BETTER APARTMENTS DRAFT DESIGN STANDARDS

Response & Discussion Paper

Date: 19/09/2016

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Executive Summary

[redacted] would like to take this opportunity to commend the Department of Environment Land, Water and Planning (DELWP) and the Office of the Victorian Government Architect (OVGA) on the consultative approach that has been taken to develop apartment design standards that seek to leave a positive legacy for Victoria's future generations.

As a boutique practise that provides Ecologically Sustainable Development (ESD) consulting services across local government & the private sector our comments on the Better Apartment Draft Design Standards (herein referred to as the Standards) relate specifically to the following standards:

- Building Setback
- Light Wells
- Energy Efficiency

It is our expert opinion that the aforementioned Standards need to be reviewed as follows:

- Building Setback

Until an evidence based scenario analysis that demonstrates how the proposed building setbacks account for and balance public and private realm amenity, urban context, built form outcomes and development feasibility, we recommend that this standard be removed.

We recommend that building setback standards be embedded within local Design Development Overlays instead because they provide a more flexible planning mechanism that accounts for local context and can be tied to community expectations.

- Light Wells

Re write the standard to define what adequate daylight means in terms of a performance benchmark. Conduct evidence based scenario testing of the light well guidelines to demonstrate that they achieve adequate daylight based on a performance benchmark.

- Energy Efficiency

We recommend the removal of this standard because it does not account for the following factors:

1. Melbourne is a heating based climate
2. Negative delivery, procurement & cost impacts
3. Prescriptive cooling load precedent considered inappropriate

More generally, but equally important, we recommend that a document of such critical importance provides references to where the proposed standards have been derived from. References would strengthen the validity of the document by providing a transparent outline of the literature used to inform their development.

Based on our experience (refer to Appendix 1) we are aware that current industry knowledge of evidence based performance criteria is varied & thus highlights a knowledge gap. Although this gap in knowledge poses a challenge, we believe this can be adequately addressed through Step 1 Better education and training as outlined in the better apartments implementation plan.

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1. Building Setbacks (pg.15)

Building setbacks are an effective mechanism to promote improved public and private realm amenity outcomes. However, it is critical to understand that building setbacks are intrinsically linked to lots sizes and their urban context. Combined building setbacks and lot sizes define the bulk 3D development envelope of a site (including the resultant building typology) and its development feasibility.

Consequently, we find the lack of an evidence based scenario analysis that demonstrates how the proposed building setbacks account for and balance public and private realm amenity, urban context, built form outcomes and development feasibility alarming. Therefore, we question the due diligence that has been undertaken to determine the building setbacks outlined in the standard.

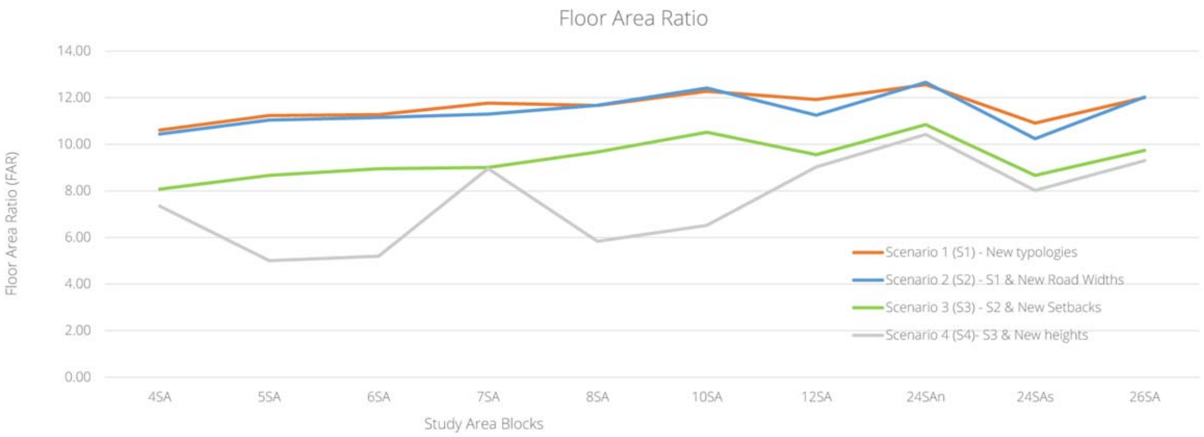
Through our Urban Design Performance Modelling services we have conducted evidence based scenario analysis of different design controls and their impacts on the following built form and environmental indicators:

Performance Indicators	Description
Built form indicators	These indicators are industry accepted methods to gain insight into potential yields, density and built form efficiency. When combined with other factors such as land costs, construction costs and projected sales revenue they provide the framework to assess the feasibility of projects.
Gross Floor Area (GFA)	The sum of the floor area of each floor of a building, measured from the external built form envelope. Exclusions: basement, storage & services areas, voids, car parking & access.
Nett Saleable Area (NSA)	The GFA minus circulation (stairs, corridors & lifts) and services areas.
Building Efficiency (BE)	GFA / NSA The industry accepted BE target is 80% & this was used within the modelling as a benchmark
Floor Area Ratio (FAR)	Gross Floor Area (GFA) of all buildings within the site divided by the site area.
Wall to Floor Area Ratio (WFAR)	WFAR is calculated by dividing the face area of a buildings' external surfaces by the Gross Floor Area (GFA) and is expressed as a ratio. The lower the ratio the more efficient the building. For the purpose of this study a WFAR range of 0.35-0.50 was considered to represent an efficient building form.
Environmental indicators	
Urban Daylight – Spatial Daylight Autonomy (SDA)	SDA describes how much of a space receives sufficient daylight. Specifically, it describes the percentage of floor area that receives daylight at or above a specified target illuminance (lux) for at least 50% of the annual occupied hours. The SDA targets used with the study align with those of the Sustainable Design in the Planning Process (SDAPP) framework. The SDA targets used were:

[redacted]

	• Residential – 75 Lux to 90% of the floor area • Non- Residential – 200 lux to 30% of the floor area
Overshadowing Analysis	Shading simulations were run for the Winter Solstice 22 September at the following times 9am, noon & 3pm to check the impacts of the modelled scenarios
Thermal mapping	Seasonal radiation maps were generated to assist to support the overshadowing modelling in determining thermal comfort in the public realm

The following graphs and images show example outputs from our Urban Design Performance Modelling work. Our work in this field demonstrates that an evidence based approach to the developing design controls such as building setbacks can be tested to balance multiple indicators.



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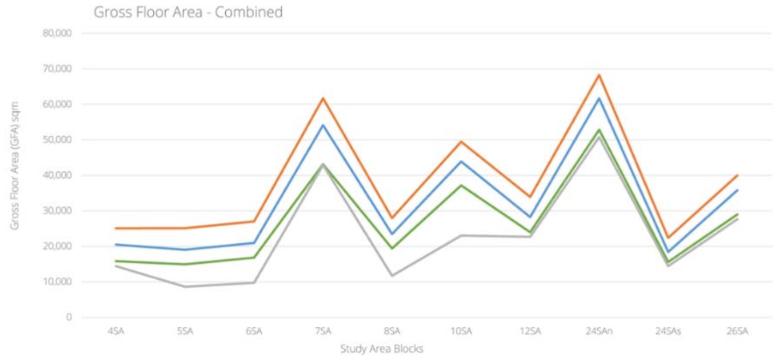

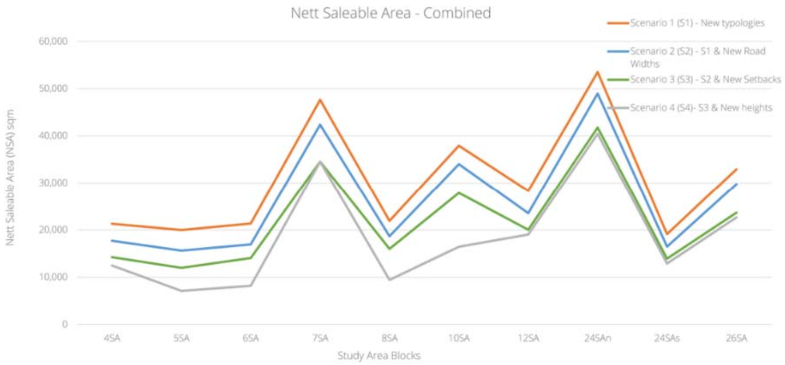

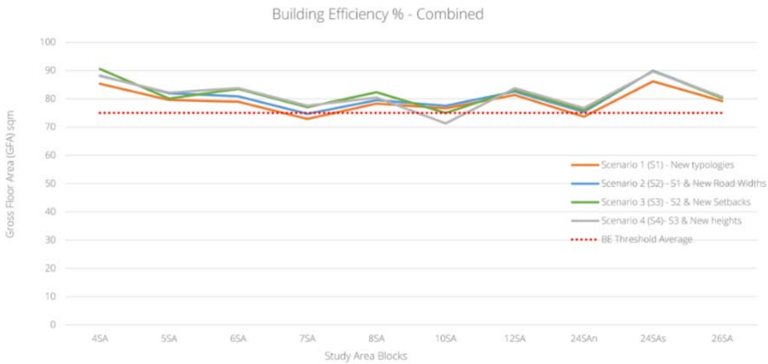

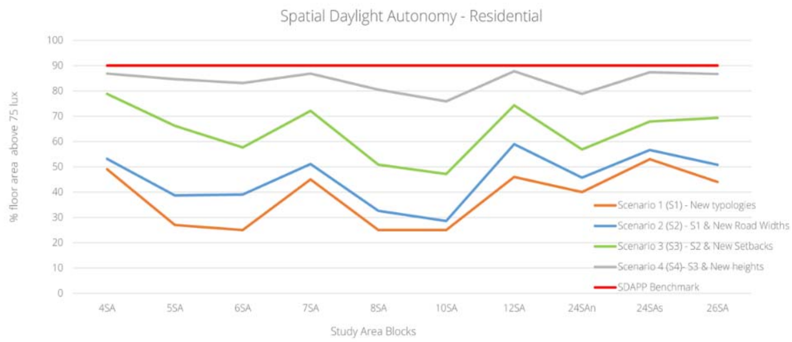

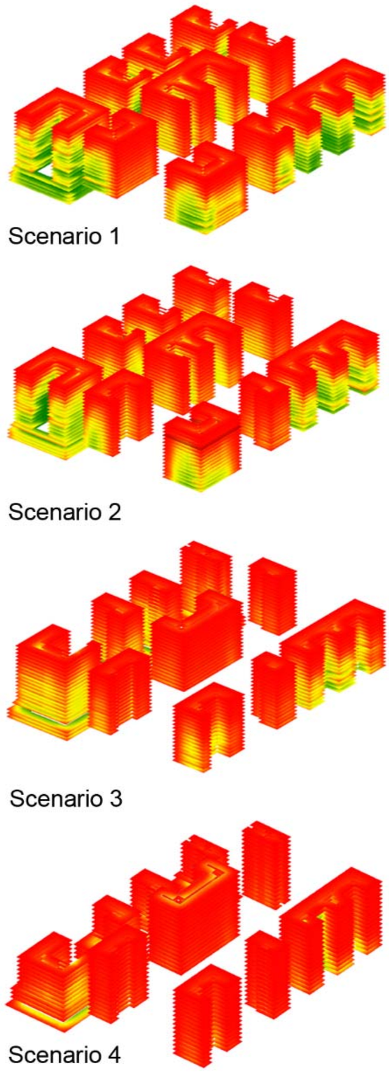

Based on our Urban Design Performance Modelling experience we suggest that until evidence based scenario analysis of the proposed building setbacks is undertaken for different urban contexts that this standard be removed. We recommend that building setbacks standards be applied within local Design Development Overlays because they provide a more flexible policy mechanism that can to account for local urban contexts and community aspirations.

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2. Light Wells (pg.17)

The proposed standard seeks to achieve 'adequate' daylight to apartments by specifying minimum light well dimensions. There are a number of issues with the proposed standard that are summarised below & followed by an in depth discussion of each issue.

- Adequate daylight is not defined or linked to a performance benchmark
- The proposed light well dimensions are inadequate

2.1 Adequate daylight is not defined or linked to a performance benchmark

The standard does not define what adequate daylight is. Given the widespread use of daylight performance metrics within local and overseas ESD assessment tools (eg Green Star and the Built Environment Sustainability Scorecard), the lack of a daylight performance benchmark to define adequate daylight is a serious omission from this standard.

2.2 The proposed light well dimensions are inadequate

There are a number of methods to assess the daylight performance of light wells. These methods are listed below and vary in the parameters they use.

- Plane / Plan Aspect Ratio (PAR) = W/L

- Height to Separation Ratio (HSR) or Section Aspect Ratio (SAR)= H/W

- Atrium Aspect Ratio (AAR) = (LxW)/H2

- Well Index (WI) (combines SAR & PAR), Measure of the effectiveness of the light well to transfer light = H(W+L)/(2WXL) , WI <1.0 good daylight, Higher WI the less efficient

Both the PAR & HSR/SAR methods are considered simple in that they only account for 2 dimensions of a light well. Whereas, the AAR & WI are considered more comprehensive in that they use all critical dimensions of a light well to determine the adequacy of daylight.

The proposed standard uses the simple HSR / SAR methodology. To provide adequate daylight under this methodology a ratio of 3:1 or less should be achieved. The assessment of the proposed standard shows that all of the ratios exceed the 3:1 recommendation.

Building Height	Height to Separation Ratio (HSR) or Section Aspect Ratio (SAR)
Up to 13.5m	4.5
Up to 25m	5.5
25 - 36m	4.1- 6

An assessment of the proposed standard using the more comprehensive AAR & WI was also conducted and is summarised below.

Building Height	Atrium Aspect Ratio (AAR) • (LxW)/H2	Well Index (WI) • H(W+L)/(2WXL)
Up to 13.5m	0.049	4.5
Up to 25m	0.046	4.7
25 - 36m	0.039	5.1

The assessment of the light well standards using the aforementioned methods demonstrates that they will not ensure that the size and design of light wells will allow adequate daylight access to apartments abutting light wells.

Furthermore, the proposed standard does not make the critical link to the Window to Wall Ratio (WWR) ie the amount of glazing facing a light well. This is a serious omission given the amount of glazing in a room facing a light well will determine the level of daylight the room will receive.

Therefore, we strongly encourage a revision of this standard to ensure its objective can be achieved.

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3. Energy efficiency (pg.27)

Specifying a maximum cooling load as detailed in *Table 1: Cooling Load* (pg. 27) of the BADDS is a poor standard to ensure energy efficiency outcomes are achieved. The issues with this approach are summarised below & followed by an in depth discussion of each issue.

4. Melbourne is a heating based climate
5. Negative delivery, procurement & cost impacts
6. Prescriptive cooling load precedent considered inappropriate

3.1 Melbourne is a heating based climate

A NatHERS assessment (more commonly known as an energy rating) is derived from a dwelling's interdependent heating and cooling loads. Performance against a maximum total annual energy load / square metre (MJ/m2) based on climate zones is then used to generate a star rating to demonstrates compliance with the National Construction Code (NCC) energy efficiency requirements. The table below highlights what the maximum annual energy loads are for the climates zones detailed within the BADDS.

Star Band Criteria

Within NatHERS, unique Star Bands are set for each Climate Zone to allow fair comparisons of buildings despite extreme regional variability in weather conditions across Australia. This table shows the maximum Energy Loads (thermal) corresponding to these Star Bands (shown in half star [0.5] increments) in each Climate Zone.

NatHERS Star Band Criteria (Energy Loads [thermal] in MJ/m^2.annum)

Climate Zone	Location	Energy Rating (stars)																			
		0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
20	Wagga	804	663	548	455	380	321	273	235	204	178	156	137	118	100	82	64	47	30	15	3
21	Melbourne	676	559	462	384	321	271	230	198	171	149	131	114	98	83	68	54	39	25	13	2
60	Tullamarine	797	663	552	462	388	328	280	241	209	182	158	138	118	100	82	64	47	30	15	2
61	Mt Gambier	849	702	582	484	405	341	290	250	216	189	165	144	124	105	86	67	48	31	15	1
62	Moorabbin	742	615	511	426	357	301	256	220	190	165	144	125	108	91	75	58	43	27	13	1

Source: http://www.nathers.gov.au/files/publications/NatHERS%20Star%20bands.pdf

Melbourne's climate is categorised as a heating climate. That is, dwellings (houses & apartments) require more heating than cooling over the course of a year. The following heating and cooling degree day maps from the Bureau of Meteorology demonstrates this by showing that Melbourne has:

- 1500 Heating degree days
- 50 Cooling degree days

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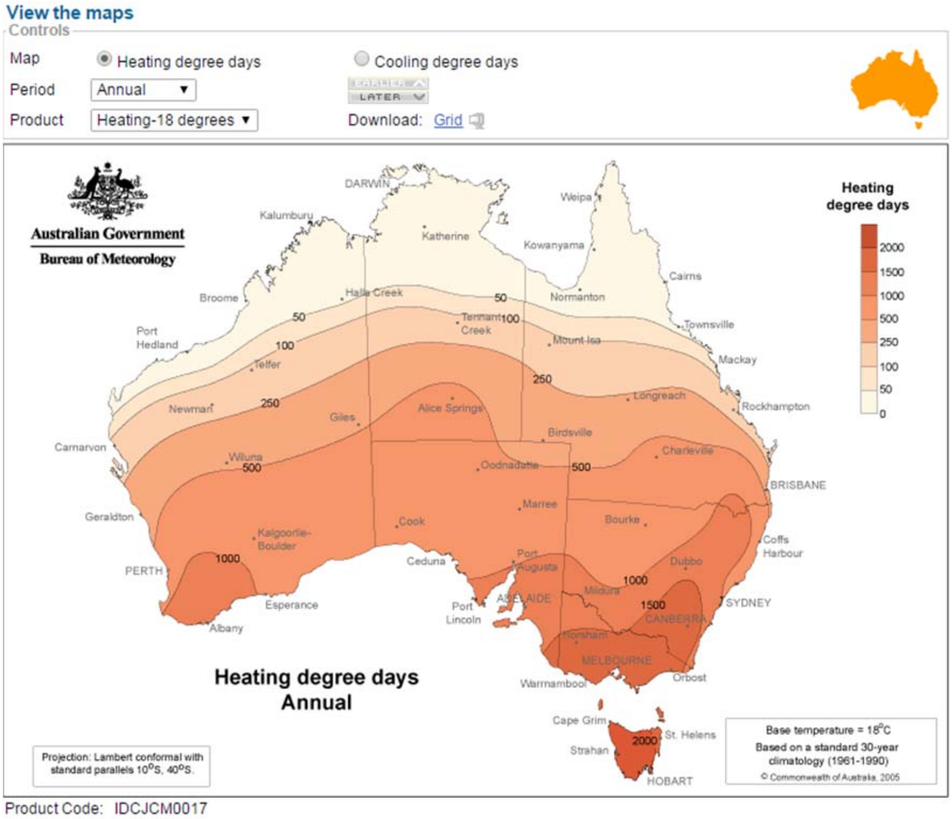
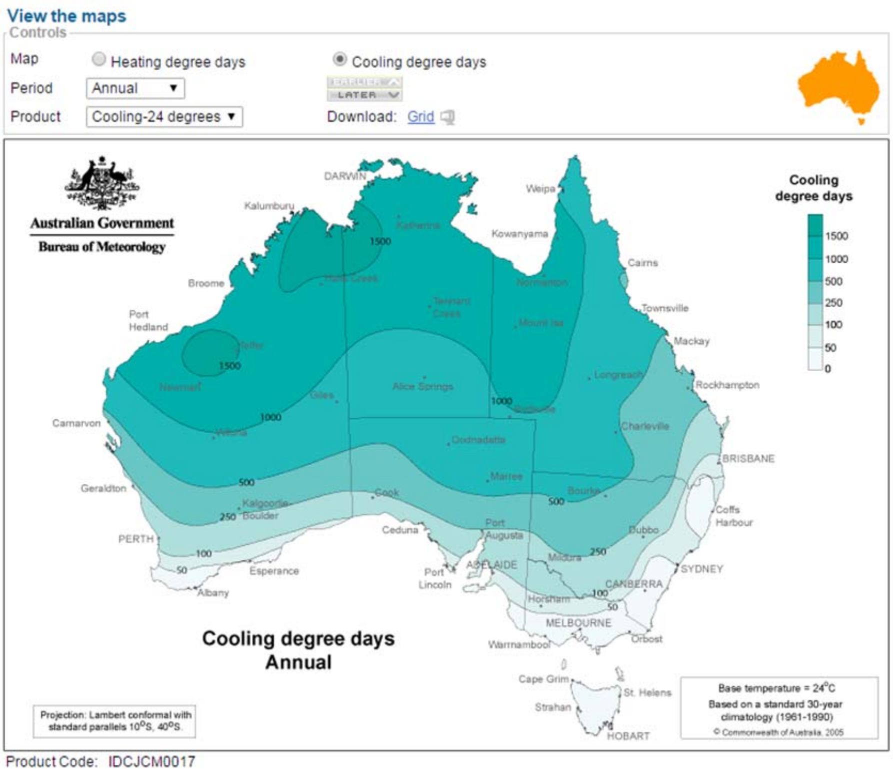


Source: Bureau of Meteorology - http://www.bom.gov.au/jsp/ncc/climate_averages/degree-days/index.jsp?maptype=1&period=an&product=hdd18#maps



Source: Bureau of Meteorology http://www.bom.gov.au/jsp/ncc/climate_averages/degree-days/index.jsp?maptype=3&period=an&product=cdd24#maps

Consequently, prescribing minimum cooling loads in Melbourne is likely to result in less solar radiation (heat) entering a dwelling causing an increase in heating energy consumption and an increase in energy consumption overall.

Therefore, focusing on one aspect of the NatHERS assessment methodology ignores Melbourne's climatic profile and therefore, this draft measure will not achieve its target objective of improved energy efficiency.

3.2 Negative delivery, procurement & cost impacts

Achieving a prescribed cooling load for every dwelling in a Class 2 Building (apartment building) fails to acknowledge the implicit complexity of the NatHERS assessment methodology and project procurement process.

To achieve the same cooling load for every dwelling would conceivably require the design and/or specification of:

- unique external shading for specific apartments
- unique glazing for specific apartments
- unique thermal mass and insulation levels for different dwelling sizes, orientations and locations

When considered in the context of a multi-residential project this presents a logistical challenge for the developer in terms of documentation, procurement, construction and regulatory compliance, leading to significant cost increases across multiple project stages.

3.3 Prescriptive cooling load precedent considered inappropriate

Prescribing a cooling load has previously been used to promote energy efficiency outcomes. The industry leading Green Star – Multi Unit Residential V1 2009 rating tool utilised this concept within its 'Indoor Environment Credit IEQ5 – Thermal Comfort.'

However, on 19 August 2014, the Green Building Council of Australia (GBCA) released an addendum to the tool in which the prescriptive cooling load within the aforementioned credit was revised. The revision came in response to a discussion paper review (11 March 2014) that stated "the reasoning for including a mj/sqm space heating and cooling allowances as a criteria threshold is not clear and, ...the credit should be rewritten for a star rating instead'.

Given the prior use of a prescriptive cooling load by the GBCA and their subsequent decision to revise the its use in response to industry feedback, utilising a prescribed cooling score appears to be an ill-considered mechanism to incorporate in the BADDS.

4. Appendix A – Snapshot of Projects

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5. Appendix B – Urban Digestor Directors

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