Attachment A1

Urban Design Study – Parramatta Road Precinct

CITY OF SYDNEY

Urban Design Study: Parramatta Road Precinct



November 2026

The City of Sydney acknowledges the Gadigal of the Eora Nation as the Traditional Custodians of our local area.

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Introduction

The Parramatta Road Precinct Urban Design Study (Study) has been prepared to inform proposed amendments to the planning controls applying to the site (Figure 0.1), including changes to the Sydney Local Environmental Plan 2012 (Sydney LEP 2012) and Sydney Development Control Plan 2012 (Sydney DCP 2012).

The purpose of the Study is to identify an appropriate urban design response for the site, test a range of built form options and establish a redevelopment framework capable of delivering additional housing, employment-generating uses and local services while responding to the site's opportunities and constraints.

The study area comprises approximately 18,000 sqm of land fronting Parramatta Road, Ross Street and Arundel Street, Forest Lodge, as shown in Figure 0.1.

This Study forms part of the evidence base for the Planning Proposal and draft Sydney Development Control Plan (draft DCP) and provides the urban design justification for the proposed planning controls.



Figure 0.1. Study area

1. Site and context

1.1. Site location

The study area is located in Forest Lodge, approximately 2 kilometres west of the Sydney Central Business District, within the City of Sydney local government area.

The site comprises a collection of properties fronting Parramatta Road, Ross Street and Arundel Street. It occupies a prominent position immediately north of the University of Sydney campus and approximately 800 metres east of Royal Prince Alfred Hospital.

The study area is situated at the interface between Forest Lodge, Camperdown and Glebe and forms part of the broader Parramatta Road corridor. The site is surrounded by a mix of educational, health, residential, commercial and open space uses and occupies a transition point between the institutional land uses associated with the University of Sydney and the established residential neighbourhoods to the north.

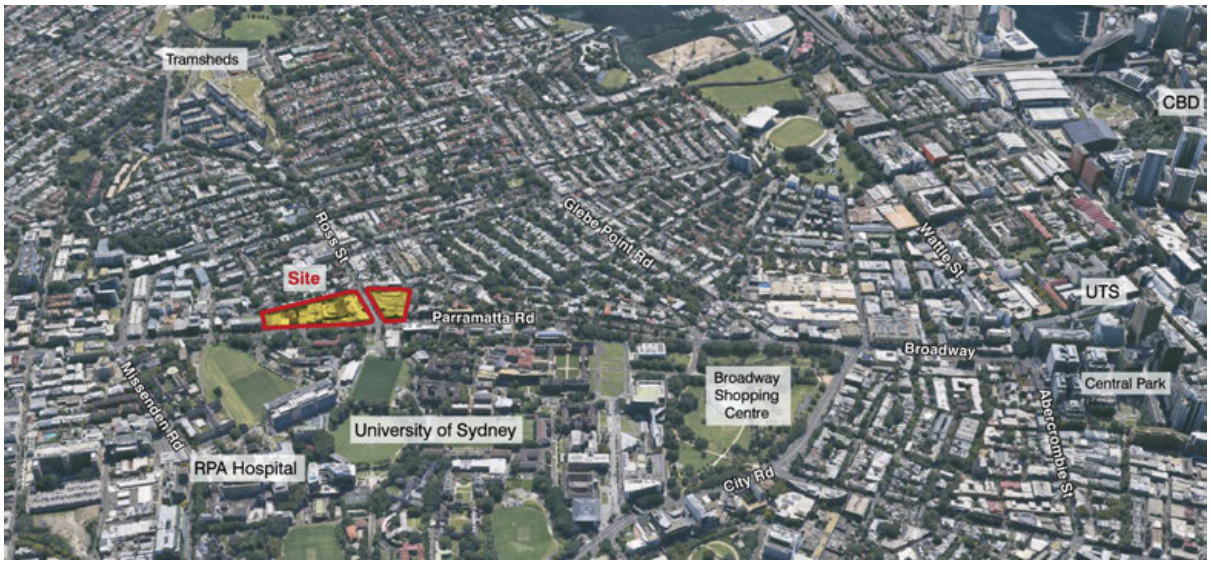


Figure 1.1. Site location

1.2. Site description

The study area comprises approximately 18,000 sqm of land fronting Parramatta Road, Ross Street and Arundel Street, Forest Lodge. The precinct contains a diverse mix of commercial, retail, educational, institutional and employment-generating uses accommodated within buildings of varying age, scale and character.

Existing uses include retail showrooms, commercial offices, educational facilities, health-related offices, government services, vehicle sales and servicing premises, specialised retail businesses, warehouses and associated storage and servicing facilities. The site also contains the recently completed NSW Ambulance Station, an important piece of social infrastructure serving the broader region.

Development within the precinct is generally low-rise in scale and reflects incremental redevelopment over an extended period. A number of buildings support active employment, education and service uses. Much of the site is characterised by extensive hardstand areas, surface parking and vehicle-oriented development.

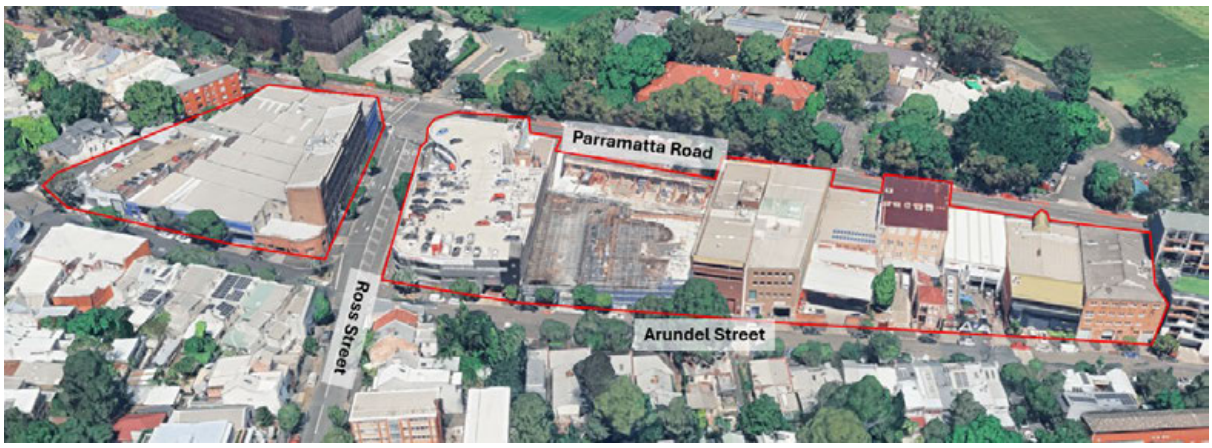


Figure 1.2. Aerial view of the study area looking from the north

The study area is highly urbanised and contains a diverse collection of buildings and land uses (Figure 1.2). Development is concentrated along the Parramatta Road frontage and Ross Street while Arundel Street provides access to the various properties within the precinct and has a more varied presentation to the street including numerous driveways.

1.2.1. Parramatta Road and Ross Street Interface

The Parramatta Road and Ross Street intersection is a highly visible location within the wider corridor (Figures 1.3 - 1.5). The intersection provides direct pedestrian connections to the University of Sydney campus and is serviced by signalised pedestrian crossings on all approaches. Existing development at this location includes a mix of retail, institutional and commercial uses, including the Former Grace Bros Repository, Officeworks and Diabetes Australia. The intersection also accommodates a bus stop serving route services along Parramatta Road and plays an important role in connecting the precinct to surrounding destinations and serves as a major pedestrian entry to the University.



Figure 1.3. Eastern precinct and Parramatta Road frontage showing the intersection of Ross Street and Parramatta Road.



Figure 1.4. Parramatta Road corner of Ross Street, facing west showing the Toyota dealership in the foreground and vacant site and western sites in the background



Figure 1.5. Ross Street, North of Arundel Street facing south towards Parramatta Road

1.2.2. Parramatta Road interface

The Parramatta Road frontage accommodates a wide variety of commercial, retail and service-based activities, including specialised retail premises, auction and trade-related businesses, commercial offices, private education providers and other employment-generating uses.

Collectively, these uses contribute to the mixed employment character of the corridor (figures 1.6 – 1.11).



Figure 1.6. Parramatta Road west of Ross Street, facing east showing the western sites in the foreground



Figure 1.7. Parramatta Road frontage – 52, 54 and 56 Parramatta Road



Figure 1.8. Parramatta Road Frontage – 58 and 60 Parramatta Road



Figure 1.9. Parramatta Road Frontage – 62 and 64 Parramatta Road

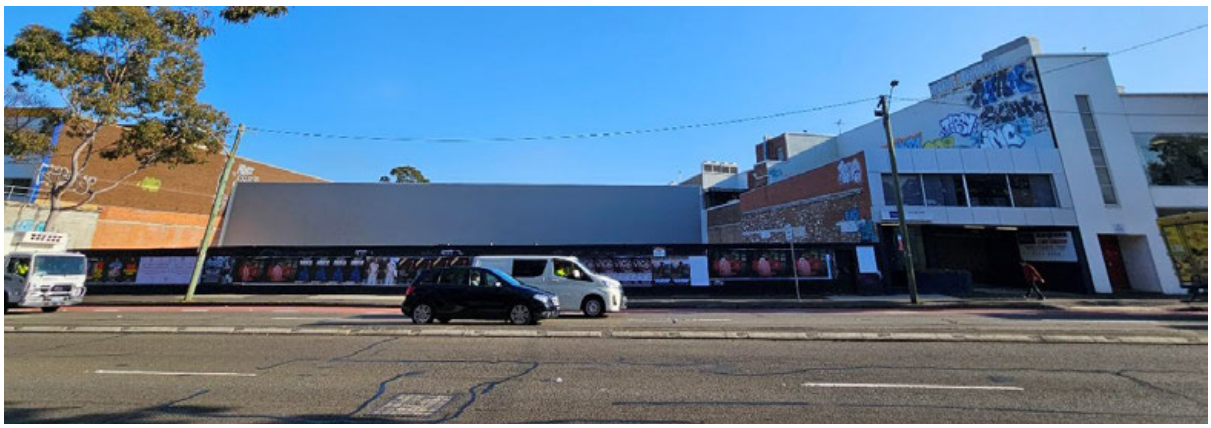


Figure 1.10. Parramatta Road Frontage – 40 and 50 Parramatta Road. Behind the hoardings is the residual vacant land that was not developed when the ambulance station was built.



Figure 1.11. Parramatta Road Frontage – 36, 40 Parramatta Road and 1-3 Ross Street

1.2.3. Arundel Street frontage

Development fronting Arundel Street varies along the length of the study area and includes a mix of educational, institutional, commercial and employment-generating uses (Figures 1.12 – 1.18). The eastern portion contains premises associated with Diabetes Australia and space occupied by the University of Sydney, while the western portion accommodates larger employment and service-based uses including the NSW Ambulance Station and vehicle sales and servicing activities.

Buildings generally present secondary frontages, servicing areas and vehicle access points to Arundel Street and are accompanied by hardstand and circulation areas. Collectively, these uses reflect the employment-focused history of the subject land and contribute to its mixed urban character.



Figure 1.12. Arundel Street frontage – 50 Arundel Street – the recently constructed NSW Ambulance Station



Figure 1.13. Arundel Street frontage – 26-30 Arundel and 1-3 Ross Street. The ramp in the foreground provides access to the rooftop parking that replaced the original saw-toothed roof of the Diabetes Australia building



Figure 1.14. Arundel Street frontage – Rear of 56 Parramatta Road



Figure 1.15. Arundel Street frontage – Rear of 58 Parramatta Road



Figure 1.16. Arundel Street frontage – Rear of 60 Parramatta Road



Figure 1.17. Arundel Street frontage – Rear of 62 Parramatta Road



Figure 1.18. Arundel Street frontage – Rear of 62 and 64 Parramatta Road

1.1 Site Characteristics

The study area contains a mix of lot sizes, ownership patterns and physical characteristics. The eastern portion of the site comprises larger landholdings concentrated around the Parramatta Road and Ross Street intersection. In contrast, the western portion of the study area comprises a series of smaller landholdings.

The site is also characterised by significant variation in topography and flooding conditions. Parramatta Road falls from east to west, while Arundel Street descends more steeply towards the western end of the site where a significant topographic depression occurs. These topographic conditions contribute to the concentration of flooding impacts within the western portion of the site.

The differing lot dimensions, ownership patterns, topography and flooding characteristics contribute to distinctly different physical conditions across the eastern and western portions of the study area. Details of the individual properties that comprise the study area are provided in Table 1.1.

Table 1.1. Lot areas and Major Uses

Address	Lot and DP	Lot size	Major use
64 Parramatta Rd	Lot 1 DP 30884	687	Book publisher
62 Parramatta Rd	Lot 2 DP 30884	771	Food caterer
60 Parramatta Rd	Lot 201 DP 746742	753	Car dealership
58 Parramatta Rd	Lot C DP 438920	1024	Furniture retail
56 Parramatta Rd	Lot 5 DP 30884	923	Homewares retail
54 Parramatta Rd	Lot 6 DP 30884	885	Office premises
52 Parramatta Rd	Lot 1 DP 60080	910	Office premises
50 Parramatta Rd	Lot 2 DP 1275257	1368	Vacant land
40 Parramatta Rd	Lot 7 DP 30884	169	Office premises
36 Parramatta Rd	Lot 8 DP 30884	2973	Car dealership
1–3 Ross St	Lots 14A and 15A and 16 and 17, DP 447083	3375	Officeworks
50 Arundel St	Lot 1 DP 1275257	2090	Ambulance Station
26 Arundel St	Lots A and B and C and D and G, DP 966001 and Lot 2 DP 104969 and Lot 1 DP 112049	1899	Diabetes Australia
30 Arundel St	Lots E and F, DP 966001	290	Carpark

1.3. Built form context

The study area is located between three distinct built form conditions.

1.3.1. University Interface

The southern side of Parramatta Road is occupied by the University of Sydney campus, residential colleges and associated sporting facilities (Figures 1.19 – 1.22). These lands present a markedly different built form condition to the residential neighbourhoods to the north and include a mix of institutional buildings, open space and recreational facilities.

Development within the University campus generally occurs at a larger scale than development surrounding the study area and includes a mixture of historic sandstone buildings and contemporary educational facilities in significant landscaped open spaces. This form of development – buildings in landscape – is sometimes referred to as “campus” development. The sporting fields opposite the site provide a substantial break in built form and contribute to the open character of this section of Parramatta Road.

The campus is continuing to evolve through the University of Sydney's Campus Improvement Program. This includes the approved Ross Street Teaching and Learning Hub at the corner of Parramatta Road and Ross Street, a five-level teaching building with associated public domain and landscape improvements that will reinforce the campus entry opposite the study area.

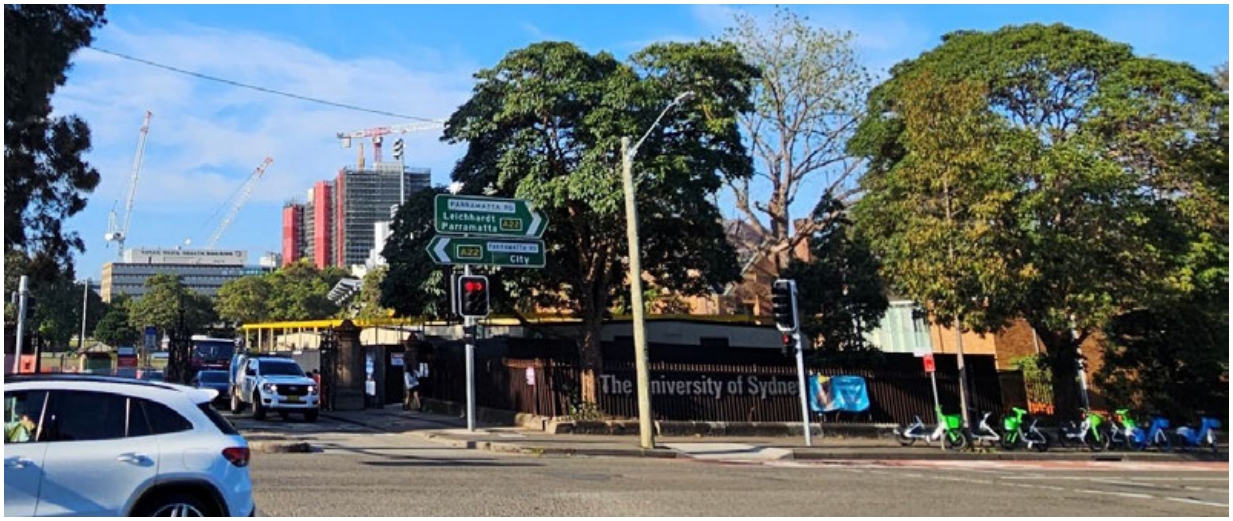


Figure 1.19. University of Sydney – Ross Street Entry (opposite Ross Street)



Figure 1.20. Artists impression of University of Sydney Teaching and Learning Hub currently under construction



Figure 1.21. University of Sydney – south-east of study area



Figure 1.22. St John's College – south-west of study area

1.3.2. Adjoining Development – west of study area

A mixed-use development at 66–70 Parramatta Road adjoins the western boundary of the study area (Figures 1.23 – 1.26). The building is approximately five storeys in height and is constructed to the common boundary, with no windows facing towards the study area. Apartments are generally oriented north and south and rely on a central landscaped courtyard that is open to the sky to provide daylight, solar access, outlook and natural ventilation. The internal courtyard also contributes to the amenity of the development while reducing reliance on side-facing windows adjacent to the study area.

A building of a similar size is located immediately to the west of this building.



Figure 1.23. Adjoining development



Figure 1.24. Development fronting Parramatta Road adjoining the study area to the west



Figure 1.25. Development fronting Arundel Street adjoining the study area to the west

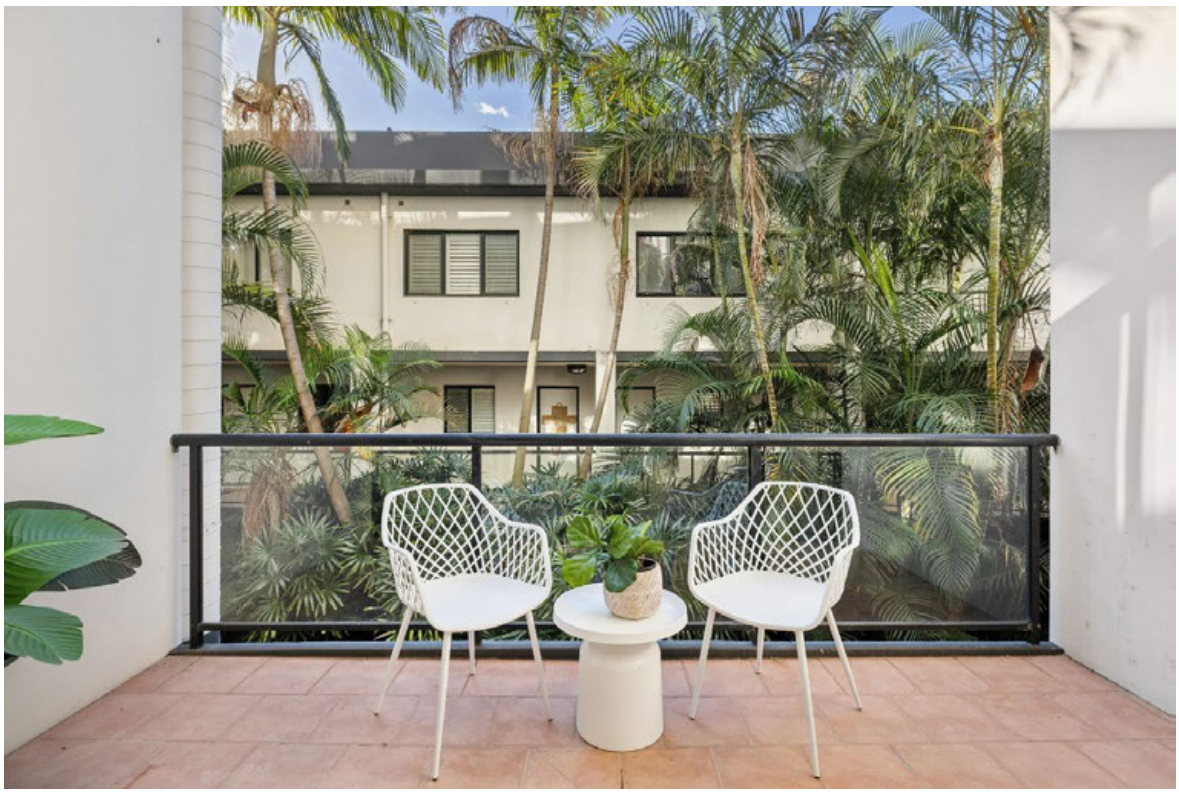


Figure 1.26. Internal courtyard – 66-70 Parramatta Road (Source: Domain)

1.3.3. Surrounding development – West of Ross Street

Surrounding development west of Ross Street is located along the northern side of Arundel Street and on both sides of Sparkes Street, which forms the continuation of Arundel Street west of the study area (Figures 1.27 – 1.33). North of Arundel Street, development is predominantly one and two-storey residential dwellings. Street tree canopy along this frontage is dense and established, contrasting with the rear of the study area, which is characterised by extensive hardstand areas, driveways and limited landscaping.

Further west, the built form transitions to a mix of one and two-storey dwellings north of Sparkes Street and larger residential flat buildings and co-living developments south of Sparkes Street, generally ranging from two to four storeys in height.

Land south of Sparkes Street has dual frontages to Sparkes Street and Parramatta Road and accommodates a mix of residential, commercial and mixed-use development. This includes the mixed-use development at 66–70 Parramatta Road and the approved Housing Delivery Authority project at 78–80 Parramatta Road, comprising ground floor non-residential floor space, approximately 223 co-living rooms and building heights of up to 12 storeys.



Figure 1.27. Surrounding development west of Ross Street



Figure 1.28. Ross Street, North of Arundel Street looking north



Figure 1.29. Surrounding residential development - North side of Arundel Street including perpendicular angled parking and inconsistent street tree planting



Figure 1.30. Surrounding residential development - North side of Arundel Street



Figure 1.31. Surrounding residential and mixed-use development – Parramatta Road

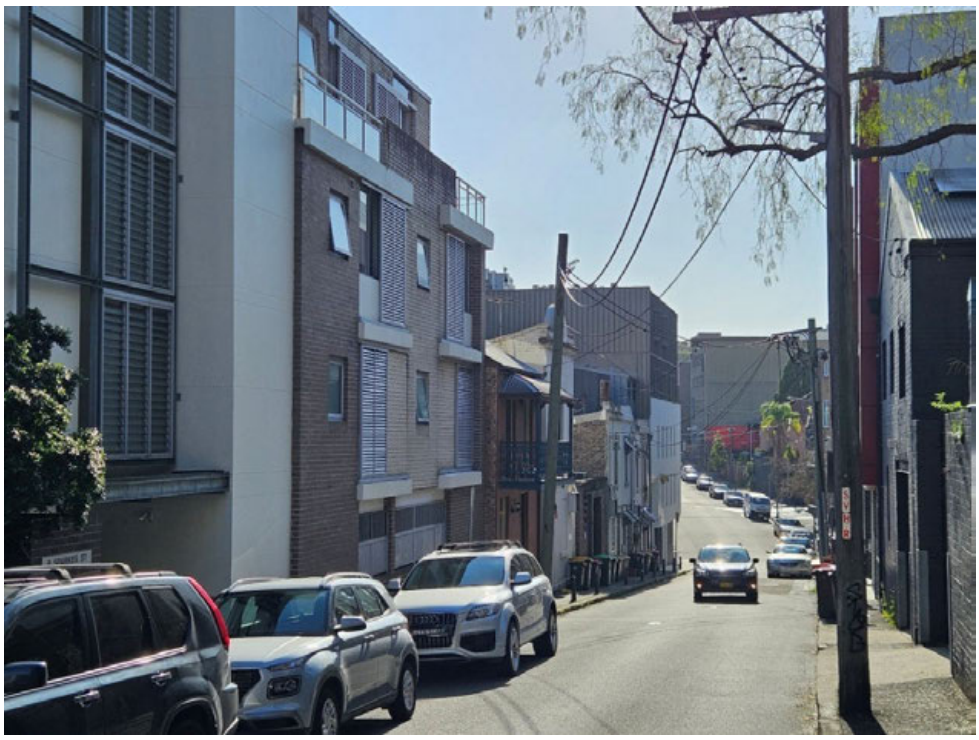


Figure 1.32. Sparkes Street to the west of the study area looking east. Sparkes Street is the western extension of Arundel Street



Figure 1.33. Sparkes Street to the west of the study area looking west

1.3.4. Adjoining Development – east of study area

Development adjoining the east of the study area includes a freestanding house fronting Arundel Street and a four-storey 1960s residential flat building fronting Parramatta Road (Figures 1.34 – 1.38). The residential flat building is also set well above street level.



Figure 1.34. Adjoining development to the east of the study area



Figure 1.35. Adjoining development Parramatta Road frontage viewed from the east - 26a Parramatta Road



Figure 1.36. Chapman steps east of the study area looking west with 28-30 Parramatta Road in the background



Figure 1.37. Adjoining development Arundel Street frontage looking south-east – 24 Arundel Street



Figure 1.38. Adjoining development Arundel Street frontage – 24 Arundel Street

1.3.5. Surrounding Development – East of Study Area

Land north of Arundel Street and east of the study area is characterised by a predominantly one and two-storey residential character (Figures 1.39 – 1.44). This pattern continues along much of Arundel Street and establishes an important relationship between the study area and the surrounding residential neighbourhood.

Development immediately east of the study area consists predominantly of two and three-storey Victorian terraces located both north and south of Arundel Street. The Forest Lodge Hotel and a local café occupy the corner of Arundel Street and Forest Street.

Fronting Parramatta Road, a row of terraces is located on elevated land behind a sandstone retaining wall. This retaining wall and the associated access stairway from Parramatta Road are known as the Chapman Steps and provide an important local landmark and pedestrian connection.

Further east, a four-storey co-living development is currently under construction. The approved development incorporates the adaptive reuse of two existing terrace houses and introduces a higher-density residential form within the broader terrace streetscape.



Figure 1.39. Surrounding development to the east of the study area



Figure 1.40. Parramatta Road Terraces – Above Chapman Steps looking east



Figure 1.41. 2 Arundel Street and 6-8 Parramatta Road development site



Figure 1.42. Southern side of Arundel Street adjacent to eastern edge of study area



Figure 1.43. Residential character north of Arundel Street looking west



Figure 1.44. Forest Lodge Hotel, Arundel Street, east of the study area looking north-west

1.4. Existing street conditions

1.4.1. Parramatta Road

Parramatta Road is a wide road at around 27-30 m. It has 6 traffic lanes and an additional turning lane east of Ross Street. There is a narrow concrete centre median that is not wide enough to provide a refuge for people crossing the street. It has narrow footpaths that are crowded at the bus stops east of Ross Street. The only safe crossing opportunity is at the signalised intersection at Ross Street which has crossings on all legs. Waiting times to cross are long (>90 seconds on average) leading to some disobedience. The next safe crossing opportunity is almost 500m to the west (around a five-minute walk) at Lyons Road and 270 m to the east at the elevated university footbridge.

The south side of the road has developing street trees and is overhung by the canopies of trees on the university land. The north side of the road has overhead wiring and very few street trees. Further west the street tree planting on the north side of the road is more continuous and it appears that the overhead wiring has been bundled allowing the canopies more space to spread.

To the east of the study area the substantial cutting and large sandstone retaining wall dominates the character of the street.

There is off-peak street parking in the kerbside bus lanes.

The City of Sydney envisages Parramatta Road to be reconfigured in the future to accommodate light rail. Buildings should be set back from Parramatta Road to support a future light rail stop on Parramatta Road near the intersection with Ross Street.

1.4.2. Ross Street

Ross Street is 20 m wide between Parramatta Road and Arundel Street. It has moderately sized footpaths that are reasonably comfortable for the current relatively low number of people walking. There are three traffic lanes and a wide centre chevron “lane” used by emergency vehicles to jump queued traffic in emergency situations.

Street tree planting is relatively small and not continuous. On the west side of the street it is limited by the location of driveways and on the east side by the overhead wiring that has not been bundled.

1.4.3. Arundel Street

Arundel Street is 20 m wide with a 12-13 m wide carriageway. It has generously sized footpaths that are comfortable for the low to moderate number of people walking. The street slopes steeply from the east down to the west.

West of Ross Street there is predominantly angled parking on the north side of the street and between the ambulance station and Ross Street there is a chevron emergency vehicle “lane” in the centre of the carriageway. There are non-bundled overhead power lines on the north side of the street which have limited the size of the street trees to around 6 m in height. On the south side of the street there are a large number of vehicle access points across the footpath which has limited opportunities for street tree planting. The street trees that have been planted are not large.

East of Ross Street there is parallel parking which makes the carriageway feel very wide for a local street. The overhead power lines on the north side of the street are unbundled which means that the street trees on that side are only 5-6 m high. Due to the presence of driveway crossings on the south side of the street there are only a small number of street trees on the south side of the street and mostly small except for one moderately sized tree next to the Officeworks.

The intersection at Ross Street is awkward. The chevroned median on the west side and poorly designed planting and vertical speed control elements make crossing uncomfortable and exposed for people walking. Despite Ross Street being a potential candidate for a pedestrian crossing there is no safe crossing facility of Ross Street for people walking along Arundel Street.

The intersection with Forest Street is very wide and there are no crossing facilities including an absence of kerb ramps. There is a zebra crossing 30 m further east. Most people walking do not use it unless they are travelling east to west.

The intersection with Short Street is wide and does not have any crossing facilities. There is a speed platform on the western leg.

There are significant opportunities to improve street tree planting, canopy coverage (particularly associated with bundling of overhead wiring) and crossing safety for people walking.

1.5. Urban renewal context

The study area forms part of a broader corridor experiencing significant redevelopment and planning activity. Recent years have seen a number of major projects approved, under construction or progressing through planning pathways across Camperdown, Forest Lodge and Annandale. These include the redevelopment of the former WestConnex dive site, a large group of Housing Delivery Authority projects and the proposed Life Sciences development at 84–94 Parramatta Road (illustrated in Figure 1.45). The number of Housing Delivery Authority projects that include concurrent rezonings in this cluster is still increasing.

In addition, land to the east within Ultimo and Broadway has been identified for further investigation through the City's Housing for All program, while land to the west within the Inner West Local Government Area is currently subject to a state-led rezoning process that seeks to deliver approximately 8,000 additional dwellings along and adjacent to the Parramatta Road corridor (illustrated by the heavy red outline in Figure 1.45).

A notable characteristic of redevelopment occurring within the broader area is the increasing focus on housing products that support students and other households seeking long-term rental accommodation close to major education, health and employment destinations. Recent proposals include build-to-rent housing, co-living accommodation and mixed-use development, reflecting strong demand generated by the surrounding concentration of education, health and employment uses.

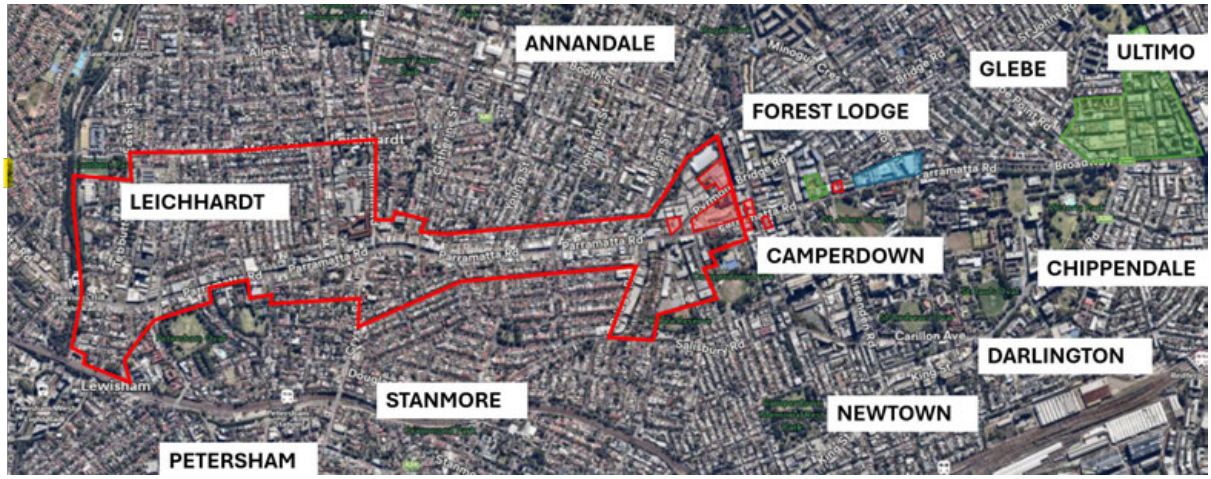


Figure 1.45. Urban renewal activity and strategic growth planning has been undertaken by Inner West Council along the Parramatta Road corridor. Inner West Council area begins west of Mallett Street in Camperdown.

Figure 1.45 illustrates the broader development and planning context surrounding the study area. Housing Delivery Authority projects and other major redevelopment sites that have been supported to proceed to the State Significant Development pathway are shown in red, the Landcom Camperdown ‘dive site’ rezoning shown in yellow, while the state-led Parramatta Road corridor rezoning investigation area in the Inner West Local Government Area is shown with a heavy red outline. The study area is shown in blue. City-led projects are shown in green, including the proposed Life Sciences Planning Proposal at 84–94 Parramatta Road, the broader Broadway / Ultimo housing investigation area identified through the City's Housing for All Discussion Paper and the area between Glebe Point Road and the Broadway Shopping centre that was rezoned in the last 10 years.

The figure demonstrates that the study area sits within a broader corridor undergoing substantial change and investment, with multiple housing, employment and institutional projects either approved, under assessment or being investigated.

Figure 1.46 focuses on major development proposals that include concurrent rezonings lodged with the Housing Delivery Authority. The figure identifies approved and proposed building heights

and shows the increasing scale of development proposed within the surrounding area. Development approved, under assessment or proposed within the surrounding area ranges from medium-density residential development through to mixed-use projects of up to 24 storeys. The proposed Life Sciences development at 84–94 Parramatta Road is approximately 17 storeys in height and, due to its predominantly employment and research-focused use, incorporates greater floor-to-floor heights than a typical residential building and is similar in scale to a 20 storey building.

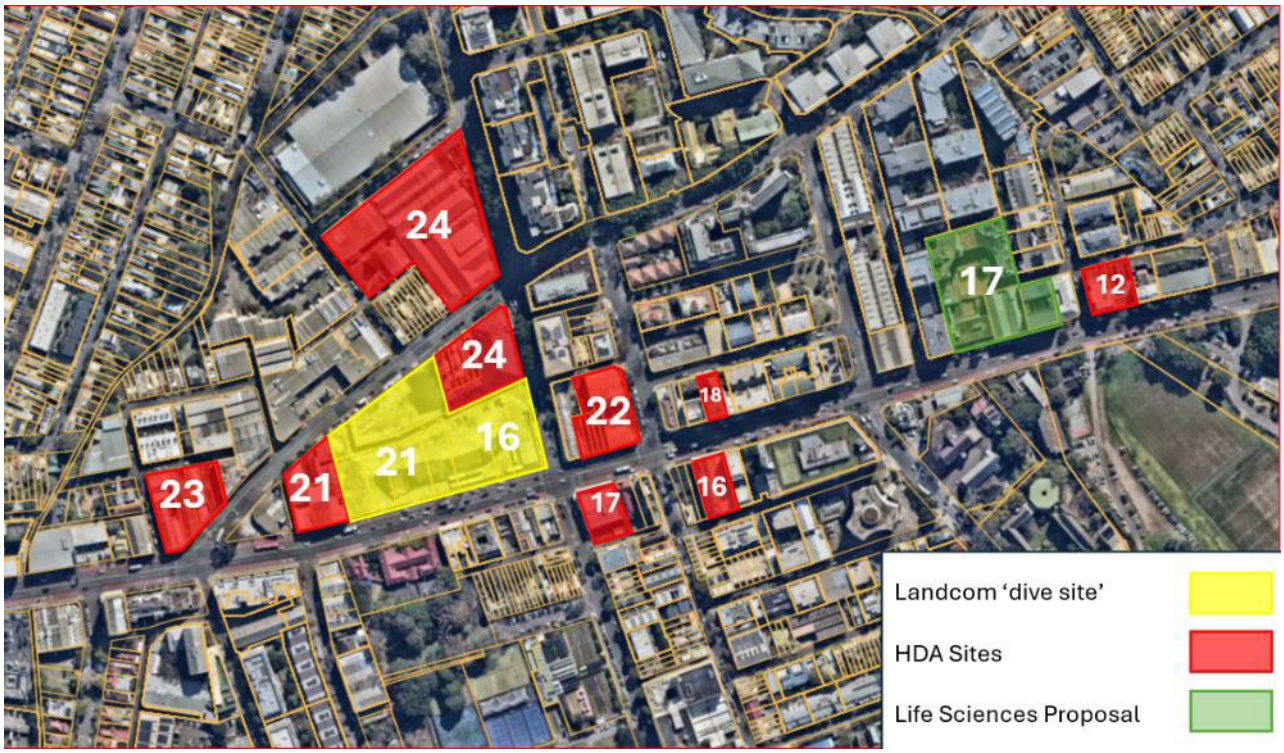


Figure 1.46. Landcom rezoning, Housing Delivery Authority projects that include concurrent rezonings and the 'Life Sciences' planning proposal are likely to significantly change the scale and character of the area west of the study area (proposed heights are noted).

2. Existing Planning Framework

2.1. Land use zone and affordable housing

The site is primarily zoned E3 Productivity Support under the Sydney LEP 2012, with one property (at 28–30 Parramatta Road) zoned R1 General Residential (see Figure 2.1).

The E3 Productivity Support zone provides for a range of employment uses, including light industry, warehouses, offices and related services. It also allows some retail and commercial uses that support employment areas, while limiting large-scale retail activity to protect established centres.

Development permitted with consent in the E3 zone includes industrial, business, warehouse and service uses, as well as specialised retail premises, hardware and building supplies, and vehicle sales or hire premises. Residential accommodation and most retail premises are prohibited.

The R1 General Residential zone provides for housing needs within a low to moderate density residential environment and permits a range of residential accommodation and complementary local services.

The current zone does not permit residential development except for the purpose of affordable housing.

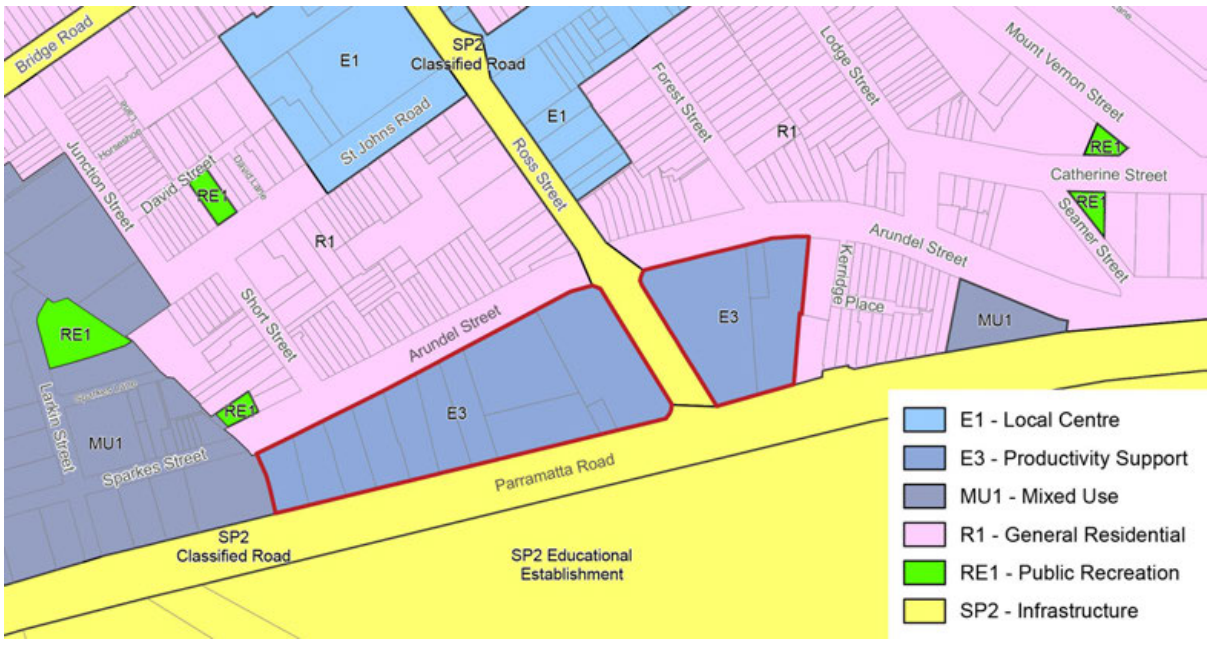


Figure 2.1. Zoning map Sydney LEP 2012

The land zoned E3 Productivity Support is also identified as “Business Area” on the Locality and Site Identification Map under Sydney LEP 2012 (see Figure 2.2). Clause 7.13A applies to that land, enabling residential flat buildings or mixed-use development where the residential component is provided as affordable housing in accordance with the City of Sydney Affordable Housing Program. While residential accommodation is otherwise not permitted in the E3

Productivity Support zone, this clause provides a limited pathway for affordable housing on the E3-zoned portion of the site.

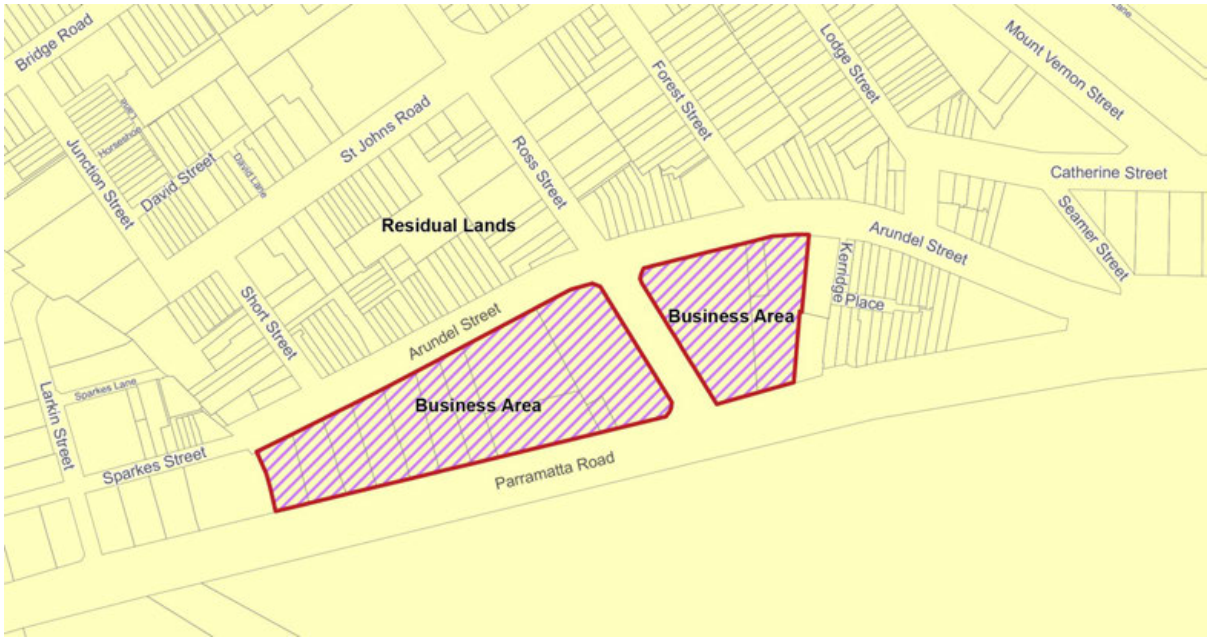


Figure 2.2. Locality and Site Identification map Sydney LEP 2012

2.2. Maximum building height

The site is subject to maximum building heights of 12 metres and 15 metres (see Figure 2.3). Land west of Ross Street is entirely subject to a 15-metre height limit, while land east of Ross Street is generally subject to a 12-metre height limit, with part of the site fronting Parramatta Road subject to a 15-metre height limit.



Figure 2.3. Building Height Map Sydney LEP 2012

2.3. Floor space ratio

The site is subject to maximum floor space ratios of 1.5:1 and 1.75:1 (see Figure 2.4). Land at 28–30 Parramatta Road, 36 Parramatta Road, 26 Arundel Street and 30 Arundel Street is subject to a maximum floor space ratio of 1.75:1, while the remainder of the site is subject to a maximum floor space ratio of 1.5:1.

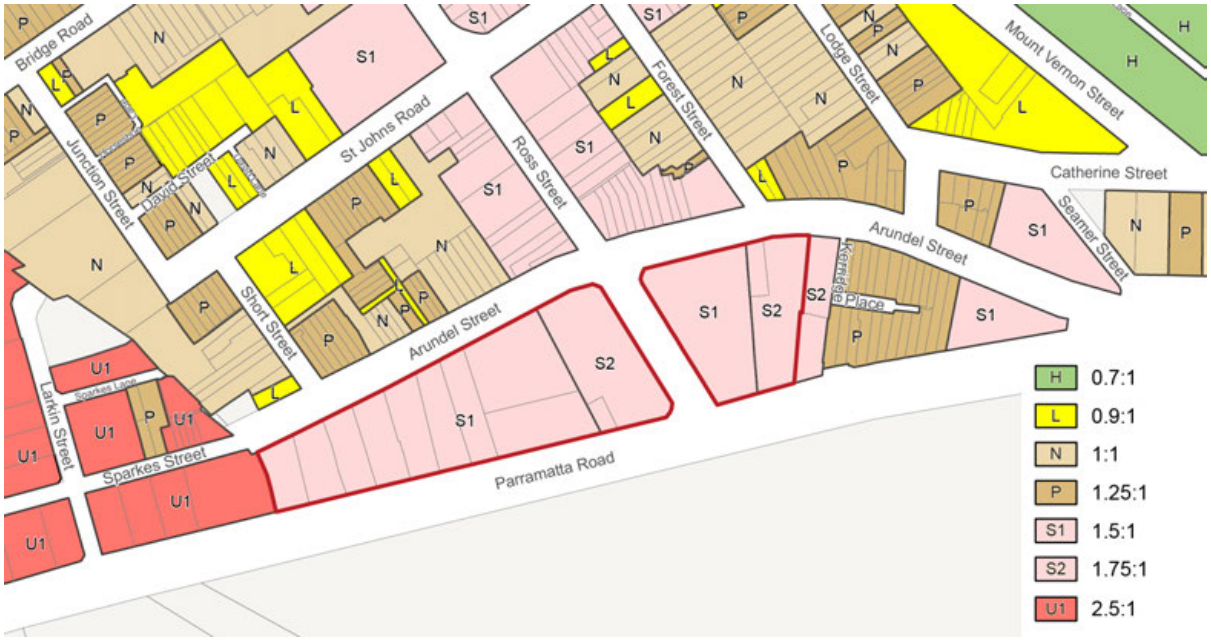


Figure 2.4. Floor Space Ratio Map Sydney LEP 2012

2.4. Heritage

The properties east of Ross Street are located within the Hereford and Forest Lodge Heritage Conservation Area (C33) under Sydney LEP 2012. The conservation area is of local heritage significance for its early residential development, including villa estates and Victorian and Federation terraces, and its association with historic institutional and civic development. It is characterised by predominantly low-scale built form, fine-grain subdivision and a mix of architectural styles. The conservation area extends to land north of Arundel Street and to the east of the study area. The applicable heritage listings and conservation areas are shown in Figure 2.5.

The study area contains two local heritage items listed in Schedule 5 of Sydney LEP 2012, being I644 (Former Grace Bros Repository) at 1–3 Ross Street and I631 (street trees). The Former Grace Bros Repository is a representative example of a Federation warehouse building in Sydney. Heritage item I631 relates to street trees identified on the Heritage Map.

The remaining properties within the study area, including other land fronting Parramatta Road, are not located within the HCA and do not contain heritage-listed items.

The broader heritage context includes heritage item I71 (stone retaining wall, fence and steps) to the east of the site along Parramatta Road and heritage items I95 and I96 (terrace houses) to the west of the site north of Sparkes Street.

The study area is also located opposite the University of Sydney, which is listed on the State Heritage Register (SHR Item No. 01974). The campus contains numerous heritage items listed under Schedule 5 of Sydney LEP 2012, including several in proximity to the site such as St John's College (I67), the JD Stewart Building (I73) and items I72, I75, I76, I703 and I704.

Land to the south forms part of the University of Sydney HCA (C5), which reflects the historic, aesthetic and institutional significance of the broader campus.

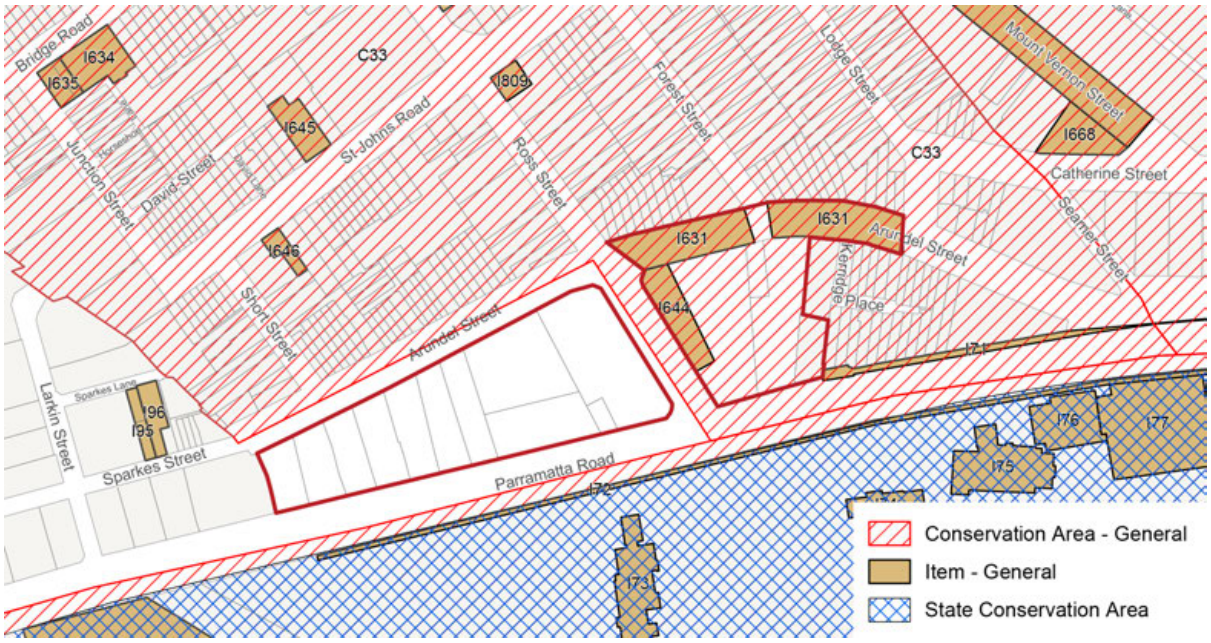


Figure 2.5. Heritage map (NSW Planning Portal Spatial Viewer 3 June 2026)

3. Strategic context

3.1. Strategic context

3.1.1. Housing for All Discussion Paper and Interim Plan

This Study has been prepared following the public exhibition of the City's Housing for All Discussion Paper. The Parramatta Road, Forest Lodge opportunity site was identified in the Discussion Paper as a suitable location for additional housing growth due to its strategic location close to the University of Sydney, Royal Prince Alfred Hospital, public transport, services and employment opportunities.

The Housing for All Interim Implementation Plan (Interim Plan) was adopted by Council following the public exhibition of the Discussion Paper. It sets out the City's broader program of strategic planning work to facilitate additional housing capacity while balancing housing delivery, employment retention, infrastructure provision, environmental constraints and urban design outcomes. Actions in the Interim Plan will be later incorporated into the City's review of its Local Strategic Planning Statement, due to commence in 2027.

Action 2.5 of the Housing for All Interim Plan identifies the preparation of a planning proposal for the site as a short-term action to increase housing supply in appropriate locations. It gives effect to the action by facilitating additional market housing, affordable housing and student housing opportunities, employment-generating uses and local services on a strategically located site.

In accordance with Action 1.3 of the Interim Plan, matters raised by the community and stakeholders in the Discussion Paper consultation must be considered. Key matters raised in this process included:

- the importance of balancing the need for additional housing with the need to respect heritage and local character;
- the need for any renewal of the precinct to ensure local services and retail can be retained and improved;
- supporting future transport infrastructure opportunities; and
- delivering a high-quality mixed-use outcome.

These key matters are incorporated into the urban principles that have guided this Study.

3.1.2. Designation as locally significant industrial land, eligible for residential

The site is classified "locally significant" industrial land under the Sydney Plan. The classification requires councils consider transitioning land from employment-focused land-use zoning to a land-use zone that allows for a wider range of employment uses, and potentially residential development.

4. Technical studies

This Study is informed by a series of technical investigations that examine the site's environmental, physical and heritage constraints. Collectively, these studies inform the opportunities and constraints affecting the study area and provide the evidence base for the urban design response and built form testing undertaken in subsequent chapters.

4.1. Flooding

A Flood Impact and Risk Assessment examined flood behaviour across the study area and identified flooding as a defining constraint affecting the western portion of the precinct.

4.1.1. Key findings

The study found that the site – located within the Johnstons Creek catchment – experiences markedly different flood conditions across its eastern and western areas. While the eastern sites experience relatively limited flood impacts, the western properties form part of a significant overland flow path and are affected by flood hazard and flood-conveyance constraints and consequently require flood-safe access (Figures 4.1 – 4.5)

The assessment also identified significant variation in topography across the study area. Both Parramatta Road and Arundel Street fall towards the west, creating a topographic depression within the western portion of the precinct where flood impacts become concentrated.



Figure 4.1. Parramatta Road facing Ross Street Intersection (low-point visible)



Figure 4.2. Arundel Street low-point – Arundel Street Reserve



Figure 4.3. Overland flow path and flood affected land in 1% AEP event

Development within the western portion of the precinct must maintain flood conveyance and avoid adverse impacts on flood behaviour elsewhere within the catchment.

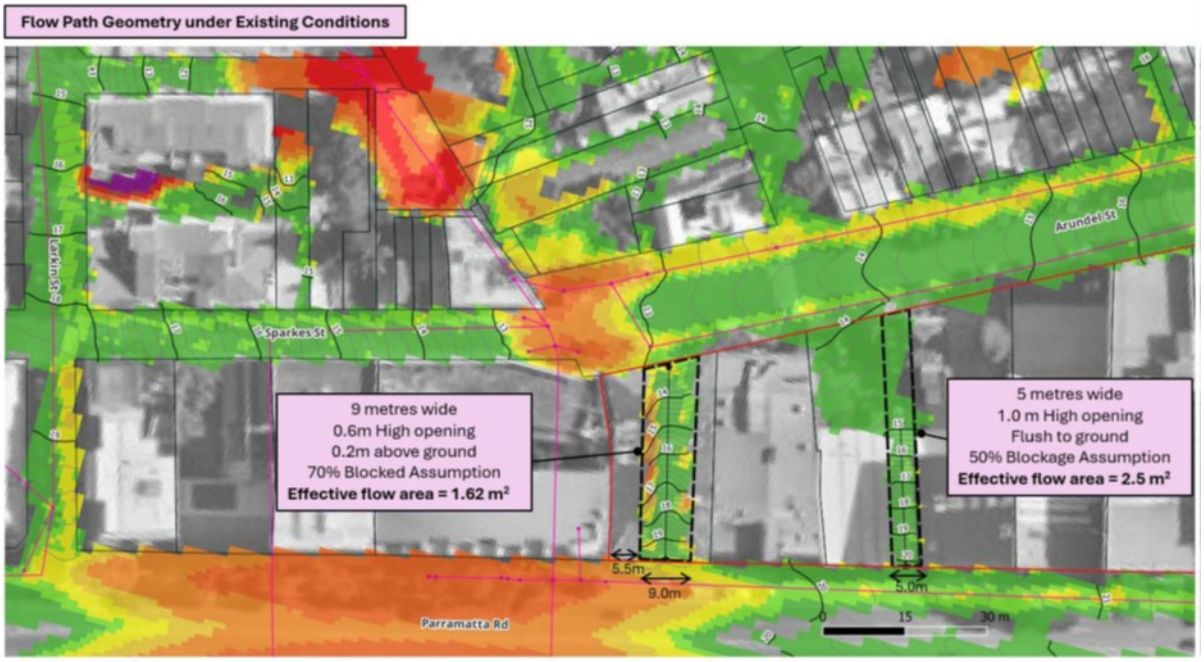


Figure 4.4. Preliminary flood conveyance requirements shown dashed

The assessment also identified the importance of providing flood-safe access during extreme flood events. Land west of Ross Street is dependent on maintaining a connection to a publicly accessible flood-safe access point located on the Parramatta Road footpath adjacent to 52 Parramatta Road.

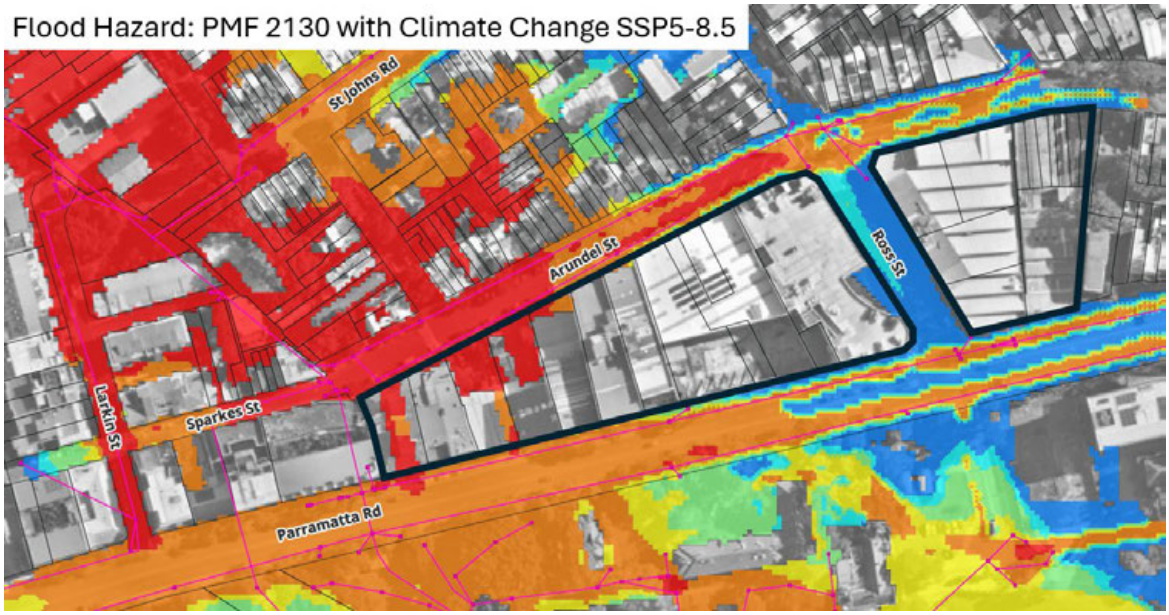


Figure 4.5. PMF flood hazard

The probable maximum flood (PMF) hazard mapping identifies areas affected by high flood hazard, including land classified as H5 (shown in orange) and H6 (shown in red) under the NSW Government Flood Hazard guideline, and demonstrates the importance of maintaining an indicative flood-safe access corridor between affected properties and the flood-safe access point.

4.1.2. Design Implications

The flood investigations demonstrate that flooding is a primary constraint affecting the western portion of the study area. The findings establish important considerations for future redevelopment, including building placement, site levels, flood conveyance, access arrangements and most significantly, evacuation requirements.

The differing flood conditions across the eastern and western portions of the study area influence the relative redevelopment capacity of individual landholdings and were an important consideration in the built form testing undertaken as part of this Study.

4.2. Heritage

4.2.1. Key findings

Parts of the study area are located within the Hereford and Forest Lodge Heritage Conservation Area (C33) under Sydney LEP 2012, including 1–3 Ross Street, 26 Arundel Street, 30 Arundel Street and 28–30 Parramatta Road. The conservation area is characterised by predominantly low-scale built form, fine-grain subdivision patterns and a mix of Victorian and Federation-era development. Land north of Arundel Street and parts of the area immediately east of the site also form part of the conservation area.

The study area contains two heritage items listed under Schedule 5 of Sydney LEP 2012, being heritage item I644 (Former Grace Bros Repository) and heritage item I631 (street trees). The Former Grace Bros Repository at 1–3 Ross Street is the most significant heritage asset within the study area and is a representative example of a Federation warehouse building.

The broader heritage context also includes heritage items adjoining the site and the heritage significance of the University of Sydney campus to the south, including the University of Sydney Heritage Conservation Area and numerous State and local heritage items within the wider campus precinct.

A Heritage Assessment prepared by TKD Architects examined the significance of buildings, conservation areas and heritage items within and surrounding the study area. The assessment found that:

- the 1912 Former Grace Bros Repository is the principal heritage asset within the study area;
- the heritage significance of the item is primarily associated with the original warehouse building rather than later additions and structures on the site;
- heritage significance varies considerably across properties currently included within the Hereford and Forest Lodge Heritage Conservation Area;
- some buildings make a positive contribution to heritage significance, while others were assessed as neutral or intrusive elements;
- the existing curtilage associated with the Former Grace Bros Repository includes structures that do not contribute to its significance; and
- opportunities exist to retain and adaptively reuse the Former Grace Bros Repository as part of future redevelopment.



Figure 4.6. View of the former Grace Bros Repository on Ross Street. (on 1-3 Ross Street property)

4.2.2. Design Implications

The heritage assessment establishes an important heritage framework for the study area and identifies those buildings, structures and landscape elements that contribute to local heritage significance.

The findings highlight the significance of the Former Grace Bros Repository and support consideration of its retention and adaptive reuse as part of future redevelopment. The assessment also informed understanding of the relationship between heritage items, conservation area character and opportunities for built form change across different parts of the study area.

The heritage assessment provided an important input into the built form testing undertaken as part of this Study, particularly in relation to the future role of the Former Grace Bros Repository, the treatment of adjoining development and the relationship between new built form and surrounding heritage fabric.

4.3. Alternative Use Assessment

4.3.1. Key Findings

An Alternative Use Assessment prepared by Urbis examined the role and function of the site in accordance with the requirements of the Statewide Policy for Industrial Lands.

The assessment considered the site's strategic location, industrial utility, surrounding land use context and potential for future redevelopment. It found that while the site currently accommodates a range of employment-generating activities, it is increasingly isolated from Sydney's broader industrial land network and no longer functions as part of a cohesive industrial precinct.

The assessment concluded that a mixed-use outcome was appropriate and that the site could accommodate substantial housing growth while maintaining a significant employment presence. As part of its testing, the assessment assumed the retention of approximately 25,000sqm of non-residential floor space across the precinct, equivalent to a minimum non-residential floor space ratio of approximately 1.5:1.

The assessment also recognised that future employment activity within the precinct is likely to comprise commercial, retail, service-based and knowledge-sector uses rather than traditional industrial activities.

4.3.2. Design Implications

The Alternative Use Assessment established the strategic land-use context for the Study and reinforced the importance of retaining employment-generating uses within future redevelopment scenarios.

The assessment informed investigation of land use distribution across the precinct and highlighted the need to balance housing delivery with the retention of employment, retail and service-based activities.

The employment floor space assumptions tested as part of the assessment provided an important input into the built form testing undertaken through this Study and informed consideration of how different parts of the precinct could contribute to future employment outcomes.

4.4. Noise and Air Quality

4.4.1. Key Findings

Parramatta Road is a major arterial road carrying significant volumes of general vehicle traffic, public transport (buses) and freight. As a result, traffic noise and vehicle emissions are important environmental considerations affecting the study area.

Acoustic investigations undertaken at nearby sites along Parramatta Road demonstrate that road traffic is the dominant source of environmental noise in the corridor. Long-term monitoring undertaken at 160–186 Parramatta Road, Annandale (the former WestConnex dive site) recorded ambient daytime noise levels of up to 72dBA and night-time noise levels of up to 70dBA adjacent to Parramatta Road.

Elevated traffic volumes also contribute to local air quality impacts, particularly along the Parramatta Road frontage where future residential development will need to carefully manage the interface between traffic-related environmental conditions and residential amenity.

A measurement of existing noise conditions on Parramatta Road has been generated through Autodesk Forma, and a representation of this is shown in Figure 4.7.

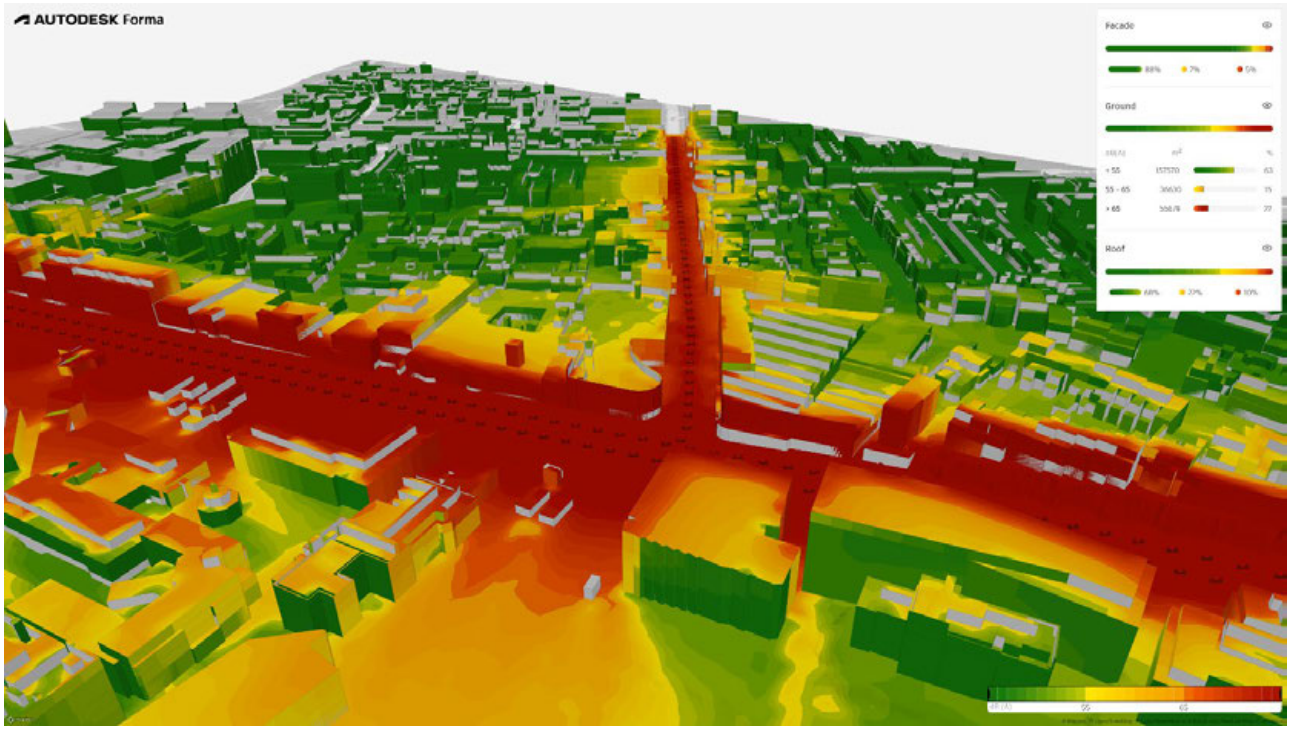


Figure 4.7. Existing noise conditions on Parramatta Road

4.4.2. Design Implications

Noise and air quality considerations are important factors in generating the built form, particularly along the Parramatta Road frontage.

Noise levels are sufficiently high that habitable rooms should not face directly towards Parramatta Road.

Residential uses are not compatible with the ground level noise environment on Parramatta Road or Ross Street.

Wherever possible non-sensitive uses or buildings designed as noise barriers should be used to shield residential ventilation openings from noise.

These findings informed consideration of land use distribution, building orientation, building depth, residential interfaces and the placement of active non-residential uses.

The built form must respond to noise and air pollution when determining building siting and layout. This is consistent with the requirements of the Apartment Design Guide.

Detailed assessment of acoustic performance and air quality impacts will occur as part of future development applications.

4.5. Traffic and transport

A Transport Impact Assessment has been prepared for the study area to examine the accessibility of the site and the capacity of the surrounding transport network to accommodate future growth.

4.5.1. Key Findings

The assessment found that the site benefits from excellent public transport accessibility, with frequent bus services operating along Parramatta Road, established walking and cycling connections, and proximity to major employment, education and health destinations. Existing travel patterns within the surrounding area demonstrate a strong use of public transport, walking and cycling.

Traffic modelling indicates that redevelopment of the site would result in only minor increases in traffic volumes and would not materially affect the operation of the surrounding road network. Flooding constraints affecting parts of the site also limit opportunities for basement parking and influence future access arrangements, reinforcing a reduced reliance on private vehicle travel.

The assessment also recognised the long-term strategic role of Parramatta Road as a major public transport corridor. While no specific public transport project is currently committed, the planning proposal should incorporate a setback at the intersection of Parramatta Road and Ross Street, behind the existing bus stop, to retain flexibility for future public transport stop location and associated footpath widening and streetscape and public space improvements.

4.5.2. Design Implications

The Transport Impact Assessment confirms the site can accommodate additional housing and employment growth while supporting reduced reliance on private vehicle travel. Its findings inform parking provision, access arrangements, pedestrian connections and the distribution of active land uses across the precinct, including setbacks to allow flexibility for future public transport and public domain improvements near the Parramatta Road and Ross Street intersection.

4.6. Contamination

4.6.1. Key Findings

A Preliminary Site Investigation examined potential contamination risks associated with historical land uses across the study area.

The investigation identified a history of commercial and industrial activities, including vehicle-related uses, warehousing, service stations, printing activities and other employment-generating uses that have the potential to result in contamination.

The investigation concluded that the site is suitable for future redevelopment, subject to further detailed contamination investigations and any required remediation being undertaken as part of future development applications.

4.6.2. Design Implications

Contamination was not identified as a factor that directly influenced the urban design response or built form testing undertaken as part of this Study.

The investigation confirms that redevelopment of the site remains feasible, with contamination matters to be addressed through future development application processes.

5. Key urban design considerations

5.1. Key areas

The site is affected by a range of characteristics including relationship to spaces sensitive to overshadowing, flooding, wind exposure, noise, heritage, solar access, air quality and public transport accessibility. The following sections describe the urban design rationale that informed the built form testing undertaken in Chapter 6.

The site comprises two distinct areas, including

- the western area, which includes seven relatively narrow properties (labelled A – G) that are flood affected and require specific flood evacuation measures and site amalgamation in order to be developed; and
- the eastern area, which is not flood affected and generally made up of larger sites that can be developed without amalgamating with adjoining land.

The western and eastern areas are shown at Figure 5.1.



Figure 5.1. West and east areas of the site

5.2. Height and Solar Access

5.2.1. Protection of solar access to Sydney University playing fields

Protection of sunlight access to the sports ovals located south of Parramatta Road is a primary consideration in the development of the overall massing of the urban design response.

The University of Sydney sporting fields and St John's College Sports Ovals are heavily used turf sports fields where access to at least four hours of sunlight every day throughout the year is important to support the ongoing usability and health of the grass playing surfaces. A key urban design response is the implementation of site-specific Sun Access Planes to protect four hours of direct sunlight to the grass all year, including during the winter solstice.

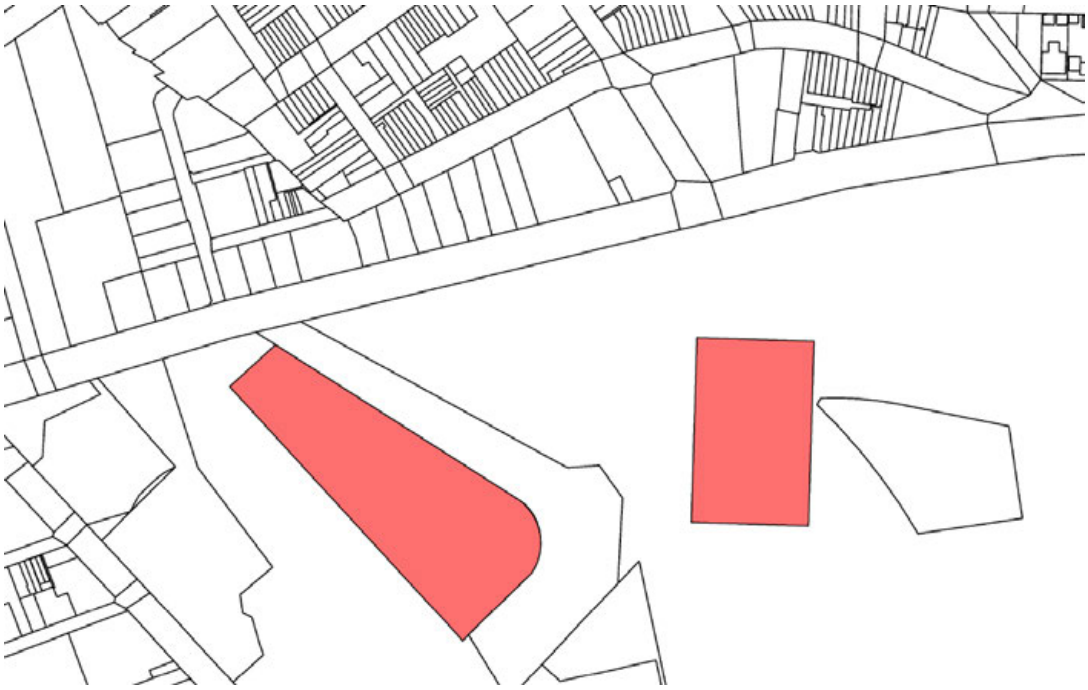


Figure 5.2. Protected recreation spaces south of Parramatta Road

The resulting Sun Access Planes establish the maximum height of development capable of occurring on the site while maintaining the required solar access to the sports fields. Figures 5.3 and 5.4 illustrate the sun access planes protecting the University of Sydney and St John's College sports ovals.

The Sun Access Planes establish the principal development envelope within which built form options are tested. Consistent with these planes, building heights generally increase from west to east.

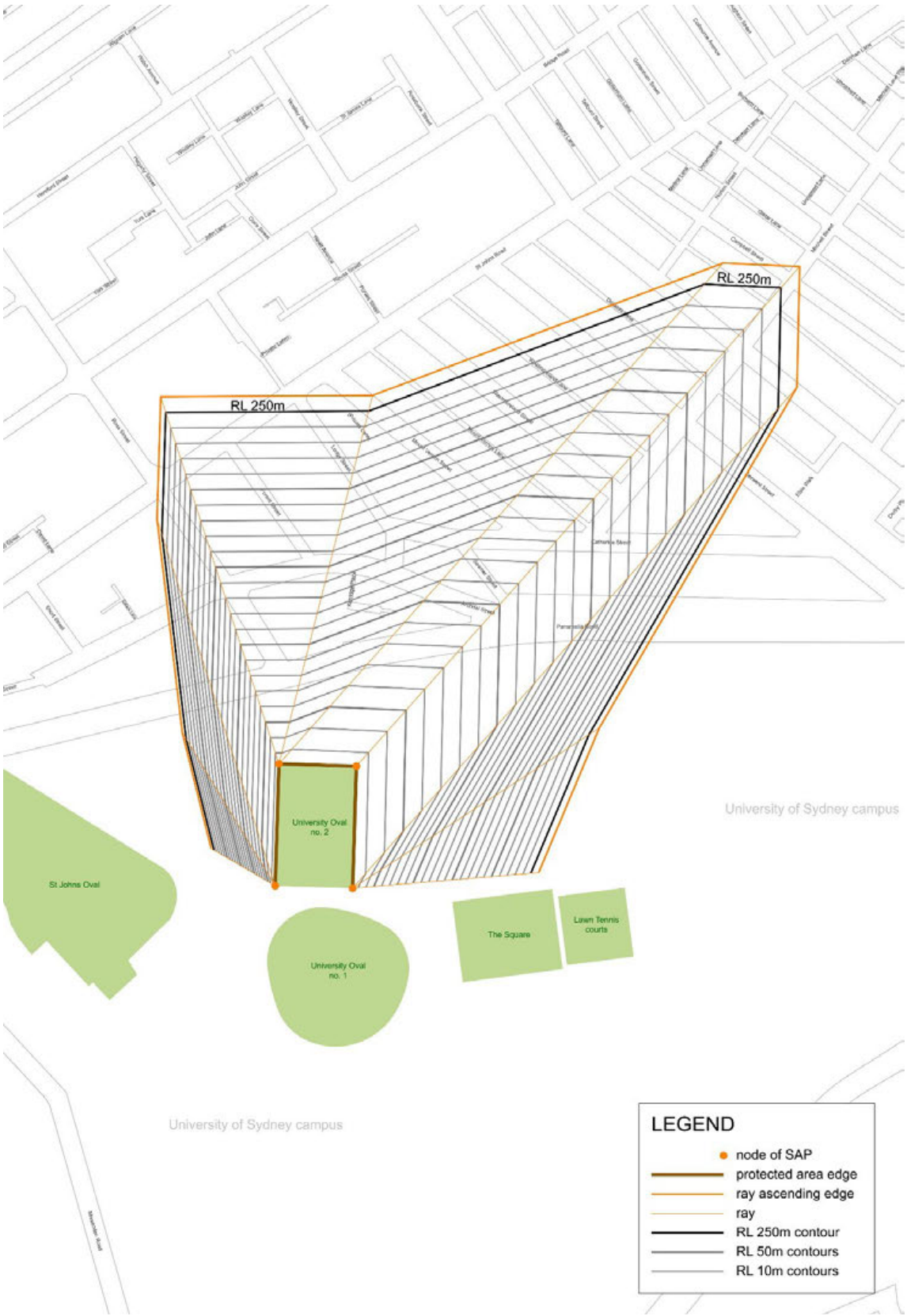


Figure 5.3. Sun Access Planes protecting University of Sydney Oval No. 2



Figure 5.4. Sun Access Planes protecting St John's College Sports Ovals

5.2.2. Arundel Street

Lower buildings are located along Arundel Street to maximise sunlight access to internal landscape courtyards and the buildings on Parramatta Road and provide an appropriate transition to the character of surrounding residential development.

The urban design response adapts to the changing geometry of development sites across the precinct. Larger properties in the eastern area can accommodate greater height while maintaining acceptable levels of solar access, building separation and amenity. Land in the western area becomes progressively narrower and shallower, limiting their ability to accommodate taller forms.

5.3. Flood-Safe Access and Resilience

Flooding is a defining characteristic of the western area of the site.

Flood investigations identify that land in the western area is subject to high flood hazard on both frontages and that access to the flood-safe access point adjacent to 52 Parramatta Road is critical to all the western sites' future redevelopment potential.

The response must provide a continuous flood-safe pedestrian connection along the Parramatta Road frontage through the western area that functions as both a publicly accessible address and a flood-safe access route.

The response must also maintain flood conveyance, accommodate significant level changes across the site and integrate flood-safe access to building entries and the public space of Parramatta Road.

5.4. Land Use and Activity

The eastern and western areas of the precinct perform different roles within the urban structure and therefore support different land use outcomes.

The eastern area is located closest to the Parramatta Road and Ross Street intersection, a transport interchange and a local activity centre characterised by high levels of pedestrian and vehicle movement and existing services. Its proximity to public transport services and the University of Sydney makes it particularly well suited to employment, retail and service uses.

Locating employment-generating and service uses within this part of the site places higher activity uses in the most accessible locations and supports street activation. It also responds to amenity considerations, as lower levels fronting Parramatta Road and Ross Street are generally less suited to residential uses because of traffic activity, noise and poor air quality.

The urban design response also recognises the role of the heritage-listed Former Grace Bros Repository at 1–3 Ross Street. The building's form, configuration and prominent location make it particularly well suited to ongoing employment, commercial and service-based uses.

The western area is constrained by flooding and is less suitable for large concentrations of employment-generating floor space. The need to accommodate flood-safe access arrangements that separate the lower floor level from the street level, results in a different land use response. Testing indicates that co-living housing provides an efficient means of accommodating additional housing on these sites while supporting a high-density urban outcome consistent with the site's proximity to the University of Sydney and nearby health institutions.

The urban design response recognises that a range of land-use distributions are possible. However, the activity and accessibility characteristics of the eastern area makes it the most appropriate location for employment-generating uses, local services and other non-residential activity.

5.5. Parramatta Road and Ross Street Interface

Parramatta Road and Ross Street form the principal public interfaces of the area and are characterised by high levels of pedestrian activity, public transport accessibility and vehicle movement. The urban design response seeks to create active, attractive and well-defined street edges that contribute positively to the public domain while responding to the differing characteristics of the eastern and western parts of the site.

The eastern area is located closest to the Parramatta Road and Ross Street intersection and is therefore expected to accommodate the highest levels of street activity. The urban design response anticipates that building entries, active uses and non-residential activities will be concentrated along these frontages, contributing to pedestrian activity and reinforcing the role of the intersection as a local transport interchange and activity centre.

The heritage-listed Former Grace Bros Repository at 1–3 Ross Street forms an important element of this interface. Its continued use for employment, commercial or service-based activities supports activity along Ross Street while ensuring future changes to the building respond appropriately to its heritage significance.

The western area responds differently due to its topography and flood-related constraints. Here, the urban design response assumes development is generally elevated above the level of Parramatta Road, creating a raised pedestrian walkway between the buildings and the street. This elevated walkway provides for pedestrian movement, landscaping, outdoor dining, and building entries.

The resulting frontage will provide an active, connected and visible publicly accessible space while accommodating the level changes required to sit above flooding levels across the site. Retaining walls, stairs, ramps and pedestrian connections become key elements of the space and contribute to the character of the street edge.

While the eastern and western areas respond differently to their respective opportunities and constraints, both seek to establish active and engaging frontages that contribute positively to the area, improve pedestrian amenity and reinforce the role of Parramatta Road and Ross Street as important streets within the precinct.

5.6. Wind Environment

5.6.1. Key Findings

The scale of development anticipated across parts of the study area has the potential to influence wind conditions at ground level and within surrounding public spaces.

Autodesk Forma has been used to assess wind conditions at a concept level. Analysis of the existing conditions shows that the existing situation is comfortable but there is significant exposure to strong southerly winds. This resulted in more than 10 design and wind testing iterations leading to the finalisation of this Study.

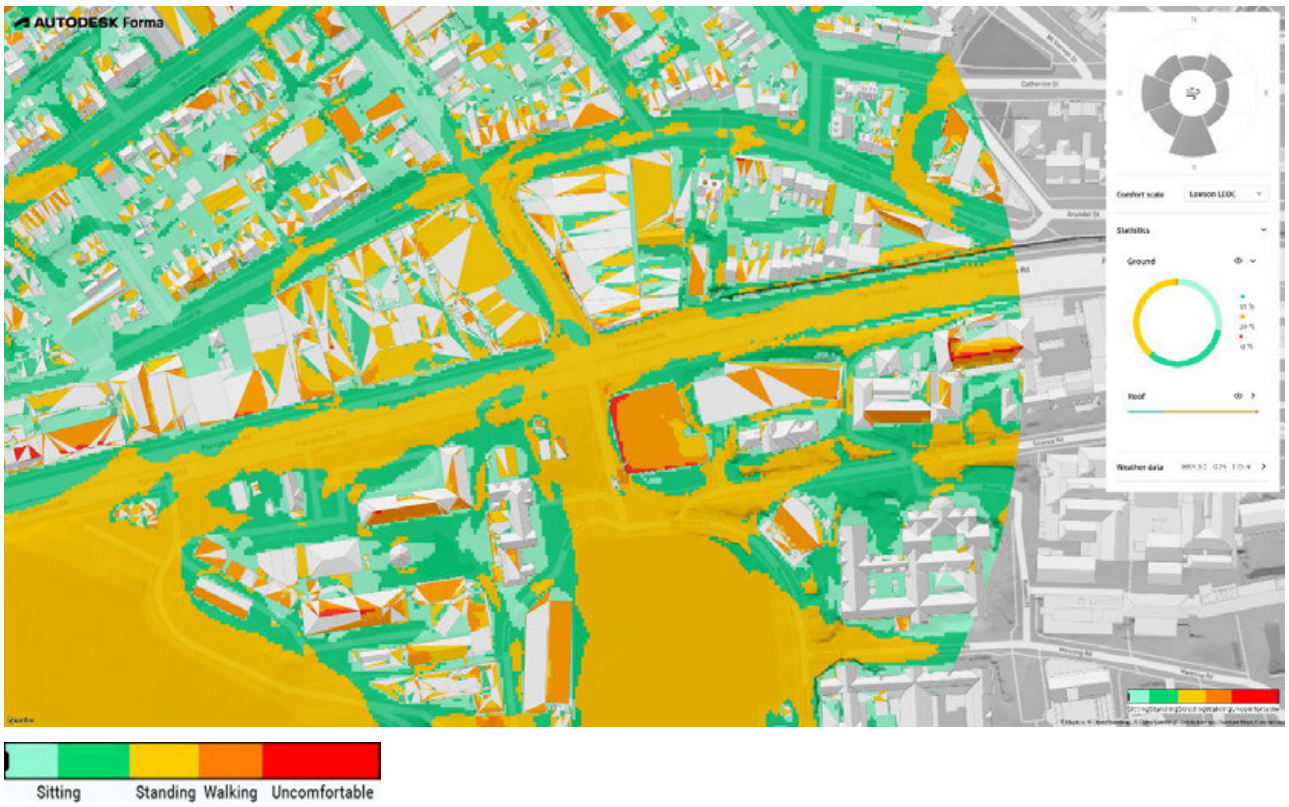


Figure 5.5. Wind comfort existing conditions

5.6.2. Design Implications

Potential wind impacts were considered during the testing of alternative built form scenarios.

The placement, shape (particularly the rounding of corners), separation of towers, upper-level setbacks illustrated in this report are a result of the wind testing. The public spaces were evaluated having regard to likely pedestrian comfort and safety outcomes.

More detail on the process is provided below.

Detailed wind modelling and assessment will be required as part of future development applications.

5.7. Noise and Air Quality

Parramatta Road is a major arterial road carrying significant traffic volumes and is a defining environmental influence on the site. Noise and air quality considerations play a major role in shaping the urban design response.

After protection of public open space from overshadowing, creating a response to minimise the exposure of people in new residential accommodation to traffic noise and air pollution is the central design priority. This is achieved by the careful design of the location and form of the proposed building envelopes. This consideration influences both the arrangement of buildings, their depth and the distribution of land uses across the precinct.

In the eastern area, the activity associated with the Parramatta Road and Ross Street intersection creates an environment that is particularly well suited to employment-generating, retail and service uses. Locating these uses closest to the road corridor at lower levels in the buildings assists in creating active public street fronts while reducing the need for residential accommodation to directly address Parramatta Road at lower levels.

In the western area, the design response favours relatively thin buildings fronting Parramatta Road. This enables windows for ventilation of the residential accommodation to be oriented away from the road corridor and towards northern quieter and less polluted internal courtyards and communal spaces. The arrangement also assists in creating a built form that acts as a buffer between Parramatta Road and the more sensitive residential parts of the development and the existing residential areas north of Arundel Street.

6. Urban design principles

6.1. Urban Design Principles

This Study is informed by the urban design principles outlined below. These principles respond to the site's unique characteristics, opportunities and constraints, and are to guide future development to achieve a high-quality redevelopment outcome that aligns with the broader objectives for the site and the wider area.

1. **Minimise overshadowing** of the nearby sports ovals

   Two grassed sports ovals south of the site are protected from overshadowing.

2. Consider **people's safety** in all **flood events**

   The area is subject to flash flooding. New development will locate residential uses above the probable maximum flood level and ensure people can shelter in place and escape during all flood events.

3. More deep soil for **more trees** and cool green spaces

   Each development site will contain deep soil areas for tree planting. The size and location of these areas vary in relation to the sites' size, shape and orientation. Deep soil areas are concentrated in locations that optimise access to winter sunlight to assist tree health and growth. There are courtyards in each lot protected from the noise and pollution of surrounding streets suitable for communal open space. On Arundel Street a three metre wide landscape setback provides space for new trees and for increased canopy for trees planted in the street reserve. On Parramatta Road setbacks allow for increased canopy from the street trees.

4. Good **design for noise** and **air pollution**

   Parramatta Road is busy and noisy having the potential to expose residents to the poor health effects that can result from long-term exposure to noise and air pollution. Building forms are designed to protect habitable rooms from the surrounding noise and air pollution.

5. Good **design for wind**

   Generally, the street wall character means that winds that cause poor comfort or compromise safety on surrounding streets are avoided. Where taller buildings are possible upper-level setbacks to arrest downdraft and curved corners to assist continuous wind flow past new buildings are included.

6. Reinforce **'street wall' form** of buildings

   The existing area is generally characterised by a continuous street wall form of buildings. This characteristic is followed for new building forms to maintain and extend the existing character of the area. New building forms have street walls that fit to their local context or establish a new street wall context. In some cases, a tower form is more appropriate, particularly on the larger eastern sites.

7. Conserve **heritage** values

   There is a heritage item on Ross Street. For new development on this site, conserving the heritage significance of the item is the primary consideration. Commercial uses will have the least impact on the conservation of this building.

8. Anticipate the **future character** of Parramatta Road and Ross Street

   The future reinstatement of light rail along Parramatta Road with a stop at Ross Street, the interchange with buses, and local shops and employment uses on Ross Street and Parramatta Road are accommodated and non-residential uses are concentrated here.

9. Locate **vehicular access** and waste facilities on Arundel Street

   Parramatta Road and Ross Street are too busy for vehicular entries so these are located on Arundel Street.

10. **Maximise development within constraints**

    Within the constraints of other principles, the development potential of each site is maximised.

7. Built form options

7.1. Integrated Urban Design Response

The urban design response demonstrates that the site's opportunities and constraints can be balanced through an integrated approach to height, solar access, flooding, land use, landscaping, noise and public space design. The following chapter tests a range of built form options to determine how these principles can be translated into a feasible redevelopment outcome.

Built form testing explored two different approaches to urban form on the site. In general terms, these can be described as a street wall and courtyard arrangement, and a tower arrangement.

Each option was compared for its compatibility with the urban design principles, with a third, combined option adopting the best of each approach and progressing through design development to arrive at a reference scheme.

7.2. Initial Street Wall and Courtyard Form

The initial built form response for the site was based on a perimeter block and street wall form. Development was generally arranged with taller commercial buildings fronting Parramatta Road, and a lower-scale residential frontage to Arundel Street and a landscaped courtyard located between them accommodating taller residential “wings”. The arrangement is shown in Figure 7.1.

The approach responds to several characteristics of the site. Parramatta Road is a busy arterial road and therefore provided an opportunity for building forms to act as a buffer between traffic-related impacts and residential accommodation. At the same time, the lower scale residential character along Arundel Street and the presence of the Hereford and Forest Lodge Heritage Conservation Area influenced the scale of development along the northern edge of the site.

The arrangement also enabled the creation of internal courtyards that could accommodate deep soil landscaping, canopy trees and communal open space while maintaining appropriate building separation and access to sunlight.

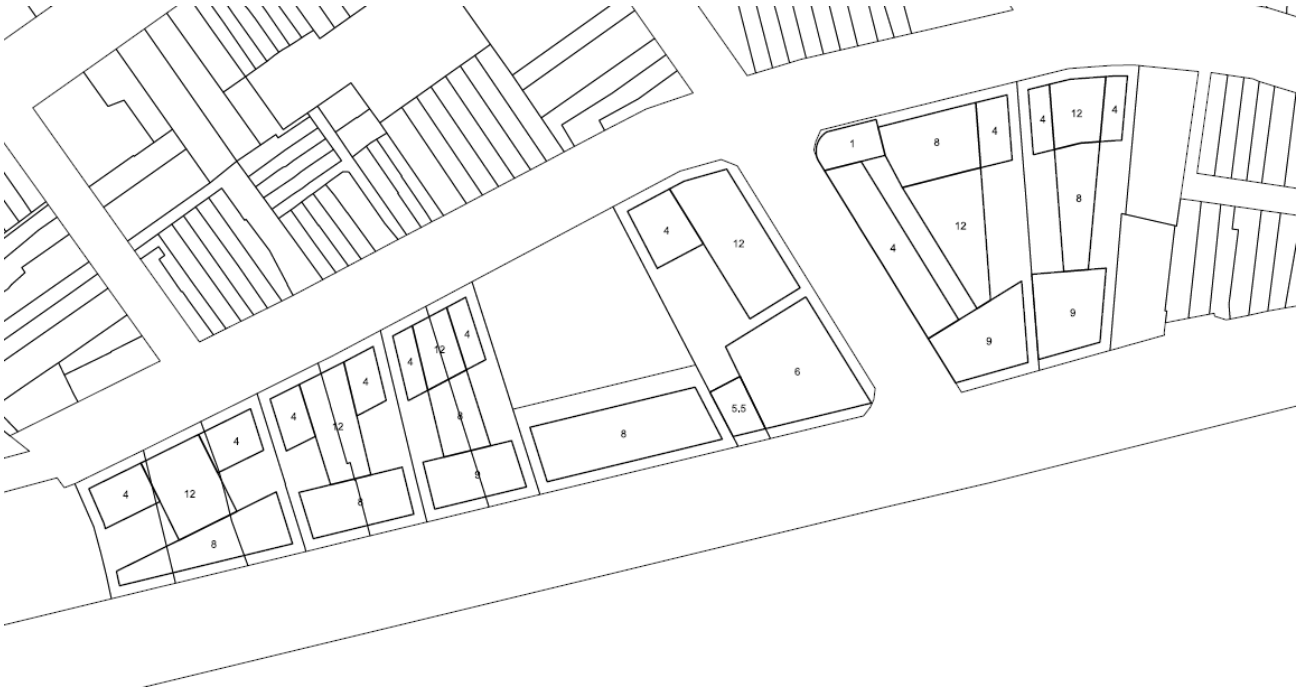


Figure 7.1. Initial Street Wall and Courtyard Form – Plan

The resulting built form established a number of principles that remained consistent throughout subsequent testing:

- a building edge fronting Parramatta Road to assist in managing noise and air quality impacts with small breaks to allow wind to flush pollutants from the courtyards;
- lower scale development fronting Arundel Street;
- a landscaped setback to Arundel Street;
- internal courtyards supporting residential amenity and deep soil planting;
- development that stepped up in scale from west to east; and
- building separation following the guidance of the Apartment Design Guide.

These principles formed the basis for subsequent testing.

7.3. Tower Forms

Following preparation of the initial street wall form, a tower-based option was tested across the precinct. Figures 7.2 and 7.3 show the tower option in plan and axonometric view.

The purpose of the testing was to understand whether taller and more slender building forms on podiums could increase development capacity while maintaining acceptable urban design outcomes.

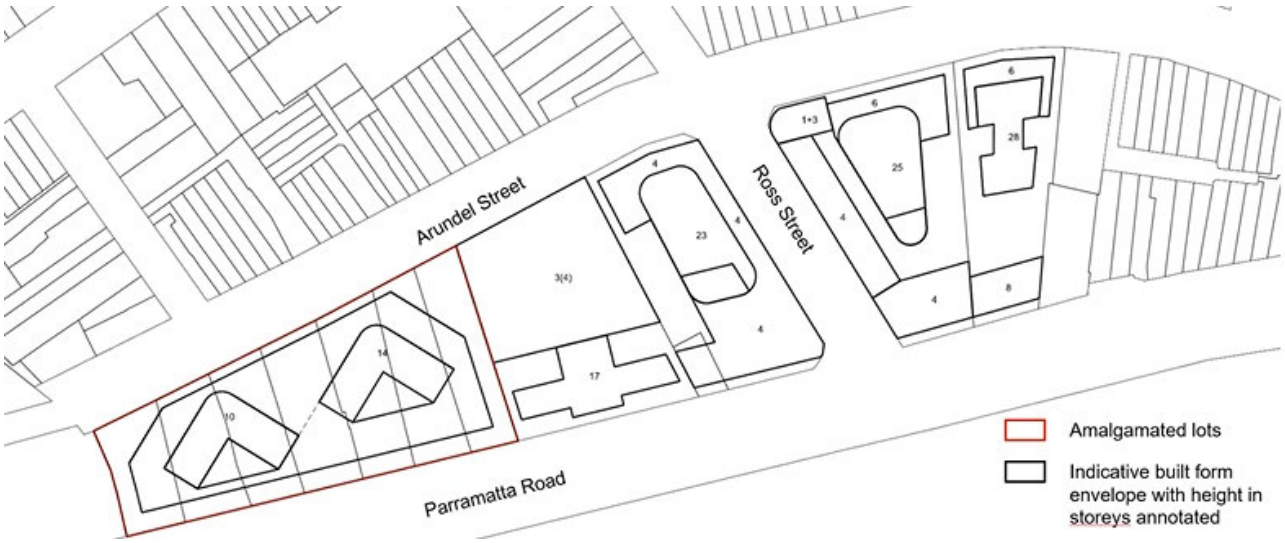


Figure 7.2. Tower Form Option – Plan



Figure 7.3. Tower Form Option – Axonometric View

The tower option produced different outcomes in the west and east areas.

In the eastern areas, tower forms responded well to the available site dimensions and were capable of accommodating substantial development while maintaining acceptable building separation, outlook and solar access outcomes.

In the western area, however, tower forms were constrained by:

- the limited depth and width of the sites;

- protecting sunlight access to the sporting fields south of Parramatta Road;
- protecting future residents from noise and pollution from Parramatta Road;
- achieving reasonable separations for outlook and visual privacy; and
- flooding.

The resulting building forms generated lower development yields on the western sites than the original street wall arrangement.

The testing demonstrated that tower forms remained appropriate in the eastern area but were not the preferred response in the western area.

7.4. Combined option

Each of the two initial built form arrangements offered advantages, leading to a combined option.

The refinement process focused on:

- improving solar access to internal courtyards;
- maximising opportunities for deep soil landscaping;
- responding to flooding;
- building separation for outlook and visual privacy;
- better residential amenity; and
- maximising development potential.

The resulting arrangement demonstrated that the street wall form was capable of achieving higher yields in the western area than a tower-based approach while also providing superior outcomes in relation to noise, air pollution, landscaping, flooding and residential amenity.

This approach was therefore adopted as the urban design response for the western area.

The combined option adopts a street wall and courtyard arrangement to the western area, along with a four-storey street wall edge to Arundel Street, and tower forms to the east with a consistent street wall edge.

The combined option is illustrated in Figures 7.4 to 7.6.

In the western area, the solar access planes to the University of Sydney playing fields determine the maximum height of buildings, and a four-storey street wall fronting Arundel Street manages a transition in scale towards the northern context of Forest Lodge.

In the eastern area, the maximum height of towers is set by the proposed solar access planes, and the street wall adopts a four-storey edge to Arundel and Ross Street, consistent with the scale of existing development on Arundel Street and the heritage building on Ross Street. On Parramatta Road, the street wall is lifted to 8 storeys.

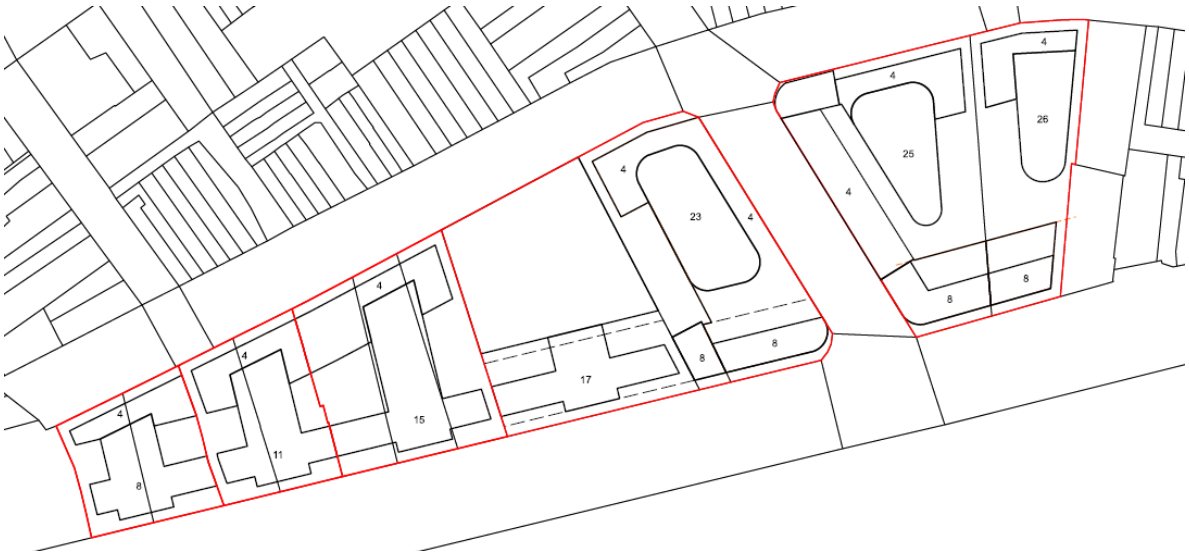


Figure 7.4. Refined Street Wall Form – Plan



Figure 7.5. Axonometric view of combined option

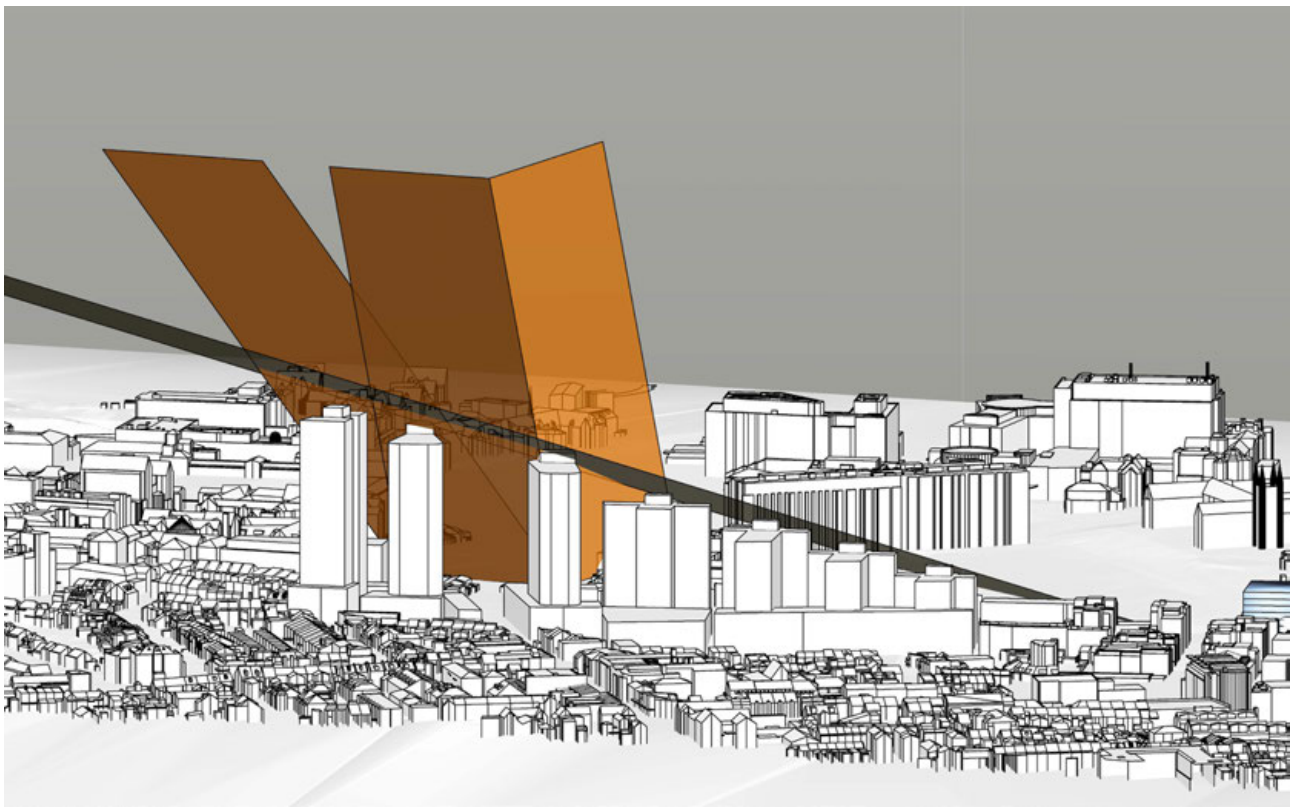


Figure 7.6. Refined Street Wall Form – Axonometric View looking from the north showing the building forms below the sun access planes that protect the open spaces at Sydney University

7.5. Wind testing of the combined option

The initial options were subject to wind comfort testing using CFD software. Initial options showed uncomfortable conditions on Ross Street resulting from channelling of wind between the towers either side. An intensive design iteration and wind testing approach was used to resolve the wind environment issues. The iterative testing and resulting modifications are shown in Figures 7.7 to 7.9.

The built form testing process explored a range of approaches to managing wind, including the use of lower street wall forms with upper-level setbacks, articulated building forms and rounded building corners. Attention is given to the relationship between taller buildings and surrounding public spaces, including Parramatta Road, Ross Street and associated pedestrian areas.

- all towers were redesigned to have rounded corners;
- towers were spread apart, the eastern-most tower was moved as far east as possible;
- a range of breaks were introduced between buildings;
- setbacks were introduced at intermediate levels on the Ross Street and Parramatta Road frontages;
- different corner designs were tested at the intersection of Ross Street and Parramatta Road including a mix of rounded and squared corners; and
- awnings were introduced.

Wind considerations informed building placement, articulation and built form geometry across the area, particularly on sites capable of accommodating taller buildings. Testing therefore focused on how tower forms could be arranged to minimise downdraft effects and improve wind performance. Building geometry, tower placement and upper-level setbacks were all refined to improve pedestrian comfort and reduce the concentration of wind at ground level.

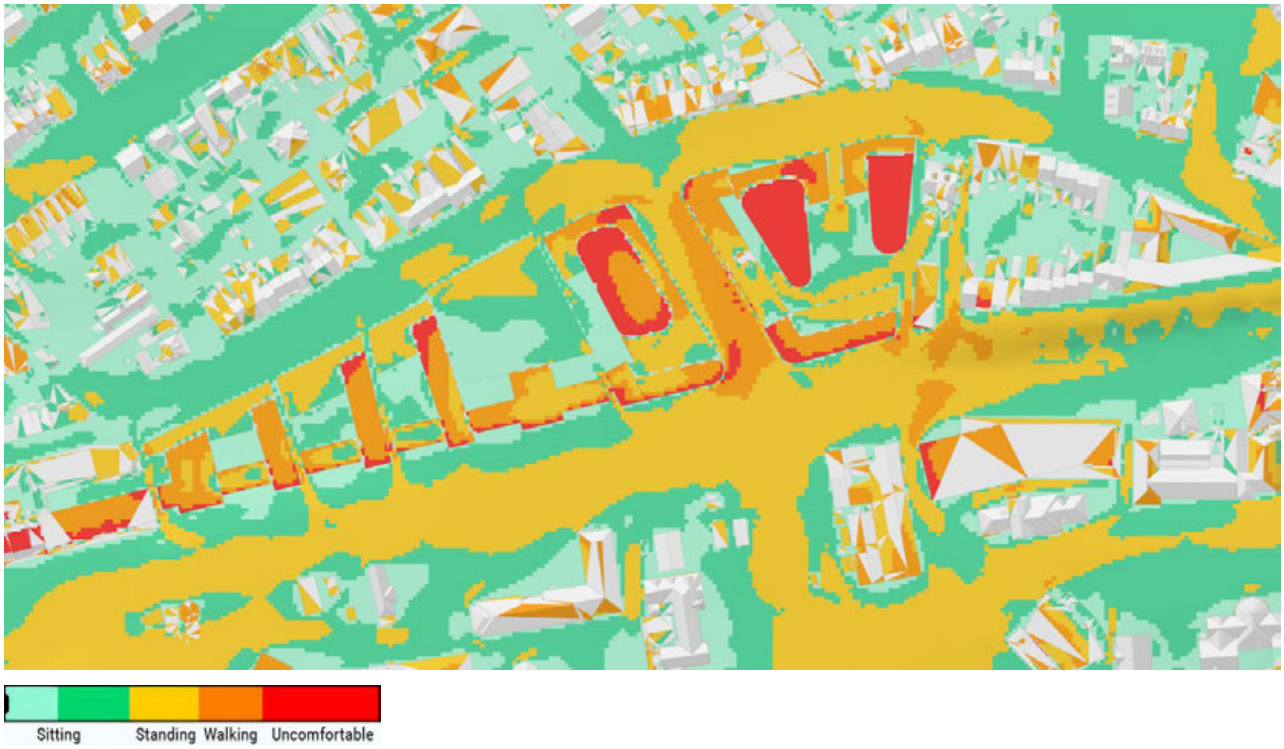


Figure 7.7. Wind performance of the combined option (intermediate process showing issues still present on Ross Street)

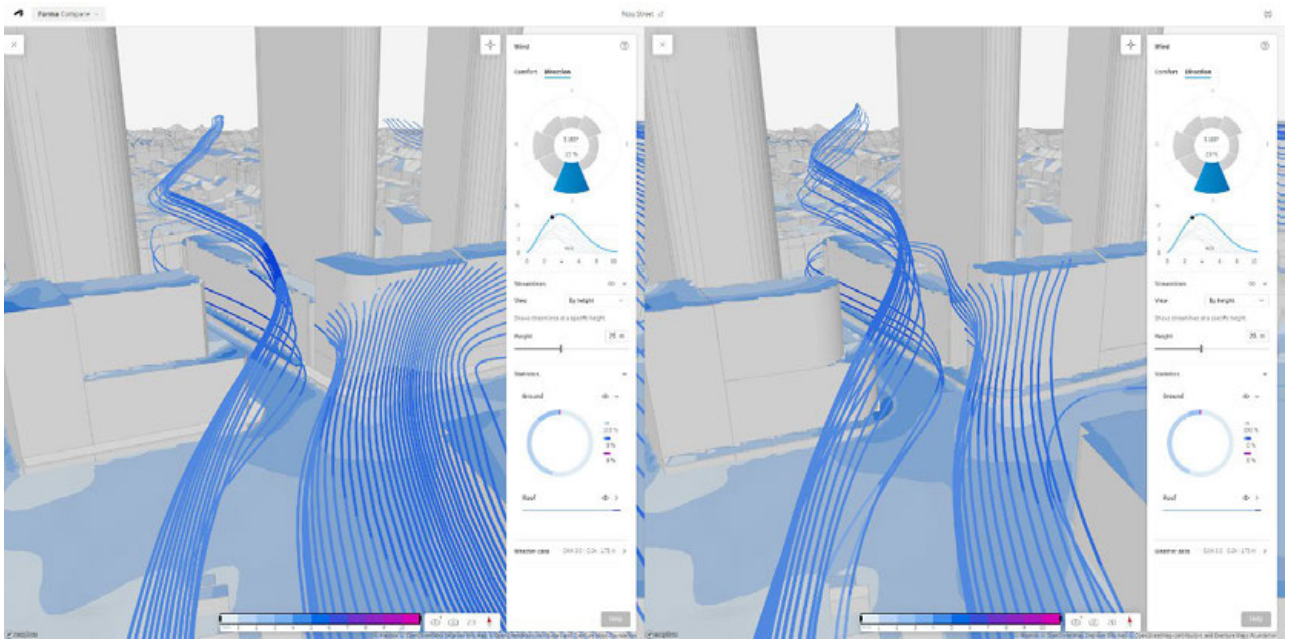


Figure 7.8. Critical southerly winds were the main issue. This figure shows an example of built form amendments tested to arrive at the reference scheme

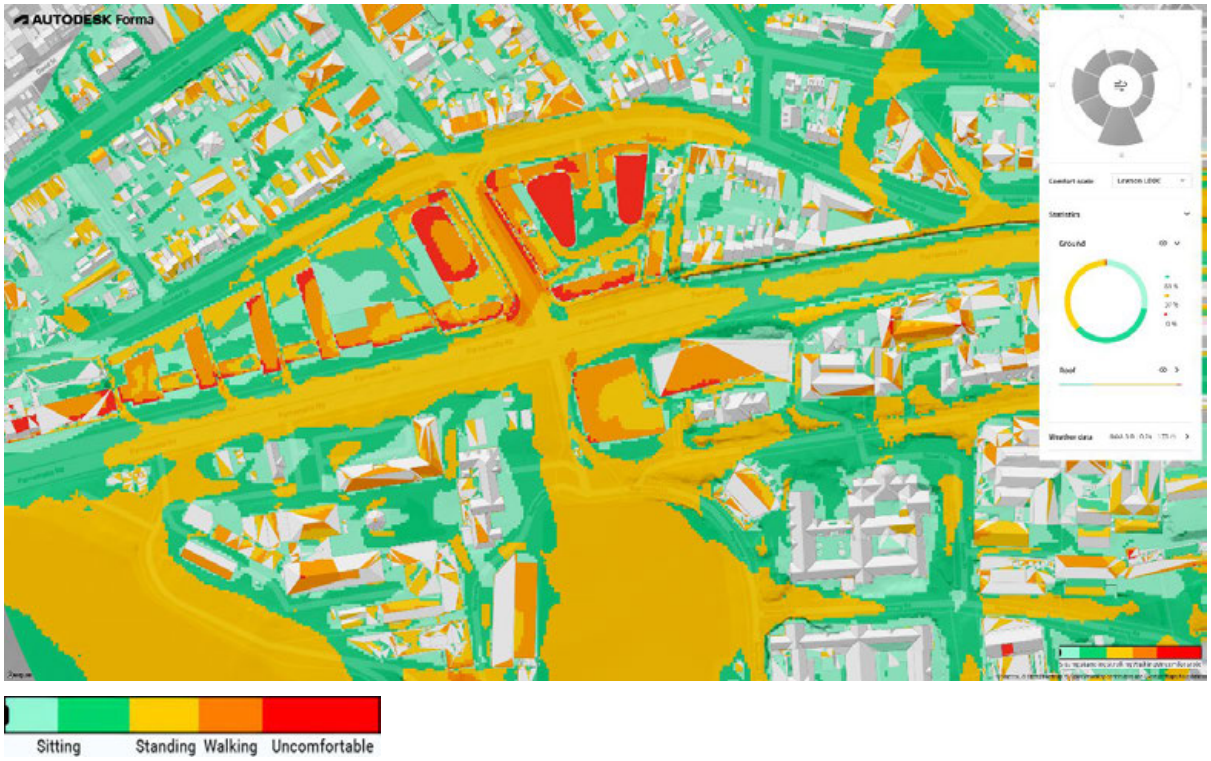


Figure 7.9. Wind performance with modifications to be incorporated into reference scheme. This wind comfort analysis shows that there are no wind comfort failures at ground level. Uncomfortable areas on Ross Street are on top of the awning that protects the footpath

This intensive design process demonstrated that careful design can often alleviate poor wind environment outcomes.

7.6. Noise testing of the combined option

The combined option was tested for noise using Autodesk Forma software. Testing demonstrated that the overall built form arrangement of the combined option is effective in protecting the internal courtyards and Arundel Street buildings from noise. Conversely, the Parramatta Road and Ross Street frontages will be unsuitable for residential uses. Any residential uses would need to be oriented away from these noise sources.

In the images below red and dark orange areas are unsuitable for residential ventilation openings, light orange and yellow areas require acoustic screening, hoods or inset balconies or the like and green areas are suitable for unprotected openings.

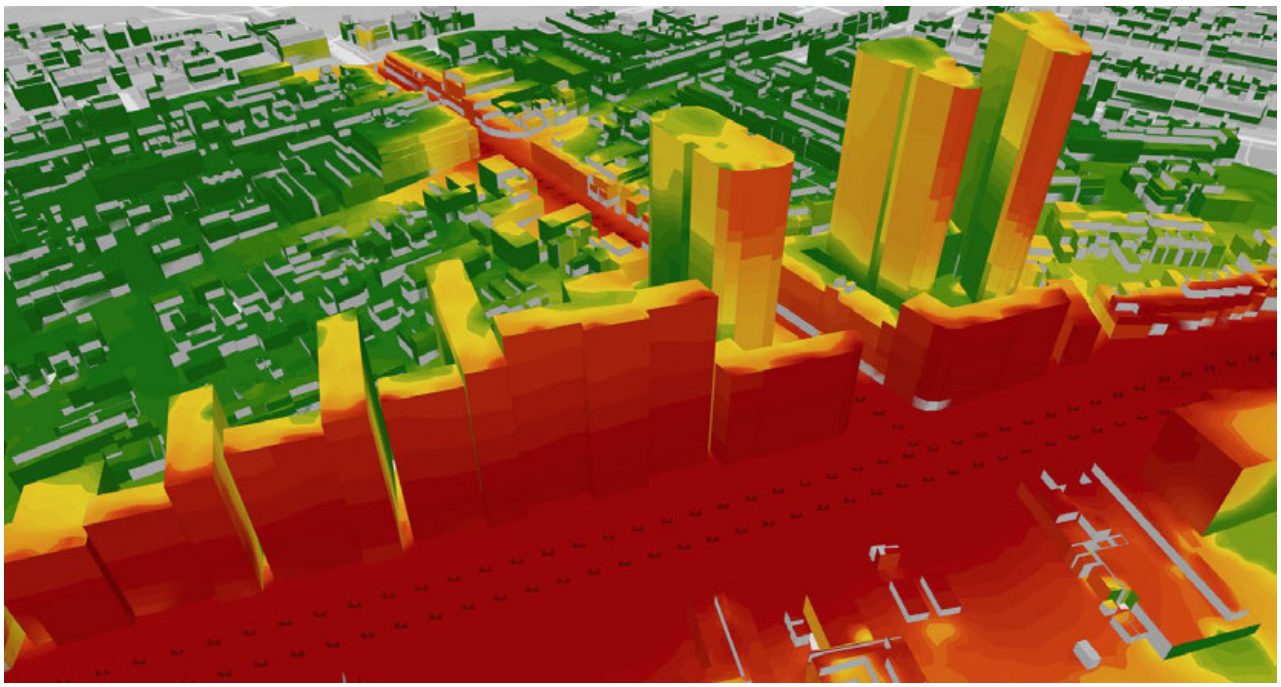


Figure 7.10. Noise from south-west

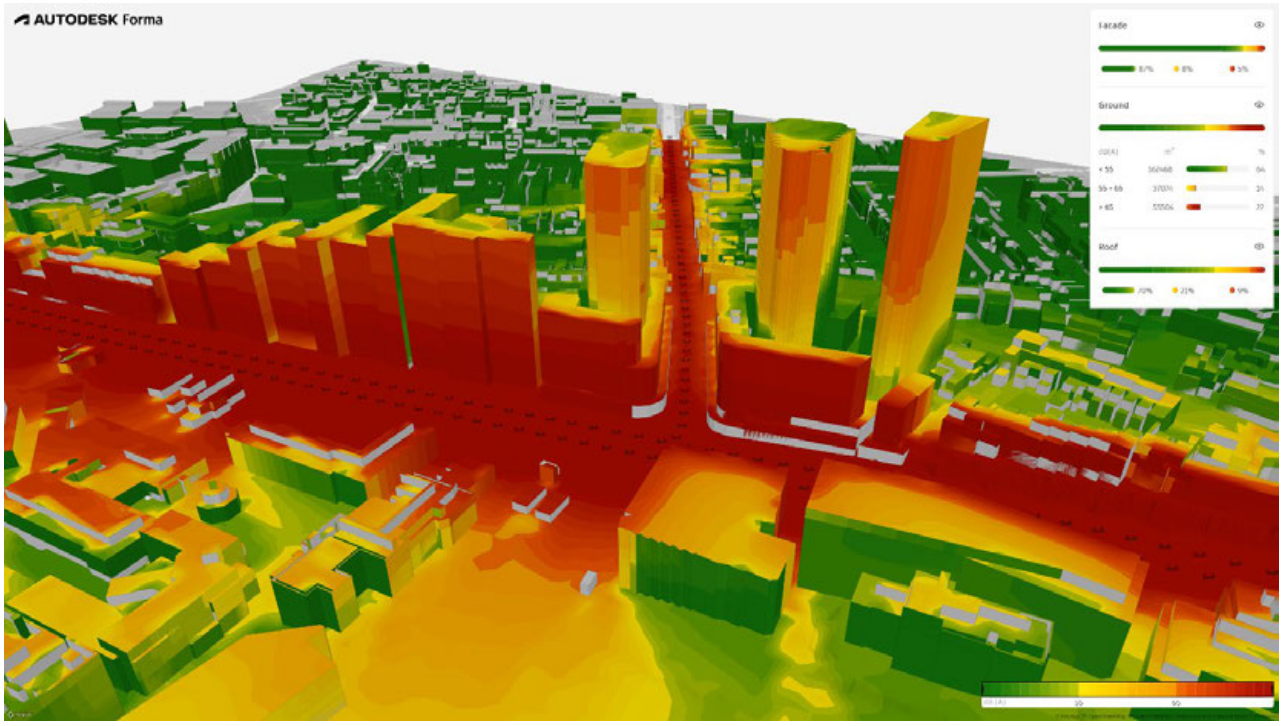


Figure 7.11. Noise from south-east

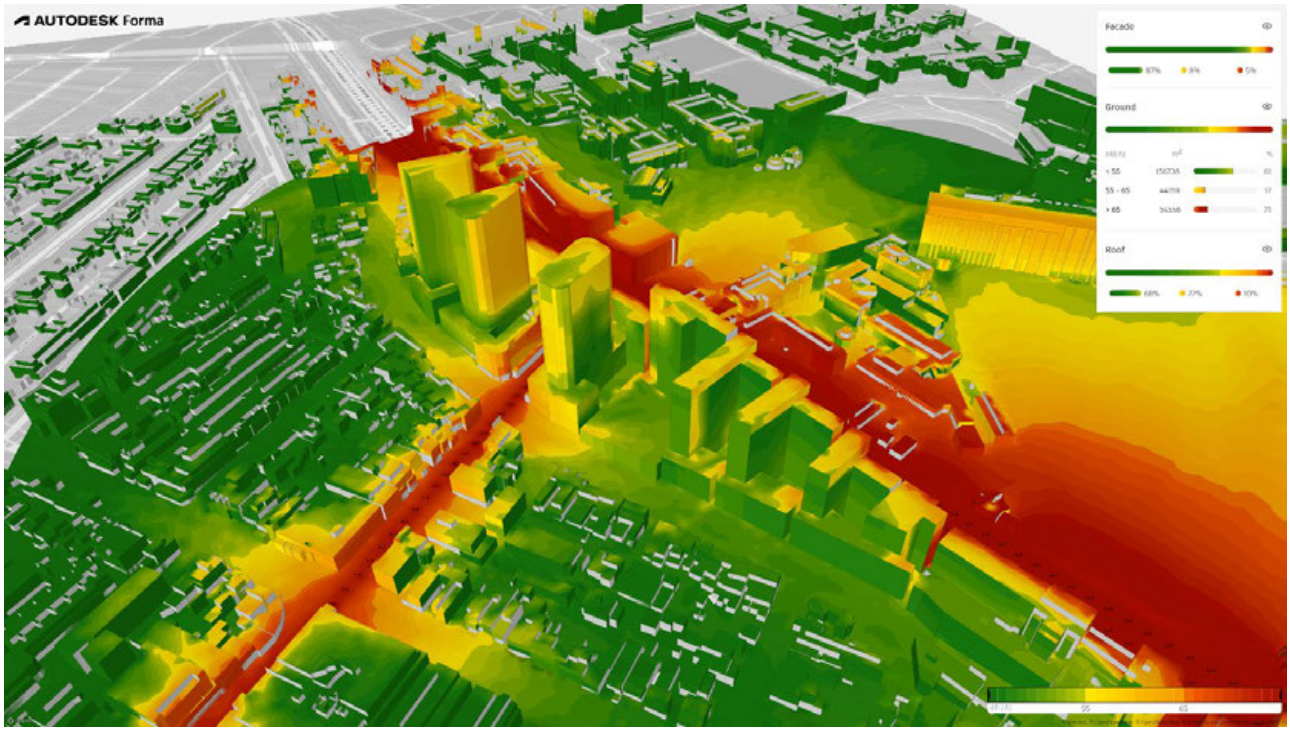


Figure 7.12. Noise from north-west

7.6.1. Managing noisy frontages – Parramatta Road

On Parramatta Road the continuous frontage proposed for the western sites protects the courtyards and buildings behind from noise and pollution. Small gaps allow the wind to flush pollutants from the courtyards without admitting too much noise. The parts of the buildings that front Parramatta Road have a narrow depth so that all habitable rooms can have openings that face away from the road which is the source of the noise. This follows the New South Wales Government planning guidance in *Development near Rail Corridors and Busy Roads – Interim Guideline.* The illustration below is from the guideline:

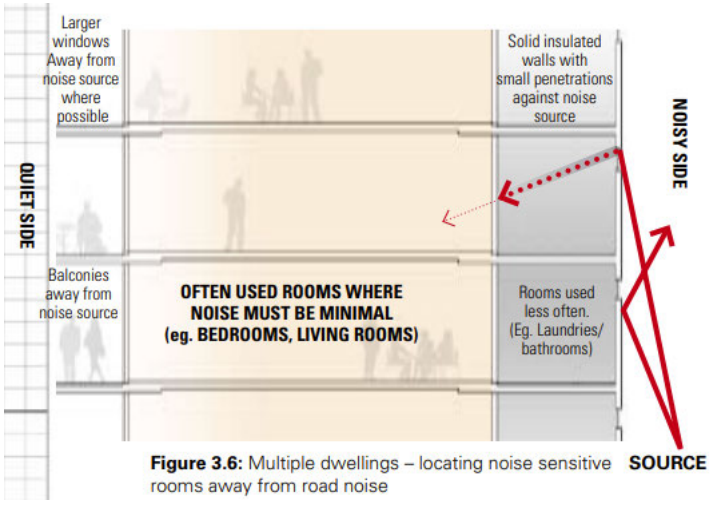


Figure 7.13. Illustration from Development near Rail Corridors and Busy Roads – Interim Guideline

7.6.2. Managing noisy frontages – towers on eastern sites

On the eastern sites the south side of the towers are very highly exposed to noise and are not suitable for habitable rooms, this includes the eastern face of the easternmost tower because of its orientation being slightly angled toward Parramatta Road. The east and west sides of the towers are exposed to the noise from Parramatta Road over the top of the lower narrow street wall

buildings that act as noise barriers. The orientation of these east and west facades is generally perpendicular to the road and on these façade openings protection with projecting fins or shielding by indented balconies will be required.

The efficacy of façade treatments and balcony recesses, additional blade screens, have been tested in the details below. These show that it is possible to achieve complying noise levels using these types of strategies. Figures 7.14 to 7.16 compare the tested facade treatments and their relative noise performance.

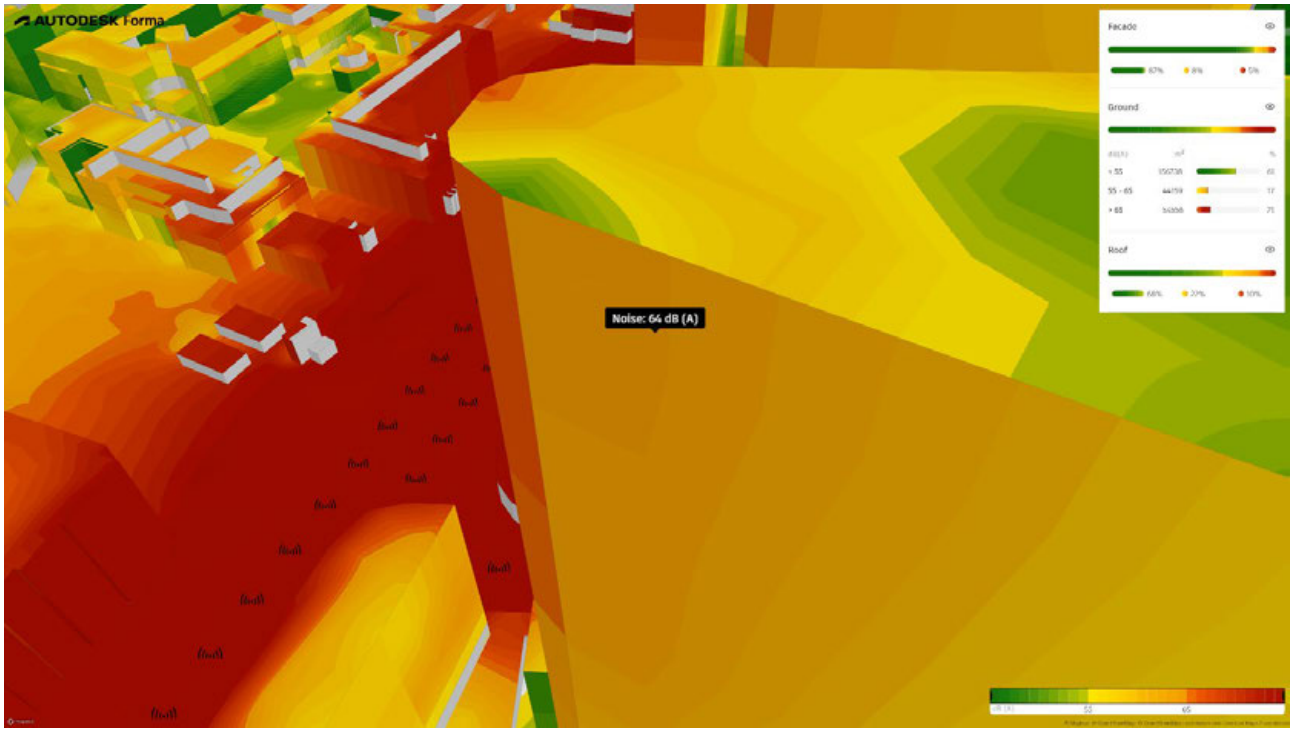


Figure 7.14. Noise levels: smooth face tower noise level

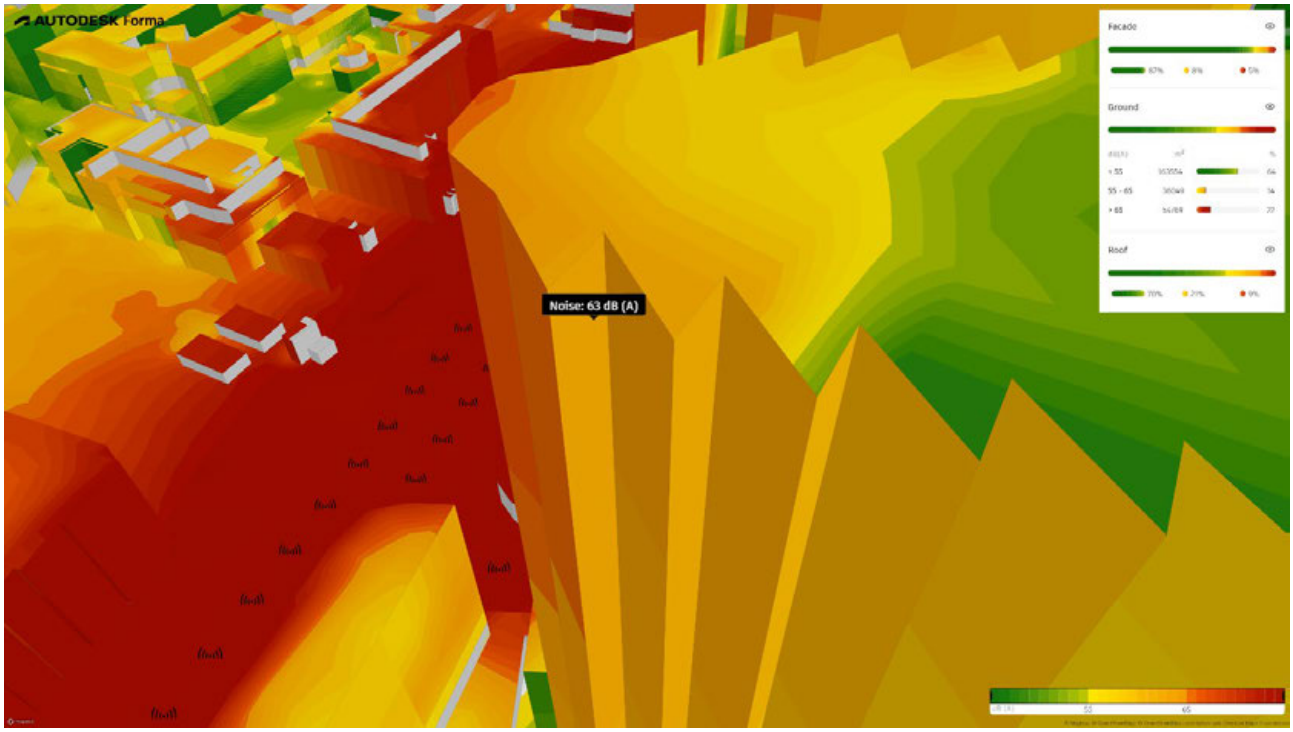


Figure 7.15. Noise levels: sawtooth façade arrangement

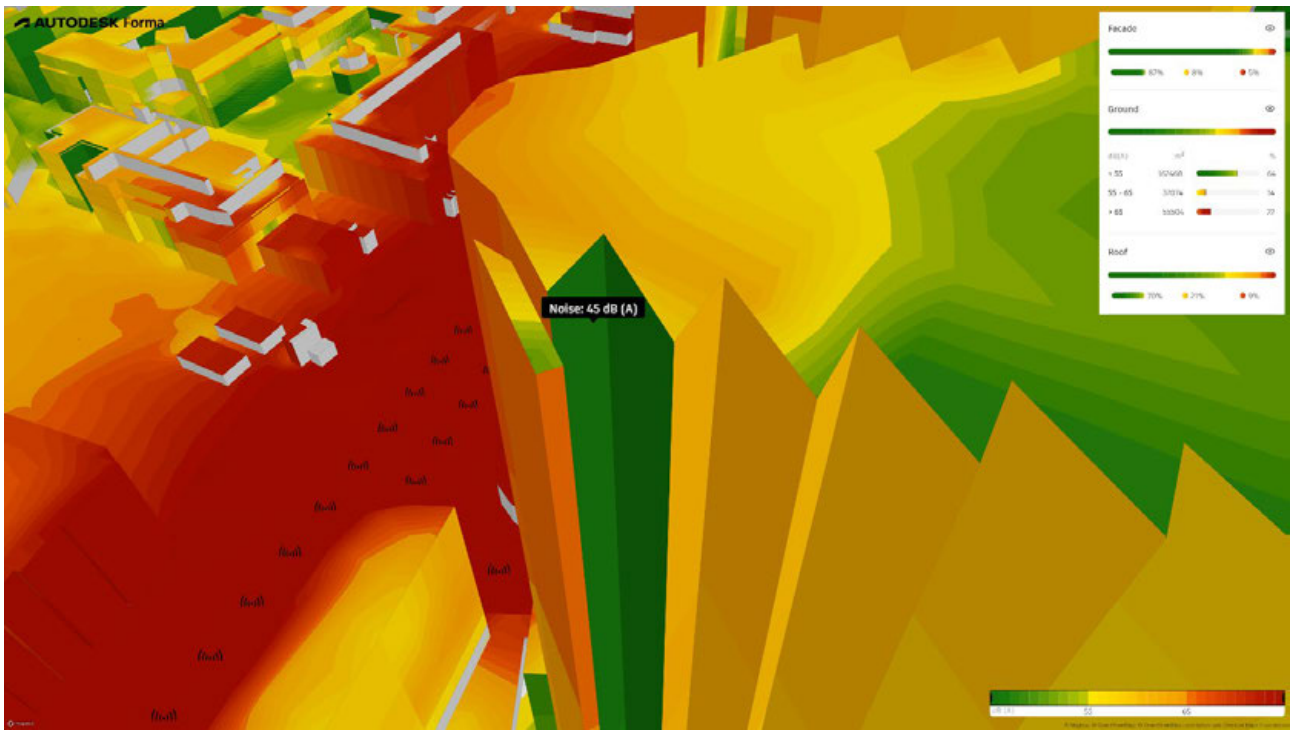


Figure 7.16. Noise levels: sawtooth façade arrangement with noise shield showing significant noise reduction behind the extended noise shield element. The façade noise level is suitable for an opening to a habitable room.

7.7. West area - amalgamation scenarios

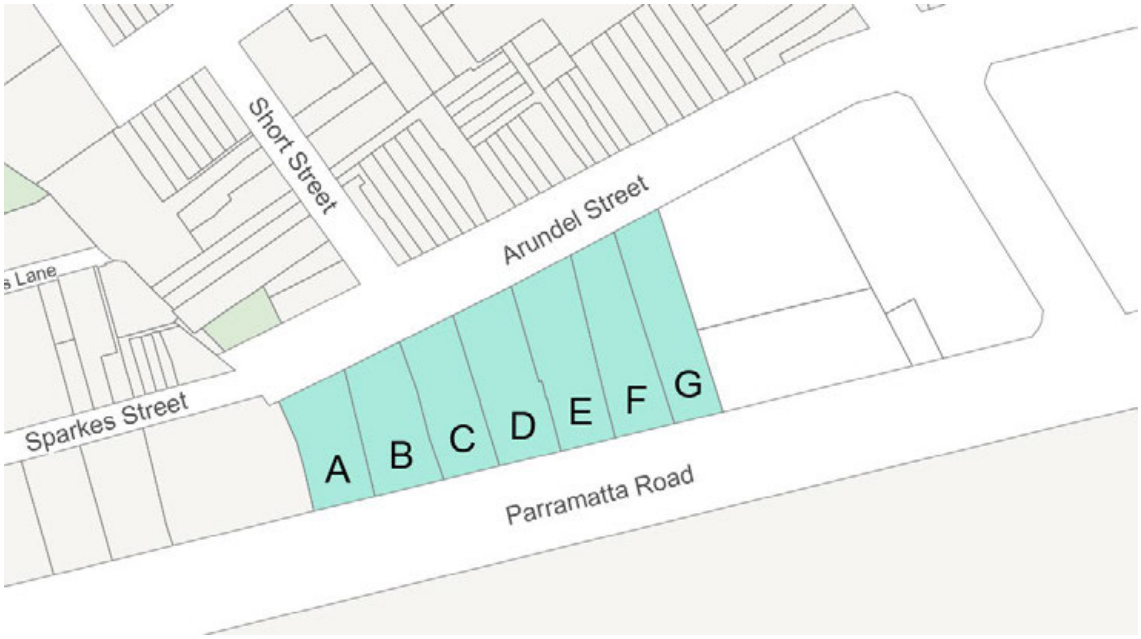


Figure 7.17. Western area (referred to as sites A to G)

The street wall form was tested against a range of possible amalgamation outcomes for the western area to understand how different ownership and redevelopment patterns affect built form, residential amenity, flood management and development capacity.

The testing did not seek to identify a single required redevelopment pattern. Rather, it was undertaken to understand how the underlying urban design principles would perform if different combinations of sites were amalgamated.

While each scenario can accommodate the street wall form and flood-safe access strategy, the scenarios differ in the efficiency of their built form outcomes and resulting development yields which are documented in the planning proposal.

The following amalgamation scenarios were tested. Figure 7.18 illustrates Scenarios 1 to 3.

Scenario	Amalgamations
Scenario 1	ABC / DE / FG
Scenario 2	AB / CDE / FG
Scenario 3	AB / CD / EFG

Larger 4 and 5 site amalgamations were also considered. These did not perform differently from combinations of 2 and 3 site amalgamations.

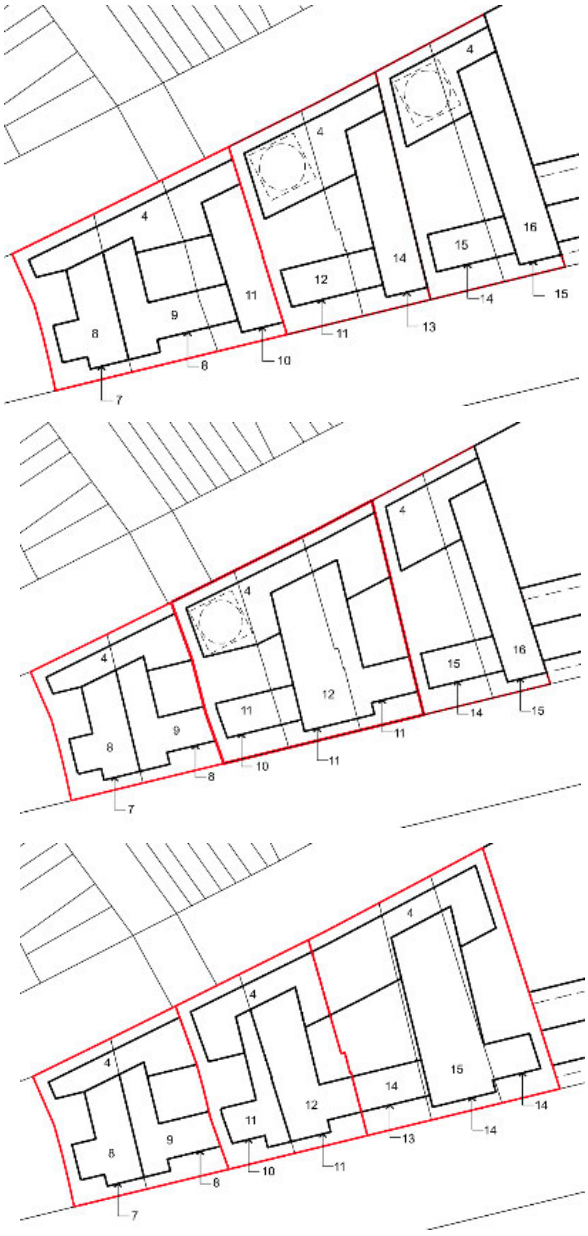


Figure 7.18. Amalgamation scenarios (Scenarios 1-3 from top to bottom)

8. Reference scheme

8.1. Development of the reference scheme

The reference scheme is a refinement of the combined option arising from testing, including the highest yielding amalgamation scenario for the western area, and some modifications to address outcomes of wind and noise testing.

The reference scheme combines tower forms in the eastern area with the street wall and courtyard forms in the western area, and the highest yielding amalgamation scenario of AB, CD and EFG.

The purpose of the reference scheme is to test the maximum development potential facilitated by the proposed planning controls and assess how the site can respond to its opportunities and constraints while delivering housing, employment and public domain outcomes.

The reference scheme is based on the following assumptions:

- the eastern sites redevelop in accordance with the proposed maximum floor space ratio and building height controls proposed by the planning proposal;
- the eastern sites maximise residential floor space while accommodating the level of non-residential floor space considered appropriate through the urban design testing;
- 40 Parramatta Road redevelops as a wholly non-residential building;
- the western properties redevelop using the highest yielding amalgamation scenario of AB, CD and EFG; and
- the western properties are developed as co-living housing.

Under this scenario, the reference scheme facilitates:

- approximately 461 apartments;
- approximately 819 co-living rooms;
- approximately 375 jobs in 15,700sqm of non-residential floor space; and
- an affordable housing contribution equivalent to approximately 96 affordable dwellings.

The reference scheme is not the only development outcome capable of being achieved under the proposed planning framework. Alternative amalgamation outcomes, residential typologies, land-use mixes and employment outcomes may also occur. The reference scheme is intended as a testing tool that demonstrates one possible outcome that can be used to inform development of the proposed planning controls.

The reference scheme demonstrates that redevelopment that occurs within the parameters tested can deliver significant housing growth while retaining a meaningful employment and service role, supporting flood-safe redevelopment, responding to noise, wind and overshadowing environmental constraints, maintaining heritage significance and providing significant space for deep soil and tree canopy. The reference scheme is shown in Figures 8.1 to 8.3.



Figure 8.1. Reference Scheme Framework Plan



Figure 8.2. Reference Scheme: axonometric view from the south-west showing street wall building on the western sites and towers and podium forms on the eastern sites.

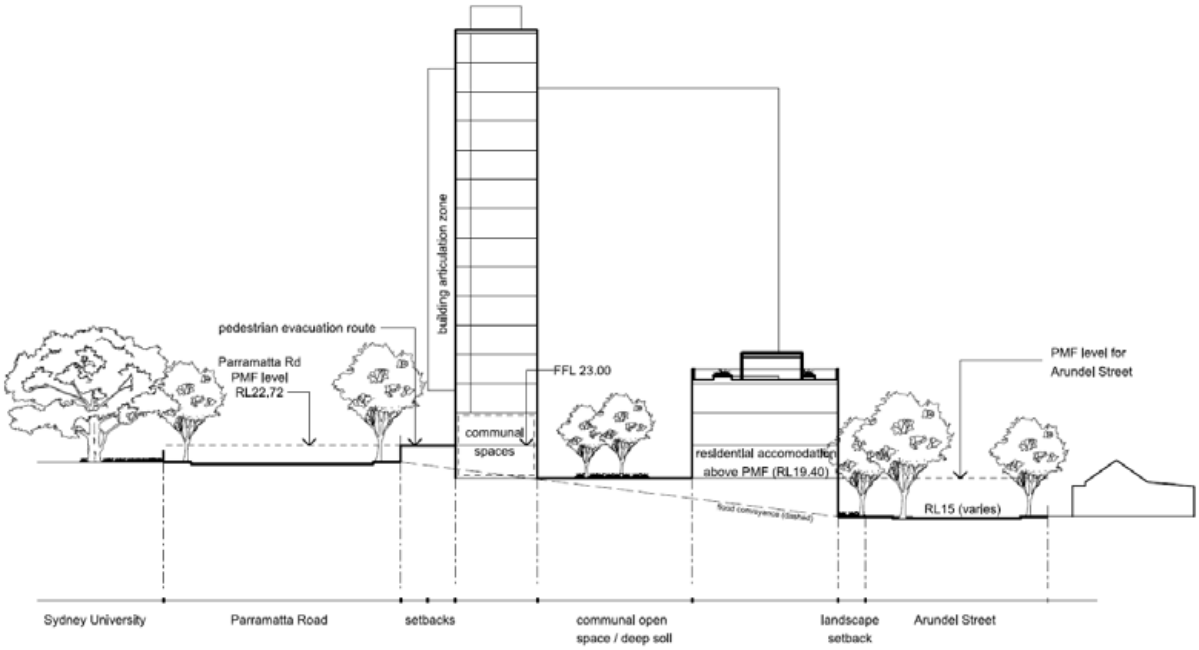


Figure 8.3. Reference Scheme: north-south cross-section through the flood affected western sites showing the flood escape pedestrian route at Parramatta Road on the left side and the low scale street wall with significant tree planting on the Arundel Street frontage on the right side.

8.2. Overshadowing effects

The shadow impacts created by the reference scheme can be compared to the existing condition in the images below. Figures 8.4-8.10 compare existing and proposed overshadowing.



Figure 8.4. Overshadowing at 9am, 21 July: existing condition (L) and reference scheme (R)



Figure 8.5. Overshadowing at 10am, 21 July: existing condition (L) and reference scheme (R)



Figure 8.6. Overshadowing at 11am, 21 July: existing condition (L) and reference scheme (R)



Figure 8.7. Overshadowing at 12pm, 21 July: existing condition (L) and reference scheme (R)



Figure 8.8. Overshadowing at 1pm, 21 July: existing condition (L) and reference scheme (R)



Figure 8.9. Overshadowing at 2pm, 21 July: existing condition (L) and reference scheme (R)



Figure 8.10. Overshadowing at 3pm, 21 July: existing condition (L) and reference scheme (R)

8.2.1. Overshadowing to the Sydney University and residential colleges playing fields

The testing shows that the built forms that are below the proposed solar access planes are effective in protecting at least four hours of solar access to the playing fields to support grass growth while also maximising development. This will ensure that the playing fields can be used for the greatest amount of time over the course of the year without having to re-turf the fields.

8.2.2. Overshadowing of adjacent residential development

All surrounding residential development maintains at least 2 hours of solar access in mid-winter as required by the DCP. The most impacted development is the neighbouring apartment building at 28-30 Parramatta Road Forest Lodge which has 14 apartments. The Apartment Design Guide establishes the requirements for considering overshadowing of apartment buildings. The ADG requires that overshadowing to neighbouring properties is minimised.

The reference scheme maintains more than 2 hours of sunlight in mid-winter to 10 of the 14 apartments which is 72%. The remaining apartments receive more than 15 minutes of sun. This outcome is consistent with the design guidance provided by the ADG.

8.3. Noise

8.3.1. Noise testing of the reference scheme

The reference scheme uses siting and layout strategies that are consistent with ensuring that no habitable rooms need to have ventilation openings that are directly exposed to the noise of Parramatta Road.

All buildings are designed to have non-residential uses at ground level facing Parramatta Road and Ross Street.

The street wall buildings on the western sites adjacent to Parramatta Road have narrow floor plates so that all habitable rooms can face north away from Parramatta Road.

The tower and podium buildings on the eastern sites are designed to have non-residential uses in the lower podium levels and use the same narrow floor plate street wall strategy for those parts of the building aligned with Parramatta Road above the non-residential uses. The towers are set back and shielded by the street wall buildings. They are designed with narrow floor plates with long north-south axes. The floor plate size allows the core to be located at the south so that there are no habitable rooms facing Parramatta Road and all other rooms along the east and west facades can be shielded from noise using a variety of strategies such as inset balconies, windows oriented to face north and noise shielding external fins. Some of these strategies are tested above, others are drawn from the City's detailed study: Passive Acoustic Design Guide that includes the detailed Design Guide for Noise Control in Apartments Using Passive Acoustic Methods.

Refer to the additional detail in the noise testing in Chapter 7.

8.4. Wind

Following the iterative process of wind testing applied to the combined option, amendments have been applied to the built form envelopes around the corner of Ross Street and Parramatta Road to ensure that the reference scheme can achieve a level of wind comfort that meets the City of Sydney's standard of 'walking' or better. The resulting wind performance is shown in Figure 8.11.

The aspects of the built form envelopes in the reference scheme that are most effective in managing wind, include:

- all towers are designed to have rounded corners particularly on their southern corners;
- towers are spread apart, the eastern-most tower is located along the east side of the site (this also helps manage noise);
- small breaks are located between buildings to flush pollutants but are narrow enough to ensure that courtyards remain shielded from noise;

- setbacks are located at intermediate levels on the Ross Street and Parramatta Road frontages to keep southerly wind from washing down to Ross Street;
- rounded corner designs used at the intersection of Ross Street and Parramatta Road; and
- awnings are used on Parramatta Road and Ross Street frontages.

The reference scheme demonstrates how building form, articulation and tower placement are used to manage wind impacts while maintaining development potential, residential amenity and public domain quality.

8.4.1. Wind testing of the reference scheme

The reference scheme incorporates minor adjustments from the combined option to manage wind effectively so that wind conditions at ground level do not exceed conditions comfortable for 'walking' (dark orange) as per the City of Sydney wind comfort standard, related to the Lawson comfort standards.

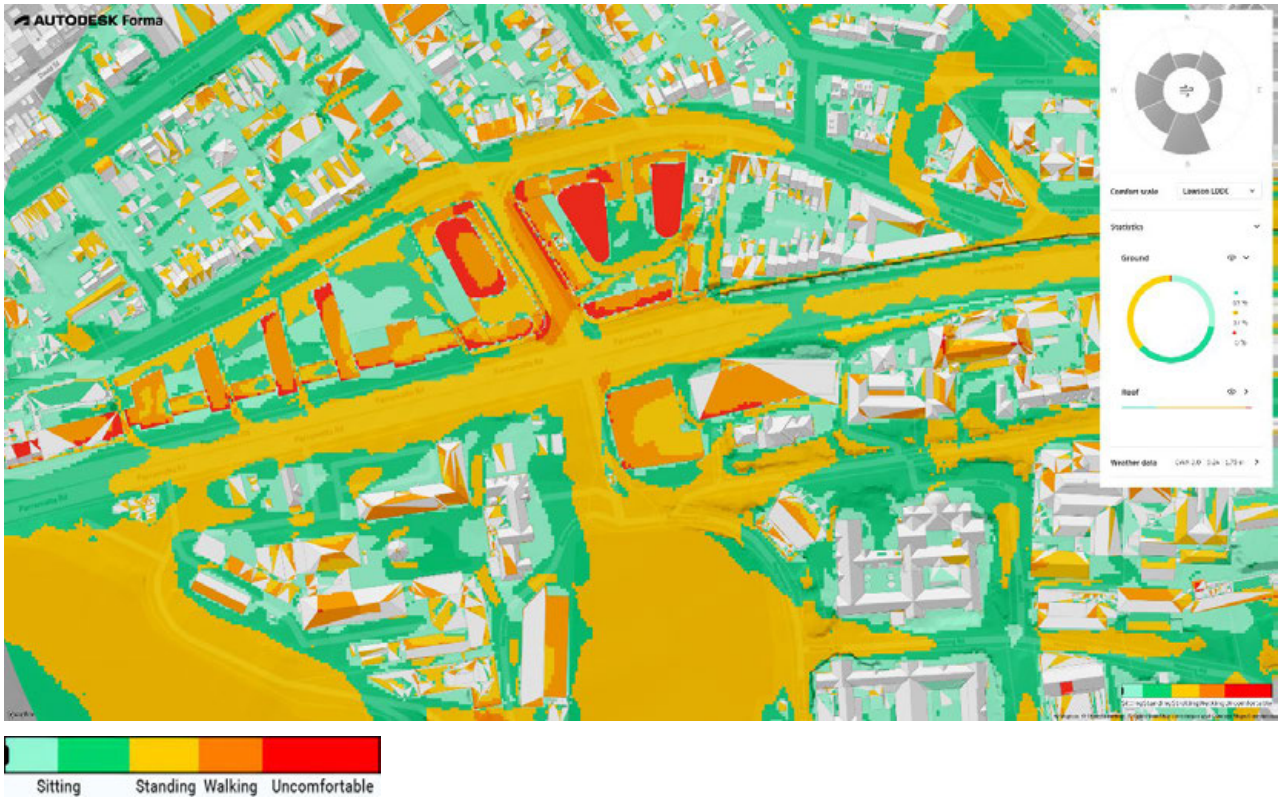


Figure 8.11. Wind performance of the reference scheme. Note that the dark red areas are either top of buildings or on top of the awnings (the ground below the awning is comfortable)

8.5. Strategy for managing noise and wind

Key urban design strategies that have been incorporated into the reference scheme to manage wind and noise have been consolidated onto the plan below. These strategies are consolidated in Figure 8.12.

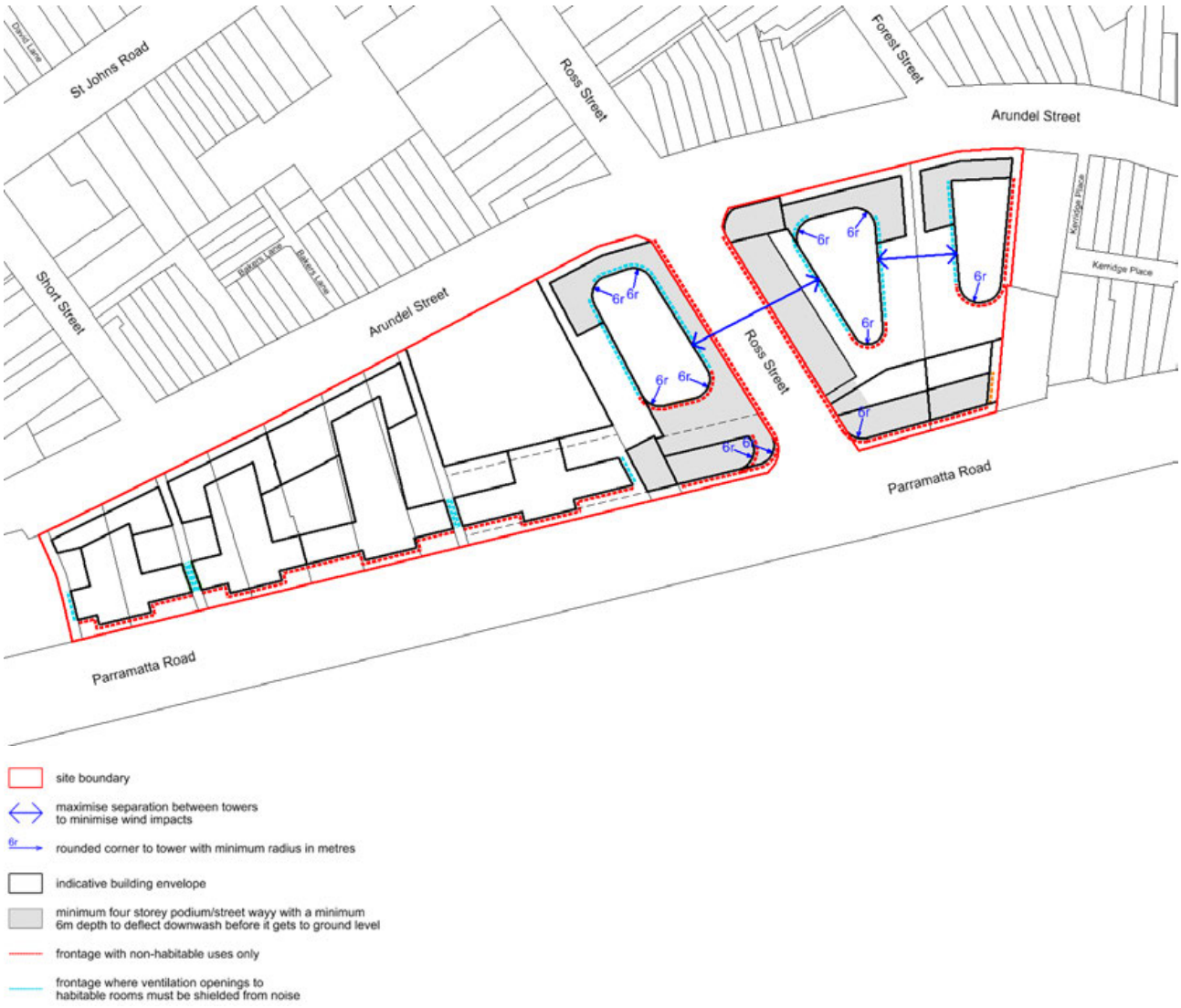


Figure 8.12. Strategies for minimising noise and wind

8.6. Strategy for managing flood affected land

The reference scheme uses a continuous flood-safe pedestrian connection along the Parramatta Road frontage through the western area that functions as both a publicly accessible address and a flood-safe access and evacuation route. This functions to allow access for all properties to a location on Parramatta Road that is accessible to emergency services including in the Probable Maximum Flood. The extent and arrangement is shown on the figures below. Figures 8.13 to 8.16 illustrate the flood-egress, conveyance and evacuation strategy.

The reference scheme also maintains flood conveyance shown hatched.



Figure 8.13 Flood affected land – strategy for flood egress and conveyance

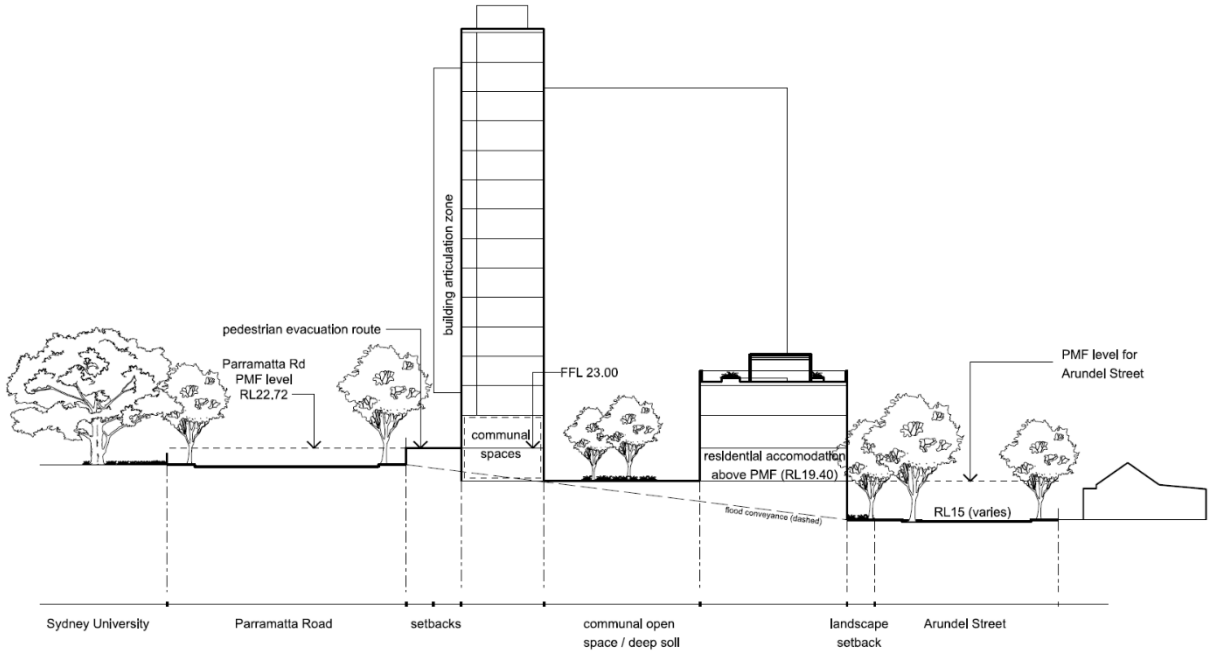


Figure 8.14. Minimum residential finished floor levels of flood affected land for the western sites.

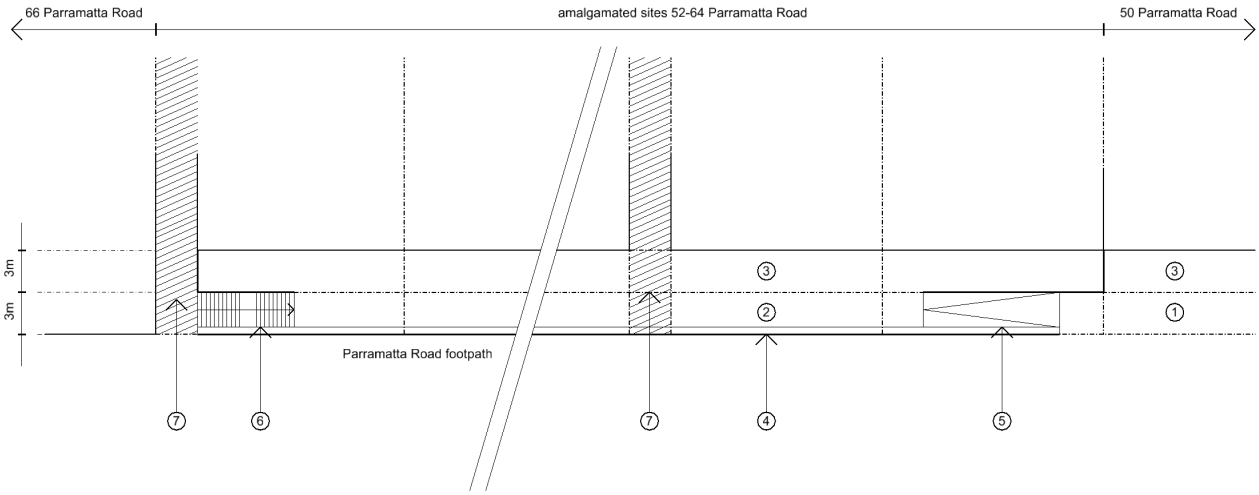


Figure 8.15. Pedestrian evacuation route – plan

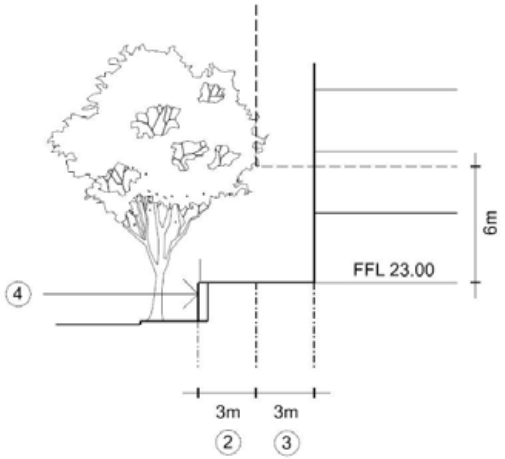


Figure 8.16. Pedestrian evacuation route – section

Key to Figures 8.13-8.16 above– (numbers in circles)

1. 3 m wide public domain footpath widening
2. 3 m wide flood-safe pedestrian evacuation route at RL 23 connecting all flood-affected land to the flood-safe access point. Constructed in accordance with the Sydney Streets Technical Specifications and Standard Drawings..
3. 3m building articulation zone - building over permitted 6 m above right of way level, for no more than 35% of the length of the building frontage
4. retaining wall - be constructed of, or faced with, natural sandstone and complement the character of Chapman Steps; and incorporate steel balustrades in accordance with the Sydney Streets Technical Specifications and Standard Drawings.
5. flood egress ramp to ground level - material and construction to Sydney Streets Technical Specifications and Standard Drawings.
6. additional access stairs - material and construction to Sydney Streets Technical Specifications and Standard Drawings.
7. Minimum 3 m wide flood conveyance corridor (matching the existing flood conveyance path) between Parramatta Road and Arundel Street. The corridor is to remain open to the sky, except where it passes beneath the flood-safe pedestrian evacuation route..

8.7. Public space dedication for footpath widening

The reference scheme includes a 3 m wide footpath widening along Parramatta Road either side of Ross Street. This land is required to ensure there is sufficient space for future public transport stop locations and associated access for people to and from the stop.



Figure 8.17. Public space dedication for footpath widening

8.8. Landscape and Deep Soil Strategy

The response seeks to maximise opportunities for tree planting and meaningful canopy cover across the area. It recognises the importance of providing sufficient deep soil areas capable of supporting mature canopy trees.

Deep soil areas are concentrated within internal courtyards and along the Arundel Street frontage. Their location responds to a combination of site dimensions, flooding, solar access requirements and surrounding neighbourhood character.

Along Arundel Street, landscape setbacks assist in creating a transition between new development and the lower scale residential neighbourhood to the north by providing opportunities for substantial tree planting.

Within the western area, the courtyard form creates significant opportunities for deep soil planting. The location and dimensions of courtyards are informed not only by residential amenity and building separation requirements, but also to accommodate meaningful landscape outcomes and mature tree growth.

The landscape response also contributes to broader urban design objectives by improving visual amenity, assisting in urban cooling, increasing canopy cover and strengthening the green character of the precinct. Together with street tree planting, internal courtyards and landscaped setbacks, the approach seeks to create a greener urban environment while supporting residential amenity and environmental performance.

8.9. Servicing

The analysis showed that both Parramatta Road and Ross Street were not suitable for vehicle access or servicing locations. The reference scheme proposes vehicle access and servicing only from Arundel Street.

8.10. Views study

The below images comprise a view study of the reference scheme discussed above. Eight views are documented from locations surrounding the site. The majority of the views are taken from pedestrian footpaths on surrounding streets. Two views are taken from inside the grounds of the University of Sydney and residential colleges, from locations that are accessible to the public. The aerial view below shows the locations of each viewpoint studied. Figure 8.18 identifies the locations of the eight viewpoints.



Figure 8.18. Aerial view of study site and its surrounds showing the locations of each viewpoint studied in the images that follow.

Note on viewing angles

For each of the following view studies, a 35mm wide angle lens was used to capture sufficient context, particularly in the short-view studies from surrounding streets in Forest Lodge and Glebe. The corresponding images of the study model use the same lens setting.

8.10.1. **View Study 1 – view from University of Sydney, Oval no. 2 (Ross St. entrance)**



Figure 8.19. General view of existing development along Parramatta Road looking north towards the site from Oval no. 2, University of Sydney.



Figure 8.20. View of the study model showing existing development along Parramatta Road looking north towards the site from Oval no. 2, University of Sydney.

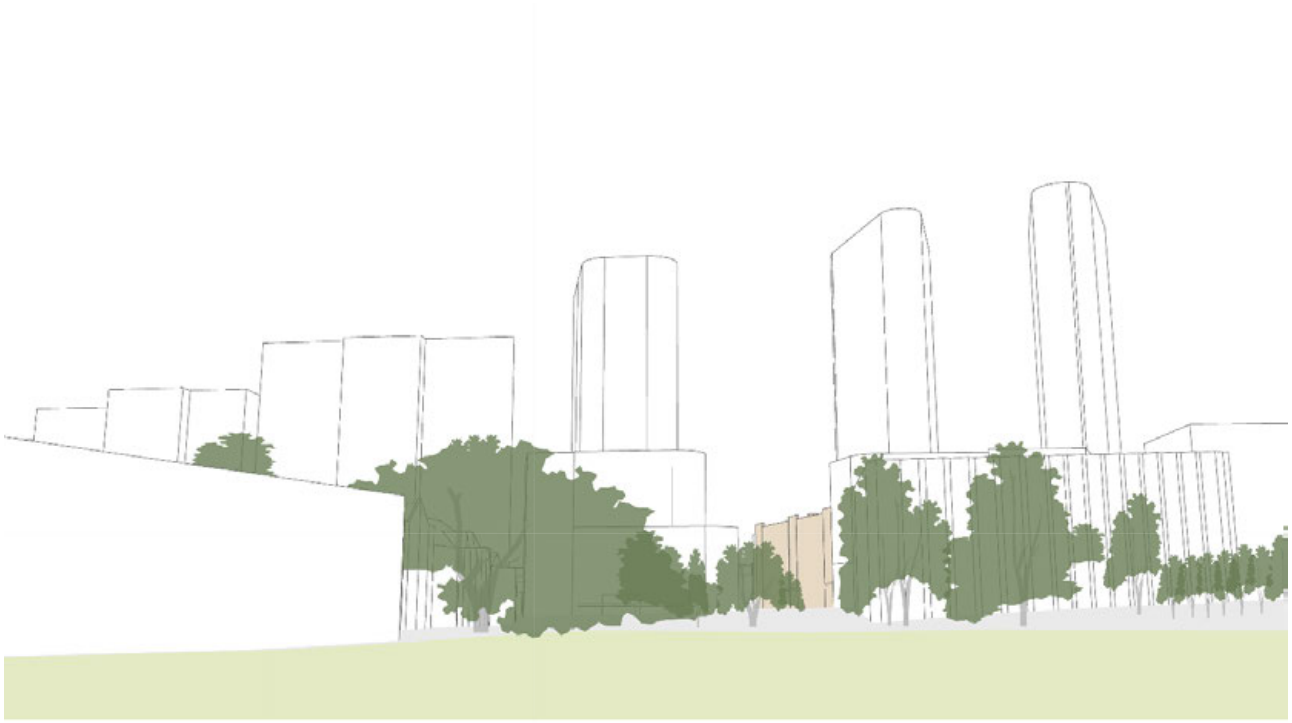


Figure 8.21. View of the study model showing the indicative reference design. In the foreground at the right appears the University of Sydney Learning Hub, currently under construction.

8.10.2. View Study 2 - view from University of Sydney, St. John’s College oval



Figure 8.22. General view of existing development along Parramatta Road looking north-east towards the site from St. John’s College oval, University of Sydney.



Figure 8.23. View of study model showing existing development along Parramatta Road looking north-east towards the site from St. John’s College oval, University of Sydney.



Figure 8.24. View of study model showing the indicative reference design looking north-east towards the site from St. John's College oval, University of Sydney.

8.10.3. **View Study 3– view from Parramatta Road, west of Missenden Road**



Figure 8.25. Street view of existing development along Parramatta Road, west of Missenden Road, looking towards the site in the background.



Figure 8.26. View of study model showing existing development along Parramatta Road, west of Missenden Road, looking towards the site in the background.



Figure 8.27. View of study model showing existing development along Parramatta Road, west of Missenden Road, with the indicative reference design appearing in the background.

8.10.4. **View Study 4 – view from Junction Street, Forest Lodge**



Figure 8.28. Street view looking towards the site down Junction Street from Bridge Street.



Figure 8.29. View of study model looking towards the site down Junction Street from Bridge Street, showing existing development.



Figure 8.30. View of study model looking towards the site down Junction Street from Bridge Street, showing indicative reference design on the site.

8.10.5. **View Study 5 – view from Short Street, Forest Lodge**



Figure 8.31. Street view looking towards the site down Short Street from St. Johns Road.



Figure 8.32. View of study model looking towards the site down Short Street from St. Johns Road, showing existing development.



Figure 8.33. View of study model looking towards the site down Short Street from St. Johns Road, showing indicative reference design.

8.10.6. **View Study 6 – view from Ross Street, Forest Lodge (at Bridge Road)**



Figure 8.34. Street view looking towards the site down Ross Street from Bridge Road.



Figure 8.35. View of study model looking towards the site down Ross Street from Bridge Road, showing existing development.



Figure 8.36. View of study model looking towards the site down Ross Street from Bridge Road, showing the indicative reference design.

8.10.7. **View Study 7 – view from Mt. Vernon Street, Glebe**



Figure 8.37. Street view of existing development along Mt. Vernon Street, looking towards the site located in the background.



Figure 8.38. View of the study model showing the existing development along Mt. Vernon Street, taken from the same position as the photo above.



Figure 8.39. View of the study model showing the existing development along Mt. Vernon Street with the reference design appearing in the background.

8.10.8. **View Study 8 – view from Catherine Street, Glebe**



Figure 8.40. Street view of existing development along Catherine Street, Glebe, looking towards the site located in the background.



Figure 8.41. View of study model showing existing development along Catherine Street, Glebe, looking towards the site located in the background.



Figure 8.42. View of study model showing existing development along Catherine Street, Glebe, with the indicative reference design appearing in the background.

8.10.9. **View Study 9 – view east along Parramatta Road from footbridge**



Figure 8.42. Street view looking east along Parramatta Road from University of Sydney footbridge, showing existing development. The study site is located in the background, at left of centre..



Figure 8.43. View of study model looking east along Parramatta Road from University of Sydney footbridge, showing existing development



Figure 8.44. View of study model looking east along Parramatta Road from University of Sydney footbridge. The indicative reference design appears in the background, behind the recently approved co-living housing at 2 Arundel Street currently under construction.

9. Recommendations

The outcomes of the urban design study including the detailed environmental testing will result in proposed planning controls for insertion in the Sydney LEP 2012 and Sydney DCP 2012. Many of the most important controls already exist in these and other planning documents including the Apartment Design Guide and Transport and Infrastructure SEPP.

Specific controls need to be added to the suite of controls to ensure that future development is consistent with the outcomes described in the reference scheme.

Additional controls should be consistent with the reference scheme and include:

- height controls in both metres (LEP) and storeys (DCP);
- additional floor space ratio controls (LEP) linked to requirements for land dedication, flood escape, contribution to affordable housing and land use mix;
- sun access planes to protect playing fields (LEP);
- built form and layout controls addressing building interfaces, wind, noise, and apartment amenity (DCP);
- landscape setbacks on Arundel Street (DCP); and
- retention of heritage significance (DCP).

Additional street tree planting is required on all the surrounding streets. This should be managed through existing tree planting programs.

CITY OF SYDNEY