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# Appendix DD

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## Solar access and overshadowing report

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# Parramatta Over and Adjacent Station Development Solar Access and Overshadowing Report

Appendix DD

October 2022

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Mott MacDonald Australia Pty Ltd

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## Glossary

Term	Definition
2D	Two-dimensional
3D	Three-dimensional
ADG	Apartment Design Guide
CBD	Central business district
Concept SSD Application	A concept development application as defined in section 4.22 of the EP&A Act. It is a development application that sets out the concept for the development of a site, and for which detailed proposals for the site or for separate parts of the site are to be the subject of a subsequent development application or applications
CSSI	Critical state significant infrastructure
DCP	Development control plan
DPE	Department of Planning and Environment
Early morning	Between 6am and 8am (inclusive)
EIS	Environmental impact statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GFA	Gross floor area
Hassall's Method	The method outlined in David N. H. Hassall's (1991) <i>'Reflectivity: Dealing with rogue solar reflections'</i> publication
Late afternoon	Between 4pm and 7pm (inclusive)
Mid-afternoon	Between 1pm and 3pm (inclusive)
Mid-morning	Between 9am and 11am (inclusive)
OSD	Over station development
POS	Public open space
RL	Relative level
SEARs	Secretary's Environmental Assessment Requirements
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State significant development

## Executive summary

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This document has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for a Concept State Significant Development Application (Concept SSDA) above Parramatta metro station. This report has been prepared to assess individual apartment's ability to receive direct sunlight and specifically respond to SEARs issued for the Concept SSDA.

The concept SSDA seeks approval for a mixed-use development comprising of three (3) new commercial office buildings (Buildings A, C, D) and one (1) residential accommodation building (Building B) above the Parramatta metro station. The Concept SSDA seeks consent for a building envelope and use for residential and commercial purposes, maximum building height, a maximum gross floor area (GFA), pedestrian and vehicular access, circulation arrangements and associated car parking and the strategies and design parameters for the future detailed design of development.

The Concept SSDA specifically seeks consent for the following land uses within the proposed SSD development:

- Building A: Approximately 38 storeys. Commercial and retail
- Building B: Approximately 33 storeys. Residential and retail
- Building C: Approximately 26 storeys. Commercial and retail
- Building D: Approximately 24 storeys. Commercial and retail.

The Secretary's Environmental Assessment Requirements (SEARs) a solar access analysis of the overshadowing impacts of the development within the site, on surrounding properties, and public spaces.

This report has been prepared by Bates Smart Architects Pty Ltd to accompany the Concept SSDA for the proposed over and adjacent station development at the Parramatta metro station.

Solar access studies were performed to assess individual apartment's ability to receive direct sunlight. The proposed apartment layouts of Building B can comply with the Apartment Design Guide (ADG) recommendations found in Part 4 of the *State Environmental Planning Policy 65* (SEPP65).

The studies demonstrate that 76% of apartments would achieve more than 2 hours of direct solar access. The same apartments (76%) achieve more than 3 hours. Apartments facing east achieve less than 2 hours of direct solar. No apartments receive zero direct sunlight on the winter solstice.

The development is considered to enjoy a high level of solar access and be in accordance with the guidelines set out by the ADG.

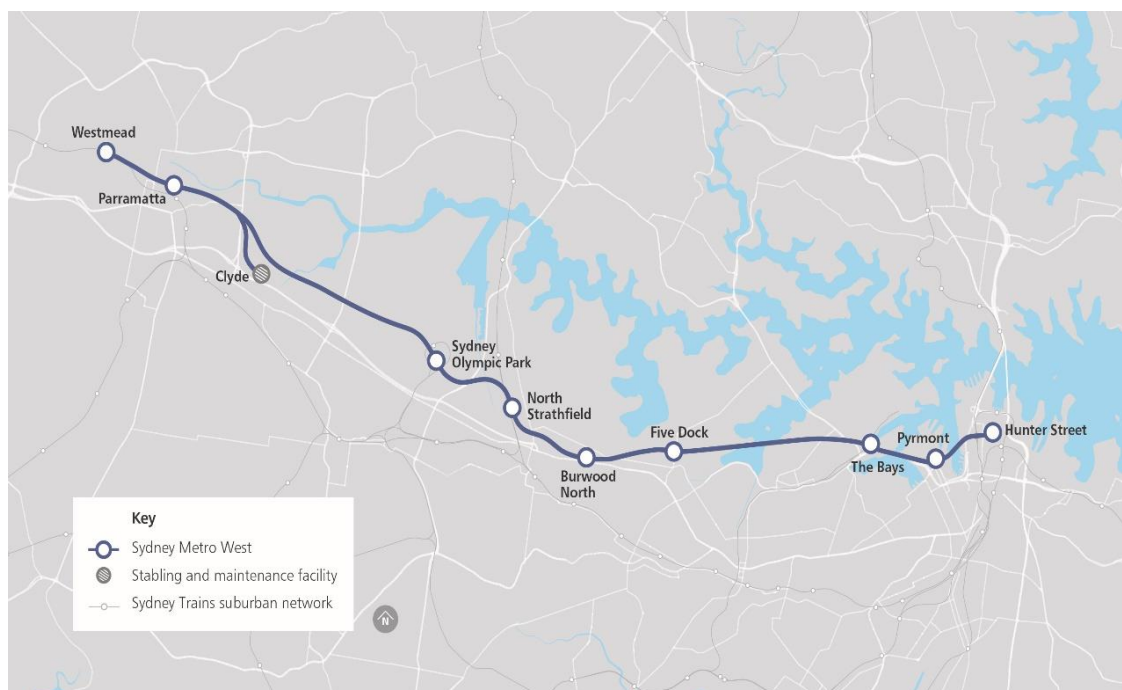
# 1 Introduction

## 1.1 Sydney Metro West

Sydney Metro West will double rail capacity between Greater Parramatta and the Sydney Central Business District (CBD), transforming Sydney for generations to come. The once in a century infrastructure investment will have a target travel time of about 20 minutes between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont, and Hunter Street (Sydney CBD).

Sydney Metro West station locations are shown in Figure 1-1.



**Figure 1-1 Sydney Metro West**

## 1.2 Background and planning context

Sydney Metro is seeking to deliver Parramatta metro station under a two-part planning approval process. The station infrastructure is to be delivered under a Critical State Significant Infrastructure (CSSI) application subject to provisions under Division 5.2 of the EP&A Act. While the over and adjacent station developments are to be delivered under a State Significant Development (SSD) subject to the provisions of Part 4 of the EP&A Act.

### 1.2.1 Critical State Significant Infrastructure

The State Significant Infrastructure (SSI) planning approval process for the Sydney Metro West metro line, including delivery of station infrastructure, has been broken down into a number of planning application stages, comprising the following:

- Stage 1 CSSI Approval (SSI-10038) – All major civil construction works between Westmead and The Bays including station excavation, tunnelling and demolition of existing buildings (approved 11 March 2021)

- Stage 2 CSSI Application (SSI- 19238057) – All major civil construction works between The Bays and Sydney CBD (approved 24 August 2022)
- Stage 3 CSSI Application (SSI- 22765520) – Tunnel fit-out, construction of stations, ancillary facilities and station precincts between Westmead and the Sydney CBD, and operation and maintenance of the Sydney Metro West line (under assessment, lodged).

### 1.2.2 State Significant Development Application

The SSDA will be undertaken as a staged development with the subject Concept SSDA being consistent with the meaning under section 4.22 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and seeking conceptual approval for a building envelope, land uses, maximum building heights, a maximum gross floor area, pedestrian and vehicle access, vertical circulation arrangements and associated car parking. A subsequent Detailed SSD/s is to be prepared by a future development partner which will seek consent for detailed design and construction of the development.

## 1.3 Purpose and scope

This Solar Access and Overshadowing report support a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the EP&A Act. The Concept SSDA is made under Section 4.22 of the EP&A Act.

This report has been prepared to specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the Concept SSDA on 22 February 2022 which states that the Environmental Impact Statement is to address the following requirements:

**Table 1-1 SEARs and where this is addressed in this report**

Key issue	SEARs	Addressed in
4.Environmental amenity	Provide a solar access analysis of the overshadowing impacts of the development within the site, on surrounding properties and public spaces (during summer and winter solstice and spring and autumn equinox) at hourly intervals between 9am and 3pm, when compared to the existing situation and a compliant development (if relevant).	Section 3, 4, 5 and 6
	Provide an assessment of the development against SEPP 65 and the Apartment Design Guideline.	Section 4 and 5

Sydney Metro is seeking to secure concept approval for a mixed-use development comprising of three (3) new commercial office buildings (Buildings A, C, D) and one (1) residential accommodation building (Building B) above the Parramatta metro station, otherwise known as the over station development (OSD). The Concept SSDA seeks consent for a building envelope and use for residential and commercial purposes, maximum building height, a maximum gross floor area (GFA), pedestrian and vehicular access, circulation arrangements and associated car parking and the strategies and design parameters for the future detailed design of development.

This purpose of this report is to assess and verify the following:

- The projected solar access to the proposed residential apartment building (Building B)
- The potential overshadowing of neighbouring residential properties
- The potential overshadowing of protected solar zones.

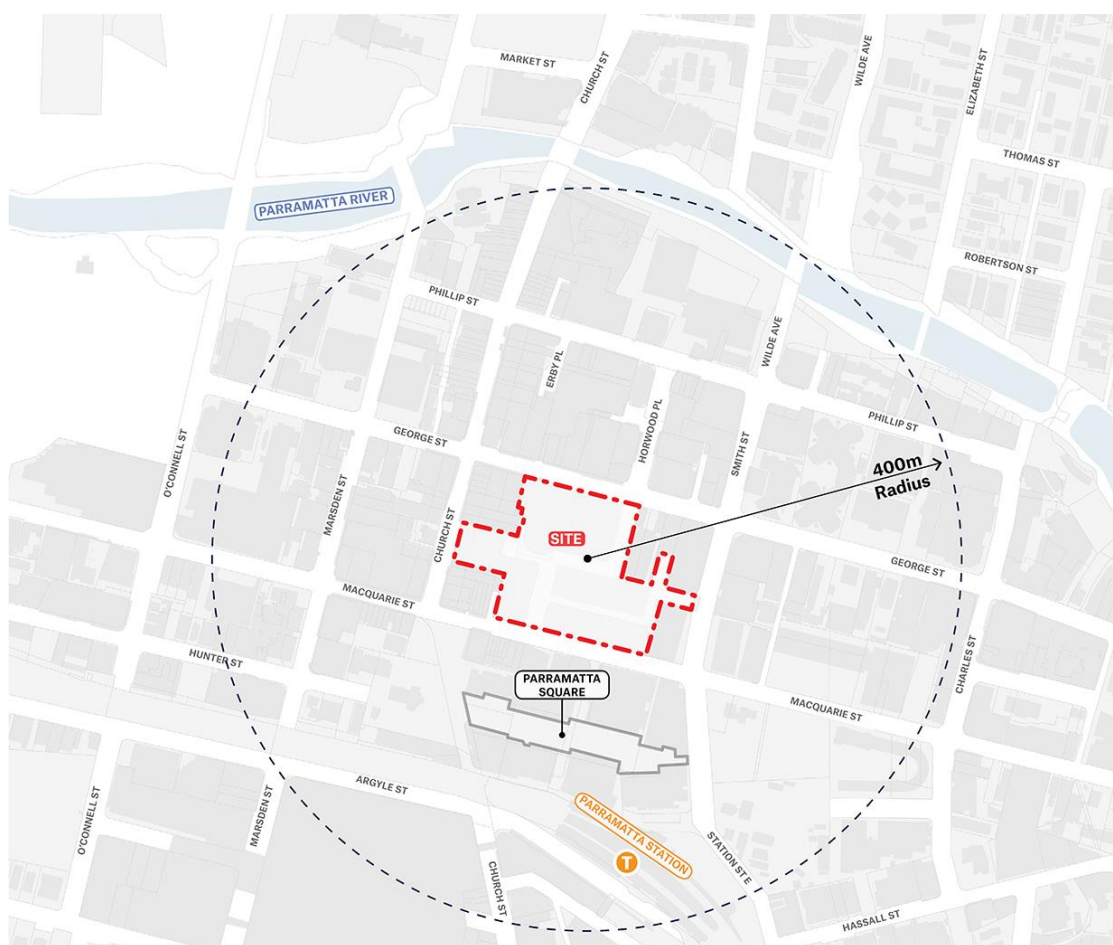
## 2 The site and proposal

### 2.1 Site location and description

The subject application is in the Parramatta CBD, in the City of Parramatta Local Government Area (LGA). It is within the city block bounded by George Street, Church Street, Smith Street, and Macquarie Street.

The site presents a 164m long frontage to Macquarie Street, 125m frontage to George Street, 48m frontage to Church Street, and 15.5m frontage to Smith Street (in the form of Macquarie Lane).

The site location is shown in Figure 2-1 and Table 2-1.



**Figure 2-1 Site location**

As described in Table 2-1, the site comprises fourteen (14) different allotments of varying sizes. It is irregular in shape, with a total area of approximately 24,899m<sup>2</sup>

**Table 2-1 Site legal description**

Street Address	Legal Description
41-59 George Street	Lot 10 in DP858392
45A George Street	Lot 2 in DP701456
61B George Street	Lot 1 in DP607181



Street Address	Legal Description
71 George Street	Lot 100 in DP607789
220 Church Street	Lot 1 in DP1041242
222 Church Street	Lot 1 in DP702291
232 Church Street	Lot 1 in DP651992
236 Church Street	Lot 1 in DP128437
238 Church Street	Lot 2 in DP591454
48 Macquarie Street	Lot B in DP394050
58-60 Macquarie Street	Lot 1 in DP399104
62-64 Macquarie Street	Lot AY in DP400258
68 Macquarie Street	Lot 1 in DP711982
70 Macquarie Street	Lot E DP 402952
72 Macquarie Street	Lot 3 in DP218510
74 Macquarie Street	Lot H in DP405846

## 2.2 Overview of this proposal

The Concept SSDA will seek consent for four building envelopes as detailed in Table 2-2 and Figure 2-2.

**Table 2-2 Parramatta proposed development overview**

Item	Description
Building use	<b>Building A:</b> Commercial and retail <b>Building B:</b> Residential and retail <b>Building C:</b> Commercial and retail <b>Building D:</b> Commercial and retail
Building Height (RL) / Number of storeys	<b>Building A:</b> 172.70 / 38 storeys <b>Building B:</b> 130.00 / 33 storeys <b>Building C:</b> 135.50 / 26 storeys <b>Building D:</b> 127.40 / 24 storeys
Gross Floor Area (m <sup>2</sup> )	<b>Building A:</b> 78,700 <b>Building B:</b> 20,000 <b>Building C:</b> 35,950 <b>Building D:</b> 55,350 <b>TOTAL: 190,000</b>
Car parking spaces	455

**Legend**

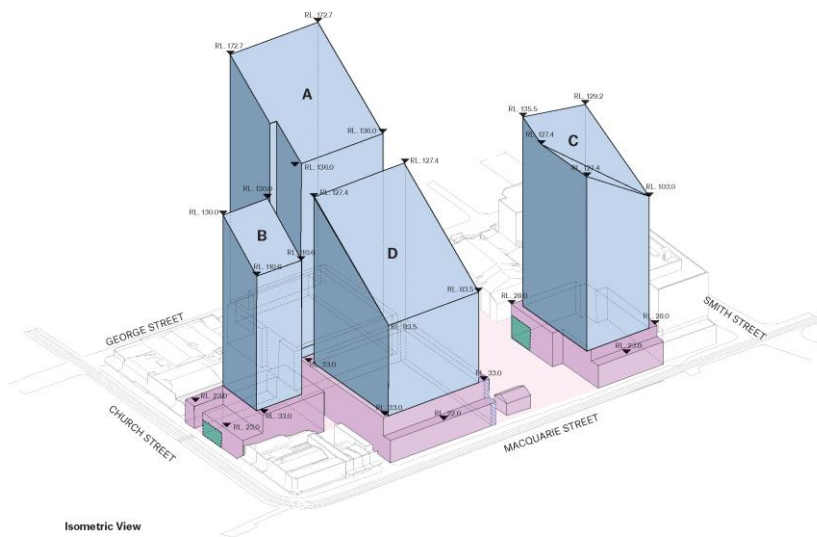
■ Parramatta Station CSSI Approval  
- Includes structure and building infrastructure and space for lift cores, access, parking, retail and building services for future OSD & ASD

■ OSD & ASD Concept SSD Building Envelope - Includes OSD & ASD Areas inside the CSSI 'shell' below ground and in the podium levels

■ Metro Station Entry and Box (Indicative)

■ 3m Podium Articulation Zone - refer to Design Guidelines.

■ Heritage Interface Zone - refer to Design Guidelines.



**Figure 2-2 Proposed development**

## 3 Scope of assessment

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### 3.1 Preliminaries

This report is an analysis and verification of the following:

- The projected solar access to the proposed residential apartment building (Building B)
- The potential overshadowing of neighbouring residential properties
- The potential overshadowing of protected solar zones

Our qualifications and experience are summarized in Appendix A: Credentials.

Documents referred to in this report are summarised in 3.1 Documents.

### 3.2 Summary

#### 3.2.1 Solar access for residential apartments

All views from the sun conducted at half hourly intervals can be found in Appendix C. Detailed tables showing individual apartment solar compliance can be found in Appendix D.

#### 3.2.2 Overshadowing to neighbouring properties

Views from the sun assessing the impact on neighbouring residential properties can be found in Appendix E.

#### 3.2.3 Overshadowing to solar protection zones

Views from the Sun assessing the impact on Parramatta Square and Lancer Barracks can be found in Appendix F.

### 3.3 Documents

We base our analysis and opinion on the following drawings and documents:

- 3D digital model in SketchUp format:
  - 220819\_Parramatta Metro\_Combined\_Tests\_Solar.skp.
- Proposed Envelope Drawings:
  - AR-01.001 – Envelope Plan – Interim
  - AR-01.002 – Envelope Plan - Future
  - AR-01.101 – Envelope Sections
  - AR-01.102 - Envelope Sections
  - AR-01.201 – Envelope – 3D SW View
  - AR-01.202 – Envelope – 3D NW View.

## 4 Predicted solar access

### 4.1 Relevant solar access standards

#### 4.1.1 Apartment Design Guide

The Apartment Design Guide (ADG) gives effect to SEPP 65 for solar access and other residential amenity provisions. Table 4-1 Table 4-1 ADG recommendations provides recommendations.

**Table 4-1 ADG recommendations**

Objective 4A - 1	
To optimise the number of apartments receiving sunlight to habitable rooms, primary windows, and private open space	
Design Criteria	
1	Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid-winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas
2	In all other areas, living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid-winter
3	A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid-winter

#### 4.1.2 Local controls

It should be noted that ADG Solar Access Criteria are discretionary controls which take precedence over controls contained within Council Development Control Plans (DCP).

### 4.2 Methodology

To investigate solar access to Building B the study used the methodology outlined below.

#### 4.2.1 3D digital model

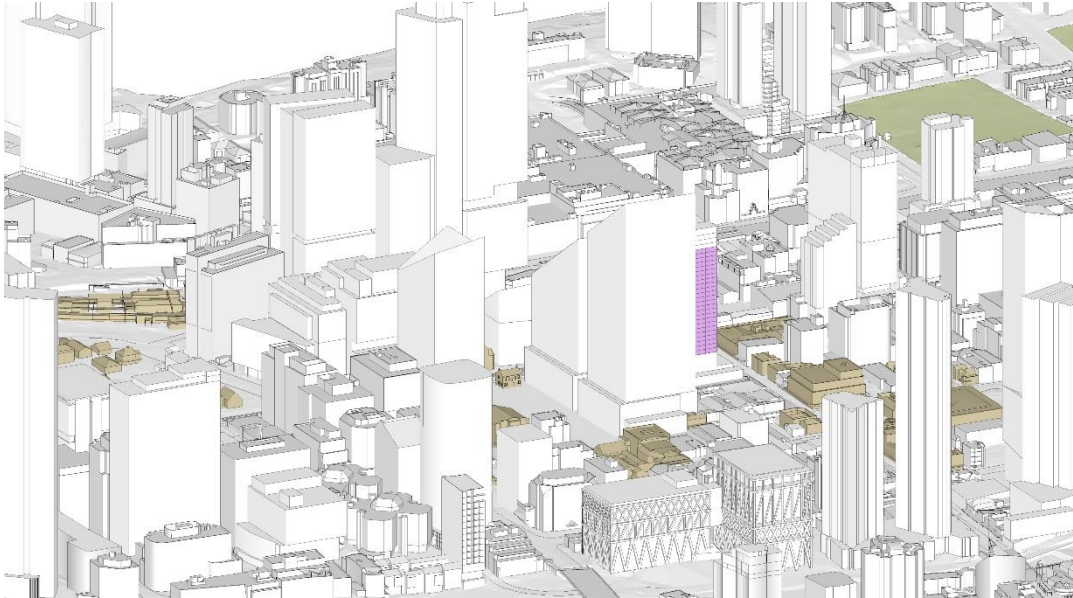
For a detailed assessment of solar access and overshadowing, the study used a 3d SketchUp file prepared by Bates Smart. (220819\_Parramatta Metro\_Combined\_Tests\_Solar.skp).

#### 4.2.2 Model geo-location & accuracy

The study independently geo located the 3d model and verified the direction of solar North using the features within SketchUp 21. The 3D model was checked against topographical and building dimensions that could give rise to errors against available survey information. Buildings under construction have been included in the study. Bates Smart Architects cannot independently warrant the model dimensions but are confident in the general accuracy of the modelling.

### 4.2.3 Views from the sun

SketchUp 21 software prepares the shadow projections by reference to accurate solar geometry built into the software. To quantify the solar access to glazing and private open space of various orientations, the analysis was performed primarily using orthographic projections known as 'views from the sun', taken every 30mins between 9am-3pm on the 21<sup>st</sup> of June (Winter Solstice). 'Views from the sun' do not show shadows therefore any surface that cannot be seen is in shadow at a snapshot in time shown in Figure 4-1.



**Figure 4-1 View from the sun, proposed envelope with Building B residential apartments shown in purple, 9am June 21**

### 4.2.4 Sun on glazing

For the purposes of quantifying solar access and compliance with the ADG recommendations, the study examined sun patches on the relevant glazing line of each individual apartment within Building B.

The study only considered patches of sunlight greater than approximately 1m<sup>2</sup> and ignores very large angles of incidence to the glazing surface, and the resultant unusably small areas of sunlight.

### 4.3 Predicted solar access to apartments

Table 4-2 summarises the projected solar access for the living area glazing and private open space of the residential dwelling units for Building B. Appendix D records the detailed solar access for individual apartments.

**Table 4-2 Solar access results**

Total number of units	145	%
Units that achieve 2 hours or more sunlight to living glazing and public open space (POS) 9am – 3pm June 21	110	76
Units that achieve less than 2 hours of sunlight living glazing and POS 9am – 3pm June 21	35	14
Units with no sun between 9am and 3pm June 21	0%	0

The ADG design criterion recommends a minimum 70% of apartments achieve more than 2 hours solar access and a maximum of 15% apartments with no sun. The proposal achieves both criterion and is compliant with the ADG Objective 4A-1.

The development planning maximises apartments fronting the north-north-easterly and west-north-westerly aspects. The site has adjacent to a low-rise area to the west and northwest. Between levels 04-13 only 2 out of 7 apartments per floor receives less than 2 hours sun. between levels 14-28 only 1 out of 5 apartments per floor receives less than 2 hours sun.

## 5 Overshadowing on neighbouring properties

### 5.1 Methodology

'Views from the sun' have also been used to determine if any neighbouring residential developments have been impacted by the proposed development. By increasing the transparency of the proposed envelope, the analysis can determine if any adjacent properties are overshadowed by the proposed envelope. 'Views from the sun' on the 21<sup>st</sup> of June between 9am and 3pm were used to identify any potentially affected properties.

### 5.2 Potentially affected properties

No medium to large scale multi residential properties have been identified as impacted so far in the process. If any later residential dwellings or approved DA are discovered the applicable control has been included below for reference.

### 5.3 Applicable control

The ADG provides a test for acceptable additional overshadowing impact on adjacent multi residential properties (Table 5-1).

**Table 5-1 ADG recommendations**

Objective 3B-2
Overshadowing of neighbouring properties is minimised during mid-winter
Design Guidance
Living areas, private open space and communal open space should receive solar access in accordance with sections 3D Communal and public open space and 4A Solar and daylight access
Solar access to living rooms, balconies and private open spaces of neighbours should be considered
Where an adjoining property does not currently receive the required hours of solar access, the proposed building ensures solar access to neighbouring properties is not reduced by more than 20

## 6 Overshadowing of Parramatta Square and Lancer Barracks

### 6.1 Methodology

#### 6.1.1 3D digital model

Proposed developments with planning approval but not yet constructed have been added to the model via block modelling of envelopes using relative levels (RL) on approved drawings.

#### 6.1.2 Model geo-location and accuracy

The 3D model has been independently geo located and verified the direction of Solar North using inbuilt features of SketchUp 21. From the 3D model we have checked topographical and building dimensions that could give rise to errors against available survey information. Buildings under construction have been included in the study. Bates Smart cannot independently warrant the model dimensions but are confident in the general accuracy of the modelling.

### 6.2 Relevant sun access planes and solar protection zones

#### 6.2.1 Parramatta Local Environment Plan 2011 (Amendment No 56)

The maximum building heights for the majority of the site are determined by the Lancer Barracks and Parramatta Square Sun Access Planes (refer to clause 7.5 of PLEP 2011). A 12m height limit applies along the Church Street frontage of the site as shown in Figure 6-1.

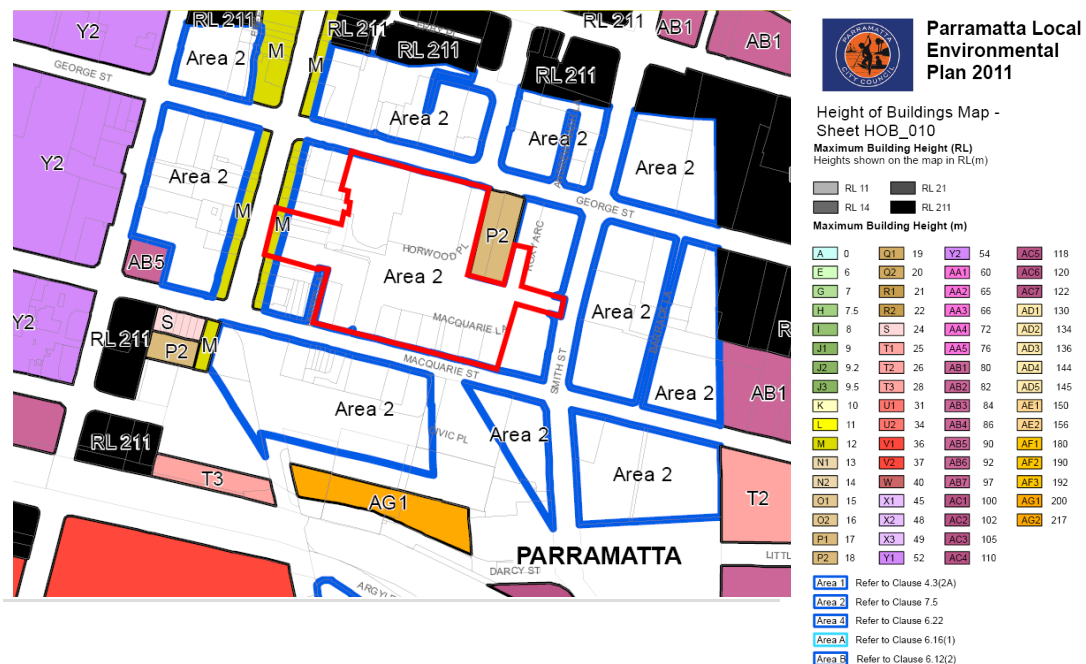


Figure 6-1 Parramatta LEP 2011 Amendment No 56 - Height of Buildings Map



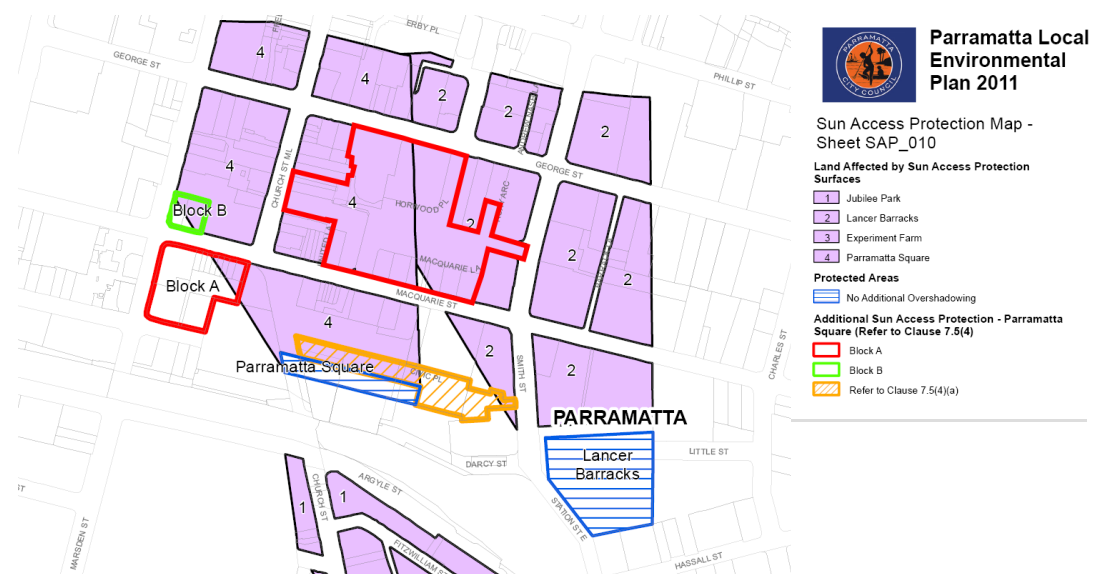
## 6.2.2 Lancer Barracks - Sun access plane

In accordance with clause 7.5(3) of Parramatta LEP 2011 (Amendment No 56):

*“Development consent must not be granted for development on land to which this clause applies if a building resulting from the development will create additional overshadowing, on 21 June in any year, on the land shown with blue hatching on the Sun Access Protection Map during the following times –*

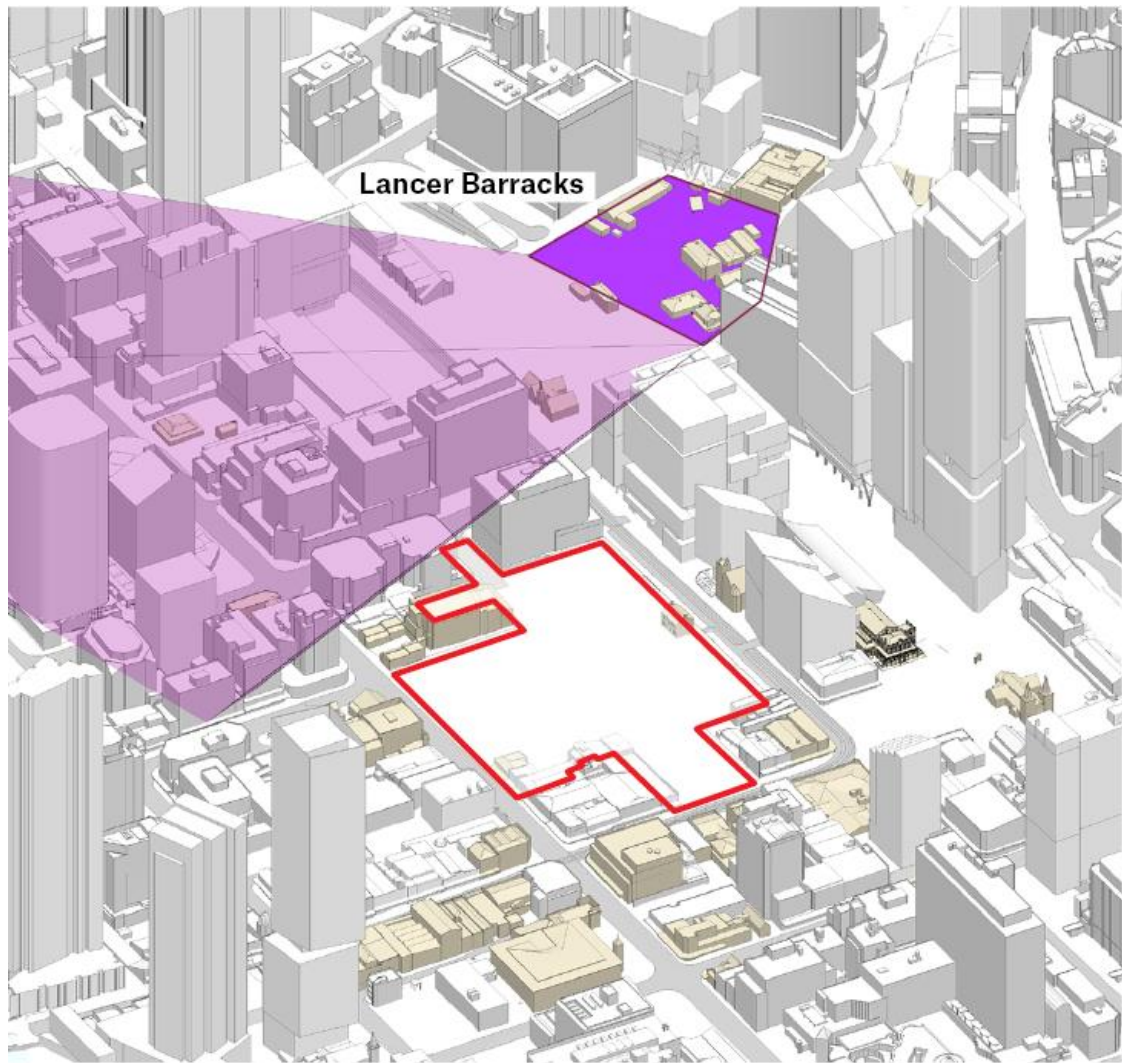
*(c) for the Lancer Barracks site—between midday and 2pm,*

*(d) for Parramatta Square—between midday and 2pm.”*



**Figure 6-2 Solar access plane to Lancer Barracks (PLEP 2011 Amendment 56)**

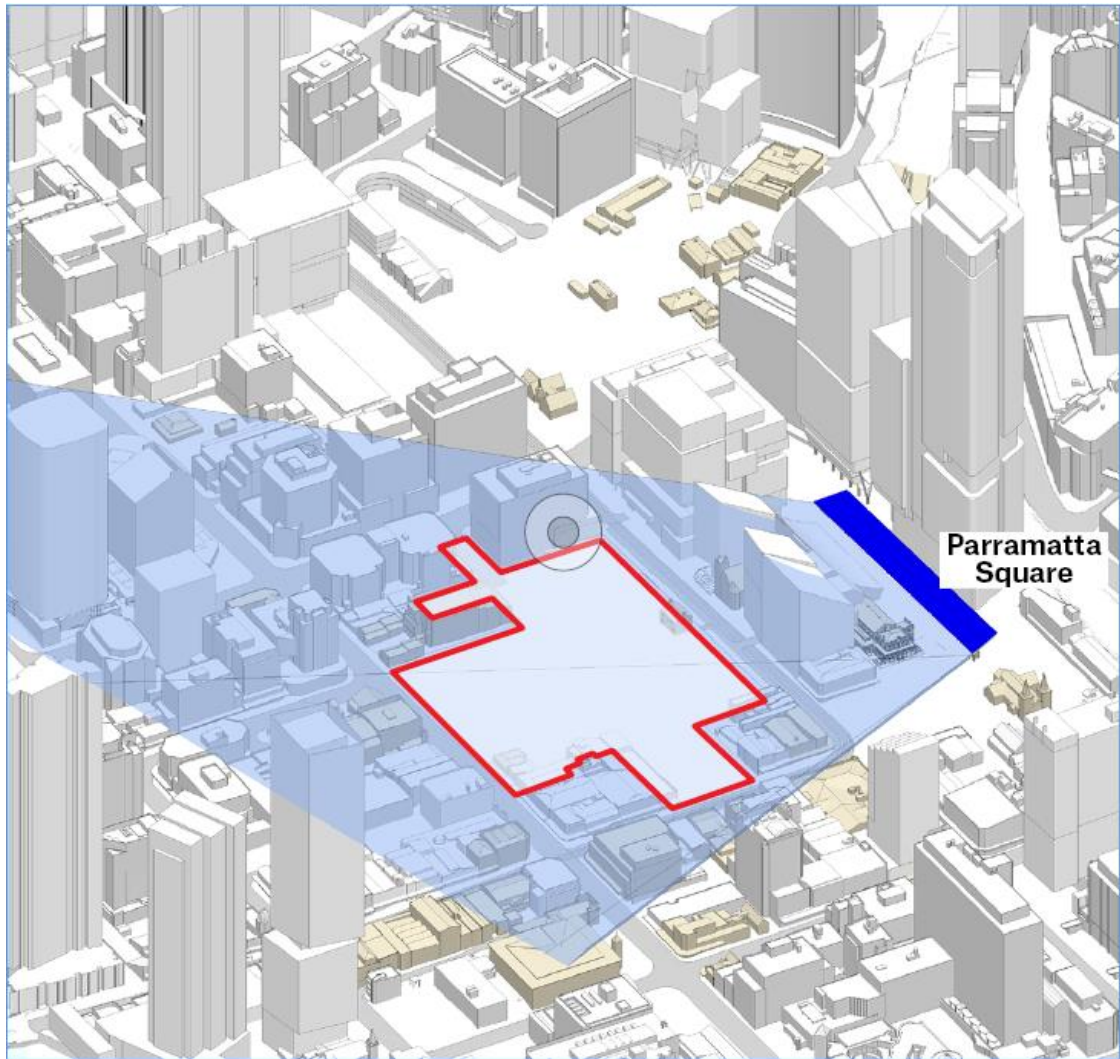
A protected area has been established at Lancer Barracks which prohibits any development from creating additional overshadowing within the hatched blue zone in Figure 6-2 (above) between 12 noon and 2pm on the 21<sup>st</sup> June. This has been depicted in Figure 6-3 in dark purple with the associated solar plane shown in mid purple.



**Figure 6-3 Solar access plane to Lancer Barracks (isometric view)**

### **6.2.3 Parramatta Square – Solar protection zone**

A 20-metre-deep zone along the southern edge of Parramatta Square has been designated as a 'Solar Protection Zone', shown in Figure 6-2. In accordance with PLEP 2011, proposed development must not cast additional shadow within this zone on 21st June between 12 noon and 2pm. Figure 6-4 graphically shows the resultant sun access protection plane.

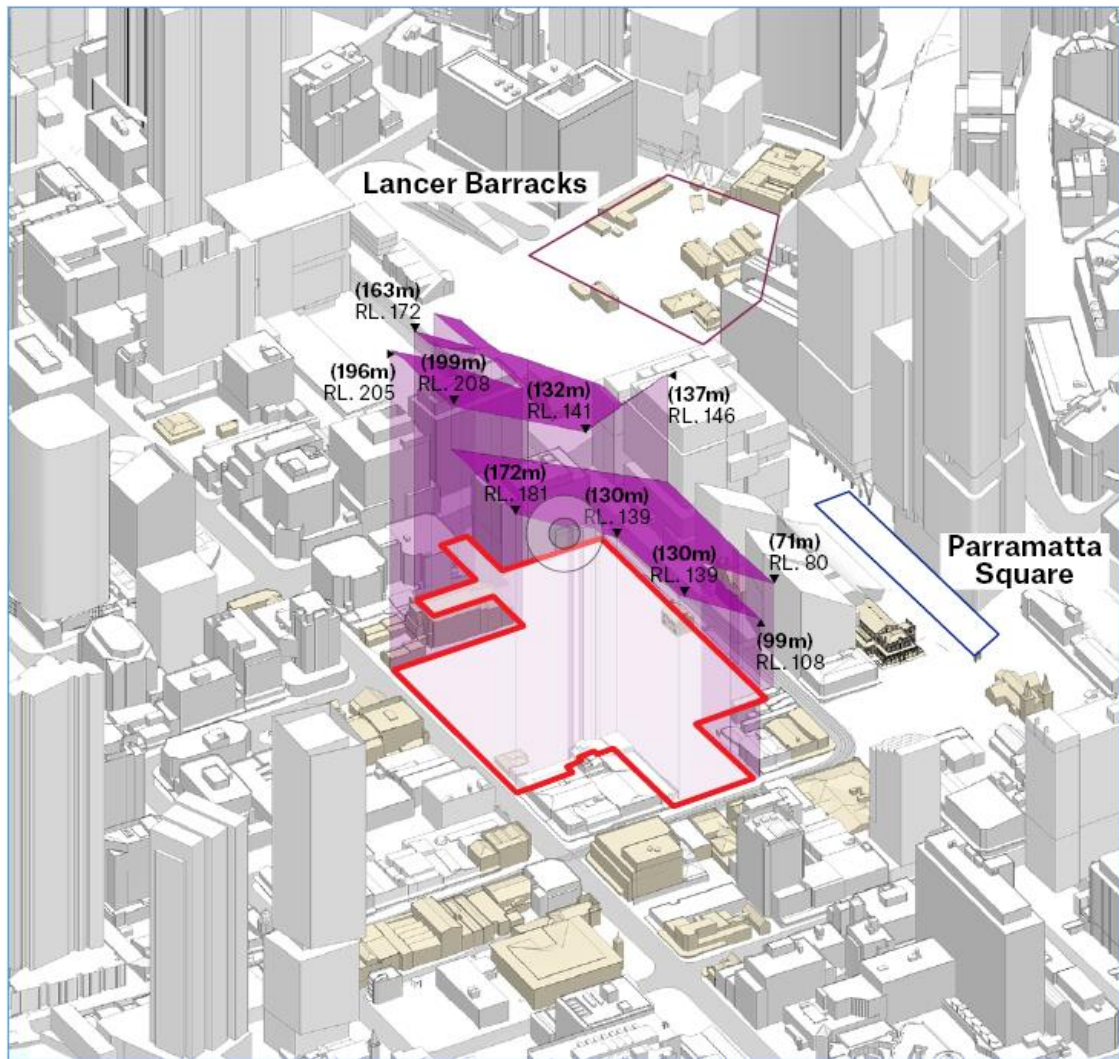


**Figure 6-4 Solar access plane to Parramatta Square (isometric view)**

#### **6.2.4 Maximum permissible envelope**

The resultant maximum heights permissible on the proposed development site are obtained by overlaying both the Lancer Barracks Sun Access Plane and the plane resulting from the Parramatta Square Solar Protection Zone. The result is a maximum height of approx. RL 80m along the Macquarie Street boundary to the south, and between RL 181m and RL 208m along George Street to the north, shown in Figure 6-5.





**Figure 6-5 Maximum permissible envelope (isometric view)**

### 6.2.5 Proposed building envelope

The proposed building envelopes have been crafted around the indicative reference scheme and sit within the maximum permissible envelope. These envelopes address podium and tower setback and height requirements as well as building separation and public open space.

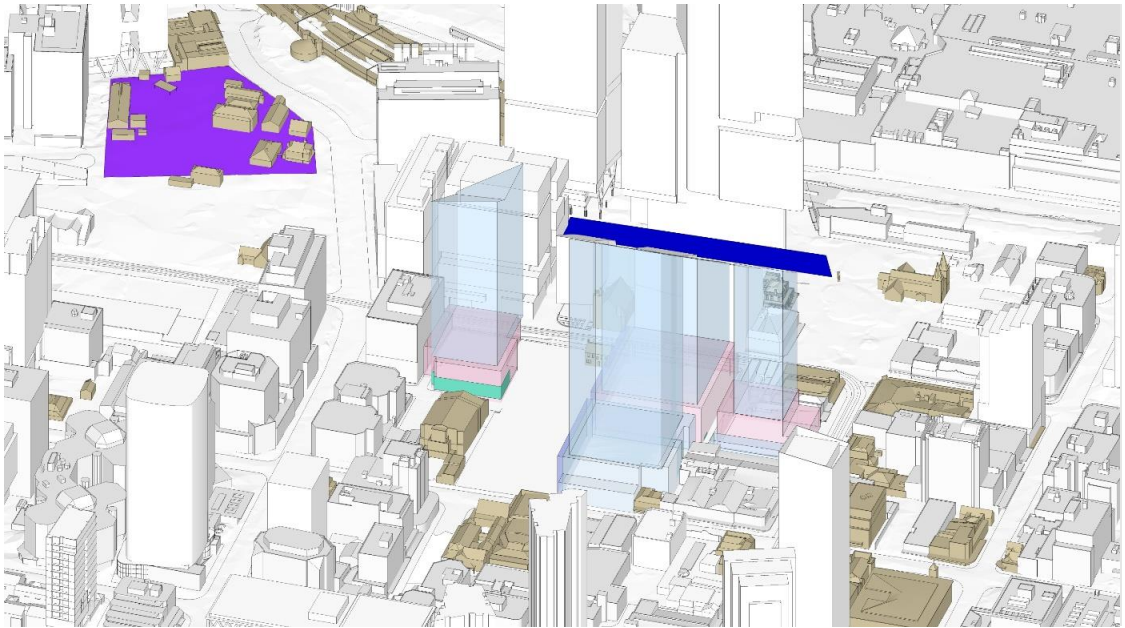
### 6.2.6 Views from the sun

'Views from the Sun' were prepared using SketchUp 21 software which references accurate solar geometry. To quantify the solar access to Parramatta Square and Lancer Barracks, the study analysed prepared 'views from the sun' using the proposed envelope. Adjusting the transparency of the proposed envelope can determine if the envelope will cause any additional overshadowing onto the protection zones. 'Views from the sun' are an orthographic projection that do not show shadows therefore any surface that cannot be seen is in shadow at a snapshot in time.

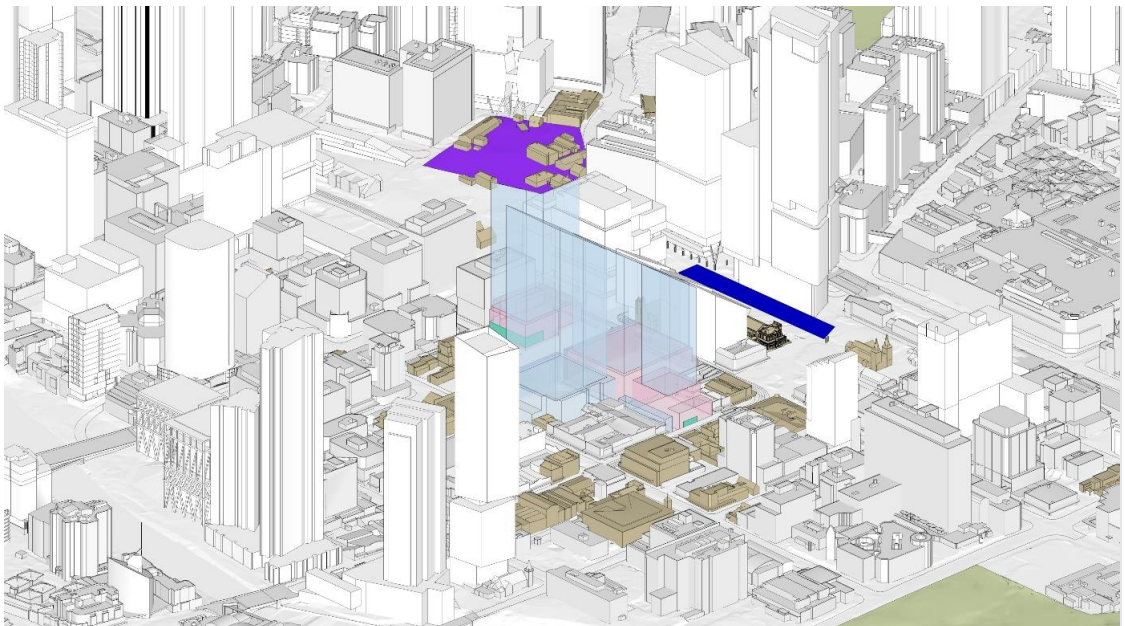
## 6.3 Results

### 6.3.1 Overshadowing of Parramatta Square

The study investigated the overshadowing of Parramatta Square and shown all the 'views from the sun' in Appendix F. Between 12pm and 2pm on the 21<sup>st</sup> of June, the proposed building envelopes do not cause any additional overshadowing to Parramatta Square, shown in Figure 6-6 and Figure 6-7.



**Figure 6-6 Proposed envelope at 12:00 21<sup>st</sup> June with Parramatta Square shown in blue**



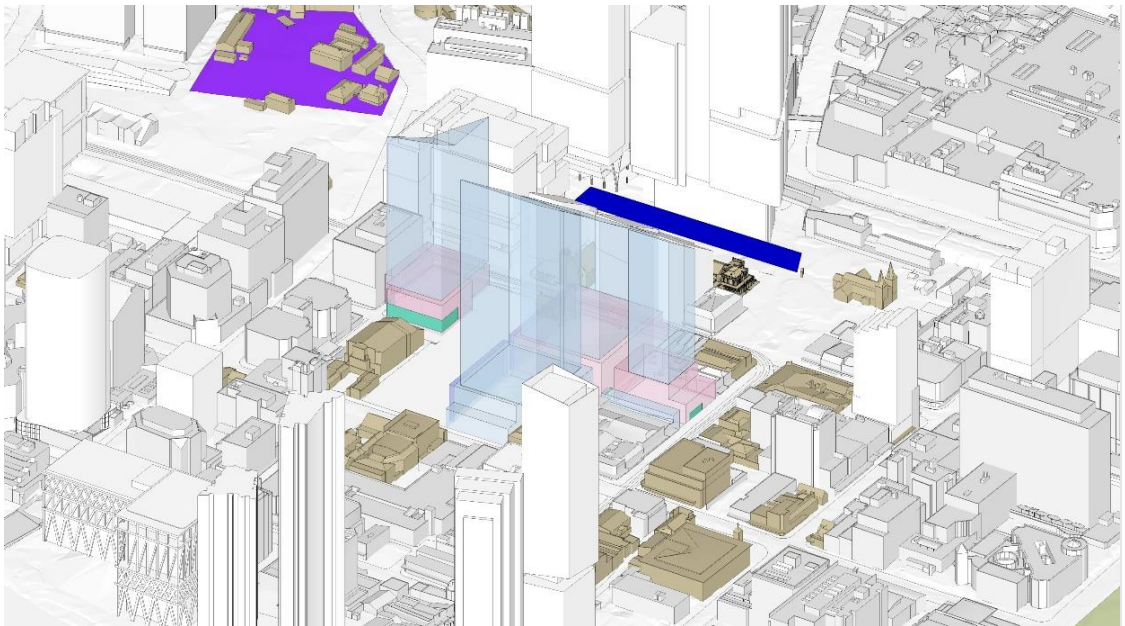
**Figure 6-7 Proposed envelope at 14:00 21<sup>st</sup> June with Parramatta Square shown in blue**



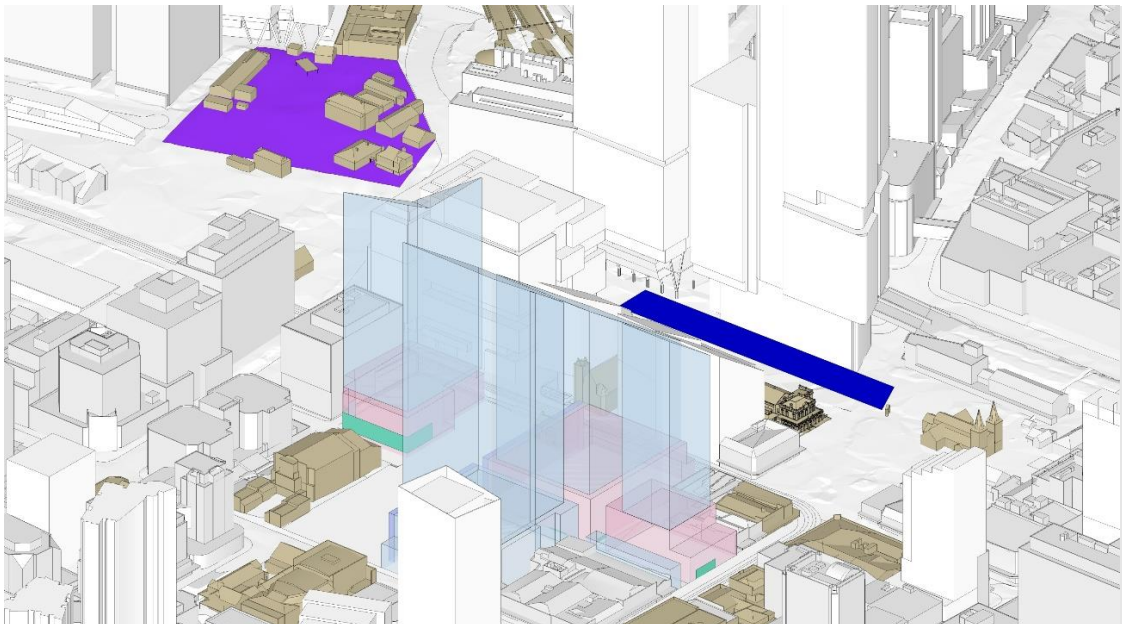
### 6.3.2 Overshadowing of Lancer Barracks

The study investigated the overshadowing of Lancer Barracks, shown as purple in the below figures. All 'views from the sun' analysed in Appendix F. Clause 7.5(3) of Parramatta LEP 2011 (Amendment No 56), prohibits additional overshadowing on Lancer Barracks between 12 noon-2pm on the 21<sup>st</sup> of June.

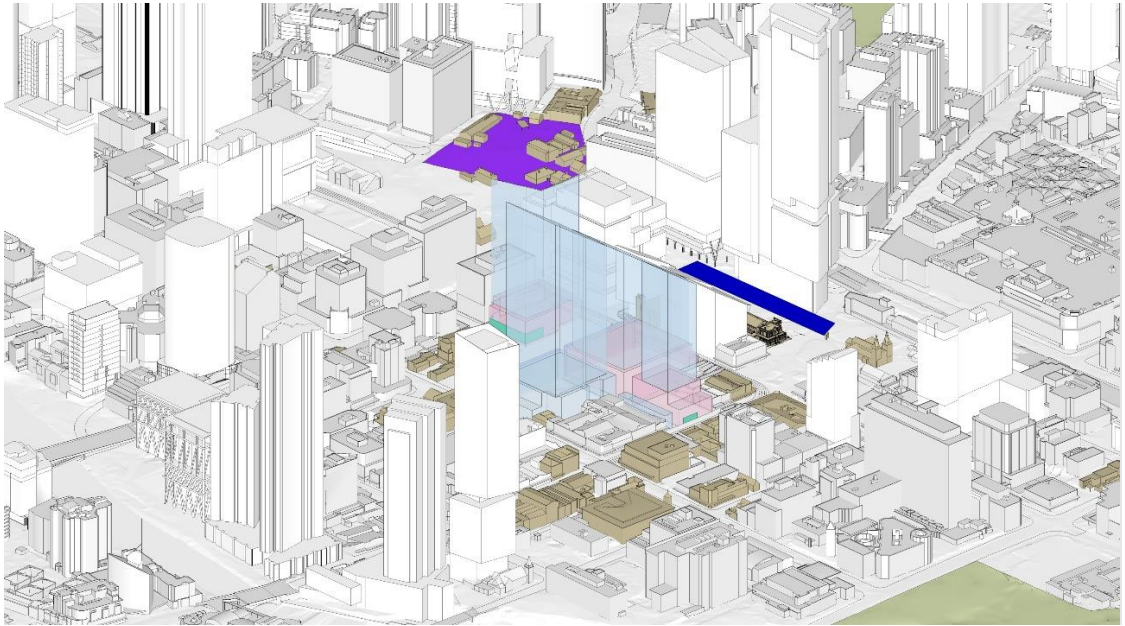
The proposed building envelopes have been calibrated to cause no additional overshadowing to Lancer Barracks between 12 noon and 2pm as illustrated in Figure 6-8, Figure 6-9 and Figure 6-10.



**Figure 6-8 Proposed envelope at 13:00 21<sup>st</sup> June with Lancer Barracks zone in purple**



**Figure 6-9 Proposed envelope at 13:30 21<sup>st</sup> June with Lancer Barracks zone in purple**



**Figure 6-10 Proposed envelope at 14:00 21st June with Lancer Barracks zone in purple**

## 7 Conclusion

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The ADG Design criteria recommend a minimum of 70% of apartments should have the amenity of two hours winter sun between 9am and 3pm. The ADG also identifies that no more than 15% of apartments should receive zero sun in midwinter.

- 110 / 145 (76%) of the dwellings are projected to achieve more than 2 hours of sunlight to glazing and POS between 9am and 3pm June 21
- 0 / 145 (0%) of the dwellings are projected to receive no sunlight between 9am and 3pm on June 21.

Based on the information above the proposed development can comply with ADG Objective 4A-1.

The proposed building envelopes have been designed in accordance with the sun access plane defining the 'Solar Protection Zone' within Parramatta Square. As such, it does not cast additional shadow within this zone on 21st June between 12 noon and 2pm.

The proposed building envelopes have been designed in accordance with the sun access plane defining the 'Solar Protection Zone' to Lancer Barracks. As such, it does not cast additional shadow within this zone on 21st June between 12 noon and 2pm.



## Appendix A      Credentials

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Bates Smart is an architectural, urban design, and interior design practice with over 165 years of experience in the Australian market. As part of our architecture and urban design work, we are routinely required to assess the solar performance of proposed developments in accordance with various planning controls to understand the environmental and amenity impacts of proposed developments.

Our methodology adopts the most commonly industry recognised approach, consisting of preparation of 3D electronic models of the context utilising available survey data such as aerial surveys, survey plans prepared by registered surveyors, or data obtained from local councils. Within that electronic context, we then construct a 3D representation of the proposed development or envelope requiring assessment. This model is then inserted into an industry standard solar assessment software package, survey data is then aligned relative to true and magnetic North, and the global geolocation entered into the software settings. (In this case, Sydney).

Based on input dates and times requiring solar simulation, the software package then prepares output data in two formats:

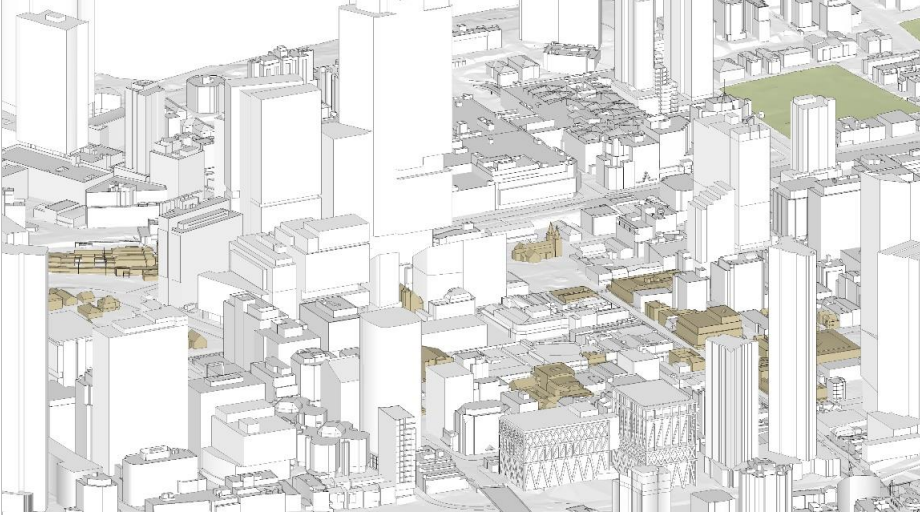
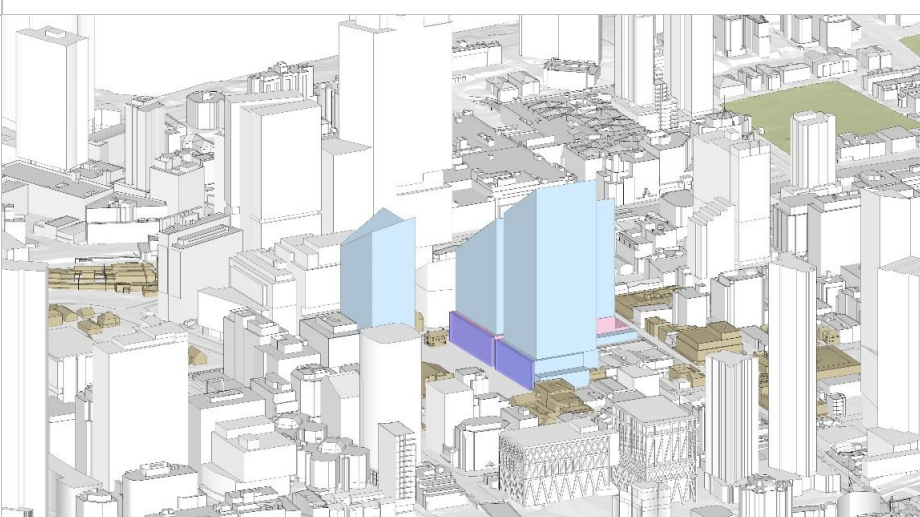
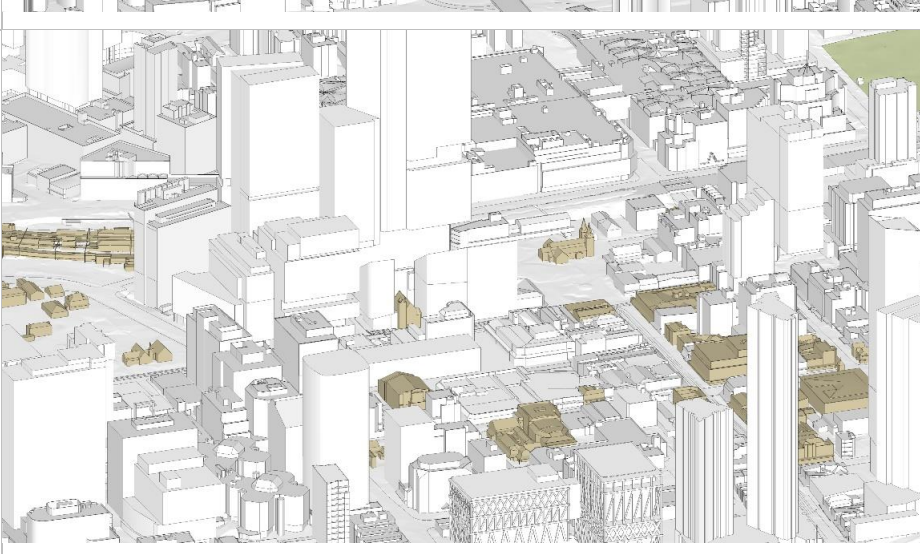
- conventional 2D shadow plan format, as well as
- simulated 3D views from the sun.

Both output formats are contained within our attached report. Outputs are then assessed against relevant planning controls, with comment made as to the compliance of the proposed development against those controls.

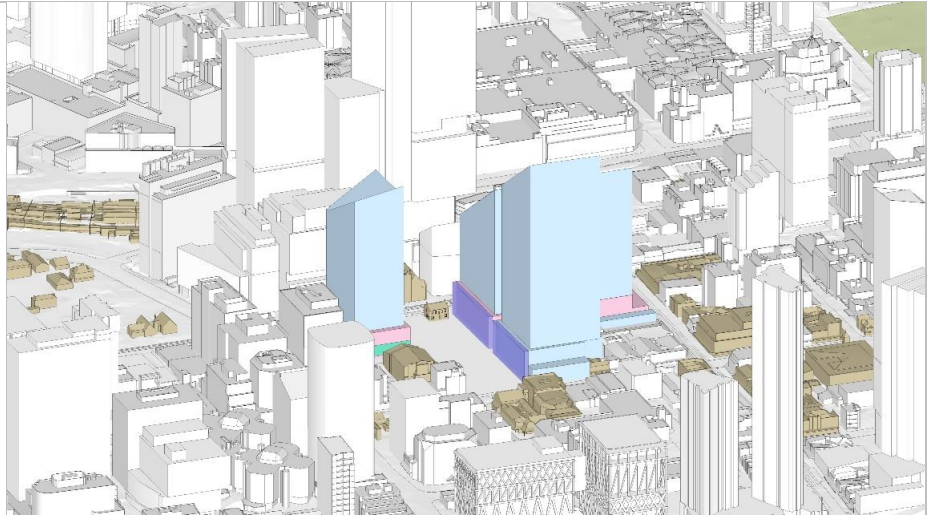
## Appendix B Views from the sun

Table B1 shows half hourly views of solar access projections for June 21st (Winter Solstice).

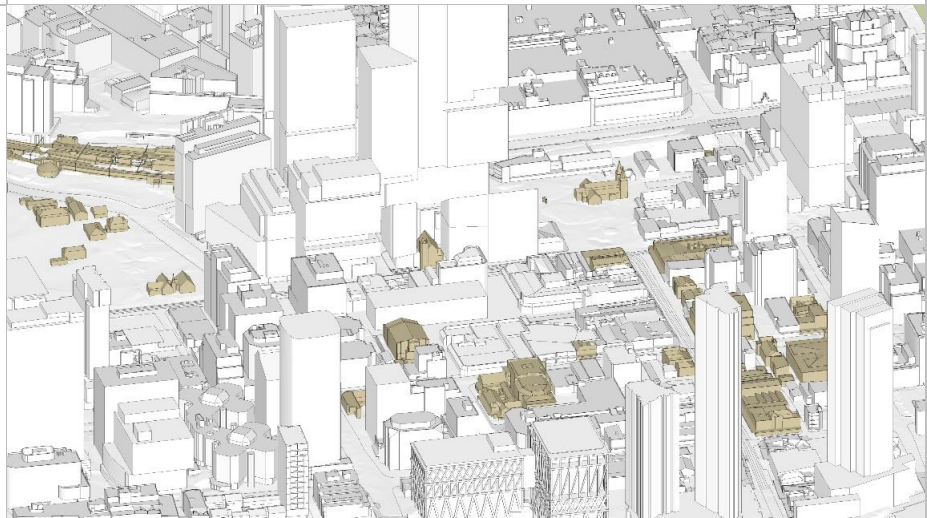
**Table B1 Views from the Sun**

<b>9:00 EXISTING</b>	 A 3D architectural rendering of a city skyline at 9:00 AM. The scene shows a dense cluster of buildings of various heights. The sun is low in the sky, casting long, soft shadows from the buildings onto the ground and other structures. The overall lighting is diffused, typical of early morning.
<b>9:00 PROPOSED</b>	 A 3D architectural rendering of the same city skyline at 9:00 AM, but with proposed developments. Two new, taller buildings are highlighted in a bright blue color, standing out from the existing grey and white buildings. The shadows and lighting are consistent with the 9:00 AM existing view.
<b>09:30 EXISTING</b>	 A 3D architectural rendering of the city skyline at 09:30 AM. The sun is slightly higher than in the 9:00 AM view, and the shadows are shorter and more defined. The scene shows the same dense urban environment with various building heights and shapes.

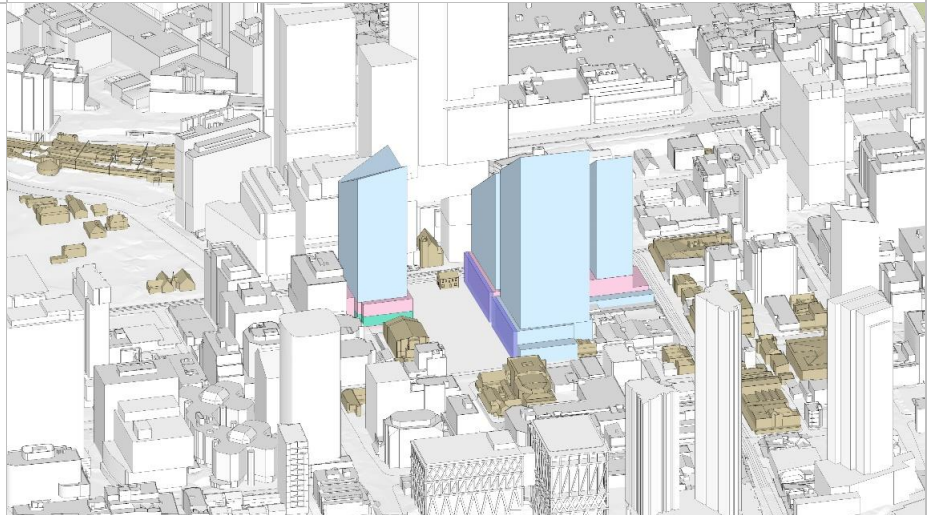
**09:30  
PROPOSED**



**10:00  
EXISTING**

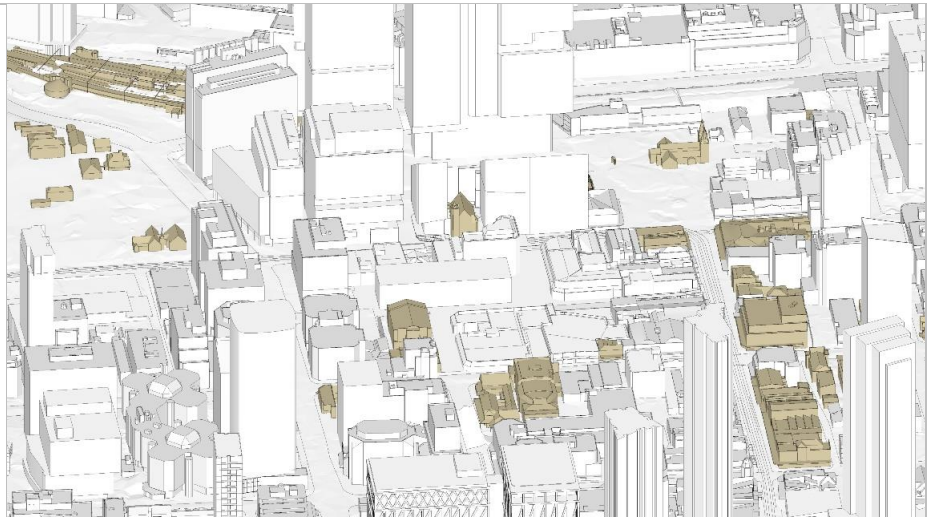


**10:00  
PROPOSED**

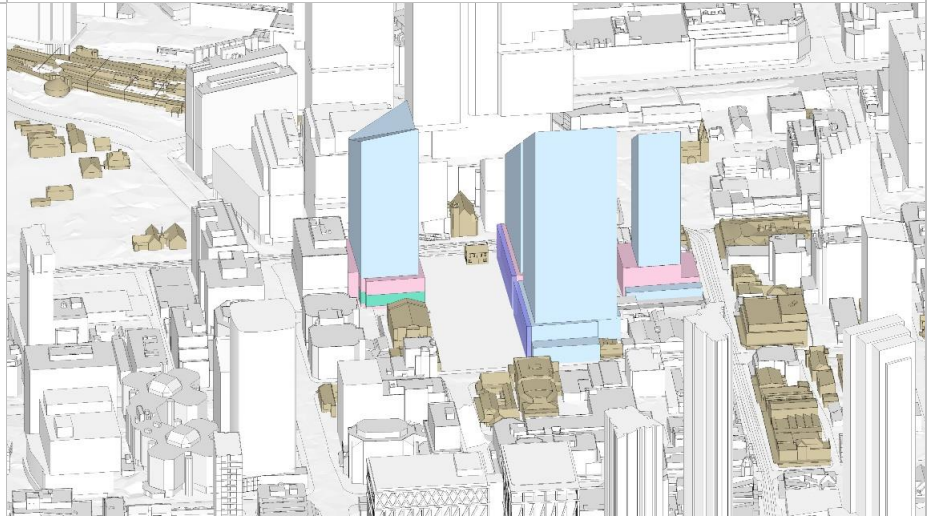




**10:30  
EXISTING**

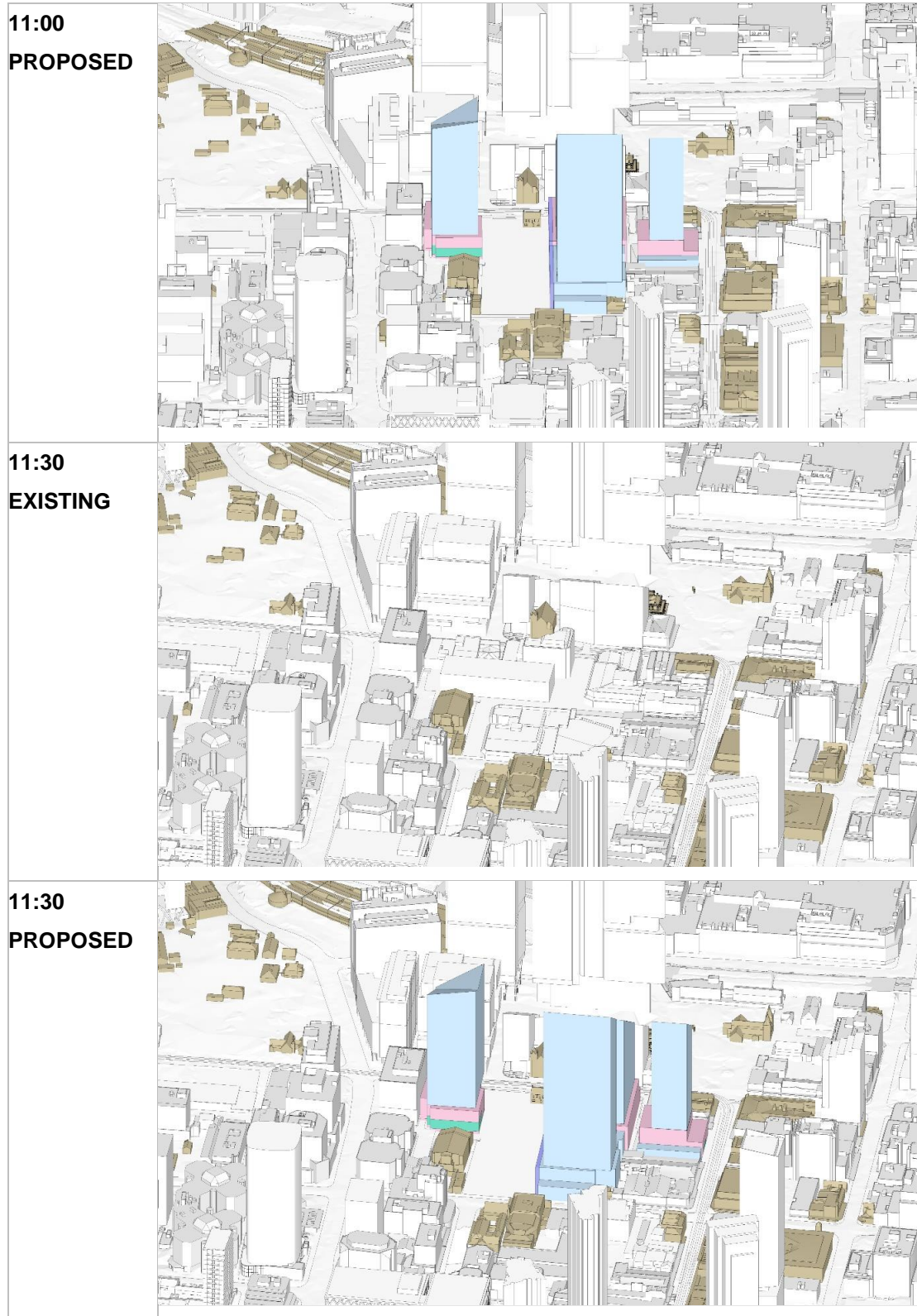


**10:30  
PROPOSED**



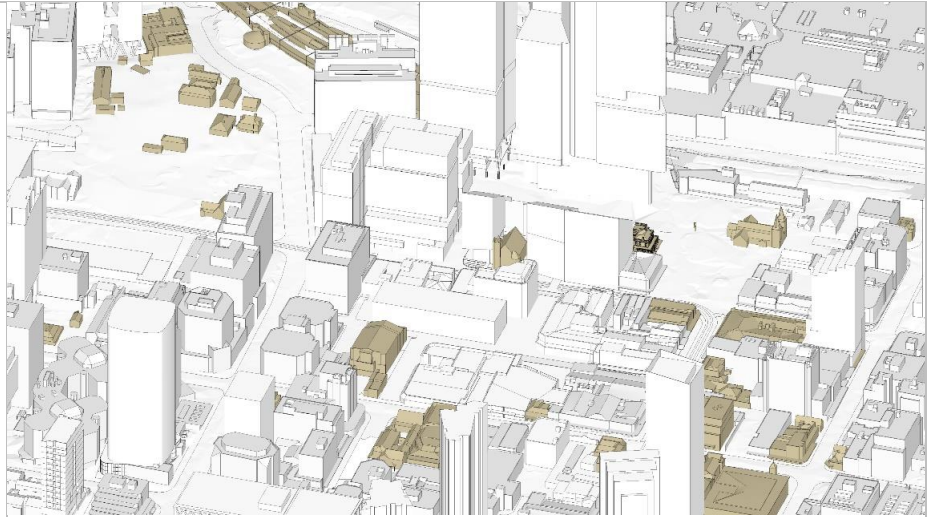
**11:00  
EXISTING**



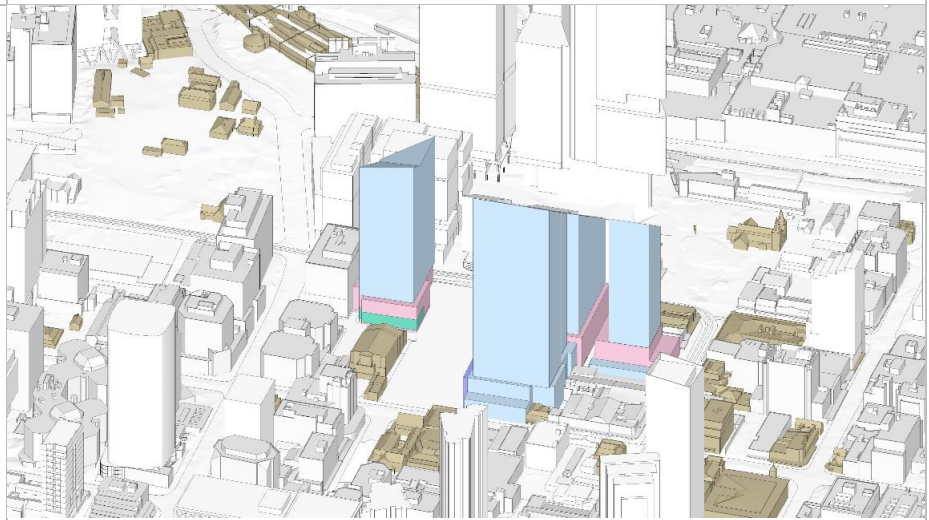




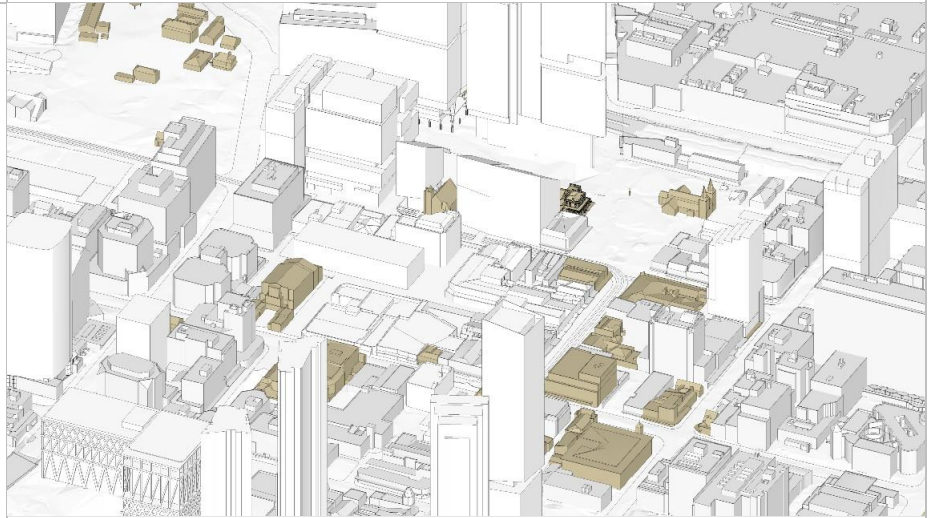
**12:00  
EXISTING**



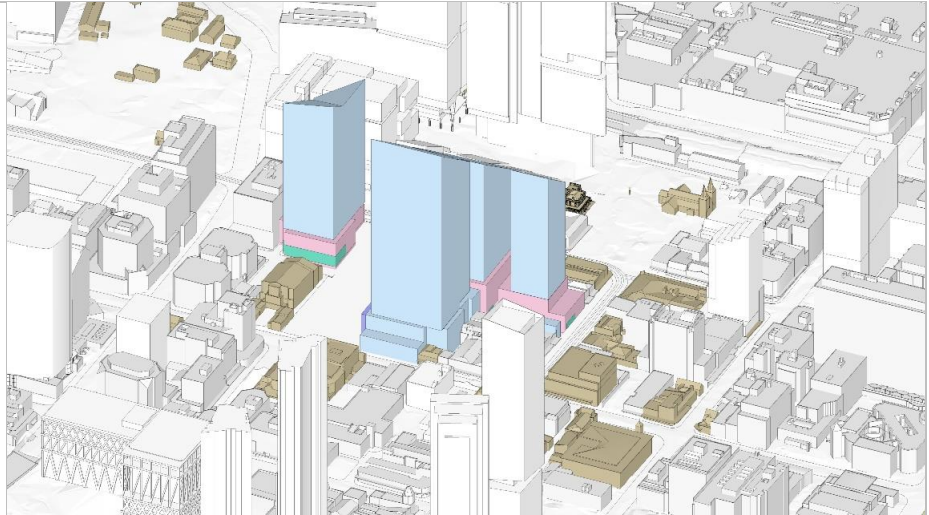
**12:00  
PROPOSED**



**12:30  
EXISTING**



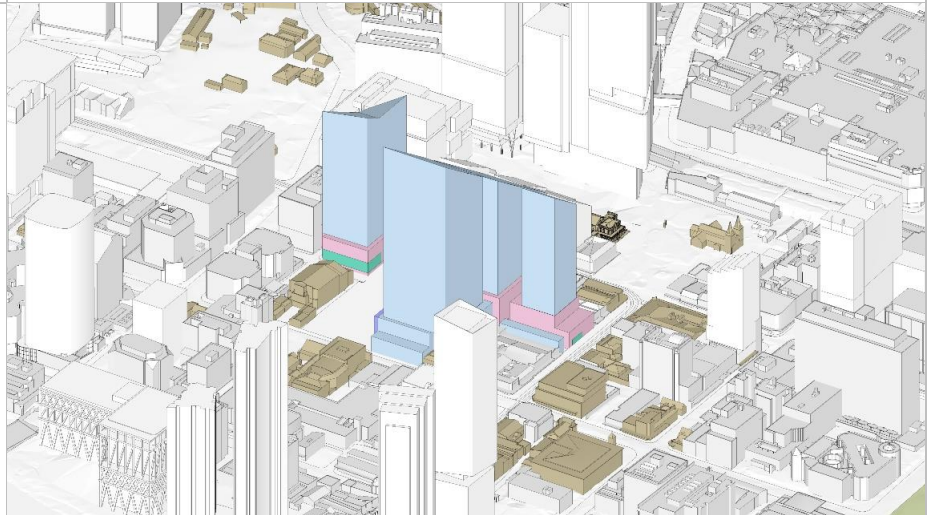
**12:30  
PROPOSED**



**13:00  
EXISTING**



**13:00  
PROPOSED**

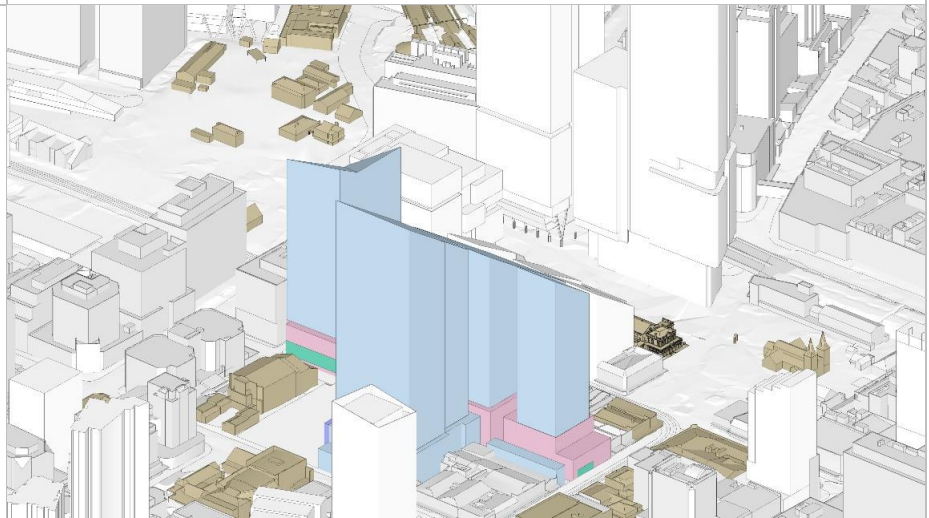




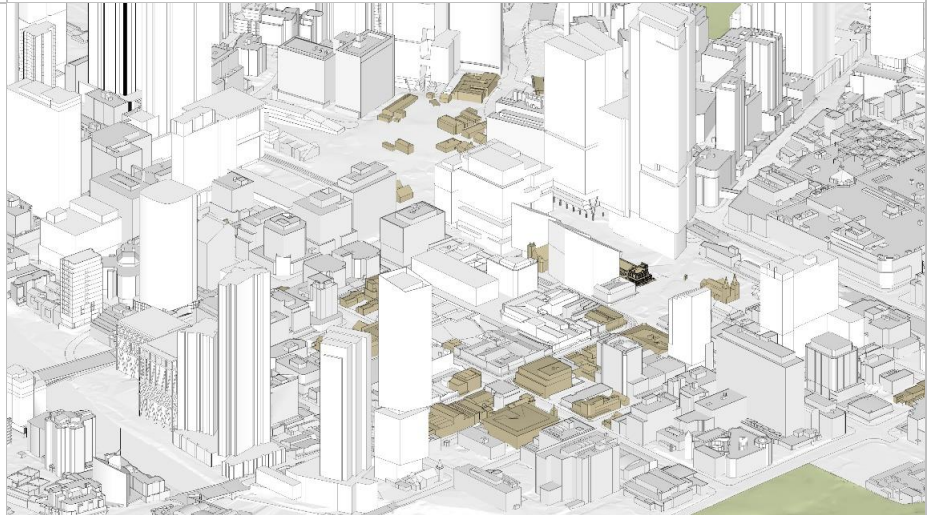
**13:30  
EXISTING**



**13:30  
PROPOSED**

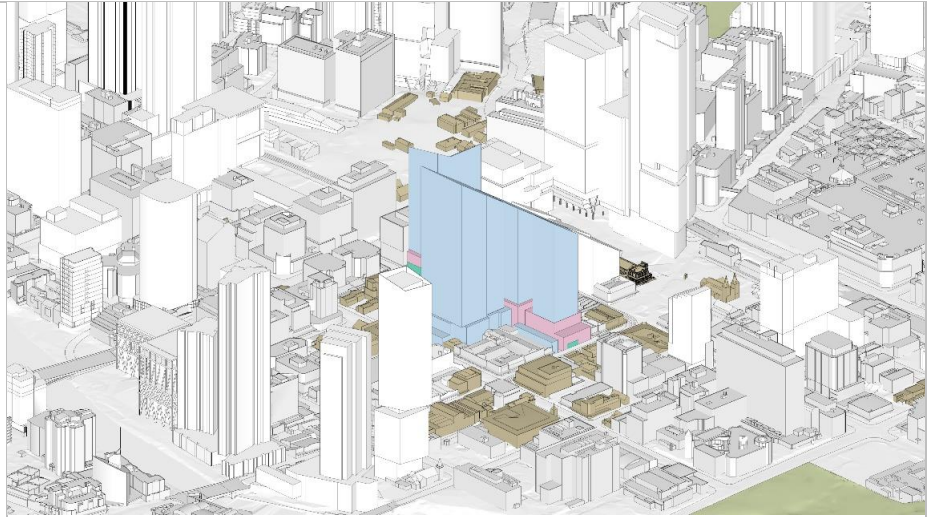


**14:00  
EXISTING**

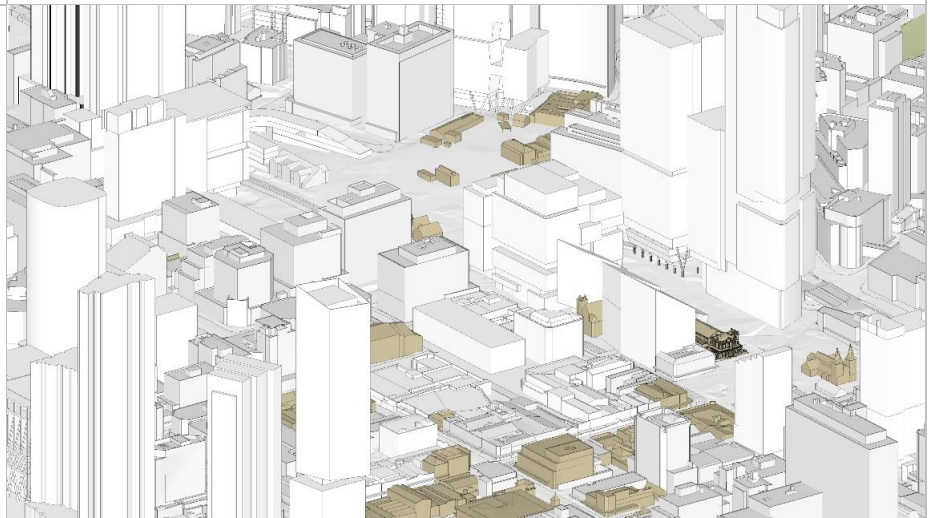




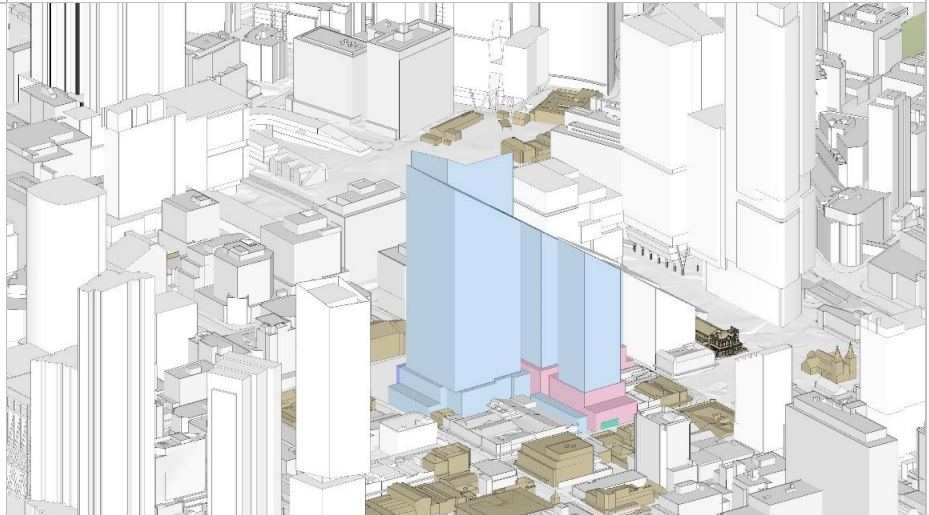
**14:00  
PROPOSED**



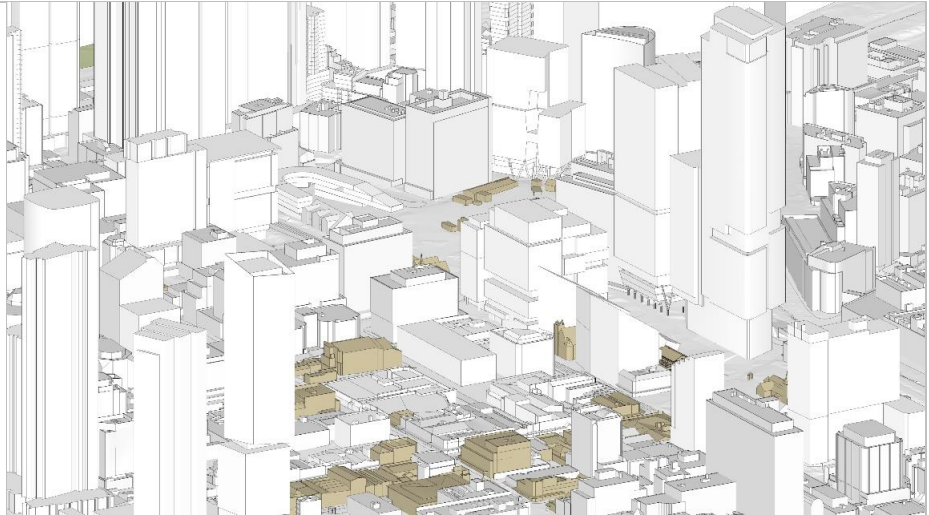
**14:30  
EXISTING**



**14:30  
PROPOSED**



**15:00**  
**EXISTING**



**15:00**  
**PROPOSED**

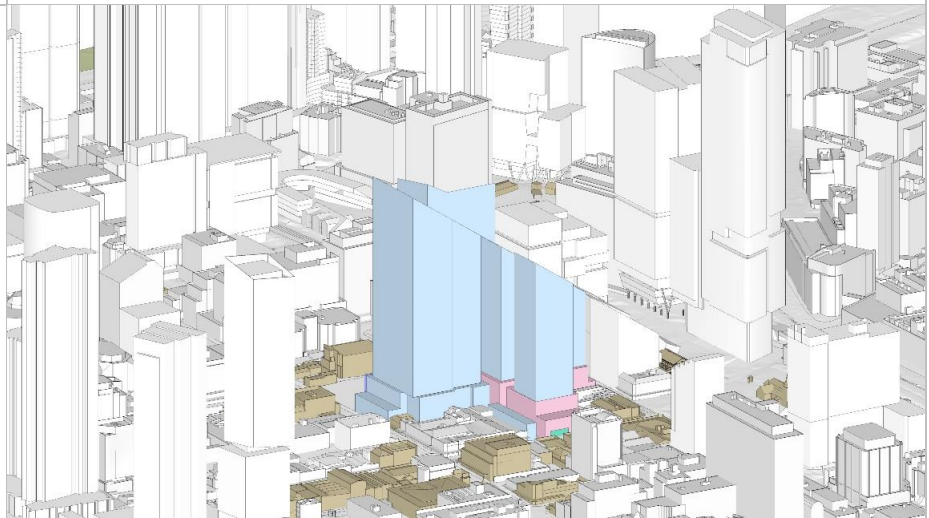





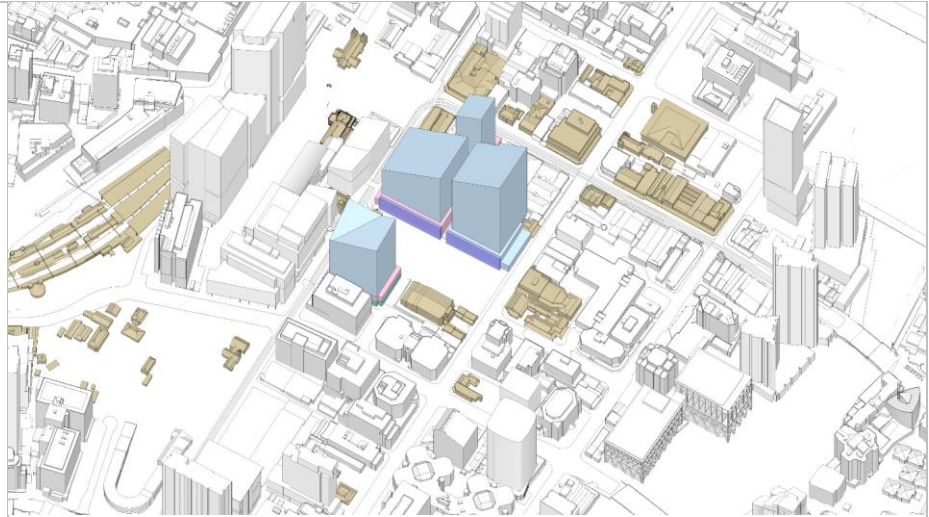


Table B2 shows hourly views of solar access projections for December 21 (Summer Solstice).

**Table B2 – Views from the Sun – December 21<sup>st</sup> - Summer Solstice**

<b>9:00</b> <b>EXISTING</b>	
<b>9:00</b> <b>PROPOSED</b>	
<b>10:00</b> <b>EXISTING</b>	

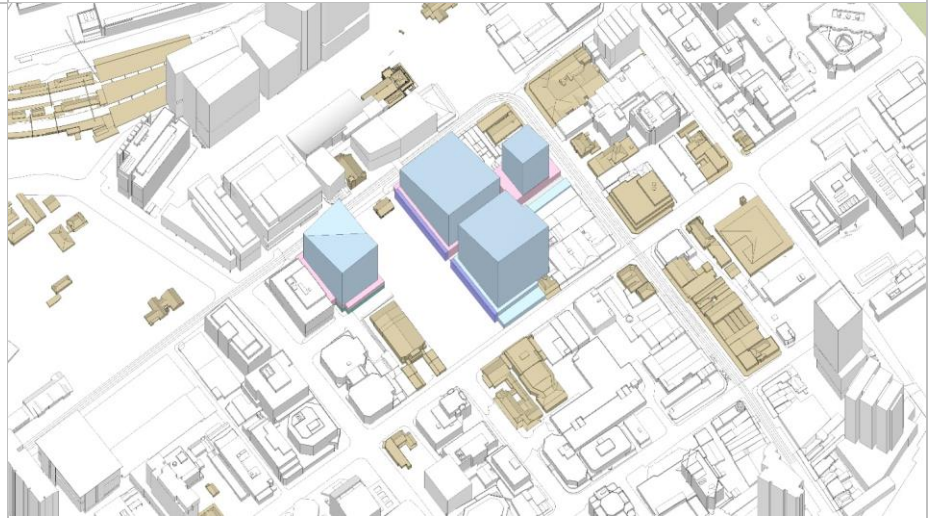
**10:00  
PROPOSED**



**11:00  
EXISTING**



**11:00  
PROPOSED**





**12:00  
EXISTING**

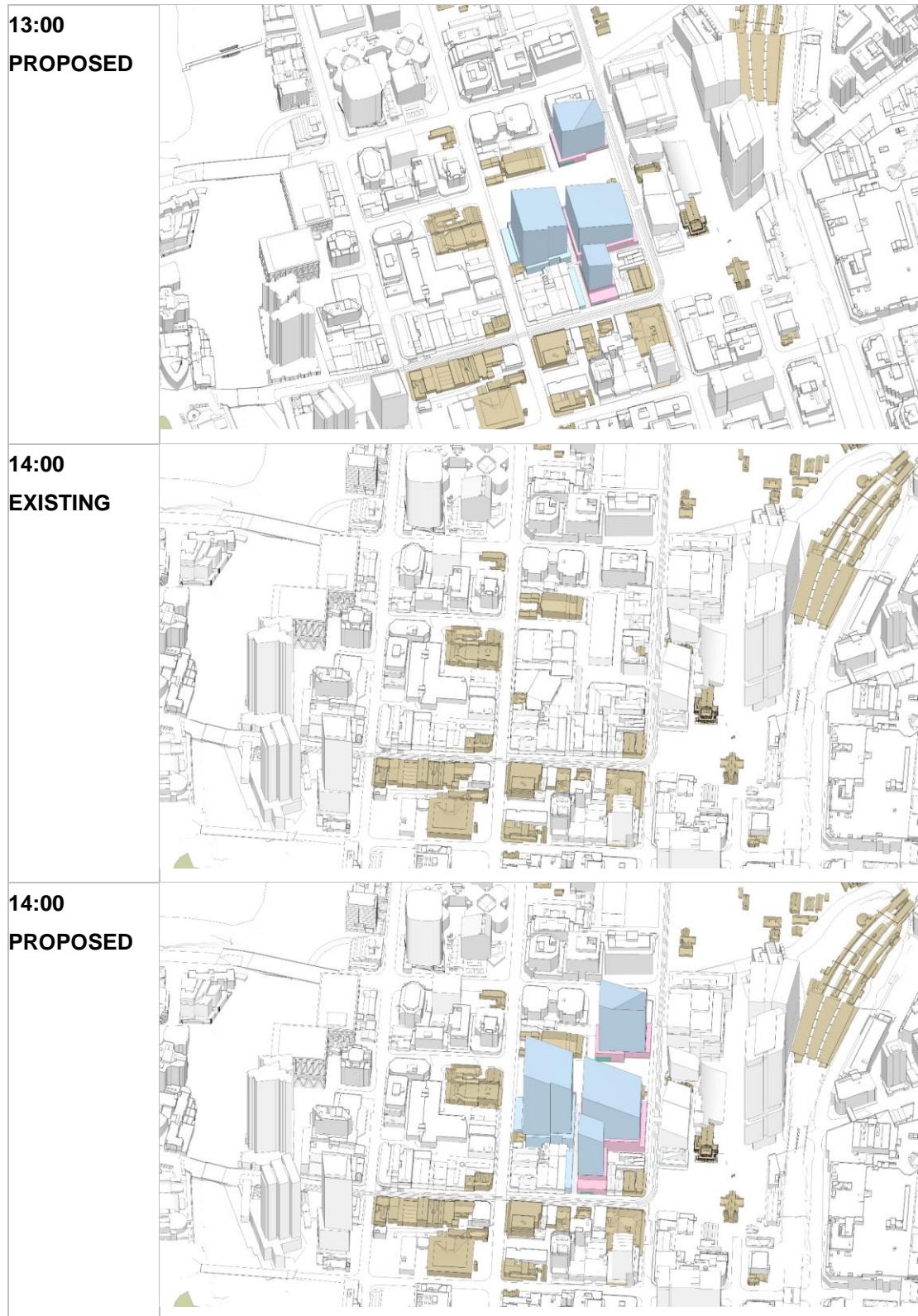


**12:00  
PROPOSED**



**13:00  
EXISTING**







**15:00  
EXISTING**

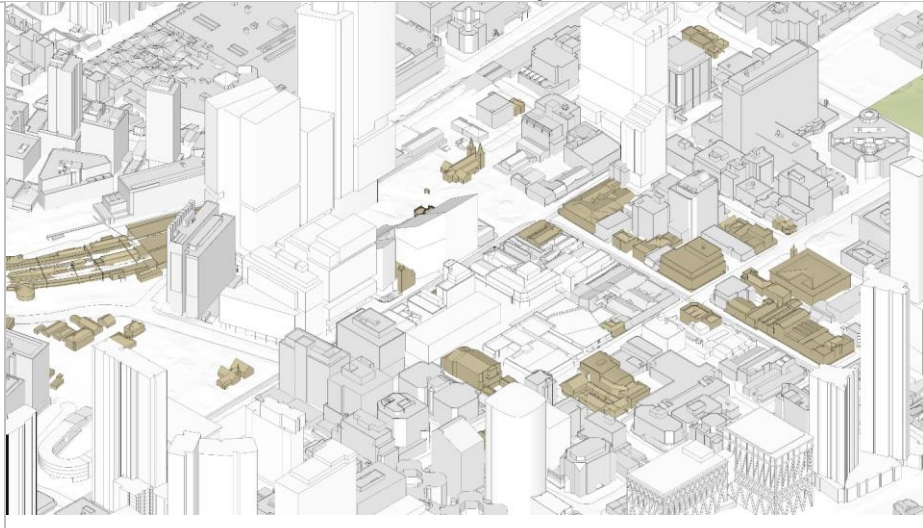
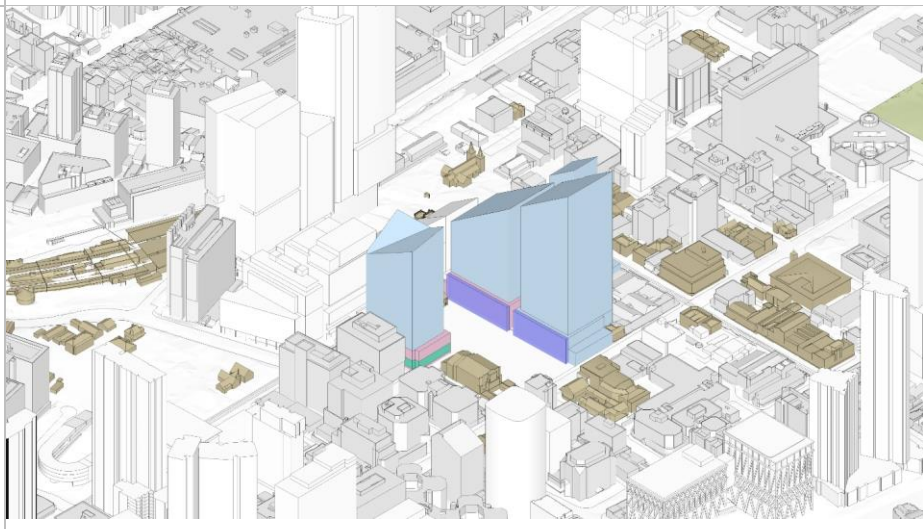
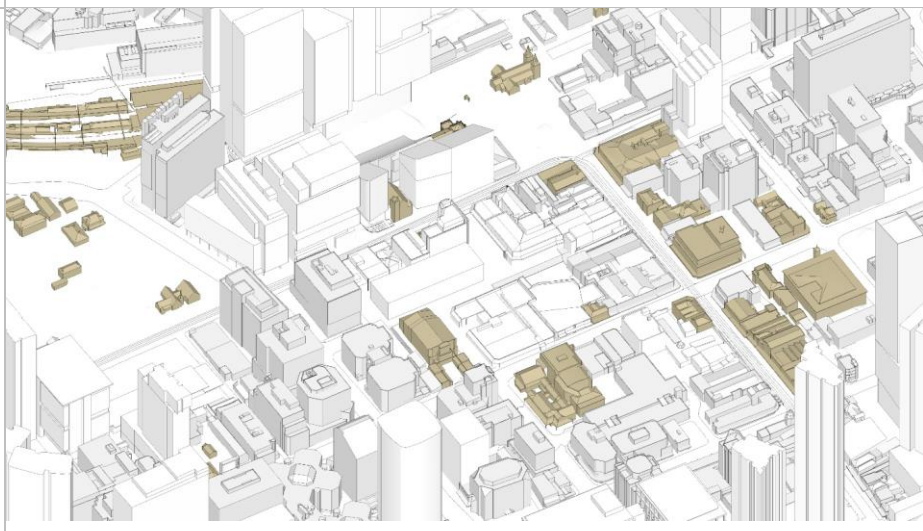


**15:00  
PROPOSED**



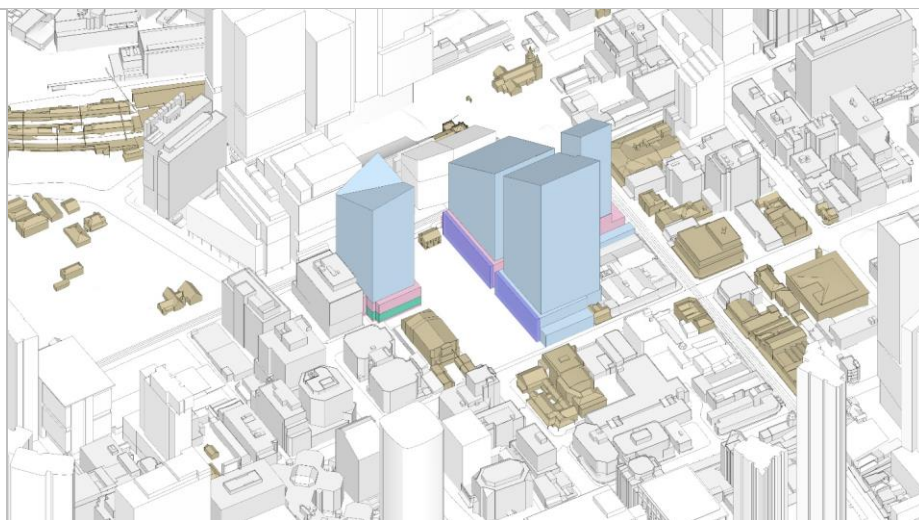
Table B3 shows hourly views of solar access projections for March 21st (Autumn Equinox).

**Table B3 – Views from the Sun – March 21<sup>st</sup> – Autumn Equinox**

<b>9:00</b> <b>EXISTING</b>	 A 3D architectural rendering of a city block at 9:00 AM on the Autumn Equinox. The scene shows a dense arrangement of buildings of various heights. Long, soft shadows are cast from the buildings, indicating the low position of the sun. The shadows are primarily oriented towards the west-northwest.
<b>9:00</b> <b>PROPOSED</b>	 A 3D architectural rendering of the same city block at 9:00 AM, but with a proposed building highlighted in blue. The proposed building is a tall, rectangular structure with a flat roof. Its shadow is cast onto the surrounding buildings and the ground, showing its potential impact on the solar access of the area.
<b>10:00</b> <b>EXISTING</b>	 A 3D architectural rendering of the city block at 10:00 AM on the Autumn Equinox. The sun is higher in the sky than at 9:00 AM, and the shadows are shorter and cast more directly towards the west. The overall scene shows the changing solar access throughout the morning.



**10:00  
PROPOSED**



**11:00  
EXISTING**



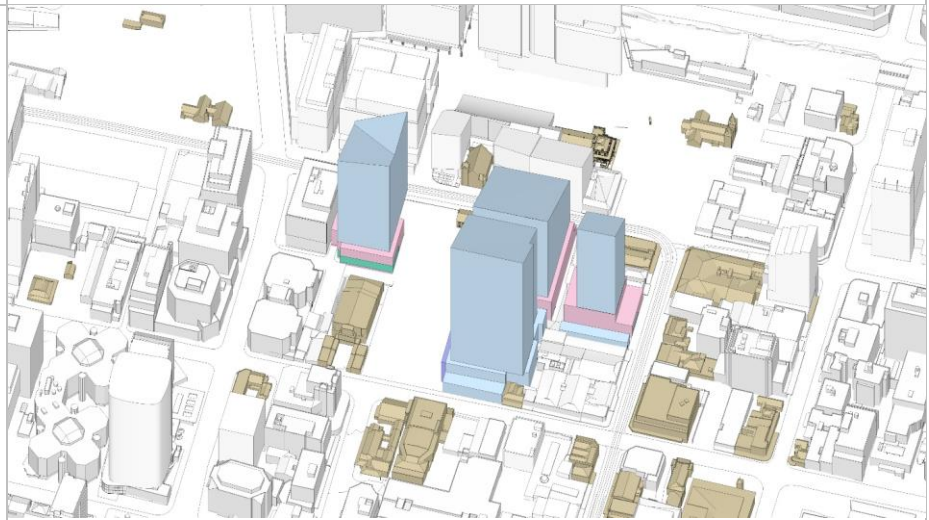
**11:00  
PROPOSED**



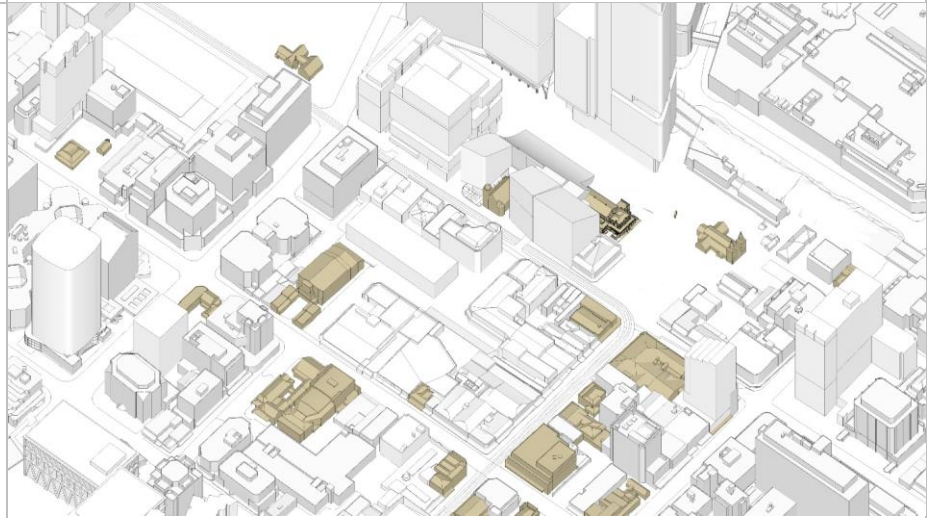
**12:00  
EXISTING**



**12:00  
PROPOSED**

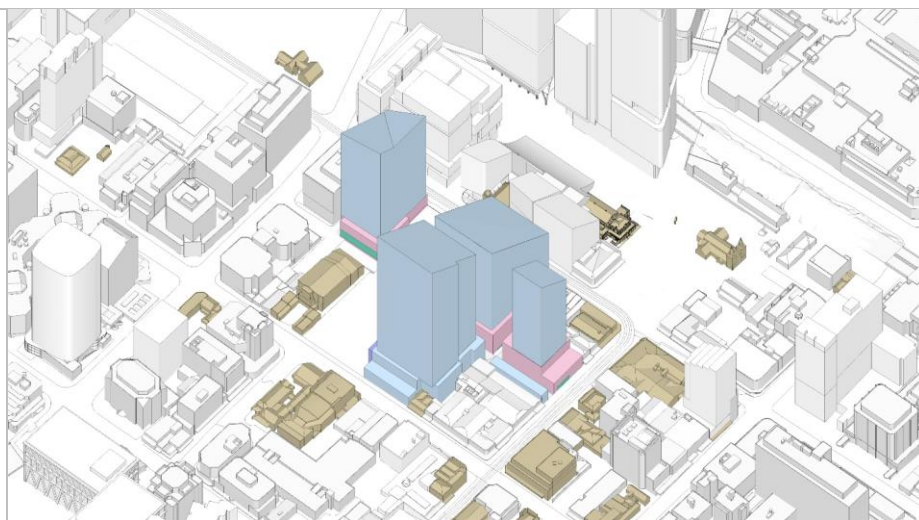


**13:00  
EXISTING**





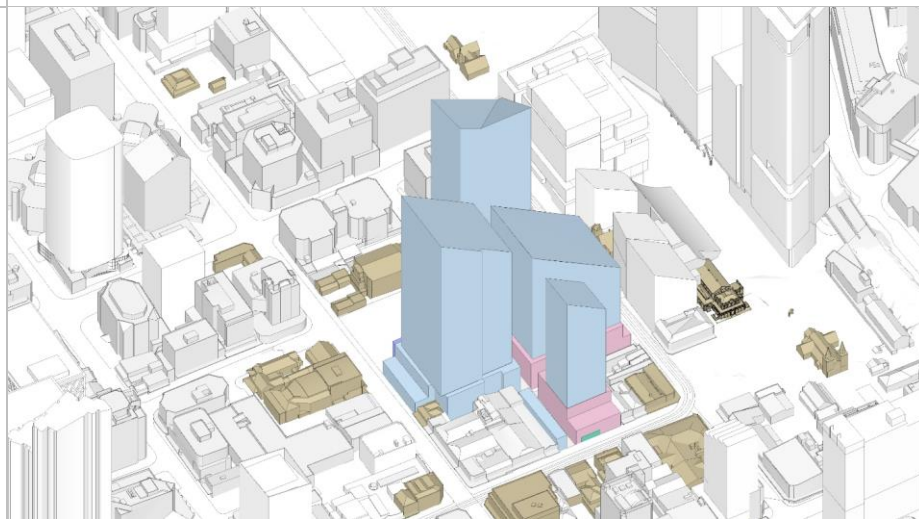
**13:00**  
**PROPOSED**



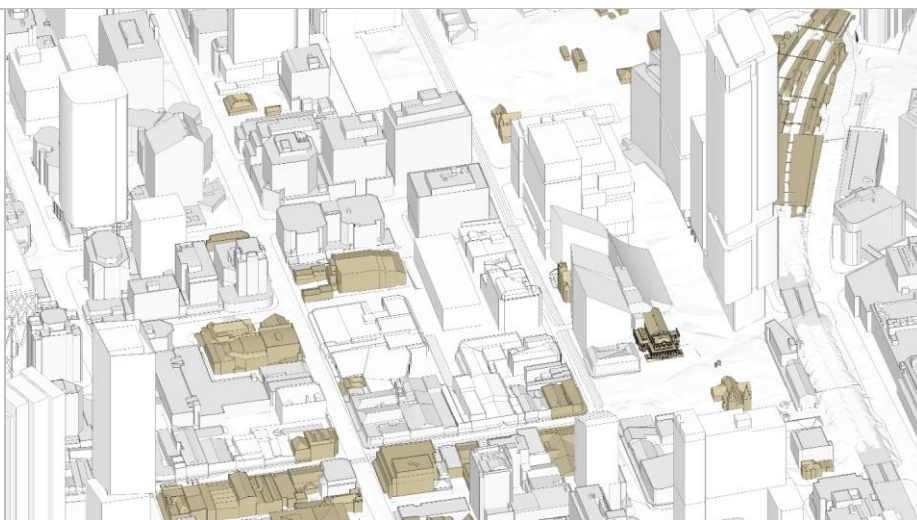
**14:00**  
**EXISTING**



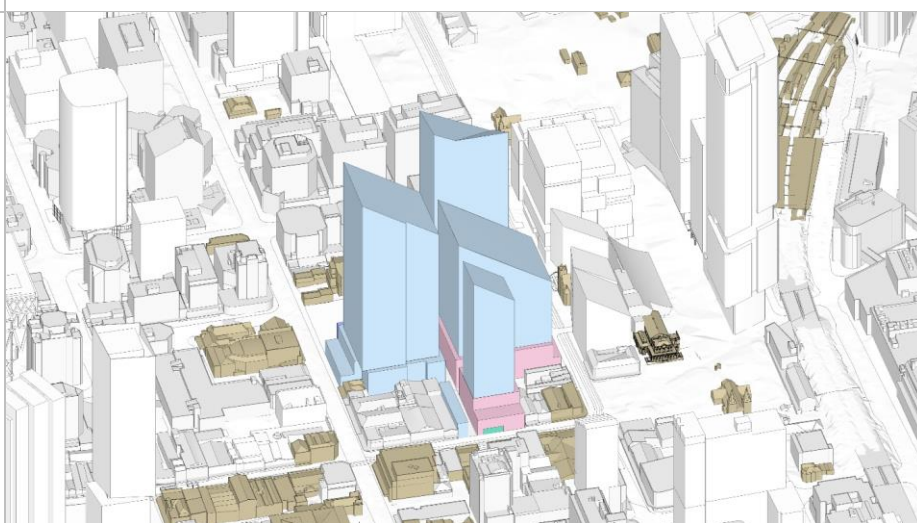
**14:00**  
**PROPOSED**



**15:00**  
**EXISTING**

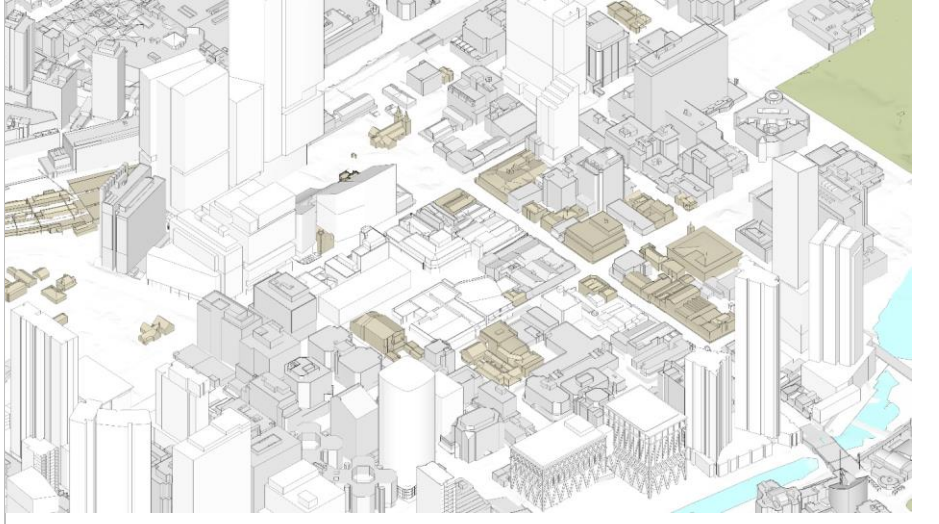
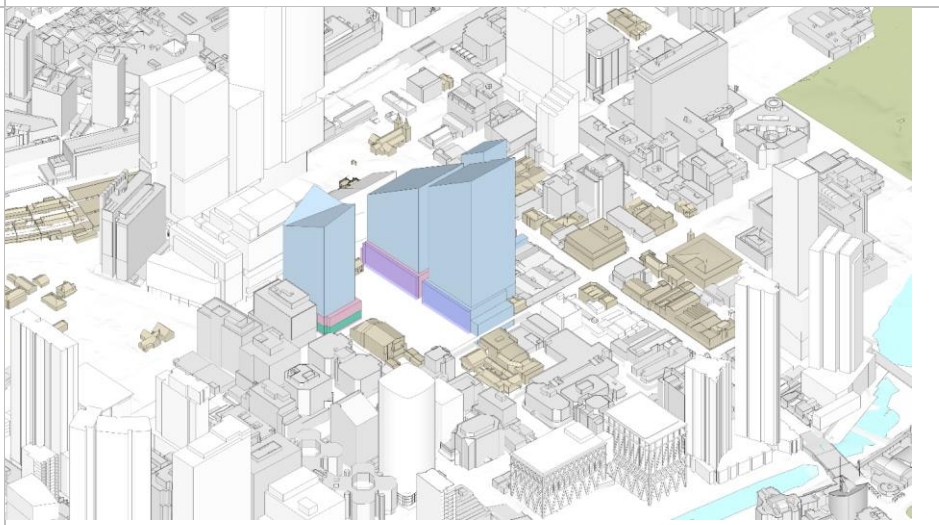



**15:00**  
**PROPOSED**

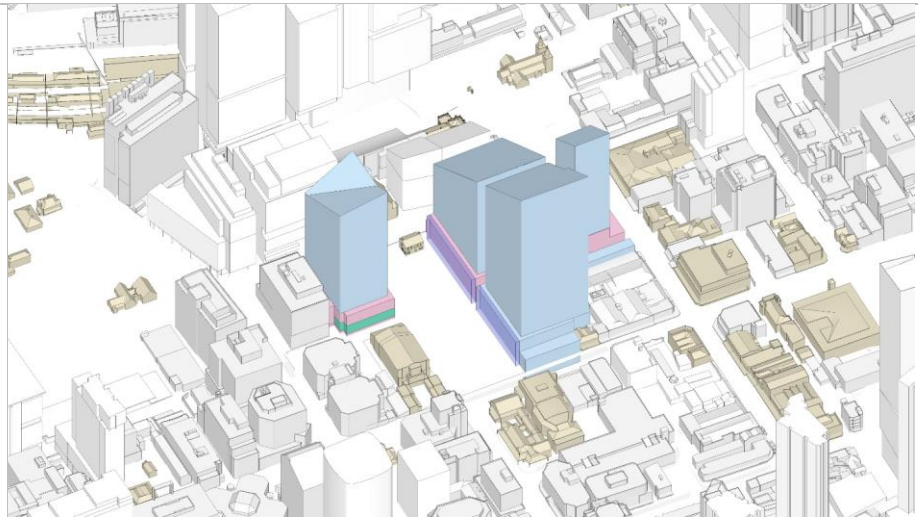




**Table B4 – Views from the Sun – September 21<sup>st</sup> – Spring Equinox**

<b>9:00</b> <b>EXISTING</b>	
<b>9:00</b> <b>PROPOSED</b>	
<b>10:00</b> <b>EXISTING</b>	

**10:00  
PROPOSED**



**11:00  
EXISTING**



**11:00  
PROPOSED**

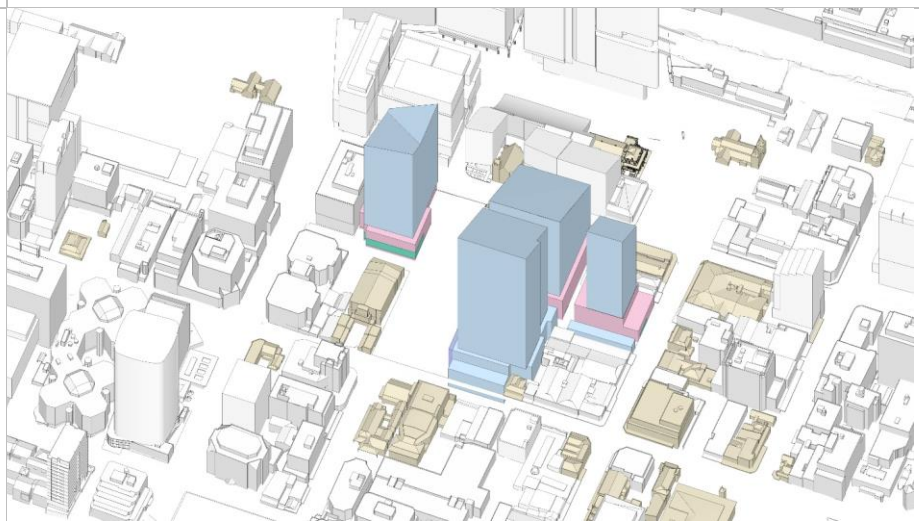




**12:00  
EXISTING**



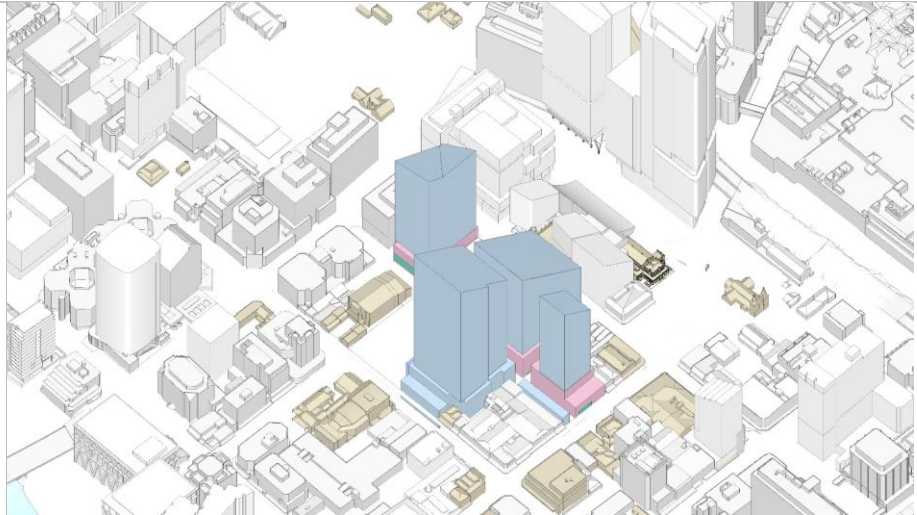
**12:00  
PROPOSED**



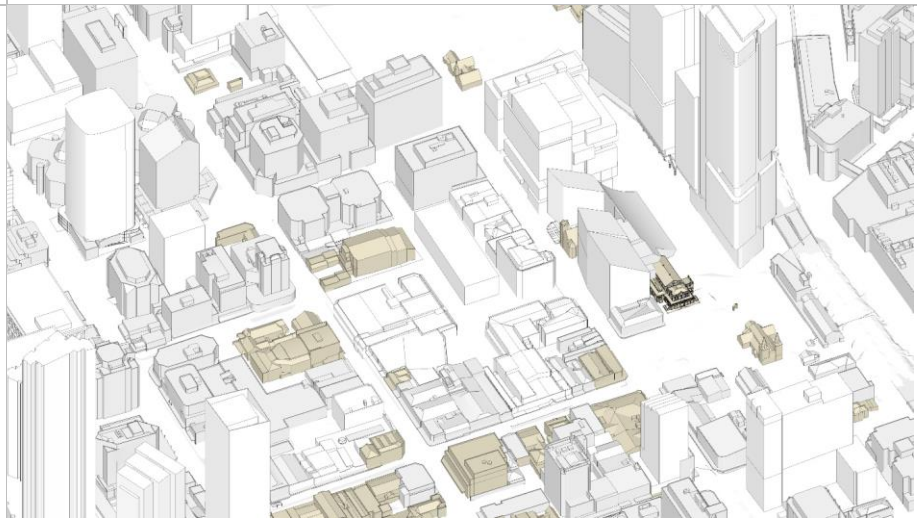
**13:00  
EXISTING**



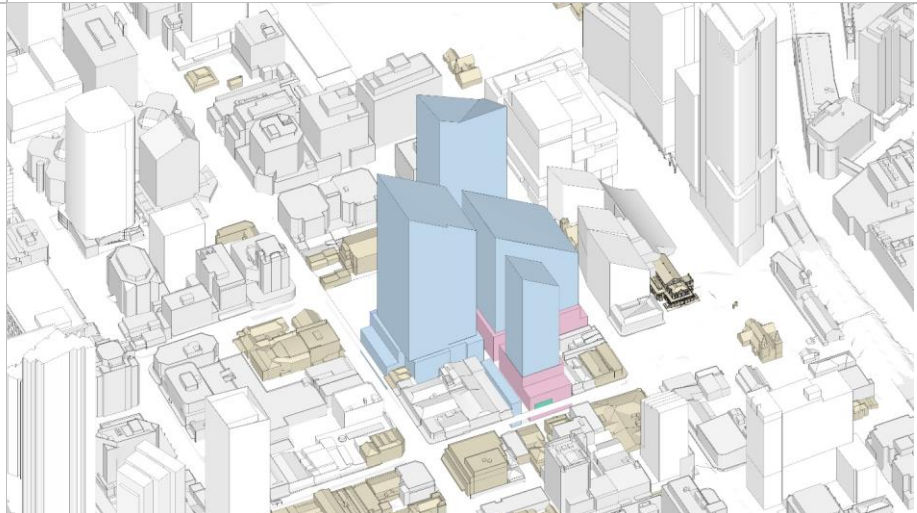
**13:00**  
**PROPOSED**



**14:00**  
**EXISTING**



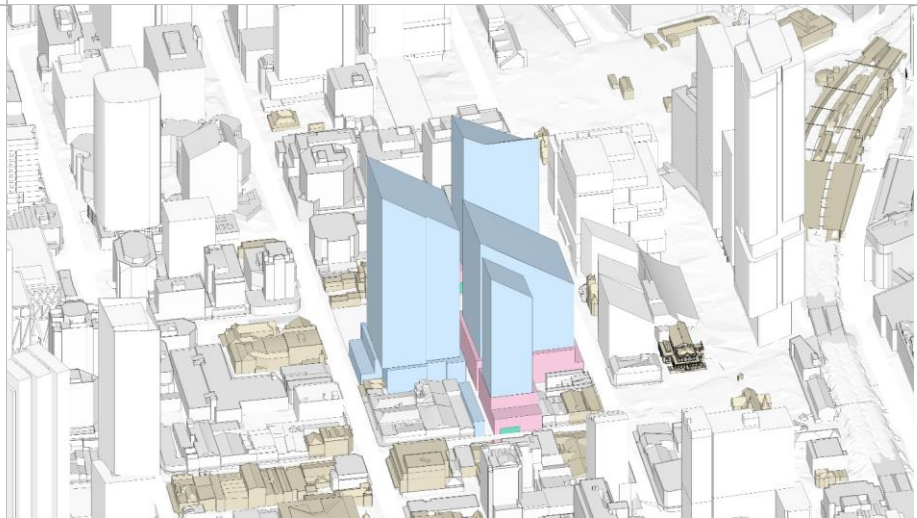
**14:00**  
**PROPOSED**



**15:00**  
**EXISTING**



**15:00**  
**PROPOSED**



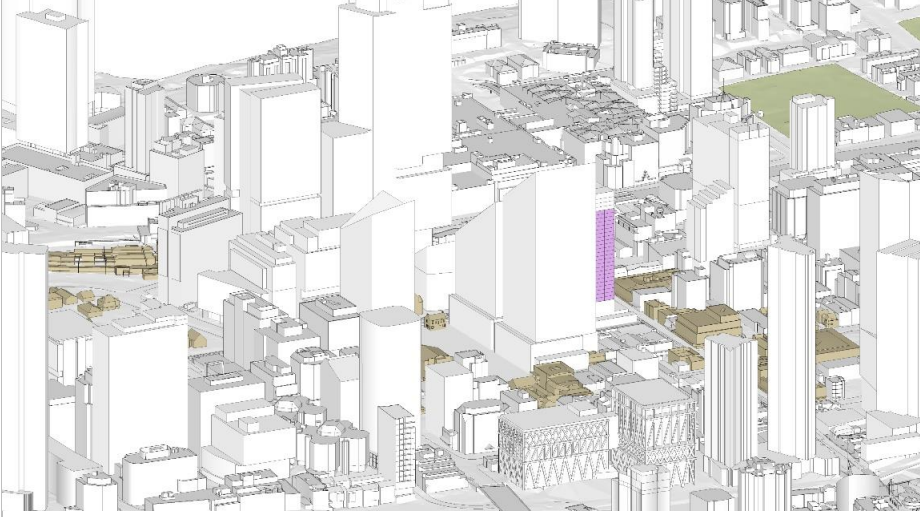
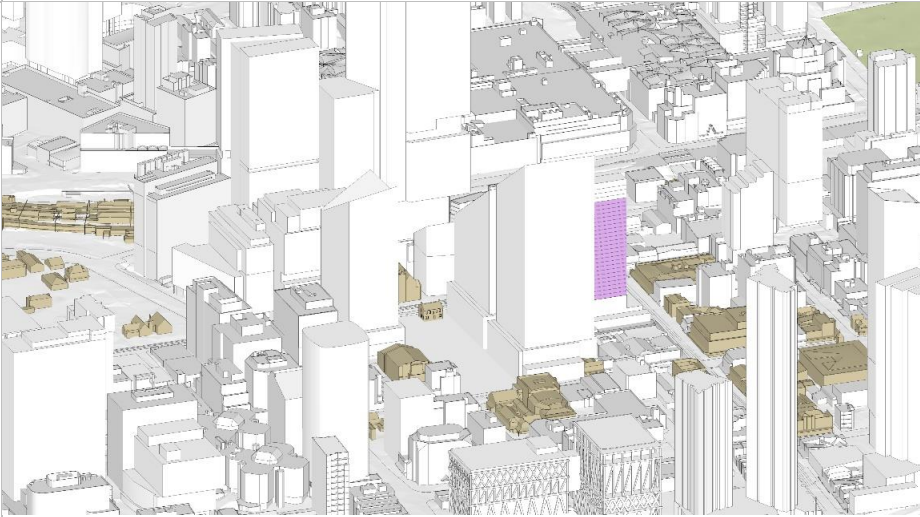
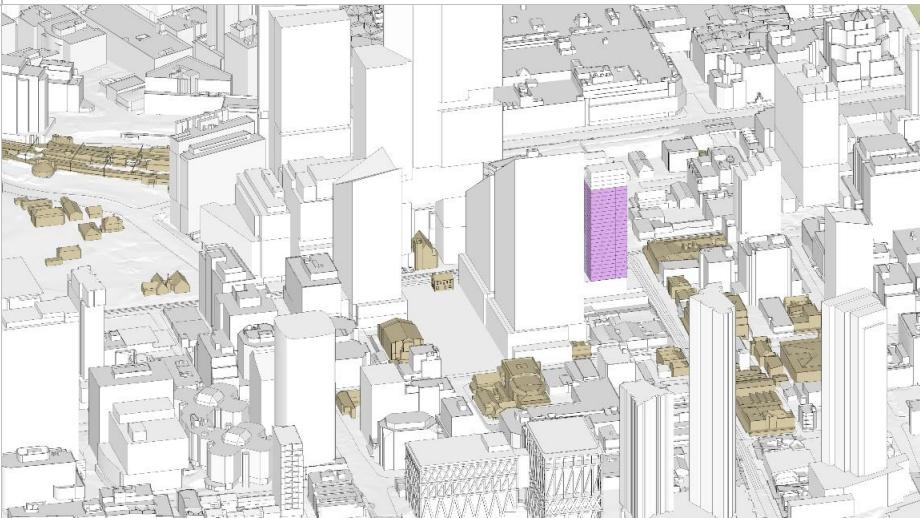


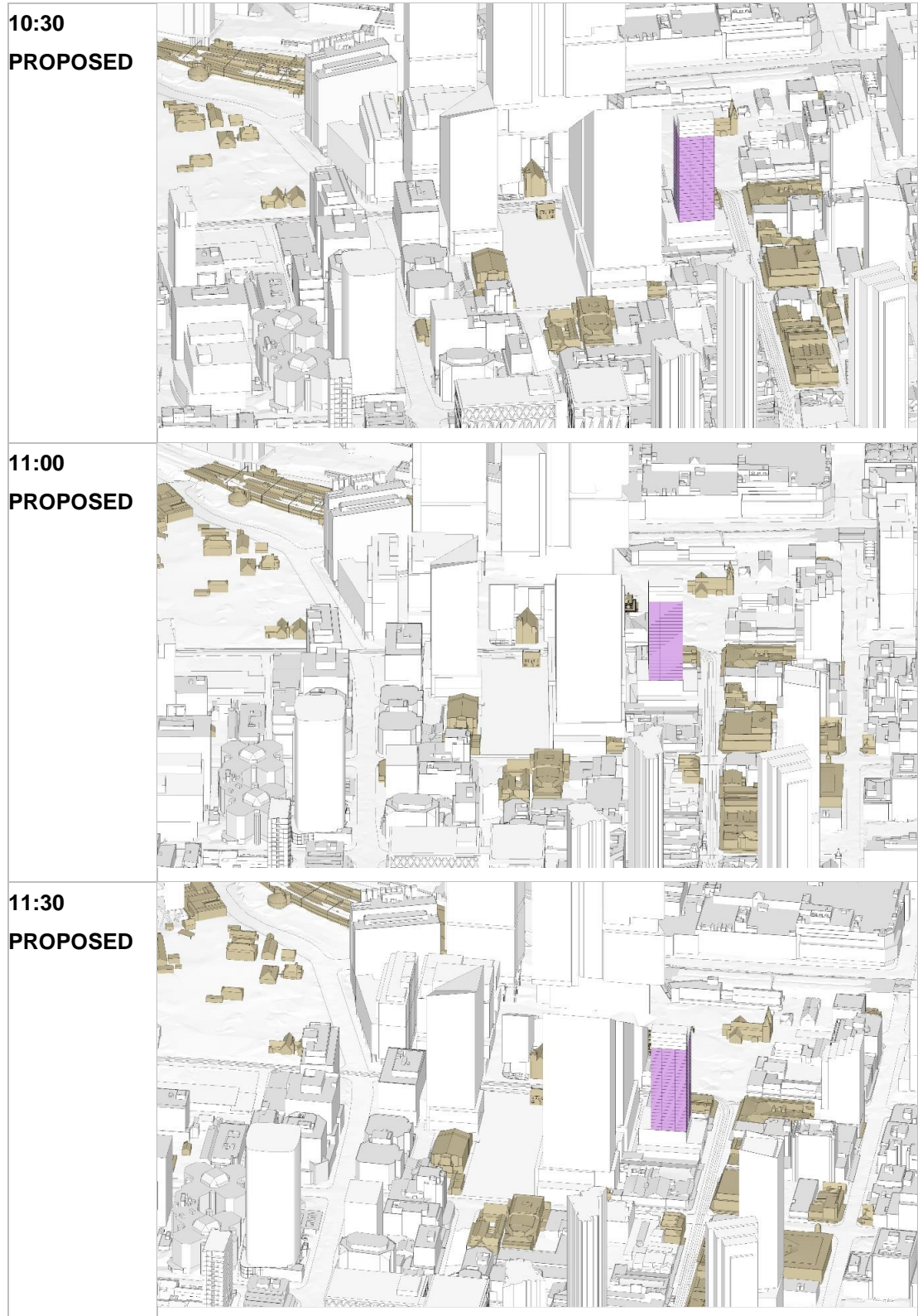
## Appendix C Views from the sun - Building B

The table shows half-hourly views of solar access projections for June 21<sup>st</sup> from 9am-3pm.

Note: Building B which is residential shown in purple.

**Table C1 Views from the Sun – Building B**

<b>9:00</b> <b>PROPOSED</b>	
<b>9:30</b> <b>PROPOSED</b>	
<b>10:00</b> <b>PROPOSED</b>	

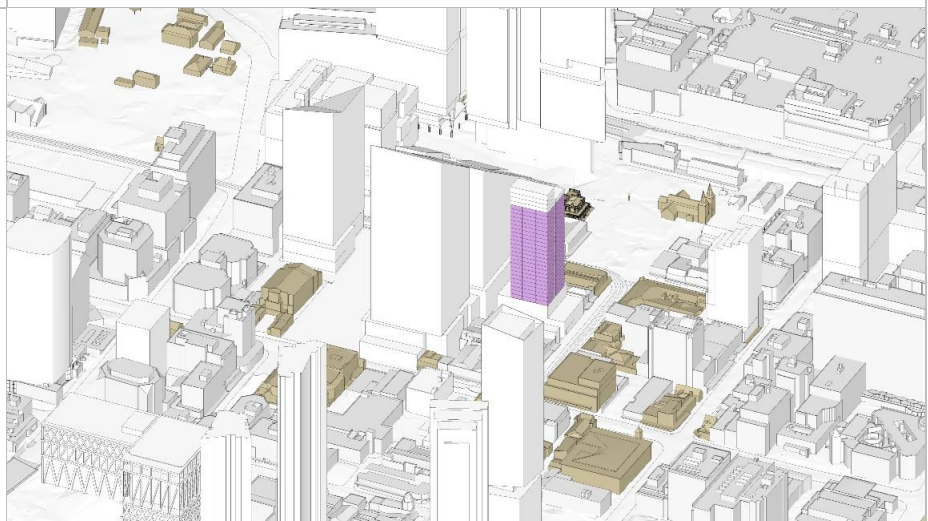




**12:00**  
**PROPOSED**



**12:30**  
**PROPOSED**

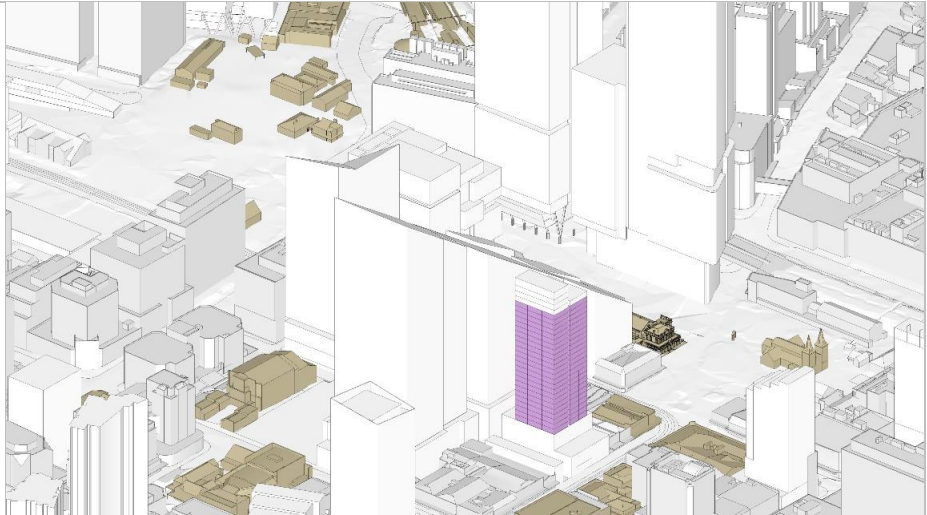


**13:00**  
**PROPOSED**

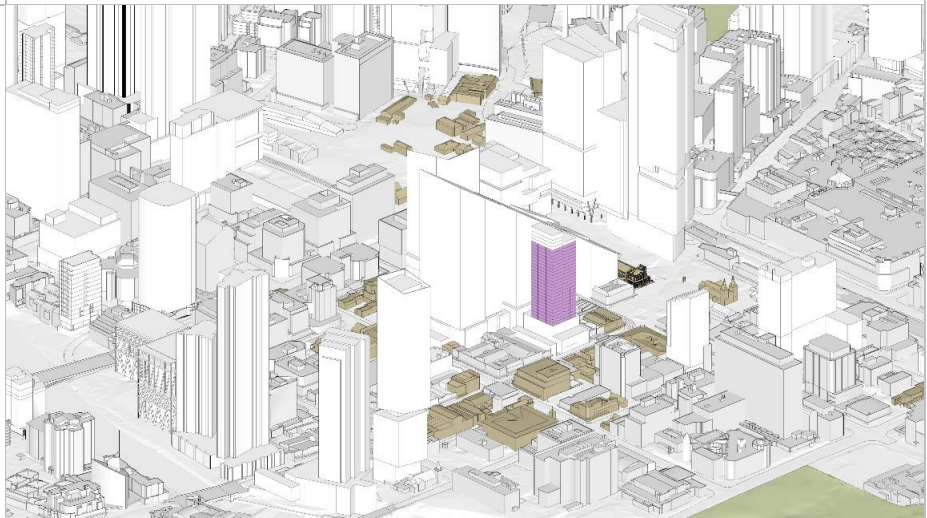




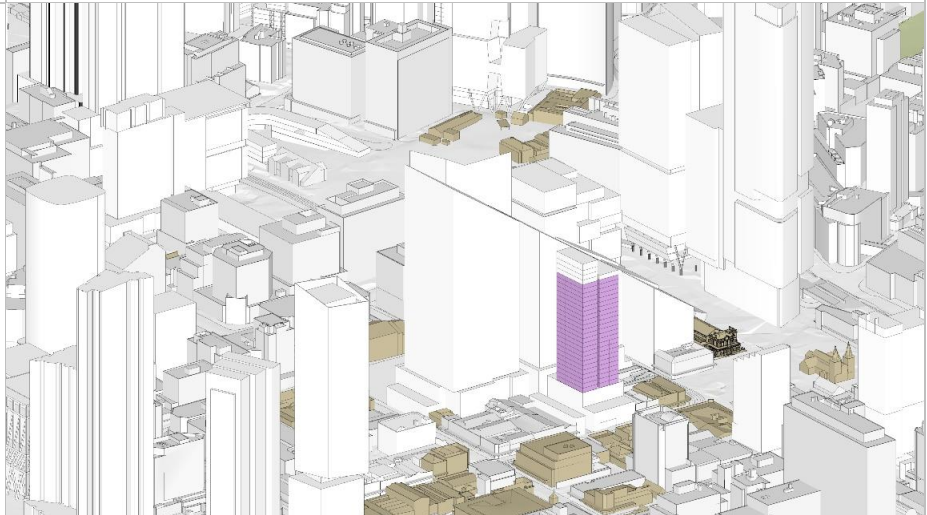
**13:30  
PROPOSED**



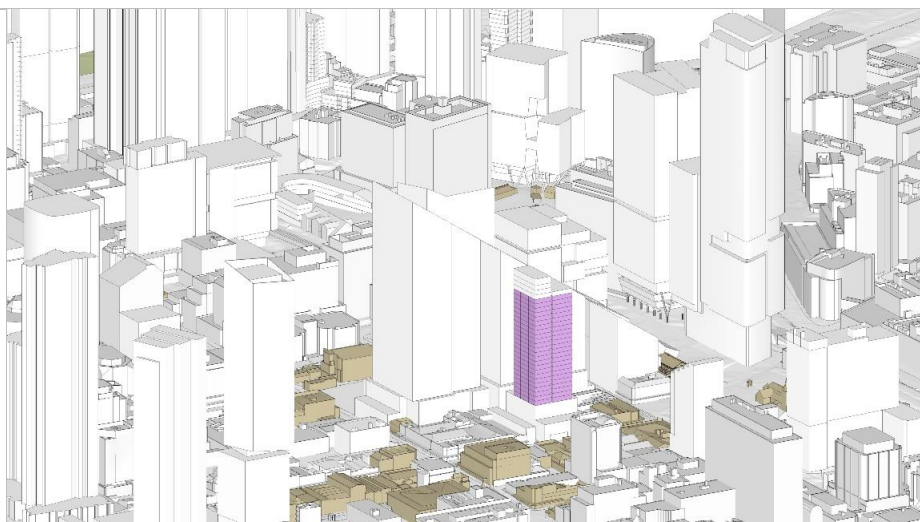
**14:00  
PROPOSED**



**14:30  
PROPOSED**



**15:00**  
**PROPOSED**



# Appendix D Building B compliance table

APARTMENT					TIME													ADG			
Unit	Level	Number	Position	Room	900	930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	Mins	> 3hrs 9-3	> 1hrs 9- 3	> 1hrs 9-3
1	4	4.01	SW	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
2	4	4.02	W	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
3	4	4.03	NW	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
4	4	4.04	N	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
5	4	4.05	NE	L		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
				POS		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
6	4	4.06	E	L			30	30										60	NO	NO	YES
				POS			30	30										60	NO	NO	YES
7	4	4.07	SE	L				30										30	NO	NO	NO
				POS				30										30	NO	NO	NO
8	5	5.01	SW	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
9	5	5.02	W	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
10	5	5.03	NW	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
11	5	5.04	N	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
12	5	5.05	NE	L		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
				POS		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
13	5	5.06	E	L			30	30										60	NO	NO	YES
				POS			30	30										60	NO	NO	YES
14	5	5.07	SE	L				30										30	NO	NO	NO
				POS				30										30	NO	NO	NO
15	6	6.01	SW	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
16	6	6.02	W	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
17	6	6.03	NW	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
18	6	6.04	N	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
19	6	6.05	NE	L		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
				POS		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
20	6	6.06	E	L			30	30										60	NO	NO	YES
				POS			30	30										60	NO	NO	YES
21	6	6.07	SE	L				30										30	NO	NO	NO
				POS				30										30	NO	NO	NO
22	7	7.01	SW	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
23	7	7.02	W	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
24	7	7.03	NW	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
25	7	7.04	N	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
26	7	7.05	NE	L		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
				POS		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
27	7	7.06	E	L			30	30										60	NO	NO	YES
				POS			30	30										60	NO	NO	YES
28	7	7.07	SE	L				30										30	NO	NO	NO
				POS				30										30	NO	NO	NO
29	8	8.01	SW	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
30	8	8.02	W	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
31	8	8.03	NW	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
32	8	8.04	N	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
33	8	8.05	NE	L		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
				POS		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
34	8	8.06	E	L			30	30										60	NO	NO	YES
				POS			30	30										60	NO	NO	YES
35	8	8.07	SE	L				30										30	NO	NO	NO
				POS				30										30	NO	NO	NO
36	9	9.01	SW	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
37	9	9.02	W	L						30	30	30	30	30	30	30		210	YES	YES	YES
				POS						30	30	30	30	30	30	30		210	YES	YES	YES
38	9	9.03	NW	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
39	9	9.04	N	L	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
				POS	30	30	30	30	30	30	30	30	30	30	30	30		360	YES	YES	YES
40	9	9.05	NE	L		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
				POS		30	30	30	30	30	30	30	30	30	30	30		330	YES	YES	YES
41	9	9.06	E	L			30	30										60	NO	NO	YES
				POS			30	30										60	NO	NO	YES
42	9	9.07	SE	L				30										30	NO	NO	NO
				POS				30										30	NO	NO	NO
43	10	10.01	SW	L																	

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APARTMENT					TIME													ADG			
Unit	Level	Number	Position	Room	900	930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	Mins	> 3hrs 9-3	> 1hrs 9- 3	> 1hrs 9-3
133	26	26.03	N	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES
134	26	26.04	NE	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	330	YES	YES
135	26	26.05	SE	POS	30	30	30	30	0	0	0	0	0	0	0	0	0	60	NO	NO	YES
				L	30	30	30	0	0	0	0	0	0	0	0	0	0	0	60	NO	NO
136	27	27.01	SW	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	210	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	210	YES	YES
137	27	27.02	NW	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES
138	27	27.03	N	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES
139	27	27.04	NE	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	330	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	330	YES	YES
140	27	27.05	SE	POS	30	30	30	30	0	0	0	0	0	0	0	0	0	60	NO	NO	YES
				L	30	30	30	0	0	0	0	0	0	0	0	0	0	0	60	NO	NO
141	28	28.01	SW	POS	0	0	0	0	0	30	30	30	30	30	30	30	30	210	YES	YES	YES
				L	0	0	0	0	0	30	30	30	30	30	30	30	30	30	210	YES	YES
142	28	28.02	NW	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES
143	28	28.03	N	POS	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES	YES
				L	30	30	30	30	30	30	30	30	30	30	30	30	30	30	360	YES	YES
144	28	28.04	NE	POS	0	30	30	30	30	30	30	30	30	30	30	30	30	330	YES	YES	YES
				L	0	30	30	30	30	30	30	30	30	30	30	30	30	30	330	YES	YES
145	28	28.05	SE	POS	0	0	30	30	0	0	0	0	0	0	0	0	0	60	NO	NO	YES
				L	0	0	30	30	0	0	0	0	0	0	0	0	0	0	60	NO	NO

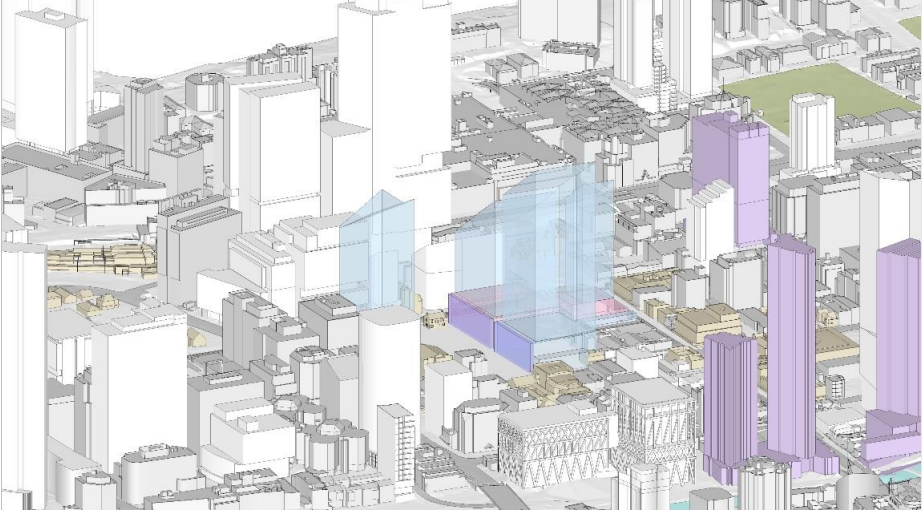
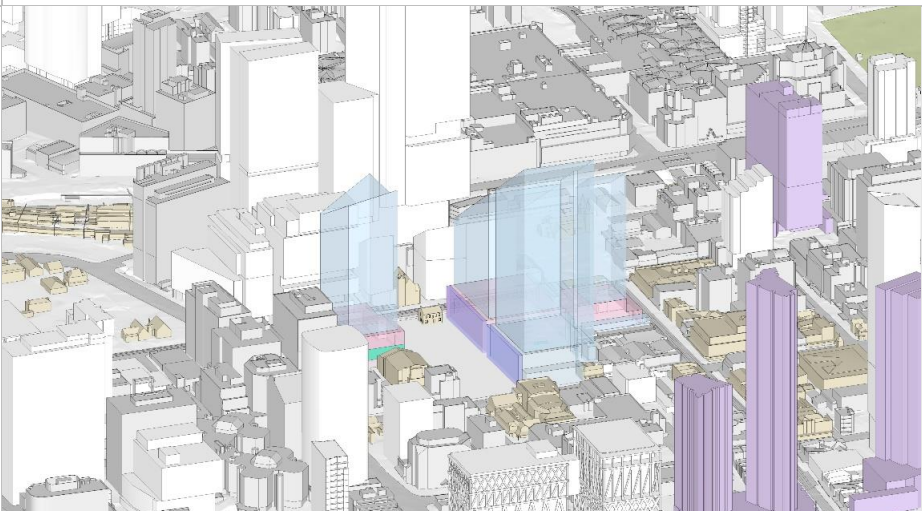
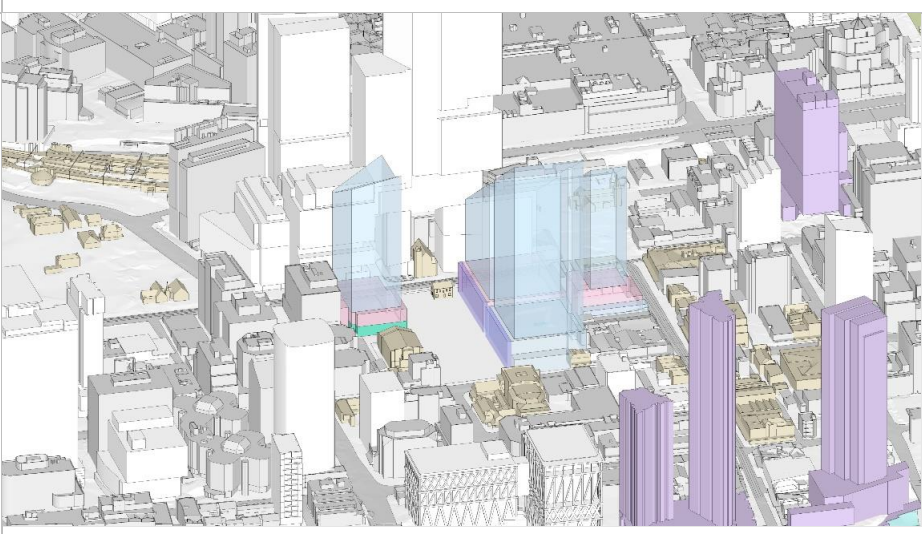
> 3hrs 9-3	> 2hrs 9-3	> 1hrs 9-3
110 76%	110 76%	135 93%

*Note: The above tables set out in detail the solar access status of each apartment in Building B.*

## Appendix E Views from the sun – Impact to neighbouring properties

Table E1 shows half-hourly views of solar access projections for June 21<sup>st</sup> from 9am-3pm. Note: Buildings in purple refer to existing neighbouring residential buildings.

**Table E1 Views from the Sun – Impact to neighbouring properties**

<b>9:00 PROPOSED</b>	
<b>9:30 PROPOSED</b>	
<b>10:00 PROPOSED</b>	



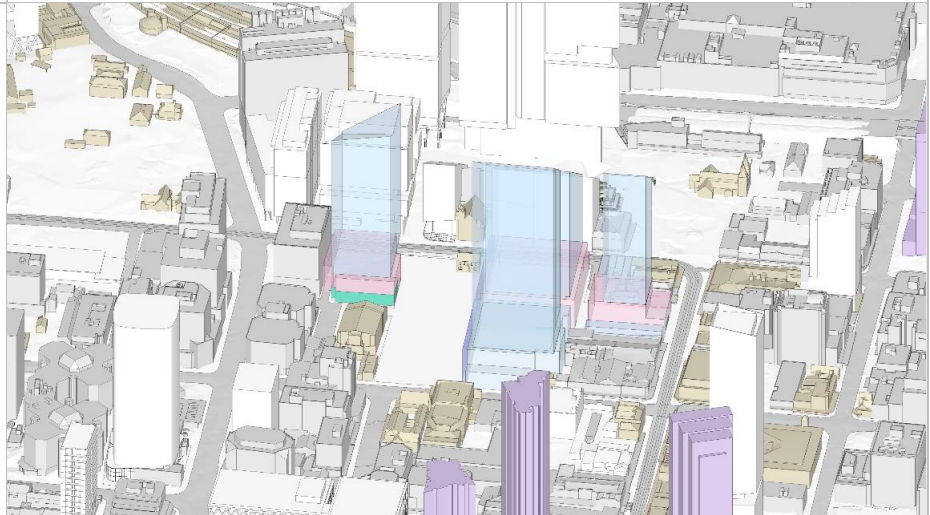
**10:30  
PROPOSED**



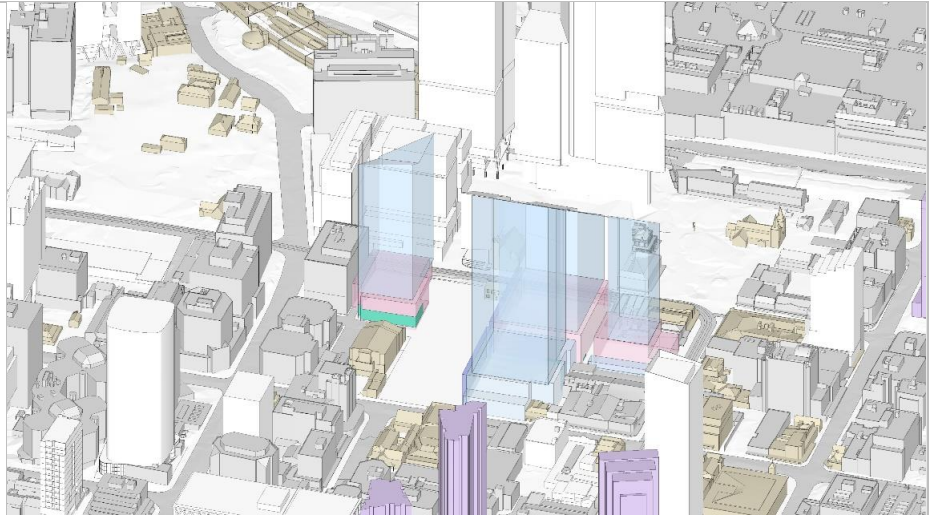
**11:00  
PROPOSED**



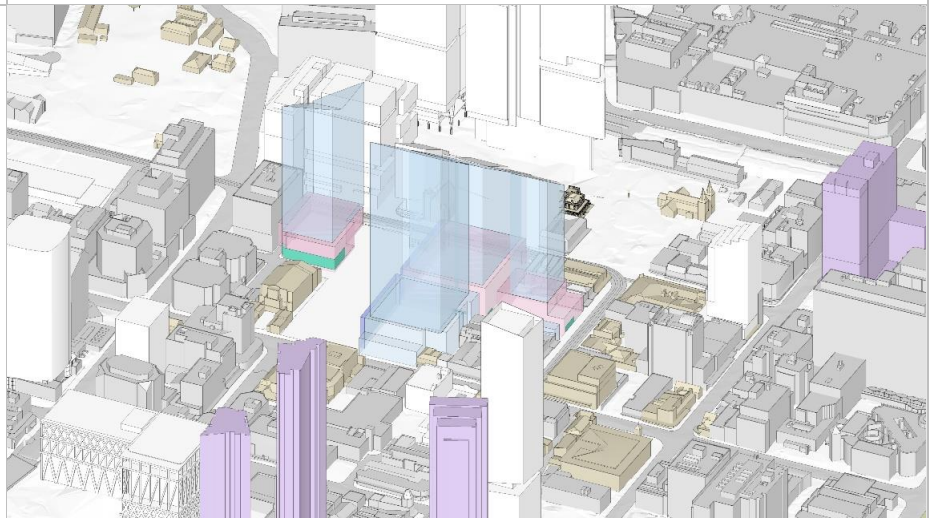
**11:30  
PROPOSED**



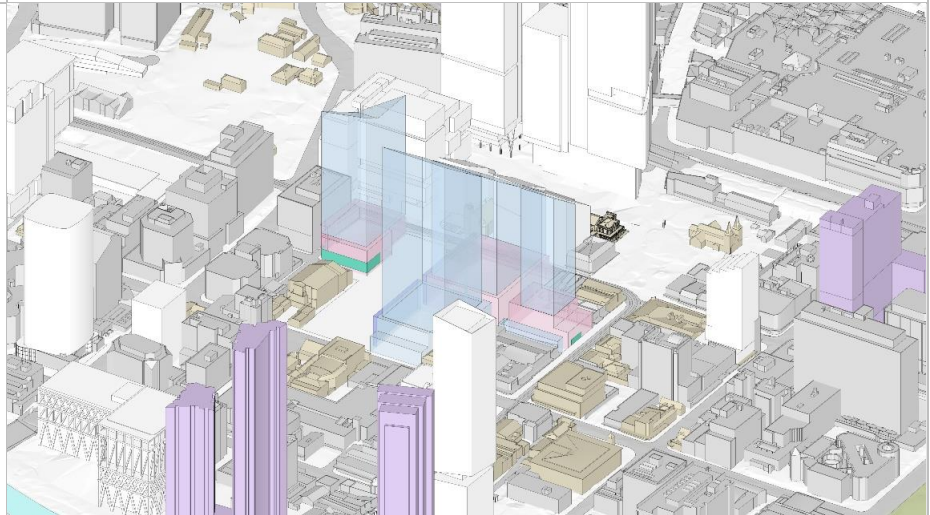
**12:00  
PROPOSED**



**12:30  
PROPOSED**

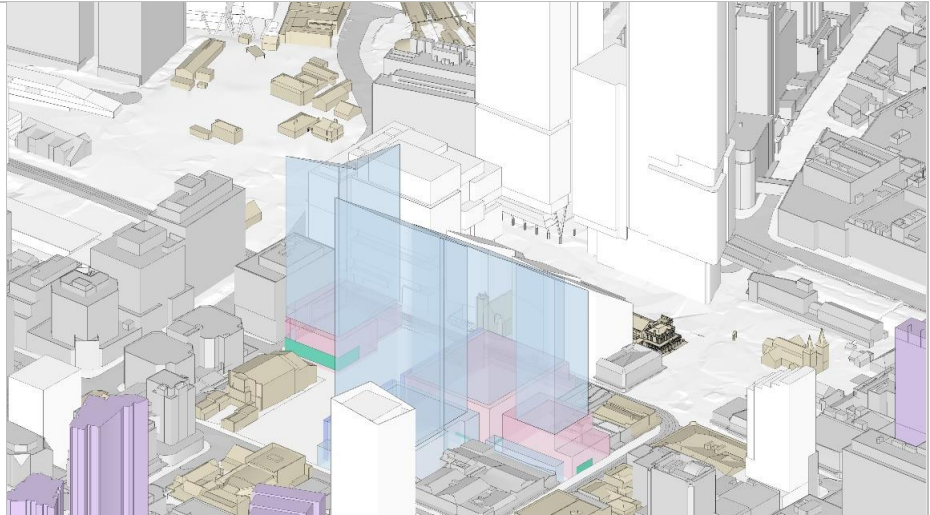


**13:00  
PROPOSED**

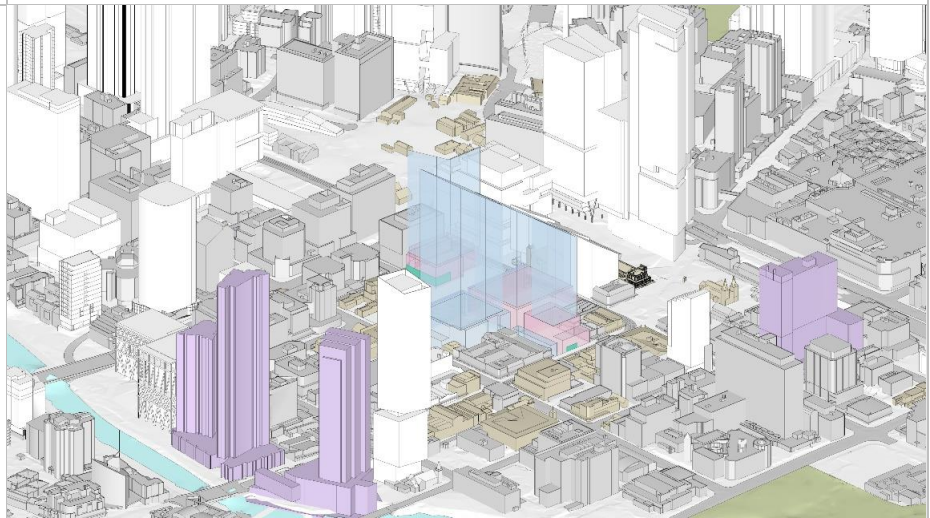




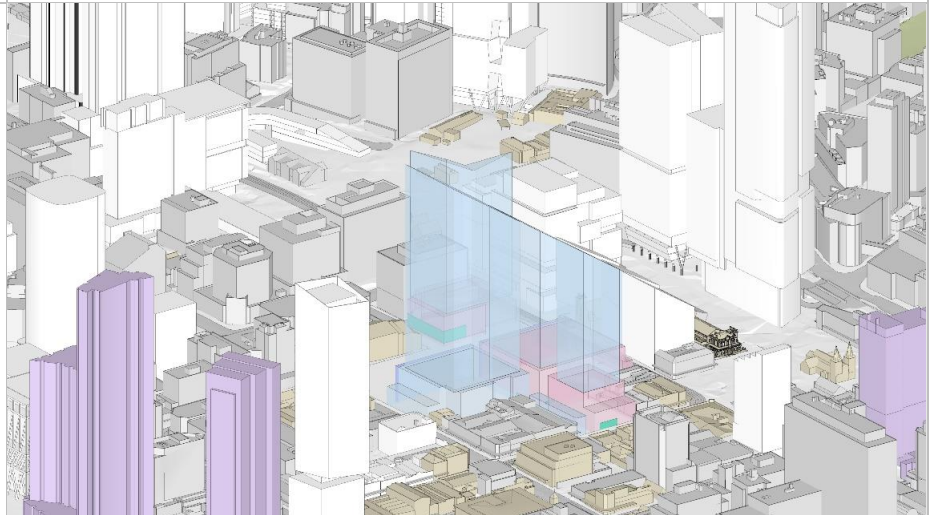
**13:30  
PROPOSED**



**14:00  
PROPOSED**

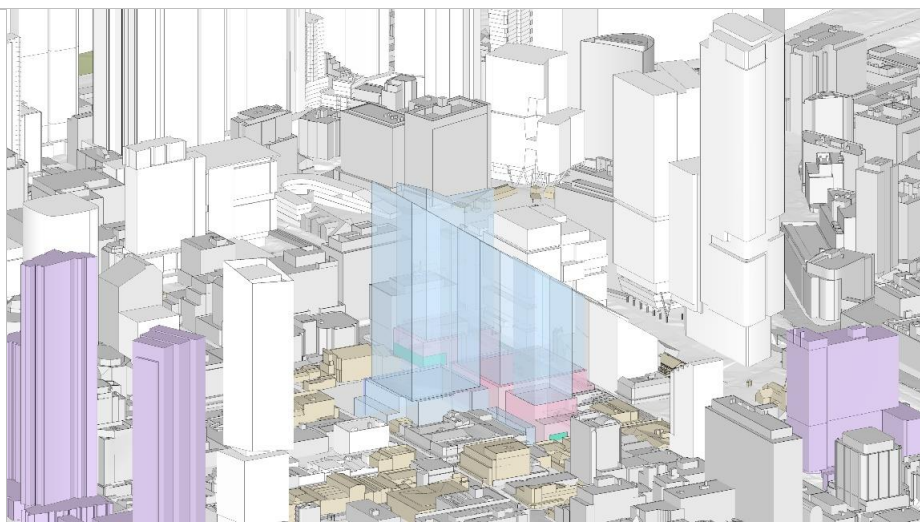


**14:30  
PROPOSED**





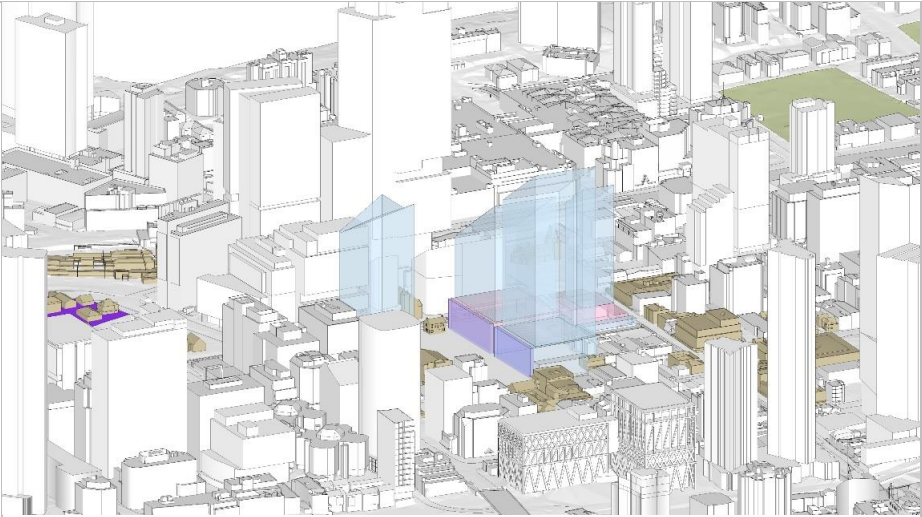
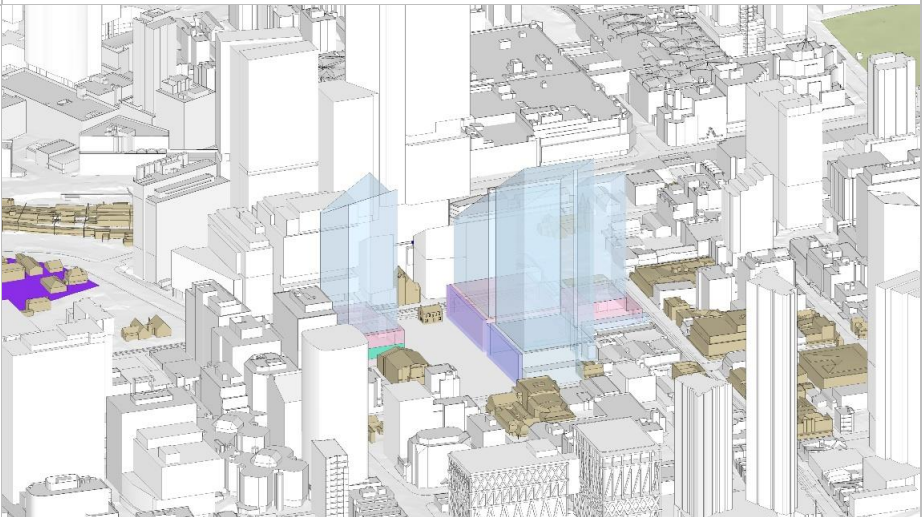
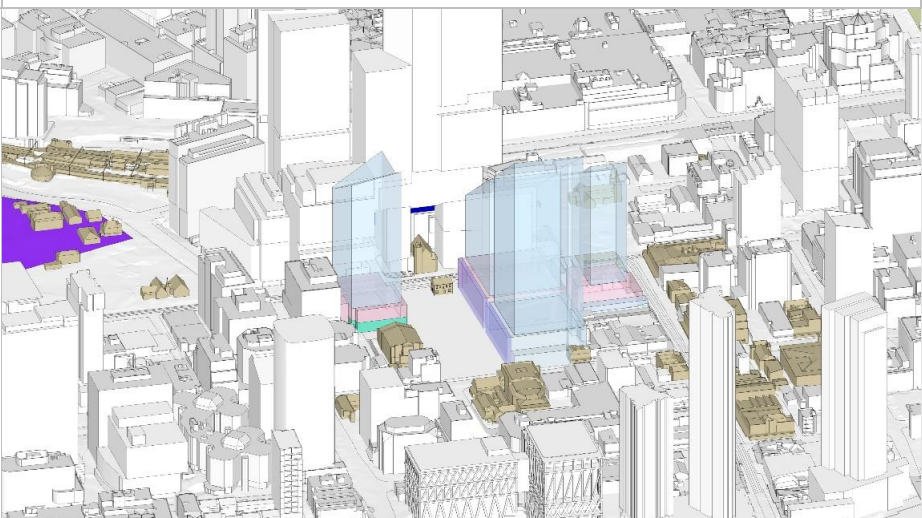
**15:00**  
**PROPOSED**



## Appendix F Views from the sun – PSQ and Lancer Barracks

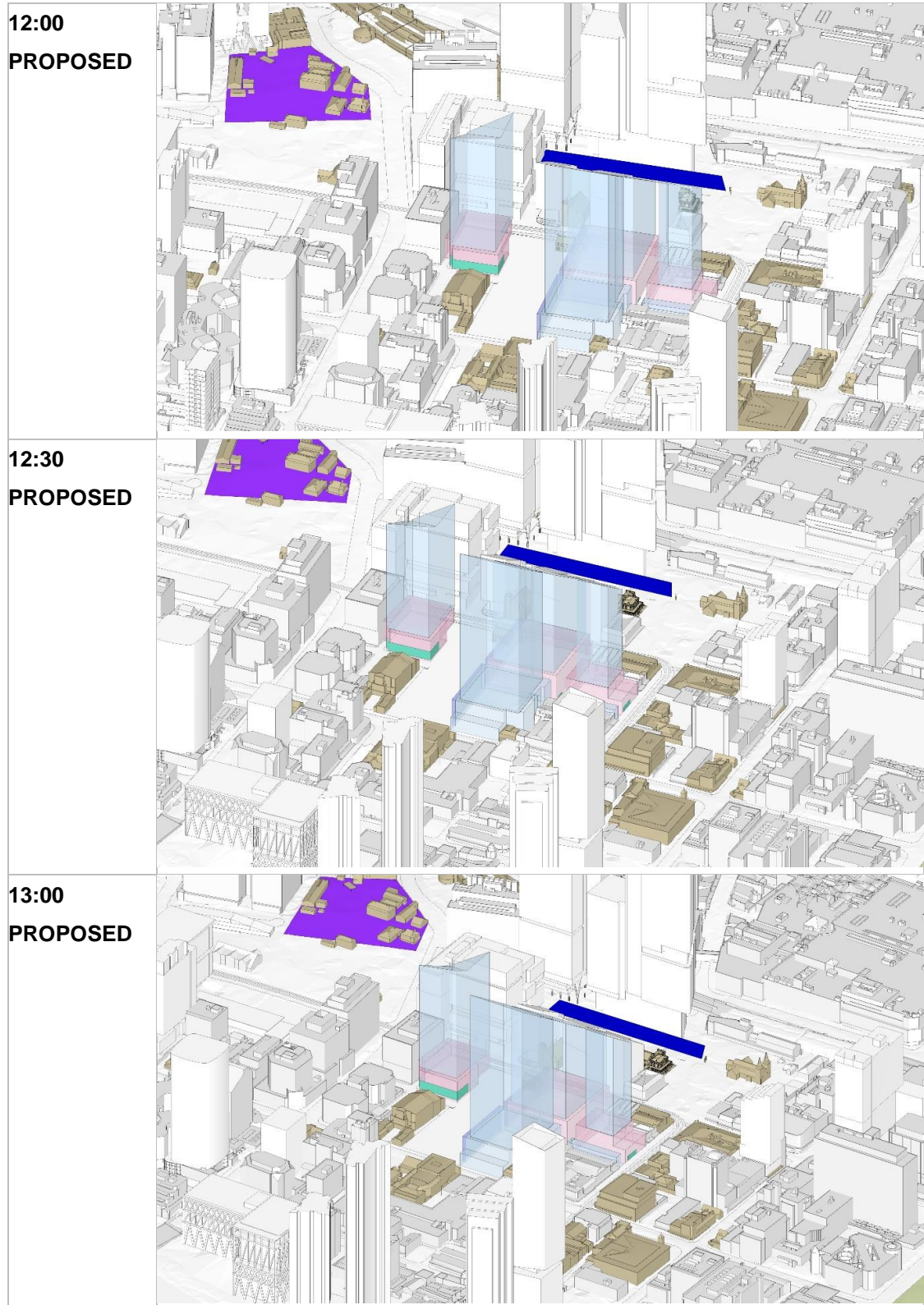
The table shows half-hourly views of solar access projections for June 21<sup>st</sup> from 9am-3pm. Parramatta Square shown in blue and Lancer Barracks shown in Purple.

**Table F1 Views from the Sun – PSQ and Lancer Barracks**

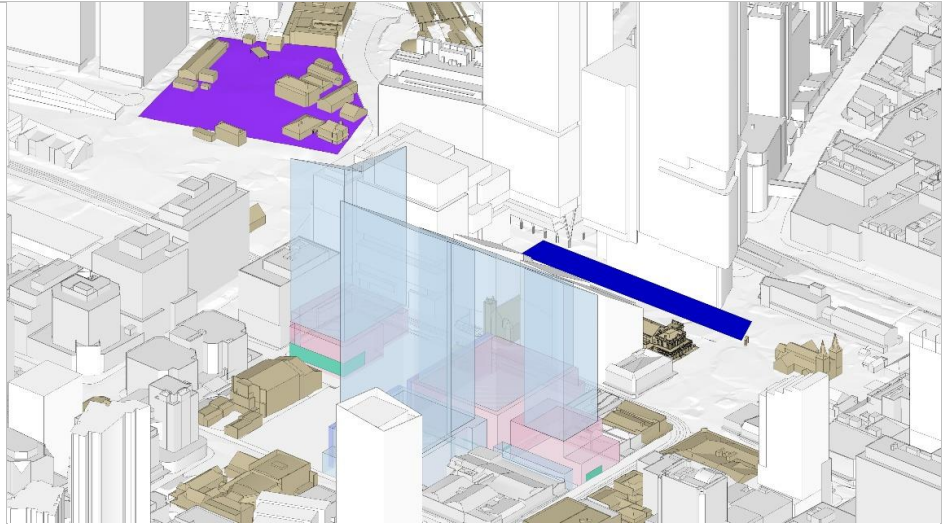
<b>9:00 PROPOSED</b>	
<b>9:30 PROPOSED</b>	
<b>10:00 PROPOSED</b>	



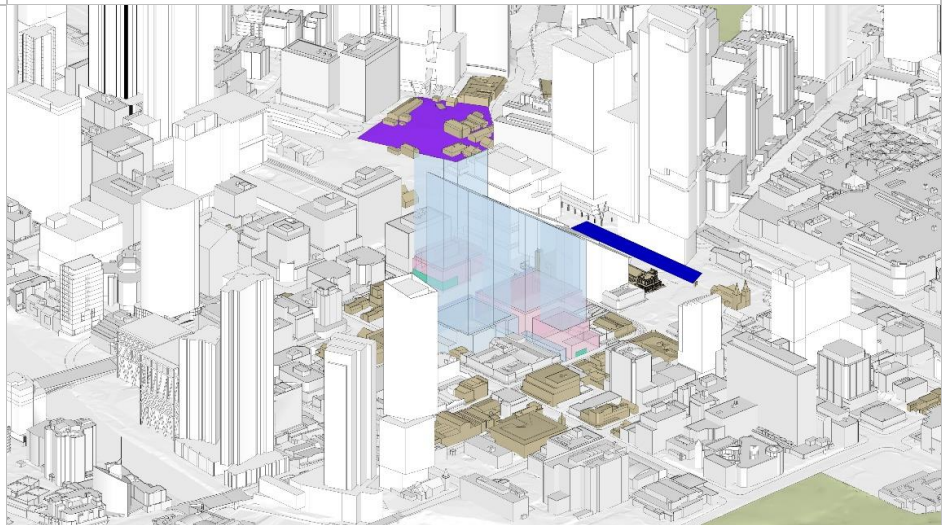




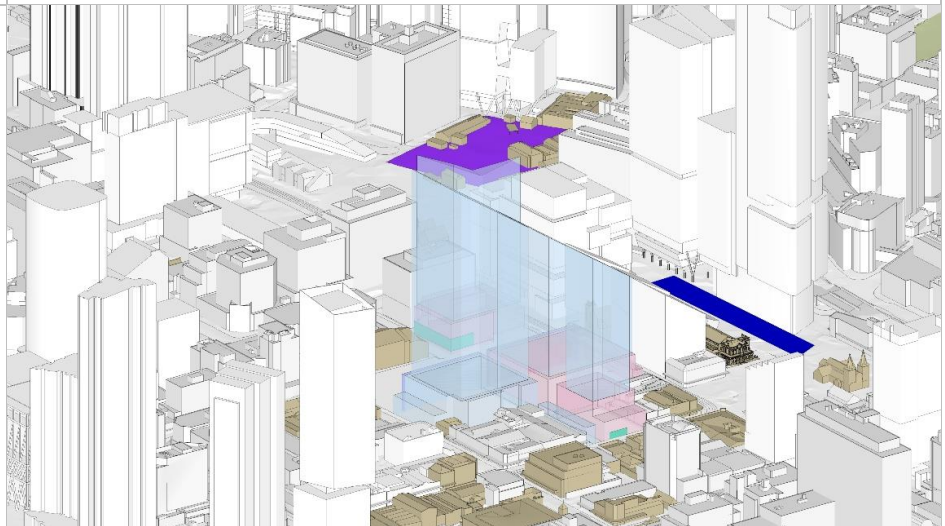
**13:30  
PROPOSED**



**14:00  
PROPOSED**



**14:30  
PROPOSED**



**15:00**  
**PROPOSED**

