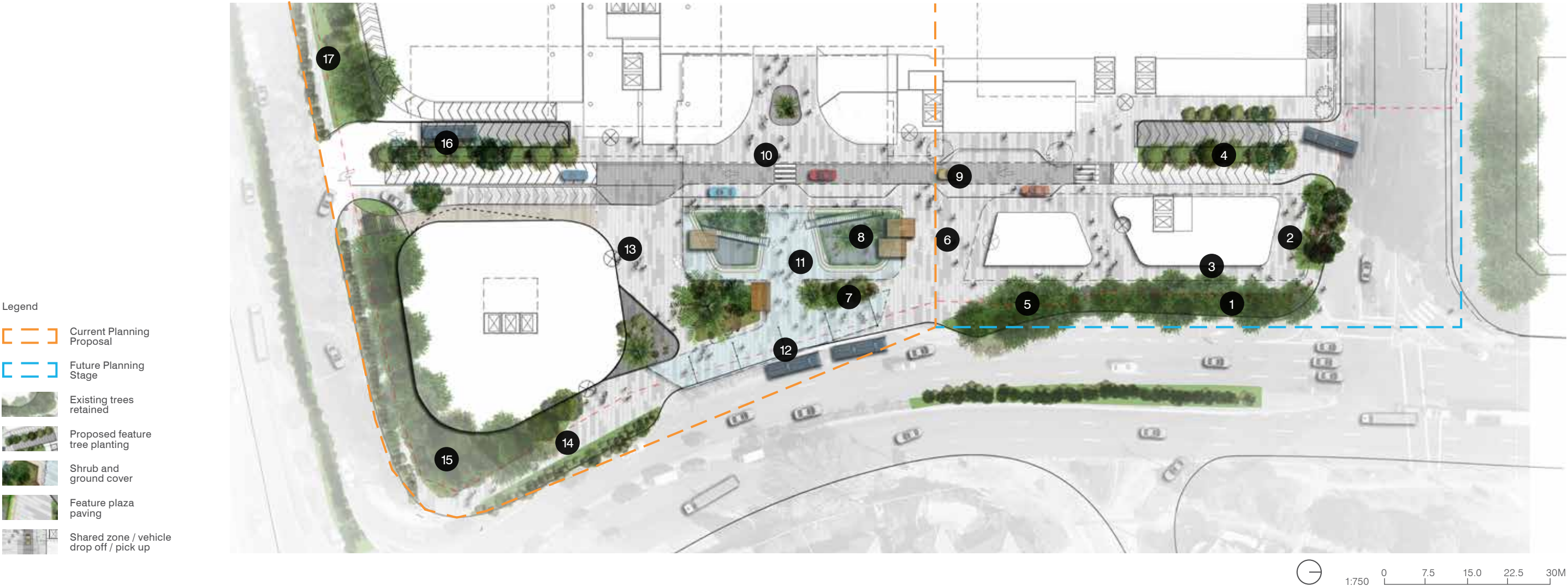




5.4 Landscape Strategy



Landscape Design Statement

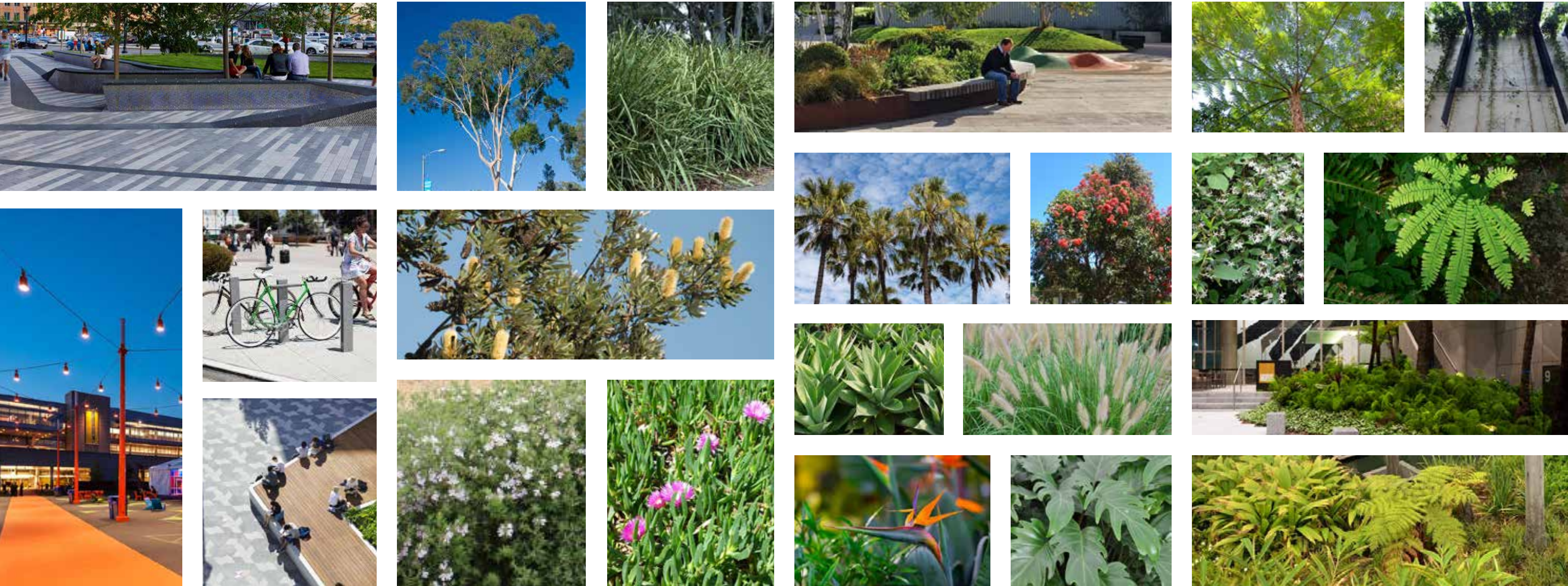
The proposed plaza and bus terminus at the Bunnerong Road frontage of Westfield Eastgardens will provide a new high quality street address for the centre. By re-organising the existing bus terminus and eastern end of the shopping mall the proposal creates a significant pedestrian focussed space set back from the busy road.

High quality paving, planting, street furniture, lighting and public art will combine to create an attractive and green environment for people to arrive, depart, meet, shop and dine. A key aspect of the proposal will be the retention of existing mature trees along Bunnerong Road and Wentworth Avenue within generous landscaped verges that offer visual amenity, protection and separation for pedestrians.

Key Features:

- 1 Existing mature trees along Bunnerong Road retained with new planting to provide an attractive landscape buffer between pedestrians and traffic.
- 2 Ground floor retail with space for outdoor seating to activate the corner of Westfield Drive and Bunnerong Road.
- 3 Pedestrian footpath set back from Bunnerong Road behind landscape buffer (minimum 2 metres) with weather protection from above.
- 4 Tree planting in raised planters to soften basement and vehicle ramp access.
- 5 Feature native tree and shrub planting along Bunnerong Road frontage.
- 6 Paved plaza space with ground floor retail and cafe spill-out spaces.
- 7 Raised planter beds with sculptural seat edges and native feature tree and shrub planting.
- 8 Voids to lower level bus terminus to be landscaped with hanging ground-covers/climbers and lower level shade tolerant gardens.
- 9 Shared zone paving emphasises pedestrian priority whilst allowing for taxi/ride-share pick-up/drop-off.
- 10 Pedestrian crossing on key desire line into the shopping centre.
- 11 Feature glazed canopy provides shelter, lighting and an opportunity for public art.
- 12 Northbound bus bay.
- 13 Plaza area with ground floor activation and spill-out from lobby cafe.
- 14 Improved pedestrian footpath and verge planting.
- 15 Existing mature trees to the boundary of Bunnerong Road and Wentworth Avenue retained with additional native tree and shrub planting.
- 16 Tree planting in raised planters to soften basement and vehicle ramp access.
- 17 Existing mature tree planting retained along Wentworth Avenue to maintain landscape buffer

Landscape Strategy



Materials and Furniture

High quality hard landscape materials will be selected to create a tactile and pedestrian focussed plaza space. Unit paving will extend over vehicle surfaces to indicate a slow speed environment for drop-off and pick-up movements.

Multiple seating opportunities will be created using sculptural benches and seat walls along planter beds as well as flexible furniture that can accommodate cafe spill out and ‘alfresco’ dining.

Street furniture such as bins, bollards, signage and lighting will be designed to minimise clutter and leave spaces free for pedestrian movement and activity.

Planting Strategy

The soft landscape has been designed to make the most of existing mature vegetation supplementing this to create a lush green space that provides sanctuary from the busy surrounding road environments.

3 planting typologies are proposed including:

1. Native Coastal Landscape Buffers

These include the existing mature trees along Bunnerong Road and Wentworth Avenue. The trees will be retained within generous verges that will be planted with hardy native tree and shrub species.

2. Feature Raised Planters

Sitting within the plaza the planters serve to break up the space with attractive, dense and green textured layers of foliage and flowering plants. The raised edges allow for sculptural seat walls where people can rest, meet or wait for transport.

3. Temperate Rainforest Light Wells

These spaces allow light and pedestrian access to the bus terminus and south bound buses below. Ground covers will fall down from planter boxes at the plaza level while lush gardens will spring from the level below reaching back up towards the light.

5.5 Architectural Character, Materials and Finishes

Proposed Materials

High quality materials and finishes will be selected for buildings and structures surrounding the eastern entry plaza.



Tower A: A-grade commercial building
A high quality A-grade office tower with floor plates of approximately 1,220 sqm (GLA) and a curtain glass facade. The building is setback a minimum 35 metres from the southern boundary to minimise shadow impacts.



Tower B: Mixed use cultural, community and commercial building
Occupying a significant position on the corner of Wentworth Avenue and Bunnerong Road, the mixed use building will be an iconic statement that marks the corner. The ground floor will have a reverse level setback to increase the public domain around the entrance and civic plaza, and to increase pedestrian permeability around the whole perimeter. It will be constructed of a palette of high quality materials including a curtain glass facade.



Building C: Enlarged existing commercial
The existing commercial floorplate will be enlarged to approximately 1,600sqm (GLA) and clad with external blades to soften the materiality of the existing building and respond to the human scale at its low height.



Canopy
A sculptural glazed canopy is proposed to provide shelter over parts of the plaza, particularly between the bus stop and the entry to the centre, as well as over the escalator voids to the bus terminus below. Whilst it is shown as clear glass for clarity in the indicative computer generated images (CGI's), there will be sun-shading built in to the detailed design.



Kiosks
Kiosks in the plaza will provide retail opportunities activating the space. They are proposed to be single storey flexible, operable timber clad structures located below the glass canopy.



Public Art
There is an opportunity to commission public art for the plaza that draws on the indigenous heritage, the coastal location and the industrial uses of the port precinct.



5.6 Westfield Drive interface / activation strategy

Role of Westfield Drive

Westfield Drive has performed a critical role in loading and servicing the centre since its original construction in 1987, and also assisted in loading of the previous BATA industrial site. In the last three years the redevelopment of the former industrial BATA site to a high density residential neighbourhood has resulted in an emerging use of Westfield Drive for pedestrian access to the bus interchange and retail services. This was not contemplated in the original design and construction, nor was it considered or addressed as part of approving the Meriton residential development. This dual function now presents some changing community expectations and pedestrian conflicts that the Westfield applicant is being requested to address.

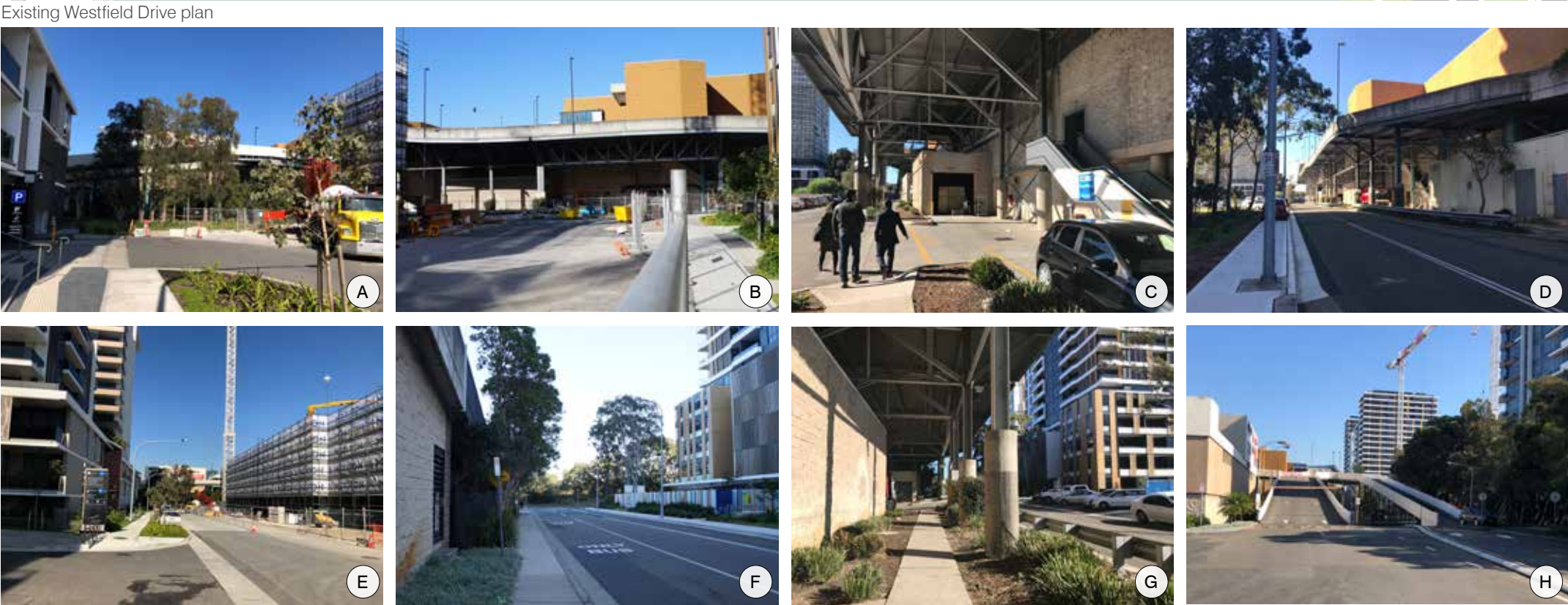
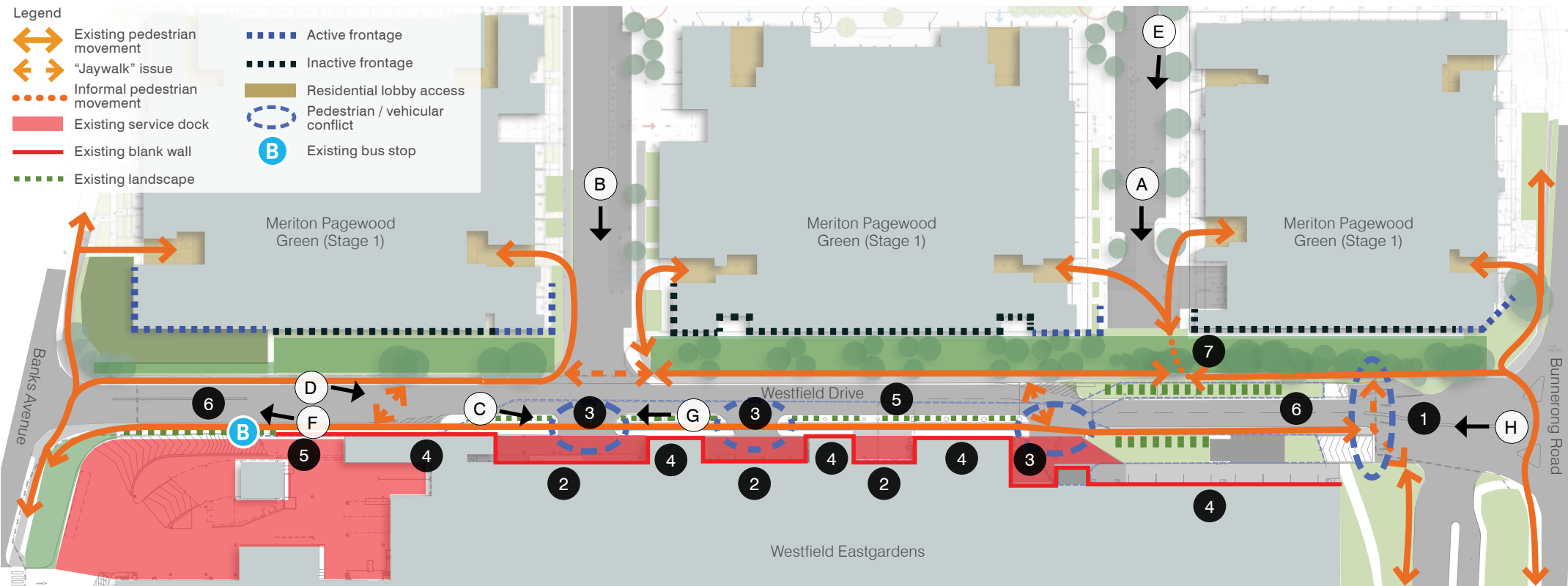
Existing conditions and observations

While vehicle traffic is low, vehicles tend to move at high speeds. In addition, pedestrian amenity is low with few opportunities to cross Westfield Drive and circulate north-south. While the existing loading docks are essential to the operation of the shopping centre, they present a blank interface to the street and create potential conflicts between truck and pedestrian movements. It is important that the pedestrian amenity and safety of Westfield Drive is improved.

The existing condition along Westfield Drive is illustrated in the adjacent photographs.

Key issues

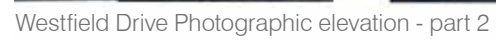
- 1 Existing footpath layout influences pedestrians to cross Westfield Drive towards the bus interchange at the bottom of carpark ramps presenting safety issues.
- 2 Loading dock area visible from public domain.
- 3 Potential for pedestrian and loading truck conflict at loading dock entry.
- 4 Blank walls present a hard interface to the pedestrian footpath.
- 5 Existing landscaping is sparse along footpath.
- 6 Traffic often travels at high speed along Westfield Drive.
- 7 Lack of path from the Meriton internal street to the footpath results in an 'ant trail' through the landscaped verge of the Meriton site.



Westfield Drive Photographic Elevation Part 1

Westfield Drive Photographic Elevation Part 2

Westfield Drive Photographic Elevation Part 3



Key issues

- 1 Existing footpath layout influences pedestrians to cross Westfield Drive at the bottom of carpark ramps presenting safety issues, particularly across the 'down' ramp.
- 2 Loading dock area visible from public domain.
- 3 Potential for pedestrian and truck conflict at loading dock entry.
- 4 Blank walls present a hard interface to the pedestrian footpath.
- 5 Existing landscaping is sparse along footpath.

- 2 Loading dock area visible from public domain.

- 3 Potential for pedestrian and truck conflict at loading dock entry.

- 4 Blank walls present a hard interface to the pedestrian footpath.

- 5 Existing landscaping is sparse along footpath.

Proposed Westfield Drive Improvement Strategy

The Westfield Drive improvement strategy aims to clearly delineate pedestrian and vehicle movement. The strategy is to improve pedestrian connections with the Meriton Pagewood Green circulation network at either end of Westfield Drive, and direct pedestrians away from the main dock entries in the centre of Westfield Drive.

There are a number of proposed improvements which will assist in achieving this, including:

Separating pedestrians from loading areas

- The generous landscaped setback to the Meriton buildings to the north of Westfield Drive acts as a natural incentive to use the northern footpath for pedestrian travel.
- Improvement works will add crossings to the south of Westfield Drive at locations either side of the central loading area. This will encourage pedestrians to cross to the southern side once they are beyond the dock area, to the eastern and western ends of the street.

Traffic calming

- Raised crossings are proposed near the intersection of the new Meriton site streets. These are intended to provide clear points of pedestrian crossing, as well as to slow traffic and deter 'rat-running' through Westfield Drive.
- 'Chicane' style traffic calming is not recommended as this cannot be navigated by buses and loading vehicles that use the street.

Pedestrian priority

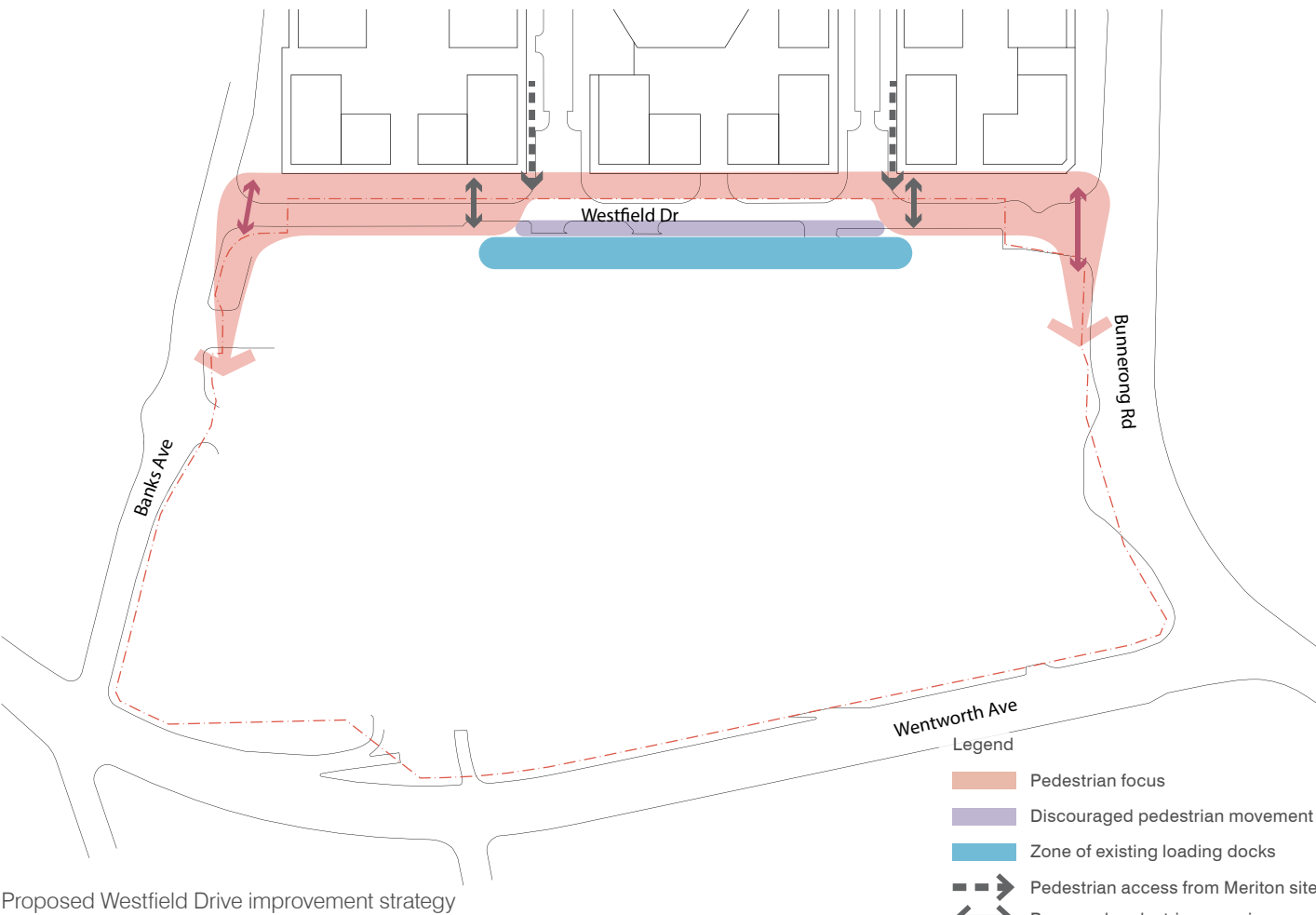
- The raised crossings slow traffic, prioritise pedestrians and increase the visibility of pedestrians crossing.
- A variety of options for circulating are proposed to suit individual pedestrian needs and offer best practice urban design connectivity.
- A pedestrian barrier in the centre of the road was discussed with Council, but is not proposed as it is felt that it would prioritise vehicular movement, encourage increased speed from vehicles, and result in a hostile pedestrian environment.

Improved amenity

- New landscaping is proposed to improve the amenity and comfort of the street and provide a buffer against the loading docks. It is proposed to use a mixture of low planting to enable visibility and ensure pedestrian safety, as well as some taller planting to provide a canopy and shade.

Safety and security

- The safety of the pedestrian path between the substation and the shopping centre has been discussed with Council. It was determined that in Stage 1, it will be important to retain this connection in order to offer sufficient choice for pedestrians, and that the short length of obscured path can be managed with CCTV. In Stage 2, the public domain will rise to the Bunnerong Plaza level after the electricity substation to provide improved visibility and surveillance of the space.



Proposed Westfield Drive improvement strategy



Raised crossing slows traffic and improves pedestrian safety and visibility



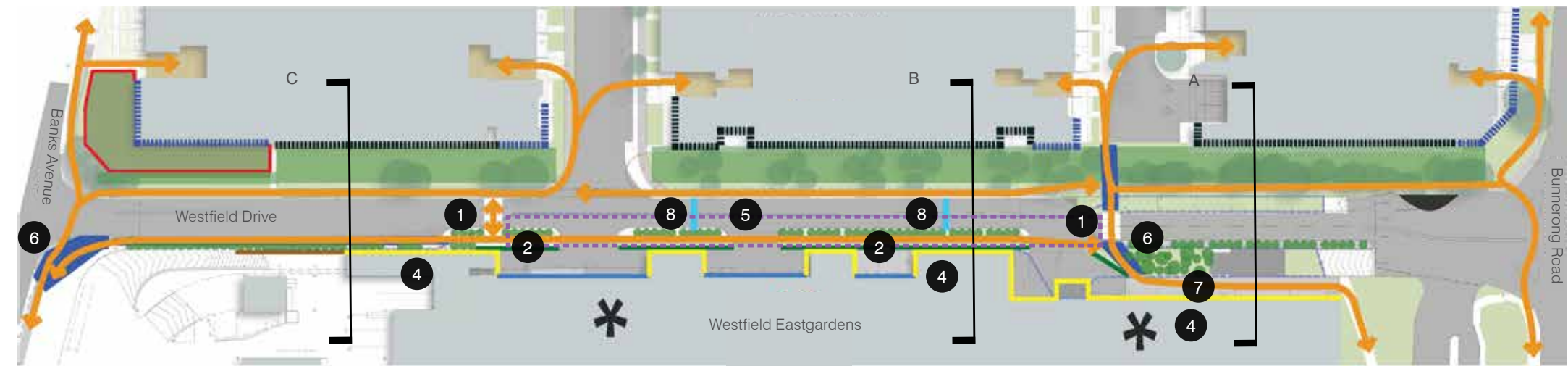
A barrier in the centre of the road can be frustrating for pedestrian choice, and prioritises vehicular movement

Westfield Drive interface / activation strategy

Proposed improvements

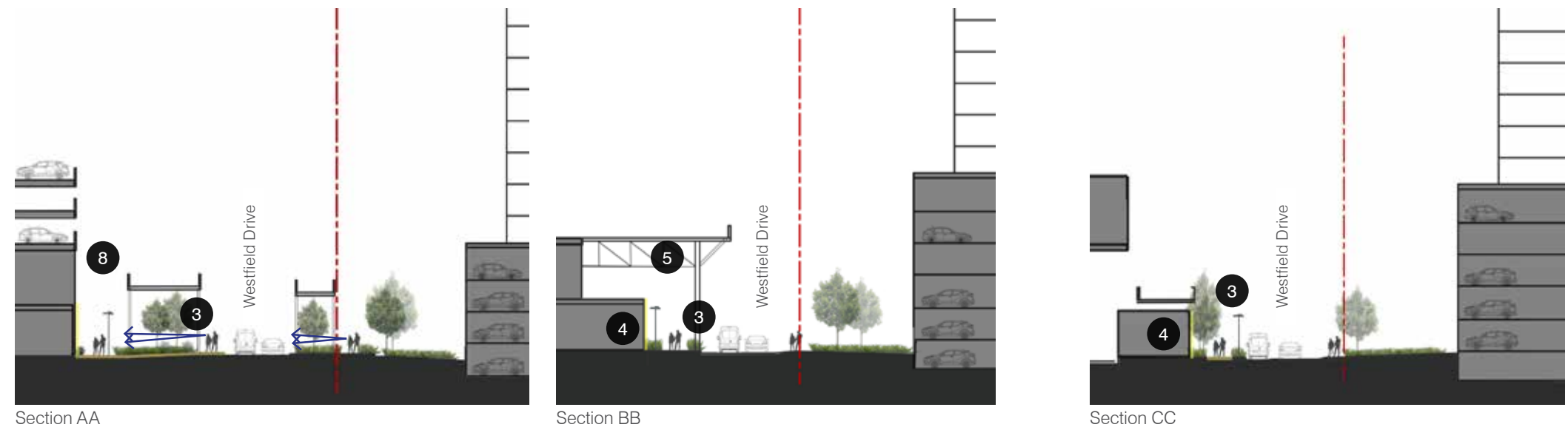
It is proposed to slow traffic, prioritise pedestrians and improve amenity on Westfield Drive with the following interventions:

- 1 Provide dedicated crossing points for pedestrians with a raised 'Wombat' crossing, to improve pedestrian safety and slow traffic.
- 2 Plant a landscape buffer to minimise sight lines into loading docks, while maintaining passing surveillance.
- 3 Enhance tree planting along footpath with clear stems up to 2m to ensure good surveillance, and improve lighting.
- 4 Introduce public art on blank facades appropriate to the context.
- 5 Introduce up-lighting to the structure to highlight the character of the place.
- 6 Widen the footpath to improve pedestrian amenity, particularly at corners.
- 7 Upgrade laneway with public art, graphic wayfinding and lighting
- 8 Introduce speed humps to slow traffic



Proposed Westfield Drive improvement strategy

- Legend
- Existing pedestrian movement
 - Existing landscape
 - Active frontage
 - Inactive frontage
 - Existing fenceline
 - Residential entry lobby
 - Improved landscape (southern edge)
 - Treatment to blank wall
 - Public art
 - Screening
 - Landscape hedge to 1,200mm height
 - Improvement to underside of slab above
 - New footpath extension
 - Visual treatment important due to terminating viewline, potential to incorporate with unobtrusive retail signage
 - New speed hump



Westfield Drive interface / activation strategy

Public domain inspirations



Low level landscaping in London by Townshend Landscape Architects



Evenglide Showroom, Blackburn, Victoria



Westfield Tea Tree



Example uplighting



Example wayfinding signage from King Abdul Aziz City for Science and Technology, Saudi Arabia



Metal exterior screening with climbing vine, by Michael Hennessey Architecture

Westfield Drive interface / activation strategy

Public art activation inspiration
Examples from recent Scentre Group developments



Westfield Chermside



Westfield Coomera



Westfield Northlakes



Westfield Plenty Valley



Westfield Plenty Valley



Westfield Tea Tree



Westfield Carousel

6 Testing and Assessment

This section provides detailed analysis of the view and overshadowing impacts of the proposal on the surrounding context.

6.1 View Impact Assessment

View Impact Assessment

The assessment and categorisation of visual impacts is based on the New South Wales Land and Environment Court Planning Principles and a qualitative assessment is set out under the following headings:

- Importance of the view;
- Visual impact; and
- Visual absorption capacity.

A visual simulation (photo-montage) of the proposed development has been prepared for each view that was nominated with Council for detailed visual impact assessment. The photo-montage was then used to determine the visual impact of the proposed development.

The photo-montages shown demonstrate the building form only; they do not show detailed articulation or material selection.

The importance of the view is defined differently for public domain and private views with weighting applied which is consistent with the New South Wales Land and Environment Court Planning Principles. The criteria are defined as follows.

An understanding of the field of view of photographs and photomontages is important in understanding impacts represented on a page. One standard typically adopted in NSW is the use of a 35mm FX format camera at 50mm focal length (or equivalent) to represent a view on a page similar to how it would be perceived by the human eye at the location.

However, for this project, a 50mm focal length would not provide a clear understanding of the breadth of the view and/or the size of the proposal. Therefore, throughout our view impact assessment a wider-angle view has been used.

All photos were captured on a Nikon D3100 which has an APS-C sized sensor (roughly 24mm), this results in a crop factor when compared to a 35mm FX (full frame) sensor. As such, although all photos were taken at 18mm, their equivalent 35mm focal length is 27mm.

LIDAR Model
To assist in the positioning of the camera, a 3D model was purchased from Near Map. This was generated from a LIDAR survey of the site and its surrounds. After matching focal length and positioning the camera, this allowed each view to be made as accurate as possible.

Importance of the public domain view

It includes consideration of the following factors:

The context of the viewer (including whether the view is static or dynamic, obtained from standing or sitting positions);

Elements within the view (including whether iconic elements are present, the existing composition of the view, and any existing obstructions to the view);

- The number of viewers;
- The distance to the proposal; and
- The likely period of view.

The features are described for each view and a final categorisation of view importance has been produced as a summary. The following table provides a definition of example use cases for each categorisation of the importance of the view:

	Definition
High	Unobstructed views of highly valuable or iconic elements from highly important locations in the public domain.
Moderate-High	Generally unobstructed views including important visual elements from well-used locations. The view attracts regular use of this location by the public.
Moderate	Views including elements of moderate importance with little obstruction which are obtained from moderately-well used locations. The view may assist in attracting the public to this location.
Low-Moderate	Views with some important elements which may be partially obstructed or from a less well used location. The view may be a feature of the location however is unlikely to attract the public to it.
Low	Views from spaces or streets with little pedestrian use or obstructed views or views with few important elements. Obtaining views is not a focus of using the space.

Importance of nearby private views

The importance of nearby private views is considered where there are private views facing the site from a location which is near to the photograph from the public domain. The table below provides a definition of the categories used.

	Definition
High	Uninterrupted views of highly important or iconic elements from standing positions in location from front or rear boundaries.
Moderate	Views of some important elements which may have some lower expectation of retention, such as those across side boundaries, seated views or partial views from bedrooms and service areas.
Low	Views with few important elements, highly obstructed views or views where there can be little expectation of retention.

Likely visibility

Likely visibility provides an estimation of how visible the proposal will be in the view. The table below provides a definition of the categories used.

	Definition
High	The proposal will dominate the field of view.
Moderate	The proposal will form part of the overall composition of the view.
Low	The proposal will be noticeable as a minor part of the field of view.
Negligible	The proposal will not be noticeable.

View Impact Assessment

Visual absorption capacity

The visual absorption capacity is an estimation of the capacity of the landscape and built environment to absorb development without creating significant visual change that would result in a reduction of scenic or visual quality. This is usually dependent on vegetation cover, landform and existing built form and is influenced by the level of visual contrast between the proposed development and the existing elements within the physical environment.

The degree of contrast between the various elements of the development and the physical environment/ landscape setting in which they are located determine the level of visual absorption. Factors such as scale, shape, colour, texture and reflectivity of the development compared to the visual context define the degree of contrast. For the purpose of this study, the rating outlined in the table below has been used in the assessment of visual absorption capacity.

This rating concentrates on the bulk of the proposal in relation to screening factors and contextual development.

Rating	Definition
High	Existing landscape and built environment able to absorb development. Low degree of visual contrast will result from building envelopes.
Moderate	Existing landscape able to absorb some development. Some visual contrast will result from building envelopes.
Low	Existing landscape unable to absorb development. High degree of visual contrast will result from building envelopes.

Some elements which form part of the consideration of view importance can be quantitatively estimated. The table below shows the criteria used in evaluating the relative number of viewers and period of view.

Relative number of viewers	Definition
High	> 1000 people per day
Moderate	100 - 1000 people per day
Low	< 100 people per day
Period of view	Definition
High (long-term)	>60minutes
Moderate	1-60 minutes
Low (short-term)	<1 minute

Conclusion

The study considers the view impacts from a variety of points in the nearby vicinity and further away from the site.

The visual impacts on the wider context are low to negligible as there is little local change in topography and no high points of note, so proposed buildings are generally either not visible from beyond the immediate vicinity or are viewed within the context of other similarly scaled development.

The visual impacts on views in the immediate vicinity as a result of the proposal can be categorised into three broad categories:

Firstly, from south of the site in the residential streets with single detached dwelling typology views have a higher visibility and lower visual absorption capacity, due to the towers being seen in the context of single storey houses in the foreground, and without the backdrop of the Meriton site development which is further away and therefore less visible. Views from the residential areas to the south are generally moderate, but are deemed acceptable given the emerging urbanised context and the role that the commercial core must play in the strategic centre.

Secondly, as seen in views from the north and east in the vicinity of Bunnerong Road and the Meriton site, the proposal is highly visible, but also has a high visual absorption capacity due to being seen in context with the new development on the Meriton site and the busy roads. The view of the proposal from the new public open space on the Meriton site (view 13) preserves the view of sky at the end of the street block. Therefore, from the north and east, view impacts are considered to be low, and in keeping with the context.

Thirdly, in views of the proposal from the west from Banks Avenue, from the approach along Wentworth Avenue and from Mutch Park it its evident that the visibility of the proposal is moderate to low. From Mutch Park, the proposal is only slightly visible, unless seen from a rarely frequented high point near the fence (view 11). From the Banks Avenue and Wentworth Avenue approach the proposal is visible but does not dramatically change the context of the existing view. From the west, the view impacts are therefore considered to be low and acceptable.

View Impact Assessment

Views
Fourteen views have been chosen in collaboration with Bayside Council to analyse view impacts generated by the proposed design included in the Planning Proposal.

All views are in the immediate vicinity of Westfield Eastgardens except for View 9, which is from Maroubra Junction, location illustrated in the map on the facing page.

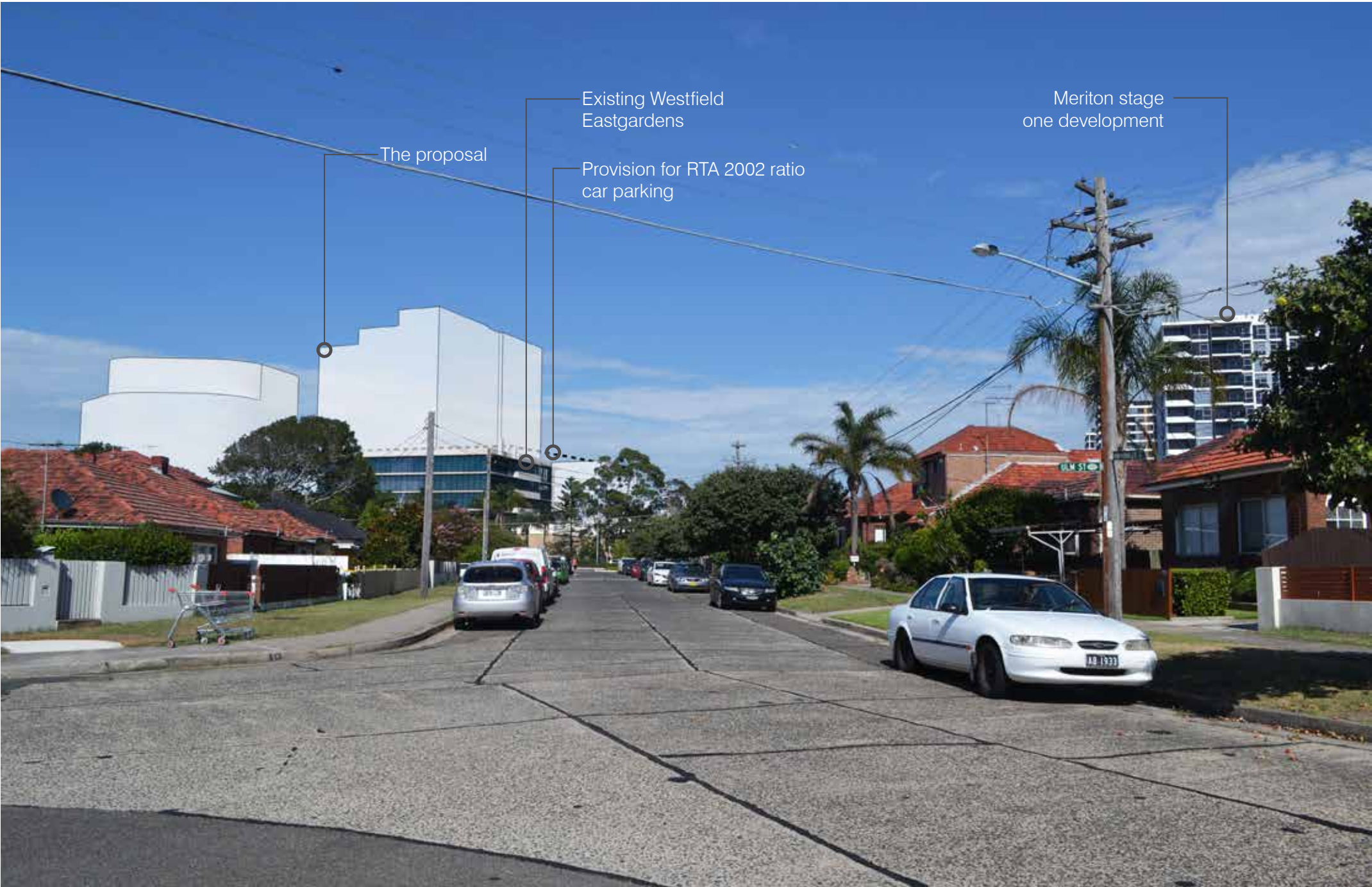




1 Hinkler Street



Description of view	This view looks west down Hinkler Street and across Bunnerong Road toward the proposal. Meriton's stage one development can be seen to the right of the image.
Context of viewer	Primarily from cars travelling toward Bunnerong Road
Importance of the public domain view	Low
Importance of nearby private views	Low
Likely visibility	High
Likely period of view	Low
Relative number of viewers	Low
Visual absorption capacity	Low



2 Bunnerong Rd



Description of view	This view looks south down Bunnerong Rd, with low-scale residential housing on the left and recently constructed high density residential on the right. The existing Westfield Eastgardens entrance can be seen. With the future stage development, greater built form relationship with and transition to the neighbouring Meriton site will be achieved.
Context of viewer	Primarily from cars travelling south along Bunnerong Road, also from cars waiting at the intersection and lights.
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	High
Likely period of view	Moderate
Relative number of viewers	High

Visual absorption capacity



3 Hensley Athletic Field



Description of view	This view looks north over Hensley Athletic Field, proposed Westfield development forms a low band over the trees with multiple towers from the Meriton development to be visible behind this. The proposal on the eastern edge.
Context of viewer	Primarily users of the athletic field (not publicly accessible), small amount of pedestrian foot traffic
Importance of the public domain view	Medium
Importance of nearby private views	N/A
Likely visibility	Moderate
Likely period of view	Moderate
Relative number of viewers	Low
Visual absorption capacity	Medium



4 Wentworth Ave + Corish Cir



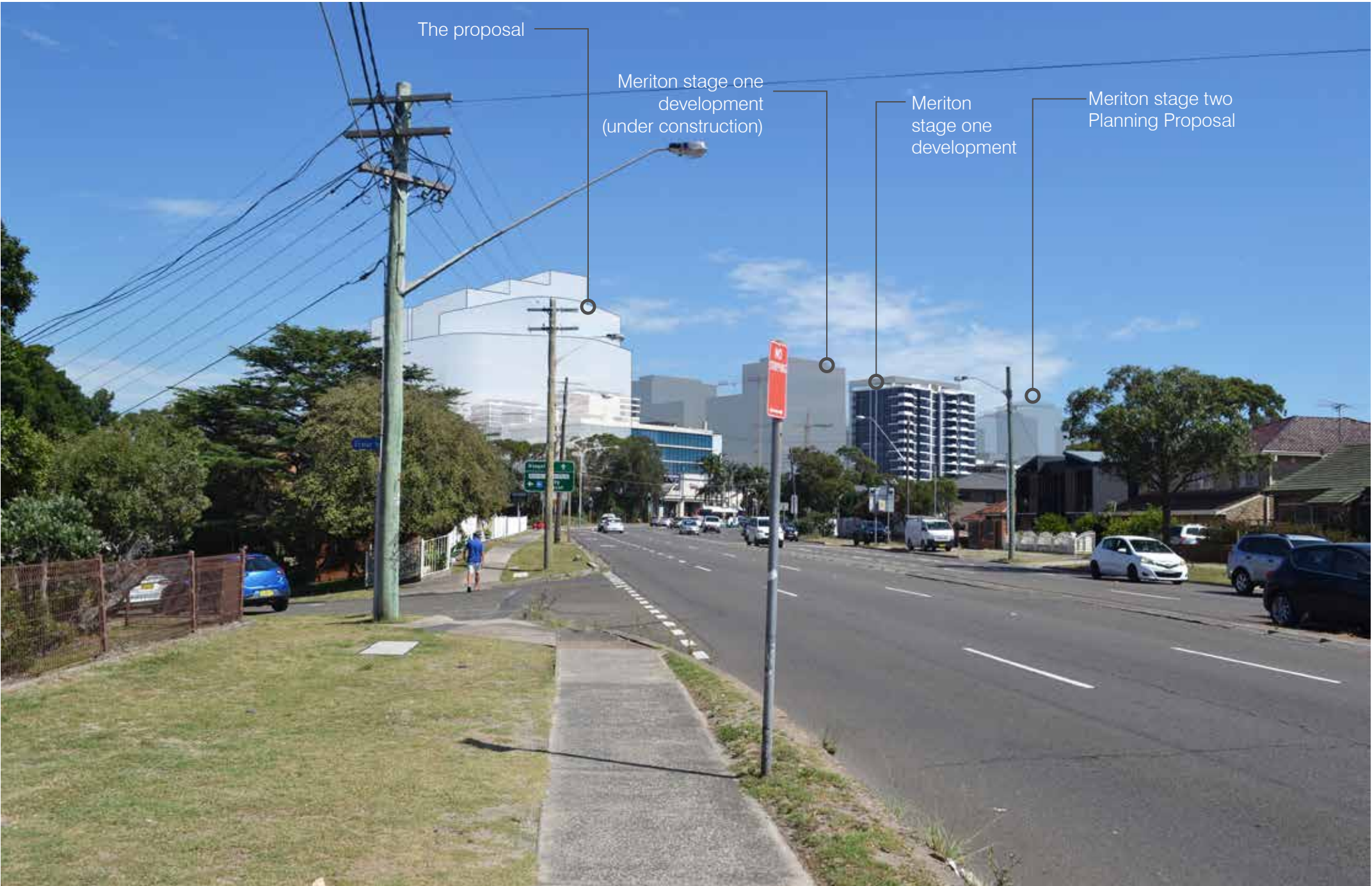
Description of view	This view looks west towards Westfield Eastgardens at a major intersection. The proposal is obscured by existing buildings, and will not be visible when the proposed entertainment and leisure precinct is complete.
Context of viewer	Eastbound traffic, waiting at the lights. Light pedestrian activity.
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	Low
Likely period of view	Moderate
Relative number of viewers	High
Visual absorption capacity	High



5 Bunnerong Rd + Fraser Ave



Description of view	This view looks north towards the site down Bunnerong road. Built and proposed form aligns at a consistent height.
Context of viewer	Primarily motorists traveling north. Medium pedestrian traffic due to bus stops along Bunnerong road.
Importance of the public domain view	Low
Importance of nearby private views	Low
Likely visibility	High
Likely period of view	Moderate
Relative number of viewers	High
Visual absorption capacity	Medium



6 Boonah Avenue



Description of view	This view looks north over low scale residential properties. It is taken near the crest in the road.
Context of viewer	Primarily from private residences, low number of pedestrians.
Importance of the public domain view	Low
Importance of nearby private views	Moderate
Likely visibility	High
Likely period of view	Low
Relative number of viewers	Low
Visual absorption capacity	Low



7 Banks Ave + Westfield Dr



Description of view	This view looks south down Banks avenue, Meriton stage one sits just off camera to the left, the existing Westfield Eastgardens can be seen through the trees, with the proposed entertainment and leisure precinct in the distance. The proposal is not visible from this location.
Context of viewer	Primarily motorists traveling south, waiting at the lights.
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	Negligible
Likely period of view	N/A
Relative number of viewers	N/A
Visual absorption capacity	N/A



8 Wentworth Ave



Description of view	This view looks west from Wentworth Ave, over Bonnie Doon Golf Club. Foliage and fencing heavily obstruct the view.
Context of viewer	Primarily from traffic traveling east.
Importance of the public domain view	Low
Importance of nearby private views	Moderate
Likely visibility	Low
Likely period of view	Low
Relative number of viewers	Moderate
Visual absorption capacity	High



9 Maroubra Junction



Description of view	This view looks south west over Anzac parade, from Maroubra Junction. Due to the distance and the existing height of built form at Maroubra Junction, the proposal is not visible from this location.
Context of viewer	High levels of both vehicular and pedestrian traffic.
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	Negligible
Likely period of view	N/A
Relative number of viewers	N/A
Visual absorption capacity	N/A



10 Mutch Park Nth



Description of view	This view looks south east over Mutch Park, development from Meriton's stage one is most prominent. Due to the distance, topography and foliage, the proposal is mostly hidden from view
Context of viewer	Primarily from people using the park recreationally
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	Low
Likely period of view	Moderate
Relative number of viewers	Low
Visual absorption capacity	High



11 Mutch Park Sth (crest)



Description of view	This view looks south west over Bonnie Doon Golf Club, from the top of the hill in Mutch Park.
Context of viewer	Very low foot traffic, as it is a crest at the edge of the park.
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	Moderate
Likely period of view	Low
Relative number of viewers	Low
Visual absorption capacity	Moderate



12 Smith St



Description of view	This view looks north over low-scale residential development. Meriton stage one is only visible between houses. The tower of the proposal breaks the profile of the roofs.
Context of viewer	Light foot and vehicular traffic.
Importance of the public domain view	Low
Importance of nearby private views	Low
Likely visibility	Moderate
Likely period of view	Low
Relative number of viewers	Low
Visual absorption capacity	Moderate



13 Meriton Site



Description of view	This view looks south through the Meriton site development from the future open space the existing Westfield Eastgardens is visible in the distance, with the proposal in line with the Meriton built form.
Context of viewer	High pedestrian and vehicular traffic once the Meriton site is completed.
Importance of the public domain view	Low
Importance of nearby private views	Low
Likely visibility	Low
Likely period of view	Moderate
Relative number of viewers	Moderate
Visual absorption capacity	High



14 Wentworth Ave + Denison St



Description of view	This view looks east down Wentworth avenue, the corner of Denison Street, a major intersection which is one of the main entries to the Westfield Eastgardens carpark.
Context of viewer	Heavy vehicular traffic and moderate pedestrian traffic. Waiting at lights increases period of view.
Importance of the public domain view	Low
Importance of nearby private views	N/A
Likely visibility	Moderate
Likely period of view	Moderate
Relative number of viewers	High
Visual absorption capacity	Moderate



6.2 Overshadowing Assessment

Overshadowing Assessment

This section analyses the overshadowing impacts cast by the proposal on the local area. Shadows were assessed during the winter solstice, as well as on the spring and autumn equinox, between the hours of 9am and 3pm, against the following DCP controls as quoted in the adjacent table:

- Botany Bay DCP 2013 Policy 4A Dwelling Houses,
- 4.3 Solar Access, Controls C1, C3 and C5; and
- 4.4 Private Open Space, Controls C4 and C5.

The dwelling houses DCP was used in the absence of any pre-existing DCP for a commercial centre, and because it represents a more conservative standard in response to the neighbouring dwelling houses.

The study indicates that during the winter solstice the proposed towers cast long shadows that are relatively fast moving and affect the surrounding residential areas for relatively short periods of time. The greatest impact on residential dwellings is seen in the area immediately to the south of Wentworth Avenue. There are 5 houses on Wentworth Avenue (Numbers 244, 246, 248, 250, 252) that have been tested in more detail on the following pages as they are not currently able to comply with Clause C1 and C3 due to self-shadowing.

The detailed study for the 5 dwellings is broadly divided into 3 categories:

1. An analysis of existing and proposed overshadowing to primary private open space to the rear of dwellings
2. A desktop analysis to identify the likely location of living rooms in the 5 dwellings that are impacted by the proposal
3. An analysis of existing and proposed overshadowing to the front yards of the 5 dwellings that are impacted by the proposal.

Shadow impacts were further tested at the equinox, to test compliance with Section 4A.4.3, Clause C5 (refer to the end of this chapter).

Summary of findings

Outcomes of the shadow studies are seen on the following pages, and are summarised as follows:

- The proposed massing creates additional overshadowing impacts to some of the southern properties fronting Wentworth Avenue. While most of the impacts are minor, and do not impact on the minimum solar access requirements specified within the DCP, there are 5 dwellings that required more detailed overshadowing analysis (due to the self-shadowing of their own private open space).
- There is no additional overshadowing to primary private open space at the rear of the 5 properties as per Section 4A.4.3, Clause C3.
- A desktop study has revealed that it can be reasonably assumed that the living areas of the 5 houses in question are located at the rear/ southern side of each property and so do not require the minimum 2 hours of solar access on 21 June to their front façades. (per 4A, 4.3, clause C1)
- Not withstanding the location of living areas for the 5 dwellings and primary areas of open space, the proposal ensures a minimum of 1 hour solar access to the front building façades and a minimum of 1 hour solar access to at least 50% of the front-yards in mid winter between the times of 9am to 3pm which is considered reasonable in the context of this location, and objectives of the strategic centre.
- It was found that between the equinox times (from the 21st September to 21st March), the proposed development does not create any additional overshadowing impact to the adjacent properties (and beyond the equinox times from approximately the 3rd August to the 10th May, all properties achieve a minimum of 2 hours solar access to 100% of the front yards and northern facade of the 5 properties in question).

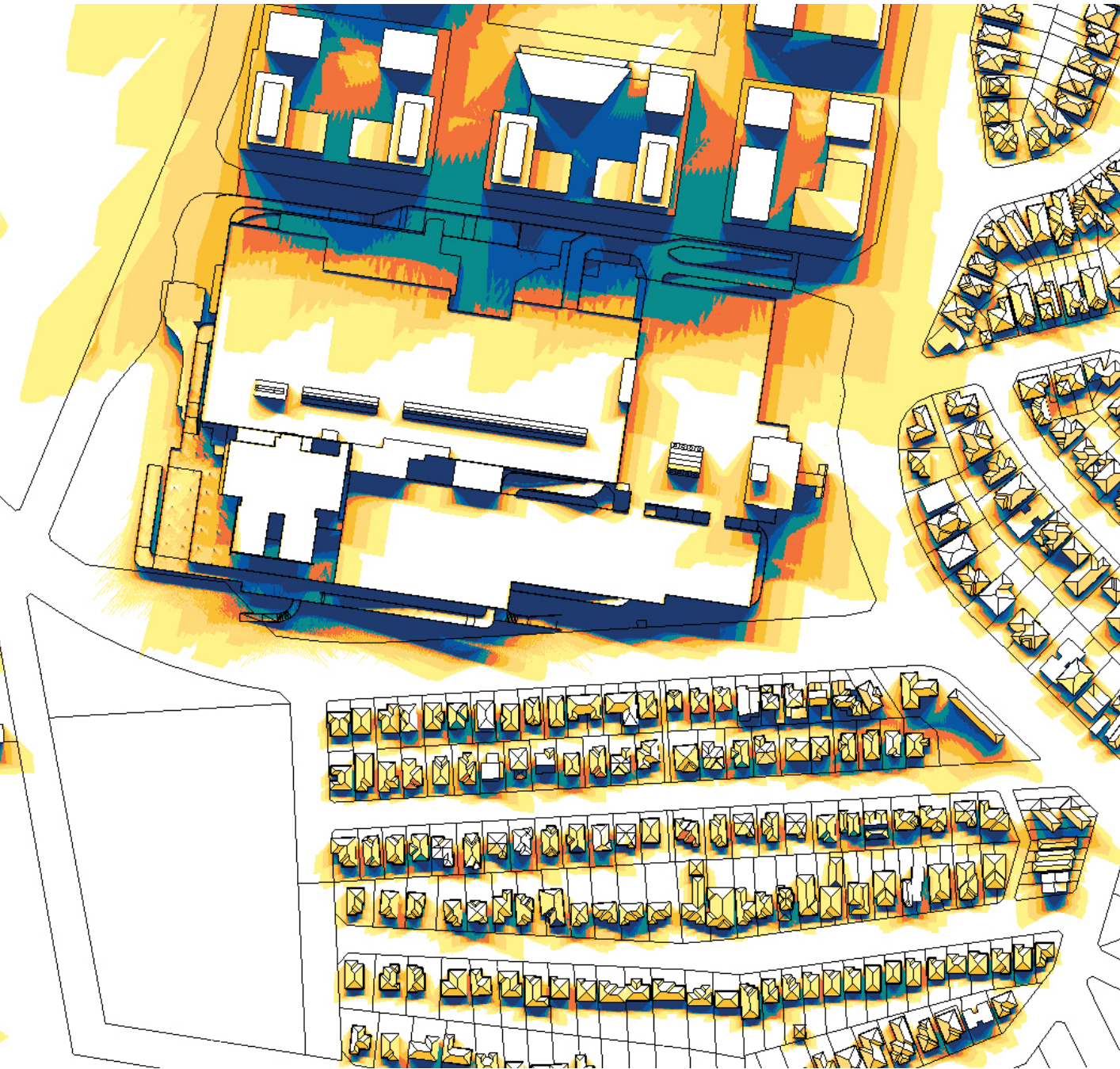
The proposed massing has been designed and amended to minimise overshadowing impacts on the dwellings to the south, however some small impacts as outlined above are considered reasonable at this interface between a strategic centre with B3 Commercial Core zoning and a relatively low-density residential area that has the potential for enhanced development over time.

Policy	The Botany Bay DCP 2013, Policy 4A Dwelling Houses
4A, 4.3 Solar Access Section C1	<i>Buildings (including alterations/additions/extensions) are to be designed and sited to maintain approximately 2 hours of solar access between 9am and 3pm on 21 June to windows in living areas (family rooms, rumpus, lounge and kitchens) and to 50% of the primary private open space areas of both the subject site and adjoining properties.</i>
4A, 4.3 Solar Access Section C3	<i>Where the primary private open space of an adjoining development currently receives less than the required amount of sunlight on 21 June (50% coverage for a minimum of 2 hours), the proposed development must not further reduce the amount of solar access to the private open space of the adjoining development.</i>
4A, 4.3 Solar Access Section C5	<i>Where a neighbouring development currently receives less than the required amount of sunlight (on 21 June) the amount of sunlight available on the 21 March or the 21 September will be assessed and form a merit based assessment of the Development Application.</i>
4A.4.4 Private Open Space C4	<i>Areas within setbacks are not to be included as private open space unless they have a minimum width of 3 metres.</i>
4A.4.4 Private Open Space C5	<i>The primary private open space area is to be located at the rear of the property.</i>

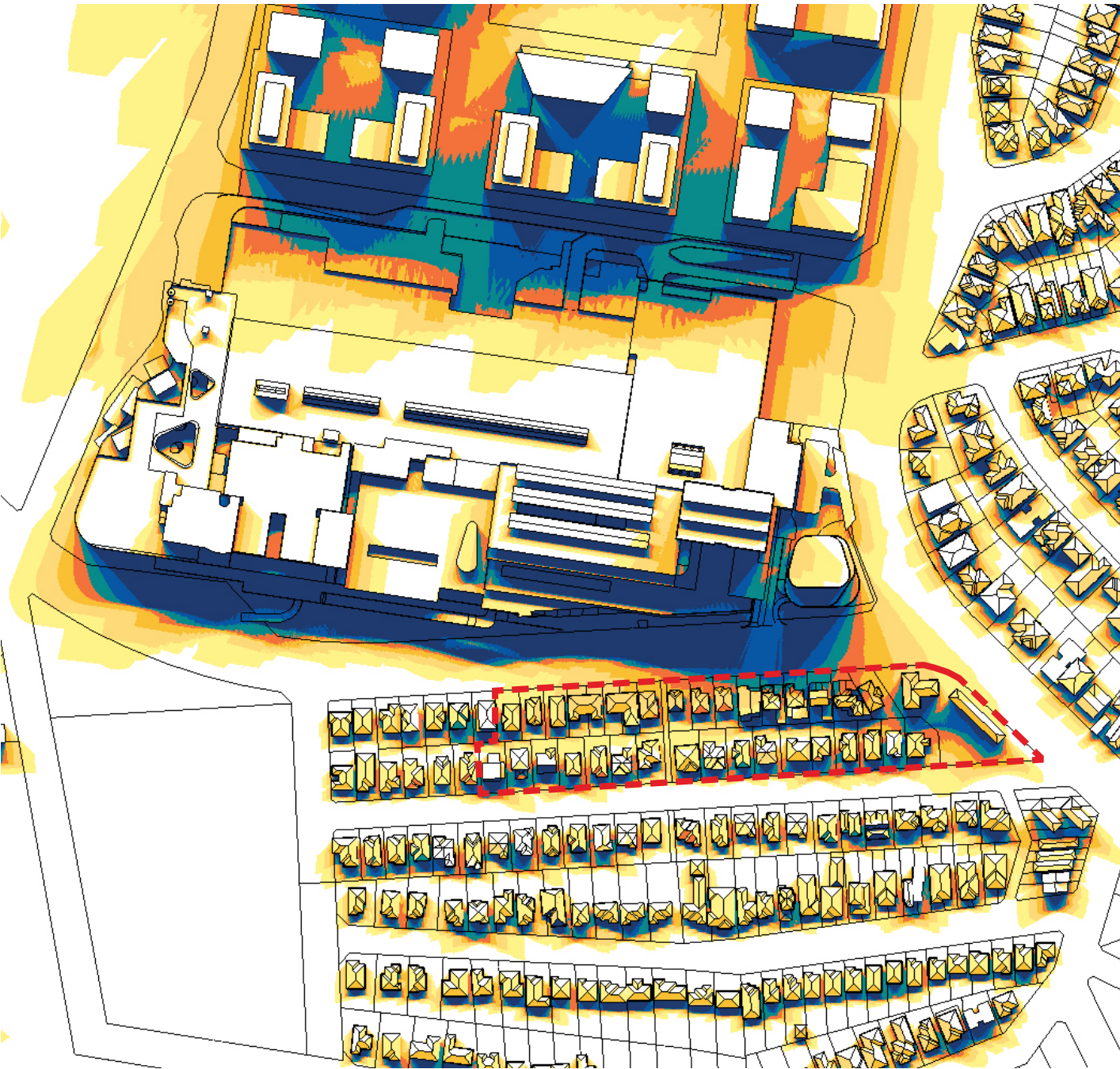
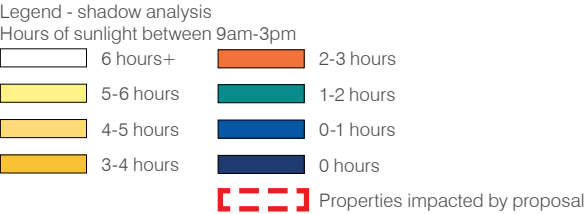
*3D model

Note the 3D model used for the shadow studies was adapted by Architectus from a 3D model purchased from Near Map. The Near Map model was generated from a LIDAR survey of the site and its surrounds. The format of the model includes elements such trees and cars in the 3D geometry, which are not able to be isolated and as such it was necessary to create a new simple built form model with which to test the overshadowing impacts of the proposal. While every care was taken to ensure accuracy, Architectus can not take responsibility for the accuracy of the 3D model used for the shadow assessment.

Overshadowing Assessment



Existing buildings Shadow analysis from 9am to 3pm
(21 June)



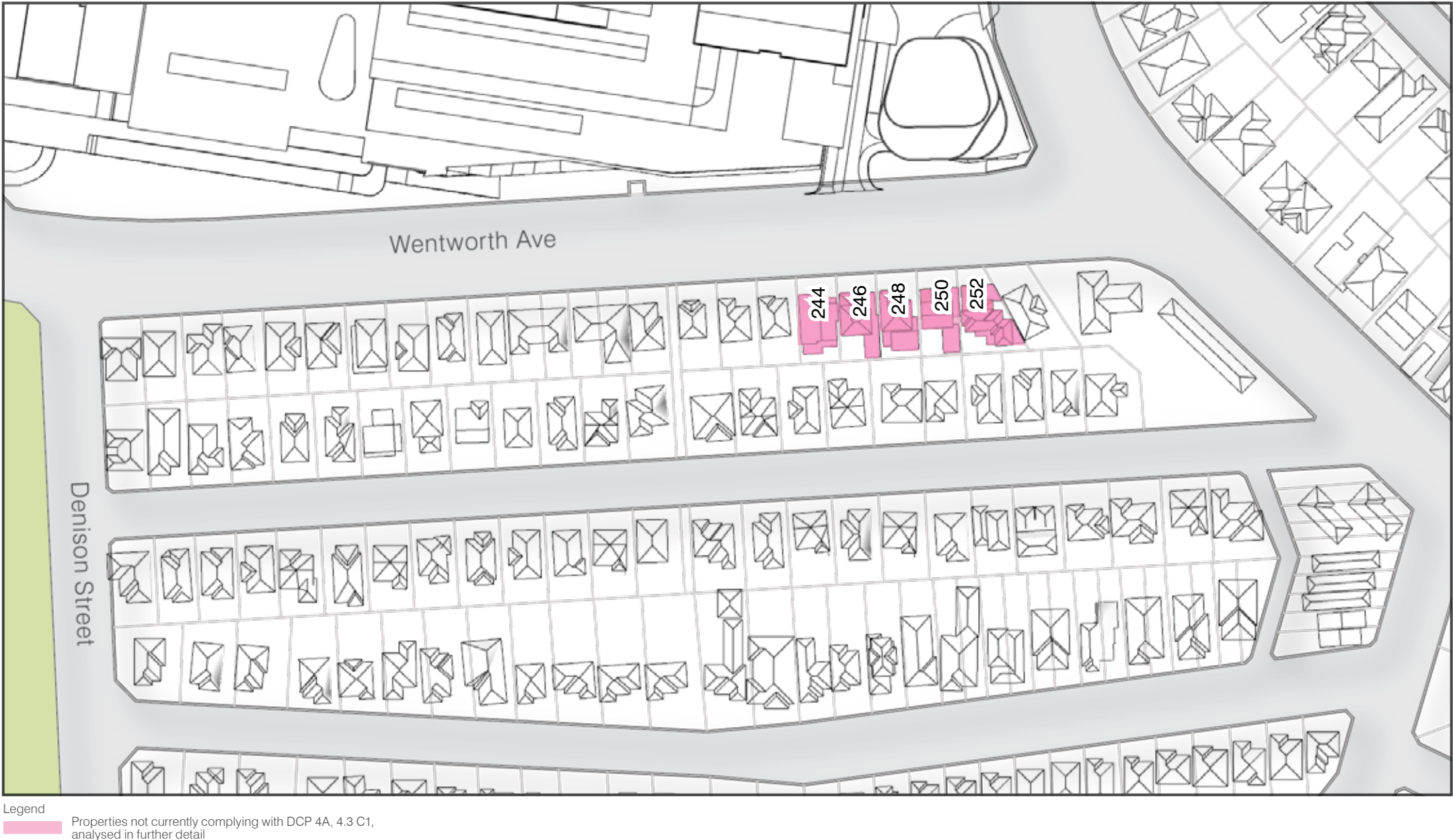
Proposed scheme Shadow analysis from 9am to 3pm (21 June)

Above: The proposed massing creates additional overshadowing impacts to the properties outlined in red. While most of the impacts are minor, and do not impact on the minimum solar access requirements specified within the DCP, there are 5 houses on Wentworth Avenue (numbers 244, 246,

248, 250, and 252) that have been tested in more detail to demonstrate that the proposed impact to the frontyards is reasonable (considering the self-shadowing that they already create to the areas of primary open space at the rear of their properties).

Overshadowing Assessment

Dwellings identified in the adjacent diagram (which do not currently comply with Section 4A.4.3, Clause C1 due to self-shadowing) were analysed in further detail, using views from the sun, and detailed shadow diagrams, as illustrated on the following pages.

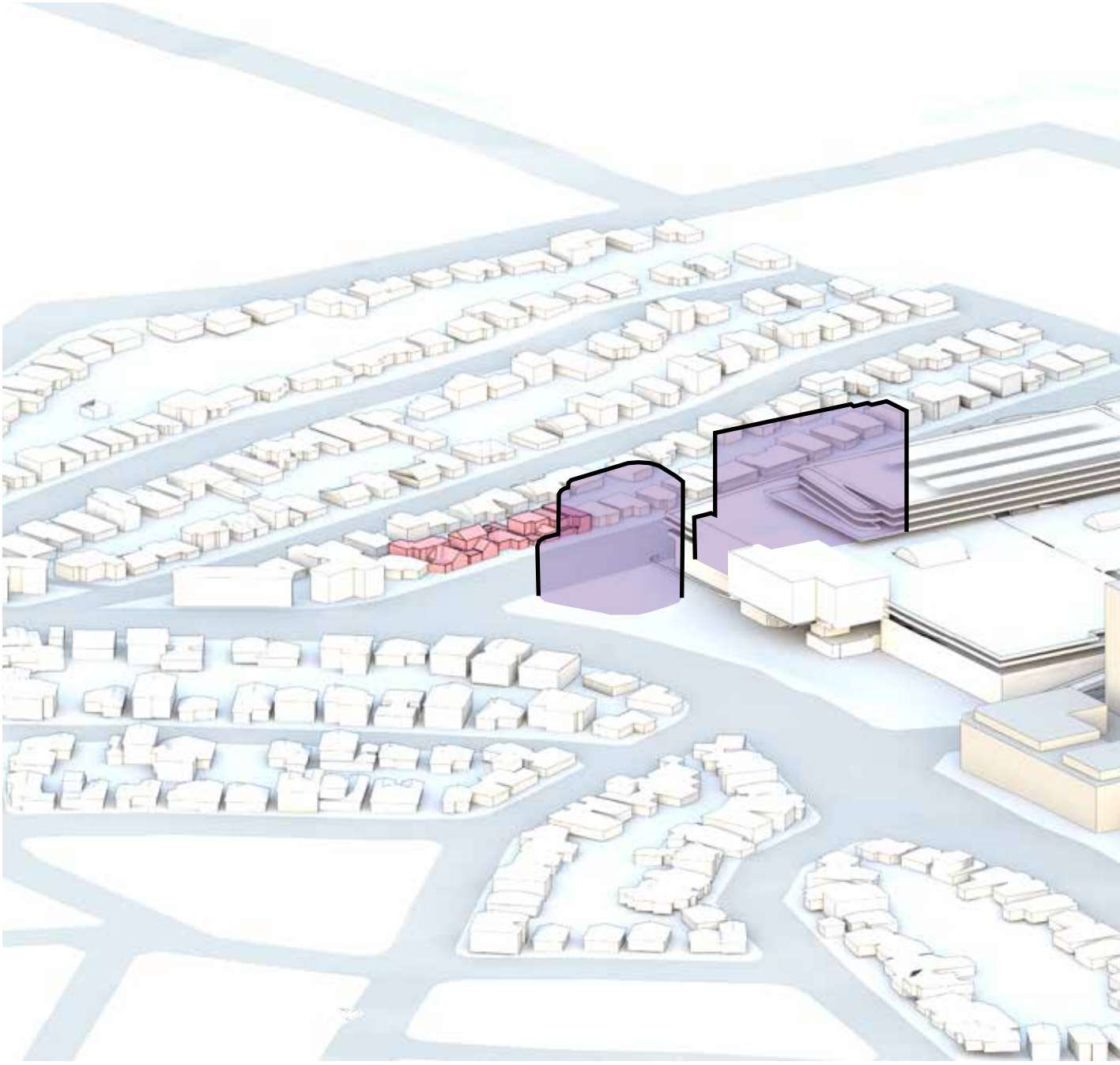


Overshadowing Assessment



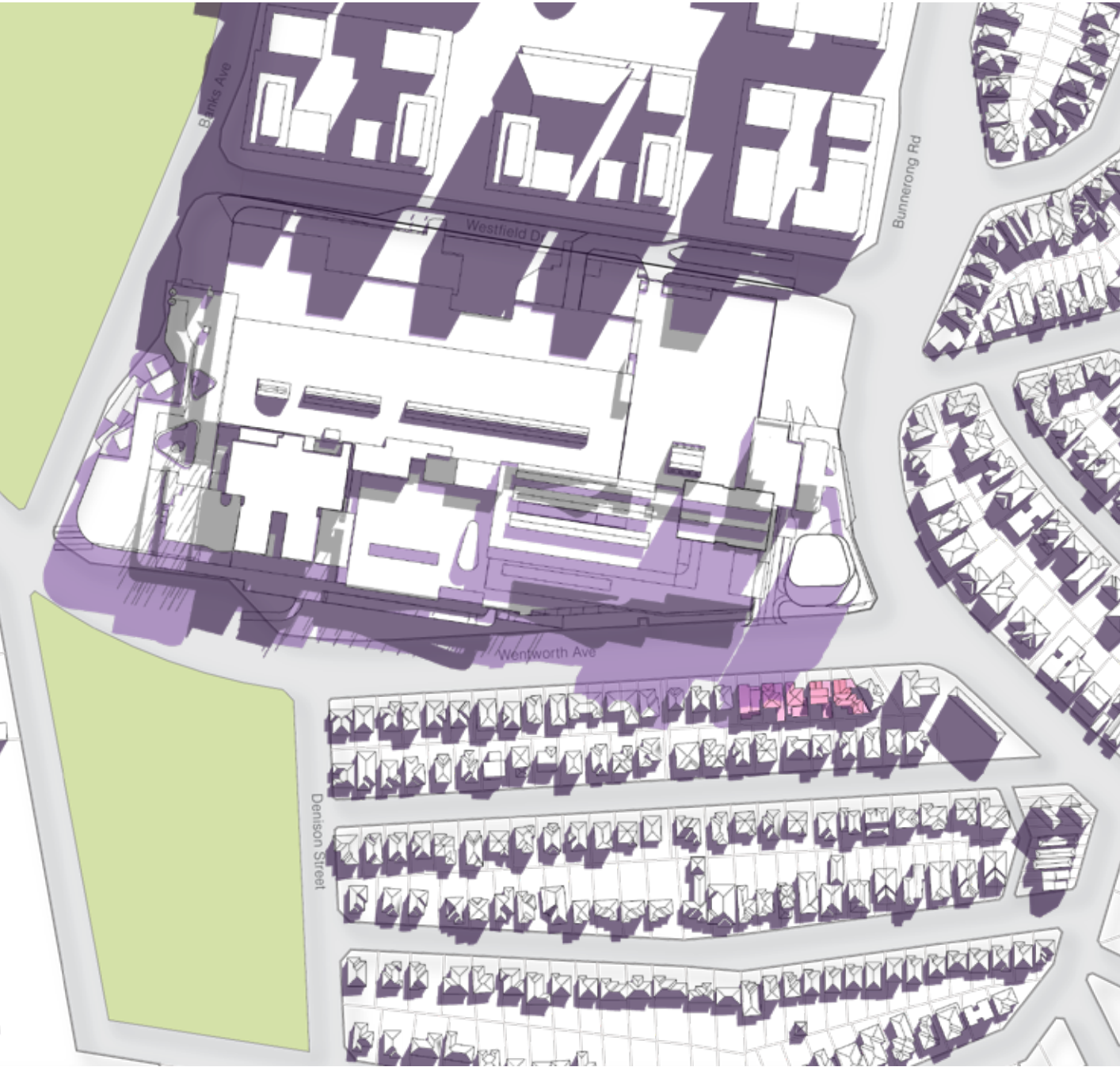
Shadow plan at 9am (21 June)

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail



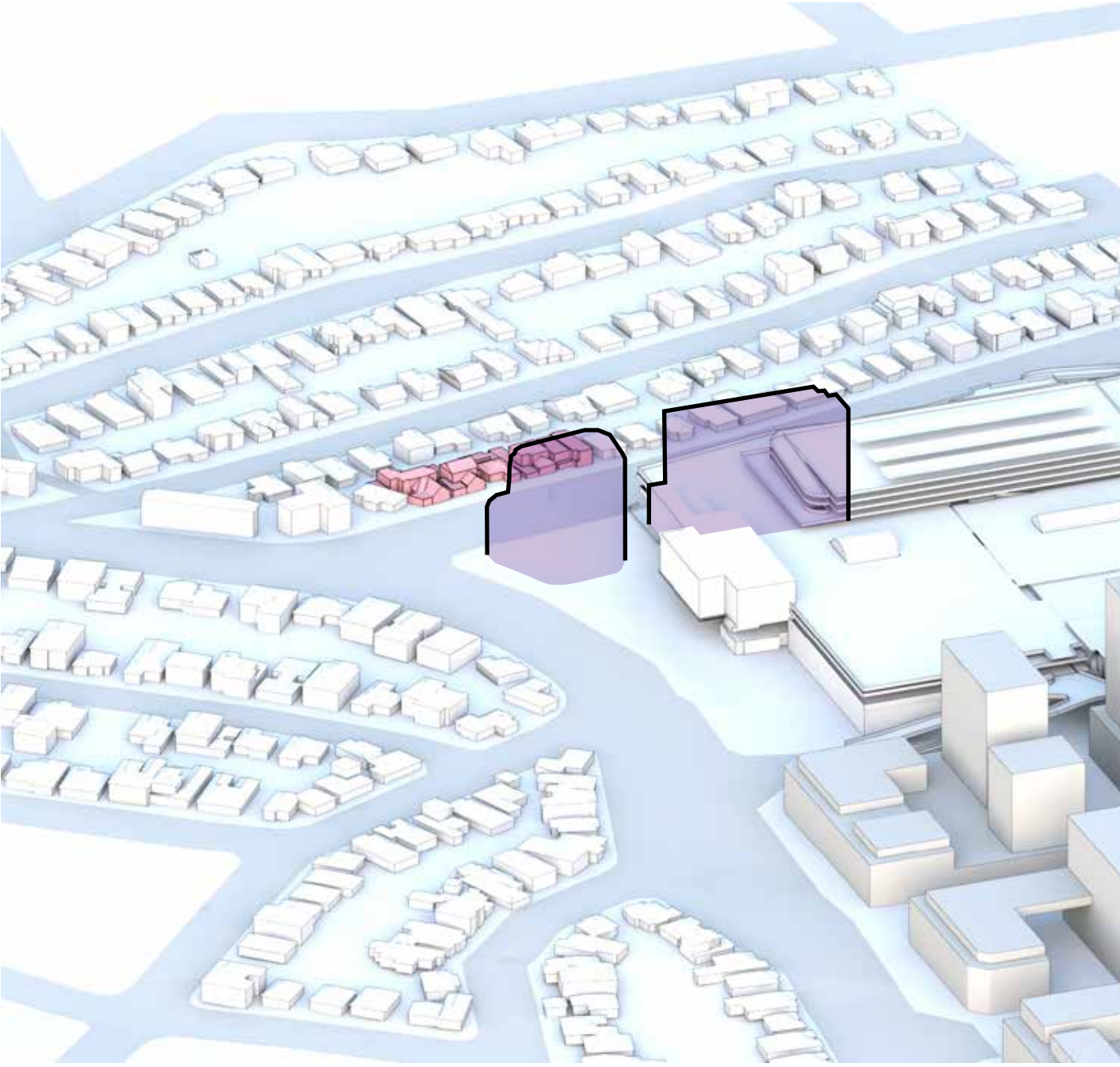
View from sun at 9am (21 June)

Overshadowing Assessment



Shadow plan at 10am (21 June)

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

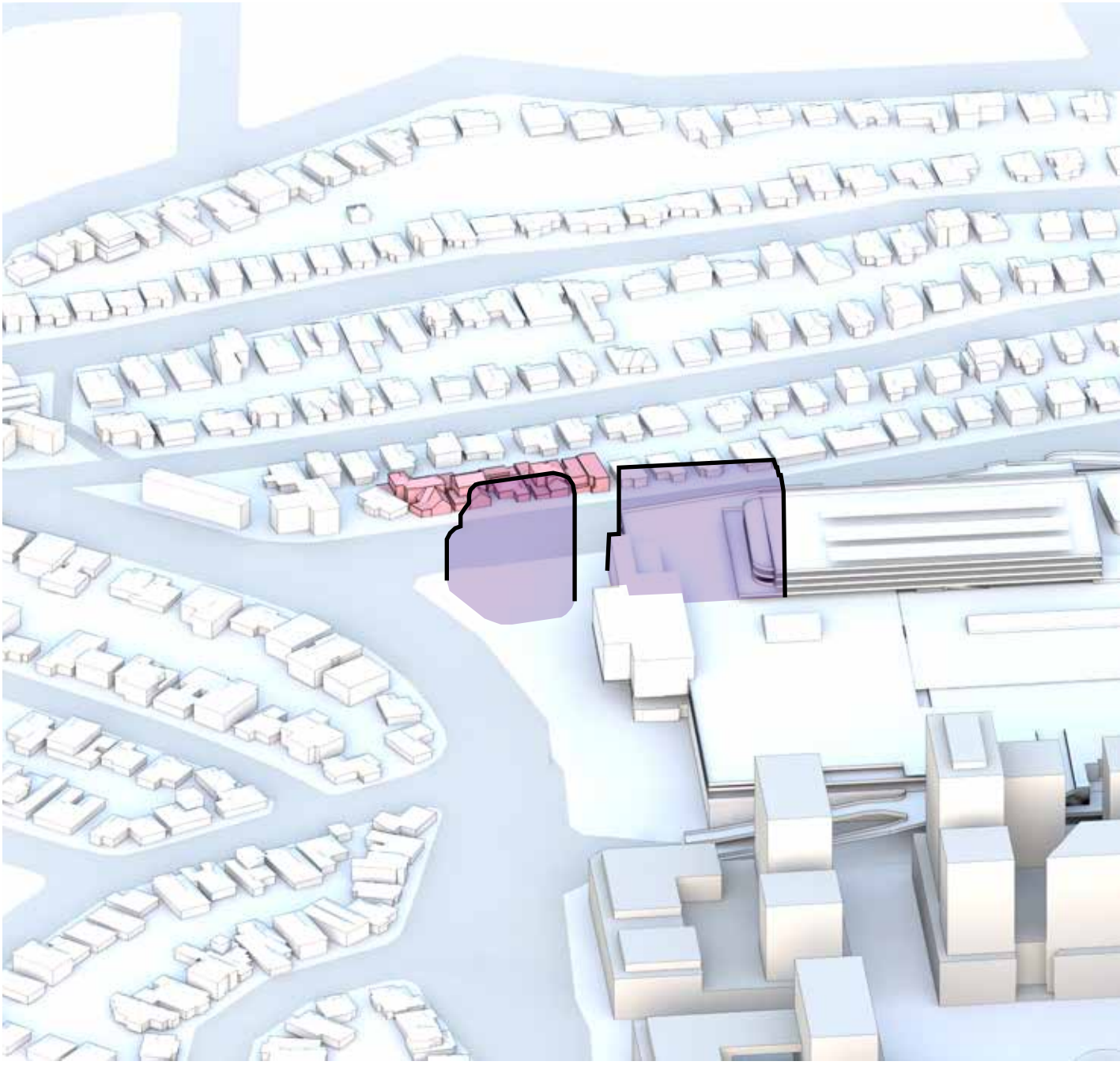


View from sun at 10am (21 June)

Overshadowing Assessment



Shadow plan at 11am (21 June)



View from sun at 11am (21 June)

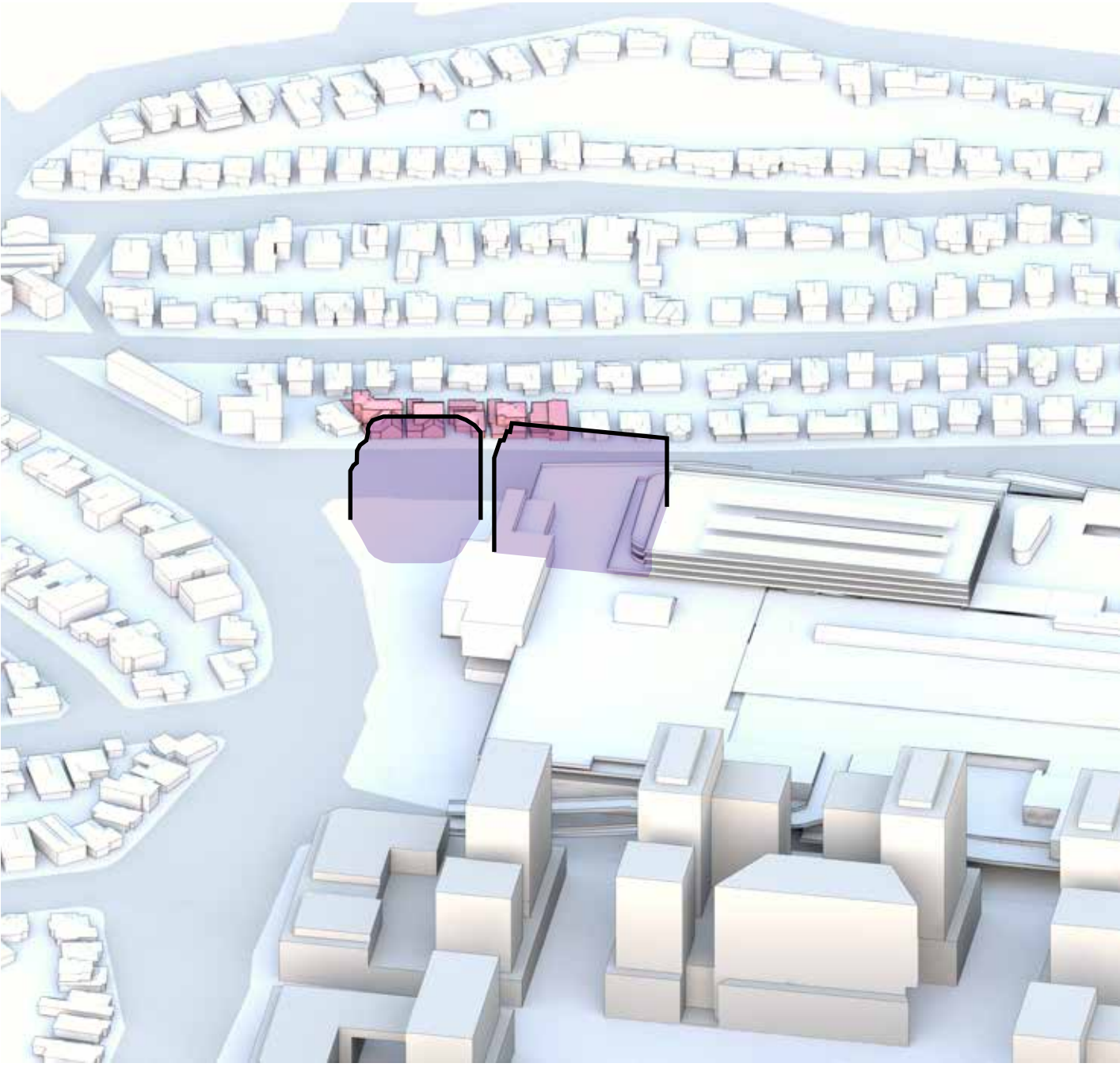
- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

Overshadowing Assessment



Shadow plan at 12pm (21 June)

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

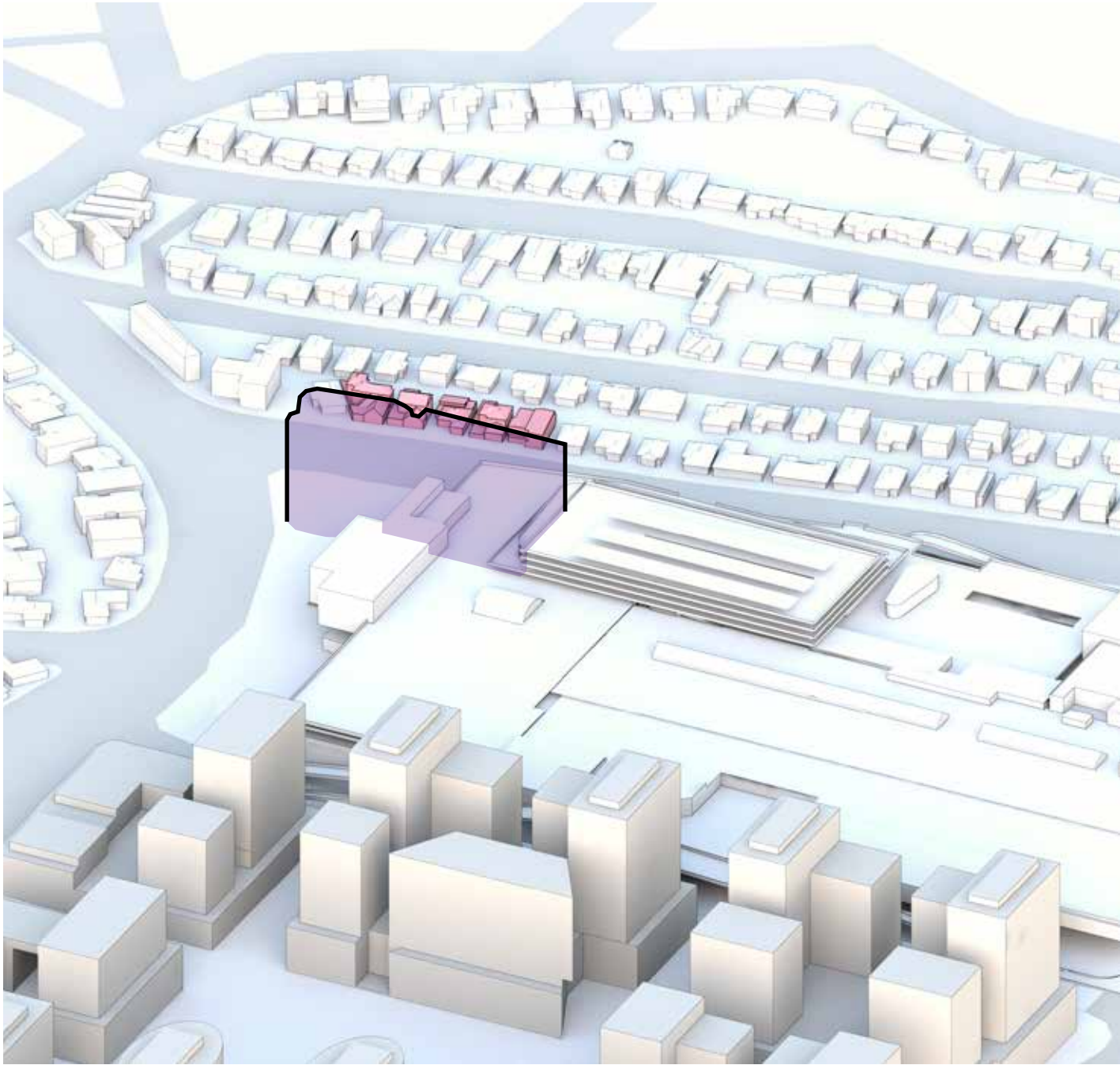


View from sun at 12pm (21 June)

Overshadowing Assessment



Shadow plan at 1pm (21 June)



View from sun at 1pm (21 June)

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

Overshadowing Assessment



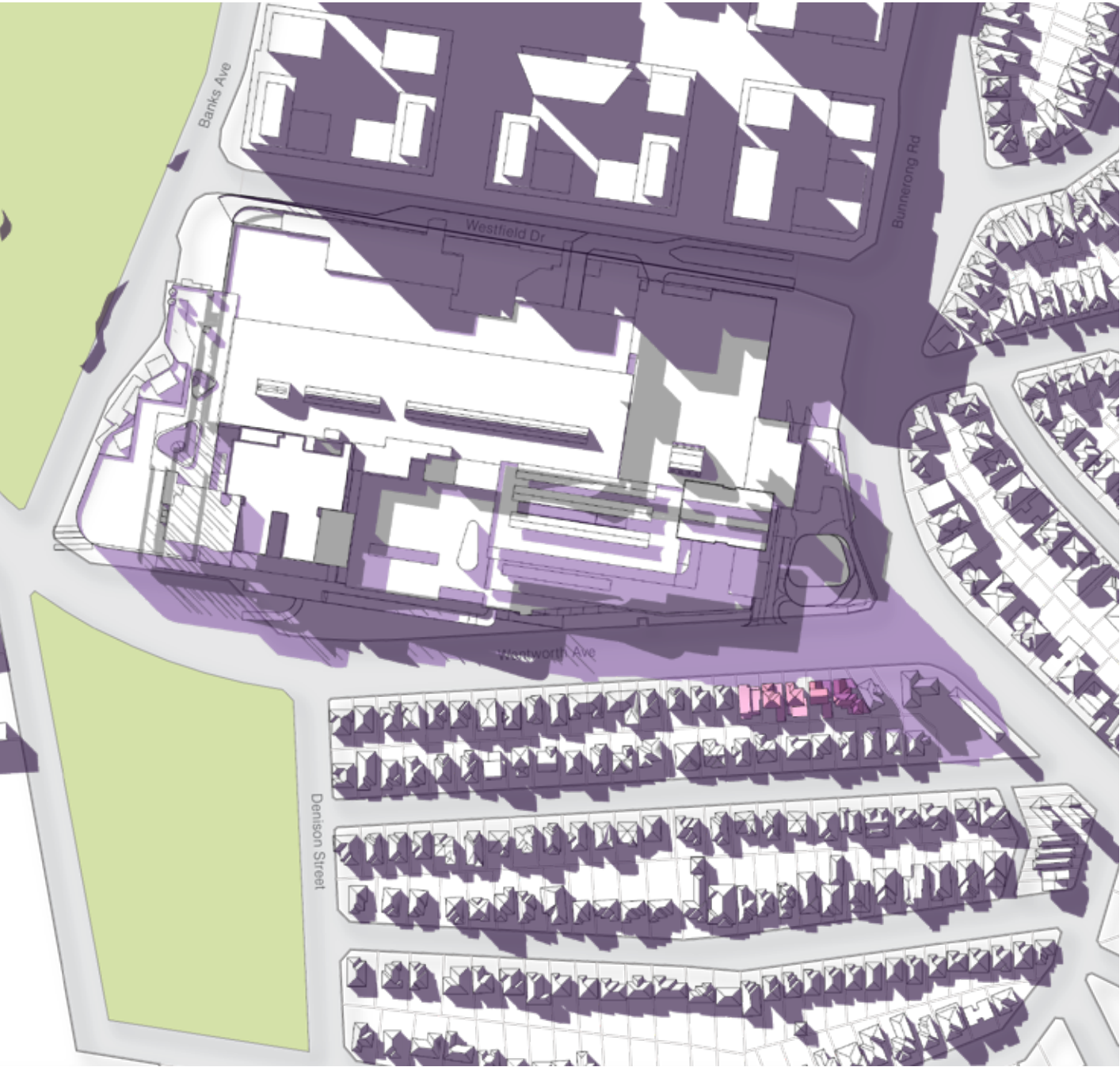
Shadow plan at 2pm (21 June)



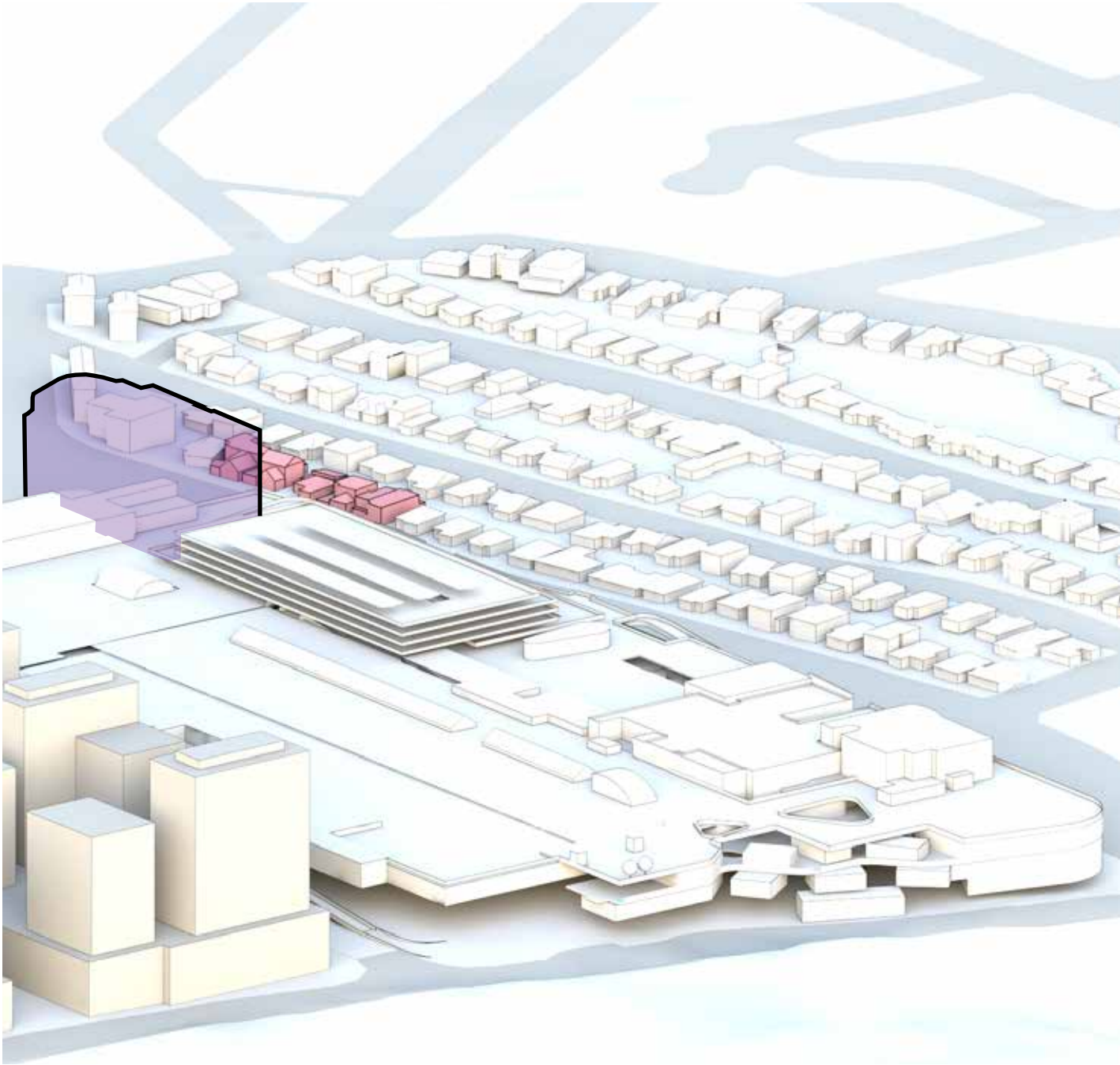
View from sun at 2pm (21 June)

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

Overshadowing Assessment



Shadow plan at 3pm (21 June)



View from sun at 3pm (21 June)

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

Overshadowing Assessment

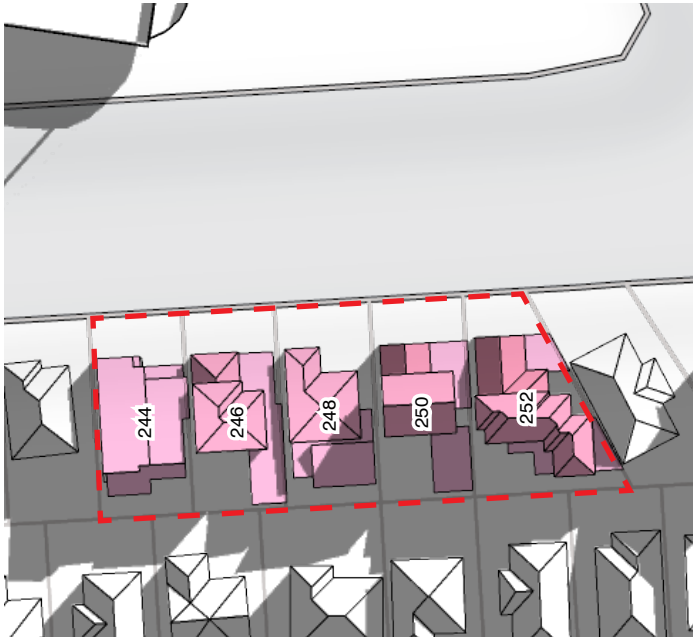
1. Analysis of overshadowing to primary private open space to the rear of dwellings

The five houses which have been analysed in more detail have been selected because of their existing self-shadows to private open space on 21 June do not allow them to comply with DCP 4A, 4.3 C1: *...maintain approximately 2 hours of solar access between 9am and 3pm on 21 June to windows in living areas (family rooms, rumpus, lounge and kitchens) and to 50% of the primary private open space*

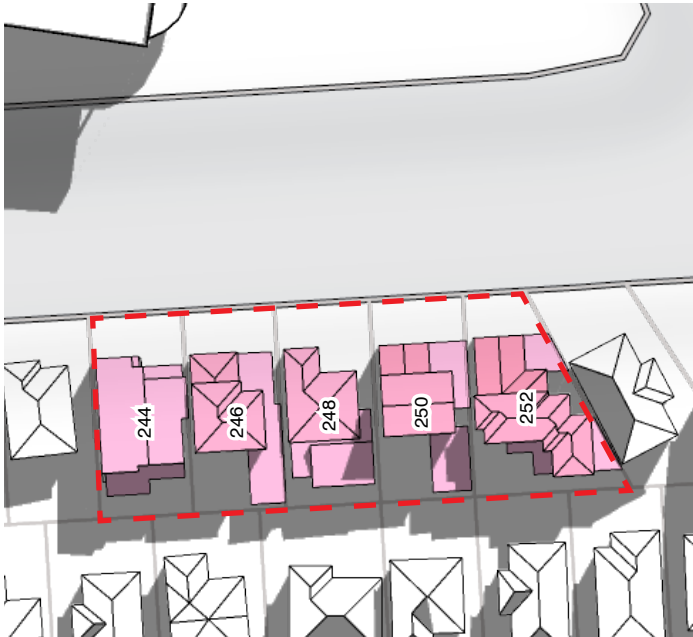
Therefore the impact of the proposal has been tested against DCP 4A, 4.3 C3: *Where the primary private open space of an adjoining development currently receives less than the required amount of sunlight on 21 June (50% coverage for a minimum of 2 hours), the proposed development must not further reduce the amount of solar access to the private open space of the adjoining development.*

Conclusion

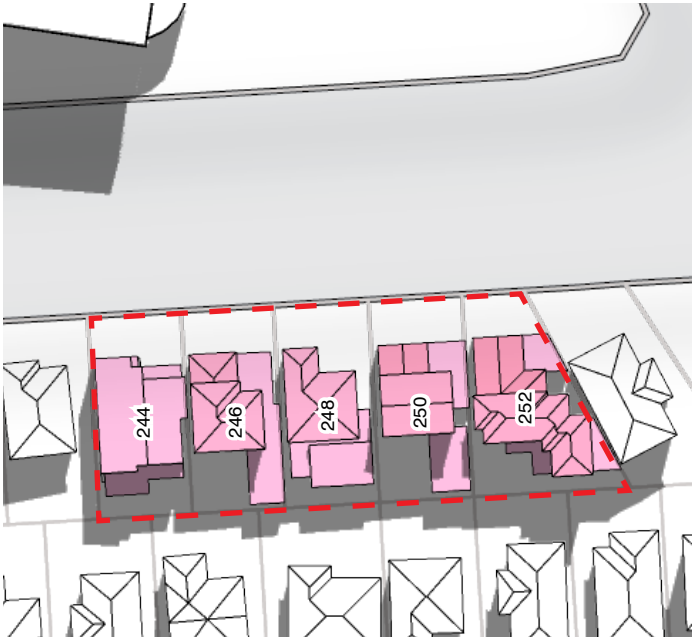
It can be seen from the adjacent diagrams that there is no additional overshadowing impact from the proposal to the primary private open space of any of the 5 dwellings in question which is consistent with Section 4A.4.3, Clause C3 of the DCP.



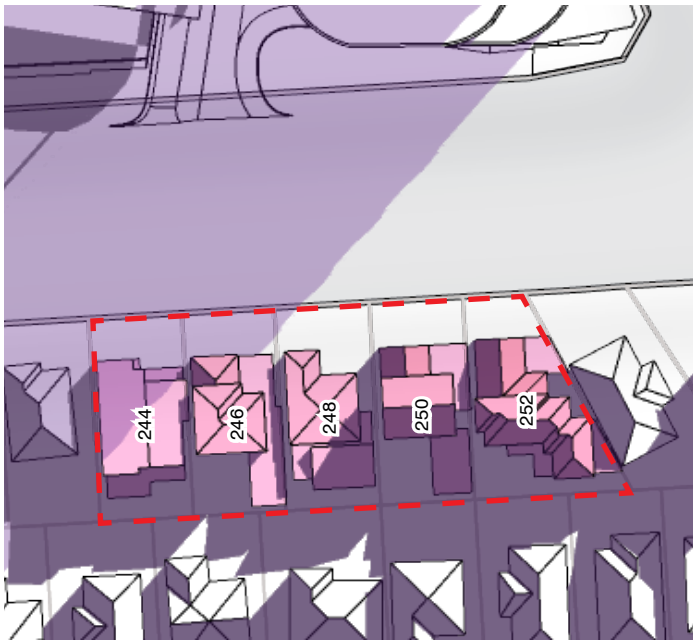
Existing
9am (21st June)



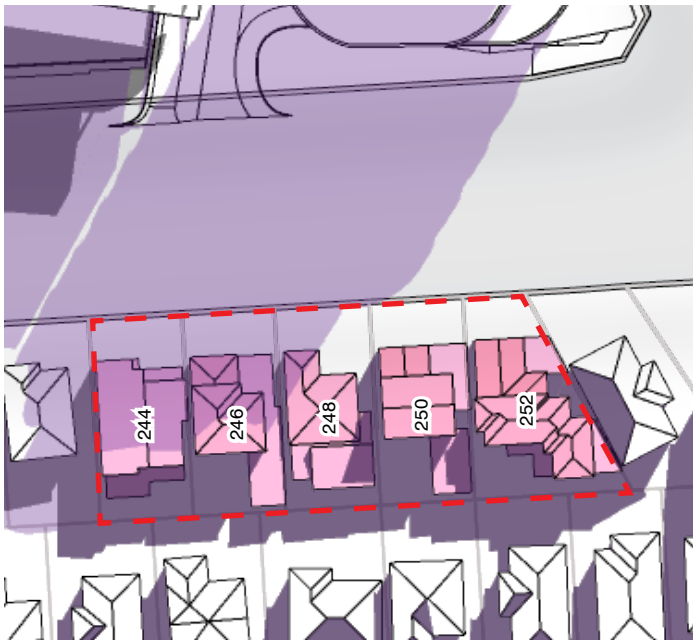
Existing
10am (21st June)



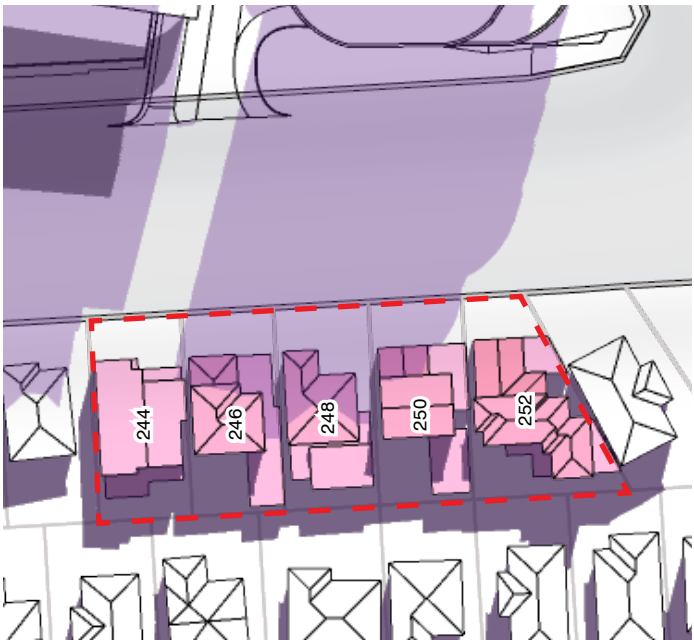
Existing
11am (21st June)



Proposed scheme shadow plan at 9am (21st June)
No additional impact to primary private open space.



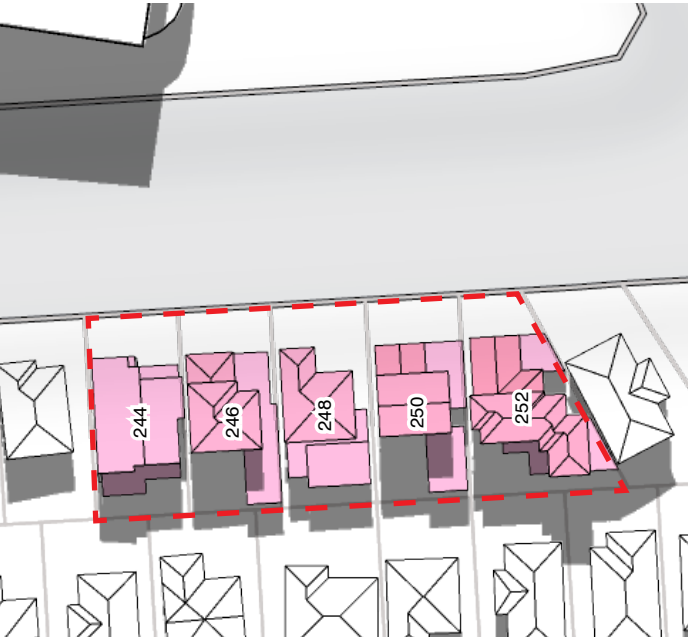
Proposed scheme shadow plan at 10am (21st June)
No additional impact to primary private open space.



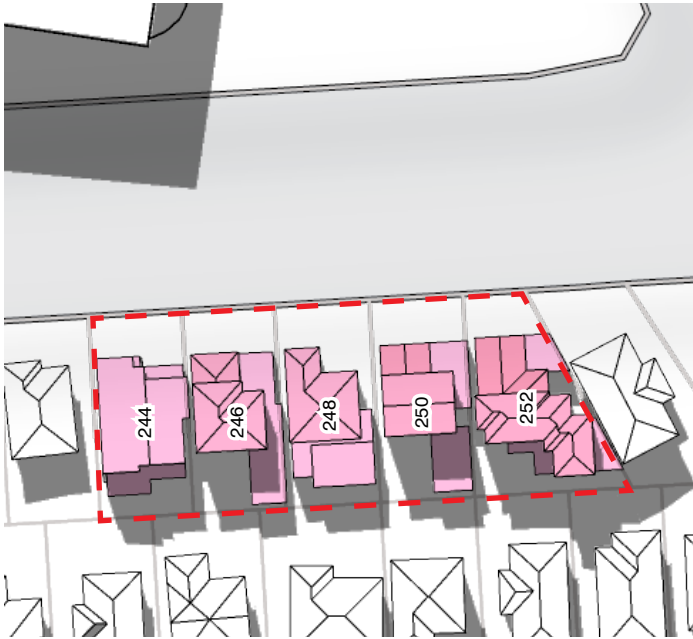
Proposed scheme shadow plan at 11am (21st June)
No additional impact to or primary private open space.

- Legend
- Shadow cast by existing buildings only
 - Additional shadow area of the proposal
 - Shadow cast by both existing buildings and new proposal
 - Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

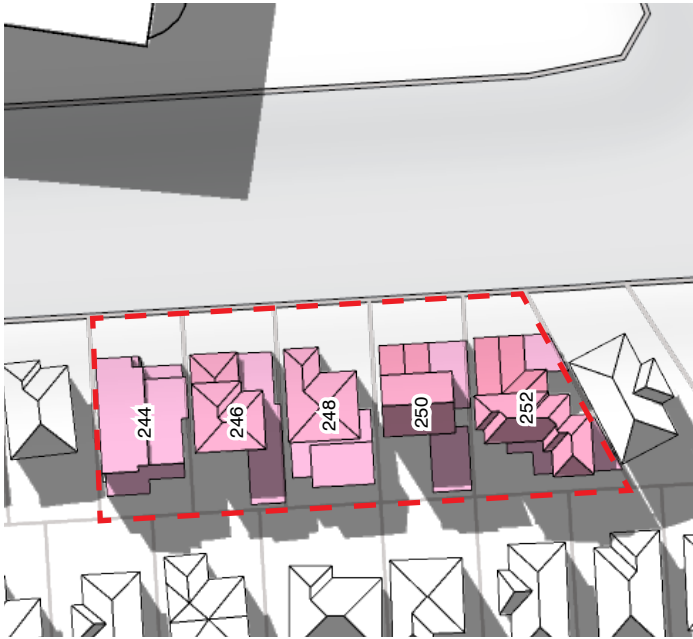
Overshadowing Assessment



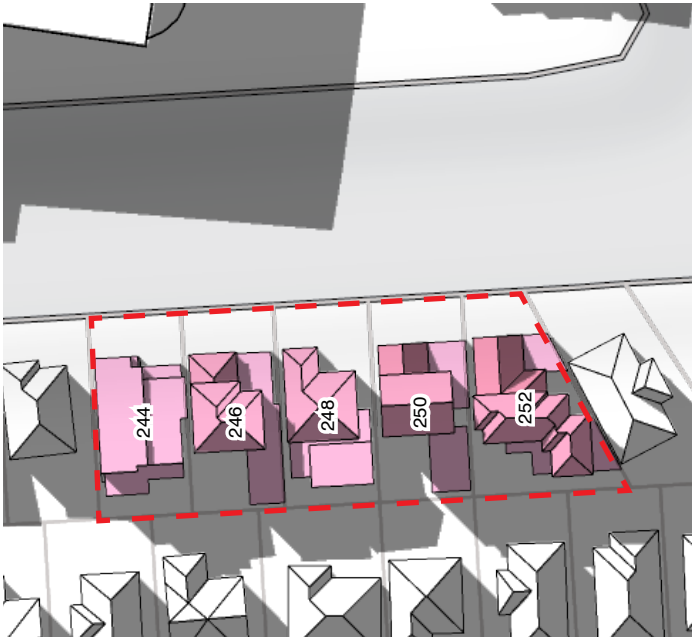
Existing
12pm (21st June)



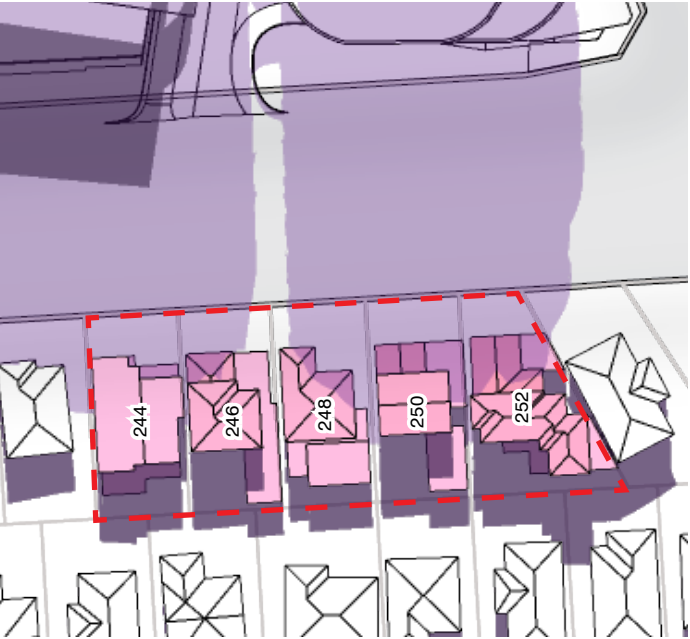
Existing
1pm (21st June)



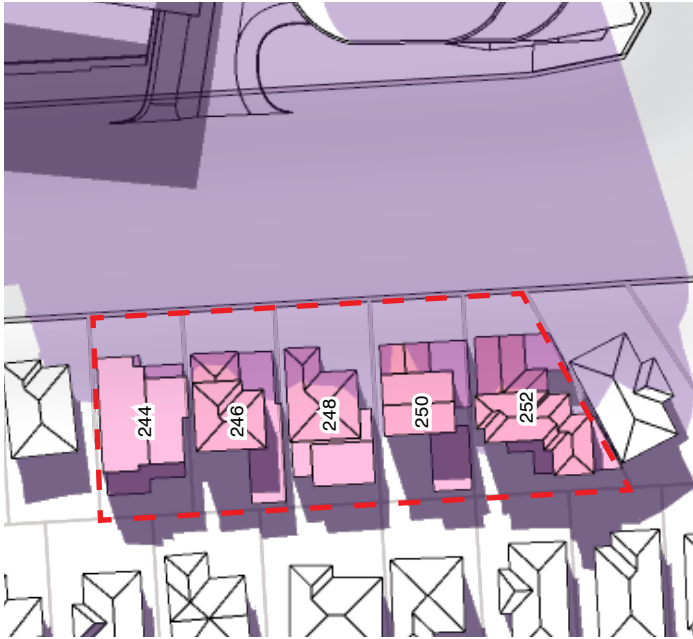
Existing
2pm (21st June)



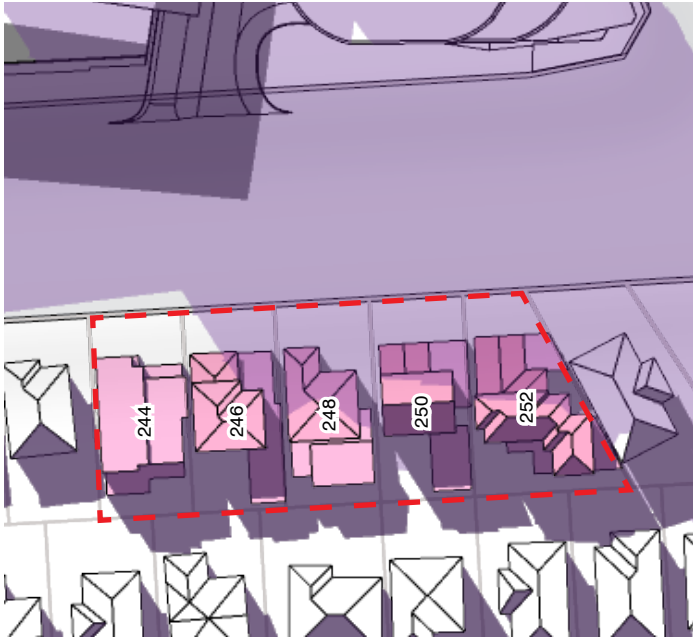
Existing
3pm (21st June)



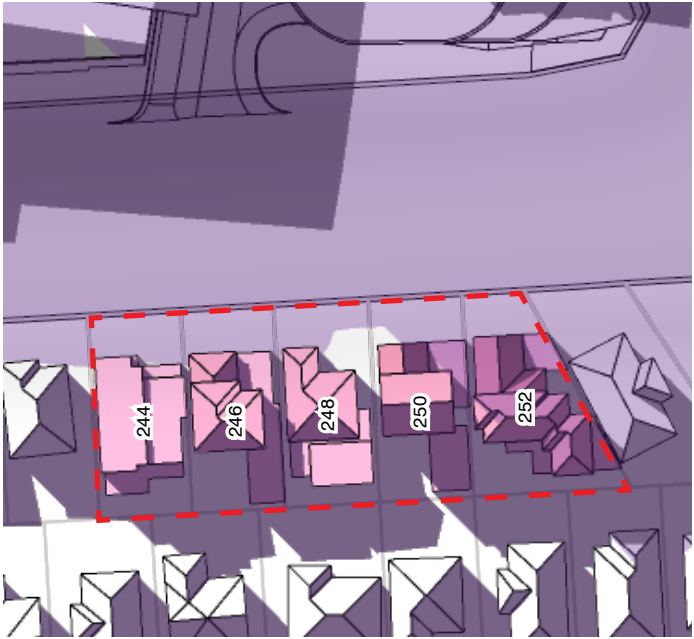
Proposed scheme shadow plan at 12pm (21st June)
No additional impact to primary private open space.



Proposed scheme shadow plan at 1pm (21st June)
No additional impact to primary private open space.



Proposed scheme shadow plan at 2pm (21st June)
No additional impact to primary private open space.



Proposed scheme shadow plan at 3pm (21st June)
No additional impact to primary private open space.

Overshadowing Assessment

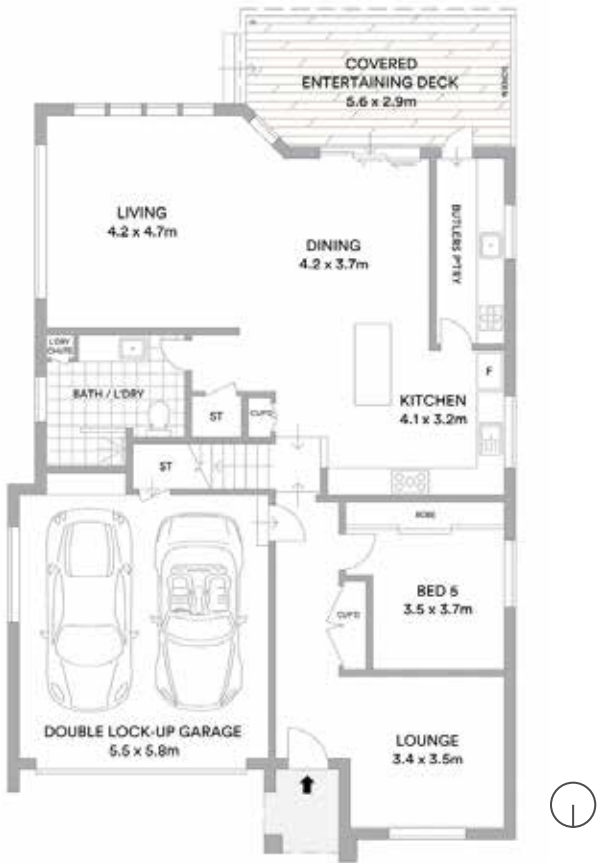
2. North elevations: location of living areas and overshadowing impacts

Likely location of living areas for 5 properties in question
A desktop analysis of each of the 5 affected properties was undertaken to identify the location of living rooms in these properties, to comply with Clause 4A, 4.3 Solar Access Section C1. The study revealed that the living areas appear to be located on the southern sides of each dwelling (except for No. 250 Wentworth Ave - where the location of the living room is unknown).

No 244 Wentworth Ave



North elevation



Plan (source- Domain.com.au)

With the exception of a small lounge area at the front/north of the dwelling, the main living areas are on the southern side.

No 246 Wentworth Ave



North elevation (source: domain.com.au)



Living room (source: domain.com.au)

Although no plan of the dwelling is available, it can be seen in the photograph above that the main living areas and their windows open to the rear fence on the southern side of the property.

No 248 Wentworth Ave



North elevation



Living room (source: domain.com.au)



Sitting room (source: domain.com.au)

Although no plan of the dwelling is available, it can be deduced from the photograph above that there is a small sitting room on the northern side, adjacent to the front door, and larger living areas to the rear on the southern side of the property.

Overshadowing Assessment

No 250 Wentworth Ave



North elevation

There are no floor plans or internal photographs of the dwelling available. However, looking at the north elevation it can be observed that the car port and front door occupy approximately 2/3 of the width of the dwelling. It can be reasonably assumed that the remaining 1/3 wide room at the front would be too narrow to be the main living area. It is therefore assumed that a main living area is located at the rear of the property.

No 252 Wentworth Ave



Living area (Source: domain.com.au)



Main living area (Source: domain.com.au)

There are no floor plans of the dwelling available. However, looking at the internal photographs it can be assumed that the living areas are located on the southern side of the dwelling. The left photo shows a hallway leading from the front door to a living area, and the top photo shows the living area opening to the rear garden.

Overshadowing Assessment

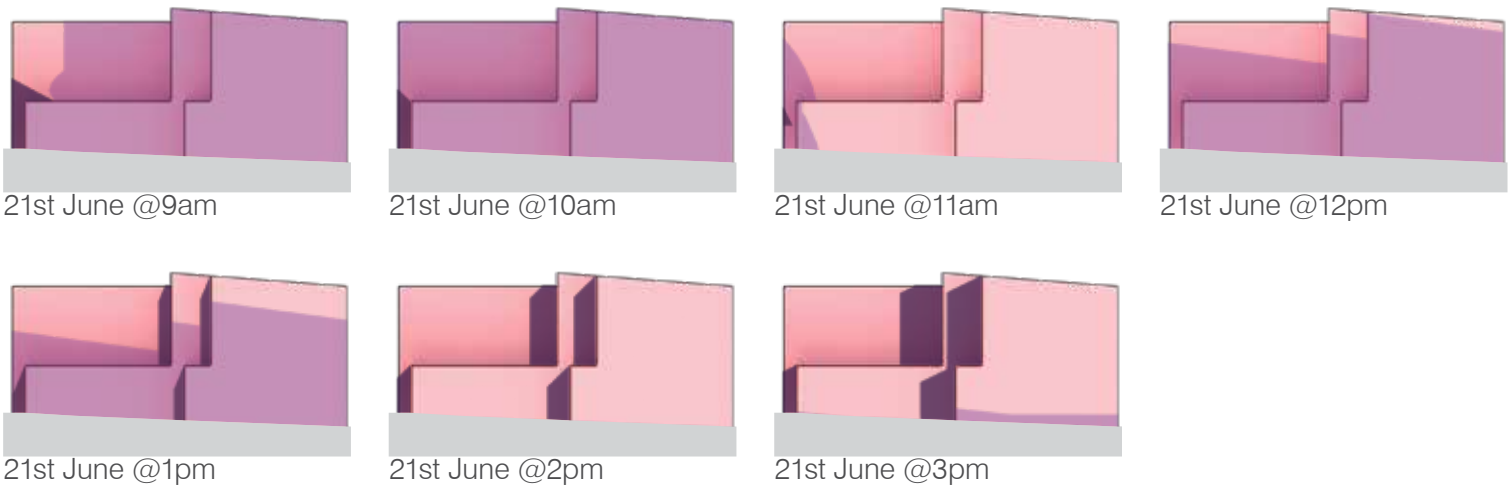
Analysis of overshadowing impacts to north elevations
In consultation with Council, it was requested that the north elevations of the five houses in question be tested for solar access against Clause 4A below:

4A, 4.3 Solar Access Section C1 Buildings (including alterations/additions/extensions) are to be designed and sited to maintain approximately 2 hours of solar access between 9am and 3pm on 21 June to windows in living areas (family rooms, rumpus, lounge and kitchens) and to 50% of the primary private open space areas of both the subject site and adjoining properties. (The Botany Bay DCP 2013, Policy 4A Dwelling Houses)

Regardless of the desktop analysis which revealed that the main living rooms are most likely located to the rear/south side of the properties, the proposal has been designed to ensure that there is appropriate solar access to the front elevations of the five houses in question.

Conclusion

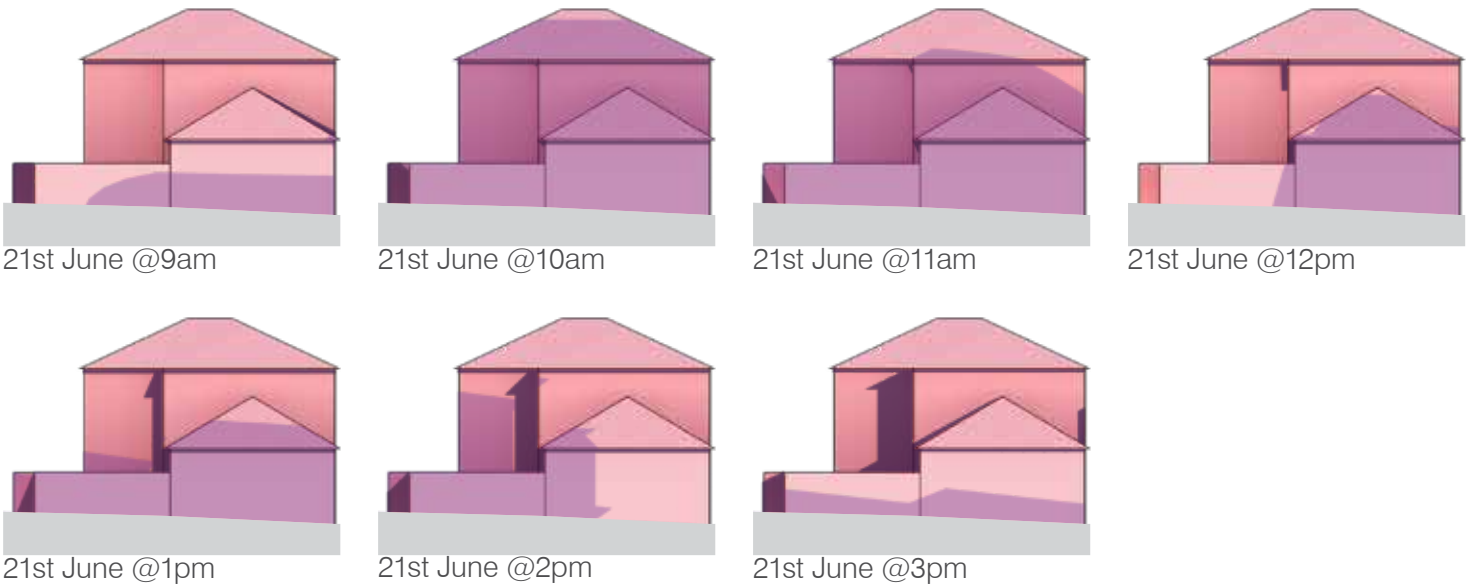
- The northern elevations receive a minimum of 1 hour of solar access in midwinter between the hours of 9am to 3pm. It is recommended that any future development maintain a minimum of 1 hour solar access to the front/ northern windows along Wentworth Avenue.
- (Note that the study is based on the 3D model built by Architectus adapted from the a 3D model purchased from NearMap, but there has not been a detailed survey undertaken to identify specific window locations.)



244 Wentworth Avenue:
Solar access to north elevation.

The elevation is in full sun at 11am and again between 2pm and 3pm.

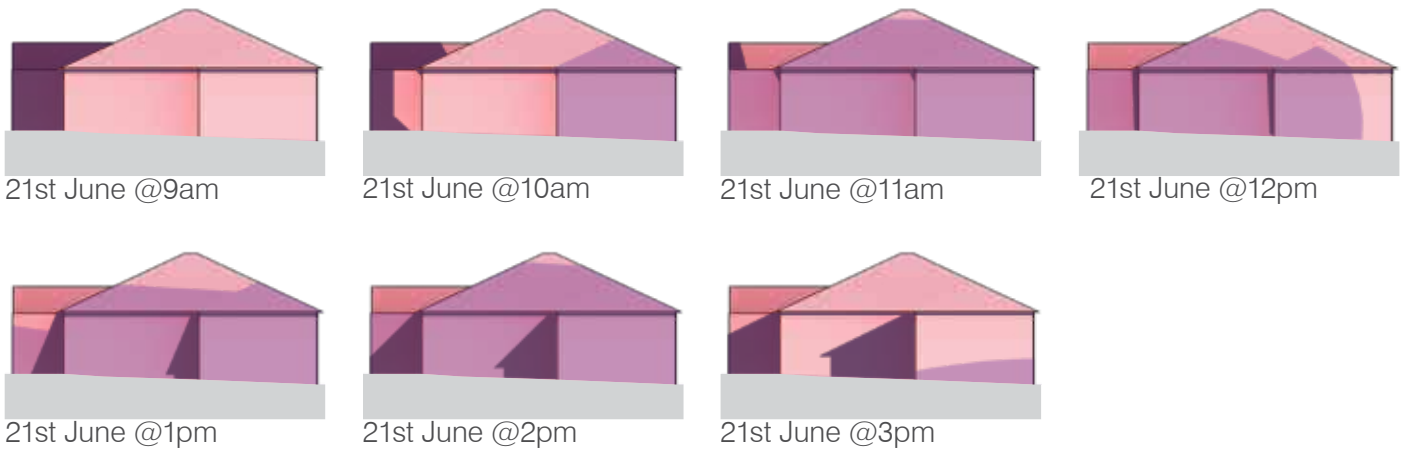
It can therefore be demonstrated that the northern windows receive a minimum of 1hr 30min of sun between 9am and 3pm.



246 Wentworth Avenue:
Solar access to north elevation.

The elevation is in sun between 9am and 9.15am, again from 2.15pm to 3pm.

It can therefore be demonstrated that the northern windows receive approximately 1hr of sun between 9am and 3pm.



248 Wentworth Avenue:
Solar access to north elevation.

The elevation is in full sun between 9am and 9.45am, and again from 2.40pm to 3pm.

It can therefore be demonstrated that the northern windows receive approximately 65mins of sun between 9am and 3pm.

Overshadowing Assessment



250 Wentworth Avenue:
Solar access to north elevation.

The elevation is in full sun between 9am and 10.30am.

It can therefore be demonstrated that the northern windows receive a minimum of 1hr 30min of sun between 9am and 3pm.



252 Wentworth Avenue:
Solar access to north elevation.

The elevation is in full sun between 9am and 11am.

It can therefore be demonstrated that the northern windows receive a minimum of 2hrs of sun between 9am and 3pm.

Legend

- Additional shadow area of the proposal
- Shadow cast by both existing buildings and new proposal
- Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail

3. Analysis of overshadowing impacts to front yards

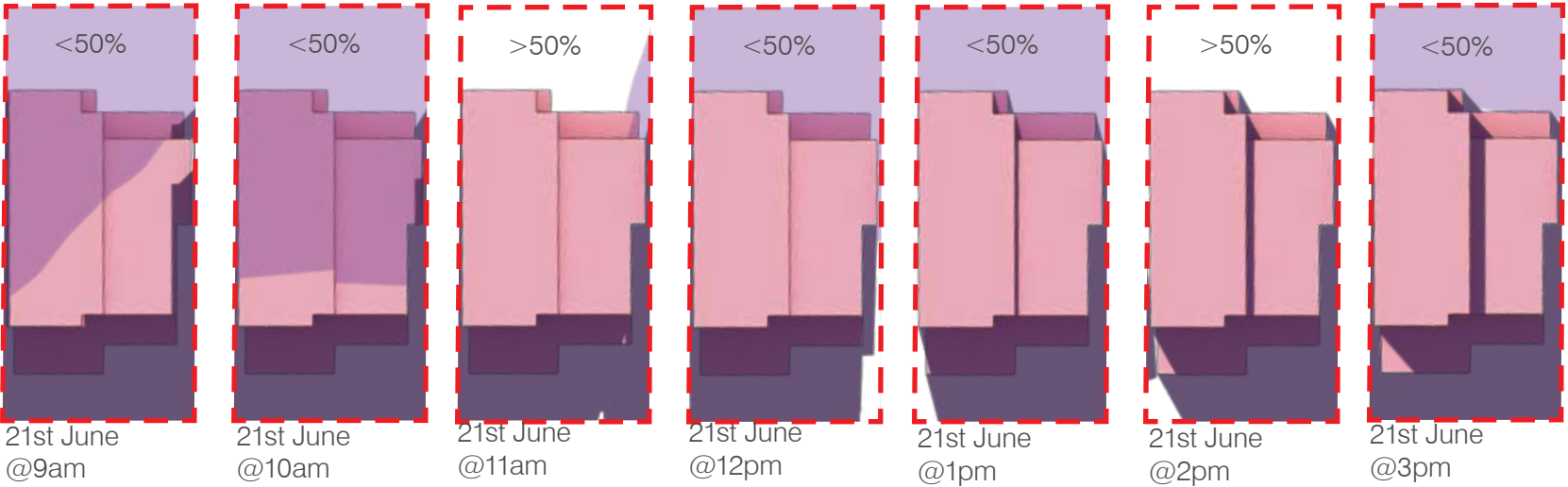
Regardless of living areas and primary private open space being located to the rear of the properties, the proposal was also tested for solar access to the front yards of each property.

Conclusion

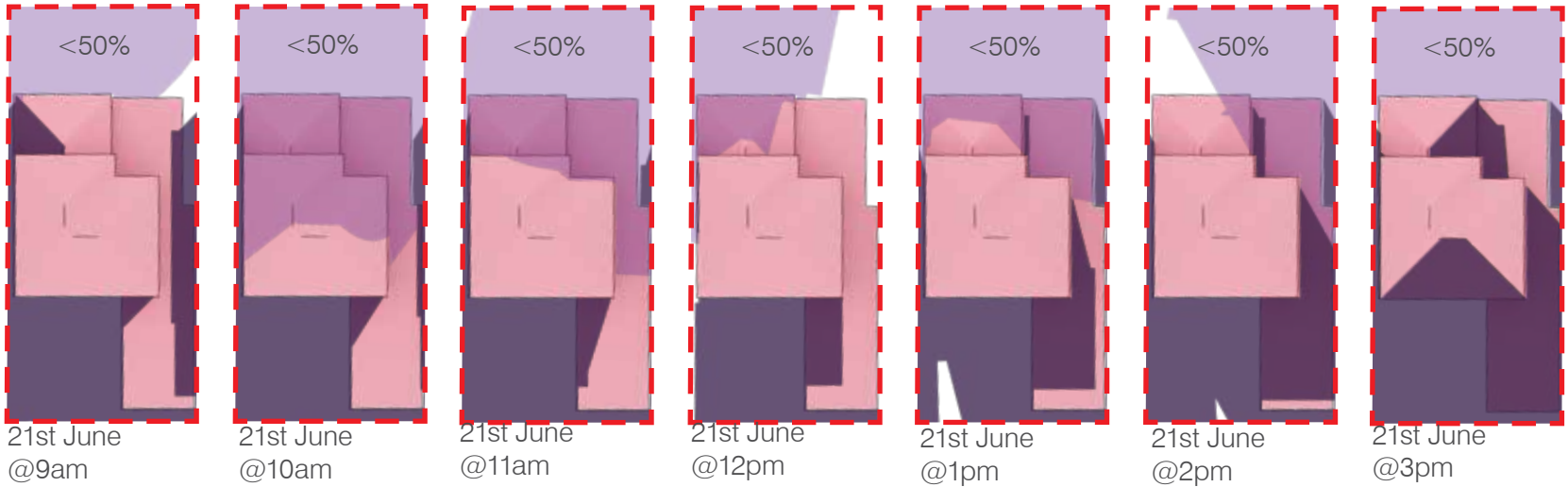
It is considered reasonable that the proposal should achieve a minimum of 1 hour of sunlight to 50% of each front yard where the primary private open space at the rear is not achieving the minimum 50% coverage for a minimum of 2 hours on the 21 June.

The detailed overshadowing study of front yards is adjacent and demonstrates that this is achieved.

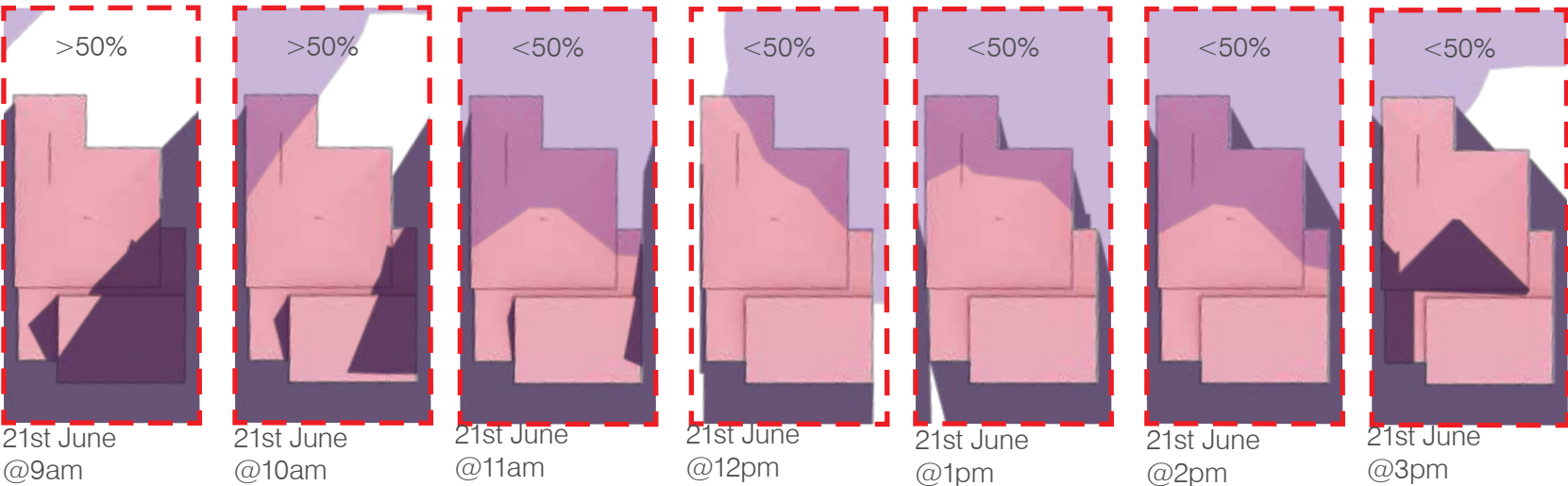
Note: the adjacent overshadowing study does not include the additional overshadowing created by the existing front fences of properties 246, 250 and 252 Wentworth Avenue (which due to the properties' location on a major arterial road, are solid walls to a height of approximately 2 metres to provide acoustic buffering and enhanced privacy).



244 Wentworth Avenue
Solar access >50% in front garden
10:40am - 11:27am
1:34pm - 2:42pm
(115mins in total)

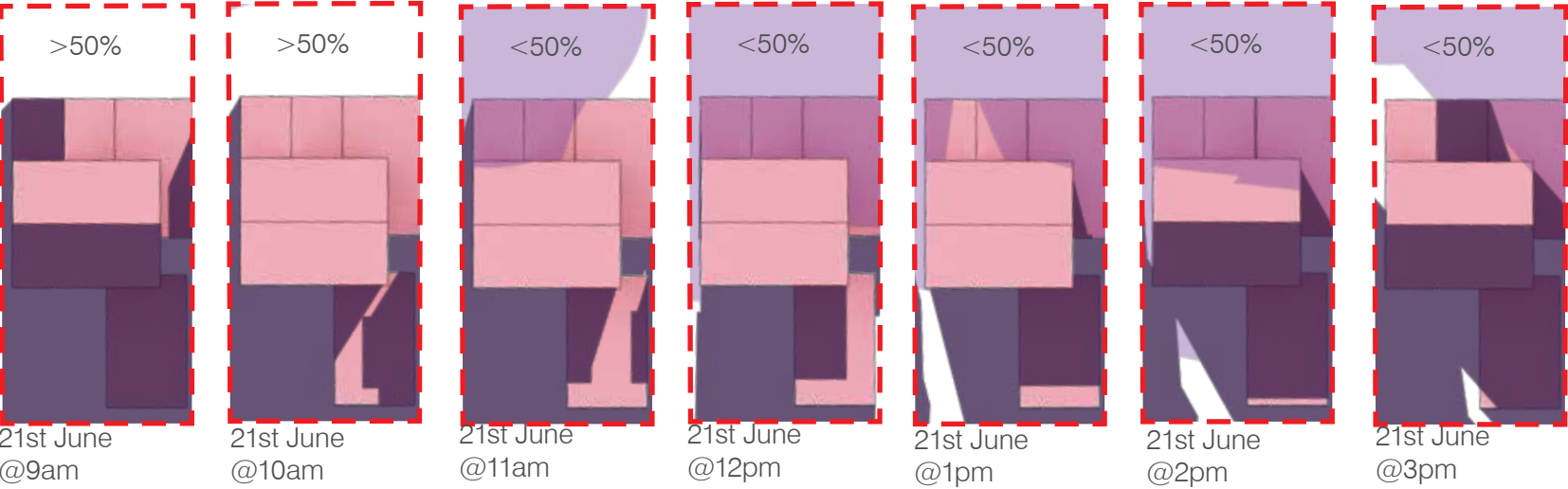


246 Wentworth Avenue
Solar access >50% in front garden
11:25am - 11:53am
2:07pm - 2:42pm
(63mins in total)



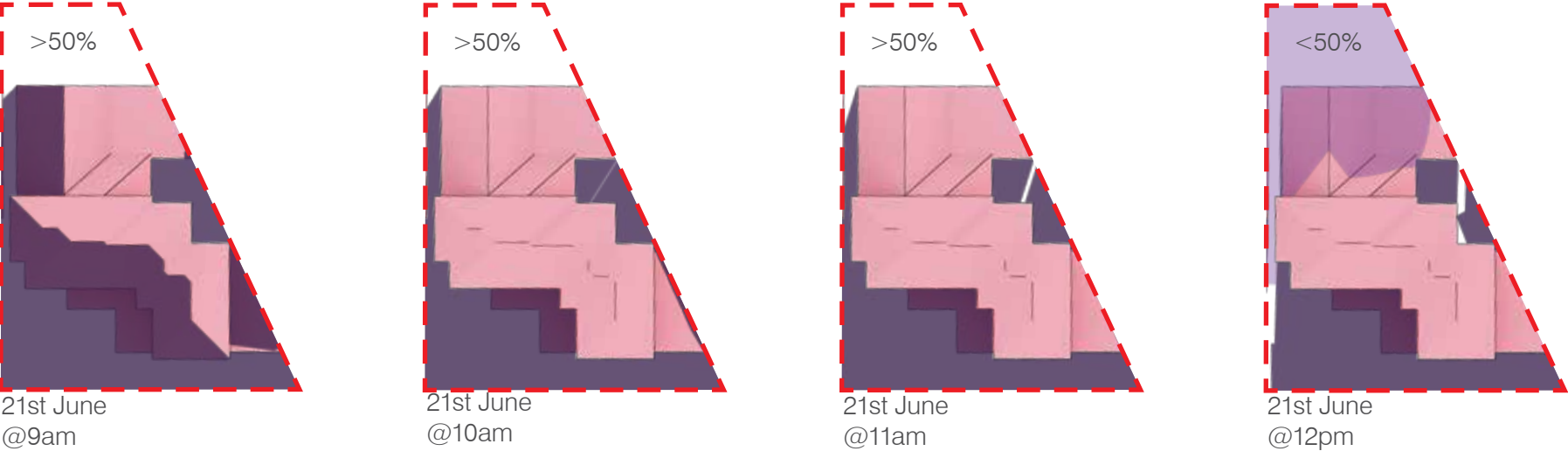
248 Wentworth Avenue
Solar access >50% in front garden
9:00am - 10:00am
2:40pm - 2:55pm
(75mins in total)

Overshadowing Assessment



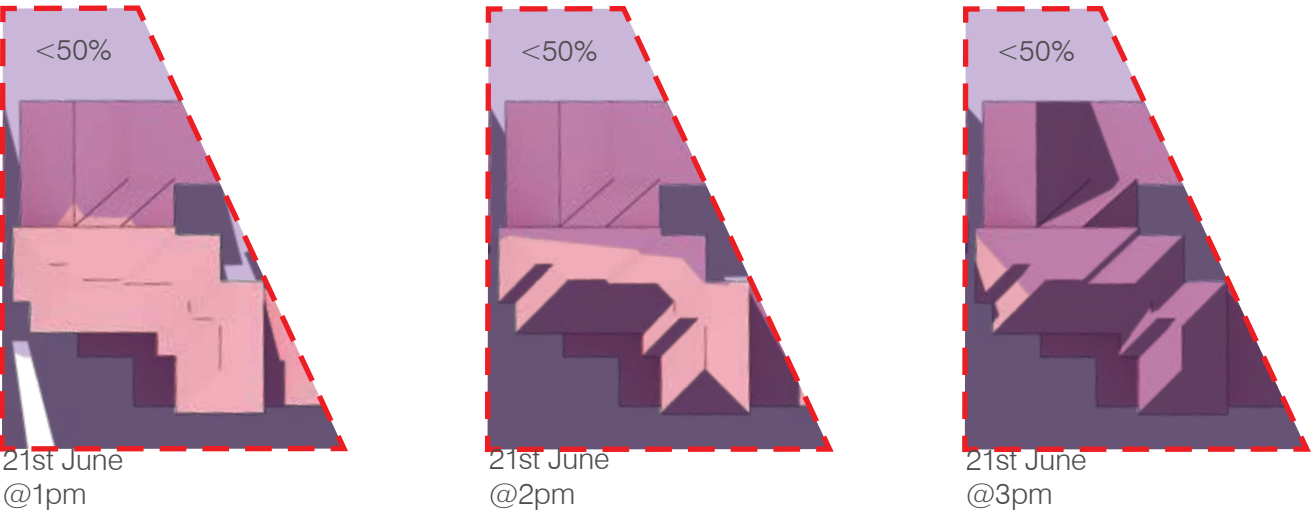
250 Wentworth Avenue
Solar access >50% in front garden

9:00am - 10:40am
(100mins in total)



252 Wentworth Avenue
Solar access >50% in front garden

9:00am - 11:25am
(145mins in total)



Legend

- Additional shadow area of the proposal
- Shadow cast by both existing buildings and new proposal
- Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail



Overshadowing Assessment

Spring Equinox shadows (21 September)

Equinox shadows have been assessed under the Botany Bay DCP 2013, Policy 4A.4.3 Solar Access, which states:

Control C5: *Where a neighbouring development currently receives less than the required amount of sunlight (on 21 June) the amount of sunlight available on the 21 March or the 21 September will be assessed and form a merit based assessment of the Development Application*

The shadow diagrams adjacent analyse overshadowing impacts on the 21st of September and conclude that the proposed development does not create any additional overshadowing impact to the adjacent properties at this time. On this basis the proposal would comply positively on a merit based assessment.



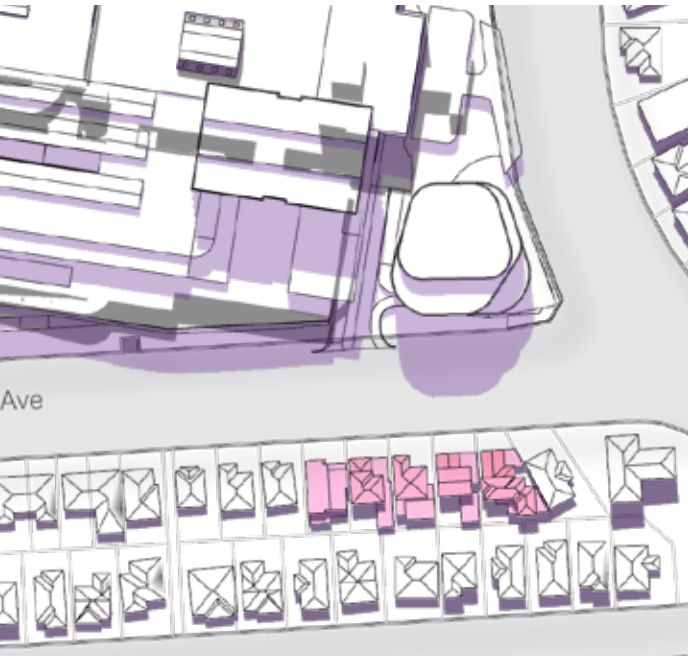
Shadow plan at 9am (21 September)



Shadow plan at 10am (21 September)



Shadow plan at 11am (21 September)



Shadow plan at 12pm (21 September)



Shadow plan at 1pm (21 September)



Shadow plan at 2pm (21 September)



Shadow plan at 3pm (21 September)

Legend

- Additional shadow area of the proposal
- Shadow cast by both existing buildings and new proposal
- Properties not currently complying with DCP 4A, 4.3 C1, analysed in further detail