

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

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## Glossary

Term	Definition
2D	Two-dimensional
3D	Three-dimensional
ADG	Apartment Design Guide
APHS	Arthur Phillip High School
CBD	Central business district
Concept SSDA	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
CoPC	City of Parramatta Council
COS	Communal Open Space
CSSI	Critical state significant infrastructure
DCP	Development control plan
DOE	Department of Education
DPE	Department of Planning and Environment (now DPHI)
DPHI	Department of Planning, Housing and Infrastructure (formerly DPE)
EFSG	Education Facilities Standards and Guidelines
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GFA	Gross floor area
OSD	Over station development
POS	Public open space
PPS	Parramatta Public School
RL	Relative level
SAP	Special Activation Precinct
SEARs	Secretary's Environmental Assessment Requirements
SINSW	School's Infrastructure New South Wales
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State significant development

## Executive summary

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This addendum to the Solar Access and Overshadowing Report supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment, now Department of Planning and Environment (DPHI) pursuant to part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Sydney Metro is seeking to secure approval within the meaning of section 4.22 of the EP&A Act, for an over station development (OSD) and adjacent station development (ASD). The Concept SSDA is seeking consent for maximum building envelopes, proposed land uses, maximum building heights, maximum Gross Floor Area (GFA) and car parking. The proposal comprises four buildings (Buildings A, B, C and D), consisting of three new commercial office buildings (Buildings A, C and D) and one residential accommodation building (Building B).

The Concept SSDA was lodged with the DPHI on 10 November 2022 and was placed on public exhibition for 28 days between 16 November 2022 and 13 December 2022. In total, advice was received from 11 State and local government agencies and 15 submissions were received from key stakeholders, community organisations and the community.

DPHI issued a letter to Sydney Metro on 16 December 2022 requesting a response to the issues raised during the public exhibition of the application. DPHI also issued a further Request for Further Information (RFI) on 6 February 2023 and the Submissions Report provides a response to these matters.

Advice from NSW government agencies have been received in response to the Concept SSDA EIS including advice received from School Infrastructure New South Wales (SINSW), on behalf of the Department of Education (DoE), which indicated that overshadowing to school property would need to be assessed under the *Education Facilities Standards and Guidelines* in further detail.

This addendum report addresses the Solar Access and Overshadowing related issues raised in agency submissions from the DPHI and City of Parramatta (CoPC) This report responds to comments raised in submissions received during the public exhibition of the Concept SSDA submitted to DPHI.

# 1. Introduction

## 1.1 Purpose and Scope

This addendum to the Solar Access and Overshadowing Report supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment, now Department of Planning and Environment (DPHI) pursuant to part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

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This addendum report addresses the Solar Access and Overshadowing related issues raised in agency submissions from the DPHI and City of Parramatta (CoPC) This report responds to comments raised in submissions received during the public exhibition of the Concept SSDA submitted to DPHI.

This addendum to the Solar Access and Overshadowing report is broken down into the following Chapter:

- Chapter 1.0 outlines an introduction to the project, discusses the design refinements made since lodgement and outlines the scope of assessment.
- Chapter 2.0 – outlines the methodology for the overshadowing analysis, outlines the applicable controls and discusses the results of the analysis.
- Chapter 3.0 – provides a conclusion and summarises the outcomes.

## 1.2 Design Refinements

The Parramatta metro station and its surrounding precinct are set to become a vital hub that reinforces Parramatta's position as the interconnected heart of Sydney's Central River City. This dynamic urban precinct will feature a mix of residential, commercial, retail, entertainment, and innovative job opportunities.

A key element of the design has been to desirable commercial floorplates which are attractive to quality tenants whilst providing a quantum of retail significant to create a new 'place' or destination, and a high-quality residential building. A new public domain has been designed to complement the new buildings and support the emerging high density commercial core of the Central River City.

A State Significant Development Application (SSDA) defining concept envelope was lodged to DPHI for approval. Subsequent design refinements have been made to the SSDA design since lodgement. These include:

- the position and alignment of Horwood Place has been refined as part of consultation with City of Parramatta Council (CoPC). This refinement has impacted the building interfaces of Building A and D reducing the eastern extent and footprint of buildings A and D.
- Podium articulation zone has been removed from buildings A and D.
- The southern side setback of Building B has been increased to 6m, to support good residential amenity.

A comparison of the exhibited and refined massing is shown below in Table 1-1.

## 1.3 Scope of Assessment

The scope of this addendum to the Solar Access and Overshadowing report is as follows:

- Conduct additional overshadowing assessment of neighbouring school infrastructure to ensure that the impacts are consistent with Education Facilities Standards and Guidelines.
- Provide updated plan shadow diagrams for the refined envelope with a clear distinction between the new and existing shadows.
- Provide updated views from the sun diagrams to reflect the refined envelope.

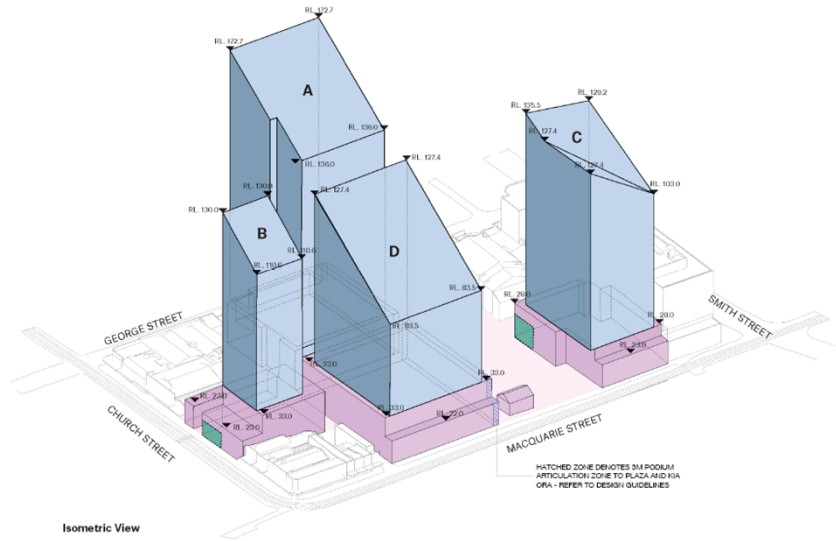
**Table 1-1 Envelope Comparison**

**Concept SSDA Envelope**

**SW Isometric View**

**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)



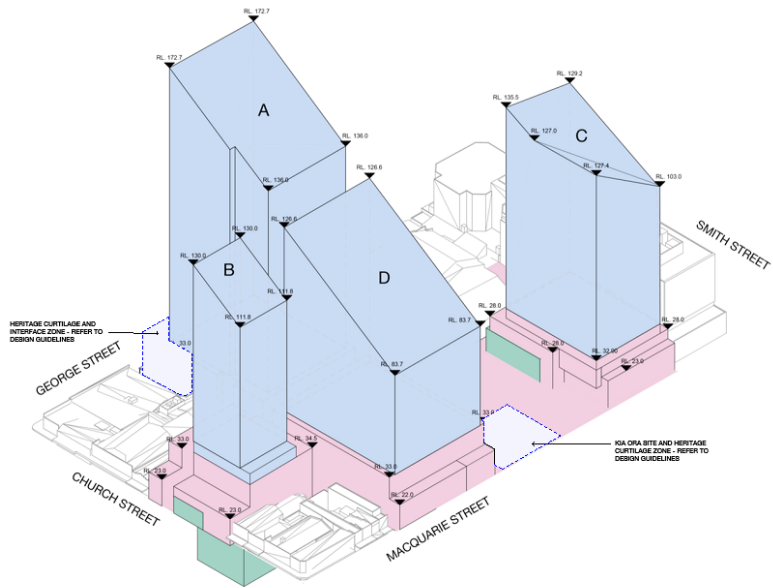
**Refined SSDA Envelope**

**SW Isometric View**

**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 CSSI "SHELL" BELOW GROUND AND IN THE PODIUM LEVELS
- METRO STATION ENTRIES, BIKEPARKING AND STATION BOX (INDICATIVE)
- HERITAGE CURTILAGE AND INTERFACE ZONE - REFER TO DESIGN GUIDELINES (PART OF SSD)

**NOTE:** MINOR PROJECTIONS OUTSIDE OF THE TOWER ENVELOPE FOR NON HABITABLE ARCHITECTURAL FEATURES AND SUN SHADING ARE PERMISSIBLE, BUT SHALL NOT EXTEND FURTHER THAN 500MM.





# Envelope Refinements

## SW Isometric View

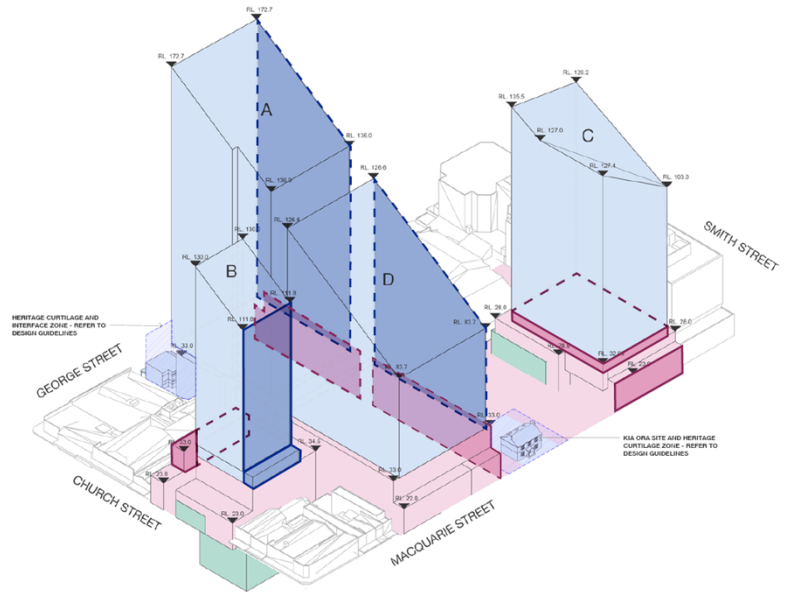
**LEGEND**

- Refinements to SSD Envelopes
- Refinements to CSSI Envelopes

**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 CSSI "SHELL" BELOW GROUND AND IN THE PODIUM LEVELS
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## 2 Overshadowing Analysis

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### 2.1 Methodology

In response to the agency advice, submissions and request for further information received, additional plan shadow diagrams and 'Views from the sun' have been added to determine if any neighbouring school infrastructure assets are affected by the proposed building envelopes. The complete set of shadow diagrams and views from the sun can be found in **Appendix A - D**.

Those properties identified have been analysed further to quantify the percentage reduction of solar access to both building facades and communal open space in accordance with Apartment Design Guide (ADG) minimum design guidelines.

This is done using the Ladybug plugin for Rhino's Grasshopper software, to track the solar hours across a specified surfaces and determine how many minutes of sun individual points on that surface receive within a time window.

### 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.

### 2.3 Plan Shadow Diagrams

Plan shadow diagrams have been prepared using SketchUp 21. This software prepares the shadow projections by reference to accurate solar geometry built into the software. To quantify the areas of additional overshadowing, comparison shadow study plans for both the existing buildings and the proposed refined building envelopes have been compared to determine the areas of additional overshadowing caused by the envelopes. The analysis was performed using orthographic plan projections known taken every 60mins between 9am-3pm on the 21<sup>st</sup> of June (Winter Solstice).

### 2.4 Views from the sun diagrams

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.

### 2.5 Solar Access Diagrams

We have adopted a highly accurate parametric process to assess the solar access performance of the neighbouring school buildings and communal open space. The process involves the use of a parametric grasshopper script in conjunction with Rhinoceros 3D CAD software and SketchUp 21 which calculates the number of hours a particular horizontal or vertical surface will receive solar access during a specified time window on a particular date and at a prescribed location. The results are then displayed both graphically and numerically.

The 3d model is imported into Rhinoceros 3D where a 1m-by-1m grid is applied to test surfaces to assess compliance accurately. The grid surfaces are then tested between 9am and 3pm in mid-winter to assess compliance, storing numerical data for us to analyse. If more than 1 square metres of façade area achieves 2 hours of consecutive daylight – the outcome will report a positive reading, with the numerical data exportable as an excel file.

Graphic settings are applied which link to the parametric analysis. Green cells report a positive reading where a 1sqm cell receives greater than 2 hours of consecutive sun in mid-winter. Red cells report a reading when an apartment receives between 0 and 2 hours of sun. The percentage of the total is calculated to check compliance.

The same process is used to determine the level of solar access received on the ground plane within communal open space. Squares are mapped onto the ground plane and the parametric tool rerun. The output is displayed graphically, with colours identified in the key below reflecting the amount of sunlight received in each location.

## 2.6 Applicable Controls

### 2.6.1 School Infrastructure NSW Submission

The agency advice received from School Infrastructure New South Wales (SINSW), on behalf of the Department of Education (DoE), indicates that overshadowing to school property is controlled by the following:

*“As outlined in the Educational Facilities Standards & Guidelines (EFSG), SINSW aims to ensure that at least 70% of school spaces, including outdoor school play spaces, receive direct sunlight between 9am and 3pm in mid-winter.”*

### 2.6.2 Education Facilities Standards and Guidelines (EFSG)

Review of the Education Facilities Standards and Guidelines (EFSG) indicates that the controls are aligned to the NSW Apartment Design Guidelines. Relevant extract from the EFSG – Site Selection and Development chapter included below:

*“While there is no current standard for solar access provision to schools, it is important that we treat them in a similar way to residential development and community open space.*

*During the week, it is likely that students spend more daylight hours in classrooms than at home in their bedrooms or living spaces. In addition, as communities become denser, the reliance on school playgrounds as community open space is increasing, and so the same principles for sunlight access should apply. Refer to the Apartment Design Guide (Department of Planning, Industry and Environment, 2015) for details on solar access requirements for residential apartments, which may also be applicable to school design.”*

### 2.6.3 NSW Apartment Design Guidelines (ADG)

The ADG provides a test for acceptable additional overshadowing impacts on adjacent multi residential properties which can be applied to school infrastructure. Table 2-2 outlines the relevant guidance from the ADG. Guidance is provided on the following areas:

- Living areas and Private open spaces – a **minimum of 70%** of areas receive a minimum of 2 hours sun between 9am-3pm during mid-winter (21<sup>st</sup> June),
- Communal open spaces - a **minimum of 50%** direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid-winter).

**Table 2-2 ADG Overshadowing Guidance**

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%
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
Objective 4A-1
An adequate area of communal open space is provided to enhance residential amenity and to provide opportunities for landscaping
Design Criteria

1. Communal open space has a minimum area equal to 25% of the site (see figure 3D.3)

2. Developments achieve a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid-winter)

## 2.6.4 Affected Properties

Potential additional overshadowing from the proposed envelopes has been identified within Arthur Phillip High School and Parramatta Public School based on plan shadow diagrams from the 21<sup>st</sup> of June. The complete study is included in Appendix G. School boundaries and communal open spaces areas are identified in Figure 2-1.

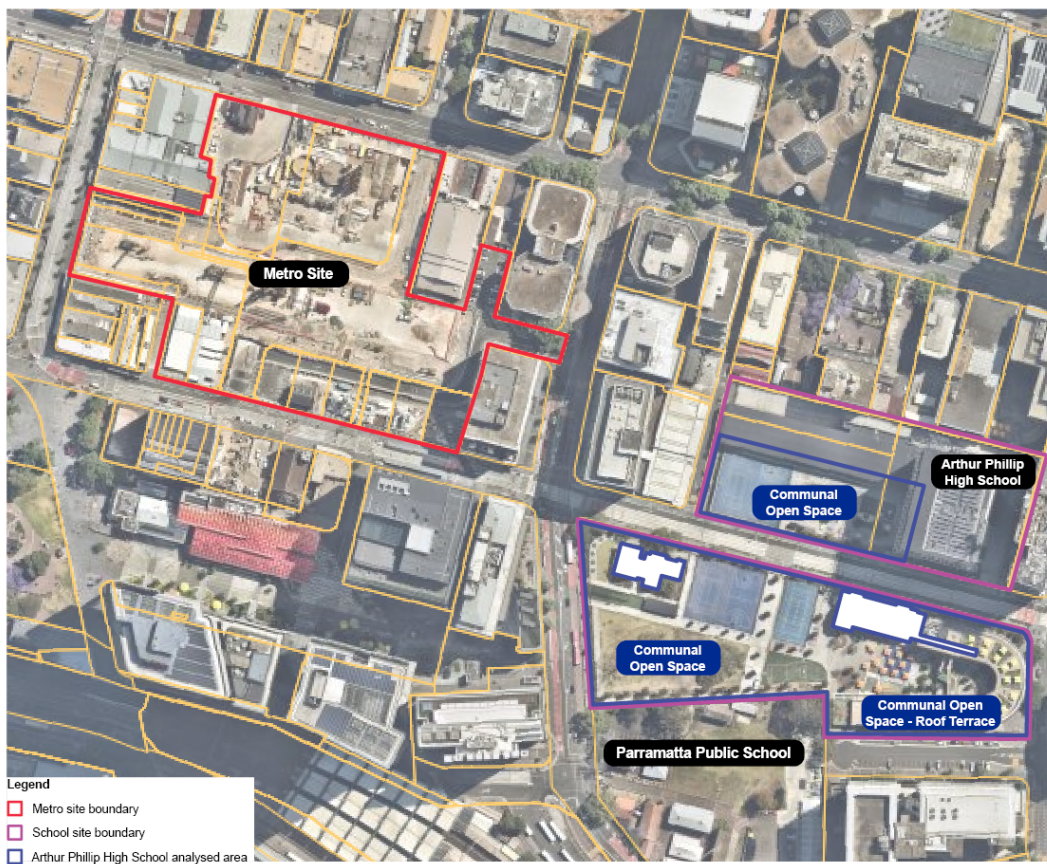


Figure 2-1 Site context plan

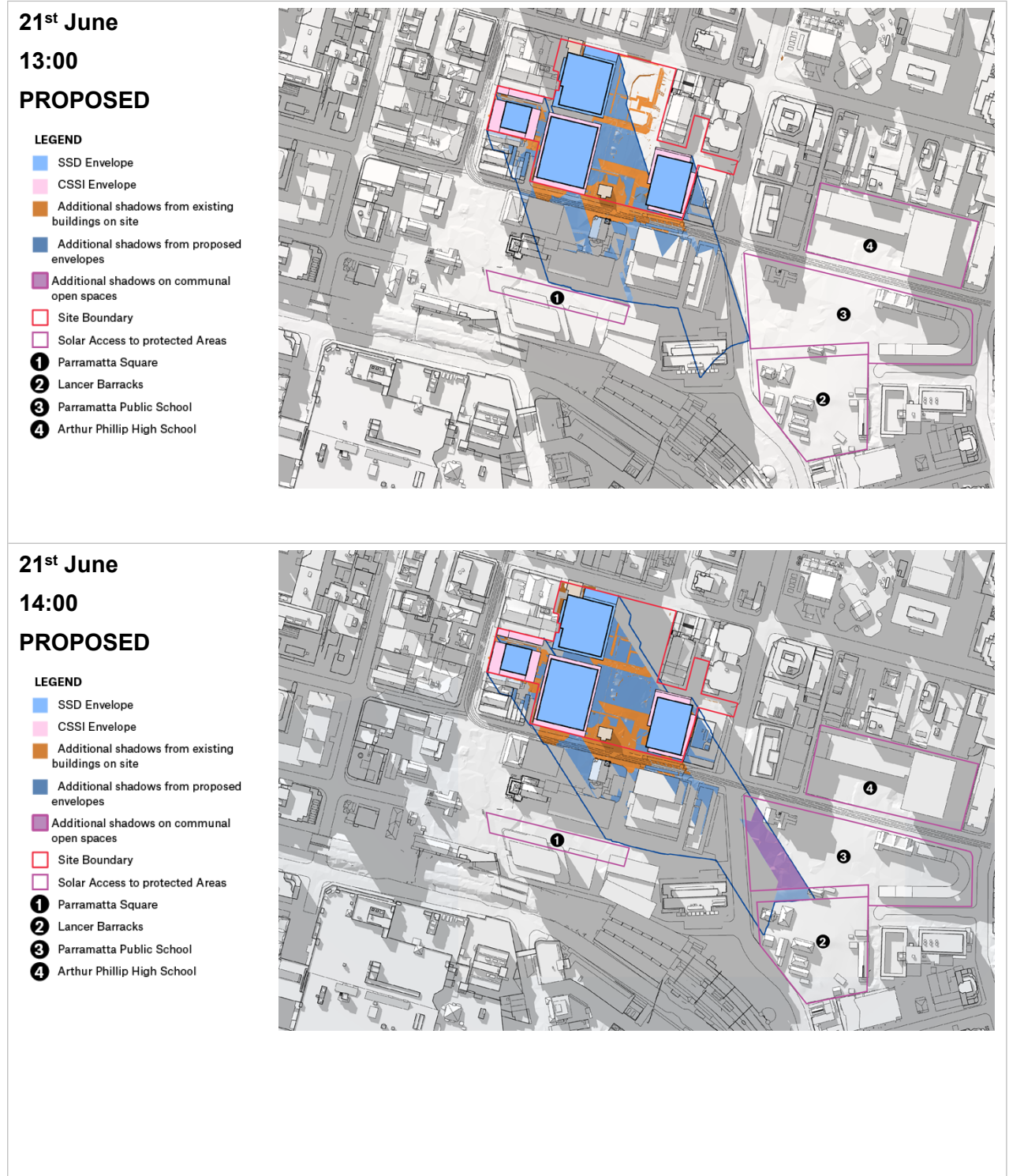
## 2.7 Results

### 2.7.1 Parramatta Public School

As identified in Table 2-1, on the 21<sup>st</sup> of June, between 1pm and 3pm, there is some additional overshadowing to Parramatta Public School communal open space and the school building to the north-western corner.

Areas of additional overshadowing caused by the proposed building envelope are shown in blue outline with the additional overshadowing on school properties highlighted in magenta.

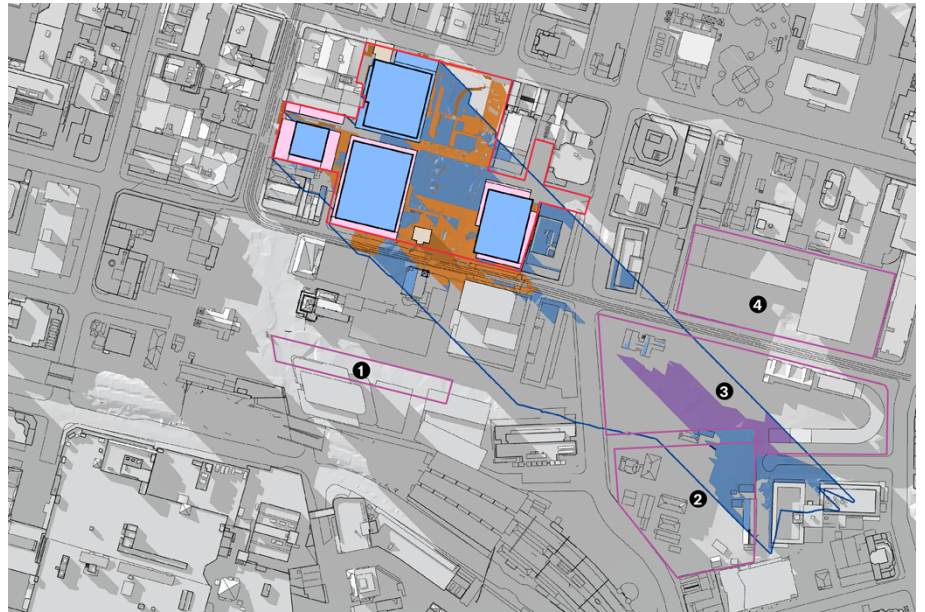
**Table 2-1 Shadow Plan Diagrams - Midwinter**



**21<sup>st</sup> June  
15:00  
PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



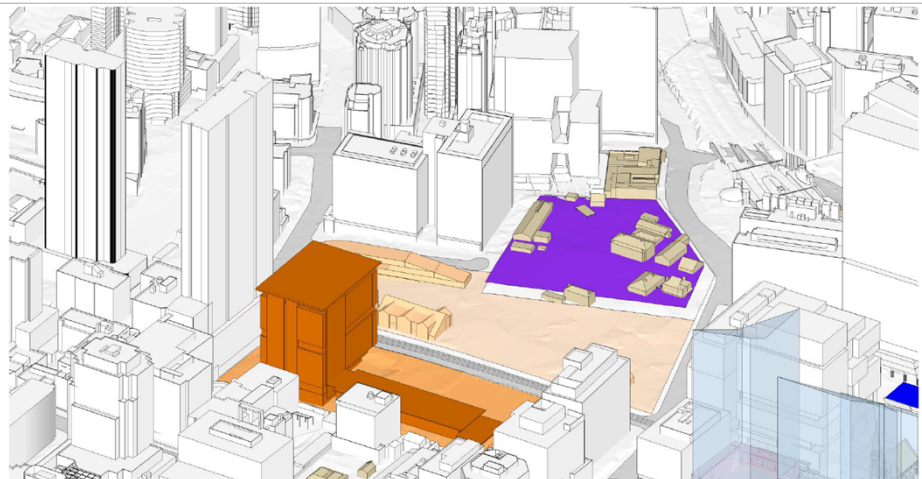
Further analysis of the 'Views from the Sun' shown below in Table 2-2 illustrates the impacts to Parramatta Public School buildings and communal open spaces. Parramatta Public School communal open spaces are impacted by the proposed envelope between 1:15pm and 3:00pm. The Parramatta Public School building located on the NW corner of the property is impacted between 2:00pm and 3:00pm. The main Parramatta Public School building located on the east side of the property is only impacted between 2:45pm to 3:00pm

**Table 2-2 View from the Sun Diagrams - Midwinter**

**21<sup>st</sup> June  
13:00**

**LEGEND**

- CSSI Envelope
- SSD Envelope
- Parramatta Public School Communal Open Space
- Parramatta Public School Buildings
- Arthur Phillip High School Communal Open Space
- Arthur Phillip High School Buildings
- Additional Overshadowing from CSSI/SSD Envelope
- Lancer Barracks Sun Access Protection Area
- Parramatta Square Sun Access Protection Area
- Heritage Buildings

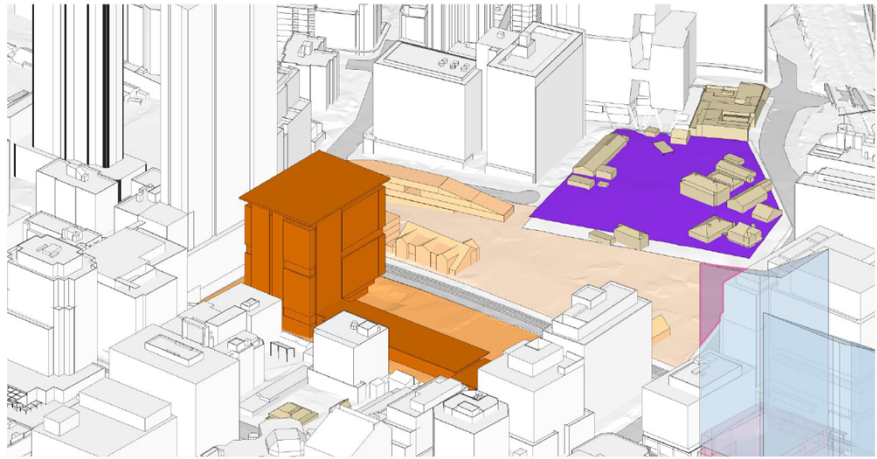


21<sup>st</sup> June

13:30

**LEGEND**

- CSSI Envelope
- SSD Envelope
- Parramatta Public School Communal Open Space
- Parramatta Public School Buildings
- Arthur Phillip High School Communal Open Space
- Arthur Phillip High School Buildings
- Additional Overshadowing from CSSI/SSD Envelope
- Lancer Barracks Sun Access Protection Area
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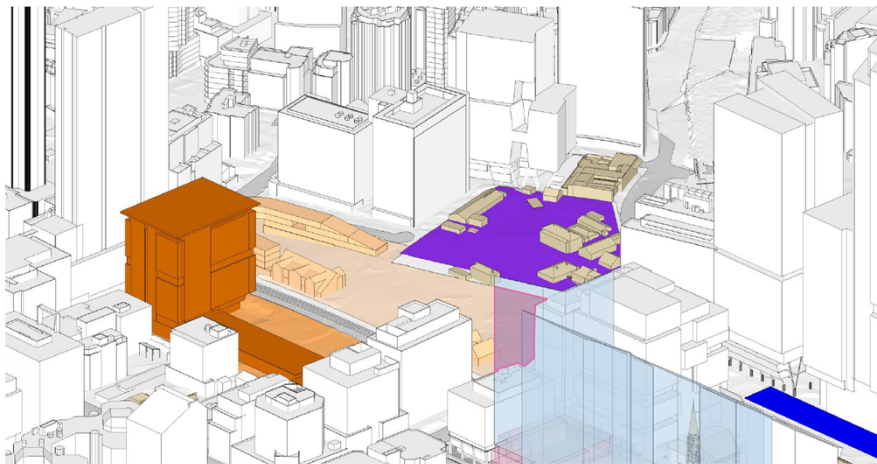


21<sup>st</sup> June

14:00

**LEGEND**

- CSSI Envelope
- SSD Envelope
- Parramatta Public School Communal Open Space
- Parramatta Public School Buildings
- Arthur Phillip High School Communal Open Space
- Arthur Phillip High School Buildings
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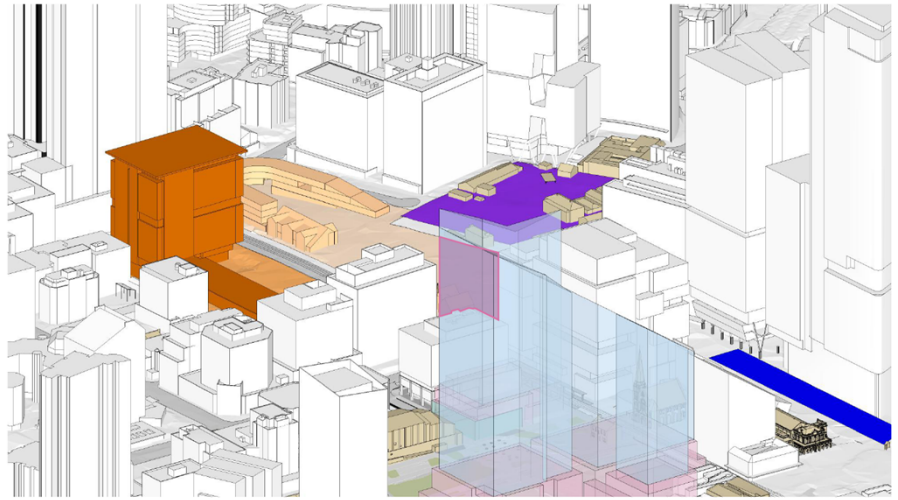


21<sup>st</sup> June

14:30

LEGEND

- CSSI Envelope
- SSD Envelope
- Parramatta Public School Communal Open Space
- Parramatta Public School Buildings
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- Arthur Phillip High School Buildings
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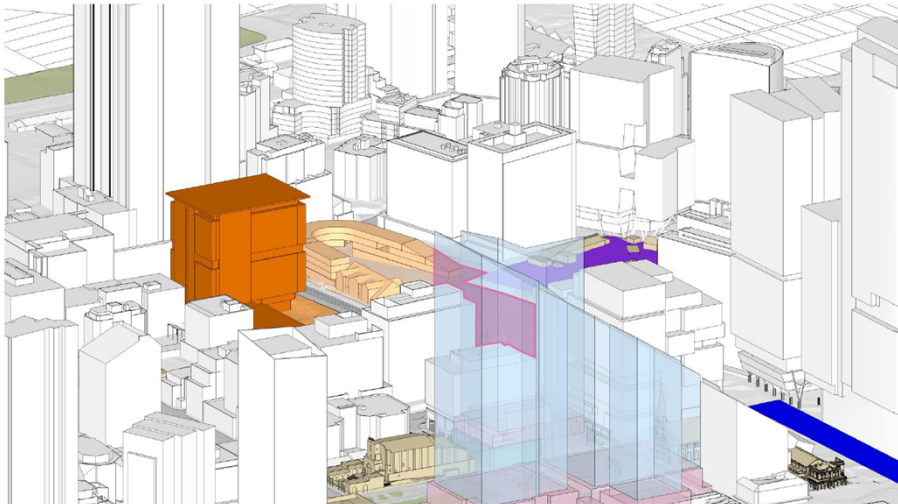


21<sup>st</sup> June

15:00

LEGEND

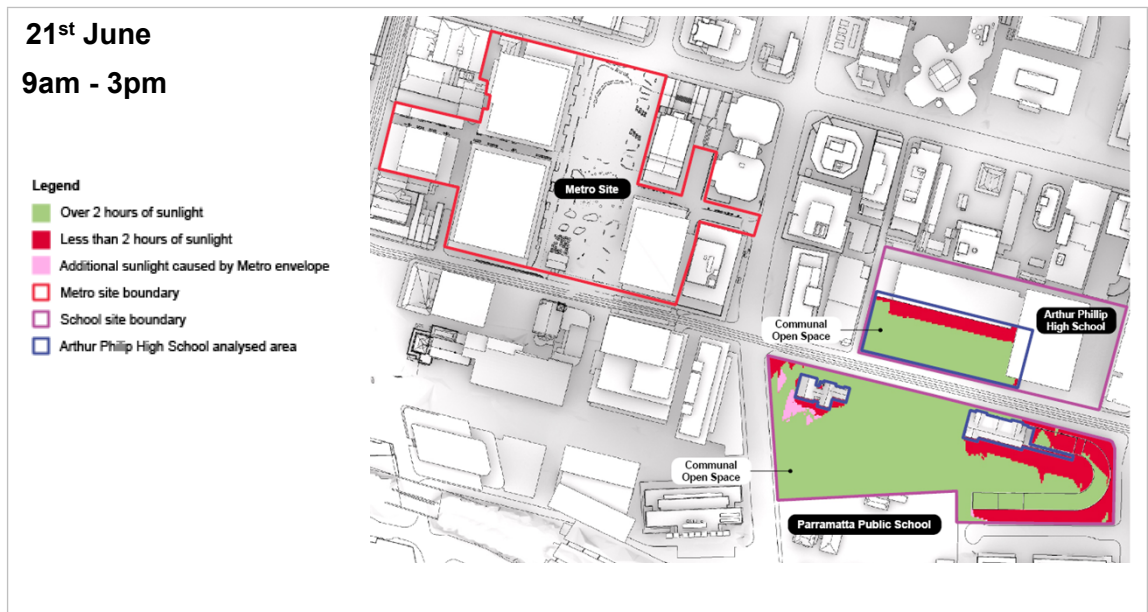
- CSSI Envelope
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- Parramatta Public School Communal Open Space
- Parramatta Public School Buildings
- Arthur Phillip High School Communal Open Space
- Arthur Phillip High School Buildings
- Additional Overshadowing from CSSI/SSD Envelope
- Lancer Barracks Sun Access Protection Area
- Parramatta Square Sun Access Protection Area
- Heritage Buildings



Further analysis of impacts to the communal open space at Parramatta Public School is illustrated in Figure 2-2 Communal open space includes both outdoor areas and trafficable rooftop areas. This depicts the areas of communal open space achieving:

- more than 2 hours of sun (shown in green),
- less than 2 hours of sun (shown in red),
- less than 2 hours of sun as the result of impacts from the proposed building envelope (shown in pink)
- Areas excluded from the study (shown in white)

**Figure 2-2 Solar Access Analysis – Communal Open Areas**

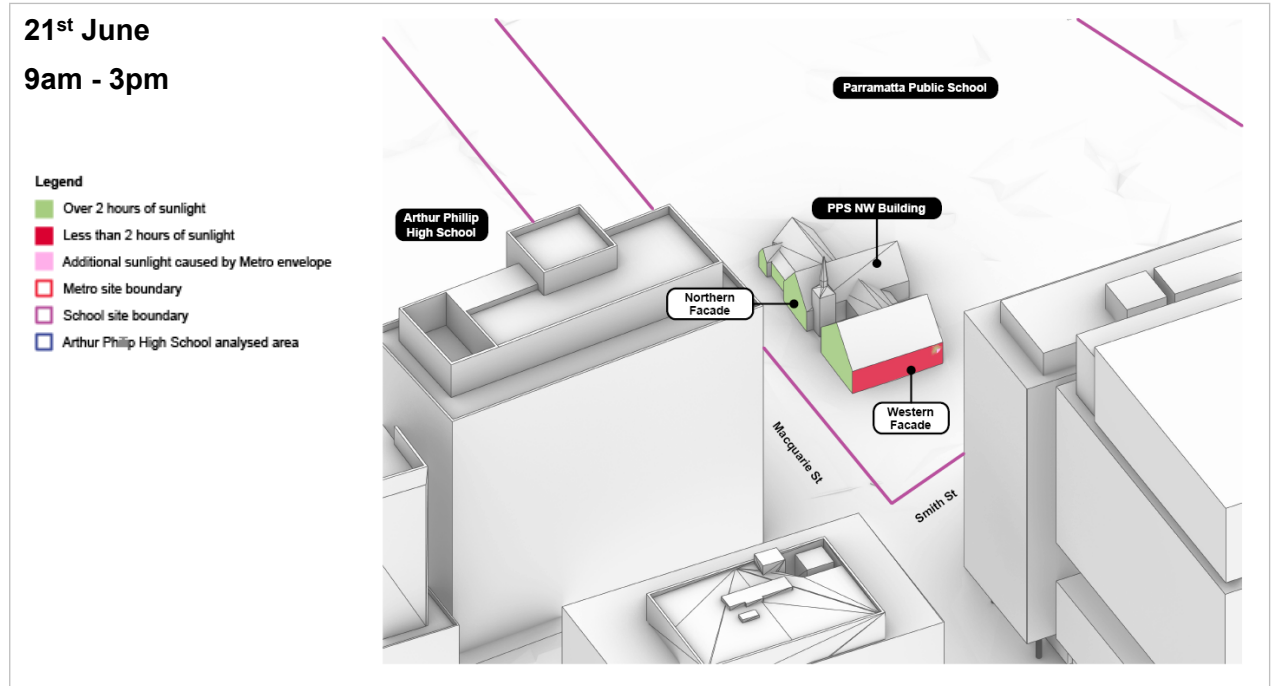


The key findings of the communal open space analysis are outlined below:

- Parramatta Public school previously achieved **79.2%** of communal open space achieving more than 2 hours sun between 9am and 3pm.
- With the introduction of the proposed metro envelopes, Parramatta Public School achieves **78%** of communal open space achieving more than 2 hours sun.
- There is a **1.2%** reduction in communal open space achieving more than 2 hours of sun which is shown in Pink located mainly in the NW corner of the site.
- The 78% achieved is significantly more than the 70% EFSG target for school spaces. Therefore, the proposed envelopes are fully in compliance with this control.
- Additionally, 78% is more than the ADG guideline of a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid-winter).

Further analysis of the Parramatta Public School building located on the north-western corner of the property has been included below. The northern and western facades of this building have been identified as potentially impacted by the proposed envelopes. The facades have been studied to determine the total percentage of façade area which achieves 2 hours of sun on the 21<sup>st</sup> of June between 9am and 3pm. Both existing site conditions and proposed building envelope conditions have been tested.

Figure 2-3 Solar Access Analysis – Affected Building Facades



Further analysis of impacts to the affected building facades is illustrated in Figure 2-3.

The key findings of the building façade analysis are outlined below:

- The northern and western facades of the Parramatta Public school building previously achieved 70.6% total area receiving more than 2 hours sun between 9am and 3pm.
- With the introduction of the proposed metro envelopes, these facades achieve 70.2% of total area receiving more than 2 hours sun.
- This is a 0.4% reduction which is deemed negligible.
- EFSG target for school spaces is minimum 70%. The proposed envelopes achieve 70.2% which is therefore deemed to be compliant with this control.
- Additionally, 70.2% is more than the ADG guideline of 70% of living rooms and private open spaces within an apartment in a building receiving 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.

### **2.7.2 Arthur Philip High School (APHS)**

Review of the plan shadow diagrams and views from the sun have concluded that there is no additional overshadowing of Arthur Philip High School on the 21<sup>st</sup> of June between 9am and 3pm as demonstrated in Appendix A.

Diagrams for midsummer and the autumn equinox are included in Appendix B and C.

### 3 Conclusion

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The refined building envelopes have been designed in accordance with the sun access protection 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 refined 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.

The refined building envelopes have some minor impacts on Parramatta Public School, affecting both communal open space and buildings. Parramatta Public School communal open space solar access is reduced from 79.2% of area achieving 2hrs or more down to 78%. This is more than the accepted minimum of 70% set out in the EFSG. Therefore, the proposed envelopes are fully in compliance with this control.

The reduction in Building B envelope has had no bearing on solar access to apartments within.

# Appendix A – Solar Access Plan – Midwinter

Table A1 shows hourly views of solar access projections for June 21<sup>st</sup> from 9am-3pm.

Orange showing shadows from the existing buildings on the site, blue showing shadows from the building envelopes. Parramatta Square, Lancer Barracks, Parramatta Public School, and Arthur Philip High School outlined in pink. Additional shadows within the school properties are identified in magenta.

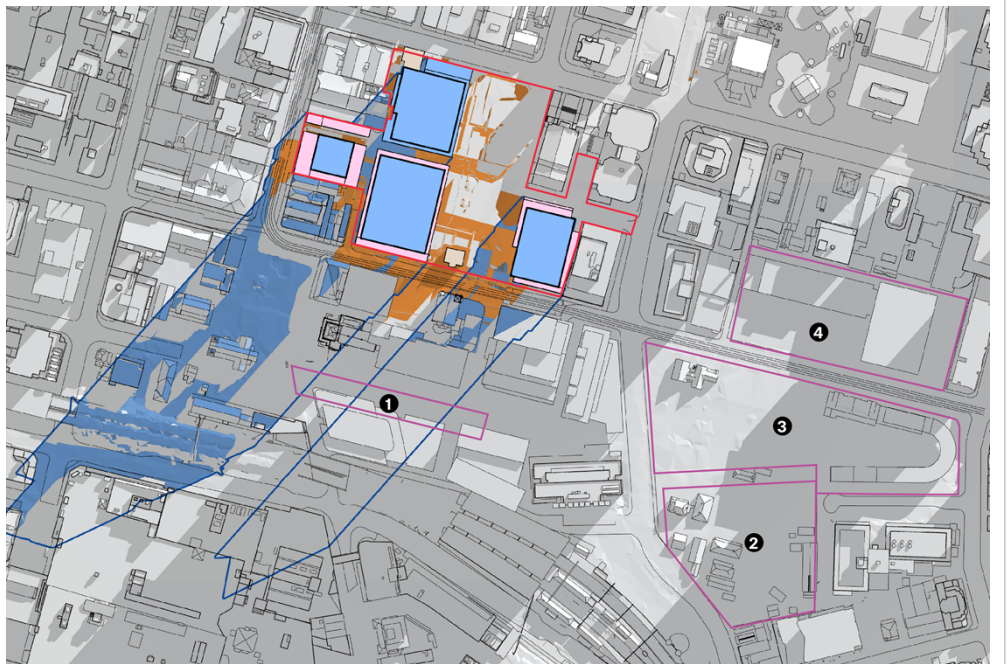
**Table A1 Solar Access Plan – PSQ and Lancer Barracks**

**09:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School

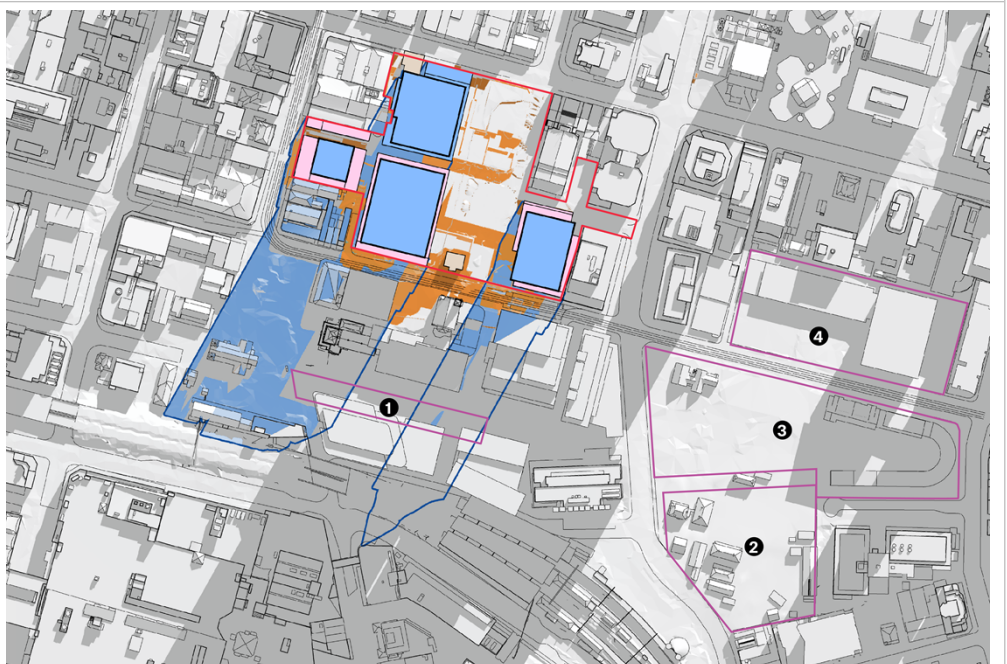


**10:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



11:00

PROPOSED

LEGEND

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



12:00

PROPOSED

LEGEND

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



**13:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



**14:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



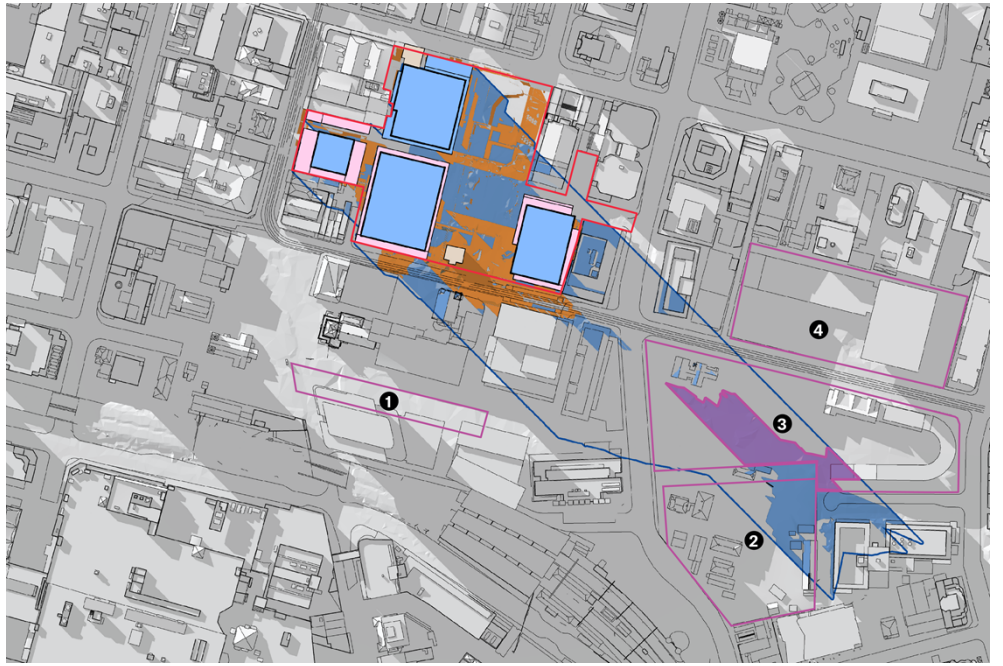


15:00

**PROPOSED**

**LEGEND**

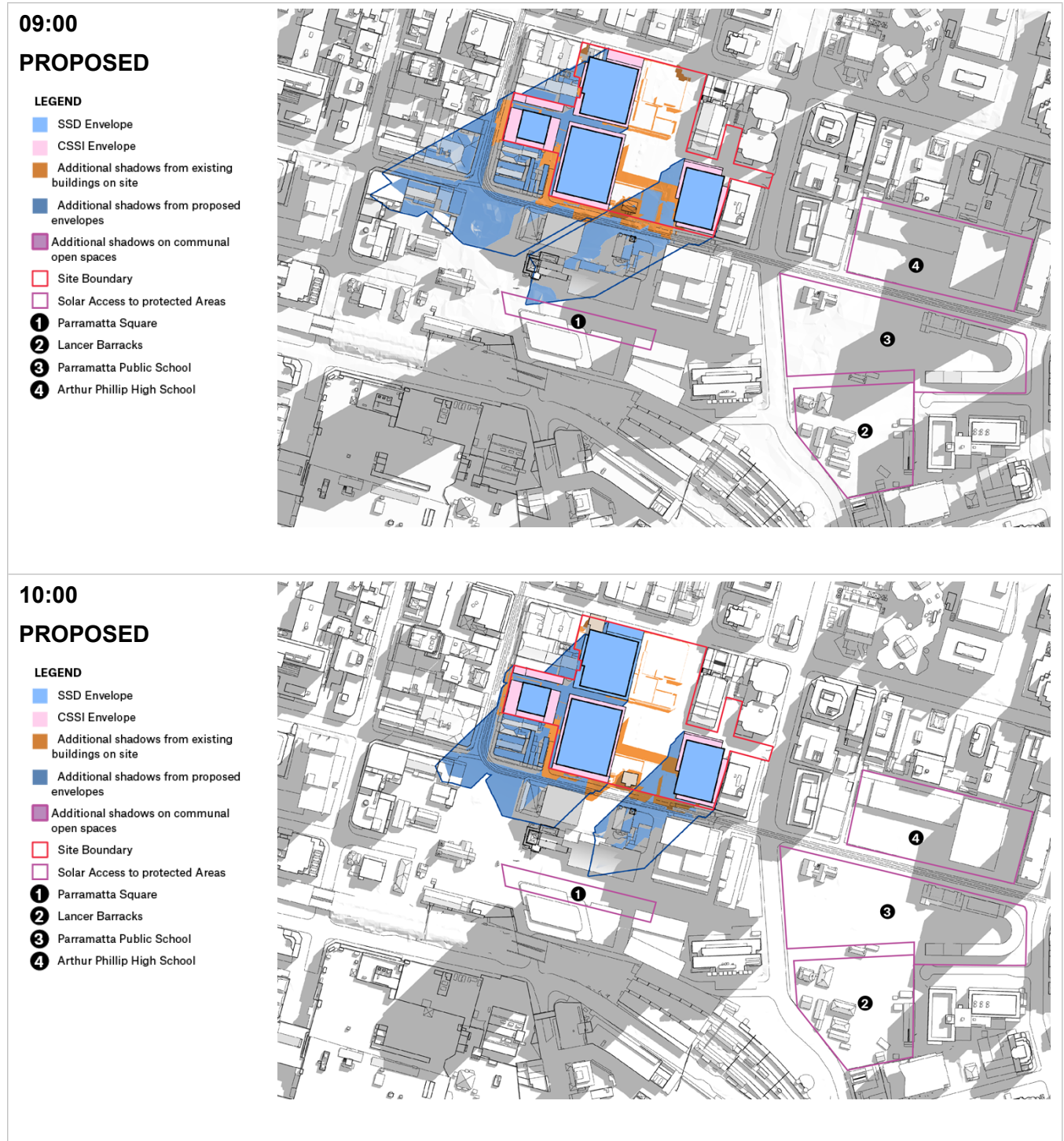
- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



# Appendix B – Solar Access Plan – Equinox

Table B1 shows hourly views of solar access projections for March 21<sup>st</sup> from 9am-3pm. Orange showing shadows from the existing buildings on the site, blue showing shadows from the building envelopes. Parramatta Square, Lancer Barracks, Parramatta Public School, and Arthur Phillip High School outlined in pink. Additional shadows within the school properties are identified in magenta.

**Table B1 Solar Access Plan – PSQ and Lancer Barracks**



11:00

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



12:00

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



**13:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



**14:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



15:00

PROPOSED

LEGEND

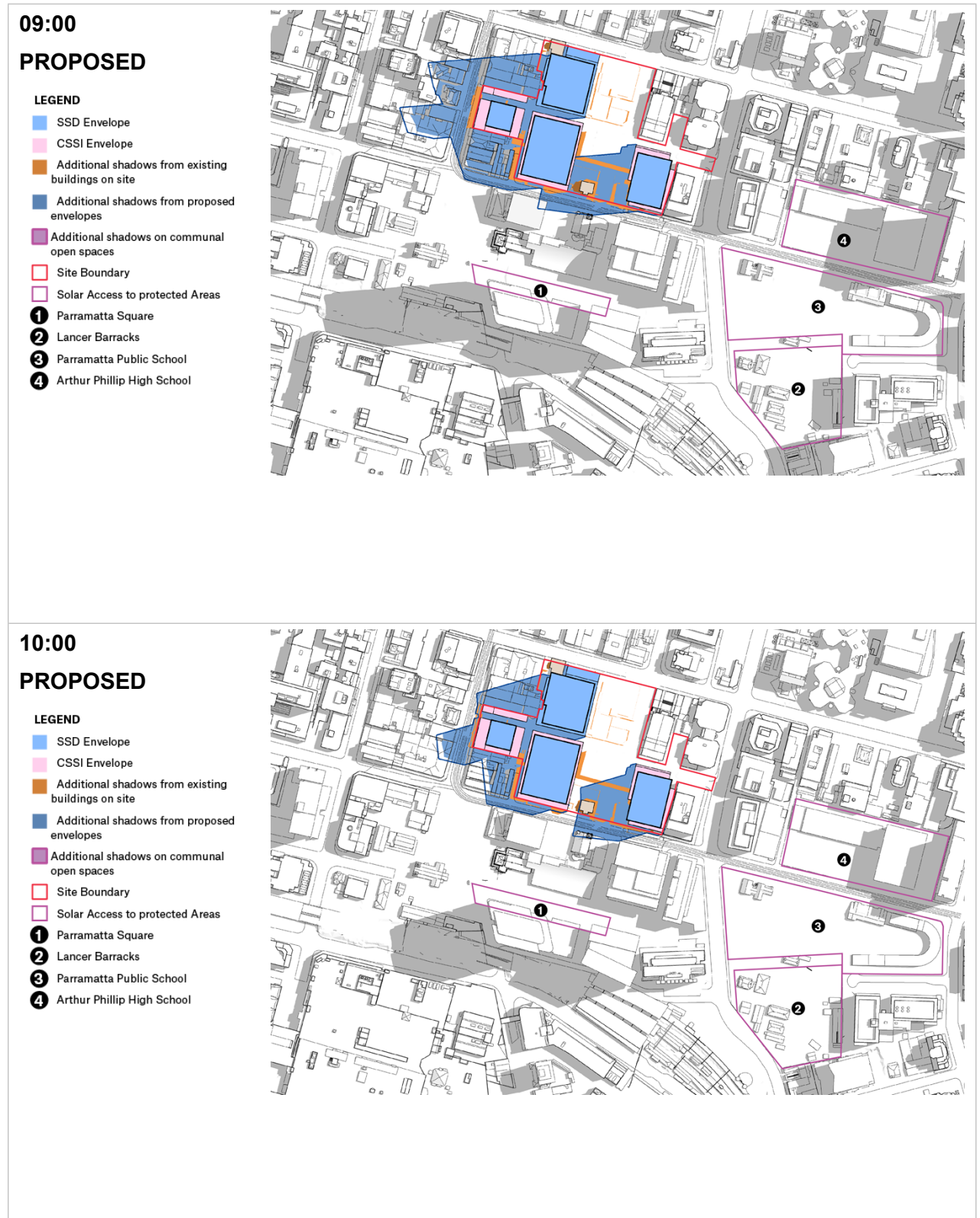
- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



# Appendix C – Solar Access Plan – Midsummer

Table C1 shows hourly views of solar access projections for December 21<sup>st</sup> from 9am-3pm. Orange showing shadows from the existing buildings on the site, blue showing shadows from the building envelopes. Parramatta Square, Lancer Barracks, Parramatta Public School, and Arthur Phillip High School outlined in pink.

**Table C1 Solar Access Plan – PSQ and Lancer Barracks**



**11:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School

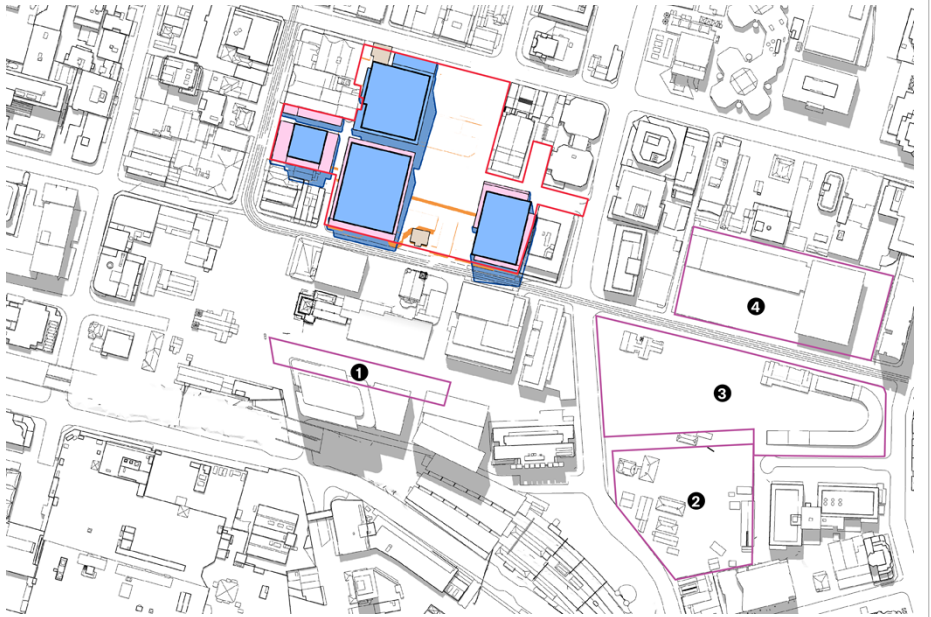


**12:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School

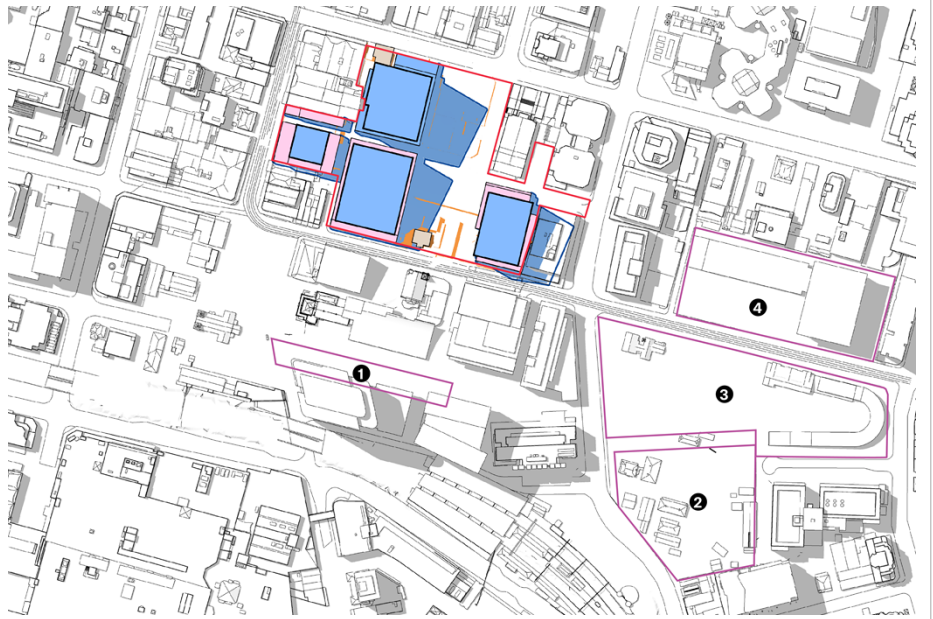


**13:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School



**14:00**

**PROPOSED**

**LEGEND**

- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1** Parramatta Square
- 2** Lancer Barracks
- 3** Parramatta Public School
- 4** Arthur Phillip High School





15:00

PROPOSED

LEGEND

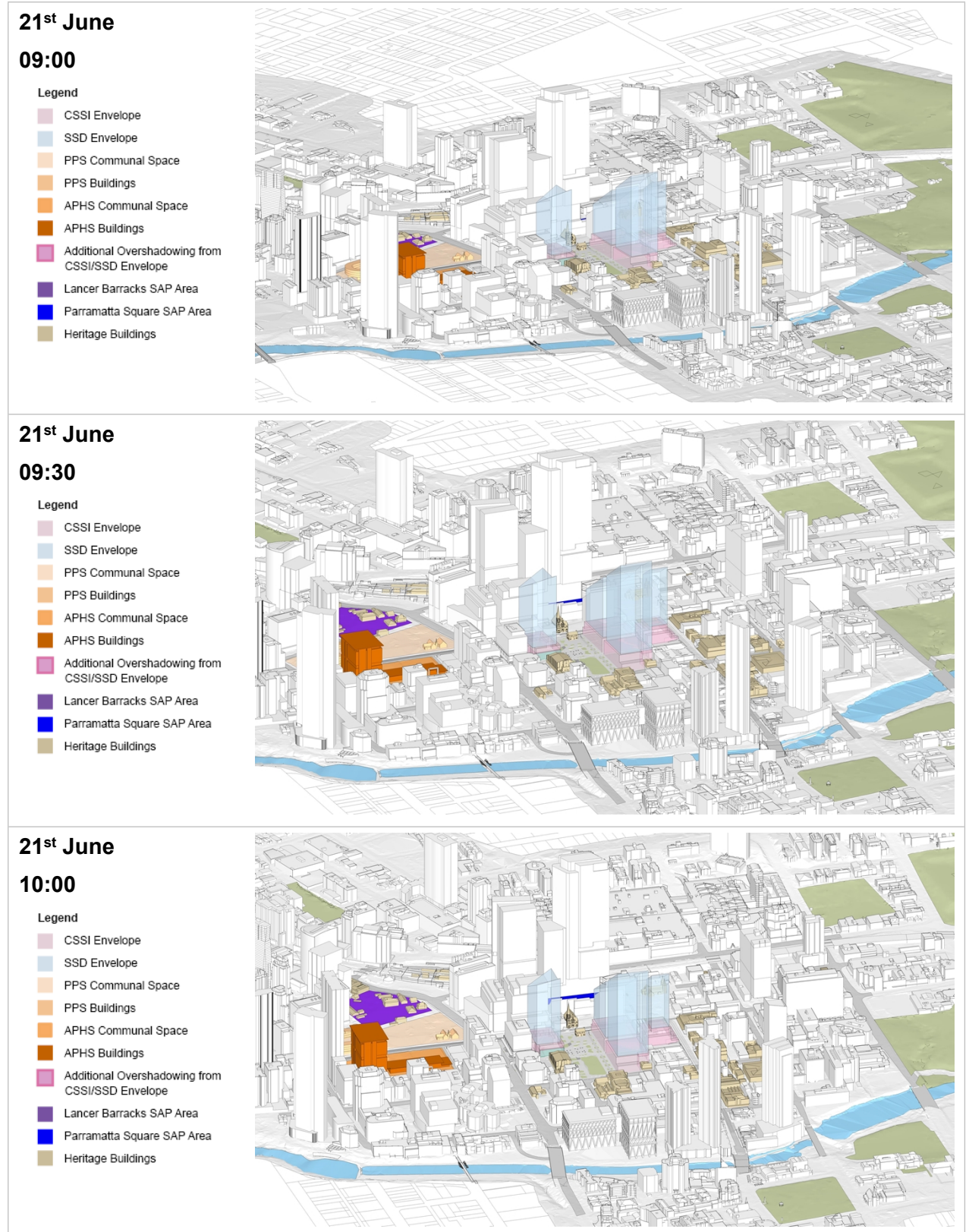
- SSD Envelope
- CSSI Envelope
- Additional shadows from existing buildings on site
- Additional shadows from proposed envelopes
- Additional shadows on communal open spaces
- Site Boundary
- Solar Access to protected Areas
- 1 Parramatta Square
- 2 Lancer Barracks
- 3 Parramatta Public School
- 4 Arthur Phillip High School



# Appendix D – Views from the Sun - Midwinter

Table D1 shows half-hourly view from the sun projections for June 21<sup>st</sup> from 9am-3pm.










**Table D1 Solar Access Plan – PSQ and Lancer Barracks**

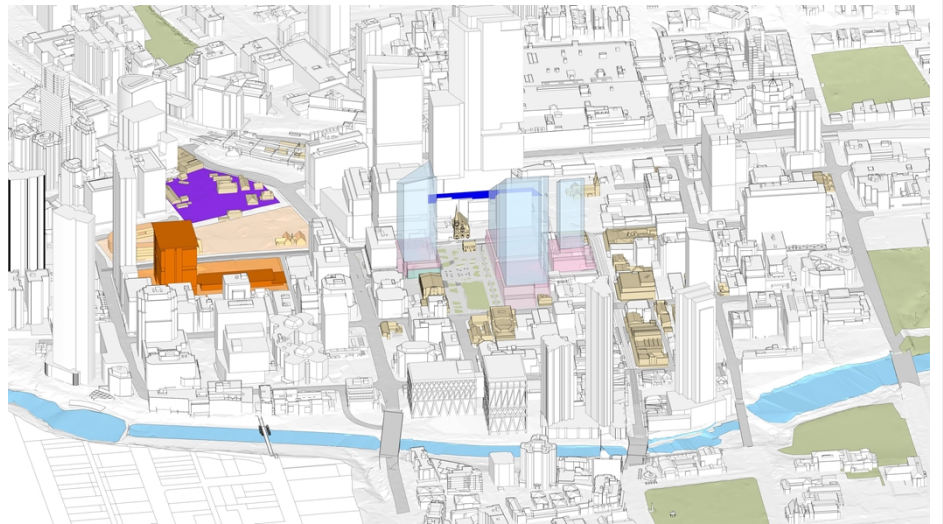


**21<sup>st</sup> June**

**10:30**

Legend








-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

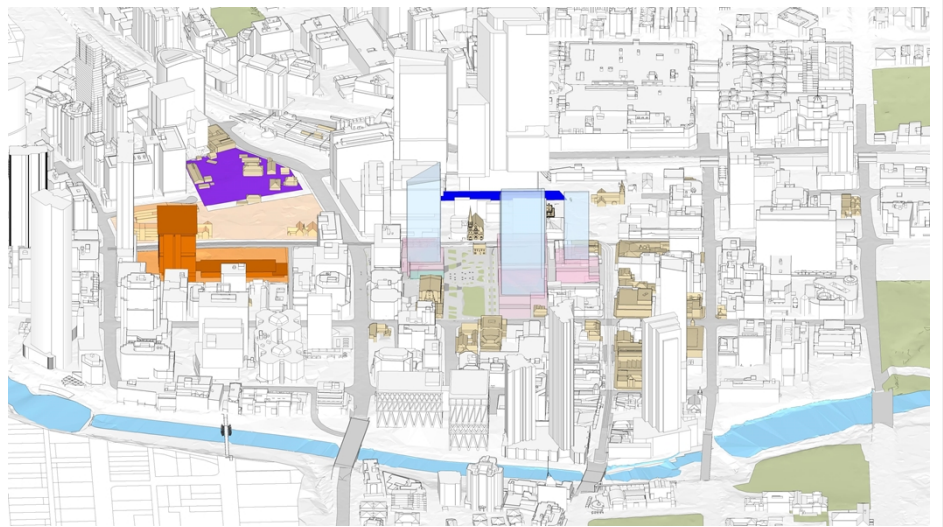


**21<sup>st</sup> June**

**11:00**

Legend







-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

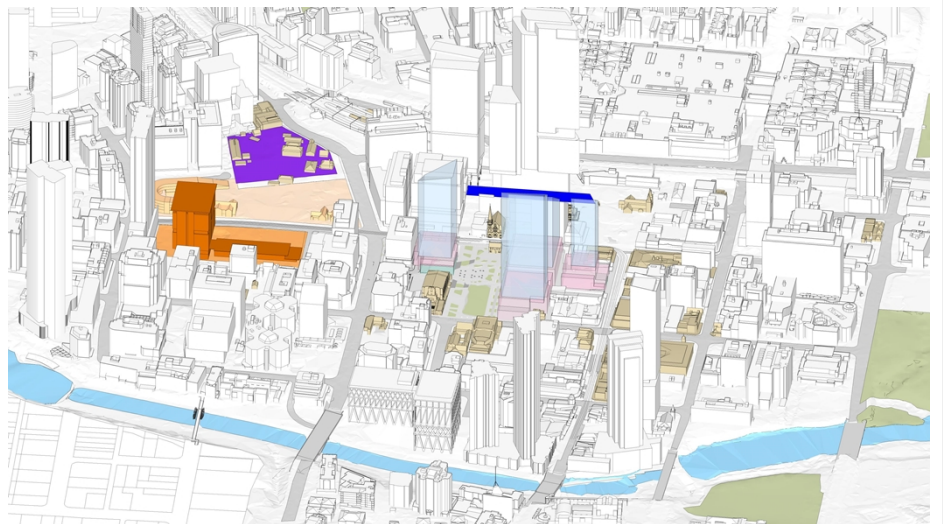


**21<sup>st</sup> June**

**11:30**

Legend





-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

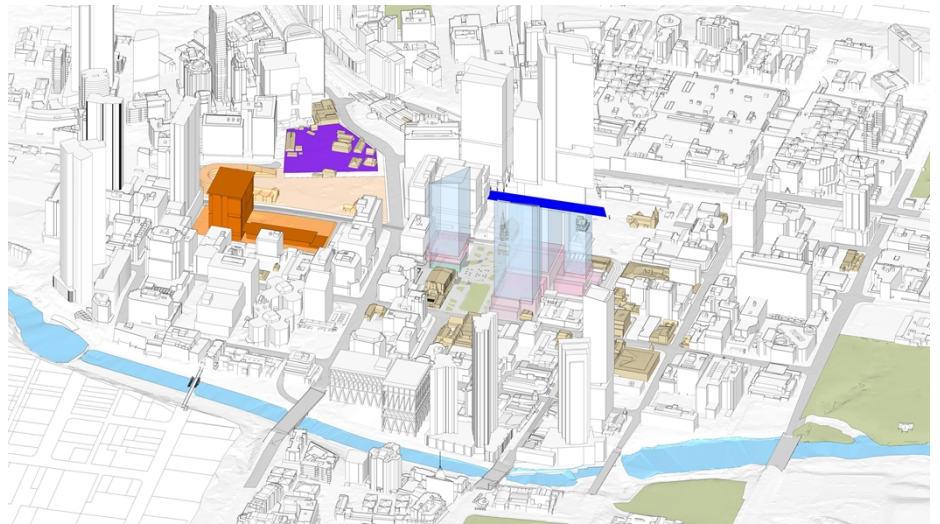


**21<sup>st</sup> June**

**12:00**

Legend





-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

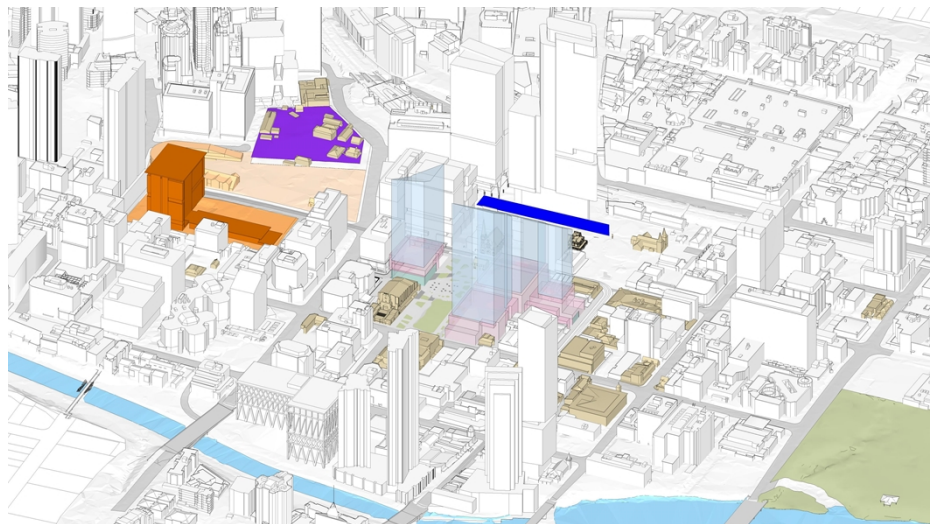


**21<sup>st</sup> June**

**12:30**

Legend





-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

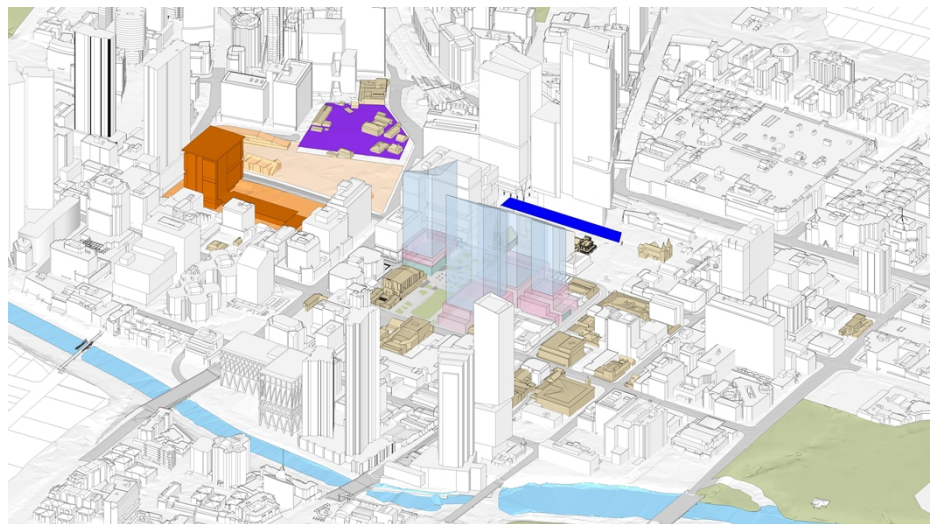


**21<sup>st</sup> June**

**13:00**

Legend




-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

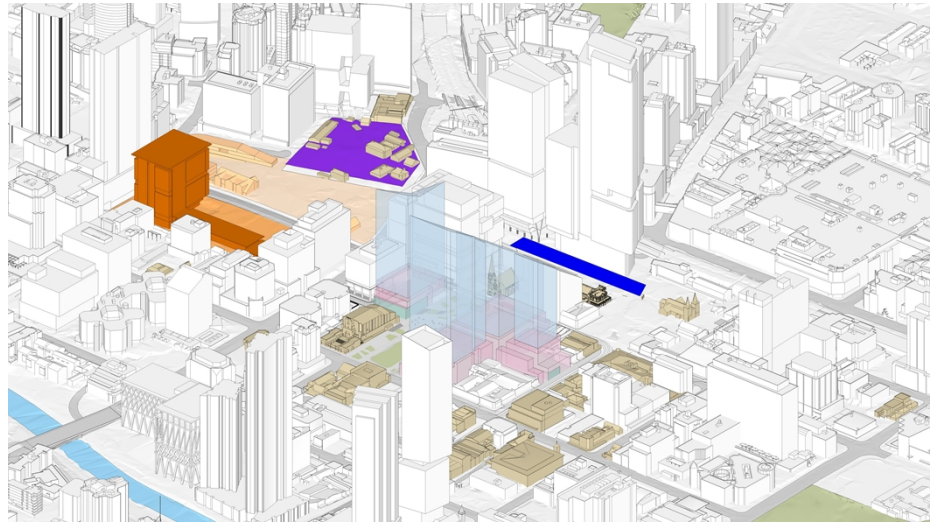


21<sup>st</sup> June

13:30

Legend





-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

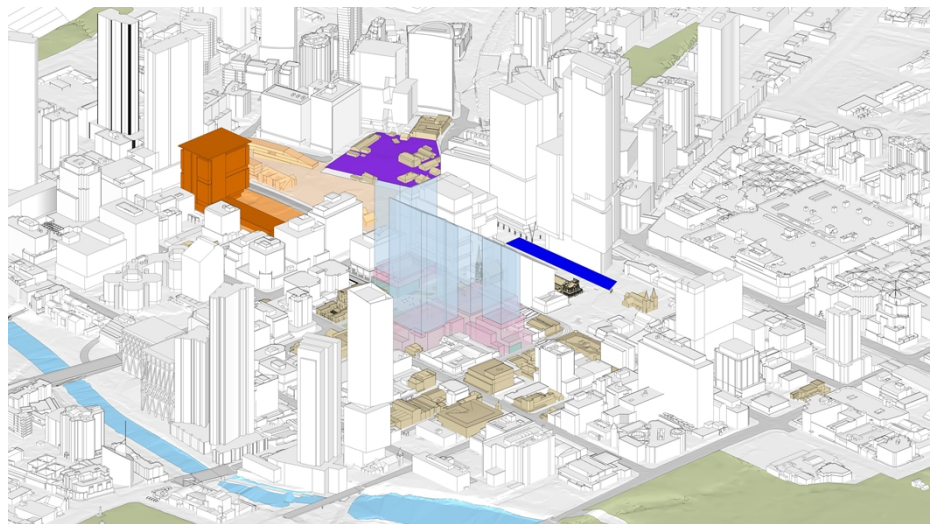


21<sup>st</sup> June

14:00

Legend



-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings

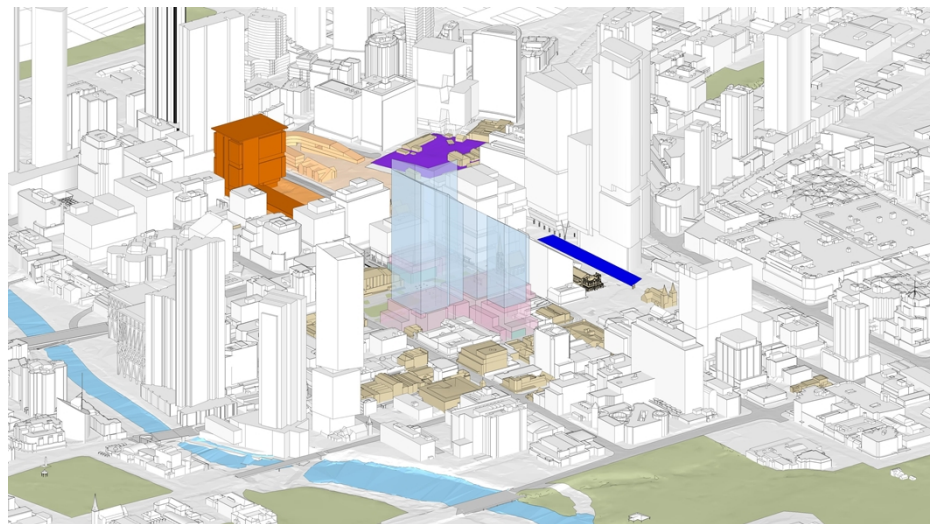


21<sup>st</sup> June

14:30

Legend

-  CSSI Envelope
-  SSD Envelope
-  PPS Communal Space
-  PPS Buildings
-  APHS Communal Space
-  APHS Buildings
-  Additional Overshadowing from CSSI/SSD Envelope
-  Lancer Barracks SAP Area
-  Parramatta Square SAP Area
-  Heritage Buildings



21<sup>st</sup> June

15:00

Legend

- CSSI Envelope
- SSD Envelope
- PPS Communal Space
- PPS Buildings
- APHS Communal Space
- APHS Buildings
- Additional Overshadowing from CSSI/SSD Envelope
- Lancer Barracks SAP Area
- Parramatta Square SAP Area
- Heritage Buildings

