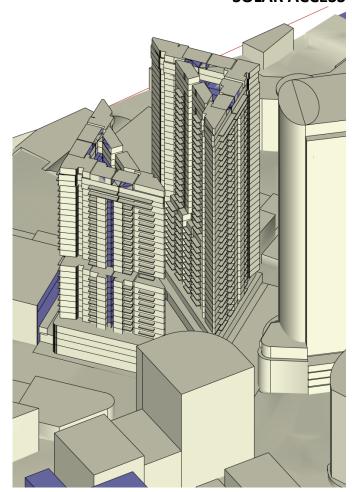
# EXPERT OPINION SEPP65 AMENITY COMPLIANCE SOLAR ACCESS



472-494 & 500-520 Pacific Hwy St Leonards

6 August 2015

Signed,

Steve King

# **TABLE OF CONTENTS**

0.0		PRELIMI	INARIES	3
1.0		INTROD	UCTION AND SUMMARY	3
2.0		CREDEN	ITIALS	4
3.0		DOCUM	IENTS	5
4.0		GENERA	AL MASSING, PLANNING AND DESIGN RESPONSE	5
	4.1	Site		5
	4.2	Building	; form	5
		4.2.1	Solar access for new public space	6
		4.2.2	Solar access for internal elevations	7
5.0		SOLAR	ACCESS	7
	5.1	Method	lology	7
		5.1.1	Probity of modelling	7
		5.1.2	Projections: views from the sun	7
	5.2	Relevan	t solar access standards	8
		5.2.1	Residential Flat Design Code	8
		5.2.2	Local controls	8
	5.3	Characte	erisation of solar access compliance: durations and available effective sun	8
		5.3.1	Duration of sun access	8
		5.3.2	Applicable times of day for effective sun	9
		5.3.3	Sun patches on glazing	9
		5.3.4	Sun to bedrooms	9
		5.3.5	Overshadowing by existing features or known developments	9
		5.3.6	Overshadowing by unknown but projected development	9
	5.4	Achieve	d solar access	9
	5.5	South fa	acing single aspect apartments	10
8.0		CONCLU	JSIONS	10
A.0		APPEND	DIX A	11
B.0		APPEND	DIX B	30

# 0.0 PRELIMINARIES

- 0.1 I provide this expert opinion relating to **solar access** compliance with the relevant local controls, and the Residential Flat Design Code as it gives effect to the Amenity provisions of SEPP65, for proposed apartments at 472-494 & 500-520 Pacific Hwy St Leonards.
- 0.2 My qualifications and experience are summarized at 2.0 Credentials.
- 0.3 The documents on which I rely are listed at 3.0 Documents.

# 1.0 INTRODUCTION AND SUMMARY

- 1.1 The proposal which is subject of this report consists of two high rise buildings on one consolidated site, over commercial, retail and basement carparking. The preferred site planning and building massing have been the subject of a rezoning following extensive consultation with Council, based on strong urban design principles.
- 1.2 The shape and orientation of the site is dictated by three surrounding streets, giving rise to potentially two of four principal facades that cannot comply for a minimum of two hours winter solar access. This is addressed by an innovative massing of two triangular towers separated by a significant distance across a north-south axis aligned with Mitchell Street to the north of the Pacific Highway intersection. The separation between the two towers is dedicated at ground level to publicly accessible open space with good solar access in the middle of the day in winter.
- 1.3 The massing of the proposed two towers effectively creates two additional facades oriented east and west respectively, on either side of the axial space. Theoretically the solar exposure of these two facades would help the project realise a higher proportion of dwellings complying for minimum two hours solar access on June 21.

In practice however, realisation of the theoretical duration of solar access is limited by self shading, by the projecting private open space verandas and their respective privacy screens. This is a relatively well understood limitation on solar access in the middle of the day for east and west facing facades.

The potential solar access for the west facing apartments is further, significantly curtailed by predicted overshadowing from the likely development to the immediate northwest of the subject site, currently known as the Charter Hall site.

1.4 Prior to Mirvac acquiring the site and revising the DA to address Council concerns, Leighton Properties prepared and submitted a Development Application (DA 222/2014) to Lane Cove Council for the subject property. That development application for the site was submitted with a mix of dwellings including an exaggerated number of one bedroom and studio apartments.

The purpose of this can be clearly inferred to be a 'numbers game', intended to maximise the proportion of complying apartments. In addition, in order to arrive at this outcome, the relatively certain effect of overshadowing by the likely Charter Hall development was ignored in the analysis.

1.5 Following acquisition, Mirvac proposes to make a selection of amendments to the current DA. The amendments are designed to address a variety of planning and market related issues. Highly relevant to the likely level of achieved solar access for the site is the reduction in the proportion of one bedroom apartments and increase in proportion of two and three bedroom apartments; this results in an overall decrease in yield from 570 apartments to 535 apartments.

Over and above the change in relative numbers, I note in particular that the proposed changes give rise to dwellings of improved variety and amenity.

1.6 As a consequence of the reduction of the number and proportion of nominally favourably oriented dwellings, the two major elevations which have unfavourable orientation for winter sun have a disproportionate impact on the achieved overall compliance for solar access. I note that:

- The southeast elevation has panoramic harbour views towards the city, centred on an iconic view of the Sydney Harbour Bridge;
- The southwest elevation has an open prospect including the upper harbour, Gladesville, Hunters Hill and the Blue Mountains.

It is clear that on balance, these are extremely high amenity apartments, and it would be unthinkable to reduce the number of such apartments. In considering so-called 'holistic amenity', I also note with respect to the apartments facing onto the axial space separating the buildings:

 Both east and west 'internal' elevations afford more restricted oblique views from their private open space, of which the worst-case is an approximately 15° view cone almost exactly centred, and including the Harbour Bridge.

## 1.7 Projected solar access.

1.7.1 On the basis of the proposed high density, under the RFDC it is appropriate to apply the so-called two-hour standard to the proposed development. This compliance standard has now been adopted throughout the metropolitan area by the newly published Apartment Design Guide.

Detailed analysis employing a full 3D digital model – which includes sufficient extent of surrounding developments – also makes it possible to take account of effective direct sun before 9am and after 3pm for those units which face substantially east or west respectively. For my reasoning, I refer in particular to the judgement by Brown C. in *Botany Development Pty Ltd v Council of the City of Botany Bay LEC 10360 of 2013*. See 5.4 Characterisation of solar access compliance: durations and available effective sun.

1.7.2 The projected proportion of dwellings with over 2 hours of winter solar access is 282 (52.7%) units from a total of 535. While this may appear a significant shortfall from the target 70% of apartments suggested by the *Rules of Thumb* in the RFDC, it is in fact a relatively high proportion if we pay regard to the effect of the adverse orientation of two major elevations. I estimate the impact of overshadowing by the hypothetical building on the Charter Hall site alone to be some thirty-eight complying units being 6.8% of the total 535 dwellings now proposed. Were the analysis undertaken on the basis of the existing context, the proportion of dwellings with over 2 hours of winter solar access would be 320 (59.8%) from a total of 535.

In my view the scheme retains close to potential maximum solar access compliance, without resorting to the artifice of deliberately distorting the unit mix, or – in order to eliminate self shading – arbitrarily applying what would be in effect a glass curtain wall with minimal relief. In my considered opinion the proposed amended DA scheme is significantly superior to the development application currently before Council.

While the exercise of discretion has always been possible with respect to the RFDC and the local controls, the new Apartment Design Guide makes explicit that on some sites with a variety of possible conflicting issues, lower proportions of units may achieve full compliance. Given that the building forms were fixed as part of the rezoning phase, in my considered opinion discretion in relation to the level of solar access compliance is justified by the very high holistic amenity of the apartments, and the significant public benefit of the preferred building design.

## 2.0 CREDENTIALS

I have 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. Until its disestablishment in November 2006, I was the Associate Director, Centre for Sustainable Built Environments, 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. Through UNISEARCH, NEERG Seminars

and Linarch P/L, 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.

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.

I have delivered 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 to 2014, and maintain a specialist consultancy practice in Sydney and Canberra. I regularly assist the Land and Environment Court as an expert witness in related matters.

# 3.0 DOCUMENTS

- 3.1 In preparing this opinion, I have referred to:
  - Architectural drawings of the proposed amended DA design issued by Sisson Architects on 4 August 2015:
    - L010D through L015 Rev 01
    - o L016D Rev 00
    - o L020D Rev 02
    - o L021D Rev 01
    - L022D, L024D through L026D, L028-L029 Rev 02
    - o L052D Rev 01
  - 141222 DA Design Report A3 being the Design Report dated December 2014 for Leighton Properties.
  - Digital 3D model supplied by the architects as SketchUp .skp export files from their CAD software.
- 3.2 I have visited the site.

# 4.0 GENERAL MASSING, PLANNING AND DESIGN RESPONSE

# **4.1** Site

- 4.1.1 The site is a near square shape, resulting from the amalgamation of individual lots. It is bounded to the northeast by the Pacific Highway, to the north-west by Friedlander Place, the south-west by Nicholson Street, and to the southeast by low rise commercial buildings fronting the highway.
- 4.1.2 Any high-rise building or combination of buildings on the site will have the benefit of iconic views of the city and the Harbour Bridge to the southeast, and of the upper harbour to the south-west. However, it is intrinsic to the geometry of the site and building shapes determined through the rezoning process, that primary facades with those orientations will not have winter solar access opportunity to comply with the relevant controls.

# 4.2 Building form

I was first retained by the previous owners, Leighton Properties, in early 2014 with a brief to peer review solar access opportunity of massing options for buildings on the site. I was again retained by Leighton Properties to

undertake solar access compliance analysis and reporting for the submitted Development Application. Through that process, I have some familiarity with detailed considerations that have informed the current proposed building forms.

I understand that the building response of two triangular buildings with a north-south axial view corridor is the outcome of detailed agreement with Council as part of the rezoning process. Figure 2 illustrates the overall arrangement.



Figure 1: Site location

# 4.2.1 Solar access for new public space

While the primary benefit of the open axis diagonally through the site, aligned north-south with Mitchell Street on the opposite side of the highway is the establishment of a view corridor, the architects design report for the development application also identifies the opportunities for improved solar access for the public space created within the subject development. As explicitly noted in the architects' analysis, the greatest winter solar access benefit for the public space coincides with the middle of the day.

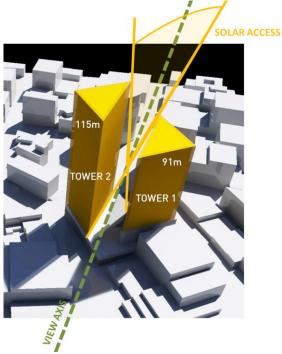


Figure 2: Massing concept

# 4.2.2 Solar access for internal elevations

The architects' site analysis puts less emphasis on the fact that the creation of a separation between the two building forms also facilitates access to winter sun for a proportion of apartments within the subject site.

That said, notwithstanding the generous separation distance of minimum 22m, mutual overshadowing by the two proposed towers limits the duration of solar access to the two internal elevations.

# 5.0 SOLAR ACCESS

## 5.1 Methodology

I have analyzed and quantified solar access for compliance with the requirements of the DCP and the Residential Flat Design Code by use of a 3D digital model and the heliodon routine of the industry standard software application *Trimble SketchUp v.2015*.

## 5.1.1 Probity of modelling

The digital model files were supplied to me by Sissons Architects, based on their own CAD documentation. I have independently geolocated the models, and verified the direction of North by reference to cadastral grid north. I have also independently verified sufficient relevant model and location parameters to conclude that the modelling is sufficiently accurate to the information of the provided plans.

I note in particular that the model provided includes an extensive representation of surrounding developments, including a conservative hypothetical DCP compliant envelope for the proposed high-rise building to the immediate northwest of the subject site (known as the Charter Hall site). This envelope effectively represents a 'worst case' scenario for overshadowing impact on the subject site.

#### 5.1.2 Projections: views from the sun

Because of the complexity of demonstrating in detail the solar access to glazing of various orientations — and taking into account the potential for self-shading by the protruding balconies and privacy screens — exhaustive detailed analysis was performed using projections known as 'View from the sun', taken at half hourly intervals.

A **view from the sun** is an aerial projection, where the observer views the subject site from the position of the sun at the nominated time and date. Such a view shows all sunlit surfaces at that time. 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. The technique is illustrated in Figure 3.

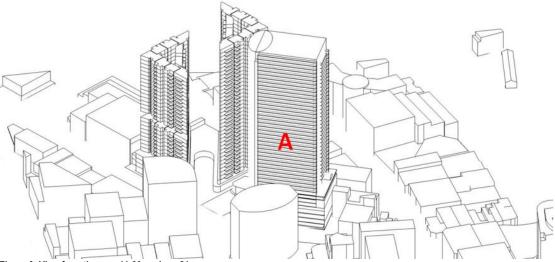


Figure 3: View from the sun, 11:30am June 21
A hypothetical compliant envelope is shown on the so-called Charter Hall site (A).

Note that a view from the sun does not show shadows, as shadows exactly align with (and are hidden by) the object which casts them. For that reason, views from the sun are the only projection in which it can be directly 'seen' what part of an obstructing building is the specific cause of any particular part of a shadow.

During my analysis I also examined other detailed shaded views of parts of the model, as required for clarification of the area of sun patches on glazing.

I have generated my own quantification and compliance tables, included in this report at Appendix A.

#### 5.2 Relevant solar access standards

# 5.2.1 Residential Flat Design Code

The Residential Flat Design Code gives the following quantified *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 (see Orientation and Energy Efficiency).
  (Rules of Thumb: Daylight Access p. 84)

#### 5.2.2 Local controls

Clause 3.15 in Part C3 of LCDCP 2010 provides as follows, inter alia:

#### **Objectives**

The objective for solar access is:

1 To provide reasonable solar access to habitable rooms and recreational areas of new and existing developments.

#### **Provisions**

These provisions apply to proposed developments and any residential development beyond the

- a) Habitable rooms in at least 70 percent of dwellings in high density residential developments should receive a minimum of three hours direct sunlight between 9 am and 3 pm on 21st June, in total between any portions of those rooms. A reasonable proportion of both the common and private open space in those sites is also to receive sunlight during that period, according to the circumstances of the sites.
- d) Council may accept a reduction in solar access for the subject site and adjacent development if the topography and lot orientation (as distinct from a preferred design) are such that the standard is considered unreasonable.

The DCP Clause is consistent with the requirement of the RFDC, and includes reduced performance expectation for closely built-up high density development. I note that the DCP controls also provide for:

- Provision (a) extends the definition from "Living rooms' to 'habitable rooms';
- Provision (d) allows explicitly for the exercise of discretion by Council to accept a reduced standard as complying.

# 5.3 Characterisation of solar access compliance: durations and available effective sun

# 5.3.1 Duration of sun access

The RFDC suggests a minimum duration of direct sun for three hours between 9am and 3pm on June 21, but accepts that a less onerous '2-hour standard' can be applied in dense urban areas. As this standard has now been extended by the recently published this Apartment Design Guide throughout the metropolitan area, without reference to high density, I take that it may be applied to this site without further discussion.

Given the design, balconies will in most cases enjoy a more favourable sun exposure than the glazing. I therefore begin by classifying as complying when direct sun access is over two hours total of partially and fully sunlit glazing between 9am and 3pm mid-winter.

#### 5.3.2 Applicable times of day for effective sun

The 9am and 3pm limits are a legacy from early controls for single dwellings in arcadian suburban settings, where the desired mature tree canopied character was assumed to limit the availability of winter sun beyond those times. In my considered opinion, to apply those limits without reference to the availability of earlier and later sun is inappropriate, and this opinion has consistently had the support of the Land and Environment Court.

A suitable 3D digital model can demonstrate what sun exposure is reliably available before 9am and after 3pm. To be relied on to do so, the digital model must incorporate sufficient extent of the surrounding developments adjacent to, and also remote from the site, for one to be able to form an opinion of whether the relevant sun exposure is likely to be permanent.

To capture where apartments will receive additional effective direct winter sun earlier or later than the arbitrary 9am and 3pm limits, I have recorded solar access from 8am and until 4.00pm. I note that in general, these earlier and later periods of winter sun are actually the most effective for the relevant east and west glazing. However, I have ignored where the model may show even earlier and later direct sun, as not sufficiently reliable for characterizing compliance.

## 5.3.3 Sun patches on glazing

For the purpose of calculating the compliance with the control, I have examined sun patches on the relevant glazing line of each apartment, and solar access of private open space related to those living spaces. In the tower component, I have given priority to compliance for the sun on the glazing of living areas. In accordance with the relevant *L+EC Planning Principle* (Benevolent Society vs Waverley Council), when I determine exposure times, I generally ignore very large angles of incidence to the glazing surface, and unusably small areas of sunlit glazing.

#### 5.3.4 Sun to bedrooms

The latest amendment of Clause 3.15 in Part C3 of LCDCP 2010 now reads:

"Habitable rooms in at least 70 percent of dwellings in high density residential developments should receive a minimum of three hours direct sunlight between 9 am and 3 pm on 21st June, in total between any portions of those rooms."

I take this to be a careful and purposeful elaboration of the previously more restrictive text of the same control that referred to 'living areas'. I infer the purpose is to recognise that for a proportion of apartments it is appropriate to give credit for solar access to bedrooms as constituting compliance.

# 5.3.5 Overshadowing by existing features or known developments

To allow for potential overshadowing by such developments, the model is extended significantly to the northeast and west of the subject site, by placing extruded building volumes in the correct locations. Figure 3 is the 11:30am view from the sun on June 21. As is clear from that view, the modelled buildings to the east along Pacific Hwy do not impact on the subject development. Buildings to the north of the Pacific Highway cause overshadowing impacts on only the lowest commercial and retail levels of the subject development.

# 5.3.6 Overshadowing by unknown but projected development

This consideration applies almost entirely to the potential effect of future high-rise building known as the 'Charter Hall site', to the northwest of the subject site (labelled A in Figure 2). My analysis includes the overshadowing effect of this hypothetical building envelope, which can be assumed to be a worst case implementation of the allowable building envelope of the site.

#### 5.4 Achieved solar access

5.4.1 Appendix A reports in detail the schedule of achieved mid-winter (June 21) solar access for each apartment for the scheme.

Appendix B presents the 'views from the sun' taken from the model shown in Figure 2 above. This tabulated set of views is reproduced at reduced scale for reference. Larger versions of the views can be provided digitally on request if required for more detailed scrutiny by Council.

Table 1: Summary of solar access for units

Units which achieve 2 hours or more sunlight 9am - 3pm June 21 to any part of habitable rooms	232	43.4%
Additional units which achieve 2 hours or more sunlight 8am – 4.00pm June 21 to any part of habitable rooms	50	9.3%
Total number of units	535	
Units deemed to satisfy the RFDC and local controls	282	52.7%
Estimated number of dwellings non-compliant due to overshadowing impact of hypothetical Charter Hall building:		
Building A: 30		
Building B: 8 (noted in schedule)	38	7.1%
Units which would achieve 2 hours or more sunlight on June 21 with present context	320	59.8%
Single aspect south facing units	42	7.9%

Council is encouraged by its DCP control to pay regard to the following factors:

- The RFDC suggests that a '2-hour standard' can be applied in dense urban areas;
- The DCP control provisions define the required sun access for each dwelling as 'in total to any portion of the habitable rooms'. In fact this provision makes little difference to the overall compliance achieved;
- Brown, C. in *Botany Development Pty Ltd v Council of the City of Botany Bay LEC 10360 of 2013* confirmed that effective sun before 9am and after 3pm is legitimately considered.

# 5.5 South facing single aspect apartments

The proportion of south facing single aspect dwellings is 46 from the total of 535, being 8.3%. The RFDC *Rules of Thumb* nominate maximum 10%. The proposed development complies for this control. Of interest is that the proposal also complies with the Apartment Design Guide of less than 15% of dwellings without any sun on June 21, with only the same units falling into that category.

# 8.0 CONCLUSIONS

- 8.1 The proportion of apartments which comply with the *performance requirements* of the Residential Flat Design Code is **282 (52.7%) units from a total of 535.**
- 8.2 To arrive at this number, I have considered it reasonable to take account of sun available before 9am or after 3pm, for those apartments where the 3D model makes clear that such sun is unlikely to be obstructed at any time in the future, and where in addition, such sun is the most effective for the apartments in question. For my reasoning, I refer in particular to the judgement by Brown C. in *Botany Development Pty Ltd v Council of the City of Botany Bay LEC 10360 of 2013* on 31 January 2014.
- 8.3 The compliance level I report may appear a significant shortfall from the target 70% suggested by the *Rules of Thumb* in the RFDC. However, if we pay regard to the effect of the adverse orientation of two major elevations of the buildings in the location and form established by the rezoning of the land, and the effect of external overshadowing, the achieved solar access is in fact a relatively high proportion. I estimate the impact of overshadowing by the hypothetical building on the Charter Hall site alone to be some thirty-eight complying units, being 7.1% of the total 535 dwellings now proposed.

Were the analysis undertaken on the basis of the existing context, the proportion of dwellings with over 2 hours of winter solar access would be 320 (59.8%) from a total of 535.

In my considered opinion the proposed amended DA scheme is significantly superior to the development application currently before Council. In my view the scheme retains close to potential maximum solar access compliance, without resorting to the artifice of deliberately distorting the unit mix, or – in order to eliminate self shading – arbitrarily applying what would be in effect a glass curtain wall with minimal relief.

I am of the view that the design approach represents a skilful resolution of very high holistic amenity for dwellings within the scheme, and achieves a significant public benefit. The level of solar access compliance is an outcome of reasoned trade-offs between adverse orientation and highly desirable view amenity. As such, in my considered opinion, the development complies for solar access amenity as provided for by the controls, and is capable of being supported for approval.

# A.O APPENDIX A

Table 2: Detailed compliance table for solar access

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	301 B						р																	_
	302 B																							
	303 B						yes	yes								yes	yes							
	305 B															yes								
en en	306 B															yes								
LEVEL 3	307 B					yes	yes	yes							yes						YES			
_ =	308 B					yes		yes	yes								yes					YES		
	309 B						р	yes		yes													YES	
	310 B							yes		yes	yes	yes									YES			
	311 B																							
	312 B																							
	401 B					р	р																	
	402 B																							
	403 B						yes	yes								yes	yes							
	405 B															yes	yes							
4	406 B															yes	yes							
LEVEL 4	407 B				yes	yes	yes	yes							yes	yes	yes			YES				
_ =	408 B					yes			yes								yes					YES		
	409 B						р	yes	yes	yes													YES	
	410 B							yes		yes	yes	yes									YES			
	411 B																							
	412 B																							_
	501 A										р	р	yes											
EL 5	502 A											р												
LEVEL 5	503 A									yes	yes													
	505 A																							YES

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	506 A																							YES
	507 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	508 A	yes	yes	yes	yes	yes	yes		yes		yes	yes	yes						YES					
	509 A		yes	yes							р	р	yes									YES		
	510 A	yes	yes	yes	yes					yes	yes	yes	yes	yes	yes				YES					
	511 A											р	yes	yes										
	512 A										р	р	yes											
	501 B					р	р																	
	502 B																							
	503 B						yes	yes								yes	yes							
	505 B															yes	yes							
	506 B															yes	yes							
	507 B				yes	yes	yes	yes							yes	yes	yes			YES				
	508 B					yes	yes	yes	yes								yes					YES		
	509 B					yes	р	yes	yes	yes													YES	
	510 B							yes	yes	yes	yes	yes									YES			
	511 B	yes	yes																					
	512 B						р																	
	601 A										р	р	yes											
	602 A											р												
	603 A									yes	yes													
	605 A																							YES
9.	606 A																							YES
LEVEL 6	607 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	608 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	609 A	yes	yes	yes	yes	yes				р	р	р	yes									YES		
	610 A	yes	yes	yes	yes					yes	yes	yes	yes	yes	yes				YES					
	611 A											р	yes	yes										
	612 A										р	р	yes											

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
22722	601 B		000		yes	р	р		1100		1200		1000		1100		1000			(* 61116 6 1)	- 00	(0 1)	Onartor Han	oouth luoning
	602 B				joo	۲	۲																	
	603 B						ves	yes								yes	yes							
	605 B						joo	joo								yes	yes							
	606 B															yes								
	607 B				ves	yes	yes	ves							yes	yes				YES				
	608 B				,,,,	yes	yes	yes	yes						,,,,,	,,,,,	yes					YES		
	609 B					р	р	yes		yes							,						YES	
	610 B					,	ľ	yes		yes	yes	yes									YES			
	611 B	yes	yes					,	,		,													
	612 B	,				р	р																	
	701 A					,	ľ				р	р	yes											
	702 A										<u> </u>	р	joo											
	703 A									yes	yes	P												
	705 A									, , , ,	, ,													YES
	706 A																							YES
	707 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	708 A					yes		yes		yes	yes		yes						YES					
	709 A			yes				yes		р	р	р	yes							YES				
LEVEL 7	710 A	yes			yes					yes	yes	yes	yes	yes	yes				YES					
LEV	711 A											р	р	yes										
	712 A										р	р	yes											
	701 B				yes	р	р																	
	702 B																							
	703 B						yes	yes								yes	yes	yes				YES		
	705 B															yes	yes							
	706 B															yes	yes							
	707 B			yes	yes	yes	yes	yes							yes	yes	yes		YES					
	708 B				yes	yes	yes	yes	yes								yes				YES			

																			>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3	(>3hrs 8-4)	9-3	(8-4)	Charter Hall	south facing
	709 B					р	р	yes	yes	yes													YES	
	710 B						yes	yes	yes	yes	yes	yes									YES			
	711 B	yes	yes			р																		
	712 B				yes	р	р																	
	801 A										р	р	yes											
	802 A											р												
	803 A									yes	yes													
	805 A																							YES
	806 A																							YES
	807 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	808 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	809 A	yes	yes	yes	yes	yes		yes	yes	р	р	р	yes							YES				
	810 A	yes	yes	yes	yes				yes	yes	yes	yes	yes	yes	yes				YES					
	811 A											р	р	yes										
8 7:	812 A										р	р	yes											
LEVEL 8	801 B				yes	р	р																	
	802 B																							
	803 B						yes	yes								yes	yes	yes				YES		
	805 B						,	,								yes	yes	yes						
-	806 B															yes	yes	yes						
	807 B			yes	yes	yes	yes	yes							yes	yes	yes		YES					
	808 B					yes	yes	yes	yes								yes				YES			
	809 B				yes		р	yes	yes	yes													YES	
	810 B				,	yes	yes	yes	yes	yes	yes	yes							YES					
	811 B	ves	yes		yes	р	,	,		,	,													
	812 B	,.,	,.,	yes			р																	
	901 A			900	y00	٧	P				р	р	yes											
LEVEL 9	902 A										P	D	,00											
LE	903 A									yes	yes	P												

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	905 A																			,				YES
	906 A																							YES
	907 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	908 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	909 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	910 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	911 A											р	р	yes										
	912 A										р	р	yes											
	901 B				yes	р	р																	
	902 B																							
	903 B						yes	yes								yes	yes	yes				YES		
	905 B															yes	yes	yes						
	906 B															yes	yes	yes						
	907 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	908 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	909 B				yes	р	р	yes	yes	yes													YES	
	910 B					yes	yes	yes	yes	yes	yes	yes							YES					
	911 B	yes	yes		yes	р																		
	912 B			yes	yes	р	р																	
	1001 A										р	р	yes											
	1002 A											р												
	1003 A									yes	yes													
_	1005 A																							YES
LEVEL 10	1006 A																							YES
LEVI	1007 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	1008 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	1009 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	1010 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	1011 A											р	р	yes										

																			>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3	(>3hrs 8-4)	9-3	(8-4)	Charter Hall	south facing
	1012 A										р	р	yes											
	1001 B				yes	р	р																	
	1002 B																							
	1003 B						yes	yes								yes	yes	yes				YES		
	1005 B															yes	yes	yes						
	1006 B															yes	yes	yes						
	1007 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1008 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1009 B			yes	yes	р	р	yes	yes	yes											YES		YES	
	1010 B				yes	yes	yes	yes	yes	yes	yes	yes							YES					
	1011 B	yes	yes	yes	yes	р																		
	1012 B			yes	yes	р	р																	
	1101 A										р	р	yes											
	1102 A											р												
	1103 A									yes	yes													
	1105 A																							YES
	1106 A																							YES
	1107 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	1108 A				yes			yes		yes			yes						YES					
_	1109 A		yes					yes		р	р	р	yes						YES					
LEVEL 11	1110 A		yes		yes			yes		yes	yes	yes	yes	yes	yes				YES					
Ë	1111 A	,				,	,	,	,	,	,	p	p	yes	,									
	1112 A										р	р	yes											
	1101 B				yes	р	р						,											
	1102 B																							
	1103 B						yes	yes								yes	yes	yes				YES		
	1105 B						,	,								yes	yes	yes						
	1106 B															yes	yes	yes						
	1107 B			yes	yes	ves	yes	ves							yes			yes	YES					

15/5	UNIT				000	40	4000	44	4400	40	4000	40	4000	44	4400	45	4500	40	>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3	(>3hrs 8-4) YES	9-3	(8-4)	Charter Hall	south facing
	1108 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1109 B			yes	yes	р	р	yes	yes	yes											YES		YES	
	1110 B				yes	yes	yes	yes	yes	yes	yes	yes							YES					
	1111 B	yes	yes	yes	yes	р																		
	1112 B			yes	yes	р	р																	
	1201 A										р	р	yes											
	1202 A											р												
	1203 A									yes	yes													
	1205 A																							YES
	1206 A																							YES
	1207 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	1208 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	1209 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	1210 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	1211 A											р	р	yes										
LEVEL 12	1212 A										р	р	yes											
EVE.	1201 B				yes	р	р																	
	1202 B					'	'																	
	1203 B						yes	yes								yes	yes	yes				YES		
	1205 B						,	,								yes	yes	yes						
	1206 B															yes	yes	yes						
	1207 B			yes	ves	yes	yes	ves							yes	yes	yes	yes	YES					
	1208 B			yes		yes			yes						,00	joo	yes	yes		YES				
	1209 B			yes			р	yes		yes							,,,,,	<i>y</i> 00			YES		YES	
	1210 B			yes		yes				yes	yes	yes							YES					
	1210 B	VCC	VOS				yes	yes	yes	yes	yes	yes												
		yes	yes																					
13	1212 B			yes	yes	р	р																	
EVEL 13	1301 A										р	р	yes											
쁘	1302 A											р												

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	1303 A									yes	yes									,		(- /		J
	1305 A									,	, ,													YES
	1306 A																							YES
	1307 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	1308 A	yes	yes	yes	yes	yes	yes	yes	yes	yes			yes						YES					
	1309 A		yes			yes				р	р	р	yes						YES					
	1310 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	1311 A											р	р	yes										
	1312 A										р	р	yes											
	1301 B				yes	р	р																	
	1302 B																							
	1303 B						yes	yes								yes	yes	yes				YES		
	1305 B															yes	yes	yes						
	1306 B															yes	yes	yes						
	1307 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1308 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1309 B			yes	yes	р	р	yes	yes	yes											YES		YES	
	1310 B		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	1311 B	yes	yes	yes	yes	р																		
	1312 B			yes	yes	р	р																	
	1401 B				yes	yes	р																	
	1402 B					yes																		
	1403 B						yes	yes								yes	yes	yes				YES		
4	1405 B															yes	yes	yes						
LEVEL 14	1406 B															yes	yes	yes						
	1407 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1408 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1409 B			yes	yes	р	р	yes	yes	yes											YES			
	1410 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					

																			>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3	(>3hrs 8-4)	9-3	(8-4)	Charter Hall	south facing
	1411 B	yes	yes	yes	yes	р																		
	1412 B			yes	yes	р	р																	
	1501 A									р	р	р	р											
	1502 A									yes	yes													
	1503 A																							YES
	1505 A																							YES
	1506 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	1507 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	1508 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	1509 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
L 15	1510 A											р	р	yes										
LEVEL 15	1501 B			pyes	yes	yes	р																	
	1502 B						yes	yes								yes	yes	yes				YES		
	1503 B															yes	yes	yes						
	1505 B															yes	yes	yes						
	1506 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1507 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1508 B			yes	yes	р	р	yes	yes	yes											YES			
	1509 B	yes	yes	yes			yes	yes	yes	yes	yes	yes							YES					
	1510 B	yes	yes	yes	yes	yes																YES		
	1601 A									р	р	р	р											
	1602 A									yes	yes													
	1603 A																							YES
91	1605 A																							YES
LEVEL 16	1606 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
"	1607 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	1608 A		yes		yes			yes	yes	р	р	p	yes						YES					
	1609 A			yes	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	1610 A											р	р	yes										

																			>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3	(>3hrs 8-4)	9-3	(8-4)	Charter Hall	south facing
	1601 B			pyes	yes	yes	р																	
	1602 B						yes	yes								yes	yes	yes				YES		
	1603 B															yes	yes	yes						
	1605 B															yes	yes	yes						
	1606 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1607 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1608 B			yes	yes	р	р	yes	yes	yes											YES			
	1609 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	1610 B	yes	yes	yes	yes	yes																YES		
	1701 A									р	р	р	р											
	1702 A									yes	yes													
	1703 A																							YES
	1705 A																							YES
	1706 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	1707 A		yes	yes				yes		yes	yes	yes	yes						YES					
	1708 A			yes						р	р	р	yes						YES					
	1709 A		yes	yes				yes		yes	yes	yes	yes	yes	yes				YES					
- 17	1710 A	, , , ,	, ,	, , , ,	,	, ,	,	,	,	, ,	, , , ,	р	р	yes	, ,									
LEVEL 17	1701 B			pves	ves	yes	р						P	Jee										
	1702 B			pyso	jee	jee	yes	yes								yes	yes	yes				YES		
	1703 B						750	, 50								yes	yes	yes						
	1705 B															yes	yes	yes						
	1706 B			yes	VAS	yes	yes	yes							yes	yes	yes	yes	YES					
	1700 B								Vec						300	you	yes	yes		YES				
	1707 B					yes				Vec							yes	yes			YES			
	1706 B	VC2	VC2	yes			р	yes	yes	yes	VC2	V/00							YES					
				yes			yes	yes	yes	yes	yes	yes										YES		
- 8	1710 B	yes	yes	yes	yes	yes																0		
LEVEL 18	1801 A									р	р	р	р											
쁘	1802 A									yes	yes													

LEVEL	UNIT	Ω	830	۵	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
LEVEL		0	030	9	330	10	1030	- 11	1130	12	1230	13	1330	14	1430	13	1330	10	9-3	(>31115 0-4)	9-3	(0-4)	Charter Hall	YES
	1803 A 1805 A																							YES
	1806 A	VOC	VOC	VOC	VOC	VOC	V00	VOC	VOC	VOC	VOC	VOC	VOC	V00					YES					
	1807 A			yes						yes			yes	yes					YES					
	1808 A		yes			yes				yes	yes	yes	yes						YES					
				yes				yes		р	р	р	yes						YES					
	1809 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes				. 20					
	1810 A											р	р	yes										
	1801 B			pyes	yes	yes	р															YES		
	1802 B						yes	yes								yes		yes				ILO		
	1803 B															yes	yes	yes						
	1805 B															yes	yes	yes	\/F0					
	1806 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1807 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	1808 B			yes	yes	р	р	yes	yes	yes											YES			
	1809 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	1810 B	yes	yes	yes	yes	yes																YES		
	1901 A									р	р	р	р											
	1902 A									yes	yes													
	1903 A																							YES
	1905 A																							YES
	1906 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
19	1907 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
LEVEL 19	1908 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
<u> </u>	1909 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	1910 A											р	р	yes										
	1901 B			pyes	yes	yes	р																	
	1902 B					yes	yes	yes								yes	yes	yes				YES		
	1903 B															yes	yes	yes						
	1905 B															yes		yes						

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	1906 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	1907 B			yes			yes		yes								yes	yes		YES				
	1908 B			yes			р	yes	yes	yes											YES			
	1909 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	1910 B	yes	yes	yes	yes	yes																YES		
	2001 A									р	р	р	р											
	2002 A									yes	yes													
	2003 A																							YES
	2005 A																							YES
	2006 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	2007 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	2008 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	2009 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
LEVEL 20	2010 A											р	р	yes										
LEVE	2001 B			pyes	yes	yes	р																	
	2002 B					yes	yes	yes								yes	yes	yes				YES		
	2003 B															yes	yes	yes						
	2005 B															yes	yes	yes						
	2006 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2007 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	2008 B			yes	yes	р	р	yes	yes	yes											YES			
	2009 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	2010 B	yes	yes	yes	yes	yes																YES		
	2101 A									р	р	р	р											
	2102 A									yes	yes													
LEVEL 21	2103 A																							YES
LEVI	2105 A																							YES
	2106 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	2107 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					

LEVEL						40	4000		4400	10	4000	40	4000	44	4400	4-	4500	40	>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3 YES	(>3hrs 8-4)	9-3	(8-4)	Charter Hall	south facing
	2108 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes											
	2109 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	2110 A											р	р	yes										
	2101 B			pyes	yes	yes	р																	
	2102 B					yes	yes	yes								yes	yes	yes				YES		
	2103 B															yes	yes	yes						
	2105 B															yes	yes	yes						
	2106 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2107 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	2108 B			yes	yes	р	р	yes	yes	yes											YES			
	2109 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	2110 B	yes	yes	yes	yes	yes																YES		
	2201 A									р	р	р	р											
	2202 A									yes	yes													
	2203 A																							YES
	2205 A																							YES
	2206 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	2207 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	2208 A		yes							р	р	g	yes						YES					
72	2209 A		yes	yes				yes	yes	yes	yes	yes	yes	yes	yes				YES					
LEVEL 22	2210 A											р	р	yes										
Ë	2201 B			pyes	yes	ves	р							,										
	2202 B					yes		yes								yes	yes	yes				YES		
	2203 B															yes	yes	yes						
	2205 B															yes	yes	yes						
	2206 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2207 B			yes					yes								yes	yes		YES				
	2208 B			yes		р	р	yes	yes	yes											YES			
	2209 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					_

LEVEL	LIMIT		000		000	40	4000	44	4400	40	4000	40	4000	44	4400	45	4500	40	>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect
LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	9-3	(>3hrs 8-4)	9-3	(8-4)	Charter Hall	south facing
	2210 B	yes	yes	yes	yes	yes																YES		
	2301 A									р	р	р	р											
	2302 A									yes	yes													
	2303 A																							YES
	2305 A																							YES
	2306 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	2307 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	2308 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	2309 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
IL 23	2310 A											р	р	yes										
LEVEL 23	2301 B			pyes	yes	yes	р																	
	2302 B				yes	yes	yes	yes								yes	yes	yes		YES				
	2303 B															yes	yes	yes						
	2305 B															yes	yes	yes						
	2306 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2307 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	2308 B			yes	yes	р	р	yes	yes	yes											YES			
	2309 B	ves	yes	yes		yes	yes			yes	yes	yes							YES					
	2310 B			yes			,		,	,	,	•										YES		
	2401 A	jee	,,,,	ju	jee	,,,,				р	р	р	р											
	2402 A									yes	yes	•												
	2403 A									,	,													YES
	2405 A																							YES
- 24	2406 A	ves	ves	ves	ves	ves	yes	ves	yes	yes	yes	yes	yes	ves					YES					
LEVEL 24	2507 A			yes						yes	yes	yes	yes	,,,,,					YES					
-	2508 A			yes						р	р	р	yes						YES					
	2509 A			yes						yes	yes	yes	yes	yes	yes				YES					
	2510 A	y00	900	900	y03	900	y00	903	you	900	900	yes D	yes D	yes	300									
	2401 B			nyes	yes	Vec	р					ų	ų	yes										

LEVEL	UNIT	8	020		020	40	4020	44	4420	42	4220	42	4220	44	1430	45	4520	16	>3 hrs	>2 hrs 9-3	>2 hrs	>2hrs	Complies without	Single aspect south facing
LEVEL		0	830	9	930				1130	12	1230	13	1330	14	1430		1530		9-3	(>3hrs 8-4) YES	9-3	(8-4)	Charter Hall	south facing
	2402 B				yes	yes	yes	yes								yes	yes	yes		TLO				
	2403 B															yes	yes	yes						
	2405 B															yes	yes	yes						
	2406 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2407 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	2408 B			yes	yes	р	р	yes	yes	yes											YES			
	2409 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	2410 B	yes	yes	yes	yes	yes																YES		
	2501 A									р	р	р	р											
	2502 A									yes	yes													
	2503 A																							YES
	2505 A																							YES
	2506 A	ves	ves	ves	ves	ves	yes	ves	yes	yes	yes	ves	yes	ves					YES					
	2507 A		yes			yes				yes	yes	yes	yes	,					YES					
	2508 A	•		yes		yes				р	р	р	yes						YES					
	2509 A			yes						yes	yes	yes	yes	yes	yes				YES					
. 25	2510 A	you	you	you	,00	,,,,	,,,,	joo	,,,,	you	you	D	D	yes	,,,,,									
LEVEL 25	2501 B			yes	VAC	yes	р					P	P	yes										
	2502 B					yes		yes								VOC	yes	yes		YES				
	2502 B 2503 B			yes	yes	yes	yes	yes								yes								
	2505 B															yes	yes	yes						
																yes	yes	yes	YES					
	2506 B			yes		yes									yes	yes	yes	yes	. 20	YES				
	2507 B			yes			yes										yes	yes		120	YES			
	2508 B			yes	yes	р	р	yes		yes									YES		ILO			
	2509 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							IES			VEO		
	2510 B	yes	yes	yes	yes	yes																YES		
- 26	2601 A									р	р	р	р							YES				
LEVEL 26	2602 A									yes	yes	yes								YES				
7	2603 A																			YES				YES

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	2605 A																			YES				YES
	2606 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes					YES					
	2607 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						YES					
	2608 A	yes	yes	yes	yes	yes	yes	yes	yes	р	р	р	yes						YES					
	2609 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	2610 A											р	р	yes						YES				
	2601 B		yes	yes	yes	yes	р																	
	2602 B		yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
	2603 B															yes	yes	yes						
	2605 B															yes	yes	yes						
	2606 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2607 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	2608 B			yes	yes	р	р	yes	yes	yes											YES			
	2609 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	2610 B	yes	yes	yes	yes	yes																YES		
	2701 A					yes	yes	yes	yes	yes	yes	yes	yes						YES					
	2702 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				YES					
	2703 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	2705 A	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes		YES					
	2701 B	yes	yes	yes	yes	yes	р															YES		
- 27	2702 B		yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
LEVEL 27	2703 B															yes	yes	yes						
	2705 B															yes	yes	yes	\/=0					
	2706 B			yes	yes	yes	yes	yes	_						yes	yes	yes	yes	YES	VEO				
	2707 B			yes	yes	yes	yes	yes	yes								yes	yes		YES	VEO			
	2708 B			yes	yes	р	р	yes	yes	yes	_								VEC		YES			
	2709 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES			\/50		
> . ~	2710 B	yes	yes	yes	yes	yes													VEO			YES		
LEV EL 28	2801 A					yes	yes	yes	yes	yes	yes	yes	yes						YES					

LEVEL	UNIT	8	830	q	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
LLVLL	2802 A															13	1550	10	YES	(×31113 0-4)	3-3	(0-4)	Onarter rian	30ath lacing
	2803 A		yes	yes				yes		yes	yes		yes	yes	yes				YES					
		yes		yes	yes		yes	yes	yes	yes	yes	yes							YES					
	2805 A			yes				yes	yes	yes	yes	yes	yes	yes	yes	yes	yes		0			YES		
	2801 B			yes			р													YES				
	2802 B	yes	yes	yes	yes	yes	yes	yes								yes		yes		120				
	2803 B															yes	yes	yes						
	2805 B															yes	yes	yes	YES					
	2806 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	TES	YES				
	2807 B			yes	yes	yes	yes	yes	yes								yes	yes		150	VEC			
	2808 B			yes	yes	р	р	yes	yes	yes									VEO		YES			
	2809 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES			\/F0		
	2810 B	yes	yes	yes	yes	yes																YES		
	2901 B	yes	yes	yes	yes	yes	р															YES		
	2902 B	yes	yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
	2903 B															yes	yes	yes						
53	2905 B															yes	yes	yes						
LEVEL 29	2906 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	2907 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	2908 B			yes	yes	р	р	yes	yes	yes											YES			
	2909 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	2910 B	yes	yes	yes	yes	yes																YES		
	3001 B	yes	yes	yes	yes	yes	р															YES		
	3002 B	yes	yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
	3003 B															yes	yes	yes						
Q.	3005 B															yes	yes	yes						
LEVEL 30	3006 B			yes	ves	yes	yes	ves							yes	yes	yes	yes	YES					
LE	3007 B			yes				yes	yes						,	,,,,,	yes	yes		YES				
	3008 B									VCC							300	900			YES			
		V00	1/05	yes			р	yes		yes	V00	V00							YES					
	3009 B		yes	yes			yes	yes	yes	yes	yes	yes							0			YES		
I [	3010 B	yes	yes	yes	yes	yes						l				l						TLU		

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	3101 B	yes	yes	yes	yes	yes	р	р														YES		
	3102 B	yes	yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
	3103 B															yes	yes	yes						
31	3105 B															yes	yes	yes						
LEVEL 31	3106 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
=======================================	3107 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	3108 B			yes	yes	р	р	yes	yes	yes											YES			
	3109 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	3110 B	yes	yes	yes	yes	yes																YES		
	3201 B	yes	yes	yes	yes	yes	р	р														YES		
	3202 B	yes	yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
	3203 B															yes	yes	yes						
32	3205 B															yes	yes	yes						
LEVEL 32	3206 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
쁴	3207 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	3208 B			yes	yes	р	р	yes	yes	yes											YES			
	3209 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	3210 B	yes	yes	yes	yes	yes																YES		
	3301 B	yes	yes	yes	yes	yes	р	р														YES		
	3302 B	yes	yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				
	3303 B															yes	yes	yes						
33	3305 B															yes	yes	yes						
LEVEL 33	3306 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	3307 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	3308 B			yes	yes	р	р	yes	yes	yes											YES			
	3309 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	3310 B	yes	yes	yes	yes	yes																YES		
LEVEL 34	3401 B	yes	yes	yes	yes	yes	р	р														YES		
LEVE	3402 B	yes	yes	yes	yes	yes	yes	yes								yes	yes	yes		YES				

LEVEL	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs (8-4)	Complies without Charter Hall	Single aspect south facing
	3403 B															yes	yes	yes						
	3405 B															yes	yes	yes						
	3406 B			yes	yes	yes	yes	yes							yes	yes	yes	yes	YES					
	3407 B			yes	yes	yes	yes	yes	yes								yes	yes		YES				
	3408 B			yes	yes	р	р	yes	yes	yes											YES			
	3409 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes							YES					
	3410 B	yes	yes	yes	yes	yes																YES		
	3501 B	yes	yes	yes	yes	yes	yes	yes												YES				
LEVEL 35	3502 B			yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES					
LEVE	3503 B					yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES					
	3505 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES					
	3601 B	yes	yes	yes	yes	yes	yes	yes												YES				
LEVEL 36	3602 B			yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES					
LEVI	3603 B					yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES					
	3605 B	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES					
	Total 535																		149	50	33	50	38	42
																			27.9%	9.3%	6.2%	9.3%	7.1%	7.9%
	KEY																			199	232	282	320	
	р	Desig	gnates	self s	hading	by pri	ivacy so	creen												37.2%	43.4%	52.7%	59.8%	

472-494 & 500-520 Pacific Hwy St Leonards

# **B.O** APPENDIX B

Views from the sun for analysis of solar access to apartments.

Note that the model does not show privacy screens on the POS verandas. I have not included in my quantification of sun on the glazing sun that would be obstructed by those screens.

Table 3: Views from the sun

