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44-66 O'Connell Street, Caddens
Proposed Subdivision/Masterplan

Traffic and Parking Impact Assessment

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Rev: D

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1.0 Introduction

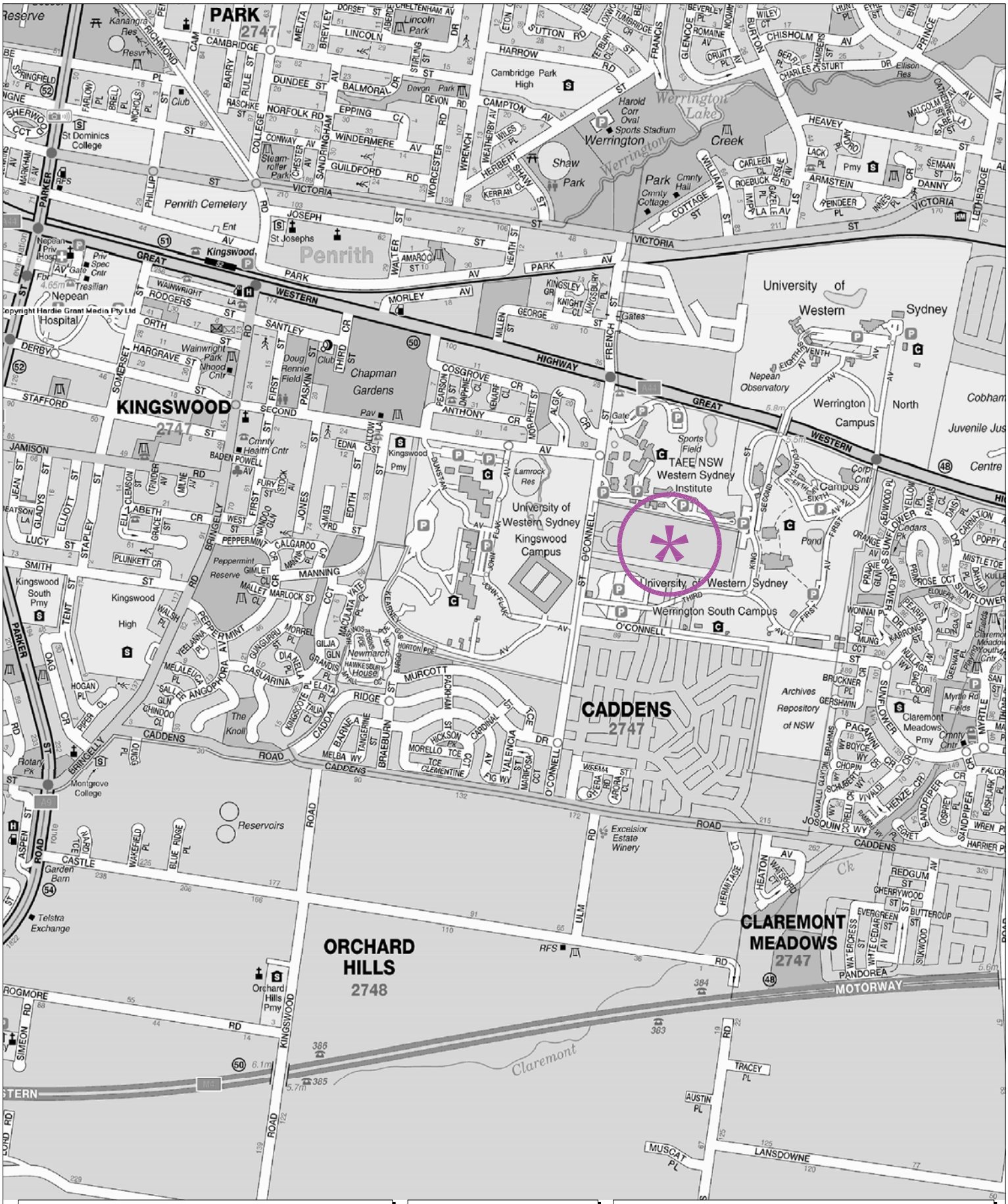
This report has been prepared to accompany a Development Application to Penrith City Council for a proposed residential subdivision on O'Connell Street at Caddens (Figure 1). The Caddens area is a large new urban precinct which will benefit from ready access to an upgraded arterial road system and the major regional facilities available nearby in Penrith CBD.

The development site is located towards the northern part of the precinct directly to the east of O'Connell Street and east of the Western Sydney University (WSU), Kingswood Campus. The subdivision application proposes a total of 252 torrens title house lots between Stages 1 through 4.

It is noted that Stage 5 (Lot 501) development would be subject to future (Stage 5) development application.

The purpose of this report is to:

* describe the site, the existing circumstances and the proposed subdivision
* describe the existing road network and the prevailing traffic conditions
* describe the future road network and traffic/traffic management circumstances
* assess the potential traffic implications of development on the proposed lots
* assess the suitability of the proposed subdivision access road and traffic control arrangements
* assess the appropriateness of provisions for lot access and servicing



LOCATION

FIG 1

2.0 Proposed Development

2.1 Site, Context and Existing Circumstances

The site (Figure 2) is a consolidation of three existing lots (Lots 3 and 6 in DP 593628 and Lot 2 DP 1217434) located in the northern part of Caddens to the south of the Great Western Highway.

The site located at 44-66 O'Connell Street, Caddens.

The surrounding uses comprise:

* the vast WSU campus to the north, west and east of the site
* the established residential areas further to the north, east and west
* the large TAFE NSW – Kingswood Campus to the north
* the new Caddens Precinct Centre (currently under construction) to the south
* the new residential subdivisions further to the south
* the WSU Werrington South Campus to the east

Caddens is a developing new suburb situated to the southeast of Kingswood residential/commercial/institutional area and the east of the WSU Kingswood campus. The large Penrith CBD, with its regional retail, hospital and educational facilities are located some 4kms to the west.

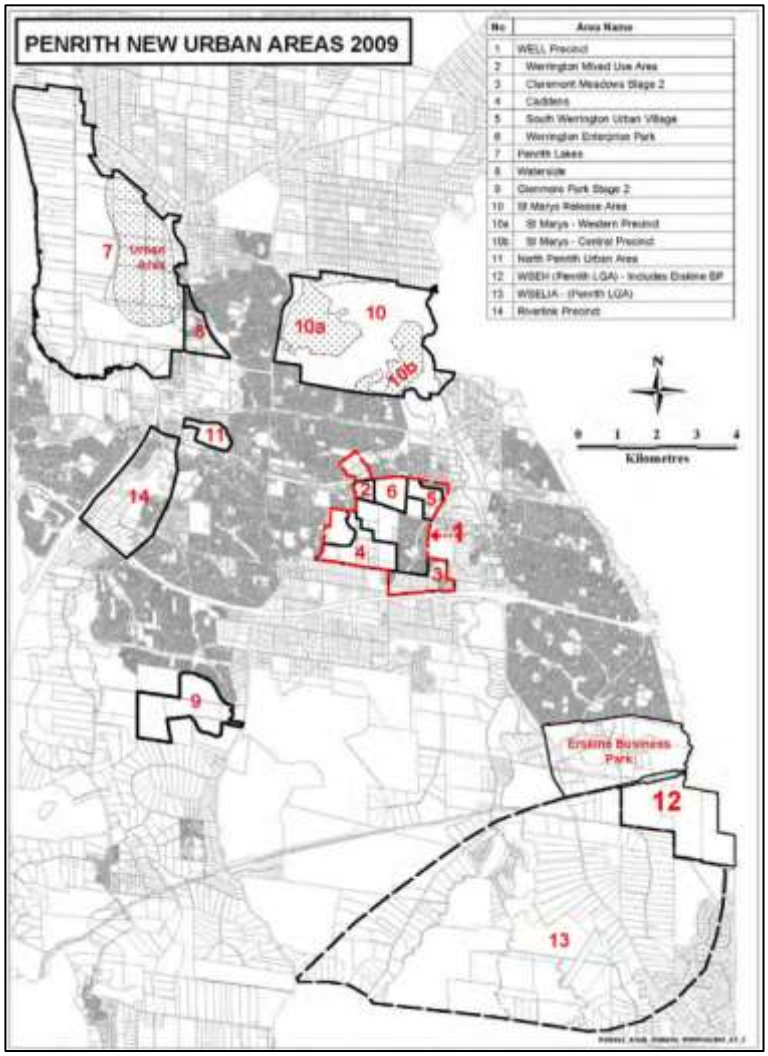
2.2 Precinct Planning

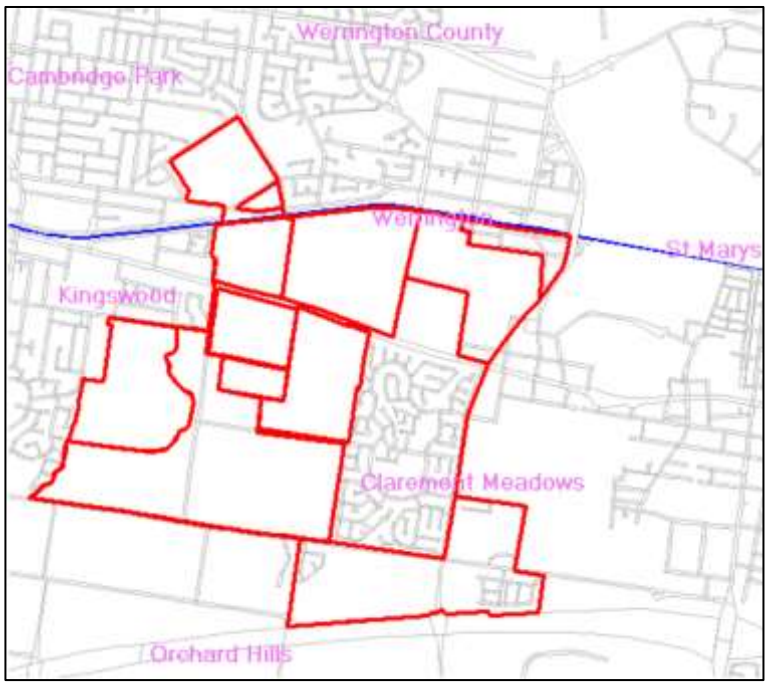
The site and surrounding lands have been identified for urban redevelopment and are centrally located within the Werrington Enterprise, Living and Learning (WELL) Precinct, as shown in the following figures.

N

SITE

FIG 2





The Precinct generally bounded by the Railway line to the north, Caddens Road to the south, Gipps Street to the east and the South Kingswood residential area to the west. The Precinct comprises a number of sub precincts including Caddens Release Area, South Werrington Urban Village, Claremont Meadows Stage 2 and Werrington Mixed Use Area and is planned to:

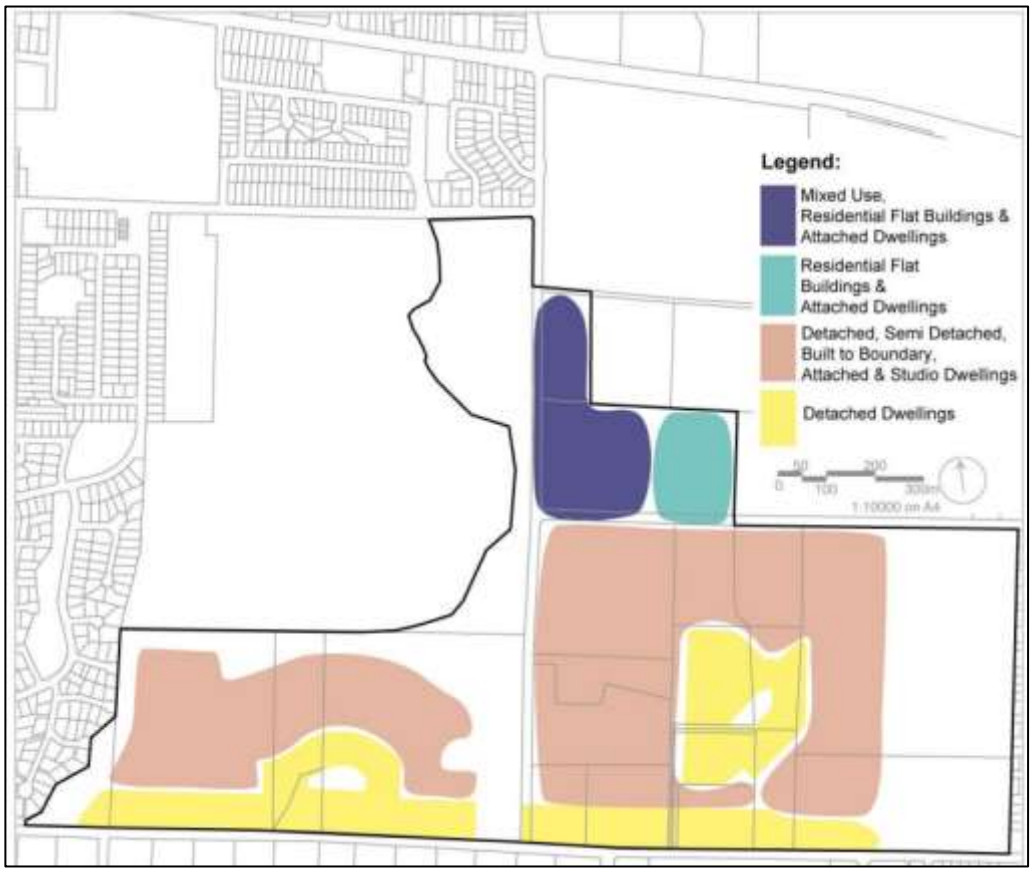
* be developed as a “Village” within the Penrith Centres Hierarchy.
* create a residential neighbourhood with 3,000 dwellings (including 100 dwellings for student accommodation) to accommodate around 8,400 people
* provide a mix of housing types with sustainable development
* create 7,800 jobs, including up to 6,000 jobs in the WELL Technology Park and around 350 jobs in the Precinct Centre.
* reduce environmental impact and facilitate greater social interaction
* provide open space amenity with landscaping retaining/protecting areas with high conservation value
* ensure to full advantage is made of bus services as well as cyclist and pedestrian networks

The Structure Plan, Dwelling Yield Targets, and Indicative Dwelling Type Location for Caddens is shown in the following figures.

Structure Plan

Dwelling Yield Targets

Indicative Dwelling Type Location



2.3 Proposed Subdivision Scheme

The proposed subdivision will adopt a relatively conventional 'grid' format with 16m wide "local streets".

The proposed subdivision will comprise a total of 252 residential lots:

* Stage 1 – 64 lots
* Stage 2 – 60 lots
* Stage 3 – 95 lots
* Stage 4 – 33 lots
* 8m-wide carriageway within 16m-wide road reserve
* 7m-wide carriageway within 12.5m-wide road reserve
* 5.5m-wide carriageway within 8m-wide road reserve
* an access road system including
    - 2 road connections to/from O'Connell Street North
    - 1 road connection to/from Caddens Corner access road

The proposal incorporates a minor departure from the road layout shown in the Caddens DCP, however, it retains the status quo in relation to the road connection on the eastern side of O'Connell Street North (as indicated in the DCP).

Details of the proposed subdivision scheme are provided on the plans prepared by Group Development Services, which accompany the Development Application and are reproduced in Appendix A.

3.0 Existing Road Network and Traffic Conditions

3.1 Road Network

The road network serving the Kingswood area (Figure 3) comprises:

- *M4 Motorway* – a principal arterial route linking between the City and the Blue Mountains crossing
- *Great Western Highway* – a State Road and arterial route which provides the secondary connection between the City and Penrith
- *Northern Road/Parker Street* – a State Road and a sub-arterial route which provides a connection between Campbelltown and Windsor
- *O'Connell Street* – a collector route which provides a connection between Great Western Highway and Caddens Road

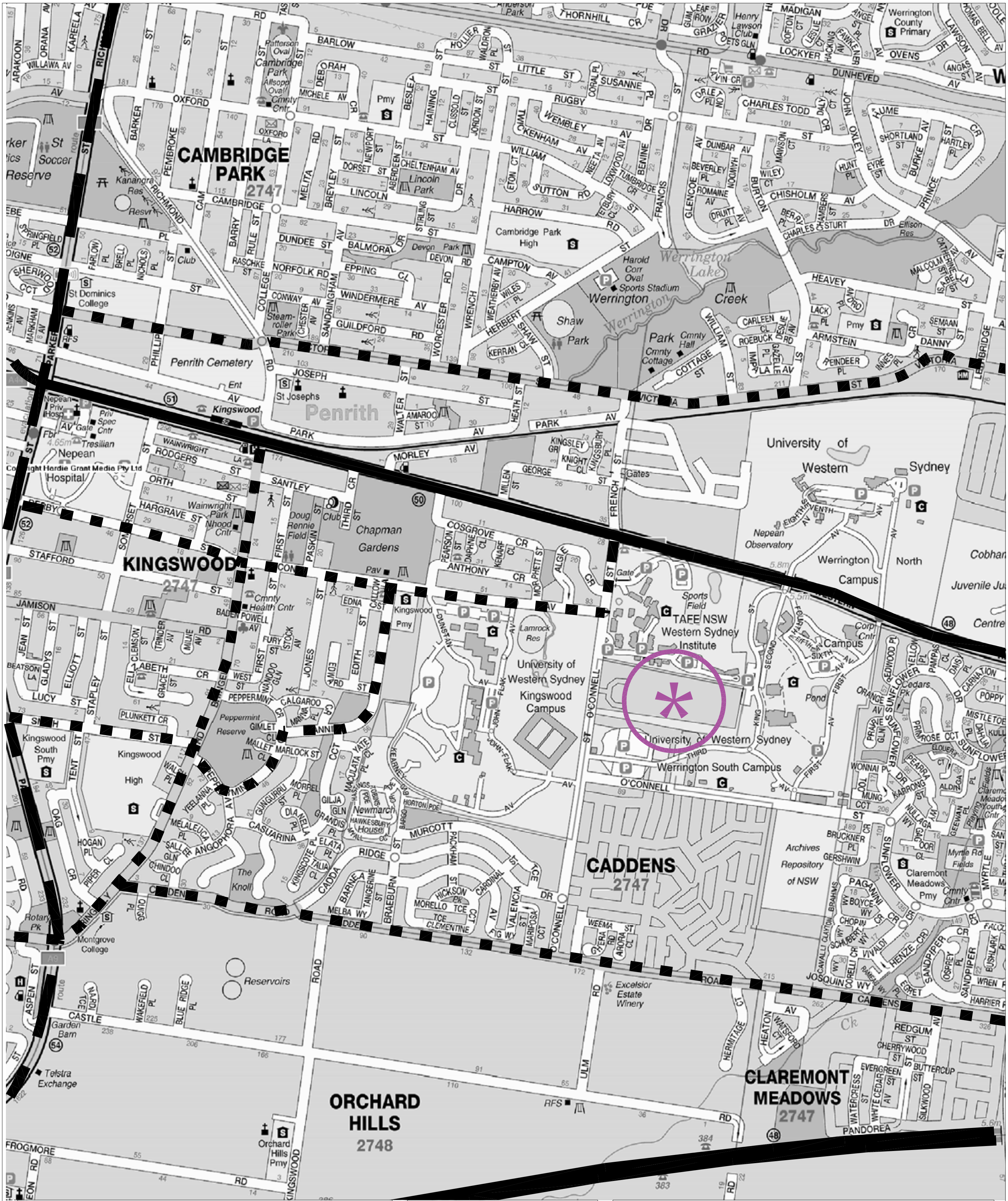
- *Caddens Road* – a collector route connecting between Kingswood and Claremont Meadows
- *Derby Street/Second Avenue* – a collector route connecting between the WSU Campus and Penrith
- *Manning Street/Peppermint Crescent* – minor collector road routes through Kingswood.

O'Connell Street has an 8.8-metre-wide sealed pavement which connects to Second Avenue to the north and O'Connell Street/ O'Connell Lane/WSU Access Road to the south.

3.2 Traffic Controls

The existing traffic controls which have been applied to the roads in the vicinity of the site (Figure 4) include:

- the 50 kmph speed restriction on the local and collector road system with some 40 kmph school restrictions (e.g., Manning Street and Second Avenue)

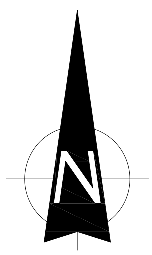


LEGEND

ARTERIAL

SUB-ARTERIAL

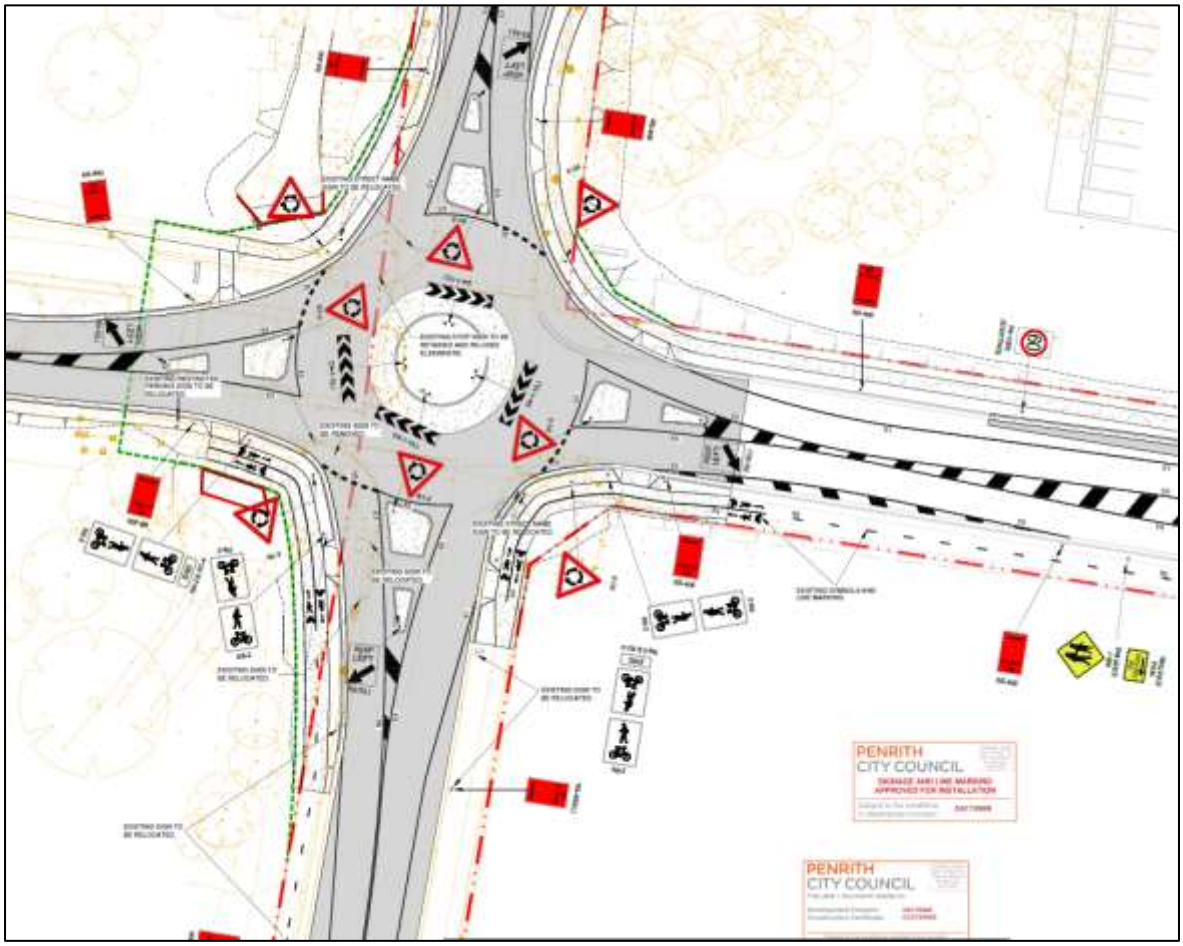
COLLECTOR

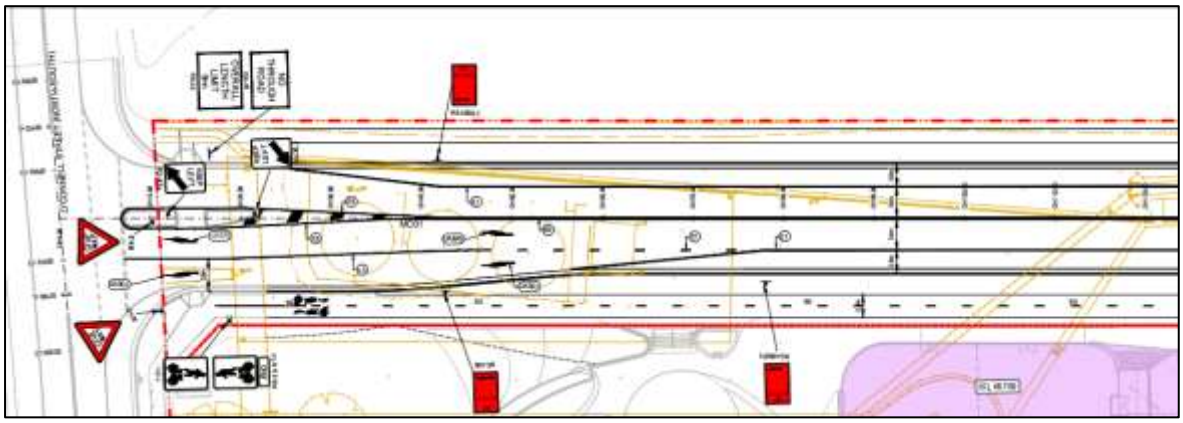


ROAD NETWORK

FIG 3

* the roundabouts:
    * along Second Avenue at the Bringelly Road, O'Connell Street, and WSU access intersections
    * at the recently upgraded O'Connell Street/ O'Connell Lane and WSU access intersection (see the following figures)





* the traffic signals on:
    - the Great Western Highway at the Bringelly Road and O'Connell Street intersections
    - Parker Street at the Derby Street and Bringelly Road intersections
* the marked foot crossing on Second Avenue at the Manning Street intersection

3.3 Traffic Conditions

An indication of the existing traffic conditions in the vicinity of the site is provided by the traffic surveys undertaken at the O'Connell Street/ O'Connell Lane/WSU Access Road intersection during the weekday AM and PM peak periods. The results in terms of vehicle movements per hour are summarised in the following:

		AM	PM
WSU Access	EB	1	6
	RT	2	40
	LT	14	54
O'Connell Street (North)	SB	74	165
	RT	46	19
	LT	79	128
O'Connell Street (East)	WB	6	2
	RT	120	120
	LT	47	55
O'Connell Street	NB	229	50
	RT	64	42
	LT	41	4

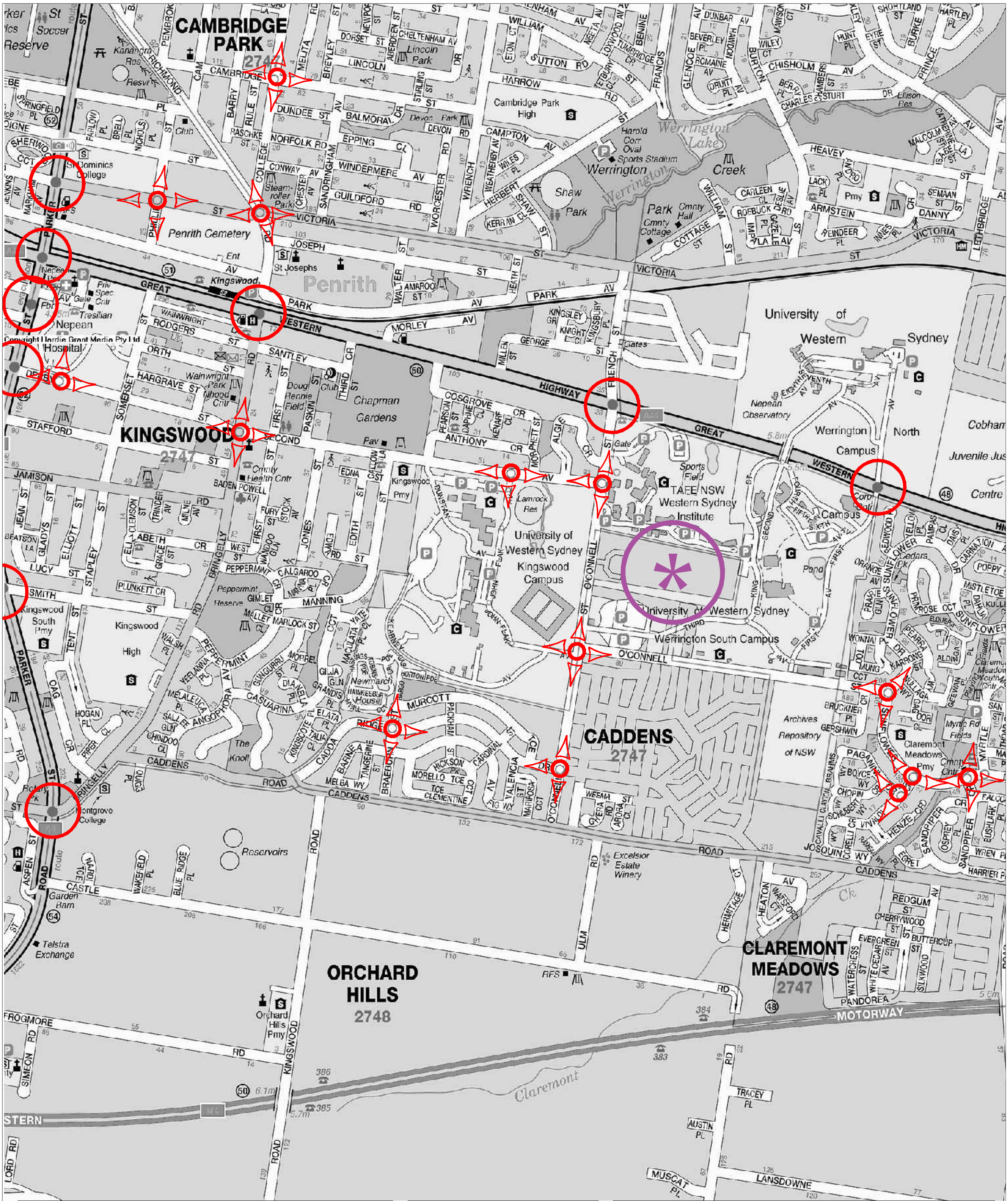
The operational performance of this intersection has been assessed using SIDRA and the results indicating satisfactory performances are provided in Appendix B and summarised in the following, while the criteria for interpreting the results are reproduced overleaf:

AM Peak		PM Peak	
LOS	**AVD**	**LOS**	**AVD**
A	8.4s	A	9.0s

The results of the SIDRA assessments indicate that this intersection operates satisfactorily and traffic conditions on the road system in the vicinity of the site are quite satisfactory where vehicle access and movements are facilitated by the priority and roundabout controls.

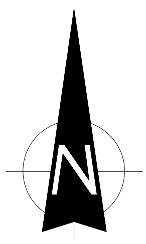
3.4 Transport Services

Bus services in the vicinity of the site are provided by Busways, which operate routes 770, 774, 775, 776 and 835 along Second Avenue, O'Connell Street and Manning Street. These services provide links to the Kingswood Railway Station, Penrith



Legend

- TRAFFIC SIGNAL CONTROL
- ROUNDABOUT
- RESTRICTED TURNING MOVEMENT



Traffic Controls

Fig 4

CBD/Nepean Hospital and St Marys CBD with 10-minute frequency during the weekday peak periods.

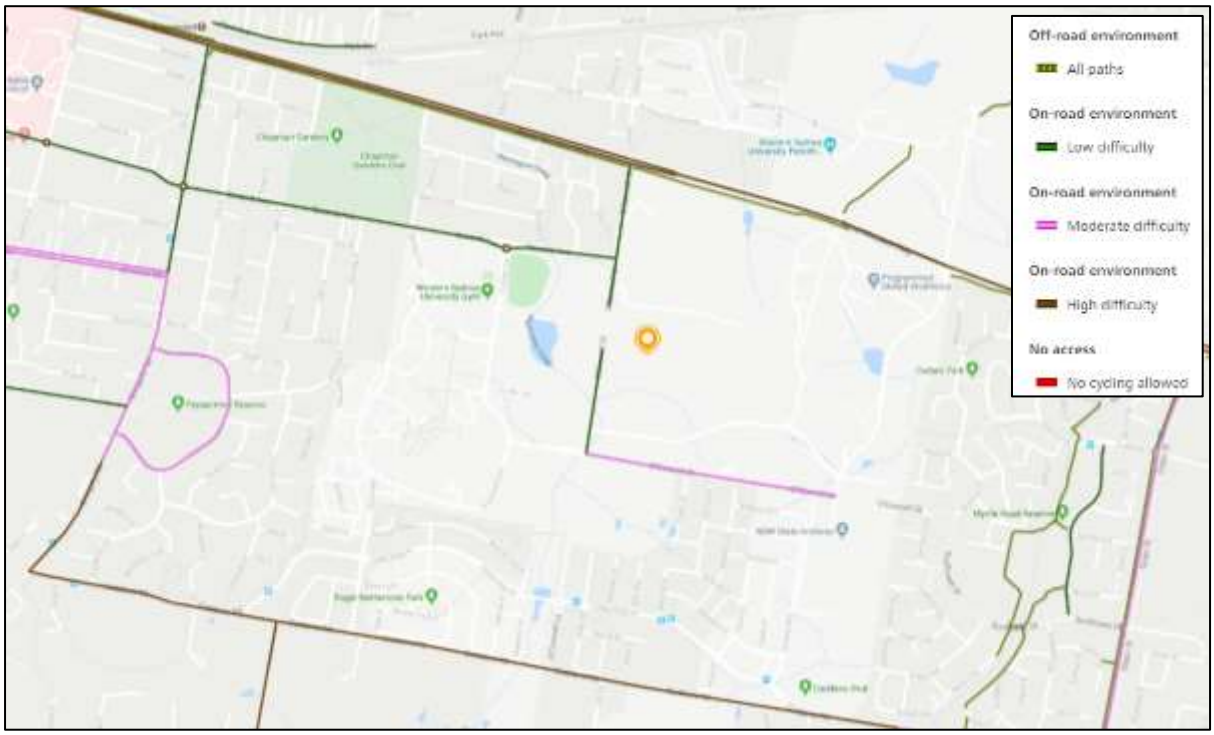
Details of the bus and rail services available near the site are provided in Appendix C. Additionally, WSU Penrith adopts a responsible policy of encouraging and facilitating travel to/from the precinct by public transport, walking and cycling as well as carpooling. A Transport Access Guide (TAG) was prepared and presented on the WSU website (Appendix D). The TAG documents the available public transport services (bus and rail), including walking times, frequency and fares while WSU Penrith also provides a free shuttle bus service (see the following figure) for staff and students operating every 10 to 15 minutes connecting the campuses with Kingswood Railway Station.

3.5 Cycling Facility

Off-road shared paths are provided on the northern side of the Great Western Highway between Parker Street and Bringelly Road, crossing at the intersection of the Great Western Highway /Bringelly Road, and continue on the southern side of the Great Western Highway towards Pages Road. A range of on-road bicycle facilities are provided

along the Great Western Highway, Parker Street, Richmond Road, College Street, Bringelly Road, Derby Street, Second Avenue, Jamison Road and O'Connell Street are available in the vicinity of the site.

WSU Penrith also provides an internal network of shared pathways which link to the regional network (Appendix E). The Kingswood Campus connects to the cycleway running along Second Avenue. Extracts from the RMS Cycleway Finder illustrating the cycleways in the vicinity of the site are shown in the figures below.



Source: https://www.rms.nsw.gov.au/maps/cycleway_finder

3.6 Pedestrian Facility

There will be a dedicated shared path along the southern side of O'Connell Street and the western side of O'Connell Lane. Pedestrian footpaths within the WSU campus. These paths provide good connectivity between the site and the Kingswood Centre and Railway Station and surrounding developments. To allow safer pedestrian crossing, the following amenities are available in the vicinity of the site:

- A shared bicycle/pedestrian refuge is currently provided on the southern leg of O'Connell Lane/O'Connell Street intersection.
- A pedestrian refuge is provided on the southern and western legs of the intersections of Second Avenue/O'Connell Street
- A pedestrian refuge is provided on the southern leg of the intersections of Algie Crescent/O'Connell Street

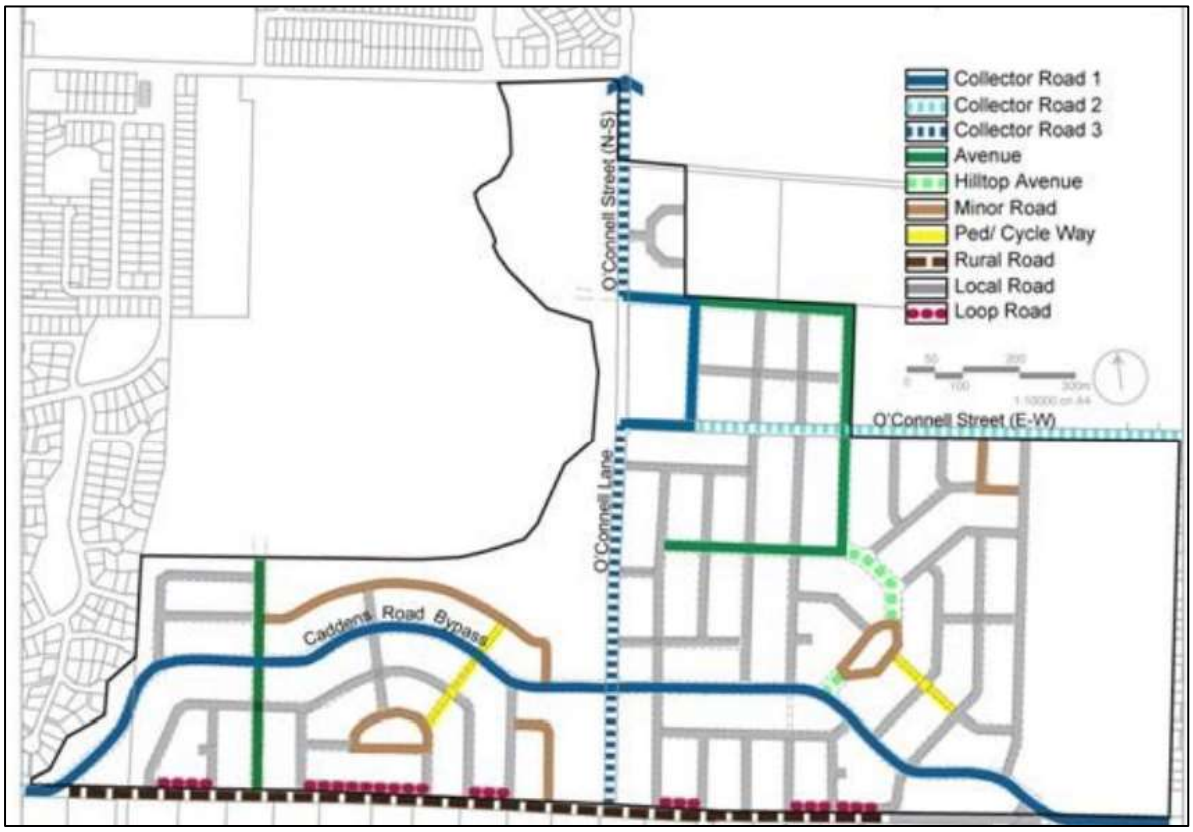
4.0 Future Road Network, Traffic and Transport Circumstances

4.1 Road Network

The Caddens Release Area includes the portion of the site which is located within the "Precinct Centre" sub precinct as defined by the WELL Precinct.

Extracts from the Penrith DCP 2014, showing the design principles for the street hierarchy is shown in the following figure.

Caddens Road Hierarchy



Key features of the DCP that are relevant to the development concept for the site include:

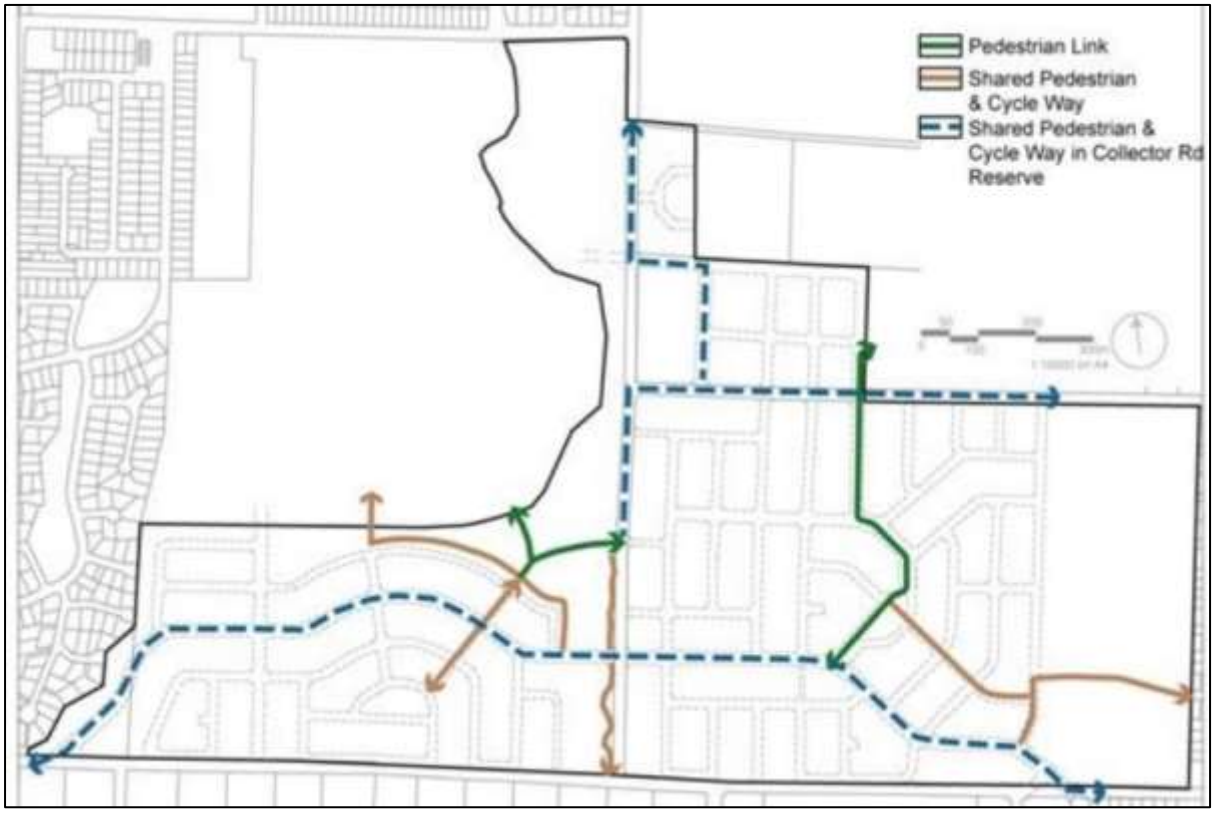
* The primary vehicle access to/from the site is via a new intersection at O'Connell Street

* O'Connell Street, along the Site's frontage is expected to be upgraded to a Collector Road 3

* A new Collector / Avenue Road is to be constructed along the Site's southern boundary with the Western Sydney University land to service the Precinct town centre. It is envisaged that the intersection of this road and O'Connell Street will be a higher-order intersection control than the site access O'Connell Street, along the Site's frontage is expected to be upgraded to a Collector Road (Collector Road 3)

4.2 Bicycle and Pedestrian Network

Details of the planned bicycle and pedestrian network are provided on the following figure.



There will be a dedicated shared path along the eastern side of O'Connell Street and the southern side of the new Collector/Avenue road as well as through Caddens Precinct Centre.

All local and collector roads will have paved footways. Shared bicycle/pedestrian refuges are proposed on the eastern and southern legs of the new roundabout at the O'Connell Street/ O'Connell Lane/WSU Access Road to facilitate pedestrian and cyclist crossings. (see the following figure).

The above measures provide opportunities for the development of the site to link to the broader networks and facilitate improved connectivity through the site

4.3 Transport Services

Bus

The following figure provides an indicative concept plan of the route and bus stops.

The adjacent Caddens Precinct Centre proposes to upgrade the existing bus stop to the western frontage of its site along O'Connell Street.

With the eastern boundary of the site being some 530m from O'Connell Street, bus stops located on O'Connell Street would result in a vast majority of residents living within the site located within the 400m catchment of the O'Connell Street bus stops.

It is proposed to maintain the bus stops on O'Connell Street based on the following reasons:

- the diversion of the existing bus route from the main road into a road with lower hierarchy as compared to O'Connell Street would not be operationally efficient
- the internal roads are not designed to accommodate a 12.5m – 15m bus. A larger footprint for road intersections will be required to accommodate for bus turning
- wider intersection will likely lead to higher travelling speed by general traffic, which results in poor amenities for pedestrians for the site and the adjacent

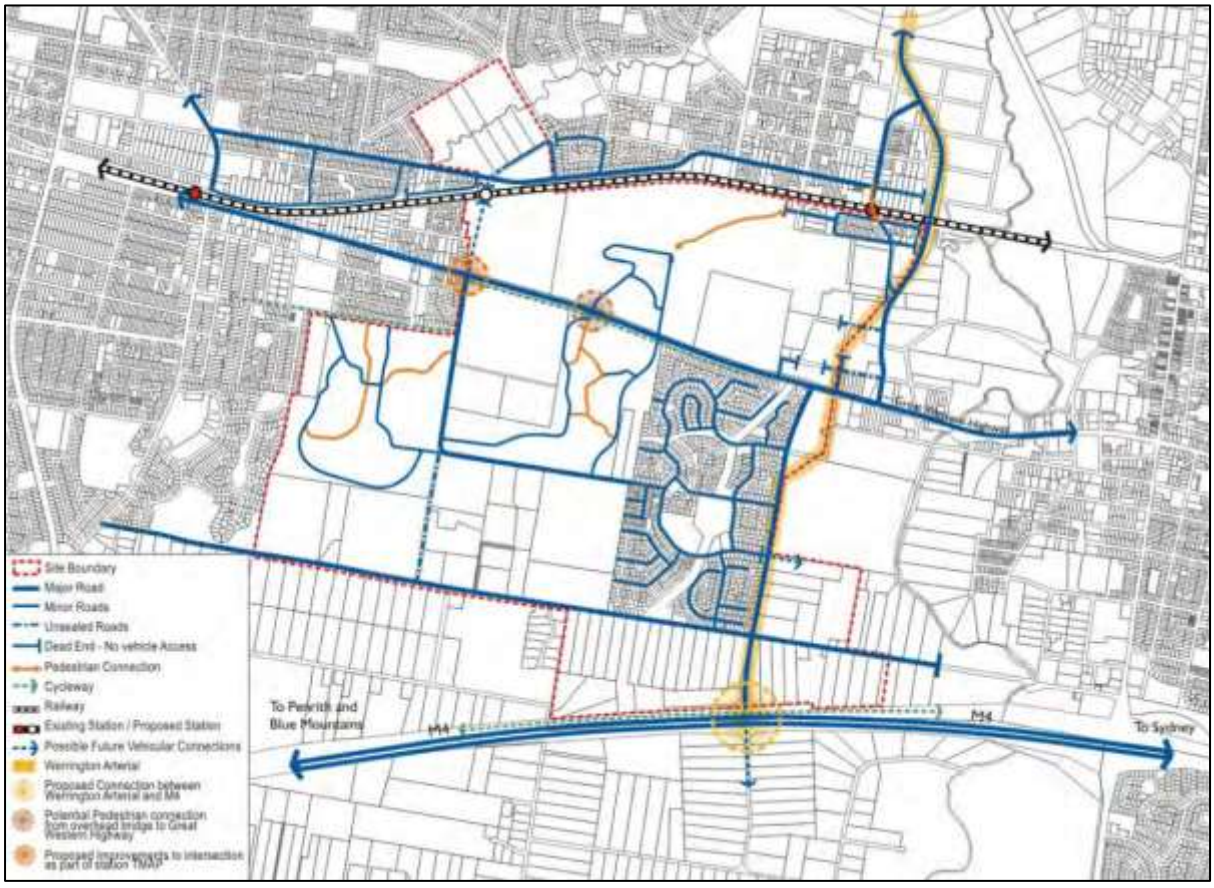
Caddens Precinct Centre.

Shuttle

The shuttle bus services stated in the WELL Precinct Strategy 2004 can complement the bus services by providing linkages to the site with stops located along both sides of the “Avenue” prior to turning right onto the Future WSU Road with additional stops. It is envisaged that these bus services would also serve the site with bus stops located to cater to the employees and tenants of the Caddens Precinct Centre.

Rail

The WELL Precinct TMAP and Section 94 Plan identifies a planned WSU railway station (see the following figure), which, together with regular and shuttle bus services, will significantly increase the attractiveness of public transport modes for travel to and from the WELL Precinct and the site.



5.0 Proposed Subdivision Road System

Whilst there is flexibility permitted in much of the future access road system, there are a number of “fixed” roads and roads which have already been fully or partially constructed and planned for construction.

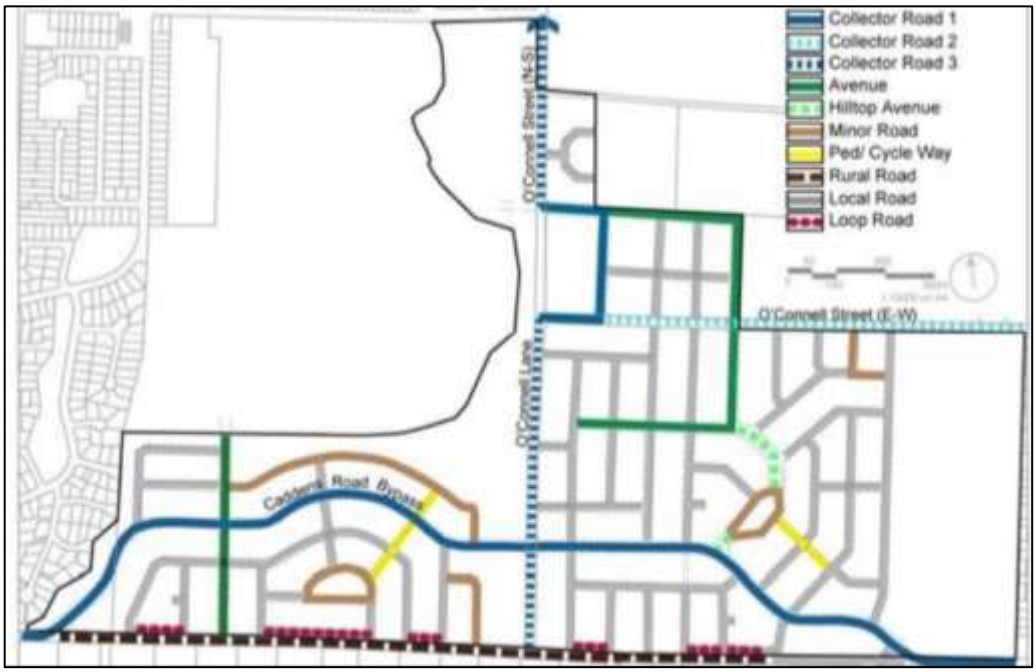
The proposed road system deviates slightly from the road network identified in the DCP; however, this proposed change does not impact on any “fixed” or existing roads. These deviations comprise:

* The primary vehicle access will be via Collector Road 1.
* deletion of the 2 dog-leg connections to join Collector Road 3

In compliance with the DCP, the proposed roadworks will involve:

- **Upgrading of O’Connell Street**

  The roadway along the site frontage will be constructed to the centreline with a carriageway and footway, which accord with the requirements for a 12m wide roadway in a 20.6m wide reserve.



- **Construction of an east-west local road between the subdivision linking to the Future WSU Road and O'Connell Street and to accommodate accesses to individual dwellings**

  The roadway will be constructed with a carriageway and footways which accord with the requirements for a 9m wide roadway in a 16m wide reserve.

- **Construction of the Avenue between O'Connell Street East and the Subdivision**

  The roadway will be constructed with carriageway and footways which accord with the requirements of an 8m wide roadway in a 9m wide roadway in a 16m wide reserve.

- **Construction of local roads off the Avenue to accommodate accesses to individual dwellings**

  The roadways will be constructed with carriageways and footways on the western side, which accord with the requirements of an 8m wide roadway in a 16m wide reserve.

- **Construction of the Local Road 01/O'Connell Street North intersection**

  The intersection will be designed as a stop-controlled intersection on the Local Road 01 approach permitting all turning movements. This is consistent with the intersection control arrangement for the shared southern site access with the adjacent Caddens Precinct Centre.

6.0 Parking

6.1 Parking and Access

The DCP requires that:

- Driveway crossings are to be minimised
- The need for on-street parking is to be minimised
- Two parking spaces are to be provided for each dwelling (at least one space located behind the 'set back')
- Parking spaces are to be convenient, safe and have sufficient space for vehicle manoeuvrability

It is apparent that the proposed lots and their relationship to the access road system will be able to be developed for dwellings with compliant provisions for access and parking.

6.2 Servicing

Refuse will be removed from the street by Council's collection service. Service personnel and small service vehicles may be able to park in the frontage driveways. However, the nature of the proposed local road carriageways will suitably provide for the on-street standing of service and delivery vehicles.

The geometry of the proposed local road network will accord with the Council's design criteria. It will accommodate the turning and manoeuvring requirements of Council's refuse vehicles and other service/delivery vehicles.

7.0 Traffic

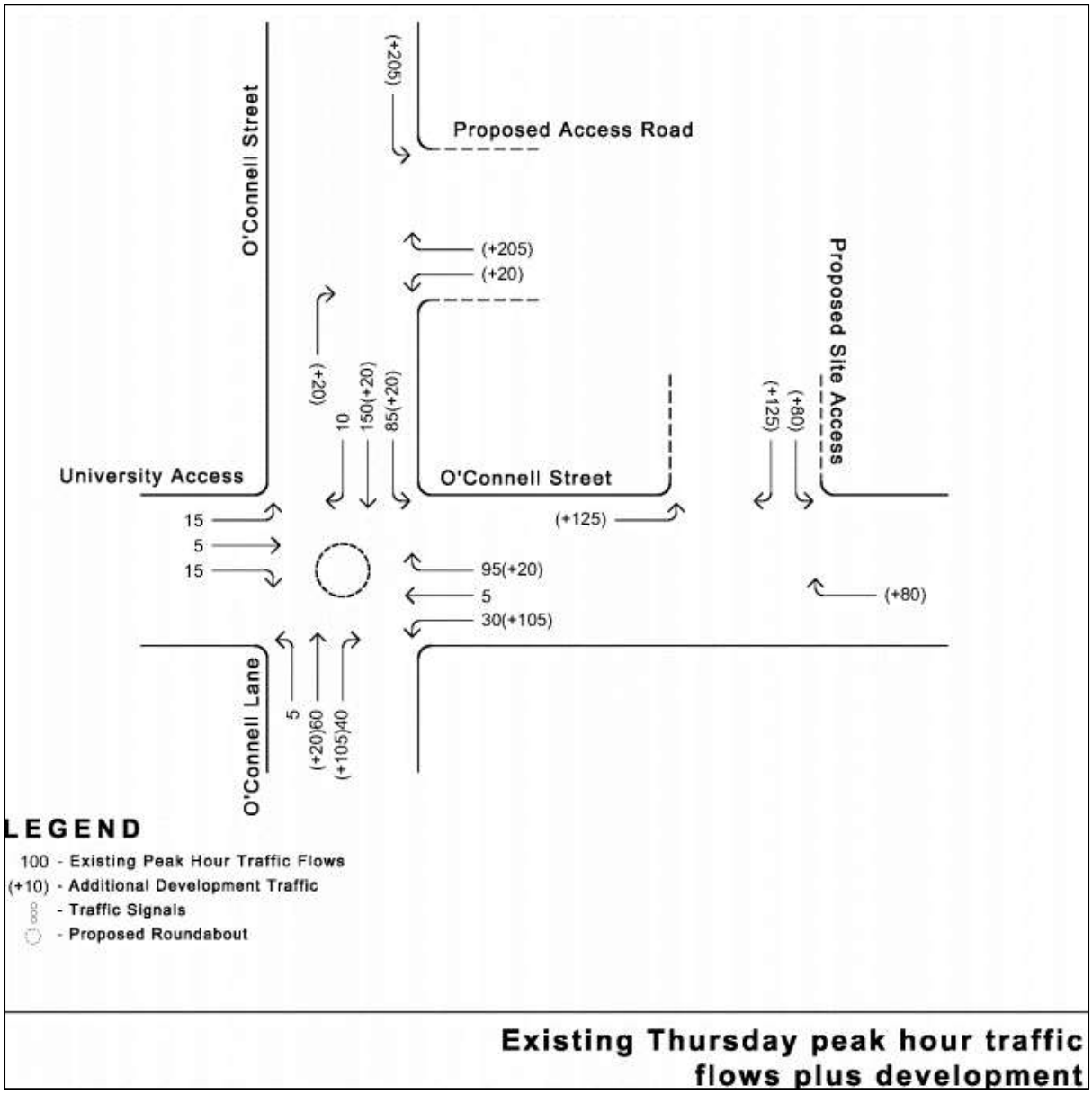
The RMS Development Guidelines specify a peak traffic generation rate of 0.85 vtph per dwelling for new residential suburbs noting that up to 25% of trips may not be on the external road network (i.e., to/from local schools and shops, etc.). However, there is no survey assessment basis to these criteria and the more recent RMS Circular adds confusion to the situation as the surveyed precincts include school, retail, hospital and medical centre facilities and present a variation in excess of 100%.

TTPA undertook a very extensive survey of the traffic generation of Glenmore Park Stage 1 (Appendix F), which comprised some 5,447 dwellings and established an "external" generation rate of 0.65 vtph per dwelling in the peak periods. It is understood that this is very similar to the generation rate used by the Growth Centres in its modelling for new release areas. Based on the above established rate, the proposed subdivision of 252 dwellings will provide for the resultant peak period generation is 164 vtph as follows:

AM		PM	
IN	**OUT**	**IN**	**OUT**
33	131	131	33

A SIDRA assessment was undertaken for the future performance of the Avenue/O'Connell Street and O'Connell Street/ O'Connell Lane/WSU Access Road intersections. The assessment considered the traffic generated by the proposed subdivision as well as Caddens Precinct Centre.

Given that the traffic generated by the adjacent Caddens Precinct Centre will have its greatest effects during the weekday PM peak period when it combines with other traffic on the surrounding road network, the SIDRA modelling has been completed for PM peak period. The traffic generated by the adjacent site was extracted from the Colston Budd Rogers & Kafes traffic report dated October 2017. See the following figure.



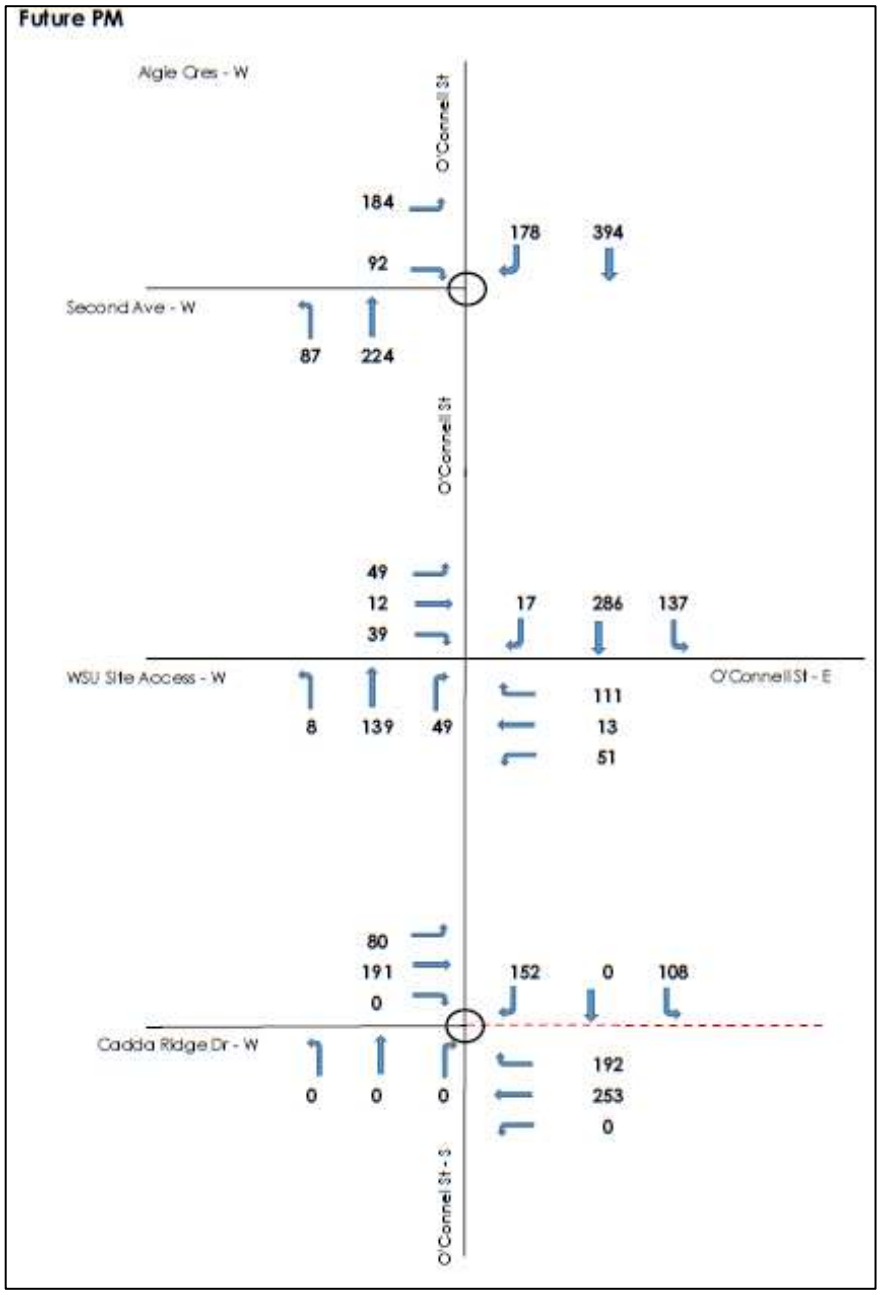
Existing Thursday peak hour traffic flows plus development

The future increase over a 20-year period in intersection turning volumes was extracted from the Concept Plan DA report prepared by The Transport Planning Partnership (TTPP) for a site on 46-66 & 46A O'Connell Street, Caddens. The future PM peak turning volumes are shown in the following figure. As indicated in the TTPP report, the future base case traffic conditions have been based on traffic flow scenarios from the following reports:

- WELL Precinct TMAP (Maunsell / AECOM 2007)
- Caddens Release Area TMAP (MWT, 2008); and
- Caddens Knoll DA Traffic Assessment (Halcrow, 2012).

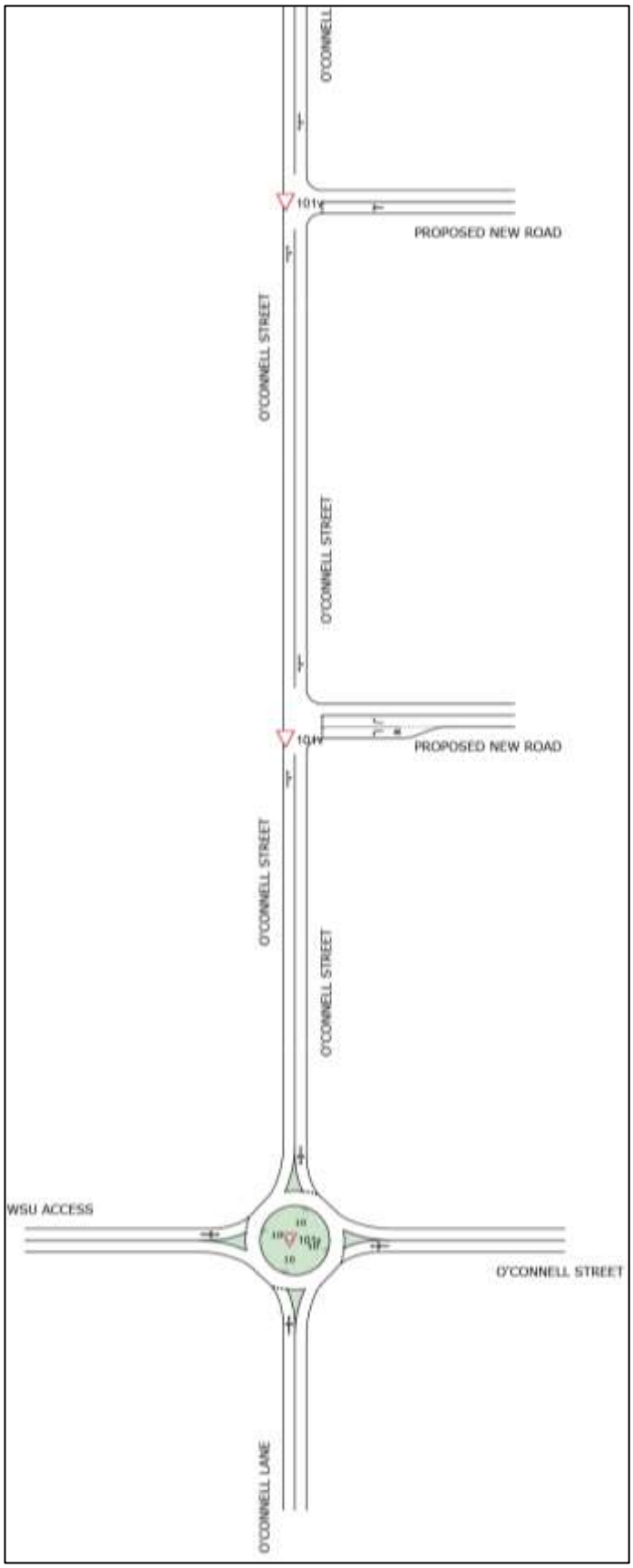
The TTPA report has assumed that the future developments to the east and north including the current WSU and TAFE lands are in accordance with the expectations set out in the WELLS Precinct planning and site design as set out in the Penrith DCP (2014).

Future Background Traffic during Thursday PM Peak

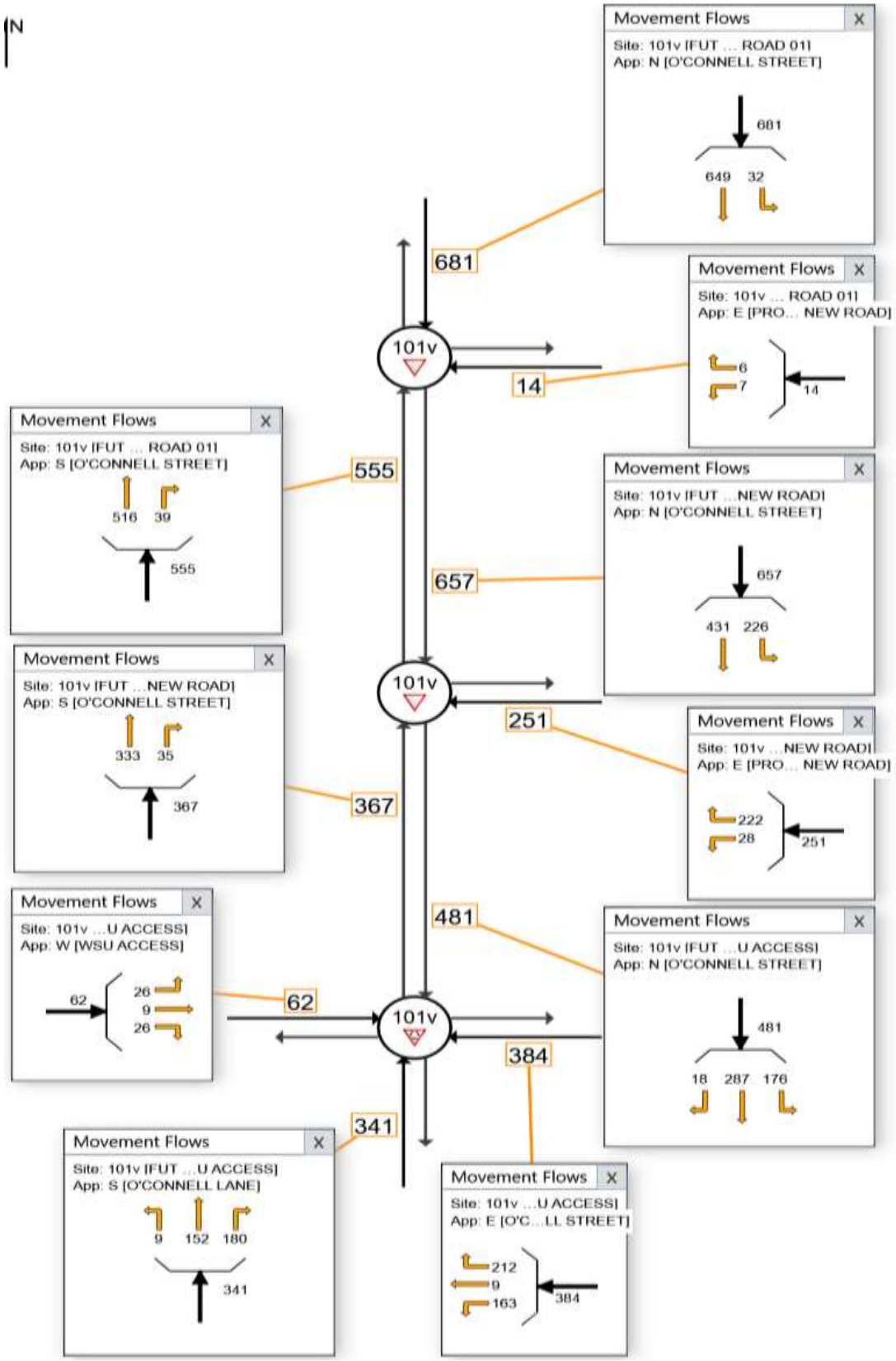


The additional traffic resultant from the 20-year traffic growth considering the cumulative traffic conditions associated with the envisaged development within the WELLS Precinct and specifically the Caddens Release area and the development has been distributed onto the prevailing traffic flows and assessed using SIDRA Network.

The SIDRA network layout of the proposed intersections is in the following figure.



The future traffic outcome with the proposed development for the PM peak periods is identified in the following figures.



The assessment detailed in Appendix B reveals that satisfactory operations will continue as follows:

	PM Peak	
Intersection	**LOS**	**AVD**
Proposed Road 01/O'Connell Street	B	16.3s
Proposed New Council Road/O'Connell Street	B	15.0s
O'Connell Street/ O'Connell Lane/WSU Access Road	A	12.0s

In addition, the traffic generation of this order of magnitude being equivalent to some 2-3 vehicles every minute during the peak hours is minor in the context of the local and arterial road system and will not act to create unacceptable traffic congestion or conflict either at the vehicle access point or at adjacent intersections.

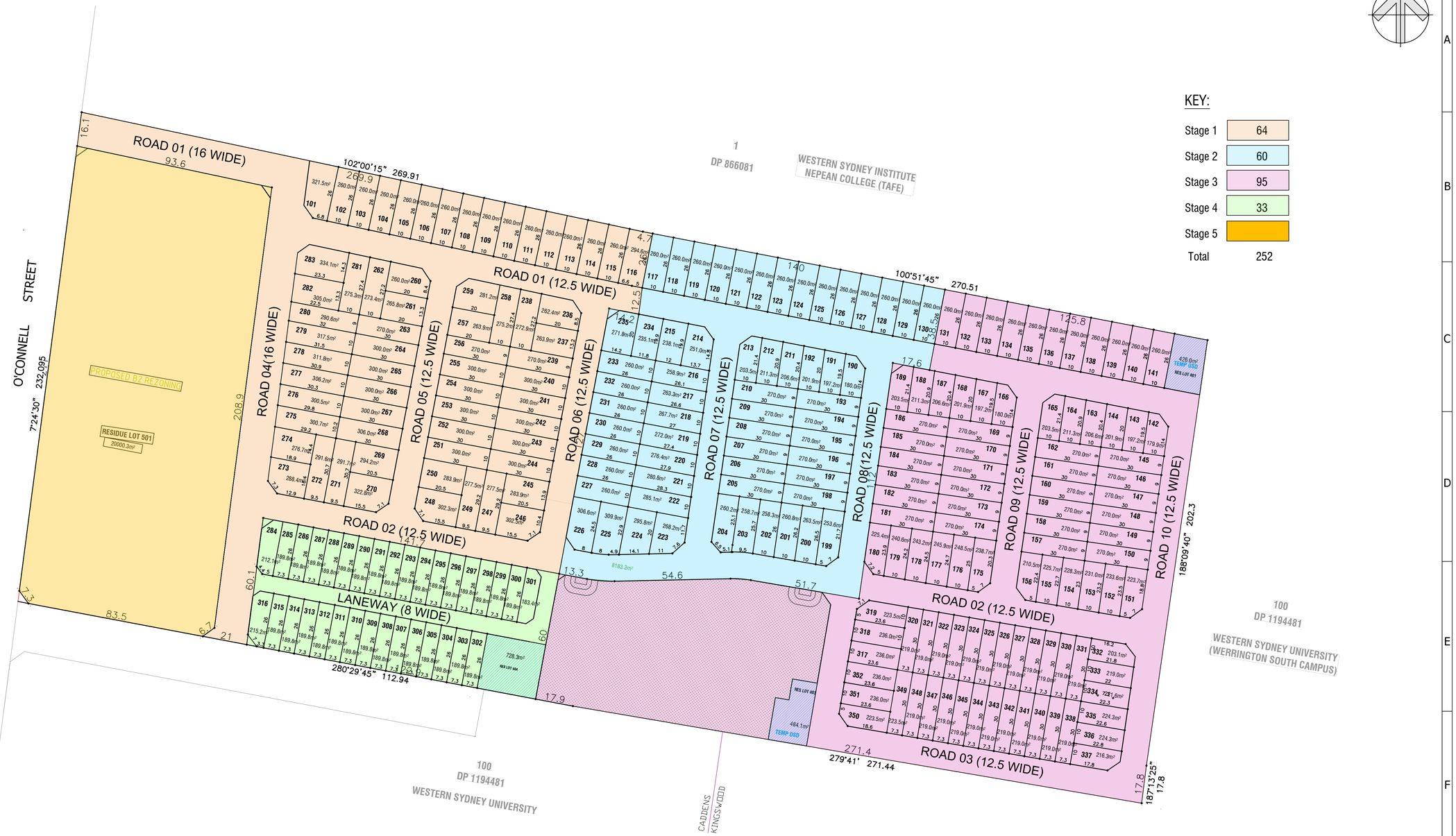
8.0 Conclusion

The proposed subdivision on O'Connell Street at Caddens will provide for the development of 252 dwellings. Assessment of the proposal has concluded that:

* the proposed road system will be appropriate and generally compliant with the DCP specifications
* the provisions for vehicle access and servicing will be satisfactory
* there will be no adverse traffic implications

Appendix A

Proposed Subdivision Scheme



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DRAWING CHECK PRINT		
DATE RAISED 23 / 03 / 21	BY	DATE
DRAFTING CHECK		
BACK-DRAFTING CHECK		
NEXT ACTION		

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	BY	DATE
E	Staging	MT	17/03/21
D	Amended Layout	MT	19/02/21
C	Amended Layout		10/12/20
B	Amended road widths	MT	23/11/20
A	ISSUED FOR -- ENGINEERING APPROVAL	--	??/01/2020

BAR SCALES

0 10 20 30 40 A1 / A3
1:1000 / 1:2000

NOTE: BOUNDARY AND LOT DIMENSIONS, ALIGNMENTS AND AREAS ARE PROVISIONAL AND ROUNDED TO NEAREST DECIMAL PLACE. AS SUCH THESE AREA ARE SUBJECT TO FINAL SURVEY.

SURVEY	HEIGHT DATUM	LGA	AUTHORITY REFERENCE
-	AHD	-	-
DESIGN	CHECKING	DA No.	DATE
-	-	-	-
DRAWN	CHECKING	CC No.	DATE
-	-	-	-

PROJECT MANAGERS • SURVEYORS • PLANNERS • ENGINEERS
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SITE DESCRIPTION
PLAN OF SUBDIVISION OF LOT _

THIS PLAN IS PRELIMINARY ONLY AND IS SUBJECT TO AMENDMENTS AND CHANGES DUE TO FURTHER INVESTIGATION, LATENT FINDS, UNKNOWN SITE CONDITIONS, SURVEYING AND LOCAL COUNCIL STATE AND FEDERAL GOVERNMENT AUTHORITIES RECOMMENDATIONS AND APPROVALS. REPORTS AND INFORMATION REQUIRED TO FINALISE THIS PLAN WILL INCLUDE BUT WILL NOT BE LIMITED TO ARCHAEOLOGY, HERITAGE, CONTAMINATION, ECOLOGY, ZONING, DWELLING DENSITIES, CONSCIENTIOUS OBJECTION, GEOTECHNICAL, ADJOINING LANDOWNERS, REFERAL AUTHORITIES, FLOODING AND WATERWAYS, SEWERAGE, WATER SUPPLY, ELECTRICITY, TELECOMMUNICATION.

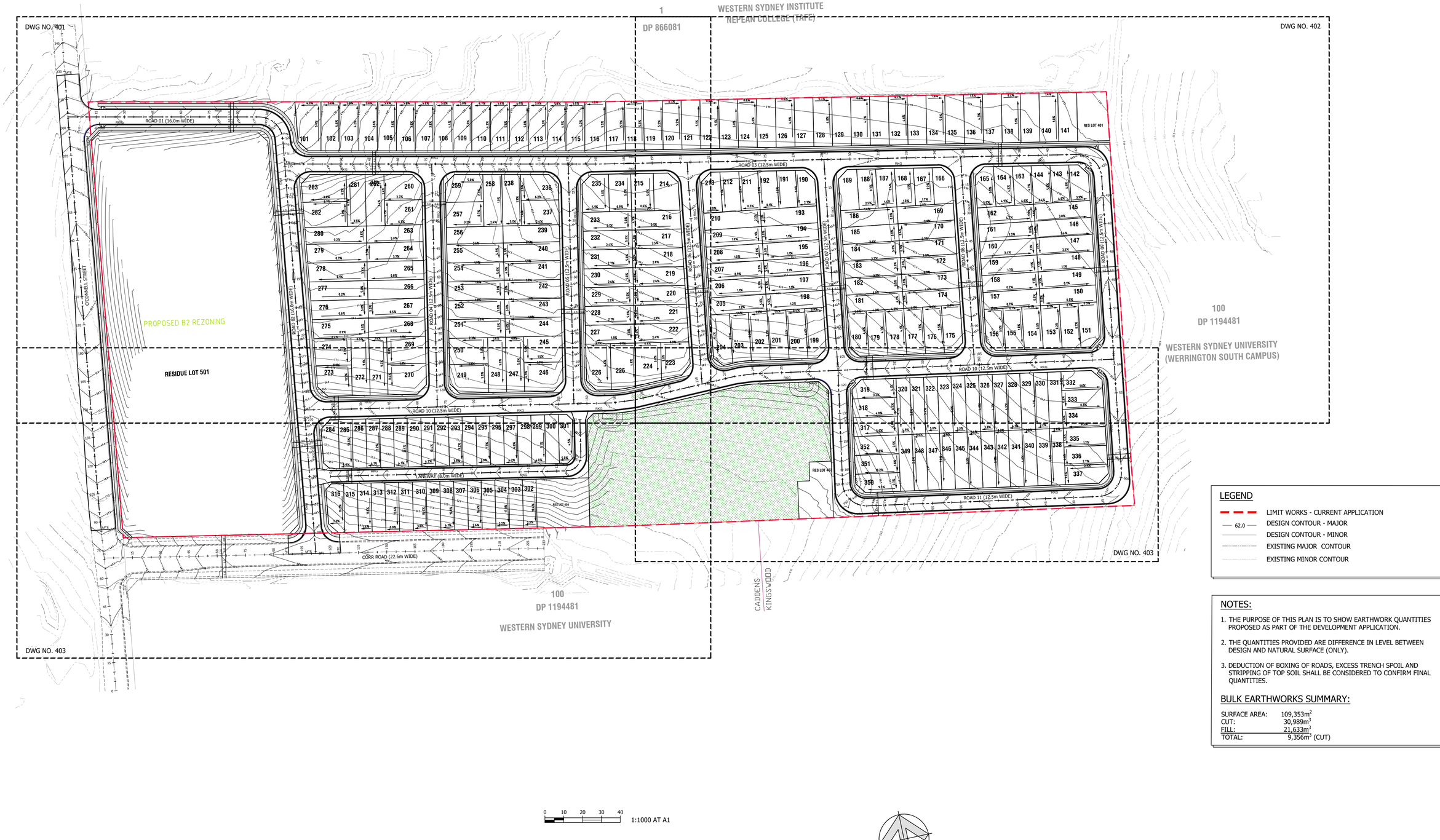
PROJECT
Subdivision of Lot 3 DP 1103503 and Lot 6 DP 593628

46-66 O'Connell rd Caddens

DRAWING NUMBER

PROJECT REFERENCE	DATE OF ISSUE	REVISION No.	SHEET SIZE
--	31/07/2020	E	A1

FILE LOCATION: C:\USERS\MARKT\GROUP DEVELOPMENT SERVICES\GDS TEAM - DOCUMENTS_2 CURRENT PROJECTS\P00361 46-66 O'CONNELL ST CADDENS\4. ENGINEERING\2. SUBDIVISION PLANS\CADDENS 46-66 O'CONNELL DA SUB01.DWG -DWG NO: OVERVIEW - STAGING -(Plot with GDS_Stnd.ctb)- PLOT DATE: 3/23/2021 12:41 PM



LEGEND

- LIMIT WORKS - CURRENT APPLICATION
- 62.0 DESIGN CONTOUR - MAJOR
- DESIGN CONTOUR - MINOR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO SHOW EARTHWORK QUANTITIES PROPOSED AS PART OF THE DEVELOPMENT APPLICATION.
2. THE QUANTITIES PROVIDED ARE DIFFERENCE IN LEVEL BETWEEN DESIGN AND NATURAL SURFACE (ONLY).
3. DEDUCTION OF BOXING OF ROADS, EXCESS TRENCH SPOIL AND STRIPPING OF TOP SOIL SHALL BE CONSIDERED TO CONFIRM FINAL QUANTITIES.

BULK EARTHWORKS SUMMARY:

SURFACE AREA:	109,353m^2
CUT:	30,989m^3
FILL:	21,633m^3
TOTAL:	9,356m^3 (CUT)

0 10 20 30 40 1:1000 AT A1

SAW CUT EXISTING PAVEMENT
A MINIMUM 600mm FROM THE
EXISTING EDGE OF SEAL

MATCH NEATLY WITH EXISTING

MTE

FOOTPATH 1.5m WIDE

ROAD 01 (16.0m WIDE)

FOOTPATH 1.5m WIDE

0+000

0+014

O'CONNELL STREET

O'CONNELL STREET

1.5m WIDE

PROPOSED B2 REZONING

JOINS DWG NO. 403

FOOTPATH 1.5m WIDE

ROAD 02 (16.0m WIDE)

FOOTPATH 1.5m WIDE

ROAD 04 (12.5m WIDE)

ROAD 05 (12.5m WIDE)

ROAD 06 (12.5m WIDE)

JOINS DWG NO.402

DP 866081

0 10 20

1:500 A1

JOINS DWG NO. 401

DP 866081

NEPEAN COLLEGE (TAFE)

DWG NO. 402

RES LOT 401

ROAD 03 (12.5m WIDE)

ROAD 06 (12.5m WIDE)

ROAD 07 (12.5m WIDE)

ROAD 08 (12.5m WIDE)

ROAD 09 (12.5m WIDE)

ROAD 10 (12.5m WIDE)

100

DP 1194481

WESTERN SYDNEY UNIVERSITY
(WERRINGTON SOUTH CAMPUS)

JOINS DWG NO. 403

8372m²

0 10 20

1:500 A1

RESIDUE LOT 501

FOOTPATH 1.5m WIDE

ROAD 02 (16.0m WIDE)

FOOTPATH 1.5m WIDE

JOINS DWG NO. 401

ROAD 10 (12.5m WIDE)

LANEWAY (8.0m WIDE)

RES LOT 404

MATCH NEATLY WITH EXISTING

SAW CUT EXISTING PAVEMENT A MINIMUM 600mm FROM THE EXISTING EDGE OF SEAL

CORR ROAD (22.6m WIDE)

MATCH NEATLY WITH EXISTING

JOINS DWG NO. 402

JOINS DWG NO. 401

RES LOT 403

ROAD 10 (12.5m WIDE)

ROAD 08 (16.0m WIDE)

JOINS DWG NO. 402

ROAD 11 (12.5m WIDE)

0 10 20

1:500 A1

Appendix B

SIDRA Modelling Outputs

MOVEMENT SUMMARY

Site: 101 [EX AM O'CONNELL STREET - WSU ACCESS]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: O'CONNELL LANE												
1	L2	43	4.0	0.332	5.6	LOS A	1.5	10.9	0.09	0.56	0.09	53.3
2	T1	241	4.0	0.332	5.2	LOS A	1.5	10.9	0.09	0.56	0.09	53.5
3	R2	67	4.0	0.332	8.0	LOS A	1.5	10.9	0.09	0.56	0.09	52.7
Approach		352	4.0	0.332	5.8	LOS A	1.5	10.9	0.09	0.56	0.09	53.3
East: O'CONNELL STREET												
4	L2	49	4.0	0.103	5.6	LOS A	0.5	3.6	0.07	0.53	0.07	53.4
5	T1	6	4.0	0.103	0.0	LOS A	0.5	3.6	0.07	0.53	0.07	54.9
6	R2	126	4.0	0.103	5.6	LOS A	0.5	3.6	0.07	0.53	0.07	53.2
Approach		182	4.0	0.103	5.4	NA	0.5	3.6	0.07	0.53	0.07	53.3
North: O'CONNELL STREET												
7	L2	83	4.0	0.052	5.6	LOS A	0.2	1.5	0.01	0.57	0.01	53.4
8	T1	78	4.0	0.143	5.1	LOS A	0.5	3.8	0.35	0.62	0.35	53.0
9	R2	48	4.0	0.143	8.4	LOS A	0.5	3.8	0.35	0.62	0.35	52.3
Approach		209	4.0	0.143	6.0	LOS A	0.5	3.8	0.21	0.60	0.21	53.0
West: WSU ACCESS												
10	L2	15	4.0	0.010	5.6	LOS A	0.0	0.1	0.04	0.52	0.04	53.6
11	T1	1	4.0	0.010	0.1	LOS A	0.0	0.1	0.04	0.52	0.04	55.1
12	R2	2	4.0	0.010	5.6	LOS A	0.0	0.1	0.04	0.52	0.04	53.0
Approach		18	4.0	0.010	5.3	NA	0.0	0.1	0.04	0.52	0.04	53.6
All Vehicles		761	4.0	0.332	5.7	NA	1.5	10.9	0.12	0.56	0.12	53.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [EX PM O'CONNELL STREET - WSU ACCESS]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: O'CONNELL LANE												
1	L2	4	4.0	0.125	5.6	LOS A	0.4	3.2	0.08	0.58	0.08	52.4
2	T1	53	4.0	0.125	5.4	LOS A	0.4	3.2	0.08	0.58	0.08	52.6
3	R2	44	4.0	0.125	9.0	LOS A	0.4	3.2	0.08	0.58	0.08	51.9
Approach		101	4.0	0.125	7.0	LOS A	0.4	3.2	0.08	0.58	0.08	52.2
East: O'CONNELL STREET												
4	L2	58	4.0	0.109	5.8	LOS A	0.5	3.8	0.16	0.52	0.16	53.0
5	T1	2	4.0	0.109	0.2	LOS A	0.5	3.8	0.16	0.52	0.16	54.5
6	R2	126	4.0	0.109	5.8	LOS A	0.5	3.8	0.16	0.52	0.16	52.8
Approach		186	4.0	0.109	5.7	NA	0.5	3.8	0.16	0.52	0.16	52.9
North: O'CONNELL STREET												
7	L2	135	4.0	0.084	5.6	LOS A	0.4	2.6	0.04	0.56	0.04	53.3
8	T1	174	4.0	0.196	5.5	LOS A	0.8	5.6	0.38	0.61	0.38	53.5
9	R2	20	4.0	0.196	7.1	LOS A	0.8	5.6	0.38	0.61	0.38	52.8
Approach		328	4.0	0.196	5.7	LOS A	0.8	5.6	0.24	0.59	0.24	53.4
West: WSU ACCESS												
10	L2	57	4.0	0.060	5.7	LOS A	0.2	1.7	0.12	0.50	0.12	53.4
11	T1	6	4.0	0.060	0.2	LOS A	0.2	1.7	0.12	0.50	0.12	54.9
12	R2	42	4.0	0.060	5.7	LOS A	0.2	1.7	0.12	0.50	0.12	52.8
Approach		105	4.0	0.060	5.4	NA	0.2	1.7	0.12	0.50	0.12	53.2
All Vehicles		721	4.0	0.196	5.8	NA	0.8	5.6	0.18	0.56	0.18	53.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [FUT 2029 PM O'CONNELL STREET - PROPOSED NEW ROAD]

Network: N101 [FUT 2029 PM PEAK]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: O'CONNELL STREET														
2	T1	333	4.0	333	4.0	0.218	0.8	LOS A	0.2	1.6	0.18	0.06	0.18	57.0
3	R2	35	4.0	35	4.0	0.218	9.7	LOS A	0.2	1.6	0.18	0.06	0.18	56.4
Approach		367	4.0	367	4.0	0.218	1.6	NA	0.2	1.6	0.18	0.06	0.18	56.9
East: PROPOSED NEW ROAD														
4	L2	28	4.0	28	4.0	0.027	7.2	LOS A	0.0	0.3	0.44	0.63	0.44	48.5
6	R2	222	4.0	222	4.0	0.491	15.0	LOS B	0.9	6.4	0.78	1.02	1.16	40.3
Approach		251	4.0	251	4.0	0.491	14.1	LOS A	0.9	6.4	0.74	0.97	1.07	41.1
North: O'CONNELL STREET														
7	L2	226	4.0	226	4.0	0.352	5.6	LOS A	0.0	0.0	0.00	0.20	0.00	55.1
8	T1	431	4.0	431	4.0	0.352	0.0	LOS A	0.0	0.0	0.00	0.20	0.00	52.8
Approach		657	4.0	657	4.0	0.352	1.9	NA	0.0	0.0	0.00	0.20	0.00	54.2
All Vehicles		1275	4.0	1275	4.0	0.491	4.2	NA	0.9	6.4	0.20	0.31	0.26	51.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [FUT 2029 PM O'CONNELL STREET - PROPOSED ROAD 01]

Network: N101 [FUT 2029 PM PEAK]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: O'CONNELL STREET														
2	T1	516	4.0	516	4.0	0.321	0.8	LOS A	0.3	2.4	0.16	0.05	0.19	58.0
3	R2	39	4.0	39	4.0	0.321	10.7	LOS A	0.3	2.4	0.16	0.05	0.19	54.9
Approach		555	4.0	555	4.0	0.321	1.5	NA	0.3	2.4	0.16	0.05	0.19	57.8
East: PROPOSED NEW ROAD														
4	L2	7	4.0	7	4.0	0.032	8.6	LOS A	0.0	0.3	0.67	0.81	0.67	43.1
6	R2	6	4.0	6	4.0	0.032	16.3	LOS B	0.0	0.3	0.67	0.81	0.67	48.3
Approach		14	4.0	14	4.0	0.032	12.1	LOS A	0.0	0.3	0.67	0.81	0.67	46.2
North: O'CONNELL STREET														
7	L2	32	4.0	32	4.0	0.359	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.8
8	T1	649	4.0	649	4.0	0.359	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.4
Approach		681	4.0	681	4.0	0.359	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.3
All Vehicles		1249	4.0	1249	4.0	0.359	1.0	NA	0.3	2.4	0.08	0.05	0.09	58.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [FUT 2029 PM O'CONNELL STREET - WSU ACCESS]

Network: N101 [FUT 2029 PM PEAK]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: O'CONNELL LANE														
1	L2	9	4.0	9	4.0	0.340	6.3	LOS A	1.0	7.4	0.60	0.67	0.60	51.1
2	T1	152	4.0	152	4.0	0.340	6.7	LOS A	1.0	7.4	0.60	0.67	0.60	46.7
3	R2	180	4.0	180	4.0	0.340	10.2	LOS A	1.0	7.4	0.60	0.67	0.60	51.6
Approach		341	4.0	341	4.0	0.340	8.5	LOS A	1.0	7.4	0.60	0.67	0.60	50.1
East: O'CONNELL STREET														
4	L2	163	4.0	163	4.0	0.429	7.6	LOS A	1.3	9.6	0.71	0.75	0.71	50.5
5	T1	9	4.0	9	4.0	0.429	7.8	LOS A	1.3	9.6	0.71	0.75	0.71	51.6
6	R2	212	4.0	212	4.0	0.429	11.3	LOS A	1.3	9.6	0.71	0.75	0.71	46.0
Approach		384	4.0	384	4.0	0.429	9.6	LOS A	1.3	9.6	0.71	0.75	0.71	48.7
North: O'CONNELL STREET														
7	L2	176	4.0	176	4.0	0.451	6.7	LOS A	1.5	10.7	0.61	0.63	0.61	51.9
8	T1	287	4.0	287	4.0	0.451	6.8	LOS A	1.5	10.7	0.61	0.63	0.61	52.8
9	R2	18	4.0	18	4.0	0.451	10.2	LOS A	1.5	10.7	0.61	0.63	0.61	52.6
Approach		481	4.0	481	4.0	0.451	6.9	LOS A	1.5	10.7	0.61	0.63	0.61	52.5
West: WSU ACCESS														
10	L2	26	4.0	26	4.0	0.084	8.4	LOS A	0.2	1.4	0.67	0.72	0.67	45.5
11	T1	9	4.0	9	4.0	0.084	8.7	LOS A	0.2	1.4	0.67	0.72	0.67	51.2
12	R2	26	4.0	26	4.0	0.084	12.0	LOS A	0.2	1.4	0.67	0.72	0.67	50.8
Approach		62	4.0	62	4.0	0.084	10.0	LOS A	0.2	1.4	0.67	0.72	0.67	49.3
All Vehicles		1268	4.0	1268	4.0	0.451	8.3	LOS A	1.5	10.7	0.64	0.68	0.64	50.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix C

Public Transport Services

Sydney rail network

NSW GOVERNMENT | Transport

Metro Trains

Sydney metro and train lines

M	*Metro North West Line* Chatswood Tallawong	T1	*North Shore & Western Line* North Shore Western Richmond	T2	*Inner West & Leppington Line* Inner West Leppington City	T3	*Bankstown Line* Liverpool Lidcombe City	T4	*Eastern Suburbs & Illawarra Line* Eastern Suburbs Illawarra Cronulla
T5	*Cumberland Line* Leppington Richmond	T6	*Carlingford Line* Carlingford Clyde	T7	*Olympic Park Line* Olympic Park Lidcombe	T8	*Airport & South Line* Airport South City	T9	*Northern Line* Northern Gordon

Stop | Interchange | Interchange | End of line

NORTH

Line under construction

Check timetables and trip planners for train services and connections

Visit **transportnsw.info**

Greater Western Sydney Bus Network Map - Effective 26 May 2019

Busways

Bus routes

- 668 Windsor to Richmond via Wilberforce, Glossodia & North Richmond
- 669 Wilberforce to Sackville
- 671 Windsor to Riverstone via McGraths Hill
- 672 Windsor to Pitt Town & Wisemans Ferry via McGraths Hill
- 673 Windsor to Penrith via Bligh Park, Llandilo & Cranebrook
- 674 Windsor to Mt Druitt via Bligh Park, Shanes Park & Whalan
- 675C Windsor - RAAF -Richmond - UWS Hawkesbury - Bligh Park - Windsor
- 675A Windsor - Bligh Park - UWS Hawkesbury - Richmond - RAAF - Windsor
- 676 Windsor to South Windsor
- 677 Richmond to Penrith via Londonderry & The Northern Rds
- 668 Richmond to Penrith via Agnes Banks, Castlereagh & Cranebrook
- 679 Windsor to Maraylya & Oakville
- 680 Richmond to Bowen Mtn via Nth Richmond, Grose Wold & Grose Vale
- 682 Richmond to Kurrajong & Berambing via Nth Richmond & Kurmond
- 718 Seven Hills to Kings Langley
- 721 Blacktown to Blacktown Hospital
- 722 Blacktown to Prospect via Flushcombe Rd
- 723 Blacktown to Mt Druitt via Huntingwood & Eastern Creek
- 724 Blacktown to Arndell Park & Eastern Creek Industrial
- 726 Blacktown to Doonside via Monash Rd
- 728 Blacktown to Mt Druitt via Bungarribee & Rooty Hill
- 729 Blacktown to Mt Druitt via Kildare Rd & Minchinbury
- 730 Blacktown to Castle Hill via Glenwood & Norwest Business Park
- 731 Blacktown to Rouse Hill via Stanhope Gardens & Kellyville Ridge
- 732 Blacktown to Rouse Hill via Pye Rd & The Ponds
- 734 Blacktown to Riverstone via The Ponds & Schofields
- 735 Blacktown to Rouse Hill via T-way
- 738 Mt Druitt to Eastern Creek Business Park via Rooty Hill
- 739V Mt Druitt to Frank St
- 741 Riverstone to Maraylya & Oakville
- 742 Rouse Hill to Marsden Park (Hollinsworth Rd) via Riverstone
- 743 Blacktown to Kings Langley via Kings Park
- 744 Blacktown to Bessemer St Industrial
- 745 St Marys to Bella Vista via Plumpton & Glenwood
- 746 Rouse Hill to Riverstone via Box Hill
- 747 Rouse Hill to Marsden Park (Elara Bvd) via Riverstone
- 750 Blacktown to Mt Druitt via Richmond Rd & Carlisle Av
- 751 Blacktown to Rouse Hill via Colebee, Marsden Park & Schofields
- 752 Blacktown to Rouse Hill via Quakers Hill & The Ponds
- 753 Blacktown to Doonside via Tallagandra Dr
- 754 Blacktown to Mt Druitt via Dean Park & Hassall Grove
- 755 Mt Druitt to Shalvey & Plumpton
- 756 Mt Druitt to Blacktown via Plumpton & Woodcroft
- 757 Mt Druitt to Riverstone via Rooty Hill Rd North & Marsden Park
- 758 Mt Druitt to St Marys via Shalvey & Tregear
- 759 Mt Druitt to St Marys via Emerton, Willmot & Ropes Crossing
- 761 Mt Druitt to Bidwill via Carlisle Av
- 770 Mt Druitt to Penrith via Colyton, St Marys & Claremont Meadows
- 771 Mt Druitt to St Marys via Colyton
- 774 Penrith to Mt Druitt via Caddens, Claremont Meadows, St Marys & Oxley Park
- 775 Penrith to via UWS, St Marys, St Clair & Erskine Park
- 776 Penrith to Mt Druitt via Nepean Hospital, UWS & St Clair
- 779 St Marys to Erskine Park Industrial Area
- 780 Penrith to Mt Druitt via Cambridge Park, Ropes Crossing & Tregear
- 781 Penrith St Marys via Glenmore Park, Orchard Hills & Claremont Meadows
- 782 Penrith to Werrington & St Marys via Cambridge Gardens
- 783 Penrith to Jordan Springs via Waterside
- 784 Penrith to Cranebrook via Castlereagh Rd
- 785 Penrith to Werrington via Cambridge Park
- 786 Penrith to Cranebrook via Greygums Rd
- 789 Penrith to Luddenham
- 791 Penrith to Jamisontown via South Penrith
- 793 Penrith to South Penrith
- 794 Penrith to Glenmore Park via South Penrith
- 795 Penrith to Warragamba via Nepean Shores & Mulgoa Rd
- 797 Penrith to Glenmore Park via Mulgoa Rd
- 799 Penrith to Glenmore Park & Blue Hills Estate

Legend
- Shopping Centres
- Common route
- Hospitals
- Occasional diversion

Windsor CBD

Windsor Street Legend
1. Kable St
2. Fitzgerald St
3. Suffolk St

Penrith CBD

Penrith Street Legend
1. Jane St
2. Lemon Grove Rd
3. Sunshine Av
4. Illawong Av
5. Caloola Av
6. Arakoon Av
7. Thurston St

Mount Druitt CBD

Blacktown CBD

Bowen Mountain Street Legend
1. Lieutenant Bowen Rd
2. Bunya Cr
3. Pamela Cr

Richmond Street Legend
1. Powell St
2. Laurence St
3. East Market St
4. Bosworth St

Windsor Street Legend
1. Macquarie St
2. Kable St
3. The Terrace
4. Fitzgerald St

Cranebrook Street Legend
1. Goldmark Cr
2. Marrett Wy
3. Calisto Dr
4. Hosking St
5. Sherringham Rd

Werrington Street Legend
1. Pasturegate Av
2. Harvest Dr
3. Singleton Av
4. John Batman Av
5. Ovens Dr
6. Lethbridge Av

St Marys Street Legend
1. Wordoo St
2. Griffiths St
3. Wattle Av
4. Jackaranoa Rd

Riverstone Street Legend
1. Melbourne Rd
2. Brisbane Rd
3. Loftus St

Ebenezer Street Legend
1. Port Erringhi Rd
2. Sirius Cres
3. Stones Rd

McGraths Hill Street Legend
1. Plimsoll St
2. Andrew Thompson Dr
3. Meares Rd
4. Old Hawkesbury Rd

Rouse Hill Street Legend
1. Rouse Hill Dr
2. Caddies Blvd

Prospect Street Legend
1. Erith St
2. Eltham St
3. Dinton St
4. Myrtle St
5. Ollier Cres
6. Ashby St

Blacktown Street Legend
1. Westpoint Tunnel
2. Campbell St
3. Panorama Pde

Lalor Park Street Legend
1. Garden St
2. Turner St
3. Northcott Rd

Glenmore Park Street Legend
1. School House Rd
2. Kenneth Slessor Dr
3. Glenmore Pkwy
4. Morrison St
5. William Howell Dr
6. Surveyors Creek Rd
7. Glenmore Pkwy
8. Floribunda Av
9. Acacia Av
10. Shearwater Dr

Glennenning Street Legend
1. Golding Dr
2. Armitage Dr
3. Adrienne St

Werrington Street Legend
1. Pasturegate Av
2. Harvest Dr
3. Singleton Av
4. John Batman Av
5. Ovens Dr
6. Lethbridge Av

Route 682 continues to Berambing

Route 669 continues to Sackville

Route 672 continues to Wisemans Ferry

Route 795 continues to Warragamba

Route 789 continues to Luddenham

Occasional trips operate to Horsley Park

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Transport and Traffic Planning Associates

Appendix D

WSU Transport Access Guide

Getting to and from UWS Penrith campus

The Penrith campus consists of three sites: Werrington North, Werrington South and Kingswood. Below are the walking options to each campus from the closest train station. Please look out for wildlife when walking on unmade paths.

The **walk to Werrington North** from Werrington train station is approximately 1.25kms and will take about 15 minutes. Exit Werrington station onto Railway Street. Turn left into Landers Street then right into Chapman Street. Follow until the end then step over the vehicle bar gate which takes you into the University grounds. Follow the partially unmade path across the grounds to the Werrington North campus.

The **walk to Werrington South** from the Werrington train station is approximately 2kms and will take about 20–30 minutes. Exit Werrington Station onto Railway Street. Turn left into Landers Street then right into Chapman Street and follow until the end and into the University grounds. Follow the partially unmade path across the grounds to the Werrington North campus. Use the 'highway cross over bridge' between North and South campuses to enter Werrington South campus.

The **walk to the Kingswood campus** from the Werrington South campus is just over 1km and will take approximately 10–15 minutes. From the Werrington South campus, follow King St, passing building BD to the roundabout and turn right at the roundabout. Follow the road until you reach the hockey parking site and then turn left into O'Connell Street. Pass the hockey fields on your right and then follow the footpath.

The **walk to the Kingswood campus** from Kingswood train station is approximately 1.5kms and will take about 10–15 minutes. Exit Kingswood Station onto the Great Western Highway. Follow the walking path on the Highway to Kingswood Park and then the footpath across the park onto Second Avenue to the entrance of the Kingswood campus.

Bicycle parking and showers are located on all Penrith campuses. Please see www.uws.edu.au/cycling for locations.

Cycling options include on-road cycling on the Great Western Highway. Please download a copy of the Penrith-Windsor-Blue Mountains cycle-ways map at www.uws.edu.au/campus.

The University is continuing to improve its cycling facilities. Bike parking is available at most locations. Thinking about cycling to campus? Need more confidence? Register for cycling proficiency skills training at transportaccess@uws.edu.au.

Werrington Station is serviced by the Western Line. From the station it is a 15 minute walk to the Werrington North campus and a 30 minute walk to the Werrington South campus.

Kingswood Station is serviced by the Western Line. The Kingswood campus is a 10–15 minute walk from the station or a 5 minute bus trip via the UWS Shuttle.

Penrith Station is serviced by the Western and Blue Mountains lines and has the most frequent services. The Penrith campus is a 15 minute bus trip from the Penrith Station Interchange at stop number 275080 via Westbus 774-776 services.

St Marys Station is serviced by the Western Line. The Penrith campus is a 15 minute bus trip from St Marys Station Interchange at stop number 2760215 via Westbus 774-776 services.

Westbus Services 774-776 operate from the St Marys and Penrith stations, stopping at the Kingswood campus on Second Avenue and on the Great Western Highway for the Werrington North and South campuses. Services run approximately every 10 minutes.

UWS Shuttle operates between the Penrith campus and Kingswood train station every 10 to 15 minutes. There is no charge to use the UWS Shuttle but a current UWS staff or student ID card must be shown upon boarding. For shuttle hours of operation and for real time tracking visit http://uwsconnect.com.au/shuttlebus.html.

Westbus Services 774-776 offer wheelchair accessible services at limited times. Please consult the Busways timetable and look for the accessible symbol for these services.

Werrington, St Marys and **Penrith train stations** are wheelchair accessible. **Kingswood train station** may be accessible with assistance from a friend or carer. Specific station details can be found on the CityRail website www.cityrail.com.au or contact Transport Info.

University of Western Sydney
Bringing knowledge to life

Transport Access Guide

Your guide for accessing Penrith campus

Penrith campus

Fares

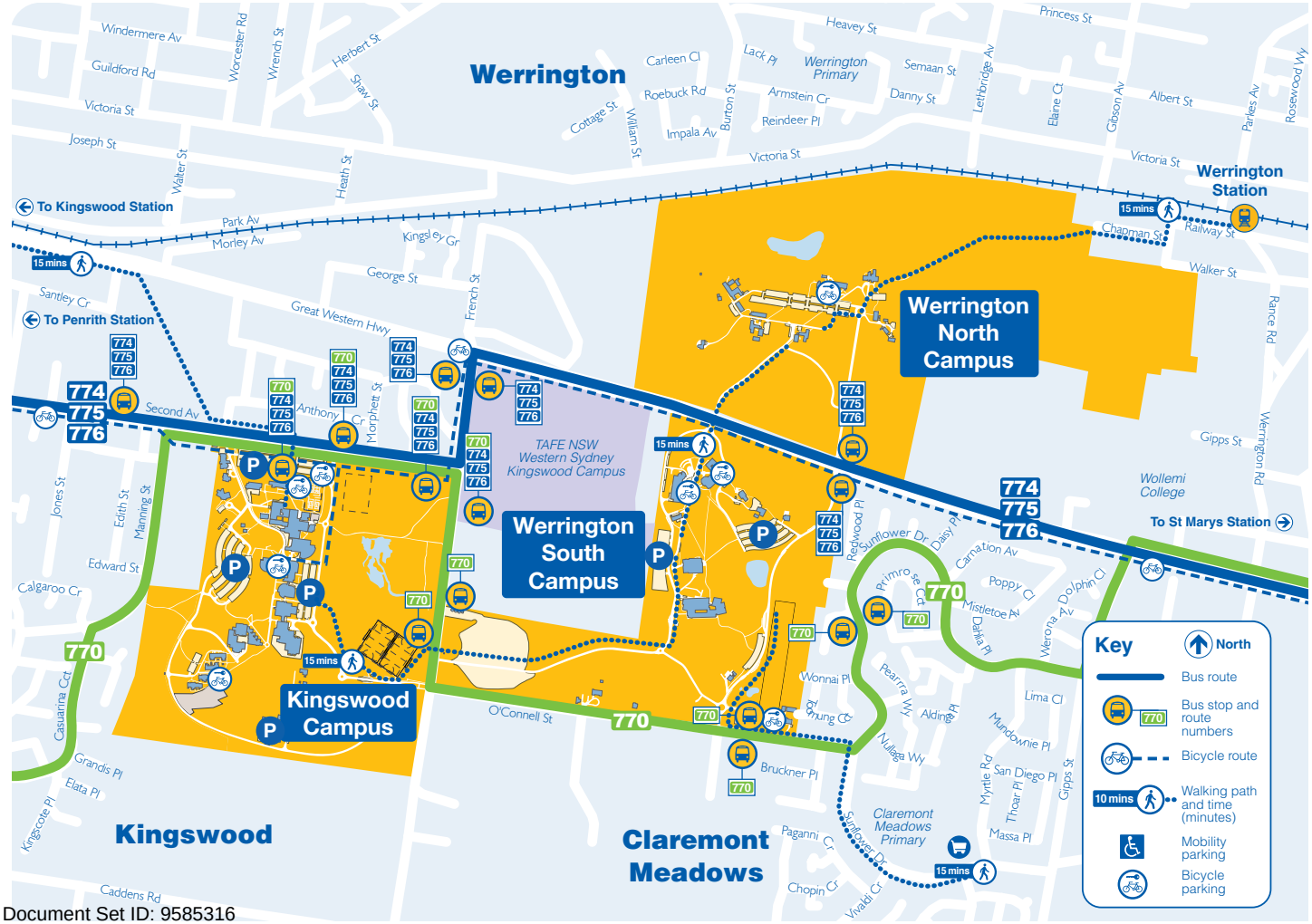
Please contact Transport Info on 131 500 for latest fare information and travel passes.

Westbus Bus Fare Information

Bus Service	Departing	Fare Section	Adult	Concession
774 to 776	Penrith Station	4	$3.50	$1.70
774 to 776	St Marys Station	3	$3.50	$1.70

Entrance to the Werrington North and South campuses is via the Great Western Highway. Entrance to the Kingswood campus is via O'Connell Street then turn into Second Avenue. The closest motorway to the campuses is the M4. Take the Mamre Road exit and follow until the end where you turn left onto the Great Western Highway.

Please be aware that parking is limited on this campus and parking permits and fees apply. For further information on parking please visit www.uws.edu.au/parking. To plan your trip using this travel option please use the UWS Interactive Map at www.uws.edu.au/campus.



Planning your Trip

UWS recommends contacting the service providers below to plan your trip and obtain the latest timetable, fare and wheelchair accessible information.

131500.com.au Transport Info
Information for people on the move

Westbus (bus services)
Phone: 02 9890 0000
Website: www.westbus.com.au

UWS Campus Map

In conjunction with this travel access guide, it is recommended you download a copy of the UWS Penrith campus map available at http://www.uws.edu.au/campus.

UWS Campus Safety and Security

UWS Information Centre, Building K
Phone: (02) 4736 0431

For comments, suggestions and feedback on travelling to UWS please email transportaccess@uws.edu.au.

University of Western Sydney
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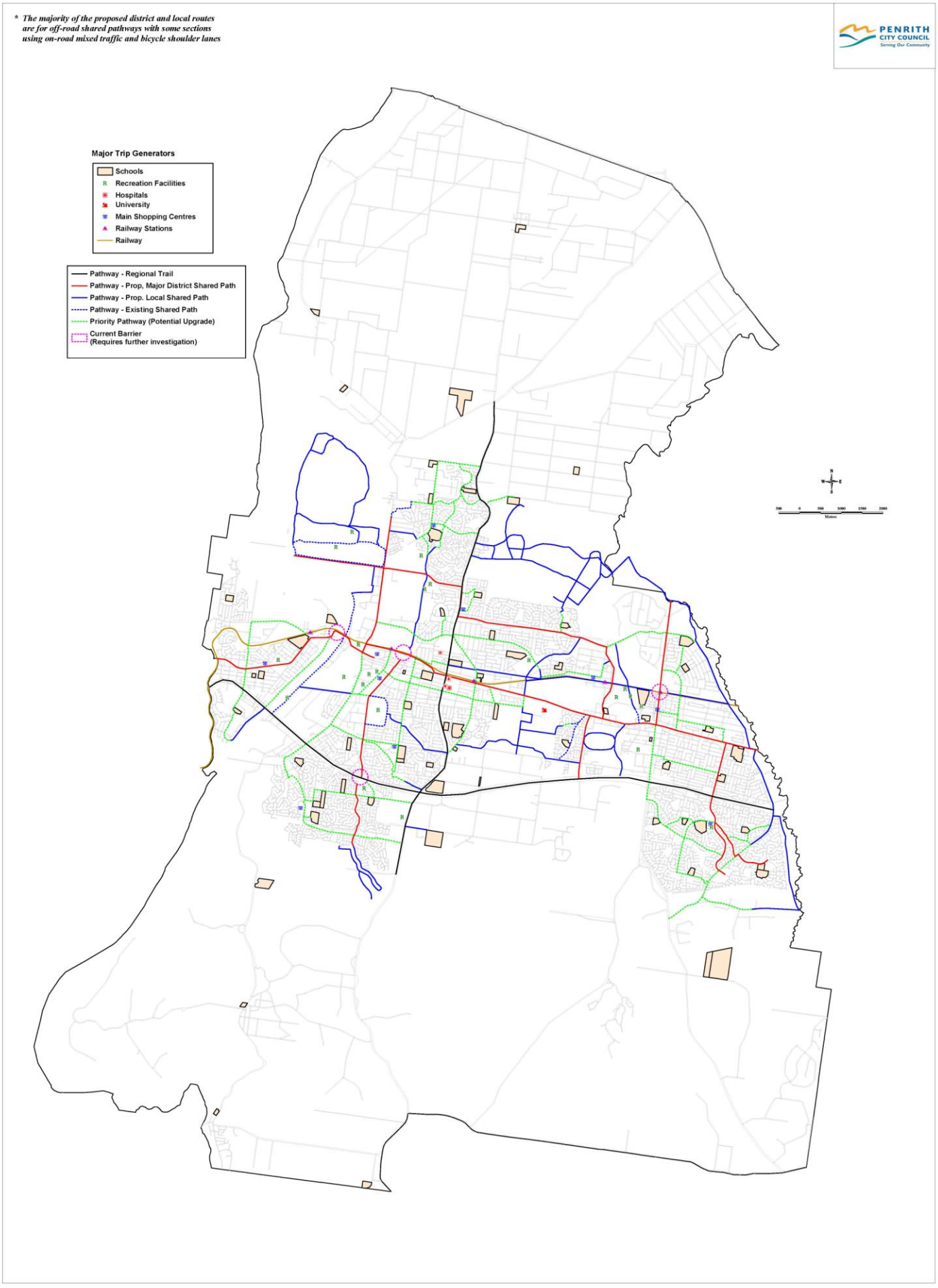
Version 3

Disclaimer: The information contained in this brochure is current as at January 2012 and is provided as a guide. The University of Western Sydney (UWS) has prepared this brochure in reliance on information provided by third parties and UWS makes no guarantee, warranty or promise, express or implied, concerning the content or accuracy of information provided. Readers should refer to the Transport Information Line, local bus companies or the local council to obtain updated information referred to in this brochure.

Appendix E

WSU Shared Paths Map



Appendix F

Extract from TTPA Study

PROPOSED GLENMORE PARK STAGE 2

Transport Management and Accessibility Plan

October 2005

Reference 0338

TRANSPORT AND TRAFFIC PLANNING ASSOCIATES
Transportation, Traffic and Design Consultants
Suite 603, Level 6
282 Victoria Avenue
CHATSWOOD 2067
Telephone (02) 9411 5660
Facsimile (02) 9904 6622
Email: ttpa@ttpa.com.au

5.2 EXISTING GLENMORE PARK

The 2001 Census established that there were some 5,447 occupied dwellings in the existing Glenmore Park development at the time of the survey.

Access to and from the surrounding Arterial Road network (ie The Northern Road and Mulgoa Road) from the existing development is restricted to the Glenmore Parkway and Garswood Road intersection. This circumstance and the circuitous internal road layout provides the relatively unique situation where it is possible to establish the vehicle trip generation rate of the estate without the complication of non-related external through movements. An assessment of the AM and PM peak hour movements at the 3 'access' intersections from the 'June' survey indicate the following IN/OUT movements from the Glenmore Park Estate.

	Total Movements	IN	OUT
AM Peak	3283	915	2368
PM Peak	3706	2666	1040

(NB The earlier survey provided similar results to the June survey being within ± 2% of the total movements)

On the conservative estimate that there were some 200 dwellings built and occupied between the undertaking of the 2001 Census (ie 5,647 dwellings), and the traffic surveys (and that a 6% vacancy rate), the traffic movements indicated above translate to the following external trip generation rates and peak period IN vs OUT ratios for the estate.

	Total (vtph)	IN (%)	OUT (%)
AM Peak	0.62	27	73
PM Peak	0.70	72	28

5.3 ORIOLE STREET CATCHMENT

The street layout within the existing Glenmore Park development provided an opportunity to undertake a 'sensitivity test' of the published RTA generation rate and the rates established in Section 5.2. To ascertain the traffic generation rate of residential only development, a survey was carried out of the vehicle movements in the AM (7.00 –9.00am) and PM (4.00 - 6.30pm) peak period travelling to/from Oriole Street at its intersection with Woodlands Drive. This intersection is the only means of vehicular access to some 340 residences and is an area of the estate which was fully developed and at the time of the survey had no new residential construction activity taking place.

The results of the survey indicate the following movements to/from Oriole Street.

LOCATION: ORIOLE STREET/WOODLANDS DRIVE
VEHICLE MOVEMENTS

		AM Peak (7.45 – 8.45am)	PM Peak (5.15 – 6.15pm)
Oriole Street (OUT)	Left Right	38 128	11 51
Woodlands Drive (IN)	Left Right	8 34	35 132
Total		**206**	**229**

On the assumption that of the 340 residences within the surveyed area, approximately 6% (20 residences) were unoccupied, the traffic movements represent an AM and PM peak generation of 0.64 vehicle trips per hour per residence and 0.72 vehicle trips per hour per residence respectively.

5.4 ASSESSMENT

From the assessment it is apparent that the RTA published trip generation rate for residential development of 0.85 vtph is not a true reflection of the circumstances which prevail at Glenmore Park. On the basis that the trip generation rate attained from the Oriole Street assessment also includes a component of 'internal' trips (say 6%), the data from this analysis and that of the 'whole' of Glenmore Park would suggest that an external trip generation rate of 0.65 vtph per dwelling in the peak periods is more reflective of the existing traffic activity generated by the Glenmore Park Estate.

Application of this rate (0.65 vtph) to the detached dwelling component and a 0.5 vtph rate to the medium density element, indicates the following likely AM and PM peak vehicle movements for the various phases of construction activity: