

14 March 2024

TN000-01F01 Acoustic Statement (r2)

Concord West Property P/L

Att: Thomas Gregg

Dear Mr Gregg,

1 King Street, Concord West – Acoustic Statement with Respect to Planning Proposal

1 Introduction

This Acoustic Report is submitted to the Council of the City of Canada Bay (**Council**) to support a request for a Planning Proposal relating to land at 1 King Street, Concord West. The Planning Proposal report prepared by Ethos Urban outlines the proposed amendments to the Canada Bay Local Environmental Plan (CBLEP) 2013. The Planning Proposal is supported by a concept master plan prepared by GroupGSA which will facilitate the following:

- Buildings, ranging from 4-12 storeys accommodating approximately 600 dwellings in a range of 1, 2, 3 and 4 bedroom apartments and townhouses.
- New loop road through the site connecting King Street and George Street.
- A total of approximately 69,982m² of gross floor area which equates to a floor space ratio of 2.23:1. The gross floor area comprises approximately:
 - o 65,641m² residential floor area
 - o 4,229m² non-residential floor area
- A green connection of approximately 2,500m² to provide pedestrian and cycle access north-south through the site and including a neighbourhood park.
- A new civic precinct – the 'station precinct' – focused along the active spine and community plaza accommodating a range of non-residential uses (i.e.: retail, food and beverage, gym, health and childcare) at street level.

This report is prepared to Canada Bay Council's requirements with respect to documentation to be included for a Planning Proposal, as detailed below:

Noise			
Acoustic reports would only be required in exceptional circumstances, where a proposal envisages residential or other sensitive uses such as schools, seniors housing and the land to which the planning proposal relates is exposed to significant noise sources.			
- High level acoustic report that: - identifies the existing noise sources, particularly if the proposed use is to be a more sensitive - considers at a high-level the suitability of the site for the purpose and/or land use from an acoustic perspective Note: Refer also to requirements in relation to noise set out in Direction 3.5 – Development Near Regulated Airports and Defence Airfields (if relevant) issued under section 9.1 of the EP&A Act	Not required	May be required	May be required

Given the site's proximity to Concord West Station and the northern rail corridor and bearing in mind the proposal involves a change of use of the site that is more noise sensitive (the introduction of residential development), the preparation of a high level acoustic report is warranted.

The purpose of this report is to:

- Identify significant noise sources in the vicinity of the site.
- Identify relevant acoustic planning controls that are applicable to those noise sources.
- Identify if compliance with the relevant planning controls is feasible, such that the site (through appropriate design) is capable of incorporating the proposed new residential uses.

2 Site Description

The site is located at 1 King Street, Concord West. It is legally described as Lot 101 DP791908, approximately 31,390m² in area and is the largest landholding in Concord West under single ownership. It is irregular in shape and has frontages to King Street to the north and George Street to the west. The site is currently accessed from King Street at its southern termination point and is primarily occupied by a large footprint office building, previously used as a call centre facility by Westpac. It also accommodates a multistorey carpark, a childcare centre and tennis court.

The site is bounded as follows:

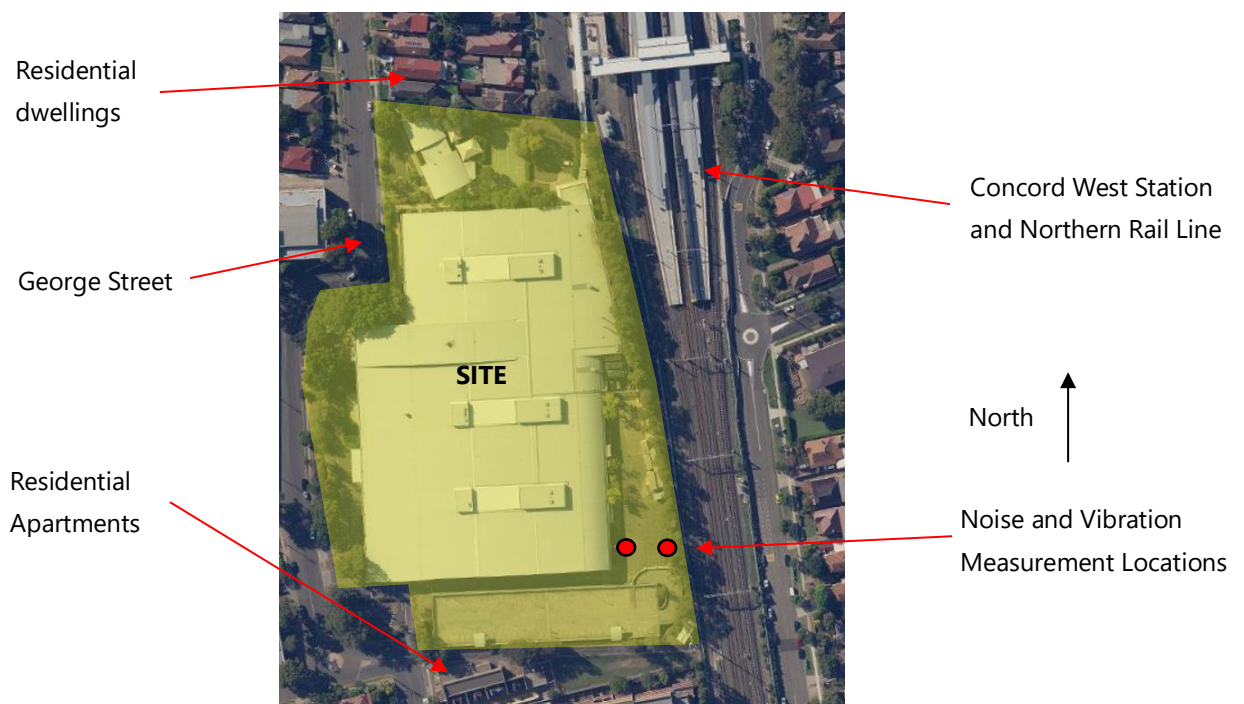
- Residential dwellings to the north.
- Concord West Station and the northern line rail corridor to the east.
- George Street to the west.
- Residential apartments to the south.

The Northern Rail Line accommodates both passenger/suburban trains and freight rail. Rail noise is the primary noise source at the site - road noise on George Street or noise from other nearby land uses is not significant.

The aerial photo below shows:

- The site and surrounding development.
- Noise and vibration measurement locations used in the examination of rail noise. These locations were selected as they were furthest from Concord West station (and as such, train speed would typically be highest, and therefore rail noise and vibration would also be highest).

See below:



It is proposed to demolish existing structures on the site and construct a mixed use residential/commercial precinct. The redevelopment site will accommodate approximately 11 buildings (residential, commercial/retail, child care centre) as well as basement car park – see below.



3 Rail Noise Survey

Planning Proposal reporting requirements (as identified in Section 1) required an acoustic report in the event the proposed site is impacted by a significant external noise source.

The primary acoustic impact on the site is noise and vibration from the Northern Rail Line (to the east of the site). There are no other significant external noise or vibration sources impacting the proposed site.

Noise impacts are addressed in the following section.

Rail vibration is addressed in Section 4.

3.1 Rail Noise Criteria

We note that there are no numerical noise controls for development adjacent to busy roads/rail lines in the Canada Bay DCP.

Being located adjacent to a major rail line, the acoustic requirements of *SEPP Transport and Infrastructure 2021* and the NSW Planning document *Development Near Rail Corridors and Busy Roads* will be applicable to any future development on the site.

The noise criteria outlined in the documents above are relevant criteria for this development have been summarised as shown in the table below.

Table 1: Recommended internal noise criteria for road traffic/rail noise

Type of Occupancy	Windows Condition	Target Internal Noise Level	
		Day, - Leq (15hour)	Night, - Leq (9hour)
Bedrooms	Closed	-	35dB(A)
	Open*	-	45dB(A)
Open-plan Living/Dining/Kitchen	Closed	40dB(A)	40dB(A)
	Open*	50dB(A)	50dB(A)

*These are "trigger levels" when supplementary ventilation must be considered.

Trigger Levels for Supplementary Ventilation

- In the event that compliance with the "windows open" goal cannot be achieved, the *Development Near Rail Corridors and Busy Roads* document recommends that the apartment have supplementary ventilation provided (to enable the apartment to have fresh air even if the occupant chooses to keep their windows closed). Based on the Guideline, this may consist of supplementary mechanical ventilation or acoustically treated natural ventilation.
- For a typical window system left open to ventilate a room, there is a 10dB(A) noise reduction between outside and an open window. Applying this reduction, external noise goals can be determined (ie – if the noise level at building façade exceeds these levels, consideration of

supplementary ventilation is required). Adopting this, *external* noise levels that will trigger consideration of supplementary ventilation are:

- 60dB(A) $L_{eq(15hr)}$ daytime and
- 55dB(A) $L_{eq(9hr)}$ night.

3.2 Noise Measurements

The rail noise levels at the site were measured on 13/10/2022.

Measurements were made between 1pm and 4pm in order to obtain a period with a high number of passenger and freight rail movements. Measurements were made using an XL2 type 1 sound analyser.

Examination of rail timetables was then used (in addition to the site measurements) is then used to determine long term day and night ($L_{eq15hr/9hr}$) noise levels (as required for assessment with reference to the criteria in section 3.1).

Results are presented in table 2.

Table 2: Representative day and night rail noise levels

Measurement Location	Survey Period	Rail Noise Level	Comment
Location L1 – Representative of the proposed eastern facades of easternmost buildings	Day time (7am-10pm)	63dB(A) $L_{eq(15hr)}$	Moderate noise level. Exceeds Supplementary Ventilation Trigger Level
	Night time (10pm to 7am)	60dB(A) $L_{eq(9hr)}$	Moderate noise level. Exceeds Supplementary Ventilation Trigger Level
Location L2 – Representative of the proposed eastern facades of central row buildings	Day time (7am-10pm)	57dB(A) $L_{eq(15hr)}$	Low noise level. Does NOT Exceed Supplementary Ventilation Trigger Level. Noise levels will be further reduced by future buildings on eastern boundary.
	Night time (10pm to 7am)	55dB(A) $L_{eq(9hr)}$	Low noise level. Does NOT Exceed Supplementary Ventilation Trigger Level. Noise levels will be further reduced by future buildings on eastern boundary.

Looking at the above:

- The measured noise levels are relatively low. A daytime level of 63dB(A) L_{eq} is what would be expected near a local road with moderate traffic flow.

- It is likely on that apartments with a direct line of sight to the rail line will be impacted by noise levels requiring façade upgrade or consideration of supplementary ventilation.
- Even for these apartments, the noise exposure is less than what is expected if adjacent to a sub-arterial road.

3.3 Commentary / Recommendations

Indicative glazing systems in order to comply with the internal noise goals detailed in section 3.1 are set out below. These recommendations are indicative only. More detailed assessment would be undertaken at DA stage:

- Once building positions and apartment layouts/window sizing is finalised.
- Following any discussion with the client if any “above minimum” noise goals are developed.

Table 3: Indicative Façade Systems

Location	Facade	Room Type	Façade Element	Indicative Glazing Requirement
Buildings: 4 Buildings on Eastern Boundary	East/North/South	Bedroom	Awning Window / Sliding Door	6.38mm laminated to 10.38mm laminated. Supplementary ventilation requirement to be reviewed.
		Living	Awning Window / Sliding Door	6mm to 6.38mm laminated. Supplementary ventilation requirement to be reviewed.
	West	Bedroom	Awning Window / Sliding Door	6mm to 6.38mm laminated. Supplementary Ventilation unlikely to be required.
		Living	Awning Window / Sliding Door	6mm. Supplementary Ventilation unlikely to be required.
Building: North	East/North	Bedroom	Awning Window / Sliding Door	6.38mm laminated to 10.38mm laminated. Supplementary ventilation requirement to be reviewed.
		Living	Awning Window / Sliding Door	6mm to 6.38mm laminated. Supplementary Ventilation unlikely to be required.
	West/South	Bedroom	Awning Window / Sliding Door	6mm. Supplementary Ventilation unlikely to be required.
		Living	Awning Window / Sliding Door	6mm. Supplementary Ventilation unlikely to be required.
Buildings: Remaining	All	Bedroom	Awning Window / Sliding Door	6mm. Supplementary Ventilation unlikely to be required.
		Living	Awning Window / Sliding Door	6mm. Supplementary Ventilation unlikely to be required.

We note, looking at the table above:

- Compliance with DoP internal noise goals is readily feasible with moderate performance acoustic glazing/façade elements.
- Some consideration of supplementary ventilation will be required for the eastern facades of apartments of buildings located on the eastern boundary of the site. This could include consideration of mechanical ventilation, winter garden designs, acoustically treated passive ventilation (acoustic vents/plenums) or similar. This should be determined at DA stage once building arrangements/apartment layouts are finalised.

4 Rail Vibration assessment

4.1 Tactile Vibration

4.1.1 Rail Tactile Vibration Criteria

Section 3.6.3 of the Department of Planning publication "*Development Near Rail Corridors & Busy Roads – Interim Guideline*" provides recommended vibration criteria documents to refer to when establishing train vibration criteria for residential buildings. Documents referred to are:

- Assessing Vibration: A technical guideline (DECC 2006)
- German Standard DIN 4150, Part 3 – 1999
- British Standard BS 7385 – 199
- Australian Standard AS 2670.2 - 1990

The above documents have been reviewed and the criterion for assessment of tactile vibration from train pass-bys affecting the proposed development is quantified using:

- Assessing Vibration: A technical guideline (DECC 2006)
- British Standard BS6472: 1992 "*Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)*"

It is noted that EPA guideline "*Assessing Vibration: A technical guideline* (DECC 2006)" is based on the British Standard BS6472:1992. The criteria curves presented in BS6472:1992 are identical to those in Australian Standard AS2670.2 1990 and the International Standard 2631-2:1989.

Criteria for continuous vibration from the British Standard BS6472:1992 for residential spaces, offices and commercial workshop environments are shown in Figure 1 below.

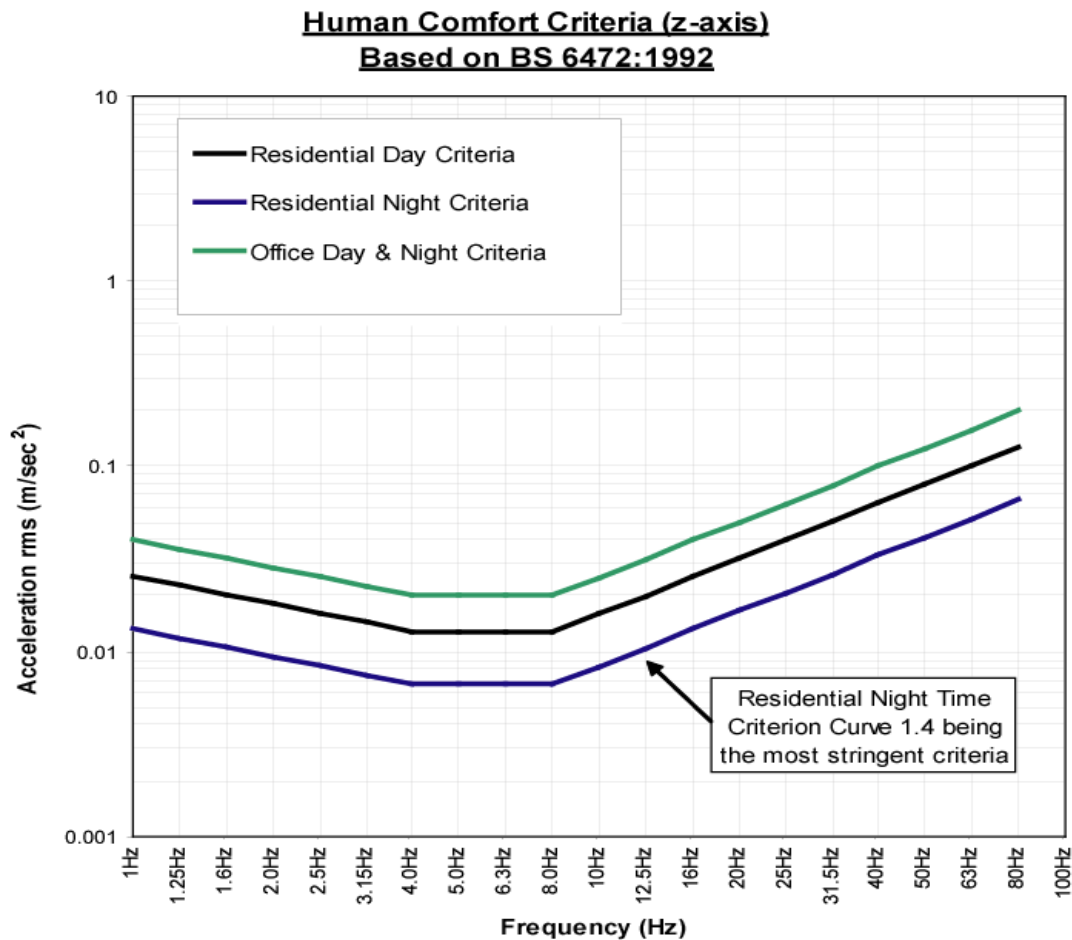


Figure 1: Tactile Vibration Criteria for Residential Buildings

Table 2.4 of the Department of Environment Climate Change's document "*Assessing Vibration: A technical guideline (DECC 2006)*" presents acceptable vibration dose values for intermittent vibration. Table 4 below outlines DECC's requirements.

Table 4: Acceptable VDV_s for intermittent vibration in residential buildings $\text{m/s}^{1.75}$

Location	Period	Preferred VDV $\text{m/s}^{1.75}$
Residence	Day time (7am – 10pm)	0.20
	Night time (10pm – 7am)	0.13

4.1.2 Measurement Instrumentation

Vibration measurements were conducted on 13/10/2022 at the locations indicated in Section 2.

Train vibration levels were measured using the Sinus SoundBook multi-channel analyser and PCB accelerometers on the existing on-grade car park in the south-eastern corner of the site. Three accelerometers (x, y & z) were fixed to a steel bracket that has been glue fixed to concrete/asphalt.

4.1.3 Measured Tactile Train Vibration, Assessment to BS6472 and DECC and Assessment of VDV (vibration dose)

Results of the train vibration survey were plotted against night and day criterion of British Standard BS6472-1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)" as shown above.

Vibration levels were compliant with the Residential Night Time curve (the most stringent applicable).

In addition, the measured train vibration levels (in addition to review of passenger and freight rail timetables) were used to calculate the vibration dosage values (VDV) and then compared to the acceptable levels from the Table 2.4 of EPA *Assessing Vibration: A Technical Guideline* document.

Table 5: Acceptable VDV for intermittent vibration in residential buildings m/s^{1.75}

Location	Period	Preferred VDV m/s ^{1.75}	Measured VDV m/s ^{1.75}	Complies
Location 1	Day time (7am – 10pm)	0.20	<0.15	Yes
	Night time (10pm – 7am)	0.13	<0.1	Yes
Location 2	Day time (7am – 10pm)	0.20	<0.1	Yes
	Night time (10pm – 7am)	0.13	<0.075	Yes

Vibration levels were comfortably compliant with the EPA recommended noise dose "Preferred" levels. Even with a significant increase in rail movements, compliance with the VDV targets will still be achieved, even at the buildings closest to the rail corridor.

4.2 Predicted Ground-borne Rail Noise Inside Proposed Buildings

Regenerated or ground-borne rail noise is the low rumble heard inside buildings with vicinity of railway tunnels or railway tracks due to ground vibration generated by passing trains which propagate through soil and rock up into building elements such as foundation, wall and floors which re-radiates as audible sound.

Train vibration levels measured on site on 13/10/2022 were used to predict the regenerated rail noise inside the proposed building from train pass-bys. These calculated noise levels inside apartments are summarised in the table below and compared to ground-borne noise criteria.

Table 6: Predicted Ground-borne Rail Noise Levels - Buildings B1-B4

Floor Level	Proposed Occupancy	Calculated ¹ Ground-borne Rail Noise L _{Amax} (Slow) inside Apartments ³		DOP Criteria for Ground-borne Rail Noise L _{Amax} (Slow)	Compliance/Comment
		Apartment on Eastern Façade (Location 1)	Apartment Away from Eastern Façade (Location 2)		
Ground Floor	Living, dining and kitchen	48dB(A)	39dB(A)	40dB(A)	Exceeds for apartment located on eastern façade.
	Sleeping areas	47dB(A)	38dB(A)	35dB(A)	
Level 1	Living, dining and kitchen	45dB(A)	36dB(A)	40dB(A)	Complies for apartment located away from eastern façade (above ground floor).
	Sleeping areas	44dB(A)	35dB(A)	35dB(A)	

Notes:

1. Ground-borne noise calculations were based upon the measured L_{Amax} (Slow) of 95% of train pass-events as per DOP Guideline 2008

With respect to the above:

- Measurements indicate a likely exceedance of structure borne noise criteria for apartments located on the eastern façade for buildings on the eastern boundary of the site.
- While an exceedance, the Department of Planning Guidelines *do* permit use of these spaces for residential development in the following circumstances:
 - o The rail source is a surface track (as opposed to tunnel).
 - o The apartments in question have a line of sight to the track, and the airborne noise (through the façade, into the room) is expected to exceed the structure borne noise level.
 - o The apartments on the eastern façade fall into this category:
 - The rail line is at ground level (not below).
 - The apartments have a line of sight to the surface rail and the airborne noise levels incident on the eastern façade during a train passby are 69-83dB(A)L_{max} during a train passby (and will be higher than the structure borne noise level).
- If feasible, avoiding a residential use on the ground floor in Buildings B1-B4 is beneficial. Even in the event a residential use was proposed at ground level, this would still be feasible, however detailed vibration analysis is recommended to determine if building vibration isolation is required.
- Buildings other than B1-4 are expected to be compliant with the DoP guideline.

The above illustrates that mixed use development at the site is feasible, even for buildings located closest to the rail corridor. Detailed vibration analysis in the DA phase is recommended to determine if vibration isolation treatment is needed, particularly in the event that residential uses are proposed on the Ground Level of buildings on the eastern boundary of the site.

5 Closure

This report presents a high level analysis of noise and vibration impacts on the proposed mixed use development at 1 King Street, Concord West, as required as part of the Planning Proposal for the site.

Noise and vibration impacts have been assessed with reference to relevant SEPP, Department of Planning and EPA acoustic guidelines.

The site is adjoined to the north and south by residential development (as similar distance from the rail line), indicating, on the face of it, that residential use can also be incorporated on the subject site.

Further, analysis based on site measured noise and vibration levels and review of relevant SEPP/Department of Planning noise controls indicates that the site is capable accommodating residential use.

A detailed noise and vibration analysis should be conducted at DA stage to:

- Determine precise façade build ups for all buildings in the development.
- Determine if any form of vibration mitigation treatment is needed in the event that residential uses are proposed on lower levels of Buildings B1-B4.
- To set operational noise limits for the site (plant/equipment noise, child care centre noise) to ensure that nearby residences are not adversely impacted by the operation of the redeveloped site.

Regards,



Thomas Taylor
Principal Engineer