VILLAWOOD STAGE 2

Natural Ventilation Assessment

Prepared for:

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Traders in Purple (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.19164-R01-v2.0	12 July 2023	Mark Hobday	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy

EXECUTIVE SUMMARY

SLR Consulting Pty Ltd (SLR) has been engaged by Traders in Purple to assess the natural ventilation of the proposed residential at Villawood, Stage 2 development. This report will a qualitative review to assess the natural ventilation under the Apartment Design Guide (ADG). This report will form part of the development application to Fairfield City Council.

The State Environmental Planning Policy (SEPP) 65 supported by the Australian Design Guide is relevant to the assessment of the natural ventilation through residential components of proposed development. Section 4B-3 of the Australian Design Guide states that:

At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. 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.

The proposed development implements a number of the ADG recommendations to maximize the natural cross ventilation throughout the development.

- The proposed development has been provided with openings on multiple sides of the apartments for the majority of proposed floor plans, allowing it to make use of wind-induced natural ventilation throughout the year and thereby minimising energy costs.
- In general the overall depth of cross-over or cross-through units does not exceed 18 m as per the Design Criteria of Objective 4B-3.

Natural cross ventilation to many single aspect apartments is achieved via building indentations. This is anticipated within ADG Section 4B which states in its opening paragraph that "*Natural cross ventilation is achieved by apartments having more than one aspect with direct exposure to the prevailing winds, **or** windows located in significant different pressure regions, rather than relying on purely wind driven air*".

The following conclusions have been reached based on a qualitative review of the floorplans of the ADG complaint dual aspect units and quantitative numerical modelling of non-dual aspect units:

- In Building A, 60% (82 out of 136) of the apartments will be naturally cross ventilated, recommendations have been given to meet the ADG.
- In Building C, 61% (43 out of 70) of the apartments will be naturally cross ventilated, recommendations have been given to meet the ADG.
- SLR recommend an effective opening of all windows to be equivalent to 5% of the floor area served as per the ADG guideline. A minimum effective open area of 1.5% of the apartment floor area served on any facade aspect is recommended.

The above analysis has been made on the basis of our best engineering judgment and on the experience gained from computational fluid dynamics analysis of a range of developments. The conclusions of this SLR report can be quantified using computational fluid dynamics analysis if required.

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SLR Consulting Pty Ltd (SLR) has been engaged by Traders in Purple to assess the natural ventilation of the proposed residential at Villawood, Stage 2 development. This report will a qualitative review to assess the natural ventilation under the Apartment Design Guide (ADG). This report will form part of the development application to Fairfield City Council.

1.1 Site and Surrounds

The proposed sits approximately 200m southwest of Villawood Station, with the site bound by Kamira Court and Kamira Avenue to the east and west respectively. A proposed extension to Howatt Street will bound the south of the site. Surrounds of the site are predominantly low-level with there being some mid-level development immediately east of the proposed

Figure 1 Site Location

Image: Nearmap (29 June 2023)

1.2 Development Description

From the drawings provided, the proposed development will comprise of an 8-storey and a 10-storey building inclusive of:

- Ground level with residential apartments, retail, building lobbies, communal facilities, communal outdoor space.
- Level 1 and 2 with residential apartments and car parking.
- Level 3 to 7 with residential apartments.
- Level 7 also has a communal open space.
- Level 8 to 10 with residential apartments.

Perspective View is shown in **Figure 2**.

Figure 2 3D Perspective View

2 Australian Design Guide Requirements

The State Environmental Planning Policy (SEPP) 65 supported by the Australian Design Guide is relevant to the assessment of the natural ventilation through residential components of proposed development. Section 4B-3 of the Australian Design Guide states that:

At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. 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.

The following points from the design guide are also noted.

- Overall depth of a cross-over or cross-through apartment does not exceed 18m, measured glass line to glass line.
- Natural ventilation to single aspect apartments is achieved with a light well or stack effect ventilation (or similar) or courtyards or building indentations have a width to depth ratio of 2:1 or 3:1 to ensure effective air circulation and avoid trapped smells.
- In cross-through apartments external window and door opening sizes/areas on one side of an apartment (inlet side) are approximately equal to the external window and door opening sizes/areas on the other side of the apartment (outlet side).

There are no specific requirements (e.g. air changes per hour) in the ADG guideline.

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)” recommends 3 air changes per hour for habitable rooms to satisfy the air quality requirements.

3 Natural Ventilation

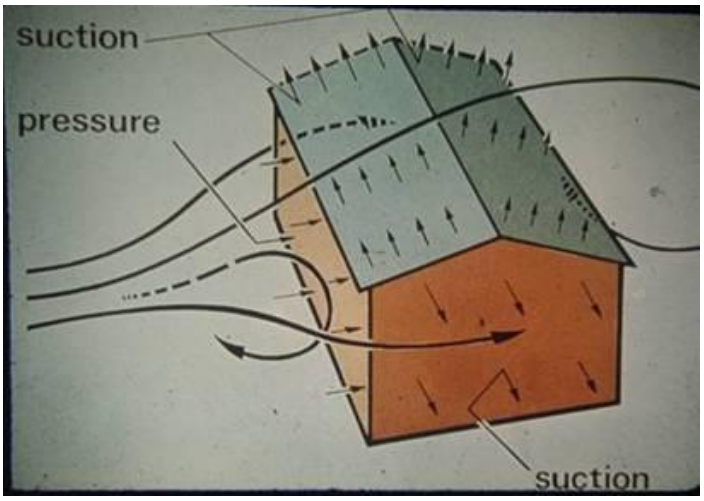
3.1 General Principles

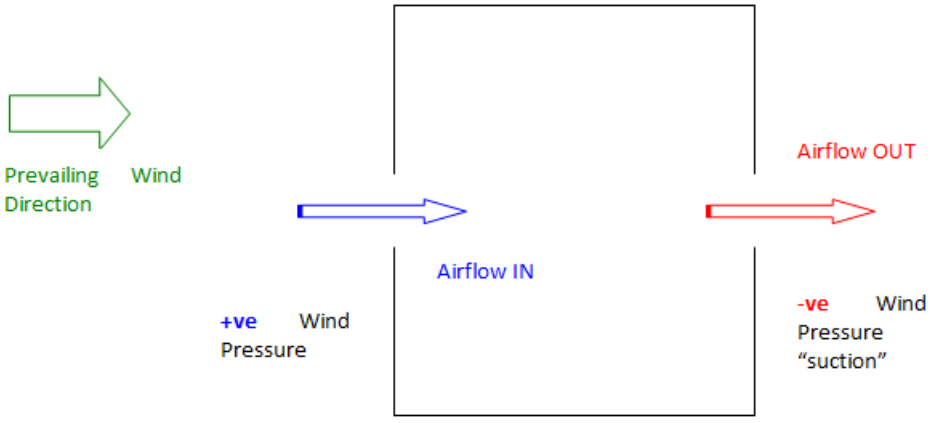
A key feature of the proposed development is the incorporation of façade openings designed to enable various spaces within the development buildings to make use of wind–induced natural ventilation throughout the year thereby minimising energy costs.

Wind-induced natural ventilation works on the straightforward principle of differential pressure. If a building envelope has multiple openings and there exists a pressure difference between those openings, e.g. the wind pressure at one opening is greater than the pressure at the other opening; airflow will be pushed through the building in the direction positive to negative.

The resulting amount of airflow through the building envelope will be a function of the magnitude of the pressure differential, size of the various building openings and degree of "blockage" in between. These features are illustrated in Figure 3**.**

Figure 3 Wind-Induced Natural Ventilation via Differential Pressure





4 Qualitative Assessment

The natural ventilation for the proposed residential development has been qualitatively assessed. Ventilation is achieved by the differential pressure between the different building facades.

For the qualitative assessment SLR the plans received July 2023.

SLR recommend an effective opening of all windows to be equivalent to 5% of the floor area served as per the ADG guideline.

A minimum effective open area of 1.5% of the apartment floor area served on any facade aspect is recommended.

4.1 Qualitative Results – Dual Aspect Apartment

Table 1 Cross Ventilated Apartments – Building A

Level	Number of Apartments	Number of Apartments with Openings to Support Cross Ventilation (as per ADG)	Percentage of Apartments with Openings to Support Cross Ventilation (as per ADG)
Ground	0	0	-
Level 1	16	4	25%
Level 2	16	4	25%
Level 3	24	15	63%
Level 4	24	15	63%
Level 5	17	12	71%
Level 6	17	12	71%
Level 7	11	10	91%
Level 8	11	10	91%
Total	136	82	60%

Table 2 Cross Ventilated Apartments – Building C

Level	Number of Apartments	Number of Apartments with Openings to Support Cross Ventilation (as per ADG)	Percentage of Apartments with Openings to Support Cross Ventilation (as per ADG)
Ground	6	2	33%-
Level 1	8	3	38%
Level 2	8	3	38%
Level 3	12	9	75%
Level 4	12	9	75%
Level 5	10	7	70%
Level 6	10	7	70%
Level 7	4	3	75%
Total	70	43	61%

Table 3 Cross Ventilated Apartments – Combined

Level	Number of Apartments	Number of Apartments with Openings to Support Cross Ventilation (as per ADG)	Percentage of Apartments with Openings to Support Cross Ventilation (as per ADG)
Combined Buildings	206	125	61%

5 Conclusion

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APPENDIX A

Flow Diagrams

Figure 1 Natural Ventilation Flow Paths - Building A – Level 1

Figure 2 **Natural Ventilation Flow Paths - Building A – Level 2**

Figure 3 **Natural Ventilation Flow Paths - Building A – Level 3**

Figure 4 **Natural Ventilation Flow Paths - Building A – Level 4**

Figure 5 **Natural Ventilation Flow Paths - Building A – Level 5**

Figure 6 **Natural Ventilation Flow Paths - Building A – Level 6**

Figure 7 **Natural Ventilation Flow Paths - Building A – Level 7**

Figure 8 **Natural Ventilation Flow Paths - Building A – Level 8**

Figure 9 Natural Ventilation Flow Paths - Building C – Ground Level

Figure 10 Natural Ventilation Flow Paths - Building C – Level 1

Figure 11 Natural Ventilation Flow Paths - Building C – Level 2

Figure 12 Natural Ventilation Flow Paths - Building C – Level 3

Figure 13 Natural Ventilation Flow Paths - Building C – Level 4

Figure 14 Natural Ventilation Flow Paths - Building C – Level 5

Figure 15 **Natural Ventilation Flow Paths - Building C – Level 6**

Figure 16 **Natural Ventilation Flow Paths - Building C – Level 7**

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