



Mulgrave Private Hospital

Acoustic DA Report

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Client HealththeCare

E-LAB Consulting

Where science and engineering inspire design.

Document QA and Revisions

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1 INTRODUCTION

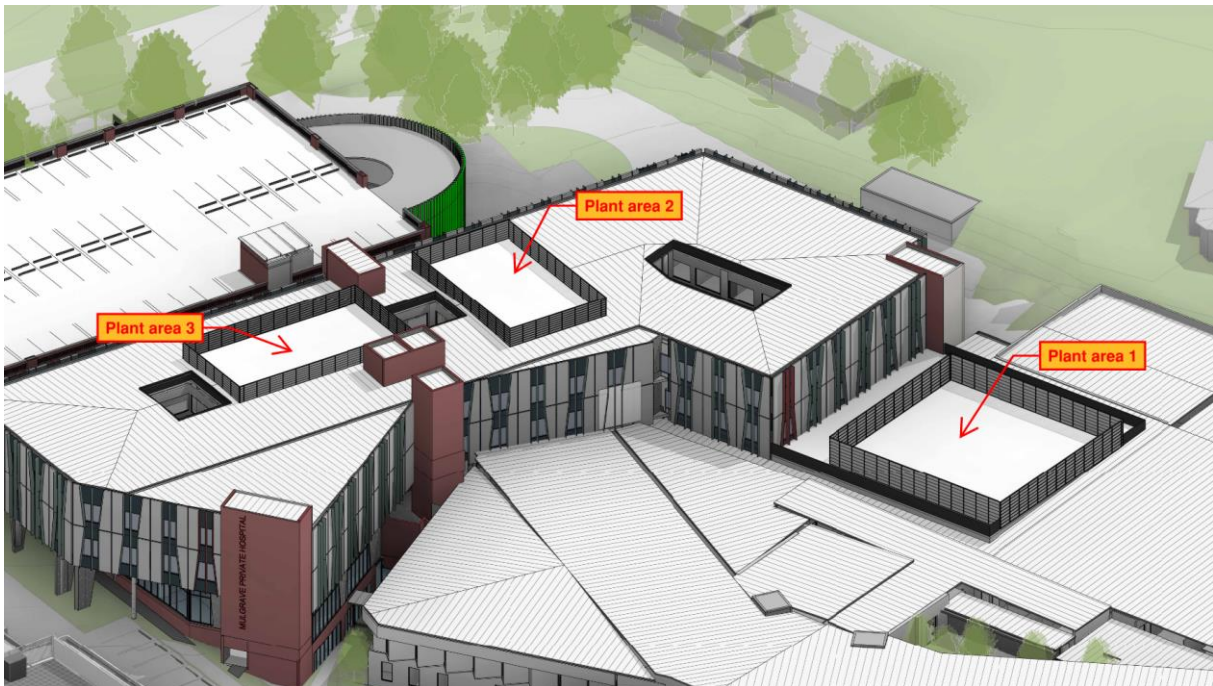
E-Lab Consulting has been engaged to assess potential noise impacts relating to the expansion of the Mulgrave Private Hospital at 535-559 Police Road, Mulgrave (Hospital). The Application proposes new hospital wings to the west of the existing building, noting that new rooftop mechanical plant is proposed as part of the expansion.

This acoustic assessment is specific to the new rooftop mechanical plant and equipment proposed as part of the expansion and in accordance with Council's RFI, as follows:

An Acoustic Report prepared by a suitably qualified acoustic engineering providing an assessment of any potential noise impacts and include recommendations of mitigation techniques associated with the location of services and plant including services located on rooftops.

The snapshot of the rooftop plant areas is shown in Figure 1 below. This assessment has been conducted based on plans prepared by HSPC dated 28 September 2023.

Figure 1: Mulgrave Private Hospital rooftop plant areas



2 SITE INSPECTION AND CONTEXT

E-Lab Consulting visited Mulgrave Private Hospital to survey nearby sensitive uses and to conduct attended background noise measurements on 16 February 2024 between 12.00am and 1.00am. The nearest sensitive uses adjacent to the proposed rooftop plant are dwellings located to the North of the expansion as presented in Figure 2.

Figure 2: Noise sensitive receivers adjacent to hospital site



Given that the sensitive uses identified above are the closest to the Hospital, it is intrinsic that compliance at these locations would also result in compliance at all other possible sensitive uses proximate the Hospital.

The following background noise levels were measured:

LOCATION	SOUND PRESSURE LEVEL, LA90
Revilo Court	34 dB(A)

3 NOISE CRITERIA

Noise from any commercial mechanical plant on the Subject Land must comply with the Environment Protection Regulations 2021 and Publication 1826: Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (Noise Protocol).

Zoning levels and resulting noise limits at identified sensitive uses have been calculated in accordance with the methodologies under the Noise Protocol, as follows:

Table 1: Noise Protocol Limits

PERIOD	ZONING LEVEL	BACKGROUND NOISE LEVEL	NOISE PROTOCOL LIMIT
'Day' Period 7am to 6pm (Monday to Saturday)	50 dB(A)	Assumed Neutral	50 dB(A)
'Evening' Period 6pm to 10pm (Monday to Saturday) 7am to 10pm (Sundays)	44 dB(A)	Assumed Neutral	44 dB(A)
'Night' Period 10pm to 7am (All days)	39 dB(A)	34 dB(A) 'Neutral'	39 dB(A)

Based on noise measurements conducted at approximately 1am, the background noise environment was found to be 'neutral', meaning that the zoning levels are taken to be the noise limits. Given that rooftop plant could operate 24-hours, the relevant period of assessment is the 'Night' period. Compliance during the Night period under 24-hour operation would inherently result in compliance during less sensitive periods.

Given that existing rooftop plant is already installed on the rooftop, it is also appropriate that an adjustment to the noise limit to allow for cumulative noise impacts. We recommend that any new mechanical plant installed as part of the proposal is designed to the following Recommended Noise Limit (RMNL), as follows:

Table 2: Recommended Noise Limits

PERIOD	NOISE PROTOCOL LIMIT	CUMULATIVE NOISE ADJUSTMENT	RECOMMENDED NOISE LIMIT FOR NEW PLANT
'Day' Period 7am to 6pm (Monday to Saturday)	50 dB(A)	-3 dB(A)	47 dB(A)
'Evening' Period 6pm to 10pm (Monday to Saturday) 7am to 10pm (Sundays)	44 dB(A)	-3 dB(A)	41 dB(A)
'Night' Period 10pm to 7am (All days)	39 dB(A)	-3 dB(A)	36 dB(A)



4 NOISE IMPACT ASSESSMENT

Mechanical plant noise emissions are typically assessed during detailed design or construction phases of a development once all requirements and plant schedules are known. E-LAB has conducted a preliminary sensitivity analysis to determine the likelihood of compliance with the recommended noise levels, including concept mitigation that may be required to ensure noise from new mechanical plant do not adversely impact on surrounding amenity.

The noise impact assessment has been undertaken based on the following preliminary mechanical plant data provided in Table 3.

Table 3: Sound power level for rooftop plant

LOCATION	UNITS	SOUND POWER LEVEL
Plant area 1	2 x Climaveneta NECS-Q chiller	97 dB(A) L_{eq} (each)
	2 x TRANE CXAX 039 SE chiller	87 dB(A) L_{eq} (each)
Plant area 2	12 x Mitsubishi PURY-P400 condenser	88 dB(A) L_{eq} (each)
Plant area 3	12 x Mitsubishi PURY-P400 condenser	88 dB(A) L_{eq} (each)

A 3D computational noise model has been generated using the software package CadnaA. The model considers acoustic propagation factors and screening, including rooftop plant screening already installed on the Hospital roof.

Based on the results of our noise modelling, we provide the following analysis:

Plant Area 1

Noise levels from the proposed chillers are expected to exceed the RMNL by up to 17dB(A) at the dwellings to the north. Based on the results of the noise modelling, it is likely that a combination of the following mitigation strategies will be required to comply with the RMNL:

- Solid plant screening to the plant area
- Attenuators to fan outlets
- Selecting quieter units, including any 'low-noise' packages by the supplier (including modified fans and/or compressor enclosures typically available from suppliers)
- Enclosing this plant area

Our sensitivity analysis also indicates that standard forms of mitigation (e.g. solid plant screening to the heights as shown on the plans) will be required to comply with the RMNL where mechanical plant and equipment have been selected to not exceed **80dB(A) L_{eq}** (cumulatively), however note that this may be difficult to achieve in practice for large commercial chillers.

It is recommended that further assessments are conducted during the design development stage when plant specifications have been developed and requirements are known such that accurate assessments can be made. At this stage however, we are satisfied that there are sufficient opportunities to mitigate mechanical plant noise emissions to comply with the RMNL.

Plant Area 2 & 3

Noise modelling was conducted assuming all condensers are running simultaneously, resulting in a conservative assessment. Our office has applied an adjustment of -7dB(A) to the sound power level (in accordance with manufacturer data) for night operation where fan speeds are expected to reduce to no more than 85%. Our instruction from the mechanical engineer is that fan speeds typically operate at around 40% at night, however



we have assumed a level of 85% to remain conservative. Equipment loading can be programmed and automated from the plant Building Management System using variable speed drives.

Based on the results of our noise modelling, the following acoustic screening is required:

- Acoustic screening up to 3 metres height
- Units must be locked to run at no more than 85% fan speed at night (between 10pm to 7am)

As above, screening extents and controls should be confirmed once plant and equipment schedules have been finalised, though the noise modelling suggests that moderate forms of screening and controls will likely be sufficient for plant areas 2 and 3.



5 CONCLUSION

E-Lab Consulting has assessed potential noise impacts from new rooftop mechanical plant as part of the Mulgrave Private Hospital expansion and is satisfied that a planning permit can be approved.

Based on our review of the site, it is recommended that all new mechanical plant and equipment is designed to comply with the Recommended Noise Limit identified in Section 3 of this report to allow for potential cumulative noise impacts.

Based on our noise impact assessment conducted on preliminary plant selections, we are satisfied that noise from mechanical plant can be mitigated and/or controlled to comply with the RMNL, as follows:

Plant Area 1

A combination of mitigation strategies will likely be required to comply with the RMNL, including:

- Solid plant screening to the plant area
- Attenuators to fan outlets
- Selecting quieter units, including potential 'low-noise' packages by the supplier
- Enclosing this plant area

Plant Area 2 & 3

Moderate forms of screening and controls will likely be required for plant to comply with the RMNL, as follows:

- Acoustic screening up to 3 metres height
- Units must be locked to run at no more than 85% fan speed at night (between 10pm to 7am)

Appropriately, it is recommended that further assessments are conducted by a suitably qualified acoustic consultant during later stages of the development when more details on mechanical plant and equipment are available.

It is recommended that this requirement is reflected on the conditions of a planning permit to ensure any adverse mechanical plant noise impacts are mitigated.



