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Queen Mary Building, Camperdown

Site Compatibility Assessment



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1 INTRODUCTION

This report presents an analysis of acoustic impacts associated with the proposed refurbishment of the Queen Mary Building at Grose Street, Camperdown in order to determine whether the site is suitable for its proposed use as student accommodation.

In this report we will:

- Conduct a review of external noise impacts to determine whether any upgrading of the building façade is likely in order to provide satisfactory levels of amenity for future occupants.
- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council acoustic requirements to ensure that nearby developments are not adversely impacted.
- Provide comment regarding internal constructions and finishes with reference to Council and BCA acoustic requirements.

2 SITE DESCRIPTION / PROPOSED DEVELOPMENT

The subject site is located on the corner of Church and Grose Streets, Camperdown, in the Royal Prince Alfred Hospital precinct.

The proposed development consists of the refurbishment of the existing building (presently vacant, previously used as accommodation quarters for hospital staff) for use as student accommodation.

At present there are approximately ten parking spaces on the site in an on-grade car park on the western property boundary. It is proposed to increase this by up to four parking spaces.

The site is bounded as follows:

- To the south by a multi-storey parking station.
- To the west by Church Street. Further to the west, in the far side of Church Street lies residential development.
- To the east by a hospital building (housing a cyclotron).
- To the north by three other hospital buildings (school of nursing, child care centre and Endocrine research).

The nearest potentially affected noise sensitive receivers are the residents to the west of the site, on Church Street.

The primary noise sources in the vicinity of the site is the parking station (to the south of the site) and the outdoor play area of the child care centre (to the north of the site).

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10} , L_{90} and L_{eq} .

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

4 NOISE IMPACT ASSESSMENT

Significant noise sources in the vicinity of the site are as follows:

- The multi-storey car park, to the south of the site.
- The outdoor play area of the child care centre, to the north of the site.

Noise impacts should comply with the requirements of the Central Sydney DCP.

4.1 ACOUSTIC OBJECTIVES

Central Sydney DCP 1996 acoustic requirements are as follows:

“All residential buildings and serviced apartments are to be constructed so that the repeatable maximum L_{Aeq} (1 hour) level does not exceed the following levels:

i) *In a naturally ventilated – windows closed condition:*

<i>Sleeping areas (night time only: 2200 – 0700)</i>	<i>35dB</i>
<i>Living areas (24 hours)</i>	<i>45dB</i>

ii) *In a naturally ventilated – windows open condition*

<i>Sleeping areas (night time only: 2200 – 0700)</i>	<i>45dB</i>
<i>Living areas (24 hours)</i>	<i>55dB</i>

Where a naturally ventilated – windows open condition cannot be achieved, it is necessary to incorporate mechanical ventilation or air-conditioning”.

4.2 NOISE MEASUREMENTS / COMMENTS

A survey of existing noise impacts was undertaken on 20 December 2010.

Measurements were made using a CEL 573 Type 1 sound analyser set on A-weighted fast response mode.

Noise levels at the southern façade (facing the car park) and the northern façade (facing the child care centre) were determined to be less than 55dB(A) $L_{eq(1hour)}$.

Given the measured external noise level, no acoustic treatment is needed in order to comply with Councils noise impact requirements:

- Noise levels within the proposed development will be less than 45 dB(A) $L_{eq(1hour)}$, even assuming that windows in the development are left open. No acoustic treatment will be needed in order to comply with the “naturally ventilated” acoustic criteria referred to in section 4.1 above. Mechanical ventilation to meet acoustic objectives is not required.
- When windows are closed, standard glazing will be sufficient to ensure that the “windows closed” acoustic criteria will be achieved.

5 NOISE EMISSION ASSESSMENT

Noise emissions from the site should be assessed to ensure that the amenity of nearby land users is not adversely affected.

Potential noise sources which should be assessed are:

- Noise generated by new mechanical plant.
- Noise generated within the development, from lounge/common areas.
- Operational noise from any commercial tenancies in the development .

The nearest potentially effected residential receivers are those directly opposite the site on Church Street and additional to the future occupants of the site itself.

5.1 NOISE EMISSION OBJECTIVES

Noise emission controls typically applied by the City of Sydney Council are set out below.

5.1.1 Noise – generally

The $L_{Aeq(15min)}$ noise level generated by the site is not to exceed background noise levels by more than 5dB(A).

5.1.2 Mechanical Services Noise

- Between 7am and Midnight - noise emissions are not to exceed background noise levels by more than three decibels in any place of different occupancy when measured in octave bands between 31.5Hz and 8,000Hz when measured at a residential property boundary..
- Between Midnight and 7am - noise emissions are not to exceed background noise levels in any place of different occupancy when measured in octave bands between 31.5Hz and 8,000Hz when measured at a residential property boundary.

5.2 COMMENTS / RECOMMENDATIONS

5.2.1 Noise Generally

Key potential noise sources are the use of common areas and commercial tenancies. In the regard we note:

- Noise generated through use of common areas and lounges to accommodation areas will be satisfactorily controlled through construction of internal walls/floors etc to meet BCA requirements.
- Base building construction of the space to be used for commercial tenancies will also be designed to meet BCA requirements with respect to noise transmission to adjacent residential tenancies. In the event that any of the tenancies are likely to generate higher than typical noise levels (restaurant/café, gymnasium) we assume that the future tenant would be required to undertake an acoustic assessment as part of any development application to ensure there will be no adverse noise impacts.

Detailed design of internal works will be undertaken during design development, once internal construction systems are determined. This will ensure noise generation within the development will not adversely impact other spaces.

The potential increase of up to four cars to the site will be insignificant in generating additional noise.

5.2.2 External Mechanical Plant

Mechanical plant items are not typically selected until CC stage.

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to level complying with Council noise emission goals (discussed in section 5.1).

Primary mechanical plant items with the potential to create noise are likely to consist ventilation plant, hydraulic plant and exhaust fans for kitchens/commercial tenancies. We note that there is no enclosed parking proposed, and therefore there will be no need for car park ventilation fans.

Given the plant items likely to be required and the distance to the nearest noise sensitive receivers, compliance with noise emission goals will be achievable using typical acoustic treatments (vibration isolation mounts, screens around external plant). Detailed review of all external plant items (or internal plant which is ducted to external facades) should be undertaken at CC stage, once design of mechanical services is undertaken.

6 INTERNAL ACOUSTICS

Acoustic privacy requirements for the accommodation units is governed by both the BCA and the City of Sydney DCP. In short, the following will need to be addressed in order to ensure a reasonable level of amenity is achieved for the future tenants:

- Sound transmission through walls (inter-tenancy walls, tenancy to common area/stairwell/lift shaft etc).
- Sound (impact and airborne noise) transmission through floors of sole occupancy units.
- Noise from mechanical and hydraulic services.

Comments:

- Compliance with all relevant guidelines will be achievable. A set of compliant treatments is outlined below. Detailed design should be undertaken on finalisation of architectural plans, prior to CC/tender stage.
- Walls.
 - Inter-tenancy walls are walls bounding sole occupancy units (whether they be single rooms or “clusters” of bedrooms with shared kitchen. These walls are required to achieve an acoustic performance of $R_w + C_{tr}$ 50 and FSTC 50-55 in order to comply with BCA and City of Sydney Council acoustic requirements.

- Existing single skin masonry wall will require upgrading when the wall forms an inter-tenancy wall.
- This wall would either need to run from slab to slab, or an acoustic ceiling would be required.
- We confirm that compliance with required acoustic performance will be achievable. Wall systems with an envelope of at least 155mm thickness will be capable of achieving the required acoustic performance.
- We recommend that prior to CC stage that an acoustic test be undertaken in a number of randomly selected walls to confirm what upgrading, if any, is necessary for inter-tenancy walls and any other internal walls within the development to meet required acoustic performance.
- Floors.
 - BCA requires that floors achieve an airborne noise rating of at least $R_w + C_{tr}$ 50 and an impact noise rating (eg footfall) of no more than $L_{nTw} + C_1$ 62. Council requires that the floors achieve an airborne noise rating of FSTC 50 and an impact noise rating of IIC 50.
 - We note that the existing floor slabs are at least 150mm thick and that a new, suspended plasterboard ceiling will be constructed below, with a ceiling cavity of at least 80mm. Assuming this is the case, airborne noise requirements of BCA and Council will be met.
 - Compliance with BCA and Council requirements is achievable. In carpeted areas, no further acoustic treatment is needed to meet impact (footfall) noise requirements. If timber or tiled floors are to be installed, a 5mm thick acoustic underlay (Acoustic Supplies Vibramat or equal) will be sufficient to address impact noise requirements. Alternately, cushion backed vinyl flooring may be considered, although any proposed flooring system should be reviewed by an acoustic consultant.
- Hydraulic Services
 - Compliance with BCA requirement for acoustic separation of hydraulic services is achievable:
 - Any waste or stormwater piping in a ceiling cavity over a bedroom or living area would need to be wrapped with 5kg/m^2 foam backed loaded vinyl lagging and a strip of 75mm thick 11kg/m^3 glasswool insulation laid on the ceiling below the piping.
 - Where pipework runs over a wet area, both sheets of the perimeter wall of the wet area will need to run slab to slab (and insulation to the cavity, if a plasterboard system is used) and a layer of 75mm thick 11kg/m^3 glasswool insulation should be installed in the wet area ceiling cavity which contains the pipework.
- Mechanical services.

Acoustic review of all mechanical services should be undertaken once plant items and layouts are completed to determine whether acoustic treatments are required. Compliance with Council/DECC requirements for noise to nearby properties, and with AS2107 for rooms within the subject development, will be achievable through appropriate design and acoustic treatments (in-duct lining, noise screens/plant rooms for external plant etc). This report should be undertaken at CC stage.

7 CONCLUSION

Potential noise impacts associated with the proposed refurbishment works at the Queen Mary Building, Camperdown t have been assessed.

Noise impacts from nearby noise sources on occupants of the development have been assessed in accordance with City of Sydney DCP guidelines, and discussed in section 4.

Noise emissions objectives for the site have been discussed, and compliance with Council/DECCW noise emission goals will be achievable, as discussed in section 5.

An initial review of internal wall/floor/riser/services has been undertaken and discussed in section 6 of this report.

Review of the above indicates that compliance with all relevant codes will be achievable and the site is appropriate for the intended refurbishment and use as student accommodation.

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