

WSU BANKSTOWN CITY CAMPUS SOLAR AMENITY STUDY

PREPARED FOR

WALKER CORPORATION

JAN 2021

ADDENDUM A

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Amenity Study
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PURPOSE OF THE REPORT

The addendum report provides an updated assessment of the latest architectural changes of the proposed Western Sydney University (WSU) vertical campus at 74 Rickard Road to Paul Keating Park in Bankstown City Centre.

This report is to be read in conjunction with the previous assessment and analysis - 'Solar Amenity Study - Revision C' produced in June 2020.

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The addendum report is structured as below:

- 1. INTRODUCTION** 3
Overview of the changes to the architectural scheme.
- 2. REVISED SOLAR AMENITY ANALYSIS** 4
Undertakes a revised solar amenity analysis between Scenario 3 and the updated scheme refer to as Scenario 4 in this report.
- 3. CONCLUSION** 14
Final solar amenity outcomes of Scenario 4.

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1.0 INTRODUCTION

REVISED ARCHITECTURE SCHEME

The proposed scheme (Scenario 4) aims to address Council's comments regarding: *'The building must be amended to so that it is located wholly within its site, with the exception of awnings and public domain works'.*

PROPOSED CHANGES

Lyons, WSU and Walker developed Scenario 4 to enable sun shading and non-habitable projections to be located within the Title Boundary. Projections into the Appian Way Right of Way (East Elevation) of 460mm are retained for sun shading and non-habitable architectural features.

To rebalance the building area the envelope volume has been redistributed to the south-western corners of Volume 2 (Levels 4-8) and Mid-Tower (Levels 9-14), including:

- **Volume 2:**
 - Rotate the south western corner of the southern facade 1.2m southwards, while retaining the 4m minimum setback to the southern title boundary.
- **Mid-Tower:**
 - Realign the southern façade to retain alignment with Volume 2.
 - Relocate the 1.5m south western corner towards the west.

Table 1 Revised Cantilever & Mid-Tower

LEVEL	FLOORPLATE (AVE - SQM)	GFA (85% EFFICIENCY, SQM)	# LEVELS	HEIGHT (M)	TOTAL GFA (SQM)
Podium:	2,561	2,193	3	13.5	6,579
- Ground	1,995	1,708	1		
- Level 1	2,762	2,365	1		
- Level 2	2,926	2,506	1		
Tower:	1,789	1,323	16	66.48	22,757
- Inset	1,978	1,463	1		
- Mid-Levels 1	2,560	1,893	4		
- Inset	1,609	1,190	1		
- Mid-Levels 2	1,939	1,434	5		
- Inset	1,296	958	1		
- Cantilever	1,355	1,002	4		
Roof Parapet:				1.55	
TOTAL			19	81.53	29,336

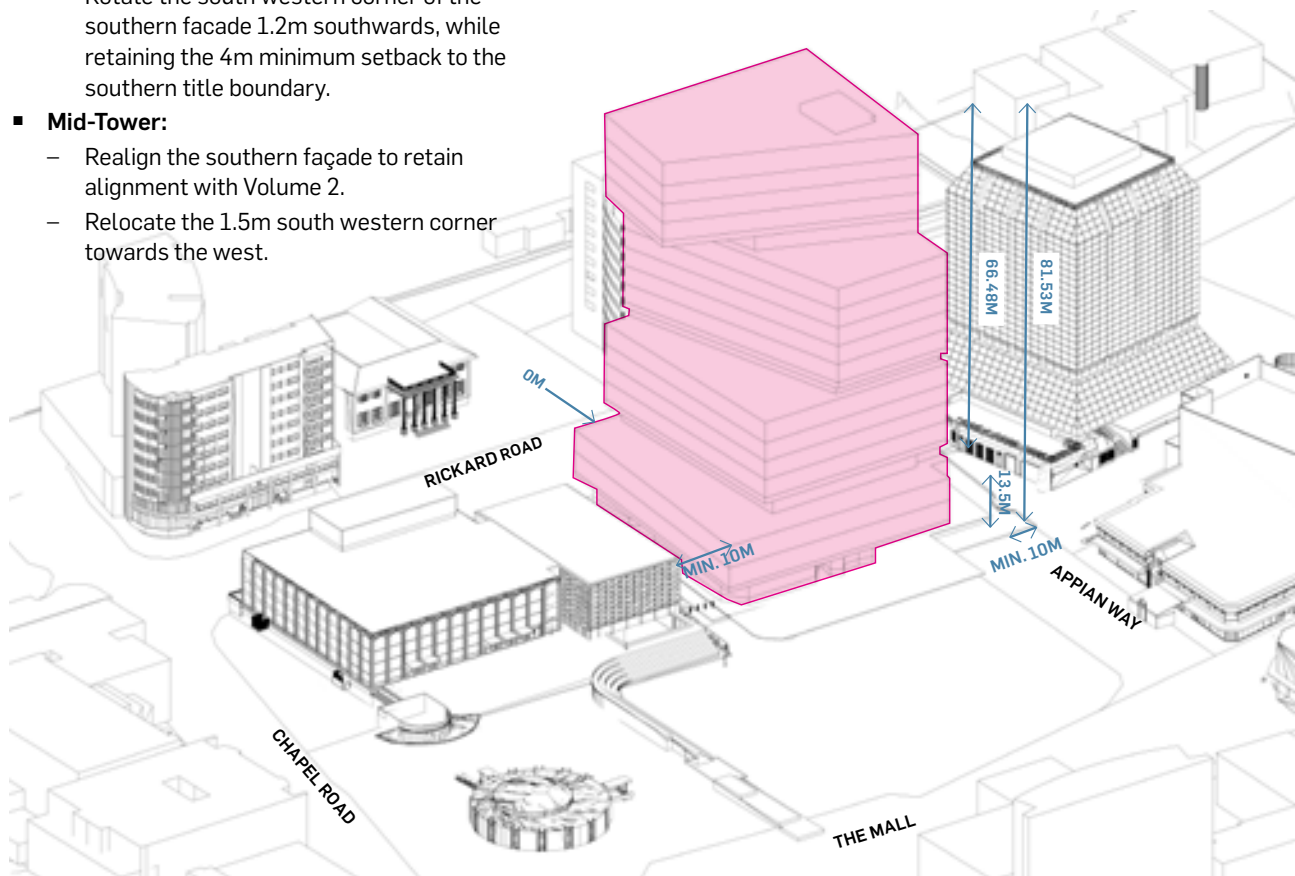


Figure 1 Proposed built form of Scenario 4

2.0 REVISED SOLAR AMENITY ANALYSIS

KEY INSIGHTS:

The findings of this investigation are summarised in the table and chart opposite. They reveal:

Scenario 4: There is minor additional sun access to the park from 9am to 10am and from 1pm to 2pm.

The increase ranging from 0.5% (61 sqm) to 0.3% (36 sqm) for four hours 9am, 10am, 1pm & 2pm.

HOURLY SOLAR AMENITY ANALYSIS

The following investigation undertakes solar amenity analysis to Paul Keating Park at hourly intervals between 9am and 4pm on winter solstice. This 7-hour period was analysed to understand the total solar amenity realised in the park throughout the day. The analysis identifies:

- Shadow cast by existing buildings;
- Additional shadow cast by the Scenario 4: compared with the existing building; and
- Contiguous area of the park in sunlight for Scenario 3 and additional sun access from Scenario 4.

LEGEND

Existing shadow

SCENARIO 3: ADDITIONAL SHADOW CAST

Scenario 3 Sunlight - contiguous

SCENARIO 4: ADDITIONAL SUN ACCESS

Scenario 4 Shadow

Scenario 4 Sunlight - contiguous

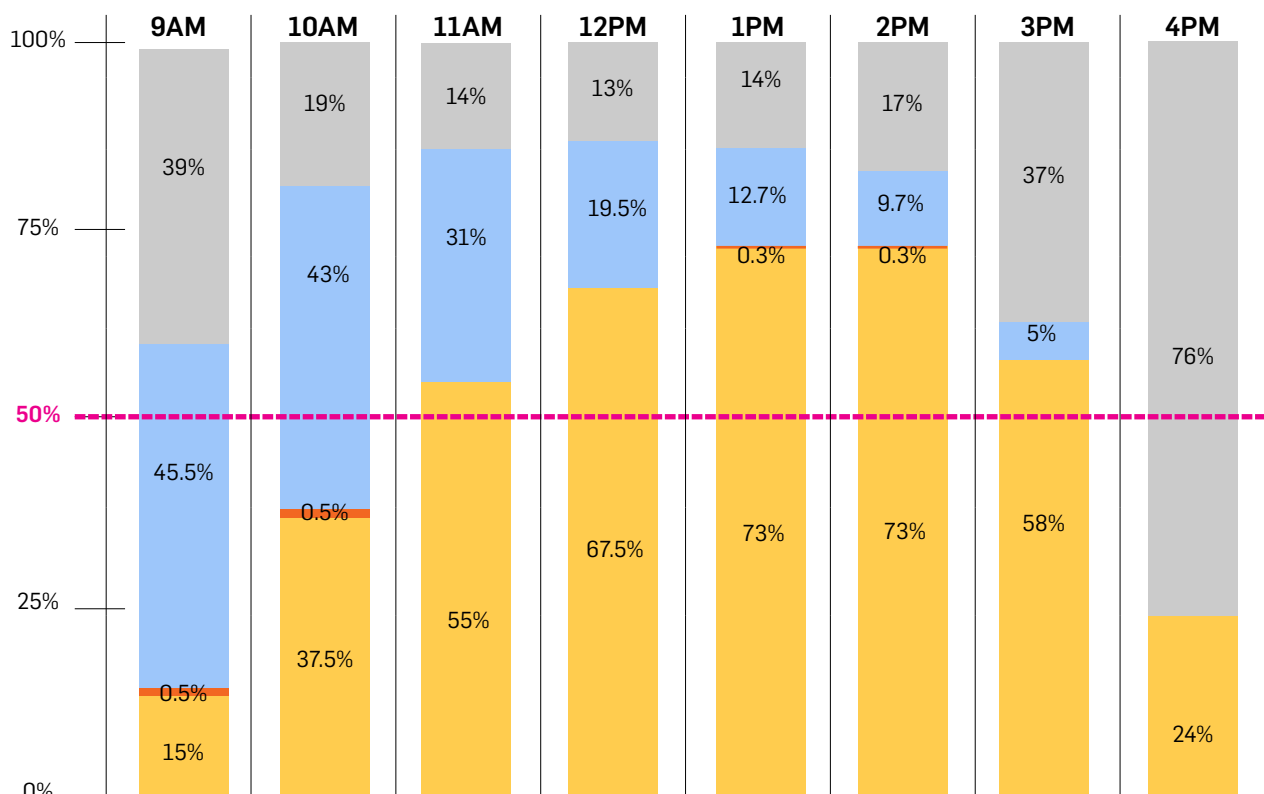
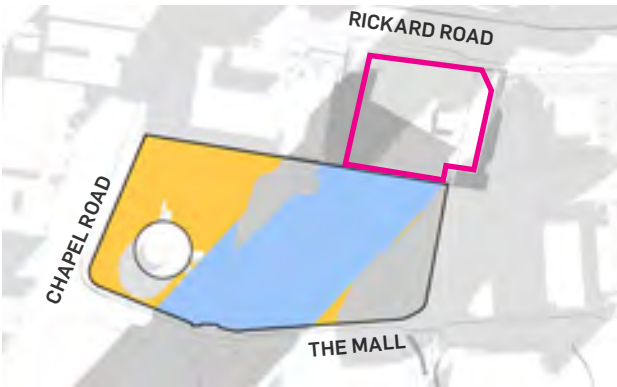
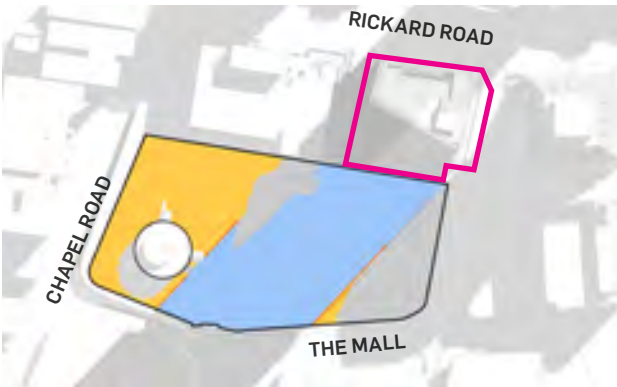


Figure 2 Solar Amenity Hourly Intervals Analysis

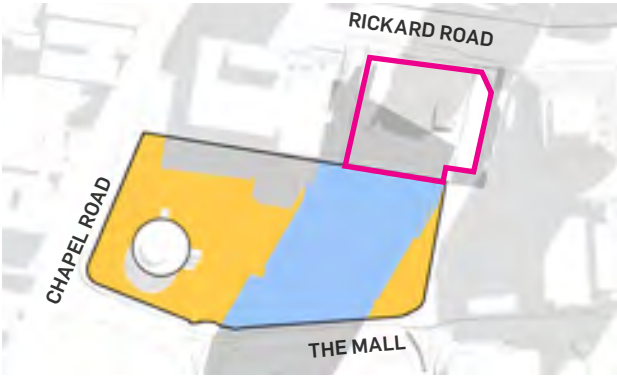
9 AM (PROPOSED JUNE 2020)



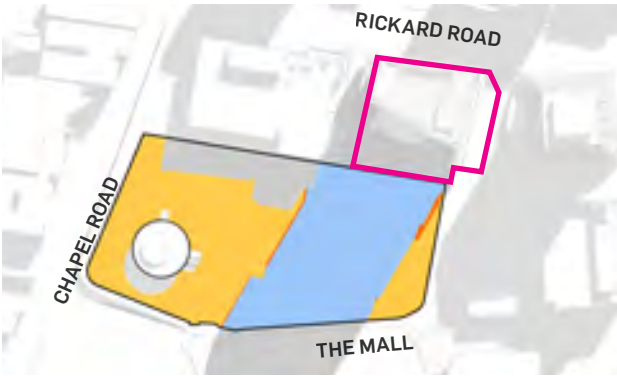
9 AM (REVISED SCHEME)



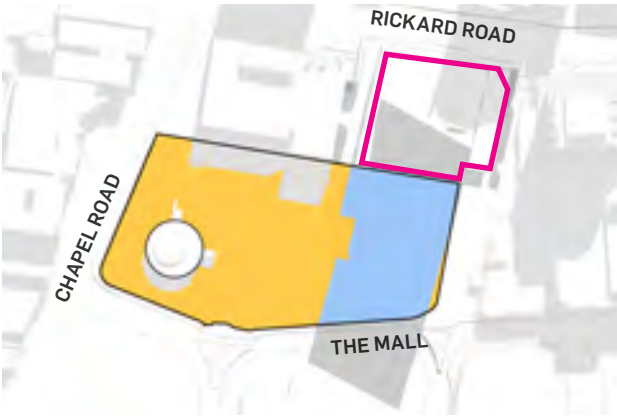
10 AM



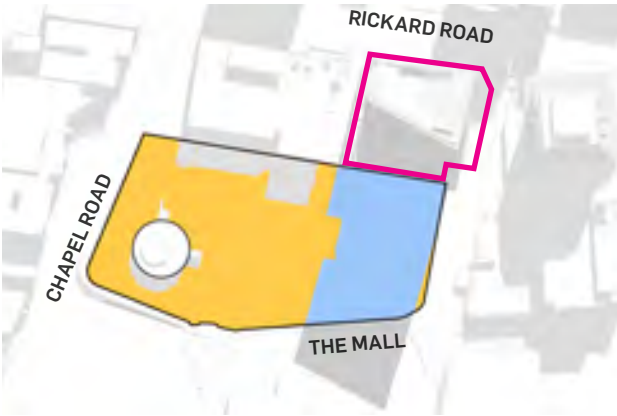
10 AM



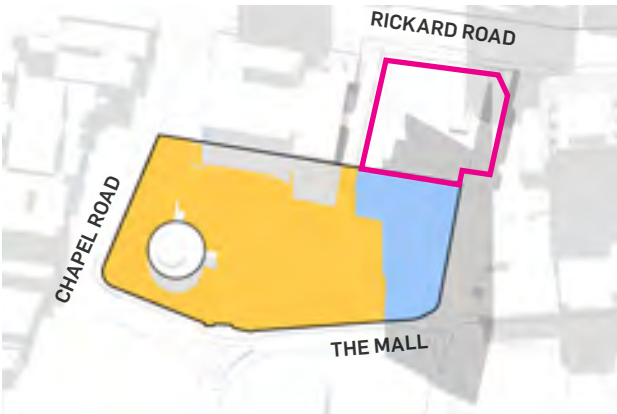
11 AM



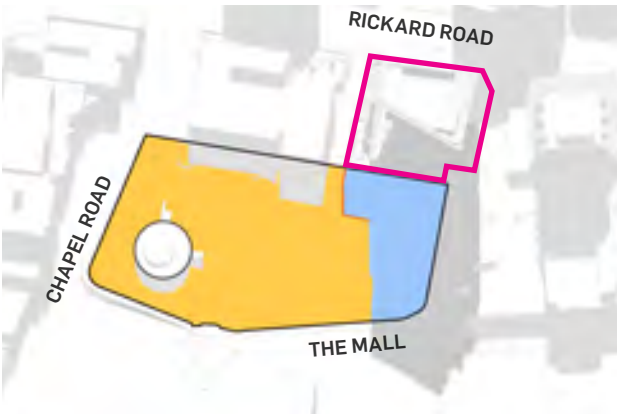
11 AM



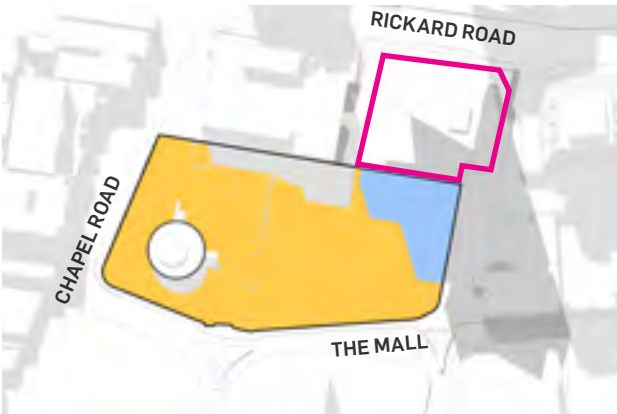
12 PM



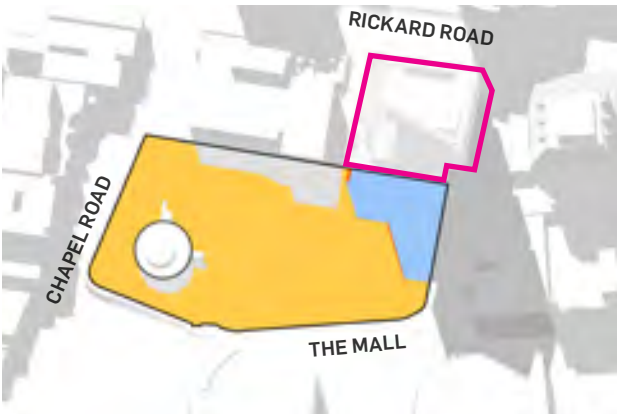
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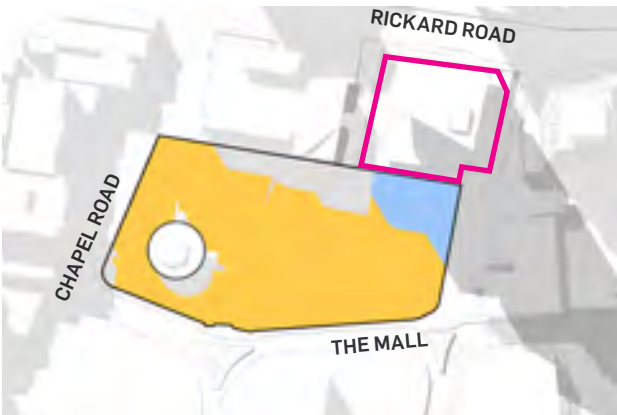
1 PM (PROPOSED JUNE 2020)



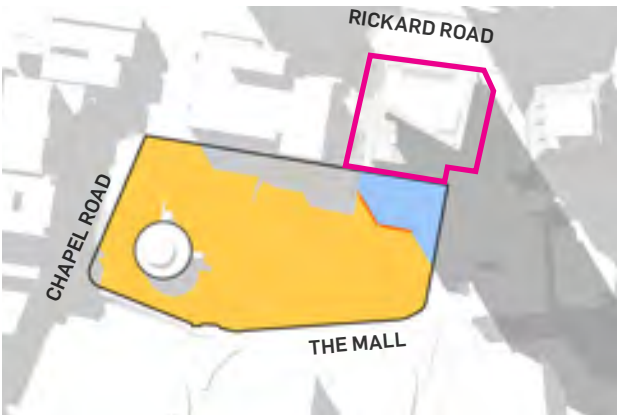
1 PM (REVISED SCHEME)



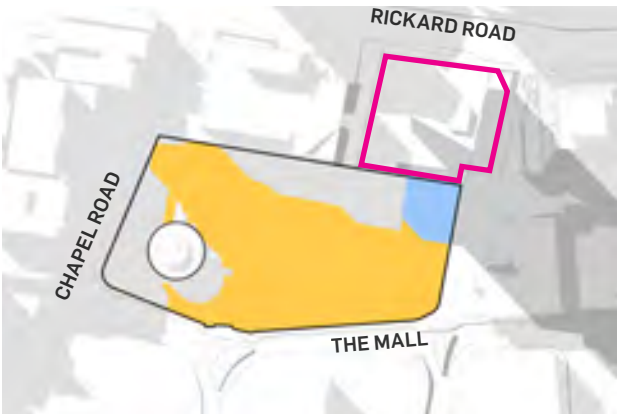
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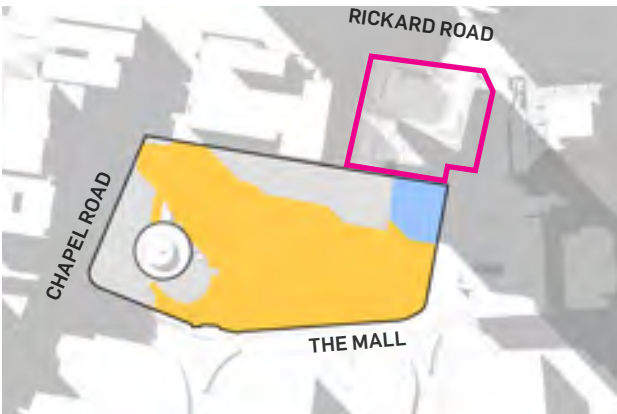
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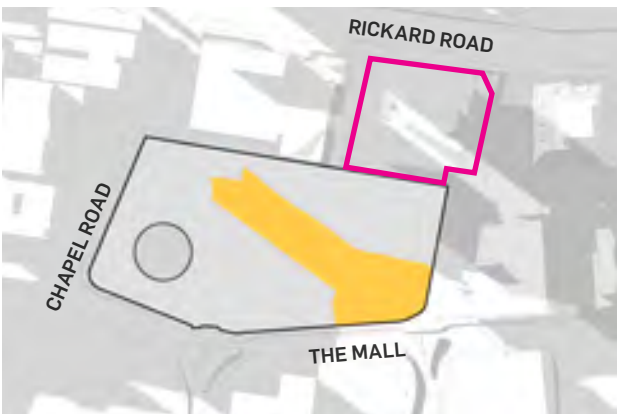
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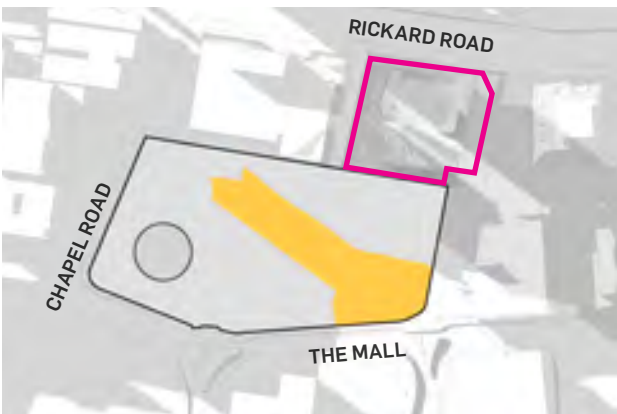
3 PM



4 PM



4 PM

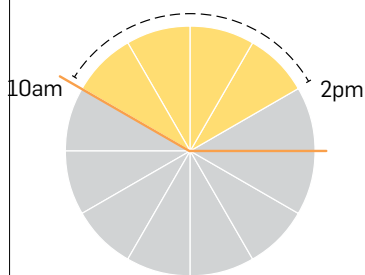


SOLAR AMENITY COMPOSITES

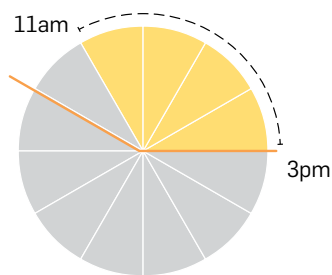
The following analysis compares solar amenity composites for Paul Keating Park. Solar amenity composites consider the cumulative solar amenity impacts across consecutive hours identifying areas in the park that meet the 'continuous' requirement of Council's proposed control.

4 HOUR COMPOSITES

The first two solar amenity composites consider two different 4-hour timeframes throughout the day being:



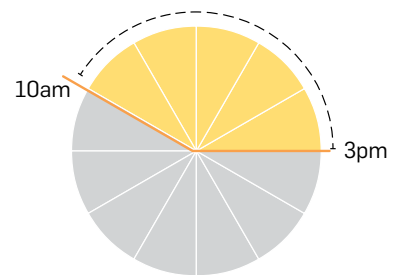
COMPOSITE A: Between 10:00 am and 2:00 pm: the first 4 hour period contained within Council's proposed solar amenity control;



COMPOSITE B: Between 11:00am and 3:00 pm: the second 4 hour period contained within Council's proposed solar amenity control.

5 HOUR COMPOSITE

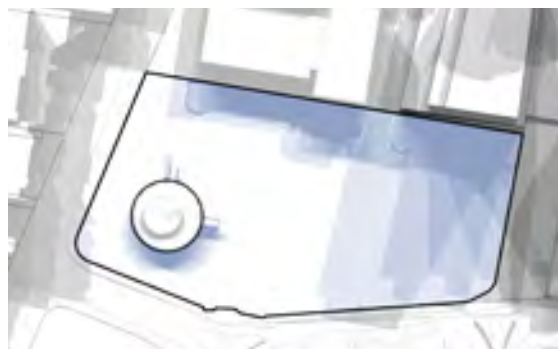
An additional solar amenity composite was subsequently prepared which combines the above 4 hour periods into a five (5) hour composite as follows:



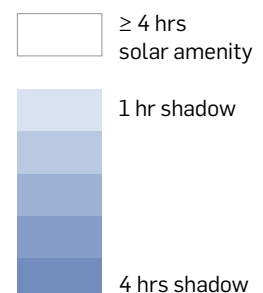
Composite C: Between 10:00 am and 3:00 pm: a 5 hour period reflecting Council's proposed solar amenity control considers the cumulative areas of PKP which achieve 4 hours of continuous solar amenity.

COMPOSITES EXPLANATION

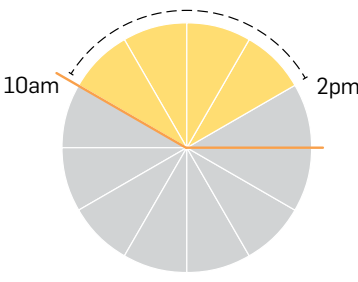
Composites are prepared by overlaying the shadow diagrams for each hour, on-the-hour, within the time period identified. These are multiplied upon one another to reflect cumulative shadows. For a four hour period, five hourly composites are overlaid i.e. from 10am to 2pm - 10am, 11am, 12pm, 1pm and 2pm are overlaid.



LEGEND



COMPOSITE A: SOLAR AMENITY 10AM TO 2PM








This solar amenity composite considers the first 4 hour period contained within Council's proposed solar amenity control - from 10am - 2pm.

KEY INSIGHTS:

- From 10:00am to 2:00pm a consolidated area of PKP receives 4 hours continuous solar amenity for:
- Scenario 3 - 35.3%.
 - Scenario 4 - Minor additional sun access to 35.6%.

This analysis identifies that the revised scheme results in no negative impacts with a minor additional benefit of 0.3% achieving four hours solar access.

LEGEND

	Site boundary	AREA (SQM)	%	AREA (SQM)	%
	Paul Keating Park	12,207sqm	100%		
		SHADOW		TOTAL SUNLIGHT 4 hr continuous (10am-2pm)	
	Existing buildings	3,948sqm	32.35%	8,259sqm	68%
Additional Shadow					
	Scenario 3	3,949sqm	32.35%	4,310sqm	35.3%
	Scenario 4	3,908sqm	32%	4,351sqm	35.6%

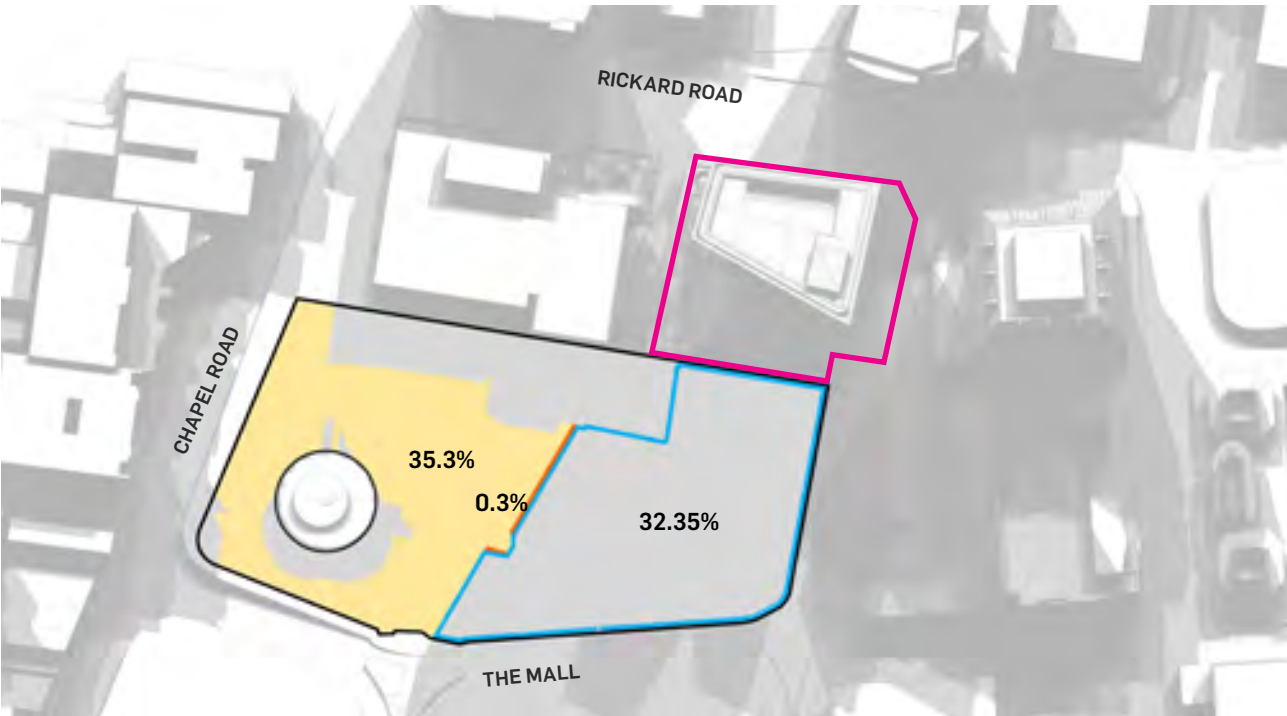


Figure 3 Overlay of Scenario 3 & 4 - Areas Greater than 4 hours Solar amenity 10am-2pm

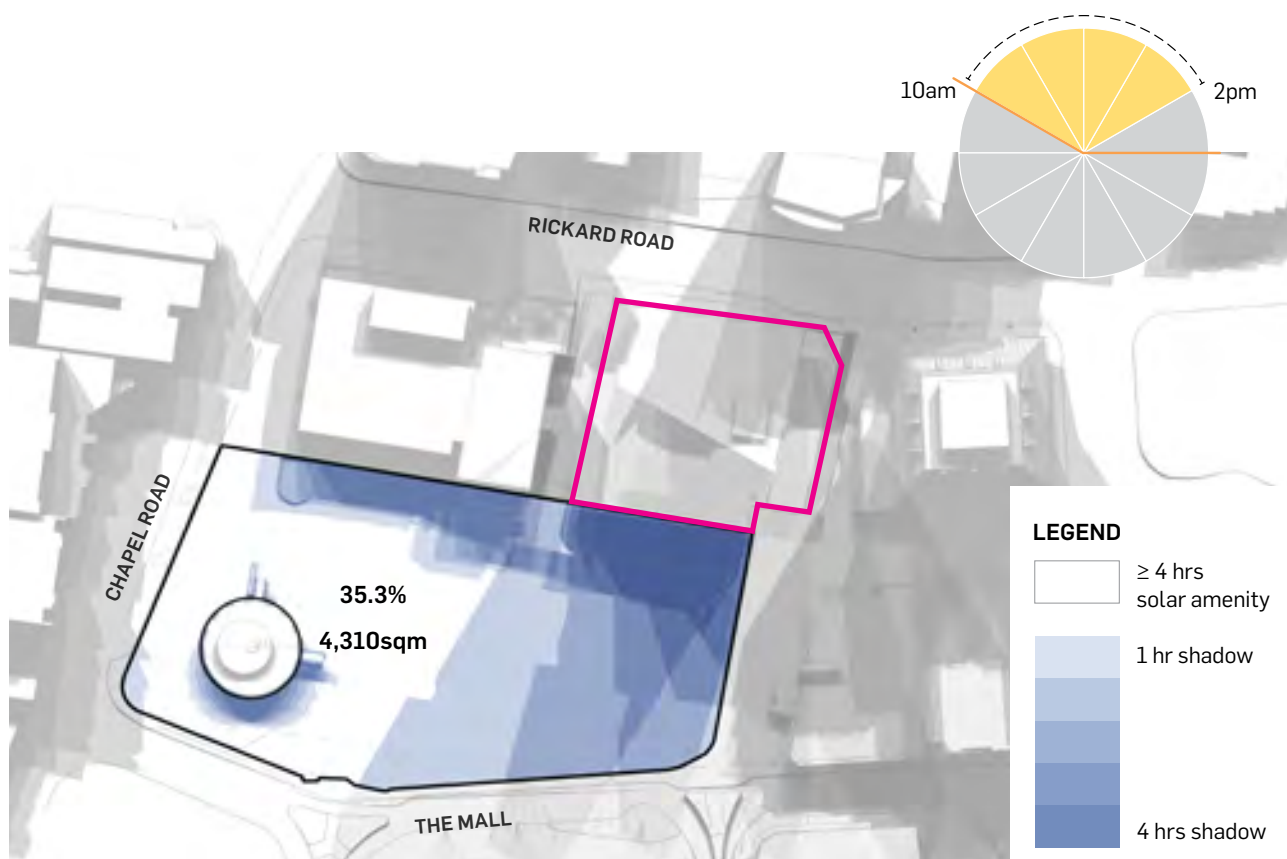


Figure 4 Scenario 3: Revised Cantilever & Mid-Tower - Solar amenity Composite 10am-2pm

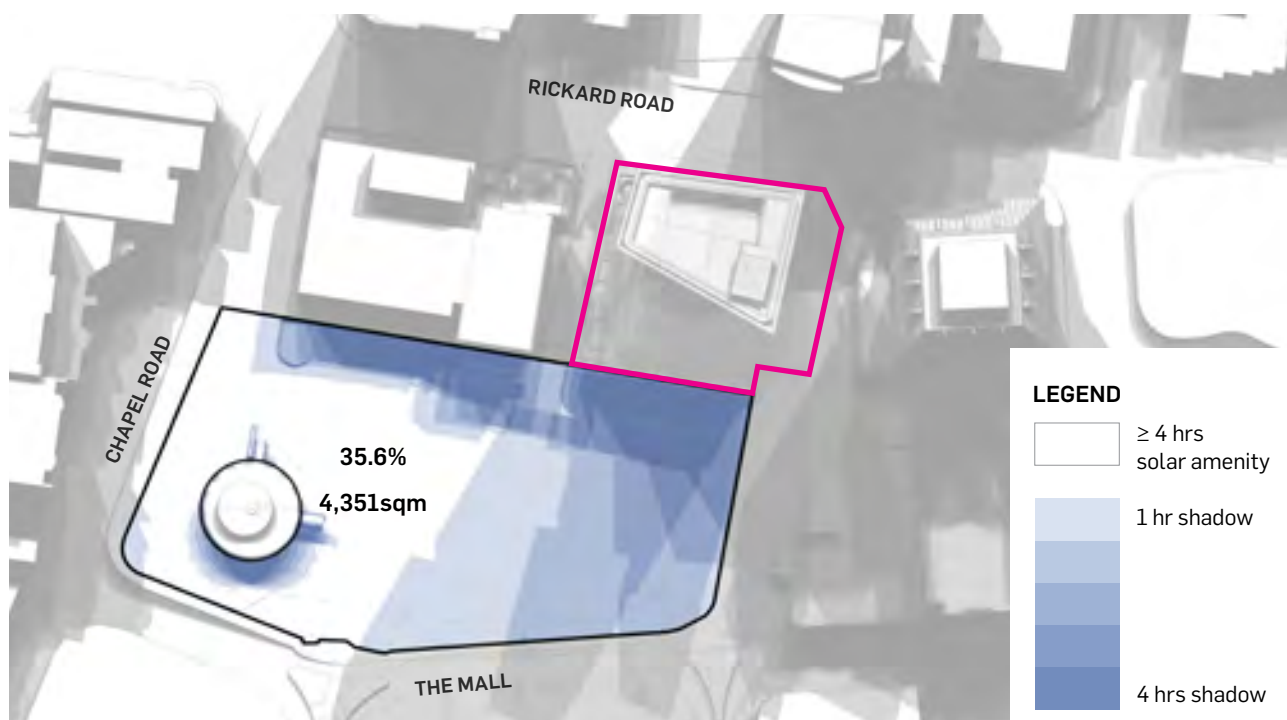
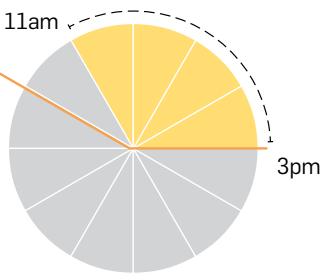


Figure 5 Scenario 4: Amended Scheme - Solar amenity Composite 10am-2pm

COMPOSITE B: SOLAR AMENITY 11AM TO 3PM



This solar amenity composite considers the second 4 hour period contained within Council's proposed solar amenity control - from 11am - 3pm.

KEY INSIGHTS:

From 11:00am to 3:00pm a consolidated area of PKP receives 4 hours continuous solar amenity for:

- Scenario 3 - 41.6%.
- Scenario 4 - Minor additional sun access to 41.75%.

This analysis identifies that the revised scheme results in no negative impacts with a minor additional benefit of 0.15% achieving four hours solar access.

LEGEND

		AREA (SQM)	%	AREA (SQM)	%
<div></div>	Site boundary				
<div></div>	Paul Keating Park	12,207sqm	100%		
		SHADOW		TOTAL SUNLIGHT 4 hr continuous (10am-2pm)	
<div></div>	Existing buildings	3,970sqm	32.5%	8,237 sqm	67.5%
Additional Shadow					
<div></div>	Scenario 3	3,149sqm	25.8%	5,088sqm	41.6%
<div></div>	Scenario 4	3,142sqm	25.75%	5,095sqm	41.75%

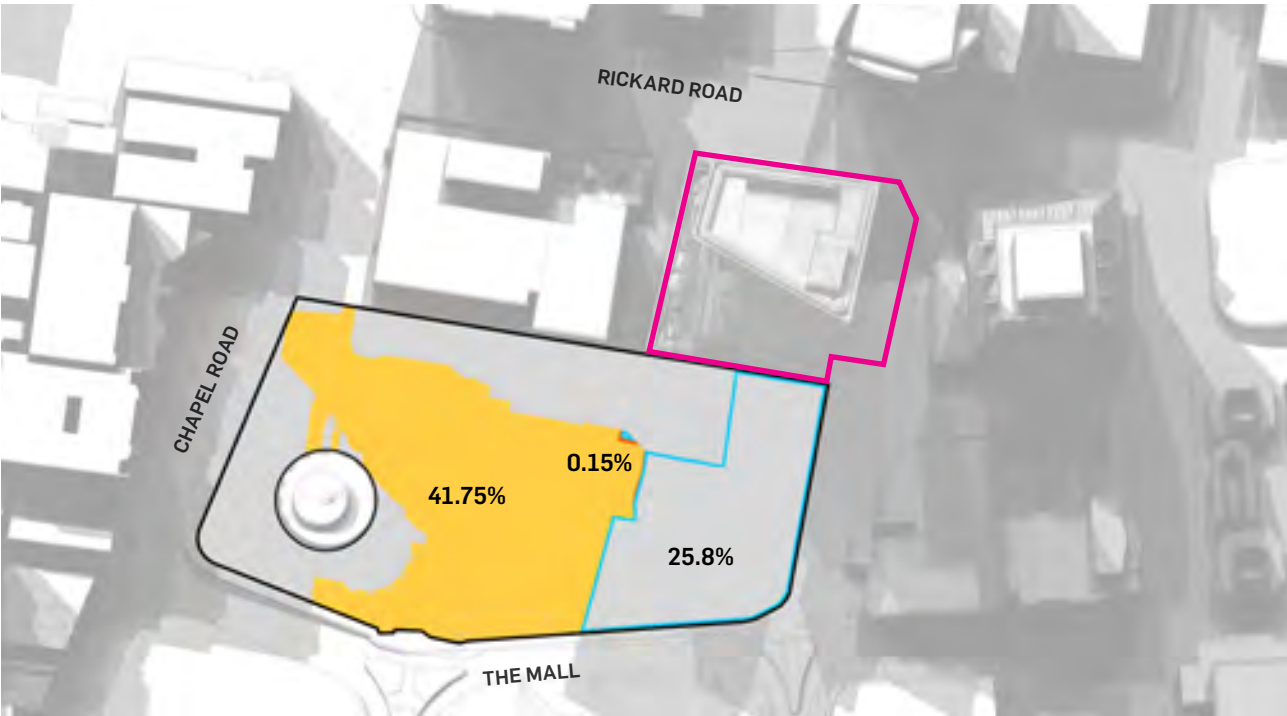


Figure 6 Overlay of Scenario 1-3 - Areas Greater than 4 hours Solar amenity 11am-3pm

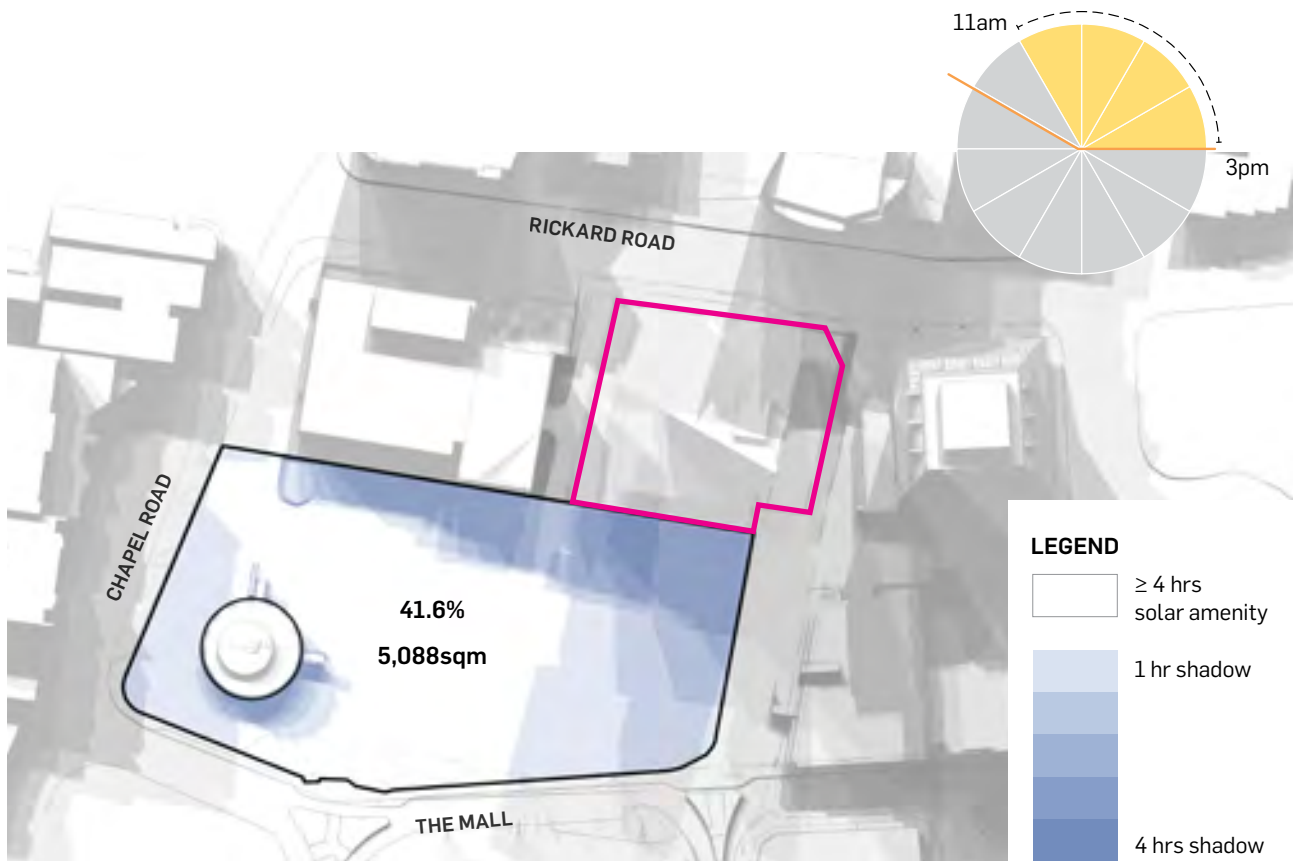


Figure 7 Scenario 3: Revised Cantilever & Mid-Tower - Solar amenity Composite 11am-3pm

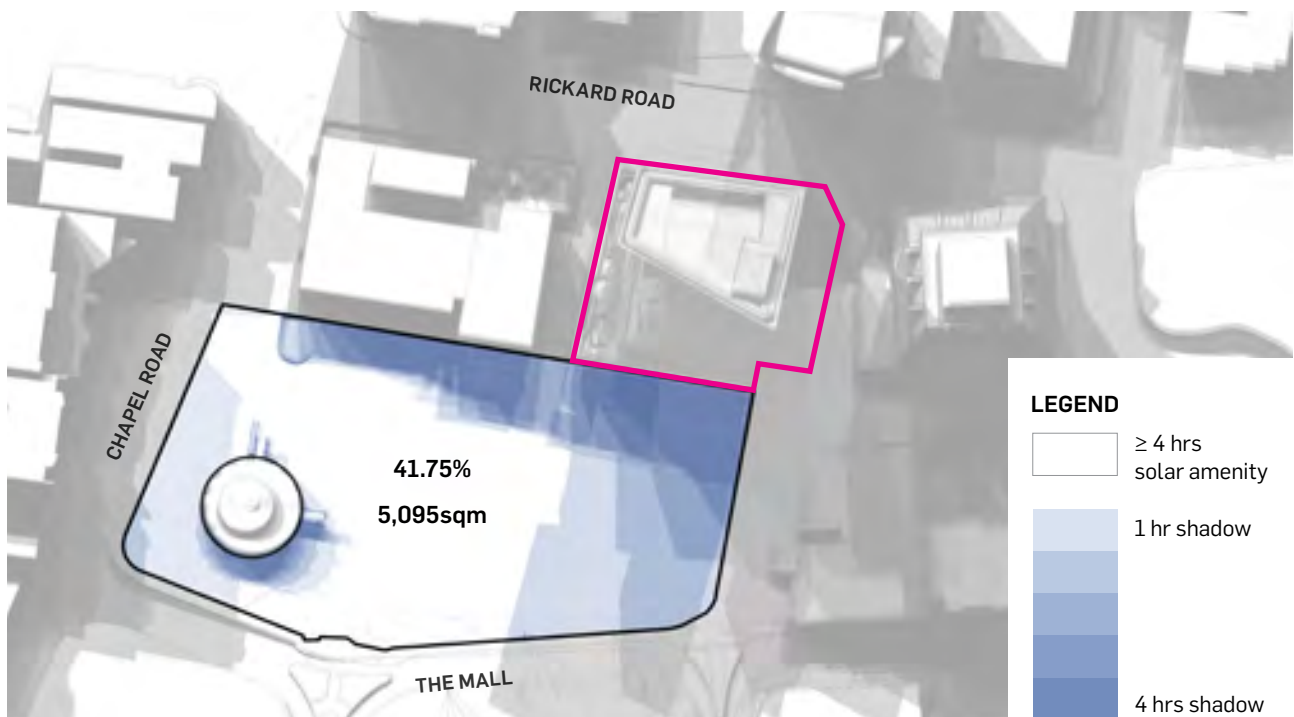
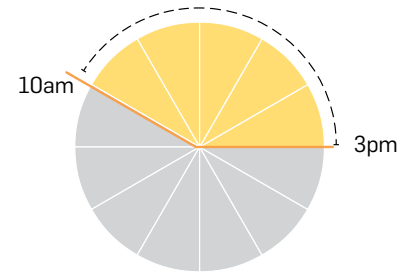


Figure 8 Scenario 4: Amended Scheme - Solar amenity Composite 11am-3pm

COMPOSITE C: SOLAR AMENITY 10AM TO 3PM



This solar amenity composite considers the cumulative areas of 4 hour solar amenity across the combined 5 hour period from 10am to 3pm by adding the areas within 10am-2pm and 11am-3pm together and discounting any overlapping areas. It compares the two scenarios.

KEY INSIGHTS:

From 10:00am to 3:00pm a consolidated area of PKP receives 4 hours continuous solar amenity for:

- **Scenario 3 Revised Cantilever & Mid-Tower** - 6,193sqm (50.7%)
- **Scenario 4 Amended Scheme** - 6,208sqm (50.9%)

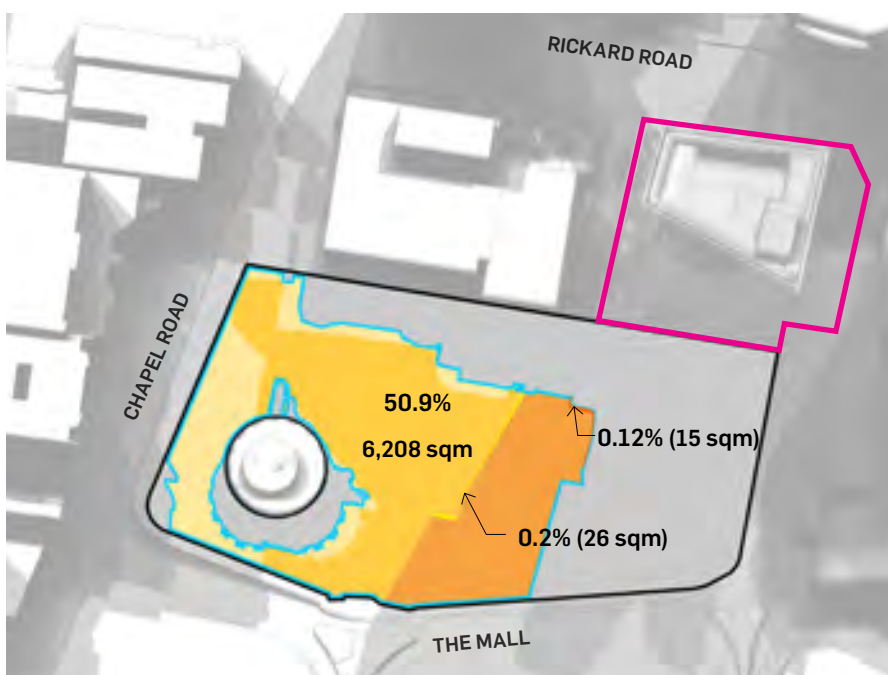
This analysis identifies that the 50% continuous 4 hours solar amenity outcome for plants and grass areas is still achieved in Scenario 4 (50.9%) between the hours of 10am to 3pm.

Table 2 Summary composite analysis calculations 10am -3pm

LEGEND		SCENARIO 3		SCENARIO 4	
	Site boundary	AREA (SQM)	%	AREA (SQM)	%
	Paul Keating Park	12,207sqm	100%	12,207sqm	100%
	Less than 4hrs solar amenity	6,014sqm	49.3%	5,999sqm	49.1%
Areas with ≥4 hrs solar amenity 10am-3pm					
	10am-2pm (4hrs)	1,283sqm	10.5%	1,283sqm	10.5%
	10am-3pm (5hrs)	3,127sqm	25.6%	3,153sqm	25.8%
	11am-3pm (4hrs)	1,783sqm	14.6%	1,772sqm	14.5%
Total Area with ≥4 hrs Solar amenity 10am-3pm		6,193sqm	50.7%	6,208sqm	50.9%

NOTE: These calculations are cumulative and do not involve overlapping areas. The methodology for this calculated the area receiving 5hrs solar amenity between 10am-3pm and added additional areas receiving 4hrs solar amenity to this baseline.

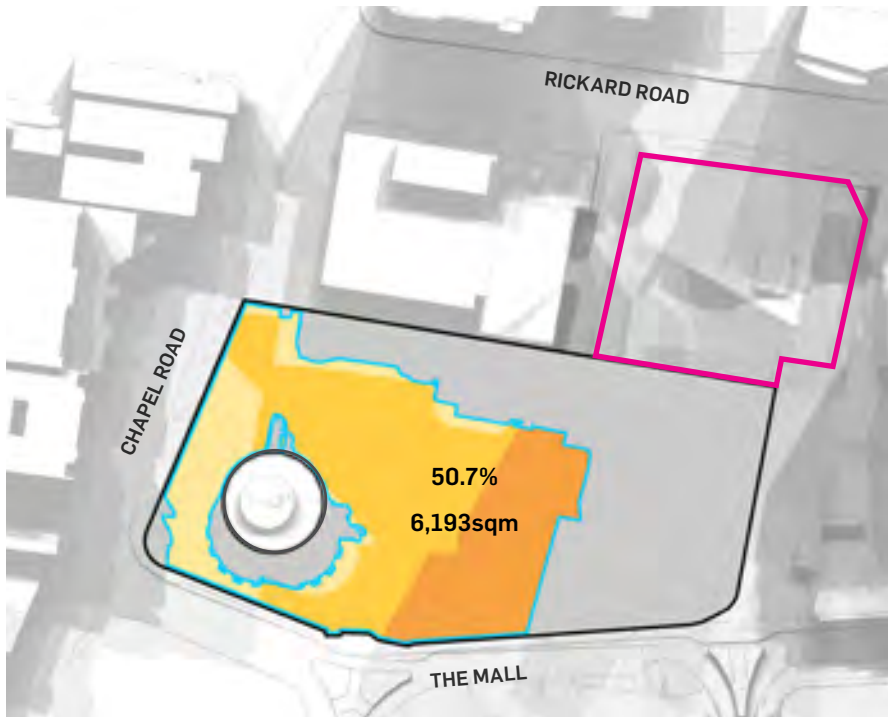
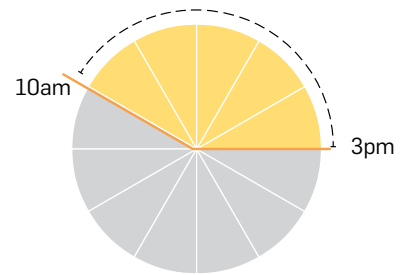
Please refer to plans on following pages for reference areas for the calculations in this table.



LEGEND

- Scenario 4: 5 hrs solar amenity 10am-3pm
- Scenario 3: Additional 5 hrs solar amenity 10am-3pm
- Scenario 4: 4 hrs solar amenity 11am-3pm
- Scenario 4: Additional 4 hours solar amenity 11am-3pm
- Both Scenarios: 4 hours solar amenity 10am-2pm
- Both Scenarios: Less than 4hrs solar amenity 10am-3pm

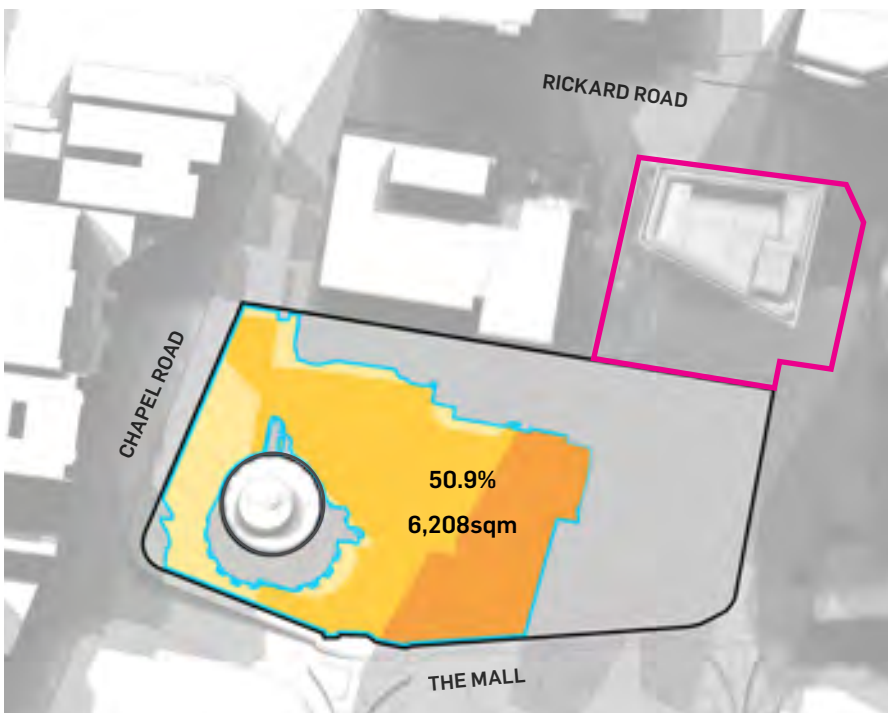
Figure 9 Difference between Scenario 3 & 4 from 10am to 3pm



LEGEND

- Area of continuous 4hr solar amenity within Council timeframe (10am-3pm)
- 4 hours solar amenity 10am-2pm
- 5 hrs solar amenity 10am-3pm
- 4 hours solar amenity 11am-3pm
- Less than 4hrs solar amenity 10am-3pm

Figure 10 Scenario 3: Revised Cantilever & Mid-Tower - Areas Greater than 4 hours Solar Amenity 10am-3pm



LEGEND

- Area of continuous 4hr solar amenity within Council timeframe (10am-3pm)
- 4 hours solar amenity 10am-2pm
- 5 hrs solar amenity 10am-3pm
- 4 hours solar amenity 11am-3pm
- Less than 4hrs solar amenity 10am-3pm

Figure 11 Scenario 4: Amended Scheme - Areas Greater than 4 hours Solar Amenity 10am-3pm

3.0 CONCLUSION

FINDINGS OF THIS STUDY

This study has identified that the proposed amendments to the architectural scheme (Scenario 4) result in no impacts to the proposed solar amenity outcomes for Paul Keating Park when compared with Scenario 3.

The changes provide a minor additional sunlight as follows:

- 26 sqm (0.2%) additional area receives 5 hours of continuous sunlight between the hours of 10am-3pm; and
- 15 sqm (0.12%) additional area receives 4 hours of continuous sunlight between the hours of 11am-3pm.

The latest architectural scheme changes retain the established architectural and engineering structural design components and achieves an additional 0.2% resulting in 50.9% solar amenity - meeting Council's proposed 50% requirement.

