Attachment A2(d)(vi)

Urban Design Study – 3 Site Analysis – Part 6 – Botany Road Precinct

3.9 Constraints

3.9.1 Built Form and Land Use Constraints

1. Heritage listed items may place constraints on new development's heights, overshadowing and scale.
2. State significant development's unknown population, open space, public domain or built form provisions challenges growth and yield assumptions within the study area.
3. East-West connections are constrained by existing development, creating a low chance through site connections.
4. Long street blocks inhibit existing east-west movements to traverse the corridor.
5. Blank facades are common on current development, and disconnect street frontages, remove activity from commercial or retail properties.
6. Steep topography limits usage of green space, impeding accessible east-west connections.
7. Development heights are constrained by sunlight access required to public open space.
8. Public domain improvements along Botany Road are constrained by discontinuous SP2 setbacks. State Government land ownership here means uncertain future use as public domain, landscaped verge or pedestrian pathways.
9. Waterloo Housing Estate redevelopment and Waterloo Metro development concept designs are influx so vehicular, pedestrian, street pattern, open space, height, scale and character may change, and may affect yield or growth potential within the corridor.
10. The scale and character of the Future Waterloo Metro Station requires sensitive integration of surrounding built form and scale. Vehicular and pedestrian impacts are known for the precinct edges only.



Figure 190: Built Form and Land Use Constraints

3.9.2 Movement, Place and Transport Constraints

1. Traffic dominated node with one way pairs results in limited pedestrian and cyclist amenity and poor public domain.
2. Public node not well defined and suffers from poor connectivity.
3. Limited connection East / West due to limited pedestrian crossing opportunities. One mid block crossing at Regent Street impedes retail connectivity east-west.
4. Future high pedestrian demand zone currently conflicts with existing vehicle traffic circulation.
5. Limited pedestrian connection east-west along Henderson Street impedes future pedestrian access to the ATP.
6. Henderson Road dog-leg resulting from one-way pairs complicates vehicle movements, and results in long pedestrian waiting time.
7. North / South link to Green Square constrained by high traffic volumes on both Botany Road and McEvoy Street.
8. The Alexandria to Moore Park widening conditions may increase traffic numbers and reduce pedestrian, residential and public domain amenity, further congesting the constrained intersection at McEvoy Street and Botany Road.
9. North-south bus pairs are currently split between Regent / Botany and Gibbons / Wyndham creating walking transitions between bus direction routes. The one way pair road direction means a loop-back is required for buses travelling east-west along Redfern Street.

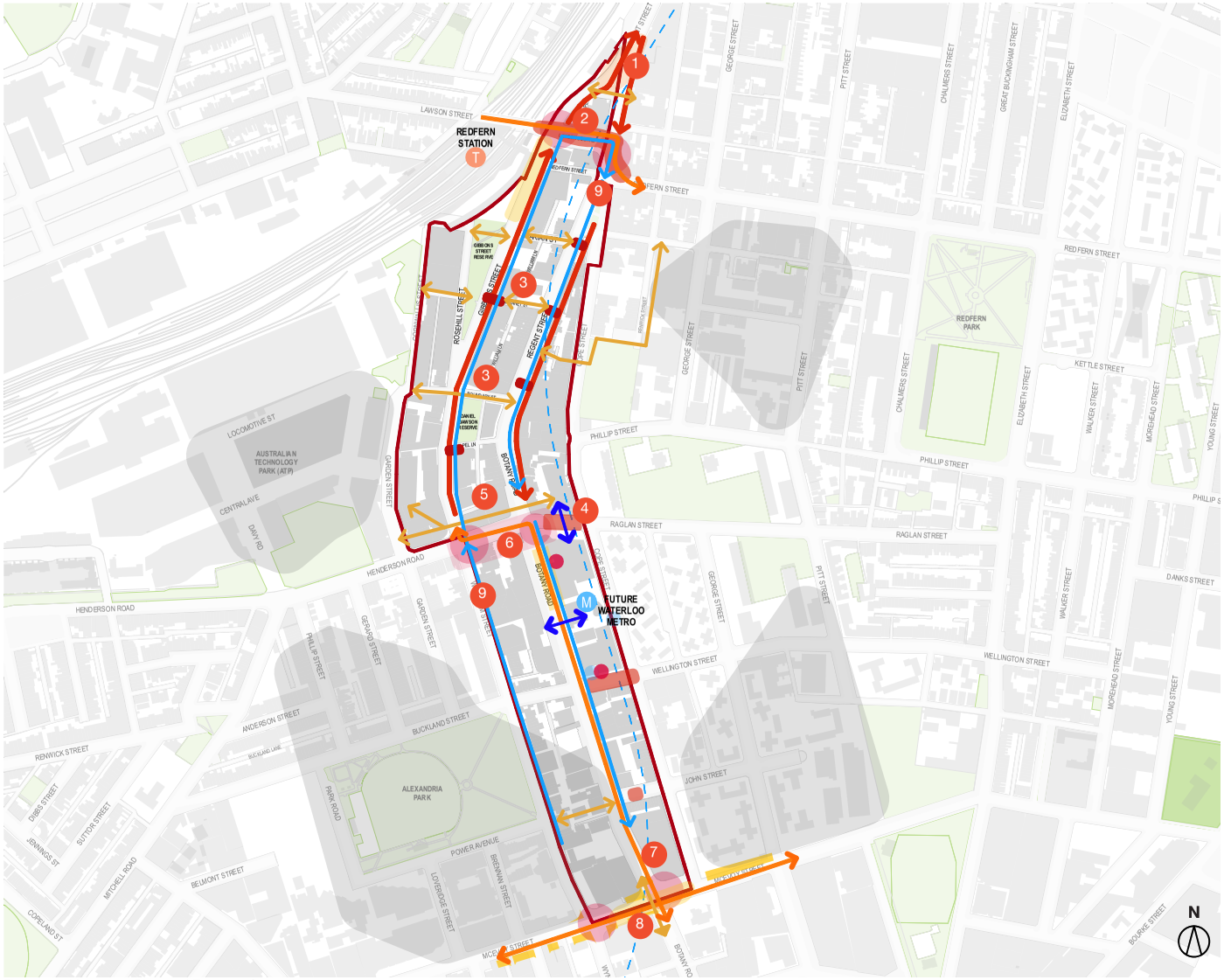


Figure 191: Movement, Place and Transport Constraints

3.9.3 Environment and Amenity Constraints

1. Sites within flood prone areas being subject to constrained development in the future and flood mitigation measures.
2. The amount of air pollution and noise generated from road traffic is governed by the overall traffic flow and speed on the road. Improvements to Noise and Air improvement may be subject to the extent of improvements that can be made on Botany Road/ Regent Street, Gibbons Street, Wyndham Street including direction of traffic, flow and vehicles numbers.
3. Residential Façades already developed along Major Vehicle corridors currently have minimal setback from the roadway. Improvements to existing amenity therefore requires owner/ strata funded development or alterations to decrease noise and air affects stemming from the existing road conditions.
4. Overall vehicle speed - affects the air quality and noise emissions generated, with reduced speed resulting in increased air pollution.

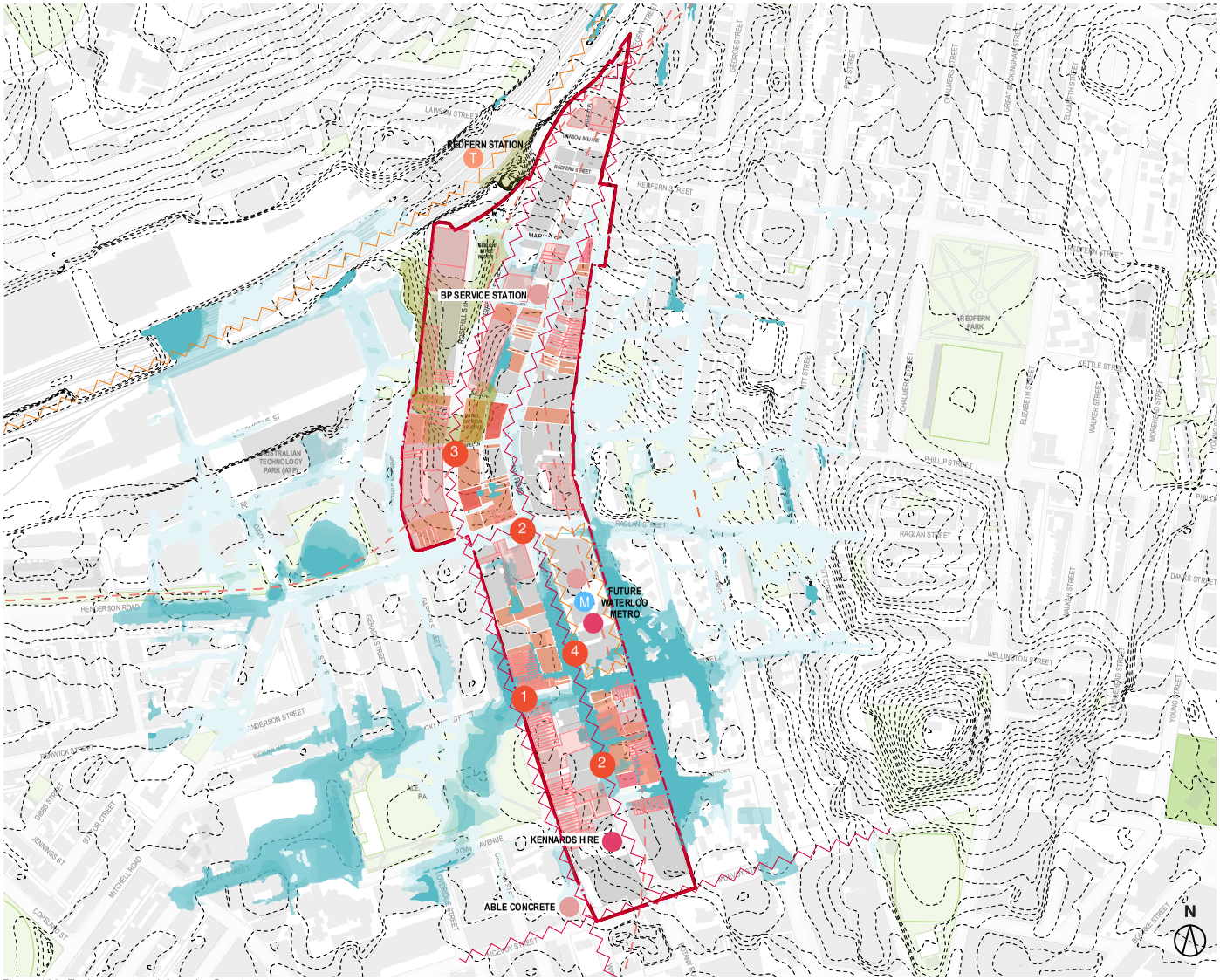


Figure 192: Environment and Amenity Constraints

3.9.4 Open Space and Public Domain Constraints

1. The public plaza on Regent Street is also a busy pedestrian thoroughfare and constrains the plazas use as a meeting place.
2. Jack Floyd Reserve is ununified, busy and divided by pedestrian movements and transport interchange.
3. Generally, narrow footpaths in the precinct constrain high pedestrian movements, particularly in east-west lanes where footpaths are between 0-1m wide.
4. Landscaped open space has steep topography and is bounded by busy roads on at least one side.
5. Kerbside parallel parking constrains use of the generous SP2 setbacks for landscaped space, public domain or active street usage.
6. New residential development constrains future continuous active frontages.
7. Use of existing shopfronts as residential results in scattered active frontages and retail on Regent Street and disrupts continuous active street frontages.
8. Future and current high pedestrian flows is constrained by narrower footpaths. Within the Waterloo Metro, this is minimised where the new development is proposed to be set back. At Redfern Station, a new station entry may activate Marian Street but is constrained by narrow footpaths at this location.
9. There are generally minimal opportunities for new public open space within the corridor unless it is provided by private development.

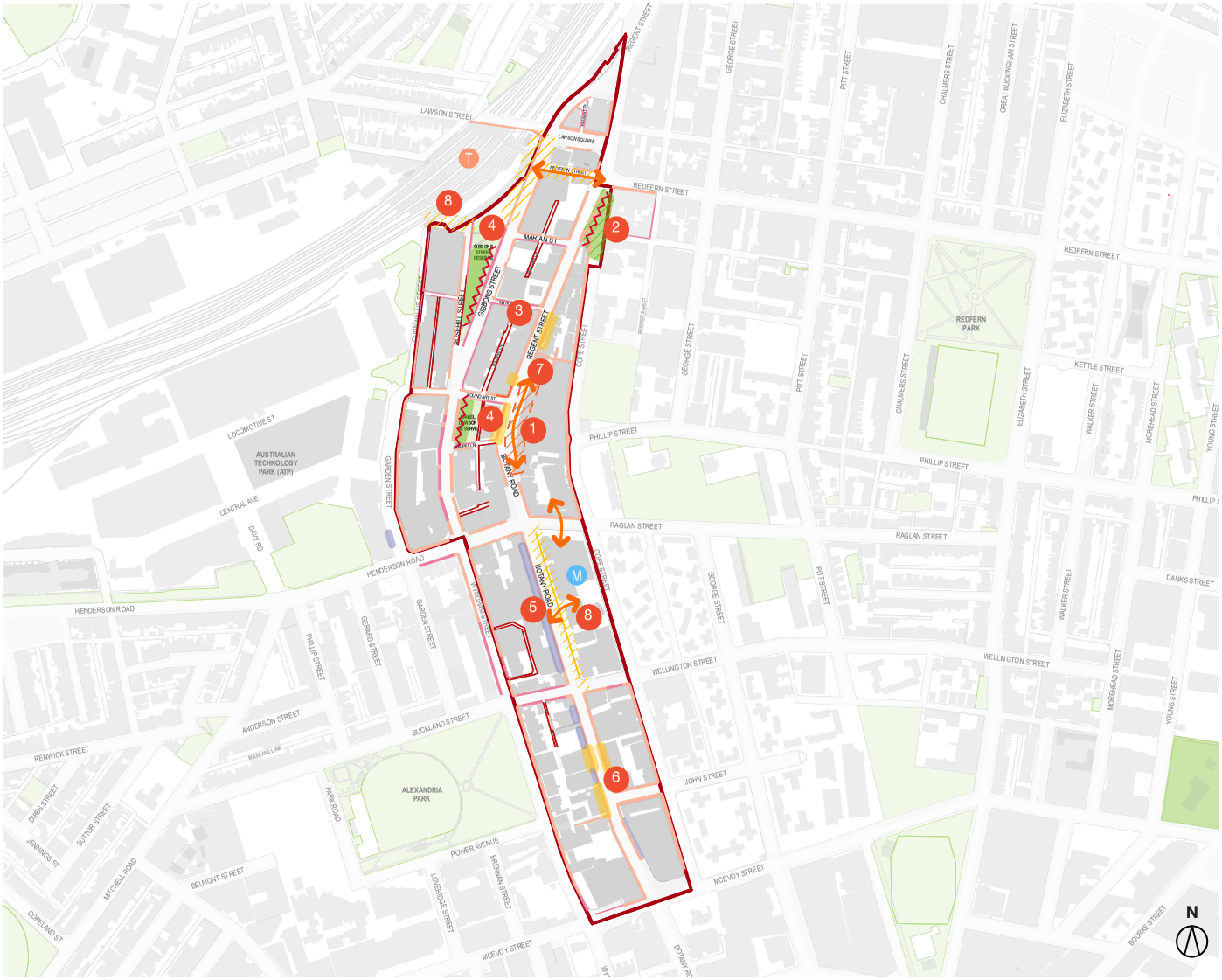


Figure 193: Open Space and Public Domain Constraints

3.9.5 Solar Access Constraints

The diagrams within this section provide analysis of maximum possible built heights (in storeys) allowable in urban areas adjacent to parks, open space or reserves within or adjacent to the Botany Road Corridor study area. The aim is to identify areas within the park that achieve minimum 50% solar access for 4 hours or more between the hours of 9am and 3pm on the winter solstice, June 21.

NCIE

Due to the low-rise nature of built form with the Redfern Estate heritage Conservation area, the NCIE benefits from good solar access in mornings and until approximately 12pm in the afternoon on June 21.

A large portion of this active private open space therefore receives solar access throughout the morning, with the western side having reduced amenity from 12pm onwards.

Proposed built form along Regent Street and Cope Street could therefore reach substantial heights between 11 storeys, 17 storeys and 20 storeys location dependant - however due to the possible constraints of retaining the fine grain, heritage and socially significant built form scattered within this area, it is unlikely that taller heights may be developed in these locations. It is therefore likely that the NCIE private open space may benefit from ongoing, good solar access with future development.



Figure 194: Solar Access Constraints - NCIE - Plan

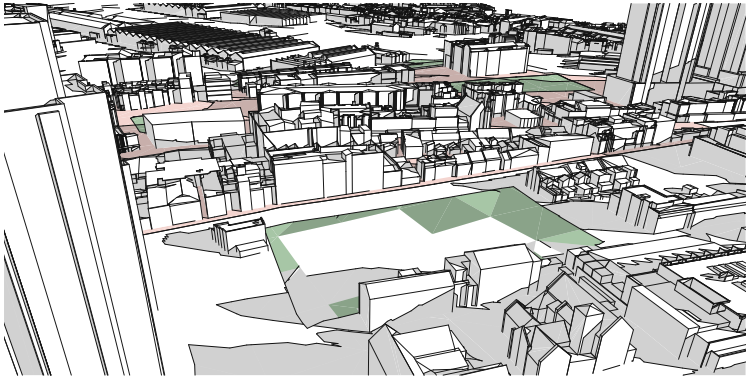


Figure 195: Solar Access - existing - NCIE - 3D

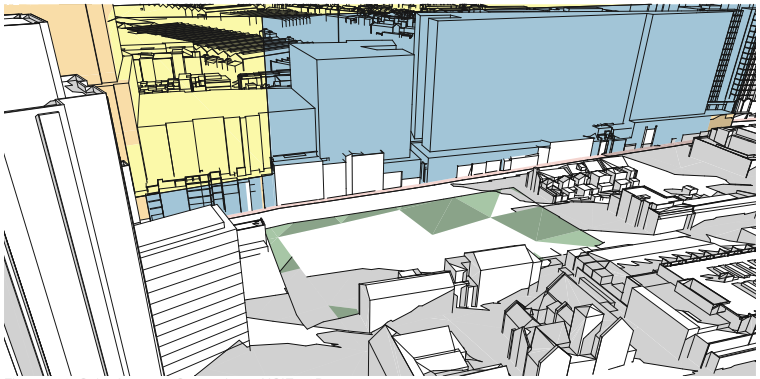


Figure 196: Solar Access - Constraints - NCIE - 3D

Gibbons Street Reserve

Existing overshadowing resulting from tall residential built form along the eastern side of Gibbons Street means that Gibbons reserve is quite constrained from achieving 50% solar access for 4 hours on June 21, particularly in the early morning hours between 9am and 10am. The adjacent diagram shows that existing solar access is maintained through-out 10am to 1pm achieving 4 hours of access to the northern portions of the Reserve. Due to the linear, triangular shape of the Reserve, between 16-18 storeys could be achieved in built form along Rosehill Street if solar access is maintained in the north of the Reserve.

However, future built form development heights north of Gibbons Reserve within TfNSW lands are currently subject to maximum 15 storeys Built Height under the RWA State planning controls. Solar access is therefore anticipated to be further reduced within Gibbons Reserve on June 21 between 9am and 3pm, if 15 storeys built form height is achieved in full.

It is therefore may be more suitable for the properties west of Gibbons Reserve along Rosehill Street to maintain more conservative and lower heights - particularly at 8-6 and 18 Rosehill Street - to provide opportunities for good solar access in the future.



Figure 197: Solar Access Constraints - Gibbons Street Reserve - Plan

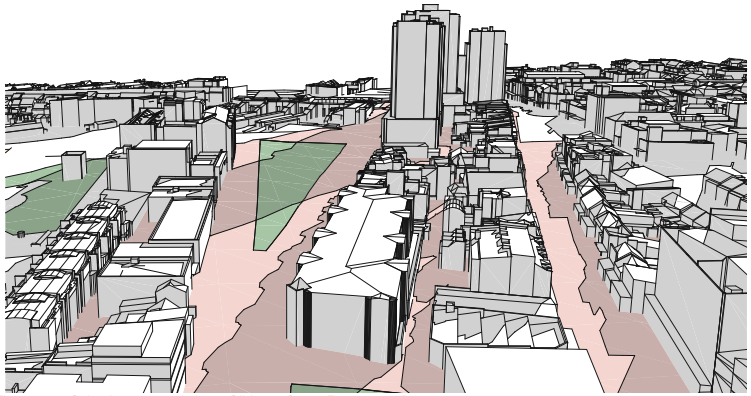


Figure 198: Solar Access - existing - Gibbons Street Reserve - 3D

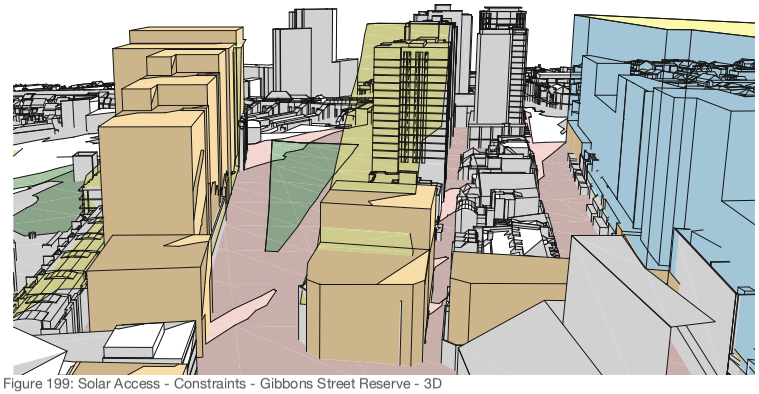


Figure 199: Solar Access - Constraints - Gibbons Street Reserve - 3D

Alexandria Park

Alexandria Park achieves minimum 4 hours solar access between 10am and 2pm on June 21, to approximately 20,770sqm of open space. This is achieved by limiting heights to 12 stories along Wyndham Street to the east and 13 stories along Wyndham, north of Buckland Street. This built form height is acknowledged to exceed the solar access plane required to provide no additional overshadowing to the Park. The majority of open space receiving 4 hours or more solar access on June 21 is on the oval portion of the Park. It therefore might be recommended to not achieve the maximum height of 10 storeys along Wyndham Street to ensure that equal provision is achieved between active open space and passive recreation open space within Alexandria Park. It is worth noting that the edges of Alexandria Park benefit from large, well-established fig trees that surround all sides and already provide some shading to these landscaped open space areas.

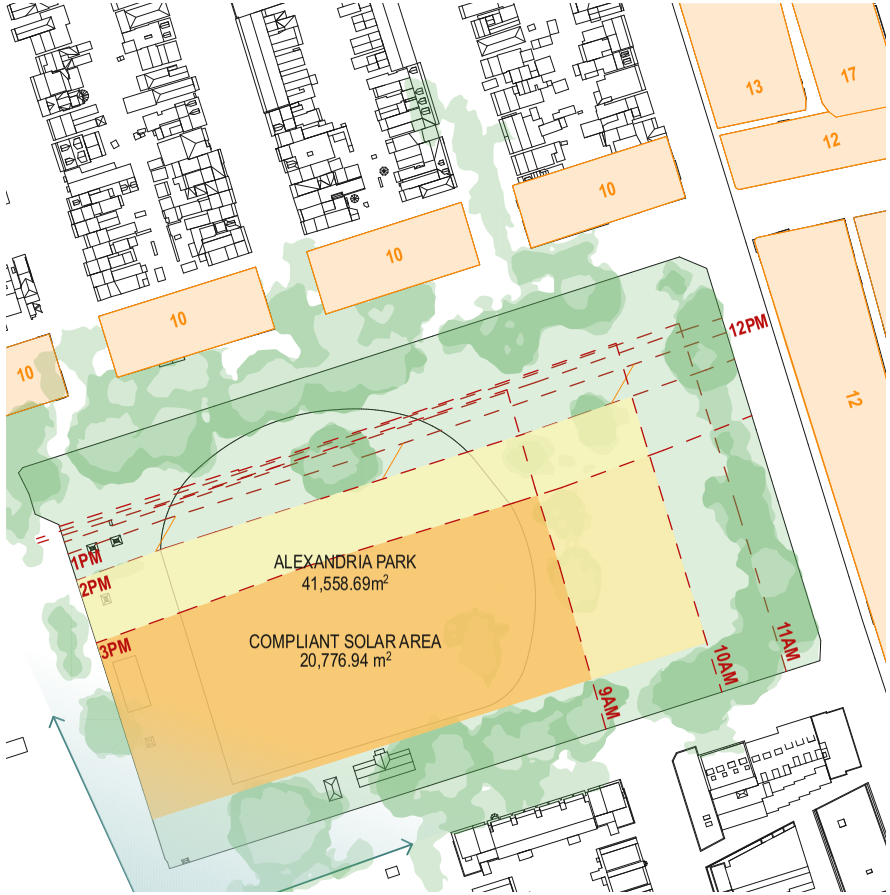


Figure 200: Solar Access Constraints - Alexandria Park - Plan

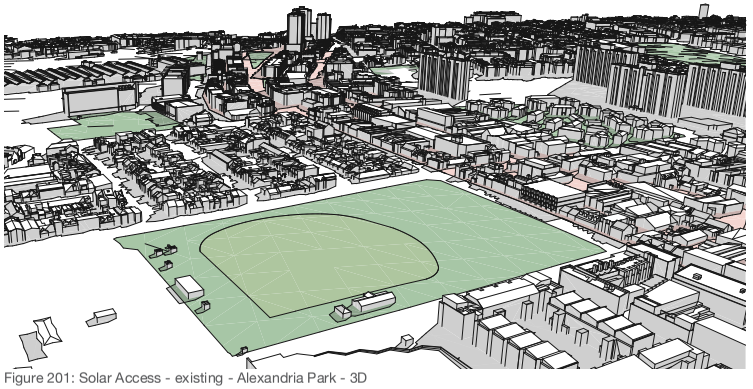


Figure 201: Solar Access - existing - Alexandria Park - 3D

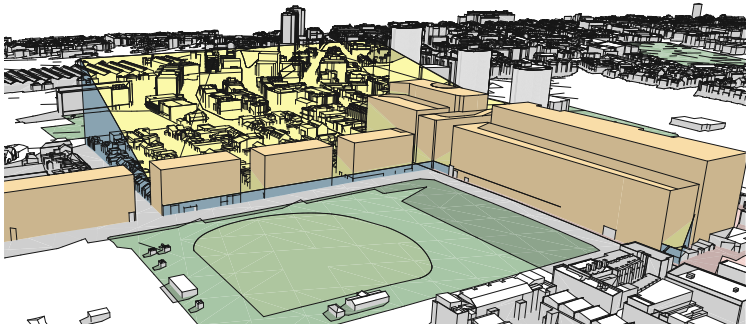


Figure 202: Solar Access - Constraints - Alexandria Park - 3D

Daniel Dawson Reserve

Daniel Dawson Reserve is highly constrained for solar access by existing development surrounding it's edges. The plan adjacent shows that with minimal additional storeys on surrounding buildings, 996 sqm of open space with Daniel Dawson Reserve will achieve a minimum 4 hours solar access between 10am and 2pm on June 21. The north facing portion of Daniel Dawson reserve does not achieve 4 hours solar access on June 21 between 10am and 1pm.

This is achieved by limiting heights to 6 stories along west Gibbons street, with the exception of 4 stories between 9 and 7 Wyndham Street. North of the Reserve at 37-61 Gibbons Street, any future development would likely need to take a stepped form, with heights restricted to 8 storeys mid-block, and 5 storeys closest to the Reserve.

At the corner of Boundary Street and Rosehill Street, development should be restricted to 6 storeys, with possible stepped forms northwards to ensure that solar access is maintained within Daniel Dawson Reserve.



Figure 203: Solar Access Constraints - Daniel Dawson Reserve - Plan

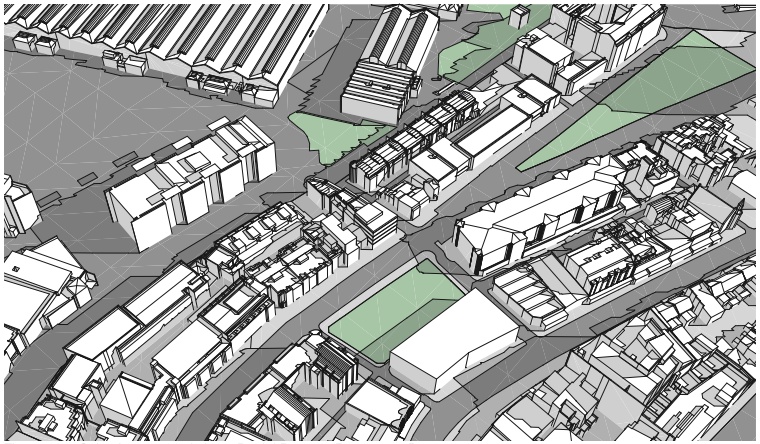


Figure 204: Solar Access - existing - Daniel Dawson Reserve - 3D

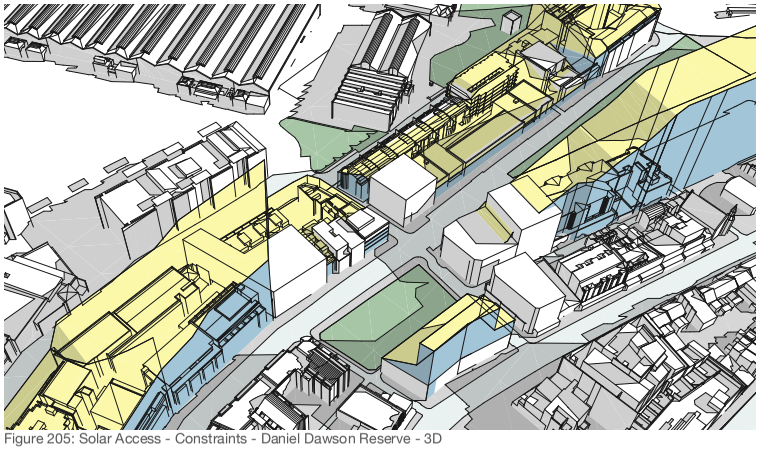


Figure 205: Solar Access - Constraints - Daniel Dawson Reserve - 3D

	Compliant Solar Access *	Non-Compliant Solar Access
Proposed Shadow Outlines		
Shadow Outlines By Others	4 Hours	3 Hours
Proposed Development Location	5 Hours	2 Hours
3 Number of Storeys	6 Hours	1 Hour
View		

* Minimum 50% solar access between the hours of 10am - 2pm

3.9.6 Solar Access Planes (SAP) Constraints

The following diagrams conservatively analyse existing built form with solar access planes that would enable continuation of existing solar access to parks, open space or signfiicant landscaped areas. The solar access planes have been developped to optimise and maintain existing solar amenity.

Proposed built form heights in storeys shown in the plan diagrams would be a constraint on future development if no additional overshadowing were to be considered for parks and open space within or adjacent to the study area.

All figures on the following pages show shadows at the winter equnox, June 21st between 9am or 3pm, and generally document the most constrained 'worst case scenario' overshadowing during this time period. Figures showing proposed 3D solar planes take into account proposed developments, DA's and SSDA's.

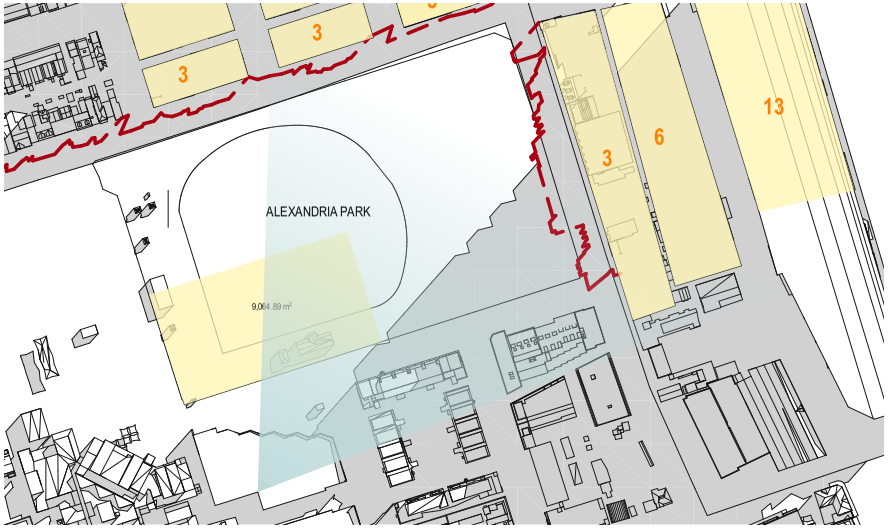


Figure 206: Alexandria Park - Solar Access Plane and associated maximum built height - 9am Overshadowing

Source: TZG

Alexandria Park - Solar Access Plane

Built height along Alexandria Park edge remains at 3 stories, to maintain full solar access into the park.

Development potential grows towards Hendersen Street (north) to 34 storeys and toward Botany Road (east) to 6 stories. Development height potential is shown across Garen Street, Gerard Street and Phillips Street blocks but there is not expected to be growth in these areas, due to the existing heritage conservations areas that encompass these blocks.

LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

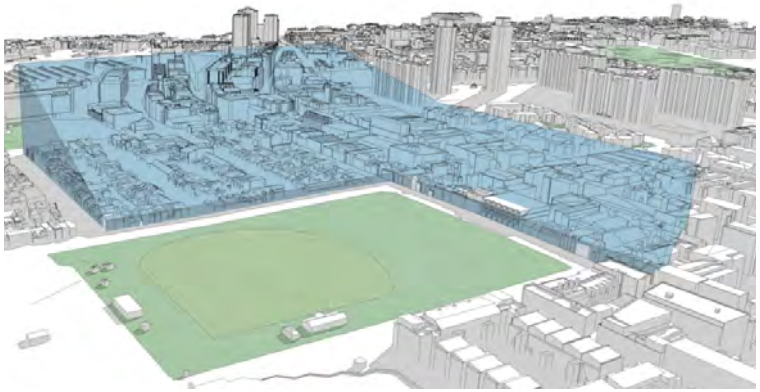


Figure 207: Alexandria Park - Existing Built Form - 9am Overshadowing

Source: TZG

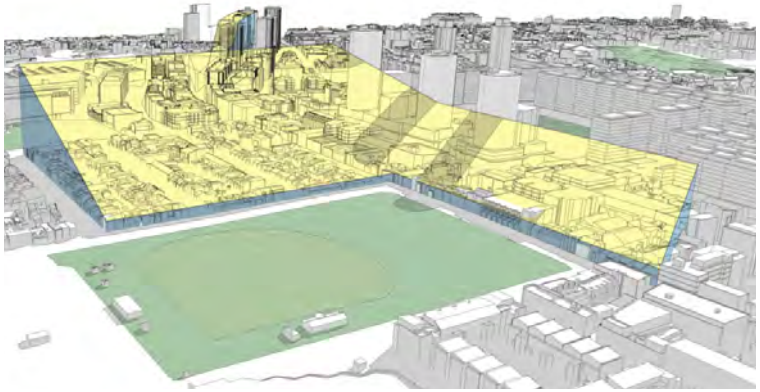


Figure 208: Alexandria Park - Existing Built Form with Solar Access Plane - 9am Overshadowing

Source: TZG

Daniel Dawson Reserve - Solar Access Plane

The fFigure 128shows Daniel Dawson Reserve is significantly overshadowing in it's existing condition as adjacent multi residential development cast shadows across approximately half of the reserve during the early morning time of 9am, June 21.

The solar access plane allows for 5 stories at Spencer Lane. Whilst storey height could potentially reach 13 stories along Regent Street / Botany Road, development potential is constrained by a singular block and may result in additional overshadowing of the Park in morning hours if applied the whole site making up 8-20 Botany Road.

Development potential rises from 4 stories to 20 stories in the northern direction away from Daniel Dawson Reserve.



Figure 209: Daniel Dawson Reserve - Solar Access Plane and associated maximum built height - 9am Overshadowing
Source: TZG

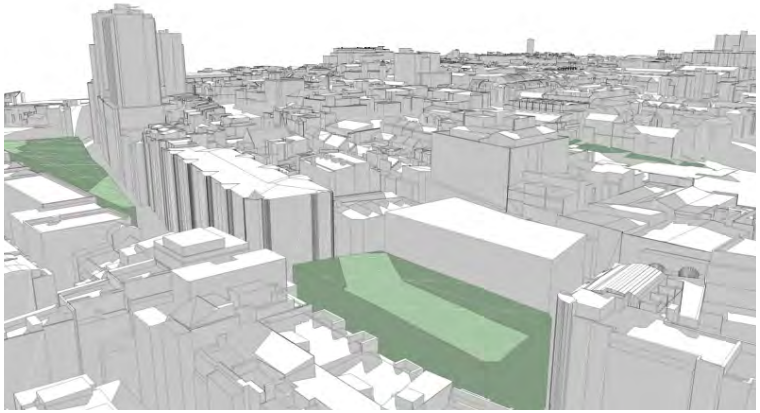


Figure 210: Daniel Dawson Reserve - Existing Built Form - 9am Overshadowing
Source: TZG

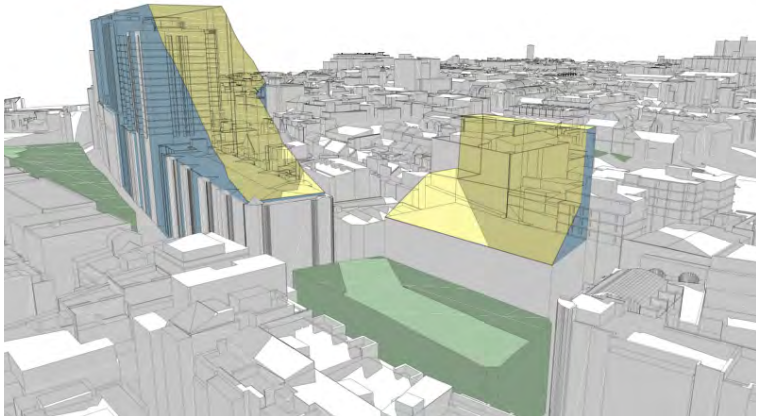


Figure 211: Daniel Dawson Reserve - Existing Built Form with Solar Access Plane - 9am Overshadowing
Source: TZG

LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

Gibbons Street Reserve - Solar Access Plane - 9am

The figures adjacent show Gibbons Reserve is significantly overshadowed at 9am, June 21 due to existing mixed use development towers on the eastern side of Gibbons Street. The solar access planes here assume that no additional height would be developped on thees sites due to their strata held nature, and as they are recent development.

Development of 20 stories could result when Daniel Dawson's solar plane (previous figures) adjoin to Gibbons Street. This solar plane does not appear to result in additional overshadowing of Gibbons Reserve, but does result in overshadowing of properties on the western side of the Reserve at Rosehill Street.

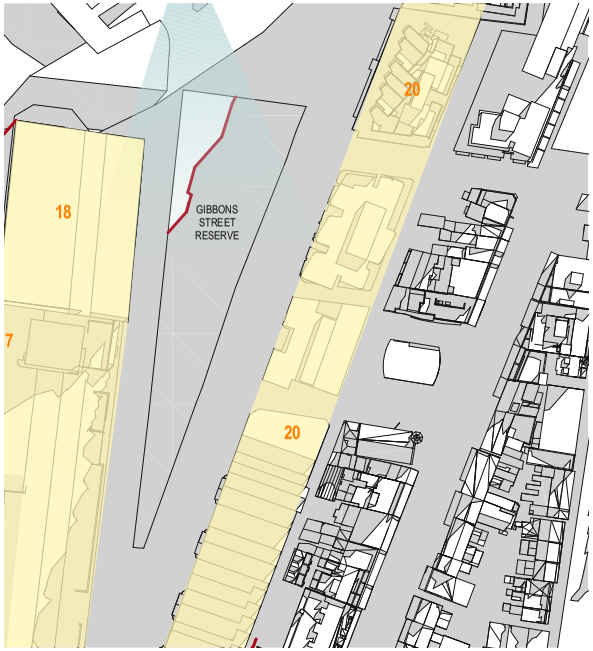


Figure 212: Gibbons Street Reserve - Solar Access Plane and associated maximum built height - 9am Overshadowing
Source: TZG

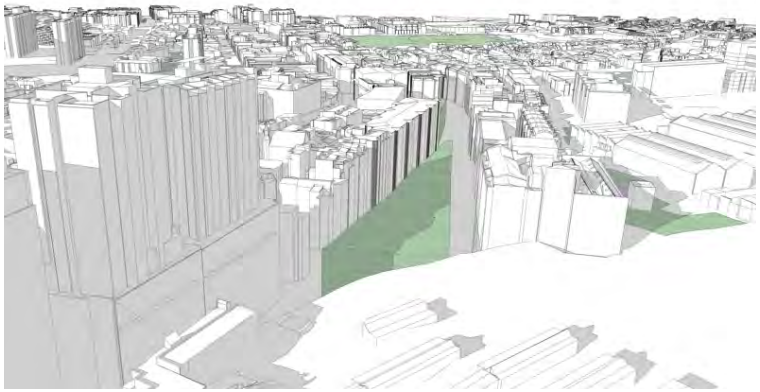


Figure 213: Gibbons Street Reserve - Existing Built Form - 9am Overshadowing
Source: TZG

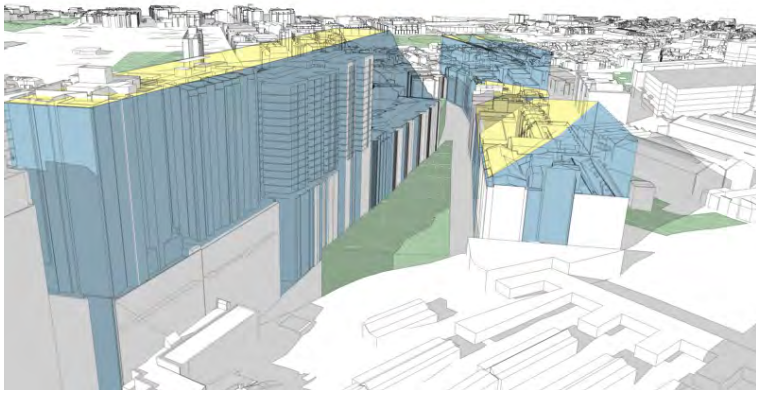


Figure 214: Gibbons Street Reserve - Existing Built Form with Solar Access Plane- 9am Overshadowing
Source: TZG

LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

Gibbons Street Reserve - Solar Access Plane - 3pm

The figures adjacent shows at 3pm on June 21, Gibbons Reserve recieves more sunlight than 9am, however is also significantly overshadowed, due to existing north - south oriented development on Rosehill Street.

By implementing a low height solar access planes on the western side of Gibbons Street, solar access is enabled in to the Australian Technology Park open spaces, which are not currently as significantly overshadowed as Gibbons Reserve.



Figure 215: Gibbons Street Reserve - Solar Access Plane and associated maximum built height - 3pm Overshadowing
Source: TZG



Figure 216: Gibbons Street Reserve - Existing Built Form - 3pm Overshadowing
Source: TZG

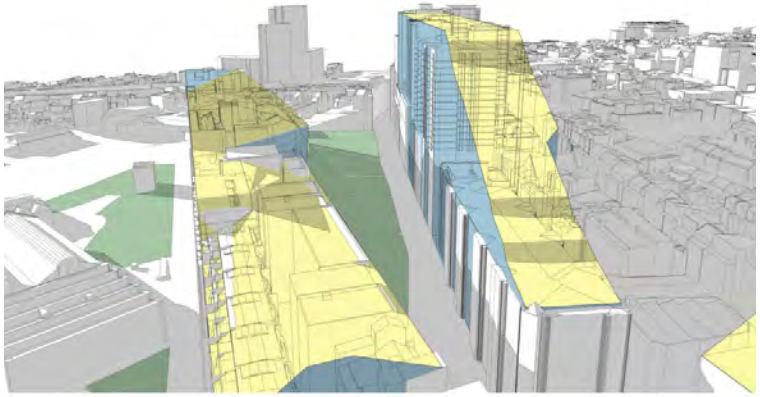


Figure 217: Gibbons Street Reserve - Existing Built Form with Solar Access Plane- 3pm Overshadowing
Source: TZG

LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

Proposed NCIE - Solar Access Plane

The figures adjacent shows potential heights that could be achieved along Botany Road and Cope Street with the proposed Park to be delievered with the Waterloo Housing redevelopment.

The Waterloo Station development casts some existing shadows across the park, allowing for increased heights in stories immediately adjacent to the Waterloo Housing development.

Height in stories rises in the north toward the NCIE, but would ultimately be contrained by heights required to maintain solar access into the NCIE playing fields in the afternoon of June 21, approaching 3pm.

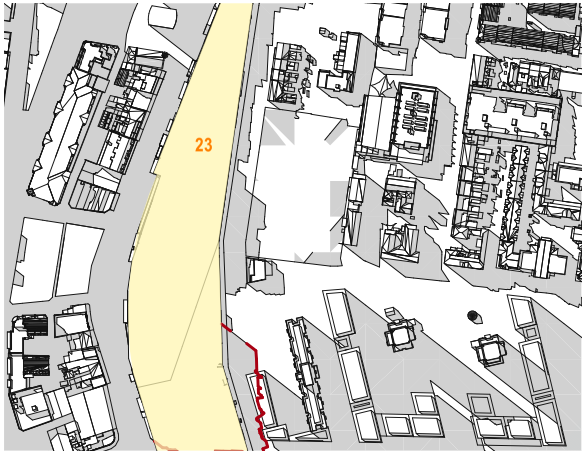


Figure 218: Proposed Waterloo Housing Park - Solar Access Plane and associated maximum built height - 3pm Overshadowing
Source: TZG



Figure 219: Proposed Waterloo Housing Park - Existing Built Form - 3pm Overshadowing
Source: TZG

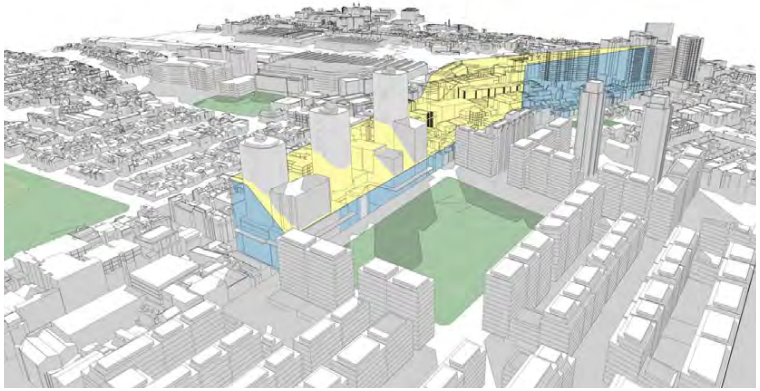


Figure 220: Proposed Waterloo Housing Park- Existing Built Form with Solar Access Plane - 3pm Overshadowing
Source: TZG

LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

Australian Technology Park open space - Solar Access Plane

The Australian Technology open spaces are outside the study area but receive overshadowing from existing development, particularly at 9am, June 21.

Recent commercial and employment building development within the ATP facing Garden Street and Cornwallis Street receive overshadowing from the solar acces plane heights, rising to possibly 18 stories in the north. to maintain no overshadowing within the Yerrabingin cultural garden, storey heights are between 3-7 storeys in the block bounded by Boundary St, Cornwallis Street, Marian St and Rosehill Street.

The corner site at 3 Rosehill Street is highly constrained as a strata owned site and not expected to reach 18 storey development potential.

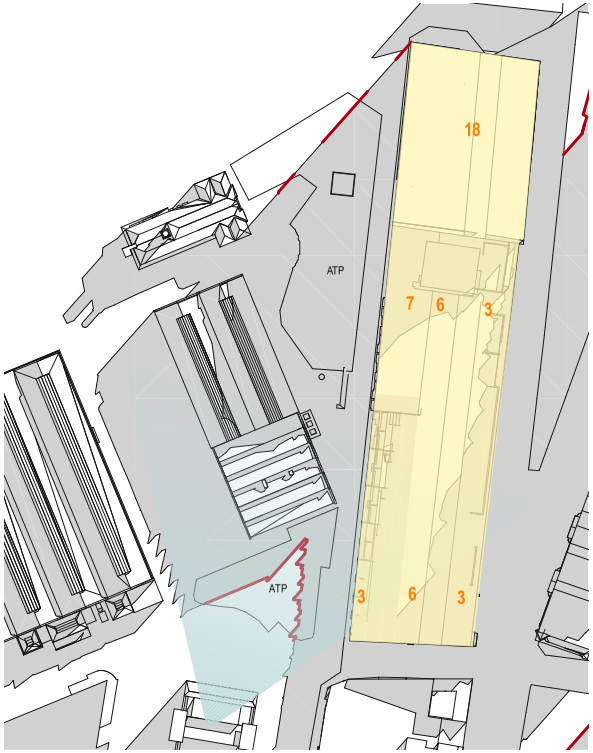


Figure 221: Australian Technology Park Open Space - Solar Access Plane and associated maximum built height - 9am Overshadowing
Source: TZG

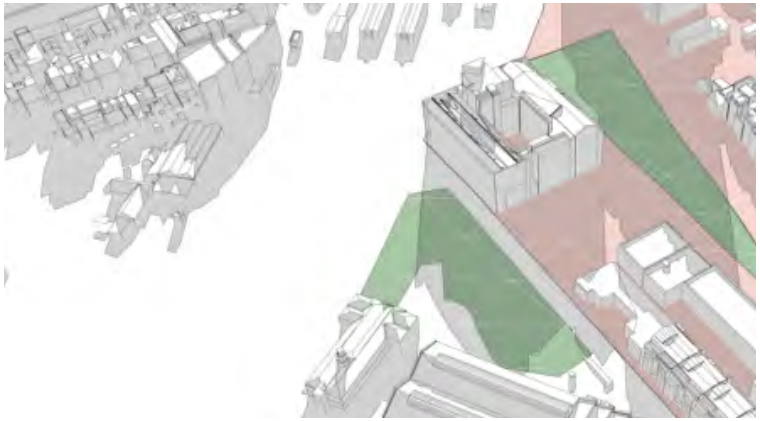


Figure 222: Australian Technology Park Open Space - Existing Built Form - 9am Overshadowing
Figure 223:
Source: TZG

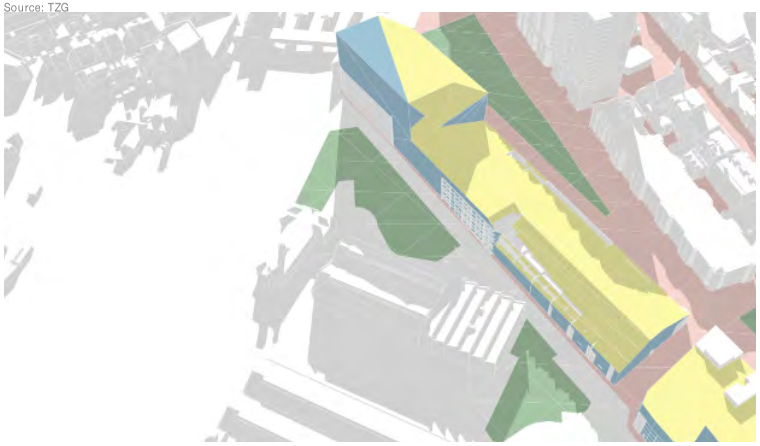


Figure 224: Australian Technology Park Open Space - Existing Built Form with Solar Access Plane - 9am Overshadowing
Figure 225:

LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

South Eveleigh Playground - Solar Access Plane

The figures adjacent show that South Eveleigh playground benefits from good existing solar access at 9am, June 21 and solar amenity continue throughout the day.

To maintain solar access to the Playground and Oval the solar plane height varies from 6 stories in the south to 14 stories in the north near Boundary Street.



Figure 226: South Eveleigh Playground - Solar Access Plane and associated maximum built height- - 9am Overshadowing

Source: TZG



Figure 227: South Eveleigh Playground - Existing Built Form - 9am Overshadowing

Source: TZG

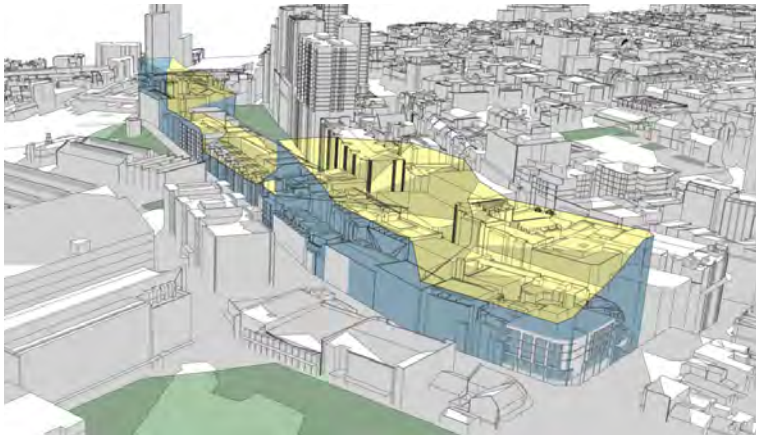


Figure 228: South Eveleigh Playground - Existing Built Form with Solar Access Plane - 9am Overshadowing

Source: TZG

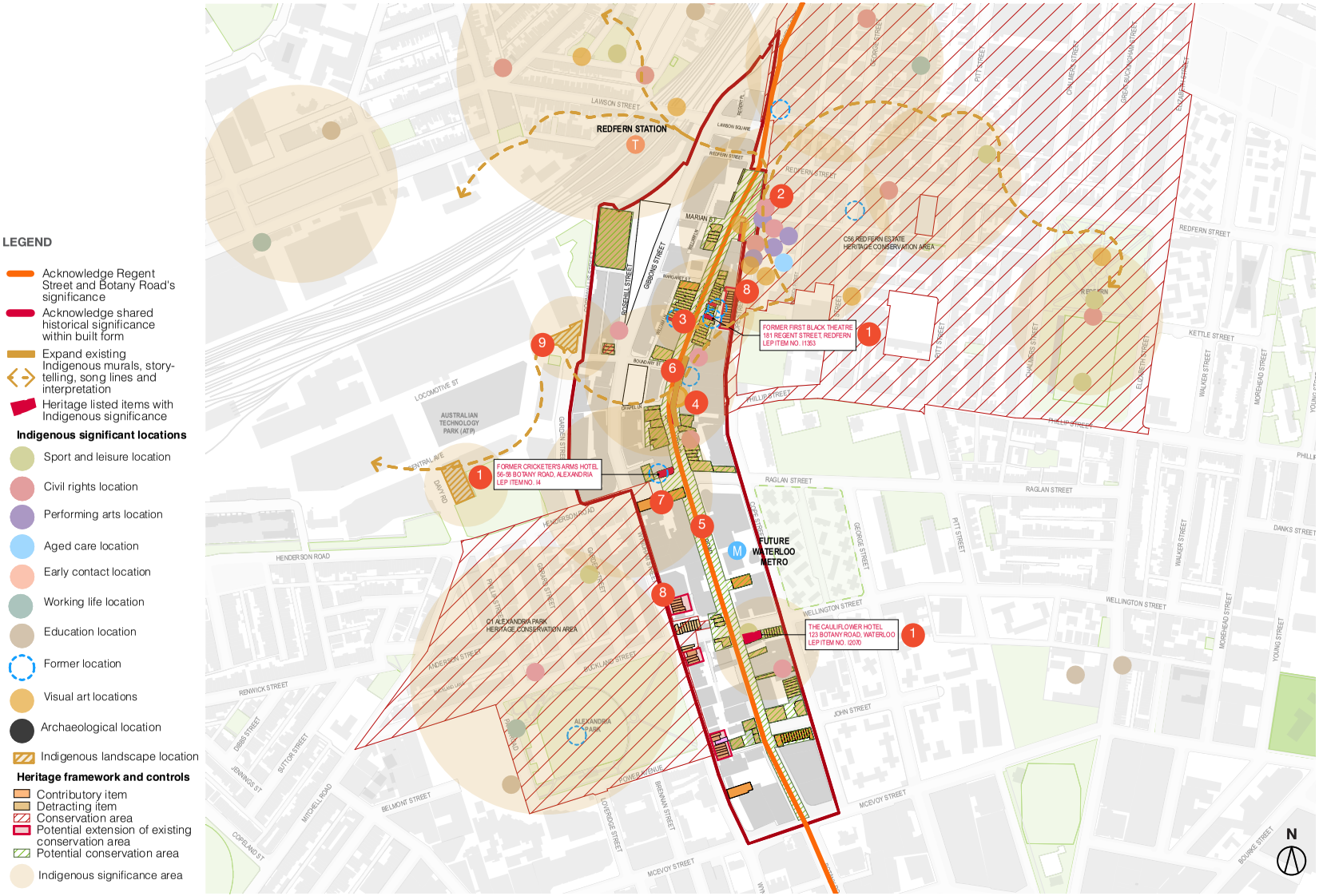
LEGEND

- EXISTING BUILT FORM OVERSHADOWING
- SOLAR ACCESS PLANE
- 3 NUMBER OF STOREYS
- 3D VIEW LOCATION

3.10 Opportunities

3.10.1 Historical, Social and Cultural Opportunities

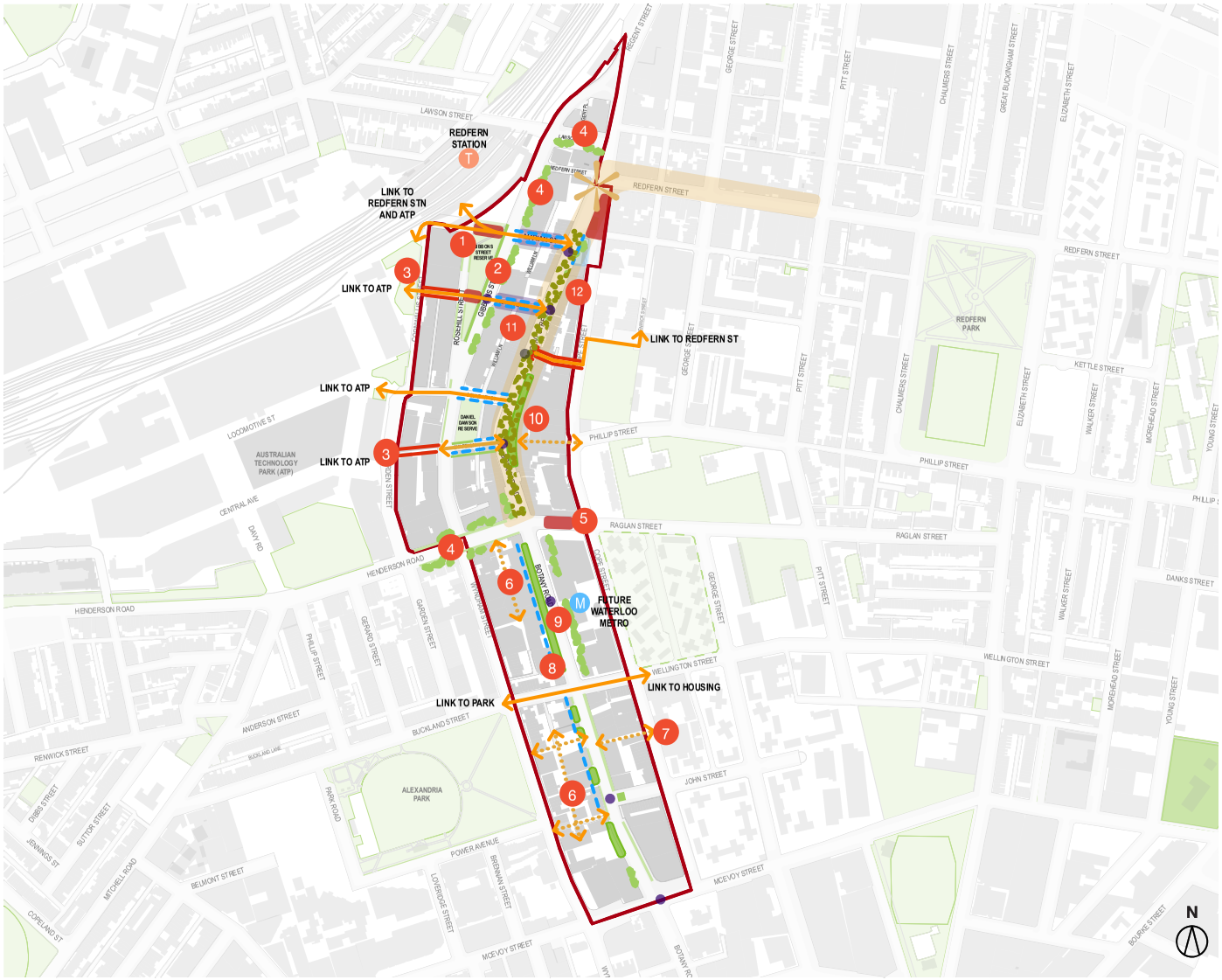
1. Acknowledge Indigenous significant places and Country within heritage listings, contributory items, conservation areas using appropriate planning and heritage controls.
2. Engage with the Indigenous Community to bring forward the invisible shared social and cultural history through placemaking, story telling and interpretation.
3. Work with the Aboriginal and Torres Strait Islander community to develop Indigenous interpretation.
4. Enhance amenity within important Indigenous outdoor meeting places and work with the local Indigenous leadership and community to define 'place' in these areas.
5. Acknowledge the significance of Regent Street, Botany Road and the living memory of Botany Road to La Perouse as a shared trade route.
6. Night-time and retail cultural placemaking reinforced by enhance Regent Street's existing 'gritty' character.
7. Establish a conservation area on Botany Road and Regent Street.
8. Extend Redfern Estate conservation area and Alexandria Park conservation area to include significant fine grain built form.
9. Enhance historical significance of the area by planting Indigenous vegetations and linking to existing Indigenous vegetations.
10. Enhance the area's local and national significance for Aboriginal and Torres Strait Islanders with ongoing community collaboration and consultation within placemaking decisions.



3.10.2 Open Space and Public Domain Opportunities

The open space and public domain opportunities could constitute local and small interventions:

1. Upgrade and establish park through connections.
2. Remove parking along Gibbons Street and extend the park or path extents.
3. Make through connections public and pedestrianise to create east-west links.
4. Enhance canopy cover along roads with busy traffic.
5. A new interchange at Raglan Street plaza to accommodate increased pedestrian flow from the future Waterloo Metro Station.
6. Possible rear laneway extensions with new development.
7. Enhance the canal's amenity, improve safety and upgrade existing condition.
8. Remove parking within setbacks along Botany Road and plant / pave for enhanced public domain and street activation.
9. Create a plaza opposite the Waterloo Metro Station and widen the verge or pave the setback to enhance amenity of future retail or active frontages.
10. Upgrade the Plaza at Regent Street, and consider widening of the plaza and removal of parking.
11. Create shared zones for enhanced pedestrian amenity and to make attractive east west connections.
12. Increase canopy cover and landscape amenity on Regent Street by providing tree blisters between street parking.



3.10.3 Movement, Place and Transport Opportunities

1. Reducing the level of heavy vehicles may improve the level of impact or amenity experienced along the road corridors.
2. Upgrade the street crossing at McEvoy Street / Botany Road to enhance pedestrian connection to Green Square.
3. Implement removal of one-way traffic pairs on Regent Street, Gibbons Street and Botany Road. Possible scenarios for road configuration with two-way pairs will be explored within later stages of the study.
4. Reduce traffic lanes on Henderson Road with removal of one way pairs, to enhance safety for pedestrians, optimise pedestrian flows with wider footpaths.
5. Implement a separated cycleway connection east-west to the future George Street cycleway and Erskineville.
6. Enhance commuter amenity with upgraded multi-modal transport transfer at Waterloo Metro Station and Redfern Station.
7. Enhance walkability along Regent Street by implementing a movement and place streets rating.
8. An extended bus interchange on Gibbons Street at Redfern Station may take advantage of an additional entry and upgraded station entry.
9. Prioritise walking connection to future night time precinct.

Street sections on the following page detail possible upgrades that take into account place-making, traffic flows.

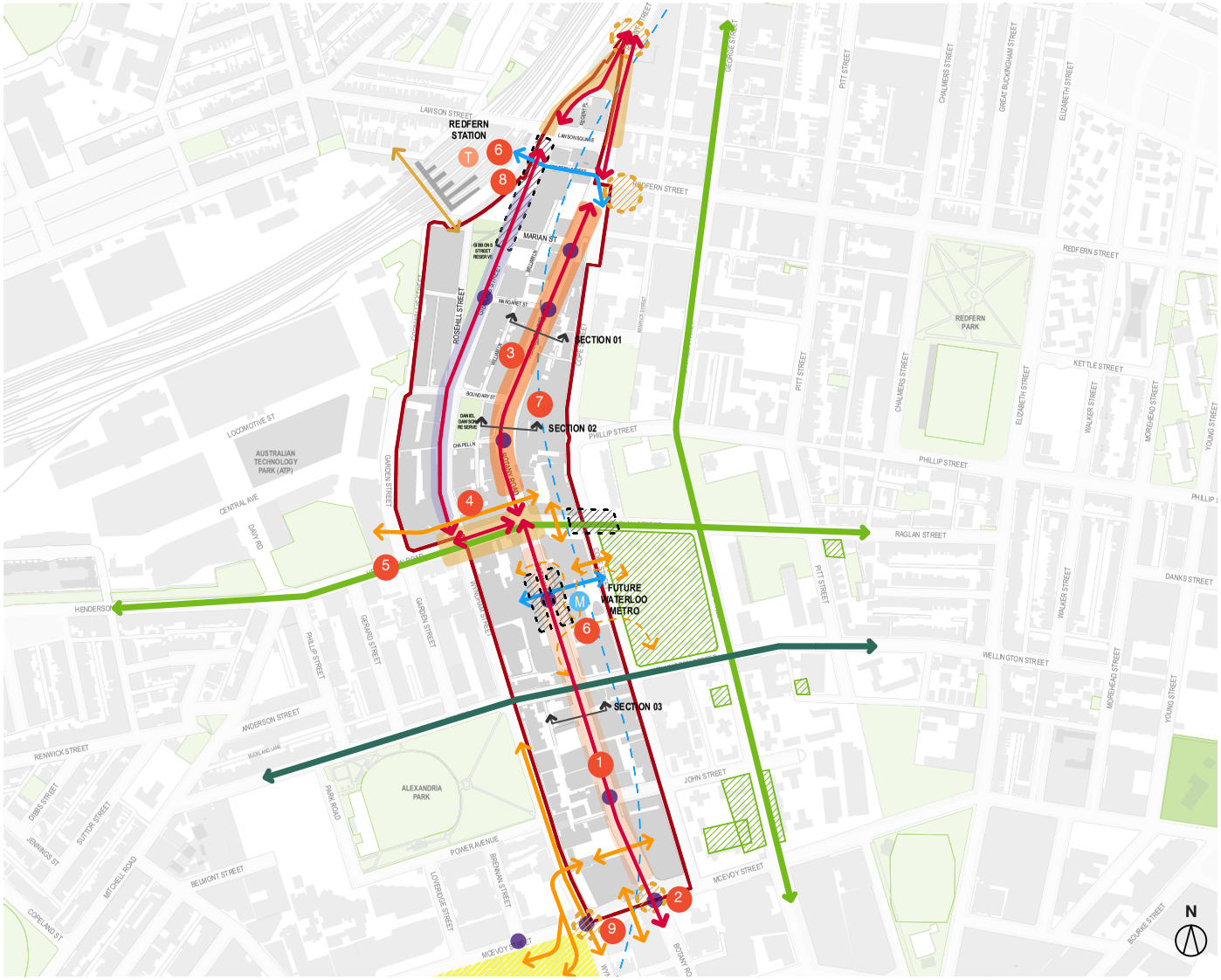
LEGEND

MOVEMENT

- Implement noise and air quality improvements for residential or sensitive receivers
- Improved vehicle / pedestrian interface
- Improved intersections
- Implement two-way traffic pairs
- Consider signalised or zebra crossings
- Prioritise pedestrian connection
- Prioritise local walking traffic
- Improve walkability

TRANSPORT

- Prioritise intermodal transport transfer
- Separated cycleway
- Enhanced bus interchange
- Strengthen existing cycleway connection
- Redfern station upgrade - new concourse/stairs/lifts
- Future open space outside of BRC scope
- Amplified music with small scale cultural uses



Regent Street Movement and Place Opportunities

Figure 214 to Figure 215 illustrates existing street conditions and possible improvements that could be implemented including:

- Removal of the one-way traffic pairs.
- Upgrades within the footpath zone and retain kerb to kerb road widths.
- Enhanced walkability from widened footpaths where possible.
- Implementation of permanent parking between blisters, to improve pedestrian safety and possible zebra crossings.
- Implementation of pedestrian islands for informal crossing and safe rest area for accessible street users, prams or cyclists.
- Increased opportunity for tree planting, WSUD initiatives and landscaping opportunities.
- Interspersed tree blisters create localised footpath widenings where historical interpretation, story-telling and Indigenous placemaking could occur.

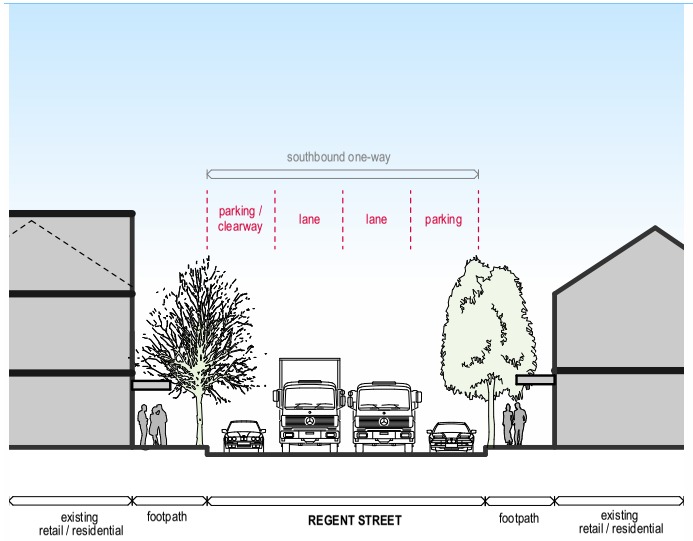


Figure 229: Section 01 - Existing Regent Street cross section condition

Source: TZG

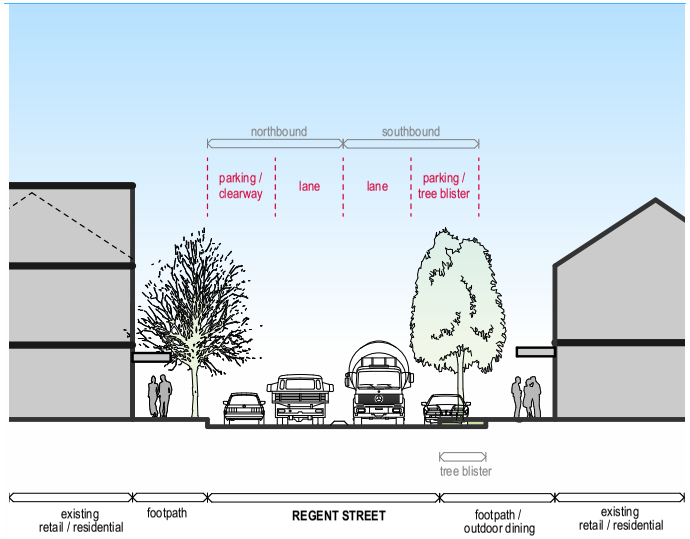


Figure 230: Section 01 - Opportunity for improved Regent Street cross section condition

Source: TZG

Regent Street Public Space opportunities

Opportunities to improve the existing public domain along Regent Street can also include the potential to:

- Increased public gathering places or enlarge existing green spaces.
- Introduce tree blisters for ease of vehicle parking.
- Explore the potential for new public squares / plazas and village centres to reinforce the sense of place and gateway when approaching from Redfern Street and Redfern Station.
- Improve active resting and seating places with pleasant surroundings so it becomes a convenient destination in the public domain. This can be achieved through introduction of plazas along Regent Street.
- Explore the needs of the Indigenous and local community to meet in public gathering places. This could be an opportunity for interpretation.
- Use of native plant species in gathering places to create pleasant and inviting surroundings.
- Increase the number of pedestrian crossings to improve access across Regent Street and safe access to public places.

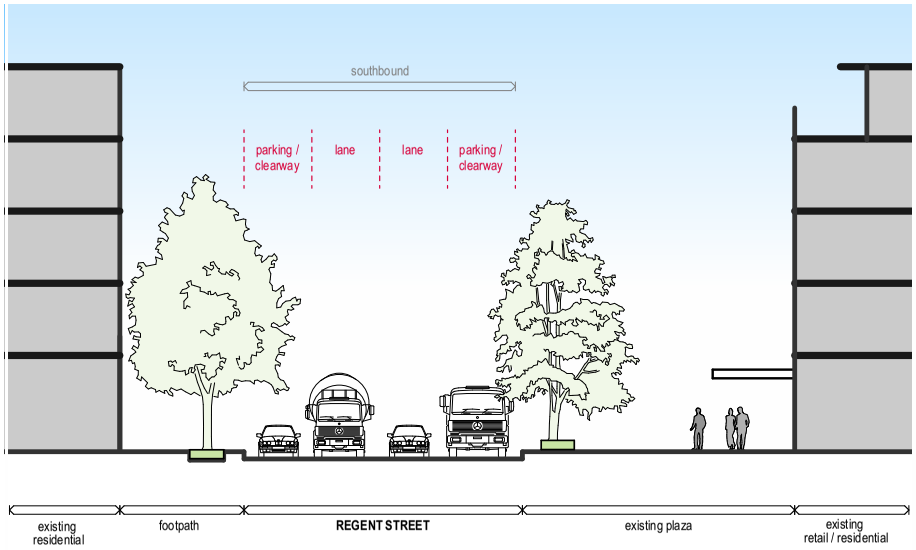


Figure 231: Section 02 - Existing Regent Street cross section condition at the public plaza

Source: TZG

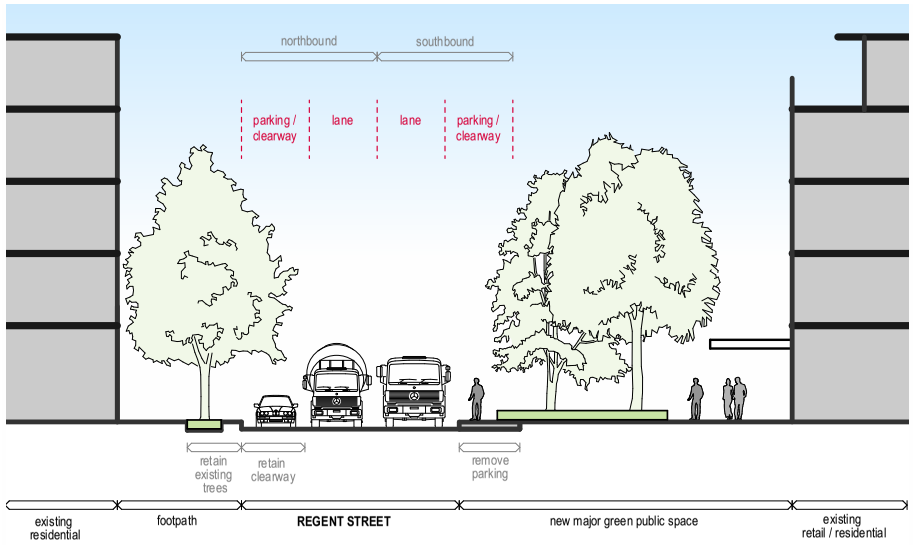


Figure 232: Section 02 - Opportunity for improved Regent Street cross section condition at the public plaza

Source: TZG

Botany Road Movement and Place opportunities

Figure 210 and Figure 211 illustrate possible improvements to public domain along Botany Road. The improvements to the public domain do not require changes to traffic direction but may benefit from slowed traffic speeds to provide safer pedestrian and vehicle conditions.

- Removal of 90 degree angle parking and landscaping of the SP2 street verge setbacks to increase pedestrian and footpath amenity,
- Increased active frontages to create destinations and provide activity to the street edge,
- Possible tree blister parking in locations where zebra crossing or signalised crossings may be required, and,
- Increase tree canopy and street planting.

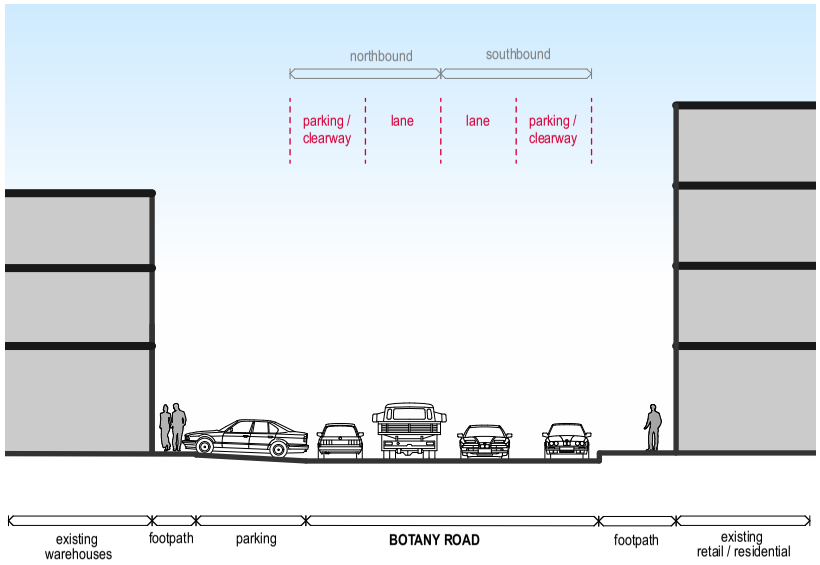


Figure 233: Section 03 - Existing Botany Road cross section condition

Source: TZG

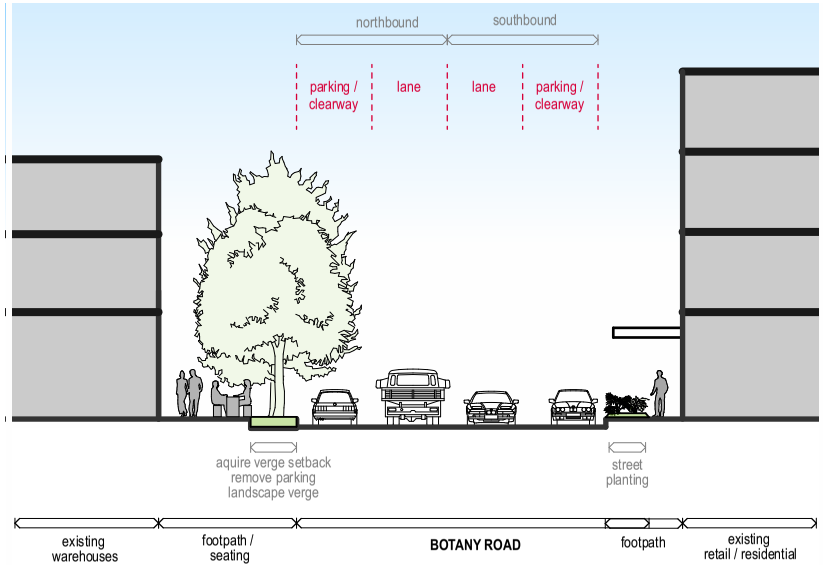


Figure 234: Section 03 - Opportunity for improved Botany Road cross section condition

Source: TZG

3.10.4 Built Form and Land Use Opportunities

1. Encourage adaptive reuse and appropriately scaled additions to heritage or contributory items, to allow for growth whilst respecting historical built fabric.
2. Provide uplift in areas that can accommodate height without overshadowing open space. Uplift heights should be appropriate to existing fine grain, character and scale.
3. Reinforce ATP's employment precinct by encouraging uptake of employment land within new development.
4. The character of Regent Street is valuable and presents opportunity to retain its small scale development. Encouraging transition from residential to non-residential may strengthen active frontage uptake and activate vacant properties.
5. Opportunity Sites have been identified to accommodate growth projected for the study area, or provide catalyst developments for renewal or transitional uses.
6. The Waterloo Metro Site presents opportunity for neighbouring development to occur directly opposite. Future built form in this area could assist scale transitions between large over station towers and neighbouring Alexandria Park conservation area residential precincts.
7. Commercial development at Waterloo Metro may benefit from complementary employment uses within a 200m radius.
8. Consider an 'in-between' zone where residential growth may be complementary to possible employment and local growth centres.

