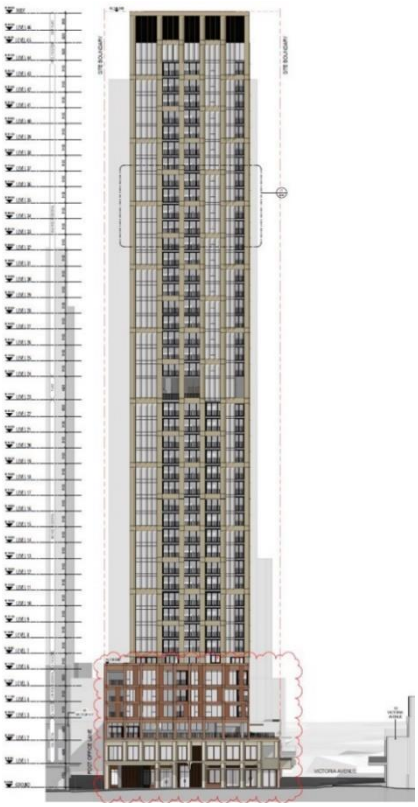

NATURAL VENTILATION STATEMENT

410-416 VICTORIA AVE, CHATSWOOD

WI518-05F02(REV1) - NVS REPORT

OCTOBER 9, 2025

Prepared for:

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DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
October 3, 2025	Initial.	0	AFM	MM	TR/AFM
October 9, 2025	Updated treatments.	1	AFM	MM	TR/AFM

EXECUTIVE SUMMARY

This report presents an opinion on the natural ventilation performance of the various residential apartments within proposed development located at 410-416 Victoria Avenue, in Chatswood, based on our extensive experience in this field and the architectural drawings issued by 'FK Australia' on July 31, 2025. The results of the assessment are based on our extensive experience in modelling of natural ventilation in buildings and our understanding of the guidelines for wind-driven natural cross ventilation provided in the Apartment Design Guide (ADG) within the State Environmental Planning Policy (Housing) 2021 (Housing SEPP). Note that this assessment considers ventilation flow paths that do not flow through bathrooms. Additionally, it is assumed that each habitable room will have an unobstructed opening size of at least of 5% of the floor area served by the opening, in accordance with Objective 4B-1 of the ADG and have a minimum free area of 0.4m^2 in order to provide effective natural ventilation.

The results of the assessment indicate that a total of **61.9% (i.e. 26 out of 42)** of the residential apartments within the first nine storeys of the development are expected to satisfy the ADG requirements for natural cross-ventilation, provided that the following treatment strategies are incorporated into the design. With these measures included, the natural ventilation performance within the first nine storeys of the development is above the required minimum of 60%. Natural cross ventilation has been achieved through openings on orthogonal aspects, with direct exposure to prevailing winds or windows/openings located in significantly different pressure regions as defined within Section 4B of the ADG.

<u>Levels 03 to 05 (Inclusive)</u>

- Unit/Apartment No. 1
  - The northern aspect of the void located to the NW of Unit 1 is recommended to be screened/glazed off from the direct winds and runs to the top of the tower roof.
  - The NW corner bedroom window to the void is recommended to be retained in the design.
  - These measures are expected to facilitate ventilation air flow from the northern façade of the living room to the top of the tower via the void (due to significant pressure differential between the northern façade and the roof top).
- Unit/Apartment No. 4
  - The eastern aspect of the void located to the SE corner of Unit 4 is recommended to be screened/glazed off from the direct winds and runs to the top of the podium roof.
  - A window opening is recommended to be provided from the living room to the void.
  - These measures are expected to facilitate ventilation air flow from the east facing balcony to the top of the podium roof (due to significant pressure differential between the east facing balcony and the podium top).
- Unit/Apartment No. 6
  - The southern aspect of the void located to south of Unit 6 is recommended to be screened/glazed off from the direct winds and runs to the top of the podium roof.
  - A window opening is recommended to be provided from the kitchen to the void. .
  - These measures are expected to facilitate ventilation air flow from the south facing balcony to the top of the podium roof (due to significant pressure differential between the south facing balcony and the podium top).
- Unit/Apartment No. 7
  - The southern aspect of the void located at the SE corner of Unit 7 is recommended to be screened/glazed off from the direct winds and runs to the top of the podium roof. Note that this void is shared with Unit 6.

- The living room window to the void is recommended to be retained in the design.
- These measures are expected to facilitate ventilation air flow from the south facing balcony to the top of the podium roof (due to significant pressure differential between the south facing balcony and the podium top).

Levels 06 to 08 (Inclusive)

- Unit/Apartment No. 1
  - Same recommendations and discussion as presented above for Unit 1 of Levels 03 to 05.

If the above measures are included in the design, the proposed residential development is suitable from the perspective of natural ventilation and warrants approval.

CONTENTS

1 INTRODUCTION

This report presents an opinion on the natural ventilation performance of the various residential apartments within the proposed development located at 410-416 Victoria Avenue, in Chatswood, based on our extensive experience in this field and the architectural drawings issued by 'FK Australia' on July 31, 2025. The results of the assessment are based on our extensive experience in modelling of natural ventilation in buildings and our understanding of the guidelines for wind-driven natural cross ventilation provided in the Apartment Design Guide (ADG) within the State Environmental Planning Policy (Housing) 2021 (Housing SEPP).

2 REGIONAL WIND CLIMATE

The Sydney region is governed by three principal wind directions, and these can potentially affect the subject development. These winds prevail from the north-east, south and west. This summary is based on an analysis of wind rose data obtained by the Bureau of Meteorology from Kingsford Smith Airport between 1995 and 2016. Directional plots of the daily average winds when temperatures are between 20-29.5°C; which is the thermal comfort range for this region is shown in Figure 1b below (when occupants tend to open windows for ventilation). These plots have been produced based on an analysis of recorded wind speed data obtained from Kingsford Smith Airport from 1995 to 2016.

Natural ventilation for a residential apartment is most beneficial during the warmer times of the year, when the occupants of the apartment are most likely to open the windows and/or doors and also when the cooling effect of airflow through the apartment is most effective. An analysis of the Sydney wind climate data within the thermal comfort zone range indicates that more than half of the wind events occur from the 'NNE' to 'S' sector, where the 'NNE' to 'NE' and 'SE' to 'S' sector winds are the most dominant.

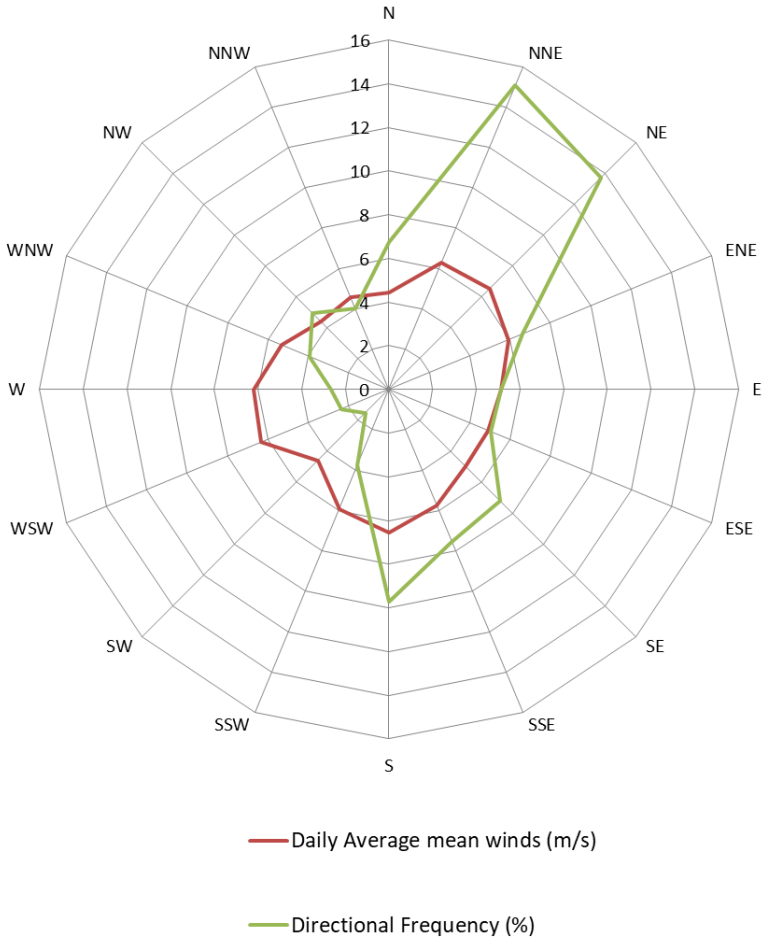

Figure 1b: Daily Average Hourly Mean Wind Speeds, and Frequencies Occurrences, for the Sydney Region for Outdoor Temperatures between 20-29.5°C (based on observations from Kingsford Smith Airport from 1995 to 2016, corrected to open terrain at 10m)

3 NATURAL CROSS VENTILATION OF DEEMED TO SATISFY APARTMENTS

Natural ventilation of indoor areas can be used to improve both the level of occupant comfort and the air quality of an internal space. Natural ventilation is beneficial in improving occupant comfort during the warmer months of the year when the occupants will generally have windows and doors open, while during the winter months it is considered primarily beneficial for air quality purposes only.

The predominant wind directions for the region have been analysed in Section 2 of this report, and from this analysis only the north-easterly and southerly winds should be considered as contributors to natural ventilation for occupant comfort purposes, since these are the predominant wind directions during the warmer months of the year. The westerly winds are predominant during the cooler winter months and would be beneficial for air quality purposes only.

The Apartment Design Guide (ADG) states that, for a development to be considered naturally ventilated, at least 60% of the individual apartments in the first nine storeys of the building must be considered to be naturally cross ventilated. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed. To be considered naturally cross ventilated, the overall depth of a cross-over or cross-through apartment should ideally not exceed 18m, measured glass line to glass line. However, based on our extensive experience in the field, we find that that relatively simpler flow paths (e.g. minimal bends and obstructions) that are greater than 18m can provide suitable natural ventilation when the openings are located on opposite aspects that are subjected to significant pressure differentials (e.g. due to exposure of one of the aspects to direct prevailing winds). Examples of apartments which are classified as being naturally ventilated by the Apartment Design Guide are shown in Figures 2 below, which also show the flow paths for natural cross ventilation through the apartments.

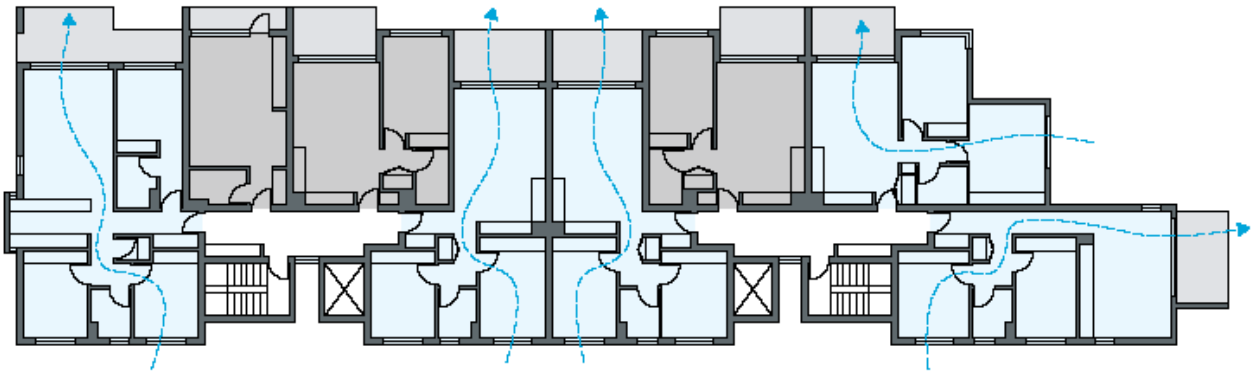

Figure 2a: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from Apartment Design Guide, floor plan of a typical residential building)

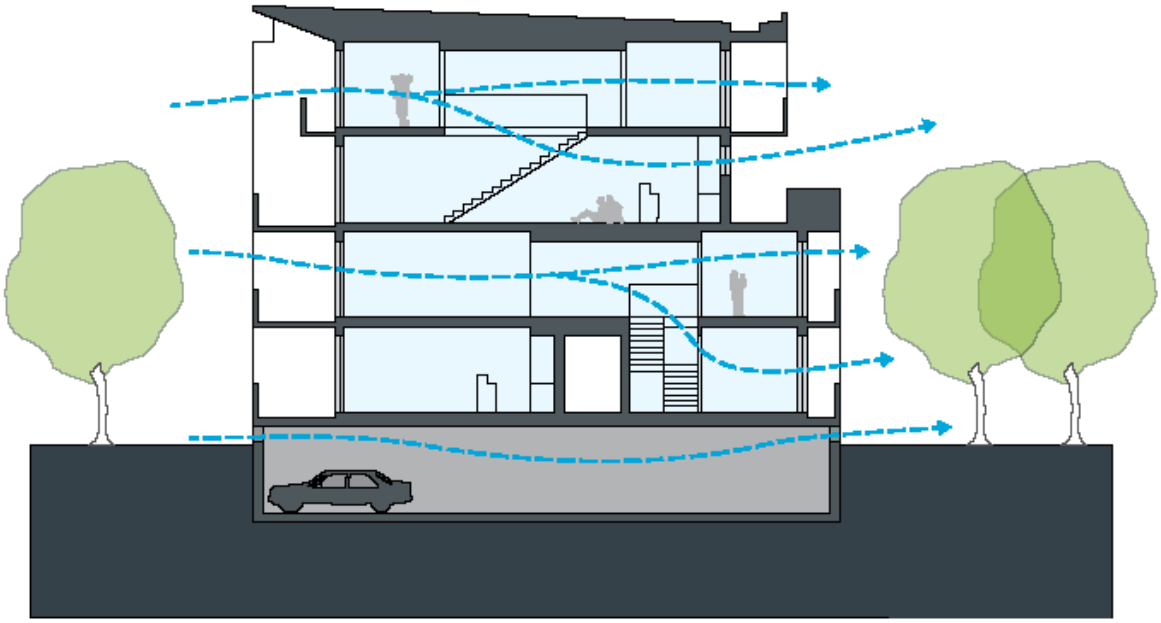

Figure 2b: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from Apartment Design Guide, section elevation of a typical residential building)

Apartments have been considered to have dual aspects if the two openings are able to be located on aspects which are less than 135° in plan orientation from each other. Openings which are located on aspect orientations greater than this are more likely to have similar pressures at the opening, and their performance cannot be considered to satisfy based on the ADG guidelines. These apartments may still be considered to be naturally ventilated, but will require further analysis, as outlined in Section 4.

The Apartment Design Guide does provide design guidance for the layout and design of single aspect apartments to maximise natural ventilation. While these are not considered naturally cross ventilated, they allow for site restraints for design excellence in single aspect apartments. The design allows for the inclusion of plenums, vertical ventilation shafts and building indentations with a width to depth ratio of 2:1 or 3:1 to ensure effective air circulation and avoid trapped smells.

It is important that the naturally cross ventilated flow path does not flow through a bathroom in order to avoid issues with odours.

It should be noted that deviations in the apartment layout shown in the Apartment Design Guide can have the potential to provide effective natural ventilation through the apartment. A comparison between the predicted natural ventilation characteristics of an apartment obtained from wind tunnel testing with the observed full-scale characteristics of the same apartment have been published in the paper titled 'Designing for Natural Ventilation for Tall Residential Buildings' by Peddie and Rofail (2011), which demonstrates close agreement.

4 RESULTS AND DISCUSSION

This assessment is based on our extensive experience in modelling of natural ventilation in buildings and our understanding of the guidelines for wind-driven natural cross ventilation provided in the Apartment Design Guide (ADG) within the State Environmental Planning Policy (Housing) 2021 (Housing SEPP). Note that this assessment considers ventilation flow paths that do not flow through bathrooms. Additionally, it is assumed that each habitable room will have an unobstructed opening size of at least of 5% of the floor area served by the opening, in accordance with Objective 4B-1 of the ADG and have a minimum free area of 0.4m^2 in order to provide effective natural ventilation.

The results of the assessment indicate that a total of **61.9% (i.e. 26 out of 42)** of the residential apartments within the first nine storeys of the development are expected to satisfy the ADG requirements for natural cross-ventilation, provided that the following treatment strategies are incorporated into the design. With these measures included, the natural ventilation performance within the first nine storeys of the development is above the required minimum of 60%. Natural cross ventilation has been achieved through openings on orthogonal aspects, with direct exposure to prevailing winds or windows/openings located in significantly different pressure regions as defined within Section 4B of the ADG.

<u>Levels 03 to 05 (Inclusive)</u>

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  - The southern aspect of the void located to south of Unit 6 is recommended to be screened/glazed off from the direct winds and runs to the top of the podium roof.
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  - These measures are expected to facilitate ventilation air flow from the south facing balcony to the top of the podium roof (due to significant pressure differential between the south facing balcony and the podium top).
- Unit/Apartment No. 7
  - The southern aspect of the void located at the SE corner of Unit 7 is recommended to be screened/glazed off from the direct winds and runs to the top of the podium roof. Note that this void is shared with Unit 6.
  - The living room window to the void is recommended to be retained in the design.
  - These measures are expected to facilitate ventilation air flow from the south facing balcony to the top of the podium roof (due to significant pressure differential between the south facing balcony and the podium top).

Levels 06 to 08 (Inclusive)

- Unit/Apartment No. 1
  - Same recommendations and discussion as presented above for Unit 1 of Levels 03 to 05.

If the above measures are included in the design, the proposed residential development is suitable from the perspective of natural ventilation and warrants approval.

Table 2: Natural Ventilation Performance - Summary

Apartments	Number	Percentage
Satisfies ADG (Deemed to Satisfy), including those that satisfy with the inclusion of treatments	26	61.9%
Does not Satisfy	16	38.1%
Total Number of Apartments	42	100%

Table 3: Natural Ventilation Performance – Individual Units

Unit Numbering	Meets ADG Guidelines for Natural Cross Ventilation
Levels 03 to 05 (Inclusive) [18/24 = Pass]	
Unit 1	YES (Significant pressure differential, assuming that the recommendations listed at the top of this section are included in the design).
Unit 2	NO
Unit 3	YES (Corner unit)
Unit 4	YES (Significant pressure differential, assuming that the recommendations listed at the top of this section are included in the design).
Unit 5	YES (Corner unit)
Unit 6	YES (Significant pressure differential, assuming that the recommendations listed at the top of this section are included in the design).
Unit 7	YES (Significant pressure differential, assuming that the recommendations listed at the top of this section are included in the design).
Unit 8	NO
Level 06 [2/4 = Pass]	
Unit 1	YES (Significant pressure differential, assuming that the recommendations listed at the top of this section are included in the design).
Unit 2	YES (Corner unit)
Unit 3	NO
Unit 4	NO
Levels 07 to 08 (Inclusive) [6/14 = Pass] Note: Level 08 is the nineth storey on elevation	
Unit 1	YES (Significant pressure differential, assuming that the recommendations listed at the top of this section are included in the design).
Unit 2	YES (Corner unit)
Unit 3	NO
Unit 4	NO
Unit 5	NO
Unit 6	YES (Corner unit)
Unit 7	NO

5 REFERENCES

ANSI/ASHRAE 55-2010, Thermal Environmental Conditions for Human Occupancy, Atlanta: American Society of Heating, Refrigeration and Air-conditioning Engineers.

ANSI/ASHRAE 62.1-2010, Ventilation for Acceptable Indoor Air Quality, Atlanta: American Society of Heating, Refrigeration and Air-conditioning Engineers.

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Peddie K.M. and Rofail A.W., 2011, 'Designing for Natural Ventilation for Tall Residential Buildings', 2011 CTBUH World Conference, Seoul, Korea, October 10-12, 2011.

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APPENDIX A - ARCHITECTURAL DRAWINGS REFERENCED

Autodesk Docs://23115 410-416 Victoria Avenue Chatswood/23115_GENERAL_R24_GROUND FLOOR SCENARIO OPTION 02.rvt

REVISION

A	SSDA LODGEMENT	15.04.2025
B	RTS LODGEMENT	31.07.2025

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410-416 VICTORIA AVE CHATSWOOD

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BW/DS	CB	31.07.2025	23115	1 : 100 @A1

DRAWING TITLE
LEVEL 03 - 04 FLOOR PLAN

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LEVEL 06 FLOOR PLAN

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