



REPORT

Noise Impact Assessment

Federal Hotel Mudgee
Canberra Airport Group

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The proposed development is for the construction of an extension to the existing Federal Hotel and a new drive-thru bottle shop and new hotel. The project is located on the corner of Inglis and Lewis St, Mudgee, 2850 NSW.

This report has been prepared for submission as part of the applicable planning pathway to Mid-Western Regional Council.

1.2 AUTHORITY

Authority to undertake this report was provided by Andrew Connor of Canberra Airport Group.

1.3 INFORMATION SOURCES

The report is based upon the following information:

- NSW Noise Policy for Industry 2017
- NSW Interim Construction Noise Guideline 2009
- NSW Road Noise Policy 2011
- AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors*
- AAAC Technical Guideline for Child Care Centre Noise Assessment 2008
- Assessing Vibration: A Technical Guideline 2006
- Vibrations in Buildings, DIN4150.3-1999
- BS 5228 – 2:2009 part II Vibration
- Bergstrom Architects plans, Rev A and B, dated May 2023.
- NDY Mechanical and electrical concept Markups, dated 20.07.23.
- Comments from client dated 10.07.23.

2 PROJECT INFORMATION

2.1 SITE LOCATION

The site is located on the corner of Inglis St and Lewis St, Mudgee, NSW, in the Mid-Western Regional Council (Figure 1). The site bounded by residential buildings to the north, east, south and west.

The current zoning of the lots are as follows (Figure 2):

- 34-36 Inglis St: SP3 Tourist zone
- 38-42 Inglis St: Mixed Use zone

The existing approval for 34-36 Inglis St is for hotel use. Fencing runs along the north side of the property to a height of approximately 1.5m from ground. The site currently includes a car park at the rear/north and has an outdoor area which has regularly housed approximately 100 people as well as a food truck with no existing complaints or concerns from neighbouring properties. A drive-thru bottle shop and a fabrication shop currently operates on 38-42 Inglis St sites.



FIGURE 1 LOCALITY MAP

It is important to note that 32 Inglis is being used as a commercial business and 19 Inglis is a mixed use with heritage overlay, used also as a commercial business.

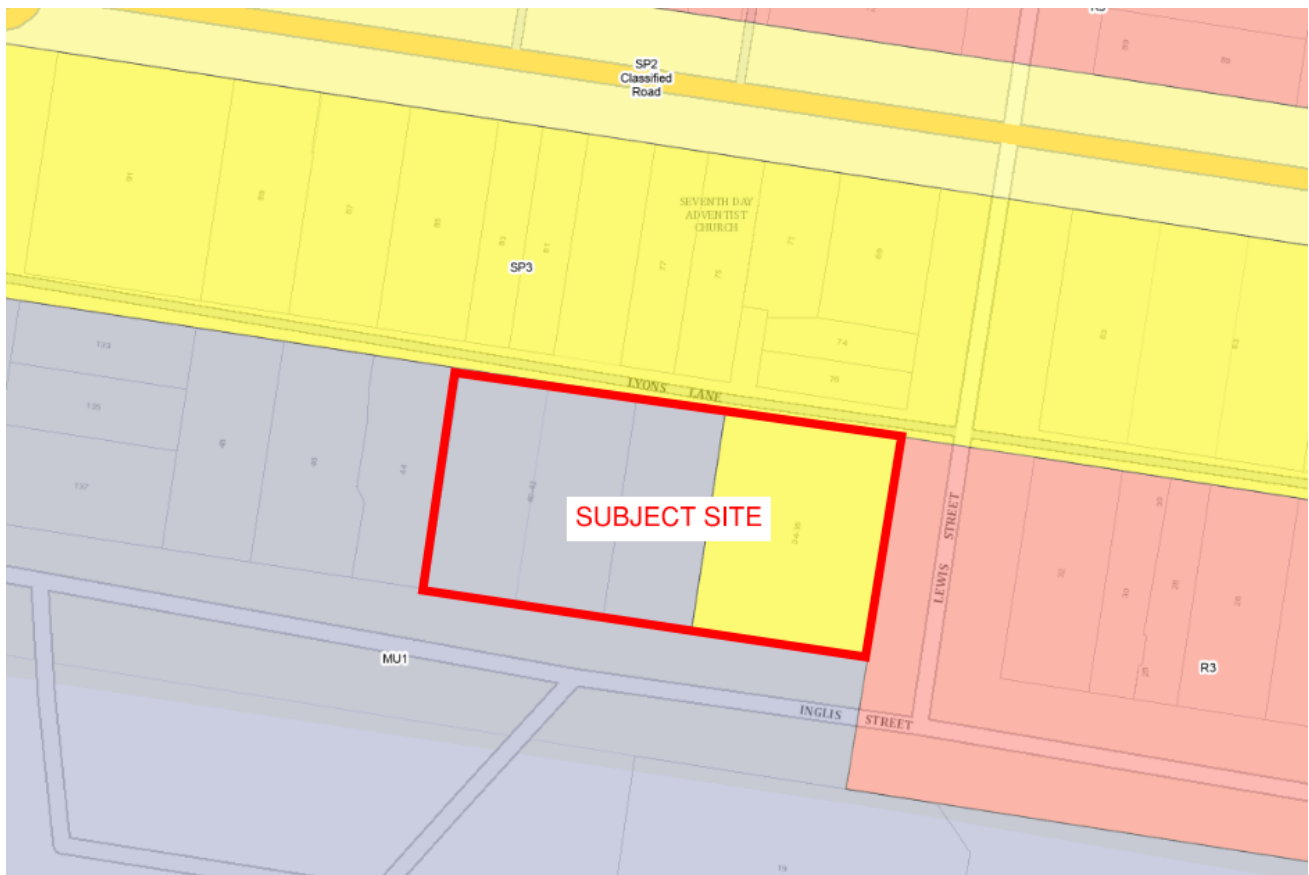


FIGURE 2 SITE LOCATION (TAKEN FROM THE NSW ESPATIAL PLANNING VIEWER)

2.2 SITE LAYOUT

The existing Federal Hotel currently lies on the eastern-most lot of the site, along with a drive through bottle shop and several buildings on the adjacent lots. The proposed layout includes the following buildings/spaces:

- Refurbished and extended Federal Hotel pub:
 - Bistro
 - Lounge
 - Sports bar
 - Gaming bar
 - Outdoor gaming
 - Banquette seating
 - Beer garden
 - kitchen
 - Family area including kids play area
 - Back of house spaces
- Bottle shop:
 - Relocated bottle shop
 - Drive thru
 - Cool room and dry store
- Hotel:
 - Entry foyer
 - Hotel rooms over two floors
 - Carpark with entry / exit through Inglis Street

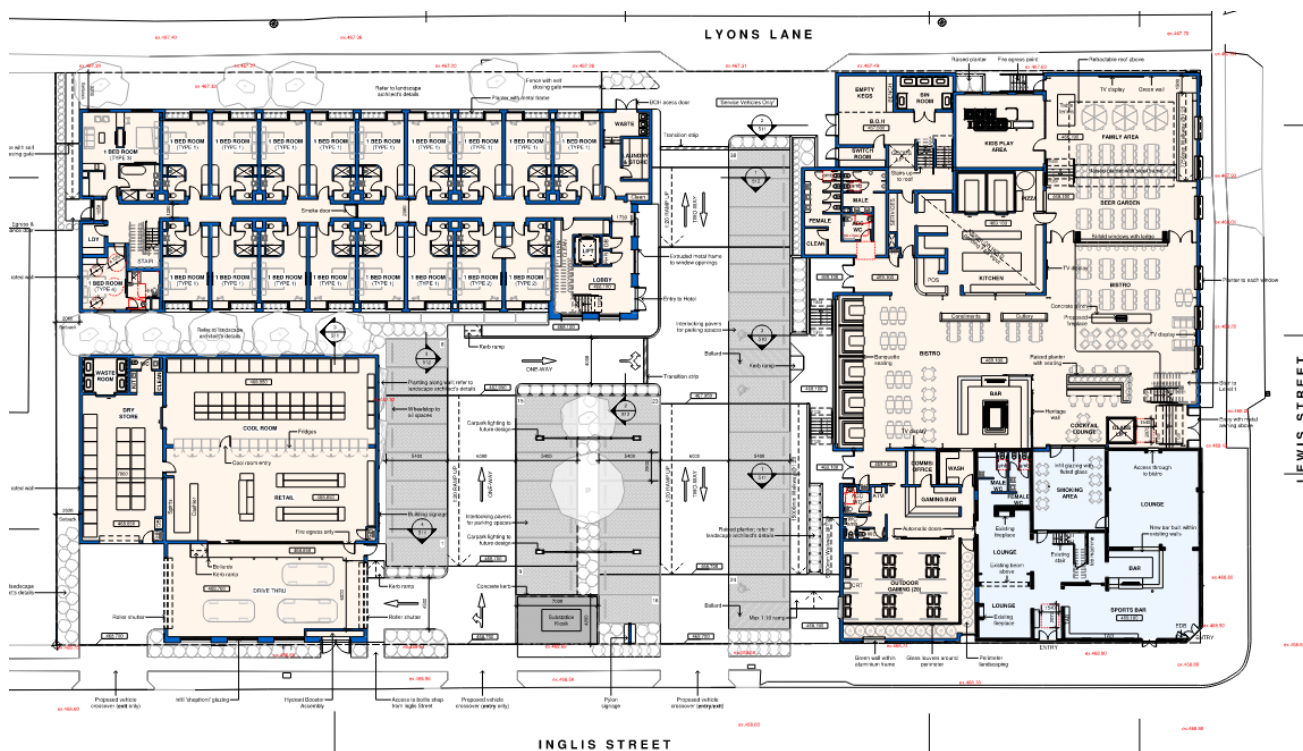


FIGURE 3 GROUND FLOOR PLAN

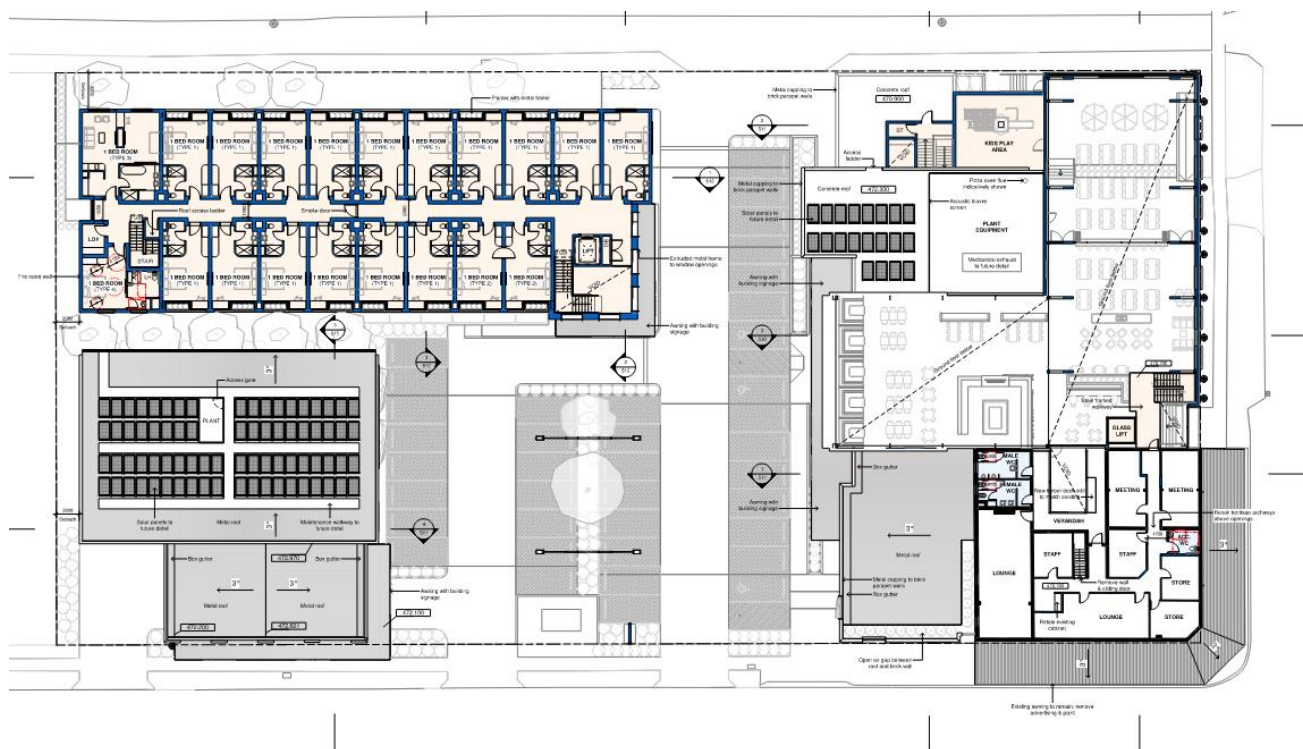


FIGURE 4 LEVEL 1 PLAN

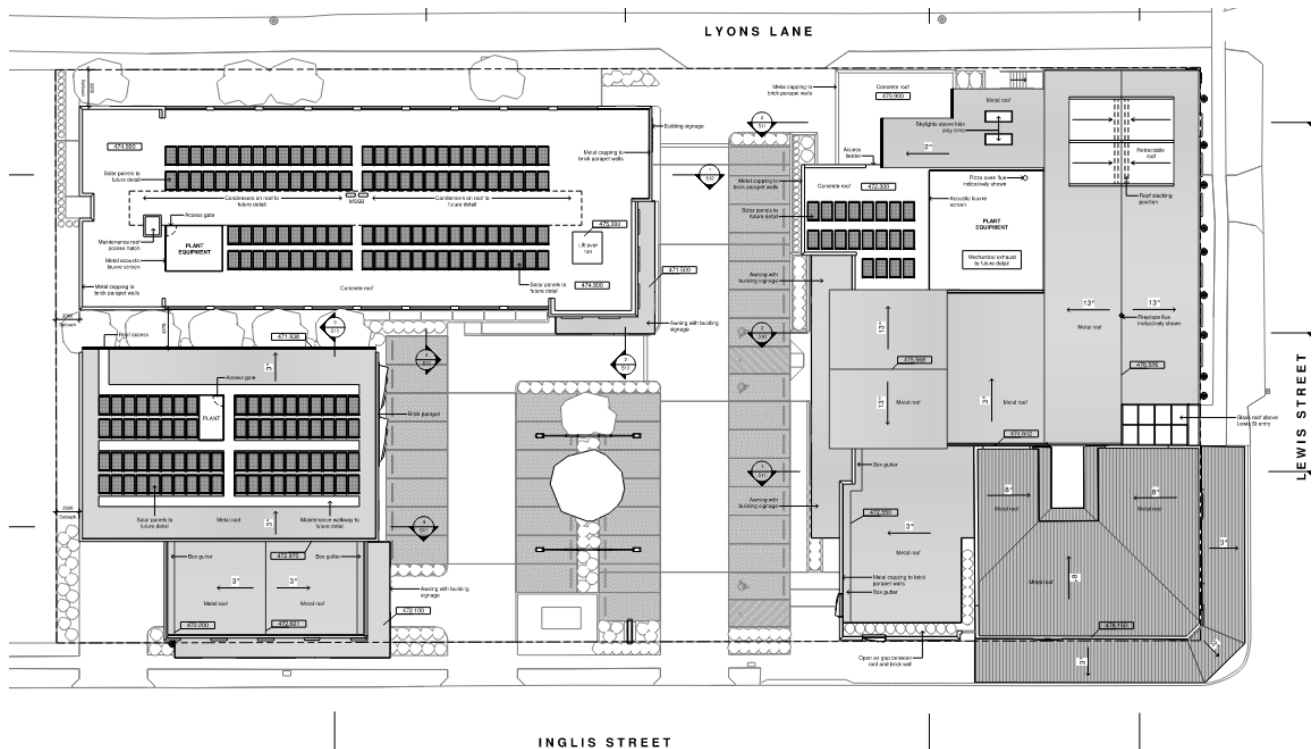


FIGURE 5 ROOF PLAN

2.3 SENSITIVE RECEIVERS

The sensitive receivers surrounding the site area as follows (Figure 6):

- 74 Lewis St to the north (Residential) / approximately 20 m
- 76 Lewis St to the north (Residential) / approximately 20 m
- 75 Horatio St to the north (Places of worship) / approximately 30 m
- 44 Lyons Ln to the north (Residential) / approximately 20 m
- 44 Inglis St to the west (Residential) / approximately 20 m
- 19 Inglis St to the south (Mixed Use zone, commercial use) / approximately 40 m
- 32 Inglis St to the east (Residential zone, commercial use) / approximately 30 m



FIGURE 6 NEAREST RECEIVERS

3 NOISE AND VIBRATION CRITERIA

3.1 NSW NOISE POLICY FOR INDUSTRY 2017

3.1.1 AMENITY AND INTRUSIVENESS CRITERIA

The NSW Noise Policy for Industry (NPfI) provides assessment methodologies, criteria and detailed information on the assessment of environmental noise emissions in NSW. The NSW NPfI criteria for noise sources consider two components:

- Controlling **intrusive** noise impacts for residential receivers. Assessing intrusiveness generally requires noise measurements to quantify background (LA90) noise levels at a location considered representative of the most potentially affected residential receiver(s). The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{aeq}) of the source(s) under consideration should be controlled to not exceed background noise levels by more than 5 dB(A).
As the subject site and surrounding land is either empty or under construction, to carry out background noise level measurements at this stage would result in intrusiveness criteria that is not representative of the developed area. As such we have not carried out background noise level measurements and recommend that at this stage only the amenity noise level criteria is applied to the project, as described below.
- Maintaining noise **amenity** for various categories of land use (including residential receivers and other sensitive receivers). The amenity criterion is based on the sensitivity of a particular land use to industrial-type noise. The recommended amenity noise levels detailed in Table 2.2 of NSW NPfI represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location. This is to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area. The project amenity criteria for each new source of industrial noise is equal to the recommended amenity noise level minus 5dB(A).
- A +3dB(A) to be added to project amenity noise level for conversion from a period level to a 15-minutes level. Where the resultant project amenity noise level is 10dB or more below the existing industrial noise level, the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.

Table 1 provides the amenity noise level for different receiver types.

TABLE 1 AMENITY NOISE LEVELS

TYPE OF RECEIVER	INDICATIVE NOISE AMENITY AREA	TIME OF DAY	RECOMMENDED L _{AEQ} NOISE LEVEL, DB
Residence	Suburban	Day 7:00 to 18:00	55
		Evening 18:00 to 22:00	45
		Night 22:00 to 7:00	40

3.2 MID-WESTERN REGIONAL COUNCIL

Mod-Western Regional Council has no noise requirements specifically applicable to the site.

3.3 DETERMINATION OF PROJECT NOISE TRIGGER LEVELS (PNTL)

Ordinarily the project trigger noise levels are the most stringent noise levels of the NSW NPfI project intrusiveness and project amenity noise levels. For this project, given the remote nature of the development, we have elected to utilise the amenity noise levels as the Project Noise Trigger Levels at this stage. As described in Section 3.1.1 we have subtracted 5 dB from the amenity noise level to account for cumulative noise sources and added 3 dB to convert from a period level to 15-minute level.

Amenity levels for a Suburban residential zoning were used for this location as the description fits table 2.3 of the NPfI (area dominated by natural sounds, little traffic noise and low background noise levels). Table 2 presents the project noise trigger level (PNTL) for the closest receivers.

TABLE 2 EXTERNAL PROJECT TRIGGER NOISE LEVEL (PTNL) FOR OPERATIONAL NOISE

TYPE OF RECEIVER	INDICATIVE NOISE AMENITY AREA	TIME OF DAY	PROJECT NOISE TRIGGER LEVEL, DB
Residence	Suburban	Day 7:00 to 18:00	53
		Evening 18:00 to 22:00	43
		Night 22:00 to 7:00	38

3.3.1 SLEEP DISTURBANCE NOISE LIMITS

In accordance with NSW NPfI 2017, the potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is both awakenings and disturbance to sleep stages.

"Where the subject development/premises night-time noise levels at a residential location exceed:

- L_{aeq}, 15min 40dB(A) or the prevailing RBL plus 5dB, whichever is the greater, and/or*
- L_{Afmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment should be undertaken."

Table 3 details the sleep disturbance noise limits for the nearest residential receivers adjacent to the proposed development. As with the intrusive noise impacts, carrying out noise monitoring to establish the RBL would be inappropriate at this stage; sleep disturbance limits are therefore governed by the absolute values provided by the NPfI.

TABLE 3 SLEEP DISTURBANCE NOISE LIMITS

LOCATION	DESCRIPTOR	SLEEP DISTURBANCE NOISE LIMITS (DBA)
All identified receivers	L _{eq} , 15mins, night	40
	L _{Fmax} , night	52

3.4 HOTEL INTERNAL NOISE LEVELS

Table 4 sets the recommended internal design noise levels for hotel spaces, which are based on AS/NZS 2107:2016 – *Acoustics – Recommended design sound levels and reverberation times for building interiors*. The overall criteria are inclusive of both external noise intrusion and internal building services noise contributions.

TABLE 4 HOTEL INTERNAL NOISE LEVEL CRITERIA

LOCATION	INTERNAL NOISE LEVEL CRITERIA, LEQ
Hotel sleeping areas	35 dBA
Hotel living areas	40 dBA

3.5 CONSTRUCTION NOISE AND VIBRATION CRITERIA

3.5.1 INTERIM CONSTRUCTION NOISE GUIDELINE

The NSW Interim Construction Noise Guideline was developed by the NSW-Department of Environment & Climate Change DECC, NSW which incorporates the EPA. The Guideline contains detailed procedures for the assessment and management of construction noise impacts.

The guideline presents two ways of assessing construction noise impacts – the quantitative method, which is generally suited to longer term construction works and the qualitative method, which is generally suited to short term works (usually not more than 3 weeks) such as infrastructure maintenance.

It is expected that the length of the construction works associated with the development would be more than 3 weeks and therefore a quantitative method has been used for this assessment.

Table 5 sets out the management levels for noise at residence and sensitive land uses, respectively. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected management level' which is >75dBA. Affected properties above 75 dBA might require community consultation and a Construction Noise & Vibration Management Plan (CNVMP). The recommended noise management level during all aspects of the construction program are summarised in Table 6 below.

TABLE 5 NOISE AT RESIDENCES USING QUANTITATIVE ASSESSMENT

RECOMMENDED HOURS	EXTERNAL MANAGEMENT LEVEL	HOW TO APPLY
Recommended standard hours	Noise Affected RBL + 10	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> Where the predicted or measured Laeq (15 minutes) noise level is greater than the affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details
Monday – Friday 7am to 5pm Saturday 8am to 3pm No work on Sundays or Public Holidays	Highly noise affected 75 dB(A)	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite period by restricting hours that the very noisy activities can occur, taking into account: <ol style="list-style-type: none"> Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences); If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Recommended standard hours	53 dBA	<ul style="list-style-type: none"> A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

*Section 6, 'work practices' of the Interim Construction Noise Guideline, states: "there are no prescribed noise controls for construction works. Instead, all feasible and reasonable work practices should be implemented to minimise noise impacts.

This approach gives construction site managers and construction workers the greatest flexibility to manage noise".

Definitions of the terms feasible and reasonable are given in Section 1.4 of the Guideline.

The external noise levels should be assessed at the most affected occupied point on the premises. A conservative estimate of 10 dB is generally applied as the difference between the external and internal level for noise sensitive uses that require internal noise measurement.

3.5.2 NOISE MANAGEMENT LEVELS

Noise Management Levels (NML) associated with the construction works on the project site are presented in Table 6. Note that for the noise affected level, we have implemented the project amenity noise level in lieu of the RBL + 10 methodology.

TABLE 6 NOISE MANAGEMENT LEVELS

RECEIVERS	RECOMMENDED HOURS	PERIOD	EXTERNAL NOISE MANAGEMENT LEVEL [DBA]
All identified receivers	Day time (standard construction hours)	When in use	53 dBA (Noise affected) 75 dB(A) (Highly noise affected)

3.5.3 CONSTRUCTION VIBRATION CRITERIA

The effects of construction vibration upon buildings can be separated into three main categories:

- Perceptibility of the occupants to the vibration and the possibility of them being disturbed or annoyed.
- Vulnerability of the building structures to vibration induced damaged.
- Vulnerability of the contents of the building that includes types of equipment, activities and processes.

HUMAN RESPONSE TO VIBRATION

Humans are very sensitive to vibration, and they can be disturbed, annoyed and have their work activities interfered with if the levels are too high. The Interim Construction Noise Guideline references "Assessing Vibration: a technical guideline" (Vibration Guideline) issued by the Department of Environment and Conservation NSW for measurement and assessment of vibration. The Vibration Guideline provides vibration criteria for continuous, impulsive and intermittent vibration.

Continuous vibration	Impulsive vibration	Intermittent vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZECC (1990).	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer this would be assessed against impulsive vibration criteria.

The criteria are discussed in more detail in the following sections.

CONTINUOUS AND IMPULSIVE VIBRATION (1-80 HZ)

According to the Vibration Guideline for continuous and impulsive vibration, assessment of impact should be considered on the basis of weighted root-mean-square acceleration values and results are to be compared against the following preferred and maximum values given for each orthogonal axis. The frequency weightings as per BS6841:1987 (reproduced in Appendix B3 of the guideline) are to be applied to the RMS measurement values (1-80Hz).

The criteria in the Vibration Guideline are derived from the limiting values of the assessment curves and multiplying factors from BS 6472:1992 (the curves are no longer referenced in the superseded version of the standard BS 6472:2008).

The Vibration Guideline notes "Activities should be designed to meet the preferred values where an area is not already exposed to vibration. Where all feasible and reasonable measures have been applied, values up to the maximum value may be used if they can be justified. For values beyond the maximum value, the operator should negotiate directly with the affected community. Situations exist where vibration above the preferred values can be acceptable, particularly for temporary disturbances and infrequent events of short-term duration. An example is a construction or excavation project."

Table 2.2 Preferred and maximum weighted rms values for continuous and impulsive vibration acceleration (m/s²) 1–80 Hz

Location	Assessment period ¹	Preferred values		Maximum values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration					
Critical areas ²	Day- or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night-time	0.020	0.014	0.040	0.028
Workshops	Day- or night-time	0.04	0.029	0.080	0.058
Impulsive vibration					
Critical areas ²	Day- or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day- or night-time	0.64	0.46	1.28	0.92
Workshops	Day- or night-time	0.64	0.46	1.28	0.92

1 Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specified above. Stipulation of such criteria is outside the scope of this policy, and other guidance documents (e.g. relevant standards) should be referred to. Source: BS 6472–1992

INTERMITTENT VIBRATION (1-80 HZ)

According to the Vibration Guideline for intermittent vibration, assessment of impact should be considered on the basis of vibration dose values (VDV). Acceptable values of vibration dose are given as follows.

Table 2.4 Acceptable vibration dose values for intermittent vibration (m/s^{1.75})

Location	Daytime ¹		Night-time ¹	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas ²	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

1 Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am.

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas.
Source: BS 6472–1992

STRUCTURAL RESPONSE TO VIBRATION – GERMAN STANDARD DIN 4150-3:1999

The German Standard DIN 4150-3 Structural Vibration Part 3: Effects on building and structures is commonly used in Australia to evaluate the effects of vibration on structures primarily used for static loading.

The response of a building to vibration is affected by several factors that include its type of foundation, the underlying ground conditions, its construction and the state of the building. Please note the construction vibration limits are designed to ensure the structural integrity of nearby buildings and are not for human comfort. The limits are well above perceptibility.

According to DIN 4150 short term vibration refers to vibration which does not occur often enough to cause structural fatigue, and which does not produce resonance in the structure being evaluated. Long-term vibration refers to all types of vibration not covered by the definition of 'short-term vibration'. The criteria for short-term and long-term vibration are listed in the following.

GUIDELINE VALUES FOR EVALUATION OF SHORT-TERM VIBRATION – DIN 4150-3:1999

The vibration limits of Table 1 in DIN 4150-3:1999 (replicated in Table 7 below) refer to the evaluation of the effects of short-term vibration on structures. The criteria are the peak particle velocities (PPV) measured on any foundation or uppermost full storey of any building not related to the site.

It should however be noted that compliance with the vibration limits to avoid structural damage of buildings, cannot provide certainty. If damage occurs despite compliance with the standard, it is to be assumed that other causes are responsible, however, further investigations are necessary. And on the other hand, exceeding the limits does not necessarily lead to damage.

TABLE 7 DIN 4150-3 CONSTRUCTION VIBRATION LIMITS – SHORT TERM

	GUIDELINE VALUES FOR VIBRATION VELOCITY (MM/S)			
	VIBRATION AT THE FOUNDATION AT A FREQUENCY OF			VIBRATION AT HORIZONTAL PLANE OF HIGHEST FLOOR AT ALL FREQUENCIES
	1HZ TO 10HZ	10 TO 50 HZ	50 TO 100HZ (AND ABOVE)	
Buildings for commercial purposes, Industrial building and building of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
Structures that because of their particular sensitivity to vibration, cannot be classified as above and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8

GUIDELINE VALUES FOR EVALUATION OF LONG-TERM VIBRATION – DIN 4150-3:1999

The vibration limits of Table 3 in DIN 4150-3:1999 refer to the evaluation of the effects of long-term vibration on structures (Table 8).

According to the standard, exceeding the values listed below does not necessarily lead to damage.

If a building is subject to harmonic vibration, then maximum values can occur in floors other than the top floor, or in the foundation. The values given also apply in these cases.

TABLE 8 DIN 4150-3 CONSTRUCTION VIBRATION LIMITS – LONG TERM

TYPE OF STRUCTURES	GUIDELINE VALUES FOR VELOCITY, VI, IN MM/S OF VIBRATION IN HORIZONTAL PLANE OF HIGHEST FLOOR, AT ALL FREQUENCIES
Buildings for commercial purposes, Industrial building and building of similar design	10
Dwellings and buildings of similar design and/or occupancy	5

TYPE OF STRUCTURES	GUIDELINE VALUES FOR VELOCITY, VI, IN MM/S OF VIBRATION IN HORIZONTAL PLANE OF HIGHEST FLOOR, AT ALL FREQUENCIES
Structures that because of their particular sensitivity to vibration, cannot be classified as above and are of great intrinsic value (e.g. listed buildings under preservation order)	2.5

In summary, we consider that for this project the vibration criteria are per DIN 4150 – 3 construction vibration limits – long term. Residential receivers in the area are predicted to have a maximum vibration velocity criterion of 5 mm/s² and commercial buildings of 10 mm/s peak particle velocity criteria.

4 OPERATIONAL NOISE IMPACT ASSESSMENT

The following sections present our assessment of noise emission impacts. Predicted noise levels and associated mitigation measures are also provided according to the noise assessment and criteria.

4.1 NOISE EMISSION FROM MECHANICAL AND BUILDING SERVICES

There are three principal outdoor plant areas across the development, one associated with each building (Figure 7). Each plant area is assessed in the following sections based on preliminary plant selections.

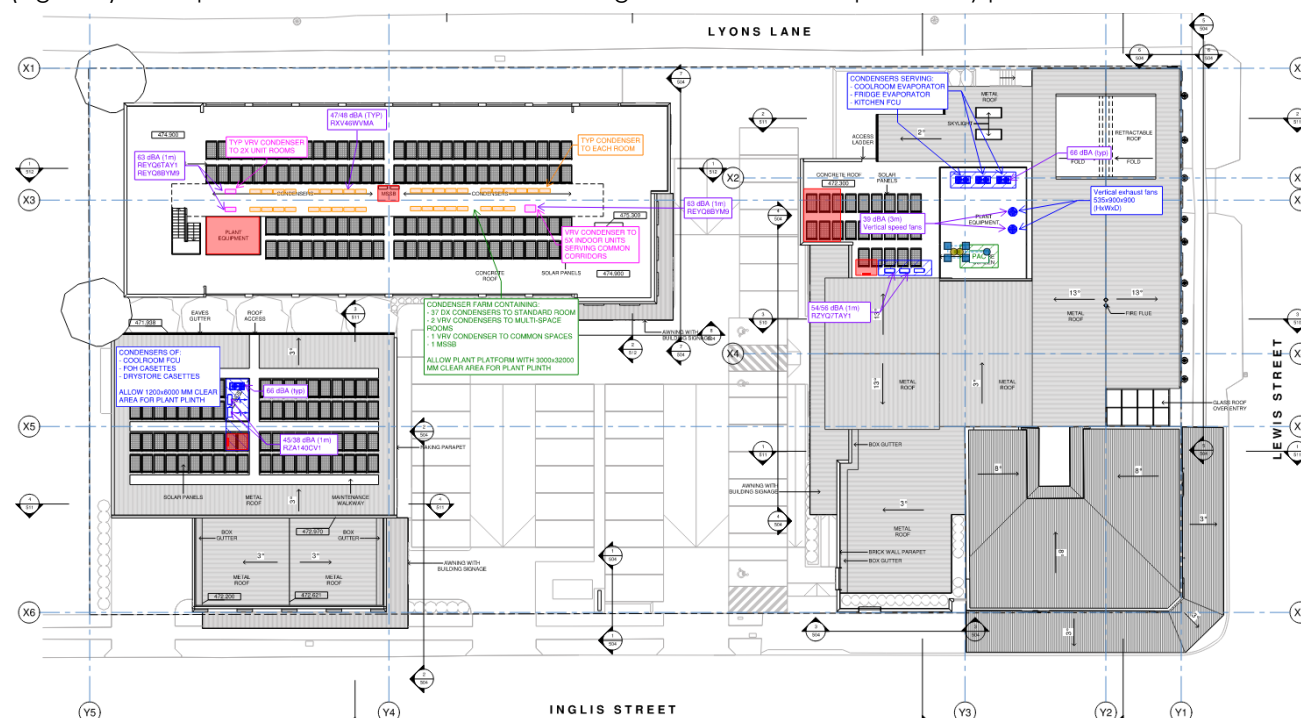


FIGURE 7 MECHANICAL SERVICES OUTDOOR EQUIPMENT LAYOUT (INDICATIVE)

4.1.1 FEDERAL HOTEL PUB PLANT AREA

A plant area is located on the roof of the Federal Hotel with outdoor condenser units, packaged air conditioning units and extract fans being the principal sources of noise. Some condenser units, the fans and the PAC are located within an enclosure with solid walls to the north, south and east faces and a louvre to the west face. 3x smaller condenser units are located outside the enclosure against the southern wall of the plant area.

In order to control noise to the nearest residential receiver located at 76 Lewis St we recommend that the west louvre be acoustically rated 300mm deep (Table 9).

TABLE 9 FEDERAL HOTEL PLANT ACOUSTIC LOUVRE

RESIDENTIAL RECEIVERS	MINIMUM INSERTION LOSS VALUES, DB							
	63 HZ	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	8000HZ
300mm acoustic louvre	3	6	8	12	19	20	18	18

4.1.2 DRIVE-THRU BOTTLE SHOP PLANT AREA

Three outdoor condenser units are to be located on the rooftop of the bottle shop. In order to comply with the NPfI noise rules at the nearest residential receiver located at 44 Inglis St we recommend allowing for acoustic treatment to the north and west faces of the plant area. The acoustic treatment is to comprise either a 300mm

acoustic louvre where air flow is required (Table 10) or a solid blockwork wall or similar extending to the top of the condenser units at a minimum. The south and east faces may be open.

TABLE 10 DRIVE-THRU BOTTLE SHOP PLANT ACOUSTIC LOUVRE

RESIDENTIAL RECEIVERS	MINIMUM INSERTION LOSS VALUES, DB							
	63 HZ	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	8000HZ
300mm acoustic louvre	3	6	8	12	19	20	18	18

4.1.3 NEW HOTEL PLANT AREA

A condenser farm is to be located on the rooftop of the new hotel. In order to comply with the NPfI noise rules at the nearest residential receiver located at 44 Inglis St and 44 Lyons Ln we recommend allowing for acoustic treatment to the north and west faces of the plant area. The acoustic treatment is to comprise either a 300mm acoustic louvre where air flow is required (Table 10) or a solid blockwork wall or similar extending to the top of the condenser units at a minimum. The south and east faces may be open.

We expect that this unit will work on a partial load during night time. However the design was done so it can meet criteria for 100% operation.

TABLE 11 NEW HOTEL PLANT ACOUSTIC LOUVRE

RESIDENTIAL RECEIVERS	MINIMUM INSERTION LOSS VALUES, DB							
	63 HZ	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	8000HZ
300mm acoustic louvre	3	6	8	12	19	20	18	18

4.2 NOISE EMISSION FROM WASTE COLLECTION

An assessment of the bin/waste collection has been made to take into consideration the potential noise emissions from commercial waste collection vehicles.

Using a sound power level of 89 dBA (typical commercial truck), it is predicted that noise emissions from waste collection vehicles (including loading activities) will comply with the day time noise criteria but not evening or night time. As such we recommend the waste collection occurs during the day time period only.

4.3 NOISE EMISSION FROM THE CARPARK

Drawings indicate that the carpark will have approximately 40 parking spaces including two accessible parking spaces. The carpark will be used patrons of the hotel, bottle shop and pub and entry will be via Inglis St. Noise emissions from the carpark were calculated to consider any possible noise impacts at the nearest residential receivers. We have assumed that the car park will fully turnover during the peak hour, i.e. 40 car park movements per hour.

Noise levels from a moving car at slow speed have been previously measured by NDY at L_{Aeq} 50 dBA at 2m over 1 minute. This was corrected for the car numbers, duration, and the distance to calculate the overall noise level. To calculate the noise levels, we have considered the existing carpark with capacity of 17 parking space at an average distance of approximately 65m to 74 Lewis St and approximately 75m to 19 Inglis St. We have also accounted for shielding provided by the new hotel building and the pub extension.

A summary of results is presented in Table 12.

TABLE 12 CAR PARK NOISE EMISSION PREDICITON

RESIDENTIAL RECEIVERS	PTNL	PREDICTED NOISE LEVEL FROM CAR PARK	COMPLIANCE
74 Lewis St	38 (night period)	34 dBA	Complies

RESIDENTIAL RECEIVERS	PTNL	PREDICTED NOISE LEVEL FROM CAR PARK	COMPLIANCE
71-73 Horatio St	38 (night period)	38 dBA	Complies
19 Inglis St	65 (when in use)	36 dBA	Complies

The above summary results predict that noise emissions from the carpark will comply with criteria at the nearest residential boundary, hence all noise levels will comply with criteria.

4.4 NOISE EMISSIONS FROM OUTDOOR AREAS

Several outdoor areas and open-top areas are planned. Amplified music / patron noise from premises including those licensed by liquor and Gaming NSW is not covered by the NPfI and we are currently not aware of any legislation that addresses crowd noise emission. Crowd noise is therefore not considered in this report. We understand however that the northern façade of the Federal Hotel will not have operable windows in order to control crowd noise emissions.

The local Development Control Plan does not address this either.

5 NEW HOTEL ARCHITECTURAL ITEMS

5.1 NATIONAL CONSTRUCTION CODE

The National Construction Code (NCC) sets minimum building construction performance requirements for multiple occupancy dwellings to control the standard of sound isolation between Sole Occupancy Units. Compliance with the NCC requires either that the adopted constructions are those scheduled as "Deemed to Satisfy" within the NCC, or if alternative constructions are implemented, that these achieve a specified acoustic rating. The methods of verifying the constructions as satisfactory for compliance with the NCC may require verification testing.

Table 13 summarises the performance requirements for the development based on NCC Design Requirements. This table presents the minimum recommended requirements, and higher performance will result in a better acoustic environment. Consideration may be given to more stringent criteria to increase the acoustic quality of the project, bearing in mind that this may have a considerable impact on construction cost.

The new hotel will be designed to achieve these standards.

TABLE 13 NCC SOUND INSULATION REQUIREMENTS

	MINIMUM AIRBORNE INSULATION RATING	MAXIMUM IMPACT INSULATION RATING
Sound Insulation of Floors		
Separating SOUs	Rw + Ctr 50	Ln,w 62
Separating a dwelling from a plantroom, lift shaft, stairway, public corridor, public lobby, etc.	Rw + Ctr 50	Ln,w 62
Separating a balcony from a dwelling below	-	Ln,w 62 [Ln,w +CI 55 for Green Star]
Sound Insulation of Walls		
Separating dwellings, generally	Rw + Ctr 50	-
Separating a habitable room in one dwelling from a bathroom, sanitary compartment, laundry or kitchen in an adjoining dwelling	Rw + Ctr 50	Discontinuous
Separating a dwelling from a stairway, public corridor, public lobby, etc.	Rw 50	-
Separating a dwelling from a plantroom or lift shaft	Rw 50	Discontinuous
Between a car park and a dwelling	Rw 50	Discontinuous
Separating rooms within the same dwelling	No specific requirements	-
Door separating a dwelling from a stairway, public corridor, public lobby, etc.	Rw 30	-
Sound Insulation of Services		
Riser, wall or ceiling construction separating a duct, soil, waste, storm water or water supply pipe passing through more than one dwelling from -		
- A habitable room	Rw + Ctr 40	-
- A non-habitable room or kitchen	Rw + Ctr 25	-
Circulating or other pumps	Flexible coupling required	

	MINIMUM AIRBORNE INSULATION RATING	MAXIMUM IMPACT INSULATION RATING
Electrical outlets located in a wall separating dwellings	Electrical outlets must be offset from each other: <ul style="list-style-type: none"> • In masonry walling, not less than 100mm; and • In timber or steel framed walling, not less than 300mm. 	

5.2 FAÇADE

As a preliminary advice for façade construction. In order to control external noise emission into internal hotel spaces we recommend implemented an acoustic glazed façade comprising the following system:

- 6.38mm laminate/12mm air gap/6mm float Rw 35 for the rooms facing the renovated pub area (East) and the rooms facing the bottle shop (south)
- 6.38 mm lam Rw 33 for the rooms facing Lyons Lane residential properties (North)

This assumes a minimum construction for the non-glazed façade of external cladding (min. 7.5 Kg/m²), min 90 mm stud with insulation and 1 x 13 mm Pb lining. This will have to be confirmed later in the project.

6 CONSTRUCTION NOISE AND VIBRATION

6.1 PRELIMINARY NOISE ASSESSMENT

The following has been assumed with regard to noise intensive equipment/activities:

- Excavations may be undertaken.
- Loading and unloading will be part of general construction activities.

For the assessment reference sound levels for representative equipment have been taken from the DEFRA, BS5228 and AS2436 databases. The documents include extensive databases of sound data covering trucks, excavators, hand tools and all manner of other construction equipment and activities. The ratings listed in Table 14 are for individual pieces of equipment at constant operation.

TABLE 14 TYPICAL EXTERNAL NOISE LEVELS OF SIT PREPARATION AND CONSTRUCTION ACTIVITIES

ITEM #	ACTIVITY /MACHINERY	SOURCE AND REFERENCE NUMBER	LEQ SOUND PRESSURE LEVEL AT 10M (DBA)
Site Establishment			
1	Heavy rigid truck	BS5228-2009 Table C5 Ref 16	75
2	Semi-trailer	BS5228-2009 Table C2 Ref 32	81
3	14T Excavator	BS5228-2009 Table C2 Ref 25	69
Ground works			
4	Heavy goods vehicle	BS5228-2009 Table C2 Ref 32	81
5	14T Excavator	BS5228-2009 Table C2 Ref 25	69
6	Mini piling rig	BS5228-2009 Table C3 Ref 18	60
Install buildings			
7	Articulated Truck	BS5228-2009 Table C5 Ref 16	75
8	Mobile Crane	BS 5228 – 1:2009 Table C4 Ref 50	71
9	Concrete truck	BS 5228 – 1:2009 Table C4 Ref 28	75
10	Handheld nail gun	BS 5228 – 1:2009 Table C4 Ref 95	78
11	Angle grinder	BS 5228 – 1:2009 Table C4 Ref 93	70
Finishing works			
12	Medium goods vehicle	BS5228-2009 Table C2 Ref 32	81

•NSW DECC 2009 Construction noise Guideline quotes on Appendix B Equipment Noise levels, the DEFRA 2005 database, which includes the above referenced BS 5228 – 1:2009 noise levels.

6.2 PREDICTED CONSTRUCTION NOISE

Based upon the above plant sound levels, predicted construction noise levels for the various works phases are presented below in Table 15. Note that the predicted noise levels are inclusive of site hoarding effects. A such the proponent will be required to erect hoarding around the site.

As shown construction noise levels during all phases were predicted to exceed the noise affected level but not to exceed 75 dBA when site hoarding is implemented. Under the ICNG, this means there is no requirement for a construction noise to be managed as part of a construction noise and vibration management plan.

However, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

TABLE 15 PREDICTED CONSTRUCTION NOISE, LEQ, 15MIN

CONSTRUCTION STAGE	RECOMMENDED HOURS	TIME PERIOD	PREDICTED CONSTRUCTION NOISE LEVEL (DBA)	EXTERNAL NOISE MANAGEMENT LEVEL	COMPLIANCE
Site Establishment	Monday Friday 7am to 5pm Saturday 8am to 5pm No work on Sundays or Public Holidays	Day	55	53* (Noise affected)	Does not comply
Ground works			56	53* (Noise affected)	Does not comply
Install buildings			59	53* (Noise affected)	Does not comply
Finishing works			54	53* (Noise affected)	Does not comply

Notes:

- * Construction noise levels are above 53 dBA, however they comply with 75 dBA for highly noise affected.
- We assume that all construction stages equipment will work during 25% of the time. As mentioned above, the construction will need a perimeter hoarding (2 m height) constructed with a solid material with minimum surface weight 8.5 kg/m², e.g. 17mm plywood, or 9mm cement sheet (critical boundary will be to Lyons Ln)
- Piling note: we expect that piling will also be time managed, particularly for the north boundary (Lyons Lane) and piling will only work for 20% of the time.

6.3 PRELIMINARY VIBRATION ASSESSMENT

Based on the information available at this stage, the construction activities expected to occur on the site are likely to have little to no impact on the surrounding buildings on a vibration basis. Compliance with vibration limits is expected based on ensuring ground compacting equipment is selected to adhere to minimum safe working distances.

It is important to note that construction vibration levels depend on several factors. These include the activity, the machine, the geology of the ground and the distance between the building and the source. Surface works are expected to have a lower vibration impact than ground compacting/breaking works.

NSW RMS provides safe operating distances as per the CNVG for cosmetic damage to the building and for human response to vibration which has been used as a guideline at this stage. Table 16 lists minimum safe working distances for critical equipment.

TABLE 16 RMS SAFE OPERATING DISTANCES - CONSTRUCTION NOISE AND VIBRATION GUIDELINE 2016

PLANT ITEM	RATING/DESCRIPTION	MINIMUM WORKING DISTANCE	
		COSMETIC DAMAGE (BS 7385)	HUMAN RESPONSE (OH&E VIBRATION GUIDELINE)
Vibratory Roller	< 50 kN (Typically 1 – 2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2 – 4 tonnes)	6 m	20 m
	< 200 kN (Typically 4 – 6 tonnes)	12 m	40 m
	< 300 kN (Typically 7 – 13 tonnes)	15 m	100 m

PLANT ITEM	RATING/DESCRIPTION	MINIMUM WORKING DISTANCE	
		COSMETIC DAMAGE (BS 7385)	HUMAN RESPONSE (OH&E VIBRATION GUIDELINE)
Small Hydraulic	(300 kg - 5 to 12t excavator)	2 m	7 m
Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m

Piling activities vibration estimations are included below, using Table E.1 Empirical Predictors for ground borne vibration arising from mechanized construction works of the BS 5228 – 2.2009 part II Vibration. using a critical horizontal distance of 20 m, vertical depth of 9 m using Table E.1 Empirical Predictors for groundborne vibration arising from mechanized construction works.

The estimated vibration levels in the closest receiver were 0.2 PPV, considering soft soils and a W factor of 85kJ. This level is below the criteria.

6.4 CONSTRUCTION ACTIVITIES AND MITIGATION

The following has been assumed with regard to vibration intensive equipment/activities:

- Drum roller are expected to be non – vibratory.
- Any excavations on the site are expected using conventional earthmoving equipment such as a hydraulic excavator with bucket attachment.
- Use of a small piling rig and a non-vibratory piling method.

The following general construction noise source control measures may be required:

- During extended construction hours, less intrusive works will be scheduled to be carried out and/or works will be carried out away from sensitive receivers.
- Activities that approach the highly noise affected criteria for the residential receivers to be carried out during times where receivers are less sensitive to noise.
- Avoid unnecessary revving of engines and turn off plant that is not being used/required.
- Where possible organise the site so that delivery trucks and haulage trucks only drive forward to avoid the use of reversing alarms.
- Where possible, avoid using tonal reverse alarm outside standard construction hours.
- Organise and schedule the equipment operations to limit the noisiest machines operating simultaneously.
- Site set up/ movement of plant / delivery of material/ waste removal to site should generally be restricted to day period.
- Truck drivers are to be informed of site access routes, acceptable delivery hours and must minimise extended periods of engine idling.
- Ensure there is no unnecessary shouting or loud stereo/radios on site. There must be no dropping of metal from heights, throwing of metal items or slamming of doors.
- Use less noise intensive equipment where reasonable and feasible.
- Where practical fixed plant should be positioned as far as possible from the sensitive receivers.
- Use temporary site buildings and material stockpile as noise barrier.
- Employ the use of solid barrier plywood hoardings if required.
- Where practical, a partial enclosure shall be used to minimise noise levels.

Table 17 lists specific construction noise mitigation measures applicable to the equipment listed above.

TABLE 17 CONSTRUCTION NOISE MITIGATION MEASURES

ITEM #	ACTIVITY /MACHINERY	
Site Establishment		
1	Heavy rigid truck	Trucks arrive at site at staggered intervals where possible. Switch off truck when loading/unloading goods. Site access for trucks to be away from sensitive receiver

ITEM #	ACTIVITY /MACHINERY	
2	Semi-trailer	Trucks arrive at site at staggered intervals where possible. Switch off truck when loading/unloading goods. Site access for trucks to be away from sensitive receiver
3	14T Excavator	Time limit use of excavator. When not in use switch off excavator to reduce idling noise
Ground works		
4	Heavy goods vehicle	Vehicles arrive at site at staggered intervals where possible. Switch off truck when loading/unloading goods. Site access for trucks to be away from sensitive receiver
5	14T Excavator	Time limit use of excavator. When not in use switch off excavator to reduce idling noise
Install buildings		
6	Articulated Truck	Switch off truck when loading/unloading goods
7	Mobile Crane	Locate crane as far away from sensitive receiver as practical; if crane needs to be set-up near the receiver it may need to be time managed, to be carried out during standard hours
8	Concrete truck	Locate as far from sensitive receiver as possible. Site access for concrete trucks to be away from sensitive receiver
9	Handheld nail gun	Compliance expected if carried out within enclosed building
10	Angle grinder	Compliance expected if carried out within enclosed building
Finishing works		
11	Medium goods vehicle	Vehicles arrive at site at staggered intervals where possible. Switch off truck when loading/unloading goods. Site access for trucks to be away from sensitive receiver

6.4.1 GENERAL/SITE MANAGEMENT ISSUES

As the construction methodology of the proposed development is yet to be finalised, NDY has provided general recommendations to manage the construction noise and vibration in the section below. A detailed construction noise and vibration management plan and a quantitative construction noise assessment should be considered in the later stage of the project with the consultant team and contractor.

All employees, contractors and subcontractors are to receive an environmental induction and should instruct all persons at the site with regard to all relevant project specific and standard noise mitigation measures, including but not limited to permissible hours of work, limitation of high noise generating activities, location of nearest affected noise receivers, construction employee parking areas, designated loading/unloading areas and procedures, site opening/closing times (including deliveries) and environmental incident procedures.

A dedicated person will form a point of contact for dissemination of general information regarding site operations. Contact persons will also be defined to receive comment or complaints from the community.

6.4.2 HOURS OF WORK

All activities associated with the construction shall take place within the standard hours as shown below:

- 7:00 am to 6:00 pm, Monday to Friday inclusive; and
- 8:00 am to 1:00 pm, Saturday.
- No Planned Work on Sundays or public holidays.

6.4.3 CONSULTATION

Consultation process is recommended for construction. Notification to residents of proposed works:

- A letter to be distributed to neighbouring sites/residents in advance of the works to notify them of the nature and estimated timescales for completion of the proposed works.

Project information line and construction response line:

- A 24-hour contact point shall be provided for any complaints regarding the construction works and a project representative shall respond to all compliant as soon as possible.

7 CONCLUSIONS

A new hotel is being developed on the corner of Inglis and Lewis St, known as the Federal Hotel Mudgee. This report addresses operational noise and operational noise and vibration emissions as received at the most affected receivers, located around the subject site:

- 76 Lewis St to the north (Residential) / approximately 20 m
- 44 Lyons Ln to the north (Residential) / approximately 20 m
- 44 Inglis St to the west (Residential) / approximately 20 m
- 19 Inglis St to the south (Mixed Use zone, commercial use) / approximately 40 m
- 32 Inglis St to the east (Residential zone, commercial use) / approximately 30 m

7.1 OPERATIONAL NOISE

- Operational noise criteria were set using a modified approach to the NSW NPfl where the project amenity noise level is adopted as the project trigger noise levels.
- The main contributors of operational noise emission are expected to be building services equipment, the waste collection area and car park.
- Outdoor condensers are predicted to comply with the PTNL based on distance propagation and acoustic treatment.
- Waste collection activities will comply with project trigger noise levels assuming sound power level of 89 dBA and an acoustic barrier at the northern boundary.
- Car park noise is predicted to comply with the PTNL with an acoustic barrier at the northern boundary.
- Noise from outdoor gaming area will also meet the project criteria, administrative control measures are recommended for evening and night time.

7.2 CONSTRUCTION NOISE

- Construction noise criteria have been set in general accordance with NSW Interim Construction Noise Guideline, again adopting the project amenity noise level as the noise affected level.
- Construction noise is predicted to exceed the noise affected level, indicating reasonable steps to reduce noise should be taken.
- Construction noise is not, however, predicted to exceed the highly noise affected level (75 dBA) when site hoarding is implemented, indicating a construction noise and vibration management plan is not required.
- Construction noise will be controlled using time management per phase and a perimeter hoarding as indicated.

7.3 CONSTRUCTION VIBRATION

- Construction vibration has been assessed against British Standard BS 7385:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground-borne vibration "Assessing Vibration: a technical guideline" issued by the Department of Environment and Conservation NSW for measurement and assessment of vibration, and German Standard DIN 4150-3 Structural Vibration Part 3: Effects on building and structures.
- The main sources of construction vibration emission from the site are expected to be vibratory rollers and piling works.

Based on the above conclusions noise and vibration impacts on the surrounding community from the proposed Federal Hotel Mudgee will be compliant with noise and vibration regulations. As such NDY supports the applicable planning pathway for the proposed hotel.

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