

# 6.6 PEDESTRIAN MOVEMENT

**EXISTING PEDESTRIAN MOVEMENT.**

The diagram on the right shows the existing concentration of pedestrian movement (based on observation) within the North Sydney Centre and demonstrates the movement of people along Miller Street and between Berry and Mount Street via Denison Street, Little Spring Street and Walker Street.

The predominant pedestrian movement is north-south along Miller Street frontage, representing movements to and from the North Sydney Train Station and to and from bus stops. There is also a strong north-south movement along Denison Street, which is to be pedestrianised between Mount Street and the lower station entry. This concentration along Denison Street demonstrates the importance of the through-site link and the pedestrianisation of Denison Street.

KEY:

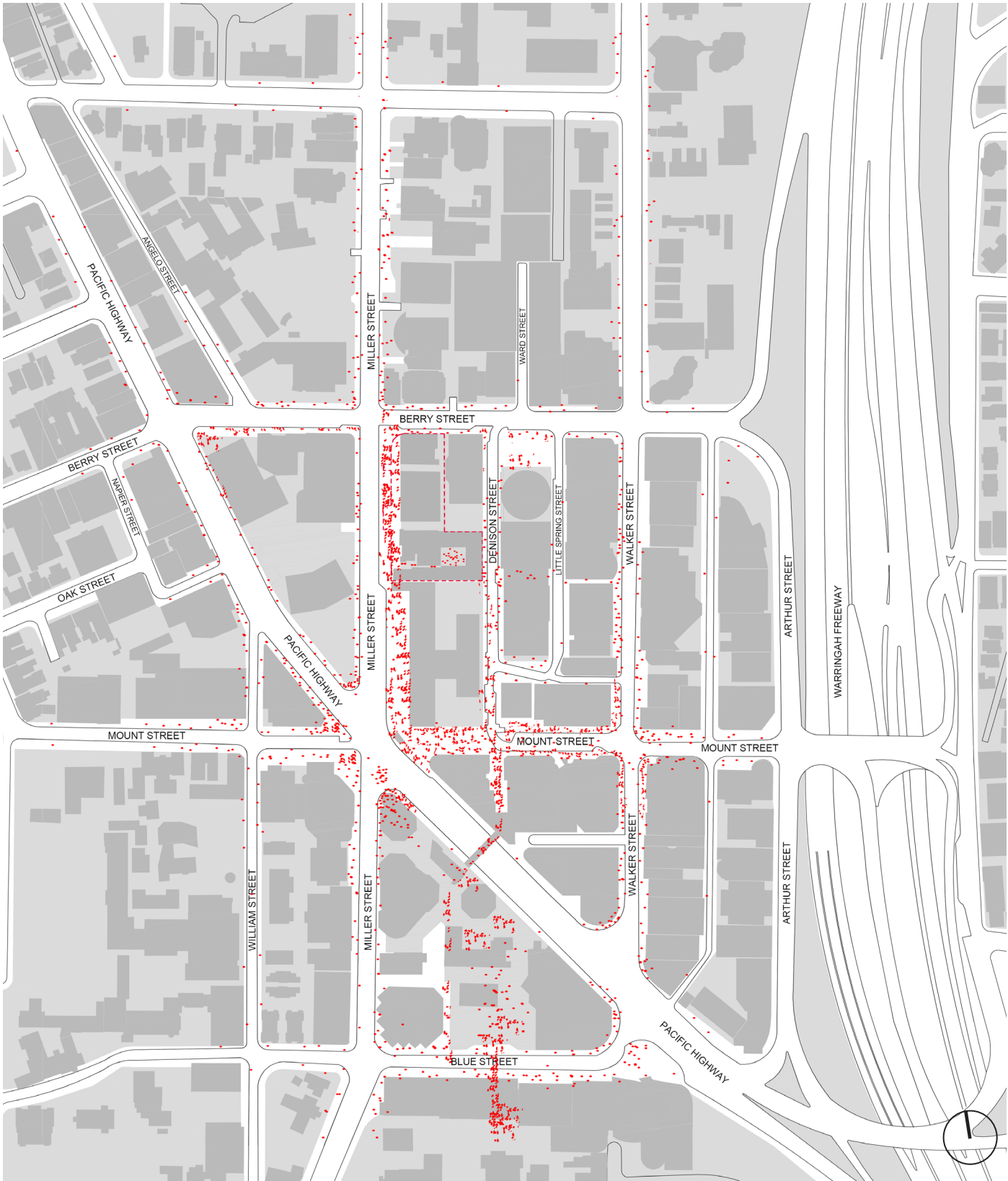
SITE



DENISON STREET



MILLER STREET SPECIAL AREA (TOWER SQUARE NOW DEMOLISHED)



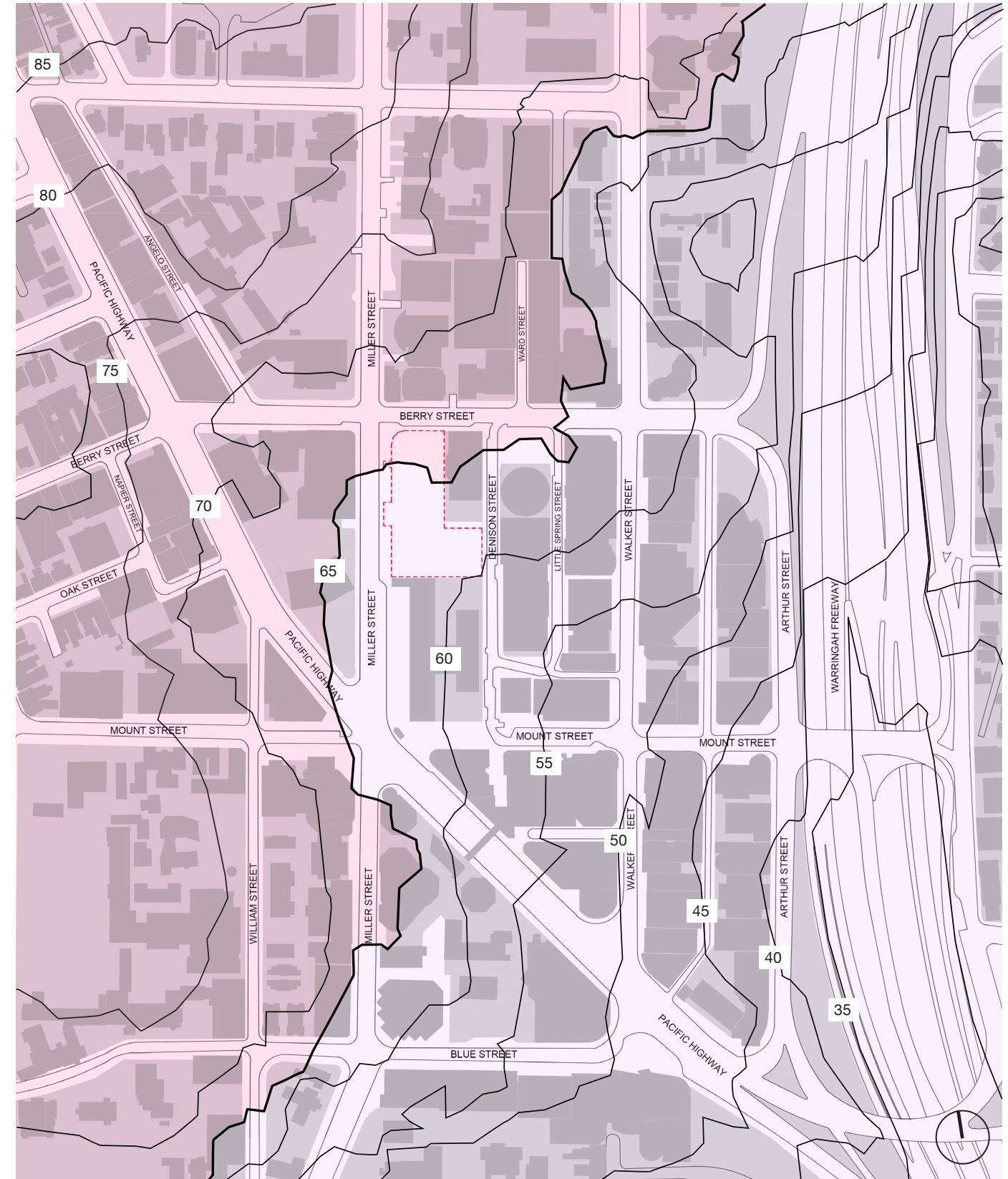
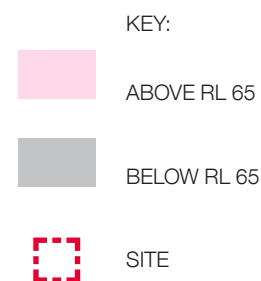
OBSERVED PEDESTRIAN ACTIVITY AT 9AM MID WEEK

# 6.7 TOPOGRAPHY

## CONTOURS

The site is considered to be centred on two topographical catchments, above and below RL 65m, the upper topographical catchment north of Berry Street and Pacific Highway with the lower topographical catchment south of Walker and Mount Streets.

This topographical analysis was key in the design of the OSD and station entry levels. The main entry from Miller Street at the upper level providing access to pedestrians arriving from the north and west and the entry from Denison Street on the lower level providing access to pedestrians arriving from the south east.



CONTOUR MAP



# 6.8 HIGH-RISE CONTEXT

### HIGH-RISE CONTEXT

The site is located within the North Sydney Centre which contains predominantly high-rise and medium rise commercial office buildings, intermingled with public buildings, educational establishments, pubs, restaurants and shops.

North Sydney has a context of commercial buildings of varied architectural form and scale. In the commercial core, there is a predominance of mid-rise buildings up to Relative Level (RL) 160; with a few high-rise towers up to RL200. Future high-rise towers are under construction at 100 Mount Street and at 1 Denison Street and will be a positive addition to the high-rise context.

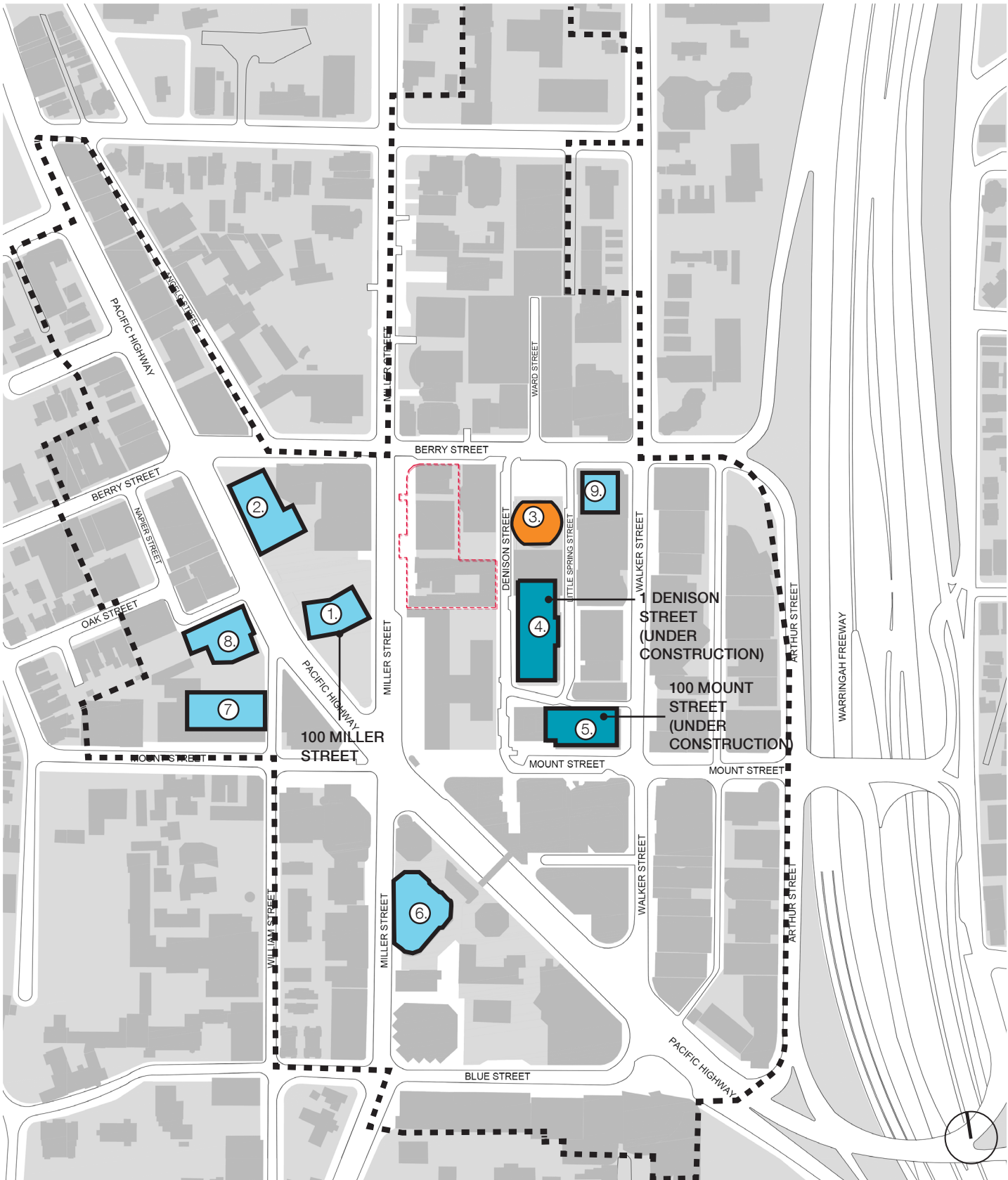
This collection of buildings creates a series of tall buildings that define the North Sydney skyline. The proposed OSD is envisioned to be located centrally within this group of buildings and will create opportunities to identify the station and OSD site as the geographical centre when viewed from the wider Sydney Metropolitan region.



NORTH SYDNEY SKYLINE (WITH BUILDINGS UNDER CONSTRUCTION AND PROPOSED OSD TOWER)

- KEY:
- Site
  - Mixed Use
  - Commercial
  - Under Construction
  - North Sydney Centre Boundary

1. Northpoint 100 Miller Street (RL. 195)
2. 177 Pacific Highway (RL. 195) (Completed 2016)
3. 77 Berry Street (RL. 180)
4. 1 Denison Street (RL. 213) (DA approved & Under Construction)
5. 100 Mount Street (RL. 200) (DA approved & Under Construction)
6. 101 Miller Street (RL. 184.5)
7. 40 Mount Street (RL. 151)
8. 100 Pacific Highway (RL. 149)
9. 124 Walker Street (RL. 137)



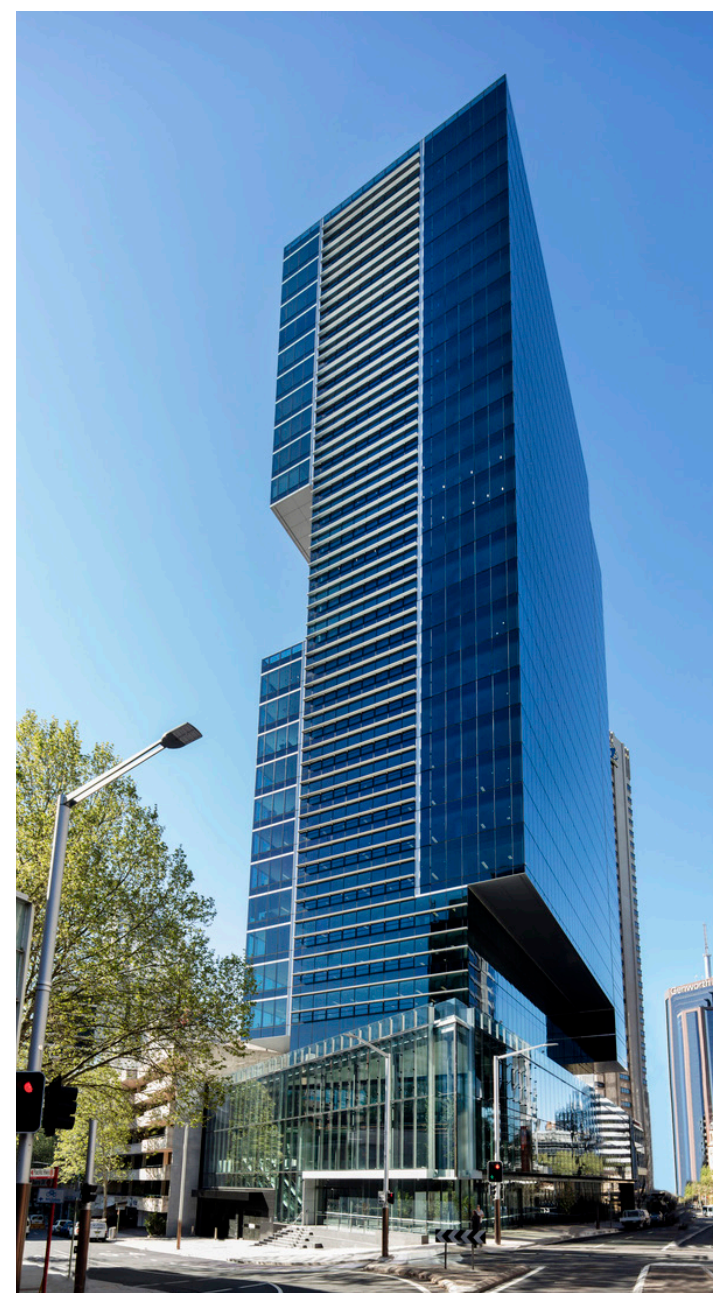
HIGH-RISE CONTEXT



*The Proposal will sit in the context of a number of large scale commercial buildings in the North Sydney CBD, including the following buildings recently completed and under construction:*  
*1 Denison Street, 100 Mount Street and 177 Pacific Highway.*



1 DENISON STREET / BATES SMART/ UNDER CONSTRUCTION



177 PACIFIC HIGHWAY / BATES SMART / COMPLETED 2016



100 MOUNT STREET / SOM AND ARCHITECTUS/ UNDER CONSTRUCTION





ARTIST'S IMPRESSION LOOKING TOWARDS THE OSD LOBBY ON THE CORNER OF MILLER AND BERRY STREETS





**7.0 DESIGN STRATEGY**



# 7.1

## APPROVED ENVELOPE

### ISOMETRICS

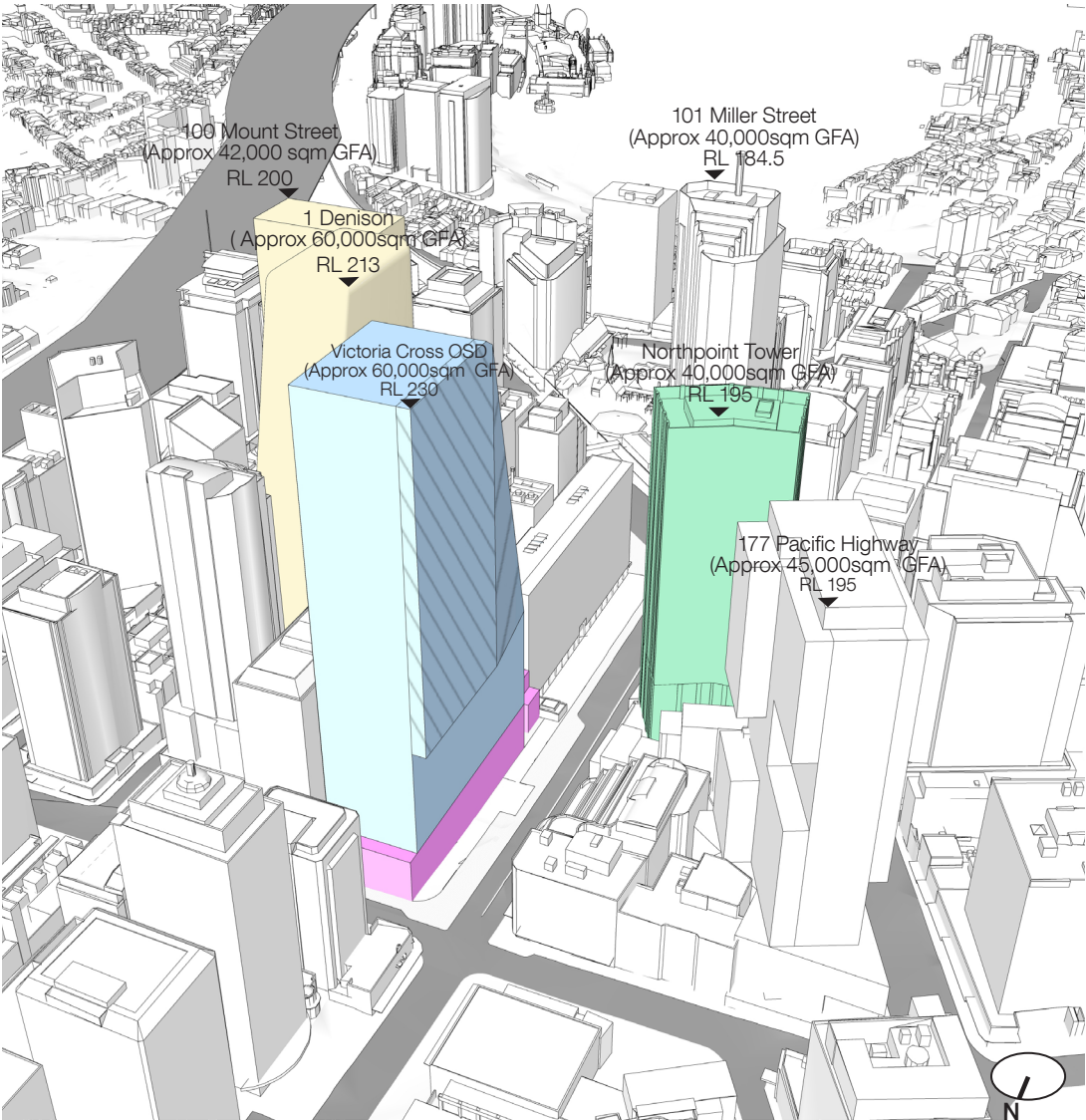
ISOMETRIC VIEWS

The adjacent isometric diagrams demonstrate the extents of the approved OSD Concept SSD building envelope and the CSSI Approval.

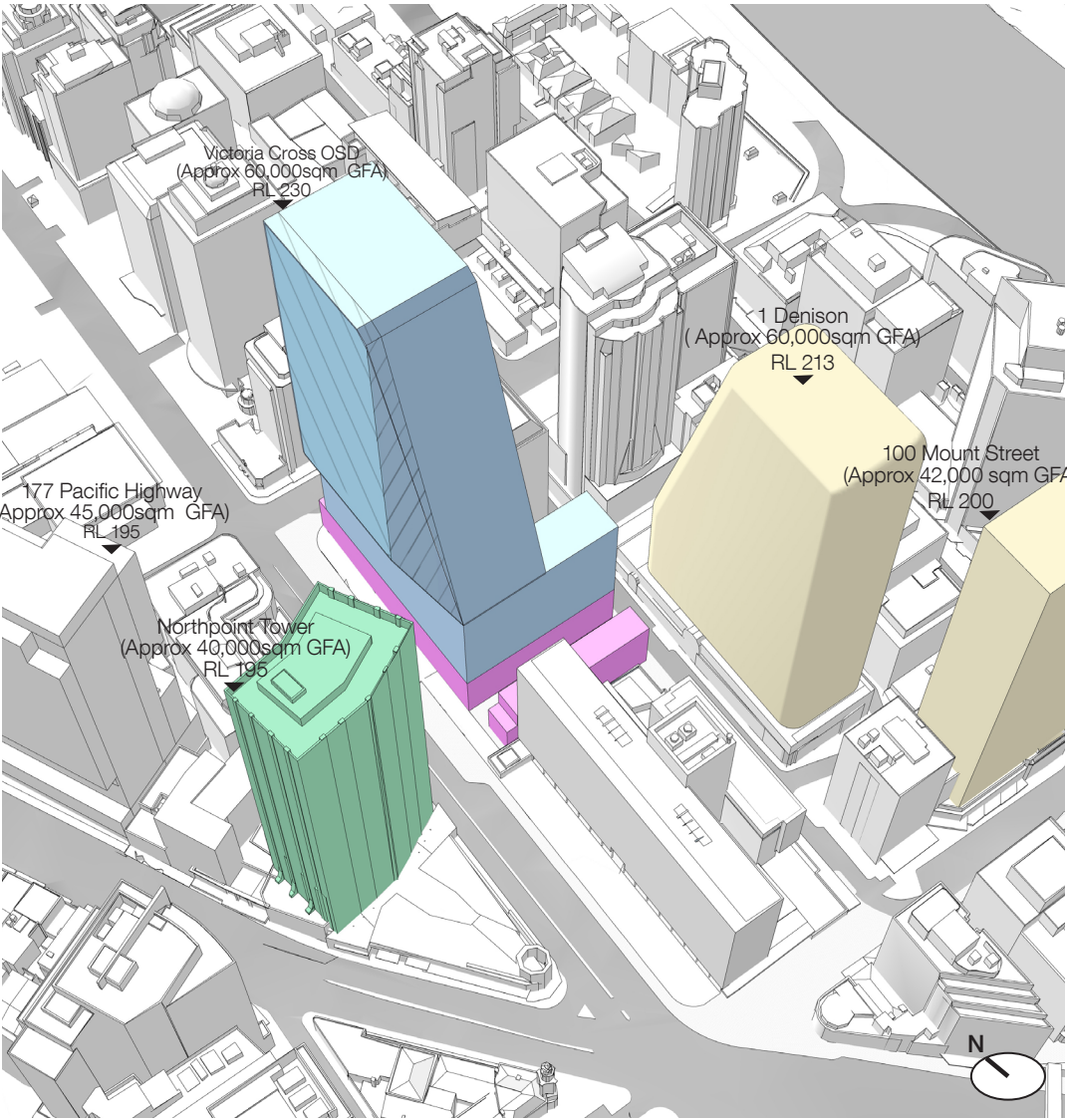
The approved OSD Concept SSD building envelope has an 'L' shaped floor plate to the lower levels of the building with a frontage to Miller, Berry and Denison Streets, whilst the upper levels of the building are concentrated on the western side of the site fronting Miller Street.

The approved building envelope has a maximum height of RL 230. The southern extents of the OSD slopes down to an RL of 118 with the low-rise portion of the envelope extending through to Denison Street.

- KEY:
- VICTORIA CROSS STATION  
CSSI APPROVAL- INCLUDES  
STRUCTURE AND BUILDING  
INFRASTRUCTURE AND  
SPACE FOR LIFT CORES,  
ACCESS, PARKING, RETAIL  
AND BUILDING SERVICES  
FOR THE FUTURE OSD
  - OSD CONCEPT SSD  
BUILDING ENVELOPE -  
INCLUDES OSD AREAS  
INSIDE THE CSSI 'SHELL'  
BELOW GROUND AND IN  
THE PODIUM LEVELS
  - UNDER CONSTRUCTION
  - UNDER REFURBISHMENT



VIEW FROM THE NORTH WEST



VIEW FROM THE SOUTH WEST

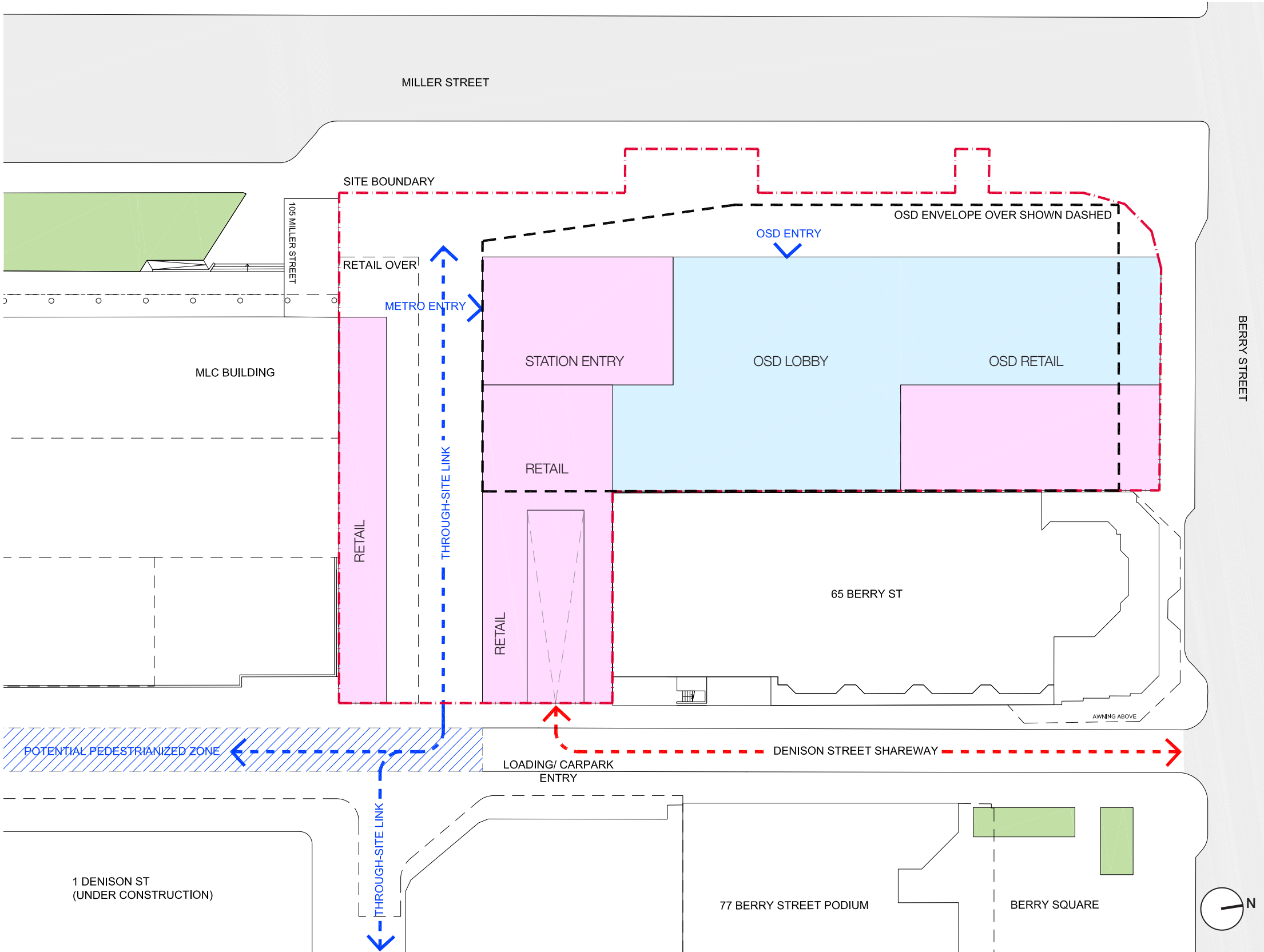
# 7.1 APPROVED ENVELOPE INDICATIVE GROUND FLOOR

INDICATIVE GROUND FLOOR PLAN

The adjacent diagram shows the indicative ground floor plan layout of the approved OSD Concept SSD building envelope and CSSI Approval. The station entry, the OSD lobby entry and the low-scale building define the edges of the through-site link between Miller Street and Denison Street. Retail tenancies will activate both edges of the through-site link as well as the corner of Miller and Berry Streets.

The diagram also indicates the loading dock entry off Denison Street which forms part of the CSSI Approval.

- KEY:
- VICTORIA CROSS STATION CSSI APPROVAL - INCLUDES STRUCTURE AND BUILDING INFRASTRUCTURE AND SPACE FOR LIFT CORES, ACCESS, PARKING, RETAIL AND BUILDING SERVICES FOR THE FUTURE OSD
  - OSD CONCEPT SSD BUILDING ENVELOPE APPROXIMATE OSD LOBBY LOCATION- INCLUDES RETAIL, CORE AND PLANT
  - PEDESTRIANISED ZONE
  - APPROXIMATE LOCATION OF TOWER ENVELOPE OVER
  - PEDESTRIAN MOVEMENT
  - VEHICULAR MOVEMENT



INDICATIVE GROUND FLOOR PLAN



# 7.1 APPROVED ENVELOPE ELEVATIONS

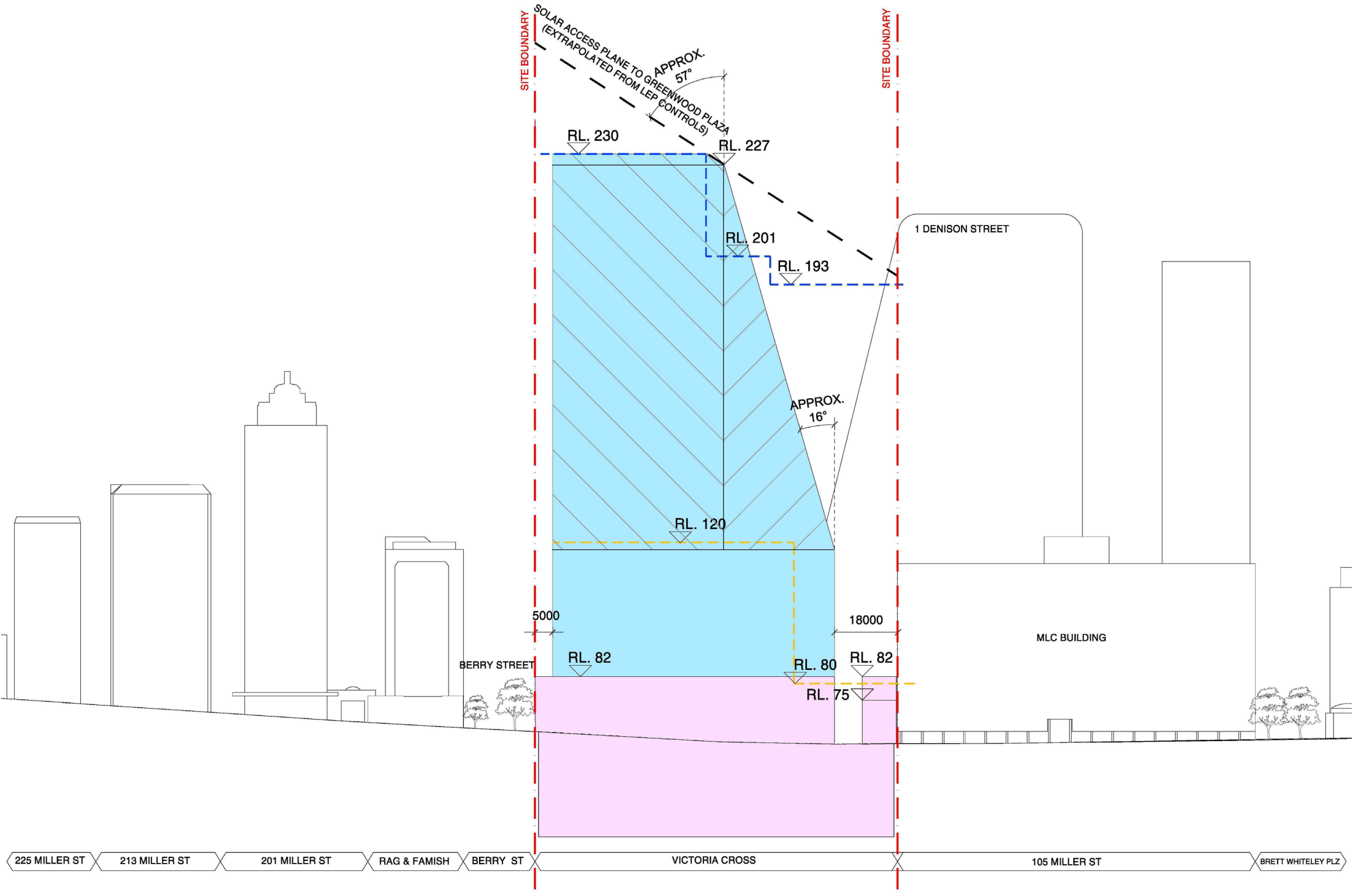
WEST ELEVATION

The adjacent elevation demonstrate the extents of the approved OSD Concept SSD building envelope and the extents of the CSSI Approval.

The approved OSD building envelope has a maximum height of RL 230 at the northern portion of the site and a height of RL 118 at the southern end.

KEY:

- MAXIMUM BUILDING HEIGHT (POST-AMENDMENT)
- MAXIMUM BUILDING HEIGHT NORTH SYDNEY LEP 2013 (PRE-AMENDMENT)
- VICTORIA CROSS STATION CSSI APPROVAL - INCLUDES STRUCTURE AND BUILDING INFRASTRUCTURE AND SPACE FOR LIFT CORES, ACCESS, PARKING, RETAIL AND BUILDING SERVICES FOR THE FUTURE OSD
- OSD CONCEPT SSD BUILDING ENVELOPE INCLUDES OSD AREAS INSIDE THE CSSI 'SHELL' BELOW GROUND AND IN THE PODIUM LEVELS
- ARTICULATION ZONE - 4.5M WIDE
- CHAMFERED ARTICULATION ZONE - 4.5M to 0M WIDE



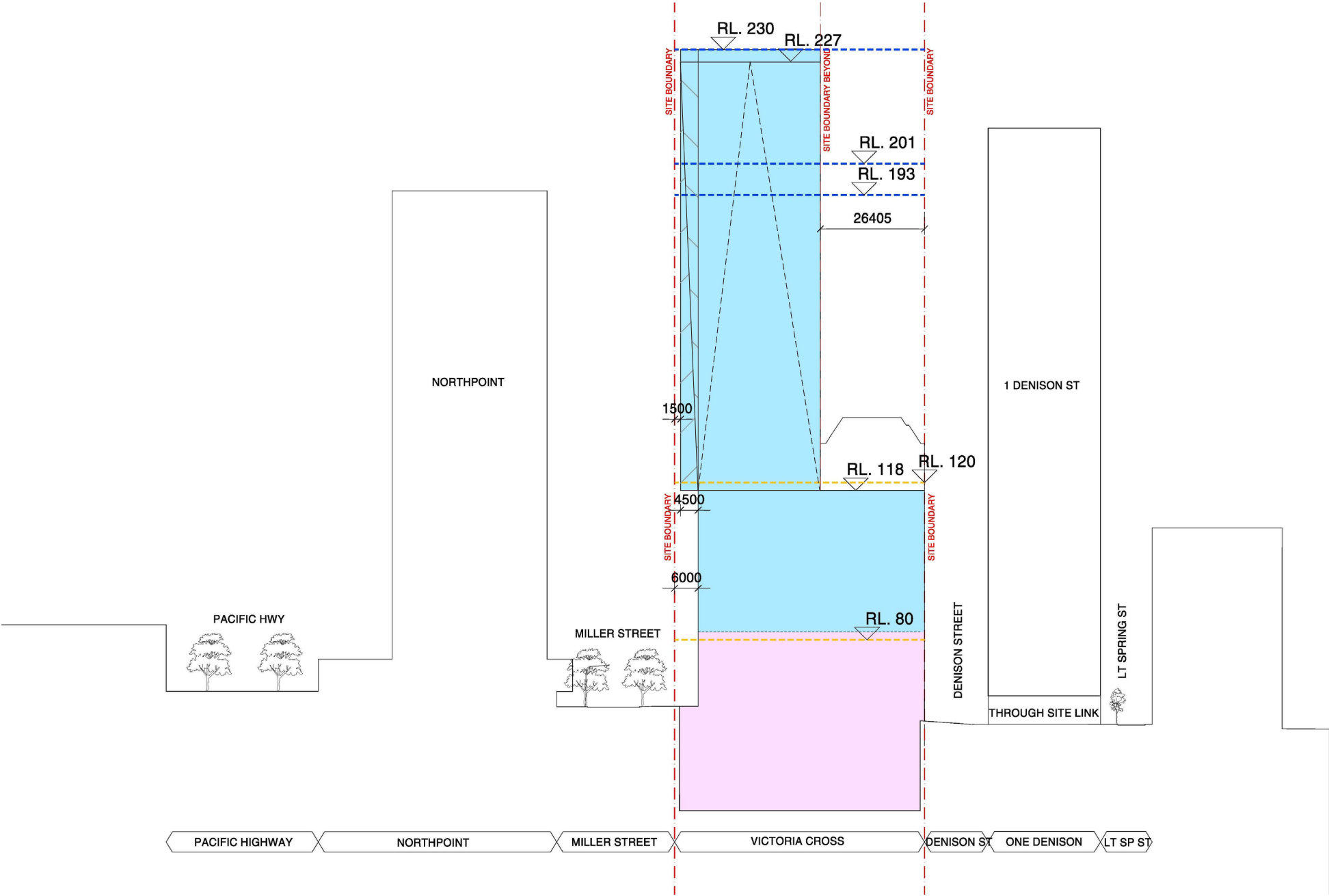
APPROVED ENVELOPE - WEST ELEVATION

SOUTH ELEVATION

The adjacent diagram demonstrates that the approved OSD Concept SSD building envelope is setback 6m from the Miller Street property boundary to a height of RL 118. Between RL 118 and RL 230, the building steps forward 4.5m to a setback of 1.5m from the Miller Street property boundary. This portion of the building forms the Articulation Zones which ranges from a 1.5m setback at the northern end to 6m setback at the southern end.

KEY:

- MAXIMUM BUILDING HEIGHT (POST-AMENDMENT)
- MAXIMUM BUILDING HEIGHT NORTH SYDNEY LEP 2013 (PRE-AMENDMENT)
- VICTORIA CROSS STATION CSSI APPROVAL - INCLUDES STRUCTURE AND BUILDING INFRASTRUCTURE AND SPACE FOR LIFT CORES, ACCESS, PARKING, RETAIL AND BUILDING SERVICES FOR THE FUTURE OSD
- OSD CONCEPT SSD BUILDING ENVELOPE INCLUDES OSD AREAS INSIDE THE CSSI 'SHELL' BELOW GROUND AND IN THE PODIUM LEVELS
- ARTICULATION ZONE - 4.5M WIDE
- CHAMFERED ARTICULATION ZONE - 4.5M TO 0M WIDE

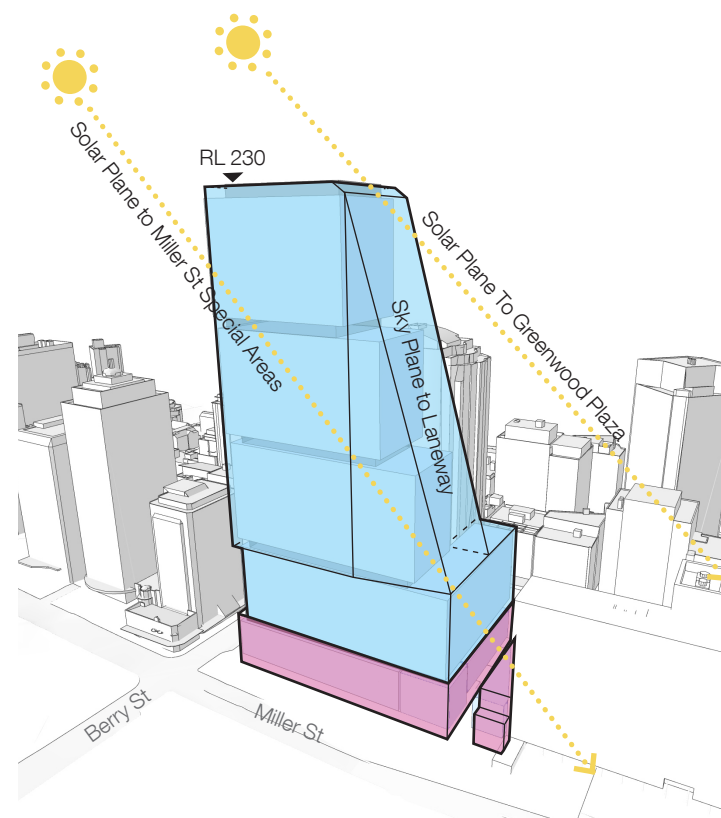


APPROVED ENVELOPE - SOUTH ELEVATION



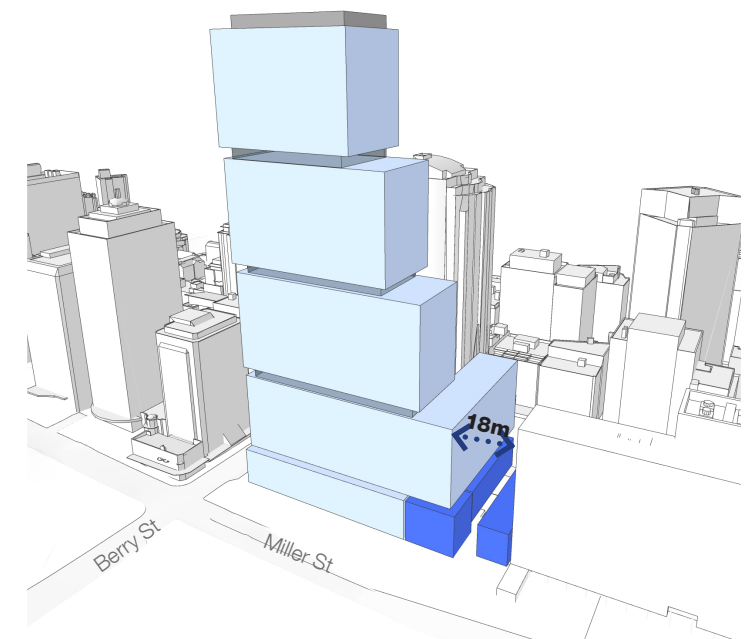
# 7.2 MODIFICATIONS TO APPROVED ENVELOPE

*Our Vision has been to create a clear identity for the Metro Station entry, a vibrant laneway with an intimate human scale and open to the sky and a sensitive built form response to the adjacent heritage items.*



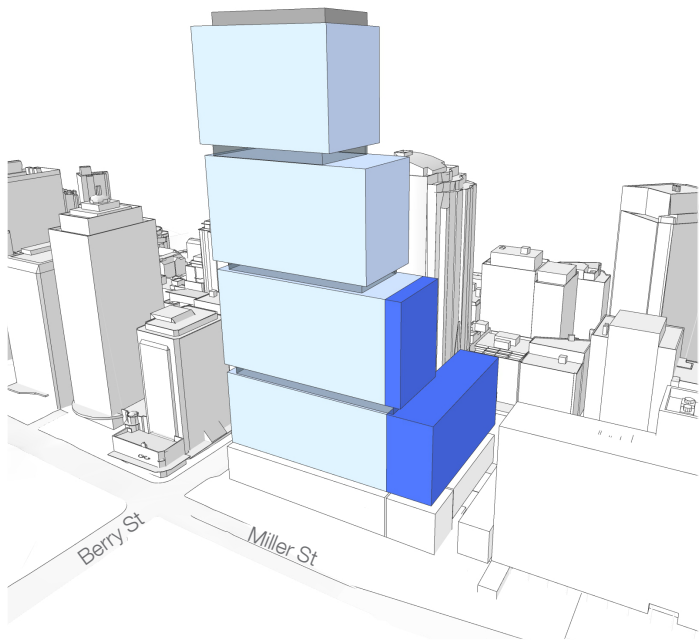
## CONCEPT TOWER WITHIN APPROVED ENVELOPE

The approved envelope was determined from the following parameters; a maximum height plane of RL 230; solar access planes to both Greenwood Plaza and the Miller Street Special Areas; and a sky-plane to the through-site laneway between Miller and Denison St.



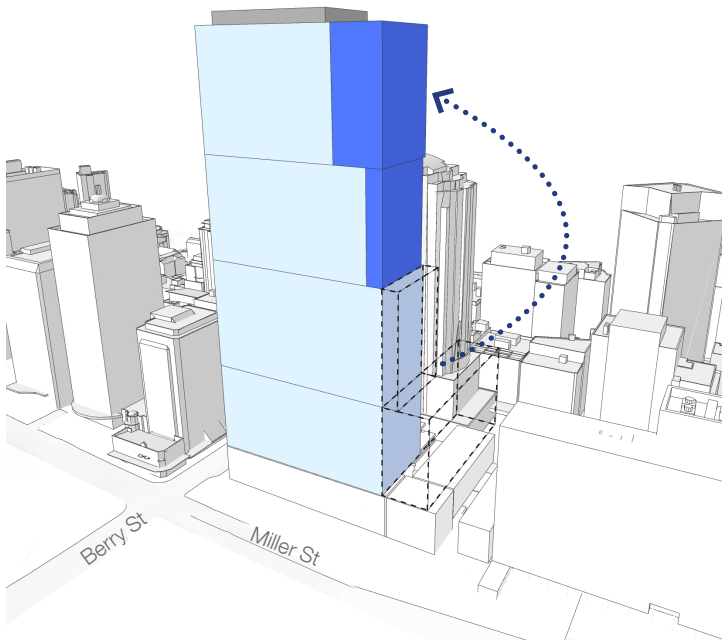
## METRO AND LANEWAY BENEATH TOWER

Conforming to the approved envelope, the stepped massing of the reference design results in both the Metro Station entry and retail laneway being concealed beneath 9 storeys of commercial office building. This confuses way finding for customers and results in a poor scale relationship between the tower and the fine grain retail laneway.



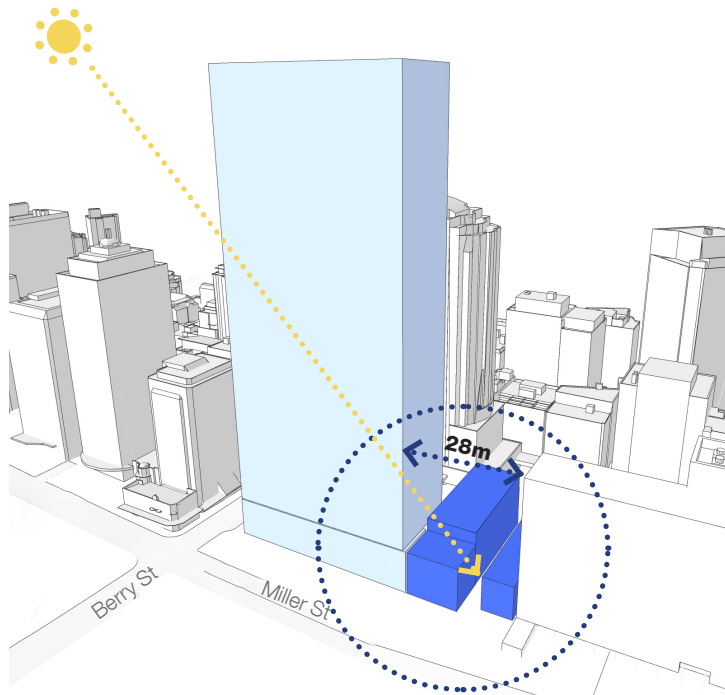
**LOWER VALUE COMMERCIAL FLOOR SPACE**

A significant quantity of low value commercial floor space is located in the lower volumes of the tower, particularly in the 9 storey east/west tower 'leg' which sits above the metro entry and laneway retail buildings. As mentioned in the previous paragraph, this area compromises the urban clarity of the metro entry while presenting a 14 storey scale to the northern side of the laneway. This results in a need to enclose the laneway with a glass roof to protect against wind downdrafts.



**LOW VALUE SPACE RELOCATED TO ABOVE**

This floorspace is relocated to the upper floors, where it becomes higher value floorspace due to greater amenity achieved through solar access, outlook and views.

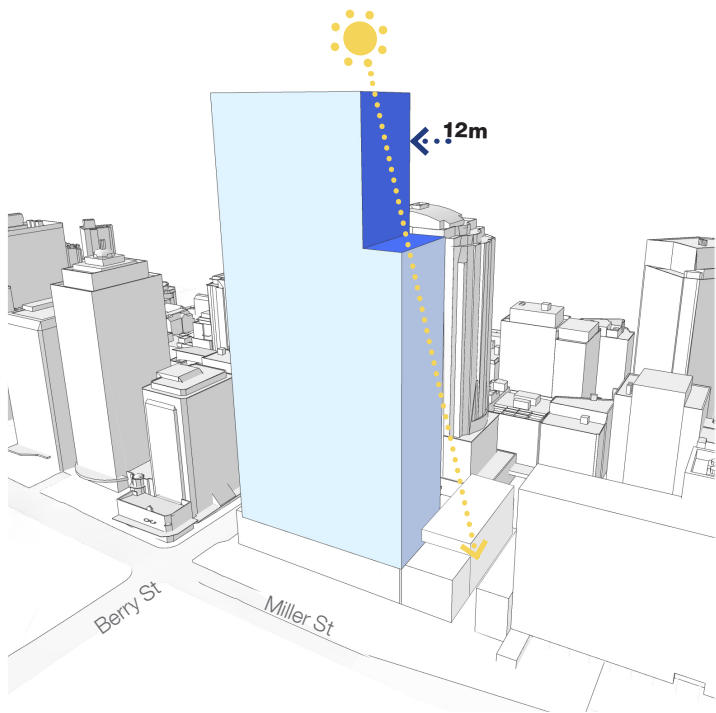


**METRO AND LANEWAY RECEIVE OWN IDENTITY AND IMPROVED SEPARATION FROM MLC**

Most importantly, the Metro and through-site link are liberated from beneath the tower massing and obtain their own identity with increased setback to the MLC building from 18m to 28m. The increased tower setback alleviates down draft and the need for a roof over the through-site link, becoming a true open sky laneway. This separation improves intuitive way finding while also creating a more intimate human scale within the laneway.

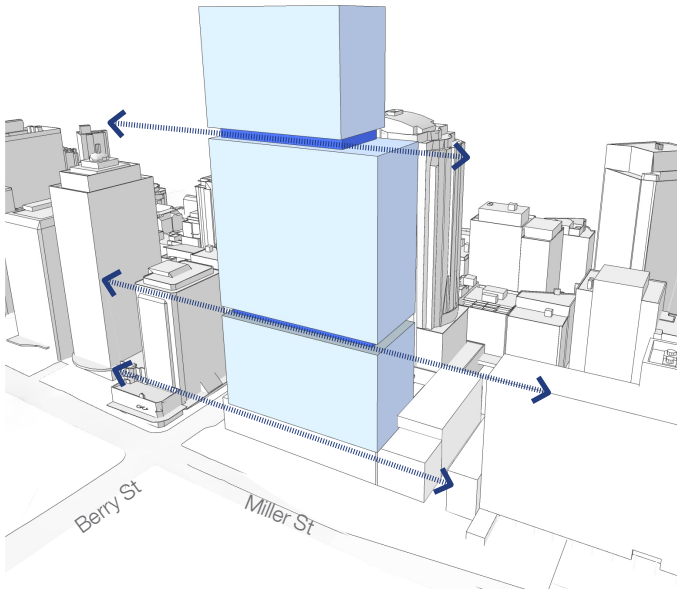


# 7.2 MODIFICATIONS TO APPROVED ENVELOPE



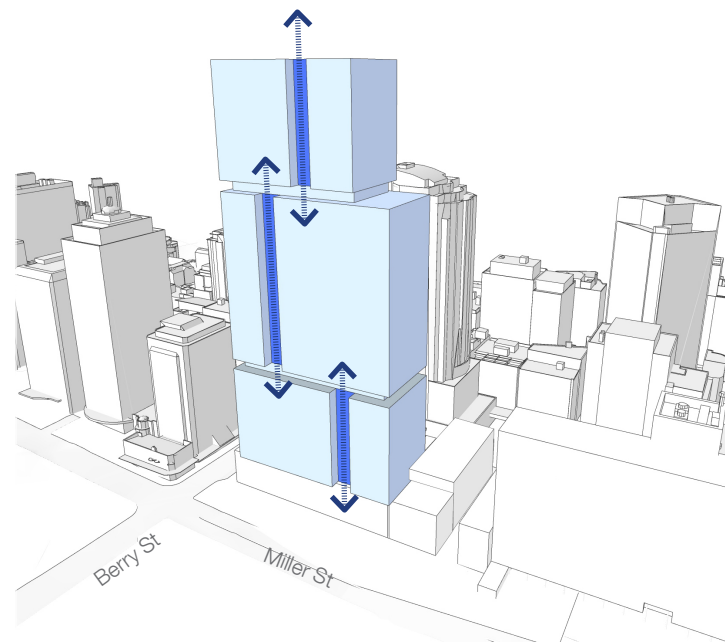
### SETBACK TO UPPER FLOORS

To ensure no additional overshadowing to the Greenwood Plaza Special Area and to improve solar access to the laneway, a single setback of 12 metres is provided along the southern edge of the tower (40 metres from the southern property boundary).



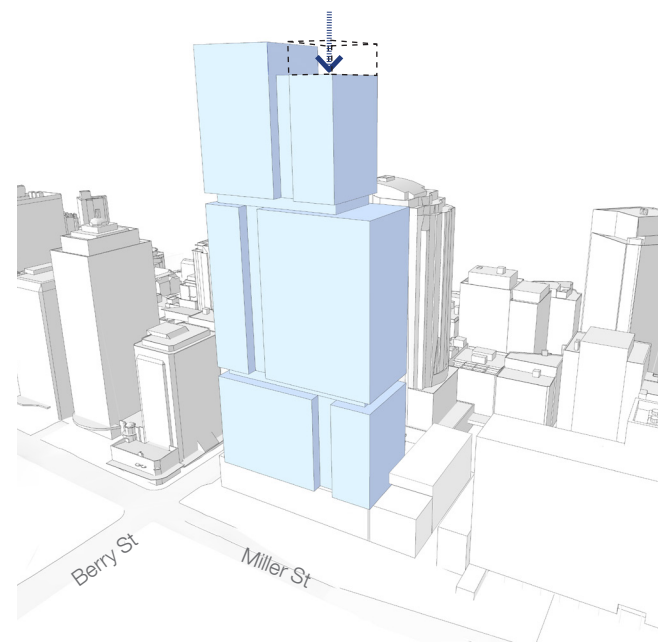
### HORIZONTAL ARTICULATION

The lower tower volume employs a recessed floor to reference the height of the MLC Building. Further horizontal articulations are made to the upper tower volume to create a clear articulation between mid rise and high rise floors. At Level 3 a horizontal articulation creates a scale relationship with the Rag and Famish Hotel on the opposite corner of Berry and Miller Streets.



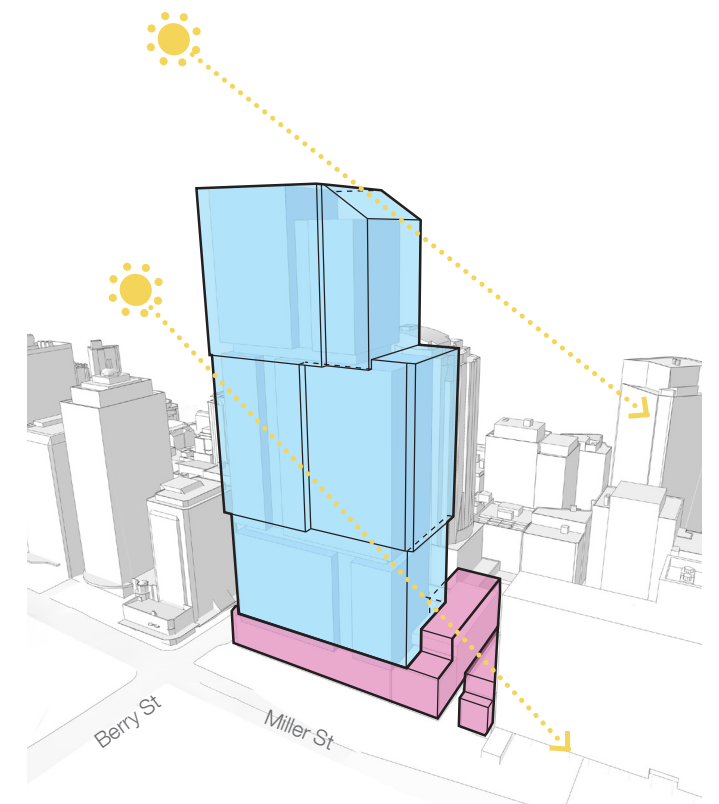
### VERTICAL EXPRESSION

A series of vertical recesses which alternate in location between low, mid and high rise volumes further articulate the form.



### PLANT

The southern portion of the high rise volume decreases in height from RL230 to RL221. This creates an integrated rooftop plant area which is holistically integrated into the tower form.



### RESULTANT ENVELOPE

The resultant envelope achieves a significant overall reduction in envelope volume (approx 27,000 m<sup>3</sup>) including a reduction of approximately 9000m<sup>3</sup> in the facade articulation zone. A true laneway is created with an intimate pedestrian scale, that is open to the sky. (See Section 7.4-Envelope Volume Analysis)

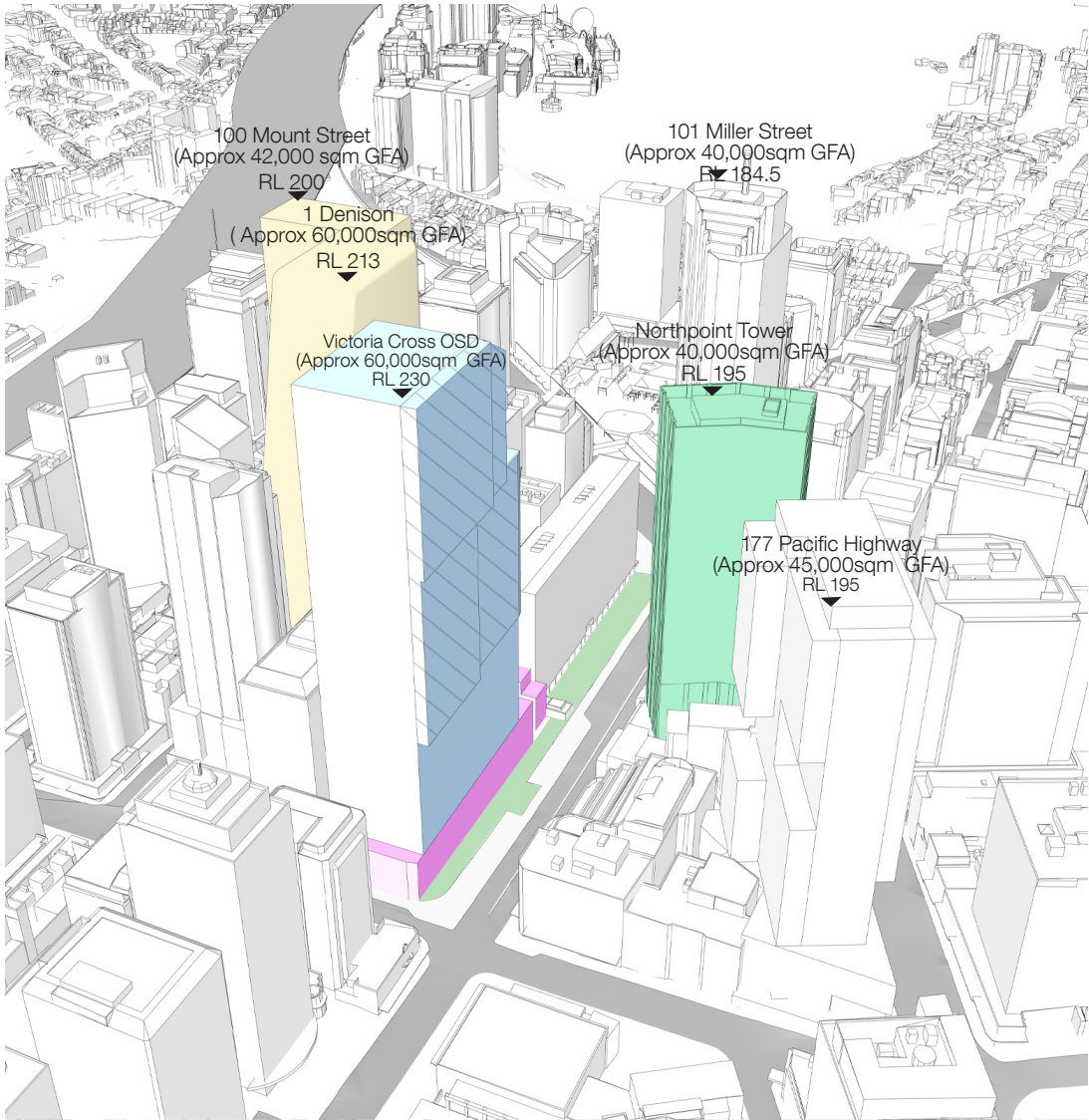


# 7.3 MODIFIED ENVELOPE ISOMETRICS

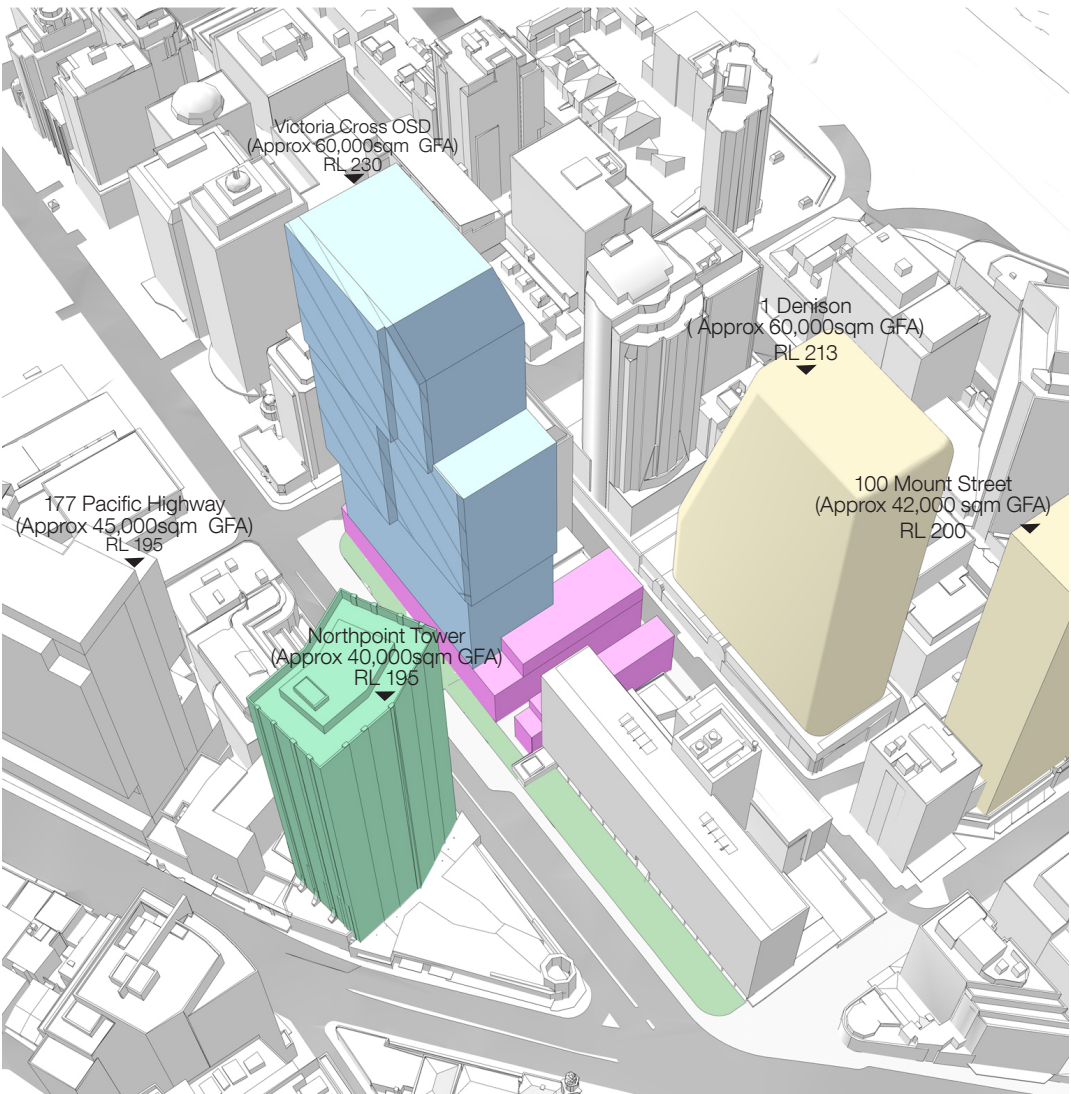
ISOMETRIC VIEWS

The adjacent isometric diagrams demonstrate the extent of the modified OSD building envelope. The envelope has a rectangular shaped floorplate on the lower levels with a frontage to Miller and Berry Streets. The middle and upper levels of the building are setback from the western boundary between 1.5m - 6m. The upper floors are also setback on the southern boundary above RL182.3. The building envelope has a maximum height of RL 230. The through-site link is flanked by low level and retail and podium office space.

- KEY:
- VICTORIA CROSS STATION  
CSSI APPROVAL- INCLUDES  
STRUCTURE AND BUILDING  
INFRASTRUCTURE AND  
SPACE FOR LIFT CORES,  
ACCESS, PARKING, RETAIL  
AND BUILDING SERVICES  
FOR THE FUTURE OSD
  - OSD CONCEPT SSD  
BUILDING ENVELOPE -  
INCLUDES OSD USES
  - ARTICULATION ZONE
  - UNDER CONSTRUCTION
  - UNDER REFURBISHMENT



VIEW FROM THE NORTH WEST



VIEW FROM THE SOUTH WEST

# 7.3 MODIFIED ENVELOPE INDICATIVE GROUND FLOOR

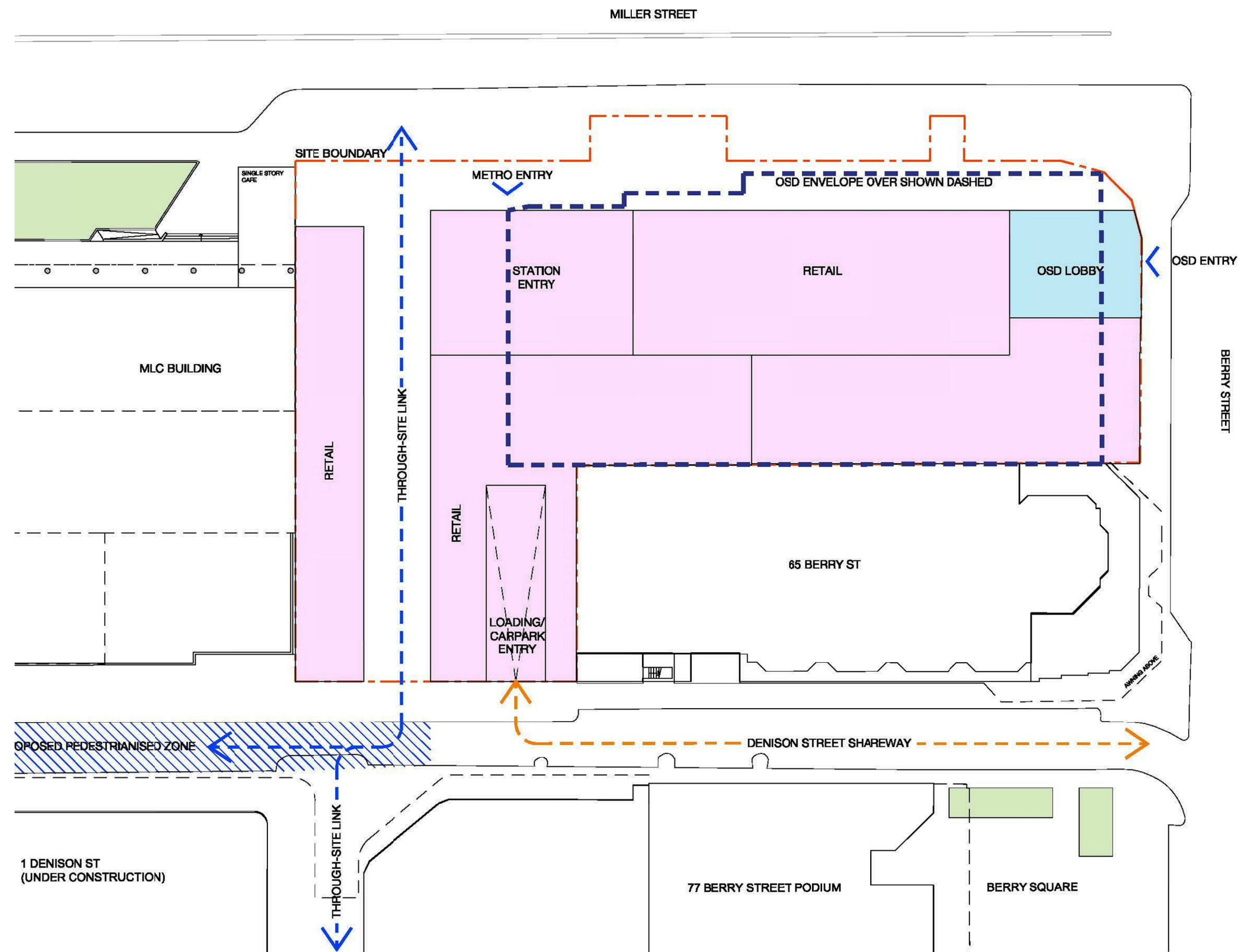
## GROUND FLOOR PLAN

The adjacent drawing shows the indicative ground floor layout of the envelope with the southern Metro station entry and the low-scale southern laneway building defining the edge of the through-site link.

Retail tenancies will activate both edges of the through-site link as well as Miller and Berry Streets. The entry to the OSD lobby is relocated to the corner of Miller and Berry Streets with the commercial office sky lobby raised to level one. This has been to maximise the retail activation of the Miller Street areas at the ground level. Entry to the loading dock remains unchanged.

### KEY:

- VICTORIA CROSS STATION CSSI APPROVAL - INCLUDES STRUCTURE AND BUILDING INFRASTRUCTURE AND SPACE FOR LIFT CORES, ACCESS, PARKING, RETAIL AND BUILDING SERVICES FOR THE FUTURE OSD.
- OSD CONCEPT SSD BUILDING ENVELOPE INCLUDES OSD USES. APPROXIMATE OSD LOBBY LOCATION.
- PEDESTRIANISED ZONE.
- PEDESTRIAN THROUGH SITE LINK.
- VEHICULAR MOVEMENT
- APPROXIMATE LOCATION OF BUILDING ENVELOPE OVER



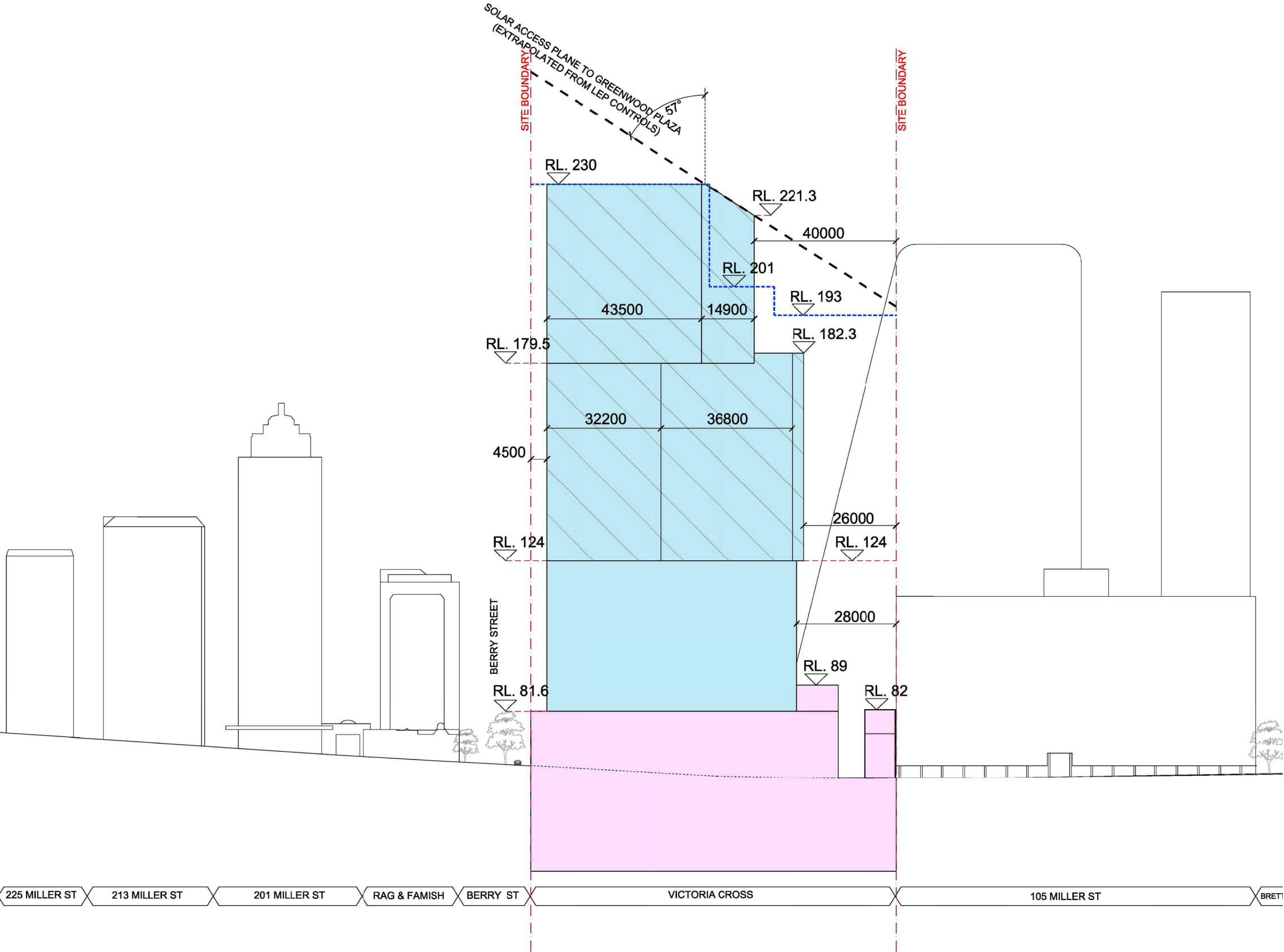


# 7.3 MODIFIED ENVELOPE ELEVATIONS

WEST ELEVATION

The adjacent west elevation diagram demonstrates the extent of the modified OSD building envelope. The OSD building envelope has a maximum height of RL230 (as per the approved) at the northern portion of the site which steps down to a height of RL182.3 towards the southern end of the site. There is an 10m increase in separation between the tower volume and the MLC Building to the south from the approved envelope.

- KEY:
- MAXIMUM BUILDING HEIGHT  
(NORTH SYDNEY LOCAL  
ENVIRONMENT PLAN 2013)
- VICTORIA CROSS STATION  
CSSI APPROVAL - INCLUDES  
STRUCTURE AND BUILDING  
INFRASTRUCTURE AND  
SPACE FOR LIFT CORES,  
ACCESS, PARKING, RETAIL  
AND BUILDING SERVICES  
FOR THE FUTURE OSD.
- OSD CONCEPT SSD  
BUILDING ENVELOPE  
INCLUDES OSD USES.
- ARTICULATION ZONE -  
0-4.5M WIDE.



Note: A 500mm flexible zone is presumed on the Northern elevation of the building envelope, and a 250mm flexible zone is presumed on the Southern elevation of the building envelope, to allow for non-habitable architectural detailing and expression such as sunshades.



The height of the building envelope has an important role in defining the future built form on the site. The building envelope has been devised to allow the tower massing to be located to the north to maximise amenity and light to the through-site link.

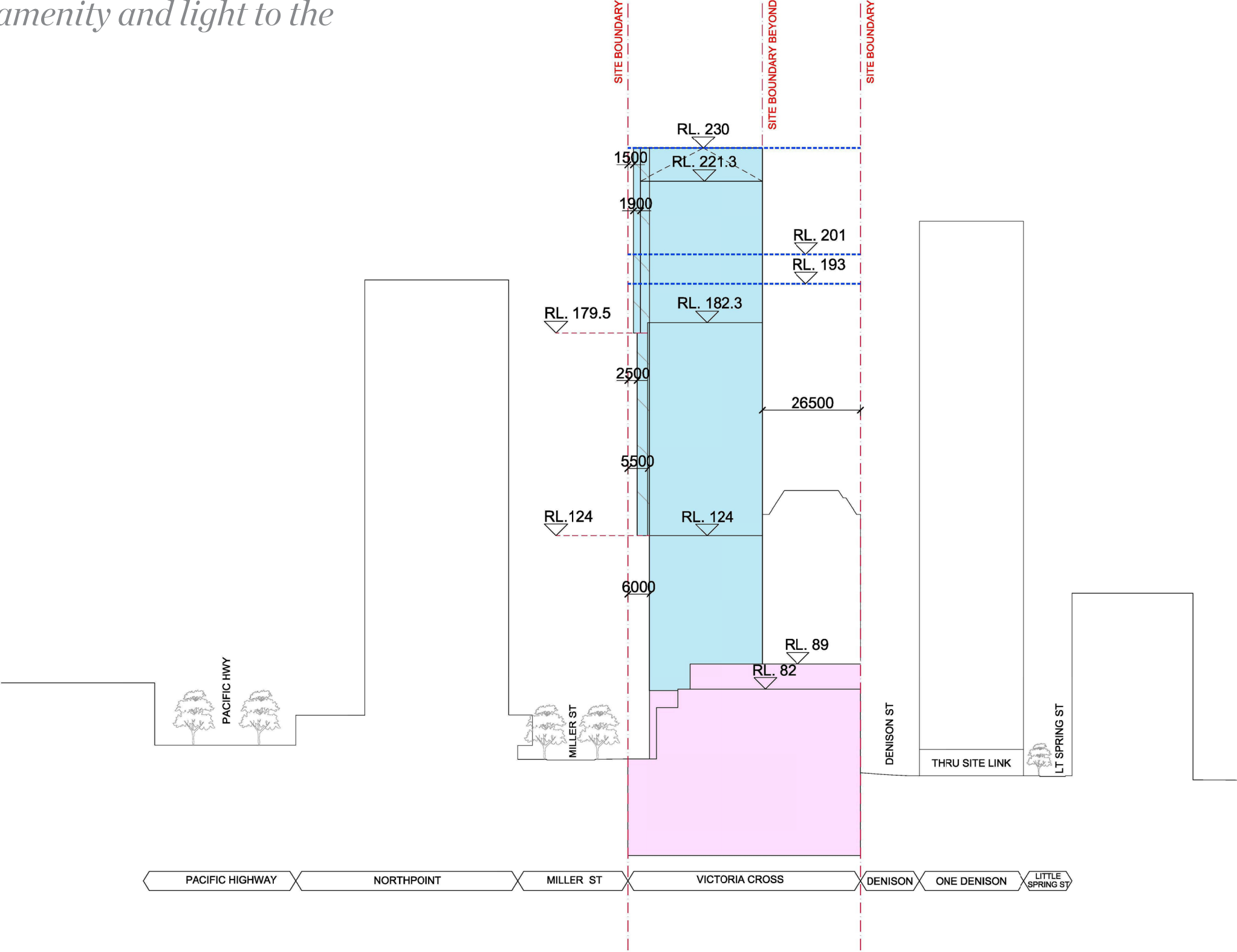
SOUTH ELEVATION

The adjacent diagram demonstrates that the modified building envelope is set back 6m from the Miller Street property boundary to a height of RL 124. Between RL 124 and RL 230, the building steps forward between 0m and 4.5m.

KEY:

- MAXIMUM BUILDING HEIGHT (NORTH SYDNEY LOCAL ENVIRONMENT PLAN 2013)
- VICTORIA CROSS STATION CSSI APPROVAL - INCLUDES STRUCTURE AND BUILDING INFRASTRUCTURE AND SPACE FOR LIFT CORES, ACCESS, PARKING, RETAIL AND BUILDING SERVICES FOR THE FUTURE OSD.
- OSD CONCEPT SSD BUILDING ENVELOPE INCLUDES OSD USES.
- ARTICULATION ZONE - 0-4.5M WIDE.

Note: A 500mm flexible zone is presumed on the Northern elevation of the building envelope, and a 250mm flexible zone is presumed on the Southern elevation of the building envelope, to allow for non-habitable architectural detailing and expression such as sunshades.





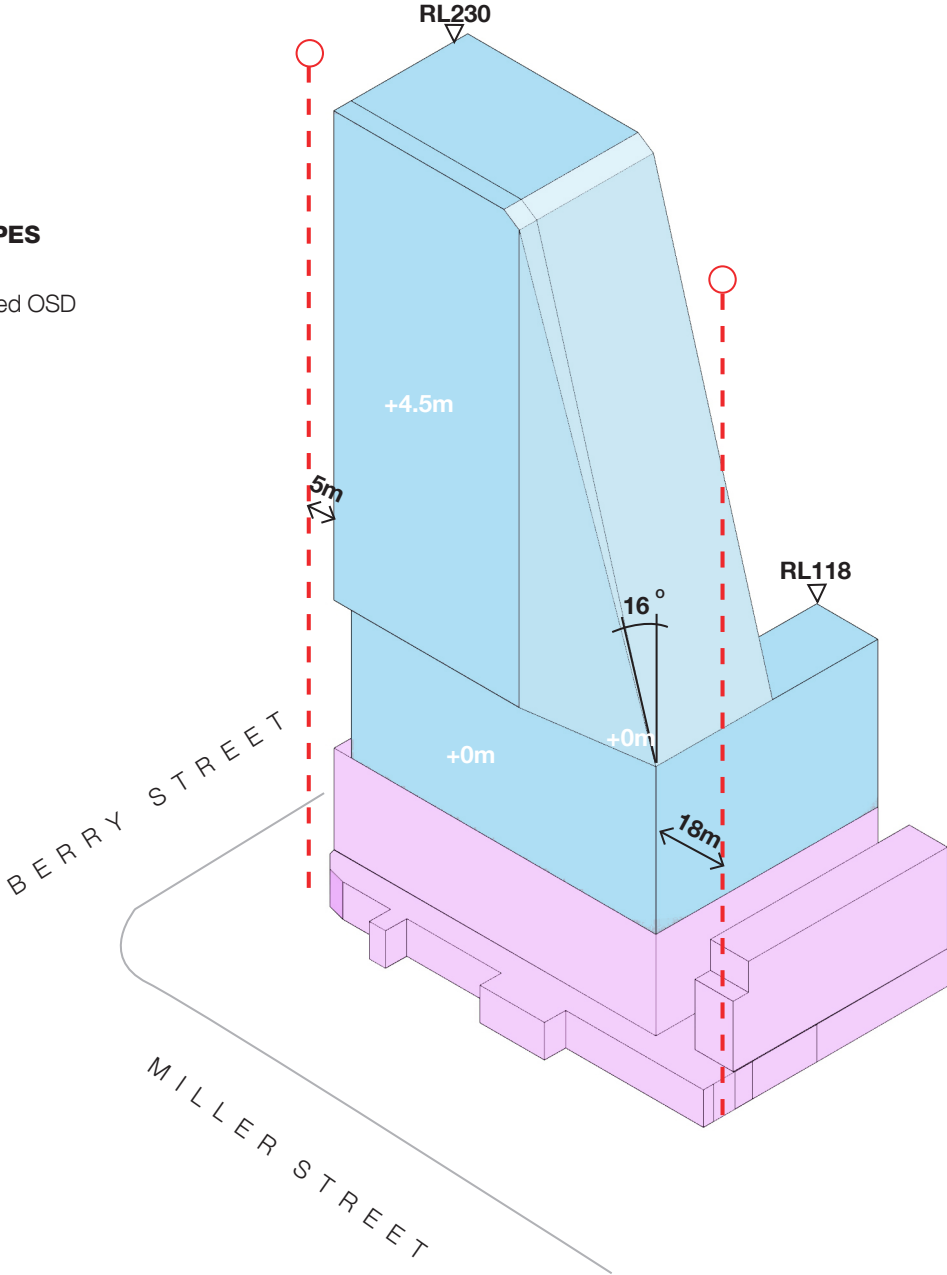
# 7.4

## ENVELOPE ANALYSIS

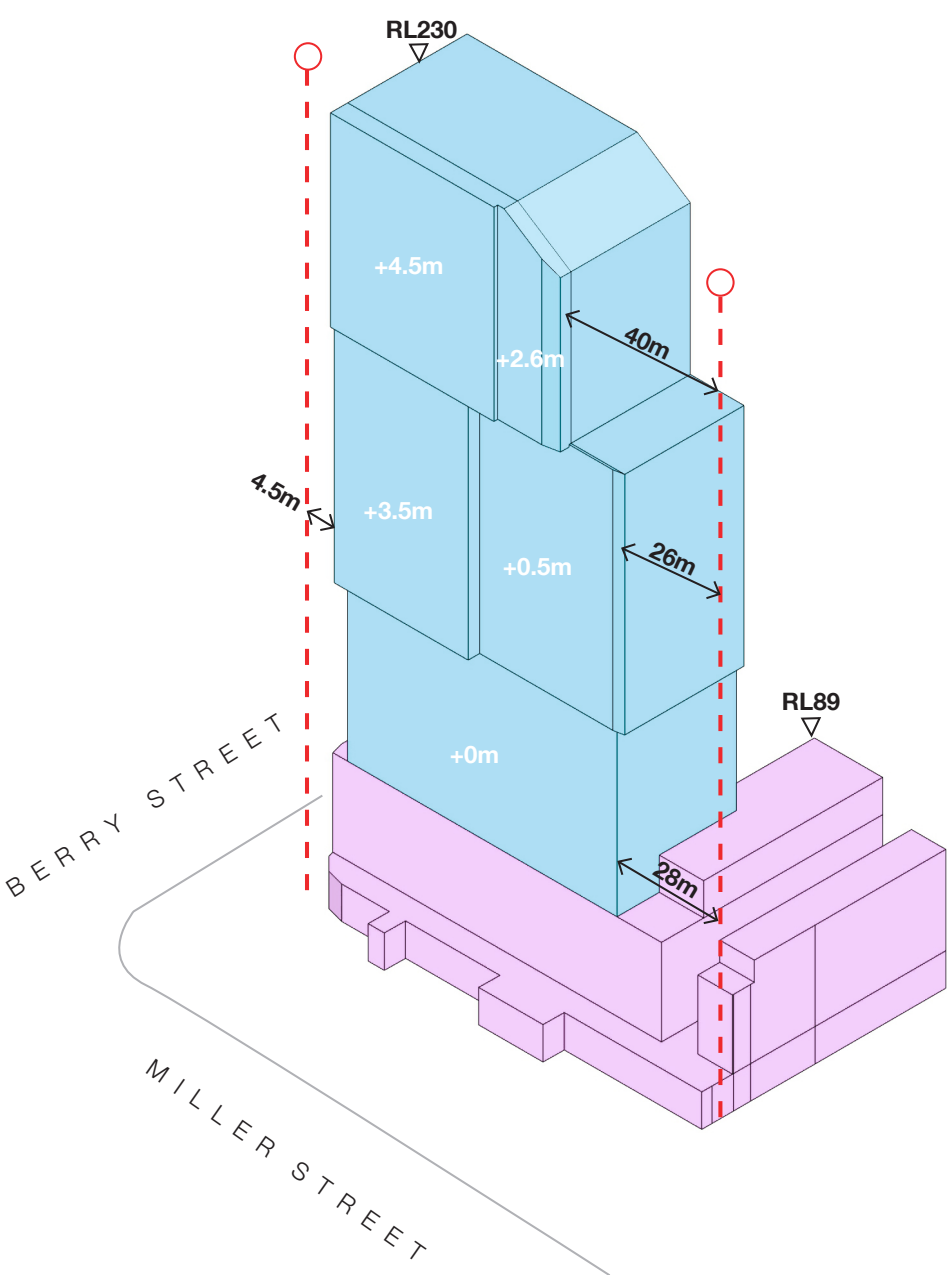
### VOLUME ANALYSIS

COMPARISON OF APPROVED AND MODIFIED ENVELOPES

The adjacent study illustrates the differences between the approved OSD Concept SSD building envelope and the modified envelope.

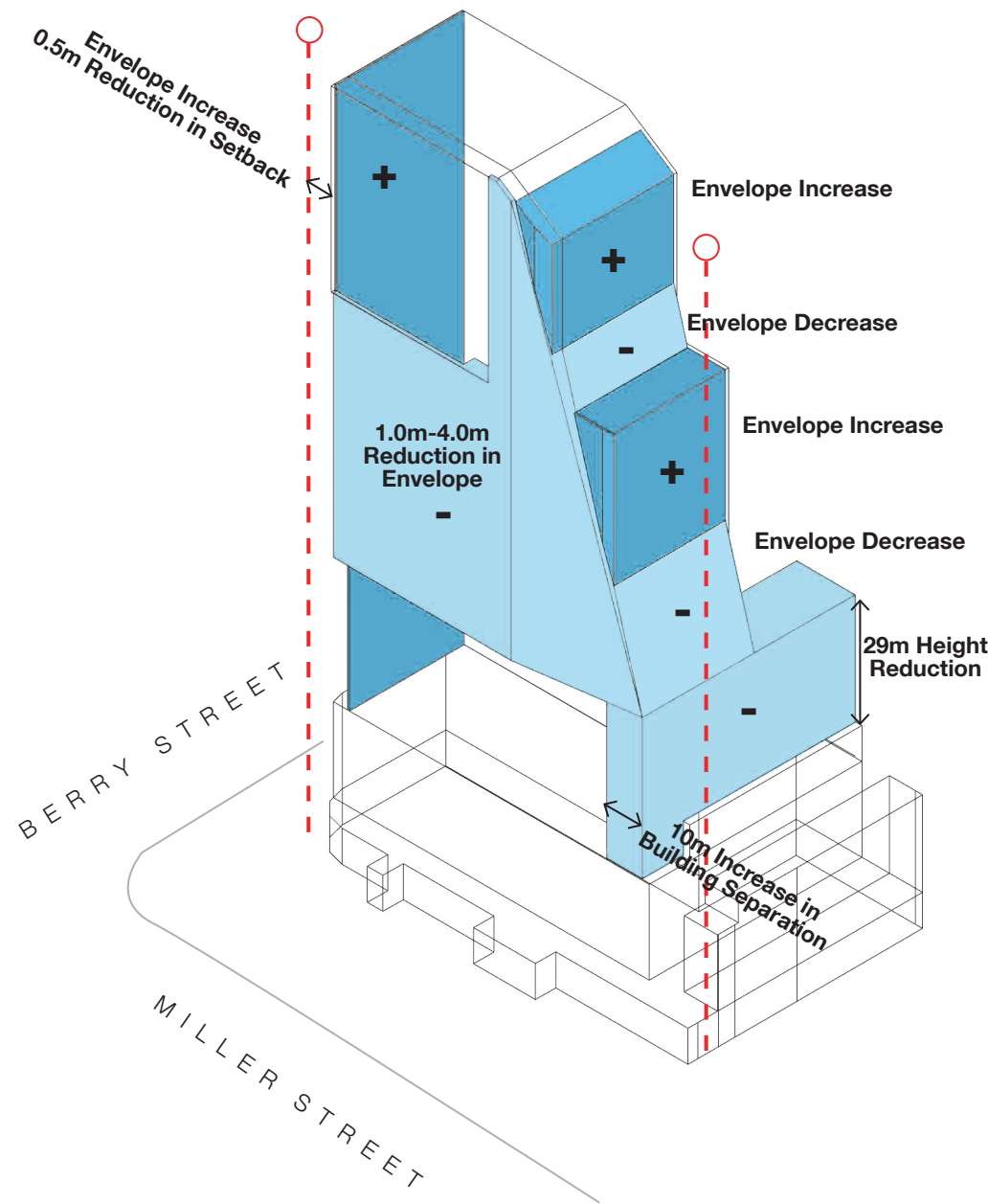


**APPROVED ENVELOPE**  
Values in white indicate the distance of cantilever out from the main tower within the articulation zone.



**MODIFIED ENVELOPE**  
Values in white indicate the distance of cantilever out from the main tower within the articulation zone.





**COMPARISON OF APPROVED AND MODIFIED ENVELOPES**

The following study illustrates the differences between the approved OSD Concept SSD building envelope and the modified OSD Envelope.

- Total Envelope Volume Reduction = Approx. 21000m<sup>3</sup>
- Envelope Volume Reduction in Articulation Zone = Approx. 9500m<sup>3</sup>
- Envelope Dimensional Reduction in Articulation Zone = 1.0m - 4.0m





ARTIST'S IMPRESSION OF METRO ENTRY FROM DENISON STREET





## 8.0 ENVELOPE ANALYSIS



# 8.1

## SHADOW ANALYSIS

### SUMMARY

Clause 6.3 (2) of the North Sydney Local Environment Plan 2013 states that:  
“Development consent must not be granted for the erection of a building on land to which the Division applies if:  
(a) The development would result in a net increase in overshadowing between 12 pm and 2 pm from the March Equinox to the September Equinox (inclusive) on land to which this Division applies that is within Zone RE1 Public Recreation or that is identified as ‘Special Area’ on the North Sydney Centre map.

Shadow diagrams have been prepared to address this control and are attached in full within the appendix. The following pages address the shadowing impact of the modified OSD envelope where and when it specifically arises.

#### AUTUMN EQUINOX MARCH 21ST

##### SPECIAL AREAS OVERVIEW

The adjacent diagrams demonstrate the shadow impact created by both the approved OSD Concept SSD building envelope and the modified building envelope in relation to the Special Areas as identified by the North Sydney Centre Map.

##### MILLER STREET SPECIAL AREA

The Miller St Special Area indicated in turquoise has some minor overshadowing for 15mins between 12:00pm and 12:15pm on the Autumn Equinox which will be discussed in the following sections. This additional shadow does not result in a net overall increase when compared to the previous conditions at the site.

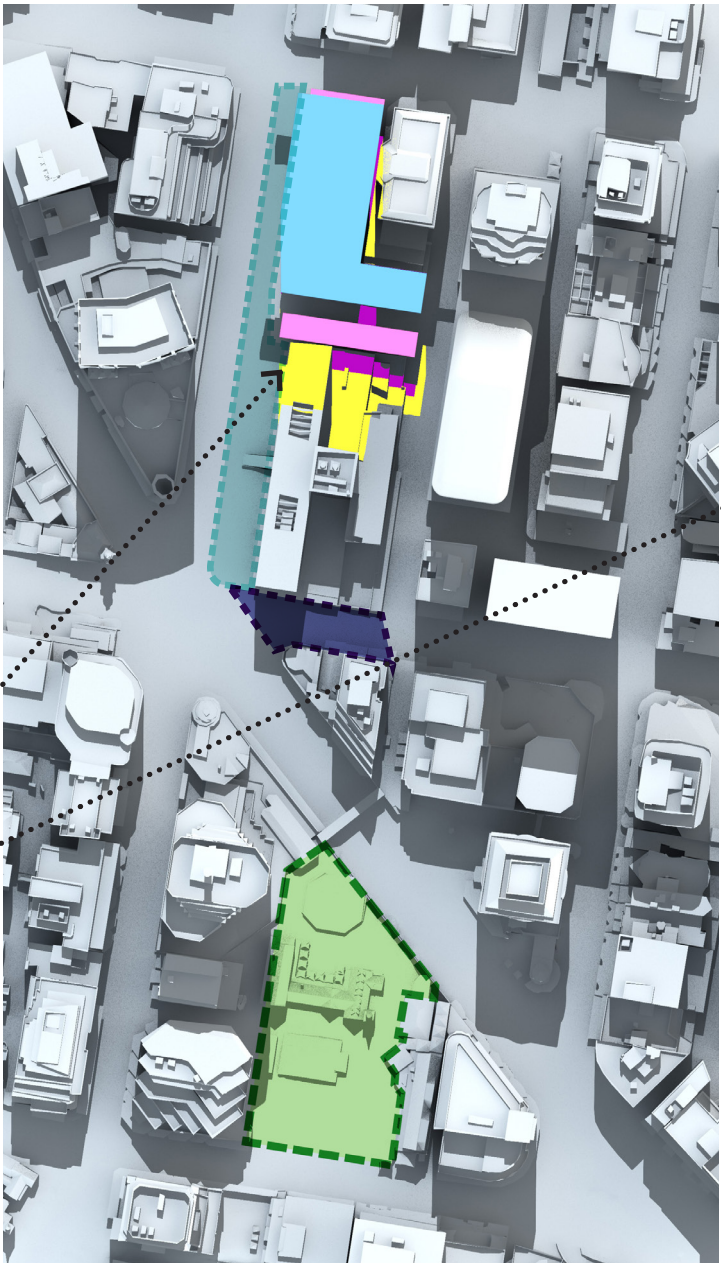
##### GREENWOOD PLAZA

The Greenwood Plaza Special Area indicated in green is not overshadowed by either the approved or modified envelopes.

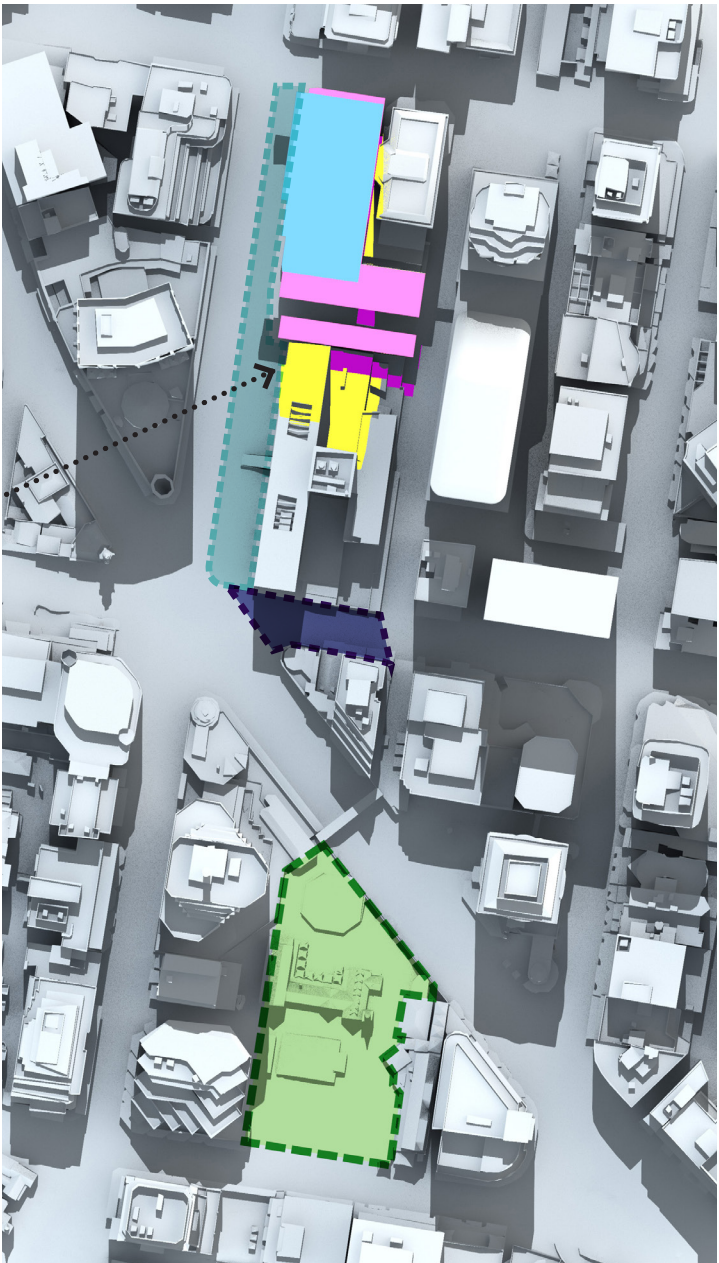
##### BRETT WHITELEY PLAZA

The Brett Whiteley Special Area indicated in purple is discussed in detail in the following sections.

- KEY:
- OSD BUILDING ENVELOPE
  - VICTORIA CROSS STATION CSSI ENVELOPE
  - SHADOWS CAST BY EXISTING BUILDINGS
  - SHADOWS CAST BY OSD ENVELOPE
  - SHADOW CAST BY CSSI ENVELOPE
  - REDUCTION OF SHADOWS
  - INCREASE IN SHADOWS
  - MILLER STREET SPECIAL AREA
  - GREENWOOD PLAZA
  - BRETT WHITELEY PLAZA



12pm March 21st - Approved Envelope



12pm March 21st - Modified Envelope



WINTER SOLSTICE  
JUNE 21ST

SPECIAL AREAS

The adjacent diagrams demonstrate the shadow impact created by both the approved OSD Concept SSD building envelope and the modified building envelope in relation to the Special Areas as identified by the North Sydney Centre Map.

MILLER STREET SPECIAL AREA

The Miller Street Special Area indicated in turquoise is not overshadowed by either the approved or modified OSD building envelopes.

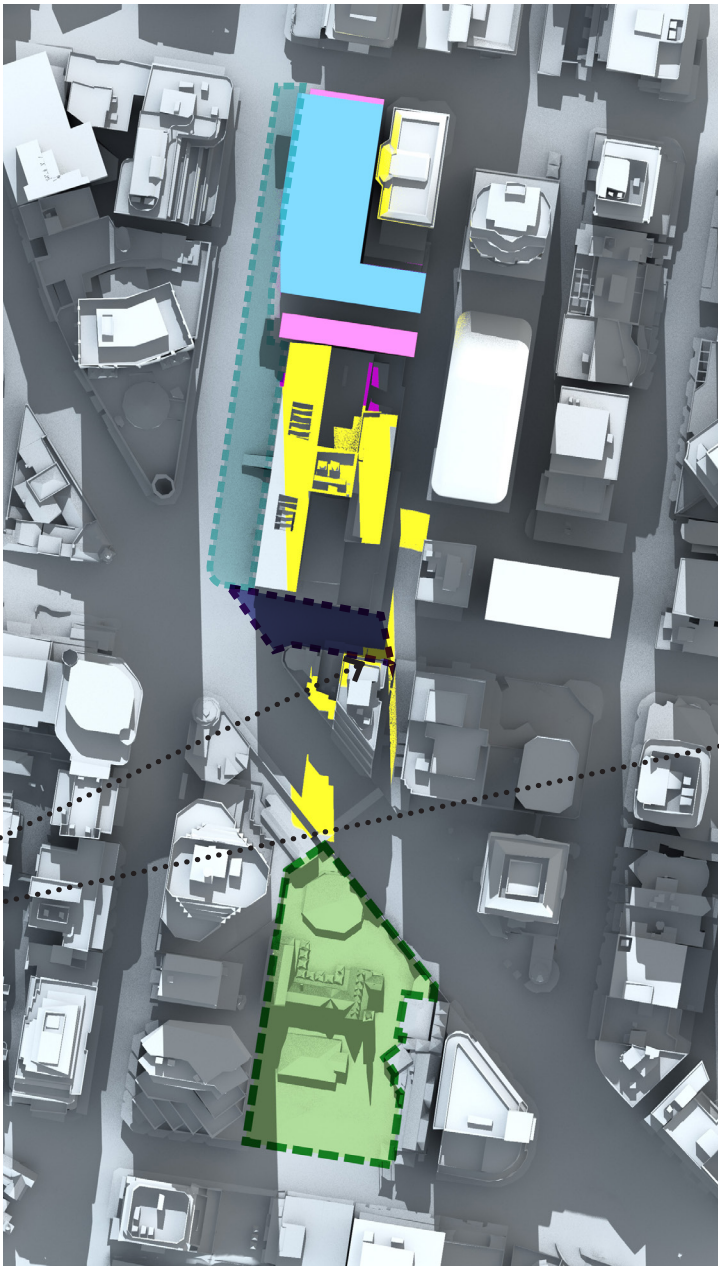
GREENWOOD PLAZA

The Greenwood Plaza Special Area indicated in green is not overshadowed by either the approved or modified envelopes.

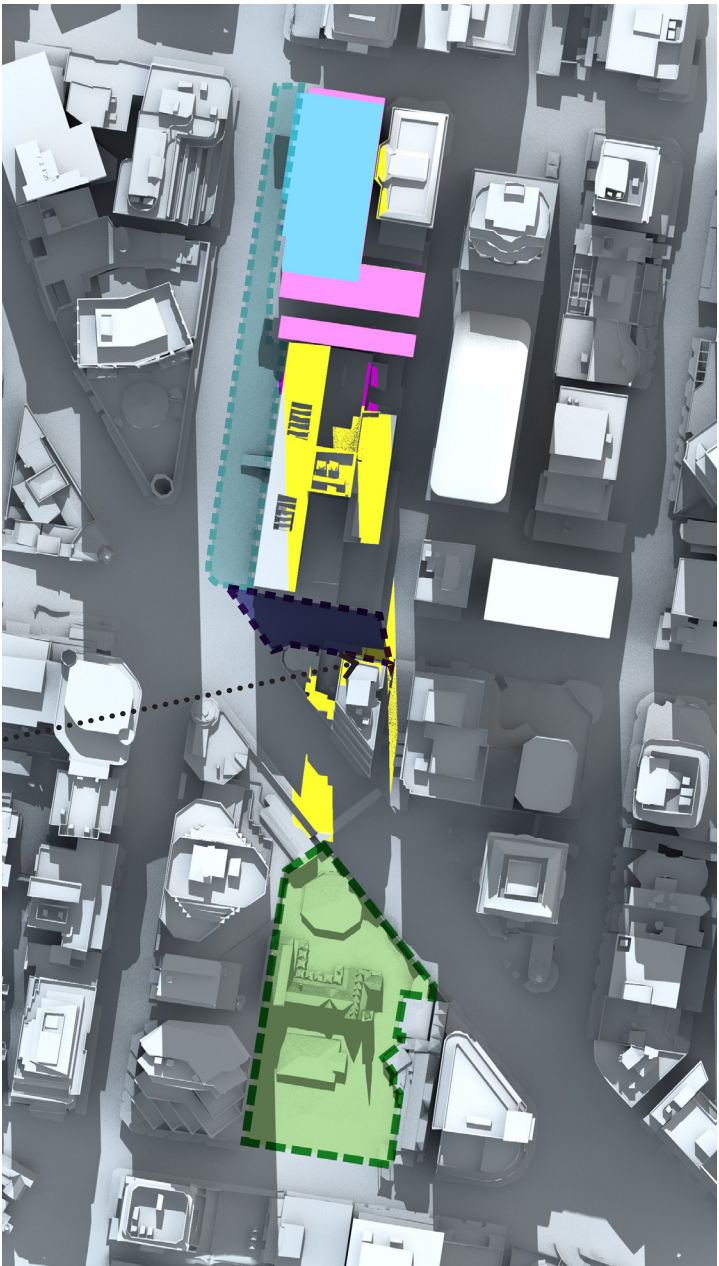
BRETT WHITELEY PLAZA

The Brett Whiteley Special Area indicated in purple is discussed in detail in the following sections.

- KEY:
- OSD BUILDING ENVELOPE
  - VICTORIA CROSS STATION CSSI ENVELOPE
  - SHADOWS CAST BY EXISTING BUILDINGS
  - SHADOWS CAST BY OSD ENVELOPE
  - SHADOW CAST BY CSSI ENVELOPE
  - REDUCTION OF SHADOWS
  - INCREASE IN SHADOWS
  - MILLER STREET SPECIAL AREA
  - GREENWOOD PLAZA
  - BRETT WHITELEY PLAZA



12pm June 21st - Approved Envelope



12pm June 21st - Modified Envelope



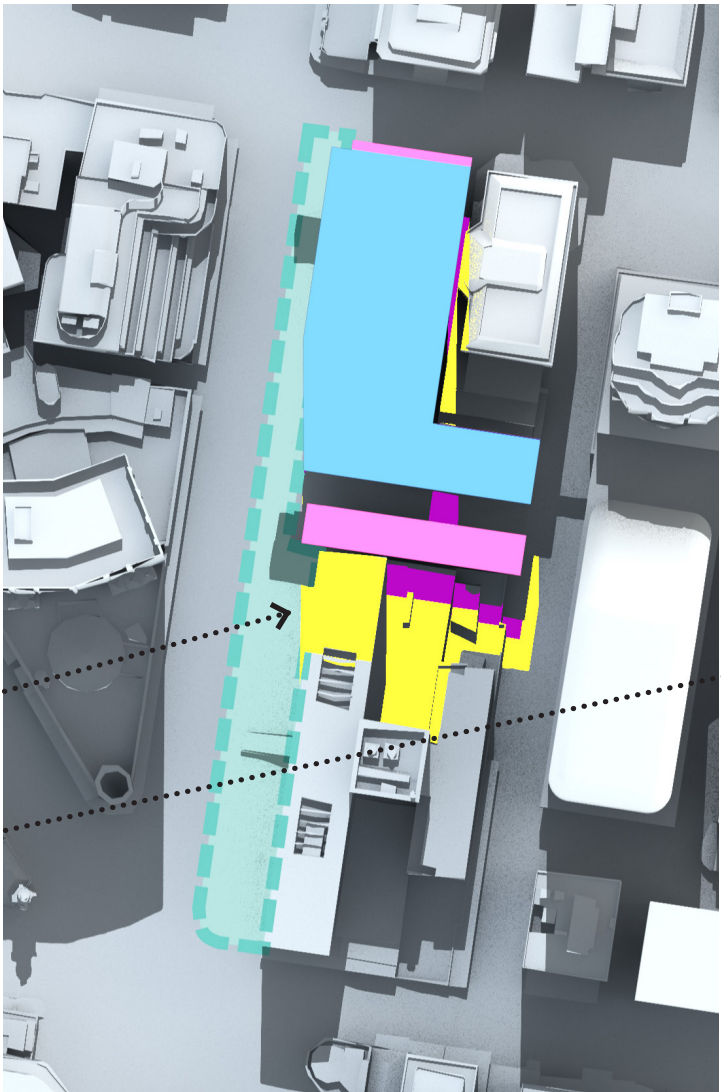
# 8.2 SHADOW ANALYSIS MILLER ST SPECIAL AREA

## AUTUMN EQUINOX MARCH 21ST

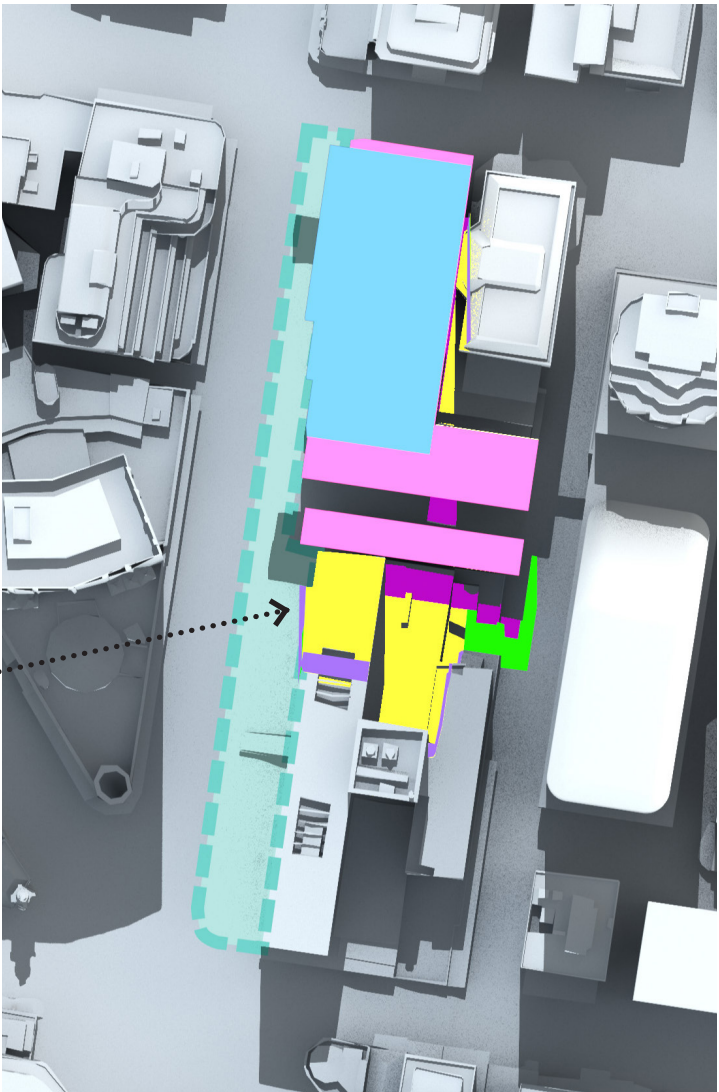
### MILLER STREET SPECIAL AREA

The following diagrams show that there is some minimal overshadowing to the Miller Street Special Area at 12pm. However by 12.15pm there is zero overshadowing. This will be discussed further in the following section.

- KEY:
- OSD BUILDING ENVELOPE
  - VICTORIA CROSS STATION CSSI ENVELOPE
  - SHADOWS CAST BY EXISTING BUILDINGS
  - SHADOWS CAST BY OSD ENVELOPE
  - SHADOW CAST BY CSSI ENVELOPE
  - REDUCTION OF SHADOWS
  - INCREASE IN SHADOWS
  - MILLER STREET SPECIAL AREA
  - GREENWOOD PLAZA
  - BRETT WHITELEY PLAZA

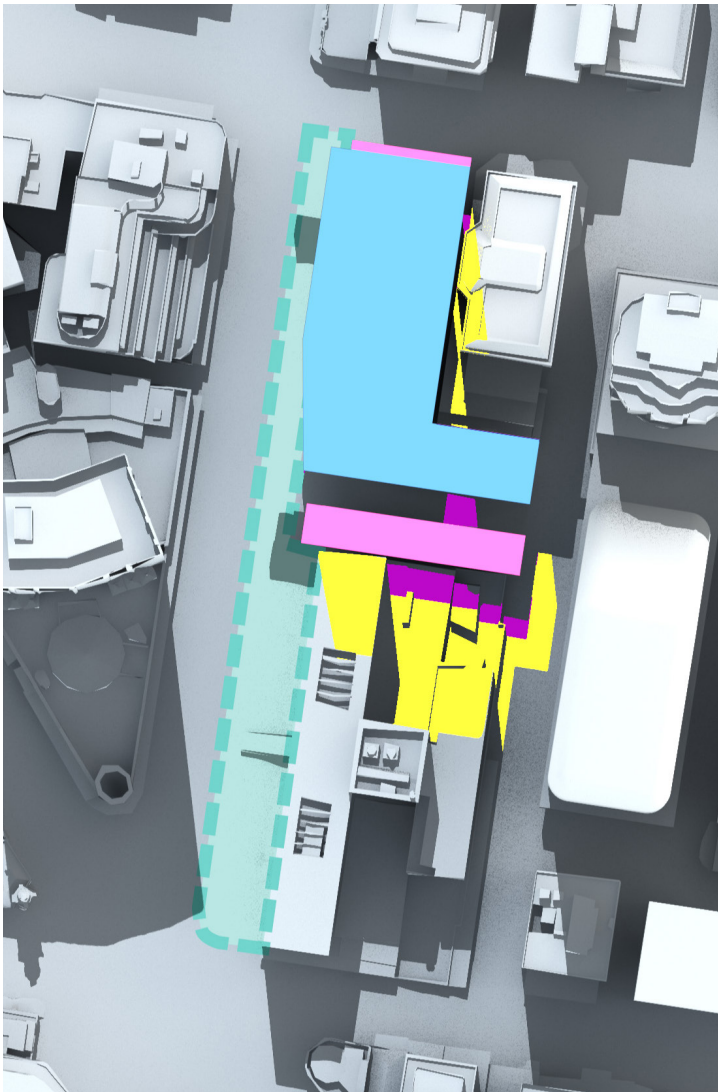


12:00pm March 21st - Approved Envelope

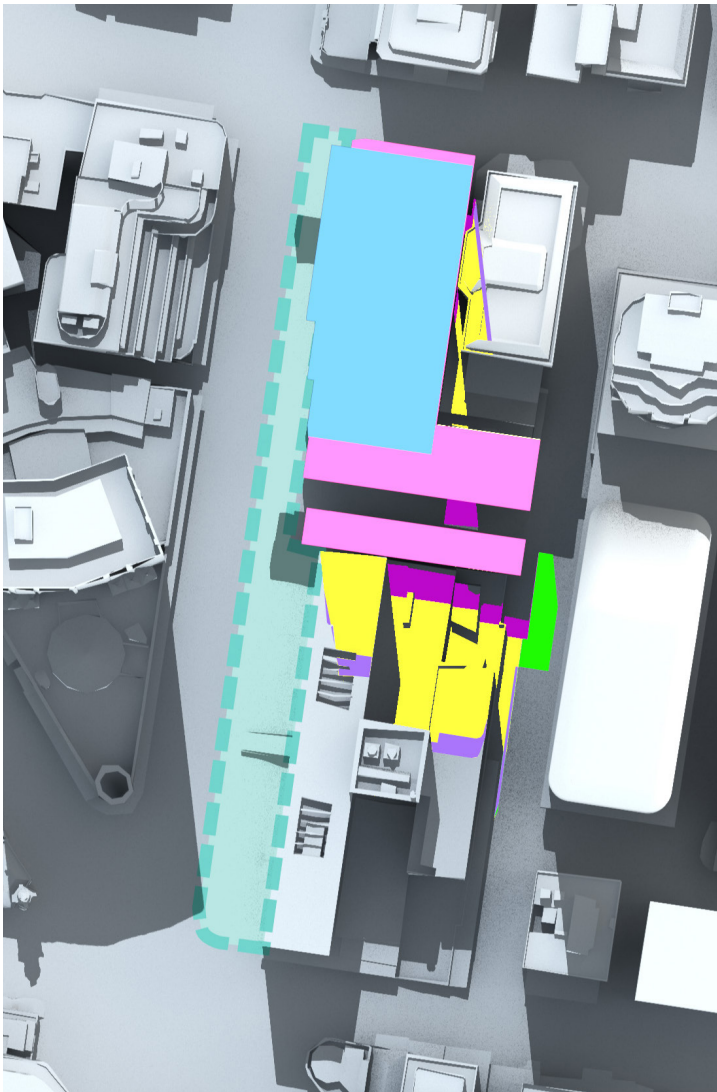


12:00pm March 21st - Modified Envelope with Comparison

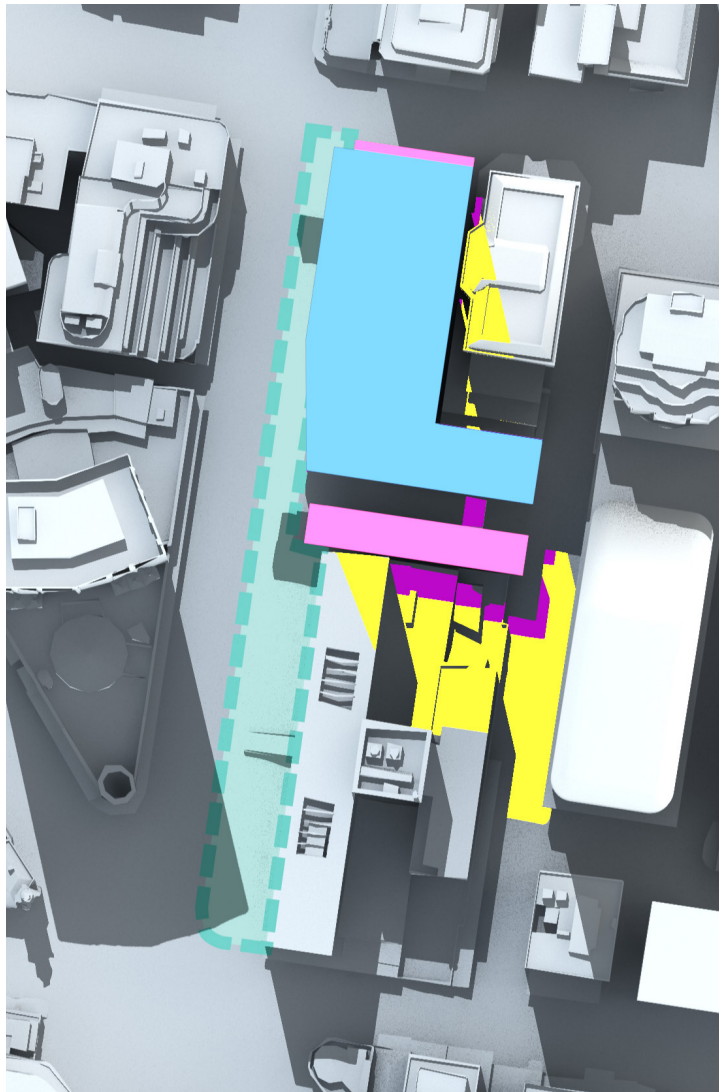




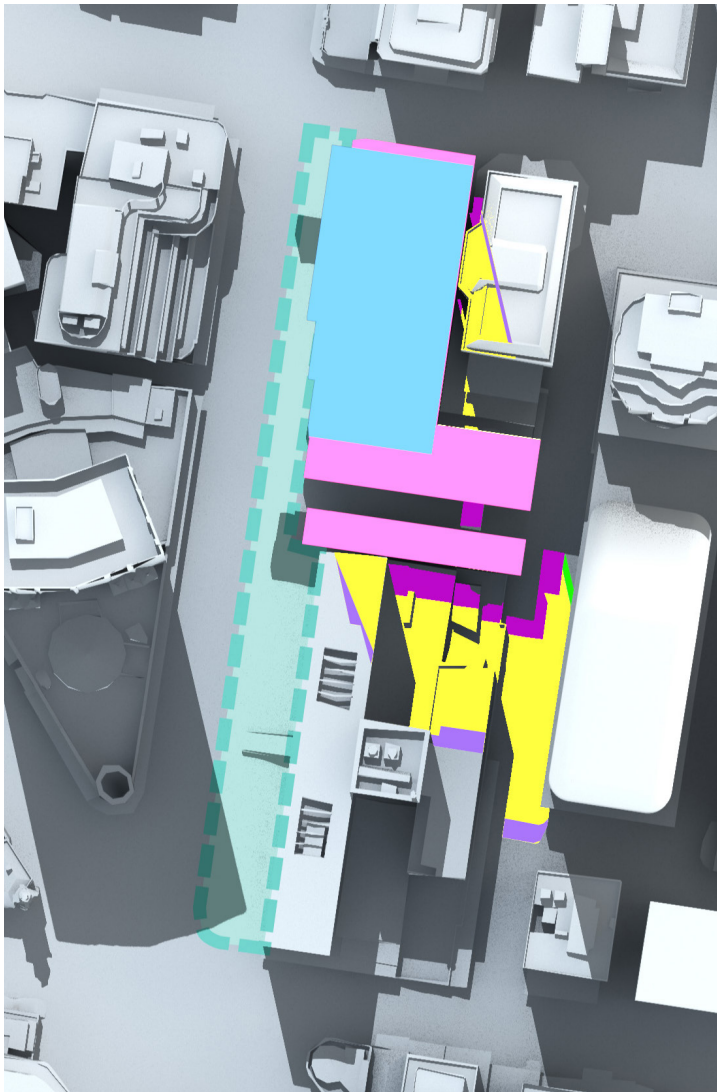
12:15pm March 21st - Approved Envelope



12:15pm March 21st - Modified Envelope with Comparison



12:30pm March 21st - Approved Envelope



12:30pm March 21st - Modified Envelope with Comparison



# 8.2 SHADOW ANALYSIS MILLER ST SPECIAL AREA

## AUTUMN EQUINOX MARCH 21ST

### MILLER STREET SPECIAL AREA

The adjacent diagrams focus on the shadow impact from both the approved OSD Concept SSD building envelope and the modified building envelope in relation to the Miller Street Special Area as identified by North Sydney Centre Map.

The approved OSD Concept SSD building envelope creates overshadowing for approximately 10-12 minutes for an average of 33m<sup>2</sup> at 12pm on the Autumn Equinox.

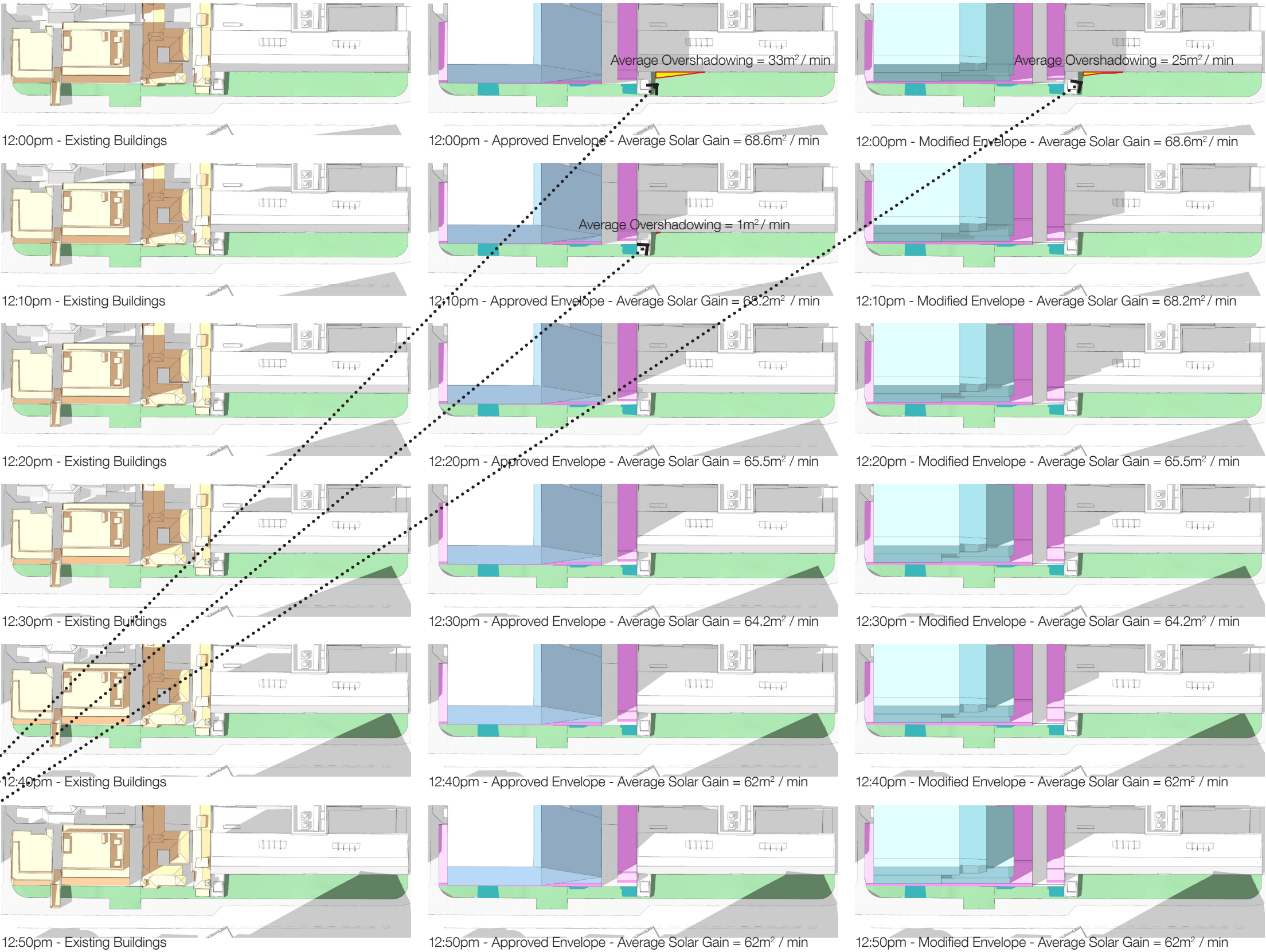
The modified building envelope creates overshadowing for approximately 10 minutes for an average of 25m<sup>2</sup> at 12pm on the Autumn Equinox. This is a reduction from the approved envelope.

By removing the existing buildings, the integrated station development (including the CSSI approved areas) achieves an average area gain in solar access of 60.5m<sup>2</sup> per minute between 12pm and 2pm on the Autumn equinox.

If considering the additional shadows from the OSD envelopes only this net gain in solar is 57.67m<sup>2</sup> per minute for the approved envelope and 58.42m<sup>2</sup> per minute for the modified envelope.

There is a significant increase in solar access to the Miller Street Special Area as a result of the integrated station development.

- KEY: 
-  MILLER STREET SPECIAL AREA
  -  VICTORIA CROSS STATION CSSI APPROVAL
  -  OSD BUILDING ENVELOPES (Approved + MODIFIED)
  -  EXISTING BUILDINGS
  -  EXISTING SHADOW
  -  INCREASE IN SHADOWS FROM OSD
  -  SOLAR ACCESS GAINED





AUTUMN EQUINOX  
MARCH 21ST

SOLAR GAIN CALCULATIONS

The average solar gain per minute is determined for both the approved and the modified envelopes. The average overshadowing per minute is determined for each envelope condition and subtracted from the solar gain to give the net solar gain.

Average area of solar gain per minute:  
 $((69 \times 10) + (68 \times 10) + (66 \times 10) + (64 \times 10) + (62 \times 10) + (60 \times 10) + (59 \times 10) + (59 \times 10) + (58 \times 10) + (41 \times 10)) / 120 = 60.5\text{m}^2$

Average area of overshadowing for by approved envelope per minute:  
 $((33 \times 10) + (1 \times 10)) / 120 = 2.83\text{m}^2$

Average area of overshadowing by modified envelope per minute:  
 $(25 \times 10) / 120 = 2.08\text{m}^2$

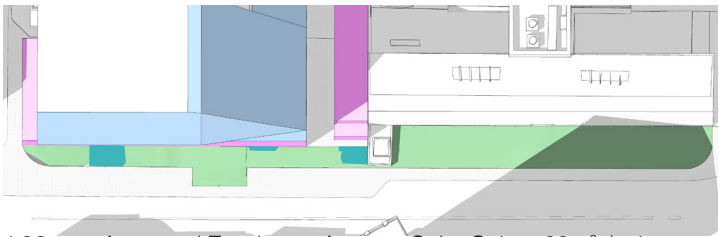
Net solar gain for approved envelope per minute:  
 $60.5 - 2.83 = 57.67\text{m}^2$

Net solar gain for the modified envelope per minute:  
 $60.5 - 2.08 = 58.42\text{m}^2$

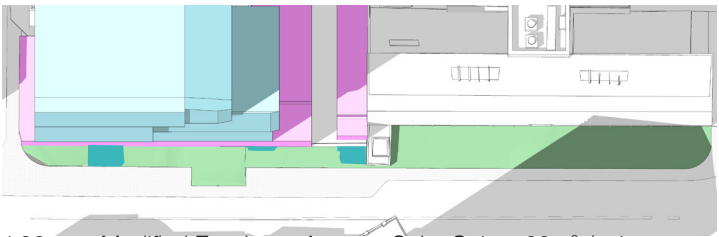
- KEY: 
-  MILLER STREET SPECIAL AREA
  -  VICTORIA CROSS STATION CSSI APPROVAL
  -  OSD BUILDING ENVELOPES (Approved + MODIFIED)
  -  EXISTING BUILDINGS
  -  EXISTING SHADOW
  -  INCREASE IN SHADOWS FROM OSD
  -  SOLAR ACCESS GAINED



1:00pm - Existing Buildings



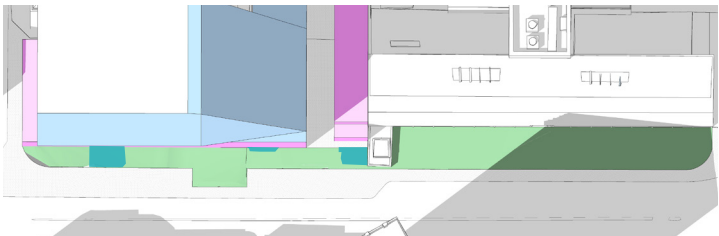
1:00pm - Approved Envelope - Average Solar Gain = 60m<sup>2</sup> / min



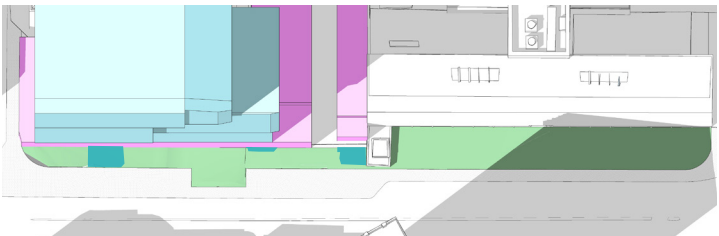
1:00pm - Modified Envelope- Average Solar Gain = 60m<sup>2</sup> / min



1:10pm - Existing Buildings



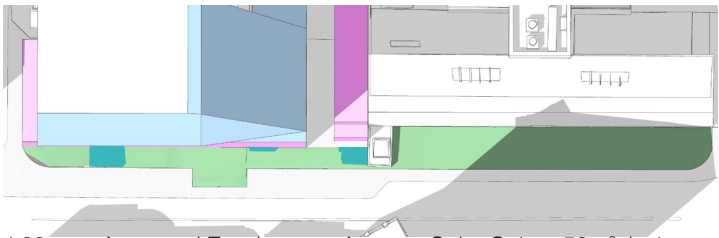
1:10pm - Approved Envelope - Average Solar Gain = 59m<sup>2</sup> / min



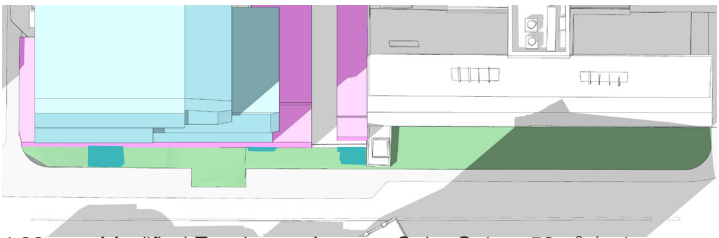
1:10pm - Modified Envelope - Average Solar Gain = 59m<sup>2</sup> / min



1:20pm - Existing Buildings



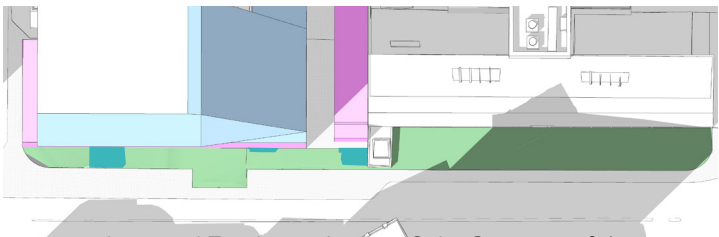
1:20pm - Approved Envelope = - Average Solar Gain = 59m<sup>2</sup> / min



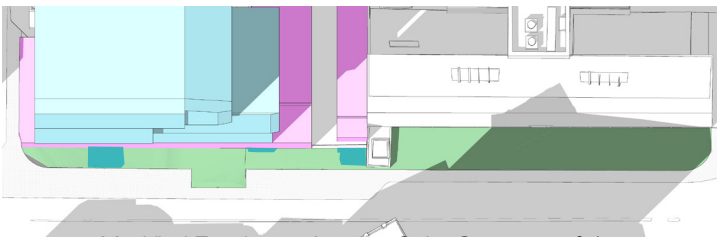
1:20pm - Modified Envelope - Average Solar Gain = 59m<sup>2</sup> / min



1:30pm - Existing Buildings



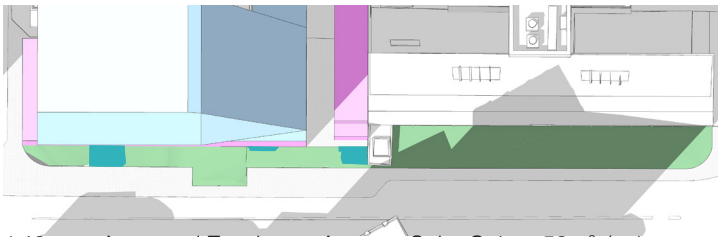
1:30pm - Approved Envelope - Average Solar Gain = 58m<sup>2</sup> / min



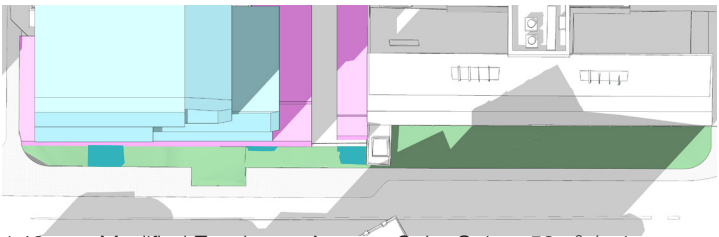
1:30pm - Modified Envelope - Average Solar Gain = 58m<sup>2</sup> / min



1:40pm - Existing Buildings



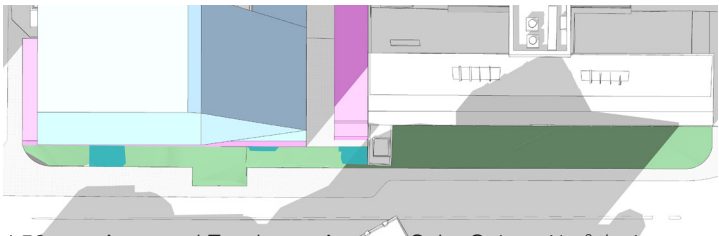
1:40pm - Approved Envelope - Average Solar Gain = 58m<sup>2</sup> / min



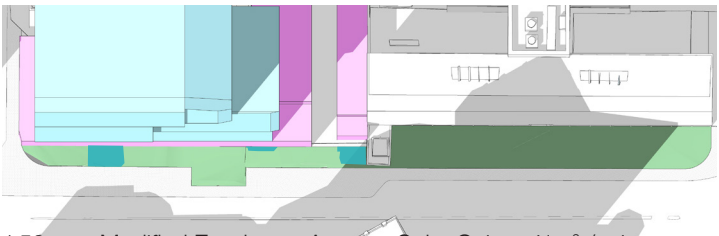
1:40pm - Modified Envelope - Average Solar Gain = 58m<sup>2</sup> / min



1:50pm - Existing Buildings



1:50pm - Approved Envelope - Average Solar Gain = 41m<sup>2</sup> / min



1:50pm - Modified Envelope - Average Solar Gain = 41m<sup>2</sup> / min



# 8.3 SHADOW ANALYSIS BRETT WHITELEY SPECIAL AREA

## WINTER SOLSTICE JUNE 21ST

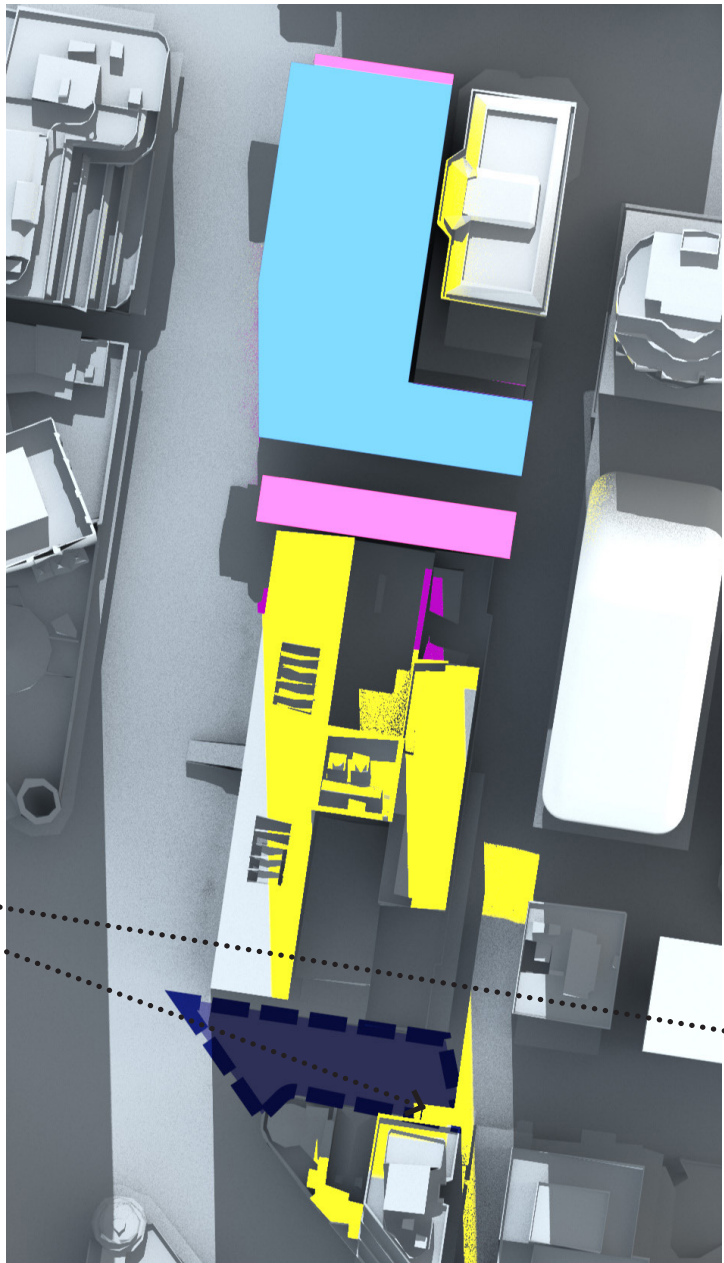
### BRETT WHITELEY SPECIAL AREA

The Brett Whiteley Special Area indicated in purple is overshadowed between 12.00 and 12.15 by both the approved OSD Concept SSD building envelope and the modified building envelope. The extents of overshadowing will be discussed in the following section.

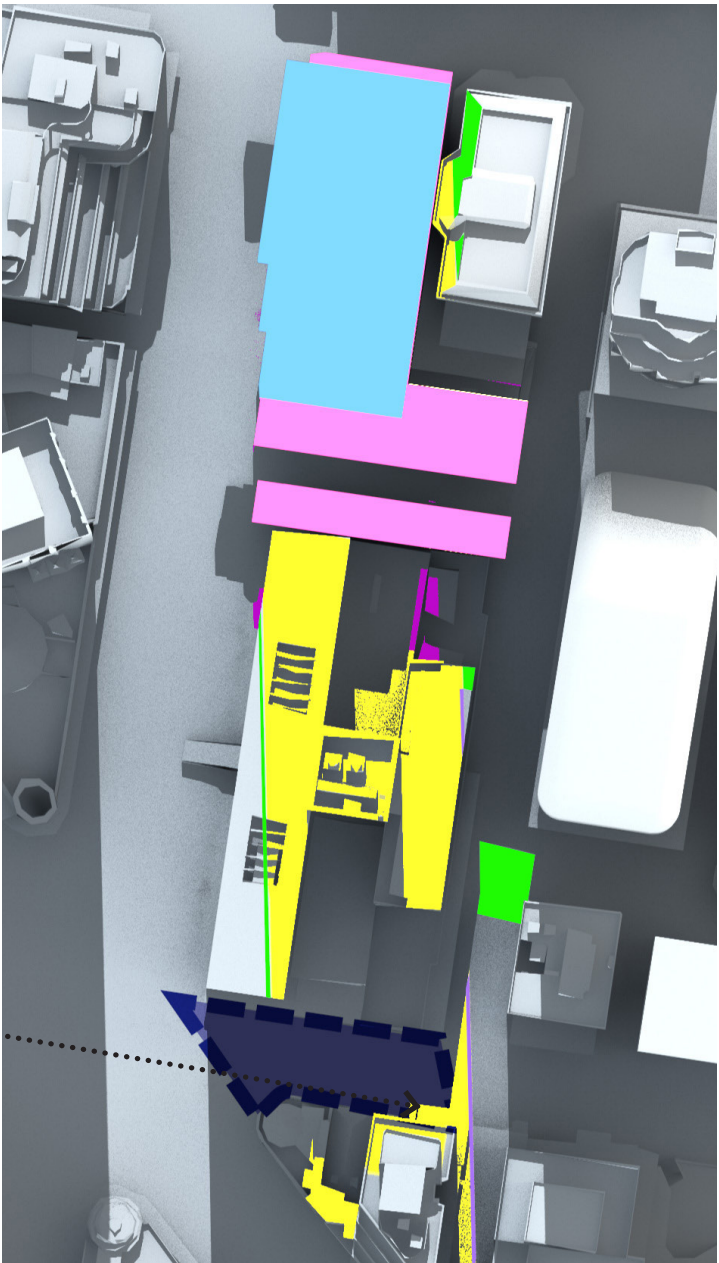
Clause 6.3 (2) of the North Sydney Local Environment Plan 2013 states that:  
“development consent must not be granted for the erection of a building on land to which the Division applies if:  
(a) The development would result in a net increase in overshadowing between 12pm and 2pm from the March Equinox to the September Equinox (inclusive) on land to which this Division applies that is within Zone RE1 Public Recreation or that is identified as ‘Special Area’ on the North Sydney Centre map.

Shadow diagrams have been prepared to address this control and are attached in full within the appendix. The following pages address the shadowing impact of the modified OSD envelope where and when it specifically arises.

- KEY:
- OSD BUILDING ENVELOPE
  - VICTORIA CROSS STATION CSSI ENVELOPE
  - SHADOWS CAST BY EXISTING BUILDINGS
  - SHADOWS CAST BY OSD ENVELOPE
  - SHADOW CAST BY CSSI ENVELOPE
  - REDUCTION OF SHADOWS
  - INCREASE IN SHADOWS
  - BRETT WHITELEY PLAZA

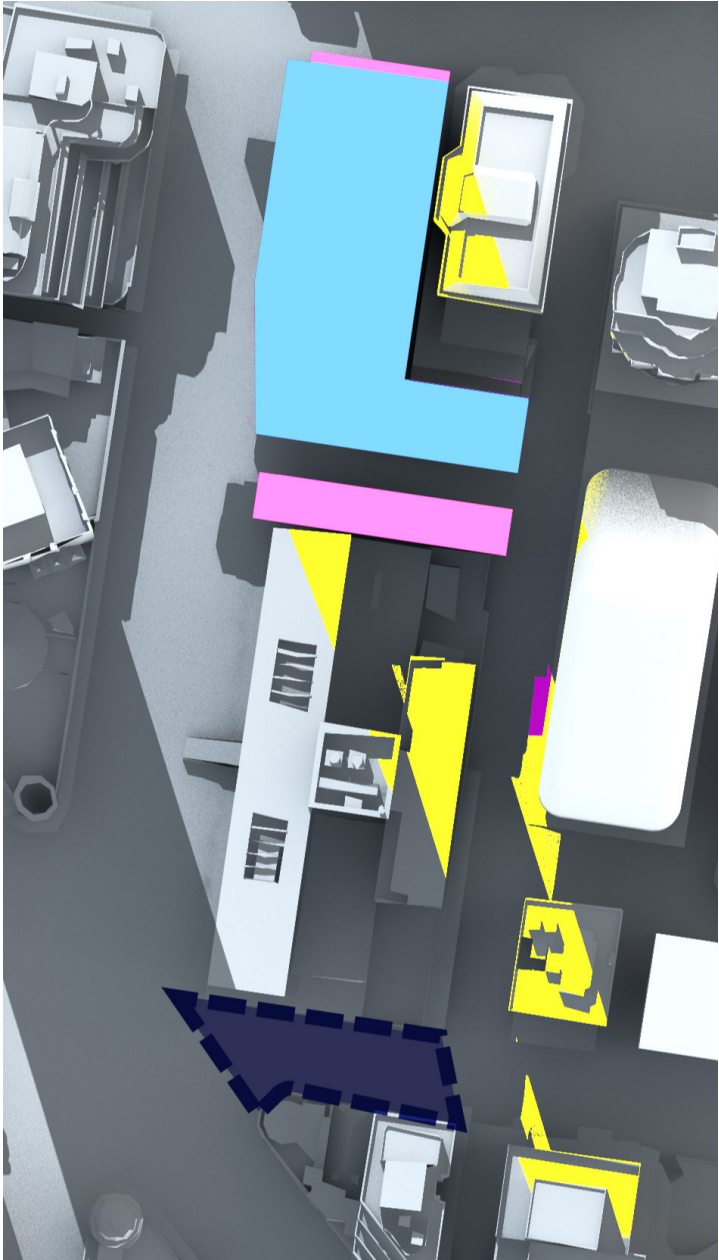


12pm June 21st - Approved Envelope

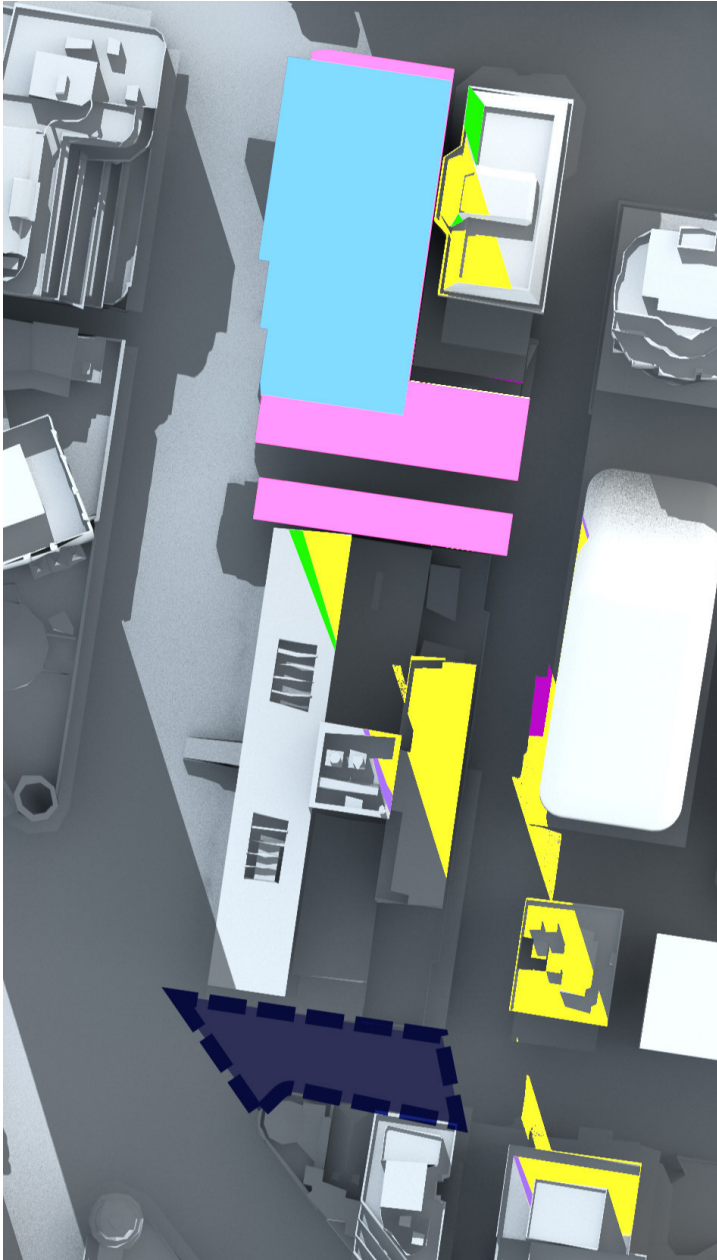


12pm June 21st - Modified Envelope with Comparison

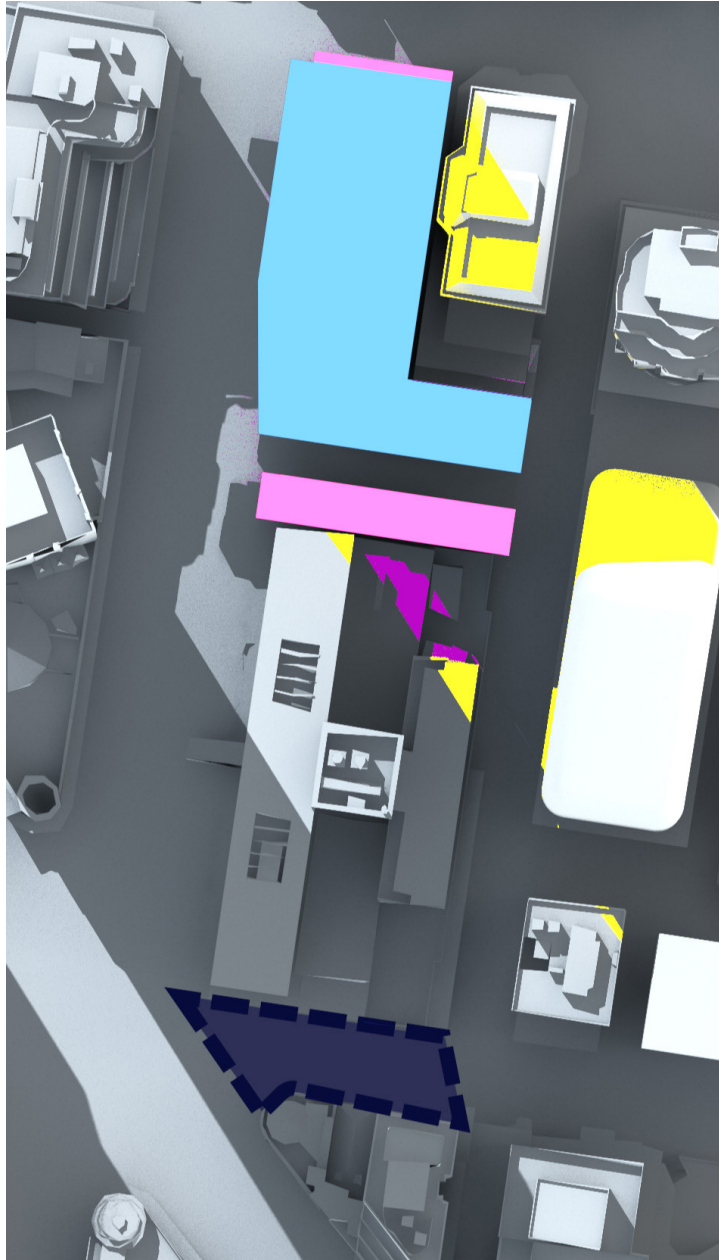




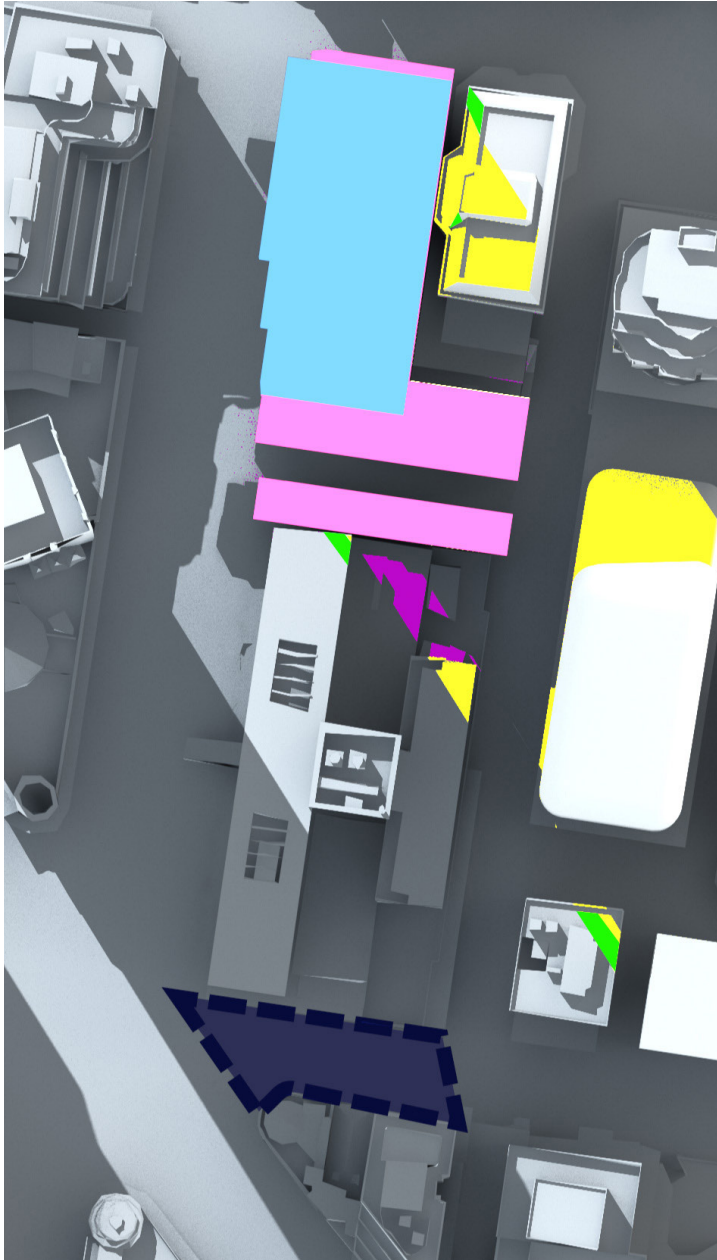
1pm June 21st - Approved Envelope



1pm June 21st - Modified Envelope with Comparison



2pm June 21st - Approved Envelope



2pm June 21st - Modified Envelope with Comparison



# 8.3 SHADOW ANALYSIS

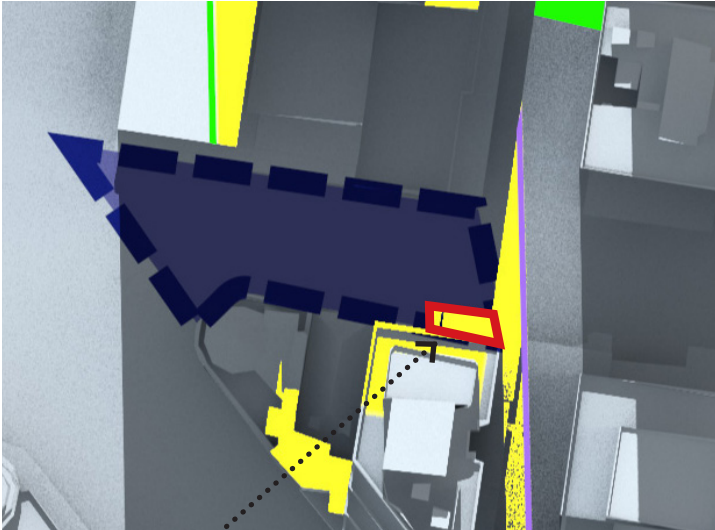
## BRETT WHITELEY SPECIAL AREA

### WINTER SOLSTICE JUNE 21ST

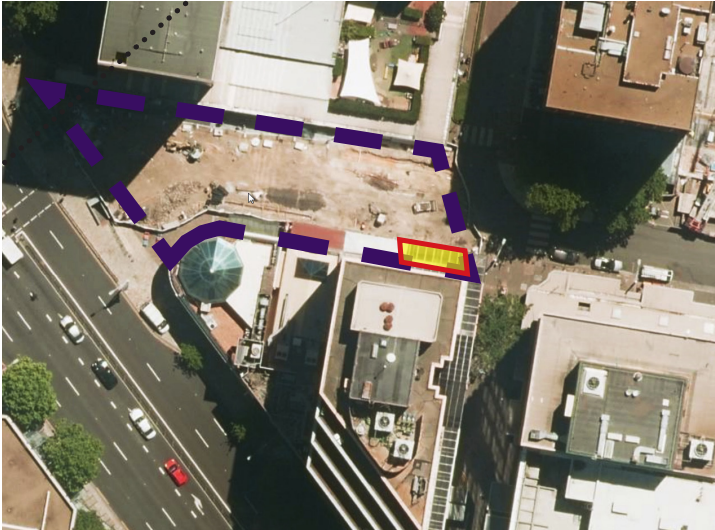
#### BRETT WHITELEY SPECIAL AREA

At 12pm on June 21st, there is a minor additional shadow created by both the approved OSD Concept SSD building envelope and the modified building envelope of 37sqm. However as the following diagrams demonstrate the shadow falls on the awning of the building on the south east corner of the plaza and not onto Brett Whiteley Plaza. The modified envelope neither increases nor decreases the overshadowing of this area from that approved.

- KEY:
- OSD BUILDING ENVELOPE
  - VICTORIA CROSS STATION CSSI ENVELOPE
  - SHADOWS CAST BY EXISTING BUILDINGS
  - SHADOWS CAST BY OSD ENVELOPE
  - SHADOW CAST BY CSSI ENVELOPE
  - REDUCTION OF SHADOWS
  - INCREASE IN SHADOWS
  - BRETT WHITELEY PLAZA



Detail View of Overshadowing on Awning 12pm 21st of June



Detail View of Overshadowing on Awning 12pm 21st of June



Brett Whiteley Plaza