



DEVELOPMENT APPLICATION STAGE ACOUSTIC REPORT

JOSEPH BANKS SECONDARY COLLEGE STAGE 3 REDEVELOPMENT

22 March 2021



For

**WITH_ARCHITECTURE STUDIO
346 WILLIAM STREET
PERTH WA 6000**

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1. INTRODUCTION

This Acoustic Report is based on review of Schematic Design Stage Architectural and Mechanical Services Drawings, for the proposed Joseph Banks Secondary College - Stage 3 Redevelopment. The development is comprised of a new two storey Teaching Block, located on the western portion of the existing school site, immediately south of the existing external playing courts. (Refer to Fig 1 on page 3 below). The project scope also includes a small component of refurbishment works to be accommodated within existing buildings, however we are advised that there are no new or increased environmental noise sources associated with this work.

The report is intended to provide information relevant to the Development Application stage (DA), and also considers acoustic requirements that must be further addressed during the Detailed Design and Documentation stages of the project.

For the DA stage of this type of project, a Local Authority may request an Acoustic Report be provided, which identifies all relevant noise sources and related acoustic regulations, policies and standards, and provides confirmation that these acoustic issues will be adequately addressed in the Detailed Design and Documentation stages of the project. In this case the Local Authority is the City of Wanneroo.

The relevant acoustic design issues to be addressed for this Educational premises include:

- Environmental Noise Intrusion
- Environmental Noise Emission

The development is considered to be BCA Class 9b Educational / Assembly Building. It does not incorporate any residential component (Class 2, 3 or 9c Aged Care). It should be noted that the acoustic requirements set out in the National Construction Code (NCC), Building Code of Australia (BCA) Volume One *Part F5 - Sound Transmission and Insulation*, only apply to residential parts of a development, so are not applicable here. Therefore there are no regulatory standards applicable to the acoustic environment within the building envelope of the development itself. These 'non-mandatory' internal acoustic design requirements are separately addressed by the Department of Education *Secondary Schools Planning Guide*.

The acoustic input in this report is comprised of overview advice, based on desktop review of Schematic Design Stage documents. It must be acknowledged that at this early stage, detailed mechanical services scheme designs and final equipment selections are not available for detailed acoustic review. Complete assessment of each relevant noise source and any requirement to incorporate specific noise control initiatives will therefore be addressed during the Design Development Stage and incorporated into the project Contract Documentation.

1.1 ACOUSTIC STANDARDS

Acoustic policies and regulations relevant to this DA Stage assessment are:

- State Planning Policy 5.4 'Road and Rail Transport Noise' (SPP 5.4), which sets out assessment procedures and design criteria for projects within defined *Trigger Zones* related to major traffic routes and railway lines.
- Environmental Protection (Noise) Regulations, 1997 (as amended). Noise emissions to surrounding premises from the Building Services and other specific noise sources associated with this development must comply with the *Assigned Level* criteria established by these Regulations.

Note that:

- a) The National Construction Code - *BCA Part F5 'Sound Transmission and Insulation* does not include any acoustic requirements related to educational facilities, or any public building.
- b) State Planning Policies 5.1 and 5.3 regarding Land Use Planning in the Vicinity of Perth and Jandakot Airport' are not relevant to this site location.

In response to the above, this acoustic report therefore addresses potential Environmental Noise Intrusion and Environmental Noise Emissions, as discussed in Section 2 below.

2. ENVIRONMENTAL NOISE

Relevant noise sources of note, in terms of both potential environmental impact (*Intrusion*) and school development sources (*Emissions*) are highlighted below on Figure 1 – which is a composite of part Site Plan drawing 2041_SD_SD01, overlaid onto a *Google Earth* aerial view.



Figure 1 – Composite Aerial View with part Site Plan 2041_SD_SD01 overlay

To provide additional context, Figure-2 below also highlights the school site on an image taken from the DPLH **PlanWA** map-viewer website. This mapping tool can be used to highlight designated SPP 5.4 major traffic route 'Trigger Zones' as red coloured. Pinjar Road has been separately highlighted 'Orange'.

This confirms that the school site is not located in a *Trigger Zone* defined under State Planning Policy 5.4 - Road and Rail Transport Noise.

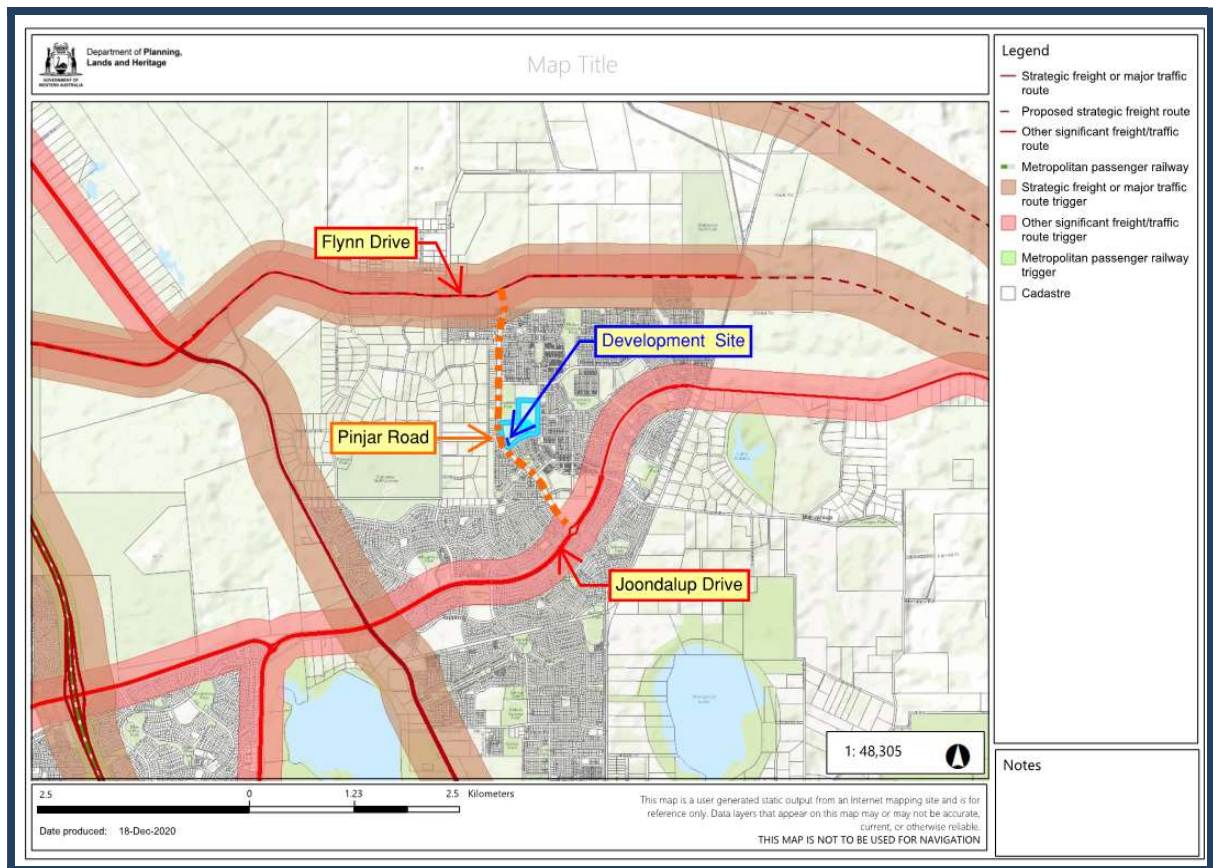


Figure 2 - DPLH PlanWA image with Transportation noise sources highlighted

Discussion regarding each of the relevant noise sources identified in Figure-1 and Figure-2 is set out below in 2.1 *Noise Intrusion* and 2.2 *Noise Emissions*.

2.1 NOISE INTRUSION

A school premises is deemed to be a 'Noise Sensitive' receiver, so potential sources of noise intrusion likely to occur during school hours need to be considered.

Based on review of the site and surrounds, the only potential source of environmental noise intrusion is traffic along Pinjar Road - as discussed in 2.1.1 below. The site is not located adjacent to railway corridors, aircraft flight-paths or neighbouring commercial / industrial noise sources.

2.1.1 TRANSPORTATION NOISE

As indicated in Figure 2 - the school development site does not fall within a *Trigger Zone* defined under *State Planning Policy 5.4 - Road and Rail Transport Noise*.

Furthermore, even considering the future widening of Pinjar Road, the building façade will be set back approximately 60 metres from the road edge (Orange dimension on Figure 1). At this distance, noise levels associated with traffic along Pinjar Road will not require consideration of *acoustically upgraded* glazing or façade construction, in order to control indoors noise levels comply with the criteria set out in *Australian Standard AS/NZS 2107:2016 Acoustics - Recommended design sound levels and reverberation times for building interiors*. This is on the basis that windows are in the closed position, which is considered acceptable, as all habitable spaces are air-conditioned, complete with dedicated code complying outdoors air supply.

2.2 NOISE EMISSION

To an extent, a school premises may also be deemed to be a ‘*Noise Emitting*’ development, so potential sources of **noise emission** need to be addressed. The relevant design requirement is to comply with the *Environmental Protection (Noise) Regulations, 1997 (as amended)*.

The potential impact of noise generating activities and building services on neighbouring premises therefore requires careful consideration. For this school project, this primarily relates to the potential impact of the proposed new Stage 3 Building Services noise sources on neighbouring ‘Residential Receivers’, which are deemed to be *Noise Sensitive* premises.

2.2.1 RECEIVER PREMISES

As indicated on Figure-1, the Stage 3 building development site is bounded by existing school grounds to both the north and east sides, with ‘neighbouring’ residential premises to the south and west, as follows:

- Across Splendens Ave, with the closest being approx. 40 meters from the southern façade
- Across Pinjar Road, with the closed being approx. 95 meters from the western facade

Residential premises are deemed to be ‘*Noise Sensitive*’, so design stage assessment of noise emissions from relevant Stage 3 noise sources must take this into account – as discussed in 2.2.2 and 2.3 below.

2.2.2 NOISE SOURCES

For the Stage 3 development, potential environmental noise sources are all related to new *Building Services*, including:

- **P1** in Figure-1 = northern Level 1 Plantroom – proposed to accommodate 4x Air-conditioning Condensing Units. Closest Residential Receiver is >120m to the west.
- **P2** in Figure-1 = north-eastern Level 1 Plantroom – proposed to accommodate 4x Air-conditioning Condensing Units and 4x Fume Extract Fans with stacks extending above roof level. Closest Residential Receiver is >100m to the south-east (and >130m west)
- **P3** in Figure-1 = south-eastern Level 1 Plantroom – proposed to accommodate 6x Air-conditioning Condensing Units and TEF Fans. Closest Residential Receiver is >45m to the south-east.
- **P4** in Figure-1 = One small west facing Level 1 Plant Compound, to accommodate 1x commercial coolroom style ‘Refrigeration’ Condensing Unit. This unit may run 24 Hours to maintain required indoors conditions, so must comply with the relevant “Overnight” *Assigned Levels*. Closest Residential Receiver is >110m to the west.

All four Plant Compounds are elevated on Level 1 and are open top for ventilation purposes. However, all noise generating equipment is located within in these Plant Compounds, below roof level. There will be no line-of-sight from the neighbouring residences to the proposed noise generating equipment. One exception is 1x roof mounted Toilet Exhaust Fan located immediately adjacent P3, which will be selected / attenuated so as not to contribute to an exceedance of the *Assigned Levels*. Similarly, if required any Exhaust Fan vertical discharge flues that may rise above roof level can incorporate inline attenuation to ensure compliance, pending further detailed assessment.

Whilst the Environmental Protection (Noise) Regulations include some basic ‘exemptions’ regarding “*Community Noise*” specifically applicable to ‘educational’ activities, these only apply to educational / recreational type activities. Noise emissions from all items of mechanical plant and equipment must fully comply from the outset.

Preliminary advice regarding each of the Plant Compounds identified above is set out in 2.4 *Specific Noise Sources*.

2.3 ENVIRONMENTAL NOISE CRITERIA – ASSIGNED LEVELS

The regulatory ‘*Assigned Level*’ criteria which must not be exceeded at neighbouring premises are site specific, taking into account surrounding land zoning and traffic flows etc. The criteria also vary depending on duration of the noise emission, time of day, and those that apply to ‘*Noise Sensitive*’ residential receivers are far more stringent than those applied to ‘*Commercial*’ receivers.

The site-specific calculated *Assigned Level* criteria that must not be exceeded at neighbouring *Noise Sensitive* residential premises are set out in Table 1 below. Determination of the *Assigned Levels* has taken into account review of site specific ‘*Influencing Factors*’, including the presences of *Major / Secondary* roads and also the land use/zoning within a 100 metre and 450 metre radius of the relevant receivers.

For this site the relevant *Influencing Factors* are:

- Splendens Ave receivers = Nil Influencing Factor, as no relevant Traffic Volume or Land Use adjustments occur within the 100m or 450m zones.
- Across Pinjar Road, potential +2dB Influencing Factor, as it is assumed Pinjar Road within 100m will accommodate >6000 vehicles per day (i.e. classed as a *Secondary* road).

However, at this early stage (without *forecast* Pinjar Road traffic flow data) and to be conservative, assessment of potential noise emission to both Splendens Ave and Pinjar Road will be compared to the most stringent compliance scenario, with Nil Influencing Factor to any receiver. The relevant *Assigned Levels* criteria are therefore as set out in Table 1 below:

Type or Part of premises receiving noise	Time of day	Assigned Noise Level (dB) (where total IF= Nil)		
		LA10	LA1	L _{Amax}
Noise Sensitive Premises - <u>Highly Sensitive Area</u> (i.e.- within 15 metres of a residential or other noise sensitive building)	From 7am to 7pm Monday to Saturday (<i>Daytime_1</i>)	45	55	65
	From 9am to 7pm Sunday and Public Holidays (<i>Daytime_2</i>)	40	50	65
	From 7pm to 10pm all days (<i>Evening</i>)	40	50	55
	From 10pm on any day to 7am Monday to Saturday and 9am Sunday and public holidays (<i>Overnight</i>)	35	45	55
Noise Sensitive Premises; any area other than the Highly Sensitive Area (i.e. - locations >15m from a building directly associated with a noise sensitive use)	All hours	60	75	80
Commercial Premises	All hours	60	75	80
Industrial and Utility Premises	All hours	65	80	90

TABLE 1 – Assigned Level criteria

For the majority of school-hours noise sources it is therefore the weekday **Daytime_1** criteria (Row 1) that apply at the neighbouring *Noise Sensitive* residential premises. However, any items that may run 24-hours, such as Coolroom Condensers etc, must comply with the more stringent **Overnight** criteria.

Therefore, based on the above:

- It is the L₁₀ criteria of **45 dB(A)** that applies to all **HVAC equipment**, that will run for more than 24 minutes in 4 hours, during *Daytime_1* period.
- It is the more stringent L₁₀ criteria of **35 dB(A)** that applies to the 1x ‘**Refrigeration**’ **Condensing Unit located in P4**, which may be required to run during *Overnight* period.
- The less stringent *Daytime_1* L₁ criteria of **55 dB(A)** applies to short duration emissions, such as testing of a Fire Pump, that will run for less than 24 minutes in 4 hours. Where relevant these can be managed to have routine maintenance runs, limited to the appropriated daytime period and run-time duration. No Fire Pump is currently included in the scope of the Stage 3 Redevelopment.

Note however, that in accordance with Regulation 9, the design target must generally be 5dB lower than the Assigned Level criteria, to account for noise sources with ‘*Tonal*’ character. The outcome must also ensure the noise emissions are not considered to be ‘contributing to an exceedance’. These requirements are taken into account during detailed analysis stage, for each relevant source.

Assessment of the various noise sources will be conducted as the design progresses, and details of the equipment noise levels, and the degree of enclosure / screening etc are further defined. Some preliminary design issues are discussed further below, in *2.4 Specific Noise Sources*.

2.3.1 EXCEPTIONS FOR 'COMMUNITY NOISE'

It must be noted that that in accordance of Regulation 16 'Community Noise', compliance with the Assigned Level criteria does **not** apply to a range of activities, which are typically located 'within', and for the benefit of the wider community.

Item 4 of Schedule 2 specifically identifies the following as 'Community Noise' relevant to school facilities, which therefore do not have to meet the Assigned Level criteria, provided they are appropriately managed, as follows:

4. *Noise emitted as a consequence of a recreational or educational activity from premises occupied for educational purposes if the activity -*
 - (a) *is conducted under the control of the occupier of the premises; and*
 - (b) *does not include the use of mechanical equipment, other than musical instruments.*

The 'exceptions' applied to educational facilities therefore relate to noise emissions from activity based sources such as Playgrounds, Playing Fields, Sports Halls and even Teaching Area noise breakout – but not Building Services (i.e. mechanical equipment).

The exceptions for educational and recreational activities are considered essential, and exist within the Regulations primarily to enable schools to be co-located within residential areas. Where 'non-curriculum' activities not covered by the 'Community Noise' exceptions may result in noise emissions, these *Special Events* may require preparation of a specific 'Noise Management Plan' in accordance with Regulation 18 or 19 procedures, in liaison with the Local Authority. (e.g. Outdoor Fetes / concerts / cinema conducted out of school hours for fundraising etc). In terms of the scope of this DA Stage report, none of these activities is directly related to this Stage 3 Redevelopment.

As noted above, it is acknowledged that all **Building Services** noise sources must fully comply with eh Assigned Level criteria. Therefore, as discussed in 2.4 below detailed assessment of building services noise emissions will be undertaken during the Design Development and Contract Documentation stages, to ensure potential environmental noise emissions will comply with the relevant time of day Assigned Level criteria. This requires detailed review of noise level data for proposed equipment sections as well as scheme layout drawings to be issued by the relevant Building Services consultants, which are not yet available at this early stage.

2.4 SPECIFIC NOISE SOURCES

2.4.1 BUILDING SERVICES

Noise emission from all items of HVAC equipment, including; Air-conditioning Condensing Units, Fume Cupboard Extract, General Air Supply & Exhaust etc, must comply with the Environmental Protection (Noise) Regulations. This will be therefore addressed in the Detailed Design and Documentation Stages of this project

As discussed in 2.2.2, sources of noise emissions are all related to new HVAC / Building Services, located in 4x Level 1 Plant Compounds, including:

Northern Plant Compound - identified as **P1** in Figure 1

This Level 1 open-top plant compound is to accommodate 4x air-conditioning Condensing Units.

This compound is located over 120 metres from the nearest Noise Sensitive Receiver, so engineering noise control will not be particularly onerous. Based on preliminary review it has been agreed that 300 mm deep acoustic louvres can be used for low level air intake, if required. At over 120m from neighbours no additional noise control is anticipated.

Detailed assessment will be undertaken during Design Development and Contract Documentation stages, to ensure compliance with the *Daytime_1* Assigned Levels, being relevant to the times this equipment will operate.

2x Eastern Plant Compounds – identified as **P2 & P3** in Figure 1

These Level 1 open-top plantroom are also to accommodate air-conditioning Condensing Units, as well as some Toilet Exhaust and General Exhaust equipment. The Level 1 ventilation louvres to both compounds only face east. Of particular note are:

- The north-eastern compound identified as **P2** in Figure 1 will accommodate 4x air-conditioning Condensing Units. It will also accommodated 3x Fume Cupboard and 1x Soldering bench Extract Fans. The associated vertical discharge stacks to theses fans can incorporate induct attenuators if deemed necessary, pending detailed review.
- The south-eastern compound identified as **P3** in Figure 1, is located approximately 45 metres from the nearest Noise Sensitive Receiver. This Level 1 compound is to accommodate 6x Air-conditioning Condensing Units and 1x Toilet Exhaust Fan (Roof mounted),

Based on preliminary review is has been agreed that 300mm deep acoustic louvres can be used for low level air intake from the east side of both P2 and P3, in part to reduce noise spill to the school grounds themselves. This together with the fact that there is no line of site from the noise generating equipment to the closest residence 45m south-east of P3 is considered appropriate.

Detailed assessment will be undertaken during Design Development and Contract Documentation stages, to ensure compliance with the Assigned Levels relevant to times of day the equipment will operate.

Western Plant Compound - identified as **P4** in Figure 1

This Level 1 open-top Plant Compound is only to accommodate 1x commercial Refrigeration Condensing Unit. However, it is acknowledged that this equipment may run intermittently over a 24-hour period to maintain indoors 'Coolroom' conditions in the 'Lunar/Mars landscape' room, so must comply with the relevant "Overnight" Assigned Level.

This compound is located over 110 metres from the nearest Noise Sensitive receiver, across Pinjar Road. Preliminary noise level data received from the project Mechanical Engineers indicates at full capacity the radiated Sound Power Level will be SWL 79 dB(A).

Based on preliminary review, it has been agreed that 300 mm deep acoustic louvres will be used for low level air intake. This has been confirmed as appropriate to allow the Refrigeration Condensing Unit to run as required (including on HIGH speed), and still not to contribute to an exceedance of the Assigned Levels, including 'Overnight'.

Further assessment will be undertaken during Design Development and Contract Documentation stages, to ensure compliance with the Assigned Levels relevant to all times of day.

Refurbishment Works (within existing buildings)

We understand that some refurbishment works within existing school buildings is also proposed as part of this Stage 3 Redevelopment project. However we have been advised that all Building Services requirements can be accommodated within existing systems capacity, such that no new air-conditioning or extraction plant required.

As discussed above, detailed assessment of Building Services environmental noise emissions as well as potential intrusion into school facilities and impact on building surrounds will be progressed during Design Development and Contract Documentation stages, once the mechanical scheme design and equipment selections are further defined.

3. SUMMARY

As discussed in this report, during Detailed Design and Documentation stages all potential sources of environmental noise emission that may impact on neighbouring premises will be assessed, and ultimately demonstrated as able to comply with the regulatory Assigned Levels, as established by the Environmental Protection (Noise) Regulations, 1997.

At DA stage establishing the relevant Assigned Level criteria and identifying each potential noise source is important, so that all project design team members are aware of their design responsibilities, to ensure full compliance of the final development. Where possible, discussion has also been included regarding planning, design, engineering and/or management strategies that may be further considered to address particular noise sources.

Initial input has therefore been provided in this DA Report, including:

- Determination of the site specific Assigned Level criteria for neighbouring premises,
- Identification of relevant noise sources,
- The need to undertake further detailed analysis of potential noise breakout / emission from each source.

We note that at this early Schematic Design stage, comprehensive Architectural Drawings are not available, including detailed sections and construction system details. Similarly, Building Services information including final scheme layouts and equipment selections complete with noise level data is not yet available. It is therefore not possible to provide a complete quantitative assessment, to demonstrate compliance. This type of assessment will therefore be undertaken during the Design and Documentation stages. However, based on preliminary review, provided appropriate consideration is given to each of the relevant noise sources identified in this report, it is considered that this development is fully capable of complying with the requirements of the Environmental Protection (Noise) Regulations.

Please contact the undersigned if you have any queries regarding the information contained within this report.

Regards



Kingsley Hearne

DIRECTOR B.Arch M.A.A.S.

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