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Alton Property Group

93-107 Cecil Ave & 9-10 Roger Ave, Castle Hill

Qualitative Natural Ventilation Study

30N-24-0299-TRP-129379-0

4 February 2026

Job Title:	93-107 Cecil Ave & 9-10 Roger Ave, Castle Hill
Report Title:	Qualitative Natural Ventilation Study
Document Reference:	30N-24-0299-TRP-129379-0

Prepared For:	**Prepared By:**
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Issued By:	Alexis Dalamagas 4 Feb 2026		Project Engineer

Revision History:

Rev. #	*Comments / Details of change(s) made*	*Date*	*Revised by:*
Rev. 00	Original issue	4 Feb 2026	

Executive Summary

Vipac Engineers & Scientists Pty Ltd has been engaged by **Alton Property Group** to conduct a qualitative assessment of natural ventilation potential of the proposed development at **93-107 Cecil Ave & 9-10 Roger Ave, Castle Hill.** This appraisal is based on Vipac's experience as a wind-engineering consultancy.

Drawings of the proposed development were provided by **Aplus Design Group** in **December 2025.**

Based on our engineering observations and the qualitative study, it is concluded that for the proposed development:

- **68.3% (69 out of 101)** apartments in **Stage 1** are expected to be cross ventilated with the current design; thereby meeting the Apartment Design Guide (ADG) requirements.
- **64.1%** (**77 out of 120**) apartments in **Stage 2** are expected to be cross ventilated with the current design; thereby meeting the Apartment Design Guide (ADG) requirements.

This analysis has been made on the basis of our engineering assumptions and on experience gained from model scale wind tunnel or Computational Fluid Dynamics (CFD) analysis of a range of developments of similar magnitude to the proposed development.

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Introduction

Vipac Engineers and Scientists Pty Ltd has been commissioned by **Alton Property Group** to undertake a qualitative cross ventilation assessment at **93-107 Cecil Ave & 9-10 Roger Ave, Castle Hill**. This report is qualitative review to assess the natural ventilation under Apartment Design Guide (ADG).

Natural ventilation is taken to mean that quantity of fresh air that enters a building without mechanical assistance. Supply of outside air indoors can decrease the level of indoor pollutant as well as cooling the building. There are two main mechanisms for natural ventilation: 'stack (or chimney)' effect and 'wind pressure' effect.

Stack effect is produced by two columns of air at different temperature, where the interference between the two columns is unstable and tends to allow the colder air to move into the warmer air at low level and the warmer air into cooler air at an upper level. The rate of air circulation due to stack effect in a building depends on separated distance (height) of the cold and hot air, opening area at a bottom and top of the building and temperature difference.

Wind pressure effect is produced by the interaction of wind with the building. The interaction will produce a building surface with local suctions and pressures. The pressures are used as intake of outside air and suction as removal of indoor air. The different pressure distribution across the building will be used to achieve the required indoor air circulation.

The proposed development is comprised of 4 buildings split into stages – Stage 1 with 2. The proposed development comprises of residential buildings with an approximate roof height of 105m (E), 82m (S), 89m (W) and 118m (N). The site is bounded by Cecil Avenue to the northeast, Roger Avenue to the south and existing developments to the remaining directions. The site plan of the proposed development and the northeastern elevation of the building are shown in Figure 1 and Figure 2, respectively. Assumed terrain categories for wind speed estimation is shown in Figure 3.

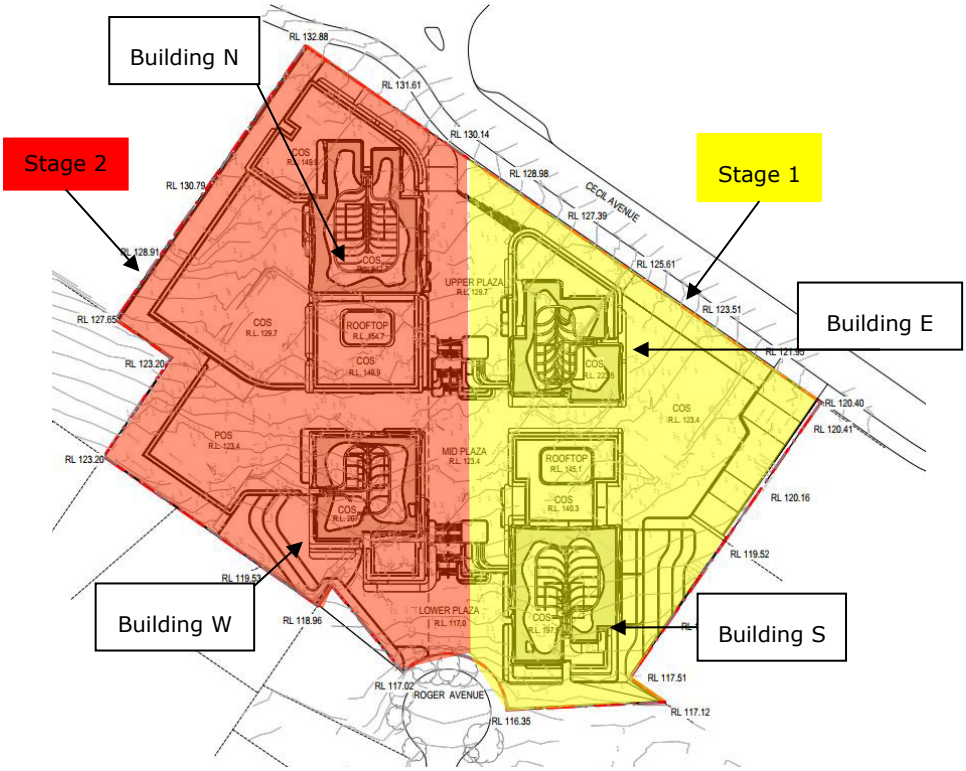

Figure 1 - Site plan of the proposed development.

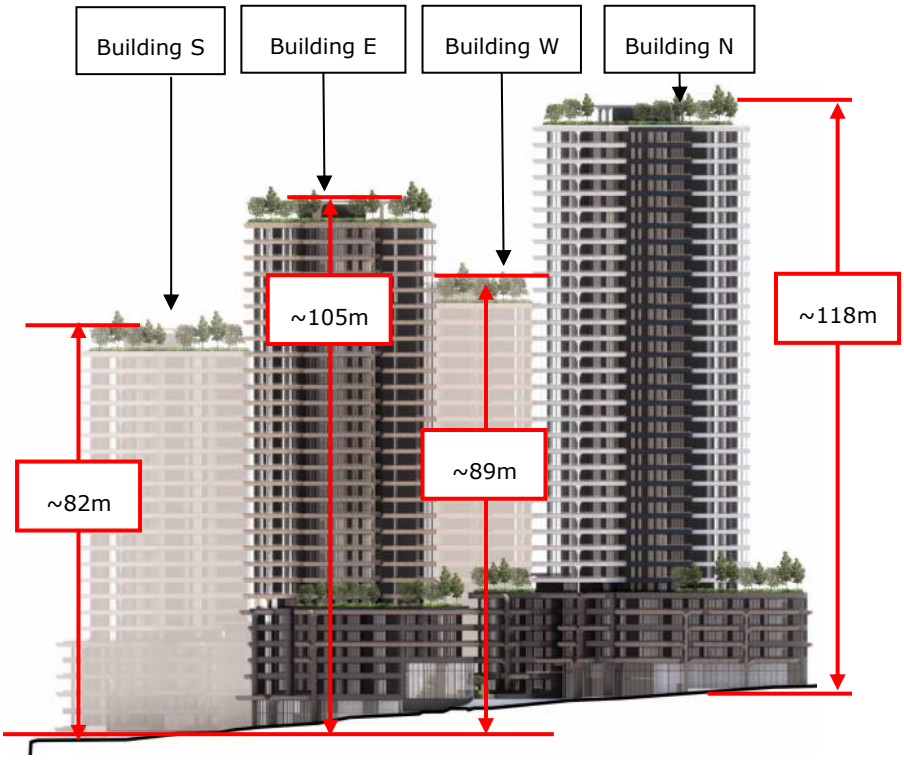

Figure 2 - Northeastern elevation of the proposed development.

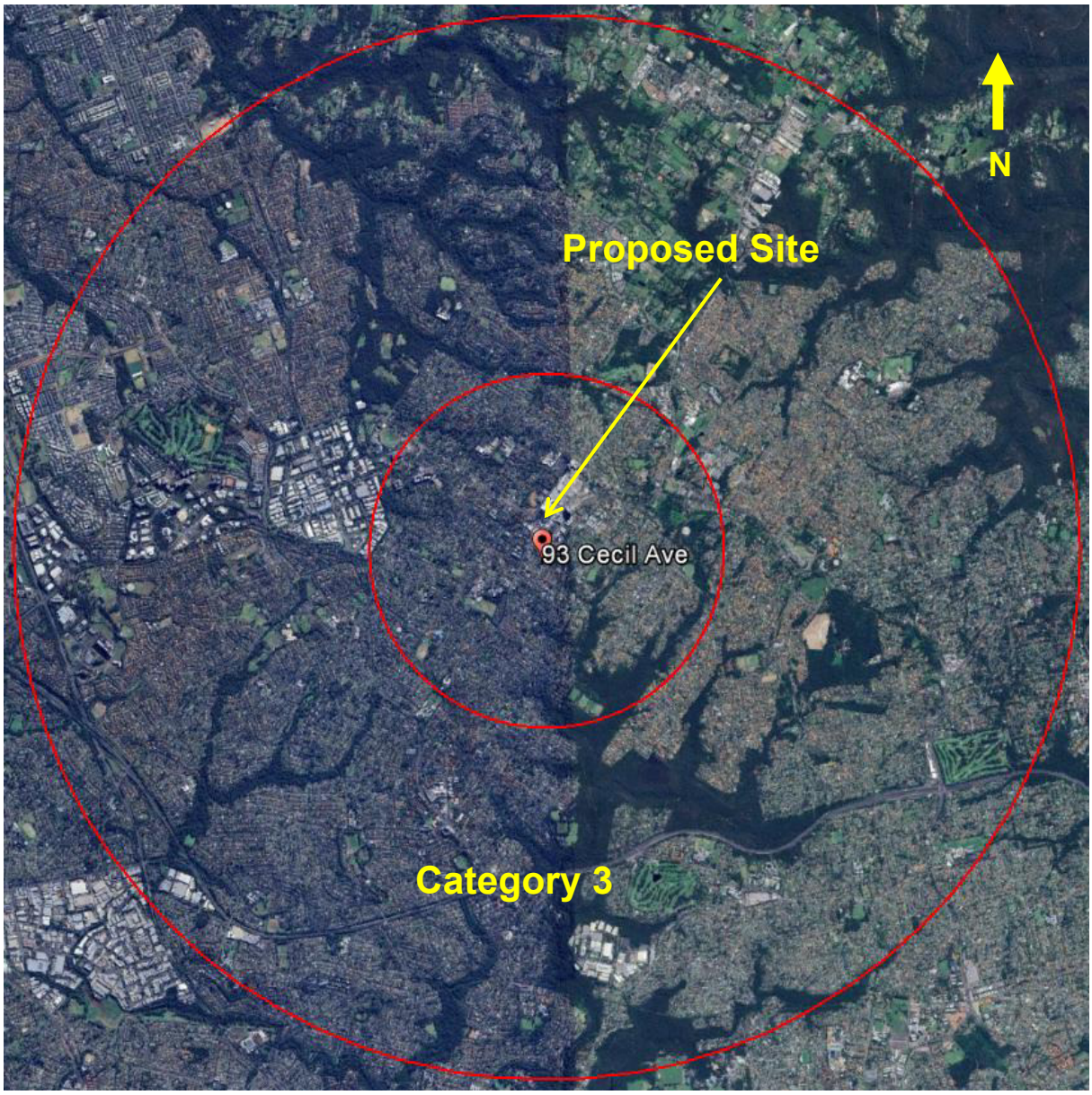

Figure 3 - Assumed terrain categories (TC) for wind speed estimation.

1 Local Wind Climate

The mean and gust wind speeds have been recorded in the Bankstown Wind Station WS_066137 (the wind station recommended by some Councils in non-coastal areas of Sydney) for over 20 years. These data have been analysed and directional probability distribution of wind speeds have been determined. The directional distribution of hourly mean wind speed at a gradient height (~300 m) is shown in Figure 4. The winds from the west are strongest and more frequent followed by those from the northwest / west and south / southeast directions.

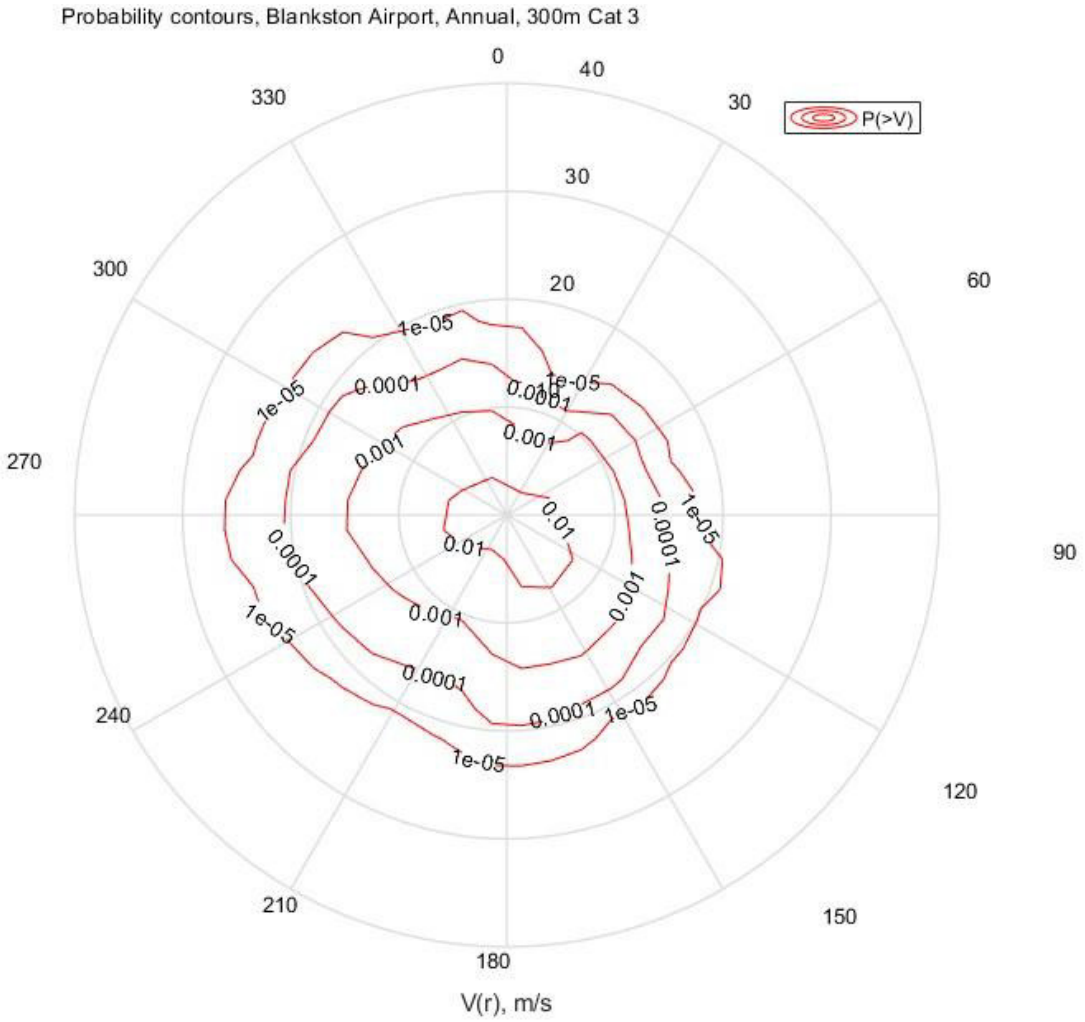

Figure 4 - Wind probability of mean wind speed and direction for Bankstown.

2 Natural Ventilation Analysis

Natural ventilation through apartments is driven by differential pressures between dominant openings, which are generated by the outside wind flow around the building structure and additional elements. The pressure distribution will vary according to the incoming wind directions and turbulence characteristics from the upstream, the angle between the local wind and the building façade, elevation of the apartment to ground level, local façade geometry, and size of door opening. Wind frequency exceeded at **80%** of the time were selected for this assessment. This resulted in a calm to light breeze reference wind speed of **2m/s**.

2.1 Australian Design Guide (ADG) Requirements

The NSW State Environmental Planning Policy (Housing) 2021 supported by the Australian Design Guide (ADG) is relevant to the assessment of the natural ventilation through residential components of proposed development. Section 4B-3 of the Australian Design Guide (ADG) states that:

"At least 60% of the 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 opening on multiple sides of the apartments for the majority of the proposed floor plans, allowing it to make use of wind-induced natural ventilation throughout the year and thereby minimising energy costs; and
- The overall depth of cross-over or cross through units does not exceed 18m as per Design Criteria of Objective 4B-3.

3 Results and Discussion

3.1 ADG Assessment

The natural ventilation for the proposed residential apartments has been qualitatively assessed. Cross ventilation is achieved by the differential pressure between the windward and leeward building façades. Description of the natural ventilation principles that apply for the proposed development are shown in Appendix A.

The following comments are made regarding the proposed cross ventilation system for the development:

- Balconies featuring sliding doors are positioned on all façades offering openings to various directions, thus significantly improving airflow, which is a favourable design selection. Reducing shielding is anticipated for the upper levels as a result; therefore, the proposed development benefits from all prevailing Sydney winds, creating the potential for cross ventilation (Figure 5 to Figure 23).
- Based on a qualitative study **68.3%** (**69 out of 101**) of the apartments within stage 1 (Table 2) and **64.2% (77 out of 120)** of the apartments within stage 2 (Table 3) of the proposed development comply with the cross-ventilation requirements of the Australian Design Guide (ADG) for the first nine storeys (Table 1). A total of **66%** (**146 out of 221**) of the apartments within the proposed development comply with the cross-ventilation requirements of the Australian Design Guide (ADG) for the first nine storeys (Table 1).

Table 1 - Total number of apartments with openings to support natural cross ventilation.

Number of Apartments	Number of Apartments with Openings to Support Cross Ventilation (as per ADG)	Percentage (%)
221	146	**66%**

3.1.1 Stage 1 (Buildings E & S)

Table 2 - Apartments with openings to support natural cross ventilation (Stage 1).

Levels	Number of Apartments		Number of Apartments with Openings to Support Cross Ventilation (as per ADG)	Percentage (%)
	Building E	Building S		
Lower Ground		5	2	40%
Ground		5	2	40%
Upper Ground		7	4	57%
Level 1		9	8	44%
Level 2	2	10	9	67%
Level 3	3	10	8	69%
Level 4	5	10	8	53%
Level 5	5	4	8	89%
Level 6	5	5	8	80%
Level 7	4		4	100%
Level 8	4		4	100%
Level 9	4		4	100%
Level 10	4		4	100%
Total	**101**		**69**	**68.3%**

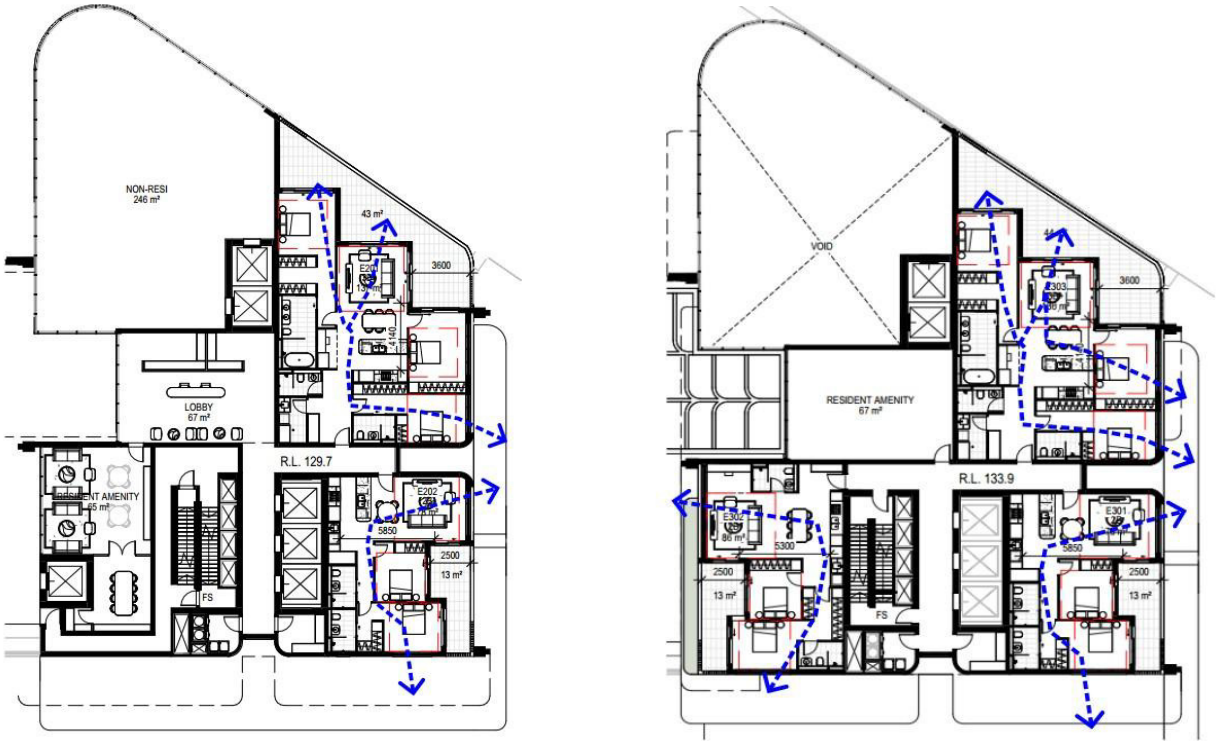

Figure 5 - Natural cross ventilation flow paths for Building E Level 2 (left) and Level 3 (right).

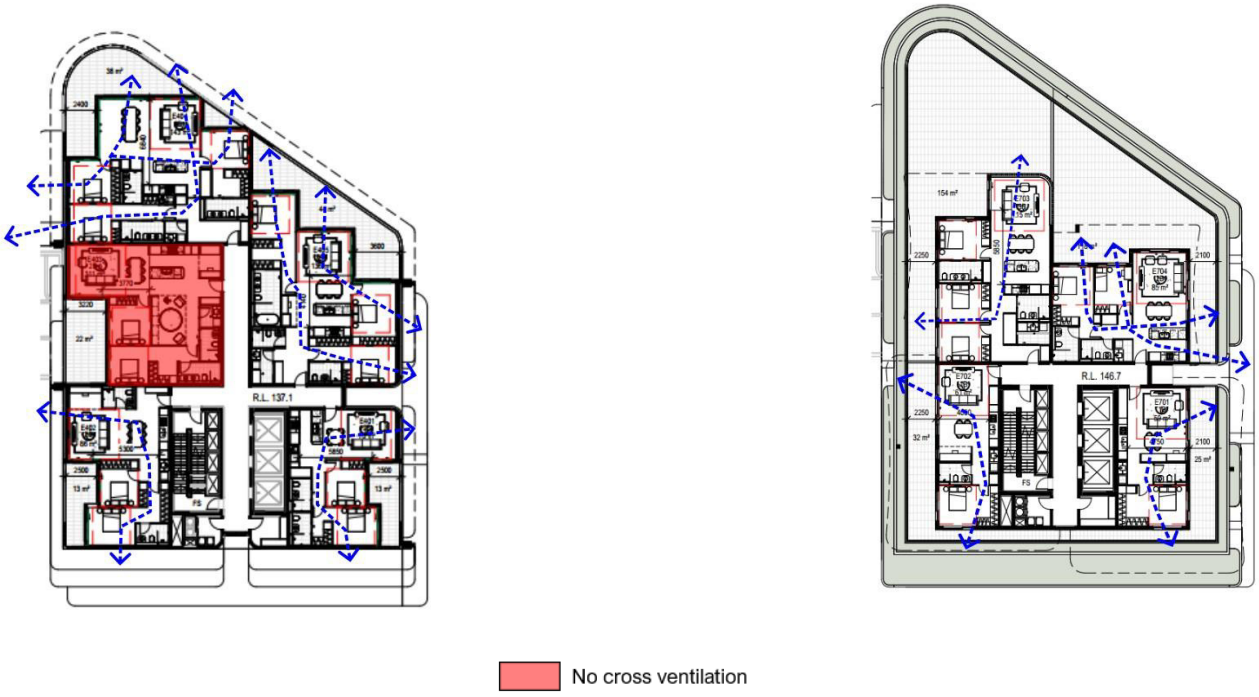

Figure 6 - Natural cross ventilation flow paths for Building E Level 4-6 (left) and Level 7 (right).

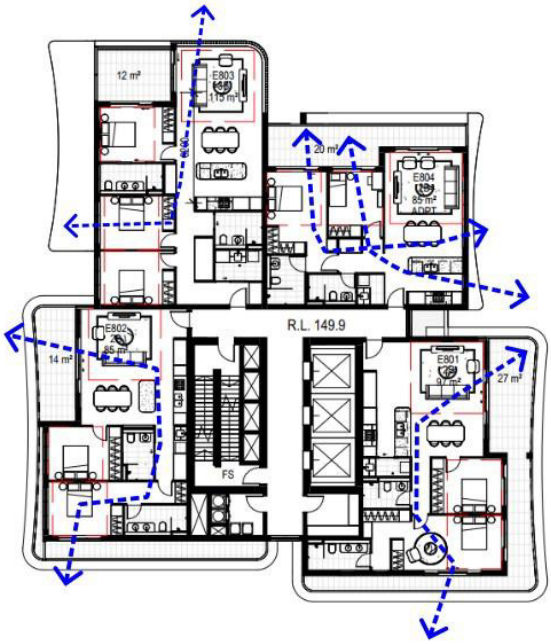

Figure 7 - Natural cross ventilation flow paths for Building E Level 8-10

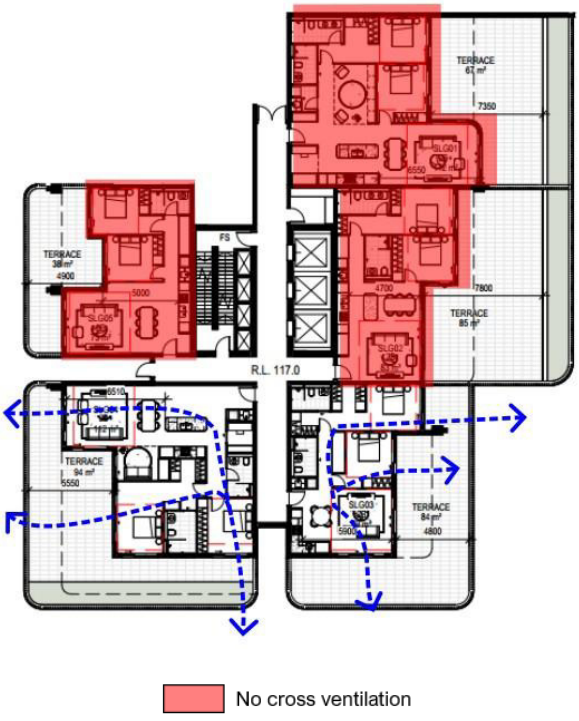

Figure 8 - Natural cross ventilation flow paths for Building S Lower Ground

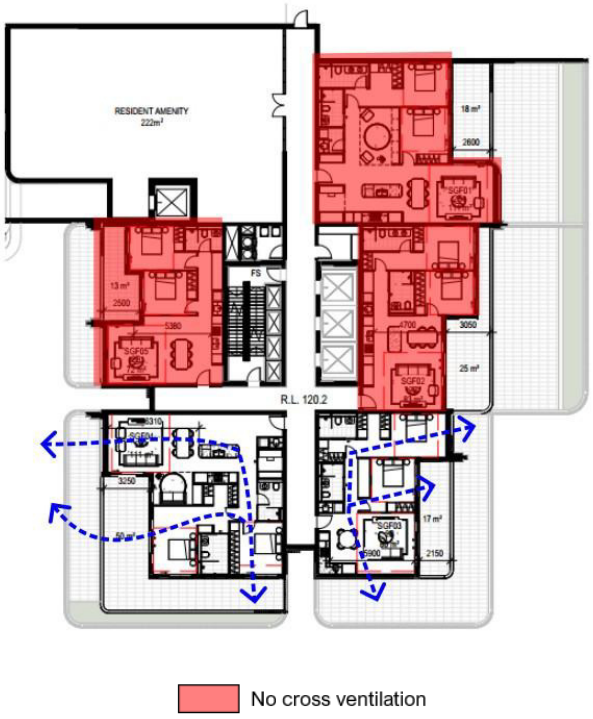

Figure 9 - Natural cross ventilation flow paths for Building S Ground

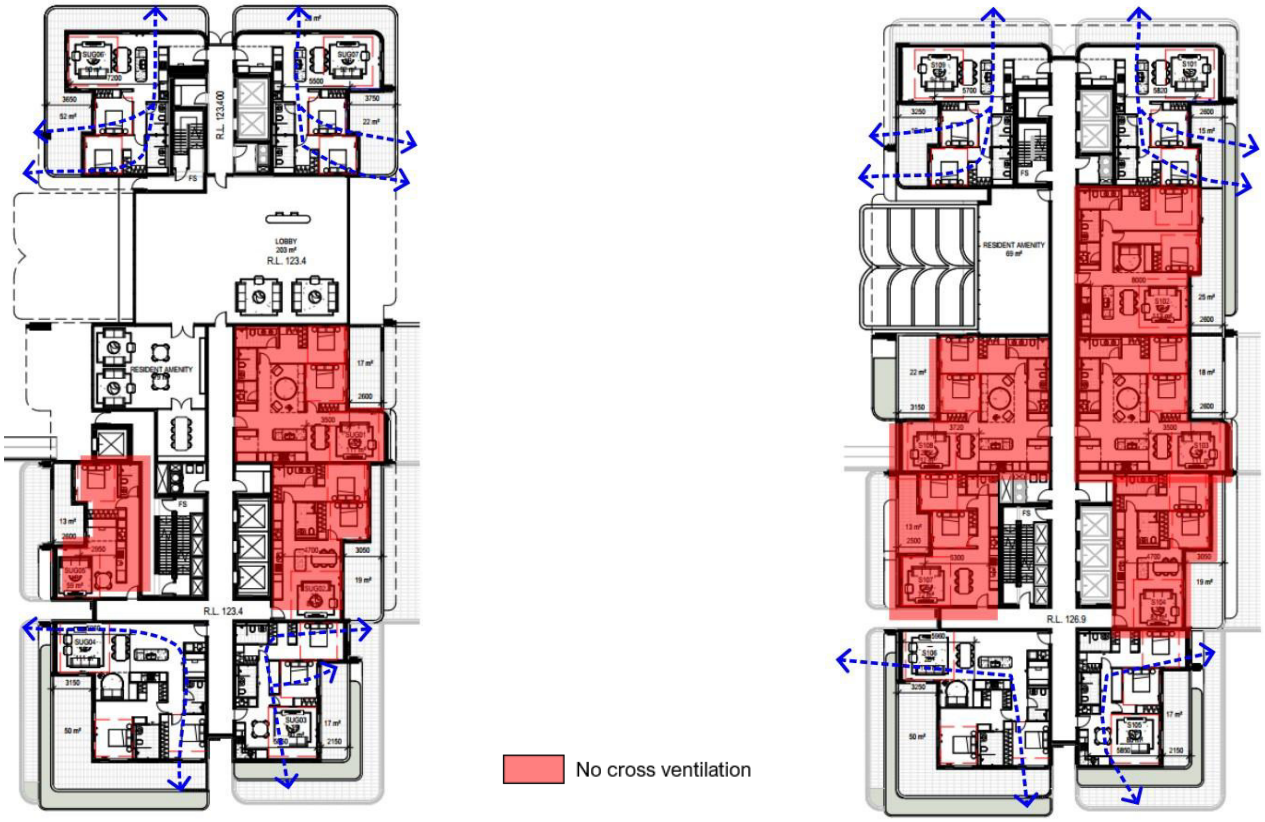

Figure 10 - Natural cross ventilation flow paths for Building S Upper Ground (left) and Level 1 (right).

Figure 11 - Natural cross ventilation flow paths for Building S Level 2-3 (left) and Level 4 (right).

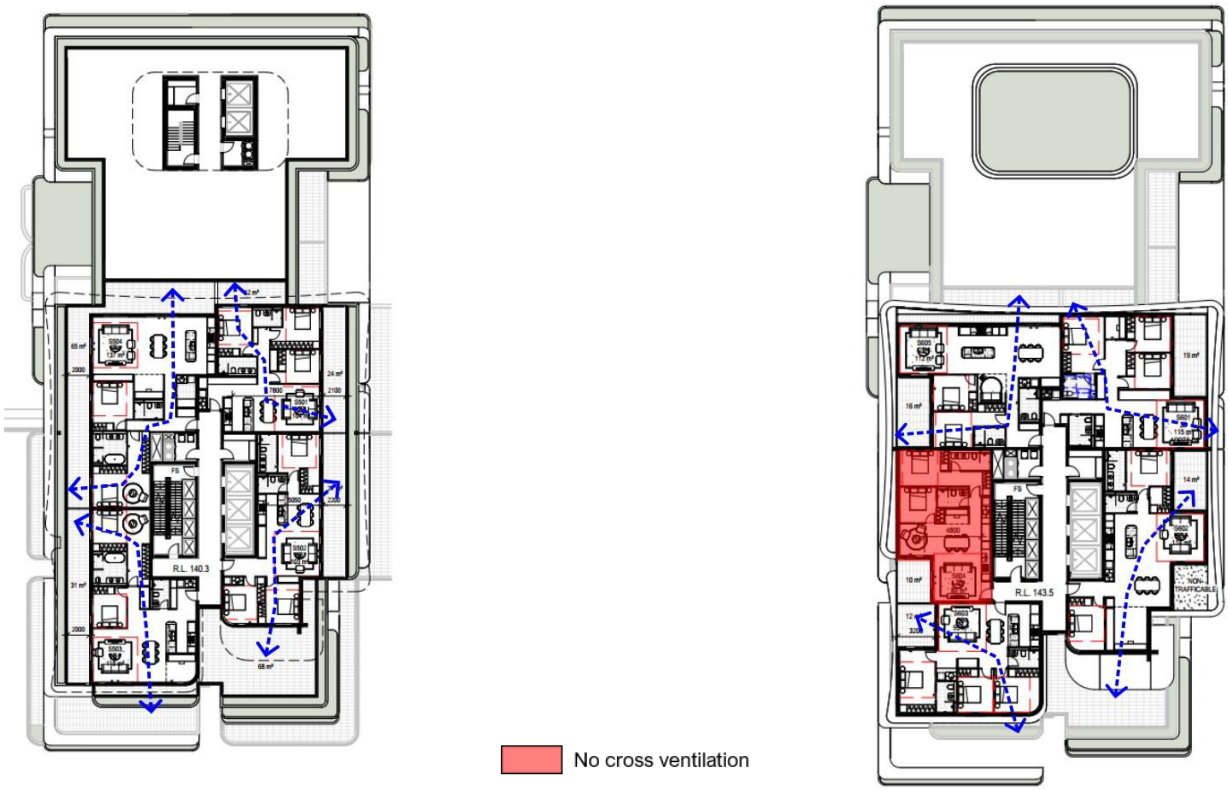

Figure 12 - Natural cross ventilation flow paths for Building S Level 5 (left) and Level 6 (right).

3.1.2 Stage 2 (Buildings N & W)

Table 3 - Apartments with openings to support natural cross ventilation (Stage 2).

Levels	Number of Apartments		Number of Apartments with Openings to Support Cross Ventilation (as per ADG)	Percentage (%)
	Building N	Building W		
Lower Ground		1	1	100%
Ground		1	1	100%
Upper Ground		4	4	100%
Level 1		4	4	100%
Level 2	5	5	7	70%
Level 3	7	5	7	58%
Level 4	14	5	10	53%
Level 5	14	4	10	56%
Level 6	14	4	10	56%
Level 7	14	2	9	56%
Level 8	5		4	80%
Level 9	6		5	83%
Level 10	6		5	83%
Total	**120**		**77**	**64.2%**

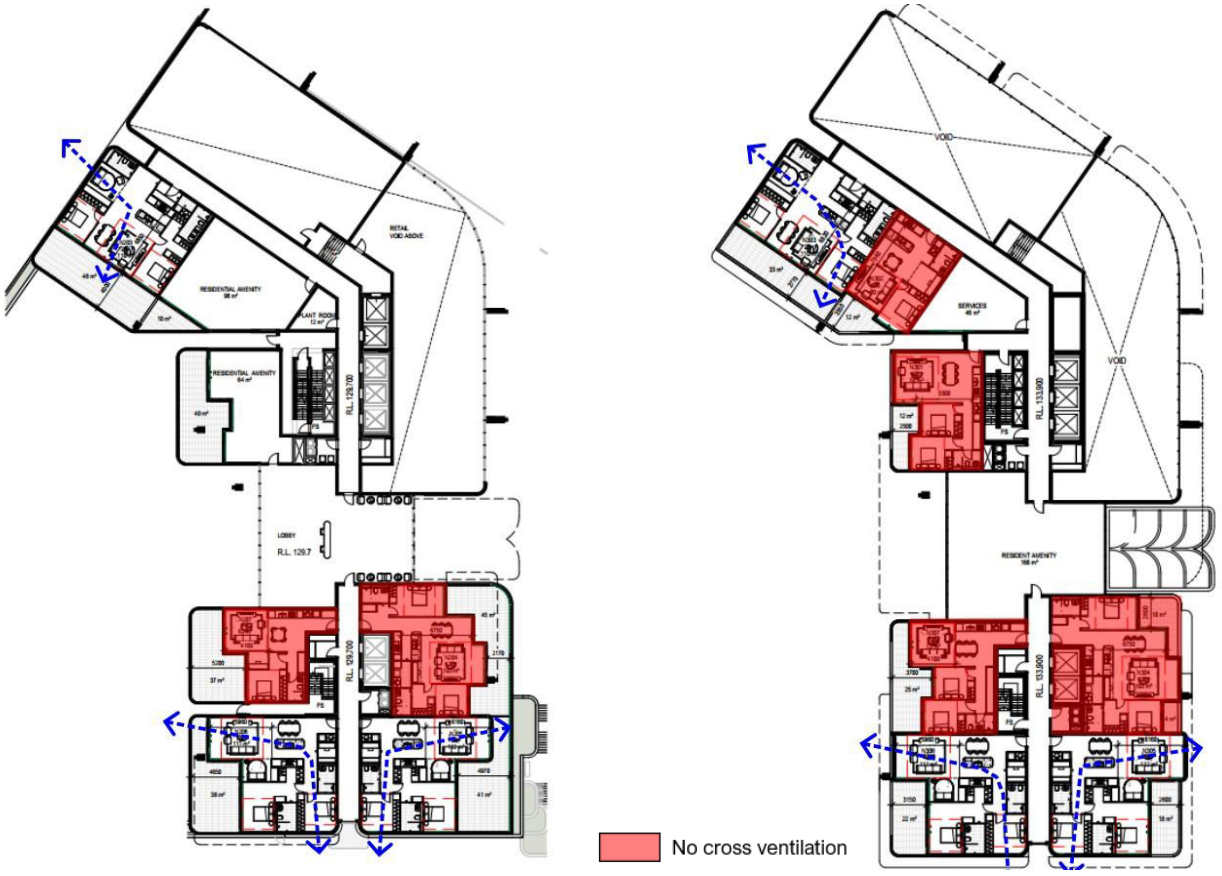

Figure 13 - Natural cross ventilation flow paths for Building N Level 2 (left) and Level 3 (right).

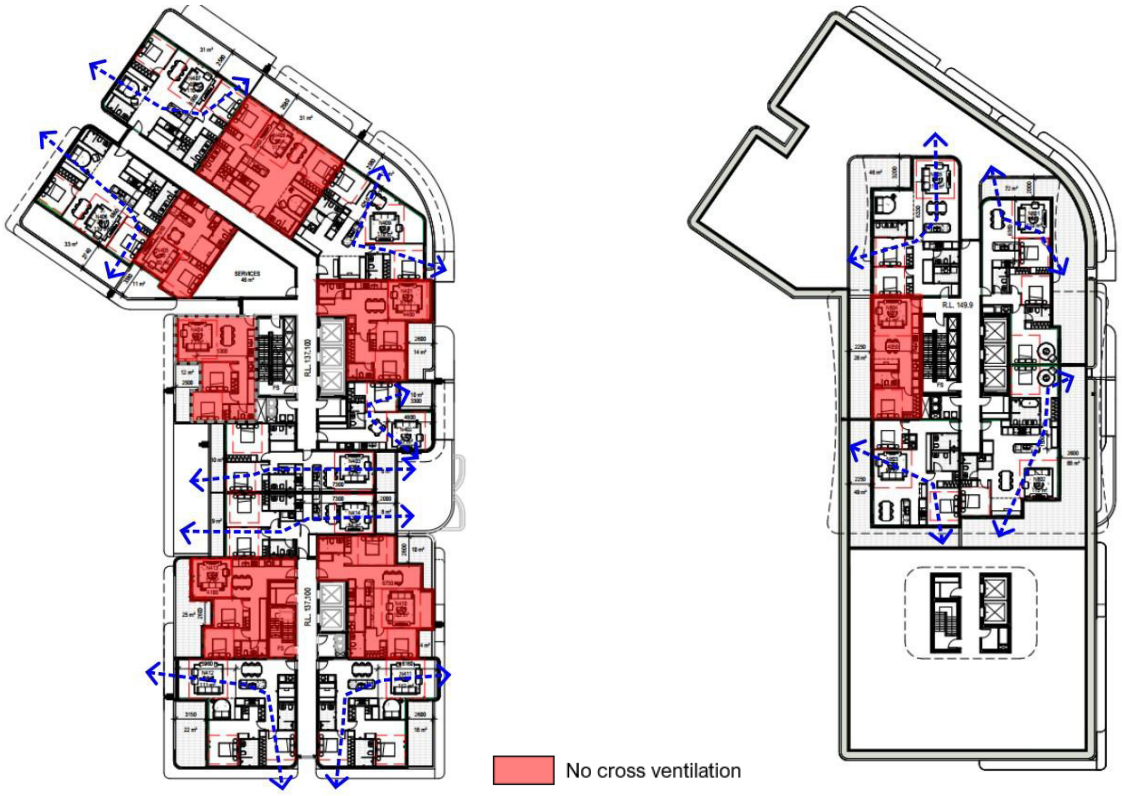

Figure 14 - Natural cross ventilation flow paths for Building N Level 4-7 (left) and Level 8 (right).

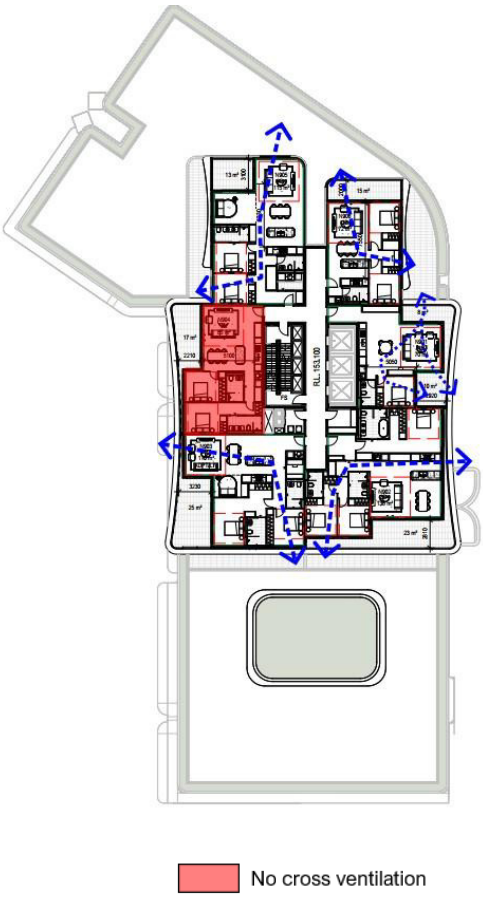

Figure 15 - Natural cross ventilation flow paths for Building N Level 9-10.

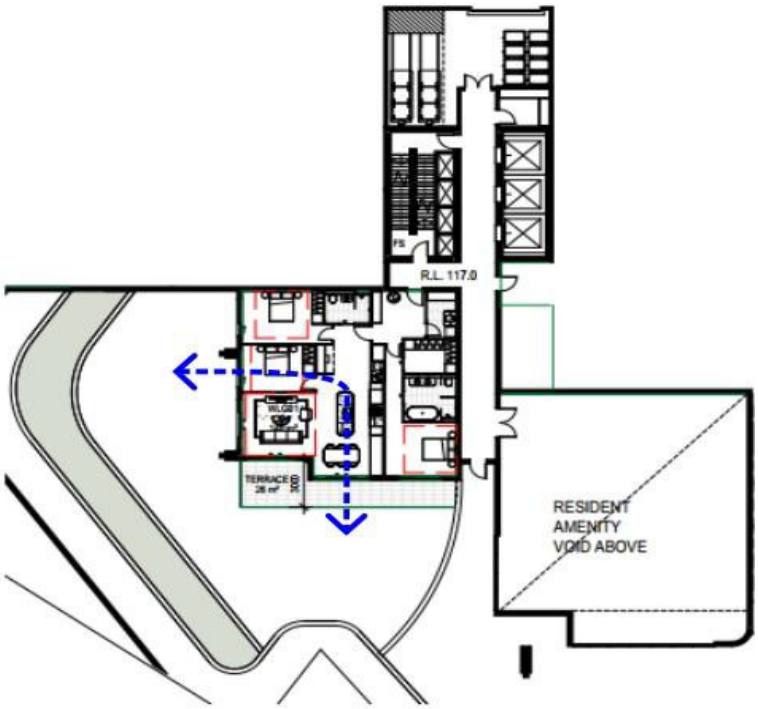

Figure 16 - Natural cross ventilation flow paths for Building W Lower Ground.

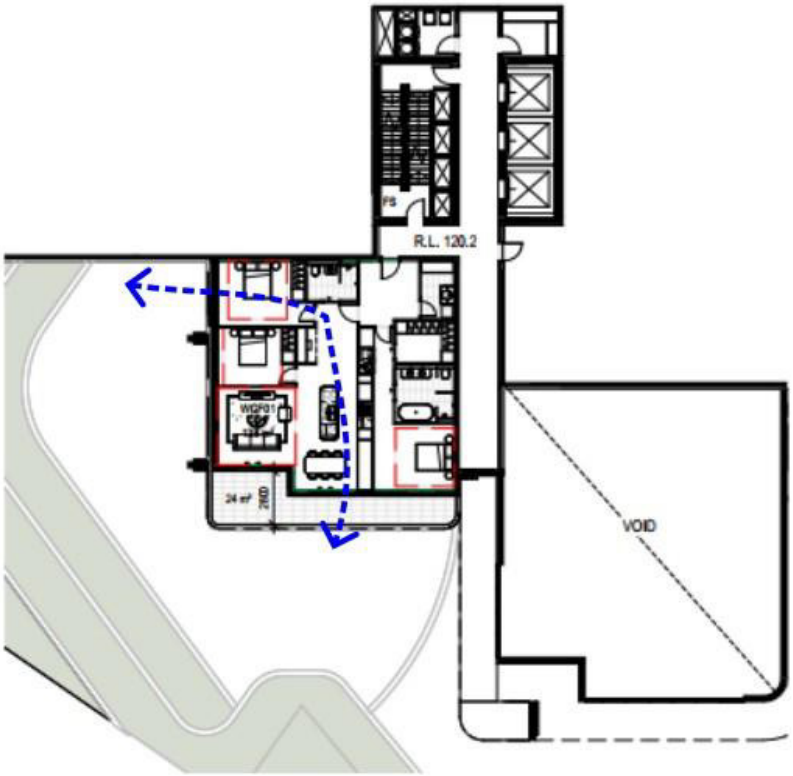

Figure 17 - Natural cross ventilation flow paths for Building W Ground.

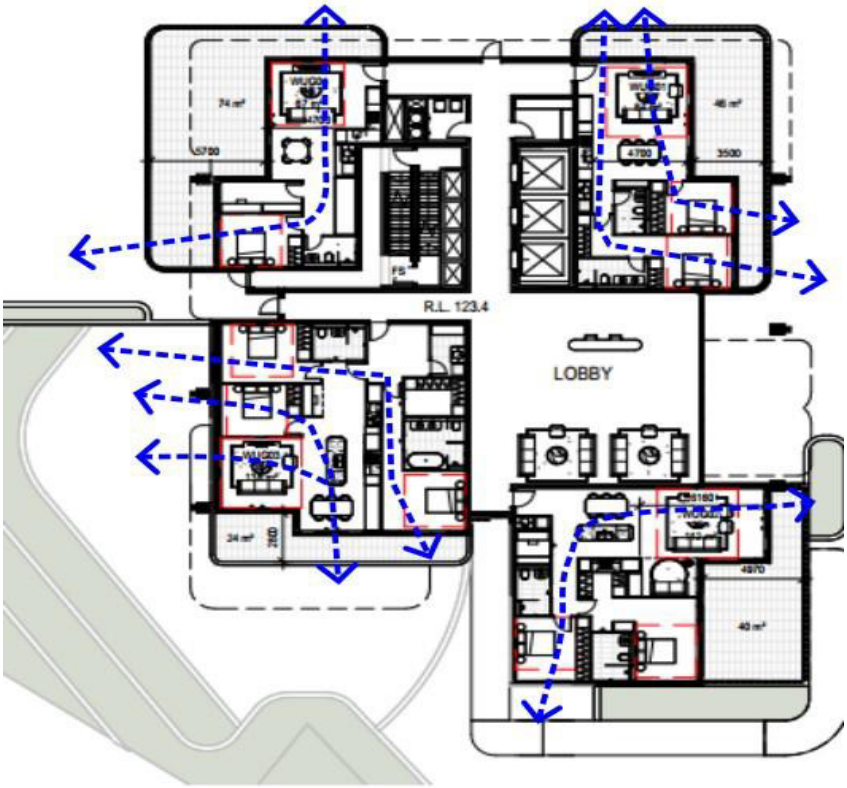

Figure 18 - Natural cross ventilation flow paths for Building W Upper Ground.

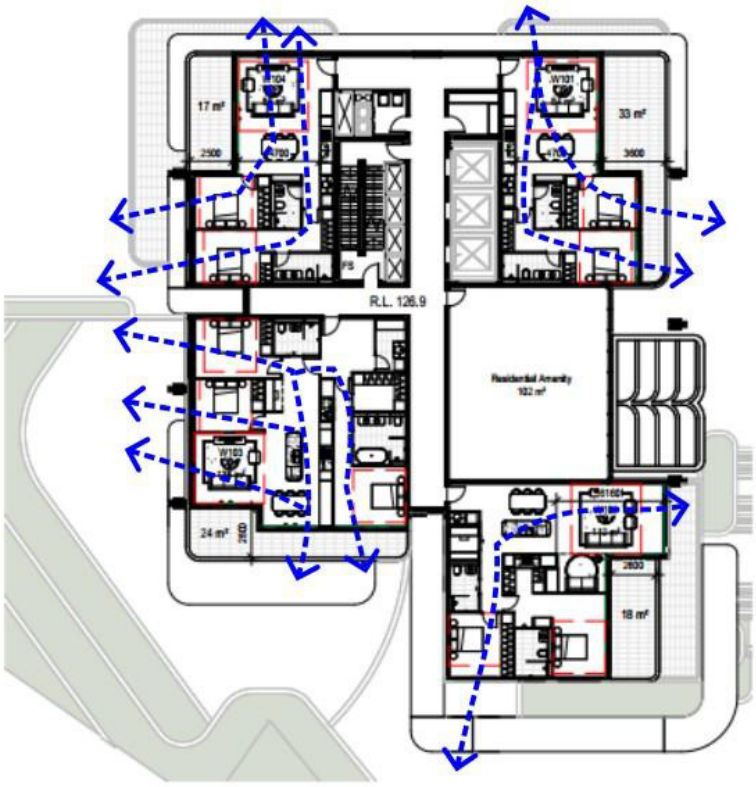

Figure 19 - Natural cross ventilation flow paths for Building W Level 1.

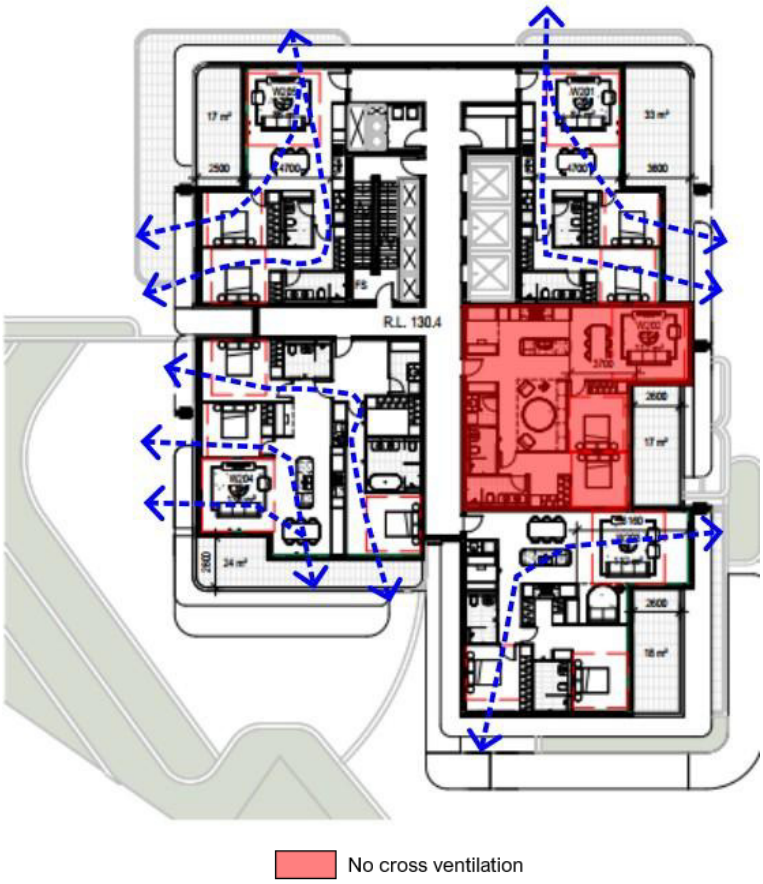

Figure 20 - Natural cross ventilation flow paths for Building W Level 2-3

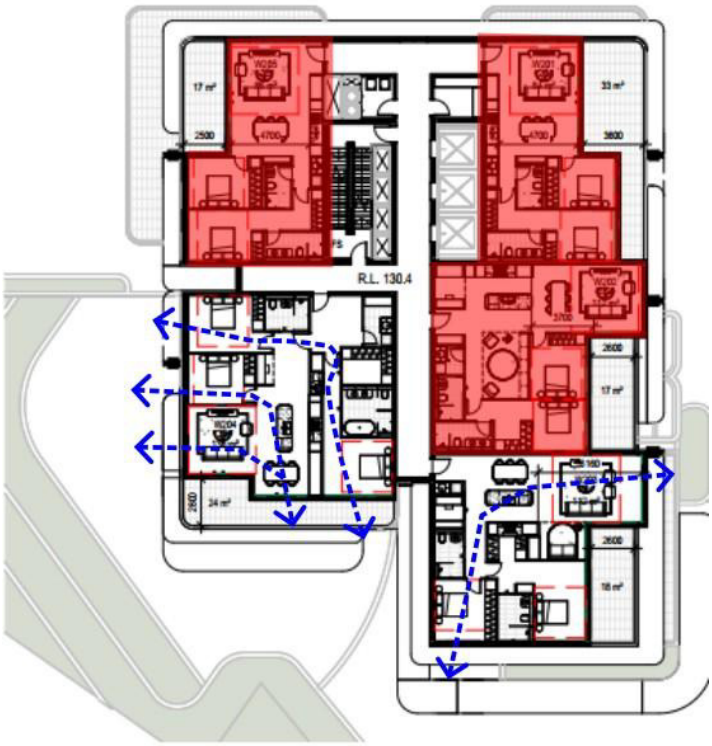

Figure 21 - Natural cross ventilation flow paths for Building W Level 4.

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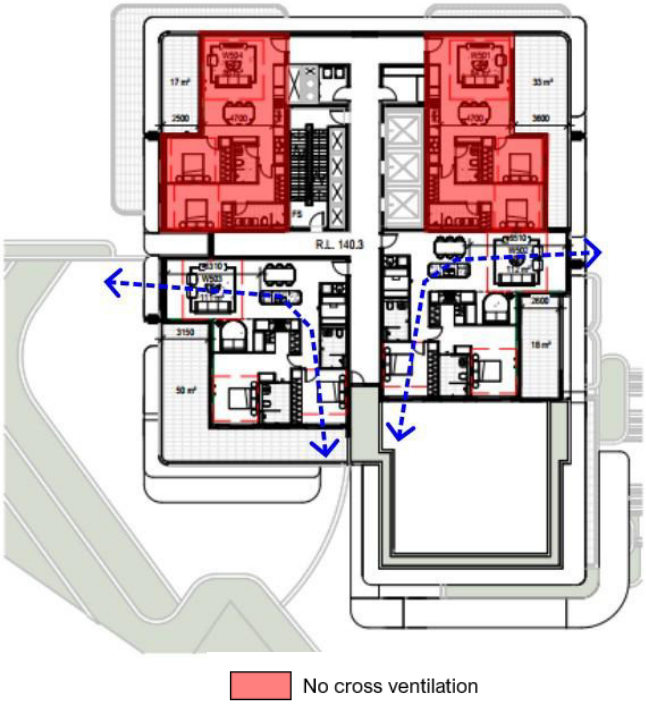

Figure 22 - Natural cross ventilation flow paths for Building W Level 5-6.

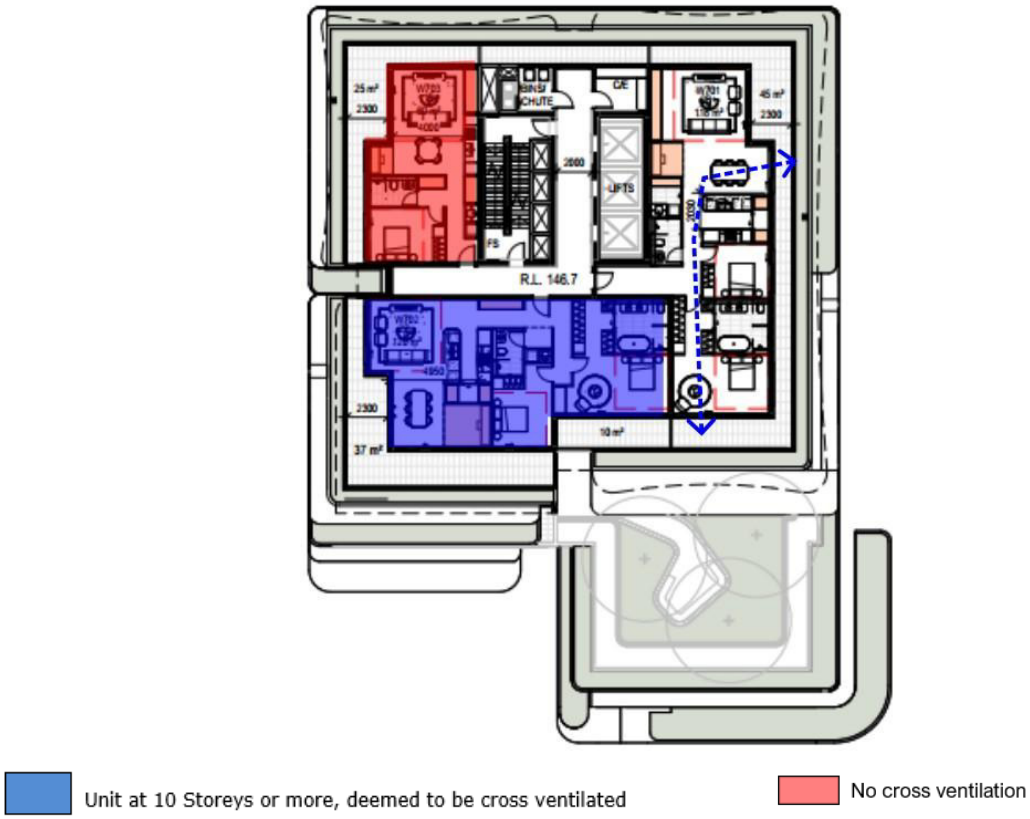

Figure 23 - Natural cross ventilation flow paths for Building W Level 7.

4 Conclusion

Vipac Engineers & Scientists Pty Ltd has been engaged by **Alton Property Group** to conduct a qualitative assessment of natural ventilation potential of the proposed development at **93-107 Cecil Ave & 9-10 Roger Ave, Castle Hill.** This appraisal is based on Vipac's experience as a wind-engineering consultancy.

Drawings of the proposed development were provided by **Aplus Design Group** in **December.**

Based on our engineering observations and the qualitative study, it is concluded that for the proposed development:

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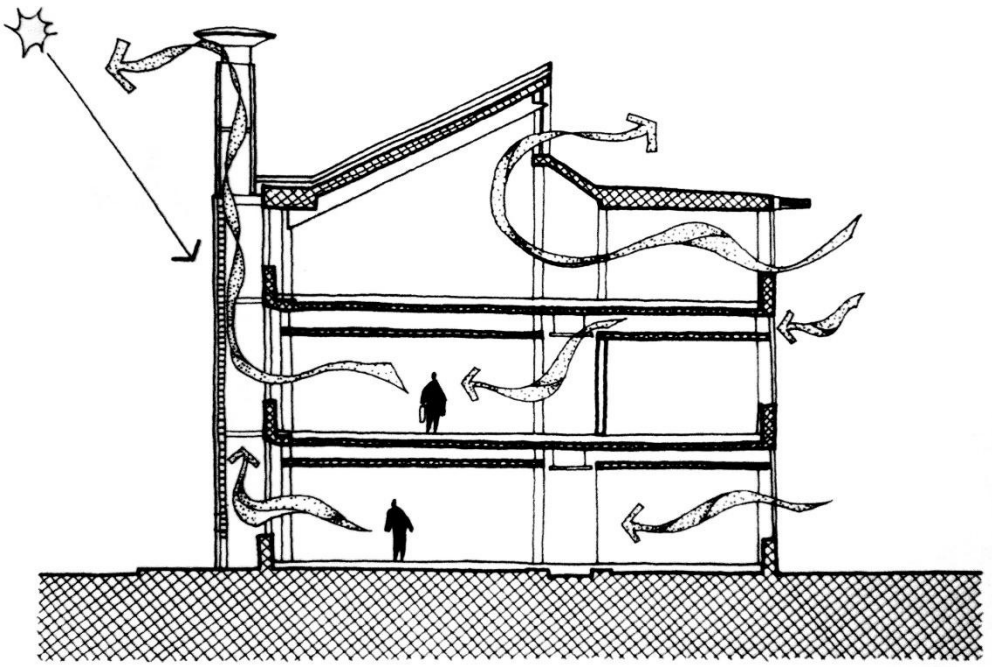
This analysis has been made based on our engineering assumptions and on experience gained from model scale wind tunnel or Computational Fluid Dynamics (CFD) analysis of a range of developments of similar magnitude to the proposed development.

Appendix A Environmental Wind Effects

Natural Ventilation (Stack effects)

Stack ventilation uses temperature differences to move air. Hot air rises because it generates lower pressure due to the density variation. For this reason, it is sometimes called buoyancy driven flow ventilation. In the stack effect, hot air plume rises due to buoyancy and its low-pressure sucks in fresh air from outside.

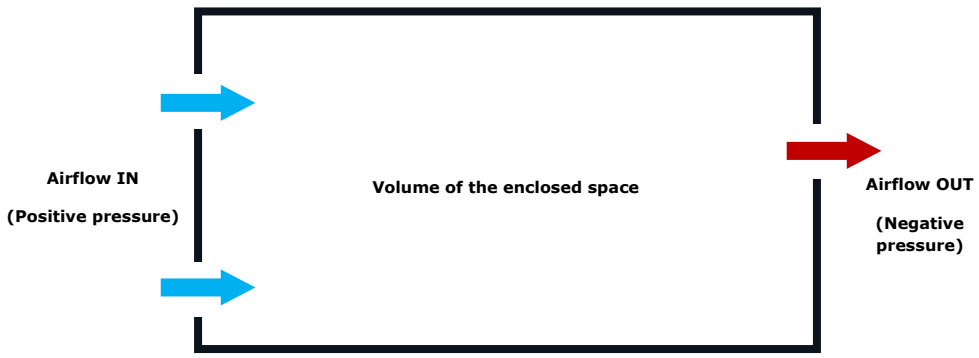


Source: G.Z brown and Mark Dekay, published by Wiley.

Natural Ventilation (Wind effects)

Wind induced natural ventilation works on the pressure differential concept. If a building massing 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 side of the openings; airflow will be pushed through building openings in the direction positive to negative sign.

$$ACH = \frac{Volumetric\ flow\ rate\ insde\ the\ enclosed\ space\left(\frac{m^3}{s}\right)}{Volume\ of\ the\ enclosed\ space\ (m^3)} \times 3600$$



Appendix B Drawing List

a24033_93-107 Cecil Ave Castle Hill_A500_Detailed Plans.pdf

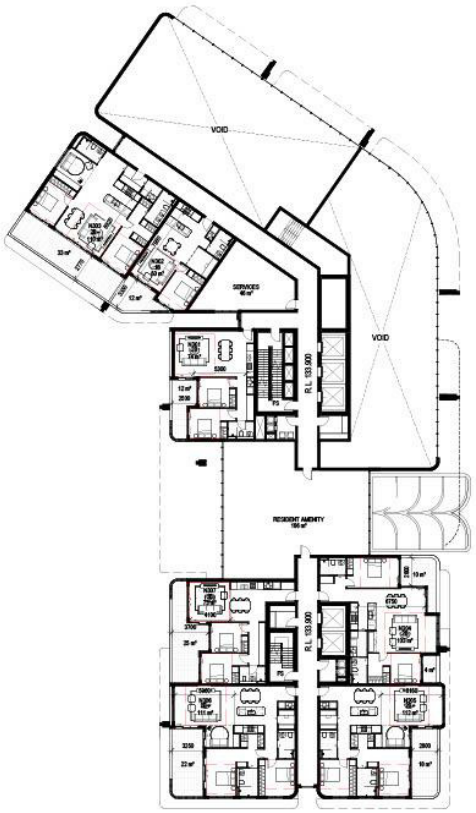
a24033_93-107 Cecil Ave. Castle Hill_Amended DA.pdf

S-Level 04.pdf

S-Level 04-03.pdf

Pages from a24033_93-107 Cecil Ave Castle Hill_Cross vent markup.pdf

Appendix C Floor Plans



REV	DESCRIPTION	DATE
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B	SDRP	25/11/2025
C	AMENDED DA	15/12/2025

PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

DRAWING TITLE:
BUILDING N - LEVEL 3

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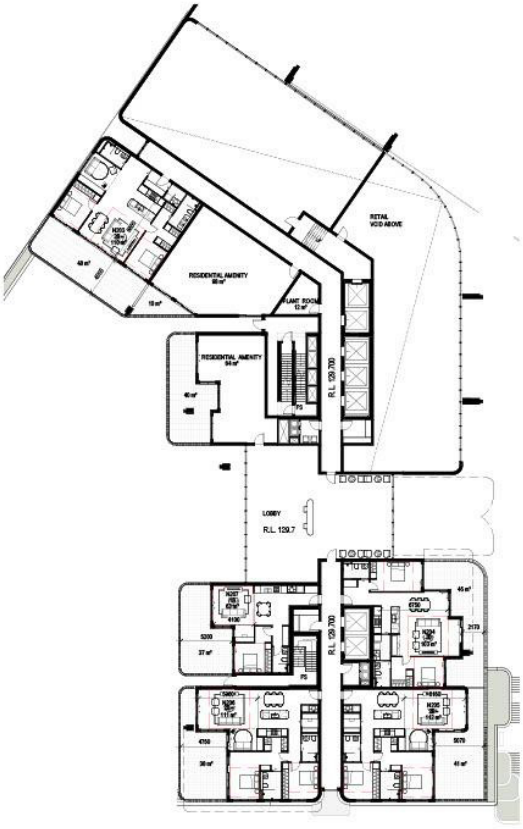

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B	SDRP	25/11/2025
C	AMENDED DA	15/12/2025

PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

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PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

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BUILDING N - LEVEL 4 - 7

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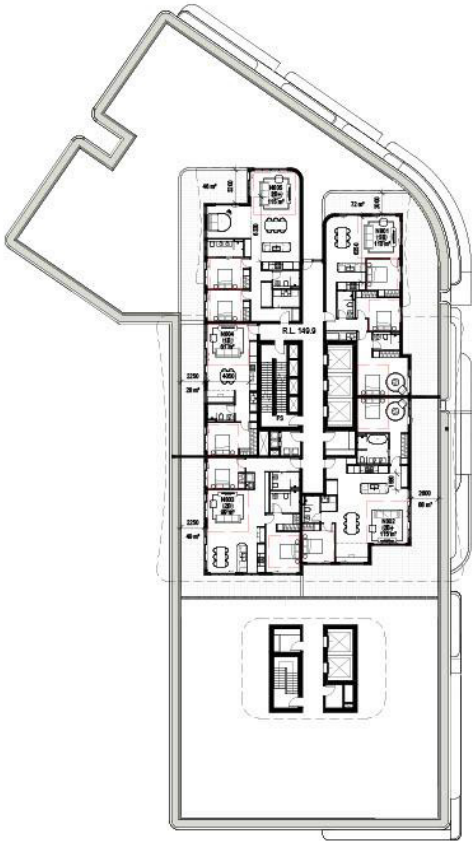

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C	AMENDED DA	19/12/2025

PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

DRAWING TITLE:
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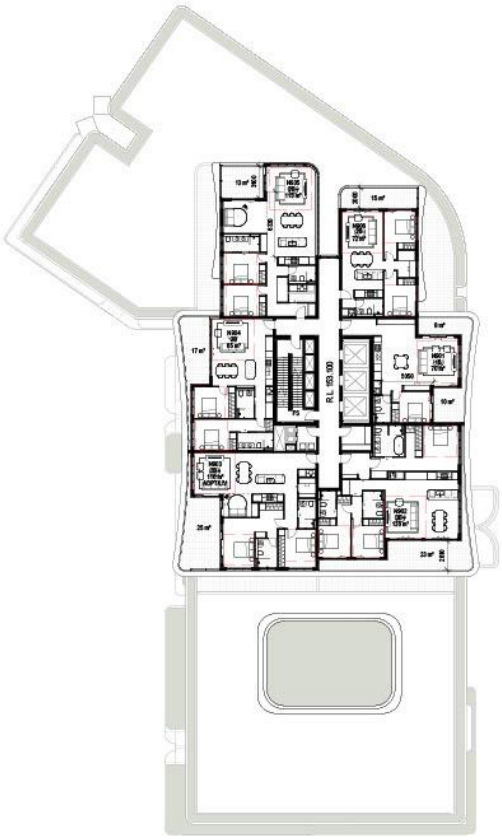

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B	SORP	25/11/2025
C	AMENDED DA	19/12/2025

PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

DRAWING TITLE:
BUILDING N - LEVEL 9 - 36

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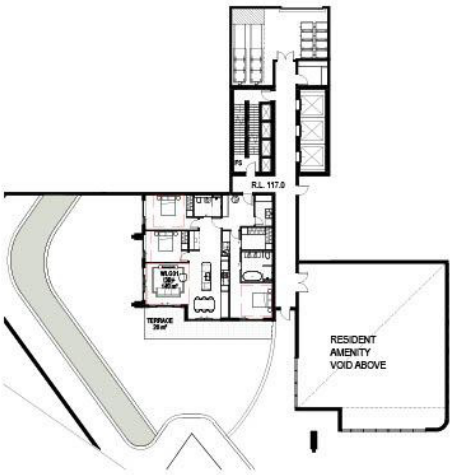
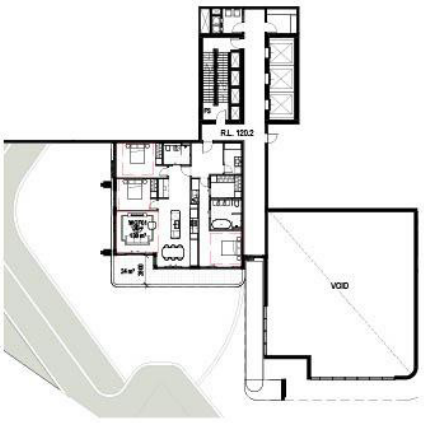


W - LOWER GROUND



W - GROUND LEVEL

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B	SORP	25/11/2025
C	AMENDED DA	19/12/2025

PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

DRAWING TITLE:
BUILDING W - LG - G

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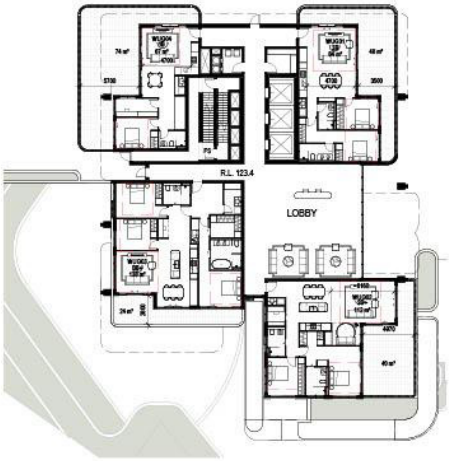
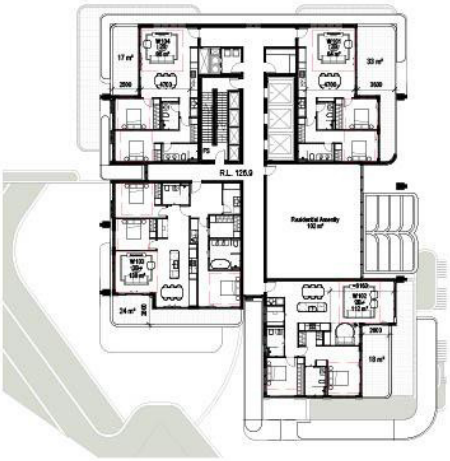
DO NOT SCALE
USE FIGURED DIMENSIONS AT ALL TIMES.



W - UPPER GROUND



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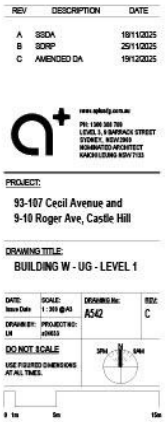
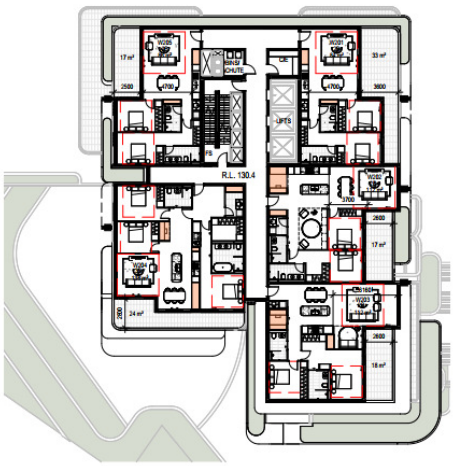
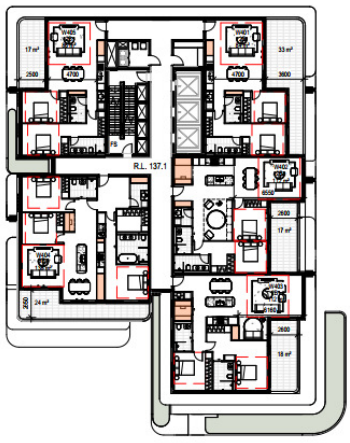
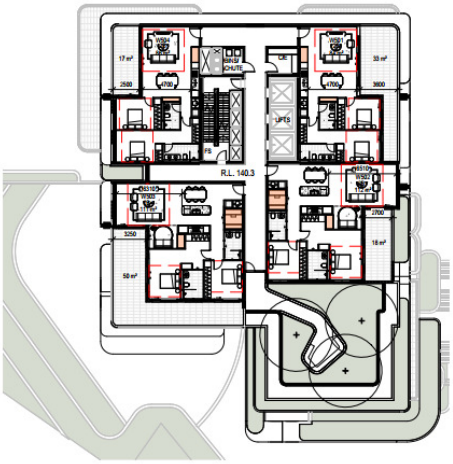




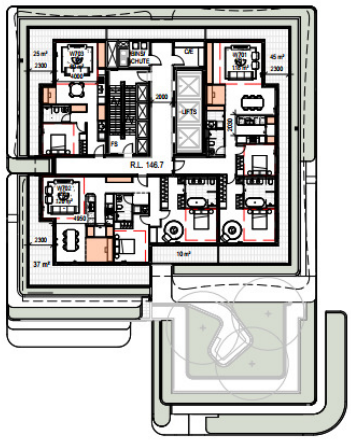
W - LEVEL 02 - 03



W - LEVEL 04

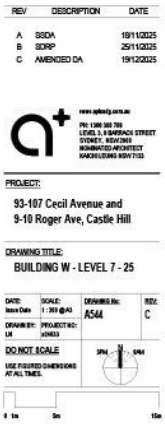


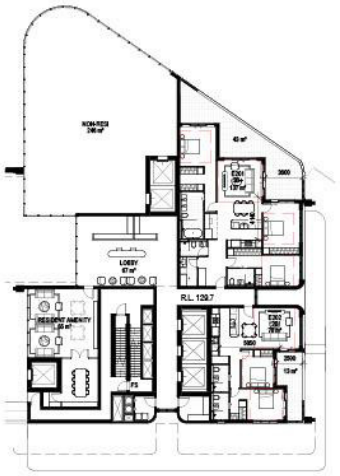
W - LEVEL 05 - 06



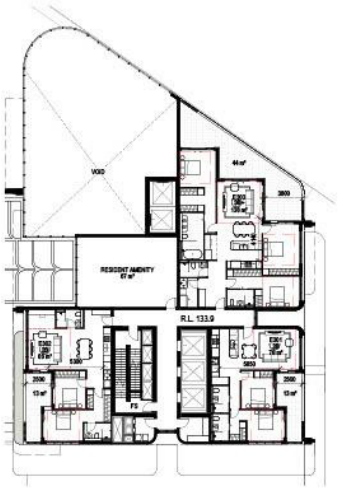
W - LEVEL 07

W - LEVEL 8 - 25

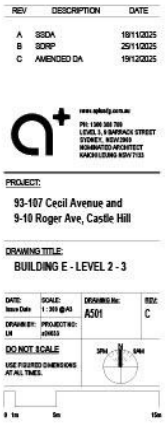


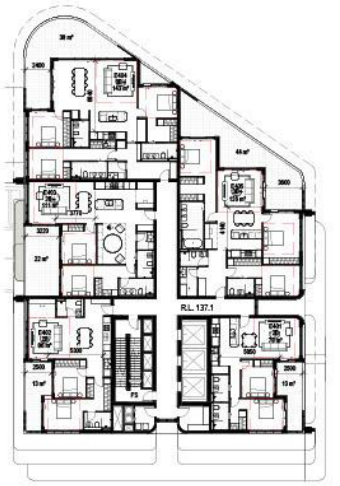


E - LEVEL 02



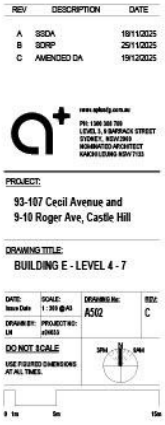
E - LEVEL 03





E - LEVEL 04 - 06

E - LEVEL 07



REV	DESCRIPTION	DATE
A	SSDA	19/11/2025
B	SDRP	25/11/2025
C	AMENDED DA	19/12/2025

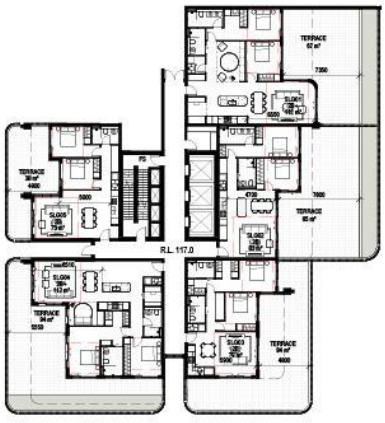
PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

DRAWING TITLE:
BUILDING E - LEVEL 8 - 30

DATE	SCALE	DRAWING No:	REV:
Issue Date	1 : 200 @ A3	A504	C

DRAWN BY: LH | PROJECT NO: s24033

DO NOT SCALE
USE FIGURED DIMENSIONS AT ALL TIMES.



S - LOWER GROUND

S - GROUND LEVEL

REV	DESCRIPTION	DATE
A	SSDA	19/11/2025
B	SDRP	25/11/2025
C	AMENDED DA	19/12/2025

PROJECT:
93-107 Cecil Avenue and
9-10 Roger Ave, Castle Hill

DRAWING TITLE:
BUILDING S - LG - G

DATE	SCALE	DRAWING No:	REV:
Issue Date	1 : 200 @ A3	A511	C

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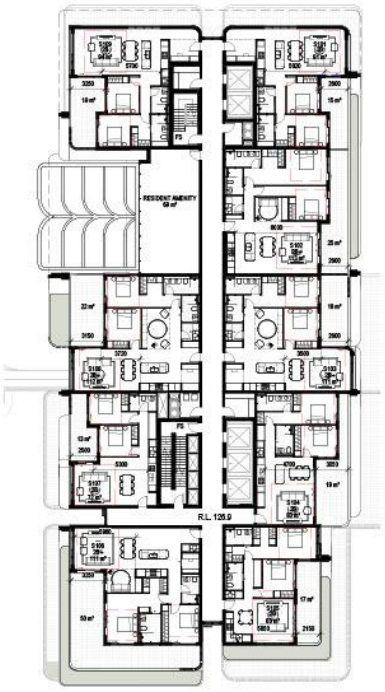
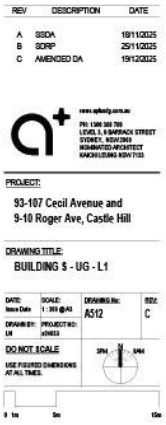
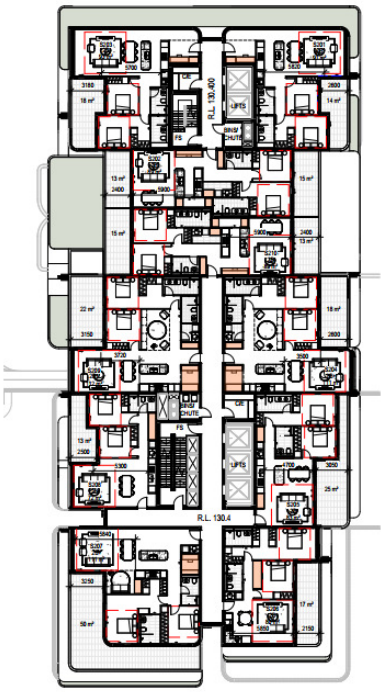
DO NOT SCALE
USE FIGURED DIMENSIONS AT ALL TIMES.

S - UPPER GROUND

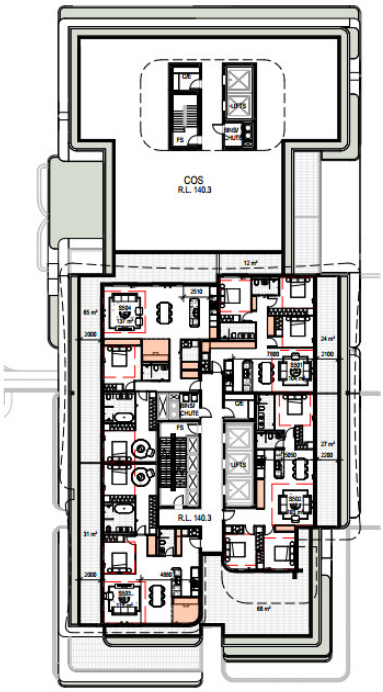


S - LEVEL 01

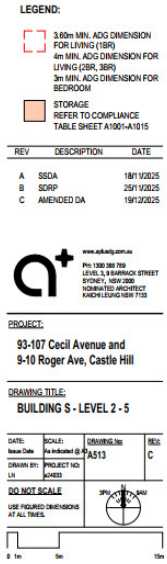


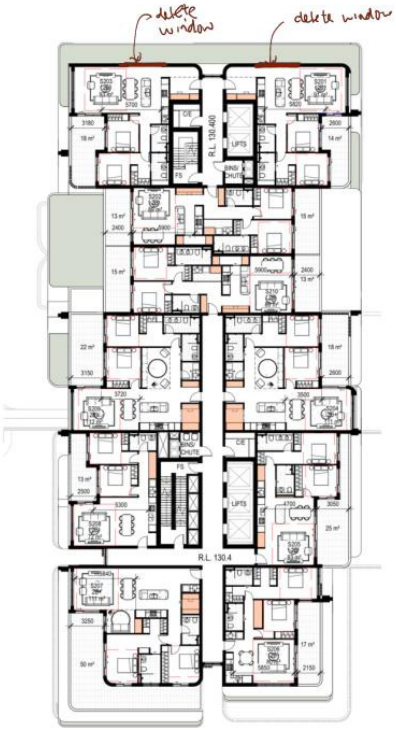


S - LEVEL 02 - 04 03



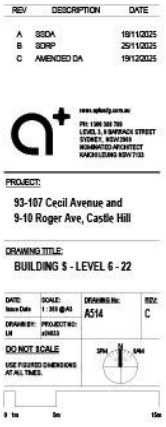
S - LEVEL 05





S - LEVEL ~~03~~ 04 Level 04

S - LEVEL 05



Appendix D References

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[2] Structural Design Actions, Part 2: Wind Actions, Australian/New Zealand Standard 1170.2:2021
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