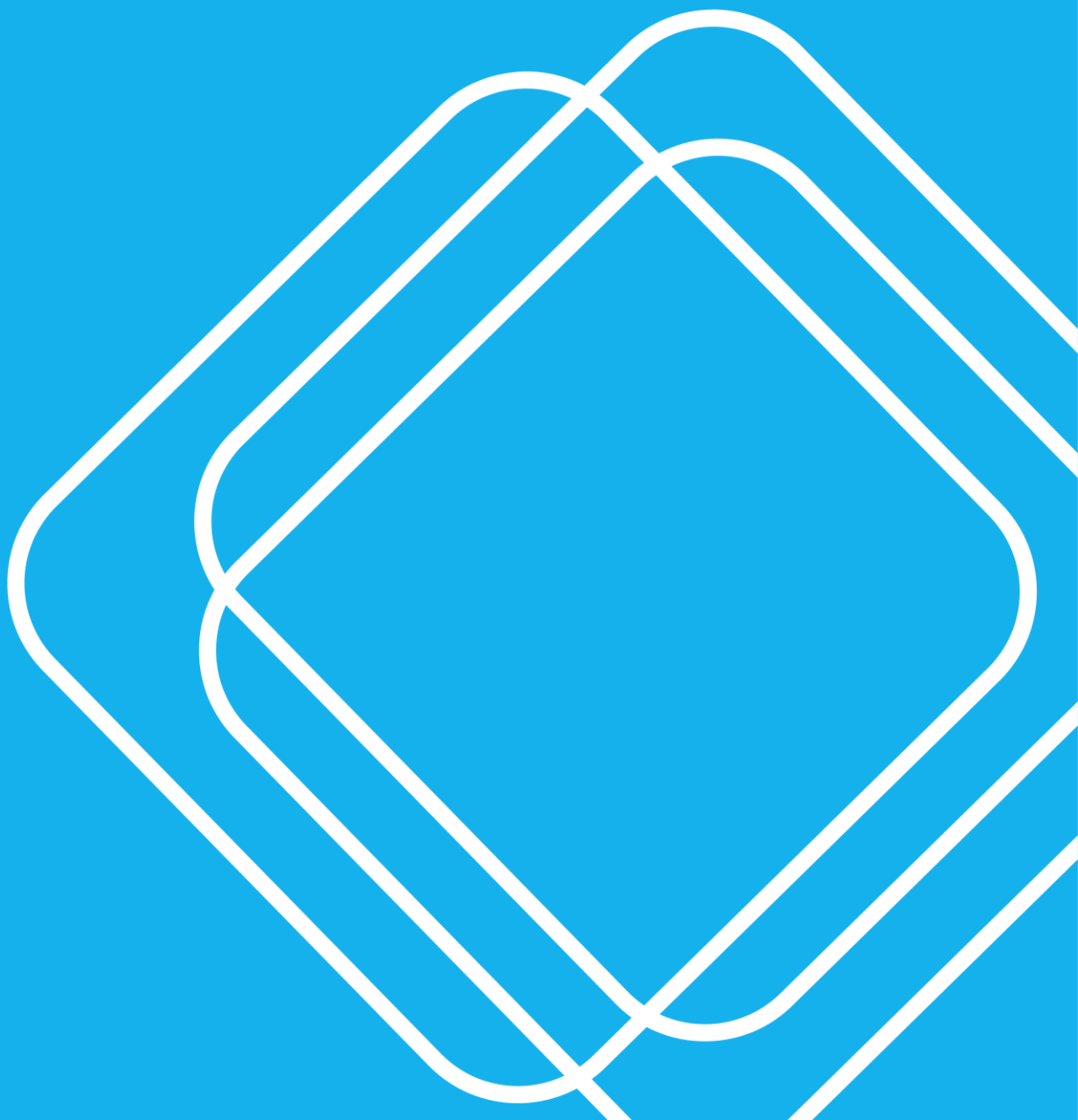
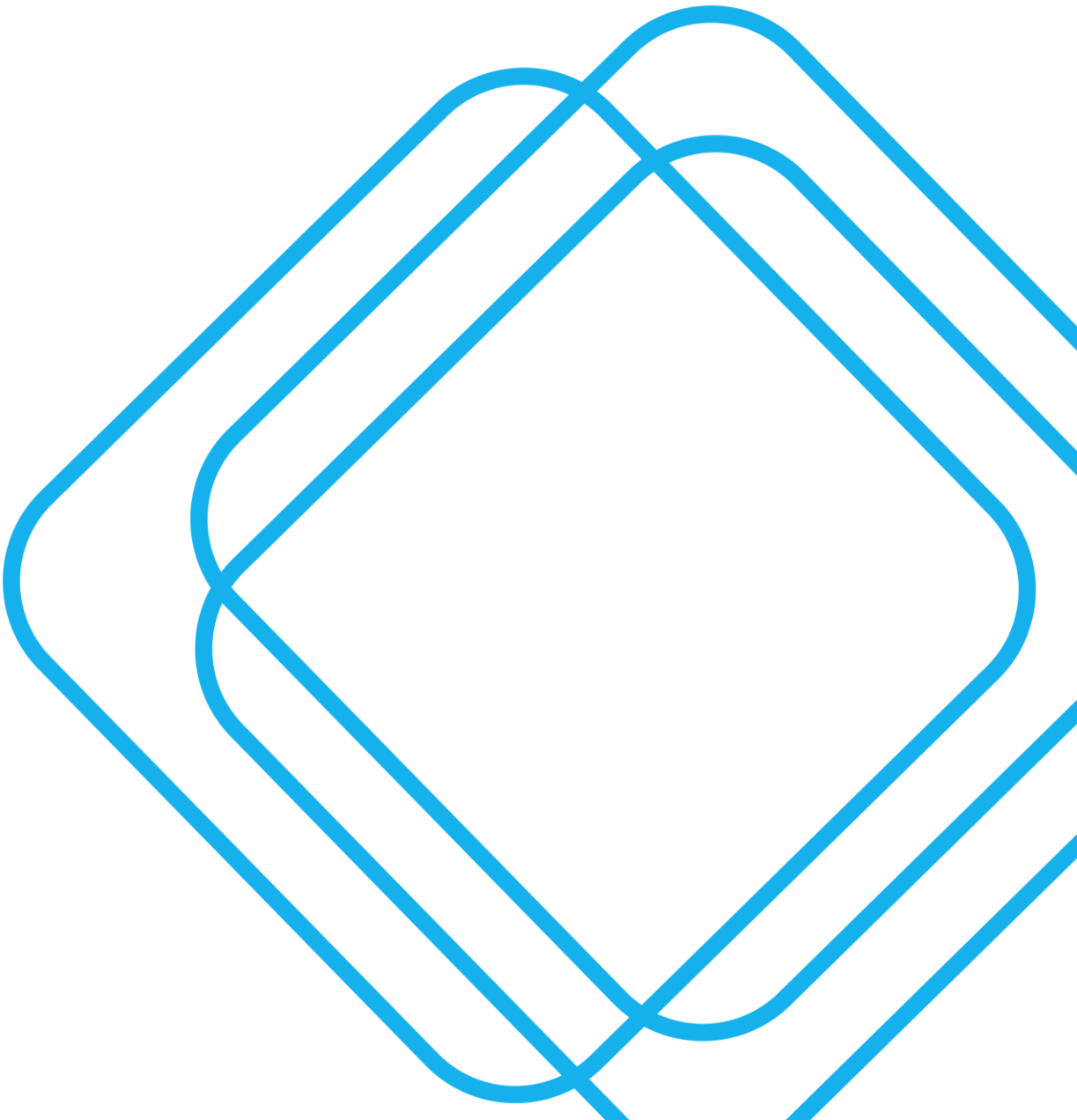
SCT Consulting

THE BELMORE ROAD PRECINCT

Updated Traffic, Transport and Access Assessment

22 SEPTEMBER 2023





Quality Assurance

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1.0	15 March 2021	Draft report
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4.0	14 June 2022	Updated final report (with revised ILP and yield)
5.0	11 July 2022	Updated final report (renaming of the precinct)
6.0	14 April 2023	Updated final report (updated analysis and scope)
7.0	22 September 2023	Updated final report (with revised ILP and yield)

Contents

Executive Summary

Purpose of the study

SCT Consulting was engaged by CKDI Pty. Ltd. (CKDI) to undertake a traffic, transport, and access assessment to support the planning proposal of the Belmore Road Precinct (previously known as South Creek West Bringelly Sub Precinct 2), located in the South West Growth Area (SWGA). The Belmore Road Precinct is bound by the old The Northern Road to the east, Greendale Road to the north, lot boundaries to the west and the planned Lowes Creek Link Road to the south. The Belmore Road Precinct, predominantly agricultural land use, is proposed to be rezoned into a community with ready access to employment, public transport, education, and commercial facilities, and is well-positioned to be integrated into infrastructure development in the wider regional area.

The assumptions for the site were made during the planning of Lowes Creek Maryland (LCM), a Department of Planning and Environment (DPE)-led planning proposal to the south. Traffic modelling and transport assumptions were based on the work for this site.

Future planning context

The SCW Release Area where the site sits anticipates a capacity of 30,000 dwellings and 1,000 new jobs. Significant growth of employment and residents are expected in the vicinity of the site in the future. Western City District Plan establishes a housing target of 184,500 by 2036. Aerotropolis Core to the north of the site, as part of the Western Sydney Aerotropolis Plan, is estimated to have 50,000 to 60,000 jobs and 20,000 to 24,000 residents, while the residential dwelling target for the Oran Park Precinct to the south is 7,540 dwellings. This will be supported by several committed transport projects and projects under investigation to realise the vision of the 30-minute city and modal change to sustainable transport.

The planned rail corridor including the North-South Rail Link / The South West Rail Link Extension and the provision of rapid bus service on The Northern Road could promote public transport, especially for commuting to/from Aerotropolis and Greater Sydney. The first stage of the North-South Rail Link has been committed, named Sydney Metro - Western Sydney Airport between St Marys to Western Sydney Airport and Badgerys Creek Aerotropolis.

The potential Outer Sydney Orbital is identified approximately 2.5 kilometres to the west of the site and may have an interchange at Greendale Road, making it convenient to access from/to the site.

Existing conditions

The 2016 Method of Travel to Work data was analysed to determine current travel behaviour and patterns to and from the site during peak travel periods. The study area showed a higher proportion of car use in the local area, 72 per cent, in comparison to 53 per cent in Greater Sydney. Train and bus usage was low at a total of nine per cent given the long commuting time to jobs by public transport, whereas Greater Sydney showed 22 per cent in total. Active transport use was low given limited employment opportunities in the vicinity and a gap in cycling infrastructure provision in the local area to connect to the regional network.

The road network around the site includes The Northern Road and Bringelly Road which are now being upgraded by TfNSW. The Northern Road has been widened to four lanes two way and the wide median will allow for a future six-lane configuration. A grade separate intersection has been provided at The Northern Road / Bringelly Road / Greendale Road intersection to provide enough capacity as part of the project upgrade. This tallies with the findings in the historical study where the existing intersection has shown poor performance and the mid-block traffic volumes have exceeded the road capacity during the commuting peaks.

The site is around seven kilometres west of Leppington Railway Station, which is a terminal station that provides T2 Inner West & Leppington Line and T5 Cumberland Line services. It has a frequency of about seven services during AM peak hour. Bus service is only available on The Northern Road and Bringelly Road, with low bus frequency at the nearby bus stops. Given the rural nature and lack of urban development in the vicinity of the site, pedestrian and cycling accessibility are poor.

Proposed development

The Belmore Road Precinct is expected to cater for approximately 3,370 dwellings with a mix of low to high-density residential premises.

Key features of the Belmore Road Precinct Indicative Layout Plan are:

– Connections and continuity to Lowes Creek Maryland precinct, providing a seamless interface to the proposal to the south, including land use and road network elements (including walking and cycling connections)

– A town centre at the centre of the site, minimising the travel distance of residents to their local shops and hence encouraging residents to access the shops via sustainable and active transport means

– A school integrated with local open space and the town centre

– A riparian corridor oriented diagonally through the middle of the precinct, which facilitates off-road shared paths across the majority of the precinct with several connections across to connect with the town centre, the school, the playing fields as well as The Northern Road

– Density clustered around the town centre and dissipated to the precinct's edges.

The yield of the Belmore Road Precinct ILP is shown below:

Use	Yield[1]	Source
Low density residential	1,604 dwellings	Urbis revised final Rev H, dated 5 September 2023
Medium density residential	1,486 dwellings	
High density residential	280 dwellings	
School	1 primary school	
Supermarket	4,000 m^2 GFA	South Creek West Bringelly Precinct Retail Demand Analysis, May 2023
Speciality Retailers	2,450 m^2 GFA (including the 550 m^2 additional supportable floorspace to be provided in a very small centre)	
Local employment (gym, childcare, medical centre, service station, fast food)	1,600 m^2 GFA	

The yield assumptions are in line with the types of uses anticipated in the LCM transport study.

Transport assessment

The transport assessment methodology was developed in collaboration with TfNSW. This modelling approach uses the STFM strategic model and focuses analysis on the overall network capacity. The methodology updated the STFM's land use assumptions to align with the DPE-approved plans.

Seven locations, which are expected to be greatly impacted by the subject development, were selected for the transport assessment. The assessment comprised six scenarios in 2036 and 2041, which forecasted the infrastructure requirements at the 7 locations at different stages of development completion: The results from the assessment recommended that The Northern Road is upgraded to a 6-lane corridor north of the Bringelly Interchange, and to an 8-lane corridor south of the Bringelly Interchange.

Delivery of the planned Bringelly metro station is indicatively four kilometres north of the site. The new station and a bus network that could be delivered in connection with Sydney Metro could significantly change travel behaviour in the area. The current transport assessment does not account for this potential change to take a conservative approach. Understanding the potential mode shift will be important to confirm post gateway.

The importance of the Outer Sydney Orbital (OSO) was also investigated to determine whether its withdrawal or non-implementation would impact the findings of this analysis. The investigation concluded that the OSO, although reduces throughput on The Northern Road, did not have an impact on the upgrade requirements.

[1] It is noted that the yields are the best and most realistic estimates at the time of preparing this version of the ILP and will continue to evolve as the ILP develops. Updates to the yield post and modelling of the maximum development potential will occur post gateway.

A road hierarchy has been developed that provides sub-arterial connections through the site to reduce pressure on The Northern Road. All sub-arterial and collector roads are bus-capable to make sure that the entirety of the precinct can be serviced by buses when the network is defined.

With footpaths proposed on both sides of all roads, active transport can be one of the most convenient modes for short-distance trips. The road network is grid-like in structure, providing numerous crossing opportunities and reducing travel distance between residential areas and the town centre.

As such, there is merit for the site to proceed through gateway, after which further work can be done to refine the proposals based on consultation with TfNSW, Council and DPE.

Next Steps

The following next steps are proposed:

– Council and TfNSW provide comments as a part of the lodgement process with Council.

– Council lodgement of the planning proposal, followed by DPE gateway determination.

– It is proposed to convene a Project Steering Group with Council, DPE, TfNSW and the proponent to use as a means of resolving technical issues during the development of a TMAP.

– Following gateway approval, SCT Consulting will prepare a Transport Mobility and Access Plan (TMAP) Scoping Note that agrees on the technical scope that would satisfy any relevant gateway conditions, for the approval of the steering committee.

– Post-gateway investigation is suggested to determine the feasibility of implementing a bus rapid transit route on The Northern Road to reduce dependence on.

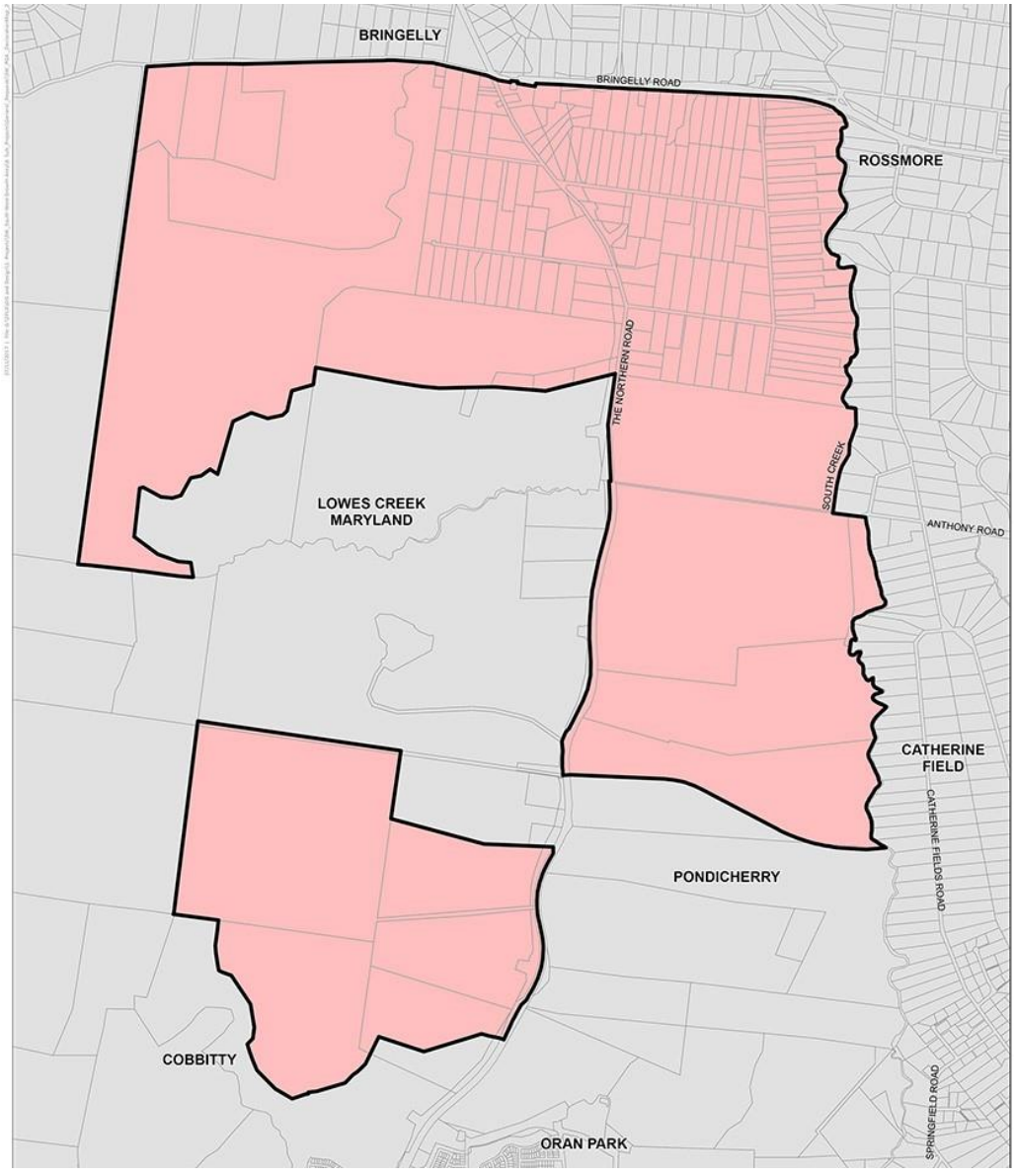
1.0 Introduction

1.1 Background

The NSW Government is working to deliver new sustainable, liveable, and connected communities, improved transportation networks, and employment opportunities in the South West Growth Area (SWGA) to accommodate Sydney's growing population. The SWGA will be a vibrant, attractive, and connected community, where people can access a range of jobs, public transport, education and community facilities, open spaces, shops and cafes. When fully developed, the SWGA will accommodate at least 155,000 homes, with a Green Grid linking growing suburbs, rehabilitating waterways, and providing recreation and community areas.

As part of this, the South Creek West Area was released in late 2017, along the newly upgraded The Northern Road corridor. The land was predominately used for agricultural purposes and the release will provide opportunities for the creation of new communities and future transport services within the Camden Local Government Area. In total, the South Creek West Release Area (as shown in **Figure 1-1**) will accommodate up to 30,000 dwellings and provide access to schools, employment, open space, parklands, and transportation corridors within proximity to the Western Parkland City and Western Sydney Aerotropolis.

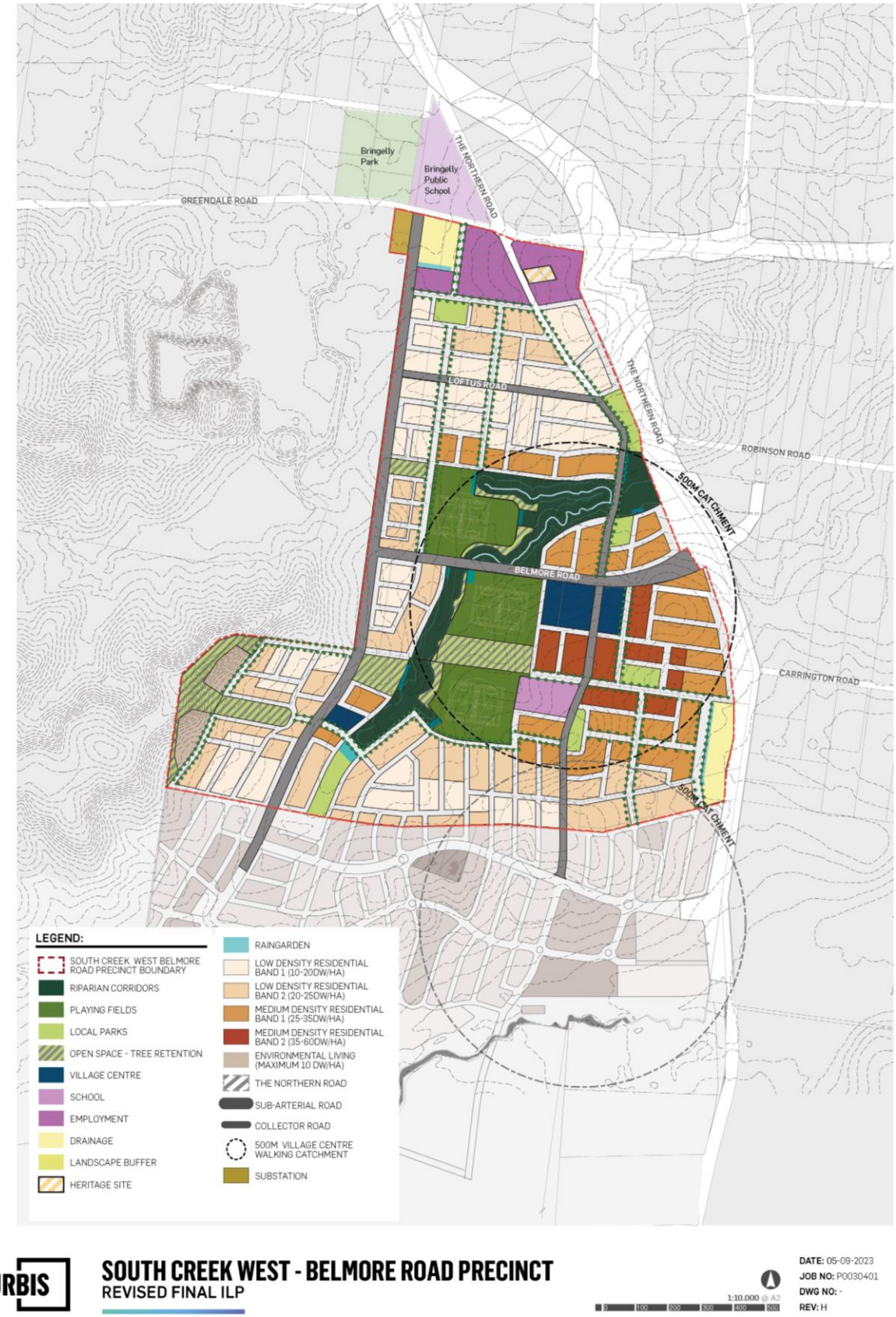
Figure 1-1 South Creek West release area



Source: NSW Department of Planning, Infrastructure and the Environment (DPIE), 2017

SCT Consulting was engaged by CKDI Pty Ltd (CKDI) to undertake a traffic, transport and access assessment to support the planning proposal of the Belmore Road Precinct, as shown in **Figure 1-2**.

Figure 1-2 The Belmore Road Precinct Indicative Layout Plan



Source: Urbis, 2023

The site is currently rural, covering a total area of 187.3 hectares. It is bound by the old The Northern Road to the east, Greendale Road to the north, the existing trail to the west and Lowes Creek Maryland precinct to the south. Greendale Road, Loftus Road, and Belmore Road are the major street networks that could provide access to The Northern Road from the site.

The Belmore Road Precinct is expected to cater for approximately 3,370 dwellings with a mix of low to high-density residential premises.

1.2 Purpose of report

The purpose of this traffic, transport and access assessment is to support the planning proposal based on the design of the proposed concept masterplan, including:

- Inform future planning controls to ensure a coordinated and efficient approach to land use planning, environmental management, and transport infrastructure
- Provide an integrated approach to determining the optimal mix of land uses and density concentrations as a means of minimising (where possible) trip generation and transport-related demand
- Ascertain the cumulative and regional traffic and transport impacts associated with future land-based demands associated with the rezoning
- Maximise efficiency and safety of the existing/proposed transport systems in proximity to the subject site.

1.3 Scope and limitations

The scope of this study is to:

- Undertake a background information and documentation review
- Collate existing traffic and travel pattern data
- Review of existing traffic and transport conditions
- Understand the status of any planned and committed infrastructure upgrades
- Understand trip generation and trip distribution to understand the implications of the proposed development
- Determine likely infrastructure upgrades required to cater for the proposed development
- Identify public and active transport measures and sustainable travel initiatives for the development, as well as the likely required parking provision.

All source of data used in this study has been carefully verified and checked by SCT Consulting. However, given the level of detail of the assessment, the modelling accuracy will be affected by any potential changes to the assumptions in the future.

1.4 Report structure

This report has been structured into the following sections:

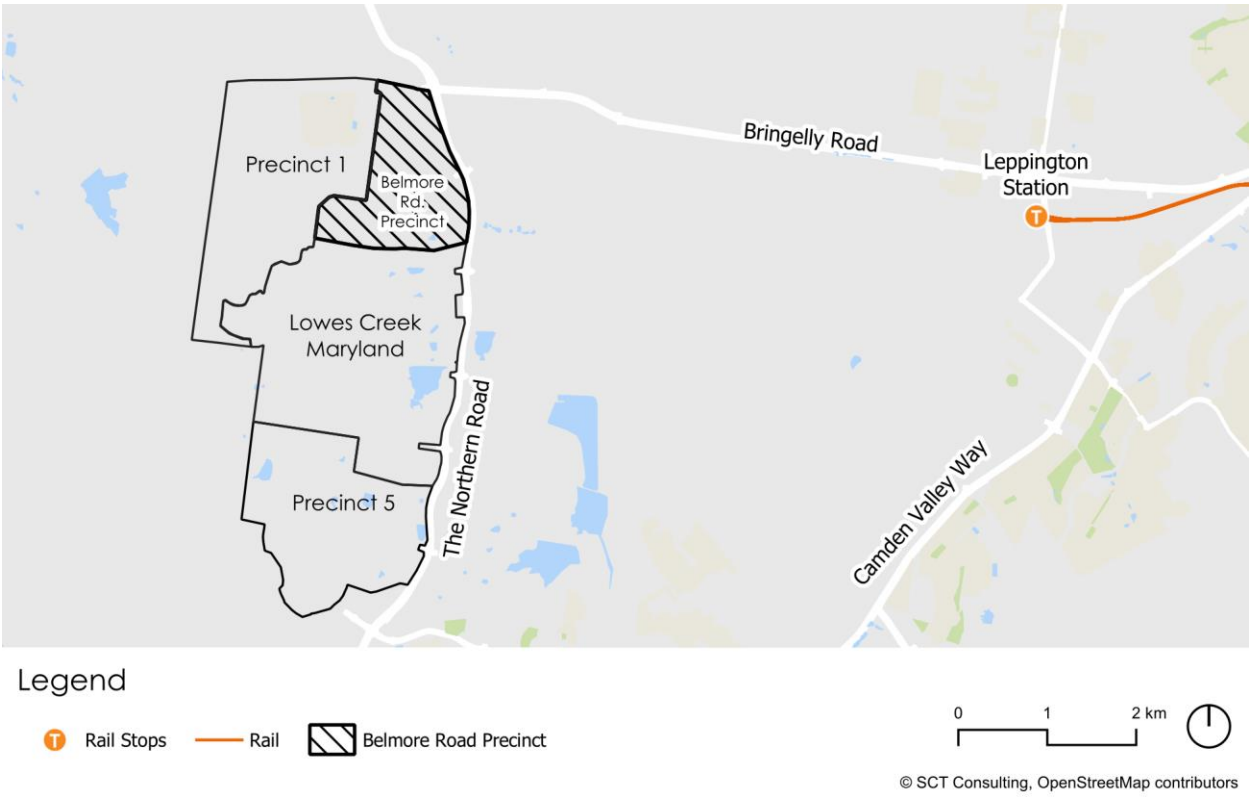
- **Section 2.0** provides a summary of the review of all relevant background documents
- **Section 3.0** describes the existing transport conditions for all modes of transport
- **Section 4.0** describes the proposed development, its access strategy and a review of parking and access requirements
- **Section 5.0** outlines the traffic and transport appraisal which describes the modelling undertaken, the likely trip generation, indicative impact as a result of the proposed development
- **Section 6.0** assesses the gateway risks
- **Section 7.0** summarises the report content and presents the conclusions.

2.0 Strategic Context

2.1 Site context

The Belmore Road Precinct is bound by the old The Northern Road to the east, Greendale Road to the north, the existing trail to the west, Lowes Creek Maryland precinct to the south as shown in **Figure 2-1**.

Figure 2-1 The Belmore Road Precinct in a regional context



Most of the site is zoned as RU1 Primary Production and RU4 Primary Production Small lots with a small piece of Neighbourhood Centre in the northeast. Current land use to the north of the site includes Bringelly Community Centre and Bringelly Public School. Leppington Station is seven kilometres to the east of the site, providing connectivity to the Sydney Greater Metropolitan Area (GMA) through mass transit services.

As part of the SWGA, the site aims to be redeveloped into a community with ready access to employment, public transport, education and commercial facilities and is well-positioned to be integrated into infrastructure development in the wider regional area outlined in future details below.

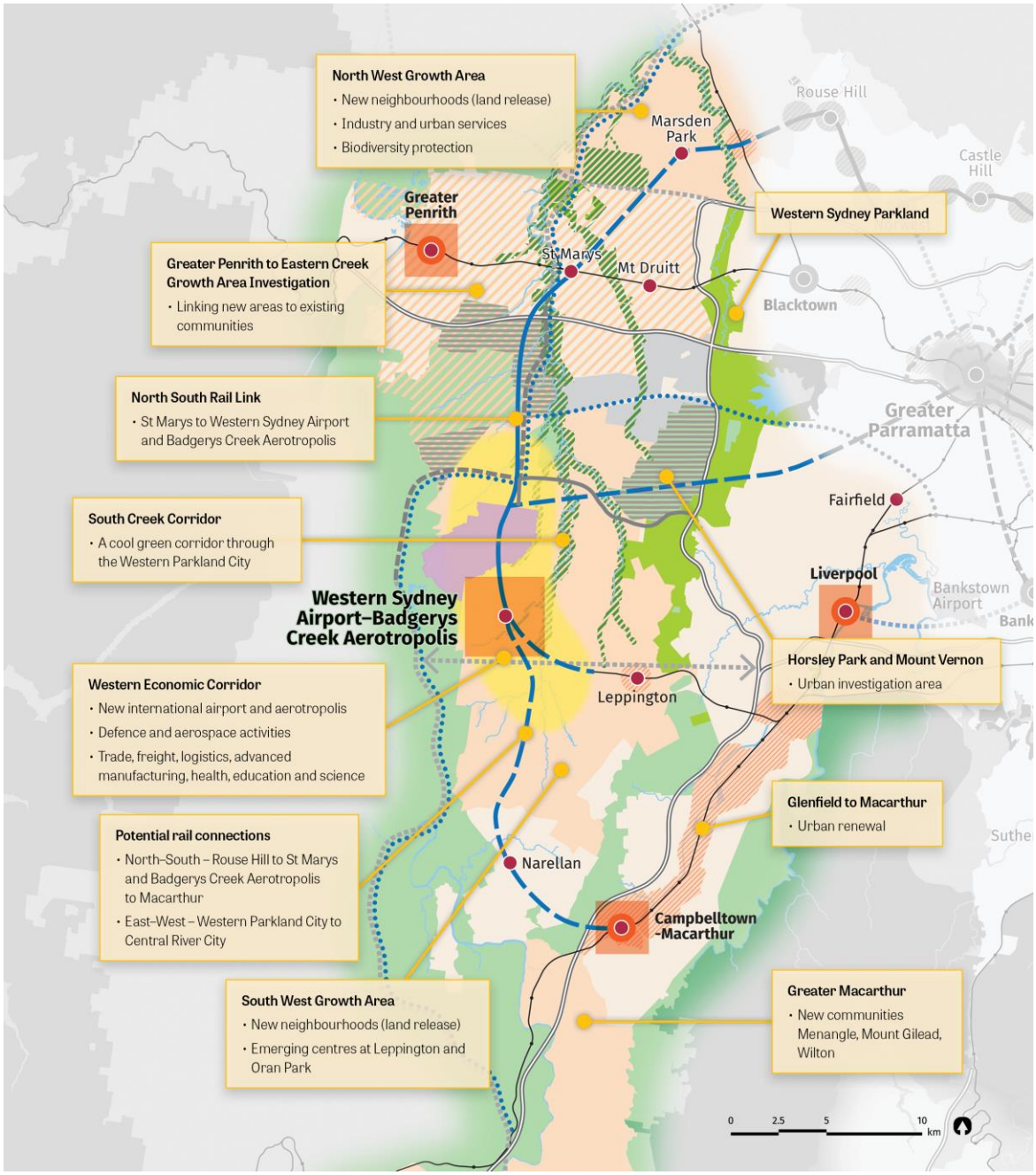
2.2 Regional planning and land use context

2.2.1 Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Region Plan, A Metropolis of Three Cities, is aiming at delivering three cities where most residents are within a 30-minute commute to employment, education, and health facilities, services, and great places. The vision seeks to develop Greater Sydney into a metropolis composed of Western Parkland City, Central River City, and Eastern Harbour City.

The site currently resides in what seeks to become the Western Parkland City which encompasses current and future centres of Greater Penrith, Western Sydney Airport – Badgerys Creek Aerotropolis, and Campbelltown – Macarthur. Development projects, as shown in **Figure 2-2,** outline key growth areas and infrastructure upgrades envisioned to develop Western Parkland City.

Figure 2-2 Western City Parkland Infrastructure Development



Source: Greater Sydney Commission, 2018

The vision of the Western Parkland City is to form new city-shaping transport and to introduce the airport that makes the city the most connected place in Australia:

– The Australian and NSW Governments will deliver the first stage of the North-South Rail Link from St Marys to the Western Sydney Airport and Badgerys Creek Aerotropolis

– A potential new east-west mass transit corridor will connect the Western Parkland City to the Central River City

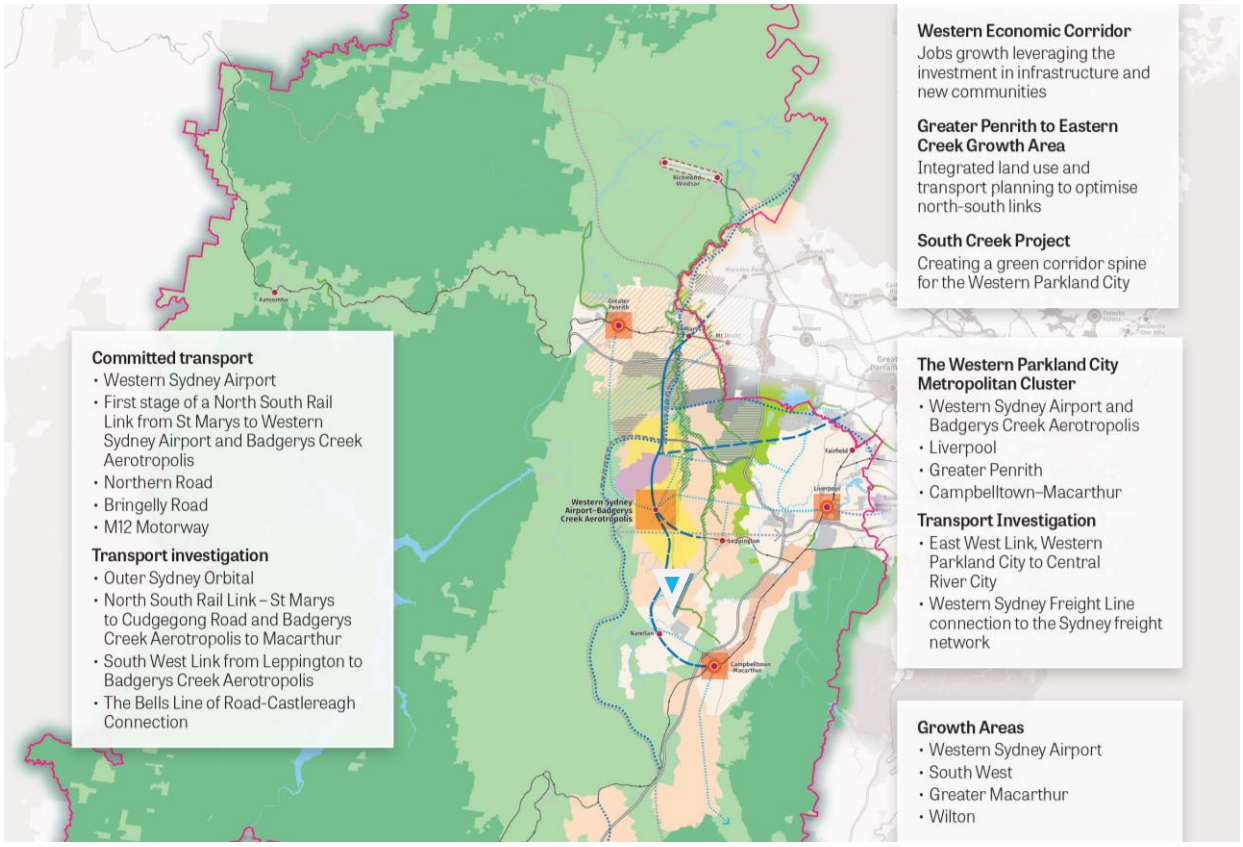
– Potential Outer Sydney Orbital will provide the city with direct connections to Greater Newcastle, Wollongong, and Canberra.

2.2.2 Western City District Plan

The Western City District Plan involves the local government areas of Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly. It aims to ensure future generations have excellent

connections to local jobs, housing, services, and great places. Under the Plan, the site is located south of the Western Sydney Airport – Badgerys Creek Aerotropolis as shown in **Figure 2-3**.

Figure 2-3 Western City District Plan



Source: Western City District Plan, 2018

The Western Sydney Airport and Badgerys Creek Aerotropolis, located to the north of the site are expected to transform the Western City District, creating a once-in-a-generation economic boom for residents, bringing infrastructure, businesses, and knowledge-intensive local jobs to residents.

The Plan establishes a housing target of 39,850 new dwellings by 2021 and 184,500 by 2036, with 11,800 additional dwellings in Camden LGA to accommodate this growth by 2021, the Draft District Plan outlines several overarching priorities and actions that will shape the future and guide policy decisions for this District. They include:

– Planning a city supported by infrastructure, including infrastructure that supports the new Western Sydney Airport and responds to growth

– Giving people housing choices by providing housing supply, choice and affordability, with access to jobs and services

– Designing places for people by creating and renewing great places and local centres, and respecting the district's heritage

– Developing a more accessible and walkable city by establishing the land use and transport structure to deliver a liveable, productive and sustainable Western Parkland City

– Creating the conditions for a stronger economy by actions including leveraging the industry opportunities from the Western Sydney Airport and Badgerys Creek Aerotropolis, planning and managing industrial and urban services land and growing investment, business opportunities and jobs in strategic centres

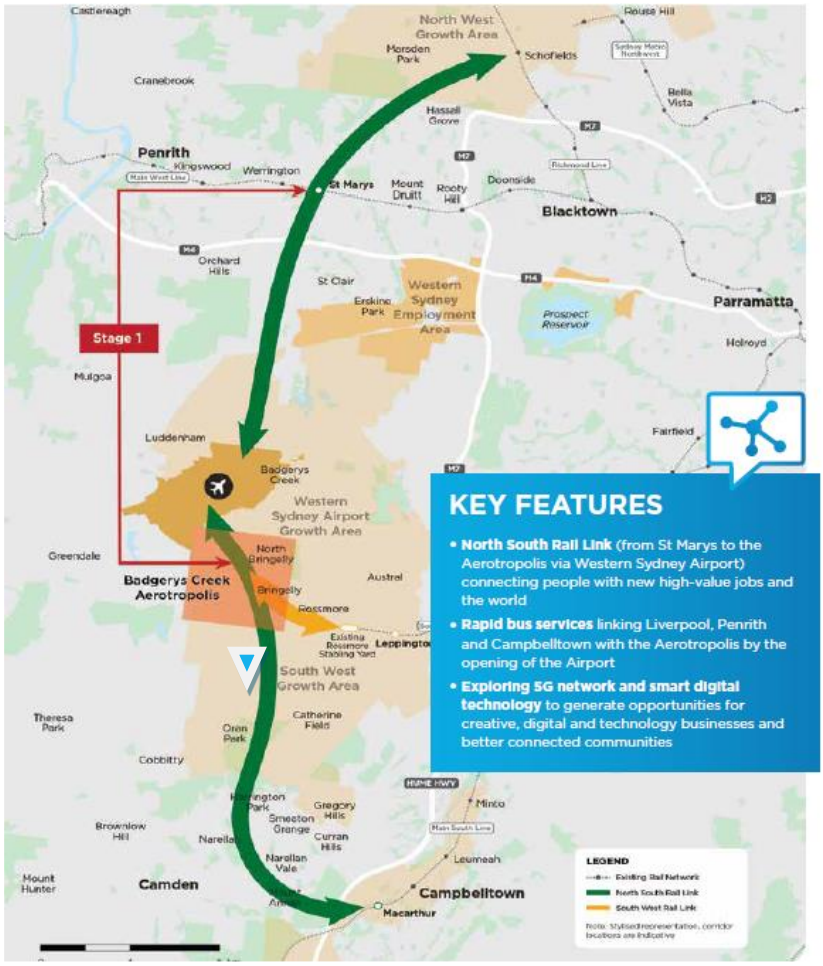
– Valuing green spaces and landscapes by actions including creating a protecting and enhancing bushland and biodiversity Planning Priority, better managing rural areas and delivering high-quality open spaces.

2.2.3 Western Sydney City Deal

The Western Sydney City Deal is a partnership between the Australian Government, NSW Government, and local governments of the Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly, announced on 4 March 2018.

Of most relevance to this study are the committed improvements in connectivity through the Western Sydney City. The new Western Parkland City will be one of Australia's most connected cities. In an emerging 30-minute city, innovative public transport, aviation and digital infrastructure will bring residents closer to jobs, centres, education and the world. The key features of transport improvements of the Western Sydney City Deal are shown in **Figure 2-4**.

Figure 2-4 Key features of improved connectivity and public transport options



Source: Western Sydney City Deal, 2018

The Australian and NSW Governments jointly committed to delivering the first stage of the North-South Rail Link from St Marys to Badgerys Creek Aerotropolis via Western Sydney Airport, with a joint objective of having rail connected to the Western Sydney Airport in time for its opening.

Work will immediately commence on a thorough design and investment case for the North-South Rail Link (including the South-West Rail Link) as part of an integrated planning and city-shaping approach. Both governments will contribute up to $50 million each to a business case process, in consultation with local government. This will include an investigation of integrated transport and delivery options for a full North-South Rail Link from Schofields to Macarthur and a South West Rail Link to connect Leppington to the Western Sydney Airport via an interchange at the Badgerys Creek Aerotropolis.

The NSW Government will establish rapid bus services from the metropolitan centres of Penrith, Liverpool and Campbelltown to the Western Sydney Airport before it opens in 2026, and to the Badgerys Creek Aerotropolis.

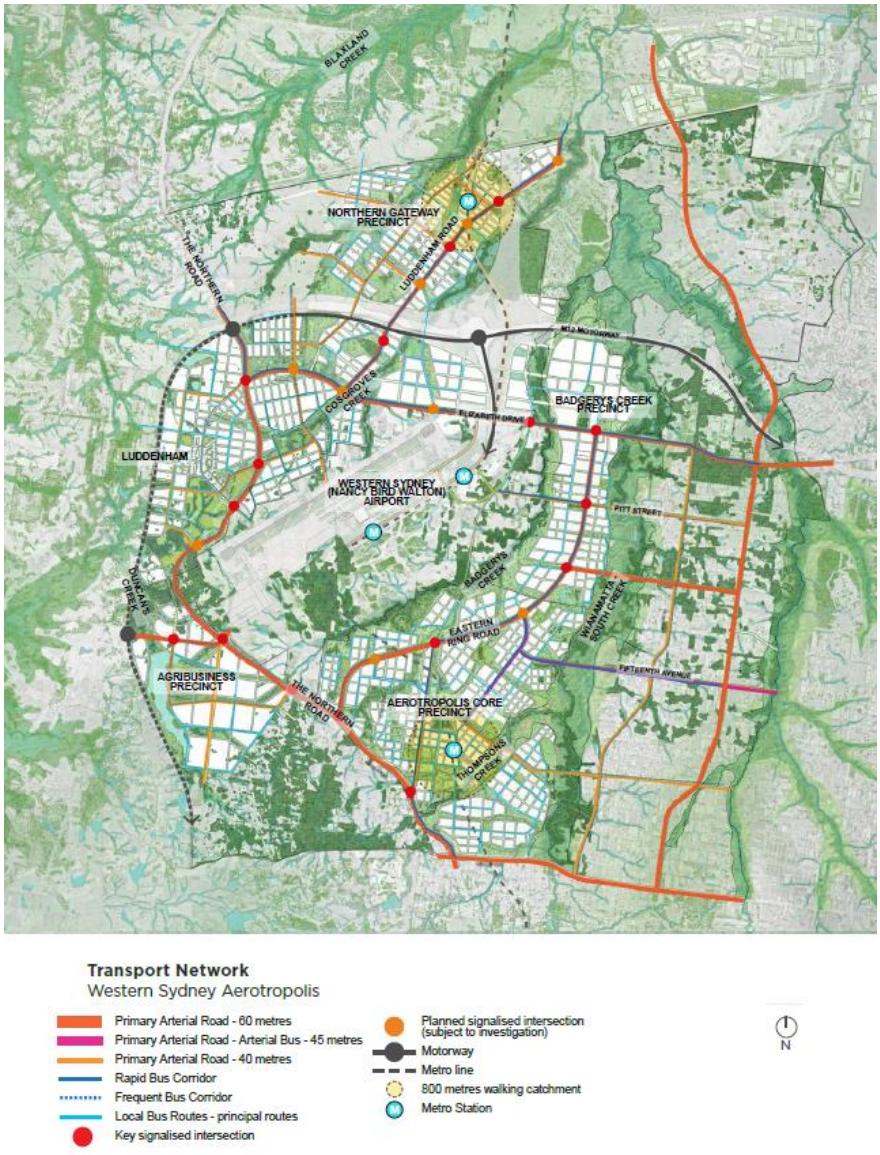
Implications for the site: The site will be developed to house residents who are envisioned to be employed mainly in the surrounding centres and Greater Sydney Metropolitan Area. As part of the vision for a 30-minute commute, the site will benefit from upgrades to roads, public transport, and active transport networks in the region including North-South Rail Link, Outer Sydney Orbital, and rapid bus services.

2.2.4 Western Sydney Aerotropolis Planning Package

The Western Sydney Aerotropolis Plan outlines the plan to develop an 11,200-hectare site surrounding the future Western Sydney International Airport. The plan envisions a 24-hour metropolitan centre that is accessible, innovative and accommodates high-value jobs close to where people live. When complete, the Aerotropolis will be home to a potential 34,000 residents and more than 100,000 jobs throughout its 10 precincts.

Aerotropolis Core Precinct in the immediate north of the site will become a diverse, dynamic and sustainable global airport city with attractive places for workers, residents and visitors accommodating 50,000 to 60,000 potential jobs and 20,000 to 24,000 potential residents.

Figure 2-5 Proposed transport network of Western Sydney Aerotropolis



Source: Western Sydney Aerotropolis Plan, 2020

As shown in **Figure 2-5**, the proposed transport network in and around the Aerotropolis includes:

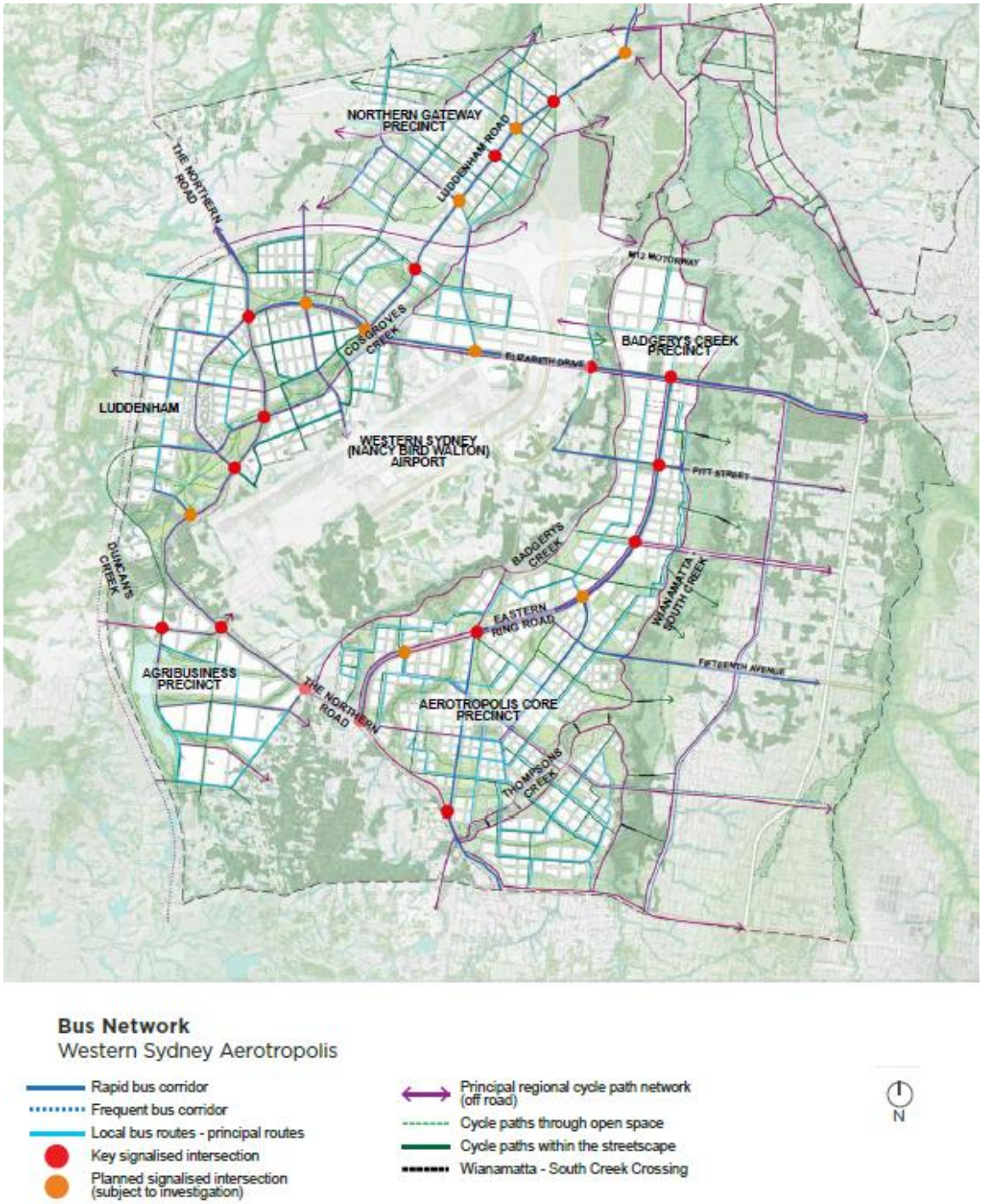
– The proposed Sydney Metro line and metro stations

– Rapid bus services proposed to link Liverpool, Penrith and Campbelltown with the Airport and Aerotropolis Core

– The proposed M12 Motorway to be the major access route to the Airport and connect to Sydney's motorway network

– The proposed Outer Sydney Orbital Corridor to be the major north-south transport corridor between Richmond Road in the north and the Hume Motorway in the south.

Figure 2-6 Proposed bus (and cycle paths) network of Western Sydney Aerotropolis



Source: Western Sydney Aerotropolis Plan, 2020

Figure 2-6 further identifies the principal regional cycle path network (off-road) in and around the Aerotropolis to support a target mode share for active transport at six per cent. This includes cycle paths on Bringelly Road, The Northern Road and an extension of the cycle path along Thompsons Creek.

The Greater Sydney Commission notes on its website that it is delivering the Western Sydney Place-based Infrastructure Compact (PIC) program for the NSW Government, as part of the Western Sydney City Deal. A PIC is a highly collaborative model that looks holistically at a place to identify at a high level the most cost-effective sequencing for growth aligned with the provision of infrastructure over 10, 20 and 40 years. This will be one of the means of planning for the changes in the Western Sydney Aerotropolis Growth Area.

Implications for the site: This site is situated just below the southern boundary of the Aerotropolis, and residents will likely be commuting to/from the Aerotropolis for work. With its advantage close to the Aerotropolis, the site should seek to maximise the ability for residents to commute to the Aerotropolis in 30 minutes, in line with the targets of the NSW Government and the Western Sydney Aerotropolis Plan. The site will benefit from the investment that the Aerotropolis brings into the area, including more frequent and reliable transport options.

2.2.5 South West Growth Centre Structure Plan

The South West Growth Centre Structure Plan (**Figure 2-7**) outlines prospected land use zoning and centres in the South West Growth Area. Structure Plans show existing or proposed main roads, centres, state heritage items, regional open space, and areas of high biodiversity. This makes them an important tool for proponents in preparing their planning proposals and for councils and agencies to assess those proposals.

Since its release in 2010, the structure plan was updated in 2022. The main goals of the updated structure plan are:

– Build new homes for growing communities

– Better quality open space and healthy waterways

– Connecting and Healing country opportunities

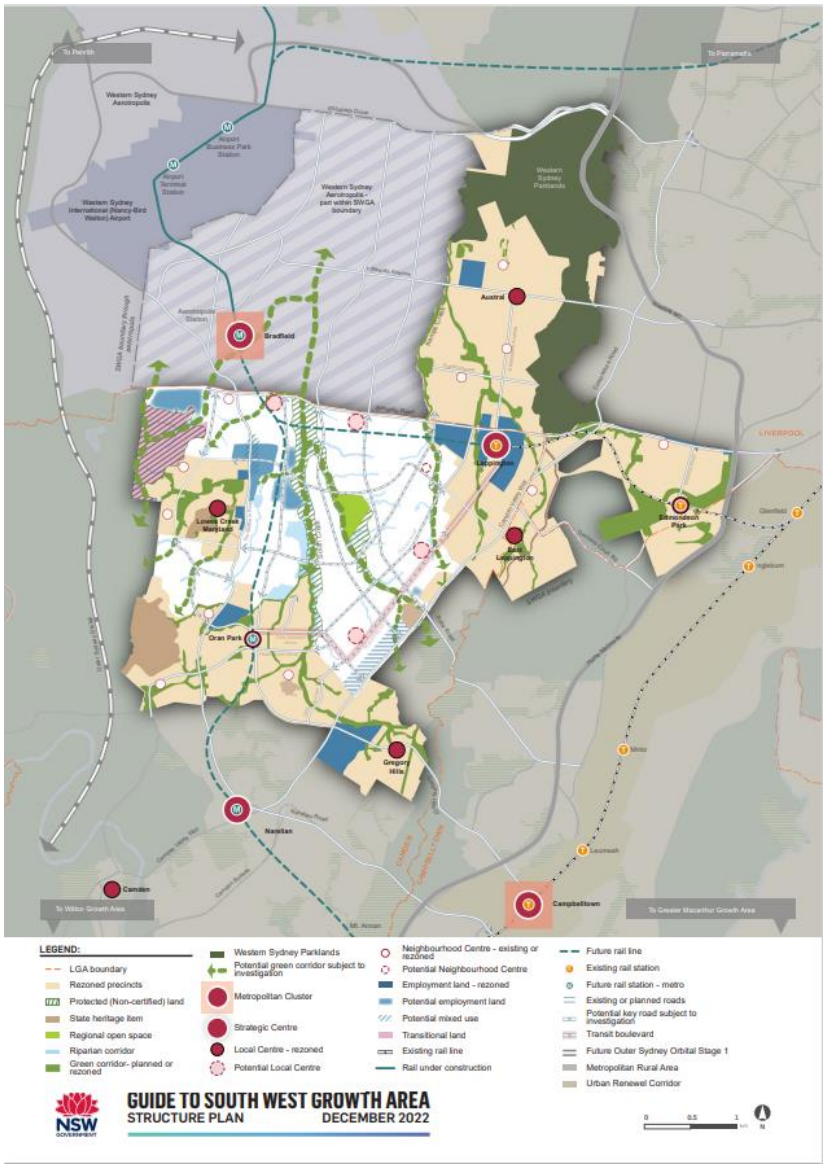
– Future transport opportunities

– Celebration of heritage.

Most of the surrounding area within the SWGA will be developed into residential areas, with a high focus on walkability and public transport permeability. In particular, the implementation of the future metro rail lines through the proposed local and city centres such as the connection from Narellan and Leppington to Bradfield.

Implications for the site: The rezoning of the growth area will improve accessibility to jobs, health, and community services. In particular, the site will benefit from the adjacent proposed employment land that will drastically improve the accessibility to jobs and services. Additionally, the expansion and integration of the public transport network will support to the site's connectivity to the wider region.

Figure 2-7 South West Growth Centre Structure Plan



Source: Guide to the South West Growth Centre Structure Plan, 2022

2.2.6 Camden Local Strategic Planning Statements (LSPS)

Camden Local Strategic Planning Statements (LSPS), prepared in 2019 and updated in March 2020, provides a 20-year land use vision for Camden and outlines directions for future growth and strategic planning. The LSPS sets short, medium, and long term-actions related to land use, transport, and sustainability objectives, as well as other strategic directions related to the Greater Sydney Region Plan and the Western City District Plan.

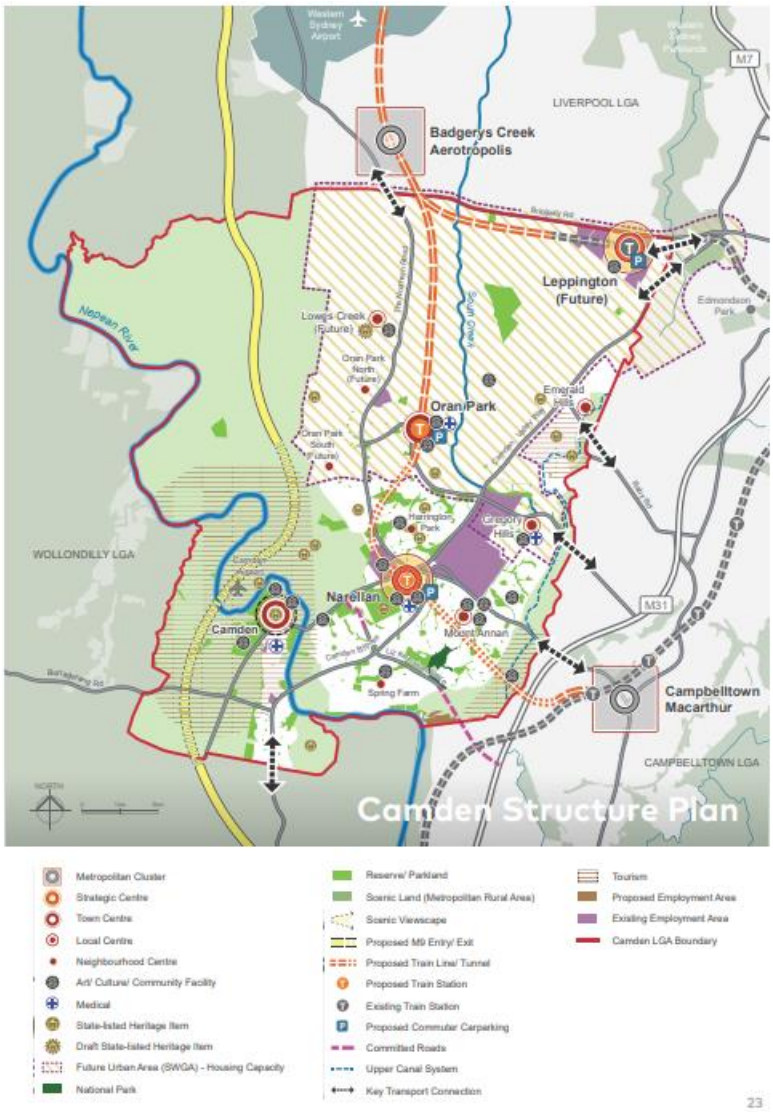
Transport objectives within the LSPS relate heavily to the 30-minute Western Parkland City envisioned by the Greater Sydney Region Plan, with a focus on sustainable transport including rail and rapid buses within Camden LGA and its surroundings. Key actions include:

– Advocacy for the delivery of the North-South Rail and South-West Rail Link Extension

– Rapid bus service route to connect key Camden centres with the Western Sydney Airport and Aerotropolis (along The Northern Road)

– Outer Sydney Orbital with an alternative underground route and appropriate east/west connections within the Camden LGA.

Figure 2-8 Infrastructure and collaboration local priority



Source: Camden LSPS, 2020

Implications for the site: The site will benefit from public transport and road network upgrades associated with delivering a 30-minute city. With the development of adjacent strategic centres and local centres comes employment opportunities and access to health, education, and community services. The expansion and integration of the public transport network will further benefit the site's connectivity to the wider region, its communities and place.

2.3 Future transport context

2.3.1 Future Transport Strategy

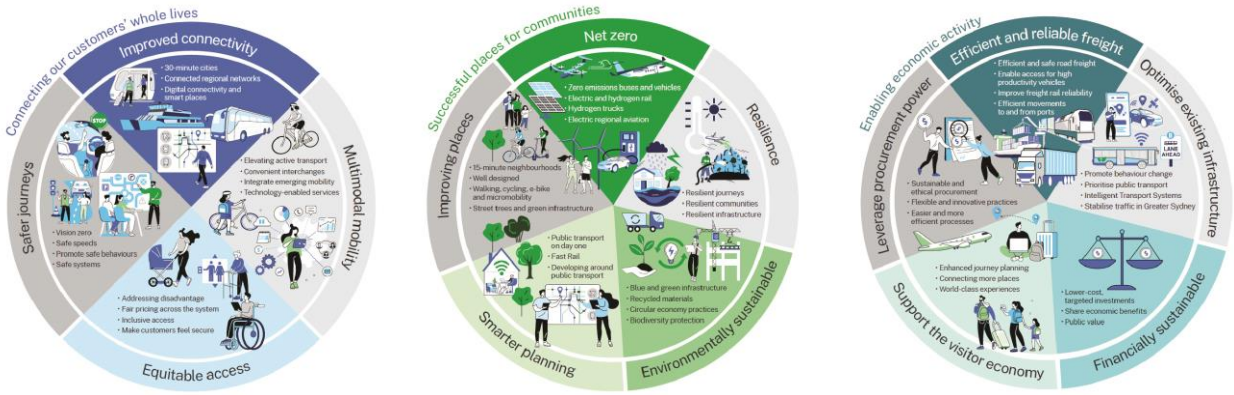
The Future Transport Strategy builds on the success of Future Transport 2056, released in 2018, and sets out Transport for NSW's (TfNSW) long-term vision to provide a safe, sustainable, accessible and integrated travel network for all passenger and freight journeys. The vision is to help make NSW the most liveable state in the world.

The Strategy was updated from the Future Transport 2056 Strategy to address significant social, cultural and economic trends/events such as the COVID-19 pandemic, the energy transition, the digital economy and enduring natural disasters. It also considers population growth, new and emerging technology and global megatrends.

The new Strategy continues to put people and places at the centre of decision-making and has a renewed focus on ensuring NSW is an economic powerhouse filled with vibrant and sustainable communities where people are connected by one integrated and multimodal transport system.

The key vision and outcomes from the strategy along with brief descriptions are shown in **Figure 2-9**.

Figure 2-9 Vision and outcomes



Future Transport Strategy, TfNSW 2022

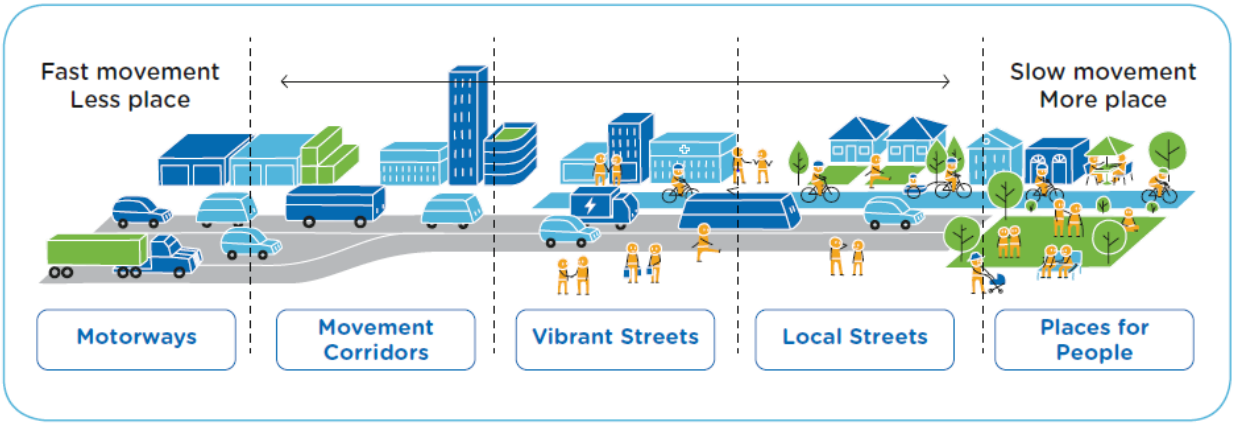
Implications for the site: Future transport initiatives are aimed at connecting people to jobs, goods and services in our cities and regions through increased permeability of public transport networks. The specific provision for pedestrian and cyclist activity and efficient interchanging contributes to a safe and comfortable walking environment, promoting an increase in sustainable transport mode share.

2.3.2 Greater Sydney Services and Infrastructure Plan

The Greater Sydney Services and Infrastructure Plan is a 40-year plan for transport in Sydney. It is designed to support the land use vision for Sydney. Building on the state-wide transport outcomes identified in the Future Transport Strategy 2056, the Plan establishes the specific outcomes that transport customers in Greater Sydney can expect and identifies the policy, service and infrastructure initiatives to achieve these.

To support the liveability, productivity and sustainability of places for the transport network, a Movement and Place Framework was developed. The Framework acknowledges that transport networks have different functions and roles and serve as both a destination and a means to move people and goods. The Movement and Place Framework will enable us to plan, design and operate the transport network to meet these different needs by providing greater transparency, supporting collaboration between those responsible for land use, transport and roads while also encouraging input from the community. Through the Framework, it is possible to design a future network that is better used and supports the safe, efficient and reliable movement of goods and the need for liveability of places along with it.

Figure 2-10 Different movement environments under the Movement and Place Framework



Source: https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Greater_Sydney_Services_Infrastructure_Plan.pdf (2018)

2.3.2.1 City-shaping network

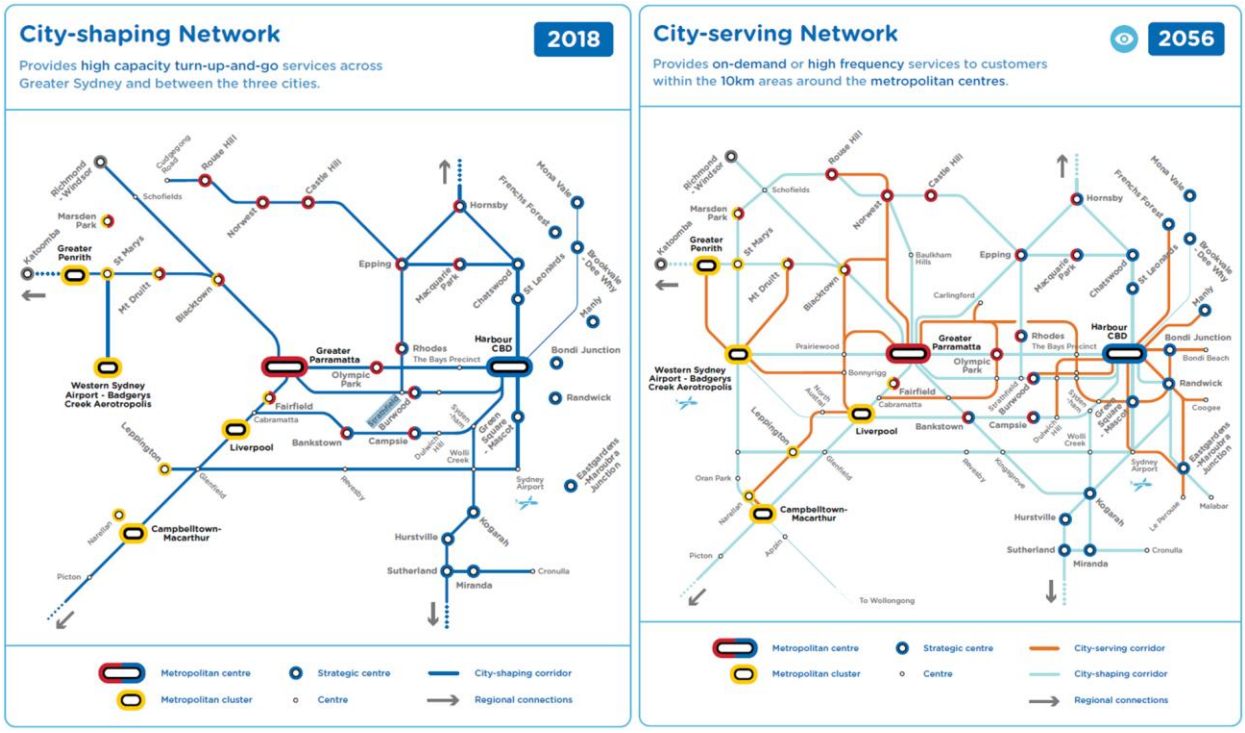
The city-shaping network includes higher speed and volume linkages between our cities and centres. The function of this network is to enable people living in any of the three cities to access their nearest metropolitan centre within 30 minutes and to be able to travel efficiently between these metropolitan centres.

As Greater Sydney transitions to a metropolis of three cities, the city-shaping network will need to expand to provide improved access to and between each metropolitan city/centre, particularly Greater Parramatta and centres in the metropolitan cluster in the Western Parkland City.

2.3.2.2 City-serving network

The city-serving network will provide high-frequency services within a ~10km radius of the three metropolitan cities/centres. This will support access within some of the densest land use in Greater Sydney where travel demand is most concentrated. As these inner urban areas in each of the three cities develop and become denser, the government will investigate the prioritisation of on-street public transport services and invest in higher frequency services.

Figure 2-11 Greater Sydney and 2056 transport network vision



Source: https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Greater_Sydney_Services_Infrastructure_Plan.pdf (2018)

Implication for the site: The development of transport infrastructure both within and between metropolitan centres provides benefits to the site by providing accessibility to a wider community, providing connectivity to employment, education, recreation, and commercial spaces.

2.3.2.3 Principle Bicycle Network

Building on the existing network, an immediate focus is working with local councils to deliver committed Priority Cycleway projects to address key missing links around the Harbour CBD, Greater Parramatta, Greater Penrith, Blacktown and Liverpool, such as the Nepean River Green Bridge and Inner West Greenway. Council partnership programs are delivering local bicycle infrastructure. Bicycle parking is also being rolled out at interchanges.

By 2056:

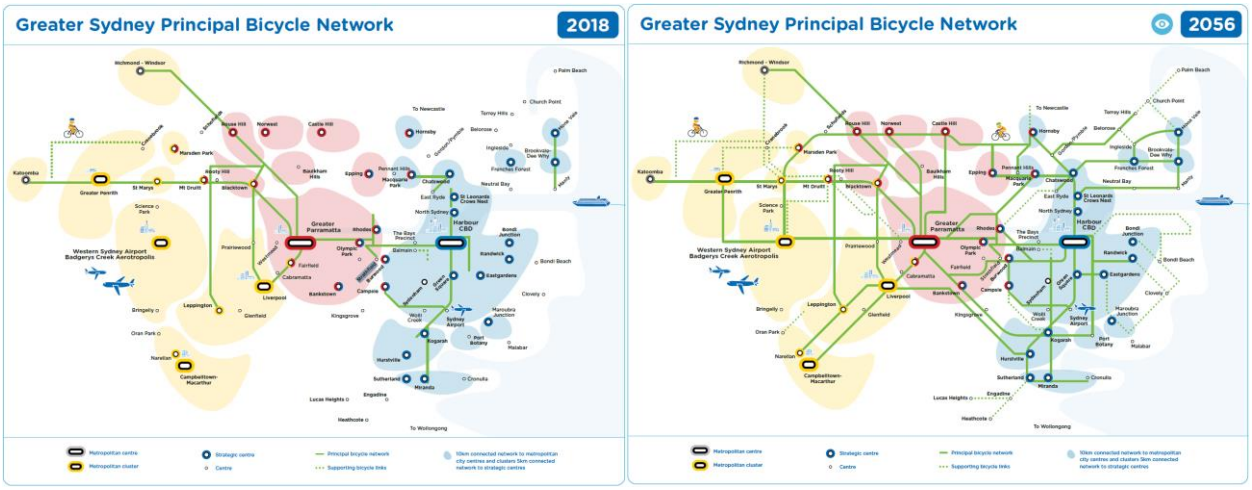
– Walking and cycling network coverage will be improved by using state-held corridors for public transport, pipelines, waterways, crown land and service easements for bicycle network infrastructure

– All strategic centres have connected walking and cycling networks, including strategic centres across the Western Parkland City

– Further investment in connections to strategic centres and the Principal Bicycle Network will support walking or cycling being the most convenient option for short trips, improving health outcomes, safety and convenience for customers as well as boosting the productivity, liveability and sustainability of Greater Sydney.

Figure 2-12 shows the current/committed Greater Sydney Bicycle Network alongside the envisioned 2056 Bicycle Network.

Figure 2-12 Current/committed and 2056 Greater Sydney Principal Bicycle Network



Source: https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Greater_Sydney_Services_Infrastructure_Plan.pdf (2018)

2.3.3 The Western Sydney Infrastructure Plan (WSIP)

The Western Sydney Infrastructure Plan (WSIP) is delivering major road infrastructure upgrades to support an integrated transport solution for the region and capitalise on the economic benefits of developing the Western Sydney Airport at Badgerys Creek. These high-quality road improvements will deliver significant, ongoing safety and congestion-relieving benefits for customers. The WSIP comprises the following projects, as shown in **Figure 2-13**:

– The Northern Road upgrade project will upgrade approximately 35 kilometres of The Northern Road to a minimum of 4 lanes between The Old Northern Road, Narellan and Jamison Road, South Penrith (completed in 2020)

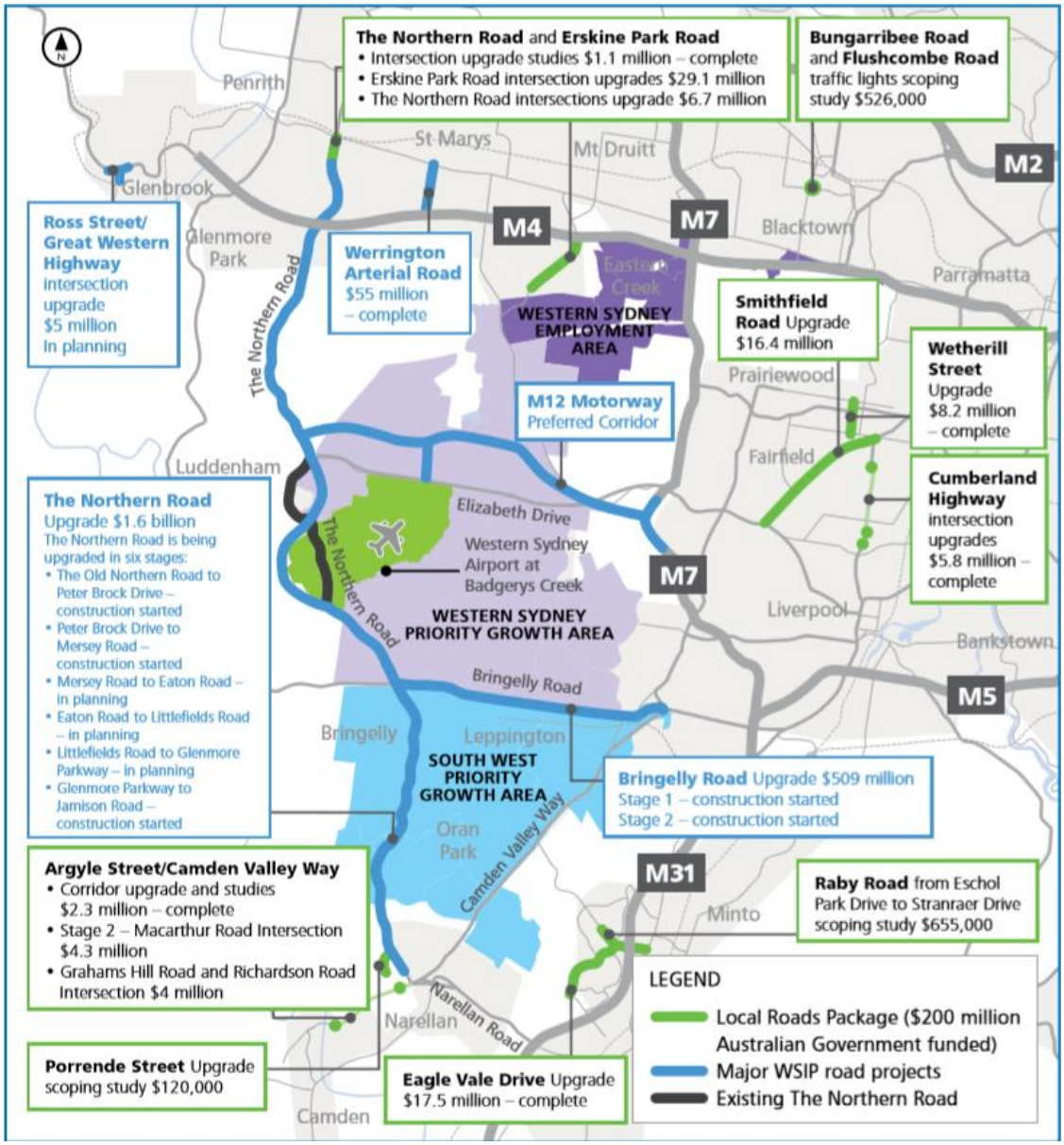
– The Bringelly Road upgrade involves the upgrade of approximately 10 kilometres of Bringelly Road between Camden Valley Way and The Northern Road (completed in 2020)

– The M12 Motorway project will provide an east-west link between the M7 Motorway and The Northern Road, while also providing a connection to the Western Sydney Airport

– The Local Roads package will enable a range of Western Sydney councils to complete minor road improvement works in the Western Sydney area.

The WSIP road upgrades, particularly The Northern Road and Bringelly Road upgrades, are expected to improve accessibility to the site and are further described in the following sections.

Figure 2-13 The Western Sydney Infrastructure Plan projects



Source: The NSW Government (2017)

2.3.4 Outer Sydney Orbital Corridor

TfNSW is currently identifying land for the Outer Sydney Orbital corridor, to be used to provide a future freight rail line and north-south motorway. It is planned to connect Box Hill in the north, and the Hume Motorway near Menangle in the south. The recommended corridor is designed to support the population, housing, freight requirements and job growth across Western Sydney.

In the future, there will be further investigations to identify land to enable the Outer Sydney Orbital to provide connections between the Illawarra and the Central Coast. This development may not commence construction for many years, however by identifying and protecting the land now stakeholders and the community will know exactly where the infrastructure will be built in the future.

Figure 2-14 Recommended Outer Sydney Orbital Corridor

Source: Transport for NSW, 2018

Implication for the site: The Outer Sydney Orbital travels approximately 2.5 kilometres to the west of the site and may have an interchange at Greendale Road, making it very convenient to access from/to the site. It could offer medium to long term benefits especially reducing traffic loadings on The Northern Road, especially the longer distance regional trips.

2.3.5 North-South Rail Link / The South-West Rail Link Extension

With the Western Sydney International (Nancy-Bird Walton) Airport and Aerotropolis at its centre, Western Sydney will have new economic and social opportunities, and be an exciting hub for new communities. The North-South Rail Line is a passenger rail line connecting St Marys with Macarthur, running from the Main West Line (T1 Western Line) to the Main South Line (T8 Airport and South Line). It will connect to the new Western Sydney Airport, Aerotropolis and surrounding business areas with the following key objectives:

– Provide a major transport link between the North West, Western Sydney, Greater Macarthur, and South West Priority Growth Areas

– Provide transport options to support the population, jobs, and economic growth across Western Sydney and for the planned Western Sydney Airport

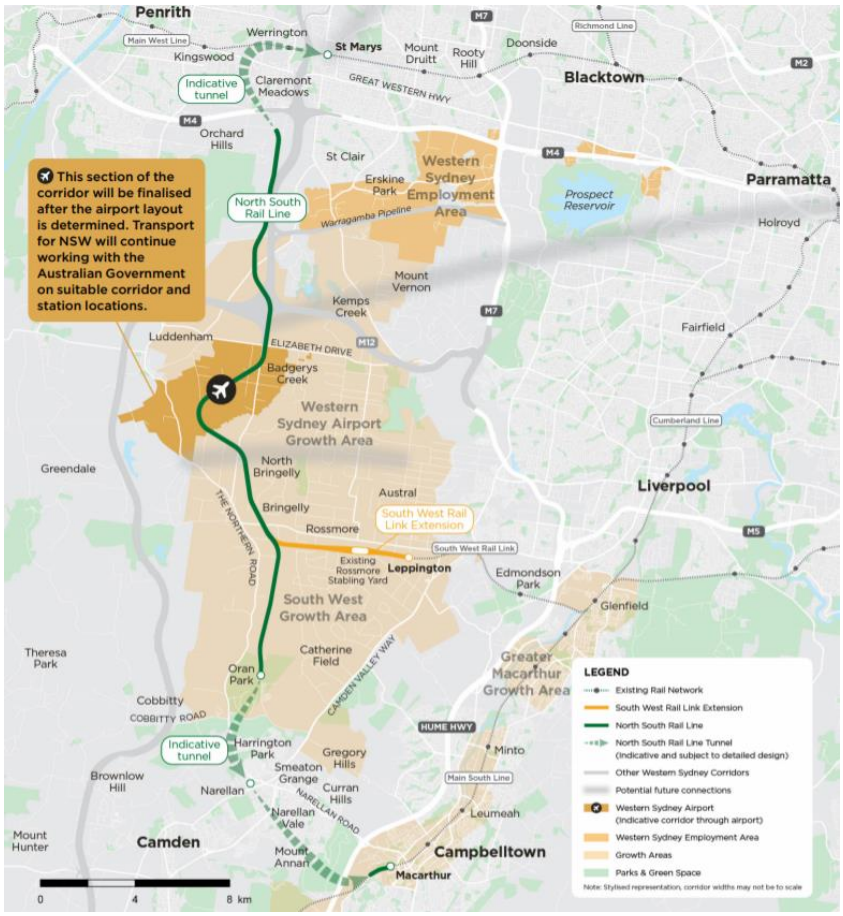
– Support future town centres to be designed and planned around transport infrastructure.

Over the next ten years, further impact assessments will be undertaken to allow the required infrastructure for the North-South Rail Link to be built. Currently, consultations are continuing to take place as part of future planning.

The South West Rail Link Extension Corridor project investigates how to provide transport infrastructure to support the proposed Western Sydney Airport and future urban development in Sydney's West. The proposed route is part of the Western Sydney Rail Needs Scoping Study and the initial plans for the route are to connect Leppington to Bringelly.

Figure 2-15 shows the map of the North-South Rail Link / The South West Rail Link Extension.

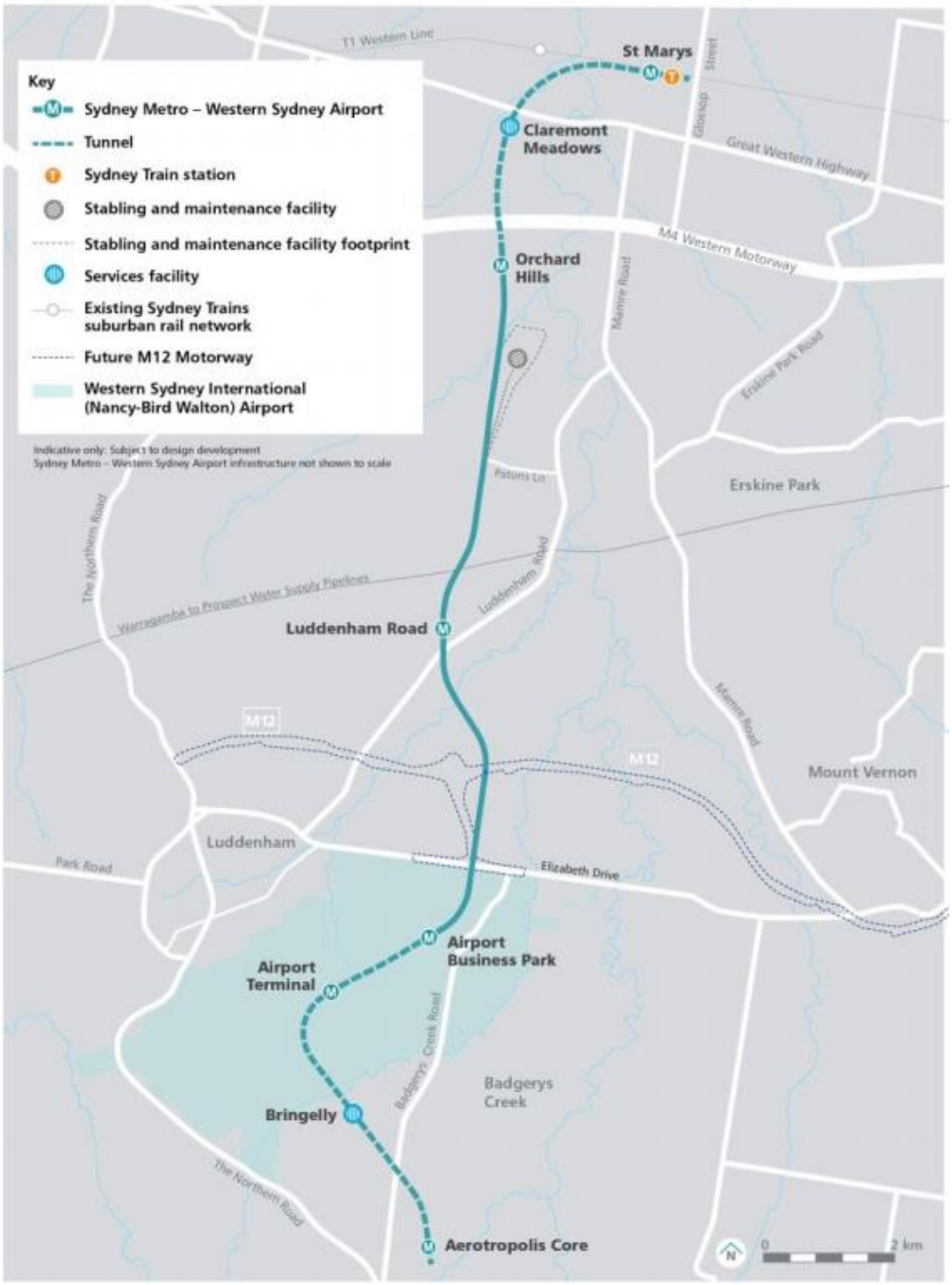
Figure 2-15 Planned North-South Rail Link and South-West Rail Link Extension



Source: Transport for NSW, 2020

The first stage of the project has been committed, named Sydney Metro - Western Sydney Airport between St Marys to Western Sydney Airport and Badgerys Creek Aerotropolis. The 23-kilometre railway line will be a combination of tunnel, surface, and viaduct sections. A total of six stations and two service facilities will be provided (**Figure 2-16**).

Figure 2-16 The alignment of Sydney Metro – Western Sydney Airport



Source: Environmental Impact Statement for Sydney Metro, Western Sydney Airport, 2020

Implication for the site: The rail link and potential stations in the vicinity of the site would improve rail access to the wider rail network of Greater Sydney, further reducing the reliance on private vehicles travel to the employment areas and activities.

3.0 Existing Conditions

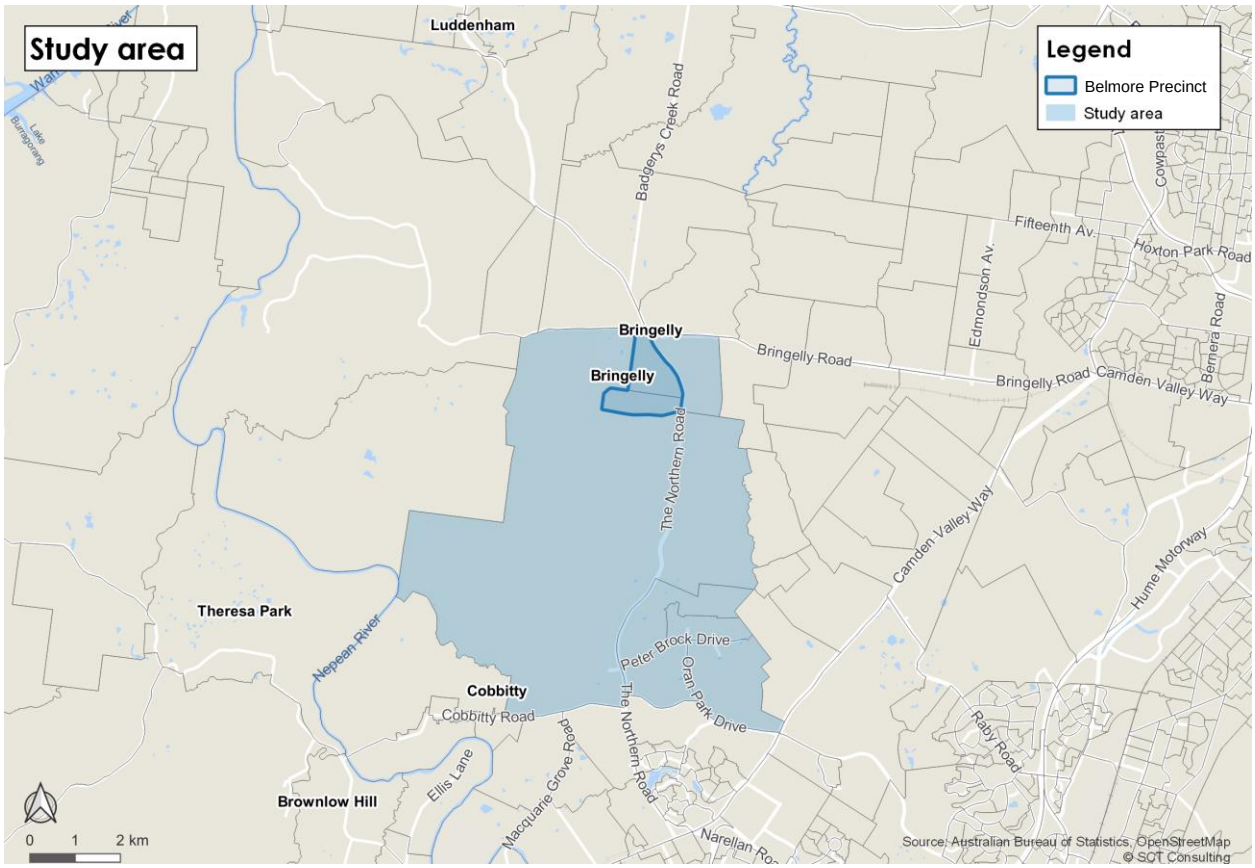
3.1 Travel behaviour

3.1.1 Method of Journey to Work data

Given the variability of the data in 2021 because of the COVID-19 lockdowns, the 2016 dataset is deemed as a more suitable measure for travel behaviour in Oran Park.

The 2016 Method of Journey to Work (JTW) data from relevant statistical areas level one including Oran Park were analysed to determine the travel behaviour of the existing residents in the vicinity of the site as shown in **Figure 3-1**.

Figure 3-1 Study area for the method of JTW analysis



At the time of the JTW data being collected in 2016, about 2,862 trip samples were included in the survey for the area. According to the Australian Bureau of Statistics, people in employment are those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit.

The study area showed a higher proportion of drivers, 72 per cent, in comparison to the 53 per cent of Greater Sydney, showing a high dependency on private car use. Train and bus usage was low at nine per cent given the commuting time to jobs by public transport, whereas Greater Sydney showed a total of 22 per cent. Active transport use was very low, i.e., zero per cent for cycling and one per cent for walking, given limited employment opportunities in the vicinity and the gap in cycling infrastructure provision to connect to the regional network. Around 20 per cent of the samples were working at home or other transport modes.

Of the 24,386 people who work in Camden Council Area, a large majority of workers (48 per cent) live in Camden LGA, followed by Campbelltown (17 per cent) and Wollondilly (14 per cent). Smaller origins include Liverpool (five per cent), and other origins across the Greater Sydney region each generating less than two per cent of work-related trips to Camden.

Around 30 per cent of the residents worked in the same Camden LGA followed by Campbelltown (16 per cent) and Liverpool (11 per cent). Other destinations of work-related trips were all below five per cent except the City of Sydney (seven per cent). Hence, the medium-long commuting distance to major employment tallies with the fact of high car use, which is convenient and cost-effective in the transport context.

3.1.2 Household Travel Survey

The proposed site sits within the statistical area "Bringelly – Green Valley" as defined by the Australian Bureau of Statistics, 2019 / 2020 Household Travel Survey (HTS) as shown in **Figure 3-2**. For analysis, it was assumed that HTS data provides a suitable reflection of the travel characteristics during AM and PM peak hour periods on an average weekday, due to the high proportion of trips during this period associated with the journey to work trips.

The data collected during the COVID-19 lockdown was not regarded as a suitable representation of the region's travel habits. Therefore, the 2019/2020 HTS dataset, which was prior to the COVID-19 lockdown, was used.

Figure 3-2 Study area for household travel survey analysis

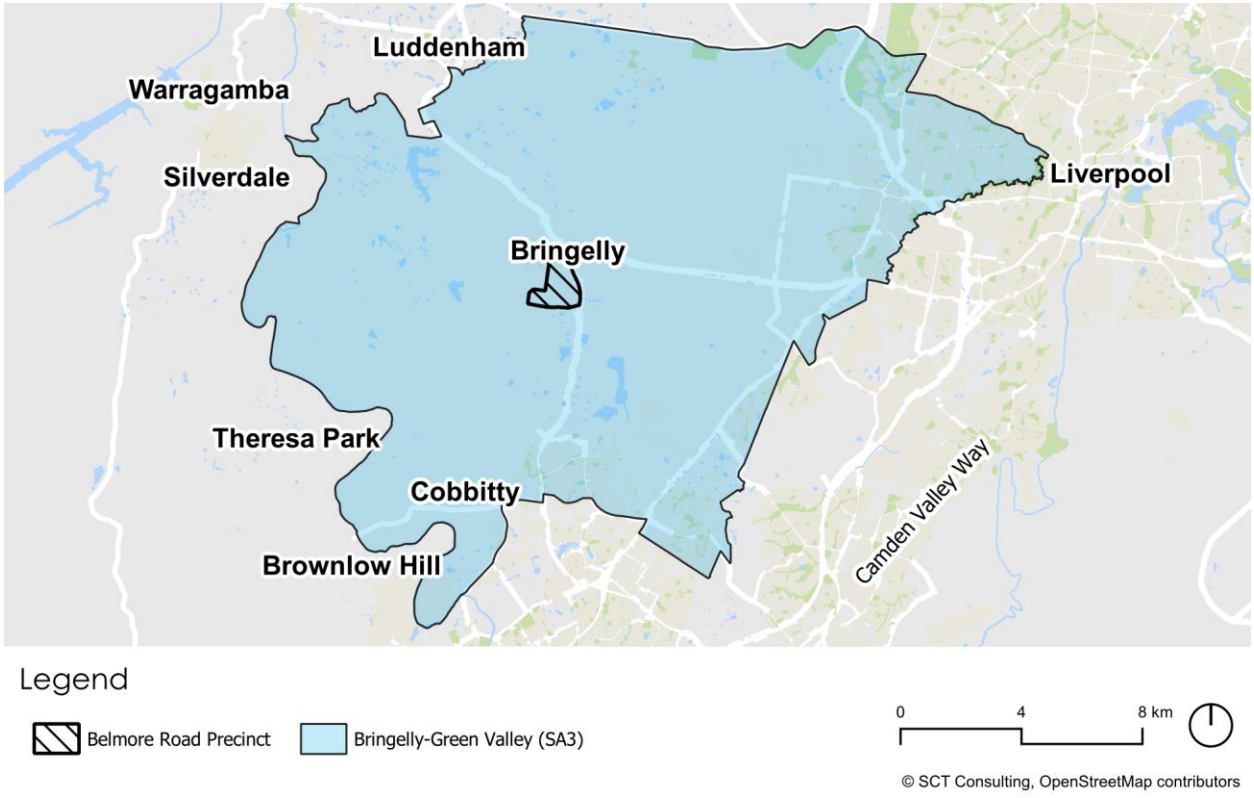


Table 3-1 and **Table 3-2** provide a summary of the overall mode choice and purpose of travel by residents of Bringelly – Green Valley against the Sydney average. The average travel distance for each category was also listed.

Table 3-1 Household travel survey – residents within Bringelly – Green Valley, travel by mode

Mode of travel	Bringelly – Green Valley		Greater Sydney	
	Percentage of total trips	Average distance	Percentage of total trips	Average distance
Vehicle Driver	51.1%	13.3 km	39.8%	9.9 km
Vehicle Passenger	29.4%	9.3 km	17.4%	8.1 km
Train	3.1%	26.5 km	5.7%	17.9 km
Bus	2.9%	9.1 km	4.8%	7.5 km
Walk Only	5.8%	0.5 km	14.8%	0.8 km
Walk Linked	6.5%	0.5 km	15.9%	0.6 km
Other	1.3%	5.3 km	1.6%	5.9 km
Total	100%	-	100%	-

Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts, 2020

The study area had more vehicle drivers and vehicle passengers at 51.1 per cent and 29.4 per cent compared to Greater Sydney's 39.8 per cent and 17.4 per cent. Higher vehicle occupancy was observed in the study area due to 12 per cent more vehicle passenger mode share. Comparatively, other modes of transport such as train and walking (both linked and unlinked) trips were close to half the Greater Sydney average due to the long distance to activities and low-density development and jobs. Additionally, the average distance travelled by train exceeded 25 kilometres, reflecting that destinations worth travelling to by train are further away than jobs that are accessible by car.

Table 3-2 Household travel survey – residents within Bringelly – Green Valley, travel by purpose

Trip purpose	Bringelly – Green Valley		Greater Sydney	
	Percentage of total trips	Average distance	Percentage of total trips	Average distance
Commute	15.1%	22.4 km	17.0%	15.7 km
Work-related business	10.1%	22.5 km	6.3%	16.4 km
Education/childcare	15.3%	7.8 km	10.0%	6.3 km
Shopping	9.4%	6.7 km	15.4%	5.5 km
Personal business	5.2%	8.4 km	5.5%	7.0 km
Social/recreation	19.8%	10.1 km	25.3%	8.4 km
Serve passenger	24.1%	8.0 km	18.2%	5.8 km
Other	1.0%	11.3 km	2.2%	4.7 km
Total	100%	-	100%	-

Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts, 2020

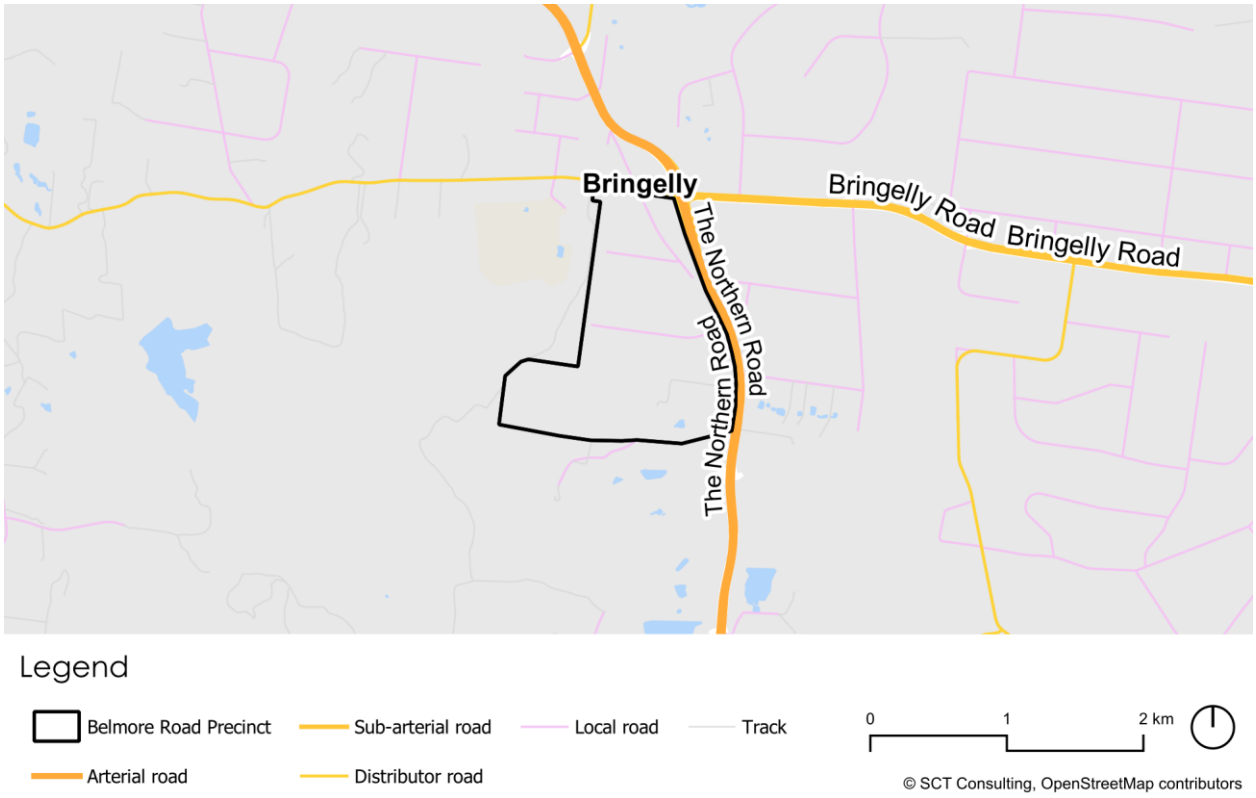
The main trip purpose in Bringelly – Green Valley was 'serve passengers' at 24.1 per cent, followed by social/recreation at 19.8 per cent. This is the exact opposite of the Greater Sydney average as social/recreation was the main trip purpose at 25.3 per cent, followed by serve passengers at 18.2 per cent.

The average distance travelled by all modes of transport and by trip purposes were both around 12.15 kilometres which was 39 per cent longer than Greater Sydney (8.7 kilometres). This can be attributed to the area's long distance to Sydney CBD, requiring residents to travel further to reach destinations. Trip purposes showed a further average distance travelled in comparison to Greater Sydney such as work-related business, which is related to jobs in Sydney CBD or other strategic centres. The low use of active transport also tallies with this increased distance.

3.2 Road network and classification

The major roads in the vicinity of the site include The Northern Road, Bringelly Road, Greendale Road, and Belmore Road. The road network is shown in **Figure 3-3**.

Figure 3-3 Road network around the site



The characteristics of the key road network, surrounding the subject site are:

– **The Northern Road**, managed by TfNSW, forms part of the A9 Western Sydney Bypass. It is an arterial road running adjacent to the east of the subject site and connects Narellan Road to the south through to the Great Western Highway to the north. The Northern Road provides direct access from the site through to the Western Sydney, SWGA and Western Sydney Airport at Badgerys Creek, north of the site. The site can access The Northern Road via Greendale Road, Loftus Road, and Belmore Road. The Northern Road has recently been upgraded by TfNSW from two lanes to a four-lane divided road (with dedicated bus lanes at intersection approaches). The provision of a wide median allows for six traffic lanes in the future. The Northern Road has a posted speed limit of 80 km/h. A dedicated off-road shared path runs along the eastern side of this corridor.

– **Bringelly Road** is a sub-arterial road, managed by TfNSW and connects The Northern Road at Bringelly, through to Camden Valley Way at Horningsea Park. It is approximately ten kilometres in length and was an undivided carriageway with one lane in each direction. Bringelly Road is now being upgraded from two lanes to a six-lane divided road between the eastern side of Upper Canal Bridge and the western side of the Eastwood Road Intersection, through the future Leppington Town Centre. The rest of Bringelly Road will also be upgraded from two lanes to a four-lane divided road with a central median. The speed limit varied from 40 km/h to 80 km/h depending on different land use along the road.

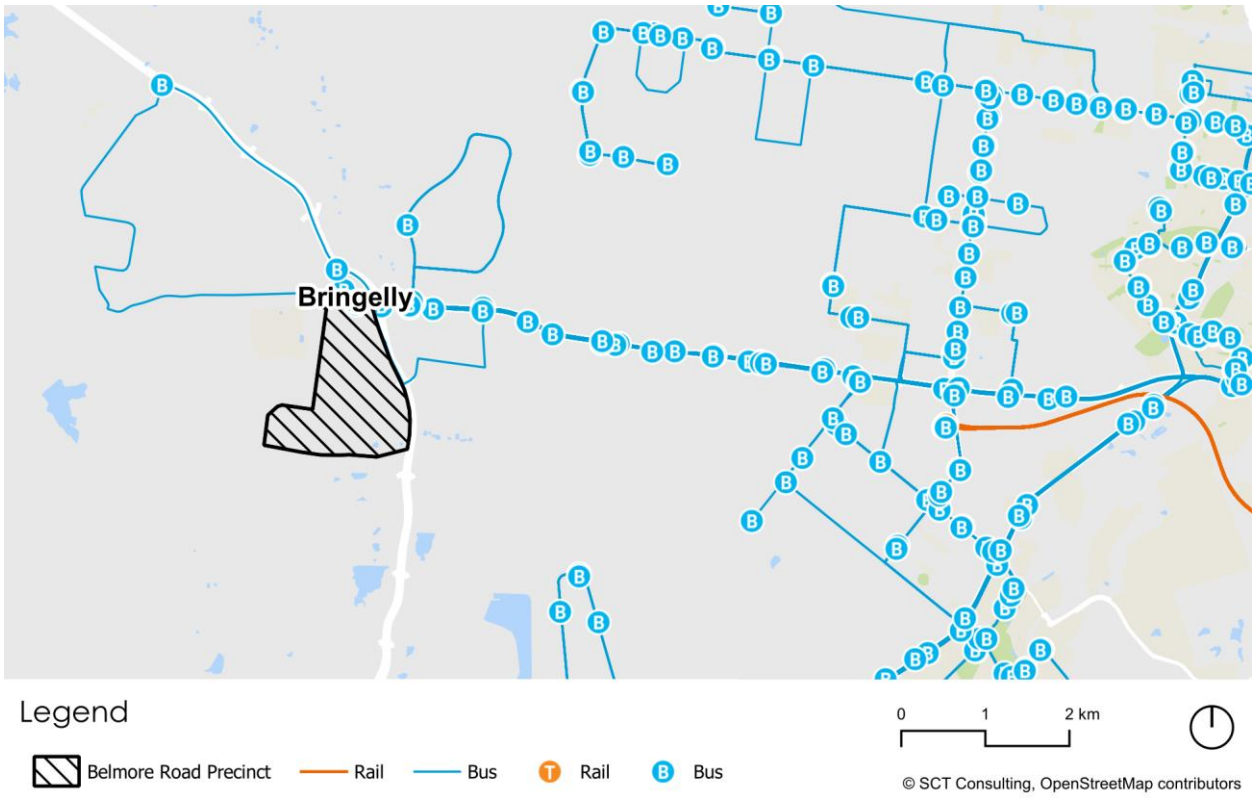
– **Greendale Road** is an undivided carriageway under the management of Liverpool City Council. It is 16 kilometres long and contains one lane in each direction with unsealed shoulders. It is a collector road that connects Park Road at Wallacia to Bringelly Road where it intersects with The Northern Road signalised intersection. Greendale Road typically has a sign posted speed limit of 80 km/h with residential precincts signposted at a 60 km/h speed limit.

– **Belmore Road** is a local road that mainly services residences and a local asphalt factory. It currently intersects The Northern Road as a roundabout but the intersection will be upgraded to a set of traffic signals as part of The Northern Road upgrade.

3.3 Public transport network

Public transport facilities around the site are shown in **Figure 3-4**.

Figure 3-4 Public transport around the site

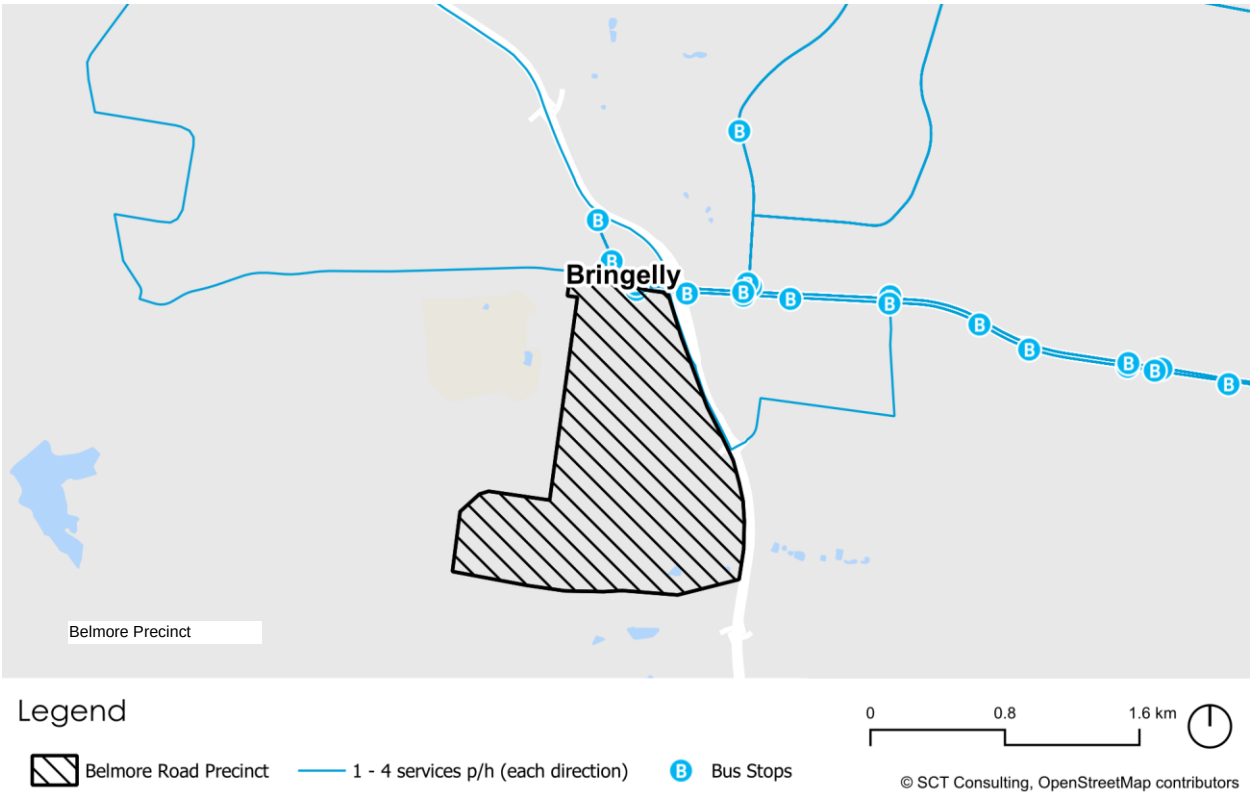


Leppington train station is the closest station (seven kilometres) from the site, which provides around seven services per hour during a typical morning peak hour. It is the terminal of T2 Inner West and Leppington Line and T5 Cumberland Line, which provide direct connectivity to several of Sydney's key commercial, and population centres including Liverpool, Parramatta, Strathfield, and Sydney CBD. The station provides new facilities, a park-and-ride service area and large commuter car parks.

There is bus route 856 on Bringelly Road and The Northern Road (north of the site), providing service between Bringelly to Liverpool via Leppington Station and Prestons. The frequency of the 856 buses is very low – about five to six services per day in each direction with most of the activity occurring during peak hours (**Figure 3-5**).

No other bus services operate on The Northern Road in proximity to the subject site. Public school students from Bringelly Public School and Rossmore Primary School are offered school bus services in the area.

Figure 3-5 Service frequency at the bus stops during a typical weekday AM peak hour



Based on the travel behaviour analysis of the study area identified in **Section 3.1**, due to the relatively long distance to major employment destinations and activities, public transport was not an attractive transport mode in the local area. The modal shift could take place when new development and public transport infrastructure are delivered in the vicinity.

3.4 Active transport

Given the rural nature and lack of urban development in the vicinity of the site, pedestrian and cycling accessibility are generally poor.

Concrete footpaths are available only on the north side of Greendale Road in proximity to the Bringelly Public School and Bringelly Community Centre and on the western side of The Northern Road in proximity to Bringelly Village shopping centre.

There are few cycling opportunities around the site as there are no cycleways along major roads. However, a dedicated off-road shared path will be running along the eastern side of The Northern Road corridor once the upgrade is completed.

Walking and cycling opportunities via dedicated infrastructure are currently very limited. However, the active transport mode share might increase after the delivery of the structure plan in the future and the connection to a wider cycle path network such as the shared path along The Northern Road.

4.0 The Planning Proposal

4.1 The Belmore Road Precinct

4.1.1 Principles and objectives

CKDI is creating and delivering market-leading, quality residential and commercial communities where Australians live and work. CKDI has identified future dwelling demand in key growth corridors across southwest Sydney – in relation to projected population growth and proximity to the Western Sydney International (Nancy-Bird Walton) Airport and the greater Aerotropolis.

This region is further supported by a range of significant infrastructure committed by all levels of government, including, The Northern Road upgrade, the M12 Motorway, and Sydney Metro Western Sydney Airport.

Three principles and objectives are driving the master planning process for the site undergoing a rezoning process, ensuring that they strictly align with the objectives.

Table 4-1 describes the principles and objectives of the development.

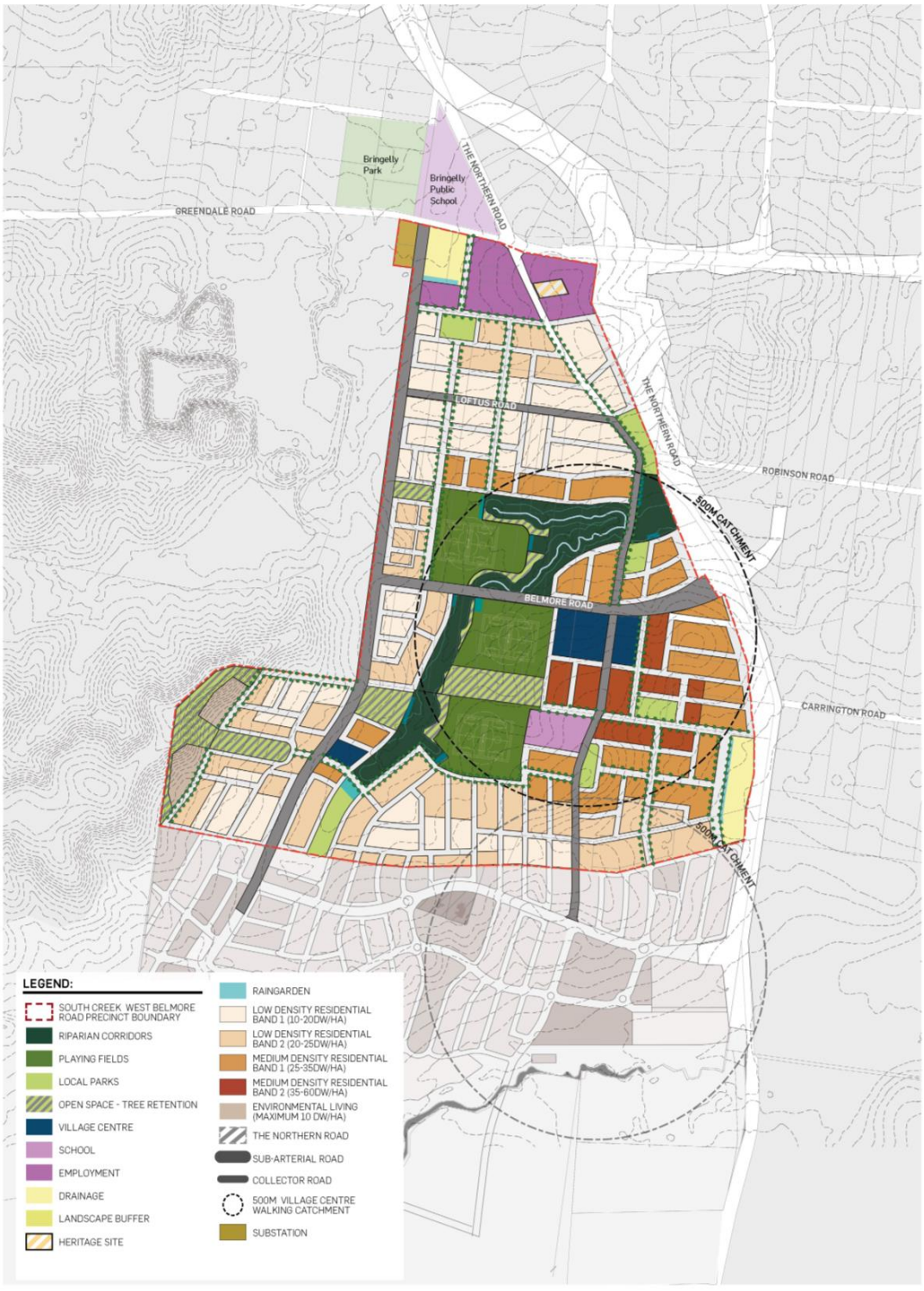
Table 4-1 Precinct principles and objectives

Precinct Objectives	Project Principles and Objectives	Project Delivery
Supporting residents with housing diversity and choices	– **Well-mixed products** to meet the various demand of home buyers. We are engaging market and economic consultants to closely monitor the housing demand in the area. – Commitment to delivering **affordable** land and housing products for more Australians to live in. – Enough **flexibility** in the design and master planning process to ensure the project can meet the future housing demand. Considerations will be given to the delivery timeframe of infrastructure and employment opportunities for the assessment of housing demand.	– A diverse mix of density lots to meet various housing demands. – Future-proofed master plans to allow flexibility to meet increasing housing demand. Consideration will be given to the proximity to employment opportunities within the aerotropolis, adjacent to the northern boundary.
Building and supporting an integrated community	– **Social infrastructure** within the master plan area to promote social interaction. – A **shopping and recreational precinct** with amenities to promote community engagement and connection. – Providing well-designed and high-quality residential precincts for workers from the Aerotropolis and Western Parkland City. – Recognising the cultural heritage of the area as it transitions to a new urban community.	– A school and an employment precinct to promote a sense of belonging. – A local centre to provide centralised shopping and amenities. – Enhance access to jobs and regional centres. – A network of open spaces to celebrate heritage (Indigenous and agricultural).
Supporting residents to live active and healthy lives	– **Open spaces** including walking trails and outdoor fitness facilities to promote an active lifestyle. – An **accessible** and well-connected community to enhance health and well-being through increased physical activity and greater social interaction. – Significant **tree canopy** coverage to contribute to the liveability of the urban community. – Use design and systems to enhance outdoor lifestyles.	– Open spaces located along the western edge and riparian areas to promote an active lifestyle. – Centrally located parks for easy access for all residents. – Resilient and integrated green and blue grids to connect open spaces and playing fields for more liveability. – High quality versus high quantity open spaces.

4.1.2 Proposed land use (Indicative Layout Plan)

An Indicative Layout Plan (ILP) has been developed to enable the development of appropriate controls such as zoning, floor space ratio (FSR), and a site-specific DCP as well as to provide a richer picture of how the site is proposed to be laid out. The ILP of the Belmore Road Precinct is provided in **Figure 4-1**.

Figure 4-1 The Belmore Road Precinct ILP



Source: Urbis, 2023

The Belmore Road Precinct is expected to cater for approximately 3,370 dwellings with a mix of low to high-density residential premises.

Key features of the Belmore Road Precinct ILP are:

– Connections and continuity to Lowes Creek Maryland precinct, providing a seamless interface to the proposal to the south, including land use and road network elements (including walking and cycling connections)

– A town centre at the centre of the site, minimising the travel distance of residents to their local shops and hence encouraging residents to access the shops via sustainable and active transport means

– A school integrated with local open space and the town centre

– A riparian corridor oriented diagonally through the middle of the precinct, that facilitates off-road shared paths across the majority of the precinct with several connections across to connect with the town centre, the school, the playing fields as well as The Northern Road

– Density clustered around the town centre and dissipated to the precinct's edges.

The yield of the Belmore Road Precinct is shown in **Table 4-2**.

Table 4-2 Proposed yield of the Belmore Road Precinct ILP (subject proposal)

Use	Yield[2]	Source
Low density residential	1,604 dwellings	Urbis revised final Rev H, dated 5 September 2023
Medium density residential	1,486 dwellings	
High density residential	280 dwellings	
School	1 primary school	
Supermarket	4,000 m^2 GFA	South Creek West Bringelly Precinct Retail Demand Analysis, May 2023
Speciality Retailers	2,450 m^2 GFA (including the 550 m^2 additional supportable floorspace to be provided in a very small centre)	
Local employment (gym, childcare, medical centre, service station, fast food)	1,600 m^2 GFA	

4.2 Proposed transport network

The proposed transport network needs to cater for the travel characteristics of the proposed land uses as well as integrate appropriately with the surrounding network.

Most trips leaving the Belmore Road Precinct are expected to be by private vehicle, so the most important interface for the precinct is with the existing road network. Further, a critical component of the Precinct Acceleration Protocol is the identification of the full set of infrastructure required to release the precinct - so an appropriately designed road network is critical to the success of the precinct.

4.2.1 Road network and hierarchy

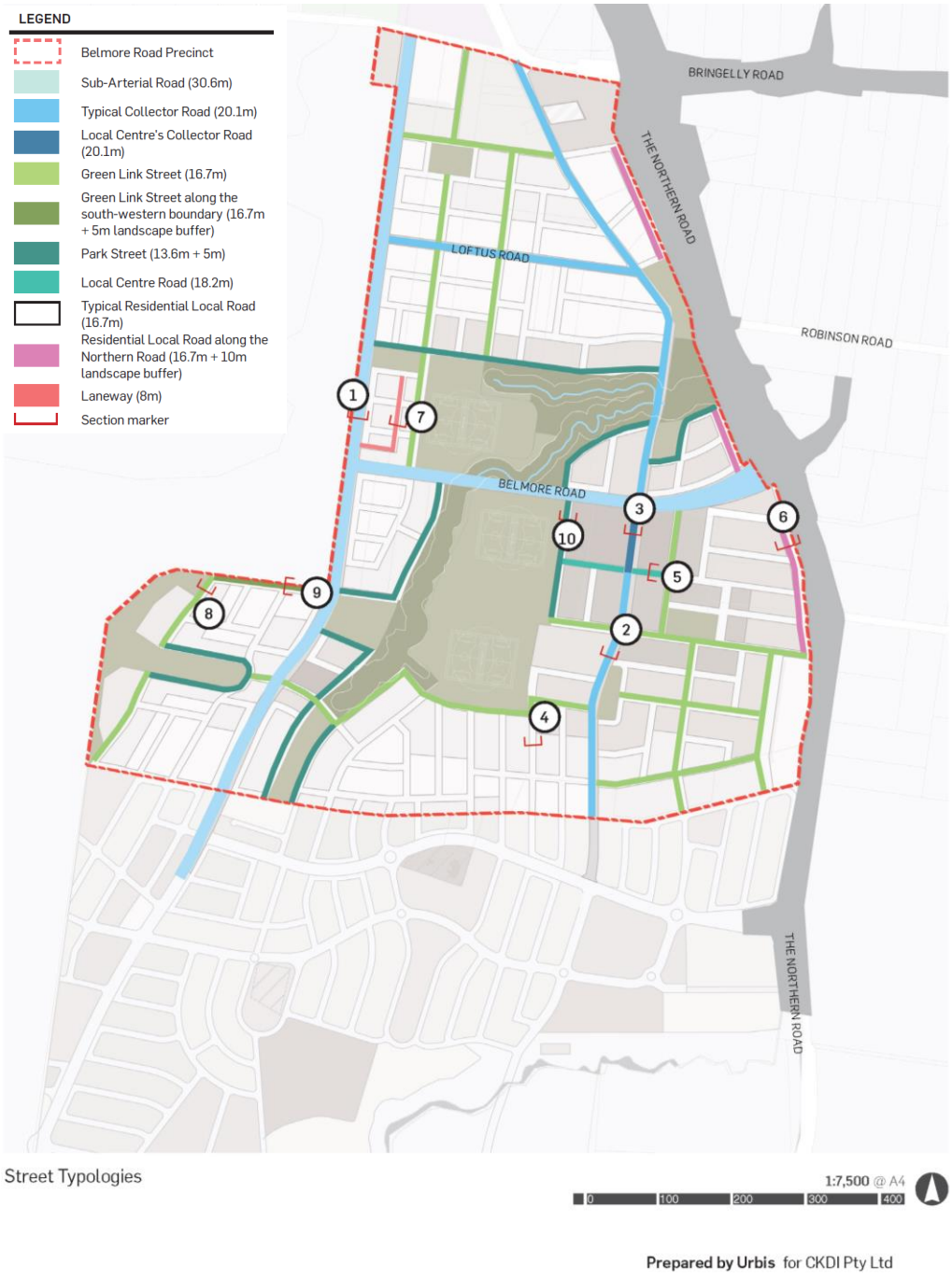
The Lowes Creek Maryland ILP identified a road network structure that extended beyond the precinct but connected to Bringelly Road / Greendale Road and further south towards the Oran Park precinct. The Belmore Road Precinct ILP proposes to continue these two north-south connections as they form legible alternatives to The Northern Road for travel between precincts as well as ensuring that vehicles can access the main intersections along The Northern Road.

The Northern Road upgrade has already identified several intersection works that have recently been constructed along with the corridor interfacing with the South Creek West Release Area, so the main role of the Belmore Road Precinct ILP is to connect effectively with these intersections with the right hierarchy roads.

[2] It is noted that the yields are the best and most realistic estimates at the time of preparing this version of the ILP and will continue to evolve as the ILP develops. Updates to the yield post and modelling of the maximum development potential will occur post gateway.

Figure 4-2 below shows the future road network proposed as part of the Belmore Road Precinct ILP, focusing on sub-arterial and collector roads.

Figure 4-2 Proposed road network



Source: Urbis, 2023

Key features of the road network are:

– A north-south sub-arterial road at the western end of the precinct that connects from the northern end of the Belmore Road Precinct at Greendale Road through Lowes Creek Maryland precinct to Oran Park and provides an alternative to The Northern Road south of Bringelly Road.

– An east-west sub-arterial along Belmore Road as a branch from the north-south arterial road to provide a direct connection to The Northern Road.

– A north-south collector road that bisects the precincts between the sub-arterial road and The Northern Road, enabling efficient distribution between all three north-south routes, especially for the local trips. This north-south collector road also provides direct connection to the local neighbourhood centre and the school.

– Local roads divide up the blocks between the sub-arterial and collector roads.

It should be noted that in previous iterations of the ILP, a local road was proposed north of the school that crosses the open space and ovals and connects between the two north-south road corridors. This local road connection is no longer provided across the open space and ovals to minimise traffic along this road near the school and also improve pedestrian and cyclist connectivity and safety to the school, the open space and ovals. The land uses surrounding the town centre, school, open space and ovals as well as the residential areas are still well-serviced by the local street network that connects with the collector and sub-arterial road systems of the precinct.

4.2.2 Proposed cross-section requirements

Cross-sections for the sub-arterial, collector and local roads are informed by the LCM proposed sections. Draft precinct-specific cross-sections are to be prepared for the Belmore Road Precinct and are to be included in the draft site-specific DCP.

Lowes Creek Maryland precinct does not have a cross-section for a sub-arterial road, however, the road reserve width for Maryland Entry Avenue is similar in width to a typical sub-arterial road. A 29.1 m road reserve is proposed based on the Camden Growth Centres DCP. The proposed cross-sections for sub-arterial roads in Belmore Road Precinct are 30.6m wide, that allows for bus-capable travel lanes and segregated shared paths on both sides of the road, which supports public transport, walking and cycling access. The proposed cross-section is shown in **Figure 4-3**.

Figure 4-3 Proposed sub-arterial road cross-section

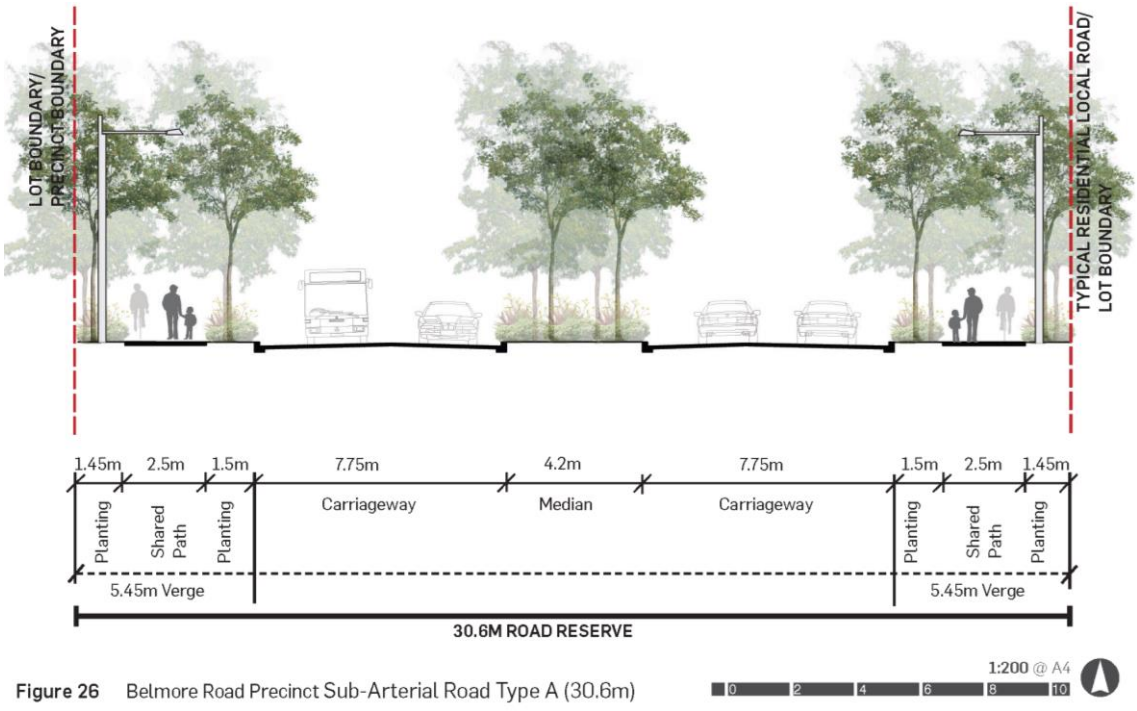


Figure 26 Belmore Road Precinct Sub-Arterial Road Type A (30.6m)

Source: Urbis, 2023

The proposed cross-sections for collector roads in Belmore Road Precinct are 20.1m wide, that is shown in **Figure 4-4** below. The width allows for bus-capable travel lanes and shared paths on both sides of the road, which supports public transport, walking and cycling access.

A slight variation of the collector road is proposed at the local neighbourhood centre with a 2.2m flex zone for on-street parking (compared to 2.1m along the typical collector road section).

Figure 4-4 Proposed collector road cross-section

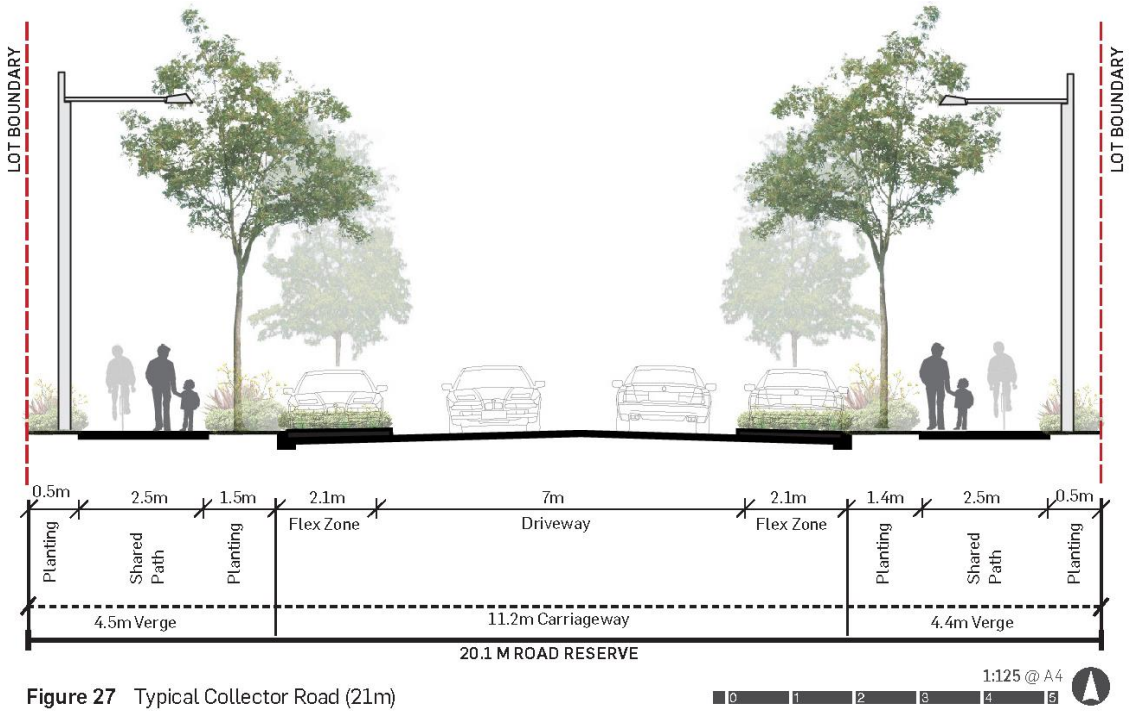


Figure 27 Typical Collector Road (21m)

Source: Urbis, 2023

The proposed cross-sections for local roads in Belmore Road Precinct are 16.7m wide, that is shown in **Figure 4-5** below. The width allows for two-way traffic with on-street parking and pedestrian paths on both sides of the road, which supports walking and cycling access.

A variation of the local road is proposed at the local neighbourhood centre with a slightly wider carriageway of 7m that would also allow bus travel. Then a 10m landscape buffer is added to the typical local residential road along the eastern boundary to mitigate noise impact from the Northern Road.

Figure 4-5 Proposed local road cross-section

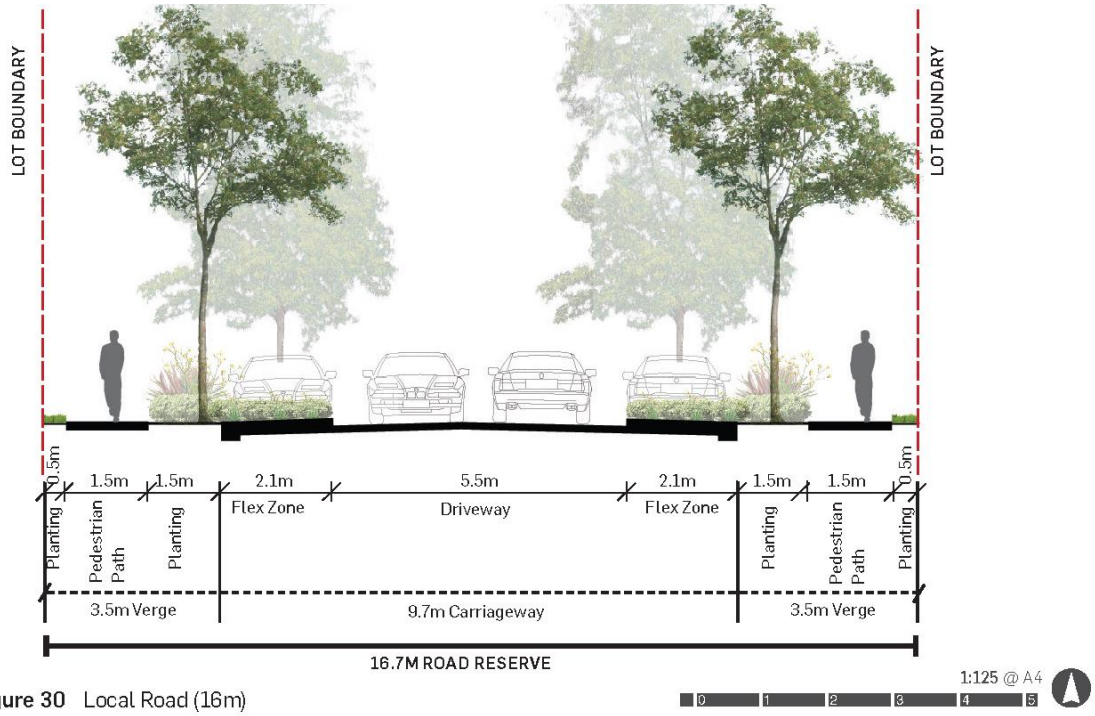


Figure 30 Local Road (16m)

Source: Urbis, 2023

A number of local streets near the open space at the south western boundary of the precinct is proposed as Green Link Streets that is a slight variation to the local streets with a shared path and a wider verge on one side of these streets, with improved amenity for pedestrians and cyclists.

Figure 4-6 Proposed green link street cross-section

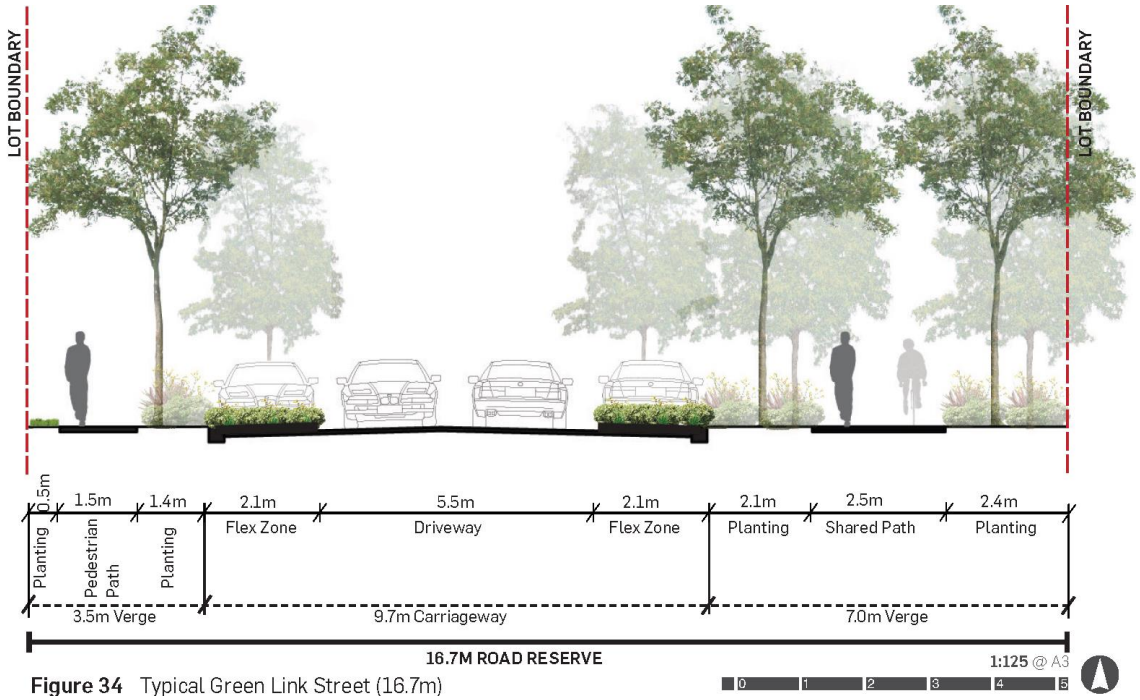


Figure 34 Typical Green Link Street (16.7m)

Source: Urbis, 2023

4.2.3 Public transport network

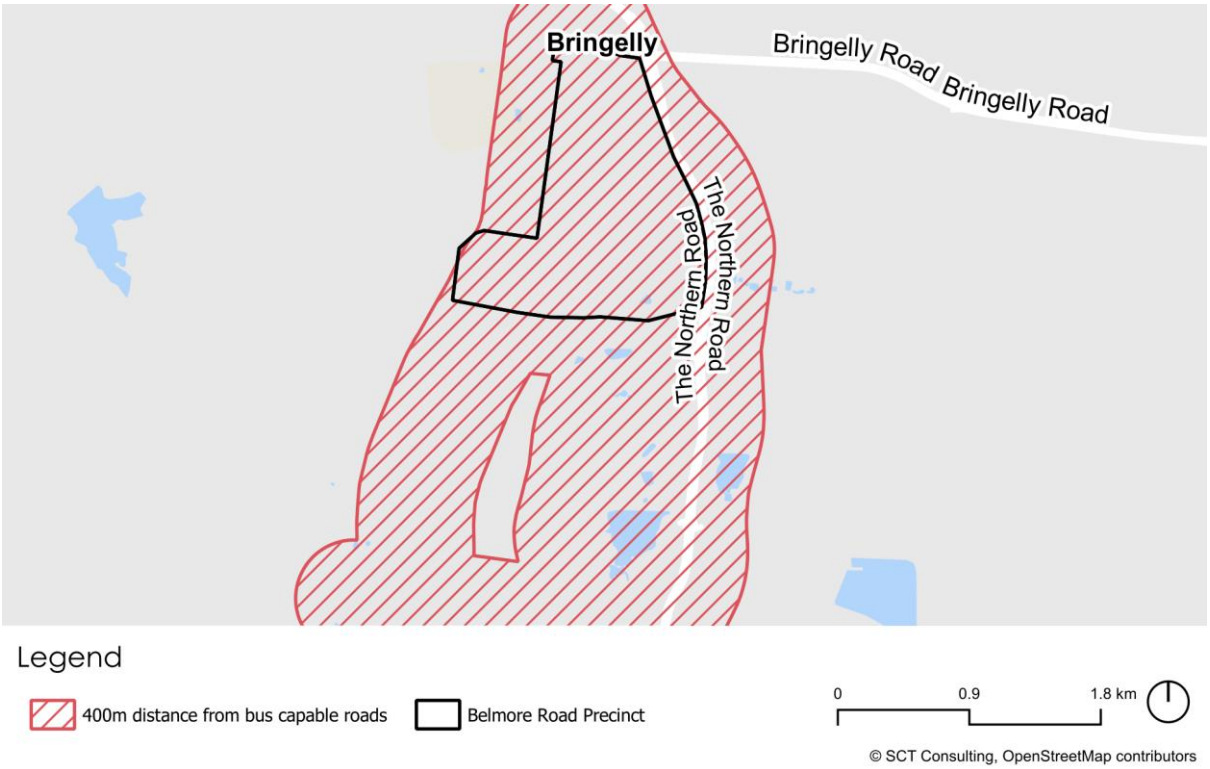
The bus network that would service the Belmore Road Precinct is not able to be resolved at this time due to the concurrent planning processes for Western Sydney Airport, the Aerotropolis, Sydney Metro – Western Sydney Airport as well as other land use changes and transport projects. Each of these projects has implications for the bus network at a strategic level, changing key destinations, route options and types of bus services required.

The critical contribution of this proposal is to maximise the potential for buses to service the precinct to ensure integration with any potential future schemes. The entirety of the sub-arterial, and collector road network is proposed to be bus-capable, ensuring full integration with any future scheme.

Figure 4-7 shows a 400 m distance from all bus-capable roads – demonstrating that the entirety of the residential areas in the precinct is within 400 m of a potential route.

The network is also in a grid-like fashion, with the sub-arterial and collector roads forming north-south and east-west access ways. This enables higher-order bus routes, such as suburban bus routes, to operate efficiently within the precinct.

Figure 4-7 Bus network coverage



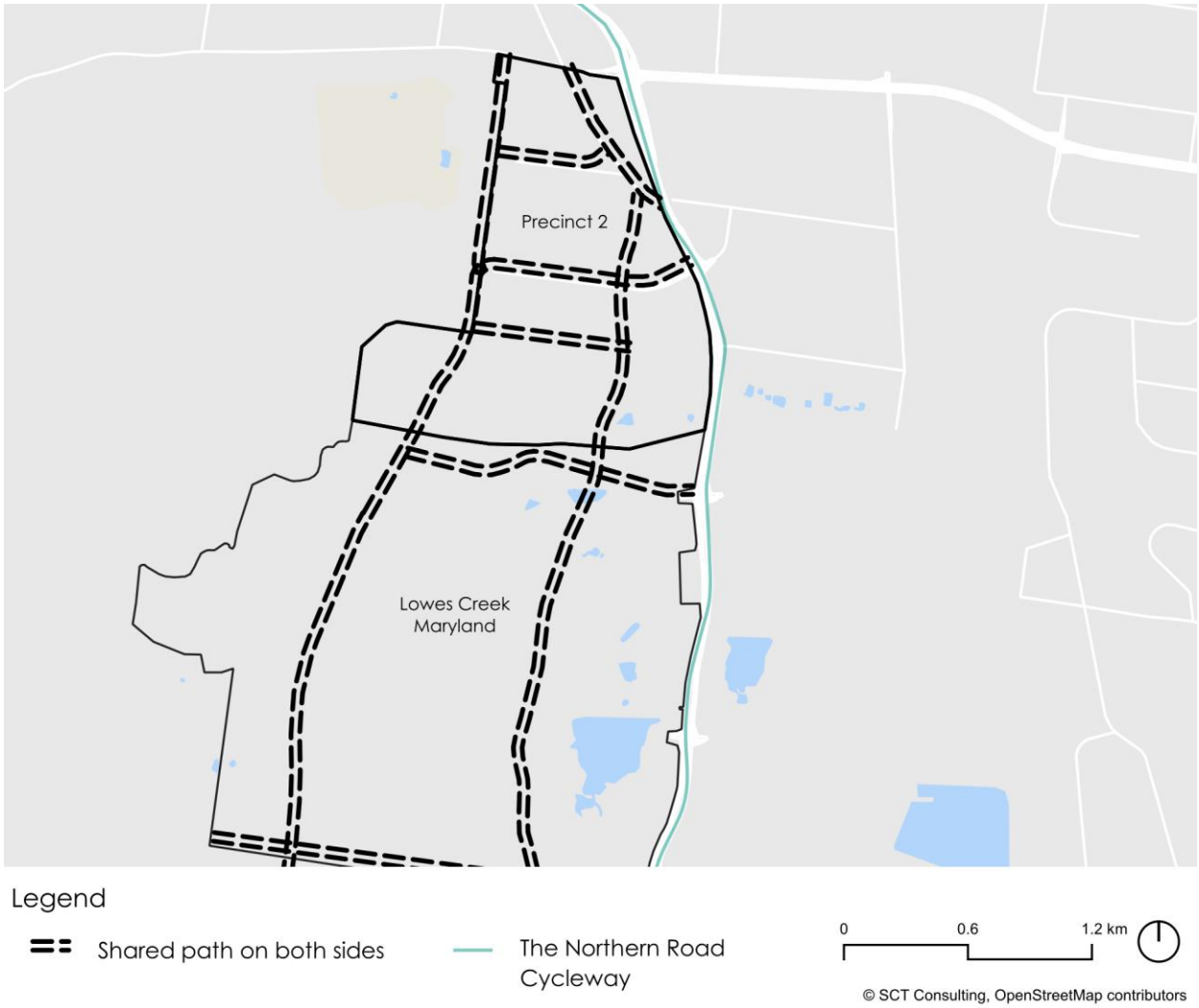
4.2.4 Active transport network

As the precinct is being designed from a blank slate, there are extensive opportunities for high-quality walking and cycling facilities.

All the roads proposed in the precinct will have footpaths on both sides. The sub-arterial and collector roads are also proposed to have shared paths on both sides.

When paired with the shared path proposed on the eastern side of The Northern Road, cycling provision is extensive within the precinct. **Figure 4-8** shows the proposed cycle network.

Figure 4-8 Proposed cycle network



Source: © OpenStreetMap contributors, TfNSW Cycle Data, SCT Consulting, 2020

The grid-like cycling network enables cyclists to have high-quality facilities for longer-distance trips, including connecting to the town centre.

4.3 Travel Demand Management measures

Sustainable transport and Travel Demand Management (TDM) strategies involve the application of policies, objectives, measures and targets to influence travel behaviour, to encourage the uptake of sustainable forms of transport, i.e. non-car modes, wherever possible. TDM measures have proven to reduce congestion created by growth within urban areas and unlock urban renewal opportunities. They result in travel behaviour that uses less road space than single-occupant vehicle commutes and takes advantage of spare transport capacity outside the morning and afternoon peaks.

TDM strategies generally guide all relevant customers (residents, employees and visitors) in changing their travel behaviour in the following ways:

– Reduce travel

– Re-mode (consideration of travel via alternative modes)

– Re-time (consideration of travel at alternative times)

– Re-route.

A Travel Plan should be developed and monitored for the Belmore Road Precinct to deliver best-practice travel programs and initiatives to manage travel demand for the proposed development. Key initiatives and measures could be developed to:

– Reduce the need to travel

  - Planning for a range of uses is to be provided or integrated into the development to provide a range of services in a single location to maximise trip containment within or in the proximity of the site and encourage the use of active transport (walking and cycling) for short trips.
  - Encourage the use of the internet to reduce the need to travel such as Australia Post, parcel drop-off /pick-up facilities.
  - Encourage the use of the internet and technology to facilitate remote working via smart work hubs with high-quality facilities or working from home.
  - Develop and encourage the use of carpooling for wider precincts and communities.

– Re-think the mode of travel

  - Walking and cycling:
    - A highly permeable and safe pedestrian network throughout the development.
    - Dedicated cycle routes that connect to the regional routes and major transport hubs.
    - Key design principles to integrate walking and cycling networks and facilities into the planning and delivery of the development.
    - High quality, safe and accessible end-of-trip facilities (centralised cycle hubs that are integrated within the development at convenient locations, on-street secure bicycle storage located conveniently at end-of-cycle destinations, parking hubs for shared bikes, lockers, and showers).
    - Free bicycles for residents, employees, and visitors to travel within the site and nearby transport interchanges (to be agreed upon with Councils and TfNSW).
    - Promotion of bicycle initiatives – NSW bicycle week, cycle to work day, free bike check-up events.
    - Establishment of a Bicycle User / Consultation Group.
    - ‘Cycle Update’ newsletter.
  - Public transport:
    - Reimbursement of public transport costs such as giving out Opal cards with credits.
    - Early provision of frequent public transport services to establish a non-car travel behaviour.
    - Good quality public transport stops in the vicinity of the development.
    - Tailored information with clear mapping and walking catchments at public transport stop.
    - Provision of public transport information from home via television channel or community app.

- Parking measures to encourage alternative modes of travel:
    - Reduced parking rates with flexibility in parking arrangements such as decoupled parking and shared vehicle parking to accommodate the parking needs of all residents.
    - Parking spaces/stations dedicated to electric vehicles, with charging stations.
    - Parking spaces dedicated to car-share schemes and community car-share vehicles, both on-street and incorporated in easily accessed public car parks.

– Re-time and Re-route journeys:

- Development of specific community app/community engagement program to enable changing travel behaviour which includes:
    - Active and public transport maps
    - Personalised journey planner
    - Notifications of the latest travel information
    - Shared vehicles information
    - Car-pooling opportunities
    - Other precinct-related information
- Real-time information embedded into development and public transport stops.
- Employers to promote and encourage flexible working hours and arrangements.

While it is important to develop a Travel Plan that is aimed at managing travel demand and reducing reliance on car travel, it is more important to monitor and evaluate the effectiveness of individual measures and the need to adjust the measures. The planning and implementation of a targeted Travel Plan with the above green travel initiatives/principles for the Belmore Road Precinct will provide significant opportunities for alternative travel options and reduce the need for car travel.

5.0 Traffic and Transport Impact Appraisal

5.1 Overview

The purpose of this analysis is to assess the impact that the upcoming developments, including those from surrounding precincts, will have on the performance of the road network. The analysis did this by using the 2036 and 2041 Strategic Traffic Forecasting Model (STFM). It used the models to obtain future year base volumes as well as to distribute development traffic in accordance with transport's travel assumptions. The core land use assumptions in the STFM differed from the proposed precinct land uses. Therefore, the methodology aims to update the land use assumptions by manually adding the missing dwelling trips from the updated precinct yields.

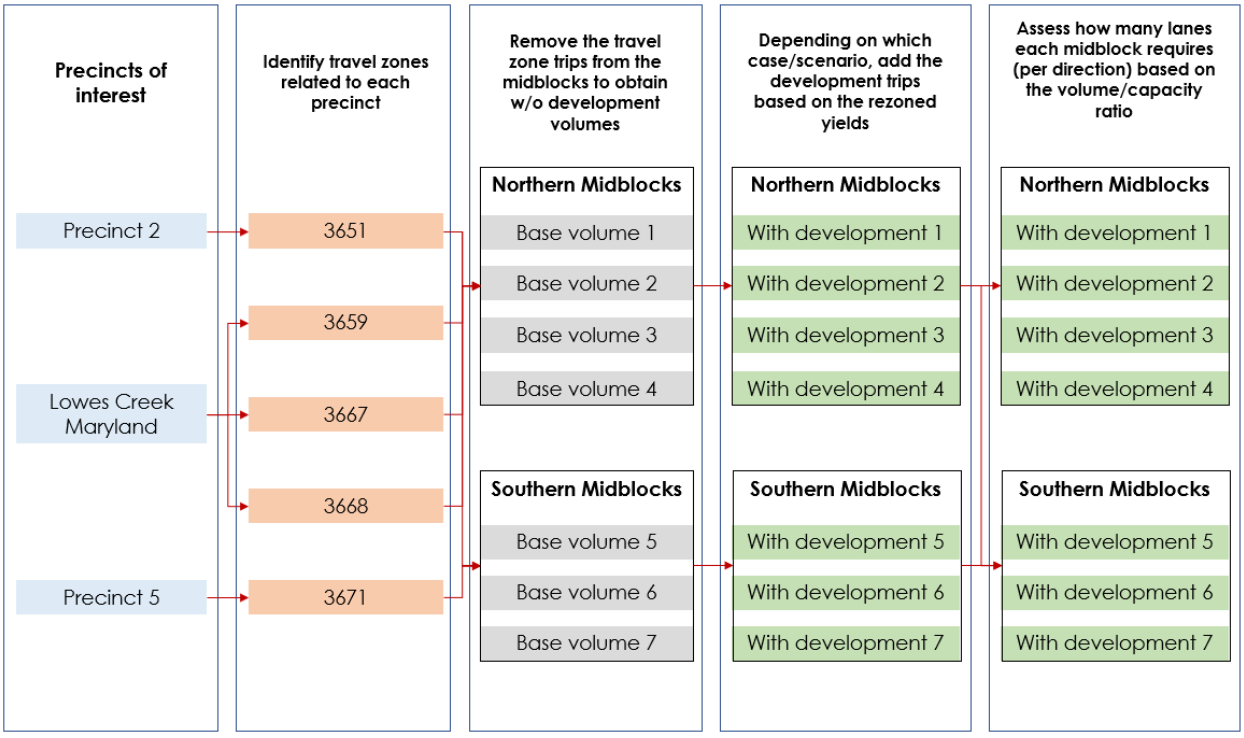
This approach was agreed upon with TfNSW prior to commencement via a model scoping note, which is provided in **Appendix A**.

5.2 Methodology

Pre-gateway scoping discussions with Transport for NSW confirmed that initial strategic model runs were desired before Gateway Determination, with more detailed modelling following. The modelling methodology was developed in collaboration with TfNSW. This modelling approach uses the STFM strategic model and focuses analysis on the overall network capacity.

A detailed breakdown of the methodology is shown in Figure 5-1.

Figure 5-1 Overview of Methodology



Source: SCT Consulting, 2023

Currently, STFM excludes the newly planned precinct developments from its trip generation assumptions and therefore, the traffic volumes shown on the STFM are lower than what is proposed.

As a starting point, the traffic generated from the three precincts was stripped from the STFM road network using the select link analysis data (SLA); this data provides the exact number of trips from a travel zone to the road links in the road network.

The traffic from these zones was subtracted from the total STFM trips to provide the raw link volumes without the existence of any development in the three precincts.

Six development scenarios were prepared per **Table 5-1**. These scenarios determined which development trips, calculated using the updated precinct yields (**Table 5-3**), were added to the raw volumes.

Table 5-1 Modelling Scenarios

Modelling scenario		TfNSW base case network assumptions	Land Use Assumptions			
			TfNSW base case land use assumptions	LCM Precinct	Precinct 2 (subject precinct)	Precinct 5
1	2041 Base Case	✓	✓	✓		
2	2041 Base Case + Precinct 2	✓	✓	✓	✓	
3	2041 Base Case + Precinct 2 and Precinct 5 (cumulative)	✓	✓	✓	✓	✓
4	2036 Base Case	✓	✓	✓		
5	2036 Base Case + Precinct 2	✓	✓	✓	✓ (70% of Precinct 2 development)	
6	2036 Base Case + Precinct 2 and Precinct 5 (cumulative)	✓	✓	✓	✓ (70% of Precinct 2 development)	✓ (70% of Precinct 5 development)

The purpose of each of the scenarios is as follows:

– Scenarios #1 and #4 provide a land use and transport baseline to assess the net impacts of the proposed land use changes of the Belmore Road Precinct. Hence the land use of SCW Precinct should include the approved residential and employment targets in the DPE forecasts minus those in Precinct 2.

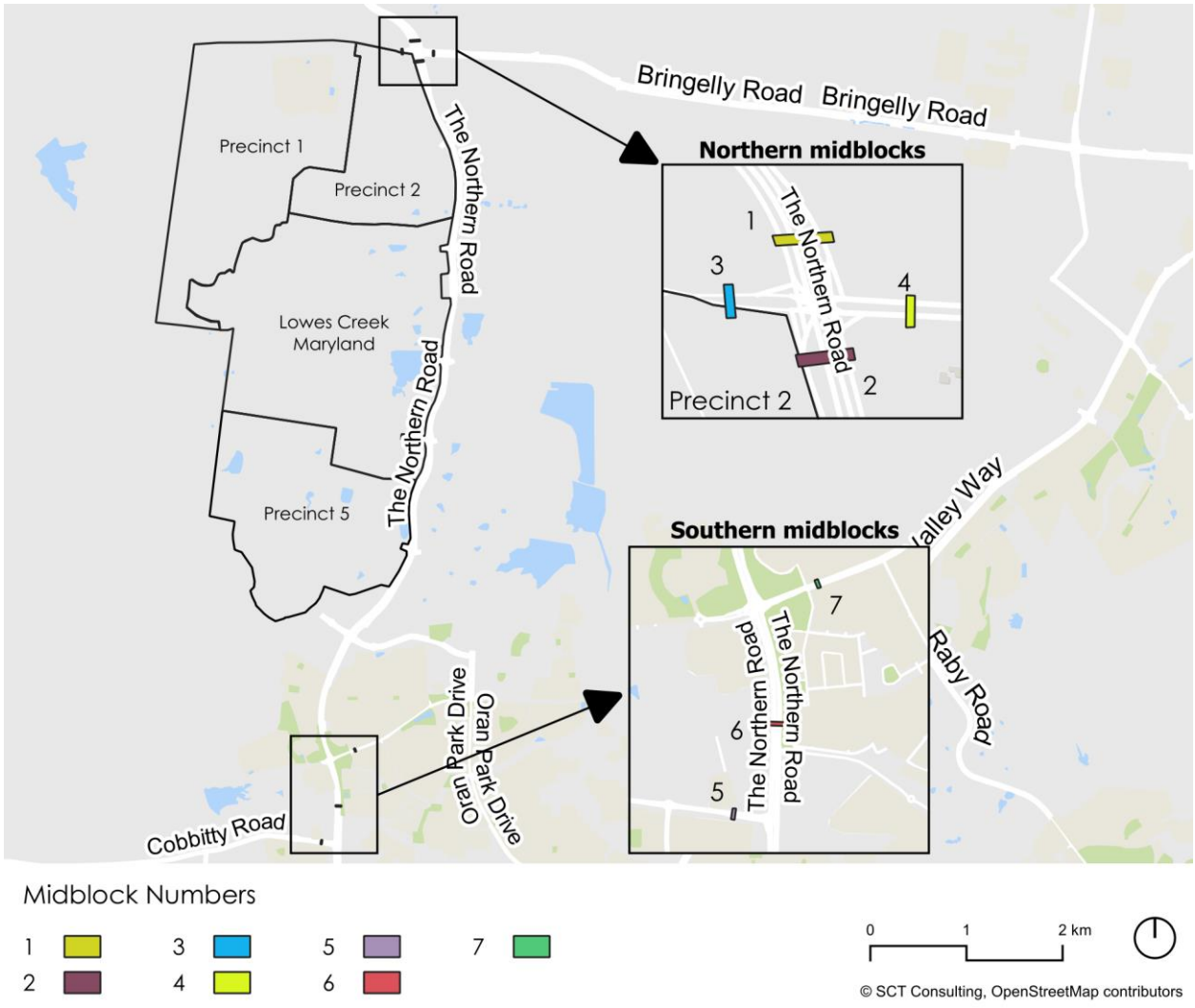
– Scenarios #2 and #5 when compared with Scenarios #1 and #4 respectively would specifically evaluate the impacts of the proposed land use change of the Belmore Road Precinct.

– Scenarios #3 and #6 were specifically requested by TfNSW in an email dated 1 December 2022 that the impacts of the proposed land use change of the Belmore Road Precinct are to be considered cumulative to the impacts of Precinct 5.

Seven locations along the road network were selected for the volume-to-capacity analysis. These locations are along the main movement corridors in the region and are expected to be heavily impacted by subject development.

The assessment will aim to ascertain whether the link requires upgrading at different stages in the development procedure (e.g. from two lanes to three). As a conservative assumption, the upgrade threshold for the analysis was 0.95 volume-to-capacity ratio (95% of capacity).

Figure 5-2 Midblock locations



5.3 Assumptions

5.3.1 Trip generation and distribution

The agreed traffic generation rates for the development are shown in **Table 5-2**. Based on these rates, a total trip count was calculated for each precinct and divided equally between its related travel zones. The total trip generation of the Belmore Precinct is approximately 3,200 peak hours trips.

The select link analysis volumes on each road were converted into percentages of the total volumes that enter and exit the travel zone. These percentages acted as the distribution of the total trips calculated.

Table 5-2 Agreed trip generation rates for the SCW Precincts

Proposed land use	AM peak hour (In / Out proportion)	PM peak hour (In / Out proportion)	Trip generation rate source
Residential	0.87 / dwelling (20% / 80%)	0.87 / dwelling (80% / 20%)	Guide to Traffic Generating Developments - Updated traffic surveys (TDT 2013/04a
Non-residential including a supermarket and specialty retail	7.76 per 100 m^2 GLFA (50% / 50%)	10.41 / 100 m^2 GLFA (50% / 50%)	Page 11 of the 2018 RMS Trip Generation Surveys Small Shopping Centres Analysis Report
Primary school	0.67 / student (60% / 40%)	0 / student	Table 4-3 of the RMS Trip Generation Surveys, Schools Analysis Report 2014
High school	0.51 / student (60% / 40%)	0 / student	Table 4-4 of the RMS Trip Generation Surveys, Schools Analysis Report 2014

5.3.2 Cumulative growth

The assumed yields for each precinct are summarised in **Table 5-3**.

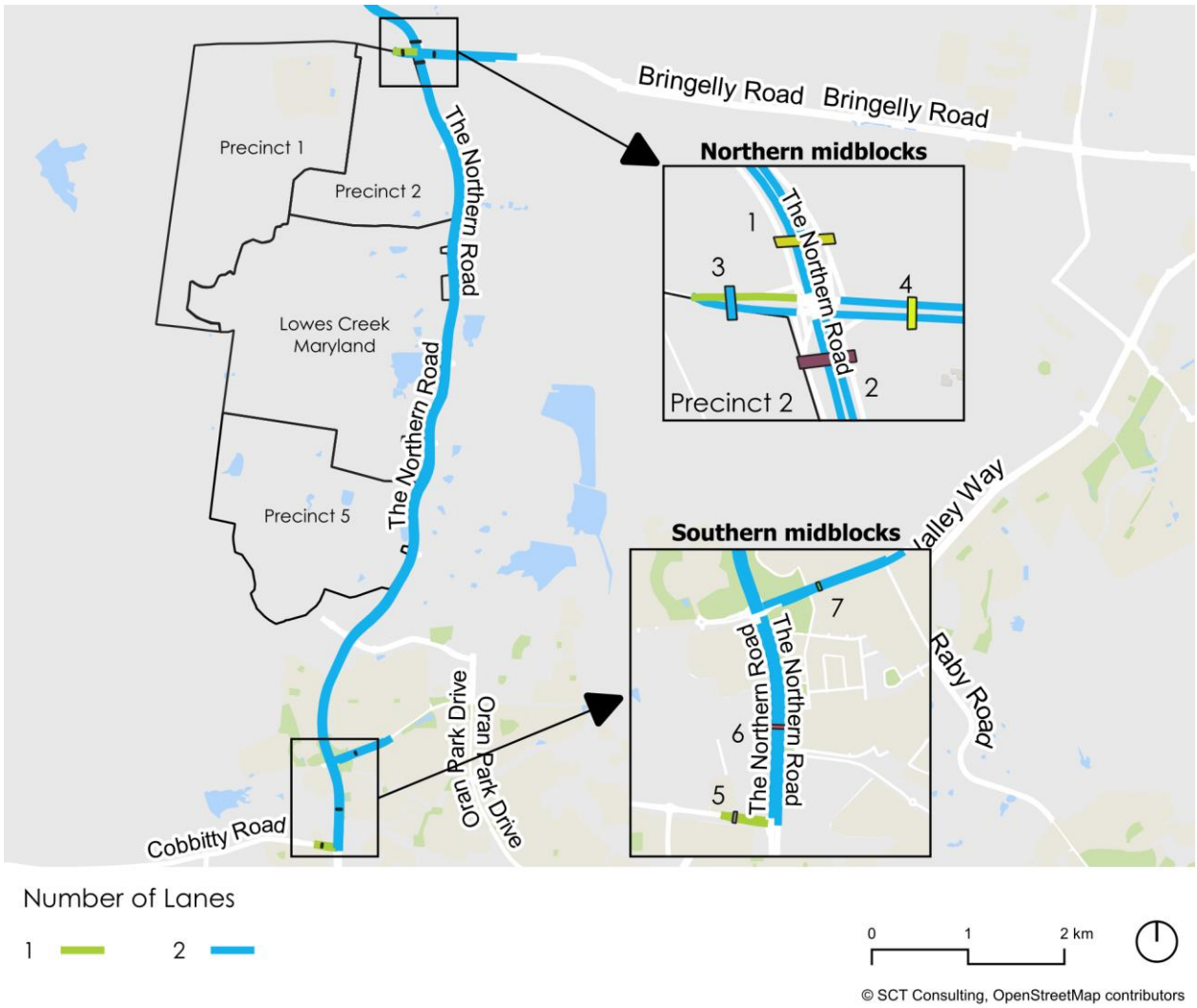
Table 5-3 Yields by precinct

Proposed land use	Belmore Road Precinct	Lowes Creek Maryland	Precinct 5	Total
Residential (dwellings)	3,370	7,060	2,600	**13,030**
Non-residential including a supermarket and specialty retail (GFA sqm)	8,050	40,000	7,500	**55,550**
Primary school (Students)	1,000	3,500	1,000	**5,500**
High school (Students)	-	3,500	-	**3,500**
Source of yields	Pre-Gateway Transport Assessment v1.0, SCT Consulting (20/12/2022)	Traffic and Transport Exhibition Report 2020, GHD (September 2018)	Yield Calculation Rev E, Design+Planning (09/09/2022)	

5.3.3 Existing lane numbers and capacities

It was assumed that the existing lane conditions are as shown in **Figure 5-3**. For this analysis, the capacities for the 7 locations were adopted from Austroads 2020 (Part 3, Table 6.1), that is 1800 vehicles/hour/lane. Therefore, referring to **Figure 5-3**, the green roads had a capacity of 1,800 vehicles/hour and the blue roads were 3,600 vehicles/hour.

Figure 5-3 Existing number of lanes



5.4 Cumulative impact assessment results

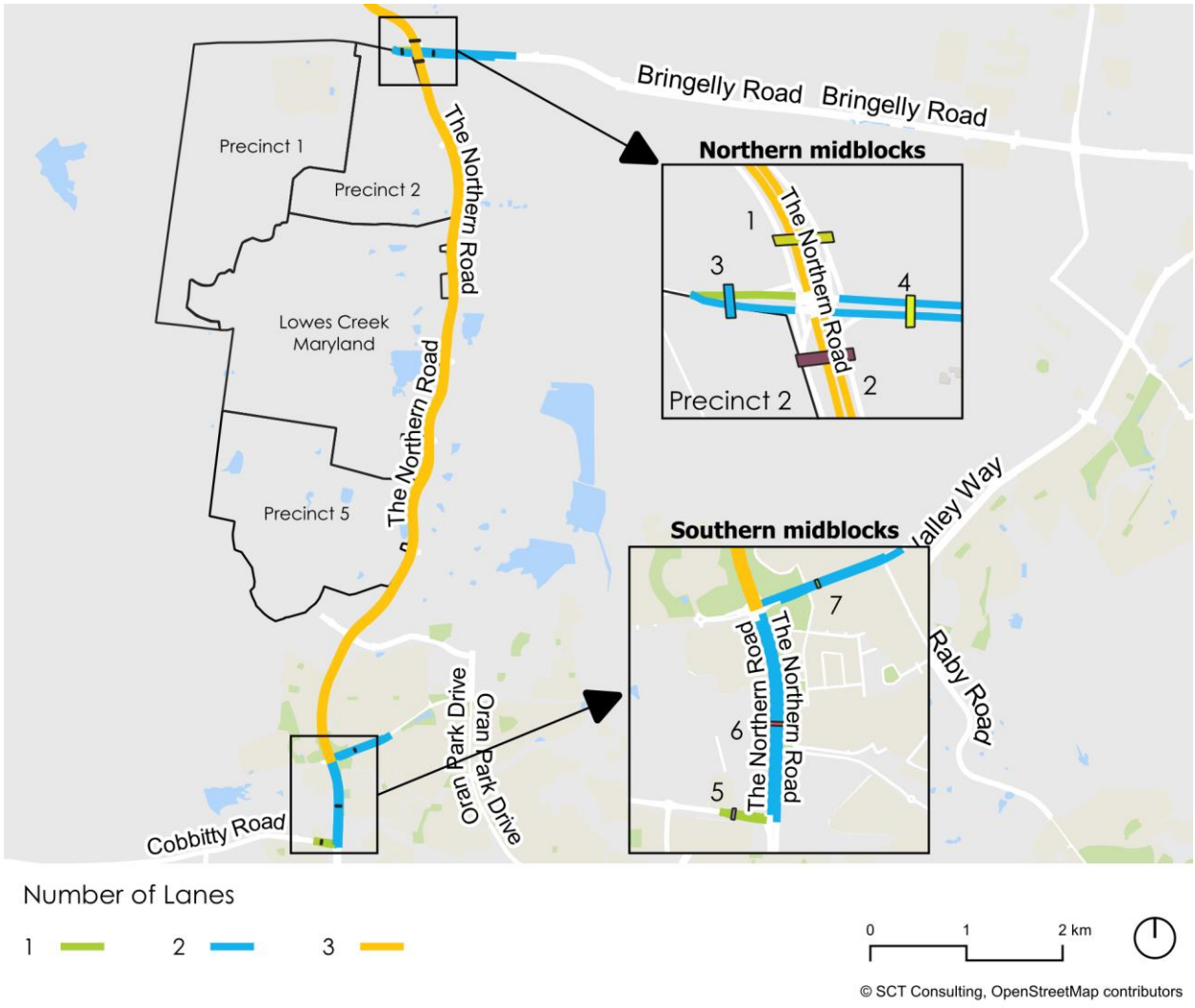
This impact assessment is related to the modelling scenarios tabulated in **Table 5-1**.

5.4.1 Scenario 1: background growth only, 2041

Scenario 1 is the 2041 base case without any traffic from Precinct 2. The results revealed that The Northern Road, both north and south of the Bringelly Interchange, would require upgrades from two lanes to three in both directions.

The results are shown in **Figure 5-4**.

Figure 5-4 2041 Scenario 1 results

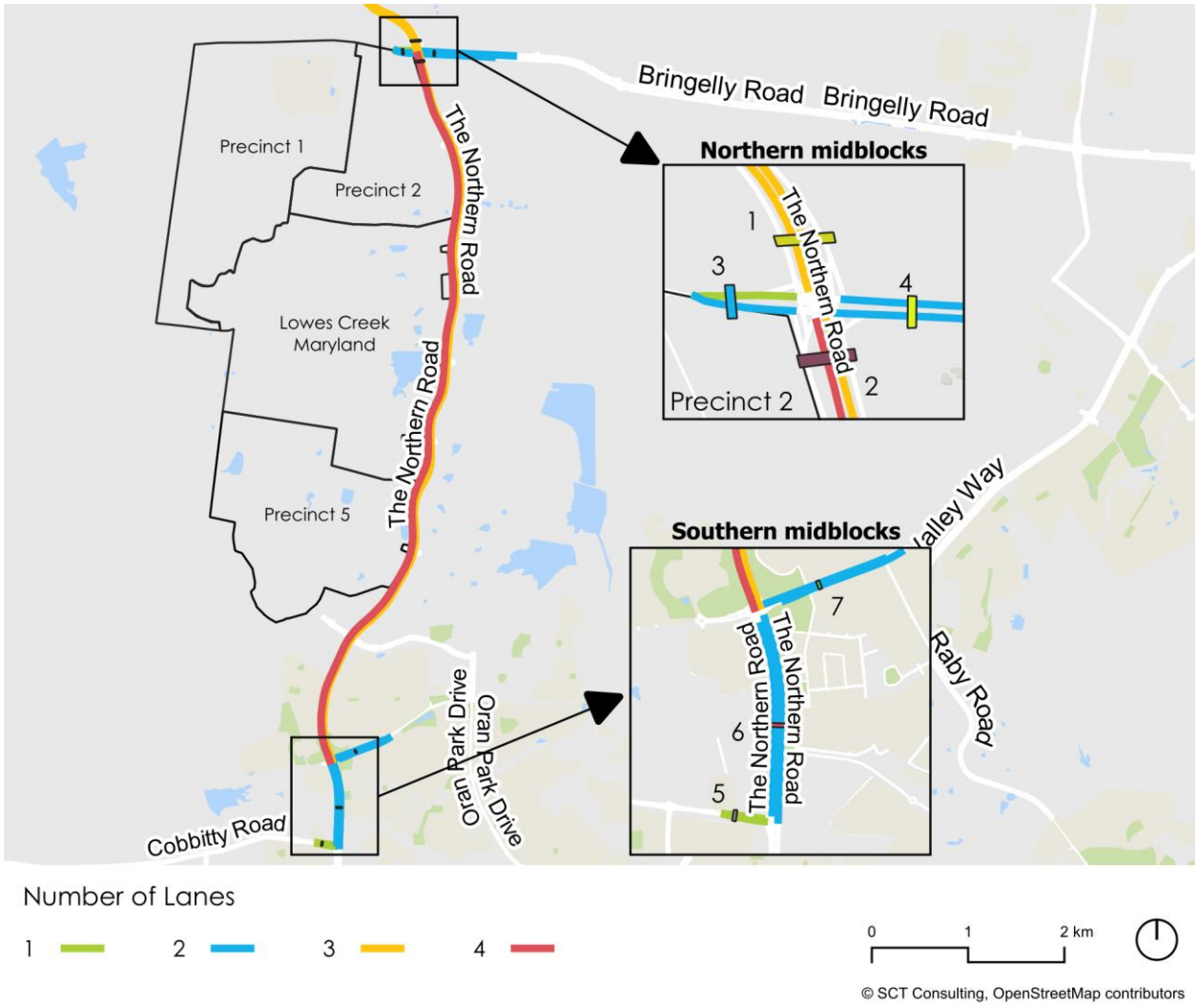


5.4.2 Scenario 2: subject site, 2041

Scenario 2 is the 2041 with development from Precinct 2. The results revealed that The Northern Road would require four lanes in the northbound link portion that runs between the Bringelly interchange (midblock 2) and Peter Brock Road (midblock 7). Its southbound counterpart is at 92% of its capacity, which means it is still below the upgrade threshold by 3%.

The results are shown in **Figure 5-5**.

Figure 5-5 2041 Scenario 2 results



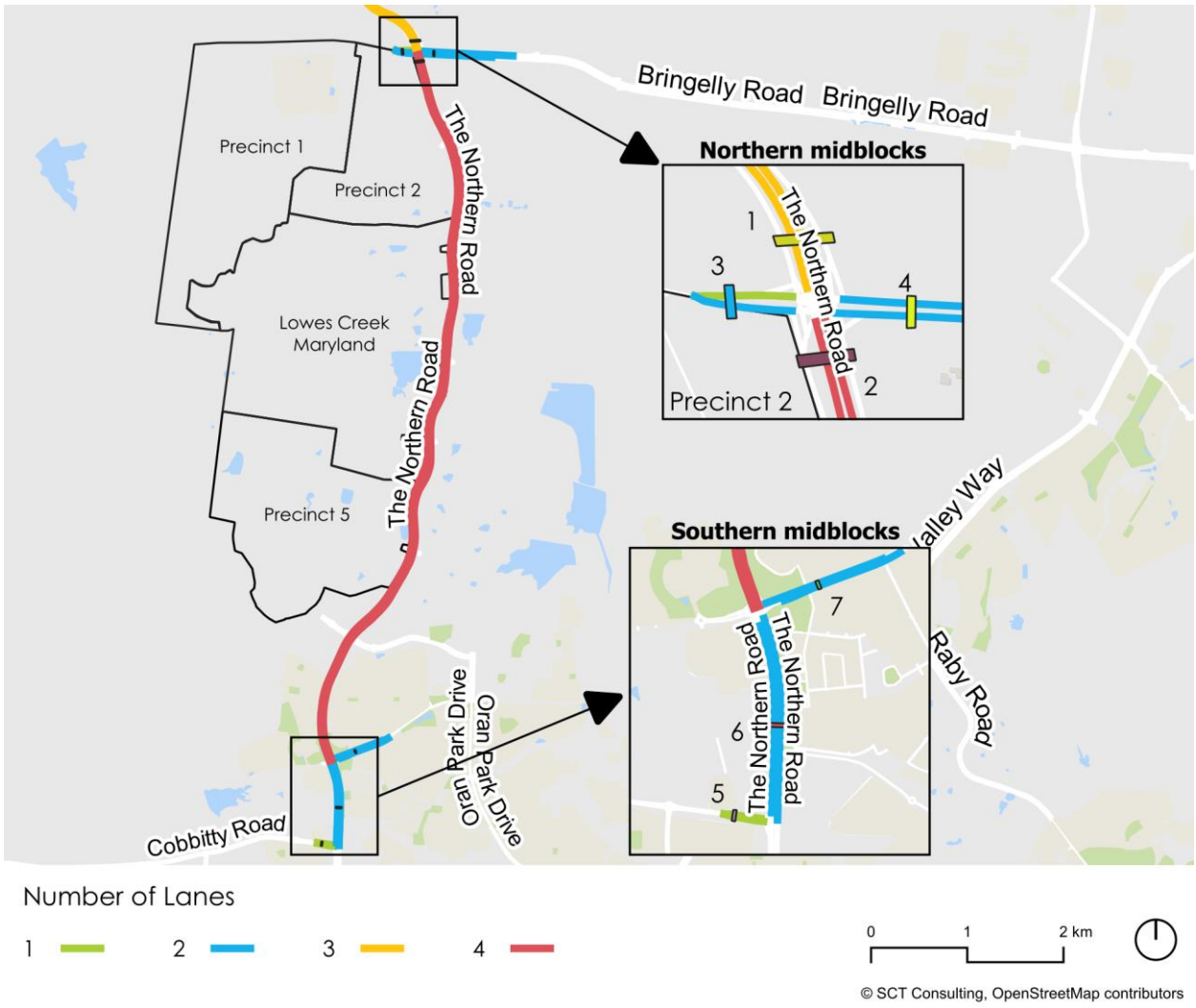
5.4.3 Scenario 3: subject site + all other precincts, 2041

Scenario 3 is the final scenario for 2041, it consists of the traffic generated from Precincts 2 and 5 in addition to the background traffic. This scenario shows the full completion of the development of all the precincts.

The results revealed that The Northern Road would require 4 lanes in both directions for the portion that runs between the Bringelly interchange (midblock 2) and Peter Brock Road (midblock 7). After the upgrades, this link was at 79 and 72 per cent of its capacity for northbound and southbound respectively.

No upgrades were required for the roads located at midblock 3, 4, 5, 6 and 7. The results are shown in **Figure 5-6**.

Figure 5-6 2041 Scenario 3 results

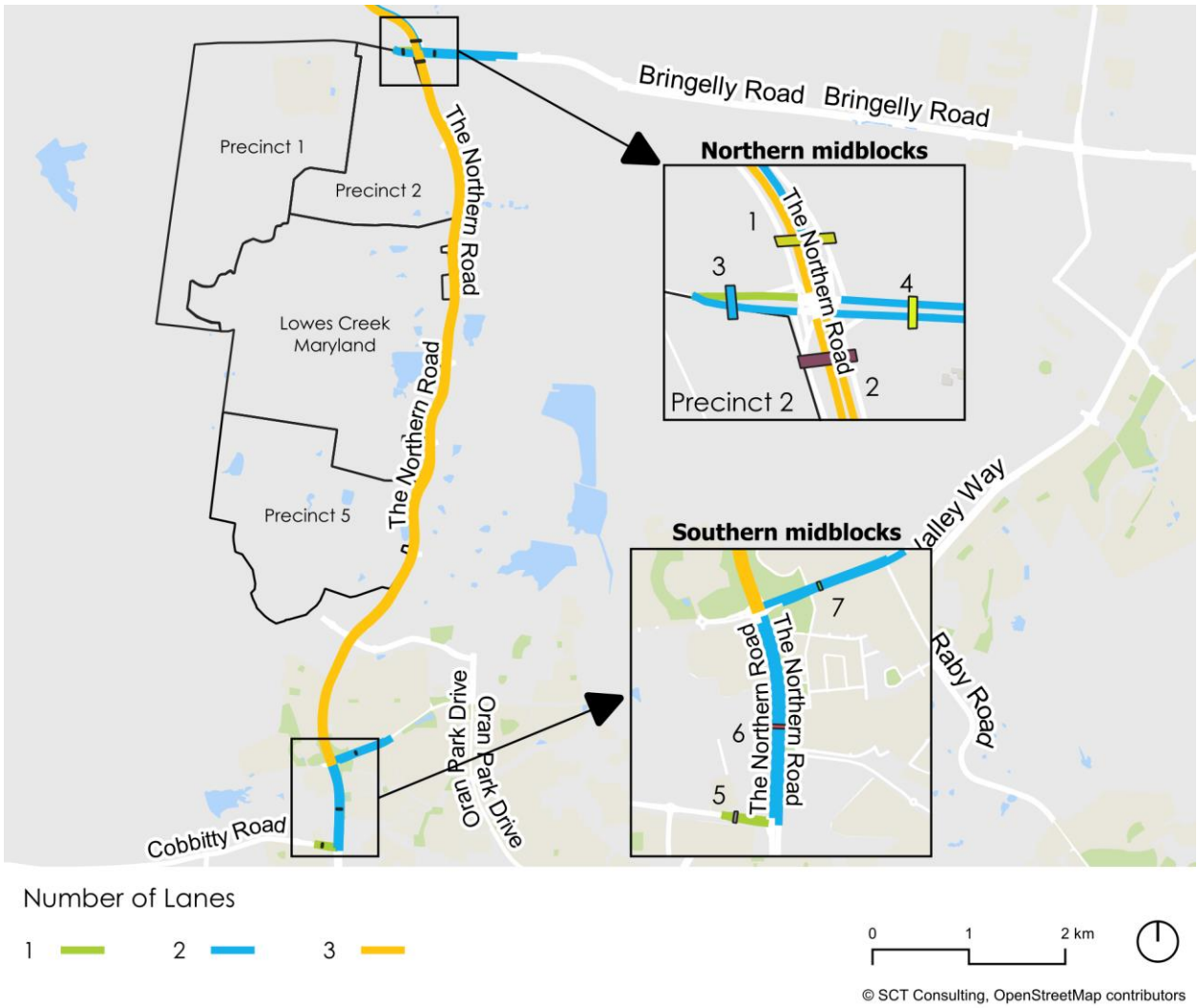


5.4.4 Scenario 4: background growth, 2036

Scenario four is modelling the traffic in 2036 without any development traffic (other than from Lowes Creek Maryland). The results revealed that The Northern Road south of the Bringelly Interchange would require upgrades from two lanes to three in both directions. Conversely, Northbound of midblock 1, only required upgrades to the northbound section, from two to three lanes. Southbound midblock 1 was at 90% of its capacity and was therefore only 5% from the upgrade threshold.

The results are shown in **Figure 5-7**.

Figure 5-7 2036 Scenario 4 results

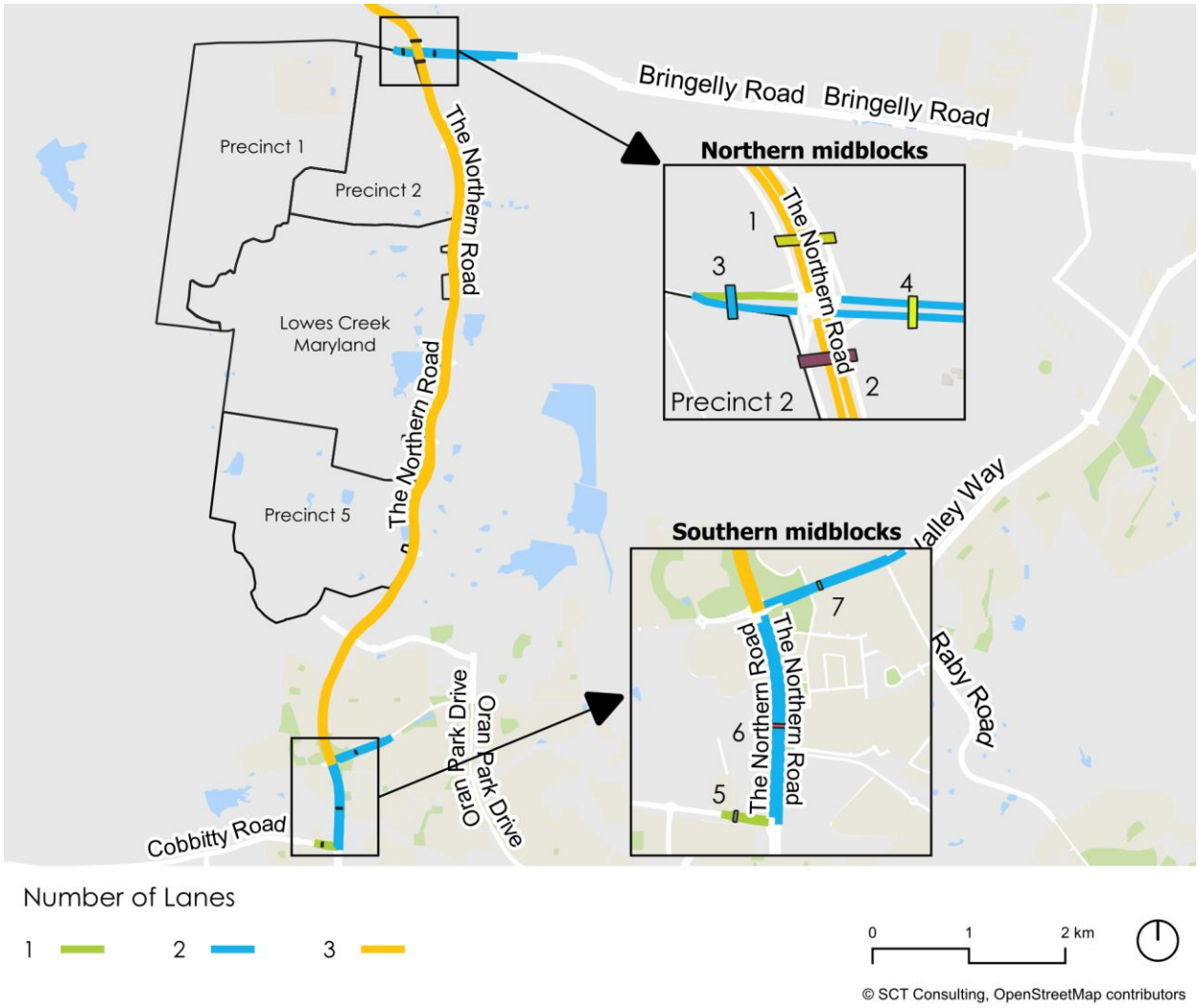


5.4.5 Scenario 5: subject site, 2036

Scenario 5 included the background traffic in 2036 as well as the development traffic generated from 70% completion of Precinct 2. In comparison to the 2036 base case (Scenario 4) there was only one upgrade required to the road network. This upgrade was for the southbound lanes in midblock 1, where the capacity required three lanes instead of two. This reduced the link's volume-to-capacity ratio to 0.66 or 66%. Additionally, the northbound of midblock 2 was at 94% of its capacity and is less than 1% from the upgrade threshold. While its southbound counterpart is 84% of its capacity.

The results are shown in **Figure 5-8**.

Figure 5-8 2036 Scenario 5 results

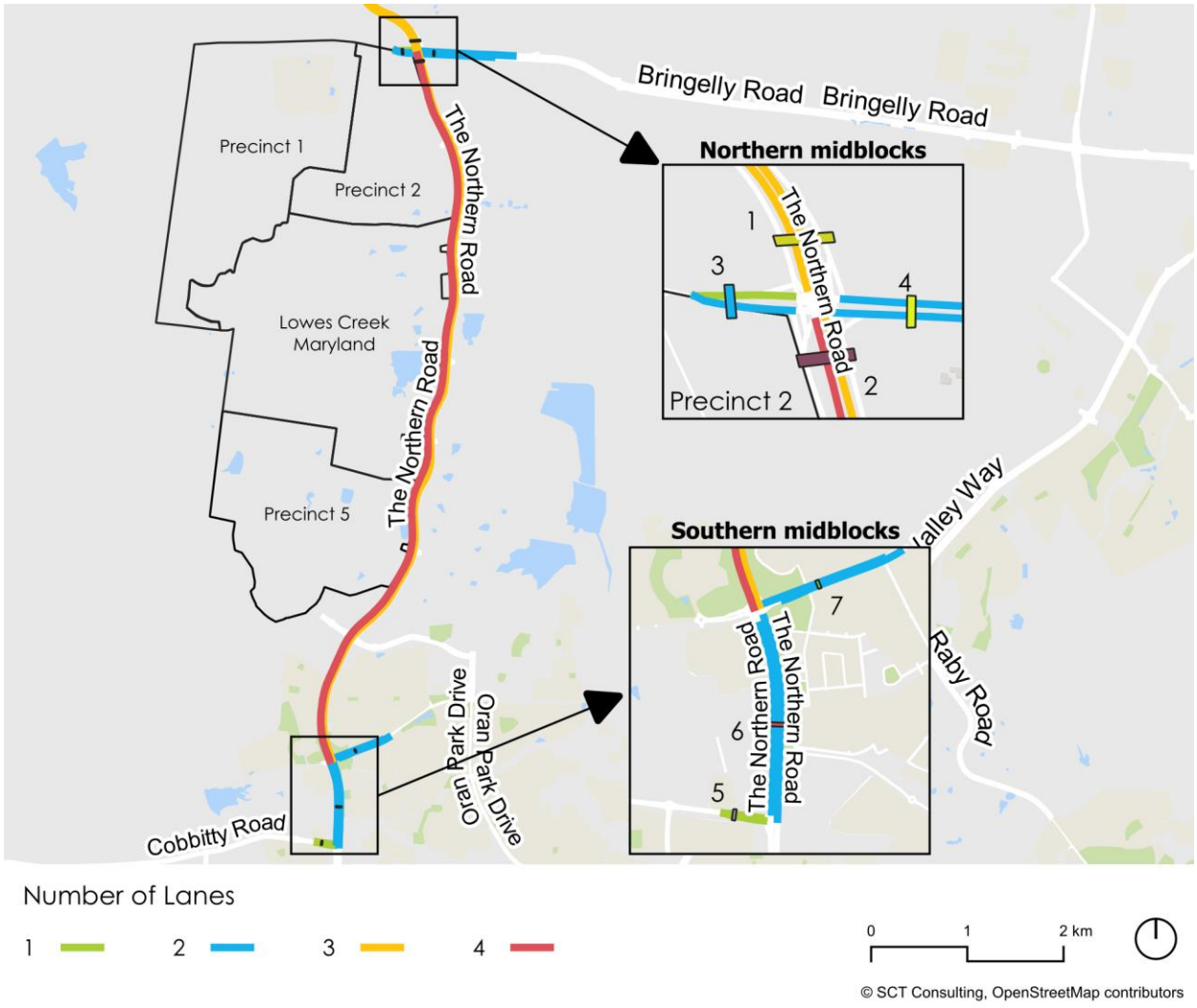


5.4.6 Scenario 6: subject site + all other precincts

Scenario 6 is the final scenario of 2036, it assessed the traffic conditions where the developments in Precincts 2 and 5 are 100% and 70% complete. The results revealed that southbound of The Northern Road at midblock 2 required an additional lane to accommodate traffic volumes. After the upgrade, the capacity of the upgraded link was at 73%. In this scenario, the following roads were close to their capacity:

No upgrades were required for the roads located at midblock 3, 4, 5, 6 and 7. The results are shown in **Figure 5-9**.

Figure 5-9 2036 Scenario 6 results



5.5 Recommendation

The determining scenario in this analysis was 3, which represents the full development of all the precincts. The results show that The Northern Road needs to be upgraded to a 6-lane corridor north of the Bringelly Interchange and to an 8-lane corridor south of the Bringelly Interchange. The results are summarised in **Table 5-4**.

Table 5-4 Final results of modelling scenario 3 (2041 with development) – coloured cells showing upgrades

Midblock location	Existing lane counts		Required lane counts	
	Northbound or Eastbound	Southbound or Westbound	Northbound or Eastbound	Southbound or Westbound
1	2	2	3	3
2	2	2	4	4
3	1	2	1	2
4	2	2	2	2
5	1	1	1	1
6	2	2	2	2
7	2	2	2	2

Source: TfNSW Strategic Traffic Forecasting Modelling, 2022

All other roads do not need to be upgraded based on this analysis.

The importance of the Outer Sydney Orbital (OSO) was also investigated to determine whether is critical to the precincts' delivery. The investigation concluded that the OSO, although reduces throughput on The Northern Road, did not have an impact on the upgrade requirements. The outcome still required the upgrades shown in **Table 5-4**.

This is the expected outcome, as OSO largely caters for longer-distance trips. The majority of the trips during peak periods are to and from employment destinations – such as the Aerotropolis and Campbelltown. The OSO would only be useful for trips at much further distances.

The site is located at a midpoint between Oran Park and the Aerotropolis future metro stations, with The Northern Road providing a north-south corridor that could be used for bus rapid transit. Using the existing car mode share of 87% and the agreed traffic generation rate of 0.87 and the existing mode share of 11% public transport, the broader precincts could generate up to 1,600 public transport users per hour – approximately 40 buses. With the proximity of Campbelltown and the Aerotropolis, a mode share of 20% public transport could be feasible - resulting in a demand of about 73 buses per hour. This would take about 1,300 vehicles off the road – almost a whole lane of traffic.

Further optioneering is suggested in the next stage of planning to refine the layout of The Northern Road.

5.6 Public transport impacts

Delivery of the planned Bringelly Metro Station is indicatively 4km north of the site. The new station and a bus network that could be delivered in connection with Sydney Metro could significantly change travel behaviour in the area. The current transport assessment does not account for this potential change to take a conservative approach. Understanding the potential mode shift will be important to confirm post gateway.

At this time, the public transport network is not fully known. As stated above, all roads in the precinct are proposed to be bus capable, enabling the entirety of the area to be covered by bus services. The north-south sub-arterial and collector roads also provide an opportunity for services to travel through the precinct to Oran Park in the south where a station for Sydney Metro Greater West may be located in the future.

5.7 Active transport impacts

With footpaths proposed on both sides of all roads, active transport can be one of the most convenient modes for short-distance trips. The road network is grid-like in structure, providing numerous crossing opportunities and reducing travel distance between residential areas and the town centre.

The school is separated from the sub-arterial roads, located at the corner of two collector roads and surrounded by higher-intensity residential development. The higher intensity of uses around the town centre will have an effect of slowing traffic speeds and enabling prioritisation of pedestrians around this area. The school is also located adjacent to local open space, removing the need for students to cross any roads to access playing fields.

6.0 Gateway risk assessment

6.1 Strategic risks

At the 25 March 2020 meeting, it was agreed that SCT Consulting will undertake a risk review of the changed strategic context since the LCM rezoning was prepared and their implications on the Belmore Road Precinct planning proposal. The identified risks will be used to inform all agencies in determining the future scope of traffic assessment and modelling post-gateway.

It is proposed that DPE work with TfNSW to establish appropriate gateway conditions to enable effective resolution of these matters if the gateway is granted.

Table 6-1 Gateway risks for the Belmore Road Precinct

No.	Category	Risk	Implications	Remarks
1	Land uses	The original LCM traffic study was based on the broader land use assumptions called “LU16”. Land use assumptions of South West Growth Area (SWGA) and the WSA has changed since land use assumptions “LU16”.	Forecast background traffic growth on the surrounding road network and the timing of infrastructure needs such as The Northern Road would change.	The Government is undertaking a significant amount of planning works to understand the strategic road network and transport needs based on the new land use assumptions. Opportunity to monitor the changes in the road network and work collaboratively with government agencies and other landowners towards an adaptive outcome.
2	Land uses	Change of travel patterns because of the WSA providing additional employment opportunities.	Change of peak travel directions and affects infrastructure requirements.	A significant amount of planning works are being undertaken by the Government to understand the strategic road network and transport needs based on the new land use assumptions. Opportunity to monitor the changes in the road network and work collaboratively with government agencies and other landowners towards an adaptive outcome.
3	Infrastructure	The strategic road network and transport package of works required such as Sydney Metro Greater West for the Western Sydney GIC are unknown.	Potential new roads and public transport infrastructure and services will not be known for the planning of the South Creek West Precincts. Alternative corridor(s) to The Northern Road could improve traffic conditions.	The LCM traffic modelling has considered the worst case where there are no new roads and public transport infrastructure and services such as Sydney Metro Greater West. If this new infrastructure is considered in the future, traffic loading on The Northern Road could be less than those considered in the LCM traffic modelling.
4	Infrastructure	Corridor preservation of major infrastructure such as Outer Sydney Orbital (OSO) and/or Sydney Metro Greater West may trigger land acquisition.	Either the main corridor or other supporting road networks may impact the precincts. None of the work to date indicates this is likely.	The known corridor of OSO is understood not to overlap with the SCW precincts and Sydney Metro Greater West is on the eastern side of The Northern Road. TfNSW to confirm corridor requirements. If the OSO or Sydney Metro Greater West is considered in the future, it is likely to relieve the traffic loading on The Northern Road and the traffic network being planned currently. This is considered minimal risk.

No.	Category	Risk	Implications	Remarks
5	Infrastructure	Changes in the interchange location of Outer Sydney Orbital will affect how traffic access the strategic road network.	Road hierarchy and trip distribution patterns may change and impact the infrastructure requirements of the surrounding road network.	The OSO is currently a corridor preservation project. Construction of this project is not likely to commence within the period of this project delivery; hence the planning of the precincts should be based on the current information available. Current planning decisions can be informed by potential interchange locations, but actual interchanges will need to respond to current planning decisions.
6	Infrastructure	There is no commitment to widening The Northern Road to six lanes.	The precinct plan and traffic assessment need to identify when six lanes are required on The Northern Road and the contribution implications.	Before confirmation of GIC, traffic modelling could be undertaken pre-gateway and post-gateway to understand the staging implications on the road network including The Northern Road and identify the timing when six lanes are required on The Northern Road including to inform contribution planning. Any requirement to upgrade The Northern Road will be informed by progress on the broader Western Sydney transport network and infrastructure upgrades.
7	Traffic modelling	Aimsun modelling prepared for LCM are dated and could need re-work to be fit for the intended purpose.	Future year modelling for LCM is being reviewed as part of the Rezoning process for LCM. The Aimsun model future year scenarios need to be reviewed and updated for land use and infrastructure assumptions once rezoned.	Should Aimsun modelling be required for post-gateway traffic assessment for the CKDI project, SCT Consulting will scope out the appropriate land use and infrastructure assumptions and modelling requirements, in collaboration with TfNSW.

These risks are believed to be able to be mitigated with a program of work post-gateway that involves collaboration with TfNSW, Council and DPE.

7.0 Conclusion and Next Steps

7.1 Conclusion

This traffic study shows that the Belmore Road Precinct ILP is feasible as:

– The study uses a modelling methodology that was developed in collaboration with TfNSW, showing a willingness to work with TfNSW and DPE to achieve an appropriate outcome for the future.

– All sub-arterial and collector roads will be bus-capable, enabling all populated areas of the Precinct to be within 400m distance of a bus route.

– The road cross sections proposed for the Belmore Precinct are from LCM's DCP, showing a willingness to work with recent DPE planning for the area.

– All roads are proposed to have footpaths on both sides, active transport can be one of the most convenient modes for short-distance trips. The road network is grid-like in structure, providing numerous crossing opportunities and reducing travel distance between residential areas and the town centre.

– The package of works updates on the land use assumptions made in the STFM to align with the proposed and recently approved land use, showing a willingness to put forward reasonable and realistic assumptions for the future.

– The findings indicated that The Northern Road is upgraded to a 6-lane corridor north of the Bringelly Interchange and to an 8-lane corridor south of the Bringelly Interchange

– An investigation into the importance of the Outer Sydney Orbital (OSO) concluded that although there is a reduction in the throughput on The Northern Road, it did not have an impact on the upgrade requirements.

– A risk table has been prepared in line with TfNSW's request. This table shows that while there are several risks in the planning proposal, these can be mitigated by appropriate gateway conditions and a good working relationship with Government agencies post-gateway.

7.2 Next Steps

The following next steps are proposed:

– Council and TfNSW provide comments as a part of the lodgement process with Council.

– Council lodgement of the planning proposal, followed by DPE gateway determination.

– It is proposed to convene a Project Steering Group with Council, DPE, TfNSW and the proponent to use as a means of resolving technical issues during the development of a TMAP.

– Following gateway approval, SCT Consulting will prepare a Transport Mobility and Access Plan (TMAP) Scoping Note that agrees on the technical scope that would satisfy any relevant gateway conditions, for the approval of the steering committee.

– Post-gateway investigation is suggested to determine the feasibility of implementing a bus rapid transit route on The Northern Road to provide more efficient options for travel.

APPENDIX A

TFNSW APPROVED SCOPING NOTE

Technical Advisory Note

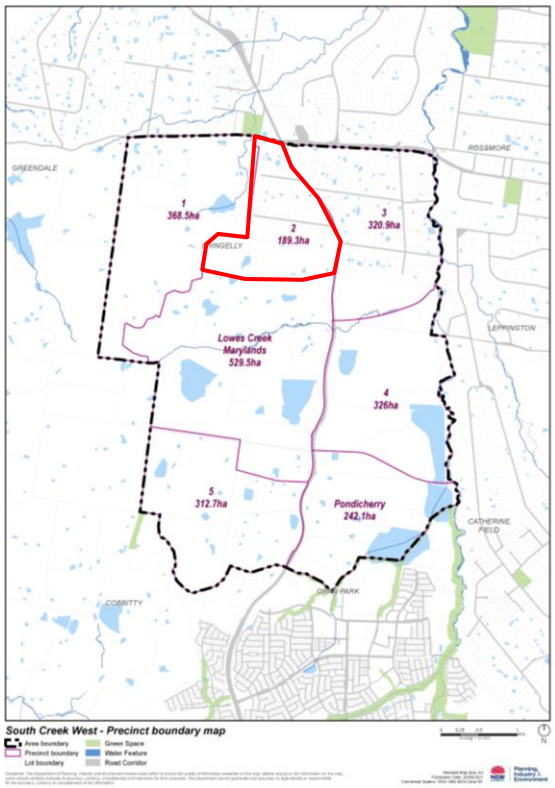
Quality Information			
Project:	South Creek West Precinct 2 (Belmore Road Precinct)		
Project Number:	SCT_00149		
Document Name:	Pre-Gateway Transport Assessment - TfNSW strategic model inputs memo		
Version:	2.0	**Date:**	21/03/2023
Author:	Andy Yung	Director	
Reviewer:	Jonathan Busch	Associate Director	
Authoriser:	Andy Yung	Director	

1.0 Background

SCT Consulting was engaged by CKDI Pty Ltd to undertake a traffic, transport and access assessment to support the planning proposal of the Belmore Road Precinct (previously known as South Creek West Bringelly Sub Precinct 2).

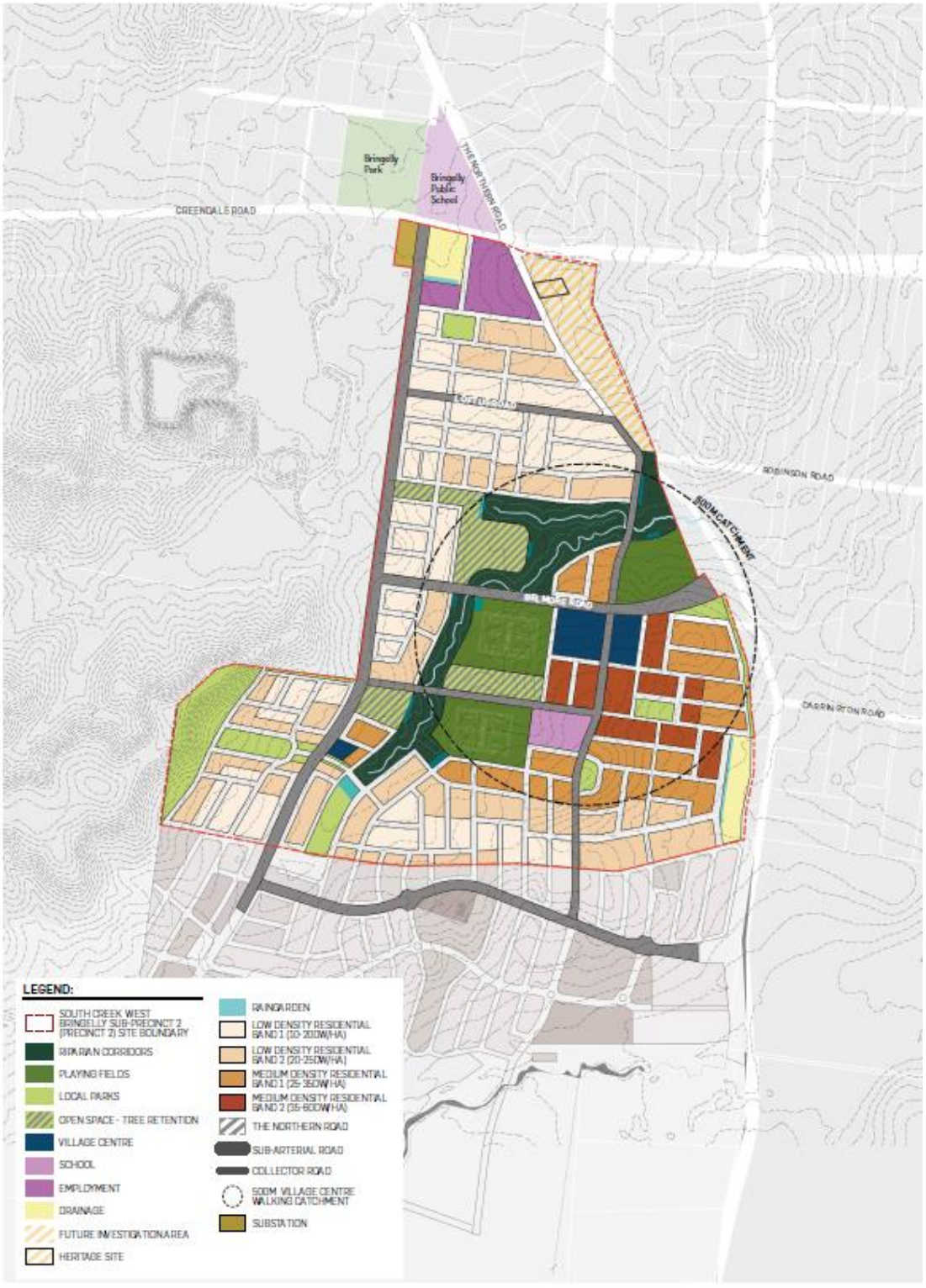
The Belmore Road Precinct is bound by the old The Northern Road to the east, Greendale Road to the north, lot boundaries to the west and the planned Lowes Creek Link Road to the south. The Belmore Road Precinct, predominantly agricultural land use, is proposed to be rezoned into a community with ready access to employment, public transport, education and commercial facilities, and is well-positioned to be integrated into infrastructure development in the wider regional area. **Figure 1-1** illustrates the site boundaries of Precinct 2 (highlighted in red) and South Creek West Land Release area.

Figure 1-1 Precinct 2 (red outline) in a regional context



The Draft Indicative Layout Plan (ILP) of Belmore Road Precinct, as shown in **Figure 1-2**. The Belmore Road Precinct is expected to cater for approximately 3,150 dwellings with a mix of low to high-density residential premises.

Figure 1-2 The Belmore Road Precinct Indicative Layout Plan



Source: Urbis, 2023

The intended outcome of this Planning Proposal is to amend the current *State Environmental Planning Policy (Precincts—Western Parkland City) 2021* to facilitate the urban development of the Belmore Road Precinct as part of the South West Growth Centre and envisaged in the Greater Sydney Commission's Regional Plan and District Plan.

Traffic modelling was undertaken and transport assumptions for this site were discussed and confirmed with relevant stakeholders. A traffic and transport assessment was undertaken based on work completed by the Department of Planning and Environment (DPE) during the planning of Lowes Creek Maryland (LCM) precinct.

Since the submission of the traffic and transport assessment in support of the planning proposal for the Belmore Road Precinct, Camden Council wrote to Transport for NSW (TfNSW) to request advice about the assessment of the planning proposal. TfNSW identified the need for further transport modelling before gateway determination.

Initial comment on the planning proposal provided by TfNSW dated 15 November 2022 as well as a meeting with a Land Use Planner at TfNSW dated 1 December 2022, confirmed the overall approach to traffic modelling for the proposal.

Evidence to support Gateway Determination (Stage 1 preliminary assessment):

– TfNSW to provide Strategic Traffic Forecasting Model (STFM) outputs so the likely impacts on the external road network (i.e. The Northern Road) can be quantified. SCT Consulting will then undertake a preliminary capacity/performance analysis and the traffic assessment and reporting will be updated based on this high-level assessment of strategic network impacts.

Post-gateway determination (Stage 2 detailed assessment):

– The scope and methodology of the detailed assessment can be confirmed post-Gateway and agreed upon between TfNSW/Council using the modelling scoping note process.

– The overall methodology is a detailed AIMSUN mesoscopic and SIDRA intersection modelling to support the planning proposal. TfNSW can review and validate AIMSUN/SIDRA base models during pre or post-gateway, as long as it is accepted by TfNSW before any detailed assessment.

– The detailed assessment should align with TfNSW's release of Future Transport Strategy 2056, Movement and Place Framework (i.e. Network Planning in Precincts), DPE-led review of the South West Growth Area Structure Plan as well as the latest traffic modelling forecasts being prepared by TfNSW.

– The detailed assessment needs to consider carefully active and public transportation networks (as requested by Council).

This memo is to provide TfNSW with the land use and transport inputs required to undertake the STFM modelling. The outputs of the STFM modelling will be used to inform a preliminary capacity/performance analysis and the traffic assessment and reporting will be updated based on this high-level assessment of strategic network impacts.

It was agreed that no further intersection and network traffic modelling will be required pre-Gateway Determination. The scope of further detailed traffic modelling will be discussed and agreed upon with all relevant stakeholders before the commencement of Stage 2 detailed Traffic and Transport Assessment to support the rezoning (post-Gateway determination).

2.0 Proposed Indicative Layout Plan (ILP) and land use

The Draft ILP (as shown in **Figure 1-2**) has been prepared to support the planning proposal and precinct rezoning and has been informed by extensive specialist consultant studies. The Belmore Road Precinct is expected to cater for approximately 3,150 dwellings with a mix of low to high-density residential premises.

Key features of the Belmore Road Precinct ILP are:

– Connections and continuity to Lowes Creek Maryland precinct, providing a seamless interface to the proposal to the south, including land use and road network elements (including walking and cycling connections)

– A town centre at the centre of the site, minimising the travel distance of residents to their local shops and hence encouraging residents to access the shops via sustainable and active transport means

– A school integrated with local open space and the town centre

– A riparian corridor oriented diagonally through the middle of the precinct, that facilitates off-road shared paths across the majority of the precinct with several connections across to connect with the town centre, the school, the playing fields as well as The Northern Road

– Density clustered around the town centre and dissipating to the edges of the precinct.

The yield of the Belmore Road Precinct ILP is shown in **Table 2-1** .

Table 2-1 Precinct 2 ILP yield

Use	Yield[1]	Source
Low density residential	1,653 dwellings	Urbis revised final Rev F, dated 8 March 2023
Medium density residential	1,240 dwellings	
High density residential	259 dwellings	
School	1 primary school	
Community uses	1,200 m^2 GFA	South Creek West Bringelly Precinct Urban Design Report, 2021
Supermarket	8,000 m^2 GFA	
Speciality Retailers	3,500 m^2 GFA	
Local employment (gym, childcare, medical centre, service station, fast food)	2,500 m^2 GFA	

The traffic modelling undertaken in the previous *Lowes Creek Maryland Precinct Traffic, Transport and Access Assessment, 2018* (GHD) considers the yield of not just the LCM precinct but the whole SCW precinct to the west of The Northern Road.

Since the 2018 Lowes Creek Maryland Precinct Traffic Assessment was completed, the Lowes Creek Maryland Precinct was rezoned on 16 July 2021. The Lowes Creek Maryland Precinct accommodates up to 7,000 new homes 2,200 new jobs, a local centre, a new school and a community facility, along with open space, cycling and pedestrian paths.

It is also assumed Precinct 5 could yield approximately 3,800 residential dwellings.

[1] It is noted that the yields are the best and most realistic estimates at the time of preparing this version of the ILP and will continue to evolve as the ILP develops. Updates to the yield post and modelling of the maximum development potential will occur post gateway.

3.0 Key strategic modelling assumptions

3.1 Modelling year

All previous traffic modelling and assessments relating to LCM and the Belmore Road Precinct were undertaken for the future years of 2021, 2026, 2031, 2036 and 2041.

For the purpose of ongoing traffic modelling and assessments for the Belmore Road Precinct planning proposal, the STFM modelling should be undertaken for the year 2036 and 2041 (weekday AM and PM peaks) to provide an understanding of the interim and full development implications of the proposed development on the surrounding road network.

3.2 Modelling study area

The modelling area for the Belmore Road Precinct planning proposal is defined as the precinct boundary of the ILP as shown in **Figure 1-2**.

3.3 Trip generation rates

Trip generation rates that were adopted for the *Lowes Creek Maryland Precinct Traffic, Transport and Access Assessment, 2018* (GHD), were agreed to be used for the previous Belmore Road Precinct traffic modelling and assessment for consistency purposes.

However, feedback and further discussions with TfNSW in additional traffic analysis and modelling for Precinct 5 (which would also apply to the Belmore Road Precinct) has noted that:

1. TfNSW won't accept 0.65 trips for 'small lots medium density housing'. This rate is appropriate for Fonzie Flats or attached dwellings/townhouses.
2. TfNSW is open to accept a different trip generation rate to be applied for all detached dwellings which would require justification based on appropriate benchmarks or studies.
3. TfNSW recommends an internal containment rate to be applied for primary school (confirm if it is private or public as this would influence the rate) and local retail centre based on appropriate benchmarks or studies.
4. Proponent may consider applying a discount rate to the total traffic generation for **only work trips** to reflect working-from-home trend. TfNSW recommends considering the latest NSW Remote Working Insight Report for justification. The appropriate discount rate should reflect the likely future demographic profile of this precinct and would be subject to TfNSW's discretion.

3.3.1 Residential trip generation rates

The *Lowes Creek Maryland Precinct Traffic, Transport and Access Assessment, 2018* (GHD), that was prepared to support the rezoned LCM Precinct adopted residential trip generation rates of 0.95 and 0.99 trips per dwelling for low density dwellings. As a result of further development of the ILP of the Belmore Road Precinct and market trends, it proposes a mix of housing products including smaller lots medium housing such as Fonzie Flats or attached dwellings/townhouses together with the more traditional detached dwellings.

Hence, TfNSW proposed a single trip generation rate to be used for all types of residential dwellings proposed in the Belmore Road Precinct. SCT Consulting has considered selected surveyed sites (instead of the average of all surveyed sites) presented in *TD 13-04a*, that has more similar characteristics to the Belmore Road Precinct such as size and population of the precinct, inclusion of centres and services to support the local area and accessibility to public transport. Of the surveyed sites, Site 3 (North Epping), Site 5 (West Hoxton) and Site 6 (Westleigh) are considered to have similar characteristics to the Belmore Road Precinct and hence the surveyed peak hour trip rates of these 3 locations were averaged and used for trip generation of all residential dwellings of the Belmore Road Precinct.

Table 3-1 Residential trip generation rates

Surveyed site	Site 3 (North Epping)	Site 5 (West Hoxton)	Site 6 (Westleigh)	Average
Surveyed peak hour vehicle trip rate (trips per dwelling)	0.59	1.32	0.71	0.87

3.3.2 Non-residential trip generation rates

As suggested by TfNSW's feedback in letter dated 17 August 2022, additional research and analysis has been undertaken to determine trip rates for retail uses based on the *2018 RMS Trip Generation Surveys Small Shopping Centres Analysis Report*.

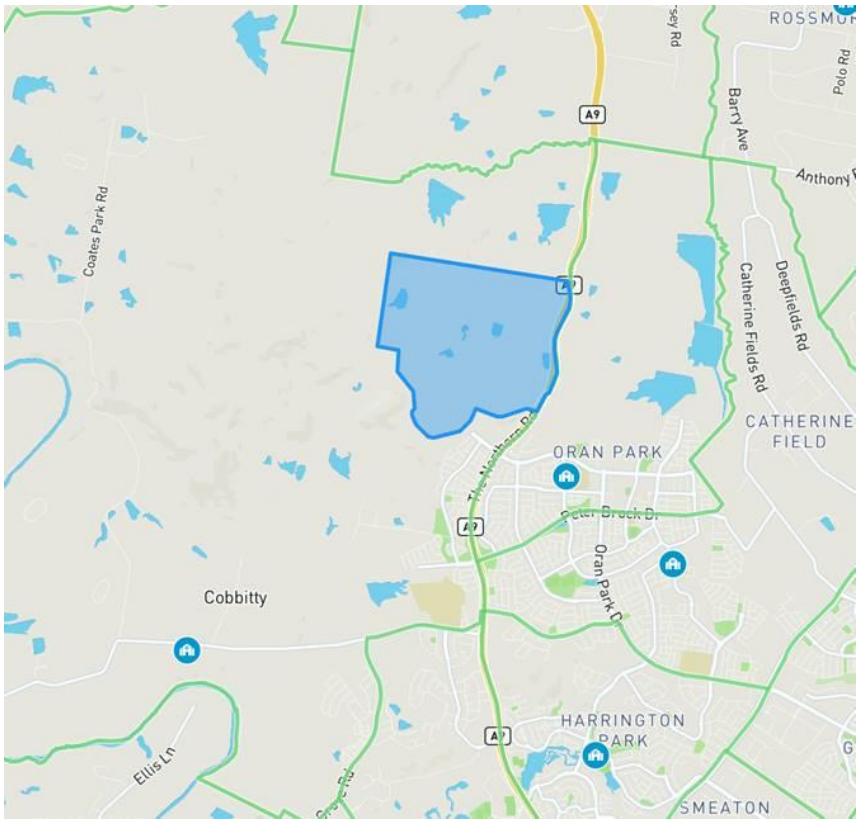
For sites between 2,000 and 10,000 m^2 GLFA, the AM and PM peak hour trip rates should be 7.76 and 10.41 / 100 m^2 GLFA.

3.3.3 Trip containment

TfNSW acknowledged that internal containment rate should be applied for the proposed public primary school and the local retail centre.

SCT Consulting is currently undertaking a Rapid Transport Assessment for the proposed 1,000-student (capped) public school in Precinct 5. Consultation with SINSW has confirmed that the potential school catchment as shown in **Figure 3-1**. The school intake area is bounded by the southern, western and eastern extent of Precinct 5 and Maryland Link Road No 2 as the northern extent which encompasses Precinct 5 and a small portion of the southern extent of the LCM precinct to the south of Maryland Link Road No 2.

Figure 3-1 Precinct 5 (part – BHL ownership) Indicative Layout Plan



Source: SINSW, 2022

Based on the school catchment almost exactly the same as the Precinct 5 boundary, it is expected that the majority of the future students attending the public school will be living within Precinct 5. This is validated through every surrounding residential precinct has schools planned in them such as Cobbitty, Lowes Creek Maryland and Oran Park. The majority of students would be within 800m of the future public school and hence it is expected they will be

walking, cycling and catching buses to travel to bus based on the active and public transport network planned within Precinct 5. The same assumptions are expected for The Belmore Road Precinct to be consistent with planning for public schools in the area.

Even if a small amount of students were to be driven to school, those vehicle trips would not be expected to be crossing The Northern Road (external to the precinct). Hence the vehicular trip containment for this public school within the Belmore Road Precinct is expected to be very high. We are only expecting the teachers may be driving to and from external of the precinct.

Based on a typical student-to-teacher ratio of 15.6 for public primary school, we expect there could be 60-70 staffs for the school in the Belmore Road Precinct. Using a trip rate of 0.67 per student in the AM peak according to Table 4-3 of the *RMS Trip Generation Surveys, Schools Analysis Report 2014*, the 1000-student school could generate a total of 670 peak hour trips (internal and external). Therefore, we would propose that 10% of these trips would be generate by the teachers (67 trips) to and from external of the precinct and 10% of these trips would be generate by future students that may live outside of the school catchment area / external of the precinct.

Hence, we propose to apply an 80% trip containment factor to the AM school trips.

The non-residential GFA proposed in the Belmore Road Precinct is proposed to be approximately 15,000 m^2 to suit the size of the precinct given the intent of this local centre is to support the local population. Hence the catchment of the local centre will also be targeted for the Belmore Road Precinct only. This is again validated through every surrounding residential precinct has centres planned in them such as Cobbitty, Lowes Creek Maryland as well as a regional centre in Oran Park.

Similar to the school discussion above regarding trip containment, it is expected that the majority of visitors of the local centre would be travelling to and from residential dwellings within the precinct, except staffs which may be travelling to and from external to the precinct. The Lowes Creek Maryland and the previous Belmore Road Precinct Traffic Assessment Reports hence assumed 100% internal trip containment.

Hence, we propose to apply a 50% trip containment factor to the AM and PM non-residential trips.

3.3.4 Trip generation discount for commuter trips to reflect working-from-home trend

According to *NSW Remote Working Insights 2 Why hybrid is here to stay and how to seize the opportunities (November 2021)*, it is forecast that 30% of total work will be done remotely which would have an implication of work-related travel patterns. For peak hour travel and trip generation rates, not all trips are work-related and according to the latest household travel surveys only 17% of trips are work-related. Hence, as an estimate, we propose to apply a 5% trip reduction (30% x 17%) to the residential trips expected to be generated in the Belmore Road Precinct to account for discount for commuter trips to reflect working-from-home trend.

3.3.5 Trip generation summary

The revised traffic generation rates and total (internal and external) traffic generation for each of the proposed land use in the Belmore Road Precinct are shown in **Table 3-2**.

It is noted that the primary school and residential land uses are destinations while residential land uses are an origin in the morning peak.

The land use and trip generation assumptions for 2036 modelling should be 70% of the proposal at full development.

Table 3-2 Total traffic generation for the Belmore Road Precinct

Proposed land use	AM peak hour (In / Out proportion)	PM peak hour (In / Out proportion)	Trip generation rate source	Yield	AM (1-hour) Peak total trips	PM total (1-hour) Peak total trips	Trip reduction / trip containment factor	AM (1-hour) Peak external trips	PM (1-hour) Peak external trips
Residential	0.87 / dwelling (20% / 80%)	0.87 / dwelling (80% / 20%)	Guide to Traffic Generating Developments - Updated traffic surveys (TDT 2013/04a	3,150 dwellings	2,742	2,742	0.05	2,602	2,602
Non-residential including a supermarket and specialty retail	7.76 per 100 m^2 GLFA (50% / 50%)	10.41 / 100 m^2 GLFA (50% / 50%)	Page 11 of the 2018 RMS Trip Generation Surveys Small Shopping Centres Analysis Report	15,000 m^2 GLFA	1,164	1,562	0.5	582	781
Primary school	0.67 / student (60% / 40%)	0 / student	Table 4-3 of the RMS Trip Generation Surveys, Schools Analysis Report 2014	1,000 students	670	0	0.8	134	0
				Total trip generation	**4,576**	**4,304**	**-**	**3,318**	**3,383**

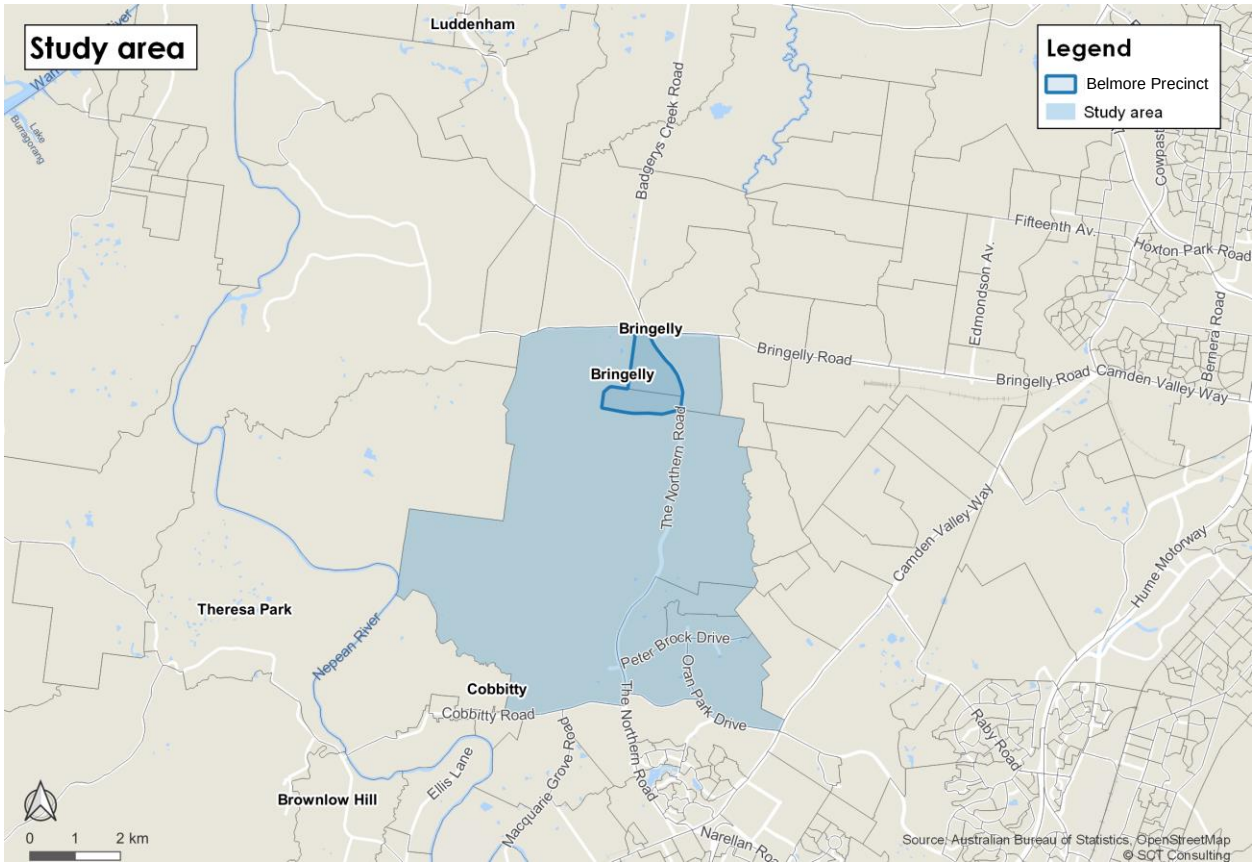
3.4 Trip Distribution

The adopted distribution pattern within STFM modelling would be used. Future discussion of any updates to the trip distribution rate can be considered in Stage 2.

3.5 Mode share

2016 Method of Journey to Work (JTW) data from relevant statistical areas level one including Oran Park were analysed to determine the travel behaviour of the existing residents in the vicinity of the site as shown in **Figure 3–2**.

Figure 3–2 Study area for the method of JTW analysis



At the time of the JTW data being collected in 2016, about 2,862 trip samples were included in the survey for the area. According to the Australian Bureau of Statistics, people in employment are those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit.

The study area showed a higher proportion of drivers, 72 per cent, in comparison to the 53 per cent of Greater Sydney, showing a high dependency on private car use. Train and bus usage was low at nine per cent given the commuting time to jobs by public transport, whereas Greater Sydney showed a total of 22 per cent.

Active transport use was very low, i.e. zero per cent for cycling and one per cent for walking, given limited employment opportunities in the vicinity and the gap in cycling infrastructure provision to connect to the regional network. Around 20 per cent of the samples were working at home or other transport modes.

Of the 24,386 people who work in Camden Council Area, a large majority of workers (48 per cent) live in Camden LGA, followed by Campbelltown (17 per cent) and Wollondilly (14 per cent). Smaller origins include Liverpool (five per cent), and other origins across the Greater Sydney region each generating less than two per cent of work-related trips to Camden.

Around 30 per cent of the residents worked in the same Camden LGA followed by Campbelltown (16 per cent) and Liverpool (11 per cent). Other destinations for work-related trips were all below five per cent except the City of

Sydney (seven per cent). Hence, the medium-long commuting distance to major employment tallies with the fact of high car use, which is relatively convenient and cost-effective in the transport context.

It is expected that future travel private car uses of the Belmore Road Precinct could be lower with the introduction of metro services in the vicinity of the Belmore Road Precinct supported by good and frequent bus services to connect to future metro stations. Therefore, a mode shift towards more sustainable targets would be considered beneficial and the development of the precinct must include measures to assist in achieving these targets. However, for the purpose of traffic modelling, the potential mode shifts would not be considered in the strategic modelling and hence the agreed trip generation rates would not be further reduced to account for the target mode shares. This is considered to be a conservative assessment and would lower the risk that any required network capacity upgrades would be insufficient.

3.6 Network/access assumptions

We have assumed that the STFM models would have the latest network configurations (confidential) assumed by TfNSW according to the latest planning assumptions to support the land use changes in Western Parkland City up to the year 2041.

The Lowes Creek Maryland ILP identified a road network structure that extended beyond the precinct that could be extended further south towards the Oran Park precinct. The Belmore Road Precinct ILP proposes to continue these north-south connections as they form legible alternatives to The Northern Road for travel between precincts as well as ensuring that vehicles can access the main intersections along The Northern Road.

The Northern Road upgrade has already identified several intersections that have recently been constructed along with the corridor interfacing with the South Creek West Land Release Area, so the main role of the Belmore Road Precinct ILP is to connect effectively with these intersections with the right hierarchy roads.

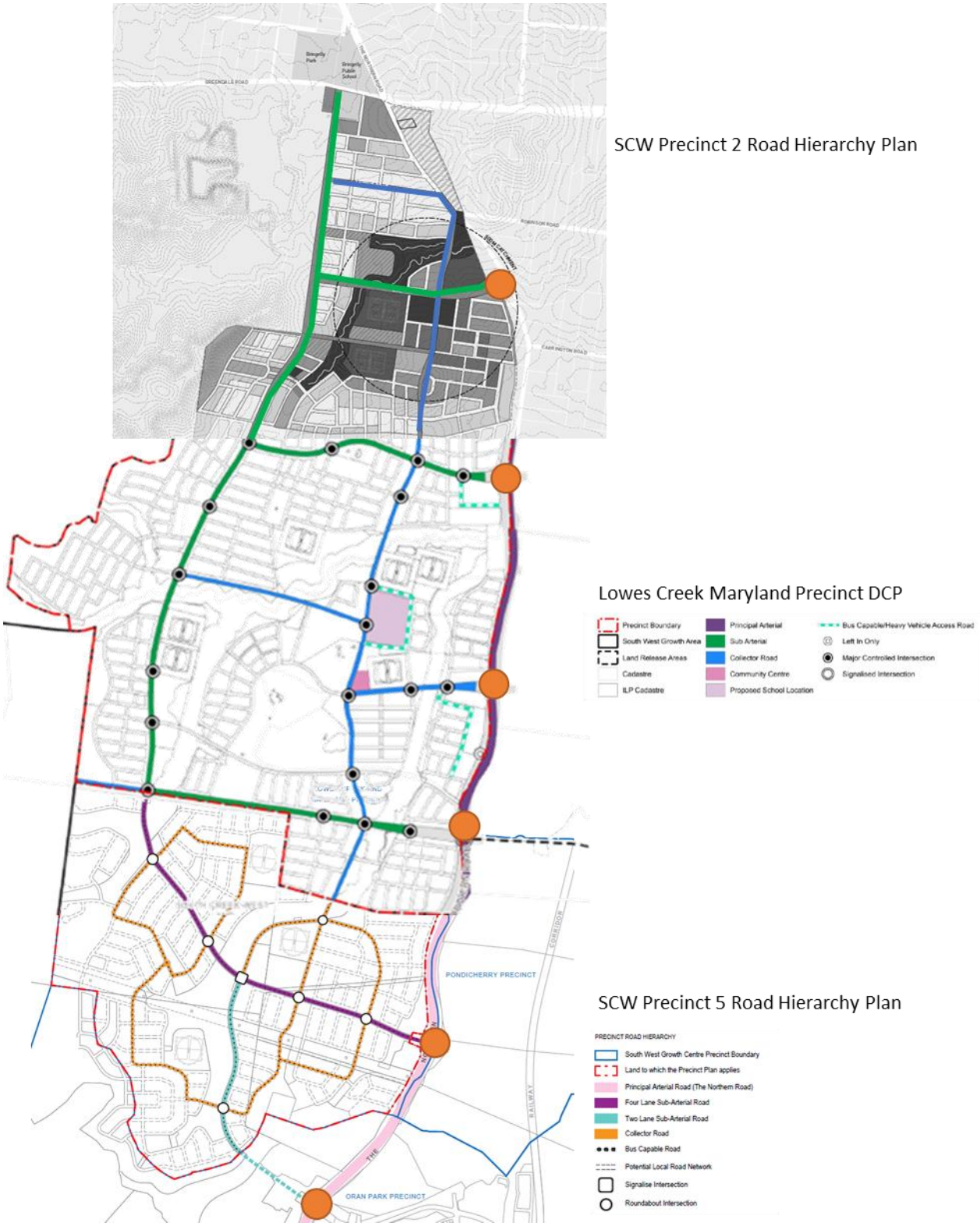
Key access and internal road network assumptions for the Belmore Road Precinct as well as the LCM and SCW Precinct 5 are shown in **Figure 3–3**:

– A north-south (four-lane) sub-arterial road network from the northern end of the Belmore Road Precinct at Greendale Road through Lowes Creek Maryland precinct and to Oran Park and provides an alternative to The Northern Road between Bringelly Road and Maryland Link Road 1

– An east-west sub-arterial along Belmore Road as a branch from the north-south arterial road to provide a direct connection to The Northern Road

– A network of collector roads that provide connections between the sub-arterial roads and the local road network.

Figure 3–3 Development accesses and internal road network assumptions



3.7 STFM modelling scenarios

The following modelling scenarios are proposed for TfNSW to run and provide results and outputs, as summarised in **Table 3-3**.

Table 3-3 STFM modelling scenario for the Belmore Road Precinct

Modelling scenario	TfNSW base case network assumptions	Land Use Assumptions			
		TfNSW base case land use assumptions	LCM Precinct (Rezoned)	Precinct 2 (subject precinct)	Precinct 5 (precinct subject to separate Planning Proposal)
#1 – 2041 Base Case	✓	✓	✓		
#2 – 2041 Base Case + Precinct 2	✓	✓	✓	✓	
#3 – 2041 Base Case + Precinct 2 and Precinct 5 (cumulative)	✓	✓	✓	✓	✓
#4 – 2036 Base Case	✓	✓	✓		
#5 – 2036 Base Case + Precinct 2	✓	✓	✓	✓ (70% of Precinct 2 development)	
#6 – 2036 Base Case + Precinct 2 and Precinct 5 (cumulative)	✓	✓	✓	✓ (70% of Precinct 2 development)	✓ (Partial Precinct 5 development)

The purpose of each of the scenarios is as follows:

– Scenarios #1 and #4 provide a land use and transport baseline to assess the net impacts of the proposed land use changes of the Belmore Road Precinct. Hence the land use of SCW Precinct should include the approved residential and employment targets in the DPE forecasts minus those in Precinct 2.

– Scenarios #2 and #5 when compared with Scenarios #1 and #4 respectively would specifically evaluate the impacts of the proposed land use change of the Belmore Road Precinct.

– Scenarios #3 and #6 were specifically requested by TfNSW in an email dated 1 December 2022 that the impacts of the proposed land use change of the Belmore Road Precinct are to be considered in cumulative to the impacts of Precinct 5.

The specific land use assumptions as presented above will be reviewed (in consultation with TfNSW) upon commencement of the modelling exercise, to confirm the scenarios are set up properly to assess the impacts of the Belmore Road Precinct.

The zone structure of the STFM modelling in the study area will also be reviewed (in consultation with TfNSW) upon commencement of the modelling exercise, to reflect realistic trip distribution between the development and the surrounding road network.

3.8 STFM modelling outputs

TfNSW will provide the following data such that SCT Consulting can undertake a general impact assessment on network capacity and key intersections for the Stage 1 Traffic Assessment:

– Select link analysis based on BHL Group site (all vehicles)

– 2-hour traffic volume plots (all vehicles, AM and PM Peak)

– Volume over capacity rate (VCR) plot (all vehicles, AM and PM Peak)

– 2-hour capacity.

A review of the STFM modelling outputs provided by TfNSW dated 23 November 2022 and a subsequent meeting with TfNSW dated 1 December 2022, confirmed that TfNSW has only provided modelling outputs for Scenarios #1 and #4 (due to limited resources of TfNSW to prepare detailed land use and network changes required for all other modelling scenarios).

Hence it was agreed with TfNSW that subsequent spreadsheet analysis can be initially used to understand impacts on the external road network to support pre-Gateway. SCT Consulting will prepare additional trip generation of the Belmore Road Precinct (and also in cumulative with Precinct 5) and mid-block capacity analysis will be undertaken for The Northern Road to undertake a high-level assessment of strategic network impacts.


SCT
Consulting