39-49 Henry Street, Penrith

Planning Proposal Acoustic Review

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Document Information

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Glossary

'A' Weighted	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Daytime (INP)	Between 7.00 a.m. and 6 p.m. as defined in the INP. (See INP)
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
dB(A)	'A' Weighted sound level in dB.
Evening	Between 6.00 p.m. and 10 p.m. as defined in the INP. (See INP)
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second. The human ear responds to sound in the frequency range of 20 Hertz to 20,000 Hz.
Ground-borne noise	Ground-borne vibration transferred into a structure causing building elements to vibrate and radiate noise.
INP	New South Wales EPA Industrial Noise Policy, 2000.
Intrusive Noise	Noise emission that when assessed at a noise-sensitive receiver (principally a residential premises boundary) is greater than 5 dB above the background (L_{90}) noise level.
L_{10}	Noise level exceeded for 10 % of the measurement time. The L_{10} level is commonly referred to as the average maximum noise level.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
Night-time (INP)	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the INP. (See INP).
Rating Background Level (RBL)	Overall single-figure A-weighted background level representing an assessment period (day/evening/night). For the short-term method, the RBL is simply the measured $L_{90,15min}$ noise level. For the long-term method it is the median value of all measured background levels during the relevant assessment period.

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1 Introduction

Resonate has been engaged by Australian Consulting Architects to undertake a planning proposal acoustic review for the proposed mixed-use development to be located at 39-49 Henry Street, Penrith NSW.

This report outlines potential acoustic requirements for consideration during the Development Application phase. It is noted that this report is at a desktop level and incorporates advice based on our experience on similar projects.

2 Project Description

The proposed mix-use development would be located at 39-49 Henry Street, Penrith. Figure 1 presents a summary of the site in context of the surrounding urban environment. The proposal consists of three sites with the following layout:

- Site A – single tower, 34 storeys
  - 214 residential apartments
  - 309 podium level car parking spaces
  - 100 hotel rooms
  - ground floor commercial/retail spaces.
- Site B – single tower, 29 storeys
  - 231 residential apartments
  - 239 basement level car parking spaces
  - podium level commercial/retail/child care spaces.
- Site C – two towers, 15-22 storeys
  - 259 residential apartments
  - 281 basement level car park spaces
  - podium level commercial/retail/child care spaces.

The proposal site is located adjacent to the Main Western railway line, and arterial road North Street (Great Western Highway), which experiences high road traffic volumes.

The current land uses surrounding the development are summarised as follows:

- North and East: North Street, Main Western railway line and residential receivers on The Crescent
- South: Henry Street and commercial receivers beyond
- West: Evan Street and commercial receivers beyond.

It is our understanding that North Street (Great Western Highway) has been identified for future development to ease traffic congestion and has therefore been considered as a potential acoustic constraint for this assessment.

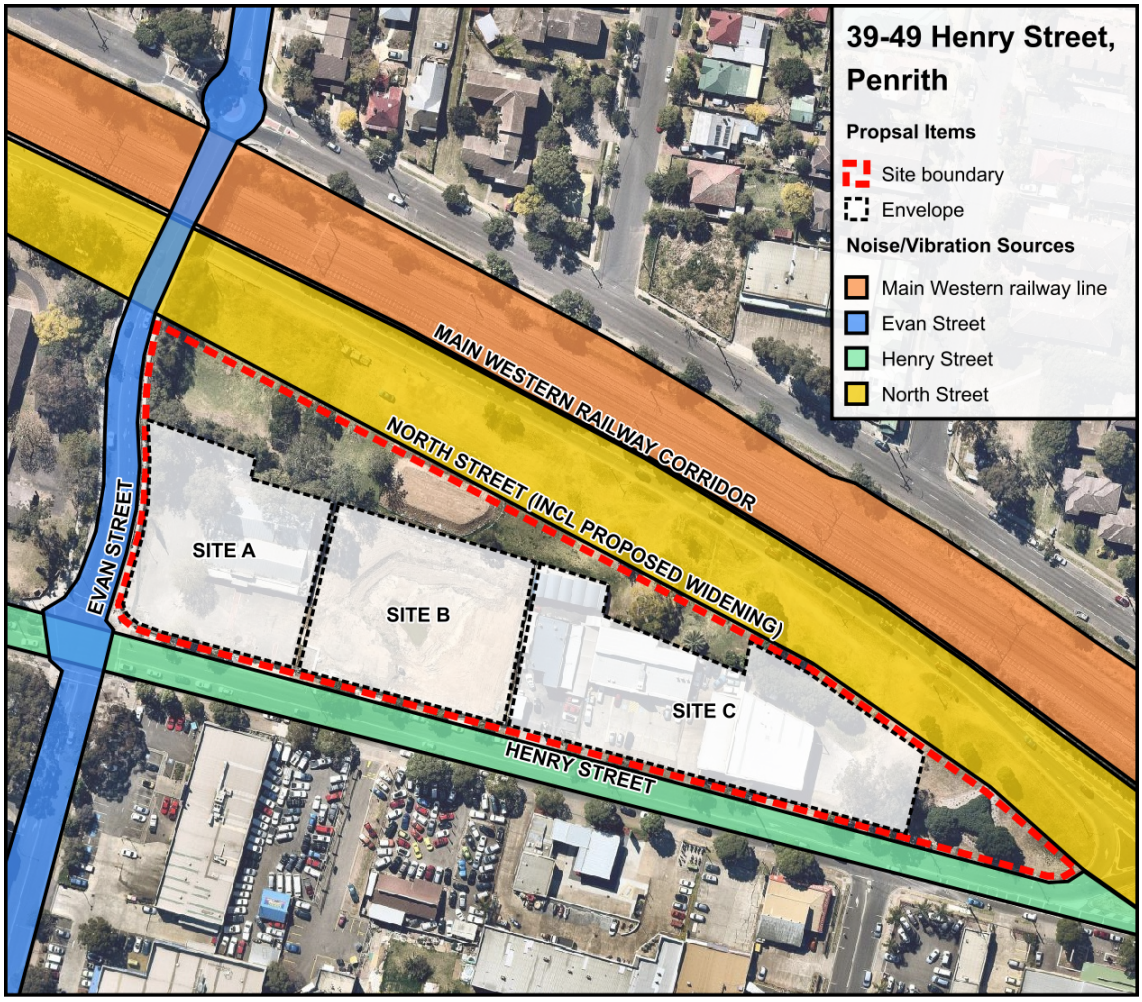

Figure 1 Site map in context

3 Potential Acoustic Constraints

Any proposed development will encounter acoustic constraints in relation to noise both on the development itself and from it to the surrounding environment. This section outlines potential constraints and provides examples of ways to minimise noise and vibration impacts through effective design.

3.1 Internal amenity – Airborne noise intrusion

Due to the proximity of the proposed development to the Main Western railway line and North Street (Great Western Highway), rail and road traffic noise may impact on internal amenity. Therefore, glazing design recommendations would be necessary to achieve targeted internal design sound levels in bedrooms and living areas. This is based on an internal design sound level of 35 dB(A) for a bedroom (*Infrastructure SEPP and DoP's Development Near Rail Corridors and Busy Roads*).

Based on a review of current planning documentation and our previous experience on similar projects located adjacent to busy road and rail corridors, it is likely that one or a combination of the following measures could be implanted in order to comply with the likely internal design sound level targets:

- Proprietary single laminated glazing systems.
- A 'winter garden' type strategy for the low-rise portion (or entire of the tower) depending on architectural strategy.
- Deep void double glazed systems.

It should be noted that a detailed program of airborne noise measurements would be conducted in order to inform the development application assessment and design process. Any acoustic design solution would be coordinated with the architectural design intent for the proposal.

3.2 Internal amenity – Ground-borne noise and vibration intrusion

Ground-borne noise and vibration due to pass-by of trains on the adjacent Main Western railway line may impact on internal amenity. Although, due to the high exposure to airborne noise from the railway corridor and road traffic on North Street, ground-borne noise is not expected to be the controlling source in general. However, ground-borne noise and vibration may be the controlling source at lower levels of the development. The development application would include the following tasks in order to quantify the potential impacts and derive management strategies for incorporation into the design.

- A detailed program of vibration measurements would be conducted in order to quantify the existing train pass-by vibration levels at the site.
- The measurement results would be used to assess tactile vibration levels as well as predict likely ground-borne noise levels within the development.

If the predictions indicate that ground-borne noise and vibration levels are likely to exceed the design targets, the following measures would be investigated for consideration as part of the design:

- Full or partial vibration isolation applied to the base of the building,
- Configuration of the building such that less sensitive usages are placed in areas where higher ground-borne noise and vibration levels are predicted.

3.3 Ventilation

Windows may need to remain closed to ensure internal noise criteria can be satisfied on certain facades of the proposal. In these cases, an alternative means of ventilation would be required. An alternative means of ventilation may take the form of:

- Air conditioning with an outside/fresh air component (not a conventional 'split' system).
- Mechanical ventilation drawn from a 'quiet' side of the building and/or with an acoustically attenuated intake path.
- An open window on a 'quiet' side of the building (should single-sided ventilation be possible).

It is recommended that acoustical modelling be undertaken at the detailed design stage once development approval is granted to optimise glazing selections and the ventilation strategy.

3.4 Mechanical services noise emission

Mechanical services noise from equipment servicing the proposed development would be designed to comply with relevant environmental noise criteria (likely to be related to the NSW EPA Noise Policy for Industry (NPI) and council requirements). Numerous options for mechanical services noise control are available for consideration including:

- Selecting the quietest plant for a given task.
- Judicious location and orientation
- Use larger fans at a slower speed rather than smaller fans at a higher speed.
- Using variable speed drives to lower fan speed in response to lower duty/load requirements.
- Use of barriers, both incidental and purpose designed.
- Internally lined ducts and bends, external duct and equipment wrapping, silencers.

4 Proposed Development Application Methodology

In the context of the potential acoustic constraints outlined in Section 3, the following is a proposed methodology in preparing a planning stage acoustic report for the Development Application:

- Establish development specific acoustic criteria based on relevant planning approval pathways, including:
  - Penrith City Council – Penrith Development Control Plan 2014 (PDCP)
  - Penrith Local Environment Plan 2010 (PLEP 2010)
  - NSW Noise Policy for Industry (NPI)
  - Building Code of Australia (BCA)
  - Development Near Rail Corridors and Busy Roads (DOP)
- Conduct a comprehensive program of noise and vibration measurements at the proposed site.
- Calculate glazing and other acoustically related façade requirements based on noise survey information and determine minimum requirements to achieve internal design sound levels as set out in AS/NZS 2107:2016 *Acoustics—Recommended design sound levels and reverberation times for building interiors* and the *DoP's Development Near Rail Corridors and Busy Roads*.
- Predict internal ground-borne noise and vibration levels within the proposed building and determine design strategies to mitigate potential impacts.
- Predict environmental noise emissions from external mechanical services and other operational noise emissions relating to the commercial tenancies at adjacent noise sensitive receivers and conduct and assessment in accordance with the NPI and/or DCP.
- Demonstrate how environmental noise criteria can be complied with.

5 Conclusion

A high-level desktop assessment of potential acoustic considerations has been undertaken for a proposed development to be located at 39-49 Henry Street, Penrith.

Key acoustic constraints in relation to environmental noise and vibration on the proposed development and its potential impacts to the surrounding area have been outlined.

Acoustic design considerations have been summarised that show these constraints may be addressed through effective design in the development approval and detailed design phases.