WINDTECH

Solar Access Analysis

for the proposed development located at

7 Railway Street, Chatswood

July 19, 2010

Report Reference No. W400-36F01(rev0)- SA Report

Sydney • Melbourne • Singapore • Dubai **www.windtech.com.au**
WINDTECH Consultants Pty Ltd: 19 Willis St, Wolli Creek NSW 2205 Australia ABN 72 050 574 037
T: (61.2) 9567 0722 **F:** (61.2) 9567 0733 **E:** reception@windtech.com.au

Document Control

Revision Number	Date	Revision History	Prepared By (initials)	Initial Review By (initials)	Reviewed & Authorised By (initials)
0	19/07/2010	Updated and Revised from W400-35F03(rev2)	TH		

The work presented in this document was carried out in accordance with the Windtech Consultants Pty Ltd Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

This document is issued subject to review and authorisation by the Team Leader noted by the initials printed in the last column above. If no initials appear, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for our Client's particular requirements which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Windtech Consultants Pty Ltd. This report should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

The information contained herein is for the purpose of wind, thermal and or solar effects only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the scope of this report.

1.0 Introduction

This study has been undertaken to assess the level of solar access into the Living Areas and Private Open Spaces of the proposed development located at 7 Railway Street, Chatswood. The proposed development consists of a mixed-use building with a total of 304 residential units across the 38 residential floors within the proposed development.

The analysis of the solar access is carried out using a solar access meter derived from the solar chart for the Sydney region, provided in R.O. Phillips (1992)[1], and attached in the Appendix of this report. The results for the number of hours of direct solar access for each residential dwelling are accurate to within 15 minutes.

The analysis presented in this report is based on architectural drawings prepared by Mirvac Design, dated July 2010. All living areas are identified by level and unit number (eg: Level 5, Unit 4 is labeled as 504) in accordance with the aforementioned drawings.

2.0 Solar Access Criteria

The number of hours of solar access for each of the residential units of the proposed development is compared to criteria from the State Environmental Planning Policy No. 65 and Residential Flat Design Code guidelines and the Willoughby City Council Development Control Plan requirements for Multi-Unit Housing and Mixed Use Commercial/ Residential Developments.

The State Environmental Planning Policy No. 65 (SEPP65) for the design of quality residential flat development requires that a residential development should be designed in such a way as to optimise the amount of available solar access. The Residential Flat Design Code has the following guidelines, listed as "Rules of Thumb":

> *"**Living rooms** and **private open spaces** for at least 70 percent of apartments in a development should receive a minimum of **three hours** direct sunlight between 9am and 3pm in mid-winter. In dense urban areas a minimum of **two hours** may be acceptable.*
>
> *Limit the number of single-aspect apartments with a southerly aspect (SW-SE) to a maximum of 10 percent of the total units proposed. Developments which seek to vary from the minimum standards must demonstrate how site constraints and orientation prohibit the achievement of these standards and how energy efficiency is addressed."*

Section 6.2 of the Willoughby City Council Development Control Plan 32 Railway Street Site states the following:

> *"All new dwellings are to receive adequate daylight and sunlight access to private open space and habitable rooms"*

[1] R.O Phillips, *Sunshine and Shade in Australia 6th edition*, CSIRO Technical Report 92/2.

3.0 Methodology

The overall solar access to the living areas pertaining to all living spaces within the proposed development has been assessed. The assessment is based on drawings prepared by Mirvac Design, dated July 2010.

The analysis includes the solar access to **Living Areas** and **Private Open Spaces** between the hours **09:00 to 15:00** on **June 22** (winter solstice) relating to the guidelines outlined by **SEPP65** and in the **Willoughby City Council DCP 32 Section 6.2.** The Willoughby City Council DCP has a broad statement regarding the amount of solar access received by the private open spaces and living areas and will refer back to the criteria as set out by the SEPP65 guidelines. SEPP65 states the requirement for three hours of solar access between the specified times of day apply, however in dense urban areas; a minimum of **two hours** of direct solar access may be acceptable.

For the living areas, solar access is calculated at the centre of the glass line of the main window of the living area (vertically and horizontally). For a window to be considered to have an adequate amount of usable direct solar access, *at least half* of the glass area should be exposed to sunlight. To be assessed as being in sunlight, at least half of the ground level area of the private open space must be exposed to direct solar access. If a tenancy has more than one point of analysis (e.g. if a tenancy has more that one window or if a balcony has multiple aspects justifying more points of analysis), the number of hours of solar access that each window provides can be added if the various windows allow solar access at different times of the day. If they both allow solar access at the same time then they cannot be double-counted.

The report will present the results based on the minimum requirements of two hours as outlined by SEPP65 for dense urban areas.

3.1 Example of a Solar Access Analysis to the Living Area Glass-Line

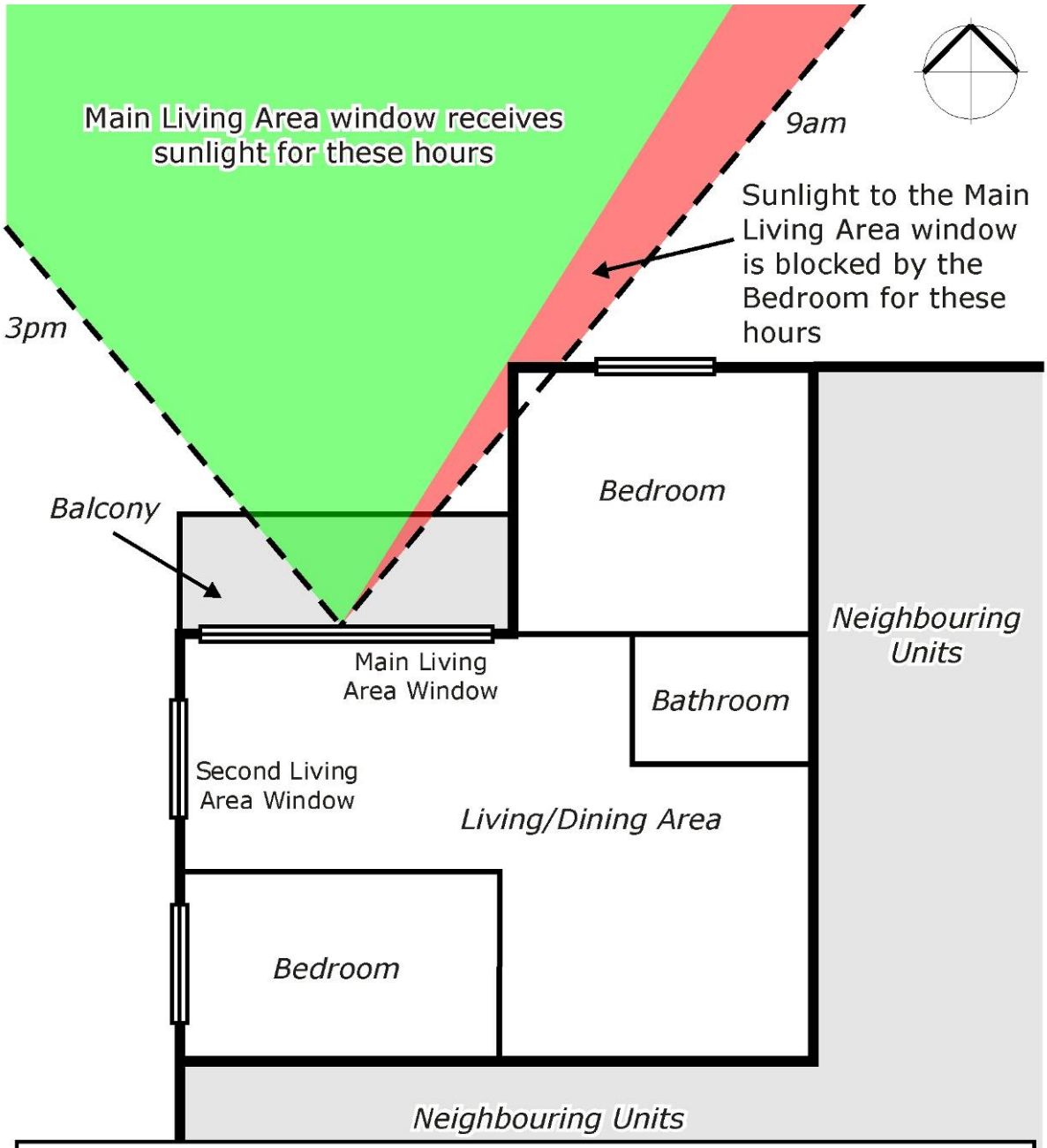
An example of how the solar access to a main living area window of a generic residential apartment is measured is presented in Figure 1. Figure 1 show how the morning sun is blocked by the protruding bedroom at the north-eastern end of the apartment. Once the sun clears the bedroom then the main living area window receives direct solar access for the rest of the day.

An inspection of scaled plan and elevation drawings is required to determine the extent of the window that is exposed to direct sunlight. The requirements for this study are that at least half of the window area should be exposed to direct sunlight.

The second living area window will only receive solar access after midday. However, since the main living area window will also receive solar access for these same hours, the solar access from these two windows cannot be added. Hence for some residential units that may face south, solar access to the main living area may still be possible if there is a second window facing either east or west, for example.

The diagram in Figure 1 does not account for obstructions in the vertical plane, these are accounted for afterwards. The number of hours of solar access calculated is also be corrected for overshadowing by balconies and neighbouring buildings, or any other type of fixed obstruction.

The angular width of the sun path between the hours of 9am and 3pm is determined from the solar chart for the Sydney region, attached in the Appendix of this report. This can also be adjusted for different times of the year. For this study the sun's path on the winter solstice (June 22) is selected for analysis.



Note: This figure shows only obstructions in the horizontal plane from the window. Obstructions in the vertical plane, such as balconies above and surrounding buildings, also need to be accounted for in the assessment.
The percent of area of the window exposed to direct solar access is determined by detailed inspection of scaled plan and elevation drawings.
Solar access to the Living Area from the Second Living Area Window is only available during the afternoon. The Main Living Area Window also allows solar access during these same hours, therefore solar access through the Second Living Area Window is not counted (to avoid double-counting solar access hours).

Figure 1: Example of Solar Access to the Main Window of a Residential Apartment

4.0 Results

The amount of direct solar access, in hours, to the various Living Areas and private open spaces of the proposed development for the various criteria described in Section 2 of this report is presented in Table 1. The report will present the results based on the applicable minimum requirement of two hours as outlined by SEPP65.

Table 1 outlines the amount and time of direct solar access to these residential dwellings on the winter solstice (June 22), between the hours of 9am and 3pm.

Note that the unit number indicated in Table 1 reflects the level and the number of the unit (e.g.: Level 5, Unit 4 is labeled as 504).

Table 1: Solar Access for Each Residential Unit

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
501	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
502	0	N/A	1.25	13.00-14.15
503	2	12.00-14.00	2	12.00-14.00
504	0.75	13.00-13.45	1.25	12.30-13.45
505	0	N/A	1	12.30-13.30
506	0	N/A	1	9.00-9.15, 11.15-12.00
507	0.5	11.15-11.45	0.75	11.15-12.00
508	0.75	11.00-11.45	0.75	11.00-11.45
509	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
601	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
602	0	N/A	1.25	13.00-14.15
603	2	12.00-14.00	2	12.00-14.00
604	0.75	13.00-13.45	1.25	12.30-13.45

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
605	0	N/A	1	12.30-13.30
606	0	N/A	0	N/A
607	0	N/A	1	9.00-9.15, 11.15-12.00
608	0.5	11.15-11.45	0.75	11.15-12.00
609	0.75	11.00-11.45	0.75	11.00-11.45
610	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
701	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
702	0	N/A	1.25	13.00-14.15
703	2	12.00-14.00	2	12.00-14.00
704	0.75	13.00-13.45	1.25	12.30-13.45
705	0	N/A	1	12.30-13.30
706	0	N/A	0	N/A
707	0	N/A	1	9.00-9.15, 11.15-12.00
708	0.5	11.15-11.45	0.75	11.15-12.00
709	0.75	11.00-11.45	0.75	11.00-11.45
710	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
801	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
802	0	N/A	1.25	13.00-14.15
803	2	12.00-14.00	2	12.00-14.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
804	0.75	13.00-13.45	1.25	12.30-13.45
805	0	N/A	1	12.30-13.30
806	0	N/A	0	N/A
807	0	N/A	1	9.00-9.15, 11.15-12.00
808	0.5	11.15-11.45	0.75	11.15-12.00
809	0.75	11.00-11.45	0.75	11.00-11.45
810	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
901	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
902	0	N/A	1.25	13.00-14.15
903	2	12.00-14.00	2	12.00-14.00
904	0.75	13.00-13.45	1.25	12.30-13.45
905	0	N/A	1	12.30-13.30
906	0	N/A	0	N/A
907	0	N/A	1	9.00-9.15, 11.15-12.00
908	0.5	11.15-11.45	0.75	11.15-12.00
909	0.75	11.00-11.45	0.75	11.00-11.45
910	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
1001	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1002	0	N/A	1.25	13.00-14.15

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
1003	2	12.00-14.00	2	12.00-14.00
1004	0.75	13.00-13.45	1.25	12.30-13.45
1005	0	N/A	1	12.30-13.30
1006	0	N/A	0	N/A
1007	0	N/A	1	9.00-9.15, 11.15-12.00
1008	0.5	11.15-11.45	0.75	11.15-12.00
1009	0.75	11.00-11.45	0.75	11.00-11.45
1010	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
1101	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1102	0	N/A	1.25	13.00-14.15
1103	2	12.00-14.00	2	12.00-14.00
1104	0.75	13.00-13.45	1.25	12.30-13.45
1105	0	N/A	1	12.30-13.30
1106	0	N/A	0	N/A
1107	0	N/A	1	9.00-9.15, 11.15-12.00
1108	0.5	11.15-11.45	0.75	11.15-12.00
1109	0.75	11.00-11.45	0.75	11.00-11.45
1110	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
1201	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
1202	0	N/A	1.25	13.00-14.15
1203	2	12.00-14.00	2	12.00-14.00
1204	0.75	13.00-13.45	1.25	12.30-13.45
1205	0	N/A	1	12.30-13.30
1206	0	N/A	0	N/A
1207	0	N/A	1	9.00-9.15, 11.15-12.00
1208	0.5	11.15-11.45	0.75	11.15-12.00
1209	0.75	11.00-11.45	0.75	11.00-11.45
1210	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
1301	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1302	0	N/A	1.25	13.00-14.15
1303	2	12.00-14.00	2	12.00-14.00
1304	0.75	13.00-13.45	1.25	12.30-13.45
1305	0	N/A	1	12.30-13.30
1306	0	N/A	0	N/A
1307	0	N/A	1	9.00-9.15, 11.15-12.00
1308	0.5	11.15-11.45	0.75	11.15-12.00
1309	0.75	11.00-11.45	0.75	11.00-11.45
1310	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
1401	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1402	0	N/A	1.25	13.00-14.15
1403	2	12.00-14.00	2	12.00-14.00
1404	0.75	13.00-13.45	1.25	12.30-13.45
1405	0	N/A	1	12.30-13.30
1406	0	N/A	0	N/A
1407	0	N/A	1	9.00-9.15, 11.15-12.00
1408	0.5	11.15-11.45	0.75	11.15-12.00
1409	1	10.45-11.45	1	10.45-11.45
1410	3.5	10.15-11.45, 13.00-15.00	3.75	10.15-12.00, 13.00-15.00
1501	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1502	1.5	12.30-14.00	1.5	12.30-14.00
1503	1.5	12.30-14.00	1.5	12.30-14.00
1504	1.5	12.15-13.45	1.5	12.15-13.45
1505	2	9.45-11.45	2	10.00-12.00
1506	1.25	10.45-12.00	1.25	10.45-12.00
1507	1	10.45-11.45	1	10.45-11.45
1508	3.5	10.15-11.45, 13.00-15.00	4	10.00-12.00, 13.00-15.00
1601	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
1602	1.5	12.30-14.00	1.5	12.30-14.00
1603	1.5	12.30-14.00	1.5	12.30-14.00
1604	1.5	12.15-13.45	1.5	12.15-13.45
1605	2.25	9.30-11.45	2	10.00-12.00
1606	2	9.45-11.45	2	10.00-12.00
1607	1.25	10.30-11.45	1.25	10.30-11.45
1608	3.5	10.15-11.45, 13.00-15.00	4	10.00-12.00, 13.00-15.00
1701	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1702	1.5	12.30-14.00	1.5	12.30-14.00
1703	1.5	12.30-14.00	1.5	12.30-14.00
1704	1.5	12.15-13.45	1.5	12.15-13.45
1705	2.75	9.00-11.45	2.5	9.30-12.00
1706	2.25	9.30-11.45	2.25	9.45-12.00
1707	1.5	10.15-11.45	1.25	10.30-11.45
1708	3.75	10.00-11.45, 13.00-15.00	4	10.00-12.00, 13.00-15.00
1801	4	9.15-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1802	1.5	12.30-14.00	1.5	12.30-14.00
1803	1.5	12.30-14.00	1.5	12.30-14.00
1804	1.75	12.15-14.00	1.75	12.15-14.00
1805	2.75	9.00-11.45	3	9.00-12.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
1806	2.5	9.15-11.45	2.75	9.15-12.00
1807	2	9.45-11.45	2	9.45-11.45
1808	4	9.45-11.45, 13.00-15.00	4.25	9.45-12.00, 13.00-15.00
1901	4.25	9.00-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
1902	1.5	12.30-14.00	1.5	12.30-14.00
1903	1.5	12.30-14.00	1.5	12.30-14.00
1904	2	12.15-14.15	2	12.15-14.15
1905	2.75	9.00-11.45	3	9.00-12.00
1906	2.75	9.00-11.45	3	9.00-12.00
1907	2.25	9.30-11.45	2.25	9.30-11.45
1908	4.25	9.30-11.45, 13.00-15.00	4.5	9.30-12.00, 13.00-15.00
2001	4.25	9.00-11.00, 12.30-14.45	4.5	9.00-11.00, 12.30-15.00
2002	1.75	12.30-14.15	1.75	12.30-14.15
2003	1.75	12.30-14.15	1.75	12.30-14.15
2004	2	12.15-14.15	2	12.15-14.15
2005	2.75	9.00-11.45	3	9.00-12.00
2006	2.75	9.00-11.45	3	9.00-12.00
2007	2.75	9.00-11.45	2.5	9.15-11.45
2008	4.75	9.30-11.45, 12.30-15.00	5	9.30-12.00, 12.30-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
2101	5.75	9.00-14.45	6	9.00-15.00
2102	1.75	12.30-14.15	1.75	12.30-14.15
2103	2	12.30-14.30	2	12.30-14.30
2104	2.25	12.15-14.30	2.25	12.15-14.30
2105	2.75	9.00-11.45	3	9.00-12.00
2106	2.75	9.00-11.45	3	9.00-12.00
2107	2.75	9.00-11.45	2.75	9.00-11.45
2108	6	9.00-15.00	6	9.00-15.00
2201	5.75	9.00-14.45	6	9.00-15.00
2202	2	12.30-14.30	2	12.30-14.30
2203	2	12.30-14.30	2	12.30-14.30
2204	2.5	12.15-14.45	2.5	12.15-14.45
2205	2.75	9.00-11.45	3	9.00-12.00
2206	2.75	9.00-11.45	3	9.00-12.00
2207	2.75	9.00-11.45	2.75	9.00-11.45
2208	6	9.00-15.00	6	9.00-15.00
2301	5.75	9.00-14.45	6	9.00-15.00
2302	2.25	12.30-14.45	2.25	12.30-14.45
2303	2.25	12.30-14.45	2.25	12.30-14.45
2304	2.75	12.15-15.00	2.75	12.15-15.00
2305	2.75	9.00-11.45	3	9.00-12.00
2306	2.75	9.00-11.45	3	9.00-12.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
2307	2.75	9.00-11.45	2.75	9.00-11.45
2308	6	9.00-15.00	6	9.00-15.00
2401	5.75	9.00-14.45	6	9.00-15.00
2402	2.5	12.30-15.00	2.5	12.30-15.00
2403	2.5	12.30-15.00	2.5	12.30-15.00
2404	2.75	12.15-15.00	2.75	12.15-15.00
2405	2.75	9.00-11.45	3	9.00-12.00
2406	2.75	9.00-11.45	3	9.00-12.00
2407	2.75	9.00-11.45	2.75	9.00-11.45
2408	6	9.00-15.00	6	9.00-15.00
2501	5.75	9.00-14.45	6	9.00-15.00
2502	2.5	12.30-15.00	2.5	12.30-15.00
2505	2.75	9.00-11.45	3	9.00-12.00
2506	2.75	9.00-11.45	3	9.00-12.00
2507	2.75	9.00-11.45	2.75	9.00-11.45
2508	6	9.00-15.00	6	9.00-15.00
2601	6	9.00-15.00	6	9.00-15.00
2602	2	13.00-15.00	2	13.00-15.00
2603	2	13.00-15.00	2.5	12.30-15.00
2604	2	13.00-15.00	2.5	12.30-15.00
2605	2	9.00-11.00	3	9.00-12.00
2606	2	9.00-11.00	2.75	9.00-11.45

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
2607	6	9.00-15.00	6	9.00-15.00
2701	6	9.00-15.00	6	9.00-15.00
2702	2	13.00-15.00	2	13.00-15.00
2703	2	13.00-15.00	2.5	12.30-15.00
2704	2	13.00-15.00	2.5	12.30-15.00
2705	2	9.00-11.00	3	9.00-12.00
2706	2	9.00-11.00	2.75	9.00-11.45
2707	6	9.00-15.00	6	9.00-15.00
2801	6	9.00-15.00	6	9.00-15.00
2802	2	13.00-15.00	2	13.00-15.00
2803	2	13.00-15.00	2.5	12.30-15.00
2804	2	13.00-15.00	2.5	12.30-15.00
2805	2	9.00-11.00	3	9.00-12.00
2806	2	9.00-11.00	2.75	9.00-11.45
2807	6	9.00-15.00	6	9.00-15.00
2901	6	9.00-15.00	6	9.00-15.00
2902	2	13.00-15.00	2	13.00-15.00
2903	2	13.00-15.00	2.5	12.30-15.00
2904	2	13.00-15.00	2.5	12.30-15.00
2905	2	9.00-11.00	3	9.00-12.00
2906	2	9.00-11.00	2.75	9.00-11.45
2907	6	9.00-15.00	6	9.00-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
3001	6	9.00-15.00	6	9.00-15.00
3002	2	13.00-15.00	2	13.00-15.00
3003	2	13.00-15.00	2.5	12.30-15.00
3004	2	13.00-15.00	2.5	12.30-15.00
3005	2	9.00-11.00	3	9.00-12.00
3006	2	9.00-11.00	2.75	9.00-11.45
3007	6	9.00-15.00	6	9.00-15.00
3101	6	9.00-15.00	6	9.00-15.00
3102	2	13.00-15.00	2	13.00-15.00
3103	2	13.00-15.00	2.5	12.30-15.00
3104	2	13.00-15.00	2.5	12.30-15.00
3105	2	9.00-11.00	3	9.00-12.00
3106	2	9.00-11.00	2.75	9.00-11.45
3107	6	9.00-15.00	6	9.00-15.00
3201	6	9.00-15.00	6	9.00-15.00
3202	2	13.00-15.00	2	13.00-15.00
3203	2	13.00-15.00	2.5	12.30-15.00
3204	2	13.00-15.00	2.5	12.30-15.00
3205	2	9.00-11.00	3	9.00-12.00
3206	2	9.00-11.00	2.75	9.00-11.45
3207	6	9.00-15.00	6	9.00-15.00
3301	6	9.00-15.00	6	9.00-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
3302	2	13.00-15.00	2	13.00-15.00
3303	2	13.00-15.00	2.5	12.30-15.00
3304	2	13.00-15.00	2.5	12.30-15.00
3305	2	9.00-11.00	3	9.00-12.00
3306	2	9.00-11.00	2.75	9.00-11.45
3307	6	9.00-15.00	6	9.00-15.00
3401	6	9.00-15.00	6	9.00-15.00
3402	2	13.00-15.00	2	13.00-15.00
3403	2	13.00-15.00	2.5	12.30-15.00
3404	2	13.00-15.00	2.5	12.30-15.00
3405	2	9.00-11.00	3	9.00-12.00
3406	2	9.00-11.00	2.75	9.00-11.45
3407	6	9.00-15.00	6	9.00-15.00
3501	6	9.00-15.00	6	9.00-15.00
3502	2	13.00-15.00	2	13.00-15.00
3503	2	13.00-15.00	2.5	12.30-15.00
3504	2	13.00-15.00	2.5	12.30-15.00
3505	2	9.00-11.00	3	9.00-12.00
3506	2	9.00-11.00	2.75	9.00-11.45
3507	6	9.00-15.00	6	9.00-15.00
3601	6	9.00-15.00	6	9.00-15.00
3602	2	13.00-15.00	2	13.00-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
3603	2	13.00-15.00	2.5	12.30-15.00
3604	2	13.00-15.00	2.5	12.30-15.00
3605	2	9.00-11.00	3	9.00-12.00
3606	2	9.00-11.00	2.75	9.00-11.45
3607	6	9.00-15.00	6	9.00-15.00
3701	6	9.00-15.00	6	9.00-15.00
3702	2	13.00-15.00	2	13.00-15.00
3703	2	13.00-15.00	2.5	12.30-15.00
3704	2	13.00-15.00	2.5	12.30-15.00
3705	2	9.00-11.00	3	9.00-12.00
3706	2	9.00-11.00	2.75	9.00-11.45
3707	6	9.00-15.00	6	9.00-15.00
3801	6	9.00-15.00	6	9.00-15.00
3802	2	13.00-15.00	2	13.00-15.00
3803	2	13.00-15.00	2.5	12.30-15.00
3804	2	13.00-15.00	2.5	12.30-15.00
3805	2	9.00-11.00	3	9.00-12.00
3806	2	9.00-11.00	2.75	9.00-11.45
3807	6	9.00-15.00	6	9.00-15.00
3901	6	9.00-15.00	6	9.00-15.00
3902	2	13.00-15.00	2	13.00-15.00
3903	2	13.00-15.00	2.5	12.30-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
3904	2	13.00-15.00	2.5	12.30-15.00
3905	2	9.00-11.00	3	9.00-12.00
3906	2	9.00-11.00	2.75	9.00-11.45
3907	6	9.00-15.00	6	9.00-15.00
4001	6	9.00-15.00	6	9.00-15.00
4002	2	13.00-15.00	2	13.00-15.00
4003	2	13.00-15.00	2.5	12.30-15.00
4004	2	13.00-15.00	2.5	12.30-15.00
4005	2	9.00-11.00	3	9.00-12.00
4006	2	9.00-11.00	2.75	9.00-11.45
4007	6	9.00-15.00	6	9.00-15.00
4101	6	9.00-15.00	6	9.00-15.00
4102	2	13.00-15.00	2	13.00-15.00
4103	2	13.00-15.00	2.5	12.30-15.00
4104	2	13.00-15.00	2.5	12.30-15.00
4105	2	9.00-11.00	3	9.00-12.00
4106	2	9.00-11.00	2.75	9.00-11.45
4107	6	9.00-15.00	6	9.00-15.00
4201	6	9.00-15.00	6	9.00-15.00
4202	2	13.00-15.00	2	13.00-15.00
4203	2	13.00-15.00	2.5	12.30-15.00
4204	2	13.00-15.00	2.5	12.30-15.00

Table 1: Solar Access for Each Residential Unit (cont..)

Unit Number	Living Areas		Private Open Spaces	
	Number of Hours	Times of Occurrence	Number of Hours	Times of Occurrence
4205	2	9.00-11.00	3	9.00-12.00
4206	2	9.00-11.00	2.75	9.00-11.45
4207	6	9.00-15.00	6	9.00-15.00

The results of the analysis are summarized below for criteria compliant with SEPP65 for two hours of solar access between 9am and 3pm on June 22.

- The results for **Living Areas** concluded that **214** out of **304** Living Areas had solar access for **2 or more hours**. This equates **70%** of all Living Areas comply with 2 hours of direct solar access between 09:00-15:00 on June 22.
- The results for **Private Open Spaces** concluded that **214** out of **304** Living Areas had solar access for **2 or more hours**. This equates **70%** of all Private Open Spaces comply with 2 hours of direct solar access between 09:00-15:00 on June 22.

The number of south facing single-aspect units within the development is required to be below 10% of the total number of proposed dwellings. For this development, it is found that **10** of the residential units will have south facing single-aspects. This equates to 3% of the residential units have south facing single-aspects.

5.0 Conclusion

A solar access analysis for the Living Areas and Private Open Spaces of the proposed development located at 7 Railway Street, Chatswood was undertaken. The proposed development consists of a mixed-use building with a total of 304 residential units across the 38 residential floors within the proposed development.

The assessment has been carried out using a solar access meter derived from the solar chart for the Sydney Region, provided in R.O. Phillips (1992)[2], and attached in the Appendix of this report. The results of the study provide the number of hours of direct solar access for each residential dwelling, and are accurate to within 15 minutes.

The requirement for the SEPP65 design code and Willoughby DCP states the living rooms and private open spaces in the development should receive a minimum of three hours direct sunlight between 9am and 3pm in mid-winter. In dense urban areas a minimum of two hours may be acceptable.

The results of the analysis requirements are summarised as follows:

- 3% apartments were found to have single-aspect south facing units.
- A total of 70% of all Living Areas comply with 2 hours or more of direct solar access between 09:00-15:00 on June 22.
- A total of 70% of all Private Open Spaces comply with 2 hours or more of direct solar access between 09:00-15:00 on June 22.

Based on the above results, the proposed development will satisfy the SEPP65 requirements to the living areas and private open spaces.

[2] R.O Phillips, *Sunshine and Shade in Australia 6th edition*, CSIRO Technical Report 92/2.

Appendix

Solar Chart for the
Sydney Region

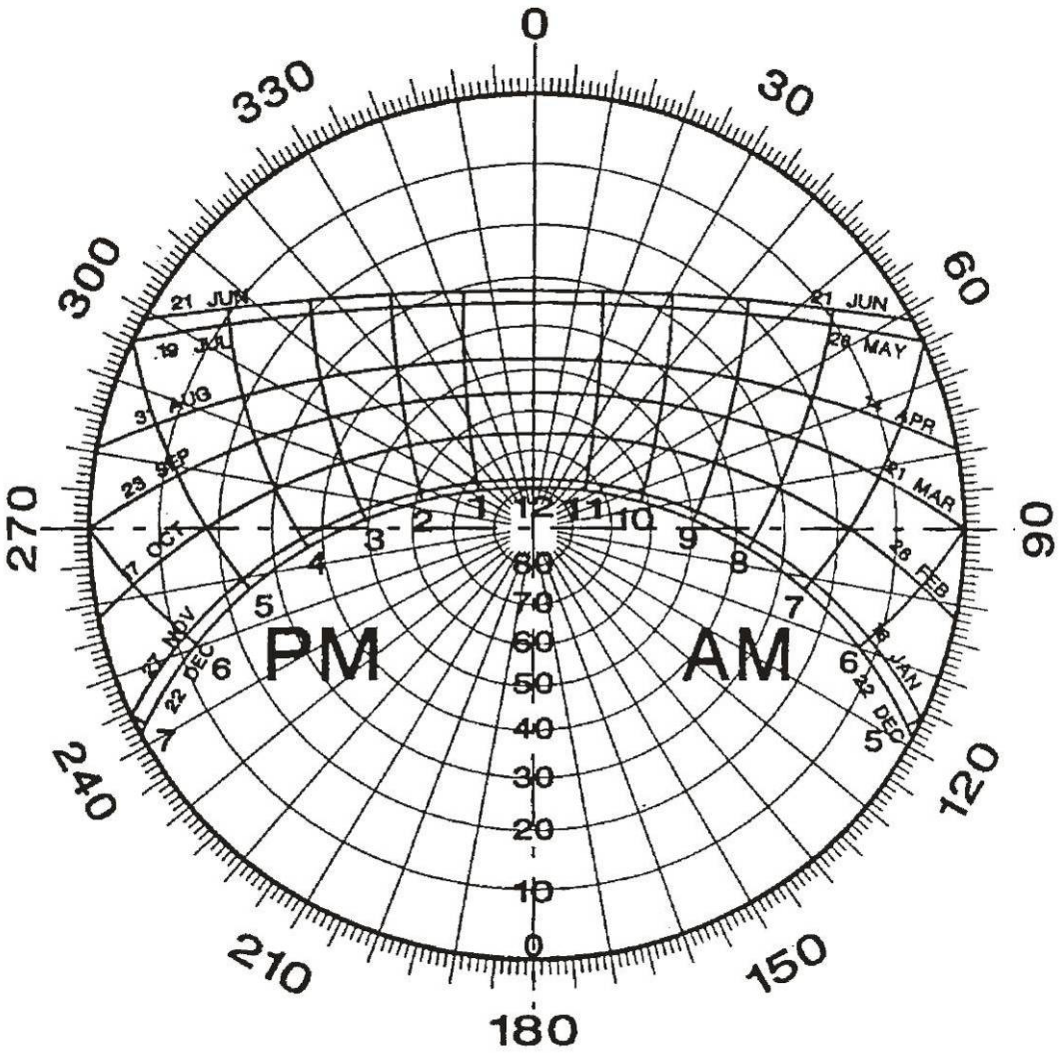


Figure A1: Solar Chart for the Sydney Region