Stantec

Memo

Project:	DNS5 - Bankstown Airport	**Project No:**	301351354
To:	Alicia Desgrand | Urbis	**Date:**	03/11/2023
From:	Jake Emmett		

RE: DNS5 - Bankstown Airport

This memo presents the criteria, method, and findings of an Aircraft Noise Impact Assessment, completed for the proposed new distribution centre located at 125 Nancy Ellis Leebold Drive, Bankstown, NSW, as well as any subsequent recommendations to the façade required to sufficiently mitigate the predicted noise from aircraft.

An existing warehouse space with attached offices at the site is proposed to be repurposed for use as the distribution centre.

This assessment has been completed based on the following documentation and drawings

- Australian Standard AS 2021:2015 – Aircraft noise intrusion – Building Siting and Construction
- Australian Standard AS 2107:2016 – Acoustics – Recommended design sound levels and reverberation times for building interiors
- As-Built Architectural Drawings of existing building – Walker Corporation (Dated August 2006)
- Proposed Demolition Drawings – SBA Architects (Dated 14/09/2023)
- Proposed Architectural Drawings – SBA Architects (Dated 14/09/2023)
- Bankstown Airport Development Guidelines
- Bankstown Airport Master Plan

1. Acoustic Criteria

The relevant conditions of consent for the proposed works state that the Australian Standard AS 2021:2000 Acoustics – *'Aircraft noise intrusion building siting and construction'* should be consulted when assessing a development expected to be impacted by aircraft noise. The current version of the Australian Standard, AS 2021:2015 has been used for the assessment.

AS 2021:2015 defines the acceptability of a site in terms of aircraft noise exposure which is assessed using the Australian Noise Exposure Forecast system (ANEF). This document provides a rating system that reflects actual human response to aircraft noise using different aspects such as the frequency of overhead aircraft movements, the noise level and duration of individual aircraft movements and the period of the day that they occur.

The proposed development falls within the 30-35 ANEF contours and as such is defined as being "conditionally acceptable". AS 2021 stipulates the recommended internal noise levels as described in Table 1. These internal noise levels have been used to assess the aircraft noise intrusion into the development.

Table 1: Recommended internal noise levels extracted from AS 2021:2015

Building type (house) and activity	Indoor sound level, LAmax dB(A)
Commercial buildings, office and shops	
Private offices, conference rooms	55
Drafting, open offices	65

AS2021:2015 also stipulates additional ventilation requirements for internal spaces for all building sites determined to be "conditionally acceptable". The Australian Standard states the following:

> *Buildings on sites determined to be 'conditionally acceptable' under Clause 2.2 should be designed such that the ANR values determined under Clause 3.2.2 are achieved for all internal spaces. In general, this will require that external windows and doors be kept closed, since if these are opened for ventilation purposes the aircraft noise reduction of the building envelope will be significantly reduced. If it is necessary to close windows and doors to comply with this Standard, building ventilation should be in accordance with the National Construction Code on the assumption that windows and doors are not openable. Mechanical ventilation or air conditioning systems complying with AS 1668.2 should be installed.*

The standard establishes the need for an alternative means of ventilation to each of the aircraft noise-affected spaces to achieve the internal noise levels provided in Table 1. The alternative means of ventilation shall comply with AS 1668.2 and the National Construction Code under the assumption that windows and doors are not openable.

2. Aircraft Noise Impact Assessment

Based on the Australian Noise Exposure Forecast (ANEF) 2033 contour map, the subject site is located within the ANEF 30 to 35 contours.

The proposed development falls within the “Conditionally Acceptable” category and will therefore require an acoustic assessment demonstrating compliance with the requirements of the AS2021:2015. An aircraft noise assessment in accordance with the methods presented in AS2021:2015 has been conducted using the aircraft noise levels summaries in Table 2. The noise levels have been determined based off the worst case scenario of flight paths taking-off and landing in close proximity to the development site.

Table 2: Maximum noise levels at assessment location as per AS2021 Data Tables

Aircraft Type	Mode of Operation	Maximum Noise Level dB(A)
BEC 300	Arrival on Northmost Runway	94

Based on the maximum value presented in Table 2, an L_{Amax} of 94dB(A) has been used in the design of the façade. Acoustic treatment has been proposed in the ensuing subsections in order to meet the internal noise levels as describe in Section 1.

Note that rooms intended to be protected against the intrusion of aircraft noise, long reverberation times are not desirable. Due to the extent of glazing present to the external façade, critical spaces such as meeting rooms should be given consideration during the design phase to ensure reverberation time is kept to a minimum.

3. Façade Design for Existing Air Traffic Noise

External Glazing

In order to maintain acoustic amenity to occupants of the proposed development and comply with the project specific internal noise levels, the acoustic performance of the building facades was assessed. The general limiting factor of the performance of a building façade in terms of noise attenuation is typically the glazing.

3.1 Based on the as built drawings of the existing warehouse, external glazing on the ground and first floor of the office spaces comprise 10.38mm to 12.38mm laminated single glazing units. Based on our assessment these system are not suitable for the proposed function of each space in the office block. Due to the limitations of the acoustic performance of glass systems (i.e. the maximum achievable sound reduction of glass systems compared to solid façades) it is recommended that the glazing areas of facades are reduced in some locations.

In order to achieve the internal noise levels established for both aircraft noise intrusion to AS2021:2015 “Acoustics – Aircraft noise intrusion – Building siting and construction” and AS2107:2016 “Acoustics – Recommended design sound levels and reverberation times for building interiors” for aircraft noise intrusion, the minimum recommended glazing types for the facades of the proposed development are presented in Table 3 below. The data presented in this table is based on the aircraft noise assessment outlined in Table 2. The glazing types presented below should be considered as the minimum to achieve the required internal noise levels. Greater glazing thicknesses may be required for structural loading, wind loading, thermal requirements etc.

Table 3: Required acoustic performance of glazing systems

Facade	Types of Spaces	Fixed Glazing System	Required Acoustic Rating of Glazing Assembly, Rw	Recommendations
All	First Floor Board Room/ Conference Room	10mm VFloat / 16mm air gap / 12.5mm VLam Hush	45	Internal noise not compliant with existing glazing system or area Glazing system to be upgraded Glazing area to be reduced to $6m^2$
All	First Floor Managers Office	10mm VFloat / 16mm air gap / 12.5mm VLam Hush	45	Glazing system to be upgraded Existing area of glazing satisfactory
All	Open Plan Offices	10mm glass / 12mm air gap / 6mm glass	38	Glazing system to be upgraded Existing area of glazing satisfactory

Note: The required acoustic rating of glazing assembly, refers to the acoustic performance of the glazing once installed on site (including the frame)

The glazing system proposed above has been provided as a high level analysis only. The acoustic performance of the glazing facade may be reduced at certain locations within the development during the detailed design phase of the project.

Light Weight Roof Construction

Based on the as-built drawings, the existing roof construction above the office block includes

0.48mm profiled steel roof sheeting on 9mm fibre cement

100mm thick 14kg/m^2 fibreglass insulation

3.2 2x layers of 16 plasterboard direct fixed to the underside of the roof purlins

Minimum 900mm thick ceiling cavity

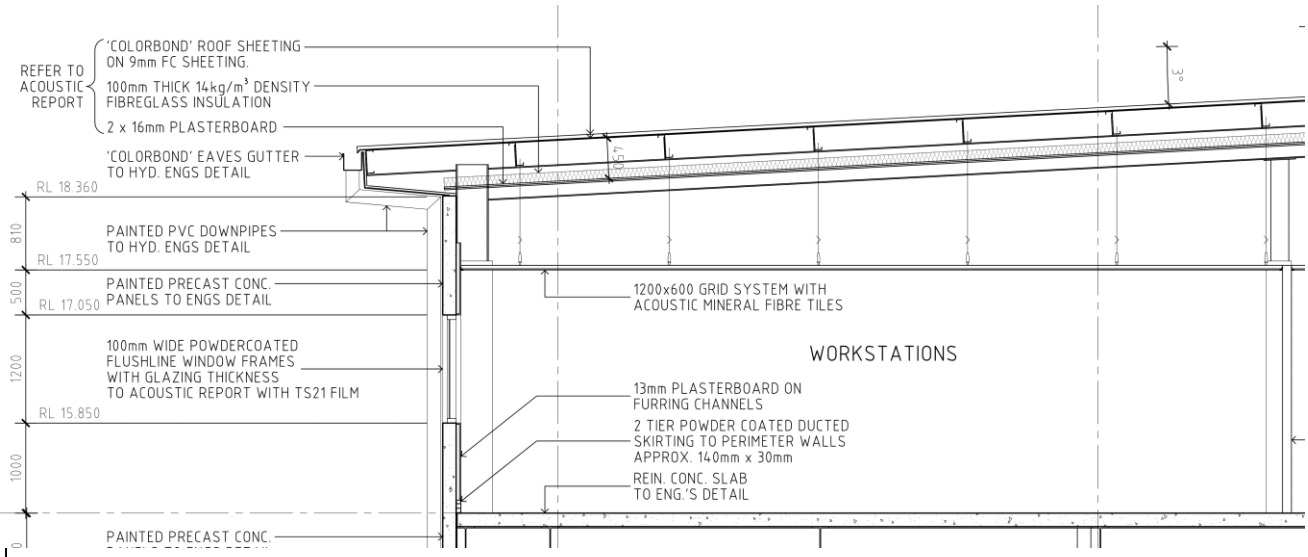
Acoustic ceiling tiles installed via suspended ceiling grid

It is predicted that this construction will be suitable for the proposed use and will result in compliant noise levels within the new office spaces.

No changes to the existing roof construction are therefore proposed.

Figure 1 below shows the existing construction of the light weight steel roof from the as built drawings.

Figure 1: Roof Construction - Typical Light Weight Roof with Acoustic Insulation



3.3

3.3.1

External Façade Walls

Existing External Walls

Based on the as-built drawings, the existing roof construction above the office block includes

Minimum 170mm thick precast concrete façade walls

28mm thick furring channel

13mm thick standard plasterboard wall lining

It is predicted that this construction will be suitable for the proposed use and will result in compliant noise levels within the new office spaces.

No changes to the existing wall construction are therefore proposed.

New Façade Walls

Where glazing areas are recommended to be reduced. New façade areas should be rated to achieve a minimum acoustic performance of Rw 50.

The following is an Indicative lightweight construction to achieve this rating

3.3.2

- 2x layers of fibre cement installed to the external side of the frame
- 64mm steel stud framing
- 1x layer of 13mm thick fire rated plasterboard installed to the internal side frame
- Minimum 50mm thick fiberglass or mineral wall insulation installed to the wall cavity
- Wall and framing to be sealed to the existing concrete façade with dense flexible mastic, with minimum specific gravity of 1.5.

Yours sincerely

Stantec Australia Pty Ltd

Jake Emmett
Acoustic Engineer