



NATURAL VENTILATION STATEMENT

50 MORISSET STREET, QUEANBEYAN

WI151-01F02(REV2)- NVS REPORT

NOVEMBER 23, 2023

Prepared for:

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DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
November 1, 2023	Initial.	0	SG	SR	SL
November 22, 2023	Updated drawings and figures.	1	SG	SR	SL
November 22, 2023	Updated figures.	1	SG	SR	SL

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EXECUTIVE SUMMARY

This report is in relation to the proposed development located at 50 Morisset Street, Queanbeyan, and presents an opinion on the natural ventilation performance and characteristics of the various residential apartments of the subject development.

The conclusions of this report are drawn from our extensive experience in this field and are based on the architectural drawings, received November 22, 2023. It should be noted that no wind tunnel testing has been undertaken for this assessment and, hence, this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection. The results of the assessment have been compared against the wind-driven natural cross ventilation criteria detailed in the Apartment Design Guide (ADG) of the State Environmental Planning Policy No. 65 (SEPP65). Any recommendations in this report are made only in-principle and are based on our extensive experience in the study of wind-driven natural ventilation effects.

Results (Based on SEPP65):

The results of the assessment indicate that a total of **60% (96 out of 160)** of the residential apartments, within the development will achieve adequate levels of natural cross ventilation as per SEPP65, which satisfies the required minimum of 60%. Natural cross ventilation has been achieved through openings on orthogonal or opposite aspects (for example corner or through apartments), with direct exposure to prevailing winds or windows located in significantly different pressure regions as defined within Section 4B of the ADG.

Important Note: It is important that the naturally cross ventilated flow path does not flow through a bathroom in order to avoid issues with odours. Additionally, each habitable room should 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 0.4m² in order to provide effective natural ventilation.

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REGIONAL WIND CLIMATE

The Canberra region is governed by two principal wind directions, and these can potentially affect the subject development. These winds prevail from the north-westerly and south-easterly directions. This summary is based on an analysis of wind rose data obtained by the Bureau of Meteorology from Canberra Airport between 2010 and 2022. 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 1 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 Canberra Airport between 2010 and 2022.

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 Canberra wind climate data within the thermal comfort zone range indicates that more than half of the wind events occur from the 'WNW' to 'SE' sector, where the 'WNW' to 'NNW' and 'E' to 'SE' sector winds are the most dominant.

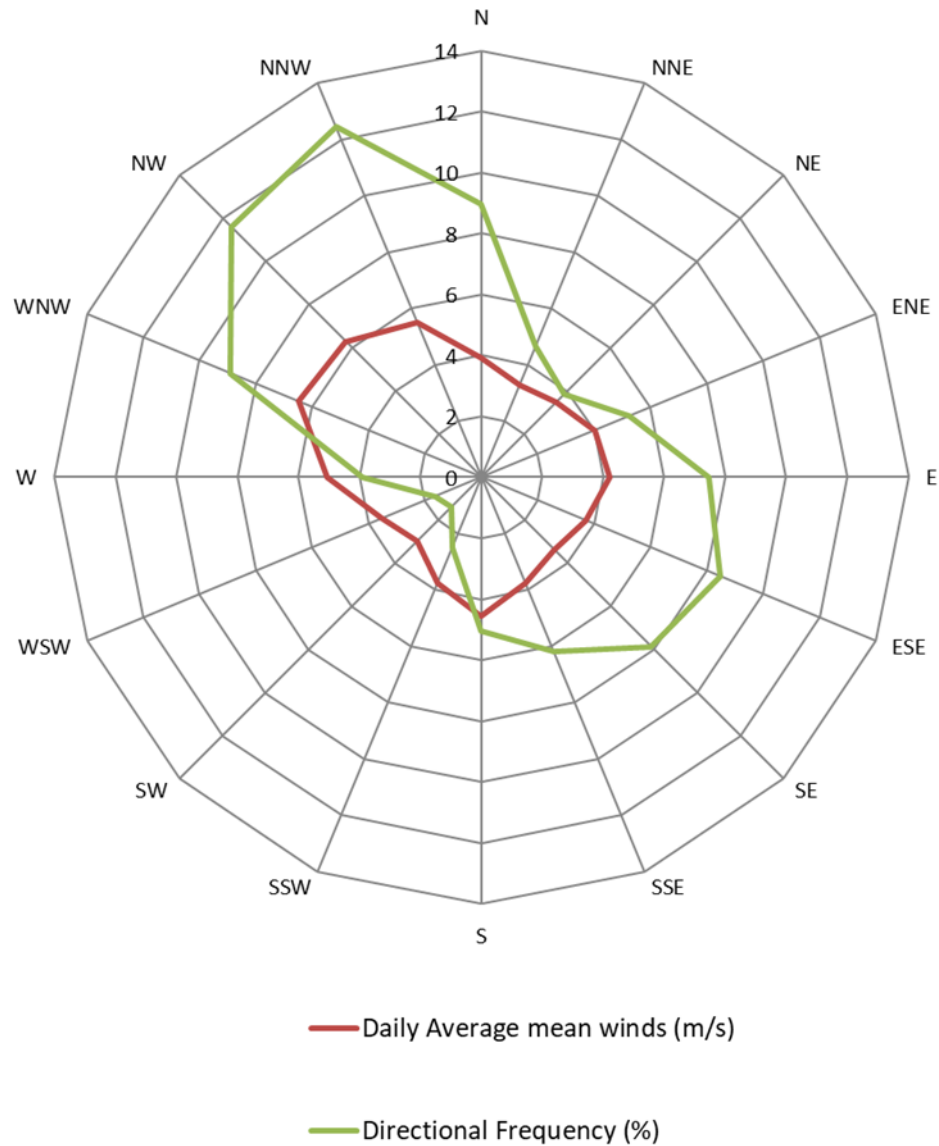


Figure 1: Daily Average Hourly Mean Wind Speeds, and Frequencies Occurrences, for the Canberra Region for Outdoor Temperatures between 20-29.5°C (based on observations from Canberra Airport between 2010 and 2022, corrected to open terrain at 10m)

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 1 of this report, and from this analysis only the north-westerly and south-easterly 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 NSW State Environmental Planning Policy No. 65 (SEPP65) 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 to be naturally cross ventilated, the overall depth of a cross-over or cross-through apartment must not exceed 18m, measured glass line to glass line. Examples of apartments which are classified as being naturally ventilated by SEPP65 are shown in Figures 2 below, which also show the flow paths for natural cross ventilation through the apartments.

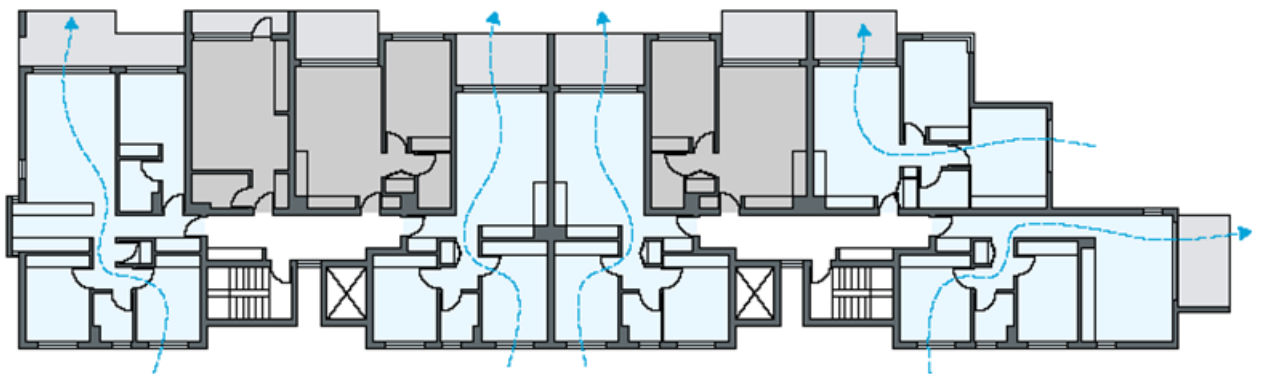


Figure 2a: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from Apartment Design Guide, floor plan of a typical residential building)

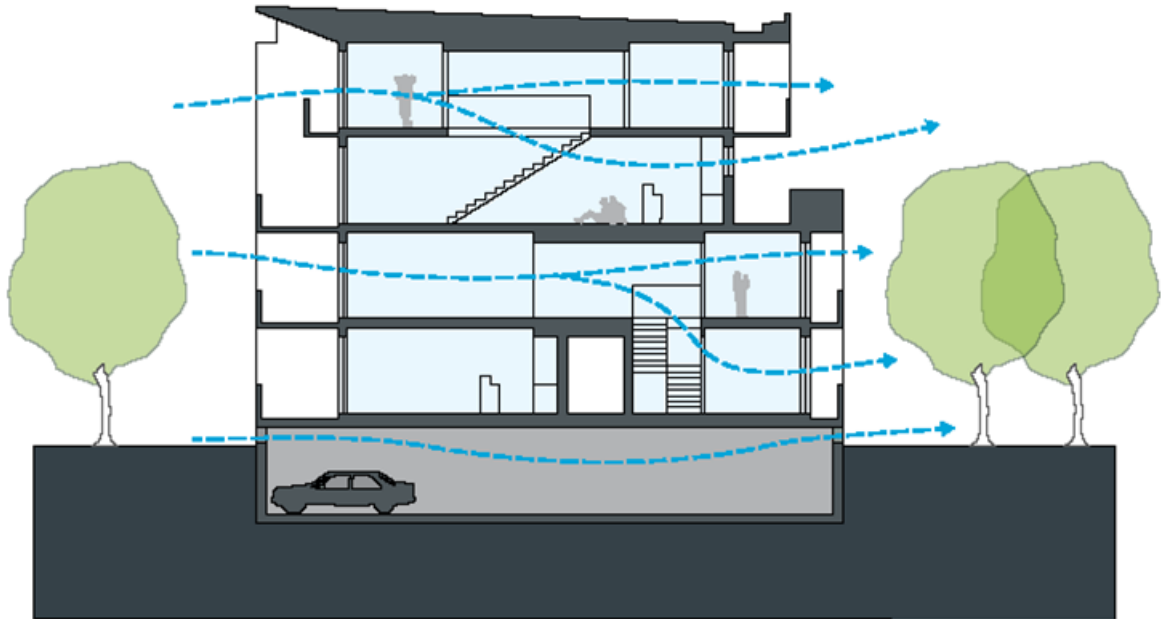


Figure 2b: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from Apartment Design Guide, section elevation of a typical residential building)

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 SEPP65 guidelines. These apartments may still be considered to be naturally ventilated, but will require further analysis, as outlined in Section 3.

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 SEPP65 can have the potential to provide effective natural ventilation through the apartment. However, due to the complicated nature of flow paths driven by pressure differentials at different openings of an apartment, the effectiveness of natural ventilation for apartments which are outside of those presented in Figures 2 should be demonstrated by means of a detailed wind tunnel study. 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.

3 RESULTS AND DISCUSSION

This report is in relation to the proposed development located at 50 Morisset Street, Queanbeyan, and presents an opinion on the natural ventilation performance and characteristics of the various residential apartments of the subject development.

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Important Note: It is important that the naturally cross ventilated flow path does not flow through a bathroom in order to avoid issues with odours. Additionally, each habitable room should 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 0.4m² in order to provide effective natural ventilation.

Table 1: Natural Ventilation Performance

Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
N201	YES
N202	YES
N203	NO
N204	YES
N205	NO
N206	YES
N207	NO
N208	YES
N209	NO
N210	YES
N301	YES
N302	YES
N303	NO
N304	YES
N305	NO
N306	YES
N307	NO
N308	YES
N309	NO
N310	YES
N401	YES
N402	YES
N403	NO
N404	YES
N405	NO
N406	YES
N407	NO
N408	YES
N409	NO
N410	YES
N501	YES
N502	YES
N503	NO
N504	YES

Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
N505	NO
N506	YES
N507	NO
N508	YES
N509	NO
N510	YES
N601	YES
N602	YES
N603	NO
N604	YES
N605	NO
N606	YES
N607	NO
N608	YES
N609	NO
N610	YES
N701	YES
N702	YES
N703	NO
N704	YES
N705	NO
N706	YES
N707	NO
N708	YES
N709	NO
N710	YES
N801	YES
N802	YES
N803	NO
N804	YES
N805	NO
N806	YES
N807	NO
N808	YES
N809	NO

Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
N810	YES
N901	YES
N902	YES
N903	NO
N904	YES
N905	NO
N906	YES
N907	NO
N908	YES
N909	NO
N910	YES
S211	YES
S212	YES
S213	NO
S214	YES
S215	NO
S216	YES
S217	NO
S218	YES
S219	NO
S220	YES
S311	YES
S312	YES
S313	NO
S314	YES
S315	NO
S316	YES
S317	NO
S318	YES
S319	NO
S320	YES
S411	YES
S412	YES
S413	NO
S414	YES

Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
S415	NO
S416	YES
S417	NO
S418	YES
S419	NO
S420	YES
S511	YES
S512	YES
S513	NO
S514	YES
S515	NO
S516	YES
S517	NO
S518	YES
S519	NO
S520	YES
S611	YES
S612	YES
S613	NO
S614	YES
S615	NO
S616	YES
S617	NO
S618	YES
S619	NO
S620	YES
S711	YES
S712	YES
S713	NO
S714	YES
S715	NO
S716	YES
S717	NO
S718	YES
S719	NO

Unit Number	Meets ADG Guidelines for Natural Cross Ventilation
S720	YES
S811	YES
S812	YES
S813	NO
S814	YES
S815	NO
S816	YES
S817	NO
S818	YES
S819	NO
S820	YES
S911	YES
S912	YES
S913	NO
S914	YES
S915	NO
S916	YES
S917	NO
S918	YES
S919	NO
S920	YES

Natural Ventilation Legend

➔ Meeting ADG Requirements for Natural Cross-Ventilation (Corner / Cross-Through)

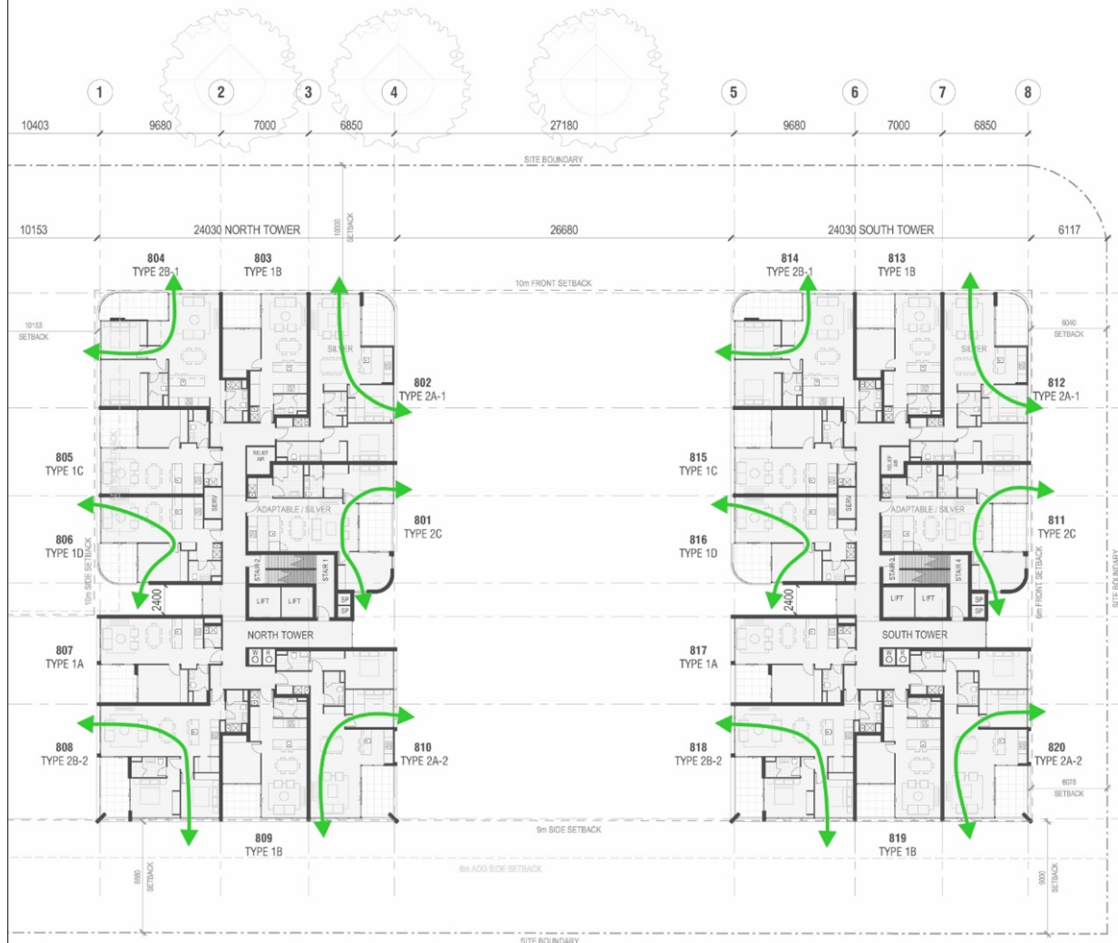


Figure 3a: Natural Ventilation Criteria following ADG Requirements (Level 2-8)

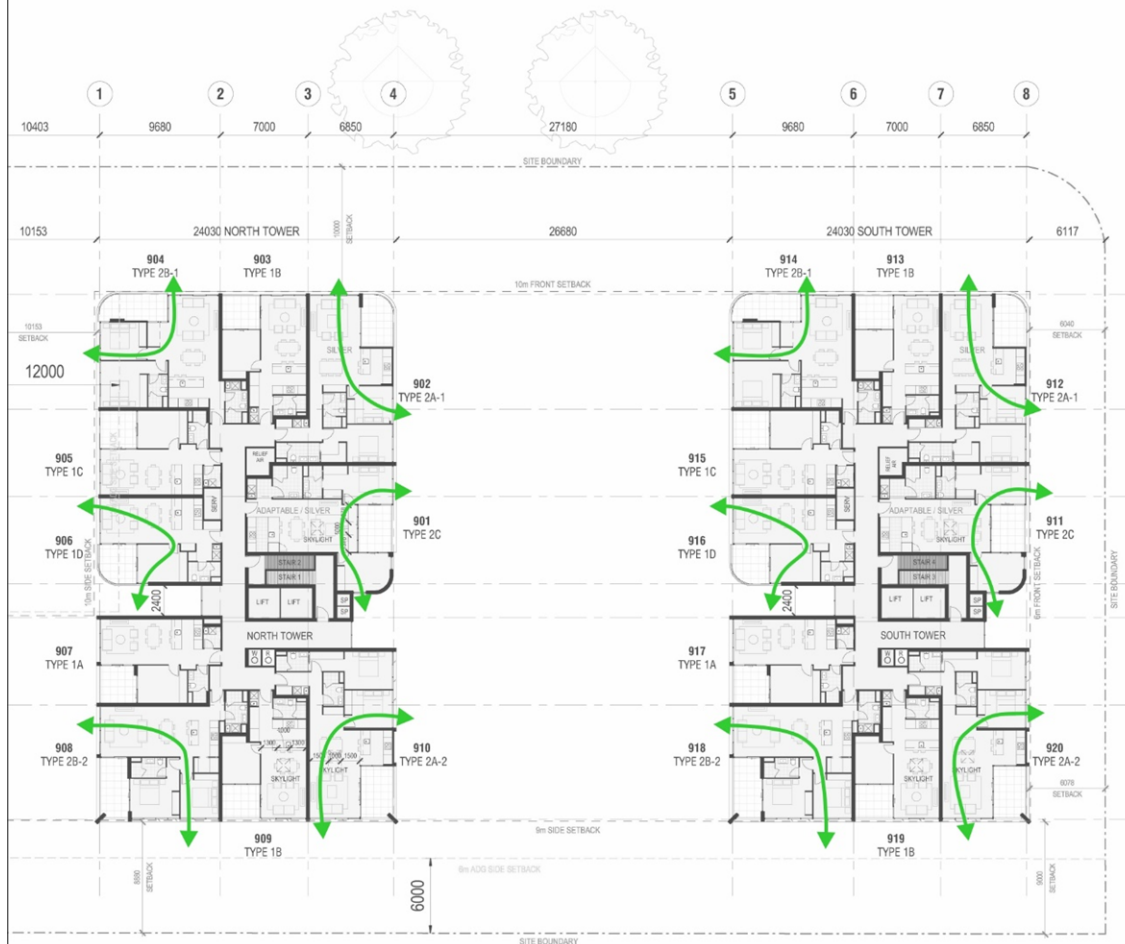


Figure 3b: Natural Ventilation Criteria following ADG Requirements (Level 9)

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.

AS1668.2-2002, The use of ventilation and air conditioning in buildings, Part 2: Ventilation design for indoor air contaminant control (excluding requirements for the health aspects of tobacco smoke exposure), Standards Australia.

Aynsley R.M., Melbourne W. and Vickery B.J., (1977) Architectural Aerodynamics, Architectural Science Series, pp192-203.

State Environmental Planning Policy No. 65 (SEPP65), 2015, "Apartment Design Guide", NSW Department of Planning and Environment.

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.

Peddie K.M. and Rofail A.W., 2010, 'Application of Natural Ventilation for Commercial Developments' 14th Australasian Wind Engineering Society Workshop, Canberra, August 5-6, 2010.