



Austral and Leppington North (ALN)
Precincts Transport Assessment
Department of Planning and
Infrastructure
04 July 2012

Post-Exhibition Traffic Report (Addendum)

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Prepared for
Department of Planning and Infrastructure

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Reviewed by Roger Jeffries

Revision History

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			Name/Position	Signature
A	13-Apr-2012	Draft Report	Andy Yung Principal Transport Planner	
B	28-May- 2012	Final Report	Andy Yung Principal Transport Planner	
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Purpose of report

This addendum traffic report has been prepared for the Department of Planning and Infrastructure (DP&I) following the public exhibition of the Austral and Leppington North (ALN) Precincts Transport Assessment, dated 11 August 2011.

This report will highlight all the proposed changes (including additions and deletions) to the original Transport Assessment required to address comments raised in all the submissions and to incorporate the final Indicative Layout Plan (ILP).

The responses for each of the traffic / transport comments raised are also provided in **Appendix A**.

Executive Summary

Intersections

(In response to Submission ID 599293 – Transport for NSW, changes to 3rd paragraph)

Those intersections which are proposed for signalisation or as roundabouts are shown in **Figure 14** and listed in **Table 14**. All remaining intersections will be priority controlled intersections. It should be noted that the traffic and transport assessment demonstrates the need for traffic signals at the indicative locations proposed in the Precinct Plan. More detailed assessment and application to RMS will occur at the time of detailed planning for the relevant road upgrades and intersection works.

Public Transport Framework

(In response to Submission ID 599293 – Transport for NSW, changes to 2nd and 3rd paragraphs)

A bus route network is proposed, which broadly follows that within the South West Growth Sector Bus Servicing Strategy, with additional local bus services that can operate along the collector road network to provide additional service coverage within the precincts. The proposed network, service coverage and route frequency will be a significant change over the existing situation, with little or no service coverage or incentive to travel by public transport, which meets existing demands but will not be sufficient to serve the future population and employment opportunities with Austral and Leppington North.

Key bus operating corridors with services providing fast, efficient regional connections will operate along the east-west routes of Bringelly Road, in the south of the precincts, and Fifteenth Avenue, in the north of the precincts. One regional route (R2) and one district route (D3) will provide effective network coverage between Bringelly Road and Fifteenth Avenue, with links between other notable regional destinations, Leppington Major Centre and onward destinations by bus or rail.

Pedestrian and Bicycle Networks

(In response to Submission ID 599293 – Transport for NSW, changes to 4th and 5th paragraphs)

The principal arterial roads, Bringelly Road and Camden Valley Way, will have shared path bicycle facilities in addition to a 2m wide shoulder on both carriageways that could potentially be used by on-road cyclists. All sub-arterial roads and collector roads connecting key origins and destinations within the precinct and onto other external destinations will have dedicated shared path bicycle facilities. The proposed cycling connections are designed to create a continuous network of facilities removing obstacles and barriers to cycling, both physical and perceived. Physical crossing points of the creek lines and the South West Rail Link have been included in the bicycle network plan to ensure route connectivity and network permeability.

On-road cycle lanes are proposed along transit boulevards providing a network of high order bicycle facilities for fast, efficient connections for both local travel within the precincts and regional travel between Leppington and Austral centres and to regional destinations such as Liverpool and Campbelltown.

3.0 Road Network

3.2.1 Road classification

(In response to Submission ID 599293 – Transport for NSW, changes to Table 1)

The Roads and Maritime Services (RMS) and Department of Planning and Infrastructure (DP&I) have developed guidelines for classification of roads. **Table 1** summarises the RMS functional classification system.

Table 1: Functional Classification of Roads (NSW Roads and Maritime Services)

Road Type	Traffic Volume (AADT)	Through Traffic	Inter-Connections	Speed Limit (km/h)
Arterial/Freeway	No limit	Yes	Sub-arterial	70-110
Sub-Arterial	<20,000	Some	Arterial/Collector	60-80
Collector	<5,000	Little	Sub-arterial/Local	40-60
Local	<2,000	No	Collector	50

Source: Updated Guidelines for Functional Classification of Roads in Urban Areas, RTA, 1993

The speed limits on any public roads in NSW should be consistent with NSW speed zoning guidelines and be referred to RMS for approval.

3.2.3 Intersection performance

(In response to Submission ID 599293 – Transport for NSW, changes to Table 4)

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 an index. A summary of the Level of Service index is shown in **Table 4**.

Table 4: Level of Service Criteria for Intersections

Level of Service	Average Delay / Vehicle (sec/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 Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA 2002

Level of Service D is generally accepted by the RMS as a design constraint. The other important intersection measurement 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.

Queue length at the intersection is also an important measure of intersection performance and should be considered for any intersection assessments.

3.3.1 Existing road network – opportunities and constraints

(In response to Submission ID 599293 – Transport for NSW, changes to 9th paragraph of Section 3.3.1)

In addition, in the future to provide access across the proposed SWRL alignment, new road bridges are proposed at Eastwood, Dickson, Rickard, Byron and Cowpasture Roads. These bridges would provide north-south access but potentially the embankments for these bridges could restrict east-west connectivity. TCA is currently delivering a partial underpass crossing at Byron Road as part of the South West Rail Link. However, it should be noted that TCA is not responsible for any future connecting roads or other infrastructure associated with the underpass structure. Further pedestrian and cycle bridges may be needed in addition to these road bridges, especially near Leppington Major Centre.

3.7 Road network analysis and classification (road hierarchy)

(In response to Submission ID 599293 – Transport for NSW, changes to Table 8)

Table 8: Forecast 2036 peak hour flows for proposed road network

Location	Direction	AM Peak	PM Peak	AADT	Classification
Bringelly Road (W of Dickson Road)	Eastbound	3,430	1,230	46,100	Principal Arterial
	Westbound	940	3,380		
Bringelly Road (E of Dickson Road)	Eastbound	3,240	810	40,800	Principal Arterial
	Westbound	630	3,270		
Bringelly Road (E of Cowpasture Road)	Eastbound	3,890	1,440	55,000	Principal Arterial
	Westbound	1,270	4,060		
Fifteenth Avenue (E of Fourth Avenue)	Eastbound	1,230	810	22,100	Transit Boulevard
	Westbound	740	1,400		
Fifteenth Avenue (E of Craik Avenue)	Eastbound	2,040	570	27,300	Transit Boulevard
	Westbound	690	2,110		
Fourth Avenue (N of Bringelly Road)	Northbound	240	650	11,400	Sub-Arterial
	Southbound	560	490		
Fourth Avenue (N of Seventh Avenue)	Northbound	270	330	7,400	Collector Road
	Southbound	400	410		
Fourth Avenue (N of Tenth Avenue)	Northbound	410	250	8,400	Collector Road
	Southbound	260	590		
Fourth Avenue (S of Fifteenth Avenue)	Northbound	490	300	9,300	Collector Road
	Southbound	300	630		
Edmondson Avenue (N of Bringelly Road)	Northbound	880	830	16,500	Transit Boulevard
	Southbound	660	820		
Edmondson Avenue (N of Seventh Avenue)	Northbound	600	560	12,300	Transit Boulevard
	Southbound	430	670		
Edmondson Avenue (N of Tenth Avenue)	Northbound	1,020	480	15,000	Transit Boulevard
	Southbound	480	1,000		

Location	Direction	AM Peak	PM Peak	AADT	Classification
Edmondson Avenue (S of Fifteenth Avenue)	Northbound	1,030	480	15,500	Transit Boulevard
	Southbound	490	1,070		
Eastwood Road (N of Ingleburn Road)	Northbound	740	420	11,500	Sub-Arterial
	Southbound	390	730		
Dickson Road (N of Ingleburn Road)	Northbound	860	250	11,500	Sub-Arterial
	Southbound	210	900		
Rickard Road (S of Byron Road)	Northbound	890	860	19,800	Sub-Arterial
	Southbound	480	1,120		
Byron Road (S of Byron Road extension)	Northbound	850	740	17,600	Sub-Arterial
	Southbound	540	1,020		
Cowpasture Road (S of Bringelly Road)	Northbound	970	900	16,200	Sub-Arterial
	Southbound	568	712		

Source: AECOM, 2012

3.7.1 Road access to Western Sydney Parklands

(In response to Submission ID 586045 – WSPT, addition of Section 3.7.1)

The draft Precinct Plan proposes to maintain all existing access roads from the Precincts into the Western Sydney Parklands. The proposed road network also allows for access to existing access points, including existing road bridges across the Upper Canal. Traffic can access Browns Road that provides access to the existing access to the Parklands, from both directions of Bringelly Road via a signalised intersection, as shown in the current RMS design for the Bringelly Road upgrade. Traffic from Fifteenth Avenue can either turn left to the collector road next to the Upper Canal, or turn right at Edmondson Avenue which will then be able to access the Parklands via existing access points.

A new signalised intersection will also be provided at Bringelly Road between Old Cowpasture Road and Camden Valley Way to provide direct access to the Western Sydney Parklands, as part of the Bringelly Road upgrade.

The following roads may be upgraded if necessary to provide appropriate vehicle access to the Parklands:

- 1) Northern extension of Edmondson Avenue (to the north of Fifteenth Avenue) – This road is currently shown as a collector road on the Precinct Plan with the potential extension to link into the Cecil Hills passive recreation hub.
- 2) Upgrade of Sixth Avenue to a collector road – The road reserve is at least 20m wide and is capable of being upgraded to a collector road without any additional land acquisition. The final ILP shows Sixth Avenue as a collector road, however, Council should only require adjoining developments to upgrade it to a local road standard. Any upgrade to collector road standard would be done by others in the future, subject to funding, including new crossing structures at Bonds Creek.

3.8 Road network analysis and classification (road hierarchy)

(In response to Submission ID 599293 – Transport for NSW, changes to 4th paragraph of Section 3.8)

The key intersection locations and the proposed form of control for those intersections throughout the precincts are shown below in **Figure 14**. It should be noted that the traffic and transport assessment demonstrates the need for traffic signals at the indicative locations proposed in the Precinct Plan. More detailed assessment and application to RMS will occur at the time of detailed planning for the relevant road upgrades and intersection works. An extracted summary of the NSW RTA Warrants for Traffic Signal Design is provided below in **Table 9**.

Table 9: RTA Warrants for Traffic Signal Design

Key Criteria	Sub-Criteria 1	Sub-Criteria 2	Sub-Criteria 3	Sub-Criteria 4
(A) Traffic Demand¹	Major road flow exceeds 600 veh/ hr (each direction)	Minor road flow exceeds 200 veh/ hr (one direction)		
(B) Continuous Traffic¹	Major road flow exceeds 900 veh/ hr (each direction)	Minor road flow exceeds 100 veh/ hr (one direction)	Traffic speed (major rd) or sight distance (minor rd) causes a hazard	No alternative nearby traffic signals for use by minor road traffic
(C) Pedestrian Safety¹	Pedestrian flow crossing major road >150 persons/ hr	Major road flow exceeds 600 veh/ hr (each direction)		

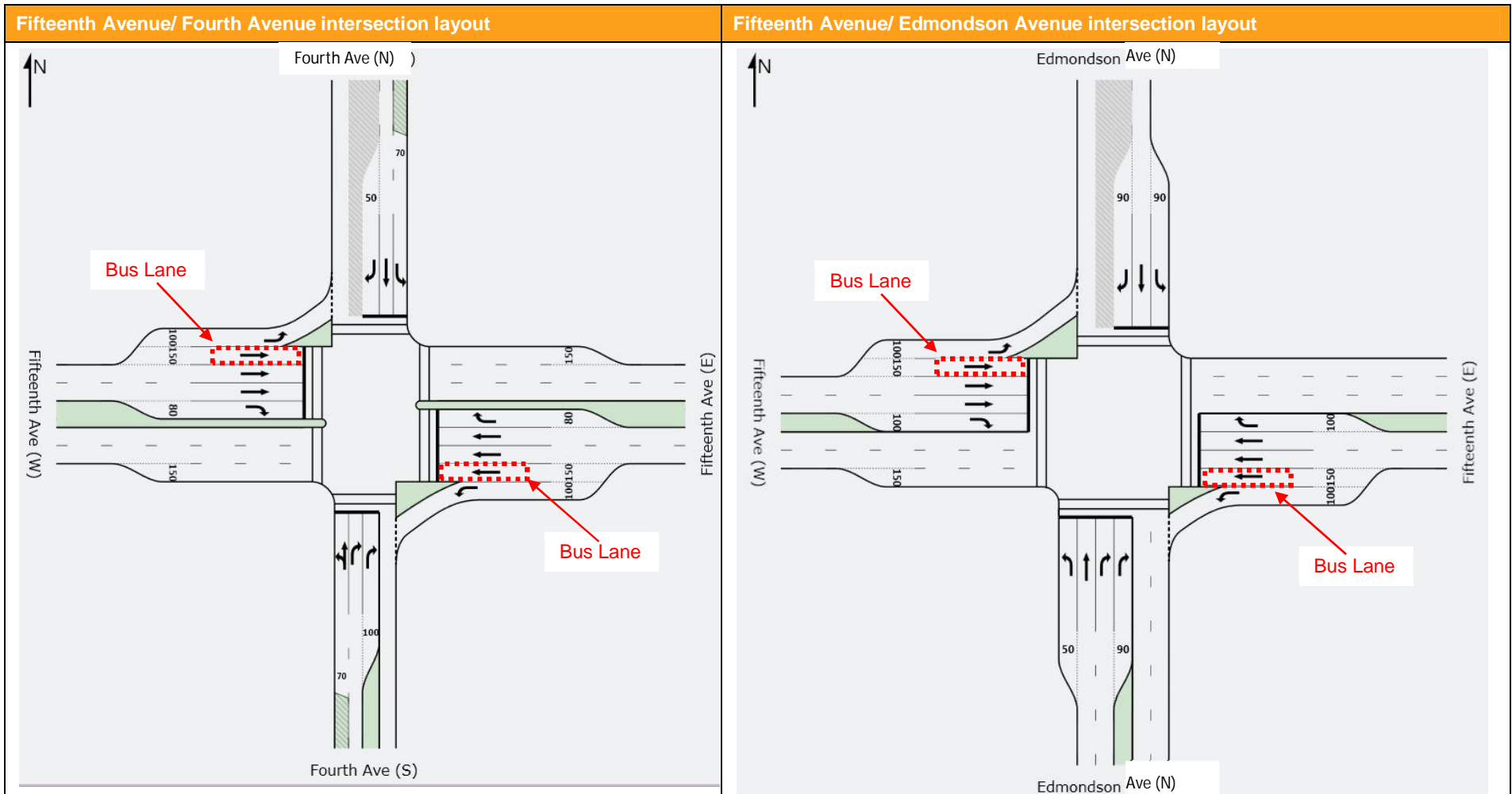
Note 1: Sub-Criteria apply to each of four one-hour periods of an average day.

The proposed road network hierarchy for the precincts is illustrated in **Figure 13**.

3.8.2 Fifteenth Avenue intersection performance analysis

(In response to Submission ID 599293 – Transport for NSW, changes to Table 13)

Table 13 Fifteenth Avenue proposed intersection layouts



3.11.2 Intersections

(In response to Submission ID 599293 – Transport for NSW, changes to 3rd paragraph of Section 3.11.2)

Those intersections which are proposed for signalisation or as roundabouts are shown in **Figure 14** and listed in **Table 14**. All remaining intersections will be priority controlled intersections. It should be noted that the traffic and transport assessment demonstrates the need for traffic signals at the indicative locations proposed in the Precinct Plan. More detailed assessment and application to RMS will occur at the time of detailed planning for the relevant road upgrades and intersection works.

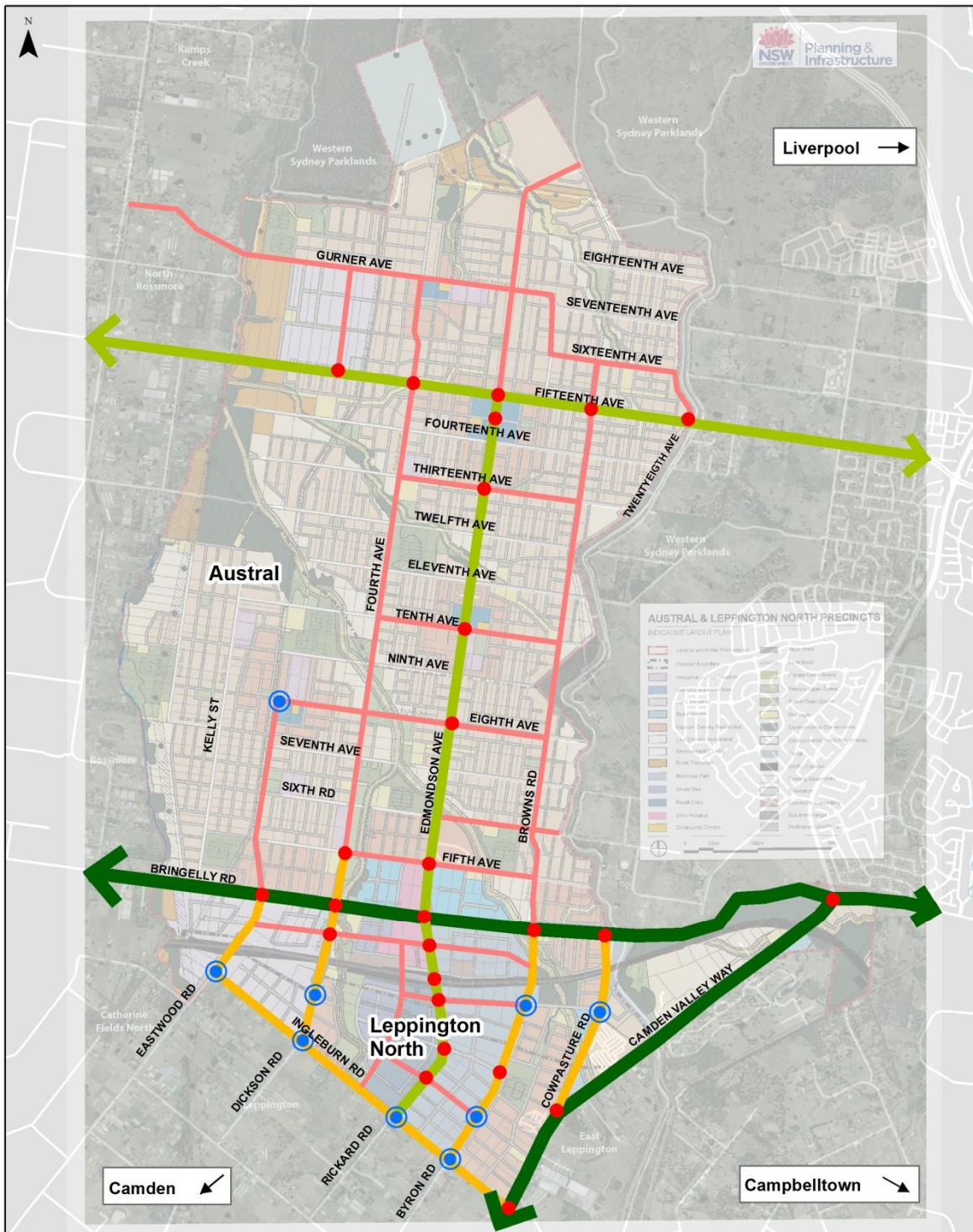
3.11.3 Heavy Goods Vehicles

A heavy goods vehicle (HGV) access strategy has been developed to prioritise HGV movements onto appropriate routes, to minimise conflict with residential land uses. This envisages HGVs utilising roads of appropriate form and function, being those classified as:

- Principal arterial - Bringelly Road and Camden Valley Way;
- Sub-arterial - Cowpasture Road, Byron Road, Dickson Road and Eastwood Road;
- Transit boulevard - Rickard Road, Edmondson Avenue and Fifteenth Avenue.

Figure 15 sets out the proposed heavy vehicle access strategy for the Austral and Leppington North precincts.

Figure 13 Proposed Road Hierarchy



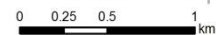
Road Classification

- █ Principal Arterial
- █ Transit Boulevard
- █ Sub Arterial
- █ Collector Road
- Signal
- Roundabout

ALN Transport Assessment

Road Hierarchy

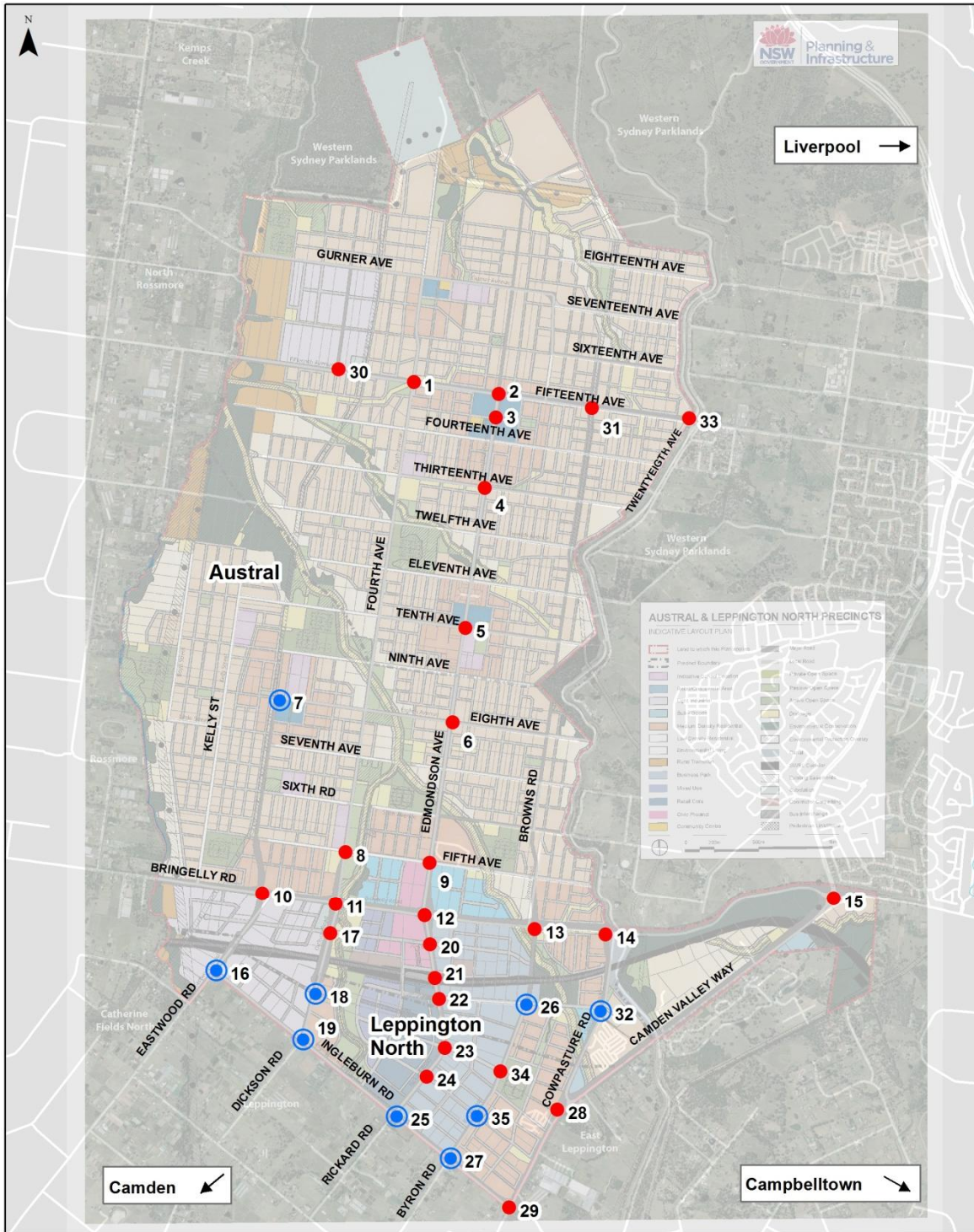
Source: LPMA 2011



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Figure 14 Key intersection locations and form of control



Intersection Type

- Signal
- Roundabout

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Proposed Intersection Treatment
Source: LPMA 2011

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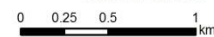
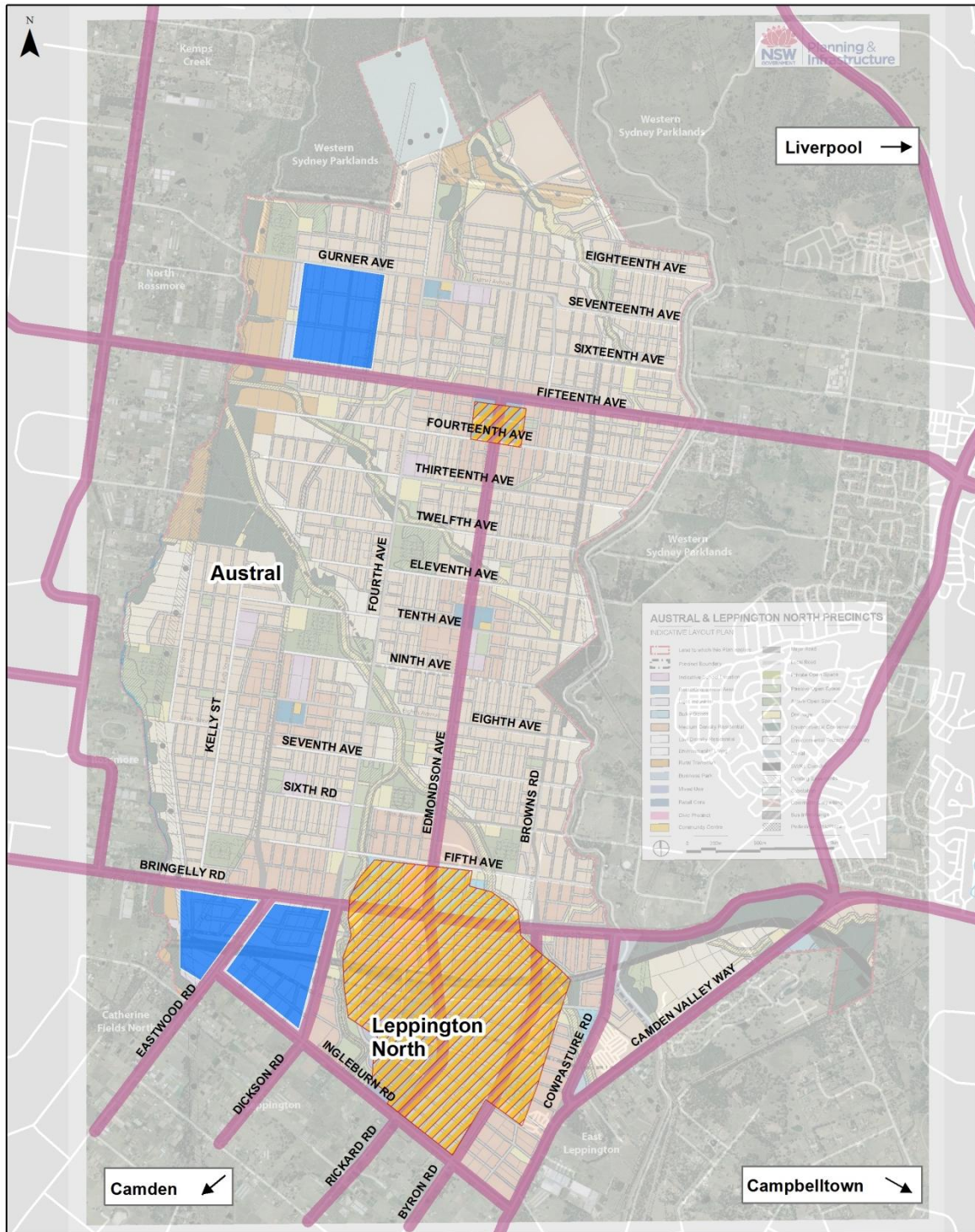


Table 14 Intersection control and justification

ID	Major road	Minor road	Method of Control	RTA Warrant	Additional considerations
1	Fifteenth Avenue	Fourth Avenue	Signals	A	
2	Fifteenth Avenue	Edmondson Avenue	Signals	A	Town Centre
3	Edmondson Avenue	<i>Austral Centre Access</i>	Signals	A, C	Town Centre, Pedestrian Connectivity
4	Edmondson Avenue	Thirteenth Avenue	Signals	A	School
5	Edmondson Avenue	Tenth Avenue	Signals	A	Town Centre, School
6	Edmondson Avenue	Eighth Avenue	Signals	A	
7	<i>New N-S Collector</i>	Eighth Avenue	Roundabout	-	Unconventional major movement
8	Fourth Avenue	Fifth Avenue	Signals	A	Bulky Goods Retail, School
9	Edmondson Avenue	Fifth Avenue	Signals	A	Bulky Good Retail, Civic Uses
10	Bringelly Road	<i>Eastwood Road (North)</i>	Signals	A	
11	Bringelly Road	Fourth Avenue	Signals	A	
12	Bringelly Road	Edmondson Avenue	Signals	A, C	Town Centre, Civic Uses
13	Bringelly Road	Browns Road	Signals	A	
14	Bringelly Road	Cowpasture Road	Signals	A	
15	Camden Valley Way	Bringelly Road	Signals	A	
16	Eastwood Road	Ingleburn Road	Roundabout	-	
17	Dickson Road	<i>New E-W Collector (Lepp)</i>	Signals	A	
18	Dickson Road	<i>Light Ind Access</i>	Roundabout	-	
19	Dickson Road	Ingleburn Road	Roundabout	-	
20	Rickard Road	<i>New E-W Collector (Lepp)</i>	Signals	A	Town Centre Land Uses
21	Rickard Road	<i>Station Access Road (North)</i>	Signals	C	Rail Station, Town Centre
22	Rickard Road	<i>Station Access Road (South)</i>	Signals	A	Rail Station, Town Centre
23	Rickard Road	<i>Lepp Town Centre Access</i>	Signals	A, C	Town Centre
24	Rickard Road	<i>Lepp Town Centre Access (S)</i>	Signals	A	Town Centre
25	Rickard Road	Ingleburn Road	Roundabout	-	
26	Byron Road	<i>Lepp Business Park Access</i>	Roundabout	-	
27	Byron Road	Ingleburn Road	Roundabout	-	
28	Camden Valley Way	Cowpasture Road	Signals	A	
29	Camden Valley Way	Ingleburn Road	Signals	A	
30	Fifteenth Avenue	Gurner Ave Industrial Area ext	Signals	B	Industrial Area
31	Fifteenth Avenue	Browns Road	Signals	A	Bus Route

ID	Major road	Minor road	Method of Control	RTA Warrant	Additional considerations
32	Byron Road	Byron Road extension	Roundabout	-	
33	Fifteenth Avenue	Twenteigh Avenue	Signals	A	
34	Byron Road	Access Road opposite Sports Field	Signals	-	Access between Town Centre and Major Sports Facility
35	Byron Road	E-W Collector (north of Ingleburn Road)	Roundabout	-	-

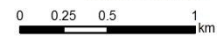
Figure 15 Austral and Leppington North Precinct Proposed HGV Routes



- Town Centre Business Land Use
- Preferred Heavy Vehicle Routes
- Light Industrial Land Use

ALN Transport Assessment
Heavy Vehicle Access Routes
Source: LPMA 2011

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4.0 Public Transport Framework

4.4.2 South West Rail Link

(In response to Submission ID 599293 – Transport for NSW, changes to 3rd paragraph of Section 4.4.2)

RailCorp proposes an initial four services per hour throughout the day with up to 12 trains per hour in peak periods (subject to demand, network capacity, operating requirements and other factors). Furthermore, the frequency of service is likely to be increased over time as demand increases and service provision is influenced by patronage demand as well operating requirements of the network. Options for a potential future extension of the project beyond Rossmore have been investigated by the NSW Government, but there is no commitment to an extension at this stage.

4.5.1 Rail Network and Interchange

(In response to Submission ID 599293 – Transport for NSW, changes to 2nd paragraph of Section 4.5.1)

The South West Rail Link will provide the following benefits to residents in Austral and Leppington North:

- Up to 12 trains per hour during the peak period from Leppington to Glenfield (subject to demand, network capacity, operating requirements and other factors).
- Ease of access to major employment destinations such as Liverpool, Parramatta and central Sydney.
- Excellent station and interchange facilities, including a dedicated bus interchange, kiss and ride and taxi zones.
- Park and ride commuter parking for rail passengers.

4.5.2 Bus networks

(In response to Submission ID 599293 – Transport for NSW, changes to Section 4.5.2 including Figure 22 and Figure 23)

The proposed long term bus network for the Austral and Leppington North Precincts will comprise a mixture of peak routes, regional routes and district routes to maximise speed and efficiency of high frequency peak hour services as well as a number of local bus routes to ensure maximum coverage throughout the precincts, facilitating public transport access and travel choice for all.

The arterial and sub-arterial road network as well as the transit boulevards within the precincts, providing a bus network that would link the proposed major centres. The collector road network proposed within the precincts will provide an additional local road network which is capable of accommodating buses. Local bus routes will be planned as the development of the precincts to support the regional routes and district routes in order to provide maximum coverage by public transport network. Transport for NSW and bus service providers will be responsible for determining the final bus routes and timetables. The future service frequency will be informed by demand, network capacity, operating requirements and other factors. The timetable will need to evolve as development occurs and be able to respond to increases in population.

Figure 21 highlights regional bus services proposed in the South West Growth Sector Bus Servicing Strategy that serves the precincts along Bringelly Road, Edmondson Avenue and Fifteenth Avenue as well as a number of the town centre roads including Eastwood Road, Rickard Road and Ingleburn Road. The large number of regional routes proposed via Leppington Station and Major Centre will provide frequent services to all existing and major centres in the SWGC.

Figure 22 shows all district bus services proposed in the South West Growth Sector Bus Servicing Strategy, with the exception of a small local re-routing of District Route D3 from Leppington to Parramatta, which is shown as running along Eastwood Road (north), Fourth Avenue and Seventeenth Avenue. The diversion to Seventeenth Avenue will provide much greater accessibility to bus services to the area north of Fifteenth Avenue, without significant diversion and additional travel kilometres. Alternatively, this diversion may not be required if a local bus service can be provided along the collector road network in this area.

Assuming a typical 400m catchment of all proposed regional and district bus routes as well as potential local bus routes that can operate on the collector road system, **Figure 23** describes the comprehensive bus service coverage which can be achieved by a potential bus network within the precincts in the future.

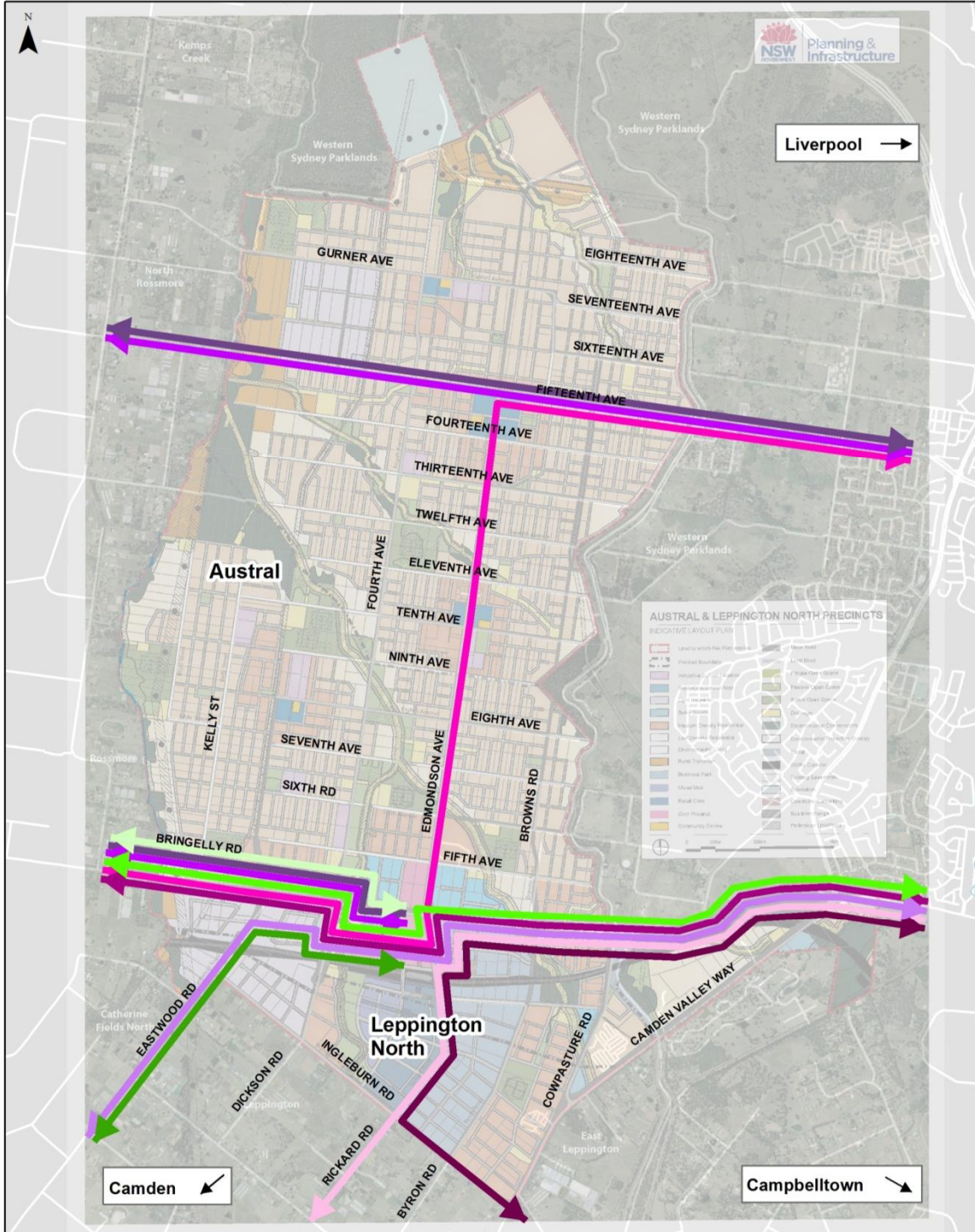
The coverage achieved by the proposed routes covers all centres, schools, all medium density housing and at least 90% of low density residential, providing feasible public transport options for all land uses. Even those fringe residential areas, the majority of which are low density in nature, are no more than 600m from a proposed bus service. Therefore, achieving efficient penetration of the precinct by public transport and ensuring accessibility for all, without comprising service efficiency.

Table 16 below sets out an evaluation of the proposed bus network against the key criteria and benchmarks for network, service and route performance set out in the planning guidelines.

Table 16: Bus Network Evaluation

Bus Planning Characteristics	Benchmark/Criteria	Met
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.	Yes
Network Legibility	Peak and off-peak services use the same routes.	Yes
Route Design	Regional Routes to be between 10 and 25 kilometres. 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%.	Yes
Section Points	The range of section point lengths to be between 1.3km and 1.9km. The average length of section points within each route to be 1.6 km.	Yes

Figure 21: Austral and Leppington North Regional Bus Routes



Route Legend	
R1 Liverpool to Campbelltown	R6 Liverpool to Leppington
R2 Liverpool to Campbelltown	R7 Liverpool to Campbelltown
R3 Liverpool to Campbelltown	P1 Leppington to Camden
R4 Liverpool to Campbelltown	P2 Leppington to Glenfield
R5 Liverpool to Leppington	P3 Leppington to St Marys

ALN Transport Assessment
Regional + Proposed Peak Bus Routes
 Source: LPMA 2011

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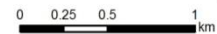
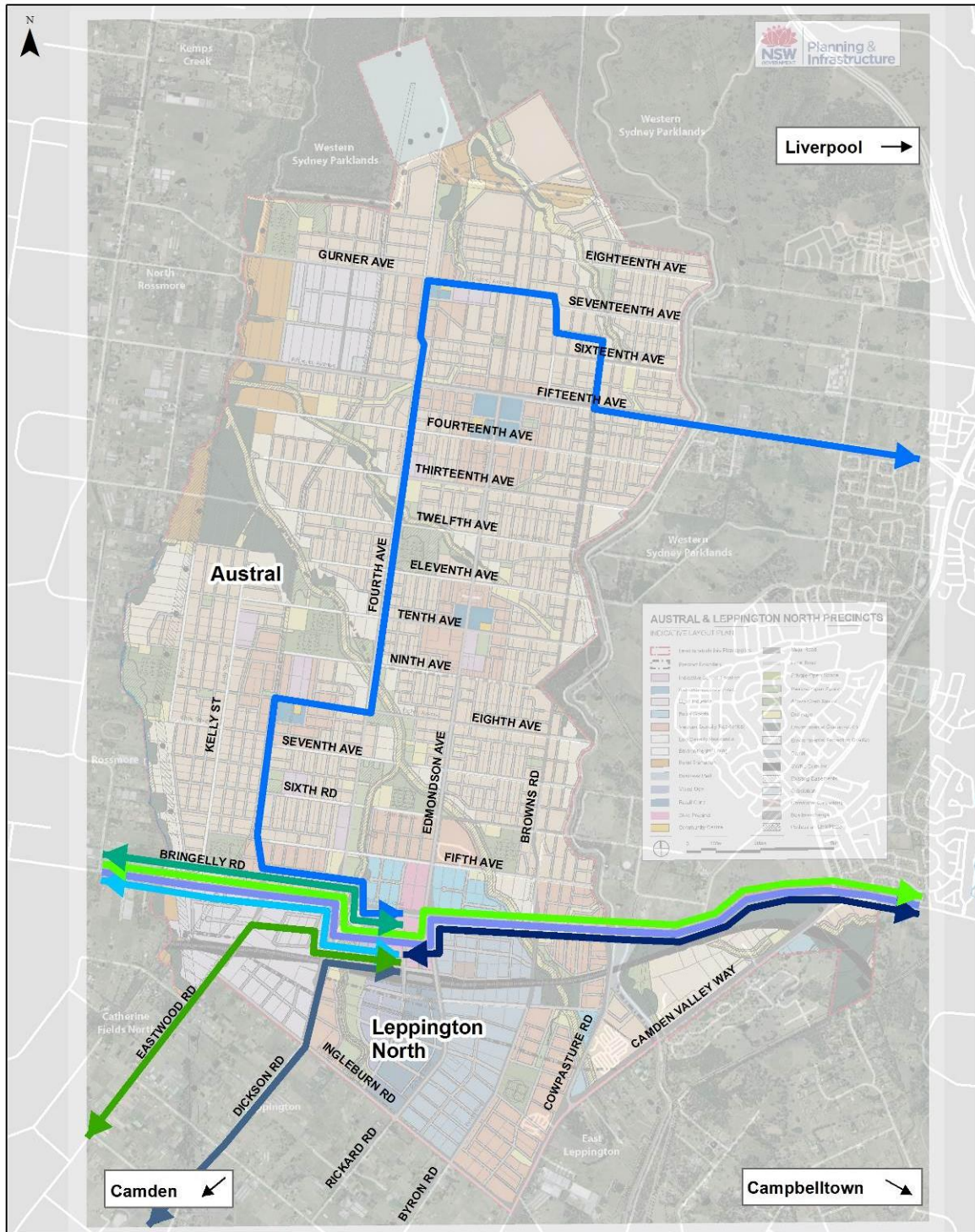


Figure 22: Austral and Leppington North District Bus Routes



- Route Legend (District and Proposed Peak Routes)**
- D1 Liverpool to Leppington
 - D2 Leppington to Campbelltown
 - D3 Leppington to Parramatta
 - D4 Oran Park to Ingleburn
 - D5 Leppington to Parramatta
 - P1 Leppington to Camden
 - P2 Leppington to Glenfield
 - P3 Leppington to St Marys

ALN Transport Assessment
District + Proposed Peak Bus Routes
Source: LPMA 2011

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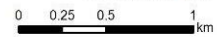
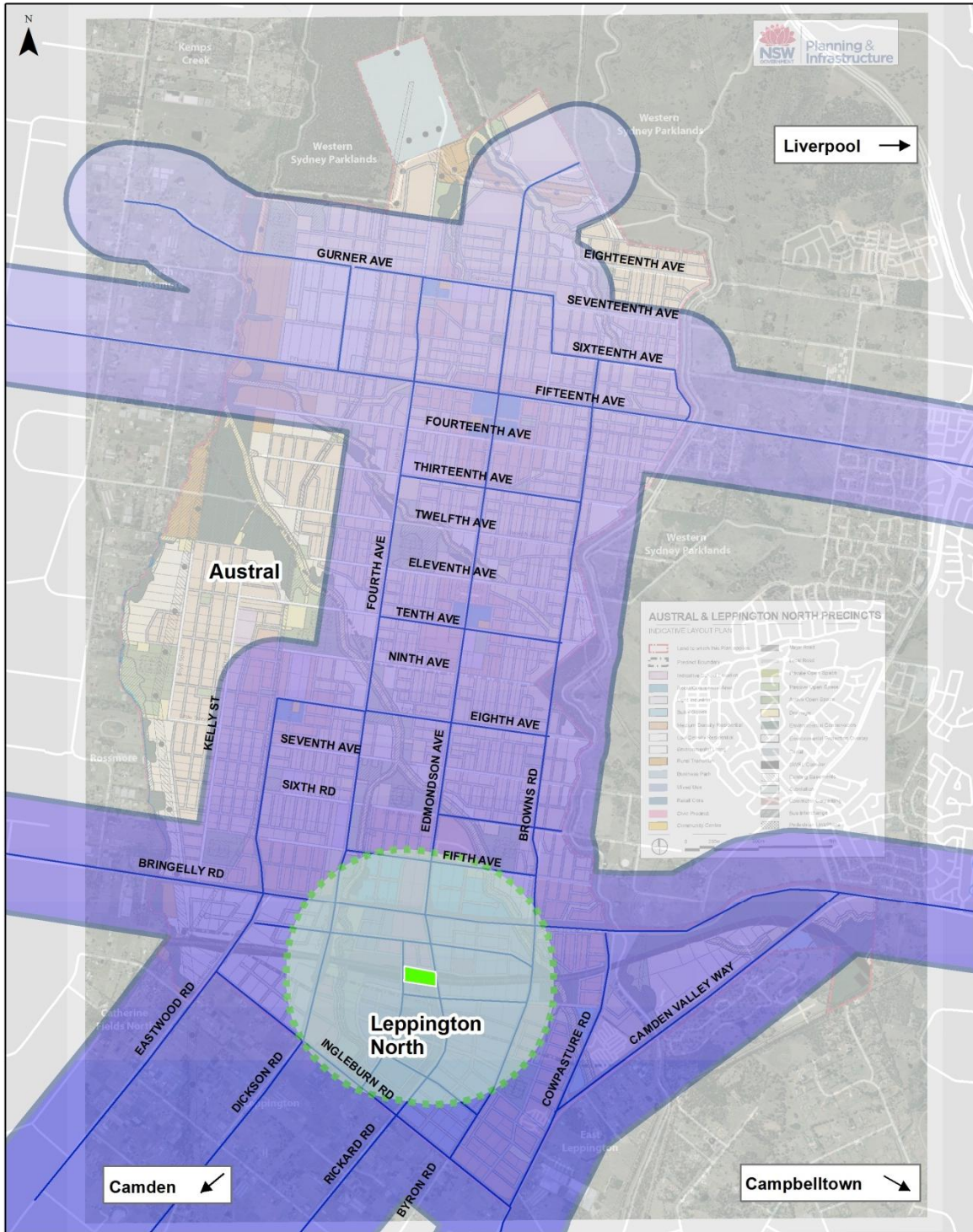
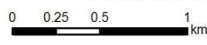


Figure 23: Austral and Leppington North Bus Route Service Coverage



- SWRL Station
- 800 m Rail Catchment
- 400m Bus Catchment
- Bus Corridor

ALN Transport Assessment
Public Transport Coverage
 Source: LPMA 2011
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4.5.3 Service time periods and frequencies

(In response to Submission ID 599293 – Transport for NSW, changes to Section 4.5.3)

The operational time periods and frequencies for proposed bus services in the South West Growth Sector Bus Servicing Strategy, adopted from the NSW Bus Servicing Planning Guidelines, to meet the land use planning requirements for Austral and Leppington North Precincts are set out in **Table 17**, **Table 18** and **Table 19**.

The proposed bus servicing strategy is designed to meet the requirements of servicing a future residential population of approximately 55,000 people and an employment population of 13,000 people in Austral and Leppington North in the future.

Table 17 Service Time Periods for Regional Services

Time Period	Weekday		Saturday		Sunday	
Pre Peak	4:30am	6:00am	-	-	-	-
Morning Peak	6:00am	9:30am	-	-	-	-
Daytime	9:30am	3:00pm	5:30am	6:00pm	6:30am	6:00pm
Afternoon Peak	3:00pm	7:00pm	-	-	-	-
Evening	7:00pm	11:00pm (12:00am Fri)	6:00pm	12:00am	6:00pm	9:00pm

Table 18 Service Time Periods for District Services

Time Period	Weekday		Saturday		Sunday	
Pre Peak	5:30am	6:00am	-	-	-	-
Morning Peak	6:00am	9:30am	-	-	-	-
Daytime	9:30am	3:00pm	7:00am	6:00pm	8:00am	6:00pm
Afternoon Peak	3:00pm	7:00pm	-	-	-	-
Evening			6:00pm	7:00pm		

Table 19 Service Frequencies by Route Type

Time Period	Frequency – equal to or better than (SWGS Bus Servicing Strategy)	
	Regional Routes	District Routes
Pre Peak	30 mins	-
Morning Peak	20 mins	60 mins
Daytime	30 mins	60 mins
Afternoon Peak	20 mins	60 mins
Evening	60 mins	-
Saturday daytime	30 mins	60 mins
Sunday daytime	30 mins	60 mins

Source: NSW Ministry of Transport, 2006

It is expected the regional and district bus services proposed in the South West Growth Sector Bus Servicing Strategy will be supported by additional local services. These local bus services will not only provide additional coverage of the precincts, but also provide additional bus services during peak hours to connect residential areas, local schools, centres as well as Leppington Major Centre.

4.5.4 School buses

(In response to Submission ID 599293 – Transport for NSW, changes to Section 4.5.4)

As the local primary schools develop, it is expected that local bus services will be established to provide connection between the schools and major transport nodes as well as the developed residential areas within the precincts. Separate dedicated school bus services could be introduced or extended as appropriate to serve the primary schools located within the precincts, where demand exceeds maximum passenger loadings. However, in general students would be encouraged to travel on scheduled public transport routes. All schools are located on collector roads that are capable of accommodating bus routes.

4.6 Findings and recommendations

(In response to Submission ID 599293 – Transport for NSW, changes to 2nd and 3rd paragraphs of Section 4.6)

A bus route network is proposed, which broadly follows that within the South West Growth Sector Bus Servicing Strategy, with additional local bus services that can operate along the collector road network to provide additional service coverage within the precincts. The proposed network, service coverage and route frequency will be a significant change over the existing situation, with little or no service coverage or incentive to travel by public transport, which meets existing demands but will not be sufficient to serve the future population and employment opportunities with Austral and Leppington North.

Key bus operating corridors with services providing fast, efficient regional connections will operate along the east-west routes of Bringelly Road, in the south of the precincts, and Fifteenth Avenue, in the north of the precincts. One regional route (R2) and one district route (D3) will provide effective network coverage between Bringelly Road and Fifteenth Avenue, with links between other notable regional destinations, Leppington Major Centre and onward destinations by bus or rail.

5.0 Walking and Cycling Networks

5.5.1 Bicycle Network

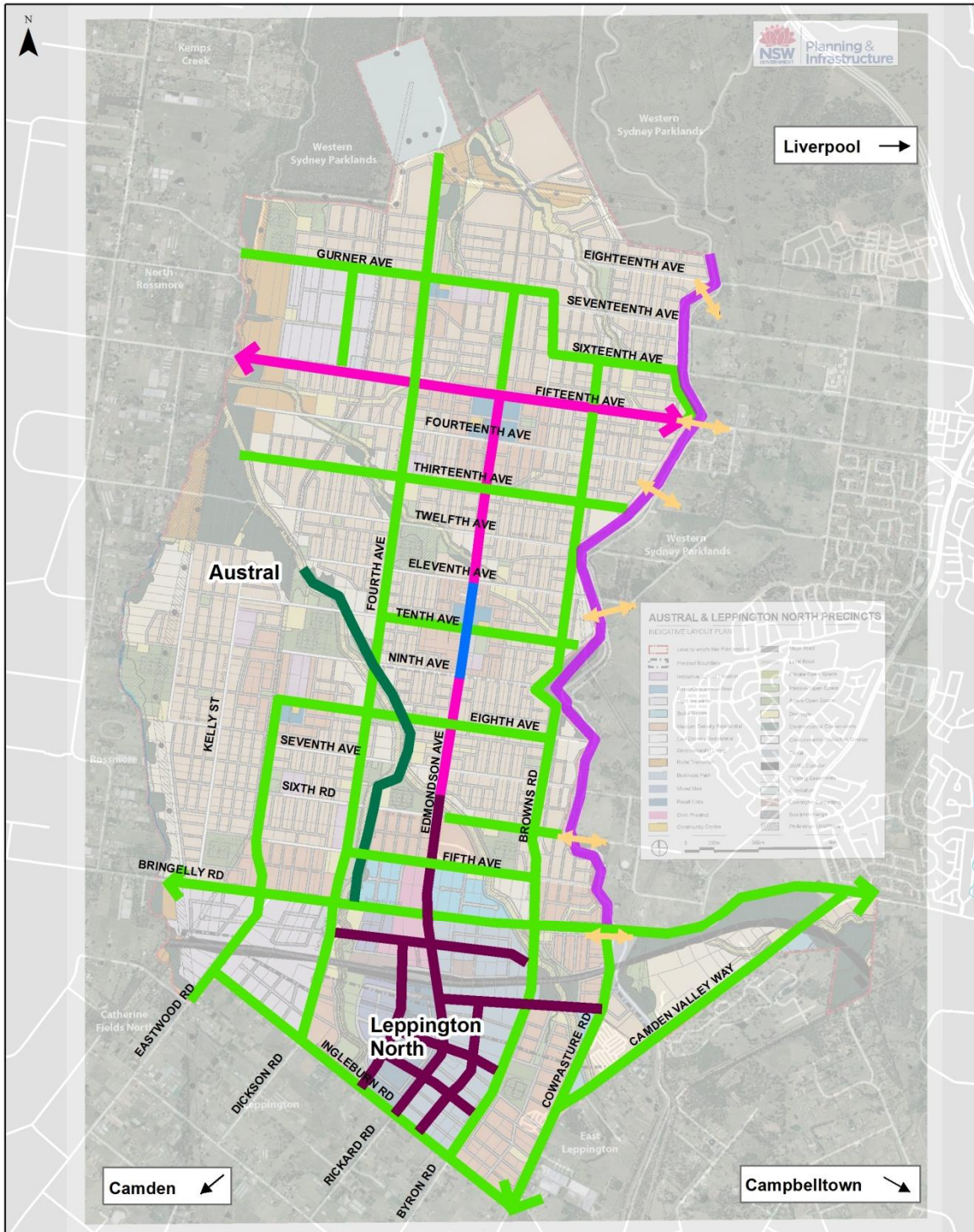
(In response to Submission ID 599293 – Transport for NSW, changes to 2nd and 3rd paragraphs of Section 5.5.1 and Figure 25)

The principal arterial roads, Bringelly Road and Camden Valley Way, will have shared path bicycle facilities in addition to a 2m wide shoulder on both carriageways that could potentially be used by on-road cyclists. On-road cycle lanes are proposed along transit boulevards providing a network of high order bicycle facilities for fast, efficient connections for both local travel within the precincts and regional travel between Leppington and Austral centres and to regional destinations such as Liverpool and Campbelltown.

5.5.2 Pedestrian Network

The location of all signalised intersections with pedestrian crossing facilities as well as the proposed dedicated pedestrian crossing facilities are shown in **Figure 26**. This figure indicates how the pedestrian crossing facilities (including signalised intersections) will link all planned centres and schools into the fabric of the pedestrian footpath network. This plan also shows the corridors which will carry buses through the precinct to demonstrate that effective, safe and efficient pedestrian connections will be created to public transport as well.

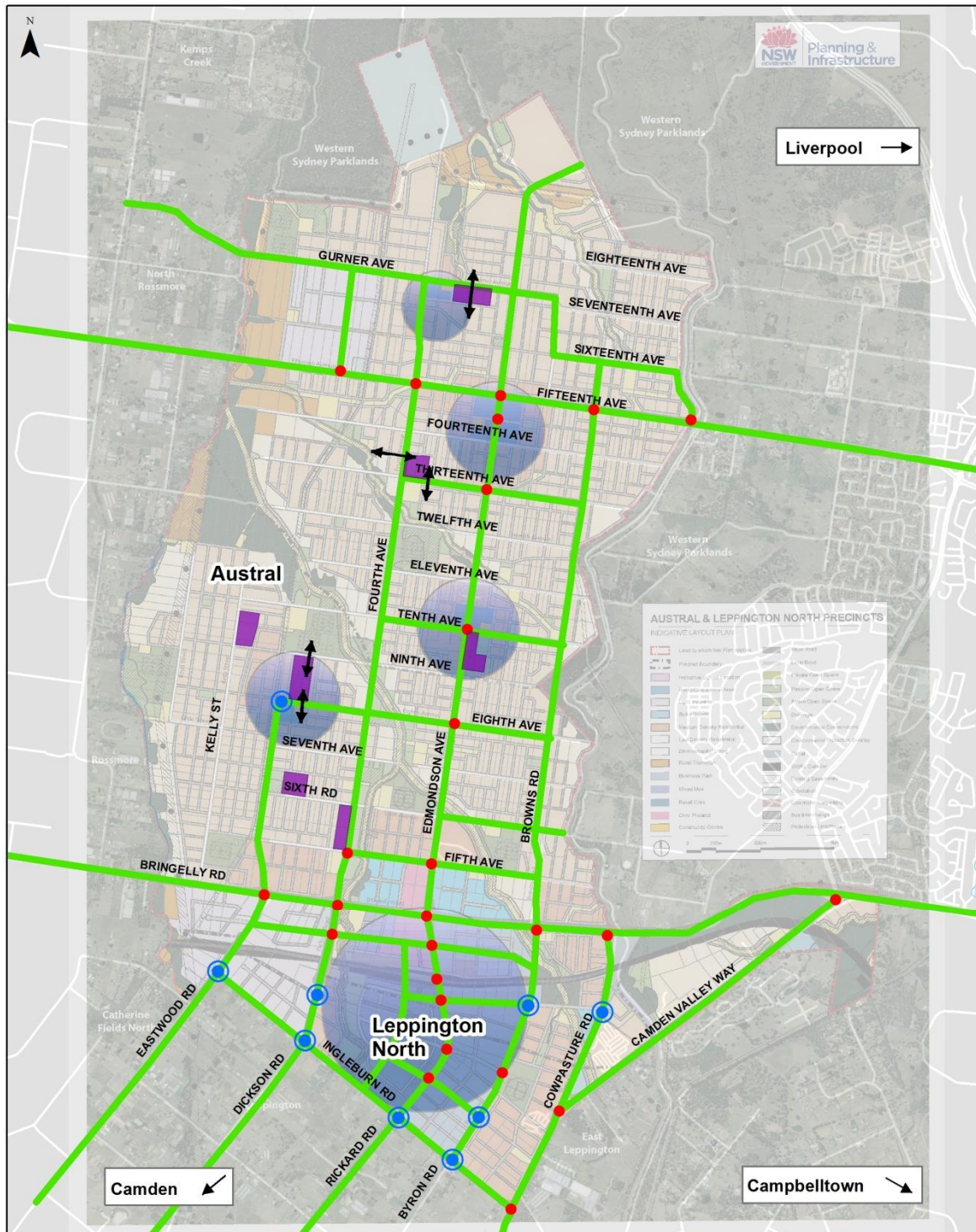
Figure 25: Proposed Future Cycle Network



- Proposed Cycleway
- Shared path (off road)
- Cycle lane (on road)
- Signed (on road)
- Shared path green corridor (off road)
- Dedicated lane (off road)
- Recreational cycle lane (off road)
- Existing connections into Western Sydney Parklands

ALN Transport Assessment JULY 2012
60159585
Cycle Plan
Source: LPMA 2011

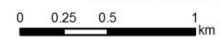
Figure 26 Location of Key Pedestrian Crossing Facilities



- ↔ Pedestrian Crossing Facility
- Indicative School Location
- Bus Corridor
- Town Centres
- Signal
- Roundabout

ALN Transport Assessment
Key Pedestrian Crossing Facilities
Source: LPMA 2011

JULY 2012
60159585



7.0 Conclusions

7.1 Road Network

(In response to Submission ID 599293 – Transport for NSW, changes to 5th paragraph of Section 7.1)

In line with RTA guidance those intersections which are proposed to be signalised have been assessed to perform at Level of Service D or above, at full development in 2036, and therefore will provide adequate capacity and operational efficiency. It should be noted that the traffic and transport assessment demonstrates the need for traffic signals at the indicative locations proposed in the Precinct Plan. More detailed assessment and application to RMS will occur at the time of detailed planning for the relevant road upgrades and intersection works.

7.2 Public Transport Network

(In response to Submission ID 599293 – Transport for NSW, changes to 2nd and 3^d paragraphs of Section 7.2)

A bus route network is proposed, which broadly follows that within the South West Growth Sector Bus Servicing Strategy, with additional local bus services that can operate along the collector road network to provide additional service coverage within the precincts. The proposed network, service coverage and route frequency will be a significant change over the existing situation, with little or no service coverage or incentive to travel by public transport, which meets existing demands but will not be sufficient to serve the future population and employment opportunities with Austral and Leppington North.

Key bus operating corridors with services providing fast, efficient regional connections will operate along the east-west routes of Bringelly Road, in the south of the precincts, and Fifteenth Avenue, in the north of the precincts. One regional route (R2) and one district route (D3) will provide effective network coverage between Bringelly Road and Fifteenth Avenue, with links between other notable regional destinations, Leppington Major Centre and onward destinations by bus or rail.

7.3 Walking and Cycling

(In response to Submission ID 599293 – Transport for NSW, changes to 4th and 5th paragraphs of Section 7.3)

The principal arterial roads, Bringelly Road and Camden Valley Way, will have shared path bicycle facilities in addition to a 2m wide shoulder on both carriageways that could potentially be used by on-road cyclists. All sub-arterial roads and collector roads connecting key origins and destinations within the precinct and onto other external destinations will have dedicated shared path bicycle facilities. The proposed cycling connections are designed to create a continuous network of facilities removing obstacles and barriers to cycling, both physical and perceived. Physical crossing points of the creek lines and the South West Rail Link have been included in the bicycle network plan to ensure route connectivity and network permeability.

On-road cycle lanes are proposed along transit boulevards providing a network of high order bicycle facilities for fast, efficient connections for both local travel within the precincts and regional travel between Leppington and Austral centres and to regional destinations such as Liverpool and Campbelltown.

Appendix A

Traffic / transport submissions

Submission ID	Issue	Response	Reference in Addendum report
B586045	<p>The Indicative Layout Plan and road network doesn't show potential access points into the Parklands. These access points and lead in roads should be at a minimum Collector Roads and zoned accordingly to secure major road links. Access points include: 1. A northern extension of Edmondson Avenue to Elizabeth Drive, 2. upgrade of Sixth Avenue to a Collector Road and provide a through link from the Parklands to Edmondson Avenue (via new crossing to Bonds Creek) given it is a transit boulevard, 3. Provision of a right hand turn from Bringelly Road into Browns Road and from Fifteenth Avenue into Brown Road northern extension, 4. The Collector Road linking Fifteenth Avenue to Gurner Road should be continued north as a Collector Road.</p>	<p>The draft Precinct Plan proposes to maintain all existing access roads from the Precincts into the Western Sydney Parklands. The proposed road network also allows for access to existing access points, including existing road bridges across the Upper Canal. Traffic can access Browns Road that provides access to the existing access to the Parklands, from both directions of Bringelly Road via a signalised intersection, as shown in the current RMS design for the Bringelly Road upgrade. Traffic from Fifteenth Avenue can either turn left or turn right at Browns Road which to access the parklands via existing access points.</p> <p>A new signalised intersection will also be provided at Bringelly Road between Old Cowpasture Road and Camden Valley Way to provide direct access to the Western Sydney Parklands, as part of the Bringelly Road upgrade.</p> <p>The following roads may be upgraded if necessary to provide appropriate vehicle access to the Parklands:</p> <ul style="list-style-type: none"> - Northern extension of Edmondson Avenue (to the north of Fifteenth Avenue) – This road is currently shown as a collector road on the Precinct Plan with the potential extension to link into the Cecil Hills passive recreation hub. - Upgrade of Sixth Avenue to a collector road – The road reserve is at least 20m wide and is capable of being upgraded to a collector road without any additional land acquisition. The final ILP shows Sixth Avenue as a collector road, however, Council should only require adjoining developments to upgrade it to a local road standard. Any upgrade to collector road standard would be done by others in the future, subject to funding, including new crossing structures at Bonds Creek. 	Addition of Section 3.7.1
B576714	<p>Zoning of land for light industrial will increase traffic issues for landowners that choose to stay and not develop.</p>	<p>The overall road network has been designed to accommodate future traffic demand created by development. Over the next 20 to 30 years, the Precincts will experience significant change as the landscape transitions from a rural setting to an urban environment and there will be changes to existing traffic conditions.</p>	N/A
B564080	<p>The proposed bus network is supported however to ensure it is properly utilised, service and timetables need to be confirmed early and commence operation.</p>	<p>Transport for NSW and bus service providers will be responsible for determining the final bus routes and timetables. The future service frequency will be informed by demand, network capacity, operating requirements and other factors. The timetable will need to evolve as development occurs and be able to respond to</p>	Changes in Section 4.5.2

Submission ID	Issue	Response	Reference in Addendum report
		increases in population.	
B588503	Alternative Byron Road northern extension arrangements, traffic movements from Browns Road to Bringelly Road could be restricted to left in/left out. This would allow the Byron Road northern extension to remain in its current location without the need to realign Browns Road.	<p>During consultation with DP&I, RMS was asked to consider aligning the intersection of Browns Road with the future Byron Road extension. The design of the intersection was subsequently investigated and considered against the proposal objectives. It was found that realigning the intersection to the east of its current location would minimise environmental impacts on Bonds Creek, reduce flooding impacts to the road corridor, minimise overall property impacts (including to existing buildings), and reduce the requirement for a wider bridge structure over Bonds Creek. Retaining the intersection in its current location would not achieve these benefits and would not allow implementation of the Indicative Layout Plan which identifies an appropriate intersection layout and configuration to meet precinct requirements.</p> <p>The proposed realigned four way intersection with traffic lights at Browns Road, accommodating a future Byron Road extension, was found to best meet the proposal objectives and to positively contribute to the development of the Austral and Leppington North precincts by providing suitable access and improved road infrastructure.</p> <p>Traffic modelling undertaken for the proposal and the Austral Leppington North precinct planning determined that a sub-arterial road is required at this location to cater for the expected type and volumes of traffic, without putting additional pressure on other parallel roads including Rickard Road and Cowpasture Road. A four way intersection is needed to allow traffic to circulate around the Leppington Town Centre, wider Austral and Leppington North precincts, and to provide access to the business park proposed by DP&I. A combination of an unsignalised left in-left out intersection and a signalised T intersection would not provide a sufficient level of access for both sides of Bringelly Road.</p> <p>The existing intersection at Browns Road would be the first intersection on the northern side of Bringelly Road after the Upper Canal when travelling from the east, and a left in/left out arrangement would not allow a right turn into the precinct areas north of Bringelly Road. It would increase traffic on Edmondson Avenue which is intended to perform a transit boulevard function. The proposed four way signalised intersection configuration best caters for the expected increase in traffic from the Leppington Town Centre and the business park/employment areas to the</p>	N/A
B588503	Alternative Byron Road northern extension arrangements, the northern extension of Byron Road could be deleted. This would avoid the need to traverse environmentally sensitive flood affected land. Instead an eastern arm to Byron Road could be built in place and take traffic to Cowpasture Road as a sub arterial road.		
B588503	Alternative Byron Road northern extension arrangements, by continuing Fifth Avenue and Sixth Avenue between Edmondson Avenue and the Water Supply Canal. This would also provide better access into and out of the medium density land.		

Submission ID	Issue	Response	Reference in Addendum report
		<p>south of Bringelly Road.</p> <p>An offset intersection (a signalised T intersections on opposite sides of the road, set a short distance apart but designed to work together as one system) was also considered but was found to not be appropriate for a principal arterial road as there would not be enough space between the two separate intersections of Browns Road and Byron Road to allow for efficient turning movements or adequate storage of turning vehicles.</p>	
B595134	<p>Schedule 1 of the Development Control Plan should be amended as follows: <u>1. Figure 2-12</u>: Precinct road hierarchy – Light industrial collector road – west of Eastwood Road. Figure indicates as a collector road. AECOM figure does not. Insert signalised intersection on Byron Road providing access between the Sports ground and the commercial area, <u>2. Figure 2-13</u>: Pedestrian and cycle network – adjust major pedestrian cycle route (off road) to the eastern side of Scalabrini Creek where it traverses the District Park so as to make the route alignment clear.</p>	<p>1. Should be local road within industrial area – no changes required to Transport Assessment report. Note latest TCA design for Dickson Road indicates this intersection will be elevated at this location, so may end up being only a connection to the east into the Civic Precinct. Signals will be provided at the proposed intersection at Byron Road and access between the Sports ground and the commercial area to cater for high pedestrian traffic from east Leppington.</p> <p>2. OK. Also remove crossing of rail line here as this is unlikely to be possible due to level of rail line relative to existing ground level - no changes required to Transport Assessment report.</p>	N/A
B599293	<p>The ILP identifies commuter carparking areas in different locations than in the SWRL approval to allow for higher order development in close proximity to Leppington Station in the longer term. The Precinct Planning Report should include commentary to confirm the above and that there will need to be further stakeholder consultation regarding the long-term commuter carpark locations.</p>	<p>The indicative commuter car park locations differ from those in the approved SWRL project, because the approved locations would significantly impact on the relationship between development in the major centre and access to Leppington Station. The car parks to be constructed as part of the SWRL project will remain operational until the level of development and activity (and rail patronage) reaches a point where redevelopment of the car parks as proposed in the ILP is required.</p> <p>The indicative car park locations were identified based on consideration of the overall patterns of land use in the Leppington Major Centre, likely vehicle access routes from the surrounding areas, and with reference to Railcorp's criteria for commuter car parks. Following exhibition, the location of the commuter car park east of Rickard Road has been moved to north of the rail corridor, on land that has previously been acquired for the SWRL project but which is surplus to operational requirements.</p>	N/A

Submission ID	Issue	Response	Reference in Addendum report
		<p>Traffic modelling undertaken for the proposal and the Austral Leppington North precinct planning has accounted for vehicular trips associated with long-term commuter parking needs at Leppington Station, therefore the proposed road hierarchy and capacity of the surrounding road network including Rickard Road and Byron Road is expected to cater for the commuter parking trips during the peak hours.</p> <p>Ongoing consultation will occur with Transport for NSW to confirm appropriate longer term commuter car parking arrangements.</p>	
B599293	Various amendments are required for the Transport Assessment prepared by AECOM regarding default urban speed limits, intersection performance, train service frequencies (currently over prescriptive until timetable has been developed) and commentary that TCA is now delivering a partial underpass crossing at Byron Road as part of the SWRL project.	<ul style="list-style-type: none"> - Default urban speed limit – 50km/hr - Intersection performance – table to be updated - Byron Road – noted / a comment will be included in the updated report. - SWRL train timetable – noted / a comment will be included in the updated report. 	Changes in Section 3.2.1, 3.2.3, 3.3.1 and 4.4.2
B599293	The forecast traffic volumes for Fourth Avenue (Collector Road) is higher than the traffic volume capacity for a Collector Road previous quoted in the Transport Assessment prepared by AECOM. This capacity constraint should be reflected in the traffic model.	<p>The section of Fourth Avenue between Bringelly Road and Fifth Avenue is classified as a sub-arterial due to the relatively higher traffic forecast in 2036 as a result of higher traffic movements generated by the bulky goods area to the north of Bringelly Road (refer to Figure 13). Classification in Table 8 to be updated.</p> <p>Additional traffic modeling to reflect ultimate development of SWGC suggested that there are no significant increases in traffic on road network within the Precincts as most development post-2036 will be in the far west of the SWGC and precincts in the east and south of the SWGC including ALN Precincts are assumed to be fully developed by 2036. Therefore, the road hierarchy proposed in Table 8 remains valid.</p>	Changes in Table 8 of Section 3.7.1
B599293	Signalised intersections along Edmondson Avenue and Fourth Avenue will need to be approved by RMS. Details of the proposed signalised intersections such as turning movements and traffic model results need to be provided to RMS.	The traffic and transport assessment demonstrates the need for traffic signals at the indicative locations proposed in the Precinct Plan. More detailed assessment and application to RMS will occur at the time of detailed planning for the relevant road upgrades and intersection works.	Changes in Section 3.8
B599293	The intersections of Fifteenth Avenue with Edmondson Road and Fourth Avenue requires 'drive through' type	The traffic and transport assessment confirmed that the intersections of Fifteenth Avenue with Edmondson Road and Fourth Avenue requires 'drive through' type	Changes in Table

Submission ID	Issue	Response	Reference in Addendum report
	bus queue jumps with both a dedicated left turn/buses only approach lane and departure side merge lane of at least 55 metres. RMS no longer supports the provision of stub "B" signal queue jumps except for right turn from left lane movements	bus queue jumps with both a dedicated left turn/buses only approach lane and departure side merge lane of at least 55 metres.	13 of Section 3.8.2
B599293	Further discussion is required regarding the road cross section and acquisition authority for Fifteenth Avenue to ensure suitable road corridors are reserved and allowance for bus priority. This may also be relevant to Eastwood Road, Dickson Road, Rickard Road and Byron Road.	<p>With the expected increase in traffic along Fifteenth Avenue, it is expected that three lanes in each direction will be required at Fifteenth Avenue, to the east of the Sydney Water Supply Channel, to meet the expected ultimate traffic generation. The traffic forecast suggested that two lanes in each direction along Fifteenth Avenue, to the west of the Sydney Water Supply Channel, will provide enough capacity to cater for the likely traffic demand generated by the full development of the SWGC. However, given the likely additional traffic demands along Bringelly Road post-2036, it may be worthwhile considering reserving a corridor along Fifteenth Avenue, to the west of the Sydney Water Supply Channel, such that it can be widened to three lanes in each direction to potentially relieve the likely traffic demands along Bringelly Road post-2036.</p> <p>Whilst it is important to reserve road corridor to cater for future demand in these growth areas, one of the principles in the transport planning for these precincts is to maximize pedestrian accessibility across major roads and reducing severance in town centre environment by minimizing road crossing width, while maximizing bus priority by proposed bus jumps at intersections. These principles should be applied to the designing of cross-sections of Fifteenth Avenue, Eastwood Road, Dickson Road, Rickard Road and Byron Road.</p>	N/A
B599293	There are differences in the modelling results for forecasted traffic flows along Bringelly Road and Ingleburn Road in the 2036 scenario between the AECOM CUBE model in the Transport Assessment and the RTAs EMME/2 model. Clarification as to why this difference has occurred is required and updates to the CUBE model as necessary.	<p>AECOM's strategic model was developed based on latest population and employment data projections produced by BTS together with latest land use assumptions and release pattern for the SWGC by DP&I.</p> <p>The modeled road network is more refined than the RMS's model including a more developed road network within ALN precincts and surrounding precincts in the SWGC.</p> <p>A modeling note was provided to RMS's modeling team and the key modeling assumptions have been documented in the Transport Assessment.</p> <p>Additional traffic modeling to reflect ultimate development of SWGC suggested that</p>	N/A

Submission ID	Issue	Response	Reference in Addendum report
		there are no significant increases in traffic on road network within the Precincts as most development post-2036 will be in the far west of the SWGC and precincts in the east and south of the SWGC including ALN Precincts are assumed to be fully developed by 2036. Refer to Technical Note prepared to highlight the modelling outcomes to reflect ultimate development of SWGC – as included in Appendix B.	
B599293	Residential development along the Bringelly Road, Cowpasture Road and Camden Valley Way corridors need to be protected from future increases in traffic generated noise. The DCP needs to include appropriate controls to ensure this as RMS will not provide noise mitigation for future residences on rezoned land.	The DCP includes controls on residential development to ensure compliance with the relevant noise criteria. Noise walls are not considered appropriate and other measures will be required to achieve compliance.	N/A
B599293	The Leppington Interchange within the ILP and Transport Assessment needs to be updated to reflect the latest design.	The interchange design by TCA is not necessarily the interchange design that will best serve the long term needs of the centre. The ILP proposes a long term station design. Further consultation is required with TfNSW to confirm long term needs of bus interchange, locations of commuter parking, and transition from TCA constructed design to the long-term design. TfNSW suggested using Liverpool Interchange as a model in terms of land area/no. of bus bays for the long-term interchange design for Leppington Interchange. A draft footprint should be established by DP&I for review by TNSW.	N/A
B599293	The AECOM Transport Assessment needs to make allowances for local bus services that will be developed as the road network is finalised and development takes place rather than relying on only Principal and Link Bus Services (and making amendments to these services to increase coverage in lieu of Local Services). In particular, the diversion to routes D3 and D6 are not supported.	We have moved D3 route from a road that doesn't connect between Bringelly Road and Fifteenth Avenue anymore – to Fourth Avenue and Edmondson Avenue which serves a much bigger residential catchment (without significant diversion or additional travel kilometres) We no longer propose the diversion of route D6 and suggested that the coverage of the precincts can be achieved by a network of local bus services that can be operated along the collector road network to be developed along with the development of the precincts.	Changes in Section 4.5.2
B599293	Edmondson Avenue, Bringelly Road, Fifteenth Avenue and Fourth Avenue will require either dedicated bus lanes or complete prohibition of stopping in the commercial/transition areas to ensure on-time running of buses.	A balance between bus servicing and other activities (including on-street parking) is required near town centres. Bringelly Road is a principal arterial which does not allow provision of on-street parking. Edmondson Avenue and Fifteenth Avenue are four lane roads which can accommodate indented on-street parking, especially near the town centres, with minimal conflicts or impacts to bus operations. A typical	N/A

Submission ID	Issue	Response	Reference in Addendum report
		<p>cross section of Edmondson Avenue or Fifteenth Avenue near the Austral Town Centre is shown in Figure 29 of the Transport Assessment with four lanes of traffic capable of bus travel and an additional parking lane and an on-road cycle lane on both side of the road.</p> <p>Traffic generation as a result of development in Austral Town Centre has been accounted for in AECOM's traffic model. Therefore, traffic forecasts around Austral Town Centre are representative of future traffic conditions of a town centre of approximately 20,000sqm of total floorspace.</p>	
B599293	The frequencies of bus services contained within the Transport Assessment prepared by AECOM are higher than those proposed in the South West Sector Bus Servicing Plan. Any proposal to amend the frequencies would need to be supported by costings for TNSW's review and determination.	<p>It is proposed that additional bus service frequencies will be supported by a network of local bus services within the precincts to provide additional connections and higher frequencies in some locations between residential areas, local schools, centres and Leppington Major Centre.</p> <p>No amendments to the bus service frequencies for those proposed in the South West Sector Bus Servicing Plan are recommended.</p>	Changes in Section 4.5.3
B599293	The Transport Assessment prepared by AECOM assumes schools will have separate dedicated bus services. TNSW has a strong preference for servicing primary schools with timetabled bus routes.	The schools can be served by local bus services and only warrant school bus services if required.	Changes in Section 4.5.4
B599293	RMS does not support on road cycle lanes and signed bicycle routes on Principal Arterial Road such as Bringelly Road and Camden Valley Way. RMS supports an off road shared path along these roads.	The Review of Environmental Factors for Bringelly Road identifies a 2 metre wide shoulder on both carriageways that could potentially be used by on-road cyclists, in addition to off road shared paths. The RMS concept designs for Bringelly Road and Camden Valley Way have been used to define the boundaries of these road corridors. The proposed configuration of lanes, shoulders and off-road paths is supported by DP&I.	Changes in Section 5.5.1 and Figure 25
B599293	RMS preference is for bicycle lanes to not continue through bus stops. Routes along Edmondson Avenue and Fourth Avenue will need to be relocated from bus stops.	Noted. However, continuous provision for cycle lanes should be provided on these major roads as they are important routes through the Precincts and to Leppington Major Centre.	N/A
B599293	The Staging Plan for Leppington Town Centre indicates that areas in close proximity to Leppington Station are medium to long term. TNSW is of the opinion that initial	The Staging Plan in the Leppington Town Centre Masterplan Report is indicative. While the land immediately adjacent to the station is likely to be attractive for early development in the centre, consideration has also been given to other factors such	N/A

Submission ID	Issue	Response	Reference in Addendum report
	development should focus on the station to encourage public transport use from commencement of the rail operations.	<p>as the likely availability of water, sewer and electricity, and the demand for different types of development in the various phases of town centre development.</p> <p>Residential areas have been identified for short or medium term development as the market for housing is anticipated to be stronger than for retail or commercial development during this time. Some early development of retail uses is likely however, significant retail floorspace will only emerge with population growth in the residential areas surrounding the Major Centre, as this will drive demand for retailers. Similarly, demand for business park type development is likely to emerge as the existing supply of similarly zoned land in the South West sub-region (and possibly across the whole metropolitan area) is exhausted or as market factors such as land value and accessibility make Leppington a comparatively attractive location. Demand for the major community and educational facilities in the civic precinct is also driven primarily by growth in the surrounding residential population. Thresholds that require the provision of these facilities are likely to be reached in the medium term.</p> <p>DP&I therefore considers that the key to establishing solid and growing patronage of the SWRL is to encourage early residential development in the areas around the town centre. This will provide a passenger base for the rail line in the short to medium term, but will also drive the development of the mixed use major centre.</p>	
B599293	Land use around the Rossmore Stabling Facility (outside of the current Precincts) should be undertaken at this stage of planning given the progress of the SWRL.	<p>This issue was addressed as part of the boundary review process in 2009-10. While land use planning may provide long term clarity in terms of future land use, it will do nothing to address the impacts of the stabling facility on existing residents. Inclusion of this land in the Precinct is not an adequate substitute for the impacts of the project being addressed through mitigation measures, and the proponent has a clear responsibility through the Minister's Conditions of Approval to ensure that these impacts are appropriately addressed.</p>	N/A
B599293	TNSW objects to either TNSW or RMS being nominated as the acquisition authority for roads to be funded by the State Infrastructure Contribution (unless they are already the agencies responsibility). Further liaison is required on this matter.	<p>Noted. No changes are required to be made in Transport Assessment.</p> <p>This issue is to be resolved by DP&I and is not part of the AECOKM scope of work.</p>	N/A
B599293	The Development Control Plans need to re-iterate that	Refer to section 3.2.6 of the DCPs.	N/A

Submission ID	Issue	Response	Reference in Addendum report
	direct vehicular access to classified roads will be prohibited where access can be gained by an alternative non-classified road.		
B599293	Additional land for the SWRL substation needs to be zoned SP2 to allow for an access road and provision of Asset Protection Zones that would compromise the conservation outcomes required under the E2 Environmental Conservation zone currently proposed.	Noted. No changes are required to be made in Transport Assessment.	N/A

Appendix B

Technical Note - Additional Modelling Scenario

Memorandum

To Paul Robilliard Page 1

CC

Subject Austral and Leppington North Precinct Plan (Post Exhibition) - Additional modelling scenario

From Andy Yung

File/Ref No. 60159585 Date 28-May-2012

AECOM has undertaken an additional strategic modelling scenario to reflect the forecast land use scenario of the ultimate development of South West Growth Centre (SWGC). This additional work was requested by the Department of Planning and Infrastructure (DP&I) to provide inputs to Transport for New South Wales (TfNSW) for consideration whether further future proofing of the Fifteenth Avenue corridor is required to cater for long-term additional traffic to be generated by any development that may potentially occur post-2036.

The latest DP&I forecasts for the SWGC comprises 18 precincts, which include approximately 17,000 hectares of land and a planned capacity of 110,000 new dwellings or approximately 300,000 people. DP&I has supplied to AECOM forecast dwelling numbers for every five years from 2011 for each of the precincts inside the SWGC as shown in **Table 1**.

Table 1: Cumulative Dwelling Occupation by Precinct in the Growth Centres from 2011

Precincts	2011	2016	2021	2026	2031	2036	Post 2036
South West Rezoned Precincts							
Edmondson Park	415	2,615	6,315	7,600	7,600	7,600	7,600
Oran Park	565	3,115	6,015	8,515	8,786	8,786	8,786
Turner Road	500	2,250	4,150	4,991	4,991	4,991	4,991
South West Released Precincts							
Austral	-	900	2,800	4,800	6,500	6,751	6,751
Leppington North	-	1,050	4,050	6,550	7,314	7,314	7,314
South West Future Release Precincts							
The Northern Road Corridor	-	750	4,400	10,100	14,473	14,663	14,663
Camden Valley Way Corridor	-	-	2,550	11,750	21,468	27,519	28,019 (+1,036)
Bringelly Road / Elizabeth Drive Corridor	-	-	-	100	3,800	15,917	35,910 (+19,993)

Source: Department of Planning and Infrastructure, August 2010

The table shows that there may be an additional 21,000 dwellings to be developed post-2036, mainly along the Bringelly Road / Elizabeth Drive Corridor. These additional dwellings will generate additional traffic to the road network. The following figures provide the outputs of the modelling scenario to reflect the forecast land use scenario of the ultimate development of SWGC.

Figure 1: AM average peak hour traffic forecast (with ultimate development of SWGC)

Figure 2: PM average peak hour traffic forecast (with ultimate development of SWGC)

Figure 3: Difference of AM traffic forecast between 2036 scenario and ultimate SWGC development scenario

Figure 4: Difference of PM traffic forecast between 2036 scenario and ultimate SWGC development scenario

It should be noted that the 2036 road network configuration has been used as the network on which to model ultimate SWGC development scenario (traffic flows).

The traffic modelling suggested that additional traffic is expected to be generated by the additional dwellings and corresponding population increase in SWGC post-2036. The traffic increases are concentrated along the key arterial and sub-arterial road network in the SWGC including Camden Valley Way, Bringelly Road, Cowpasture Road and Fifteenth Avenue.

Within the Austral and Leppington North Precinct, there is no significant increase in traffic within the local and town centre road network as the modelling has assumed that the majority of the development within these two precincts would be fully developed by 2036. The increases of traffic along Bringelly Road and Fifteenth Avenue are generated by population increase in precincts on the western edge of the SWGC.

With the increase in traffic along Bringelly Road, assuming a typical lane capacity of approximately 1,200 to 1,400 veh/hr/lane and the planned six-lane corridor between King Street and Camden Valley Way, the majority of Bringelly Road is still capable of catering for the forecast demand with the full development of the SWGC, except the section of road between Camden Valley Way and Old Cowpasture Road. It is expected the forecast traffic on this eastern section of Bringelly Road will exceed capacity in around 2036, prior to the full development of the SWGC.

With the expected increase in traffic along Fifteenth Avenue, it is expected that three lanes in each direction will be required at Fifteenth Avenue, to the east of the Sydney Water Supply Channel, to meet the expected ultimate traffic generation. The traffic forecast suggested that two lanes in each direction along Fifteenth Avenue, to the west of the Sydney Water Supply Channel, will provide enough capacity to cater for the likely traffic demand generated by the full development of the SWGC. However, given the likely additional traffic demands along Bringelly Road post-2036, it may be worthwhile considering reserving a corridor along Fifteenth Avenue, to the west of the Sydney Water Supply Channel, such that it can be widened to three lanes in each direction to potentially relieve the likely traffic demands along Bringelly Road post-2036.

It should be noted that the traffic forecasts produced for post-2036 are indicative only based on a very long-term predicted land use scenario. There are a number of other factors that may affect the long-term traffic forecasts such as:

- Future revision of land use (population and employment) forecasts for the SWGC and wider Metropolitan Sydney.
- Timing and staging of delivery of all precinct development in the SWGC.
- Timing and staging of delivery of the SWGC road network strategy.
- Further improvements in public transport network and services as well as active transport network in the long-term.
- Change of car use pattern in the long-term.
- Change of travel and origin-destination pattern in the long-term.

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Figure 1

AUSTRAL AND NORTH LEPPINGTON PRECINCTS

Full Development - AM Peak

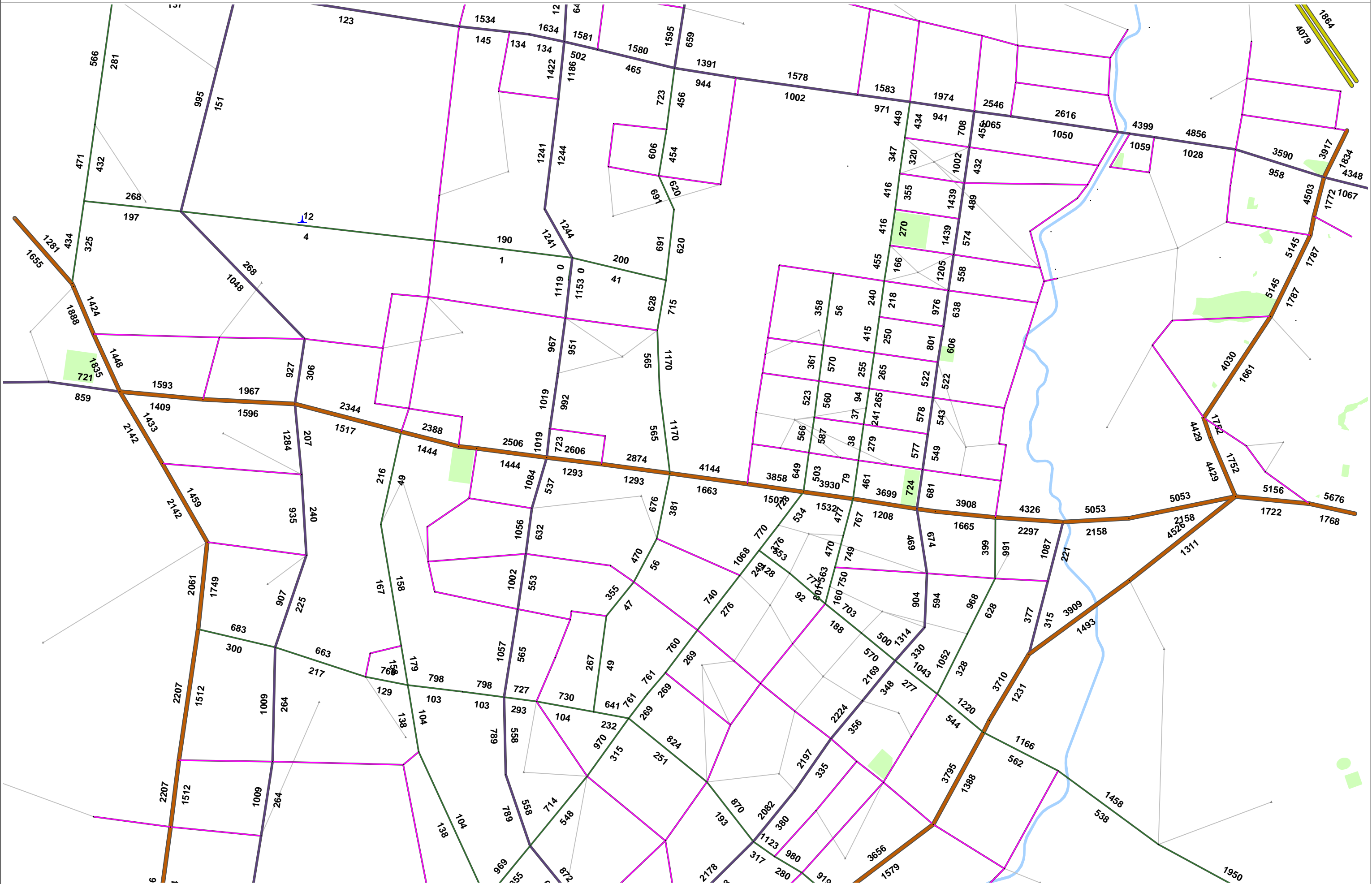


Figure 2

AUSTRAL AND NORTH LEPPINGTON PRECINCTS

Full Development - PM Peak

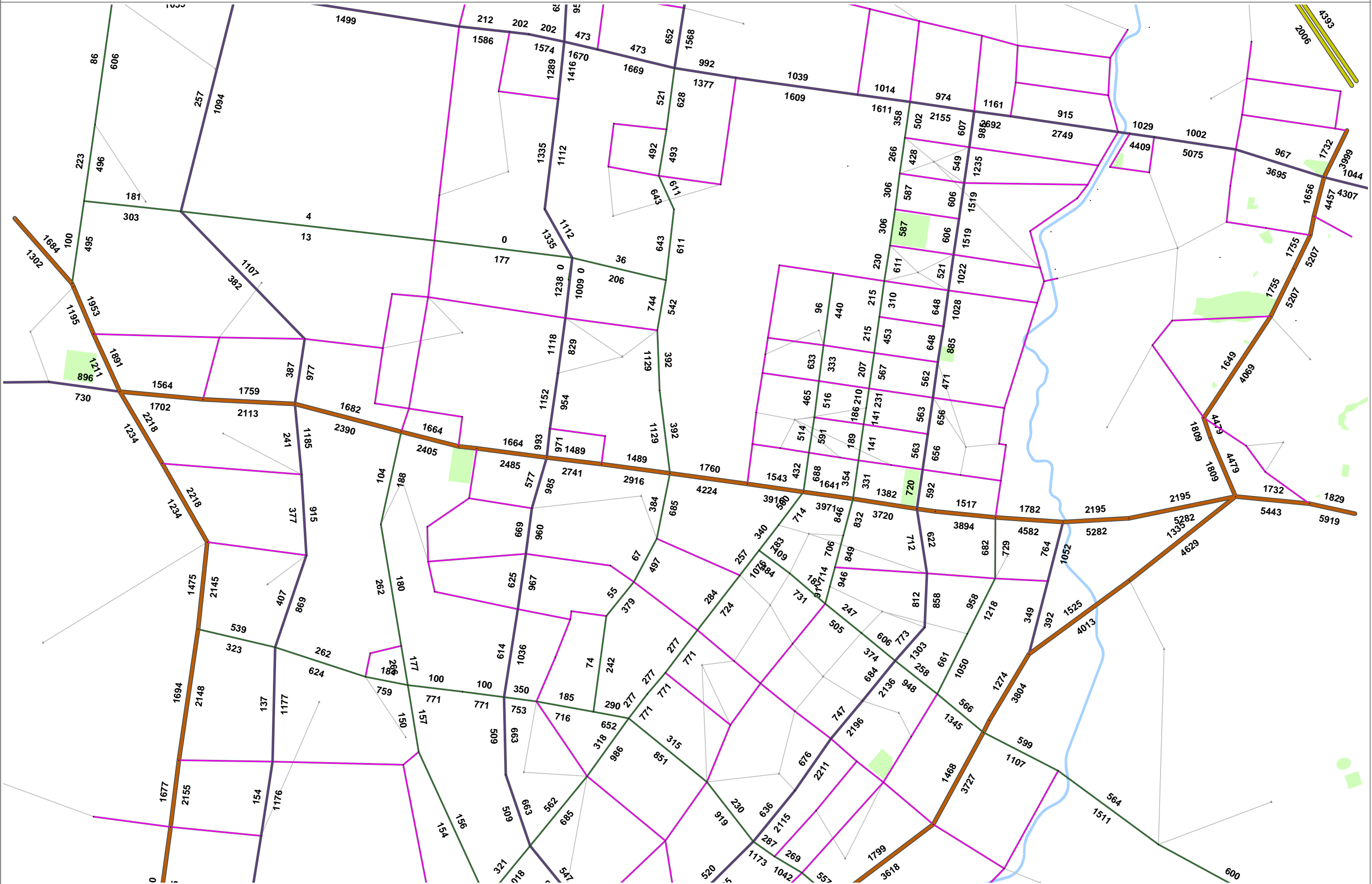


Figure 3

AUSTRAL AND NORTH LEPPINGTON PRECINCTS Full Development - AM Peak Difference with 2036 Scenario

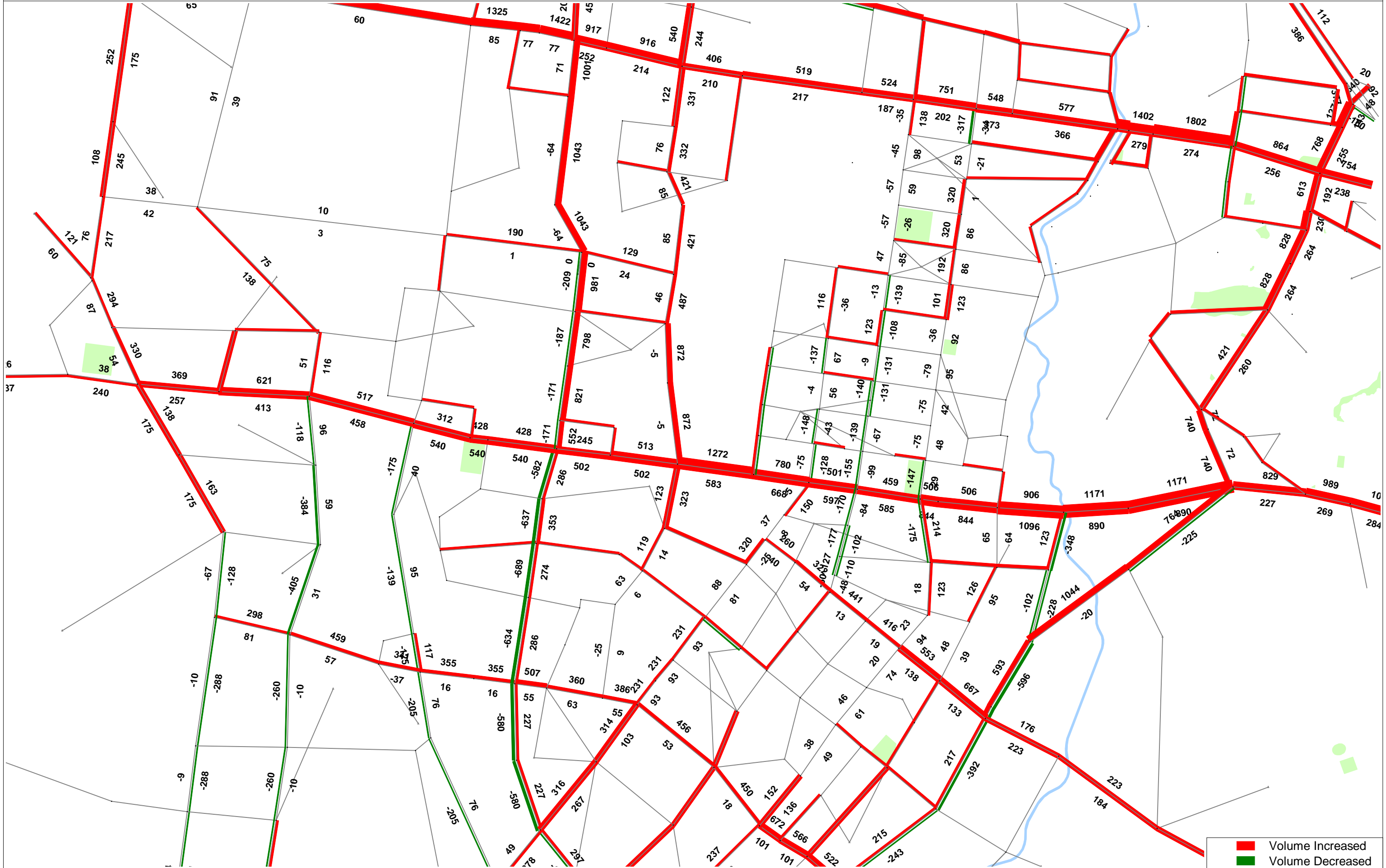


Figure 4

AUSTRAL AND NORTH LEPPINGTON PRECINCTS Full Development - PM Peak Difference with 2036 Scenario

