Menangle Park Contributions Plan 2020

CAMPBELLTOWN CITY COUNCIL

APPENDIX C TRANSPORT MANAGEMENT AND ACCESSIBILITY PLAN

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Dear Pat

Spring Farm Parkway - Strategic Design Development Update and Traffic Modelling

AECOM was engaged by UrbanGrowth NSW (UGNSW) to further develop the strategic design and to update traffic modelling if necessary for Spring Farm Parkway between Liz Kernohan Drive and Menangle Road to support the rezoning of the Menangle Park Urban Release Area (MPURA).

In 2013 AECOM developed a strategic design package and micro simulation modelling for Spring Farm Parkway from the vicinity of the now roundabout at the termination of Liz Kernohan Drive to Menangle Road. The design and traffic modelling were approved by the Roads and Maritime Services.

This letter has been prepared to summarise the changes that have been applied to the 2013 strategic design and traffic modelling.

Strategic design changes

As a result of recent consultation with relevant stakeholders by UGNSW, the following design changes were applied to the 2013 strategic design:

- Extend the strategic design westward to tie-in with the Liz Kernohan Drive roundabout at Glenlee.
- Widen the median from 8.0m to 9.0m between Liz Kernohan Drive roundabout to Hume Highway Interchange to be consistent with the cross-section of Liz Kernohan Drive that has been / is being constructed.
- Raise the two bridges over the existing Glenlee rail siding and the Main Southern Railway to provide 7.1m clearance for future double-decker train use.
- Include provision of two signalised intersections for access to the Mount Annan Botanical Gardens and the Tripodi landholdings.

The updated strategic design drawing set showing the alignment, typical cross-sections, longitudinal sections and turning paths at the key intersection is attached to this letter.

Traffic modelling changes

In 2013, AECOM was engaged by UGNSW to conduct traffic microsimulation (VISSIM) modelling to assess the future road operation around the MPURA, especially intersections along the Spring Farm Parkway between the collector road and Menangle Road. The modelling undertaken in 2013 confirmed that the proposed road network can accommodate the full development of the MPURA and Glenlee Industrial Area during the peak hours of year 2031. The proposed road network that has been modelled to support the rezoning of MPURA includes:

- Spring Farm Parkway between the collector road and Menangle Road.
- Signalised intersections at Spring Farm Parkway with the collector road and Menangle Road.
- North-facing ramps to the Hume Highway at Spring Farm Parkway.
- A collector road extension of Glenlee Road that connects between Spring Farm Parkway and Menangle Road.

The design changes stated above have no fundamental changes to any traffic movements to, from and along the Spring Farm Parkway corridor that have been modelled using VISSIM in 2013. Therefore, no additional traffic modelling is required to reflect the design changes.

AECOM confirms that the modelling undertaken in 2013 is still current to reflect the assumptions of the MPURA development and background traffic growth in order to support the rezoning of the MPURA development.

Traffic proportions to inform S94 Plan

AECOM has also been requested to review the proportion split of the amount of local vs regional traffic that would be using the full / completed SFP based on the 2013 traffic modelling in order to update the S94 Plan.

We have reviewed the last 2013 traffic modelling and hence the update of the table as shown below.

Section	2010 TMAP*		2013 VISSIM model^	
	Local development traffic	Regional traffic	Local development traffic	Regional traffic
West of north/south collector road	27%	73%	22%	78%
Between the N/S collector road and F5 ramps	52%	48%	41%	59%
SFP / F5 ramps	22%	78%	37%	63%
Between F5 ramps and Menangle Road	41%	59%	28%	72%
SFP / Menangle Road intersection	40%	60%	16%	84%

* - Based on 2026 AM peak hour modelling only as part of the 2010 TMAP

^ - Based on average of 2031 AM and PM peak hour traffic modelling (+10% background traffic)

As shown in the table, the proportions have changed at all locations – generally the local development traffic component (by Menangle Park) has dropped due to two reasons:

1. There has been additional background traffic - 2031+10% compared to 2026 that were used in the 2010 TMAP, while development traffic component has remain the same as the yield is similar.
2. The development traffic component may not have been fully captured as the way the modelling was undertaken we have not counted development traffic that uses the southern accesses on Menangle Road. However, it is expected this only accounts for a small proportion of the overall development traffic and these traffic are expected to travel along Menangle Road only without using the Spring Farm Parkway.

Yours faithfully

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menanglepark

Menangle Park
Draft Transport Management & Accessibility Plan

Revision H

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AECOM Australia Pty Ltd

1 June 2010

campbelltown city council

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CONTENTS

1.0 EXECUTIVE SUMMARY

New South Wales, and in particular the Sydney metropolitan area, is being challenged by a strong demand for residential growth. This is a trend that has been seen for the last 20 years and one that is likely to continue for the next twenty years. The demand for housing is partly driven by reducing household size and partly by increased population (through migration and immigration).

The Metropolitan Strategy seeks to provide approximately 70% new residential dwellings in existing urban areas, with the remaining 30% in greenfield areas.

The Menangle Park release area has been identified by the NSW Government as being suitable for rezoning for residential purposes, with a potential for 3,400 lots. This is subject to suitable specialist studies being undertaken to assess the implications of such a development.

This Transport Management and Accessibility Plan (TMAP) report has been prepared to assess the transport impacts of the Menangle Park land release, leading towards a package of measures that will achieve a sustainable outcome for the region. The key objectives of the study are to:

- define the transport impacts and opportunities stemming from development of the release area;
- develop a package of measures to support development over time; and
- feed into a Local Environmental Study to be documented for the subject lands.

Existing infrastructure for pedestrians is limited in the Menangle Park area, reflecting the low number of residents that currently live in Menangle Park and the rural nature of the area. Footpaths are not provided on local roads in Menangle Park or on Menangle Road. To encourage journeys on foot within the Menangle Park development, the structure plan will include footpaths on all roads providing safe, high quality connections to shops, services and to transport.

The Campbelltown cycleway network consists of both on and off road signposted routes and is being expanded. Currently, an on-road cycle route is provided on Menangle Road from the F5 overbridge near Medhurst Road into Macarthur. A regional cycleway is proposed in the area and the TMAP recommends a connection to enable easy pedestrian and cyclist access to Macarthur, together with cycle parking and comprehensive directional signage.

Menangle Park is currently serviced by Busways route 892 from Menangle to Campbelltown, a low frequency route. All buses to the Macarthur area stop at the bus interchange at Macarthur Square rather than Macarthur Station. Bus mode share for Journey to Work trips is low, at less than one percent. The TMAP proposes bus service improvements that are responsive to the development of the site. Public transport infrastructure, such as public transport priority at key intersections, a public transport spine within the site and the upgrade of Macarthur Interchange to better facilitate transfers between bus and rail will encourage bus use, as will public transport information, including comprehensive timetable information on all stops and key retail locations. A community intranet will provide another source of public transport information.

CityRail services to the south west generally terminate at Campbelltown, although some services on the East Hills Line terminate at Macarthur Station. Electrification of the rail line ceases to the south of Macarthur Station and services to the Menangle Park Station are provided by diesel trains on the Southern Highlands Line. Electrification of the rail line to Menangle Park is unlikely to be financially viable. One diesel service runs from Menangle Park to the city in the peak hour. Plans for a turn-back at Macarthur station are underway and construction is anticipated in early 2011 after the completion of the Macarthur Station upgrade by the Transport Infrastructure Development Corporation (TIDC) (*Project Update, Macarthur Station Upgrade and Interchange*, *May 2009)* commencing in 2009. This will allow additional services to terminate at Macarthur, thus increasing the frequency of peak hour services.

The Campbelltown City Council strategic traffic model provides an indication of road network performance at 2006 and reports that the roads in the vicinity of the Menangle Park site are operating within their theoretical capacity in the evening peak, this being the busiest period on a typical weekday; however, Narellan Road westbound on the approach to the F5 ramps is close to capacity. Certain intersections within the vicinity of the site are currently operating close to or at capacity although intersections south of Narellan Road, such as Menangle Road/ Glen Alpine Road appear to operate within capacity.

Road network improvements within Macarthur to widen selected links and to provide intersection improvements at key locations will enable traffic generated by the development to access the local road network without reducing the overall performance.

In summary, the site benefits from a trend of journey to work containment within the locality, relatively good proximity to the suburban rail network and an emerging cycling network, together with an existing public transport framework. However, some key transport constraints in the area include certain road links approaching capacity (in particular Narellan Road north of the F5/M5 corridor), limited peak period capacity at intersections in the Macarthur and Campbelltown centres, limited pedestrian facilities in Macarthur and relatively high levels of car use in the region.

The recommendations of this study are reflected in the package of measures developed for the site that will meet the needs of new residents within Menangle Park while achieving a mode shift towards public transport over the next 10 to 15 years.

2.0 INTRODUCTION

2.1 INTRODUCTION AND PURPOSE

AECOM Australia Pty Limited (AECOM), formerly Maunsell AECOM, has been commissioned by Landcom and Campbelltown City Council (Council) to prepare a Transport Management and Accessibility Plan (TMAP) for Menangle Park, a residential development of some 3,400 dwellings.

It is intended that this TMAP will form one of the supporting documents for the Menangle Park Local Environmental Study (LES) and has been prepared to:

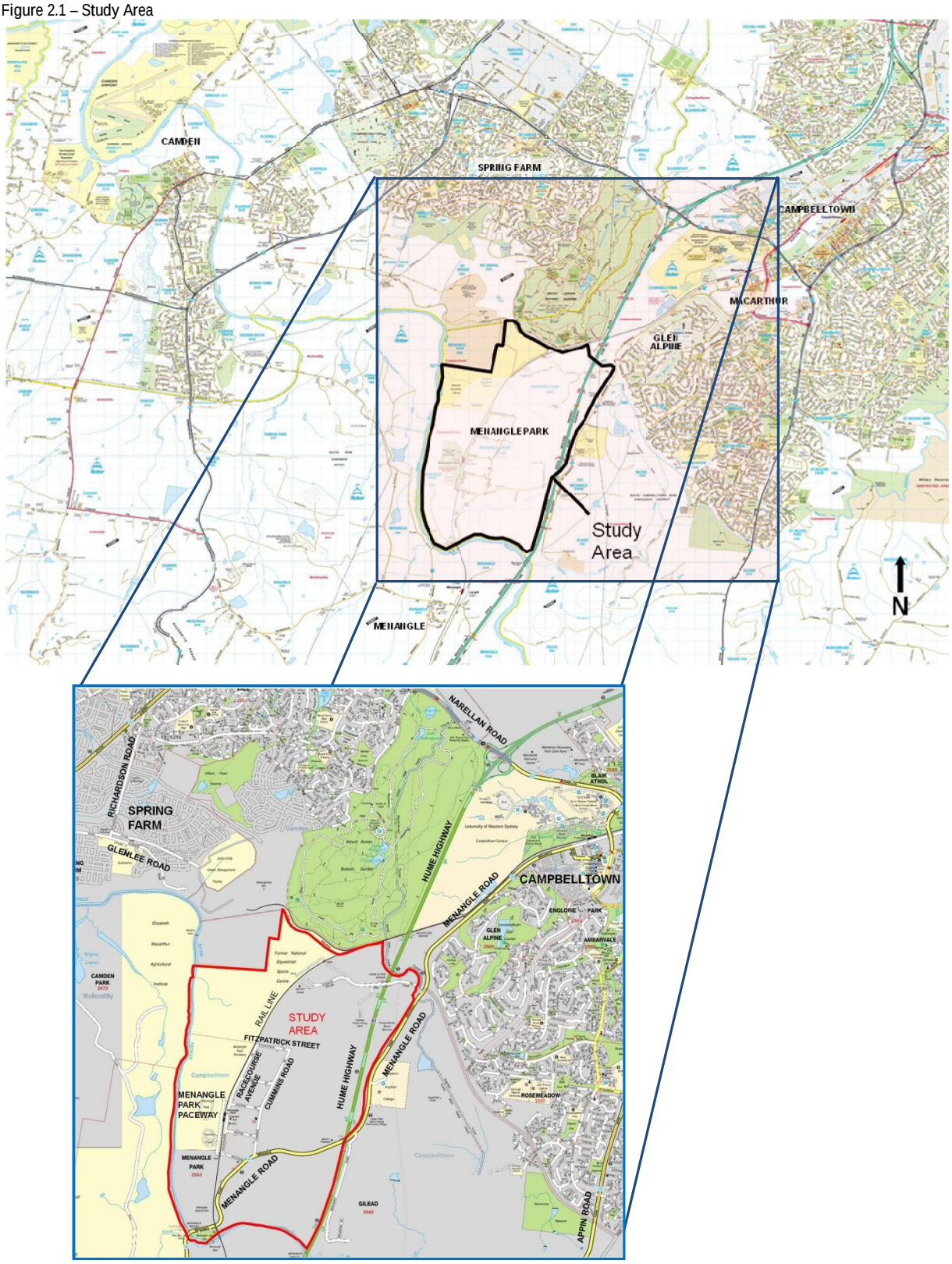
- define the transport impacts stemming from development of the Menangle Park release; and
- develop a package of measures that will assist in meeting the performance measures.

This study has been undertaken having regard to the Interim Guidelines for Transport Management and Accessibility Plans (Department of Transport, 2002). The modelling aspects of the study have been undertaken with the aid of Campbelltown City Council's strategic traffic model.

2.2 THE STUDY AREA

Menangle Park is located approximately 5km south west of Campbelltown, between Menangle Road and the Nepean River. As shown in Figure 2.1, the study area is bounded to the west and south by the Nepean River, by Menangle Road to the east and by the approximate alignment of the Mount Annan Coal Railway spur to the north. The study area includes a variety of current land uses, including the Menangle Park residential subdivision, Glenlee House and Menangle Park Paceway.

Figure 2.1 – Study Area



Source: AECOM, 2008

The site presents an interesting challenge on a number of fronts - parts of the site are within the Nepean River flood plain, there are indigenous and non-indigenous heritage items in the area, pockets of sensitive vegetation and the potential for the site to yield sand for mining.

Against these challenges, the site is well located in terms of transport corridors, there is an existing trend of trip containment in the region and a reasonable rail mode share for existing areas in South Campbelltown, all of which will assist in the development of an innovative package of measures that will meet transport needs, while achieving integrated land use and transport planning objectives.

2.3 THE PROJECT

Since the developable area of the site is limited by topography and flood risk, the Menangle Park site is expected to provide approximately 3,400 residential dwellings.

The project will be developed in stages, over a period of approximately 20 to 25 years. Table 2.1 illustrates the dwellings that are expected to be completed at each five year period.

Table 2.1 – Project Stages

Year	Lots completed (Cumulative Total)
2014	200
2018	1,150
2022	2,400
2028	3,400

Source: Landcom, 2009

The site will be accessed via existing intersections of Menangle Road with Cummins Road and Glenlee Road (relocated to the south to improve visibility), and via two new left in/ left out intersections with Menangle Road. In addition, consideration has been given to a link road connecting Spring Farm and Camden to Menangle Road and the F5, referred to as the Spring Farm Parkway. The site would provide one intersection with this link road and one structure over the Parkway, as illustrated in Figure 2.2.

Figure 2.2 – Draft Structure Plan

Source: Urbis, 2010

Access to the Menangle Park Harness Club would be provided via the existing Racecourse Avenue. The Menangle Park Harness Club will host regular race meetings, pending the proposed closure of the Harold Park Paceway. The transport analysis undertaken as part of this report relates specifically to the AM peak period, as it is forecast that the greatest transport impact is likely to be associated with the journey-to-work trips generated during the AM peak hour. Based on the existing staff levels at Harold Park and the

proposed size of the Menangle Park Harness Club, it is forecast that approximately 10 full-time staff would be employed at the Menangle Park Harness Club.

Given that races are unlikely to be held during the AM peak hour, it is forecast that the traffic generation from the Menangle Park Harness Club would have negligible impact on the transport during the AM peak hour. Furthermore, any redevelopment of the harness club will require a separate transport assessment to analyse the impact of any proposed redevelopment of the site.

2.4 REPORT FRAMEWORK

This report has been structured into the following sections:

- Section 3 discusses the strategic context of the development;
- Section 4 provides an overview of previous studies in the Menangle Park environs;
- Section 5 provides a benchmark of existing conditions in the locality, including walking, cycling, public transport and traffic conditions;
- Section 6 discusses transport performance measures for this TMAP;
- Section 7 discusses the potential travel demand resulting from the development scenario, together with an assessment of the likely impact on local transport networks, including walking, cycling, public transport and private vehicles;
- Section 8 outlines a package of measures developed to achieve the performance targets defined for this site; and
- Section 9 provides a summary of the key findings and recommendations of this study.

3.0 PLANNING CONTEXT

3.1 INTRODUCTION

The strategic context of the Menangle Park study area is governed by three core frameworks, namely:

a) State and Regional planning policies;

b) local planning policies; and

c) the local transport context.

This section provides an overview of the main aspects of each these frameworks and its relevance to the study area.

3.2 STATE AND REGIONAL CONTEXT

3.2.1 Metropolitan Strategy

The Metropolitan Strategy for Sydney was released by the NSW Government in December 2005. *City of Cities – A Plan for Sydney's Future* is a broad framework for delivering strong and sustainable growth and to secure Sydney's place in the global economy.

City of Cities – A Plan for Sydney's Future supports continuing economic growth while balancing social and environmental impacts. It is based on anticipated population, economic and demographic trends. The Plan has been developed with five aims that have been identified to achieve a more sustainable city. These are:

- Enhance Liveability – by ensuring a diverse choice of housing for an ageing and changing population, close to services, while protecting the character of our suburbs and communities.
- Strengthen Economic Competitiveness – strengthening Sydney's long–term economic prosperity by increasing the city's and region's competitiveness in globalised markets, and sharing the benefits across the city.
- Ensure Fairness – providing fair access to jobs, services and lifestyle opportunities by aligning services close to where people live, and by providing access to high quality transport.
- Protect The Environment – protecting Sydney's unique environmental setting and reducing the city's use of natural resources and production of waste.
- Improve Governance – improving the quality of planning and decision making, and giving the community confidence in its institutions.

The Strategy includes priorities for planning and responsibilities of each level of Government, including investment priorities and a context for decision-making by Local Government and the private sector. The

Strategy is not a single policy document, but rather a dynamic action strategy based on a series of key directions – including the Land Releases in North West and South West Sydney, Centres Renewal, Key Corridor Revitalisation Plans (Parramatta Road, Sydney Airport – CBD), Metropolitan Water Plan, Rail Clearways and Bus Reform.

Funding is integral to the planning of the new metropolitan strategy. The Government is committed to identifying innovative sources of funding to pay for the infrastructure required to support the growth of the region.

The systematic release of land in the South West and North West growth centres aims to increase the quality of the growth areas by encouraging a mix of land uses and hence improving the accessibility of residents to amenities and employment. This in turn would contribute to achieving environmentally sustainable development (ESD) objectives.

The planning for these release areas proposes to provide:

- Improved public transport, including frequent buses linking with the rail system. Proposals in the South West sector include the rail link from Glenfield to Edmondson Park and Leppington, which will commence in the first five years of the release of the Metropolitan Strategy;
- A range of land uses to provide the right mix of houses, jobs, open and recreational space and green spaces;
- Easy access to major town centres with a full range of shops, recreational facilities and services along with smaller village centres and neighbourhood shops;
- Employment opportunities available locally and within the region, reducing the demand for transport services into the Sydney CBD and inner west and reducing travel times;
- Streets and suburbs, which are planned so that residents can walk to shops for their daily needs;
- A wide range of housing choices to provide for varying needs and incomes, being single residential dwellings on their own block of land as well as smaller, lower maintenance homes, units and terraces for older people and young singles or couples; and
- Conservation land in and around the development sites will help to protect the region's biodiversity and provide clean air for Western Sydney.

Although Menangle Park is not located within the South West Growth Centre, it is likely that the NSW Government will look favourably on the adoption of planning principles in this development, such as trip containment, public transport provision and encouraging walking and cycling.

3.2.2 South West Rail Link

The NSW Metropolitan Transport Plan identifies the NSW Government's plan to link Metropolitan Sydney's to the South West through the South West Rail Link as a heavy rail link. It will provide a rail link to the South West of Sydney from Glenfield to Leppington, via Edmondson Park. The new rail link will service 110,000 new homes and provide commuter access to Sydney's second CBD of Parramatta. The construction of the South West Rail Link is scheduled to begin in 2010.

3.2.3 Rail Clearways Plan

The Rail Clearways Plan, announced by NSW Government in 2003, is a NSW Government initiative to improve the reliability of the CityRail network. The program of works to separate Sydney's 14 metropolitan rail routes into five independent clearways is currently in construction at an estimated cost of $1billion. By removing congestion on the network that cause delays, CityRail will be able to operate more reliable and frequent services with reduced passenger crowding whilst having the potential to increase capacity as demand grows into the future.

CityRail services on the Cumberland Line, South Line and East Hills Line terminate at Campbelltown, while some services on the East Hills Line (via Sydenham) terminate at Macarthur station. 'Clearway 3' will enable express services to operate from Campbelltown to the City. Works to facilitate this include construction of extra tracks between Kingsgrove and Revesby and a new platform at Macarthur. These works enable additional trains to be introduced on the line, reducing crowding on peak commuter services in the peak direction and improving frequency and reliability.

3.2.4 Action for Bikes / NSW BikePlan

Action for Bikes 2010 was released in September 1999 as an accompanying document to Action for Transport 2010. Action for Bikes seeks to increase levels of cycling in Sydney through a four step plan that includes improving the bike network, making it safer to cycle, improving personal and environmental health, and raising community awareness.

A key innovation of Action for Bikes is the development of rail trails, such as the Liverpool-Parramatta rail trail and the proposed Campbelltown-Liverpool rail trail, by the RTA in co-operation with rail agencies.

In August 2008, the NSW Government announced the preparation of a new bicycle blueprint, and reiterated again in the NSW Metropolitan Transport Plan (2010), aimed at encouraging bicycle use. The NSW BikePlain 2010, when released, will update and replace the Action for Bikes.

3.2.5 Draft SEPP 66: Integrating Land Use and Transport

The release in 2001 of draft State Environmental Planning Policy (SEPP) 66 for integrated land use and transport planning indicated the Government's heightened focus on this issue. Key features of SEPP 66 have since been brought into Metropolitan Strategy and the policy package is a useful framework to government and developers to integrate land use and transport.

The package is particularly relevant to the future development of Menangle Park since it emphasises the importance of effectively integrating land use and transport planning in order to improve urban environments.

3.2.6 Review of Bus Services in New South Wales ('Unsworth' Review)

The Unsworth Review of Bus Services in New South Wales aims to establish a network of strategic bus corridors to connect centres in a fast, frequent, convenient and direct manner along established routes throughout Sydney's Metropolitan Region.

The review focuses on the role Campbelltown CBD will play as a regional hub for bus transport. Two of the identified bus corridors will provide strategic bus routes to connect Campbelltown town centre with Liverpool and Camden.

Integrated network plans have been prepared for each contract region, and the planning process was completed for the South West (Regions 2 and 15) in August 2008. The outcome for this process was no change in the short-term for bus services travelling between Menangle Park and Campbelltown.

3.2.7 State Infrastructure Strategy

The State Infrastructure Strategy marks a new direction for the planning and delivery of infrastructure in the next 10 years for New South Wales's six broad regions — Sydney, the Central Coast, the Hunter, the Illawarra and the South East, the North Coast and Inland New South Wales.

The State Infrastructure Strategy also marks a new direction by linking the four year Budget cycle and the 25 year regional plans, including the Sydney Metropolitan Strategy. Furthermore, the integrated nature of this Strategy will allow the private sector, public sector agencies, local councils and the wider community to make decisions based on the NSW Government's priorities and timing for major infrastructure projects.

These infrastructure priorities illustrate the connections between infrastructure planning and long–term planning strategies, including:

- Sydney Metropolitan Strategy — City of Cities;
- A Plan for Sydney's Future;
- Metropolitan Water Plan 2006;
- North West and South West Growth Centres; and
- Draft Regional Strategies for the Far–North Coast, Lower Hunter and the South Coast.

3.3 LOCAL PLANNING CONTEXT

3.3.1 Historical Development

The Three Cities Plan (1973), prepared by the NSW Planning and Environment Commission, proposed the development of a complex of three new cities in the Campbelltown, Camden and Appin area to accommodate a population of approximately 500,000 people.

In the mid 1970's a retail study was undertaken to consider the creation of a district centre in Menangle Park that would be integrated with the expansion of major regional centres at Camden, Campbelltown, Holsworthy and Appin (Macarthur Growth Centre, Retail Study Final Report, Macarthur Development Board, 1976). A traffic planning study was undertaken at a similar time to investigate the infrastructure requirements of the forecast expansion in the area (South Campbelltown Traffic Planning Study, Sinclair Knight & Partners, 1975).

A decade later, a regional road hierarchy study (Campbelltown, Camden, Wollondilly Regional Road Hierarchy Study, Project Planning Associates Pty Ltd, 1988) was undertaken to review the comprehensive road network proposed in the Three Cities Plan and to consider funding requirements. The outcomes of this study include the majority of the current road reservations in the Menangle Park and Campbelltown area, including what has become known as the Spring Farm Parkway and the Georges River Parkway connection to Appin Road.

3.3.2 State of the Environment

Campbelltown City Council has developed a State of the Environment Report, which is intended to provide information and direction to Councils management plan. It ensures that the principles of environmentally sustainable development (ESD) are fully integrated into Council's decision making processes and actions. The most recent report, for the year 2007/2008, defines issues and achievements into four categories:

a) our land;

b) our water;

c) our community; and

d) our heritage.

Council has continued the implementation of its Integrated Transport Strategy, developed in association with Camden Council. During the reporting period, significant on-ground works, lobbying and reviews were undertaken to improve transport options for the residents of Campbelltown. Specifically, traffic modelling was undertaken (Badgally Road extension to Camden Valley Way, and the future Spring Farm Parkway at Menangle Park) and intersection improvement works were completed at the Gilchrist Drive/Narellan Road intersection.

3.3.3 Campbelltown and Camden Integrated Transport Strategy (GHD, 2006)

Campbelltown and Camden Councils commissioned GHD to prepare an Integrated Transport Strategy for the Campbelltown-Camden region. The report sets transport related targets, including for mode share and vehicle kilometres travelled, and then sets out the strategy to achieve these.

Relevant elements strategies include:

- Plan for a minimum of 15 dwellings/ hectare in residential zones unless constrained by environmental or heritage features.
- Consider public transport services, routes and access to stops when planning new development and redevelopment.
- Consider accessibility related maximum car parking requirements for new development, based on accessibility to public transport.
- Reduce demand for commuter parking by promoting and supporting bus feeder services.
- Work with bus operators to provide efficient bus routes in existing and planned areas.
- Consider incentives and other arrangements to provide bus services from 'Day 1' in of occupation in new developments.
- Promote active transport modes for health and transport.

The timescale for achieving the targets is ten years and therefore well within the forecast period for this study.

3.3.4 Campbelltown (Sustainable City) Development Control Plan

The Campbelltown (Sustainable City) Development Control Plan supplements the LEP and provides details for the built form of new developments to ensure that they are high quality and liveable. Transport requirements include:

- Provision of adequate on site car parking for residents and visitors that is convenient, secure and safe;
- Undertaking to ensure efficient and safe vehicle and pedestrian movement within, into and out of development; and
- Provision of safe, convenient access for vehicles, pedestrians and cyclists whilst minimising conflict between them.

3.3.5 Campbelltown Structure Plan

The Draft Campbelltown Centres Structure Plan has been developed by Campbelltown City Council as a visionary document which will guide development in the area over the next 25 years. The plan includes key elements which will be refined into strategies and actions in more detailed studies that will take place at a later date.

The structure plan seeks to generate local employment opportunities and encourage high density residential development around the transport nodes and to increase the value and quality of the retail environment.

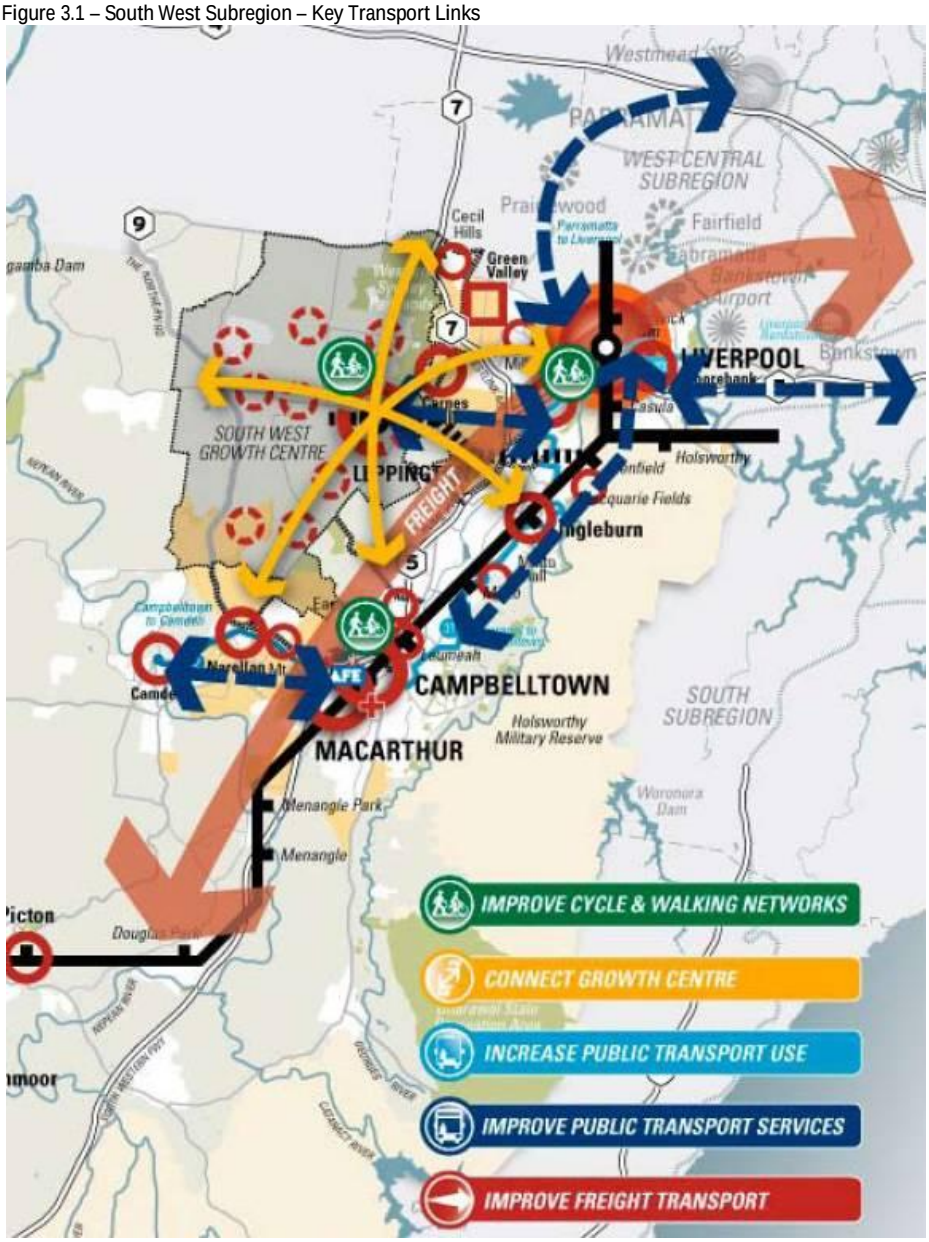
Key points from the plan to note are:

- Macarthur is not affected by the Structure Plan.
- The plan suggests a balanced approach be adopted across all transport modes; reinforcing that public transport/ walking/ cycling should be encouraged.
- The plan encourages increased density around transit nodes will increase patronage from the walking catchment.

3.3.6 South West Subregion Draft Subregional Strategy

The Draft South West Subregional Strategy was released in November 2007. The focus of the strategy is on the promotion of Campbelltown as a Major Centre, with a proposal to investigate its suitability as a Regional City. From a transport perspective, road and public transport links to surrounding areas (including Menangle Park) and increases in the density of development at transport nodes are key features of the strategy, supporting state wide transport strategy such as the Metropolitan Strategy. The key transport links in the South West Subregion are illustrated in Figure 3.1.

Figure 3.1 – South West Subregion – Key Transport Links



3.4 LOCAL TRANSPORT CONTEXT

3.4.1 Increasing congestion

As is evident in many locations in Sydney, traffic congestion levels are increasing as a result of higher car ownership, greater reliance on road-based carriage of freight and the general increase in trip making and distances. This congestion leads to several negative impacts including economic costs and environmental impacts. As an example, car ownership in Sydney grew approximately 10% between 2001 and 2006 (HTS).

Congestion on the strategic road network should be managed in such a way as to retain economic efficiency in freight movement, to support public transport and to mitigate environmental impacts on the total road network.

It will be essential that sufficient measures are provided to mitigate the potential for increased congestion as a result of the increase in population resulting from the development of land release areas, such as Menangle Park. With this in mind it will become important over time that the road network is used as a form of capacity restraint for private car vehicles, while improving the performance of public transport (for example by providing bus priority measures) to encourage a mode shift towards public transport.

3.4.2 Network Improvements

A range of network improvements have been identified for provision in the south western suburbs of Sydney, including Camden, Campbelltown and Liverpool. Many of these relate to the development of release areas in these suburbs and will be required to meet future demands over the next twenty years. Some of the major transport network improvements considered in the area around Menangle Park can be summarised as follows:

- Upgrades to Macarthur Interchange to provide a high quality public transport interchange that provides the opportunity to run feeder bus services from land release areas to connect to rail services for longer journeys;
- Increased capacity on Narellan Road. As this link is approaching capacity, additional capacity will be needed over time to maintain access to Camden, local industrial and employment land uses and the South West Growth Centre;
- The potential for the Spring Farm Parkway between Camden Bypass and Campbelltown, possibly with ramps to the F5 has been considered for some time, partly to relieve congestion on Narellan Road and partly to improve access between Camden and Campbelltown; and
- A package of public transport priority measures, including bus only links, bus only lanes and intersection improvements has been considered to improve the performance of public transport against private car travel.

3.5 SUMMARY

The strategic context for Menangle Park is governed by both state and regional planning policies, which are aimed at reducing growth in vehicle kilometres travelled. While it may at first appear that the release of Menangle Park for residential development would be in contravention to these policies, as a cohesive metropolitan wide strategy it is necessary to provide multi-unit high density housing in areas that can support such dwelling types together, while providing detached housing in areas that have sufficient land capacity.

The Menangle Park release area will be a good example of urban development in an outer suburb, providing a package of measures can be designed that:

- Provide a realistic transport choice for public transport users;
- Ameliorate the negative impacts of additional car use; and
- Facilitate a walkable community with good access to employment.

4.0 PREVIOUS TRANSPORT STUDIES

4.1 CAMDEN RELEASES AREAS AND MENANGLE PARK TRANSPORT REQUIREMENTS STUDY (MAUNSELL, AUGUST 2002)

This report was produced for the RTA and Transport NSW to review and plan for the cumulative impacts of release areas on transport networks in the region. Key findings of this study include:

- Identification that parts of the arterial road network in the region were beginning to approach capacity in 2002, with impending upgrade requirements for Narellan Road, Campbelltown Road and Camden Valley Way;
- A future Spring Farm Parkway would become an important link between Camden Valley Way and Menangle Road to aid sub-regional travel and alleviate congestion on Narellan Road;
- Opportunities exist to capture public transport patronage through a range of priority corridors; and
- That a framework for regional developer contributions needed to be established to enable effective levying of funds towards transport infrastructure.

The report also refers to the potential for longer term transport requirements to include connection of Spring Farm Link to the F5, together with widening of the F5 to six lanes between Spring Farm Link and the Westlink M7, although it was noted that planning and funding of these works would require Federal Government approval.

4.2 MACARTHUR TRANSPORT INTERCHANGE STUDY (MAUNSELL, APRIL 2003)

The Macarthur Transport Interchange Study focused on the changing public transport environment of the region, and resulting opportunities for the Macarthur rail station and bus interchange. In particular, a lack of rail access towards Camden will result in a need, or opportunity, to provide a bus network that can act as feeder services from emerging land release areas to existing rail services in the Campbelltown LGA, including Campbelltown Station and Macarthur Station.

A range of design scenarios were considered to accommodate potential growth in public transport use in the area around Macarthur Station, including demands associated with residential land release areas, expansion of the adjoining Macarthur Square shopping centre, TAFE and proximity to the Campbelltown CBD.

The study concluded that technically, the opportunities for upgrading Macarthur Interchange's function as a regional transport hub are sound. Further opportunities to strengthen this role include provision of a new, expandable bus interchange with improved access to the rail station, an increase to eight East Hills

services an hour from Macarthur Station (four via Sydenham and four via Airport) and a potential bus link over the rail line to provide connecting services via the TAFE campus.

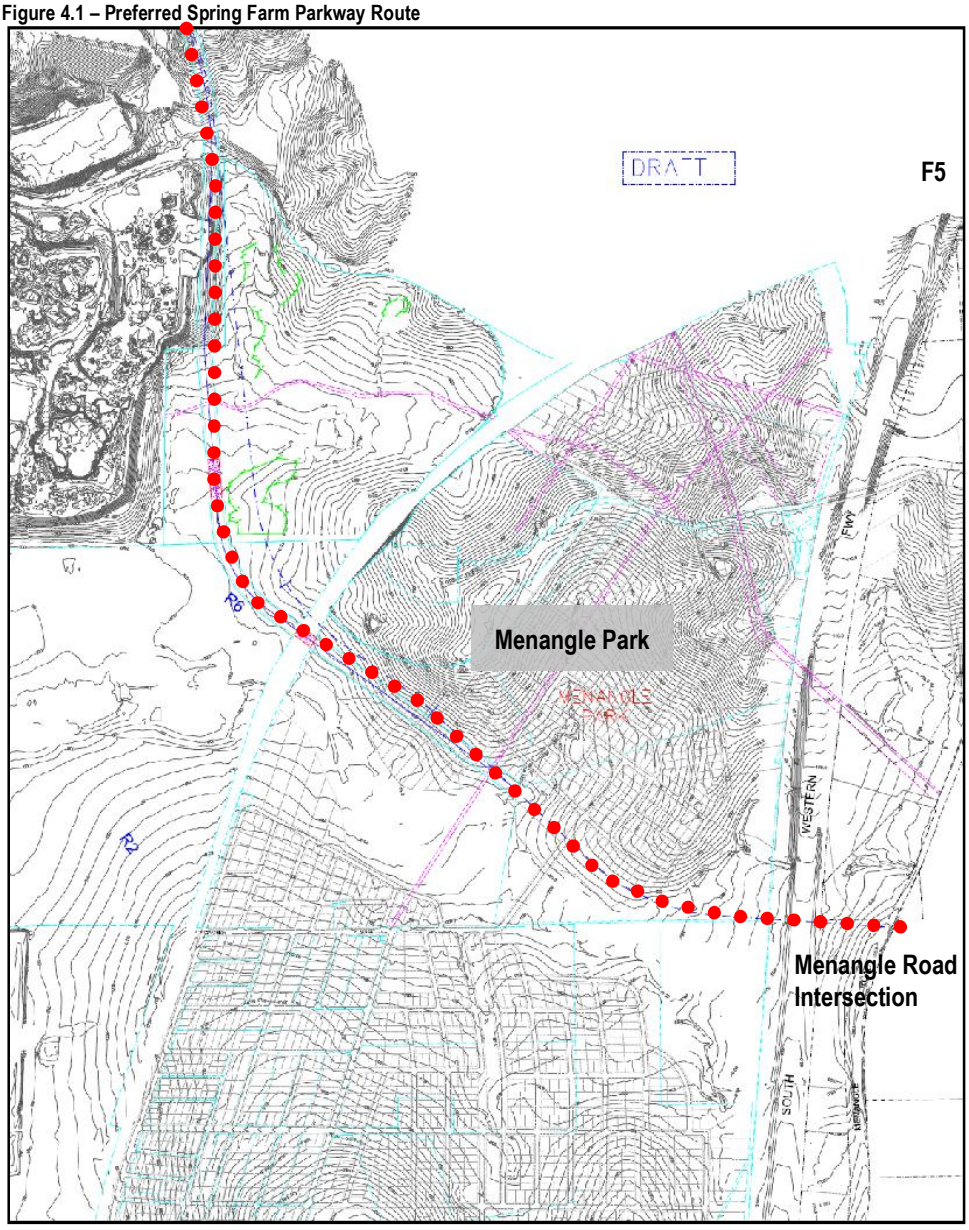
4.3 SPRING FARM PARKWAY (LANDCOM, 2008)

Landcom has initiated a study to identify a preferred route for a link from Menangle Road through to Camden. The study, undertaken by Northrop, has included a review of previous studies, on-site assessment of constraints and opportunities and consultation with stakeholders, including government agencies such as the NSW Roads and Traffic Authority, Council and landowners.

A range of options were developed in consultation with the stakeholders and, following further investigations and consultation, the preferred route was selected, referred to as Option 2. The alignment of Option 2 is illustrated by Figure 4.1. The Spring Farm Parkway connections to the F5 indicate considerable network benefits including restrictions in total VKT, VHT and vehicle delays as well as significantly reducing future traffic growths along in the Campbelltown / Macarthur regional centre and along Narellan Road.

For the purpose of this TMAP, it is assumed that the Spring Farm Parkway would be an east-west four land road (two lanes in each direction), in the long term, with potential links to the F5. However, regional traffic analysis revealed that the Spring Farm Parkway is not a vital infrastructure for the development of Menangle Park to proceed.

Figure 4.1 – Preferred Spring Farm Parkway Route



Source: Landcom, 2010

4.4 SUMMARY

Key developments that are likely to affect the transport networks in the vicinity of Menangle Park include the Macarthur interchange proposal and the South West Growth Centre.

The redevelopment of Macarthur station as an improved bus and train interchange will provide opportunities to develop feeder services from the Menangle Park land release area to the interchange in the future. Improved rail service frequencies from Macarthur Interchange are also likely to have a positive effect on mode split in the local area.

5.0 EXISTING TRANSPORT CONDITIONS

5.1 INTRODUCTION

Existing transport conditions in Menangle Park reflect the rural nature of the locality. There are limited walking and cycling tracks in the area, but when considered against very low traffic volumes (Menangle Road has an AADT of around 5,000 vehicles), this is not a current concern. Menangle Park has a rail station that connects residents to Macarthur and the Southern Highlands, while road connectivity to the area is provided by Menangle Road into Campbelltown.

This section considers existing transport conditions both in Menangle Park and in South Campbelltown, these being the likely areas of influence for the proposed development.

5.2 EXISTING TRAVEL BEHAVIOUR

The 2006 Journey to Work data and Household Travel Survey found the following characteristics in the Campbelltown region:

- Campbelltown LGA Population (2006 Census) 143,077
- Estimated population 2031 (Transport Data Centre) 181,843
- Forecast growth rate approximately 1.1% per annum
- Proportion of Campbelltown LGA population under 25 40%

Approximately one third of trips are made from South Campbelltown to the Campbelltown LGA. The majority of these trips are to travel zones around the commercial and hospital area of Campbelltown and Englorie Park. Other important destinations include Liverpool (8%) and Camden (5%). A fairly high proportion of 'self-containment' exists in the South Campbelltown area, with around a third of residents working in the Campbelltown LGA.

Of the 36,079 potential journey-to-work trips generated by residents in Campbelltown – South (SLA 1504) in 2006, 12% reported working from home or did not go to work. The remainder chose the follow modes to travel to work:

- 16% were made by rail;
- 1% were made by bus;
- 70% were made by car drivers;
- 8% were made by car passengers; and
- 5% were made by 'other' modes.

The journey-to-work trips of residents in the Travel Zone 1299 (Glen Alpine) provides a good indication of the patterns expected in the Menangle Park site. Of the potential 2,496 journey to work trips, 14% reported working from home or not going to work during the time of the survey. Of the residents that did go to work, the following travel modes were reported:

- 14% were made by rail;
- Less than 1% were made by bus;
- 75% drove a car
- 6% were passengers in a car; while
- 3% travelled by other modes.

This preliminary information highlights the good level of demand for rail services, which is influenced by the electrified CityRail network to Campbelltown and Macarthur. It will be a challenge for this TMAP to offer an innovative package of measures that can work towards a similar mode split proportion with a lower accessibility to rail in Menangle Park, currently on a diesel rail line.

5.3 WALKING

Existing infrastructure for pedestrians is limited in the Menangle Park area, reflecting the low number of residents that currently live in Menangle Park and the rural nature of the area. Footpaths are not provided on local roads in Menangle Park, as shown in Figure 5.1, or on Menangle Road.

Figure 5.1 – Existing Road Standards in Menangle Park

Source: AECOM, 2008

In Campbelltown SLA, 1.6% of journey to work trips are made on foot (2006, JTW). This mode split is low when compared to other regions in Sydney, but reflect high levels of car ownership, longer commuting distances, lower density housing and limited accessibility to public transport.

There are a number of potentially hazardous pedestrian treatments on site, which will be considered through this TMAP process, including:

- the Menangle Road bridge over the F5 (shown in Figure 5.2), which proves limited clearance between vehicles and pedestrians and could provide an obstacle to east-west connectivity;
- the position of the bus stop on Menangle Road opposite Glenlee Road, which affords limited visibility for both motorists and pedestrians crossing Menangle Road;
- the corner of Racecourse Avenue at its underpass of the rail line, which also offers limited visibility; and
- the at-grade pedestrian crossing of the rail line at Menangle Park Station.

Figure 5.2 – Limited Pedestrian Clearance on Menangle Road Bridge

Source: AECOM, 2008

At Macarthur Station, where the majority of residents travelling to work from Menangle Park are likely be heading, pedestrian facilities are mainly provided above ground via a pedestrian overpass between the station and the shopping centre, with stairs and ramps providing access to the station and education precincts to the north. Limited pedestrian facilities are provided at ground level in the vicinity of the station or shopping centre.

The constraints to walking trips within the site include the absence of existing facilities and barriers to pedestrian activity caused by topography, the freeway and rail line.

However, the site provides an excellent opportunity to create a permeable community linked to open spaces, community facilities and public transport networks by designing a safe, high quality and connected network of pedestrian routes.

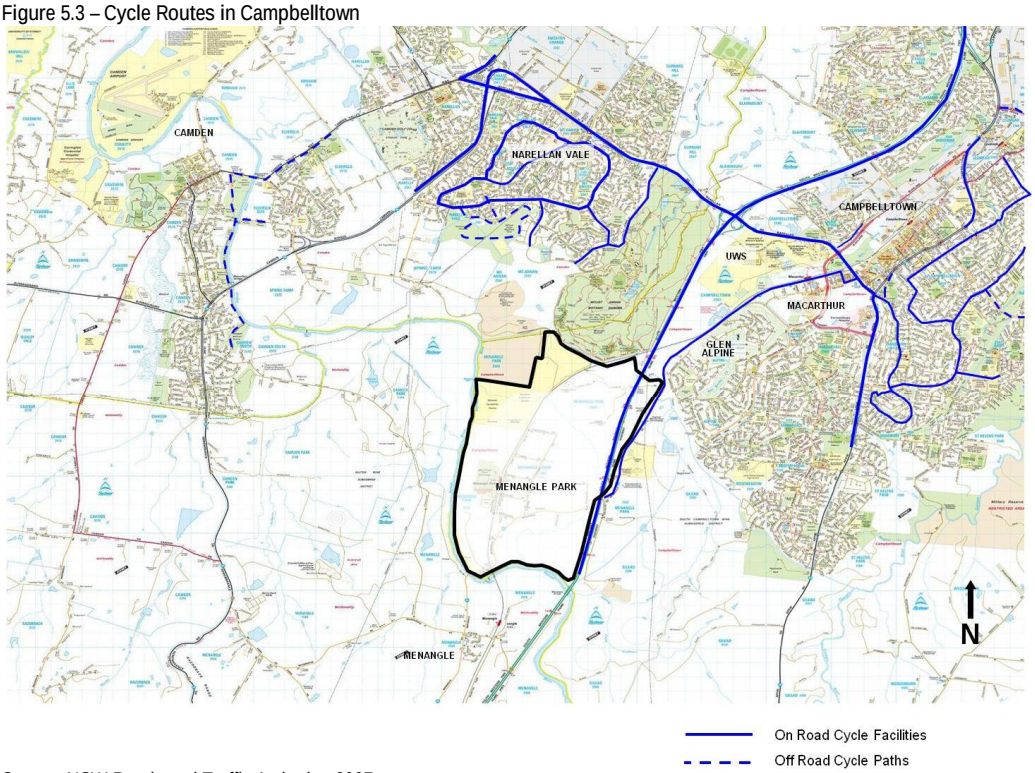
5.4 CYCLING

The Campbelltown cycleway network consists of both on and off road signposted routes. An on-road cycle route is provided on Menangle Road from the F5 overbridge near Medhurst Road into Macarthur. Cyclists are also permitted to use shoulder facilities along the F5 through the surrounding region, as shown in Figure 5.3.

The cycle network is being expanded in Campbelltown, with Council recently implementing an on-road cycle route along Englorie Park Drive from the residential area towards Macarthur. Additional cycling works have been completed in Ambarvale as well as works provided within the Park Central precinct. Cycling improvements are also planned within the Campbelltown CBD. A rail trail cycleway is proposed as far south as Campbelltown station in accordance with the former Action for Bikes (Bikeplan 2010). The rail trail will form part of the regional cycle network, but there not currently plans to extend beyond Campbelltown station at this time. In addition, Landcom is currently planning a Regional Cycleway which will primarily be a commuter route linking Macarthur, Mt Annan Botanical Gardens and the Camden area.

The provision of cyclist infrastructure is working towards a cohesive cycle network that will, in future, provide access to major education, employment, leisure and retails zones such as University of Western Sydney, Campbelltown and Macarthur centres.

Figure 5.3 – Cycle Routes in Campbelltown



Source: NSW Roads and Traffic Authority, 2007

The constraints to cycling trips site are similar to the constraints to pedestrians and include the barriers caused by topography, the freeway and rail line. In addition, high traffic volumes on key traffic routes and at major intersections reduce the amenity of cycle trips, so that journeys on some routes may be restricted to experienced cyclists.

However, the cycle network is expanding and connections are available between Camden, Narellan, Smeaton Grange and Macarthur and Campbelltown.

5.5 BUS SERVICES

Menangle Park is currently serviced by Busways route 892 from Menangle to Campbelltown, as shown in Figure 5.4. Six services are provided each weekday and two on Saturdays, with no services operating on Sundays or public holidays.

All buses to the Macarthur area stop at the bus interchange at Macarthur Square rather than Macarthur Station. The bus interchange at the shopping centre is on Kellicar Road, a 250m walk from the station, with a need to change levels in the shopping centre and at the station. Buses stopping at Macarthur Square continue to the bus/train interchange at Campbelltown Station. During the morning peak hour, some services do not stop at Macarthur Square until the shopping centre opens at 9am.

Most bus routes in the area suffer from the circuitous layout of local roads, which increase journey times at the expense of the passenger and operator. While there are limited bus priority measures in the Campbelltown region, future measures are planned on Narellan Road and Camden Valley Way, as well as potential bus only links through Mount Annan and Elderslie to improve public transport performance into the future. An additional bus priority link is proposed between Campbelltown and Macarthur.

Figure5.4 – Bus Routes in South Campbelltown

Source: Busways, August 2008

Bus mode share is 3% of the trips made to the Campbelltown CBD (2006 JTW Travel Zone 1288), while to all other destinations this proportion is much lower at less than 1%. Low bus mode share may be a result of constraints including congestion on bus routes and the low permeability of local communities which have been developed with a 'back fence' to public transport corridors.

However, there are opportunities to create links to adjacent communities. New routes can be created from the outset of the development, with high quality infrastructure and frequent services which will be competitive against trips by private car.

5.6 RAIL SERVICES

CityRail services on the Cumberland Line, South Line and East Hills Line terminate at Campbelltown, while some services on the East Hills Line (via Sydenham) terminate at Macarthur Station. Electrification of the rail line ceases to the south of Macarthur Station and services to Menangle Park are provided by diesel trains on the Southern Highlands Line.

A summary of currently timetabled CityRail northbound services connecting Menangle Park, Macarthur and Campbelltown Stations to the city during the morning peak period is shown in Table 5.1, while the average frequency of rail service to each of these stations can be gauged from Table 5.2.

Table 5.1 – AM Peak Citybound Rail Service Arrival Times (7.00am – 9.00am)

Menangle Park	Macarthur	Campbelltown	Central
	7:00	7:04	8:02
	-	7:12	8:11
7:09	7:16	7:20	-
-	7:19	7:24	8:15
	-	7:28	8:21
	7:30	7:31	8:28
	-	7:42	8:37
	7:45	7:49	8:47
	7:59	8:03	9:03
8:03	8:10	8:13	-
	-	8:18	9:17
	-	8:45	9:44
	8:57	9:01	10:02

Table 5.2 – Average AM Peak frequency of Citybound Rail Service Arrivals

Station	Menangle Park	Macarthur	Campbelltown	Central
Number of services per hour	1	6	8	7
Average time between services	54 mins	15 mins	7 mins	7 mins

Source: www.cityrail.info, September 2009

Public transport services compete with private car for some destinations more than others. For example, the rail mode share to Sydney CBD and North Sydney was 72%, while the Eastern Suburbs was 18%. The rail mode share for closer stations is much lower, with Liverpool at 10% and Fairfield at 8%.

Menangle Park Station is a rural station with concrete platforms for passengers boarding or alighting in both directions. Pedestrians can cross the line at Menangle Park using an at-grade crossing points with a signalised boom-gate as shown in Figure 5.5. Pedestrian connectivity to the local area from the station is minimal and it is understood that Menangle Park Station has been moved in the past.

Figure 5.5 – Menangle Park Station

Source: AECOM, 2008

Macarthur Station, shown in Figure 5.6, is located on the northern side of Menangle Road, opposite Macarthur Square shopping centre. Pedestrian connectivity is provided by an overpass between the shopping centre and the station.

The majority of CityRail services terminate at Campbelltown due to the lack of turn-back capacity at Macarthur Station. Direct CityRail services are provided from Campbelltown Station to a range of destinations, including the City via East Hills, Riverwood and Sydney Airport; the City via Granville, Lidcombe and/or Bankstown; and Blacktown and St Marys via Parramatta and Westmead. Plans for a turn-back at Macarthur station are underway and construction is anticipated to start by 2011. This will vastly improve the performance of rail services to Macarthur, increasing the frequency of peak hour services.

The implementation of the Australian Rail Track Corporation (ARTC) proposal to create a national rail freight network would limit capacity to two passenger services per hour or less south of Macarthur Station, requiring any extension of the CityRail network to construct an additional line, with several overbridges and underpasses. Two options were considered in the first stage of the TMAP to provide additional passenger capacity, finding that the costs would be in the order of $103-$142 million depending on the option pursued. Subsequently, further investigations for the Issues Paper regarding rail electrification have found that the cost may be in excess of $280 million. As discussed in Section 6.8, it is unlikely that an extension of the CityRail network to Menangle Park would be a financially viable option.

RailCorp has noted the presence of proposals for a high speed rail line. Two options would involve straightening of the rail line south of Menangle Park Station, while a third would see a dedicated very high speed line roughly parallel to the South Western Freeway (at this stage it is not known to which side).

Figure 5.6 – Macarthur Station

Source: AECOM, 2008

A review of 2007 weekday station entries and exits, shown in Table 5.3, highlights the low level of use from Menangle Park Station. It also highlights the relationship between demands at Macarthur and Campbelltown Stations.

Table 5.3 – 2007 Weekday Station Entries and Exits

Station	02:00 - 06:30		06:30 - 09:30		09:30 - 15:00		15:00 - 18:30		18:30 - 02:00		Total	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Menangle Park	0	0	10	0	0	0	0	10	0	0	10	10
Macarthur	40	20	730	440	470	560	450	670	210	210	1,900	1,900
Campbelltown	110	60	3,260	860	1,400	1,310	1,220	2,880	290	1,170	6,280	6,280

Source: A Compendium of CityRail Travel Statistics, Sixth Edition, June 2008

5.7 ROAD SYSTEM

5.7.1 Network Inventory

Local Roads

Within Menangle Park, Menangle Road intersects with Glenlee Road, Cummins Road, Medhurst Road, Racecourse Avenue and a number of minor private driveways. All of these intersections are unsignalised T-junctions in 80km/hr and 100km/hr zones. The intersection of Glenlee Road and Menangle Road is located on a vertical and horizontal curve with poor visibility. Due to ownership patterns, the majority of local roads are limited to the village area and are typically 20 metres wide and laid out in a grid pattern. These are of rural standard.

Menangle Road

Menangle Road is critical to the site, as it is currently the sole provider of external access - it performs as a two-way two-lane rural arterial road with an 80km/hr speed limit adjacent to the northern part of site, with the exception of a 40km/hr timed school zone alongside Broughton Anglican College. The speed limit south of the school rises to 100km/hr. Current traffic volumes are well below capacity due to limited land use activity southwest of Campbelltown and the availability of the F5 for longer distance trips. All vehicles on Menangle Road travel through the Macarthur Square town centre to access the surrounding regional road network.

Narellan Road

This arterial road provides the only regional access between Campbelltown, Camden and the F5. It caters for a significant volume of through traffic, in addition to freight movements and F5 bound traffic, and is already nearing capacity. At the regional level, Narellan Road forms the southern section of Metroad 9 connecting Campbelltown in the south to Penrith in the west via the Northern Road.

Demands for travel on Narellan Road have increased rapidly as a result of regional growth and are likely to continue to do so as the Smeaton Grange industrial area and land release areas in the Camden LGA are developed. All road trips between Menangle Park and the F5, the orbital road network and Camden will rely on Narellan Road unless an alternative route becomes available.

Camden Bypass and Camden Valley Way

Camden Valley Way performs a radial function, running parallel to the M5/F5 corridor from Edmondson Park towards Camden. The Camden Bypass connects Camden Valley Way (via Narellan Road) to the old Hume Highway reducing traffic impacts in the historic centre of Camden.

Appin Road

Appin Road is a two-lane arterial link that runs south from Campbelltown to Appin and on to Wollongong, parallel to the South Western Freeway.

F5 (Hume Highway)

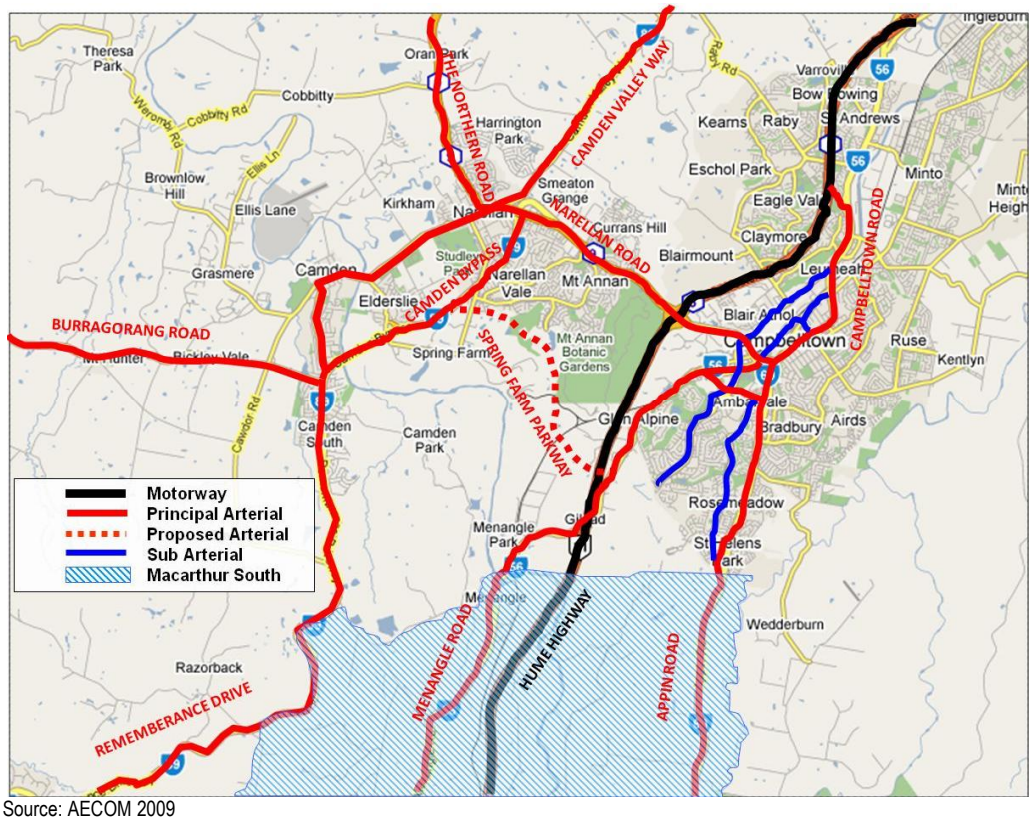
The F5 is a National Highway and therefore has an emphasis on catering for freight and inter-regional trips to the Southern Highlands and Canberra. However, it also provides trunk commuter access between south western Sydney, the Sydney CBD and industrial areas along the M5 Motorway. The

Westlink M7 provides a connection between the south west and areas to the north of Sydney, including Parramatta, Blacktown and the Hills District. Accesses to the F5 from Menangle Park are 8km north at Narellan Road and 16km south at Picton Road.

Figure 5.7 illustrates the regional road hierarchy serving the site. To enable a full appreciation of the factors influencing the road hierarchy needs around the Menangle Park site, the figure includes proposed links and the location of the Macarthur South development.

The site is adjacent to the intersection of two arterial roads, with access to the motorway network at Spring Farm Parkway if ramps were constructed to the F5.

Figure 5.7 – Regional Road Hierarchy



Source: AECOM 2009

5.7.2 Network Performance

Campbelltown City Council has developed a strategic traffic model of the Campbelltown area using NETANAL software. This will assist in selection of transport infrastructure to mitigate traffic congestion that may result from development planned in the south west of Sydney.

The model includes the impacts of local developments such as:

- UWS Campbelltown residential development;
- Macarthur Square/Macarthur Gardens Expansion;
- Spring Farm residential development;
- Elderslie residential development;
- Mount Gilead residential development;
- expansion of Narellan Town Centre; and
- Smeaton Grange industrial area.

The road network, as exists currently, in the immediate vicinity of the site performs well. However, within Macarthur Square town centre to the north of the site and Narellan Road, traffic conditions are congested in the morning and in particular during evening peak periods. The Campbelltown City Council strategic model provides an indication of network performance at 2026 and reports that the roads in the vicinity of the Menangle Park site would operate within their theoretical capacity in the evening peak. In particular, traffic along the F5 in both directions as well as Narellan Road, westbound on the approach to the F5 ramps, would operate at capacity.

Table 5.4 – Estimated 2026 Traffic Volumes on Key Roads

Link Flow Location	Capacity**	Without North Facing*		With North Facing* Ramps	
		Veh	V/C+	Veh	V/C+
SB on F5 N of Narellan Rd	4400	4666	1.1	4763	1.1
NB on F5 N of Narellan Rd	4400	3490	0.8	3566	0.8
SB at Blaxland Rd N of Narellan Rd	2800	568	0.2	628	0.2
NB at Blaxland Rd N of Narellan Rd	2800	335	0.1	372	0.1
NB on Menangle Rd S of Menangle Park	1400	401	0.3	401	0.3
SB on Menangle Rd S of Menangle Park	1400	1017	0.7	1017	0.7
EB on Narellan Rd S of F5	3200	2621	0.8	2199	0.7
WB on Narellan Rd S of F5	3200	3302	1.0	2987	0.9
WB on Kellicar Rd W of Gilchrist Drive	2400	2046	0.9	1659	0.7
EB on Kellicar Rd W of Gilchrist Drive	2400	1499	0.6	1180	0.5
SB on Menangle Rd S of Gilchrist Drive	1400	1237	0.9	959	0.7
NB on Menangle Rd S of Gilchrist Drive	1400	573	0.4	363	0.3
SB on Menangle Rd S of Glenlee Rd	1400	1193	0.9	997	0.7
NB on Menangle Rd S of Glenlee Rd	1400	509	0.4	381	0.3

Source: SMEC 2009
*Assumes construction of the Spring Farm Parkway
**Theoretical future road capacities.
+V/C = Volume to Capacity ratio, where 1.00 is at full capacity.

A Section 94A Development Contribution Plan exists to obtain funds to improve key intersections in the Campbelltown area. In the vicinity of the Menangle Park site these include:

- Narellan Road/ Blaxland Road/ Gilchrist Road: Dual left turn from Gilchrist to Narellan and left slip from Narellan to Blaxland (completed);
- Gilchrist Drive/ Kellicar Road: Dual right turn from Gilchrist to Kellicar and additional through lane on Gilchrist eastbound (completed);
- Narellan Road/ Kellicar Road: Dual right turn from Kellicar to Narellan and left slip from Kellicar to Narellan (construction to commence May 2010);
- Gilchrist Drive/ Therry Street: Replace roundabout with signals; and
- Gilchrist Drive/ Englorie Park Drive: Replace roundabout with signals.

5.8 SUMMARY

This review of existing transport conditions has noted a number of constraints in the local area, including:

- limited existing pedestrian facilities;
- barriers to pedestrian and cycle activity caused by topography, the freeway and rail line;
- high traffic volumes on cycle routes;
- low bus mode share, caused in part by low permeability of local communities, restricting access to public transport;
- lack of electrification between Menangle Park and Macarthur Interchange;
- some road links approaching capacity, in particular Narellan Road north of the F5/M5 corridor;
- limited peak period capacity at intersections in the Macarthur and Campbelltown centres; and
- relatively high levels of car use in the region.

The key strengths of the existing transport networks in the Menangle Park area include:

- a trend of journey to work containment within the suburb;
- opportunities to create a high quality and connected transport network for non-motorised modes of travel;
- an emerging local cycling network;
- an existing public transport framework, with scope for improvement in frequency and quality;
- relative proximity to the suburban rail network;
- a planned increase in CityRail services to Macarthur Station.

These strengths and weaknesses will provide ample opportunity for leverage towards a package of measures through this TMAP process.

6.0 TRANSPORT PERFORMANCE MEASURES

6.1 INTRODUCTION

There are no set performance measures that need to be achieved through the TMAP process. However, to date they have tended to include a mode shift target because, despite the limitations of this indicator, it is able to be monitored through the five yearly census data. The TMAP should also consider service delivery, accessibility, public transport attractiveness and road network performance.

It is recommended that the objectives of the TMAP include:

- providing an integrated transport network between modes and land uses;
- providing a choice of travel mode by developing a comprehensively accessible transport network;
- providing a safe and secure transport network;
- providing a system that is efficient and equitable;
- providing a system that is sustainable;
- supporting the local economy; and
- providing a healthy environment.

6.2 SERVICE DELIVERY

It will be necessary to augment existing public transport services to meet future demands from Menangle Park. However, because the development will be staged over time, it is important to have services that can be implemented as the development progresses. While the public transport services will be staged, they should be run to consistent frequencies from the outset.

In NSW, buses are governed by the NSW Service Planning Guidelines (NSW Ministry of Transport, 2006). A summary of the Service Planning Guidelines planning principles is provided at Table 6.1 and Table 6.2.

Table 6.1 – Service Planning Guidelines Summary

Bus Planning Characteristics	Benchmark/Criteria
Network (Area) Coverage	• 90% of households to be within 400 metres of a rail line and/or a Regional or District bus route during commuter peaks, inter peak and weekend day time. • 90% of households to be within 800m of a rail line and/or a Regional or District bus route at other times.
Network Legibility	• Peak and off-peak services should use the same route wherever possible.
Route Design	• Regional Routes to be between 10 and 25 kilometres in length. • Routes to be between 30 and 60 minutes in duration. • Maximum diversion from the fastest or shortest route (between termini) to be no more than 20%.
Accessible Buses	• Low floor, wheelchair accessible buses to be allocated to Strategic Transport Corridor routes. • Accessible buses to be evenly timetabled on the corridors and advertised as "accessible" trips in the public timetable.
Dedicated School Services	• Dedicated school services should be kept to a minimum in order to maximise the frequency and availability of normal route services. • Average 5 boardings per revenue kilometre. • Students to be delivered to their school within half an hour of school commencement time and picked up within half an hour of school finishing.
Section Points	• The range of section point lengths to be between 1.3 km and 1.9 km. • The average length of section points within each route to be 1.6 km.
Patronage	• Average 1.5 to 2.5 boardings per revenue kilometre (based on an average operating speed of 24 kph). • Peak period patronage to be in the range of 50% (25% at other times) seated capacity and 85% of the legal bus capacity (averaged by the number of trips operated during any 20 minute period) at maximum load point. • Passengers not to stand for more than 30 minutes of a timetabled service.

Source: NSW Service Planning Guidelines, NSW Ministry of Transport, 2006

Table 6.2 – Service Frequencies by Route Type

Route Type	Frequency (Equal to or better than)
Regional Routes	• Pre peak 30 mins • Peaks 20 mins • Inter Peak 30 mins • Night time 60 mins • Saturday daytime 30 mins • Sunday daytime 30 mins
District Routes	• Peaks 60 mins • Inter Peak 60 mins • Saturday daytime 60 mins • Sunday daytime 60 mins
Local Fixed Routes Local Flexible Transport Services	• Inter Peak 120 mins • As required (Negotiated with the Ministry)

Source: NSW Ministry of Transport, 2006

6.3 LOCAL ACCESSIBILITY

The development should be designed so that it is conducive to meeting the Service Planning Guidelines listed in Table 6.1. To ensure that 90 per cent of households have access to a bus stop or rail line within easy walking distance, the road network should be developed in a grid format, without cul-de-sacs.

6.4 PUBLIC TRANSPORT ATTRACTIVENESS

Bus priority should be provided at intersections to maintain bus reliability and increase competitiveness of public transport through shorter journey times.

6.5 MODE SPLIT TARGET

Existing mode split proportions at adjacent residential land uses are a fair indication of the likely travel characteristics if a community were developed with no additional transport infrastructure. Based on the 2006 Census for the adjacent residential area of Glen Alpine, approximately 81% of journey-to-work trips involved car trips whereas approximately 16% were by public transport.

While it may not be possible to achieve a modal split characteristic of the middle and some outer precincts of Sydney because of the characteristics of the locality, it should be possible to achieve a mode shift of around 10% away from private car use.

It is therefore recommended that a target mode shift of between 5% and 10% be pursued for the journey to work to provide similar levels of accessibility in Menangle Park as seen in other suburbs in South Campbelltown.

The limitations of using a journey to work mode split target are appreciated and it is not the intention to suggest that other journeys during the day are not as important as the journey to work – it will be necessary to provide a sufficient level of public transport accessibility to Menangle Park to ensure that people are able to undertake shopping, leisure, education and other trips by public transport, while also ensuring the area has a high level of pedestrian permeability.

However, journey to work mode split is a clear indicator from the Census that can be used to monitor progress towards this target. The journey to work is also a significant proportion of daily travel for a household and all progress towards reducing demand on transport networks at this time will benefit the movement of freight and other commercial needs.

6.6 ROAD NETWORK PERFORMANCE TARGETS

The capacity of an urban road network is controlled by the capacity of the intersections within that network. Average delay is commonly used to assess the actual performance of intersections, with Level of Service used as a simple index. A summary of the Level of Service index is shown in Table 6.3.

Table 6.3 – Level of Service Criteria for Intersections

Level of Service	Average Delay / Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA 1993

While it is generally accepted that signalised intersections are approaching capacity at Level of Service D (an average of between 43 and 56 seconds delay), it is recommended that intersections in the range of influence around Menangle Park are ameliorated to Level of Service D or E, while providing public transport priority wherever possible to achieve competitive travel times by non-car modes of transport.

The other important intersection metric is Degree of Saturation (DoS), or the ratio of flow to capacity. It is generally accepted that intersections should have a degree of saturation of less than 0.9.

Levels of Service have also been defined for mid-block lanes as a measure of perceived quality. Mid-block Levels of Service are based on volume/capacity ratios rather than delay, with Level of Service D flow rates between 630 vehicles per hour for residential streets and 1,440 vehicles per hour for urban networks with clearways and coordinated signalised intersections. It is recommended that this Level of Service is not exceeded for mid-block links on Menangle Road.

6.7 CONCLUSION

In summary, a series of performance targets have been identified that will assist in meeting the NSW Government policy to encourage public transport use, while creating a permeable and safe walking community.

The following performance targets have been recommended for use in this TMAP:

- a public transport service frequency that is responsive to the progress of the development;
- a mode shift of around 10 per cent away from car use;
- that 90 per cent of the population should live within a 400m walk distance of a bus route or within 800 metres walk distance of a rail station;
- that intersections be ameliorated to Level of Service D or E, with public transport priority measures where required; and
- that sufficient mid-block capacity be provided to achieve Level of Service D on Menangle Road.

7.0 TRANSPORT IMPACT ASSESSMENT

7.1 INTRODUCTION

The objectives of the transport impact assessment are to:

- estimate the likely impacts of the development on surrounding transport networks;
- identify opportunities to encourage the use and viability of sustainable transport modes; and
- determine appropriate mitigation works to ameliorate impacts.

This section provides a summary of the forecasting approach used to determine the number of people travelling by each mode of transport and then considers opportunities to encourage mode shift and manage impacts. This review has considered the morning and evening peak periods for a typical weekday.

7.2 METHODOLOGY

7.2.1 Assessing regional and local impact

The transport impacts for the development have been assessed using two approaches.

a) Regional traffic impact: Campbelltown City Council has undertaken model runs with and without population estimates for the Menangle Park development to assess of the traffic impact on the regional road network

b) Local transport impact: To assess of the impact on the local transport network, including the arrangement and performance of access intersections and the frequency of bus services required, trip generation was estimated by mode and distributed across local roads in the development using a spreadsheet approach. The performance of access intersections was assessed using isolated intersection models.

Section 7 includes impacts on all modes of travel and therefore focuses on the local assessment approach to estimating trip generation and transport impacts. Section 7.10: Traffic Implications considers both the regional and local traffic impacts and therefore reports from both the assessment approaches.

7.2.2 Regional traffic assessment approach methodology

Campbelltown City Council has undertaken traffic assessments using transport models of additional road links adjacent to the Menangle Park development for the future years of 2016 and 2026. In particular, it assessed the traffic implications of the proposed Spring Farm Parkway to connect Camden By-pass with Menangle Road. Although the development of Menangle Park will not be completed by 2026, this is the most distant model year prepared at the time of writing.

Model runs were prepared for the morning and evening peak hour. Population and employment forecasts for the models, including Menangle Park, for 2026 were based on RTA trip tables derived from the Transport & Population Data Centre land use assumptions.

7.2.3 Local assessment approach methodology

The estimation of travel demands for new residential releases tends to be undertaken using the trip generation rates identified in the Guide to Traffic Generating Developments (RTA, 2002).

The RTA guide suggests traffic generation rates using surveys conducted in areas where new residential subdivisions are being built. However, the guide does not quantify to what extent public transport is accessible, the trip rate by other modes, the sample size of the surveys or the dates at which they were completed. The provision of only peak hour car trip rates makes estimating mode split or mode shift changes from a new development difficult.

To enable a full analysis of all modes, AECOM has adopted a first principles method of travel demand forecasting using information from the Transport and Population Data Centre (TPDC) 2006 Household Travel Survey.

The steps taken in the first principles method are as follows:

1 Establish lot type yield
2 Multiply by lot occupancy to establish site population: 2.7[1]
3 Apply average trips per person to establish site trips: 3.77[1]
4 Apply percentage of trips in the AM period (6.00am to 9.30am): 20.5%[1]
5 Apply percentage of trips in the AM Peak Hour: 40%[2]
6 Split trips into purposes and mode share[1]

7.3 TRAVEL DEMAND

Travel demand has been estimated for the planned development yield of:

- 3,400 residential dwellings;
- 31 hectares for employment uses;
- 6 hectares for town centre uses (although including some residential lots); and
- 1 primary school.

7.3.1 Residential Travel Demand

AECOM has adopted a first principles method of residential travel demand forecasting using supporting information from the *Guide to Traffic Generating Developments* (RTA, 2002) and the Transport and Population Data Centre (TPDC) *2006 Household Travel Survey* (mode by trip purpose).

The following steps were taken to establish residential travel demand:

[1] TPDC Household Travel Survey 2006, except commuting trips – Census 2006 Journey to Work Data

[2] Assumed

1	Establish lot type yield	3,400 dwellings
2	Multiply by lot occupancy[3] to establish site population	3,400 x 2.7 = 9,180
3	Apply average trips per person[4] to establish site trips	3.77 * 9,180 = 34,609
4	Apply percentage of trips in the AM period (6.00am to 9.30am)[5]	21.2% x 34,609 = 7,337
5	Apply percentage of trips in the AM Peak Hour[6]	40% x 7,7337 = 2,935
6	Split trips into purposes and mode share	

The 2006 House Travel Survey identified the purpose household travel and the proportion of private vehicle uses for the various purposes as shown in Table 7.1.

Table 7.1 – 2006 Household Travel Survey Proportion of Trips by Mode and Purpose

Purpose	Proportion	Private Vehicle	Public Transport	Other
Commute	*26.9%*	*69.7%*	*22.1%*	*8.3%*
Work related business	9.3%	86.4%	4.9%	8.7%
Education/childcare	18.0%	57.0%	26.8%	16.2%
Shopping	7.0%	65.6%	6.5%	27.9%
Personal business	4.2%	70.0%	7.9%	22.1%
Social/recreation	9.4%	61.6%	5.9%	32.5%
Serve passenger	24.8%	89.2%	1.2%	9.6%
Other	0.5%	-	-	-

Source: 2006 Household Travel Survey Summary Report *2008 Release*, TRANSPORT DATA CENTRE, 2008

Expanding the transport modes of Table 7.1 using the journey to work transport rates, identified in Section 5.2, provides the estimate of trips by mode for the AM peak hour as summarised in Table 7.2.

Table 7.2 – Trips by purpose and mode: AM Peak Hour

Purpose	Trips	Car	Car Passenger	Train	Bus	Other – Walk / Cycle
Commute	789	596	50	112	4	27
Work related business	273	234	20	9	0	10
Education/childcare	528	367	31	91	3	36
Shopping	205	159	13	9	0	24
Personal business	123	97	8	6	0	11
Social/recreation	276	210	18	10	0	38
Serve passenger	728	639	54	6	0	29
Other	15	14	1	0	0	0
Total	2938	2316	195	243	8	176
% Mode Share[a]		79%	7%	8%	<1%	6%

Source: AECOM, 2009

[a] 2006 JTW Travel Zone 1299 (Glen Alpine) used a proxy for mode split characteristics

[3] assumed

[4] TPDC Household Travel Survey 2006

[5] TPDC Household Travel Survey 2006

[6] assumed

If it is assumed that approximately two thirds of rail trips will begin with a car trip to the station, the vehicle trip rate per household calculated by following this method is 0.73. This rate is comparable to the average of the trip rates identified in Guide to Traffic Generating Developments (RTA, 2002) for residential house and medium density dwellings.

Guide to Traffic Generating Developments suggests that approximately 25 per cent of trips from a sub division may be to destinations within the development, so it assumed that 25 per cent of car trips will be to adjacent residences, the primary school, town centre and Menangle Park rail station and that the remaining 75 per cent of trips will travel on the arterial road network.

7.3.2 Employment Travel Demand

The category of employment development for lands to the north west of the site is not known at the time of TMAP preparation, so it is assumed for the demand analysis that the most likely uses of the site would be similar to that of existing sites in the vicinity, such as industrial and warehousing.

Travel demand has been established using peak hour trip rates for industrial uses within the Guide to Traffic Generating Developments (RTA, 2002) of 1 trip per 100m^2 Gross Floor Area (GFA). If it is assumed that the Gross Floor Area is approximately half the site area (allowing for service infrastructure and non-developable land), approximately 1,500 trips would be generated in the peak hour.

7.3.3 Town Centre Demand

Macarthur Square shopping centre is a major attractor for retail activity in the area and it is not expected that Menangle Park town centre would divert a significant number of existing trips. The town centre will primarily service the residents of the Menangle Park development. There is, however, potential for employees of sites to the west along Spring Farm Parkway, or others travelling to and from the arterial and motorway network in the vicinity, to call in at the centre if it offers a range of everyday services at a more convenient location. In summary, it is not expected that the centre would generate a large number of additional trips on the surrounding road network.

Shopping centre development trip generation in the evening peak is calculated using an equation published in the Guide to Traffic Generating Developments (RTA, 2002):

V(P) = 20A(S) + 51A(F) + 155A(SM)+ 46A(SS) + 22A(OM)

where:
V(P) = vehicles in the peak hour
A(S) = slow rate retail floorspace GFA, e.g. large top end development stores
A(F) = fast retail floorspace GFA, e.g. discount department stores
A(SM) = supermarket GFA
A(SS) = speciality stores GFA, including small shops, fast food outlets
O(OM) = other uses GFA, e.g. medical, offices

The NSW / ACT Shopping Centre Directory (Property Council of Australia, 2006), includes GFA and Gross Leasable Floor Area (GLFA) measurements for major, regional, subregional and neighbourhood centres, including in some cases the split of floor area by tenant. In combination with the RTA trip rate calculation above, the typical floor areas were used to estimate travel generation for the town centre as summarised by Table 7.2. Trip rates for three neighbourhood style restaurants have been included outside of the shopping centre calculation since it does not cover this land use.

Table7.2 – Shopping Centre Trip Generation

Land Use	Gross Leasable Floor Area	Gross Floor Area*	Evening Peak Hour Trips
Fast food outlet x 3	2,000	1,500	19
Medical/ offices	6,667	5,000	2,087
Large supermarket x 2	6,000	4,500	
Discount department stores x 2	16,000	12,000	
Speciality stores x 150	19,333	14,500	
Total	50,000	37,500	2,187

* GLFA is assumed to be 0.75 of GFA (Guide to Trip Generating Developments, RTA, 2002).

Peak demand for retail land uses occurs in the evening. To estimate demand in the morning peak, typical arrival profiles were examined using existing data for a car park at a similar town centre. The data showed that arrivals and departures during the morning peak were approximately two thirds of evening movements, or 1,457 trips. If 25 per cent of trips (561) by residents are to internal destinations such as the town centre, the town centre demand from external locations is reduced to 895 trips in the morning peak hour.

7.4 MODE CHOICE

The determinants used to assess mode choice in this analysis are travel time, travel cost and amenity (comfort, reliability and security). As an example: rail provides a more competitive choice to destinations such as Sydney CBD where parking congestion makes car trips unattractive – capturing 75% of total trips; whereas destinations such as Fairfield capture only 6% of total trips. This indicates that even though Fairfield provides good rail access, its proximity to Campbelltown favours the use of private vehicles.

2006 Journey to Work data has been used to develop a generalised cost mode choice logit model that replicates observed journey to work mode splits (generally to within 5-10%) to major destinations in the Sydney metropolitan area from South Campbelltown, including:

- Hawkesbury;
- Outer North;
- Northern Beaches;
- North Shore;
- Western;
- City;

- Eastern Suburbs;
- Sutherland;
- Parramatta;
- Outer West;
- Inner West (Outer);
- Inner West (North);
- Inner West (South);
- South Sydney; and
- St George.

During this process trips to Camden and Campbelltown were found to be very insensitive to change in travel cost and have therefore been assumed as fixed at their existing mode split proportions. Residents travelling to Central Coast, Blue Mountains, Southern Highlands and the South Coast reported that 100% of these trips were made by car and this pattern is unlikely to change as a result of the Menangle Park development. Therefore, these journeys have been assumed to remain at 100% car mode share.

Journey to Work trips in the mode choice model have been aggregated to car and public transport (including rail and bus trips). The model does not include walk or cycle trips because these tend to be short journeys that have different mode choice parameters such as attractiveness of route and/or gradient, rather than cost.

Having calibrated the model to Glen Alpine conditions, the transport costs in the model have been changed to reflect travel costs from the Menangle Park release area. This process includes changing total highway costs to all destinations, and changing public transport costs from Menangle Park to Macarthur Station.

The Menangle Park mode choice model estimates that in 2006, without any additional transport infrastructure, a mode split of 81% car and 19% public transport would be seen (excluding 'other' mode, 'worked from home' or 'didn't work' trips).

The following factors in the mode choice model have then been changed to reflect the likely 2026 conditions:

- increased frequency of rail services from Macarthur Station (to 8 services per hour);
- slower car travel times in 2026 due to increased congestion;
- slower bus travel times in 2026 due to increased congestion; and
- no change in rail travel times in 2026.

A recommendation of the Review of Bus Services in NSW is that combined mode single ticketing be implemented. While this will have many benefits for bus passengers, it is unlikely to result in a measurable change in mode choice because ticket purchases are integral to interchange, which attracts a high mode choice penalty for many other reasons such as changing modes, timetable differences or capacity/seat finding.

The 2026 model indicates that a mode split of 71% car and 29% public transport be expected if the above conditions changed. This equates to a mode shift of 6% between 2006 and 2026, which is within the recommended 5-10% mode shift target identified as being appropriate for Menangle Park. This forecast mode split has been used as the basis for future travel from the Menangle Park release area.

It should be noted that this is a strategic estimate of mode shift based on quantifiable generalised cost changes and should be viewed with a degree of caution. To achieve this mode shift, it will also be necessary to implement a range of measures that improve public transport attractiveness, such as:

- improved timetable information and marketing;
- improved interchange facilities at Macarthur Interchange;
- high quality local bus service arrangements that meet scheduled timetables;
- no deterioration in rail travel times and reliability as a result of rail networks becoming congested; and/or
- integrated ticketing.

Achieving this mode split will also be dependent on the timing of the scheduled RTA highway upgrade schemes, or any additional major highway schemes in the area, that would improve the attractiveness of car travel.

To disaggregate public transport trips into separate modes, it has been assumed that all public transport trips outside of Camden/Campbelltown are rail trips, with the access mode split 33% bus and 66% car park or car drop off. The existing access mode split to Macarthur is 2% bus and 89% car (8% walk or other) (Railcorp, *A Compendium of CityRail Travel Statistics – Sixth* Edition, 2008). This reflects the existing poor interchange between buses and trains at Macarthur and the relatively small survey sample. The access mode split at Campbelltown is 27% bus and 57% car park or drop off, which is likely to be more similar to the future proportions at Macarthur.

This assumption is intended to reflect the future high quality interchange to be developed at Macarthur Station, bus reform and the restraints to commuter parking provision in the region.

While increasing public transport frequency and car travel times are likely to be the most important factors in achieving a mode shift for trips from Menangle Park, a comprehensive package of measures has also been identified in Section 7 to assist in meeting the targets specified in this TMAP.

Table 7.3 summarises the estimated total travel demand by mode during the morning peak hours, incorporating a mode shift of 6 per cent from car trips as driver.

Table 7.3 – Travel Demand by Mode – Morning Peak

	Car Driver	Car Passenger	Train	Bus	Other
% Mode Share	73%	8%	8%	5%	6%
No. of Trips	2139	224	243	155	176

Source: AECOM, 2009

7.5 TRIP DISTRIBUTION

Trip distributions reflect the range of external destinations of residents from a subdivision. Trip distribution patterns are influenced by wealth, employment patterns, the accessibility of regional employment zones and the cost and amenity of surrounding transport networks and will change relative to these variables over time.

Trip lengths and impact on the transport network can be reduced by planning employment opportunities, retail facilities and schools close to residential areas. It has been assumed that 25 per cent of trips will be contained within the Menangle development precinct, for example to the primary school or town centre.

Trip distribution within the Campbelltown City Council strategic model is derived from the TPDC trip tables for Sydney.

For the local transport impact assessment and the distribution of non-car trips, trip distribution patterns within the 2006 Census Journey to Work data were examined for adjacent travel zone 1299 (Glen Alpine). Employment trip distribution patterns were examined for adjacent travel zone 1367 (Narellan).

All bus trips stated during the 2006 Census from this zone would be made to Campbelltown as a destination or to use the bus interchange. No bus trips were recorded for work trips to the south or to Camden. However, in the future, since residential and employment land uses will increase in the Camden area, demand for services to Camden could also increase.

7.6 PEDESTRIANS IMPACTS AND OPPORTUNITIES

The development of Menangle Park will redefine walking demands throughout the site. New demands for walking trips will mostly be internal to the study area, for public transport access, recreational and retail purposes. The design of the estate will ensure that these demands are encouraged through provision of high quality pedestrian routes connecting the sites residential areas to the town centre and rail station, and alongside feeder bus routes.

The additional growth forecast in the development scenarios will lead to significant increases in the level of pedestrian activity in the Menangle Park area. Even trips made by bus or rail will generate pedestrian movements, as passengers access Menangle Park station and bus services on key local roads. It is likely that there will be some opportunities for Menangle Park residents to walk to work, to the employment uses proposed at the northern end of the site. At a nominal 1-2% of journey to work trips, this would be between 30 and 70 pedestrians per hour moving through the precinct.

Footpaths should be provided on both sides of all roads at a minimum paved width of 1.2 metres but with increased widths around bus stops and within high pedestrian activity areas, such as in the vicinity of shops and schools.

A pedestrian crossing of Menangle Road will be required to connect residents of the southern precinct to facilities and public transport on the north of Menangle Road. The location of the crossing is discussed in Section 7.10 Traffic Implications.

7.7 CYCLING IMPACTS AND OPPORTUNITIES

The provision of improved facilities between Menangle Park and Macarthur would dramatically increase the opportunity to cycle to local work destinations or retail centres. Macarthur is within an easy cycle distance of Menangle Park providing opportunities to encourage cycling for these trips.

A mode split of between 1-3% could be seen for weekday peak hour trips. At the upper end, this would see over 100 cyclists travelling between Menangle Park and Macarthur during peak hours.

Cycle lanes should be provided on all collector roads to encourage cycling. On arterial roads off road cycle lanes will provide protection from higher vehicle speeds. On local streets where traffic volumes are lower cyclists will mix with general traffic.

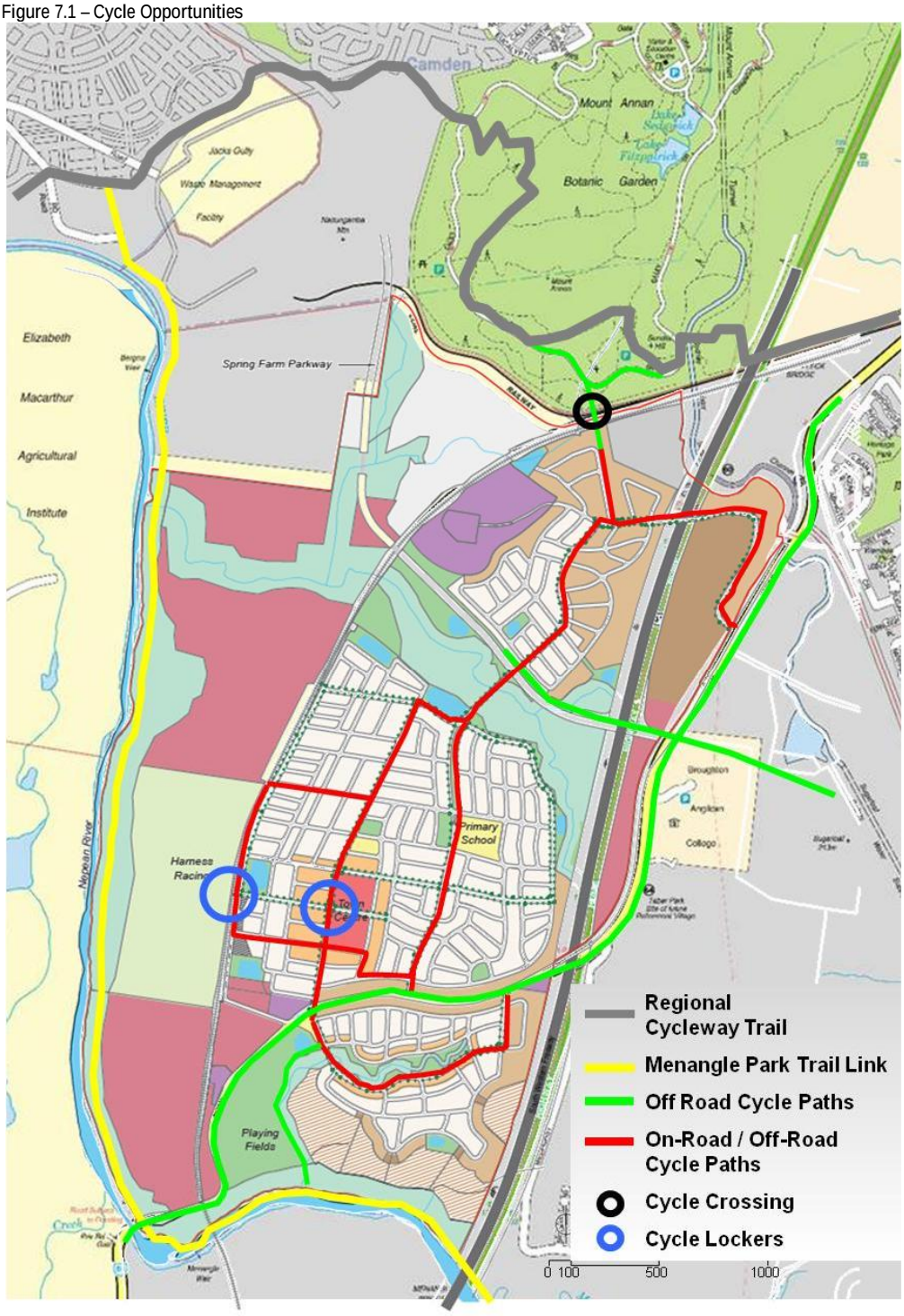
Bicycle crossing opportunities should be considered at arterial roads, such as the proposed Spring Farm Parkway and Menangle Road, with cycle facilities incorporated at signalised crossings and safety barriers provided adjacent to cycle crossings.

Given that traffic conditions on Menangle Road will become much busier into the future as Menangle Park is developed, it will be necessary to provide some form of separation between cyclists and vehicles on this corridor. Therefore, it is recommended that an off-street cycle path be provided between Menangle Park and Macarthur, namely Macarthur Square, and Campbelltown CBD, with safe crossing opportunities, to improve access between the centres for non-motorised forms of transport at an easy grade, conducive to these modes. Landcom is currently planning a Regional Cycleway linking Macarthur, Mt Annan Botanical Gardens and the Camden area with links to Menangle Park, so an opportunity exists to provide a connection to the network to encourage cycling from Menangle Park via the Menangle Park Trail Link and Menangle Road cycle paths. Recreational trips by bike around Mt Annan Botanical Gardens will also be attractive to residents.

The attractiveness of cycling between Menangle Park and Macarthur would suggest that sufficient cycle parking provision should be implemented at Macarthur Interchange. It is recommended that up to 20 lockers be provided, together with standard parking racks, and a reservation for additional cycle parking over time should it be required. Cycle parking stands should be provided at Menangle Park station, although this could be incorporated into a shared parking facility for retail facilities or other adjacent land uses.

Figure 7.1 illustrates the opportunities for a cycle network and facilities.

Figure 7.1 – Cycle Opportunities



Source: AECOM 2010, Urbis 2010

7.8 RAIL IMPACTS AND OPPORTUNITIES

Upon construction of an additional platform, under the Rail Clearways Program, RailCorp intends to increase services from Macarthur Interchange providing 8 city bound services during the morning peak hour and a reciprocal number during the evening peak hour.

Two potential scenarios were considered for servicing the Menangle Park site by rail:

a) Electrification of the rail line from Macarthur to Menangle Park (and potentially on to the South Highlands).

   Implications for rail access: Rail passengers would have direct access to the metropolitan rail service.

b) Maintain diesel rail service from Menangle Park and offer a high quality bus connection from Menangle Park to Macarthur Interchange.

   Implications for rail access: Rail passengers would have direct access to an hourly rail service from Menangle Park and indirect access to the frequent rail service from Macarthur via a bus connection.

Discussions with Railcorp and the ARTC in January 2007 confirmed that costs, operational and contractual issues would preclude Scenario A from proceeding to the planning stages. Therefore, Scenario B, a high quality bus link to Macarthur rail station is proposed to augment existing services from Menangle Park. Bus impacts and opportunities are discussed in Section 6.9.

Preliminary patronage estimates prepared by AECOM to support a Rail Electrification Issues Paper prepared by APP Corporation in January 2007 are included at Appendix A.

Table 7.5 illustrates the estimated impact of the Menangle Park development on rail services.

Table 7.5 – Morning Peak Hour Rail Use

Year	Cumulative Total
2014	13
2018	76
2022	143
2028	243

Source: AECOM, 2009

These trips would be shared between the diesel service from Menangle Park and the electric service from Macarthur. There is sufficient capacity on the timetable trains to accommodate these trips although it is noted that services become congested as they move towards the city.

7.9 BUS IMPACTS AND OPPORTUNITIES

Table 7.6 illustrates the estimated impact of the Menangle Park development on bus services.

Table 7.6 – Morning Peak Hour Bus Use

Year	Cumulative Total
2014	8
2018	46
2022	85
2028	155

Source: AECOM, 2009

The Unsworth Review of Bus Services in New South Wales, completed in February 2004, will play a role in guiding the future operation and management of bus services throughout the Sydney Metropolitan Region. This report illustrates an increased focus on the role that the Campbelltown CBD will play as a regional hub for bus transport. Campbelltown is identified as connecting three strategic bus corridors, along Narellan Road, Campbelltown Road and an indicative connection to the South West Growth Centre.

In NSW, buses are governed by the NSW Service Planning Guidelines (NSW Ministry of Transport, 2006). The main points included within the guidelines to which the development should adhere are included within Table 6.1 and Table 6.2.

Menangle Park will generate around 155 bus passengers during peak hours for trips to Macarthur and Campbelltown Interchanges. In addition, there will be demand of up to 100 bus-rail passengers (assuming 33% of rail passengers access Macarthur by bus, as discussed in Section 7.4).

At a comfortable capacity of 60 passengers per bus, a bus service to Macarthur and Campbelltown Interchanges would justify provision of a 12 to 15 minute frequency at full development during the peak periods, with a 30 minute off-peak frequency to be provided to maintain public transport accessibility during the day for non-journey to work trips and to meet the Service Planning Guidelines.

It is recommended that peak period frequencies be provided between 6.30am and 8.30am in the morning and between 5.00pm and 7.30pm in the evening. Services should be scheduled to coordinate with rail services from Macarthur to reduce interchange times.

There is an opportunity to divert the existing Campbelltown-Menangle service 892 via Menangle Park. It is recognised that a Menangle-Menangle Park-Macarthur-Campbelltown service would run along a section of Menangle Road that would not have any suitable stop locations. While this is not an issue during peak periods when buses are likely to be full, it may be more of an issue for off-peak services.

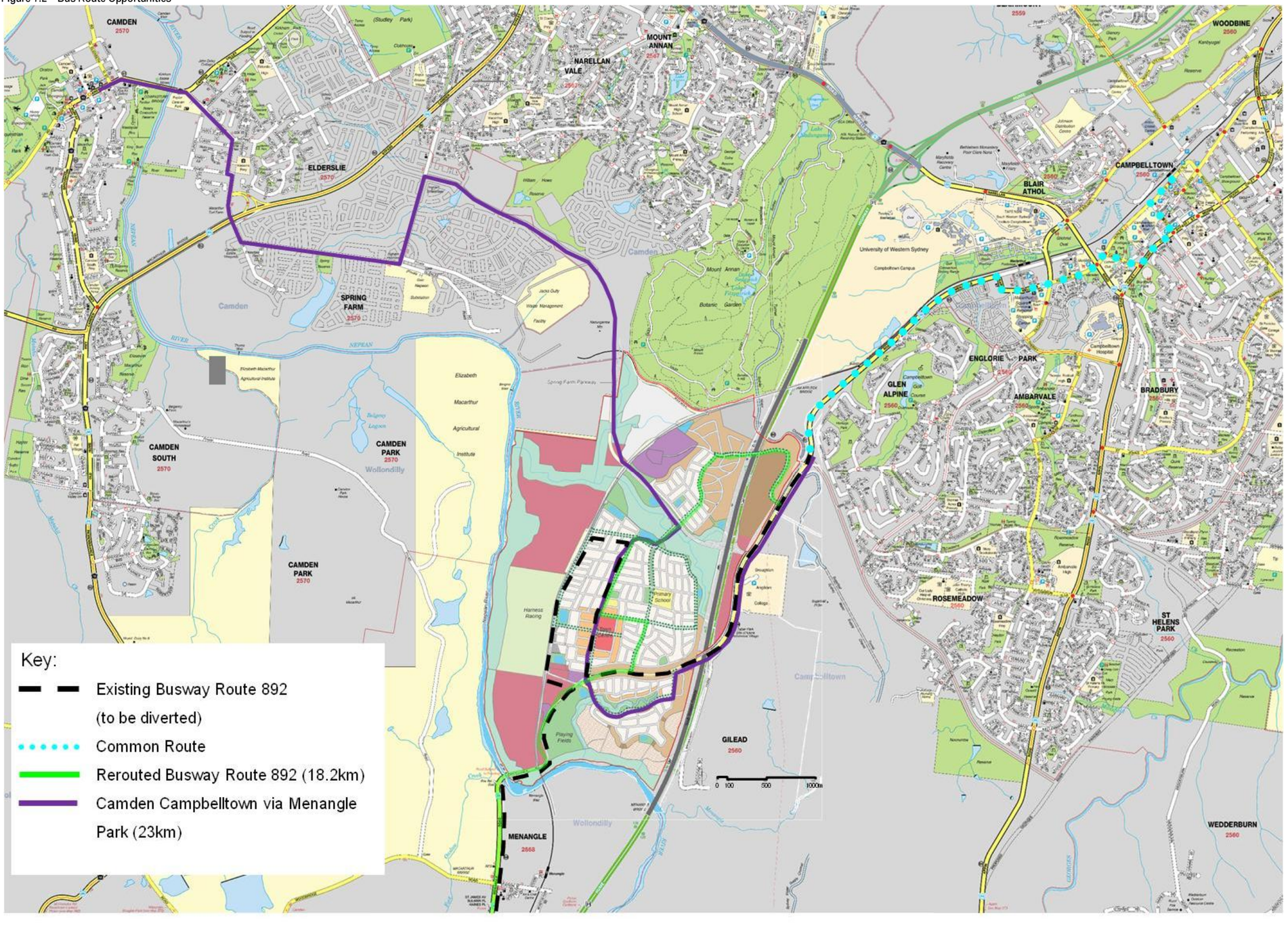
Bus stops with timetable and network information should be provided every 400 metres along the public transport routes within the site. Kerbside lane width of 3.5m is recommended for areas accessed by buses to pick up and set down passengers. Bus priority should be provided at intersections to maintain the competitiveness of public transport services against private car travel.

The Spring Farm Parkway presents an opportunity to provide a bus link from Campbelltown to Camden town centre and employment areas, although there will insufficient demand to warrant provision for the

Menangle Park development alone, this would allow bus coverage for the majority of Menangle Park community.

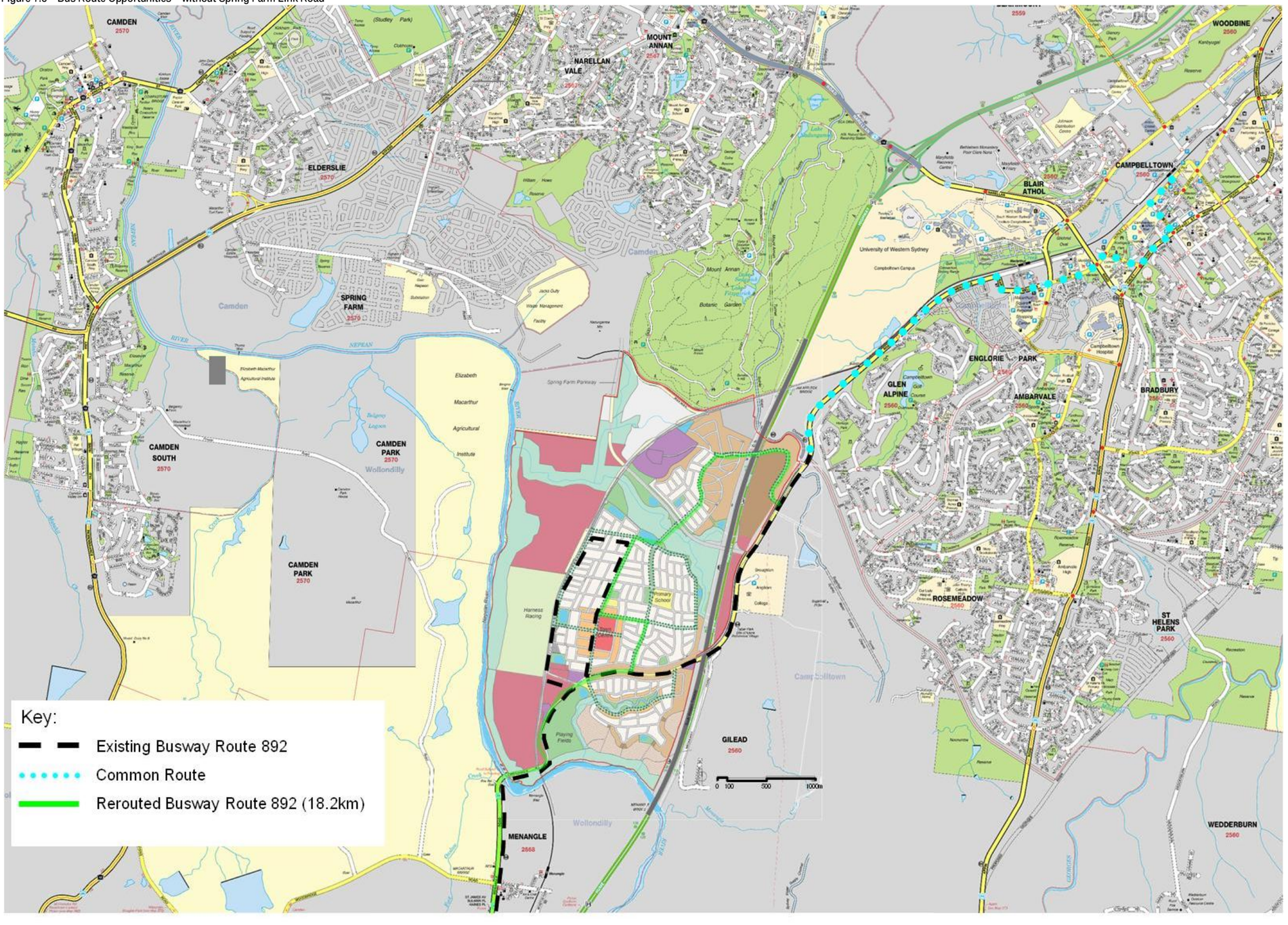
Figure 7.2 illustrates bus routes through the site that would meet the impacts and opportunities described above. Figure 7.3 illustrates potential bus routes through the site if the Spring Farm Parkway was not constructed.

Figure 7.2 – Bus Route Opportunities



Source: AECOM 2010, Urbis 2010

Figure 7.3 – Bus Route Opportunities – without Spring Farm Link Road



Source: AECOM 2010, Urbis 2010

7.10 TRAFFIC IMPLICATIONS

Much of the forecast demand from Menangle Road is to Campbelltown and the F5/M5 corridor, with only limited demands to and from Camden to the west and Wollondilly to the south.

As described in Section 7.2.1, the traffic impact of the development has been considered using two approaches:

a) Local transport impact, using spreadsheet analysis and isolated intersection models; and

b) Regional traffic impact, using the Campbelltown City Council strategic models.

7.10.1 Local Traffic Implications

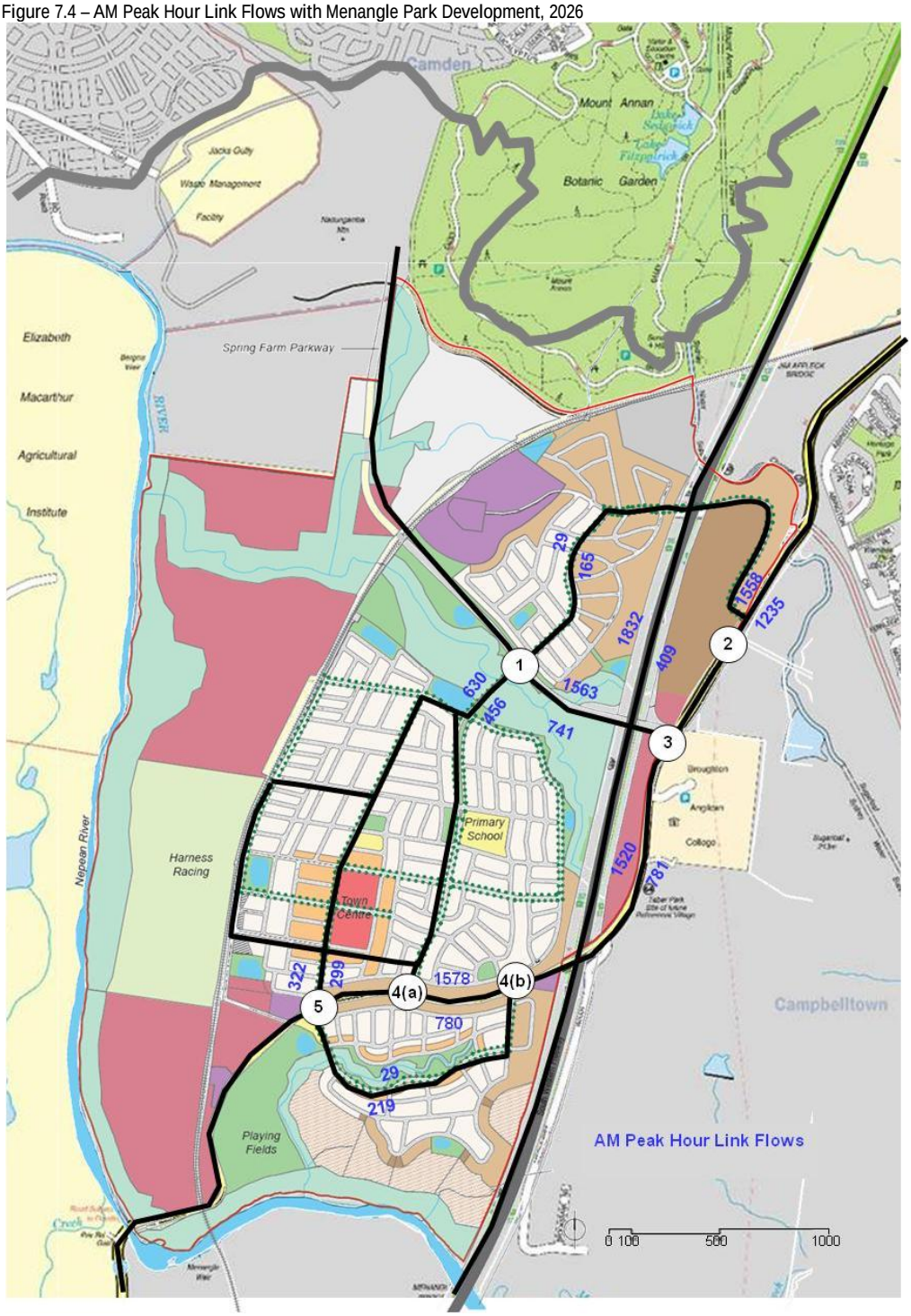
Local traffic flows have been assessed in the morning peak period as this is the worse of the two peaks for the operation of the access intersections as generated traffic flows are higher. Regionally, traffic volumes are higher in the evening peak due to the Macarthur Square development.

Trips have been distributed across the proposed Structure Plan network using the number of dwellings within each area of the development as a guide. It has been assumed that trips in and out of the development will be split in a 15:85 ratio in the AM Peak.

Although the RTA Guide to Traffic Generating Developments recommends that approximately 25% of trips generated by new residential subdivisions may be internal trips, to assess the worst case distribution, no trip containment has been assumed for Menangle Park.

Figure 7.4 illustrates the link flows within the development and the position of the access intersections.

Figure 7.4 – AM Peak Hour Link Flows with Menangle Park Development, 2026



Source: AECOM, 2009, RDA 2007

SIDRA Intersection 3.2 has been used to assess the performance of the access intersections and to define the control method required.

Table 7.9 shows that the proposed access intersections are likely to operate satisfactorily.

Table 7.9 – 2026 Morning Peak Hour Access Intersection Performance

Intersection	Type of intersection proposed	DoS	Level of Service	Average Delay
1: Spring Farm Parkway/ Collector Rd (north)	Roundabout	0.50	A	8.1 sec
2: Menangle Rd/ Glenlee Rd	Roundabout	0.50	A	4.8 sec
3. Spring Farm Parkway/ Menangle Road	Signals	0.95	C	36.5 sec
4a: Menangle Rd/ Collector Rd (north)	Left-in, Left-out*	1.00	A	0.3 sec
4b: Menangle Road/ Collector Rd (south)	Left-in, Left-out*	0.81	B	0.1 sec
5: Menangle Rd/ Cummins Rd	Roundabout	0.79	A	10.3 sec

Source: AECOM, 2009
Notes: DoS: Degree of Saturation, LoS: Level of Service
* Exempt for buses

The layout of the access intersections is illustrated by Figures 7.5 to 7.8. The roundabouts at Menangle Road/ Cummins Road, Menangle Road/ Glenlee Road and Spring Farm Parkway/ Collector Rd (north) will include dropped kerbs and refuges to facilitate pedestrian access across Menangle Road to bus stops and the town centre.

RTA warrants for signals are met at the proposed roundabouts at the intersections of Spring Farm Parkway / Collector Rd (north) and Menangle Rd / Cummins Rd. Therefore, it may be acceptable to propose traffic signals as an alternative at these locations. The intersection performances with signal controls at the two intersections are summarised in Table 7.10.

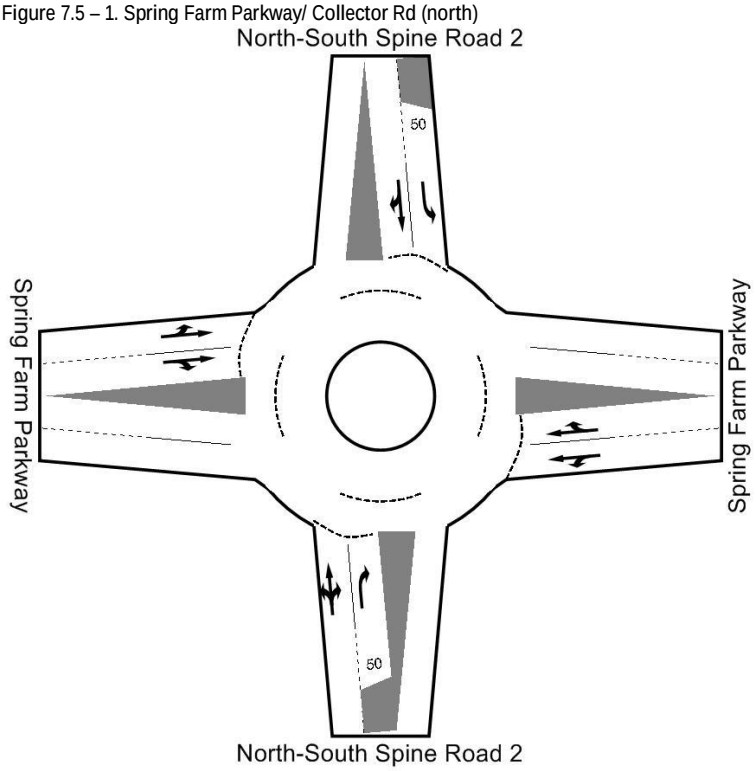
Table 7.10 - 2026 Morning Peak Hour Access Intersection Performance with Traffic Signals

Intersection	Type of intersection proposed	DoS	Level of Service	Average Delay
1:Spring Farm Parkway/ North-South Collector Rd	Signalised	0.69	B	25.0 sec
5:Menangle Rd/ North-South Collector Rd (Cummins Rd)	Signalised	0.84	C	32.3 sec

Source: AECOM, 2009
Notes: DoS: Degree of Saturation, LoS: Level of Service

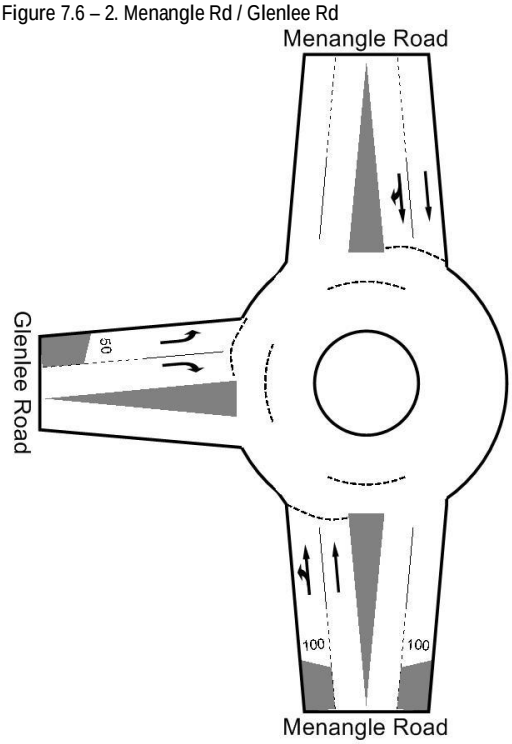
The layout of the signalised intersections is shown in Figure 7.11 and 7.12. Installation of signalised intersections also allows safe crossing opportunities for pedestrians as well as bicyclists especially across Menangle Road.

Figure 7.5 – 1. Spring Farm Parkway/ Collector Rd (north)



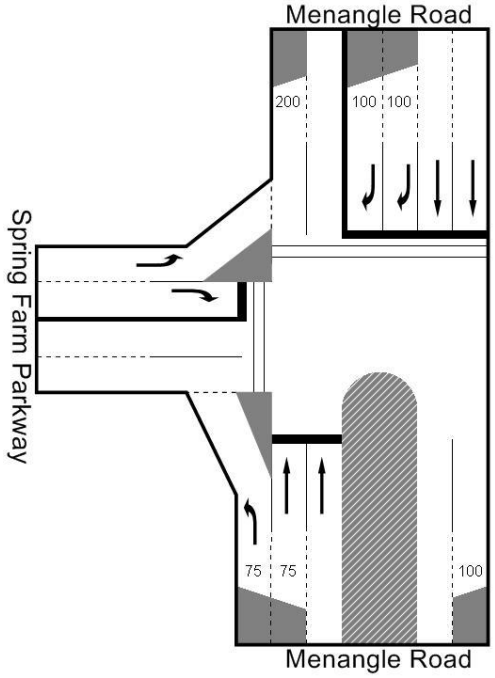
Source: AECOM 2010
Note: Numbers indicate length (m)

Figure 7.6 – 2. Menangle Rd / Glenlee Rd



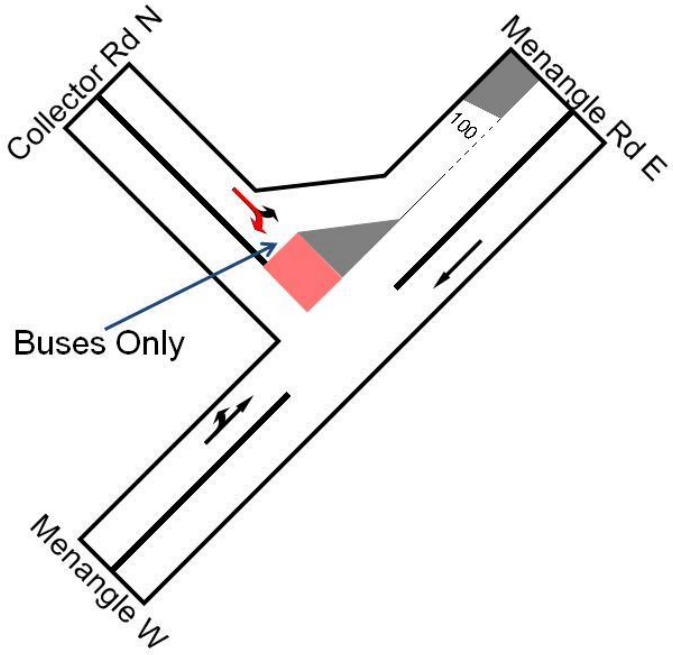
Source: AECOM 2010
Note: Numbers indicate length (m)

Figure 7.7 – 3. Menangle Rd/ Spring Farm Parkway



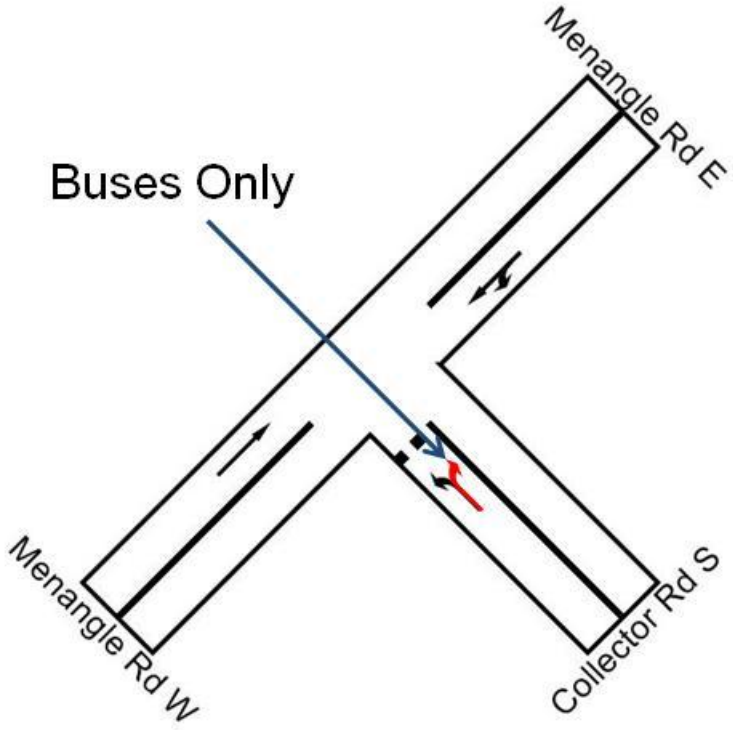
Source: AECOM 2010
Note: Numbers indicate length (m)

Figure 7.8 – 4a. Menangle Rd/ Collector Rd (north)



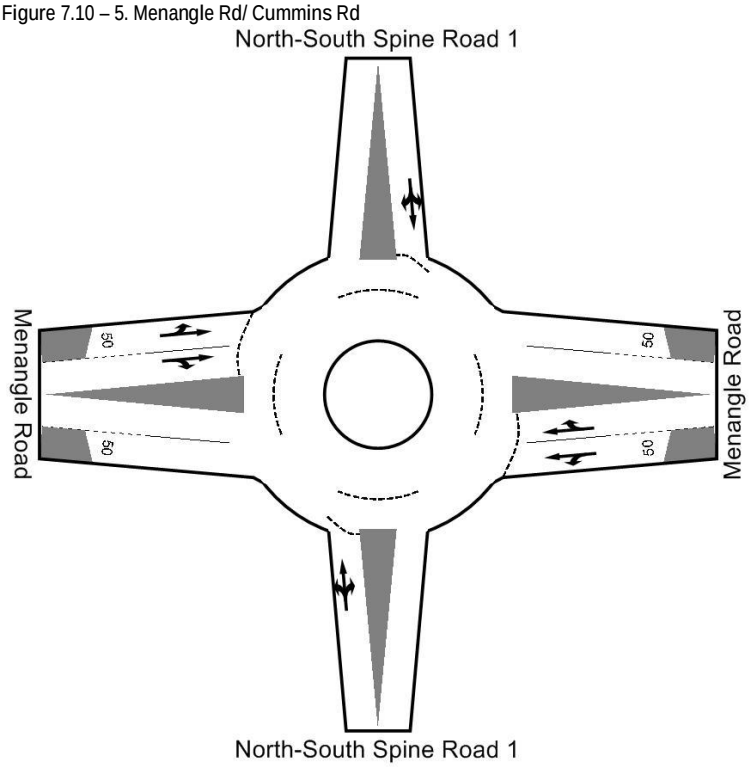
Source: AECOM 2010
Note: Number indicates length (m)

Figure 7.9 – 4b. Menangle Rd/ Collector Rd (south)



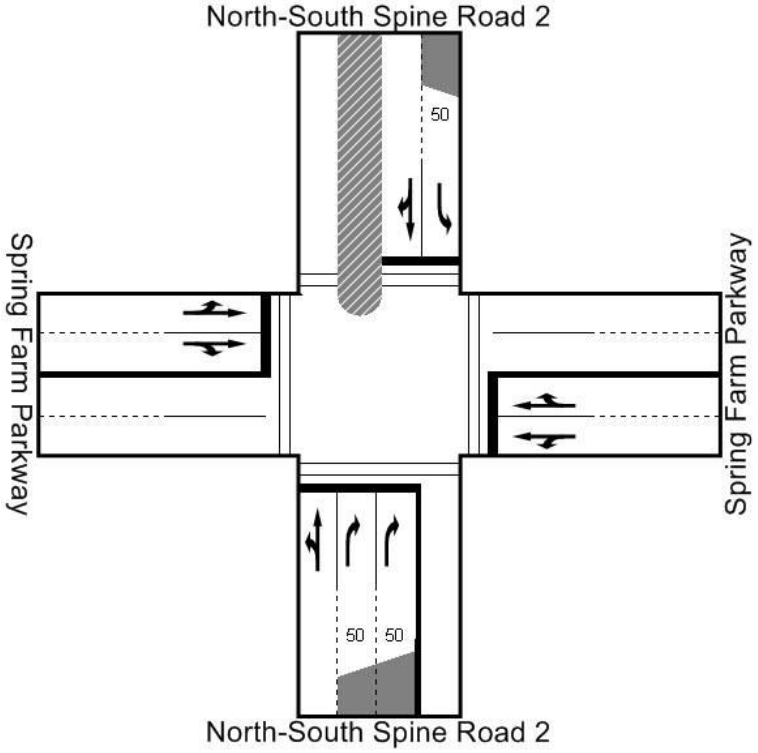
Source: AECOM 2009
Note: Number indicates length (m)

Figure 7.10 – 5. Menangle Rd/ Cummins Rd



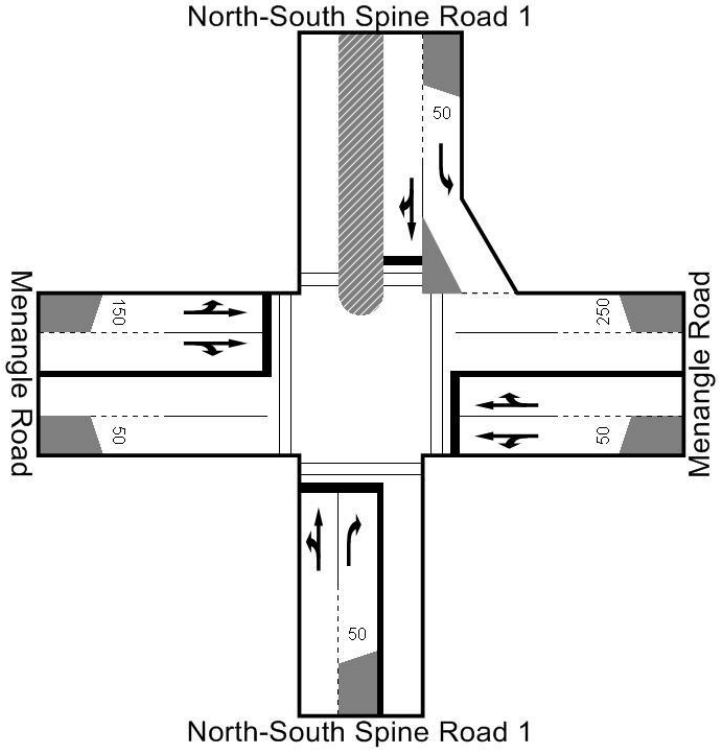
Source: AECOM 2009
Note: Number indicates length (m)

Figure 7.11 – 1. Signalised Spring Farm Parkway/ Collector Rd (north)



Source: AECOM 2009
Note: Numbers indicates length (m)

Figure 7.12 – 5. Signalised Menangle Rd/ Cummins Rd



Source: AECOM 2009
Note: Number indicates length (m)

7.10.2 Regional Traffic Implications

Under the regional approach, strategic models were developed based on RTA supplied trip tables, which were derived from the Transport Data Centre population projection forecast for Camden and Campbelltown, including Menangle Park, for the years 2016 and 2026. It is noted that the population forecasts are based on the Metropolitan Development Program (MDP) of sub-west subregion, which assumes a development lot yield of 4,200 for Menangle Park. However, the current proposed lot yield for Menangle Park is approximately 3,600.

The strategic models developed include:

- 2026 Base Case AM and PM Peak Hours
- 2026 With Spring Farm Parkway and North Facing Ramps AM and PM Peak Hours

The Base Case models include items specified in the Section 94A Developer Contribution Plan for Campbelltown listed in Section 5.7. Furthermore, the models were developed with the following network assumptions:

- Widening of Hume Highway southbound carriageway to four lanes between Camden Valley Way and Brooks Road; and
- Extension of Badgally Road between from Eagle Vales Drive and Camden Valley Way, two lanes in both directions.

Outputs from the strategic model outputs the peak hours are illustrated in Table 7.7 and by Link Flow Plots, included at Appendix C.

Table 7.7 – 2026 Peak Hour Traffic Flow

Link Flow Location	Capacity*	2026 Base Case				2026 With Spring Farm Parkway and North Facing Ramps			
		AM		PM		AM		PM	
		Veh***	V/C+	Veh***	V/C+	Veh***	V/C+	Veh***	V/C+
SB on F5 N of Narellan Rd	4,400	4,121	0.94	5,079	**1.15**	4,197	0.95	5,321	**1.21**
NB on F5 N of Narellan Rd	4,400	4,983	**1.13**	4,076	0.93	5,245	**1.19**	4,230	0.96
SB at Blaxland Rd N of Narellan Rd	2,800	476	0.17	754	0.27	519	0.19	1,078	0.39
NB at Blaxland Rd N of Narellan Rd	2,800	637	0.23	543	0.19	792	0.28	616	0.22
NB on Menangle Rd S of Menangle Park	1,400	1,308	0.93	650	0.46	1,308	0.93	650	0.46
SB on Menangle Rd S of Menangle Park	1,400	648	0.46	1,289	0.92	648	0.46	1,289	0.92
EB on Narellan Rd S of F5	3,200	3,638	**1.14**	2,698	0.84	3,286	**1.03**	1,799	0.56
WB on Narellan Rd S of F5	3,200	2,671	0.83	3,432	**1.07**	1,750	0.55	2,937	0.92
WB on Kellicar Rd W of Gilchrist Drive	2,400	1,959	0.82	3,348	**1.40**	1,344	0.56	2,304	0.96
EB on Kellicar Rd W of Gilchrist Drive	2,400	3,354	**1.40**	2,093	0.87	2,100	0.88	1,437	0.60
SB on Menangle Rd S of Gilchrist Drive	1,400	938	0.67	2,387	**1.71**	429	0.31	1,519	**1.09**
NB on Menangle Rd S of Gilchrist Drive	1,400	2,467	**1.76**	986	0.70	1,320	0.94	506	0.36
SB on Menangle Rd S of Glenlee Rd	1,400	777	0.56	2,062	**1.47**	576	0.41	1,497	**1.07**
NB on Menangle Rd S of Glenlee Rd	1,400	2,131	**1.52**	816	0.58	1,292	0.92	639	0.46

Source: AECOM, 2009
* Practical road capacity
** Assumes construction of the Spring Farm Parkway
***Traffic Flow (Source: SMEC 2009)
+V/C = Volume to Capacity ratio, where 1.00 is at full capacity.

Table 7.7 shows that in 2026, Narellan, Kellicar and Menangle Road are likely to operate over capacity. However, the Menangle Park development does not exacerbate the issue as the model forecasts an increase of less than two per cent of total traffic in both directions, with the majority of increases due to the opening of the Spring Farm Parkway to Camden.

7.10.3 Traffic Impact Mitigation Measures

A draft package of measures has been identified to mitigate the development impact in addition to the works included in the Section 94A Developer Contribution Plan. The main features of this package are:

- widening of Menangle Road to four lanes between Glenlee Road and Gilchrist Drive to cater for the proposed traffic generation. Two northbound lanes are required in the morning peak period and two southbound lanes during the evening peak period;
- upgrade of existing intersections at Menangle Road/ Glenlee Road and Menangle Road/ Cummins Road;
- provision of a roundabout, or signals, between the Collector Road (north) and the Spring Farm Parkway;
- provision two left in/ left out intersections at the southern end of the site to provide additional access to Menangle Road;
- provision of a signalised intersection between the Spring Farm Parkway and Menangle Road; and
- north facing ramps from the Spring Farm Parkway to the F5.

A strategic model run including ramps from the Spring Farm Parkway to the F5 indicated that the Spring Farm Parkway and ramps relieve capacity issues across the Campbelltown area, but is not an essential item within a package of measures to mitigate the effects of the Menangle Park development by 2021.

As the Parkway would benefit residents of the development by relieving traffic congestion in the wider Campbelltown area, some contribution would be apportioned to the Menangle Park proponent.

7.11 CONCLUSION

The findings of this impact assessment indicate that a package of infrastructure measures will be required to mitigate the impacts of the proposed land release area. Much of this infrastructure will be required within Macarthur to provide access between Menangle Park, Macarthur and the F5/M5 corridor.

On the basis of the forecast trips generated by the proposed development and the output from the traffic model, the package of measures will include:

- pedestrian footpaths on all local roads, with a 3m shared path on bridges;
- pedestrian facilities (dropped kerbs, refuges) at roundabouts and pedestrian phases at signalised intersections;
- cycle lanes on all collector and arterial roads;
- a pedestrian/cyclist connection between Menangle Park and the Regional Cycleway planned by Landcom;

- collector roads suitable for a public transport service running north south through the site;
- high quality and frequent bus service between Menangle Park and Macarthur Interchange and Campbelltown Interchange;
- upgrade of the Macarthur Interchange to include improved interchange facilities, pedestrian connectivity and cycle connectivity and parking;
- three new intersections with Menangle Road, at Spring Farm Parkway (signals) and providing access to the south of the site (two left in/ left out intersections);
- roundabout, or signalisation, at intersection of the North South Collector Road with Spring Farm Parkway;
- upgrade of existing intersection of Menangle Road and Glenlee Road; and
- widening of Menangle Road to four lanes between Gilchrist Drive and Glenlee Road.

Should the Spring Farm Parkway not be constructed, the existing Mark Evans Bridge will need to be duplicated to provide two lanes in each direction at the northern end of the site and the intersection of Glenlee Road and Menangle Road will need to be signalised.

A range of policy and service measures will also be required to supplement this infrastructure package to meet the sustainable objectives of this TMAP. The comprehensive package of measures is discussed in detail in Section 8.

8.0 PACKAGE OF MEASURES

8.1 INTRODUCTION

This section discusses the package of measures recommended for implementation in the Menangle Park environs. The package includes a range of initiatives, addressing:

- infrastructure needs – including measures to improve walking, cycling and public transport opportunities, while maintaining private vehicle access;
- service needs – providing sufficient service frequency and quality to promote a high public transport mode split; and
- policy needs – opportunities to establish local policies that reduce reliance on the private car, while making public transport travel viable.

It is recommended that the initiatives discussed in this section be implemented as an integrated package. A number of the measures identified are related and the achievement of maximum benefits will be dependent on the full range of measures being implemented. For example, while timetable improvements and marketing will not have a significant effect on mode choice, together with infrastructure and service improvements they will have an effect. Section 9 outlines the funding and implementation strategy developed to deliver these measures in a timely manner.

8.2 INFRASTRUCTURE

This section discusses the infrastructure that is required to underpin the service and policy initiatives. The infrastructure package has been tailored to improving public transport operations, while maintaining satisfactory levels of private car performance.

8.2.1 Walking and Cycling Infrastructure

The existing rural conditions in the study area are not conducive to walking trips, including a lack of footpaths and a lack of permeability.

Footpaths (1.2-1.5m width) will be provided on both sides of all roads within the Menangle Park release area to ensure that pedestrians have a choice of travel within the precinct. The pedestrian network within Menangle Park has been designed as far as possible in a grid network, to minimise walk distances to a public transport service, thus helping to achieve public transport targets.

On road cycle lanes (1.4 - 2.5 m width) should be provided on all collector roads within the development and off road lanes along arterial roads. Cyclists will mix with general traffic on local streets where traffic volumes are lower.

Connectivity to Macarthur and Campbelltown will also be important, both for local journey to work trips and for leisure and retail trips. A connection should therefore be provided to the proposed Regional Cycleway proposed by Landcom to provide a high quality corridor for walking and cycling trips into the town centres, without the need for people to travel on Menangle Road, which will become much busier and less attractive for walking and cycling trips into the future and has limited capacity for pedestrians at the M5 overbridge.

The Regional Cycleway should be connected to the main street network within Menangle Park and the proposed Menangle Park extension to the cycleway provided around the perimeter of the development.

Local streets will be available for use by cyclists and managed and maintained to ensure that cycling on these routes is safe and convenient. This would include maintaining the road surface to an acceptable standard, ensuring that drainage covers are designed with cyclists in mind, managing on-street parking to ensure cycle safety and enforcing speeding and parking regulations.

A pedestrian crossing of Menangle Road is required to connect residents in the southern precinct to the facilities to the north of Menangle Road and will be provided at the access roundabouts, using dropped kerbs and refuges, or signalised phases, if a signalised intersection is installed.

8.2.2 Bus Infrastructure

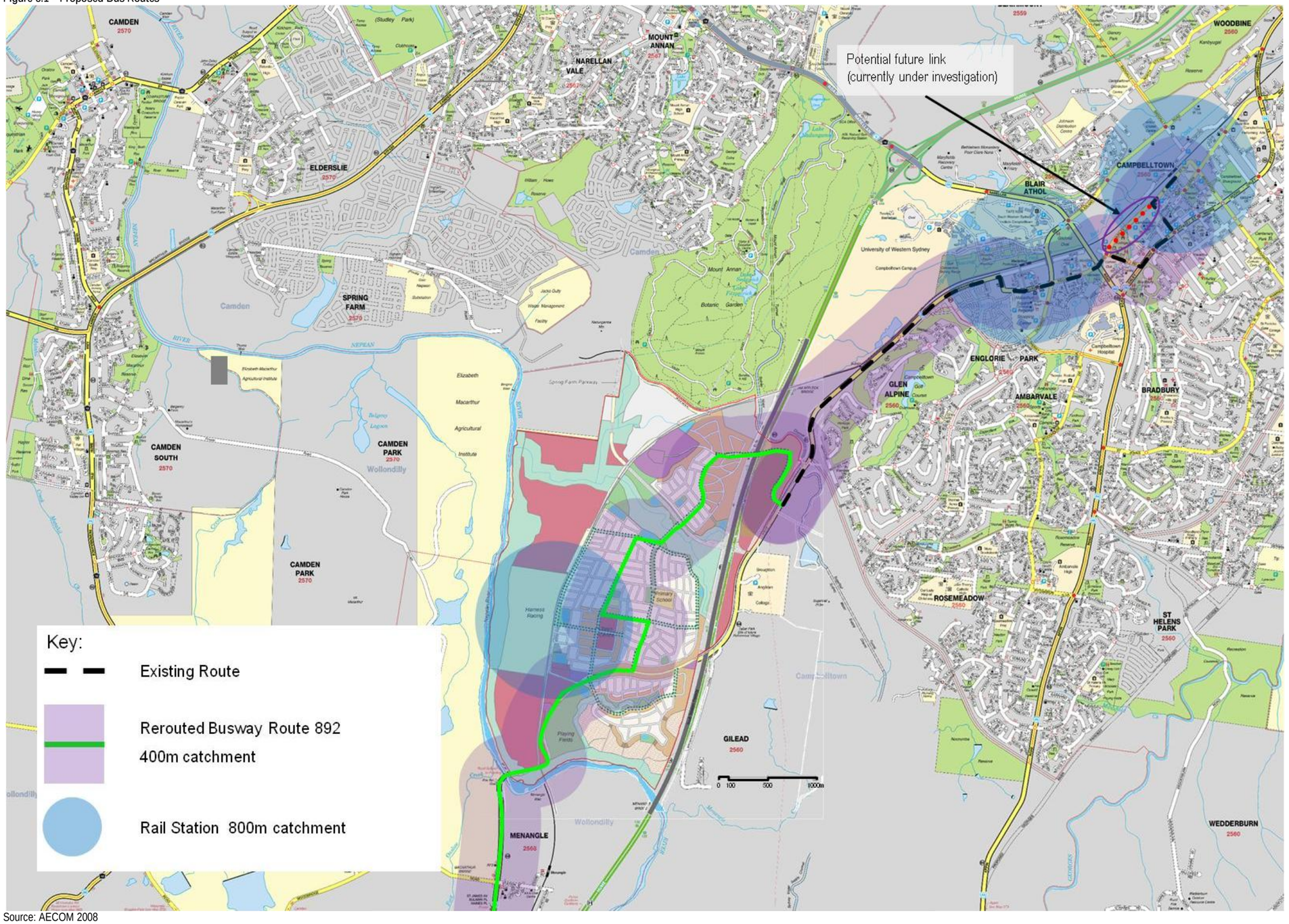
The provision of a high quality spine road and public transport corridor within the site will maximise the patronage catchment of services. The kerbside lane of the bus routes will be a minimum of 3.5 metres wide.

The provision of north-south collector spine roads will mean that the majority of the site is within 400m walk of the bus corridor or 800 metres of the rail station, as illustrated by Figure 8.1. The local road network maximises pedestrian permeability and high density residential areas are located on the bus route, both assisting in meeting the target that 90 per cent of the population lives within an actual 400m walk of a public transport stop.

While it may not be possible to provide bus priority on mid-block sections of the local road network, it will be important to provide public transport priority at intersections within the network to maintain the competitiveness of public transport services against private car travel. These measures could include short bus lanes to avoid queues at the intersections of Menangle Road/ Glenlee Road, Cummins Road/ Menangle Road and North South Collector Road/ Spring Farm Parkway.

Comprehensive public transport information is a key factor affecting public transport use, particularly in residential areas where opportunities exist to achieve regular patterns of public transport use, provided initial awareness of transport options can be achieved. As part of this TMAP package, comprehensive public transport information should be provided at all bus stops. This information should a locality map, the routes of local bus services and timetables. This is an essential and cost-effective element of the package, and should be implemented in the short term.

Figure 8.1 – Proposed Bus Routes



Source: AECOM 2008

8.2.3 Rail Infrastructure

The provision of high quality rail infrastructure in Macarthur is going to be a prerequisite of achieving the sustainable mode split targets for this TMAP, given the constraints of amplifying services to and from Menangle Park.

A study has been undertaken by others to determine the design and layout of the proposed Macarthur Interchange.

8.2.4 Road Network Infrastructure

The focus of this TMAP is to promote and achieve improved walking, cycling and public transport use in the area around Menangle Park to meet NSW Government objectives for sustainable travel and environmental impacts.

With this in mind, as discussed in the previous section, there will be a need for a significant amount of additional road network capacity in the South West Sydney area to cater for the projected demands from the combined land releases. However, much of this infrastructure is required to the north of the F5/M5 corridor and is therefore beyond the influence of the Menangle Park development.

To the south of the F5/M5 corridor there will be a need to provide a degree of additional road network capacity to mitigate the effects of additional car trips from the Menangle Park area:

- pedestrian footpaths on all local roads, with a 3m shared path on bridges;
- pedestrian facilities (dropped kerbs, refuges) at roundabouts and pedestrian phases at signalised intersections;
- cycle lanes on all collector and arterial roads;
- a pedestrian/cyclist connection between Menangle Park and the Regional Cycleway, as planned by Landcom;
- collector roads suitable for a public transport service running north south through the site;
- high quality and frequent bus service between Menangle Park and Macarthur Interchange and Campbelltown Interchange;
- upgrade of the Macarthur Interchange to include improved interchange facilities, pedestrian connectivity and cycle connectivity and parking;
- three new intersections with Menangle Road, at Spring Farm Parkway (signals) and providing access to the south of the site (two left in/ left out intersections);
- roundabout, or signalisation, at intersection of the North South Collector Road with Spring Farm Parkway;
- upgrade of existing intersection of Menangle Road and Glenlee Road; and
- widening of Menangle Road to four lanes between Glenlee Road and Gilchrist Drive.

The Spring Farm Parkway and ramps to the F5 are included in the package of measures as it would benefit the residents of Menangle Park. On a regional level, the links to the F5 would result in considerable network benefits, including reductions in Vehicles Kilometres Travelled (VKT), Vehicles Hours Travelled (VHT) and vehicle delays. Furthermore, the Spring Farm Parkway would significantly reduce future traffic growths in the Campbelltown and Macarthur regional centres along Narallen Road.

Should the Spring Farm Parkway not be constructed, the existing Mark Evans Bridge, over the F5, will need to be duplicated, at significant cost, to provide two lanes in each direction.

However, although the infrastructure is beneficial to the Menangle Park development, the Spring Farm Parkway and ramps to the F5 are not necessary to mitigate the Menangle Park development's traffic impact.

8.3 SERVICE RESPONSES

8.3.1 Bus Services

At full development, a twelve to fifteen minute frequency bus service should be provided between Menangle Park station and Macarthur Interchange/Campbelltown Interchange during peak periods (between 6.30am and 8.30am in the morning and 5.00pm and 7.30pm in the evening). Outside of the peak periods a 30 minute frequency service should be provided. All services should be scheduled with rail services at Macarthur to reduce interchange times.

The bus route can be provided by diverting the existing Busways route 892 to Menangle, as illustrated by Figure 7.2.

If the Spring Farm Parkway proceeds, a bus service could be provided between Campbelltown and Camden via Macarthur and Menangle Park to encourage bus trips to the west of the site. While this service is not necessary to meet demand from the Menangle Park development, its provision should be supported by the development.

8.3.2 Rail Services

In 2014 it is expected that the works under the Rail Clearways Program to construct an additional platform at Macarthur will be completed. It is understood that these works will allow an increase in the frequency of services from Macarthur Station to eight services per hour. This will assist greatly in meeting the sustainable transport objectives of the proposed development.

8.3.3 Community Intranet

A community intranet provides an excellent opportunity to disseminate public transport information and service changes at the local level for a minimal cost. It can also help to improve the cohesiveness of communities.

8.4 POLICY RESPONSES

As noted in the introduction to this chapter, policy responses are an important element of any integrated land use and transport planning approach. In many cases, they provide strong support for the community's investment in major infrastructure or transport services, and reinforce the viability and benefits arising from those investments.

8.4.1 Pedestrian and Cyclist Policy Issues

A comprehensive network of pedestrian and cycle paths would be a cost-effective element of a package of transport measures for Menangle Park.

The deficiencies within the existing pedestrian and cycling networks at Macarthur need to be addressed to assist in encouraging travel by these modes. In order to improve the overall pedestrian and cycling environments there are a number of more general principles that should be considered and applied when planning and designing facilities. These include:

- *Permeability* – pedestrians and cyclists should be able to move conveniently through the study area by ensuring that all key origins and destinations are well connected. Large sites, developments and buildings should not present unacceptable barriers to movement.
- *Priority* – high priority should be given to pedestrian and cycle movements on key routes, through measures such as short wait times at signalised crossing points.
- *Continuous* – pedestrian and cycle routes should be continuous, with connected foot/cycle paths, crossing facilities and entry points to developments, such as Macarthur Interchange and Macarthur Square.
- *High quality* – pedestrian and cycle facilities should at least meet design standards. Footpaths should include provision for people with disabilities. Designs should at least meet the standards expressed in Austroads Guide to Traffic Engineering, Part 13: Pedestrians and Part 14: Bicycles.
- *Integration* – walking and cycling should be integrated with other modes (particularly bus and train services) through the provision of obvious, safe and convenient pedestrian/cycle access paths to interchange areas, as well as secure cycle storage facilities.
- *Legibility* – the local environment should be easy for pedestrians and cyclists to 'read' so that they can easily find their way – street names should be clearly visible and clear signage should be provided including key destinations and distances.
- *Capacity* – pedestrian and cycle paths should be designed to provide ample space for both travelling and waiting pedestrians and cyclists.
- *Pleasant* – streetscapes should be designed to high urban design standards that provide interesting pedestrian and cycle routes, free of litter and fear of crime. Appropriate lighting should be provided on all routes. Greater levels of pedestrian and cyclist activity will assist in these regards.

The following principles relate well to the design of pedestrian facilities and should be incorporated into the design of the masterplan:

- *Comfortable* – pedestrian paths should be comfortable to walk on. Walking surfaces should be free of obstructions and provide a smooth surface (with no broken paving).
- *Crossing facilities* – appropriate at-grade pedestrian crossing facilities should be provided on desire lines. Consideration should be given to reducing the road width at these locations. Grade separated crossing facilities should be avoided where possible. However, at Macarthur Interchange it may be necessary to provide a high quality upper link between the shopping centre and the station.
- *Facilities* – appropriate facilities should be provided within the footpath area, including regular seating, rubbish bins and maps. Design of facilities should be coordinated with the overall urban design theme and care should be taken when placing facilities to ensure that footpaths are not obstructed.

- *Access to car parks* – pedestrian access between car parks and local attractions should be considered to ensure that safe, convenient and obvious routes are provided, including pedestrian routes within car parks.

The following principles relate well to the design of cyclist facilities and should be incorporated into the design of the masterplan:

- *Segregated facilities* – cyclists should generally be provided with segregated on-road facilities, with clear cycle lanes, advance stop lines and other priority treatments. Particular care needs to be taken if cycle lanes and on-street parking are to be integrated.
- *Storage Facilities* – appropriate storage facilities should be provided at all key destinations (including train stations, major bus stops and large developments). Storage facilities should provide for both long and short term storage of cycles and related equipment. Design should be such that storage is not only secure and provides weather protection, but also conveys a sense of high priority for the treatment of cycles and cyclists.
- *Intersection Treatments* – appropriate facilities should be provided for cyclists at intersections, ideally signalised, and at locations where cyclists have to move between on and off-street paths and vice versa to ensure safe and convenient access. These locations are typically the most difficult and confusing areas of the network for both cyclists and other road users.

The following principles relate well to the design of shared pedestrian/cyclist facilities and should be incorporated into the design of the masterplan:

- *Separate* - in general, facilities should be provided separately for pedestrians and cyclists, taking into account the different needs of these two groups, and in particular, vulnerable pedestrians such as those with impaired hearing, sight or walking difficulties.
- *Consultation* - where opportunities for shared off-road routes are identified (such as the Menangle Park-Macarthur rail trail), paths should be carefully planned with wide consultation at an early stage to ensure suitability of the route and the proposed facilities. Once implemented, use of the route should be monitored and changes made if problems arise.

8.4.2 Car Parking Policy

Improvements in public transport accessibility allow less parking to be provided in new developments because people who work there or visit these developments have an improved range of transport choices. In turn, provision of less parking reinforces the viability of these improved services, thereby encouraging further improvements over the short to medium term.

Some of the intersections on key arterial road links in the Macarthur area are experiencing some peak period congestion. However, most of these links are already at the full extent of their practical designs, with limited opportunities for any significant capacity expansions. A more focused approach to parking policy, in concert with public transport service improvements, will help to ameliorate any further impact arising from increased levels of development.

It is recommended that parking requirements for the Menangle Park area be set as maximum rates, with developers being required to justify provision above these levels. Parking rates should also be location-responsive. Rather than applying a uniform rate across the local government area or even Menangle

Park, lower rates of parking provision should be allowed in areas with excellent public transport accessibility. Provision also needs to be made to ensure that the viability of retail opportunities is maintained through the provision of short-term parking in these areas.

Parking provisions can also influence the mode share of public transport use. In particular, balancing the supply of commuter parking near Marcarthur Station will be an important factor in encouraging the mode share of bus services within Menangle Park during early phases of the development occupancy. Therefore, any increase in commuter parking at Macarthur Interchange should in consideration of bus services operating during the peak hours.

8.5 CONCLUSION

This chapter has described in some detail a proposed package of measures for implementation in the Menangle Park area. The package has been designed as an integrated package, requiring implementation of all measures if the objective of increasing public transport use, walking and cycling is to be achieved.

The strategic analysis undertaken to supplement this TMAP suggests that a mode shift of 6% could be achieved through the implementation of this integrated package of measures.

The implementation of the package will clearly need to occur over a number of years, and will therefore require a sustained commitment from key stakeholders, as well as funding and contributions mechanisms which can stand the test of time. Table 8.1 provides a summary of the recommended measures developed as part of this TMAP.

Table 8.1 – Summary of Package of Measures

Area	Measure	Detail
Infrastructure	Pedestrian Facilities	Create a cohesive pedestrian network within the site that provides excellent accessibility to public transport services and other land uses
		Provide footpaths of at least 1.2m width on both sides of all roads within the site
		Provide improved pedestrian facilities at Macarthur Interchange
	Cyclist Facilities	Cycle lanes (1.4m width) on all collector roads
		Provide connection to Regional Cycleway (2.5m width)
		Provide comprehensive directional signage system for pedestrians and cyclists
		Implement cycle parking at Menangle Park station
		Implement cycle parking at Macarthur Interchange
		Implement cycle route along Menangle Road
	Bus Priority	Create quality public transport spines within the site, including bus stops with shelters at 400m spacing and 3.5m kerbside lanes on bus routes. In addition, bus priority lanes at intersections of Menangle Road/Glenlee Road, Cummins Road/Menangle Road and Collector Road/Spring Farm Parkway.
	Rail	Upgrade Macarthur Interchange
	Public Transport Information	Implement comprehensive public transport information system at all bus stops and key retail locations
		Develop a community intranet for information dissemination
	Road Network	Widen Menangle Road between Glenlee Road and Gilchrist Drive.
		Improve existing intersections of Menangle Road/ Glenlee Road and Menangle Road Cummins Road (with potential to signalisation at the Cummins Road intersection)
		Provide two new roundabout intersections with Menangle Road, with the potential for one of the two to be signalised.
		A roundabout (or signalised) intersection of Collector Road (north)/ Spring Farm Parkway
		Spring Farm Parkway between Camden Bypass and Menangle Road
		Ramps to F5 from Spring Farm Parkway
Transport Services	Bus Services	Provide a bus service between Menangle Park and Macarthur Interchange and Campbelltown Interchange
	Rail Services	Increase frequency of services from Macarthur Interchange
Policy	Parking Policy	Prepare comprehensive Transport DCP (or equivalent) to address needs of all transport modes
		Provide location responsive parking provision rates
	Pedestrian and Cyclist	Integrate pedestrian and cyclist planning principles into Transport DCP
		Make pedestrian and cycle planning issues fundamental priorities

Source: AECOM 2008

9.0 FUNDING APPORTIONMENT

9.1 INTRODUCTION

A range of infrastructure, policy and service initiatives has been identified as having the potential to accommodate the transport needs of the site over time. In this chapter the funding mechanisms available to the proponent and consent authority are addressed having regard to the peculiarities of the site, land ownership and range of stakeholder views.

This memo documents the following:

- an opinion of strategic costs;
- available funding options; and
- apportionment of funding and delivery responsibility.

9.2 OPINION OF COST

Lean and Hayward Pty Ltd will provide costs for the civil works within the package of measures. AECOM has formed an opinion of probable cost for cycle parking, bus stops information and policy items within the package of measures[7]. The probable cost is indicative at this preliminary stage and may have a confidence level of between +/-30 per cent and +/-50 per cent. Upon agreement of the package and an associated scope of works for each measure, a more thorough scrutiny of likely costs can be undertaken if appropriate within the context of the planning process.

The opinion of cost has been derived having regard to:

- the need for costs to be borne across a range of stakeholders, in accordance with the apportionment methodology discussed below;
- the need to agree apportionment and funding at this, the pre-rezoning stage of the development. As such the estimates are of a very strategic nature, and it is beyond the scope of this study to provide detailed cost estimates for measures;
- more detailed investigations may be required prior to their inclusion in Section 94 plans, development agreements or regional contributions plans; and
- the need to implement the package of measures over a relatively long time period.

The Spring Farm Parkway and ramps to the F5 are long-term projects, the need for which is not triggered by the release of this site. As such, the cost, design and apportionment of funding are difficult to accurately predict at this stage – and will require further detailed discussions with the relevant Government agencies and Councils.

[7] Opinion of probable costs are made on the basis of best judgment as an experienced and qualified engineering consultant, familiar with the construction industry As AECOM is not a qualified Quantity Surveyor, AECOM cannot and will not guarantee that any tenders or actual costs will not vary from this opinion of probable cost.

Table 9.1 – Summary of Cost Estimates

Area	Measure	Opinion of Cost
Infrastructure	Signalled intersection: Menangle Rd/ Spring Farm Parkway	$2.0 million[1]
	Access intersections: - Menangle Rd/ Collector Rd (north) roundabout; - Menangle Rd/ Collector Rd (south) roundabout; - Menangle Rd/ Cummins Road upgrade; and - Menangle Rd/ Glenlee Road upgrade.	$3.8 million[1]
	Widen Menangle Road (Glenlee Road to Gilchrist Drive)	$11.5 million[1]
	Spring Farm Parkway including ramps to F5	$122.2 million[1]
	On site works (including pedestrian network, cycle lanes and local road network located within Menangle Park	N/A
	Regional Cycleway Connection	$5.61 million[1]
	Macarthur Rail Interchange	N/A
	Cycle parking at Menangle Park station (5 lockers @$1,000)	$5,000
	Bus stops on bus route (400m spacing) (24 stops @ $2,700)	$64,700
	Public transport information	$0.5 million
Transport Services	Bus and Rail – Increased service frequencies	N/A
Policy	Parking policy	$50,000
	Pedestrian and cycle policy	$50,000
	Community intranet	$0.1 million

Source: AECOM, 2009

[1] Source: Lean & Hayward

[2] Based on the assumption that the operator can recoup an increase of 10%, per year, of the operating cost from passenger fares for each year for 5 years.

9.3 FUNDING MECHANISMS AND OPTIONS

Legislation facilitating contributions towards the provision of public transport infrastructure was introduced as Section 94 of the Environmental Planning and Assessment Act, 1979. Amendments have since been made to the Act in response to the changing requirements of contribution mechanisms creating a variety of potential contribution mechanisms, including:

- Special Infrastructure Contributions (Section 94EE-EH);
- Development Contributions (Section 94);

- Fixed Development Levies (Section 94A);
- Planning Agreements (Section 93F-L); and
- Cross Boundary Contributions (Section 94C).

9.4 SPECIAL INFRASTRUCTURE CONTRIBUTIONS (SECTION 94EE-EH OF EP&A ACT)

The Environmental Planning and Assessment Amendment Act 2006 took effect from June 2006. Changes to the legislation included the addition of the Special Infrastructure Contribution which applies to any land within the Growth Centres.

- The Minister determines the level and nature of the Special Infrastructure Contributions.
- The Minister is required to make publicly available the way that the contributions were calculated and the reasons for the contributions.
- The special infrastructure contributions must "*relate to the capital or recurrent costs of public amenities or services, affordable housing, transport or other infrastructure or environmental conservation.*"
- Special Infrastructure Contributions can be levied to fund regional infrastructure that is not in the vicinity of the site and "*which benefit development across several Council areas*."
- Transport infrastructure outside the Growth Centres can be funded as long as it benefits the development within the Growth Centres.
- Section 94 contributions may still be levied but not for the same purpose as a Special Infrastructure Contribution.
- There are no rights to appeal against the level and nature of a Special Infrastructure Contribution. (Department of Planning, Planning Circular PS 06-016, 5 July 2006).

Under Section 94EG the Minister has the ability declare other land, such as Menangle Park, to be a Special Infrastructure Contributions Area if necessary, following consultation with relevant industry organisations (Environmental Planning and Assessment Amendment Act 2006).

The Special Infrastructure Contribution has been calculated for the North West and South West Growth Centres at the levels below:

- Residential land levies: $349,200 per hectare;
- Industrial land levies: $150,000 per hectare; and
- Commercial / retail land: No levies.

The Special Infrastructure Contribution will fund 75 percent of infrastructure within the Growth Centres, the remainder being funded by authorities (Growth Centres Commission, Fact Sheet 3: Special Infrastructure Contribution). The Special Infrastructure Contribution Fund will be administered by the Director General of the Department of Planning and the Secretary of NSW Treasury.

9.5 DEVELOPMENT CONTRIBUTIONS (SECTION 94 OF EP&A ACT)

Section 94 development contributions are paid by a developer to a Council to be spent on Council facilities. Section 94 Contributions are based on the formulae contained within a publicly exhibited Section 94 Contributions Plan, produced in accordance with provisions of Section 94 of the EP&A Act. Section 94(1) states that:

> *"If a consent authority is satisfied that development for which development consent is sought will or is likely to require the provision of or increase the demand for public amenities and public services within the area, the consent authority may grant the development consent subject to a condition requiring: (a) the dedication of land free of cost, or (b) the payment of a monetary contribution, or both."*

A nexus between funding and the development contributing must be established by the plan and allocated for specific infrastructure improvements. The Amendment Act allows the imposition of contributions to recoup past costs of providing infrastructure (assuming a nexus can be established).

Funding gathered under Section 94 can only be applied to capital funding of Council facilities. Capital funding means the initial one-off designed to meet the cost of providing infrastructure and includes:

- Costs of land acquisition; and
- Construction and provision of facilities.

Section 94 Contributions may remain the most appropriate method in Greenfield areas or urban consolidation development areas with multiple landowners.

- Most suitable where growth is faster and higher levels of contributions are able to offset the considerable administration costs, financial risks and inefficiencies of managing money amongst and within the funds (DoP, 2005).
- Areas with multiple owners who are unable to co-ordinate in offering dedications or works-in-kind (DoP, 2005).

9.6 FIXED DEVELOPMENT LEVIES (SECTION 94A OF EP&A ACT)

Provisions relating to fixed developer levies are defined in Section 94A of the EP&A Act, wherein Section 94A(1) states:

> *"A consent authority may impose, as a condition of development consent, a requirement that the applicant pay a levy of the percentage, authorised by a contributions plan, of the proposed cost of carrying out the development."*

The levy must be authorised by a contributions plan and cannot be required in addition to a Section 94 contribution on the same consent. Money required under this section is to be applied to the provision, extension or augmentation of public amenities or public services. The public amenities/services and the proposed development do not have to be connected, although the consent authority should identify where the money is to be spent.

A Contributions Plan must be prepared to authorise a fixed levy, which specifies the expenditure of money. Strict nexus does not apply but contributions must be expended towards the capital cost of providing or augmenting public amenities or services.

Department of Planning guidelines (DoP, 2005) state that appropriate situations for use of fixed development levies under Section 94A include:

- Established urban areas are where there is little opportunity to acquire open space and development is often incremental;
- Small rural councils where development is sporadic and administration costs associated with preparing a Section 94 contributions plan may be difficult to justify;
- Established urban areas or rural areas with little growth and slow accrual of funds, or where provision of facilities benefits a dispersed set of contributors;
- Areas with multiple ownership with little scope for land dedications or works-in-kind; and
- Costs of needed infrastructure are relatively low and spread over time.

9.7 PLANNING ARRANGEMENTS (SECTION 93F-L OF EP&A ACT)

Provisions relating to planning agreements are contained within Sections 93F to 93L of the EP&A Act. Planning agreements comprise a voluntary contractual agreement between the planning authority and the developer. Planning authorities can include councils, the Minister, a development corporation and a public authority (as described by the *Environmental Planning & Assessment Regulation 2000*).

Planning agreements are a method to obtain contributions for a public purpose, which can include the provisions of (or the recoupment of the cost of providing) public amenities and services, affordable housing, transport and other infrastructure, the funding of recurrent expenditure, the monitoring of the impacts of development and the conservation or enhancement of the natural environment.

Other key aspects of voluntary planning agreements include:

- As part of a voluntary planning agreement, a developer may dedicate land free of cost, pay a monetary contribution or provide any other material public benefit, or any combination of the above.
- As planning agreements are of a voluntary nature and are open to negotiation, a nexus is not required between the development and the public service on which the money is to be spent.
- Planning agreements can be entered into at either the rezoning or the development application (DA) stage, and the agreements must be exhibited for 28 days before it is entered into.
- A planning agreement may be registered by the Registrar-General in relation to the land which it applies, meaning that future holders of titles to the land may be bound to the requirements.
- Once entered into, a planning agreement becomes a statutory obligation wherein a failure to comply becomes a breach of the EP&A Act.
- An important distinction between Planning Agreements and Section 94 Contributions is that Planning Agreements can fully fund infrastructure, whereas Section 94 Contributions only partly fund infrastructure.

Some areas in which voluntary planning agreements may be an appropriate mechanism include:

- Large scale developments with longer timeframes, likely to be developed in stages, and in situations where the developer has a key interest in delivering public infrastructure.
- One or few owners that have an incentive to fund infrastructure (DoP, 2005).
- More successful where major growth or development occurs in a distinct area (DoP, 2005).
- Can offer different and better outcomes through efficiencies in the process or through innovation by the parties (DoP, 2005).

9.8 POOLING OF CONTRIBUTION FUNDS

The Amendment Act authorises that monetary contributions paid for different purposes (other than under a voluntary planning agreement) may be 'pooled' and used for another purpose for which a contribution is required. It is intended that this amendment will promote the efficient use of funds and timely provision of priority infrastructure while ensuring that all borrowed funds are eventually paid back to the source development contributions fund and used for the agreed use within a reasonable time.

9.9 CROSS BOUNDARY CONTRIBUTIONS

The Amendment Act provides that development contributions to be levied or imposed for the benefit of an adjoining local government area (LGA) and that adjoining councils may collectively develop a contributions plan and distribute money between them for purposes in accordance with that plan.

The preferred funding approach is likely to involve a both a Section 94 contribution and a voluntary planning agreement since Council ahs established a Section 94 Contributions Plan for transport in the local area and there will be a need for flexibility when considering transport infrastructure that is not included within the Section 94 Plan.

9.10 APPORTIONMENT METHODOLOGY

Apportionment aims to ensure that development is only charged for the portion of demand (i.e. cost) that it actually creates. DIPNR notes, (in its Section 94 manual) that full cost recovery (i.e. no apportionment) can only be used where the public facility is provided to meet the level of demand anticipated by new development only and there is no facility or spare capacity available in the area.

If the proposed public facility satisfies not only the demand of new development, but also some regional demand, demand by people from outside the area, or makes up for some existing deficiency, only the portion of demand created by new development can be charged.

These principles are obviously important to the apportionment methodology for this project. Apportionment is particularly important in this case because there are diverse ownerships, a range of development intentions, and many Government agencies (including Campbelltown and Camden Councils) with direct interests in the transport and land use outcomes in the vicinity of the site.

The basic principles underlying the methodology for apportionment for this project are:

- developers of land should be required to contribute to the extent necessary to ameliorate the impacts generated by their development;
- growth in background levels of demand for facilities and infrastructure should be met by government, either local or State, depending on the traditional allocation of responsibilities;
- where commercial operators can be expected to benefit from increased patronage, they should be expected to contribute (where practical) to the provision of infrastructure which makes new services and patronage possible;
- the scale of proposed Menangle development is will have some regional or at least sub-regional transport impacts, so the proponent should be expected to contribute to some extent to the delivery of regional infrastructure; and

wherever possible, measures have been nominated for inclusion in Section 94 plans so that established and equitable funding mechanisms can be used as much as possible. Table 9.2 lists the suggested apportionment and associated costs for each of the various measures. In some cases, moderately arbitrary breakdowns between stakeholders may have been assumed. In others, the results will be based on transport analyses outcomes or breakdowns reflecting lengths of on-site infrastructure compared to off-site works. The basis of the suggested apportionments is summarised in Appendix A.

Table 9.2 – Suggested Apportionment

Measure	Entity	%	Amount
Other on site transport & traffic works	Proponent	100	N/A
Regional Cycleway	Proponent	100	$4,500,000
Macarthur Interchange	RailCorp	100	N/A
Access intersections (excluding Menangle Road/ Spring Farm Parkway)	Proponent	100	$3,810,000
Menangle Road/ Spring Farm Parkway intersection[1]	Proponent	40	$2,000,000
	RTA/Other developers	60	
Spring Farm Parkway and ramps to F5[1]			$122,200,000
West of Collector Rd (north)	Proponent	27%	
	RTA/Other developers	*73%*	
Between Collector Rd (north) and F5 ramps	Proponent	52%	
	RTA/Other developers	*48%*	
SFP / F5 Ramps	Proponent	22%	
	RTA/Other developers	*78%*	
Between F5 ramps and Menangle Road	Proponent	41%	
	RTA/Other developers	*59%*	
Widen Menangle Road	Proponent	51	$11,500,000
	RTA/other developers	49	
Menangle Park station Cycle parking	RailCorp	100	$5,000
Bus stops	Proponent	100	$64,700
Public transport information	Proponent	90	$450,000
	RailCorp	5	$25,000
	MoT	5	$25,000

Measure	Entity	%	Amount
Rail – Increased service frequencies	Railcorp	100	N/A
Bus – Increased service frequencies (first five years of operation)	MoT	100	$2,700,000
Parking policy	Proponent	100	$50,000
Pedestrian and cycle policy	Proponent	100	$50,000
Community intranet	Proponent	100	$100,000

Source: AECOM, 2009

[1] To be determined following completion of regional traffic modelling exercise by Campbelltown City Council/ Camden Council.

[2] Refer to Appendix D

9.11 TIMING

The likely timing for each of the elements of the package has been considered, having regard to the need for some measures to be in pace during the early stages of development in an effort to encourage preferred travel habits, the realities of funding availability over time and residents beginning to occupy the site in 2014. The timing regime can be refined after further work on development staging has been undertaken.

The NSW Transport and Infrastructure (formerly Ministry of Transport) noted during consultation that a slow rate of dwelling release of around 200 lots a year is not conducive to establishing a bus route through the site. Negotiations with the NSW Transport and Infrastructure will be required to finalise the year in which buses would begin to service the site.

Table 9.3 – Suggested Timing

Area	Measure	Timing
Infrastructure	New intersection onto Menangle Road	2014
	Spring Farm Parkway	N/A
	Ramps to F5	
	Other on site transport & traffic works	2014
	Connection to Regional Cycleway	N/A
	Macarthur Rail Interchange	N/A
	Widen Menangle Road	2016
	Cycle lockers	2014
	Bus stops	2014
	Public transport information	2014
Transport Services	Rail – Increased service frequencies	N/A
	Bus – Increased service frequencies	2014
Policy	Parking policy	2010+
	Pedestrian and cycle policy	2010+
	Community intranet	2014

Source: AECOM, 2009

10.0 CONCLUSION

The Menangle Park release area presents an interesting challenge from a transport perspective. Constraints to maximising the potential for the development include:

- limited existing pedestrian facilities;
- barriers to pedestrian and cycle activity caused by topography, the freeway and rail line;
- high traffic volumes on cycle routes;
- low bus mode share, caused in part by low permeability of local communities, restricting access to public transport;
- lack of electrification between Menangle Park and Macarthur Interchange;
- some road links approaching capacity, in particular Narellan Road north of the F5/M5 corridor;
- limited peak period capacity at intersections in the Macarthur and Campbelltown centres; and
- relatively high levels of car use in the region.

The key strengths of the existing transport networks in the Menangle Park area include:

- a trend of journey to work containment within the suburb;
- opportunities to create a high quality and connected transport network for non-motorised modes of travel;
- proposed interchange and station upgrade at Macarthur Station;
- an emerging local cycling network;
- an existing public transport framework, with scope for improvement in frequency and quality;
- relative proximity to the suburban rail network;
- a planned increase in CityRail services to Macarthur Station.

Building on an assessment of the constraints and opportunities in the local area, the implications of the development traffic on the local transport networks will be reviewed to enable a comprehensive package of measures to be identified. The package of measures will meet the needs of both new residents within Menangle Park and those of the local community, while meeting targets for sustainable development, including a mode shift away from the car.

10.1 KEY RECOMMENDATIONS

The recommendations of this study are reflected in the package of measures developed for the site discussed in Section 7, together with the finding and implementation strategy discussed in Section 8.

Key points of this package include:

- Policy measures aimed at increasing levels of pedestrian and cycle movements through a comprehensive transport policy that deals with all modes, not just cars. Other policy measures include the provision of location responsive parking rates (again for all modes).
- Transport service improvements, including increased rail services from Macarthur Interchange and from Menangle Park, together with an integrated package of bus service improvements that are responsive to the development of the site.
- Infrastructure improvements to provide easy pedestrian and cyclist access to Macarthur via a connection to the Regional Cycleway, together with cycle parking and comprehensive directional signage.
- Public transport infrastructure, such as public transport priority at key intersections, a public transport spine within the site and the upgrade of Macarthur Interchange to better facilitate transfers between bus and rail.
- Public transport information, such as comprehensive timetable information on all stops and key retail locations, together with a community intranet.
- Road network improvements within Macarthur to widen selected links and to provide intersection improvements at key locations.

As a comprehensive package of measures, this will meet the needs of both new residents within Menangle Park and those of the local community, while achieving a mode shift towards public transport over the next 10 to 15 years.

11.0 APPENDIX A: ANALYSIS OF RAIL PATRONAGE

11.1 APPENDIX A: ANALYSIS OF RAIL PATRONAGE FOLLOWING ELECTRIFICATION OF RAIL TO MENANGLE PARK

Analysis undertaken by Parsons Brinckerhoff during the first stage of this TMAP concluded that an extension to the electrified rail system will not be a warranted or financially viable measure that can be implemented to support the Menangle Park development. It is forecast almost 750 passengers would use the service in the peak hour and other developments in the area would also increase the population within the catchment of the station, the investigations to support this TMAP have revisited the electrification option and the analyses is summarised below.

It was assumed that 17 per cent of working residents from new developments at Menangle Park, Elderslie, Spring Farm and Mount Gilead would use Menangle Park station if a frequent service was available (2,500 passengers). It was assumed that approximately 900 existing rail passengers would transfer from other stations in the south west region to use a nearer station if the frequency of services was improved from one an hour, based on an analysis of car park usage[8].

In total, it is estimated that in the order of 3,400 passengers could use the station at Menangle Park during the morning peak (3.5 hours) if the number of services was increased.

A sensitivity test where the proportion of residents choosing the train to travel to work was reduced to 10 per cent indicated that approximately 2,300 passengers would use the service.

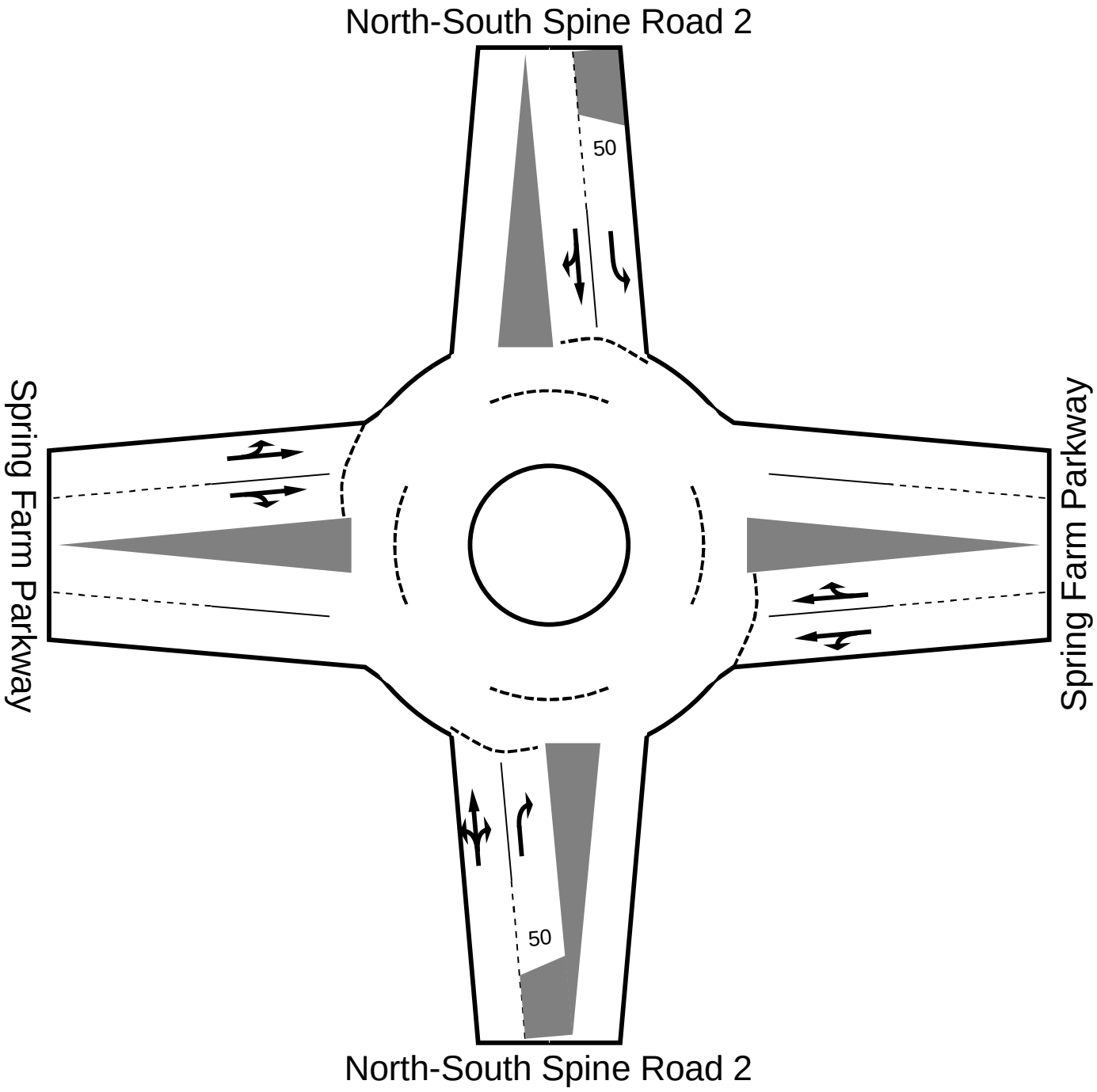
In comparison, Campbelltown station currently services 3,600 passengers in the morning 3.5 hour period, which indicates that on the basis of patronage, an improved station and service at Menangle Park would be a viable proposal.

However, discussions with Railcorp and the Australian Rail Track Corporation (ARTC) in February 2007 indicated that costs and contractual issues would preclude the project from going ahead.

[8] G. Creber and Associates, 2004, Rail Parking Study Glenfield to Macarthur

12.0 APPENDIX B: SIDRA MODEL OUTPUT

1. Spring Farm Parkway /North-South Spine Road



1. Spring Farm Parkway /North-South Spine Road Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

North South Spine Road 2 / Spring Farm Parkway

AM peak hour

Roundabout

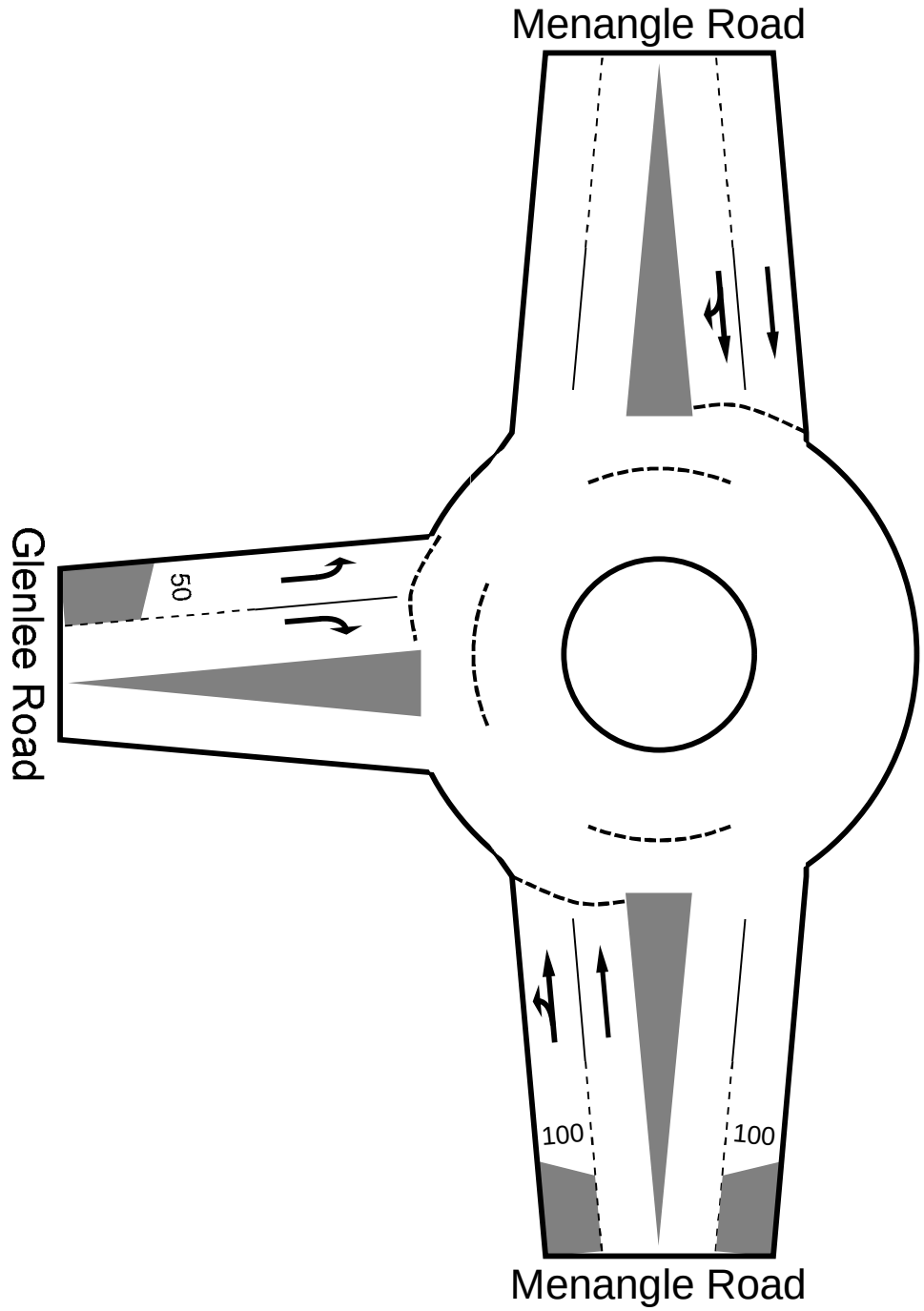
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
North-South Spine Road 2										
1	L	102	0.0	0.269	6.7	LOS A	12	0.45	0.59	49.0
2	T	12	0.0	0.267	5.5	LOS A	12	0.45	0.50	50.0
3	R	515	0.0	0.269	12.5	LOS A	12	0.45	0.71	44.8
Approach		**629**	**0.0**	**0.269**	**11.4**	**LOS A**	**12**	**0.45**	**0.69**	**45.5**
Spring Farm Parkway										
4	L	316	0.0	0.243	6.1	LOS A	11	0.30	0.51	50.0
5	T	321	5.0	0.243	5.1	LOS A	11	0.31	0.45	51.1
6	R	15	0.0	0.242	11.8	LOS A	11	0.31	0.66	45.4
Approach		**652**	**2.5**	**0.243**	**5.7**	**LOS A**	**11**	**0.31**	**0.48**	**50.4**
North-South Spine Road 2										
7	L	84	0.0	0.109	9.0	LOS A	5	0.72	0.79	47.3
8	T	70	0.0	0.144	9.1	LOS A	6	0.72	0.83	48.1
9	R	11	0.0	0.143	15.9	LOS B	6	0.72	0.92	42.8
Approach		**165**	**0.0**	**0.144**	**9.5**	**LOS A**	**6**	**0.72**	**0.81**	**47.3**
Spring Farm Parkway										
10	L	2	0.0	0.500	7.7	LOS A	27	0.62	0.69	47.9
11	T	964	5.0	0.493	6.8	LOS A	27	0.62	0.63	48.8
12	R	70	0.0	0.493	13.9	LOS A	26	0.63	0.87	44.0
Approach		**1036**	**4.6**	**0.493**	**7.3**	**LOS A**	**27**	**0.62**	**0.65**	**48.4**
All Vehicles		**2482**	**2.6**	**0.500**	**8.1**	**LOS A**	**27**	**0.50**	**0.63**	**48.0**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

2. Glenlee Road / Menangle Road



2. Glenlee Road / Menangle Road Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

Glenlee Road / Menangle Road

AM peak hour

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Menangle Road										
1	L	1	0.0	0.500	5.8	LOS A	23	0.28	0.43	50.1
2	T	1445	5.0	0.468	4.6	LOS A	26	0.20	0.37	52.0
Approach		**1446**	**5.0**	**0.468**	**4.6**	**LOS A**	**26**	**0.20**	**0.37**	**52.0**
Menangle Road										
8	T	1215	5.0	0.434	4.5	LOS A	29	0.04	0.38	53.3
9	R	20	0.0	0.435	11.2	LOS A	29	0.04	0.67	46.6
Approach		**1235**	**4.9**	**0.434**	**4.6**	**LOS A**	**29**	**0.04**	**0.39**	**53.2**
Glenlee Road										
10	L	114	0.0	0.126	8.5	LOS A	5	0.64	0.75	47.8
12	R	3	0.0	0.005	15.3	LOS B	0	0.63	0.74	43.3
Approach		**117**	**0.0**	**0.126**	**8.7**	**LOS A**	**5**	**0.64**	**0.75**	**47.7**
All Vehicles		**2798**	**4.8**	**0.500**	**4.8**	**LOS A**	**29**	**0.15**	**0.39**	**52.3**

Symbols which may appear in this table:

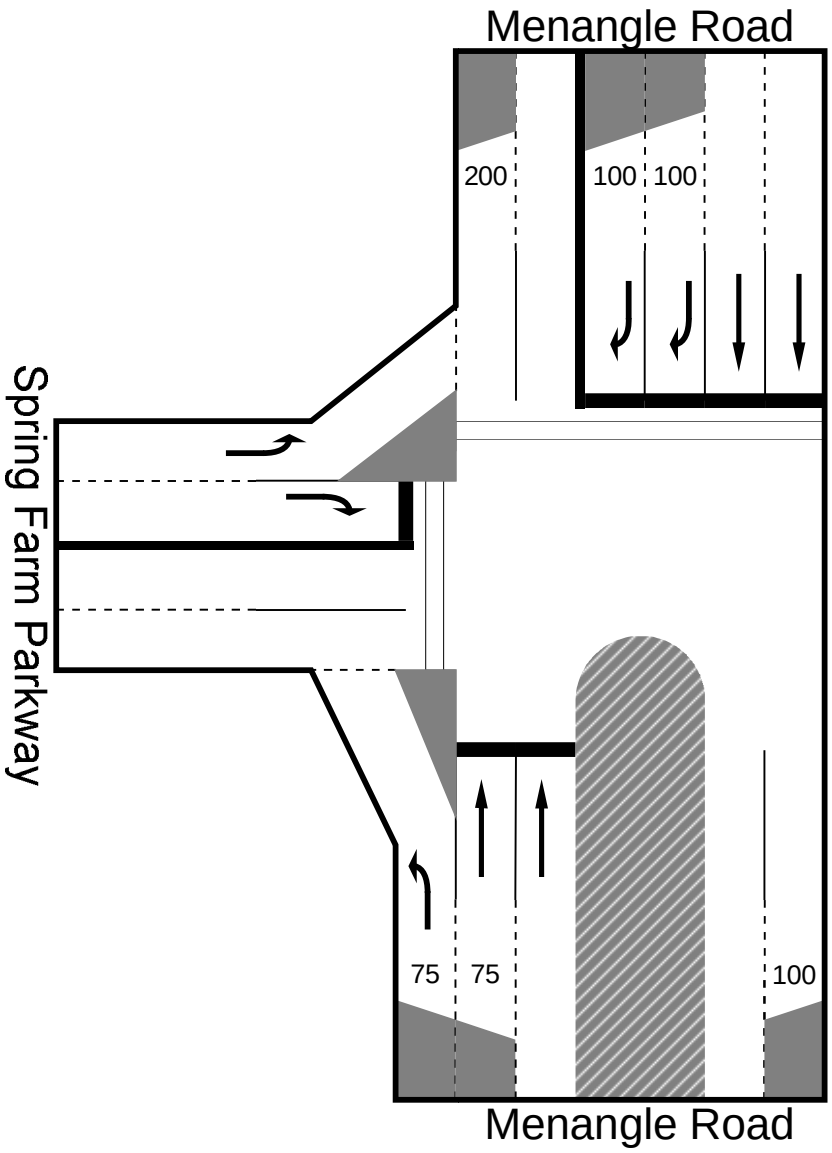
Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

3. Menangle Road / Spring Farm Parkway



3. Menangle Road / Spring Farm Parkway Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

Menangle Road / Spring Farm Parkway

AM peak hour

Signalised - Fixed time **Cycle Time = 80 seconds**

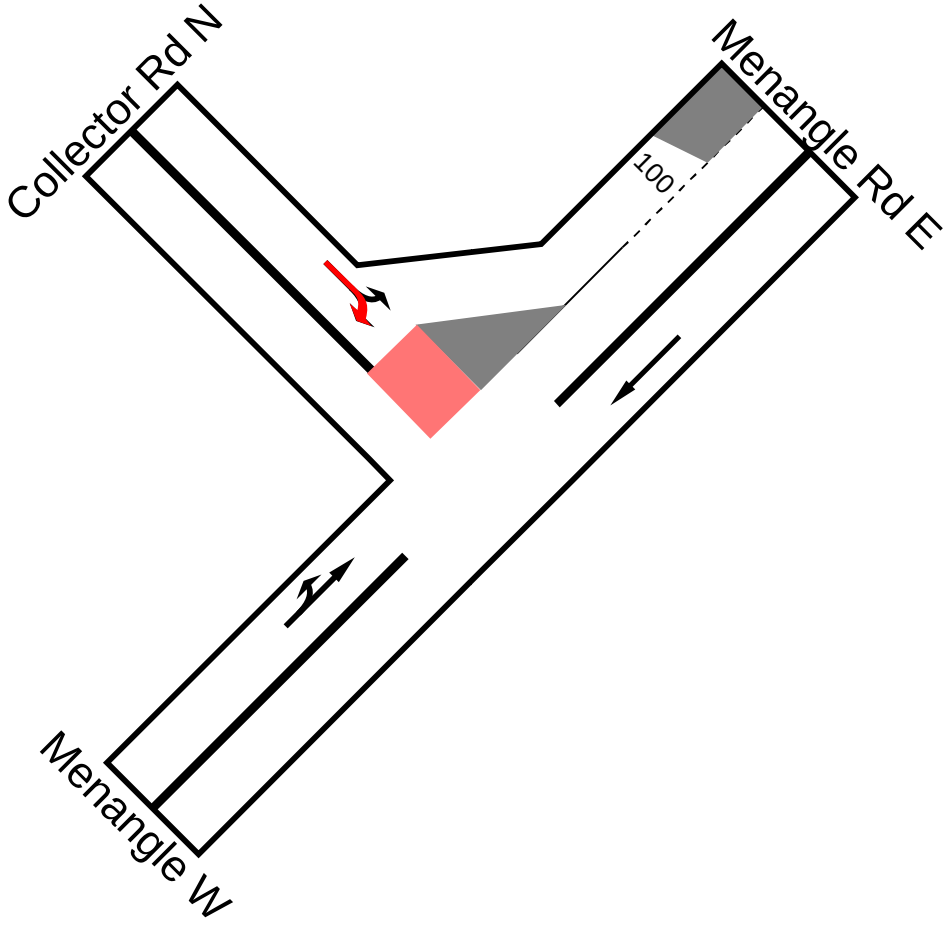
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Menangle Road										
1	L	656	0.0	0.754	16.6	LOS B	85	0.58	0.83	41.4
2	T	864	0.0	0.950	47.5	LOS D	171	1.00	1.09	26.0
Approach		**1520**	**0.0**	**0.950**	**34.2**	**LOS C**	**171**	**0.82**	**0.98**	**31.0**
Menangle Road										
8	T	287	0.0	0.161	8.8	LOS A	33	0.50	0.41	48.3
9	R	928	0.0	0.919	56.3	LOS D	166	1.00	1.17	23.5
Approach		**1215**	**0.0**	**0.919**	**45.1**	**LOS D**	**166**	**0.88**	**0.99**	**26.8**
Spring Farm Parkway										
10	L	581	0.0	0.442	13.1	LOS A	66	0.48	0.77	44.3
12	R	493	0.0	0.891	50.0	LOS D	164	1.00	1.11	25.3
Approach		**1074**	**0.0**	**0.891**	**30.0**	**LOS C**	**164**	**0.72**	**0.92**	**33.0**
All Vehicles		**3809**	**0.0**	**0.950**	**36.5**	**LOS C**	**171**	**0.81**	**0.97**	**30.0**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P5	53	34.2	LOS D	0	0.93	0.93
P7	53	29.8	LOS C	0	0.86	0.86
All Peds	**106**	**32.0**	**LOS C**	**0**	**0.89**	**0.89**

4(a). Menangle Road / Collector Road (N)



4(a). Menangle Road / Collector Road (N) Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

North-South Spine Road 2 / Menangle Road (4a)

AM peak hour

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Menangle Rd E										
25	T	780	0.0	0.400	0.0	LOS A	0	0.00	0.00	60.0
Approach		**780**	**0.0**	**0.400**	**0.0**	**LOS A**		**0.00**	**0.00**	**60.0**
Collector Rd N										
27	L	85	0.0	0.046	7.6	LOS A#	1#	0.00	0.60	49.8
Approach		**85**	**0.0**	**0.046**	**7.6**	**LOS A**		**0.00**	**0.60**	**49.8**
Menangle W										
30	L	1	0.0	1.000	8.2	LOS A	0	0.00	0.67	49.0
31	T	1578	0.0	0.810	0.0	LOS A	0	0.00	0.00	60.0
Approach		**1579**	**0.0**	**0.810**	**0.0**	**LOS A**		**0.00**	**0.00**	**60.0**
All Vehicles		**2444**	**0.0**	**1.000**	**0.3**	**Not Applicable**	**0**	**0.00**	**0.02**	**59.6**

Symbols which may appear in this table:

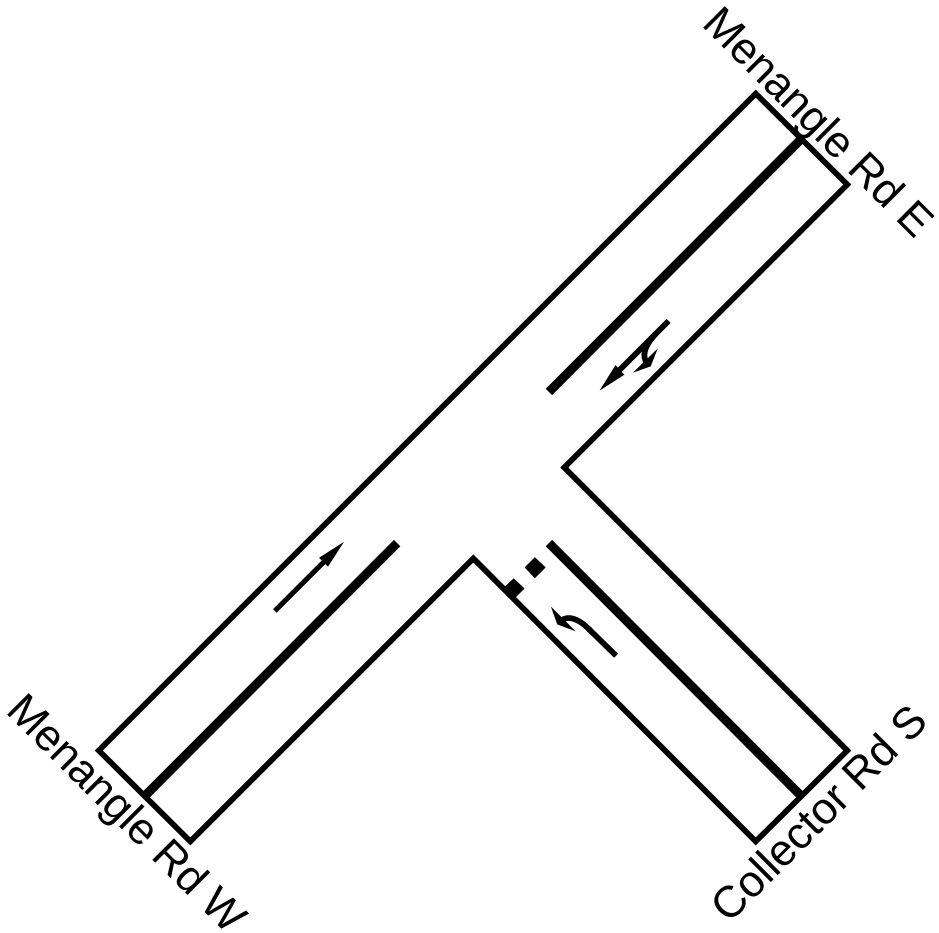
Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

4(b). Menangle Road / Collector Road (S)



4(b). Menangle Road / Collector Road (S) Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

North-South Spine Road 2 / Menangle Road (4b)

AM peak hour

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Collector Rd S										
21	L	16	0.0	0.040	15.2	LOS B	1	0.68	0.89	42.2
Approach		**16**	**0.0**	**0.040**	**15.2**	**LOS B**	**1**	**0.68**	**0.89**	**42.2**
Menangle Rd E										
24	L	12	0.0	0.400	8.2	LOS A	0	0.00	0.67	49.0
25	T	768	0.0	0.400	0.0	LOS A	0	0.00	0.00	60.0
Approach		**780**	**0.0**	**0.400**	**0.1**	**LOS A**		**0.00**	**0.01**	**59.8**
Menangle Rd W										
31	T	1578	0.0	0.809	0.0	LOS A	0	0.00	0.00	60.0
Approach		**1578**	**0.0**	**0.809**	**0.0**	**LOS A**		**0.00**	**0.00**	**60.0**
All Vehicles		**2374**	**0.0**	**0.809**	**0.1**	**Not Applicable**	**1**	**0.00**	**0.01**	**59.8**

Symbols which may appear in this table:

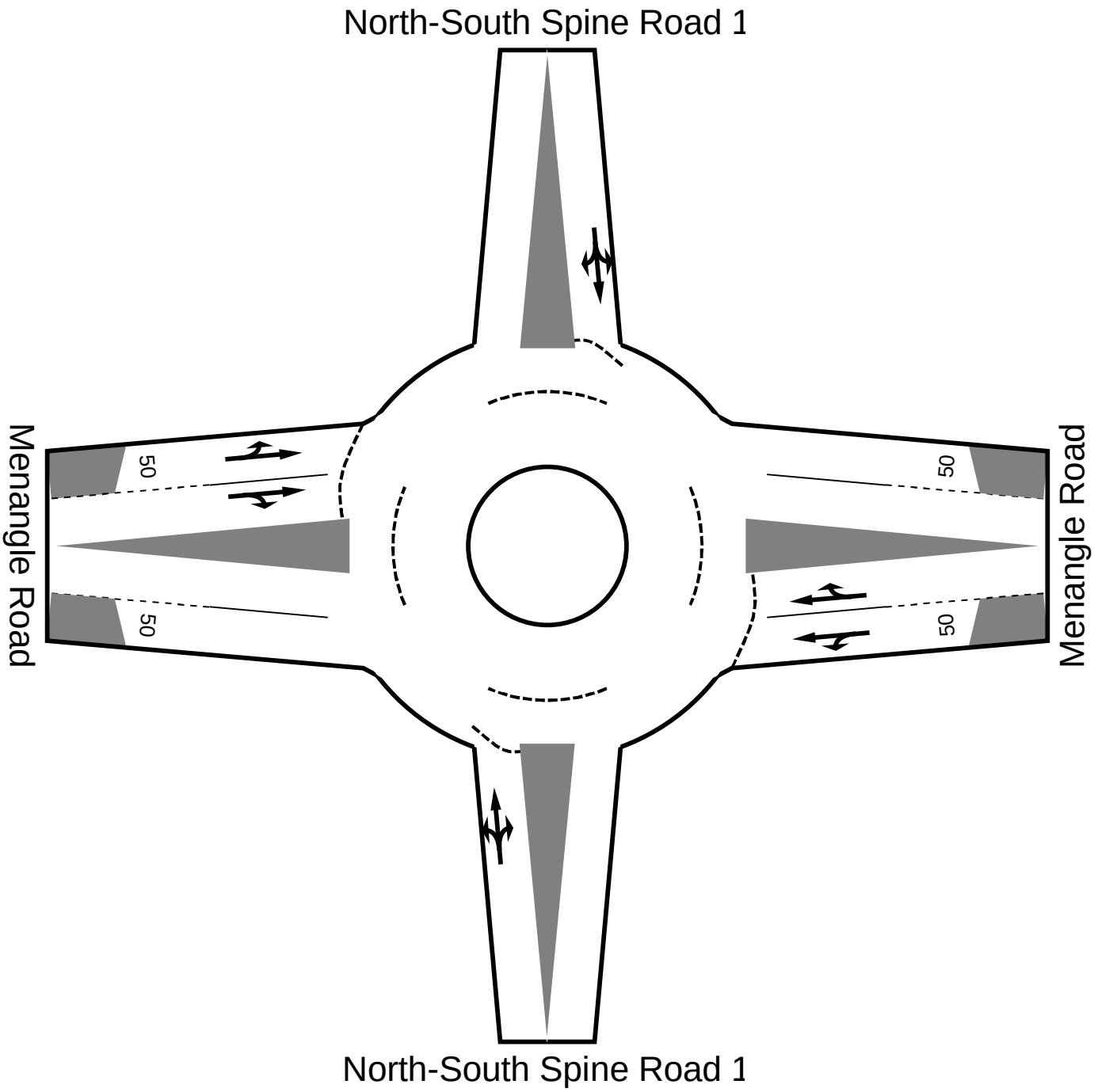
Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

5. Menangle Road / Cummins Road



5. Menangle Road / Cummins Road Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

North-South Spine Road 1 / Menangle Road

AM peak hour

Roundabout

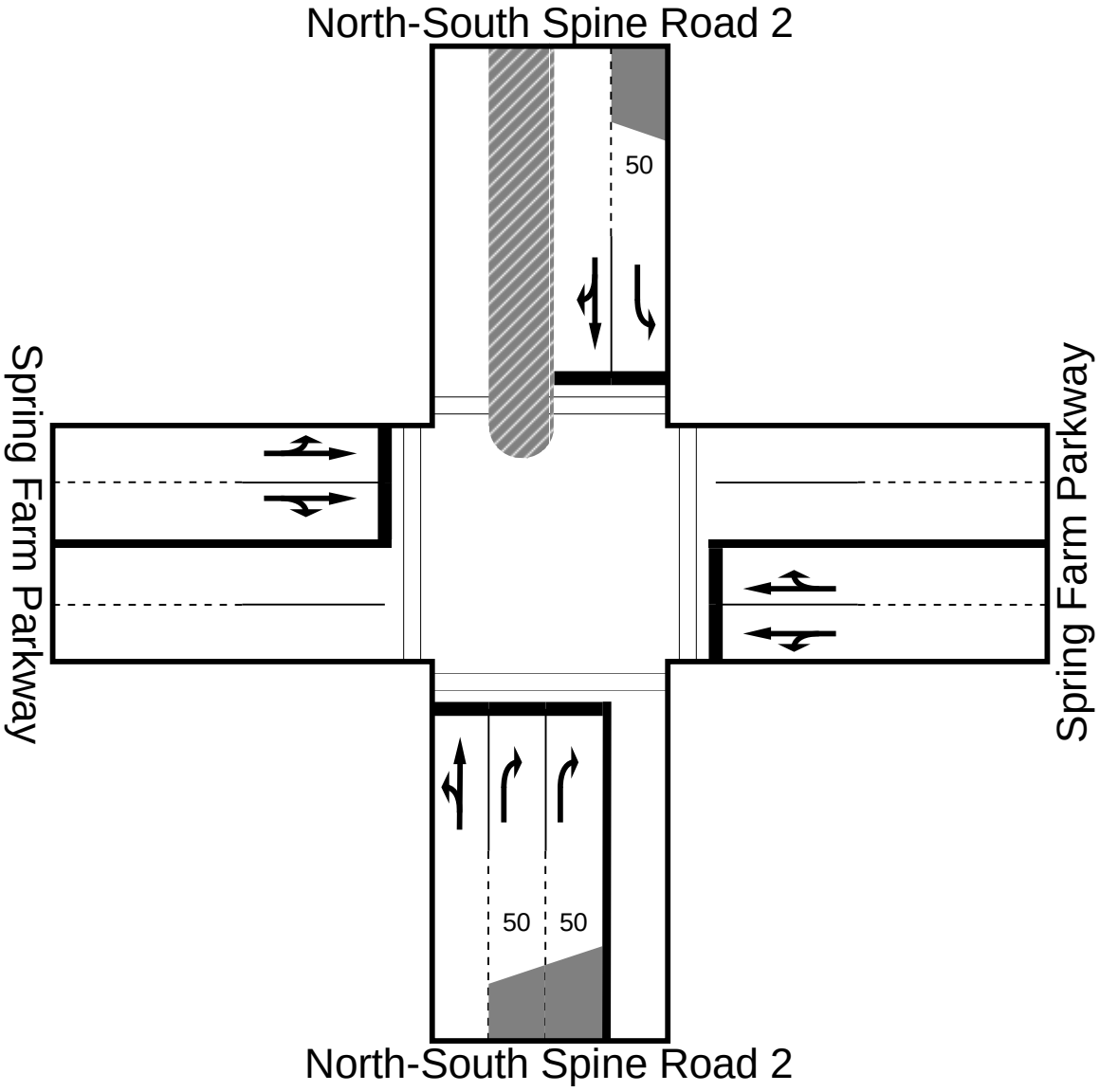
Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
North-South Spine Road 1										
1	L	1	0.0	0.250	8.6	LOS A	11	0.62	0.76	48.1
2	T	54	0.0	0.267	7.6	LOS A	11	0.62	0.69	48.8
3	R	165	0.0	0.267	14.5	LOS A	11	0.62	0.81	43.9
Approach		**220**	**0.0**	**0.267**	**12.7**	**LOS A**	**11**	**0.62**	**0.78**	**45.0**
Menangle Road										
4	L	17	5.9	0.179	6.0	LOS A	7	0.18	0.47	50.8
5	T	540	5.0	0.387	4.6	LOS A	26	0.20	0.39	52.0
6	R	224	4.9	0.387	11.5	LOS A	26	0.20	0.62	45.9
Approach		**781**	**5.0**	**0.387**	**6.6**	**LOS A**	**26**	**0.20**	**0.46**	**50.0**
North-South Spine Road 1										
7	L	258	0.0	0.637	18.5	LOS B	43	0.95	1.11	39.8
8	T	12	0.0	0.632	17.6	LOS B	43	0.95	1.11	40.6
9	R	29	0.0	0.630	24.4	LOS B	43	0.95	1.11	37.1
Approach		**299**	**0.0**	**0.636**	**19.1**	**LOS B**	**43**	**0.95**	**1.11**	**39.5**
Menangle Road										
10	L	44	4.5	0.364	8.8	LOS A	18	0.60	0.73	48.0
11	T	1155	5.0	0.786	10.1	LOS A	92	0.80	0.88	47.0
12	R	1	50.0	0.667	17.5	LOS B	92	0.86	1.06	41.6
Approach		**1201**	**5.1**	**0.786**	**10.1**	**LOS A**	**92**	**0.80**	**0.87**	**47.0**
All Vehicles		**2501**	**4.0**	**0.786**	**10.3**	**LOS A**	**92**	**0.61**	**0.76**	**46.6**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

1 (signalised) Spring Farm Parkway /North-South Spine Road



1 (signalised) Spring Farm Parkway /North-South Spine Road Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

North South Spine Road 2 / Spring Farm Parkway

AM peak hour

Signalised - Fixed time **Cycle Time = 80 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
North-South Spine Road 2										
1	L	102	0.0	0.136	22.0	LOS B	26	0.62	0.75	37.4
2	T	12	0.0	0.136	13.8	LOS A	26	0.62	0.50	43.5
3	R	515	0.0	0.685	36.4	LOS C	76	0.98	0.86	29.9
Approach		**629**	**0.0**	**0.685**	**33.6**	**LOS C**	**76**	**0.91**	**0.83**	**31.1**
Spring Farm Parkway										
4	L	316	0.0	0.660	25.6	LOS B	62	0.94	0.86	35.2
5	T	321	5.0	0.660	28.4	LOS B	93	0.95	0.81	33.7
6	R	15	0.0	0.658	37.3	LOS C	93	0.95	0.85	29.6
Approach		**652**	**2.5**	**0.660**	**27.3**	**LOS B**	**93**	**0.94**	**0.84**	**34.3**
North-South Spine Road 2										
7	L	84	0.0	0.291	41.9	LOS C	30	0.93	0.77	27.8
8	T	70	0.0	0.203	28.5	LOS B	26	0.86	0.67	33.7
9	R	11	0.0	0.202	36.6	LOS C	26	0.86	0.76	29.9
Approach		**165**	**0.0**	**0.291**	**35.8**	**LOS C**	**30**	**0.90**	**0.73**	**30.2**
Spring Farm Parkway										
10	L	2	0.0	0.684	24.5	LOS B	134	0.80	0.85	35.8
11	T	964	5.0	0.632	16.1	LOS B	134	0.82	0.71	41.4
12	R	70	0.0	0.632	23.7	LOS B	94	0.87	0.83	36.4
Approach		**1036**	**4.6**	**0.632**	**16.7**	**LOS B**	**134**	**0.83**	**0.72**	**41.0**
All Vehicles		**2482**	**2.6**	**0.685**	**25.0**	**LOS B**	**134**	**0.88**	**0.78**	**35.5**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	30.6	LOS D	0	0.88	0.88
P3	53	34.2	LOS D	0	0.93	0.93
P5	53	27.2	LOS C	0	0.82	0.82
P7	53	34.2	LOS D	0	0.93	0.93
All Peds	**212**	**31.6**	**LOS C**	**0**	**0.89**	**0.89**

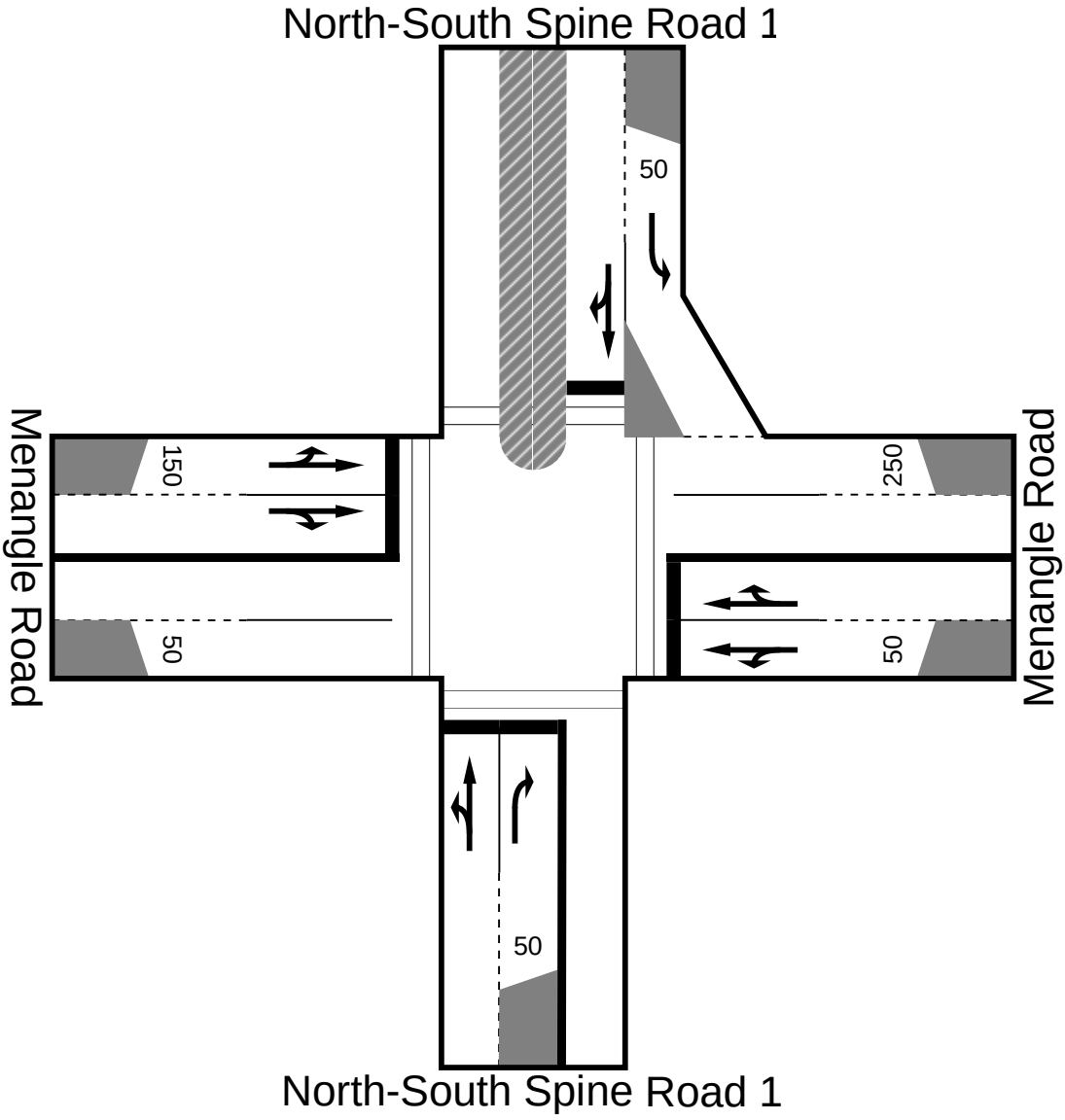
Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

5 (signalised) Menangle Road / Cummins Road



5 (signalised) Menangle Road / Cummins Road Intersection Performance Summary

SIDRA INTERSECTION

Movement Summary

North-South Spine Road 1 / Menangle Road

AM peak hour

Signalised - Fixed time **Cycle Time = 100 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
North-South Spine Road 1										
1	L	1	0.0	0.163	46.8	LOS D	23	0.89	0.75	26.2
2	T	54	0.0	0.162	38.6	LOS C	23	0.89	0.68	29.1
3	R	165	0.0	0.736	55.8	LOS D	70	1.00	0.90	23.6
Approach		**220**	**0.0**	**0.736**	**51.5**	**LOS D**	**70**	**0.97**	**0.84**	**24.8**
Menangle Road										
4	L	17	5.9	0.272	13.2	LOS A	24	0.33	0.72	44.2
5	T	540	5.0	0.843	27.9	LOS B	194	0.81	0.90	34.0
6	R	224	4.9	0.843	44.1	LOS D	194	0.98	1.13	27.2
Approach		**781**	**5.0**	**0.844**	**32.2**	**LOS C**	**194**	**0.85**	**0.96**	**31.8**
North-South Spine Road 1										
7	L	258	0.0	0.231	8.6	LOS A	17	0.21	0.65	48.5
8	T	12	0.0	0.163	40.0	LOS C	18	0.90	0.67	28.6
9	R	29	0.0	0.163	48.2	LOS D	18	0.90	0.74	25.8
Approach		**299**	**0.0**	**0.231**	**13.7**	**LOS A**	**18**	**0.30**	**0.66**	**43.6**
Menangle Road										
10	L	44	4.5	0.819	41.4	LOS C	197	0.94	0.95	28.1
11	T	1155	5.0	0.819	33.1	LOS C	213	0.95	0.92	31.4
12	R	1	50.0	0.833	41.2	LOS C	213	0.96	0.95	28.1
Approach		**1201**	**5.1**	**0.819**	**33.4**	**LOS C**	**213**	**0.95**	**0.92**	**31.3**
All Vehicles		**2501**	**4.0**	**0.843**	**32.3**	**LOS C**	**213**	**0.84**	**0.89**	**31.8**

Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	23.1	LOS C	0	0.68	0.68
P3	53	44.2	LOS E	0	0.94	0.94
P5	53	21.1	LOS C	0	0.65	0.65
P7	53	44.2	LOS E	0	0.94	0.94
All Peds	**212**	**33.2**	**LOS C**	**0**	**0.80**	**0.80**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

13.0 APPENDIX C: NETANAL MODEL OUTPUT

13.1 APPENDIX C: NETANAL MODEL OUTPUT

Table C1 provides a summary of 2026 Strategic Traffic Model outputs for the PM peak hour including Spring Farm Parkway with ramps to F5.

Table C1 – 2026 Evening Peak Hour Traffic Flow

Link Flow Location	Base Case Without North Facing Ramps**		Base Case With North Facing Ramps**	
	Veh***	V/C+	Veh***	V/C+
SB on F5 N of Narellan Rd	4,400	5,079	1.2	5,321
NB on F5 N of Narellan Rd	4,400	4,076	0.9	4,230
SB at Blaxland Rd N of Narellan Rd	2,800	754	0.3	1,078
NB at Blaxland Rd N of Narellan Rd	2,800	543	0.2	616
NB on Menangle Rd S of Menangle Park	1,400	650	0.5	650
SB on Menangle Rd S of Menangle Park	1,400	1,289	0.9	1,289
EB on Narellan Rd S of F5	3,200	2,698	0.8	1,799
WB on Narellan Rd S of F5	3,200	3,432	1.1	2,937
WB on Kellicar Rd W of Gilchrist Drive	2,400	3,348	1.4	2,304
EB on Kellicar Rd W of Gilchrist Drive	2,400	2,093	0.9	1,437
SB on Menangle Rd S of Gilchrist Drive	1,400	2,387	1.7	1,519
NB on Menangle Rd S of Gilchrist Drive	1,400	986	0.7	506
SB on Menangle Rd S of Glenlee Rd	1,400	2,062	1.5	1,497
NB on Menangle Rd S of Glenlee Rd	1,400	816	0.6	639

*Theoretical future road capacities are based on those stated in the Stage 2 TMAP report.
** Assumes construction of the Spring Farm Parkway
***PM Traffic Flow (Source: SMEC 2009)
+V/C = Volume to Capacity ratio, where 1.00 is at full capacity.

14.0 APPENDIX D: APPORTIONMENT METHODOLOGY

On site works

Footpaths, cycleways and local road network within the development, will be funded by the proponent as well as through Section 94 Contributions.

Widening of Menangle Road (Glenlee Road to Gilchrist Drive)

The strategic traffic model and traffic generation analyses indicate that during the morning peak hour, 51 per cent of the traffic likely to utilise the road are generated by the Menangle Park development.

The remainder of the widening costs would be met by the RTA as the agency responsible for arterial road upgrades.

Spring Farm Parkway/ F5 Ramps

The strategic traffic model and traffic generation analyses indicate that during the morning peak hour, the following proportion of traffic along the Spring Farm Parkway would be attributable to the Menangle Park Development:

Section	Proportion
West of north/south collector road	27%
Between the N/S collector road and F5 ramps	52%
SFP / F5 ramps	22%
Between F5 ramps and Menangle Road	41%
SFP / Menangle Road intersection	40%

The remainder of the costs would be met by the RTA as the agency responsible for arterial road upgrades and other developers which would benefit from the connection. For the purpose of analysis costs other than for Menangle have been apportioned to the RTA.

Intersection of Spring Farm Parkway and Menangle Road

The strategic traffic model and traffic generation analyses indicate that during the morning peak hour, 40 per cent of traffic utilising the intersection of Spring Farm Parkway and Menangle Road would be generated by the Menangle Park development.

The remainder of the costs would be met by the RTA as the agency responsible for arterial road upgrades and other developers which would benefit from the connection. For the purpose of analysis costs other than for Menangle have been apportioned to the RTA.

Cycle Parking at Menangle Station

As the provider of all rail infrastructure, it is assumed that RailCorp would meet 100% of the cost of these works and will benefit from increased patronage as a result.

Connection to Regional Cycleways

The cost of a connection will need to be met by the proponent as it provides for access between the site and Macarthur/ Camden.

Macarthur Rail Interchange

The design of the rail interchange has commenced, funding has been allocated from other sources and construction will commence prior to development of the site. It has therefore been assumed that the proponent will not contribute towards these costs.

Rail – Increased Service Frequencies

The Clearways Program, including provision of an additional platform at Macarthur and increased service frequencies, has commenced and funding has been allocated from other sources. It has therefore been assumed that the proponent will not contribute towards these costs.

Bus stops

The cost of providing bus stops within the site has been apportioned in full to the proponent.

Bus - Increased Service Frequencies

The latest changes (December 2008) to State Infrastructure Contributions have excluded the funding of bus services from all State levies. The costs associated with the provision of increased peak period bus services to the site will be fully funded by State Government.

Parking Policy

This would be funded by the proponent.

Pedestrian and Cycle Policy

This would be funded by Campbelltown City Council.

Community Intranet

This would be funded by the proponent.

Real Time Transport Information

Real time rail information will be provided as part of the Macarthur interchange upgrade, however, a nominal allowance for the provision of real time bus information by the proponent and bus operators has been made.