Blacktown City Council

Riverstone Town Centre Masterplan

Transport Assessment

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Job number 243692

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1 Introduction

1.1 Study Appreciation

The Riverstone town centre is situated within the Riverstone Precinct – one of the first release precincts of the North West Growth Area (NWGA). The town centre is supported by Riverstone railway station which functions as the primary public transport hub serving the area. Road connectivity to the centre is focused along the Garfield Road East corridor, however high traffic volumes (including large proportion of heavy vehicle movements) along this route act as a major barrier to pedestrian and cycle movements. Noise and exhaust fumes generated by heavy vehicles along Garfield Road East significantly detracts from the town centre environment.

Arup, as a sub-consultant to Elton Consulting, has been engaged to provide transport planning services to support the development of a Masterplan for the Riverstone town centre. It is envisaged that the Masterplan will create a thriving, economically viable, well designed and safe town centre.

1.2 Study Objectives

Given that the Riverstone precinct could accommodate up to an additional 30,000 residents in the coming years, it will be important that the traffic impacts arising from this growth are properly considered. A transport network must be developed which supports the overall objectives of the town centre Masterplan. Specific objectives of the study will be to:

- Identify existing transport infrastructure and traffic and transport trends;
- Consider the current function of the transport network including local and arterial roads, public transport services, car parking, pedestrian networks and cycling routes;
- Identify any improvements to the transport network that are necessary to implement the recommendations of the town centre Masterplan; and
- Identify future transport needs to manage growth within the area

1.3 Study Area

The Riverstone Town Centre is located approximately 15 km north of Blacktown and 50 km northwest of the Sydney CBD, wholly within the Blacktown Local Government Area (LGA). The study area is located adjacent to the Richmond railway line – generally within a 400m radius east of Riverstone train station. The study areas is illustrated in Figure 1 and is bounded by King Street, Picacadilly Street, Elizabeth Street and the Richmond Railway Line.

The Town Centre comprises of business zoned land fronting Garfield Road East, the Council owned Marketown Shopping Centre, a range of community services and recreation uses, as well as low density residential housing. There are a number of heritage listed buildings within the Town Centre.

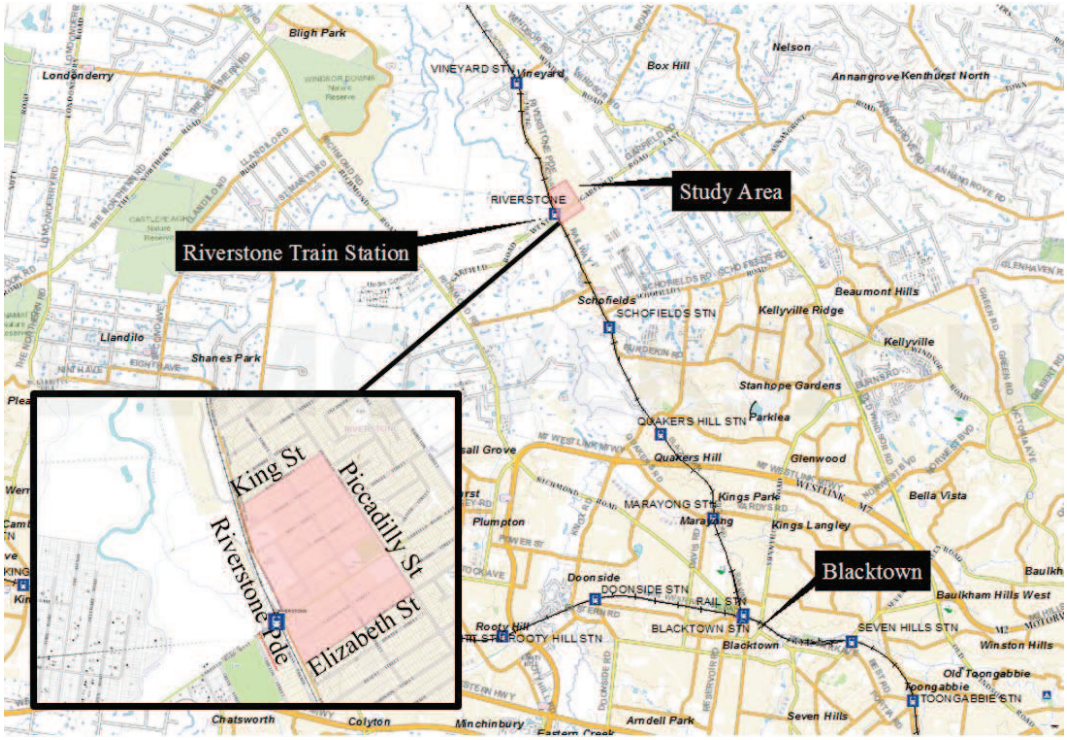

Figure 1 Study area

2 Planning Context

2.1 North West Growth Area

The NWGA comprises of 16 precincts. It is approximately 10,000 hectares and is expected to contain around 90,000 new dwellings for 250,000 people over the next 25-30 years. 11 of the 16 precincts have been rezoned for development, those being:

- North Kellyville
- Alex Avenue
- Riverstone
- Riverstone West
- Colebee
- Area 20
- Marsden Park Industrial
- Schofields
- Box Hill
- Box Hill Industrial
- Marsden Park

Figure 2 North West Growth Area

The NWGA spans three local government areas (LGA) – Blacktown, Hawkesbury and The Hills Shire. The NWGA is undergoing a streamlined planning process to enable land to be rezoned in a shorter period. Figure 3 illustrates the current North West Land Use and Infrastructure Plan.

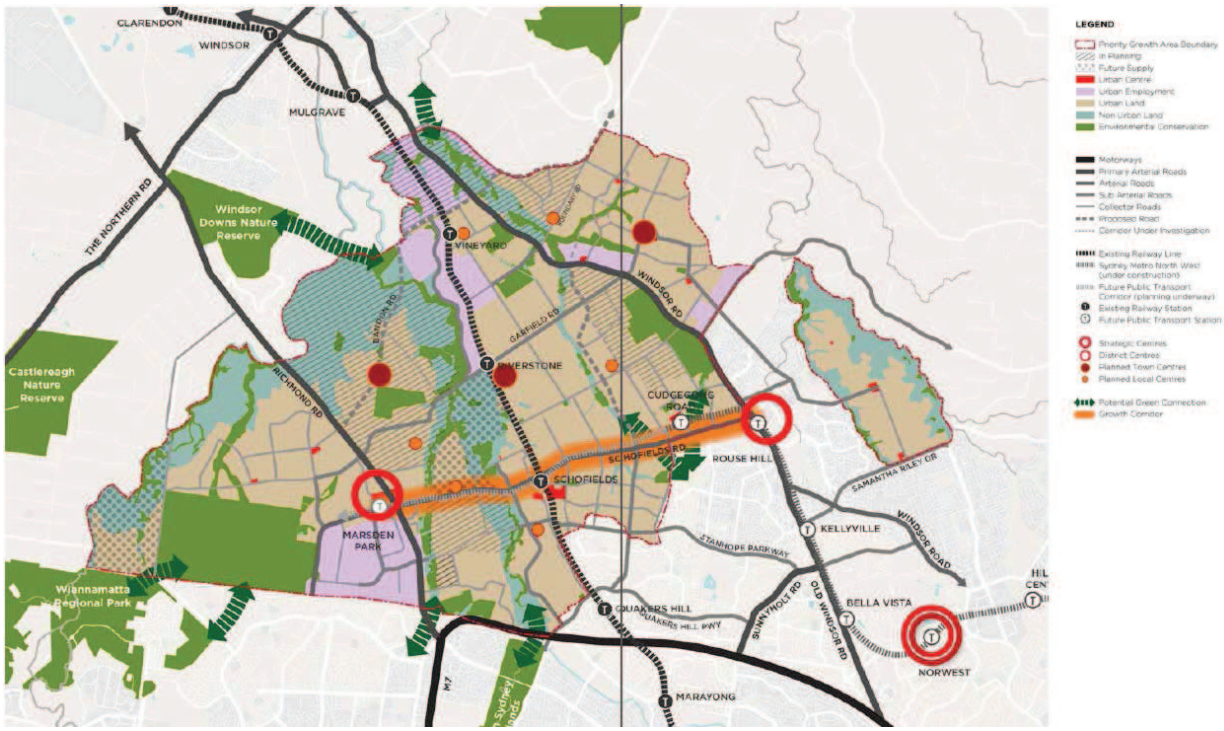

Figure 3 North West Growth Area Structure Plan

2.2 Riverstone Release Precinct

The Riverstone Precinct was one of the first release precincts of the North West Growth Centre, rezoned for development in May 2010. It is bounded by Bandon Road to the north, Schofields Road to the south, the Richmond Rail Line to the west and First Ponds Creek and Windsor Road to the east.

The precinct plan allows for up to an additional 9,000 dwellings accommodating an additional 27,000 people. The final indicative layout plan for the rezoning of Riverstone is shown in Figure 4.

Importantly no changes to the zoning of the Riverstone Town Centre were made as part of the release of the wider precinct.

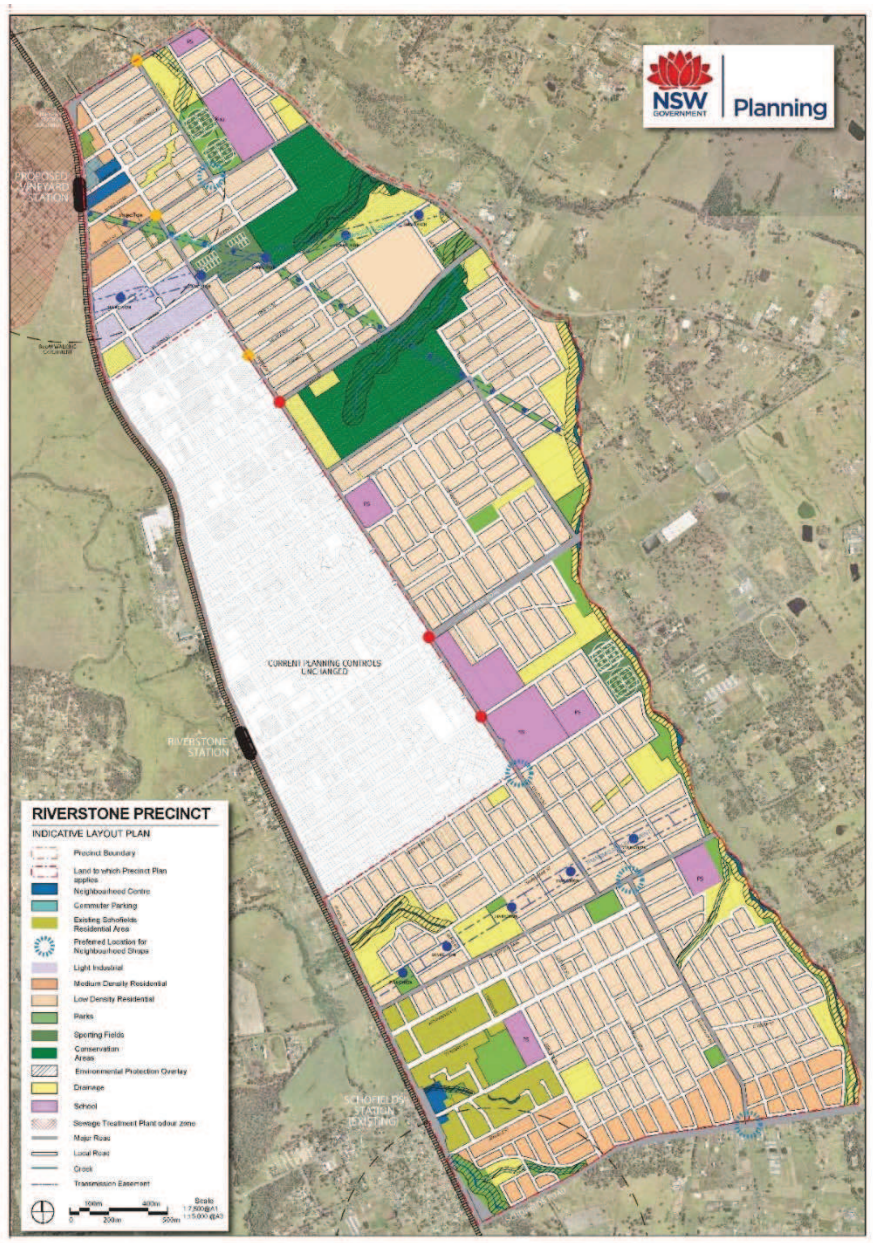

Figure 4 Final indicative plan

Source: http://growthcentres.planning.nsw.gov.au

3 Existing Transport Conditions

3.1 Travel Patterns

Existing travel characteristics in the Riverstone Town Centre and suburbs under the Blacktown City Council jurisdiction have been identified based on 2011 Journey to Work Census data.

3.1.1 Place of Residence

The journey to work method of people living in these areas are shown in Figure 5.

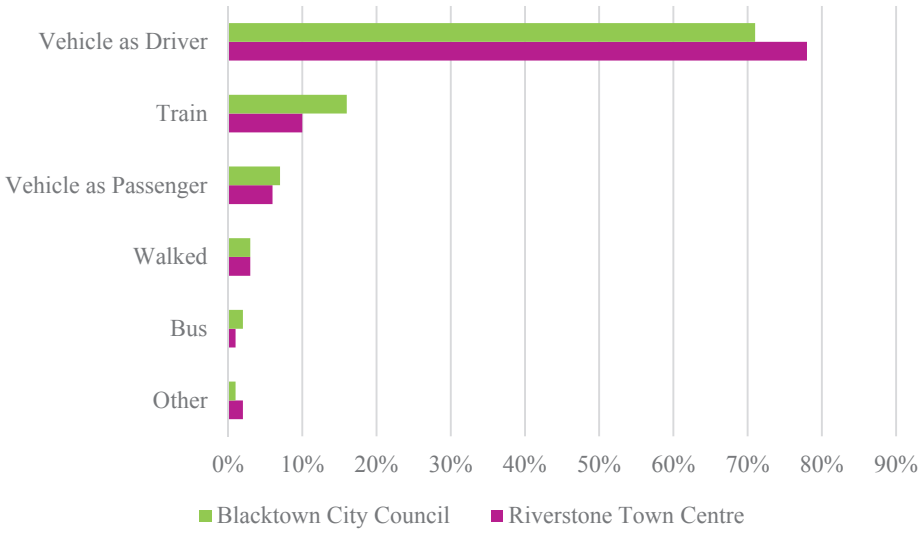

Figure 5 Existing travel patterns of residents

Source: Bureau of Transport Statistics, 2014
Other includes motorcycle, bicycle and mode not stated

The results indicate the significant majority of journeys for residents of these areas are made by private vehicles. A higher user rate of private vehicles is observed in the study area when compared to other areas in the Blacktown City Council jurisdiction – reflecting the greater accessibility of public transport in many areas of the Blacktown Council area compared to Riverstone.

Train travel accounts for 10% of total work trips in the study area, however this would be expected to increase following the completion of the North West Rail Link (anticipated for 2019).

3.2 Road Network

The existing road network supporting the Riverstone Town Centre, as well as potential future road infrastructure upgrades, is outlined in this section.

3.2.1 Windsor Road

Windsor Road forms the primary access route into the precinct, providing north and south traffic access. It is located east of the study area and is classified as a sub-arterial road, with two traffic lanes in each direction with provision of a third lane for right turn vehicles at certain intersections. East of Commercial Road (at Rouse Hill town centre) Windsor Road widens to three lanes in each direction, reflecting the increasing traffic demands at this location.

Figure 6 Windsor Road

3.2.2 Garfield Road

Garfield Road currently provides the primary east-west road connection through Riverstone. It provides a link between Windsor Road and Riverstone Parade (to Riverstone Railway Station), extending west to Richmond Road. It is currently an undivided two lane sealed road, with a 50km/hr speed limit within the study area. It currently forms an at grade intersection with the Richmond railway line.

Roads and Maritime have identified Garfield Road as a future east-west road corridor providing connectivity between Windsor Road and Garfield Road. This infrastructure would be delivered by the time the North West Growth Areareaches approximately 75% of its population and employment development.

Figure 7 Garfield Road East

3.2.3 Schofields Road

Schofields Road, located south of the site and is illustrated in Figure 8. Stage 1 upgrades between Windsor Road and Tallawong Road were completed in June 2014 and now provide two traffic lanes in both directions.

Stage two involved constructing an underpass crossing of the Richmond Rail Line. Further work along this road corridor is to be carried out in the coming years which will provide for a four lane divided road corridor along the full length of Schofields Road between Windsor Road and Richmond Road, giving the opportunity to further upgrade to a six lane road in the future. Additionally, the upgrade will place more emphasis on active and public transport.

The upgrade of Schofields Road, to become a 'transit boulevard', will provide connections for pedestrians, cyclists and buses to surrounding land uses. A wide central median will be provided to allow for a six lane corridor in the future should demand necessitate. This will meet the future transport needs of the NWGA.

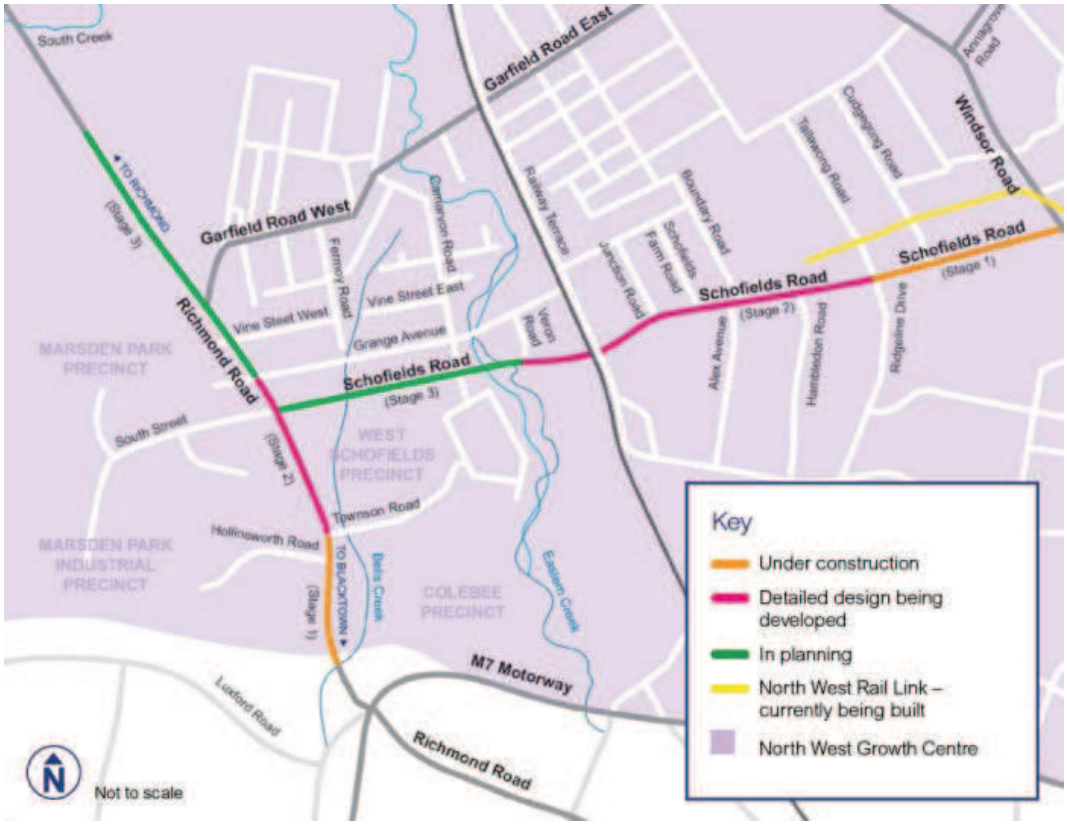

Figure 8 Schofields Road upgrade

(Source: RMS, Schofields Road upgrade location map)

3.2.4 Richmond Road

Richmond Road currently lies to the west of the Precinct and is being upgraded in three separate stages. Richmond Road serves as a principle arterial road for the NWGA and is being upgraded in accordance with this function.

Stage one was completed mid-2014 and involved upgrading Richmond Road to a four-land divided road with traffic signals at Townson Road and two new intersections at Colebee and the Sydney Business Park.

Stage two was completed at the end of 2016 and involved extending the four lane section of Richmond Road up to Garfield Road. Further work along this road corridor is to be carried out in the coming years which will provide for a four lane divided road corridor up to the South Creek floodplain in the north.

As shown in Figure 9, Stage 3 will involve upgrading Richmond Road between Bells Creek and the South Creek floodplain at Marsden Park. This final stage will be constructed as neighbouring development progresses.

The upgrade of Richmond Road will provide continued service as a "principal arterial" providing access to pedestrians, cyclists and buses within the NWGA and to surrounding areas. A wide central median will be provided to allow for a six lane corridor in the future should demand necessitate. This will meet the future transport needs of the NWGA.

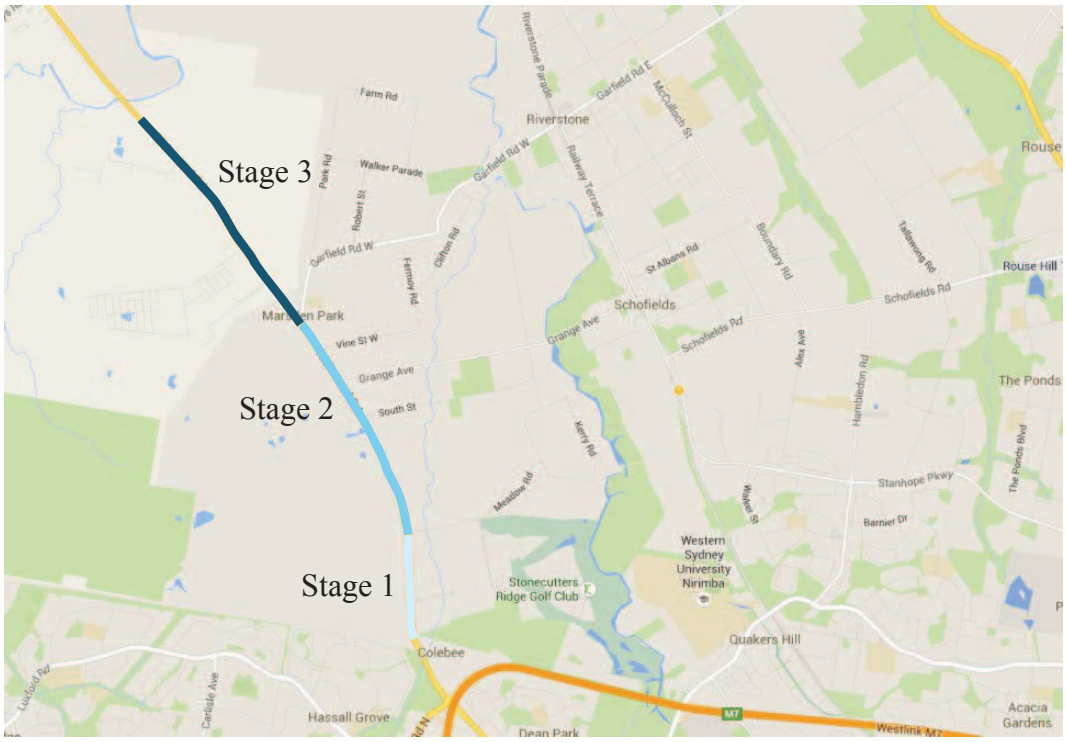

Figure 9 Richmond Road Upgrade

3.2.5 Local Roads

Piccadilly Street and King Street which bound the north and east of the study area are local roads. They provide access to residential dwellings and are both undivided and unmarked two way roads.

3.3 Parking

There are a number of public off-street car parking areas within the study area as illustrated in Figure 10.

A commuter car parking area is located directly adjacent to Riverstone railway station which provides 67 all day parking spaces. Overflow commuter parking is also available on the eastern side of Railway Parade with capacity for an additional 100 vehicles. A 50 space car park is located at the eastern edge of the study area adjacent to George Street, serving the nearby swimming pool and park.

193 parking spaces are provided for the Market Town centre along with other uses in the town centre. These parking spaces are time limited to four hours and therefore not available for commuters.

Figure 10 Off-street car parking

Unrestricted, all day on street parking is generally provided within the study area. One hour time limits are in place along Garfield Road and Riverstone Parade in the town centre to encourage higher turnover of vehicles.

3.4 Traffic Volumes

Based on the existing land uses within the town centre, it is estimated that in the order of 800 vehicle trips are generated in the commuter peak hours.

Traffic surveys were carried out in March 2014 to understand the existing level of traffic in the vicinity of the Riverstone precinct. Intersection counts and seven day automated counts were undertaken at a total of 19 locations in the area.

The results of the surveys are shown in Figure 11, and indicate Windsor Road carries the majority of traffic in the precinct. Traffic volumes on Windsor Road progressively increase from north to south, attributable to the more densely developed areas around Rouse Hill and The Ponds.

In the vicinity of the study area, Garfield Road east of the railway line currently carries approximately 530 vehicles per hour in each direction. West of the railway line, this increase to approximately 900 vehicles per hour.

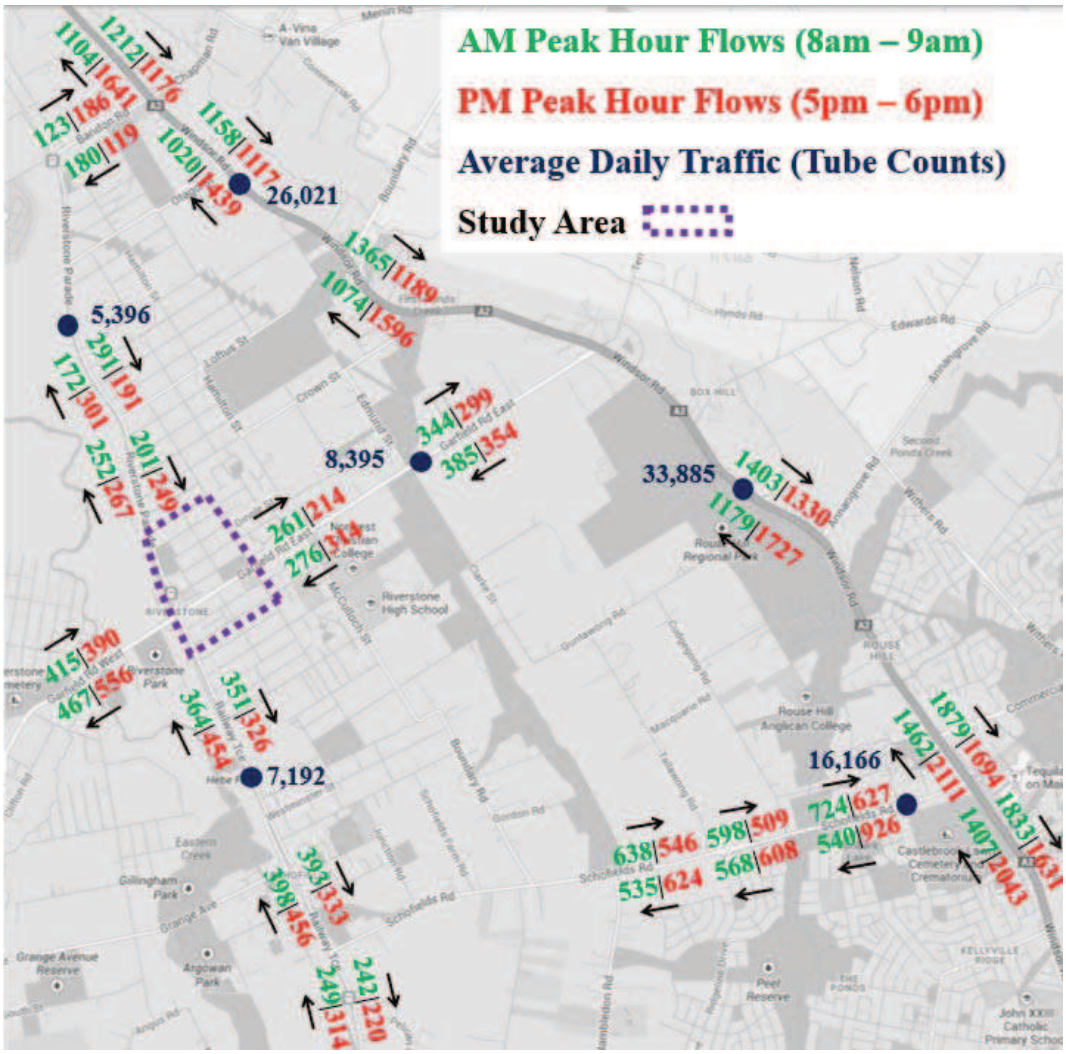

Figure 11 2014 Traffic Volumes

3.5 Traffic Conditions

Traffic congestion in the Riverstone town centre is common during commuter peak hours in and around the level crossing of the Richmond railway line at the Garfield Road / Riverstone Parade intersection (Figure 12). This location is currently controlled by traffic signals. During train arrivals and departures, boom gates on both sides of Garfield Road are lowered to prevent traffic from crossing the railway line. This typically results in significant queues of traffic through the town centre and along Riverstone Parade.

Figure 12 Riverstone Parade level crossing

3.6 Heavy Vehicles

Traffic surveys conducted in March 2014 identified the existing level of heavy vehicles utilising key roads in the vicinity of the study area. Key findings from the surveys, with respect to heavy vehicle traffic, were as follows:

- 12% of traffic (approximately 1,100 vehicles per day) were identified as heavy vehicles along Garfield Road. This is a significant number and reflects the current function of Garfield Road as the predominant east-west link between Windsor Road and Richmond Road. The presence of these heavy vehicles detracts from the function of the Riverstone town centre as a pedestrian friendly environment.
- On Riverstone Parade to the north of the study area, 16% of all vehicles surveyed were identified as heavy vehicles. This reflects the number of light industrials uses in this area and relatively low number of local residents.

The outcomes of the surveys with respect to heavy vehicles are illustrated in Figure 13.

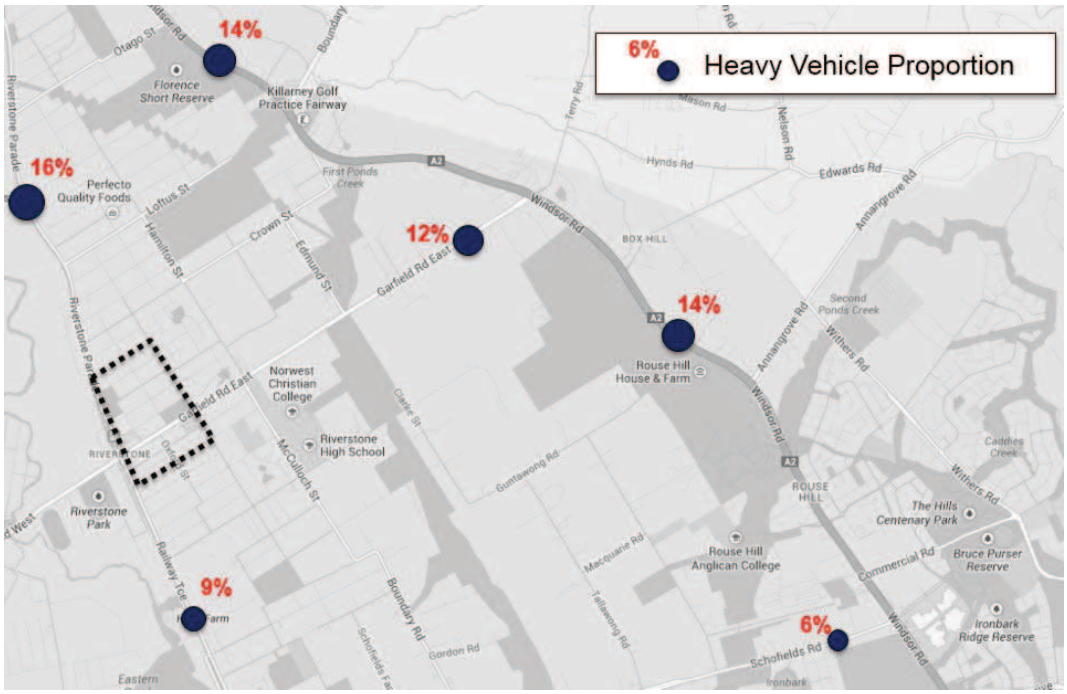

Figure 13 Heavy vehicle proportions

3.7 Rail Services

The Riverstone town centre is currently served by the Richmond railway line, a branch of the main western line. The Richmond Line currently provides access to key centres located throughout Sydney via both direct links and onward connections. A summary of the existing services along the Richmond Line is shown in Table 1.

Table 1 Existing services along the Richmond rail line

Departing Station	Direction	Average Frequency of Services (Weekday)		
		AM Peak (7am – 9am)	PM Peak (4pm – 6pm	Off Peak (10am – 3pm)
Riverstone	Northbound	30 minutes	30 minutes	30 minutes
	Southbound	30 minutes	30 minutes	30 minutes
Schofields	Northbound	20 minutes	15 minutes	15 minutes
	Southbound	12 minutes	15 minutes	15 minutes

In 2011 a duplication of the rail line was completed between Quakers Hill and Schofields, including the opening of the new Schofields Station. This duplication has allowed for more frequent train services travelling to and from Schofields. The new station at Schofields includes 230 park and ride spaces and a new bus interchange servicing residents of the North West Growth Centre.

A second stage of the project includes a new and relocated Vineyard station and an upgrade of the existing Riverstone Station. This second stage of the project is not presently proceeding, however the planning of the Riverstone Precinct considered a new station location at Vineyard.

3.8 Bus Services

Within the study area, bus stops are located along Riverstone Parade, next to the train station, and along Piccadilly Street. There are currently limited bus services within the vicinity of the Riverstone town centre. These typically run at low frequencies throughout the day which limit the uptake of travel by bus. The following bus routes currently service the Riverstone town centre precinct.

- **Route 661**: Windsor to Riverstone via McGraths Hill (via Commercial Road and Crown Street)
- **Route 662**: Riverstone to Maraylya and Oakville (via Boundary Road)
- **Route 757**: Mt Druitt to Riverstone via Rooty Hill Rd North & Marsden Park (via Richmond Road to Riverstone Station)
- **Route T75**: Blacktown to Rouse Hill and Riverstone (via Schofields Road, Tallawong Road and Cudgegong Road)
- **Route T74**: Blacktown to Riverstone via The Ponds (via Burdekin Road and Railway Terrace)

This is illustrated in Figure 14.

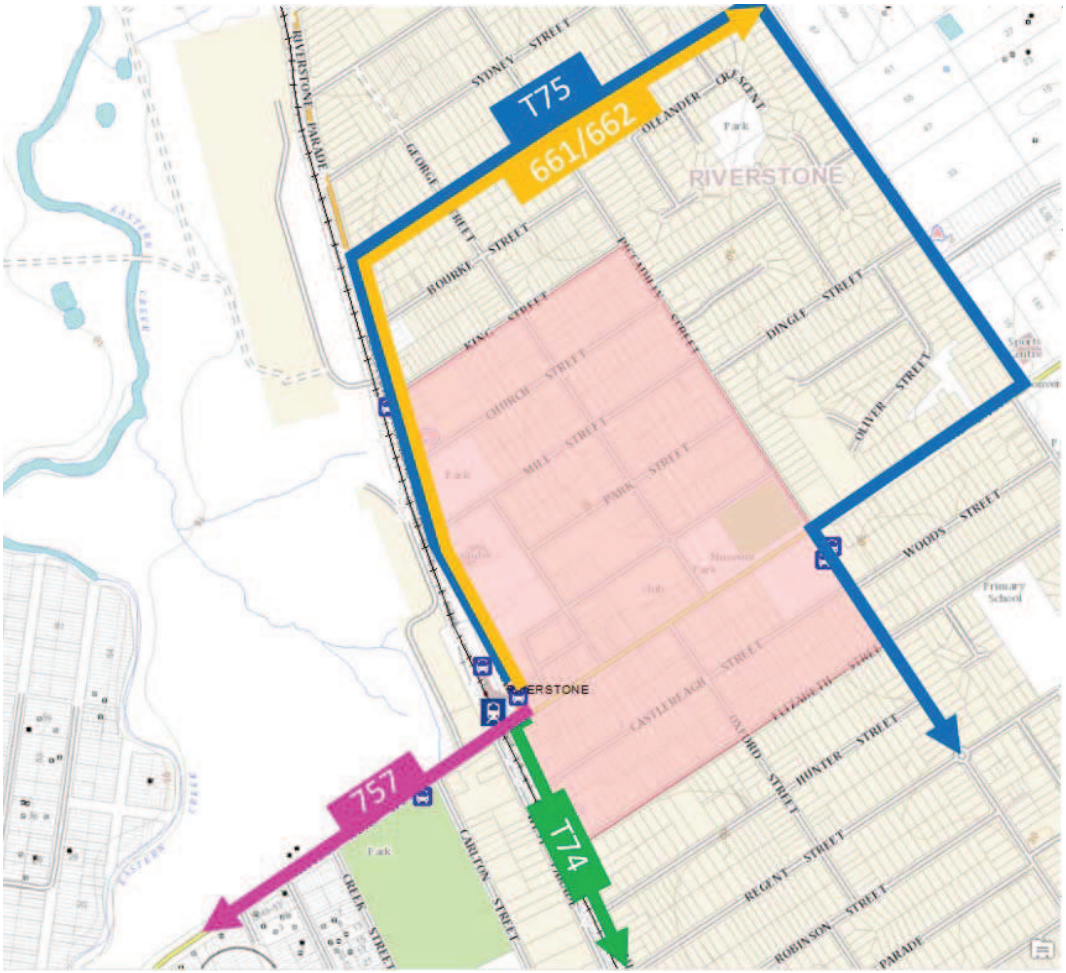

Figure 14 Bus services

3.9 Walking

Pedestrian crossing facilities are limited within the Riverstone town centre and only provided at signalised intersections located at:

- Garfield Road East and Riverstone Parade
- Garfield Road East and Piccadilly Street

No formal crossing facilities are provided along Garfield Road in between these locations. Other pedestrian facilities in the study area include:

- A zebra crossing on Picadilly Street (north of Castlereagh Street)
- Pedestrian refuges at the intersection of George Street and Market Street

Several of the local roads within the study area such as Mill Street, Church Street and King Street have no footpaths along either sides of the road. Most of the other local roads have footpaths on one side of the road only.

The existing pedestrian facilities are shown in Figure 15.

Figure 15 Existing pedestrian facilities

3.10 Cycling

Existing cycling routes and facilities within and surrounding the study area are currently limited.

Windsor Road provides on-road cycleways, however include no dedicated bicycle facility (e.g. on-road markings). These designated cycle routes often carry large volumes of traffic and are generally only appropriate for confident riders.

According to the Blacktown Bike Plan 2013, several developer funded bicycle lanes are proposed to be constructed near the study area. They will run along McCulloch Street and Riverstone Parade. Council has also recommended a state link bicycle route through Garfield Road.

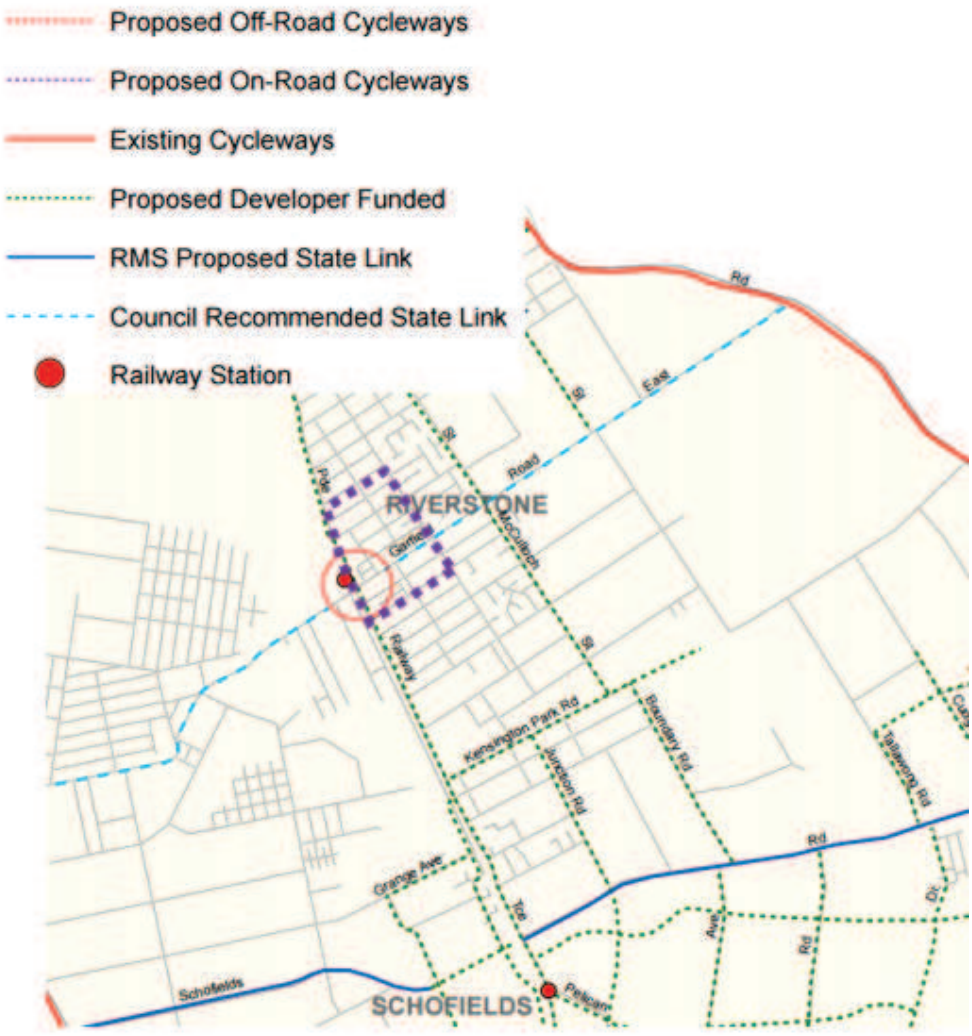

Figure 16 Blacktown Bike Plan 2013 map

4 Future Transport Upgrades

4.1 Crossings of the Richmond Rail Line

The RMS has developed a strategy for the provision of grade-separated road crossings across the Richmond rail line. The strategy has recommended an upgrade of Bandon Road (including an underpass of the Richmond railway line) which would provide a high quality road connection between Windsor Road and Richmond Road. This upgrade would be completed by the time the NWGA reaches approximately 25% of its population and employment development. This will provide connectivity for Vineyard residents and visitors travelling west of the railway line.

In addition, the strategy has recommended the construction of a grade separated crossing at Garfield Road, replacing the existing level crossing. This infrastructure would be delivered by the time the NWGA reaches approximately 75% of its population and employment development.

An overview of the Bandon Road and Garfield Road crossing alignments are illustrated in Figure 17.

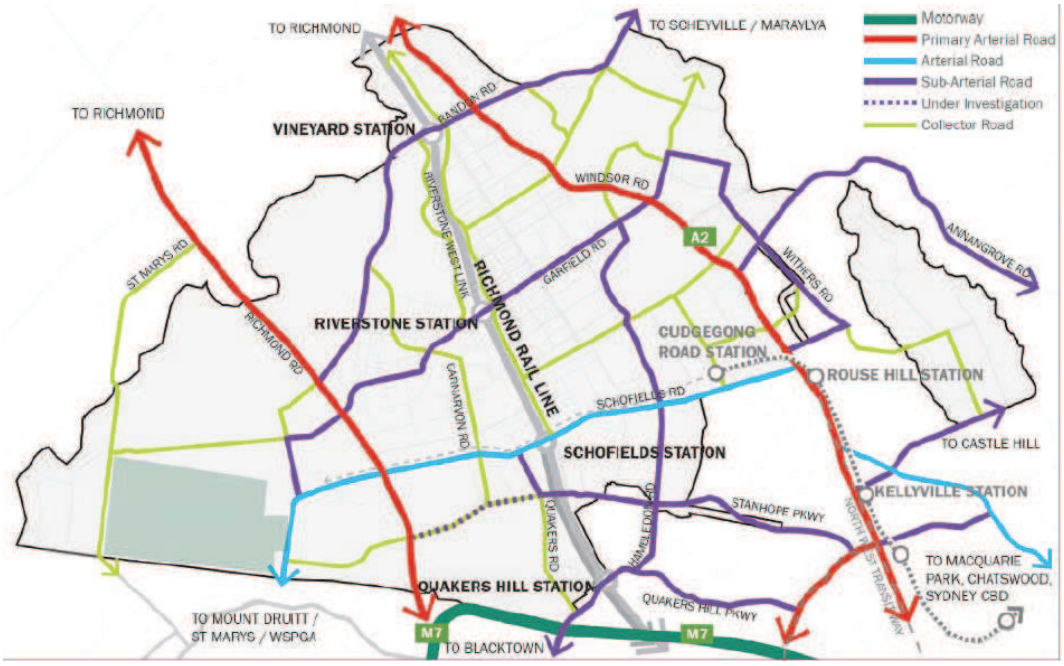

Figure 17 Road hierarchy and rail crossing alignments

Source: North West Growth Area structure plan review (Jacobs, 2017)

The road network strategy has been divided into short, medium and long terms works as described in detail in the sections below.

4.1.1 Short Term Works

The planned short term works (to be completed within the next four years) will directly influence traffic conditions within the Riverstone town centre. These works include:

- Work with Blacktown City Council to develop local strategies to improve traffic flow within Riverstone town centre to boost capacity and minimise delays, with the existing level crossing retained. The specific location and extent of these works are currently being developed.
- Link Westminster Street with Garfield Road West to provide an alternative route for local traffic away from the Garfield Road level crossing.
- Work with the Department of Planning and Environment and Blacktown City Council to reserve a road corridor along Garfield Road between Richmond Road and Windsor Road for future widening

4.1.2 Medium Term Works

The strategy has recommended an upgrade of Bandon Road to function as a transit boulevard (including an underpass of the Richmond railway line) which would provide a high quality road connection between Windsor Road and Richmond Road. This upgrade would be completed by the time the NWGA reaches approximately 25% of its population and employment development. Based on current projections, this could occur by 2021. Works include the construction of an underpass and creation a new road connection between Richmond Road and Windsor Road. The existing level crossings at Bandon Road and Level Crossing Road would be closed at this time.

4.1.3 Long Term Works

The road network strategy has recommended the construction of a grade separated crossing at Garfield Road, replacing the existing level crossing. This infrastructure would be delivered by the time the NWGA reaches approximately 75% of its population and employment development. Based on current projections, this could occur between 2031 and 2036. Works would also include an upgrade Garfield Road between Richmond Road and Windsor Road.

4.2 Sydney Metro Northwest

Sydney Metro Northwest (previously known as the North West Rail Link), is the first stage of Sydney Metro. The project is scheduled for completion in 2019 and will deliver eight new railway stations to Sydney's North West, providing a connection into Chatswood and the Sydney CBD. Passengers will be provided with rail services every 5 minutes during peak periods and every 10 minutes across the day.

The new rail line will ultimately connect with Metro City & Southwest - the second stage of the Sydney Metro network. This will provide residents of the Riverstone Town Centre with direct rail services between Bankstown, the Sydney CBD, North Sydney, Macquarie Park and the North West Growth Centre.

The Sydney Metro Northwest map is illustrated in Figure 18.

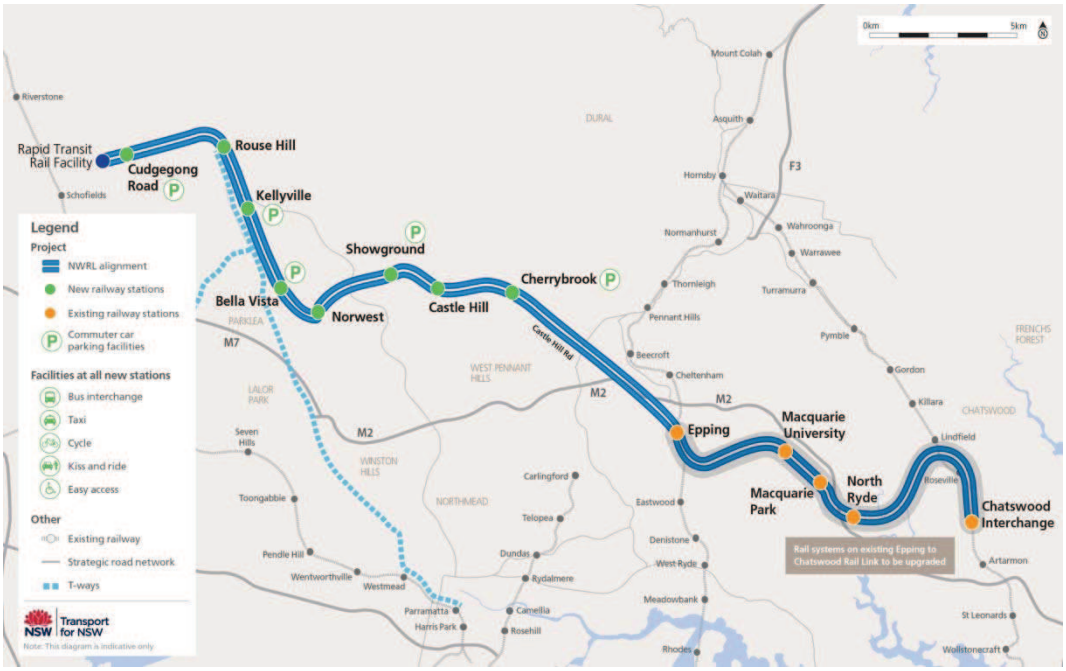

Figure 18 Sydney Metro Northwest map

Source: Transport for NSW, 2014

Residents of the Riverstone town centre will be provided with a high quality rail interchange via a new station at Cudgegong Road. Located between Tallawong Road and Cudgegong Road, the new station will provide for 1,000 commuter car parking spaces and space for 6 buses. The station design will include pedestrian linkages to these areas as well as secure parking and storage for up to 45 bicycles. The Cudgegong Road train station is located some 3km from the study area.

5 Masterplan Development

5.1 Options Development

Prior to the development of the preferred master plan for the Riverstone Town Centre, two alternate options were developed and considered. These options (options 1, 3 and 4) are outlined in more detail in the overall planning study, however transport comments in relation to these are summarised below.

5.1.1 Option 1

- Should Market Street be the focus of activity it is recommended this remain open to vehicular traffic. Closing Market Street as indicated would place a high reliance on George Street for access and on-street parking serving the town centre – particularly following the introduction of the overpass which will restrict access into Pitt Street.
- Some form of pedestrian crossing facility (potentially zebra crossing) should be provided at the Market Street / Pitt Street intersection to emphasise the priority pedestrian route between the town centre and the train station

5.1.2 Option 3

- Pedestrian priority should be focused around the Market Street / Riverstone Parade intersection to provide good access for people travelling between the train station and town centre. This option indicates the pedestrian crossing to be located just south of this intersection which does not meet the pedestrian desire line.
- Closing Pitt Street to vehicular traffic between Market Street and Park Street reduces the overall level of permeability through the town centre – directing more traffic towards George Street which is already expected to accommodate significant increase in traffic volumes. This measure would also limit opportunities for vehicle access into an upgraded Marketown.
- A better outcome in terms of the functionality of the town centre would be to provide a north-south pedestrian link between Pitt Street and George Street adjacent to the Village Green.

5.1.3 Option 4

- Closing the western end of Market Street to support improved pedestrian connectivity to Riverstone Station is feasible and supported. This will however require all vehicular access (private vehicles and service vehicles) to Marketown to be via Pitt Street.
- The proposal for a pedestrian pathway between Garfield Road East and Market Street will improve pedestrian connectivity and permeability, providing a valuable link between the Village Green and Garfield Road East. It will however require the provision of a new pedestrian crossing facility on Garfield Road East to accommodate the new pedestrian desire line.

5.1.4 Option 2 – Preferred Masterplan

Detailed comments relating to the preferred master plan option (option 2) are described below as well as in Section 6 of this report.

The preferred Masterplan for the Riverstone town centre is illustrated in Figure 19 below. This focuses activity predominantly along the Market Street corridor, centred around the community hub and village green. High density mixed use development (up to nine storeys) is proposed close to the railway station, with medium density residential (up to six storeys) location towards the periphery of the town centre.

Figure 19 Preferred town centre Masterplan

Source: Group GSA

Key features of the Masterplan relating to transport connectivity include:

- Pedestrianisation of the western end of Market Street, between Pitt Street and Riverstone Parade, providing a direct connection to Riverstone train station
- A new pedestrian through link between Park Street and Garfield Road East
- A calmed traffic environment on Market Street
- New pedestrian crossing opportunities across Garfield Road East

5.2 Potential Development Yields

The preferred Masterplan envisages the following development yields:

- 475,561m^2 of residential floor space, equivalent to 3,804 dwellings
- 12,373m^2 of retail floor space (not including the supermarket)
- 4,000m^2 supermarket
- 9,373m^2 of commercial floor space
- 5,000m^2 community/recreational floor space

6 Transport Assessment

6.1 Transport Planning Objectives

In considering the preferred transport network, in conjunction with the Master planners, the following key transport objectives have been considered. These aim to provide for a coherent, legible transport network that supports movement both to, and within, the Riverstone town centre.

- Provide a road network that allows for good access to all modes of transport, particularly public transport, walking and cycling;
- Design a physical site layout which encourages walking and cycling, particularly to key land uses and public transport nodes;
- Ensure the road network for town centre provides suitable connections to adjacent development precincts in the North West Growth Centre;
- Ensure the road network within the town centre continues to operate at satisfactory levels of service
- Integrate transport and land use planning so that high intensity land uses have strong accessibility to public transport;
- Provide high quality access to public transport stops to reduce the dependence on private vehicles.
- Protect residential areas from through traffic intrusion, particularly heavy vehicles.

6.2 Traffic Generation

The forecast traffic generation during the AM and PM peak hours associated with the full development of the Riverstone town centre (as envisaged under the Masterplan) is presented in Table 2 below. This nearly 2,700 vehicle trips may be generated in the PM peak hour that are associated with the development of the town centre – a significant increase from the 800 that are currently estimated to be generated.

Table 2 Forecast traffic generation

Quantum	**Units**	**Generation Rate**		**Traffic Generation**	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
3,804	Dwellings	0.500	0.500	1,902	1,902
12,373	Retail GFA	0.020	0.040	247	495
4,000	Supermarket GFA	0.020	0.040	80	160
9,373	Commercial GFA	0.016	0.012	150	112
Total				**2,379**	**2,669**

6.3 Traffic Conditions

Preliminary recommendations to manage traffic flow have been identified in this study. These recommendations align with the overall transport planning objectives, specifically:

- Provide a road network that allows for good access to all modes of transport, particularly public transport, walking and cycling;
- Ensure the road network within the town centre continues to operate at satisfactory levels of service; and
- Protect residential areas from through traffic intrusion, particularly heavy vehicles.

Given however the level of development expected, and the associated increase in traffic, the ongoing development of the town centre will need to be accompanied by detailed traffic modelling.

The measures identified are summarised in the sections below.

6.3.1 George Street Traffic Signals

As the majority of development is expected to occur north of Garfield Road East, providing appropriate levels of capacity and accessibility for people using north-south roads such as Pitt Street, George Street and Piccadilly Street must form a key consideration of future planning.

To manage traffic movements onto Garfield Road East and provide for improved pedestrian connectivity, it is recommended traffic signals be installed at the Garfield Road East / George Street intersection. George Street has been selected given it's proximity to nearby signalised intersections (more than 220m away from Piccadilly Street) and it's future importance as the 'gateway' to the town centre following the introduction of the overpass of the railway line. Traffic signals at this location will facilitate for a safer and more efficient road network, providing for controlled vehicle and pedestrian movements across Garfield Road East.

The installation of these traffic signals would be subject to agreement from Roads and Maritime, and works would be undertaken when relevant traffic signal warrants can be satisfied. This will be dependent on the speed and scale of development within the town centre.

6.3.2 Riverstone Parade / Garfield Road Intersection Performance

Consistent with the Roads and Maritime strategy for the town centre, local strategies should be developed to improve traffic flow within Riverstone town centre to boost capacity and minimise delays at the existing Riverstone Parade / Garfield Road signalised intersection. This will be important prior to the provision of the overpass of the railway line.

6.3.3 Market Street High Pedestrian Activity Area

The development of the Riverstone town centre will facilitate the introduction of a 40km/h High Pedestrian Activity Areas (HPAA) on Market Street – the main activity spine of the town centre. HPAAs are strongly focused on pedestrian safety, with a 40km/hr maximum speed at all times. The different road environment helps to alert drivers to lower their speed and make them aware of the presence of pedestrians moving about or near the road. This creates a safer road environment for all road users, particularly for pedestrians, cyclists and children. Drivers will be aware they are entering a 40km/hr HPAA through a different street environment including alternate pavement surfacing and kerb extensions.

Figure 20 High Pedestrian Activity Area Signage

6.3.4 Riverstone Parade Capacity

One of the transport planning objectives of the town centre Masterplan is to protect residential areas from through traffic intrusion, particularly heavy vehicles. Riverstone Parade currently acts as a thoroughfare for through traffic travelling west towards Richmond Road and south to Schofields. It also acts as a major barrier to pedestrian movements towards Riverstone railway station from the town centre.

Following the introduction of a road underpass at Bandon Road, Riverstone Parade will play a less important role in serving regional traffic movements – particularly those travelling to/from Richmond Road.

To enhance pedestrian accessibility across Riverstone Parade, it is recommended the role of the road corridor be downgraded to serve a more local function. This would include a crossing facility opposite Market Street to link the town centre with the railway station – either via a pedestrian refuge or zebra crossing.

6.3.5 Summary

A summary of the measures identified are presented in Figure 21 below.

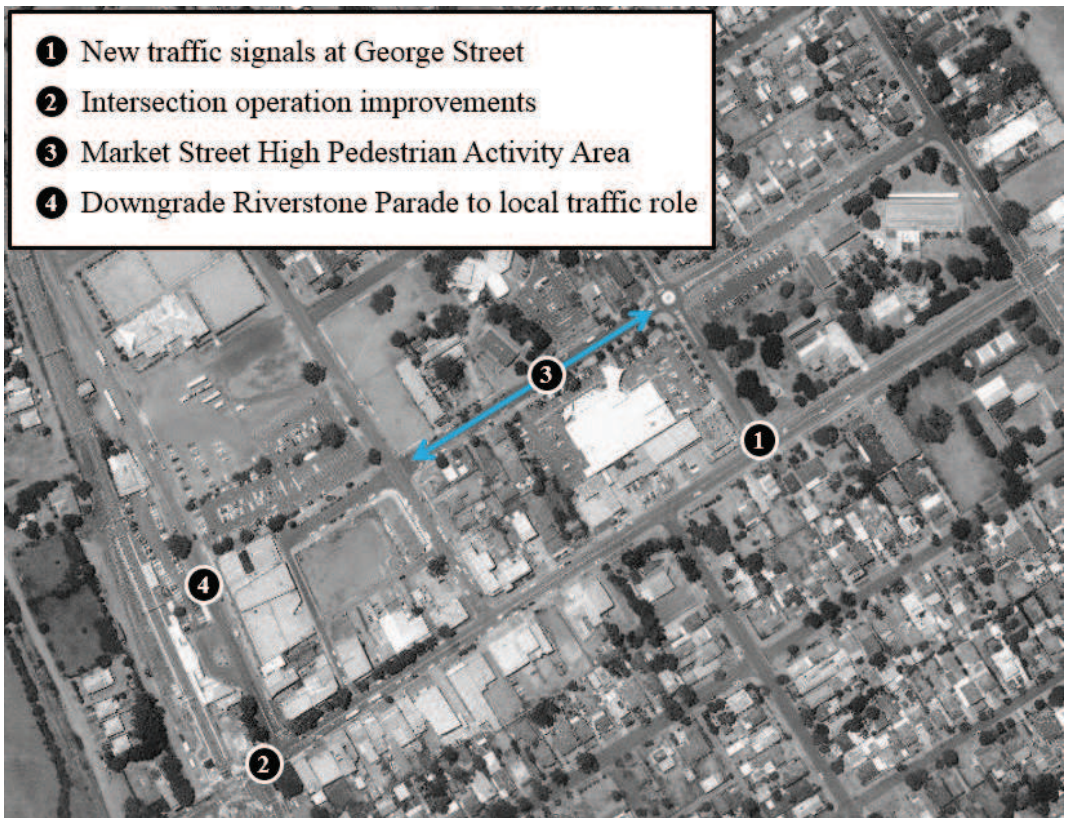

Figure 21 Summary of road improvement measures

6.4 Parking

6.4.1 On-Site Parking

On-site parking for land uses within the Riverstone town centre precinct should be provided in accordance with the rates outlined in Blacktown City Council Growth Centre Precincts DCP 2010, as summarised in Table 3 and Table 4

Table 3 Parking Rates –Residential Uses

Zone	Car Parking Requirement
R2 zone (shop top housing)	• 1-2 bedrooms: 1 covered space (min) • 3 bedrooms or more: 2 covered spaces (min)
R3 zone	• 1-2 bedrooms: 1 covered space (min) • 3 bedrooms or more: 2 covered spaces (min) • 1 visitor car parking space per 5 apartments
B2 and B4 zones	• 1-2 bedrooms: 1 covered space (max) • 3 bedrooms or more: 2 covered spaces (max) • 1 visitor car parking space per 8 apartments

Table 4 Parking Rates – Non-Residential Uses

Land Use	Car Parking Requirement
Commercial/office premises	1 space per 40m² GFA
Retail shops/showrooms (less than 200m² GFA)	1 space per 30m² GFA
Retail shops/showrooms (greater than 200m² GFA)	1 space per 22m² GFA
Restaurants/cafes	1 space per 10m² of dining area 1 space per 3 employees

6.4.2 Commuter Car Parking

The formal commuter car parking area located directly adjacent to Riverstone railway station only currently provides 67 all day parking spaces, which are typically fully occupied on a daily basis.

The expansion of the Market Town shopping centre (Block E2 in the Masterplan) involves development over the existing overflow commuter car parking area, which has capacity for approximately 100 vehicles.

Should the Market Town development proceed, it will be important to offset the loss of these 100 existing commuter parking spaces either within the development or elsewhere within the town centre.

6.5 Pedestrian Movements

6.5.1 Summary of Measures

The preferred Masterplan proposes a number of enhancements to the pedestrian network, including:

- New pedestrian crossing opportunity of Garfield Road East through the installation of traffic signals at George Street
- Traffic calming along Market Street including the introduction of a 40km/h high pedestrian activity area
- Pedestrianisation of the western end of Market Street, between Pitt Street and Riverstone Parade, providing a direct connection to Riverstone train station.
- New pedestrian crossing opportunity of Riverstone Parade at Market Street (either via a pedestrian refuge or zebra crossing)
- New north-south pedestrian link between Park Street and Garfield Road East

These initiatives are summarised in Figure 22 below.

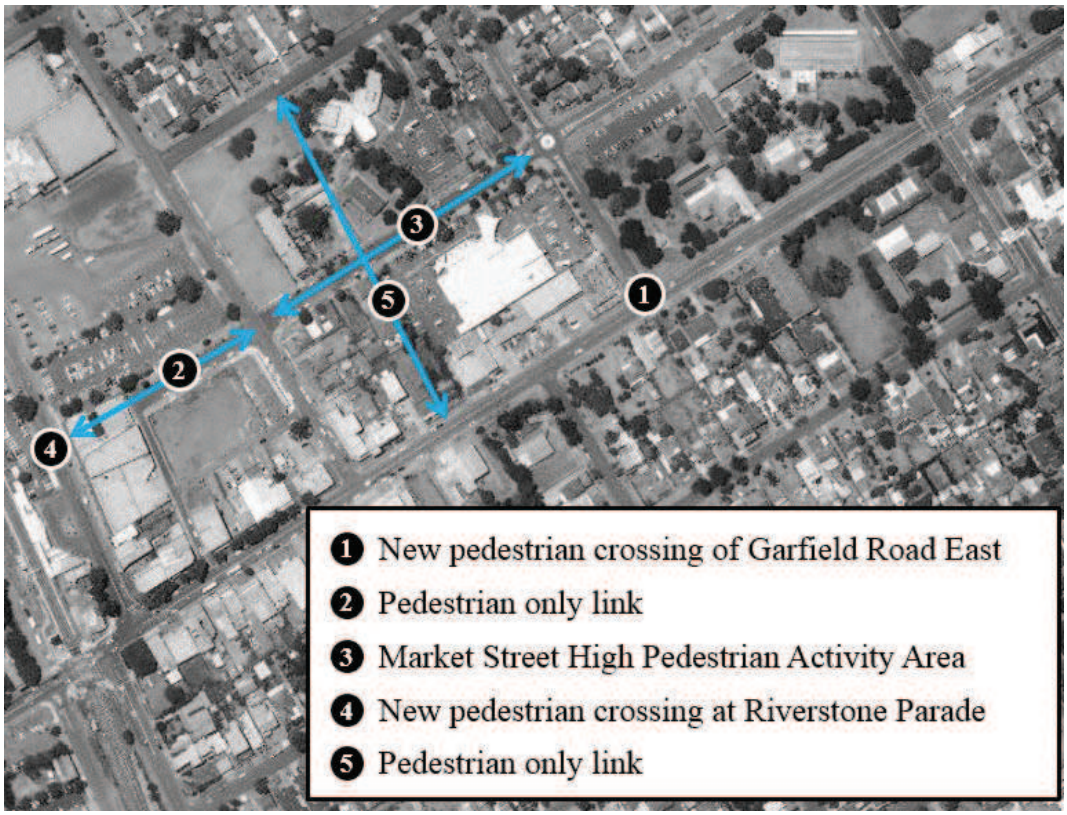

Figure 22 Summary of pedestrian improvement measures

In addition, in conjunction with the development of the town centre, accessible footpaths (ideally 3m wide) should be provided on both sides of streets to provide equitable access for all pedestrians.

6.5.2 Garfield Road Overpass

Pedestrian circulation and accessibility will need to be an important planning consideration of the Garfield Road overpass (expected to be introduced in the next 10 to 20 years). It will be particular important to consider access for pedestrians travelling between the railway station and the town centre.

Figure 23 below provides an example of a pedestrian connection under a road overpass – at the Lane Cove Road / Epping Road intersection. While pedestrian amenity is not considered desirable at this location, it does provide an example of an environment with a road overpass where pedestrians may safely cross from one side of the road to another.

Figure 23 Lane Cove Road / Epping Road overpass

Source: Google Street View

6.6 Public Transport

6.6.1 Bus Services

It is not expected the existing bus routes servicing the Riverstone town centre would change in the short to medium term. As densification occurs within the Riverstone town centre and the population increases, demand for bus services will naturally increase. This may lead to increased service frequencies of buses which would improve access to and from the town centre.

In the long term, the population increase within the town centre may necessitate the need for new or more direct/express bus routes. Further consultation with the private bus operators (Hills Bus) to confirm this.

6.6.2 Richmond Rail Line Duplication

The NSW Government has postponed the second stage of the duplication of the Richmond Railway Line. This project, which would upgrade the existing tracks between Schofields and Vineyard stations and increase service frequencies, was initially announced in 2003 to increase capacity on the existing network.

Should the duplication of the rail line proceed it would have the effect of significantly enhancing public transport accessibility to and from the Riverstone town centre. As previously noted, the limited frequencies of the heavy rail service, particularly during off-peak and weekend periods, is one of the main contributors to the high reliance on private vehicle travel for residents and workers of the town centre. The upgrade of the rail line would provide these users a more viable travel alternative, reducing localised traffic impacts in the town centre.

6.7 Cycling

As part of the upgrade works planned for Garfield Road East, the provision of a segregated off-road cycleway should be planned. This would provide for a safe and connected bicycle route between the town centre and the shared path along Windsor Road which acts as a regional bicycle route.

Segregated bicycle facilities on other roads within the town centre within the town centre are not considered warranted based on the level of expected bicycle activity. However, roads should be planned and designed to provide for safe bicycle movements via a number of mechanisms including wide kerbside travel lanes, traffic calming devices to lower vehicle travel speeds and on-road bicycle symbols to notify motorists of the presence of cyclists.

7 Summary

Arup has prepared this transport assessment to support the development of a Masterplan for the Riverstone town centre. It is envisaged that the Masterplan will create a thriving, economically viable, well designed and safe town centre. The assessment aims to:

- Identify existing transport infrastructure and traffic and transport trends;
- Consider the current function of the transport network including local and arterial roads, public transport services, car parking, pedestrian networks and cycling routes;
- Identify any improvements to the transport network that are necessary to implement the recommendations of the town centre Masterplan; and
- Identify future transport needs to manage growth within the area

The Masterplan focuses activity predominantly along the Market Street corridor, centred around the community hub and village green. High density mixed use development is proposed close to the railway station, with medium density residential (up to six storeys) location towards the periphery of the town centre.

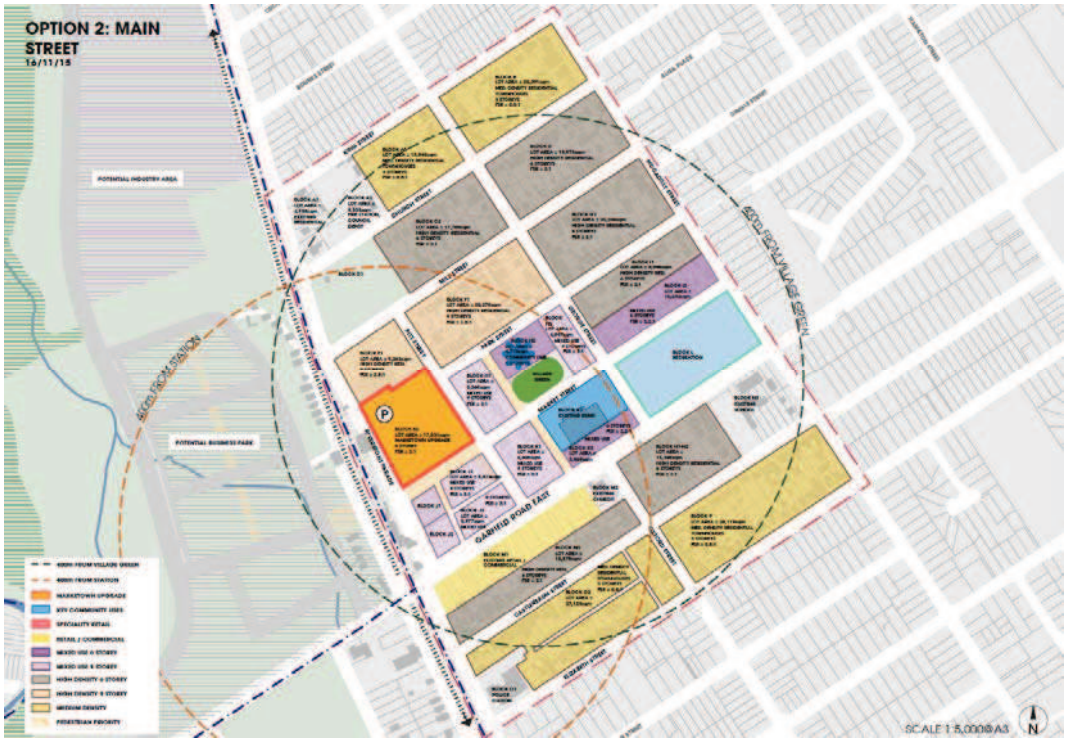

Figure 24 Preferred town centre Masterplan

Source: Group GSA

The transport strategy supporting the Masterplan has identified a number of measures which aim to provide for a coherent, legible transport network that supports movement both to, and within, the Riverstone town centre. These measures include:

- Installation of traffic signals at the Garfield Road East / George Street intersection to facilitate for a safer and more efficient road network, providing for controlled vehicle and pedestrian movements across Garfield Road East
- Improve traffic flow within Riverstone town centre to boost capacity and minimise delays at the existing Riverstone Parade / Garfield Road signalised intersection
- Introduction of a 40km/h High Pedestrian Activity Areas on Market Street – the main activity spine of the town centre
- Downgrading the role of Riverstone Parade and introducing a pedestrian crossing opportunity to enhance pedestrian accessibility across Riverstone Parade between the railway station and the town centre
- Maintaining the 100 overflow commuter parking bays as part of any redevelopment of the Market Town site
- Pedestrianisation of the western end of Market Street, between Pitt Street and Riverstone Parade, providing a direct connection to Riverstone train station.
- Introduction of a new north-south pedestrian link between Park Street and Garfield Road East
- Providing for pedestrian crossing opportunities of Garfield Road near Riverstone station following the introduction of the road overpass
- Implementation of paved footpaths on both sides of all streets within the town centre
- Investigating the increase of bus service frequencies as the town centre develops
- Introduction of a segregated off-road cycleway as part of the upgrade of Garfield Road East
- Providing a safe environment for cyclists on all local streets within the town centre.