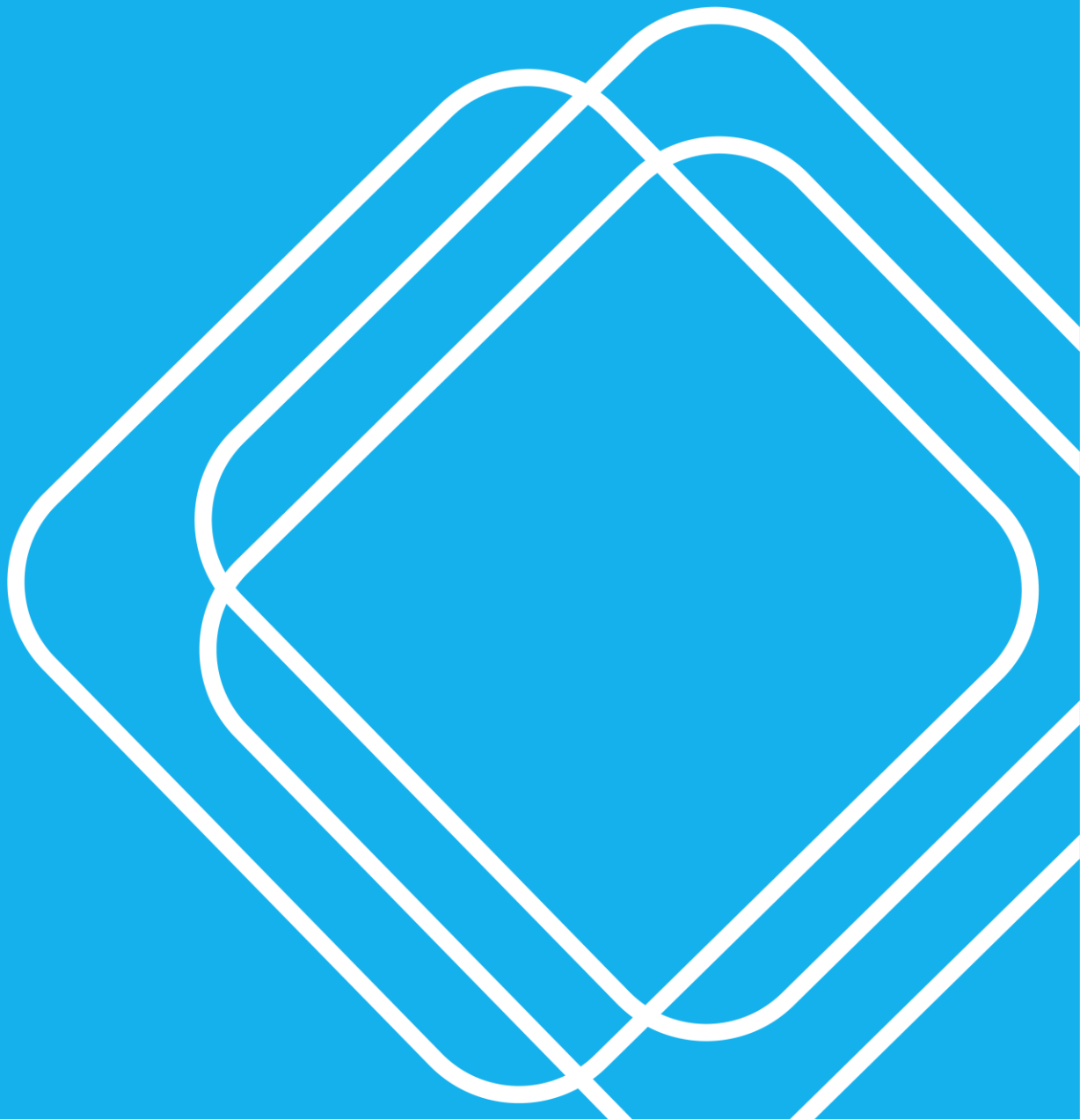
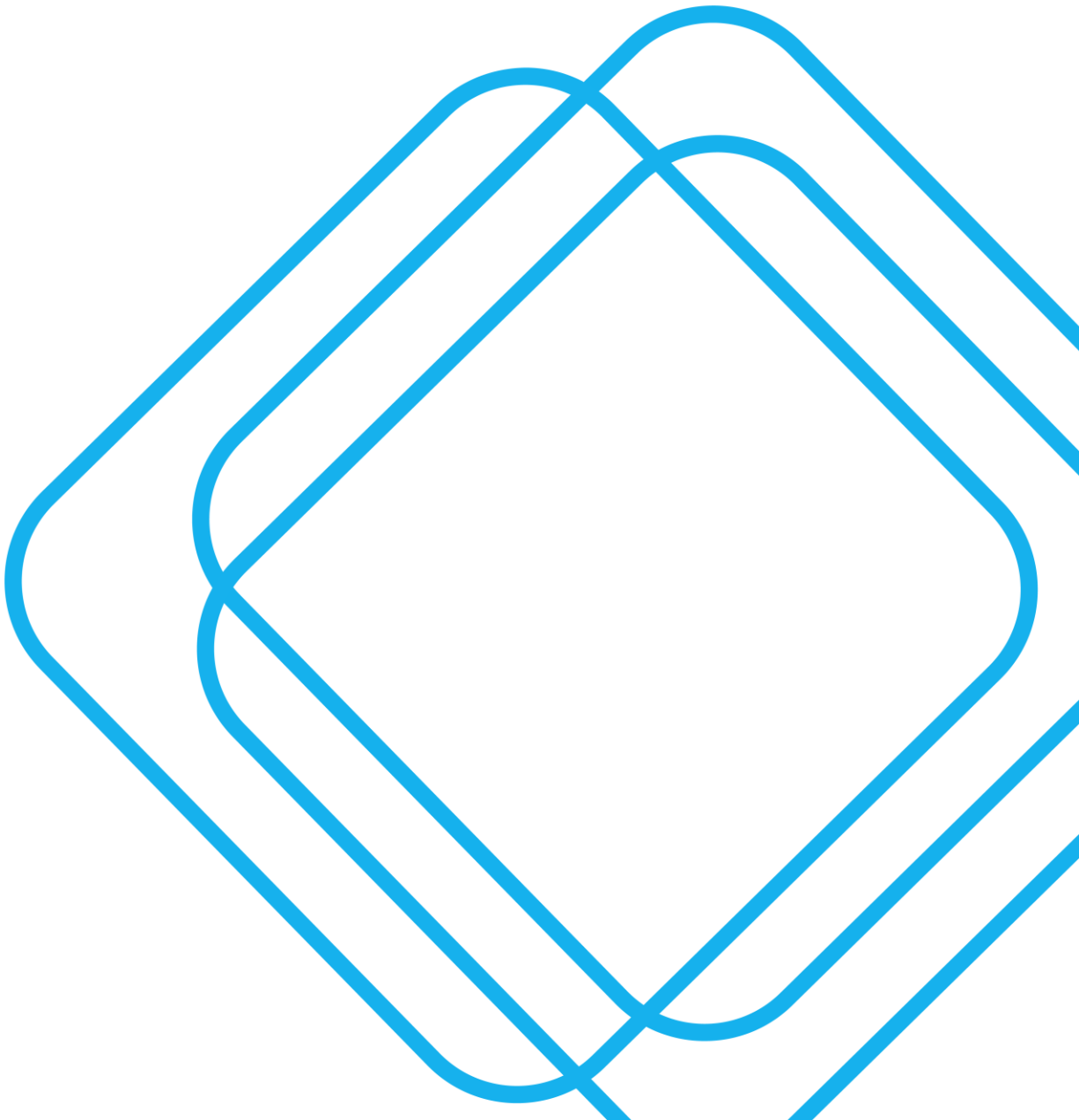
SCT Consulting

CHERRYBROOK STATION GOVERNMENT LAND SSP

Traffic and Transport Assessment

6 OCTOBER 2022





Quality Assurance

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1.2	9 December 2020	Updated Draft report
1.3	22 December 2020	Draft Final report
2.0	22 January 2021	Final Report
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6.0	6 October 2022	Updated Final Report (including response to submissions)

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Executive Summary

Background and introduction

Sydney Metro is Australia's biggest public transport project. This new standalone railway will deliver 31 metro stations and more than 66 kilometres of new metro rail, revolutionising the way Sydney travels. The Metro North West Line opened in May 2019 between Tallawong and Chatswood.

When Sydney Metro is extended into the central business district (CBD) and beyond in 2024, metro rail will run from Sydney's North West region under Sydney Harbour, through new underground stations in the CBD and beyond to the south west.

This study relates to a proposal to develop land called the 'Cherrybrook Station Government Land State Significant Precinct' (the State Significant Precinct) by Landcom on behalf of the landowner, Sydney Metro. The State Significant Precinct is centred around Cherrybrook Station on the Metro North West Line. The Metro North West Line delivers a direct connection with the strategic centres of Castle Hill, Norwest, Macquarie Park and Chatswood. It covers 7.7 hectares of government-owned land that comprises the Cherrybrook Station, commuter carpark and station access road (Bradfield Parade) and vacant land to the east of the station (referred to as the Developable Government Land) (DGL). It is bound by Castle Hill Road (south), Franklin Road (south east) and Robert Road (north west).

As a State Significant Precinct, the Minister for Planning and Public Spaces (the Minister) has determined that it is of State planning significance and should be investigated for rezoning. This investigation will be carried out in accordance with study requirements issued by the NSW Department of Planning, Industry and Environment (now Department of Planning and Environment (DPE)) in May 2020. These study requirements were prepared in collaboration with Hornsby Shire Council and The Hills Shire Council.

The outcome of the State Significant Precinct process will be new planning controls. This will enable the making of development applications to create a new mixed-use local centre to support Cherrybrook Station and the needs of the local community.

At the same time, DPE is also working with Hornsby Shire and The Hills Shire Councils, as well as other agencies such as Transport for NSW, to undertake a separate planning process for a broader area called the Cherrybrook Precinct. Unlike the State Significant Precinct, the outcome of this process will not be a rezoning. Instead, it will create a Place Strategy that will help set the longer term future for this broader area. Landcom will be consulted as part of this process.

SCT Consulting was engaged to carry out a Traffic and Transport Assessment to support a rezoning investigation of the State Significant Precinct.

The proposal

The proposed new planning controls for the State Significant Precinct are based on the investigations undertaken as part of the State Significant Precinct Study process. A Reference Scheme has also been prepared to illustrate one way in which the State Significant Precinct may be developed in the future under the proposed new planning controls.

The proposed planning controls comprise amendments to the Hornsby LEP 2013 to accommodate:

– Rezoning of the site for a combination of R4 High Density Residential, B4 Mixed Use and RE1 Public Recreation zoned land
– Heights of between 18.5m – 22m
– FSR controls of 1:1 – 1.25:1
– Inclusion of residential flat buildings as an additional permitted use on the site in the B4 Mixed Use zone
– Site specific LEP provisions requiring the delivery of a minimum quantity of public open space
– New site-specific Design Guide addressing matters such as open space, landscaping, land use, built form, sustainability and heritage.

The Reference Scheme seeks to create a vibrant, transit-oriented local centre, which will improve housing choice and affordability and seeks to integrate with Hornsby's bushland character. The Reference Scheme includes the following key components:

– Approximately 33,350m^2 of residential GFA, with a yield of approximately 390 dwellings across 12 buildings ranging in height from 2 to 5 storeys (when viewed from Bradfield Parade).
– A multi-purpose community hub with a GFA of approximately 1,300m^2.
– Approximately 3,200m^2 of retail GFA.
– Over 1 hectare of public open space, comprising:
  - A village square with an area of approximately 1,250m^2, flanked by active retail and community uses.
  - A community gathering space with an area of approximately 3,250m^2.
  - An environmental space around the pond and Blue Gum High Forest with an area of approximately 8,450m^2.
– Green corridors and pedestrian through site links, providing opportunities for potential future precinct-wide integration and linkages to the north.

The SSP would facilitate development which supports best practice transit-oriented development principles, by providing increased residential and employment density in proximity to existing and planned transport infrastructure upgrades that provides future residents with greater access to public transport and employment options, while promoting the use of sustainable travel options. Hence the need to predict and provide parking provision based on historical data / trends does not align with the principle of the Cherrybrook SSP.

The recommended parking rates is part of the proposal to encourage public transport use and minimise traffic impacts, as shown below:

Land use		Maximum car parking rates	Minimum bicycle parking rates
Residential	1 Bed	0.4 space per dwelling	One space per three apartments for resident and one visitor space per 10 apartments
	2 Bed	0.7 space per dwelling	
	3 Bed	1.2 spaces per dwelling	
	Visitor	0.14 spaces per dwelling	
Retail		1 space per 70 m^2 GFA	One space per 600 m^2 GFA for staff
Commercial / community facilities		1 space per 70 m^2 GFA	One space per 600 m^2 GFA for staff

Source: SCT Consulting, 2020

Based on recommended maximum car parking rates and minimum bicycle parking rates, the Reference Scheme proposes 376 car parking spaces, 8 motorcycle parking spaces and 177 bicycle parking spaces. This includes 3 car share parking spaces, based on 1 space per 150 car spaces for residential and 1 space per 80 car parking spaces for commercial.

Trip generation and traffic impacts

The Reference Scheme would generate about 220 peak hour vehicular trips during the AM and PM peak hours. The proposed restrained car parking provision is one of the tools used to reduce the traffic impacts of this proposal.

The key road servicing the SSP is Castle Hill Road. The intersections modelled in SIDRA Network were:

– Castle Hill Road / Bradfield Parade
– Castle Hill Road / Franklin Road
– Castle Hill Road / County Drive / Highs Road
– Castle Hill Road / Edward Bennett Drive / Coonara Avenue
– Castle Hill Road / Glenhope Road
– Bradfield Parade / Robert Road
– Bradfield Parade / Franklin Road.

The modelled road network currently operates with a performance of Level of Service D or better, with the degree of saturation of intersections at Castle Hill Road / County Drive and Castle Hill Road / Edward Bennett Drive approaching capacity.

The proposal should also have minimal impacts on the Movement and Place status of Bradfield Parade, Robert Road and Franklin Road given the small amount of additional traffic as a result of the proposed SSP site using each of these vehicular access points.

The highest traffic increase on the surrounding road network as a result of SSP site development is observed at Bradfield Parade given the intersection with Castle Hill Road would be the main access gateway to the proposed development. Given the scale of the SSP development and associated small increase in vehicle trip generation, there is limited impact of the SSP site on the road network. Therefore, no additional infrastructure is needed for SSP development.

However, due to the background traffic growth and the Place Strategy traffic, infrastructure upgrades are required at the intersection of Castle Hill Road / County Drive by 2036. The details of the scope and costs of upgrade at this intersection can be found in the wider Cherrybrook Precinct Traffic & Transport Planning Study prepared for DPE.

Based on the non-car generation of the preferred development option (as described in **Section 4.7**) and the increased mode shift target towards active transport, approximately 430 additional pedestrians (including public transport trips) and 16 additional cyclists would be generated in the busiest peak period. Given the extent of the proposed improvements to the walking and cycling network as part of the proposed development and the introduction of the metro station, the surrounding active transport network is expected to be able to handle the additional 450 walking and cycling trips, as a result of the proposed development. With the high frequency of train services, the pedestrian demand between the proposed development and the station would be very well-spread across the peak hours, hence reducing the likely crowding levels and the need for additional upgrade of current footpaths and shared paths which were delivered for significantly higher demand and are currently observed to have significant spare capacities.

The proposed development would also be expected to generate over 390 public transport trips in a typical peak hour based on the assumed future mode share target (refer to **Section 4.6**). The site has access to an average of 30 metro services (in both directions) per weekday peak hour and 12 services per hour throughout the day during weekends. The bus data indicates that the combined frequency of bus services near the site is 22 and 25 services (in both directions) per AM and PM peak hour respectively during weekdays. It is expected that the additional public transport demand can be accommodated by the existing frequent metro and bus services. Applying the additional 236 metro and 157 bus trips would equate to approximately 8 additional passengers per metro train and 6 additional passenger per bus being generated by the site during weekday peak hours. With bus stops interchanging directly at Cherrybrook Station, no changes to bus service patterns are considered necessary to service the development.

Conclusion

This Traffic and Transport Assessment concludes that:

– The location of the site directly adjacent to Cherrybrook Station and bus interchange will provide future residents and employees with good access to high frequency public transport services, which will provide an alternative to private vehicle use especially for commuter trips.

– Footpath and pedestrian crossing facilities are well provided around the site to support safe and convenient walk to / from Cherrybrook Station.

– Dedicated cycle routes around the site connecting to the regional routes will cater for more short trips by cycling to nearby activities and destinations.

– Parking rates are proposed for the Reference Scheme to create a transit-oriented centre in line with metro's vision, reflecting the higher level of public transport services and to minimise additional congestion to the surrounding road network.

– The total number of residential parking spaces is appropriate for this transit-oriented development and in line with Council's DCP and SEPP 65 requirements and will naturally limit the traffic impacts of this proposal.

– The additional vehicle trips will not have any significant adverse traffic implications on the public road network and no additional infrastructure or upgrades are required to service the development.

1.0 Introduction

1.1 Context

SCT Consulting was engaged to carry out a Traffic and Transport Assessment for a proposal to develop land called the 'Cherrybrook Station Government Land State Significant Precinct' (the State Significant Precinct) by Landcom on behalf of the landowner, Sydney Metro.

The State Significant Precinct is centred around Cherrybrook Station on the Metro North West Line. The Metro North West Line delivers a direct connection with the strategic centres of Castle Hill, Norwest, Macquarie Park and Chatswood. It covers 7.7 hectares of government-owned land that comprises the Cherrybrook Station, commuter carpark and station access road (Bradfield Parade) and vacant land to the east of the station (referred to as the Developable Government Land) (DGL). It is bound by Castle Hill Road (south), Franklin Road (south east) and Robert Road (north west).The SSP is located in the Hornsby Shire local government area (LGA), just north of The Hills Shire LGA (with the LGA border boundary being Castle Hill Road). The DGL in the context of the SSP is shown in **Figure 1–1**.

Figure 1–1 Location of Cherrybrook Station SSP site

Source: Study Requirements for Cherrybrook Station Government Land (May 2020)

The proposed new planning controls for the State Significant Precinct are based on the investigations undertaken as part of the State Significant Precinct Study process. A Reference Scheme has also been prepared to illustrate one way in which the State Significant Precinct may be developed in the future under the proposed new planning controls.

The proposed planning controls comprise amendments to the Hornsby LEP 2013 to accommodate:

– Rezoning of the site for a combination of R4 High Density Residential, B4 Mixed Use and RE1 Public Recreation zoned land

– Heights of between 18.5m – 22m

– FSR controls of 1:1 – 1.25:1

– Inclusion of residential flat buildings as an additional permitted use on the site in the B4 Mixed Use zone

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– Green corridors and pedestrian through site links, providing opportunities for potential future precinct-wide integration and linkages to the north.

1.2 Planning background

1.2.1 Sydney Metro

Sydney Metro is Australia's biggest public transport project. As a new standalone railway, this 21st century network will revolutionise the way Sydney travels.

The Sydney Metro program of works includes:

1. **Metro North West Line**

Passenger services started in May 2019 between Tallawong and Chatswood, with a driverless metro train every four minutes in the peak.

2. **Sydney Metro City & Southwest**

A new 30km line extending metro rail from Chatswood, under Sydney Harbour, through new CBD stations and southwest to Bankstown. It is due to open in 2024 with the ultimate capacity to run a metro train every two minutes each way through the centre of Sydney.

Sydney Metro City & Southwest will deliver new metro stations at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street, Waterloo and new underground metro platforms at Central Station. In addition, it will upgrade and convert all 11 stations between Sydenham and Bankstown to metro standards.

3. **Sydney Metro West**

Sydney Metro West is a new underground railway between Greater Parramatta and Sydney. This once-in-a-century infrastructure investment will transform Sydney for generations to come, doubling rail capacity between these two areas, linking new communities to rail services and unlocking housing supply and employment growth between the two CBDs.

Sydney Metro West will service key precincts, with stations at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and the Sydney CBD.

4. **Sydney Metro – Western Sydney Airport**

Metro rail will also service Greater Western Sydney and the new Western Sydney International (Nancy Bird Walton) Airport. The new railway line will become the transport spine for the Western Parkland City's growth for generations to come, connecting communities and travellers with the rest of Sydney's public transport system with a fast, safe and easy metro service. The Australian and NSW governments are jointly delivering this new railway, to open at the same time as the airport.

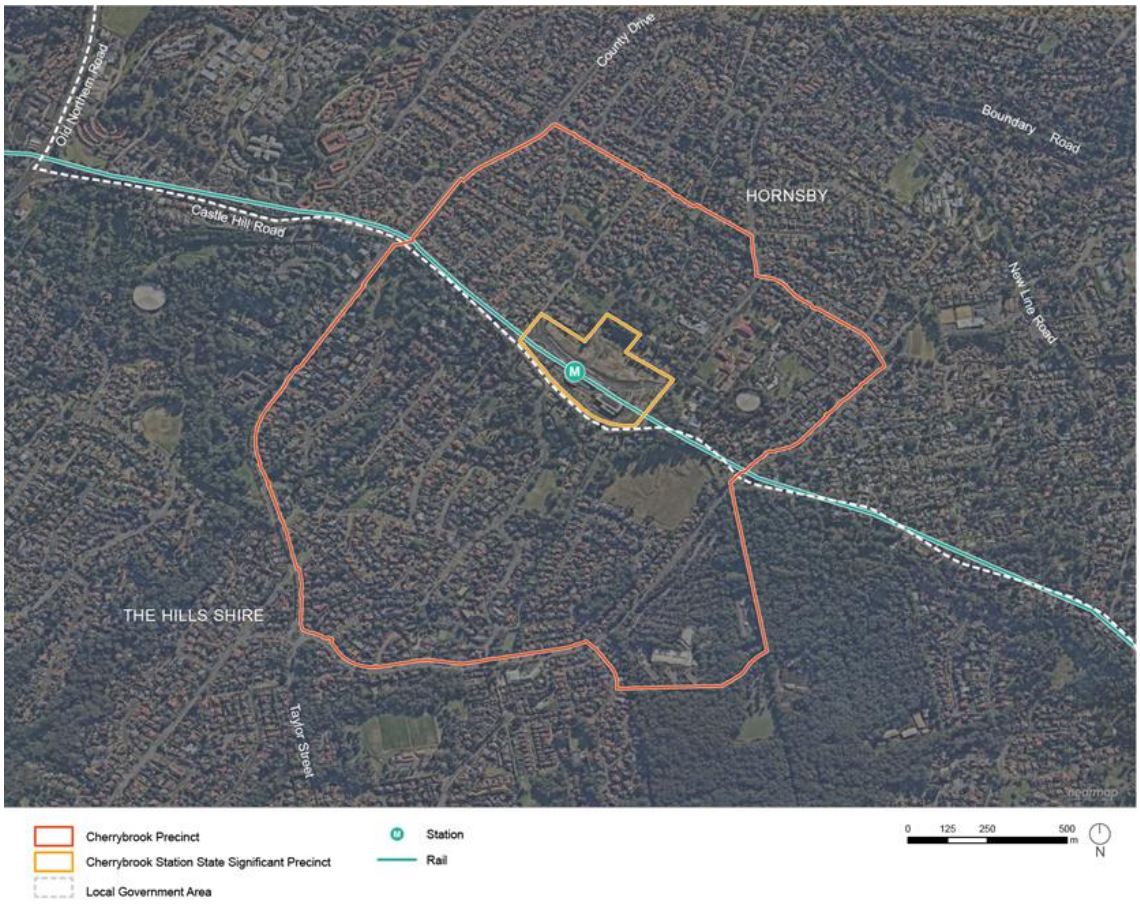
1.2.2 Cherrybrook Station Precinct

The Metro North West Line, with 13 stations is a catalyst for urban renewal, providing connections to areas that will be transformed through both NSW Government and private investment. NSW Government-owned land surrounding the metro stations includes land that is no longer required to support operation. These sites have been made available for development that supports NSW Government priorities of housing affordability, local infrastructure delivery and economic development.

Cherrybrook Station Precinct (as shown in **Figure 1–2**) is one of eight urban transformation projects under the Sydney Metro Northwest Places (SMNWP) Program, with the other seven sites around new metro stations being Castle Hill, Hills Showground, Norwest, Bella Vista, Kellyville and Tallawong, as well as around the existing Epping Station.

The precinct covers 187 hectares and encompasses land within Hornsby Shire and The Hills Shire LGAs, bisected by Castle Hill Road. It is bounded by John Road / Neale Avenue to the north, Edward Bennett Drive / Coonara Avenue to the east and Highs Road / Country Drive to the west.

Figure 1–2 Cherrybrook Station Precinct and Cherrybrook Station State Significant Precinct



Source: NSW Department of Planning and Environment

Based on the Cherrybrook Station Place Strategy, future rezoning proposals in the precinct will:

– Transform the area around Cherrybrook Station into a vibrant urban centre that provides a precinct that contains a mix of local retail and residential uses to provide activation within the station and interchange areas, and attractive public spaces that are a focal point for the local community

– Provide for an additional 3,200 residential dwellings and 50 new jobs by 2036

– Provide attractive open spaces of high amenity for the public, as well as an accessible and safe public domain

– Provide a public domain that ensures safety and accessibility for all modes of transport, particularly cycling and walking, within the station precinct and between the station and adjoining uses.

The introduction of the metro has provided an opportunity to transform Cherrybrook Station by providing a new focal point for the community centred around the station, proposed to include a mix of neighbourhood shops and services to provide for the daily needs of the local community. It also provides an opportunity to increase residential densities within walking distance of the station, involving a variety of housing types. Car parking provision will recognise the transit-oriented development nature of the development.

In parallel to this SSP traffic and transport study, DPE has engaged Bitzios Consulting to develop a traffic and transport improvements implementation plan for the Cherrybrook Precinct Place Strategy. Since the scopes of the two assessments vary in modelling software, extent and year due to the different scope of the two studies, the outcomes of the two assessments such as intersection performance and infrastructure upgrades identified are not expected to be exactly the same. However, in general the outcomes of the two assessments are generally aligned in terms of intersections requiring upgrade to cater for future development growth of the Cherrybrook Precinct and the SSP.

1.3 Purpose of this study

As a State Significant Precinct, the Minister for Planning and Public Spaces (the Minister) has determined that it is of State planning significance and should be investigated for rezoning. This investigation will be carried out in accordance with study requirements issued by the NSW Department of Planning, Industry and Environment (now Department of Planning and Environment (DPE)) in May 2020. These study requirements were prepared in collaboration with Hornsby Shire Council and The Hills Shire Council.

The outcome of the State Significant Precinct process will be new planning controls. This will enable the making of development applications to create a new mixed-use local centre to support Cherrybrook Station and the needs of the local community.

At the same time, DPE is also working with Hornsby Shire and The Hills Shire Councils, as well as other agencies such as Transport for NSW, to undertake a separate planning process for a broader area called the Cherrybrook Precinct. Unlike the State Significant Precinct, the outcome of this process will not be a rezoning. Instead, it will create a Place Strategy that will help set the longer term future for this broader area. Landcom will be consulted as part of this process.

The purpose of this State Significant Precinct Study is to address the relevant study requirements for the State Significant Precinct, as issued by DPE. It is part of a larger, overall State Significant Precinct Study. This State Significant Precinct Study undertakes planning investigations for the precinct in order to achieve a number of objectives that are summarised as follows (refer to the State Significant Precinct Study Planning Report for a full list of the study requirements):

– Facilitate a mixed-use local centre at Cherrybrook Station that supports the function of the station and the needs of the local community
– Deliver public benefit through a mixed use local centre
– Deliver transport and movement initiatives and benefits
– Demonstrate the suitability of the site for the proposed land uses
– Prepare a new planning framework for the site to achieve the above objectives.

The purpose of this Traffic and Transport Assessment is to support the overall State Significant Precinct Study for a proposed mixed-use development at Cherrybrook Station Government Land. This report has addressed the requirements outlined in Section 9 (Traffic and Transport) of the ‘Study Requirements for Cherrybrook Station Government Land (NSW Government, May 2020)’ report.

Table 1-1 shows the study requirements and how SCT Consulting has addressed each of the study requirements in this assessment.

Table 1-1 Study requirements and compliance

Study requirements (Section 9 Traffic and Transport)		Relevant section(s) that addressed the study requirements
Prepare a Traffic and Transport study for the site, including, but not limited to:		
9.1	Review and liaison including:	
	– Review of relevant State, regional and local planning policies and all relevant background documents.	Section 2.0
	– Review of concept plans prepared and provide traffic, transport, access and parking design advice during design development phase, for all modes of transport.	Section 4.2 and 4.4
	– Review of existing traffic and travel pattern data (pre COVID-19) including Census, Journey-to-work data and Opal data.	Section 3.1 and 3.2
	– Liaison with Transport for NSW, including Transport Performance and Analytics (TPA), and other relevant stakeholders to review and update Strategic Travel Model (STM) and PTPM (by TPA) to reflect relevant modelling scenarios required for this assessment.	Section 5.4
9.2	Collection of traffic and transport movement data (walking, cycling and traffic) at the following intersections near the SSP site (undertaken after the opening of the new metro station) on a typical Thursday: – Castle Hill Road / Bradfield Parade – Castle Hill Road / Franklin Road – Castle Hill Road / County Drive / Highs Road – Castle Hill Road / Edward Bennett Drive / Coonara Avenue – Castle Hill Road / Glenhope Road – Bradfield Parade / Robert Road – Bradfield Parade / Franklin Road	Walking / cycling data – Section 3.3.2 Traffic data – Section 3.7
9.3	Review of existing traffic and transport conditions, including connectivity and accessibility to walking and cycling routes, public transport accessibility and intersection performance for a typical Thursday AM and PM peak hour.	Section 3.0
9.4	Consideration and application of the Movement and Place objectives and general approaches as outlined in “Better Placed Aligning Movement and Place” by Government Architect NSW. This should be considered as part of the traffic study analysis and recommendations and the urban design work and should include informing the transport prioritization and the overall urban design framework for new street/s and public domain and recommendations for adjacent streets and intersections.	Section 2.5, 2.6, 3.6.2 and 4.2
9.5	Evidence should be provided to demonstrate the future travel behaviour (i.e. mode share) patterns which are established on the basis of a comparative Benchmarking Study and forecast modelling such as the Strategic Travel Model (STM) or Public Transport Project Model.	Section 4.6 and 5.4
9.6	Preparation of a traffic and transport assessment for the SSP site, in accordance with TfNSW including former RMS (now that RMS is part of TfNSW) requirements and methodologies and to address the transport and movement initiatives and benefits (Listed under ‘Purpose of the SSP study’ – page 7 of the Study Requirements Document), including:	

Study requirements (Section 9 Traffic and Transport)		Relevant section(s) that addressed the study requirements
	– Assess site access and demonstrate connectivity to the surrounding road network, including consideration of the servicing and delivery requirements of the SSP site development.	Section 4.2
	– Understand the surrounding walking and cycling networks and determine future demands	Section 3.3, 3.4, 4.2.3, 4.4.2, 4.6
	– Identify and propose walking and cycling network measures to improve access to and from the SSP site development as well as connecting to the surrounding area	Section 3.3, 3.4, 4.2.3, 4.4.2, 4.6
	– Consider appropriate Travel Demand Management measures to reduce vehicular trip generation of the SSP site	Section 4.3
	– Apply background growth scenarios from strategic modelling outputs to the surrounding road network and understand the without development transport demand scenarios for the future years	Section 5.4.1
	– Determine net increase trip generation of the proposed development (based on the agreed development yield and trip generation rates)	Section 4.5 and 5.4.2
	– Distribution of the net trip generation to the surrounding road network based on the preferred access strategy and using the travel patterns derived from the strategic models	Section 4.5 and 5.4.2
	– Identify existing and proposed bus and public transport services that connect to the Cherrybrook Station in the surrounding area	Section 3.5, 4.2.2, 4.6
	– Review the Cherrybrook Station Precinct Parking Strategy (undertaken by the Department) and liaise with relevant stakeholders to confirm appropriate parking provision for the SSP site plus review on-street parking requirements	Section 2.13 and 4.4.1
	– Identify separate bicycle and car parking requirements to be applied to the development considering sustainable travel initiatives for the development	Section 4.4
	– Assess the suitability and provision of electric vehicle charging infrastructure and parking	Section 4.4.4
	– Assess the road network using SIDRA (version 8) for each identified intersection with and without the development, for existing and future scenarios during AM and PM peak hours according to modelling requirements as set out below	Section 3.7 and 5.4
	– Identify potential road network traffic impacts due to the development and non-development related traffic and recommend mitigation measures required to address the impacts	Section 5.4
9.7	Agree the core modelling assumptions including trip generation, travel mode share, parking rates with all relevant stakeholders, prior to commencement of any future year traffic modelling	Section 5.4
9.8	Undertake the following traffic modelling requirements to provide an understanding of the impacts of the SSP site as well as any regional upgrades (including costings) required to cater for the background traffic growth and local upgrades (including costings) required to support the SSP site and that of the broader precinct growth, including:	

Study requirements (Section 9 Traffic and Transport)	Relevant section(s) that addressed the study requirements
– Existing traffic (based on survey data) SIDRA base models are to be calibrated/ validated in accordance with RMS Traffic Modelling Guidelines and Chapter 2.6 of the SIDRA 8 User Guide	Section 3.7
– Vehicle movements associated with Cherrybrook Station (kiss and ride, park and ride and bus movements)	Section 3.1.2 and 3.7
– General background traffic growth on the road network as a result of wider population and employment growth of the whole Sydney Metropolitan Area excluding the surround precinct (Cherrybrook Structure Plan area), IBM site and the SSP site. The background growth will be determined using outputs of PTPM model, to be run by TPA	Section 5.4.1
– Traffic generated by the SSP site e.g. 600-700 dwellings	Section 4.5 and 5.4.2
– Traffic generated by proposals in vicinity of Cherrybrook Station including: • The surrounding precinct (2013 Cherrybrook Structure Plan area) – total of 3,200 additional dwellings (less estimated SSP site dwellings) • NOTE: the precinct dwelling total may change and require additional input to this modelling as a result of 1) the precinct planning process, or 2) any planning proposals within the surrounding precinct that receive gateway determination approval or rezoning approval i.e. if they alter the surrounding precinct dwelling total. ○ Former IBM site proposal – gateway approval – 600 additional dwellings ○ Potentially Cherrybrook Central (Toplace) proposal – proposed additional dwellings ○ Potentially Grosvenor Place proposal – proposed additional dwellings	Section 5.4
– Scenarios for modelling are listed within Appendix 2 of the Study Requirements	Section 5.4

Source: Department of Planning and Environment, May 2020 with responses by SCT Consulting, November 2020

1.4 Report structure

This report has been structured into the following sections:

– **Section 2** considers the relevant transport planning context.

– **Section 3** describes the existing transport conditions for all modes of transport.

– **Section 4** describes the proposed development and its access strategy as well as the parking requirements and the likely trip generation as a result of the proposed development.

– **Section 5** describes the likely cumulative impacts for all transport modes and parking impacts as a result of the proposed development.

– **Section 6** summarises the report content and presents the final conclusions.

2.0 Transport planning context

This section of the report provides a summary of key planning and transport context that are relevant for the planning of traffic and transport infrastructure and services to support the development of the Cherrybrook SSP site. Hence the majority of discussion of the context relates to wider area outside of the DGL site, such as the wider Cherrybrook Precinct Place Strategy area, The Hills Corridor Strategy along the Metro North West Line, the draft Local Strategic Planning Strategy for The Hornsby and Hills LGAs, the Central and North City District Plans as well as State Government plans and strategies.

These planning documents contain principles and strategies of potential traffic and transport infrastructure and services to guide the planning of land use and transport changes within the study area and in the wider surrounding context. The specific traffic and transport infrastructure and services discussed in this chapter should be read as planning context and they may not be infrastructure and services proposed to service the site and the development as proposed in this SSP study.

The specific traffic and transport infrastructure and services proposed to service the SSP site are further discussed and included in **Section 4.0** of this report.

2.1 The NSW Government Future Transport 2056 Strategy

The Future Transport Strategy 2056 (The NSW Government, 2018) is an update of NSW's Long-Term Transport Master Plan. It is a vision for how transport can support growth and the economy of New South Wales over the next 40 years. The strategy is underpinned by the Regional Services and Infrastructure Plan and the Greater Sydney Services and Infrastructure Plan, as well as a number of supporting plans including Road Safety and Tourism.

The Future Transport Strategy 2056 sets the long-term vision for mobility and transport provision in NSW, explains how the customer experience of transport will change and what this means for NSW. The Future Transport Strategy 2056 identifies that Sydney will grow as a global metropolis with benefits distributed more evenly across the City. It sets out a vision of three cities to guide many of the planning, investment and customer outcomes including faster, convenient and reliable travel times to major centres, as shown in **Figure 2–1**.

Existing and potential transit connections, together with new technology and innovation, will make the network surrounding the site more responsive to demand and better able to manage congestion in the future. For the three cities identified, more specific outcomes listed as part of the Strategy which will benefit the site's transport context, include:

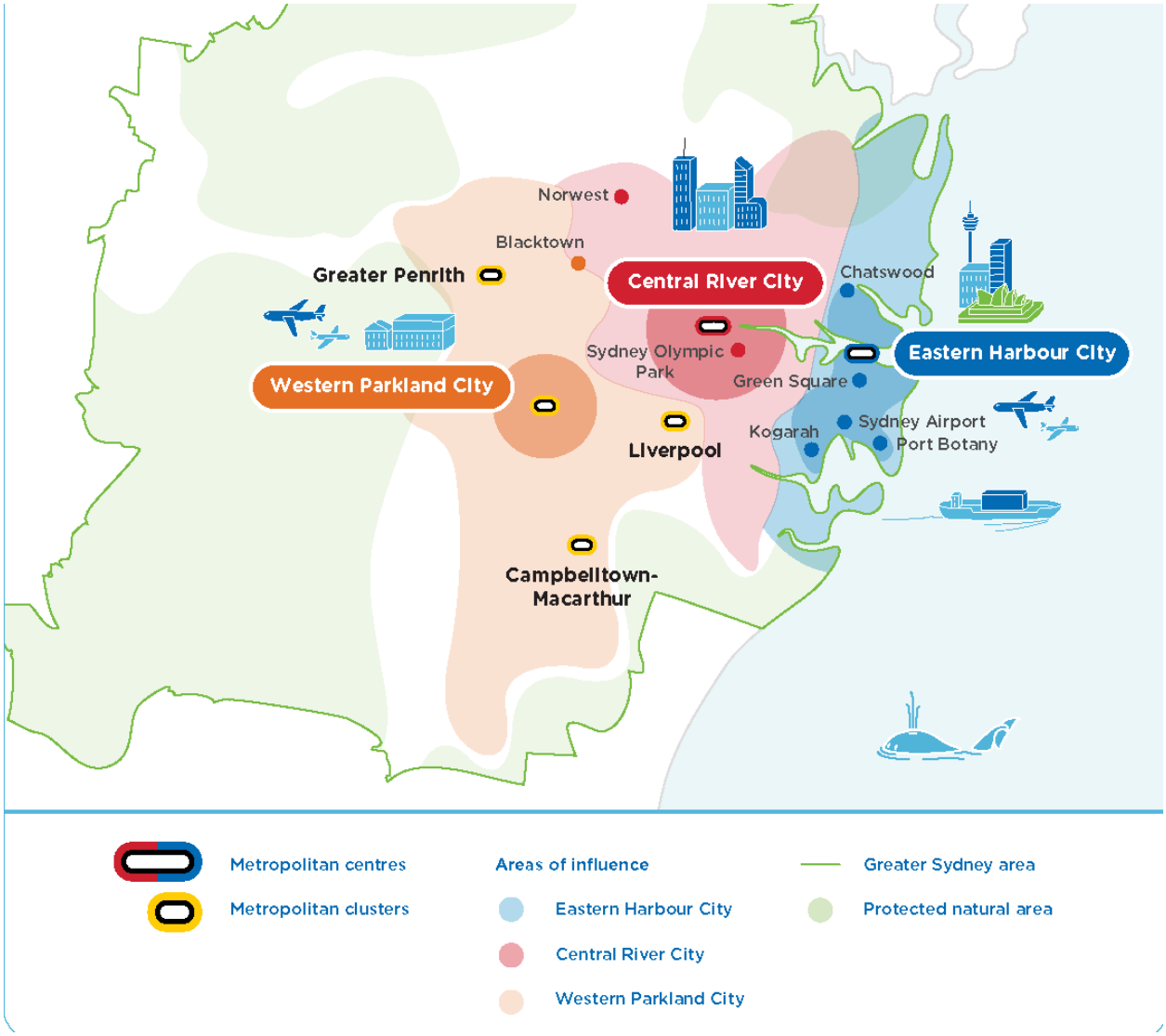
– A 30-minute access for customers to their nearest Centre by public transport 7-days a week

– Fast and convenient interchanging with walking times no longer than 5 minutes between services

– Walking or cycling is the most convenient option for short trips around centres and local areas, supported by a safe road environment and attractive paths

– Fully accessible transport for all customers.

Figure 2–1 A future metropolis of three cities



Source: The NSW Government Future Transport 2056 Strategy, 2018

2.2 State Infrastructure Strategy

The Future Transport Strategy 2056 was released in coordination with the State Infrastructure Strategy. One of the strategic directions of the strategy was integrating land use and infrastructure planning. The strategy notes that "Further action needs to be taken to identify and protect major infrastructure corridors and supporting and coordinating housing supply plans that align with Regional Plans." (INSW, 2018). One of the key challenges and opportunities is that "the State's growing population and tightening fiscal position make it imperative that we get the most from our current infrastructure stock and that investment in new infrastructure is targeted effectively to meet and shape demand."

Implications for Cherrybrook SSP site: Managing the impacts of the development while maximising the use of current infrastructure is critical at this location. With major new investment into the Sydney Metro, the site is well placed to benefit from current capacity without the need for significant additional expenditure.

2.3 Central City and North District Plans

The SSP site is located within the Hornsby Shire LGA which is covered by the North District Plan, but the entirety of the wider Cherrybrook Station Precinct stretches over areas within both the Central City and North District Plans, as seen in **Figure 2–2** and **Figure 2–3**.

The vision for the Central City and North Districts is to help residents have quicker and easier access to a wider range of jobs, housing types and activities as part of the transformation of their District. The vision will improve the District's lifestyle and environmental assets. The District Plans are 20-year plans to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision of Greater Sydney.

The District Plans inform local strategic planning statements and local environmental plans, the assessment of planning proposals as well as community strategic plans and policies. The District Plans also assist councils to plan for and support growth and change and align their local planning strategies to place-based outcomes. It guides the decisions of state agencies and informs the private sector and the wider community of approaches to manage for growth and change. Community engagement on the District Plans has contributed to a plan for growth that reflects local values and aspirations, in a way that balances regional and local considerations.

The North District Plan identifies Cherrybrook as an emerging destination and local centre for eateries and cafes, offering unique neighbourhood qualities and cultural facilities, as well as proximity to public transport and transport interchanges, as an important part of a 30-minute city. This, together with the introduction of the Sydney Metro, identifies the Cherrybrook Precinct as a site that has the opportunity to transform into a transit-oriented, more vibrant and diversified centre, with a mix of residential uses and supporting services. The Metro North West Line will also enable faster and more reliable business-to-business connections to other centres such as Epping, Macquarie Park and Chatswood.

The vision for Greater Sydney is one where people can access jobs and services in their nearest metropolitan and strategic centre. The 30-minute city is a long-term aspiration that will guide decision-making on locations for new transport, housing, jobs, tertiary education, hospitals and other amenities. It means that they will be planned for metropolitan and strategic centres and more people will have public transport access to their closest metropolitan or strategic centre within 30 minutes. This will enable more efficient access to workplaces, services and community facilities.

The Plans set out several planning priorities to achieve their future vision. Initiatives related to 'delivering integrated land use and transport planning and a 30-minute city' outlined in the North District Plan include:

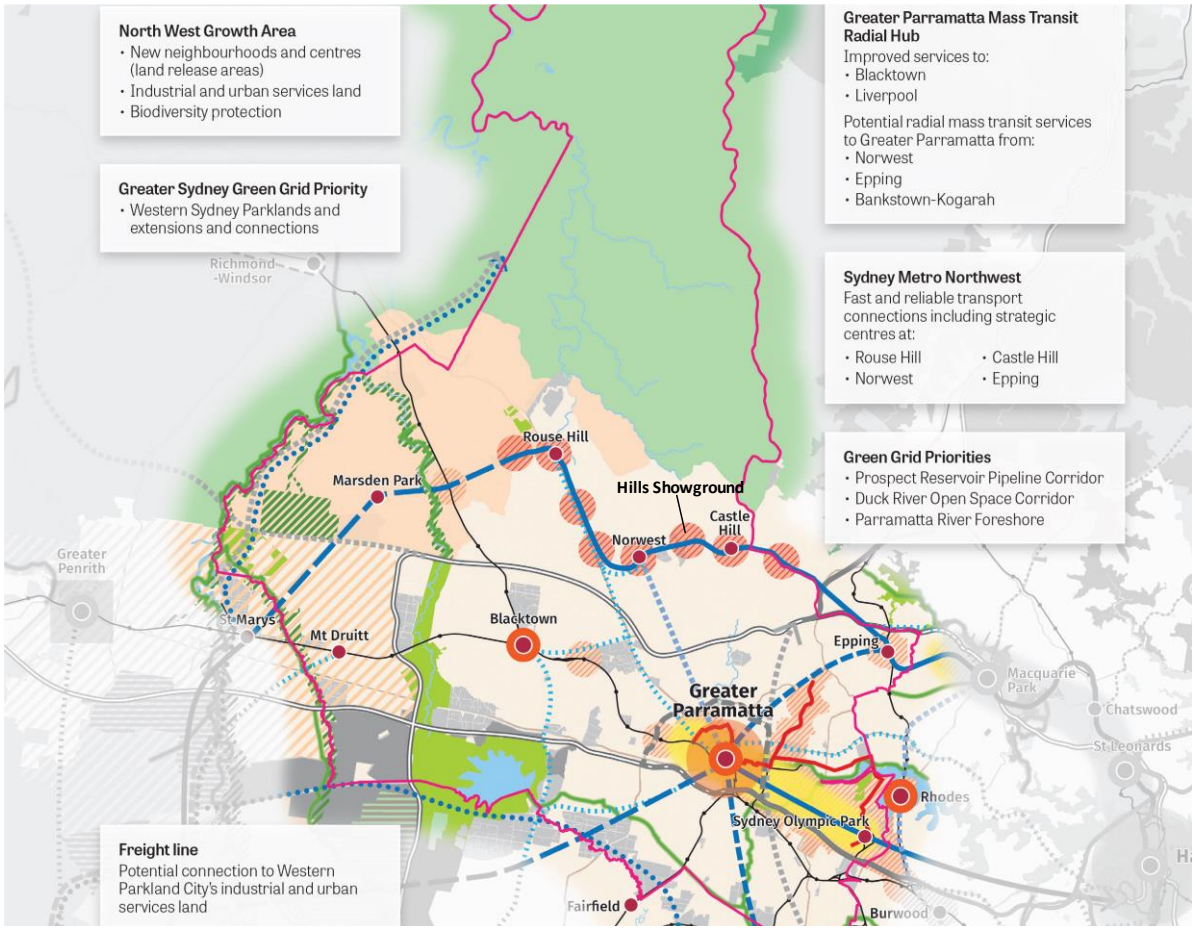
– City-shaping transport providing higher speed and volume linkages to better connect people to centres and services including committed and proposed links to both the Harbour CBD and the Central River City.

– Capacity and reliability improvements on existing transport corridors serving the Harbour CBD and strategic centres.

– Improvements to the strategic road network, which may include both new roads and road space reallocation to prioritise the efficient movement of people and goods on transport corridors and key intersections to improve movement through the District and access to strategic centres.

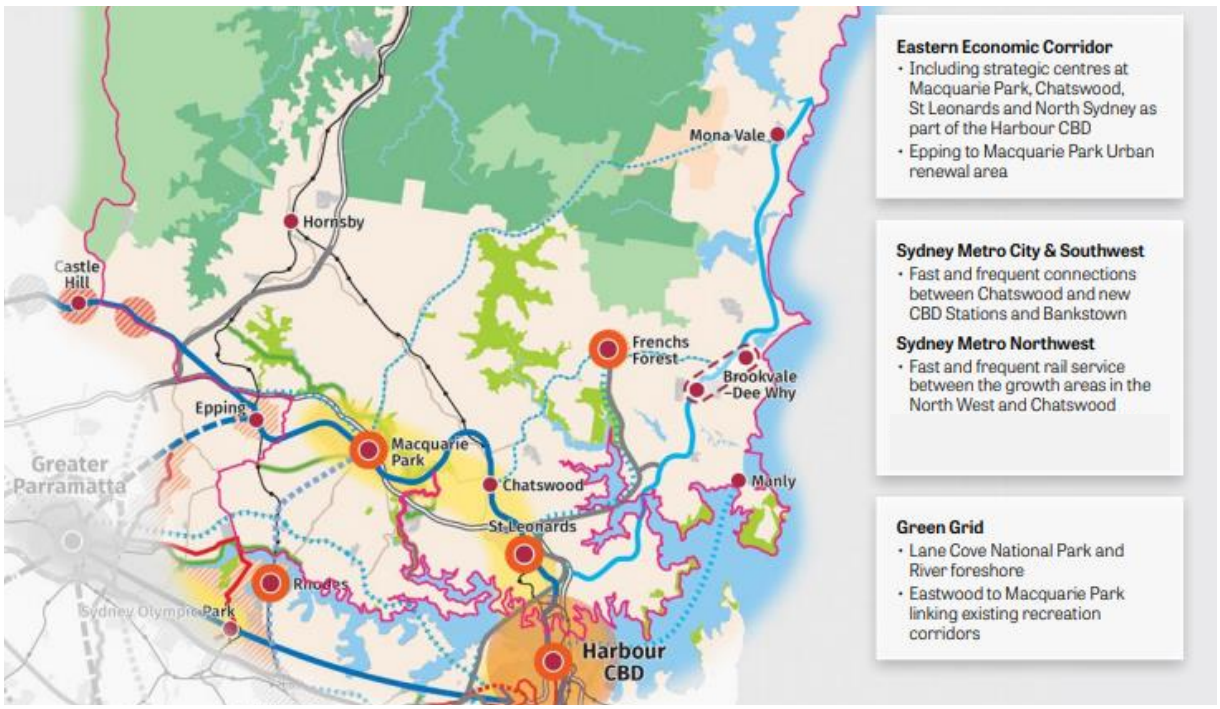
– Travel behaviour change to help manage demand on the transport network.

Figure 2–2 Future of the Central City District



Source: Central City District Plan, 2018

Figure 2–3 Future of the North City District



Source: North City District Plan, 2018

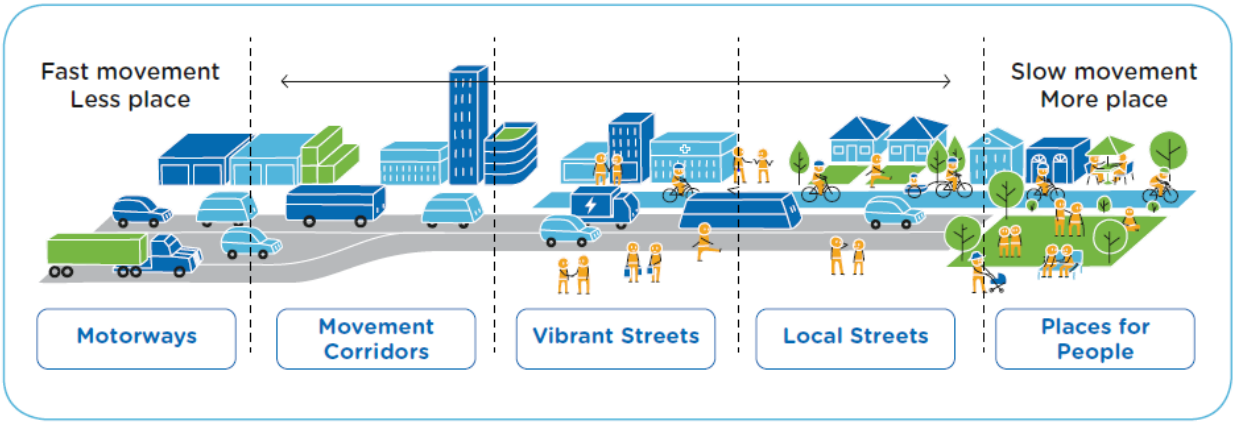
Implications for Cherrybrook SSP site: Given the excellent access to the Metro North West Line and Cherrybrook being identified as a future local centre, the Cherrybrook SSP site can play an important role as a transit-oriented development. Transit-oriented developments must aim to adopt car parking rates that provide a balance between meeting car parking demand whilst encouraging sustainable and active transport use. New developments are encouraged to minimise car parking provision and demonstrate the inclusion of supportive mix of land uses and transport alternatives or strategies to reduce trip generation and discourage private motor vehicle use. The proposal will support future residents who choose to live in a transit-oriented centre with low parking provision and excellent access to public and active transport.

2.4 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 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 as 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 we will be able 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 it.

Figure 2–4 Different movement environments under the Movement and Place Framework



Source: https://future.transport.nsw.gov.au/sites/default/files/media/documents/2018/Future_Transport_2056_Strategy.pdf, 2018

Implication for Cherrybrook SSP site: The road network proposed as part of the site would be classified as local streets and will be part of a suburban neighbourhood where people live their lives, as well as facilitating local community access to the station. The station arrival areas at Bradfield Parade are places for people, and therefore are expected to have a Place function.

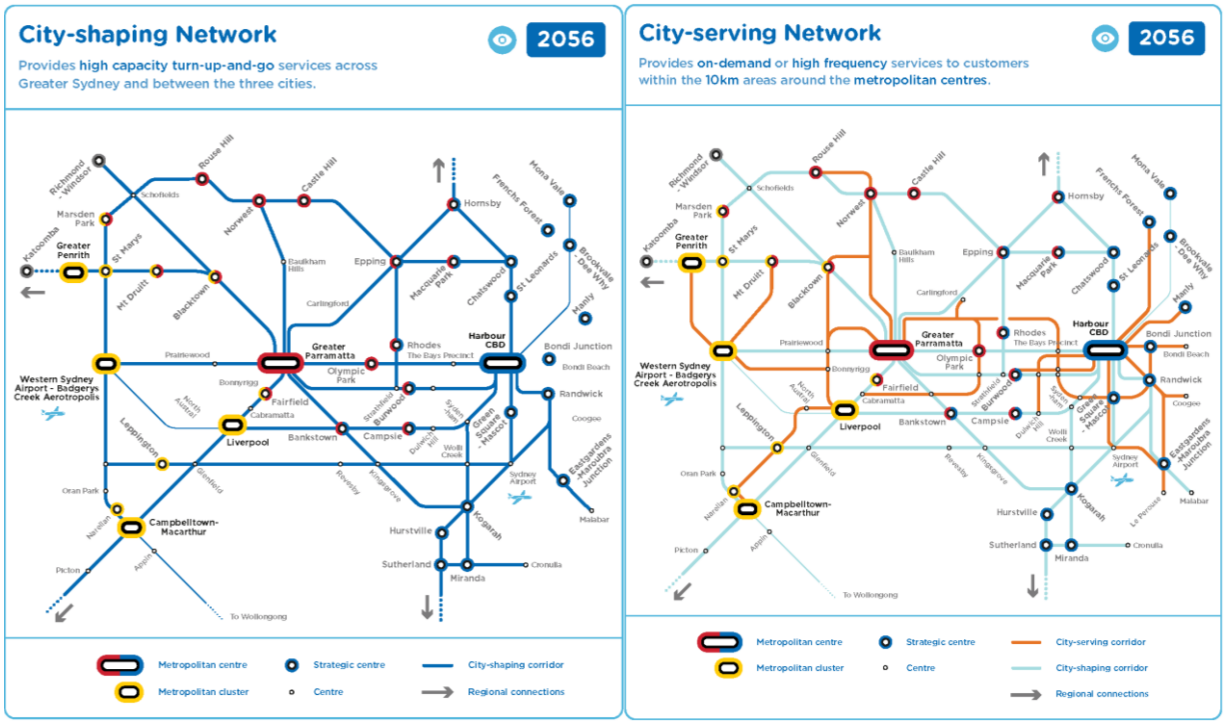
2.4.1 Future Transport Network

2.4.1.1 City-shaping network

The city-shaping network includes higher speed and volume linkages between our cities and centres (**Figure 2–5**). 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.

Figure 2–5 City-shaping and City Serving networks - 2056



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

2.4.1.2 City-serving network

The city-serving network will provide high-frequency services within a ~10km radii of the three metropolitan cities/centres (**Figure 2–5**). This will support access within some of the densest land use in Greater Sydney where demand for travel is most concentrated. As these 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, providing more travel options for employees and visitors to the SSP site.

Implication for Cherrybrook SSP site: The site, located between Castle Hill and Epping, is part of both city-shaping and city-serving networks that would connect Cherrybrook to Greater Parramatta via Epping, the Western Sydney Airport via Greater Parramatta or St Marys as well as the Harbour CBD via Chatswood. This would bring Cherrybrook into reach of all three cities by high frequency and high capacity public transport links.

2.4.1.3 Bicycle Network

Building on the existing network, the immediate focus for State Government 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:

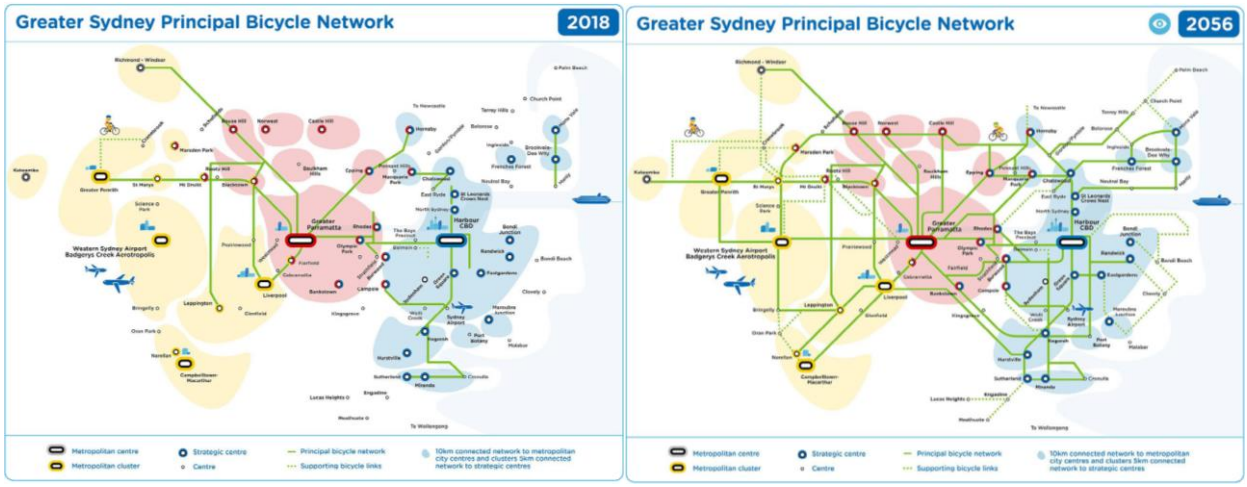
– Walking and cycling network coverage will be improved by using state held corridors for public transport, pipelines, waterways, crown land and service easements for bicycle network infrastructure

– That 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 in 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 2–6 shows the current / committed Greater Sydney Bicycle Network alongside the envisioned 2056 Bicycle Network.

Figure 2–6 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 (April, 2018)

Implication for Cherrybrook SSP site: Transport for NSW and Councils will work together to investigate the delivery of Principle Bicycle Network that connects Cherrybrook with surrounding centres including Castle Hill, Epping as well as Greater Parramatta and Hornsby. The future PBN's connections with key centres will help encourage a mode shift towards more sustainable transport trips and reduce future residents' reliance on private vehicles for trips of all purposes.

2.5 Better Placed Aligning Movement and Place

The Aligning Movement and Place document (Government Architect NSW, 2019) provides an introduction to the Movement and Place Framework and sets out an approach to understanding places in relation to movement infrastructure. The document is meant to assist state and local government as well as practitioners to balance movement and align movement and place in the design, planning, construction and operation of NSW's transport network. It explains why and how there is a need to collaborate on strategies, plans, and projects, across all stages of design and delivery, to achieve a better built environment.

The document sits under Better Placed, a policy developed by Government Architect NSW to create a better design-built environment across NSW, as well as Future Transport Strategy 2056. It complements other policies and strategies – most relevantly, Greener Places and Good Urban Design, the Greater Sydney Region Plan; A Metropolis of Three Cities and the State Infrastructure Strategy 2018–2038.

The Movement and Place Framework will provide a toolkit for a number of professionals including design professionals, traffic and transport engineers, strategic land use planners and business case assessors. The toolkit will guide these professions when it comes to movement and place and will provide:

– Tools for delivering better places on movement links

– Indicators to recognise the degree of balance required in a given context

– Mechanism for shaping project briefs to reduce severance and improve mobility

– Mechanism for ensuring place benefits are included in briefs and realised.

Implication for Cherrybrook SSP site: The framework have been used as a guide considering the relationship between Place and Movement for the current and future transport network surrounding the SSP site, developing key principles of the function of the surrounding road network as proposed in Section 4.2 and the site-specific DCP.

2.6 The Movement and Place Practitioner's Guide

Practitioners specialising in movement and place have a shared accountability to foster a well-designed built environment including effective transport networks. Movement and Place establishes a collaborative, iterative

process that can guide consultation, analysis, decision-making, and evaluation throughout the life cycle of a plan or project. It details the importance of considering the whole street which includes people walking and cycling as well as people spend time in places. It notes the need to make trade-offs when pursuing the balance between movement and place where the outcomes may not always be complementary.

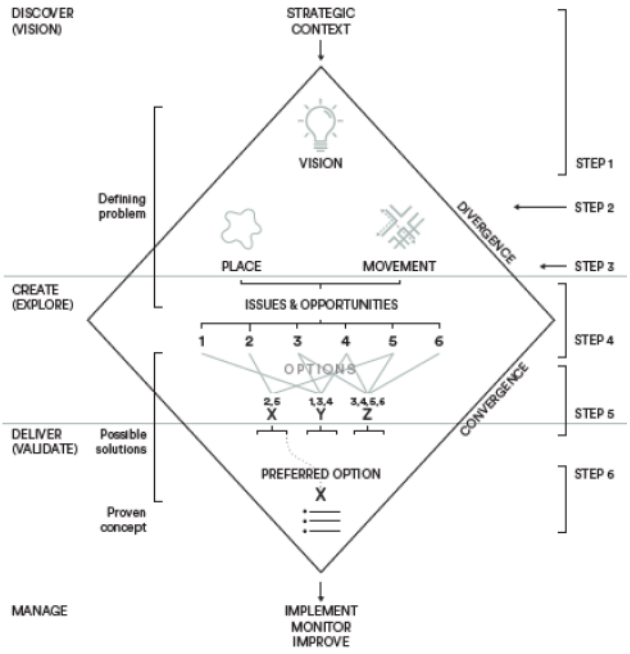
The objective of Movement and Place is to achieve roads and streets that:

– contribute to the network of public space within a location

– are enhanced by transport and have the appropriate space allocation to move people and goods efficiently and connect places together.

Similar to the Better Placed Aligning Movement and Place Framework, the practitioners guide also suggest that movement and place should be balanced to achieve a best fit for the objectives. The six steps in the process are shown in **Figure 2-7**.

Figure 2-7 The six steps in the core Movement and Place process



Source: Government Architect NSW, 2020

The NSW Movement and Place Framework includes five built environment themes. These themes are shown in **Figure 2-8** and are used as organising principles throughout this Movement and Place Assessment.

– Access and Connection: Walkable or accessible neighbourhoods, cycle routes and public transport support equitable movement around and between places

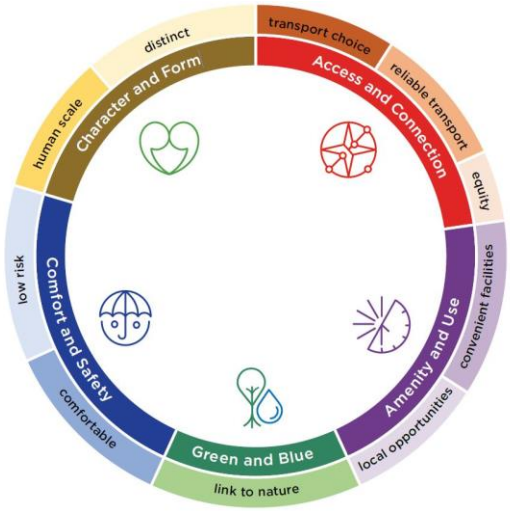
– Amenity and Use: Providing a diversity of uses, both public and private spaces, a variety of activities at different times of day

– Green and Blue: Trees, landscapes and water help to cool places in sustainable ways

– Comfort and Safety: Safe places with clear air, sun, shade, peaceful parks and active streets are important to great places. If places are pleasant, we use them and care for them. Roads and street environments cater for all users and minimise the risk of death and serious injury

– Character and Form: The identity of a place is perceived through its built form, landscape character, and the contributions of people over time. Culture and histories shape our everyday environments.

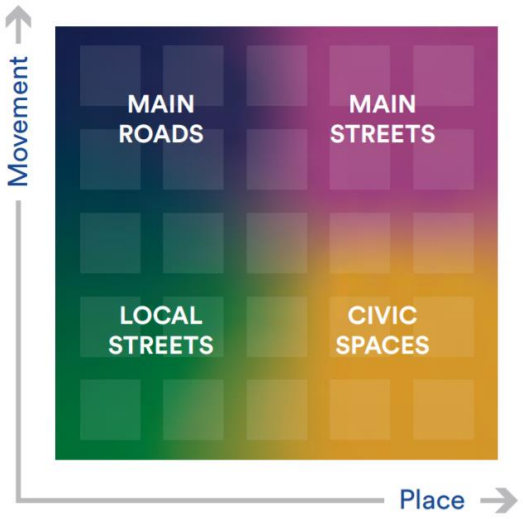
Figure 2-8 Five built environment themes



Source: Government Architect NSW, 2020

Classification, as part of the Movement and Place process, involves characterising a given segment of a road or street for a specific project purpose, such as identifying priority areas or priority needs. It should focus on desired outcomes. **Figure 2-9** shows the four street environments – defined by a combination of the place intensity and movement significance.

Figure 2-9 Four street environments for analysing the combinations of movement and place



Source: Government Architect NSW, 2020

The Practitioner's Guide to Movement and Place defines the four street environments as follows:

– Civic spaces (previously "places for people") are streets at the heart of our communities and have a significant meaning, activity function or built environment. They are often in our major centres, our tourist and leisure destinations and our community hubs. These streets are often pedestrian priority, shared spaces.

– Local streets are the majority of streets within our transport networks and often have important local place qualities. Activity levels are less intense; however, these streets can have significant meaning for local people.

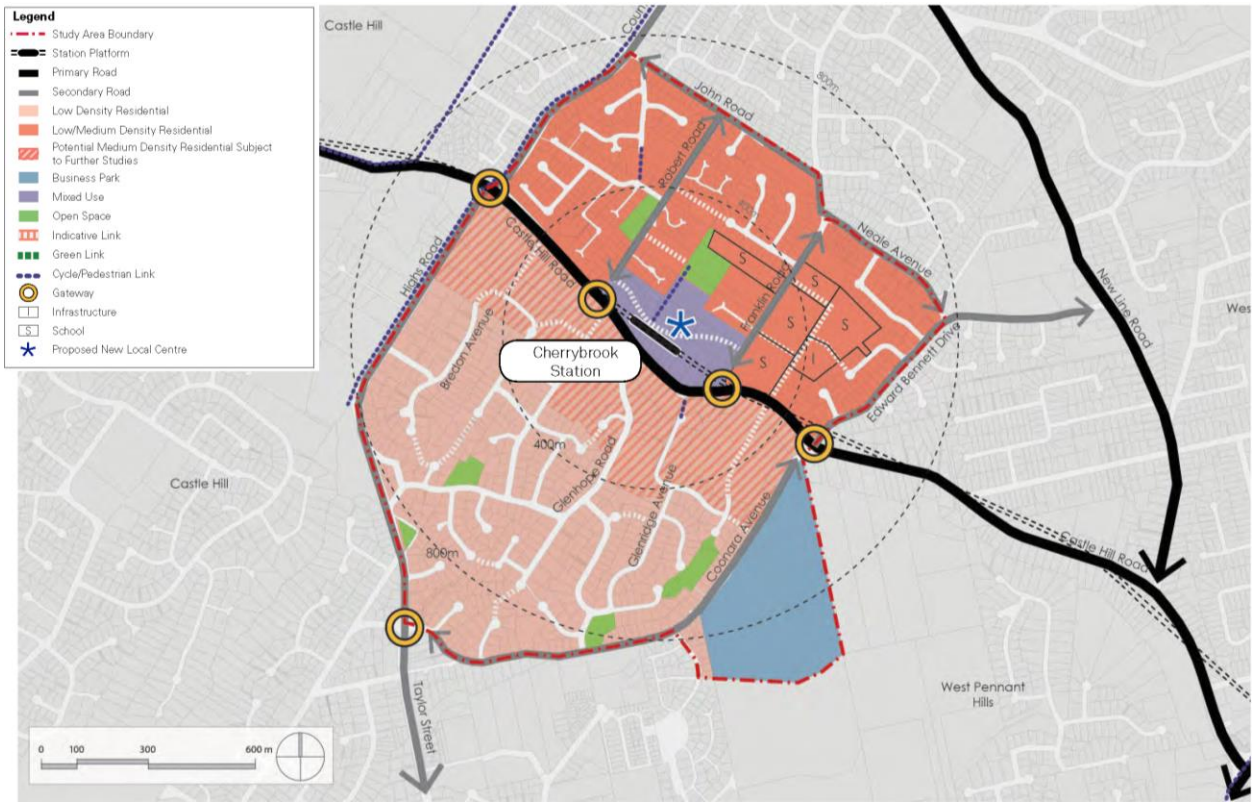
– Main streets (previously "vibrant streets") have both significant movement functions and place qualities. Balancing the functions of these streets is a common challenge.

– Main roads (previously "movement corridors" and "motorways") are routes central to the efficient movement of people and freight. They include motorways, primary freight corridors, major public transport routes, the principal bicycle network and key urban pedestrian corridors. Place activity levels are less intense; however, these roads and routes can have significant meaning to local people.

2.7 North West Rail Link Corridor Strategy

The North West Rail Link (NWRL – now the Metro North West Line) Corridor Strategy was prepared in 2013 to identify future visions for precincts surrounding NWRL stations and establish frameworks for managing future land use change. This strategy enables infrastructure agencies to identify, prioritise and co-ordinate the delivery of infrastructure upgrades in accordance with each precinct's long-term growth potential, providing increased transparency about the area's growth infrastructure pipeline. The Cherrybrook Precinct Structure Plan outlined in the Strategy is shown in **Figure 2–10**.

Figure 2–10 Cherrybrook Precinct Structure Plan



Source: North West Rail Link Corridor Strategy (NSW Department of Planning, 2013)

The Strategy highlights the role of transit-oriented development in maximising the benefits of the rail investment in delivering dwelling and employment growth for the area. It identifies objectives to grow patronage, increase access to public transport, help communities access jobs and services closer to home, build liveable centres and improve housing affordability.

The Strategy states that the Metro North West Line supports positive changes in travel behaviour arising from mode shift to rail. The project facilitates reduced private vehicle movements, in turn addressing capacity constraints on the road network and reducing traffic congestion, including reduced bus congestion in the CBD in the longer term. The Metro North West Line also provides increased opportunities for sustainable transport alternatives, through the provision of cycling and walking networks to the Metro North West Line stations.

The introduction of the Metro North West Line and a station at Cherrybrook has the potential to further transform the area around Cherrybrook Station into a vibrant urban centre and a precinct that contains a mix of local retail and residential uses, to provide activation within the station and interchange areas. It also gives an opportunity to provide attractive public spaces that are a focal point for the local community in the future. The expected residential dwellings and jobs will be an additional 3,200 residential dwellings and 50 new jobs in the area by 2036.

Implication for Cherrybrook SSP site: The proximity of the site to Cherrybrook Station aligns with the North West Rail Link Corridor Strategy to contribute to positive changes in travel behaviour for future residents, through a mode shift to rail, by providing housing near excellent public transport.

2.8 The Hills Corridor Strategy

The Hills Corridor Strategy identifies the Metro North West Line as a significant transport project that enhances the liveability of The Hills Shire. It is transformational in that it provides a fast and efficient connection to the global arc but importantly within The Hills Shire itself. It is important that the land uses around the station support each station's role, achieve housing and jobs targets as well as create vibrant and safe places.

A key consideration is the capacity of roads and intersections to take more growth whilst accounting for mode shift. As a result of the Metro North West Line, there could be a shift from private vehicles to public transport modes. This is based upon a review of other key transit centres within the Sydney Metropolitan Region such as Chatswood, Hurstville and Meadowbank-West Ryde and indicates there is likely to be an increase in the proportion of employed residents catching public transportation to work in the areas closest to the station.

The Strategy notes that such a mode shift will take time and a careful response will be needed to ensure the additional yield does not compromise residents' ability to get to where they need to go in a reasonable time.

Implication for Cherrybrook SSP site: The proximity of the site to Cherrybrook Station aligns with the Hills Corridor Strategy to account for a mode shift for future residents of the site towards more sustainable modes of transport. The provision of retail and commercial space at each of the station precinct will provide job opportunities, and the provision of open space helps achieve the creation of vibrant and safe places.

2.9 Hornsby Shire Council Local Strategic Planning Statement (LSPS)

Hornsby Shire Local Strategic Planning Statement (LSPS) provides details upon which to base planning decisions and drive future land use planning and the management of growth in the area over the next 20 years. The planning priorities identified within the LSPS will help guide these land use decisions and earmark changes to Council's local land use plans, strategies and policies in the future. The LSPS details the local response to the objectives and priorities of the North District Plan and Greater Sydney Region Plan – A Metropolis of Three Cities.

The population of Hornsby Shire is forecast to increase by one per cent per annum, requiring an additional 14,900 homes by 2036, with growth expected to be highest between 2016 and 2021. Population growth in the LGA is driven predominantly by growth in dwelling stock, with the main areas of growth in the short-term being Asquith, Waitara and Hornsby. The highest proportional growth (compared to other suburbs) expected in the Cherrybrook area will occur between 2021 and 2026 (10 per cent growth) and between 2026 and 2031 (16 per cent growth). This growth is expected from the development of government land at Cherrybrook Station, which will aid with the LGA achieving its longer-term housing targets.

The LSPS refers to the Cherrybrook Station Precinct as being used by local residents for commutes to the Harbour CBD, Macquarie Park and Norwest Business Park, since the commencement of operations of the Metro North West Line. The LSPS also states that in November 2019, the State Government reclassified the State Government-owned land around Cherrybrook Station as a 'State-led Rezoning', with the State Government prioritising planning in this area. Council will collaborate with the state government and Landcom concerning planning for government-owned land adjoining the Metro North West Line. The planning will aim to provide integrated community facilities, open space, transport and an infrastructure strategy, incorporating the wider precinct.

The LSPS identifies a number of key walking and cycling corridors, in response to The Greater Sydney Services and Infrastructure Plan (as part of Future Transport 2056), which establishes a vision of the '30-minute city', where people can access jobs and services within 30 minutes by public or active transport. As seen in **Figure 2–11**, Cherrybrook will be located in proximity of a key walking and cycling movement corridor in the future.

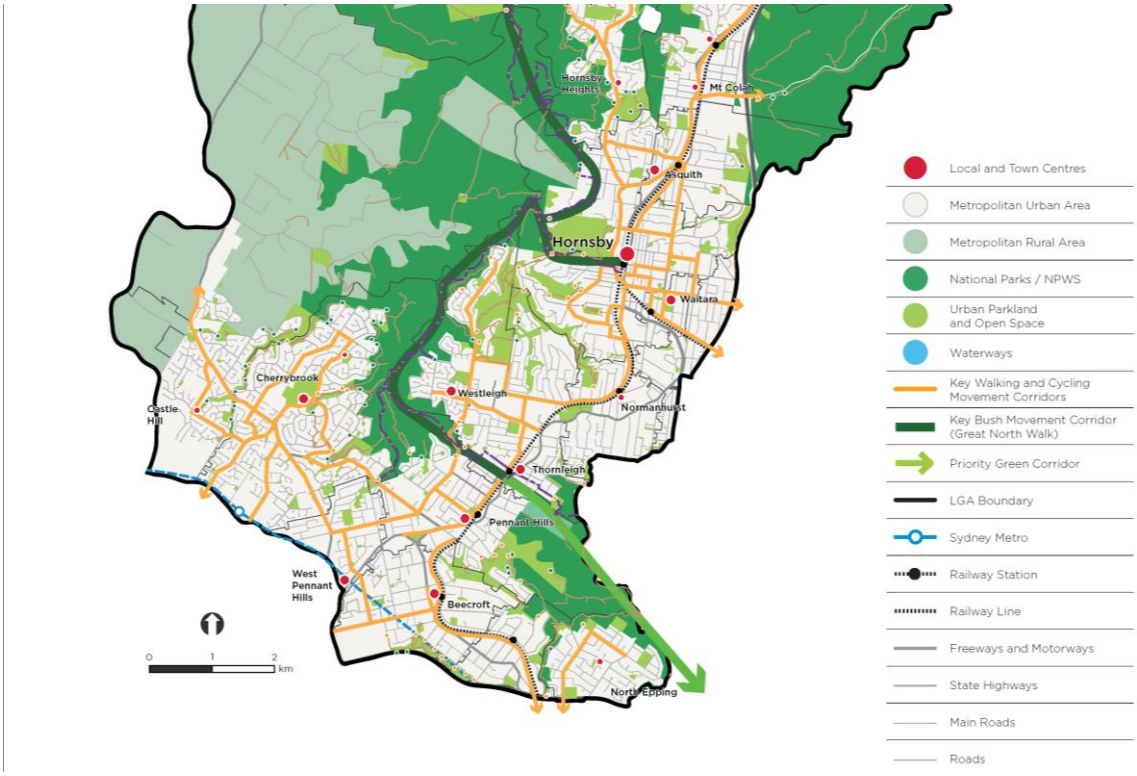
Several actions are identified in the LSPS under a number of key planning priorities. Those priorities of particular relevance to Cherrybrook include:

– Resolving the local and regional infrastructure issues facing Cherrybrook and surrounding areas as a result of the opening of Cherrybrook Station.

– Aligning the delivery of local infrastructure and public domain improvements with current and future growth.

– Prioritising local employment opportunities, and improvements to services, amenities, and infrastructure to support the future population.

Figure 2–11 Key walking and cycling movement corridors in the Hornsby Shire LGA



Source: The Hornsby Shire LSPS (2020)

Implication for Cherrybrook SSP site: The LSPS highlights the importance of the future development of the Cherrybrook Precinct and its proximity to the metro station, as well as excellent walking and cycling movement corridors. The development of the SSP site will contribute towards Council's future population targets.

2.10 Hills Future 2036 – Local Strategic Planning Statement (LSPS)

The Hills Future 2036 - Local Strategic Planning Statement (LSPS) provides details upon which to base planning decisions and drive future land use planning and the management of growth in the Shire based on our economic, social and environmental needs over the next 20 years. The LSPS sets out planning priorities and corresponding actions to be delivered over the next 5 years that will provide for more housing, jobs, parks and services.

The Hills Shire will be a significant contributor to achieving outcomes identified under the Central City District Plan, with an 18 per cent of additional dwellings in Central City (38,000 of 207,500) and up to 30 per cent of additional jobs (32,200) in 2036. In conjunction with the Metro North West Line, careful planning for new dwellings and employment opportunities close to transport nodes and bus links will contribute to the 30-minute city vision for Greater Sydney.

Several actions are identified in the LSPS under a number of key planning priorities. Those priorities of particular relevance to Cherrybrook include:

– Plan for convenient, connected and accessible public transport.

– Manage travel behaviour to promote sustainable choices.

– Expand and improve the active transport network.

– Aligning the delivery of local infrastructure and public domain improvements with current and future growth.

– Prioritising local employment opportunities, and improvements to services, amenities, and infrastructure to support the future population.

Implication for Cherrybrook SSP site: The LSPS highlights the importance of careful planning for new dwellings and employment opportunities close to transport nodes such as the Metro North West Line, and their future contribution to the 30-minute city vision for Greater Sydney.

2.11 Hornsby Shire Council Development Control Plan (DCP)

The 'General Section (Part 1)' of the Hornsby Shire DCP (May 2019) outlines the following desired outcomes for new developments with regards to transport and parking:

– Development that manages transport demand around transit nodes to encourage public transport usage.

– Car parking and bicycle facilities that meet the requirements of future occupants and their visitors.

– Development with simple, safe and direct vehicular access.

In Part 1C.2 of the DCP, the required car parking provision (maximum), bicycle parking provision (minimum) and accessible parking provision (minimum) of the relevant land uses of the site are specified, as shown in **Table 2-1** and **Table 2-2**. The maximum car parking rates apply to developments located less than 800 m from a railway station.

Table 2-1 Required car and bicycle parking provisions as outlined in Hornsby Shire DCP

Land Use Class	Land Use	Maximum Car Parking Provision^	Minimum Bicycle Parking Provision^^
Residential	High-density dwellings	0.4 spaces per studio dwelling 0.4 spaces per 1-bedroom dwelling 0.7 spaces per 2-bedroom dwelling 1.2 spaces per 3 (or more) -bedroom dwelling 1 visitor space per 7 dwellings	1 space per 5 units for residents to be located in a safe, secure and undercover area. 1 space per 10 units for visitors.
Residential	Medium-density dwellings	0.75 spaces per studio/1-bedroom dwelling 1 space per 2-bedroom dwelling 1.5 spaces per 3 (or more) -bedroom dwelling 1 visitor space per 7 dwellings	
Commercial	Business / office premises	1 space per 48 m^2 GFA	1 space per 600 m^2 (GFA) for staff. Developments with a gross floor area over 2,500 m^2 should provide end of destination facilities for staff in the form of at least 1 shower cubicle with ancillary change rooms.
	Restaurants / cafes	1 space per 29m^2 GLFA	
Retail	Shops	1 space per 29m^2 GLFA	

Source: Hornsby Shire DCP (May 2019)

^ *The maximum car parking rates apply to developments located less than 800 m from a railway station.*

^^ *Bicycle parking for commercial premises applies to premises of over 1,200 m^2 GFA*

Table 2-2 Accessible car parking provisions

Land Use	Minimum number of accessible spaces
Commercial premises	1-2% of car parking spaces
Community and recreation facilities e.g. civic centres and gymnasiums	2-3% of car parking spaces
Entertainment facilities e.g. theatres, libraries, sport centres	3-4% of car parking spaces
Medium and high-density residential development	1 for each Adaptable Design unit as per AS 2890.6

Source: Hornsby Shire DCP (May 2019)

Motorcycle parking is to be provided for all developments with on-site parking and should be available as part of the common property for use by residents and visitors, to the rate of *one space per 50 car parking spaces*, or part thereof.

Carshare parking spaces are encouraged for:

- Any residential development containing more than 25 residential units; or
- Any employment generating development with a floor space of 5,000 m^2; and
- is located within 800 metre radial catchment of a railway station, or within a transit node centre that is serviced by a strategic bus corridor.

On-site loading and unloading areas for non-residential developments should be provided in accordance with the RTA Guide to Traffic Generating Development (2002). The on-site loading and unloading area in non-residential developments should incorporate provision for *1 car space and 1 motorcycle space for use by couriers*, sited in a convenient location.

On-site pick up and manoeuvring areas for waste collection vehicles should be provided in accordance with the waste collection provisions at Section 1C.2.3 of the DCP.

On-site parking for a removalist vehicle should be provided for a residential development with more than 20 dwellings that adjoins a public road where kerb side parking for removalist vehicles is difficult or restricted. Parking for a removalist vehicle should be designed to accommodate at least a small rigid vehicle (SRV), and preferably a medium rigid vehicle (MRV) as defined by AS2890.2.

Implication for Cherrybrook SSP site: There are specific parking rates in the Hornsby Shire DCP that apply to developments within 800 m of a railway station. These rates should be further considered and benchmarked with review of other relevant parking studies and rates that are appropriate for developments with excellent access to frequent public transport services to ensure car use is minimised and more sustainable travel options are encouraged.

2.12 Apartment Design Guide

The Apartment Design Guide (DPIE, 2015) provides design criteria and general guidance about how development proposals can achieve the nine design quality principles identified in SEPP 65 (State Environmental Planning Policy No 65 - Design Quality of Residential Apartment Development). The SEPP 65 legislation states:

> *(1) If an application for the modification of a development consent or a development application for the carrying out of development to which this Policy applies satisfies the following design criteria, the consent authority must not refuse the application because of those matters:*
>
> > *(a) if the car parking for the building will be equal to, or greater than, the recommended minimum amount of car parking specified in Part 3J of the Apartment Design Guide*

The specific term of the Apartment Design Guide that captures parking provision is repeated below:

Objective 3J-1

Car parking is provided based on proximity to public transport in metropolitan Sydney and centres in regional areas

Design criteria

For development in the following locations:

- *on sites that are within 800 metres of a railway station or light rail stop in the Sydney Metropolitan Area; or*
- *on land zoned, and sites within 400 metres of land zoned, B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre*

The minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant Council, whichever is less.

The car parking needs for a development must be provided off-street.

The rates provided in the Guide to Traffic Generating Developments are shown in **Table 2-3**.

Table 2-3 Roads and Maritime Services Guide to Traffic Generating Developments (2002) parking rates

Dwelling type	Number of parking spaces required (minimum)	
	Metro Regional CBD Centres	Metro Sub-Regional CBD Centres
1 Bed	0.4 spaces	0.6 spaces
2 Bed	0.7 spaces	0.9 spaces
3 Bed	1.2 spaces	1.4 spaces
Visitor	0.14 spaces	0.2 spaces

Source: Roads and Maritime Service, 2002

As per SEPP 65, the parking rates that comply with the above rates cannot be used as grounds to refuse consent of this SSP study. The Apartment Design Guide stipulates that the rates for Metro Sub-Regional CBD Centres should be applied to Cherrybrook as a centre in Sydney serviced by railway stations but not a CBD, Regional City Centre or Strategic Centre as defined in A Plan for Growing Sydney.

Hence the rates suggested for Metro Sub-Regional CBD Centres and the Council DCP rates should be considered together and whichever is less would apply to the proposed development.

2.13 Cherrybrook Station Precinct Parking Strategy

The Cherrybrook Station Precinct Parking Strategy (Kinesis, February 2019) was prepared for DPIE to ensure that parking at the wider Cherrybrook Station Precinct is optimised to reflect car ownership patterns of the future. The purpose of the study was to:

– Reflect Cherrybrook Station Precinct's accessibility and urban form following the development of Cherrybrook Station

– Respond to future trends in mobility such as car share, autonomous vehicles and innovative parking solutions.

2.13.1 Residential parking analysis

The background data analysis undertaken as part of the Strategy was based on the expected accessibility and urban form variables for the Cherrybrook Station Precinct in and outside the Developable Government Land (DGL) site and was supported with comparable benchmarks across metropolitan Sydney. These variables that drive car ownership include access to public transport, access to amenities and services, access to local employment, dwelling occupancy rates, proximity to centres and dwelling density. The outcome of the analysis predicted a car ownership rate of:

– 1.3 cars per dwelling on average in developments within the station precincts but outside the DGL

– 1 car per dwelling on average for developments in the DGL.

To understand the impact of parking innovation on the provision of parking, a base case that contains standard parking rates without innovation to respond to predicted car ownership rates was analysed, as well as benchmark reviews across similar sites across metropolitan Sydney. These reviews investigated unbundled parking, decoupled parking, shared parking and car share. The outcome of the analysis predicted that parking innovation has the potential to reduce the above car ownership rates to:

– 0.8 cars per dwelling on average in developments within the station precincts but outside the DGL

– 0.6 car per dwelling on average for developments in the DGL.

For the Cherrybrook Station Precinct, the Parking Strategy suggested that parking innovation strategies are delivered as follows:

– All resident car parking is unbundled from the sale of apartments.

– Car parking for 1 bedroom / studios and visitor parking in the DGL is spatially decoupled to centralised parking stations. Only 1 bed dwellings are chosen as the typical demographic for these dwellings are younger and willing to walk to a car.

– Visitor parking for the residential component of the development would be shared with the commercial and retail visitor parking.

– Car share is delivered at the rate of 1 per 15 apartments without parking and 1 per 200 apartments with 1 parking space. These rates have been developed with GoGet.

Applying the above parking strategies and innovations would result in suggested parking ratios, as outlined in **Table 2-4**, which reduce construction costs and in turn assists in housing affordability.

Table 2-4 Suggested maximum residential car parking rates from the Parking Strategy

Dwelling type	Number of parking spaces required per dwelling type	
	Outside the DGL	Within the DGL
Studio	0.25 spaces	0 spaces
1 Bed	0.5 spaces	0.3 spaces
2 Bed	0.9 spaces	0.6 spaces
3 Bed	1.1 spaces	1.0 spaces
Visitor	0.05 spaces	0.05 spaces
Suggested average	**0.8 spaces**	**0.6 spaces**

Source: The Cherrybrook Station Precinct Parking Strategy (Kinesis, February 2019)

2.13.2 Non-residential parking opportunities

Shared parking is parking shared by more than one user, which allows parking facilities to be used more efficiently since different land uses occur at different times. The Parking Strategy considered shared parking opportunities between different land uses for the Cherrybrook Station Precinct as follows:

– On a typical weekday (9AM to 5PM), some of Cherrybrook's residents may use their car to travel to work. At the same time, visitors to the commercial and retail centre at Cherrybrook are seeking car parking spaces.

– By applying shared parking, efficient sharing of non-residential parking with decoupled residential car parks could reduce non-residential parking requirement by over 25%. This parking peaks during the day as employees and visitors arrive to shop in the retail centre at the same time as residents use their car to travel to work.

– Strategically locating these shared parking spaces to enable shared parking with visitors to the commercial and retail centre could reduce the need for non-residential visitor parking by 25%.

Implication for Cherrybrook SSP site: The proposed car parking rates and non-residential parking opportunities outlined in the Strategy for the site will be considered together with, and compared to, other relevant car parking rates (such as DCP rates and rates applied to other metro station developments), to ensure car use is minimised and more sustainable travel options are encouraged.

It should be highlighted that these parking rates and parking innovation strategies were suggested in the Cherrybrook Station Precinct Parking Strategy. These rates and strategies have been considered as part of the SSP investigations and this Traffic and Transport Assessment and are not currently being proposed for the SSP.

Shared parking may reduce the requirements for parking provision but does not encourage sustainable travel options as it can mean that residents are required / encouraged to vacate their parking space during the day (and drive to work) rather than leave their car at home and catch public transport or use active transport to get to work. This may contradict with the transit-oriented development (TOD) principles being proposed for the DGL site, if the initiative of shared parking is not implemented / managed properly.

Further discussions on parking requirements and provision for the SSP site are included in **Section 4.4**.

2.14 Guide to Traffic Generating Developments

The RMS Guide to Traffic Generating Developments (RTA, 2002) sets out traffic generation rates based on survey data collected in New South Wales for a range of land uses. This guide is referred to in the Austroads Guide and the Apartment Design Guide which is used by Roads and Maritime Services and is generally regarded as the standard for metropolitan development characteristics. The suggested parking rates for residential development in centres provided in the Guide to Traffic Generating Developments are shown in **Table 2-3**.

Over the past few years, several surveys have however been undertaken to update trip generation and parking information as part of the Guide. The Technical Direction: TDT 2013/04a provides a summary of the updated information. Typical vehicle trip generation rates for high density residential flat dwellings in Sydney are shown in **Table 2-5**, based on the TDT 2013/04a. The guidance provides advice on the traffic impacts of land use developments, based on traffic surveys in various locations in Sydney.

Table 2-5 Typical vehicle trip generation rates for high density residential flat dwellings

Weekday rates	Sydney average	Sydney range
AM peak (1 hour) vehicle trips per unit	0.19	0.07-0.32
PM peak (1 hour) vehicle trips per unit	0.15	0.06-0.41
Daily vehicle trips per unit	1.52	0.77-3.14

Source: Roads and Maritime Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys

Trip generation rates specified for office blocks (with most having access to the rail network) and shopping centres (<10,000 m^2 GLFA) are shown in **Table 2-6**.

Table 2-6 Typical vehicle trip generation rates for office blocks and shopping centres

Weekday rates	Office blocks	Shopping centres (<10,000 m^2)
AM peak (1 hour) vehicle trips	1.6 / 100 m^2 GFA	Not specified
PM peak (1 hour) vehicle trips	1.2 / 100 m^2 GFA	12.3 / 100 m^2 GLFA
Daily vehicle trips	11 / 100 m^2 GFA	-

Source: Roads and Maritime Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys

3.0 Existing conditions

3.1 The site

3.1.1 Location and existing land use

The SSP covers 7.7 hectares of government-owned land that comprises the Cherrybrook Station, commuter carpark and station access road (Bradfield Parade) and vacant land to the east of the station (referred to as the Development Government Land) (DGL). The DGL is shown in **Figure 3–1**, and is bounded by Castle Hill Road and Bradfield Parade to the south, Franklin Road to the south east and Robert Road to the north West.

Figure 3–1 Location of the Cherrybrook developable government land

Source: SJB, 2022

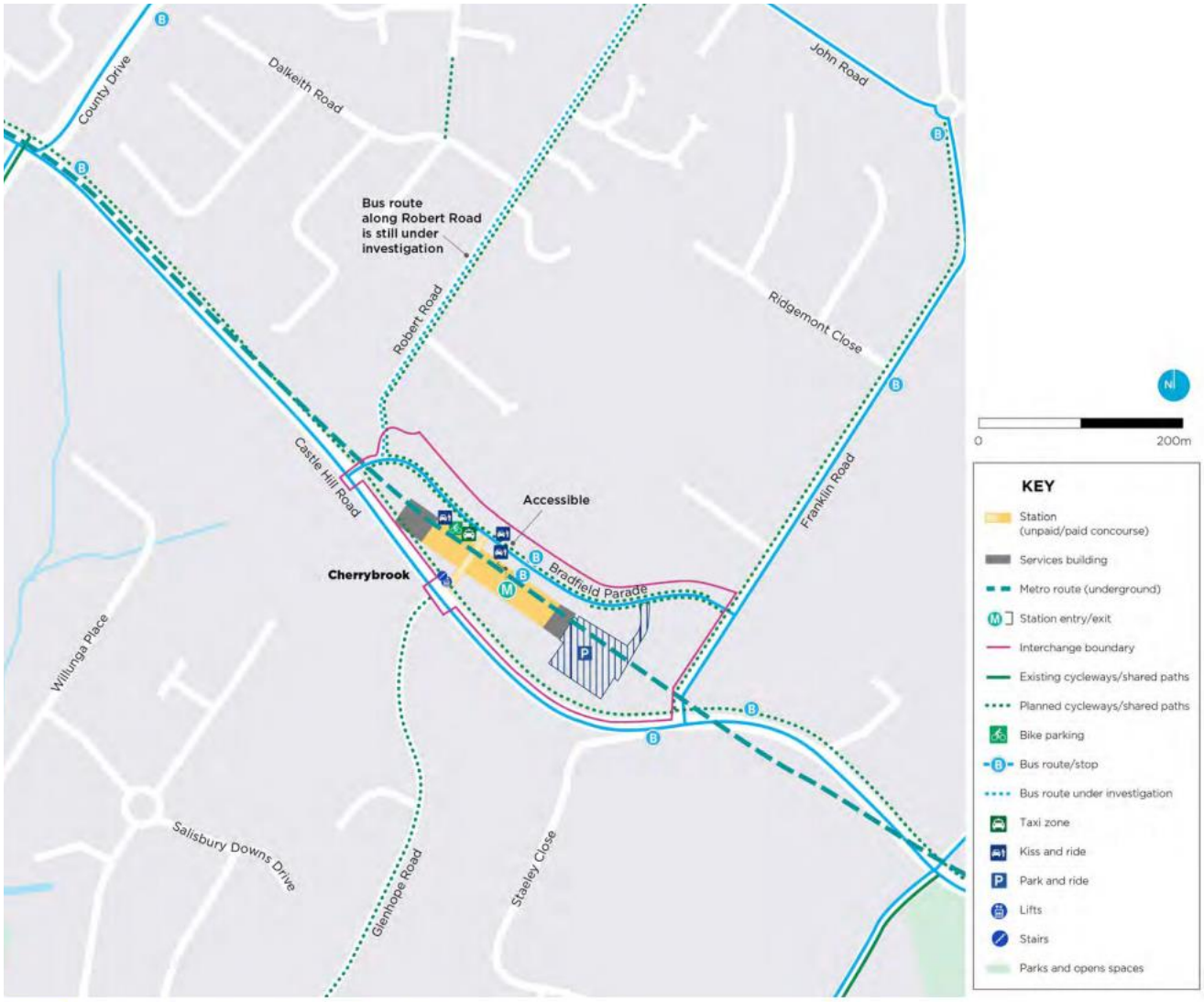
3.1.2 Cherrybrook Station

Cherrybrook Station is an open-cut station located north of Castle Hill Road between Robert Road and Franklin Road, immediately south of the site. The station is accessible from a station concourse located over the rail corridor with plaza entries on Bradfield Parade to the north and on Castle Hill Road to the south.

It is an interchange station for walking, cycling, bus (5 bus bays), taxi (4 spaces) as well as kiss-and-ride (14 spaces) and a commuter car park with 400 spaces. It is primarily serving as an 'origin' station for the surrounding residential population in the suburbs of Cherrybrook and West Pennant Hills.

As shown in **Figure 3–2**, the station has bicycle parking located close to the entrance plaza at Bradfield Parade, kiss and ride spaces and taxi ranks along Bradfield Parade as well as a commuter car park accessed from Bradfield Parade.

Figure 3–2 Cherrybrook Station interchange overview



Source: Sydney Metro Interchange Access Plan, October 2018

Opal data for Cherrybrook Station are provided by Transport for NSW that shows the average station entries and exits for Cherrybrook station for November 2019 (pre-COVID conditions), as shown in **Table 3-1**.

Table 3-1 Cherrybrook Station entries and exits

Time period	Entries	Exits	Notes
Average weekday AM (1 hour) peak	790	50	7am - 8am
Average weekday AM (3.5 hour) peak	2,000	160	6am - 9.30am
Average weekday PM (1 hour) peak	120	580	5pm - 6pm
Average weekday PM (3.5 hour) peak	420	1,700	3.30pm - 7pm
Average weekday daily	3,300	3,100	
Average weekend (1 hour) peak	120	200	Peak entries + exits at 5pm – 6pm
Average weekend daily	1,800	1,700	

Source: Transport for NSW, November 2019

Notes:

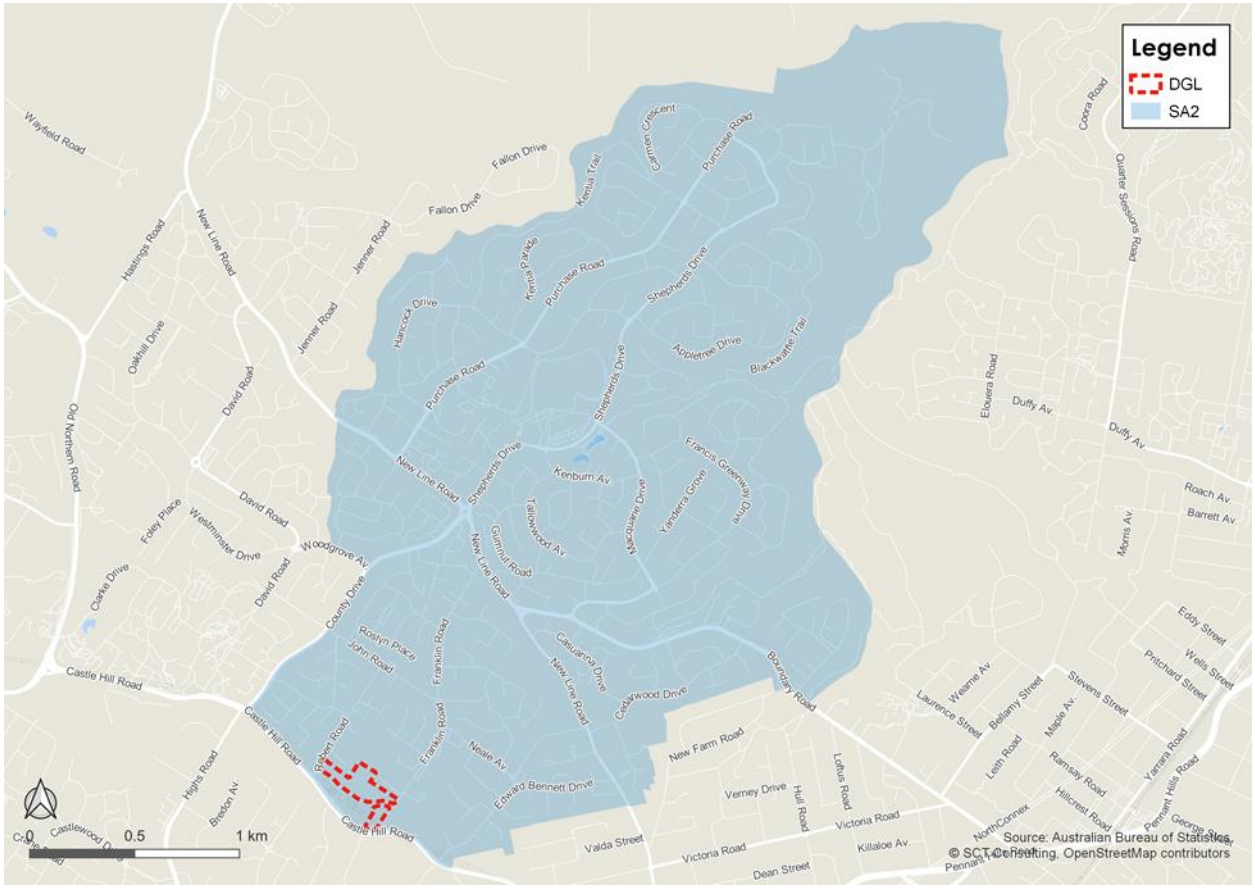
- Station entries and exits based on Opal tap on (entry) and tap off (exit), including CTP (contactless transport payments)
- Totals >1,000 are rounded to the nearest 100 and <1,000 to the nearest 10
- Weekend data excludes 2-Nov-2019 and 3-Nov-2019, which were a two-day track possession

3.2 Travel behaviour

3.2.1 Method of travel to work data

2016 Method of travel to work data from the statistical area of Cherrybrook was analysed to determine travel behaviour of the existing residents in the vicinity of the site as shown in **Figure 3–3**.

Figure 3–3 Study area for method of travel to work analysis for Cherrybrook

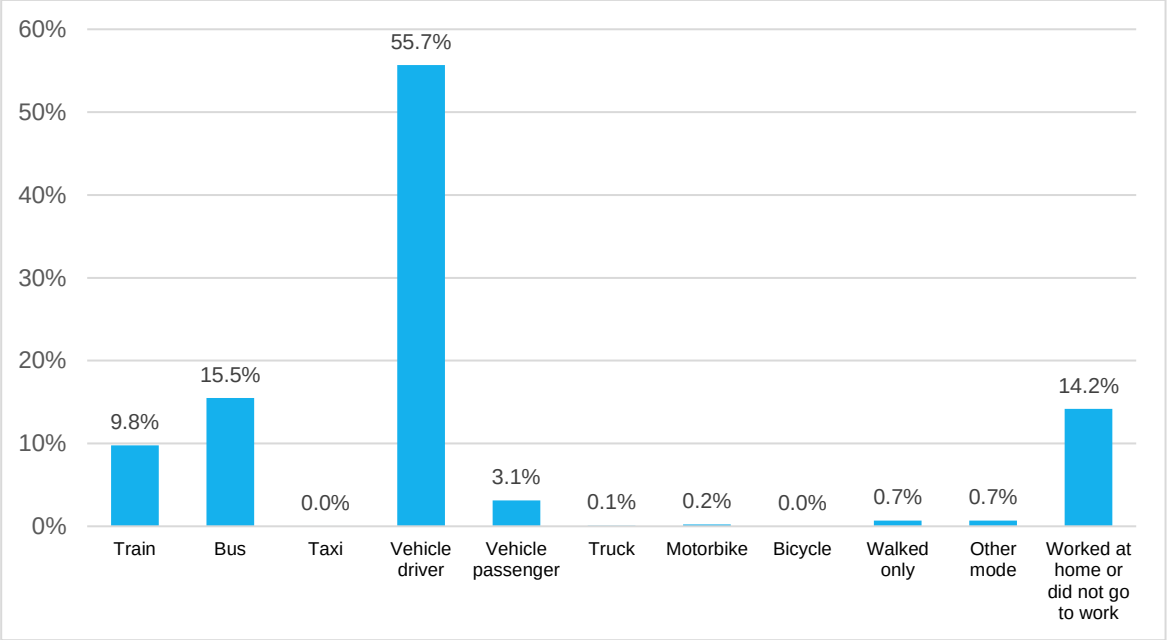


At the time of the journey-to-work (JTW) data being collected in 2016, approximately 9,100 trip samples were included in the survey for Cherrybrook. According to the Australian Bureau of Statistics, a person in employment are those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit.

The travel mode split is shown in **Figure 3–4**, where vehicle driver or passenger is the most dominant travel mode with 59 per cent, followed by 10 and 16 per cent train and bus usage respectively, implying a less developed public transport infrastructure in 2016 in the area surrounding the site. This equates to under 900 daily trips were made by train during the survey period in 2016.

The low public transport mode share at the Cherrybrook area is expected to change significantly with the introduction of the Metro North West Line, as larger catchment of residential areas along the metro / rail network would now have direct and frequent access to employment areas via significantly improved public transport. The 2019 Cherrybrook Station entries and exits data (see **Table 3-1**) shows that there were over 3,000 daily trips were made by metro by residents in the surrounding areas. When the 2019 metro usage data at Cherrybrook Station is compared to the 2016 public transport mode split, the comparison shows an increasing trend of public transport usage as a result of the opening of the Metro North West Line.

Figure 3–4 Travel modes for journey to work in Cherrybrook (2016)



Source: https://profile.id.com.au/hornsby/about?WebID=160 (2016)

The demand for point to point (i.e. including taxi services) was indicatively 0.03 per cent of total journey to work mode share. It is therefore concluded that point to point demand is unlikely to be significant at this location even though the growth of ride share trips have increased over the last few years and does not require additional surveys beyond that of the Method of Travel to Work survey. This is also true for the existing conditions for cycling demands which is considered a small part of the overall demand and does not require additional surveys beyond that of the method of travel to work survey.

Table 3-2 lists the Journey to Work 2016 destinations for departures from Cherrybrook by LGA, based on the Hornsby Shire LGA travel data. Local destinations in Hornsby attract the highest percentage of commuters at 28 per cent, followed by Sydney (18 per cent) and Ryde (8 per cent). The remainder of departures from the Hornsby Shire LGA are fairly fragmented throughout the NSW LGAs, which reflects the vehicle driver travel modes shown in **Figure 3–4**.

Table 3-2 Departures LGA Destination (2016)

LGA	Number of Trips	Percentage (%)	LGA	Number of Trips	Percentage (%)
Hornsby	20,091	28.4	Willoughby	3,685	5.2
Sydney	12,359	17.5	North Sydney	3,114	4.4
Ryde	5,421	7.7	No Fixed Address (NSW)	2,629	3.7
Parramatta	4,337	6.1	Northern Beaches	1,850	2.6
Ku-ring-gai	4,195	5.9	Blacktown	1,313	1.9
The Hills Shire	3,962	5.6	Other LGAs	7,566	11
			Total	**70,522**	**100**

Source: https://profile.id.com.au/hornsby/about?WebID=160 (2016)

Table 3-3 shows the Journey to Work 2016 origins of arrivals at Cherrybrook by LGA. The arrivals into Cherrybrook are significantly dominated from The Hornsby LGA (48 per cent), followed by around 10 per cent from the Central Coast (NSW) and the Hills Shire respectively. There are around six per cent of the workers coming from Kur-ring-gai, while five per cent are traveling from Blacktown and Parramatta respectively.

Table 3-3 Arrivals LGA Origin (2016)

LGA	Number of Trips	Percentage (%)	LGA	Number of Trips	Percentage (%)
Hornsby	20,091	47.5	Parramatta	2,071	4.9
Central Coast (NSW)	4,094	9.7	Northern Beaches	921	2.2
The Hills Shire	4,014	9.5	Ryde	884	2.1
Ku-ring-gai	2,356	5.6	Cumberland	705	1.7
Blacktown	2,165	5.1	Other LGAs	4,800	12
			Total	**42,101**	**100**

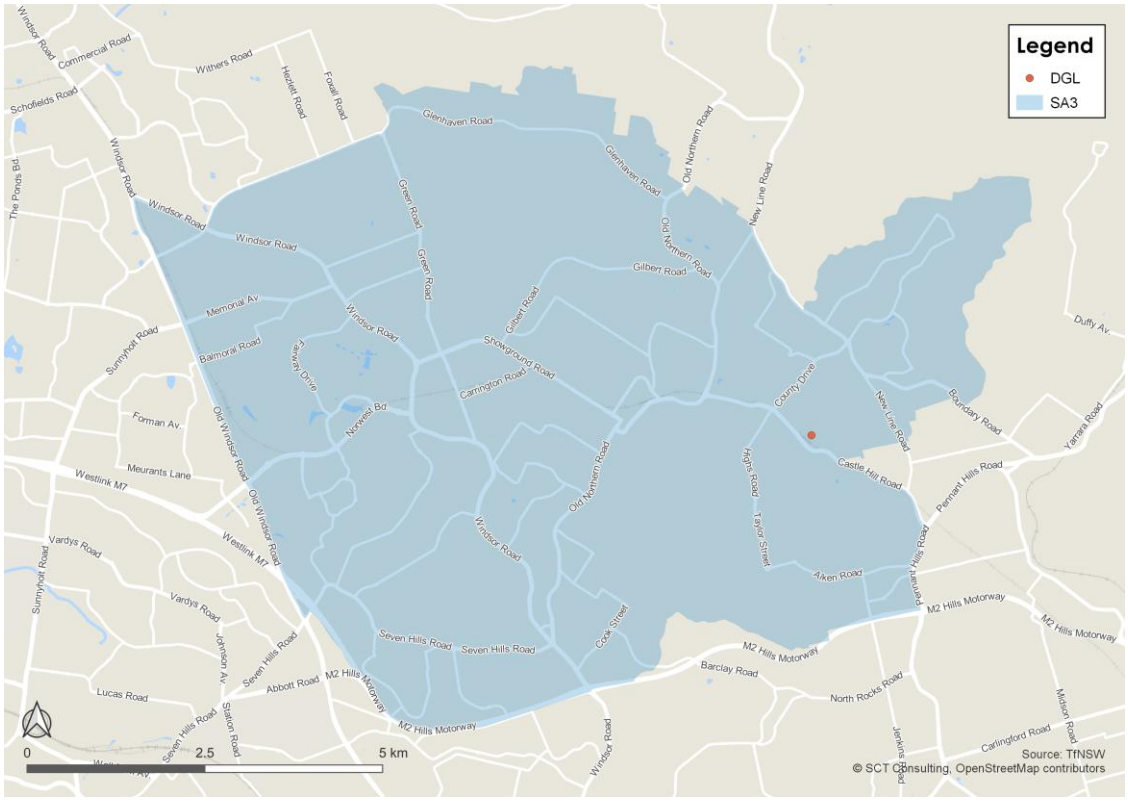
Source: https://profile.id.com.au/hornsby/about?WebID=160 (2016)

3.2.2 Household Travel Survey

The Cherrybrook SSP site sits within the statistical area "Baulkham Hills"[1] (**Figure 3–5**) as defined by the Australian Bureau of Statistics, 2017/2018 Household Travel Survey (HTS).

[1] Baulkham Hills is a "Statistical Area 3".

Figure 3–5 Study area for household travel survey analysis



For the purpose of analysis, it has been assumed that JTW data provides a suitable reflection of the travel characteristics during AM and PM peak hour periods, due to the high proportion of trips during this timeframe associated with journey to work trips.

Analysis of the 2017/2018 Household Travel Survey (HTS), which is reflective of travel characteristics of residents throughout an average weekday, indicates that the majority (approximately 22, 21, 15 and 14 per cent respectively) of daily trips made by residents of statistical area "Baulkham Hills" are likely to be associated with Serve Passenger, Social/recreation, shopping and commuting respectively.

The majority (83 per cent) of all daily trips are undertaken by car, either as driver or passenger, while train and bus trips account for approximately two and five per cent of daily trips respectively. Walk only trips account for nine per cent of all daily trips undertaken within the Baulkham Hills area.

Table 3-4 and **Table 3-5** provide a summary of the purpose of travel and overall mode choice by residents of Baulkham Hills associated with these trip purposes.

Table 3-4 Household Travel Survey – residents within Baulkham Hills, trip purpose

Mode of Travel	Number of Trips	Proportion of Total
Serve passenger	144,691	22%
Social/recreation	136,159	21%
Shopping	96,331	15%
Commute	91,574	14%
Education/childcare	62,248	9%
Change mode of travel	62,187	9%
Personal business	25,808	4%
Work related business	19,991	3%
Other	17,882	3%

Source: https://www.transport.nsw.gov.au/performance-and-analytics/passenger-travel/surveys/household-travel-survey (2019)

Table 3-5 Household Travel Survey – residents within Baulkham Hills, mode choice

Mode of Travel	Number of Trips	Proportion of Total
Vehicle Driver	362,447	55%
Vehicle Passenger	183,355	28%
Train	12,967	2%
Bus	35,619	5%
Walk Only	59,577	9%
Other	2,906	0%

Source: https://www.transport.nsw.gov.au/performance-and-analytics/passenger-travel/surveys/household-travel-survey (2019)

3.3 Walking

3.3.1 Pedestrian network

Given the DGL is located immediate to the surrounds of Cherrybrook Station, the discussion of pedestrian network surrounding the existing Cherrybrook Station is directly relevant to pedestrian access to future development at the DGL.

Cherrybrook Station is an origin station, meaning that in the morning peak hour, the majority of trips arriving at the station are from the surrounding residential land uses, while destination trips would arrive at the station to go to surrounding educational and employment uses. Pedestrian activity is expected to cluster around station entry points and dissipates further afield along various pedestrian desire lines including two signalised pedestrian crossings of Castle Hill Road at Bradfield Parade and Glenhope Road. Adequate pedestrian facilities are provided to connect to the surrounding land uses in a safe and convenient manner.

Existing pedestrian infrastructure in proximity of the site includes a footpath network that provides access for pedestrians to the station entry points from the surrounding areas, including:

– A shared path along the northern side of Castle Hill Road between David Road and Victoria Road and a footpath along the southern side of Castle Hill Road.

– Shared paths along both sides of Bradfield Parade and the eastern side of Robert Road.

– A shared path along the western side of Franklin Road.

Pedestrian crossings are provided in proximity of the northern and southern station entrance points as follows and, as shown in **Figure 3–6**:

– Signalised pedestrian crossings of Castle Hill Road at Bradfield Parade and Glenhope Road, south of the station entrance, to provide safe connections for pedestrians in the southern half of the walking catchment of the station.

– Two marked pedestrian crossings at Bradfield Parade, one directly outside the northern station entrance and the second one near Franklin Road, to provide safe and direct access between the station and land uses in the northern half of the walking catchment of the station.

– A pedestrian refuge across Robert Road, near the intersection with Bradfield Parade.

– A pedestrian refuge across Franklin Road at Castle Hill Road, to provide access to / from the residential areas and schools located to the east of the station.

– A new marked pedestrian crossing near Tangara School for Girls (further north on Franklin Road).

Figure 3–6 Existing footpath and pedestrian crossing facilities in proximity of the site

3.3.2 Pedestrian volumes

Pedestrian surveys in proximity of the site were undertaken on 7 November 2019 at a number of intersections during weekday AM and PM peak hours, as summarised in **Table 3-6**. The data indicates the largest pedestrian crossing demand occurs at:

– Castle Hill Road / Glenhope Road (at the signalised crossings as shown in **Figure 3–6**), with a crossing demand of 100 in the AM peak and 76 in the PM peak.

– John Road / Franklin Road (at the pedestrian refuges as shown in **Figure 3–6**), with a crossing demand of 65 in the AM peak and 50 in the PM peak.

Table 3-6 Pedestrian counts surrounding Cherrybrook Station

Intersection	Pedestrian volumes per hour	
	AM Peak Hour	PM Peak Hour
Castle Hill Road / County Drive / Highs Road	9	4
Castle Hill Road / Bradfield Parade	22	9
Castle Hill Road / Glenhope Road	100	76
Castle Hill Road / Franklin Road	33	28
Castle Hill Road / Edward Bennett Drive / Coonara Avenue	26	44
John Road / Robert Road	24	12
John Road / Franklin Road	65	50
Bradfield Parade / Robert Road	12	7
Bradfield Parade / Franklin Road	0	0

Source: SCT Consulting based on surveys provided by Datacorp Traffic, November 2019

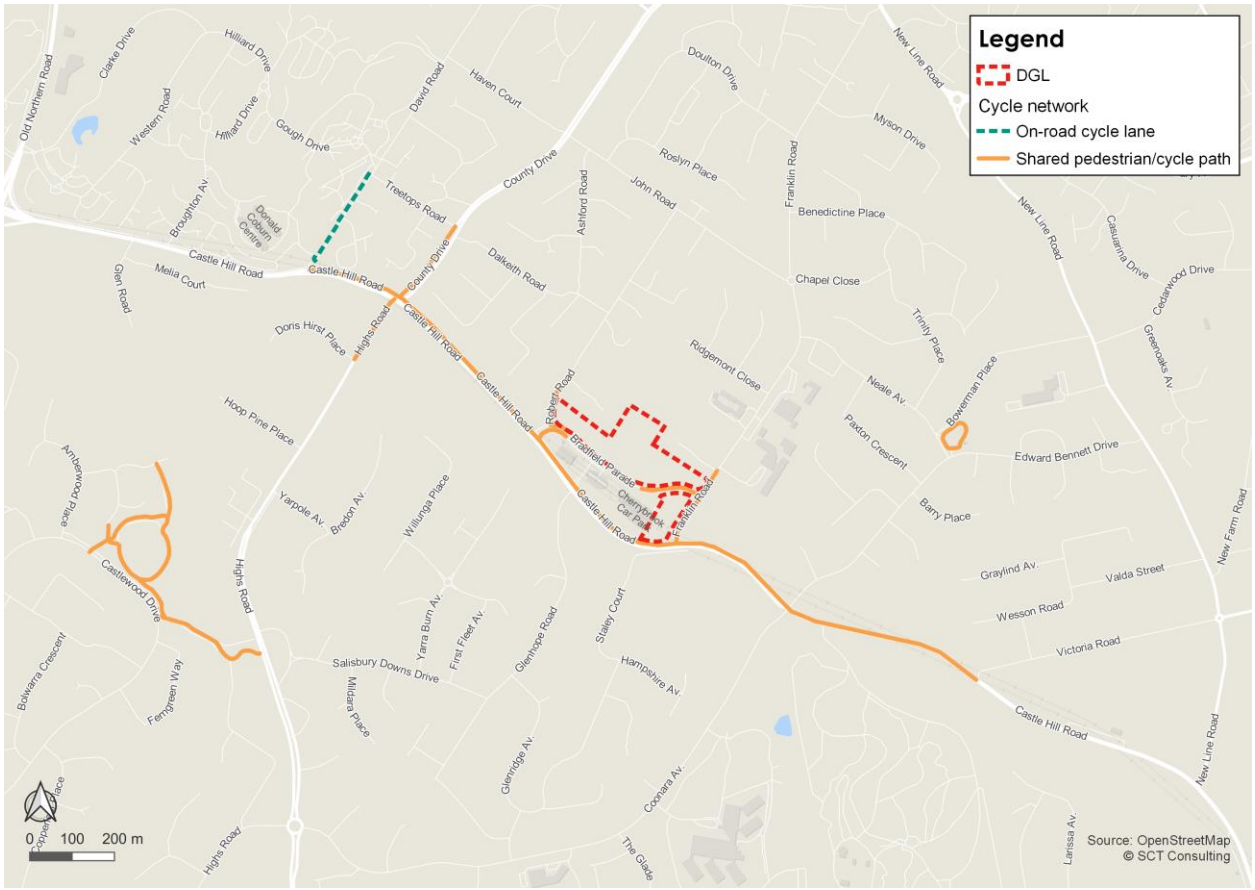
3.4 Cycling

3.4.1 Cycling network

Shared paths are provided along the northern side of Castle Hill Road (between David Road and Victoria Road), both sides of Bradfield Parade, the eastern side of Robert Road and the western side of Franklin Road. The existing cycle network in proximity of the site is presented in **Figure 3–7**.

Bicycle parking is provided at two locations, accessed off Bradfield Parade, with a bike shed for 35 bicycles and bike racks for 10 bicycles.

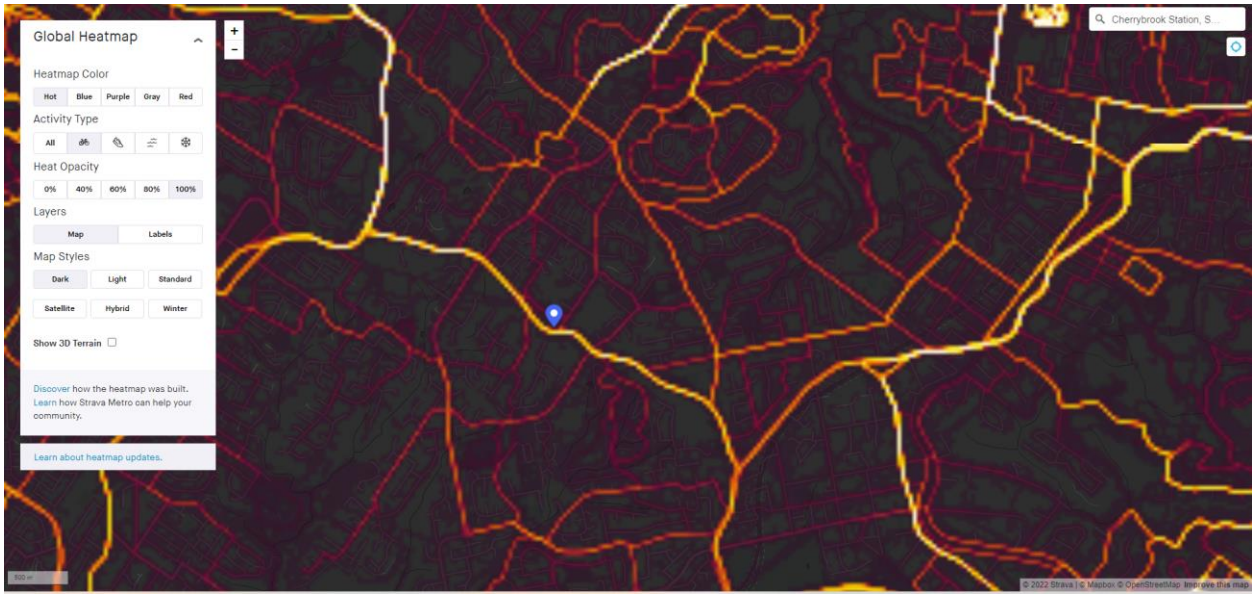
Figure 3–7 Existing cycle paths in proximity of the site



3.4.2 Cycling activities

With the limited cycling facilities and network in the vicinity of the study area, the cycling activities are mostly happening along the main roads, as shown in **Figure 3–8**, along Castle Hill Road, Old Northern Road and Pennant Hills Road based on publicly available Strava Metro data. Medium level of cycling activities is also observed along New Line Road, Highs Road and Aiken Road.

Figure 3–8 Current cycle activities in proximity of the site



Source: Strava Metro, 2022

Note: the map does not come with a legend however the lighter the line colour (such as yellow) represents the higher the usage. Hence the darker the line colour (orange and red) implies lower usage.

3.5 Public transport

The Metro North West Line was opened in May 2019 and the site has direct access to Cherrybrook Station located just south of the site. The station entry is accessed via Bradfield Parade and Castle Hill Road, as shown in **Figure 3–9**.

The Metro North West Line delivers fast travel time to major destinations. For example, from Cherrybrook Station, it only takes approximately three minutes to access Castle Hill, six minutes to Epping, 12 minutes to Macquarie Park, 19 minutes to Chatswood, and 39 minutes to Wynyard[2]. The metro line servicing the site provides an average of 30 services (in both directions) per weekday peak hour and 12 services per hour throughout the day during weekends.

The increased network coverage, train frequency, journey-time reliability and improved customer offering of Sydney Metro, has been shown to encourage rail network usage and increase journey to work trips by non-car modes. The metro patronage published by Transport for NSW has risen to a total monthly trip of 2,085,000[3] in August 2019, indicating a typical weekday patronage over 70,000.

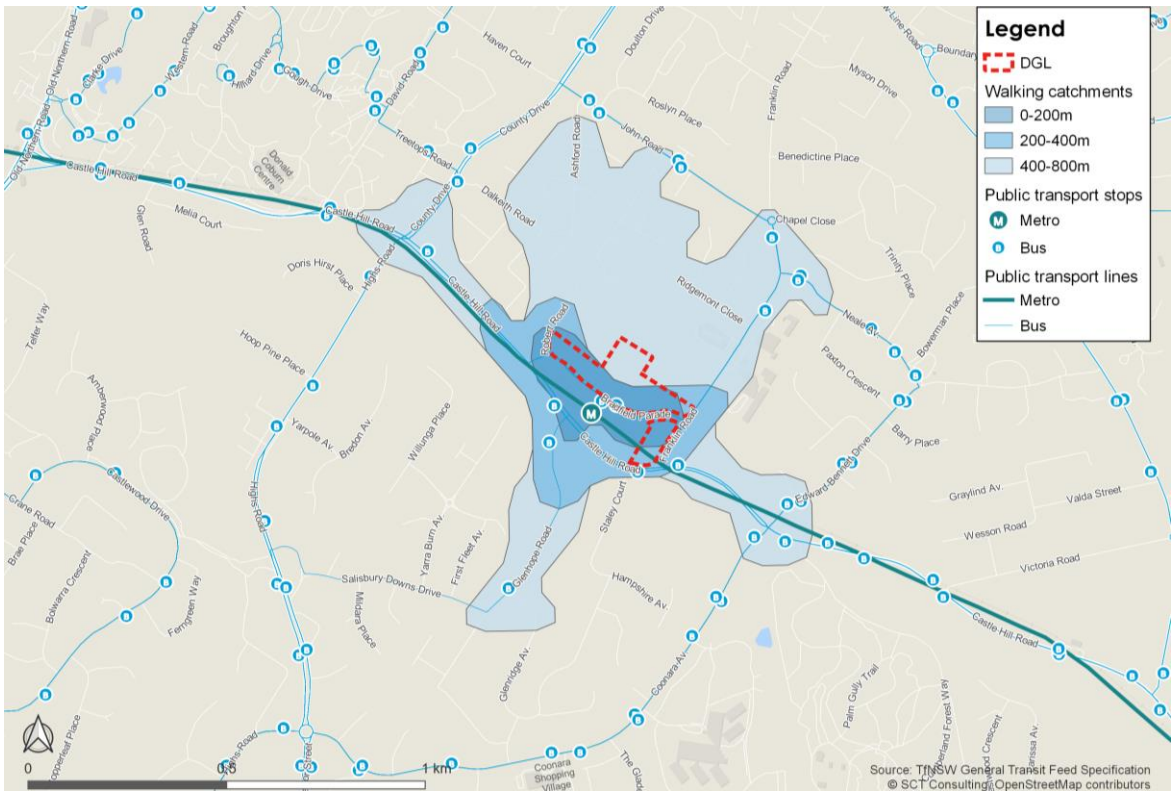
Cherrybrook Station is a bus-rail interchange station serving the local residents and educational precincts surrounding the site. Bus stops are located immediately outside the station on Bradfield Parade and within a short walking distance on Castle Hill Road at Franklin Road, as shown in **Figure 3–9** and **Figure 3–10**.

[2] These are indicative travel times source from publicly available travel apps
[3] https://www.transport.nsw.gov.au/data-and-research/passenger-travel/metro-patronage/metro-patronage-top-level-chart

Figure 3–9 Bus interchange facilities at Cherrybrook Station

Source: Sydney Metro North West Interchange Access Plan, October 2018

Figure 3–10 Bus services in proximity of the site



The bus routes that operate around Cherrybrook Station typically run between a variety of places such as Rouse Hill, Castle Hill, Pennant Hills, Beecroft and Wynyard. The frequency of the five bus services available in proximity of the site, being routes 626, 632, 633, 635 and 642X, are shown in **Table 3-7**. In total, there are 88 and 101 bus services servicing the site during the weekday AM and PM peak hours (6am to 10am and 3pm to 7pm) respectively, while 48 and 40 services run on the Saturday and Sunday (from 10 am to 2pm). On average, 22 and 25 services serve the site per weekday AM and PM peak hour respectively. On the weekends, 12 and 10 services per hour run past the site, during the Saturday and Sunday respectively.

Table 3-7 Existing bus routes and service frequencies at Cherrybrook Station

Route	Corridor	To	From	Total number of services			
				Weekday		Saturday 10am-2pm	Sunday 10am-2pm
				6-10am	3-7pm		
626	Bradfield Parade / Castle Hill Road	Kellyville Station	Pennant Hills	8	13	8	4
		Pennant Hills	Kellyville Station	6	9	8	4
632	Bradfield Parade / Castle Hill Road	Rouse Hill Station	Pennant Hills	8	8	4	4
		Pennant Hills	Rouse Hill Station	8	8	4	4
633	Bradfield Parade / Castle Hill Road	Rouse Hill Station	Pennant Hills	8	8	8	8
		Pennant Hills	Rouse Hill Station	8	8	8	8
635	Bradfield Parade / Castle Hill Road	Castle Hill	Beecroft	7	13	4	4
		Beecroft	Castle Hills	12	8	4	4
642X	Bradfield Parade / Castle Hill Road	Round Corner	Wynyard	19	8^^	0	0
		Wynyard	Round Corner	4^	18	0	0
Total				**88**	**101**	**48**	**40**

Source: TfNSW GTFS, March 2022

^ Commences at Cherrybrook Station

^^ Finishes at Cherrybrook Station

3.6 Street network

3.6.1 General description

The SSP is bounded by Castle Hill Road to the south, Franklin Road to the east and Robert Road to the west, while Bradfield Parade transverses the SSP. The characteristics of the key road network, as shown in **Figure 3–11**, surrounding the site are:

– Bradfield Parade is a local street that provides interchange function to support access to Cherrybrook Station by buses and vehicular pick-up drop-off as well as commuter parking. Disabled parking spaces are also located on Bradfield Parade. It is designated as high pedestrian zone with 40km/hr speed limit.

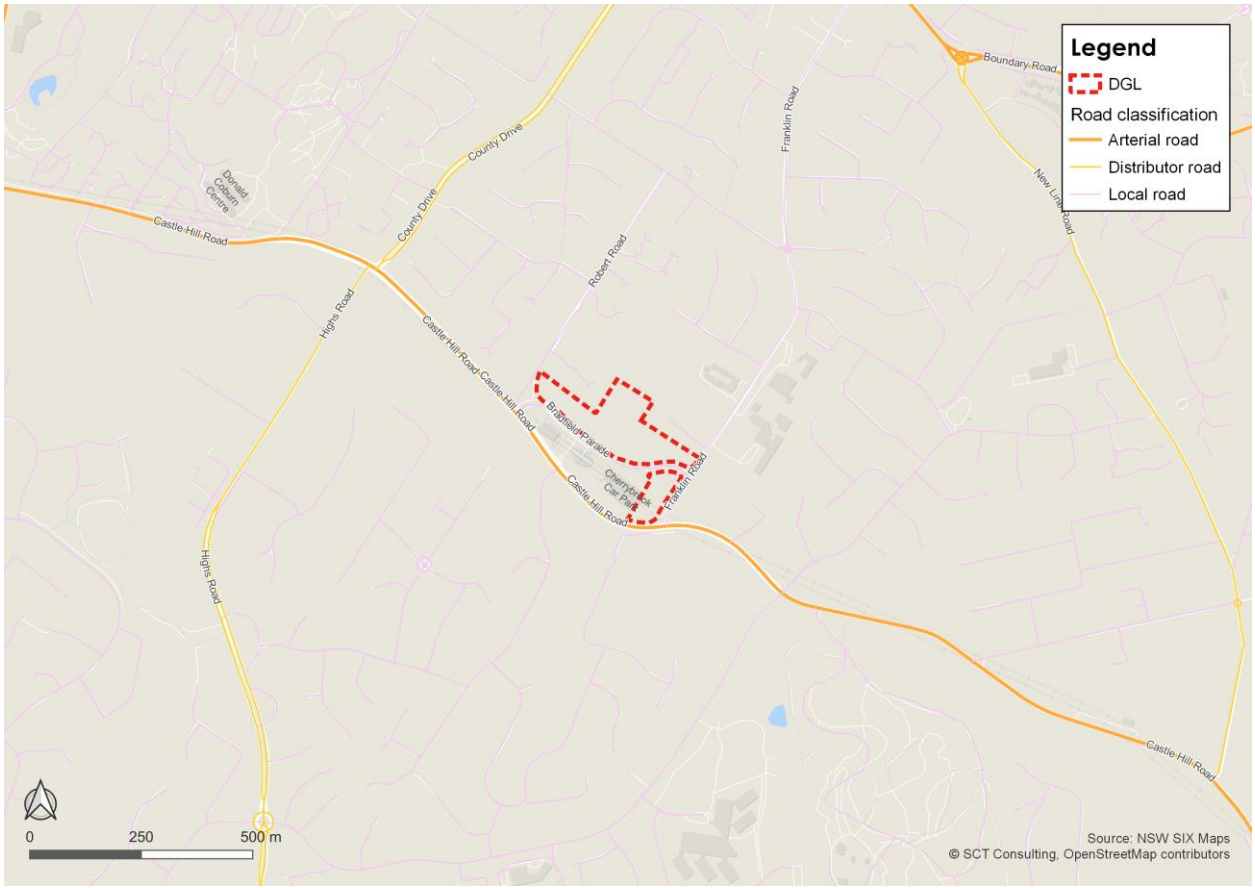
– Robert Road and Franklin Road are north-south local streets that connect John Road and Castle Hill Road, providing access between the site and the residential areas to the north of the site, as well as County Drive as a sub-arterial road located to the west of the site.

– Castle Hill Road is a 4-lane classified state road which runs south of the site and provides a connection between Cumberland Highway in the east and Old Northern Road in the west.

– New Line Road is a 2-lane two-way classified state road that runs east of the site, connecting to Castle Hill Road in the south and Old Northern Road in the north. It provides access from the site to suburbs north of the site including Cherrybrook and Dural.

– County Drive is a 2-lane two-way unclassified regional road that runs west of the site, between Castle Hill Road in the south and New Line Road in the north. It also connects to Highs Road west of the site, which provides access from the site to West Pennant Hills.

Figure 3–11 Road network surrounding the site



3.6.2 Movement and Place classification

Bradfield Parade was created as a 'High Pedestrian Activity' zone with high Place function while serving high and efficient interchange movements of buses, cars and cyclists. Hence Bradfield Parade would be classified as a Civic Space according to The Practitioner's Guide to Movement and Place.

Franklin Road and Robert Road are local streets with relatively low Place and Movement functions.

On the other hand, County Drive, New Line Road and Castle Hill Road are classified as Main Roads that function as major traffic movement corridors serving the major centres and communities of Sydney's north west.

3.7 Existing traffic conditions

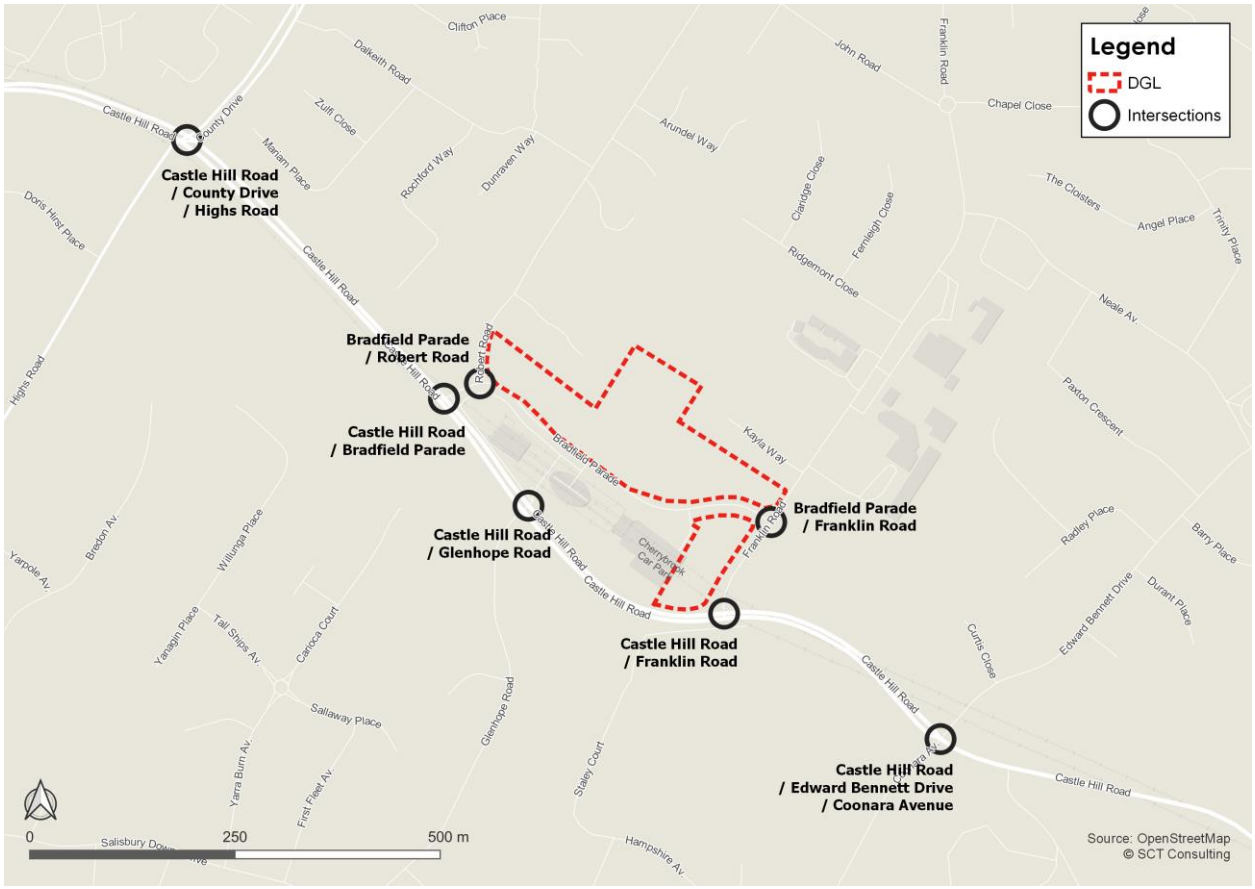
A SIDRA 8 Network model was prepared for the key intersections in the study area to understand the existing network performance and to test the impacts of the development.

The intersections contained in the traffic modelling cover those stipulated in the Study Requirements for Cherrybrook Station Government Land (May 2020) and includes:

– Castle Hill Road / County Drive / Highs Road
– Castle Hill Road / Bradfield Parade
– Castle Hill Road / Glenhope Road
– Castle Hill Road / Franklin Road
– Castle Hill Road / Edward Bennett Drive / Coonara Avenue
– Bradfield Parade / Robert Road
– Bradfield Parade / Franklin Road.

Figure 3–12 shows the intersections included in the SIDRA Network modelling. Intersections were modelled using a single 'network' within SIDRA due to the close spacing of junctions.

Figure 3–12 Intersections included in SIDRA Network model surrounding the site



3.7.1 Input data

Traffic data were collected by Cardno for Sydney Metro on 6 (Wednesday) and 7 (Thursday) November 2019 during the AM and PM peaks. The determined peak hours for the Cherrybrook Station Precinct based on traffic survey data (**Table 3-8**).

Table 3-8 Traffic data peak hour

Peak period	Peak day	Peak hour
AM peak	Thursday	8-9am
PM peak	Wednesday	5-6pm

Source: Sydney Metro, 2019

Traffic data collected show that traffic volumes are three per cent higher on the Wednesday afternoon than those collected during the Thursday PM peak hour. Therefore, Wednesday PM peak (17:00-18:00) was selected as the worst-case PM peak period for this assessment.

Intersection layouts were derived from a combination of site visits, Sixmaps imagery and traffic signal design drawings. Traffic signal data was obtained from Transport for NSW for all of the signalised intersections for 6 and 7 November 2019. Data provided included 15-minute summary signal timing data, detector counts, LX files and SCATS summary images.

3.7.2 Model calibration

The intersection models were calibrated using the input data to reflect observations of traffic behaviours on site and to match indicative queue lengths recorded in the regular traffic and parking monitoring work undertaken by Sydney Metro. One of the key goals is to calibrate the models such that the degree of saturation of all movements was 1.0 or below. This is a standard procedure to ensure that the models are not over-predicting congestion under current conditions. Key assumptions made to achieve calibration for the intersections were:

– Up to five seconds green time end gain for the movements at intersection of Castle Hill Road / County Drive and a favourable arrival type for through movement in the northwest approach

– Adjustment of green time end gain (two to four seconds) for other signal intersections

– Critical gap changed to five seconds and follow-up headway to three seconds for right turn from Castle Hill Road to Bradfield Parade.

3.7.3 Network performance

Operational performance is typically measured through an assessment of the throughput of vehicles across a traffic network, with average delay per vehicle used to assess the performance of an individual intersection. The average delay per vehicle measure is linked to a Level of Service (LoS) index which characterises the intersection's operational performance. **Table 3-9** provides a summary of the LoS performance bands.

Table 3-9 Level of Service index

Level of Service	Average delay per vehicles (sec/h)	Performance explanation
A	Less than 14.5	Good operation
B	14.5 to 28.4	Good with acceptable delays and spare capacity
C	28.5 to 42.4	Satisfactory
D	42.5 to 56.4	Operating near capacity
E	56.5 to 70.4	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.
F	70.5 or greater	

Source: Guide to Traffic Generating Developments; RMS; 2002

In addition, intersection performance is measured using degree of saturation, which is a measure of the spare capacity of each intersection. These measures enable clearer target setting, with future performance of degree of saturation greater than one being unacceptable. The intersection performance per the SIDRA Network results is shown in **Table 3-10**.

Table 3-10 Network performance for existing conditions (2019)

Intersection	AM Peak			PM Peak		
	Delay	LoS	DoS	Delay	LoS	DoS
Castle Hill Road / County Drive / Highs Road	41.0s	C	0.93	53.8s	D	0.95
Castle Hill Road / Bradfield Parade	12.8s	A	0.64	10.2s	A	0.50
Castle Hill Road / Glenhope Road	10.4s	A	0.38	10.6s	A	0.58
Castle Hill Road / Franklin Road	45.5s	D	0.28	37.1s	C	0.39
Castle Hill Road / Edward Bennett Drive / Coonara Avenue	28.8s	C	0.72	27.4s	B	0.97
Bradfield Parade / Robert Road	6.7s	A	0.11	6.5s	A	0.10
Bradfield Parade / Franklin Road	4.9s	A	0.13	4.9s	A	0.11

Source: SCT Consulting, 2020
Delay = worst movement for priority and roundabout controlled intersections and DoS = degree of saturation of worst movement

The SIDRA results show that while the majority of intersections operate at a typically deemed acceptable level of service, the degree of saturation of Castle Hill Road / County Drive / Highs Road and Castle Hill Road / Edward Bennett Drive indicates the intersections are approaching capacity or practically at capacity when DoS is above 0.9.

Although the intersection performance presented in this assessment varies with those presented in the Bitzios traffic and transport assessment for the Cherrybrook Precinct Place Strategy due to the use of a different set of existing traffic data, both studies identified that Castle Hill Road / County Drive / Highs Road is the critical intersection of the surrounding road network.

3.8 Car parking

3.8.1 On-street parking

Parking surveys were also undertaken by Sydney Metro as part of the regular traffic and parking monitoring work completed since the opening of the Metro North West Line. The parking surveys indicated around 387 on-street parking spaces in the precinct.

There are limited number of on-street parking spaces available on Franklin Road and Robert Road due to the narrow cross-section of these two streets leading to the station. Any on-street parking spaces available on Franklin Road, Robert Road and Glenhope Road in proximity to the station are 4P between 9am and 3pm on Monday to Friday. The residential streets further away from the station generally has unrestricted parking provisions.

From the parking survey undertaken in November 2019, it was observed peak parking occupancy occurred along Robert Road – over 76% of the on-street parking spaces were occupied between 8am and 5pm and peaking at 99% occupied around midday on the weekdays. On-street parking along Glenhope Road and John Road was about 75% occupied around midday during the weekdays. Less than 15% of the 30 on-street parking spaces available on Franklin Road were occupied during the weekdays surveyed.

On average, over 80% of all on-street parking spaces surveyed around Cherrybrook Station were available during Saturday and Sunday.

3.8.2 Off-street commuter parking

The parking survey undertaken in November 2019 also indicates that the commuter car parking demand exceeded the full capacity (400 vehicles) between 7am and 4.30pm on the weekdays. This is possible due to illegal parking in areas not marked as formal parking spaces.

The peak demand was found to reach 244 vehicles between 1.30pm and 2pm on Saturday and 326 vehicles between 2pm and 2.30pm on Sunday. Hence there were over 150 and 70 spaces available on Saturday and Sunday respectively.

4.0 The Proposal

4.1 Proposed development

The SSP at Cherrybrook Station covers 7.7 hectares of government-owned land that comprises Cherrybrook Station, commuter carpark and station access road (Bradfield Parade) and vacant land to the east of the station (referred to as the Developable Government Land) (DGL).

The proposed new planning controls for the State Significant Precinct are based on the investigations undertaken as part of the State Significant Precinct Study process. A Reference Scheme has also been prepared to illustrate one way in which the State Significant Precinct may be developed in the future under the proposed new planning controls.

The proposed planning controls comprise amendments to the Hornsby LEP 2013 to accommodate:

– Rezoning of the site for a combination of R4 High Density Residential, B4 Mixed Use and RE1 Public Recreation zoned land

– Heights of between 18.5m – 22m

– FSR controls of 1:1 – 1.25:1

– Inclusion of residential flat buildings as an additional permitted use on the site in the B4 Mixed Use zone

– Site specific LEP provisions requiring the delivery of a minimum quantity of public open space

– New site-specific Design Guide addressing matters such as open space, landscaping, land use, built form, sustainability and heritage.

The Reference Scheme (as shown in **Figure 4–1**) seeks to create a vibrant, transit-oriented local centre, which will improve housing choice and affordability and seeks to integrate with Hornsby's bushland character. The Reference Scheme includes the following key components:

– Approximately 33,350m^2 of residential GFA, with a yield of approximately 390 dwellings across 12 buildings ranging in height from 2 to 5 storeys (when viewed from Bradfield Parade).

– A multi-purpose community hub with a GFA of approximately 1,300m^2.

– Approximately 3,200m^2 of retail GFA.

– Over 1 hectare of public open space, comprising:

  - A village square with an area of approximately 1,250m^2, flanked by active retail and community uses.
  - A community gathering space with an area of approximately 3,250m^2.
  - An environmental space around the pond and Blue Gum High Forest with an area of approximately 8,450m^2.

– Green corridors and pedestrian through site links, providing opportunities for potential future precinct-wide integration and linkages to the north.

Figure 4–1 Cherrybrook SSP Site Reference Scheme

Parcel	*Area	Res GFA	Units	Non-Res GFA	Community	Portion FSR*
A	8,597	12,031	141	749		1.49
B	9,610	11,924	140	2,452	1,300	1.68
C	2,574	2,736	32			1.06
D	6,715	6,621	78			0.98
	27,272	**33,312**	**391**	**3,201**	**1,300**	

Notes:
Residential GBA > GFA : 75%
Non-residential GBA > GFA : 85%
Average unit size : 85m

Source: SJB, 2022

The site would facilitate development which supports best practice transit-oriented development principles, by providing increased employment density in proximity to recent transport infrastructure upgrades that provides future residents with greater access to public transport and employment options, while promoting the use of sustainable travel options.

The site has 4 parcels of land (A to D) with each parcel contains between 1 to 5 residential buildings. Parcels A and B will also provide some non-residential uses.

4.2 Proposed access arrangements

4.2.1 Vehicular access

As shown in **Figure 4–2**, each of the 4 development parcels have individual access points (as shown by the blue arrows) from the existing road network as follows:

– Parcel A has vehicular access to the car park for residential uses via Robert Road.

– Parcels B and C has a shared vehicular access to the car park via Bradfield Parade, just to the west of Franklin Road. This access point at Bradfield Parade will provide access to the car park and loading dock facilities for both the residential and non-residential uses of the precinct. The access will then provide separate connections to the residential and non-residential components of Lot B.

  Given the small scale of the retail facilities in Lot B, the on-site loading / unloading area as well as the access to Lot B will be designed such that a heavy rigid vehicle (HRV) of 12.5m can access / exit the site in a forward direction.

– Parcel D has vehicular access to the car park for residential uses via Franklin Road.

Figure 4–2 Potential car parking configuration and access arrangements

Parcel	*Area	Res GFA	Units	Non-Res GFA	Community	Portion FSR*
A	8,597	12,031	141	749		1.49
B	9,610	11,924	140	2,452	1,300	1.68
C	2,574	2,736	32			1.06
D	6,715	6,621	78			0.98
	27,272	33,312	391	3,201	1,300	

Notes:
Residential GBA > GFA : 75%
Non-residential GBA > GFA : 85%
Average unit size : 85m

Source: SJB, 2022

All proposed vehicular access points were determined in consultation with Sydney Metro / Transport for NSW to ensure impacts to station / public transport functions were minimised.

The location of the car park and loading dock access points have also been designed to minimise interface with high pedestrian areas particularly at Bradfield Parade, while providing the most direct access to the surrounding street network. Hence, the proposal supports the Movement and Place status of Bradfield Parade, Robert Road and Franklin Road as local streets by providing one additional access point along these streets while minimising interference with the existing operations of the interchange by all modes of transport.

The retail component of the site (within Site B) is not intended to function as a retail centre or a major shopping destination, and is expected to only service a smaller localised catchment area. Hence the local residents will be expected to access the localised retail premises by foot or cycle, and not highly reliant on cars. Therefore, the

weekday peak hour trip generation would be significantly lower than retail provision in a more traditional shopping centre. The number of heavy vehicles expected to be generated by the retail component of the site is also expected to be relatively small across the day (see **Section 4.5.2**). Delivery times of future tenants could be managed in an operations management plan to be submitted as future DAs, to minimise the impacts of heavy vehicles accessing the high pedestrian activity area surrounding the SSP site and station.

The key principles of the function of the surrounding road network are included in **Table 4-1** and referenced in the DCP.

Table 4-1 Key street network principles

Street name and type	Role	Guidelines	Changes as a result of the proposed development
Bradfield Parade – Civic Space	Supports high movement and high place functions	– Multi-purpose street, having a movement function by providing interchange between the metro, buses, taxis and vehicles (kiss and ride and access to the commuter car park) and a place function with local retail, station plaza and high amenity residential street environment – Connects the metro station and precinct, as opposed to providing a barrier – Has a high-quality public domain, with an emphasis on pedestrian movement and urban forest outcome	No, it remains as a Civic Space to support high movement and high place functions.
Franklin Road – Local Street	Supports low movement and low place functions	– Development ensures the safety and efficiency of the road through the appropriate location of vehicle access ways – Development incorporates or contributes to a high-quality public domain, including paving and street trees, to mitigate the visual impact of development of greater scale – Particular consideration is given to integration of street tree plantings in the public domain with established trees within the adjacent Inala School site	No, it remains as a Local Street to support low movement and low place functions.
Robert Road – Local Street	Supports low movement and low place functions	– Development incorporates or contributes to a high-quality public domain, including paving and street trees, to mitigate the visual impact of development of greater scale	No, it remains as a Local Street to support low movement and low place functions.
Castle Hill Road – Main Road	Supports high movement and low place functions	– Development does not involve creation of new access points providing direct access to Castle Hill Road for private development such as driveways	No, it remains as a Main Road to support high movement and low place functions.
Vehicle access roads	Supports low movement and low place functions	– Internal access ways are to provide for improved vehicle, pedestrian and cyclist connectivity and permeability throughout the precinct – Consideration is to be given to a shared way arrangement, where layout, design and slower vehicle speeds provide for a high level of pedestrian and cyclist safety – Integration is to occur with the overall landscaping strategy, including consideration of materials and carefully considered plantings	New roads created as part of proposed development.

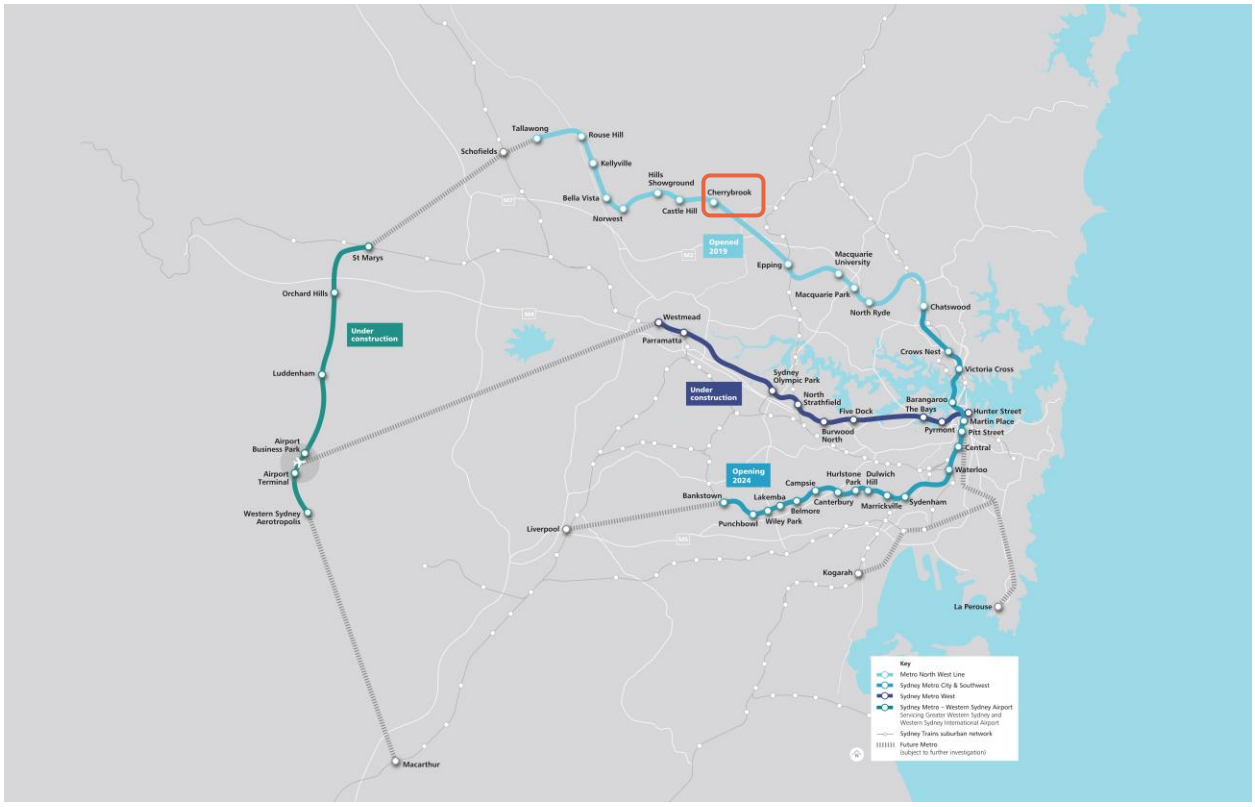
Source: Cherrybrook Station Government Land State Significant Precinct | Proposed Site-specific Development Control Plan (amendment to the Hornsby Development Control Plan 2020)

4.2.2 Public transport access

Sydney Metro provides existing and future residents and employees with high quality access to public transport and employment options and promotes sustainable travel options. Cherrybrook Station on the Metro North West Line is shown in **Figure 4–3**, which provides direct access to Chatswood to the south east and Rouse Hill and Tallawong Station to the north west, with fifteen services in an hour in each direction during the weekday peak hours.

The Metro North West Line opened in May 2019 between Tallawong and Chatswood. When Sydney Metro is extended into the central business district (CBD) and beyond in 2024, metro rail will run from Sydney's North West region under Sydney Harbour, through new underground stations in the CBD and beyond to the south west. Access to a wide range of employment locations within 30 minutes will most likely attract more people to live at Cherrybrook.

Figure 4–3 Sydney Metro network map



Source: Sydney Metro, 2022

Cherrybrook Station is a bus-rail interchange station serving the local residents and educational precincts surrounding the site. Bus stops are located immediately outside the station on Bradfield Parade and within a short walking distance on Castle Hill Road east of Franklin Road.

As discussed in **Section 3.5**, the bus routes that operate around Cherrybrook Station typically run between a variety of places such as Rouse Hill, Castle Hill, Pennant Hills, Beecroft and Wynyard, with an average of 22 and 25 services serving the site per AM and PM peak hour respectively.

The proximity to bus stops to the station allows efficient access of future residents and patrons to the site. The Reference Scheme has been developed to facilitate efficient access by bus and metro passengers through the station plaza and surrounding road network.

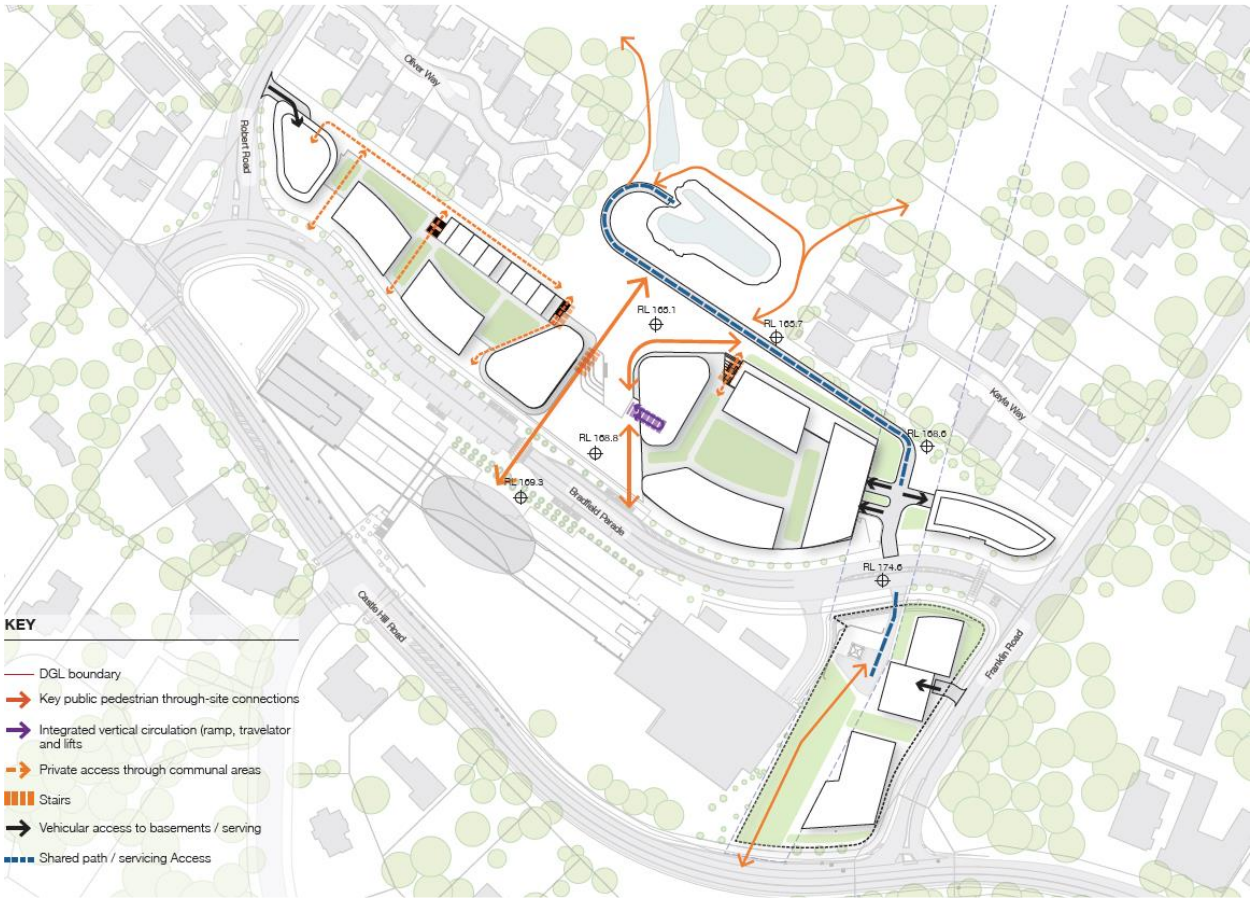
4.2.3 Active transport access

The vast majority of trips to, through and within the site will be taken on foot and the experience of the pedestrian is a critical consideration. Pedestrian footpath and through site links have been proposed to ensure permeability and activity within all precincts of the site.

Footpaths within the proposed development are proposed according to the DCP requirements to ensure capacity to cater for a high number of walking trips and all major circulation spaces will be provided with shelter from the weather. In particular, opportunities exist to create a station plaza directly across from the metro station entrance at

Bradfield Parade, that connects with the community and retail facilities as well as the proposed open space and water feature. Further opportunities have been identified for future pedestrian / cycle connections north of the site, improving permeability and connectivity to the station. These connections, as shown in **Figure 4–4**, could allow more direct access to the station via the central open space area and the station plaza.

Figure 4–4 Proposed through site links and potential future pedestrian / cycle connections



Source: SJB, 2022

Shared paths are already provided along Castle Hill Road, Bradfield Parade and part of Franklin Road near the metro station, which provides connection to existing cycleway / shared path network.

On-site bicycle parking will be provided for residents and employees, which will have access to the existing pedestrian and cycle path network.

4.3 Travel Demand Management

Sustainable transport and Travel Demand Management (TDM) strategies involve the application of policies, objectives, measures and targets to influence travel behaviour, to encourage 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 a single occupant vehicle commute 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 the 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.

Landcom and Sydney Metro has set up a framework for encouraging more sustainable travel, which has been used as a key principle of planning for the development. A Travel Plan should be developed by future developers and monitored by strata management for the Cherrybrook Station Precinct community to deliver best practice travel programs and initiatives to manage travel demand for a transit-oriented development. Key initiatives and measures of Travel Demand Management Strategies should be strongly suggested and further developed into a Travel Plan to:

– Reduce the need to travel
  - Planning of the wider Cherrybrook Station Precinct as a mixed-use community to maximise trip containment within the precinct and encourage use of active transport (walking and cycling) for short trips.

– 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 network 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 development at convenient locations, on-street secure bicycle storage located conveniently at end of cycle destinations, parking hubs for shared bikes, lockers and showers)
    - Promotion of bicycle initiatives – such as cycle-to-work day, free bike check-up events.
  - Public transport:
    - 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 stops
    - 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 shared parking between non-conflicting uses, shared vehicles parking and / or carpooling to accommodate parking needs of all employees
    - Parking spaces dedicated to electric vehicles, with charging stations (as required in the SSP Study requirements). The design to consider the future ability of spaces to link to electrical systems / power supply within the structure
    - Parking spaces dedicated to car share scheme 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 engagement program to enable changing travel behaviour which includes:
    - Active and public transport maps
    - Personalised journey planner
    - Notifications to latest travel information
    - Shared vehicles information
    - Car-pooling opportunities
    - Other precinct-related information.
  - Real-time information embedded into development and public transport stops.

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 could support the delivery of a transit-oriented development at Cherrybrook Station that provides significant opportunities for alternative travel options and reduces the need for car travel.

At the SSP stage, there is no means to enforce the delivery of Green Travel Plan actions. It is recommended that subsequent development applications be given the requirement to develop green travel plans to realise the benefits of access to Metro North West Line and frequent bus services.

4.4 Parking requirements and provision

4.4.1 Car parking facilities

Transit-oriented developments aim to adopt car parking rates that provide a balance between meeting car parking demand whilst encouraging sustainable and active transport by residents. New developments are encouraged to reduce car parking provision and demonstrate the inclusion of transport alternatives or strategies to discourage and minimise private motor vehicle use.

As a principle, Landcom is committed to reduced car parking provision for Cherrybrook SSP to facilitate:

– An exemplar transit-oriented development (maximising the benefits of fast frequent metro connections with services every four minutes in the peak and 10 minutes in off-peak

– A precinct not dominated by cars

– Activation and life on the street

– A reduction in the congestion of precinct roads.

Hornsby Shire DCP has already specified maximum parking rates that apply to developments within 800 m of a railway station, in order to manage transport demand around transit nodes to encourage public transport usage.

The Cherrybrook SSP site is located within 800 m of the metro station, considered as an industry accepted 10-minute walking catchment for public transport patrons. In fact, research by University of Sydney[4] indicates that travel lengths even up to 1 km attract a similar (70%) proportion of walking trips.

Hence the SSP would facilitate development which supports best practice transit-oriented development principles, by providing increased residential density in proximity to Cherrybrook Station and complimentary feeder bus services that provides residents with greater access to public transport and employment options, while promoting the use of sustainable travel options. Future residents of the precinct would benefit from the increased network coverage, train frequency, journey-time reliability and improved customer offering of the Metro North West Line, significantly reducing their reliance on private vehicle usage.

4.4.1.1 Residential car parking provision

The site is located with excellent access to Cherrybrook Station, as well as improved active transport links implemented as part of the metro in proximity of the site. Hence, it is most appropriate to apply the maximum parking rates suggested in the Hornsby Shire DCP developments within 800 m of a railway station, in order to manage transport demand around transit nodes to encourage public transport usage. These rates were also compared to other relevant DCP rates or rates approved / adopted by other similar sites near railway / metro stations, as shown in **Table 4-2**.

Overall, with the comparison to other relevant rates, the proposed Hornsby Shire DCP rates will be the same as those approved already for the DGL development at Epping Station (with Epping being the next station to Cherrybrook). The proposed rates would also comply with the Apartment Design Guide and SEPP 65 requirements as the Council DCP rates are the lesser when compared to those specified for Metro Sub-Regional CBD Centres in the Guide to Traffic Generating Developments.

The maximum rates suggested by the Cherrybrook SSP Parking Strategy have not been adopted to acknowledge the parking needs of future residents and also not to deviate from the Apartment Design Guide and SEPP 65 requirements. Also decoupled parking would not be suitable at this site due to the proposal for basement parking and having restricted access points. Shared parking would also not be preferred as this could discourage residents from using public/active transport and encourage driving to work. However, the proposed Hornsby Shire DCP rates are

[4] Explaining walking distance to public transport: the dominance of public transport supply World Symposium on Transport and Land Use Research, 28-30 July 2011

maximum such that flexibility is provided for future developers in their development applications to further reduce and justify the rates as suggested in the Cherrybrook SSP Parking Strategy.

The proposed visitor parking rates are also proposed to be capped at the rate Council suggests in the DCP, given the site's proximity to public transport access.

The estimated number of parking spaces to be provided for the residential component based on the Reference Scheme is 318 spaces, as shown in **Table 4-2**.

4.4.1.2 Non-residential car parking provision

The retail component of the site is expected to be relatively minor and will most likely be used by residents and passing trade within the local walking catchment, accessing the premises by foot or cycle, hence not highly reliant on cars. A comparison of the relevant parking rates applicable to the non-residential component of the proposed development is presented in **Table 4-3**.

As described for the residential car parking component, it is considered acceptable to adopt the lower rates given the transit-oriented nature of the development and retail's main target customer group, i.e. local walk-up catchment. It is recommended that for the non-residential component that the car parking rate be set at a maximum of 1 space per 70 m^2. This maximum rate is consistent with those rates approved / proposed along the Metro North West Line.

The estimated number of parking spaces provided is 64 spaces for the non-residential component of the proposed development, which is based on the range for similar TOD sites.

Table 4-2 Comparison of proposed residential car parking rates with other relevant rates

Dwelling type		Proposed no. of units*	Proposed maximum rates	Hornsby Council DCP (site <800m of station) (maximum rates)	Approved maximum rates of DGL development at Epping	Metropolitan Regional Centres (minimum rates)	Metropolitan Sub-Regional Centres (minimum rates)
Residential	1 Bed	137 units	0.4	0.4	0.4	0.4	0.6
	2 Bed	195 units	0.7	0.7	0.7	0.7	0.9
	3 Bed	59 units	1.2	1.2	1.2	1.2	1.4
Sub-total spaces for 391 dwellings			**262**	**262**	**262**	**262**	**340**
Visitor		391 dwellings	0.14	0.14	0.14	0.14	0.2
Sub-total visitor spaces			**56**	**56**	**56**	**56**	**78**
Total		**391 dwellings**	**318**	**318**	**318**	**318**	**418**
Percentage difference to the proposed maximum rates			**-**	**0%**	**0%**	**0%**	**+32%**

Source: SCT Consulting, 2022

*- According to the Concept Plan across the precinct, a 35 per cent, 50 per cent and 15 per cent ratio was applied for the proportion of one bed, two bed and three bed dwellings for all dwelling types.

Table 4-3 Comparison of proposed non-residential car parking rates with other relevant rates

Type of use	GFA	Proposed maximum rates	Approved maximum rates of DGL development at Epping	Approved minimum rates of Tallawong Station Precinct South	Hornsby Council DCP (site <800m of station) (maximum rates)	Guide to Traffic Generating Developments (minimum rates)	Hills Showground / Kellyville / Bella Vista SSDA (maximum rates)
Retail	3,200 m^2	1 space per 70m^2 GFA	1 space per 70m^2 GFA	1 space per 60m^2 GFA	1 space per 29m^2 GFA	1 space per 16.4m^2 GLFA ^	1 space per 60m^2 GFA
Commercial / community facilities	1,300 m^2	1 space per 70m^2 GFA	1 space per 70m^2 GFA	1 space per 70m^2 GFA	1 space per 48m^2 GFA	1 space per 40m^2 GFA	1 space per 100m^2 GFA
Total	**4,500 m^2**	**64**	**64**	**72**	**137**	**228**	**66**
Percentage difference to the proposed maximum rates		**-**	**0%**	**+13%**	**+114%**	**+256%**	**+3%**

Source: SCT Consulting, 2022

^Assuming GLFA: GFA=0.75:1 (refer to Section 5.7 Guide to Generating Traffic Development).

4.4.1.3 Further opportunities to reduce car dependence and encourage sustainable travel behaviours

Further reduction of car parking provision could be considered in the future while maintaining a balance between meeting car parking demand and encouraging sustainable and active transport by residents. The car parking needs can still be met through a number of flexible and sustainable parking management measures / options such as:

– **Unbundled parking**: Unbundled parking is parking that is separated from the cost of the flat, with residents having the choice to purchase or lease parking rather than it being bundled in the cost of housing. This strategy better matches supply with demand and gives residents the choice of more affordable homes.

– **Car sharing**: Car share allows residents or businesses to use a shared vehicle fleet. Car share relies on the restriction of parking in areas of high public transport access and mobility choice. Car share parking is also encouraged in the Hornsby Shire Council DCP for sites located within 800 m of a railway station, for residential developments of more than 25 residential units and employment generating developments with a floorspace of more than 5,000 $m^{2.}$

Introducing car share parking spaces within the development would fully leverage the opportunities offered by the Metro North West Line and the principles of a transit-oriented development. Development applications would need to demonstrate how the car share parking spaces are to be accessed, including where access is through a security gate. A covenant is to be registered with the strata plan advising of any car share parking space. The covenant is to include provisions that the car share parking spaces cannot be revoked or modified without prior approval of Council.

SCT Consulting was engaged by Landcom to review DCPs and guidelines from other locations in Sydney to identify reasonable number of car share parking spaces. The other DCPs from City of Sydney, North Sydney and Parramatta provide an indication of suggested car share parking spaces as follows:

– The City of Sydney DCP specifies a minimum rate of car share parking to be provided in residential developments, ranging from 1 per 50 to 90 car spaces provided, depending on the location. For office or retail premises, the minimum rate specified ranges from 1 per 30 to 50 car spaces, depending on the location.

– North Sydney Council does not provide a minimum rate of car share parking; however it allows developers to substitute residential or commercial parking spaces with car share spaces at the rate of 3 or 4 to 1.

– The City of Parramatta Council DCP prescribes 1 car share parking space is to be provided for any business development with a floor space of 5,000 m^2 or above and is within an 800 m of a railway station. 1 car share space can be provided in lieu of 3 car parking spaces.

Given the increase in density and quantity of development surrounding the station and limited provision of car share locations around the site, a ratio of one per 150 car spaces for residential and one per 80 car parking spaces for commercial developments for the site is proposed, in lieu of 3 car parking spaces per car share parking space as suggested by some Councils. **This results in 3 car share spaces which could further offset 9 spaces from the total parking provision**. It would leverage on the precincts' excellent public transport access through the new Sydney Metro, but also reflect the area's more suburban character compared to the City of Sydney, North Sydney and Parramatta. Further discussions will be required between future developers with car share companies to confirm number of car share spaces and detailed arrangements of these spaces.

The car parking spaces for the overall development proposal are shown in **Table 4-4**.

Table 4-4 Total car parking spaces for overall development

Type of use	Overall development
Non-residential	64 spaces
Residential	262 spaces
Visitor	56 spaces
Sub-total	**382 spaces**
Car share	3 spaces
Offsetting of normal parking spaces	*minus 9 spaces*
Total (maximum)	**376 spaces**

Source: SCT Consulting, 2020

Hence, it is recommended that 376 parking spaces be provided for the residential and non-residential components of the development, which includes 3 car share parking spaces.

4.4.2 Bicycle parking facilities

A comparison of the relevant bicycle parking rates applicable to the proposed development is presented in **Table 4-5**.

Table 4-5 Comparison of proposed bicycle parking rates with other relevant rates

Type of use	Yield	Proposed minimum rates	Hornsby Council DCP (site <800m of station) (minimum rates)	City of Parramatta DCP - Epping Town Centre (minimum rates)	Approved Epping DGL site and Tallawong Station Precinct South (minimum rates)
Residential	391 units	1 space per 3 dwelling	1 space per 5 dwelling	1 space per dwelling	1 space per dwelling
Visitors	391 units	1 space per 10 dwelling	1 space per 10 dwelling	1 space per 10 dwelling	1 space per 10 dwelling
Retail	3,200 m^2	1 space per 600 m^2 GFA for staff	1 space per 600 m^2 GFA for staff	1 space per 600 m^2 GFA for staff	Not specified
Commercial / community facilities	1,300 m^2				
Total (minimum)		**177**	**125**	**438**	**430**
Percentage difference to the proposed minimum rates		**-**	**-30%**	**+147%**	**+143%**

Source: SCT Consulting, 2020

A total of 177 bicycle parking spaces is required for the site according to proposed development mix and yield. Given the relatively minor non-residential component, 169 secured bicycle parking spaces are attributed to the future residents and visitors within the residential buildings or in the basements. 8 bicycle parking spaces will be allocated for retail / commercial staff. Additional bicycle parking spaces will be provided to retail customers in the public domain area to encourage cycling access to the proposed Station Plaza with active retail and community uses.

A balanced approach has been taken in consideration of the relevant rates and to encourage sustainable transport options, hence the proposed rate is slightly higher than those suggested by Council DCP. The suggested rates for Epping Town Centre are not adopted as cycling conditions in Cherrybrook are not as favourable, including challenging topography, limited formal routes and connections to the regional facilities and strategic centres.

4.4.3 Other parking requirements

Other parking requirements that apply to the site, as listed in the Hornsby Shire DCP include:

– Motorcycle parking is to be provided for all developments with on-site parking and should be available as part of the common property for use by residents and visitors, to the rate of *one space per 50 car parking spaces*, or part thereof. Hence 8 motorcycle parking spaces should be provided for the proposed development.

– On-site loading and unloading areas for non-residential developments should be provided in accordance with the RTA Guide to Traffic Generating Development (2002). The on-site loading / unloading area in non-residential developments should incorporate 1 car space and 1 motorcycle space for use by couriers. Lot B will be designed such that a heavy rigid vehicle (HRV) of 12.5m can access / exit the site in a forward direction.

– On-site pick up and manoeuvring areas for waste collection vehicles should be provided in accordance with the waste collection provisions at Section 1C.2.3 of the DCP.

– On-site parking for a removalist vehicle should be provided for a residential development with more than 20 dwellings that adjoins a public road where kerb side parking for removalist vehicles is difficult or restricted. Parking for a removalist vehicle should be designed to accommodate at least a small rigid vehicle (SRV), and preferably a medium rigid vehicle (MRV) as defined by AS2890.2.

– Accessible car parking spaces to be provided as specified in **Table 4-6**.

Table 4-6 Accessible car parking provisions

Land Use	Minimum number of accessible spaces
Commercial premises	1-2% of car parking spaces
Community and recreation facilities e.g. civic centres and gymnasiums	2-3% of car parking spaces
Entertainment facilities e.g. theatres, libraries, sport centres	3-4% of car parking spaces
Medium and high-density residential development	1 for each Adaptable Design unit as per AS 2890.6

Source: Hornsby Shire DCP (May 2019)

4.4.4 Electric vehicle parking and charging infrastructure

Vehicle manufacturers and charging providers are rapidly developing Electic Vehicle (EV) technologies to prepare for this transition and to be well positioned for future market growth in passenger and freight mobility. In NSW, the state government is committed to supporting households and communities, and empowering businesses with accessible and safe transport choices that shape a competitive, clean and prosperous future for NSW. Actions stated in the *NSW Electric and Hybrid Vehicle Plan* (as part of the Future Transport 2056) are focussed on three key priority areas being: vehcile availability, charging points and customer information. The NSW Department of Planning and Environment has already updated the Apartment Design Guide to provide guidance for developers and councils for charging stations to be included into apartment designs.

Council also identified opportunities as stated in its LSPS to support smart transport and electric vehicles through car sharing programs and charging infrastructure for future investigation and potential implementation. However, there are no specific DCP specifications on the amount of charging infrastructure required.

From a sustainability point of view, green star point is awarded when 5 per cent of parking is designated for electric vehicles and charging infrastructure is provided. Additional dedicated charging stations and infrastructure can be provided to futureproof further uptake of EVs in the medium and long term. Hence, it is also recommended that at least 10 per cent of total parking spaces are to have Electric Vehicle charging stations.

Parking spaces for fuel efficient, hybrid and electric vehicles must be clearly designated, for example through use of different coloured line markings and highly visible signage. Appropriate electric vehicle charging infrastructure must be easily accessed by the users of dedicated electric vehicle charging spaces and comply with all relevant standards and health and safety legislation.

As the market begins its transition to electric vehicles, an increasing portion of a precinct's energy demand will also need to cater for the charging requirements of electric vehicles. The additional electricity loading as a result of the 40 electric vehicle charging spaces will need to be considered in future design stages.

4.4.5 Parking summary

Restrained parking is proposed for the Reference Scheme to create a transit-oriented centre, reflecting the higher level of public transport services and to minimise additional congestion to the surrounding road network. Based on a parking review of other relevant DCPs and similar development examples that are located close to train stations, it is proposed that the following car parking rates be adopted and applied to the Reference Scheme of the Cherrybrook SSP site as shown in **Table 4-7**.

Table 4-7 Recommended parking rates for Cherrybrook SSP site

Land use		Maximum car parking rates	Minimum bicycle parking rates
Residential	1 Bed	0.4 space per dwelling	One space per three apartments for resident and one visitor space per 10 apartments
	2 Bed	0.7 space per dwelling	
	3 Bed	1.2 spaces per dwelling	
	Visitor	0.14 spaces per dwelling	
Retail		1 space per 70 m^2 GFA	One space per 600 m^2 GFA for staff
Commercial / community facilities		1 space per 70 m^2 GFA	One space per 600 m^2 GFA for staff

Source: SCT Consulting, 2020

Based on recommended maximum car parking rates and minimum bicycle parking rates, the Reference Scheme proposes 376 car parking spaces, 8 motorcycle parking spaces and 177 bicycle parking spaces. This includes 3 car share parking spaces, based on 1 space per 150 car spaces for residential and 1 space per 80 car parking spaces for commercial.

It is also recommended that at least 10 per cent of total parking spaces are to have Electric Vehicle charging stations.

4.5 Vehicle trip generation

The site at the Cherrybrook Station Precinct is proposed to have a mix of residential, retail and commercial uses within proximity of Cherrybrook Station as well as restrained parking provision. Research indicates that these types of built environment variables lead to higher public transport mode share. Research paper (*The influence of the built environment on mode choice – evidence from the journey to work in Sydney, McKibbin 2011)* indicates that there are several factors that influence travel behaviour and that the strongest relationships are associated with demographics, car ownership and public transport access. A summary of the findings is provided in **Table 4-8**.

Table 4-8 Findings of built environment variables and their influence on public transport mode share

Category	Built environment variables	Model coefficient	Elasticity
Density	Residential density (pop/ha) Employment density (jobs/ha)	0.0004 0.0003	0.05 0.02
Diversity	Jobs/housing diversity (0 = single use, 1 = mixed use)	0.0247	0.03
Design	Street density (m/ha) *Not statistically significant*	-	-
Destination accessibility	% of jobs accessible by public transport in 30 mins % of jobs accessible by car in 30 mins	0.4019 -0.1044	0.11 -0.05
Distance to transit	Distance to the nearest CityRail station (log km)	-0.0537	-002
Control variables	Weekly income per person ($ per week) Cars per household % workers travelling to Sydney CBD	0.0001 -0.2216 0.5415	0.17 -0.98 0.24

Source: McKibbin, 2011

Table 4-8 provides a relationship between the level of car ownership and the non-car mode share / car trip generation. The relationship between these variables is an elasticity of -0.98, indicating that a 100 per cent decrease in car ownership would result in a 98 per cent increase in non-car mode share or vice-versa (all else being equal). When viewed together with research that indicates that low parking supply for households results in less car ownership, it can be concluded that parking supply can influence travel behaviour.

Given the site's access to frequent transit services, low proposed parking provision and mixed-use nature, trip generation rates have been tailored to the proposal as per the following sections.

4.5.1 Residential vehicle trip generation

The average trip rate for high density residential flat dwellings that have good access to public transport services within Sydney urban areas, as published by the Roads and Maritime Services[5], is identified as 0.19 and 0.15 trips per dwelling within the AM and PM peak hour periods respectively and 1.52 daily trips per dwelling.

Table 4-9 shows a summary of a number of selected sites that Roads and Maritime has surveyed for residential developments that are located close to public transport services, including their parking provision, mode share and trip generation (to indicate actual car use).

[5] Technical Direction TDT 2013/04a, Guide to Traffic Generating Developments – Updated traffic surveys (Roads and Maritime Services, 2013)

Table 4-9 Peak hour trip rates for high density residential sites and their related parking provision and mode share

Site No. and location	Site 1 St Leonards	Site 2 Chatswood	Site 3 Cronulla	Site 5 Parramatta	Site 7 Strathfield	Site 10 Pyrmont	Average
Total units	70	129	28	83	31	131	
Parking spaces	97	206	18	108	30	199	
Parking ratio	1.39	1.60	0.64	1.30	0.97	1.52	**1.24**
% Mode Split							
Car driver & passenger	27%	35%	32%	42%	31%	40%	**35%**
Non-car	73%	64%	67%	57%	69%	60%	**65%**
Vehicular Trip Generation (vehicle trips per unit)							
AM Peak	0.14	0.14	0.07	0.27	0.10	0.18	**0.15**
PM Peak	0.07	0.12	0.11	0.12	0.06	0.10	**0.10**

Source: Roads and Maritime Service, Technical Direction 2013/14

The data in the table shows that these sites all achieve an average of 35 per cent car mode share and low weekday peak hour trip generation rates. However, all these developments offer a range of parking provision (ranging between 0.64 and 1.6 and on average of 1.24 spaces per dwelling) but still achieve low car uses. This also suggests that the trip generation rates are also dependent on other factors such as good access to frequent public transport services, access to jobs in key employment centres.

Lower trip generation rates are considered appropriate for this development for the following reasons:

– The site is in proximity to frequent public transport services
– The site has constrained parking provision in line with transit-oriented development principles
– The site has access to large number of key employment centres within a reasonable travel time. This will further expand with the delivery of Sydney Metro City & Southwest by 2024

However, 0.3 trips per residential dwelling has been adopted for this study such that the assumption is consistent with the wider Cherrybrook Precinct Place Strategy Traffic and Transport Assessment, that was endorsed by the relevant stakeholders. This rate (0.3 trips per dwelling) was derived based on benchmarking of trip rates of other similar medium and high density residential flat dwellings at a number of rail station precincts.

4.5.2 Non-residential vehicle trip generation

The retail component of the site is expected to be relatively minor and will most likely be used by residents and passing trade within the local walking catchment, accessing the premises by foot or cycle, hence not highly reliant on cars and therefore weekday peak hour trip generation would be significantly lower than retail provision in a more traditional shopping centre.

For the purpose of this assessment, the following non-residential trip generation rates were adopted:

– Retail trip rates of 1.94 and 2.70 trips per 100 m^2 of GFA for AM and PM peak hour respectively (that were adopted and approved for the Tallawong Station Precinct South SSDA which has a similar retail offer based on local walking catchment and passing trade with metro customers).
– Community facility trip rates of 1.6 and 1.2 trips per 100 m^2 of GFA for AM and PM peak hour respectively (that are the commercial trip rates for development that is close to public transport services since there are no suggested trip generation rates in the RMS guide. These rates used are considered to be conservative during the peak hours for community facilities as the community facilities are not expected to generate as many trips as an office especially during the peak hours).

Based on an estimated heavy vehicle trip generation rate using Transport for NSW's Urban Freight Forecasting Model, the retail area could generate a maximum of 127 vehicle (including all deliveries, servicing and waste collection) trips per day or up to 13 vehicles during the peak hour. Of these retail related trips, only about 8 of these vehicles per day would be described as MRV or HRV.

4.5.3 Total vehicle trip generation

The likely estimated peak hour vehicle trip generation of the Cherrybrook SSP site is shown in **Table 4-10**.

Table 4-10 Peak hour vehicle trip generation of the site

Land Use	Indicative Yield	Proposed AM Peak trip rates	AM Peak trips	Proposed PM Peak trip rates	PM Peak trips
Residential	391 units	0.3 per unit	118 veh/h	0.3 per unit	118 veh/h
Retail	3,200m^2	1.94/100m^2 GFA	62 veh/h	2.7/100m^2 GFA	86 veh/h
Commercial / community facilities	1,300m^2	1.6/100m^2 GFA	21 veh/h	1.2/100m^2 GFA	16 veh/h
Total	**-**	**-**	**201 veh/h**	**-**	**220 veh/h**

Source: SCT Consulting, 2020

Based on the adopted trip generation rates of the respective land uses, it is estimated the SSP site would generate up to 220 vehicle trips per hour during the AM and PM peak hours. Total point to point trip generation is considered negligible given the low journey to work mode share in the area for point to point.

4.6 Public and active transport demand

The Journey to Work data (2016) presented in **Section 3.2** indicates that public transport trips undertaken in the Cherrybrook Statistical Area currently accounts for approximately 26 per cent of all trips undertaken. This is already higher than the Sydney average of 22 per cent public transport trips. However, given the site's location directly adjacent to Cherrybrook Station, a higher usage towards public transport from future residents and employees of the site can be expected. The 2019 Cherrybrook Station entries and exits data (see **Table 3-1**) shows that there were over 3,000 daily trips made on the metro by residents in the surrounding areas. This could be equivalent to a 30 per cent mode share by metro alone.

Recent surveys[6] showed that public transport mode share of high-density residential developments that are located close to high frequency public transport services range from 40 to 70 per cent. Hence for the Cherrybrook SSP site it is expected to have a minimum of 50 percent mode share to public transport. A future mode shift target of approximately 24 per cent toward public and active transport (20 per cent train / metro and four per cent bus) has therefore been set, resulting in a future public transport mode split of 30 per cent train / metro and 20 per cent bus trips. It should be noted that these mode share targets are set for the SSP site only, given its proximity to the metro station. The wider Cherrybrook Precinct may have different public transport and active transport mode share targets set.

To further confirm that the proposed public transport mode share targets (in relation to the proposed parking provision) of the site is feasible, a benchmarking exercise was undertaken again using the Technical Direction TDT 2013/04a data surveyed for a number of high-design residential development. The benchmarking exercise is presented in **Table 4-11**.

[6] Technical Direction TDT 2013/04a, Guide to Traffic Generating Developments – Updated traffic surveys (Roads and Maritime Services, 2013)

Table 4-11 Benchmarking for high density residential sites and their related parking provision and mode share

Site No. and location	Site 1 St Leonards	Site 2 Chatswood	Site 3 Cronulla	Site 5 Parramatta	Site 7 Strathfield	Site 10 Pyrmont	Average
Total units	70	129	28	83	31	131	
Parking spaces	97	206	18	108	30	199	
Parking ratio	1.39	1.60	0.64	1.30	0.97	1.52	1.24
% Mode Split							
Car driver & passenger	27%	35%	32%	42%	31%	40%	35%
Non-car	73%	64%	67%	57%	69%	60%	65%
Revised parking ratio							
Car Parking Occupancy %	62%	62%	-	77%	73%	50%	
Revised Parking Ratio based on Car Parking Occupancy %	0.87	0.99	-	1.01	0.71	0.76	0.87

Source: Technical Direction TDT 2013/04a Source: Roads and Maritime Service, Technical Direction 2013/14

Based on the data shown in **Table 4-11**, the average revised car parking ratio based on the surveyed car parking occupancy is 0.87. This revised car parking ratio equates to an average car driver and passenger mode share of 35%. Therefore, noting the proposed residential parking ratio for the Cherrybrook SSP is 0.81 (318 spaces / 391 dwellings), the suggested 28% car mode share target would likely be achievable.

The existing number of walk only and cycling trips as listed in the 2016 JTW data is relatively low (one per cent), compared to the Greater Sydney area. However, with the implementation of metro, future residents and employees of the site have access to an improved active transport network as well as the provision of good cycle parking facilities within the proposed development. This could encourage a mode shift towards cycling away from cars. Therefore, a mode share target of two per cent (compared to the existing 0 per cent) has been set for the site for cycling. The walk only trips are also expected to increase (from one to five per cent), as more trips would be associated with visits to the retail / community / educational land uses within walking distance to the site. However, all public transport trips expected to be made by future residents will use walking as mode of transport to get to public transport.

A summary of existing and future mode share of the residential component of the development is shown in **Table 4-12**. It is estimated the proposed residential development at the SSP site will generate a total of just over 670 peak hour total trips by different modes of transport.

Table 4-12 Existing and future mode share of Cherrybrook SSP residential development

Mode	Existing mode share	Forecast mode share	Estimate future trips per peak hour with forecast mode share
Car	58%	28% (-30%)	220
Train / metro	10%	30% (+20%)	236
Bus	16%	20% (+4%)	157
Cycling	0%	2% (+2%)	16
Walking	1%	5% (+4%)	40 (+393 of walking trips to public transport stops)
Other	1%	1%	8
Total trips by all modes	*86%*	*86%*	*677*
Did not go to work	14%	14%	110
Total	**100%**	**100%**	**787**

Source: SCT Consulting, 2020

The assumed mode shift towards public and active transport would result in a 30 per cent reduction in car trips, from the existing 58 per cent to 28 per cent for future residents of the SSP site.

The 220 peak hour car trips were estimated based on agreed trip rates, which would represent the targeted 28 per cent mode share for future car trips. Hence, the number of trips by other modes are then estimated pro-rata to the number of car trips according to the forecast mode share.

Based on the assumed future mode share target, the proposed development would be expected to generate over 390 public transport trips in a typical peak hour. The proposed development would also generate approximately 450 walking and cycling trips in a typical peak hour of which the majority are within short walking distance to the public transport stops and retail / community / educational land uses within walking distance to SSP.

5.0 Traffic and transport impact assessment

5.1 Public transport impacts

The site is located immediately adjacent to Cherrybrook Station, which provides direct access to Epping, Chatswood, Rouse Hill, Macquarie Park and other employment centres via connecting rail services. The wide network coverage, train frequency, journey-time reliability and improved customer offering of Sydney Metro, will encourage public transport usage and increase journey to work trips by non-car modes.

The delivery of this site would support best practice transit-oriented development principles, by providing increased mixed-use density in proximity to high frequency and capacity public transport services. Sydney Metro will provide residents with greater access to public transport and employment options, while promoting the use of sustainable travel options.

As described in **Section 4.6**, the proposed development would be expected to generate over 390 public transport trips in a typical peak hour based on the assumed future mode share target. As described in **Section 3.5**, the site has access to an average of 30 metro services (in both directions) per weekday peak hour and 12 services per hour throughout the day during weekends. The bus data indicates that the combined frequency of bus services near the site is 22 and 25 services (in both directions) per AM and PM peak hour respectively during weekdays.

It is expected that the additional public transport demand can be accommodated by the existing frequent metro and bus services. Applying the additional 236 and 157 metro and bus trips would equate to approximately 8 additional passengers per metro train and 6 additional passenger per bus being generated by the site during weekday peak hours. With bus stops interchanging directly at Cherrybrook Station, no changes to bus service patterns are considered necessary to service the development.

5.2 Active transport impacts

Based on the non-car generation of the Reference Scheme (as described in **Section 4.6**) and the increased mode shift target towards active transport, approximately 430 additional pedestrians (including public transport trips) and 16 additional cyclists would be generated in the busiest peak period. It is important to ensure a safe and well connected, high quality footpath and cycle path system around the site, to promote sustainable transport use.

As described in **Section 4.2.3**, improved cycling and walking access from the site to the surrounding road network is proposed via new footpaths, through site links and station plaza.

In addition, the active transport network has recently been improved as part of the implementation of Cherrybrook Station (**Section 3.3** and **Section 3.4**), which is expected to support walking and cycling around the site, as well as improve accessibility to public transport. The active transport improvements as part of metro include a shared path along the northern side of Castle Hill Road, along Bradfield Parade, along the eastern side of Robert Road and along the western side of Franklin Road, as well as additional crossing opportunities.

The station layout also has several features to support the additional number of pedestrians. There are two access points to the station, reducing pressure on each of the access points. There is also a spacious public domain and plaza, which provide waiting or meet and greet space for customers and reduces queue build-up near station gates. Lastly, with the frequent number of metro services, the peak factor for pedestrian demand will be well-spread across the peak hours and is expected to be more balanced compared with a conventional heavy rail station.

Given the extent of the proposed improvements to the walking and cycling network as part of the proposed development and the introduction of the metro station, the surrounding active transport network is expected to be able to handle the additional 450 walking and cycling trips, as a result of the proposed development.

5.3 Parking impacts

The number of residential and visitor off-street car parking spaces provided as part of the proposed development at the SSP site is complemented by the excellent level of access to frequent public transport (metro and buses), within short walking distance to the SSP and good access to active transport using the recently introduced cycle routes delivered as part of the opening of the metro station at Cherrybrook.

As a result of the opening of Cherrybrook Station, on-street parking surrounding the station has been converted to short-term parking such that they will not be available for long-term users or commuters. Hence the reduced parking

rates of the proposed development, combined with the limited availability of long-term on-street parking, will further encourage the uptake of public transport use and assist in reducing the traffic generating impacts of the proposal.

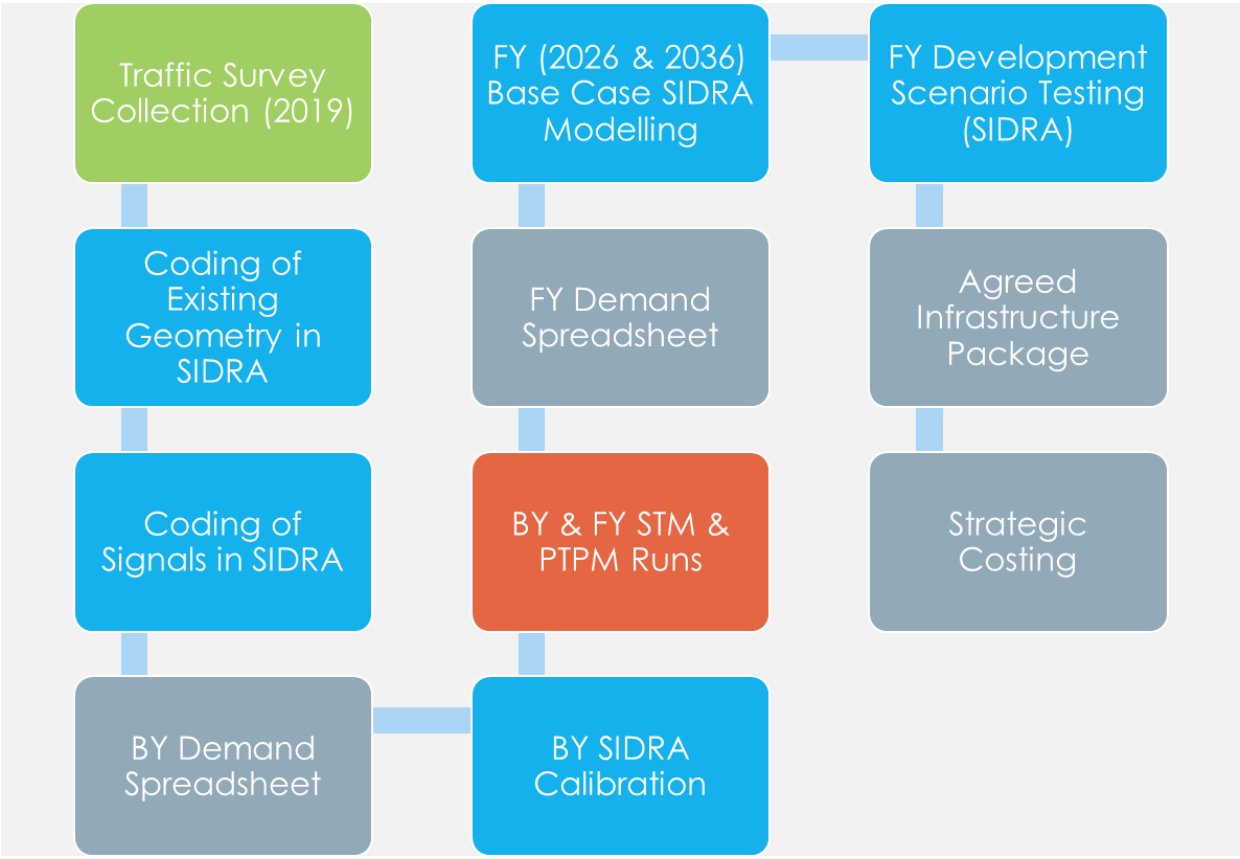
The SSP site will increase housing stock that is within walking distance to the station interchange, local retail and community facilities as well as a number of schools, which reduce the reliance of future residents to drive and even the ownership of cars for some residents or families.

177 bicycle parking spaces are proposed as part of the SSP site that exceed Council's DCP requirements, in order to provide an alternative to driving for shorter distance trips and to encourage residents to adopt sustainable transport modes.

5.4 Road network impacts

As outlined in the Study Requirements for Cherrybrook Station Government Land (May 2020), land use assumptions in the Strategic Travel Model (STM) and PTPM (prepared and operated by Transport for NSW) are required to be reviewed and updated to reflect relevant modelling scenarios required for this assessment. A general overview of the traffic modelling approach adopted for this assessment is shown in **Figure 5–1**. The traffic modelling approach and brief was developed in consultation with DPE and TfNSW. Similar modelling framework is widely accepted and used to estimate traffic demand and infrastructure needs for similar land use change studies.

Figure 5–1 Traffic modelling approach



Source: SCT Consulting, 2020

The key steps involved in the traffic modelling approach are:

– Base year traffic data collection

– STM and PTPM modelling to understand the amount of traffic growth on key corridors (taken in account of mode share by public transport usage), trip generation of proposed land use scenarios and trip distribution patterns based on regional land use assumptions and network conditions.

– SIDRA Network to understand local and regional intersection performance and to inform preliminary infrastructure upgrade needs.

The key modelling scope, approach and assumptions were discussed and consulted with the Project Working Group including DPE, Hornsby Shire Council, The Hills Shire Council and Transport for NSW in several meetings to clarify traffic modelling assumptions before traffic modelling commenced.

The Study Requirements also require a number of other land use scenarios were modelled in addition to the Cherrybrook SSP site to understand the cumulative impacts of wider land use changes. An overview of these scenarios is presented in **Table 5-1** and the results of the modelling are presented in the following sections.

It has been confirmed by DPE that the Cherrybrook Precinct Place Strategy dwelling numbers have not changed during the precinct planning process and have maintained 3,200 dwellings as the total increase in dwellings for the broader Cherrybrook Precinct area. The former IBM site proposal is the only planning proposal in the precinct that has been approved, which could deliver up to an additional 600 dwellings to the Cherrybrook Precinct.

Cherrybrook Central (Toplace) and Grosvenor Place proposals were not supported by the Hills Shire Council and have not proceeded to Gateway determination based on a rezoning review by the Sydney Central City Planning Panel. The current status and description of these proposals are unknown, and as such, were not included in the modelling scenarios.

Table 5-1 SIDRA modelling scenarios for the future years of 2026 and 2036

Modelling scenario description	Modelling scenario reference	Existing Traffic	Background Traffic	SSP Site Traffic	IBM Proposal Traffic	Cherrybrook Precinct Place Strategy
2026 / 2036 Base Case	FY0	✓	✓			
2026 / 2036 Base Case (+ potential upgrades)	FY0-I	✓	✓			
2026 / 2036 Base Case + SSP	FY1	✓	✓	✓		
2026 / 2036 Base Case + SSP (+potential upgrades)	FY1-I	✓	✓	✓		
2026 / 2036 Base Case + SSP + IBM Proposal	FY2	✓	✓	✓	✓	
2026 / 2036 Base Case + SSP + IBM Proposal (+ potential upgrades)	FY2-I	✓	✓	✓	✓	
2026 / 2036 Base Case + SSP + IBM Proposal + Cherrybrook Precinct Place Strategy	FY3	✓	✓	✓	✓	✓
2026 / 2036 Base Case + SSP + IBM Proposal + Cherrybrook Precinct Place Strategy (+ potential upgrades)	FY3-I	✓	✓	✓	✓	✓

Source: Study Requirements for Cherrybrook Station Government Land (May 2020)

The impact these additional trips will have on the seven intersections in proximity of the site for the future years of 2026 and 2036, was determined using a SIDRA network model. As per the base case scenario, the following intersections were analysed:

– Castle Hill Road / County Drive / Highs Road
– Castle Hill Road / Bradfield Parade
– Castle Hill Road / Glenhope Road
– Castle Hill Road / Franklin Road
– Castle Hill Road / Edward Bennett Drive / Coonara Avenue
– Bradfield Parade / Robert Road
– Bradfield Parade / Franklin Road.

In parallel to this SSP traffic and transport study, DPE has engaged Bitzios Consulting to develop a traffic and transport improvements implementation plan for the Cherrybrook Precinct Place Strategy. Since the scopes of the two assessments vary in modelling software, extent and year due to the different scope of the two studies, the

outcomes of the two assessments such as intersection performance and infrastructure upgrades identified are not expected to be exactly the same. However, in general the outcomes of the two assessments are generally aligned in terms of intersections requiring upgrade to cater for future development growth of the Cherrybrook Precinct and the SSP.

5.4.1 Future year base case (FY0)

5.4.1.1 Background growth

Background traffic growth was derived from the PTPM strategic model prepared by TPA that takes into account of latest population and employment growth forecasts generated by Department of Planning and Environment. Based on PTPM forecasts, Castle Hill Road is expected with background traffic growth of an average of 7% and 14% increase by 2026 and 2036 compared to 2019, respectively. It should be noted that the modelled background traffic growth does not include the Cherrybrook Precinct increased dwelling numbers, which will be applied as a separate scenario (FY3) in **Section 5.4.4**.

The forecast 2026 and 2036 traffic volumes along Castle Hill Road, Bradfield Parade and Franklin Road in the vicinity of the SSP site are summarised in **Table 5-2** and the spreadsheet models that show the forecast traffic volumes at each of the intersections modelled are included in **Appendix A**.

Table 5-2 2026 and 2036 Peak Hour Traffic Flows (FY0)

Location	Peak period	2019 traffic flows	2026 traffic flows	Traffic increase	2036 traffic flows	Traffic increase
Castle Hill Road between Old Northern Road and County Drive	AM	3,588	3,850	**+262**	4,087	**+499**
	PM	3,866	4,130	**+264**	4,401	**+535**
Castle Hill Road between County Drive and Bradfield Parade	AM	2,108	2,256	**+148**	2,400	**+292**
	PM	2,360	2,515	**+155**	2,684	**+324**
Castle Hill Road between Bradfield Parade and Franklin Road	AM	1,971	2,107	**+136**	2,237	**+266**
	PM	2,287	2,439	**+152**	2,606	**+319**
Castle Hill Road between Franklin Road and Edward Bennett Drive	AM	2,003	2,138	**+135**	2,280	**+277**
	PM	2,282	2,433	**+151**	2,597	**+315**
Bradfield Parade just north of Castle Hill Road	AM	390	418	**+28**	444	**+54**
	PM	316	337	**+21**	360	**+44**
Franklin Road just north of Castle Hill Road	AM	245	262	**+17**	279	**+34**
	PM	130	141	**+11**	139	**+9**

Source: SCT Consulting based on 2026 and 2036 PTPM model

The highest traffic increase as a result of background traffic growth is observed at Castle Hill Road to the west of County Drive. There is some small increase in traffic volumes on Bradfield Parade and Franklin Road due to the local nature of these two streets.

5.4.1.2 Intersection performance

The performance of all assessed intersections under future background traffic growth scenario in 2026 and 2036 is summarised in **Table 5-3**. The detailed SIDRA modelling outputs are included in **Appendix B**.

During the peak hours in 2026 and 2036, the intersections of Castle Hill Road / County Drive / Highs Road and Castle Hill Road / Edward Bennett Drive / Coonara Avenue continue to operate as the critical intersections of the surrounding road network, where DoS are over 1.00 in both 2026 / 2036 and LoS becomes E / F in 2036.

Table 5-3 2026 and 2036 intersection performance (FY0)

No.	Intersection	2026 Base Case			2026 Base Case (+ intersection upgrades)			2036 Base Case			2036 Base Case (+ intersection upgrades)		
		Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS
AM peak													
1	Castle Hill Road / County Drive / Highs Road	51.4s	D	1.03	56.2s	D	0.99	60.8s	E	1.13	50.6s	D	0.96
2	Castle Hill Road / Bradfield Parade	12.8s	A	0.64	10.7s	A	0.88	13.2s	A	0.69	10.7s	A	0.88
3	Castle Hill Road / Glenhope Road	10.7s	A	0.38	9.8s	A	0.41	10.8s	A	0.42	9.9s	A	0.44
4	Castle Hill Road / Franklin Road	45.3s	D	0.28	32.1s	C	0.29	54.1s	D	0.30	38.2s	C	0.32
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	29.5s	C	0.75	29.9s	C	0.79	31.1s	C	0.79	33.5s	C	0.93
6	Bradfield Parade / Robert Road	6.9s	A	0.14	7.1s	A	0.20	7.1s	A	0.16	7.3s	A	0.22
7	Bradfield Parade / Franklin Road	4.9s	A	0.13	4.9s	A	0.13	4.9s	A	0.14	4.9s	A	0.14
PM peak													
1	Castle Hill Road / County Drive / Highs Road	56.1s	D	1.04	54.5s	D	1.00	76.1s	F	1.13	50.7s	D	0.99
2	Castle Hill Road / Bradfield Parade	10.3s	A	0.56	5.7s	A	0.94	13.2s	A	0.81	4.9s	A	0.86
3	Castle Hill Road / Glenhope Road	10.7s	A	0.57	13.3s	A	0.59	11.1s	A	0.61	15.2s	B	0.67
4	Castle Hill Road / Franklin Road	39.5s	C	0.38	43.2s	D	0.41	44.2s	D	0.41	43.2s	D	0.44
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	31s	C	1.02	22.3s	B	0.79	66.9s	E	1.33	31.5s	C	0.98
6	Bradfield Parade / Robert Road	6.7s	A	0.11	6.8s	A	0.11	6.9s	A	0.12	7.0s	A	0.12
7	Bradfield Parade / Franklin Road	4.9s	A	0.12	4.9s	A	0.12	4.9s	A	0.13	4.9s	A	0.13

Source: SCT Consulting, 2020

The constraints of the network capacity lead to reduced demand that can enter the network, making it necessary for infrastructure upgrades to achieve acceptable performance of the critical intersections.

The assessment confirmed that due to the background traffic growth, traffic infrastructure upgrades are required at the intersection of Castle Hill Road / County Drive by 2036. The details of the scope and costs of upgrade at this intersection can be found in the wider Cherrybrook Precinct Traffic & Transport Planning Study prepared for DPE.

Signal optimisation (reallocation of green times as traffic volumes change on different approaches of the intersection) is only required at the intersection of Castle Hill Road / Edward Bennett Drive / Coonara Avenue, to achieve acceptable performance at this location under this scenario with background traffic growth.

The network operates satisfactorily with the inclusion of the proposed infrastructure upgrades and signal optimisation where DoS does not exceed 1.0 and LoS are acceptable for all intersections for the two peak hours, as shown in **Table 5-3**.

5.4.2 Future year base case with SSP site development (FY1)

5.4.2.1 Trip generation

As discussed in **Section 4.5.3**, the Reference Scheme proposes 391 dwellings and about 4,500 m^2 of non-residential GFA, resulting in an additional 220 vehicle trips during peak hours.

5.4.2.2 Trip distribution

Trip distribution pattern was estimated based on PTPM strategic model which determined the increase of the vehicle trips associated with the SSP site development on the surrounding network, as follows:

– East of SSP site via Castle Hill Road: 57%

– West of SSP site via Castle Hill Road: 33%

– North of SSP site via Robert Road and Franklin Road: 8%

– South of SSP site via Highs Road, Glenhope Road and Coonara Avenue: 2%.

Due to the coarseness of the STM and PTPM at a local level, instead of directly using the PTPM traffic volumes outputs of the local network surrounding the station and the SSP site, the traffic increase as a result of the SSP site is distributed to the surrounding road network (in a spreadsheet model) according to trip patterns based on PTPM modelling outputs.

5.4.2.3 Future year traffic forecast

The SSP development trip generation as estimated in **Section 4.5.3** have been applied to the 2026 and 2036 base case traffic volumes (FY0). The resultant 2026 and 2036 peak hour traffic volumes are summarised in **Table 5-4** and the spreadsheet models that show the forecast traffic volumes at each of the intersections modelled are included in **Appendix A**.

Table 5-4 2026 and 2036 Peak Hour Traffic Flows (FY1)

Location	Peak period	2026 FY0 traffic flows	2026 FY1 traffic flows	Traffic increase	2036 FY0 traffic flows	2036 FY1 traffic flows	Traffic increase
Castle Hill Road between Old Northern Road and County Drive	AM	3,850	3,904	**+54**	4,087	4,140	**+53**
	PM	4,130	4,182	**+52**	4,401	4,453	**+52**
Castle Hill Road between County Drive and Bradfield Parade	AM	2,256	2,309	**+53**	2,400	2,454	**+54**
	PM	2,515	2,565	**+50**	2,684	2,736	**+52**
Castle Hill Road between Bradfield Parade and Franklin Road	AM	2,107	2,147	**+40**	2,237	2,284	**+47**
	PM	2,439	2,504	**+65**	2,606	2,671	**+65**
	AM	2,138	2,230	**+92**	2,280	2,372	**+92**

Location	Peak period	2026 FY0 traffic flows	2026 FY1 traffic flows	Traffic increase	2036 FY0 traffic flows	2036 FY1 traffic flows	Traffic increase
Castle Hill Road between Franklin Road and Edward Bennett Drive	PM	2,433	2,523	**+90**	2,597	2,687	**+90**
Bradfield Parade just north of Castle Hill Road	AM	418	518	**+100**	444	544	**+100**
	PM	337	440	**+103**	360	463	**+103**
Franklin Road just north of Castle Hill Road	AM	262	282	**+20**	279	322	**+43**
	PM	141	171	**+30**	139	179	**+40**

Source: SCT Consulting based on 2026 and 2036 PTPM model

The highest traffic increase on the surrounding road network as a result of SSP site development is observed at Bradfield Parade given the intersection with Castle Hill Road would be the main access gateway to the proposed development.

5.4.2.4 Intersection performance

The performance of all assessed intersections under the SSP site development scenario (in cumulative with background traffic growth) in 2026 and 2036 is summarised in **Table 5-5**. The detailed SIDRA modelling outputs are included in **Appendix B**.

Given the scale of the development and associated small increase in vehicle trip generation, there is limited impact of the SSP site on the road network.

The infrastructure upgrades included in **Table 5-5** are the same as previously identified to support background growth. Therefore, no additional infrastructure is needed for SSP development regardless whether intersection upgrades are delivered at the intersection of Castle Hill Road / County Drive / Highs Road.

Table 5-5 2026 and 2036 intersection performance (FY1)

No.	Intersection	2026 Base Case + SSP			2026 Base Case + SSP (+ intersection upgrades)			2036 Base Case + SSP			2036 Base Case + SSP (+ intersection upgrades)		
		Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS
AM peak													
1	Castle Hill Road / County Drive / Highs Road	51.8s	D	1.03	56.0s	D	0.99	63.0s	E	1.13	51.6s	D	0.98
2	Castle Hill Road / Bradfield Parade	13.2s	A	0.65	12.3s	A	0.87	13.6s	A	0.70	12.6s	A	0.93
3	Castle Hill Road / Glenhope Road	10.7s	A	0.38	9.9s	A	0.43	10.8s	A	0.42	9.9s	A	0.46
4	Castle Hill Road / Franklin Road	47.0s	D	0.28	33.3s	C	0.3	56.2s	D	0.30	40.2s	C	0.33
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	29.9s	C	0.77	30.6s	C	0.79	31.8s	C	0.81	34.7s	C	0.93
6	Bradfield Parade / Robert Road	7.8s	A	0.28	8.2s	A	0.29	8.2s	A	0.30	8.7s	A	0.31
7	Bradfield Parade / Franklin Road	4.9s	A	0.16	4.9s	A	0.16	4.9s	A	0.17	4.9s	A	0.17
PM peak													
1	Castle Hill Road / County Drive / Highs Road	59.7s	E	1.04	55.4s	D	0.98	79.0s	F	1.13	53.4s	D	0.99
2	Castle Hill Road / Bradfield Parade	10.7s	A	0.57	6.2s	A	0.86	18.7s	B	0.88	5.7s	A	0.90
3	Castle Hill Road / Glenhope Road	10.8s	A	0.60	13.0s	A	0.61	11.3s	A	0.74	15s	B	0.69
4	Castle Hill Road / Franklin Road	40.9s	C	0.40	45.5s	D	0.42	45.8s	D	0.43	45.9s	D	0.45
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	31.3s	C	1.02	22.2s	B	0.82	68.0s	E	1.33	33.2s	C	0.98
6	Bradfield Parade / Robert Road	7.4s	A	0.15	7.7s	A	0.15	7.6s	A	0.16	7.9s	A	0.16
7	Bradfield Parade / Franklin Road	4.9s	A	0.15	4.9s	A	0.15	4.9s	A	0.16	4.9s	A	0.16

Source: SCT Consulting, 2020

Note: The infrastructure upgrades included in Table 5-5 are the same as previously identified to support background growth. Therefore, no additional infrastructure is needed for SSP development

5.4.3 Future year base case with SSP site and IBM site proposal (FY2)

5.4.3.1 Trip generation

The proposed IBM site would convert the existing jobs to up to 600 dwellings. The PTPM modelling outputs related to this scenario showed minimal traffic reduction on Castle Hill Road and surrounding street network for 2026 and 2036 comparing to the scenario of base case with SSP site development.

5.4.3.2 Future year traffic forecast

The net trip generation of the IBM site development proposal has been applied to the 2026 and 2036 FY1 traffic volumes to understand the cumulative impacts with background traffic growth as well as the SSP site development. The resultant 2026 and 2036 peak hour traffic volumes are summarised in **Table 5-6** and the spreadsheet models that show the forecast traffic volumes at each of the intersections modelled are included in **Appendix A**.

Table 5-6 2026 and 2036 Peak Hour Traffic Flows (FY2)

Location	Peak period	2026 FY1 traffic flows	2026 FY2 traffic flows	Traffic increase	2036 FY1 traffic flows	2036 FY2 traffic flows	Traffic increase
Castle Hill Road between Old Northern Road and County Drive	AM	3,904	3,868	**-36**	4,140	4,102	**-38**
	PM	4,182	4,139	**-43**	4,453	4,410	**-43**
Castle Hill Road between County Drive and Bradfield Parade	AM	2,309	2,287	**-22**	2,454	2,430	**-24**
	PM	2,565	2,537	**-28**	2,736	2,708	**-28**
Castle Hill Road between Bradfield Parade and Franklin Road	AM	2,147	2,126	**-21**	2,284	2,262	**-22**
	PM	2,504	2,476	**-28**	2,671	2,644	**-27**
Castle Hill Road between Franklin Road and Edward Bennett Drive	AM	2,230	2,207	**-23**	2,372	2,349	**-23**
	PM	2,523	2,496	**-27**	2,687	2,662	**-25**
Bradfield Parade just north of Castle Hill Road	AM	518	514	**-4**	544	539	**-5**
	PM	440	437	**-3**	463	459	**-4**
Franklin Road just north of Castle Hill Road	AM	282	303	**21**	322	319	**-3**
	PM	171	169	**-2**	179	178	**-1**

Source: SCT Consulting based on 2026 and 2036 PTPM model

Traffic volumes are forecast to have a general reduction along Castle Hill Road, as a result of the IBM site proposal. This is due to a new reduction in trip generation of the proposed IBM proposal as a result of changing the land use from commercial to 600 residential dwellings.

5.4.3.3 Intersection performance

The performance of all assessed intersections under the IBM site development scenario (in cumulative with background traffic growth and SSP site development) in 2026 and 2036 is summarised in **Table 5-7**. The detailed SIDRA modelling outputs are included in **Appendix B**.

Given the negative traffic increase in associated with IBM proposal, there is no net impact and hence no additional infrastructure is needed for the IBM site development scenario.

Table 5-7 2026 and 2036 intersection performance (FY2)

No.	Intersection	2026 Base Case + SSP + IBM Proposal			2026 Base Case + SSP + IBM Proposal (+ intersection upgrades)			2036 Base Case + SSP + IBM Proposal			2036 Base Case + SSP + IBM Proposal (+ intersection upgrades)		
		Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS
AM peak													
1	Castle Hill Road / County Drive / Highs Road	54.3s	D	1.14	55.8s	D	0.99	63.4s	E	1.25	50.8s	D	0.98
2	Castle Hill Road / Bradfield Parade	13.2s	A	0.64	12.8s	A	0.92	13.5s	A	0.69	12.6s	A	0.92
3	Castle Hill Road / Glenhope Road	10.7s	A	0.38	9.9s	A	0.43	10.8s	A	0.42	9.9s	A	0.45
4	Castle Hill Road / Franklin Road	45.5s	D	0.28	32.4s	C	0.29	54.6s	D	0.30	38.9s	C	0.33
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	29.9s	C	0.77	30.6s	C	0.83	31.6s	C	0.80	34.8s	C	0.96
6	Bradfield Parade / Robert Road	7.7s	A	0.27	8.1s	A	0.28	8.1s	A	0.30	8.6s	A	0.31
7	Bradfield Parade / Franklin Road	4.9s	A	0.16	4.9s	A	0.16	4.9s	A	0.17	4.9s	A	0.17
PM peak													
1	Castle Hill Road / County Drive / Highs Road	56.8s	E	1.00	53.2s	D	0.98	74.8s	F	1.09	48.4s	D	0.97
2	Castle Hill Road / Bradfield Parade	10.7s	A	0.55	6.7s	A	0.94	17.9s	B	0.87	5.7s	A	0.89
3	Castle Hill Road / Glenhope Road	10.8s	A	0.59	13.0s	A	0.60	11.2s	A	0.65	15.1s	B	0.68
4	Castle Hill Road / Franklin Road	40.2s	C	0.39	44.4s	D	0.41	45.1s	D	0.42	44.2s	D	0.45
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	30.4s	C	1.02	21.9s	B	0.80	40.7s	C	1.10	27.0s	B	0.89
6	Bradfield Parade / Robert Road	7.4s	A	0.15	7.6s	A	0.15	7.6s	A	0.16	7.9s	A	0.16
7	Bradfield Parade / Franklin Road	4.9s	A	0.15	4.9s	A	0.15	4.9s	A	0.16	4.9s	A	0.16

Source: SCT Consulting, 2020

5.4.4 Future year base case with SSP site, IBM proposal and Cherrybrook Precinct (FY3)

5.4.4.1 Trip generation

The trip generation for Cherrybrook Precinct Place Strategy area considers:

– A development cap of up to 3,200 dwellings by 2036, a net increase of 2,750 dwellings when up to 450 dwellings are being considered for the SSP site development (in FY1) which is within the Cherrybrook Precinct Place Strategy area.

– 600 dwellings (to be delivered in the Cherrybrook Precinct) in addition to up to 390 dwellings being considered for the SSP site development (in FY1) in 2026.

– 0.30 vehicle trips per dwelling during AM and PM peak hour. This is considered appropriate as the majority of the Cherrybrook Precinct is within 800 m of Cherrybrook Station which provides high frequency public transport services to employment centres across Sydney.

– Traffic distribution pattern derived from PTPM modelling assumptions and outputs as follows:

  - East of SSP site via Castle Hill Road: 57%
  - West of SSP site via Castle Hill Road: 33%
  - North of SSP site via Robert Road and Franklin Road: 8%
  - South of SSP site via Highs Road, Glenhope Road and Coonara Avenue: 2%.

5.4.4.2 Future year traffic forecast

The net trip generation of Cherrybrook Precinct has been applied to the 2026 and 2036 FY2 traffic volumes to understand the cumulative impacts with background traffic growth, the SSP site and IBM site developments. The resultant 2026 and 2036 peak hour traffic volumes are summarised in **Table 5-8** and the spreadsheet models that show the forecast traffic volumes at each of the intersections modelled are included in **Appendix A**.

Table 5-8 2026 and 2036 Peak Hour Traffic Flows (FY3)

Location	Peak period	2026 FY2 traffic flows	2026 FY3 traffic flows	Traffic increase	2036 FY2 traffic flows	2036 FY3 traffic flows	Traffic increase
Castle Hill Road between Old Northern Road and County Drive	AM	3,868	3,897	**+29**	4,102	4,292	**+190**
	PM	4,139	4,169	**+30**	4,410	4,550	**+140**
Castle Hill Road between County Drive and Bradfield Parade	AM	2,287	2,307	**+20**	2,430	2,553	**+123**
	PM	2,537	2,558	**+21**	2,708	2,881	**+173**
Castle Hill Road between Bradfield Parade and Franklin Road	AM	2,126	2,144	**+18**	2,262	2,358	**+96**
	PM	2,476	2,501	**+25**	2,644	2,756	**+112**
Castle Hill Road between Franklin Road and Edward Bennett Drive	AM	2,207	2,231	**+24**	2,349	2,474	**+125**
	PM	2,496	2,514	**+18**	2,662	2,787	**+125**
Bradfield Parade just north of Castle Hill Road	AM	514	520	**+6**	539	571	**+32**
	PM	437	443	**+6**	459	502	**+43**
Franklin Road just north of Castle Hill Road	AM	303	306	**3**	319	332	**+13**
	PM	169	169	**0**	178	179	**+1**

Source: SCT Consulting based on 2026 and 2036 PTPM model

The small amount of net increase in dwellings in 2026 means that the traffic increase across the surrounding network is relatively small. The increase in traffic on Castle Hill Road has proportionally increased with the additional 2,750 dwellings to be delivered by 2036.

5.4.4.3 Intersection performance

The performance of all assessed intersections under the Cherrybrook Precinct scenario (in cumulative with background traffic growth, SSP site and IBM site developments) in 2026 and 2036 is summarised in **Table 5-9**.

During the peak hours in 2026 and 2036, the intersections of Castle Hill Road / County Drive / Highs Road and Castle Hill Road / Edward Bennett Drive / Coonara Avenue continue to operate as the critical intersections of the surrounding road network, where DoS are over 1.00 and LoS becomes E / F in both 2026 / 2036.

The constraints of the network capacity lead to reduced demand that can enter the network, making it necessary for infrastructure upgrades to achieve acceptable performance of the critical intersections.

Due to a combination of the background traffic growth and the Place Strategy traffic, infrastructure upgrades are required at the intersection of Castle Hill Road / County Drive by 2036. The details of the scope and costs of upgrade at this intersection can be found in the wider Cherrybrook Precinct Traffic & Transport Planning Study prepared for DPE.

The network operates satisfactorily with the inclusion of the proposed infrastructure upgrades and signal optimisation where DoS does not exceed 1.0 and LoS are acceptable for all intersections, as shown in **Table 5-9**.

Table 5-9 2026 and 2036 intersection performance (FY3)

No.	Intersection	2026 Base Case + SSP + IBM Proposal + Cherrybrook Precinct			2026 Base Case + SSP + IBM Proposal + Cherrybrook Precinct (+ intersection upgrades)			2036 Base Case + SSP + IBM Proposal + Cherrybrook Precinct			2036 Base Case + SSP + IBM Proposal + Cherrybrook Precinct (+ intersection upgrades)		
		Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS	Delay	LoS	DoS
AM peak													
1	Castle Hill Road / County Drive / Highs Road	56.6s	E	1.16	55.9s	D	0.98	63s	E	1.25	53.9	D	0.99
2	Castle Hill Road / Bradfield Parade	13.2s	A	0.64	12.5s	A	0.88	13.3s	A	0.68	12.2	A	0.88
3	Castle Hill Road / Glenhope Road	10.9s	A	0.38	10.1s	A	0.43	10.8s	A	0.42	10.8	A	0.47
4	Castle Hill Road / Franklin Road	46.6s	D	0.28	33.2s	C	0.3	55.4s	D	0.30	43.9	D	0.55
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	30.4s	C	0.77	32s	C	0.91	31.9s	C	0.81	56.2	D	1.00
6	Bradfield Parade / Robert Road	7.8s	A	0.29	8.3s	A	0.3	7.7s	A	0.25	9.3	A	0.38
7	Bradfield Parade / Franklin Road	4.9s	A	0.16	4.9s	A	0.16	4.9s	A	0.18	4.9	A	0.17
PM peak													
1	Castle Hill Road / County Drive / Highs Road	58.2s	E	1.00	55.5s	D	0.97	72.8s	F	1.09	53.5	D	1.00
2	Castle Hill Road / Bradfield Parade	10.7s	A	0.55	6.8s	A	0.94	15.8s	B	0.85	5.7	A	0.89
3	Castle Hill Road / Glenhope Road	10.8s	A	0.59	13.5s	A	0.61	11.3s	A	0.65	15.3	B	0.69
4	Castle Hill Road / Franklin Road	41.2s	C	0.40	44s	D	0.42	45.3s	D	0.43	51.9	D	0.47
5	Castle Hill Road / Edward Bennett Dr / Coonara Av	31.6s	C	1.02	22.9s	B	0.83	41.7s	D	1.10	44.1	D	0.97
6	Bradfield Parade / Robert Road	7.4s	A	0.16	7.6s	A	0.16	7.5s	A	0.16	8.2	A	0.18
7	Bradfield Parade / Franklin Road	4.9s	A	0.15	4.9s	A	0.15	4.9s	A	0.17	4.9	A	0.17

Source: SCT Consulting, 2020

6.0 Summary and conclusions

6.1 Summary

SCT Consulting was engaged to carry out a Traffic and Transport Assessment for a proposal to develop land called the 'Cherrybrook Station Government Land State Significant Precinct' (the State Significant Precinct) by Landcom on behalf of the landowner, Sydney Metro. The Reference Scheme (as shown in **Figure 4–1**) seeks to create a vibrant, transit-oriented local centre, which will improve housing choice and affordability and seeks to integrate with Hornsby's bushland character. The Reference Scheme includes the following key components:

– Approximately 33,350m^2 of residential GFA, with a yield of approximately 390 dwellings across 12 buildings ranging in height from 2 to 5 storeys (when viewed from Bradfield Parade).

– A multi-purpose community hub with a GFA of approximately 1,300m^2.

– Approximately 3,200m^2 of retail GFA.

– Over 1 hectare of public open space, comprising:

  - A village square with an area of approximately 1,250m^2, flanked by active retail and community uses.
  - A community gathering space with an area of approximately 3,250m^2.
  - An environmental space around the pond and Blue Gum High Forest with an area of approximately 8,450m^2.

– Green corridors and pedestrian through site links, providing opportunities for potential future precinct-wide integration and linkages to the north.

Based on recommended maximum car parking rates and minimum bicycle parking rates, the Reference Scheme proposes 376 car parking spaces, 8 motorcycle parking spaces and 177 bicycle spaces.

In summary:

– The proposal is supported by TDM strategies with a number of green travel initiatives / principles developed specifically for a transit-oriented development at this location that provide significant opportunities for alternative travel options and reduce the need of car travel. A Travel Plan will be developed by the future developers to deliver best practice travel programs and initiatives to manage travel demand for a transit-oriented development.

– The SSP site has excellent access to the public transport system, with Cherrybrook Station located directly adjacent to the site. The increased network coverage, journey-time reliability and improved customer offering of Sydney Metro services together with nearby frequent bus services, will encourage public transport patronage and encourage the majority of the trips to be made by non-car modes.

– The proposal promotes pedestrian and cyclist movements that could provide good connection to the surrounding cycling and walking network, and to public transport. Local retail and community facilities are proposed as well as a number of schools are also located within walking distance to future residents.

– Proposed vehicle access points to the development have been designed to minimise interface with high pedestrian areas particularly at Bradfield Parade, while providing the most direct access to the surrounding street network.

– The SSP would facilitate a transit-oriented development by minimising the amount of car parking, reflecting the higher level of public transport services and the ability to reduce additional congestion to the surrounding road network. The total number of residential parking spaces is appropriate for this transit-oriented development and in line with Council's DCP.

– The non-residential component of the site is expected to be relatively minor and will most likely be used by residents and passing trade within the local walking catchment, accessing the premises by foot or cycle, hence not highly reliant on cars. Hence, it is considered acceptable to adopt rates that are lower than those suggested in Council's DCP given the transit-oriented nature of the development and retail's main target customer group, i.e. local walk-up catchment. It is recommended that for the non-residential component that the car parking rate be set at a maximum of 1 space per 70 m^2. This maximum rate is consistent with those rates approved / proposed along the Metro North West Line.

- The proposal should also have minimal impacts on the Movement and Place status of Bradfield Parade, Robert Road and Franklin Road given the small amount of additional traffic as a result of the proposed SSP site using each of these vehicular access points.
- The highest traffic increase on the surrounding road network as a result of the SSP site development is observed at Bradfield Parade given the intersection with Castle Hill Road would be the main access gateway to the proposed development. Given the scale of the SSP development and associated small increase in vehicle trip generation, there is limited impact of the SSP site on the road network. Therefore, no additional infrastructure is needed for the SSP development.
- Due to a combination of the background traffic growth and the Place Strategy traffic, infrastructure upgrades are required at the intersection of Castle Hill Road / County Drive by 2036. The details of the scope and costs of upgrade at this intersection can be found in the wider Cherrybrook Precinct Traffic & Transport Planning Study prepared for DPE.

6.2 Conclusions

This Traffic and Transport Assessment concludes that:

- The location of the site directly adjacent to Cherrybrook Station and bus interchange will provide future residents and employees with good access to high frequency public transport services, which will provide an alternative to private vehicle use especially for commuter trips.
- Footpath and pedestrian crossing facilities are well provided around the site to support safe and convenient walk to / from Cherrybrook Station.
- Dedicated cycle routes around the site connecting to the regional routes will cater for more short trips by cycling to nearby activities and destinations.
- Parking rates are proposed for the Reference Scheme to create a transit-oriented centre in line with metro's vision, reflecting the higher level of public transport services and to minimise additional congestion to the surrounding road network.
- The total number of residential parking spaces is appropriate for this transit-oriented development and in line with Council's DCP and will naturally limit the traffic impacts of this proposal.
- The additional vehicle trips as a result of the SSP site will not have any significant adverse traffic implications on the public road network and no additional infrastructure or upgrades are required to service the development.

APPENDIX A

Spreadsheet models

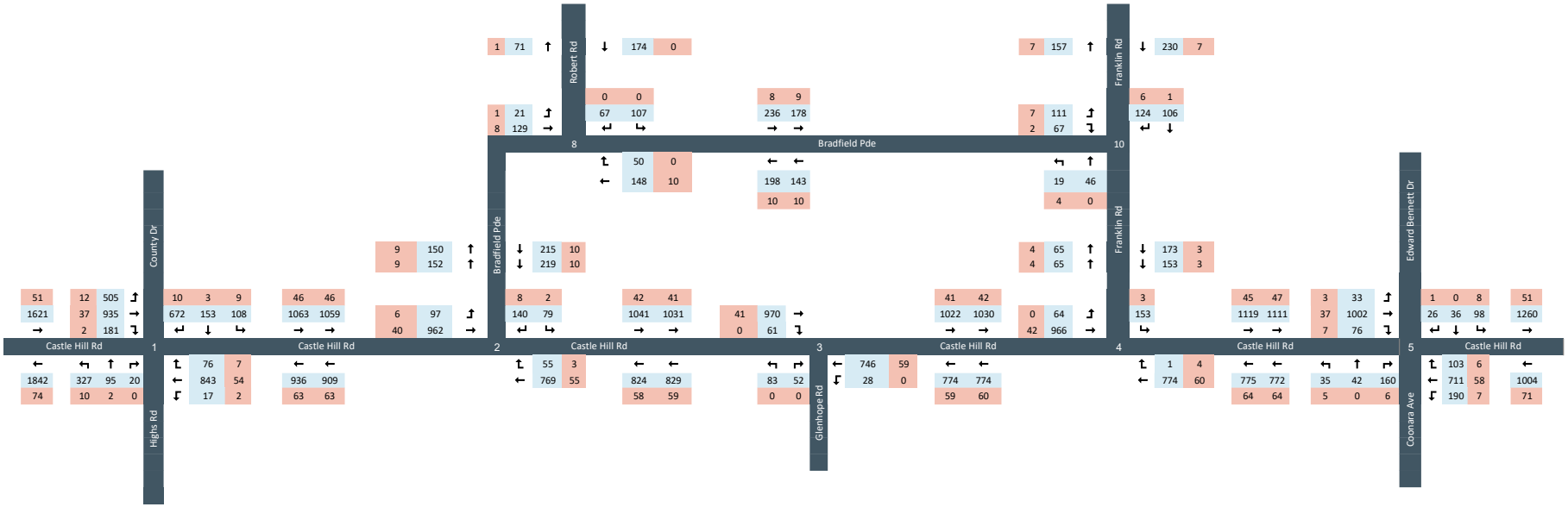
2019 Base Year AM

07th Nov

Legend

Light Vehicles

Heavy Vehicles



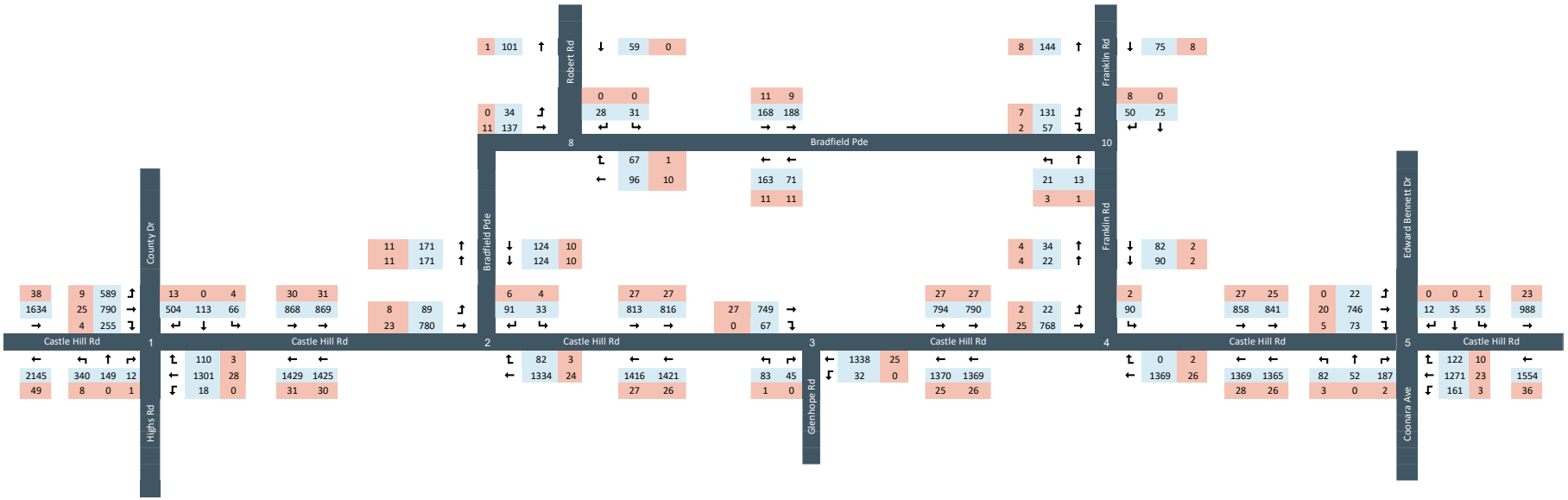
2019 Base Year PM

06th Nov

Legend

Light Vehicles

Heavy Vehicles

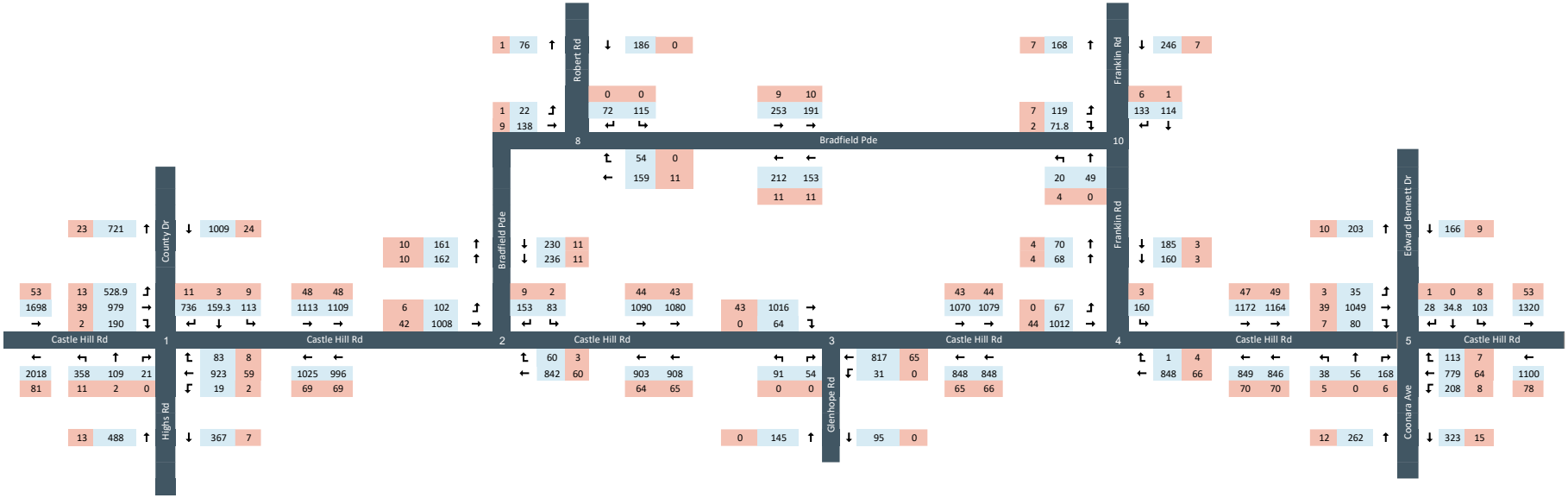


2026 Future Year AM

Legend

Light Vehicles

Heavy Vehicles

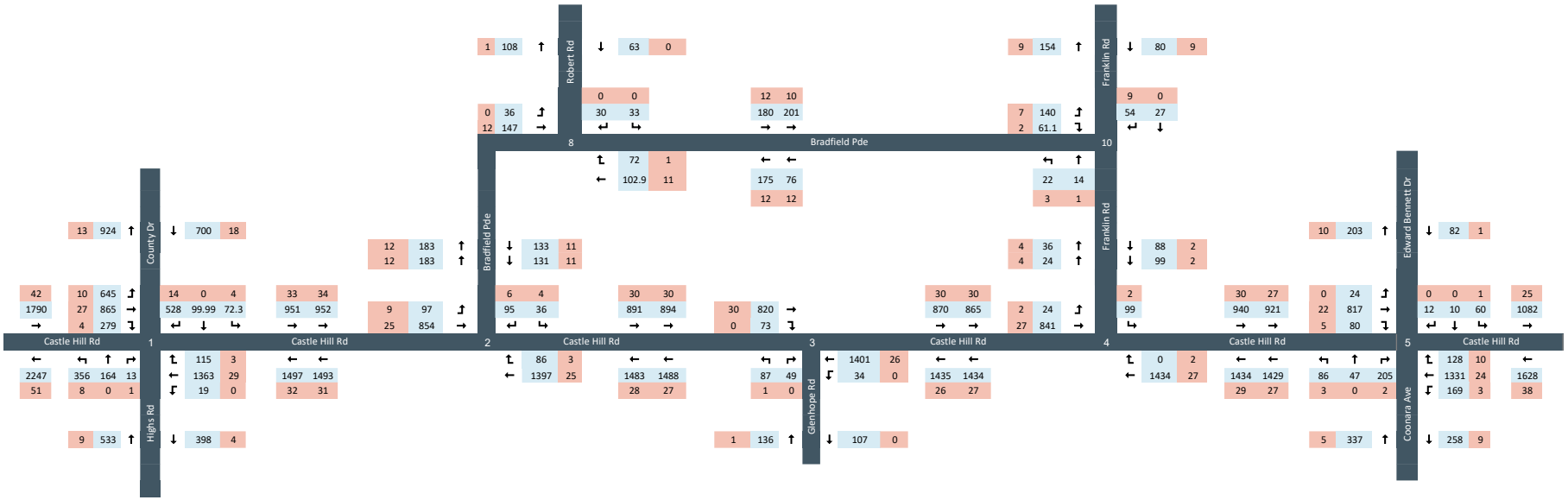


2026 Future Year PM

Legend

Light Vehicles

Heavy Vehicles

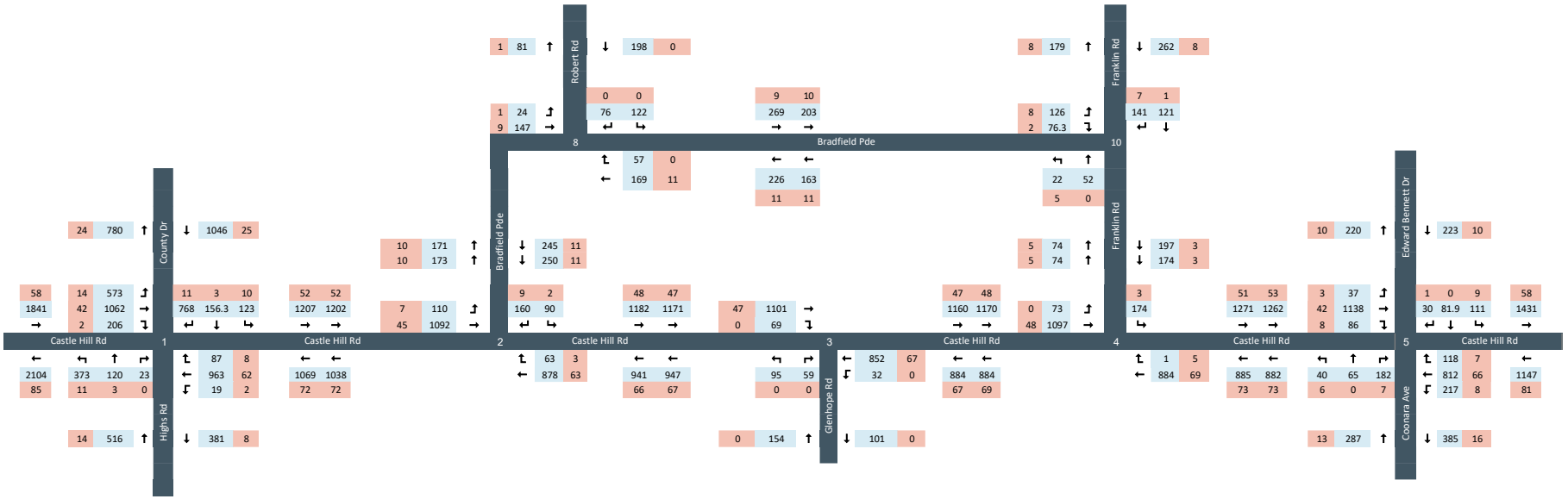


2036 Future Year AM

Legend

Light Vehicles

Heavy Vehicles

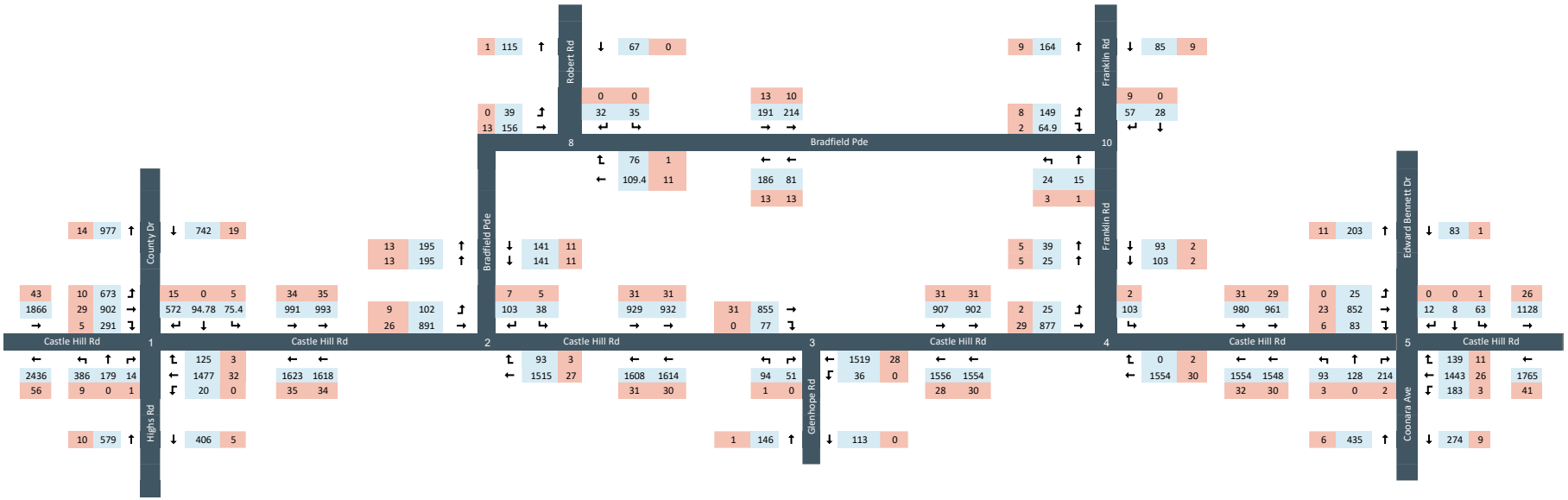


2036 Future Year PM

Legend

Light Vehicles

Heavy Vehicles

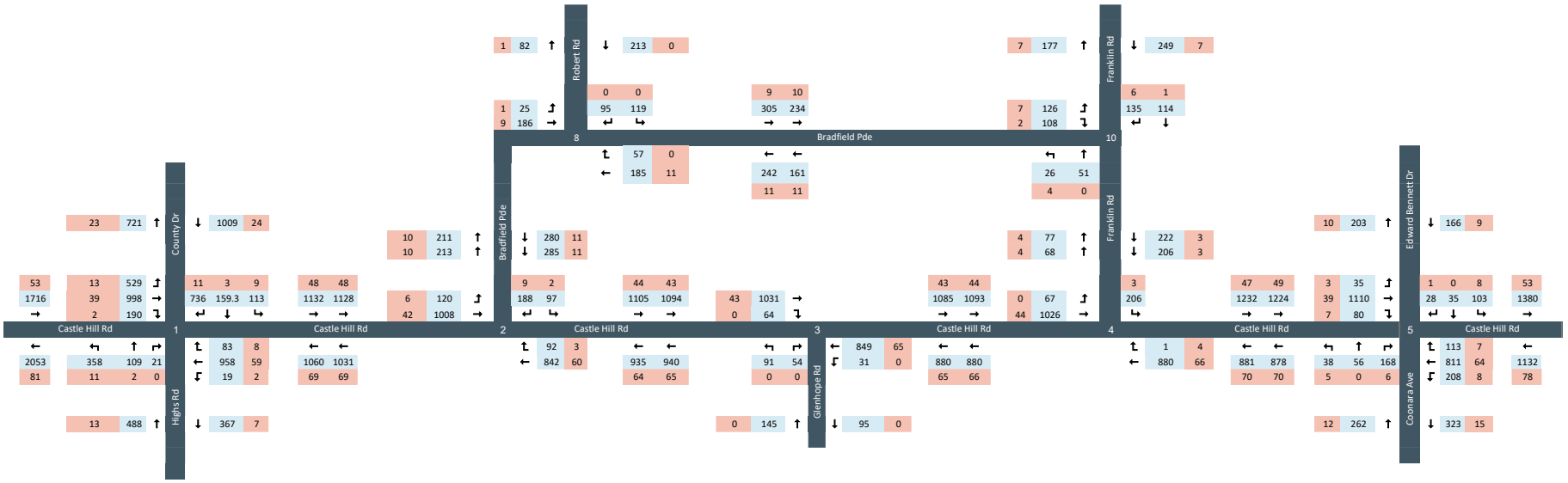


2026 Future Year + DGL AM

Legend

Light Vehicles

Heavy Vehicles

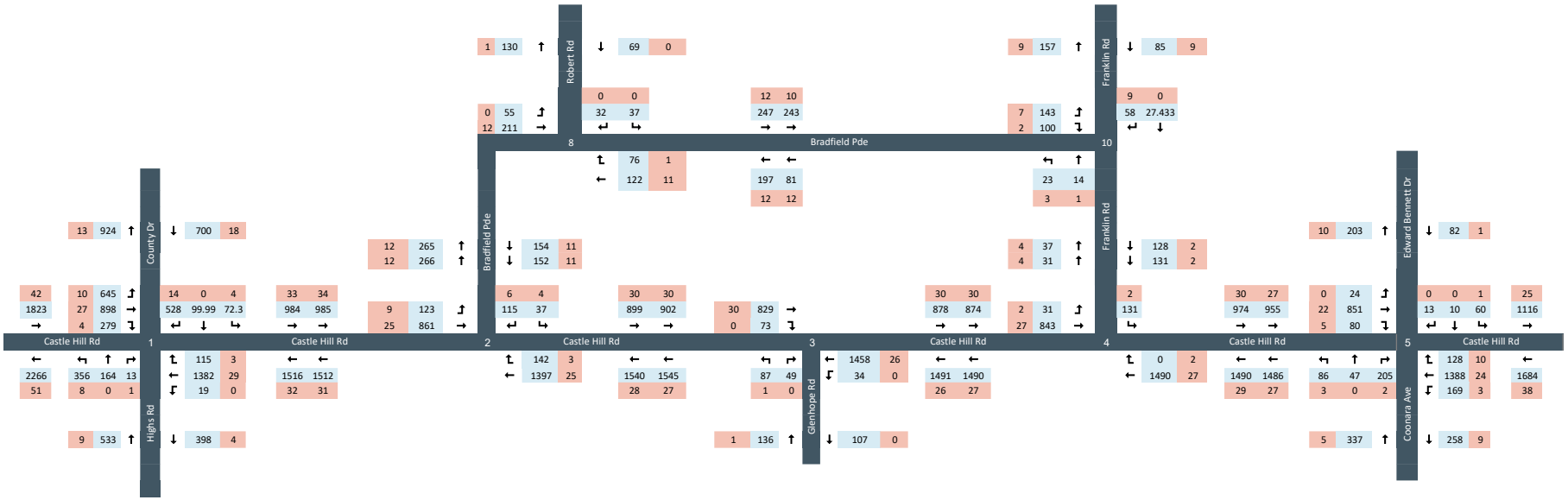


2026 Future Year + DGL PM

Legend

Light Vehicles

Heavy Vehicles

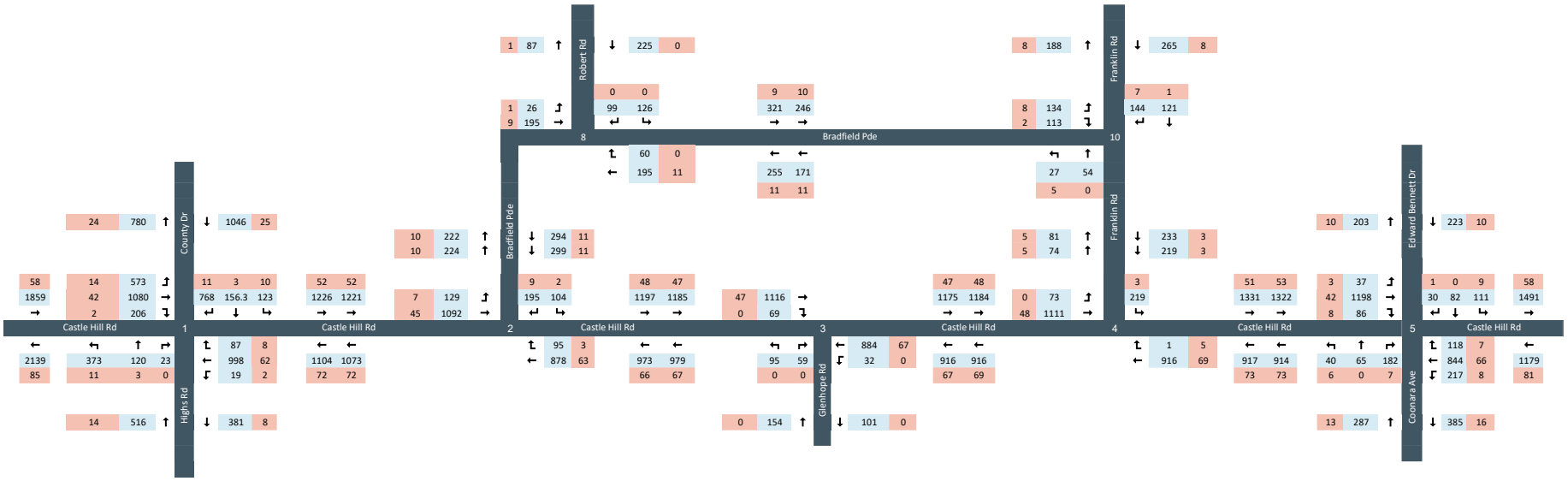


2036 Future Year + DGL AM

Legend

Light Vehicles

Heavy Vehicles

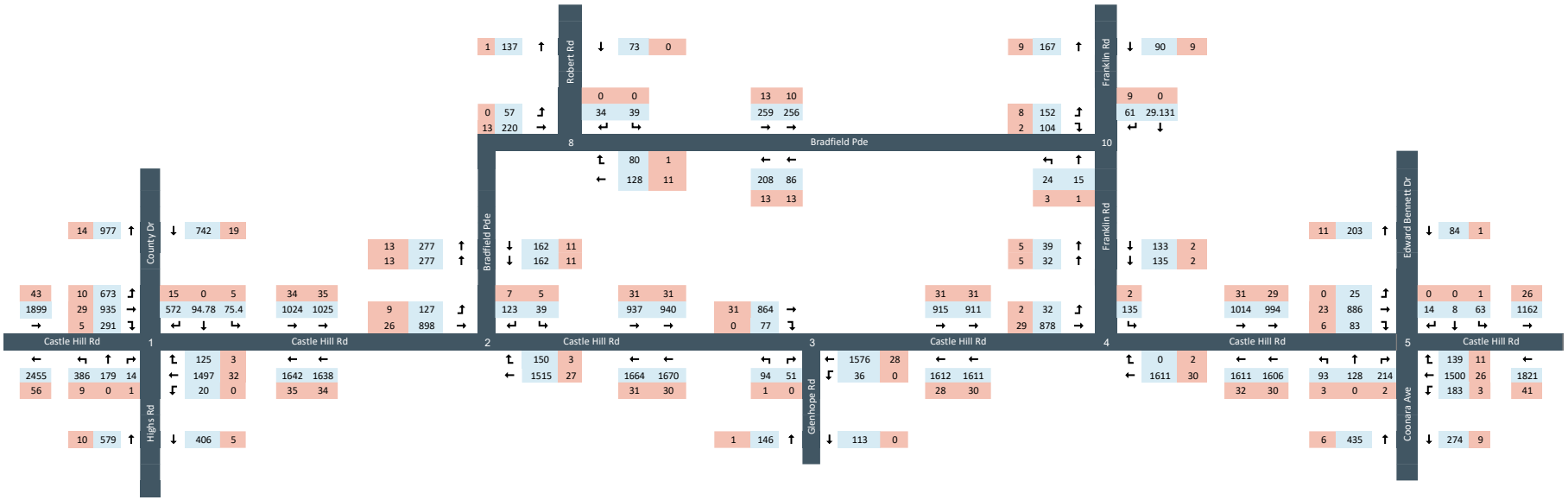


2036 Future Year + DGL PM

Legend

Light Vehicles

Heavy Vehicles

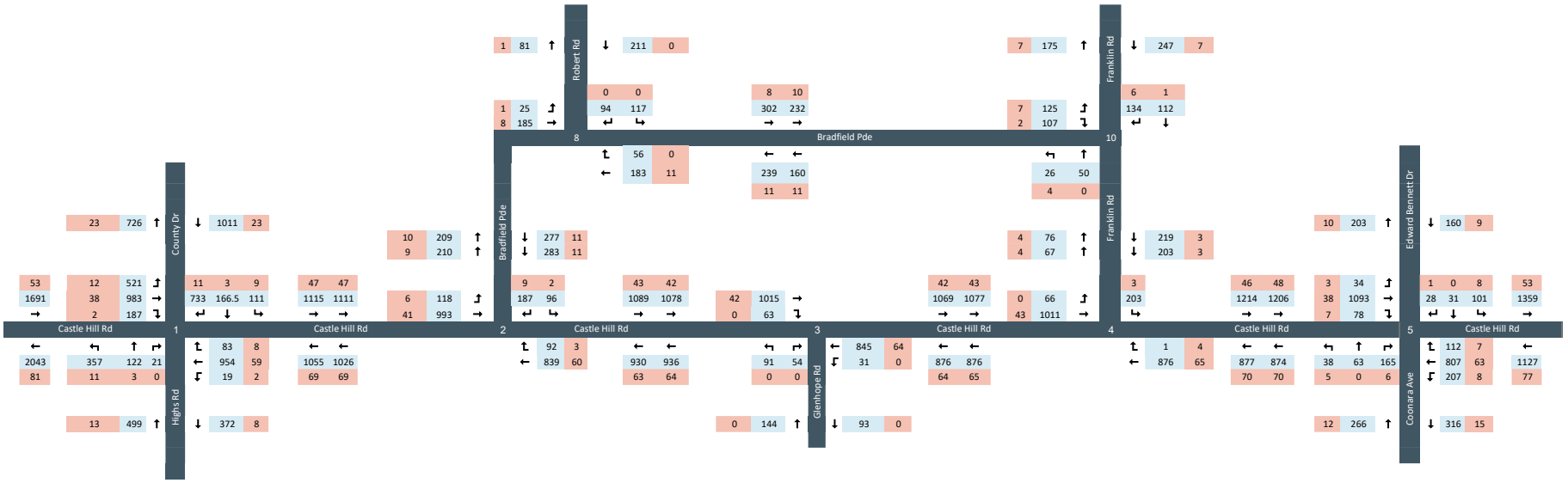


2026 Future Year + DGL + IBM AM

Legend

Light Vehicles

Heavy Vehicles

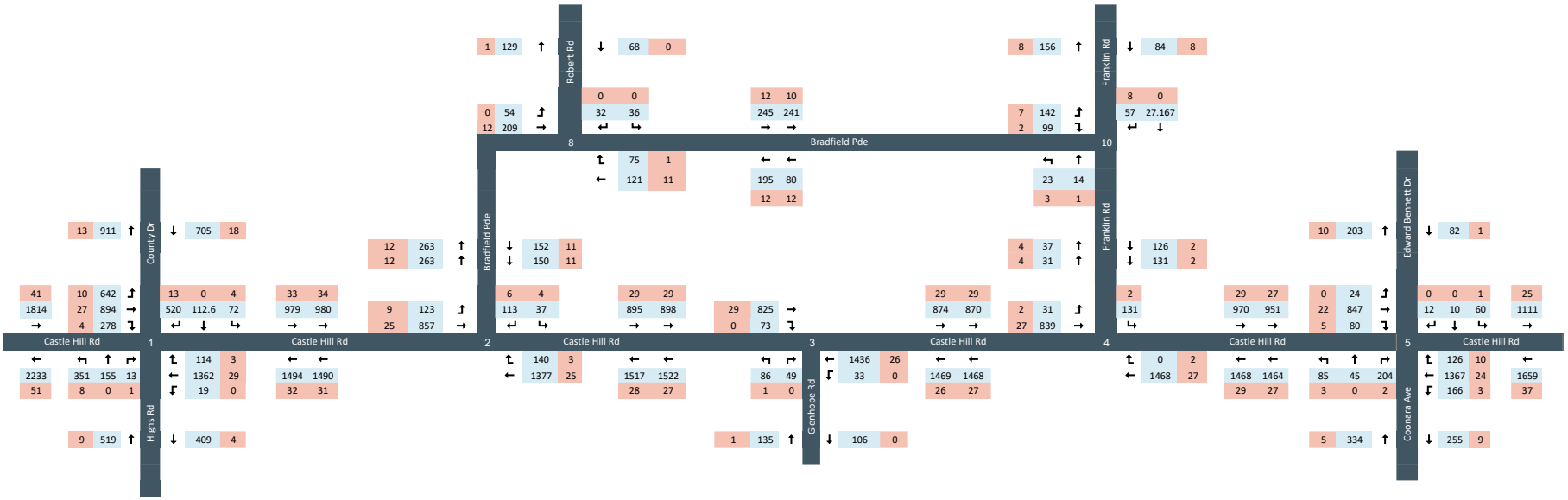


2026 Future Year + DGL + IBM PM

Legend

Light Vehicles

Heavy Vehicles

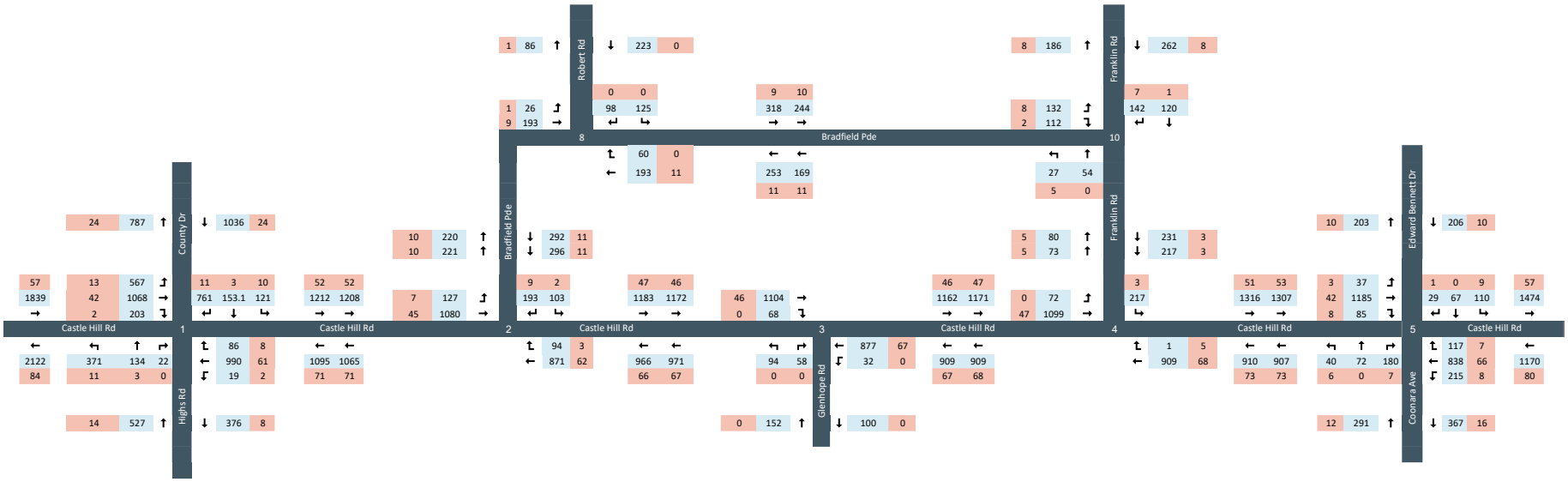


2036 Future Year + DGL+ IBM AM

Legend

Light Vehicles

Heavy Vehicles

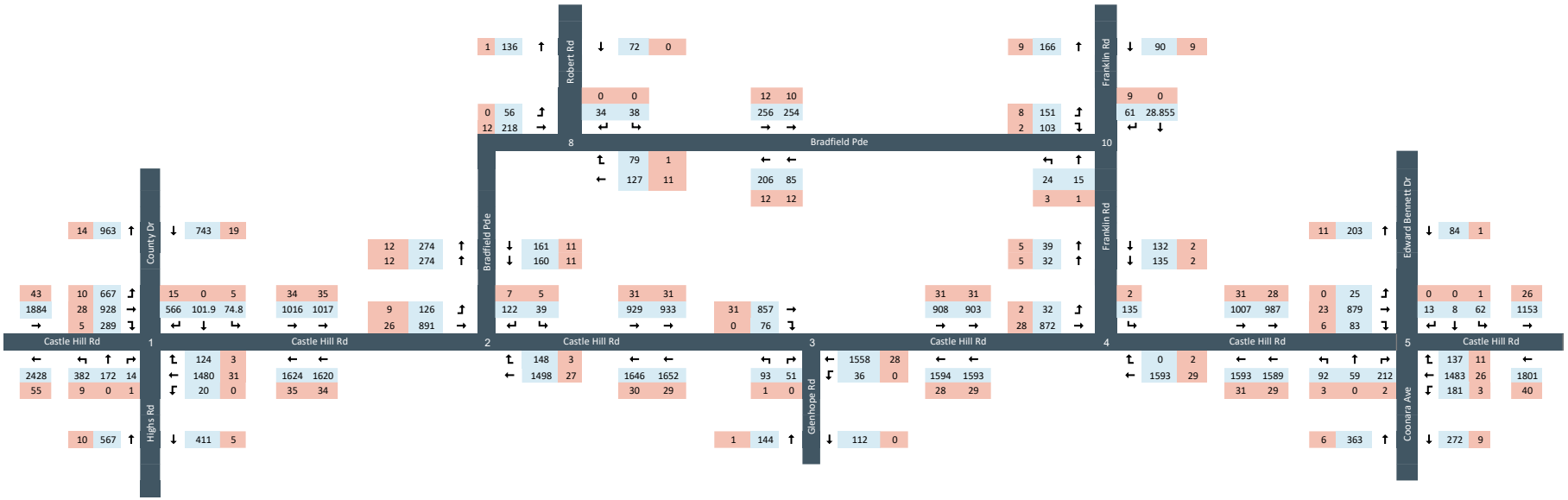


2036 Future Year + DGL+ IBM PM

Legend

Light Vehicles

Heavy Vehicles

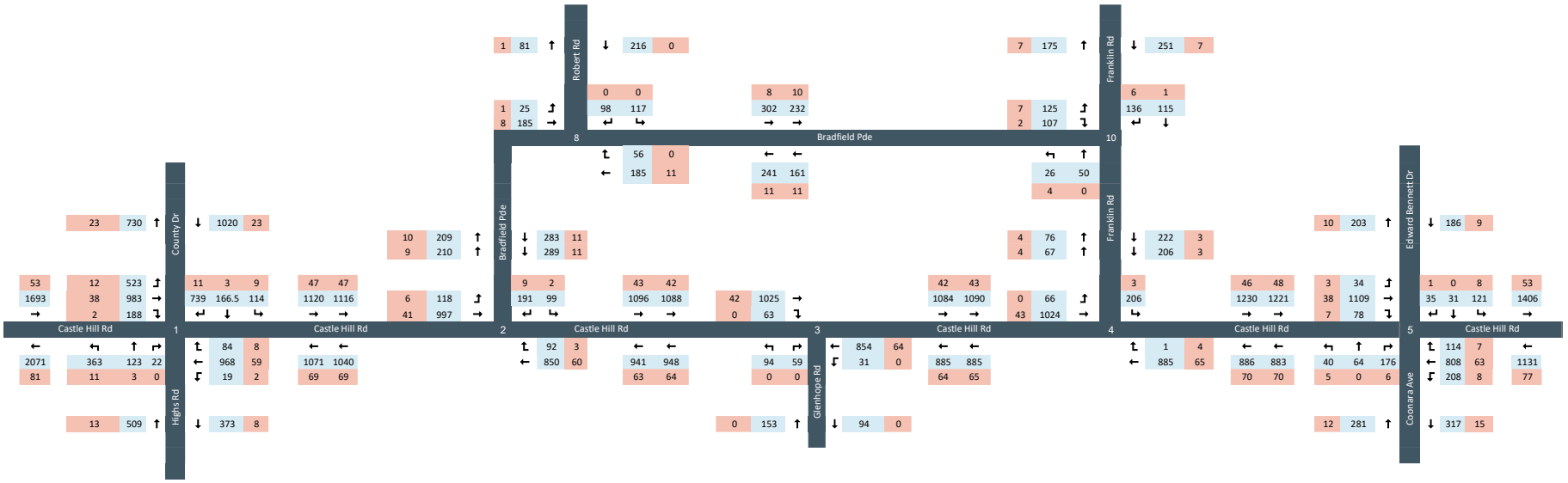


2026 Future Year + DGL+ IBM +SP AM

Legend

Light Vehicles

Heavy Vehicles

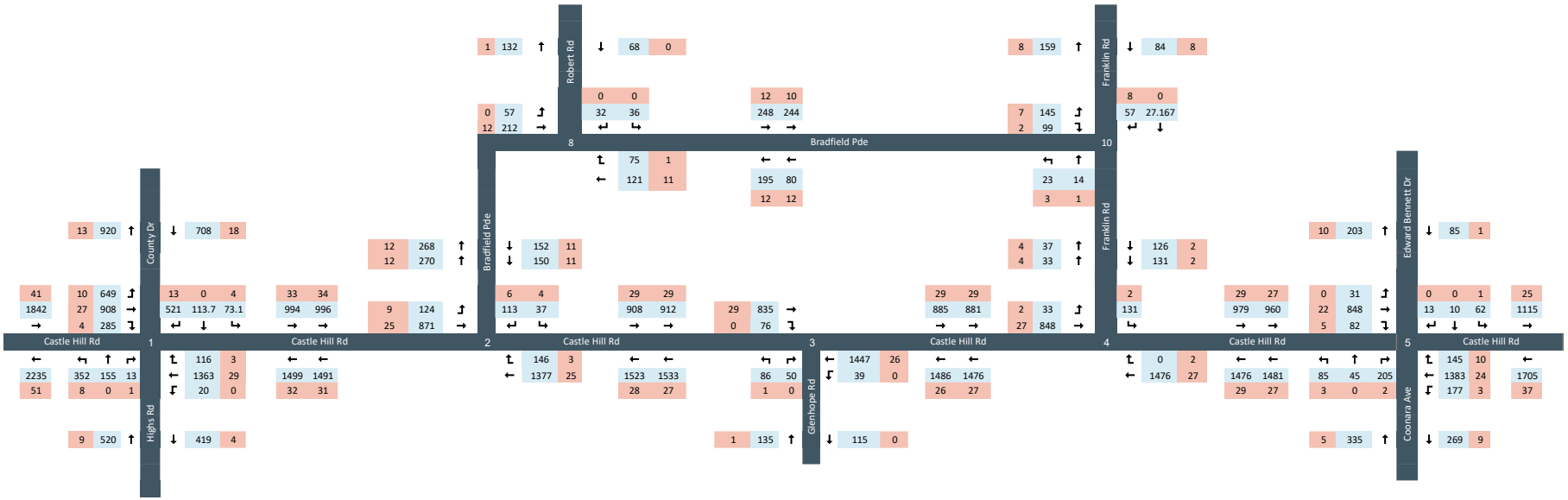


2026 Future Year + DGL + IBM +SP PM

Legend

Light Vehicles

Heavy Vehicles

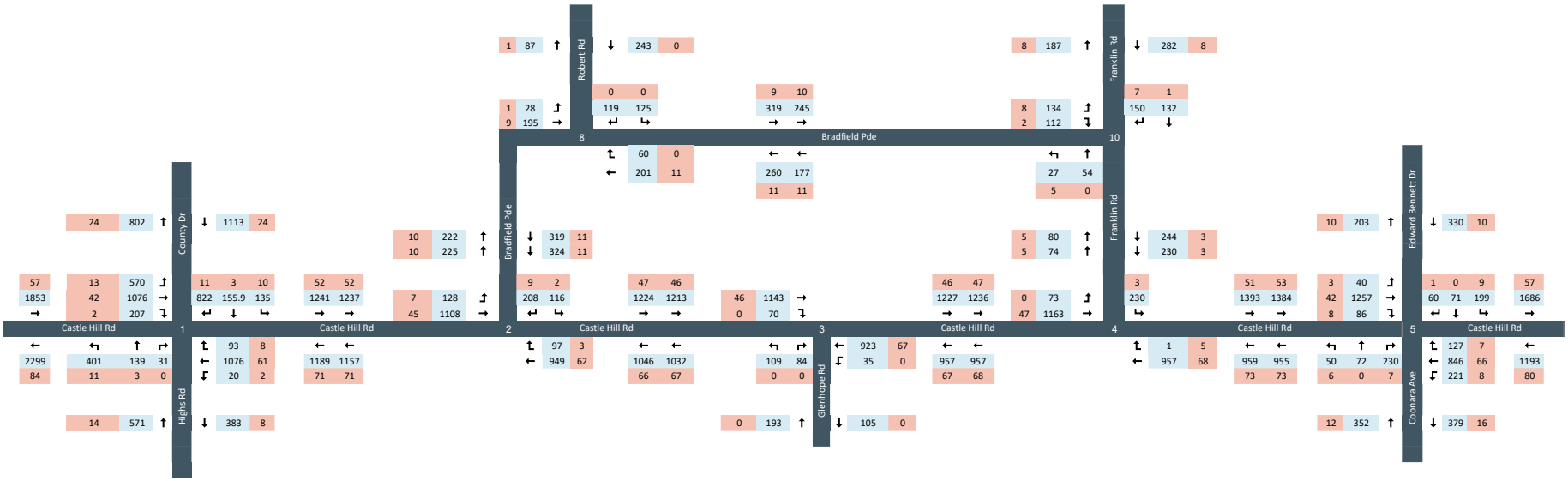


2036 Future Year + DGL+ IBM + SP AM

Legend

Light Vehicles

Heavy Vehicles

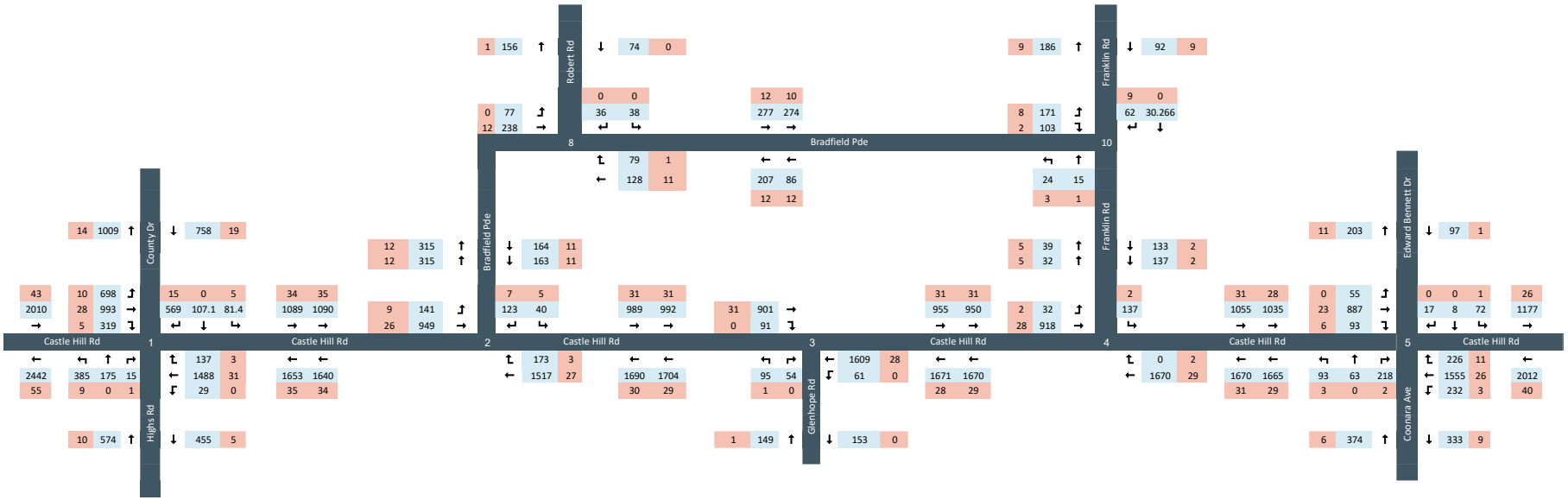


2036 Future Year + DGL + IBM + SP PM

Legend

Light Vehicles

Heavy Vehicles



APPENDIX B

Detailed intersection modelling outputs

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
0. Base model 2019	Network_AM	1AM	CAS_COU_19_AM_X	Signal	X	33.6	4,295	3.6	0.93	41.0	89.2	41.0	137.0	33.6	5,160	41.0	89.2	C
0. Base model 2019	Network_AM	2AM	CAS_BRA_19_AM_X	Signal	X	33.4	2,333	5.1	0.64	12.8	24.9	12.8	60.5	33.2	2,809	12.8	25.8	A
0. Base model 2019	Network_AM	3AM	CAS_GLE_19_AM_X	Signal	X	32.1	2,147	4.9	0.38	10.4	55.9	10.4	53.6	28.6	2,664	12.0	57.8	A
0. Base model 2019	Network_AM	4AM	CAS_FRA_19_AM_X	Give Way	X	54.9	2,175	5.3	0.28	1.4	45.5	45.5	3.2	54.6	2,731	3.4	45.5	D
0. Base model 2019	Network_AM	5AM	CAS_COO_19_AM_X	Signal	X	41.8	2,789	5.2	0.72	28.8	57.1	28.8	118.2	41.7	3,362	28.8	57.1	C
0. Base model 2019	Network_AM	8AM	BRA_ROB_19_AM_X	Give Way	X	41.7	569	3.5	0.11	2.5	6.7	6.7	1.0	41.7	683	2.5	6.7	A
0. Base model 2019	Network_AM	10AM	BRA_FRA_19_AM_X	Give Way	X	38.0	519	4.1	0.13	2.9	4.9	4.9	1.8	38.0	623	2.9	4.9	A
0. Base model 2019	Network_PM	1PM	CAS_COU_19_PM_X	Signal	X	30.0	4,571	2.2	0.95	53.8	97.1	53.8	249.0	30.0	5,496	53.8	97.1	D
0. Base model 2019	Network_PM	2PM	CAS_BRA_19_PM_X	Signal	X	35.3	2,397	3.0	0.50	10.2	29.5	10.2	47.8	34.9	2,896	10.3	29.5	A
0. Base model 2019	Network_PM	3PM	CAS_GLE_19_PM_X	Signal	X	33.3	2,491	2.2	0.58	10.6	42.0	10.6	84.6	31.6	3,047	11.3	44.3	A
0. Base model 2019	Network_PM	4PM	CAS_FRA_19_PM_X	Give Way	X	58.0	2,427	2.5	0.39	0.5	37.1	37.1	1.1	58.0	2,973	1.3	37.1	C
0. Base model 2019	Network_PM	5PM	CAS_COO_19_PM_X	Signal	X	42.1	3,037	2.3	0.97	27.4	95.6	27.4	141.9	42.0	3,662	27.4	95.6	B
0. Base model 2019	Network_PM	8PM	BRA_ROB_19_PM_X	Give Way	X	41.7	437	5.3	0.10	1.9	6.5	6.5	0.9	41.7	524	1.9	6.5	A
0. Base model 2019	Network_PM	10PM	BRA_FRA_19_PM_X	Give Way	X	42.1	335	6.6	0.11	3.5	4.9	4.9	1.4	42.1	402	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
1. FY2026 0 B	Network_AM	1AM	CAS_COU_26_AM_FY0_X	Signal	X	30.3	4,448	3.5	1.03	51.4	126.9	51.4	157.6	30.3	5,344	51.4	126.9	D
1. FY2026 0 B	Network_AM	2AM	CAS_BRA_26_AM_FY0_X	Signal	X	33.1	2,378	5.1	0.64	12.8	25.0	12.8	59.8	32.9	2,863	12.8	25.8	A
1. FY2026 0 B	Network_AM	3AM	CAS_GLE_26_AM_FY0_X	Signal	X	31.9	2,183	4.9	0.38	10.7	56.0	10.7	56.3	28.5	2,706	12.2	57.8	A
1. FY2026 0 B	Network_AM	4AM	CAS_FRA_26_AM_FY0_X	Give Way	X	55.0	2,209	5.2	0.28	1.4	45.3	45.3	3.0	54.8	2,765	3.2	45.3	D
1. FY2026 0 B	Network_AM	5AM	CAS_COO_26_AM_FY0_X	Signal	X	41.5	2,851	5.1	0.75	29.5	58.0	29.5	117.0	41.4	3,436	29.4	58.0	C
1. FY2026 0 B	Network_AM	8AM	BRA_ROB_26_AM_FY0_X	Give Way	X	41.7	605	3.3	0.14	2.5	6.9	6.9	1.1	41.7	726	2.5	6.9	A
1. FY2026 0 B	Network_AM	10AM	BRA_FRA_26_AM_FY0_X	Give Way	X	38.0	551	3.8	0.13	2.9	4.9	4.9	1.9	38.0	661	2.9	4.9	A
1. FY2026 0 B	Network_PM	1PM	CAS_COU_26_PM_FY0_X	Signal	X	29.4	4,678	2.1	1.04	56.1	138.7	56.1	242.2	29.3	5,625	56.1	138.7	D
1. FY2026 0 B	Network_PM	2PM	CAS_BRA_26_PM_FY0_X	Signal	X	34.8	2,642	2.7	0.56	10.3	29.6	10.3	55.7	34.4	3,191	10.4	29.6	A
1. FY2026 0 B	Network_PM	3PM	CAS_GLE_26_PM_FY0_X	Signal	X	33.2	2,525	2.2	0.57	10.7	42.1	10.7	83.6	31.5	3,088	11.3	44.3	A
1. FY2026 0 B	Network_PM	4PM	CAS_FRA_26_PM_FY0_X	Give Way	X	57.9	2,461	2.4	0.38	0.6	39.5	39.5	1.2	57.9	3,011	1.3	39.5	C
1. FY2026 0 B	Network_PM	5PM	CAS_COO_26_PM_FY0_X	Signal	X	40.7	3,054	2.3	1.02	31.0	124.1	31.0	140.7	40.5	3,683	31.0	124.1	C
1. FY2026 0 B	Network_PM	8PM	BRA_ROB_26_PM_FY0_X	Give Way	X	41.7	463	5.2	0.11	1.9	6.7	6.7	0.9	41.7	556	1.9	6.7	A
1. FY2026 0 B	Network_PM	10PM	BRA_FRA_26_PM_FY0_X	Give Way	X	42.1	354	6.3	0.12	3.5	4.9	4.9	1.5	42.1	424	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
2. FY2026 0 I	Network_AM	1AM	CAS_COU_26_AM_FY0_I	Signal	I	29.1	4,598	3.5	0.99	56.2	100.4	56.2	192.7	29.0	5,524	56.2	100.4	D
2. FY2026 0 I	Network_AM	2AM	CAS_BRA_26_AM_FY0_I	Signal	I	35.8	2,489	5.1	0.88	10.7	75.5	10.7	37.6	35.6	2,997	10.8	75.5	A
2. FY2026 0 I	Network_AM	3AM	CAS_GLE_26_AM_FY0_I	Signal	I	33.1	2,289	4.9	0.41	9.8	58.7	9.8	68.8	29.6	2,835	11.3	59.3	A
2. FY2026 0 I	Network_AM	4AM	CAS_FRA_26_AM_FY0_I	Give Way	I	56.1	2,316	5.2	0.29	1.0	32.1	32.1	2.0	56.0	2,900	2.3	32.1	C
2. FY2026 0 I	Network_AM	5AM	CAS_COO_26_AM_FY0_I	Signal	I	41.3	2,977	5.1	0.79	29.9	69.0	29.9	151.0	41.2	3,587	29.9	69.0	C
2. FY2026 0 I	Network_AM	8AM	BRA_ROB_26_AM_FY0_I	Give Way	I	41.7	605	3.3	0.20	2.5	7.1	7.1	14.9	41.7	726	2.5	7.1	A
2. FY2026 0 I	Network_AM	10AM	BRA_FRA_26_AM_FY0_I	Give Way	I	38.0	551	3.8	0.13	2.9	4.9	4.9	1.9	38.0	661	2.9	4.9	A
2. FY2026 0 I	Network_PM	1PM	CAS_COU_26_PM_FY0_I	Signal	I	29.8	4,855	2.1	1.00	54.5	88.4	54.5	288.8	29.8	5,837	54.5	88.4	D
2. FY2026 0 I	Network_PM	2PM	CAS_BRA_26_PM_FY0_I	Signal	I	42.8	2,774	2.7	0.94	5.7	90.0	5.7	25.0	42.3	3,348	5.8	90.0	A
2. FY2026 0 I	Network_PM	3PM	CAS_GLE_26_PM_FY0_I	Signal	I	30.0	2,651	2.2	0.59	13.3	63.5	13.3	117.0	28.3	3,239	14.2	63.5	A
2. FY2026 0 I	Network_PM	4PM	CAS_FRA_26_PM_FY0_I	Give Way	I	57.8	2,585	2.4	0.41	0.6	43.2	43.2	1.5	57.8	3,163	1.4	43.2	D
2. FY2026 0 I	Network_PM	5PM	CAS_COO_26_PM_FY0_I	Signal	I	44.5	3,191	2.3	0.79	22.3	73.0	22.3	125.8	44.4	3,847	22.3	73.0	B
2. FY2026 0 I	Network_PM	8PM	BRA_ROB_26_PM_FY0_I	Give Way	I	41.7	462	5.0	0.11	1.9	6.8	6.8	4.4	41.7	555	1.9	6.8	A
2. FY2026 0 I	Network_PM	10PM	BRA_FRA_26_PM_FY0_I	Give Way	I	42.1	354	6.3	0.12	3.5	4.9	4.9	1.5	42.1	424	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
3. FY2026 1 B	Network_AM	1AM	CAS_COU_26_AM_FY1_X	Signal	X	30.2	4,501	3.5	1.03	51.8	126.9	51.8	157.6	30.2	5,408	51.8	126.9	D
3. FY2026 1 B	Network_AM	2AM	CAS_BRA_26_AM_FY1_X	Signal	X	32.3	2,482	4.9	0.65	13.2	25.6	13.2	61.1	32.2	2,987	13.2	25.8	A
3. FY2026 1 B	Network_AM	3AM	CAS_GLE_26_AM_FY1_X	Signal	X	31.9	2,230	4.8	0.38	10.7	56.0	10.7	58.8	28.6	2,763	12.1	57.8	A
3. FY2026 1 B	Network_AM	4AM	CAS_FRA_26_AM_FY1_X	Give Way	X	54.4	2,303	5.0	0.28	1.5	47.0	47.0	3.2	54.3	2,879	3.3	47.0	D
3. FY2026 1 B	Network_AM	5AM	CAS_COO_26_AM_FY1_X	Signal	X	41.3	2,943	4.9	0.77	29.9	58.0	29.9	123.6	41.2	3,547	29.9	58.0	C
3. FY2026 1 B	Network_AM	8AM	BRA_ROB_26_AM_FY1_X	Give Way	X	41.4	718	2.8	0.28	2.6	7.8	7.8	1.6	41.4	861	2.6	7.8	A
3. FY2026 1 B	Network_AM	10AM	BRA_FRA_26_AM_FY1_X	Give Way	X	37.9	606	3.5	0.16	3.0	4.9	4.9	2.0	37.9	728	3.0	4.9	A
3. FY2026 1 B	Network_PM	1PM	CAS_COU_26_PM_FY1_X	Signal	X	28.4	4,731	2.1	1.04	59.7	138.7	59.7	254.1	28.4	5,689	59.7	138.7	E
3. FY2026 1 B	Network_PM	2PM	CAS_BRA_26_PM_FY1_X	Signal	X	34.2	2,753	2.6	0.57	10.7	29.9	10.7	57.7	33.9	3,324	10.7	29.9	A
3. FY2026 1 B	Network_PM	3PM	CAS_GLE_26_PM_FY1_X	Signal	X	33.0	2,589	2.2	0.60	10.8	42.1	10.8	88.9	31.4	3,165	11.4	44.3	A
3. FY2026 1 B	Network_PM	4PM	CAS_FRA_26_PM_FY1_X	Give Way	X	57.5	2,561	2.3	0.40	0.7	40.9	40.9	1.6	57.5	3,131	1.4	40.9	C
3. FY2026 1 B	Network_PM	5PM	CAS_COO_26_PM_FY1_X	Signal	X	40.6	3,143	2.2	1.02	31.3	124.1	31.3	154.2	40.5	3,790	31.2	124.1	C
3. FY2026 1 B	Network_PM	8PM	BRA_ROB_26_PM_FY1_X	Give Way	X	41.7	579	4.0	0.15	1.9	7.4	7.4	1.0	41.7	695	1.9	7.4	A
3. FY2026 1 B	Network_PM	10PM	BRA_FRA_26_PM_FY1_X	Give Way	X	41.7	404	5.5	0.15	3.5	4.9	4.9	1.7	41.7	485	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
4. FY2026 1 I	Network_AM	1AM	CAS_COU_26_AM_FY1_I	Signal	I	29.1	4,654	3.5	0.99	56.0	100.4	56.0	195.4	29.1	5,591	56.0	100.4	D
4. FY2026 1 I	Network_AM	2AM	CAS_BRA_26_AM_FY1_I	Signal	I	33.5	2,596	4.9	0.87	12.3	73.2	12.3	41.6	33.3	3,124	12.3	73.2	A
4. FY2026 1 I	Network_AM	3AM	CAS_GLE_26_AM_FY1_I	Signal	I	33.0	2,339	4.8	0.43	9.9	58.7	9.9	71.9	29.6	2,894	11.3	59.3	A
4. FY2026 1 I	Network_AM	4AM	CAS_FRA_26_AM_FY1_I	Give Way	I	55.5	2,413	5.0	0.30	1.2	33.3	33.3	2.7	55.5	3,016	2.5	33.3	C
4. FY2026 1 I	Network_AM	5AM	CAS_COO_26_AM_FY1_I	Signal	I	41.1	3,074	4.9	0.79	30.6	69.0	30.6	161.1	41.0	3,703	30.6	69.0	C
4. FY2026 1 I	Network_AM	8AM	BRA_ROB_26_AM_FY1_I	Give Way	I	41.4	718	2.8	0.29	2.7	8.2	8.2	20.2	41.4	861	2.7	8.2	A
4. FY2026 1 I	Network_AM	10AM	BRA_FRA_26_AM_FY1_I	Give Way	I	37.9	606	3.5	0.16	3.0	4.9	4.9	2.0	37.9	728	3.0	4.9	A
4. FY2026 1 I	Network_PM	1PM	CAS_COU_26_PM_FY1_I	Signal	I	29.6	4,911	2.1	0.98	55.4	100.3	55.4	283.5	29.5	5,904	55.4	100.3	D
4. FY2026 1 I	Network_PM	2PM	CAS_BRA_26_PM_FY1_I	Signal	I	41.6	2,889	2.6	0.86	6.2	79.0	6.2	29.1	41.1	3,487	6.3	79.0	A
4. FY2026 1 I	Network_PM	3PM	CAS_GLE_26_PM_FY1_I	Signal	I	30.3	2,718	2.2	0.61	13.0	63.5	13.0	121.7	28.7	3,319	13.9	63.5	A
4. FY2026 1 I	Network_PM	4PM	CAS_FRA_26_PM_FY1_I	Give Way	I	57.4	2,688	2.3	0.42	0.7	45.5	45.5	1.6	57.4	3,287	1.5	45.5	D
4. FY2026 1 I	Network_PM	5PM	CAS_COO_26_PM_FY1_I	Signal	I	44.6	3,285	2.2	0.82	22.2	73.0	22.2	132.5	44.4	3,960	22.2	73.0	B
4. FY2026 1 I	Network_PM	8PM	BRA_ROB_26_PM_FY1_I	Give Way	I	41.7	579	4.0	0.15	1.9	7.7	7.7	7.8	41.7	695	1.9	7.7	A
4. FY2026 1 I	Network_PM	10PM	BRA_FRA_26_PM_FY1_I	Give Way	I	41.7	404	5.5	0.15	3.5	4.9	4.9	1.7	41.7	485	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
5. FY2026 2 B	Network_AM	1AM	CAS_COU_26_AM_FY2_X	Signal	X	29.5	4,484	3.5	1.14	54.3	206.1	54.3	154.6	29.5	5,387	54.3	206.1	D
5. FY2026 2 B	Network_AM	2AM	CAS_BRA_26_AM_FY2_X	Signal	X	32.3	2,455	4.9	0.64	13.2	25.6	13.2	59.7	32.2	2,956	13.2	25.8	A
5. FY2026 2 B	Network_AM	3AM	CAS_GLE_26_AM_FY2_X	Signal	X	31.9	2,209	4.8	0.38	10.7	55.9	10.7	58.5	28.6	2,738	12.2	57.8	A
5. FY2026 2 B	Network_AM	4AM	CAS_FRA_26_AM_FY2_X	Give Way	X	54.6	2,280	5.1	0.28	1.5	45.5	45.5	3.0	54.4	2,851	3.2	45.5	D
5. FY2026 2 B	Network_AM	5AM	CAS_COO_26_AM_FY2_X	Signal	X	41.3	2,923	5.0	0.77	29.9	58.4	29.9	122.7	41.2	3,523	29.9	58.4	C
5. FY2026 2 B	Network_AM	8AM	BRA_ROB_26_AM_FY2_X	Give Way	X	41.4	712	2.8	0.27	2.6	7.7	7.7	1.6	41.4	854	2.6	7.7	A
5. FY2026 2 B	Network_AM	10AM	BRA_FRA_26_AM_FY2_X	Give Way	X	37.9	601	3.5	0.16	3.0	4.9	4.9	2.0	37.9	721	3.0	4.9	A
5. FY2026 2 B	Network_PM	1PM	CAS_COU_26_PM_FY2_X	Signal	X	29.2	4,689	2.1	1.00	56.8	113.6	56.8	240.5	29.1	5,638	56.7	113.6	E
5. FY2026 2 B	Network_PM	2PM	CAS_BRA_26_PM_FY2_X	Signal	X	34.3	2,723	2.6	0.55	10.7	29.9	10.7	54.1	33.9	3,288	10.7	29.9	A
5. FY2026 2 B	Network_PM	3PM	CAS_GLE_26_PM_FY2_X	Signal	X	33.1	2,562	2.1	0.59	10.8	42.1	10.8	86.8	31.4	3,132	11.4	44.3	A
5. FY2026 2 B	Network_PM	4PM	CAS_FRA_26_PM_FY2_X	Give Way	X	57.5	2,533	2.3	0.39	0.6	40.2	40.2	1.6	57.5	3,097	1.4	40.2	C
5. FY2026 2 B	Network_PM	5PM	CAS_COO_26_PM_FY2_X	Signal	X	40.9	3,109	2.2	1.02	30.4	119.3	30.4	147.5	40.8	3,749	30.4	119.3	C
5. FY2026 2 B	Network_PM	8PM	BRA_ROB_26_PM_FY2_X	Give Way	X	41.7	574	4.0	0.15	1.9	7.4	7.4	1.0	41.7	688	1.9	7.4	A
5. FY2026 2 B	Network_PM	10PM	BRA_FRA_26_PM_FY2_X	Give Way	X	41.7	400	5.5	0.15	3.5	4.9	4.9	1.7	41.7	480	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
6. FY2026 2 I	Network_AM	1AM	CAS_COU_26_AM_FY2_I	Signal	I	29.2	4,635	3.5	0.99	55.8	100.6	55.8	193.2	29.1	5,568	55.8	100.6	D
6. FY2026 2 I	Network_AM	2AM	CAS_BRA_26_AM_FY2_I	Signal	I	32.8	2,568	4.9	0.92	12.8	81.7	12.8	39.9	32.7	3,092	12.9	81.7	A
6. FY2026 2 I	Network_AM	3AM	CAS_GLE_26_AM_FY2_I	Signal	I	33.0	2,317	4.8	0.43	9.9	58.7	9.9	71.5	29.5	2,868	11.4	59.3	A
6. FY2026 2 I	Network_AM	4AM	CAS_FRA_26_AM_FY2_I	Give Way	I	55.6	2,388	5.1	0.29	1.1	32.4	32.4	2.6	55.6	2,987	2.4	32.4	C
6. FY2026 2 I	Network_AM	5AM	CAS_COO_26_AM_FY2_I	Signal	I	41.1	3,053	5.0	0.83	30.6	70.8	30.6	157.4	41.0	3,678	30.6	70.8	C
6. FY2026 2 I	Network_AM	8AM	BRA_ROB_26_AM_FY2_I	Give Way	I	41.4	712	2.8	0.28	2.6	8.1	8.1	22.2	41.4	854	2.6	8.1	A
6. FY2026 2 I	Network_AM	10AM	BRA_FRA_26_AM_FY2_I	Give Way	I	37.9	601	3.5	0.16	3.0	4.9	4.9	2.0	37.9	721	3.0	4.9	A
6. FY2026 2 I	Network_PM	1PM	CAS_COU_26_PM_FY2_I	Signal	I	30.1	4,866	2.1	0.98	53.2	82.6	53.2	280.6	30.1	5,851	53.2	82.6	D
6. FY2026 2 I	Network_PM	2PM	CAS_BRA_26_PM_FY2_I	Signal	I	40.8	2,858	2.6	0.94	6.7	91.1	6.7	28.5	40.3	3,449	6.8	91.1	A
6. FY2026 2 I	Network_PM	3PM	CAS_GLE_26_PM_FY2_I	Signal	I	30.3	2,689	2.2	0.60	13.0	63.5	13.0	118.7	28.7	3,285	13.8	63.5	A
6. FY2026 2 I	Network_PM	4PM	CAS_FRA_26_PM_FY2_I	Give Way	I	57.4	2,659	2.3	0.41	0.7	44.4	44.4	1.6	57.4	3,251	1.5	44.4	D
6. FY2026 2 I	Network_PM	5PM	CAS_COO_26_PM_FY2_I	Signal	I	44.7	3,249	2.2	0.80	21.9	73.0	21.9	125.9	44.6	3,917	21.9	73.0	B
6. FY2026 2 I	Network_PM	8PM	BRA_ROB_26_PM_FY2_I	Give Way	I	41.7	574	4.0	0.15	1.9	7.6	7.6	7.7	41.7	688	1.9	7.6	A
6. FY2026 2 I	Network_PM	10PM	BRA_FRA_26_PM_FY2_I	Give Way	I	41.7	400	5.5	0.15	3.5	4.9	4.9	1.7	41.7	480	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
9. FY2026 4 B	Network_AM	1AM	CAS_COU_26_AM_FY4_X	Signal	X	28.8	4,524	3.4	1.16	56.6	225.6	56.6	159.9	28.8	5,435	56.6	225.6	E
9. FY2026 4 B	Network_AM	2AM	CAS_BRA_26_AM_FY4_X	Signal	X	32.3	2,478	4.8	0.64	13.2	25.6	13.2	60.0	32.1	2,983	13.2	25.8	A
9. FY2026 4 B	Network_AM	3AM	CAS_GLE_26_AM_FY4_X	Signal	X	31.6	2,237	4.7	0.38	10.9	56.2	10.9	59.3	28.4	2,772	12.3	57.8	A
9. FY2026 4 B	Network_AM	4AM	CAS_FRA_26_AM_FY4_X	Give Way	X	54.5	2,305	5.0	0.28	1.5	46.6	46.6	3.2	54.3	2,881	3.3	46.6	D
9. FY2026 4 B	Network_AM	5AM	CAS_COO_26_AM_FY4_X	Signal	X	41.1	2,982	4.9	0.77	30.4	59.6	30.4	123.3	41.0	3,594	30.4	59.6	C
9. FY2026 4 B	Network_AM	8AM	BRA_ROB_26_AM_FY4_X	Give Way	X	41.4	718	2.8	0.29	2.6	7.8	7.8	1.7	41.4	861	2.6	7.8	A
9. FY2026 4 B	Network_AM	10AM	BRA_FRA_26_AM_FY4_X	Give Way	X	37.9	605	3.5	0.16	3.0	4.9	4.9	2.0	37.9	726	3.0	4.9	A
9. FY2026 4 B	Network_PM	1PM	CAS_COU_26_PM_FY4_X	Signal	X	28.8	4,726	2.1	1.00	58.2	113.6	58.2	242.7	28.8	5,683	58.2	113.6	E
9. FY2026 4 B	Network_PM	2PM	CAS_BRA_26_PM_FY4_X	Signal	X	34.2	2,745	2.6	0.55	10.7	29.9	10.7	54.5	33.9	3,315	10.7	29.9	A
9. FY2026 4 B	Network_PM	3PM	CAS_GLE_26_PM_FY4_X	Signal	X	33.1	2,592	2.1	0.59	10.8	42.1	10.8	88.3	31.4	3,168	11.4	44.3	A
9. FY2026 4 B	Network_PM	4PM	CAS_FRA_26_PM_FY4_X	Give Way	X	57.5	2,553	2.3	0.40	0.7	41.2	41.2	1.6	57.5	3,121	1.4	41.2	C
9. FY2026 4 B	Network_PM	5PM	CAS_COO_26_PM_FY4_X	Signal	X	40.4	3,170	2.2	1.02	31.6	122.5	31.6	163.6	40.3	3,822	31.6	122.5	C
9. FY2026 4 B	Network_PM	8PM	BRA_ROB_26_PM_FY4_X	Give Way	X	41.7	579	4.0	0.16	1.9	7.4	7.4	1.0	41.7	695	1.9	7.4	A
9. FY2026 4 B	Network_PM	10PM	BRA_FRA_26_PM_FY2_X	Give Way	X	41.7	403	5.5	0.15	3.5	4.9	4.9	1.7	41.7	484	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
10. FY2026 4 I	Network_AM	1AM	CAS_COU_26_AM_FY4_I	Signal	I	29.1	4,676	3.4	0.98	55.9	96.7	55.9	183.4	29.1	5,617	55.8	96.7	D
10. FY2026 4 I	Network_AM	2AM	CAS_BRA_26_AM_FY4_I	Signal	I	33.2	2,592	4.8	0.88	12.5	74.3	12.5	41.8	33.0	3,119	12.5	74.3	A
10. FY2026 4 I	Network_AM	3AM	CAS_GLE_26_AM_FY4_I	Signal	I	32.7	2,346	4.8	0.43	10.1	58.9	10.1	72.5	29.3	2,903	11.6	59.3	A
10. FY2026 4 I	Network_AM	4AM	CAS_FRA_26_AM_FY4_I	Give Way	I	55.6	2,415	5.0	0.30	1.2	33.2	33.2	2.7	55.5	3,019	2.4	33.2	C
10. FY2026 4 I	Network_AM	5AM	CAS_COO_26_AM_FY4_I	Signal	I	40.5	3,113	4.9	0.91	32.0	78.8	32.0	160.3	40.4	3,750	32.0	78.8	C
10. FY2026 4 I	Network_AM	8AM	BRA_ROB_26_AM_FY4_I	Give Way	I	41.3	718	2.8	0.30	2.7	8.3	8.3	20.6	41.3	861	2.7	8.3	A
10. FY2026 4 I	Network_AM	10AM	BRA_FRA_26_AM_FY4_I	Give Way	I	37.9	605	3.5	0.16	3.0	4.9	4.9	2.0	37.9	726	3.0	4.9	A
10. FY2026 4 I	Network_PM	1PM	CAS_COU_26_PM_FY4_I	Signal	I	29.5	4,905	2.1	0.97	55.5	95.4	55.5	267.8	29.5	5,898	55.5	95.4	D
10. FY2026 4 I	Network_PM	2PM	CAS_BRA_26_PM_FY4_I	Signal	I	40.6	2,881	2.6	0.94	6.8	91.1	6.8	32.8	40.1	3,477	6.9	91.1	A
10. FY2026 4 I	Network_PM	3PM	CAS_GLE_26_PM_FY4_I	Signal	I	29.8	2,721	2.1	0.61	13.5	63.5	13.5	120.8	28.3	3,323	14.3	63.5	A
10. FY2026 4 I	Network_PM	4PM	CAS_FRA_26_PM_FY4_I	Give Way	I	57.4	2,680	2.3	0.42	0.7	44.0	44.0	1.6	57.4	3,277	1.5	44.0	D
10. FY2026 4 I	Network_PM	5PM	CAS_COO_26_PM_FY4_I	Signal	I	44.2	3,314	2.2	0.83	22.9	73.1	22.9	141.0	44.0	3,994	22.9	73.1	B
10. FY2026 4 I	Network_PM	8PM	BRA_ROB_26_PM_FY4_I	Give Way	I	41.7	579	4.0	0.16	1.9	7.6	7.6	7.4	41.7	695	1.9	7.6	A
10. FY2026 4 I	Network_PM	10PM	BRA_FRA_26_PM_FY4_I	Give Way	I	41.7	403	5.5	0.15	3.5	4.9	4.9	1.7	41.7	484	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
1. FY2036 0 B	Network_AM	1AM	CAS_COU_36_AM_FY0_X	Signal	X	27.7	4,713	3.5	1.13	60.8	200.5	60.8	184.5	27.7	5,662	60.8	200.5	E
1. FY2036 0 B	Network_AM	2AM	CAS_BRA_36_AM_FY0_X	Signal	X	32.8	2,531	5.0	0.69	13.2	25.2	13.2	67.2	32.7	3,046	13.2	25.8	A
1. FY2036 0 B	Network_AM	3AM	CAS_GLE_36_AM_FY0_X	Signal	X	31.6	2,327	4.9	0.42	10.8	56.2	10.8	59.6	28.5	2,880	12.2	57.8	A
1. FY2036 0 B	Network_AM	4AM	CAS_FRA_36_AM_FY0_X	Give Way	X	54.3	2,356	5.2	0.30	1.6	54.1	54.1	4.1	54.0	2,943	3.6	54.1	D
1. FY2036 0 B	Network_AM	5AM	CAS_COO_36_AM_FY0_X	Signal	X	40.7	3,091	5.0	0.79	31.1	60.2	31.1	131.7	40.6	3,724	31.1	60.2	C
1. FY2036 0 B	Network_AM	8AM	BRA_ROB_36_AM_FY0_X	Give Way	X	41.7	643	3.4	0.16	2.5	7.1	7.1	1.2	41.7	772	2.5	7.1	A
1. FY2036 0 B	Network_AM	10AM	BRA_FRA_36_AM_FY0_X	Give Way	X	38.0	585	3.6	0.14	2.9	4.9	4.9	2.1	38.0	702	2.9	4.9	A
1. FY2036 0 B	Network_PM	1PM	CAS_COU_36_PM_FY0_X	Signal	X	24.9	4,979	2.1	1.13	76.1	201.6	76.1	314.9	24.9	5,986	76.1	201.6	F
1. FY2036 0 B	Network_PM	2PM	CAS_BRA_36_PM_FY0_X	Signal	X	31.1	2,821	2.7	0.81	13.2	29.7	13.2	76.1	30.8	3,405	13.2	29.7	A
1. FY2036 0 B	Network_PM	3PM	CAS_GLE_36_PM_FY0_X	Signal	X	32.7	2,698	2.2	0.61	11.1	42.1	11.1	93.3	31.1	3,295	11.6	44.3	A
1. FY2036 0 B	Network_PM	4PM	CAS_FRA_36_PM_FY0_X	Give Way	X	57.8	2,626	2.4	0.41	0.6	44.2	44.2	1.4	57.8	3,209	1.4	44.2	D
1. FY2036 0 B	Network_PM	5PM	CAS_COO_36_PM_FY0_X	Signal	X	29.6	3,338	2.2	1.33	66.9	361.8	66.9	188.6	29.5	4,024	66.7	361.8	E
1. FY2036 0 B	Network_PM	8PM	BRA_ROB_36_PM_FY0_X	Give Way	X	41.7	494	5.1	0.12	2.0	6.9	6.9	1.0	41.7	592	2.0	6.9	A
1. FY2036 0 B	Network_PM	10PM	BRA_FRA_36_PM_FY0_X	Give Way	X	42.1	375	6.2	0.13	3.5	4.9	4.9	1.5	42.1	450	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
2. FY2036 0 I	Network_AM	1AM	CAS_COU_36_AM_FY1_I	Signal	I	30.6	4,873	3.5	0.96	50.6	77.6	50.6	204.1	30.6	5,853	50.6	77.6	D
2. FY2036 0 I	Network_AM	2AM	CAS_BRA_36_AM_FY1_I	Signal	I	35.9	2,649	5.0	0.88	10.7	73.4	10.7	39.8	35.7	3,189	10.8	73.4	A
2. FY2036 0 I	Network_AM	3AM	CAS_GLE_36_AM_FY1_I	Signal	I	32.8	2,441	4.9	0.44	9.9	56.1	9.9	73.0	29.6	3,017	11.3	56.8	A
2. FY2036 0 I	Network_AM	4AM	CAS_FRA_36_AM_FY1_I	Give Way	I	55.6	2,471	5.2	0.32	1.2	38.2	38.2	2.3	55.5	3,086	2.6	38.2	C
2. FY2036 0 I	Network_AM	5AM	CAS_COO_36_AM_FY1_I	Signal	I	39.8	3,224	5.0	0.93	33.5	83.4	33.5	171.5	39.7	3,884	33.5	83.4	C
2. FY2036 0 I	Network_AM	8AM	BRA_ROB_36_AM_FY1_I	Give Way	I	41.6	643	3.4	0.22	2.6	7.3	7.3	15.6	41.6	772	2.6	7.3	A
2. FY2036 0 I	Network_AM	10AM	BRA_FRA_36_AM_FY1_I	Give Way	I	38.0	585	3.6	0.14	2.9	4.9	4.9	2.1	38.0	702	2.9	4.9	A
2. FY2036 0 I	Network_PM	1PM	CAS_COU_36_PM_FY1_I	Signal	I	30.9	5,166	2.1	0.99	50.7	98.0	50.7	187.4	30.9	6,211	50.7	98.0	D
2. FY2036 0 I	Network_PM	2PM	CAS_BRA_36_PM_FY1_I	Signal	I	44.6	2,961	2.7	0.86	4.9	71.4	4.9	25.0	44.0	3,573	4.9	71.4	A
2. FY2036 0 I	Network_PM	3PM	CAS_GLE_36_PM_FY1_I	Signal	I	28.1	2,832	2.2	0.67	15.2	56.4	15.2	128.8	26.8	3,456	15.8	56.4	B
2. FY2036 0 I	Network_PM	4PM	CAS_FRA_36_PM_FY1_I	Give Way	I	57.9	2,759	2.4	0.44	0.6	43.2	43.2	1.4	57.9	3,371	1.3	43.2	D
2. FY2036 0 I	Network_PM	5PM	CAS_COO_36_PM_FY1_I	Signal	I	40.4	3,485	2.2	0.98	31.5	105.4	31.5	190.3	40.3	4,200	31.5	105.4	C
2. FY2036 0 I	Network_PM	8PM	BRA_ROB_36_PM_FY1_I	Give Way	I	41.7	494	5.1	0.12	2.0	7.0	7.0	3.8	41.7	592	2.0	7.0	A
2. FY2036 0 I	Network_PM	10PM	BRA_FRA_36_PM_FY1_I	Give Way	I	42.1	375	6.2	0.13	3.5	4.9	4.9	1.6	42.1	450	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
3. FY2036 1 B	Network_AM	1AM	CAS_COU_36_AM_FY1_X	Signal	X	27.2	4,767	3.5	1.13	63.0	200.5	63.0	184.5	27.2	5,727	63.0	200.5	E
3. FY2036 1 B	Network_AM	2AM	CAS_BRA_36_AM_FY1_X	Signal	X	32.1	2,633	4.8	0.70	13.6	25.7	13.6	68.8	32.0	3,169	13.6	25.8	A
3. FY2036 1 B	Network_AM	3AM	CAS_GLE_36_AM_FY1_X	Signal	X	31.6	2,373	4.8	0.42	10.8	56.2	10.8	62.2	28.5	2,935	12.2	57.8	A
3. FY2036 1 B	Network_AM	4AM	CAS_FRA_36_AM_FY1_X	Give Way	X	53.7	2,452	5.0	0.30	1.7	56.2	56.2	4.4	53.4	3,057	3.8	56.2	D
3. FY2036 1 B	Network_AM	5AM	CAS_COO_36_AM_FY1_X	Signal	X	40.5	3,183	4.8	0.81	31.8	60.2	31.8	138.3	40.4	3,834	31.8	60.2	C
3. FY2036 1 B	Network_AM	8AM	BRA_ROB_36_AM_FY1_X	Give Way	X	41.3	759	2.9	0.30	2.7	8.2	8.2	1.8	41.3	911	2.7	8.2	A
3. FY2036 1 B	Network_AM	10AM	BRA_FRA_36_AM_FY1_X	Give Way	X	37.9	641	3.3	0.17	3.0	4.9	4.9	2.1	37.9	769	3.0	4.9	A
3. FY2036 1 B	Network_PM	1PM	CAS_COU_36_PM_FY1_X	Signal	X	24.4	5,030	2.1	1.13	79.0	201.6	79.0	331.1	24.3	6,047	78.9	201.6	F
3. FY2036 1 B	Network_PM	2PM	CAS_BRA_36_PM_FY1_X	Signal	X	25.8	2,931	2.6	0.88	18.7	30.1	18.7	101.9	25.6	3,537	18.7	30.1	B
3. FY2036 1 B	Network_PM	3PM	CAS_GLE_26_PM_FY1_X	Signal	X	32.4	2,762	2.1	0.74	11.3	42.1	11.3	114.5	30.9	3,372	11.9	44.3	A
3. FY2036 1 B	Network_PM	4PM	CAS_FRA_36_PM_FY1_X	Give Way	X	57.4	2,725	2.3	0.43	0.7	45.8	45.8	1.6	57.4	3,328	1.5	45.8	D
3. FY2036 1 B	Network_PM	5PM	CAS_COO_36_PM_FY1_X	Signal	X	29.4	3,428	2.1	1.33	68.0	361.8	68.0	221.4	29.3	4,132	67.8	361.8	E
3. FY2036 1 B	Network_PM	8PM	BRA_ROB_36_PM_FY1_X	Give Way	X	41.6	609	4.1	0.16	1.9	7.6	7.6	1.1	41.6	731	1.9	7.6	A
3. FY2036 1 B	Network_PM	10PM	BRA_FRA_36_PM_FY1_X	Give Way	X	41.7	427	5.4	0.16	3.5	4.9	4.9	1.8	41.7	513	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
4. FY2036 1 I	Network_AM	1AM	CAS_COU_36_AM_FY1_I	Signal	I	30.3	4,929	3.5	0.98	51.6	77.6	51.6	217.9	30.3	5,922	51.6	77.6	D
4. FY2036 1 I	Network_AM	2AM	CAS_BRA_36_AM_FY1_I	Signal	I	33.2	2,755	4.9	0.93	12.6	79.6	12.6	43.5	33.1	3,315	12.7	79.6	A
4. FY2036 1 I	Network_AM	3AM	CAS_GLE_36_AM_FY1_I	Signal	I	32.9	2,489	4.8	0.46	9.9	56.1	9.9	76.2	29.7	3,075	11.2	56.8	A
4. FY2036 1 I	Network_AM	4AM	CAS_FRA_36_AM_FY1_I	Give Way	I	55.1	2,568	5.0	0.33	1.3	40.2	40.2	3.1	55.0	3,203	2.8	40.2	C
4. FY2036 1 I	Network_AM	5AM	CAS_COO_36_AM_FY1_I	Signal	I	39.4	3,321	4.8	0.93	34.7	83.4	34.7	189.4	39.4	4,000	34.6	83.4	C
4. FY2036 1 I	Network_AM	8AM	BRA_ROB_36_AM_FY1_I	Give Way	I	41.2	759	2.9	0.31	2.8	8.7	8.7	23.2	41.2	911	2.8	8.7	A
4. FY2036 1 I	Network_AM	10AM	BRA_FRA_36_AM_FY1_I	Give Way	I	37.9	641	3.3	0.17	3.0	4.9	4.9	2.1	37.9	769	3.0	4.9	A
4. FY2036 1 I	Network_PM	1PM	CAS_COU_36_PM_FY1_I	Signal	I	30.2	5,220	2.1	0.99	53.4	98.0	53.4	181.0	30.1	6,276	53.4	98.0	D
4. FY2036 1 I	Network_PM	2PM	CAS_BRA_36_PM_FY1_I	Signal	I	42.5	3,076	2.6	0.90	5.7	74.9	5.7	25.0	42.0	3,711	5.8	74.9	A
4. FY2036 1 I	Network_PM	3PM	CAS_GLE_36_PM_FY1_I	Signal	I	28.3	2,899	2.1	0.69	15.0	56.4	15.0	137.0	27.1	3,537	15.6	56.4	B
4. FY2036 1 I	Network_PM	4PM	CAS_FRA_36_PM_FY1_I	Give Way	I	57.5	2,861	2.3	0.45	0.7	45.9	45.9	1.8	57.5	3,494	1.4	45.9	D
4. FY2036 1 I	Network_PM	5PM	CAS_COO_36_PM_FY1_I	Signal	I	39.7	3,580	2.1	0.98	33.2	105.4	33.2	224.6	39.6	4,314	33.2	105.4	C
4. FY2036 1 I	Network_PM	8PM	BRA_ROB_36_PM_FY1_I	Give Way	I	41.6	609	4.1	0.16	1.9	7.9	7.9	7.2	41.6	731	1.9	7.9	A
4. FY2036 1 I	Network_PM	10PM	BRA_FRA_36_PM_FY1_I	Give Way	I	41.7	427	5.4	0.16	3.5	4.9	4.9	1.8	41.7	513	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
5. FY2036 2 B	Network_AM	1AM	CAS_COU_36_AM_FY2_X	Signal	X	27.1	4,740	3.5	1.25	63.4	296.5	63.4	179.3	27.0	5,694	63.4	296.5	E
5. FY2036 2 B	Network_AM	2AM	CAS_BRA_36_AM_FY2_X	Signal	X	32.1	2,610	4.8	0.69	13.5	25.7	13.5	67.2	32.0	3,142	13.5	25.8	A
5. FY2036 2 B	Network_AM	3AM	CAS_GLE_36_AM_FY2_X	Signal	X	31.6	2,351	4.8	0.42	10.8	56.1	10.8	61.5	28.5	2,909	12.2	57.8	A
5. FY2036 2 B	Network_AM	4AM	CAS_FRA_36_AM_FY2_X	Give Way	X	53.8	2,427	5.0	0.30	1.7	54.6	54.6	4.2	53.6	3,027	3.7	54.6	D
5. FY2036 2 B	Network_AM	5AM	CAS_COO_36_AM_FY2_X	Signal	X	40.6	3,144	4.8	0.80	31.6	61.1	31.6	137.0	40.5	3,788	31.6	61.1	C
5. FY2036 2 B	Network_AM	8AM	BRA_ROB_36_AM_FY2_X	Give Way	X	41.3	752	2.9	0.30	2.7	8.1	8.1	1.8	41.3	902	2.7	8.1	A
5. FY2036 2 B	Network_AM	10AM	BRA_FRA_36_AM_FY2_X	Give Way	X	37.9	635	3.3	0.17	3.0	4.9	4.9	2.1	37.9	762	3.0	4.9	A
5. FY2036 2 B	Network_PM	1PM	CAS_COU_36_PM_FY2_X	Signal	X	25.1	4,983	2.1	1.09	74.8	170.7	74.8	329.1	25.1	5,991	74.8	170.7	F
5. FY2036 2 B	Network_PM	2PM	CAS_BRA_36_PM_FY2_X	Signal	X	26.4	2,903	2.6	0.87	17.9	30.0	17.9	98.2	26.3	3,503	17.8	30.0	B
5. FY2036 2 B	Network_PM	3PM	CAS_GLE_36_PM_FY2_X	Signal	X	32.6	2,734	2.2	0.65	11.2	42.1	11.2	104.0	31.1	3,338	11.8	44.3	A
5. FY2036 2 B	Network_PM	4PM	CAS_FRA_36_PM_FY2_X	Give Way	X	57.4	2,700	2.3	0.42	0.7	45.1	45.1	1.6	57.4	3,298	1.4	45.1	D
5. FY2036 2 B	Network_PM	5PM	CAS_COO_36_PM_FY2_X	Signal	X	37.0	3,323	2.2	1.10	40.7	176.0	40.7	206.1	36.9	4,005	40.7	176.0	C
5. FY2036 2 B	Network_PM	8PM	BRA_ROB_36_PM_FY2_X	Give Way	X	41.6	604	4.2	0.16	1.9	7.6	7.6	1.1	41.6	725	1.9	7.6	A
5. FY2036 2 B	Network_PM	10PM	BRA_FRA_36_PM_FY2_X	Give Way	X	41.7	422	5.5	0.16	3.5	4.9	4.9	1.8	41.7	507	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
6. FY2036 2 I	Network_AM	1AM	CAS_COU_36_AM_FY2_I	Signal	I	30.5	4,901	3.5	0.98	50.8	100.0	50.8	206.7	30.5	5,888	50.8	100.0	D
6. FY2036 2 I	Network_AM	2AM	CAS_BRA_36_AM_FY2_I	Signal	I	33.3	2,731	4.9	0.92	12.6	78.7	12.6	42.8	33.1	3,286	12.6	78.7	A
6. FY2036 2 I	Network_AM	3AM	CAS_GLE_36_AM_FY2_I	Signal	I	32.9	2,466	4.8	0.45	9.9	56.1	9.9	75.3	29.7	3,047	11.2	56.8	A
6. FY2036 2 I	Network_AM	4AM	CAS_FRA_36_AM_FY2_I	Give Way	I	55.2	2,542	5.0	0.33	1.3	38.9	38.9	3.0	55.1	3,172	2.7	38.9	C
6. FY2036 2 I	Network_AM	5AM	CAS_COO_36_AM_FY2_I	Signal	I	39.4	3,281	4.8	0.96	34.8	91.2	34.8	182.0	39.3	3,952	34.8	91.2	C
6. FY2036 2 I	Network_AM	8AM	BRA_ROB_36_AM_FY2_I	Give Way	I	41.3	752	2.9	0.31	2.7	8.6	8.6	22.7	41.3	902	2.7	8.6	A
6. FY2036 2 I	Network_AM	10AM	BRA_FRA_36_AM_FY2_I	Give Way	I	37.9	635	3.3	0.17	3.0	4.9	4.9	2.1	37.9	762	3.0	4.9	A
6. FY2036 2 I	Network_PM	1PM	CAS_COU_36_PM_FY2_I	Signal	I	31.6	5,172	2.1	0.97	48.4	92.8	48.4	177.4	31.6	6,217	48.4	92.8	D
6. FY2036 2 I	Network_PM	2PM	CAS_BRA_36_PM_FY2_I	Signal	I	42.6	3,046	2.6	0.89	5.7	74.0	5.7	25.0	42.1	3,676	5.8	74.0	A
6. FY2036 2 I	Network_PM	3PM	CAS_GLE_36_PM_FY2_I	Signal	I	28.2	2,869	2.2	0.68	15.1	56.4	15.1	134.3	26.9	3,501	15.8	56.4	B
6. FY2036 2 I	Network_PM	4PM	CAS_FRA_36_PM_FY2_I	Give Way	I	57.5	2,835	2.3	0.45	0.6	44.2	44.2	1.8	57.5	3,462	1.4	44.2	D
6. FY2036 2 I	Network_PM	5PM	CAS_COO_36_PM_FY2_I	Signal	I	42.4	3,473	2.2	0.89	27.0	76.7	27.0	211.3	42.3	4,185	27.0	76.7	B
6. FY2036 2 I	Network_PM	8PM	BRA_ROB_36_PM_FY2_I	Give Way	I	41.6	604	4.2	0.16	1.9	7.9	7.9	7.0	41.6	725	1.9	7.9	A
6. FY2036 2 I	Network_PM	10PM	BRA_FRA_36_PM_FY2_I	Give Way	I	41.7	422	5.5	0.16	3.5	4.9	4.9	1.8	41.7	507	3.5	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
9. FY2036 4 B	Network_AM	1AM	CAS_COU_36_AM_FY4_X	Signal	X	27.1	4,703	3.5	1.25	63.0	296.5	63.0	179.3	27.1	5,650	63.0	296.5	E
9. FY2036 4 B	Network_AM	2AM	CAS_BRA_36_AM_FY4_X	Signal	X	32.4	2,590	4.9	0.68	13.3	25.3	13.3	66.3	32.2	3,118	13.4	25.8	A
9. FY2036 4 B	Network_AM	3AM	CAS_GLE_36_AM_FY4_X	Signal	X	31.7	2,370	4.7	0.42	10.8	56.1	10.8	62.5	28.6	2,931	12.2	57.8	A
9. FY2036 4 B	Network_AM	4AM	CAS_FRA_36_AM_FY4_X	Give Way	X	53.6	2,465	4.9	0.30	1.8	55.4	55.4	4.2	53.4	3,073	3.8	55.4	D
9. FY2036 4 B	Network_AM	5AM	CAS_COO_36_AM_FY4_X	Signal	X	40.5	3,181	4.7	0.81	31.9	61.1	31.9	139.2	40.4	3,832	31.9	61.1	C
9. FY2036 4 B	Network_AM	8AM	BRA_ROB_36_AM_FY4_X	Give Way	X	41.5	732	3.0	0.25	2.7	7.7	7.7	1.6	41.5	878	2.7	7.7	A
9. FY2036 4 B	Network_AM	10AM	BRA_FRA_36_AM_FY4_X	Give Way	X	37.8	647	3.3	0.18	3.0	4.9	4.9	2.1	37.8	777	3.0	4.9	A
9. FY2036 4 B	Network_PM	1PM	CAS_COU_36_PM_FY4_X	Signal	X	25.6	4,947	2.1	1.09	72.8	170.7	72.8	317.3	25.5	5,948	72.8	170.7	F
9. FY2036 4 B	Network_PM	2PM	CAS_BRA_36_PM_FY4_X	Signal	X	28.2	2,890	2.6	0.85	15.8	29.8	15.8	92.1	28.0	3,488	15.8	29.8	B
9. FY2036 4 B	Network_PM	3PM	CAS_GLE_36_PM_FY4_X	Signal	X	32.5	2,752	2.1	0.65	11.3	42.1	11.3	102.9	31.0	3,360	11.8	44.3	A
9. FY2036 4 B	Network_PM	4PM	CAS_FRA_36_PM_FY4_X	Give Way	X	57.4	2,733	2.3	0.43	0.7	45.3	45.3	1.8	57.4	3,337	1.5	45.3	D
9. FY2036 4 B	Network_PM	5PM	CAS_COO_36_PM_FY4_X	Signal	X	36.7	3,359	2.2	1.10	41.7	176.0	41.7	222.2	36.6	4,048	41.7	176.0	C
9. FY2036 4 B	Network_PM	8PM	BRA_ROB_36_PM_FY4_X	Give Way	X	41.7	596	4.2	0.16	1.9	7.5	7.5	1.0	41.7	715	1.9	7.5	A
9. FY2036 4 B	Network_PM	10PM	BRA_FRA_36_PM_FY4_X	Give Way	X	41.6	437	5.3	0.17	3.6	4.9	4.9	1.9	41.6	524	3.6	4.9	A

Network Performance Summary

File	Network Name	Site ID	Site Name	Site Type	Option	Veh Speed	Veh Demand	HV % Demand	Degree of Saturation	Control Delay Average	Control Delay Worst Movement	Control Delay	Back of Queue Distance Worst Lane	Pers Speed	Pers Demand	Pers Control Delay Average	Pers Control Delay Worst Movement	Delay LoS
10. FY2036 4 I	Network_AM	1AM	CAS_COU_36_AM_FY4_I	Signal	I	29.7	5,138	3.3	0.99	53.9	103.7	53.9	154.9	29.7	6,172	53.9	103.7	D
10. FY2036 4 I	Network_AM	2AM	CAS_BRA_36_AM_FY4_I	Signal	I	33.5	2,874	4.6	0.88	12.2	70.5	12.2	49.8	33.4	3,458	12.2	70.5	A
10. FY2036 4 I	Network_AM	3AM	CAS_GLE_36_AM_FY4_I	Signal	I	31.7	2,602	4.5	0.47	10.8	57.0	10.8	80.3	28.9	3,210	12.0	57.0	A
10. FY2036 4 I	Network_AM	4AM	CAS_FRA_36_AM_FY4_I	Give Way	I	54.2	2,675	4.8	0.55	1.6	43.9	43.9	4.6	54.2	3,331	3.1	43.9	D
10. FY2036 4 I	Network_AM	5AM	CAS_COO_36_AM_FY4_I	Signal	I	32.9	3,579	4.4	1.00	56.2	111.1	56.2	298.0	32.8	4,309	56.2	111.1	D
10. FY2036 4 I	Network_AM	8AM	BRA_ROB_36_AM_FY4_I	Give Way	I	41.1	782	2.8	0.38	3.0	9.3	9.3	22.4	41.1	939	3.0	9.3	A
10. FY2036 4 I	Network_AM	10AM	BRA_FRA_36_AM_FY4_I	Give Way	I	37.9	658	3.2	0.17	3.0	4.9	4.9	2.2	37.9	789	3.0	4.9	A
10. FY2036 4 I	Network_PM	1PM	CAS_COU_36_PM_FY4_I	Signal	I	30.1	5,361	2.0	1.00	53.5	110.3	53.5	181.1	30.1	6,445	53.5	110.3	D
10. FY2036 4 I	Network_PM	2PM	CAS_BRA_36_PM_FY4_I	Signal	I	42.8	3,174	2.5	0.89	5.7	79.1	5.7	25.0	42.3	3,828	5.8	79.1	A
10. FY2036 4 I	Network_PM	3PM	CAS_GLE_36_PM_FY4_I	Signal	I	28.1	3,019	2.1	0.69	15.3	60.9	15.3	149.3	26.9	3,681	16.0	60.9	B
10. FY2036 4 I	Network_PM	4PM	CAS_FRA_36_PM_FY4_I	Give Way	I	57.4	2,965	2.2	0.47	0.7	51.9	51.9	1.9	57.4	3,619	1.6	51.9	D
10. FY2036 4 I	Network_PM	5PM	CAS_COO_36_PM_FY4_I	Signal	I	35.9	3,774	2.0	0.97	44.1	85.5	44.1	377.2	35.8	4,546	44.1	85.5	D
10. FY2036 4 I	Network_PM	8PM	BRA_ROB_36_PM_FY4_I	Give Way	I	41.7	649	3.9	0.18	2.0	8.2	8.2	8.1	41.7	779	2.0	8.2	A
10. FY2036 4 I	Network_PM	10PM	BRA_FRA_36_PM_FY4_I	Give Way	I	41.8	446	5.2	0.17	3.5	4.9	4.9	2.0	41.8	536	3.5	4.9	A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