

### 4.2.3 Site's contribution to CBD / Parramatta Skyline

The site occupies a significant corner of Church Street and is central of the changing face of Parramatta. A number of new developments with heights greater than permitted in the LEP have been approved through the Gateway Approval process, in the vicinity of the site. It shows the capacity for variation to height on the basis of a development's significant public benefits and positive contribution to the area. In the Draft Planning Framework Review of Parramatta, prepared by Architectus, a preferred future scenario of 'Increased FSR and no height control' was developed and tested to encourage tall slim towers and put Parramatta on the world map as the second CBD of Sydney.

The existing Parramatta skyline is a relatively flat silhouette reflective of the predominantly large, east-west block structure. Large building footprints and lower building height limits have resulted in a city form with minimal distinction or recognisable character.

There is capacity for Parramatta to reinvent itself and to strike a balance between its history and its future. Recent development approvals such as Aspire Tower and 330 Church Street in particular, represent building concepts which exceed the current building height planes prescribed by the LEP and will result in a significant change to the Parramatta skyline. Specifically, taller, slender towers which punctuate the railway station and the river foreshore and reinforce the structure of the city.

The Parramatta City skyline is evolving from a low, flat city to one with more distinction and variety, which expresses the key characteristics of the ground floor plane and provides for a much more interesting & unique profile. (Refer to Appendix A4 - CBD Skyline Study for more details)

It is considered that this site is deserving of a landmark building because:

- The site is located at the most significant intersection of Parramatta. This corner is the geographical & historical heart of Parramatta and the location where retail, commercial and cultural precincts meet.
- It anchors the northern end of the civic space
- It is a bookend to the southern key site – Aspire.
- It provides unique opportunities to extend and define the Civic spaces and provide opportunities for public art displays.
- It acts as an entry gateway into the historical / commercial strip of Church Street.
- From a pedestrian experience, it has good visibility and view sight lines along transport corridors. It can be viewed north and south of Church Street and east & west of Macquarie Street.
- The 'Boomerang' contributes to the civic space by providing a landmark building that sets a visually pleasing marker for pedestrians and acts as a 'pull' to the north end of the Church St Mall.
- The development will provide around 550 residential apartments and 11,000m2 of retail and commercial floor space in a location proximate to existing transport and infrastructure in the heart of the Parramatta CBD.



Figure 15  
197 Church St in context with Parramatta civic space



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CONCEPT PROPOSAL &  
JUSTIFICATION

05

### 5.1.1 Design Principles

Having regard to the preceding discussion in regards to context & setting, the continuing evolution of the Parramatta City centre, the strategic & historical significance of this site and the opportunity to provide an iconic, landmark developments on this site, a series of design principles have been developed.

The site presents an opportunity for a major landmark building and public domain element that will contribute to the evolving character of the city centre. Development of the site should be guided by the following overarching design principles:

- A strong tower element to provide interest to the skyline and reinforce the urban structure of the city.
- A unique and contemporary design solution for the corner of the site, which creates landmark architecture in Parramatta.
- A proportion for non-residential (retail and commercial) uses and residential uses.
- A civic piazza or publicly accessible space supported by active retail uses on the ground floor.
- Commercial floor space at the podium levels.
- An east - west pedestrian through site link between Church Street and Marsden Street.
- Improved public domain space on the ground floor potentially integrated with Parramatta Square/Centenary Square.
- A building design that incorporates a creative design solution for the conservation of the heritage values of the site.
- An increased curtilage to the adjacent heritage item at 213 Church Street.
- The siting, design, orientation and grounding of the tower form which respects the site's potential archaeological relics, heritage values and considers overshadowing impacts.
- Unity and simplicity should be achieved through connecting the podium and tower element into a single readable piece of architecture.
- Manage potential wind effects and enhance pedestrian comfort in active areas of the development.
- A public domain which is sensitively designed to take into account CPTED considerations.
- Achieve high levels of sustainability through adopting market leading practices.



Figure 16  
View looking down Church St to 197 Church St & Parramatta civic space





***"The success of great spaces is their inherent ability, through constant management, to accommodate a wide variety of day and night activities."***

*Carl F. Meyer, 3 ways to creating great "Good places" (www.fastcodesign.com)*

### 5.1.2 Design Response

Any design for the site should recognise the opportunity to provide a unique and landmark development which will make a positive contribution towards the urban form and character of the city.

High quality landmark towers in the Parramatta CBD will add prominence and interest to the city. The delivery of a significant tower on this key site is a positive response to the emerging built form and vision for major high rise buildings in the context of the Parramatta city centre and in the Sydney, Australian and global context. The height potential of the site should be considered in the context of an emerging city skyline comprised of tall, iconic buildings.

With this in mind, R+M envisages a built form with a distinct identity, architecturally designed to be a landmark visual marker that will embrace panoramic views to Sydney CBD, the Parramatta River, the surrounding district and beyond, while at the same time achieving high standards of environmental sustainability through innovative best practice technology that positively influence sustainability of the building, construction and building management, efficient use of energy to reduce overall greenhouse emissions, managing waste, water efficient fittings & fixtures, recycling grey water, photovoltaics, using building materials with recycled content, secure bike storage in basement parking, use indigenous vegetation etc. It will provide a significant new publicly accessible public domain and facilities that complement & enhance the character and vitality of Church Street. The proposed built form will have a simple iconic form resembling the shape of a boomerang.

The Boomerang will exhibit the following features:

- The gravity defying form creates visual interest and has landmark quality that will set it apart from the neighbouring developments. It also reflects the angled Church Street creating a visual marker unique to the street.
- The built form sits at the corner of the site with zero set back to Church Street and Macquarie Street. This allows for increased curtilage to the adjacent heritage building at 213 Church Street but will not compromise the future development opportunities of the adjacent lot at 20-22 Macquarie Street.
- The building is oriented east west with the bent form visible along Church Street and presenting as a tall slender building along Macquarie Street.
- The built form is proposed to have a maximum building height of 250m and a max GFA of 70,950m<sup>2</sup>
- The lower half of the built form bends away from the 12m street setback along Church Street providing a perceived setback and appropriate scale to the existing low to medium height street frontage.
- The bent form also helps reduce overshadowing onto Parramatta Square during the winter solstice between 12pm to 2pm.
- A mixture of apartment sizes and increase housing supply in the area.
- It sits on an elevated podium with a publicly accessible domain on ground level supported by active retail and commercial facilities.
- Subject to extent of archaeological find, a set of design principles have been considered on how to best showcase it and made available for public viewing. This will be further addressed in a later section.

*Note: This drawing is conceptual only. Dimensions are for explanatory purposes to understand the concept. Final dimensions will be subject to detailed design after the planning proposal process.*



- The design addresses the heritage facade of the existing Murray Bros Building by proposing different ways this can be treated. This will be further addressed in a later section. As illustrative examples, three concept images have been produced for consideration. See pages 45,46 & 47.
- The proposed built form departs from the Council's applicable controls in order to achieve a better planning outcome for the City centre by providing the opportunity for an iconic building contributing to a recognisable skyline.

In order to ensure that the Boomerang is able to be built, specific design aspects have been assessed. These design aspects have taken into account the design principles which have been derived following detailed urban design analysis.

**197 Church Street - 'Boomerang'**

**Aspire Tower**

Stages 5 & 6

Westfield Parramatta

**Parramatta Civic Space -**

(Centenary Square, Parramatta Square, Church St Mall)

**Church Street**



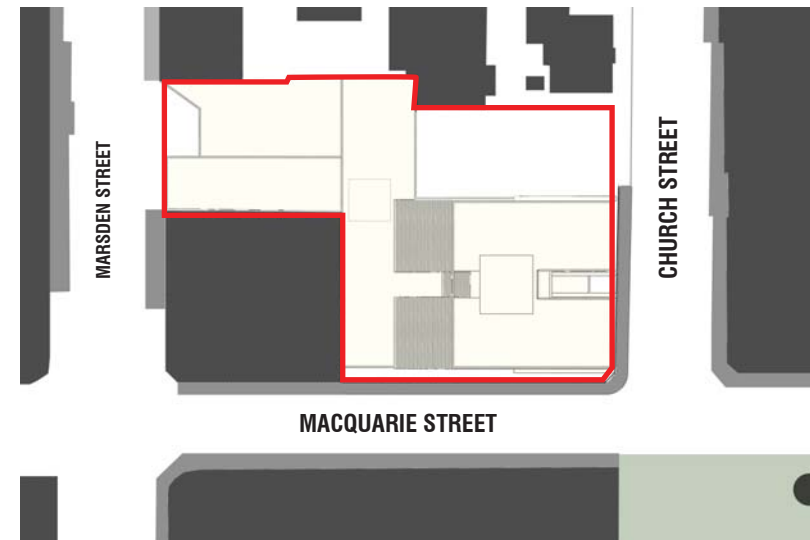
Figure 17  
Aerial view looking down Church St to Parramatta civic space

*Note: This drawing is conceptual only. Dimensions are for explanatory purposes to understand the concept. Final dimensions will be subject to detailed design after the planning proposal process.*

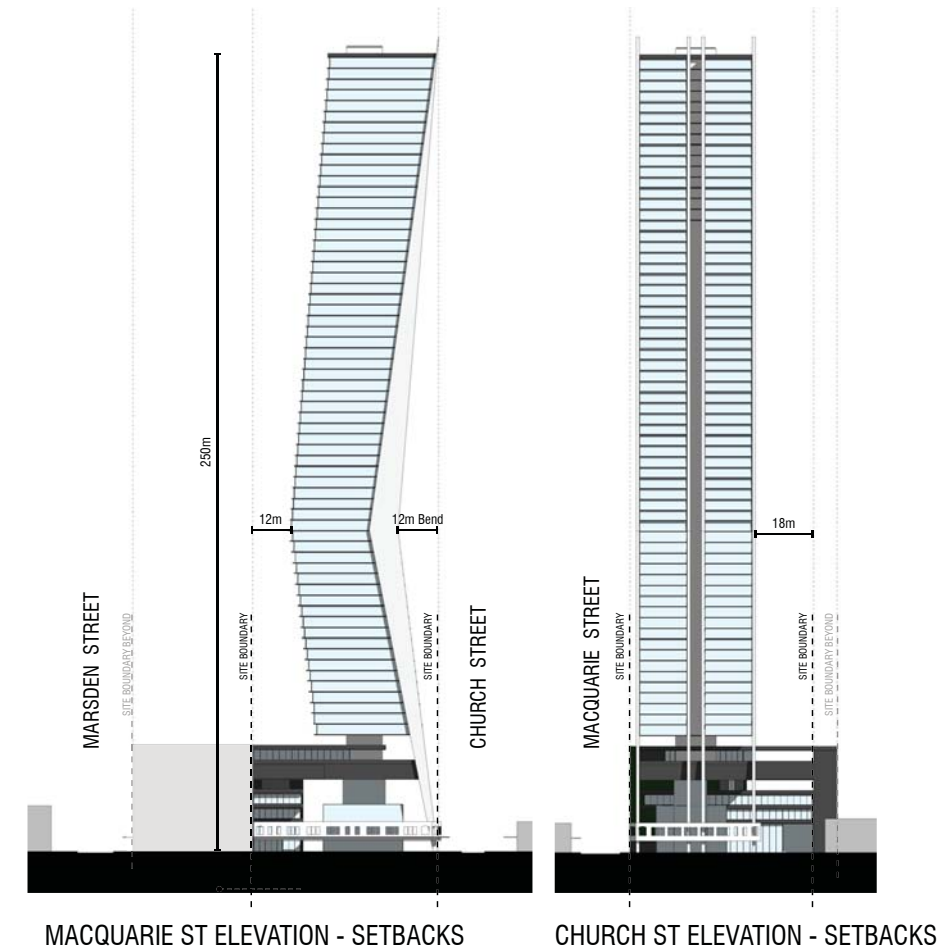


## 5.1.3 Detailed Considerations - Tower Setbacks

- The Tower form is sited at the South East corner of the site.
- Along Church Street, the built form bends with a maximum setback of 12m.
- Along Macquarie Street, subject to structural advice, the built form sets back to slightly to align with the Church St corner of the site boundary.
- To the North, the built form set back by 18m from the site boundary thereby achieving increased curtilage to the Heritage building at 213 Church St.
- To the West, the built form varies in set back with a minimum of 12m (applying half SEPP rule) to a maximum of 24m due to the bent profile of the tower. A minimum separation is maintained so that the adjoining site is not compromised for potential development.



PLAN - SITE PLAN



MACQUARIE ST ELEVATION - SETBACKS

CHURCH ST ELEVATION - SETBACKS

## 5.1.4 Detailed Considerations - Tower Configuration

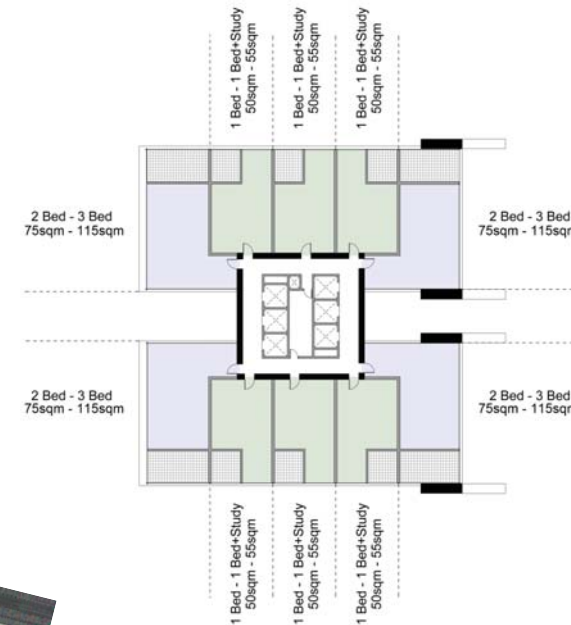
The tower has been divided into low to medium, high rise and penthouse levels to achieve a mix of apartments.

Indicative Unit mix:

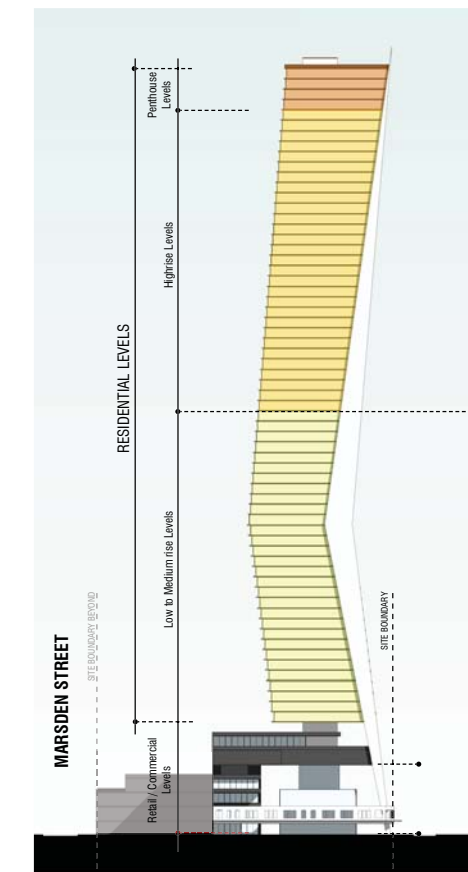
- 1 Bed 20%
- 1 Bed + Study 20%
- 2 Bed 55%
- 3 Bed 5%

Approximate Unit sizes:

- 1 Bed 50m<sup>2</sup>
- 1 Bed+Study 55m<sup>2</sup>
- 2 Bed 75m<sup>2</sup>
- 3 Bed 95-115m<sup>2</sup>



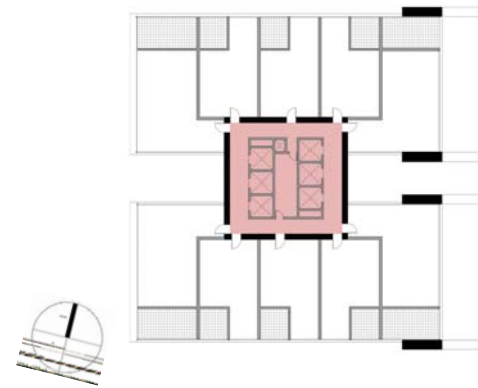
TYPICAL PLAN



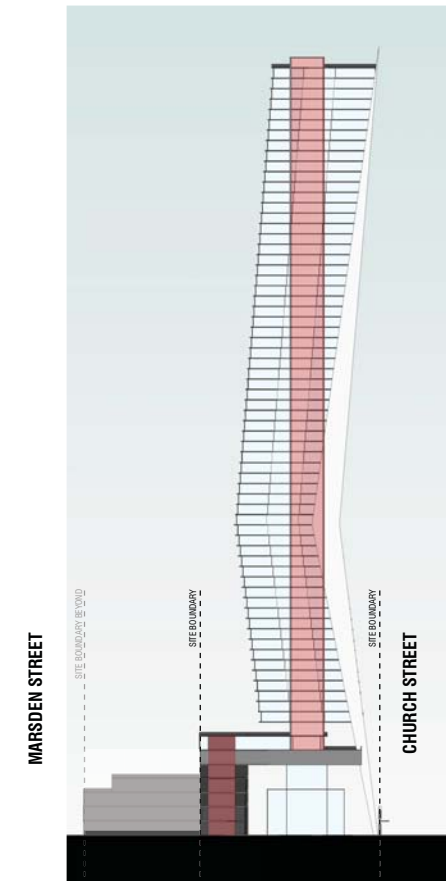
MACQUARIE ST ELEVATION - TOWER CONFIGURATION

## 5.1.5 Design Considerations - Tower Circulation

- The core is centrally located to maximise the number of apartments to the perimeter.
- The core is minimised in size due to the 6 lift configuration, efficient scissor stair and floor by floor plant strategy.



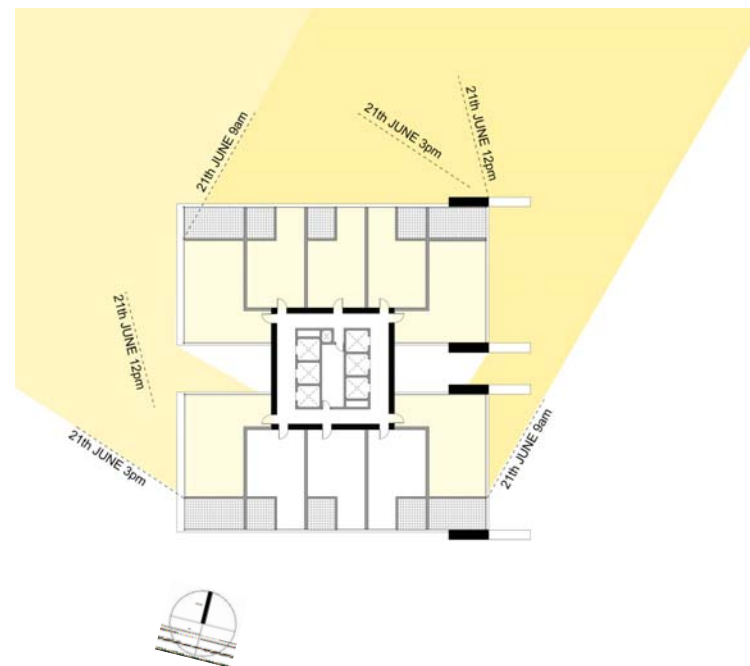
TYPICAL PLAN - TOWER CIRCULATION



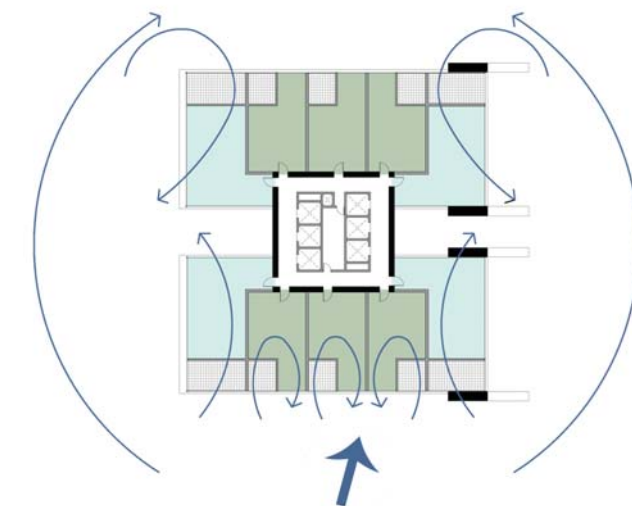
MACQUARIE ST SECTION - TOWER CIRCULATION

## 5.1.6 Detailed Considerations - SEPP 65 / RFDC

- The compact tower configuration delivers the best SEPP 65 performance.
- The circulation corridors have been positioned wholly internal to provide the units with access to expansive city and district views, sunlight and natural ventilation.
- The building orientation and unit layout helps achieve 70% solar access into units & 70% cross ventilation.
- The development is designed to embrace ESD principles. The massing, internal layouts & orientation have been organised so as to provide natural day lighting and solar access into primary living spaces. Energy efficient appliances and water efficient devices will be specified to minimise water consumption of resources.
- Acoustic & visual privacy of residents achieved with intertenancy walls designed to BCA requirements and acoustic consultant recommendations.
- All units have balconies that comply with SEPP 65 dimensions.
- The materials, colours, finishes that will be used in the development will be of high standard and will integrate with the emerging character of development in the area.



SOLAR ACCESS



CROSS VENTILATION

NOTE: The mix of uses, numbers of levels and numbers of apartments noted in this report are preliminary and indicative only and are subject to change as the design is developed within the proposed nominated height and GFA planning controls



***“Intricate minglings of different uses in cities are not a form of chaos. On the contrary, they represent a complex and highly developed form of order.”***

*Jane Jacobs*

### 5.2.1 Strategic & Public Benefits

The redevelopment of the site comprising a tall (250m) slender tower could realise the following public benefits:

- The amenity of the site will be enhanced and complement the renewal of Church Street Mall and the development of Parramatta Square.
- A tower building on the site can provide a ‘marker’ and ‘pull’ at the northern end of the Church Street mall.
- A mixed use development could provide around 550 residential apartments and 11,000m<sup>2</sup> of retail and commercial on a site proximate to existing transport and infrastructure.
- Strong activation of Church Street and Macquarie Street can be achieved, contributing to the urban vitality of this part of the CBD.
- A new development can be achieved, whilst retaining and enhancing the heritage values of the site.
- The potential for archaeological relics on site will be investigated and opportunities to enhance and preserve items will be explored.
- An increased curtilage to the adjoining heritage item at 213 Church Street can be provided.
- Redevelopment of the site will have broader social, cultural and economic benefits for Parramatta and contribute to achieving the objectives of The Plan for Growing Sydney and the Parramatta Economic Development Strategy.
- Redevelopment of the site can contribute to the Parramatta Art Walk through the siting of appropriate and relevant public art on the site.
- Improved pedestrian permeability can be achieved by providing a new pedestrian through site link between Church Street and Marsden Street.
- Contributions (monetary and/or physical works) towards urban improvements in the CBD, such as an upgrading of Macquarie Street to improve links between Parramatta Park and the CBD and treatment of the intersection of Macquarie Street and Church Street to create a seamless extension of the Mall across to the site.
- The opportunity to provide new publicly accessible spaces on the ground plane and podium roof top will be considered.
- Enhanced quality of the public domain and improved integration with Parramatta Square through an extension of the material palette and public domain treatments to the site.
- Opportunity for new public accessible/public domain spaces on the podium with views to Parramatta Square.
- Opportunity for public participation during recovery and restoration of archaeological items on site.

### 5.2.2 Public Domain Outcomes

Design principles for the public domain:

- Publicly accessible space supported by active retail uses on the ground floor.
- Viewed as an extension of Centenary Square and widening of the public domain area to Church Street.
- Significant archaeological finds on site to be retained and displayed for public benefit.
- Signage and place finding interactive panel boards to guide and inform the public.
- Pedestrian friendly ground floor that links effortlessly with surrounding streets and creates opportunities to linger and enjoy different experiences.
- Celebratory space that contributes and expands existing street festivals and events like Parramasala.

Outcome Options:

- Open piazza supported by active retail uses and cafes at the fringe.
- A concept store (Apple store style).
- A boutique retail plaza with high end stores.



**5.2.3 Heritage**

Heritage considerations include:

- Potential for subterranean archaeology of former buildings known to have occupied the site.
- Murray Bros facade.
- Heritage items in the vicinity of the site
- Collective heritage values of Parramatta CBD

Subject to further archaeological investigation, significant archaeological finds of state or national significance can be retained on site with structural footings, basement parking, driveway access(s) and lift cores to circumvent or cause minimum disruption to items. The archaeological finds can be displayed for public viewing through use of toughened glass floors, interpretive signage and interactive display panels.

The heritage facade of the existing building can be propped as a free standing facade which acts as an entry portal into the public domain on site. It could also be documented and removed.

The adjacent images demonstrate the numerous design responses available for preservation & incorporation of heritage items as part of the redevelopment of a site.

**Design Options:**

- Archaeological investigations to be undertaken following demolition of existing buildings.
- Subject to further archaeological investigations, significant archaeological finds could be:
  - Retained on site in an untouched strata
  - Exposed + displayed for public viewing through the use of glass floors and display cases.
  - Demolition of Facade
  - Retention of Facade



Figure 18 Justice Precinct, Parramatta, (Batessmart)



Figure 19 'Portico' The Scots Redevelopment, (Tonkin Zulaikha Greer)



Figure 20 'The Quay', Sydney (WMK Architecture)



### CONCEPT IMAGES

Three options for the treatment and design of the ground floor plane have been investigated. However the final outcome maybe a combination of these options.

The final design outcome for the ground floor plane will be determined following archaeological investigations and discussions with Council in relation to their vision for this pivotal site in the CBD.

### CONCEPT IMAGE 1

- No heritage façade
- Open Piazza
- Potential archaeological finds displayed under toughened glass floor.
- Retail / Commercial along the western boundary wrapping around to a potential cafe laneway / arcade to Marsden Street.
- Free standing kiosks provide additional activation.

### Outcomes from this option are:

- A modern celebratory public space that presents a wider presence of Church Street.
- Extends and increases the public civic space by linking the site to the Centenary Square, Church Street Mall and the Parramatta Square.



Fig 21: 3D Rendering of conceptual ground level treatment of subject site:

*NOTE: The mix of uses, numbers of levels and numbers of apartments noted in this report are preliminary and indicative only and are subject to change as the design is developed within the proposed nominated height and GFA planning controls*





### CONCEPT IMAGE 2

- Concept Store (Apple style)
- Heritage façade retained (Upper level) and used as an entry portal.
- Potential archaeological finds displayed under toughened glass floor.
- Retail / Commercial along the western boundary wrapping around to a potential cafe laneway / arcade to Marsden Street.

### Outcomes of this option are:

- A ribbon like heritage edge that ties in with existing Church St character whilst opening up the ground level of the site for public to access a modern internal public space with a large glass concept store at its centre.
- Maintain existing street edges.
- Activation of the street.



Fig 22: 3D Rendering of conceptual ground level treatment of subject site:

*NOTE: The mix of uses, numbers of levels and numbers of apartments noted in this report are preliminary and indicative only and are subject to change as the design is developed within the proposed nominated height and GFA planning controls*





### CONCEPT IMAGE 3

- Existing façade with the upper level heritage retained and used as a entry portal into small high end boutique retail.
- Retail / Commercial along the western boundary wrapping around to a potential cafe laneway / arcade to Marsden Street.
- Minor archaeological finds displayed within retail plaza.

### Outcomes from this option are:

- Existing public street edge and space retained.
- Heritage façade retained and incorporated into the development.
- Activation of the street.



Fig 23: 3D Rendering of conceptual ground level treatment of subject site:

*NOTE: The mix of uses, numbers of levels and numbers of apartments noted in this report are preliminary and indicative only and are subject to change as the design is developed within the proposed nominated height and GFA planning controls*





### 5.2.4 Traffic Principles

The Traffic Assessment prepared by Thompson Stanbury Associates provides a thorough review of the Traffic implications presented by the proposed development and the surrounding future character of Church Street. It concluded there would be no traffic, parking and transportation related issues associated with the Planning Proposal which would prevent Thompson Stanbury Associates from recommending the proposal for approval.

As per Traffic Consultant advice, two design options have been proposed:

#### Design Option 1:

- Access via Macquarie Street – ingress only for both cars and service vehicles. The driveway entry located to the edge of the side boundary adjacent to the neighbouring lot.
- [NOTE: Potential impact on heritage façade with increased height cut-out (total opening height = 4.5m). Heritage Consultant has indicated that minor changes to façade to cater for access to the site are supportable.]
- Egress via Marsden Street – Left in and left out. Driveway to be centred on the Marsden Street boundary.

#### Design Option 2:

Same as above except for location of driveway off Macquarie Street shifted to minimise disturbance to archaeological heritage subject to significant finds during dig.

### 5.2.5 Wind Shear Considerations

The Pedestrian Wind Environment Statement prepared by Windtech Consultants presents an analysis on the likely impact of the proposed building design on the local wind environment to the critical outdoor areas within and around the site. In order to achieve suitable wind conditions, Several design options are recommended to be included in the final design.

As per Wind Consultant advice, the design options proposed are:

For the Ground level:

- Option 1: Incorporate an awning along the western and southern aspects of the tower base, above the podium.
- Option 2: an awning at approx. 4.2m height from street level along the Macquarie St with a minimum width of at least 3m.
- Option 3: If podium enclosed, then an awning at approx. 4.2m height from street level along the Macquarie St and wrapping around to Church St with a minimum width of at least 3m.

For the podium roof level:

- Option 1: The inclusion of an awning that extends from the floor slab of the first typical tower floor, over the northern, western and southern aspects.
- Option 2: The inclusion of an awning that extends from the floor slab of the first typical tower floor, over the northern and western aspects of the podium roof, with a full height impermeable screen to meet the awning at the south western corner. This screen could be comprised of glass or similar transparent material and made non trafficable.

### 5.2.6 Structural Considerations

A preliminary structural design concept review prepared by van der Meer Consulting provides a certification that the proposed sculptural built form structure would be based on accepted engineering practice and that it is in accordance with the relevant building code and Australian standard provisions.



CONCLUSIONS

06



## 6.1.1 Conclusions

The proposed development at the strategic site 197 Church Street, Parramatta is in the public interest and serves to create a vibrant mixed use residential development which contributes positively to Parramatta as a whole. It will offer distinct advantages, value add to the community and considerably improve the urban design and amenity of the Parramatta civic space, Church Street & Macquarie Street.

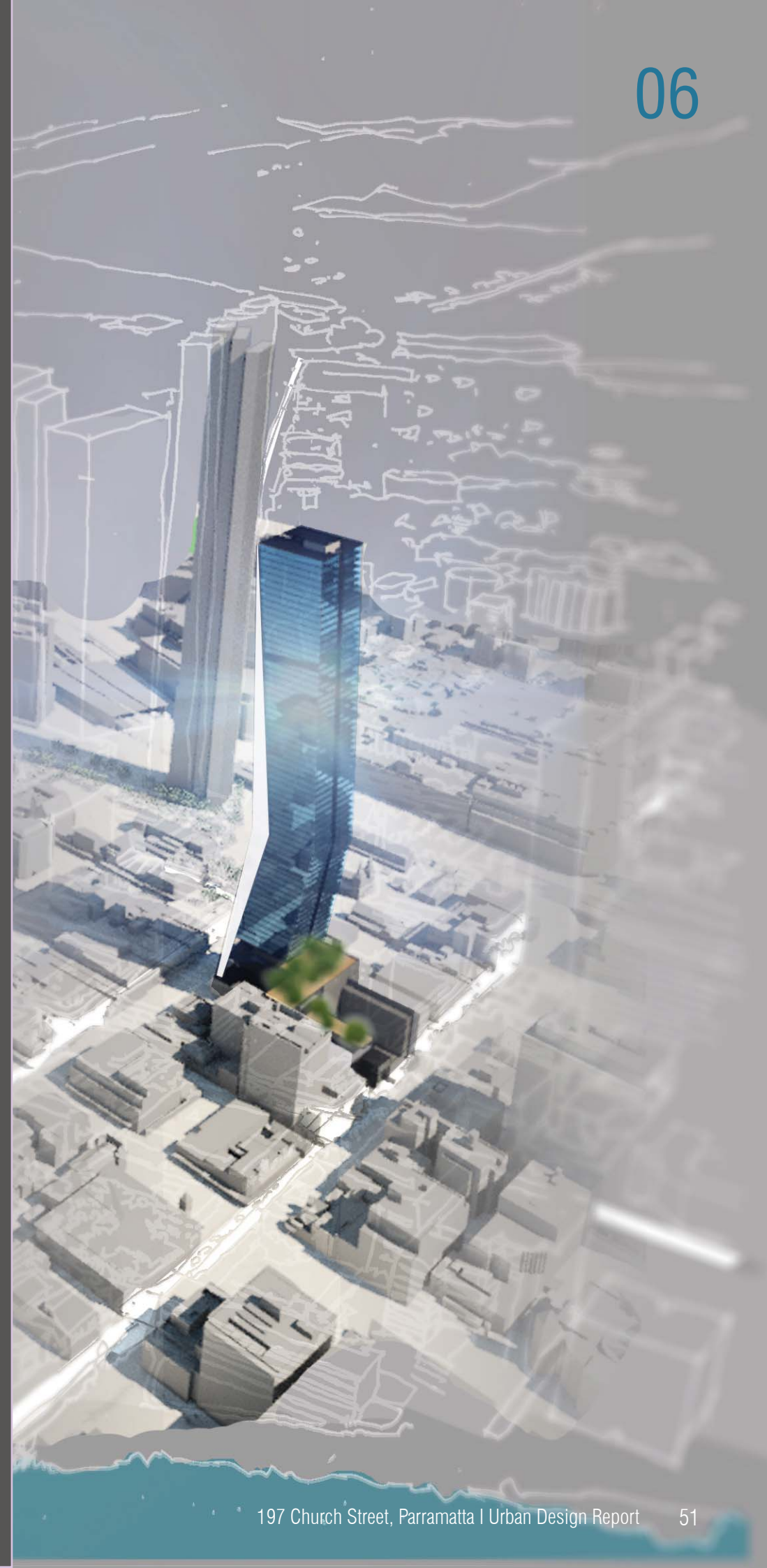
These overall benefits and improvements will include:

- Contribution to the civic space by providing a sculptural landmark building, 'The Boomerang' sets a visually pleasing marker for pedestrians and acts as a 'pull' to the north end of the Church St Mall and bookend to the southern key site – Aspire.
- Provides unique opportunities to extend and define the Civic spaces and provide opportunities for public art displays.
- The development will provide around 550 residential apartments and 11,000m<sup>2</sup> of retail and commercial floor space in a location proximate to existing transport and infrastructure in the heart of the Parramatta CBD.
- Provides an opportunity to investigate the heritage and archaeological potential of the site.
- Provides an opportunity to open up views to the adjacent heritage item by providing an increased curtilage to the Post Office building.
- Provides options for the treatment and management of known heritage items (the Murray Bros façade).
- Provides options for the future treatment and management of unknown in situ archaeological items.
- Would restore to this historically and socially significant location, and to Parramatta, a landmark building that replaces the lost historical landmark, and recognizes and respects the great significance of this site.
- Enlarge the central civic space area within the Parramatta CBD
- Make a positive contribution to the Parramatta Civic space as a great public space.
- Enhance and complement Church St Mall and development of Parramatta Square through an extension of material palette and public domain treatments to the site.
- Contribute to a sense of 'feeling safe' by enhancing the public domain in the vicinity of the site and giving priority to pedestrians.
- Contribute to the sense of 'feeling secure' by activating the space in and around the site day and night, through the introduction of residential development on site and elevated public podiums providing passive surveillance and improved street lighting.
- Provide a pedestrian through link / laneway connecting Church Street & Marsden Street that contributes to the lanes network identified in Council's urban form plans.
- Provide an iconic landmark building on a strategically and historically significant site in the Parramatta CBD.
- Enhance the pedestrian experience by providing wide accessible footpaths, good surfaces and street lighting.
- Encourage the public to stay and linger in the space by providing by an interesting and engaging 'edge' through active ground level retail, display of heritage items, provision of street furniture, columns and niches to sit and lean on and attractive detailed facades.

- Meet the criteria that contribute to a good functioning civic space as per Jan Gehl's twelve quality principles and/or the four key attributes – accessibility, activities, comfort and sociability – championed by Project for Public Access (PPS). Access to sunlight is not the only consideration by which a civic space is deemed successful and useable. As the shadow travels, other areas of the Parramatta civic space will have solar access. Reduction in sunlight to the solar zone in Parramatta Square amounts to 19% at 1pm and 12% at 2pm on June 21. The shaded portion of any point in the Square is limited to under an hour with the shadow traveling quickly across due to the slender tower form. Parramatta Square opens up to Church Street mall and Centenary Square which gives users a sense of a much larger space and avoids the sense of enclosure.
- Provide a variety of treatments to public spaces including wider footpaths, landscaped areas, formal sitting areas all of which will have access to views and daylight. Measures including improved street furniture, café spaces and ameliorating the impacts of traffic noise that encourage people to use and interact in the spaces can be incorporated.
- Provide a 'human scale' to a civic space by developing ground level activities like laneway style café experience, retail, public piazza and exhibits of archaeological finds and heritage.
- Manage the microclimate in the vicinity of the site by mitigating wind down drafts through the use of large horizontal overhangs, covered walkways & arcades, and landscaping thus protecting against unpleasant sensory experiences.

From an urban design perspective, we consider that the increased height and built form respond appropriately to the unique characteristics of the site and its context within the Parramatta city centre. The Boomerang will deliver high quality architectural solution and distinctive development that will achieve design excellence, enhance the sense of place, activate the city centre and also contribute to the heritage significance of the site.

Accordingly, it is recommended Council to support this proposal and endorse the proposed height and built form as set out within this document.





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APPENDIX

# A0



*Note: This drawing is conceptual only. Dimensions are for explanatory purposes to understand the concept. Final dimensions will be subject to detailed design after the planning proposal process.*



APPENDIX

SUNSHADOW ANALYSIS - PARRAMATTA SQUARE

**A1**

## A.1.1 Solar Access to Civic Spaces:

As previously mentioned in section 4.1.5, the solar access to civic spaces should be considered in the context of sunlight access to other criteria that also contribute to making a successful civic space. It is not the only determining criteria to a successful civic space.

With this in mind, R+M conducted a detailed sunshadow analysis to determine the extent of shadow that the proposal contributes to Council's solar access control zone in Parramatta Square. The analysis took into factor the shadows from tree planting on the solar control zone of Parramatta Square.

### Factoring shadows from tree planting on Parramatta Square:

If the Aspire tower ( or any other smaller tower) is constructed, the resulting wind effect will require mitigation. The recommended solution for this is planting dense evergreen trees in Parramatta Square as per AECOM and Windtech 2013 Reports as set out below.

AECOM recommends in the Public Realm Design report for Aspire (March 2013) that trees in Parramatta Square will be *“planted in formal avenues to provide formal structure to the square and provide shade to the edges of square along building frontages. Shade tree species branch closer to the ground, creating a more intimate, densely shaded area beneath the canopy.”*

Windtech's Pedestrian Wind Environment Study for Aspire (March 2013) recommends that for effective wind mitigation the trees in Parramatta Square tree planting comprising of evergreen and dense foliage species with a height of at least 6m and a canopy of at least 8m in diameter would be required. Retractable shades are proposed for the northern edge of Aspire.

A shade factor of 75% has been adopted for recommended trees (as per University of Southern California Study, 2013) for all areas directly affected by tree shadow as demonstrated on the solar analysis.

### Calculations

The method of producing shade calculations is as follows (except where noted otherwise);

1. Area affected by shadow caused by buildings calculated
2. Area affected by shadow caused by trees calculated
3. Area affected by shadow caused by trees multiplied by the shade factor produces Tree Shaded Area (TSA)
4. Area affected by shadow caused by buildings and TSA subtracted from DCP Solar Zone total Area produces Net Shadow Area (NSA)
5.  $NSA / (DCP \text{ Solar Zone Gross Area}) = \% \text{ of Net Shaded Component (NSC)}$
6.  $100\% - NSC\% = \text{Solar Access}$

### Conclusion:

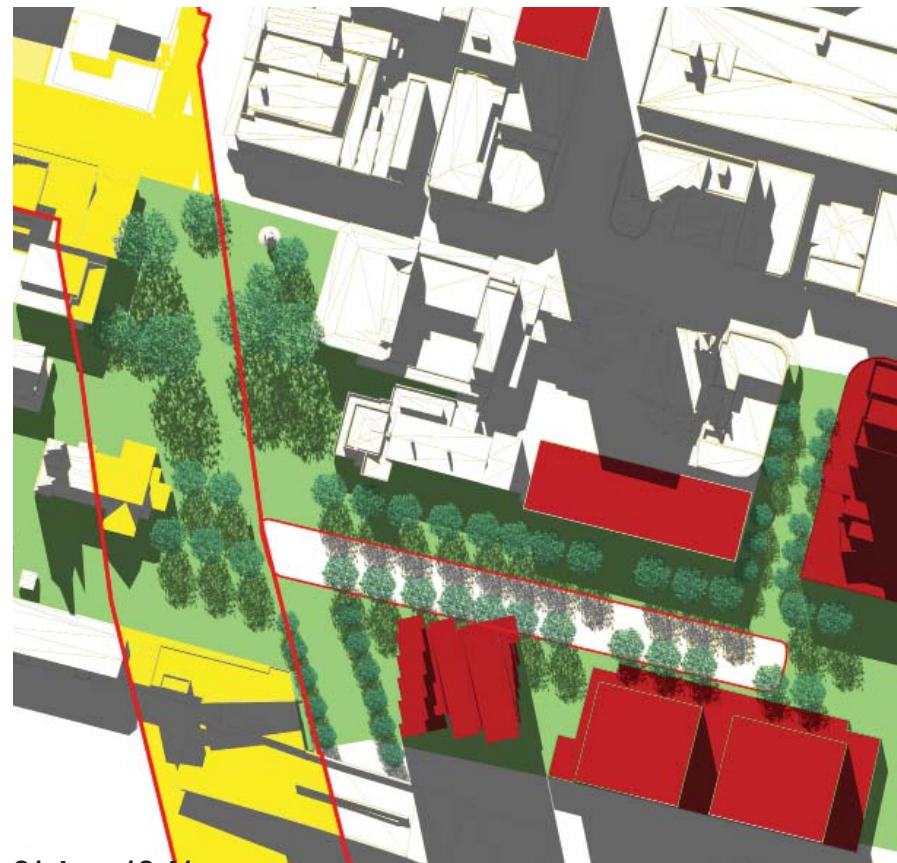
A - If the recommended tree planting is undertaken in Parramatta Square, these trees will cause 35% of the DCP Solar Zone in Parramatta Square to be in shadow on 21 June (before any effect from any other potential shadowing is taken into account) leaving 65% of the DCP Solar Zone in sunlight.

B - On 21 June (midwinter) shadows from a 250m high tower on 197 Church Street would have the following effects on the DCP Solar Zone of Parramatta Square:

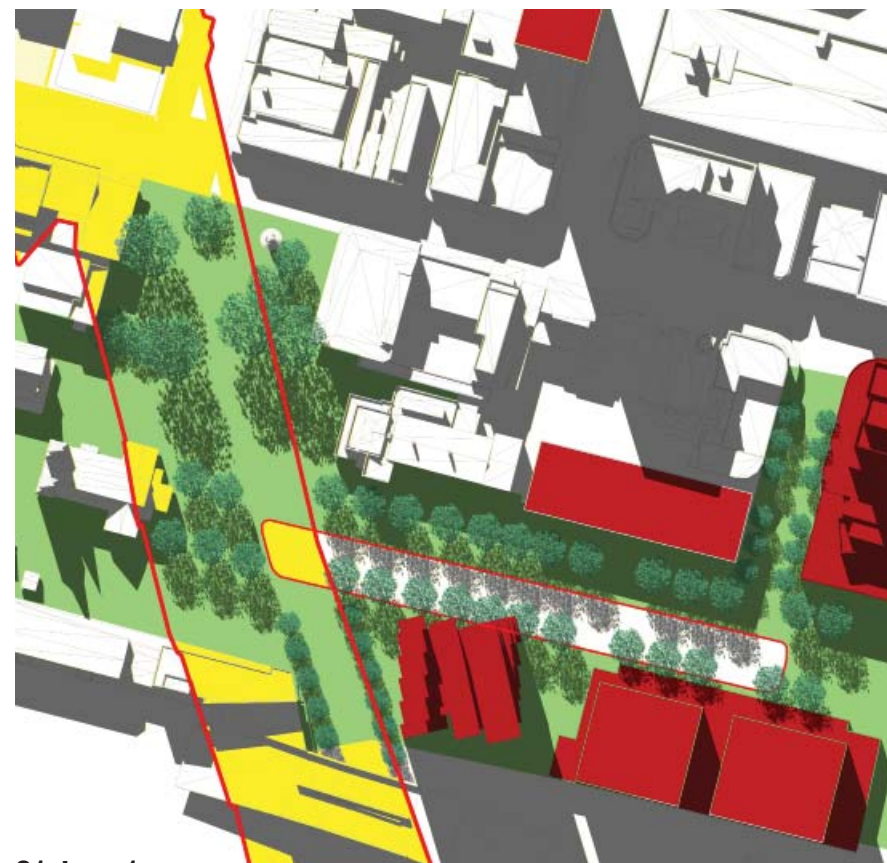
Time	Existing Shadow	Additional Shadow	Solar Access
12 noon	35%	0%	65%
1pm	37%	10%	53%
2pm	44%	24%	32%

### A.1.2

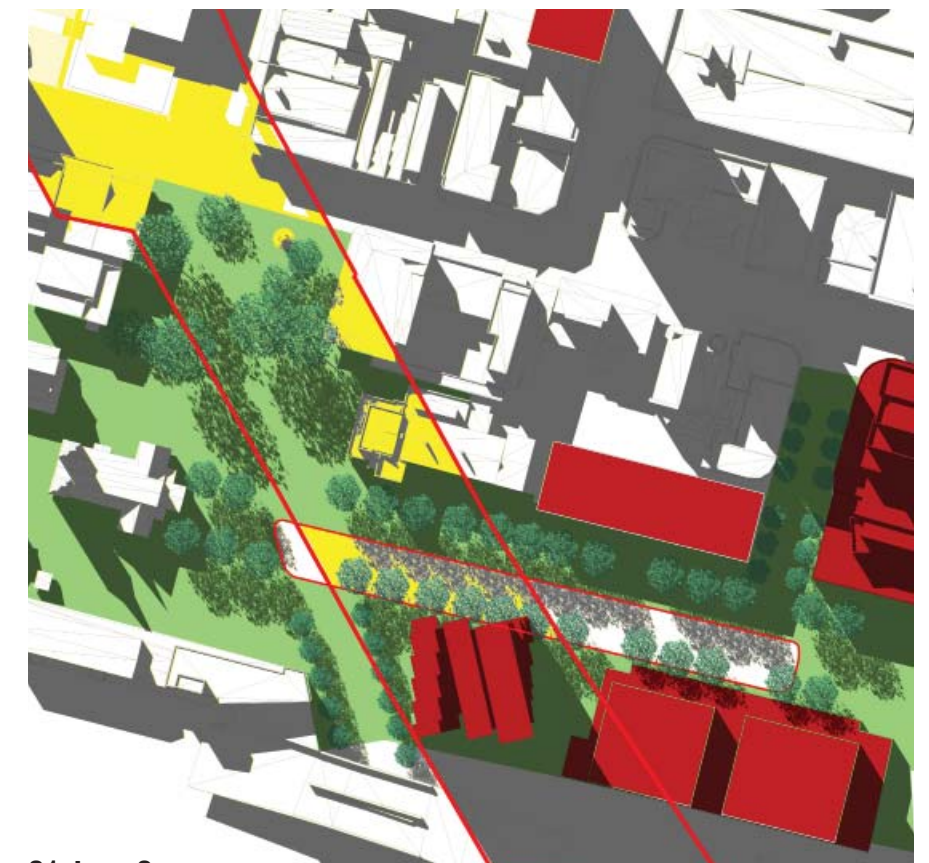
The impact of Boomerang's shadow upon the solar control zone of Parramatta Square, on 21st June (Winter Solstice), starts at 12:41pm. Due to the tall slender form of the tower, the shadow swiftly travels across the square at a rate of 46m per hour or 750mm per minute. The shadow subsequently overlap with the existing shadows cast by the trees already proposed along the square. This interaction has been assessed and reported below.



21 June 12:41pm



21 June 1pm



21 June 2pm



APPENDIX

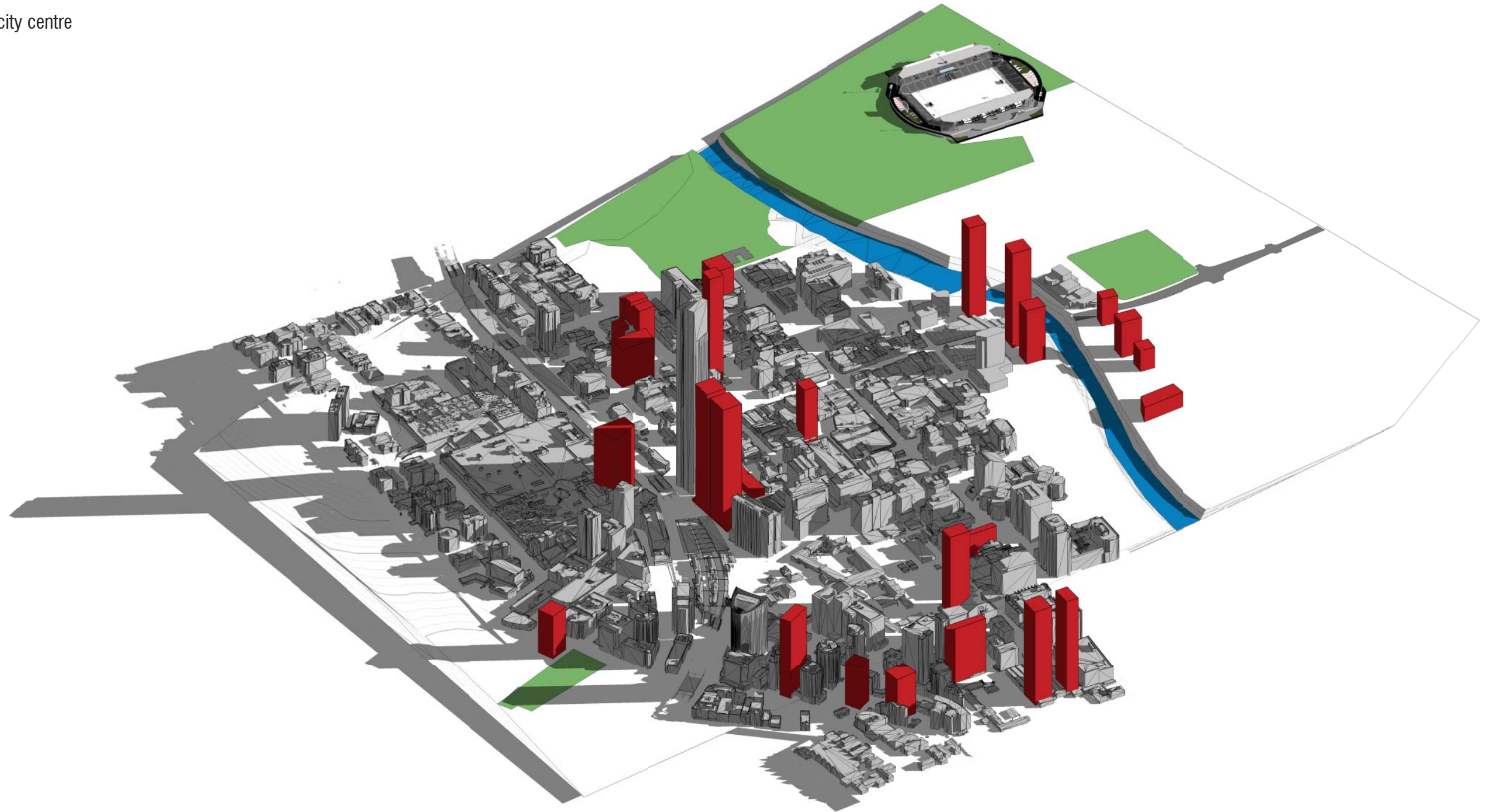
SUNSHADOW ANALYSIS - PARRAMATTA CBD

**A2**

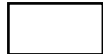

## A.2.1 Sunshadow Analysis

The 3D model of Parramatta contains:

- The existing context
- The Aspire Tower
- 197 Church Street
- Other approved DAs in Parramatta city centre



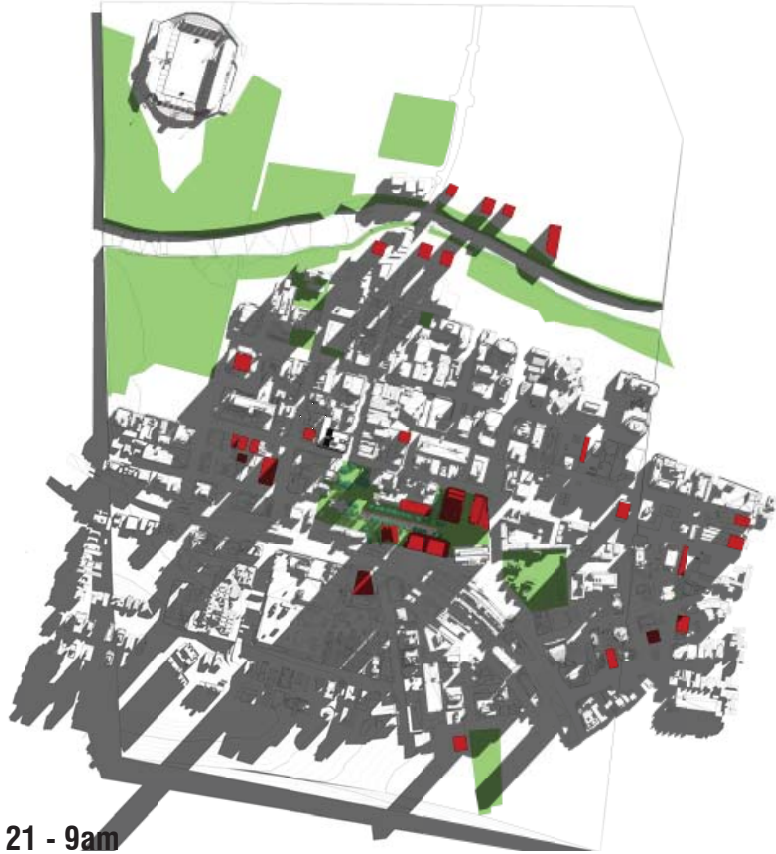
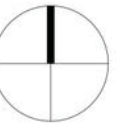
### LEGEND

-  Existing Buildings + Aspire Tower
-  Current Planning Proposals + Development Applications



## A.2.2 - Summer & Winter Solstice

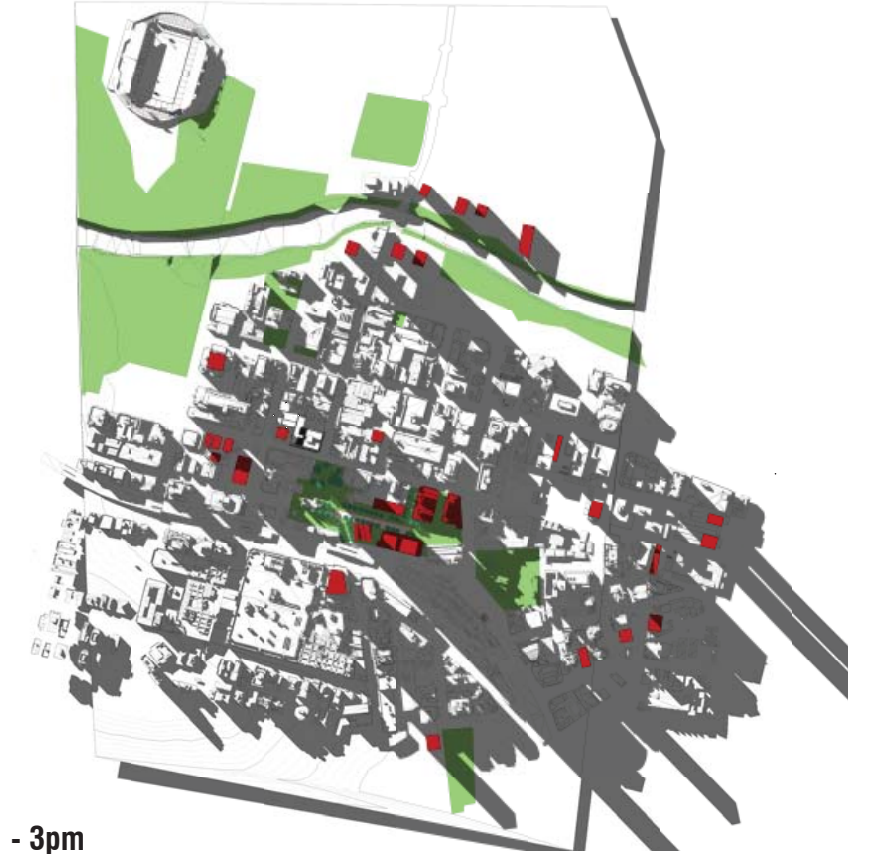
June 21 & December 21 9am, 12pm & 3pm Solar Assessment



June 21 - 9am



June 21 - 12pm



June 21 - 3pm



December 21 - 9am



December 21 - 12pm

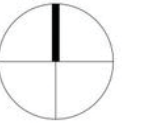


December 21 - 3pm



## A.2.2 - Equinoxes

March 21 & September 21 9am, 12pm & 3pm Solar Assessment



March 21 - 9am



March 21 - 12pm



March 21 - 3pm



September 21 - 9am



September 21 - 12pm



September 21 - 3pm



## A.2.3

### Winter Solstice Parramatta Square Shadow Review 9am till 3pm

Boomerang shadow will move at a rate of approximately 46m/Hour (or 750mm / minute)

Hour by Hour analysis of shadow impacts on Parramatta Square solar zone:

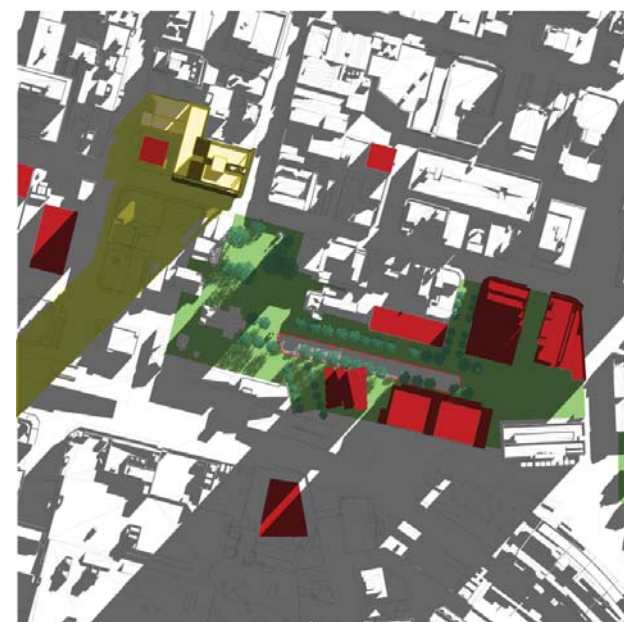
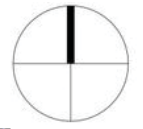
Time	Existing Shadow	Additional Shadow	Solar Access
9am	93%	0%	7%
10am	72%	0%	28%
11am	35%	0%	65%
12 noon	35%	0%	65%
1pm	37%	10%	53%
2pm	44%	24%	32%
3pm	56%	19%	25%

### Civic Space Sunlit Areas

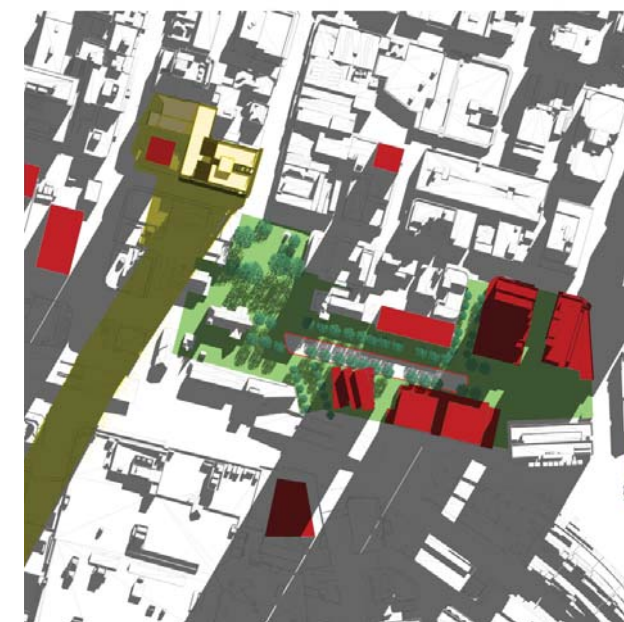
The total Civic Space (Church Street Mall, Centenary Square & Parramatta Square) is approximately 48,780 sqm.

Between 12pm and 2pm the areas of the Civic Space that will be in sunlight are (Excludes shadows cast by landscape/public domain elements)

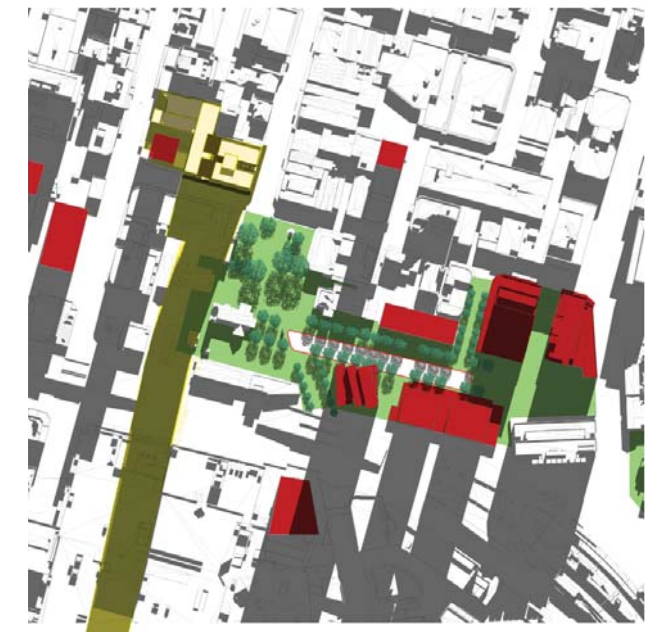
Time	Sun Area
12noon	4085 sqm
1pm	2019 sqm
2pm	3695 sqm



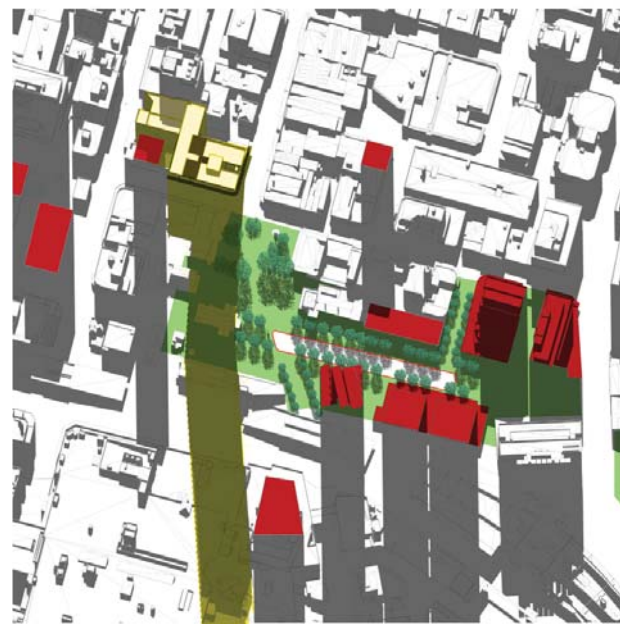
9am



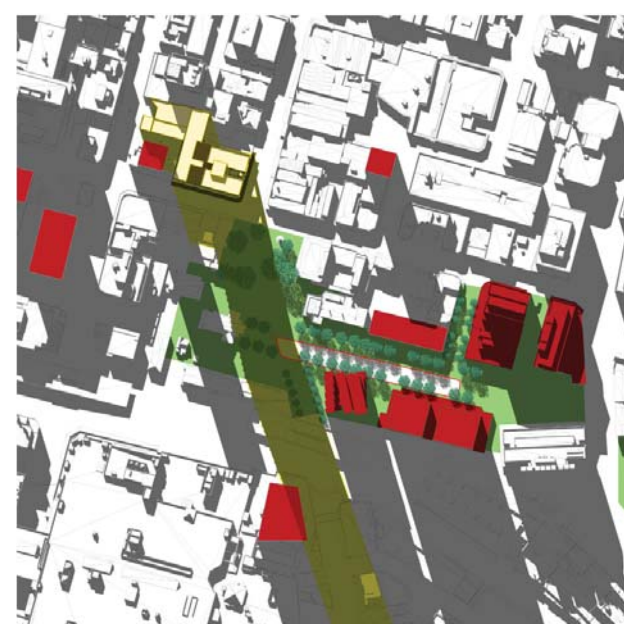
10am



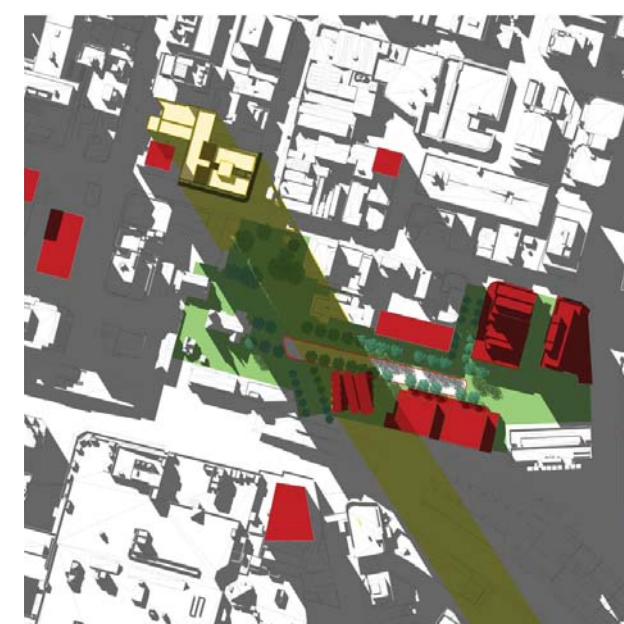
11am



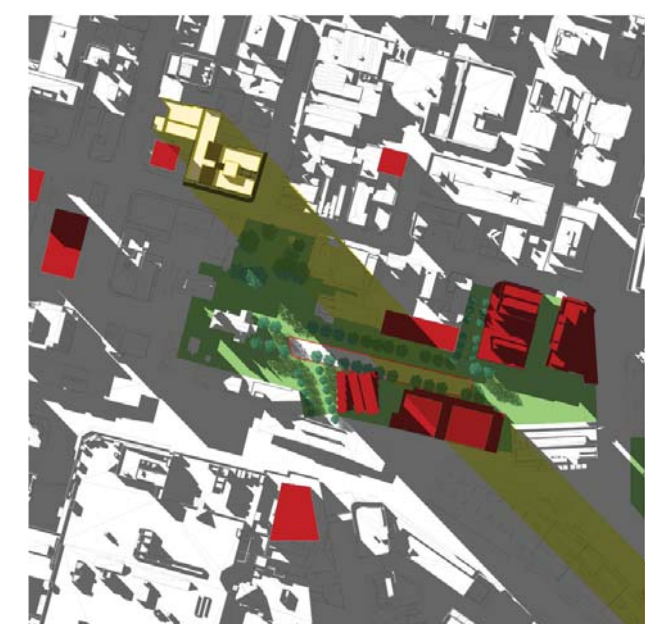
12pm



1pm



2pm



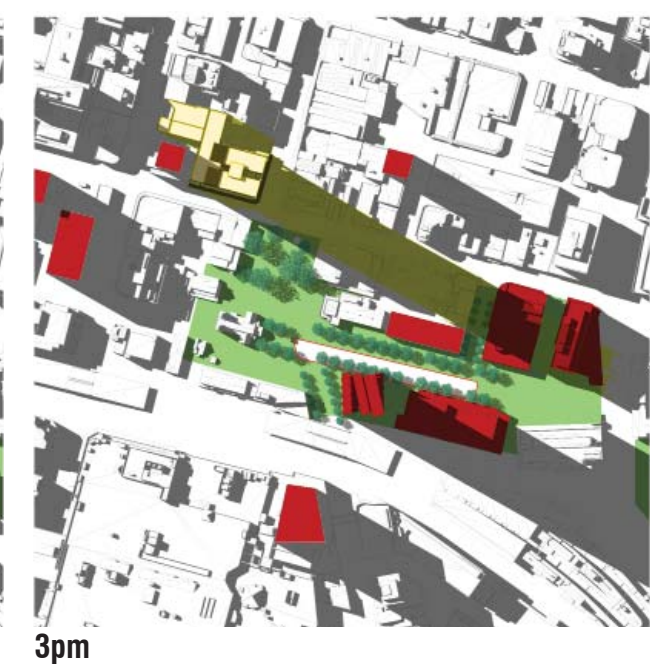
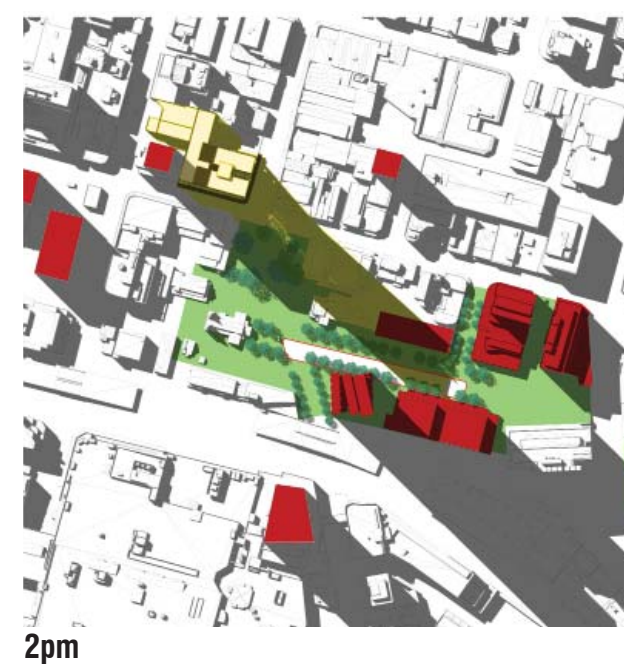
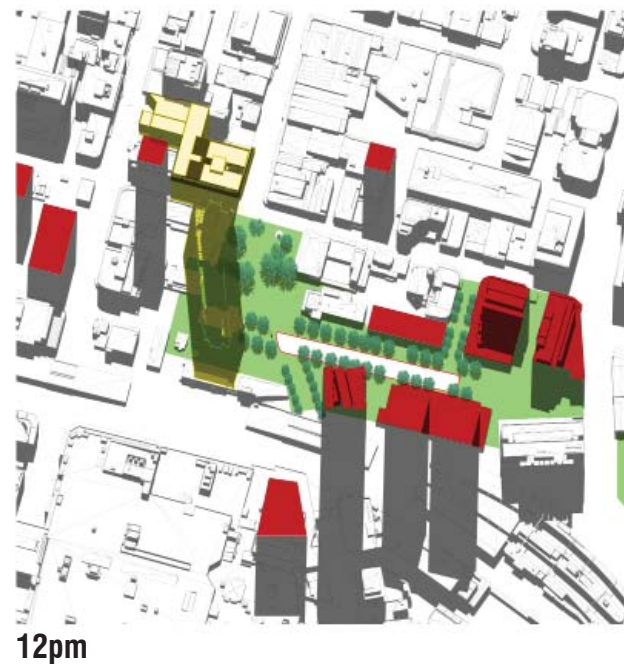
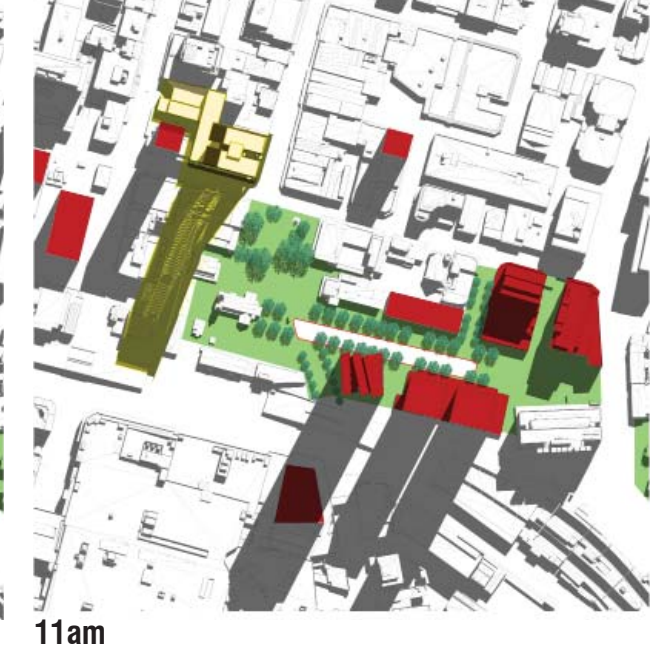
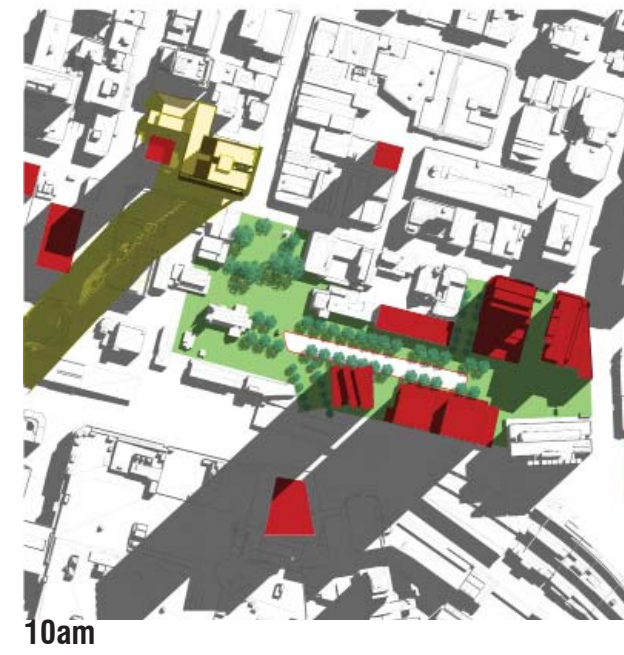
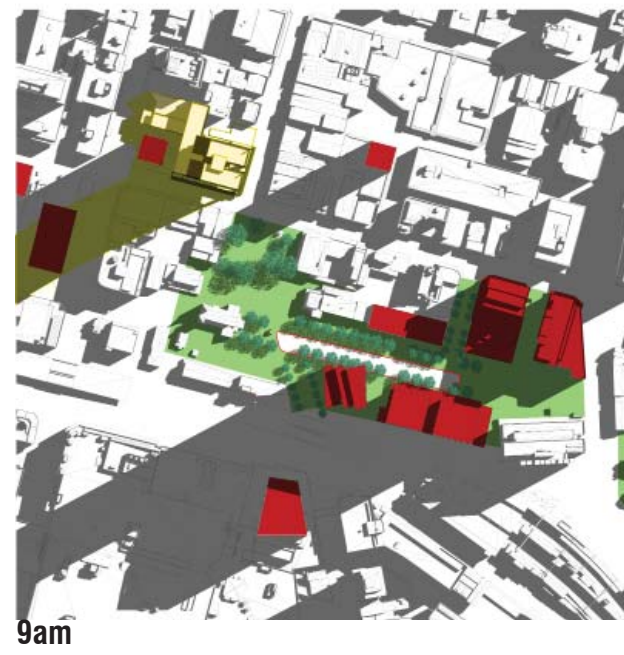
3pm



## A.2.3

### September Equinox Parramatta Square Shadow Review 9am till 3pm

Time	Existing Shadow	Additional Shadow	Solar Access
9am	34%	0%	66%
10am	16%	0%	84%
11am	12%	0%	88%
12 noon	11%	0%	89%
1pm	14%	30%	56%
2pm	19%	26%	56%
3pm	27%	0%	73%

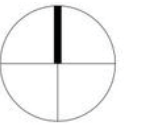




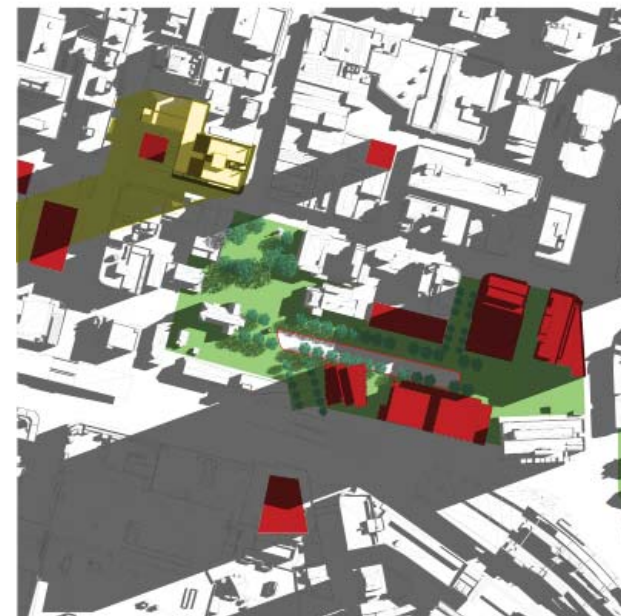
## A.2.3

### March Equinox Parramatta Square Shadow Review 9am till 3pm

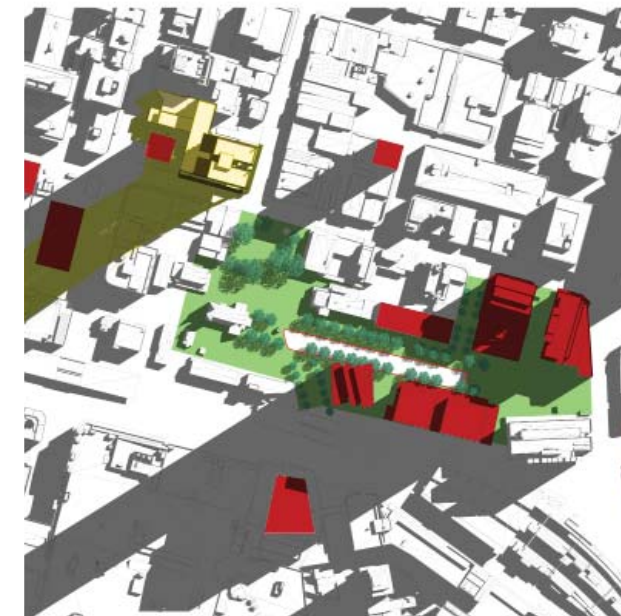
Allowance made for Daylight savings time



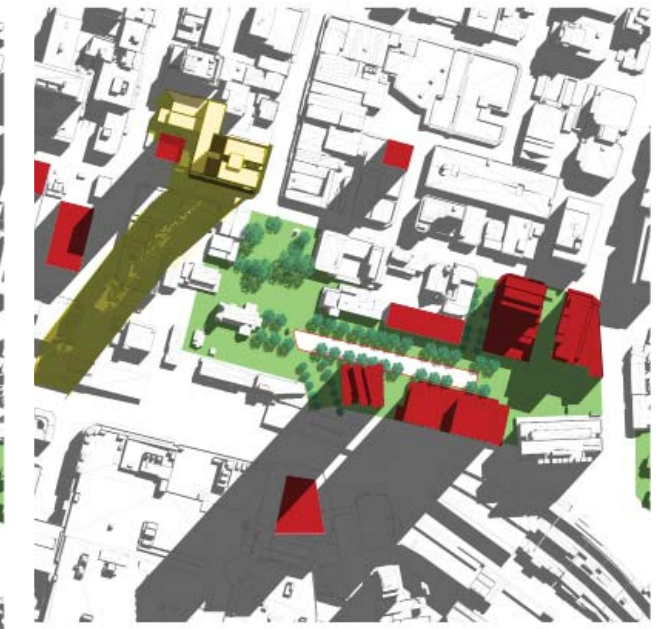
Time	Existing Shadow	Additional Shadow	Solar Access
9am	75%	0%	25%
10am	34%	0%	66%
11am	16%	0%	84%
12 noon	12%	0%	88%
1pm	11%	0%	89%
2pm	14%	30%	56%
3pm	19%	26%	56%



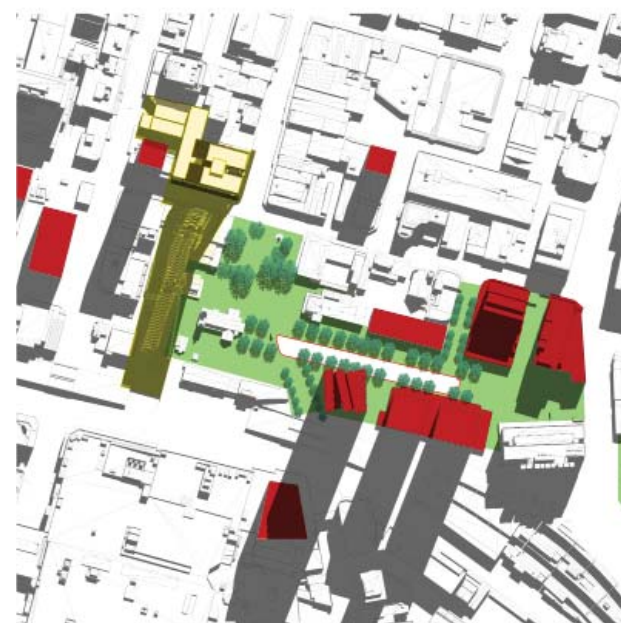
9am



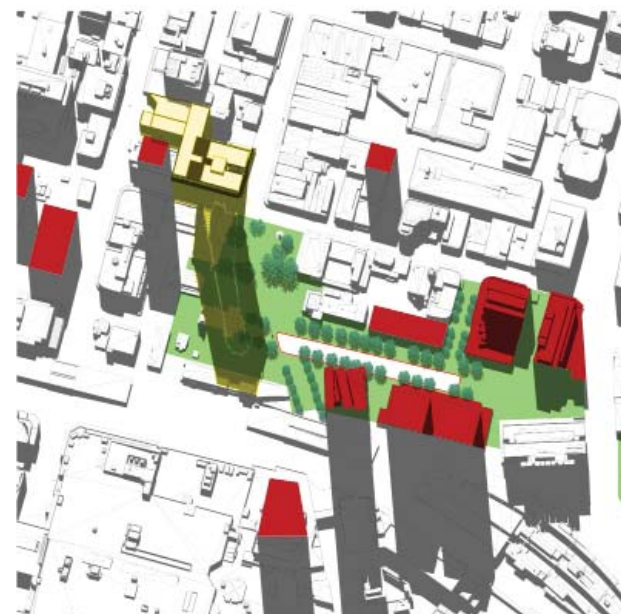
10am



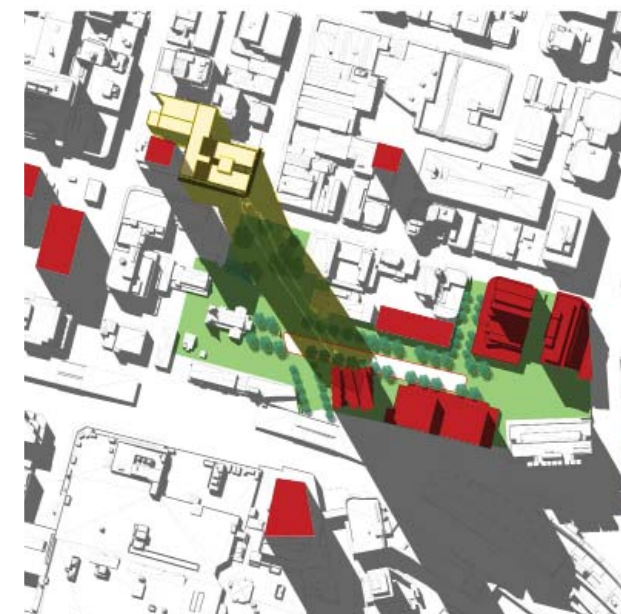
11am



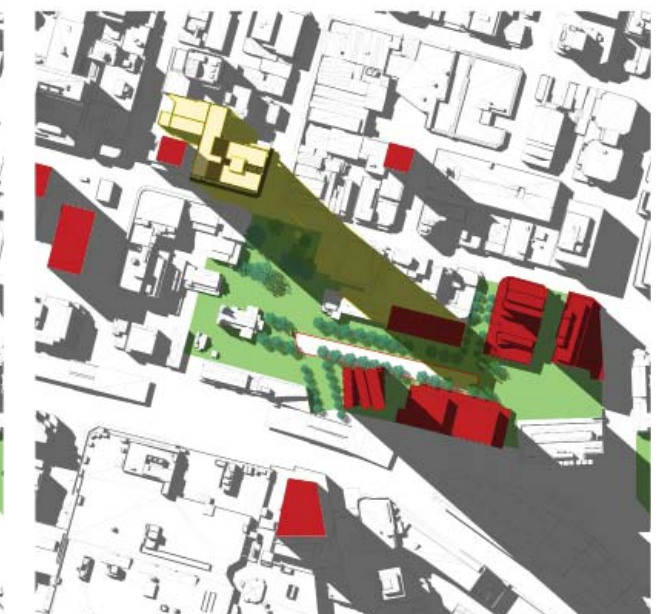
12pm



1pm



2pm



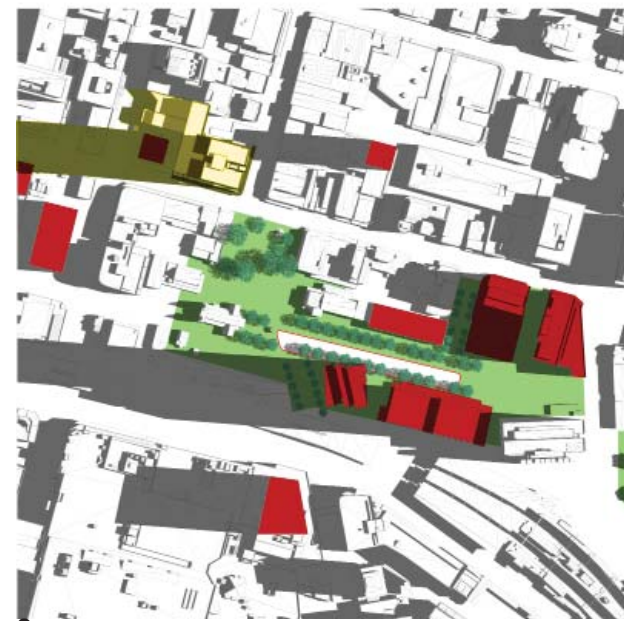
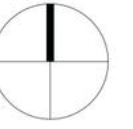
3pm



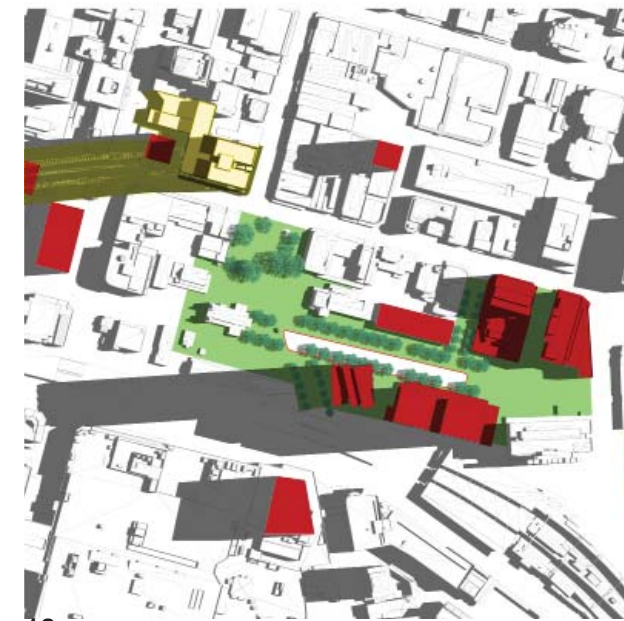
## A.2.3

### Summer Solstice Parramatta Square Shadow Review 9am till 3pm

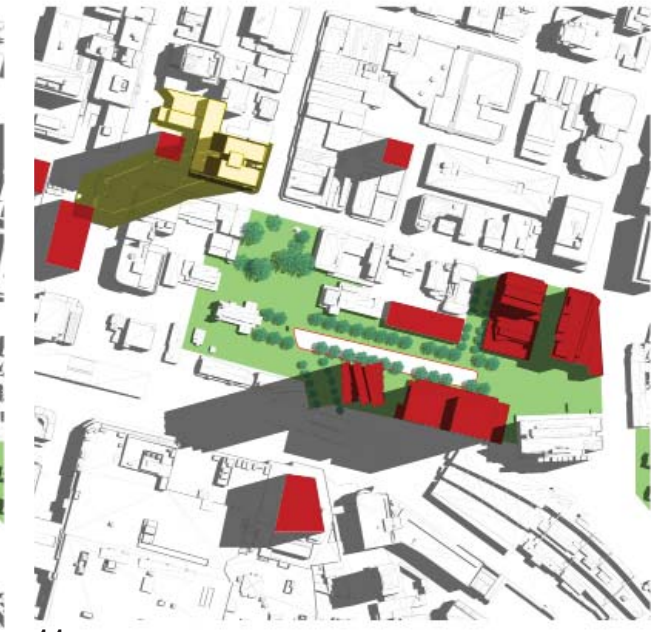
No impact



9am



10am



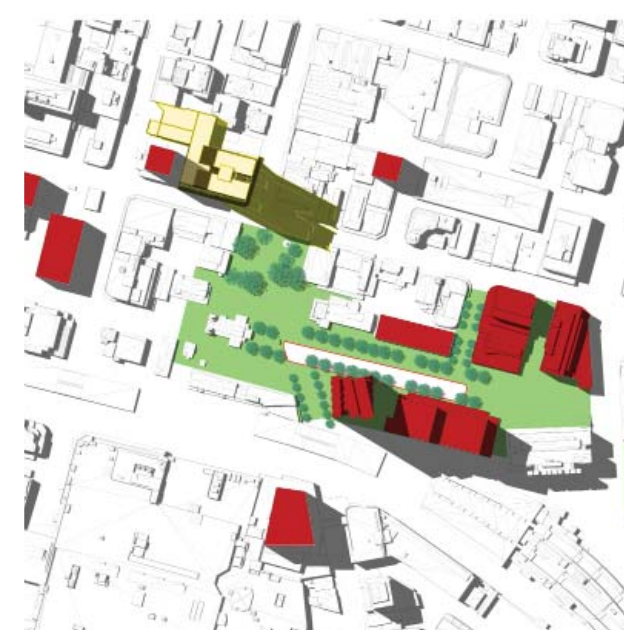
11am



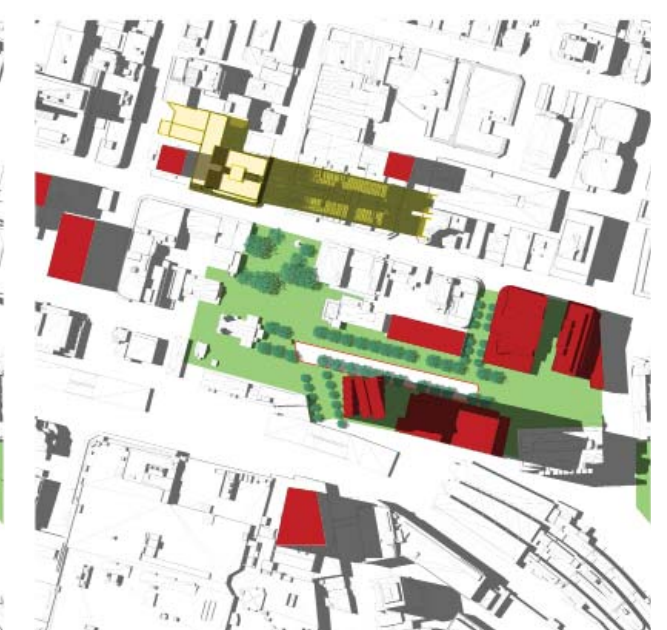
12pm



1pm



2pm



3pm



APPENDIX

SUNSHADOW ANALYSIS - BASED ON PARRAMATTA CITY  
CENTRE PLANNING FRAMEWORK STUDY (PCCPFS)

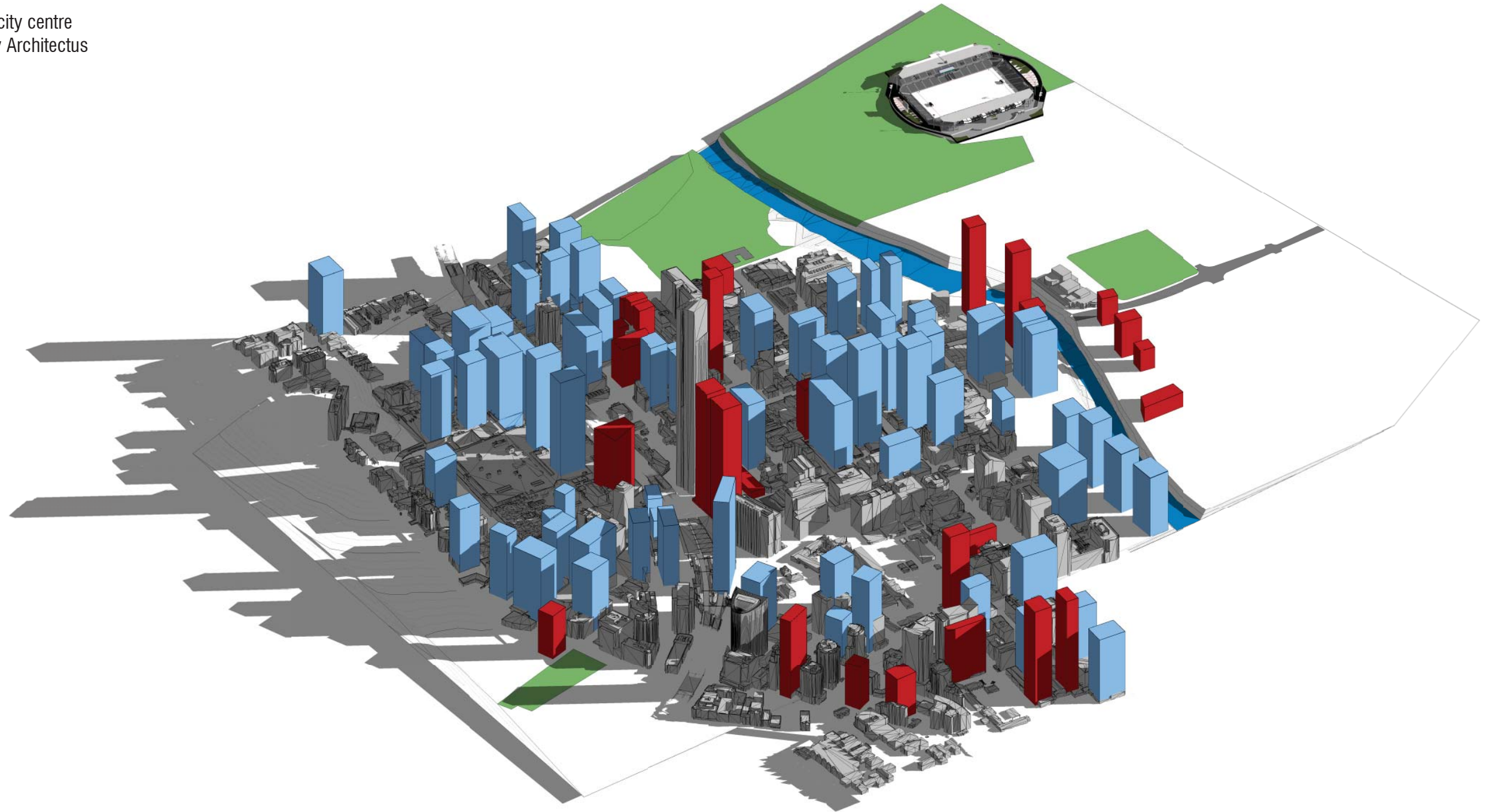
A3



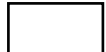


## A.3.1 Sunshadow Analysis

The 3D model of Parramatta contains:

- The existing context
- The Aspire Tower
- 197 Church Street
- Other approved DAs in Parramatta city centre
- Amalgamation plan as proposed by Architectus



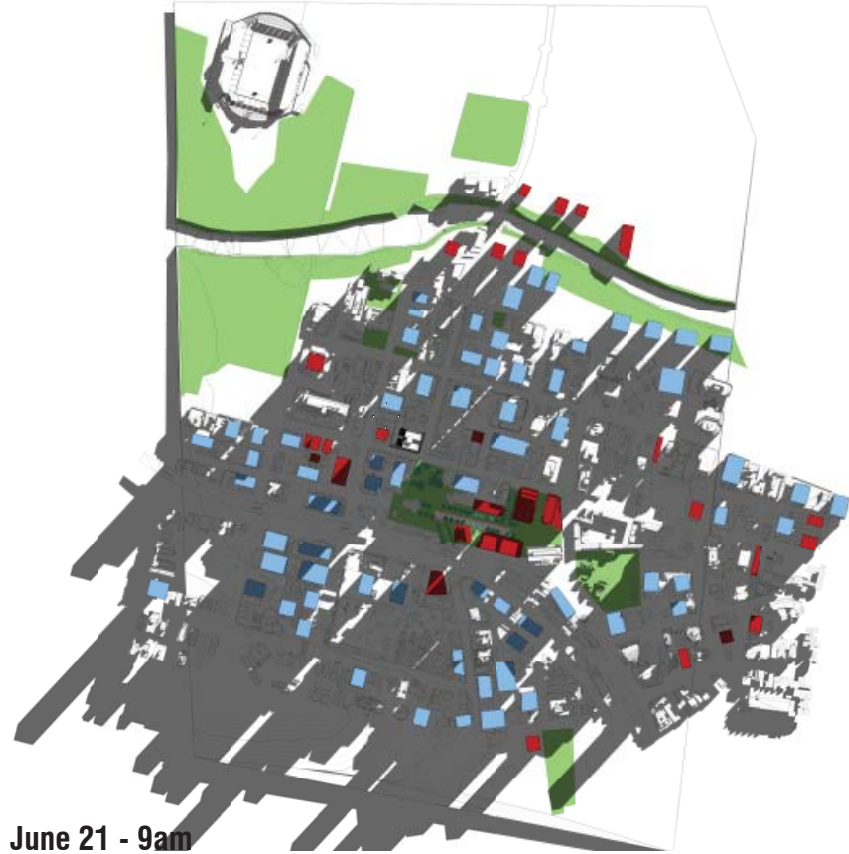
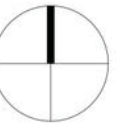
### LEGEND

-  Existing Buildings + Aspire Tower
-  Current Planning Proposals + Development Applications
-  Architectus Amalgamated Sites



## A.3.2 - Summer & Winter Solstice

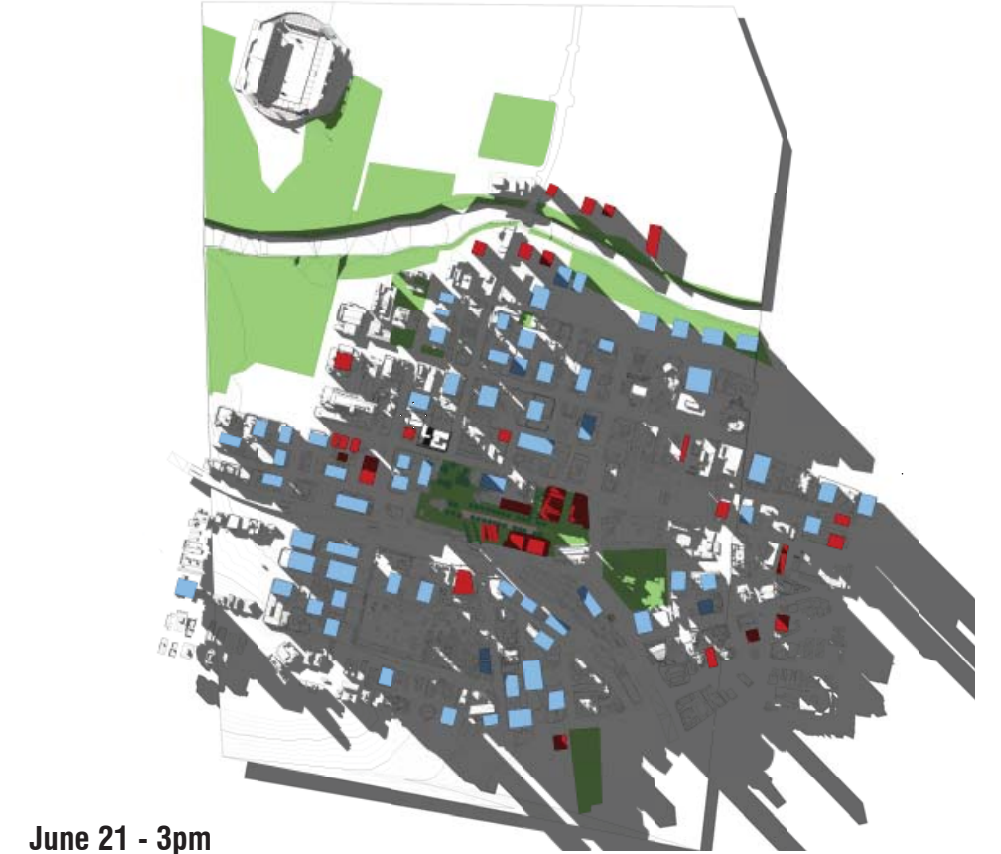
June 21 & December 21 9am, 12pm & 3pm Solar Assessment



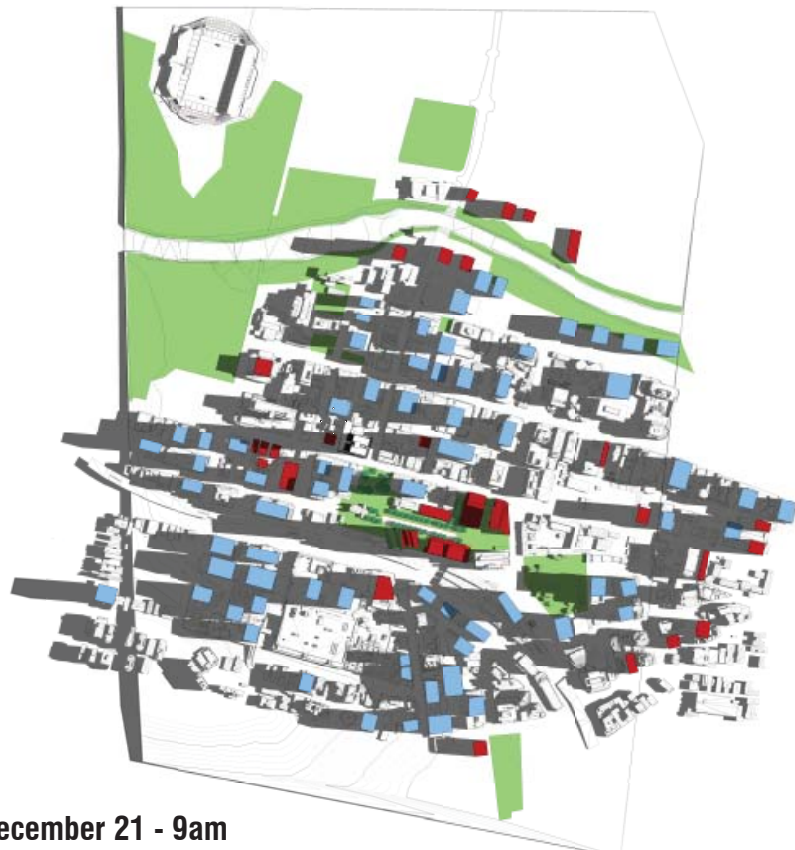
June 21 - 9am



June 21 - 12pm



June 21 - 3pm



December 21 - 9am



December 21 - 12pm

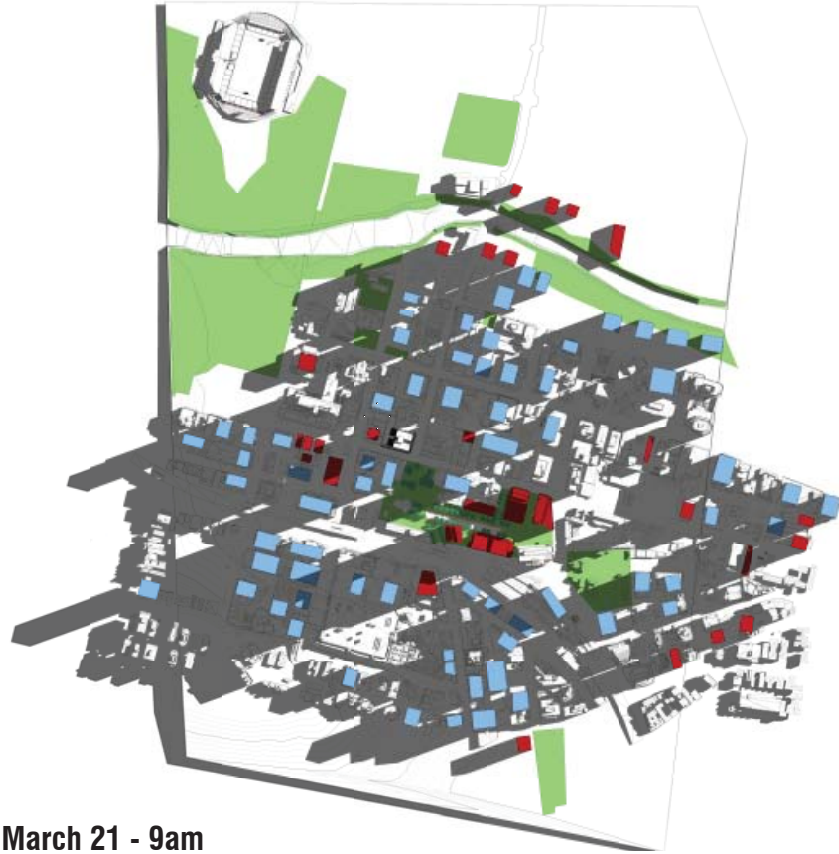
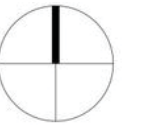


December 21 - 3pm



## A.3.2 - Equinoxes

March 21 & September 21 9am, 12pm & 3pm Solar Assessment



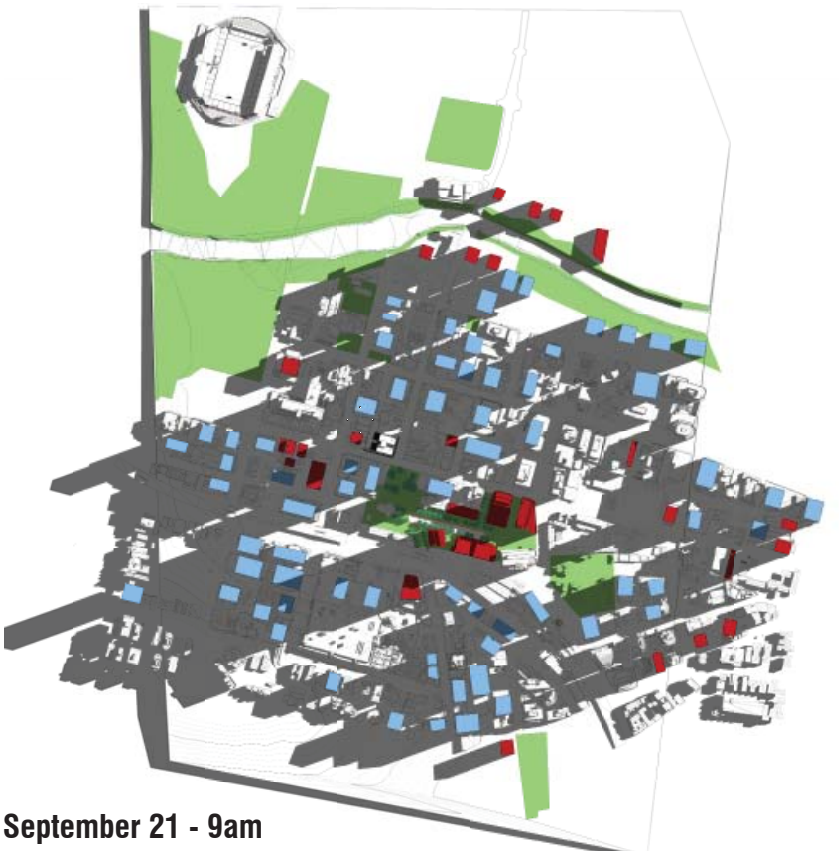
March 21 - 9am



March 21 - 12pm



March 21 - 3pm



September 21 - 9am



September 21 - 12pm



September 21 - 3pm

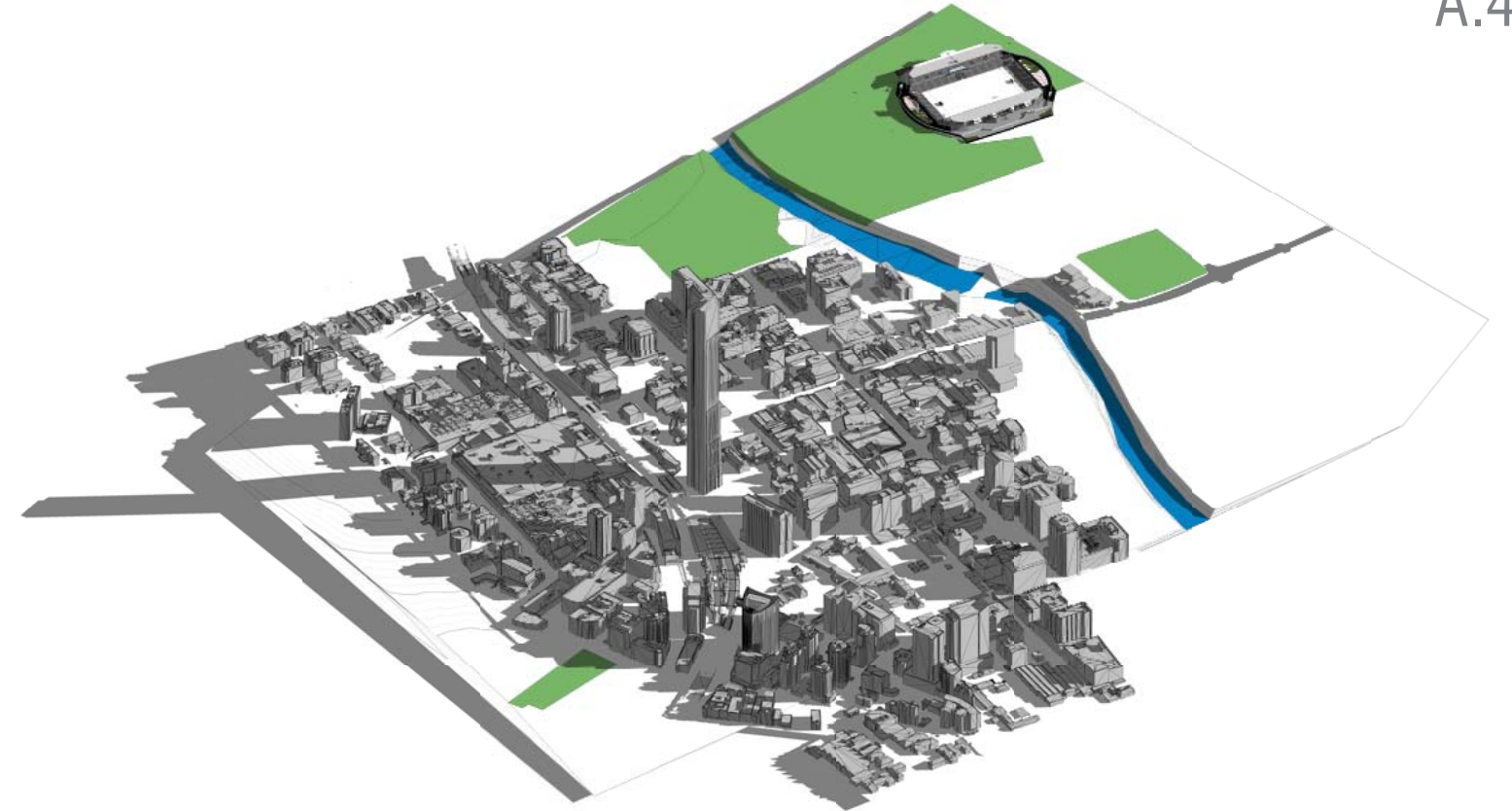


APPENDIX  
CBD SKYLINE STUDY

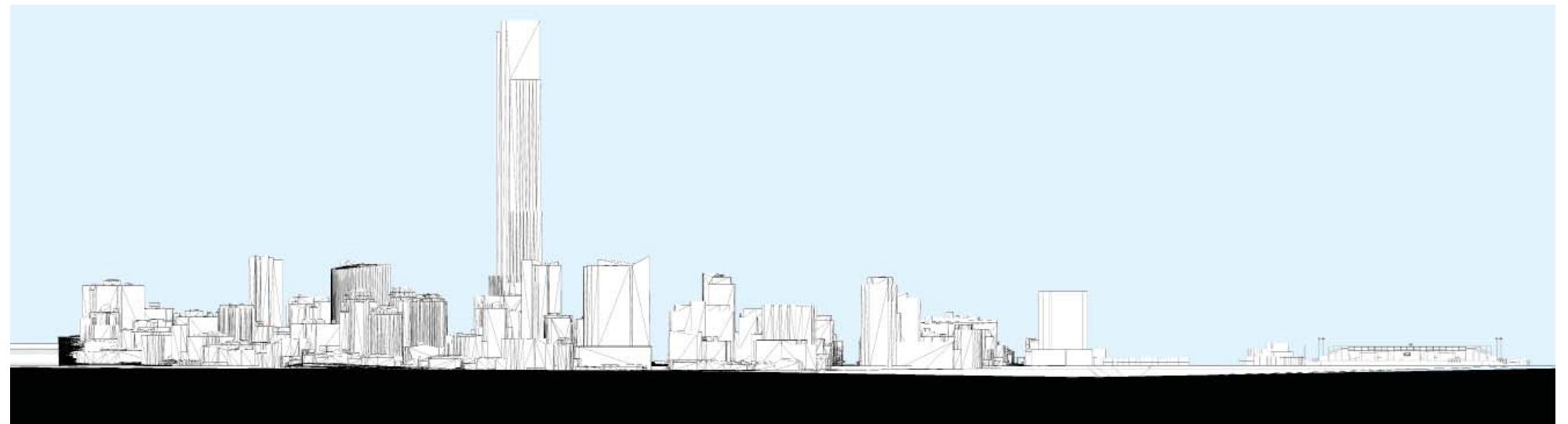
A4



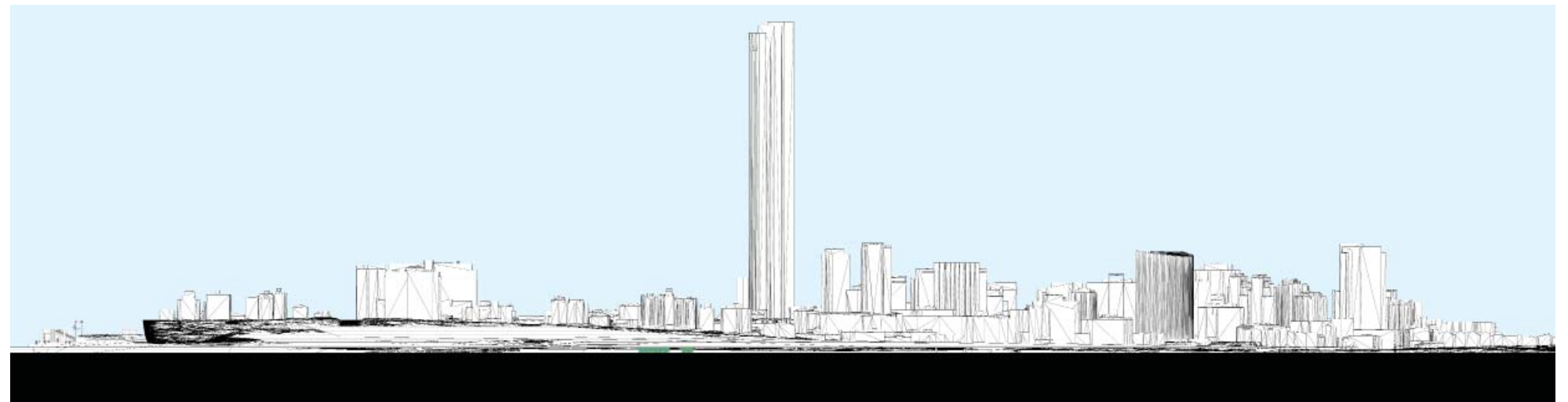
## A.4.1 Existing Parramatta Skyline



Aerial View



Skyline Elevation looking from East



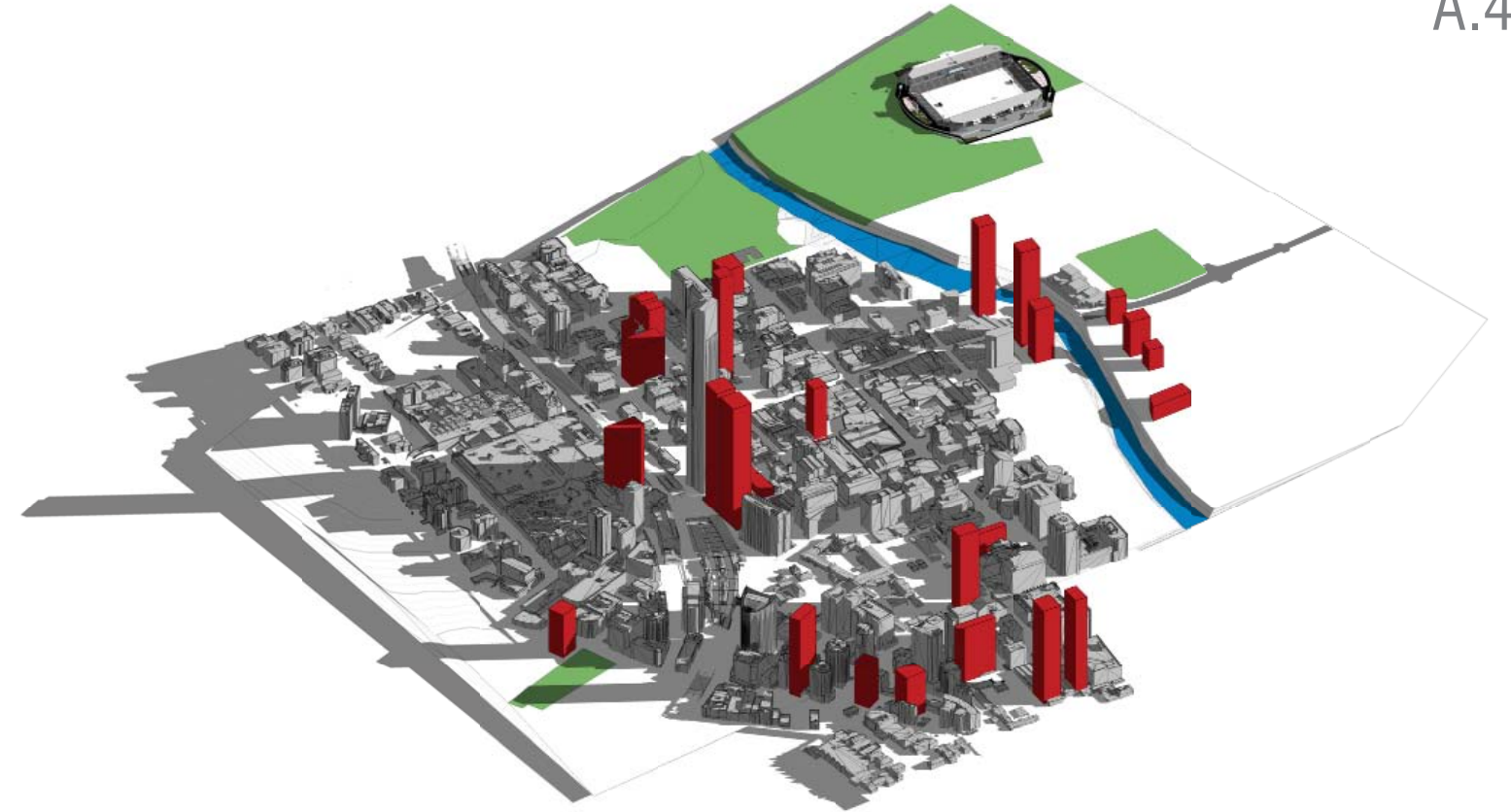
Skyline Elevation looking from South

### LEGEND

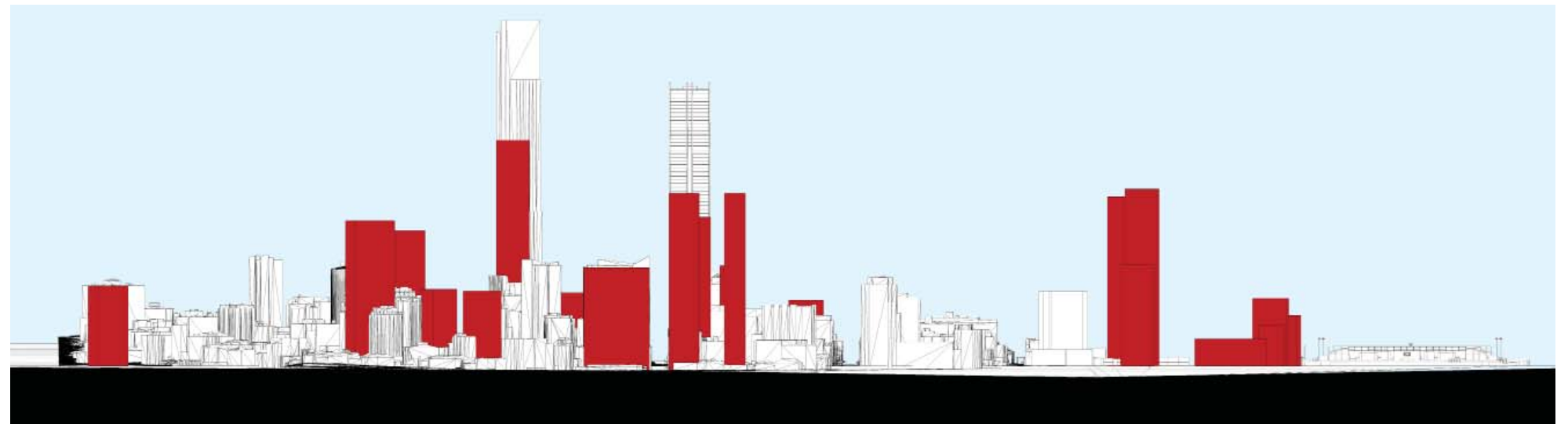
 Existing Buildings + Aspire Tower



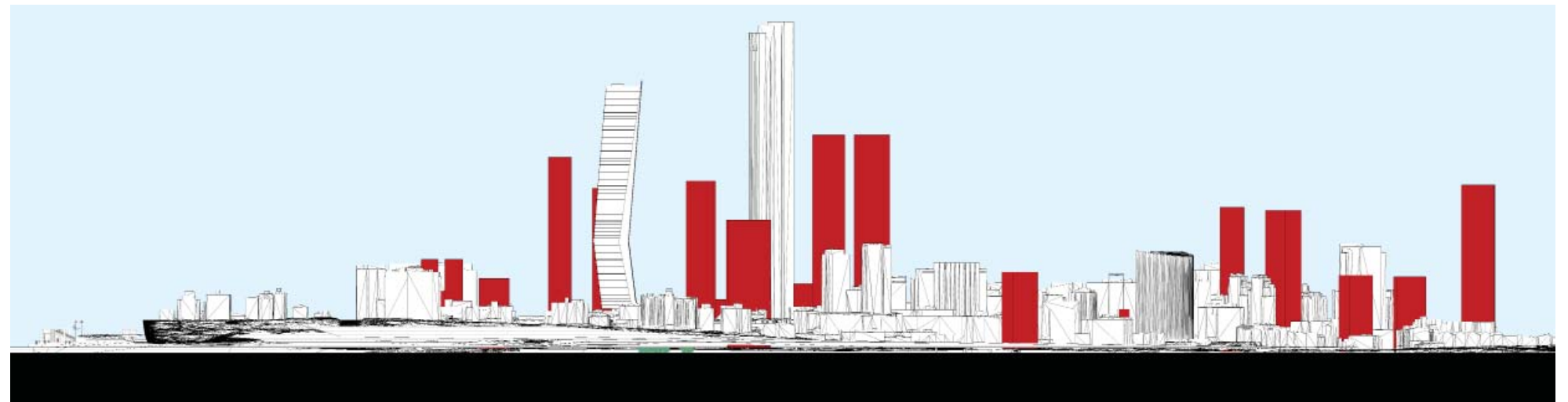
A.4.2 Planning Proposals and Development Application Parramatta Skyline



Aerial View

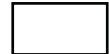



Skyline Elevation looking from East



Skyline Elevation looking from South

**LEGEND**

-  Existing Buildings + Aspire Tower
-  Current Planning Proposals + Development Applications



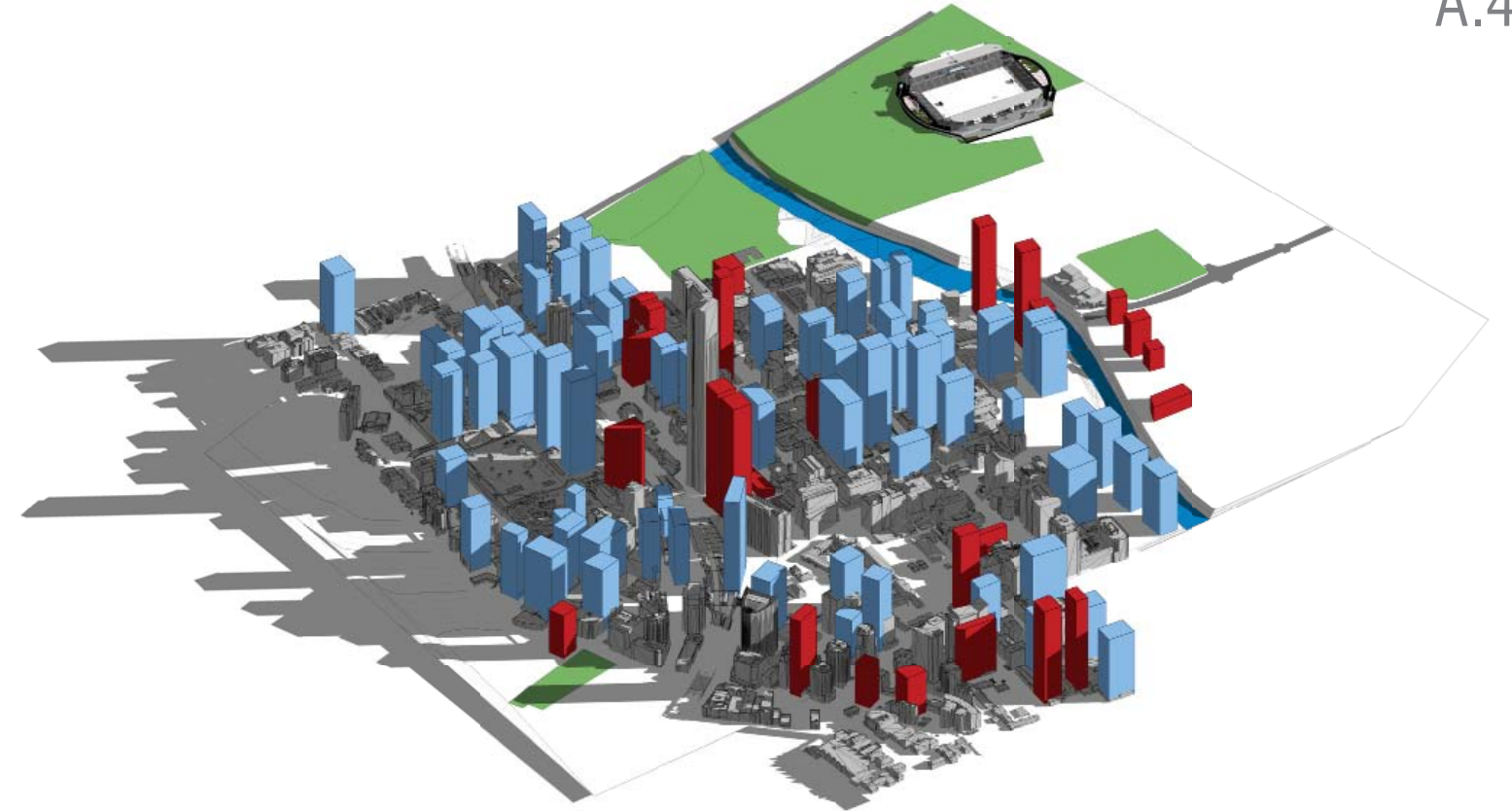
## A.4.3 Architectus Proposed future Parramatta Skyline

### CBD Skyline Analysis

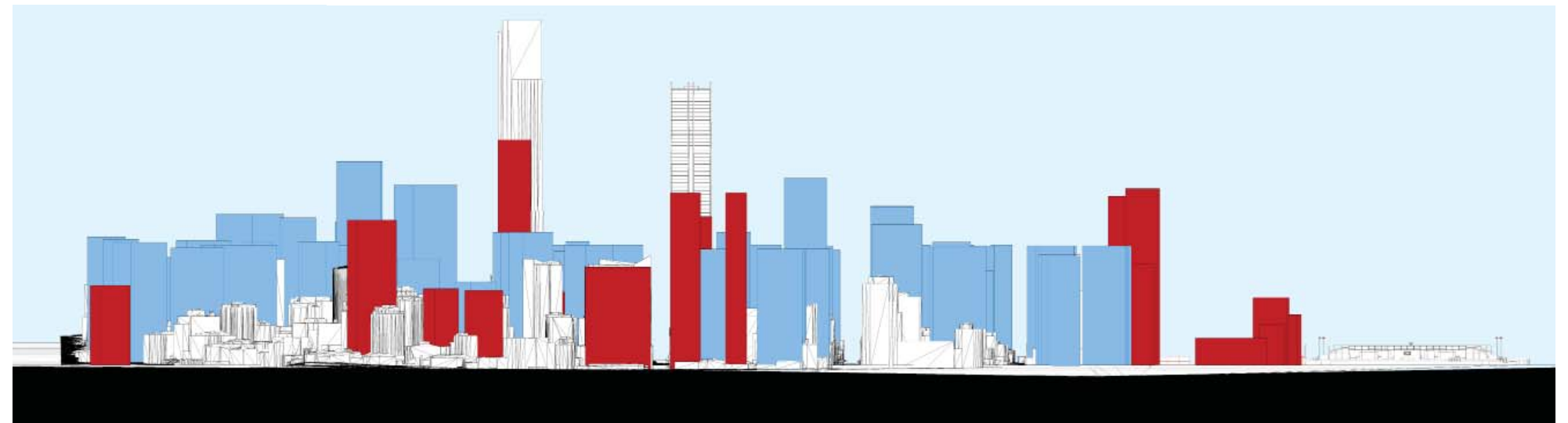
The views adjacent show the proposed built form in the context of the Parramatta City Centre skyline.

As evidenced from these views the proposal makes a positive contribution to Parramatta skyline in the following ways:

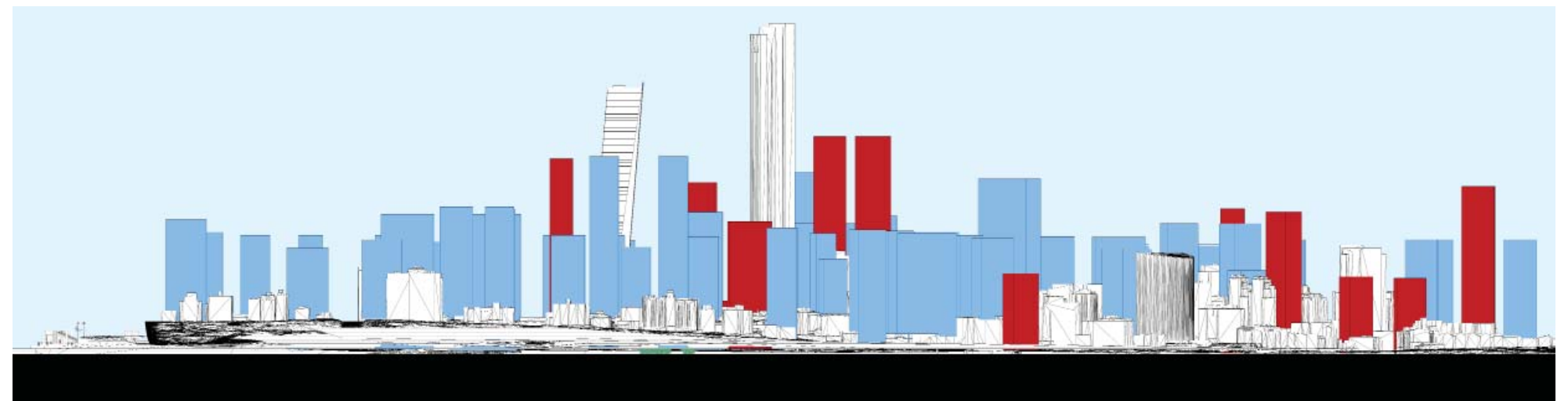
- Presents a visually pleasing landmark sculptural form in the shape of a 'Boomerang' when viewed from the North or South.
- Presents as a tall slender building well separated from other towers when viewed from East or West.
- Acknowledges and complements the taller Aspire Tower by the step down in height.



Aerial View

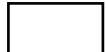




Skyline Elevation looking from East



Skyline Elevation looking from South

### LEGEND

-  Existing Buildings + Aspire Tower
-  Current Planning Proposals + Development Applications
-  Architectus Amalgamated Sites



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