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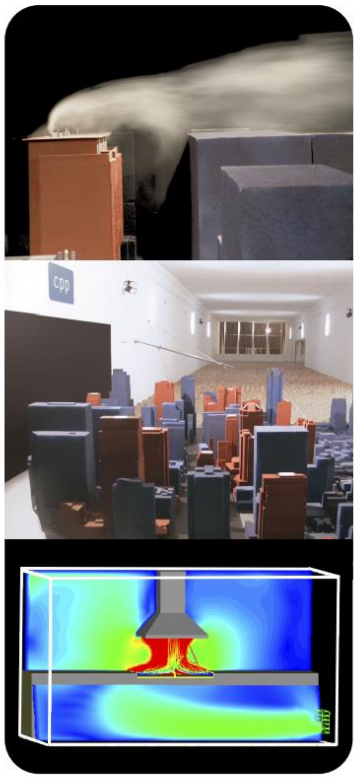
FINAL REPORT



Natural Ventilation studies for:

2 FIGTREE DRIVE

Sydney Olympic Park, NSW, Australia

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INTRODUCTION

An experience-based qualitative assessment of the proposed mixed-use development known as 2 Figtree Drive, Sydney Olympic Park, was carried out to analyse the development's Natural Ventilation amenity potential in compliance with the Department of Planning and Environment, Apartment Design Guide.

The development site has a frontage to Figtree Drive to the north and Australia Avenue to the east. The proposed development consists of a new residential precinct with a common single storey podium and four towers rising approximately 20 to 50 m above ground level, Figure 1.

Figure 1: Location and ground floor layout of development site

NATURAL VENTILATION ANALYSIS

To assess the development for natural ventilation this report refers to the Apartment Design Guide in conjunction with the amended 'State Environmental Planning Policy No 65 (SEPP 65) - Design Quality of residential Apartment Development'.

Apartment Design Guide: Part 4B – Natural Ventilation

Objective 4B-2: Design Guidance

The layout and design of single aspect apartments maximises natural ventilation.

- *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*

Objective 4B-3: Design Criteria

- *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.*
- *Overall depth of a cross-over or cross-through apartment does not exceed 18 m, measured glass line to glass line.*

Natural ventilation through the apartments is driven by differential pressures established between the openings to the apartment and will vary according to the incident wind direction, the local wind velocity at the opening, elevation of the unit to ground level, local façade geometry, upstream shielding, and incident turbulence levels. Even small pressure differentials between openings can produce significant flow circulation in an apartment. The prevailing winds of most benefit for natural ventilation of apartments in Sydney are from the north-east and south.

In accordance with the Apartment Design Guide (ADG), analysis has shown that a total of 68% of the 321 apartment units in the first nine storeys of the proposed development are fundamentally structured to allow for natural ventilation, Table 1.

Of the total compliant apartments, 25% include operable windows at building indentations. These windows, which CPP recommend to have an opening area of at least 0.4 m^2, will allow for provision of suitable flow circulation in the apartment volume. Awning windows are considered suitable for achieving these conditions. The apartments that possess operable windows in building indentations to induce sufficient internal flow to meet the intent of the ADG are denoted with an asterisk in Table 1.

Eleven percent of the compliant apartments have external vertical fins at effective locations. Vertical external fins of an appropriate length and orientation installed between operable windows in an apartment and at selected balconies are expected to induce a larger differential pressure between the openings on either side of the fin element thereby promoting flow circulation in the apartment volume. The apartments considered to have suitable external fins to induce sufficient internal flow to meet the intent of the ADG are denoted with an exclamation mark in Table 1.

One percent of the compliant apartments include those with operable skylights or roof ventilators integrated at effective locations. These apartments are indicated with a tilde in Table 1.

The apartments highlighted in blue in Table 1 are structured to potentially become compliant if operable windows were to be installed at the adjacent building indentation. If operable windows were installed at these apartments, the total compliant percentage will increase to 72%.

Table 1: List of apartments categorized in accordance with SEPP65

Building Level																	
01		02		03		04		05		06		07		08		09	
Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant	Compliant	Non-compliant
N1.01	N1.03	N2.01	N2.03	N3.01	N3.03	N4.01	N4.03	N5.01	E5.02	E6.01	E6.07	E7.01	S7.06	E8.01	E8.02	E9.01	E9.03
N1.02	N1.04	N2.02	N2.04	N3.02	N3.04	N4.02	N4.04	N5.02	E5.03	E6.02!	S6.06	E7.02!	S7.09	E8.04*	E8.03	E9.02!	S9.06
N1.06	E1.02	N2.06	E2.02	N3.06	E3.02	N4.06	E4.07	N5.03~	S5.06	E6.03!	S6.09	E7.03!	W7.03	E8.08	E8.05	E9.04*	S9.09
N1.07	E1.05	N2.07	E2.06	N3.07	E3.03	N4.07	S4.06	N5.04~	S5.09	E6.04*	W6.03	E7.04*	W7.04	E8.09	E8.06	E9.05!	W9.03
E1.01	E1.06	E2.01	S2.06	E3.01	S3.06	E4.01	S4.09	N5.06	W5.03	E6.05!	W6.04	E7.05!	W7.05	E8.10*	E8.07	E9.06!	W9.04
E1.04*	E1.07	E2.04*	S2.08	E3.04*	S3.09	E4.02!	W4.03	N5.07	W5.04	E6.06!	W6.05	E7.06!	W7.06	E8.11*	S8.06	E9.07!	W9.05
E1.08	E1.11	E2.05!	S2.09	E3.05!	W3.03	E4.03!	W4.04	E5.01	W5.05	E6.08	W6.06	E7.07!	W7.07	E8.12	S8.09	E9.08	W9.06
E1.09	S1.03	E2.07*	W2.03	E3.06!	W3.04	E4.04*	W4.05	E5.04*	W5.06	E6.09	W6.07	E7.08	W7.09	S8.01	W8.03	E9.09	W9.07
E1.10*	S1.06	E2.08	W2.04	E3.07!	W3.05	E4.05!	W4.06	E5.05!	W5.07	E6.10*	W6.09	E7.09	W7.12	S8.02*	W8.04	E9.10*	W9.09
E1.12	S1.08	E2.09	W2.05	E3.08	W3.06	E4.06!	W4.07	E5.06!	W5.09	E6.11*	W6.12	E7.10*		S8.03*	W8.05	E9.11*	W9.12
S1.02*	W1.09	E2.10*	W2.06	E3.09	W3.07	E4.08	W4.09	E5.07!	W5.12	E6.12		E7.11*		S8.04	W8.06	E9.12	
S1.04		E2.11*	W2.07	E3.10*	W3.09	E4.09	W4.12	E5.08		S6.01		E7.12		S8.05	W8.07	S9.01	
S1.05		E2.12	W2.09	E3.11*	W3.12	E4.10*		E5.09		S6.02*		S7.01		S8.07*	W8.09	S9.02*	
S1.07*		S2.01		E3.12		E4.11*		E5.10*		S6.03*		S7.02*		S8.08*	W8.12	S9.03*	
W1.10		S2.02*		S3.01		E4.12		E5.11*		S6.04		S7.03*		S8.10		S9.04	
W1.11		S2.03*		S3.02*		S4.01		E5.12		S6.05		S7.04		W8.01		S9.05	
		S2.04		S3.03*		S4.02*		S5.01		S6.07*		S7.05		W8.02		S9.07*	
		S2.05		S3.04		S4.03*		S5.02*		S6.08*		S7.07*		W8.08		S9.08*	
		S2.07*		S3.05		S4.04		S5.03*		S6.10		S7.08*		W8.10		S9.10	
		S2.10		S3.07*		S4.05		S5.04		W6.01		S7.10		W8.11		W9.01	
		W2.01		S3.08*		S4.07*		S5.05		W6.02		W7.01				W9.02	
		W2.02		S3.10		S4.08*		S5.07*		W6.08		W7.02				W9.08	
		W2.08		W3.01		S4.10		S5.08*		W6.10		W7.08				W9.10	
		W2.10		W3.02		W4.01		S5.10		W6.11		W7.10				W9.11	
		W2.11		W3.08		W4.02		W5.01				W7.11					
				W3.10		W4.08		W5.02									
				W3.11		W4.10		W5.08									
						W4.11		W5.10									
								W5.11									

* apartments with operable windows at building indentations that will promote natural ventilation
! single-sided apartments with external fins and façade articulation to induce natural ventilation
~ apartments allowing integrated skylights or roof ventilator to promote natural ventilation
highlighted apartments have the potential for natural ventilation with an operable window

CONCLUSIONS

The proposed project 2 Figtree Drive, Sydney Olympic Park, consists of 321 apartment units in the first nine storeys of which 68% are considered suitable for crosswind ventilation. With the addition of operable windows at appropriate locations, the total compliant percentage could increase to 72%.

REFERENCES

New South Wales Government, Department of Planning and Environment, "Apartment Design Guide", June 2015