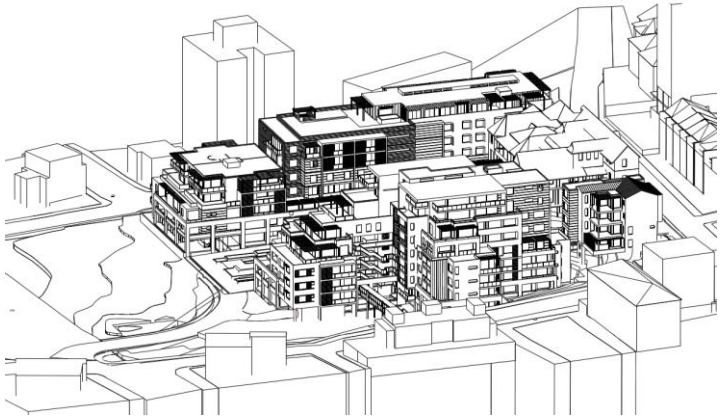
Analysis Report

SEPP65 ISSUES OF AMENITY

SOLAR ACCESS



PROPOSED INDEPENDENT LIVING UNITS AND RACF
THE TERRACES
Scottish Hospital No 2 Cooper Street, Paddington

23 September 2010

Signed,

S T E V E K I N G

C O N S U L T A N T A R C H I T E C T

1 1 C l o v e l l y R o a d R a n d w i c k N S W 2 0 3 1 A u s t r a l i a

P H O N E 0 4 1 4 3 8 5 4 8 5

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0.0 SUMMARY

0.1 This report addresses issue of **solar access** relating to the design of the proposed redevelopment of the property known as **Scottish Hospital, 2 Cooper Street, Paddington** providing for 82 apartments as Independent Living Units and 100 bed residential aged care facility.

0.2 Solar access. I have independently reviewed the design for solar access for the multi-unit residential component. I confirm that the applicable performance requirements of the Residential Flat Design Code which gives effect to SEPP65 are satisfied.

1.0 PRELIMINARIES

1.1 My qualifications and experience are summarized in **2.0 Credentials**.

1.2 I have visited the site. The documents utilised to support the opinions contained in this report are detailed in **3.0 Documents and Information**.

2.0 CREDENTIALS

2.1 I have been teaching architectural design, thermal comfort and building services at the Universities of Sydney, Canberra and New South Wales since 1971. From 1992, I was a Research Project Leader in SOLARCH, the National Solar Architecture Research Unit at the University of NSW.

Until November 2006, I was the Associate Director, Centre for Sustainable Built Environments (SOLARCH), UNSW. My teaching, research and practice specialization is in the assessment of comfort and energy performance of buildings, in particular solar access and other environmental control parameters such as natural ventilation.

My research and consultancy includes work in solar access, energy simulation and assessment for houses and multi-dwelling developments, building assessments under the NSW SEDA Energy Smart Buildings program, appropriate design and alternative technologies for museums and other cultural institutions, and 'asthma and domestic building design'. SOLARCH/UNISEARCH under contract to SEDA NSW set up and administered the House Energy Rating Management Body (HMB), to accredit assessors under the Nationwide House Energy Rating Scheme, NSW. I was until early 2004 the technical supervisor of the HMB, with a broad overview of the dwelling thermal performance assessments carried out by assessors in NSW over the initial four and a half years. I carried out the Independent Expert Review of the comparison of NatHERS and DIY methods of compliance for Thermal Comfort under BASIX, for the NSW Department of Planning. I have delivered professional development courses on topics relating to energy efficient design both in Australia and internationally.

I am the principal author of SITE PLANNING IN AUSTRALIA: Strategies for energy efficient residential planning, funded by the then Department of Primary Industry and Energy, and published by AGPS, and of the RAIA Environment Design Guides on the same topic. Through UNSWGlobal and NEERG Seminars, I conduct training in solar access and overshadowing assessment for Local Councils.

Also of relevance, I teach the wind and ventilation components of environmental control in the course in architecture at UNSW, and am the author of refereed papers and internationally referenced, web accessed coursework materials on the subject.

I am a registered Architect and maintain a specialist architectural consultancy practice in Sydney and Canberra.

2.2 I regularly assist the Land and Environment Court as an expert witness in similar matters.

3.0 DOCUMENTS AND INFORMATION

3.1 I base my report on

- DA architectural drawings, numbered DA203 through DA211, DA221,222,231 and 232, Issue P11 at 14.09.10, by JPR Architects.
- Half-hourly 'views from the sun' views of the digital model prepared by the architects to my instructions.
- Digital copy of ArchiCAD model file.

4.0 GENERAL PLANNING AND MASSING

The site address is No 2 cooper Street, Paddington. The site is bounded to the north by Dillon Reserve, to the east by Stephen Street, to the west by Brown and Nield Avenue and Cooper Street to the south. The site drops in level from Cooper St to Dillon Reserve by approximately 16m.

The proposal is to build/ replace the existing Nursing Home facility with 100 beds, retain/restore and adaptively re-use the existing heritage building at Cooper Street. A total of 82 independent living units in three new separate buildings are proposed, including adaptive re-use of the heritage building located at the 'top' of the site. The location of the new Aged Care building will be at the corner of Stephen and Cooper St.

The independent Living Units are located and named in the plan as:

1. Brown St ILU: 4-9 storey building with 55 apartments,
2. Stephen St ILU: 3-5 storey building with 10 apartments,
3. Gate Keeper's Lodge at Cooper St: 4 storey building with 4 apartments,
4. Heritage Building: Adaptively re-used with 9 apartments,
5. Top of Aged Care Building with 4 apartments.

The new buildings appear to be sited within the constraints of the site topography, the retention of the heritage trees, the dedication of large open space to the north adjacent to Dillon reserve and the conservation of the heritage building and landscape/ terrace courtyard. I have been advised that the retention of the residents within the existing nursing home dictates the location of the major new building.

In considering the projected solar access compliance for amenity for the proposed development, I give consideration to the apparent general strategy for site planning and building massing. I note that approximately eight of the total of 82 units are so located in plan within the southern portion of the Brown St ILU complex, that they are unlikely to receive any sun in mid-winter. A further six units have limited opportunity for the glazing lines, and only nominal sun to private open space early in the morning at mid-winter. However, I can also clearly infer the direct influence of the drip-lines of the retained trees as the major constraint on the building layouts.

Other than alienating the central north facing open space, I cannot nominate any logical variation on the planning which would eliminate a similar portion of units without useful sun. That solution is clearly highly undesirable, because it would mask the most prominent facade of the heritage building. As additional height is most probably limited by controls, and is likely undesirable on programmatic grounds, I conclude that the massing and planning provide for reasonable solar access strategy on this constrained site.

5.0 SOLAR ACCESS

5.1 Relevant solar access standard

The Residential Flat Design Code gives the following quantified recommendations:

- 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 (see Orientation and Energy Efficiency).
  (Rules of Thumb: Daylight Access p. 84)

5.2 Achieved solar access

5.2.1 Predicted solar access: methodology

Because of the complexity of *demonstrating* in detail the quantification of solar access to glazing of various orientations — and taking into account the considerable mutual and self-shading and other potential obstructions by recessed balconies and other facade detailing — I undertook exhaustive detailed analysis by computer generated projections. The digital model was provided to me by the applicant from the ArchiCAD software used to prepare the design and application documents, and independently checked by me for sufficient accuracy. The views of the model were prepared by the architects on my instructions, using the heliodon routine of the ArchiCAD software package, and with the appropriate solar geometry data supplied by me. I independently verified the direction of North by examining the cadastral grid north, which is, as expected, within 1° of the north on the model provided to me. That possible margin of error is not relevant in solar access analysis.

The projections used are known as *'View from the Sun'*, and were taken at half hourly intervals. A view from the sun shows all sunlit surfaces at a given time and date. It therefore allows a very precise count of sunlight hours on any glazing or horizontal surface, with little or no requirement for secondary calculations or interpolation. Figure 1 illustrates the technique. *Note that a 'view from the sun' by definition does not show any shadows.*

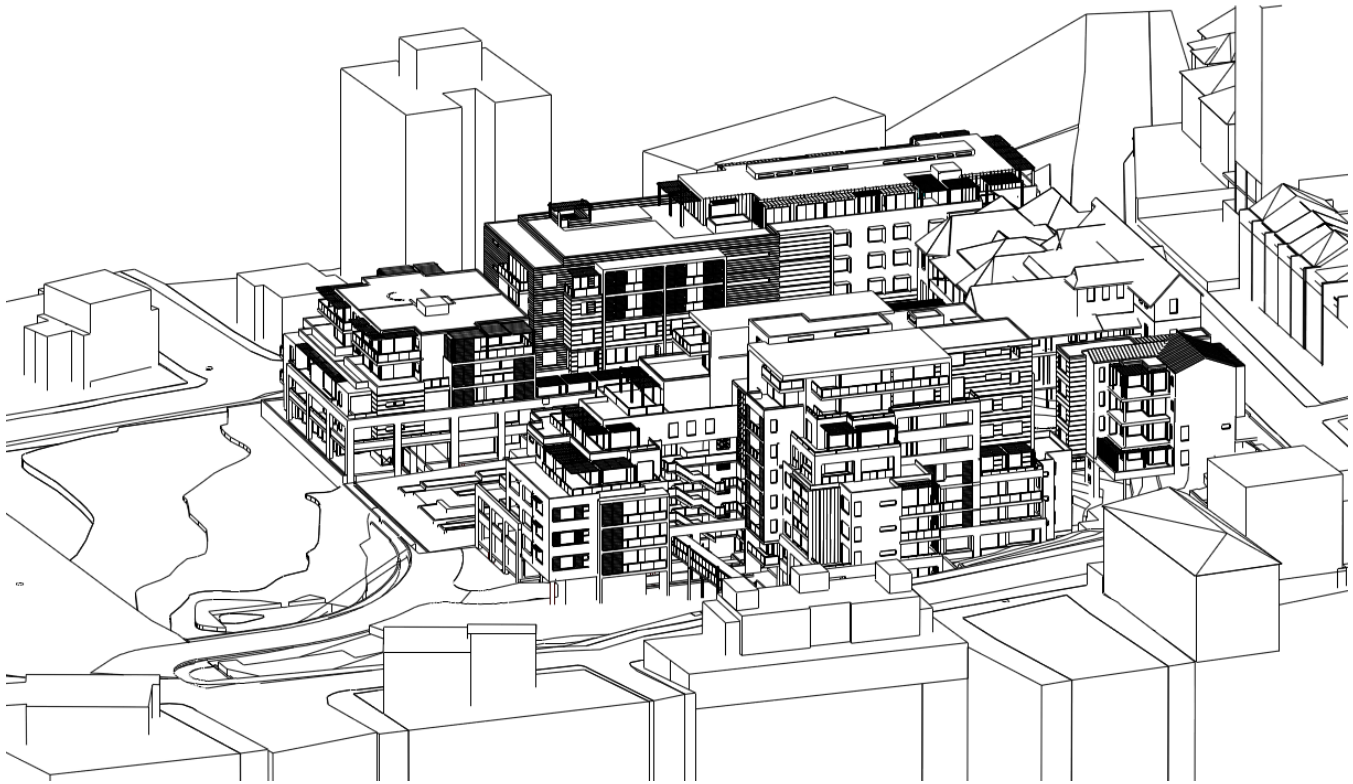


Figure 1: View from the sun, 2pm June 21

For the purpose of calculating the compliance with the control, I have examined sun patches on the relevant glazing line of each apartment. Given the design, the balconies will in most cases enjoy a more favourable sun exposure. The limiting condition is generally self-shading by the privacy walls and/or deeply recessed balconies to comply with minimum dimensions of private open space.

Because of its key importance in the determination of what is 'effective sunlight' for characterisation of compliance, for both glazing and private open space, I refer specifically to the application of the relevant *L+EC Planning Principle (The Benevolent Society v Waverley Council [2010] NSWLEC 1082):*

- I ignore very large angles of incidence to the glazing surface, and unusably small areas of sunlit glazing. I quantify as complying all sun patches of reasonable size.
- I have generally characterised as complying when sun access is over three hours total of partially and fully sunlit glazing between 9am and 3pm mid-winter.
- I quantify all **effective sun** that is demonstrably available to a point of interest, including sun earlier than 9am, or later than 3pm.

- Where appropriate, I note extended periods of sun available to bedrooms, as contributing significantly to the amenity of any apartment that has an otherwise unfavourably oriented living area.

Both latter characterisations are consistent with the interpretation of *the BenSoc Principle (and its predecessor Parsonage Principle)* as previously accepted by the Land and Environment Court, and by various Councils.

5.2.2 Solar access compliance

I tabulate available effective sun in detail. Table 1 shows available sun for all apartments, with shaded cells equal to 30 minutes showing acceptable area of sunlit glazing to Living rooms, and where appropriate a darker shading (un-numbered) showing effective sun to bedrooms. In a few instances, I show a third tone to draw attention to a sunlit private open space, but do not rely on it for quantification.

			8 HOURS OF DAYLIGHT															
Level	**Unit No.**	**Orientation**	**8:00**	**8:30**	**9:00**	**9:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**	**12:30**	**13:00**	**13:30**	**14:00**	**14:30**	**15:00**	**15:30**	**16:00**
BROWN ST ILU																			
1																			
2	B-01	S-E-W										0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-02	S-E																	
	B-03	S-E																	
	B-04	S-E																	
	B-05	S-E																	
	B-06	E-N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
	B-07	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-08	N			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	B-09	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-10	W														0.5	0.5	0.5	
3	B-11	S-E-W										0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-12	S-E																	
	B-13	S-E																	
	B-14	S-E														0.5	0.5	0.5	
	B-15	S-E																	
	B-16	E-N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
	B-17	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-18	N			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	B-19	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-20	W														0.5	0.5	0.5	
4	B-21	S-E-W										0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-22	S-E																	
	B-23	S-E																	
	B-24	S-E														0.5	0.5	0.5	

										8 HOURS OF DAYLIGHT								
Level	**Unit No.**	**Orientation**	**8:00**	**8:30**	**9:00**	**9:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**	**12:30**	**13:00**	**13:30**	**14:00**	**14:30**	**15:00**	**15:30**	**16:00**
	B-25	S-E																	
	B-26	E-N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
	B-27	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-28	N		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	B-29	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-30	W														0.5	0.5	0.5	
5	B-31	S-E-W																	
	B-32	S-E																	
	B-33	S-E								0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-34	S-E											0.5	0.5	0.5	0.5	0.5	0.5	
	B-35	E-N-W		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
	B-36	N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
	B-37	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-38	W														0.5	0.5	0.5	
6	B-39	S-E-W																	
	B-40	S-E																	
	B-41	S-E																	
	B-42	E-N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-43	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-44	W											0.5	0.5	0.5	0.5	0.5	0.5	
7	B-45	S-E-W																	
	B-46	S-E																	
	B-47	E-N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-48	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-49	W										0.5	0.5	0.5	0.5	0.5	0.5	0.5	
8	B-50	S-E-W																	
	B-51	E-N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
	B-52	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
9	B-53	S-E-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	B-54	E-N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
	B-55	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
STEPHEN ST ILU																			
1																			
2	S-01	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	S-02	E-N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						
3	S-03	S-E	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	S-04	S-E	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						

			8 HOURS OF DAYLIGHT															
Level	**Unit No.**	**Orientation**	**8:00**	**8:30**	**9:00**	**9:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**	**12:30**	**13:00**	**13:30**	**14:00**	**14:30**	**15:00**	**15:30**	**16:00**
	S-05	S-E																	
	S-06	S-E							0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
4	S-07	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
	S-08	E-N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
5	S-09	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
	S-10	E-N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
GATE KEEPERS LODGE ILU																			
1	G-01	N-W							0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
2	G-02	N-W							0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
3	G-03	N-W							0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
4	G-04	N-W							0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
HERITAGE ILU																			
1	H-01	N-W	0.5	0.5	0.5	0.5									0.5	0.5	0.5	0.5	
2	H-02	N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						
	H-03	N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5								
	H-04	N-W	0.5	0.5	0.5	0.5	0.5								0.5	0.5	0.5	0.5	
3	H-05	N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
	H-06	N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						
	H-07	N-W	0.5	0.5	0.5	0.5	0.5	0.5					0.5	0.5	0.5	0.5	0.5	0.5	
4	H-08	N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5								
	H-09	N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RACF ILU																			
7	R-01	E-S-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	R-02	E	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	R-03	E-N-W	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	R-04	W					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	

LEGEND	
0.5	SUNLIGHT TO WINDOW OF LIVING
	SUNLIGHT TO WINDOW OFBEDROOMS ONLY
	SUNLIGHT TO BALCONY/TERRACE

Table 1: Effective sun

Note

- Table 1 records the presence of effective sun at the nominated time, and for the subsequent 30 minute period.

- In characterising compliance applied to some one bedroom dwellings, I consider it appropriate to pay regard to a bedroom contiguous with the adjacent living room, as it affords the occupant ample opportunity to enjoy the intended amenity. I am generally conservative with this characterisation, but consider it an important acknowledgement of the actual sun access for a small apartment. I also separately note sun to *two* bedrooms of larger apartments where a clear choice appeared appropriate, to locate the living area on an unfavourable orientation.
- I do not enter into any argument concerning whether this is a 'closely built up environment'. However, I am of the mind that it is appropriate to admit some dwellings as compliant under the RFDC '2 hour standard', if (as here) *only a small proportion of apartments are projected to receive between two and three hours of effective sun in mid-winter.*

Table 2 summarizes the projected solar access for the residential dwelling units in the development.

Units which achieve 3 hours or more sunlight to Living and POS 9am – 3pm as defined in the RFDC	**49**	**60%**
Units which achieve 2 hours or more sunlight to Living and POS 9am – 3pm as defined in the RFDC	**57**	**70%**
Units which achieve 2 hours or more sunlight *taking account of contiguous bedrooms*	**63**	**77%**
Units which achieve 3 hours or more *effective* sunlight to Living and POS 8am – 4pm	**57**	**70%**
Units which achieve 3 hours or more *effective* sunlight to Living and POS 8am – 4pm *taking account of contiguous bedrooms*	**61**	**74%**

Table 2: Summary of solar access for units

5.0 SUMMARY AND CONCLUSION

5.1 Solar access to glazing and private open space

The development achieves **70% of apartments with complying periods of effective sun, as set out in the RFDC.**

This proportion of apartments is derived by counting 49 apartments (60%0 at the ***minimum 3 hours of effective sun access to living area glazing and private open space between 9am and 3pm on June 21, together with a further eight apartments (10%) at greater than 2 hours.*** The majority of the apartments thus characterized as complying actually enjoy mid-winter sun well in excess of the nominated '3 hour standard'.

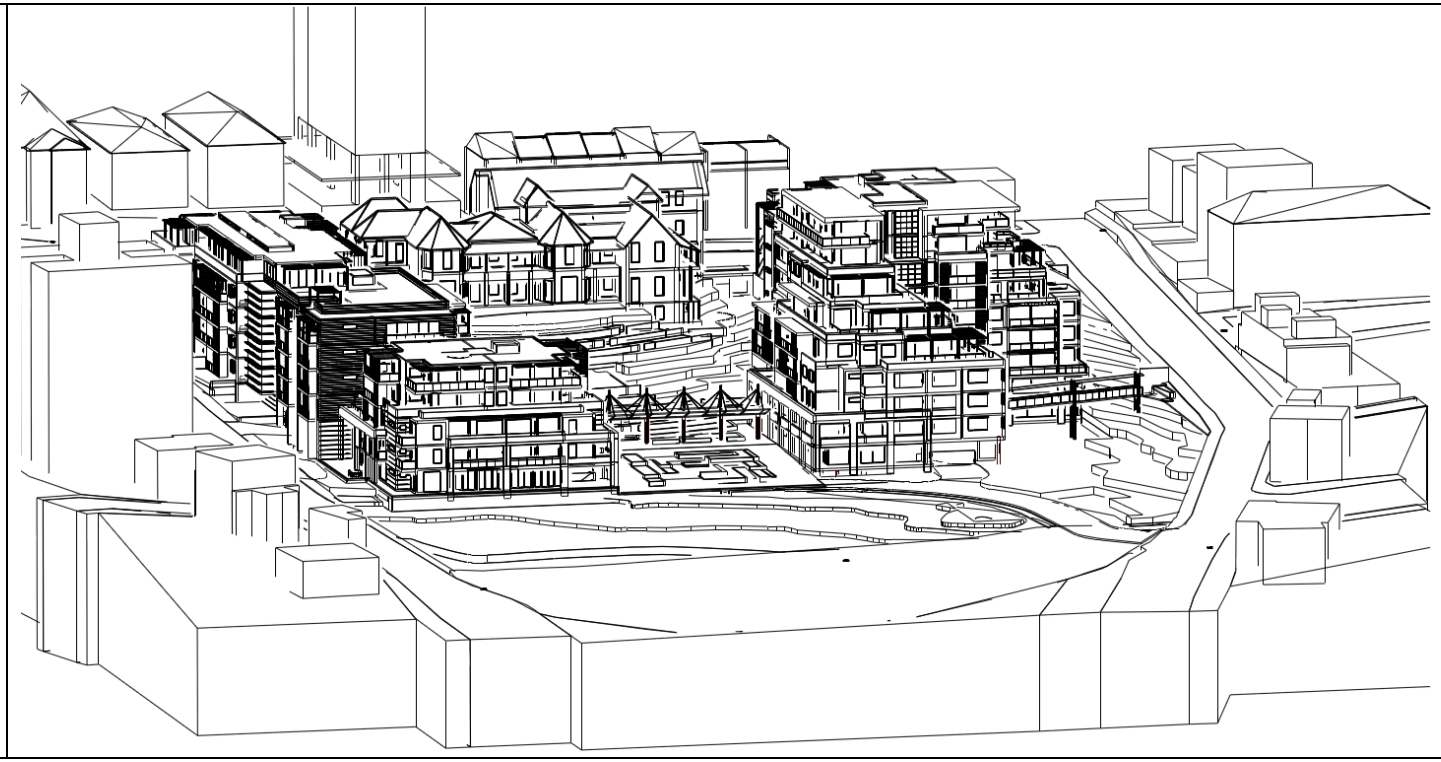
Alternatively, if one takes account of effective sun before 9am and after 3pm, that is demonstrated to be unlikely to be alienated by adjacent development, 57 out of 82, being a full 70% of the apartments are projected to comply at the minimum 3 hour standard. A further six apartments are projected to receive a minimum 2 hours effective sun at mid-winter, achieving an overall 77% compliance level.

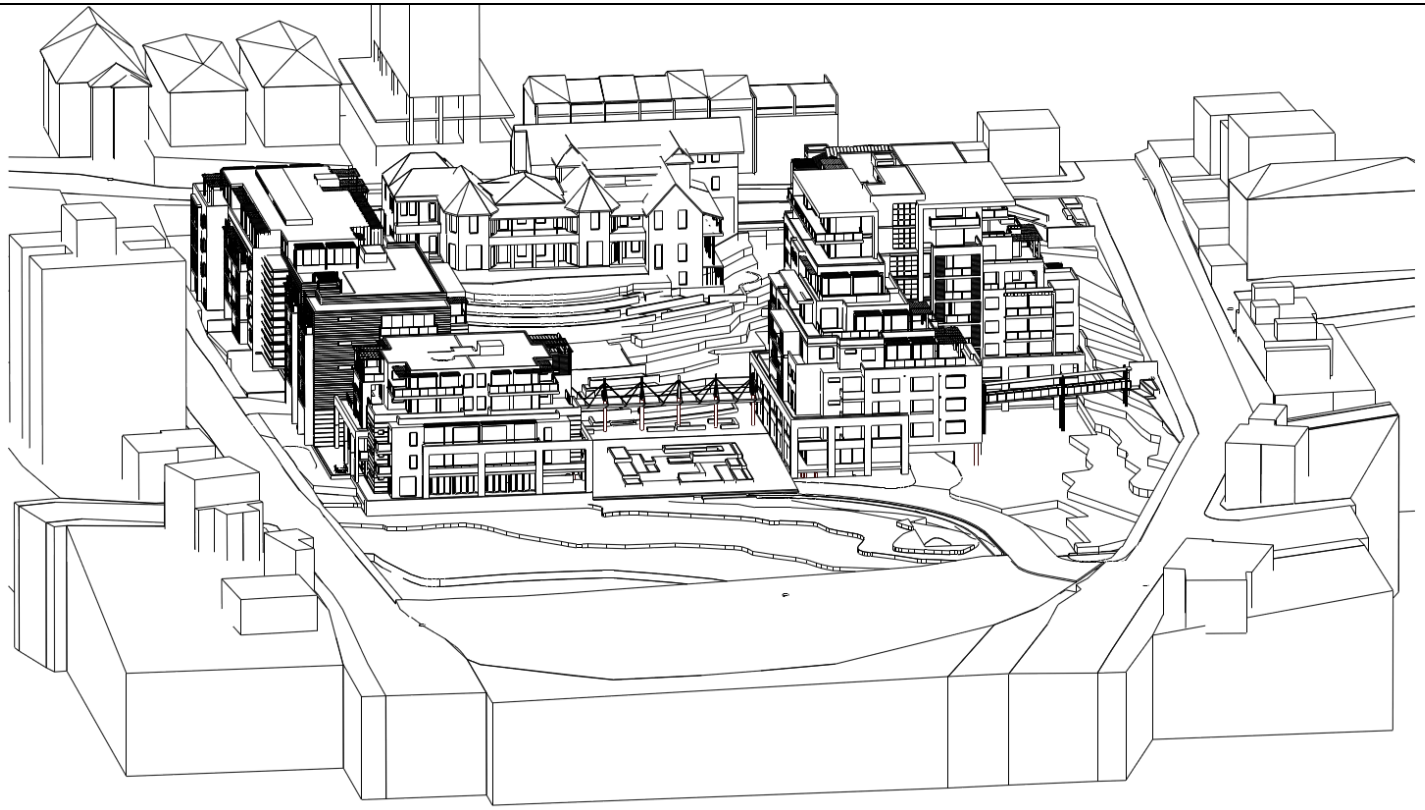
I consider it legitimate under the broad intents of the RFDC to add these apartment to those I characterize as complying by strict interpretation of the Rule of Thumb. **In my considered opinion, the total proportion of apartments that may be characterised as complying with the performance requirements of the RFDC is 77%**, where a minimum of 70% is required by that code.

In addition, some apartments not characterized as complying do have a lesser quantum of sun access on June 21.

A.0 APPENDIX: VIEWS FROM THE SUN

The following are 'views from the sun' on a half-hourly basis prepared by the Architects to my instructions, and from my solar geometry data, and independently checked by me.

8		

8.30		

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