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PROPOSED INDOOR SPORT & RECREATION, EDUCATIONAL AND HOSPITAL (BIRTHING SUITE)

22 FRAZER STREET, SOUTHPORT

NOISE IMPACT ASSESSMENT

Commissioned by:	Evans Long Pty Ltd
Date:	14 October 2024
Project number:	6166
Version:	V.3
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EXECUTIVE SUMMARY

Evans Long Pty Ltd proposed a material change of use for an Indoor Sport and Recreation, Education Establishment and Hospital (Birthing suite) at 22 Frazer Street, Southport (Proxima Building). The site is described as Lot 1 on SP322402, and the locality is shown in Figure 1. The site is located within the Parklands Priority Development Area, and the development application is through the Minister for Economic Development Queensland (MEDQ).

Palmer Acoustics (Australia) Pty Ltd has been commissioned to provide a noise impact assessment for the MEDQ.

This report addresses noise from the following:

- External loading activities, car parking, people noise, amplified music and mechanical plant noise.
- Within the same development i.e. indoor sport & recreation activities to Hospital (birthing suites) overnight stay and childcare centre to Hospital (birthing suites).

The report has been prepared in accordance with the requirements of the Minister for Economic Development Queensland and is based on the original acoustic report by TTM, Version 1, (9 Feb 2021).

Based on our assessment, we conclude:

- Offsite activities will impact noise into the Hospital (birthing suite) at levels that complies with the internal Acoustic Quality Objectives set by the EPP Noise.
- Offsite noise activities will impact noise into the Hospital (birthing suite) at levels that complies with EPP Noise sleep disturbance limits.
- Noise from the onsite gym (amplified music activities) to the nearby residential balconies complies with day and night time limits.
- Noise from within the development into the Hospital (birthing suite) will normally comply with the Acoustic Quality Objectives objectives set by the EPP Noise.
- Noise and vibration limiting criteria should be applied to future indoor sport and recreation facilities. Further testing and acoustic advice may be required to protect the Hospital (birthing suite) from indoor sport and recreation facilities.

To ensure compliance with the EDQ noise requirements, we recommend:

- The noise and vibration from the future indoor sport and recreation facilities must be limited to section 3.3 in the adjacent tenancies.
- If the external glazed façade of the Hospital (birthing suite) faces a childcare outdoor play area, additional glazing will be required in the Hospital (birthing suite). In this case the external glazed façade should be upgraded with an additional 6.38mm laminated glass minimum 50mm air gap on the internal side of the existing DGU.
- If the birthing suite (external glazed façade) does not face the outdoor play area, acoustic treatment is not required to the Hospital (birthing suite).
- The indoor sport and recreation tenancy must provide, within its tenancy, airborne and vibration treatments to the adjacent tenancies' floor, ceiling and walls. If physical acoustic treatment cannot be applied to the adjacent tenancies (due to limited access), indoor sports and recreation tenancies must limit the level of amplified music and the dropping of weights.

- The noise and vibration limits are imposed in the lease agreement. The lessee must comply with these noise and vibration limits.
- The proposed acoustic treatments recommended in this report are required to validate compliance with the operational limits.

CONTENTS

1.0 INTRODUCTION

Evans Long Pty Ltd proposed a material change of use for an Indoor Sport and Recreation, Education Establishment and Hospital (Birthing suite) at 22 Frazer Street, Southport (Proxima Building). The site is described as Lot 1 on SP322402, and the locality is shown in Figure 1. The site is located within the Parklands Priority Development Area, and the development application is through the Minister for Economic Development Queensland (MEDQ).

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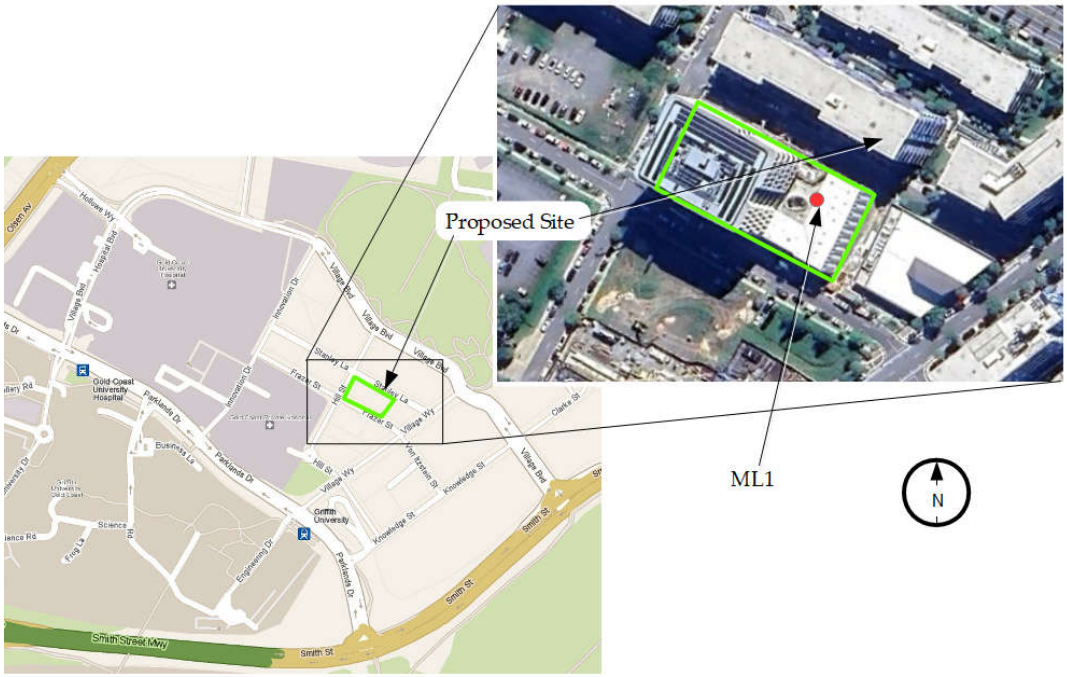

Figure 1: Locality

1.1 Existing Site and Surroundings

The site is located between Frazer Street and Stanley Lane on the southern side of Hill Street. Residential buildings are to the north and north-east. On the eastern boundary, there are retail/commercial buildings. To the west and south the land is vacant. The building site has an existing childcare centre on levels 2 and 3, medical and office tenancies throughout the building. There are still vacant tenancies in the building. The building is currently approved for commercial, retail, medical, and childcare operations.

1.2 Information request from Economic Development Queensland

The following was extracted from Economic Development Queensland (EDQ) RFI dated 30/07/24, ref DEV2024/1484.

Noise
Provide a noise impact assessment report that demonstrates the proposal provides adequate noise mitigation to minimize potential impacts on residential and other surrounding sensitive uses. At a minimum the report should include the following:

a) Background sound level monitoring;
b) Detail the expected impact of all relevant noise sources (e.g. loading dock/delivery activities, car park noise, people noise, amplified music, all mechanical plant and equipment, industrial noise, etc) against the Environmental Protection (Noise) Policy 2008 and the Ecoaccess Guideline: Noise – Planning for Noise Control (2015) (i.e. Sleep Disturbance);
c) Consider the noise impact of uses within the same development, eg Indoor Sport and Recreation to the Hospital (Birthing Suites), childcare centre to the Hospital (Birthing suites) and others.
d) Be prepared in accordance with AS1055.1-3 - Acoustics – Description and Measurement of Environmental Noise and the Environmental Protection Act 1994 and Subordinate Regulations and Policies;
    i. Provide all monitoring data and locations, methodology and calculations;
    ii. Detail the required control measures to achieve compliance with applicable legislation and standards

1.3 Proposed Development

The PDA Assessable Development Application proposes indoor sports and recreation, education establishments, and a hospital (birthing suite). The indoor sports and recreation activities are likely to be a gym/fitness centre.

The proposed operating hours:
- indoor sport & recreation 24/7 operation
- Education establishment 7:00am to 10:00pm
- Hospital (birthing suite) 24/7 operation

2.0 EQUIPMENT AND PROCEDURES

2.1 Measurement Procedures

Environmental noise levels were measured over a six-day period commencing Wednesday 27 August 2024. The measurement location is shown as ML1 on Figure 1. ML1 was selected as the most appropriate location considering security, to obtain the ambient noise level. The result of the logging is presented in Figure 2, below.

The logger was set to record 15-minute statistics over the logging period. The weather during the logging period was fine. Unusual data (bird calls close to microphone) were excluded from the calculation.

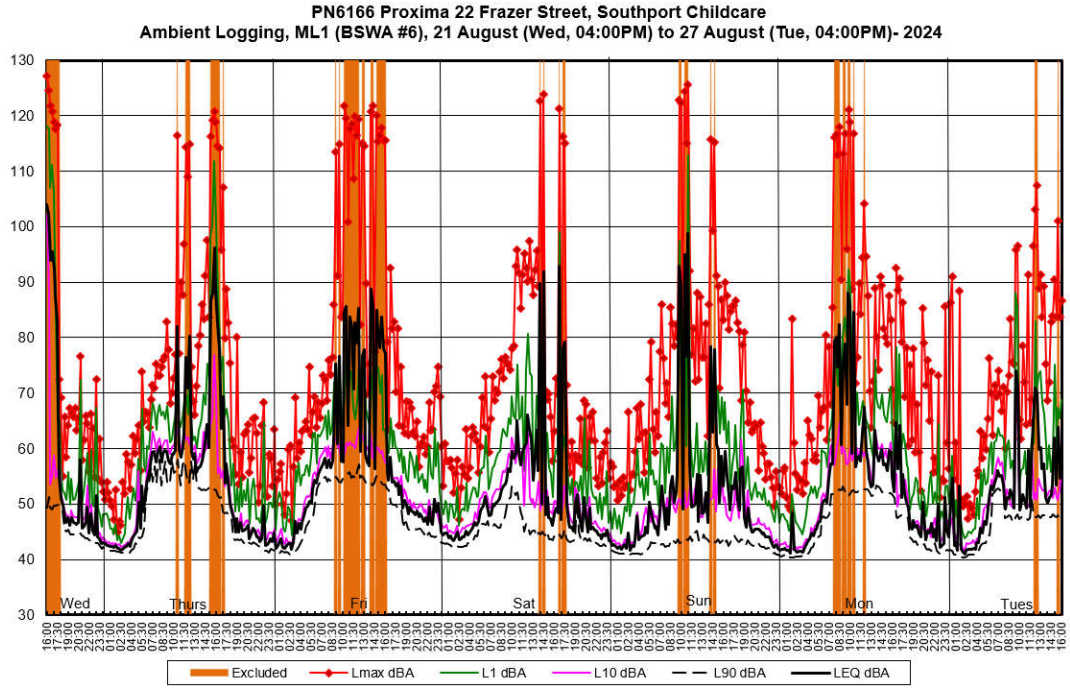

Figure 2: Ambient noise logging graphed data

The average ambient noise levels measured at ML1 are presented in Table 1.

Table 1: Measured Ambient Noise Levels ML1

Time	Measured Noise Levels[1] dB(A)[2]				
	L_{Amax}[3]	L_{A01}[4]	L_{A10}[5]	L_{Aeq}[6]	RBL[7]
Day: 7 am to 6 pm	80	64	55	56	47
Evening: 6 pm to 10 pm	65	54	48	47	43
Night: 10 pm to 7 am	59	51	46	45	41

2.2 Instrumentation

The following instruments were used to measure the ambient noise levels:

- BSWA 309 #6 noise logger (serial number 600003)
- B & K 4230 Calibrator (serial number 1638750)

The sound level measuring equipment operation was field calibrated before and after each measurement session and was found to be within 0.2dB of the reference signal. The calibrator and noise logger used in this assessment has a current calibration certificate from a certified NATA calibration laboratory.

[1] *Average noise levels throughout the period, with the exception of L_{A90} which is the average below the median noise levels for the period.*
[2] *dB(A) decibels, A-weighted*
[3] *L_{Amax} refers to the maximum a-weighted sound pressure level occurring during the sampling period*
[4] L_{A01} *for a specified time interval, means the A-weighted sound pressure level that is equalled for 1% of the interval*
[5] L_{A10} *for a specified time interval, means the A-weighted sound pressure level that is equalled or exceeded for 10% of the interval*
[6] L_{Aeq} *for a specified time interval, means the time average A-weighted sound pressure level, within the meaning given by AS1055.1 for the interval*
[7] *RBL refers to the rating Background Level*

3.0 NOISE CRITERIA

The information request from the EDQ requires that noise be assessed against the Environmental Protection (Noise) Policy 2008 (EPP(Noise)) and Ecoaccess Guideline: Noise – Planning for Noise Control (2015).

This policy (EPP Noise 2008) has been superseded by the Environmental Protection (Noise) Policy 2019 however this assessment should be assessed against the earlier policy as per the RFI. The 2015 Planning for Noise Control version cannot be found on the Government website. This assessment will apply the 2004 Planning for Noise Control version for sleep disturbance criteria.

3.1 Environmental Protection (Noise) Policy

The Environmental Protection (Noise) Policy 2008 details acoustic quality objectives in schedule 1. Relevant sections of this schedule are extracted in Table 2, below.

Table 2: Extract from EPP (Noise) Schedule 1 Acoustic quality objectives

Column 1	Column 2	Column 3			Column 4
Sensitive Receptor	Time of day	Acoustic quality objectives (measured at the receptor) dB(A)			Environmental value
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$	
residence (for outdoors)	daytime and evening	50	55	65	health and wellbeing
residence (for indoors)	daytime and evening	35	40	45	health and wellbeing
	night-time	30	35	40	health and wellbeing, in relation to the ability to sleep
library and educational institution (including a school, college and university) (for indoors)	when open for business or when classes are being offered	35			health and wellbeing
hospital, surgery or other medical institution (for indoors)	Visiting hours	35			health and wellbeing
hospital, surgery or other medical institution (for indoors)	anytime, other than visiting hours	30			health and wellbeing, in relation to the ability to sleep

We note that the quality objectives are below the measured background noise levels. As the noise levels are natural in origin, there is no avenue to enhance the acoustic environment by

the control of noise emissions to the objective level. Accordingly, noise emissions are considered against the measured background noise level.

the EPP Environmental Protection (Noise) Policy 2008.

(a) for noise that is continuous noise measured by $L_{A90,T}$—more than nil dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$; or
(b) for noise that varies over time measured by $L_{Aeq,adj,T}$—more than 5dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$

Based on the RBL levels presented in Table 1, the noise intrusion limits (outdoor) are calculated and shown in Table 3.

Table 3: Noise Limits

Time	Background Levels dB(A)	Emission and Intrusion outdoor limit $L_{Aeq,adj,T}$ dB(A)		Hospital birthing suite Internal noise limit $L_{Aeq,adj,1hr}$ dB(A)	Education Internal noise limits $L_{Aeq,adj,1hr}$ dB(A)
	RBL	Continuous	Varying		
Day: 7 am to 6 pm	47	47	52	35	35
Evening: 6 pm to 10 pm	43	43	48	35	35
Night: 10 pm to 7 am	41	41	46	30	

3.2 Sleep Disturbance criteria

The sleep disturbance criteria are obtained from the Ecoaccess Guideline: Noise – Planning for noise control 2004. The relevant section is extracted and presented below.

> *Research has shown that the ability to get to sleep and, when asleep, the probability of experiencing a change of sleep state or ultimately of awakening are related to both the ambient and maximum instantaneous noise levels at the ear of the sleeper and the number of events during the night time period (WHO 1999).*
>
> *As a rule in planning for short-term or transient noise events, for good sleep over eight hours, the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45dBA maxLpA more than 10-15 times per night. The corresponding external noise level, assuming partially closed windows, is 52dBA maxLpA, measured in the free field*

The internal sleep disturbance noise limit within the building, Hospital (birthing suite) is L_{Amax} 45dB with an external limit of 52dB.

3.3 Impulsive Noise Limits (weight drops)

In our experience with impact noise and vibration from gymnasiums, that when the noise is appropriately controlled, vibration is not a concern (ie will not cause issues for adjacent occupants). The proposed limiting criteria appling to impulsive noise from weight drops (taken from the *AAAC, Guideline for Acoustic Assessment of Gymnasiums and Exercise Facilities*) should not exceed the flowing levels (for non-Residential receivers):

Impulsive Noise Emission to Non-Residential Receivers

$L_{AFmax(\Sigma Oct,31.5\text{-}250Hz)} \leq 40$ dB for general uses[1]
$L_{AFmax(\Sigma Oct,31.5\text{-}250Hz)} \leq 35$ dB for sensitive uses[2]
$L_{AFmax(\Sigma Oct,31.5\text{-}250Hz)} \leq 30$ dB for critically sensitive uses[3]

Notes:
1. *General uses may include office spaces and general working areas*
2. *Sensitive uses may include private offices, classrooms, childcare and movie cinemas*
3. *Critically sensitive uses may include noise sensitive laboratories and board rooms*
4. *Justification would be required of the acoustician for the objective criteria adopted*

We recommend that this be assessed as a 35 dB LA01 level.

Impulsive Vibration Emission

The acceptable weighted r.m.s. vibration acceleration values for impulsive vibration set out in Table 2.2 of the NSW EPA Guideline are presented within Table 4 below.

Table 4: EPA Acceptable Impulsive Vibration Weighted r.m.s. Acceleration Values (m/s^2) (1-80Hz)

Location	Assessment period	Preferred Value		Maximum value	
		Z axis	X & Y axes	Z axis	X & Y axes
Critical Area	Day or night time	0.005	0.0036	0.01	0.0072
Residences	Day time	0.3	0.21	0.6	0.42
	Night time	0.1	0.071	0.2	0.14
Office, school, equcational institution and places of worship	Day or night time	0.64	0.46	1.28	0.092
Workshop	Day or night time	0.64	0.46	1.28	0.092

Hospital (birthing suite) is considered a critically sensitive use, therefore the impulsive noise of $L_{AFmax(\Sigma Oct,31.5\text{-}250Hz)} \leq 30$ dB or 35 dB LA01. The recommended vibration limits are highlighted in Table 4 above.

4.0 NOISE SOURCE LEVEL FROM TTM

The following noise source table was extracted from the original TTM acoustic report.

Table 5: Typical Onsite Transient Noise Source Levels

Noise Source Description	*Noise level at 1m, dB(A)*			*Measured Duration (Second)*
	$L_{Aeq,T}$	$L_{A10,T}$	$L_{A01,T}$/ L_{AMax}	
Car door closure	*75**	*77**	*83**	*2*
Car bypass @ 5km/h	*69*	*75*	*75*	*6*
Car engine ignition	*72*	*74*	*74*	*3*
Conversations (external areas)	*65*	*68*	*72*	*Long term avg.*
*Children playing (AAAC Guideline 0-2 year old's)^*	*71*	*n/a*	*n/a*	*Long term avg.*
*Children playing (AAAC Guideline 2-3 year old's)^*	*77*	*n/a*	*n/a*	
*Children playing (AAAC Guideline 3-6 year old's)^*	*79*	*n/a*	*n/a*	
Waste collection	*93**	*94**	*105**	*40*
Deliveries	*80*	*83*	*85*	*60*

**Includes 2dB(A) adjustment to account for impulsiveness characteristics in accordance with AS1055.*
^ the AAAC sound power levels for outdoor play are categorised based on the age of the children. The centre of the AAAC noise level range has been used. Note that the AAAC noise level presented in Table 4 has been converted from a sound power level to a sound pressure level at 1m.

5.0 NOISE INTRUSION FROM OFFSITE ACTIVITIES

The original TTM report states that the offsite noise sources are:

- Mechanical plant noise from Gold Coast University Hospital
- Car parking activities from across Hill Street
- Conversation activities from the adjacent residential apartment balconies across Stanley Lane
- Deliveries truck bypass activities from Woolworths and BWS across Nexus Way

Figure 3: Offsite Potential noise impact

The TTM report:

- Calculations attenuation from offsite activities to inside the building with a-20dB reduction (based on standard construction and closed windows and doors.)
- Predictes indoor noise levels from offsite activities at less than 23dB $L_{Aeq,\ 1hr}$. This complies with the internal Acoustic Quality Objectives criteria.

The indoor noise levels from offsite activities at 23dB $L_{Aeq,\ 1hr}$ meet the internal Acoustic Quality Objectives for a hospital (birthing suite) of 30dB and 35dB $L_{Aeq,\ 1hr}$. Thus the Hospital (birthing suite) complies with the internal Acoustic Quality Objectives.

5.1 Sleep Disturbance from Offsite Activities

Some offsite activities will not occur during the night period, i.e. children playing, waste collection and truck deliveries. From Table 5, the LAMax noise sources are applied to predict noise from offsite activities on the Hospital (birthing suite).

The distance between the building façade to nearby apartment balconies and car parking is approx 15m and 20m, respectively. The distance attenuation is calculated at 6 dB per doubling with distance.

The current glazing being a 24mm thick DGU (6mm toughened glass, 12mm argon gap, 6mm toughened glass). Based on Insul prediction software, this DGU rates at Rw35, which is likely to achieve a -29dB reduction, 9 dB better than required from the TTM report.

The night time Lmax level from the nearby car park and conversation noise from residential balconies to the Hospital (birthing suite) are presented Table 6.

Table 6: Predicted night time noise impacts Lmax inside Hospital (birthing suite)

Source	Distance Attenuation	Façade Attenuation	Noise Level dB(A) at residences	Complies With night time internal Noise Limits 45dB(A) L_{Max}
			L_{Amax}	
Car door closure 83dB@1m	-26dB (1m to 20m)	-29dB	28 dB(A)	Yes
Car bypass 75dB@1m	-26dB (1m to 20m)	-29dB	20 dB(A)	Yes
Car engine ignition 74dB@1m	-26dB (1m to 20m)	-29dB	19 dB(A)	Yes
Conversations 72dB@1m	-23dB (1m to 15m)	-29dB	20 dB(A)	Yes

The Lmax from the offsite noise complies with the internal noise limit at night (sleep disturbance limit for a birthing suite).

6.0 NOISE FROM ONSITE ACTIVITIES TO OFFSITE RESIDENCES

The proposed educational establishment and Hospital (birthing suite) do not increase noise emissions from the site. From the original DA report by TTM, the predicted delivery noise level at the closest residential balcony across Stanley Lane is 38dB(A) L_{eq}. The outdoor night time limit is 46dB, refer to Table 3 above. When doubling the frequency of the loading and unloading activities this will increase the L_{eq} by 3dB (38+3=41). The noise levels will still comply with the night time limit. Waste collection will need to be limited to day time operations, as per the original DA report.

Indoor sports and recreation activities are likely to introduce amplified music as part of the operation. The following section will assess amplified music from within the building (closed facades) impacting onto the closest residential balconies across Stanley Lane.

6.1 Onsite gym activities to offsite residence

Part of this application is to have indoor sports and recreation facilities tenanted in the building. The closest noise-sensitive receiver (balcony) is across Stanley Lane. The distance between the external façade and the residential balcony is approximately 15m.

a) Noise Source – Amplified music

Measurements of typical amplified music (DJ style music from gym) and background music have been conducted by this office and are presented in Table 7.

Table 7: Typical maximum measured noise levels 3m from speakers

Source – individual event		Noise Level at 3m from Speakers			
	L_{C10}	L_{Ceq}	L_{A01}	L_{A10}	L_{Aeq}
Amplified music (high bass sound track)	110dB(C)	107dB(C)	106dB(A)	104dB(A)	97dB(A)
Amplified background music	-	75dB(C)	74dB(A)	-	65dB(A)

b) Gym noise calculations

Table 8 and Table 9 presents the noise impacts from the proposed gymnasium tenancy to the adjacent residential balcony. The calculation is based on the following:

- Distance attenuation of 6 dB per doubling of distance,
- Inside to outside calculation based on Woods Practical Guide to Noise Control (SPL2 = SPL1 - R + 10 log Sp[8] - 20 log r[9] - 14dB)
- An overall façade attenuation of R = -29 dB (6mm glazing, with 12mm air gap & 6mm glazing).
- Typical external façade area of gym tenancy 3.6m x 20m = 72m^2

[8] Sp is the area of the wall in m^2
[9] r is the distance from the wall in m

Table 8: Amplified music impacts into adjacent apartments - L_{eq}

Source	inside to outside calculation, including distance and façade attenuation, 3dB façade reflection	Noise Level dB(A) at northern residential balcony	Complies With Noise Limits 52/48/46dB(A)
		L_{Aeq}	
Amplified music (high bass sound track) 97dB (A)	-48 dB, & +3dB	52 dB(A)	Yes to daytime limit
Amplified background music 65dB(A)	-48 dB, +3dB	20 dB(A)	Yes to all

Table 9: Amplified music impacts into adjacent apartments - L_{Max} (sleep disturbance)

Source	inside to outside calculation, including distance and façade attenuation, 3dB façade reflection	Noise Level dB(A) at northern residential balcony	Complies With Noise Limits 52dB(A)
		L_{AMax}	
Amplified music (high bass sound track) 106dB (A)	-48 dB, &+3dB	61 dB(A)	No
Amplified background music 74dB(A)	-48 dB, +3dB	29 dB(A)	Yes

Table 8 and Table 9 shows that amplified music within the existing glazed façade complies with the Council daytime limits at the closest residential balcony. For amplified music (with high bass) inside the gym to comply with night time limits (both L_{eq} and L_{Max}), the music level must not exceed 88dB(A) at 3m from speakers. The allowable music level is 97dB(A) during day and 88dB(A) at night.

If the gym operator requires a higher levels of music, the external glazing should be upgraded. Further acoustic investigations will be necessary before a gym be tenanted, i.e. operation of the gym and type of acoustic treatment.

7.0 NOISE WITHIN THE SAME DEVELOPMENT

As per the Economic Development Queensland information request, the following section considers the noise from the childcare centre to the Hospital (birthing suite) and Indoor Sports and Recreation to the Hospital (birthing suite).

7.1 Childcare facility

Noise from the level 2 outdoor play area will impact into the near by Hospital (birthing suite) façade (worst case). Child play noise is obtained from the original acoustic report (refer to Table 5). The outdoor childcare play area is used between 7am to 6pm. The EPP Noise limit is 30dB(A) inside the birthing suite.

The distance between the centre of the play area to the closest building façade (within the same development) is approx 5m. Distance attenuation is calculated at 6 dB per doubling with distance.

The current glazed façade is a 24mm thick DGU (6mm toughened glass, 12mm argon gap, 6mm toughened glass) achieving a -29dB reduction.

Daytime Leq levels from the centre of the play area to the Hospital (birthing suite) (closest building façade) are presented Table 10.

Table 10: Predicted day time noise impacts Leq inside Hospital (birthing suite)

Source	Distance Attenuation	Façade Attenuation	Noise Level dB(A) at residences	Complies With day time internal Noise Limits 30dB(A) L_{eq}
			L_{Aeq}	
Children playing (3-6 year old) 79dB@1m	-14dB (1m to 5m)	-29dB	36 dB(A)	Exceed by 6 dB

If the birthing suite faces the outdoor play area, additional acoustic treatments will be required. The external glazed façade of the birthing suite should be upgraded with an additional 6.38mm laminated glass panel with minimum 50mm air gap on the internal side of the existing DGU.

If the birthing suite does not face the outdoor play area, no acoustic treatment is required to the Hospital (birthing suite).

7.2 Gym facilities

This section of the assessment assumes for the worst case, Hospital (birthing suite), education, or office located directly above and below a gym. This assessment has two noise paths: airborne and structure borne.

a) Airborne

It is understood that the thickness of the concrete slab throughout each level is 300mm thick and achieves approximately Rw65. The noise attenuation through a 300mm slab is approximate -59dB or -47dB at 125Hz. The new source noise level in the gym (amplified music) could be 88dB(A) @ 3m from speakers. We predict noise levels in the Hospital (birthing suite) at approximately 88 -59 = 29dB(A) L_{eq}. A level of 29dB(A) complies with the noise level during visiting hours 35dB(A) and anytime other than visiting hours 30dB(A). In our experience, low-frequency music may still be audible in the hospital (birthing suite), education, and office tenancies.

To reduce the low frequency music impact from gym, we recommend a solid plasterboard ceiling between the gym and Hospital (birthing suite) tenancy. The suspended ceiling should be two (2) layers of 13mm thick fire rated plasterboard with 75mm thick fibreglass insulation (min density of 11 kg/m^3) in the void.

b) Structure-borne

Noise from the gym (weight drop) can generate a structure-borne noise throughout the building. The level of the intrusion is subject to the weight and height of the drop. This assessment is difficult to assess, as there are many different types of gyms with very different operations. Different vibration treatments are applied to different gym equipment, i.e. free weights, weight machines, cardio equipment, rope and medicine ball exercises.

For example – treatment for free weights:

- if a gym operates with heavy weights 100kg and drops weight at 1.5m high, will require a rubber mat on top of the concrete floating floor (spring isolation) (further testing and construction details will be provided at the design stage of the gym)

- if a gym operates with weights 60kg and drops weight at 0.7m high, will require a rubber mat on top of the timber floating floor (spring isolation)

We recommend that the lease agreement state the noise and vibration limits (refer to section 3.3). A sample test of the floor and walls with noisy operation, i.e. dropped weights and amplified music, should be conducted before installation.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our assessment, we conclude:

- Offsite activities will impact noise into the Hospital (birthing suite) at levels that complies with the internal Acoustic Quality Objectives set by the EPP Noise.
- Offsite noise activities will impact noise into the Hospital (birthing suite) at levels that complies with EPP Noise sleep disturbance limits.
- Noise from the onsite gym (amplified music activities) to the nearby residential balconies complies with day and night time limits.
- Noise from within the development into the Hospital (birthing suite) will normally comply with the Acoustic Quality Objectives objectives set by the EPP Noise.
- Noise and vibration limiting criteria should be applied to future indoor sport and recreation facilities. Further testing and acoustic advice may be required to protect the Hospital (birthing suite) from indoor sport and recreation facilities.

To ensure compliance with the EDQ noise requirements, we recommend:

- The noise and vibration from the future indoor sport and recreation facilities must be limited to section 3.3 in the adjacent tenancies.
- If the façade of the Hospital (birthing suite) faces a childcare outdoor play area, additonal glazing will be required in the Hospital (birthing suite). In this case the external glazed façade should be upgraded with an additional 6.38mm laminated glass minimum 50mm air gap on the internal side of the existing DGU.
- If the birthing suite does not face the outdoor play area, acoustic treatment is not required to the Hospital (birthing suite).
- The indoor sport and recreation tenancy must provide, within it's tenancy, airborne and vibration treatments to the adjacent tenancies' floor, ceiling and walls. If physical acoustic treatment cannot be applied to the adjacent tenancies (due to limited access), indoor sports and recreation tenancies must limit the level of amplified music and the dropping of weights.
- The noise and vibration limits are imposed in the lease agreement. The lessee must comply with these noise and vibration limits.
- The proposed acoustic treatments recommended in this report are required to validate compliance with the operational limits.

Subject to the proposed acoustic treatments, it is the opinion of Palmer Acoustics (Australia) Pty Ltd that the proposed development will comply with the requirements of the Economic Development Queensland.

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Reviewed by:

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Principal