



Transport
for NSW

Bella Vista Station Precinct

Transport Plan



Executive Summary

The Department of Planning and Environment has prepared planning proposals for the three Northwest urban renewal Priority Precincts – Showground Station, Bella Vista Station and Kellyville Station. These precincts aim to take advantage of the opportunities provided by the Sydney Metro Northwest by transforming the generally low-density residential corridor into a series of activity centres and providing increased housing around the eight new railway stations. The proposed growth and activation would be supported by a broad range of complementary infrastructure and service initiatives.

This transport plan describes the transport network recommended to support the Bella Vista Station Precinct (the Precinct) planning proposal.

Proposed future land uses

The proposed Precinct structure plan is illustrated on the following page. The Precinct comprises a local centre, commercial and light industrial areas, an employment spine along Lexington Drive, as well as apartments, townhouses and detached dwellings.

The land uses and scale of development is based on analysis undertaken by the Department of Planning and Environment. The analysis included a review of the historical and current supply of residential, retail, industrial and commercial floor space in the Local Government Area (LGA) and comparisons of the take up of dwellings and employment floor space in similar areas. The future land uses and assumed realisation to 2036 within the Precinct that form the basis of this planning proposal are summarised in the table below.

Land use	2036 Yields
Residential	6,000 dwellings
Employment	18,900 jobs
Retail	5,000 to 10,000m ² GFA
Bella Vista Rail Station	

Note: above yields include existing and future land uses in the precinct

Retail figures in the 2036 yields relate to additional convenience retailing in the Precinct. Bulky goods and business park retail premises have been included in the employment yield forecast.

Proposed supporting future transport network

Sydney Metro Northwest will transform the Precinct and enable an activated transit-oriented precinct, resulting in a diversity of activities that create and shape the travel demand for residents, workers and visitors. The demands associated with these activities will require a range of efficient travel choices to support the range of trip purposes and distances to, from and within the precinct.

The proposed future transport system:

- Caters for travel choices by identifying appropriate specialisation of roads for different travel tasks and where appropriate for combinations of prioritised modes;
- Improves network capacity by completing networks for each mode and minimising conflicts between modes; and
- Supports the desired place making outcomes within the precinct.

The proposed urban renewal and transport improvements will achieve a significant shift in the way residents, workers and visitors travel to, from and within the Precinct. The analysis in this transport plan suggests a mode share of 53% for public and active transport for trips made both to and from the Precinct, higher than many well-established station precincts across Sydney.

This shift to public transport will happen over time, and will need to be reinforced with the proposed integrated future network, including:

- Delivery of Sydney Metro Northwest;
- Focused investment in the road network to manage both movement and place functions;
- Significantly improving walking safety, connectivity and amenity;
- Providing cycling links and facilities;
- Facilitating a network of bus corridors that connect the Precinct to surrounding centres outside the rail corridor; and
- Facilitating longer distance private vehicle travel and key road freight movements will be on primary roads and access provided for local freight, including deliveries, on local roads

Recommendations

To support the Precinct planning proposal, the following steps are recommended:

- Adoption of the future transport framework outlined in this transport plan and illustrated in the figure on the following page;
- Staged delivery of transport initiatives consistent with the staging of development and subregional growth, evolving travel patterns and further informed by detailed technical studies supporting future development applications;
- Monitoring transport system performance over time as detailed development applications are prepared and development proceeds; and
- Ongoing collaboration with Council to ensure urban renewal objectives are achieved and transport needs are accommodated.

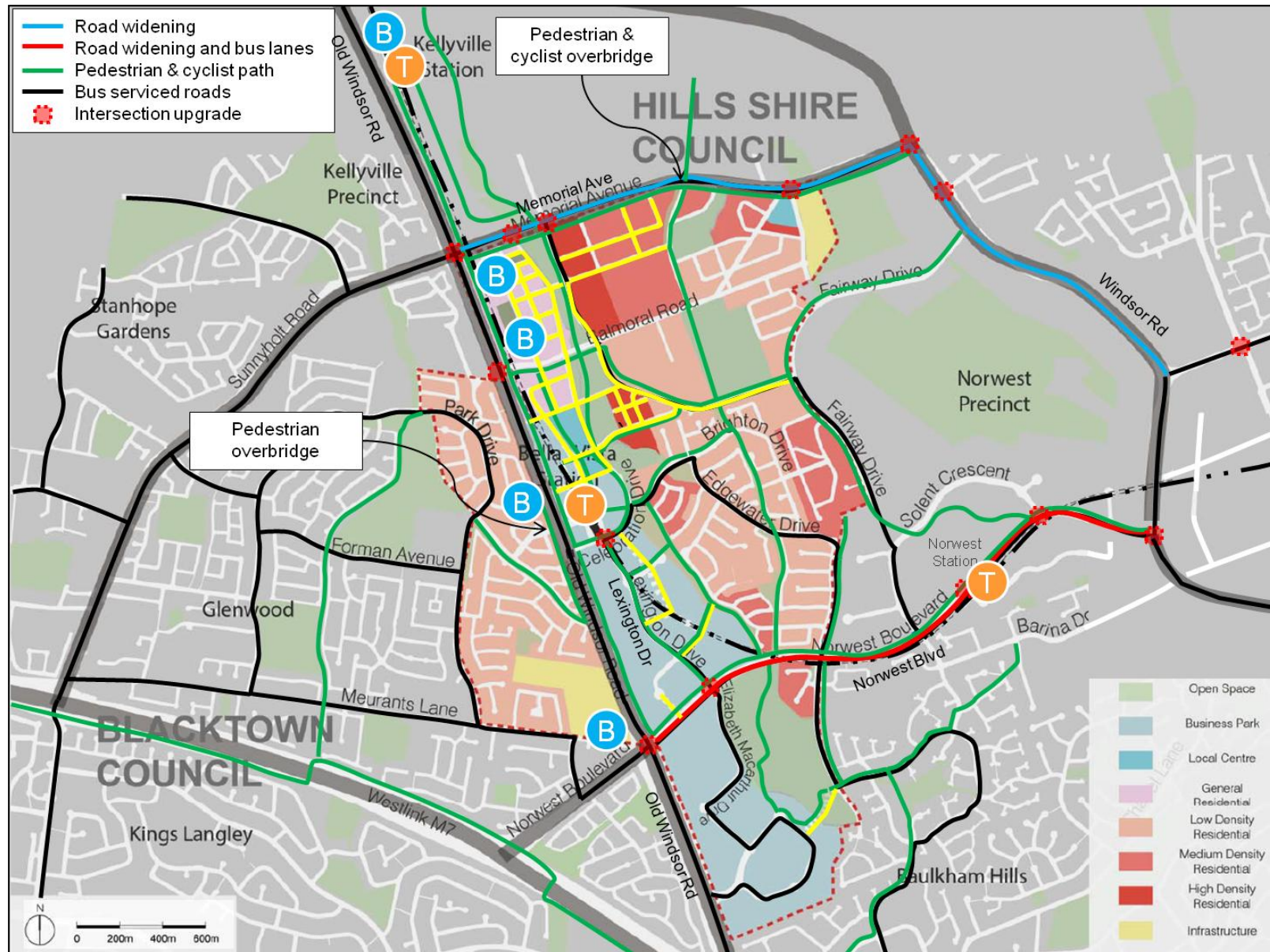
Next steps

Following the public exhibition of the Precinct rezoning proposal, the Department of Planning and Environment will assess the matters raised in the submissions and where required, the planning proposal will be amended. Once finalised, the planning proposal will be forwarded to the Minister for Planning for determination.

Approval and publication of the rezoning would enable the lodgement of development applications for individual development proposals with The Hills Shire Council for processing and assessment. During the development application process, when staging, delivery and detailed urban form are proposed, further detailed traffic modelling will be required to understand the impact and mitigation measures required on the local transport network.

The planning controls proposed allow for greater yields to be delivered. Any development beyond the assumed yield will require further assessment to augment the transport response. As proposed development proceeds, Transport for NSW and Roads and Maritime Services will continue to monitor the performance of the transport network and the timing of initiatives proposed in this report.

The NSW Government is investigating a range of funding sources for infrastructure to support the planning proposal. This will value sharing mechanisms.



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1 Introduction

Sydney is a rapidly growing city forecast to grow by more than 1.6 million people by 2031.

The NSW Government's *A Plan for Growing Sydney* identifies a number of goals and actions to ensure that Sydney's continuing growth can be accommodated, and to realise the Government's vision for Sydney as a strong global city and a great place to live.

A key action from *A Plan for Growing Sydney* is implementing the Priority Precincts Program to coordinate planning, and target growth and investment to revitalise local centres, services and infrastructure, in locations with existing or planned infrastructure capacity.

The \$8.3 billion Sydney Metro Northwest project currently under construction provides a catalytic opportunity for urban renewal. Sydney Metro Northwest will dramatically improve accessibility to jobs and services across the growing Northwest area of Sydney and to and from Sydney's Global Economic Corridor, including central Sydney.

The location of the Bella Vista Station Precinct within the context of the Sydney Metro Northwest corridor is shown in the figure below.

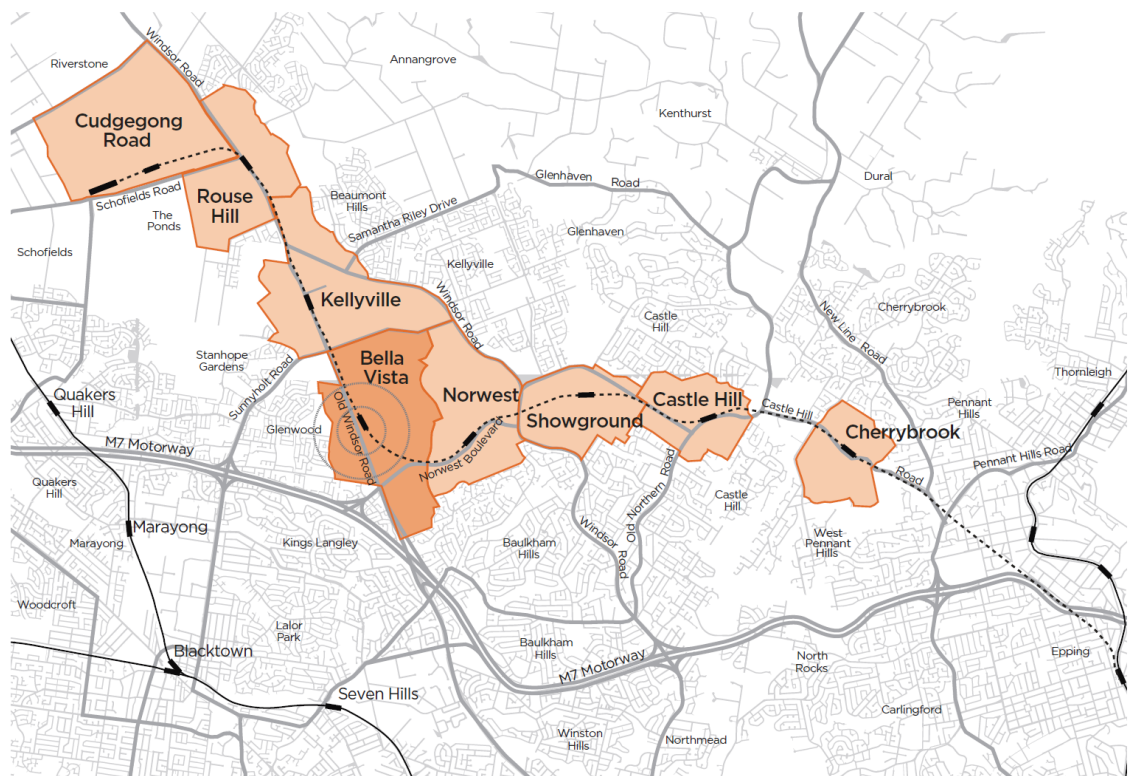


Figure 1 Sydney Metro Northwest Precincts

Building on the capacity and opportunities provided by the Sydney Metro Northwest, the Department of Planning and Environment has identified three priority precincts along the corridor – Showground Station, Bella Vista Station, and Kellyville Station – to:

- Facilitate housing supply for the 1.6 million more people forecast to live in Sydney by 2031;
- Coordinate planning; and
- Target growth and investment to revitalise local centres, services and infrastructure, in locations with existing or planned infrastructure capacity.

Transport for NSW has prepared this report to identify the transport initiatives recommended to support the planning proposal for the Precinct.

This report seeks to explain the policy and regional context, describe the various travel tasks arising from the Precinct planning proposal, document the transport network components recommended to cater for those tasks and meet the NSW Government's broader urban renewal objectives, and verify the suitability of the transport initiatives.

The Station Precinct outlined in **Figure 1** generally encompasses 1,200 metres from the Bella Vista Station, which is currently under construction. Precinct initiatives have been informed by a broader study area along the Sydney Metro Northwest corridor and across Sydney and by travel demand analyses at a variety of scales.

The remainder of this report is structured as follows:

- The relevant policy context, including selected objectives, goals and actions from NSW and local policy documents, and major planned and committed projects, are summarised in **Chapter 2**.
- **Chapter 3** describes transport objectives for the Precinct, and outlines the transport planning framework used to match, complement, or prioritise the various place and movement functions. It also presents some illustrative examples of varied travel behaviour in similar precincts, reinforcing the importance of transport solutions tailored to the expected travel destinations and needs of the Precinct's customers.
- **Chapter 4** elaborates the future land use and transport proposal, beginning with the catalyst of the Sydney Metro Northwest, continuing with land uses and the nature of the forecast travel demand, and concluding with a description of the overall transport network and its components.
- **Chapter 5** evaluates the performance of the transport initiatives in meeting project and broader objectives.

Sydney Metro Northwest

Customer service, accessibility and revitalisation

The \$8.3 billion Sydney Metro Northwest is Australia's largest public transport infrastructure project currently under construction and a priority transport project for the NSW Government. It will be the first fully-automated metro system in Australia. The Sydney Metro Northwest will deliver, for the first time, a reliable public transport service to a region which has one of the highest levels of car ownership per household in Australia.



The project will deliver:

- All Sydney Metro stations will be developed with bus interchanges, with higher capacity interchanges at Rouse Hill, Kellyville and Castle Hill.
- 23 kilometres of new metro line between Cudgegong Road and Epping, including 15 kilometres of tunnels and a four kilometres skytrain viaduct.
- Conversion of the existing Epping to Chatswood railway to metro standards including new platform safety screen doors.
- A train every four minutes during peak periods (15 trains an hour). With Metro there will be no need for a timetable as customers can turn up and go, with a train at least every 10 minutes from 5am to 11pm.
- Sydney's new generation of fast, safe and reliable single deck trains will be rolled out on the Sydney Metro Northwest first, which is expected to open to customers in the first half of 2019.

Sydney Metro will unlock urban renewal potential in the corridor by providing an alternative to the constrained road and bus network, and cater for trips to, from and within the corridor. The Metro will enable renewal of station precincts, which lead to jobs and retail closer to home and provide a second wave of funding to support further transport infrastructure and services investment.

The project will drive a significant shift in travel patterns and behaviour in the region and along with the proposed urban renewal will provide significantly more local opportunities for and enable and attract greater walking, cycling and public transport use.

2 Policy and planning context

This chapter documents the policy context that has informed the planning outcomes detailed in this transport plan and highlights the key visions, objectives and strategies relevant to the Precinct. It also outlines the existing transport issues and planned transport projects relevant to the precinct.

2.1 NSW and regional context

2.1.1 State Priorities

The Premier announced in September 2015 12 Premier's priorities to support the growth of the economy while protecting the most vulnerable in our society.

The Premier's priorities are supported by a 30 State priorities or 'reforms' that aim to grow the economy, deliver infrastructure, deliver infrastructure, and improve health, education and other services across NSW.

Key policies and actions relevant to study area:

- **Increase housing supply.**
- **Building infrastructure**
- **Consistently meet public transport reliability targets.**
- **Improve the efficiency of the road network during peak times on Sydney's road corridors.**

2.1.2 A Plan for Growing Sydney

As the NSW Government's planning strategy for Sydney, *A Plan for Growing Sydney*, will guide land use planning decisions to 2031 to cater for an estimated 1.6 million additional people in Sydney. The Plan's vision is for Sydney to be a strong global city and a great place to live. The Plan identifies four goals:

- A competitive economy with world-class services and transport;
- A city of housing choice with homes that meet our needs and lifestyles;
- A great place to live with communities that are strong, healthy and well connected; and
- A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources.

These four goals are supported by 22 directions and 59 actions to achieve the Plan.

The Plan identifies six subregions to deliver the infrastructure needed to support the city's growth. The Precinct is located in the West Central subregion. By 2031, the population is expected to grow by over 479,000 to a total of 1,516,000. This planning proposal will facilitate growth and help to accommodate the forecast growth in the subregion.

Key policies and actions relevant to study area:

- **A Plan for Growing Sydney outlines that the West Central subregion is forecast to grow by over 450,000 residents by 2031.**

- **The Precinct is identified in A Plan for Growing Sydney as a Priority Precinct to accelerate the provision of housing supply and maximise existing and planned infrastructure.**

2.1.3 NSW Long Term Transport Master Plan

The NSW Long Term Transport Master Plan (LTTMP) sets the framework for the NSW Government to deliver an integrated transport system for NSW. The framework includes eight objectives for the NSW transport system that guide the planning and delivery of transport infrastructure and services:

- Improve quality of service;
- Improve liveability;
- Support economic growth and productivity;
- Support regional development;
- Improve safety and security;
- Reduce social disadvantage;
- Improve sustainability; and
- Strengthen transport planning processes.

The LTTMP also has a number of actions that affect this precinct directly, these are:

Planning

- Plan transit-oriented development as part of the Sydney Metro Northwest (formerly North West Rail Link) stations;
- Plan for walking, cycling and bus networks as part of new land releases and developments in Greater Sydney; and
- Improve integration of land use and freight planning, ensuring that planning decisions with respect to housing consider the freight logistic needs and network implications, and to prevent the encroachment by incompatible development and sensitive land use.

Walking and cycling

- Improve walking network and facilities in partnership with local government;
- Design new links in off-road pathway networks to provide walking and cycling separation where feasible;
- Plan and deliver a connected cycling network within a five kilometres catchment of local centres in conjunction with local government;
- Provide bike parking at transport interchanges; and
- Continue to invest in the cycling network with a focus on dedicated cycling paths and pinch point improvements.

Public transport

- Redesign city-wide bus networks to meet customer needs, use buses more efficiently, and better complement rail and light rail;
- New interchange facilities as part of the Sydney Metro Northwest project;
- Design and build modern interchanges that add value to local communities; and

- Increase park and ride at key interchanges.

Road

- Identify future demand and protect strategic freight corridors; and
- Upgrade the Greater Sydney road network, including a commitment to improve bus priority measures address pinch-points in the network.

The LTTMP seeks to implement actions across the Sydney Metropolitan area via detailed mode, place and sector-based planning documents. **Figure 2** illustrates the relationship of the LTTMP to other planning documents.

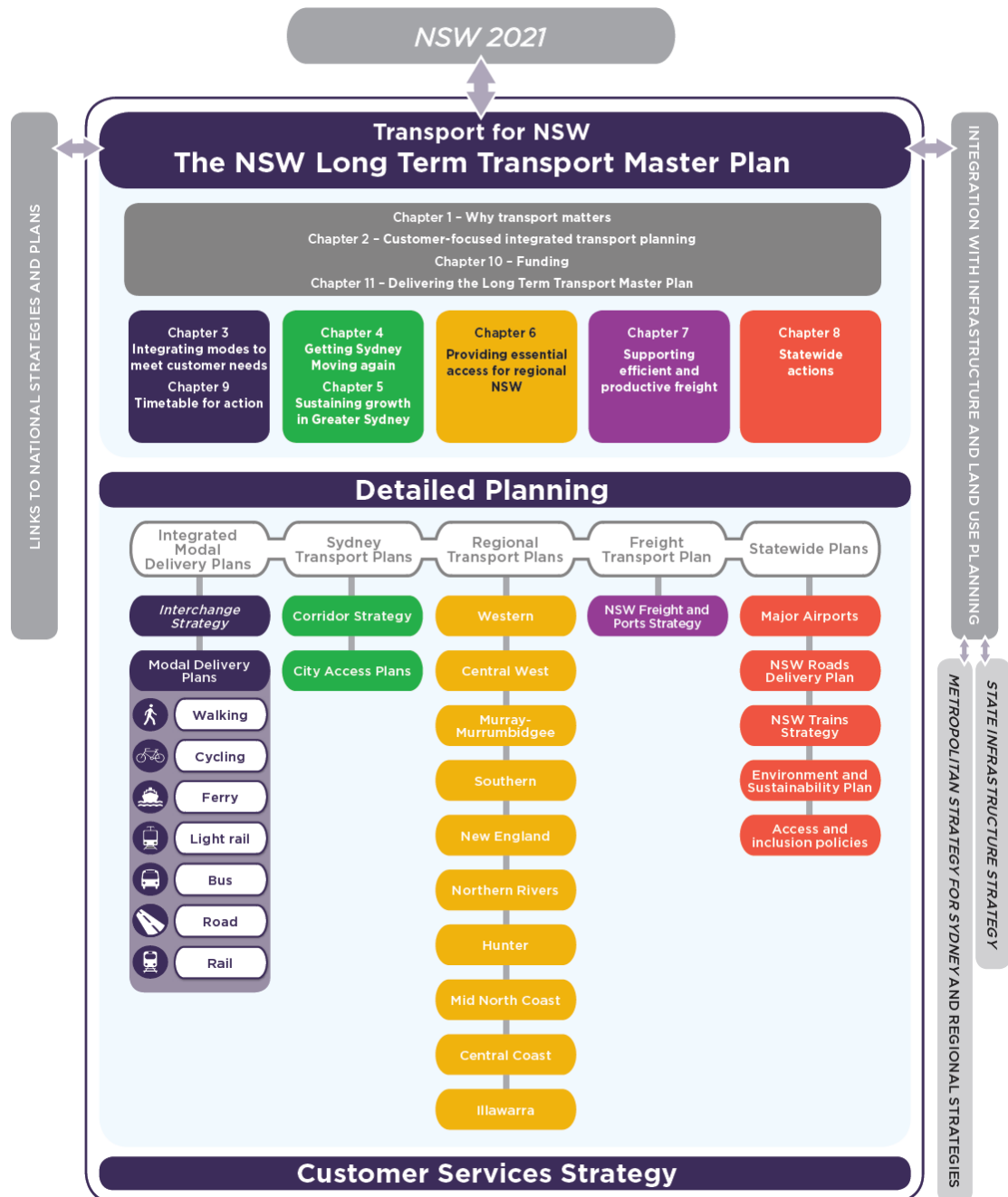


Figure 2 Long Term Transport Master Plan

Key policies and actions relevant to study area:

- **Integrated land use and transport planning for the Precinct.**
- **Plan for an integrated transport network considering all modes of transport and travel demand.**
- **Planning of the Precinct should consider freight logistic needs, network implications, and prevent encroachment by incompatible developments.**
- **Walking networks and facilities should provide good connections to and in the local centre and the station interchange.**
- **Cycling facilities should cater for regional connections within the Precinct to Rouse Hill and Norwest Business Park while also facilitating connections to local centres.**
- **There is a need for this transit-oriented development to facilitate and be supported by improved pedestrian, cycling and bus networks and infrastructure and targeted road connections and upgrades.**

2.1.4 State Infrastructure Strategy 2014 Update

The 2014 State Infrastructure Strategy (NSW Government) outlines a framework for investment in NSW. This framework covers all aspects of public infrastructure, including education, health, transport, energy and water.

Infrastructure NSW has identified seven opportunities for NSW, which include:

- Long-term infrastructure planning;
- Harnessing technology; and
- Delivering 'whole of government' outcomes.

The Strategy plans to deliver \$20 billion worth of infrastructure for NSW. This includes allocations towards:

- Sydney Metro, to fully fund a second harbour crossing and commits to Sydney Metro and improved public transport choices. Sydney Rapid Transit is now called Sydney Metro City & Southwest;
- Bus Rapid Transit and Bus Priority Infrastructure;
- Pinch points and clearways program;
- Traffic management upgrades; and
- Planning for corridor reservation for Parramatta Light Rail.

Key policies and actions relevant to study area:

- **Commitment to fund Sydney Metro (Sydney Rapid Transit) and various other transport improvements that will be within and surrounding the area.**

2.1.5 Sydney's Future Plans

Sydney's Rail Future

Sydney's Rail Future identifies the 'North West Rail Link' (now called Sydney Metro Northwest) as a new rapid transit system that will operate initially with 12 trains per hour (a train every 5 minutes) in the peak, and a minimum frequency of a train every 10 minutes. Note that the project design for the metro has increased this frequency to 15 trains per hour. The high frequency service will cater for large numbers of customers getting on and off at employment, commercial and educational centres and the residential areas that serve them between Cudgegong Road and Chatswood.

Sydney's Rail Future notes that Sydney Metro Northwest will transform the precincts along this corridor, create new travel behaviours, and with complementary changes in land use, reshape the way people live, work and play in these precincts. The Metro also unlocks critical interchanging opportunities in the corridor, allowing customers to access a wide catchment area of jobs, housing and community facilities.

Key policies and actions relevant to study area:

- **Sydney Metro Northwest is the catalyst for the urban renewal in Bella Vista Station and other precincts.**
- **Metro will significantly shift the travel behaviours in the corridor**
- **Broader network and interchanging initiatives will unlock access to a wide catchment area of jobs, housing and community facilities.**

Sydney's Walking Future

Sydney's Walking Future identifies that walk only trips are an ideal mode for trips of two kilometres or less. Walk only trips integrate communities, improve health and wellbeing, and deliver environmental benefits compared with other trip modes.

There are three pillars for *Sydney's Walking Future*, which are:

- Promote benefits and provide information;
- Connect through infrastructure and technology; and
- Engage through policy and partnerships.

Sydney's Walking Future's initiative to connect communities is implemented via an action to link walking to urban growth. In this action, the Rouse Hill and Castle Hill to Norwest corridor is identified as an 'Activity Centre', which are identified to have a two kilometre walking catchment. The Precinct is situated in between these two Activity Centres.

The Walking Future also identifies that walking is a key mode for linked trips and that the Sydney Metro Northwest (formerly North West Rail Link) interchanges will prioritise access for people walking to and through stations.

Key policies and actions relevant to study area:

- **Walk only trips are an ideal mode for trips of two kilometres or less**
- **The plan identifies Rouse Hill and Castle Hill to Norwest as an activity centre that is aimed to have a 2 km walking catchment.**
- **Sydney Metro interchanges should prioritise access for people walking to, from and through stations.**
- **Walking initiatives will be implemented through partnerships with**

stakeholders such as local government.

Sydney's Cycling Future

Sydney's Cycling Future identifies that cycling network infrastructure will focus in and around centres and aim for separation of bikes, vehicles, and pedestrians whenever possible.

There are three pillars for *Sydney's Cycling Future*, which are:

- Providing connected bicycle networks to major centres and transport interchanges;
- Promoting better use of existing infrastructure; and
- Engaging with partnership with local government, developers and cyclists.

Figure 3 shows customer preferences for cycling infrastructure, indicating a preference for greater separation from other modes.

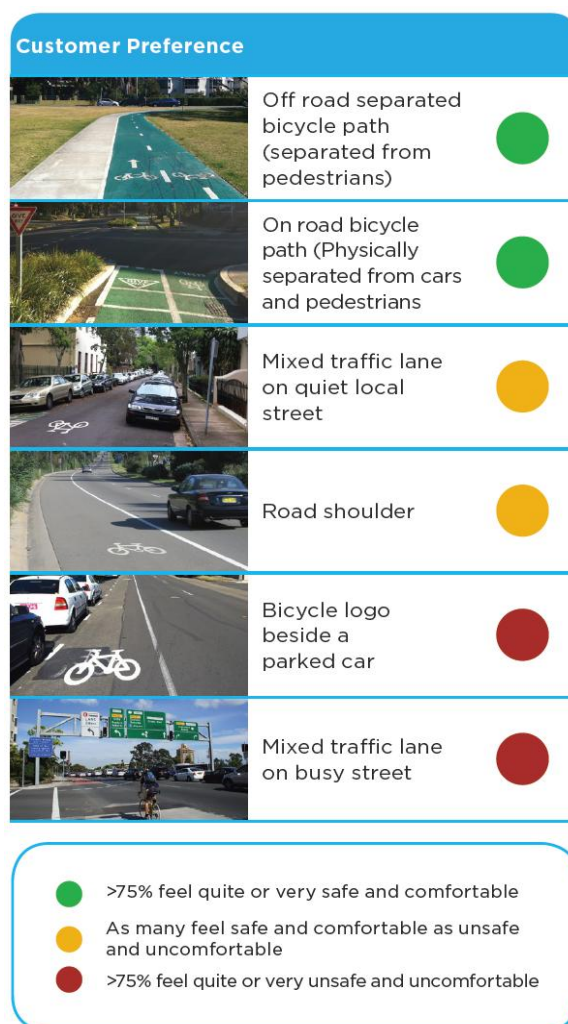


Figure 3 Customer preferences for cycling infrastructure

The Plan commits to developing a bike plan within five kilometres of Rouse Hill and the Norwest Business Park major centre, which both overlap with a proportion of the Precinct.

Sydney's Cycling Future also commits that Sydney Metro Northwest will include secure bike parking and racks at all stations, and will improve the local bicycle

network to these interchanges as well as providing better trip planning and information to customers wanting to continue their journey by train.

Key policies and actions relevant to study area:

- **The Plan identifies that a bike plan will be prepared for Norwest Business Park and Rouse Hill, which would interact with the Precinct.**
- **Sydney Metro Northwest interchanges are committed to having secure bike parking and racks, and providing improvements to local bicycle network, as well as improving trip planning information.**

Sydney's Bus Future

Sydney's Bus Future outlines key challenges for the bus network, opportunities to increase the attractiveness of bus usage and key actions for the NSW Government to undertake to create an improvement bus service for all customers. *Sydney's Bus Future* identifies three key goals for the bus system:

- A simpler bus network that is easier for customers to understand and use. It plans to make routes more direct, reduce duplication and increase the number of locations which customers can travel by bus;
- A faster bus network, which gets customers where they want to go in the shortest amount of time. It is reliable and delivers frequent services that connect seamlessly with other buses, trains, light rail, and ferries; and
- A better bus network that is more efficient, convenient and cost-effective with features that include a modern, comfortable fleet, real time customer information and world-class customer service.

The plan identifies a tiered service provision of buses: rapid, suburban and local.

The plan reflects coordination with the Sydney Metro Northwest project, by providing rapid bus route alignments to coordinate with station locations. An improved route is proposed from Rouse Hill to Hurstville via T-way, Parramatta and Bankstown with improved bus priority and pinch point reduction.

Key policies and actions relevant to study area:

- **All Sydney Metro stations will be developed as bus interchanges, with a T-Way terminal to be developed at the Rouse Hill station.**
- **The plan identifies two rapid routes that will be delivered; Hornsby – Blacktown via Castle Hill and T-way, and Growth Centre Rapid route: Rouse Hill – Blacktown via Marsden Park and Richmond Road.**

2.1.6 NSW Freight and Ports Strategy

The NSW Freight and Ports Strategy is a core component in the delivery of the Long Term Transport Master Plan, and provides a framework for industry, all levels of government and stakeholders to guide investment and other decision to enhance freight logistics in NSW. The plan identifies a suite of actions to deliver freight network efficiency, capacity and sustainability.

Key policies and actions relevant to study area:

- **The road network needs to promote efficient movement of general road freight, including light freight, responding to the local transport needs.**

- The road network needs to remove barriers to highly productive use of the road network

2.1.7 Service standards

Integrated Public Transport Service Planning Guidelines

The *Integrated Public Transport Service Planning Guidelines* provide guidance to support the implementation of the Long Term Transport Master Plan across public transport modes. The plan informs a ten year horizon of service planning for public transport across the Greater Sydney Metropolitan Area.

The guidelines identify three hierarchies of network between centres:

- Mass Transit Network;
- Intermediate Transit Network; and
- Local Transit Network.

These are described in **Table 1**, along with the hierarchies for other transport networks.

Table 1 NSW transport planning hierarchies

Network	Land Use Classification	Public Transport	Roads	Road Freight	Interchange
Level 1	Major centre	Mass Transit Network	Arterial network (includes motorway)	Primary	Regional cities and major centres
Level 2	Town centre	Intermediate Transit Network	Sub-arterial / Collector network	Secondary	Town centres
Level 3	Village	Local Transit Network	Local network	Tertiary	Local villages

The corridor between Norwest and Sydney CBD is defined as Sydney's "Global Economic Corridor" and includes the strategic centres Norwest, Castle Hill, Chatswood, St Leonards and North Sydney. This is a major mass transit corridor and is reflected in the planning for the Sydney Metro Northwest.

The corridor between Blacktown and Hornsby connects the strategic centres of Norwest and Castle Hill and includes the Precinct. This is an important intermediate transit corridor which is reflected in Government's planning and this transport plan.

The guidelines provide requirements for service coverage across public transport modes across the Sydney Greater Metropolitan Area, which are shown in **Table 2**.

Table 2 Integrated Public Transport Service Planning – Service Coverage Guidelines

Integrated Public Transport Service Planning - Service Coverage Guidelines	
Weekday	90% of households to be within 800m (as the crow flies) of a bus stop, ferry wharf, light rail station or train station between the hours of 09:00 – 18:00.
Saturday	90% of households to be within 400m (as the crow flies) of a bus stop, ferry wharf, light rail station or train station between the hours of 06:00 – 22:00.

Integrated Public Transport Service Planning - Service Coverage Guidelines

Sunday / Public Holiday	90% of households to be within 400m (as the crow flies) of a bus stop, ferry wharf, light rail station or train station between the hours of 09:00 – 18:00.
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The guidelines identify service periods for the operation of these hierarchies of public transport, which are shown in **Table 3**.

Table 3 Integrated Public Transport Service Planning – Service Periods

Period	Mass Transit Network	Intermediate Transit Network	Local Network
Peak	Morning peak – 06:00 – 09:00 Afternoon peak – 15:00 – 18:00 School services are in addition to base service level provision.	Morning peak – 06:00 – 09:00 Afternoon peak – 15:00 – 18:00 School services are in addition to base service level provision.	Morning peak – 06:00 – 09:00 Afternoon peak – 15:00 – 18:00 School services are in addition to base service level provision.
Shoulder	Shoulder services may operate for an hour pre peak or post peak.	Shoulder services may operate for an hour pre peak or post peak.	Shoulder services may operate for an hour pre peak or post peak.
Base	7 days a week – 06:00 to 24:00.	7 days a week – 06:00 to 24:00.	Frequent – 7 days a week – 06:00 – 22:00. Standard – 5 - 7 days a week – 09:00 – 18:00. Tailored – As required.
Overnight	24:00 – 06:00 as required.	24:00 – 06:00 as required.	18:00 – 09:00 as required.

Key policies and actions relevant to study area:

- **Defined hierarchy of service provision based on demand land use characteristics.**
- **90% of households to be within 800 metres (as the crow flies) of a bus stop or train station for weekday services.**
- **Service periods relate to time of day and network demand.**

2.2 Subregional and local context

2.2.1 Subregional planning

The Department of Planning and Environment is undertaking subregional planning to help to set out how *A Plan for Growing Sydney* will apply to local areas.

They will outline how the Government will make decisions on public spaces, community facilities, housing, jobs, transport options, schools and hospitals to meet the needs of communities across Sydney.

The draft subregional plans will be released for consultation and will:

- Influence the delivery of housing supply;

- Inform and influence the planning for business activity and investment to encourage jobs growth, particularly in strategic centres and transport gateways;
- Inform the decision making for infrastructure planning; and
- Provide guidance on urban planning issues.

Key policies and actions relevant to study area:

- **The subregional planning process will seek to implement the goals, directions and actions of *A Plan for Growing Sydney* and influence and provide guidance on housing supply, infrastructure investment, business activity and services planning across the local government areas of Auburn, Bankstown, Blacktown, Holroyd, Parramatta and The Hills.**

2.2.2 North West Rail Corridor Strategy

The North West Rail Corridor Strategy, prepared by Department of Planning and Environment, guides the urban renewal along the North West Rail Corridor over the next 20-25 years to maximise the investment in the Sydney Metro Northwest corridor. This includes:

- Land use location and density;
- New and improved transport connections and corridors for investigation; and
- Potential dwellings and employment yields.

The proposed Precinct structure plan provides mixed use development with adjacent high and medium density residential and has been used to inform this planning proposal.

To support the proposed new centre a potential street network has been developed to guide the planning of development and ensure connections to and from the centre is legible and integrated into the surrounding street network.

Hills Shire Council exhibited *The Hills Corridor Strategy* in response to the Department of Planning and Environment in September 2015. *The Hills Corridor Strategy* advocates a different land use and transport framework along the Metro corridor.

Key policies and actions relevant to study area:

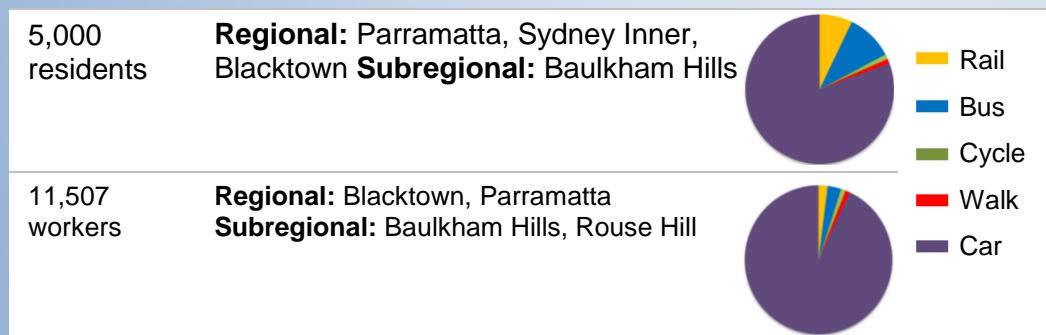
- **The North West Rail Corridor Strategy provided the framework for the preparation of this planning proposal.**
- **The Precinct structure plan outlines a proposed transport network, including a street layout and potential transport improvements for further investigation.**

Current transport challenges

Transport analysis & community input received on the Sydney Metro Northwest project and urban renewal concepts have identified a number of transport challenges in and around the existing area. These include:

- Increasing the mode share of walking, cycling, bus and rail use. Currently the majority of trips are made by private vehicle to and from the precinct (refer to statistics below).
- An integrated land use and transport approach to planning for increased dwellings and employment. Currently the majority of trips to and from the precinct are subregional and regional (refer to statistics below).
- Missing links for cyclists and pedestrians moving around the area.
- No safe crossing facilities for cyclists and pedestrians along Lexington Drive and Norwest Boulevard.
- Lack of convenient pedestrian access from Glenwood to the Bella Vista employment precinct and T-way stop.
- Existing bus network is not configured to support and complement the Sydney Metro Northwest project.
- The lack of bus priority beyond the Northwest T-way results in longer and less reliable journeys.
- The existing street network structure does not support easy movement of pedestrians and cyclists, as well as direct local bus network.
- Provision of parking and reliance on private vehicle travel has responded the lack of public transport options in the area..
- Congestion on Old Windsor Road and Norwest Boulevard and significant delays for motorists accessing businesses.
- Local access to/from businesses along Norwest Boulevard is constrained due to traffic congestion on the local road network and performance of the roundabout intersections.

The current conditions have informed development of the proposed future transport investments and the urban renewal proposal. The evaluation presented in **Chapter 4** outlines the ability of the future transport network to accommodate the increased travel demand and changing travel behaviours resulting from this planning proposal.



2.2.3 Hills Shire Council Integrated Transport Direction 2010

The Hills Shire Council Integrated Transport Direction outlines the local government area's transport objectives, challenges and outcomes. The Direction focuses on current trends in transport use and infrastructure, in particular and how to respond to the increasing demand in private vehicle use.

The Direction outlines:

- Rail – the importance of constructing new and improving lines that link major centres and growth areas.
- Bus – the important role buses perform in the public transport network and ability to provide an alternate to private vehicle use. The Direction also outlines key locations where bus improvements have the potential to improve bus travel, including potential bus priority along Norwest Boulevard.
- Parking – the role parking can play in encouraging more use of public transport and the important role parking plays in supporting, without grid locking, in town centres.
- Road – the role the road network can play in providing access to parts of Sydney that are difficult to access via walking, cycling and public transport. The Direction lists a number of projects, including the replacement of roundabouts with traffic signals along Norwest Boulevard and the widening of Windsor Road from Kellyville to Norwest Boulevard from four lanes to six, plus two bus lanes.
- Cycle – the role in commuting and recreational use cycling plays within the community. This includes the provision of a connected network and bike parking at key destinations.
- Walk – the role walking plays in the transport network, including the ability to fund potential improvements through development.

Key policies and actions relevant to study area:

- **Collaboration with council and integration with its committed and planned transport projects to optimise transport outcomes overall.**

2.2.4 Hills Shire Council Local Environmental Plan (LEP) 2012

The Hills Shire Council LEP is a statutory document that defines local planning objectives, regulates land use and outlines requirements for development.

The Precinct planning proposal would amend the current Hills Shire Council LEP to reflect the proposed land use changes.

Relevant LEP objectives include:

- To guide the orderly and sustainable development of The Hills, balancing its economic, environmental and social needs; and
- To provide for balanced urban growth through efficient and safe transport infrastructure, a range of housing options, and a built environment that is compatible with the cultural and natural heritage of The Hills.

Key policies and actions relevant to study area:

- **Provide for balanced urban growth through efficient and safe transport infrastructure, a range of housing options, and a built environment that**

is compatible with the cultural and natural heritage of The Hills Shire.

2.2.5 Blacktown Local Environmental Plan (LEP) 2015

The Blacktown LEP is a statutory document that defines local planning objectives, regulates land use and outlines requirements for development.

The Precinct planning proposal would amend the current Hills Shire Council LEP to reflect the proposed land use changes.

Relevant LEP objectives include:

- To recognise the role of the urban renewal precincts as the major locations for higher density residential and employment development for the city;
- To encourage development opportunities for business and industry so as to deliver local and regional employment growth; and
- To provide for infrastructure to maintain and meet demands arising from housing and employment growth.

Key policies and actions relevant to study area:

- **Provide for balanced urban growth through efficient and safe transport infrastructure, a range of housing options, and a built environment that is compatible with the cultural and natural heritage of Blacktown.**

2.2.6 Council Development Control Plans (DCP)

The Hills Shire and Blacktown City DCPs support the respective LEPs and provide detailed requirements for development within the local government areas for residential, commercial, retail and other land uses. The planning proposal would require the DCPs to be updated to facilitate the urban renewal and transport outcomes sought.

Key policies and actions relevant to study area:

- **The Development Control Plan reflect the desired outcomes of the Local Environmental Plans and would need to be updated to enable the urban renewal and transport objectives of this planning proposal to be delivered.**

2.3 Planned and committed projects

In addition to the Sydney Metro Northwest, a number of other transport projects relevant to the Precinct are planned or committed.

2.3.1 Pedestrian and cycle

The following pedestrian and cycle project is currently proposed as part of other NSW Government projects and programs:

- Shared pedestrian / cycle path between Celebration Drive and White Hart Drive.

2.3.2 Bus

Sydney's Bus Future identifies two proposed rapid routes:

- Rouse Hill to Hurstville via T-way, Parramatta and Bankstown. The design of the route is currently under investigation and includes an alignment that would run along Old Windsor Road, which would serve the Precinct.
- Growth Centre Rapid route: Rouse Hill – Blacktown via Marsden Park and Richmond Road.

All Sydney Metro stations have been planned with bus interchange facilities according to anticipated future service levels. Stations such as Rouse Hill, Kellyville and Castle Hill will have higher capacity interchange facilities, as they offer direct interchange between Sydney Metro and high-frequency bus services.

2.3.3 Roads

A number of upgrades are currently in the detailed design phase around the Precinct, including:

- Widening of Memorial Avenue from two lanes to four lanes between Old Windsor Road and Windsor Road, including the upgrade of intersections with Old Windsor Road, Windsor Road, T-way and Arnold Avenue/Free Settlers Drive.
- Signalisation of the intersection at Celebration Drive with Lexington Drive.
- Re-alignment and complete signalisation of the intersection at Old Windsor Road, Balmoral Road and Miami Street.

3 Objectives & planning framework

Transport planning objectives will ensure that planning and investment for the transport network within the corridor meet the Government's intention and vision for positive urban renewal outcomes, address the areas of highest priority and cater for future transport demands. Transport planning objectives

The transport planning objectives have been developed to align with the documented policy contained within the relevant NSW Government documentation as well as agency, network, operational and performance standards as shown in **Figure 4**.



Figure 4 Development of Strategic Objectives

The transport planning objectives informing the outcomes in this transport plan are set out in **Table 4**.

Table 4 Transport planning objectives

Objective	Principle
Improve transport and land use integration	Plan transport networks and land uses that reflect the environment in which they exist and operate.
Optimise existing infrastructure and planned investment	Government funds are finite; transport planning for the precinct must seek to maximise the benefits (social, economic, and others) of investment such as the Sydney Metro project.
Greater transport options	Provide access to multiple modes for customers to choose based on the purpose of their trip and to provide greater system resilience.
Coordinate travel distance and mode	Provide infrastructure and services to encourage customers to mode choice to correspond to the length of their trip.
Support multi-modal trips	Provide for effective and efficient interchanges between modes of transport.
Manage travel demand	Provide high quality accessibility between supporting and inter-related land uses and a policy framework that shapes sustainable travel behaviours.

3.1 Transport planning framework

3.1.1 Street network function

A planning framework has been developed to define the function of the street network to inform the planning outcomes and investment decisions for the future Precinct. The framework defines the future function of the street network on the basis of overall land use and transport objectives and desired outcomes for the precinct.

The roads within and around the Precinct will provide two primary functions for transport customers:

- **Movement:** the ability to travel between places; and
- **Place:** the ability to access origins and destinations of travel.

An understanding of the two functions that street environment play is especially important when the two functions compete, such as through increased movement requirements or improved place amenity. The movement place function of the street environment informs planning for the level of access across each of the transport modes.

The street network consists of a mixture of different road types serving different functions within the transport network. They include:

Motorways	Move people and goods rapidly over long distances with our motorways playing a strategically significant function within the road network.
Movement corridors	Main roads provide safe, reliable and efficient movement between regions and strategic centres.
Vibrant streets	High demand for movement as well as destinations and activity centres within the same road space.
Places for people	High demand for activities on or adjacent to the street and lower levels of vehicle movement create places people enjoy, attract visitors and are places communities value.
Local streets	The streets that facilitate local access to communities.

The matrix illustrated in **Figure 5** shows how the different road types are categorised with respect to the relationship between the movement and place functions.

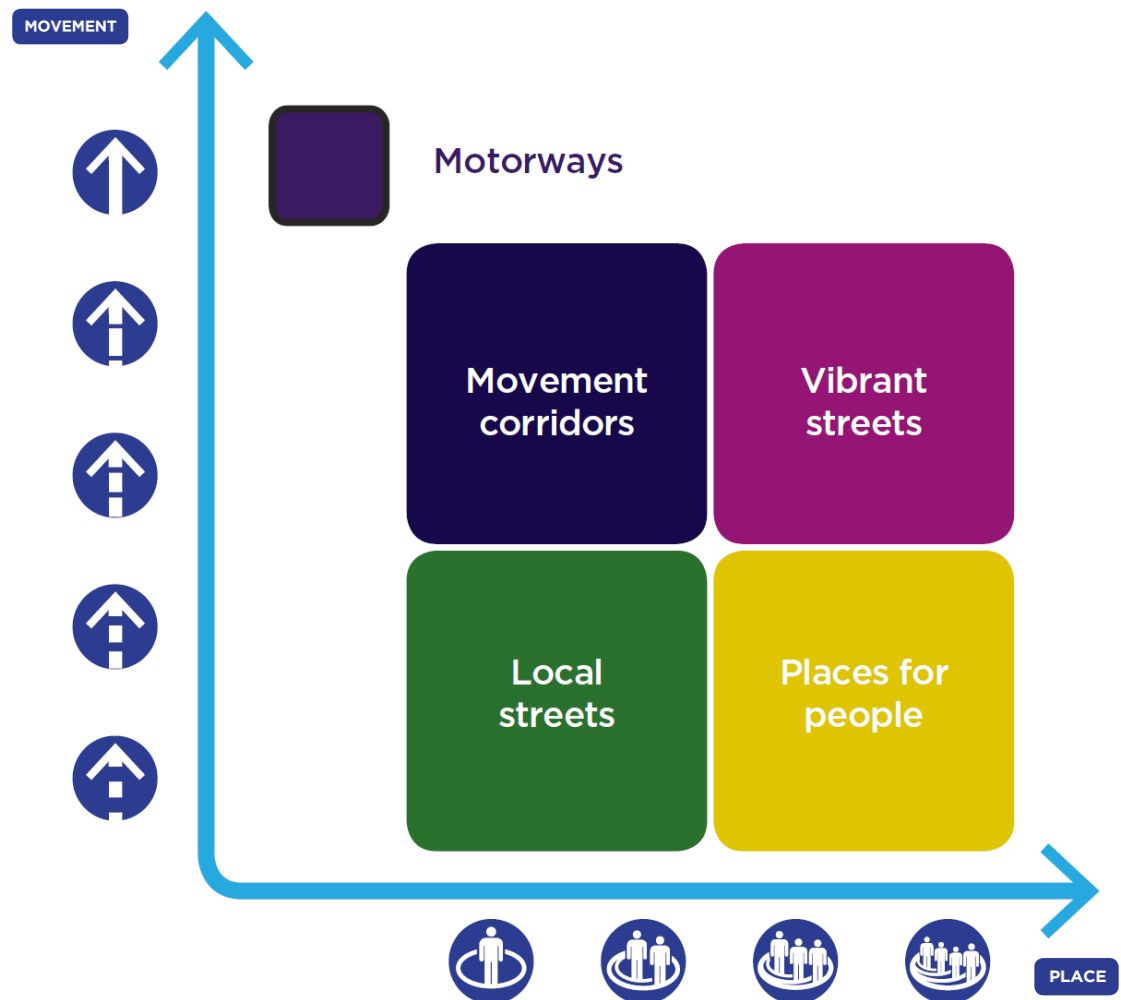


Figure 5 Road planning framework matrix

3.1.2 Modes and street network function

Transport for NSW undertakes planning for all modes of transport; street networks are required to consider different modes and modal priorities. Transport modes that utilise street networks include:

- Pedestrians
- Cyclists
- Buses
- Taxis
- Private vehicles (including pick-up/drop-off)

Each of these modes require streets to facilitate movement and place functions, which is dependent on the nature of the street.

Streets close to railway stations will require consideration of the Transport for NSW modal priority (see **Figure 6**) that advantages pedestrians, cyclists and other public transport modes seeking to access the station, interchange facilities or adjacent town centres. In this example, the modal priority would help to focus street design to create places for people and vibrant streets.

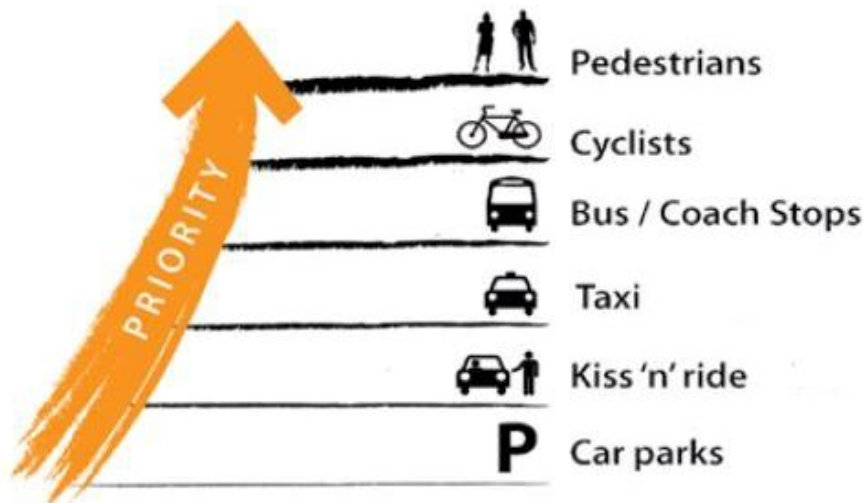


Figure 6 Interchange Street Modal Priority (Transport for NSW)

Travelling between destinations, all modes take advantage of movement corridors and local streets in a similar manner. Greater priority is given to the safe and efficient movement of vehicles such as buses, taxis, private vehicles and cyclists in order to keep the transport system functioning optimally.

3.1.3 Travel behaviours and patterns

The travel patterns and behaviours across Sydney's Greater Metropolitan Area and within existing rail station precincts are useful to contextualise and benchmark the evaluation of future travel patterns and behaviours resulting from this planning proposal. This information has been used in conjunction with the transport modelling tools discussed in **Chapter 3.1.4**.

Mode choice for different trips

The graph shown in **Figure 7** illustrates how Sydney residents use different modes of travel for trips of different lengths. This and provides an indication of how residents, workers and visitors will travel to, from and within the Precinct.

The data shows that the length of trip is a key determinant in the choice of mode of travel. This is an important factor in understanding how the proposed land uses will influence travel behaviour and mode choice for residents, workers and visitors of the Precinct.

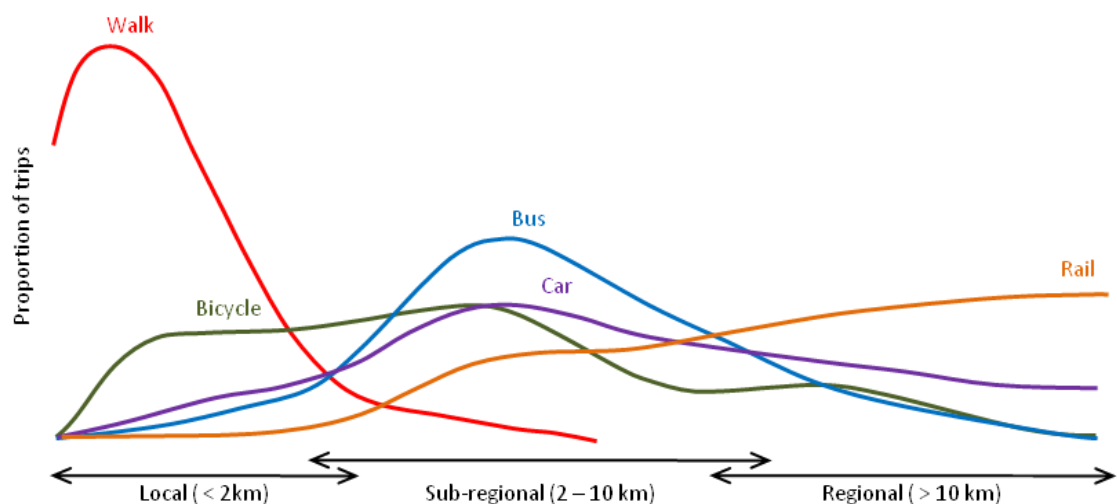


Figure 7 Proportion of Trips by Mode by Trip Length (HTS 2013)

Benchmark station precinct travel behaviours

An understanding of how travel behaviours and patterns respond to land use and the proximity of housing to jobs and services provides insight into the future travel demands for residents, workers and visitors of the Precinct.

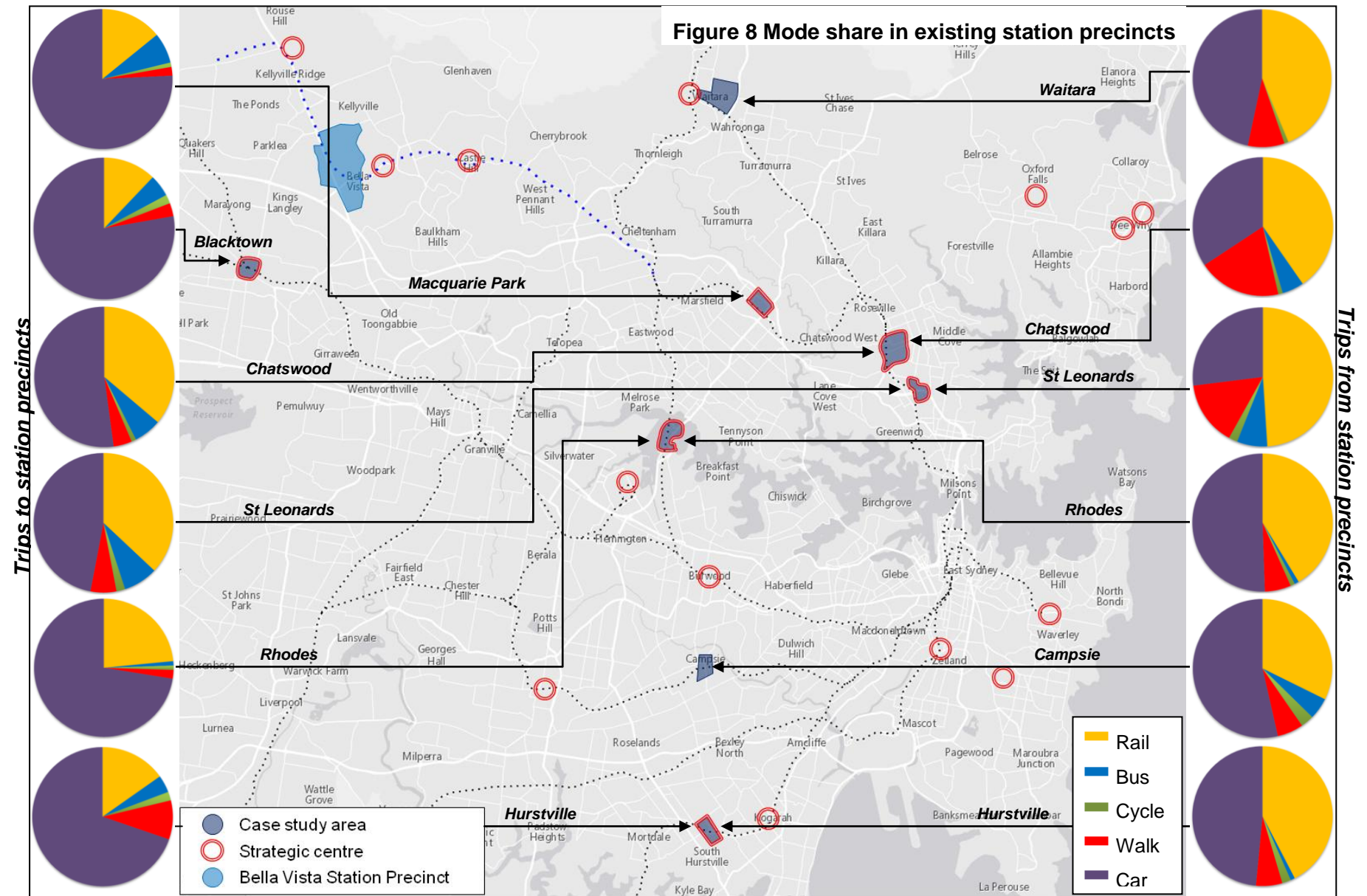
Existing travel patterns have been reviewed and information that influences travel behaviours is shown in **Table 5** and illustrated in **Figure 8**.

The data shows that choice of mode varies for trips to and from station precincts and that the proximity to rail is a key factor in determining how people choose to travel. Walking is an important mode of travel to work in larger and mixed use centres. Bus mode share is highest to and from larger centres that have well established bus networks serving subregional travel and connecting nearby centres.

Table 5 Current travel patterns in existing station precincts

Location	Population / employment	Key origins / destinations*
Rhodes	2,817 residents	Regional: Sydney Inner, North Sydney Subregional: Canada Bay, Ryde, Strathfield
	10,092 workers	Subregional: Parramatta, Ryde, Strathfield, Baulkham Hills Local: Canada Bay
Hurstville	7,708 residents	Regional: Sydney Inner Subregional: Kogarah-Rockdale, Botany, Cronulla Local: Hurstville
	8,089 workers	Subregional: Cronulla, Bankstown, Kogarah-Rockdale, Sutherland Local: Hurstville
Chatswood	3,993 residents	Regional: Sydney Inner Subregional: North Sydney, Ryde, Ku-ring-gai Local: Chatswood
	18,366 workers	Subregional: Ku-ring-gai, Warringah, Ryde, Hornsby Local: Chatswood
St Leonards	1,959 residents	Regional: Sydney Inner Subregional: Ryde, Warringah Local: Chatswood, North Sydney
	10,938 workers	Subregional: Sydney Inner, Ku-ring-gai, Warringah Local: Chatswood, North Sydney
Campsie	4,539 residents	Regional: Sydney Inner Subregional: Marrickville, Botany Local: Canterbury, Strathfield
Waitara	4,759 residents	Regional: Sydney Inner, Ryde Subregional: Chatswood, Ku-ring-gai Local: Hornsby
Macquarie Park	26,333 workers	Regional: Baulkham Hills, Parramatta Subregional: Ku-ring-gai, Chatswood Local: Ryde
Blacktown	7,593 workers	Subregional: Mount Druitt, Penrith, Baulkham Hills, Parramatta Local: Blacktown

*Origins for employment precincts and destinations for residential precincts



3.1.4 Transport modelling approach

Transport modelling has been undertaken as part of the overall transport evaluation to support the planning for Precinct. The transport modelling tools have been used to inform the understanding of future travel demand, travel patterns and performance of the road network with consideration of:

- Existing land uses, population and employment in the Sydney Greater Metropolitan Area.
- Future land use changes along the Sydney Metro Northwest corridor.
- Future proposed, planned and committed transport infrastructure and services.

The following four modelling tools have been used to inform this transport plan:

- **Strategic Travel Model (STM):** The NSW Government Bureau Statistics and Analytics (BSA) STM has been used to identify the amount of trips (travel demand) and what origins and destinations that people will travel to, from and within (trip distribution) for all purposes of travel. The model outputs were used to inform the Public Transport Project Model that has been developed for the Sydney Metro Project.
- **Public Transport Project model (PTPM):** The PTPM has been used to inform how people will travel (mode choice) to and from the Precinct. The travel demand and distribution of trips underpinning the PTPM analysis is based on the STM outputs.
- **Aimsun traffic operational model:** A mesoscopic model has been developed to inform what roads motorists will choose to travel on (trips assignment) and provide an understanding of how the road network will operate with the future land use changes and transport infrastructure investments.
- **SIDRA intersection modelling:** Intersection modelling has been undertaken to identify the performance of key intersections as a result of traffic generated by the proposed future land uses.

Figure 9 illustrates the relationship between the four modelling tools used to inform this transport plan.

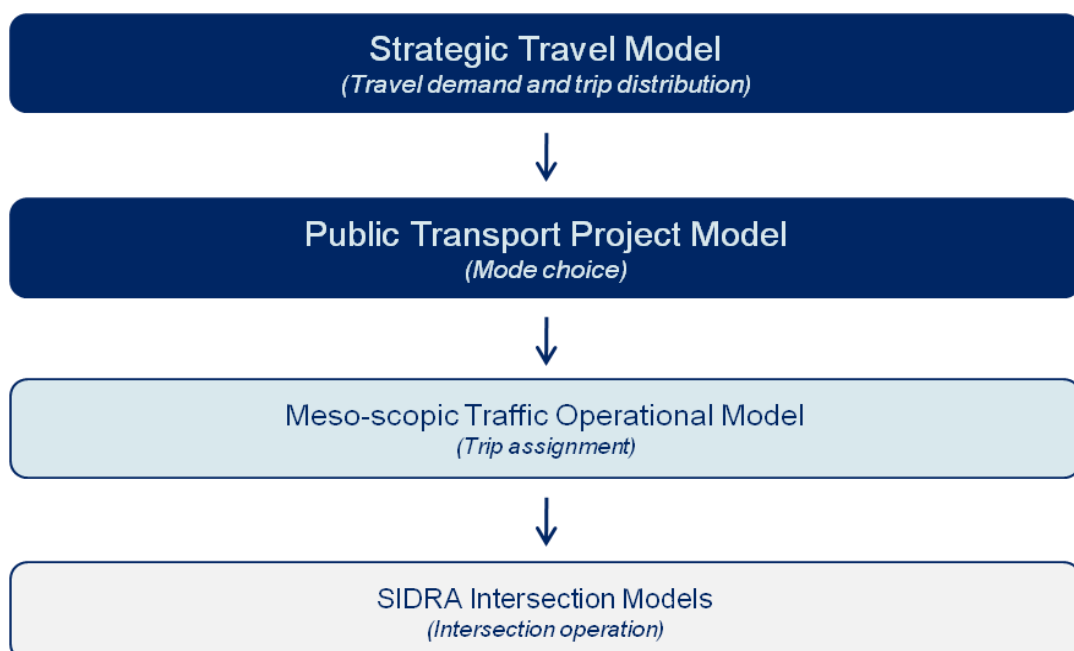


Figure 9 Transport modelling hierarchy

A key objective of this transport plan is to optimise the use of existing infrastructure and has been a key consideration in understanding the desired performance of the road network.

The Level of Service (LoS) for the performance of the intersections is a qualitative measure describing operational conditions within a traffic stream and their perception by drivers and / or passengers. The intersection operational conditions in terms of LoS criteria are classified into six categories as shown in **Table 6**.

Table 6 Current travel patterns in existing station precincts

Level of Service	Performance
A	Good operation
B	Good with acceptable delays and spare capacity
C	Satisfactory
D	Operating near capacity
E	At capacity
F	Extra capacity required

Source: Guide to Traffic Generating Developments (Roads and Maritime Services, version 2.2, 2002)

4 Future land use and transport proposal

This chapter details the future land uses and transport network proposed for the Precinct in this planning proposal. It describes the types of uses and the travel demand derived from those uses. It also identifies the future transport infrastructure and services that would be required to support the travel demand resulting from the future land uses proposed in the Precinct.

4.1 Sydney Metro Northwest

The project, due to open in 2019, includes the 23 kilometre line from Epping to Cudgegong Road, and will deliver eight new railway stations to Sydney's growing North West. Sydney Metro Northwest will also include the existing 13 kilometre Epping to Chatswood rail line. The entire project will span from Chatswood to Cudgegong Road.

Sydney Metro Northwest will provide high frequency public transport services to the precincts along the corridor, improving the connectivity to, from and within the corridor. The improved connectivity and capacity opens up the precincts for increased density, as development is no longer required to rely solely on the constrained road network. The project will change the way people travel by enabling greater options for land use and transport.

The second stage of Sydney Metro, the Sydney Metro City and Southwest, will extend from Chatswood, run under Sydney Harbour, the Sydney CBD and west to Bankstown. This section is planned to open in 2024 with the capacity to run a Metro train every two minutes each way under the Sydney CBD.

The change to travel behaviours within the corridor will be substantial. The existing travel behaviour is car dependent and relies on sub regional jobs and retail to service work and leisure trips. The increased density and structure planning of precincts will:

- Increase retail within each precinct leading to shorter trips associated with shopping;
- Increase job density in each precinct with mixed-use development, providing jobs closer to home; and
- Provide a 'second wave' of funding for transport infrastructure and services to support urban renewal, such as Section 94 contributions.

4.2 Planning proposal

4.2.1 Future land uses

The Sydney Metro Northwest will catalyse growth and land use change along the corridor with the provision of greater capacity on the transport system and improved accessibility to strategic centres in the region and across Sydney.

The structure plan that forms the basis for this planning proposal is illustrated in **Figure 10**. The structure plan aims to increase the density and mix of uses that will both attract and generate travel demand to, from and within the Precinct. The plan will result in greater trip containment within the Precinct and the corridor, as well as encouraging transit use, as the Precinct functions as a transit-oriented development.

The land uses and scale of development is based on analysis undertaken by Department of Planning and Environment. The analysis included a review of the historical and current supply of residential, retail, industrial and commercial floor space in the Local Government Area (LGA) and comparisons of the take up of dwellings and employment floor space in similar areas. The future land uses and assumed take up rates up to 2036 that form the basis of this planning proposal are summarised in the **Table 7**.

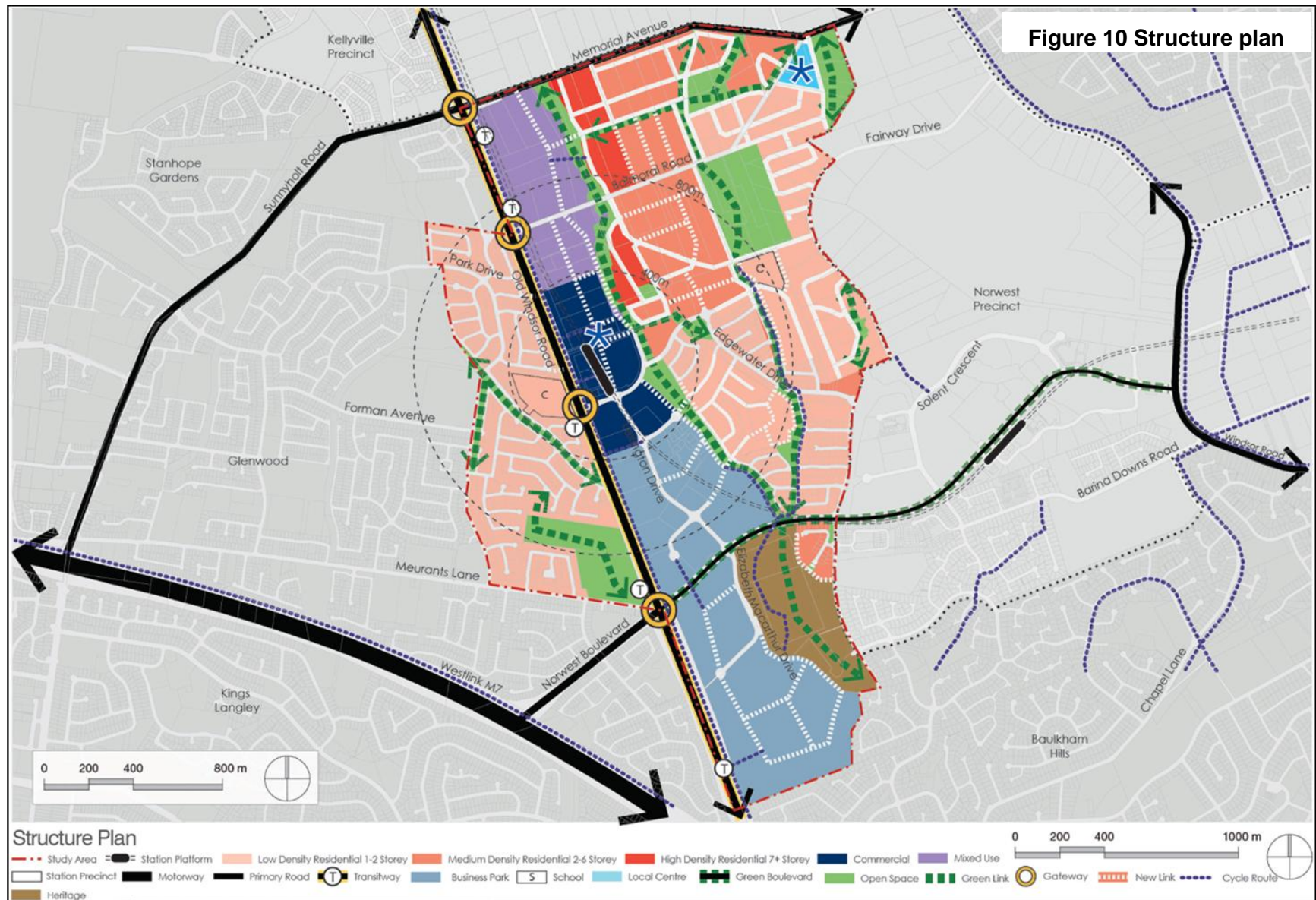
Table 7 Proposed land uses

Land use	2036 Yields
Residential	4,200 dwellings
Employment	9,400 jobs
Retail	5,000 to 10,000m ² GFA
Bella Vista Rail Station	

Note: above yields are additional to existing land uses in the precinct

Retail figures in the 2036 yields relate to additional convenience retailing in the Precinct. Bulky goods and business park retail premises have been included in the employment yield forecast.

It should be noted that these yields have been used as the basis for all analysis informing this transport plan. The planning controls proposed in this planning proposal allow for greater yields to be delivered. Any development beyond the assumed yield will require further assessment to augment the transport response. As proposed development proceeds, Transport for NSW and Roads and Maritime Services will continue to monitor the performance of the transport network and the timing of initiatives proposed in this report.





Local centre

A new local mixed use centre will be located adjacent to the northern side of the rail station. The local centre will comprise of a mix of retail and cafes/restaurants below residential dwellings. The intention of the local centre will be to serve local residents within the precinct and rail customers accessing the station.



Employment area

The area surrounding the station, and to the south, will also provide a hub for additional employment. This area will help to support Bella Vista as a local employment area and encourage businesses to locate in this area.



Business park

The business park to the south of the station is proposed to be retained. This location will provide opportunities for employment and business growth in the local area.



Residential apartments

Increased residential density in the northeast of the station will encourage a greater diversity of housing choice to leverage off the investment in the Sydney Metro project and facilitate the development of a transit-oriented precinct. The intention is for future residents to work within the precinct and along the rail corridor. Improved local transport infrastructure will also provide accessibility for the residents within the precinct and to the adjacent centres at Norwest and Castle Hill.



Town houses and detached dwellings

The eastern and western sections will comprise of medium density dwellings where the precinct transitions into the existing lower density urban environment. Residents in these areas will be located within the walking catchment of the rail station.

4.2.2 Future travel demand

The travel demand generated by the Precinct is derived from the proposed future land uses and urban form, along with the demographics, attitudes and behaviours of the existing and future residents, workers and visitors.

A summary of the quantum of peak hour travel demand in the Precinct is provided in **Table 8**. This is based on the assumed take up of development within the Precinct. The planning controls proposed in this planning proposal allow for greater yields to be developed and so any additional take up will need to be further assessed to understand the impact on the transport network.

Table 8 Travel demand

Land use	Peak hour trips
Total peak hour trips	9,400 trips
Trips from precinct	2,400 trips
Trips to precinct	6,750 trips
Trips within precinct	300 trips

The transport task and travel distribution can be characterised as follows:

- **Regional trips:** The future land uses and Sydney Metro project will generate and attract longer distance regional travel to and from the precinct. This will largely be associated with the residential and employment land uses in the Precinct. These trips will be made by rail, private vehicle and bus to areas outside of North West Sydney. These areas may include Parramatta, Macquarie Park, North Sydney and Sydney CBD.
- **Subregional trips:** Shorter distance travel along the Sydney Metro Northwest corridor and within North West Sydney will make up a majority of the travel demand to and from the Precinct. A large proportion of the subregional travel will be made by cycle, rail, bus and private vehicle. These areas may include Castle Hill, Norwest and Rouse Hill.
- **Local trips:** Local travel within the Precinct will comprise of residents accessing employment, recreational and the local centre. A large portion of these trips will be walking and cycling trips.

Urban renewal in the Sydney Metro Northwest corridor provides the opportunity for workers and residents to satisfy their daily requirements for goods and services at a more local scale. This is the result of a higher number of and more diverse range of goods and services coupled with the improved transport networks for access.

It is estimated that approximately 50 percent of trips will be subregional trips (refer to **Table 9**). This broadly relates to the attractiveness of Norwest, Castle Hill and Rouse Hill to cater for employment, retail and recreational demands. The distribution of future travel to and from the precinct for regional and subregional trips is illustrated in **Figure 11**.

Table 9 Trip distribution

Transport task	Proportion of trips
Local	10%
Subregional	50%
Regional	40%

The travel choices relating to trips made to, from and within the Precinct is estimated to change considerably as a result of the Sydney Metro Northwest and this planning proposal. The Sydney Metro Northwest will provide a high frequency service for subregional and regional trips. This infrastructure will provide an alternate to private vehicle travel with a higher reliability for trip times.

The planning proposal will result in improved local and subregional connections for walking, cycling and public transport. The walking and cycling network will be higher quality, more fine grained and connect to new and existing key destinations, including neighbouring suburbs. Improved bus priority and facilities will support the continued use of buses in the area and improve reliability and journey times.

Table 10 outlines the modelled future mode share for all trips to and from Kellyville, Bella Vista, and Showground Precincts, an important performance measure of the proposed transport initiatives. The results reflect lower private vehicle mode share than for the existing rail station precincts (as benchmarked in **Section 3.1.3**), which is a highly positive outcome. These estimates are considered robust, noting that:

- The data for existing station precincts is for work related trip only. The estimated Precinct mode share reflected in the transport modelling tools accounts for all trip purposes, including trips to local shops, schools and for recreational purposes.
- The Sydney Metro Northwest will provide a turn-up-and-go service that will likely attract a greater proportion of trips to travel by rail.
- The Precinct and other areas along the Sydney Metro corridor will be structured based on transit-oriented development principles. This will likely result in a greater proportion of walk, cycle and public transport trips made by residents, workers and visitors to the precinct than what is currently experienced across the Sydney Greater Metropolitan Area.

Table 10 Mode share

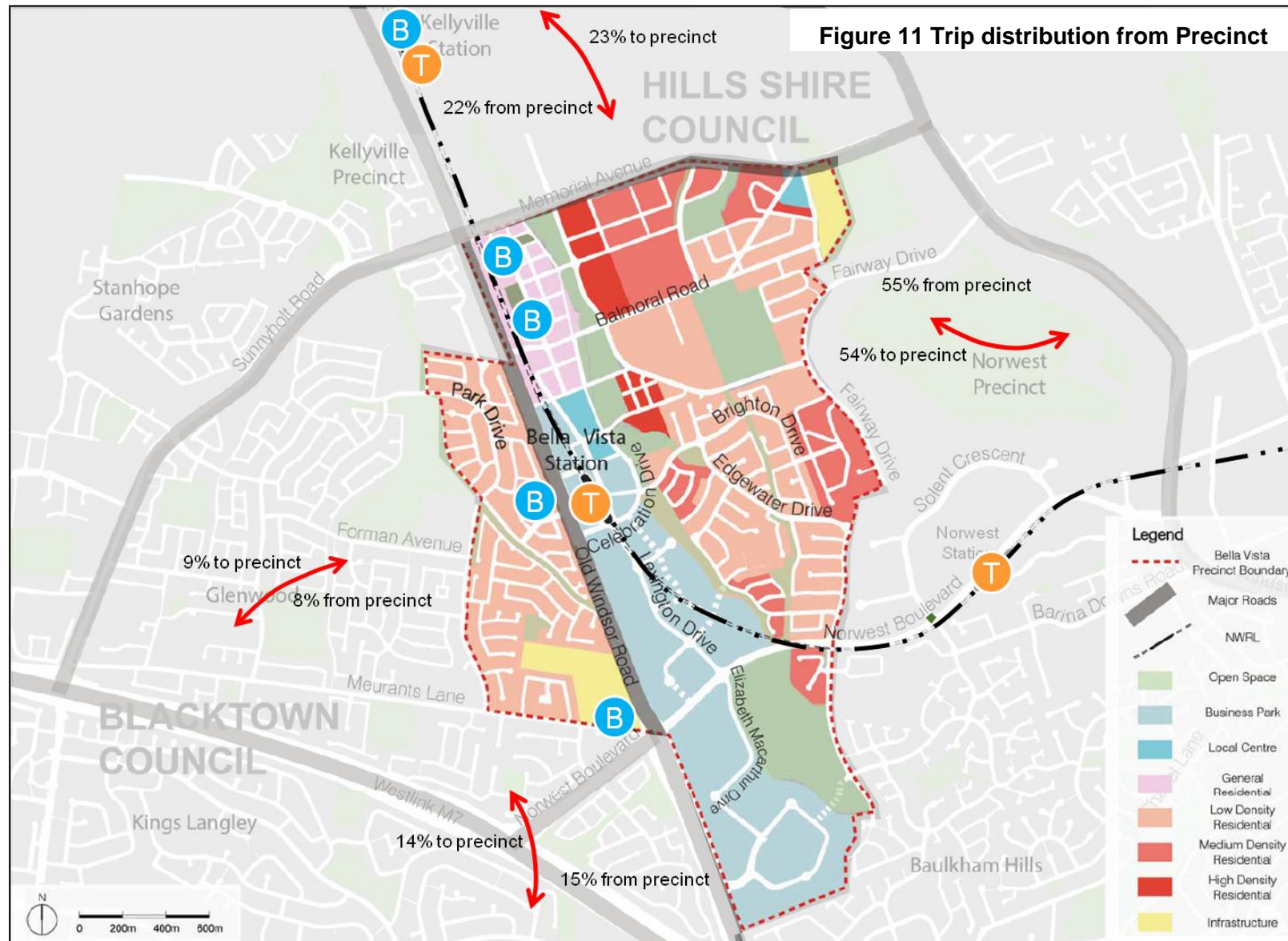
Transport task	Trips to precinct	Trips from precinct
Public transport, walk and cycle	53%	52%
Private vehicle	47%	48%

Local freight, including for deliveries, trades and waste management, will continue to remain important in servicing the needs of the precinct. Freight movement, many of which occur outside of peak hours, will use the local, subregional and regional road network to service demand.

Transport for NSW has undertaken a rigorous process of transport modelling and analysis to understand future transport travel behaviours and demands in the

Precinct. The analysis undertaken has forecast a significant mode share shift from private vehicle to walking, cycling and public transport in the long term.

These transport modelling outputs affirm that these recommended public and active transport networks are highly time-competitive in the future, and that the change in land uses in the Precinct will create an environment that supports more walking, cycling and public transport use. This mode shift will take place over time. It is crucial that Council, Roads and Maritime Services and Transport for NSW continue to monitor the planning and delivery phase of the Precinct and broader travel patterns in North West Sydney to ensure the local and subregional transport network supports the growth of residential and commercial development consistent with the desired travel and urban outcomes described in this report.



4.3 Proposed transport network

The transport network identified in this section responds to the transport planning objectives, the future land uses and travel behaviours, and the opportunity created by Sydney Metro Northwest. Transport for NSW, Roads and Maritime Services and Hills Shire Council will need to work collaboratively to monitor and review the performance of the transport network to ensure that the system is able to accommodate the travel demand in the future.

Delivery mechanisms and responsibilities are identified in the Walking, Cycling, Bus and Road infrastructure sections below. These include funding mechanisms such as Section 94 Contributions Plans ('S94 plan') or State Government funding via Roads and Maritime Services and Transport for NSW.

If evolving social and development trends result in a significantly greater (or lesser) redevelopment rate, it may be prudent to reconsider elements of the proposed transport solution or adjust the timing of its delivery.

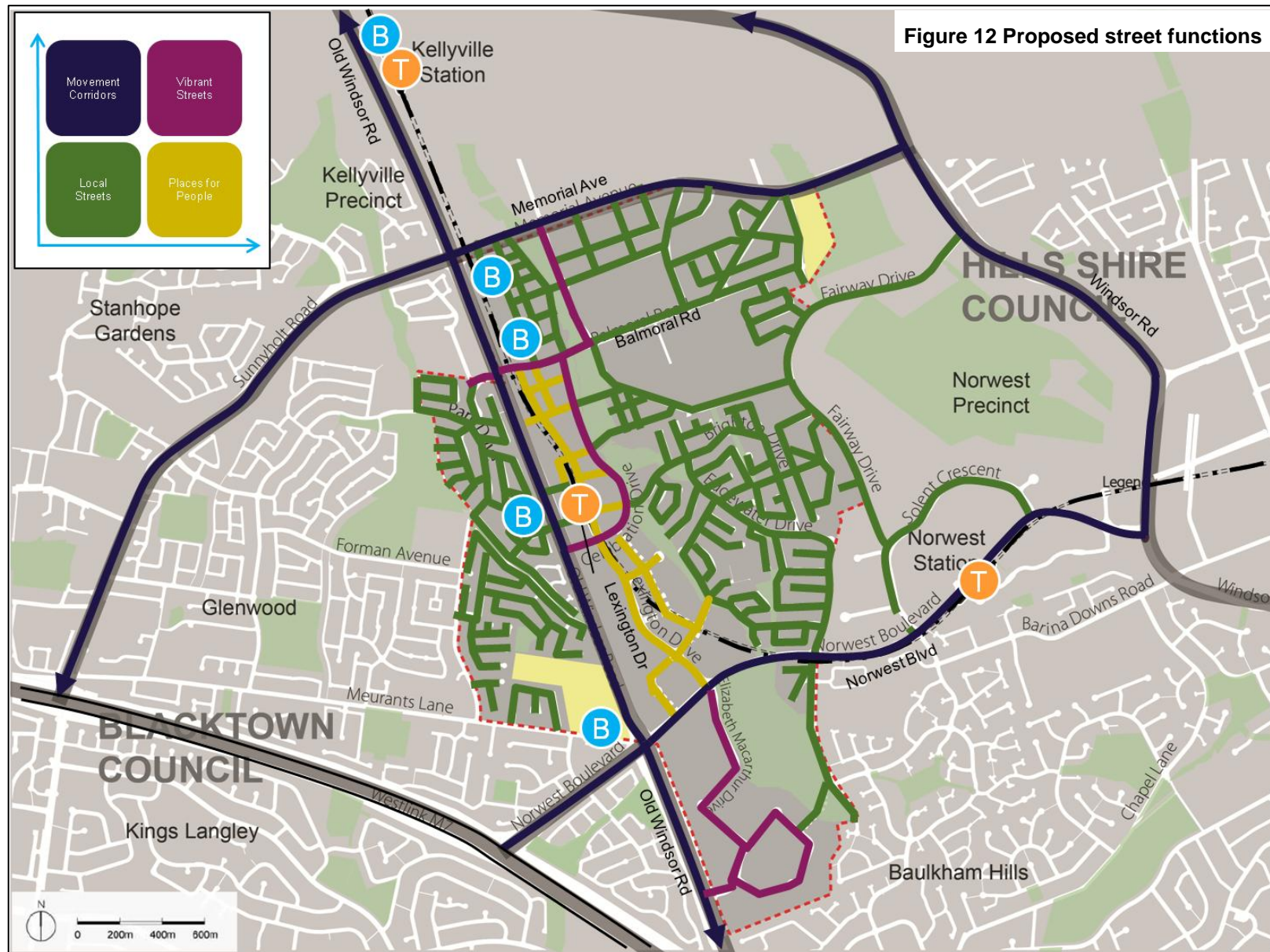
4.3.1 Street functions

The future road network has been defined in the context of the movement and place functions that it will serve, consistent with desired urban renewal and transport outcomes. The future street functions are illustrated in **Figure 12** and show the planned movement and place function of each of the roads in the Precinct.

Key road functions as a result of the Sydney Metro Northwest and the land use proposal will be:

- Windsor Road and Old Windsor Road will remain as primary north-south movement corridors connecting areas northwest of the Precinct to the M2 and Parramatta and Castle Hill.
- Memorial Avenue and Norwest Boulevard will remain as the primary east-west movement corridors for vehicles travelling to, from and through the region.
- Celebration Drive will have a greater place function in the core of the Precinct as urban renewal occurs and will operate as a vibrant street.
- Lexington Drive will function as a local street providing access to businesses along its frontage.
- Local roads including new links will provide local permeable access for vehicles, walking and cycling, and accommodate the local freight task.

The proposed Precinct street functions enable travel options to support the local, subregional and regional transport needs of residents, workers and visitors for all modes including walking, cycling, buses, private vehicles and freight vehicles.



4.3.2 Walking

Improved pedestrian infrastructure and amenity will be required for residents, workers and visitors in the precinct and for customers accessing the Bella Vista station. The future proposed urban renewal will facilitate improved pedestrian connectivity through a finer grained street network that provides greater permeability.

The local streets within the Precinct, including Lexington Drive and Celebration Drive will have greater place function as a result of the proposed future land use changes and the Bella Vista Station. This will create a demand for improved walking amenity within the precinct, accessing the mix of land uses and the rail station.

To support the demand for improved walking amenity and safety, the following will be provided:

- Signalise intersection of Lexington Avenue with Celebration Drive; and
- General footpath improvements, including new and improved footpaths to complete the walking network.

These improvements will facilitate walking to, from and within high movement corridors.

The proposed walking network improvements, timing and funding mechanisms are outlined in **Table 11** and illustrated in **Figure 13**.

4.3.3 Cycling

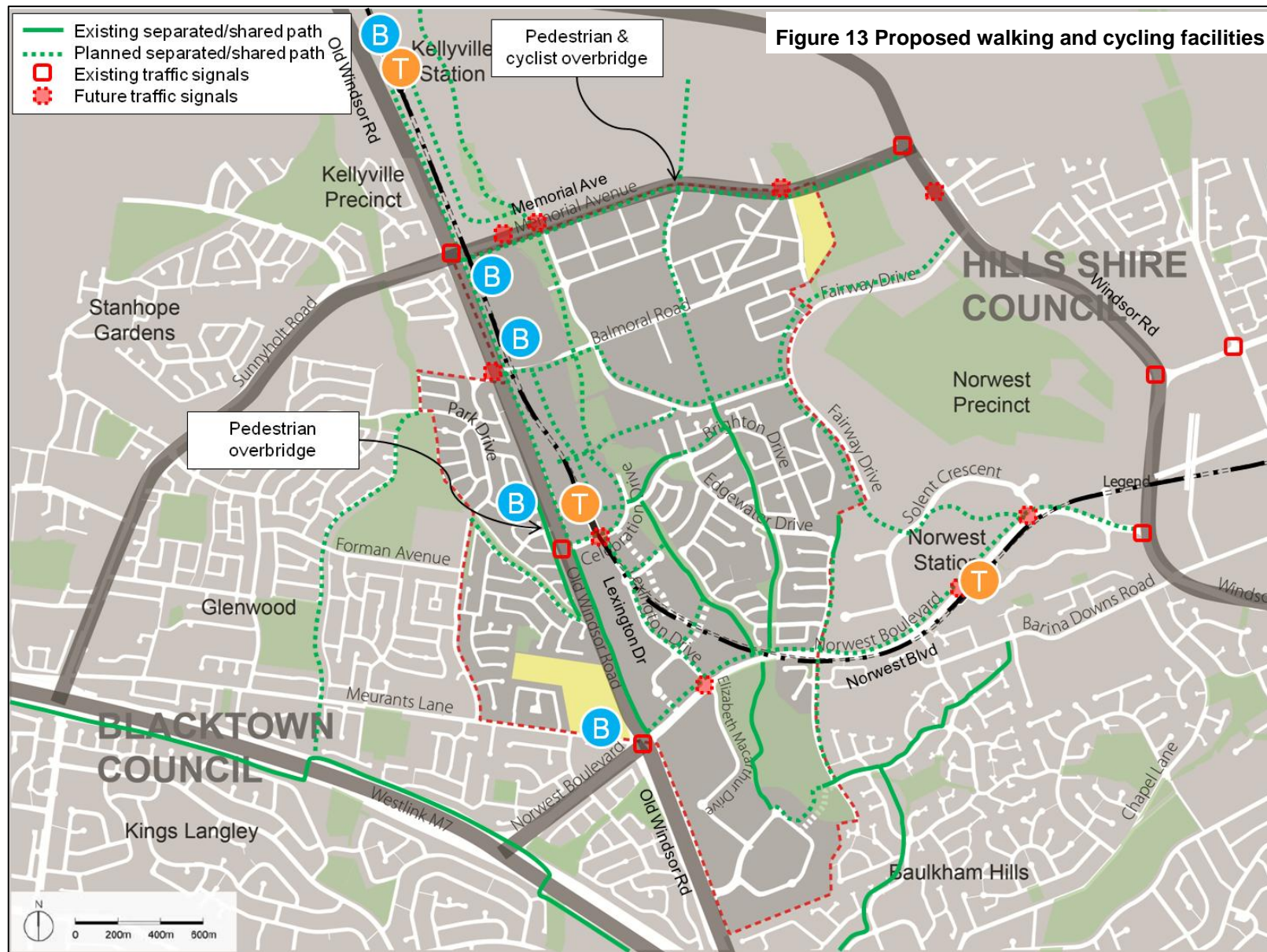
The introduction of the Sydney Metro Northwest will generate a demand for improved cycling amenity for residents within the Precinct and the surrounding area.

Increased cycling trips will also result from the future proposed urban renewal with a greater population of residents and workers requiring a mix of cycling facilities for commuting and recreational purposes.

Future cycling facilities would cater for both local and subregional travel demand. Existing facilities currently serve demand between the Precinct and the surrounding residential areas. Increased off-road facilities will be required to improve accessibility between the adjacent centres at Kellyville and Norwest.

The proposed cycling network improvements, timing and funding mechanisms are outlined in **Table 11** and illustrated in **Figure 13**.

These proposed walking and cycling improvements provides the main network structure that will be further integrated with the fine grain road network that will be developed to support residential, commercial, retail and other business land uses. An evaluation of the future network and its suitability to cater for future travel demands is discussed in **Chapter 5**.



4.3.4 Bus

Improved service routing and frequencies are required to increase the catchment for bus accessibility to the Precinct and the rail station for residents and workers in the region. The proposed rapid and suburban bus services will compliment the future rail services and service travel demand to locations away from the rail corridor. The local bus routes will also need to cater for local access to, from and within the area.

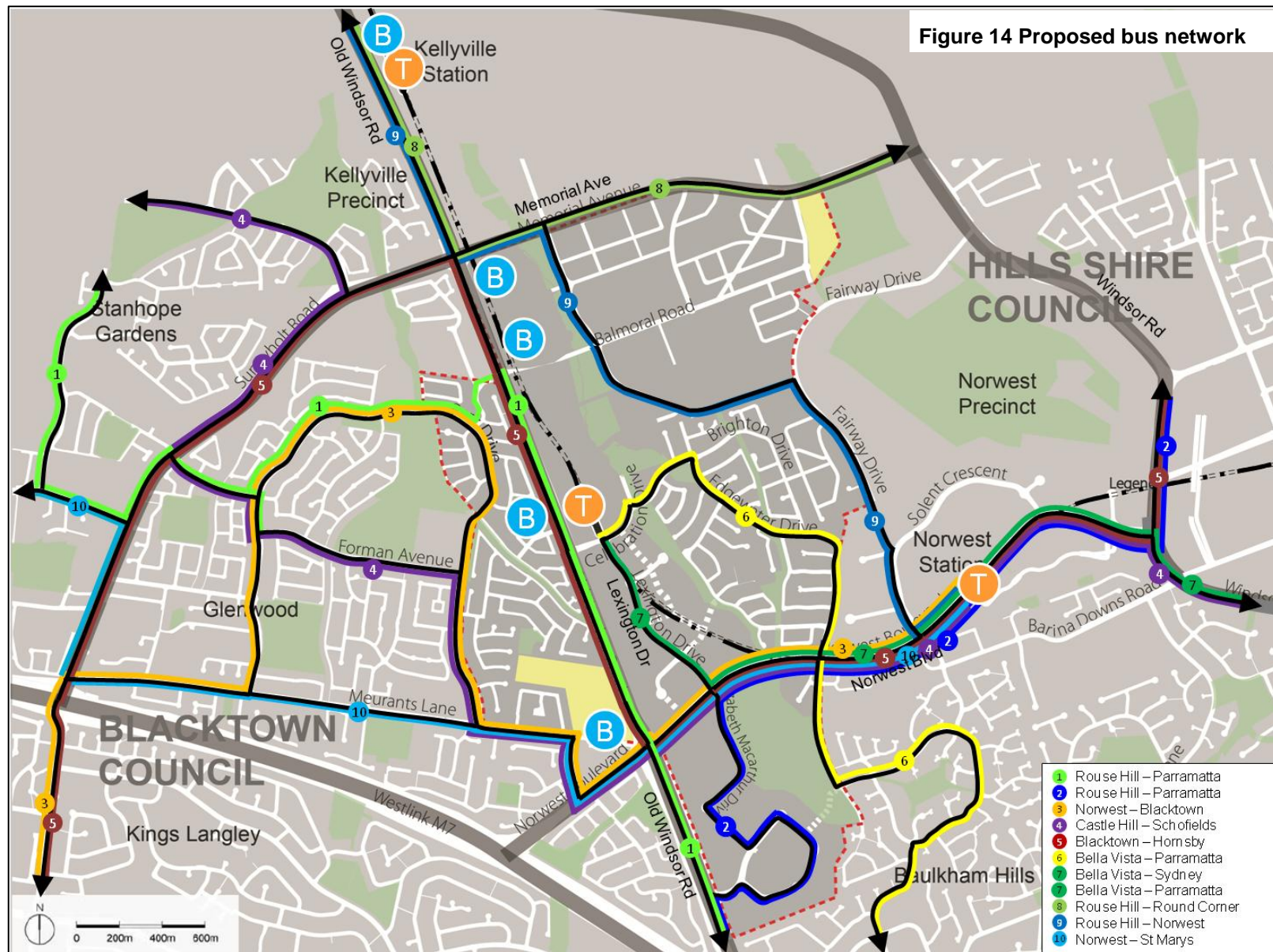
Utilising Sydney's Bus Future, a proposed future bus network is illustrated in **Figure 14**. The bus network will require comprehensive review to take advantage of new precinct streets, additional bus priority measures, servicing improvements across north-west Sydney, local precinct development and the interchange capabilities of Sydney Metro Northwest.

The main considerations for the proposed bus network include:

- Bus stops located every 800 metres on rapid bus routes.
- Bus priority measures along rapid bus routes.
- Provision of bus services within 400 metres of at least 90 percent of homes.
- Peak service frequencies of four to six services per hour per route.
- Off-peak service frequencies of at least two services per hour per route.
- Maximising the use of the T-Way.

Buses will continue to service demand between the precinct and Parramatta utilising the T-Way and trips along the M2 Motorway to connect to centres along this corridor. Improved service routing and frequencies will increase the bus catchment and transport options for the precinct's residents and workers in the region.

The proposed bus network improvements, timing and funding mechanisms are summarised in **Table 11** and illustrated in **Figure 14**. An evaluation of the future network and its suitability to cater for future travel demands is discussed in **Chapter 5**.



4.3.5 Road

The road network will continue to be an integral part of the transport network in the Precinct. The road network also facilitates access for walking, cycling and buses to, from and within the Precinct. The road network will mainly serve subregional and regional travel demand for a range of trip purposes.

A finer grain street network in the Precinct will have an important role in improving accessibility for pedestrians and cyclists to move within the Precinct, as well as for motorists to access the arterial road network. Proposed intersection improvements would facilitate access to the Precinct and provide safe crossing points for pedestrians and cyclists, as well as bus priority measures where required.

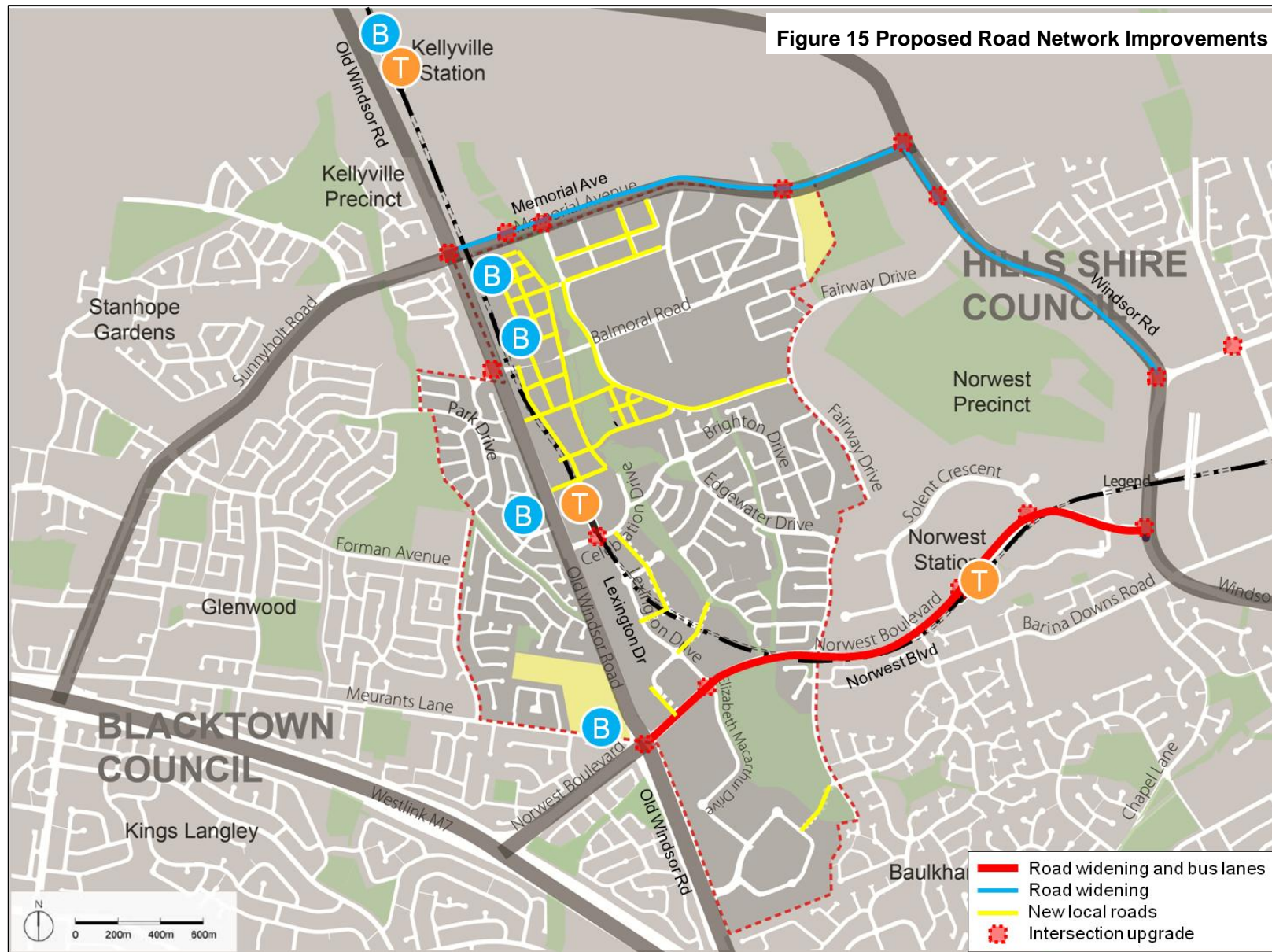
To support customers living outside the walking, cycling and bus catchments, some parking will be provided at the Showground Station. Currently 600 spaces are planned for these customers to provide equitable access for potential metro customers. Additionally, the Burns T-Way station will also provide 168 car parking spaces.

Road upgrades including bridges, new and realigned roads and intersection upgrades are planned as a part of the Sydney Metro project, which will support connection to and from the station for commuters using the commuter car parks.

The major connection to Sydney's motorway network is Old Windsor Road, which will continue to be a primary link between the precinct and the M2 and M7 Motorways. Windsor Road will also continue to function as a major north-south movement corridor providing access between the region and Castle Hill and Sydney's northern suburbs.

The proposed upgrade of Norwest Boulevard to accommodate bus priority measures and improved connectivity for motorists, cyclists and pedestrians to the surrounding road network would also help to accommodate growth in the region.

The proposed road improvements, timing and funding mechanisms are summarised in **Table 11** and illustrated in **Figure 15**. An evaluation of the future network and its suitability to cater for future travel demands is discussed in **Chapter 5**.



4.4 Infrastructure List

The infrastructure schedule for the Precinct that is required to support the forecast growth is shown in **Table 11**.

The NSW Government is investigating a range of funding sources for infrastructure to support the planning proposal. This will include mechanisms which enable the Government to share the value uplift created by increased development density and investment in better infrastructure and services

Table 11 Infrastructure Schedule

#	Measure	Who	Process
Regional and strategic transport planning measures			
1.	Construction of the Sydney Metro Northwest including: <ul style="list-style-type: none"> New Metro Station, station plaza and public domain Bus, taxi, cycle and kiss and ride interchange facilities Customer Car Park with 800 spaces 	TfNSW	Sydney Metro Northwest and associated works to be completed in 2019
2.	Windsor Road widening, between Memorial Ave and Showground Rd, including intersection upgrades	RMS	To be investigated as precinct develops
3.	Memorial Avenue upgrade between Old Windsor Rd and Windsor Rd including improved pedestrian and cycle access across Memorial Ave and intersection upgrades	RMS	To be confirmed as precinct develops
4.	Upgrade of Norwest Boulevard including the signalisation of the intersection with Lexington Drive and intersection upgrades at: <ul style="list-style-type: none"> Old Windsor Road; and Windsor Road 	TfNSW	Ongoing
5.	Bus network: <ul style="list-style-type: none"> Improvements to the rapid bus and suburban bus network to create a more connected system that complements the Sydney Metro Northwest Bus lanes on Norwest Blvd as part of future upgrade Continued review of local bus services, including to service new development areas Bus priority improvements: <ul style="list-style-type: none"> New bus only access street linking NW T-way and Bella Vista station precinct (delivered as part of Sydney Metro Northwest) Bus/taxi only section on Lexington Drive adjacent to Bella Vista Metro station (delivered as part of Sydney Metro Northwest) Investigate bus priority measures on Lexington Drive and Elizabeth Macarthur Drive on the approach to intersection with Norwest Boulevard. 	TfNSW/ relevant road authority / developer	To be investigated as precinct develops
Local transport measures – potential road upgrades			

#	Measure	Who	Process
6.	New signalised intersection - Lexington Ave and Celebration Dr (to replace the existing roundabout) Upgraded (realigned) intersection of Balmoral Rd, Miami St and Old Windsor Rd, to provide direct access to Bella Vista precinct from Glenwood	TfNSW	Sydney Metro Northwest and associated works to be completed in 2019
7.	Signalisation of the intersection of Memorial Ave, Free Settlers Dr and Arnold Ave.	TfNSW	To be confirmed as precinct develops
8.	New and upgraded intersections, including: <ul style="list-style-type: none"> New signalised intersection - Lexington Ave and Celebration Drive (to replace the existing roundabout) Upgraded (realigned) intersection of Balmoral Road, Miami Street and Old Windsor Road, to provide direct access to Bella Vista precinct from Glenwood 	TfNSW	Sydney Metro Northwest and associated works to be completed in 2019
9.	New and upgraded intersections, including: <ul style="list-style-type: none"> Signalisation of the intersection of Memorial Ave, Free Settlers Drive and Arnold Ave. New upgraded intersection with potential signals on Memorial Avenue at New access road between Old Windsor Road and Free Settlers Drive. 	TfNSW	To be confirmed as precinct develops
10.	New and upgraded Station Precinct access streets, including: <ul style="list-style-type: none"> Extension of Lexington Drive from Celebration Drive to Balmoral Road New station precinct access streets Three road bridges over Sydney Metro Northwest rail corridor (Balmoral Road and two new streets) Upgrade of Balmoral Road between Old Windsor Road and new station precinct access street 	TfNSW	Sydney Metro Northwest and associated works to be completed in 2019
11.	New streets as development occurs	Relevant road authority	To be confirmed as precinct develops
12.	New local road bridge(s) across Elizabeth Macarthur Creek	Relevant road authority	Delivery as part of a Section 94 Plan and potential other funding sources
13.	Extension of Brighton Drive to Bella Vista Station and new signalised intersection with Celebration Drive	Relevant road authority	Delivery as part of a Section 94 Plan and potential other funding sources
Local transport measures – Pedestrian and Bicycle Network			
14.	Pedestrian network: <ul style="list-style-type: none"> Footpaths on both sides of all new streets in the precinct and both sides of all streets within the Norwest business park Installation of new pedestrian crossings on new and existing streets where required to accommodate increased pedestrian activity. Provide for or extend footpaths on both sides of Memorial Ave, Celebration Dr, Edgewater Dr, Northridge Ave, Ravenswood Rise and Springdale 	Relevant road authority / developer	Delivery as part of a Section 94 Plan and potential other funding sources

#	Measure	Who	Process
	Rise. <ul style="list-style-type: none"> • Pedestrian crossing phases provided on all legs at new signalled intersections • Widen footpaths on both sides of Lexington Dr between Norwest Blvd and Celebration Dr 		
15.	Shared footpaths and cycleways: <ul style="list-style-type: none"> • New pedestrian / cycle bridge over Old Windsor Rd adjacent to Bella Vista station • Investigate potential for a pedestrian and cycle connection between Glenwood and the proposed pedestrian / cycle bridge over Old Windsor Road 	TfNSW	Sydney Metro Northwest and associated works to be completed in 2019
16.	Shared footpaths and cycleways: <ul style="list-style-type: none"> • Along Norwest Blvd, between Windsor Rd and Old Windsor Rd • Along Elizabeth Macarthur Creek from Memorial Dr to Celebration Dr • Along Balmoral Rd, between Old Windsor Rd and Free Settlers Dr • Along Free Settlers Dr and proposed new local street from Balmoral Dr to Fairway Dr • Along Old Windsor Rd from Memorial Dr to Celebration Dr • Along Celebration Dr from Old Windsor Rd to Elizabeth Macarthur Dr • Along proposed new local street between Old Windsor Rd and Free Settlers Dr • Along Lexington Dr from Norwest Blvd to Celebration Dr • Along Fairway Dr, from Old Windsor Rd to Solent Cr • Along Shaun Dr or parallel street to the Bella Vista Metro Station • Pedestrian and cycle connections between the existing paths within Bella Vista Farm Park and the off-road cycle path on Bella Vista Dr 	Relevant road authority / developer	Delivery as part of a Section 94 Plan and potential other funding sources
17.	New pedestrian/cycle bridges over Elizabeth Macarthur Creek	The Hills Council / Sydney Water	Delivery as part of a Section 94 Plan and potential other funding sources
18.	Pedestrian and cyclist bridge over Memorial Ave, adjacent to Pellizzer Blvd	Hills Shire Council	To be confirmed as precinct develops

4.5 Travel demand management

Travel demand management involves managing the transport task through:

- Reducing dependence on the private vehicle for many trips;
- Rescheduling trips outside of peak periods; and
- Encouraging people to better organise their travel so they make fewer trips, make shorter trips, use one vehicle to carry more people and combine journey purposes.

Policy and design initiatives aiming to manage travel demand and optimise existing and planned transport infrastructure and services will help to accommodate the growth in this planning proposal, as well as the objectives and planning framework outlined in **Chapter 3**. This section outlines key travel demand management tools that can be used in the development of the Precinct.

4.5.1 Travel plans

Travel plans are a tool that support shift of travel behaviour to more sustainable modes of transport by providing information on transport options to and from an area/location along with incentives.

When people change jobs or move house, this is a period of transition for travel behaviour which can be positively influenced to walk, cycle and use public transport more often. Travel plans seek to maximise the transport outcomes during this window of transition.

Travel plans are normally prepared as a part of the development application process and include a range of hard and soft initiatives, which can be conditioned to the development, and implemented during the delivery and maintained during occupation for the Precinct.

Travel plans have a documented history of achieving behaviour change, with a shift from sole private vehicle drivers of between 5% and 66%¹ achieved with a range of measures.

4.5.2 Walk and cycle infrastructure

The pedestrian and cyclist infrastructure discussed in **Section 4.3**, together with the integrated land use outcomes in this planning proposal, will help to reduce dependence on private vehicle trips within the Precinct and encourage shorter trips.

High quality urban environments and end of trip facilities, such as bicycle parking, showers and lockers, will compliment the walking and cycling infrastructure proposed and result in positive travel demand management outcomes.

These initiatives will be partly delivered by the Sydney Metro Northwest project where bicycle parking will be provided at the rail station. In the preparation of relevant development control plans and in the assessment of development applications further initiatives and design outcomes can be conditioned on development sites to complement the broader transport infrastructure and services.

4.5.3 Local public transport initiatives

Council and local businesses in collaboration with Transport for NSW may consider provision of additional local bus services that complement the core bus network and meet specific industry or community needs.

4.5.4 Car parking controls

Car parking controls can be used as a policy tool to manage travel demand and dependence on private vehicle. Oversupply of car parking and the corresponding private vehicle dependency often results in lower economic, health and environmental outcomes in centres².

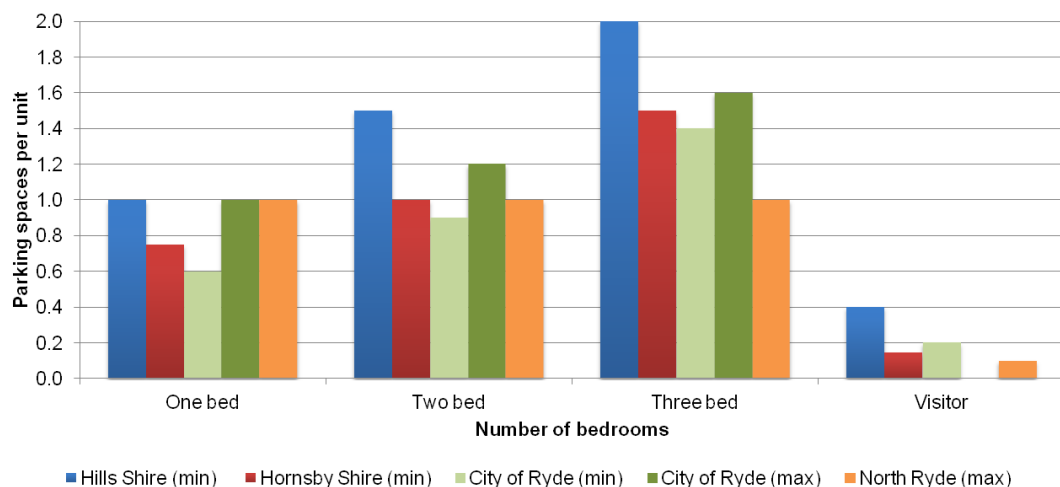
¹ *Making travel plans work*, Department for Transport, London

² *The Missing Link: Parking...*, Genter, Schmitt & Donovan

An outline of the car parking controls for the Hills Shire Council LGA and other similar council areas is provided in **Figure 16**. The existing controls guiding development in the Hills Shire Council LGA generally require a greater supply of parking spaces to be provided by developments in comparison to Hornsby Shire and City of Ryde Councils. This generally reflects the existing transport network in the respective LGAs, where Hornsby Shire and City of Ryde Council areas are currently better served by public transport, including heavy rail networks, while Hills Shire Council is predominantly served by suburban and rapid bus routes.

In Council's preparation of relevant development controls for the Precinct, it is recommended that car parking controls be reviewed to respond to changing trends in car ownership and balance the needs of residents and workers in the precinct while encouraging sustainable travel choices.

Residential parking controls



Non-residential parking controls

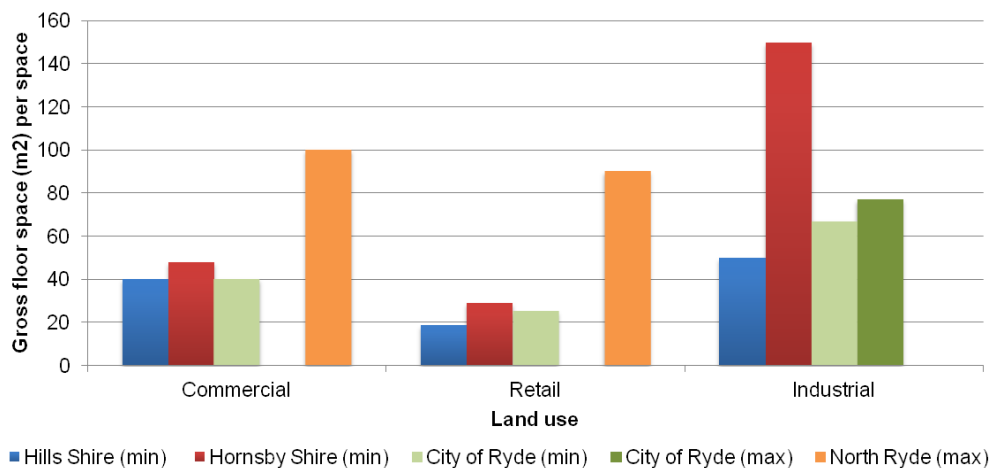


Figure 16 Parking controls in centres* for Hills Shire, Hornsby Shire and City of Ryde

*Hills Shire Council defines a centre as Castle Hill Major Centre, Baulkham Hills Town Centre and Rouse Hill Major Centre. Hornsby Shire Council defines centre as sites within 800m from railway station.

The parking provisions have been included for North Ryde, which is a comparable transit-oriented development. City of Ryde also includes parking maximums in LEP 2014 for Macquarie Park, which are not dependent on development type, and vary between 1 space per 46m² Gross Floor Area and 1 space per 80m² Gross Floor Area.

5 Evaluation

The Precinct planning proposal was developed in response to the opportunities created by the Sydney Metro Northwest project. This section outlines an evaluation of the transport plan in relation to relevant policy, the system objectives and its ability to accommodate future travel demand.

This section outlines the estimated performance of the transport network in 2036 when development is fully realised. The timing of these upgrades is dependent on the staging and delivery of the Precinct. It should be noted that the yields from the planning proposal and outlined in **Chapter 4.2.1** have been used as the basis for all analysis informing this transport plan. The planning controls proposed in this planning proposal allow for greater yields to be developed and so any additional take up will need to be further assessed to understand the impact on the transport network.

5.1 Rail network assessment

Sydney Metro provides a critical connection along the corridor and to other strategic centres such as Epping and Chatswood. Metro services will operate every four minutes (15 services per hour) in peak periods and every ten minutes off-peak. Services will be equipped to display real time information and run at greater than 97% reliability. Metro services will also be ‘turn up and go’, meaning customers will not require a timetable; customers can turn up at any time and expect a service to be arriving within ten minutes.

The Metro corridor connects residents, visitors and workers along the corridor in centres such as Norwest, Bella Vista, Rouse Hill, Castle Hill and Cherrybrook. The reduced travel times between these precincts will enable residents to take the Metro and then walk to their destination. Urban activation in the other precincts along the corridor will also drive greater opportunities to live, work and play in the corridor.

The Metro is also an enabler of interchange and broader accessibility across the subregion. Bus, cycle and walking facilities in each of the precincts will be coordinated with the Metro station to enable customers to take the Metro and then seamlessly shift to another mode to reach their destination.

Key finding

The proposed Sydney Metro Northwest project will provide:

- **A critical major public transport option for current and future residents in the West Central subregion. The project also provides the opportunity to integrate housing and employment with the delivery of a significant increase in public transport accessibility.**
- **The opportunity to increase the amount of jobs and services within close proximity to the corridor, reducing travel distances and times for goods and services.**

5.2 Pedestrian network assessment

The proposed pedestrian network provides the transport mode between land uses within the Precinct. Walking is used predominantly for local trips of less than two kilometres (refer **Figure 7**), and the density proposed in the Precinct focuses land uses within this walking distance.

Bella Vista's local centre and Norwest Business Park are located within two kilometres of the residential sector, which is considered a walkable distance. This proximity will cater for retail and small business jobs living in the Precinct. The distance to Rouse Hill and Castle Hill is approximately five to six kilometres, which is considered longer than the normal walking distance to work, although some residents may choose to walk this distance.

Within a two kilometre walking catchment of the Precinct there is approximately 5,100 metres of separated/shared path facilities plus footpaths on the majority of the street network. This transport plan proposes an additional 12,400 metres, which represents a 242% increase, of separated/shared path to improve pedestrian amenity and connectivity to, from and within the Precinct.

The proposed separated/shared path network will also provide an attractive green corridor that will encourage walking between the sectors. Additional traffic signals are planned on Memorial Avenue to improve walking connections across the road to the Kellyville Station Precinct to the north. New bridge connections provide increase connectivity from the surrounding areas. These proposed improvements, including new crossing points and connections, facilitate walk only trips as well as walking to and from major stops and services.

Improved personal security within the Precinct, new walking connections and slow speed environments also support and encourage more walking. This is achieved through improved active frontages and road safety facilities.

In addition development control plans for the area will need to require pedestrian spaces to be designed in an attractive way with high quality urban design outcomes to encourage walking.

Key finding

The proposed pedestrian network will:

- **Provides the main pedestrian network structure that will be further developed and integrated with fine grain road network that supports residential, commercial, retail and other business land uses.**
- **Provide fine grain integration with residential, commercial, retail and other business land uses.**
- **Maximise the investment in Metro Northwest through the provision of direct, safe and amenable walking paths in and around Bella Vista Station.**
- **Provide an alternate to vehicle travel for short trips in the local area to reduce the pressure on the local, sub arterial and arterial roads surrounding the precinct.**
- **Help deliver the pedestrian network that connections to local centres as outlined in Sydney's Walking Future.**

5.3 Cycle network assessment

The proposed cycle network provides direct, reliable and safe connections to adjacent centres such as Norwest, Castle Hill and Rouse Hill, as well as connectivity between residential land uses bordering the precinct to the Metro and jobs, leisure and retail within the Precinct.

Within a two kilometre cycling catchment of the precinct there is approximately 5,100 metres of separated/shared path facilities. This transport plan proposes an additional 12,400 metres (over 240% increase) of separated/shared path to improve cyclist amenity and connectivity to, from and within the Precinct. Additionally, the local road network will provide routes for cyclists to travel within the precinct.

The proposed cycle network will facilitate interchanging to the Metro as residents, workers and visitors can cycle from the station to and from other land uses in the Precinct. The entire Precinct is within a two kilometre catchment of the Bella Vista Station – a seven minute ride. Facilities such as cycle parking at the station and well distributed separated/shared paths will also facilitate this interchanging function.

The proposed cycle network will provide good coverage of the different sectors in the Precinct. Separated/shared paths are provided on all of the major roads within the Precinct and along a number of the arterial roads such as Windsor Road, Old Windsor Road, Memorial Avenue and Norwest Boulevard. These separated/shared paths form the key arteries of the system, which provide connectivity to local roads with limited through traffic. This system provides connectivity between the different land use sectors.

Cycling is used predominantly for local and subregional trips (refer **Figure 7**), which infers that cycling is a key point of connectivity between land uses in the Precinct and to the adjacent centre of Norwest. The major employment area in Norwest is within a 15 minute cycle from the centre of the residential areas, which is a reasonable cyclable distance and will likely attract some residents living in the Precinct and working in Norwest.

Key finding

The proposed cycle network will:

- **Facilitate local and subregional trips within and surrounding the Precinct through a complete network of separated/shared paths and local streets.**
- **Provides the main cycle network structure that will be further developed and integrated with fine grain road network that supports residential, commercial, retail and other business land uses.**
- **Capitalise on the investment for the Metro Northwest by providing safe cycling links to the station and the provision of end of trip facilities at the station.**
- **Provide an alternate to vehicle travel in the local area to reduce the pressure on the local, sub arterial and arterial roads surrounding the precinct.**
- **Help deliver the cycle network that connects to major centres as outlined in Sydney's Cycle Future.**

5.4 Bus network assessment

The proposed bus network will complement the Sydney Metro Northwest by connecting the Precinct to other centres such as Parramatta, Blacktown and Hornsby as well as providing access for residents in the surrounding areas to the Bella Vista Station.

In order to deliver transport equity and facilitate greater transport choices, the proposed bus network will need to satisfy the Integrated Public Transport Service Planning Guidelines, including with respect to service and geographic coverage. The proposed bus network provides a critical link between the Metro service, which is high frequency but corridor based, and the other regional centres.

The coverage of the proposed bus routes will result in greater than 90% of households in the area located within 400 metres (as the crow flies) of a bus stop.

The proposed bus network will predominantly serve subregional trips and a proportion of regional trips to and from the Precinct. The strategic modelling undertaken to support the assessment indicates that the key regional destinations for residents in the Sydney Metro Northwest Corridor include Sydney, North Sydney, Parramatta and Blacktown. These locations will be connected to the Precinct by either bus and/or rail.

The proposed bus hierarchies are shown along each of the bus corridors in **Figure 17**. The frequencies along Lexington Drive are proposed to be 16 buses during peak hours and four buses per hour in off-peak times. Bus frequencies proposed on roads providing direct access to the Precinct ranges from four to six peak hour services and two to six services per hour during off-peak times.

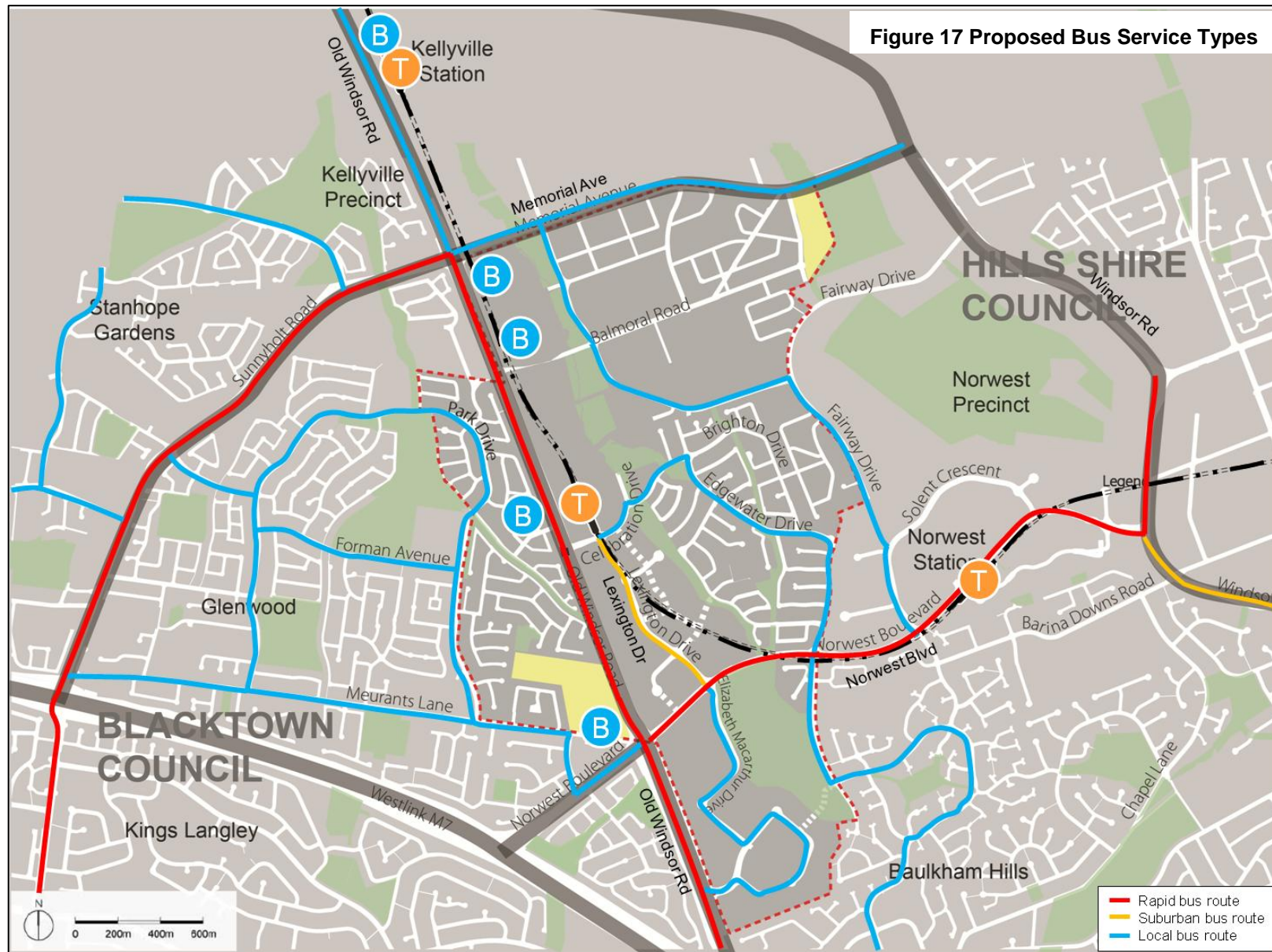
The planned rapid bus routes that are committed by Sydney's Bus Futures, Hornsby - Blacktown and Rouse Hill – Blacktown, will improve connectivity to the key employment centres of Blacktown, Hornsby and Castle Hill at a high frequency.

These routes will also serve the bulky goods and commercial precincts by providing a service from the high density residential centres of Blacktown, Castle Hill and Hornsby.

Key finding

The proposed bus network will:

- **Provide greater land use and transport integration for the Precinct. It will facilitate subregional and regional connections to other transport modes and to areas not serviced by rail.**
- **Maximise investment in the Metro Northwest through providing public transport integration and facilitation/encouragement of multi-modal trips.**
- **Provide a good level of bus service and coverage for residents, businesses and visitors of the Precinct. This means the area will have an equitable transport system for all customers.**



5.5 Road network assessment

The proposed road network will need to serve both a movement and a place function for trips to, from and within the Precinct. Travelling by private vehicle will be a mode choice for a range of trip purposes and especially subregional trips within North West Sydney and to centres not served by the Sydney Metro Northwest or the bus network. Road freight will remain an essential task serving the future land uses, including the local centre, residential and commercial and light industrial uses in the precinct.

The proposed street network within the Precinct will offer greater permeability for local access to the station and the other land uses. The traffic flows anticipated along Carrington Road and Victoria Avenue reinforce their vibrant street character and will continue to offer motorists access to the primary arterial road network as well as pedestrians, cyclists, buses and freight access to the station precinct and surrounding land uses.

Old Windsor Road, Windsor Road, Memorial Avenue and Norwest Boulevard will continue to function as the primary arterial road network, which is supported by the traffic analysis and the anticipated flows along those roads. Current and future investment should focus on maintaining these links as the primary movement corridors to reduce conflict in the high activity areas within the Precinct to support this planning proposal.

Traffic modelling results of the proposed road network are shown in **Figure 18**, which shows the intersection performance (level of service) for 2036. Analysis indicates that the majority of the roads in the study area will operate within the available capacity with traffic generated by this proposal as well as growth in station precincts along the Sydney Metro Northwest corridor.

The intersections along Old Windsor Road, Windsor Road and Norwest Boulevard, providing access to the precinct will operate with long average delays for motorists. Additional capacity will be required to accommodate future growth in traffic flows generated by the Precinct and other growth in Sydney's North West.

Key finding

The proposed road network will:

- **Optimise the existing and future transport network by providing adequate capacity for peak period traffic conditions.**
- **Facilitate a connected bus network to compliment the Sydney Metro Northwest.**
- **Provide a transport option for customers who cannot walk, cycle or catch a bus.**
- **Recognise the place value and access requirements of the surrounding environment while providing adequate capacity for movement of vehicles.**
- **Provide access for freight movements to the Precinct and the surrounding areas.**





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