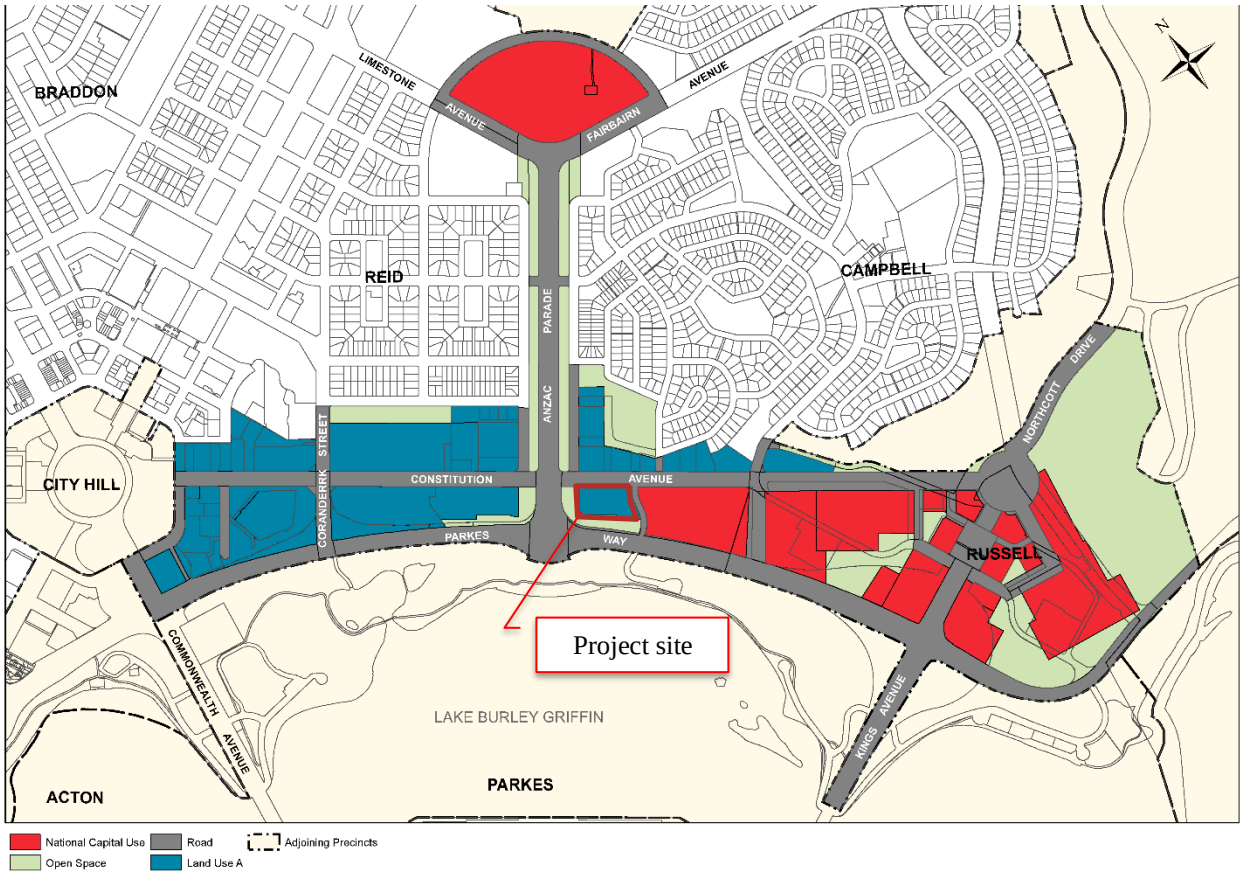
> *Building design, layout and construction should take account of the impacts of noise on surrounding uses*

2.1.2 Permitted land use

The proposed development is located within 'Land Use A' for the CAAP precinct (refer Figure 2.1) where the permitted land uses include several potentially noisy uses (as defined in the ACT Commercial Zones Development Code), including:

- Café, bar, restaurant
- Club
- Hotel
- Indoor recreation facility

Based on our experience with the preparation of noise assessments in the ACT, amplified music noise emissions from such potentially noisy uses is typically the primary source of concern by regulatory authorities such as ACT Environment Protection Authority (EPA).



Source: *The Consolidated National Capital Plan*

Figure 2.1 Land use for the Constitution Avenue and Anzac Parade precinct

2.2 ACT noise zone limits

The Environment Protection Regulation (ACT) 2005 (EPR) prescribes requirements to control or govern conduct regarding how the environment is impacted from activities and developments. Under the EPR, the ACT is divided into noise zones based on land use policies defined by the ACT Territory Plan. Section 26 of the Australian Capital Territory Planning and Land Management Act 1988, which is administered by the NCA, states the following:

> *The Territory Plan shall be taken to be consistent with the National Capital Plan to the extent that it is capable of operating concurrently with the National Capital Plan.*

The NCP does not explicitly refer to the EPR, however Section 6.1 of the ACT Noise Environment Protection Policy (NEPP) states that

> *an activity causes environmental harm if that noise exceeds the noise standard at the compliance point set either by the Regulation, an environmental authorisation or an approval*

In order to be consistent with the NEPP, it would be prudent to apply noise limits for the proposed development that are in agreement with the EPR. Table 2.1 and Table 2.2 from Schedule 2 of the EPR define noise zones and their associated noise standards, as summarised in Table 2.1 The noise standards applicable to this project are highlighted for clarity (Zone C2).

Table 2.1 ACT Environment Protection Regulation (2005) Schedule 2 Noise Zones and Standards

Noise zone	ACT land	Noise standard (dB $L_{A10, T}$)	
		Day	Night
Zone A	Land in an industrial zone	65 (1)	55 (2)
Zone B1	Land in the city centre or a town centre	60 (3)	50 (4)
Zone B2	Land in the Central National Area (City Hill Precinct)	60 (1)	50 (2)
Zone C1	Land in a group centre	55 (5)	45 (6)
Zone C2	Land in a corridor site or an office site. Land in the Central National Area (Parliamentary Zone and Other Areas)	55 (1)	45 (2)
Zone D	Land (other than land in the city centre, town centres and group centres) in a commercial CZ4 zone	50 (1)	35 (2)
Zone E	Land (other than land in the city centre, town centres and group centres) in – A restricted access recreation zone A broadacre zone	50 (1)	40 (2)
Zone F	Land (other than land in the city centre, town centres and group centres) in – A commercial CZ5 zone A TSZ2 services zone A community facility zone A leisure and accommodation zone	Same as noise standard for the adjoining noise zone with the loudest noise standard for the time period	
Zone G	All other land, other than land in the Central National Area (Fairbairn)	45 (1)	35 (2)

(1) Noise standard Monday to Friday: 7am - 10pm; Sunday and public holidays: 8am - 10pm

(2) Noise standard Monday to Friday: 10pm – 7am; Sunday and public holidays: 10pm – 8am

(3) Noise standard Monday to Thursday: 7am - 10pm; Friday and Saturday: 7am - 12am; Sunday and public holidays: 8am - 10pm

(4) Noise standard Monday to Thursday: 10pm – 7am; Friday and Saturday: 12am - 7am; Sunday and public holidays: 10pm – 8am

(5) Noise standard Monday to Thursday: 7am - 10pm; Friday and Saturday: 7am – 11pm; Sunday and public holidays: 8am - 10pm

(6) Noise standard Monday to Thursday: 10pm – 7am; Friday and Saturday: 11pm - 7am; Sunday and public holidays: 10pm – 8am

Once a noise zone has been identified according to the ACT Territory Plan, the Noise Standard for that zone is applicable as an upper limit. Section 8.2 of the ACT (NEPP) states that the limits shown in Table 2.1 are to be measured as $L_{A10\ T}$, where 'T' is not less than 5 minutes or greater than 15 minutes. In assessing the noise impact at sensitive receivers, the EPR specifies the compliance point as any point as near as practicable to the property boundary.

2.3 Project-specific criteria

2.3.1 Noise intrusion

This section outlines the assessment criteria of noise intrusion to the proposed residential units within the project site.

2.3.1.1 Noise intrusion from road traffic noise

The internal design noise level range for residential developments, in accordance with AS/NZS 2107:2016 Acoustics – *Recommended design sound levels and reverberation times for building interiors* (AS 2107), are listed in Table 2.2 and based on the recommended design targets for the category of houses and apartments near major roads. AS 2107 uses the L_{Aeq} descriptor, which describes a steady state sound level of equivalent energy to the time varying noise level over a given period. The time period used for assessment purposes should be representative of the time period that the building will be in use.

The façade of the development shall be designed to achieve the recommended internal noise levels shown in Table 2.2.

Table 2.2 AS 2107 design sound level

Type of occupancy	AS 2107 design sound range $L_{Aeq,t}$	Proposed project assessment level
Living areas	35 to 45 dB	≤ 40 dB $L_{Aeq,\ 15\text{-}hour}$ (day time)
Sleeping areas (night time)	35 to 40 dB	≤ 35 dB $L_{Aeq,\ 9\text{-}hour}$ (night time)
Work areas	35 to 45 dB	≤ 40 dB $L_{Aeq,\ 15\text{-}hour}$ (day time)

AS 3671 is concerned with road traffic noise intrusion to buildings near to major roads. AS 3671 provides guidelines for determining necessary building envelope constructions to achieve the internal noise levels recommended in AS 2107. Table 2.3 outlines building construction categories that are required to achieve satisfactory internal noise levels for a residential building, as per AS 2107 (see Table 2.2). This is a guideline only, and the actual reduction afforded will depend upon the frequency content of the noise. Where significant low frequency noise is evident, the guidelines in AS 3671 may not be sufficient.

According to AS 3671, the categories referenced in are:

1. Category 1 – Standard construction: openings including windows may comprise up to 10% of the exposed façade.
2. Category 2 – Standard construction except for lightweight elements or all glass façades (both of which require acoustic advice). Windows, doors and other openings should be closed.
3. Category 3 – Special construction as advised in the Standard. Windows, doors and other openings should be closed.
4. Category 4 – Special acoustic advice should be sought.

Table 2.3 AS 3671 residential building construction categories

Assessment type	Residential building construction category			
	Category 1	Category 2	Category 3	Category 4
External road traffic noise level, dB L_{Aeq}	≤ 45	>45 ≤ 60	>60 ≤ 75	>75
Most onerous proposed project assessment level (see Table 2.2), dB L_{Aeq}	Sleeping areas ≤ 35	Sleeping areas ≤ 35	Sleeping areas ≤ 35	Sleeping areas ≤ 35
Resulting necessary Traffic Noise Reduction (TNR)	≤ 10	> 10 ≤ 25	>25 ≤ 35	>35

2.3.1.2 Noise intrusion from adjacent land use

The proposed development is directly opposite land uses zoned as Central National Area (Parliamentary Zone and other areas). It is assumed that existing and potential future developments on adjoining land will comply with their requirements under the EPR to meet the relevant zone noise limits at the boundary of this development.

The noise from adjacent land uses impacting the proposed development is therefore assumed to be the highlighted noise levels given in Table 2.1: **55 dB L_{A10}** for daytime and **45 dB L_{A10}** for night-time. The zone noise limit can then be

assumed to be the maximum external noise level that would incident on the development site for the purposes of assessing noise from sources other than road traffic.

2.3.2 Noise emissions

This section provides an overview of the noise limits applicable to the proposed development and summarises the project-specific noise assessment criteria, as per Table 2.4. According to Section 24(2) (a) of the EPR, noise transfer between units within the same unit plan is required to be limited to 5 dB below the noise limit applicable for the site. Section 7.2 of the NEPP describes the intent of this part of the EPR is to provide equity to residents not in "free-standing houses" who do not have the ability to close doors or windows to reduce noise intrusion to their part of the building.

Table 2.4 Project-specific noise emission assessment criteria

Assessment Scenario	**Compliance location**	**Noise Standard (dB)**	
		Mon – Sat 7 am – 10 pm **Sun and Pub. Hols 8 am – 10 pm**	**Mon – Sat 10 pm – 7 am** **Sun and Pub. Hols 10 pm – 8 am**
Noise emission from the proposed non-residential components to residential units within the same project area	Within residential units internal to the proposed development	**External noise**: 50 L_{A10} **Internal noise**: 35 to 45 L_{Aeq} (living areas) (1)	**External noise**: 40 L_{A10} **Internal noise**: 35 to 40 L_{Aeq} (living areas) (1)
Noise emissions from the proposed development to land in the Central National Area (Parliamentary Zone and other areas)	Block 23 Section 131 Campbell (2) Block 1 Section 132 Campbell Block 1 Section 133 Campbell Block 2 Section 49 Parkes Block 3 Section 4 Parkes	**External noise**: 55 L_{A10}	**External noise**: 45 L_{A10}
Noise emission from the proposed development to Residential Zone blocks	Block 25 Section 17 Campbell (3) Block 26 Section 17 Campbell Block 27 Section 17 Campbell Block 24 Section 17 Campbell Block 23 Section 17 Campbell	**External noise**: 45 L_{A10}	**External noise**: 35 L_{A10}
Noise emission from the proposed development to Parks and Recreation blocks zoned PRZ1	Block 29 Section 19 Campbell (4) Block 1 Section 18 Campbell	**External noise**: 45 L_{A10}	**External noise**: 35 L_{A10}

(1) Based on the recommended design targets (L_{Aeq}) for the category of houses and apartments near major roads given in AS2107:2016

(2) Compliance at this location is expected to result in compliance at all other locations zoned Central National Area (Parliamentary Zone and other areas)

(3) Compliance at this location is expected to result in compliance at all other Residential Zone locations

(4) Compliance at this location is expected to result in compliance at all other locations zoned PRZ1

3 Existing noise environment

Typically, noise intrusion into the proposed residential units is assessed using measurements of the existing noise environment. However, due to the likely decrease in the road traffic volume on Parkes Way caused by the COVID-19 pandemic, the noise environment surrounding the proposed development may be quieter than typically expected. Therefore, the noise intrusion assessment within this report is based on noise monitoring data and forecasted road traffic volumes.

3.1 Noise survey details

3.1.1 Noise monitoring locations

Attended and unattended noise monitoring was undertaken to establish the existing ambient noise levels around the project site. Monitoring locations are presented in Figure 3.1.

3.1.1.1 Attended

Additionally, attended noise monitoring was carried out on the 25 March 2022 at seven (7) locations near the boundary of the site to assist with characterising the noise environment. Measurement were carried out during AM peak traffic hours, with a sound level meter placed 1.5 m from the ground. The attended noise monitoring locations are labelled NM01 to NM07 in Figure 3.1.

3.1.1.2 Unattended

Unattended monitoring was carried out from 1 to 8 March 2022. The unattended noise monitors were located at the perimeter of the site boundary adjacent to Constitution Avenue (NM08) and Parkes Way (NM09). The microphones were placed at approximately 2.5 metres above the ground, 0.5 m above the project site fencing and away from any reflective structure. The attended noise monitoring locations are labelled NM08 to NM09 in Figure 3.1.

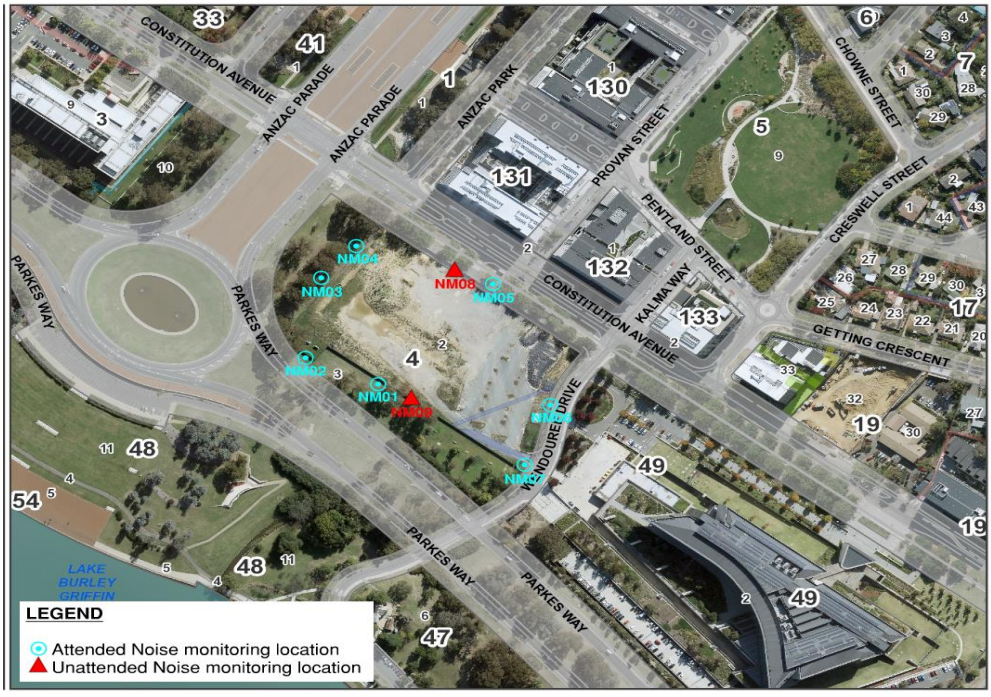


Figure 3.1 Noise monitoring locations

3.1.2 Equipment

The monitoring equipment was fitted with a windshield and was field calibrated before and after the monitoring. No significant drifts in calibration (± 0.5 dB) were noted. Details of all equipment used to conduct the noise survey are presented in Table 3.1. All equipment used in the survey were calibrated by a NATA-approved laboratory and have current calibration certificates as required in AS 1055-2018 Acoustics – *Description and measurement of environmental noise* (AS 1055).

Table 3.1 Noise monitoring equipment

Monitoring	Equipment	Manufacturer	Model	Serial No.	Calibration due
Unattended	Noise Logger	NTi	XL2	A2A-06185-E0	19/03/2023
Unattended	Noise Logger	ARL	316	16-207-008	13/08/2023
Attended	Sound level meter	NTi	XL2	A2A-05718-E0	10/11/2023
Attended and unattended	Acoustic calibrator	Rion	NC-74	34315156	12/04/2023

3.2 Noise monitoring results

3.2.1 Attended noise monitoring

The results from the attended noise measurements are presented in Table 3.2. Based on observations at the time of the measurement, the primary noise source impacting on the proposed development is road traffic noise from Parkes Way.

Table 3.2 Attended noise measurement results

Monitoring location	Time	Measured noise levels			Observations
		$L_{Aeq, 5\text{-}15\ min}$	$L_{A90, 5\text{-}15\ min}$	$L_{A10, 5\text{-}15\ min}$	
NM01 – Southern site boundary, approx. 44 m from centreline of Parkes Way	08:07 am to 08:22 am	64 dB	62 dB	66 dB	Road traffic noise dominant (free-flow traffic Parkes Way east bound) – 64 to 65 dB L_{Aeq}
NM02 – South-western site boundary, approx. 19 m from centreline of Parkes Way	08:23 am to 08:28 am	69 dB	65 dB	71 dB	Road traffic noise dominant (free-flow traffic Parkes Way east bound) – 67 to 69 dB L_{Aeq}
NM03 - Western site boundary, approx. 57 m from centreline of Anzac Parade	08:29 am to 08:44 am	58 dB	56 dB	59 dB	Road traffic noise from Parkes Way dominant. Intermittent traffic flow on Anzac Parade, flowing traffic - 58 dB L_{Aeq}, no traffic – 55 dB L_{Aeq}
NM04 - North-western site boundary, approx. 57 m from centreline of Anzac Parade	08:45 am to 08:50 am	57 dB	54 dB	59 dB	Road traffic noise from Parkes Way dominant. Intermittent traffic flow on Anzac Parade, flowing traffic - 58 dB L_{Aeq}, no traffic – 55 dB L_{Aeq}

Monitoring location	Time	Measured noise levels			Observations
		$L_{Aeq, 5\text{-}15\ min}$	$L_{A90, 5\text{-}15\ min}$	$L_{A10, 5\text{-}15\ min}$	
NM05 - North-eastern site boundary approx. 22 m from centreline of Constitution Avenue	08:52 am to 08:57 am	61 dB	55 dB	64 dB	Road traffic noise from Parkes Way dominant. Intermittent traffic flow on Constitution Avenue, car pass-by – 61 dB L_{Aeq}, no traffic – 54 dB L_{Aeq}
NM06 - Eastern site boundary approx. 7 m from centreline of Wendouree Drive	08:59 am to 09:04 am	61 dB	54 dB	64 dB	Road traffic noise from Parkes Way dominant. Minor traffic flow on Wendouree Drive, car pass-by – 66 dB L_{Aeq}, no traffic – 56 dB L_{Aeq}
NM07- South-eastern site boundary approx. 7 m from centreline of Wendouree Drive	09:05 am to 09:10 am	61 dB	57 dB	64 dB	Road traffic noise from Parkes Way dominant. Background noise consisting of building services noise from adjacent building Car movements from adjacent carpark - 71 dB L_{Aeq} Noise from adjacent carpark gates – 60 dB L_{Aeq}

3.2.2 *Unattended noise monitoring*

The results from the unattended noise measurements are presented in Table 3.3, which will be used to inform the overall noise level trend as well as to the provide $L_{Aeq, 15\text{-}hour}$ and $L_{Aeq, 9\text{-}hour}$ noise levels. The noise monitoring data has been adjusted for the meteorological conditions using data from BOM to exclude data where wind speed exceeds 5 m/s and periods of rain in accordance with AS 1055.

Table 3.3 Unattended noise monitoring results of existing ambient acoustic environment

Measurement location	Date	Measured sound pressure levels	
		Daytime $L_{Aeq,15\text{-}hour}$	Night-time $L_{Aeq,9\text{-}hour}$
NM08 – North-eastern site boundary adjacent to Constitution Avenue, approx. 22 m from centreline of road	1 March to 8 March 2022	58 dB	51 dB
NM09 – Southern site boundary adjacent to Parkes Way, approx. 44 m from centreline of road	1 March to 8 March 2022	62 dB	55 dB

3.2.3 *Future road traffic noise*

As previously mentioned, it is likely that at the time of the measurements the road traffic noise levels surrounding the proposed development were reduced due to the decrease in the road traffic volume on Parkes Way caused by the

COVID-19 pandemic. A noise assessment has therefore been carried out to account for future traffic flow on Parkes Way by comparing forecasted traffic flow data from ACT Transport Assessment and Planning's Canberra Strategic Transport Model.

Traffic flow during peak hours along Parkes Way is forecasted to increase by 10% between 2031 and year 2041. No traffic count data has been made available for the 2022 traffic volumes; therefore, the noise assessment has assumed a traffic volume increase of 15% to account for the increase in Parkes Way traffic volumes between 2022 and 2041. This equates to a noise level increase of approximately 1 dB.

For noise intrusion assessment purposes, this factor will be used to adjust daytime $L_{Aeq\ 15\text{-}hour}$ noise levels in the noise intrusion assessment from road traffic noise on Parkes Way. Forecasted traffic flow on Constitution Avenue have shown marginal increases in peak traffic volumes which results in negligible noise level increases.

4 Noise intrusion assessment

4.1 Required noise reduction

Based on the measured and adjusted road traffic noise levels and the assumed levels determined by the relevant zone noise limits, the noise attenuation requirements of the residential façades to limit noise intrusion is summarised in Table 4.1.

Table 4.1 Required noise reduction for residential façades of the proposed development facing Parkes Way

Building	Period	Assessment noise level	AS 2107 project assessment level (see Table 2.2)	Required noise reduction
Façades facing Parkes Way (Building A and B)	**Noise from road traffic**			
	Day time (7 am to 10 pm)	63 dB $L_{Aeq, 15\text{-}hour}$	≤ 40 dB $L_{Aeq, 15\text{-}hour}$ (day time)	23 dB
	Night time (10 pm to 7 am)	55 dB $L_{Aeq, 9\text{-}hour}$	≤ 35 dB $L_{Aeq, 9\text{-}hour}$ (night time)	20 dB
	Noise from adjacent land uses (1)			
	Day time (7 am to 10 pm)	55 dB $L_{A10, T}$	≤ 40 dB $L_{Aeq, 15\text{-}hour}$ (day time)	15 dB
	Night time (10 pm to 7 am)	45 dB $L_{A10, T}$	≤ 35 dB $L_{Aeq, 9\text{-}hour}$ (night time)	10 dB
Façades facing Constitution Avenue (Building D and E)	**Noise from road traffic**			
	Day time (7 am to 10 pm)	58 dB $L_{Aeq, 15\text{-}hour}$	≤ 40 dB $L_{Aeq, 15\text{-}hour}$ (day time)	18 dB
	Night time (10 pm to 7 am)	51 dB $L_{Aeq, 9\text{-}hour}$	≤ 35 dB $L_{Aeq, 9\text{-}hour}$ (night time)	16 dB
	Noise from adjacent land uses (1)			
	Day time (7 am to 10 pm)	55 dB $L_{A10, T}$	≤ 40 dB $L_{Aeq, 15\text{-}hour}$ (day time)	15 dB
	Night time (10 pm to 7 am)	45 dB $L_{A10, T}$	≤ 35 dB $L_{Aeq, 9\text{-}hour}$ (night time)	10 dB

(1) Assuming adjacent land uses meet the noise zone limits at the boundary of the project

4.2 Noise intrusion assessment for road traffic noise

Measured road traffic noise levels place the development site in AS 3671 construction Category 3 for Buildings A and B and Category 2 for Buildings C and D (see Table 2.3) resulting in a required façade noise reduction of up to 23 dB for noise from road traffic. Table 4.2 provides the recommended façade sound insulation performances for road facing façades and typical glazing systems normally capable of meeting these performances.

Selected glazing frames for the development should not degrade the performance of the glazing pane. Furthermore, all solid wall components are recommended to be a well-pointed masonry construction. Many lightweight construction options are capable of providing sufficient sound insulation. If non-masonry construction be intended; this should be further reviewed during detailed design stage.

Table 4.2 Recommended glazed façade constructions to meet potential recommended internal noise levels

Building	Room type	Recommended sound insulation performance	Typical glazing normally capable of this performance
Building A and B	Bedrooms	≥ 30 dB $R_w + C_{tr}$	— ≥ 6.38 mm laminated glazing; or — A double-glazed system with the configuration of ≥ 6 mm float glass | ≥ 12 mm air gap | ≥ 6.mm float glass The façade should be capable of being fully closed and incorporate compression seals.
	Living rooms	≥ 32 dB $R_w + C_{tr}$	— ≥ 10.38 mm laminated glazing; or — A double-glazed system with the configuration of ≥ 6 mm float glass | ≥ 12 mm air gap | ≥ 6.38 mm laminated glass The façade should be capable of being fully closed and incorporate incorporate compression seals.
Building D and E	Bedrooms	≥ 30 dB $R_w + C_{tr}$	— ≥ 6.38 mm laminated glazing; or — A double-glazed system with the configuration of ≥ 6 mm float glass | ≥ 12 mm air gap | ≥ 6.mm float glass The façade should be capable of being fully closed and incorporate compression seals.
	Living rooms	≥ 30 dB $R_w + C_{tr}$	

It should be noted that the sound insulation requirements determined above represent the most onerous necessary façade constructions. Sound insulation requirements in certain areas are likely to reduce dependent on the position of the façade relative to the noise sources and relative glazing areas. For example:

- Inward facing façades would be less exposed to road traffic noise
- Smaller window areas would be a strategy to reduce sound insulation requirements for glazing

This will be further assessed during detailed design stage to optimize façade constructions.

4.2.1 Noise intrusion assessment for adjacent land use

A noise assessment has been made against the maximum external noise level of 55 dB from adjacent land uses, as limited by the EPR, outside the façade of all non-road facing apartments in the proposed development.

The required noise reduction provided by non-road facing façades was determined to be ≥ 15 dB (see Table 4.1), in relation to the potential noise intrusion from adjacent land uses. Facades with standard glazing (e.g. 4 mm float glazing) are capable of meeting this performance, however the glazing should be well-sealed within a brick/ masonry façade construction.

5 Noise emissions

This section discusses the assessment conducted for the noise impact associated with the potential noise emissions from the development.

5.1 Commercial uses

5.1.1 Potentially noise sources

The uses proposed for the commercial tenancies in the Anzac Park East development are for retail and restaurant use, where the Client has instructed WSP that they do **not** intend on pursuing any other noisy commercial use as those listed in the CAAP Precinct Code (such as club, hotel and indoor recreation) at any later stages. To reduce the risk of noise complaints from the proposed development, WSP will apply the ACT EPA guidance music noise levels for restaurant use to assess noise emissions from the commercial accommodation premises.

The typical internal reverberant sound pressure levels associated with restaurant use, as per ACT EPA guidance is summarised in Table 5.1

Table 5.1 Proposed potentially noisy uses, and associated assumed internal sound pressure levels

Noisy uses proposed for this development	**Assumed internal sound pressure levels, dB $L_{A10\ (5\text{-}15\ mins)}$**
Restaurant	85

For assessment and planning purposes, the internal reverberant amplified music sound pressure level is assumed to not exceed the levels set out in Table 5.2 which include a relatively high low-frequency (bass) component to provide a worst-case assessment as currently required.

Table 5.2 Assumed amplified music sound pressure level, dB $L_{A10\ (5\text{-}15\ min)}$

Amplified music, assumed internal reverberant sound pressure levels	**Octave band centre frequency, Hz**							**dBA**
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	
Restaurant	87	88	81	83	77	79	71	**85**

5.1.2 Currently proposed design – restaurant tenancies

Proposed restaurant tenancies are located on Level 1 (ground level) of Building D, adjacent to the site boundary at Constitution Avenue, as well as internal to development on the south and southwest of Building D (refer Figure 1.2).

An assessment was carried out to determine the corresponding indicative construction requirements for commercial tenancies to control noise emissions from restaurant uses and meet the noise emission criteria set out in Table 2.4. Examples of typical construction requirements suitable to control noise emissions are provided in Table 5.3.

Table 5.3 Commercial tenancy construction requirements based on restaurant use

Element	Minimum R_w rating and example of suitable system
Building D and E north facade	Standard glazing meeting minimum thermal insulation requirements on a well-sealed façade. The ability to operate with all doors and windows closed when the highest levels of amplified music are employed.
Building E South-east facade	Standard glazing meeting minimum thermal insulation requirements on a well-sealed façade. The ability to operate with all doors and windows closed when the highest levels of amplified music are employed.
Building D and E Separating floor construction to residential units above commercial tenancies	≥64 dB R_w — ≥200 mm solid concrete slab; — ≥150 mm cavity that includes ≥50 mm fibrous insulation (≥11 kg/m^3); and — ≥1 layer of standard plasterboard (≥8.5 kg/m2) suspended on light steel grid. Penetrations in ceiling to be well sealed. High degree of attention to surrounding flanking detailing.

5.2 Retail

Associated noise generated from retail activities on the ground floor of the proposed development are expected to include possible low-level music and general retail noise, neither which are considered to have significant environmental noise impact. Such activities are also compatible and consistent with the zone noise limits in the surrounding premises and therefore not expected to cause a negative noise impact. In addition, it is also expected that any issues with noise from these activities will be managed by the building owner

5.3 Resident common areas

The development includes several resident common areas and amenities, including a gym and swimming pool for residential use (see Section 1.1). These areas are non-commercial areas and have therefore not been included in the noise emission assessment. Any potential disturbances from these areas to the residents within the proposed development will be managed by the building owner. Advice from an acoustic consultant should be sought at the detailed design stage to help mitigate transmission of noise and vibration from common areas to residential units.

5.4 Waste management

Noise associated with waste collection activities at the proposed development is not considered to be significant, as the location of proposed bin collection point is far enough away from neighbouring properties and residential dwellings within the development to reduce the impact of noise during bin use and collection. Bin collection is also already occurring at all neighbouring premises and not unique to the proposed development. Furthermore, the proposed bin collection point is accessed via a service lane from Constitution Avenue that allows the collection vehicles to move in one forward direction, eliminating the need for collection vehicles to reverse. Collections are also expected to occur at a general maximum frequency of three times a week and the duration of impact to an individual noise sensitive receivers is typically short.

Additional noise impact associated with the bin collection servicing the proposed development is therefore expected to be similar to the existing situation and minor.

5.5 Mechanical services plant

It is recommended that noise from the proposed development meets the relevant zone noise limits given by the EPR. In this case, the noise limits are the same as those summarised in Table 2.4. These criteria apply to noise from fixed sources associated with the building (i.e. local external air-conditioning units, major plant items or the like). The zone noise limits set out in Table 2.4 should be met through judicious selection and siting (e.g. using fences or walls as localised barriers, and selection of equipment with low operating noise levels).

It is recommended that the final air-conditioning selections and any external mechanical services design (such as mechanical plant associated with the proposed retail tenancies and residential swimming pool) be reviewed by an acoustic consultant at detailed design stage, to ensure that the applicable noise limits will be met.

6 Conclusion

WSP has undertaken a noise impact assessment to support the Works Approval for a proposed mixed-use development at the Anzac Park East site, Parkes ACT.

The assessment has been prepared in reference to the Constitution Avenue and Anzac Parade Precinct Code detailed in the National Capital Plan, as well as criteria established in accordance with industry best-practice and noise assessment guidelines provided by the ACT Environment Protection Authority.

With regard to noise intrusion into the residential component due to road traffic noise and adjacent land use, the required façade construction requirements have been assessed and provided in Section 4.

Potential noise emissions due to commercial restaurants within the proposed development, have been assessed. It was found that noise control measures can be achieved using conventional façade constructions to reduce the risk of noise complaints from the proposed development. Examples of suitable construction elements are provided in Section 5.1.2.

Further assessment is recommended to be undertaken during the detailed design stages to finalise the acoustic design and detailing to be implemented.