

Natural Ventilation Statement for the proposed development located at 7 Railway Street, Chatswood

July 14, 2010

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1.0 Introduction

This report is in relation to the proposed development located at 7 Railway Street, Chatswood, and presents an opinion on the natural ventilation performance and characteristics of the various residential units of the proposed development as required by Willoughby Council DCP 32, Section 6.6.

The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the architectural drawings prepared by the project architects for this development, Mirvac Design, dated 9th July, 2010. The results of the study are compared to the wind-driven natural ventilation criteria detailed in the State Environmental Planning Policy No. 65 (SEPP65). No wind tunnel tests have been undertaken for the subject development. As such, this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection. 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.

2.0 Sydney Wind Climate

Natural ventilation for a residential unit is most beneficial during the summer months of the year, when the occupants of the unit are most likely to open the windows of their unit and also when the cooling effect of airflow through the unit is most effective.

Three principal wind directions occur for the Sydney region, these are winds from the north-east, south and west. Table 1 is a summary of the principal time of occurrence of these three predominant winds for the twelve months of the year. This summary is based on data obtained by the Bureau of Meteorology from Sydney's Kingsford Smith Airport between 1939 and 2000. Wind roses for the Sydney region are also presented in the attached Appendix A.

Natural ventilation is more beneficial for the occupant of a development during the warmer months of the year. An analysis of the Sydney wind climate data for the 6 warmer months of the year (October to March), indicates that the north-easterly and southerly winds dominate for this time of year, while the westerly winds are more predominant during the winter months. The north-easterly winds account for 39% of all occurrences during the warmer months, while the southerly winds account for 43% of all occurrences for these months.

Table 1: Principal Time of Occurrence of Winds – Sydney Region

Month	Wind Direction		
	North-Easterly	Southerly	Westerly
January	X	X	
February	X	X	
March	X	X	
April		X	X
May			X
June			X
July			X
August			X
September		X	X
October	X	X	
November	X	X	
December	X	X	

3.0 Natural Ventilation Criteria

Natural ventilation is effective when the occupant of the building chooses to benefit from the effects by opening windows to allow airflow through the occupied area. As such, natural ventilation is more beneficial during the warmer months of the year when the occupant will have openings to their unit open, while during the winter months it is considered more beneficial for air quality purposes. The predominant wind directions for the Sydney region has been analysed in Section 2.0. From this analysis, only the north-easterly and southerly winds should be considered as the predominant wind directions that contribute to natural ventilation for the warmer months of the year, since these are the predominant wind directions for the Sydney region for the warmer months of the year. The westerly winds are more predominant during the cooler winter months and would be primarily beneficial for an air quality perspective.

The NSW State Environmental Planning Policy No. 65 (SEPP65) defines that for a development to be considered naturally ventilated it is required that 60% of the individual units of the development be considered naturally ventilated. For a unit to be considered naturally ventilated, it is required that they perform to the minimum performance of a double-ended unit or corner unit with effective openings either on orthogonal aspects or opposite aspects, providing good cross ventilation as indicated in Figure 1a and 1b from SEPP65. For the purpose of this analysis, a unit will comply with the SEPP65 requirements for effective natural ventilation if the unit is deemed to have either **excellent** or **good** natural ventilation characteristics.

The criterion for natural ventilation for the residential units of the development requires that a unit must be considered a corner or double ended unit as specified in SEPP65 and/or meet more than one of the following criteria;

- (i) The individual unit needs to have openings located either on orthogonal aspects or opposite aspects.
- (ii) One of the aspects of the individual unit needs to have openings either facing or orthogonal to the north-easterly direction, with minimal obstruction.
- (iii) One of the aspects of the individual unit needs to have openings either facing or orthogonal to the southerly direction, with minimal obstruction.
- (iv) One of the aspects of the individual unit needs to have openings either facing or orthogonal to the westerly direction, with minimal obstruction.

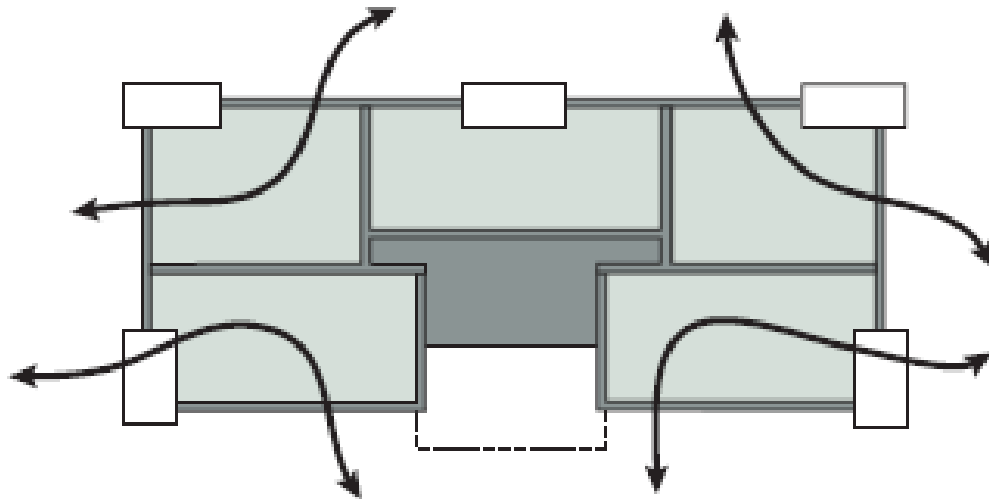
If a unit satisfies the first three criteria then it is deemed to have **excellent** natural ventilation characteristics.

If a unit satisfies two out of the first three criteria then it is deemed to have **good** natural ventilation characteristics.

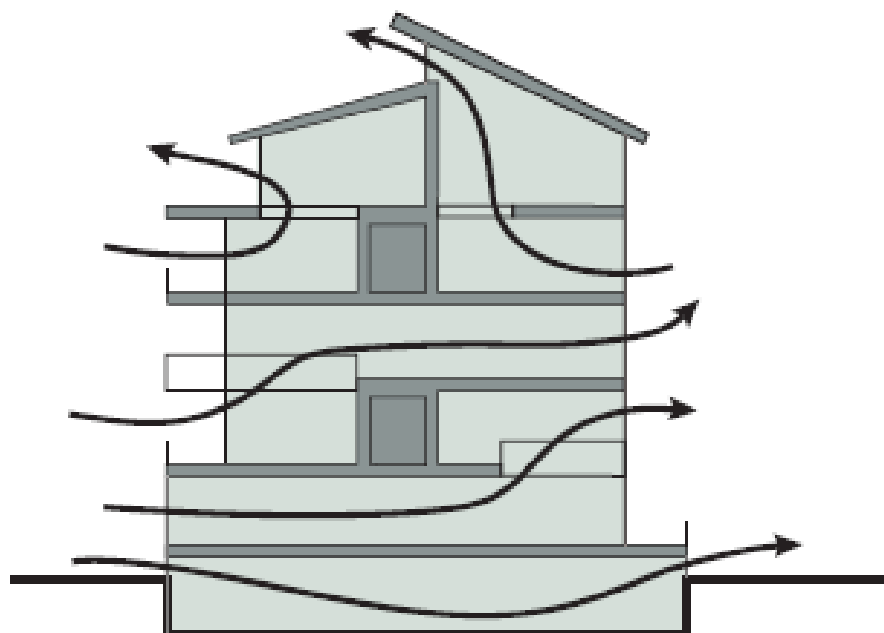
If a unit satisfies one out of the first three criteria, and the fourth criteria, then it is deemed to have **average** natural ventilation characteristics.

If a unit satisfies one out of the first three criteria then it is deemed to have **below average** natural ventilation characteristics.

If a unit satisfies none of the first three criteria then it is deemed to have **poor** natural ventilation characteristics.



**Figure 1a: Units Achieving Effective Natural Ventilation
(floor plan of a typical residential building)**



**Figure 1b: Units Achieving Effective Natural Ventilation
(section elevation of a typical residential building)**

4.0 Description of the Proposed Development

The proposed development site is bounded by Help Street to the south, Railway Street to the west, an adjacent public open space to the north and the Railway track enclosure to the east. An aerial image of the site location and local surrounds is shown in Figure 2.

The local land topography generally rises to the north and west of the site, with the elevated North Shore railway line running along the eastern boundary of the site. The neighbouring buildings to the south-east to west directions are high-rise commercial office buildings, while to the north-east are one and two storey residential houses. The proposed development consists of a 37 Level apartment building atop a 4 level podium. Ground Level consist of residential and commercial lobby areas, Levels 2 to 4 are proposed commercial floors while Levels 5 to 42 are proposed for residential apartments, with a mechanical level proposed on Level 25. There are a total of 304 residential units proposed for the development. The residential apartments proposed for the development consists of balconies and openings on all four aspects of the development. Full height privacy screens are proposed between the balcony areas on the northern, eastern and western facades.

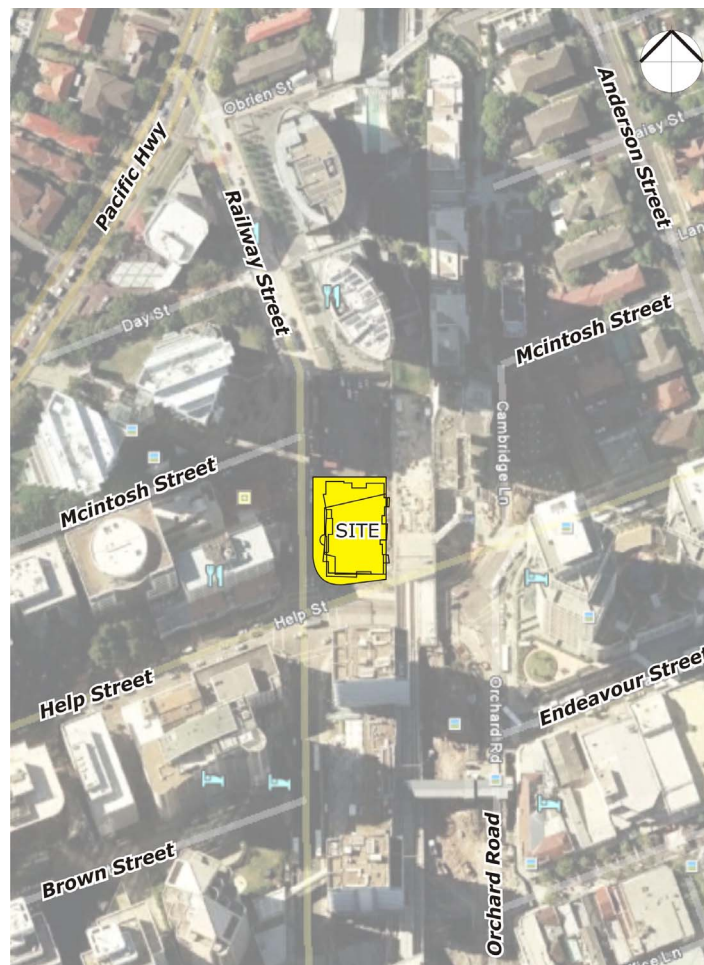


Figure 2: Aerial Image of the Proposed Development Site

5.0 Results of the Analysis

The natural ventilation assessment for the development took into account the predominant wind directions for the Sydney region, the interaction between the wind and the building morphology in the area was considered. As discussed in Section 3.0, the westerly winds are not considered as effective in natural ventilation performance, since for the Sydney region these winds predominantly occur during the winter months, when wind-driven natural ventilation would not be considered desirable for the occupants of the development. Other important features which were taken into account for the assessment include the distances between the proposed building floor plan and orientation, as well as the landform surrounding the site.

5.1 Initial Results from Analysis

The results for the natural ventilation characteristics for the various residential units within the proposed development are presented in Table 2 below. The analysis of the wind-driven natural ventilation characteristics considers the living space of the various residential units of the proposed development. The indicated unit numbers in these tables correspond to the unit numbering scheme as indicated in Appendix B of this report and based on the latest architectural drawings prepared by project architect Mirvac Design, dated 9th June 2010. Note that each residential unit is compared to the three basic criteria detailed in Section 3.0 of this report.

Table 2: Natural Ventilation Results

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
501	Yes	Yes	No	Yes	Good
502	No	No	No	Yes	Poor
503	No	No	No	Yes	Poor
504	No	No	No	Yes	Poor
505	Yes	No	Yes	Yes	Good
506	No	No	Yes	No	Below Average
507	No	Yes	No	No	Below Average
508	No	Yes	No	No	Below Average
509	Yes	Yes	No	No	Good
601	Yes	Yes	No	Yes	Good

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
602	No	No	No	Yes	Poor
603	No	No	No	Yes	Poor
604	No	No	No	Yes	Poor
605	Yes	No	Yes	Yes	Good
606	No	No	Yes	No	Below Average
607	Yes	Yes	Yes	No	Excellent
608	No	Yes	No	No	Below Average
609	No	Yes	No	No	Below Average
610	Yes	Yes	No	No	Good
701	Yes	Yes	No	Yes	Good
702	No	No	No	Yes	Poor
703	No	No	No	Yes	Poor
704	No	No	No	Yes	Poor
705	Yes	No	Yes	Yes	Good
706	No	No	Yes	No	Below Average
707	Yes	Yes	Yes	No	Excellent
708	No	Yes	No	No	Below Average
709	No	Yes	No	No	Below Average
710	Yes	Yes	No	No	Good
801	Yes	Yes	No	Yes	Good
802	No	No	No	Yes	Poor
803	No	No	No	Yes	Poor
804	No	No	No	Yes	Poor

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
805	Yes	No	Yes	Yes	Good
806	No	No	Yes	No	Below Average
807	Yes	Yes	Yes	No	Excellent
808	No	Yes	No	No	Below Average
809	No	Yes	No	No	Below Average
810	Yes	Yes	No	No	Good
901	Yes	Yes	No	Yes	Good
902	No	No	No	Yes	Poor
903	No	No	No	Yes	Poor
904	No	No	No	Yes	Poor
905	Yes	No	Yes	Yes	Good
906	No	No	Yes	No	Below Average
907	Yes	Yes	Yes	No	Excellent
908	No	Yes	No	No	Below Average
909	No	Yes	No	No	Below Average
910	Yes	Yes	No	No	Good
1001	Yes	Yes	No	Yes	Good
1002	No	No	No	Yes	Poor
1003	No	No	No	Yes	Poor
1004	No	No	No	Yes	Poor
1005	Yes	No	Yes	Yes	Good
1006	No	No	Yes	No	Below Average
1007	Yes	Yes	Yes	No	Excellent

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
1008	No	Yes	No	No	Below Average
1009	No	Yes	No	No	Below Average
1010	Yes	Yes	No	No	Good
1101	Yes	Yes	No	Yes	Good
1102	No	No	No	Yes	Poor
1103	No	No	No	Yes	Poor
1104	No	No	No	Yes	Poor
1105	Yes	No	Yes	Yes	Good
1106	No	No	Yes	No	Below Average
1107	Yes	Yes	Yes	No	Excellent
1108	No	Yes	No	No	Below Average
1109	No	Yes	No	No	Below Average
1110	Yes	Yes	No	No	Good
1201	Yes	Yes	No	Yes	Good
1202	No	No	No	Yes	Poor
1203	No	No	No	Yes	Poor
1204	No	No	No	Yes	Poor
1205	Yes	No	Yes	Yes	Good
1206	No	No	Yes	No	Below Average
1207	Yes	Yes	Yes	No	Excellent
1208	No	Yes	No	No	Below Average
1209	No	Yes	No	No	Below Average
1210	Yes	Yes	No	No	Good

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
1301	Yes	Yes	No	Yes	Good
1302	No	No	No	Yes	Poor
1303	No	No	No	Yes	Poor
1304	No	No	No	Yes	Poor
1305	Yes	No	Yes	Yes	Good
1306	No	No	Yes	No	Below Average
1307	Yes	Yes	Yes	No	Excellent
1308	No	Yes	No	No	Below Average
1309	No	Yes	No	No	Below Average
1310	Yes	Yes	No	No	Good
1401	Yes	Yes	No	Yes	Good
1402	No	No	No	Yes	Poor
1403	No	No	No	Yes	Poor
1404	No	No	No	Yes	Poor
1405	Yes	No	Yes	Yes	Good
1406	No	No	Yes	No	Below Average
1407	Yes	Yes	Yes	No	Excellent
1408	No	Yes	No	No	Below Average
1409	No	Yes	No	No	Below Average
1410	Yes	Yes	No	No	Good
1501	Yes	Yes	No	Yes	Good
1502	No	No	No	Yes	Poor
1503	No	No	No	Yes	Poor

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
1504	Yes	No	Yes	Yes	Good
1505	Yes	Yes	Yes	No	Excellent
1506	No	Yes	No	No	Below Average
1507	No	Yes	No	No	Below Average
1508	Yes	Yes	No	No	Good
1601	Yes	Yes	No	Yes	Good
1602	No	No	No	Yes	Poor
1603	No	No	No	Yes	Poor
1604	Yes	No	Yes	Yes	Good
1605	Yes	Yes	Yes	No	Excellent
1606	No	Yes	No	No	Below Average
1607	No	Yes	No	No	Below Average
1608	Yes	Yes	No	No	Good
1701	Yes	Yes	No	Yes	Good
1702	No	No	No	Yes	Poor
1703	No	No	No	Yes	Poor
1704	Yes	No	Yes	Yes	Good
1705	Yes	Yes	Yes	No	Excellent
1706	No	Yes	No	No	Below Average
1707	No	Yes	No	No	Below Average
1708	Yes	Yes	No	No	Good
1801	Yes	Yes	No	Yes	Good
1802	No	No	No	Yes	Poor

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
1803	No	No	No	Yes	Poor
1804	Yes	No	Yes	Yes	Good
1805	Yes	Yes	Yes	No	Excellent
1806	No	Yes	No	No	Below Average
1807	No	Yes	No	No	Below Average
1808	Yes	Yes	No	No	Good
1901	Yes	Yes	No	Yes	Good
1902	No	No	No	Yes	Poor
1903	No	No	No	Yes	Poor
1904	Yes	No	Yes	Yes	Good
1905	Yes	Yes	Yes	No	Excellent
1906	No	Yes	No	No	Below Average
1907	No	Yes	No	No	Below Average
1908	Yes	Yes	No	No	Good
2001	Yes	Yes	No	Yes	Good
2002	No	No	No	Yes	Poor
2003	No	No	No	Yes	Poor
2004	Yes	No	Yes	Yes	Good
2005	Yes	Yes	Yes	No	Excellent
2006	No	Yes	No	No	Below Average
2007	No	Yes	No	No	Below Average
2008	Yes	Yes	No	No	Good
2101	Yes	Yes	No	Yes	Good

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
2102	No	No	No	Yes	Poor
2103	No	No	No	Yes	Poor
2104	Yes	No	Yes	Yes	Good
2105	Yes	Yes	Yes	No	Excellent
2106	No	Yes	No	No	Below Average
2107	No	Yes	No	No	Below Average
2108	Yes	Yes	No	No	Good
2201	Yes	Yes	No	Yes	Good
2202	No	No	No	Yes	Poor
2203	No	No	No	Yes	Poor
2204	Yes	No	Yes	Yes	Good
2205	Yes	Yes	Yes	No	Excellent
2206	No	Yes	No	No	Below Average
2207	No	Yes	No	No	Below Average
2208	Yes	Yes	No	No	Good
2301	Yes	Yes	No	Yes	Good
2302	No	No	No	Yes	Poor
2303	No	No	No	Yes	Poor
2304	Yes	No	Yes	Yes	Good
2305	Yes	Yes	Yes	No	Excellent
2306	No	Yes	No	No	Below Average
2307	No	Yes	No	No	Below Average
2308	Yes	Yes	No	No	Good

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
2401	Yes	Yes	No	Yes	Good
2402	No	No	No	Yes	Poor
2403	No	No	No	Yes	Poor
2404	Yes	No	Yes	Yes	Good
2405	Yes	Yes	Yes	No	Excellent
2406	No	Yes	No	No	Below Average
2407	No	Yes	No	No	Below Average
2408	Yes	Yes	No	No	Good
2501	Yes	Yes	No	Yes	Good
2502	No	No	No	Yes	Poor
2505	Yes	Yes	Yes	No	Excellent
2506	No	Yes	No	No	Below Average
2507	No	Yes	No	No	Below Average
2508	Yes	Yes	No	No	Good
2601	Yes	Yes	No	Yes	Good
2602	No	No	No	Yes	Poor
2603	No	No	No	Yes	Poor
2604	Yes	No	Yes	Yes	Good
2605	Yes	Yes	Yes	No	Excellent
2606	No	Yes	No	No	Below Average
2607	Yes	Yes	No	No	Good
2701	Yes	Yes	No	Yes	Good
2702	No	No	No	Yes	Poor

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
2703	No	No	No	Yes	Poor
2704	Yes	No	Yes	Yes	Good
2705	Yes	Yes	Yes	No	Excellent
2706	No	Yes	No	No	Below Average
2707	Yes	Yes	No	No	Good
2801	Yes	Yes	No	Yes	Good
2802	No	No	No	Yes	Poor
2803	No	No	No	Yes	Poor
2804	Yes	No	Yes	Yes	Good
2805	Yes	Yes	Yes	No	Excellent
2806	No	Yes	No	No	Below Average
2807	Yes	Yes	No	No	Good
2901	Yes	Yes	No	Yes	Good
2902	No	No	No	Yes	Poor
2903	No	No	No	Yes	Poor
2904	Yes	No	Yes	Yes	Good
2905	Yes	Yes	Yes	No	Excellent
2906	No	Yes	No	No	Below Average
2907	Yes	Yes	No	No	Good
3001	Yes	Yes	No	Yes	Good
3002	No	No	No	Yes	Poor
3003	No	No	No	Yes	Poor
3004	Yes	No	Yes	Yes	Good

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
3005	Yes	Yes	Yes	No	Excellent
3006	No	Yes	No	No	Below Average
3007	Yes	Yes	No	No	Good
3101	Yes	Yes	No	Yes	Good
3102	No	No	No	Yes	Poor
3103	No	No	No	Yes	Poor
3104	Yes	No	Yes	Yes	Good
3105	Yes	Yes	Yes	No	Excellent
3106	No	Yes	No	No	Below Average
3107	Yes	Yes	No	No	Good
3201	Yes	Yes	No	Yes	Good
3202	No	No	No	Yes	Poor
3203	No	No	No	Yes	Poor
3204	Yes	No	Yes	Yes	Good
3205	Yes	Yes	Yes	No	Excellent
3206	No	Yes	No	No	Below Average
3207	Yes	Yes	No	No	Good
3301	Yes	Yes	No	Yes	Good
3302	No	No	No	Yes	Poor
3303	No	No	No	Yes	Poor
3304	Yes	No	Yes	Yes	Good
3305	Yes	Yes	Yes	No	Excellent
3306	No	Yes	No	No	Below Average

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
3307	Yes	Yes	No	No	Good
3401	Yes	Yes	No	Yes	Good
3402	No	No	No	Yes	Poor
3403	No	No	No	Yes	Poor
3404	Yes	No	Yes	Yes	Good
3405	Yes	Yes	Yes	No	Excellent
3406	No	Yes	No	No	Below Average
3407	Yes	Yes	No	No	Good
3501	Yes	Yes	No	Yes	Good
3502	No	No	No	Yes	Poor
3503	No	No	No	Yes	Poor
3504	Yes	No	Yes	Yes	Good
3505	Yes	Yes	Yes	No	Excellent
3506	No	Yes	No	No	Below Average
3507	Yes	Yes	No	No	Good
3601	Yes	Yes	No	Yes	Good
3602	No	No	No	Yes	Poor
3603	No	No	No	Yes	Poor
3604	Yes	No	Yes	Yes	Good
3605	Yes	Yes	Yes	No	Excellent
3606	No	Yes	No	No	Below Average
3607	Yes	Yes	No	No	Good
3701	Yes	Yes	No	Yes	Good

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
3702	No	No	No	Yes	Poor
3703	No	No	No	Yes	Poor
3704	Yes	No	Yes	Yes	Good
3705	Yes	Yes	Yes	No	Excellent
3706	No	Yes	No	No	Below Average
3707	Yes	Yes	No	No	Good
3801	Yes	Yes	No	Yes	Good
3802	No	No	No	Yes	Poor
3803	No	No	No	Yes	Poor
3804	Yes	No	Yes	Yes	Good
3805	Yes	Yes	Yes	No	Excellent
3806	No	Yes	No	No	Below Average
3807	Yes	Yes	No	No	Good
3901	Yes	Yes	No	Yes	Good
3902	No	No	No	Yes	Poor
3903	No	No	No	Yes	Poor
3904	Yes	No	Yes	Yes	Good
3905	Yes	Yes	Yes	No	Excellent
3906	No	Yes	No	No	Below Average
3907	Yes	Yes	No	No	Good
4001	Yes	Yes	No	Yes	Good
4002	No	No	No	Yes	Poor
4003	No	No	No	Yes	Poor

Table 2: Natural Ventilation Results (cont..)

Unit Number	Satisfies Criteria				Natural Ventilation Rating
	Criterion (i)	Criterion (ii)	Criterion (iii)	Criterion (iv)	
4004	Yes	No	Yes	Yes	Good
4005	Yes	Yes	Yes	No	Excellent
4006	No	Yes	No	No	Below Average
4007	Yes	Yes	No	No	Good
4101	Yes	Yes	No	Yes	Good
4102	No	No	No	Yes	Poor
4103	No	No	No	Yes	Poor
4104	Yes	No	Yes	Yes	Good
4105	Yes	Yes	Yes	No	Excellent
4106	No	Yes	No	No	Below Average
4107	Yes	Yes	No	No	Good
4201	Yes	Yes	No	Yes	Good
4202	No	No	No	Yes	Poor
4203	No	No	No	Yes	Poor
4204	Yes	No	Yes	Yes	Good
4205	Yes	Yes	Yes	No	Excellent
4206	No	Yes	No	No	Below Average
4207	Yes	Yes	No	No	Good

The results for the natural ventilation characteristics of the various residential units within the proposed development are summarised as follows:

- Total number of residential units is **304**.
- A total of **150** residential units were found to comply with SEPP65 as having effective wind-driven natural ventilation
- Percentage of units that comply with SEPP65 as having effective wind-driven natural ventilation is **49.3%**.

Based on these results, the development does not comply with the requirements of SEPP 65 for 60% of the residential units of the development displaying characteristics of a naturally ventilating unit.

5.2 Recommendations for Compliance

After the initial analysis was conducted, it was found that the reason the development didn't meet the requirements for natural ventilation due to the orientation of the development being aligned in the north-south direction.

The development has been further assessed to consider treatment options for the development for it to meet the requirements for natural ventilation. This review included taking into account wind tunnel test results for other developments previously investigated which have displayed that a single aspect unit is able to meet the requirements for natural ventilation depending on the orientation and external façade profile. It has been found from wind tunnel modelling of similar apartment configurations, that single aspect units are able to meet the requires for natural ventilation the following specifications for the unit need to apply:

1. The external surface of the single aspect unit needs to be at approximately 45 degrees to the direction of one of the predominant wind directions (for the Sydney region these are the north-easterly or southerly winds)
2. The façade of the single aspect unit needs to be stepped by about 2metres or more. The setback needs to be such that it can generate a positive pressure on one side of the unit and a neutral or negative pressure at the other side of the unit.

The performance of units which display these two characteristics will generally meet the requirements for air flow through a unit for natural ventilation, however this needs to be verified through wind tunnel testing. This is due to the individual buildings façade profile, surrounding buildings and land topography having a different effect for all site locations.

Based on these requirements, Unit Type 8 and 9 for Levels 5 to 14, Unit Type 6 and 7 for Levels 15 to 25 and Unit Type 6 for Levels 26 to 42 are expected to be able to meet the requirements for a naturally ventilated complying unit. Other units may also potentially have sufficient natural ventilation to comply. The natural ventilation performance for these units will require verification through wind tunnel modelling. The above indicates that 68.7% of the residential units can potentially have adequate natural ventilation and the development would therefore effectively comply with the natural ventilation provisions in SEPP65.

It should also be noted that Unit 506 could also be considered to be naturally ventilated if provisions for openings were included on the eastern aspect of the unit.

6.0 Conclusion

An assessment of the natural ventilation characteristics of the various residential units of the proposed development located at 7 Railway Street, Chatswood, has been undertaken. The conclusions of this report are drawn from our extensive experience in this field and are based on an examination of the architectural drawings prepared by the project architect Mirvac Design, dated 9th July 2010. No wind tunnel tests have been undertaken for the subject development. As such, this report addresses only the general wind effects and any localised effects that are identifiable by visual inspection. 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.

The results of the study are compared to the wind-driven natural ventilation criteria detailed in the State Environmental Planning Policy No. 65 (SEPP65), which requires that at least 60% of the residential units within a development should achieve effective natural ventilation.

The results of our assessment indicate that 49.3% of the residential units within the proposed development are deemed to have effective natural ventilation as defined by SEPP65. Hence the proposed development does not have an adequate number of units that are deemed to satisfy the natural ventilation provisions in SEPP65.

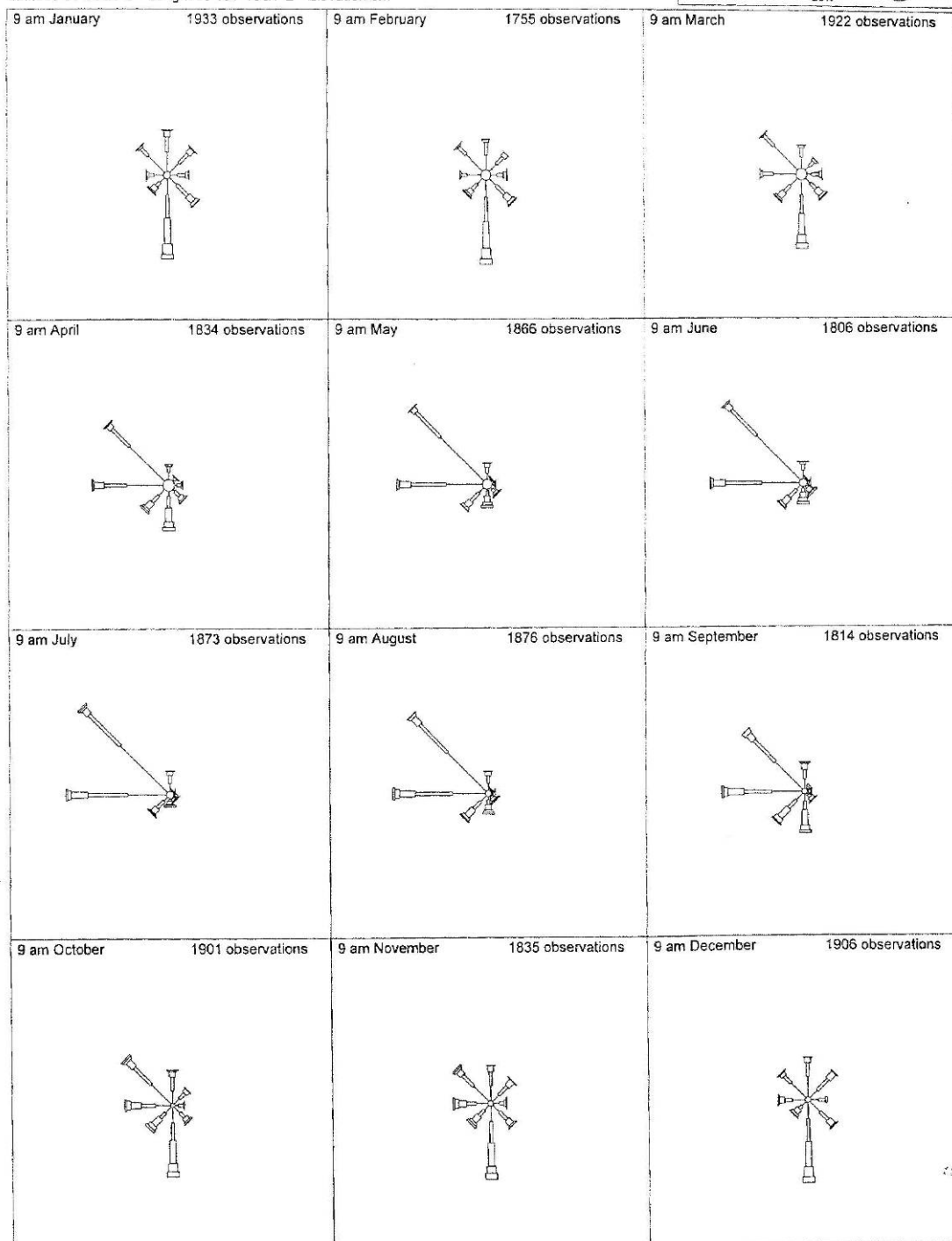
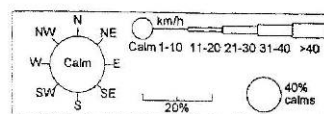
A recommendation has been made in this report to undertake wind tunnel modelling to demonstrate the ability of some of the units to meet compliance with SEPP65 based on a performance comparison with the units that are deemed to comply. It is expected that a sufficient number of additional units will comply to satisfy the requirement for 60% of the residential units to achieve natural ventilation. This assessment has been made in principle based off our extensive experience and knowledge in the performance of residential units with wind-driven natural ventilation.

Appendix A

Wind Roses for Sydney
Kingsford Smith Airport, 1939-2000

Wind Roses using available data between 1939 and 2000 for SYDNEY AIRPORT AMO

Site Number 066037 • Locality: SYDNEY AIRPORT • Opened Jan 1929 • Still Open
Latitude 33°56'28"S • Longitude 151°10'21"E • Elevation 6m

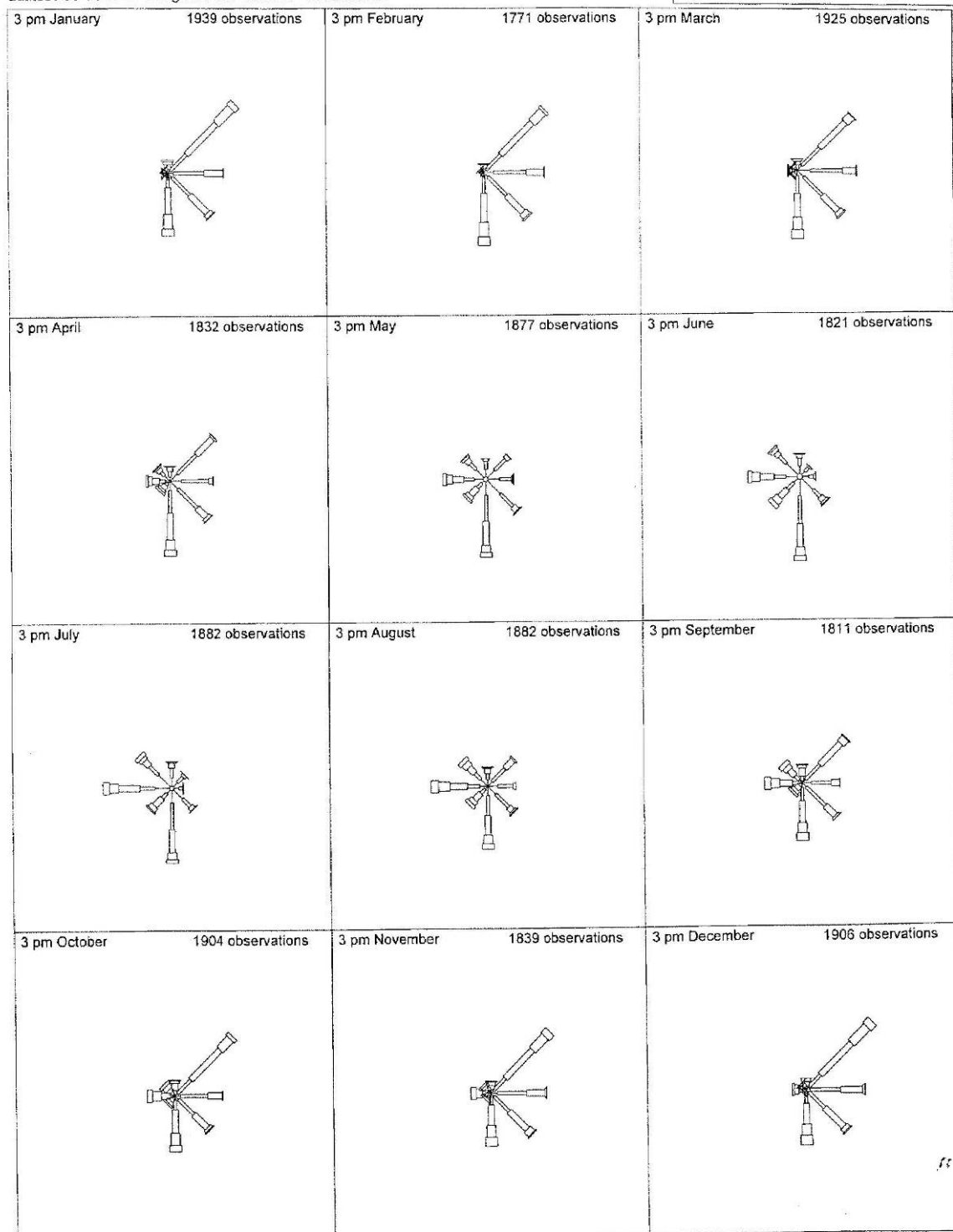
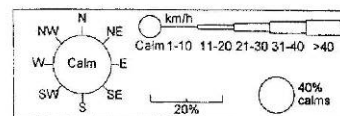


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Page 1 of 1

Wind Roses using available data between 1939 and 2000 for SYDNEY AIRPORT AMO

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Page 1 of 1