

Barangaroo Concept Plan (MP06_0612 MOD 9)

Transport Management and Accessibility Plan – MOD 09

Rev C | 16 November 2021



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Job number 274378-00

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Acknowledgement of Country

We would like to acknowledge the Gadigal people who are the Traditional Custodians of this land. We would also like to pay respect to the Elders both past and present of the Eora Nation and extend that respect to all Aboriginal people.

Executive Summary

Barangaroo Concept Plan Modification 9 (MOD 9) provides a flexible approach to the future mix of land uses at Central Barangaroo comprising commercial office, retail, residential, community uses and public open space. At this stage, the actual mix of uses is not yet proposed and will be the subject of future detailed applications. For the purposes of MOD 9, this Transport Management and Accessibility Plan (TMAP) assesses the transport, traffic and access implications of the highest traffic generation scenario, which is represented by a mix of uses that optimises future potential residential use in Blocks 5, 6 and 7.

This report addresses the changes that have come about as a result of the proposed floor space modifications for Central Barangaroo as well as any changes to the future public transport plans announced by the NSW government. The report has considered the transport recommendations and findings of several key planning documents relevant to Barangaroo, those being:

- Future Transport 2056
- Barangaroo Integrated Transport Plan
- Sydney City Centre Access Strategy

Initial planning approval for Barangaroo was based on the principle of achieving high usage of public transport, walking and cycling as a method of travel to work, with a low target of 4% by car. The overall mode split targets have been retained for the whole of Barangaroo from the TMAP August 2015 (MOD 8), with the exception of train and Metro trips. The TMAP August 2015 did not consider the provision of a new Metro Station at Barangaroo. It is now forecast that the travel demand will be split evenly between heavy rail (primarily using Wynyard Station) and the Metro to Barangaroo.

The precinct maintains a high degree of pedestrian connectivity, with the Foreshore Walk providing a continuous link for pedestrians between Barangaroo Reserve and Barangaroo South. The internal streets will be designed as low speed environments suitable for high levels of pedestrian movements. The Central Barangaroo development also includes a new grade separated crossed at Hickson Road, known as the Barangaroo Steps with an overhead bridge linking Central Barangaroo to High Street, Millers Point. This will provide a grand civic connector that extends through the site in an east west direction through to a public plaza adjacent to the waterfront. Complementing this pedestrian network will be several high-quality bicycle routes, including a bi-directional cycleway on Hickson Road adjacent to the site.

The introduction of the Metro to Barangaroo will improve public transport access for people travelling to and from the precinct by providing an accessible, high capacity alternative to Wynyard Station. It will provide future workers and residents direct access to key strategic centres such as Bankstown, Waterloo, North Sydney, Crows Nest and Macquarie Park. Three main entry points to the Metro Station are planned within the Central Barangaroo Precinct at Nawi Cove, Block 7 and Block 5. This will provide users with a high capacity, high frequency public transport service integrated with the retail use.

A comparison was undertaken of the traffic modelling from MOD 8, the revised traffic generation forecasts in MOD 10 supplementary assessment, and this proposed modification (MOD 9). It was concluded that the total volume of traffic generated by the entire precinct will be slightly higher when compared with that previously assessed in MOD 8. This is due to the following reasons:

- Adjustment in traffic generation due to the increase in GFA (arising primarily from the introduction of the Metro Station and Central Barangaroo); and
- The revision in future bus numbers on Hickson Road.

A corridor traffic model was developed which assessed the future performance of the road network serving the precinct. The modelling indicated little difference in the road network performance due to the minor changes in traffic flows. The assessment concluded that the road network can accommodate this modification to the currently approved Barangaroo Concept Plan with performance remaining at acceptable levels.

Car parking is proposed at the same parking ratios as used in the MOD 8 TMAP. A reduction in the number of on-street parking bays on Hickson Road to approximately 20 spaces (down from 125) due to the road upgrade is envisaged compared to that previously considered.

1 Introduction

The Central Barangaroo Developer commissioned Arup to prepare a Transport Management and Accessibility Plan (TMAP) report to accompany a modification (MOD 9) to the currently approved Barangaroo Concept Plan (MP06_0162).

This document was prepared with reference to the amendment to the “Barangaroo Transport Management and Accessibility Plan, Request for Detailed Proposal - Barangaroo South” issued by the NSW Government in 2008 (TMAP September 2008), MOD 8 (TMAP 2015) and the MOD 10 Supplementary TMAP. Since the 2008 TMAP was prepared, there have been some changes which have implications for the precinct, including:

- Modifications to the planned floor space mix;
- Changes to the future public transport network serving the precinct, particularly the introduction of a new Metro Station at Central Barangaroo; and
- Adjustments in the road network layout (both internal and external to the site).

The main transport principles for the updated TMAPs have remained unchanged including journey to work mode share target of 4% trips by car, 19% trips by bus/light rail and 61% by Train and 4% trips by ferry.

MOD 9 provides a flexible approach to the future mix of land uses at Central Barangaroo comprising commercial office, retail, residential, community uses and public open space. At this stage, the actual mix of uses is not yet proposed and will be the subject of future detailed applications. For the purposes of MOD 9, this TMAP assesses the transport, traffic and access implications of the highest traffic generation scenario, which is represented by a mix of uses that optimises future potential residential use in Blocks 5, 6 and 7.

1.1 Barangaroo Concept Plan

The transformation of the former East Darling Harbour site into Barangaroo is Sydney’s most important waterfront renewal project in decades, regenerating a once neglected and inaccessible area of the city into a dynamic cultural, residential, business and retail hub.

Barangaroo is located on the north western edge of the Sydney Central Business District. It is bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east and a range of development dominated by large CBD commercial tenants to the south.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) - the Barangaroo Reserve, Central Barangaroo and Barangaroo South as shown in Figure 1. The Approved Barangaroo Concept Plan relates to Central Barangaroo.

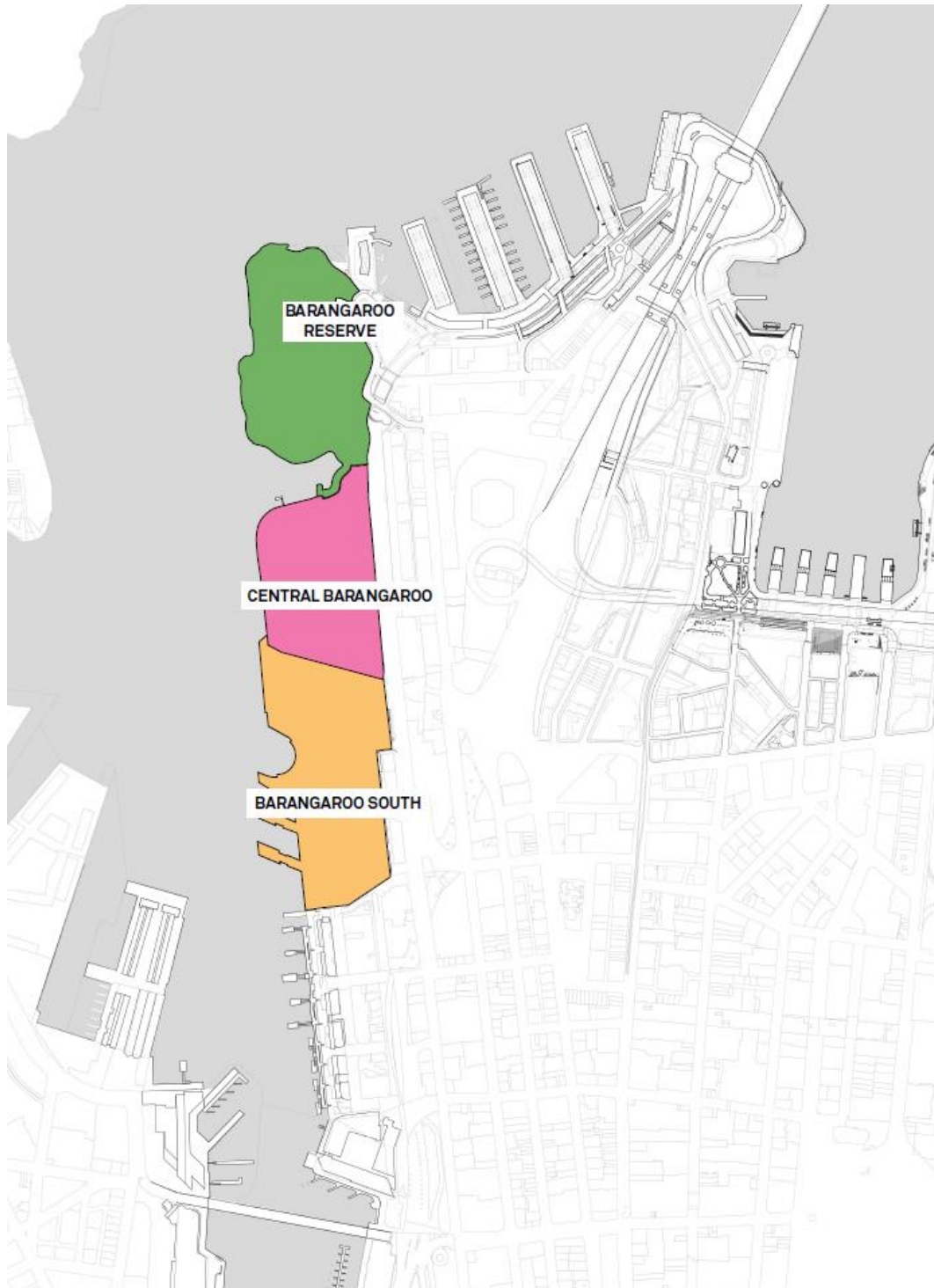


Figure 1 Site location of Barangaroo

Barangaroo’s mixed use development framework creates three connected precincts each with their own distinct character:

1. **Barangaroo Reserve.** At the northern end of the precinct, Barangaroo Reserve, has been designed and delivered as a six-hectare foreshore parkland offering spectacular panoramic harbour views, extensive walking and cycling trails, idyllic coves, unique event spaces and peaceful picnic spots.

- Barangaroo South.** To the south is Barangaroo's commercial and residential precinct featuring world class dining, retail, and premium waterfront office space. Barangaroo South includes the three International Towers, International House, Daramu House, five residential buildings, Barangaroo Ferry Wharf, the iconic Barangaroo House, and nearly three hectares of public space. It will also be home to Sydney's first six-star luxury hotel and resort, Crown Sydney Hotel and Resort, attracting thousands of visitors from overseas and around Australia.
- Central Barangaroo** is a mixed use precinct located between the Barangaroo Reserve in the north, the new financial, retail and residential address of Barangaroo South and the adjacent historic suburbs of Miller Point and Walsh Bay. As Barangaroo's keystone project, Central Barangaroo will draw together retail, commercial and residential uses with civic spaces and foreshore parklands to create its own distinct identity and become the vibrant civic and community heart of Barangaroo.

The initial environmental assessment requirements for the overall Barangaroo renewal project were issued in June 2006 (Ref MP06_0162) and the original Barangaroo Concept Plan for the redevelopment of Barangaroo was approved in February 2007, by the then Minister for Planning.

The currently approved Barangaroo Concept Plan creates a development framework of streets and development blocks that is delivering a dynamic mix of commercial, residential, tourist, retail, community and cultural uses, whilst ensuring over half of the 22 hectare site is dedicated for public open space on or close to the harbour foreshore.

The currently approved Barangaroo Concept Plan has been modified a number of times since 2007. Most recently by Modification 10 and Modification 11 and to be concluded with the proposed MOD 9 for Central Barangaroo.

1.2 Introduction to Central Barangaroo

Central Barangaroo is proposed as a dynamic mixed-use foreshore precinct that draws together and integrates high quality foreshore public spaces with city living, next generation workspace, community and cultural uses, a bustling shopping and dining precinct, all easily connected to Sydney's new metro network.

Barangaroo Station will significantly improve access for visitors, residents, workers and shoppers alike and transform how people arrive in the Sydney CBD and on the harbour foreshore. Central Barangaroo will connect seamlessly to the new metro station and create the new place to arrive in and experience the city.

Central Barangaroo comprises the remaining development blocks 5, 6 and 7 of the approved Barangaroo Concept Plan and Harbour Park connecting to the western harbour foreshore, as displayed in Figure 2. There are five main streets within Central Barangaroo, those being Hickson Road, Barangaroo Avenue, Barton Street, Street C and Street D.

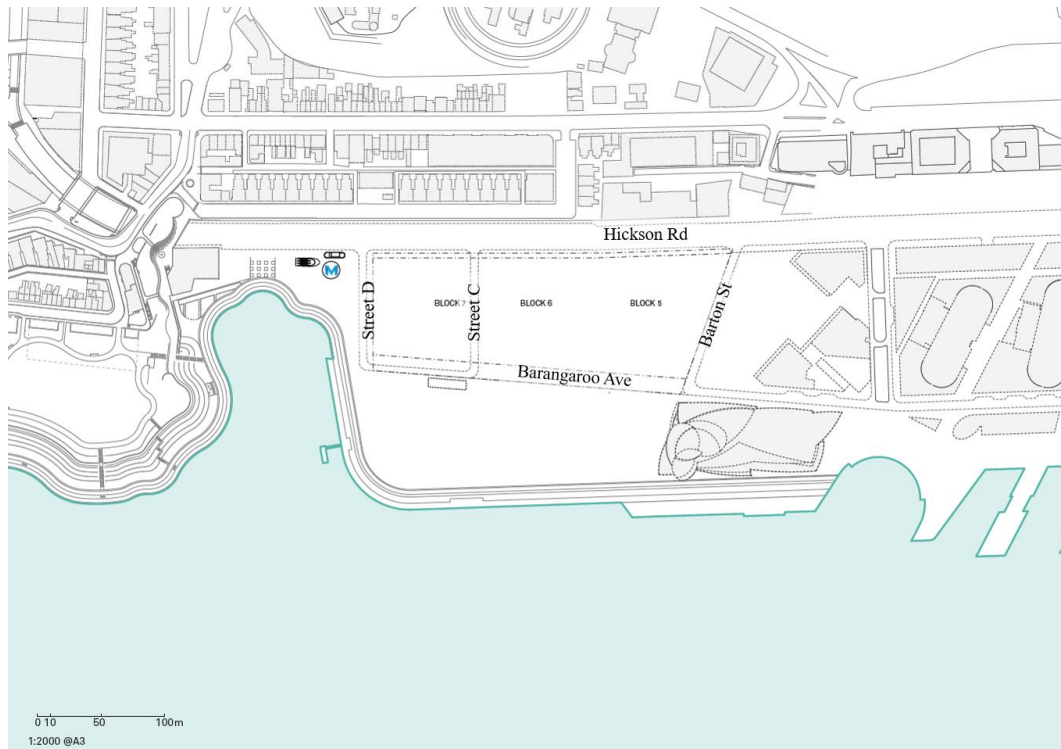


Figure 2 Central Barangaroo proposed blocks and streets

The Central Barangaroo Urban Design Report builds upon the key objectives and core principles of the SOM Master Plan Framework for Central Barangaroo to ensure the proposed built form creates an appropriately scaled visual transition between the natural setting and scale of Barangaroo Reserve and Nawi Cove, to the bustling, high rise central business district scale of Barangaroo South.

The recently completed Wulugul Walk now extends along the entire Barangaroo waterfront as a vital section of the 14km Woolloomooloo to Glebe foreshore walk. Central Barangaroo's Harbour Park will create a major western harbour public open space that seamlessly integrates with Wulugul Walk, to diversify and enhance the city's waterfront experience. To the south, Central Barangaroo will shape and activate Hickson Park as a city park and to the north, help create Nawi Cove as the new place to arrive in the city.

1.3 Planning Context

Barangaroo is a globally recognised urban renewal project of approximately 22 hectares (ha) located on the western harbour foreshore of Sydney's CBD. As Australia's first carbon neutral urban precinct, Barangaroo showcases world-class sustainability, whilst delivering extensive new foreshore public spaces on Sydney Harbour, international design excellence, the implementation of leading technologies and public art and cultural programs.

The Barangaroo Act 2009 (transferred to Infrastructure NSW on 1 July 2019) was established in March 2009 to ensure management and compliance of Barangaroo in achieving the following objectives:

- *To encourage the development of Barangaroo as an active, vibrant and sustainable community and as a location for national and global business;*
- *To create a high-quality commercial and mixed-use precinct connected to, and supporting, the economic development of Sydney;*
- *To facilitate the establishment of Barangaroo Reserve and public domain land;*
- *To promote the orderly and sustainable development of Barangaroo, balancing social, economic and environmental outcomes; and*
- *To create in Barangaroo an opportunity for design excellence outcomes in architecture and public domain design.*

Infrastructure NSW (INSW) was established in July 2011 to assist the NSW Government in identifying and prioritising the delivery of critical public infrastructure for NSW. As of 1 July 2019, INSW is the State Government agency responsible for the development of Barangaroo and management of its public spaces.

The original environmental assessment requirements for the overall Barangaroo renewal project were issued in June 2006 (Ref MP06_0162) and the original Concept Plan for the redevelopment of Barangaroo was approved in February 2007, by the former Minister for Planning.

The currently approved Barangaroo Concept Plan creates a development framework of streets and development blocks that can deliver a future mix of commercial, residential, tourist, retail and community uses, whilst dedicating approximately 50% of the 22 hectare site for new public open space. The approved Barangaroo Concept Plan has since been modified a number of times and the most recent approved modification is Modification 11 (MOD 11) to Barangaroo Concept Plan (MP06_0162 MOD 11).

The currently approved Barangaroo Concept Plan defines three distinct precincts referred to as Barangaroo South, Central Barangaroo and Barangaroo Reserve. These three precincts together form the overall mixed use development framework as approved under MOD 11 comprise the following:

- A mixed use development involving a maximum of 602,354 sqm gross floor area
- (GFA), comprised of:
 - a maximum of 191,031 sqm of residential GFA of which a maximum of 162,031 sqm will be in Barangaroo South;
 - a maximum of 76,000 sqm of GFA for tourist uses of which a maximum of 59,000 sqm will be in Barangaroo South;
 - a maximum of 34,000sqm of GFA for retail uses of which a maximum of 30,000 sqm will be in Barangaroo South;
 - a maximum of 5,000 sqm of GFA for active uses in the Public Recreation zone of which 3,500 will be in Barangaroo South; and
 - a minimum of 12,000sqm GFA for community uses.

- Approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational functions and including an approximate 2.2km public foreshore promenade.
- Built form design principles, maximum building heights and GFA for each development block within the mixed use zone.
- Public domain landscape concept, including parks, streets and pedestrian connections.
- Alteration of the existing seawalls and creation of a partial new shoreline to the harbour.
- Construction, operation and maintenance of a concrete batching plant to supply concrete for construction of future development under this approved Concept Plan at Barangaroo South.
- No approval is granted or implied for the future use of a heliport and/or a helipad.

The GFA and maximum building heights for each development block, as approved under MOD 11 are detailed below:

Table 1 MOD 11 GFA and maximum building heights

| Block | GFA (sqm) | Residential GFA (Max) (sqm) | Height (m) (Max AHD) | Height above existing ground level (m) |
|--------------|----------------|-----------------------------|----------------------|--|
| Block 1 | 1,927 | 0 | RL 25 | 23 |
| Block 2 | 197,280 | 0 | RL 180 | 178 |
| Block 3 | 129,934 | 10,515 | RL 209 | 207 |
| Block 4A | 92,629 | 91,816 | RL 250 | 248 |
| Block 4B | 21,508 | 20,637 | RL 107 | 173 |
| Block X | 18,908 | 16,463 | RL 41.5 | 39.5 |
| Block Y | 77,500 | 22,600 | RL 275 | 273 |
| Block 5 | 29,688 | 15,000 | RL 34 | 32 |
| Block 6 | 3,000 | 0 | RL 29 | 27 |
| Block 7 | 15,000 | 14,000 | RL 35 | 33 |
| Total | 587,354 | 191,031 | | |

In addition to the above, the current Barangaroo Concept Plan as approved in MOD 11 also allows for:

- a maximum of 5,000sqm of GFA for active uses within the Public Recreation zone (RE1), 3,500sqm of which is located within Barangaroo South; and
- a minimum of 12,000sqm GFA for community uses.

The Concept Plan as modified provides for a B4 Mixed Use Zone within Central Barangaroo comprising three development blocks (Blocks 5, 6 and 7) in addition to land identified for new public open space / public domain.

The Section 75W Modification to the currently approved Concept Plan for Barangaroo (MOD 9) was initially commenced in 2014 and has been recommenced in 2020. MOD 9 incorporates significant further master planning work and public consultation to realise the delivery of the final stage of the Barangaroo renewal project.

1.4 Proposed Modification to Barangaroo Concept Plan for Central Barangaroo (MOD 9)

To allow for development within the Central Barangaroo precinct and below Barangaroo Reserve, Modification 9 to the Barangaroo Concept Plan (MP06_0162 MOD 9) proposes:

- 1) An increase in total permissible **GFA** from 602,354 sqm to 708,041sqm, with the following within Central Barangaroo and Barangaroo Reserve:
 - a. up to 116,189sqm of above ground GFA within Blocks 5, 6 and 7;
 - b. up to 28,166sqm of below ground GFA within Blocks 5, 6 and 7;
 - c. a minimum of 2,800sqm of Community uses GFA within Blocks 5, 6 and 7; and
 - d. a minimum of 6,000sqm and up to 18,000sqm of Community uses GFA within the RE1 Zone of Barangaroo Reserve, to allow for future community / cultural facilities located in the Cutaway.
- 2) Modifications to Barangaroo’s **movement network** to redirect and reduce the impact of vehicular traffic and significantly improve pedestrian movement, safety, and amenity, including the removal of vehicular traffic from Block 5 and 6 and the extension of Central Barangaroo’s Harbour Park.
- 3) Modifications to the Central Barangaroo **building envelope** that allow for greater variation in building heights across Blocks 5, 6 and 7 to enable building form, massing and modulation that is responsive to context and adjusts the development boundary for Block 5.
- 4) Introduction of **Design Guidelines** for Central Barangaroo.
- 5) Consequential amendments to the **State Significant Precincts SEPP**.
- 6) Revisions to the Barangaroo Concept Plan **Statement of Commitments**.

1.5 Proposed GFA and maximum building heights

The existing and proposed GFA and maximum building heights for each Barangaroo development block, comprising Barangaroo South, Central Barangaroo and including Barangaroo public domain (RE1), are tabulated below in Table 2.

Table 2 Proposed GFA and maximum building heights

| Block | GFA (sqm) | Residential GFA (Max) (sqm) | Height (m) (Max AHD) | Height above existing ground level (m) |
|--|----------------|-----------------------------|--|--|
| BARANGAROO SOUTH - Existing | | | | |
| Block 1 | 1,927 | 0 | RL 25 | 23 |
| Block 2 | 197,280 | 0 | RL 180 | 178 |
| Block 3 | 129,934 | 10,515 | RL 209 | 207 |
| Block 4A | 92,629 | 91,816 | RL 250 | 248 |
| Block 4B | 21,508 | 20,637 | RL 107 | 173 |
| Block X | 18,908 | 16,463 | RL 41.5 | 39.5 |
| Block Y | 77,500 | 22,600 | RL 275 | 273 |
| Barangaroo South subtotals | 539,686 | 162,031 | | |
| CENTRAL BARANGAROO - Proposed | | | | |
| Block 5, 6 & 7 above ground | 116,189 | 28,000 | Block 5 & 6: RL44.5 Block 7: RL73.7 | Block 5 & 6: 42.0 Block 7: 71.2 |
| Block 5, 6 and 7 below ground | 28,166 | 0 | n/a | n/a |
| Block 5, 6 and 7 subtotals | 144,355 | 28,000 | | |
| COMMUNITY AND ACTIVE USES (RE1) | | | | |
| Community uses (in the Cutaway, located below the Barangaroo Reserve RE1 Zone) | 18,000 | 0 | n/a | n/a |
| Active uses in the RE1 Zone | 5,000 | | RL 25 | 23.0 |
| Community uses in the RE1 Zone (Central Barangaroo and Barangaroo South) | 1,000 | | RL 25 | 23.0 |
| Community and active uses subtotals | 24,000 | | | |
| BARANGAROO CONCEPT PLAN TOTAL | 708,041 | | | |

NOTE: The approved Barangaroo Concept Plan defines *Community uses* and *Active uses* as follows:

- **Community uses** include child care centres, community facilities, educational establishments, entertainment facilities (other than cinemas and amusement

centres) information and education facilities, landside ferry facilities, places of public worship, public administration buildings, public halls, recreations areas, recreation facilities (major, outdoor and indoor) and health services facility;

- **Active uses** include café kiosks, retail kiosks, pavilions, ferry ticket office, public convenience (toilet facilities) and small equipment storage spaces and the like.

1.6 Urban Design Principles for Central Barangaroo (MOD 9)

In envisioning the last phase of Barangaroo’s renewal, the urban design principles for Central Barangaroo respond to and build upon the planning, design and development guidance provided in SOM’s Master Plan Framework.

The urban design principles for MOD 9 for Central Barangaroo’s propose to:

1. Connect with the continuous Harbour Walk
2. Create major foreshore public spaces
3. Establish a new city gateway and new front doors for Barangaroo
4. Create a network of connected streets and paths
5. Create Hickson Road as the civic address
6. Optimise metro station access with new uses and activities
7. Define a distinctive, well scaled built form response
8. Create a connected, diverse and active place
9. Respect city and harbour views

Master Plan Framework Guidance Plan for MOD 9 for Central Barangaroo is displayed in Figure 3.



Figure 3 Master Plan Framework Guidance Plan (Source: SOM)

1.7 Central Barangaroo – Key Moves and Design Strategy

To realise these urban design principles, Central Barangaroo’s design strategy proposes three key integrated planning and design moves:

A. Improve the movement network and create better places

MOD 9 for Central Barangaroo proposes to improve Barangaroo’s movement network by redirecting and reducing the impact of vehicular traffic, whilst significantly improving pedestrian movement, amenity,

safety and the quality of future public spaces and places.

The key movement network and place improvements propose to:

- 1) remove vehicular traffic from Blocks 5 and 6 and enable Central Barangaroo's Harbour Park to extend eastwards between Hickson Park and Street C;
- 2) establish Barton Street as a permanent two-way vehicular connection between Barangaroo Avenue and Hickson Road, designed to redirect Barangaroo Avenue's north-south vehicular traffic, define the northern edge of Hickson Park and activate the southern edge of Central Barangaroo Block 5;
- 3) redesign Streets C and D as shared pedestrian street zones that connect Hickson Road with Barangaroo Avenue, Harbour Park and Nawi Cove; and
- 4) create a finer grain and walkable network of activated streets, laneways, public parks and urban places that offer improved movement, pedestrian safety, amenity and quality of place.

B. Increasing public open space and accessible public domain

MOD 9 for Central Barangaroo proposes to increase the overall provision of public open space to over 11 ha, an area greater than 50% of the Barangaroo precinct.

To complement this harbour foreshore public open space, MOD 9 proposes a connected network of finer grained urban spaces and places designed as part of the Central Barangaroo development blocks, to provide approximately 3,500sqm of accessible and activated public domain in three new urban spaces:

- 1) Nawi Terrace, as an elevated publicly accessible urban space, with north-facing views over Nawi Cove and west over Harbour Park;
- 2) Barangaroo Steps and a new pedestrian bridge over Hickson Road, as a linear public space connection, linking Harbour Park with High Street, Millers Point; and
- 3) Barton Plaza, as a busy urban space located at the heart of Barangaroo, where Hickson Park, Harbour Park, Barangaroo South and Central Barangaroo all converge.

C. Integrating and shaping the built form response

MOD 9 proposes amendments to the shape, form, massing and modulation of the Central Barangaroo building envelope to enable new streets, new pedestrian connections, new urban spaces and new buildings that can better respond to both context and opportunity.

The key changes to Central Barangaroo building envelope propose to:

- 1) optimise the benefits of proximity and direct access to the city's evolving metro network, via the adjacent Barangaroo Station;
- 2) establish a mixed use and multi-level development designed for easy access with Barangaroo Station, via multiple entry points and vertically integrated retail offering a platform to place experience;

- 3) increase allowable Concept Plan GFA to enable an intensity of commercial, retail, residential and community use activity, in a location with optimal access to new metro infrastructure, CBD activities and services and harbour foreshore amenity, with limited overall development impact;
- 4) allow for greater variation in building heights across Blocks 5, 6 and 7, to enable ‘city markers’ to be created that can assist legibility and wayfinding, both at the scale of the precinct and the city;
- 5) modulate building form and heights within Block 7, to increase building height on the northwest corner and reduce height in the centre and enable Nawi Terrace to be created as a north facing urban space overlooking Nawi Cove;
- 6) modulate the building form and height of Block 5 adjacent to Harbour Park and Hickson Park to create a flagship building with reduced building height and reduced building footprint, setback to create Barton Plaza as a key urban space and facilitate foreshore and city views; and
- 7) adjust the Block 5 site boundary to respond to both the reduced building footprint of the proposed flagship building and support Barton Street as a key vehicular connection between Barangaroo Avenue and Hickson Road.

Central Barangaroo’s public domain design is shown below in Figure 4.



Figure 4 Day-to-Day Public Domain Condition (Source: SOM)

2 Director General’s Requirements

The Department of Planning, Industry and Environment issued a list of the Director General’s Requirements (DGRs) which inform the approved Concept Plan Modification 9 for Central Barangaroo. Table 3 lists the DGRs that are specific to traffic and transport and accessibility.

Table 3 Transport, traffic and accessibility specific DGRs

| Item | Director - Generals Requirements | Sections addressed |
|---|---|--------------------|
| 8. Transport Management and Accessibility Impacts | Undertake an assessment of future transport needs associated with Barangaroo Central and the Headland Park, including a clear understanding of the travel task for all modes at different times of the day (peak, off-peak and other peak periods relevant to differing uses) and week; and confirmation or modification (with justification) to the AM and PM peak commute mode share targets for Barangaroo as outlined in the Barangaroo integrated Transport Plan 2012. | Sections 4 & 5 |
| | Analyse the operation of existing and future transport networks (all modes) to understand the implications for Barangaroo. The analysis of the future road network operations needs to focus on intersections in the north-west quadrant of the CBD in the vicinity of Barangaroo. In particular, address the road network in the King Street Wharf area to ensure that intersections such as Erskine Street and Lime Street and Lime Street itself are modified to cater for the different traffic demands that Barangaroo Central and the Barangaroo Reserve will bring to the network. | Section 5 |
| | Analyse car parking provision and how traffic generation (number of vehicles and time of access) will be managed in response to capacity limitations on the road network. The car parking breakdown shall identify all approved car parking numbers, and all potential car parking numbers across the whole of the Barangaroo site. | Section 6.4 |
| | Undertake a corridor model analysis of the road network, including an analysis of traffic generation and circulation, and service vehicle arrangements as a consequence of the modification; and demonstrate the potential to accommodate additional vehicular movements (including private vehicles, buses, commercial traffic and cyclists) in the surrounding road network. | Section 5 |
| | Undertake an assessment of the public transport network and associated pedestrian linkages and demonstrate that additional people movements can be accommodated by the surrounding public transport network. | Section 6 |
| | Outline late night transport provision | Section 6.13 |
| | Outline the timing and responsibility for delivering different elements of the transport network to serve | Section 0 |

| Item | Director - Generals Requirements | Sections addressed |
|--------------------------------|--|------------------------|
| | Barangaroo Central and the Barangaroo Reserve and Barangaroo in general. | |
| | Outline provisions for water-based transport and outline the potential to accommodate charter vessels, water taxis and private boats for short or long stays. | Section 6.8 |
| | Prepare a comprehensive Traffic Management and Accessibility Plan, including an assessment of all of the above matters and: <ul style="list-style-type: none"> • cumulative regional traffic impacts, including but not limited to, local and regional intersections and road improvements, and vehicular access options; • impacts from changes to Barangaroo South (MOD 8); • amendments to accommodate future bus service provision on Hickson Road (in consultation with Transport for NSW); • identify provision for taxi ranks and coach parking on site; • the timing and cost of infrastructure works and identification of funding; • package of travel demand management measures for workers, residents and visitors to the site. • emergency vehicle access arrangements; and • proposed loading dock provisions and access arrangements to loading docks and car parks. | Sections 5, 6, 7 and 0 |
| 9. Pedestrian and Cycle Access | Outline the future cycleway network and demonstrate direct cycle connections between Barangaroo Central and the strategic cycleway network as outlined in the Sydney City Centre Access Strategy. | Section 6.7 |
| | Outline provisions for walking and demonstrate provision for direct walking connections. | Section 6.6 |

3 Transport and Access Planning Framework

3.1 Methodology

The TMAP September 2008 was derived from the iterative process that commenced in 2006. This involved refinement of the Barangaroo concept and development details, establishment of the statutory planning and approvals framework, and preparation of the initial Transport concept based on investigation of various transport and access matters. The Statement of Commitments and development of the approved Concept Plan Modification facilitated the more detailed assessment of transport and access matters in a series of supporting studies including detailed Paramics modelling. These have provided the basis for the TMAP September 2008. This previous work has informed this TMAP report.

Since the TMAP September 2008 (MOD 2) was released a Transport Report was prepared in August 2015 to support the Modified Concept Plan (MOD 8). The study reiterated the transport principles outlined in the TMAP September 2008 report as a basis for the analysis of the traffic impacts for the modification. The 2015 study also considered an updated road network layout for the precinct and the likely public transport provision, including a potential Metro Station at Barangaroo and a ferry hub at Barangaroo. Mode splits were adjusted to reflect this improved public transport provision, but the 4% car mode share target was not altered at this point in time. A LinSig model was established for the surrounding road network and assessed on this basis.

MOD 8 has since been modified further by the MOD 10 and MOD 11 applications to the currently approved Barangaroo Concept Plan. Two supplementary TMAPs were prepared by JMT Consulting for each MOD.

A MOD 10 TMAP was issued by JMT Consulting on 11 December 2019 which relates specifically to Barangaroo South and was approved on 2 September 2020. This study showed that MOD 10 has an improved level of traffic flows compared to the previously assessed MOD 8 noting: *“despite the small increase in traffic associated with the additional residential GFA, this will be significantly offset by a reduction in overall bus numbers on Hickson Road and traffic generation from residential uses due to the introduction of a metro station at Barangaroo.”* No traffic modelling was undertaken.

On 22 October 2020, MOD 11 of the Barangaroo Concept Plan was approved which further amended MOD 10 for Barangaroo South. MOD 11 is a minor modification and relates specifically to Barton Street and Hickson Park and does not change GFA or building height. A transport assessment for MOD 11 was issued by JMT Consulting on 9 July 2020, which noted minimal changes in future traffic outputs compared to MOD 8. Traffic modelling was focused at the Hickson Road and Watermans Quay intersection in its current condition (i.e. no signals) with and without Barton Street.

MOD 11 is not used as the basis of comparison for the MOD 9 TMAP as it considers the temporary nature of traffic arrangements before the completion of Central Barangaroo only whereas MOD 9 is considering the end state. Therefore,

due to only minor GFA changes and negligible changes in traffic volumes above, this current report compares the comprehensive traffic modelling undertaken for the MOD 8 TMAP as amended for the MOD 10 Supplementary TMAP and GFA.

The traffic modelling methodology for this MOD 9 TMAP used the software SIDRA Network 8.0 as it is the preferred modelling tool advised by TfNSW for assessments such as these. Therefore, a network model was created in SIDRA and calibrated against the LinSig model used previously for MOD 8.

The analysis for MOD 9 considers the slightly reduced traffic generation in comparison to the MOD 8 analysis. While the conversion of Barton Street as a permanent two-way vehicular connection has not been included in the modelling for this assessment, providing an additional option for drivers to enter Barangaroo Central is not expected to adversely impact network capacity.

The configuration of Hickson Road is dependent on the Hickson Road Design Process currently being undertaken by INSW, Sydney Metro and TfNSW. Should traffic signals be supported at the intersection of Hickson Road and Barton Street as part of this process, these traffic signals would include pedestrian crossing facilities, removing the requirement for a separate mid-block crossing while promoting access to public transport as well as the walkability of the precinct thereby reducing the reliance on private vehicle transport.

3.2 Service Principles

The service principles of Barangaroo with regards to mode split targets, opportunity to create a transport hub and provide good access to public transport remain largely unchanged from that described in the September 2008 TMAP. These principles are outlined below.

- Meet the mode split targets and provide access to existing public transport bus and rail services;
- Provide access to public transport to/from the site without prejudicing the majority of existing passengers to and from the CBD;
- Provide the opportunity for integration with envisaged future public transport projects; and
- Provide safe and convenient access to all, including the mobility impaired.

3.3 Scope of Investigations

3.3.1 Barangaroo Integrated Transport Plan

The Barangaroo Integrated Transport Plan (BITP) was released in August 2012, which was prepared by a taskforce chaired by Transport for NSW and included City of Sydney, INSW, Lend Lease and other Government agencies. The plan outlines a series of transport strategies and actions to accommodate the significant employment growth in the northern CBD over both the short and long term. A selection of the recommended actions includes:

- Plan for investigation of a future bus corridor along Hickson Road in lieu of light rail;
- For Wynyard Station to accommodate the significant increase passenger throughput over the short and long term (up to 26%), prepare a costed implementation plan to upgrade the station and improve capacity;
- Investigate options to relieve congestion at the Wynyard bus interchange and increase the number of bus stops and layovers;
- Construct Wynyard Walk, City Walk Bridge and other bridges over Hickson Road as per existing planning approvals;
- Improving cycling access to Barangaroo by extending the City of Sydney's bicycle network, including upgrading existing bicycle shoulder lanes on Hickson Road; and
- Locate sufficient taxi ranks in consultation with City of Sydney, INSW and the Taxi Council.

3.3.2 Sydney City Centre Access Strategy

The Sydney City Centre Access Strategy was released by the NSW Government in December 2013 following a period of public review. The document outlines the NSW Government's key strategies for transport access to, and within, the Sydney CBD. A summary of the key elements of the strategy relevant to Barangaroo include:

- Commitment to the construction of a new ferry hub at Barangaroo South and new ferry routes to provide more opportunities to access Barangaroo via public transport;
- New bus routes to run to Barangaroo and Walsh Bay via the city centre, Napoleon Street and Hickson Road, with the major bus stop serving the precinct in the area surrounding Wynyard Station on York, Clarence and Kent Streets;
- Commitment to the completion of the Wynyard Walk bridge and tunnel which will provide a direct and accessible pedestrian connection between Barangaroo and Wynyard Station;
- Identification of new taxi rank locations within Barangaroo South;
- Commitment to the implementation of light rail along George Street through the CBD;
- Completion of the city cycleway network, including new bi-directional cycle routes on Castlereagh Street and Pitt Street and the identification of new routes into Barangaroo via the Pyrmont Bridge and Sydney Harbour Bridge cycleways;
- Upgrades to Wynyard Station including better interchange facilities for rail, bus and ferry customers at the station and at Barangaroo; and
- Improving visitor information including wayfinding and signage to CBD destinations and transport hubs in major visitor precincts such as Barangaroo.

3.3.3 Future Transport 2056

Future Transport 2056 is an update of NSW's Long Term Transport Master Plan. It is a suite of strategies and plans for transport developed in concert with the Greater Sydney Commission's Sydney Region Plan, NSW's State Infrastructure Strategy, and the DPIE's regional plans, to provide an integrated vision for the state.

A key component of the strategy is to balance the movement and place needs on the transport network. This aligns with the principles of the Barangaroo Integrated Transport Plan through the idea of keeping pedestrians and cyclists safe by implementing various measures and ensuring speed limits are reduced in areas of high pedestrian activity such as Barangaroo.

Another key component of the strategy is the concept of the 30-minute city, which is important for guiding the improvement and maintenance of access to centres across Greater Sydney. Central Barangaroo lies in the Eastern Harbour City, which is focused on achieving improved public transport, congestion management and urban renewal outcomes, supporting renewal and walkability by drawing vehicle traffic away from centres. The mix of uses proposed in Central Barangaroo, particularly housing, jobs, open space and retail, supports this concept as it allows people to work, live and play in the one precinct.

3.3.4 Sydney Metro at Barangaroo

Existing rail and ferry access to Barangaroo is achieved via Wynyard Station and Barangaroo Ferry Wharf and is supplemented by the city's bus and light rail services. The Barangaroo precinct, when complete, is projected to provide employment for up to 26,000 office workers, be home for up to 4,000 people and attract up to 33,000 visitors per day (NSW Auditor-General's Report 2011).

In June 2015, as part of the Sydney Metro City & Southwest project, the NSW Government confirmed a strategic alignment option to build a new metro station at Barangaroo, as shown in Figure 5. In November 2015, the location of Barangaroo Station was confirmed as beneath the northern end of Hickson Road in Millers Point, with pedestrian access via Central Barangaroo and Nawi Cove. The station is currently being constructed beneath Hickson Road and is due to be operational in 2024 when the City & Southwest line opens.



Figure 5 City and Southwest Metro line

The Metro Station is a key part of the city shaping metro network that will transform how people arrive in Sydney CBD. At a city scale, the 400 metre walking catchments from existing CBD rail stations and ferry wharves clearly illustrate that the historic suburbs of Millers Point and Walsh Bay are poorly served by existing rail and ferry services and largely dependent on bus services. The Metro Station will allow for better connections between these historic areas and the Sydney CBD and broader city, as shown in Figure 6.

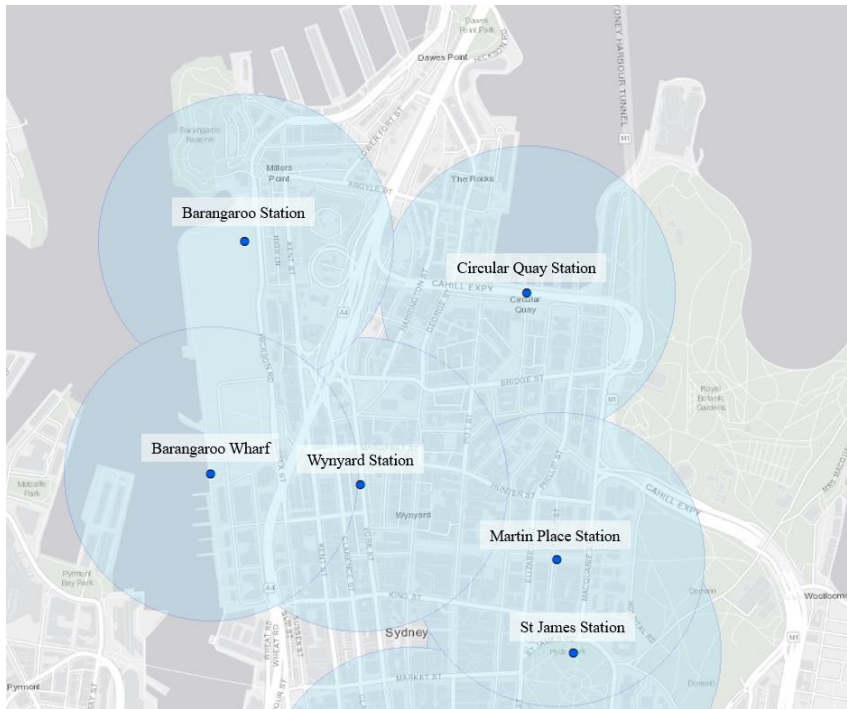


Figure 6 400 metre walking catchments from stations and wharves in Sydney CBD

The Metro Station is being constructed beneath Hickson Road towards its northern end and is scheduled to open in 2024. By 2036, Sydney Metro estimates that during peak hour, approximately 6,525 customers will exit, and 900 customers enter the Metro network at Barangaroo (Sydney Metro EIS).

The overall mode split targets have been largely retained for the Barangaroo site from the TMAP MOD 8, with the train mode percentage being split evenly between train and metro. The delivery of the Metro Station combined with the mixed-use development of Central Barangaroo is forecast to support public transport mode targets to 31% metro, 30% rail, 4% ferry and 19% bus/light rail. Whilst reflecting predominant commuter use of the Metro Station accessing employment within Barangaroo and Sydney CBD, these patronage forecasts also reflect increased accessibility to and attraction of the historic Walsh Bay Arts and Cultural Precinct and Millers Point, as well as nearby residents.

3.4 Movement and place

The Practitioner’s Guide to Movement and Place recognises that a liveable, productive and successful city requires a variety of road and street typologies that serve different roles and functions in different places. This framework is a useful tool for obtaining a greater understanding of the existing and future function of street and road networks.

Movement and place classifications are grouped into road and street typologies that have similar or shared land-use activities and user groups. The typologies provide a quick overview of how movement and place interact. Each street and road typology varies according to a modal hierarchy and provides the basis for discussions on future changes. The movement and place classification graph divides four overarching street and road typologies in a 5x5 matrix to assist with more detailed classifications (shown in Figure 7). The matrix is a useful tool for comparing the relative significance of movement and place functions particularly when the intensity of movement and place vary.

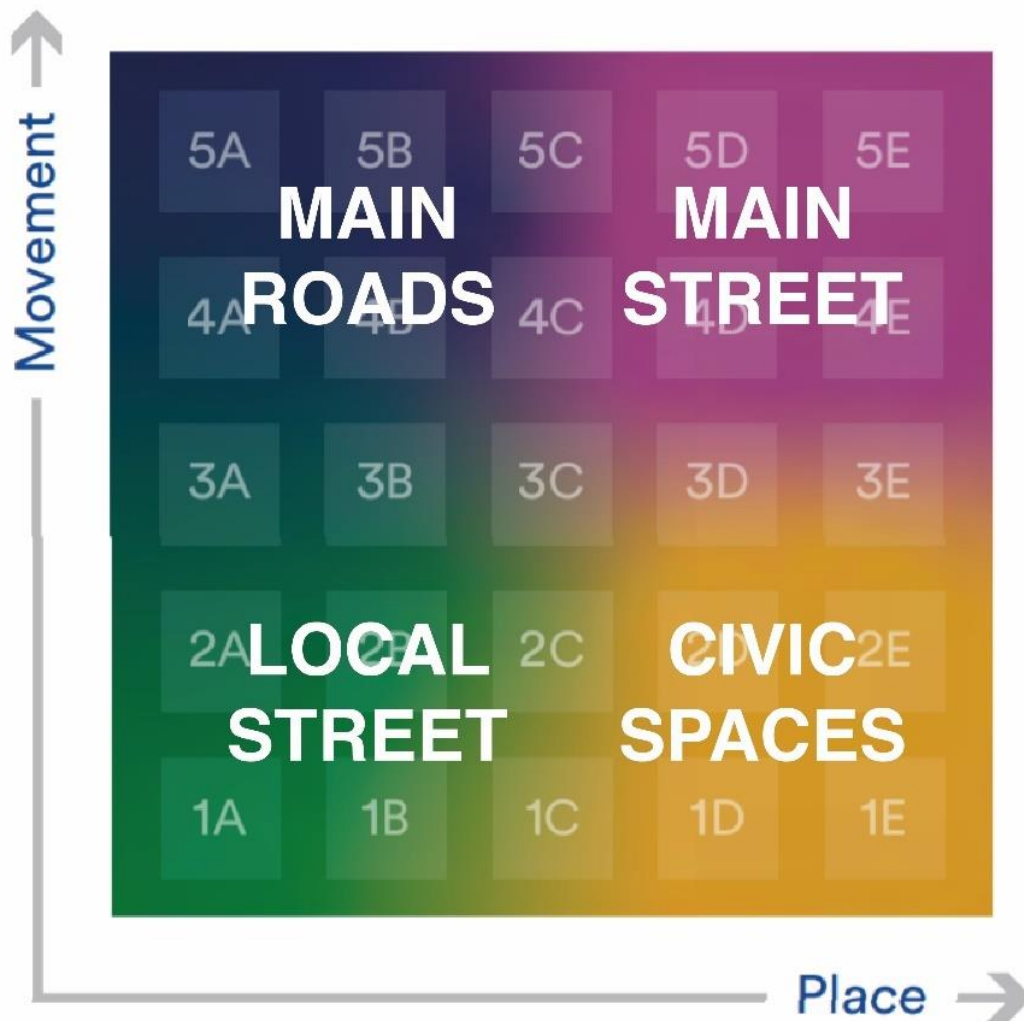


Figure 7 Four street typologies matrix within the Movement and Place Guide

3.4.1 Road and Street typologies

Through categorising streets and roads into movement and place typologies, it assists transport planners with balancing competing demands within the transport network. Ideally, major place and streetscape planning schemes succeed when improvements create positive impacts for a range of user groups. The four general road and street typologies are defined below:

| | |
|---------------|---|
| Civic Spaces | Civic spaces are streets at the heart of our communities and have a significant meaning, activity function or built environment. They are often present within our major centres, tourist and leisure destinations. These streets are often pedestrian priority shared spaces. |
| Local Streets | Local streets make up the majority of streets within our transport networks and often play important local place qualities. Activity levels are less intense; however, these streets can have significant meaning for local people. |
| Main Streets | Main streets have both significant movement functions and place qualities. Balancing the main function along these streets is a common challenge. |
| Main Roads | Main roads are routes which prioritise efficient movement of people, services and freight. They include motorways, primary freight corridors, major public transport routes, the principal bicycle network, and key urban pedestrian corridors. Place activity levels are less intense. |

4 Barangaroo Development

4.1 Total floor space

The GFA allocation per activity used to develop the trip generation for the traffic analysis is shown in Table 4 for the above-mentioned approvals and modifications of the approved Concept Plan. The proposed MOD 9 GFA uses the maximum residential GFA scenario which produces the highest traffic generation within Barangaroo.

Table 4 Total GFA for the Barangaroo Development (highest traffic generation case)

| | Commercial | Hotel/ tourist | Public | Residential | Retail/ Other Uses | Total |
|--|---------------|-------------------|-------------|---------------|--------------------------|----------------|
| MOD 8/10 | | | | | | |
| Barangaroo South | 312,109 | 48,200 | 3,598 | 151,479 | 24,300 | 539,686 |
| Central Barangaroo | 30,225 | 0 | 3,250 | 24,000 | 1,750 | 59,225 |
| Active/Community Uses | | | | | | 14,500 |
| Concept Plan (MOD 10/11) | 342,334 | 48,200 | 6,848 | 175,479 | 26,050 | 613,411 |
| MOD 9 Proposed (maximum residential scenario GFA number used – see section 5.1) | | | | | | |
| Barangaroo South | 312,109 | 48,200 | 3,598 | 151,479 | 24,300 | 539,686 |
| Central Barangaroo | 46,997 | 0 | 2,350 | 40,000* | 36,781 | 126,128 |
| Active/Community Uses | | | | | | 13,050 |
| Proposed Concept Plan (MOD 9) | 359,106 | 48,200 | 5,948 | 191,479 | 61,081 | 665,814 |
| Difference between MOD 9 and MOD 8/10 | 16,772 | 0 | -900 | 16,000 | 35,031 | 52,403 |

*While the maximum proposed residential development for Central Barangaroo is 28,000sqm GFA, the traffic model developed trip generation based on a higher 40,000sqm GFA, allowing for a more robust assessment to be provided.

4.2 Barangaroo site population

The assumptions used for estimating the population numbers are summarised in Table 5 below which combines both Barangaroo South and Central Barangaroo. These population assumptions are kept consistent with those previously utilised in the TMAP September 2008 so that a direct comparison with MOD 10/11 traffic can be made. The highest traffic generation scenario is used which involves

maximum residential GFA. These numbers do not consider the potential; implication of COVID-19.

Table 5 Barangaroo site population assumptions (Barangaroo South and Central Barangaroo)

| Land Use | MOD 8/10 GFA | MOD 9 GFA | Density | MOD 8/10 population | MOD 9 population |
|--|--------------|-----------|-------------------------------------|---------------------|------------------|
| Commercial | 342,334 | 359,106 | 1 employee / 20m ² GFA | 17,117 | 17,955 |
| Hotel/Tourist | 48,200 | 48,200 | 1 employee / 20m ² GFA | 2,410 | 2,410 |
| Public | 6,848 | 5,948 | 1 employee / 20m ² GFA | 342 | 297 |
| Retail/ Other Uses | 26,050 | 61,081 | 1 employee / 20m ² GFA | 1,303 | 3,054 |
| Sub Total – Workers | | | | 21,172 | 23,717 |
| Workers On-site per Day¹ | | | | 19,372 | 21,701 |
| Residential | 175,479 | 191,479* | 2 residents / 100m ² GFA | 3,510 | 3,830 |

*The maximum proposed population for the residential component is based on two residents per 100m². As mentioned above, for the development of the trip generation for the traffic model, this was based on a residential component of 40,000m². While it is acknowledged that a maximum of 28,000m². the increased residential component assessed allows for a more robust assessment to be provided.

4.3 Mode share targets

Initial planning approval for Barangaroo was based on the principle of achieving high usage of public transport, walking and cycling as a method of travel to work. Journey to work mode share by car is targeted at 4% which will be achieved through minimal on-site parking and promotion of travel demand management plans. These mode split targets were adopted in the Barangaroo Integrated Transport Plan.

The overall mode split targets have been retained for the Barangaroo site from the MOD 8 TMAP, noting that train and Metro trips were combined overall as train (further described in Section 6.1). From MOD 8, MOD 11 has an increase in residential GFA. A transport assessment for MOD 11 was issued by JMT Consulting on July 2020, which displays minimal changes in future traffic outputs compared to MOD 8 and is therefore expected to have a similar mode share. It is noted that the MOD 10 or 11 TMAPs did not change the mode split assumptions.

It is now forecast that the travel demand will be split evenly between heavy rail (primarily using Wynyard Station) and the Metro to Barangaroo once the Metro

¹ Consistent with previous TMAPs, it has been assumed 8.5% of workers would not be on-site on a typical day

opens in 2024, in line with the 2017 Sydney Metro Stage 1 Design Pedestrian Modelling Report prepared by Metron. The adopted journey to work mode share targets for the precinct are noted in Table 6 below. The mode of travel for the AM and PM peaks will be the same as the majority of the trips are return journeys to/from work.

Table 6 Mode Share Targets for Journey to Work

| Mode | TMAP MOD 8/10 (AM & PM peak) | | TMAP MOD 9 (AM & PM peak) | | Difference between MOD9 and MOD 8/10 |
|---|------------------------------|-----------------|---------------------------|-----------------|--------------------------------------|
| | Mode share target | Number of trips | Mode share target | Number of trips | |
| Car (driver / passenger) | 4% | 775 | 4% | 868 | 93 |
| Bus / Light Rail | 19% | 3,681 | 19% | 4,123 | 442 |
| Metro | 0% | 0 | 31% | 6,727 | 6,727 |
| Train | 61% | 11,817 | 30% | 6,510 | -5,307 |
| Ferry | 4% | 775 | 4% | 868 | 93 |
| Other (pedestrian, cyclists, motorcycles, taxi) | 12% | 2,325 | 12% | 2,640 | 315 |
| Total | 100% | 19,372 | 100% | 21,701 | 2,329 |

5 Road Network Assessment

5.1 Reference schemes

The Central Barangaroo Developer has generated a number of reference schemes to inform the preparation of the TMAP. The reference scheme producing the most future traffic around a regular AM and PM peak has been used as the basis of this report and noted as the ‘maximum residential scenario’. All calculations and modelling have been based off the maximum residential scheme within Central Barangaroo.

The maximum residential scenario involves:

- Residential GFA of approximately **28,000m²** (per Table 4) within Block 7, Block 6 and Block 5;
- Commercial GFA of approximately **47,000m²** within Block 6 and Block 5; and
- Retail and other uses GFA of approximately **36,700m²** within Block 7, Block 6 and Block 5.

A maximum commercial scenario has been tested and has a lower traffic impact for Central Barangaroo.

5.2 Traffic generation

5.2.1 Traffic generation rates

The following common assumptions have been used, consistent with those utilised in the MOD 8 TMAP:

- 1 residential unit provides an average of 100m²
- Commercial and public trips split 80% in / 20% out during AM and 80% out / 20% in during PM
- Residential trips split 80% out / 20% in during AM and 80% in / 20% out during PM
- Public use parking at Barangaroo Reserve assumed to generate at retail rate during PM peak hour and at 10% of that level during AM peak hour

Key changes to the traffic generation assumptions since the MOD 8 TMAP are mainly focused around forecast bus numbers and minor parking changes.

Forecast bus numbers on Hickson Road were previously based on a strategy developed in 2008. There is now more certainty around the number of buses using Hickson Road following the introduction of three bus routes in October 2015. Currently 12 buses in each direction during the peak hour travel along Hickson Road. As a conservative assumption, it has been assumed there will be 18 buses an hour in each direction on Hickson Road in future, which is a 50% increase

from the current situation. This is however significantly less than the predicted bus numbers assumed in the MOD 8 TMAP as supplemented by MOD 10.

The existing public transport services considered as part of MOD 9 remain unchanged from those used in the assessment of MOD 8. In particular, the introduction of a Sydney Metro Station at Barangaroo will support additional residential demand. These public transport services will provide future residents of Barangaroo a connection to key employment centres in metropolitan Sydney such as Central Station, North Sydney, Crows Nest and Macquarie Park.

The TMAP 2008 (and subsequent MOD 10/11 TMAPs) adopted traffic generation rates for the residential component of the development of 0.14 and 0.09 in the AM and PM peak hours respectively. This was based on surveys of at similar residential developments in the CBD on Sussex Street and Kent Street. An update has since been made to the TfNSW traffic generation rates guidelines (TDT 13/04a). Since similar locations such as St Leonards and Chatswood display comparable traffic generation rates to TMAP 2008, the rates have been kept consistent.

2016 Census data indicates that only 5% of residents in the northern CBD area use private vehicles as their primary mode of travel to work, which would equate to a rate of approximately 0.04 trips / dwelling. Notwithstanding this, the traffic generation rates for the surveyed site in St Leonards has been adopted in the analysis.

5.2.2 Forecast traffic generation (MOD 8/10)

Peak hour traffic generation based on the assumptions contained in the MOD 8 TMAP are shown in Table 7. This is noting that the MOD 8 is reflective of the MOD 10 traffic given there were minimal changes forecast.

Table 7 Forecast traffic generation, MOD 8/10

| 2015 Concept Plan (MOD 8/10) | | | AM Peak Hour | | | | PM Peak Hour | | | |
|------------------------------|-----------|-----------------|--------------|-------------|-----|-----|--------------|-------------|-----|-----|
| Land Use | Variable | Variable Number | trip rate | no of trips | In | Out | trip rate | no of trips | In | Out |
| Light Vehicles | | | | | | | | | | |
| Residential | Dwelling | 2,018 | 0.14 | 283 | 57 | 226 | 0.09 | 182 | 145 | 36 |
| Commercial | car space | 571 | 0.26 | 148 | 119 | 30 | 0.26 | 148 | 30 | 119 |
| Retail | car space | 48 | 0.4 | 19 | 15 | 4 | 0.4 | 19 | 4 | 15 |
| On-Street Parking | car space | 40 | 0.4 | 16 | 13 | 3 | 0.8 | 32 | 13 | 19 |
| Public Off Street Parking | car space | 300 | 0.04 | 12 | 10 | 2 | 0.4 | 120 | 24 | 96 |
| Hotel* | | | | 75 | 51 | 24 | | 213 | 147 | 66 |

| 2015 Concept Plan (MOD 8/10) | | | AM Peak Hour | | | | PM Peak Hour | | | |
|---------------------------------|----------|-----------------|--------------|-------------|------------|------------|--------------|-------------|------------|------------|
| Land Use | Variable | Variable Number | trip rate | no of trips | In | Out | trip rate | no of trips | In | Out |
| Cultural / Civic | | | | 8 | 6 | 2 | | 8 | 2 | 6 |
| Sub Total | | | | 561 | 270 | 291 | | 722 | 365 | 357 |
| Heavy Vehicles | | | | | | | | | | |
| Service vehicles | | | | 70 | 35 | 35 | | 0 | 0 | 0 |
| Coaches | | | | 4 | 2 | 2 | | 22 | 11 | 11 |
| Sub Total | | | | 74 | 37 | 37 | | 22 | 11 | 11 |
| Total traffic generation | | | | 635 | 307 | 328 | | 744 | 376 | 368 |
| <i>Public Transport (Bus)</i> | | | | 66 | 39 | 27 | | 66 | 39 | 27 |
| Total Additional Traffic | | | | 701 | 346 | 355 | | 810 | 415 | 395 |

* The hotel forecast future traffic generation is based on the Crown resort in Melbourne. See TMAP Mod 8 Appendix A for further detail.

5.2.3 Forecast traffic generation (MOD 9)

The forecast traffic generation arising from the proposed amendment to the approved Concept Plan (MOD 9) is outlined in Table 8.

Table 8 Forecast traffic generation, MOD 9

| Approved Concept Plan (MOD 9) | | | AM Peak Hour | | | | PM Peak Hour | | | |
|-------------------------------|-----------|-----------------|--------------|-------------|-----|-----|--------------|-------------|-----|-----|
| Land Use | Variable | Variable Number | trip rate | no of trips | In | Out | trip rate | no of trips | In | Out |
| Light Vehicles | | | | | | | | | | |
| Residential* | Dwelling | 2,202 | 0.14 | 308 | 62 | 247 | 0.09 | 198 | 159 | 40 |
| Commercial | car space | 599 | 0.26 | 156 | 124 | 31 | 0.26 | 156 | 31 | 124 |
| Retail | car space | 113 | 0.4 | 45 | 36 | 9 | 0.4 | 32 | 13 | 19 |
| On-Street Parking | car space | 40 | 0.4 | 16 | 13 | 3 | 0.8 | 32 | 13 | 19 |
| Public Off Street Parking | car space | 300 | 0.04 | 12 | 10 | 2 | 0.4 | 120 | 24 | 96 |
| Hotel** | | | | 75 | 51 | 24 | | 213 | 147 | 66 |

| Approved Concept Plan (MOD 9) | | | AM Peak Hour | | | | PM Peak Hour | | | |
|---------------------------------|----------|-----------------|--------------|-------------|------------|------------|--------------|-------------|------------|------------|
| Land Use | Variable | Variable Number | trip rate | no of trips | In | Out | trip rate | no of trips | In | Out |
| Cultural / Civic | | | | 8 | 6 | 2 | | 8 | 2 | 6 |
| Sub Total | | | | 620 | 301 | 318 | | 772 | 384 | 387 |
| Heavy Vehicles | | | | | | | | | | |
| Service vehicles | | | | 70 | 35 | 35 | | 0 | 0 | 0 |
| Coaches | | | | 4 | 2 | 2 | | 22 | 11 | 11 |
| Sub Total | | | | 74 | 37 | 37 | | 22 | 11 | 11 |
| Total traffic generation | | | | 694 | 338 | 355 | | 794 | 395 | 398 |
| <i>Public Transport (Bus)</i> | | | | <i>36</i> | <i>18</i> | <i>18</i> | | <i>36</i> | <i>18</i> | <i>18</i> |
| Total Additional Traffic | | | | 730 | 356 | 373 | | 830 | 413 | 416 |

* While the trip generation for the traffic model is based on 40,000 m² GFA for residential, it is understood that the maximum residential will be 28,000 m² GFA. Therefore, the traffic analysis is more robust.

**The hotel forecast future traffic generation is based on the Crown resort in Melbourne. See TMAP Mod 8 Appendix A for further detail.

5.2.4 Traffic generation comparison

A comparison of the traffic generation forecast under the TMAP August 2015 (MOD 8) as amended by MOD 10 Supplementary TMAP and the proposed modification (MOD 9) has been undertaken and is summarised in Table 9.

Table 9 Traffic generation comparison

| Time Period | Direction | MOD 8/10 | MOD 9 | Change |
|--------------|----------------|------------|------------|-----------|
| AM Peak Hour | In | 346 | 356 | 10 |
| | Out | 355 | 373 | 18 |
| | Two-way | 701 | 730 | 28 |
| PM Peak Hour | In | 415 | 413 | -2 |
| | Out | 395 | 416 | 21 |
| | Two-way | 810 | 830 | 19 |

This indicates that, under the currently approved Barangaroo Concept Plan MOD 9, the total volume of traffic generated by the entire precinct will be slightly higher when compared with that previously assessed in the MOD 8 TMAP. This is due to the following reasons:

- Adjustment in traffic generation due to the increase residential GFA (arising primarily from the introduction of a new Metro Station and Central Barangaroo); and
- The revision in future bus numbers on Hickson Road. It should be noted that the future bus numbers are less than the predicted bus numbers in MOD 8 TMAP.

It should be noted that the volume of traffic forecast under the proposed modification is commensurate with that forecast under the MOD 2 TMAP. This is important to note as the traffic modelling and road network analysis contained in the MOD 2 TMAP underpinned the development of the 4% car mode share for the site.

5.3 Peak and off-peak traffic generation

The mix of land uses proposed within Barangaroo will generate trips during both the traditional commuter peak hours (i.e. 7am-10am and 4pm-7pm) and other times of the day – e.g. lunchtime peak, evening peak and weekend peak.

Figure 8 below provides an illustration of the variation in travel task generated by the entire Barangaroo development (MOD 9) throughout a typical weekday. This demonstrates that traffic generated during the lunchtime and evening peak hours is expected to be less than that in the commuter peak hours. Evening peak hour traffic is forecast to be less than half of that the PM commuter peak hour. The Crown Sydney Hotel is anticipated to be the primary generator of vehicular traffic from the entire Barangaroo precinct in the evening peak hour. Although the casino at Crown Sydney Hotel is yet to be approved, the casino use case was considered as it will produce the highest traffic generation.

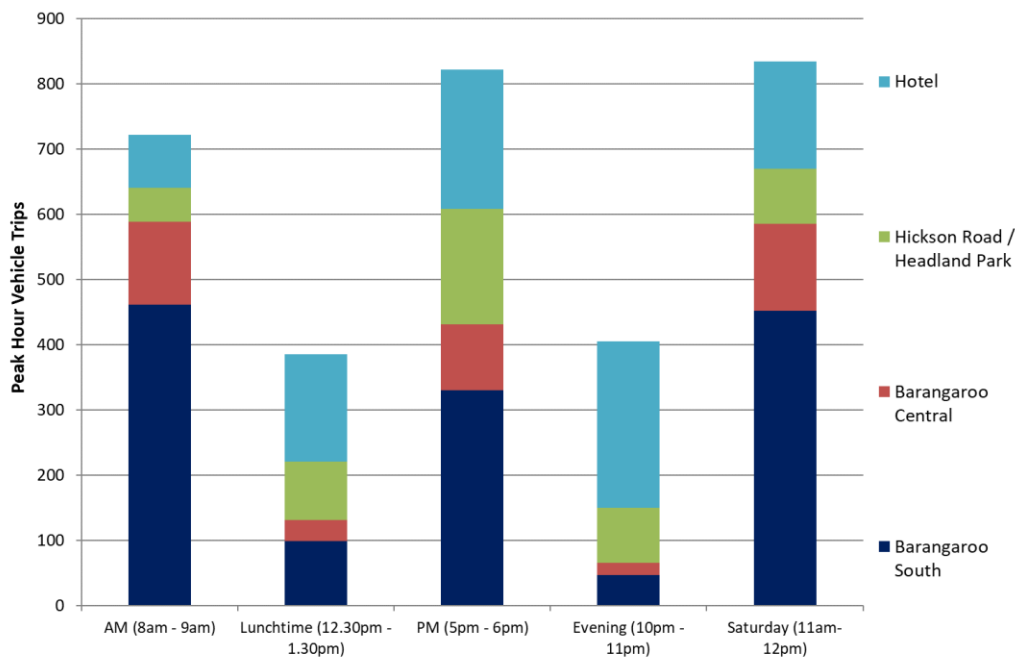


Figure 8 Peak and off-peak traffic generation

5.4 Saturday traffic

A summary of the forecast weekend travel task (during the peak hour, expected between 11am and 12pm) associated with the Barangaroo development was previously shown in Figure 8 in section 5.3. This indicates the level of traffic generated during the Saturday peak hour is comparable to that during the AM and PM weekday periods. While the traffic generated by the commercial uses at Barangaroo is reduced compared to the weekday peaks, the residential and retail uses are expected to generate higher levels of traffic movements on weekends.

The Saturday peak hour from a road network operations perspective in the Sydney CBD is not as critical when considered in the context of the level of background traffic on key roads. The figure below illustrates the volume of traffic during the respective peak hours on Hickson Road (north of Napoleon Street) adjacent to the Barangaroo site. This shows that background traffic on a Saturday is 15% lower compared to the weekday PM peak hour and 20% lower compared to the weekday AM peak hour. This is to be expected as much of the traffic on CBD streets is related to the commercial uses in nearby areas which are not operating on weekends. The difference between weekday and Saturday is smaller at off peak times. As a result, nearby intersections in Barangaroo operate with spare capacity and may accommodate the forecast levels of traffic generated by the precinct.

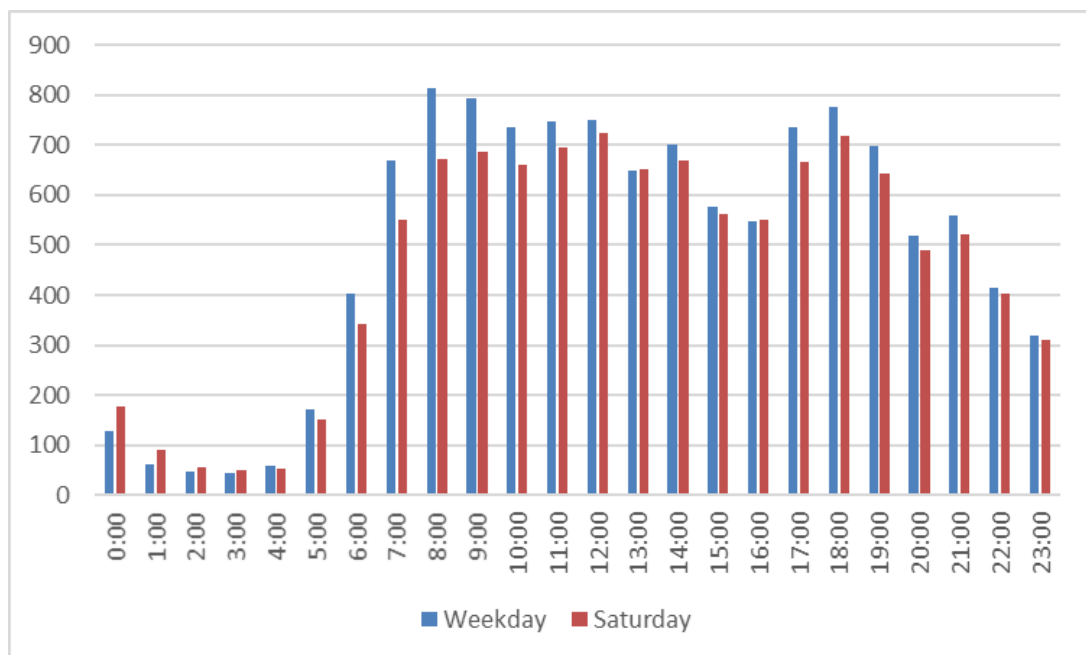


Figure 9 Comparison of weekday and Saturday traffic flows (Hickson Road)

5.5 Road Network Modelling

5.5.1 Description

The operation of the road network following the full development of Barangaroo (including the future uplift to Central Barangaroo) has been modelled using the SIDRA 8 software, as a network model.

5.5.2 Existing traffic data

Existing traffic data collected on Thursday 10 May 2018 was used as the basis of the traffic modelling. This date is still considered acceptable as the traffic data was taken prior to Covid-19, which would impact the traffic volumes. MOD 8 TMAP used traffic data from July 2013 which were broadly lower than the 2018 counts. It should be acknowledged that the base flows have been increased incrementally based on the forecasts from the Barangaroo South precinct (still progressively opening), but there have been no major development occupations apart from varying construction activity.

The data was collected at the following intersections in Barangaroo:

- Hickson Road / Watermans Quay
- Hickson Road / Napoleon Street / Sussex Street
- Sussex Street / Erskine Street
- Kent Street / Napoleon Street / Margaret Street

This survey date was outside of school holiday periods and is representative of typical weekday traffic conditions in the precinct. The identified peak hours were as follows:

- AM peak hour: 8.15am – 9.15am
- PM peak hour: 5.15pm – 6.15pm

These existing traffic counts are illustrated in Figure 10 (for the AM peak hour) and Figure 11 (for the PM peak hour).

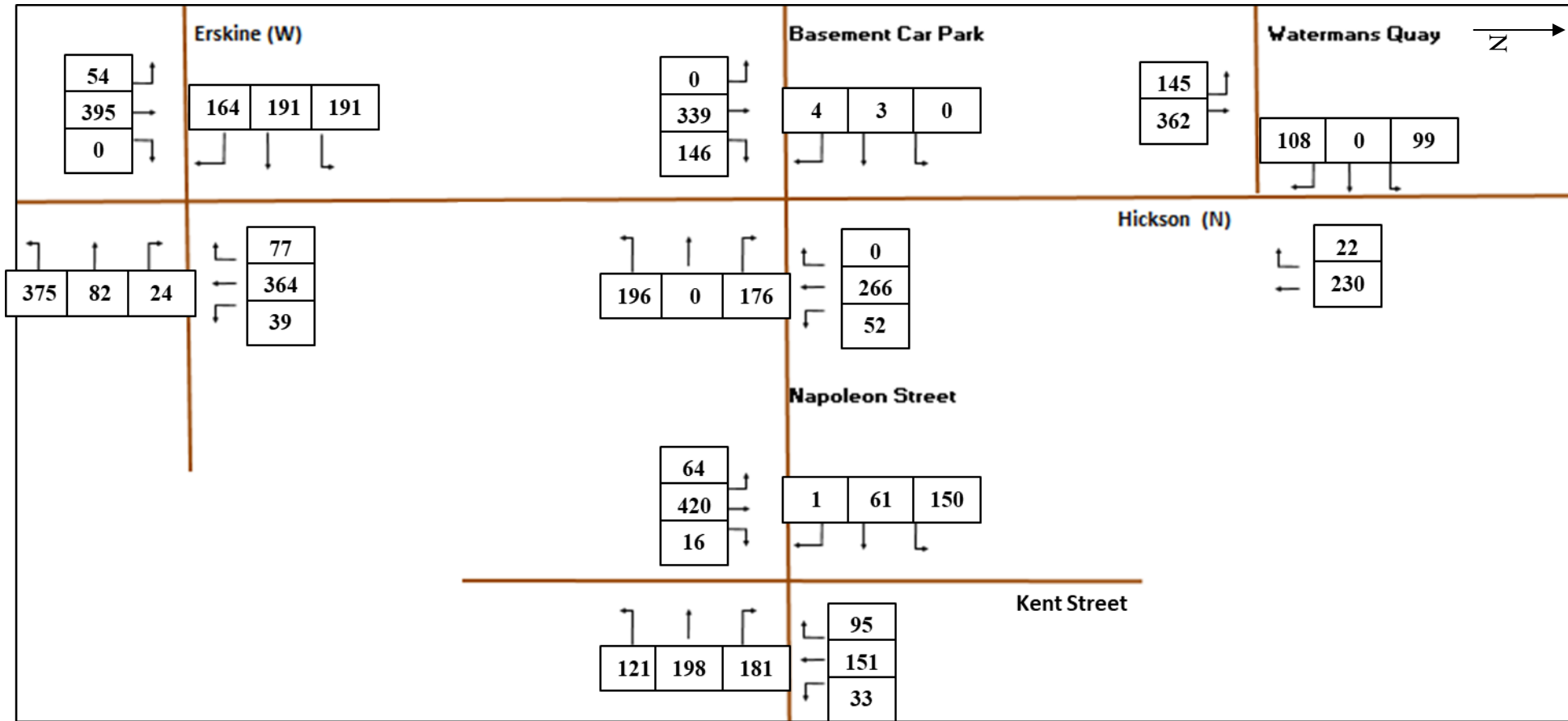


Figure 10 Existing traffic counts – AM peak hour (8.15am – 9.15am)

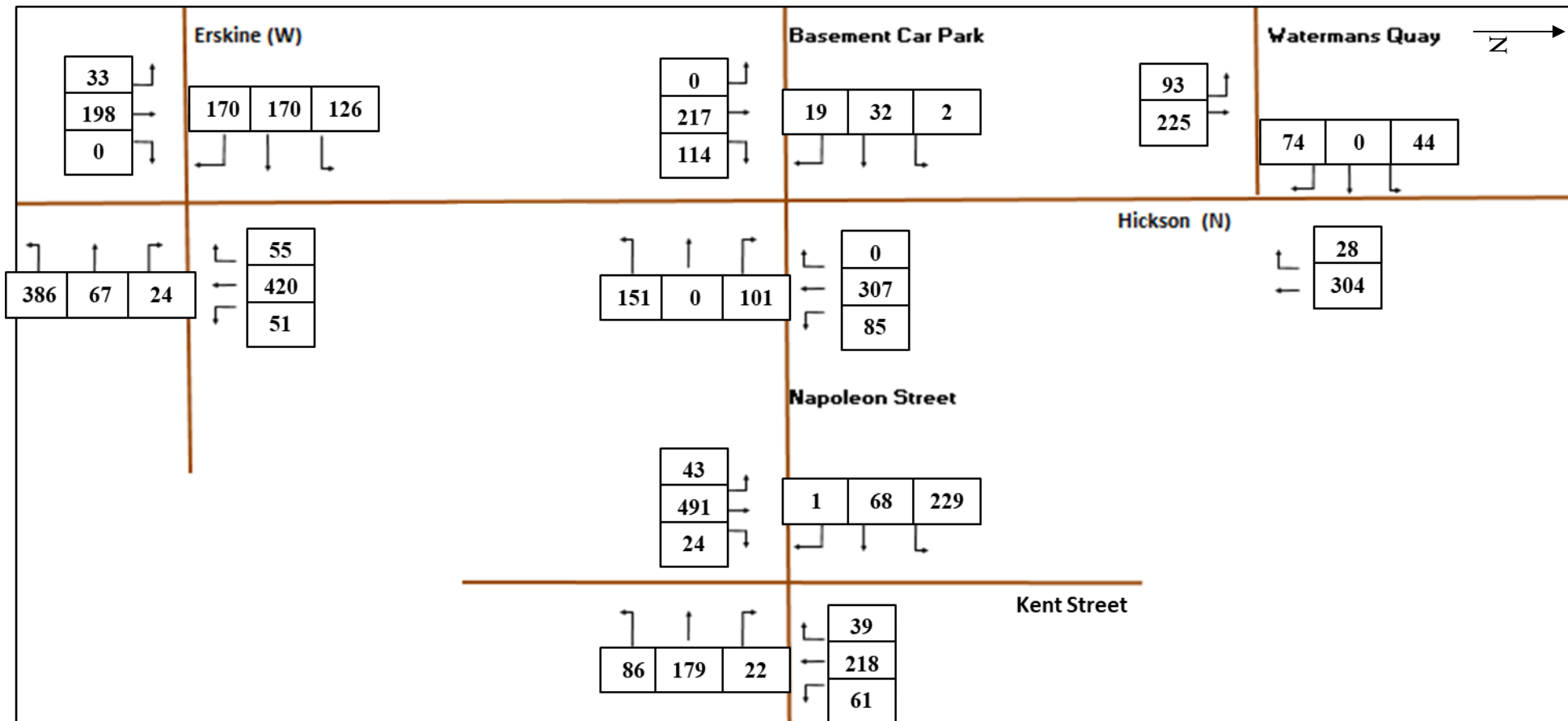


Figure 11 Existing traffic counts – PM peak hour (5.15pm – 6.15pm)

5.5.3 Traffic distribution

Traffic associated with the new development has been distributed across the road network based on Journey to Work Census data as shown in Table 10. This is consistent with the assumptions outlined in the MWT Modified Concept Plan – Transport Report, July 2008.

Table 10 Development traffic distribution

| Direction | Route | Distribution |
|--------------|---------------------|--------------|
| North | Harbour Bridge | 40.7% |
| East | Eastern Distributor | 22.9% |
| | William Street | 1.5% |
| | Oxford Street | 4.1% |
| South | Harbour Street | 8.6% |
| West | Western Distributor | 21.8% |
| Sydney Inner | - | 0.4% |
| Total | | 100% |

These key approach and departure routes are consistent with previous Concept Plan modifications and those illustrated in the in the Barangaroo Integrated Transport Plan.

5.6 Future traffic modelling

5.6.1 Overview

A corridor traffic model (using the SIDRA 8 software package) was developed to assess the future road network performance arising from the currently approved Barangaroo Concept Plan MOD 9. This modelling software allows intersections to be modelled in a single network and provides the ability to forecast future traffic conditions within Barangaroo. The corridor network modelled is shown in Figure 12.

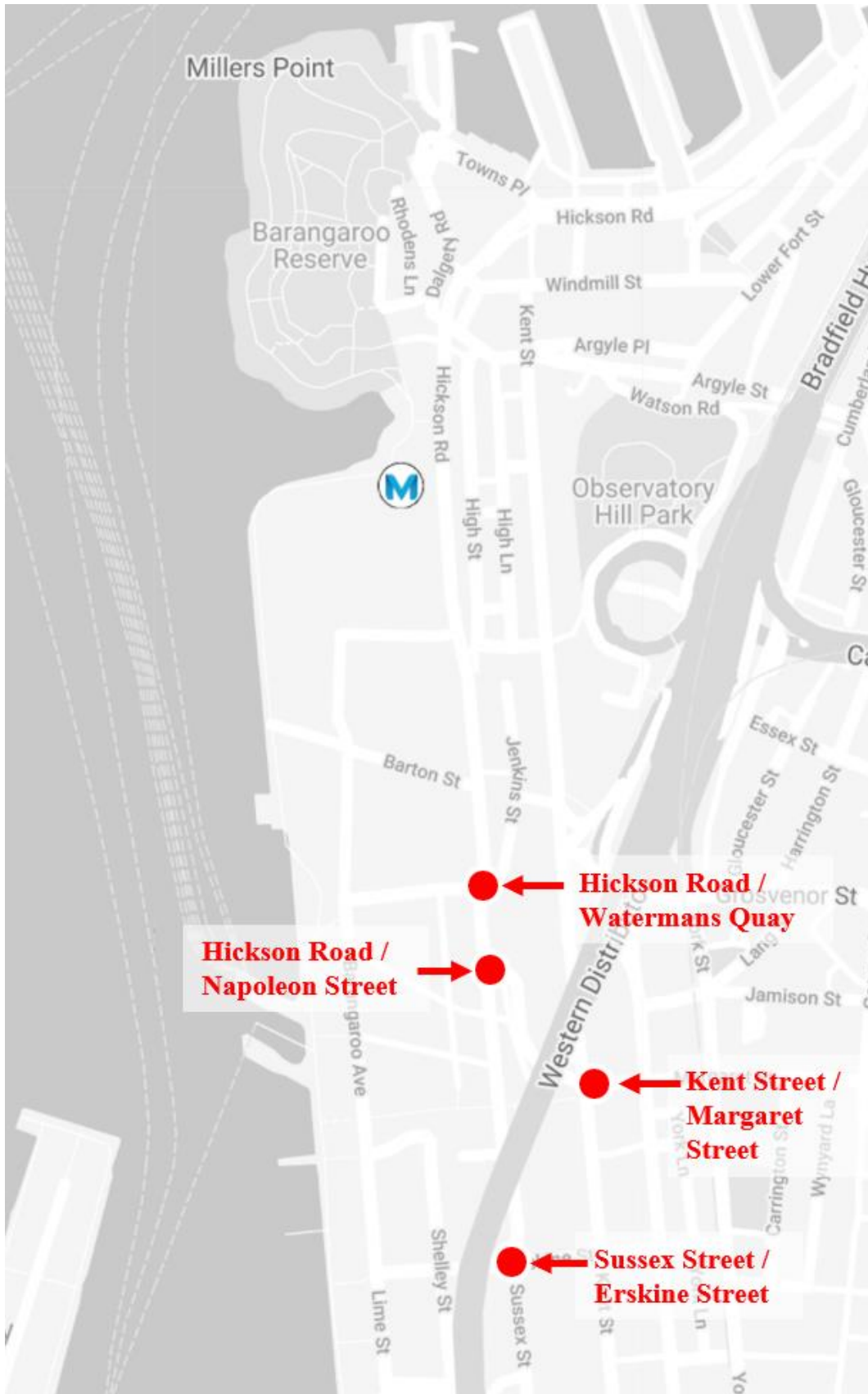


Figure 12 Road network modelled

To optimise the throughput movements within SIDRA, a southbound route was applied to the networks for both peaks to prioritise the phase times for southbound traffic along Hickson Road. In the previous MOD 8 TMAP, phase times were optimised manually.

Within the SIDRA model, the lane capacity at a number of locations was manually reduced to reflect queue spillback from downstream and upstream intersections that currently occurs during peak hours. These capacity adjustments are consistent with those previously applied in the TMAP August 2015 (MOD 8). The SIDRA flows were calibrated with the previous MOD 8 LinSig outputs by further reducing the saturation flows to emulate consistent traffic conditions.

The following capacity adjustments shown in Table 11 were applied in the model.

Table 11 Capacity adjustments at key intersections

| Intersection | Approach | Movement | Capacity Adjustment |
|---|-------------------|---------------------------|---------------------------|
| Sussex Street / Erskine Street | South | Through and left | 20% reduction (AM and PM) |
| | West | Right | 20% reduction (AM only) |
| | | Left | 20% reduction (PM only) |
| | North | Right | 20% reduction (AM and PM) |
| | | Through | 50% reduction (PM only) |
| East | Through and right | 20% reduction (AM and PM) | |
| Hickson Road / Napoleon Street / Sussex Street | South | Through | 50% reduction (AM only) |
| | North | Through and left | 20% reduction (PM only) |
| Kent Street / Napoleon Street / Margaret Street | South | Through and right | 50% reduction (AM and PM) |
| | North-west | Left | 50% reduction (AM and PM) |
| | | Through | 50% reduction (PM only) |
| | North | Through and left | 50% reduction (AM and PM) |

It is understood that Transport for NSW are currently investigating the reinstatement of a second eastbound traffic lane on Margaret Street. This lane was removed following the closure of the Kent Street pedestrian tunnel to provide additional footpath capacity on Margaret Street. This new traffic lane has not been included within the traffic model. Provision of this measure would significantly reduce the extent of queue spillback experienced in the PM peak hour for eastbound vehicles – therefore improving the operation of the Kent Street / Napoleon Street / Margaret Street intersection.

The DGRs have requested that the road network in the King Street Wharf area be addressed to ensure that intersections such as Erskine Street and Lime Street and

Lime Street itself are modified to cater for the different traffic demands that Central Barangaroo and the Barangaroo Reserve will bring to the network. Traffic distribution, as discussed in section 5.5.3, focuses generated traffic mainly onto Hickson Road, Sussex Street and Napoleon Street as the key access road. As Barangaroo Avenue is closed to vehicle traffic north of Watermans Quay, Lime Street and Erskine Street are not directly connected to Central Barangaroo and drivers are not expected to travel to Central Barangaroo these streets. On this basis, minimal impacts on the King Street Wharf area are expected from Central Barangaroo.

5.6.2 Assessment methodology

The road network performance has been measured against three parameters, those being:

- Level of Service (LOS)
- Degree of Saturation (DOS)
- Average Vehicle Delay (AVD)

The performance of intersections in an urban environment is measured in terms of its Level of Service (LOS). Levels of service ranges from A (very good) to F (over capacity with significant delays). This is described in the RTA Guide to Traffic Generating Developments as summarised in Table 12. Across the Sydney CBD road network, it is not uncommon for intersections to operate at Level of Service E or F (at capacity) during commuter peak hours.

Table 12 Intersection level of service

| Level of Service | Average Vehicle Delay (seconds) | Traffic Signals and Roundabouts | Priority Intersections ('Stop' and 'Give Way') |
|------------------|---------------------------------|--|--|
| A | < 14 | Good operation | Good operation |
| B | 15 to 28 | Good with acceptable delays and spare capacity | Acceptable delays and spare capacity |
| C | 29 to 42 | Satisfactory | Satisfactory, but accident study required |
| D | 43 to 56 | Operating near capacity | Near capacity and accident study required |
| E | 57 to 70 | At capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode | At capacity; requires other control mode |
| F | >71 | Unsatisfactory with excessive queuing | Unsatisfactory with excessive queuing; requires other control mode |

Another common measure of intersection performance is the degree of saturation, which provides an overall measure of the capability of the intersection to

accommodate additional traffic. A DOS of 1.0 indicates that an intersection is operating at capacity.

5.6.3 Scenarios considered

Two scenarios have been considered in the traffic modelling:

- (i) Operation of the road network using the land use and traffic generation assumptions from the August 2015 TMAP (MOD 8)
- (ii) Operation of the road network based on the proposed amendment to the approved Concept Plan (MOD 9), using the traffic generation assumptions detailed in Section 5.2.1 of this report

5.6.4 Future traffic flows

The future traffic flows at the intersections assessed in this study (based on the MOD 9 scenario) are shown in Figure 13 and Figure 14 for the AM and PM peak hours respectively. These traffic flows reflect full development of Barangaroo traffic under Mod 9.

It should be noted that under both scenarios, traffic generated by Barangaroo (as at May 2018) has been discounted from the overall traffic generation forecasts, as this traffic is already included in the existing traffic counts. Reductions have been applied to the volume of traffic generated by the Barangaroo South development (approximately 70% occupied as at May 2018), on-street parking in Barangaroo South and traffic from the Barangaroo Reserve car park.

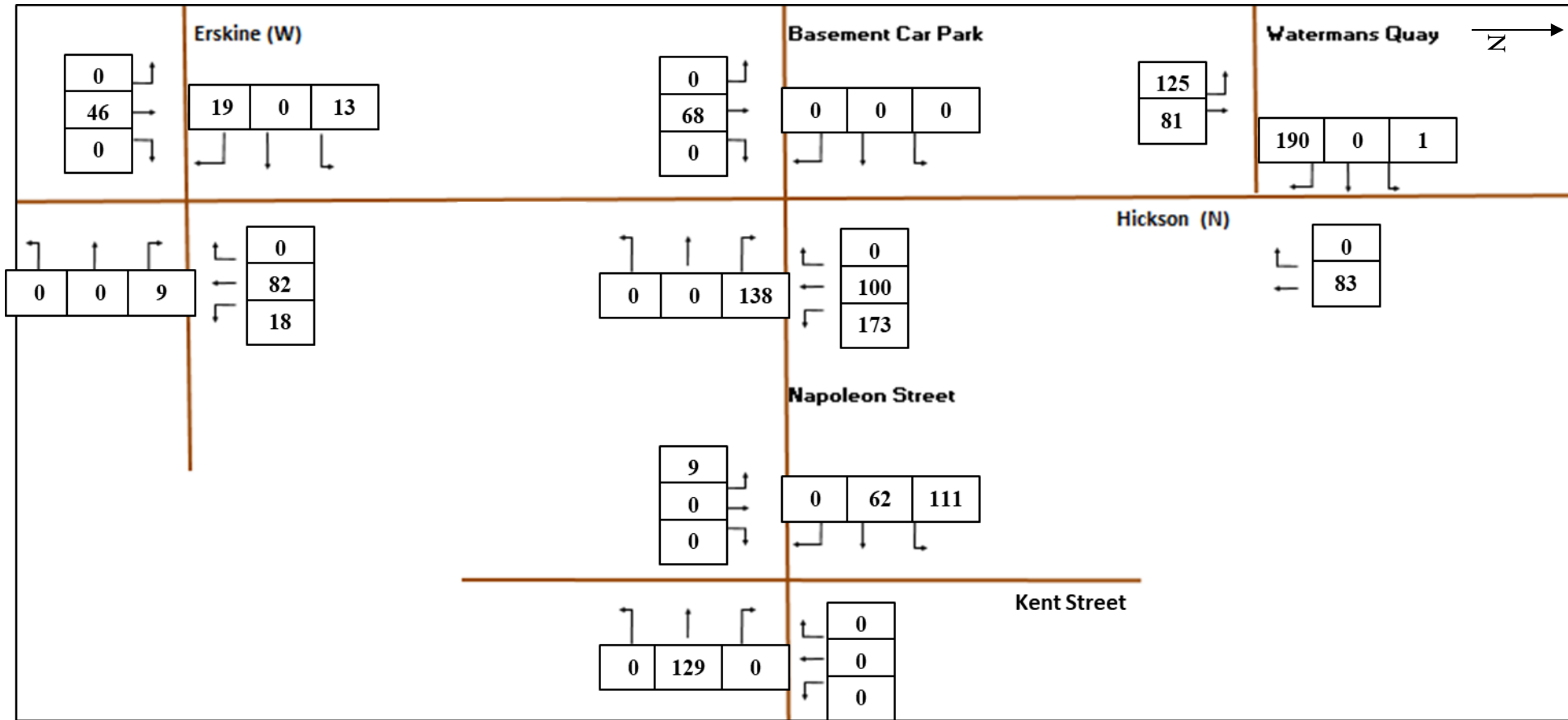


Figure 13 Forecast future (additional) development flows – MOD 9 AM peak hour

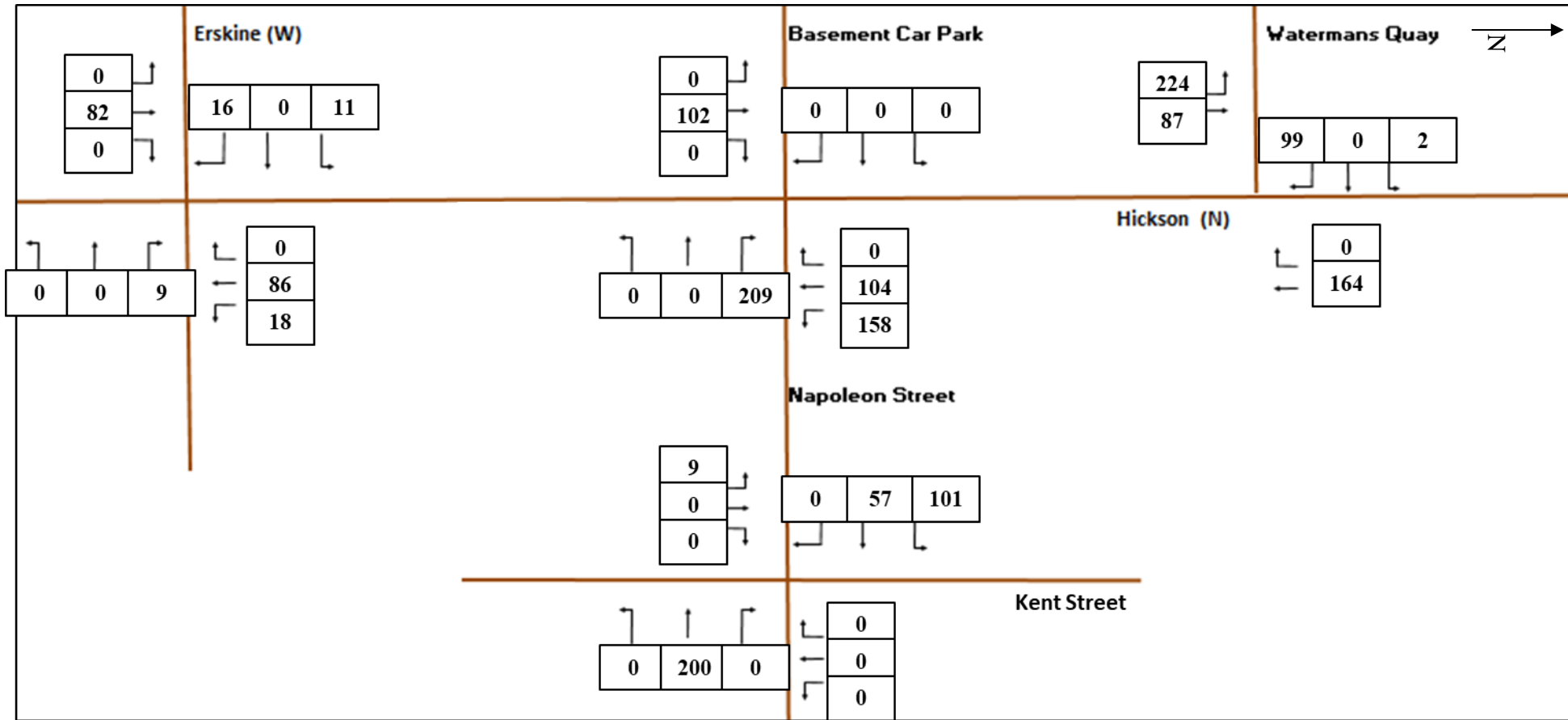


Figure 14 Forecast future (additional) development flows – MOD 9 PM peak hour

5.6.5 Intersection operation

The results of the traffic modelling as a consequence of the modification are summarised in Table 13 below. The complete traffic results are provided as an appendix to this report.

Table 13 Traffic Modelling Results

| Peak | Intersection | TMAP MOD 8/10 | | | TMAP MOD 9 | | |
|------|--------------------------------|---------------|------|-----------|------------|------|-----------|
| | | LOS | DOS | AVD (sec) | LOS | DOS | AVD (sec) |
| AM | Sussex Street / Erskine Street | B | 0.60 | 27 | C | 0.91 | 37 |
| | Hickson Road / Napoleon Street | E | 1.00 | 69 | E | 1.01 | 63 |
| | Hickson Road / Watermans Quay | B | 0.62 | 16 | B | 0.54 | 19 |
| | Kent Street / Margaret Street | B | 0.77 | 26 | C | 0.88 | 30 |
| PM | Sussex Street / Erskine Street | D | 0.97 | 55 | C | 0.94 | 42 |
| | Hickson Road / Napoleon Street | D | 0.92 | 43 | C | 0.76 | 34 |
| | Hickson Road / Watermans Quay | A | 0.47 | 11 | A | 0.81 | 14 |
| | Kent Street / Margaret Street | B | 0.75 | 23 | C | 0.90 | 29 |

LOS - Intersection Traffic Level of Service, DOS - Degree of Saturation, AVD - Average Delay per vehicle

The results of the traffic modelling forecast minimal changes in the operation of key intersections as a result of the currently approved Barangaroo Concept Plan MOD 9 when compared with performance under MOD 8 (and therefore MOD 10 and 11). Changes in vehicle delays are relatively minor in both the AM and PM commuter peak hours.

Therefore, given that these results are consistent with the previously approved TMAPs, this indicates that the road network can accommodate both development modifications with performance remaining at acceptable levels. This implies that the additional trips generated by the increase in floor space are offset by lower traffic generation rates for the residential uses and reduction in bus volumes along Hickson Road. The commercial use option is based on car spaces is assumed to be fixed, which therefore will not affect trip generation.

The DGRs require consideration of how vehicular traffic will be managed in response to capacity limitations on the road network. This investment considered the cumulative regional traffic impacts of the area. Whilst the modelling of the local road network has indicated the acceptable performance will be achieved, the intersections are approaching the capacity and the wider road network providing the connection to the precinct is generally constrained. The limited amount of car parking provided within Barangaroo, strong accessibility to public transport and

constrained road network surrounding the site effectively limits the traffic generation to be within the capacity of the road network.

6 Transport and Access Service Strategy

6.1 Sydney Metro

Sydney Metro is a major rail project connecting the Sydney CBD, the inner south-western suburbs and the north-western suburbs of Sydney. A map of the project is shown in Figure 15. It is a high capacity system, with the ability to run trains every four minutes in the peak in each direction of the line. The first stage of Sydney Metro (Sydney Metro Northwest) opened in May 2019.

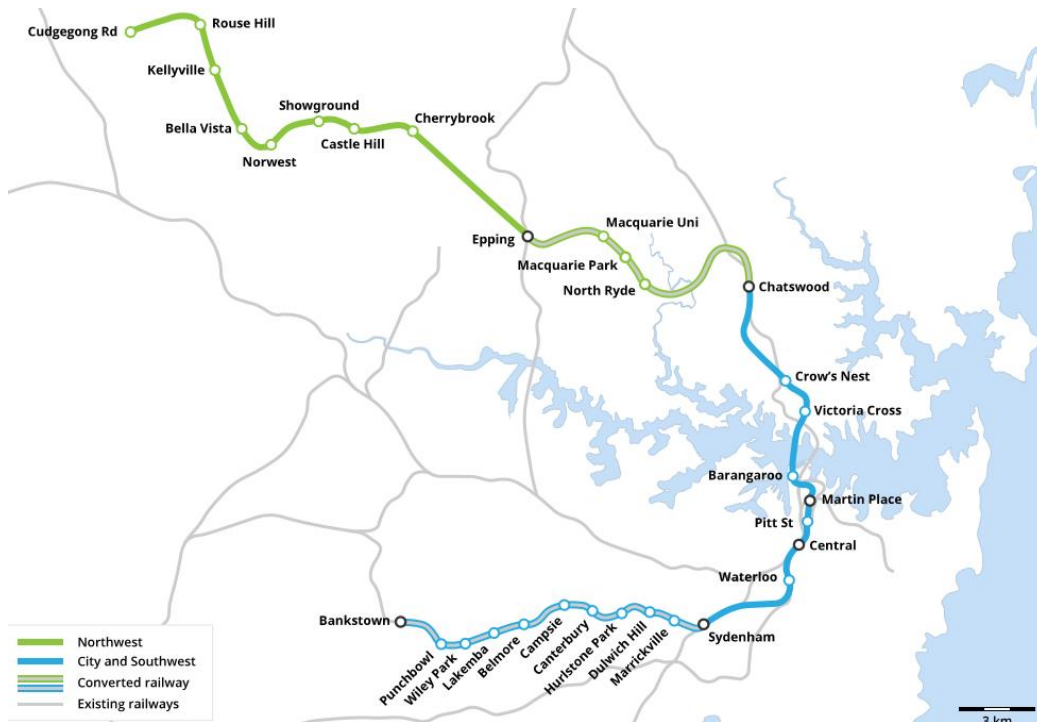


Figure 15 Sydney Metro Project

In June 2015, the NSW Government announced a new station would be constructed at Barangaroo as part of the Sydney Metro (City and Southwest) project. Based on patronage modelling undertaken by Sydney Metro, delivering a new station at Barangaroo will, in the morning peak, reduce entries and exits at both Wynyard Station and Martin Place station by approximately 5,000 passengers (NSW Government). This Metro Station will improve public transport access for people travelling to and from Central Barangaroo by providing an accessible, high capacity alternative to Wynyard Station, which can experience over-crowding during peak periods. It will provide future workers and residents direct access to key strategic centres such as Bankstown, North Sydney, St Leonards and Macquarie Park.

Sydney Metro Stage 2 (which includes the new Metro Station at Barangaroo) is currently under construction and is expected to be opened in 2024. Three entry points to the Metro Station are planned within the Central Barangaroo precinct as shown in Figure 16. This will provide convenient access to high capacity, high-frequency public transport services for workers, residents and visitors to the Central Barangaroo precinct.

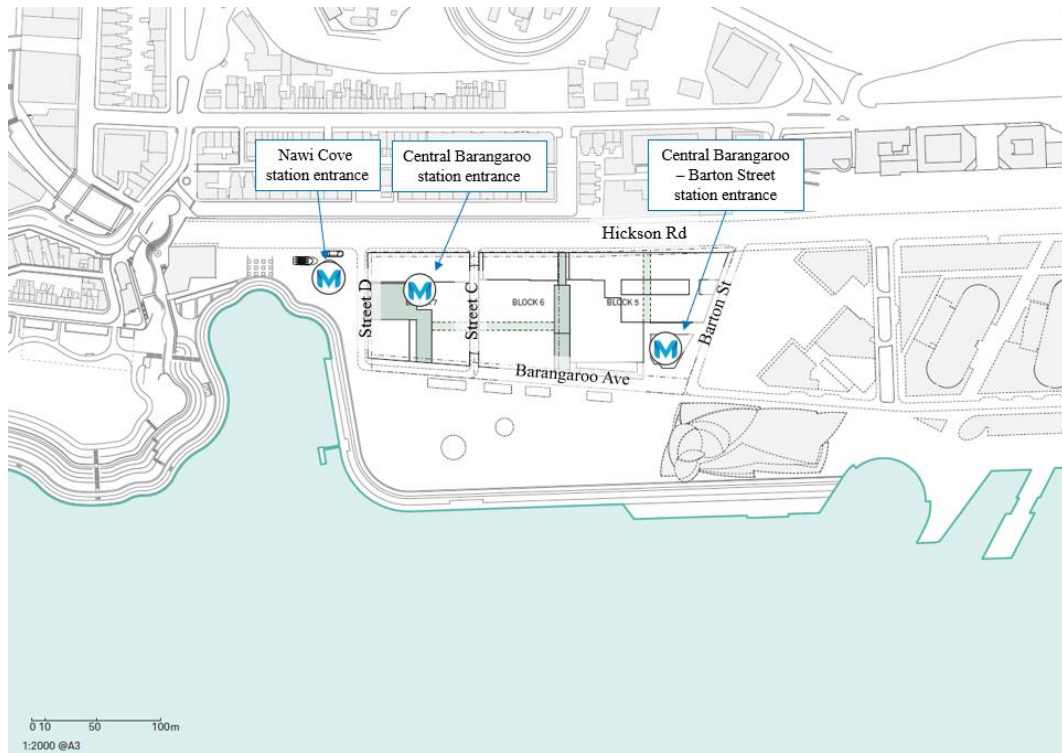


Figure 16 Indicative entry points to the Metro Station

6.2 Site access and circulation

The site access arrangements and circulation arrangements for Central Barangaroo are shown in Figure 17. Key features of the proposed scheme include:

- One-way (clockwise) vehicle circulation around Block 7. A one-way system is proposed to reduce street widths and minimise conflicts with pedestrians. This circulation route covers Street D, Barangaroo Avenue and Street C and will be shared streets where pedestrians are prioritised, which makes this loop a Civic Place in the Movement and Place classification.
- A Barton Street connection between Barangaroo Avenue and Hickson Road linking Barangaroo South and Central Barangaroo, serving the function of a Local Street in the Movement and Place classification.
- The section of Barangaroo Avenue between Street C and Barton Street will become a pedestrian priority zone making this street a Civic Place and will be used by service vehicles only during specific times.

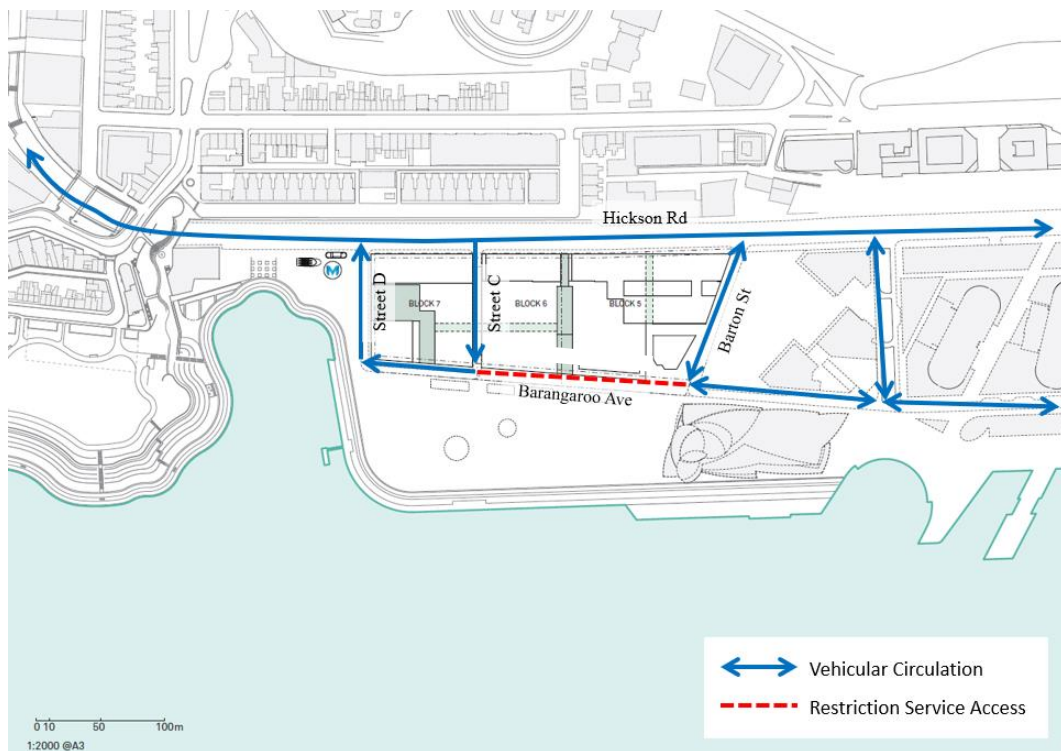


Figure 17 Central Barangaroo circulation strategy

Access to the Central Barangaroo basement car park and servicing area is proposed to be directly off Hickson Road. All turning movements will be permitted at this driveway. Internal Central Barangaroo streets are not expected to carry through traffic and will carry relatively low traffic volumes accessing the adjacent developments.

There is a planned taxi rank and Kiss and Ride area on Hickson Road for station users located between Blocks 6 and 7.

6.3 Street layouts and building access

Streets within Central Barangaroo will be designed as low speed environments suitable for high levels of pedestrian movements with a high place value and pedestrian based move level, which will create a special character unique to this precinct. They would aim to maintain clarity for pedestrian, bicycle, and vehicle movement within Central Barangaroo and to the surrounding areas, as well as waterfront pedestrian access.

The driveway access point into the basement car park will be via Hickson Road. The number of driveways will be minimised to limit the interaction between pedestrians and vehicles within the precinct. It is envisaged all turning movements will be permitted at these driveway access points, but this will be confirmed during subsequent design stages of the project (subject to a separate application).

The internal roads within Central Barangaroo will be designed to accommodate trucks up to 12.5 m in length to facilitate service vehicle requirements, as well as NSW Fire brigade aerial appliances. This will also preserve options to get trucks to/from the central event space within the public domain.

6.4 Car parking

6.4.1 Summary

This car parking analysis has been based at the same parking ratios as used in TMAP 2008 and 2015. These rates are summarised below in Table 14. The parking numbers are presented for the purposes of presenting the potential parking needs of development under the proposed Barangaroo Concept Plan MOD 9 with the maximum residential scenario. Actual parking numbers may vary from those presented in this report and will be confirmed in the relevant applications to carry out development contemplated by the proposed MOD 9.

The parking numbers presented in this section are nominal numbers extrapolated from the assumed GFA mix described in Section 3 and an indicative dwelling mix for residential uses (which may be subject to change), applying the approved car parking rates specified under the proposed MOD 9.

Table 14 Parking Rates within Barangaroo

| Land Use and Activity | Parking Rate | Parking spaces with MOD 8/10 | Parking spaces with MOD 9 |
|-------------------------------------|---|------------------------------|---------------------------|
| Commercial | 1 space / 600m ² GFA | 571 | 599 |
| Retail | Estimated on the City of Sydney LEP2012 rates for 'other' uses. | 48 | 113 |
| Residential* | Bedsitter: 0.5 spaces / dwelling 1 bed: 0.5 spaces / dwelling 2 bed: 1.2 spaces / dwelling 3 bed: 2.0 spaces / dwelling 3+ bed: 2.0 spaces / dwelling | 2,018 | 2,202 |
| Hotel | n/a | 500 | 500 |
| Hickson Road on-street parking** | n/a | 125 | 20 |
| On-Street parking within Barangaroo | n/a | 40 | 25 |
| Barangaroo Reserve parking | n/a | 300 | 300 |
| Total | | 3,602 | 3,768 |

* Based on upon the optimised residential scenario and indicative. Final residential car parking provision to be determined at a later stage of the planning process

** Based on draft Hickson Road masterplan (subject to change)

While the proposed GFA may potentially provide for more car parking on the site, this has not resulted in a significant increase in traffic generation in the vicinity of the site as demonstrated in Section 5.1.

6.4.2 On-street parking

It is envisaged only a small number of on-street parking bays will be provided within Central Barangaroo, which is in keeping with the overall strategy of reducing car dependency and enhancing the movement of pedestrians and cyclists. Public car parking is available in the 300-space car park under Barangaroo Reserve, as well as a number of other car parking areas in the precinct.

The on-street parking provided within the Central Barangaroo streets will be provided in indented parking bays for drop-off of passengers and disabled parking. The anticipated that approximately six car parking spaces are accommodated on-street. All on-street spaces are likely to be for short stay purposes only, aligning with restrictions that have been implemented in the wider precinct.

There is also some on-street parking expected to be provided on Hickson Road. Previous planning for Barangaroo envisaged approximately 100 to 125 parallel parking spaces between Napoleon Street and Towns Place. With the latest Hickson Road upgrade master plan it is expected this number will be reduced to approximately 20 spaces.

6.4.3 Loading and servicing

Access to loading docks, temporary tradesman parking and servicing areas will be provided from Hickson Road the basement levels of Block 6 and at specific times along the pedestrian priority zone along Barangaroo Avenue between Street C and Barton Street. Internal turning facilities would be provided to enable large refuse vehicles and delivery/removalist vehicles to enter and leave in a forward movement. As per the Statement of Commitments for the approved Concept Plan:

- All building servicing & loading facilities are to accord with City of Sydney Council's rates
- All service/delivery areas to accord with AS2890. 2:2002 subject to driveways complying with City of Sydney Council's requirements

Loading and servicing will be provided 24 hours a day in the basement for the retail tenants within Central Barangaroo.

6.5 Hickson Road

Hickson Road will be a two-way street connecting Central Barangaroo with the broader Sydney CBD street network. Pedestrian movement corridors will be predominately located to the west of the street and aligned with the new development blocks of Central Barangaroo. Pedestrian crossings will also be provided throughout the street to allow for east-west movement. Hickson Road will be a traffic environment suitable for cyclists with a bi-directional cycleway and include well integrated and discrete areas for bus stops, taxi drop-offs and parking. The materiality of Hickson Road will build on the existing City of Sydney material palette.

6.6 Pedestrians

6.6.1 Pedestrian expected flows

A high-level pedestrian analysis was undertaken of the main south-north pedestrian corridors being Hickson Road and Barangaroo Avenue to ensure Central Barangaroo could appropriately cater for future flows without reaching a high level of congestion. The width of the footpath was applied to the pedestrian flows to calculate the flow rate and Level of Service, as shown in Table 15. The flows consider the entire width of Barangaroo Avenue as it is fully pedestrianised however only the width of the western side of Hickson Road. Both streets display a Level of Service of B, which are acceptable walking conditions.

Table 15 Level of service for 2056 AM Peak Metro passenger demand

| | Percentage split | Flow (pedestrian/minute) | Width of footpath | Flow rate (pedestrian/minute/metre) | Level of Service (walkways) |
|-------------------|------------------|--------------------------|-------------------|-------------------------------------|-----------------------------|
| Barangaroo Avenue | 75% | 270 | 9m | 30 | B |
| Hickson Road | 25% | 90 | 4m | 22.5 | B |

The pedestrian movement was evaluated by measuring the density of people over the peak minute. The density was banded into Levels of Service proposed by John J. Fruin (1971), which describe the comfort and freedom of movement of individuals experiencing different densities. The levels of service density thresholds are shown in Table 16, and generally described in Figure 18.

Table 16 Fruin Level of Service Thresholds

| Level of Service | Flow rate (pedestrians/minute/metre) |
|------------------|--------------------------------------|
| LoS A | 0 – 23 |
| LoS B | 23 – 33 |
| LoS C | 33 – 49 |
| LoS D | 49 – 66 |
| LoS E | 66 – 82 |
| LoS F | > 82 |

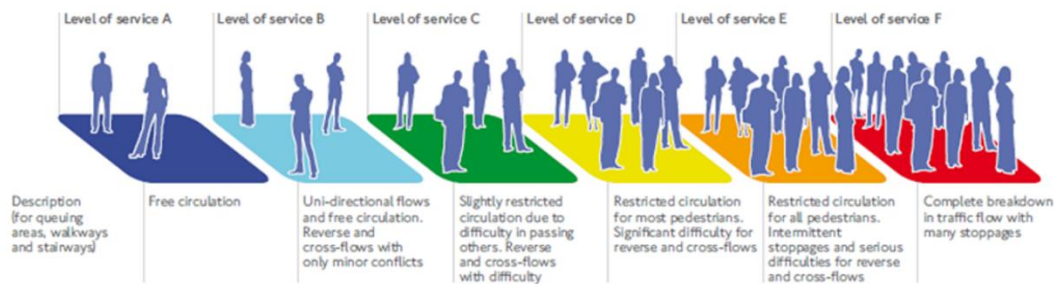


Figure 18 Fruin Level of Service

The peak pedestrian flows within Barangaroo Central are expected to occur during the peak passenger demand at Barangaroo Station. These flows were obtained from the 2017 Sydney Metro Stage 1 Design Pedestrian Modelling Report prepared by Metron. During 2056, the AM peak minute passenger demand is estimated to be 360 people per minute departing from the southern exit as shown in Figure 19. PM peak flows were substantially smaller than the AM peak flows and therefore these were not analysed in detail.

All people exiting the north access point are assumed to be heading north and not crossing Central Barangaroo, and therefore have not been considered. Passengers entering Barangaroo have been discounted for as they are negligible compared to the exiting flows.

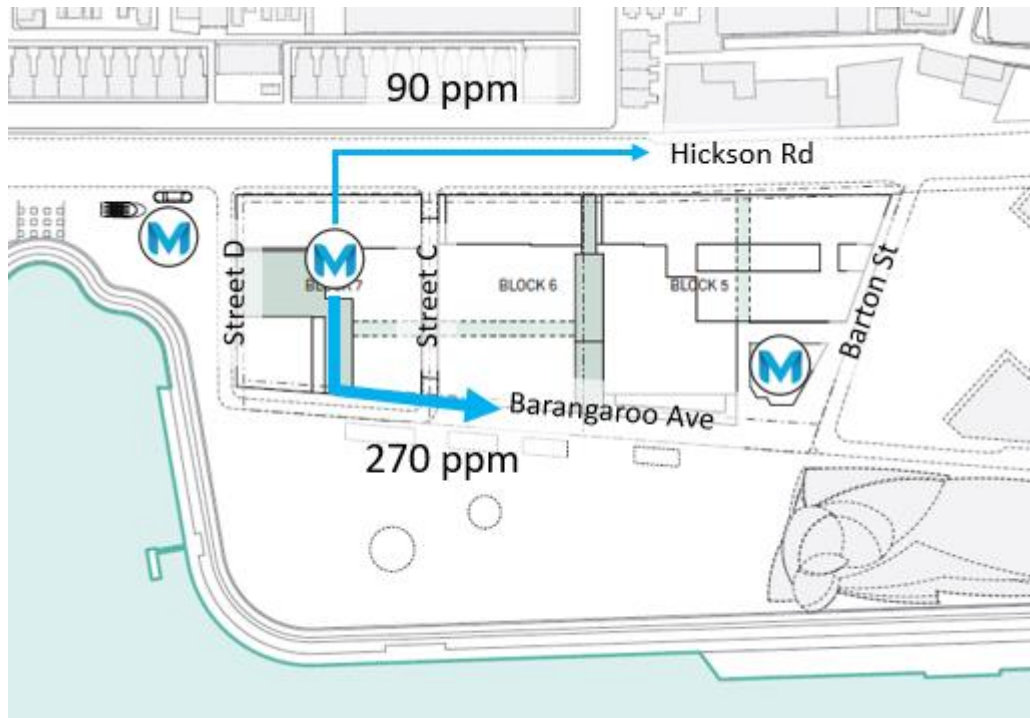


Figure 19 Predicted pedestrian flows based on Sydney Metro analysis

Over 85% of commercial GFA is at Barangaroo South so it is expected that the future AM flows will mostly affect Hickson Road and Barangaroo Avenue as they provide a direct pathway to the south. A percentage split of the pedestrian movements was applied to both streets. This was estimated through predicting commuters' route choice by understanding the location of commercial lobbies.

Barangaroo Station is scheduled to open in 2024 prior to the opening Central Barangaroo. Only the north metro entrance will open initially and passengers heading to Barangaroo South will only be able to travel along Hickson Road. An estimation has been made within this report that 2024 peak passenger movements will be half of that in 2056. This is assumed because the commercial GFA of Central Barangaroo is excluded and there will also be restricted access between Barangaroo South and Barangaroo Station since Central Barangaroo will not be open at this stage, which in turn is expected to cause more of a preference for commuters to use Wynyard Station. With 180 pedestrians exiting Barangaroo Station per minute, Hickson Road will experience a Level of Service of C, as shown in Table 17. This density is an acceptable walking condition for Hickson Road.

Table 17 Level of service for 2024 AM Peak Metro passenger demand

| | Percentage split | Flow (pedestrian/minute) | Width of footpath | Flow rate (pedestrian/minute/metre) | Level of Service (walkways) |
|--------------|------------------|--------------------------|-------------------|-------------------------------------|-----------------------------|
| Hickson Road | 100% | 180 | 4m | 45 | C |

6.6.2 Pedestrian accessibility

A number of pedestrian connections are proposed to service the Central Barangaroo precinct. This includes a widened pedestrian footpath on the western side of Hickson Road, as well as a permeable internal pedestrian network within Central Barangaroo which provides connections to Barangaroo South. This includes the wide Wulugul foreshore walk which connects Barangaroo Reserve and Central Barangaroo to the south to Darling Harbour via King Street Wharf and Barangaroo South.

Formal pedestrian crossings are provided at the Hickson Road / Napoleon Street intersection, as well as the future signalised Hickson Road / Watermans Quay intersection and Hickson Road / Barton Street intersection.

MOD 11 Supplementary Transport Assessment estimates that Hickson Road / Barton Street intersection will experience 993 and 904 vehicles in the AM (8-9am) and PM (5-6pm) peak respectively with most of the demand being throughput traffic along Hickson Road. The signalised intersection at Barton Street will assist in the key pedestrian movement east-west from Gas Lane to Harbour Park via Barton Street.

These are consistent with the connections identified in the Barangaroo Integrated Transport Plan as illustrated in Figure 20.

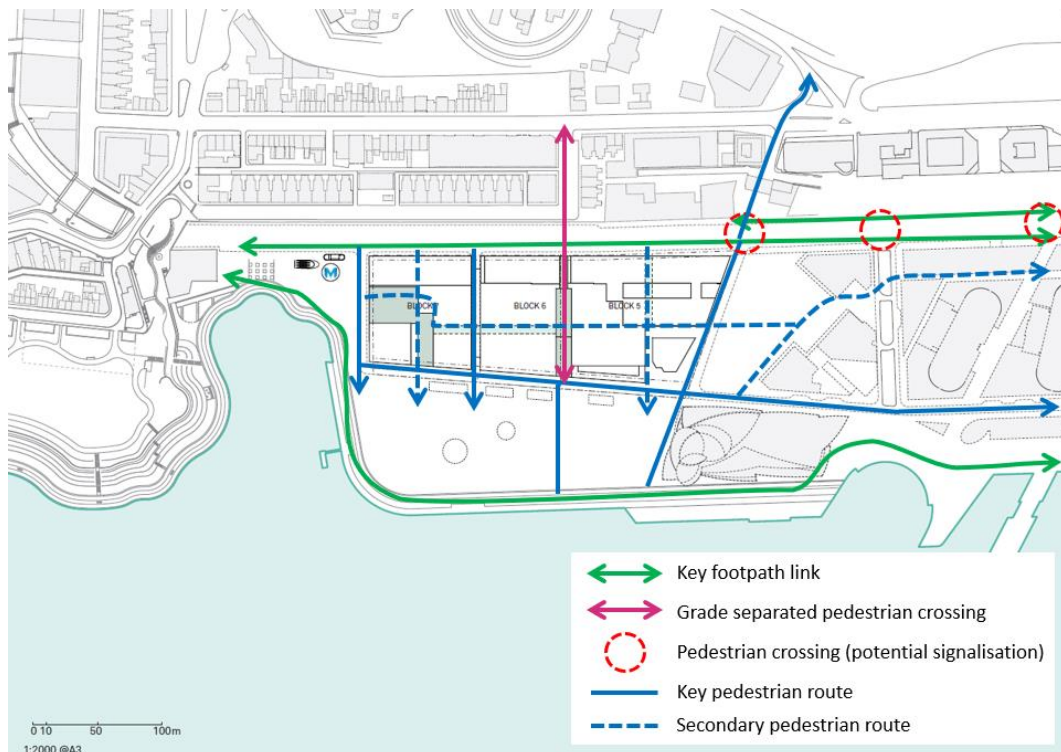


Figure 20 Pedestrian routes serving Central Barangaroo

Dedicated pedestrian infrastructure servicing the precinct are described in the sections below.

6.6.2.1 Barangaroo Steps

The Barangaroo Steps will provide an overhead bridge grade-separated crossing of Hickson Road, linking Central Barangaroo to a new pedestrian connection to High Street in Millers Point. It will provide a grand civic connector that extends through the site in an east-west direction through to a public plaza adjacent to the waterfront.

The steep grade difference between Hickson Road and Kent Street creates a physical barrier for pedestrians. High steps is an existing steep and narrow link between Hickson Road and High Street and is the only west-east connection linkage between Central Barangaroo and Millers Point.

The Barangaroo Steps will create a direct connection between Central Barangaroo to both the commercial area of Kent Street and the heritage site at Observatory Hill Park. This will be beneficial with the introduction of the Metro Station as it will serve as a direct pedestrian link to the metro line.

6.6.2.2 Napoleon Bridge

The Napoleon Bridge provides a new pedestrian link bridge over Sussex Street located close to the intersection of Hickson Road and Napoleon Street which links into the Wynyard Walk. The facility enhances connectivity between Barangaroo South and the Wynyard Station precinct. Napoleon Bridge will be one of the key pedestrian routes for those travelling between Central Barangaroo and Wynyard transport interchange.

6.6.2.3 Wynyard Walk

The Wynyard Walk is a direct pedestrian link connecting the Wynyard Interchange to Barangaroo. The Wynyard Walk helps provide an efficient and fast connection between the site and Wynyard Station, with a typical walking time from the Central Barangaroo to Wynyard Station of approximately ten minutes. Wynyard Walk is shown in Figure 21.



Figure 21 Wynyard Walk

6.7 Cycling

6.7.1 Key cycling routes

Central Barangaroo is located close to major cycle routes into the CBD from the north, and close to the City of Sydney cycleway network. The Barangaroo development has the ability to improve the city cycleway network as well as improving its own transport options through the upgrade of Hickson Road and Sussex Street alongside the Central Barangaroo precinct. The proposed bicycle network is shown in Figure 22 and includes:

- Hickson Road two-way segregated cycleway on the eastern side of Hickson Road
- Hickson Road slow speed traffic environment (between Watermans Quay and Barangaroo Reserve)
- Napoleon Street – cycle lane uphill (eastbound) plus cycle path mixed with traffic downhill (westbound) to connect to Kent Street cycleway.
- Foreshore Walk – shared pedestrian and cycle path.
- Kent Street two-way segregated cycleway
- Slow speed and shared traffic environments within Central Barangaroo precinct which include Streets C and D

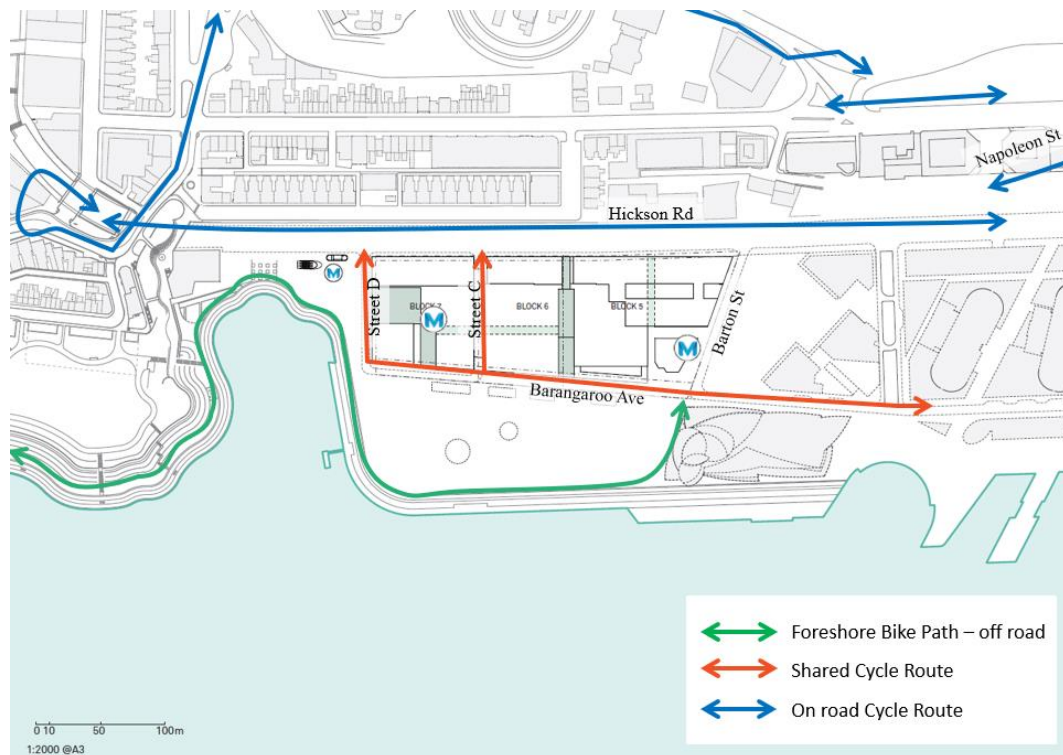


Figure 22 Supporting cycleway network

As part of the Central Barangaroo development, the convenience of using bicycles will be improved by:

- Providing bicycle locking facilities within public spaces for visitors, retail customers and tourists.
- Incorporating bicycle locking and ‘end of trip’ facilities (showers, change rooms) into the requirements for commercial buildings.
- Incorporating generous bicycle parking in residential buildings

6.7.2 Bicycle parking and ‘end of trip’ facilities

Sydney Metro is providing bicycle racks at the northern entrance to the station and also on the eastern Hickson Road opposite the station.

End of trip facilities will be located within Block 6 approximately 150 metres south of Barangaroo Station. There will be a ground floor access directly off Hickson Road. These facilities are proposed to cater for bike commuters arriving directly at Central Barangaroo.

Off street bicycle parking and shower facilities will be provided within buildings in line with the following minimum rates (in line with the relevant statement of commitments):

- Residential: One space per dwelling (may be provided within the dwelling’s basement storage area).

- Commercial: the number of bicycle spaces shall be 4% of the commercial GFA/20 m² (i.e. one per 250 m²). The minimum number of showers shall be one for every 10 bicycle spaces.
- Other uses: Six bicycle spaces for every 100 other uses car parking spaces.

A small quantum of visitor bicycle parking will be considered in the public domain and monitored as required. Bicycle parking will be considered in the public domain and will be increased if demand requires.

6.8 Water-based transport

The Barangaroo Ferry Hub opened to the public in June 2017. The new ferry hub connects Central Barangaroo to Circular Quay and other stops along the Paramatta River route. It also reduces capacity constraints on the Circular Quay terminal and brings additional ferry services and routes directly to Barangaroo. It will provide a viable and convenient mode of travel to Central Barangaroo, with pedestrian access to the ferry wharf via the foreshore walk.



Figure 23 Barangaroo ferry wharf

A summary of the current Sydney ferry routes and frequency of these services from Barangaroo Ferry Wharf is listed in Table 18.

Table 18 Ferry routes and frequencies

| Ferry Routes | Frequency valid from 25 October 2020 |
|--------------------------------------|--|
| F3 Circular Quay to Parramatta River | Service operates Monday to Friday every 30 minutes in the morning (8am to 9am) and every 15 minutes in the evening (5pm to 6pm). Weekend services operate throughout the day. |

| | |
|---|---|
| F3 Parramatta River to Circular Quay | Service operates Monday to Friday every 15 minutes in the morning (8am to 9am) and every 45 minutes in the evening (5pm to 6pm). Weekend services operate throughout the day in both directions. |
| F4 Circular Quay to Pymont Bay | Service operates Monday to Friday every 20 minutes in the morning (8am to 9am) and every 20 minutes in the evening (5pm to 6pm). Weekend services operate throughout the day. |
| F4 Pymont Bay to Circular Quay | Service operates Monday to Friday every 20 minutes in the morning (8am to 9am) and every 20 minutes in the evening (5pm to 6pm). Weekend services operate throughout the day. |

6.9 Bus services

In July 2015 the NSW Government announced a series of bus routes will directly service Barangaroo. These services all run along Hickson Road adjacent to Central Barangaroo, terminating at Walsh Bay, and include:

- Route 311
- Route 324
- Route 325

Figure 24 displays key bus stops in relation to Central Barangaroo. These stops take 4-10 minutes walking time from Central Barangaroo.

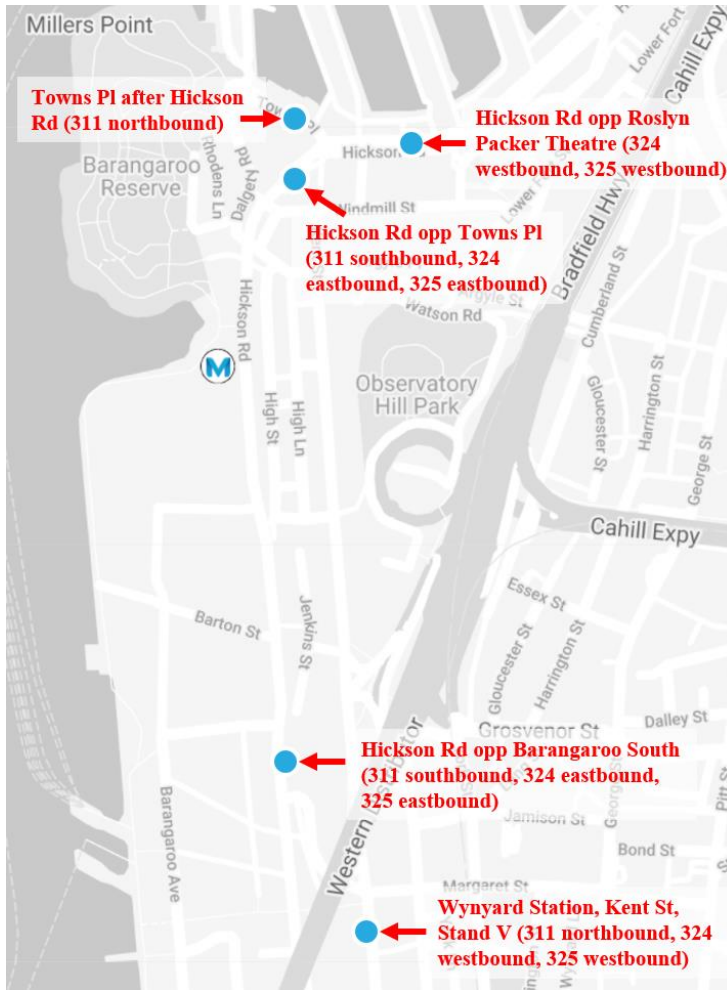


Figure 24 Bus stops servicing Barangaroo

A summary of the bus routes and frequency of these services along Hickson Road is listed in Table 19.

Table 19 Bus routes and frequencies

| Bus Routes | Frequency valid from 12 July 2021 |
|---|--|
| Route 311 Millers Point to Central Railway Square via Darlinghurst & Potts Point | Service will operate Monday to Friday every 15-16 minutes in the morning (8am to 9am) and every 15-16 minutes in the evening (5pm to 6pm). Weekend services will operate throughout the day in both directions. |
| Route 324 Walsh Bay to Watsons Bay via Old South Head Road | Service will operate Monday to Friday every 6-30 minutes in the morning (8am to 9am) and every 16-32 minutes in the evening (5pm to 6pm). Weekend services will operate throughout the day in both directions. |
| Route 325 Walsh Bay to Watsons Bay via Vaucluse Road | Service will operate Monday to Friday every 19-32 minutes in the morning (8am to 9am) and every 18-38 minutes in the evening (5pm to 6pm). Weekend services will operate throughout the day in both directions. |

Wynyard Walk will provide the main pedestrian link between Barangaroo and bus and rail services in Wynyard. The focus for bus services to/from Barangaroo will

therefore be on providing a frequent connection to the City Centre, from where connections can be made with bus services to the east, south and west and with rail services at Town Hall Station.

Based on the Barangaroo Integrated Transport Plan and current planning for Hickson Road, two north bound and two south bound bus stops would be provided on Hickson Road to serve Barangaroo South and Central Barangaroo/Barangaroo Reserve.

6.10 Sydney Light Rail

The opening of the CBD and South East Light Rail in 2019 has improved public transport accessibility and further increased the attractiveness of public transport as a means of access to Central Barangaroo. Light rail services travel between the Sydney CBD and Moore Park approximately every four minutes, and approximately run every eight minutes between Moore Park and Kingsford.

For Barangaroo, light rail offers the opportunity of a high-frequency service that can provide a quicker journey than walking to some destinations. The Grosvenor Street stop is the most convenient for passengers from Central Barangaroo taking a walking time of 10 minutes, with access via the new pedestrian bridge over Hickson Road, Kent Street and Grosvenor Street. During inclement weather, the route via Wynyard Walk to the Wynyard stop may be preferable. The light rail route and stops are shown in Figure 25.

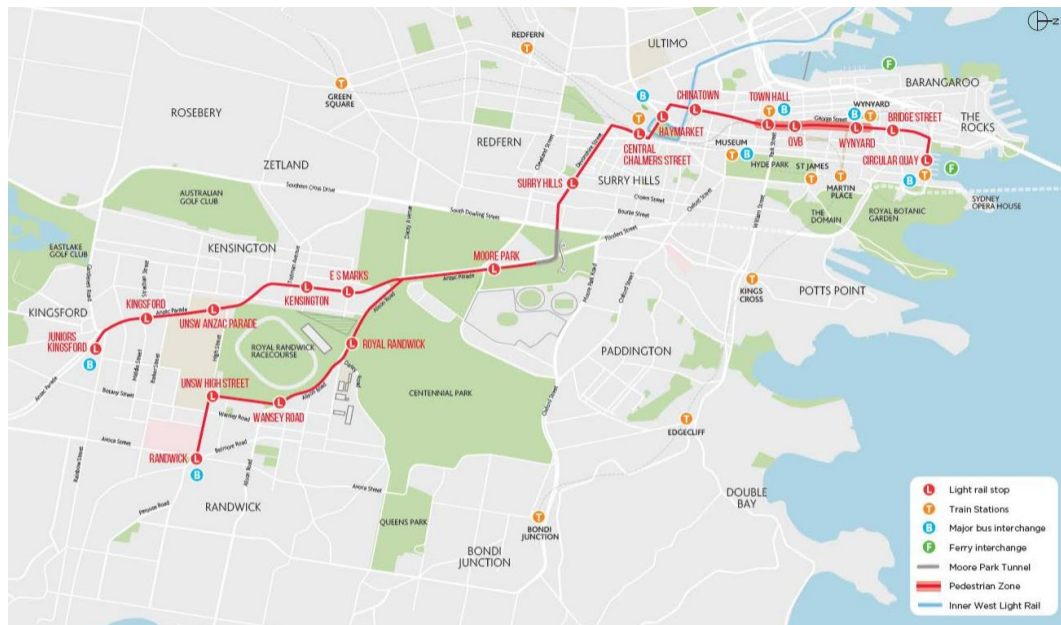


Figure 25 CBD and South East Light Rail route
 Source: Transport for NSW

6.11 Taxis and ridesharing

Taxis and ride-sharing services (e.g. Uber) play an important role in assisting Barangaroo to meet its mode share targets. While they make up only 1% of the

target mode share, they reduce the need for residents and workers to own/use their cars.

A number of taxi ranks are proposed throughout Barangaroo to serve the commercial, resident and visitor population. These will be strategically located to serve major buildings including the hotel, residential buildings and commercial towers, in line with the objectives outlined in the Barangaroo Integrated Transport Plan. Taxis will form an important component of the transport network serving Barangaroo, particularly for tourists and those departing the precinct late at night.

On street valet drop off and pick up will be provided within Central Barangaroo. Taxi ranks will be provided on Hickson Road adjacent to the precinct and/or on internal streets. The size and location of these ranks will be detailed further as planning for the precinct progresses.

6.12 Coach

The types of events held at Central Barangaroo Waterfront Park, Nawi Cove and Barangaroo Reserve could attract tourist coaches. Allocation of kerbside space in the vicinity of the Central Barangaroo, on Hickson Road, for coach set down / pick up is planned within the currently approved Barangaroo Concept Plan Mod 9. This will service tour groups travelling to and from the precinct to other areas of Sydney

6.13 Late night transport network

Barangaroo is a mixed-use precinct which will generate activity at all hours of the day, including in the evening and late at night. A number of transport alternatives will be available at these times, currently including:

- Train services from Wynyard which run until 1am on weeknights on several routes, resuming again at 4.30am. On weekends the last train service departs Wynyard at 1.41am.
- Ferry services at the Barangaroo Ferry Hub run until midnight seven days a week.
- Services on the future Sydney Metro line are expected to run into the early hours of the morning seven days a week.
- Taxi services and rideshare operators such as Uber and Ola will provide an important form of late-night transport for users, as they currently do at King Street Wharf. Taxis will be available at all hours of the night at the strategic taxi ranks identified in Section 6.11. These ranks will likely be managed during busy periods to accommodate the increased demands expected in the evening.

The majority of the late-night traffic is expected to be generated by the hotel in Barangaroo South. Access to the hotel for taxis and private vehicles will be available through Watermans Quay or Barton Street. The late-night traffic is expected to have a minimal effect on Central Barangaroo.

6.14 Emergency vehicles

The internal roads within Central Barangaroo will be designed to accommodate the turning requirements of a NSW Fire Brigade aerial appliance. Emergency Vehicles will be able to enter the site via Street C from Hickson Road and travel one-way around Block 7 via Barangaroo Avenue and Street D. Emergency vehicles will also be able to enter via Barton Street from Hickson Road to access the southern end of Central Barangaroo. The pedestrian priority section of Barangaroo Avenue between Street C and Barton Street can also be accessed by emergency vehicles. Emergency vehicle routes into the public open space and along the foreshore walk will be planned to ensure the site has adequate access. Any bollards that are used to define the laneway area will include removable bollards to enable access for emergency vehicles. These paths through the public open space will be coordinated with the event transport plans to provide the necessary access for ambulances and Police vehicles.

7 Travel Planning

One of the TMAP objectives is to reduce the level of private car usage in favour of more sustainable modes of travel such as walking, cycling and public transport. A method of achieving this is personalised marketing strategies to assist in modifying travel behaviour through the development of Travel Demand Management Plans (TDMPs).

The main objectives of the Travel Demand Management Plan are to reduce the need for unnecessary travel and promotion of sustainable means of transport. The more specific objectives include:

- To reduce the number of car journeys associated with the site
- High modal share for sustainable transport modes including public transport, cycling and walking journeys;
- To ensure adequate facilities are provided at the site to enable staff and patrons to visit the site by sustainable transport modes, and
- To raise awareness of sustainable transport options, particularly amongst the patrons of the site who may be tourists or visitors to Sydney and thus not familiar with the Sydney public transport network.

A number of travel demand travel plans have already been prepared by occupants of buildings in Barangaroo South. These plans outline measures that will be encouraged by future tenants to support sustainable modes of travel to Barangaroo and reduce car dependency. It is expected that commercial and residential buildings within the Central Barangaroo development would prepare similar plans as part of their respective development applications. A summary of the measures already in place in Barangaroo South is as follows:

7.1 General Promotion and Marketing

The objectives of the Travel Demand Management Plan will only be achieved with the support of tenants within the precinct. Marketing the benefits and promoting the sustainable alternatives available are therefore crucial in encouraging the adoption of the Travel Demand Management Plan measures. Currently, ‘Getting Here’ information is provided by both the Barangaroo South and Streets of Barangaroo websites. This is shown in Figure 26 and Figure 27.

Other promotional material will take a variety of forms and are issued either to individual employees or displayed in prominent locations.

LOCATION | GETTING HERE

Barangaroo South brings Sydney's Central Business District down to the water's edge.

With significant investment into transport and infrastructure including buses, ferries, trains, cycle paths and the Wynyard Walk pedestrian bridge, Barangaroo will be seamlessly connected with every part of wider Sydney.

Train
 Wynyard Station is only a short walk away. The Wynyard Walk tunnel is now open, which provides a fully accessible pedestrian link between Wynyard Station and Barangaroo South, and avoids steep inclines and road crossings.

Bus
 Bus services will now take you directly to Barangaroo. Routes 311, 324 and 325 travel to Hickson Road from Town Hall, and a number of off peak services are now arriving at neighbouring King Street Wharf.

Car
 There is limited parking available at Barangaroo South. If you are visiting by car, public carparks are available nearby at Barangaroo Reserve and Shelley Street.

Taxi
 There's a taxi rank located within Barangaroo South, with additional taxi ranks nearby on Shelley Street and Hickson Road.

Bike
 As the number of designated bike lanes within the CBD continue to grow, access to the streets of Barangaroo for bicycle riders is set to become even easier as time goes by. Bike access within the neighbourhood is through Watermans Quay and Barangaroo Avenue, with short term bicycle parking available at a number of convenient locations, the largest of these located along Barangaroo Avenue, in front of The Canteen, and residential buildings Alexander and Anadara.

Ferry
 The new ferry wharf at Barangaroo South is expected to open in early 2017. Until then, ferries arrive and depart from King Street Wharf and Circular Quay.

New transport solutions include:

- 1 **Wynyard Walk** which will provide a world class, fully accessible pedestrian link between Wynyard Station and Barangaroo. The walkway will allow pedestrians to get from Wynyard transport hub to the Barangaroo waterfront in approximately six minutes, avoiding steep inclines and road crossings.
- 2 The existing Wynyard bus interchange with additional proposed bus routes to service Hickson Road and the Barangaroo precinct.
- 3 A new ferry hub positioned at Barangaroo to serve the new commercial district.
- 4 A **Light Rail network** which will connect the CBD with Sydney's inner west and south eastern suburbs.
- 5 Extensive cycle paths connecting the precinct to the wider CBD and, within the commercial towers, more than 1,000 bike spaces.

Source: Transport for NSW

Figure 26 Travel information – Barangaroo South website

DISCOVER THE STREETS EAT & DRINK SHOP SEE & DO **GETTING HERE**

GETTING HERE

Getting here is easy - especially when Google Maps can do its thing and figure it all out for you!

Get directions

Central Station

GET DIRECTIONS >

1. Head northwest on Eddy Ave 0.1 km
2. Make a U-turn 0.2 km
3. Turn left onto Elizabeth St 0.4 km
4. Slight left to stay on Elizabeth St 0.2 km
5. Turn left onto Southum 0.4 km

Show me

TAXI RANKS PARKING

Figure 27 Travel information – Streets of Barangaroo website

7.2 Staff Induction

To ensure new members of staff are aware of the Travel Demand Management Plan, all new staff members should be made aware of the Plan as part of their induction process. The Travel Demand Management Plan section of the induction should provide new starters with the following:

- A brief introduction to the Travel Demand Management Plan and its purpose;
- Provision of a Travel Demand Management Plan information package which would include information on incentives to use sustainable means of transport e.g. public transport, NightRide buses, cycling and walking information.

7.3 Cycling

The precinct already has good access to the well-developed local cycling network, as outlined in Section 6.7. In order to further encourage the usage of cycling as a means for staff and patrons to access the site, the following measures should be considered:

- Consider the provision of a bicycle pump adjacent to the bicycle storage racks.
- Provide a Sydney cycle map to the staff and patrons accessing the site.
- Consider having a wayfinding sign board at the front of the site to also show detailed cyclist information such as nearby cycleways and information on how to access and use local bikesharing applications.
- The tenant websites could provide information detailing how to access the site by cycling, including details of bike storage areas and links to bikesharing service providers.
- Make staff and patrons aware of public transport cycling carriage policies and cycle storage facilities at rail stations

7.4 Public Transport

The precinct enjoys good accessibility to public transport including trains, ferries and buses. The usage of public transport by the staff and patrons of the site can be encouraged through the following measures:

- Provide a public transport website containing useful links to journey planning websites in Sydney;
- Provide useful public transport information and maps to patrons and staff.
- Provide live public transport information to patrons near the exit to the building, including information such as upcoming train, bus and ferry services;
- Consider having a public wayfinding sign board at the front of the site to also show detailed information about nearby NightRide Buses information in order to encourage this as a key late-night mode of transport instead of private vehicles and taxis;
- The tenant websites could have information detailing how to access the site by public transport, including the nearest railway station at Wynyard, the

Barangaroo Ferry Wharf, the Metro Station, nearby bus services and NightRide buses. This would help patrons of the site unfamiliar with the Sydney Public Transport network to access the site easily, reducing the need for less sustainable means of travel such as taxi or private vehicle; and

- Ensure that customer service staff members are able to give accurate information about accessing public transport, especially late night transport options such as NightRide buses, to the customers and patrons of the site, many of whom may be tourists or visitors to Sydney and unfamiliar with the public transport network.

7.5 Walking

Staff and Patrons can be encouraged to walk to Central Barangaroo through the following measures:

- Providing wayfinding signage and maps on pedestrian links to public transport and nearby attractions such as Barangaroo Reserve, Walsh Bay, The Rocks, Darling Harbour, Wynyard Station and the City Centre;
- The tenant websites could have information detailing how to access the site easily by walking; and
- Ensure that customer service staff members are able to give accurate walking directions to the customers and patrons of the site, such as tourists or visitors.

7.6 Monitoring

The Travel Demand Management Plan is a strategy that will evolve over time. Although the objectives of the Plan to inform staff and patrons to facilitate travel by sustainable modes will not change, it may be possible over time to refine this. Target setting should reflect an ambition for continued progress year on year and there should be a mechanism to review targets. The monitoring measures could include collecting data on travel patterns from patrons and staff accessing the building. The recorded data would inform modes of transport and distance travelled by each mode, from which energy consumption and emissions could be estimated. The recorded data could be published online and be available on the website homepage. This will allow external review and provide public evidence that the Travel Demand Management Plan is being implemented over the life of the development.

Following the implementation of the Travel Demand Management Plan, it is recommended that a travel survey is conducted at least 12 months post-occupation and periodically thereafter to assess the effectiveness of the travel plan against the mode share targets. Based on the results of this survey, the Travel Demand Management Plan team should adjust the strategy to promote non-car related travel.

7.7 Targeted users

Table 20 displays an overview of the travel demand measures and their associated users in which they are targeted towards.

Table 20 Application overview of travel demand measures

| Measure | Description | Targeted users |
|---------------------------------|--|---------------------------------|
| General promotion and marketing | <ul style="list-style-type: none"> • ‘Getting Here’ information • Other promotional material | Visitors |
| Staff induction | <ul style="list-style-type: none"> • Introduction to Travel Demand Management Plan • Travel Demand Management Plan information package | Workers |
| Cycling | <ul style="list-style-type: none"> • Provision of a bicycle pump • Provision of Sydney cycle map • Wayfinding sign board to show detailed cyclist information • Information on tenant websites detailing how to access the site by cycling • Awareness of public transport cycling carriage policies and cycle storage facilities at rail stations | Workers, residents and visitors |
| Public transport | <ul style="list-style-type: none"> • Public transport website containing useful links to journey planning websites in Sydney • Useful public transport information and maps • Live public transport information • Public wayfinding sign board to show detailed public transport information • Information on tenant websites detailing how to access the site by public transport • Accurate information about accessing public transport | Workers, residents and visitors |
| Walking | <ul style="list-style-type: none"> • Wayfinding signage and maps on pedestrian links to public transport and nearby attractions • Information on tenant websites detailing how to access the site easily by walking • Accurate walking directions to the customers and patrons of the site, such as tourists or visitors | Workers, residents and visitors |
| Monitoring | <ul style="list-style-type: none"> • Data collection on travel patterns from patrons and staff accessing the building | Workers and residents |

8 Delivery and Timing

The transport management measures proposed to support Central Barangaroo, the Headland Park and Barangaroo in general, including the agency responsible for the delivery of the measure and estimated timing, are summarised in Table 21 below.

Table 21 Delivery and Timing of Transport Measures

| Measure | Description | Responsibility for Delivery | Estimated Timing |
|----------------------------|--|-------------------------------------|---|
| Road network modifications | Hickson Road upgrade | INSW | Prior to completion of Central Barangaroo |
| | Signalisation of Hickson Road / Watermans Quay | Barangaroo South developer and INSW | Prior to the opening of Stage 1B development |
| | Creation of intersections on Hickson Road to access Central Barangaroo | Central Barangaroo developer | Prior to opening of each block within Central Barangaroo |
| | Creation of the following streets within Central Barangaroo: Barangaroo Avenue Street D Barton Street | Central Barangaroo developer | Opening of Block 5 Opening of Block 6 Opening of Block 7 Staged with the opening of each block |
| Pedestrian connections | Wynyard Walk | TfNSW | Completed |
| | Napoleon Bridge | Barangaroo South developer | Completed |
| | Barangaroo Steps including High Street | Central Barangaroo developer | At completion of Central Barangaroo |
| | At grade walking routes within Central Barangaroo | Central Barangaroo developer | Concurrently with the opening of each block |
| | Wulugul / Foreshore Walk | INSW | Completed |
| Cycling | Visitor bicycle parking in Central Barangaroo public domain | Central Barangaroo developer | Staged following the opening of the precinct |
| | Hickson Road Cycleway | INSW | In conjunction with Hickson Road upgrade |
| Bus and coach services | Allocation of space on Hickson Road to accommodate future bus stops | TfNSW, City of Sydney and INSW | In conjunction with Hickson Road upgrade |
| | Allocation of kerbside space in vicinity of the Central Barangaroo | City of Sydney and INSW | Prior to initial opening of Central Barangaroo |
| Metro | Sydney Metro Station at Barangaroo | TfNSW | 2024 |

| Measure | Description | Responsibility for Delivery | Estimated Timing |
|-----------------------|--|------------------------------------|--|
| Taxi services | Provision of taxi ranks serving Central Barangaroo | Central Barangaroo developer | Staged following the opening of the precinct |
| Water based transport | Barangaroo Ferry Hub | TfNSW | Completed |

9 Summary

The comparison of the traffic generation forecast under the MOD 8/10 transport assessment and the proposed modification (MOD 9) indicates that the total volume of traffic generated by the entire precinct will be slightly higher when compared with that previously assessed. This is due to the following reasons:

- Adjustment in traffic generation rates for the increased residential component (arising primarily from the introduction of a new Metro Station and Central Barangaroo); and
- The revision in future bus numbers on Hickson Road.

The TMAP August 2015 (MOD 8) was used as the comparator given that way the latest change to GFA and traffic volumes. A corridor traffic model was developed which assessed the future performance of the road network serving the precinct. The modelling indicated little difference in the road network performance due to the minor changes in traffic flows. The assessment concluded that the road network can accommodate MOD 9 with performance remaining at acceptable levels. This implies that the additional trips generated by the increase in floorspace are offset by lower traffic generation rates for the residential uses and reduction in bus volumes along Hickson Road.

Off-street car parking will be provided at the same parking ratios as used in previous MODs, consistent with the currently approved Barangaroo Concept Plan. A reduction in the number of on-street parking bays on Hickson Road of approximately 20 spaces (down from 125) is envisaged compared to that previously considered.

The precinct maintains a high degree of pedestrian connectivity, with Wulugul Walk providing a continuous link for pedestrians between Barangaroo Reserve and Barangaroo South. The internal streets will be designed as Civic Places, slow-speed environments suitable for high levels of pedestrian movements.

The Central Barangaroo development also includes a new overhead bridge grade-separated crossing of Hickson Road, known as the Barangaroo Steps. This will provide a grand civic connector that extends through the site in an east-west direction through to a public plaza adjacent to the waterfront. Complementing this pedestrian network will be a number of high-quality bicycle routes, including an upgraded cycleway on Hickson Road adjacent to the site.

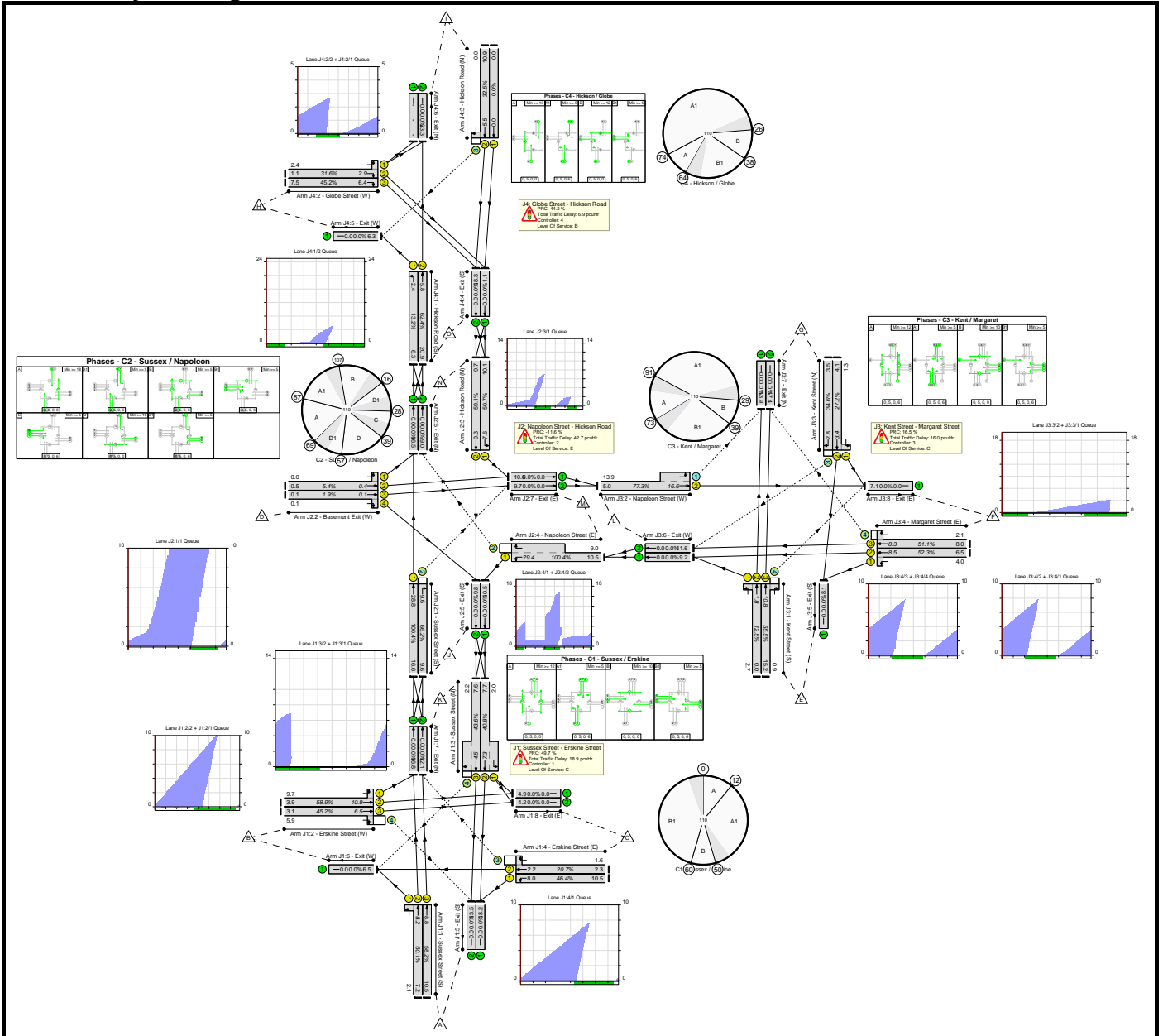
The introduction of the Metro Station at Barangaroo will improve public transport access for people travelling to and from the precinct by providing an accessible, high capacity alternative to Wynyard Station. It will provide future workers and residents direct access to key strategic centres such as Bankstown, Waterloo, North Sydney, St Leonards and Macquarie Park. Three main entry points to the Metro Station are planned within the Central Barangaroo precinct which provides users with a high capacity, high-frequency public transport service integrated with the retail use.

Appendix A

Traffic modelling outputs

A1 LinSig modelling outputs: MOD 8

Basic Results Summary
Scenario 3: 'AM Mod8' (FG5: 'AM Future MOD8 Traffic', Plan 1: 'Future (with Basement)')
Network Layout Diagram



Basic Results Summary

Network Results

| Item | Lane Description | Lane Type | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Demand Flow (pcu) | Sat Flow (pcu/Hr) | Max. Back of Uniform Queue (pcu) | Mean Max Queue (pcu) |
|---|--------------------------------|-----------|---------------|---------------------------|-------------------|-------------------|----------------------------------|----------------------|
| Network: Linsig Modelling | - | - | 100.4% | - | - | - | - | - |
| J1: Sussex Street - Erskine Street | - | - | 60.1% | - | - | - | - | - |
| 1/2+1/1 | Sussex Street (S) Left Ahead | U | 60.1% | 37.3 | 302 | 1440:1440 | 7.4 | 8.2 |
| 1/3 | Sussex Street (S) Ahead | U | 58.2% | 32.5 | 343 | 1440 | 8.1 | 8.8 |
| 2/2+2/1 | Erskine Street (W) Left Ahead | U | 58.9% | 30.4 | 443 | 1800:1800 | 10.1 | 10.8 |
| 2/3+2/4 | Erskine Street (W) Right Ahead | U+O | 45.2% | 28.1 | 295 | 1800:1440 | 6.1 | 6.5 |
| 3/2+3/1 | Sussex Street (N) Ahead Left | U | 40.8% | 18.3 | 318 | 1800:1800 | 6.9 | 7.3 |
| 3/3+3/4 | Sussex Street (N) Ahead Right | U+O | 43.6% | 17.2 | 320 | 1800:1440 | 4.1 | 4.5 |
| 4/1 | Erskine Street (E) Left | U | 46.4% | 28.3 | 342 | 1800 | 7.6 | 8.0 |
| 4/2+4/3 | Erskine Street (E) Ahead Right | U+O | 20.7% | 23.0 | 129 | 1440:1440 | 2.1 | 2.2 |
| J2: Napoleon Street - Hickson Road | - | - | 100.4% | - | - | - | - | - |
| 1/1 | Sussex Street (S) Ahead | U | 100.4% | 120.7 | 542 | 1800 | 16.6 | 28.8 |
| 1/2 | Sussex Street (S) Right | O | 66.2% | 35.0 | 315 | 1800 | 8.7 | 9.6 |
| 2/2+2/1 | Basement Exit (W) Left Ahead | U | 5.4% | 45.4 | 16 | 1800:1800 | 0.4 | 0.4 |
| 2/3+2/4 | Basement Exit (W) Right Ahead | U | 1.9% | 44.6 | 6 | 1800:1800 | 0.1 | 0.1 |
| 3/1 | Hickson Road (N) Left | U | 50.7% | 15.4 | 332 | 1800 | 7.1 | 7.6 |
| 3/2 | Hickson Road (N) Ahead | U | 59.1% | 33.0 | 319 | 1800 | 8.6 | 9.3 |
| 4/1+4/2 | Napoleon Street (E) Left Right | U+O | 100.4% | 95.1 | 639 | 1800:1800 | 16.2 | 29.4 |
| J3: Kent Street - Margaret Street | - | - | 77.3% | - | - | - | - | - |
| 1/2+1/1 | Kent Street (S) Left Ahead | U | 12.5% | 24.4 | 88 | 1800:1800 | 1.7 | 1.8 |
| 1/3+1/4 | Kent Street (S) Ahead Right | U+O | 55.5% | 20.1 | 526 | 1800:920 | 10.2 | 10.8 |

Basic Results Summary

| | | | | | | | | |
|--|---------------------------------|------------------------------|-------------------------|--|------------------------------------|-----------|---------------------|------|
| 2/2+2/1 | Napeleon Street (W) Left Ahead | U+O | 77.3% | 24.1 | 619 | 920:1800 | 14.9 | 16.6 |
| 3/2+3/1 | Kent Street (N) Ahead Left | U | 27.2% | 19.9 | 174 | 1800:920 | 3.2 | 3.4 |
| 3/3 | Kent Street (N) Right | O | 34.6% | 35.2 | 116 | 1800 | 2.5 | 2.8 |
| 4/2+4/1 | Margaret Street (E) Left Ahead | U | 52.3% | 33.1 | 344 | 1800:1800 | 7.9 | 8.5 |
| 4/3+4/4 | Margaret Street (E) Ahead Right | U+O | 51.1% | 33.3 | 333 | 1800:1800 | 7.8 | 8.3 |
| J4: Globe Street - Hickson Road | - | - | 62.4% | - | - | - | - | - |
| 1/1 | Hickson Road (S) Left | U | 13.2% | 5.3 | 206 | 1800 | 2.4 | 2.4 |
| 1/2 | Hickson Road (S) Ahead | U | 62.4% | 7.5 | 686 | 1800 | 4.9 | 5.8 |
| 2/2+2/1 | Globe Street (W) Right Left | U | 31.6% | 44.2 | 114 | 1800:1800 | 2.7 | 2.9 |
| 2/3 | Globe Street (W) Right | U | 45.2% | 37.2 | 244 | 1800 | 6.0 | 6.4 |
| 3/1 | Hickson Road (N) Ahead | U | 0.0% | 0.0 | 0 | 1800 | 0.0 | 0.0 |
| 3/2+3/3 | Hickson Road (N) Ahead Right | U+O | 32.5% | 12.9 | 356 | 1800:1800 | 5.2 | 5.5 |
| C1 - Sussex / Erskine | | PRC for Signalled Lanes (%): | 49.7 | Total Delay for Signalled Lanes (pcuHr): | | 18.91 | Cycle Time (s): 110 | |
| C2 - Sussex / Napoleon | | PRC for Signalled Lanes (%): | -11.6 | Total Delay for Signalled Lanes (pcuHr): | | 42.75 | Cycle Time (s): 110 | |
| C3 - Kent / Margaret | | PRC for Signalled Lanes (%): | 16.5 | Total Delay for Signalled Lanes (pcuHr): | | 16.02 | Cycle Time (s): 110 | |
| C4 - Hickson / Globe | | PRC for Signalled Lanes (%): | 44.2 | Total Delay for Signalled Lanes (pcuHr): | | 6.92 | Cycle Time (s): 110 | |
| | | | PRC Over All Lanes (%): | -11.6 | Total Delay Over All Lanes(pcuHr): | | 84.60 | |

Basic Results Summary

Network Results

| Item | Lane Description | Lane Type | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Demand Flow (pcu) | Sat Flow (pcu/Hr) | Max. Back of Uniform Queue (pcu) | Mean Max Queue (pcu) |
|---|--------------------------------|-----------|--------------|---------------------------|-------------------|-------------------|----------------------------------|----------------------|
| Network: Linsig Modelling | - | - | 96.9% | - | - | - | - | - |
| J1: Sussex Street - Erskine Street | - | - | 96.9% | - | - | - | - | - |
| 1/2+1/1 | Sussex Street (S) Left Ahead | U | 27.7% | 18.4 | 229 | 1800:1440 | 4.1 | 4.3 |
| 1/3 | Sussex Street (S) Ahead | U | 19.6% | 16.1 | 186 | 1800 | 2.9 | 3.1 |
| 2/2+2/1 | Erskine Street (W) Left Ahead | U | 59.2% | 40.1 | 325 | 1800:1800 | 8.0 | 8.7 |
| 2/3+2/4 | Erskine Street (W) Right Ahead | U+O | 86.3% | 79.8 | 231 | 1800:920 | 6.7 | 9.4 |
| 3/2+3/1 | Sussex Street (N) Ahead Left | U | 95.0% | 53.1 | 507 | 920:1800 | 13.8 | 20.2 |
| 3/3+3/4 | Sussex Street (N) Ahead Right | U+O | 94.0% | 52.0 | 461 | 900:1440 | 12.7 | 18.3 |
| 4/1 | Erskine Street (E) Left | U | 96.9% | 103.7 | 406 | 1440 | 12.2 | 19.5 |
| 4/2+4/3 | Erskine Street (E) Ahead Right | U+O | 21.9% | 31.8 | 108 | 1440:1800 | 2.1 | 2.2 |
| J2: Napoleon Street - Hickson Road | - | - | 92.1% | - | - | - | - | - |
| 1/1 | Sussex Street (S) Ahead | U | 70.6% | 43.7 | 439 | 1800 | 10.7 | 11.9 |
| 1/2 | Sussex Street (S) Right | O | 71.4% | 60.2 | 174 | 1800 | 5.0 | 6.2 |
| 2/2+2/1 | Basement Exit (W) Left Ahead | U | 12.9% | 46.3 | 38 | 1800:1800 | 1.0 | 1.1 |
| 2/3+2/4 | Basement Exit (W) Right Ahead | U | 16.8% | 46.3 | 52 | 1800:1800 | 1.2 | 1.3 |
| 3/1 | Hickson Road (N) Left | U | 43.0% | 15.9 | 324 | 1800 | 4.2 | 4.6 |
| 3/2 | Hickson Road (N) Ahead | U | 92.1% | 59.3 | 573 | 1800 | 16.8 | 21.6 |
| 4/1+4/2 | Napoleon Street (E) Left Right | U+O | 84.6% | 33.2 | 531 | 1800:1800 | 15.8 | 18.4 |
| J3: Kent Street - Margaret Street | - | - | 75.3% | - | - | - | - | - |
| 1/2+1/1 | Kent Street (S) Left Ahead | U | 9.4% | 22.7 | 69 | 1440:1800 | 1.3 | 1.3 |
| 1/3+1/4 | Kent Street (S) Ahead Right | U+O | 63.1% | 21.8 | 512 | 1440:920 | 10.2 | 11.1 |

Basic Results Summary

| | | | | | | | | |
|--|---------------------------------|------------------------------|-------------------------|--|------------------------------------|-----------|---------------------|------|
| 2/2+2/1 | Napeleon Street (W) Left Ahead | U+O | 75.3% | 17.4 | 613 | 920:1440 | 11.2 | 12.7 |
| 3/2+3/1 | Kent Street (N) Ahead Left | U | 38.8% | 22.3 | 251 | 1800:920 | 4.9 | 5.2 |
| 3/3 | Kent Street (N) Right | O | 19.2% | 33.4 | 62 | 1800 | 1.3 | 1.4 |
| 4/2+4/1 | Margaret Street (E) Left Ahead | U | 36.3% | 31.7 | 225 | 1800:1800 | 5.0 | 5.3 |
| 4/3+4/4 | Margaret Street (E) Ahead Right | U+O | 35.4% | 31.7 | 218 | 1800:1800 | 4.9 | 5.2 |
| J4: Globe Street - Hickson Road | - | - | 47.4% | - | - | - | - | - |
| 1/1 | Hickson Road (S) Left | U | 16.2% | 2.2 | 252 | 1800 | 2.0 | 2.1 |
| 1/2 | Hickson Road (S) Ahead | U | 40.9% | 2.9 | 502 | 1800 | 0.3 | 0.7 |
| 2/2+2/1 | Globe Street (W) Right Left | U | 28.4% | 52.9 | 66 | 1800:1800 | 1.5 | 1.7 |
| 2/3 | Globe Street (W) Right | U | 27.9% | 41.2 | 114 | 1800 | 2.9 | 3.0 |
| 3/1 | Hickson Road (N) Ahead | U | 14.4% | 7.9 | 177 | 1800 | 1.9 | 2.0 |
| 3/2+3/3 | Hickson Road (N) Ahead Right | U+O | 47.4% | 11.0 | 582 | 1800:1800 | 8.2 | 8.7 |
| C1 - Sussex / Erskine | | PRC for Signalled Lanes (%): | -7.7 | Total Delay for Signalled Lanes (pcuHr): | | 37.52 | Cycle Time (s): 110 | |
| C2 - Sussex / Napoleon | | PRC for Signalled Lanes (%): | -2.4 | Total Delay for Signalled Lanes (pcuHr): | | 25.16 | Cycle Time (s): 110 | |
| C3 - Kent / Margaret | | PRC for Signalled Lanes (%): | 19.6 | Total Delay for Signalled Lanes (pcuHr): | | 12.53 | Cycle Time (s): 110 | |
| C4 - Hickson / Globe | | PRC for Signalled Lanes (%): | 89.8 | Total Delay for Signalled Lanes (pcuHr): | | 5.00 | Cycle Time (s): 110 | |
| | | | PRC Over All Lanes (%): | -7.7 | Total Delay Over All Lanes(pcuHr): | | 80.21 | |

A2 SIDRA modelling outputs: MOD 9

MOVEMENT SUMMARY



Site: 1 [1_Erskine Street /Sussex Street _ Future_AM]



Network: N101 [AM Future]

Erskine Street /Sussex Street

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn | Average Delay | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed |
|--------------------------|------|--------------|-----|---------------|-----|-----------|---------------|------------------|---------------------|----------|--------------|---------------------|------------------|---------------|
| | | Total | HV | Total | HV | | | | Vehicles | Distance | | | | |
| | | veh/h | % | veh/h | % | v/c | sec | | veh | m | | | | km/h |
| South: Sussex Street (S) | | | | | | | | | | | | | | |
| 1 | L2 | 54 | 3.0 | 54 | 3.0 | 0.325 | 34.3 | LOS C | 2.4 | 17.4 | 0.86 | 0.73 | 0.86 | 10.6 |
| 2 | T1 | 441 | 3.0 | 441 | 3.0 | 0.881 | 42.2 | LOS C | 12.1 | 86.7 | 0.95 | 1.06 | 1.24 | 4.9 |
| Approach | | 495 | 3.0 | 495 | 3.0 | 0.881 | 41.4 | LOS C | 12.1 | 86.7 | 0.94 | 1.02 | 1.20 | 5.5 |
| East: Erskine Street (E) | | | | | | | | | | | | | | |
| 4 | L2 | 375 | 3.0 | 375 | 3.0 | 0.838 | 44.5 | LOS D | 10.9 | 78.6 | 1.00 | 0.98 | 1.21 | 8.8 |
| 5 | T1 | 82 | 3.0 | 82 | 3.0 | 0.447 | 35.5 | LOS C | 2.8 | 20.4 | 0.92 | 0.76 | 0.92 | 11.5 |
| 6 | R2 | 33 | 3.0 | 33 | 3.0 | 0.447 | 38.8 | LOS C | 2.8 | 20.4 | 0.92 | 0.76 | 0.92 | 7.9 |
| Approach | | 490 | 3.0 | 490 | 3.0 | 0.838 | 42.7 | LOS D | 10.9 | 78.6 | 0.98 | 0.93 | 1.14 | 9.2 |
| North: Sussex Street (N) | | | | | | | | | | | | | | |
| 7 | L2 | 57 | 3.0 | 57 | 3.0 | 0.109 | 28.2 | LOS B | 1.2 | 8.7 | 0.83 | 0.72 | 0.83 | 21.8 |
| 8 | T1 | 446 | 3.0 | 446 | 3.0 | 0.242 | 9.5 | LOS A | 4.7 | 33.4 | 0.45 | 0.38 | 0.45 | 30.6 |
| 9 | R2 | 77 | 3.0 | 77 | 3.0 | 0.269 | 21.5 | LOS B | 1.2 | 8.6 | 0.93 | 0.75 | 0.93 | 24.1 |
| Approach | | 580 | 3.0 | 580 | 3.0 | 0.269 | 13.0 | LOS A | 4.7 | 33.4 | 0.55 | 0.46 | 0.55 | 28.4 |
| West: Erskine Street (W) | | | | | | | | | | | | | | |
| 10 | L2 | 204 | 3.0 | 204 | 3.0 | 0.893 | 51.6 | LOS D | 12.7 | 91.2 | 1.00 | 1.10 | 1.34 | 5.2 |
| 11 | T1 | 191 | 3.0 | 191 | 3.0 | 0.893 | 48.2 | LOS D | 12.7 | 91.2 | 1.00 | 1.10 | 1.34 | 9.0 |
| 12 | R2 | 183 | 3.0 | 183 | 3.0 | 0.911 | 61.8 | LOS E | 6.2 | 44.4 | 1.00 | 1.13 | 1.58 | 6.2 |
| Approach | | 578 | 3.0 | 578 | 3.0 | 0.911 | 53.7 | LOS D | 12.7 | 91.2 | 1.00 | 1.11 | 1.42 | 6.8 |
| All Vehicles | | 2143 | 3.0 | 2143 | 3.0 | 0.911 | 37.3 | LOS C | 12.7 | 91.2 | 0.86 | 0.87 | 1.07 | 11.9 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow | Average Delay | Level of Service | Average Back of Queue | | Prop. Queued | Effective Stop Rate |
|-----------------|---------------------|-------------|---------------|------------------|-----------------------|----------|--------------|---------------------|
| | | | | | Pedestrian | Distance | | |
| | | ped/h | sec | | ped | m | | |
| P1 | South Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P2 | East Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P3 | North Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P4 | West Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| All Pedestrians | | 211 | 39.3 | LOS D | | | 0.94 | 0.94 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 2 [2_Hickson_Sussex_Napoleon_Future_AM]

 Network: N101 [AM Future]

Hickson Road / Sussex Street / Napoleon Street

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn | Average Delay | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed |
|--------------------------------|------|--------------|-----|---------------|-----|-----------|---------------|------------------|---------------------|----------|--------------|---------------------|------------------|---------------|
| | | Total | HV | Total | HV | | | | Vehicles | Distance | | | | |
| | | veh/h | % | veh/h | % | v/c | sec | | veh | m | | | | km/h |
| South: Sussex Street (S) | | | | | | | | | | | | | | |
| 2 | T1 | 400 | 3.0 | 400 | 3.0 | 0.976 | 77.7 | LOS F | 17.6 | 126.7 | 1.00 | 1.46 | 1.72 | 10.1 |
| 3b | R3 | 146 | 3.0 | 146 | 3.0 | 0.556 | 37.4 | LOS C | 3.7 | 26.7 | 0.99 | 0.80 | 0.99 | 16.7 |
| Approach | | 546 | 3.0 | 546 | 3.0 | 0.976 | 66.9 | LOS E | 17.6 | 126.7 | 1.00 | 1.28 | 1.53 | 11.3 |
| SouthEast: Napoleon Street (E) | | | | | | | | | | | | | | |
| 21b | L3 | 196 | 3.0 | 196 | 3.0 | 0.272 | 27.1 | LOS B | 4.5 | 32.2 | 0.90 | 0.81 | 0.90 | 13.5 |
| 23a | R1 | 314 | 3.0 | 314 | 3.0 | 1.090 | 154.9 | LOS F | 18.1 | 130.0 | 1.00 | 1.78 | 2.46 | 3.0 |
| Approach | | 510 | 3.0 | 510 | 3.0 | 1.090 | 105.8 | LOS F | 18.1 | 130.0 | 0.96 | 1.41 | 1.86 | 4.3 |
| North: Hickson Road (N) | | | | | | | | | | | | | | |
| 7a | L1 | 255 | 3.0 | 255 | 3.0 | 0.641 | 18.6 | LOS B | 5.1 | 36.3 | 0.84 | 0.76 | 0.84 | 10.4 |
| 8 | T1 | 366 | 3.0 | 366 | 3.0 | 0.641 | 29.9 | LOS C | 7.1 | 51.0 | 0.95 | 0.82 | 0.95 | 7.0 |
| Approach | | 621 | 3.0 | 621 | 3.0 | 0.641 | 25.3 | LOS B | 7.1 | 51.0 | 0.90 | 0.79 | 0.90 | 8.1 |
| West: Basement Car Park (W) | | | | | | | | | | | | | | |
| 10 | L2 | 1 | 3.0 | 1 | 3.0 | 0.014 | 47.4 | LOS D | 0.0 | 0.3 | 0.95 | 0.59 | 0.95 | 20.0 |
| 12a | R1 | 3 | 3.0 | 3 | 3.0 | 0.059 | 46.3 | LOS D | 0.2 | 1.2 | 0.96 | 0.64 | 0.96 | 19.8 |
| 12 | R2 | 4 | 3.0 | 4 | 3.0 | 0.059 | 48.3 | LOS D | 0.2 | 1.2 | 0.96 | 0.65 | 0.96 | 19.7 |
| Approach | | 8 | 3.0 | 8 | 3.0 | 0.059 | 47.5 | LOS D | 0.2 | 1.2 | 0.96 | 0.64 | 0.96 | 19.8 |
| All Vehicles | | 1685 | 3.0 | 1685 | 3.0 | 1.090 | 63.3 | LOS E | 18.1 | 130.0 | 0.95 | 1.14 | 1.40 | 7.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow | Average Delay | Level of Service | Average Back of Queue | Prop. Queued | Effective Stop Rate |
|-----------------|-------------------------|-------------|---------------|------------------|-----------------------|--------------|---------------------|
| | | ped/h | sec | | Pedestrian | | |
| | | | | | ped | | |
| | | | | | Distance | | |
| | | | | | m | | |
| P1 | South Full Crossing | 194 | 29.0 | LOS C | 0.4 | 0.4 | 0.81 |
| P5 | SouthEast Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 |
| P3 | North Full Crossing | 64 | 31.3 | LOS D | 0.1 | 0.1 | 0.84 |
| P4 | West Full Crossing | 188 | 2.7 | LOS A | 0.1 | 0.1 | 0.25 |
| All Pedestrians | | 499 | 20.5 | LOS C | | | 0.61 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 3 [3_ Watermans Quay_Hickson Road_Future_AM]  Network: N101 [AM Future]

2_ Watermans Quay_Hickson Road

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn | Average Delay | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed |
|-----------------------|------|--------------|-----|---------------|-----|-----------|---------------|------------------|---------------------|----------|--------------|---------------------|------------------|---------------|
| | | Total | HV | Total | HV | | | | Vehicles | Distance | | | | |
| | | veh/h | % | veh/h | % | v/c | sec | | veh | m | | | | km/h |
| South: Hickson Road S | | | | | | | | | | | | | | |
| 1 | L2 | 270 | 3.0 | 270 | 3.0 | 0.345 | 4.0 | LOS A | 0.2 | 1.6 | 0.03 | 0.47 | 0.03 | 33.0 |
| 2 | T1 | 443 | 3.0 | 443 | 3.0 | 0.538 | 22.9 | LOS B | 8.4 | 60.0 | 0.90 | 0.79 | 0.90 | 27.7 |
| Approach | | 713 | 3.0 | 713 | 3.0 | 0.538 | 15.7 | LOS B | 8.4 | 60.0 | 0.57 | 0.67 | 0.57 | 28.5 |
| North: Hickson Road N | | | | | | | | | | | | | | |
| 8 | T1 | 313 | 3.0 | 313 | 3.0 | 0.295 | 9.3 | LOS A | 4.1 | 29.1 | 0.52 | 0.45 | 0.52 | 33.3 |
| 9 | R2 | 22 | 3.0 | 22 | 3.0 | 0.066 | 23.0 | LOS B | 0.4 | 2.8 | 0.72 | 0.67 | 0.72 | 28.5 |
| Approach | | 335 | 3.0 | 335 | 3.0 | 0.295 | 10.2 | LOS A | 4.1 | 29.1 | 0.53 | 0.46 | 0.53 | 32.8 |
| West: Watermans Quay | | | | | | | | | | | | | | |
| 10 | L2 | 100 | 3.0 | 100 | 3.0 | 0.520 | 32.8 | LOS C | 5.7 | 40.6 | 0.89 | 0.80 | 0.89 | 25.5 |
| 12 | R2 | 298 | 3.0 | 298 | 3.0 | 0.520 | 33.9 | LOS C | 5.7 | 40.6 | 0.89 | 0.80 | 0.89 | 10.4 |
| Approach | | 398 | 3.0 | 398 | 3.0 | 0.520 | 33.6 | LOS C | 5.7 | 40.6 | 0.89 | 0.80 | 0.89 | 16.3 |
| All Vehicles | | 1446 | 3.0 | 1446 | 3.0 | 0.538 | 19.4 | LOS B | 8.4 | 60.0 | 0.65 | 0.66 | 0.65 | 26.1 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow | Average Delay | Level of Service | Average Back of Queue | | Prop. Queued | Effective Stop Rate |
|-----------------|---------------------|-------------|---------------|------------------|-----------------------|----------|--------------|---------------------|
| | | | | | Pedestrian | Distance | | |
| | | ped/h | sec | | ped | m | | |
| P3 | North Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P4 | West Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| All Pedestrians | | 105 | 39.3 | LOS D | | | 0.94 | 0.94 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 4 [4_Napoleon_Kent_Margaret_Future_AM]

 Network: N101 [AM Future]

New Site

Site Category: Napoleon_Kent_Margaret_Future_AM

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn v/c | Average Delay sec | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|----------------------------|------|--------------|------|---------------|------|---------------|-------------------|------------------|---------------------|------------|--------------|---------------------|------------------|--------------------|
| | | Total veh/h | HV % | Total veh/h | HV % | | | | Vehicles | Distance m | | | | |
| South: Kent Street (S) | | | | | | | | | | | | | | |
| 1a | L1 | 73 | 3.0 | 73 | 3.0 | 0.414 | 15.5 | LOS B | 6.1 | 44.1 | 0.63 | 0.58 | 0.63 | 20.9 |
| 2 | T1 | 420 | 3.0 | 420 | 3.0 | 0.414 | 16.8 | LOS B | 6.1 | 44.1 | 0.68 | 0.61 | 0.68 | 31.0 |
| 3 | R2 | 16 | 3.0 | 16 | 3.0 | 0.414 | 31.7 | LOS C | 2.6 | 18.4 | 0.84 | 0.71 | 0.84 | 15.3 |
| Approach | | 509 | 3.0 | 509 | 3.0 | 0.414 | 17.1 | LOS B | 6.1 | 44.1 | 0.68 | 0.61 | 0.68 | 30.1 |
| East: Margaret Street | | | | | | | | | | | | | | |
| 4 | L2 | 121 | 3.0 | 121 | 3.0 | 0.877 | 54.5 | LOS D | 7.2 | 51.9 | 1.00 | 1.11 | 1.40 | 10.6 |
| 6a | R1 | 327 | 3.0 | 327 | 3.0 | 0.877 | 48.5 | LOS D | 12.4 | 88.9 | 1.00 | 1.09 | 1.33 | 4.2 |
| 6 | R2 | 181 | 3.0 | 181 | 3.0 | 0.877 | 48.7 | LOS D | 12.4 | 88.9 | 1.00 | 1.08 | 1.29 | 20.8 |
| Approach | | 629 | 3.0 | 629 | 3.0 | 0.877 | 49.7 | LOS D | 12.4 | 88.9 | 1.00 | 1.09 | 1.33 | 12.1 |
| North: Kent Street (N) | | | | | | | | | | | | | | |
| 7 | L2 | 35 | 0.0 | 35 | 0.0 | 0.616 | 31.8 | LOS C | 4.3 | 31.0 | 0.89 | 0.78 | 0.90 | 21.4 |
| 8 | T1 | 151 | 3.0 | 151 | 3.0 | 0.616 | 28.5 | LOS C | 4.3 | 31.0 | 0.89 | 0.77 | 0.90 | 26.9 |
| 9b | R3 | 95 | 3.0 | 95 | 3.0 | 0.325 | 32.2 | LOS C | 2.1 | 14.9 | 0.83 | 0.76 | 0.83 | 23.7 |
| Approach | | 281 | 2.6 | 281 | 2.6 | 0.616 | 30.2 | LOS C | 4.3 | 31.0 | 0.87 | 0.77 | 0.88 | 25.2 |
| NorthWest: Napoleon Street | | | | | | | | | | | | | | |
| 27b | L3 | 261 | 3.0 | 261 | 3.0 | 0.514 | 4.4 | LOS A | 0.2 | 1.6 | 0.04 | 0.47 | 0.04 | 38.7 |
| 27a | L1 | 123 | 3.0 | 123 | 3.0 | 0.277 | 32.5 | LOS C | 3.0 | 21.2 | 0.93 | 0.77 | 0.93 | 13.7 |
| Approach | | 384 | 3.0 | 384 | 3.0 | 0.514 | 13.4 | LOS A | 3.0 | 21.2 | 0.33 | 0.57 | 0.33 | 31.8 |
| All Vehicles | | 1803 | 2.9 | 1803 | 2.9 | 0.877 | 29.7 | LOS C | 12.4 | 88.9 | 0.75 | 0.79 | 0.86 | 23.1 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Queue Distance m | Prop. Queued | Effective Stop Rate |
|-----------------|-------------------------|-------------------|-------------------|------------------|--------------------------------------|------------------|--------------|---------------------|
| P1 | South Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P2 | East Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P3 | North Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P7 | NorthWest Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| All Pedestrians | | 211 | 39.3 | LOS D | | | 0.94 | 0.94 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: 1 [1_Erskine Street /Sussex Street _ Future_PM]



Network: N101 [PM Future]

Erskine Street /Sussex Street

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn v/c | Average Delay sec | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|--------------------------|------|--------------|------|---------------|------|---------------|-------------------|------------------|---------------------|------------|--------------|---------------------|------------------|--------------------|
| | | Total veh/h | HV % | Total veh/h | HV % | | | | Vehicles veh | Distance m | | | | |
| South: Sussex Street (S) | | | | | | | | | | | | | | |
| 1 | L2 | 33 | 3.0 | 33 | 3.0 | 0.553 | 55.4 | LOS D | 1.0 | 7.2 | 1.00 | 0.77 | 1.12 | 7.0 |
| 2 | T1 | 280 | 3.0 | 280 | 3.0 | 0.680 | 35.3 | LOS C | 7.1 | 51.2 | 0.97 | 0.84 | 1.00 | 5.8 |
| Approach | | 313 | 3.0 | 313 | 3.0 | 0.680 | 37.4 | LOS C | 7.1 | 51.2 | 0.97 | 0.83 | 1.01 | 6.0 |
| East: Erskine Street (E) | | | | | | | | | | | | | | |
| 4 | L2 | 386 | 3.0 | 386 | 3.0 | 0.924 | 59.0 | LOS E | 13.8 | 98.9 | 1.00 | 1.14 | 1.47 | 7.1 |
| 5 | T1 | 67 | 3.0 | 67 | 3.0 | 0.209 | 22.0 | LOS B | 1.9 | 13.6 | 0.73 | 0.63 | 0.73 | 15.6 |
| 6 | R2 | 33 | 3.0 | 33 | 3.0 | 0.209 | 25.2 | LOS B | 1.9 | 13.6 | 0.73 | 0.63 | 0.73 | 11.2 |
| Approach | | 486 | 3.0 | 486 | 3.0 | 0.924 | 51.6 | LOS D | 13.8 | 98.9 | 0.95 | 1.04 | 1.32 | 7.9 |
| North: Sussex Street (N) | | | | | | | | | | | | | | |
| 7 | L2 | 69 | 3.0 | 69 | 3.0 | 0.925 | 62.8 | LOS E | 2.3 | 16.2 | 1.00 | 1.04 | 1.68 | 14.0 |
| 8 | T1 | 506 | 3.0 | 506 | 3.0 | 0.773 | 37.8 | LOS C | 7.5 | 53.6 | 0.96 | 0.94 | 1.09 | 18.1 |
| 9 | R2 | 55 | 3.0 | 55 | 3.0 | 0.336 | 30.1 | LOS C | 1.1 | 7.7 | 0.96 | 0.73 | 0.96 | 20.8 |
| Approach | | 630 | 3.0 | 630 | 3.0 | 0.925 | 39.8 | LOS C | 7.5 | 53.6 | 0.96 | 0.93 | 1.15 | 17.7 |
| West: Erskine Street (W) | | | | | | | | | | | | | | |
| 10 | L2 | 137 | 3.0 | 137 | 3.0 | 0.637 | 28.0 | LOS B | 6.6 | 47.7 | 0.87 | 0.78 | 0.87 | 8.9 |
| 11 | T1 | 170 | 3.0 | 170 | 3.0 | 0.637 | 25.4 | LOS B | 6.6 | 47.7 | 0.87 | 0.79 | 0.88 | 13.9 |
| 12 | R2 | 186 | 3.0 | 186 | 3.0 | 0.637 | 41.4 | LOS C | 5.1 | 36.5 | 0.97 | 0.83 | 1.00 | 8.5 |
| Approach | | 493 | 3.0 | 493 | 3.0 | 0.637 | 32.2 | LOS C | 6.6 | 47.7 | 0.91 | 0.80 | 0.92 | 10.4 |
| All Vehicles | | 1922 | 3.0 | 1922 | 3.0 | 0.925 | 40.5 | LOS C | 13.8 | 98.9 | 0.95 | 0.91 | 1.11 | 12.1 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue | | Prop. Queued | Effective Stop Rate |
|-----------------|---------------------|-------------------|-------------------|------------------|-----------------------|------------|--------------|---------------------|
| | | | | | Pedestrian ped | Distance m | | |
| P1 | South Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P2 | East Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P3 | North Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P4 | West Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| All Pedestrians | | 211 | 39.3 | LOS D | | | 0.94 | 0.94 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 2 [2_Hickson_Sussex_Napoleon_Future_PM]

 Network: N101 [PM Future]

Hickson Road / Sussex Street / Napoleon Street

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn | Average Delay | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed |
|--------------------------------|------|--------------|-----|---------------|-----|-----------|---------------|------------------|---------------------|----------|--------------|---------------------|------------------|---------------|
| | | Total | HV | Total | HV | | | | Vehicles | Distance | | | | |
| | | veh/h | % | veh/h | % | v/c | sec | | veh | m | | | | km/h |
| South: Sussex Street (S) | | | | | | | | | | | | | | |
| 2 | T1 | 319 | 3.0 | 319 | 3.0 | 0.467 | 29.4 | LOS C | 7.7 | 55.0 | 0.95 | 0.81 | 0.95 | 18.9 |
| 3b | R3 | 114 | 3.0 | 114 | 3.0 | 0.901 | 61.8 | LOS E | 3.6 | 25.9 | 1.00 | 1.00 | 1.39 | 12.1 |
| Approach | | 433 | 3.0 | 433 | 3.0 | 0.901 | 37.9 | LOS C | 7.7 | 55.0 | 0.96 | 0.86 | 1.06 | 16.4 |
| SouthEast: Napoleon Street (E) | | | | | | | | | | | | | | |
| 21b | L3 | 151 | 3.0 | 151 | 3.0 | 0.420 | 36.0 | LOS C | 3.7 | 26.5 | 0.93 | 0.80 | 0.93 | 11.1 |
| 23a | R1 | 310 | 3.0 | 310 | 3.0 | 0.851 | 52.4 | LOS D | 9.2 | 65.9 | 1.00 | 0.95 | 1.15 | 7.8 |
| Approach | | 461 | 3.0 | 461 | 3.0 | 0.851 | 47.0 | LOS D | 9.2 | 65.9 | 0.98 | 0.90 | 1.08 | 8.7 |
| North: Hickson Road (N) | | | | | | | | | | | | | | |
| 7a | L1 | 243 | 3.0 | 243 | 3.0 | 0.624 | 28.0 | LOS B | 6.5 | 46.6 | 0.81 | 0.76 | 0.81 | 7.5 |
| 8 | T1 | 411 | 3.0 | 411 | 3.0 | 0.624 | 24.5 | LOS B | 7.6 | 54.3 | 0.85 | 0.75 | 0.85 | 8.2 |
| Approach | | 654 | 3.0 | 654 | 3.0 | 0.624 | 25.8 | LOS B | 7.6 | 54.3 | 0.84 | 0.76 | 0.84 | 8.0 |
| West: Basement Car Park (W) | | | | | | | | | | | | | | |
| 10 | L2 | 2 | 3.0 | 2 | 3.0 | 0.042 | 50.1 | LOS D | 0.1 | 0.8 | 0.97 | 0.63 | 0.97 | 19.5 |
| 12a | R1 | 32 | 3.0 | 32 | 3.0 | 0.178 | 38.0 | LOS C | 1.2 | 8.4 | 0.90 | 0.71 | 0.90 | 21.9 |
| 12 | R2 | 19 | 3.0 | 19 | 3.0 | 0.178 | 39.2 | LOS C | 1.2 | 8.4 | 0.89 | 0.71 | 0.89 | 22.0 |
| Approach | | 53 | 3.0 | 53 | 3.0 | 0.178 | 38.9 | LOS C | 1.2 | 8.4 | 0.90 | 0.71 | 0.90 | 21.8 |
| All Vehicles | | 1601 | 3.0 | 1601 | 3.0 | 0.901 | 35.6 | LOS C | 9.2 | 65.9 | 0.91 | 0.83 | 0.97 | 11.9 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow | Average Delay | Level of Service | Average Back of Queue | Prop. Queued | Effective Stop Rate |
|-----------------|-------------------------|-------------|---------------|------------------|-----------------------|--------------|---------------------|
| | | ped/h | sec | | Pedestrian | Distance | |
| | | | | | ped | m | |
| P1 | South Full Crossing | 194 | 35.8 | LOS D | 0.4 | 0.4 | 0.90 |
| P5 | SouthEast Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 |
| P3 | North Full Crossing | 64 | 38.4 | LOS D | 0.2 | 0.2 | 0.92 |
| P4 | West Full Crossing | 188 | 5.4 | LOS A | 0.2 | 0.2 | 0.35 |
| All Pedestrians | | 499 | 25.0 | LOS C | | | 0.70 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 3 [3_ Watermans Quay_Hickson Road_Future_PM]  Network: N101 [PM Future]

2_ Watermans Quay_Hickson Road

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn | Average Delay | Level of Service | Aver. Back of Queue | | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed |
|-----------------------|------|--------------|-----|---------------|-----|-----------|---------------|------------------|---------------------|----------|--------------|---------------------|------------------|---------------|
| | | Total | HV | Total | HV | | | | Vehicles | Distance | | | | |
| | | veh/h | % | veh/h | % | v/c | sec | | veh | m | | | | km/h |
| South: Hickson Road S | | | | | | | | | | | | | | |
| 1 | L2 | 317 | 3.0 | 317 | 3.0 | 0.298 | 3.9 | LOS A | 0.2 | 1.7 | 0.03 | 0.47 | 0.03 | 33.3 |
| 2 | T1 | 312 | 3.0 | 312 | 3.0 | 0.279 | 12.0 | LOS A | 5.6 | 40.5 | 0.73 | 0.63 | 0.73 | 32.5 |
| Approach | | 629 | 3.0 | 629 | 3.0 | 0.298 | 7.9 | LOS A | 5.6 | 40.5 | 0.38 | 0.55 | 0.38 | 32.7 |
| North: Hickson Road N | | | | | | | | | | | | | | |
| 8 | T1 | 468 | 3.0 | 468 | 3.0 | 0.459 | 4.0 | LOS A | 4.5 | 32.4 | 0.39 | 0.35 | 0.39 | 36.8 |
| 9 | R2 | 28 | 3.0 | 28 | 3.0 | 0.053 | 9.7 | LOS A | 0.3 | 2.0 | 0.44 | 0.60 | 0.44 | 34.1 |
| Approach | | 496 | 3.0 | 496 | 3.0 | 0.459 | 4.4 | LOS A | 4.5 | 32.4 | 0.39 | 0.36 | 0.39 | 36.6 |
| West: Watermans Quay | | | | | | | | | | | | | | |
| 10 | L2 | 46 | 3.0 | 46 | 3.0 | 0.847 | 55.6 | LOS D | 4.1 | 29.7 | 1.00 | 1.05 | 1.44 | 20.3 |
| 12 | R2 | 173 | 3.0 | 173 | 3.0 | 0.847 | 57.1 | LOS E | 4.1 | 29.7 | 1.00 | 1.05 | 1.49 | 6.9 |
| Approach | | 219 | 3.0 | 219 | 3.0 | 0.847 | 56.8 | LOS E | 4.1 | 29.7 | 1.00 | 1.05 | 1.48 | 10.9 |
| All Vehicles | | 1344 | 3.0 | 1344 | 3.0 | 0.847 | 14.6 | LOS B | 5.6 | 40.5 | 0.48 | 0.56 | 0.56 | 28.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow | Average Delay | Level of Service | Average Back of Queue | | Prop. Queued | Effective Stop Rate |
|-----------------|---------------------|-------------|---------------|------------------|-----------------------|----------|--------------|---------------------|
| | | | | | Pedestrian | Distance | | |
| | | ped/h | sec | | ped | m | | |
| P3 | North Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P4 | West Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| All Pedestrians | | 105 | 39.3 | LOS D | | | 0.94 | 0.94 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 4 [4_Napoleon_Kent_Margaret_Future_PM]

 Network: N101 [PM Future]

New Site

Site Category: Napoleon_Kent_Margaret_Future_AM

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

| Mov ID | Turn | Demand Flows | | Arrival Flows | | Deg. Satn v/c | Average Delay sec | Level of Service | Aver. Back of Queue Vehicles veh | Back of Queue Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|----------------------------|------|--------------|------|---------------|------|---------------|-------------------|------------------|----------------------------------|--------------------------|--------------|---------------------|------------------|--------------------|
| | | Total veh/h | HV % | Total veh/h | HV % | | | | | | | | | |
| South: Kent Street (S) | | | | | | | | | | | | | | |
| 1a | L1 | 52 | 3.0 | 52 | 3.0 | 0.551 | 17.6 | LOS B | 7.4 | 53.2 | 0.71 | 0.64 | 0.71 | 19.5 |
| 2 | T1 | 491 | 3.0 | 491 | 3.0 | 0.551 | 19.0 | LOS B | 7.4 | 53.2 | 0.76 | 0.67 | 0.76 | 30.2 |
| 3 | R2 | 24 | 3.0 | 24 | 3.0 | 0.551 | 33.5 | LOS C | 3.6 | 25.8 | 0.90 | 0.76 | 0.90 | 14.7 |
| Approach | | 567 | 3.0 | 567 | 3.0 | 0.551 | 19.5 | LOS B | 7.4 | 53.2 | 0.76 | 0.67 | 0.76 | 29.3 |
| East: Margaret Street | | | | | | | | | | | | | | |
| 4 | L2 | 86 | 3.0 | 86 | 3.0 | 0.570 | 41.9 | LOS C | 4.1 | 29.5 | 0.97 | 0.80 | 0.97 | 12.9 |
| 6a | R1 | 379 | 3.0 | 379 | 3.0 | 0.570 | 30.3 | LOS C | 7.3 | 52.7 | 0.89 | 0.78 | 0.89 | 6.7 |
| 6 | R2 | 22 | 3.0 | 22 | 3.0 | 0.570 | 30.1 | LOS C | 7.3 | 52.7 | 0.88 | 0.78 | 0.88 | 26.0 |
| Approach | | 487 | 3.0 | 487 | 3.0 | 0.570 | 32.4 | LOS C | 7.3 | 52.7 | 0.91 | 0.78 | 0.91 | 9.8 |
| North: Kent Street (N) | | | | | | | | | | | | | | |
| 7 | L2 | 61 | 0.0 | 61 | 0.0 | 0.902 | 57.7 | LOS E | 9.9 | 71.0 | 1.00 | 1.24 | 1.49 | 16.7 |
| 8 | T1 | 218 | 3.0 | 218 | 3.0 | 0.902 | 54.2 | LOS D | 9.9 | 71.0 | 1.00 | 1.24 | 1.49 | 20.8 |
| 9b | R3 | 39 | 3.0 | 39 | 3.0 | 0.148 | 32.2 | LOS C | 0.8 | 5.9 | 0.80 | 0.72 | 0.80 | 23.7 |
| Approach | | 318 | 2.4 | 318 | 2.4 | 0.902 | 52.2 | LOS D | 9.9 | 71.0 | 0.97 | 1.17 | 1.41 | 20.2 |
| NorthWest: Napoleon Street | | | | | | | | | | | | | | |
| 27b | L3 | 330 | 3.0 | 330 | 3.0 | 0.394 | 19.5 | LOS B | 7.0 | 50.1 | 0.95 | 0.85 | 0.95 | 31.1 |
| 27a | L1 | 125 | 3.0 | 125 | 3.0 | 0.440 | 35.2 | LOS C | 3.2 | 22.8 | 0.96 | 0.81 | 0.96 | 13.0 |
| Approach | | 455 | 3.0 | 455 | 3.0 | 0.440 | 23.8 | LOS B | 7.0 | 50.1 | 0.95 | 0.84 | 0.95 | 27.3 |
| All Vehicles | | 1827 | 2.9 | 1827 | 2.9 | 0.902 | 29.7 | LOS C | 9.9 | 71.0 | 0.88 | 0.83 | 0.96 | 23.2 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Pedestrian | Back of Queue Distance m | Prop. Queued | Effective Stop Rate |
|-----------------|-------------------------|-------------------|-------------------|------------------|--------------------|--------------------------|--------------|---------------------|
| | | | | | | | | |
| P2 | East Full Crossing | 50 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P3 | North Full Crossing | 50 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| P7 | NorthWest Full Crossing | 50 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 |
| All Pedestrians | | 200 | 39.3 | LOS D | | | 0.94 | 0.94 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.