Department for Planning and Environment

Bays West Precinct 1 Masterplan

Transport and Traffic Impact Report

Draft 2 | 10 February 2022

Job number 284325

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Job title		Bays West Precinct 1 Masterplan			**Job number** 284325
Document title		Transport and Traffic Impact Report			**File reference**
Document ref					
Revision	**Date**	**Filename**	Traffic and Transport Masterplan Report.docx		
Draft 1	4 Feb 2022	Description	First draft		
			Prepared by	Checked by	Approved by
		Name	Clarence Li / Vanessa Ly-Dam	Sam Oswald	Eric Rivers / Ian Brocklehurst
		Signature			
Draft 2	10 Feb 2020	Filename	Traffic and Transport Masterplan Report.docx		
		Description	Update incorporating DPE comments		
			Prepared by	Checked by	Approved by
		Name	Clarence Li / Vanessa Ly-Dam	Sam Oswald	Eric Rivers / Ian Brocklehurst
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
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			Prepared by	Checked by	Approved by
		Name			
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				Issue Document verification with document	✓

Contents

Appendices

Appendix A

SIDRA results

1 Executive Summary

This Traffic and Transport Impact Report was developed to support the *White Bay Power Station (Metro) and Roberts Street Sub-Precincts Urban Design Framework and Concept Master Plan* and outline the process undertaken to develop the transport response to the two masterplan options.

The design development has drawn upon the vision for the Precinct outlined in the Bays West Place Strategy and the supporting Place Based Transport Strategy that included a range of transport principles to guide the development of the future transport network. This was paired with engagement with Sydney Metro, Transport for NSW and Port Authority for data , insights and feedback throughout the process. To align with the planning approach for all precincts in NSW the Movement and Place Framework has been applied to guide decision making. The masterplan sits within Stages 4 and 5 of the Movement and Place process and further work will be required in the rezoning application and detailed design phases.

Although the masterplan has been driven by the Bays West Place Strategy vision. There were also a number of requirements that were agreed by all stakeholders:

- No encroachment of streets above the proposed Sydney Metro station box
- Ports Authority NSW operations will continue within the wider precinct, and direct access to the precinct for passengers will be required for cruise terminal operation.
- The location of the Sydney Metro Station and associated buildings and services. Detailed required outlined in Section 6.
- Levels that ensure the access and agrees points to the Metro station are outside flood and coastal inundation zones and the White Bay Power Station is protected from overland flow and 1 in 100 year flood events
- A single point of access to Robert Street from the precinct that considers the interaction with other existing intersections

This initial assessment is only a small part of the full process that will be undertaken to develop a robust and efficient transport network to serve Bays West in the future. The wider process is presented in Figure 1

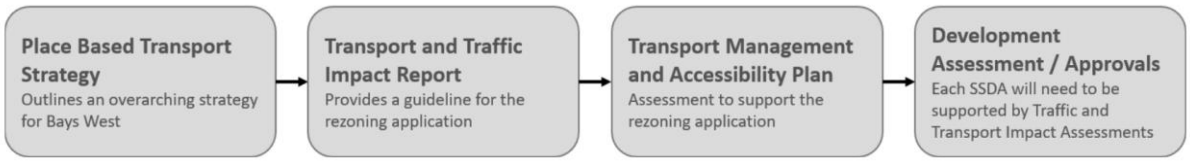


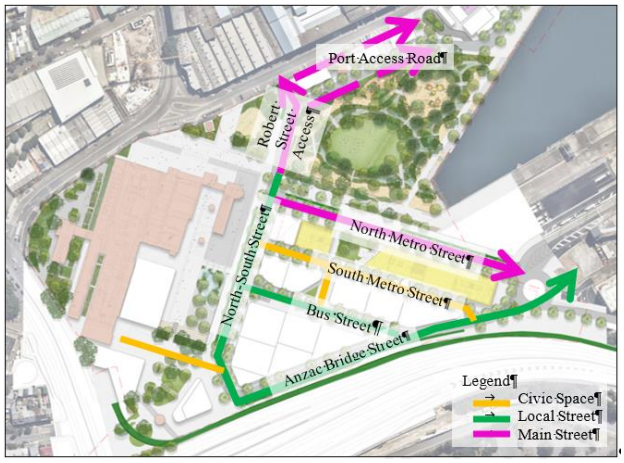
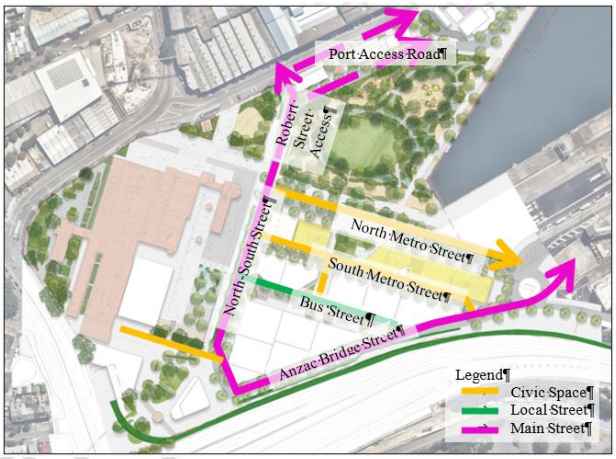
Figure 1: Precinct Planning Progression

Transport responses were developed for the two masterplan options presented in the Urban Design Framework:

- Option 1: Primary Street out the front of the Metro Station
- Option 2: Primary Street next to the Anzac Bridge approach

The key differences between these options (presented in Table 1) are the movement and place typologies for certain streets which has downstream impacts for transport responses relating to certain modes, streets and intersections.

Table 1: Movement and Place typologies – Options 1 and 2

Option 1 – Primary Street out the front of the Metro Station	**Option 2 – Primary Street next to the Anzac bridge approach**
	

Following exhibition of the masterplan, a robust process will be undertaken by DPE to select a preferred option.

Traffic modelling was undertaken to estimate the traffic generated by the Precinct. This included both 2030 and 2040 horizon years to capture the progressive urban renewal of the precinct and involved testing 5% and 15% private vehicle mode shares for all new uses within the Precinct. Although modelling was undertaken for new intersections within the Precinct, capacity concerns were only observed at existing intersections on the surrounding road network. Results for these intersections are presented in Table 2

Table 2: Existing Intersections Results Summary

Intersection	**Non-cruise day**						**Cruise day**					
	2030			**2040**			**2030**			**2040**		
	Base	**5% PV**	**15% PV**	**Base**	**5% PV**	**15% PV**	**Base**	**5% PV**	**15% PV**	**Base**	**5% PV**	**15% PV**
The Crescent / James Craig Road	B	B	B	B	C	F	C	C	C	D	E	F
Victoria Road / Robert Street	D	F	F	F	F	F	D	F	F	F	F	F
Robert Street / Mullens Street	B	B	C	B	E	F	B	B	C	B	E	F

Traffic modelling will need to be refined as the planning for the Precinct progresses. However, initial results clearly indicate achieving an ultra low car mode share for the Precinct is essential to the future operation of the road network. Further work will be undertaken to develop a travel demand management approach that enables this ultra low car vision to be realised.

2 Context and Vision

2.1 Purpose

The purpose of this Transport and Traffic Impact Report (TTIR) is to outline the traffic and transport analysis and decision making that was undertaken to support the development of the *White Bay Power Station (Metro) and Roberts Street Sub-Precincts Urban Design Framework and Concept Master Plan*. Our approach has involved a combination of strategic directions drawn from the Place Strategy and supporting Place Based Transport Strategy (PBTS), engagement with key stakeholders, technical analysis of inputs and conceptual designs of the transport network within the masterplan.

It should be noted that the traffic and transport analysis presented in this report is only one portion of the assessment that will be undertaken to support the development and delivery of Bays West. Figure 2 outlines the wider process that will be taken as the planning for the precinct progresses. DPE will continue to engage stakeholders using a co-design approach throughout this process to ensure these stakeholders are appropriately informed and enabled to provide input and critique at suitable hold points.

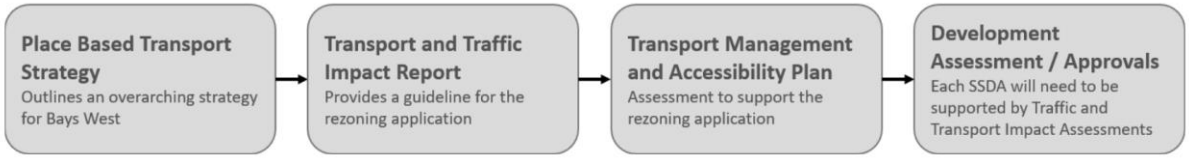


Figure 2: Precinct Planning Progression

2.2 Report Structure

The TTIR contains the following sections:

- Description of Bays West and the sub-precincts being masterplanned
- Strategic context used to guide the development of the masterplan
- Requirements and limitations relating to the TTIR
- Existing and future transport context relating to Bays West
- Description of the proposed masterplan
- Transport response to the masterplan including Options 1 and 2
- Validation of the proposed road network using SIDRA modelling
- Next steps in the planning of the sub-precincts

2.3 Bays West

The Bays West precinct is located two kilometres west of the Sydney CBD and is comprised of numerous sub-precincts outlined in Figure 3.

Despite its central location, Bays West is waterlocked on three boundaries and severed by major arterial roads including the City West Link Road and the Anzac Bridge Access Road. The Bays West precinct holds significant historical value as the main power source for Sydney, and today as a vital working harbour providing key services to Sydney Harbour and support cruise ship berthing at the White Bay Cruise Terminal. It will be important to embrace the precinct's heritage, its current operations and the central location to deliver a unique precinct to Sydney. The precinct is surrounded by other major projects such as the Sydney Fish Markets, Blackwattle Bay and the Glebe Island Bridge.

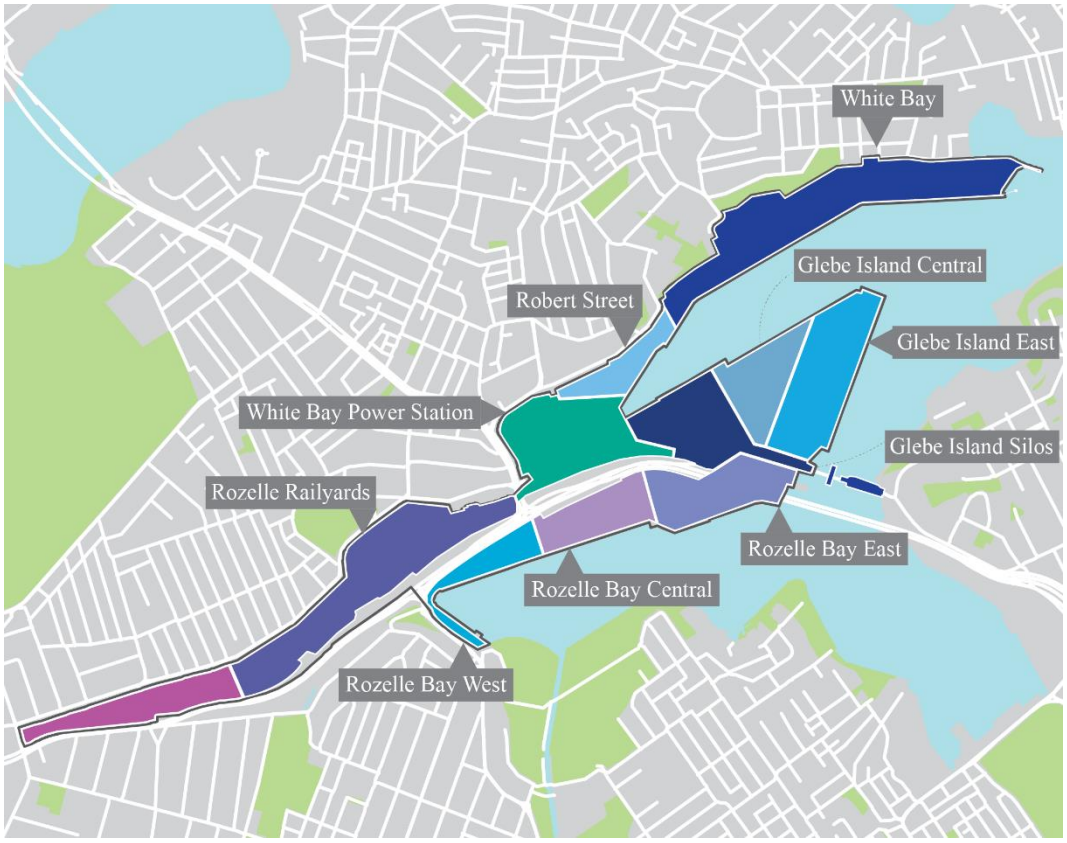


Figure 3: Bays West Sub-precincts

2.4 WBPS (Metro) and Robert Street sub-precincts

Stage 1 of the Bays West Precinct Masterplan comprises of the White Bay Power Station (and Metro) and Robert Street sub-precincts. These sub-precincts are vital to the urban renewal of the Bays West precinct, as they include the White Bay Power Station (WBPS) and future Bays West Metro Station. Acting as the central node for Bays West, these sub-precincts will be the key centres of activity connecting employment, cultural, recreational, and social uses.

The WBPS (and Metro) sub-precinct will form the main access to public transport and act as the gateway to the precinct for many users. This heightens the importance of celebrating the heritage listed WBPS and the waterfront access to attract people to the precinct.

The Robert Street sub-precinct will serve as the key interface with the current White Bay Cruise Terminal and the Balmain Peninsula, connecting the existing community with the White Bay waterfront and new facilities delivered by the WBPS (and Metro) sub-precinct. These sub-precincts are outlined in Figure 4.

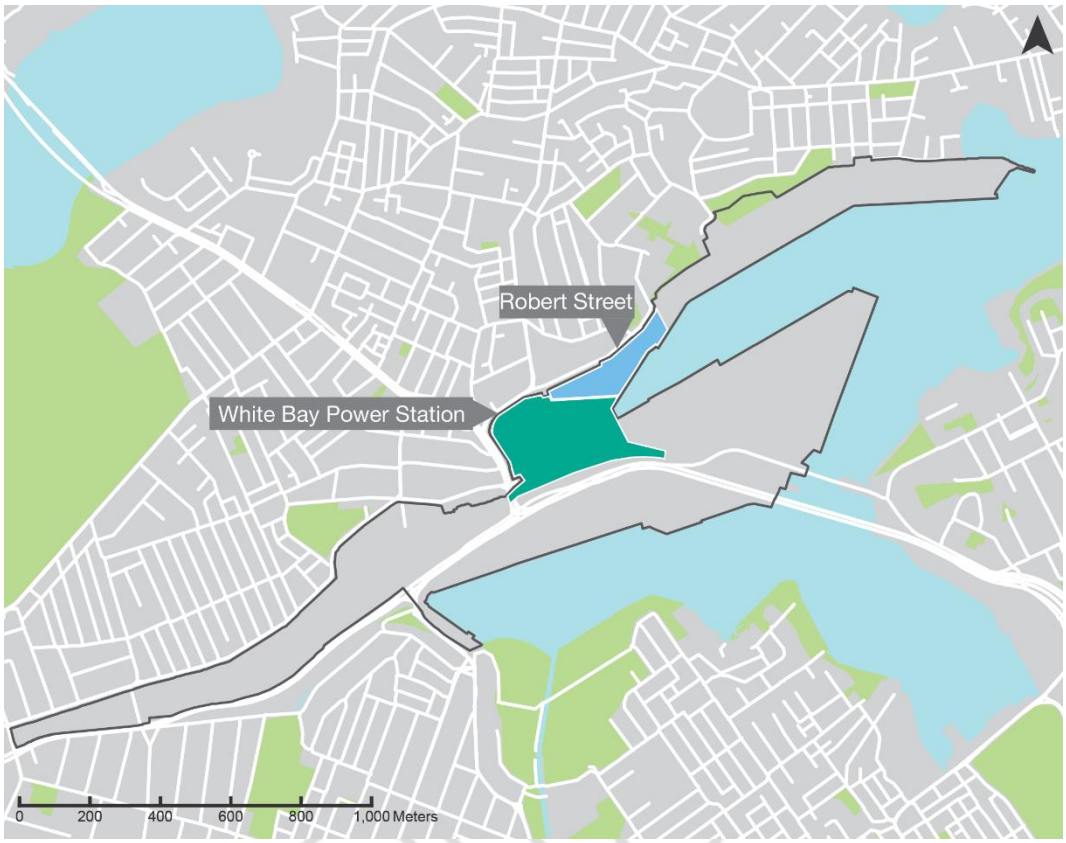


Figure 4: White Bay Power Station and Robert Street sub-precincts

2.5 Strategic Context

The Department of Planning and Environment (DPE) prepared the Bays West Place Strategy (November 2021) that sets out a vision for Bays West:

Bays West will represent a new kind of Sydney Urbanism that respects and celebrates Country.

It will build on its natural, cultural, maritime and industrial stories to shape an innovative and sustainable new place for living, recreation and working.

New activities, places, connections and destinations will enrich the Bays West's character and meaning over time through built form and public spaces that embrace its natural cultural heritage.

This vision is supported by 14 directions under five enabling themes that address the connectivity, productivity, liveability and sustainability which will guide the transformation of the precinct over time. These themes are outlined in Figure 5.

Land use and function that | **Design of places and** | **Transport and movement** that | **Heritage and culture** that | **Infrastructure delivery and**

address further land uses of Bays West and the role it will play in Sydney's future	**spaces** that provide guidance on how Bays West will feel to people and what is important in the design of buildings and public domain	recognise the constrained nature of Bays West and establish how the Precinct will safely move people and goods within, to, from and through Bays West	recognise the importance of the past and how understanding history and culture is critical to creating a place with meaning	**governance** that recognise that the Precinct will evolve over time and that multiple stakeholders are required to ensure that Bays West is successfully delivered

Figure 5: Themes, Bays West Place Strategy (November 2021)

The Place Strategy has identified the constrained nature of the environment, with limited opportunities to move people and goods to, from, and through Bays West. This is clearly outlined in the *Transport and Movement* theme which aims to enhance connectivity, integration, permeability and sustainable transport options in the Precinct. The three directions that support this theme are presented in Figure 6

Figure 6: Transport and Movement theme in the Place Strategy, Bays West Place Strategy (November 2021)

The Place Strategy vision, themes and directions are supported by six Big Moves (Figure 7). Several of which directly relate to transport.

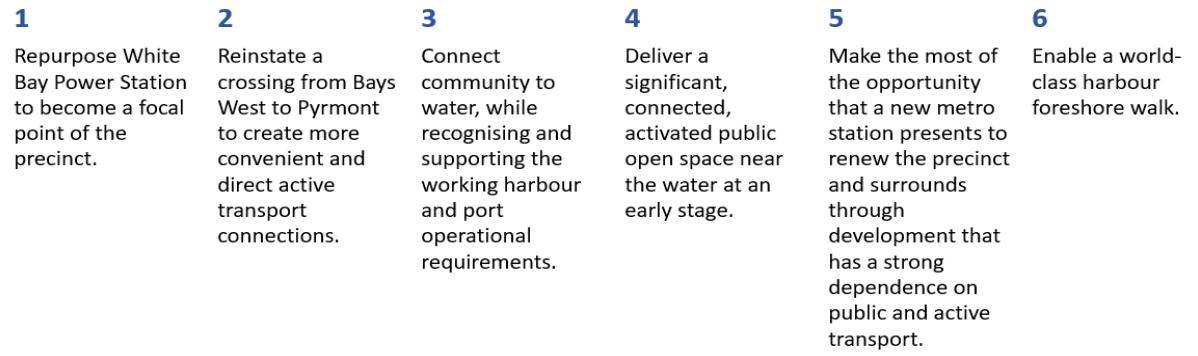


Figure 7: Six big moves, Bays West Place Strategy (November 2021)

2.5.1 Placed Based Transport Strategy

To support the Place Strategy a Place Based Transport Strategy has been developed. This strategy outlines four key transport themes that align with the broader aspirations presented in the Place Strategy.

Each of the four themes in the PBTS are supported by a set of key principles, as outlined in Figure 8. These principles have guided the development of the Bays West Stage 1 Masterplan to achieve positive transport outcomes for the precinct and its future users.

Access and Connectivity

- Implement a visionary low car Precinct
- Connect and integrate Bays West with the Eastern Harbour 30-minute City, the Innovation Corridor and the Inner West
- Harness opportunities provided by wider transport investment such as Sydney Metro and Rozelle Interchange and potential government investment such as the Glebe Island Bridge active transport connection between Rozelle and Pyrmont
- Integrate a core multimodal network that is equitable, people-focused and planned around seamless interchange at transport nodes
- Leverage opportunities to support Bays West using emerging technology and smart cities thinking

Environment and Topography

- Implement a low (or zero) carbon Precinct
- Exceptional connections that activate the heritage, landmarks, harbour and open space of Bays West

Implementation and Operation

- Preserve and enhance operations, servicing requirements and freight
- Recognise the evolving transport demands of Bays West and plan and respond flexibly
- Provide safe and equitable access to a range of modes

Environment and Topography

- Deliver outcomes for the community and stakeholders through application of the Movement and Place Framework
- Establish a Precinct wide Travel Demand Management philosophy from opening
- Implement flexible uses and spaces that can adapt to changing functions and temporal travel patterns

Figure 8: Place Based Transport Strategy Precinct Principles

Section 6 tests the Masterplan options against these principles to confirm alignment with the wider vision for Bays West.

2.5.2 Precinct-wide transport strategies

The PBTS outlines key initiatives that responds to the vision of the Bays West Strategy. The transport strategies relevant to these sub-precincts are:

- **Creating walkable streets and places:** delivering a direct, safe and amenable walking network comprised of primary and local connections.
- **A connected cycle network:** delivering an integrated, tiered cycle network to connect the sub-precincts internally and with regional routes.
- **Enhanced public transport:** supporting sustainable travel with the delivery of a Metro station in the heart of the precinct and a bus interchange that accommodates rapid, frequent and local services.
- **Towards Net Zero:** contributing to NSW Government's Net Zero goal through supporting sustainable travel mode such as active transport
- **Balancing Movement and Place:** developing a masterplan that balances the movement needs of the ports and maritime land uses and a permeable people focussed place for the community.

2.5.3 Travel Demand Management Approach

A Travel Demand Management (TDM) Approach is needed in the development of the masterplan to deliver an ultra-low car vision. A TDM strategy is an interconnected web of strategies, policies and interventions that will span the sub-precincts and the entirety of the Bays West precinct.

The TDM approach has been integrated into the development of the masterplan focussing on:

- Making sustainable travel options and choices available to customers
- Promotion of sustainable travel options to influence mobility.

Specific TDM options are outlined in Figure 9.

Figure 9: TDM Options (Source: Mobility Lab 2013)

2.5.4 Movement and Place Framework

Place-based planning is an emerging approach across NSW Government that involves taking a collaborative, spatial, long-term approach to develop contextual responses that better meet the needs of the local people and their environment in a defined geographic location. It aims to support and build thriving communities and is ideally characterised by partnering and sharing design, shared stewardship, and shared accountability for outcomes and impacts.

A ‘Place-based’ approach was applied to the masterplan and thus has driven the transport findings of this report, in which the interplay of contextual elements like land use, urban form and population demographics is balanced against the movement of people and goods through, to and within places. In Future Transport 2056, TfNSW adopted the Movement and Place Framework for planning and managing the road network.

The design nature of this work means that the focus on this work will sit within *Design Principles* steps of the movement and place process. The masterplan sits within Stages 4 and 5 and further work will be required in the rezoning application and detailed design phases to

continue to explore and investigate in further detail. The core steps in the Movement and Place Framework are shown in Figure 10.

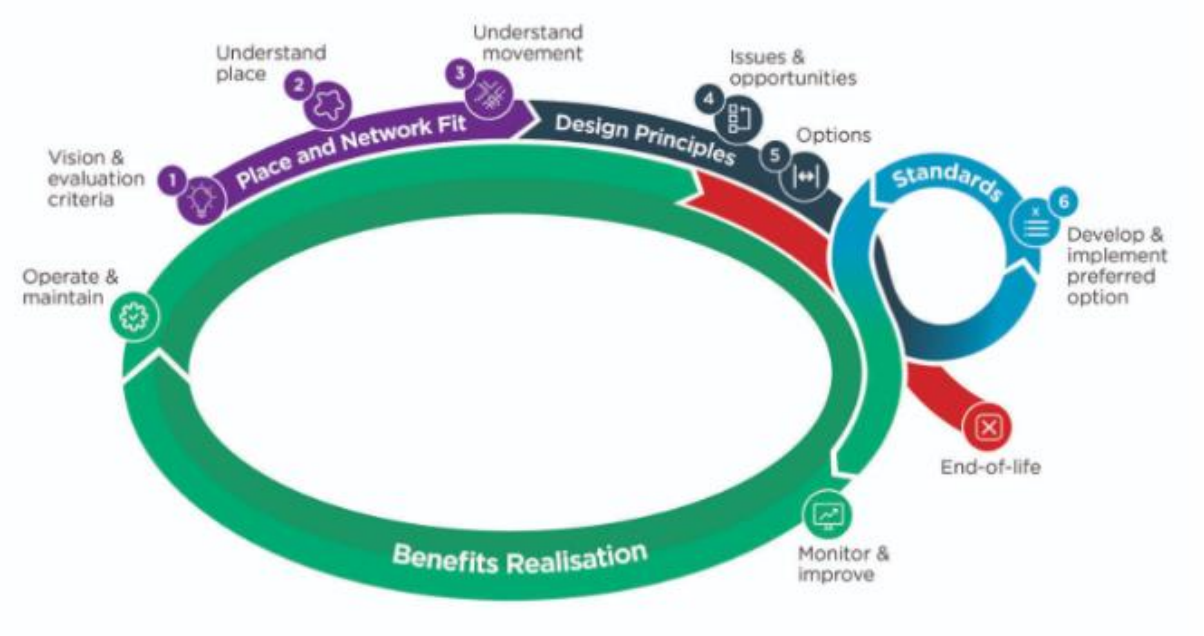


Figure 10: Steps in the core Movement and Place process (TfNSW 2020)

2.5.5 Precinct Personas

The precinct is expected to serve a variety of customers including residents, commuters, service vehicle drivers, cruise passengers, recreational users and maritime operators. The key personas that were developed as part of the PBTS are presented in Table 3. These personas were used to identify their likely mode of travel, time of travel and the priorities which are to be considered in development of the masterplan transport network.

Table 3: Customer personas

Customer type		Mode	Time of day	Consideration in street network development
	Resident of Bays West, commuting for work	Public transport / walking / cycling	Early morning and late at night	• Well-lit pedestrian and cycling pathways • Regional active transport connections
	Resident of Pyrmont, commuting for work	Public transport / walking / cycling	AM and PM peak	• Efficient and reliable public transport alternatives • Pedestrian and cycling links to key public transport interchanges • Bicycle storage facilities

Customer type		Mode	Time of day	Consideration in street network development
	Worker in Bays West	Public transport / private vehicle	AM and PM peak	• Multi-modal trips with car parking alternatives
	Low mobility cruise ship passenger	Taxi / private vehicle	Cruise peak	• Kiss and Ride facilities for taxi and private vehicles at cruise terminal • Intuitive wayfinding • Limited pedestrian path grade changes
	Heavy vehicle driver	Freight	All day	• Separated road space for vehicles, cyclists and pedestrians • Loading and servicing bay capacity
	Active traveller	Walking / cycling / micromobility	Evenings and weekends	• Separated cycling and walking paths • Improved access to green spaces
	Tourist	Walking / public transport	All day	• Pedestrian links to key landmarks • Seamless public transport integration with compatible ticketing systems
	Recreational maritime user	Boat	During the day	• Safety in the water • Connection to green space
	Marine operations	Boat	During the day	• Safe water accessibility to the ports

This TTIR draws upon the Bays West Place Strategy (November 2021), the Bays West Place Based Transport Strategy (PBTS) and the Movement and Place Framework. Inputs have also been provided by Sydney Metro as part of the Sydney Metro West Project and the planning of port and harbour operations such as the White Bay Cruise Terminal and Glebe Island by Port Authority of NSW (PANSW).

2.6 Masterplan design principles

Considering the PBTS themes and principles, leveraging the future Bays West Metro station and the scale of the development in this stage of the masterplan, the street network aims to prioritise walking and cycling. The modal hierarchy (Figure 11) outlines how different modes of transport were prioritised in the proposed masterplan street network.

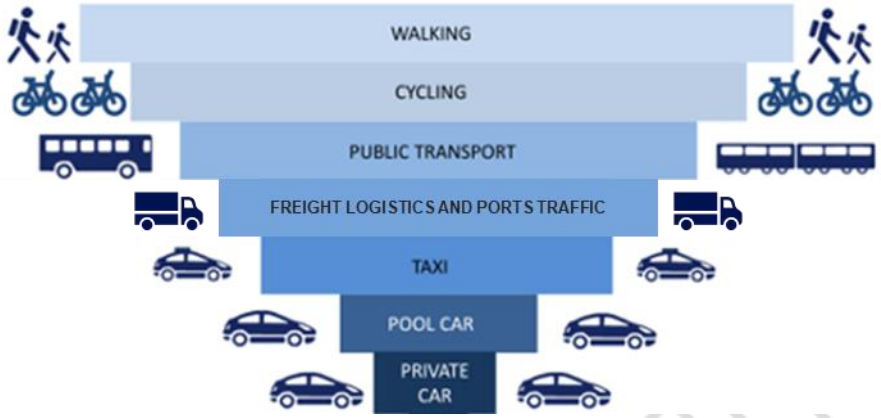


Figure 11: Modal hierarchy for user priority

The resultant street network aims to:

- Promote walkability by incorporating footpaths along every side of every street,
- Promote pedestrian priority and safety at intersections through zebra crossings, scramble crossings, raised crossings and wide footpaths,
- Promote walking through the precinct by considering pedestrian desire lines between public transport, points of interest and the foreshore and designing paths and street crossings accordingly,
- Promote regional cycling by providing precinct connections to external regional active transport routes at the Anzac Bridge, the Mouse Hole and north to Glebe Island Bridge
- Promote precinct cycling by incorporating dedicated cycle lanes, low speed local streets with on-street cycling, and shared streets,
- Promote pedestrian and bicycle safety by intentionally reducing the potential for pedestrian-vehicle and cyclist-vehicle interactions,
- Support public transport and the future Bays West Metro station by providing seamless transfer to bus services directly adjacent to the Metro station,
- Support public transport by intentionally incorporating bus routes and stops within the planned street network,
- Intentionally consider building servicing in order to support development yields and a foster a lively and successful precinct,
- Consider and serve future year traffic expectations for ports, cruise day and private vehicles.
- Implement a Safe Systems Approach to design and work towards zero fatalities and serious injury for all modes of transport within the precinct.

3 Study Requirements

The development of the masterplan was undertaken considering a number of key requirements that stakeholders agreed must be included. Given the accelerated program for developing the masterplan there were also several limitations relating to the analysis undertaken.

3.1 Requirements

To align with the PBTS and the Place Strategy, there are several minimum requirements for the masterplan that have been considered in the development of the street network, these include:

- No encroachment of streets above the proposed Sydney Metro station box
- Ports Authority NSW operations will continue within the wider precinct, and direct access to the precinct for passengers will be required for cruise terminal operation.
- The location of the Sydney Metro Station and associated buildings and services. Detailed required outlined in Section 6.
- Levels that ensure the access and agrees points to the Metro station are outside flood and coastal inundation zones and the White Bay Power Station is protected from overland flow and 1 in 100 year flood events
- A single point of access to Robert Street from the precinct that considers the interaction with other existing intersections

3.2 Limitations

Limitations relating to the analysis undertaken in the TTIR is as follows:

- Consultation is ongoing with Sydney Metro, TfNSW & PANSW, and requirements will continue to be refined over the coming weeks and months and may require amendment to the advice presented in this report.
- Advice has been prepared based on preferred options for Options 1 and 2. We understand following the exhibition of the masterplan, a robust process will be undertaken to select a final option.
- The bus interchange is only a draft concept and will need to be reviewed and discussed with TfNSW bus operations team.
- Further discussions with Sydney Metro will be required to ensure streets bordering the station have suitable Hostile Vehicle Management (HVM) measures.
- High-level traffic validation has been undertaken to help define the emerging street network. Traffic validation has been undertaken using land uses and background traffic forecasts available at the time traffic modelling was undertaken, including Public Transport Project Model and Port Authority of NSW forecasts. Further detailed analysis will be undertaken, to refine the design of intersections and understand the impacts on the transport network in future stages.

- Swept path analysis for the precinct road network, is not included in this report. This analysis has been undertaken for key movements but will be refined further once a final option is selected with respect to the street network.
- Locations for parking, loading and serving are preliminary, and have only been considered at a high-level. Detail around provision for specific uses would need to be developed in conjunction with any future development plots and approvals at both rezoning and detailed development assessment phases.

4 Existing and future transport and land use

4.1 Existing Transport and Land Use

Bays West is a centrally located precinct with limited public access. The precinct is predominantly used for industrial maritime, cruise, working harbour and port functions. Three major roads – City-West Link Road, Victoria Road and Anzac Bridge - sever Bays West into sections and despite these roads, the precinct faces several constraints. Connections to the North and West are limited due to the steep slopes leading inland, and towards the east the Anzac Bridge provides the only direct connection to Pyrmont and the Sydney CBD.

Road network connections to the WBPS (and Metro) and Robert Street sub-precincts are nearing maximum capacity; a situation that is exacerbated on cruise days when passengers and workers access the White Bay Cruise Terminal. These passengers predominantly use private vehicles due to the minimal public transport options and an undesirable setting for walking and cycling.

4.1.1 Walking and Cycling

The current walking and cycling network of the sub-precincts is shaped by the industrial land uses that are restricted to public access. The network within these sub-precincts has fundamental barriers to safe and convenient travel. Heavy vehicle movements associated with the ports and maritime uses create unpleasant walking and cycling conditions. Although footpaths are provided in some locations these generally provide minimal amenity. Regional connections are provided through shared paths on Victoria Road or Anzac Bridge however local connections are not provided to the sub-precincts, as outlined in Figure 12. In short, currently there is only one shared-use path around the perimeter of the Robert Street, White Bay, and Glebe Island sub-precincts and due to the industrial nature of the existing land use, almost no public access or connectivity across the precinct.

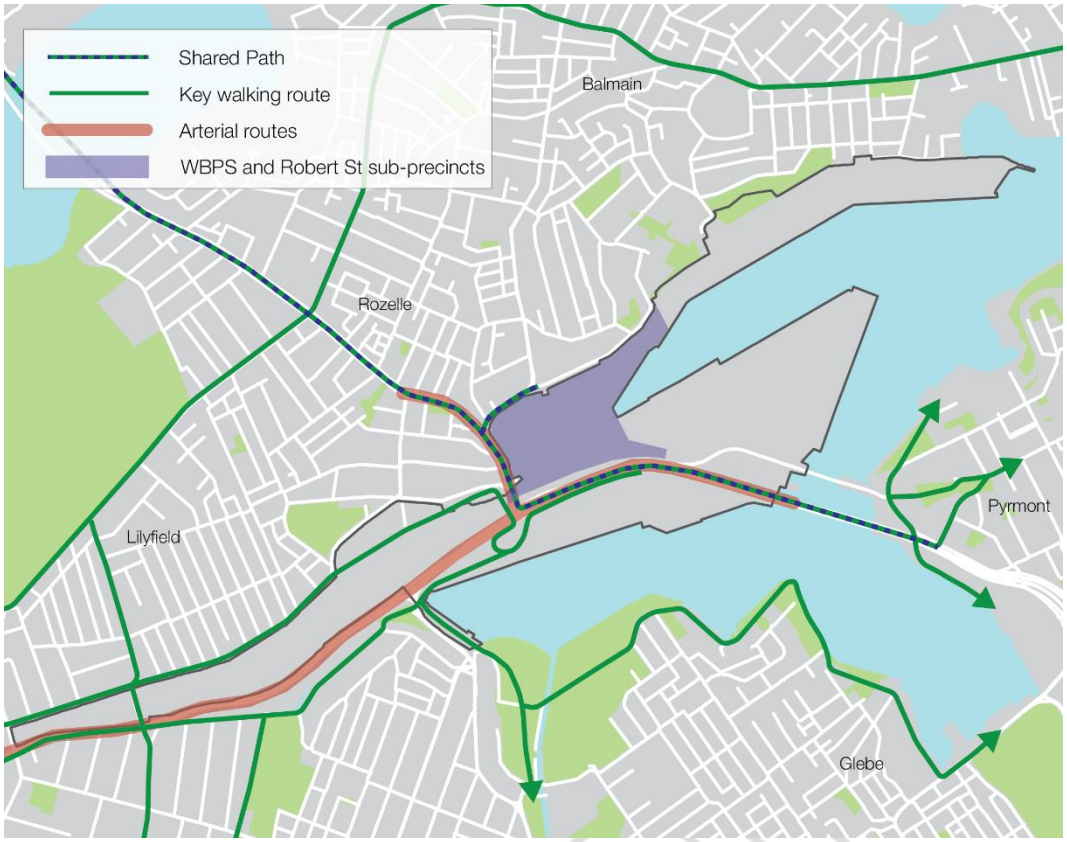


Figure 12: Existing walking and cycling infrastructure

4.1.2 Public Transport

Similar to walking and cycling, access to public transport services are limited. The current public transport services are outlined in Figure 13.

Various bus services are available on Robert Street, bordering the WBPS sub-precinct and on Victoria Road. These bus services connect to the Balmain Peninsula, the Inner West and towards the Sydney CBD. Although there are services available, accessing the bus stops from precinct generally involve convoluted walking routes and grade changes, further reducing accessibility to bus services.

The Inner West Light Rail network is located adjacent to the Bays West precinct with the closest stop at Rozelle Bay. The stop is approximately a 3km walk from the WBPS and Robert Street precincts due to the lack of pedestrian amenity within the precinct despite being geographically close.

Reduced public transport accessibility to the sub-precincts affects the public transport mode share. Improved public transport services could potentially drive a mode shift to more sustainable modes of transport and better integrate the precinct with greater Sydney.

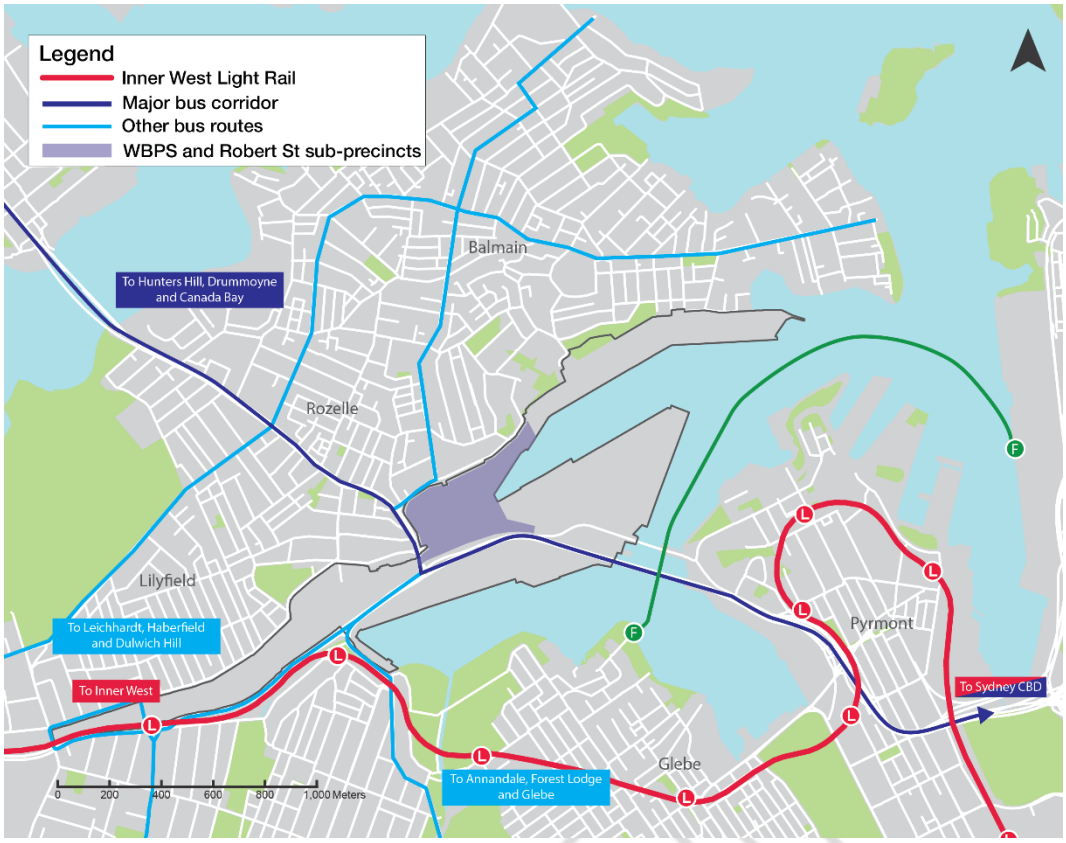


Figure 13: Existing public transport network

4.1.3 Private Vehicles and Freight

The Bays West Precinct is located at the intersection of three major arterial roads, Victoria Road, Anzac Bridge and City-West Link Road which connect to the Inner West, Sydney CBD, eastern suburbs and Northern Sydney. These roads are part of the tertiary freight network, which include traffic accessing the precinct either through the intersection of James Craig Road and The Crescent or using the Port Access Road via Robert Street.

The intersection of James Craig Road and The Crescent is currently congested and operating at capacity. Despite the delivery of WestConnex and the vicinity of the Bays West precinct to this key piece of infrastructure, it is unlikely that this will alleviate the traffic congestion of these intersections. The second main road access at Port Access Road is via the Robert Street and Victoria Road intersection. Victoria Road is also operating at capacity as a major thoroughfare during peak hours for traffic travelling into the Sydney CBD.

Private Vehicles

Key to the Bays West Precinct is the industrial land uses of Glebe Island, the ports and White Bay Cruise Terminal. The lack of public transport provision and the industrial landscape of the area have contributed to a high private vehicle mode share for those working in the precinct.

Ports and Maritime uses

The maritime and ports land uses of Bays West are important to wider Sydney maritime operations. Port Access Road is the main internal road that facilitates this heavy vehicle traffic for Glebe Island and White Bay Cruise Terminal activities. On days when cruise ships

are berthed at the White Bay Cruise Terminal, private vehicle and freight traffic throughout the precinct significantly increases affecting Robert Street and Port Access Road within the WBPS and Robert Street precincts.

Considering the port and industrial operations of Bays West will be important in the development of the sub-precinct masterplan to ensure effective integration between the various land uses and transport modes

4.2 Future Transport and Land Use

As outlined by the PBTS, the Bays West Precinct is capable of becoming an extension of the Sydney CBD and Tech Central development which will provide a diverse range of land uses to ensure a vibrant and lively precinct with cultural, retail, commercial, residential, social and educational land uses. The existing ports activities at Glebe Island may continue to be operational in the immediate future along with the White Bay Cruise Terminal.

4.2.1 Walking and Cycling

Pertinent to the connectivity of the precinct is ensuring that there is seamless walking and cycling access to and within the precinct. The NSW Government has set out an ambition in Future Transport 2056 to provide a network of safe, high-quality cycleways within 5-10 kilometres of strategic centres, which may connect Bays West with other strategic centres such as Pyrmont and Sydney CBD. Within Bays West, pedestrian bridges and shared paths have been proposed as part of the Rozelle Interchange works. While these paths will improve the overall connectivity within the Bays West precinct, they will not directly connect with the WBPS and Robert Street sub-precincts. The Inner West Council Integrated Transport Strategy has outlined additional proposals to improving the cycling and walking pathways to better link the precinct with surrounding areas.

Cycling

The Inner West Council has outlined a proposed cycling network for the future Bays West and local area. Part of the planned Parramatta to CBD foreshore link includes extra cycleways along the harbour foreshore providing a new recreational cycling route. Another major opportunity is the potential to reactivate the Glebe Island Bridge providing a safe, at-grade connection to Pyrmont and the CBD which will divert cycling traffic away from the heavily congested Anzac Bridge.

The current publicly available cycling plans have significant gaps within the WBPS and Robert Street sub-precincts, as outlined in Figure 14. It will be important to develop an internal cycling network that connects the sub-precincts to the wider precinct and onwards.

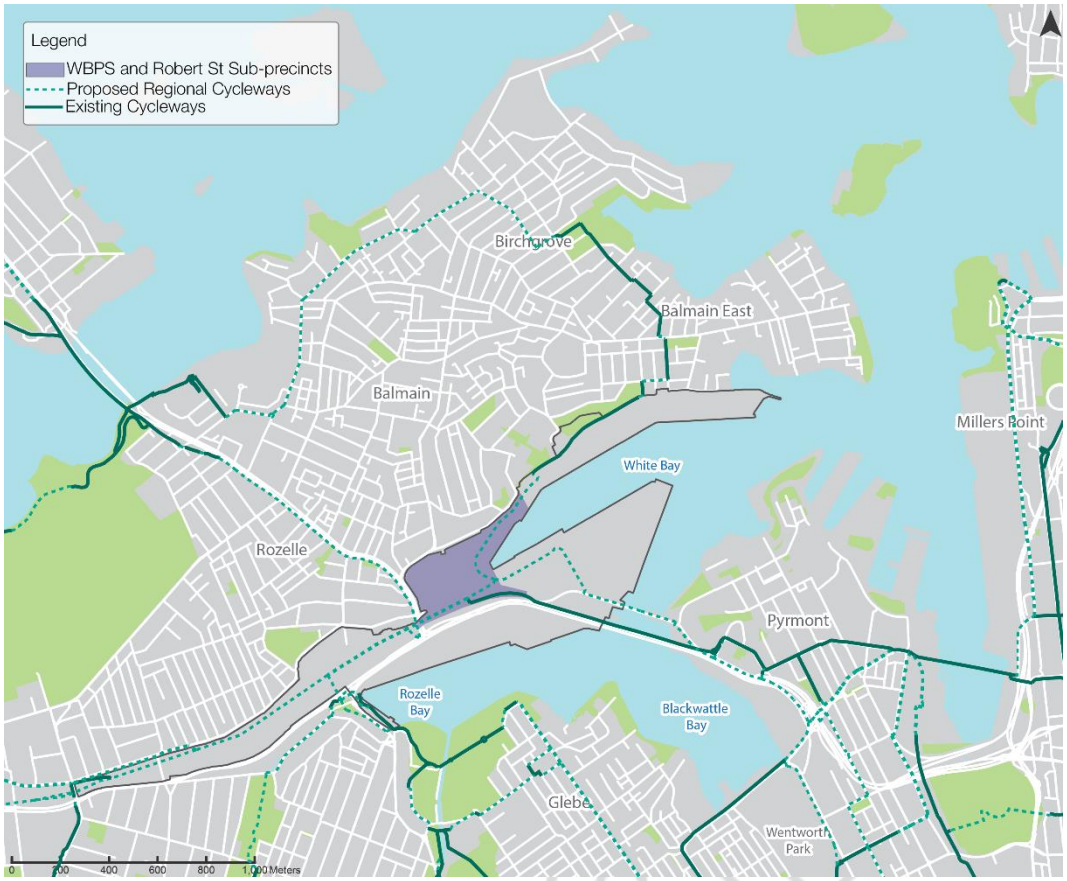


Figure 14: Future proposed Bays West cycling network

Walking

Similar to the cycling network, the Parramatta to CBD foreshore link will offer a new recreational walking route to the precinct. Despite the Rozelle Interchange pedestrian links and land bridges, the WPBS and Robert Street sub-precincts will remain disconnected from these connections. The future proposed walking network is outlined in Figure 15.

It will be important for planning of the sub-precincts to consider the walking network within the various land uses of the sub-precincts as well as connections with the proposed future infrastructure. A well connected internal walking network will improve the pedestrian amenity of the sub-precincts and contribute to creating a place that caters to the needs of the community and its visitors.

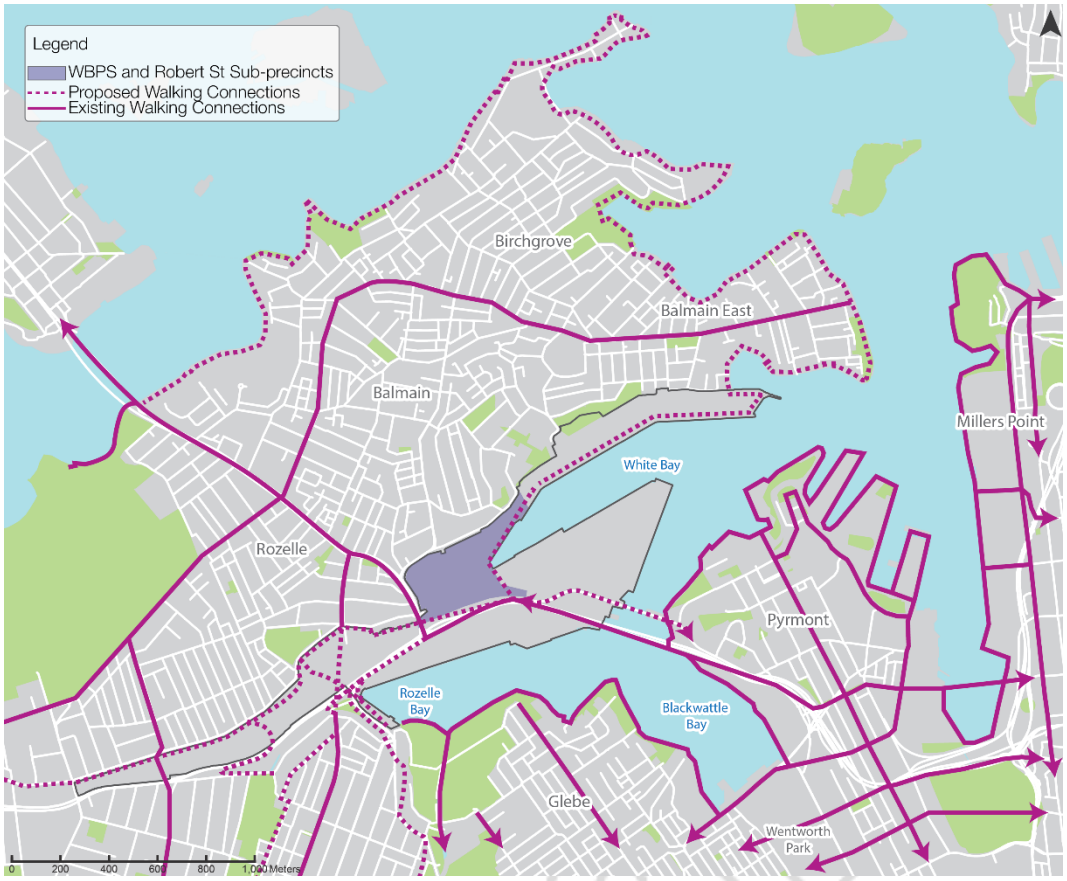


Figure 15: Future proposed Bays West walking network

4.2.2 Public Transport

Key to the public transport connectivity of the sub-precincts in the future is the delivery of the Sydney Metro West Station. This station will provide a frequent reliable service to enable Parramatta and the Sydney CBD as well as providing connections to the wider Sydney Trains network. This service will provide public transport accessibility for the entire precinct forming a key hub for the transport network to pivot around. The Sydney Metro West Station will be supported by a transport interchange providing seamless connections to local bus services and improved connections to rapid services on Victoria Road.

4.2.3 Private Vehicles and Freight

The Rozelle Interchange and WestConnex project is expected to impact surface traffic volumes on Victoria Road and Anzac Bridge. Increased freight traffic will be generated by the Hanson's Operations and Multi-User facility planned for Glebe Island. Congestion of the surrounding network is therefore also expected to be an issue in the future.

Private Vehicles

All private vehicles will use the existing access point to the precinct via James Craig Road or the new access from Robert Street. Ultimately for the surrounding transport network to continue to function private vehicle trips will need to be significantly minimised through limiting parking and encouraging a mode shift to other transport services. The Bays West precinct will need to achieve an ultra low car mode share and the masterplan for the Stage 1 will be cognisant of this.

Ports and Maritime uses

Any future transport network for the precinct will need to provide for the freight generated by industrial uses on Glebe Island which serve an important role for Sydney. However, given the constrained capacity on the road network efforts to consolidate and re-time these movements will be vital to the continued function of the road network and to support wider aspirations for placemaking within the precinct.

Cruise days currently generate a large number of private vehicle trips to transport passengers to the White Bay Cruise Terminal via James Craig Road. In the future other transport services will need to be considered which leverage of the Sydney Metro West Station to achieve passenger mode shares that are similar to the Overseas Passenger Terminal at Circular Quay.

5 Proposed Masterplan

The *Bays West Daft Master Plan and Urban Design Framework* presents the initial proposed masterplan for the WBPS and Robert Street precincts. This aligns with the vision for the precinct as outlined in the Bays West Place Strategy and inputs provided from an expansive multidisciplinary team. The masterplan structure is presented in Figure 16.

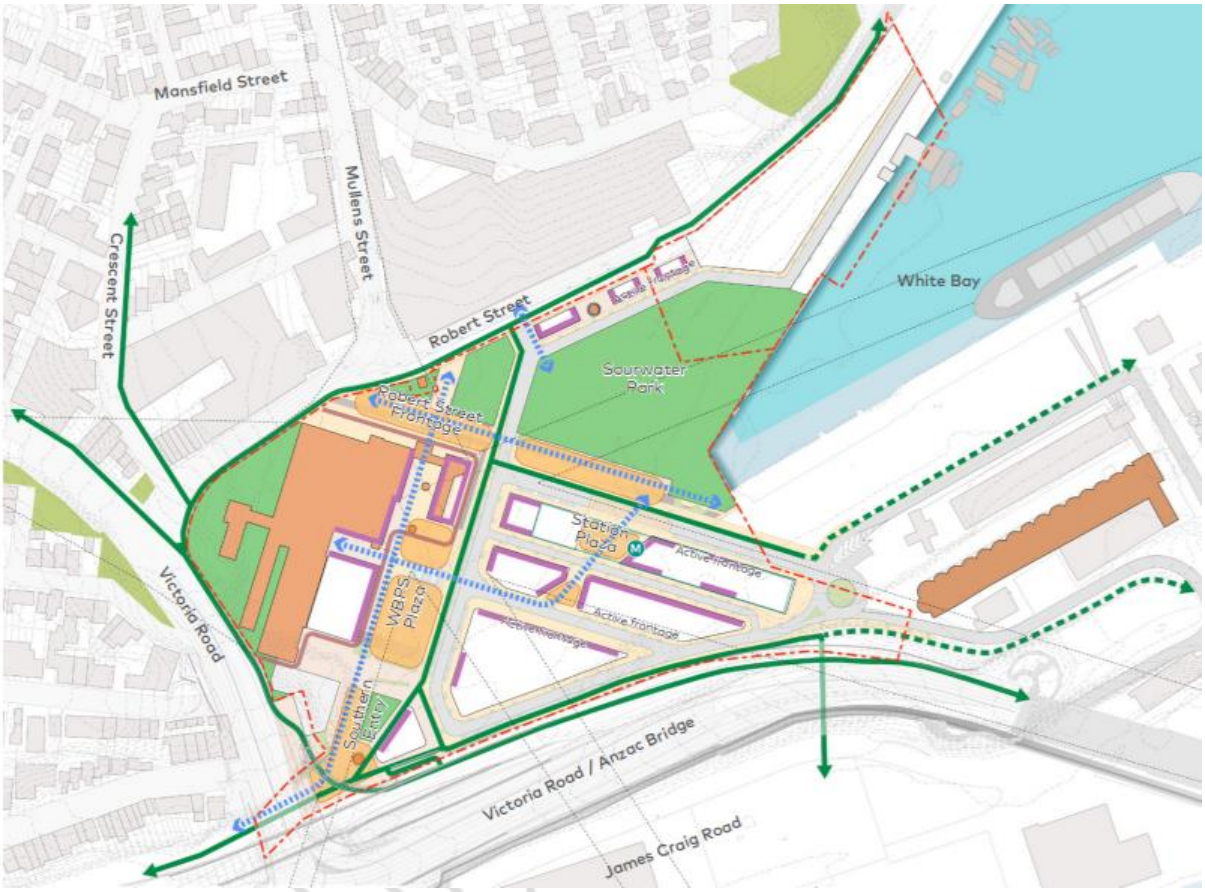


Figure 16: Proposed Masterplan

The Integrated Station Development will be supported by commercial and retail land parcels connected by a fine grained street network. Retail uses will be provided at lower levels to harness the street activity expected in the precinct due to the Sydney Metro West Station, WBPS and Harbourside Park.

Three land use scenarios have been proposed in the *Bays West Daft Master Plan and Urban Design Framework*. The TTIR has tested Scenario 2 as it represents the highest yields with a balance of uses. These yields are presented in Table 4.

Table 4: Scenario 2 land use and yields

Land Use		Yield (m^2)
Residential	Metro sub-precinct	28,500
	Robert Street	25,000
Commercial	OSD and ASD	8,600
	Metro Sub-precinct	51,500

	WBPS	12,000
Retail	Metro sub-precinct	5,000

6 Transport Response

An emerging street network has been developed through co-design, coordinated by DPE. A tiered network is proposed, that has several different street typologies to service the differing needs of the Precinct. The emerging network with street names is presented in Figure 17.

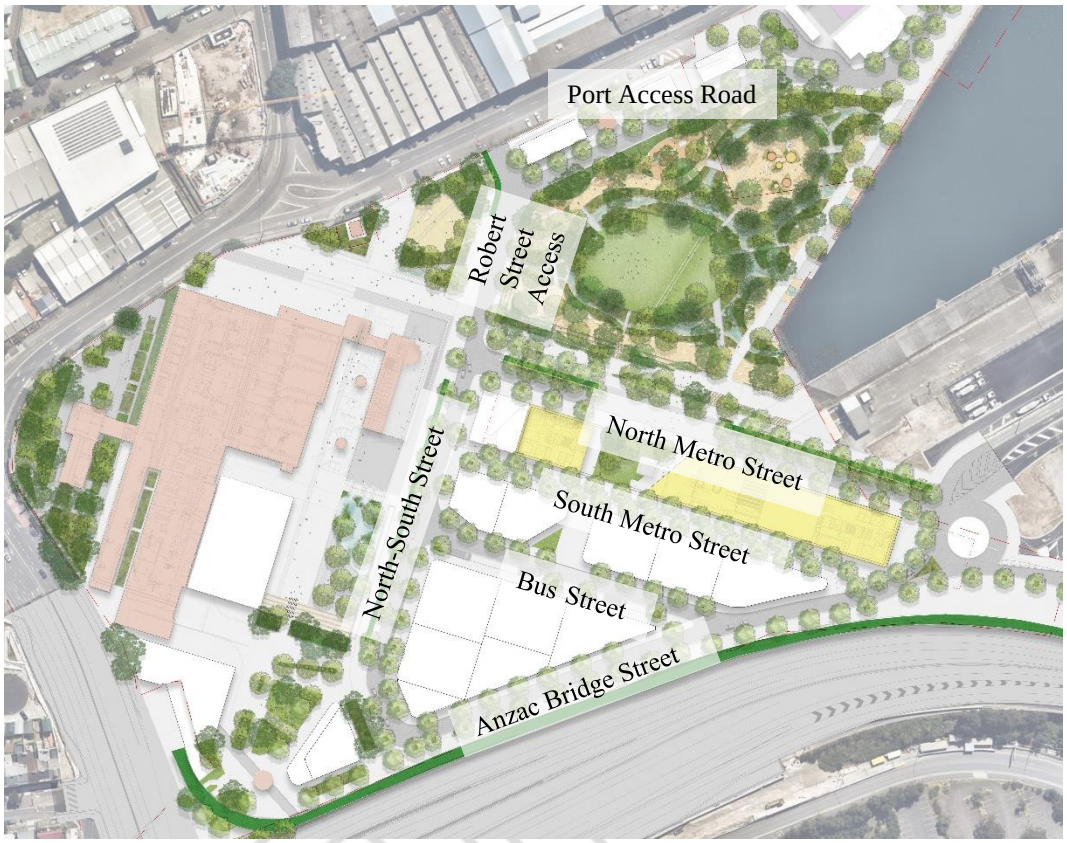


Figure 17: Street network

As agreed with stakeholders, two options are being progressed as part of the master planning process:

- Option 1: Primary Street out the front of the Metro Station
- Option 2: Primary Street next to the Anzac Bridge approach

For the purposes of this report, the key differences between these two options are the street hierarchy and location of provisions for different modes. We note that as the design progresses and a preferred option is selected, other design aspects will need to be refined.

The movement and place street hierarchies relating to Option 1 and 2 are outlined in Figure 18 and Figure 19 respectively.

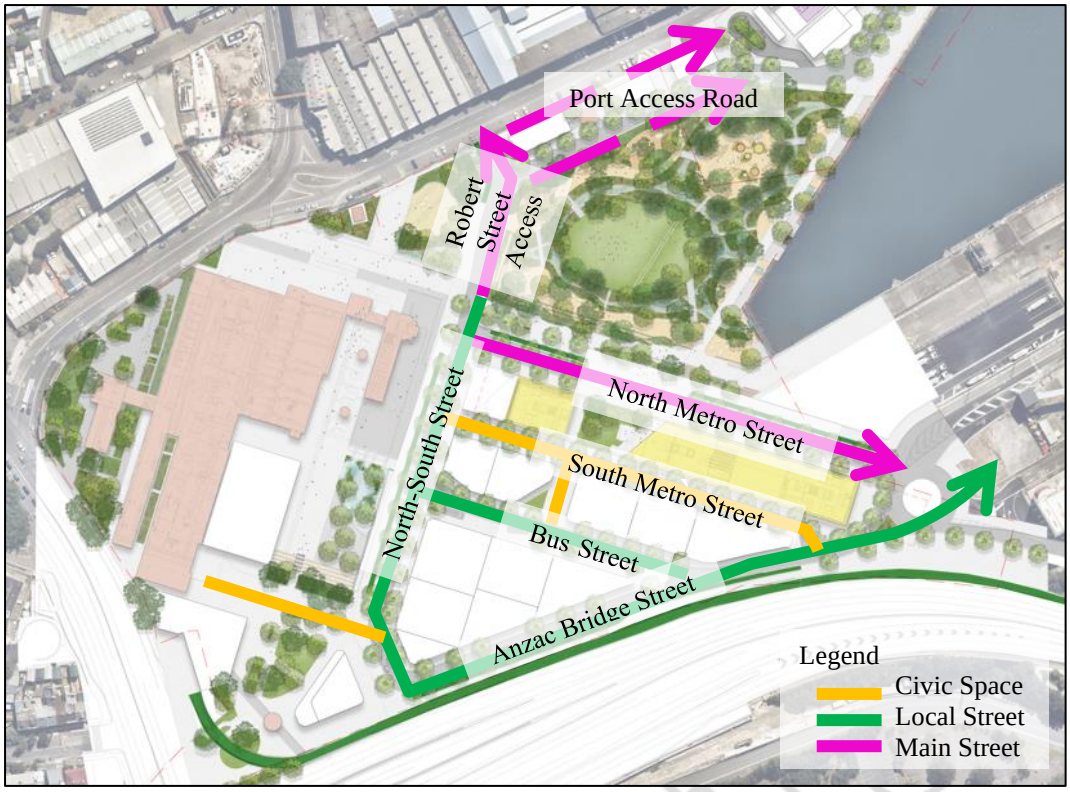


Figure 18: Street hierarchy – Option 1

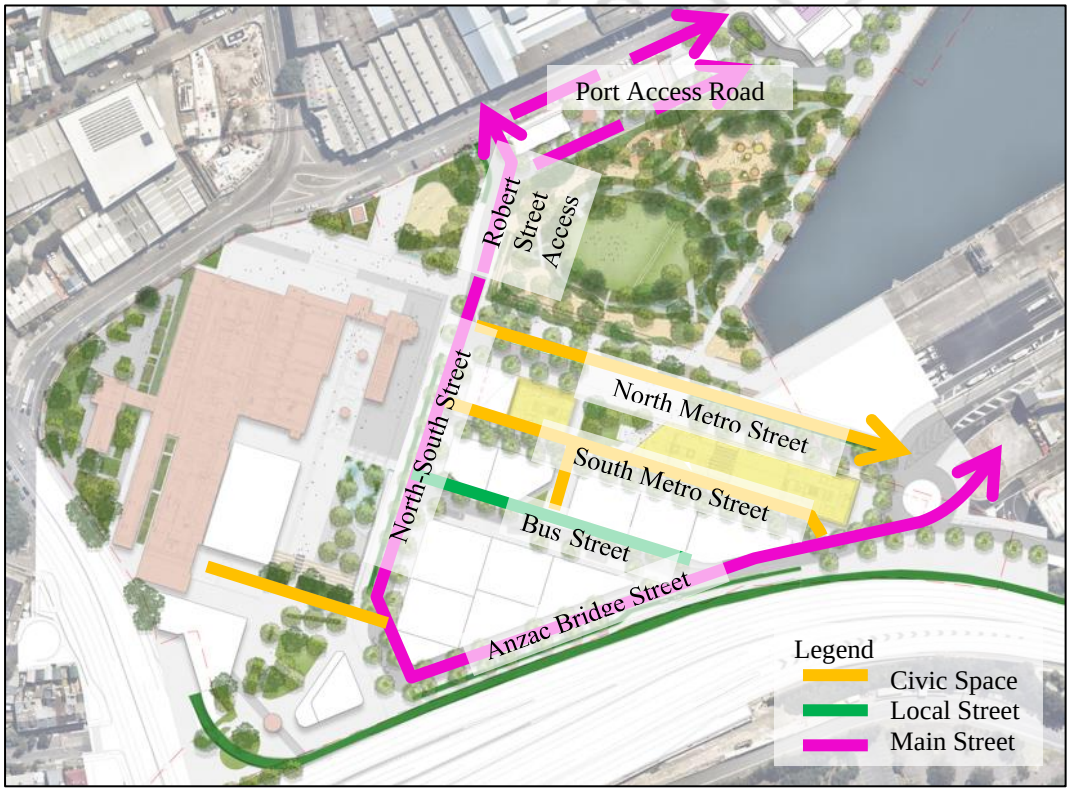


Figure 19: Street hierarchy – Option 2

Option 1 has the Main Street situated north of the Sydney Metro West Station along the north eastern edge of the site, acting as the key route for vehicles travelling through the precinct. This layout allows all other streets to be of a lower order with reduced traffic flows within the

interior of the precinct, yielding an improved street environment for walking and cycling. Option 1 provides a convenient connection between the Precinct's core and the WBPS which is planned to a be a key heritage destination for visitors. Channelling a large portion of traffic between the Sydney Metro West Station and Harbourside Park means that the perimeter of the Precinct is porous and accessible for future cycling and pedestrian connections. The key area segregated by traffic on the Main Street is the Harbourside Park. However, use of a controlled crossing will allow access across the Main Street to the core of the Precinct.

Option 2 designates the key vehicle route as Anzac Bridge Street and the North-South Street. This layout places most vehicle traffic on a north-south spine through the centre of the precinct and along the southern perimeter. The major benefit of this layout is that the street north of the Sydney Metro West Station is converted to a Civic Space with a public realm and pedestrian priority connection between the Precinct, the Sydney Metro West Station and the Harbourside Park. There are two key issues caused by vehicle traffic on this planned loop, the first being the connection between the core of the precinct and the WBPS, which will require a controlled crossing to enable access. The second being that people moving between regional or local active travel routes and the finer grain network within the Precinct will either need to cross the key vehicle route or take circuitous routes around the edge of the .

As noted above both options have their merits, the fundamental difference between the two Options being the location of the main traffic thoroughfare, and thereby how the resulting street network facilitates connections between the Metro Station, the precinct and the public amenities (namely the Harbourside Park and the WBPS). Option 1 tends to favour pedestrian and cycling-centric streets between the Metro Station, the precinct, the WBPS and other external connections, while Option 2 tends to favour pedestrian connections between the Metro Station, the precinct, and Harbourside Park. Following the public exhibition of the masterplan a robust process will be undertaken by DPE, with input from key stakeholders, to select a preferred option.

This masterplan explores an option where a section of the existing Robert Street (between Buchannan Street and the existing warehouse buildings opposite the Ports land) could be utilised in the future by traffic from the new Bays West town centre precinct travelling to the Cruise terminal on cruise days. Utilising Robert Street in this way would avoid duplicating road infrastructure and could improve the precinct's traffic and built form outcomes, particularly for the Robert Street sub-precinct. It is acknowledged that any change would require further detailed investigation, traffic studies, community consultation and modification to the existing Conditions of Consent for the White Bay Cruise Terminal.

Despite the differences between the two options there are a range of transport responses that are consistent across both.

6.1 Movement and Place Street Typologies

Balancing the movement and place outcomes is critical to the success of the precinct. In developing the emerging street layout, the Movement and Place Practitioners Guide was used to provide a very high-level indication of the typology, function, and purpose of each of the proposed streets within the masterplan. These classifications are presented in Table 5 for all streets except the North Metro Street, Anzac Bridge Street and the North-South Street.

Table 5: Movement and Place street typologies

Street	Movement and Place typology	Function	Purpose
Port Access Road	Local Street	To and from	Access to Cruise Terminal
Robert Street Access	Main Street	To and from	Access to Robert Street
South Metro Street	Civic Space	Within	Servicing lane with priority for walking
Bus Street	Local Street	Within	Public transport interchange

6.2 Cross sections

Proposed cross sections for the various streets have been prepared. The street layout and associated cross sections have been designed to promote the use of public transport, walking and cycling, and to limit the use of private vehicle travel. It is proposed that the majority of streets planned will be 30km/h, with some shared spaces planned to be 10 km/h. All street cross sections will be consistent across both options except the North Metro Street.

Ports Access Road

The Port Access Road (Figure 20) will be a two-way street designed to accommodate all cruise day traffic entering and existing the stage 1 precinct. Footpaths will be provided on either side to aid people walking to and from the Balmain peninsula or the Cruise Terminal.

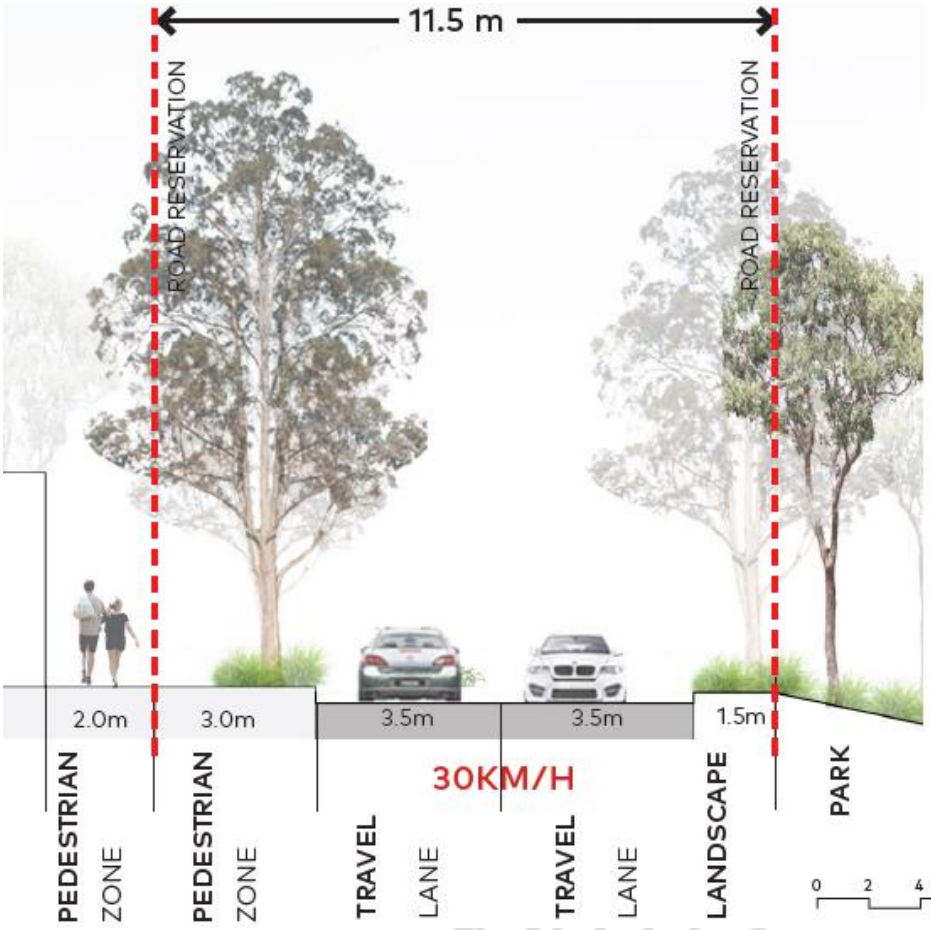


Figure 20: Port Access Road facing north

South Metro Street

The South Metro Street (Figure 21) will be a civic space with shared space treatments and a reduced speed limit of 10km/h to give priority to pedestrians and improve the connection between the station and other development plots. This street will be one-way eastbound and be used predominantly by servicing vehicles.

Figure 21: South Metro Street facing west

Bus Street

A local street is proposed (Figure 22) for the location of the Bus interchange with in-line provision for dropping off passengers on the inbound direction and three indented bus bays for pick up on the outbound direction to allow for short-term layover and longer load times for boarding passengers. Wide footpaths would support the transit and walking character of the street. This street would only be used by bus services.

Figure 22: Bus Street facing west

Anzac Bridge Street

The Anzac Bridge Street (

Figure 23) will be a local street with a two-way carriageway and a parking lane on the Anzac Bridge side of the carriageway. Between the parking bays and the Anzac Bridge frontage will be a 3m shared path that connects to the wider regional network. A wide footpath will be provided adjacent to the commercial core.

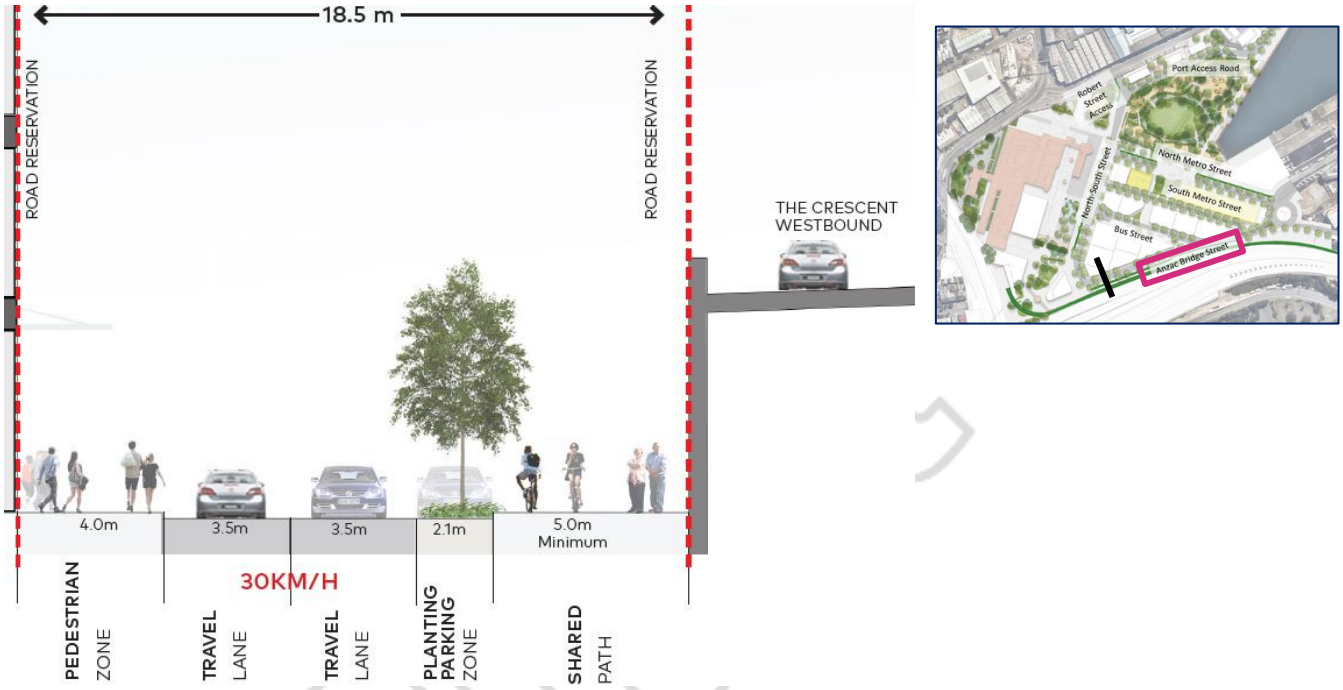


Figure 23: Anzac Bride Street facing east

6.3 Walking and Cycling

The walking and cycling network will have a range of different provisions depending on the function of the route. The hierarchy of these networks is as follows:

- Primary – high quality segregated routes that connect to the wider regional network
- Secondary – connections to key uses and catchments surrounding Bays West
- Local – finer grain provisions to access specific uses with a greater focus on placemaking.

Primary Network

The primary walking and cycling networks are key to encouraging active travel and providing a connected network to enhance the public amenity of the WBPS and Robert Street sub-precincts. The sub-precincts should contain a regional cycling network that connects wider plans for Sydney's Metropolitan Connected Cycling Network and primary walking routes that connect with the Rozelle Interchange pedestrian links. All regional cycle paths are proposed to be two-way, will need to be 4m in width and are presented in Figure 24.

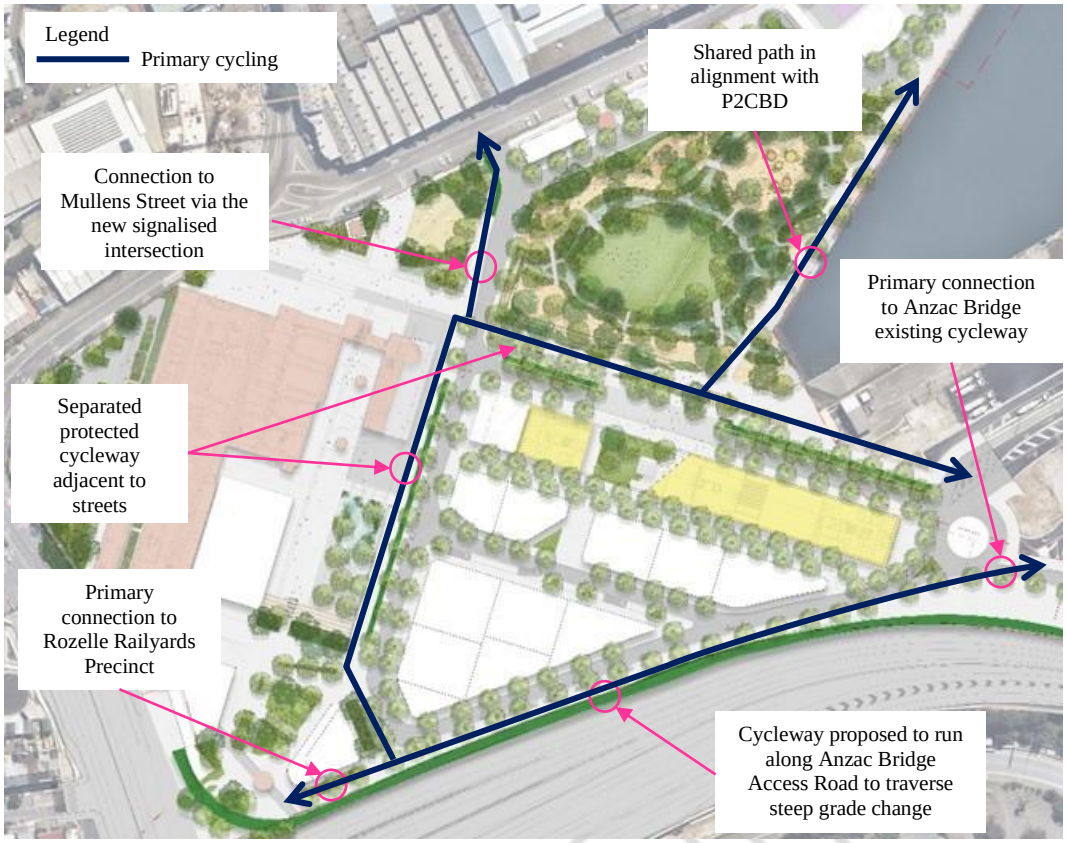


Figure 24: Primary walking and cycling network

Secondary Network

In addition to the primary network, secondary connections will be required to connect within the sub-precincts. This secondary cycling network will provide links to the other sub-precincts of the Bays West masterplan, Rozelle Bay, and the Robert Street cycleway. The secondary cycle connections are presented in Figure 25.

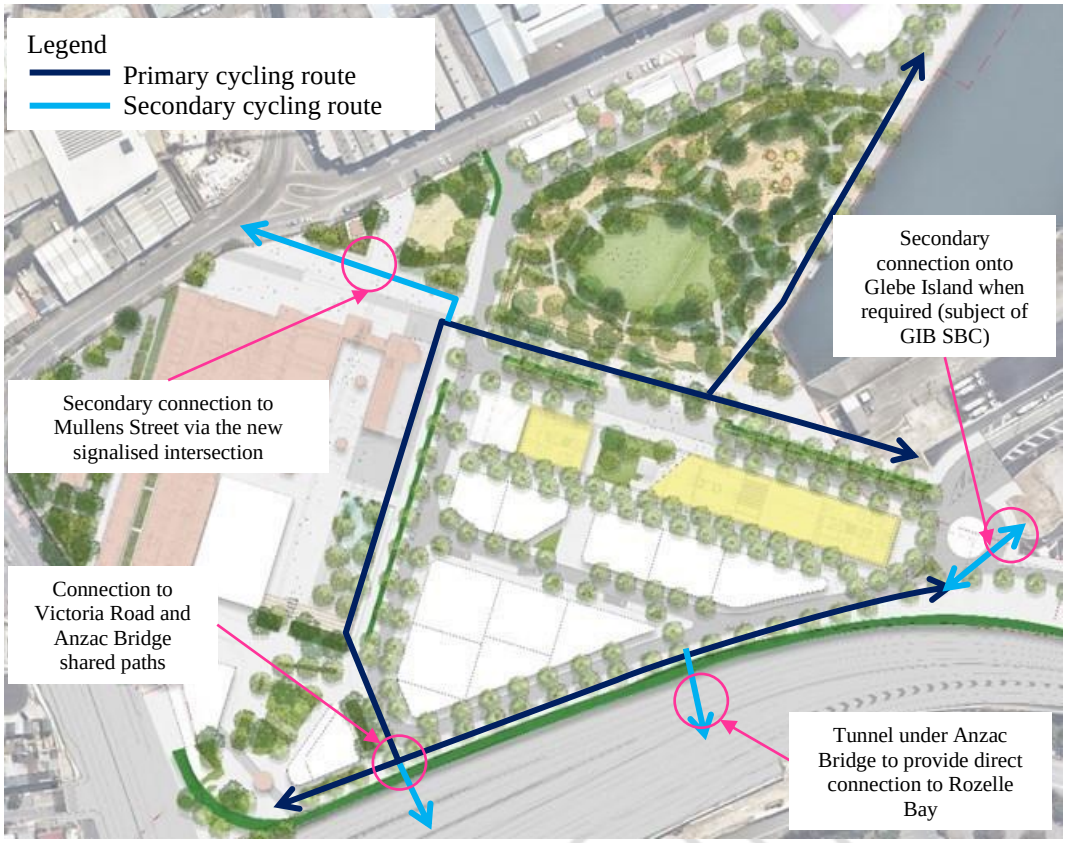


Figure 25: Secondary cycling network

Local Network

Within the sub-precincts, a finer grain pedestrian network will be required to ensure easy pedestrian access to the various land uses. It will be important to consider the various vehicle movements within the sub-precincts such as the ports traffic, bus services and heavy vehicle movements associated with the White Bay Cruise Terminal. The walking routes should have a minimum width of 2m with wider extents considered for high activity areas such as in front of the WBPS. The local walking network is outlined in Figure 26.

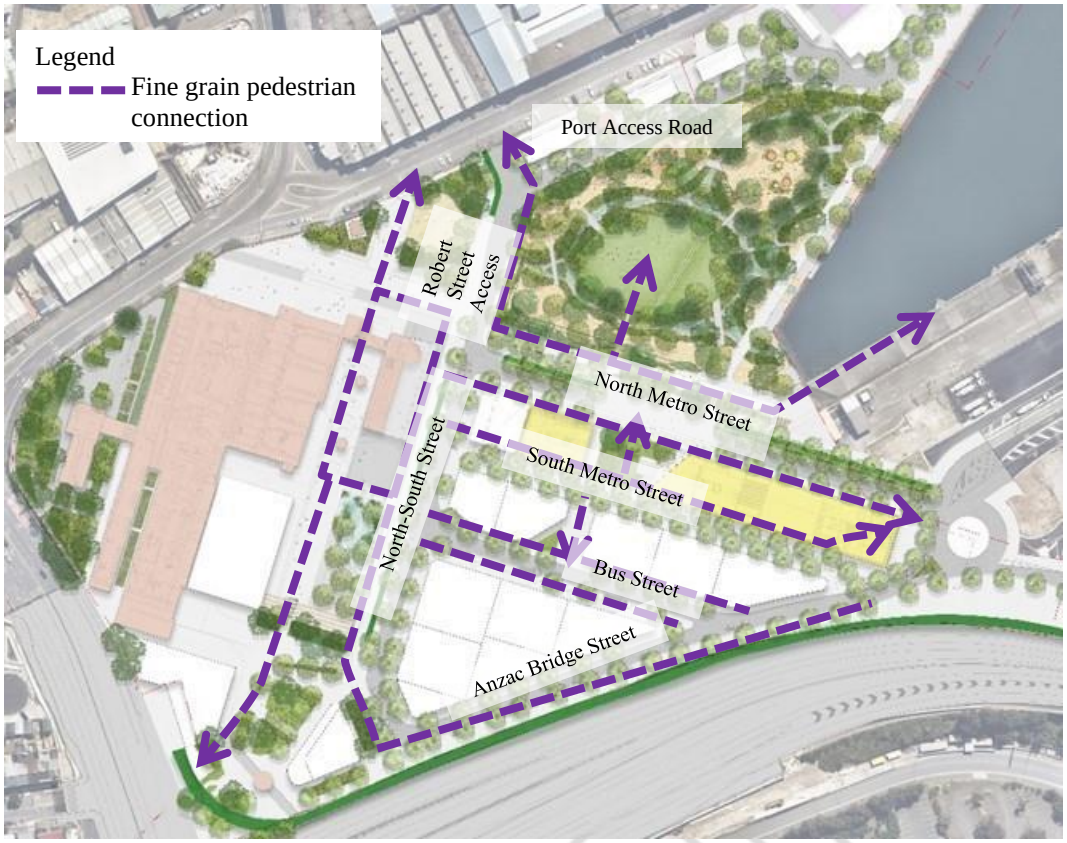


Figure 26: Local pedestrian network

6.4 Public Transport

The Sydney Metro West Station and bus services together will improve the public transport accessibility for the sub-precincts and wider Bays West precinct. Both transport modes have requirements to ensure seamless integration with the active transport network and the land uses of the sub-precincts.

6.5 Bus

A bus network will be developed to service the local market and enhance the catchment of Sydney Metro. Though a detailed network plan has not been provided by TfNSW at this stage, several baseline requirements have been set. The interchange will need to accommodate up to 30 buses per hour with short term layover facilities for various services. To accommodate these services the interchange will provide 6 bays.

A seamless connection between the bus services and the Metro is essential to encourage the use of public transport. The bus interchange must be conveniently located near the Metro station. Considering this, the bus interchange is proposed to be located at the future core of the precinct, approximately 50-60 metres from the entrance of the Sydney Metro West Station, accessible by a wide and active pedestrian throughfare.

Bus movements within the precinct are proposed to be in a loop, using a roundabout at the northern end of Anzac Bridge Street as shown in Figure 27. Over time and as the precinct expands the bus services will have the flexibility to serve other destinations within Bays West. Regional and other local bus services will continue to be accessible nearby at the

existing bus stops on Robert Street and Victoria Road with improved walking connections to these stops.

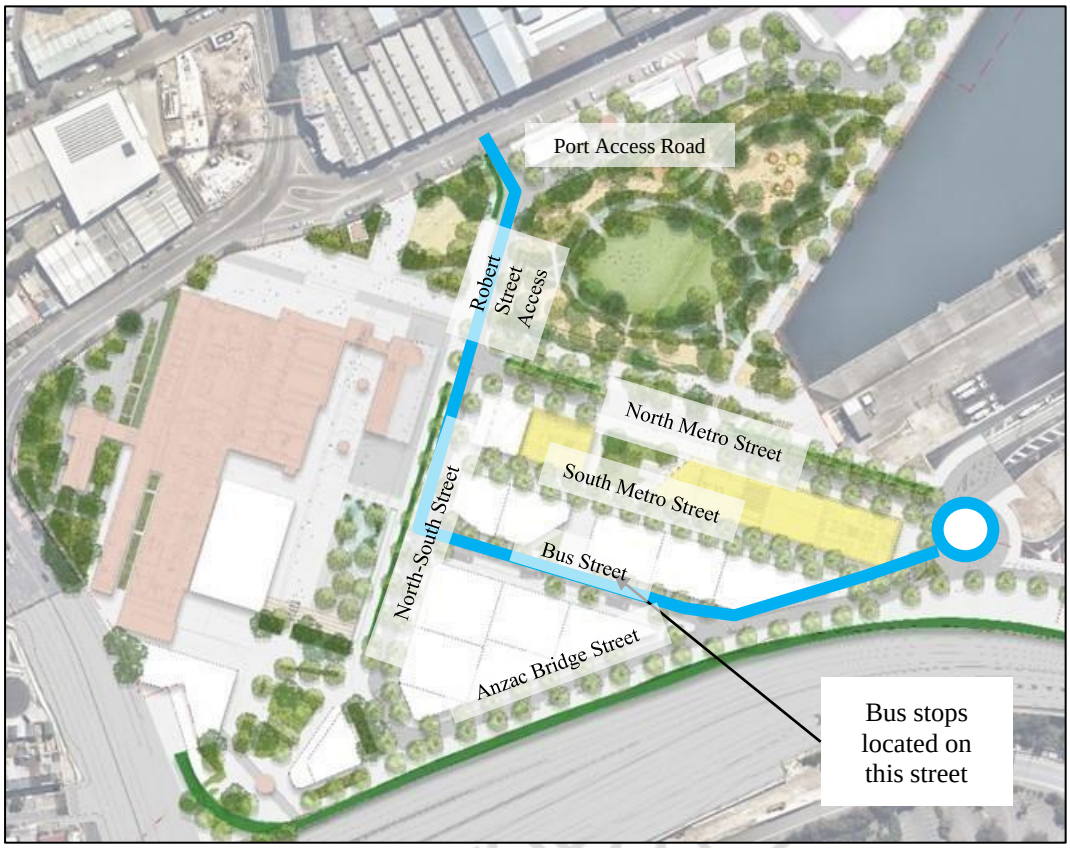


Figure 27: Bus movements within the precinct

6.6 Sydney Metro

The delivery of the Sydney Metro West Station will drastically improve the public transport accessibility of the precinct. The station and associated service buildings have requirements to ensure successful operation and integration within the sub-precincts. These requirements include taxi/kiss and ride bays, an Intake Sub Station (ISS), Hostile Vehicle Mitigation (HVM) and servicing.

Additionally, some overarching requirements for the station include:

- Sydney Metro West shall provide seating at transfer points between modes for the comfort of waiting;
- Sydney Metro Stations, station plazas, interchanges and integrated development shall promote active and attractive public domain;
- Sydney Metro West customers shall have an easy journey experience requiring low physical and cognitive effort; and
- Bus stops need to be within a 100m walk of the gate line (interpreted as the nearest station entrance for these purposes).

Intake Sub Station (ISS)

The ISS required to operate Sydney Metro West, will be in the Bays West Precinct, this will be a large structure adjacent to the White Bay Power Station and Victoria Road. The ISS has servicing requirements when a transformer is being replaced which will need to be accommodated. This operation requires two Articulated Vehicles and a Medium Rigid Vehicle (MRV) to be positioned a shown on Figure 28.

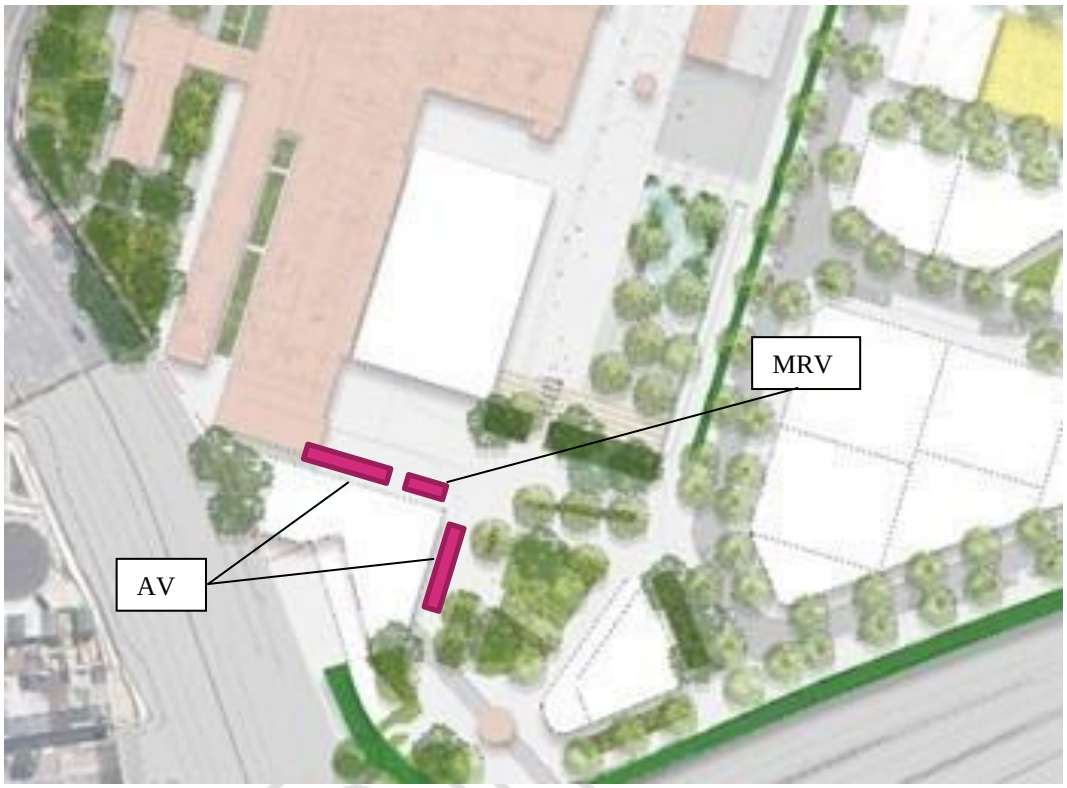


Figure 28: ISS servicing requirements

Servicing of the ISS is extremely infrequent, and it is assumed this would occur under managed conditions, as such though not precluded this requirement has not driven the design of the street layout.

Servicing

The Sydney Metro eastern service building requires access for a waste truck to reverse into the south eastern corner of this building. In addition to this movement three servicing bays are required (1x MRV, 2x B99). We recommend accommodating these bays on the northern kerb of the South Metro Street but they could also be accommodated on hardstand adjacent to the station building. Figure 29 and Figure 30 show the location of the service bays and how the servicing requirements were accommodated in the Sydney Metro design.

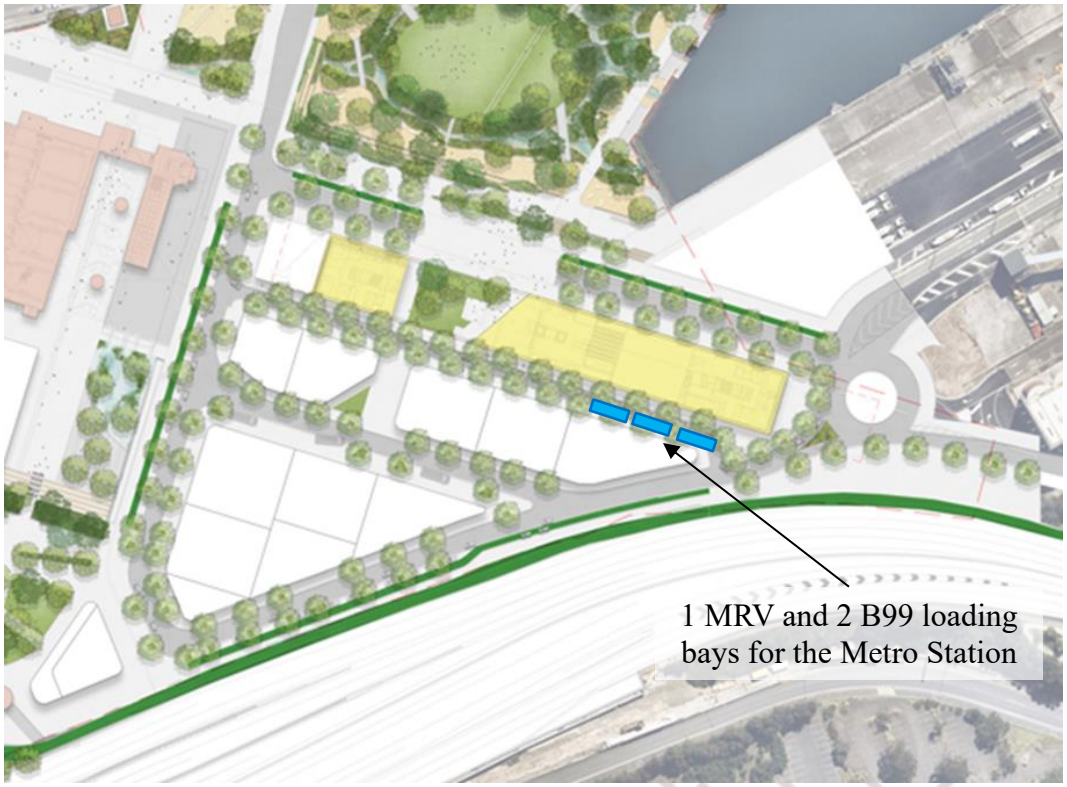


Figure 29: Location of Metro servicing

Figure 30: Sydney Metro Eastern services building servicing requirement

Hostile Vehicle Mitigation (HVM)

Sydney Metro have highlighted the importance of HVM measures around the station entrance. Any street bordering the station will need to have appropriate setbacks and include suitable mitigation measures to manage a safety threat (such as bollards, concrete planter boxes, landscaping, public seating). To understand measures in more detail advice should be sought from a Risk and Security consultant. Further information regarding Sydney Metro's

requirements for HVM will need to be sought. HVM measures may also need to be considered for other key public realm destinations within the precinct such as the Harbourside park and the White Bay Power Station.

6.7 Loading and servicing

A freight and servicing strategy will need to be prepared for the precinct that considers demand relating all uses. An initial concept for loading and servicing has been prepared, this will need to be refined as the different building uses and built forms are refined. Figure 31 shows the servicing access locations for the various development plots including the White Bay Power Station.

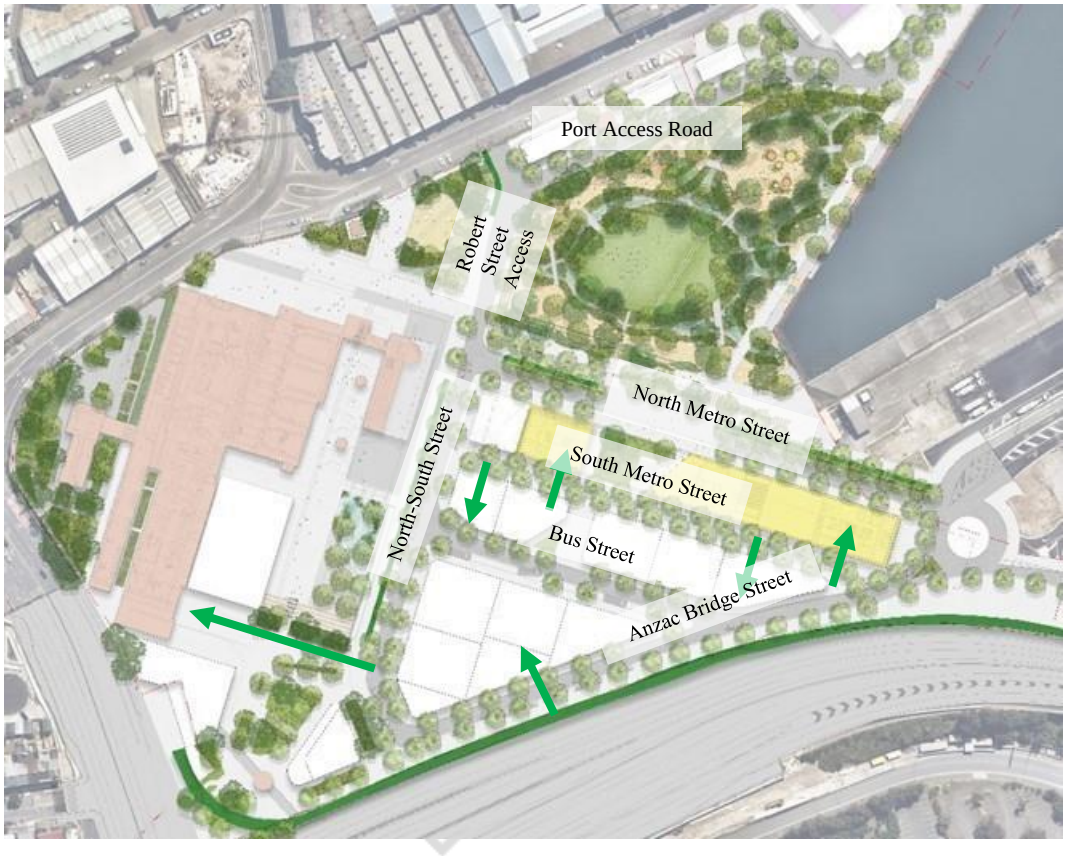


Figure 31: Servicing access locations

We have assumed the maximum size of service vehicles will be a Medium Rigid Vehicle (MRV). Any ramping for these vehicles could have a maximum gradient of 1:6.5 with a minimum of 4m long 1:12 transitions. Advised clear heights for these vehicles within building footprints is 4.5m. Articulated Vehicles may be required for events. Accommodating the unloading of these vehicles within the White Bay Power Station is unlikely to be possible due to the size of turning paths and accommodating a suitable structural grid. Therefore, managed arrangements would need to be sought to unload on street or in the public realm at off peak times.

6.8 Estimated Parking Provision

Parking will align with the aspirations to create an ultra-low car environment through reducing parking rates for all uses.

The proposed parking requirement for all land uses within the sub-precincts is summarised in Table 6. The residential and commercial rates are consistent with advice provided by TfNSW from developments in other Sydney Metro State Significant Precincts in the City of Sydney Local Government Area.

Table 6: Parking requirement

Land use		**Units / GFA (m²)**	**Parking rate**	**Parking requirement**
Residential	Studio	67	0 per dwelling	0
	1-bed	134	0.25 per dwelling	33
	2-bed	401	0.5 per dwelling	201
	3+ bed	67	0.5 per dwelling	33
	Visitor	-	1 per 20 dwellings	33
Commercial		72,100	1 per 400m² GFA	180
Retail		5,000	1 per 90m^2 GFA	56
Total				**536**

Note a portion of these spaces will need to be allocated for car share, EV charging and accessible parking. Residential car parking spaces are proposed to be decoupled to reduce space take in areas of the precinct where activated frontages are preferred.

There are several locations where this parking could be located within the precinct, as outlined on Figure 32. On street locations for parking are shown in blue. Off street opportunities for car parking could be in the Raised Basement located within the commercial core or the residential uses that will be located within the Robert Street sub precinct. Decoupled solutions for parking should also be considered if suitable land parcels are available in the wider precinct.

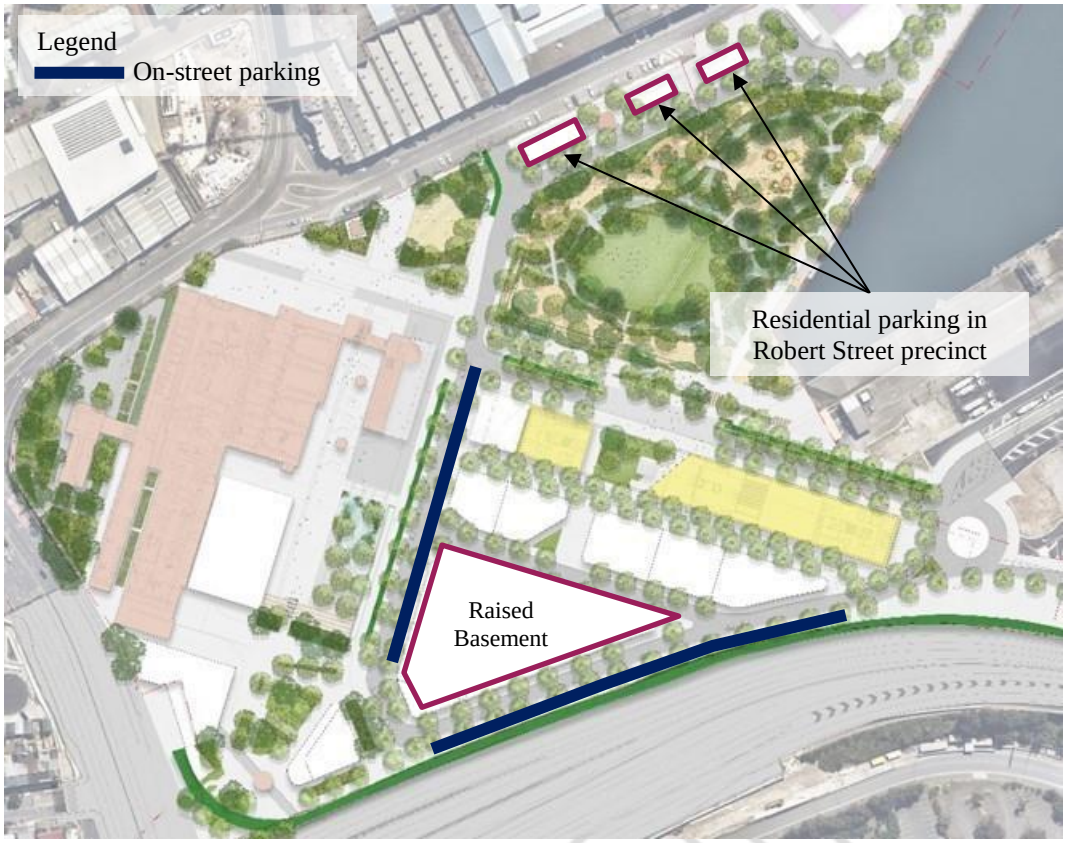


Figure 32: Potential parking locations

6.9 Differing transport response

Due to the different street hierarchies, there are a number of differences between the two options, these include:

- Movement and Place considerations for North Metro Street, North-South Street and Anzac bridge Street
- Cross section of the North Metro Street
- Intersection types of North Metro Street / North-South Street and the Port Access Road roundabout
- Crossing points along Anzac Bridge Street, North-South Street and Bus Street
- Pick-up and drop-off locations for the Sydney Metro West Station.

6.9.1 Movement and Place Street Typologies

The movement and place typologies for all a number of streets vary between the different options. The classifications for certain streets in Option 1 are presented in Table 7.

Table 7: Movement and Place street typologies – Option 1

Street	Movement and Place typology	Function	Purpose
North-South Street	Local Street	Within	Connection to White Bays Power Station and Commercial Core
North Metro Street	Main Street	Through	Main vehicle route also to be used by cruise day traffic
Anzac Bridge Street	Local Street	Within	Street serving precinct uses and through route for cruise day traffic

Due to the differing street hierarchy the movement and place typologies for certain streets vary in Option 2. The classifications are presented in Table 8.

Table 8: Movement and Place street typologies – Option 2

Street	Movement and Place typology	Function	Purpose
North-South Street	Main Street	Through /Within	Main traffic and route and a connection to White Bays Power Station and Commercial Core
North Metro Street	Civic Space	Within	Priority for walking and cycling
Anzac Bridge Street	Main Street	Through / Within	Street serving precinct uses

6.9.2 Cross sections

Following the change in movement and place typologies, the cross section of North Metro Street will change. In Option 1, the North Metro Street (Figure 33) will be a two-way carriageway suitable to carry all cruise day traffic. Wide footpaths will be provided on either side of the carriageway. In addition, a segregated cycleway will intersect between the carriageway and the park. A small number of indented bays may be provided along the southern kerb line for Kiss and Ride, Taxi or Cruise Shuttle services.

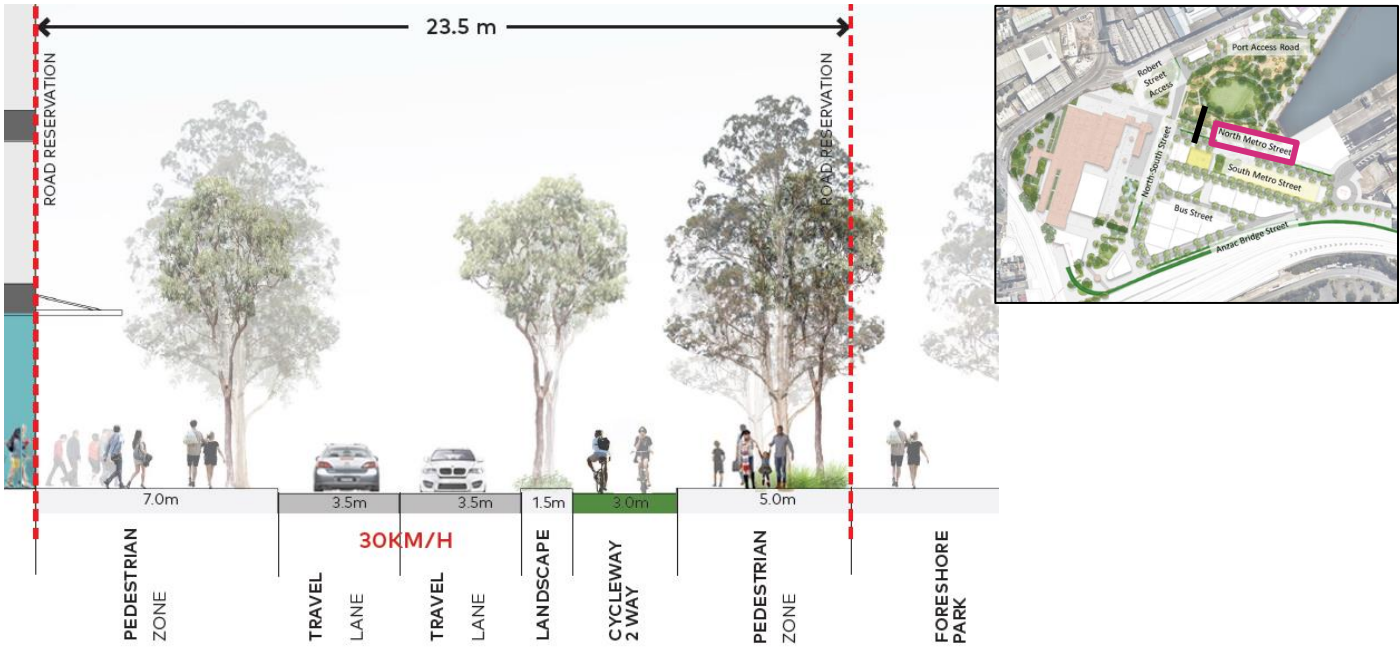


Figure 33: North Metro Street facing west – Option 1

For Option 2 the cross section will differ as North Metro Street is now a civic space to cater to pedestrians and cyclists. The street will provide an uninterrupted connection from the Sydney Metro West Station to key public to the Harbourside park and foreshore. The civic space will also seamlessly link to the regional active transport connections such as the Parramatta to CBD foreshore link, the Robert Street cycleway and Glebe Island Bridge. This differing cross section is presented in Figure 34.

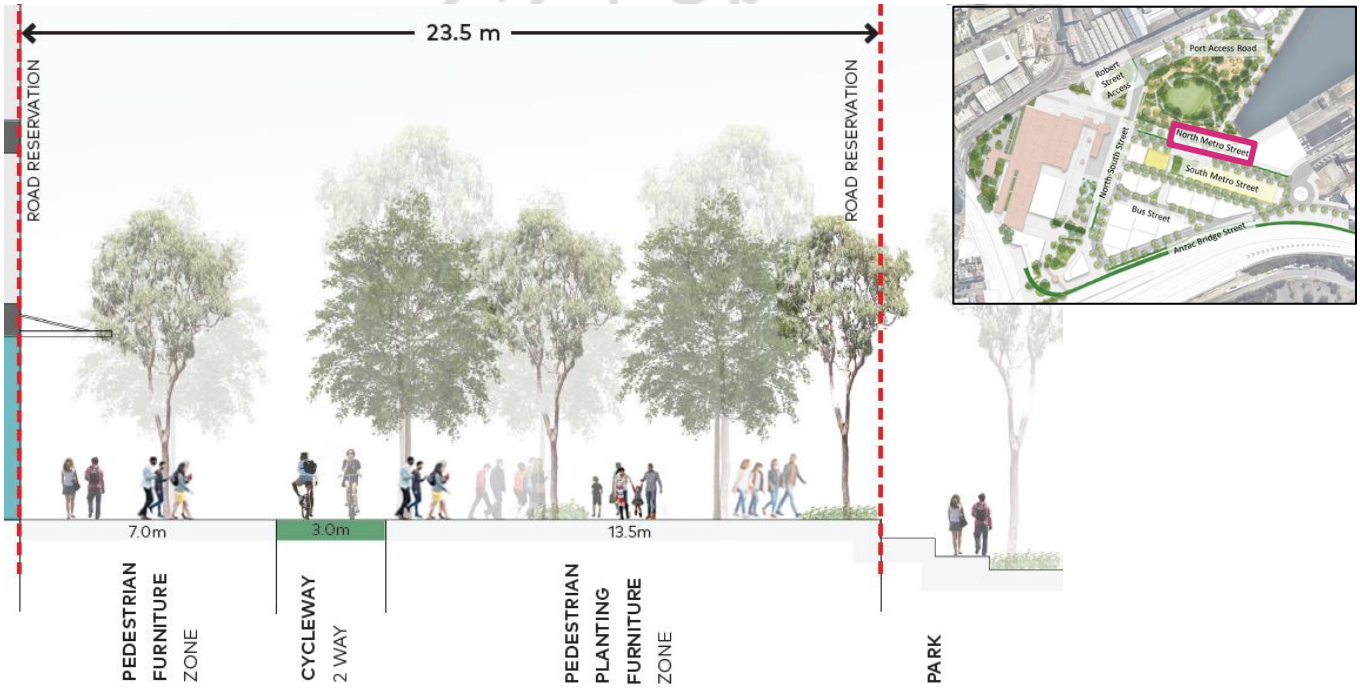


Figure 34: North Metro Street facing west – Option 2

6.9.3 Intersections

As the street hierarchy changes between the two options, a number of intersections will vary. The intersection types for Option 1 are presented in Figure 35.

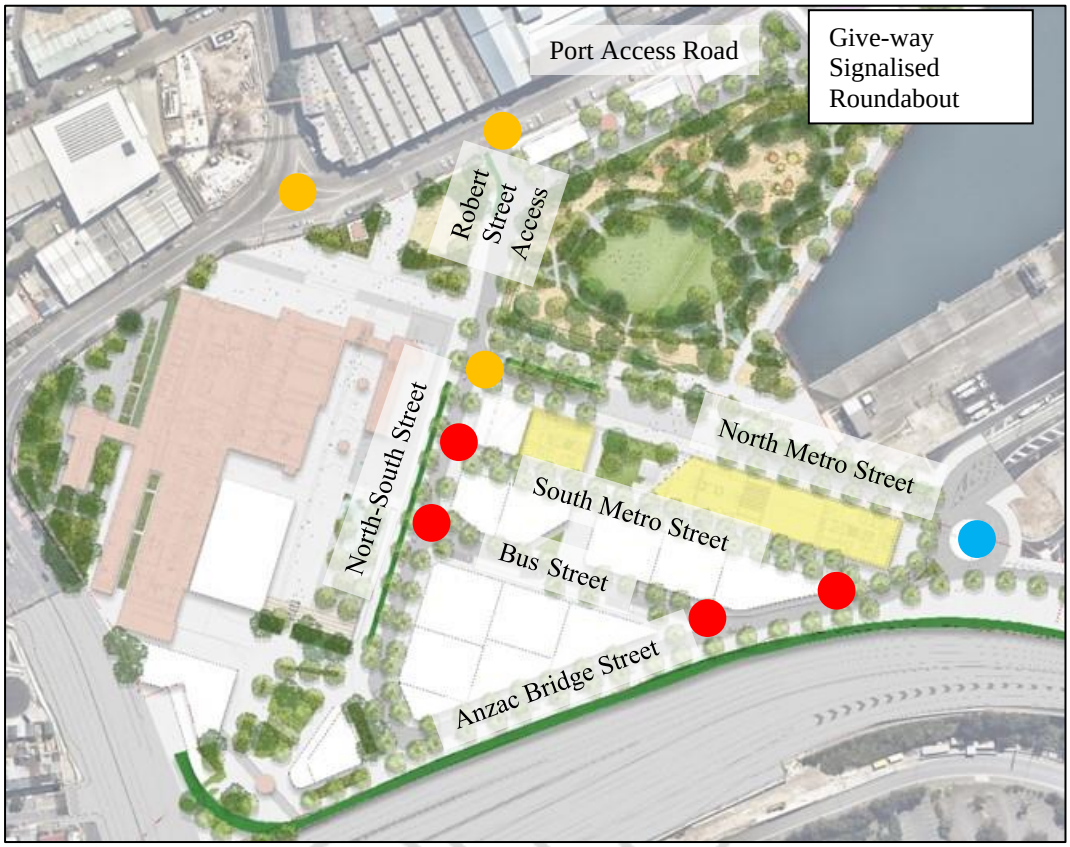


Figure 35: Intersection Types - Option 1

Mullens Street / Robert Street

It is assumed this intersection will be signalised as proposed by Sydney Metro. The key benefit to the masterplan of this arrangement is signalised crossings will provide improved connections from Mullens Street into the northern boundary of the precinct.

Robert Street Access

This intersection will have a similar arrangement to that proposed by Sydney Metro, as shown on Figure 36. This intersection will need to be a minimum of 100m from the Mullens Street / Robert Street intersection to allow for queuing of future traffic demands in 2040. The length of the right turn bay to access the Port Access Road will need to be balanced with the left turn lane required at the intersection further south.

Figure 36: Robert Street access – Sydney Metro design

The key variation from this design will be due to the revised alignment of the north-south street the intersection will be more compact, but the operation will remain the same.

North-South Street T-intersection

This intersection is proposed to be signalised with two traffic phases and a scramble crossing to enhance connectivity between the White Bay Power Station, Harbourside park and Metro station. The northern approach will require a left turn lane of approximately 50m to minimise delays at the intersection.

Port's roundabout

The Port's roundabout will connect to Solomons Way, Somerville Road, North Metro Street, Anzac Bridge Street. The roundabout will need to have adequate circumference to accommodate B-Doubles travelling from Solomons Way to Somerville Road and bus services looping to and from Anzac Bridge Street.

As the street hierarchy differs for Option 2. The T-intersection at the western end of the North Metro Street will be replaced by a signalised crossing, and the Ports roundabout will have one less arm. The intersection types for Option 2 are presented in Figure 37.

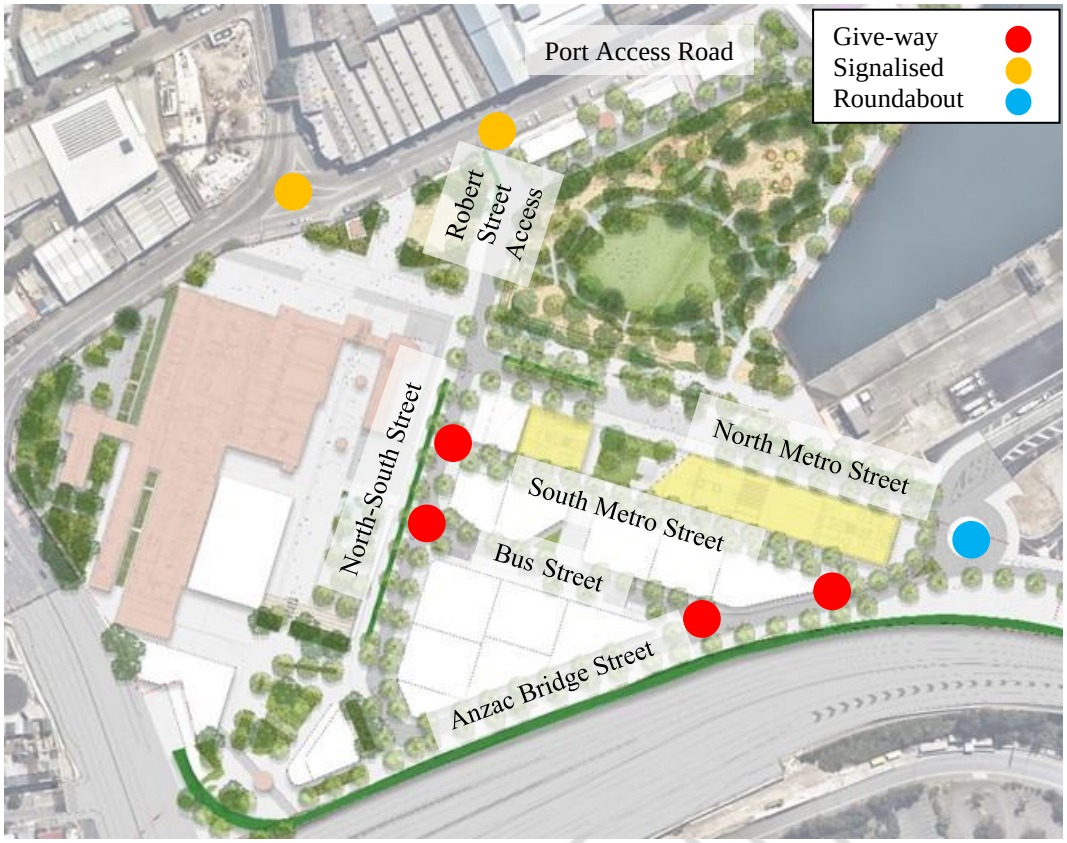


Figure 37: Intersection types – Option 2

North-South Street T-intersection

An intersection will no longer be required at this location and will instead be replaced by a signalised pedestrian crossing to connect the Civic Space with the WBPS.

Port's roundabout

The Ports roundabout will now only connect to Solomons Way, Somerville Road, and Anzac Bridge Street. The roundabout will need to have adequate circumference to accommodate B-Doubles travelling from Solomons Way to Somerville Road and bus services looping to and from Anzac Bridge Street.

6.9.4 Crossings

To create a precinct that promotes walking as the primary mode crossing points that are safe and convenient are essential. A range of crossing types have been suggested that align with the various street typologies and desire lines for all key trips. Crossing types will be refined further in future stages of the design. The crossing locations and types for Option 1 are outlined in Figure 38.

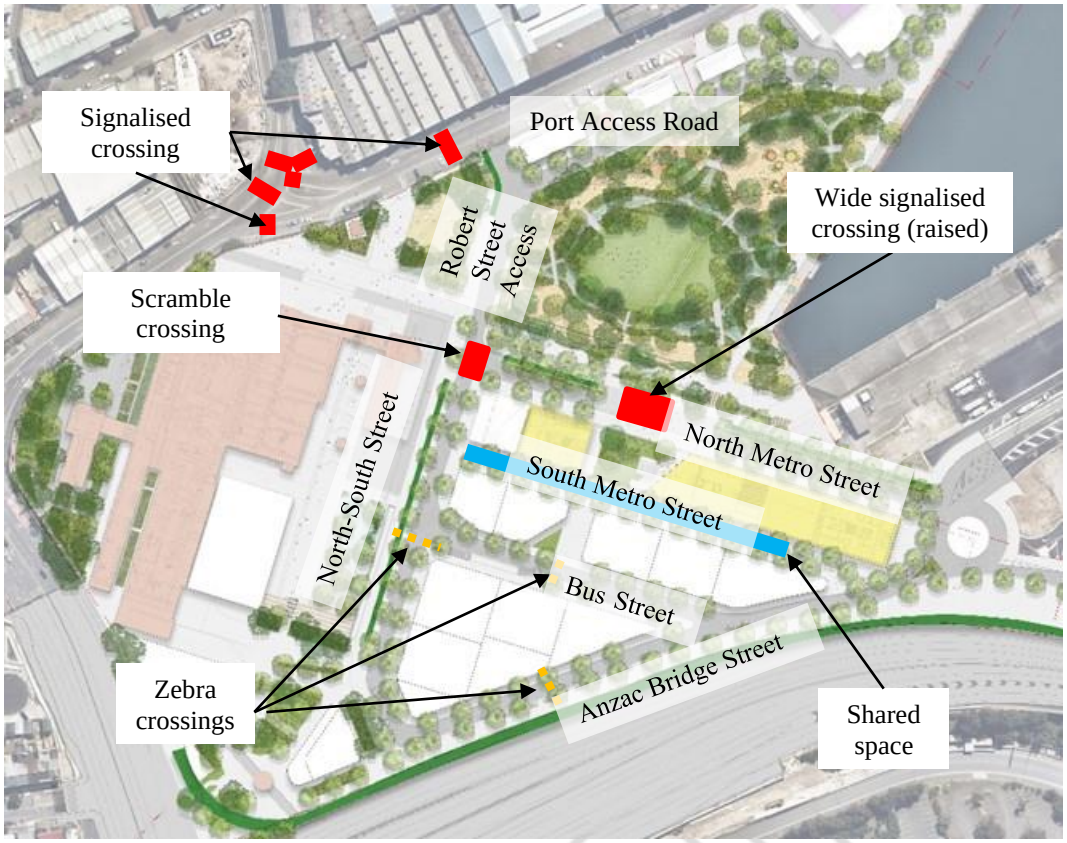


Figure 38: Crossing locations - Option 1

The key changes to crossings in Option 2 will be:

- The scramble crossing on the North-South Street being converted to a signalised crossing
- The wide signalised crossing on North Metro Street will be removed
- All other crossings on the North-South Street and Anzac Bridge Street will need to be signalised crossings given they are now located on the main vehicular route.

These updates to crossing locations and types are marked on the Figure 39

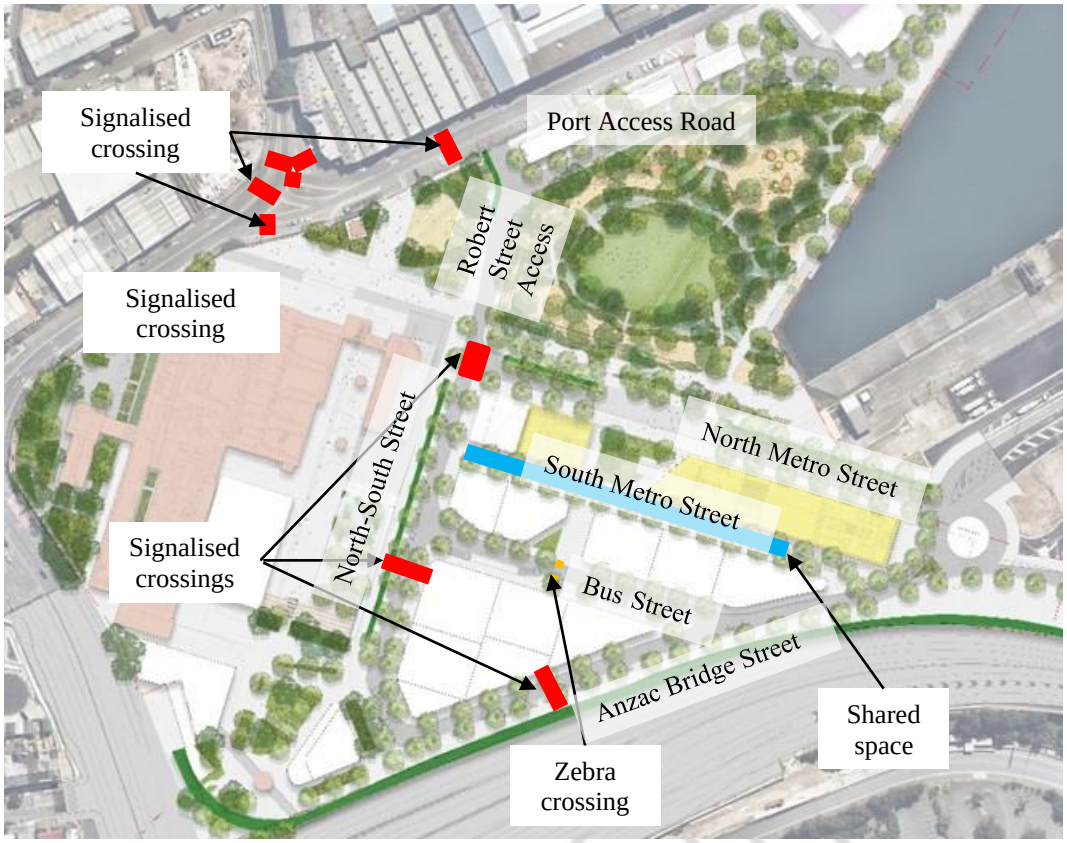


Figure 39: Crossing locations – Option 2

6.9.5 Pick up and drop off

The Sydney Metro West Station will require taxi and kiss and ride bays to cater for pick up and drop off demand. Due to the high turnover rate of these facilities, bays should be planned to be 6m so they can operate independently and support entry and exit in forward gear.

It is noted that provisions may also be required for shuttle bus services to serve the White Bay Cruise Terminal. The aspiration is for the pick up and drop off facilities to be used flexibly on cruise days to accommodate these services. This provision will be further refined in future stages noting holding of any shuttle services will need to occur within PANSW land.

Table 9 indicates the TfNSW requirements for Kiss and Ride and Taxi provisions.

Table 9: Taxi / Kiss and Ride bay requirements

Proposed number of bays			Total
Taxi	**Kiss and Ride**	**Kiss and Ride (accessible)**	
2	6	1	9

Due to the varying street networks between the two options, the pick-up and drop-off bays for the Sydney Metro West Station will be located differently. The taxi and kiss and ride bays for Option 1 are outlined in Figure 40.

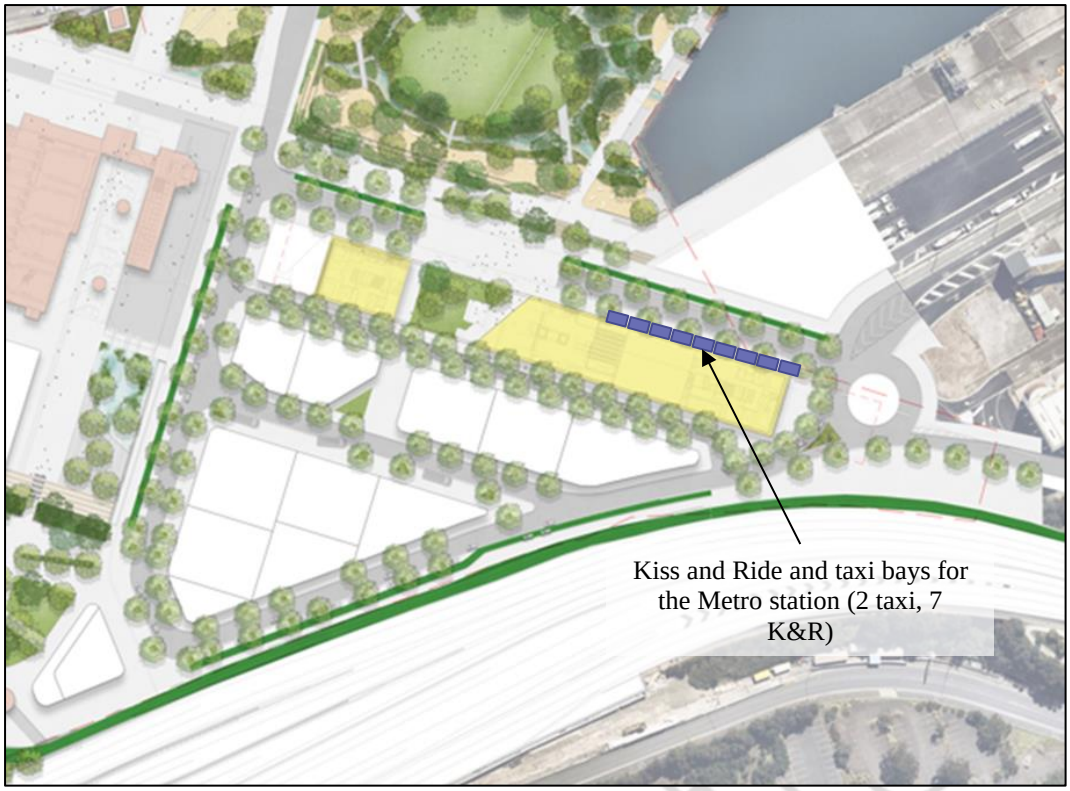


Figure 40: Location of taxi and kiss and ride bays - Option 1

In Option 2, these bays will be relocated to Anzac Bridge Street (Figure 41) near the crossing to allow for seamless access to the Sydney Metro West Station and bus interchange. A total of 9 on street parking spaces will be lost due to this relocation.

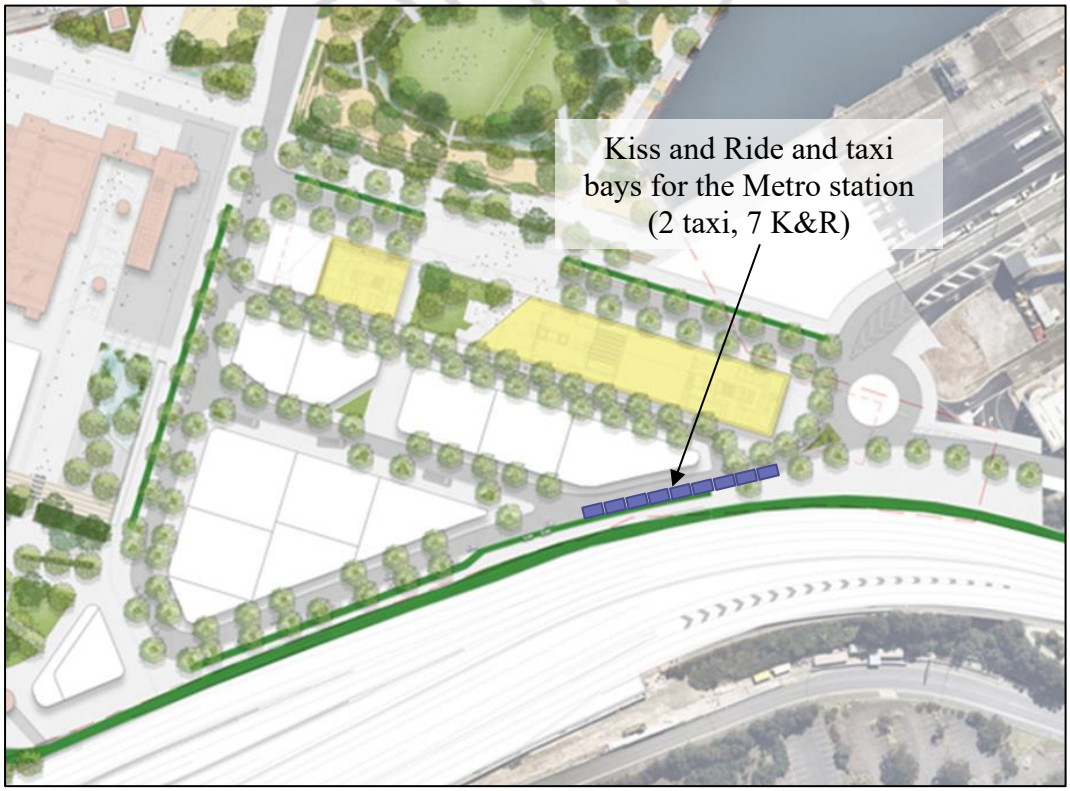


Figure 41: Location of kiss and ride and taxi bays – Option 2

7 Road Network Validation

To assess the impact of the masterplan on the surrounding road network, traffic modelling was undertaken using the SIDRA Intersection 9.0 traffic modelling software package. SIDRA Intersection is a microanalytical tool for evaluation of intersection performance mainly in terms of capacity, level of service and a wide range of other performance measures such as delay, queue length and stops for vehicles and pedestrians.

Intersection performance has been measured using delay, level of service and 95th percentile queue lengths as defined in the *Guide to Traffic Generating Developments* (Roads and Traffic Authority, 2002) and shown in Table 10.

Table 10: Level of Service

Level of service	Average delay per vehicle (seconds)	Operation
A	< 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity
F	> 70	Over capacity

Source: Guide to Traffic Generating Developments (Roads and Traffic Authority, 2002)

It should be noted that the traffic modelling is subject to the land uses and background traffic forecasts available at the time traffic modelling was undertaken. As development of the project progresses, these land uses and background traffic forecasts will be refined and agreed with TfNSW moving forward.

All SIDRA modelling results presented in Sections 7.4 and 7.5 are presented in **Appendix A**.

7.1 Modelling scenarios

Traffic modelling was undertaken for the AM peak hour (08:00-09:00) for the 12 scenarios shown in Table 11.

Table 11: Modelled scenarios

No.	Year and assumed land use				Mode share		White Bay Cruise Terminal operation	
	2030 Baseline	2040 Baseline	2030 with project	2040 with project	5% vehicle mode share	15% vehicle mode share	Non-cruise day	Cruise day
1	✓				✓		✓	
2	✓					✓		✓
3		✓			✓		✓	
4		✓				✓		✓
5			✓		✓		✓	
6			✓		✓			✓
7			✓			✓	✓	
8			✓			✓		✓
9				✓	✓		✓	
10				✓	✓			✓
11				✓		✓	✓	
12				✓		✓		✓

Following feedback from TfNSW, scenarios were considered using a 5% and 15% private vehicle mode share. A 5% private vehicle mode share presents an ultra low car mode share target and 15% aligns with mode shares achieved in other low car precincts in Sydney such as Barangaroo.

Traffic modelling was undertaken for the following intersections surrounding the Bays West precinct (shown graphically in Figure 42).

1. The Crescent / James Craig Road
2. Victoria Road / Robert Street
3. Robert Street / Mullens Street
4. Robert Street / Port Access Road (with project only)
5. Port Access Road / Cruise Terminal Access Road (with project only)
6. Port Access Road / Metro North Road T-intersection (with project only)
7. Port Access Road / Metro North Road Roundabout (with project only)

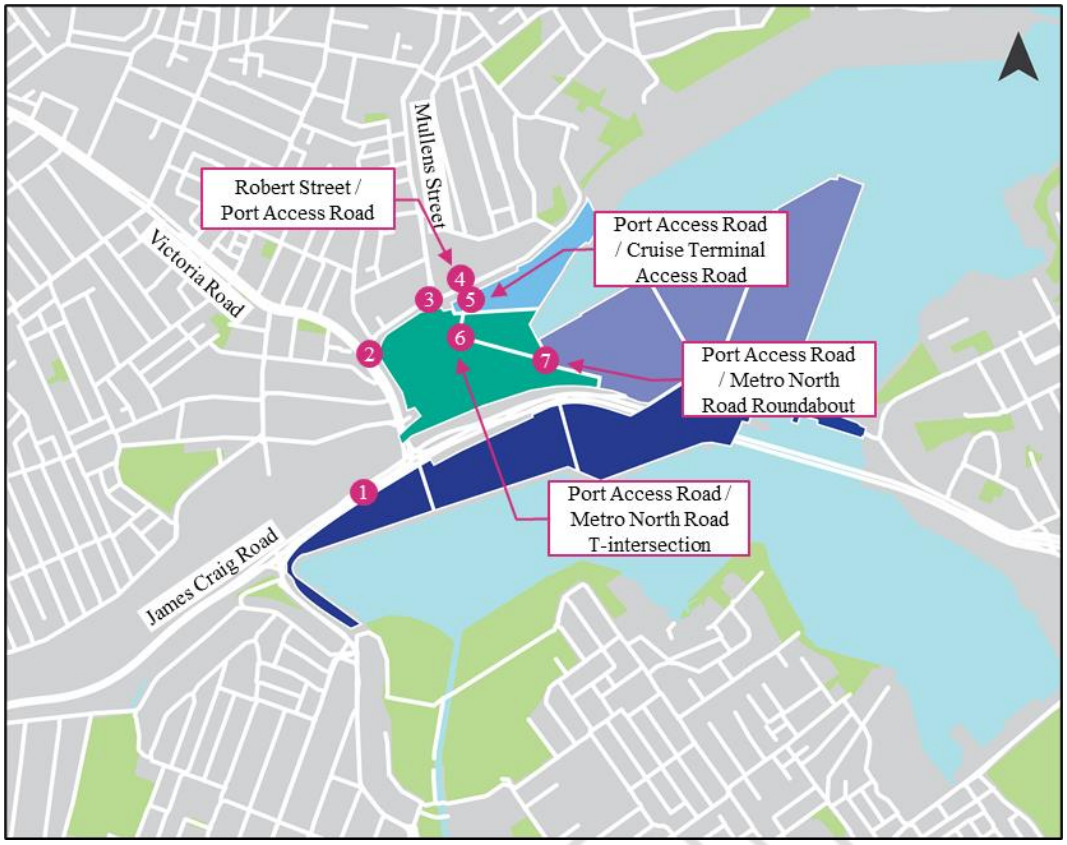


Figure 42 Modelled intersections

7.2 Traffic demands

7.2.1 Baseline traffic

The methodology and data sources used to estimate the baseline traffic volumes in 2030 and 2040 is described in Figure 43.

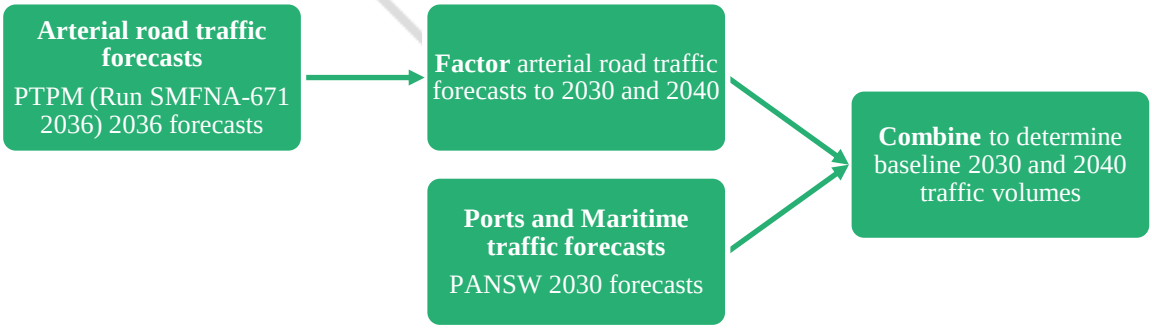


Figure 43 Baseline traffic methodology and data sources

2036 non-cruise day AM peak hour demands on Victoria Road, The Crescent and City West Link were extracted from the Public Transport Project Model (PTPM) (SMFNA-671 2036). As only 2036 background traffic forecasts were available, 2030 and 2040 non-cruise day demands have been estimated by using an annual compound reduction or growth rate of one per cent from 2036 demands respectively.

Non-cruise day and cruise day demands within Glebe Island (including Port Access Road, Sommerville Road and James Craig Road) were derived from Port Authority of NSW (PANSW) 2030 traffic volume forecasts. These forecasts also included committed future developments within Glebe Island including the Hanson Operations and Multi-User Facility.

The PTPM and PANSW traffic volume forecasts were used to determine forecast baseline traffic demands on the surrounding road network. The assumed baseline non-cruise day AM peak hour demands are shown in Figure 44 and Figure 45. The assumed baseline cruise day AM peak hour demands are shown in Figure 46 and Figure 47.

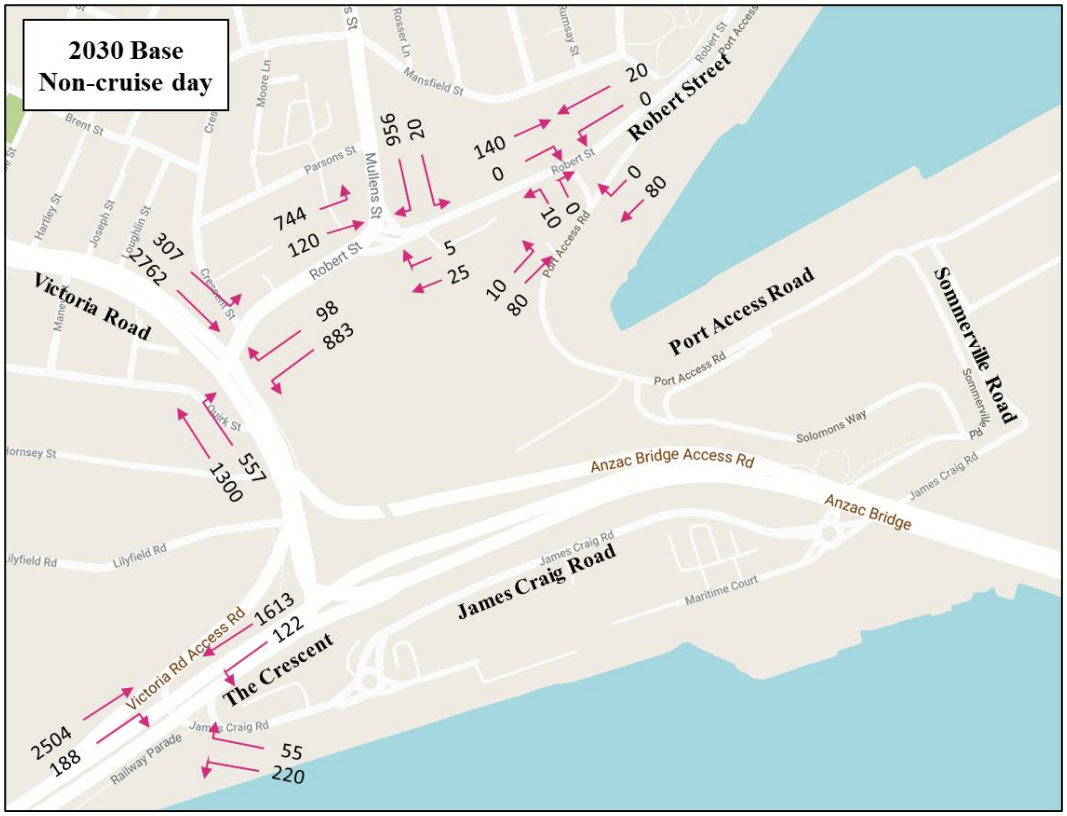


Figure 44 Forecast baseline 2030 non-cruise day AM peak hour demands (without Bays West)

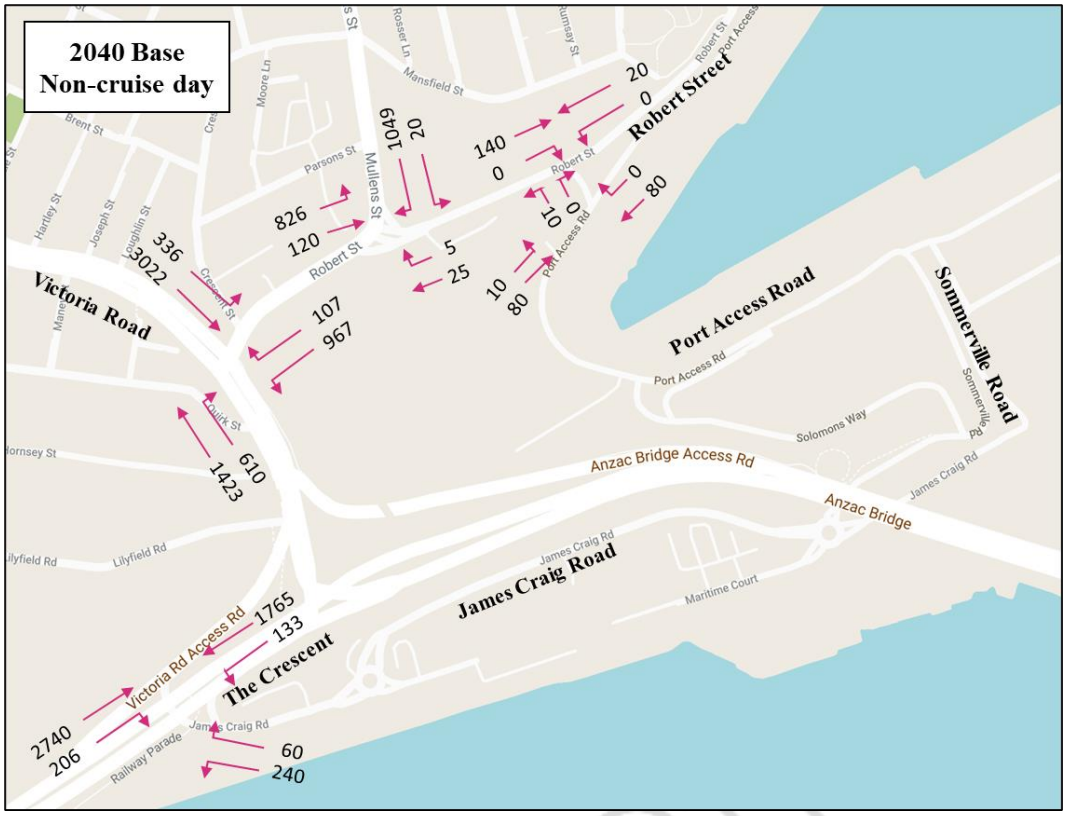


Figure 45 Forecast baseline 2040 non-cruise day AM peak hour demands (without Bays West)

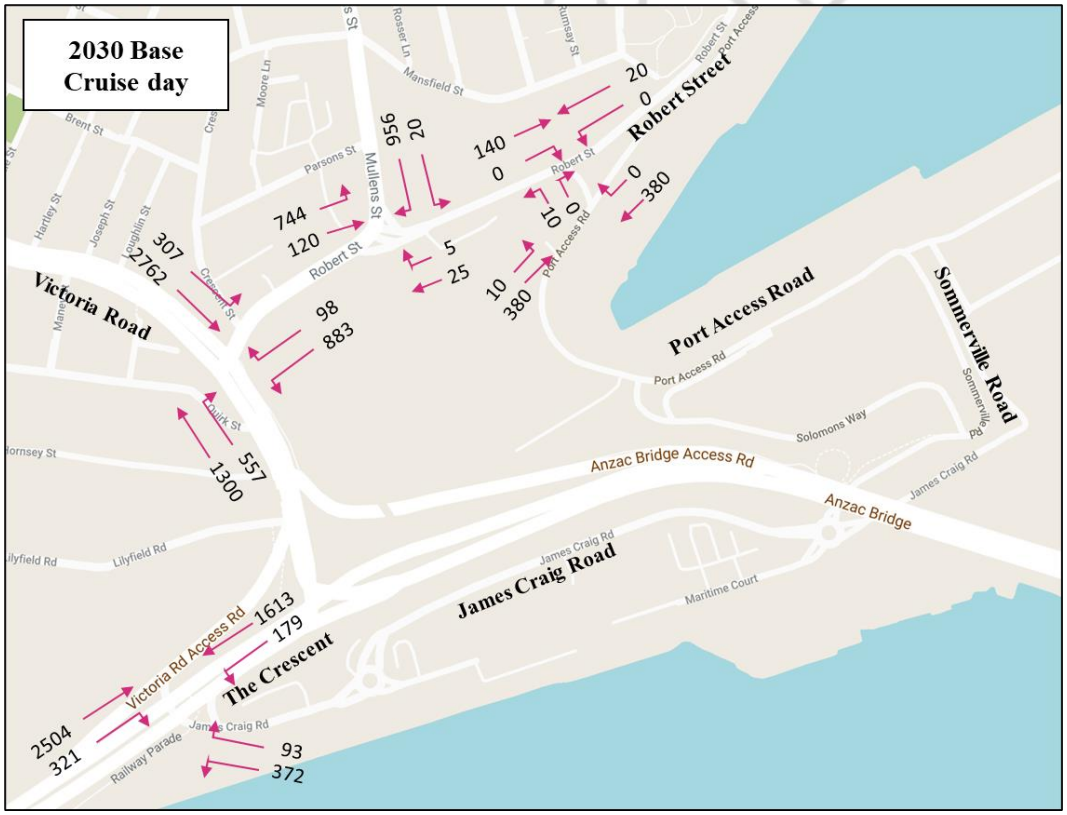


Figure 46 Forecast baseline 2030 cruise day AM peak hour demands (without Bays West)

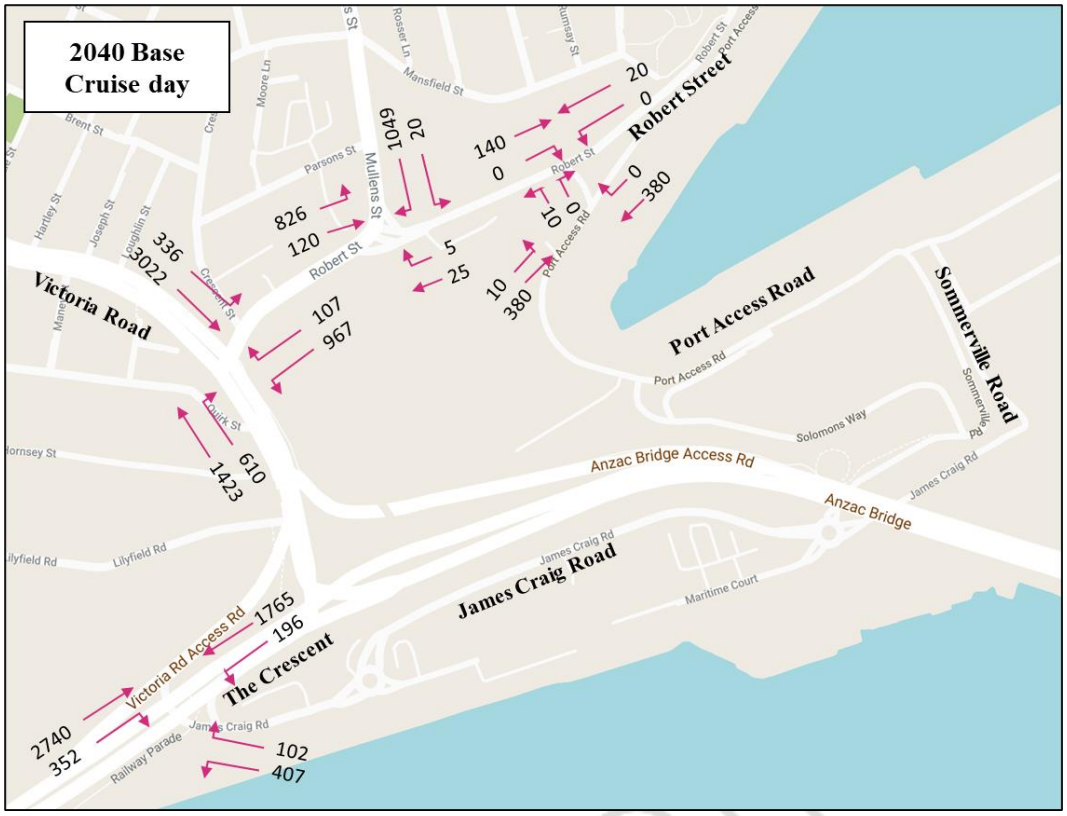


Figure 47 Forecast background 2040 cruise day AM peak hour demands (without Bays West)

7.2.2 Trip and traffic generation of the Masterplan

The AM peak hour trip generation of all new uses proposed in the Bays West Precincts were derived from a variety of data sources for each land use. The assumed trip rates for each land use were agreed with DPE and are shown in Table 12.

Table 12: Person trip generation rates

Land use	AM peak hour person trip generation rate	Directional split		Source
		In	Out	
Residential	0.66 per 100m^2	20%	80%	RMS TDT 2013/04a, average of Sydney high-density residential surveys. Assumed one dwelling per 100m^2
Commercial	2.0 per 100m^2	90%	10%	Assuming one employee per 25m^2, attendance rate of 90% and 50% arriving within morning peak hour
Retail	2.86 per 100m^2	50%	50%	Terroir (*Bays Area Schedule Combined Metrics 180626*)
Tertiary education	0.57 per 100m^2	90%	10%	UNSW Travel Survey 2016
Social infrastructure	0.67 per 100m^2	90%	10%	TRICS Database (Cambourne Community Centre, Mere Community Centre, Wolverhampton Community Centre, Swansea Community Centre)
Cultural infrastructure	0.78 per 100m^2	90%	10%	TRICS Database (Edinburgh Theatre, Swansea Theatre)
Miscellaneous/indoor recreation	0.27 per 100m^2	50%	50%	Terroir (*Bays Area Schedule Combined Metrics 180626*)

The refined land uses and yields for the WBPS/Robert Street Precincts were assumed according to Scenario 2 from the *White Bay Power Station and Roberts Street Sub-Precincts Draft Urban Design Framework and Concept Master Plan* (Cox, 2021). Land uses and yields for the Rozelle Bay Precinct and Glebe Island Precinct were assumed according to Option 2 from the *Bays West Strategic Masterplan Reference Scheme Options – Yield Studies* (Terroir, 2021).

The overall land use yields for 2030 and 2040 when combining these two data sets are presented in Table 13.

Table 13: 2030 and 2040 yields and trips by land use

Land use	2030		2040	
	Yield	Person trips (peak hour)	Yield	Person trips (peak hour)
Residential (m^2)	53,500	441	350,377	2,891
Commercial (m^2)	72,100	1,442	407,108	8,142
Retail (m^2)	5,000	143	5,000	143
Tertiary education (m^2)	-	0	56,000	319
Social infrastructure (m^2)	-	0	5,100	34
Cultural infrastructure (m^2)	-	0	0	0
Miscellaneous/indoor recreation (m^2)	-	0	6,333	17
Total	**130,600**	**2,026**	**829,918**	**11,546**

Source: Urban Design Framework (Cox, 2021), Bays West Strategic Masterplan Reference Scheme Options – Yield Studies (Terroir, 2021)

The resulting traffic generation in 2030 and 2040 when considering 5% and 15% private vehicle mode shares are shown in Table 14.

Table 14: 2030 and 2040 person and private vehicle mode trips by land use

Land use	2030			2040		
	Person trips	5% PV mode share	15% PV mode share	Person trips	5% PV mode share	15% PV mode share
Residential	441	22	66	2,891	145	434
Commercial	1,442	72	216	8,142	407	1,221
Retail	143	7	21	143	7	21
Tertiary education	0	0	0	319	16	48
Social infrastructure	0	0	0	34	2	5
Cultural infrastructure	0	0	0	0	0	0
Miscellaneous/indoor recreation	0	0	0	17	1	3
Total	**2,026**	**101**	**303**	**11,546**	**578**	**1,732**

7.2.3 Trip distribution

The trip distribution across each access point was estimated using the proximity of each sub-precinct to the Robert Street and James Craig Road access points as well as connections to destinations in Greater Sydney. The assumed trip distribution for each precinct is shown in Figure 48.

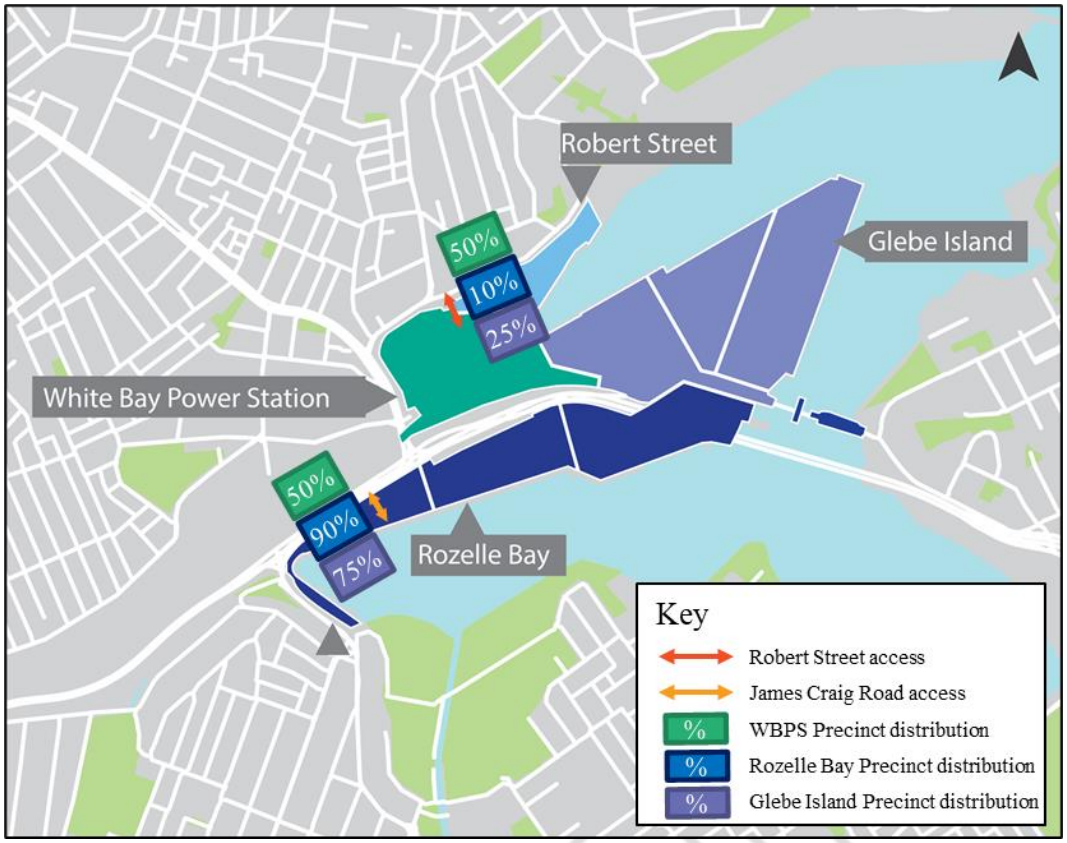


Figure 48 Trip distribution to the Robert Street and James Craig Road accesses

The trip distribution of land uses beyond the Precinct was estimated using the following assumptions:

- For residential, commercial, retail, tertiary, cultural infrastructure and miscellaneous land uses, trips are expected to be distributed across Greater Sydney with traffic generally using City West Link and the Anzac Bridge to travel to Western Sydney, Sydney CBD and Eastern Suburbs.
- For social infrastructure land uses, trips are expected to be local with a greater proportion of trips using Victoria Road, Mullens Street and City West Link to travel to Balmain, Rozelle and Lilyfield.

Based on the above assumptions, the trip distributions for different land uses are shown in Figure 49 and Figure 50.

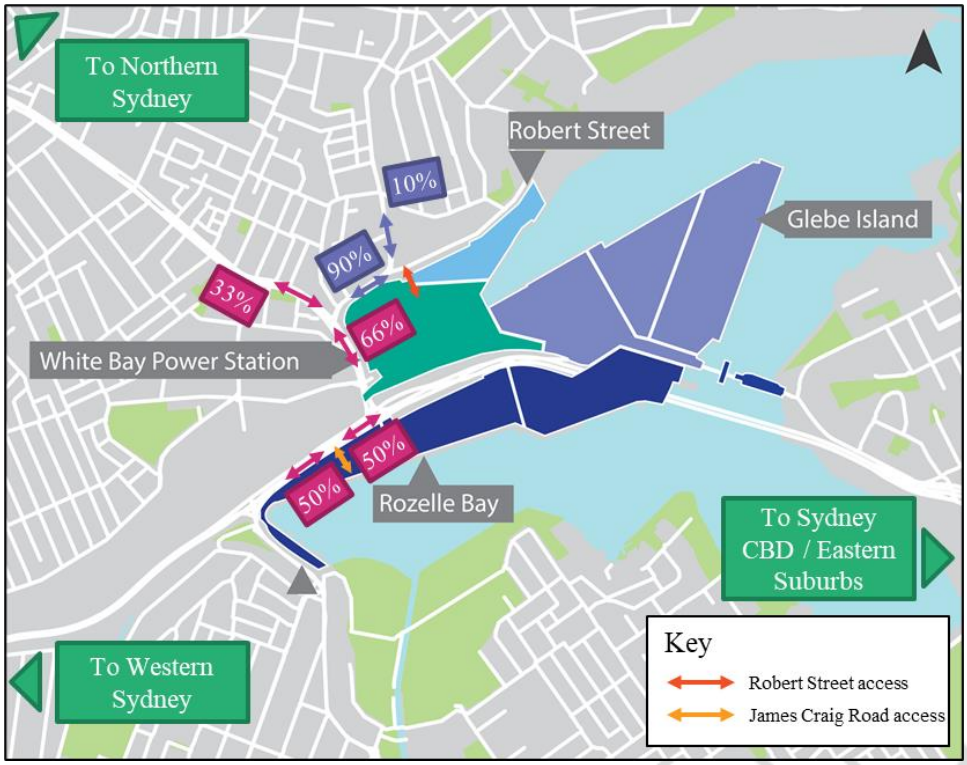


Figure 49 Trip distribution for residential, commercial, retail, tertiary, cultural infrastructure and miscellaneous land uses

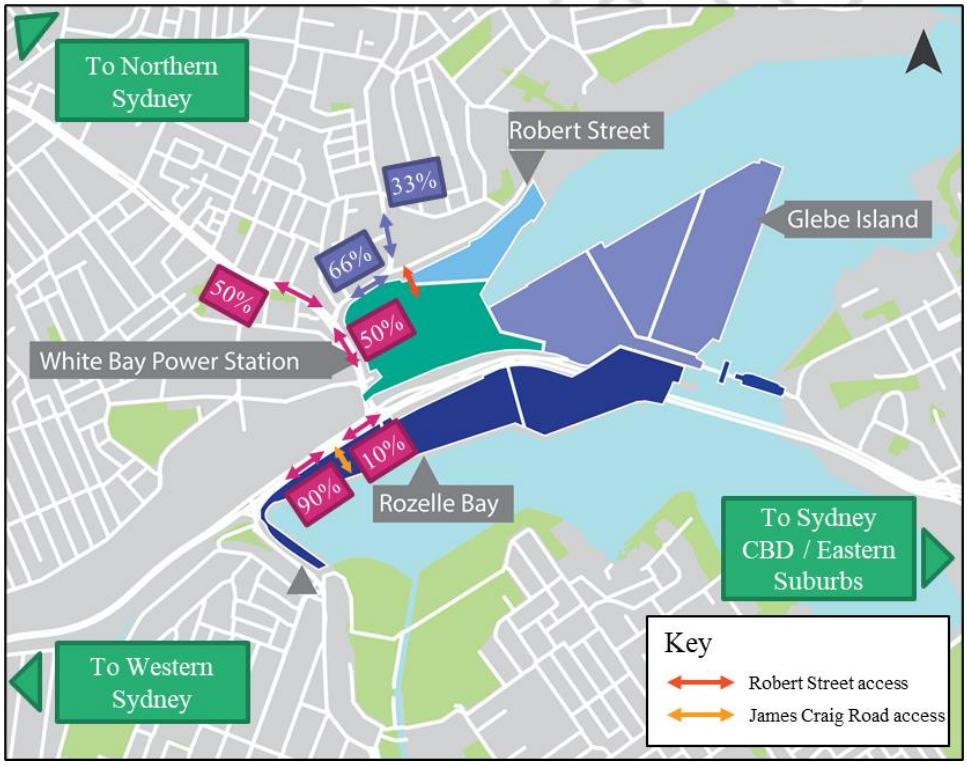


Figure 50 Trip distribution for social infrastructure land uses

7.3 Traffic impact – Baseline

Intersection performance for the baseline non-cruise day and cruise day scenarios is shown in Table 15 and Table 16 and shown graphically in Figure 51 and Figure 52.

Table 15: Baseline SIDRA Modelling results - 2030

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
The Crescent / James Craig Road	0.846	15.5	B	175m (east approach)	0.902	27.0	C	250m (east approach)
Victoria Road / Robert Street	1.007	49.9	D	500m (north approach)	1.007	49.9	D	500m (north approach)
Robert Street / Mullens Street	0.704	16.2	B	120m (west approach)	0.704	16.2	B	120m (west approach)

Table 16: Baseline SIDRA Modelling results - 2040

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
The Crescent / James Craig Road	0.878	16.4	B	200 (east approach)	0.898	35.3	D	400m (east approach)
Victoria Road / Robert Street	1.153	107.6	F	860m (north approach)	1.153	107.6	F	860m (north approach)
Robert Street / Mullens Street	0.738	16.1	B	130m (west approach)	0.738	16.1	B	130m (west approach)

The Crescent / James Craig Road and Robert Street / Mullens Street intersections are expected to operate satisfactorily at Level of Service D or above in all scenarios. The Victoria Road / Robert Street intersection is expected to operate at close to capacity in 2030 with a Level of Service D. However, in 2040 the increases to background traffic lower the Level of Service of this intersection to F with extensive queues on the northern approach.

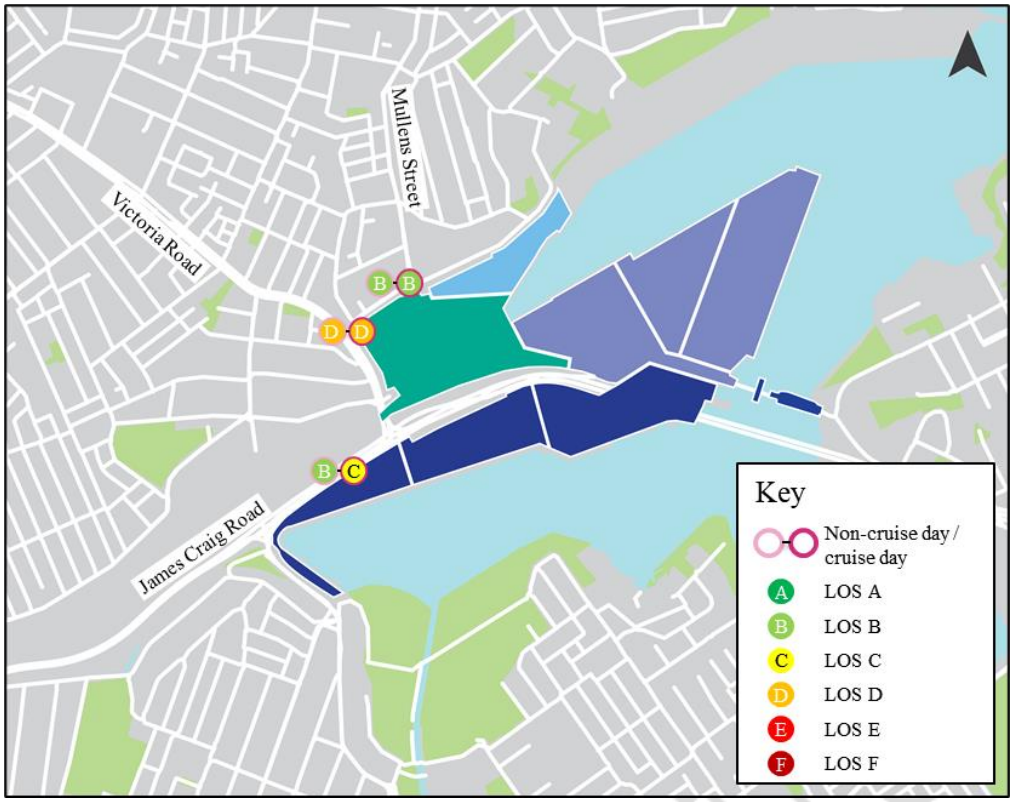


Figure 51 SIDRA Modelling results – Baseline 2030

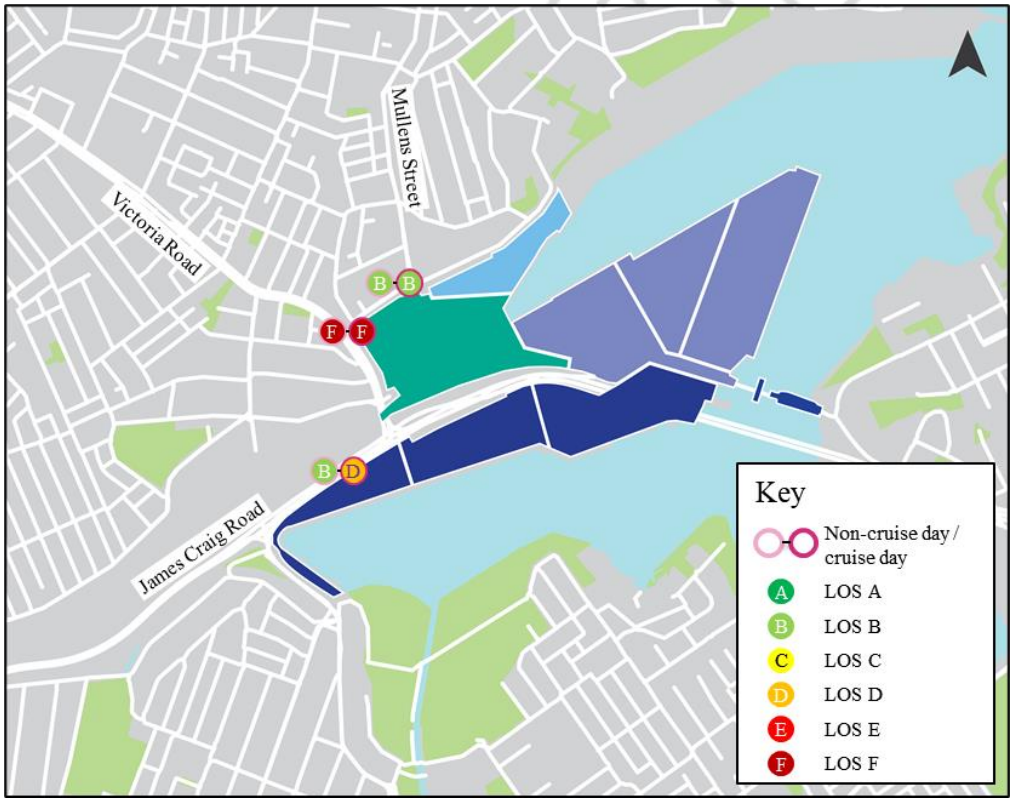


Figure 52 SIDRA Modelling results - Baseline 2040

7.4 Traffic impact – 2030

Intersection performance for the 2030 non-cruise day and cruise day scenarios at all existing intersections are shown in Table 17 and Table 18 and shown graphically on Figure 53 and Figure 54.

Table 17: SIDRA Modelling results - Existing Intersections - 2030 (5% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
The Crescent / James Craig Road	0.879	18.0	B	175m (east approach)	0.907	31.0	C	300m (east approach)
Victoria Road / Robert Street	1.105	86.8	F	700m (north approach)	1.105	86.8	F	700m (north approach)
Robert Street / Mullens Street	0.882	25.6	B	150m (north approach)	0.882	25.6	B	150m (north approach)

Table 18: SIDRA Modelling results – Existing Intersections - 2030 (15% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
The Crescent / James Craig Road	0.860	19.1	B	200m (east approach)	0.903	34.7	C	350m (east approach)
Victoria Road / Robert Street	1.133	97.0	F	750m (north approach)	1.133	97.0	F	750m (north approach)
Robert Street / Mullens Street	0.973	40.9	C	225m (north approach)	0.973	40.9	C	225m (north approach)

These results indicate that the Victoria Road / Robert Street intersection will operate with Level of Service F with significant delays whereas the other two intersection will operate with an acceptable Level of Service.

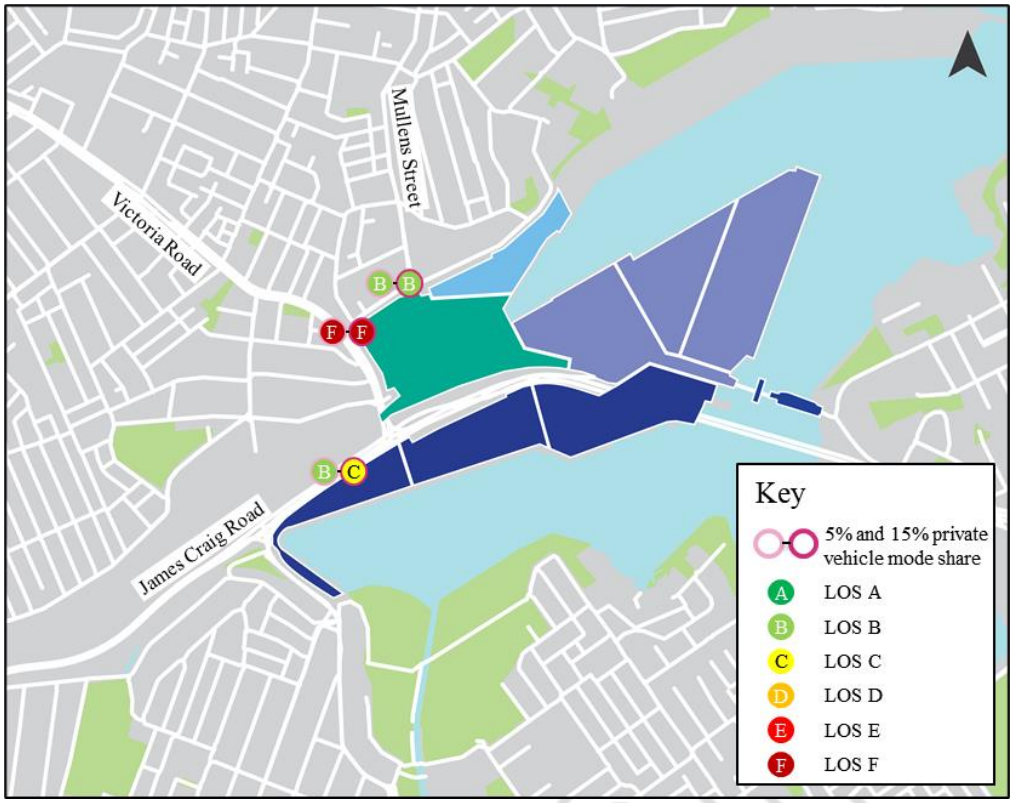


Figure 53 SIDRA Modelling results – Existing Intersections - 2030 (5% private vehicle mode share)

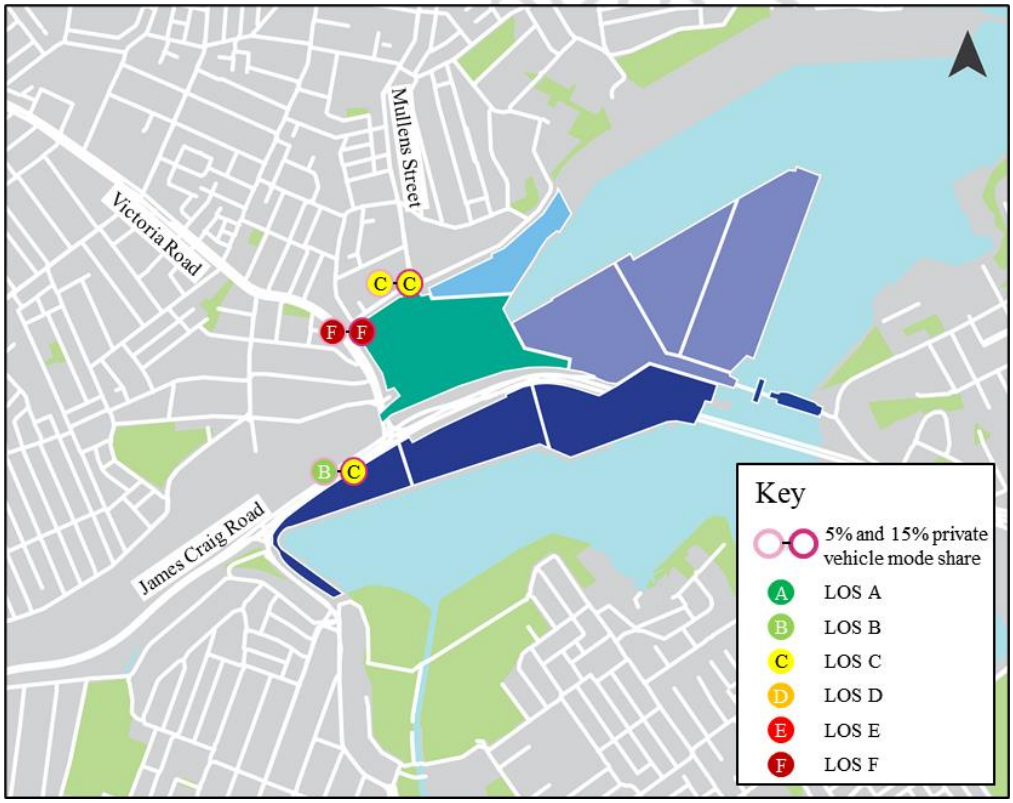


Figure 54 SIDRA Modelling results - Existing Intersections - 2030 (15% private vehicle mode share)

The intersections within the precinct were also modelled considering the impact of the varying street hierarchy between Options 1 and 2.

7.4.1 Option 1

All intersections relating to Option 1 (as presented in Section 6.9.3) were also modelled to understand the operation of the internal street network. These results are presented in Table 19 and Table 20.

Table 19: Option 1 SIDRA Modelling results – Precinct Intersections - 2030 (5% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
Robert Street / Port Access Road	0.093	6.6	A	5m (south approach)	0.093	6.6	A	5m (south approach)
Port Access Road / Cruise Terminal Access Road	0.090	5.0	A	5m (north approach)	0.409	5.6	A	20m (east approach)
Port Access Road / North Metro Street T-intersection[1]	0.270	17.2	B	30m (east approach)	0.605	16.0	B	85m (east approach)
Port Access Road / North Metro Street Roundabout	0.146	6.9	A	5m (east approach)	0.379	8.2	A	20m (east approach)

Table 20: Option 1 SIDRA Modelling results – Precinct Intersections - 2030 (15 per cent private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
Robert Street / Port Access Road	0.140	6.5	A	5m (south approach)	0.140	6.5	A	5m (south approach)
Port Access Road / Cruise Terminal Access Road	0.124	5.6	A	5m (north approach)	0.467	7.0	A	25m (east approach)
Port Access Road / North Metro Street T-intersection	0.324	18.0	B	35m (east approach)	0.656	17.6	B	90m (east approach)
Port Access Road / North Metro	0.205	6.8	A	10m (east approach)	0.435	7.8	A	25m (east approach)

[1] Average delay reduces slightly in a cruise day scenario when compared to a non-cruise day scenario. This is due to signal phasing optimisations in response to an increase in vehicles travelling to and from the White Bay Cruise Terminal.

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
Street Roundabout								

This traffic modelling indicated all precinct intersections will operate with an acceptable Level of service in 2030.

7.4.2 Option 2

Option 2 includes the following changes to intersections within the WBPS Precinct (as presented in Section 6.9.3):

- Due to the conversion of the North Metro Street to a Civic Space. The Port Access Road / North Metro Street T-intersection becomes a signalised midblock crossing.
- The Port Access Road / Nort Metro Street Roundabout reduces from four legs to three legs.

The performance of these two revised intersections was modelled and the results are presented in Table 21.

Table 21: Option 2 SIDRA modelling results – Precinct intersections - 2030

Intersection		Non-cruise day				Cruise day			
		DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
5% private vehicle mode share	Midblock crossing	0.156	3.9	A	15m (south approach)	0.393	4.7	A	50m (south approach)
	Roundabout	0.135	4.2	A	5m (east approach)	0.348	4.3	A	15m (east approach)
15% private vehicle mode share	Midblock crossing	0.195	4.0	A	20m (north approach)	0.413	4.8	A	55m (south approach)
	Roundabout	0.190	4.2	A	10m (east approach)	0.400	4.3	A	20m (east approach)

This analysis indicated that the two intersections that vary in Option 2 would operate with an acceptable Level of Service.

7.5 Traffic Impact – 2040

Intersection performance for the 2040 non-cruise day and cruise day scenarios at all existing intersections are shown in Table 22 and Table 23 and shown graphically on Figure 55 and Figure 56.

Table 22: Option 1 SIDRA Modelling results - 2040 (5% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
The Crescent / James Craig Road	0.901	27.4	C	325m (east approach)	1.024	61.7	E	625m (east approach)
Victoria Road / Robert Street	1.209	132.7	F	975m (north approach)	1.209	132.7	F	975m (north approach)
Robert Street / Mullens Street	1.028	64.3	E	350m (north approach)	1.028	64.4	E	350m (north approach)

Table 23: Option 1 SIDRA Modelling results - 2040 (15% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
The Crescent / James Craig Road	1.077	76.1	F	700m (east approach)	1.265	150.8	F	975m (east approach)
Victoria Road / Robert Street	1.393	213.3	F	1250m (north approach)	1.393	213.2	F	1250m (north approach)
Robert Street / Mullens Street	1.261	177.0	F	600m (north approach)	1.261	177.3	F	600m (north approach)

In 2040, the operation of the Victoria Road / Robert Street continues to fail with impacts from this intersection also causing the Robert Street / Mullens Street intersection to fail in the 15% private vehicle mode share scenario. The Crescent / James Craig Road intersection will operate satisfactorily with a 5% vehicle mode share on a non-cruise day but will operate with a Level of Service E or lower in all other scenarios. The increased background flows on the network in 2040 have a significant impact on the capability of the proposed network to accommodate traffic relating to Bays West. Due to significant uplift in development in Bays West by 2040, the volumes of traffic produced exacerbates traffic congestion at all existing intersections.

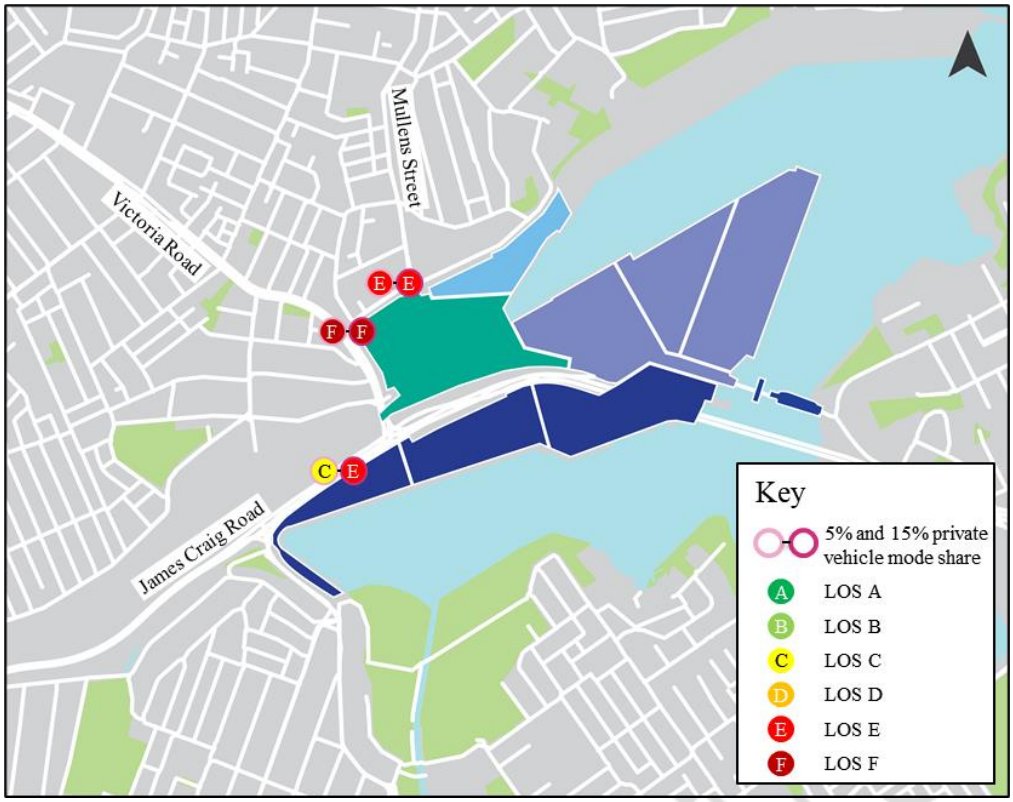


Figure 55 SIDRA Modelling results – Existing Intersections - 2040 (5% private vehicle mode share)

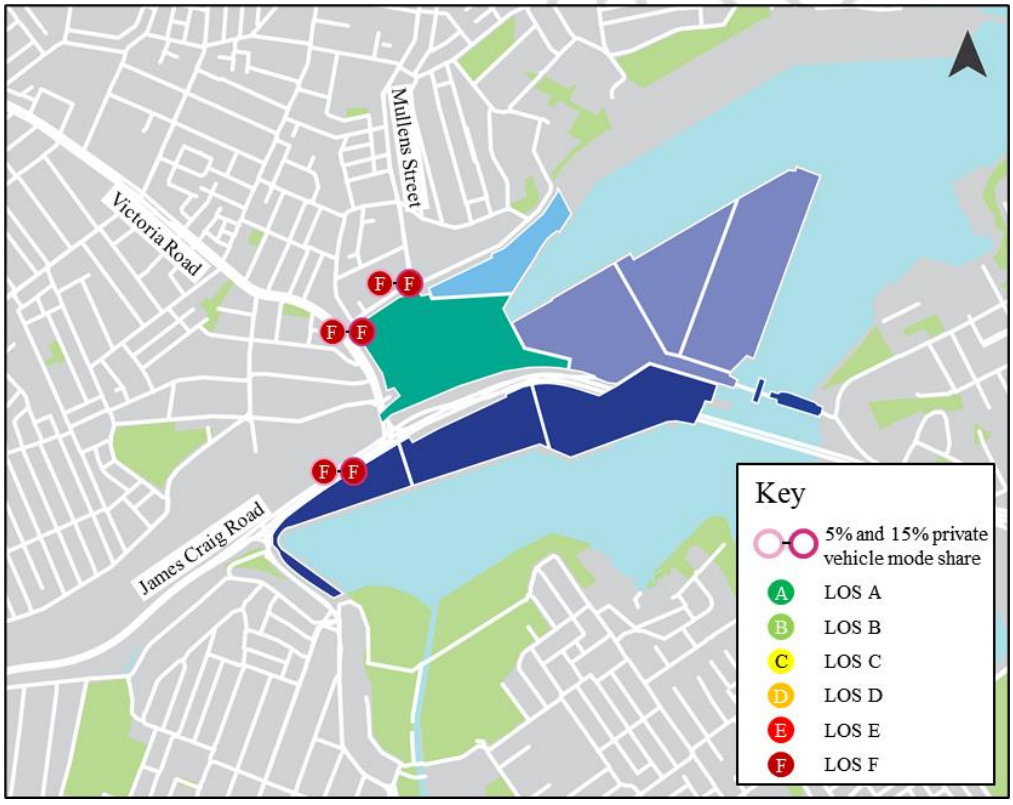


Figure 56 SIDRA Modelling results - Existing Intersections - 2040 (15% private vehicle mode share)

7.5.1 Option 1

The intersections within the precinct for Option 1 were also modelled for 2040, these results are presented in Table 24 and Table 25.

Table 24: Option 1 SIDRA Modelling results – Precinct intersections - 2040 (5% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
Robert Street / Port Access Road	0.132	6.5	A	5m (south approach)	0.132	6.5	A	5m (south approach)
Port Access Road / Cruise Terminal Access Road	0.118	5.5	A	5m (north approach)	0.441	6.5	A	25m (east approach)
Port Access Road / North Metro Street T-intersection	0.302	16.5	B	35m (east approach)	0.637	16.1	B	90m (east approach)
Port Access Road / North Metro Street Roundabout	0.174	6.1	A	5m (east approach)	0.405	8.5	A	25m (east approach)

Table 25: Option 1 SIDRA Modelling results – Precinct intersections - 2040 (15% private vehicle mode share)

Intersection	Non-cruise day				Cruise day			
	DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
Robert Street / Port Access Road	0.224	6.4	A	5m (west approach)	0.224	6.4	A	5m (west approach)
Port Access Road / Cruise Terminal Access Road	0.206	6.8	A	10m (north approach)	0.558	10.0	A	40m (east approach)
Port Access Road / North Metro Street T-intersection	0.414	17.1	B	45m (east approach)	0.732	18.1	B	115m (east approach)
Port Access Road / North Metro Street Roundabout	0.286	5.8	A	15m (east approach)	0.513	8.5	A	35m (east approach)

This modelling confirmed all internal intersections in Option 1 would operate with an acceptable Level of Service. The Port Access Road / North Metro Street intersection Level of Service will reduce but will continue to operate efficiently.

7.5.2 Option 2

The precinct intersections that differ in Option 2 were also modelled in 2040. These results are presented in Table 26.

Table 26: Option 2 SIDRA modelling results – Port Access Road/Metro North Road intersections - 2040

Intersection		Non-cruise day				Cruise day			
		DoS	Average delay (s)	LoS	Max queue & approach (m)	DoS	Average delay (s)	LoS	Max queue & approach (m)
5% private vehicle mode share	Midblock crossing	0.186	4.1	A	20m (south approach)	0.435	5.1	A	60m (south approach)
	Roundabout	0.160	4.2	A	5m (south approach)	0.267	4.2	A	10m (south approach)
15% private vehicle mode share	Midblock crossing	0.291	4.4	A	35m (north approach)	0.503	5.4	A	70m (south approach)
	Roundabout	0.372	4.3	A	20m (east approach)	0.474	4.3	A	25m (east approach)

This modelling confirmed all internal intersections in Option 2 would operate with an acceptable Level of Service in 2040.

7.5.3 Intersection spacing between Robert Street / Mullens Street and Robert Street / Port Access Road

To validate the required distance between the Robert Street / Mullens Street and Robert Street / Port Access Road intersections, modelled 95th percentile queue lengths on the eastern leg of the Robert Street / Mullens Street intersection are shown in Table 27.

The modelled queue lengths are up to a maximum of 33.9 metres in the 2040 scenario with 15 per cent private vehicle mode share.

Table 27: Robert Street / Mullens Street east leg queue lengths

Scenario		Robert Street / Mullens Street east leg maximum queue length (m)
2030	Five per cent private vehicle mode share	21.9m
	15 per cent private vehicle mode share	22.7m
2040	Five per cent private vehicle mode share	27.2m
	15 per cent private vehicle mode share	33.9m

7.6 Traffic impact – Summary

Overall road network performance within the precinct is expected to be satisfactory in 2030 and 2040 for Options 1 and 2.

Impacts to existing intersections appear to be more significant due to the congestion that already exists on the surrounding network and the additional background traffic that will be added by 2040. A summary of the modelling results for the existing intersections is outlined Table 28.

Table 28: Existing Intersections Results Summary

Intersection	Non-cruise day						Cruise day					
	2030			2040			2030			2040		
	Base	5% PV	15% PV	Base	5% PV	15% PV	Base	5% PV	15% PV	Base	5% PV	15% PV
The Crescent / James Craig Road	B	B	B	B	C	F	C	C	C	D	E	F
Victoria Road / Robert Street	D	F	F	F	F	F	D	F	F	F	F	F
Robert Street / Mullens Street	B	B	C	B	E	F	B	B	C	B	E	F

These results indicate that even small additions of traffic to the Victoria Road / Robert Street intersection will lead to significant delays and congestion, as this intersection is already at capacity. The Precinct should aim to divert traffic away from this intersection where possible particularly as The Crescent / James Craig Road intersection has more capacity to accommodate additional traffic.

The Robert Street / Mullens Street intersection once signalised will operate efficiently in 2030. However, in 2040 particularly if an ultra low car mode share is not achieved will reach a Level of Service F which is to an extent caused by delays upstream at the Victoria Road / Robert Street intersection.

The Crescent / James Craig Road intersection has the most latent capacity of all the intersections. Without cruise traffic the intersection will only fail if an ultra low car mode share is not achieved in 2040. Although the Level of Service of this intersection is impacted by cruise passenger traffic, if a travel demand management approach can be used to reduce private vehicle use to the White Bay Cruise Terminal this may mitigate this issue.

Overall these modelling results clearly highlight the importance of achieving an ultra low car mode share to avoid unacceptable congestion on the surrounding road network.

Appendix A

SIDRA results

A1