



## MEMORANDUM

<b>DATE:</b>	February 12, 2021	<b>RWDI REFERENCE #:</b> 1904405
<b>TO:</b>	Anthony Witherdin	Director, Key Sites Assessments - DPIE
<b>FROM:</b>	Kevin Peddie	<b>Email:</b> kevin.peddie@rwdi.com
	Michael Pieterse	michael.pieterse@rwdi.com
<b>RE:</b>	<b>ADG Natural Cross Ventilation- City of Sydney Review Response Waterloo Metro Quarter - Building 2</b>	

Dear Anthony,

It is understood that after submission of the planning documents for the Waterloo Metro Quarter development, City of Sydney has provided commentary on the submission, with one item related to the natural cross ventilation design of Building 2 in accordance with the Apartment Design Guide. The comments received are noted below, with commentary in response discussed in this report. This document is as an addendum to the submitted Appendix SS – Natural Cross Ventilation report for the project.

### DRP Comments

Item 20 of the DRP comments under the heading Amenity – central residential building pertains to the Natural Cross Ventilation requirement of the Apartment Design Guide and noted the following:

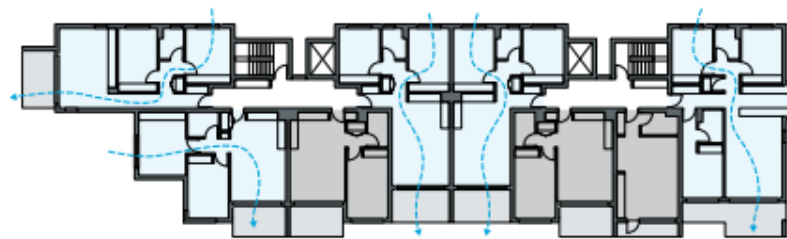
*Natural cross ventilation – Objective 4B-3 of the ADG recommends a minimum 60% of apartments to be naturally cross ventilated. The applicant includes centrally located apartments as achieving natural cross ventilation, notwithstanding these do not meet the definition under the ADG. Furthermore, at least half of the apartments that do meet the definition of natural cross ventilation are noise affected and will require windows and doors to be closed to comply with Objective 4J-1. As such the development provides well below the minimum recommended.*

### RWDI Clarifications

The apartments considered to be naturally cross ventilated in accordance with the Apartment Design Guide for the Building 2 design has taken a conservative approach. This conservative approach is to not only consider the provisions in the ADG of open location orientation for dual or adjacent aspects, but also if these openings would be in notably different pressure regions during the prevailing winds for the Sydney region

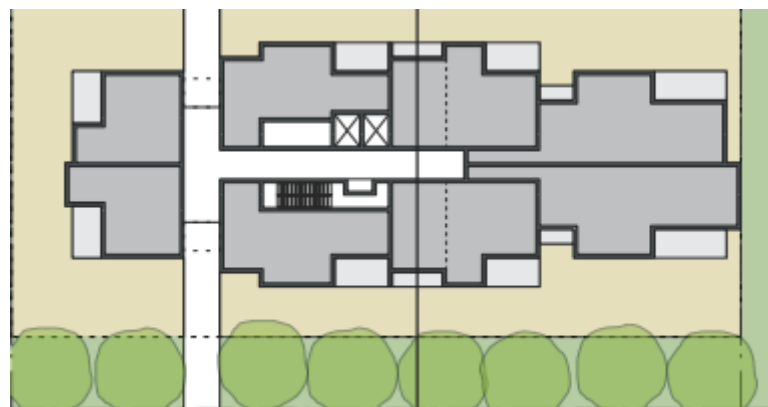
(North-easterly, southerly and westerly). The tower design has included the corner apartments being set back on the eastern and western aspect to create a stepped form and enable exposure to the prevailing winds in accordance with the ADG requirements for Natural Cross Ventilation.

Figure 4B.8 of the ADG (noted in Image 1a below) indicates *one approach* for how natural cross ventilation can be achieved. The design guidance for this simply notes that “The building should include dual aspect apartments.....”. Dual aspect apartments are noted in the Glossary of the ADG as cross ventilating the apartment which have at least two major external walls facing different directions. These examples and definitions align with the current design of Building 2.



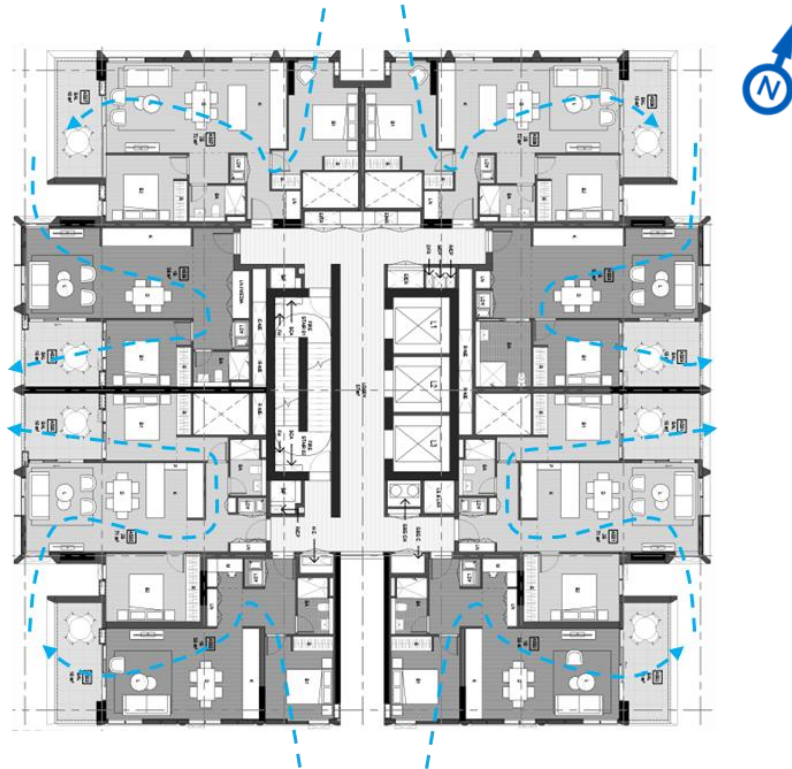
**Image 1a: One Approach in the ADG for Natural Cross Ventilation Flow Paths**

Furthermore, Appendix 4 of the ADG notes Example Schemes for developments which incorporates the requirements of the ADG. Scheme 8 of Appendix 4 (noted in Image 1b below) indicates a similar floor plan design, consisting of 8 apartments per floor, centrally located apartments on two aspects and setback corner apartments. This scheme notes the design qualities as possessing excellent natural ventilation provided for residents of the building.



**Image 1b: Example Scheme 8 for Tower Apartments (freestanding)**

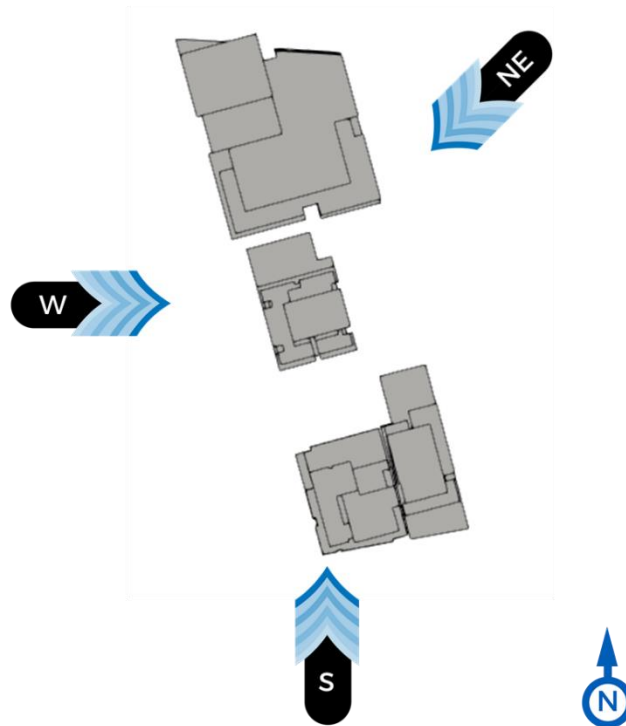
The floor plate design of Building 2, also shown in Image 1c shows the alignment of the natural cross ventilation design with the ADG example.



**Image 1c: Building 2 Proposed Floor Plan**

The apartments considered to be naturally cross ventilated were also further assessed with respect to the outline of how Natural Cross Ventilation is achieved in the introduction to Section 4B of the ADG. This notes that “Natural cross ventilation is achieved by apartments having more than one aspect with direct exposure to the prevailing winds, or windows located in significantly different pressure regions, rather than relying purely on wind driven air”. This statement is accurate in noting that natural cross ventilation through the internal spaces of an apartment is driven by the difference in pressure at opening locations of an apartment.

Subsequently a detailed review of the Sydney wind climate was undertaken (Section 7.3 of Appendix SS) and consideration of the site and building design alignment to the predominate winds for the region, north-easterlies, southerlies and west to north-westerlies. The general alignment of these prevailing winds to the site is noted in Image 2 for reference. These prevailing winds and the shielding from the other buildings of the development, were considered when assessing the expected pressures at the opening location for Building 2.



**Image 2: Approach of Predominant Winds at Proposed Development**

An assessment of the expected pressure differential was then carried out for the tower for these wind directions, with the approximate pressure coefficient values noted in Images 3a to 3c. This enabled a better understanding of the expected pressure differential at main opening locations of the apartment to be understood and the alignment with how natural cross ventilation is achieved as noted in Section 4B of the ADG.

From this assessment of the eastern and western apartments, it was noted that Apartment Types 01 and 05 will experience significant pressure differential for the opening locations for a range of different predominant wind directions for the region. However due to the site alignment, Apartment Types 06 and 09 would experience pressure values at opening locations, likely to be similar in nature. Based on this assessment, apartment types 06 and 09 were not considered as part of the natural cross ventilation count, which is a conservative approach to the ADG requirements.

**NORTH-EASTERLY WINDS**

- Desktop estimates (unobstructed) of Cp values for the midline of the building are presented (positive values in green, negative in orange).

Apt Type 01

- Pressure differential is slightly larger than the corner units, but additional door results in ventilation rate ~91% of the corner units

Apt Type 05, 06 and 09

- Expected to have very little pressure difference between the openings.
- Apartments are still compliant with the ADG based on opening locations and apartment layout.



**Figure 3a: Anticipated Pressure Coefficients for the North-Easterly Winds**

**WESTERLY WINDS**

- Desktop estimates (unobstructed) of Cp values for the midline of the building are presented (positive values in green, negative in orange).

Apt Type 05

- Pressure differential is slightly larger than the corner units, but additional door results in ventilation rate ~86% of the corner units

Apt Type 01, 06 and 09

- Expected to have very little pressure difference between the openings.
- Apartments are still compliant with the ADG based on opening locations and apartment layout.



**Figure 3b: Anticipated Pressure Coefficients for the Westerly Winds**

**SOUTHERLY WINDS**

- Desktop estimates (unobstructed) of Cp values for the midline of the building are presented (positive values in green, negative in orange).

Apt Type 05

- The bedroom window is expected to have a similar Cp to the south elevation, hence flow rates would be approximately ~82% of the corner unit.

Apt Type 01, 06 and 09

- The obstruction created by Building 3 will likely reduce the natural ventilation potential, for apartment type 01, while type 05 will maintain exposure due to the alignment of Botany Road.
- Apartments are still compliant with the ADG based on opening locations and apartment layout.



**Figure 3c: Anticipated Pressure Coefficients for the Southerly Winds**

With regards to Natural Cross Ventilation in Noise Environment (Objective 4J-1), the design guidance notes that where developments are not able to achieve the design criteria, alternatives may be considered in the following areas, which includes natural cross ventilation. Further to this, Section 4J notes that SEPP65 developments located near rail corridors and busy roads, must have regards to the NSW Government’s *Development near Rail Corridors and Busy Road – Interim Guideline*. Section 4.4 of this document notes that ventilation options for apartments located in these noisy environments can include: Natural ventilation, passive acoustic ventilation or mechanical ventilation can be considered as acceptable approaches in accordance with the BCA and AS1668.

**Summary**

As noted in the submitted Appendix SS – Natural Cross Ventilation report for Building 2, a total of 75% (36 out of 48) of apartments are considered naturally cross ventilated in accordance with the ADG. Of these 36 apartments, 30 of the apartments considered to be naturally cross ventilated in the first nine levels are noted in the Noise and Vibration Impact Assessment report to be noise affected apartments. These apartments can be considered as naturally cross ventilated under the ADG. The design provisions in the form of a ventilated façade design is a separate consideration to enable natural ventilation to be enabled during noisy periods. It is also noted that an unobstructed window opening of at least 5% of the floor area served for all habitable rooms will be incorporated in the design, allowing suitable air flow through the apartment.