

MANAGING DIRECTORS

MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS

MATTHEW SHIELDS
BEN WHITE



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Health Infrastructure
ABN 89 600 377 397
PO Box 1060
NORTH SYDNEY NSW 2059

Email: accounts@hinfra.health.nsw.gov.au

Hornsby Ku-ring-gai Hospital Stage 2 Redevelopment - Response to Planning NSW Queries

This letter has been prepared in response to comments made by the Planning NSW in an email received regarding the Revision 4 of our *SSD Acoustic Assessment* (dated 28/03/2018) for the Stage 2 Redevelopment of the Hornsby Ku-ring-gai Hospital.

Our responses are presented below.

- **Response to point (i)**

Planning NSW has stated that our previous response prepared on the 29/03/2018 has not adequately addressed the concerns raised by the EPA in their letter with reference DOC18/127775-01.

- The concerns raised by the EPA related to background noise surveys and the noise emission goals for the site, the assessment of plant and equipment noise and the proposed noise screens (lapped and capped timber) fences around generators.
- Our responses are presented in points (ii) to (iv) below.

SYDNEY

A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

**SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE**

ABN: 11 068 954 343

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- **Response to point (ii)**

Point (ii) of NSW Planning comments states that background noise measurements have not been undertaken at the nearest receiver locations, and are therefore unacceptable without significant justification. Given this, it is not possible to determine suitable noise emission goals for the site.

- The EPA had made comments with respect to our original acoustic assessment with respect to background noise logging and noise emission goals. Following this, Acoustic Logic undertook additional measurement and justification of noise goals.
- The EPA has since made recommendations that the following noise limits be set for operational noise from the site (their letter ref DOC18/127775-01):
 - 40 dB(A) L_{eq} (15 minute) for residences in Burdett Street;
 - 35 dB(A) L_{eq} (15 minute) for residences in Derby Road; and
 - 39 dB(A) L_{eq} (15 minute) for residences Palmerston Road.
- We propose that these noise goals are in fact set for operational noise limits (in fact, they were very close, although not identical to those proposed in revision 4 of our Acoustic Assessment, Rev 4).
- Given the agreement with the EPA proposed noise emission goals, we believe that concern about background noise monitoring and the corresponding noise emission goals for the site are addressed.

- **Response to point (iii)**

Point (iii) of the Planning NSW comments states noise from mechanical plant servicing the Stage 2 redevelopment has not been adequately assessed. Specific mention was made with respect to potential noise from the new generators (Level 6 plant room). This is addressed below:

- Proposed new diesel generators
 - Two new diesel generators are proposed to be located on Level 6 of the Stage 2 redevelopment. Depending on the generator model selected, these may or may not have proprietary acoustic enclosures.
 - Diesel generators *without* proprietary acoustic enclosures:
 - These typically have a sound power level of approximately 125dB(A).
 - Acoustic treatment to air intake and discharge openings to the plant room typically require acoustic attenuators in the order of 2700mm long, 40% free area (Noise Control or equal).
 - In addition, generators without proprietary enclosures would need to have partitions constructed around them, separating them from other areas of the plant room (in order to control noise breaking out through louvres from the remainder of the plant room).
 - The bounding partitions to the generator area will typically need to be either concrete block (min 90mm) or an insulated stud wall construction (9mm fc sheet to each side of studwork with 75mm thick 11kg/m3 insulation to the cavity).
 - Diesel generators that do have proprietary acoustic enclosures:
 - Typically, these systems have a noise emission level of approximately 75dB(A) at 7 metres. While this substantially reduces the need for acoustic treatment, there is still typically a small amount of additional treatment required.
 - Any air intake or discharge to the plant room housing the generator with an enclosure would typically require 600mm deep acoustic louvres.
 - In addition (regardless of generator/enclosure type) an appropriate exhaust gas muffler would be selected such that the resultant noise level at one metre from the exhaust gas discharge point is no more 75dB(A) (the discharge being directed away from the residents to the south and east).
- Level 6 plant room.
 - The east facing louvres are the most critical aspect of the Level 6 plant room (closest to the Derby Road residences).
 - Plant room design is such that it is primarily air handling units and return air fans that are located adjacent to the eastern louvres. The case radiated noise from these units is typically one of the quieter plant room noise sources (compared to chillers, pumps, generators etc).

- Despite this, the eastern louvres of the plant room is likely to need to be blanked off (6mm fc sheeting or 1mm steel sheet) to ensure noise emitted is compliant with the 35dB(A) noise target for Derby Street.
- Outside air intakes for the air-handling units would be ducted from the unit to the façade penetrating the blanking sheeting (to enable air intake without other plant room noise escaping). This outside air ductwork would need to be internally lined (indicatively 50mm thick) to ensure that the outside air ducting itself is not an excessive noise source.
- The eastern plant room façade is the primary operational noise source from the hospital to the nearest residences. The design of this ductwork will be such that the 35dB(A) noise limit at the Derby Street residences is achieved.
- Cooling towers
 - Two cooling towers are proposed to be located in an external area on level 6 of the development (away from the eastern façade/Derby Street residences).
 - Current plant selections indicate that the cooling towers will have a sound power level of 86dB(A) when operating at full speed.
 - Given the distance between the cooling towers and the surroundings residents and shielding provided by the hospital building structure, the proposed cooling towers will comply with the noise emission requirements.
 - Despite this, it recommended that cooling towers are fitted with variable speed drives, to allow for reduced fan speed during periods of low load. Typically, a fan speed of no more than 50% would be expected at night time.
 - In the event that significantly louder cooling towers are ultimately selected (over 95dB(A)) *and* the hospital building shell does *not* provide a noise screen to the east and south of the towers (ie – the sides facing the Derby and Burdett Street residences) a dedicate noise screen or acoustic louvre around the cooling tower is likely to be required. Alternatively, dedicated air intake and discharge attenuators to the cooling towers may be required.
- Chillers (assumed sound power of 102dB(A)).
 - Three chillers are proposed to be located within the Level 6 plant room.
 - The plant rooms housing the chillers should not have any external ventilation opening/louvre.
 - The chillers would need to have partitions constructed around them, separating them from other areas of the plant room (in order to control noise breaking out through louvres from the remainder of the plant room). The bounding partitions to the generator area will typically need to be either concrete block (min 90mm) or an insulated stud wall construction (9mm fc sheet to each side of studwork with 75mm thick 11kg/m³ insulation to the cavity).

- Light weight cladding to external plant room walls and ceiling will potentially require internal plasterboard sheeting to ensure acceptable noise breakout through wall/roof to nearby receivers.
- Typical vibration isolation would consist of 25mm static deflection springs sitting on a concrete plinth isolated from the structural slab using 10mm rubber matting.
- Major fan units (e.g. air handling units, kitchen and toilet exhaust fans)
 - Acoustic treatment will be needed for any fan ducted to atmosphere what has a sound power level of more than 70dB(A). The precise extent of in-duct treatment will depend on the sound power of a given fan and the external grill location (its orientation relative to Debry Street).
 - For the most part, suitable noise emissions will be achieved through internal lining of ductwork to atmosphere, although acoustic attenuators are potentially required for fans with sound powers exceeding 80dB(A) or when the duct runs are very short.

With the above treatments, cumulative noise levels complying with the nearest 35dB(A) noise limit on Derby Street (the nearest residence) and the other residences on Burdett Street (40dB(A)) and Palmerston Road (39dB(A)) will be achieved.

- **Response to point (iv)**

Point (iv) of the Planning NSW comments states that Colorbond or lapped and capped fence is not an effective noise mitigation measure.

- Colobond/lapped and capped fencing had been specified in relation to the acoustic screening recommended for the existing generator in section 6.3.1 of our Acoustic Assessment.
- Screen heights had been proposed to extend 1.2m above the top of the generator, and the acoustic benefit provided as a result is approximately 10dB(A).
- When examining noise screens, there is always a component of noise that travels over a screen, and noise that travels through the material of the screen itself.
- When considering acceptable screening materials, provided that the noise traveling *through* the material of the screen is significantly less (at least 8dB(A)) than the noise travelling over the screen, the material of the screen is satisfactory.
- In this case, lapped and capped timber material is capable of reducing noise transmitted through it by approximately 20dB(A), whereas only a 10dB(A) reduction was needed (being the reduction achieved by noise travelling *over* the screen). This being the case, a suitably constructed lapped and capped screen is suitable in the circumstances.
- In discussion with NSW Planning, a minimum material density of any screening element of 15kg/m² can be adopted for the development for screening material. Any screening must be constructed (and maintained) such that the screen has no gaps to the ground at the base, and between the elements of the screen itself.

Closure

Please contact us should you have any further queries.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'T. Taylor', with a stylized flourish at the end.

Acoustic Logic Consultancy Pty Ltd
Thomas Taylor