

Wagga Wagga Special Activation Precinct

Assessment of Refined Land Use - Transport and Traffic Plan



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Wagga Wagga Special Activation Precinct Assessment of Refined Land Use - Transport and Traffic Plan

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TABLE OF CONTENTS

	GLOSSARY	VII
	ABBREVIATIONS	VIII
1	INTRODUCTION	1
1.1	WAGGA WAGGA SPECIAL ACTIVATION PRECINCT	1
1.2	REGIONAL AND LOCAL CONTEXT	2
1.3	REFINED VISION STATEMENT AND STRATEGIC ALIGNMENT	5
1.4	THIS REPORT	5
2	STRATEGIC CONTEXT	7
2.1	FUTURE TRANSPORT 2056	7
2.2	NSW FREIGHT AND PORTS PLAN 2018–2023	9
2.3	NATIONAL FREIGHT AND SUPPLY CHAIN STRATEGY	10
2.4	WAGGA WAGGA INTEGRATED TRANSPORT STRATEGY AND IMPLEMENTATION PLAN 2040	10
2.5	RIVERINA INTERMODAL FREIGHT LOGISTICS HUB	11
2.6	INLAND RAIL	12
2.7	BOMEN STRATEGIC MASTER PLAN	13
2.8	NEARBY DEVELOPMENT	14
2.9	SUMMARY	14
3	EXISTING AND PLANNED TRANSPORT	15
3.1	PEDESTRIAN	15
3.2	BICYCLES	15
3.3	BUSES	19
3.4	FREIGHT	20
3.5	ROAD NETWORK	25
3.6	ROAD FREIGHT NETWORK	29
3.7	LIVESTOCK AND HORSE TRAILS	30
3.8	EXISTING MODE SHARE	30
3.9	SUMMARY OF EXISTING TRANSPORT	31

4	STAKEHOLDER LIAISON.....	32
4.1	TRANSPORT FOR NSW.....	32
4.2	WAGGA WAGGA CITY COUNCIL	33
4.3	BOMEN BUSINESSES.....	33
4.4	ARTC	35
5	LAND USE SCENARIOS.....	36
5.1	LAND USE MAPS	36
5.2	SCENARIO ASSESSMENT	40
5.3	STRENGTHS WEAKNESSES OPPORTUNITIES THREATS	55
5.4	WORKSHOP SUMMARY	59
6	REFINED LAND USE STRUCTURE PLAN	60
6.1	LAND USE TYPE AND SIZE	62
6.2	INDICATIVE LAND USE STAGING.....	63
6.3	PROJECTED EMPLOYMENT.....	63
6.4	INDICATIVE ROAD CROSS SECTION	65
6.5	INTERNAL ROAD NETWORK.....	67
7	TRANSPORT ASSESSMENT.....	68
7.1	ROAD NETWORK	68
7.2	HEAVY VEHICLE NETWORK	76
7.3	RAIL AND INTERMODAL	76
7.4	PUBLIC TRANSPORT	78
7.5	ACTIVE TRANSPORT.....	80
7.6	LIVESTOCK.....	80
7.7	BUSINESS EFFICIENCY AND INNOVATION.....	83
8	TRANSPORT MEASURES	84
8.1	INTEGRATED TRANSPORT NETWORK.....	84
8.2	INFRASTRUCTURE TIMING	84
8.3	FUNDING AND DELIVERY	84
8.4	APPORTIONMENT METHOD.....	84



9	CONCLUSIONS	90
10	LIMITATIONS	91

LIST OF TABLES

TABLE 2.1	FORECAST INLAND RAIL TRAIN NUMBERS (ROUND TRIPS).....	13
TABLE 3.1	EXISTING BUS FREQUENCY SUMMARY	20
TABLE 3.2	SUMMARY OF EXISTING FREIGHT VOLUMES (ANNUAL KILOTONNES) TO/FROM WAGGA WAGGA LGA	21
TABLE 3.3	DIRECTION OF FREIGHT ARRIVAL/DEPARTURE TO/FROM WAGGA WAGGA LGA.....	22
TABLE 3.4	EXISTING ROAD HIERARCHY AND DESCRIPTION.....	27
TABLE 3.5	TRANSPORT MODE FOR JOURNEY TO WORK	30
TABLE 4.1	LOCAL BUSINESS TRANSPORT NEEDS AND ISSUES.....	33
TABLE 5.1	LIST OF ROAD UPGRADES FOR THE BASELINE SCENARIO (CURRENTLY PLANNED GROWTH IN BOMEN PLUS OTHER DEVELOPMENTS AND BACKGROUND TRAFFIC GROWTH) WITH APPROXIMATE TIMING FOR IMPLEMENTATION	41
TABLE 5.2	REQUIRED CAPACITY OF ROAD CONNECTIONS FROM THE SAP TO THE EXTERNAL ROAD NETWORK	42
TABLE 5.3	SUMMARY OF HEAVY VEHICLE NETWORK ASSESSMENT	46
TABLE 5.4	SUMMARY OF FREIGHT AND INTERMODAL ASSESSMENT	47
TABLE 5.5	SUMMARY OF PUBLIC TRANSPORT ASSESSMENT	49
TABLE 5.6	SUMMARY OF ACTIVE TRANSPORT ASSESSMENT	54
TABLE 5.7	WORKSHOP SWOT ANALYSIS SUMMARY	59
TABLE 6.1	PROPOSED LAND USE AND EMPLOYMENT WITH INDICATIVE STAGING	62
TABLE 6.2	PERCENTAGE OF DEVELOPMENT BY INDICATIVE STAGE AND ASSESSMENT YEAR.....	63
TABLE 6.3	PROJECT EMPLOYMENT INCREASE IN WAGGA WAGGA SAP - MEDIUM GROWTH SCENARIO	64
TABLE 7.1	PROPOSED VEHICLE TRIP GENERATION BY STAGE	69
TABLE 7.2	RECOMMENDED LIST OF ROAD UPGRADES.....	72
TABLE 8.1	LIST OF TRANSPORT INFRASTRUCTURE SUGGESTIONS FOR THE WAGGA WAGGA SAP PRECINCT – PRELIMINARY, SUBJECT TO REVIEW.....	85
TABLE 8.2	SUMMARY OF SAP APPORTIONED COST ESTIMATES	89

LIST OF FIGURES

FIGURE 1.1	WAGGA WAGGA STRATEGIC CONNECTIVITY	2
FIGURE 1.2	WAGGA WAGGA SAP INVESTIGATION AREA.....	4
FIGURE 1.3	WAGGA WAGGA SAP VISION STATEMENT	6
FIGURE 2.1	TECHNOLOGY AND POTENTIAL IMPACT ON THE FUTURE OF MOBILITY	8
FIGURE 2.2	RIVERINA INTERMODAL FREIGHT AND LOGISTICS HUB.....	12
FIGURE 3.1	ON-ROAD CYCLING FACILITY – KINCAID STREET	15
FIGURE 3.2	OFF-ROAD SHARED PATH – PLUMPTON ROAD	16
FIGURE 3.3	EXISTING AND PROPOSED ACTIVE TRANSPORT ROUTES	16
FIGURE 3.4	ON-LINE BICYCLE MAP (JULY 2019).....	17
FIGURE 3.5	ACTIVE TRAVEL PLAN PRIORITY BICYCLE MAP (JULY 2018)	18
FIGURE 3.6	EXISTING BUS NETWORK.....	19
FIGURE 3.7	STRATEGIC FREIGHT FORECASTS – COMMODITY ORIGIN MAP, RIVERINA 2016	23
FIGURE 3.8	STRATEGIC FREIGHT FORECASTS – COMMODITY ORIGIN MAP, RIVERINA 2056	24
FIGURE 3.9	STRATEGIC FREIGHT FORECASTS – COMMODITY FORECAST MAP, WAGGA WAGGA 2016.....	24
FIGURE 3.10	STRATEGIC FREIGHT FORECASTS – COMMODITY FORECAST MAP, WAGGA WAGGA 2056.....	25
FIGURE 3.11	EXISTING ROAD HIERARCHY	26
FIGURE 5.1	SCENARIO 4 LAND USE MAP AND YIELDS.....	37
FIGURE 5.2	SCENARIO 5 LAND USE MAP AND YIELDS.....	38
FIGURE 5.3	SCENARIO 7 LAND USE MAP AND YIELDS.....	39
FIGURE 5.4	SCENARIO 4 ROAD NETWORK WITH LANE CAPACITY FOR ULTIMATE DEVELOPMENT	44
FIGURE 5.5	SCENARIO 5 ROAD NETWORK WITH LANE CAPACITY FOR ULTIMATE DEVELOPMENT	44
FIGURE 5.6	SCENARIO 7 ROAD NETWORK WITH LANE CAPACITY FOR ULTIMATE DEVELOPMENT	44
FIGURE 5.7	SAMPLE SHARED PATH CROSS-SECTION AND EXAMPLE IN WAGGA WAGGA.....	50
FIGURE 5.8	SCENARIO 4 POTENTIAL ACTIVE TRANSPORT ROUTES	51
FIGURE 5.9	SCENARIO 5 POTENTIAL ACTIVE TRANSPORT ROUTES	52
FIGURE 5.10	SCENARIO 7 POTENTIAL ACTIVE TRANSPORT ROUTES	53
FIGURE 5.11	SCENARIO 4 SWOT ANALYSIS.....	56

FIGURE 5.12 SCENARIO 5 SWOT ANALYSIS.....	57
FIGURE 5.13 SCENARIO 7 SWOT ANALYSIS.....	58
FIGURE 6.1 REFINED WAGGA WAGGA SAP STRUCTURE PLAN WITH INDICATIVE STAGING	60
FIGURE 6.2 FINAL WAGGA WAGGA SAP STRUCTURE PLAN.....	61
FIGURE 6.3 LOW, MEDIUM AND HIGH DEVELOPMENT PACE SCENARIOS	63
FIGURE 6.4 MERINO ROAD TYPICAL CROSS SECTION	65
FIGURE 6.5 TYPICAL CROSS SECTION WITH ON-STREET PARKING	66
FIGURE 6.6 TYPICAL CROSS SECTION WITH CHANNELISED RIGHT TURN LANE	67
FIGURE 7.1 RECOMMENDED ROAD UPGRADES – BY 2030.....	73
FIGURE 7.2 RECOMMENDED ROAD UPGRADES – BY 2040.....	74
FIGURE 7.3 RECOMMENDED ROAD UPGRADES – BY 2060.....	75
FIGURE 7.4 VEHICLE PRIORITY ROADS.....	77
FIGURE 7.5 POTENTIAL BUS ROUTE.....	79
FIGURE 7.6 POTENTIAL SHARED WALK AND CYCLE ROUTES	81
FIGURE 7.7 WAGGA WAGGA SAP LIVESTOCK RESERVES AND ROUTES.....	82

LIST OF APPENDICES

APPENDIX A CLASSES OF HEAVY VEHICLES
APPENDIX B REST AREA CATEGORIES
APPENDIX C RIFL TRAFFIC GENERATION
APPENDIX D SAP TRAFFIC GENERATION CALCULATION
APPENDIX E FUTURE BASELINE AND SAP TRAFFIC ASSESSMENT

GLOSSARY

EMME	Strategic transport modelling software
Intermodal	Transfer of freight between different modes of transport. For Wagga Wagga, this relates to road, rail or air.
Level of Service	Defined by Austroads as a measure for ranking a transport infrastructure conditions/performance, based on metrics such as speed, travel time, freedom to manoeuvre, interruptions, comfort and convenience. Levels range from Level of Service A (good performance) to F (poor performance)
V/C Ratio	Ratio of traffic volume in a lane to the theoretical traffic capacity of the lane – used as a measure of the available capacity and performance – equated to Level of Service

ABBREVIATIONS

ABS	Australian Bureau of Statistics
CBD	central business district
CCTV	closed circuit television
DCP	Development Control Plan
DDA	Disability Discrimination Act
DPIE	Department of Planning, Industry and Environment
DSRC	dedicated short-range communication
EbD	enquiry by design
EIS	Environmental Impact Statement
ESD	ecologically sustainable development
ETSC	European train control system
FTE	fulltime equivalent (jobs)
IoT	Internet of Things
HML	Higher Mass Limit
LCL	less than container load
LGA	local government area
LIDAR	light detection and ranging (laser measurement)
LoS	Level of Service
M2M	Machine to Machine
MSF	Maximum Service Flow (measured in passenger car units per hour)
NSW	New South Wales
pcu	passenger car units
pcuph	passenger car units per hour
R&D	Research and Development
RIFL Hub	Riverina Intermodal Freight and Logistics Hub
SAP	Special Activation Precinct
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAFE	Technical and Further Education
TfNSW	Transport for NSW
vph	Vehicles per hour
V/C	Volume to Capacity ratio
WWCC	Wagga Wagga City Council
WW ITS	Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040

1 INTRODUCTION

The NSW Government announced the creation of a Special Activation Precinct (SAP) in the north-east area of Wagga Wagga on 29 January 2019 to:

- Create a world-class business precinct
- Capitalise on the inland rail
- Promote advanced manufacturing, agribusiness, freight and logistics.

The Department of Planning, Industry and Environment (DPIE) together with the Wagga Wagga City Council (WWCC) are commencing investigations to develop a master plan for the SAP. The master plan proposal will identify the scale, type and extent of the development in the SAP along with the infrastructure needed to support its development and mitigate its impact.

DPIE commissioned a number of specialist studies to inform the master plan process, including an Infrastructure and Transport Plan (this study) prepared by WSP, which focuses on the Traffic and Transport component of the master plan.

A short Enquiry by Design (EbD) workshop was held on 8 and 9 August 2019 to develop three land use scenarios to be considered as part of the SAP master plan process. A full EbD workshop was held between 17 and 19 September 2019 to consider the merits of each of the three scenarios and identify a single preferred land use structure plan to be assessed in more detail.

This document assesses the refined land use structure plan from the full EbD workshop from a transport perspective, to enable it to be progressed to the consultation stage.

1.1 WAGGA WAGGA SPECIAL ACTIVATION PRECINCT

The NSW Government announced the establishment of Special Activation Precincts as part of its 20-Year Economic Vision for Regional NSW. The precincts will be funded as part of the NSW Government's \$4.2 billion Snowy Hydro Legacy Fund, following the sale of the Snowy Hydro Scheme to the Commonwealth.

Special Activation Precincts are a new way of planning and delivering infrastructure projects in certain regional locations in NSW to attract and grow businesses, stimulate the regional economy and provide more employment opportunities.

Special Activation Precincts based around the Bomen Business Park are unique in regional NSW as they bring together planning and investment support services. This means that businesses will be able to establish and grow with certainty and confidence knowing that the right planning framework is in place.

Key elements include:

- Faster and easier planning processes
- Government-led development in some locations
- Investment in infrastructure
- Coordinated land-use and infrastructure planning
- Business concierge services to help businesses start up in Special Activation Precincts, including grants and interest-free loans for eligible businesses under the Regional Investment Attraction Package.

The Wagga Wagga Special Activation Precinct will be a world-class business precinct that capitalises on the Inland Rail, with a focus on freight and logistics, advanced manufacturing, agribusiness, recycling and renewable energy. It will potentially cover up to approximately 4,100 hectares, with 300 to 400 hectares already developed in the Bomen Business Park.

Wagga Wagga is a highly linked city due to its rail and road network connections with Australia's major cities, as shown in Figure 1.1. Figure 1.1 shows the existing rail and road connections to Wagga Wagga linking with Sydney, Canberra, Melbourne, Adelaide and Brisbane. The SAP will build on existing and already-planned private and government investments, including Inland Rail, creating an efficient transport and logistics hub that will incorporate the Riverina Intermodal Freight Logistics (RIFL) Hub, create faster and easier access to global markets, create jobs, and attract investors and developers.



Source: Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040 (WWCC, August 2017)

Figure 1.1 Wagga Wagga strategic connectivity

Wagga Wagga is forecast to experience population growth of approximately 22 per cent from 66,635 in 2018 to 81,000 by 2036. The SAP will support this increased population with new job creation of up to 6,000 jobs over 20 years¹.

Recent public investments in roads and freight access include the \$52m for Wagga Wagga High Productivity Freight Route², comprising:

- RIFL Stage 1 – Enabling Roads = \$35m
- Eunony Bridge Road Deviation Project = \$5.5m
- Byrnes Road reconstruction = \$1.86
- Eunony Bridge upgrade = \$9.8m.

1.2 REGIONAL AND LOCAL CONTEXT

Wagga Wagga local government area (LGA) is located approximately 455 kilometres south-west of Sydney, in the Riverina Murray Region. The City of Wagga Wagga is the major centre in the Region with nearby townships including Gundagai, Tumut, Hay, Temora, Narrandera, Junee and Deniliquin.

Bomen Business Park is located approximately 10 kilometres north-east of Wagga Wagga Central Business District (CBD), bordering the Main South Rail Line between the Olympic Highway and Byrnes Road. The area is serviced by several major roads, including Bomen Road, which connect the area to Brisbane and Melbourne. Wagga Wagga Regional Airport is located south-east of Wagga Wagga CBD and is located approximately 11 kilometres from Bomen Business Park.

¹ Wagga Wagga Special Activation Precinct Brochure, DPIE, undated

² Wagga Wagga 2018 Economic Snapshot, Wagga Wagga City Council, 2018

The Riverina Murray Regional Plan 2036 identifies Bomen Business Park as a significant contributor to jobs and economic growth in the region and highlights the need to protect industrial areas from potential land use conflicts. The Regional Plan identifies that Wagga Wagga and its surrounds is:

- The largest inland regional city in NSW with a population of approximately 62,500 people (ABS, 2016).
- A major freight and logistics hub, with identified growth potential linked to its strategic location between major ports in Sydney and Melbourne and increased agricultural production capacity.
- A provider of services to the wider region of 185,000 people through its hospital and education institutes, including Charles Sturt University and Riverina TAFE.
- An identified location for the establishment of a business environment that is conducive to innovation and advances in technology.
- Forecast to grow to a population of 100,000 people post 2038.

Figure 1.2 shows the Wagga Wagga SAP study area. This includes a study area bounded approximately by Vomax Road and Mary Gilmore Road to the north, Shepherds Siding Road and Windmill Road to the east, Bavin Road to the south and Fuller Street, Wright Street and Poiles Road to the west.

The establishment of a Wagga Wagga SAP is consistent with the City of Wagga Wagga's vision and strategic planning for the locality.



Figure 1.2 Wagga Wagga SAP investigation area

1.3 REFINED VISION STATEMENT AND STRATEGIC ALIGNMENT

A comprehensive set of aspirations has been established for the Wagga Wagga SAP to guide its master planning. It is also useful to identify a smaller number of distinguishing aspirations to 'elevate' to a high prominence to be infused in the planning decisions. These aspirations are designed to make Wagga Wagga SAP stand out with leading industry and business performance, reflect competitive strengths, and target areas for investment or attention.

A workshop was held in Wagga Wagga with DPIE, WWCC, the master planners, Jensen Plus, the consultant team and key stakeholders to ensure the vision statement captures the desired qualities and language. The resulting refined vision statement is shown in Figure 1.3.

The key aspects of the Vision Statement include:

- 1 As NSW's Southern gateway supporting Australia's richest food and agricultural region, the Wagga Wagga SAP will be a sustainable hub of high value production and manufacturing supporting innovative industries and businesses which are connected to the world.
- 2 Design a modern precinct that respects its strong landscape setting and existing communities.
- 3 Provide certainty and confidence for industries and businesses to establish and expand.
- 4 Target secure, affordable renewable energy to support ecologically sustainable development (ESD) and business investment.
- 5 Future-proof road and rail to accommodate larger trucks and longer trains, building from the new RIFL hub.
- 6 Create an 'employment place of choice' by providing appropriate services and amenities.
- 7 Promote innovation and research and development (R&D).
- 8 Accelerate the establishment of circular economies.

1.4 THIS REPORT

The remainder of this report is structured as follows:

- Section 2 extracts the relevant points from various State and Local Government planning and policy documents.
- Section 3 assesses the existing transport situation
- Section 4 provides the results of stakeholder liaison conducted so far
- Section 5 describes the three land use scenarios and compares their strengths, weaknesses, opportunities and threats from a transport perspective
- Section 6 outlines the refined land use structure plan
- Section 7 provides the results of the transport assessment of the refined land use structure plan
- Section 8 identified the proposed transport measures to support the transport network for the SAP and provides cost information
- Section 9 outlines the conclusions of this assessment

2.3 Vision and Aspirations

The following Vision and aspirations were developed and endorsed by the SAP technical consultant team.

“As NSW’s Southern Gateway supporting Australia’s richest food and agricultural region, the Wagga Wagga SAP will be a sustainable hub of high value production and manufacturing supporting innovative industries and businesses which are connected to the world.”



Master Planning + Precinct Design

- Design a modern environmentally responsive industry and employment precinct that respects its strong landscape setting.
- Locate industries to manage amenity impacts (e.g. noise, light, air quality, odour, visual) on workplaces and communities.
- Grow from existing industry clusters and planned RiFL Hub.
- Provide for a range of land uses and futureproof for emerging industries.
- Provide a foundation to deliver on the promise ‘Wagga to the World’.
- Provide certainty and confidence for industries and businesses to establish and expand within the Wagga Wagga SAP.



Environment, Heritage + Sustainability

- Protect and acknowledge Aboriginal culture and places (eg Bowmen Axe Quarry), and European heritage.
- Incorporate world-class water, energy and waste cycle management and ecologically sustainable development principles.
- Be carbon and climate positive / neutral.
- Target secure, affordable renewable energy to support ESD and business investment.
- Identify and achieve a world-class ESD rating or certification best suited to the proposed uses.
- Protect the catchment of the Murrumbidgee River.
- Protect precinct biodiversity and environmental values and plan an enhanced green infrastructure network.



Natural Hazards + Resilience

- Incorporate precinct scale measures to manage natural hazards, including bushfire, to ensure future resilience.
- Water reuse will be a standard approach throughout the precinct recognising its environmental importance.
- Future development will be located outside of flood prone areas and drainage corridors.



Infrastructure + connectivity

- Aligning the delivery of development with recently completed road infrastructure upgrades
- Ensure appropriate utility and service (water, sewer, stormwater, telephone/ data) connectivity, including the potential for district level energy and storage.
- Maximise opportunities for a digitally connected precinct, leveraging 5G, GigState and Smart Regional Places initiatives in Wagga Wagga.
- Optimise road, rail (and airport) infrastructure to enable efficient development.
- Futureproof road and rail to accommodate larger trucks and longer trains, building from the new RiFL Hub.
- Integrate active transport connectivity and public transport opportunities for a 24/7 Precinct.



Social + Community Infrastructure

- Integrate TAFE and tertiary education institutions, promote training and apprenticeships within the Wagga Wagga SAP.
- Create an ‘employment place of choice’ including by providing appropriate services and amenities to meet the needs of future workers.
- Consider other community infrastructure to support the people living and working in the area (e.g. open space, local services, recreation, trails).
- Work with local communities, including Wiradjuri people and local residents to create a strong connection to place.



Economic + Industry

- Facilitate the streamlined establishment of diversified businesses in freight and logistics, advanced manufacturing, recycling, value-add agribusiness, engineering and technology, and renewable energy.
- Accelerate the establishment of circular economies, connecting existing organisations and resources, maintaining the value of products for as long as possible and minimising waste.
- Broker partnerships with industry and tertiary education / research sectors to promote innovation, R+D and commercialisation of new products.
- Ensure future development is aligned to precinct opportunities (land use efficiencies).
- Attract exemplar businesses with corporate social responsibilities aligned to the vision and aspiration of the precinct.

Source: Wagga Wagga Special Activation Precinct Structure Plan, Jensen Plus, July 2020

Figure 1.3 Wagga Wagga SAP vision statement

2 STRATEGIC CONTEXT

This section provides a brief assessment of the relevant State and Local Government policies, planned infrastructure and transport initiatives that will affect the SAP development.

2.1 FUTURE TRANSPORT 2056

Future Transport 2056 (Transport for NSW, March 2018) plans for a future transport network that is customer focussed, fosters successful places and strong economy, operates with safety and suitable performance, provides accessible services and is sustainable. Future Transport 2056 is a long-term, strategic plan for transport in NSW that considers a wide range of initiatives around the state. Wagga Wagga is identified as a regional city with an important role in providing services to the region. As the regional hub, improved transport connections to Wagga Wagga are planned.

It acknowledges that most people in regional NSW drive to work. However, facilitating emerging technology can help provide cheaper and more efficient movement of people and freight. Improved transport connections to Wagga Wagga are being investigated from Albury–Wodonga, Griffith, with secondary connections to Junee, Gundagai, Tumut, Lockhart and West Wyalong.

Wagga Wagga has strategic importance due to its position on the Sturt Highway between Sydney and Adelaide and the Main Southern Rail Line between Sydney and Melbourne via Albury–Wodonga.

Future Transport 2056 outlines a three-tiered public transport service. Wagga Wagga is categorised in Tier 2, meaning that it has connecting services to surrounding villages and towns and other regional centres. Public transport solutions need to be tailored to meet the needs of the people using them.

The range of transport options available to regular users should provide them with greater choice. This will be achieved through initiatives such as:

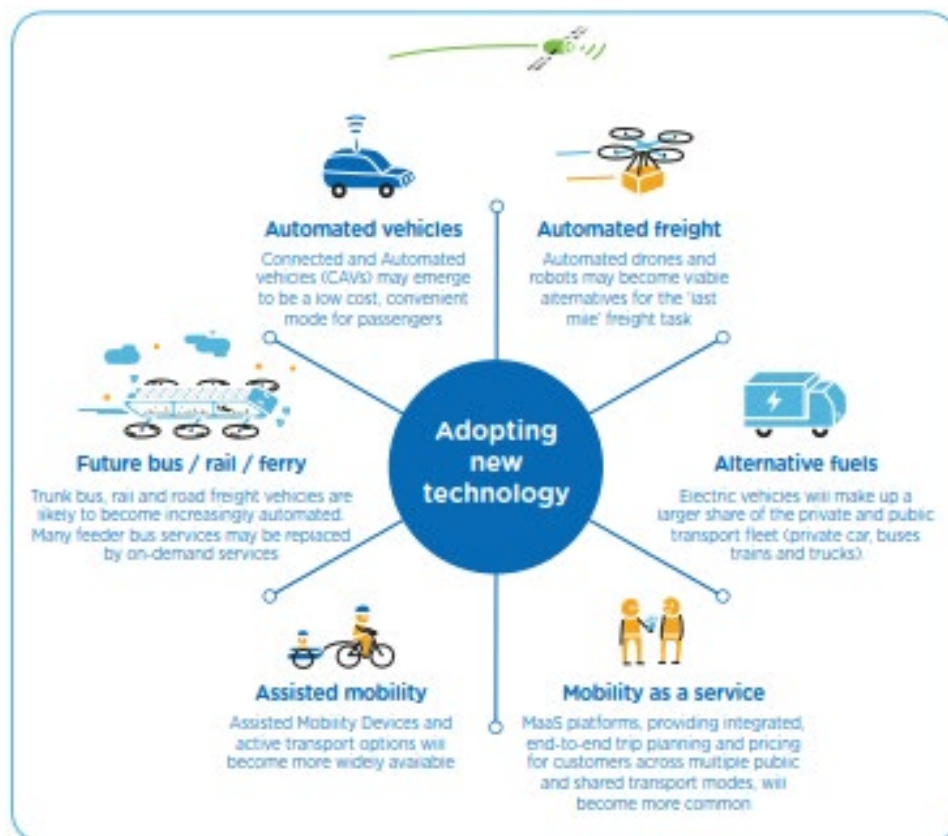
- Hub and spoke model connecting to centres and regional cities (connections (spokes) to and from the key centres (hubs) – in this case Wagga Wagga). The spokes link to different hubs across the region rather than focussing on one key hub.
- Integrated timetables enabling better connections and day return services.
- Increased frequencies and operating hours.
- Flexible/demand-responsive public transport offering a mix of services.
- Accessible services for mobility impaired and disadvantaged customers.
- Real-time information making public transport more user friendly and accessible.
- Mobility as a Service.
- Improved walking and cycling infrastructure within towns to accommodate shorter trips.

For the SAP and the existing businesses in the Bomen Business Park, the shift-work, with varied start and finish times, and the location of employees in surrounding villages present challenges in terms of public transport provision. Trials of day-return public transport options between regional hubs and other non-standard service formats have commenced, which may have application for the Wagga Wagga SAP.

Wagga Wagga Regional Airport is a significant asset with regular services to Sydney, Melbourne, Brisbane and other towns. The Government is investing in the future of regional aviation. Changes to regional airport security screening are planned.

Opportunities for possible application of future transport technologies include those shown in Figure 2.1. Potential technologies that could assist the SAP include:

- Mobility as a Service and associated technology platforms enable dynamic, personalised services, for example in situations where traditional fixed-route bus services are unable to feasibly offer the flexibility required.



Source: *Future Transport 2056 Regional NSW Services and Infrastructure Plan, Transport for NSW, March 2018*
Figure 2.1 Technology and potential impact on the future of mobility

- Improving productivity through exploring benefits of freight technology advances, for example supply chain efficiencies of vehicle platooning.
- Smart vehicle technology features such as automatic braking and lane keep assist are increasingly available in new vehicles to improve road safety.
- Electric vehicles and automated vehicles that could provide employee transport during shift changeover and other tasks in Wagga Wagga at other times.
- Telecommunication improvements to enable people to travel less and undertake some work at home, or at locations close to home.

Future Transport also considers the application of movement and place principles into road network planning. For Wagga Wagga, this could mean:

- Separation of through movement (Movement Corridors) and reinforced place-based activity (Places for People). For the SAP this includes prioritising certain roads for the movement of freight and commuting employees and a distinct area for a 'place' to serve the employment area.
- Linking the 'place' serving the employment area to the surrounding land use and public transport and active transport network.

- Integrating safety features with road function, accounting for needs of different road users in each environment.
- Connecting the SAP to Wagga Wagga and use of the SAP to connect Wagga Wagga onwards to capital cities and international markets.
- Wider consideration of increasing frequencies and span of hours for public transport services in Wagga Wagga.
- Improve port connections catering for significant freight movements and enabling improved market access and distribution.

Intermodal terminals play a critical role in freight transport, facilitating improved productivity and efficiency and enabling increasing rail share. With the existing Qube facility at Harefield and the planned Riverina Intermodal Freight and Logistics (RIFL) Hub, combined with the Inland Rail project, Wagga Wagga will be positioned at the junction of major rail corridors to a wider selection of markets, assisting the businesses in the area.

Following on from the introduction of movement and place principles in Future Transport, Transport for NSW is currently working with Council to produce a 'Place Plan' for Wagga Wagga.

2.2 NSW FREIGHT AND PORTS PLAN 2018–2023

The NSW Freight and Ports Plan 2018–2023 (Transport for NSW, September 2018) is a plan for the direction of the NSW government investment supporting freight and ports in NSW which projects the volume of exports and imports to grow substantially. Its key actions are to enable regional growth and the future operation of critical freight infrastructure.

It contains forecasts for the growth of freight for the Riverina, indicating a 27 per cent increase in its top export of grain, 29 per cent growth in milk and 16 per cent in forestry products to 2036. For NSW, the expected growth to 2036 in commodities important for the Riverina region include:

- Grains: 26.2 per cent
- Livestock: 121.4 per cent
- Red Meat: 116.7 per cent
- Horticulture: 20 per cent
- Forestry: 6.3 per cent
- Oilseeds: 30.8 per cent.

Initiatives to assist road freight include (amongst others) road enhancements for safety and improved accessibility for higher productivity vehicles. These could include improvements to road surfaces, lane and shoulder widths, intersections, level crossings and bridges and other safety infrastructure upgrades.

The Plan identifies the need to protect strategic freight corridors, especially those that offer multi-modal facilities, such as the corridor through Bomen. For the SAP, this means that operational and buffer zones need to be planned for either side of the corridor to prevent restrictions on the ability to increase capacity in the future. This includes the separation of freight and passenger movements – considered further in the Bomen Strategic Plan with different road access points prioritised for freight and employee vehicles. This buffer also needs to be applied to the Olympic Highway, as a key freight corridor to the SAP.

2.3 NATIONAL FREIGHT AND SUPPLY CHAIN STRATEGY

The National Freight and Supply Chain Strategy (Transport and Infrastructure Council, August 2019) identifies road and rail freight between Sydney and Adelaide as being a major flow in the context of national freight movement (measured by volume). While the Strategy reports that there has been little change in freight productivity in the last 20 years, the rise of e-commerce is likely to drive changing business practices and new technologies, like digitalisation, automation and electrification to improve productivity. The Strategy seeks to provide regional and remote Australia with infrastructure capable of connecting regions and communities to major gateways, through land links, regional airports or coastal shipping. For Wagga Wagga the primary pieces of infrastructure are Inland Rail and RIFL.

2.4 WAGGA WAGGA INTEGRATED TRANSPORT STRATEGY AND IMPLEMENTATION PLAN 2040

The Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040 (WW ITS) (City of Wagga Wagga Council, August 2017) plans for a population of Wagga Wagga in excess of 80,000 people, however it makes provision for a city that could grow to beyond 100,000 people.

It seeks to capitalise on the Inland Rail project and Riverina Intermodal Freight and Logistics (RIFL) Hub to open up access to Melbourne and Brisbane ports through the Bomen Business Park. To increase economic and employment growth, it strives for transport efficiency, safety and a sustainable environment through reduced congestion and travel time.

The WW ITS also includes strategies for:

- Improving cycling infrastructure, corridors and networks
- Investigating innovative public transport initiatives for locals and visitors
- Implementing measures to increase the likelihood of the NSW Government duplicating the Gobbagombalin Bridge
- Supporting development in the northern growth area through appropriate structure planning
- Preserving a corridor within Council strategies for a southern heavy vehicle bypass
- Prioritising Bomen as an intermodal hub connected to the Inland Rail Network
- Working to improve the Olympic Highway and Old Narrandera Road intersection.

The Strategy emphasises the following:

- An arterial and sub-arterial road network that is strategic will reduce pressure on local roads.
- Heavy vehicles and high traffic movements should be separated from local streets.
- Active travel should be safe, efficient and comfortable. Alternative modes of transit will only be utilised if suitable end of trip facilities are provided.
- Emerging smart technologies need to be incorporated with end of trip facilities.
- Partner with Transport for NSW and local transport operators to investigate and trial a more flexible public transport system.

For the Bomen Business Park, the type of development is preferred to include:

- Land use patterns that ensure access to transport infrastructure, primarily the rail corridor. This can be achieved by prioritising enterprises that require direct access/proximity to the rail corridor.
- Provide a hierarchy of road networks that allow direct and efficient routes to and within Bomen.
- Infrastructure network that is economically efficient and environmentally effective.
- Enable Bomen Intermodal Hub and industrial area to become a greater strategic asset for Wagga Wagga, the Riverina–Murray region, and Australia.
- To preserve Bomen from inappropriate development.
- Preserve buffers around Bomen and key corridors to avoid land use conflict.

Another freight initiative is to provide a heavy freight transport interchange, with the following criteria:

- Positioned in a strategic location, which corresponds with a future bypass
- Having a large site that provides separation between heavy vehicles and small vehicles
- Provides services such as fuel, food and beverage, amenities, and a secure location for parking of heavy vehicles for long periods of time
- Includes an interchange will provide a fatigue management centre, trailer interchange and a high-quality service centre and will both boost capacity along the Sturt Highway and Olympic Highway, and provide for improved safety options for heavy vehicle operators
- Provision for driver amenities including self-catering facilities, showers and toilets.

The WW ITS includes plans for:

- An active transport route alongside the Main South Rai line from the south side of the Murrumbidgee River to Bomen
- A rapid bus route from Wagga Wagga CBD to Bomen and a bus interchange at Bomen.

2.5 RIVERINA INTERMODAL FREIGHT LOGISTICS HUB

The RIFL Hub, part of the Bomen Business Park, is a proposed freight precinct including an intermodal terminal allowing the transfer of containers between road and rail, a complementary and adjacent industrial development and a rail siding and terminal loading tracks, as shown in Figure 2.2.

The precise layout of the intermodal terminal and siding is not currently available, nor are predicted train numbers, however, it has been announced that a 5.8 km master rail siding will be built parallel to the Main Southern Railway (and Inland Rail). The terminal loading tracks are proposed to accommodate, split and reassemble 900 m long trains³, which could be amalgamated into 1,800 m long trains in the master rail siding. The rail terminal is open access for the businesses in Bomen and the surrounding area.

Apart from potentially exporting containerised grain or forestry products from the region through the intermodal terminal, there is an opportunity for the export of oil and oil seed meal through a bulk loading facility. It will, and the Inland Rail project also provide opportunity to link Wagga Wagga to existing eastern ports in NSW.

³ RIFL Hub Brochure, Wagga Wagga City Council, undated.



Source: RIFL Hub Brochure, Wagga Wagga City Council, undated

Figure 2.2 Riverina Intermodal Freight and Logistics Hub

2.6 INLAND RAIL

Inland Rail will be a 1,700 km rail line between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland that will provide freight producers and regional centres with efficient rail access to domestic and international trade gateways. The Inland Rail corridor is expected to be fully operational by 2025. The Wagga Wagga Special Activation Precinct lies within the Albury to Illabo section which uses 185 km of the Main Southern Railway line. The Albury to Illabo (A2I) project is an enhancement of the existing rail corridor to allow double-stacked freight trains.

The Inland Rail Service Offering document states that the infrastructure will accommodate 1,800 m long trains with future proofing for an ultimate 3,600 m train length, and 7.1 m clearances for double stack operation. This increases the efficiency of rail freight movement by allowing more freight to be transported per train.

The Inland Rail Programme Business Case was completed in 2015 and outlines the strategic rationale and the programme definition and feasibility. The business case provides high level forecast daily train numbers for the section between Tottenham and Illabo, of 16.2 in 2015 and rising to 19.2 in 2025 and 19.7 in 2040.

An indication of the breakdown of the forecast weekly train numbers is provided in Table 2.1. It should be noted that the forecasts do not necessarily account for additional demand from new regional freight terminals, although the business case does state:

'The proposed route opens up opportunities for new purpose-built freight terminals along the corridor serving national and local freight markets, including an east-west rail hub at Parkes in New South Wales. Delivery of complementary infrastructure, such as metropolitan and regional terminals, upgraded fleet and complementary land use and freight precinct developments are outside the scope of the Inland Rail Programme'. Inland Rail Programme Business Case (page 14)

Table 2.1 Forecast Inland Rail train numbers (round trips)

Train type	Trains per week					
	2024–2025	2029–2030	2034–2035	2039–2040	2044–2045	2049–2050
Inter-capital/intermodal	36	43	51	36	42	47
Grain	15	15	16	17	18	19
Coal	58	87	87	87	87	87
Others (including steel, mineral and general freight)	15	16	17	19	20	22
Total	123	162	171	158	166	174

Note: Assumes maximum intercapital/intermodal train lengths of 1800 metres with 50 per cent double stacking of containers (net payload 1470 tonnes), increasing to 3600 metres from 2039–2040 (net payload 2938 tonnes); 800 metre bulk agriculture trains reflecting an assumed range of 650 metres for narrow gauge to 900 metres for standard gauge trains (net payload 2010 tonnes); and 1010 metre coal trains (net payload 4250 tonnes). Reference train payloads have been adjusted by ARTC to reduce from theoretically efficient trains for planning purposes. Train numbers reflect the maximum across all line sections. Totals may not sum due to rounding.

Source: ARTC Inland Rail Business Case, 2015

These forecasts indicate that the rail network will have a large capacity for rail freight movement into the future. From a practical viewpoint, it will also involve increased disruption to existing level crossings, including Shepherds Siding Road to the north of the SAP area.

2.7 BOMEN STRATEGIC MASTER PLAN

The Bomen Structure Plan (City of Wagga Wagga Council, 2009) included the following recommendations for transport:

- Funding for a road connecting Bomen to the Sturt Highway and to the Olympic Highway to the eastern side of the Sydney/Melbourne railway line with a bridge
- B-double access to Bomen from regions using this type of vehicle
- Upgrading Eunony Bridge and its approach roads to B-triple standard
- Two additional access points to Bomen from the Olympic Highway (between Bomen Road and Trahairs Road (or one if Bomen connects to Trahairs Road
- The main accesses to be designed and landscaped to make an entry statement
- An additional rail siding, to be approved by ARTC
- A corridor of between 450 m and 750 m for rail access and storage, shipping and related activities
- Owner of new siding to enter into an agreement with ARTC
- Improve access to and from the sale yards
- Prepare a traffic study to address the medium and long-term impacts for Bomen Business Park, considering traffic growth from development and employment generation and freight
- A new bridge to provide access between east and west sides of the railway line
- Dampier Street level crossing to be closed after the new link is open.

In addition, Roads and Maritime Services requested the inclusion of a north-south road link to avoid traffic using the Olympic Highway as a link between different parts of Bomen. Roads and Maritime Services also requested bicycle and bus access from Wagga Wagga.

2.8 NEARBY DEVELOPMENT

Increasing residential development is planned in the areas to the west of the SAP, including within the neighbouring suburb of Estella and Charles Sturt University. A priority area for potential additional residential development has been identified in the Northern Growth Precinct, to the west of the SAP. Development in this area would offer opportunities and constraints for transport for the SAP:

- Close residential and employment areas offer shorter trips with less energy use and increased opportunities for active transport, e.g. cycling, provided suitable facilities are provided
- Increased demand for current infrastructure, especially along the Olympic Highway between the Northern Growth Area and Wagga Wagga.

The structure plan for the Northern Growth Precinct would be influenced by the structure plan for the SAP. The transport requirements of both developments would be considered in a holistic way to coordinate the delivery of infrastructure and services, especially at the Olympic Highway crossings/access intersections at:

- Merino Road
- Bomen Road
- Poiles Road to Hamden Avenue crossing
- Existing Coolamon Road/Horseshoe Road intersection.

These intersections and crossings will need to be designed to cater for both Northern Growth Precinct and SAP/Bomen Business Park traffic. However, the rationalised access should benefit the operation of the Olympic Highway through reduced numbers of flow interruptions.

Bomen Solar Farm

A new solar energy collection facility is proposed for the eastern part of the Bomen Business Park (east of Byrnes Road) within the SAP boundary. A traffic impact assessment for the solar farm, identified that it would include 10 parking spaces and a minor upgrade of the unsealed section of Trahairs Road, east of Byrnes Road, for site access (*Bomen solar farm EIS Traffic impact assessment* (GHD, 20 February 2018)). The traffic impact assessment identifies that the amount of traffic generation generated during the construction will be higher than a relatively small day-to-day operational traffic generation. This would mean very little constraint on the development within the rest of the SAP.

2.9 SUMMARY

The recently constructed upgrades currently planned transport facilities (e.g. Bomen Enabling Works, RIFL and Inland Rail) will place the Wagga Wagga SAP in an excellent position to act as a hub for the surrounding Riverina Area to gain access to wider intrastate, national and international markets.

NSW transport policy supports the provision of increase transport choice to the SAP area (bus service, cycle route), which have been identified in previous transport-related studies of Wagga Wagga and Bomen.

Of the currently planned development within the vicinity of the SAP, the residential development to the west is likely to have the largest combined impact on the performance of the road network.

The existing transport network assessment establishes the baseline transport situation with which to identify the areas to concentrate on for potential future transport solutions.

3 EXISTING AND PLANNED TRANSPORT

3.1 PEDESTRIAN

Due to the rural and industrial nature of the existing Bomen and wider SAP area, with dispersed land use activity and low numbers of pedestrians, there are few dedicated facilities. Walking alongside the road and crossing roads is possible, but there are no facilities to make this safer. The North Wagga Wagga area has the most provision for pedestrians, especially around the public school.

Of the bridges across the Murrumbidgee River:

- Olympic Highway – has wide shoulders on the bridge but no pedestrian or cycle facilities
- Hampden Avenue – has a pedestrian path on the eastern side connecting in to the Wagga Wagga CBD, but this finishes immediately at the northern end of the bridge
- Eunony Bridge Road – currently has no pedestrian or cycle facilities. No details on these facilities in the proposed upgrade bridge have been identified.

The Bomen Strategic Master Plan included consideration of a future pedestrian bridge over the Sydney/Melbourne rail line at the eastern end of Bomen Road, near the Teys facility and the old Bomen Train Station.

3.2 BICYCLES

The type and quality of the existing cycle facilities varies considerably across Wagga Wagga. In some areas, the routes are constructed of asphalt while other areas are concrete slabs or hard packed soil. Some routes are marked with painted bicycle symbols, with most located within marked on-street parking areas in residential areas (Figure 3.1).



Source: Google Street view

Figure 3.1 On-road cycling facility – Kincaid Street

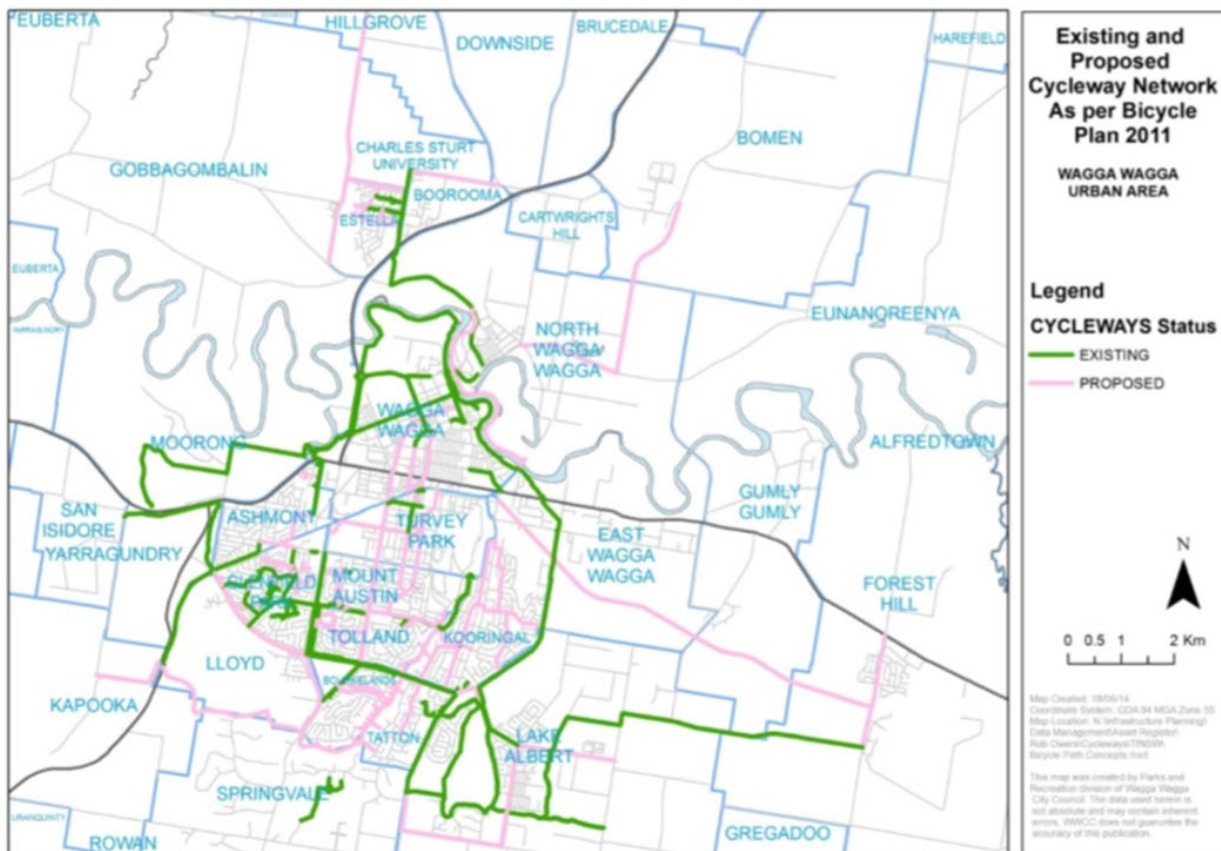
The online cycling map also shows the existing on-road shared facilities and the off-road shared paths in Wagga Wagga. An off-road shared path facility is shown in Figure 3.2 overleaf.



Source: Google Street view

Figure 3.2 Off-road shared path – Plumpton Road

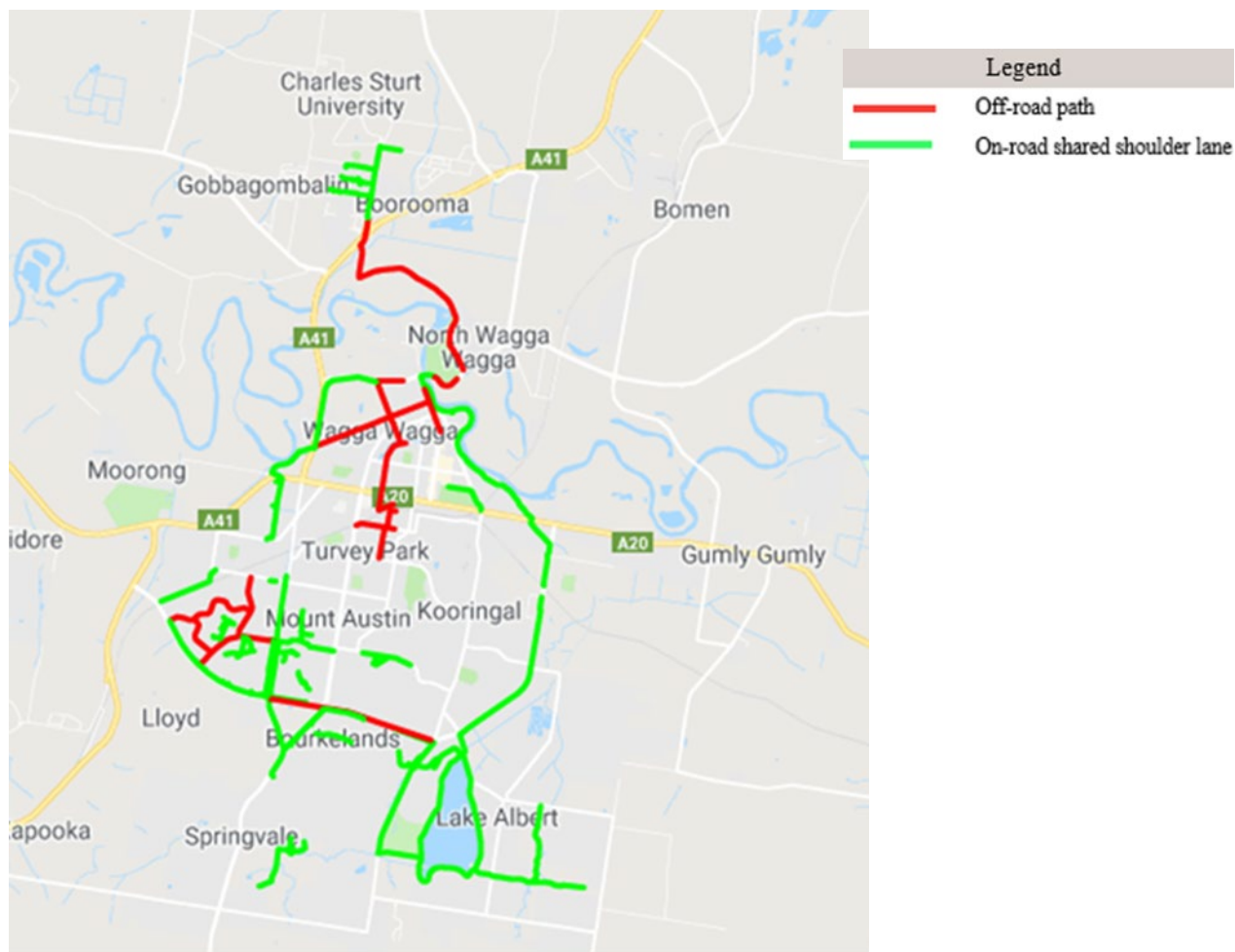
In 2011, WWCC developed a Bike Plan. Existing and proposed routes were mapped, as shown in Figure 3.3. The existing routes in the 2011 Plan, are primarily off-road or on a shared path. The network is not well connected, with many gaps, particularly within the City. A relatively comprehensive network forms a 'ring' around the urban area, south of the Murrumbidgee River. While there are no facilities currently located in Bomen or the SAP areas, there is a proposed future route to Bomen alongside Mill Street, Oura Road and Byrnes Road.



Source: Wagga Wagga City Council, 2011

Figure 3.3 Existing and Proposed Active Transport Routes

The routing is not consistent between the online map and the map in the Bike Plan. The 2011 Bike Plan indicates that the cycling network is more extensive than the online mapping indicates. However, both maps are consistent in that there is a lack of bicycle facilities in the northeast area of the local government area where Cartwrights Hill and Bomen are located.



Source: Wagga Wagga City Council

Figure 3.4 On-line bicycle map (July 2019)

In 2018, the bicycle network was further refined with the development of the principal bicycle network. The intent is to provide a network of active transport corridors to support cycling and walking in the community through connecting neighbourhoods and improving safety and accessibility. The principal network connects to numerous lower-order routes which creates an integrated network of over 100 kilometres of bicycle infrastructure serving the Wagga Wagga urban area. It includes a University Link north of the Murrumbidgee River.

Along with identifying the principle network, the plan provides detailed information about the type of facilities that can be constructed – based on several factors, including road reserve width, traffic speeds and volumes, gradient, sight lines and the number and type of users expected. Providing safe options for cyclists to travel through intersections were identified in the plan.

The plan also includes a business case and implementation plan to develop the network shown in Figure 3.5. These were developed as part of an overall package to obtain funding and develop the network by the end of 2020. This package was approved for funding from the NSW State Government in 2018.



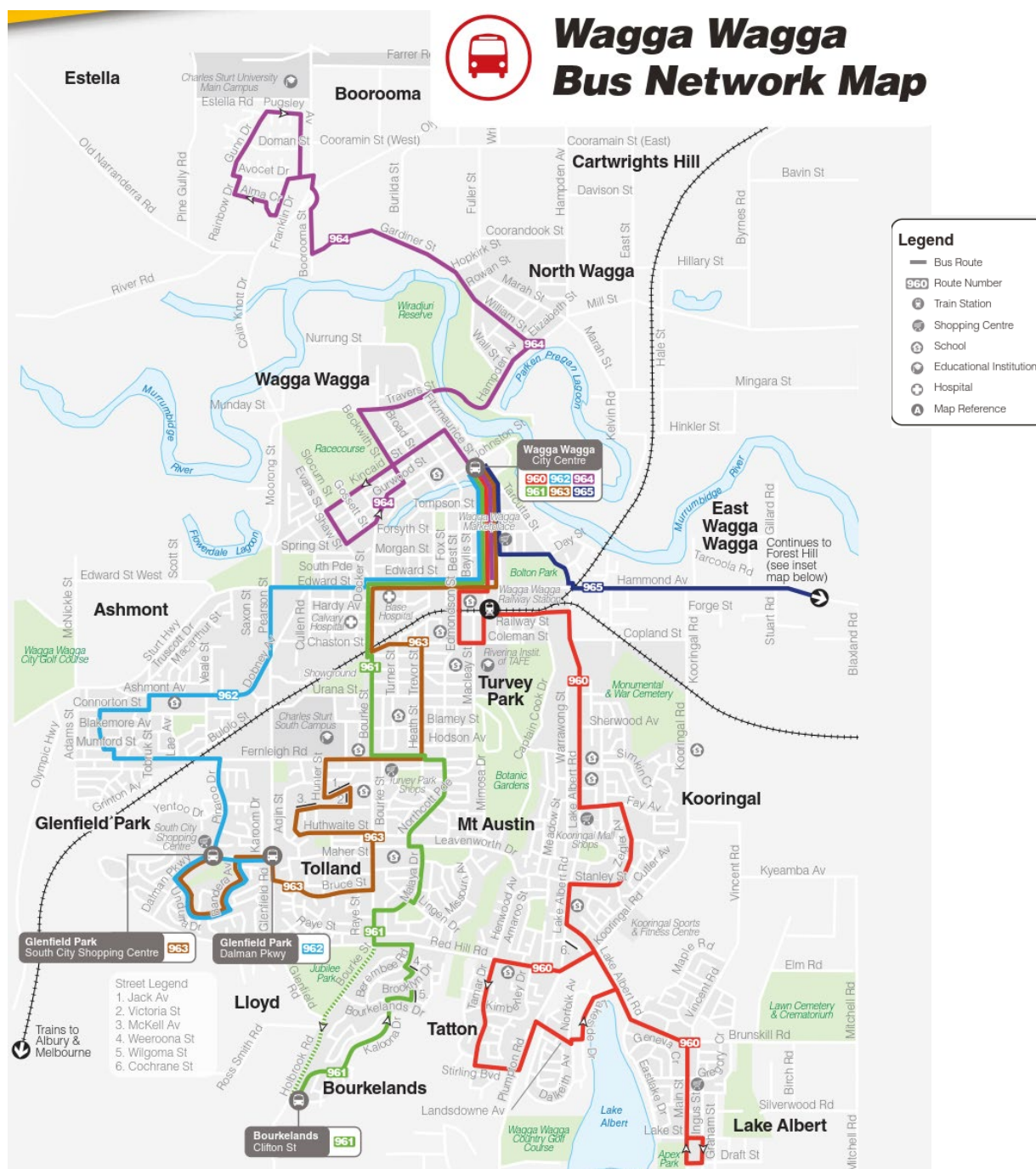
Source: Wagga Wagga Active Travel Plan project, Wagga Wagga City Council and Roads and Maritime Services, July 2018

Figure 3.5 Active Travel Plan priority bicycle map (July 2018)

3.3 BUSES

No regularly timetabled bus services currently travel into or near the SAP. The closest are Routes 964, 966, 967 and 968 that use the Hampden Avenue Wiradjuri Bridge, William Street and Gardiner Street on their way to the University and Estella.

The existing bus network in Wagga Wagga is focussed on a main CBD corridor along Fitzmaurice Street and Bayliss Street. The official terminus is at the intersection of Fitzmaurice Street and Johnston Street, as shown in Figure 3.6.



Source: *Busabout bus network map, viewed on website viewed 12 July 2019*

Figure 3.6 Existing bus network

The frequency of bus services in Wagga Wagga, summarised in Table 3.1, is currently low compared to the convenience of the private vehicle. The time of operation matches regular office/business hours. However, it provides only limited support for shift times or seven-day operation, with no services before 7.00 am and after 6.00 pm on a weekday and no service on Sunday. Even if a service could be provided to Bomen in a wider range of hours to suit employment needs, the connecting bus network in the rest of Wagga Wagga would also need an increase in hours of operation to provide a network-wide solution.

Table 3.1 Existing bus frequency summary

Route	From/To	Number of services			Days/Time periods of operation	
		AM peak hour	PM peak hour	Weekday		
960	Lake Albert to Wagga Wagga	2	2	13 in/11 out	Monday to Saturday, morning to afternoon	
961	Bourkelands to Wagga Wagga	1	1	12 in/10 out	Monday to Saturday, morning to afternoon	
962	Glenfield Park to Wagga Wagga	1	1	13 in/12 out	Monday to Saturday, morning to afternoon	
963	Glenfield Park to Wagga Wagga	2	2	13 in/12 out	Monday to Saturday, morning to afternoon	
964	Wagga Wagga to Albury Street	0	1	7 in/7 out (loop)	Monday to Saturday, day to early afternoon	
965	Forest Hill to Wagga Wagga	0	1	5 in/5 out	Monday to Saturday, day to early afternoon	
966	University and Estella to Wagga Wagga	2	3	9 in/7 out	Some shared services Combined total 17 in/ 16 out	Monday to Saturday, morning to afternoon
967	University and Estella to Wagga Wagga	0	1	7 in/7 out		Monday to Saturday, day to early afternoon
968	University and Estella to Wagga Wagga	0	1	3 in/3 out		Monday to Friday, day to early afternoon

Source: Busabout Wagga timetables, website viewed 12 July 2019

The NSW Government has committed to improving local public transport services in 16 regional cities, including Wagga Wagga. Transport for NSW have been working with local stakeholders and community to develop more customer focused services, improved journey times, increased temporal coverage and linking new destinations including the Bomen Business Park. Transport for NSW are investigating options to service the Bomen area, which may include a trial service to inform further changes.

3.4 FREIGHT

The closest intermodal terminals are the LINX facility in Bomen and the Qube facility in Harefield, approximately 10 km north of the SAP. The LINX intermodal terminal handles containerised freight to Melbourne on the Pacific National Griffith to Melbourne service. There is also a rail siding into AusTrack to load concrete sleepers. There are also rail sidings adjacent to Wagga Wagga Station.

The opportunities offered by the Inland Rail and the proposed RIFL development in association with the intermodal activities of the VISY plant in Tumut will create new opportunities for the existing Bomen businesses and wider SAP area.

The SAP is located within the Riverina–Murray region; a region recognised as an economic powerhouse for NSW. The region is strategically located with access to key road and rail links on the National Land Transport network and is a major producer of agricultural (grain and oil seeds) and forestry products.

Existing

Transport for NSW freight model data provides information on the types, amounts, origins and destinations and mode of transport of freight in NSW. Table 3.2 outlines the data for the Wagga Wagga local government area.

This data shows a dominant pattern of importing of freight by road and exporting by rail. The movement of grain is important for import and export by road and rail, representing over 60 per cent of the freight by weight. Other important products include Forestry and horticulture with 14 per cent, livestock and meat with 6 per cent and seed-related products with 5 per cent by weight.

Table 3.2 Summary of existing freight volumes (annual kilotonnes) to/from Wagga Wagga LGA

Origin/Destination	Rail		Road		Total
Within Wagga Wagga	Grain	270	Grain	728	1,453
			Horticulture	7	
			Livestock	204	
			Meal and oil seeds	34	
			Milk	11	
			Seeds (oil seeds)	106	
			Wine and grapes	94	
			Sub-total	1,183	
Export	Forestry to port	441	Grain – within NSW	296	3,284
	Grain – Interstate	165	Horticulture – within NSW	109	
	Grain – within NSW	1,145	Livestock – within NSW	44	
	Grain to port	715	Meal oilseeds – Interstate	18	
	Meal and oil seeds to port	17	Meal oilseeds – within NSW	37	
	Oil from oil seeds to port	36	Meat – within NSW	64	
	Sub-total	2,519	Meat to port	51	
			Milk – within NSW	18	
			Oil from oil seeds – Interstate	13	
			Oil from oil seeds – within NSW	21	
			Other dairy – within NSW	4	
			Other dairy to port	5	
			Wine – within NSW	33	
			Wine to port	52	
			Sub-total	765	

Origin/Destination	Rail	Road	Total
Import	Grain – within NSW 970	Food – within NSW 193	2,512
		Forestry – within NSW 486	
		Fuel from port 100	
		Grain – within NSW 242	
		Horticulture – within NSW 5	
		Livestock – Interstate 50	
		Livestock – within NSW 213	
		Meal and oil seeds – within NSW 11	
		Meat – within NSW 1	
		Milk – within NSW 41	
		Motor vehicles – Interstate 3	
		Motor vehicles from port 8	
		Non-food – within NSW 74	
		Seeds from oil seeds – within NSW 90	
		Steel – within NSW 29	
		Steel from port 4	
		Sub-total 1,552	
Total	3,748	3,501	7,249

Source: Transport for NSW Freight Forecast from the Strategic Freight Model, September 2018

Notes Origin and/or destination = Wagga Wagga local government area for 2016

To provide an understanding of the most important directions for freight movements, the Transport for NSW (TfNSW) freight data was allocated to a direction by WSP based on their origin/destination local government area. The results are shown in Table 3.3. For rail freight, the majority of imports come in from the east and go out to the north-east, with some movement south and west. For road freight, the majority of imports come from east or west (indicating reliance on the Sturt Highway), followed by the south (Olympic Highway). Exports are mainly heading east (via Sturt Highway) or south (via the Olympic Highway). These statistics reinforce the importance of upgrading the Eunony Bridge Road bridge for the connection to the Sturt Highway and the Olympic Highway access to the south (potentially including the Gobbagombalin Bridge).

Table 3.3 Direction of freight arrival/departure to/from Wagga Wagga LGA

Freight movement	Rail	Road
Export	East 87% South 13% Total 100%	East 54%
		South 30%
		West 6%
		North 5%
		North-east 5%
		North-west 0%
		Total 100%
Import	North-east 44% South 32% West 24% Total 100%	East 40%
		West 31%
		South 18%
		North 8%
		North-east 3%
		North-west 0%
		Total 100%

Source: Transport for NSW Freight Forecast from the Strategic Freight Model, September 2018, direction assigned by WSP

Notes Origin and/or destination = Wagga Wagga local government area for 2016

Strategic freight forecasts by Transport for NSW (Transport Performance and Analytics) have been analysed to understand the composition and direction of freight flows from areas around Wagga Wagga.

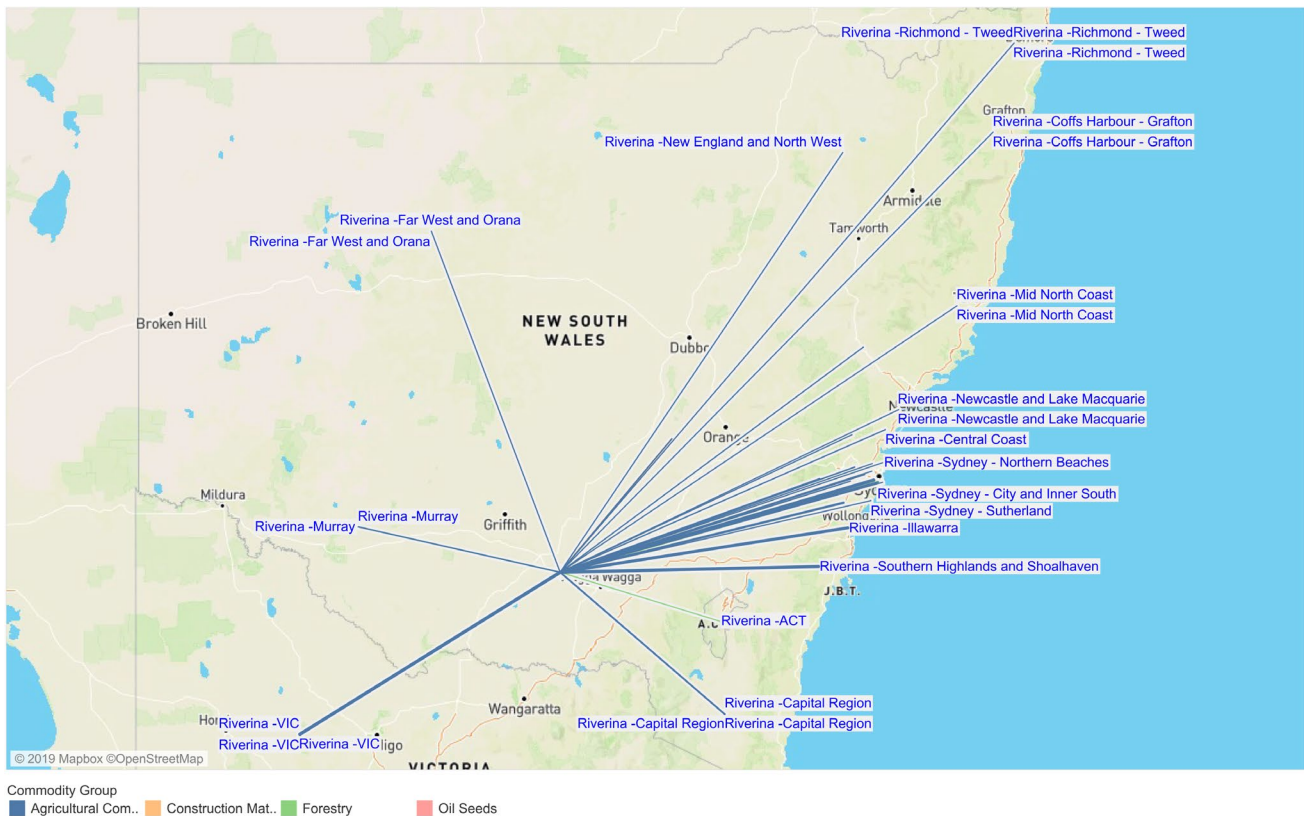
Figure 3.8 shows the destination of commodities in 2056 and suggests that there is no forecast material change to the destination of commodities originating from the Riverina region.

Figure 3.9 shows the composition of commodities originating from the Wagga Wagga area (SA3) in 2016. Almost 85 per cent of all freight movements to, from and around Wagga Wagga are agricultural commodities, with forestry products and oil seeds making up approximately 9 and 6 per cent respectively. It is forecast that the volume of agricultural commodities moved will increase from approximately 4 kilotonnes in 2016 to 6.5 kilotonnes in 2056. Despite commodity volumes increasing in 2056, there is no large change in composition of commodities forecast, as shown in Figure 3.10.

Note that this freight forecast data does not include any uplift or change associated with the development of the RIFL Hub or the Bomen Business Park.



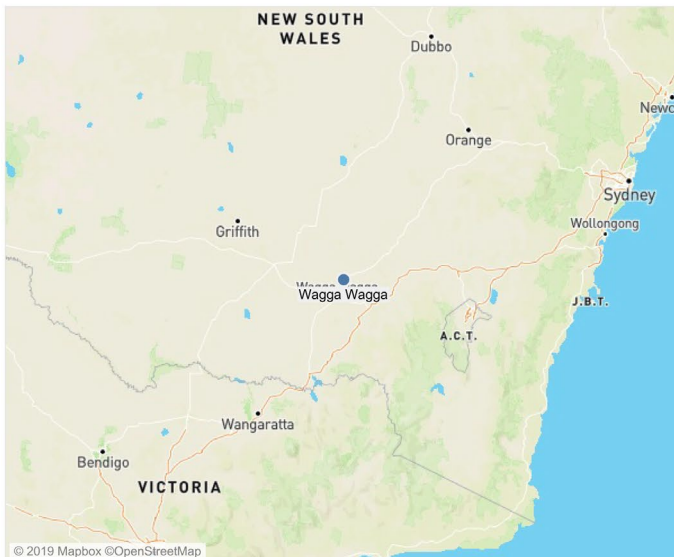
Figure 3.7 Strategic freight forecasts – commodity origin map, Riverina 2016



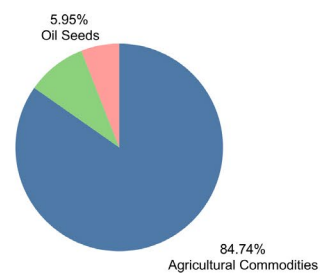
Source: Transport for NSW Freight Forecast, September 2018, NSW open data

Figure 3.8 Strategic freight forecasts – commodity origin map, Riverina 2056

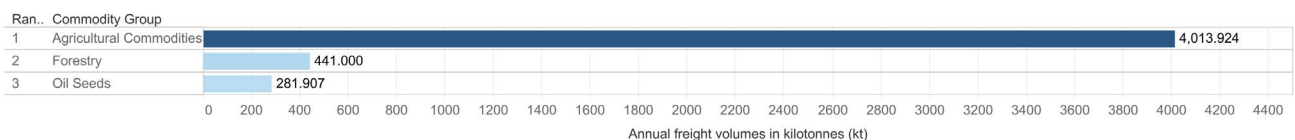
Statistical Area level 3



Composition of Freight Commodities in 2016



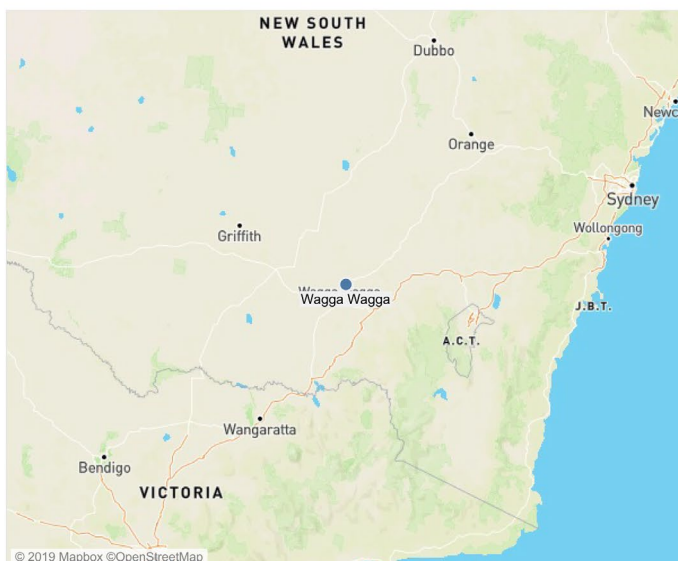
Ranking of Commodity by Volume in 2016



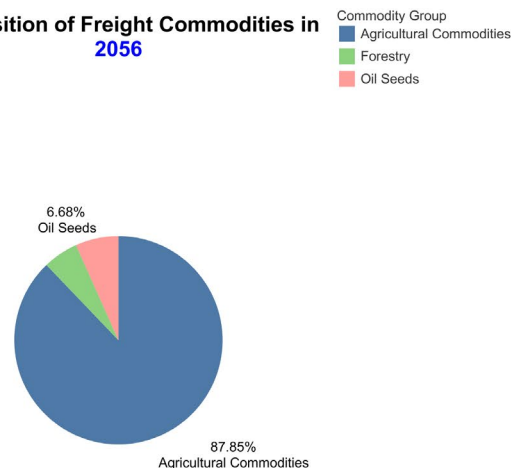
Source: Transport for NSW Freight Forecast, September 2018, NSW open data

Figure 3.9 Strategic freight forecasts – commodity forecast map, Wagga Wagga 2016

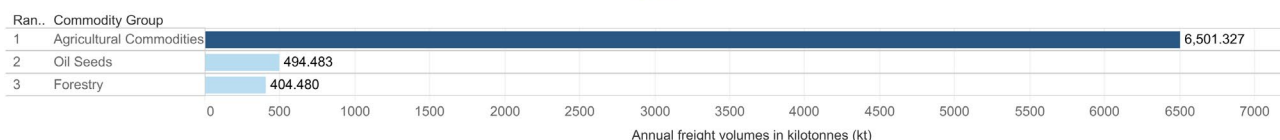
Statistical Area level 3



Composition of Freight Commodities in 2056



Ranking of Commodity by Volume in 2056



Source: Transport for NSW Freight Forecast, September 2018, NSW open data

Figure 3.10 Strategic freight forecasts – commodity forecast map, Wagga Wagga 2056.

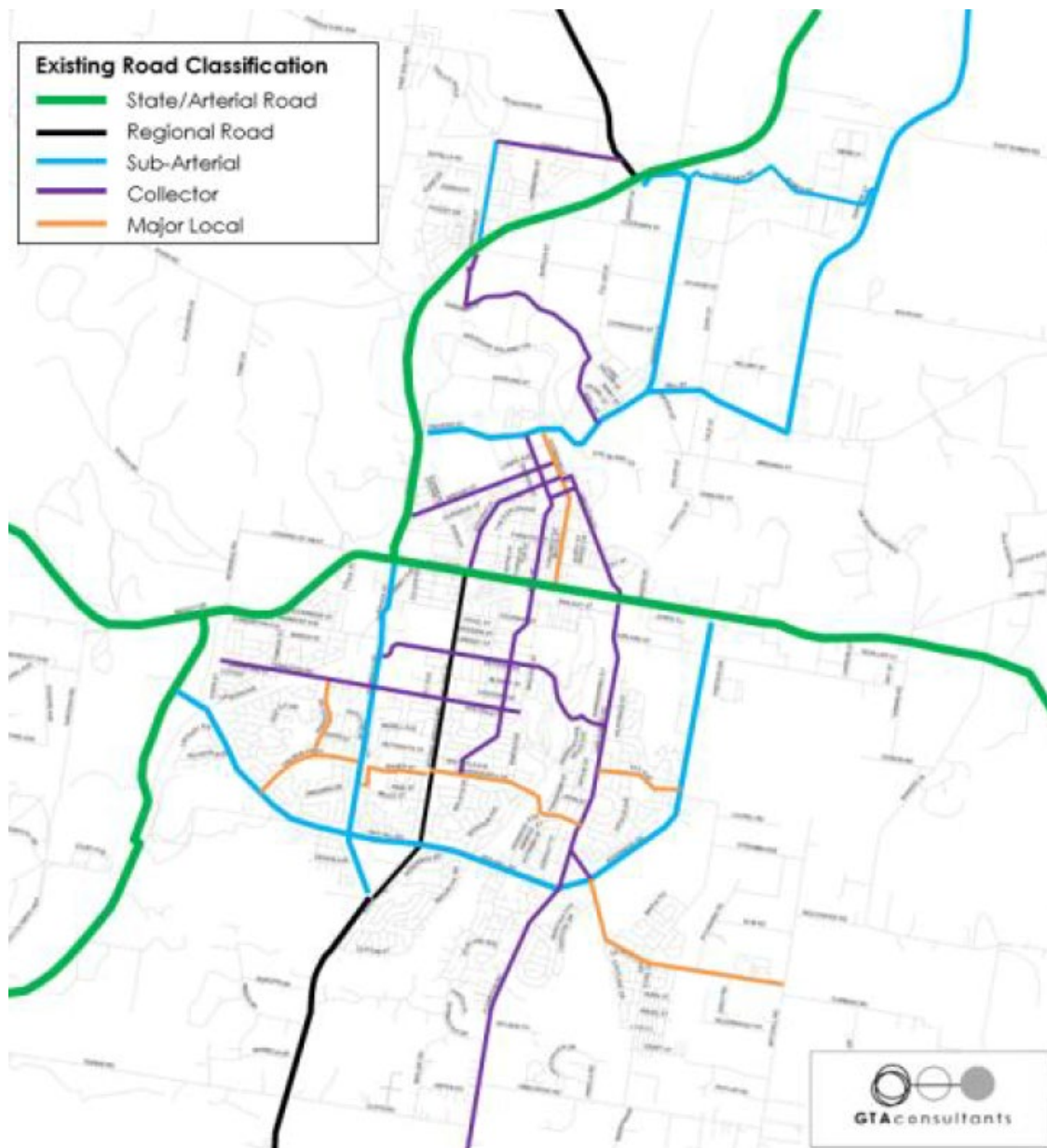
3.5 ROAD NETWORK

This section describes the classification and geometry of the road network in the study area. The information was obtained from the *Schedule of Classified Roads and Unclassified Regional Roads* (Roads and Maritime Services, 2017) and *Alpha Numeric Route Number System* (Roads and Maritime Services, 2013).

The Schedule of Classified Roads and Unclassified Regional Roads classify the road network based the administrative function of the roads. Gazetted State Roads are managed and financed by the Roads and Maritime Services and Regional and Local Roads are managed and financed by Councils.

The alpha-numeric route numbering system was developed for wayfinding purposes in NSW and does not directly relate to the legal classification of roads. The system includes a combination of a letter – either an M (motorway), A (route of national significance) or B (route of state significance) and a number from 1 to 99.

The roads relevant to the study area are detailed in Table 3.4 overleaf. The existing road hierarchy is shown in Figure 3.11.



Source: *Existing Road Hierarchy: (Source: GTA Consultants Technical Report, 2016) as reported in the Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040, Wagga Wagga City Council, August 2017*

Figure 3.11 Existing road hierarchy

Changes to the road hierarchy proposed in the Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040 include:

- Upgrading of Byrnes Road to a regional road and classification of Eunony Bridge Road after its upgrade.
- Downgrading of Old Bomen Road to a collector road.
- Upgrading of Wall Street, Gardiner Street and Boorooma Street between Hampden Avenue and the Olympic Highway to a sub-arterial route.
- Classification of Merino Road as a sub-arterial road.

These changes appear to be designed to recognise the upgraded freight role for Byrnes Road and Eunony Bridge Road, promote Gardiner Street as an alternative route into town for Estella and Curtin University traffic and reduce through traffic in Cartwrights Hill.

Table 3.4 Existing road hierarchy and description

Road name (Administrative category)	Direction and connectivity	Road description	Survey period (Source)	Daily traffic volume AADT (AAWT)	Heavy vehicle % AADT (AAWT)	25/26 M B-double route	PBS Classes
Sturt Highway Road No: 14 Alpha Numeric No: A20 (State)	East-west between Hume Highway (Tarcutta) to the Newell Highway (Narrandera)	Sealed road, one lane in each direction for most part. Two lanes in each direction between Pearson Street and Gillard Road (Wagga Wagga).	2015 (TfNSW)	<i>East of Wagga (east of O’Hehirs Road at Forest Hill)</i> EB: 8,288 vpd (9,110 vpd) WB: 8,734 vpd (9,584 vpd)	EB: 8.3% (9.3%) WB: 8.0% (9.0%)	Yes	1, 2A, 3A with Permit west of Olympic Highway
Olympic Highway Road No: 78 Alpha Numeric No: A41 (State)	North-south between Hume Highway (north of Albury) to the Sturt Highway (Wagga Wagga) and Grenfell Road (Cowra) via Junee and Cootamundra	Sealed road, one lane in each direction for most part. Two lanes in each direction between Travers Street and Sturt Highway.	2015 (TfNSW)	<i>At Gobbagombalin Bridge</i> NB: 7,339 vpd (8,167 vpd) SB: 7,291 vpd (8,162 vpd)	NB: 6.5% (7.1%) SB: 7.0% (7.7%)	Yes	1, 2A, 3A with Permit
			2018 (TfNSW)	<i>At Gobbagombalin Bridge</i> NB: 9,109 vpd (10,100 vpd) SB: 9,000 vpd (10,000 vpd)	NB: 6.0% (6.6%) SB: 5.6% (6.3%)		
Byrnes Road (Sub-arterial)	North-south between Oura Road (Wagga Wagga) and Kemp Street (Junee). It follows the rail track and provides access to Bomen, Shepherds, Harefield and Junee train stations	Sealed road, one lane in each direction for most part.	2013 (WWCC)	<i>Near Oura Road</i> Bidirectional: 3,065 vpd (3,423 vpd)	Bidirectional AAWT only: 7.6%	Yes	1 (Merino Road to Trahairs Road), 2A, 2B with Permit 3A with Permit, Trahairs Road to Oura Road
Eunony Bridge Road (Regional)	3.8 km road in north-south direction between Sturt Highway and Oura Road	Sealed road, one lane in each direction.	2015 (TfNSW)	<i>South of Oura Road</i> NB: 1,808 vpd (2,032 vpd) SB: 1,887 vpd (2,123 vpd)	NB: 16.4% (17.5%) SB: 16.5% (17.6%)	Yes, max. of 62.5 tonne applies until upgrade	2A, Currently being upgraded for 2B with Permit
Merino Road (Sub-arterial)	East-west sub-arterial road between Olympic Highway and Byrnes Road	Sealed road, one lane in each direction.		N/A		Yes	1, 2A, 3A with Permit
Bomen Road (Sub-arterial)	East-west sub-arterial road between Olympic Highway and Bomen Railway Station	Sealed road, one lane in each direction.	2015 (WWCC)	<i>Between Olympic Highway and Old Bomen Road</i> Bidirectional: 2,824 vpd (2,259 vpd)	Bidirectional AAWT only: 29.8%	Yes	1, 2A, 3A with Permit
Old Bomen Road (Collector)	East-west road between Hampden Avenue and Bomen Road	Sealed two-way road with no delineation. No truck over 4.5 tonne mass limit applies.	2015 (WWCC)	<i>Near Bomen Road</i> Bidirectional: 1,321 vpd (1,075 vpd)	Bidirectional AAWT only: 9.2%	No	-
East Bomen Road (Local)	East-west road between Byrnes Road and Windmill Road	Sealed two-way road with no delineation. Some part of the road is unsealed.		N/A		No	-
Horseshoe Road (Local)	East-west between Olympic Highway and Hampden Avenue	Sealed road, one lane in each direction.		N/A		Yes	2A
Hampden Avenue (Sub-arterial)	North-south road between Fitzmaurice Street and Old Bomen Road	Sealed road, one lane in each direction.	2016 (WWCC)	<i>Near Mary Street</i> Bidirectional: 5,196 vpd (5,614 vpd)	Bidirectional AAWT only: 12.3%	Yes	2A

Road name (Administrative category)	Direction and connectivity	Road description	Survey period (Source)	Daily traffic volume AADT (AAWT)	Heavy vehicle % AADT (AAWT)	25/26 M B-double route	PBS Classes
			2016 (WWCC)	<i>Near Cooramin Street</i> Bidirectional: 2,371 vpd (2,650 vpd)	Bidirectional AAWT only: 9.4%	Yes	
Travers Street (Sub-arterial)	East-west road between Fitzmaurice Street and Olympic Highway	Sealed road, one lane in each direction.	2015 (TfNSW)	<i>West of Murrumbidgee River</i> EB: 3,456 vpd (3,727 vpd) WB: 3,396 vpd (3,661 vpd)	EB: 5.9% (6.5%) WB: 4.8% (5.2%)	Yes	2A
Boorooma Street–Gardiner Street–Wall Street (Sub-arterial)	East-west between Olympic Highway and Hampden Avenue	Sealed road, one lane in each direction	2017 (WWCC)	<i>North of Avocet Drive</i> Bidirectional: 4,583 vpd (5,771 vpd)	Bidirectional AAWT only: 5.4%	No	-
			2017 (WWCC)	<i>South of Avocet Drive</i> Bidirectional: 8,720 vpd (10,225 vpd)	Bidirectional AAWT only: 4.8%	No	
Mill Street–Oura Road (Sub-arterial)	East west between Hampden Avenue and Byrnes Road. Oura Road continues further east to Nangus Road via Oura and Wantabadgeery	Sealed road, one lane in each direction.	2018 (WWCC)	<i>East of Byrnes Road</i> Bidirectional: 4,418 vpd (4,720 vpd)	Bidirectional AAWT only: 19.4%	Yes –between Hampden Avenue and Stapylton Place	2A
Trahairs Road (Local)	East-west local road connecting Olympic Highway, Byrnes Road and access to local properties east of Byrnes Road	Unsealed two-way road.		N/A		Yes – up to 400 m east of Byrnes Road. No loading or unloading permitted	1, 2A, 3A with Permit immediately east of Byrnes Road
Shepherds Siding Road (Local)	East-west local road between Byrnes Road near Shepherds train station to Pattersons Road	Unsealed two-way road.		N/A		Yes – No loading or unloading permitted	2A
East Street (Local)	North-south road between Old Bomen Road and Mingara Street, intersecting at Oura Road	Two-way road with no delineation. Unsealed between Cooramin Street and Oura Street.	2015 (WWCC)	<i>Near Old Bomen Road</i> Bidirectional: 103 vpd (113 vpd)	Bidirectional AAWT only: 15.9%	No	-

3.6 ROAD FREIGHT NETWORK

General access heavy vehicles (which includes 12.5 metres truck, 12.5 metres bus, 19 metres truck-trailer and 19 metres articulated vehicles which of up to 4.3 metres high) do not require additional permits to travel on the road network, unless signposted otherwise. Vehicles longer and larger than these are considered to be Restricted Access Vehicles (RAV) and are required to travel on designated routes only.

Table 3.4 details where B-double access is permitted on the road network per the Restricted Access Vehicles Map (TfNSW, 2019) and the Performance Based Standards (PBS) vehicles classes that are permitted on certain roads.

In addition to the above, there are some sections in Wagga Wagga which permit road trains which include (see Appendix A for vehicle definitions):

- Class 1 vehicles = specialist vehicles up to 19 m long (less than 20 m long)
- Class 2A = less than 26 m long, which includes heavy truck + dog trailer
- Class 2B = less than 30 m long, which includes mini A-doubles
- Class 3A = less than 36.5 m long, which includes B-triples and long A-doubles.

The Heavy Vehicle Access Policy Framework (Transport for NSW, September 2018) seeks to define a network for heavy vehicles, including PBS Class 2B and 3A vehicles. These include vehicles such as Class 3A which are being planned as the design vehicles for the internal roads within the Bomen Business Park. While the focus of the network is the Newell Highway, access routes such as the Sturt Highway (and possibly the Olympic Highway and Wagga Wagga Heavy Vehicle Access Route) are being considered. The road network is being planned by Roads and Maritime to enable:

- PBS Class 3A to a network of roads from the Olympic Highway and Sturt Highway (west of Olympic Highway) with permit only
- PBS Class 2A network around Bomen and to the Sturt Highway east to the Hume Highway. The Sturt Highway is being planned to be PBS 2B compatible (under permit) in the future east of Wagga to the Hume Highway.

A gap in the heavy vehicle network is the Eunony Bridge Road between Bomen and the Sturt Highway to the east. However, the upgrading of this bridge is currently being constructed to permit use by PBS Class 2B vehicles.

Truck compatible rest areas/parking areas/informal heavy vehicle parking areas (see Appendix B for definitions) are provided on the Sturt Highway and Olympic Highway:

- Sturt Highway west: Collingullie Truck Parking – 27 km from Bomen
- Sturt Highway east: Lower Tarcutta – 20 km from Bomen
- Olympic Highway north: Dunning Road Brucedale – 9 km from Bomen
- Olympic Highway south: Henty Bicentennial Park – 69 km from Bomen.

The area in Uranquinty is listed as available for truck use on the NSW Rest Area website, but has a sign advising that it is not for truck use. The approximate 70 km distance between rest areas and Bomen for truck trips to/from the south on the Olympic Highway is more than other major directions.

Other issues for road freight include:

- The availability of refuelling facilities for large vehicles – a new facility is currently under construction on the Sturt Highway in Gumly

- Space available to swap/leave/pick up trailers – instead of haphazard use of the road shoulder in streets within Wagga Wagga.

3.7 LIVESTOCK AND HORSE TRAILS

Livestock currently plays an important role in the Bomen Business Park with the inclusion of the Wagga Wagga saleyards. While most livestock arrive and depart by truck or ute, there are livestock highways and travelling stock reserves in the Wagga Wagga area. Those influencing the SAP include:

- Livestock along the Olympic Highway
- Travelling stock reserve on the northern side of Bomen Road/eastern side of the Olympic Highway
- Travelling stock reserve on the western side of the Olympic Highway, in Brucedale, south of Vonarx Road
- Travelling stock reserve on the northern side of Coolamon Road, connecting to the Agricultural College and a livestock highway connecting to the Olympic Highway
- Travelling stock reserve near Bomen Lagoon on the corner of Oura Road and Hale Street.

Wagga Wagga City Council information identifies horse riding trails:

- In Wilks Park, between Hampden Avenue, Gardiner Street and the Murrumbidgee River
- In land on the north side of Oura Road between East Street and the Mail Southern Railway embankment.

3.8 EXISTING MODE SHARE

The 2016 Census results for method of travel to work for Wagga Wagga local government area, shown reinforce the understanding that vehicle travel is the dominant mode choice, even for trips within Wagga Wagga township. Combining driver and passenger, approximately 87 per cent of trips are made by private vehicle. The next highest percentages are walking or working from home. Other mode choices such as public transport and cycling make up only a small percentage of the overall trips. This is due to a combination of low demand and a low level of infrastructure and services.

Table 3.5 Transport mode for journey to work

Transport mode	Trips from	Trips to
Car, truck or motorcycle driver	81.4%	80.0%
Car passenger	6.4%	6.1%
Public transport	0.6%	0.6%
Taxi	0.3%	0.3%
Bicycle	0.7%	0.7%
Walk only	5.1%	5.7%
Other	1.1%	2.0%
Worked at home	4.4%	4.5%
Total	100.0%	100.0%

Source: Australian Bureau of Statistics, *Census of Population and Housing, 2016 Method of Travel to Work*

Notes Statistics for trips to or from Wagga Wagga local government area

3.9 SUMMARY OF EXISTING TRANSPORT

The existing situation for transportation in the SAP area is:

- Low levels of provision of pedestrian facilities in the Bomen area and between Wagga Wagga CBD and the area north of the Murrumbidgee River.
- Low levels of provision of cycling facilities, with future plans to extend a new route to Bomen.
- No bus service, but with future plans to extend a new service to Bomen.
- Large volumes of freight arriving by road and leaving by rail, with agricultural product the main commodity transported, road freight mainly arriving from the east or west (i.e. the Sturt Highway), and the south (Olympic Highway) and leaving to the east (via Sturt Highway) or south (via the Olympic Highway).
- The road hierarchy and traffic data confirm the important role of the three Murrumbidgee River Crossings and the Sturt Highway through Wagga Wagga for traffic movement.
- The upgrading of the Eunony Bridge Road bridge as a critical missing link for the freight network.
- A lack of driver rest facilities on the Olympic Highway to the south of Wagga Wagga.
- Livestock routes and reserves focussed on the Olympic Highway near Bomen.
- A dominance of private vehicle travel for journeys to work (approximately 87 per cent) with a relatively small use of public transport and cycling.

4 STAKEHOLDER LIAISON

This section outlines the results of transport-focussed stakeholder liaison undertaken for the Wagga Wagga SAP Infrastructure and Transport Plan. Stakeholders were canvassed to identify any critical issues to be considered as part of the Plan, and to obtain data and information to assist in the assessment of the SAP master plan options and their impact on the transport network.

4.1 TRANSPORT FOR NSW

Consultation has been undertaken with Transport for NSW, including the former Roads and Maritime Services. The purpose of the consultation was to understand the key issues to be considered as part of the SAP assessment process and to obtain useful information for the transport study. The results are summarised below:

- Driver facilities need to be upgraded for large increases in truck freight movement.
- Freight forwarding businesses typically have large transport requirements. A freight connection to the Airport is important for business travel options and the potential for some freight tasks, such as the delivery of high value, specialist equipment or components. The potential for air freight exports will depend on the commodities manufactured in the SAP.
- Class 3A heavy vehicle truck access into the SAP area is important – e.g. for the design of intersections. There should be no new height constraints built for the road network. Livestock vehicles can be 4.6 metres high. A-double and B-triple access needed over Eunony Bridge Road and Byrnes Road.
- The Wagga Wagga Heavy Vehicle Route should be designed to accommodate the same class of vehicles as the Sturt and Olympic Highways are being designed for – i.e. Class 3A.
- When considering potential projects, consider that free-flowing movement of freight has environmental benefits compared to trucks stuck in traffic congestion.
- There are refuelling facilities for trucks making east-west movements on the Sturt Highway, but there are limited refuelling opportunities for north-south movement on the Olympic Highway. Could a service facility be provided within the SAP?
- There are unofficial trailer de-coupling areas around Wagga Wagga, which causes issues with adjoining properties.
- Rail noise from IMT operations is to be managed through appropriate provision of buffers to residential areas and protection of industrial land from urban encroachment.
- Freight horizon should be 20 years plus another 20 years for long-term.
- TfNSW is interested in identifying opportunities to introduce public transport to Bomen. The workforce is spread within Wagga Wagga and surrounding towns and has shift work, which makes providing a viable and effective fixed route bus service difficult.
- SAP area needs north-south and east-west internal connections.
- Consider separate freight access points from workforce to improve freight efficiency.
- Private connections between properties with related businesses could reduce truck travel on the road network and provide for more efficient operation, e.g. an automated tug, an overhead conveyor/elevator or a pipeline.
- For employees, consider the opportunity for a vehicle park-and-ride facility within Wagga Wagga town.

- Protect corridors for active transport even if demand is low initially.
- Additional development could put pressure on Merino Road.
- Setting up a Development Corporation could allow it to provide incentives for less parking and the funding of a shuttle bus (see earlier comment regarding public transport).
- Potential need to upgrade the Gobbagombalin bridge in the future. The upgrading of the intersections at each end would prolong its life substantially and delay the significant capital cost of duplicating it. Other options include:
 - Encourage traffic to CBD onto a different route (Hampden Avenue/Wiradjuri Bridge).
 - Ban certain vehicle movements to simplify intersection operation.

4.2 WAGGA WAGGA CITY COUNCIL

Preliminary discussions have been held with Wagga Wagga City Council to obtain traffic data and access to the Wagga Wagga Strategic Traffic Model. Future discussions will seek to identify any issues Council would like assessed as part of the Infrastructure and Transport Plan.

4.3 BOMEN BUSINESSES

A drop-in session for local businesses was held on 15 and 16 July 2019. Information on their current and potential future requirements is summarised in Table 4.1.

Table 4.1 Local business transport needs and issues

Business	Transport magnitude, employee and transport
Wagga Wagga Sale Yards	<ul style="list-style-type: none"> — Auctions start at 8.00 am. — Trucks in Monday and Thursday, usually from local and eastern seaboard grazing areas. — Vehicles as large as A-double (livestock). — Trucks out to domestic/regional destinations.
Tey's	<ul style="list-style-type: none"> — Approximately 900 employees (full-time equivalents) (can be as high as 1,100 at peak times). — A mixture of regular 8 hour/5-day production, two shifts of 10 hours/6-day day and afternoon shifts, plus cleaning and maintenance shifts. — Approximately 1,200 animals per day in 30 B-double truck movements, mainly from local and eastern seaboard graziers. — Exports in containers (approximately 18 per day) going to local regional and CBD plus Sydney and Melbourne on road or rail via the Qube facility in Harefield. — Listed lack of public transport for employees as an issue.
ROBE	<ul style="list-style-type: none"> — 40 employees over a 24 hour/7-day cycle. — Between 30 and 200 truck movements in per day (peak during harvest time) from Victoria, South Australia and NSW. — Approximately 30 truck trips out with products. — New rail siding an opportunity for harvest time with a means of moving grain into their plant without the need for intermediary truck movements.

Business	Transport magnitude, employee and transport
Austrack	<ul style="list-style-type: none"> — 30 employees (FTE). — Shifts: 12 hours starting at 5.00 am, plus 24/7 operation during peaks. — Semi-trailers and rigid trucks in from South Australia, Queensland and NSW. — Rail movements out with 43 wagons at a time mainly to NSW rail projects. — A longer rail siding would allow quicker loading without the need to break the train into shorter lengths.
Great Southern Electrical	<ul style="list-style-type: none"> — 60 employees (FTE). — Mostly 9 m long medium rigid vehicles and semi-trailers. — Each rail load must be turned around in 24 hours or risk penalties. Current siding makes it difficult to load quickly, safely, efficiently 43 wagons.
Fulton Hogan	<ul style="list-style-type: none"> — 2 to 3 employees (FTE) in shifts of 8 hours, 5 days per week. — Mostly 9 m long medium rigid vehicles and semi-trailers. — 27 trucks per day on average – 30 to 40 during peak times. Same numbers out to local areas and Councils. — Bitumen semi-trailers from Melbourne.
Proway	<ul style="list-style-type: none"> — 90 FTE on site plus 30 contractors. — B-double trucks. — Approximately 30 truck movements per day. — 50% within 5 hours drive of Wagga Wagga, 45% domestic beyond 5 km and 5% export. — Opportunity to provide public transport for employees.
Southern Oil	<ul style="list-style-type: none"> — 24/7 operation, 340 days per year. — 35 FTE on site. — 1,000 B-double tankers in per annum (approximately 3 per day), same number out with refined products. — Rail improvements could compliment expansion for waste transport (currently 80% by road). — Opportunity to source and blend liquid hydrogen locally.
Energi	<ul style="list-style-type: none"> — 77 FTE excluding contractors and logistics. — 24/7 operation, 245 operating days per year. — Approximately 65 truck movements per week for input materials, plus 41 truck movements per week for outbound movement. — Rail an opportunity for future imported battery products to reduce road transport. — Currently shipping 80% air due to maximum mass density limits, so could partner with another business.

This information will be used to identify issues to be considered and in developing trip generation rates for future SAP businesses.

4.4 ARTC

The main points from preliminary consultation with ARTC are:

- ARTC has had input into Inland Rail and RIFL projects and is positive about their opportunities
- The VISY involvement in the RIFL will be good for the SAP
- Further details of the RIFL configuration are needed to identify opportunities for efficiency improvements.

5 LAND USE SCENARIOS

From the Short Enquiry by Design workshop held on 8 and 9 August 2019, three land use scenarios were developed and refined by Master Plan consultants, Jensen Plus. They include:

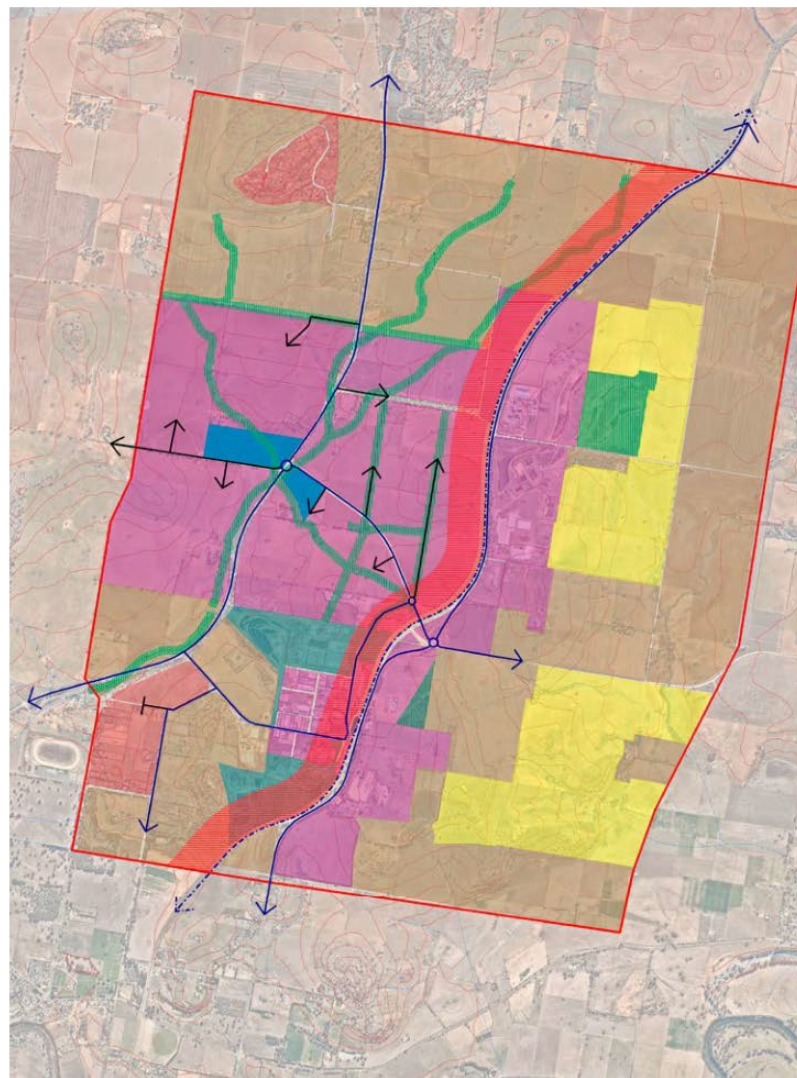
- Scenario 4 High growth scenario, low amenity industries close to RIFL, high amenity technology and clean industries to the west of Olympic Highway
- Scenario 5 Compact scenario, commercial precinct along Bomen Road
- Scenario 7 High growth scenario, development directed north and north-east.

5.1 LAND USE MAPS

The land use maps for the three scenarios (Scenarios 4, 5 and 7) prepared by Jensen Plus are shown overleaf in Figure 5.1, Figure 5.2 and Figure 5.3 respectively. These three maps show the proposed land use types and their respective yields in hectares for each scenario. Note that the SAP boundary was modified slightly following the scenario assessment. The original boundary is shown on the figures in this section to reflect the scenarios considered.

Scenario 4

“Scenario 4 is a ‘high growth’ scenario featuring a central area for low amenity ‘stack’ industries, close to the RiFL hub. A Byrne Road industry cluster develops, along with green corridors, and a new area of high amenity tech and clean industries to the west of Olympic Highway.”



AUG 2019
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Sub Precinct	ha
Regional Enterprise	1276
Intensive Livestock Agriculture	112
Commercial Gateway	37
Solar	476
Landscape Protection	1911
Residential	118
Sub Total	3930
No sub precinct (e.g. existing road reserves)	250
Total	4180

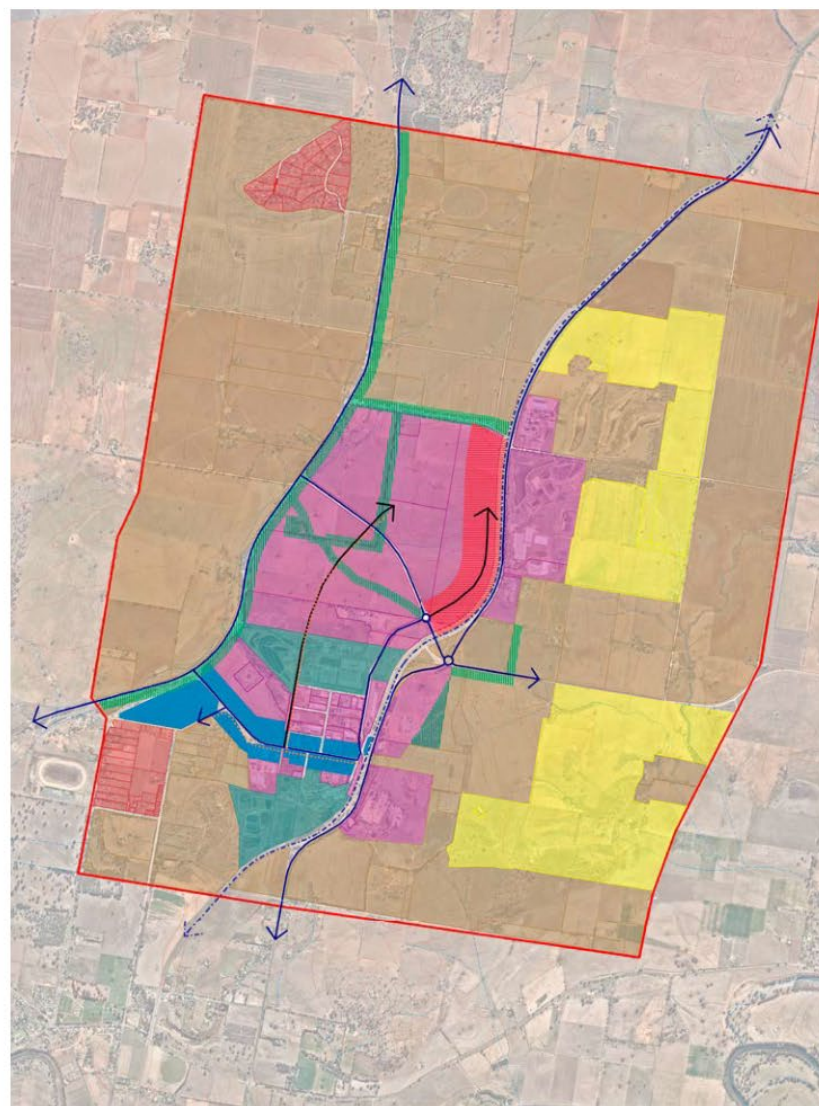
Overlay	ha
Rail Terminals	299
Green Infrastructure	249
Large Allotments	0

Source: Wagga Wagga Special Activation Precinct A.3.A Concept Scenario Options (incorporating Short EbD Workshop Summary), Jensen Plus, August 2019

Figure 5.1 Scenario 4 land use map and yields

Scenario 5

“Scenario 5 is a ‘compact’ scenario focussed on developing land north and south of Merino Drive. A Commercial Gateway precinct is also included along Bomen Road.”



Sub Precinct	ha
Regional Enterprise	647
Intensive Livestock Agriculture	111
Gateway	63
Solar	502
Landscape Protection	2511
Residential	96
Sub Total	3930
No sub precinct*	250
Total	4180

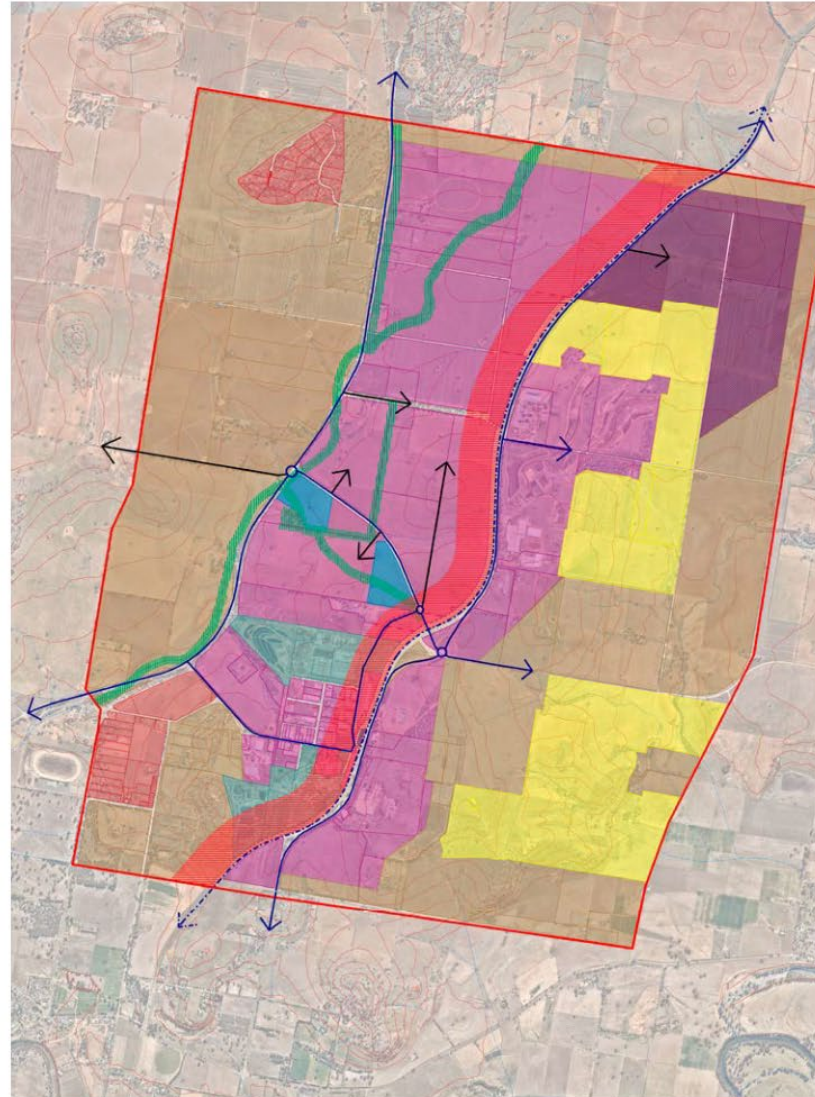
Overlay	ha
Rail Terminals	68
Green Infrastructure	134
Large Allotments	0

Source: Wagga Wagga Special Activation Precinct A.3.A Concept Scenario Options (incorporating Short EbD Workshop Summary), Jensen Plus, August 2019

Figure 5.2 Scenario 5 land use map and yields

Scenario 7

“Scenario 7 is a ‘high growth’ scenario where development is directed north and north-east. It incorporates industry zoned land north-east of Byrnes Road and also new land along Olympic Highway. Additional rail terminals are included north of RiFL.”



AUG 2019
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Sub Precinct	ha
Regional Enterprise	1508
Intensive Livestock Agriculture	114
Gateway	34
Solar	502
Landscape Protection	1653
Residential	119
Sub Total	3930
No sub precinct*	250
Total	4180

Overlay	ha
Rail Terminals	299
Green Infrastructure	143
Large Allotments	219

Source: Wagga Wagga Special Activation Precinct A.3.A Concept Scenario Options (incorporating Short EbD Workshop Summary), Jensen Plus, August 2019

Figure 5.3 Scenario 7 land use map and yields

5.2 SCENARIO ASSESSMENT

5.2.1 ROAD NETWORK STRUCTURE

Recommended strategies from previous studies and stakeholder liaison include:

- Upgrade of the Eunony Bridge Road bridge as a priority to facilitate the Northern Heavy Vehicle Alternative Route (from the WW ITS) and to improve heavy vehicle access for the SAP and facilitate the transition of VISY operations to the RIFL Hub. The upgrade will enable the use of this corridor by Performance Based Standards level 2B vehicles.
- Upgrade the intersections of Old Narrandera Road and the Olympic Highway, and Travers Street and the Olympic Highway to prolong the life of the Gobbagombalin Bridge, and mitigate the impacts of increased residential development in the Northern Growth Area and the SAP.
- Upgrade the Boorooma Road, Gardiner Street, Wall Street, Hampden Avenue route as an alternative route into the CBD via the Gobbagombalin Bridge.
- Further to this, opportunities to further improve the road network based on the high-level assessment of the model results include:
 - Duplicating the Gobbagombalin Bridge in the long-term.
 - Consider providing a corridor width for Eunony Bridge Road suitable to accommodate four lanes in the future.
 - Consider upgrading the intersection of Hampden Avenue and Wall Street and Hampden Avenue and Fitzmaurice Street to prolong the life of the Hampden Avenue Wiradjuri Bridge.

Opportunities for the SAP include:

- Promoting Bomen Road access for cars and Merino Road for heavy vehicles.
- Investigating one/two additional east-west connections, potentially including Trahairs Road for access between the Olympic Highway and Byrnes Road.
- Planning for an internal network of north-south and east-west roads to reduce the need to use the Olympic Highway.
- Investigating the need for another grade-separated crossing of the Main South Rail Line to cater for car access to Byrnes Road.
- Investigating if the land to the west of the Olympic Highway is to be developed as part of the SAP, for a potential grade-separated intersection at Merino Road and the Olympic Highway that provides access into the western area.

The road networks for the three land use scenarios presented (shown in Figure 5.1, Figure 5.2 and Figure 5.3) provide detail for the internal SAP network and connections only. The strength, weakness, opportunities and threat (SWOT) analysis is detailed further in section 5.3. An assessment of the impact of the three land use scenarios on the wider road network and the capacity requirements for the internal road network is provided in section 5.2.2.

The Bomen Strategic Master Plan mentioned the need for an internal road network within Bomen and the SAP to minimise the impact on and the need for limited connections (up to four) to the Olympic Highway, based on a request from Roads and Maritime Services. This was supported by the Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040 and was mentioned again by TfNSW in consultation for this study.

Based on the analysis, the proposed road network for Scenario 5 is preferred. It would be possible to combine the road network for Scenario 5 into the Bomen core portions of Scenarios 4 and 7 to retain its positive qualities in all three scenarios.

5.2.2 ROAD NETWORK CAPACITY

An assessment of the road capacity for the baseline scenario has indicated that by 2060, growth in background traffic in Wagga Wagga and the already planned development in Bomen could require upgrades to the Olympic Highway, Merino Road, Eunony Bridge Road, the Sturt Highway, Bomen Road and Hampden Avenue.

Based on the adjusted output of the Wagga Wagga EMME traffic model, the Olympic Highway at the Gobbagombalin Bridge reaches capacity in the medium-term. This and the residential development in the Northern Growth Area, centred around Coolamon Road, directs additional traffic to Hampden Avenue and over the Wiradjuri Bridge, using up its spare capacity. As time progresses, an increased number of road sections of the Olympic Highway require upgrading, as does the Eunony Bridge Road link between Oura Road and the Sturt Highway.

A list of the provisional road upgrades for the baseline scenario in 2030, 2040 and 2060 is provided in Table 5.1. The SAP is not the sole generation of additional traffic that is driving the need for these potential upgrades, and in some instances may only be a small contributor for the need. Discussions with TfNSW (Roads and Maritime Services) indicate that they are already investigating the potential need to upgrade the following intersections to cater for planned residential growth in the areas of Estella, Gobbagombalin and Boorooma:

- Olympic Highway (Colin Knott Drive) and Old Narrandera Road
- Olympic Highway (Colin Knott Drive) and Travers Street.

In addition, TfNSW is investigating strategies to direct traffic from the proposed Northern Growth Area around Hillgrove to use Hampden Avenue and the Wiradjuri Bridge to access Wagga Wagga CBD to reduce demand for the Gobbagombalin bridge.

Table 5.1 List of road upgrades for the Baseline scenario (currently planned growth in Bomen plus other developments and background traffic growth) with approximate timing for implementation

Road name	2030	2040	2060
Olympic Highway	Merino Road to south of Murrumbidgee River	-	South of Red Hill Road
Merino Road	-	-	Olympic Highway to Byrnes Road
Byrnes Road	-	-	Oura Road to Merino Road
Eunony Bridge Road	-	Oura Road to Sturt Highway	-
Study Highway	East of Eunony Bridge Road	West of Olympic Highway	-
Bomen Road	-	-	Olympic Highway to Dorset Drive
Hampden Avenue	Wiradjuri Bridge	Bomen Road to CBD	-
	South of Bomen Road borderline		

The comparison between the Baseline, Scenarios 4, 5 and 7 has indicated that by 2060, large road sections of the Olympic Highway and Sturt Highway, as well as Merino Road, Byrnes Road, Eunony Bridge Road, Bomen Road and Hampden Avenue require upgrading. Of the road sections investigated, only the Olympic Highway and Byrnes Road north of the SAP did not require upgrading.

Comparison of Scenarios 4, 5 and 7

Scenarios 4 and 7 were assessed as having higher traffic generation than Scenario 5. The implications for the road network are increased road capacity into and out of the SAP along with increased road upgrade requirements on the wider road network.

As identified in section 5.2.1, Scenario 5 has a more extensive internal road network, providing greater opportunities for movement within the SAP and reducing the impact on the external road network. It is recommended that Scenarios 4 and 7 incorporate a similar internal road network. This is more important for these scenarios because of their higher traffic generation, increased potential for internal trips to impact the external road network, coupled with increased reliance on the external road network operating efficiently.

The traffic assignment process has identified that the current road capacity into and out of the SAP is insufficient to cater for the traffic generated at full development. This means that for each scenario, Merino Road, Bomen Road and Hampden Avenue will require additional capacity and/or new road connections will be required.

For the purpose of quantifying the potential road reservations for full development, Table 5.2 outlines the number of lanes required for connections between the SAP and the external road network for each of the land use scenarios. Much of the lane requirements are triggered by the afternoon peak period demand, where the forecasted trips by workers are notably higher than other peaks on the road network. The table also presents options for delivering this increased road capacity, i.e. one road with four lanes or two roads with two lanes.

It is noted that some of the road capacity for Scenario 4 would serve the high-amenity industrial land located west of the Olympic Highway. Similarly, some of the road capacity for Scenario 7 would serve the industrial land located east of Byrnes Road, which does not require a crossing of the Main South Rail Line. Additional detail is required to be able to split the lane capacity requirements to this level of detail.

Table 5.2 Required capacity of road connections from the SAP to the external road network

External road connection	Scenario 4	Scenario 5	Scenario 7
Westbound towards Olympic Highway at Merino Road or parallel roads further north	<p>To maximise capacity, Merino Road is to have limited direct property accesses and no on-street parking throughout.</p> <p>Six lanes (three each way), this includes:</p> <ul style="list-style-type: none"> — One road with two lanes in each direction (i.e. Merino Road) — Another road with one lane in each direction, from the land west of Olympic Road. 	<p>To maximise capacity, Merino Road is to have limited direct property accesses and no on-street parking throughout.</p> <p>Four lanes (two each way):</p> <ul style="list-style-type: none"> — One road with two lanes in each direction (i.e. Merino Road). 	<p>To maximise capacity, Merino Road is to have limited direct property accesses and no on-street parking throughout.</p> <p>Six lanes (three each way):</p> <ul style="list-style-type: none"> — One road with two lanes in each direction (i.e. Merino Road) — Another road with one lane in each direction, near Trahairs Road.

External road connection	Scenario 4	Scenario 5	Scenario 7
Westbound towards Olympic Highway at Bomen Road	Three lanes (one eastbound, two westbound for PM worker exit).		
Southbound towards Hampden Avenue	Five lanes (two northbound, three southbound for PM worker exit): — One road with two lanes in each direction, plus — Two roads with one lane in each direction.		
Eastbound towards Byrnes Road (requires grade separation of the Main South Rail Line)	<p>To maximise capacity, Merino Road is to have limited direct property accesses and no on-street parking throughout.</p> <p>Seven lanes (four eastbound, three westbound):</p> <ul style="list-style-type: none"> — One road with two lanes in each direction (Merino Road) — Another road with one lane in each direction plus a PM eastbound lane. 	<p>To maximise capacity, Merino Road is to have limited direct property accesses and no on-street parking throughout.</p> <p>Four lanes (two each way):</p> <ul style="list-style-type: none"> — One road with two lanes in each direction (Merino Road). 	<p>To maximise capacity, Merino Road is to have limited direct property accesses and no on-street parking throughout.</p> <p>Eight lanes (four eastbound, four westbound):</p> <ul style="list-style-type: none"> — One road with two lanes in each direction (Merino Road) — Additional connection from western side of rail line near Trahairs Road to Byrnes Road – one lane in each direction, includes extra grade separated crossing — Additional connection from eastern side of Byrnes Road north of Trahairs Road – one lane in each direction.
Total lanes	<ul style="list-style-type: none"> — 9 lanes in — 12 lanes out 	<ul style="list-style-type: none"> — 7 lanes in — 9 lanes out 	<ul style="list-style-type: none"> — 10 lanes in — 12 lanes out

This assessment does not include additional allowance for car traffic using Merino Road, Byrnes Road and Eunony Bridge Road. The lane requirements shown in Table 5.2 are shown graphically in Figure 5.4, Figure 5.5 and Figure 5.6 Scenarios 4, 5 and 7 respectively. These three figures show the proposed road networks for each scenario in the form of a high level schematic diagram with proposed lane capacities for each.

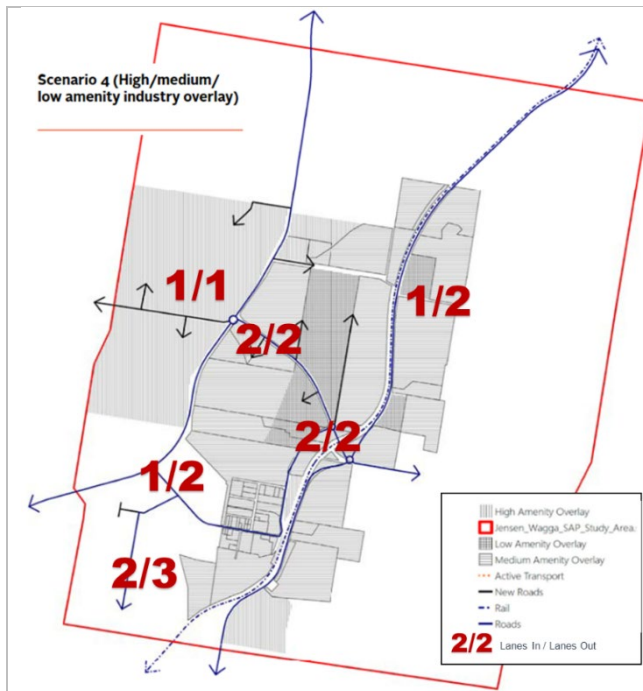


Figure 5.4 Scenario 4 road network with lane capacity for ultimate development

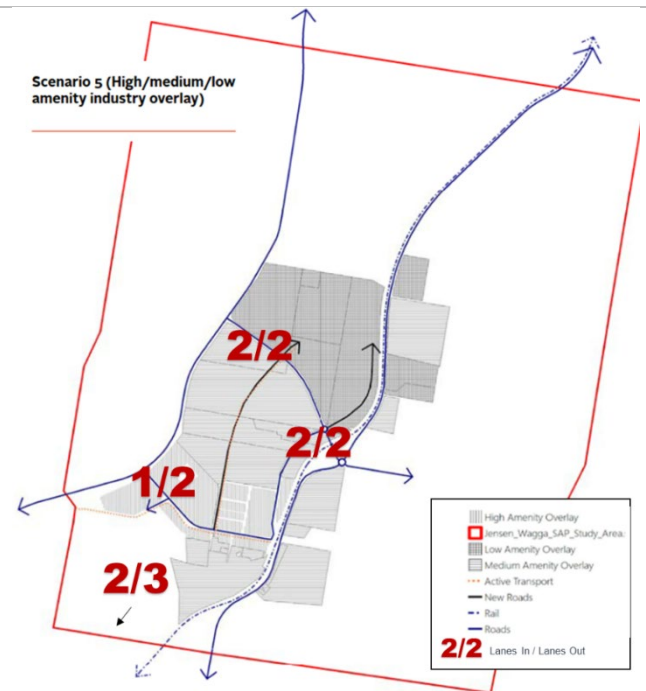


Figure 5.5 Scenario 5 road network with lane capacity for ultimate development

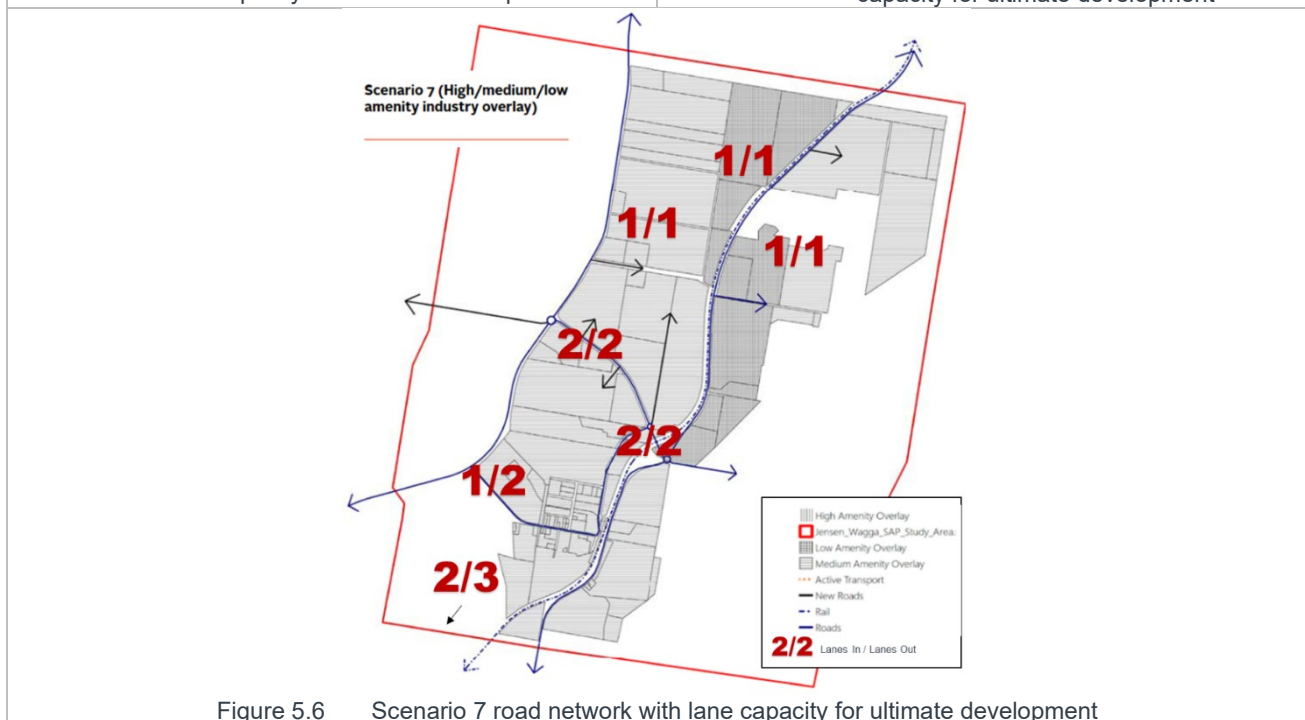


Figure 5.6 Scenario 7 road network with lane capacity for ultimate development

Table 5.2 includes suggestions for how the additional lanes could be provided/located. This assumes that Merino Road can be widened to two lanes in each direction, including through the underpass of the Main South Rail Line. If this is not possible, an additional grade separation would be required.

Some other notes about the possible road upgrades required by 2060 under ultimate development:

- Byrnes Road north of Oura Road and Eunony Bridge Road is required to have three lanes in each direction for Scenarios 4 and 7. Two lanes in each direction is sufficient for Scenario 5.
- Sturt Highway is required to have six lanes (three in each direction) by 2060. The Baseline and Scenario 5 are the last to require upgrading from four to six lanes, with the PM eastbound direction have a LoS E with a four-lane carriageway.

- Merino Road and the Olympic Highway is required to have limited access and no parking in all the scenarios.
- Six lanes would be required on the Gobbagombalin Bridge by 2060 for Scenarios 4 and 7 (three in each direction). The Baseline and Scenario 5 would only require five lanes (two northbound and three southbound). It is noted that the SAP is only one source of traffic growth contributing to the need for this upgrade. Other transport strategies (e.g. promoting alternative corridors for traffic growth or improved public transport) may be able to delay or reduce the scope of this upgrade.
- Scenario 5 would require three southbound lanes on the Olympic Highway between Merino Road and Coolamon Road to cater for workers living in the Northern Growth Area, or alternatively a connection from Bomen Road into the Northern Growth Area.
- Scenarios 4 and 7 would require three southbound lanes from Merino Road to the Gobbagombalin Bridge.
- The high volume of traffic using the Hampden Avenue and Wiradjuri Bridge corridor indicates that by 2060 either eight lanes are required, or two crossings of four lanes (two each way) are required.

Intersections

It is expected that with the magnitude of traffic changes being considered for 2060, several intersection upgrades would be required in addition to the road upgrades mentioned. For access intersections into the SAP, this is likely to include:

- Olympic Highway and Merino Road
- Olympic Highway and Bomen Road
- Byrnes Road and Merino Road.

The widening from one to two lanes for Byrnes Road, the Olympic Highway, Merino Road and Bomen Road will automatically require a reconfiguration of the intersection and possible change of intersection control type (traffic signals or roundabout) to maintain safe operation. In addition, the management of, and planning for, increase traffic volumes along the Hampden Avenue corridor is required to minimise the impact on residents and schools in North Wagga Wagga.

Summary

The 2060 timeframe and ultimate development of the three land use scenarios generates much of the need for some road upgrades. Due to the long timeframe until this occurs, changes in background traffic growth or the pace of development could have a large impact in delaying some of the more extensive upgrades, e.g. widening the Sturt Highway, Hampden Avenue and Gobbagombalin Bridge to six lanes.

It is therefore not possible to definitively conclude that the road network does not have sufficient capacity (with reasonable upgrades) to accommodate Scenarios 4 and 7, as changes to background traffic growth could change the magnitude of the development.

The obvious conclusion, however, is that Scenarios 4 and 7 have a substantially larger impact on the road network, while Scenario 5 has impacts that are closer to that of the Baseline.

In terms of the access roads into and out of the SAP, the level and distribution of road capacity is in scale with the areas being developed. The new road connections could be staged to open as new land parcels are developed. The largest impact is the additional grade-separated crossing of the Main South Rail Line in Scenario 7. The widening of the Hampden Avenue/Wiradjuri Bridge corridor could also be staged, with four lanes providing sufficient capacity in 2040 Baseline and Scenario 5.

5.2.3 HEAVY VEHICLE NETWORK

Recommended strategies from the Baseline analysis include:

- Upgrading the Eunony Bridge to accommodate Class 3 heavy vehicles is a critical infrastructure upgrade for the success of the SAP.
- Considering locating a fatigue management centre, trailer interchange and a high-quality service centre within the SAP. This could include a charging station for electric vehicles.
- Investigating opportunities to provide a truck compatible rest area or truck parking area with access to the Olympic Highway south of Wagga Wagga with appropriate facilities as part of a wider improvement to heavy vehicle facilities in the area.

The Eunony Bridge upgrade is under way and is therefore common to all three land use scenarios plus the baseline.

All three land use scenarios include a potential location for a fatigue management centre, trailer interchange, high-quality service centre within their Commercial Gateway area. In terms of space requirements, using the facility on the Hume Highway at Marulan as an example, a size of between 3.6 hectares and 3.7 hectares could be required. It is noted that additional space may be needed for 3A vehicles and trailer coupling/decoupling, which aren't included at the Marulan facility. While the amount of land dedicated to this facility is not known, it is noted that all three scenarios have substantially more than this area allocated to the Commercial Gateway. The options close to the Olympic Highway would ideally be accessed via Merino Road to limit direct access to the Highway.

Table 5.3 provides commentary on the heavy vehicle provisions and impacts for Scenarios 4, 5 and 7, in terms of the positive and negative qualities, as well as suggestions for potential improvement.

Table 5.3 Summary of Heavy Vehicle Network assessment

Scenario	Positive qualities	Negative qualities	Potential improvements
4	<ul style="list-style-type: none"> — Includes adequate space for service centre and trailer interchange — Potential location for truck service centre either adjacent to Olympic Highway and/or RIFL Hub. 	<ul style="list-style-type: none"> — Concentrates development and access on Merino Road – part of the nominated heavy vehicle route between the Olympic Highway and Sturt Highway. — Employee access may reduce road performance on Merino Road. 	<ul style="list-style-type: none"> — Add internal road network to reduce demand on Olympic Highway, Merino Road, Dorset Drive.
5	<ul style="list-style-type: none"> — Includes adequate space for service centre and trailer interchange. 	<ul style="list-style-type: none"> — Potential location for truck service centre away from both Olympic Highway and RIFL Hub. 	<ul style="list-style-type: none"> — Relocate service centre either adjacent to Olympic Highway and/or RIFL Hub.

Scenario	Positive qualities	Negative qualities	Potential improvements
7	<ul style="list-style-type: none"> Includes adequate space for service centre and trailer interchange. Potential location for truck service centre either adjacent to Olympic Highway and/or RIFL Hub. 	<ul style="list-style-type: none"> Concentrates development and access on Merino Road – part of the nominated heavy vehicle route between the Olympic Highway and Sturt Highway. Employee access may reduce road performance on Merino Road. 	<ul style="list-style-type: none"> Add internal road network to reduce demand on Olympic Highway, Merino Road, Dorset Drive.

5.2.4 FREIGHT

The outcomes from the Baseline analysis was that the following principles should guide the development of the SAP:

- RIFL and Inland Rail are substantial opportunities for the success of the SAP
- Maximise working length of the new RIFL rail siding
- Encourage rail-compatible businesses to locate their operations alongside rail line.

A summary of the freight, rail and intermodal assessment of Scenario 4, 5 and 7 is included in Table 5.4. This includes the positive and negative qualities and potential improvements that could be made.

Table 5.4 Summary of Freight and Intermodal assessment

Scenario	Positive qualities	Negative qualities	Potential improvements
4	<ul style="list-style-type: none"> Road freight task distributed between Olympic Highway and Byrnes Road. Preserves significant land for industrial uses and future expansion. Preserves significant area for future rail terminals. 	<ul style="list-style-type: none"> Concentration of Regional Enterprise with accesses along Byrnes Road could affect road safety. Relies heavily on Merino Road for circulation around and travel through the precinct. 	<ul style="list-style-type: none"> Consider additional roads off Byrnes Road to minimise direct frontages. Consider intersection upgrades to Olympic Highway–Merino Road and Byrnes Road–Merino Road for freight efficiency. Limit direct vehicle access to Olympic Highway, Merino Road and Byrnes Road

Scenario	Positive qualities	Negative qualities	Potential improvements
5	<ul style="list-style-type: none"> — Road freight task more evenly distributed along Merino Road and Bomen Road. — No frontages along Olympic Highway. — Separation between residential and industrial minimises restrictions on operations. — Allows for internal circulation without using Byrnes Road or Olympic Highway. 	<ul style="list-style-type: none"> — Small area for future industrial expansion. — Little room for expansion of intermodal activities if needed in the future. 	<ul style="list-style-type: none"> — Consider intersection upgrades to Olympic Highway–Merino Road and Byrnes Road–Merino Road for freight efficiency. — Limit direct vehicle access to Olympic Highway, Merino Road and Byrnes Road.
7	<ul style="list-style-type: none"> — Road freight task distributed between Olympic Highway and Byrnes Road. — Preserves significant land for industrial uses and future expansion. — Preserves significant area for future rail terminals. 	<ul style="list-style-type: none"> — Concentration of Regional Enterprise with accesses along Byrnes Road could affect road safety. — No buffer between residential and industrial land uses on Bomen Road. — Reliance on Byrnes Road and Eunony Bridge Road. — Reliance on Merino Road for east-west access between industrial precincts – single crossing of rail line could become a pinch point. — Minimal road infrastructure in the northern precinct. 	<ul style="list-style-type: none"> — Consider adding buffer between industrial and residential areas on Bomen Road. — Consider upgrades to Eunony Bridge Road to become main road freight route to Sturt Highway and Hume Highway. — Consider additional road infrastructure in northern precinct and potential additional grade separated crossing of the rail corridor.

5.2.5 PUBLIC TRANSPORT

The outcomes from the Baseline analysis was that the following should be provided to/within the SAP:

- A fixed-route bus service with associated infrastructure such as bus stops, seats, shelters, etc.
- Mobility as a Service (MaaS) could provide a flexible service to supplement the public transport offer.

A summary of the public transport assessment for scenarios 4, 5 and 7 is included in Table 5.5.

Table 5.5 Summary of Public Transport assessment

Scenario	Positive qualities	Negative qualities	Potential improvements
4	<ul style="list-style-type: none"> — Can be connected to a service to Wagga Wagga CBD. — Potential for connection of service to Northern Growth Area in the future. 	<ul style="list-style-type: none"> — Dispersed land uses reduce effectiveness of bus service. — One north-south route encourages bus service to leave SAP to find a suitable terminus. — Lack of defined heart for anchoring bus service. 	<ul style="list-style-type: none"> — Include more internal roads to allow internal circulation. — Include bus facilities.
5	<ul style="list-style-type: none"> — Can be connected to a service to Wagga Wagga CBD. — More compact and therefore more conducive to walk and cycle trips. — Potential for a loop service around SAP achieving greater coverage. — Greater intensity of land use along Bomen Road makes a bus route more effective. 	<ul style="list-style-type: none"> — Less direct connection to Northern Growth Area. 	<ul style="list-style-type: none"> — Include bus facilities, especially on Bomen Road and near old Bomen train station.
7	<ul style="list-style-type: none"> — Can be connected to a service to Wagga Wagga CBD. — Potential for connection of service to Northern Growth Area in the future. 	<ul style="list-style-type: none"> — Dispersed land uses reduce effectiveness of bus service. — One north-south route encourages bus service to leave SAP to find a suitable terminus. — Obvious defined heart is on Merino Road, making crossing between bus stops difficult for pedestrians. 	<ul style="list-style-type: none"> — Include more internal roads to reduce block size and assist walk and cycle. — Include bus facilities.

5.2.6 ACTIVE TRANSPORT

The outcomes from the Baseline analysis was that the following should be provided to/within the SAP:

- Pedestrian:
 - Active transport routes to Wagga Wagga CBD and across to the Northern Growth Area as possible sources of employees who may choose to walk to Bomen
 - Footpaths around planned shared employee 'place' such as eating areas, parks or community facilities.
- Cycle:
 - Active transport route from Hamden Avenue across the Murrumbidgee River, Mill Road, Oura Road, then alongside the Main South Rail Line to Bomen.

- Active transport route from the Northern Growth Area to SAP, possibly via Old Bomen Road and Bomen Road
- Public bike racks near the shared employee 'places'
- Provision in the DCP for cycle lockers, showers and change areas in businesses with a sufficient number of employees.

To a certain extent, all the scenarios could have these facilities included. However, there is a difference in the ease in which they could be incorporated.

The desirable active transport corridor is recommended as a three to four-metre-wide off-road shared path built within the road reserve. This would improve the safety of cyclists and pedestrians as these will be busy roads with a variety of personal and commercial vehicle types using them. A sample cross-section and an image of an existing location in Wagga Wagga are shown in Figure 5.7. The sample cross-sections show a diagram of a proposed shared path cross section and its users (pedestrians and cyclists) adjacent a photo showing an example of a similar existing shared path within Wagga Wagga.



Figure 5.7 Sample shared path cross-section and example in Wagga Wagga

Scenario 4

There is a large area of this scenario that could be difficult to serve using active modes. The location of a potential corridor is shown on Figure 5.8. The main routes travel along the old right of way to Old Bomen Road, then continue onto Bomen Road and then to Dorset Drive. A potential link could be developed to the north and west as shown but it will be dependent upon growth in the adjacent precinct and the Bomen precinct to the west of Olympic Highway. Figure 5.8 shows the proposed road networks for Scenario 4 in the form of a high level schematic diagram with potential walk and cycle routes overlayed.

Scenario 4 (High/medium/low amenity industry overlay)

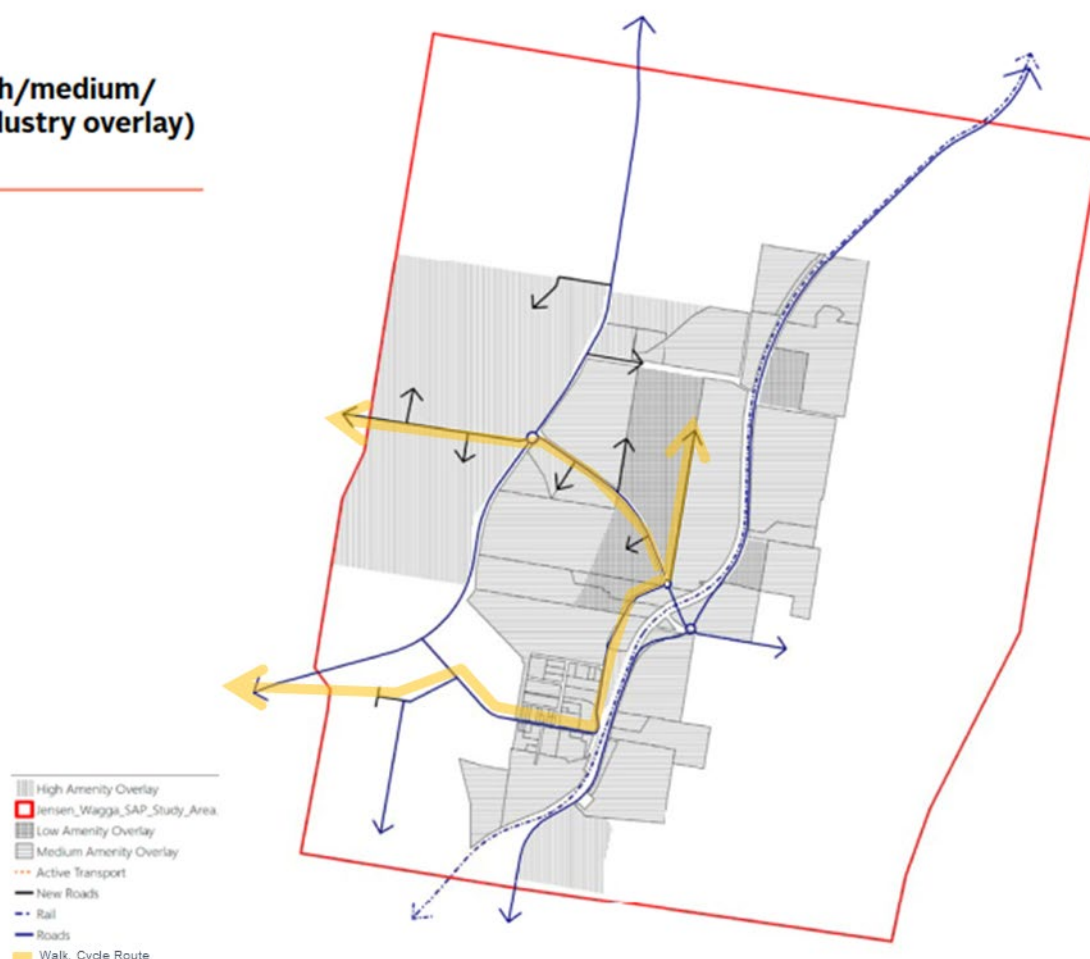


Figure 5.8 Scenario 4 potential active transport routes

The route will link to the exiting University Link which would allow for connections to the growing community to the west and Charles Sturt University. While it is possible to provide limited active transport infrastructure under this scenario, the overall size of the precinct area may result low ridership, despite its connection to the University Link.

As the only north-south route through the SAP, it is likely that Dorset Drive would attract a large volume of truck and car traffic, potentially reducing the safety and amenity of pedestrians and cyclists.

Scenario 5

The land uses for this scenario are more compact and varied which may encourage more trips by active modes. An active transportation route is shown on the map, which could be extended to include more of the precinct, particularly to the north along Dorset Drive. As a smaller area, it is more likely that people may choose to use active modes from the precinct to the west and even from the urban centre of Wagga Wagga. The corridor proposed for this scenario will connect to the University Link. Figure 5.9 shows the proposed road networks for Scenario 5 in the form of a high level schematic diagram with potential walk and cycle routes overlaid.

Scenario 5 (High/medium/low amenity industry overlay)

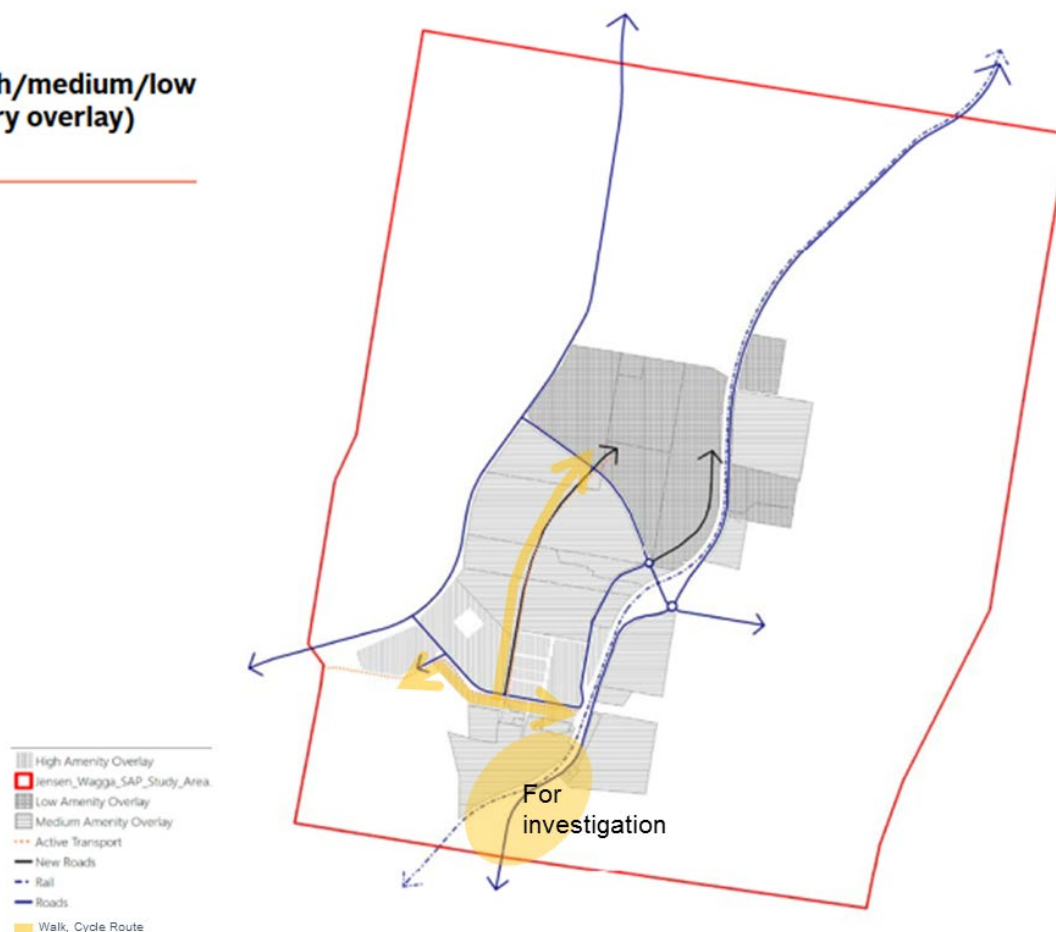


Figure 5.9 Scenario 5 potential active transport routes

The north-south route shown is not located on the main truck route through Bomen, and therefore has improved safety for pedestrians and cyclists. The route along Bomen Road to Bomen Station would link the more commercial/office-based land uses together and to the active transport route. It could also link to a potential tertiary education site.

Scenario 7

The area of growth is located further from the existing and proposed growth areas in the north section of Wagga Wagga, west of the Bomen precinct. This may result in only those working in the southern portion of the precinct using active modes as the distances from the existing communities will be greater than those in the other scenarios. It is unlikely that this scenario will support the use of sustainable modes and the car will likely be the predominant option.

The route shown in Figure 5.10 is an indicative route that should follow the existing and future road network. The route will be a longer link but will still connect to the University Link. As with Scenario 4, the only north-south route through the SAP, it is likely that Dorset Drive would attract a large volume of truck and car traffic, potentially reducing the safety and amenity of pedestrians and cyclists. Figure 5.10 shows the proposed road networks for Scenario 7 in the form of a high level schematic diagram with potential walk and cycle routes overlaid.

Scenario 7 (High/medium/low amenity industry overlay)

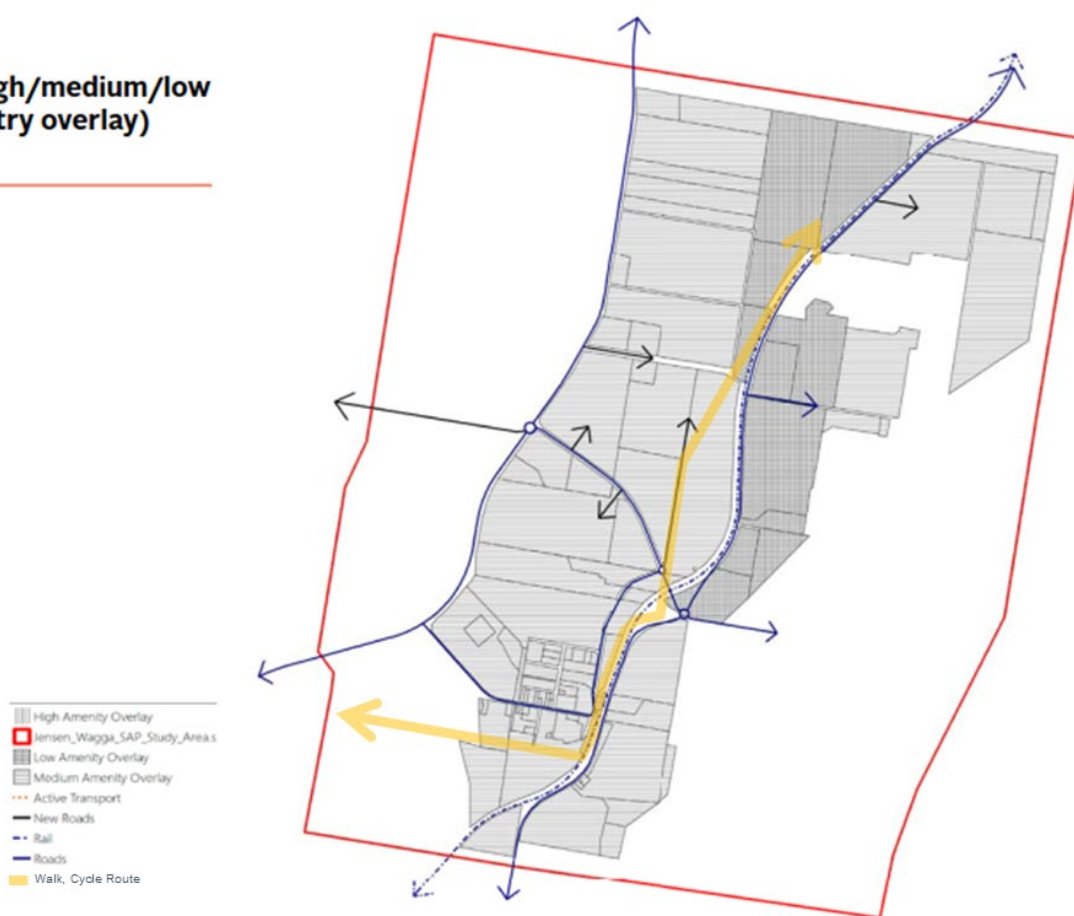


Figure 5.10 Scenario 7 potential active transport routes

Summary

All three land use scenarios provide opportunity to build an active transport corridor that can be connected to the existing and proposed links in Wagga Wagga. However, Scenario 5 provides the best opportunity to increase the modal share for active travel as it is a more compact and mixed-use development. The distance to the centre of the precinct from the existing development to the west is the shortest. It will also be easier to connect to the other links in the community.

Future consideration should be given for the extension of the shared path as shown on the Scenario 5 map located in the yellow circle. Extending the path to the south will connect to more areas in Wagga and provide greater opportunity to use sustainable and active travel modes.

A summary of the public transport assessment of the scenarios is included in Table 5.6.

Table 5.6 Summary of Active Transport assessment

Scenario	Positive qualities	Negative qualities	Potential improvements
4	<ul style="list-style-type: none"> Can be connected to routes to Wagga Wagga CBD and the Northern Growth Area/University Link. 	<ul style="list-style-type: none"> Dispersed land uses reduce attractiveness of walk and cycle for internal trips. North-south route on busy road. 	<ul style="list-style-type: none"> Include more internal roads to reduce block size and assist walk and cycle.
5	<ul style="list-style-type: none"> Can be connected to routes to Wagga Wagga CBD and the Northern Growth Area/University Link. More compact and therefore more conducive to walk and cycle trips. More internal connecting roads split traffic, reducing the volume on the active transport route and improving safety and amenity. Route along Bomen Road connects office uses and potential tertiary education site. 	<ul style="list-style-type: none"> Less direct connection to Northern Growth Area. 	<ul style="list-style-type: none"> Include more internal roads to reduce block size and assist walk and cycle.
7	<ul style="list-style-type: none"> Can be connected to routes to Wagga Wagga CBD and the Northern Growth Area/University Link. 	<ul style="list-style-type: none"> Dispersed land uses reduce attractiveness of walk and cycle for internal trips. North-south route on busy road. 	<ul style="list-style-type: none"> Include more internal roads to reduce block size and assist walk and cycle.

5.2.7 TRAVELLING LIVESTOCK

The recommendation from the Baseline analysis was that:

- The current livestock highway along the Olympic Highway and Coolamon Road and travelling stock reserves on Bomen Road and in Brucedale should be preserved unless a suitable alternative can be found.

Of the three scenarios, only Scenario 4 preserves the potential for retention of the travelling stock reserve in its current position. Scenarios 5 and 7 reallocate the land for other uses, requiring a suitable alternative to be identified, preferable along the Olympic Highway livestock highway.

5.3 STRENGTHS WEAKNESSES OPPORTUNITIES THREATS

This section aims to identify and highlight the strengths, weaknesses, opportunities and threats (SWOT) present in the scenarios considered and assessed in section 5.2. This analysis also aims to provide valuable input into the consultation workshop to enable the preferred scenario to be selected and progress to a more detailed modelling of the road network scheduled in the next stage of the Project.

The definition of the categories in SWOT are indicated below:

- **Strengths:** internal factors that give the scenario an advantage over other available options
- **Weakness:** internal factors that give the scenario a disadvantage against other available options
- **Opportunities:** identify opportunities that may improve efficiency and effectiveness of the scenario's operation
- **Threats:** identify threat that may affect efficiency and effectiveness of the scenario's operation.

The SWOT analyses for the three scenarios (Scenarios 4, 5 and 7) are shown in Figure 5.11, Figure 5.12 and Figure 5.13 respectively. These three figures show the strengths, weaknesses, opportunities and threats for each scenario in the form of a high level schematic diagram with locations and brief descriptions of each identified.

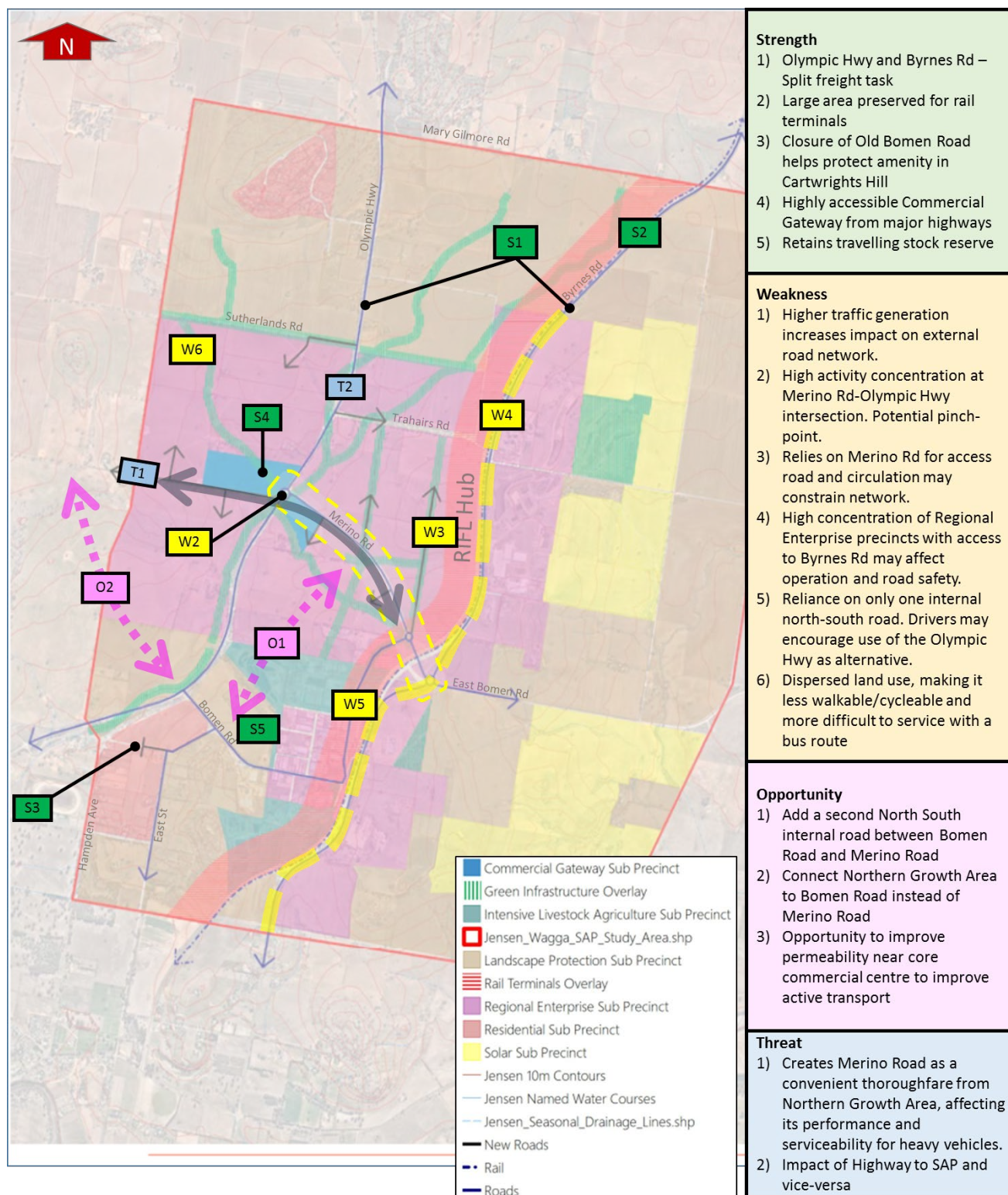


Figure 5.11 Scenario 4 SWOT analysis

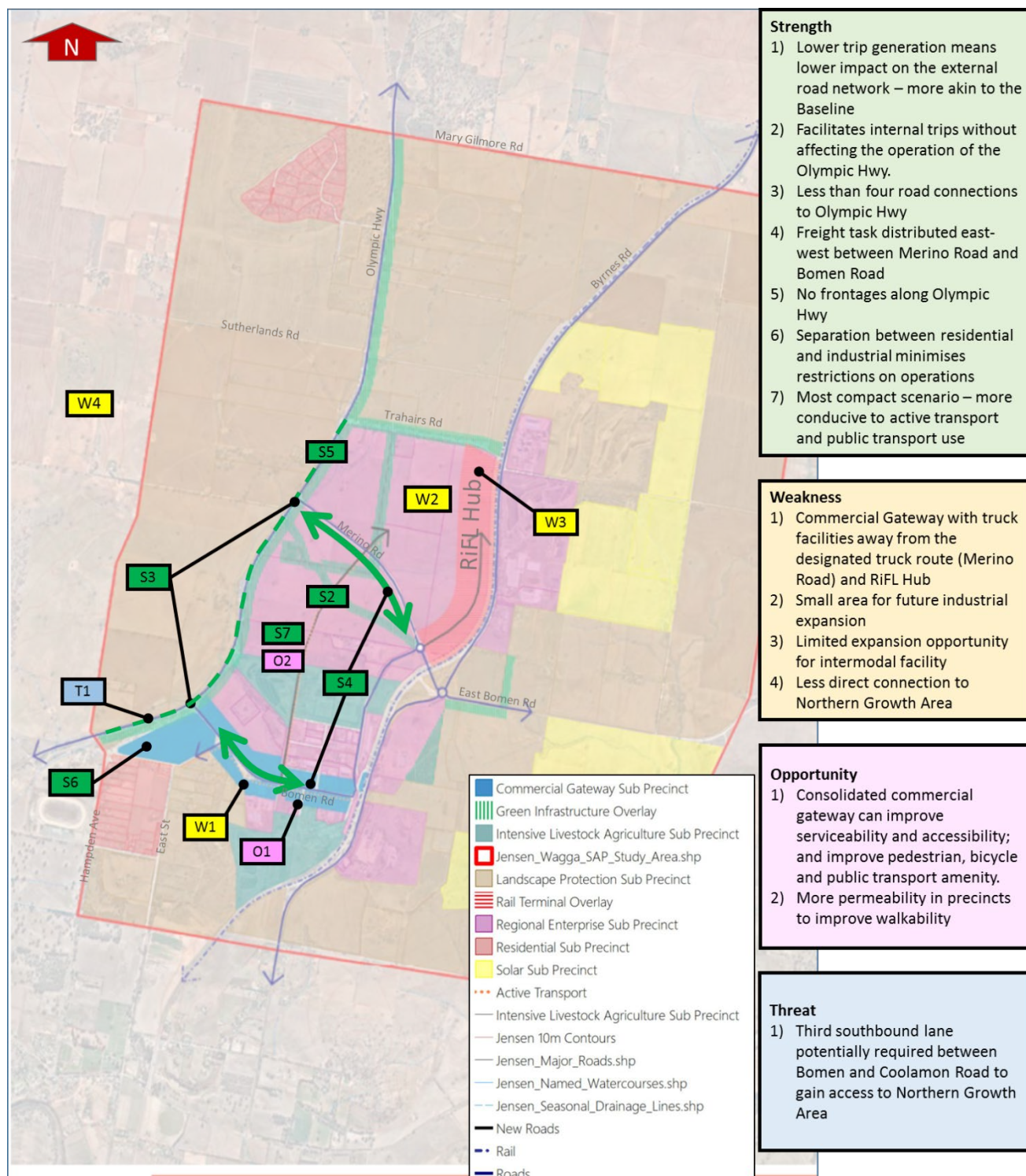


Figure 5.12 Scenario 5 SWOT analysis

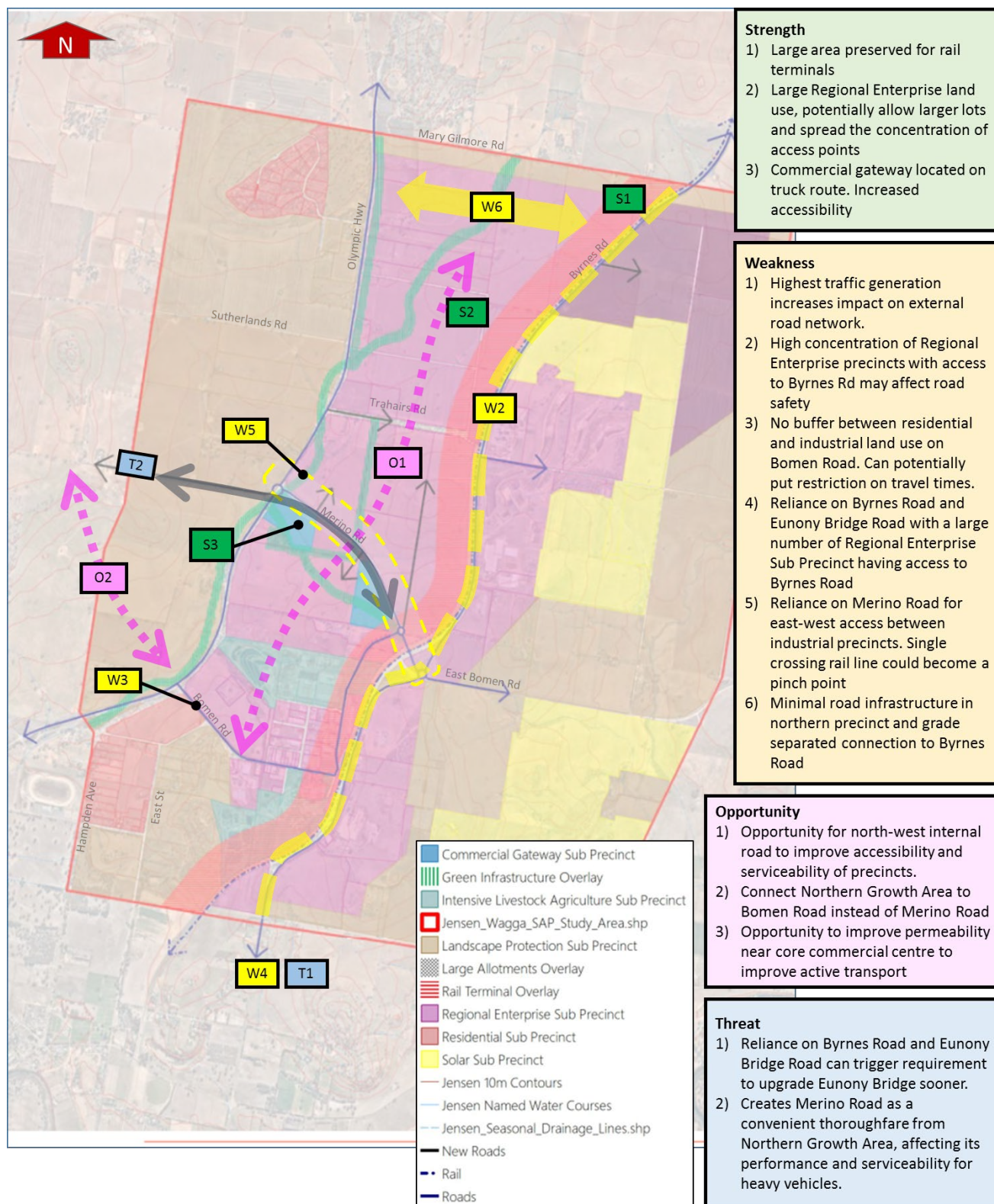


Figure 5.13 Scenario 7 SWOT analysis

5.4 WORKSHOP SUMMARY

A Full EbD workshop held on 17 and 19 September 2019 to consider the merits of the three land use scenarios developed at the Short EbD and refined them into one preferred land use structure plan. The three SWOT analyses of nine work streams were summarised in Table 5.7 below.

Table 5.7 Workshop SWOT analysis summary

Scenario	Comments
Scenario 4	<ul style="list-style-type: none"> — Greater visual impact on Brucedale residence — Extended RIFL Increase SAP freight capacity — Commercial Gateway highly accessible — Relies on Merino Drive for circulation — Slopes in excess of 6% — Highway a barrier
Scenario 5	<ul style="list-style-type: none"> — Lower impact on external roads — More conducive to active and public transport — Strongest buffer to residential land — Higher employment density — Inadequate industrial land supply — No direct road connection to northern growth area — Lower excess power available for energy storage
Scenario 7	<ul style="list-style-type: none"> — Accommodates all industrial land supply and supports land affordability — Strong landscape buffer – defined edge to Olympic Highway — Large areas of flat land suitable to for large buildings potential for further revegetation along drainage lines — Costly to service north-eastern areas — Highest potential for Aboriginal heritage impact

The comments about each scenario were used to produce a single refined scenario. This scenario was considered further from the following topics to ensure that it still captured the essential aspects:

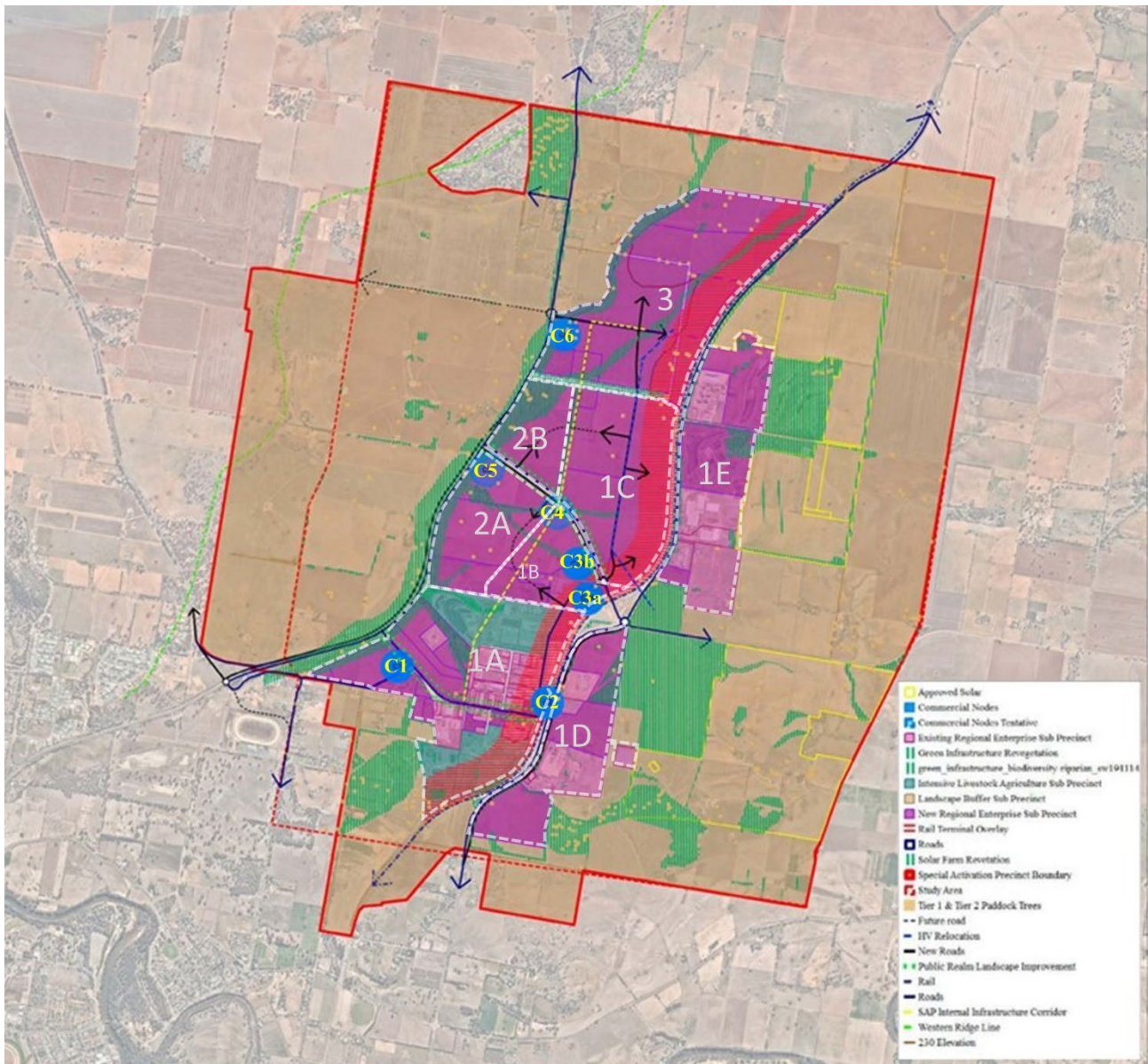
- Preferred scenario, refined and tested for whole of SAP Structure Plan
- Implementing Circular Economy strategy
- Industry, Investment Attraction and Skills strategy
- Risk-based planning framework
- Infrastructure strategy
- Community and Place.

The workshop considered how to integrate the Wiradjuri culture into the SAP and design planning principles to create harmony with local indigenous culture.

The refined land use structure plan is presented in section 6 will be assessed further in section 7.

6 REFINED LAND USE STRUCTURE PLAN

The refined land use structure plan, developed following the full Enquiry by Design workshop held in September 2019, is shown in Figure 6.1. The SAP boundary has changed slightly to exclude existing residential areas, including Brucedale.



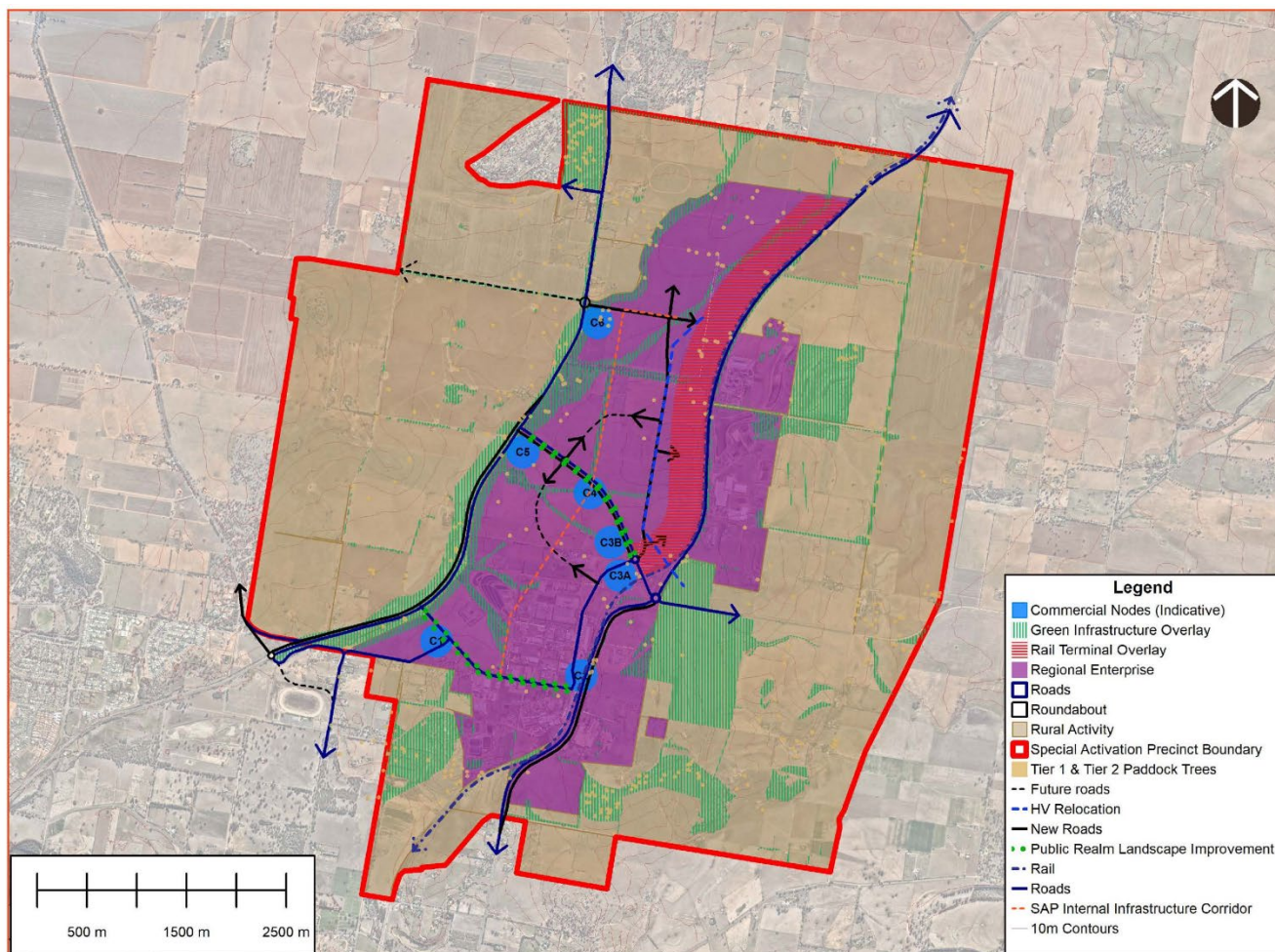
Source: Wagga Wagga Special Activation Refined Structure Plan, Jensen Plus, Rev A 3 October 2019

Figure 6.1 Refined Wagga Wagga SAP structure plan with indicative staging

The land use yields presented in Figure 6.1 are for ultimate development. The geographical area of the indicative staging (1A, 1B, 1C, 1D, 1E, 2A, 2B and 3) is also shown in Figure 6.1. This provides an indication of their location and proportion compared to the whole SAP area. The location of the commercial centres (C1 to C6) are also shown.

Following the Final Enquiry by Design workshop, the preferred Structure Plan was subject to further testing and refinement. At the time of this study, the Structure Plan showed indicative staging and land use sub-precincts, which were used as a basis for ongoing testing and analysis of the structure plan. Following this study, the Draft Master Plan and planning framework for the Wagga Wagga Special Activation Precinct was developed by the NSW Department of Industry, Planning and Environment.

The draft planning framework proposes processes to determine staging (i.e. the Delivery Plan) and zoning controls and performance measures for noise, odour and air quality that would have a similar effect on controlling land use as the earlier sub-precincts approach. As such, the final Structure Plan in the draft planning framework no longer indicates staging and sub-precincts. The final structure plan, as included in the Draft Wagga Wagga Master Plan currently on exhibition is shown in Figure 6.2.



Source: Jensen Plus (2019)

Figure 6.2 Final Wagga Wagga SAP structure plan

6.1 LAND USE TYPE AND SIZE

The proposed land use types, their corresponding area (hectares) and indicative staging are shown in Table 6.1 below. The net developable regional enterprise has been revised to 483 hectares. The employment number estimate has also been included in the table below, with the assumption that Wagga Wagga SAP will be able to generate 11.7 jobs per hectare.

Table 6.1 Proposed land use and employment with indicative staging

Land use type	Equation	Indicative staging								TOTAL
		Stage 1						Stage 2	Stage 3	
		Stage 1A	Stage 1B	Stage 1C	Stage 1D	Stage 1E	Sub-Total			
Regional Enterprise <i>Proposed New</i> (Gross area – hectares)	(A)	90	69	164	85	88	496	146	277	919
Green Infrastructure Biodiversity and Riparian (hectares)	(B)	26	3	8	6	15	58	34	72	164
Developable Regional Enterprise <i>Proposed New</i> (hectares)	(C)=(A)-(B)	64	66	156	79	73	438	112	205	755
20% roads (hectares)	(D)	12.8	13.2	31.2	15.8	14.6	87.6	22.4	41	151
Less 20% 'capacity constraints' e.g. undeveloped, for sale	(E)	10.2	10.6	25.0	12.6	11.7	70.1	17.92	32.8	120.8
Net Developable Regional Enterprise <i>Proposed New</i>	(F)=(C)-(D)-(E)	41.0	42.2	99.8	50.6	46.7	280.3	71.68	131.2	483.2
Employment @ 11.7 jobs per hectare	(G)=(F) x 11.7	478	492	1164	589	545	3,268	836	1530	5,633

Source: MacroPlan

6.2 INDICATIVE LAND USE STAGING

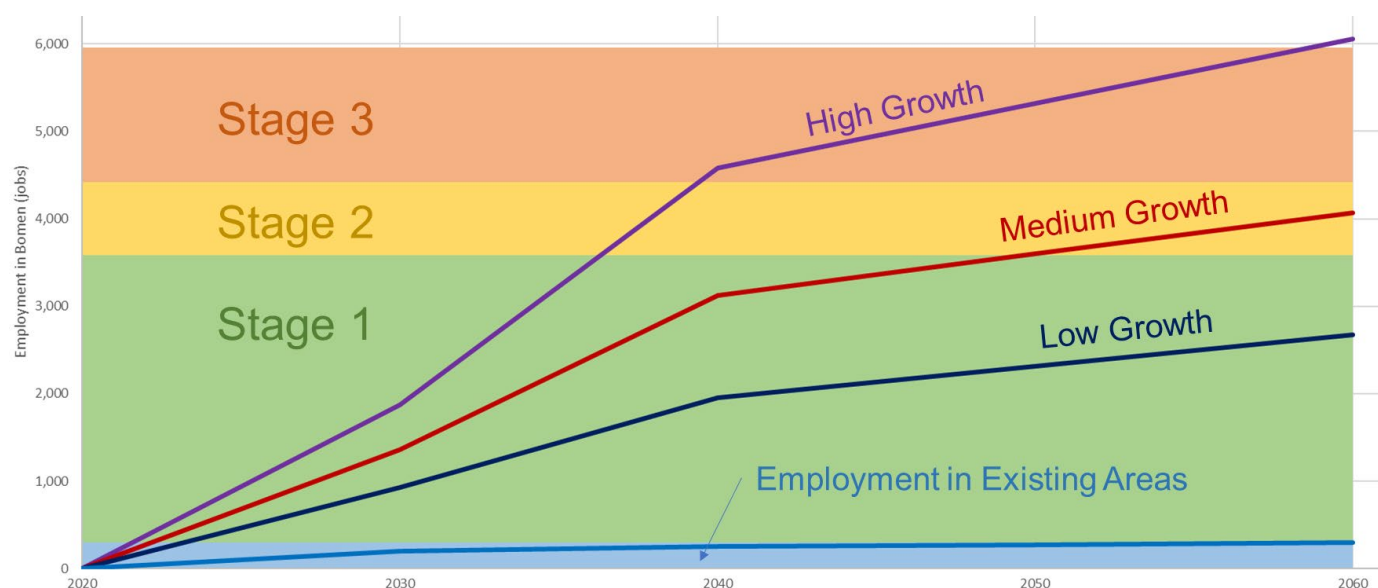
The pace of development was assessed by MacroPlan for low, medium and high growth scenarios (referred to as Series 1, 2 and 3 respectively). As agreed with the DPIE, we have assumed the Series 2 growth scenario for the assessment of the impact of the SAP on the road network. For this assessment, the following time periods have been assessed:

Table 6.2 Percentage of development by indicative stage and assessment year

Stage	By 2030	By 2040	By 2060	Beyond 2060
1	35%	87%	95%	100%
2	0%	0%	80%	100%
3	0%	0%	0%	100%

6.3 PROJECTED EMPLOYMENT

Stages 1, 2 and 3 are expected to release a large amount of land for employment uses. The take-up of this land will depend on several economic factors. MacroPlan has assessed three potential development scenarios (low, medium and high) which test different rates of development take-up and therefore different numbers of projected employment numbers in each time period. The three different development rates and how much they achieve of each indicative development stage is shown in Figure 6.3.



Source: WSP graph of MacroPlan data, October 2019

Figure 6.3 Low, medium and high development pace scenarios

From this graph, it is observed that:

- The Low growth scenario is expected to only see development in Stage 1, which would not be completely developed by 2060
- The Medium growth scenario is expected to see development in Stages 1 and 2 by 2060. However, development in Stage 3 would not occur until after 2060
- The High growth scenario is expected to see Stages 1, 2 and 3 largely complete by 2060.

The analysis in this transport assessment will assume the medium growth scenario for the purposes of assessing the impact of the SAP on the wider road network as requested by DPIE. The corresponding amount of employment increase is shown in Table 6.3.

Table 6.3 Project employment increase in Wagga Wagga SAP - Medium growth scenario

	2018 to 2030	2030 to 2040	2040 to 2060	2018 to 2060 total
Employment in Existing Areas	200	50	50	300
Net Industrial Employment	954	1,401	738	3,093
Net Non-Industrial	209	307	162	679
Total	1,163	1,708	900	3,772

Source: MacroPlan, October 2019

6.3.1 COMMERCIAL NODES

The locations of the commercial nodes are shown in Figure 6.1; four locations have been identified characterised by their high accessibility to the road network:

- C1: Bomen Road–Old Bomen Road
- C2: Bomen Road–Dorset Drive
- C3A and C3B: Merino Road–Dorset Drive
- C6: Olympic Highway–Sutherlands Road
- Two additional possible locations include:
 - C4: Merino Road–SAP north-south internal access road
 - C5: Merino Road–Olympic Highway.

The types of land uses envisaged at these locations includes:

- Tertiary education, child care, food, meeting place, and gym
- Concierge and sales centre
- Retail, food, gym etc.
- Fuel and services
- Innovation hub,
- Data centre
- Motel
- Tavern.

The details of the size and intensity of these land uses is not currently known. The fuel and services centre could be used to house refuelling facilities for large vehicles, driver rest facilities and space available to swap/leave/pick up trailers. The potential locations for the fuel and services centre are 3A or 3B near the intersection of Merino Road and Dorset Drive. This site is conveniently located close to the RIFL Hub.

6.4 INDICATIVE ROAD CROSS SECTION

6.4.1 MERINO ROAD

Merino Road is currently a two-lane/two-way road and will require duplication to accommodate future traffic growth generated by the proposed SAP. The design considerations of the cross section are listed below:

- Generally, maintain the existing road alignment with the additional travel lanes in each direction. The design and posted speed limit of Merino Road may require further review in detailed design, taking into consideration the access needs and amenities of adjacent land uses.
- Limit direct property accesses from Merino Road.
- Alignment with Austroads Guide to Road Design for urban arterial road design to maximise road capacity, including:
 - A general traffic lane of 3.5 metres wide
 - A wide kerbside lane of 4.2 metres wide to optimise tracking capability accessing side streets for high-efficiency vehicles such as multi-combination trailers. This width would minimise the need for longer vehicles to straddle to the adjacent travel lanes, which would otherwise interrupt the flow of the road network.
- Separated right turn auxiliary lanes at side streets/property accesses to reduce flow interruption to the road network.
- Physical separation (e.g. a low-kerbed median island) between eastbound and westbound lanes.
- Spatial provision for footpath and/or shared path appropriately set-back from the road. Their installation however, is subject to detailed assessment of active transport uptake and connectivity requirement between land uses.

The total kerb-to-kerb width of Merino Road may vary from 17 metres to 20 metres, depending on the proposed features at the isolated location (e.g. wider road cross section required where turn bays are proposed). The use of kerb and gutter may be omitted given an appropriately designed open-channel drainage system and road shoulder for pavement integrity can be included in the detail design.

A typical cross section of Merino Road is shown in Figure 6.4 below.

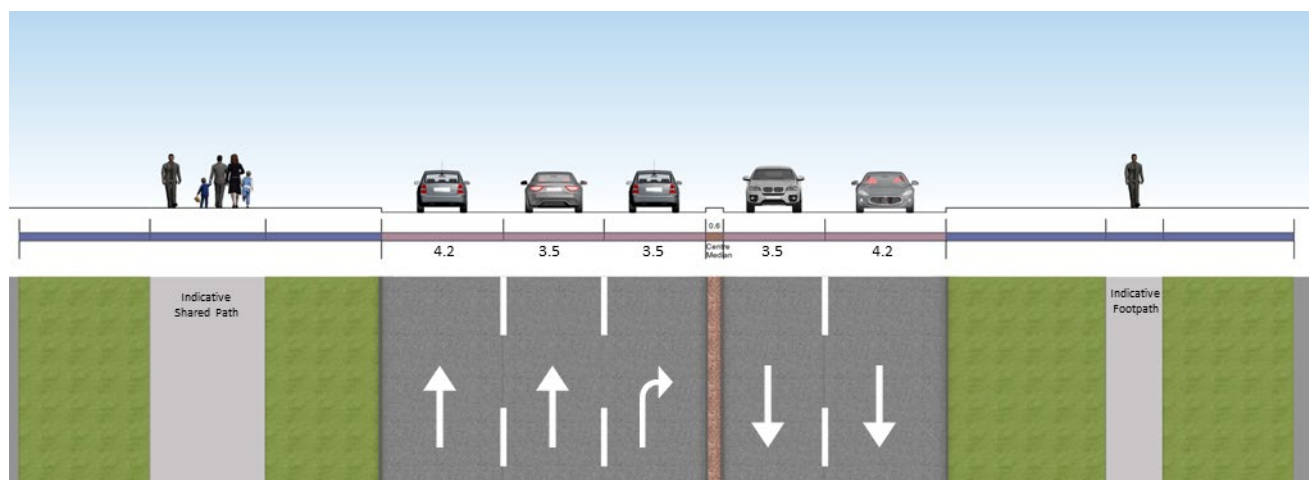


Figure 6.4 Merino Road typical cross section

6.4.2 LOCAL COLLECTOR ROAD

The width of a local collector road within the Special Activation Precinct will generally achieve a travel lane in each direction.

Design considerations of a local collector road within the SAP are listed below:

- To guide the geometric road design, a lower posted speed limit (e.g. of up to 60 km/h) for efficient and safer operations of the road network. Lower posted speed limit may be considered in high-activity areas with the aid of more constrained road geometry and/or traffic calming devices.
- Traffic lane widths to be suitable to accommodate high productivity vehicles (HPV) as per Austroads Guide to Road Design.
- On-street parking to be considered in high-activity areas (i.e. commercial locations).
- For safety reasons, consider providing minimum turning radii into access driveways or side streets to manage entry/exit speed and conflict at footpaths/shared paths.
- Consideration of verge width to provide suitable space for ancillary facilities (i.e. footpaths and/or shared paths, bus stops, road furniture).

To safeguard future road network capacity requirements, wider road widths suitable to accommodate future lane quantity needs are advisable at locations that are likely to be highly trafficable (e.g. at entry points to the proposed SAP).

Typical cross sections of a local collector road are shown in Figure 6.5 and Figure 6.6 below. The provision of a channelised right turn bay, or parking kerbside lanes on either side of the travel lanes will depend on the type of land uses, associated parking, access and operational needs (i.e. manoeuvrability of vehicles required to service the developments). These details will need to be addressed in concept/detailed design stage.

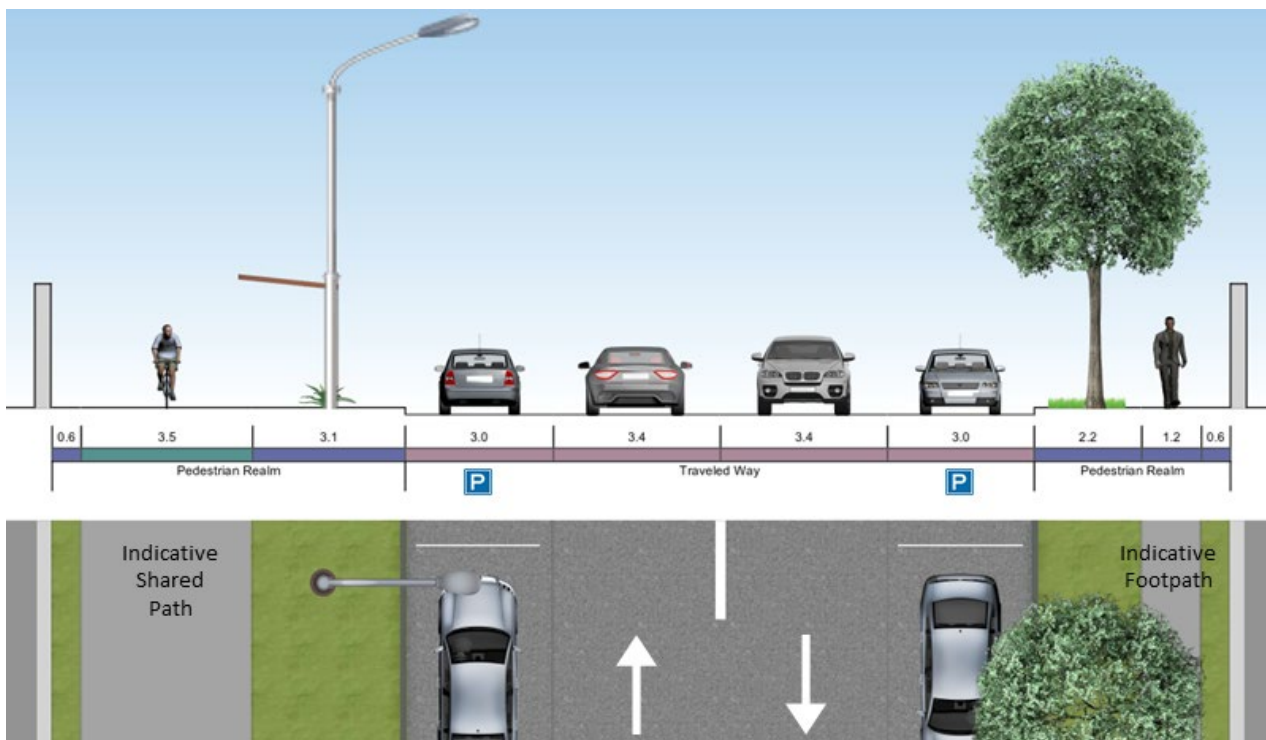


Figure 6.5 Typical cross section with on-street parking

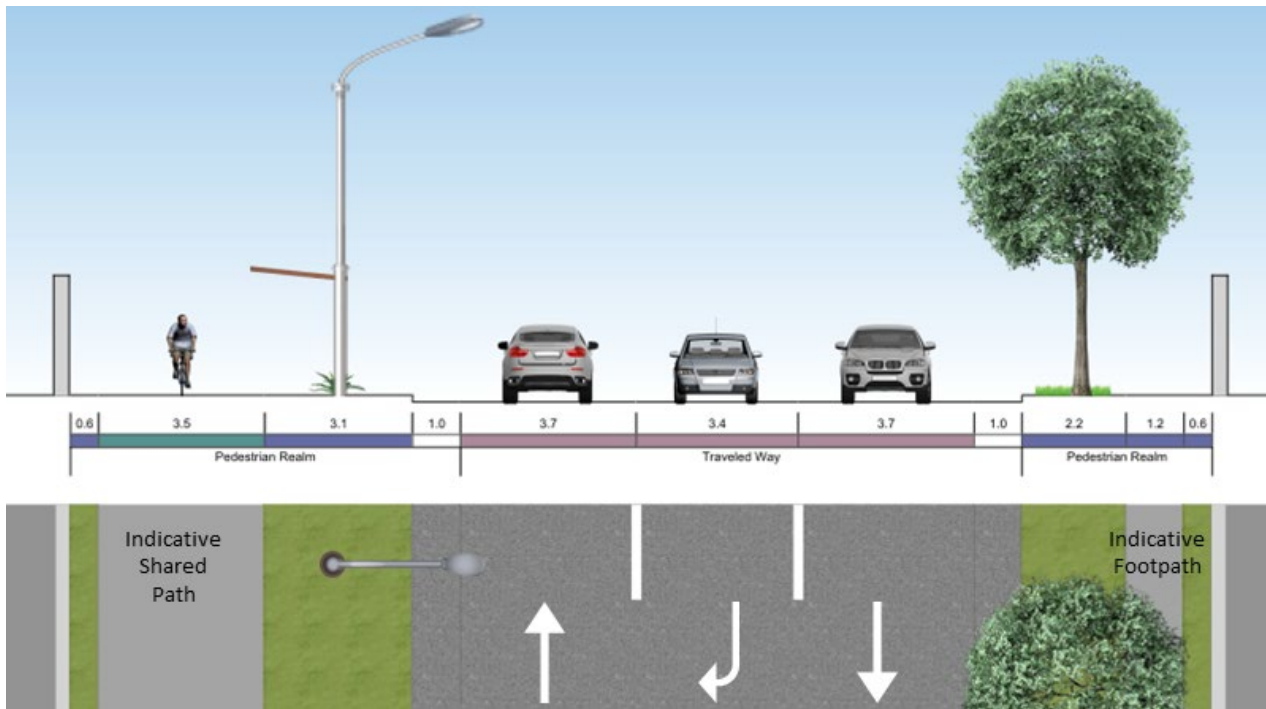


Figure 6.6 Typical cross section with channelised right turn lane

6.5 INTERNAL ROAD NETWORK

The internal road network, outlined in Figure 6.1 would be delivered to match the staging, i.e. Stage 1 roads would be delivered first, with roads for Stages 2 and 3 as development commences.

Further detailed design of the roads shown in Figure 6.1 will occur as the plans for the SAP progress, taking into consideration the position of current roads and accesses.

7 TRANSPORT ASSESSMENT

This chapter discusses the transport assessment of the refined land use structure plan.

7.1 ROAD NETWORK

This section estimates the quantity of vehicular trips generated by the SAP and assesses their impact on the road network.

7.1.1 TRAFFIC GENERATION

The traffic generation rates of industrial businesses can vary greatly, depending on the levels of activity, number of employees, nature of deliveries of input materials and exporting of the final product. The traffic generation rates from two Roads and Maritime Services publications were investigated to find a suitable rate:

- *Guide to Traffic Generating Developments, Version 2.2*, October 2002 (for road transport terminals, factories and warehouses)
- Technical Direction TDT 2013/04a *Guide to Traffic Generating Developments Updated traffic surveys*, August 2013 (for business parks).

These rates were compared to trip information provided by businesses in Bomen Business Park, which were approximately equal to the published rate for factories. This rate was converted to a rate per employee (0.57 peak hour vehicle trips per employee) and then a rate per hectare (**11.1 peak hour vehicle trips per hectare**) using comparable information from the TD13/04a business park trip data. This equates to **44.6 daily vehicle trips per hectare**). For the purpose of this strategic assessment, we have adopted this trip generation rates. Details of the trip generation assessment are included in Appendix D.

The following points are noted for the trip generation assessment:

- Land within the SAP remaining as rural is assumed to be included within existing traffic volume information. Land converted from rural to industrial is assumed to have effectively no existing traffic generation during the peak period.
- Trips from the Commercial Gateways (shown as blue dots in in Figure 6.1) are assumed to be already on the road network or captured within the internal trip allocation within the SAP.
- It has been assumed that 20 per cent of vehicle trips are heavy vehicles (trucks) to reflect the industrial nature of the Regional Enterprise land. The RIFL hub is assumed to have 40 per cent heavy vehicles based on traffic modelling for RIFL (*Bomen Traffic Model Report, Transport Modellers 2015*).
- The RIFL traffic generation as outlined in Appendix C, was checked against the trip calculation from the per hectare rate calculated using the above method and was found to be in accordance.
- The solar farm trip generation is based on the estimate provided for the Environmental Impact Statement (EIS) – i.e. 20 light vehicle peak hour movements per day, with 10 inbound movements in the AM peak and 10 outbound during the defects liability period (Bomen solar farm EIS Traffic impact assessment, GHD, 20 February 2018).
- Trip generation of existing businesses (including future job growth), solar farm, remaining agricultural land, intensive livestock and landscape buffer assumed to be included in baseline assessment.
- 80 per cent in and 20 per cent out AM peak direction split for light vehicles, reverse in the PM peak, 50 per cent in and 50 per cent out for heavy vehicles on average throughout the day.

- There are opportunities for businesses to work with Council and Transport for NSW to modify shift patterns to reduce the peak impact on the road network, potentially reducing the need for road upgrades.

The expected trip generation for the SAP area (including existing and currently planned growth) is outlined in Table 7.1. These numbers are further distributed by the in/out splits listed above.

Table 7.1 Proposed vehicle trip generation by stage

Trips in time period	Stage 1						Stage 2	Stage 3	Total
	Stage 1A	Stage 1B	Stage 1C	Stage 1D	Stage 1E	Sub-Total			
Net Developable Regional Enterprise (hectares)	41.0	42.2	99.8	50.6	46.7	280.3	71.7	131.2	483.2
Peak hour trips Total Vehicles	456	471	1,112	563	520	3,123	798	1,462	5,383
<i>Peak hour trips Light Vehicles</i>	365	376	776	451	416	2,498	639	1,169	4,306
<i>Peak hour trips Heavy Vehicles</i>	91	94	336	113	104	625	160	292	1,077
Daily trips Total Vehicles	1,825	1,882	4,449	2,253	2,082	12,491	3,194	5,846	21,531
<i>Daily trips Light Vehicles</i>	1,460	1,506	3,103	1,802	1,665	9,993	2,555	4,677	17,225
<i>Daily trips Heavy Vehicles</i>	365	376	1,346	451	416	2,498	639	1,169	4,306

7.1.2 TRIP DISTRIBUTION

Circular economy promoted for Wagga Wagga SAP has been assumed to result in **40 per cent** of trips being internal within the SAP. These trips have been distributed between the Stages as they become active. Of the remaining trips, the following directional assumptions were made:

- 96 per cent of employees live within Wagga, 2 per cent live in Junee and 2 per cent live in Coolamon based on 2016 Census information.
- For those living in Wagga Wagga, select link analysis of the 2015 Wagga Wagga EMME traffic model was used to assign them to the road network. This indicated that 67 per cent used Byrnes Road to get to Bomen, 9 per cent used Hampden Avenue and 20 per cent use the Olympic Highway. Upon adding the planned Northern Growth Area, these drop to 50 per cent, 6 per cent and 15 per cent respectively with 24 per cent using Coolamon Road or the direct connections to Hillgrove or Downside, etc.
- The direction of trucks trips was based on the 2056 Transport for NSW Freight Forecast from the Strategic Freight Model, September 2018:
 - North on Olympic Highway – 3 per cent of imports and 3 per cent exports
 - West on Olympic Highway then Sturt Highway – 4 per cent of imports and 11 per cent of exports
 - South on Olympic Highway – 17 per cent of imports, 10 per cent of exports
 - East on Byrnes Road, Eunony Bridge Road and Sturt Highway – 27 per cent of imports and 15 per cent of exports
 - North East on Byrnes Road – 3 per cent of imports and 1 per cent of exports
 - Internal within Wagga – 46 per cent of imports and 60 per cent of exports. These were further distributed on the 2015 car directions from the Wagga Wagga EMME traffic model.

7.1.3 TRIP ASSIGNMENT

A representative existing year traffic situation was obtained by using traffic survey data supplied by WWCC and Transport for NSW (TfNSW) (formerly Roads and Maritime Services) and factoring up older counts to 2018 volumes.

The trips calculated from the trip generation and direction assumptions were assigned to the road network on top of the baseline traffic projections. The baseline traffic projections were obtained from the Wagga Wagga EMME model supplied by WWCC and Transport for NSW (TfNSW) (formerly Roads and Maritime Services). The Wagga Wagga Strategic Traffic Model includes currently known development information provided by Wagga Wagga City Council and an estimate of background traffic growth on the Roads and Maritime highway network.

The future growth from 2018 to 2030 and 2030 to 2040 was applied to 2018 existing situation to obtain representative future 2030 and 2040 baseline traffic volumes. The modelled traffic growth from 2030 to 2040 was used to project a 2060 model volume. This growth was then applied to the 2018 existing situation to obtain a 2060 baseline set of traffic volumes.

The Wagga Wagga Strategic Traffic Model includes some land use growth projections in the SAP area. The SAP trip generation was applied for the land use change beyond what was already assumed in the baseline model to avoid double counting.

The SAP increase in trips was assigned to the road network using the most direct route that used highways or arterial/sub-arterial roads where possible. The SAP traffic was then added on top of the baseline traffic volumes to obtain a final estimate of traffic volumes on the road network with the SAP. The forecast traffic volumes and road capacity assessment are provided in Appendix E.

7.1.4 ROAD NETWORK PERFORMANCE AND UPGRADE

The demands on the road network over the 40+ year timeframe for the development of the SAP are likely to change substantially. The road network traffic assessment outlined in section 7.1.1 through to 7.1.3 above and Appendix E has been supplemented with an understanding of the traffic issues from the stakeholder liaison carried out for this study. These have been used to provide a high-level strategic assessment of the opportunities to improve the road network for the SAP.

Plans for upgrading Eunony Bridge Road and the Eunony Bridge are already in the implementation phase to support the planned growth in the Bomen Business Park and to facilitate the Northern Heavy Vehicle Alternative Route (from the WW ITS) to the RIFL Hub towards the Sturt Highway (east of Wagga Wagga) without having to travel through Wagga Wagga town.

Stakeholders have identified existing and short-term future issues with the Olympic Highway in the section from the Travers Street roundabout to the Old Narrandera Road seagull T-intersection. The upgrade to the intersections on the Olympic Highway either side of the Murrumbidgee River are considered most important to address the peak traffic capacity issues and the safety issues at these intersections. However, with future growth in residential development in the Northern Growth Area, the industrial development in the SAP and future plans for Charles Sturt University mean that a future upgrade of the Gobbagombalin Bridge is likely.

As the three north-western suburbs of Estella, Gobbagombalin and Boorooma expand, the 'centre of gravity' for trip generation will shift northwards. This could lead to an alternative route to the CBD (compared to the Olympic Highway) becoming more attractive, i.e. Coolamon Road and Hampden Avenue through Cartwrights Hill. This could lead to greater use of the Wiradjuri Bridge, reducing pressure on the Gobbagombalin Bridge. The encouragement of greater use of the Cartwrights Hill route and Boorooma Road/Gardiner Street as alternative corridors to the CBD could protect the freight route via the Olympic Highway from peak period delays caused by passenger vehicle movements.

The recommended road network upgrades from the traffic assessment and stakeholder liaison is outlined in Table 7.2. They are also shown in Figure 7.1, Figure 7.2 and Figure 7.3 for the 2030, 2040 and 2060 time periods respectively. This includes the development of new internal roads within the SAP that are assumed to be timed for the commencement of development in the stage they serve. It is recommended that the performance of the road network be monitored, and the list of upgrades and their timing be reviewed periodically to ensure the underlying assumptions of traffic growth remain suitable in the future.

Table 7.2 Recommended list of road upgrades

PERIOD	BASELINE AND SAP UPGRADES ¹	SAP ONLY UPGRADES
2018 to 2030	<ul style="list-style-type: none"> — Upgrade intersection of Olympic Highway and Travers Street — Upgrade intersection of Olympic Highway and Old Narrandera Road — Widen Olympic Highway between Coolamon Road and Travers Street² — Upgrade Gobbagombalin Bridge (Olympic Highway) 	<ul style="list-style-type: none"> — Internal Precinct Road – Stages 1B and 1C (including RIFL Road) — Preserve road corridor width for potential future widening of RIFL Road to two lanes in each direction
2030 to 2040	<ul style="list-style-type: none"> — Upgrade intersection of Hampden Avenue, Travers Street and Fitzmaurice Street — Widen Hampden Avenue corridor including Wiradjuri Bridge between Travers Street and Coolamon Road — Widen Olympic Highway between Merino Road and Coolamon Road — Widen Eunony Bridge Road between Oura Road and Sturt Highway — Widen Sturt Highway east of Eunony Bridge Road⁴ — Widen Sturt Highway between Pearson Street and Olympic Highway 	<ul style="list-style-type: none"> — Widen Merino Road between Olympic Highway and Byrnes Road — Upgrade intersection of Olympic Highway and Merino Road — Widen Byrnes Road between Merino Road and Oura Road — Upgrade intersection of Oura Road, Byrnes Road and Eunony Bridge Road — Widen RIFL Road between Merino Road and first intersection
2040 to 2060	<ul style="list-style-type: none"> — Widen Hampden Avenue corridor including Wiradjuri Bridge between Travers Street and Wall Road³ — Widen Sturt Highway west of Olympic Highway⁴ 	<ul style="list-style-type: none"> — Internal Precinct Road – Stage 2 — Widen Bomen Road and Dorset Drive between Olympic Highway and Merino Road — Widen Old Bomen Road between Bomen Road and Coolamon Road upgrade

(1) Required for Baseline, percentage apportionment for SAP to be advised

(2) Upgrade of Hampden Avenue/Wiradjuri Bridge by 2030 assumed to be delayed by redistribution of traffic from Gobbagombalin Bridge upgrade

(3) Second upgrade of Gobbagombalin Bridge by 2060 assumed to be delayed by redistribution of traffic from Wiradjuri Bridge upgrade

(4) Indicative only. Potential upgrading of Sturt Highway to be investigated separately.

- All road widening upgrades are assumed to add one additional lane in each direction
- Intersection upgrades recommended based on experience. No modelling has been undertaken. More detailed traffic modelling may identify other intersections requiring upgrades and/or the delay of the intersection upgrades recommended
- All timings are approximate and require further assessment
- Subject to further detailed review, analysis and planning in the future by Transport for NSW.
- Assumes Merino Road underpass of the rail line is wide enough for four lanes, subject to confirmation with further assessment.

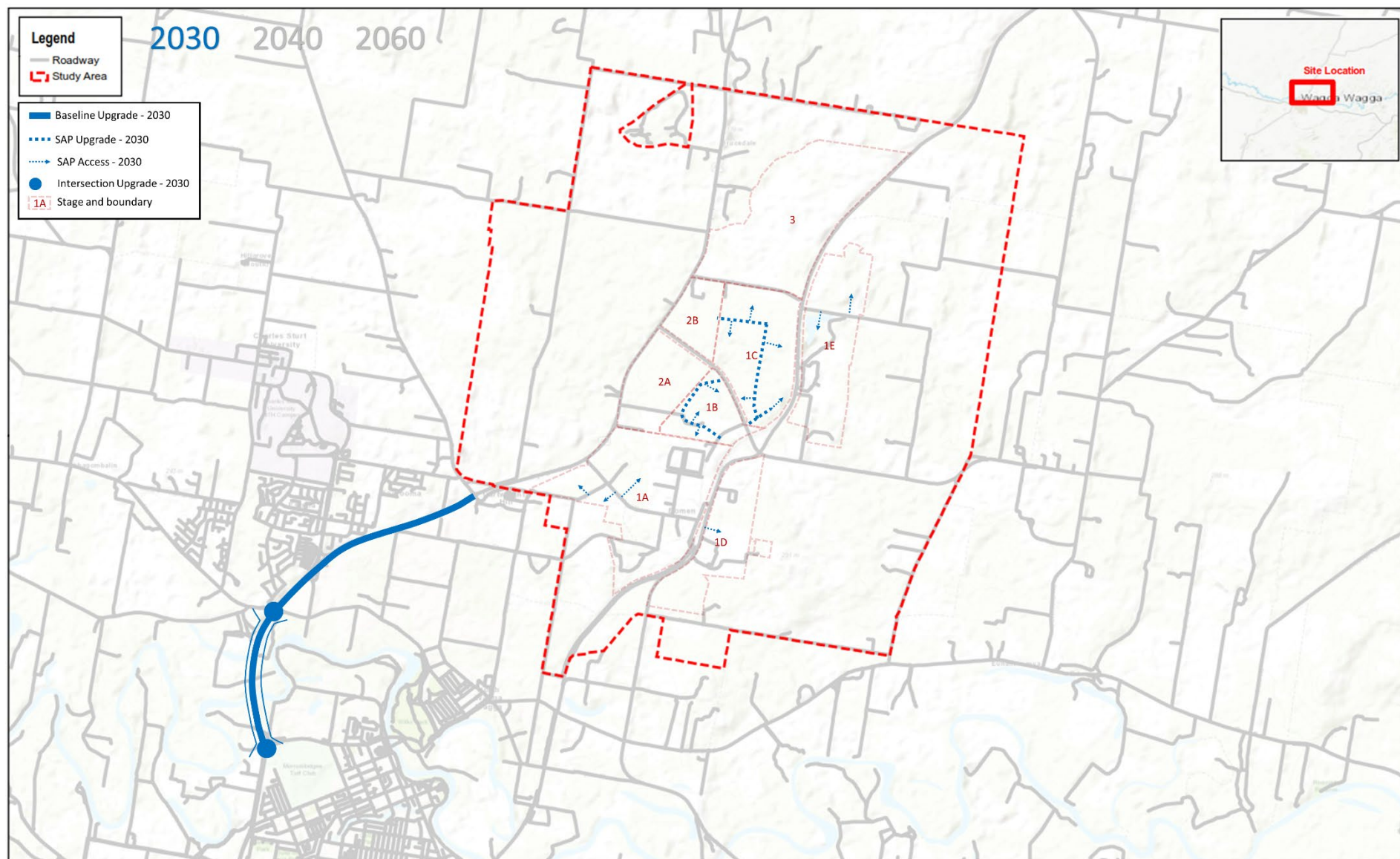


Figure 7.1 Recommended road upgrades – by 2030

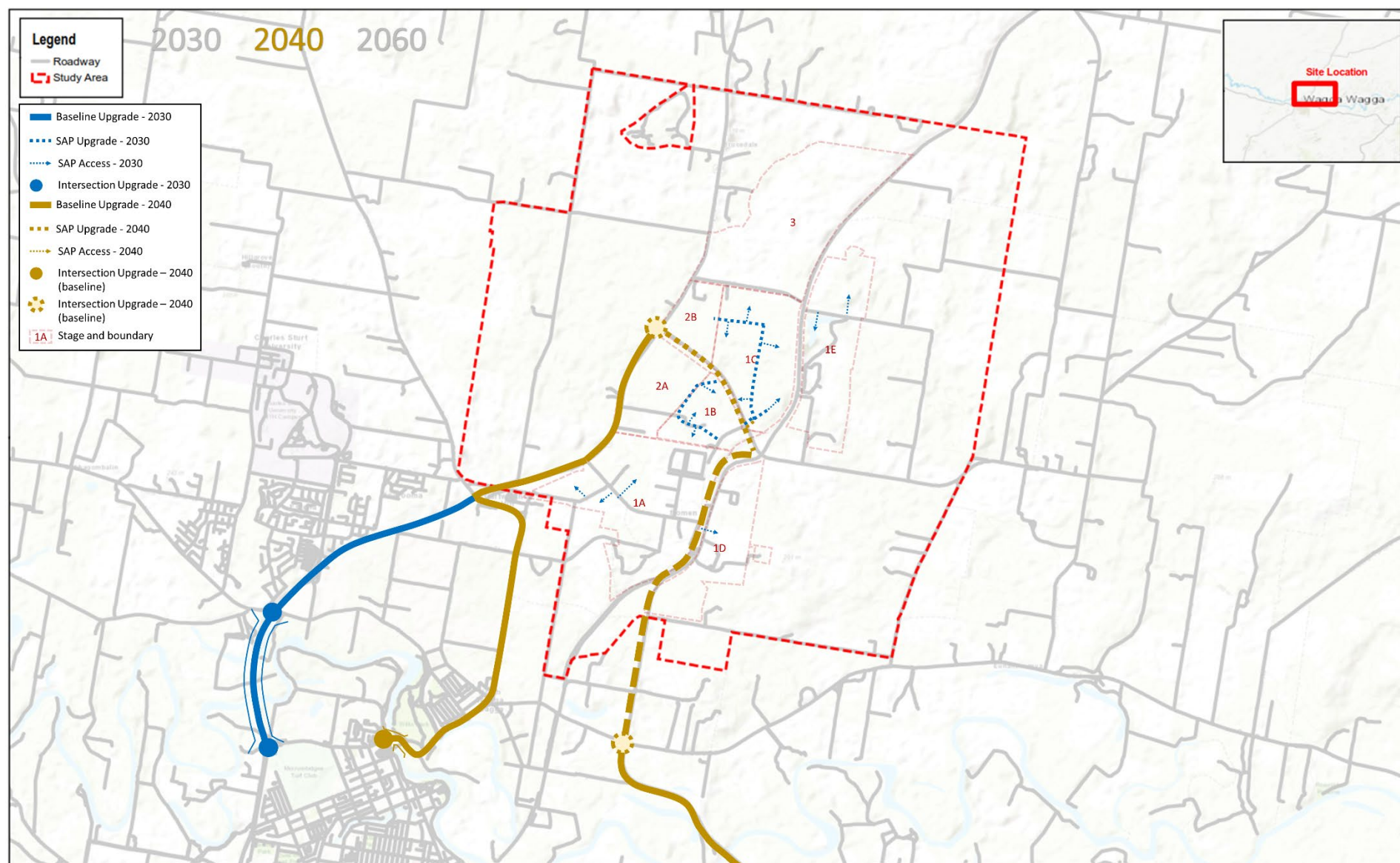


Figure 7.2 Recommended road upgrades – by 2040

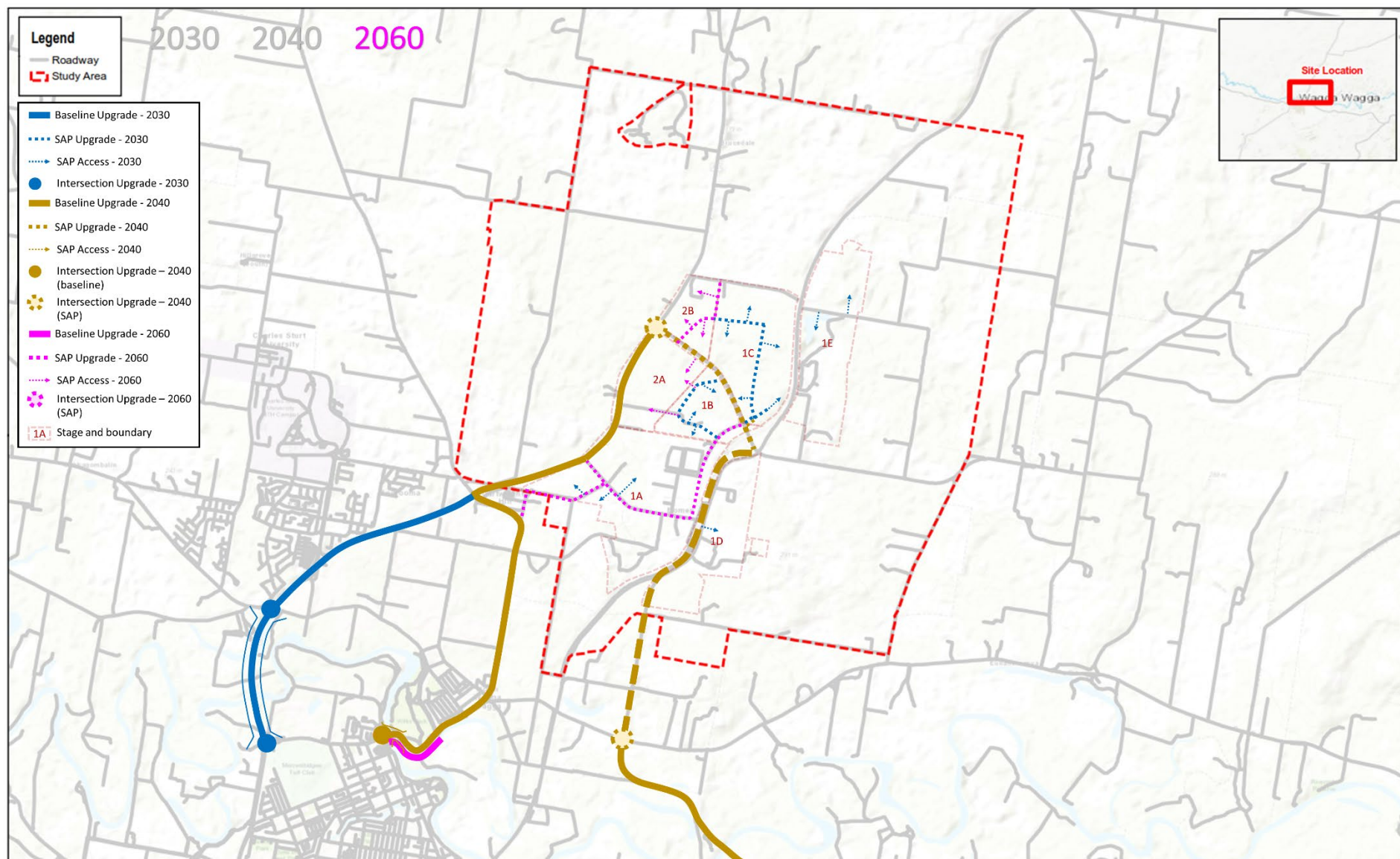


Figure 7.3 Recommended road upgrades – by 2060

7.2 HEAVY VEHICLE NETWORK

The refined structure plan provides the core of the heavy vehicle road network. New roads within the SAP should be constructed with suitable dimensions and pavements to accommodate the needs of HML vehicles, 4.6 m high vehicles and Performance Based Standards Class 2B and 3A vehicles. Figure 7.4 shows that the Olympic Highway, Byrnes Road and Merino Road should be considered as priority heavy vehicle corridors (although still used by light vehicles). Other SAP roads would require access for both light and heavy vehicles. The route to the south via Hampden Avenue and the western portion of Old Bomen Road to continue to have heavy vehicle restrictions (No trucks Over 4.5 tonne mass limit). However, this restriction will need to be removed from the eastern portion of Old Bomen Road to allow trucks to exit via Bomen Road.

The recommendations from the baseline assessment remain applicable, i.e.:

- Upgrading the Eunony Bridge Road bridge to accommodate Level 2B heavy vehicles is a critical infrastructure upgrade for the success of the SAP.
- Consider locating a fatigue management centre, trailer interchange and a high-quality service centre within the SAP. This could include a charging station for electric vehicles.
- Investigate opportunities to provide a truck compatible rest area or truck parking area on the Olympic Highway south of Wagga Wagga with appropriate facilities.
- Consideration should also be given to upgrading the Byrnes Road corridor, north to Harefield, for use by HML vehicles.

As mentioned in section 6.3.1, the possible locations for the fuel and service centre at the intersection of Merino Road and Dorset Drive should include driver fatigue management services and space for trailer drop-off. The location near the RIFL hub is favourable in terms of minimising the distance the trucks visiting the inter-modal terminal have to travel.

7.3 RAIL AND INTERMODAL

Rail forms a critical component of the Wagga Wagga Special Activation Precinct. In the preferred structure plan, the Main South Railway Line forms a north-south freight link to international and domestic markets. The Riverina Intermodal Freight and Logistics (RIFL) Hub gives freight generators and receivers within the precinct direct access to freight rail services and will provide significant opportunities for efficient freight movement. The RIFL Hub, as a multi-purpose and open access terminal, will act as a catalyst for industry and business investment in Wagga Wagga and the Special Activation Precinct.

Inland Rail will provide even greater opportunities for fast and efficient movement of freight by rail to and from the Wagga Wagga Special Activation Precinct. The project comprises 13 individual projects and more than 1700 km and includes both new sections of track and upgrades to existing lines.

If economically and technically feasible, future stages of the RIFL Hub could take advantage of the upgrades proposed as part of Inland Rail (double stack containers and 1800 m long trains), which may open up other interstate import–export opportunities for the Wagga Wagga Special Activation Precinct. Supporting longer trains and double-stacked containers could lower freight costs and make businesses in the Special Activation Precinct even more competitive. This will largely depend on the distance to be travelled and the loading and unloading facilities at the end point.

Other small rail intermodal facilities are currently operating at Bomen and Harefield. These existing facilities could provide market competition in the area, potentially lowering freight costs and providing businesses with greater choice. The existing terminals could also provide for freight businesses requiring their own siding without the need to immediately expand the RIFL Hub. Alternatively, the existing facilities could be consolidated into a single, central site, potentially providing for greater scale and efficiencies in intermodal transfer. These rail services could be consolidated into longer trains, providing even greater transport savings for businesses and industries in the region.

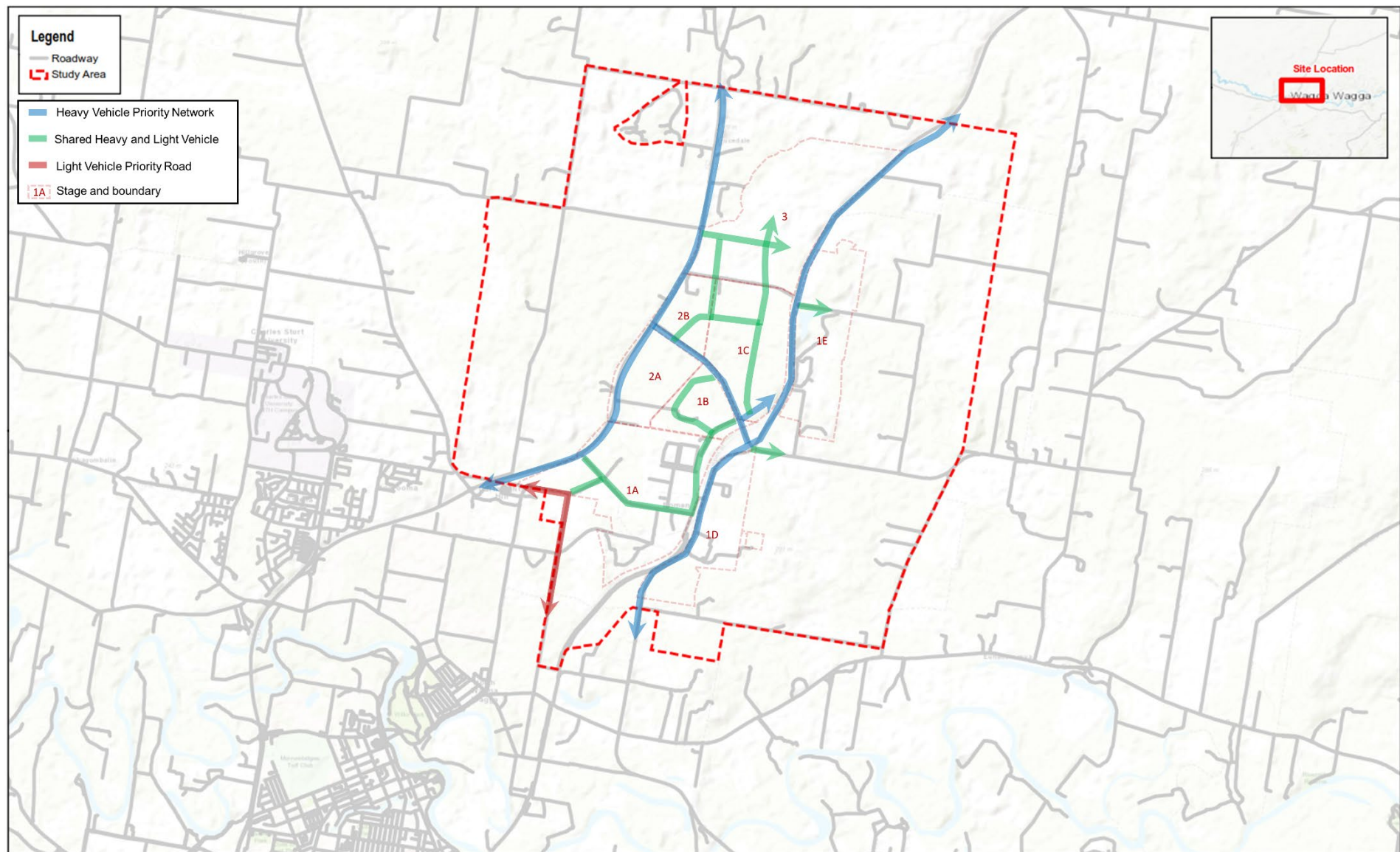


Figure 7.4 Vehicle priority roads

Furthermore, Inland Rail will extend the potential reach of industries and businesses in the Wagga Wagga Special Activation Precinct. When complete, Inland Rail will connect Melbourne and Brisbane via regional Victoria, NSW and Queensland.

The opportunities that the Inland Rail and RIFL Hub can bring to the Special Activation Precinct can be maximised by improving the interface between rail, intermodal terminal and precinct. Integrated warehousing and bulk freight loading facilities within the terminal allows more efficient transfer of goods and reduces double handling. Warehouses located within the RIFL precinct may be able to use in-terminal vehicles – non-street legal vehicles that are used only within the terminal – for quick loading/unloading of containers and transport within the terminal area, particularly when using a bomb cart/terminal trailer.

Rail-compatible businesses should be encouraged to locate their operations within a corridor of between 450 m and 750 m of the rail line for rail access and associated storage, shipping and related activities. The area immediately adjacent to the rail siding should be reserved for businesses that require direct access to rail to minimise double-handling.

Other rail and intermodal opportunities include:

- Investigation and investment to attract more businesses to use the RIFL Hub and rail freight to maximise the opportunities from Inland Rail.
- Early investigation and master-planning of extensions to RIFL Hub and integrated warehousing/bulk freight loading facilities.
- Adding additional sidings and freight loading facilities to RIFL Hub to maximise terminal efficiency, capacity and flexibility.
- Attracting new rail freight businesses to the Wagga Wagga Special Activation Precinct and supporting existing businesses such as Austrak.

7.4 PUBLIC TRANSPORT

Extending the public transport service to Bomen and SAP to provide improved accessibility for people who do not have access to a car and those with reduced mobility is important for transport sustainability and to improve their employment opportunities. This initiative has received support in the stakeholder liaison from transport agencies and businesses.

Shift work, 24-hour operation and dispersed employment locations create a challenge for regular timetables/fixed route services. It will be difficult to provide full Disability Discrimination Act (DDA) accessible services with no observed footpaths to provide an accessible link between the bus stops and properties.

The bus service could include a combination of fixed-route and flexible/on-demand services. This service could be included in the Transport for NSW review of the bus services in Wagga Wagga. A fixed-route service with associated bus infrastructure such as bus stops, seats, shelters, etc. Typical business start and finish times are recommended to suit the greatest number of employees. A possible route is shown in Figure 7.5. The potential introduction of a service to the SAP requires liaison with Transport for NSW and Council. Its introduction would depend on the number of employees in the SAP. However, its early introduction would provide employees with an alternative to private car use before their travel patterns become established.

A more flexible service to supplement this service could suit the nature of the transport needs of the SAP businesses. However, there are issues to be addressed if the rest of the bus network does not offer the same flexibility. To avoid replicating the service offered by taxis and ride share services, an on-demand bus could operate to a fixed origin/destination such as the interchange terminus on Fitzmaurice Street/Johnston Street.

Opportunities exist for future privately operated transport services to supplement the public transport offer. This could be in the form of a private car-pooling or minibus service. Future transport plans for the SAP should be flexible to embrace new opportunities as they arise.

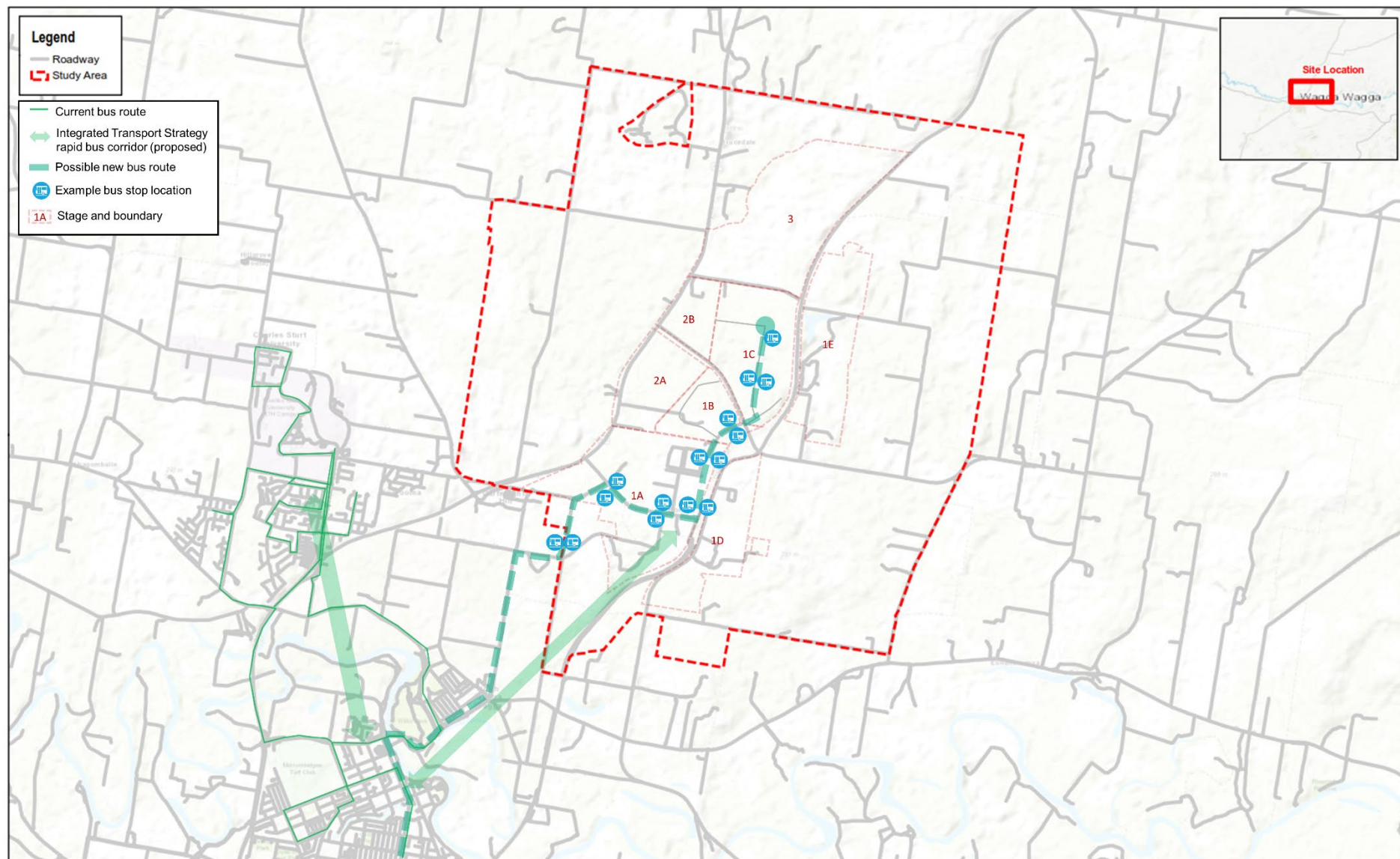


Figure 7.5 Potential bus route

7.5 ACTIVE TRANSPORT

7.5.1 PEDESTRIAN

There are currently minimal pedestrian facilities in the existing Bomen Business Park. The continuing industrial land use and the large lots proposed for the SAP means that walking is likely to remain a small proportion the SAP's transport task. However, the provision of a connected footpath network is needed to maximise future mobility opportunities within SAP. Items to be considered include:

- Active transport routes to Wagga Wagga town centre and across to the northern growth area as possible sources for employees who may choose to walk to Bomen from the nearby northern growth area and existing residential communities to the south.
- Footpaths which will provide direct connections within the SAP from businesses to shared places such as dining areas, parks or community facilities, predominantly located within and near the commercial nodes shown in Figure 6.1.
- Regular pedestrian crossing opportunities, including to the proposed commercial nodes at locations 'C3A' or 'C3B' in Figure 6.1 across Merino Road (to connect to the RIFL Hub) and across and along Dorset Drive would assist in connecting the surrounding businesses to the retail opportunities at these locations.
- Where suitable and if the opportunity exists, investigate opportunities to provide pedestrian links through lots to increase permeability of the footpath network.

7.5.2 BICYCLES

Wagga Wagga City Council is planning improvements to the cycle network across Wagga Wagga to link the major areas to the CBD and to each other. There are two proposals for the cycle route from the CBD to Bomen: Hampden Avenue Bridge, Mill Street/Oura Road and Byrnes Road (from the 2011 cycle plan) or alongside the Main South Rail Line (including a new river crossing) (from the WW ITS). The proposed route as depicted in Figure 7.6 are as follows:

- A north-south spine between SAP and Wagga Wagga town centre through Hampden Avenue, Old Bomen Road, Bomen Road and Dorset Drive (approximately 11 km route). The provision of an active transport network on Hampden Avenue can be included as part of the road upgrade to provide the most direct route which supports a passive surveillance design from passing vehicles.
- An east-west link to the Charles Sturt University, TAFE, Riverina College, sporting fields and surrounding residential developments to Hampden Avenue via Farrer Road and Boorooma Street.
- If the opportunity exists, investigate an east-west link to the Northern Growth Area with future upgrade of Sutherland Road.
- Appropriately designed bicycle crossings to be included with all proposed bicycle routes to ensure a safe, convenient and connected bicycle network.

Public and private end of trip facilities should be included in the planning, including public bike racks near the shared employee places, 'Provision in the DCP for cycle lockers, showers and change areas in businesses with a sufficient number of employees.

7.6 LIVESTOCK

Given the continued operation of the Wagga Wagga livestock saleyards and the presence of the Teys facility, the need for livestock highways and travelling stock reserves is expected to continue in the future. The current livestock highway along the Olympic Highway and Coolamon Road and travelling stock reserves on Bomen Road and in Brucedale should be preserved unless a suitable alternative can be found (potentially in the landscape buffer sub-precincts – see Figure 6.1). Figure 7.7 illustrates the location of livestock highways and travelling stock reserves.

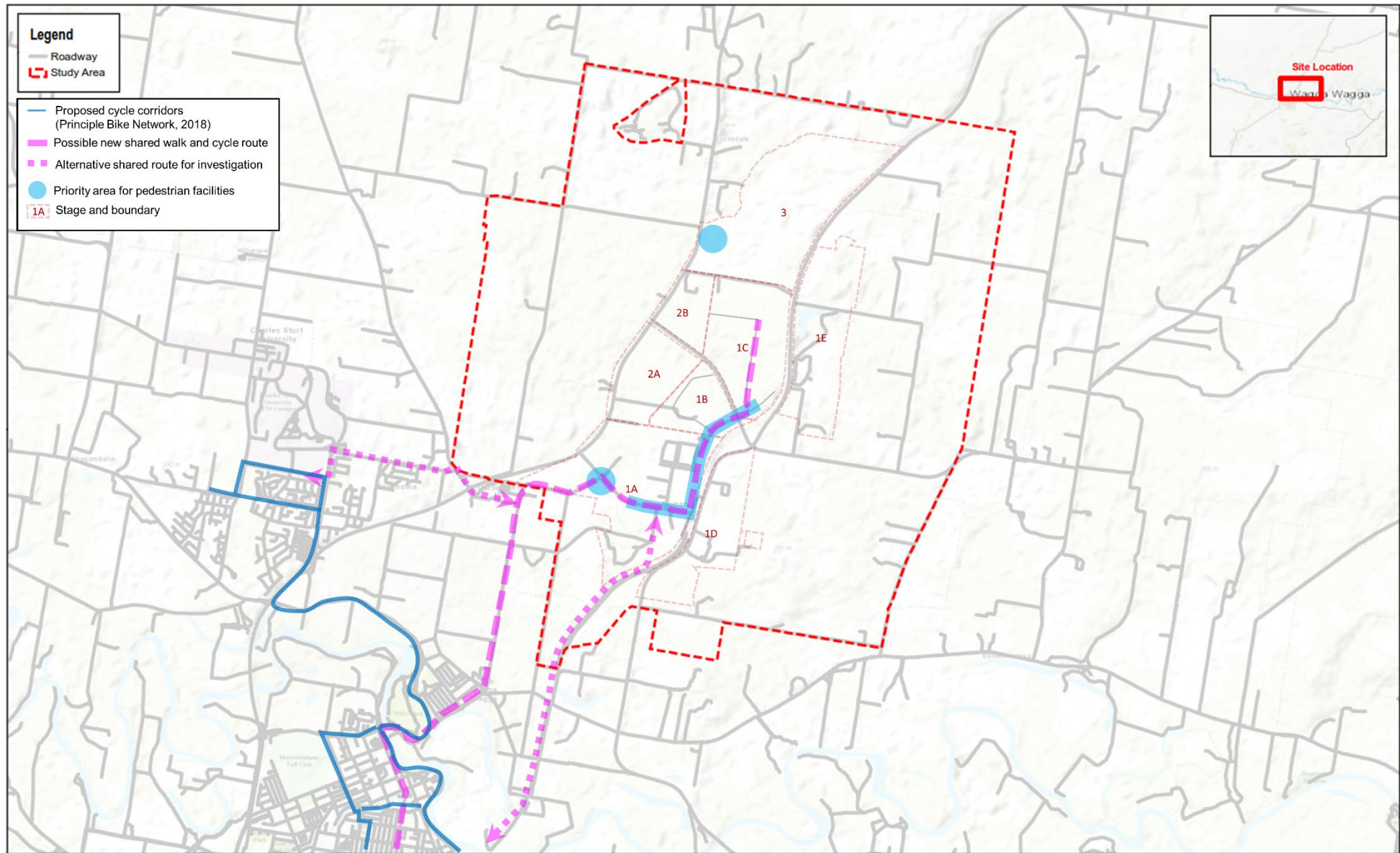


Figure 7.6 Potential shared walk and cycle routes

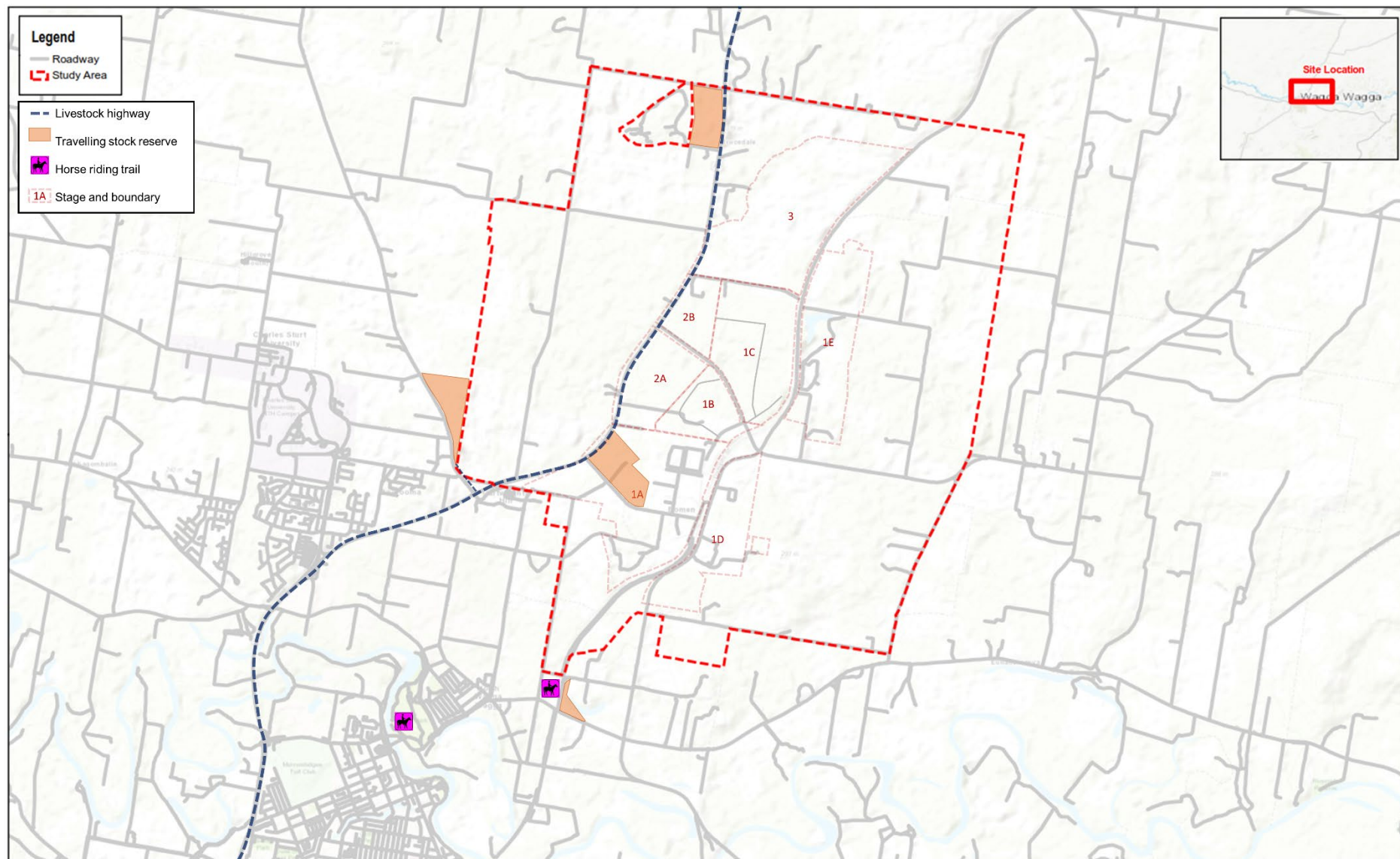


Figure 7.7 Wagga Wagga SAP Livestock reserves and routes

7.7 BUSINESS EFFICIENCY AND INNOVATION

From Future Transport 2056, potential opportunities for business efficiency and innovation include:

- Freight customers value reliability, efficient travel, and certainty to maximise productivity and reduce costs and energy intensity.
- Freight customers will increasingly harness data and analytics to achieve efficiencies that make them competitive on a local and international level.
- Load sharing applications will combine freight loads from different network users to maximise capacity and reduce delivery timeframes.
- Direct business-to-consumer delivery models and on-demand service models will blur the lines between traditional freight companies and retail businesses, and lead to innovative partnerships.
- Heavy vehicle road reforms aimed at turning the provision of heavy vehicle road infrastructure into an economic service, where feasible. This would see a market established that links the needs of heavy vehicle users with the level of service they receive and the charges they pay and how this revenue is invested back into road services.
- Heavy vehicle road reform will provide a basis for comparing road and rail freight pricing – a stepping stone towards the development of a market for freight where technology, data and analytics could support innovative ways of providing dynamic priority, and freight-as-a-service multimodal offerings.

Emerging technologies could play a role in the future SAP businesses:

- Create intelligent transport networks managed with data that enable increasingly efficient, flexible and dynamic service delivery with improved safety, access, reliability and responsiveness.
- Innovations in connected and automated vehicles are likely to develop in the freight industry.
- Through installing traffic signals at key intersections other sensor technology could be built off it to track movements and provide priority when required for freight.

Upcoming innovations in rail freight to improve efficiency include: automatic train protection and/or control (ARTC have been developing and testing the Advanced Train Management System (ATMS) to replace lineside signals, provide automatic route clearances and enforce movement authority), integrated systems reduce LCL (less than container load), and foldable containers (also applicable to road transport).

Upcoming innovations in road freight to improve efficiency include: connected and autonomous vehicles, truck platooning, Machine to Machine (M2M)/telematics.

Last Mile innovations that could have application in the SAP include:

- Connected and automated freight distribution vehicles
- GPS tracking
- Internet of Things (IoT) platforms of sensors
- Intelligent roadways (use a variety of sensors to provide roadside analytics of traffic flow) at a number of intersections using fibre network and wireless network. Creation of intelligent intersections that could be fitted with LIDAR, DSRC and sensor technology to enable dynamic signalling scenarios based on prioritisation or real-time traffic patterns. The intelligent intersections will prove analytics and then become integrated into the multi-modal network to provide mode prioritisation and responsive network infrastructure for freight movements.

8 TRANSPORT MEASURES

The transport assessment for this study has identified several pieces of infrastructure to provide for future development within the SAP and in the surrounding transport networks to support access to the SAP. It is envisaged that the development in the SAP would contribute to the cost of this infrastructure. Where the infrastructure provides a wider regional benefit, this contribution may be for only a part of the full cost.

8.1 INTEGRATED TRANSPORT NETWORK

A list of the transport infrastructure projects suggested for the Wagga Wagga SAP has been compiled based on the analysis in sections 7.1 to 7.6. The list shown in Table 8.1 is based on the assessment undertaken for this study. This list requires further consultation with the relevant agencies and are not government policy.

8.2 INFRASTRUCTURE TIMING

An assessment of potential timeframes for the suggested transport upgrades is also included in Table 8.1. The assessment considers the need for the infrastructure based on the delivery of developable regional enterprise land as well as coordination with other major developments. These development timeframes are approximate, based on the strategic nature of the assessment. It is recommended that the performance of the road network be monitored, and the list of upgrades and their timing be reviewed periodically to ensure the underlying assumptions of traffic growth remain suitable in the future.

8.3 FUNDING AND DELIVERY

The delivery of the package of road and public transport upgrades outlined in Table 8.1 may require funding from a range of sources including State government, Council and possibly contributions from businesses or other developers. To provide a preliminary understanding of the possible contributions to the cost of works, high-level strategic cost estimates have been prepared.

8.4 APPORTIONMENT METHOD

Apportionment has been based on the principle that the precinct development should contribute to the cost of transport infrastructure upgrades to the extent that they contribute to need for that upgrade. Each upgrade has had one of the two types of apportionment.

- 1 Future traffic congestion issues in the baseline (road or intersection performance assessed as Level of Service E or F) are contributed to by the future growth traffic and the SAP development traffic based on its percentage of the total growth traffic (excluding existing traffic).
- 2 Locations that only require upgrading if the SAP development proceeds or upgrades that are required for access to the development are 100 per cent attributable to the development.

The estimated upgrade costs, contribution from the Wagga Wagga SAP and apportionment are shown in Table 8.1 overleaf. They should be read in conjunction with the assumptions listed on the page following the table.

Table 8.1 List of transport infrastructure suggestions for the Wagga Wagga SAP Precinct – PRELIMINARY, SUBJECT TO REVIEW

Item		Lead delivery agency	Approximate timing	Apportionment percentage ^{1,3}	Length (metres)	Total cost estimate ^{2,3}				SAP apportioned cost estimate ³				Assumptions
						2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	
Pedestrians														
P.1	SAP connection to University to Wagga Wagga CBD Shared Path	Council	With Stages	100%	3,210	\$1,950,075	\$0	\$0	\$0	\$1,950,075	\$0	\$0	\$0	Allowance for 7 km of 2.5 m wide shared path built during 2018 to 2030
P.2	SAP to Northern Growth Area Shared Path	Council	With Stages	100%	9,140	\$5,467,500	\$0	\$0	\$0	\$5,467,500	\$0	\$0	\$0	Allowance for 9 km of 2.5 m wide shared path built during 2018 to 2030
P.3	Internal Shared Paths	Council	With Stages	100%		\$1,937,925	\$3,067,875	\$4,270,725	\$0	\$1,937,925	\$3,067,875	\$4,270,725	\$0	Shared paths along 1 side of internal roads
P.4	Pedestrian refuges	Council	With Stages	100%	n/a	\$96,896	\$153,394	\$213,536	\$0	\$96,896	\$153,394	\$213,536	\$0	Allowance for 5% of P.3 cost for pedestrian refuges
P.5	Footpaths in high-activity areas	Council	With Stages	100%	n/a	\$193,793	\$306,788	\$427,073	\$0	\$193,793	\$306,788	\$427,073	\$0	Allowance for 10% of P.3 cost for high pedestrian activity areas
Cycles														
C.1	SAP connection to University to Wagga Wagga CBD Shared Path	Council	With Stages	100%	n/a	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Assumed included for in P.1
C.2	SAP to Northern Growth Area Shared Path	Council	With Stages	100%	n/a	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Assumed included for in P.2
C.3	Internal Shared Paths	Council	With Stages	100%	n/a	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Assumed included for in P.3
C.4	Bicycle locking facilities	Council	With Stages	100%	n/a	\$38,759	\$61,358	\$85,415	\$0	\$38,759	\$61,358	\$85,415	\$0	Allowance for 2% of P.3 cost for pedestrian refuges
Buses														
B.1	Bus stops with shelters on dedicated bus routes	TfNSW	With Stages	100%	n/a	\$232,369	\$789,750	\$27,338	\$0	\$232,369	\$789,750	\$27,338	\$0	Assume 15 new bus shelters with seating and bike rack.

Item		Lead delivery agency	Approximate timing	Apportionment percentage ^{1,3}	Length (metres)	Total cost estimate ^{2,3}				SAP apportioned cost estimate ³				Assumptions
						2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	
Road – Internal														
Ri.1	Widen Merino Road between Olympic Highway and Byrnes Road	Council	2035	100%	2,400	\$0	\$14,147,000	\$0	\$0	\$0	\$14,147,000	\$0	\$0	Council
Ri.2	Old Bomen Road	Council	2031	100%	1,140	\$0	\$0	\$7,650,000	\$0	\$0	\$0	\$7,650,000	\$0	Council
Ri.3	Bomen Road	Council	2045	100%	1,740	\$0	\$0	\$11,511,000	\$0	\$0	\$0	\$11,511,000	\$0	Council
Ri.4	Dorset Drive	Council	2055	100%	1,590	\$0	\$0	\$10,560,000	\$0	\$0	\$0	\$10,560,000	\$0	Council
Ri.5	Stage 1B Road	Council	For Stage 1B	100%	1,450	\$12,887,000	\$0	\$0	\$0	\$12,887,000	\$0	\$0	\$0	Council
Ri.6	RIFL Road – Stage 1	Council	For Stage 1C	100%	1,060	\$9,508,000	\$0	\$0	\$0	\$9,508,000	\$0	\$0	\$0	Council
Ri.7	RIFL Road – Stage 2	Council	For Stage 1C	100%	750	\$0	\$6,788,000	\$0	\$0	\$0	\$6,788,000	\$0	\$0	Council
Ri.8	RIFL Road – Stage 3	Council	For Stage 1C	100%	1,590	\$0	\$0	\$14,118,000	\$0	\$0	\$0	\$14,118,000	\$0	Council
Ri.9	West-East Road Stage 1	Council	For Stage 1C	100%	680	\$6,187,000	\$0	\$0	\$0	\$6,187,000	\$0	\$0	\$0	Council
Ri.10	West-East Road Stage 1	Council	For Stage 2A	100%	600	\$0	\$5,499,000	\$0	\$0	\$0	\$5,499,000	\$0	\$0	Council
Ri.11	North-South Road	Council	For Stage 2A	100%	1,150	\$0	\$10,281,000	\$0	\$0	\$0	\$10,281,000	\$0	\$0	Council
Ri.12	Sutherlands Road Upgrade	Council	For Stage 3	100%	970	\$0	\$0	\$0	\$8,707,000	\$0	\$0	\$0	\$8,707,000	Council
Ri.13	Widen RIFL Road between Merino Road and first intersection	Council	2049	100%	360	\$0	\$2,617,000	\$0	\$0	\$0	\$2,617,000	\$0	\$0	Council
Road – External														
Re.1	Upgrade intersection of Olympic Highway and Travers Street	TfNSW	2020	15%	n/a	\$2,197,000	\$0	\$0	\$0	\$329,550	\$0	\$0	\$0	4-way signalised intersection
Re.2	Upgrade intersection of Olympic Highway and Old Narrandera Road	TfNSW	2020	15%	n/a	\$2,789,000	\$0	\$0	\$0	\$418,350	\$0	\$0	\$0	Complex 3-way signalised intersection
Re.3	Widen Olympic Highway between Coolamon Road and Travers Street ²	TfNSW	2026	19%	3,650	\$21,458,000	\$0	\$0	\$0	\$4,077,020	\$0	\$0	\$0	
Re.4	Upgrade Gobbagombalin Bridge (Olympic Highway)	TfNSW	2026	15%	1,500	\$137,201,000	\$0	\$0	\$0	\$20,580,150	\$0	\$0	\$0	1.5 km length bridge duplication 2 x 3.5 m width lanes + 2.5 m shoulders Assume bridge duplication next to existing bridge

Item		Lead delivery agency	Approximate timing	Apportionment percentage ^{1,3}	Length (metres)	Total cost estimate ^{2,3}				SAP apportioned cost estimate ³				Assumptions
						2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	
Re.5	Upgrade intersection of Hampden Avenue, Travers Street and Fitzmaurice Street	Council	2031	3%		\$0	\$1,435,000	\$0	\$0	\$0	\$43,050	\$0	\$0	Complex 3-way signalised intersection on Olympic Highway
Re.6	Widen Hampden Avenue corridor including Wiradjuri Bridge between Travers Street and Coolamon Road	Council	2031	3%	5,500	\$0	\$46,297,000	\$0	\$0	\$0	\$1,388,910	\$0	\$0	Includes for duplication of 2 bridges
Re.7	Widen Olympic Highway between Merino Road and Coolamon Road	TfNSW	2031	64%	3,700	\$0	\$21,614,000	\$0	\$0	\$0	\$13,832,960	\$0	\$0	
Re.8	Widen Eunony Bridge Road between Oura Road and Sturt Highway	Council	2034	100%	3,700	\$0	\$30,597,000	\$0	\$0	\$0	\$30,597,000	\$0	\$0	Includes for duplication of 1 bridge
Re.9	Widen Sturt Highway east of Eunony Bridge Road	TfNSW	2033	5%	n/a	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Excluded
Re.10	Widen Sturt Highway between Pearson Street and Olympic Highway	TfNSW	2043	2%	n/a	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Excluded
Re.11	Upgrade intersection of Olympic Highway and Merino Road	Council	2031	100%		\$0	\$1,771,000	\$0	\$0	\$0	\$1,771,000	\$0	\$0	Complex 3-way signalised intersection on Olympic Highway
Re.12	Widen Byrnes Road between Merino Road and Oura Road	Council	2033	100%	4,700	\$0	\$27,345,000	\$0	\$0	\$0	\$27,345,000	\$0	\$0	
Re.13	Upgrade intersection of Oura Road, Byrnes Road and Eunony Bridge Road	Council	2033	100%		\$0	\$2,836,000	\$0	\$0	\$0	\$2,836,000	\$0	\$0	4-way signalised intersection
Re.14	Widen Hampden Avenue corridor including Wiradjuri Bridge between Travers Street and Wall Road	Council	2050	2%	900	\$0	\$0	\$13,803,000	\$0	\$0	\$0	\$276,060	\$0	Includes for duplication of 1 bridge
Re.15	Widen Sturt Highway west of Olympic Highway	TfNSW	2043	2%	n/a	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Excluded
Total						\$202,144,317	\$175,606,165	\$62,666,087	\$8,707,000	\$63,904,387	\$121,525,085	\$49,139,147	\$8,707,000	

(1) Depending on timing – at 2040 or 2060 (highest percentage)

(2) WT Partnership cost estimate, October 2019

(3) Cost estimates and apportionment have not been assessed in detail by Transport for NSW. They will be subject to further review, analysis and planning in the future.

Notes regarding cost estimates

- 1 These costs estimates are high level strategic only for option comparison purposes. Further design development is recommended before attempting to establish a project budget.
- 2 Property acquisitions have been excluded.
- 3 Client-side costs excluded, including project management, property acquisition, professional fees, community liaison, project investigation, investigation and design, and finalisation and handover.
- 4 Costs exclude GST and escalation.
- 5 Quarter 4, 2019 prices have been utilised.
- 6 A contingency of 50 per cent has been utilised, which is considered low when compared with Roads and Maritime guidelines for Strategic Stage estimates.
- 7 Construction overheads of 35 per cent have been utilised within this estimate to account for:

Supervision	Site services	Establishment and
Vehicles	Small tools	disestablishment
Accommodation and allowances (hotels etc.)	Material testing (primary testing)	Rise and fall (3.5 per cent) each year
Plant and equipment in addition to plant specified on cost build-ups	Site services	Risk at 7 per cent of overheads
	Buildings	Contractor's Contingencies and risk
		Fees and insurances.
- 8 No allowance for changes to government legislation.
- 9 Allowances for removal of existing are limited to potentially outdated Google streetview captures.
- 10 Road allowance assumptions detailed within breakdown tabs.
- 11 Site establishment for road widening are individual contracts.
- 12 Earthworks cut allows for pavement boxing only and assumes 25 per cent of cut material to be used in fills and 75 per cent to be disposed of offsite as VENM.
- 13 Intersections constructed concurrently with other road widening works.
- 14 Road widenings are to be one extra 3.5 m wide lane per carriageway for External roads and 3 m wide per carriageway for Internal roads.
- 15 Road widenings are assumed to be of 300 mm thick SMZ, 150 mm thick DGB, 100 mm thick AC20 intermediate course and 50 mm thick AC14 wearing course with associated seals.
- 16 Existing road along widenings assumed to be milled and re-sheeted with 50 mm asphalt wearing course.
- 17 Bridge widenings are assumed to be duplications.
- 18 Shared path lengths are assumed where described, and to one side of roads.
- 19 Pedestrian refuges, high activity areas, and bicycle locking facilities are assumed to be an allowed based on overall cost.
- 20 Geotech to fully confirm classification of ground conditions at a later design stage.
- 21 No allowance for stabilization to ground or rock embankments.
- 22 Road furniture allowed for based on similar projects.

23 No allowance for fencing and property adjustments.

24 No allowance for site CCTV or surveillance.

The estimates are based upon information made available to WSP and WT Partnership at the time of preparing the estimates. The estimates have been prepared for this specific Client and Project, and should not be used or relied on for any other use. WSP and WT Partnership accept no liability for actual costs varying from those estimated.

A summary of the cost estimate for the minimum package of works is shown in Table 8.2. With these set of assumptions, the apportioned cost to the Wagga Wagga SAP of the infrastructure items listed would be approximately \$243.3 million out of a total cost of \$449.1 million (or approximately 54 per cent).

Table 8.2 Summary of SAP apportioned cost estimates

Infrastructure type	2018–2030	2030–2040	2040–2060	Beyond 2060 (SAP infrastructure only)	Total
Pedestrian	\$9,646,189	\$3,528,057	\$4,911,334	\$0	\$18,085,580
Cycle	\$38,759	\$61,358	\$85,415	\$0	\$185,532
Bus	\$232,369	\$789,750	\$27,338	\$0	\$1,049,457
Road – Internal	\$28,582,000	\$39,332,000	\$43,839,000	\$8,707,000	\$120,460,000
Road – External	\$25,405,070	\$77,813,920	\$276,060	\$0	\$103,495,050
Total SAP	\$63,904,387	\$121,525,085	\$49,139,147	\$8,707,000	\$243,275,619
Total Infrastructure	\$202,144,317	\$175,606,165	\$62,666,087	\$8,707,000	\$449,123,569
Total SAP Apportionment	32%	69%	78%	100%	54%

Source: WSP and WT Partnership

Notes To be read in conjunction with assumptions listed on previous page

9 CONCLUSIONS

The refined structure plan provides the core of a strong transport network for the Wagga Wagga SAP:

- The landscaping buffer sub-precinct land use around the regional enterprise land and key corridors should be preserved to avoid land use conflict in the future.
- The structure plan includes an internal street network that facilitates movement within the SAP without the need for travel on the Olympic Highway. It also limits the number of connections to the Olympic Highway to three (Bomen Road, Merino Road and Sutherlands Road), reducing its disruption to inter-state travel.
- A staged package of road improvements has been identified in a strategic transport assessment to address the traffic impacts of the SAP and to also provide efficient road freight routes to the SAP. The indicative timeframes proposed are to maintain acceptable road performance levels. However, if a higher-level of performance for the heavy vehicle network is required to realise efficiency gains, upgrades on the Olympic Highway, Byrnes Road and Eunony Bridge Road may need to be brought forward.
- The performance of the road network be monitored, and the list of upgrades and their timing be reviewed periodically to ensure the underlying assumptions of traffic growth remain suitable in the future.
- A wider traffic study of the road crossings of the Murrumbidgee River is required to coordinate the upgrades needed to serve multiple developments including the SAP, Northern Growth Area and increased activity at the Charles Sturt University. This should seek to stage the upgrading of road and use re-routing of traffic to get value from each upgrade rather than upgrading all crossings in quick succession.
- The provision of improved heavy vehicle driver fatigue management, refuelling and trailer drop-off within the SAP at the commercial centre on Merino Drive either near the RIFL Hub is of high importance.
- Maximise the internal transport connections from the RIFL hub to the adjoining businesses to reduce the delays from interaction with general traffic on the public road network. This also creates opportunities to introduce autonomous vehicles, creating further opportunity for efficiency.
- The SAP should be planned in conjunction with Transport for NSW to coordinate the provision of a bus service. Opportunities to create greater density of employment at nodes/centres and a defined commercial street would improve the success of the public transport service.
- The internal road network proposed assists walk and cycle movement. Opportunities should be sought to provide smaller blocks by identifying through-site links for pedestrians and cycles. The planning for the SAP should capitalise on the roll-out of Council's shared path network.
- The structure plan should preserve the travelling stock reserve where possible or identify an alternative location should it need to be relocated elsewhere.

10 LIMITATIONS

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and/or recommendations in the Report (Conclusions) are based in whole or in part on information provided by the Client and other parties identified in the report (Information), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

The following limitations are noted regarding this assessment:

- The study is strategic overing potential land use changes in the future.
- The projection of traffic volumes to 2060 assumes that the trends (e.g. assumed growth rates) in the EMME model for the period to 2040 will continue between 2040 and 2060. Changes in the assumptions of growth and background traffic increases will have large impacts on the forecast traffic volumes. The forecasts used for this assessment should be considered as strategic, having a large potential range of values (confidence interval).
- The assessment is aimed at comparing the relative merits of the three land use scenarios for the qualities included. It is not meant to be a definitive assessment of each scenario. Stage 4 of the Wagga Wagga SAP study will assess the preferred land use scenario in more detail.
- The trip generation assessment is based on an understanding of current business trip generation. Businesses moving into the SAP area in the future may have different characteristics that may change the traffic impacts of the SAP.
- The road network assessment uses the Wagga Wagga strategic traffic model forecasts. This model and the assumptions therein are assumed to have been agreed during its development by Wagga Wagga City Council and NSW Roads and Maritime Services. It is therefore assumed as fit for purpose. This model includes estimates of land use growth across Wagga Wagga and background traffic growth rates per annum. Changes in these assumptions would change its forecasts.
- The traffic modelling for RIFL used in this assessment is from 2015 and has not been updated to reflect changes to the design since that time.





















APPENDIX A

CLASSES OF HEAVY VEHICLES






















Class 1 Heavy Vehicles (examples for illustration purposes)





February 2019

Special Purpose Vehicle (SPV)			Oversize Overmass Vehicles (OSOM)		
1		All Terrain Crane	15		Prime Mover and Low Loader (Gooseneck)
2		All Terrain Crane with Dolly	16		Prime Mover and Low Loader with Dolly (Gooseneck)
3		Pick and Carry Crane	17		Prime Mover and Platform Trailer (Gooseneck)
4		Truck Mounted Crane	18		Prime Mover and Extendable Trailer
5		Truck Mounted Drill Rig	19		Block Truck towing Drawn Platform
6		Truck Mounted Concrete Pump	20		Two Block Trucks towing Drawn Platform with Push Block Truck
7		Prime Mover Towing Drill Rig Trailer	HVNL Definitions		
8		Grader	HVNL s116 (1) (1) A heavy vehicle is a class 1 heavy vehicle if it, together with its load, does not comply with a prescribed mass requirement or prescribed dimension requirement applying to it, and— (a) it is a special purpose vehicle; or (b) it is an agricultural vehicle other than an agricultural trailer; or Note— See subsection (2) for agricultural trailers. (c) it— (i) is a heavy vehicle carrying, or designed for the purpose of carrying, a large indivisible item, including, for example, a combination including a low loader; but (ii) is not a road train or B-double, or carrying a freight container designed for multi-modal transport. (2) An agricultural trailer is a class 1 heavy vehicle , irrespective of whether it, together with its load, does or does not comply with a prescribed mass requirement or prescribed dimension requirement applying to it.		
9		Firetruck			
Agricultural Vehicles (including implements and trailers)			HVNL s116 (4) Special purpose vehicle means— (a) A motor vehicle or trailer, other than an agricultural vehicle or a tow truck, built for a purpose other than carrying goods; or (b) a concrete pump or fire truck. HVNL s5 Agricultural vehicle means an agricultural implement or agricultural machine. HVNL s5 Agricultural trailer means a trailer that is designed to carry a load and used exclusively to perform agricultural tasks, but does not include a semitrailer. HVNL s5 Oversize vehicle means a heavy vehicle that does not comply with a dimension requirement applying to it.		
10		Combine Harvester	NHVR Notes: Not all SPV's and agricultural vehicles are Class 1 heavy vehicles. SPV's and agricultural vehicles (except agricultural trailers) which comply with prescribed mass and dimension requirements are general access vehicles.		
11		Tractor			
12		Grain Auger	Overmass Vehicle: A heavy vehicle or combination that does not comply with a prescribed mass requirement applying to it (including gross mass, axle or axle group mass).		
13		Chaser Bin			
14		Cane Haul Out Truck			

Class 2 Heavy Vehicles (examples for illustration purposes)

Freight Carrying Vehicles			Vehicles Exceeding 4.3m in Height (up to 4.6m high as per Schedule 6 of Heavy Vehicle (Mass, Dimension and Loading) National Regulation) (MDL)		
21		B-double	37		Vehicle Carrier
22			38		A-double (Livestock)
23		A-double	39		B-triple (Livestock)
24			HVNL Definitions		
25		B-triple	HVNL s136 A heavy vehicle is a class 2 heavy vehicle if— (a) it— (i) complies with the prescribed mass requirements and prescribed dimension requirements applying to it; and (ii) is— (A) a B-double; or (B) a road train; or (C) a bus, other than an articulated bus, that is longer than 12.5m; or (D) a combination designed and built to carry vehicles on more than 1 deck that, together with its load is longer than 19m or higher than 4.3m; or (E) a motor vehicle, or a combination, that is higher than 4.3m and is built to carry cattle, sheep, pigs or horses; or (b) it is a PBS vehicle.		
26			HVNL s5 B-triple means a combination consisting of a prime mover towing 3 semitrailers, with— (a) The first semitrailer being attached directly to the prime mover by a fifth wheel coupling; and (b) The second semitrailer being mounted on the rear of the first semitrailer by a fifth wheel coupling on the first semitrailer; and (c) The third semitrailer being mounted on the rear of the second semitrailer by a fifth wheel coupling on the second semitrailer.		
27		AB-triple	HVNL s5 road train means— (a) A B-triple; or (b) A combination, other than a B-double, consisting of a motor vehicle towing at least 2 trailers, excluding any converter dolly supporting a semitrailer.		
28		A-triple	HVNL s5 PBS vehicle means a heavy vehicle that is the subject of a current PBS vehicle approval under Part 1.4.		
29		BAB-Quad	HVNL s5 PBS vehicle approval means a current approval issued for a heavy vehicle by the Regulator under section 23.		
30		ABB-Quad	NHVR Notes: B-doubles: Despite the shorter length, 19m B-doubles are classified as Class 2 Vehicles. General freight carrying vehicles that are longer than 19m require specific networks that are capable of handling these larger vehicles. This is usually managed by declaring route networks in gazette notices, but where a network does not exist, an operator may apply for a permit.		
31		Rigid Truck and 2 Dog Trailers	Buses: A bus, other than an articulated bus, that is longer than 12.5m but less than 14.5m, that complies with prescribed mass and dimension requirements is a class 2 heavy vehicle. These vehicles are also known as a 'Controlled Access Bus'		
Performance Based Standards (PBS)			Vehicle carriers: A vehicle carrier is a combination designed and built to carry vehicles on more than one deck that together with its load is longer than 19m or higher than 4.3m.		
32		Prime Mover and Quad Axle Semitrailer	Livestock vehicles: A livestock vehicle is a heavy vehicle, or a combination, that may be higher than 4.3m and is built to carry cattle, sheep, pigs or horses.		
33		Rigid Truck and 5 Axle Dog Trailer	Performance Based Standards: (PBS) An alternative compliance scheme for heavy vehicles setting minimum performance levels for safe and efficient operation (as opposed to standard prescriptive rules). Greater access is generally afforded for higher performance.		
34		B-double with Quad Axle Groups (up to 30m)			
35		A-double (up to 30m)			
Buses					
36		Controlled Access Bus			

Class 3 Heavy Vehicles (examples for illustration purposes)



40		Rigid Truck and Dog (over 42.5 tonnes GCM)	HVNL Definitions		
41		Prime Mover and Semitrailer towing Converter Dolly	HVNL s116 (3) (3) A heavy vehicle is a class 3 heavy vehicle if— (a) it, together with its load, does not comply with a prescribed mass requirement or prescribed dimension requirement applying to it; and (b) it is not a class 1 heavy vehicle.		
42		B-double towing Converter Dolly			
43		Underhook/Underlift Tow Truck	NHVR Notes: A truck and dog trailer combination whose dimensions and mass do not exceed prescribed mass and dimension requirements is a general access vehicle. If its mass or dimension limits exceed prescribed requirements, this combination is classified as a Class 3 vehicle. Examples of Class 3 vehicles include: • A truck and dog trailer combination consisting of a rigid truck with 3 or 4 axles towing a dog trailer with 3 or 4 axles weighing more than 42.5t is an example of a class 3 heavy vehicle. • Other examples might include a B-double or road train transporting a load wider than 2.5m.		




APPENDIX B

REST AREA CATEGORIES



Rest area category list of values

Code	Description	Visual Example
SCT	<p>A Highway Service Centre means a building or place used to provide refreshments and vehicle services to highway users. It may include any one or more of the following:</p> <ul style="list-style-type: none"> • a restaurant or cafe • take away food and drink premises • service stations and facilities for emergency vehicle towing and repairs • parking for vehicles • rest areas and public amenities 	 <p>Figure 3 - Highway Service Centre</p>
RA	<p>A Rest Area is an area for light and/or heavy vehicles, which generally offers parking, picnic tables, shelter, toilets and water</p>	 <p>Figure 4 - Rest Area</p>

Code	Description	Visual Example
PA	<p>A Parking Area is an area clear of the carriageways for stopping. Includes stopping bays and truck stopping bays as defined in RS01</p> <p>Generally only rubbish bins are provided at these areas</p>	 <p>Figure 5 - Truck Stop with RS01 standard signposting</p>
INH	<p>An Informal Heavy Vehicle Stopping Area is an area accessible from the carriageway, such as a disused stockpile site or road reserve that is not fenced, that is evidently used for parking. It may be just a wider part of the road shoulder. It should have green (formerly blue) reflective markers. It will not have rubbish bins or road signs indicating its existence</p>	 <p>Figure 6 - Informal Heavy Vehicle Stopping Area</p>
INS	<p>A Heavy Vehicle Inspection area is an area clear of the carriageway to undertake vehicle regulations tasks</p>	 <p>Figure 7 - Heavy Vehicle Inspection</p>

APPENDIX C

RIFL TRAFFIC GENERATION



C1 RIFL TRAFFIC GENERATION

An assessment of the traffic impact of the Riverina Intermodal Freight Logistics (RIFL) Hub was made in the *Bomen Traffic Model Report, Transport Modellers 2015*.

The estimate of traffic generation for the RIFL hub by 2040 contained in this report was:

- 433 cars in and 433 cars out per day
- 368 trucks in and 368 trucks out per day (i.e. approximately 40 per cent of total daily trips by truck).

It is noted that the information in this report is four years old and may no longer reflect the latest philosophy on how the terminal will operate. However, no updated traffic assessment has been undertaken since.

In the absence of more recent forecasts, and given the strategic nature of this assessment, we have used these forecasts in our assessment of the Wagga Wagga SAP for the RIFL hub.

APPENDIX D

SAP TRAFFIC GENERATION CALCULATION



D1 EXISTING TRAFFIC GENERATION BY LOCAL BUSINESSES

D1.1 EXISTING BUSINESS INFORMATION

A drop-in session for local businesses was held on 15 and 16 July 2019. Information on their trip generation is summarised in Table D.1.

Table D.1 Trip generation information from local business transport needs and issues

Business	Transport magnitude, employee and transport
Tey's	<ul style="list-style-type: none">— Approximately 900 employees (full-time equivalents) (can be as high as 1,100 at peak times).— Approximately 1,200 animals per day in 30 B-double truck movements, mainly from local and eastern seaboard graziers.— Exports in containers (approximately 18 per day) going to local regional and CBD plus Sydney and Melbourne on road or rail via the Qube facility in Harefield.
ROBE	<ul style="list-style-type: none">— 40 employees over a 24 hour/7-day cycle.— Between 30 and 200 truck movements in per day (peak during harvest time) from Victoria, South Australia and NSW.— Approximately 30 truck trips out with products.
Fulton Hogan	<ul style="list-style-type: none">— 2 to 3 employees (FTE) in shifts of 8 hours, 5 days per week.— 27 trucks per day on average – 30 to 40 during peak times. Same numbers out to local areas and Councils.
Proway	<ul style="list-style-type: none">— 90 FTE on site plus 30 contractors.— Approximately 30 truck movements per day.
Southern Oil	<ul style="list-style-type: none">— 35 FTE on site.— 1,000 B-double tankers in per annum (approximately 3 per day), same number out with refined products.
Energi	<ul style="list-style-type: none">— 77 FTE excluding contractors and logistics.— Approximately 65 truck movements per week for input materials, plus 41 truck movements per week for outbound movement.

Some of these rates provided in Table 3.3 are seasonal – i.e. they can increase substantially during harvest time.

D1.2 FLOOR AREA TO LAND AREA RATIOS

Based on approximate measurements of the Bomen businesses, the ratio of floor area to land area is approximately 20 per cent – i.e. 2,000 m² floor area per hectare.

Benchmarking current employment in Bomen of 1,475⁴, and assuming:

- 12 employees per hectare for Regional Enterprise
- 8 employees per hectare for Intensive Livestock Agriculture
- 40 employees per hectare for Commercial Gateway
- 0.05 employees per hectare for Solar and Landscape protection.

the current level of development equates to about 20 per cent development (including open space within a businesses' land and public space (e.g. roads)).

D1.3 TRAFFIC GENERATION

Using the information in Table D.1, assumptions about employee movement (1.1 people per car and 100 per cent in the peak period) and a rough estimate of the floor space, the traffic generation varied as follows:

- 0.3 to 6.8 one-way car traffic movements per day per 100 m² gross floor area
- 0.2 to 4.0 one-way truck traffic movements per day per 100 m² gross floor area.

Adding up all the trip generation for the businesses surveyed the overall average rate was:

- 3.3 one-way car traffic movements per day per 100 m² gross floor area
- 0.5 one-way truck traffic movements per day per 100 m² gross floor area
- 3.8 one-way total vehicle movements per day per 100 m² gross floor area.

This rate is similar to the Roads and Maritime warehouse rate, and approximately 80 per cent of the factory and road transport terminal traffic generation rates.

⁴ Concept Scenario Options Economics and Employment – Methodology, Table 3 Bomen Employment Scenarios, MacroPlan, August 2019

D2 TRAFFIC GENERATION GUIDELINES

The Roads and Maritime Services publication *Guide to Traffic Generating Developments (Version 2.2, October 2002)* lists the following rates, which were utilised as a basis for comparison purposes to businesses already existing within the SAP.

- Road transport terminals:
 - Daily vehicle trips = 5 per 100 m² gross floor area
 - Peak hour vehicle trips = 1 per 100 m² gross floor area.
- Factories:
 - Daily vehicle trips = 5 per 100 m² gross floor area
 - Evening peak hour vehicle trips = 1 per 100 m² gross floor area.
- Warehouses:
 - Daily vehicle trips = 4 per 100 m² gross floor area
 - Morning peak hour vehicle trips = 0.5 per 100 m² gross floor area.

A survey of existing businesses in Bomen indicated that they have trip rates very similar (3.9 one-way total vehicle movements per day per 100 m² gross floor area) to that of the warehouse rate.

A more recent publication from Roads and Maritime Services (TDT13/04a Guide to Traffic Generating Developments Updated traffic surveys) provides detailed data about a variety of business parks in metropolitan and regional NSW locations. For regional areas, they indicate trip generations in a range

- Daily vehicle trips = 3.78 to 11.99 per 100 m² gross floor area (average 7.83)
- Morning peak hour vehicle trips = 0.32 to 1.20 per 100 m² gross floor area (average 0.70)
- Evening peak hour vehicle trips = 0.39 to 1.30 per 100 m² gross floor area (average 0.78).

The Technical Direction also provides trip generation rates from the surveys per employee (0.95 vehicle trips during the peak hour per employee) and per hectare (18.6 vehicle trips during the peak hour per hectare).

It is noted that business parks will have an element of retail activity that is not characteristic of the potential businesses that are envisaged for the Wagga Wagga SAP, and therefore its rates could be higher than those for the SAP.

APPENDIX E

FUTURE BASELINE AND SAP TRAFFIC ASSESSMENT



E1 ROAD NETWORK ASSESSMENT

The pages overleaf show the forecast baseline and with SAP traffic volumes as well as the assessment of the road link capacity and need for an upgrade for the following model years:

- 2030
- 2040
- 2060.

E1.1 ROAD CAPACITIES

To assess how well a road section will perform for a particular forecast traffic volume, a nominal theoretical lane traffic capacity has been assigned based on Austroads and Roads and Maritime Services guidance depending on the type of road. Table E.1 shows the assumed traffic volumes (measured in passenger car units per hour (pcuph)) and the Level of Service from A to F (equated to a volume to a volume to capacity ratio (V/C Ratio)).

For these calculations, trucks are converted to passenger car units using a factor based on their length. Roads were classified as either a rural highway, urban highways with clearways, urban highways with interruptions or an industrial street.

Table E.1 Assumed road lane traffic capacities by road type and associated LoS (as determined by V/C ratio)

Level of Service	Rural highway undivided		Urban divided/ undivided highways or roads, with clearways		Urban divided/ undivided highways or roads with interruptions		Industrial streets	
	V/C Ratio	MSF (pcuph)	V/C Ratio	MSF (pcuph)	V/C Ratio	MSF (pcuph)	V/C Ratio	MSF (pcuph)
A	0.15	210	0.35	560	0.35	420	0.35	315
B	0.27	380	0.5	800	0.5	600	0.5	450
C	0.43	600	0.75	1,200	0.75	900	0.75	675
D	0.64	900	0.9	1,440	0.9	1,080	0.9	810
E	1	1,400	1	1,600	1	1,200	1	900
F	10	> 1,400	10	> 1,600	10	> 1,200	10	> 900

Notes:

- (1) V/C: ratio of traffic demand to nominal capacity on a road network
- (2) LoS: Level of Service
- (3) MSF: Maximum Service Flow, measured in passenger car units per hour (pcuph)

For this assessment, to obtain effective use of current road assets, the threshold for upgrading a road has been assumed as the transition **between LoS D and LoS E**, i.e. 900 pcuph for a rural highway, 1,440 pcuph for urban highways with clearways, 1,080 pcuph for urban highways with interruptions and 810 pcuph for industrial streets.

The transition from LoS D to E is used as the threshold for upgrade as daily fluctuations in traffic volumes and conditions may mean above-capacity operation on some days. It also plans for upgrades before LoS E operation which has unstable flow where minor disruptions can cause delays. The transition from LoS E to F is assumed to be the theoretical capacity of the lane. LoS F represents above-capacity operation, with extensive delays.

The recent WWCC traffic counts on Merino Road were used to calculate truck to passenger car units (pcu) equivalent factor, which was found to be 2.12. This means that in terms traffic volume demand, a truck is equivalent to 2.12 passenger car unit (pcu).