STEVE KING
CONSULTANT
ABN 31 388 380 557

11 CLOVELLY ROAD RANDWICK NSW 2031
Mob. 0414 385485 Phone/ Fax 02 93986376

# SUPPLEMENTARY OPINION: VERIFICATION

**SOLAR ACCESS AMENITY COMPLIANCE**
PROPOSED MIXED USE MULTIRESIDENTIAL BUILDING
**229 Miller Street North Sydney**
**9 September 2016**

## 1.0 PRELIMINARIES AND SUMMARY

### 1.1 Preliminaries

1.1.1 In this Supplementary Opinion I review the Applicant's latest amended plans, and submissions relating to solar access compliance. I provide this report in the nature of a probity statement, verifying the accuracy of the analysis, and commenting on the conclusions.

1.1.2 I have previously provided the following opinions in relation to the subject development:

- **Summary Opinion dated 16 December 2015**, specifically addressing solar access compliance of an earlier scheme with a greater number of apartments per floor plate, but with effectively identical response to the site constraints for solar access.

- **Summary Opinion dated 22 June 2016**, addressing issues of solar access, natural ventilation, and related issues of apartment amenity, in response to comments by Council and the Design Excellence Panel (DEP) in relation to the subject proposed development. In that opinion, I address questions put to me by the applicant, citing specific comments of Council and the DEP.

1.1.3 My qualifications and experience are included with those earlier reports, and at *Appendix A*.

1.1.4 The documents on which I rely are listed at *2.0 Documents*

1.1.5 It is critical to understanding and supporting the Applicant's reporting of compliance with the performance objectives of the ADG in relation to winter solar access, to take into account the site constraints and reasoned building response. This is specifically encouraged by the ADG Objective 4A-1 *Design guidance*. For that reason, at *3.0 THE SITE AND BUILDING RESPONSE* I quote my key explanatory comments from my earlier reports.

### 1.2 Summary: solar access predicted for amended scheme

1.2.1 Relying on a full 3D digital model analysis, the Applicant reports the following detailed compliance for solar access:

| Level | Total Units | Solar Access June 21 | Solar Access Equinox | Cross Ventilation |
|---|---|---|---|---|
| Ground | 3 | 1 | 1 | 2 |
| Level 1 | 6 | 1 | 3 | 4 |
| Level 2 | 6 | 1 | 3 | 4 |
| Level 3 | 6 | 3 | 3 | 4 |
| Level 4 | 6 | 3 | 5 | 4 |
| Level 5 | 6 | 3 | 5 | 4 |
| Level 6 | 6 | 3 | 6 | 4 |
| Level 7 | 6 | 3 | 6 | 4 |

| Level | Total Units | Solar Access June 21 | Solar Access Equinox | Cross Ventilation |
|---|---|---|---|---|
| Level 8 | 6 | 5 | 6 | 4 |
| Level 9 | 6 | 6 | 6 | 6 |
| Level 10 | 5 | 5 | 5 | 5 |
| Level 11 | 5 | 5 | 5 | 5 |
| Level 12 | 5 | 5 | 5 | 5 |
| Level 13 | 5 | 5 | 5 | 5 |
| Level 14 | 5 | 5 | 5 | 5 |
| Level 15 | 5 | 5 | 5 | 5 |
| Level 16 | 2 | 2 | 2 | 2 |
| Level 17 | 2 | 2 | 2 | 2 |
| | | | | |
| Total | **91** | **63** | **78** | 74 |
| % of Total | | **69.2%** | 85.7% | 81.3% |

There are no South facing apartments.

*1.2.2 Verification*

***I verify that my review of the modelling arrives at the same conclusion.***

## 2.0 DOCUMENTS

I rely for this opinion on the following documents:

- Amended plans:
  - DA00 COVER PAGE.pdf
  - DA01 SITE ANALYSIS PLAN.pdf
  - DA02 SITE PLAN.pdf
  - DA03 BASEMENT 4.pdf
  - DA04 BASEMENT 3.pdf
  - DA05 BASEMENT 2.pdf
  - DA06 BASEMENT 1.pdf
  - DA07 R.O.W. CARPARK ENTRY LEVEL.pdf
  - DA08 COMMERCIAL LEVEL.pdf
  - DA09 GROUND LEVEL.pdf
  - DA10 LEVEL L1.pdf
  - DA11 LEVEL L2.pdf
  - DA12 LEVEL L3.pdf
  - DA13 LEVEL L4.pdf
  - DA14 LEVEL L5.pdf
  - DA15 LEVEL L6.pdf
  - DA16 LEVEL L7.pdf
  - DA17 LEVEL L8.pdf
  - DA18 LEVEL L9.pdf
  - DA19 LEVEL L10.pdf
  - DA20 LEVEL L11.pdf
  - DA21 LEVEL L12.pdf
  - DA22 LEVEL L13.pdf
  - DA23 LEVEL L14.pdf
  - DA24 LEVEL L15.pdf
  - DA25 LEVEL L16.pdf
  - DA26 LEVEL L17.pdf
  - DA27 ROOF LEVEL.pdf
  - DA28 PUBLIC DOMAIN.pdf
  - DA29 PUBLIC DOMAIN.pdf
  - DA31 NORTH & SOUTH ELEVATIONS.pdf
  - DA32 EAST & WEST ELEVATIONS.pdf
  - DA33 NORTH ELEVATION.pdf
  - DA34 EAST ELEVATION.pdf
  - DA35 SOUTH ELEVATION.pdf
  - DA36 WEST ELEVATION.pdf
  - DA37 SECTION S1_ LOOKING EAST.pdf
  - DA38 SECTION S2_ LOOKING NORTH.pdf
  - DA60 MESH SCREEN DETAIL.pdf
  - DA61 WINTERGARDEN DETAIL.pdf
  - DA62 TYPICAL WINTERGARDEN.pdf
- Annotated views from the sun prepared by the architects:
  - 3.1 VIEWS FROM THE SUN JUN 21 8-10_30AM.pdf
  - 3.2 VIEWS FROM THE SUN JUN 21 11AM -1_30PM.pdf
  - 3.3 VIEWS FROM THE SUN JUN 21 2 - 4PM.pdf

- 3.4 VIEWS FROM THE SUN MAR 21 8-10_30AM.pdf
- 3.5 VIEWS FROM THE SUN MAR 21 11AM -1_30PM.pdf
- 3.6 VIEWS FROM THE SUN MAR 21 2 - 4PM.pdf
- 3.7 Solar Analysis 8.30-9.30 - UNITS 303 TO 1103.pdf
- 3.8 Solar Analysis 10.30-11.00 - UNIT 303 TO 1103.pdf
- 3.9 Solar Analysis 8.30-9.30 - UNIT 1203 TO 1503.pdf
- 3.10 Solar Analysis 10.30-11.00 - UNIT 1203 TO 1503.pdf
- 3.11 Solar Analysis 8.30-9.30 - UNIT 302 TO 1102.pdf
- 3.12 Solar Analysis 10.30-11.00 - UNIT 302 TO 1102.pdf

- 3D digital model supplied by the archirects as a SketchUp .skp format file

## 3.0 THE SITE AND BUILDING RESPONSE

### 3.1 Solar access opportunity

*3.2.1 Overshadowing from North*

I observe that the lower half of the north façade of any proposed building on the site is overshadowed in winter by existing high rise towers, curtailing the solar access available to apartments on the lower levels facing in that direction.

*3.2.2 Site orientation*

The site is located within a rectangular street grid with a slight westerly bias in the direction of true North. This characteristic is shared with almost all 19th century and early 20th century subdivisions that were surveyed in relation to magnetic north.

*This 'bias' results in a reduced duration of solar access to glazing on the eastern elevation of any building with an orthographic relationship to the block boundaries*. The last nominal exposure to direct sun on an east elevation occurs shortly after 11am. This is illustrated in *Figure 1*.


**Figure 1: View from the sun at 10.30 and 11am June 21**

### 2.2 Building

*2.2.1 Overall amenity*

The proposed building floor plates are laid out so that an increased number of the apartments respond to a relatively open prospect to the north-east and east.

In my considered opinion, this is the correct response to balancing solar access opportunity, wind exposure for summer cooling by natural ventilation, and importantly, the outlook available in that direction.

*2.2.2 Wintergardens to East facade*

Logically, the applicant employs a proven and usually accepted strategy for maximising the effective winter sun available to the apartments which face East – East facing private open spaces (POS) are configured as wintergardens.

It is understood that the wintergarden glazing is intended to meet the following objectives:

- *Well-controlled air exchange* to optimise the performance of the wintergarden as an *attached sunspace in winter*. In practical terms, an attached sunspace is a more effective passive solar gain strategy than 'direct gain';
- Designed for maximum opening to encourage (and possibly enhance) *summer ventilation*.

Where those requirements are both met, the relevant glazing line for winter solar access compliance is the 'outer', facade glazing. That said, I note especially that neither I nor the Applicant seeks to characterize the wintergardens as indoor space.

The Applicant goes much further than is usual – or even than illustrated in the ADG by way of example of satisfactory implementation of the wintergarden principles – by including the considerstion to preserve the true nature of balconies in providing 3D articulation for the façade. The proposed detailed strategy for the operable glazing forgoes an 'easy' solution of full glass louvres, in favour of glazed panels sliding away in front of adjacent solid walls.

## 3.0 SOLAR ACCESS ANALYSIS FOR FURTHER AMENDED SCHEME

### 3.1 Probity statement

I have reviewed the Applicant's new analysis and reported compliance for solar access:

- I have carried out a nominal probity check on the supplied model.
- I verify that the primary analysis methodology used is my preferred practice of generating 'views from the sun'; *and*
- The interpretation of effective sun corresponds to the reasoning I also employ.

### 3.2 Discussion: the ADG Design criteria

I quote from my previous opinions, with minor additional notes.

*3.2.1 The ADG Design criterion*

The Apartment Design Guide gives the following relevant quantified recommendation:

| ***Design criteria*** |
|---|
| 1. Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas |

*3.2.2 Interpreting ADG Design criteria*

Solar access (6.1) design criteria in the ADG are discretionary controls which, by virtue of Cl. 6A of SEPP65, take precedence over these controls contained in Councils' DCPs.

I take from this that criticality of the prescribed two-hour time span occurring entirely within the 9am to 3pm relates primarily to the relationship to other controls, as if the ADG design criterion functioned as a non-discretionary development standard.

***To my mind, Council is not precluded from taking into consideration the limitations of solar access to the site, and exercising discretion in relation to actual solar access amenity.***

### 3.3 The Applicant's analysis

The Applicant uses best practice three-dimensional analysis, with sufficient of the built context to record in detail direct solar access to glazing and wintergarden style POS from the limits of confidence at 8am through 4pm. The drawings supplied to me for review include half hourly views from the sun, clearly encoded with highlighting to identify the dwellings which are deemed to comply for solar access.

I illustrate the view from the sun at 8:30am in Figure 2. It becomes immediately obvious that the eastern elevation receives its best quality winter solar access in this early morning period.

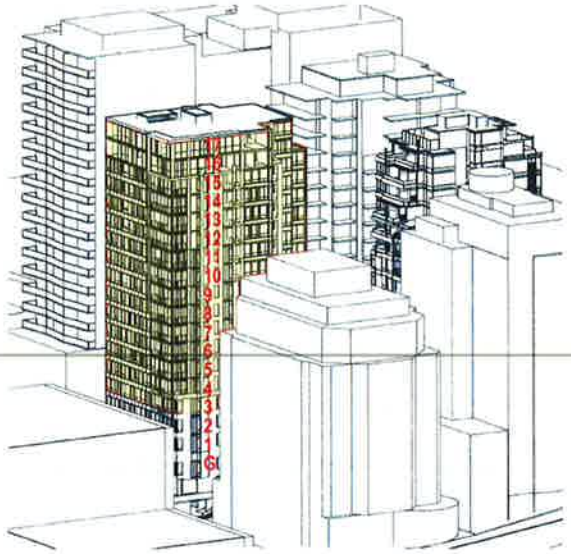

**Figure 2: View from the sun at 8.30am**

The view from the sun also illustrates that taking into account the much greater overshadowing of the northern elevation, more of the units in the development will benefit from useful periods of direct sun exposure if oriented to the east elevation.

### 3.4 Actual solar access predicted

From the views from the sun, the Applicant reports the following detailed compliance for solar access:

| Level | Total Units | Solar Access June 21 | Solar Access Equinox | Cross Ventilation |
|---|---|---|---|---|
| Ground | 3 | 1 | 1 | 2 |
| Level 1 | 6 | 1 | 3 | 4 |
| Level 2 | 6 | 1 | 3 | 4 |
| Level 3 | 6 | 3 | 3 | 4 |
| Level 4 | 6 | 3 | 5 | 4 |
| Level 5 | 6 | 3 | 5 | 4 |
| Level 6 | 6 | 3 | 6 | 4 |
| Level 7 | 6 | 3 | 6 | 4 |
| Level 8 | 6 | 5 | 6 | 4 |
| Level 9 | 6 | 6 | 6 | 6 |
| Level 10 | 5 | 5 | 5 | 5 |
| Level 11 | 5 | 5 | 5 | 5 |
| Level 12 | 5 | 5 | 5 | 5 |
| Level 13 | 5 | 5 | 5 | 5 |
| Level 14 | 5 | 5 | 5 | 5 |
| Level 15 | 5 | 5 | 5 | 5 |
| Level 16 | 2 | 2 | 2 | 2 |
| Level 17 | 2 | 2 | 2 | 2 |
| Total | **91** | **63** | **78** | 74 |
| % of Total | | **69.2%** | 85.7% | 81.3% |

There are no South facing apartments.

## 4.0 CONCLUSIONS

### 4.1 Interpreting the ADG

At 11am on June 21, the angle of incidence of direct sun to the nominally east facing glazing is too great to be considered as part of the prescribed minimum 2 hour period of solar access.

***Therefore, a literal application of the ADG Design criterion (minimum 2 hours after 9am) is unachievable for glazing in that elevation***.

### 4.2 'Extended hours'

*On the other hand, the applicant's full 3-D analysis makes clear that early morning sun after 8am is both available, and provides for a superior amenity for units oriented towards the east.*

I note again, that not only is the earlier sun of significantly higher value to the relevant units, but that given the greater overshadowing of the site from the north, *sun access is actually available to more units*. This solar access opportunity is combined with a more favourable exposure to both dominant summer cooling wind regimes, and what I understand to be significant amenity of views.

***In my considered opinion the designers are making the appropriate decision by laying out the floor plates to maximise the benefits of the easterly orientation.***

As I have previously reported, I have examined recent approvals within close vicinity of the subject application, that have significantly lower solar access than the proposal. In my considered opinion, the subject application uses best practice and good design to maximize solar access.

***In my experience, Council is not precluded from exercising its discretion – in that it should take into consideration such superior solar access in determining that the performance objective of the ADG is satisfied.***

## APPENDIX A: CREDENTIALS

I taught 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, and until its disestablishment in November 2006, I was the Associate Director, Centre for Sustainable Built Environments (SOLARCH), UNSW.

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. 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.

SOLARCH/UNISEARCH were the contractors to SEDA NSW for the setting up and administration of the House Energy Rating Management Body (HMB), which accredits assessors under the Nationwide House Energy Rating Scheme (NatHERS), NSW. I was the technical supervisor of the HMB, with a broad overview of the dwelling thermal performance assessments carried out in NSW over five years. I have been a member of the NSW BRAC Energy Subcommittee, and also a member of the AGO Technical Advisory Committee on the implementation of AccuRate, the new mandated software tool under NatHERS. I undertook the Expert Review for the NSW Department of Planning, of the comparison of NatHERS and DIY methods of compliance for Thermal Comfort under BASIX, and was subsequently a member of a three person expert panel advising on the implementation of AccuRate in BASIX.

Through UNISEARCH, NEERG Seminars and Linarch Design, I conduct training in solar access and overshadowing assessment for Local Councils. I have delivered professional development courses on topics relating to energy efficient design both in Australia and internationally, including the key papers in the general area of assessment of ventilation and solar access performance and compliance for NEERG Seminars, cited by Commissioners of the LEC. Senior Commissioner Moore cited my assistance in reframing of the Planning Principle related to solar access (formerly known as the Parsonage Principle) in *The Benevolent Society v Waverley Council [2010] NSWLEC 1082.*

I practiced as a Registered Architect from 1971-2014, and now maintain a specialist consultancy practice advising on passive environmental performance and sustainability in buildings. I regularly assist the Land and Environment Court as an expert witness in related matters.