URBIS

NORTH APPIN (PART) PRECINCT MASTERPLAN – STRATEGIC TRANSPORT ASSESSMENT

Prepared for Ingham Property Group
June 2022

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Urbis acknowledges the important contribution that Aboriginal and Torres Strait Islander people make in creating a strong and vibrant Australian society.

We acknowledge, in each of our offices, the Traditional Owners on whose land we stand.

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INTRODUCTION

OVERVIEW

This Strategic Transport Assessment has been prepared as part of the Planning Proposal prepared by Urbis Pty Ltd on behalf of Ingham Property Group (IPG) (the proponent) which seeks to amend State Environment Environmental Planning Policy (Precincts - Western Parkland City) (Precincts SEPP) for the site located at 345 Appin Road, Appin (the site).

The Planning Proposal seeks to rezone the site comprising approximately 301 hectares of land in the North Appin (part) Precinct which forms part of the Greater Macarthur Growth Area (GMGA). The NSW Government Department of Planning and Environment (DPE) has identified the site to deliver approximately 3,000 new homes and secure and implement a koala corridor along Ousedale Creek.

To facilitate this outcome, on 2 November 2022 the Planning Secretary, as delegate of the NSW Minister for Planning notified the proponent that under section 3.32(2)(a) of the Environmental Planning and Assessment Act 1979 the site is of environmental planning significance to the Western District of the Western Parkland City and therefore the Planning Secretary has been appointed as the planning proposal authority for the proposed instrument.

In a further media announcement on 2 November 2022, the Minister for Planning and Minister for Homes Anthony Roberts said the Government was fast-tracking the assessment of three large, complex and interrelated proposals as part of the Government's $2.8 billion package to improve housing supply in NSW.

The site is under the single ownership of IPG and forms the majority of the North Appin (part) Precinct allocated by the Greater Macarthur 2022 Plan. As such the site presents an immediate opportunity to deliver approximately 3,000 new homes as part of an integrated and holistically planned precinct.

The vision for the site is to unlock the opportunity the site provides to enable the delivery of high-quality housing choice with a genuine connection to the site's cultural history, natural assets and the existing Appin township. To recognize and respond to the natural significance of the land to create a holistic community supported by access and utility infrastructure, economic investment, and a range of suitable local services.

This preliminary strategy has been developed in consultation with Transport for NSW (TfNSW) and will be followed by further strategic planning documents to guide the proposal. TfNSW has endorsed the Brian Road alignment as a viable east-west connector option supporting the North Appin (part) Precinct in a letter to DPE dated 23 May 2023.

Moving forward, IPG is committed to producing a Transport Management and Accessibility Plan (TMAP) to further support the future development of the site and act as a primary decision-making tool. At the time of the strategic assessment, up-to-date regional modelling by TfNSW is not available. Regional infrastructure is being reviewed by TfNSW separately to inform regional transport infrastructure requirements and staging. The future TMAP process will incorporate the findings of this work.

SITE OVERVIEW

SITE OVERVIEW

The land to which this Planning Proposal (PP) relates to is 345 Appin Road, Appin. For the purpose of providing clarity in the PP, the site is referred to as North Appin (part) Precinct.

The site is accessed via Appin Road and is located within the North Appin Precinct. It is more broadly situated in the GMGA within southwest Sydney. The majority of the site is located with the Wollondilly Shire local government area (LGA), while a small northwest portion is located in the Campbelltown LGA. The site is irregular in shape and can be characterized as predominantly cleared pastoral land that has access to significant natural assets and corridors.

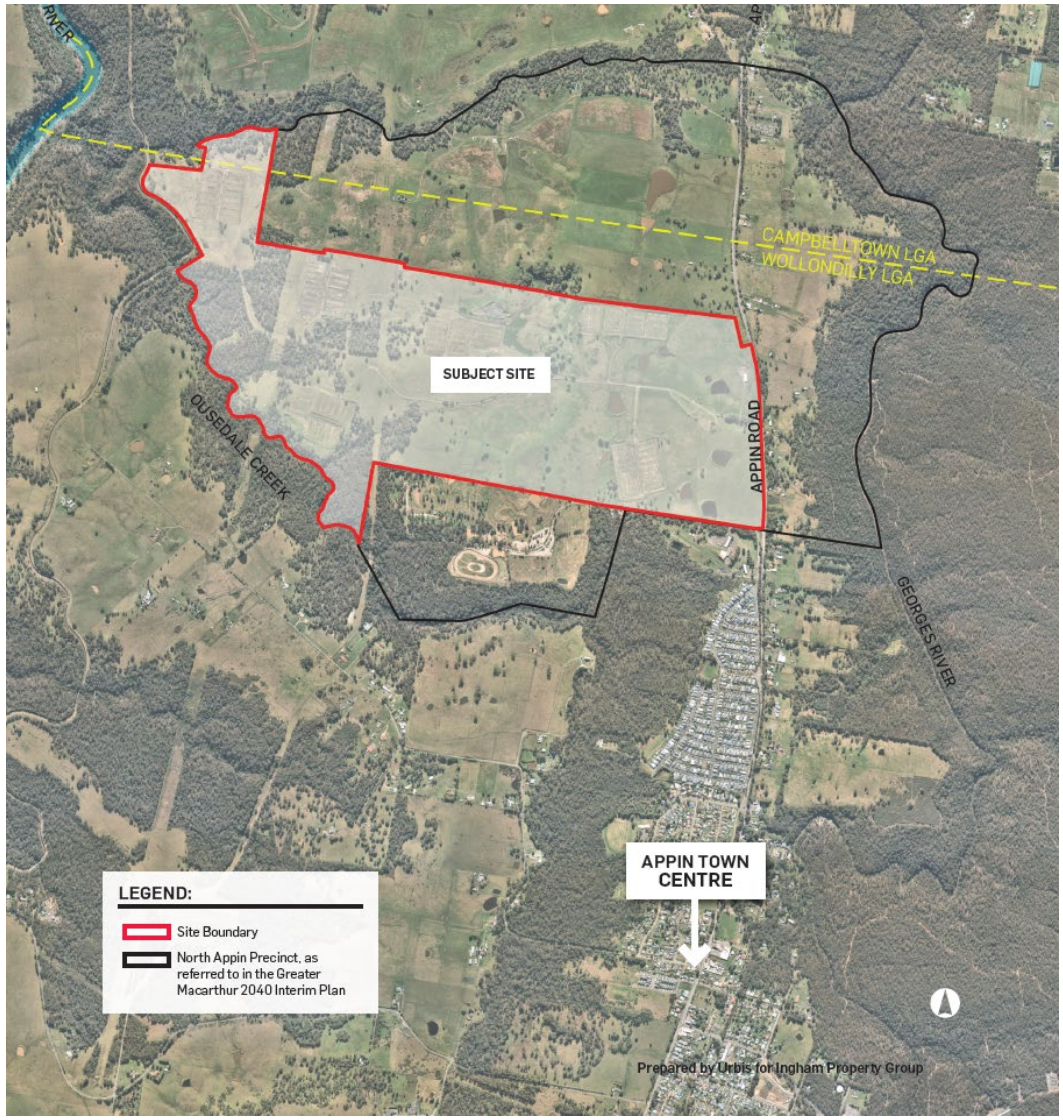
The site is mostly cleared of any built structures. A sealed east-west road traverses through the center of the site, providing the site with access to Appin Road.

Historically, on the site, IPG's Enterprises ran the largest broiler chicken operation in the southern hemisphere from the 1970's through until the early 2000's. The pads for the poultry sheds and associated structures are still visible through aerial imagery.

The site is approximately 73km southwest of Sydney CBD and 60km southwest of Parramatta CBD. The site is also in proximity to the Campbelltown-Macarthur Metropolitan Cluster, approximately 15km to the north, as well as approximately 35km south of the Aerotropolis and Western Sydney Airport. The Campbelltown-Macarthur Metropolitan Cluster is developing into one of southwest Sydney's key health and education centres and has the potential to accommodate 31,000 jobs by 2036, while the Aerotropolis is anticipated to provide the potential for 100,000 jobs once fully developed.

Figure 1 shows the location of the site in an aerial view.

FIGURE 1 SITE LOCATION



Source – Urbis

TRANSPORT CONTEXT

TRANSPORT CONNECTIONS

The site is directly connected to the Campbelltown town centre (north) and the Appin town centre (south), via Appin Road (state road), which runs along the eastern edge of the site as indicated in **Figure 1**. To the north of the site, Appin Road connects with the Hume Motorway which runs between Sydney and Melbourne (840 km). To the south of the site, Appin Road runs through the Dharawal National Park and connects with the Princes Highway, providing access to the south coast suburbs including Bulli, Corrimal and Wollongong.

Key destinations from the site via road are below, the travel time by car to these key destinations from three indicative access points is noted in **Table 1**.

- Campbelltown via Appin Road.
- Appin via Appin Road.
- Wollongong via the B69 and M1.
- Bowral via the Hume Motorway.

PUBLIC AND ACTIVE TRANSPORT

The site currently has limited public transport connections. The closest bus stop to the site sits on Appin Road, an approximately five to nine-minute walk from the indicative access points proposed as part of the Planning Proposal Draft Structure Plan indicated in **Figure 2**. This bus stop is serviced by the following route

- 887 Campbelltown to Wollongong via Appin (approximately one service per hour)

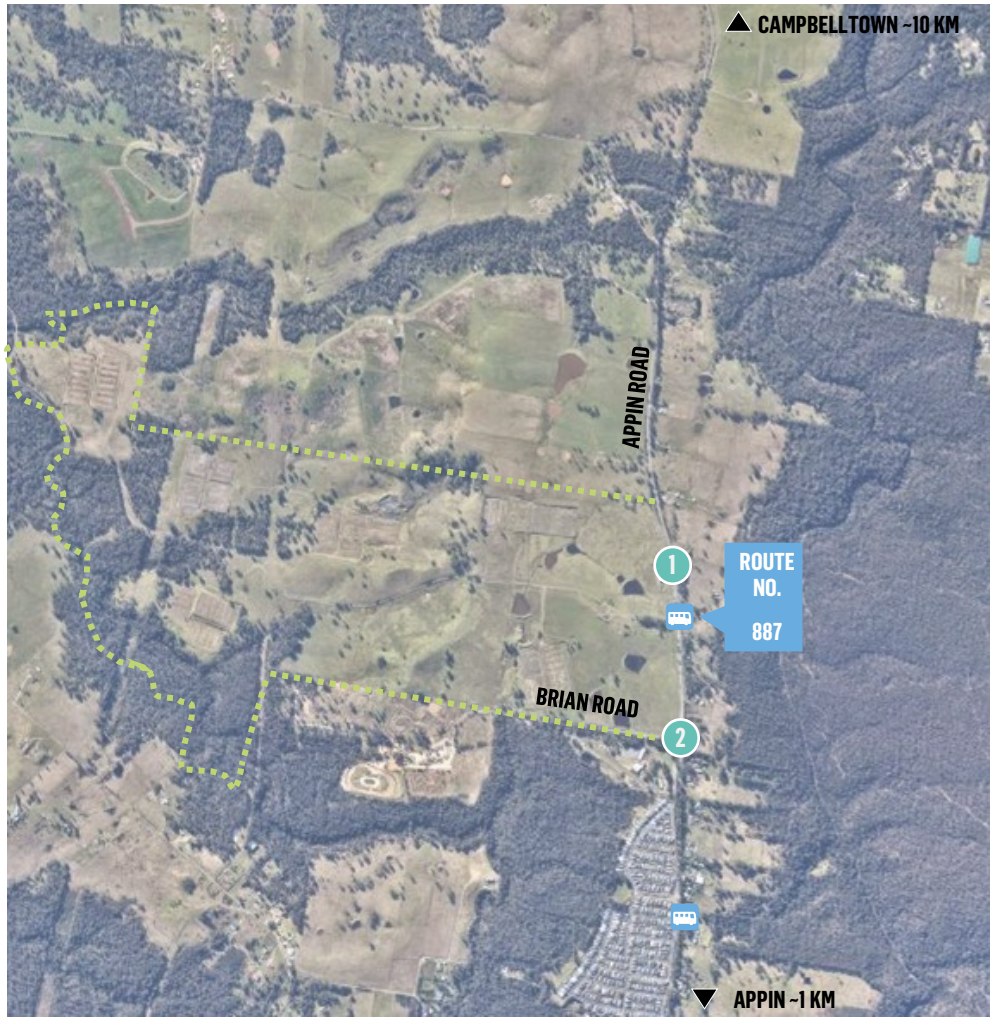
The closest train stations to the site are Macarthur and Campbelltown Stations, which are both an approximately 14-minute drive from the site. Both train stations can also be accessed by the 887 bus, an approximately 40-minute commute.

Currently, the site's active transport infrastructure is limited, as Appin Road does not provide any footpaths or cycleways.

TABLE 1 KEY DESTINATION ACCESS

INDICATIVE ACCESS POINT	FROM 1 (MIN)	FROM 2 (MIN)
Campbelltown	13	14
Appin	4	3
Wollongong	35	34
Bowral	49	48

FIGURE 2 TRANSPORT CONNECTIONS TO THE SITE



Source – Urbis based on Nearmap

CRASH HISTORY

SUMMARY OF CRASH HISTORY

Between 2016 and 2020, 116 crashes occurred along Appin Road, 10 of which occurred within proximity to the site as indicated in **Figure 3**. 60 per cent of these nearby crashes resulted in a serious injury, the majority of which (67 per cent) resulted from the vehicle steering off the road to the left and colliding with an object (Road User Movement (RUM) Code 71).

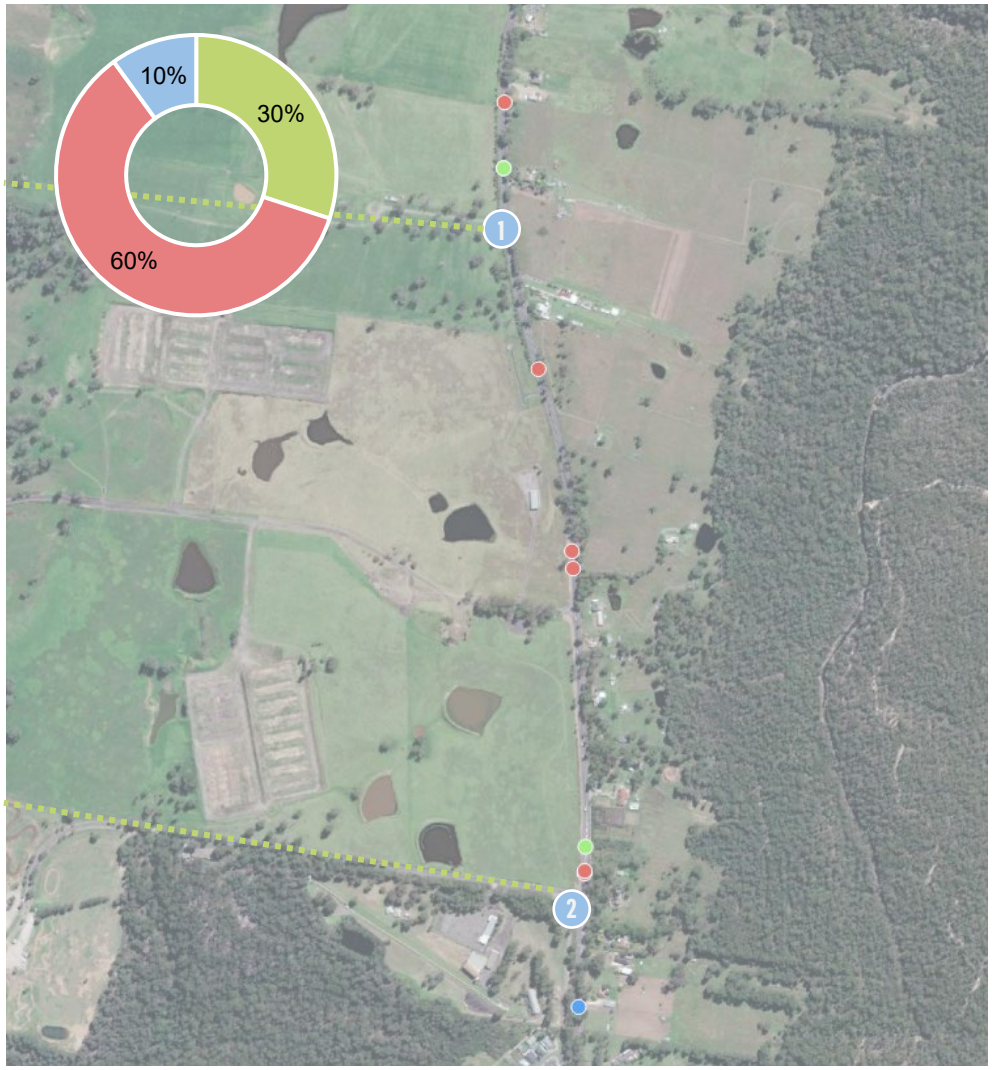
As displayed in **Table 2**, the vast majority of RUM Code 71 occurred in darkness (between 6:00 pm and 5:00 am), suggesting the impact of poor lighting and fatigue. RUM Codes 66 and 67 (object on road and struck animal) are typical characteristics of collisions within rural areas.

Overall the results from the crash history analysis characterise the collisions along Appin Road as lighting and fatigue-related. If traffic volumes along this road are increased, investment in improved street lighting will be required to reduce the number of crashes during the night.

TABLE 2 ROAD USER MOVEMENT (RUM) STATISTICS

RUM CODE	RUM DESCRIPTION	PERCENTAGE	DAYLIGHT	DARKNESS
71	Off the road left into an object	60%	17%	83%
90	Fell in / from vehicle	10%	100%	0%
67	Struck animal	20%	0%	100%
66	Object on road	10%	0%	100%

FIGURE 3 LOCATIONS OF CRASHES



Source – Urbis based on NSW Crash Data

SURROUNDING STRATEGIC PLANNING CONTEXT

SURROUNDING SUB PRECINCTS

- Menangle Park
- Mt Gilead
- West Appin

MENANGLE PARK

The Menangle Park Sub-Precinct is located to the northwest of the proposal and will have an anticipated yield of 5,243 dwellings. It is unlikely traffic generated by this Sub-Precinct will impact the road network surrounding the IPG site.

MT GILEAD

The Mt Gilead Sub-Precinct is located to the north of the proposal and will have an indicative yield of 17,228 dwellings. Traffic generated by this Sub-Precinct will likely impact the road network surrounding the IPG site.

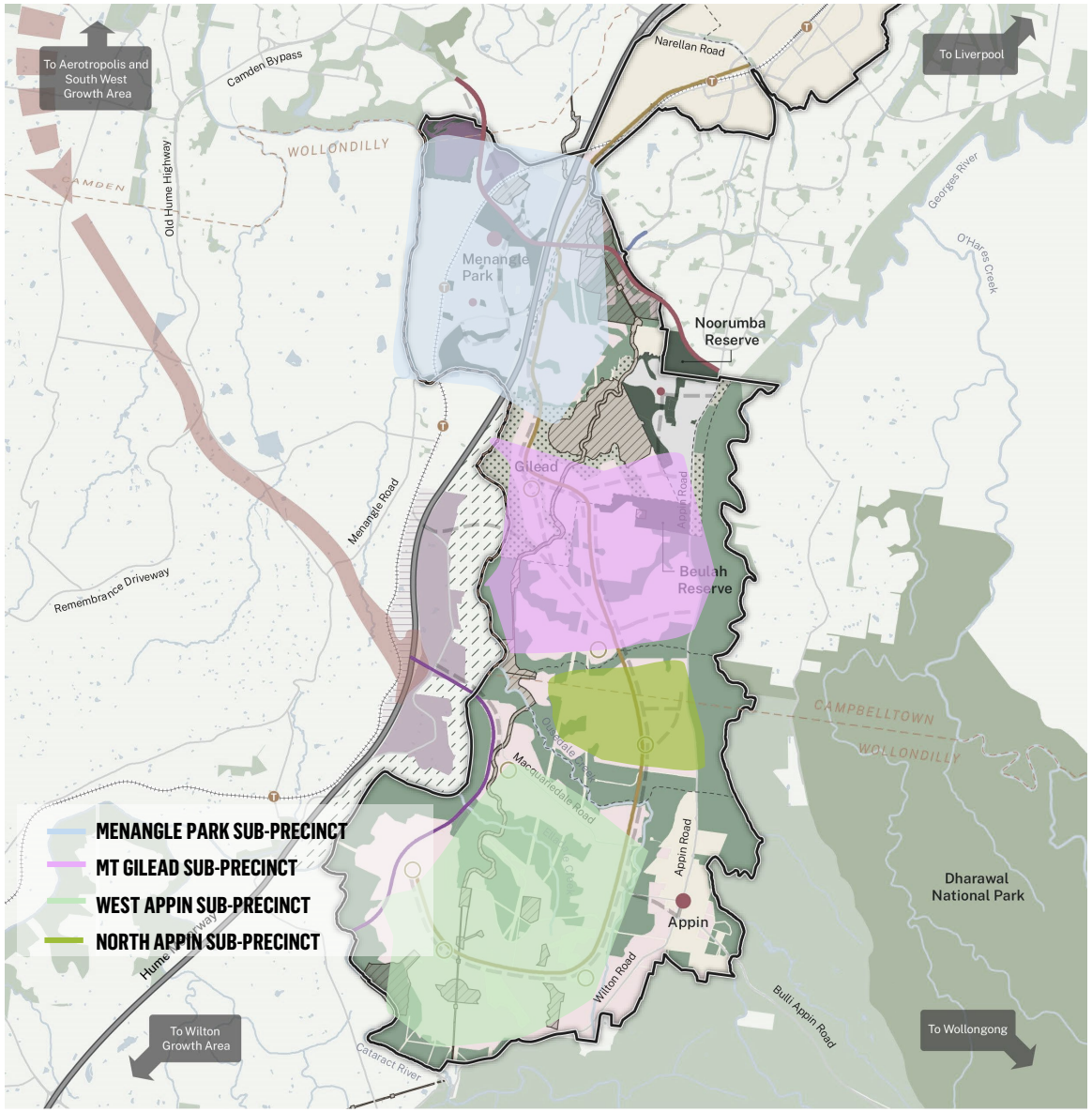
WEST APPIN

The West Appin Sub-Precinct is located to the south of the proposal. A yield of approximately 15,000 dwellings is expected from this Sub-Precinct in the long term. Traffic generated by this Sub-Precinct will likely impact the road network surrounding the IPG site.

NORTH APPIN

The North Appin Sub-Precinct is the Sub-Precinct which this proposal falls into. It is located adjacent to the existing Appin township and will form a natural extension of the town once fully developed. The Precinct is allocated to deliver 5,000 new dwellings (or 15,000 new residents) supported by a local centre, transport connections and open space.

FIGURE 4 GREATER MACARTHUR GROWTH AREA SUB-PRECINCTS



Source- Greater Macarthur Structure Plan, November 2022

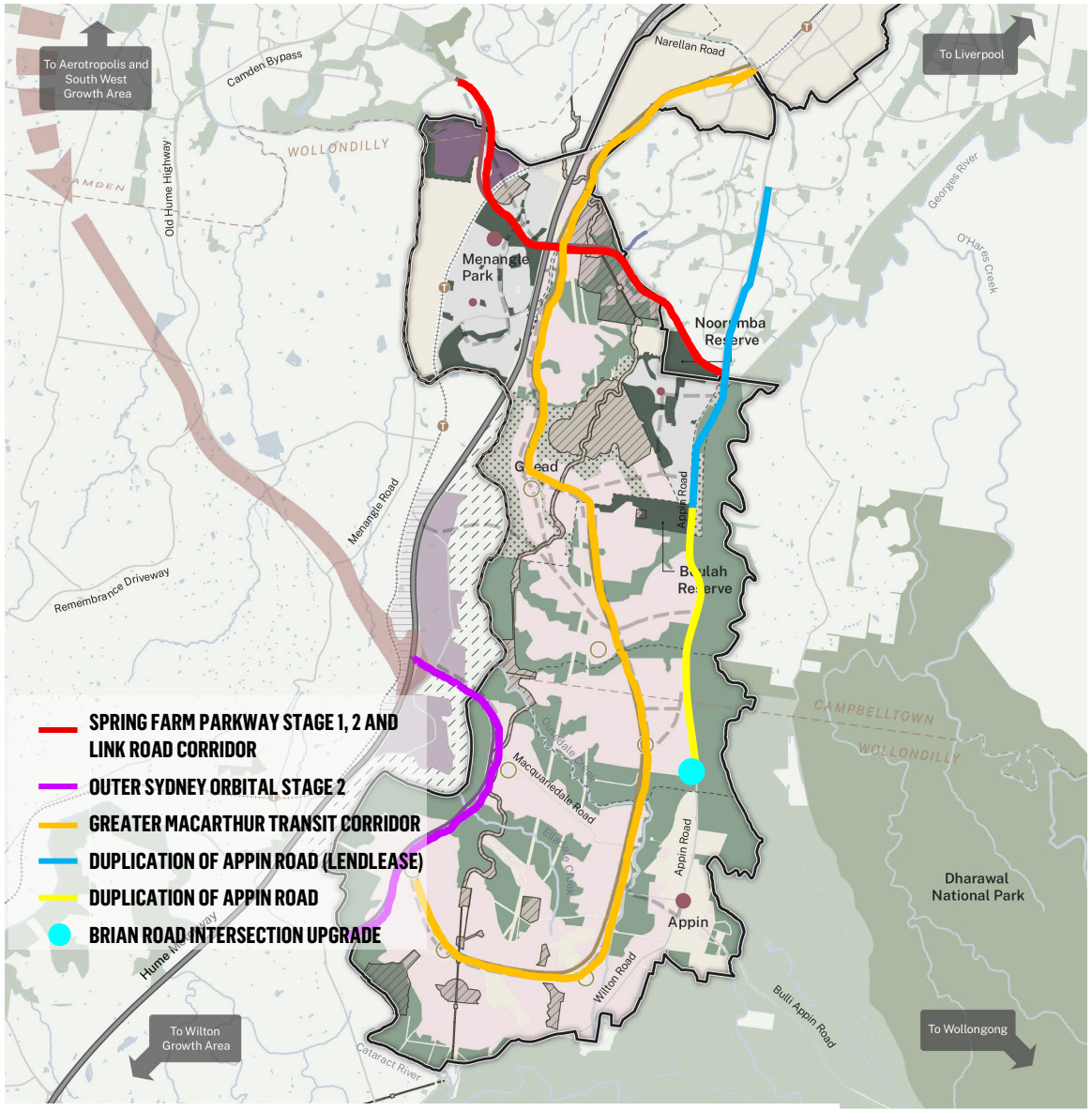
PLANNED ROAD UPGRADES

PLANNED UPGRADES

Figure 5 displays the Greater Macarthur Structure Plan, NSW Department of Planning, which provides high-level guidance for the future of land release within the Greater Macarthur Growth Area. The transport upgrades outlined in this plan include

- Spring Farm Parkway Stage 1, a road connecting Menangle Road to the Menangle Park Precinct, with a partial interchange with the Hume Highway, expected to be completed by late 2024.
- Spring Farm Parkway Stage 2, which will involve the completion of the key east-west link between the suburbs of Menangle Park and Spring Farm. (no indicative completion timeline)
- The Link Road Corridor, an east-west link road that will provide a connection between Appin Road, Gilead and Menangle Road, Menangle Park and Spring Farm Parkway Stage 1.
- Outer Sydney Orbital Stage 2, a transport connection between Western Sydney and the Illawarra-Shoalhaven region, west of Wilton and Appin.
- Greater Macarthur Transit Corridor to provide a growable transport spine in the Greater Macarthur area (to be delivered as adjacent developments come online).
- Duplication of Appin Road between southernmost access point of the Mt Gilead planning proposal and Brian Road. IPG will contribute to the upgrading of Appin Road. The scope of the upgrade will be confirmed following the adoption of the Transport Management and Accessibility Plan (TMAP) for the project.
- Duplication of Appin Road between Rosemeadow and the southernmost access point of the Mt Gilead planning proposal, supported by Lendlease.
- Brian Road Intersection Upgrade will involve the construction of a roundabout and additional safety measures for road users and fauna, including the construction of a new fauna underpass, fauna fencing and safety barriers.

FIGURE 5 PLANNED ROAD UPGRADES



Source – Greater Macarthur Structure Plan, November 2022

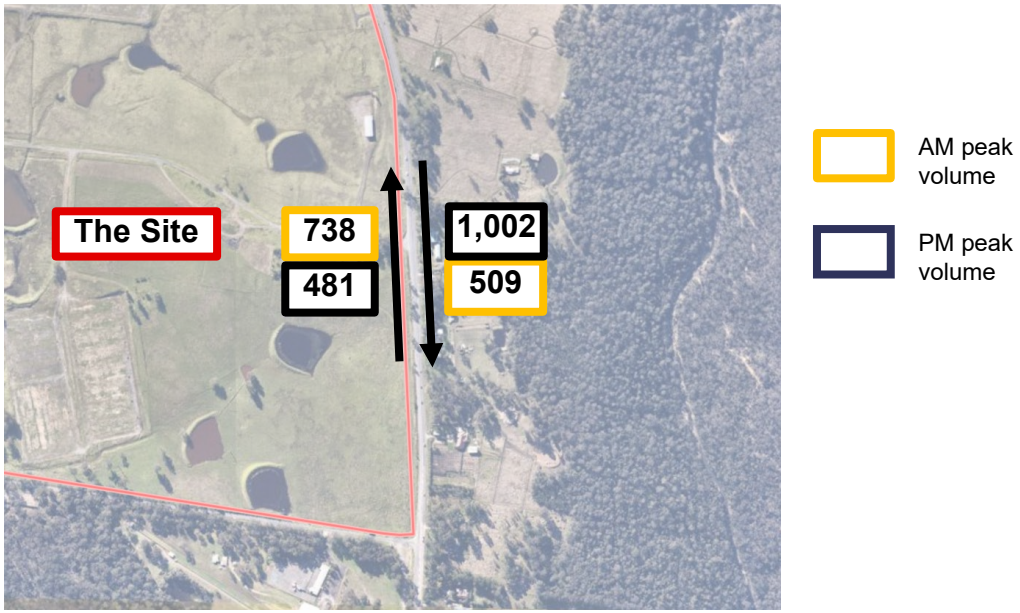
CURRENT TRAFFIC

PEAK HOUR TRAFFIC VOLUMES

AM and PM peak hour traffic volumes on Appin Road, south of the Mount Gilead Planning Proposal Northern Entrance for 2019 were provided in the Appin Road Upgrade Review of Environmental Factors (REF). These volumes are depicted below

- AM peak hour
  - Northbound – 738 vehicles.
  - Southbound – 509 vehicles.
- PM peak hour
  - Northbound – 481 vehicles.
  - Southbound – 1,002 vehicles

FIGURE 7 EXISTING TRAFFIC VOLUME ON APPIN ROAD



Source –Traffic counts from SECA Solution, 2020.

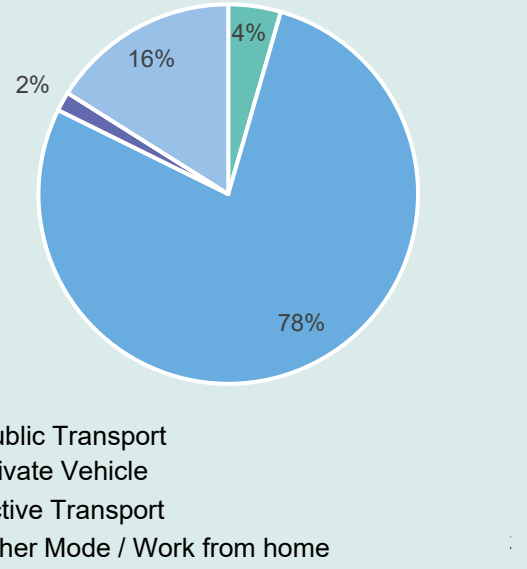
FIGURE 6 TRAVEL PATTERNS IN THE AREA

Journeys to work from Statistical Area Level 1 (SA1) for people currently living in Appin and the immediate surrounds were analysed using ABS Census data, from 2016 and 2021 to understand work destinations and travel patterns in the northbound and southbound directions from the site

- 81 per cent of people travelled northbound for work while 19 per cent travelled southbound in 2021.
- 82 per cent of people travelled northbound for work while 18 per cent travelled southbound in 2016 for work.

Mode splits were determined using the 2016 ABS Census Data (2021 data was not used to avoid the discrepancies created by the Covid-19 pandemic). It was found that

- Private vehicles account for nearly 80 per cent of trips.
- Public and active transport usage is low. likely reflecting the poor network coverage in peri-urban areas.



Source – ABS 2016 Census data

GROWTH IN THE AREA

LOCAL GROWTH

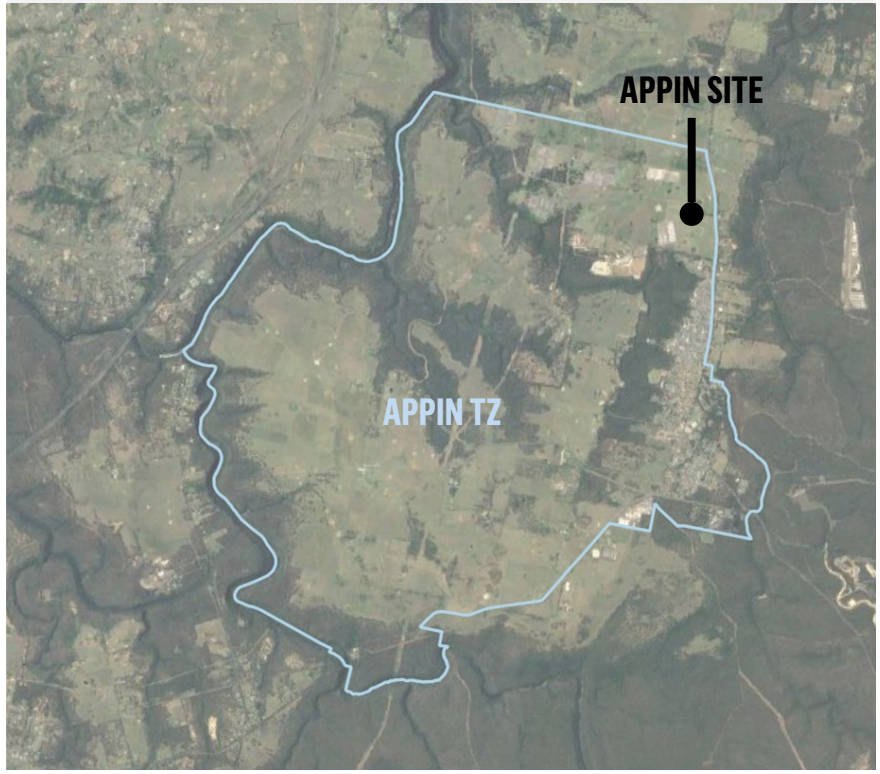
The site is situated within the Appin Travel Zone (TZ), indicated in **Figure 8**. A TZ is a spatial zone that is basis of data collection, transport modelling and analysis. The Estimated Resident Population (ERP) growth, employment growth and workforce in the Appin TZ were analysed and the results are shown in **Table 3**. This is based on TfNSW Travel Zone Projections 2022 and is publicly available data. As can be seen, population growth (both ERP and workforce population) is forecast to grow significantly more than employment, indicating the residential development that will occur in this area.

TABLE 3 FORECAST GROWTH

	2021	2026	2036	2056
Population (ERP)	3,613	3,331	4,491	14,462
Workforce Population	1,762	1,900	2,603	8,353
Employment	1,084	1,071	1,091	1,130

Source – Urbis based on TfNSW Travel Zone Projections 2022 (TZP2022)

FIGURE 8 APPIN TRAVEL ZONE (TZ)



Source – Urbis based on TfNSW Travel Zone Projections 2022 (TZP2022)

STAKEHOLDER CONSULTATION

TFNSW CONSULTATION

Since lodgement of the draft Planning Proposal, IPG, with the support of DPE, commenced an engagement program with TfNSW including regular Transport Working Group meetings. This engagement is to enable IPG, DPE and TfNSW to understand the current status of transport planning for the GMGA, transport infrastructure and traffic modelling in association with the rezoning of the site for urban development.

Key feedback provided by TfNSW that has been incorporated into the Draft Structure Plan is

- The existing Brian Road alignment is a viable Appin bypass option supporting the proposed IPG development of the North Appin (part) precinct.
- The required road reservation for the Greater Macarthur transit corridor is 40 metres.

TMAP PROCESS

IPG has committed to producing a Transport Management and Accessibility Plan (TMAP) to support the future development of the site.

The TMAP for the North Appin (part) Precinct will include:

- Opportunities and constraints analysis.
- Strategic context assessment.
- Current transport conditions (walking, cycling, public transport, road, freight, parking, travel behaviors, crash analysis).
- Assessment of traffic impacts for the site on the local area network.
- Future land use and infrastructure analysis and recommendations.

This TMAP will be completed prior to the submission of any Development Applications.

The TMAP is being prepared to guide the development of the final North Appin (part) Precinct Structure Plan, transport infrastructure and the future Planning Agreements.

IPG are continuing to engage with TfNSW to

- Develop strategic traffic demand projections.
- Understand future network changes and the emerging land-use and transport network context.
- Identify site-specific transport infrastructure interventions for the site.
- Develop the optimal configuration and operation of key intersections.

This will form part of the TMAP to support the future urban development of the site as per the Planning Proposal.

Source – James McIntyre

THE PROPOSAL – NORTH APPIN (PART) PRECINCT

OVERVIEW

The North Appin (part) Precinct proposal involves the following

- Approximately 3,000 Low and Medium density residential dwellings located to the west of Appin Road.
- A major collector type road is to be provided towards the northern side of the development which connects the internal North Appin (part) Precinct traffic to and from the Greater Macarthur Transit Corridor and Appin Road.
- An east-west connector road will connect the development to the Greater Macarthur Transit Corridor and Appin Road, with internal access to the lots provided by minor roads.
- The internal road network is not envisaged to carry strategic traffic.
- Construction of the proposal is anticipated to commence in 2026 with the first occupation in 2027. Approximately 300 dwellings will be delivered per year.
- All emergency vehicles accessing the site will be able to use the Appin Road access points or the Greater Macarthur Transit Corridor (once the through connection to Macarthur is completed). All collector and sub-arterial roads will have lane widths of 3.5 metres, which can accommodate emergency vehicles. The configurations and widths of local roads will be subject to future planning.
- The proposal is made up of 14 precincts and a local centre, as shown on **Figure 9.**

FIGURE 9 DRAFT STRUCTURE PLAN SHOWING KEY INTERSECTIONS

Source – Urbis

EAST-WEST CONNECTOR ROAD VIABLE OPTIONS

As the Greater Macarthur precinct grows, the increased demand for travel along the Appin Road Corridor will necessitate either the upgrade of Appin Road in Appin's town centre or a bypass of Appin. Additionally, there is a need for a future strategic link between the Greater Macarthur Transit Corridor and Appin Road. Historically, a bypass alignment (as described below) has been set aside but is now considered to be a habitat reservation and is no longer considered a road option. This and two options are outlined below.

- Appin Bypass Alignment: This option follows the existing Appin Road corridor to the west of Appin Valley. With this option, the Greater Macarthur Transit Corridor and Appin Road exist in separate road corridors. This option maximises the use of existing alignments and also supports housing and growth for North Appin. However, the close proximity to Appin township may have negative impacts for the existing village. This option requires three state road intersections and three transit corridor intersections.
- GM2040 East-West Connector Road Option: This option links Appin Road to the Greater Macarthur Transit Corridor via a connection in the north-eastern part of the North Appin (part) precinct. This option divides North Appin and requires four overpasses over collector roads with the precinct. This will have negative impacts on the proposed local centre and schools precincts of this proposal. This option also requires six state road intersections and three transit corridor intersections.
- Proposed Brian Road alignment of East-West Connection: This option links Appin Road to the Greater Macarthur Transit Corridor via Brian Road corridor with minor deviation. This maximises the use of existing alignments and supports housing and growth in the region Appin. This option requires four state road intersections and four transit corridor intersections. The principle of this alignment for the east-west connector between the Greater Macarthur Transit Corridor and Appin Road has been endorsed by TfNSW.

PROPOSED BRIAN ROAD ALIGNMENT FOR EAST-WEST CONNECTOR ROAD

APPIN BYPASS ALIGNMENT

GM2040 EAST-WEST CONNECTOR ROAD ALIGNMENT

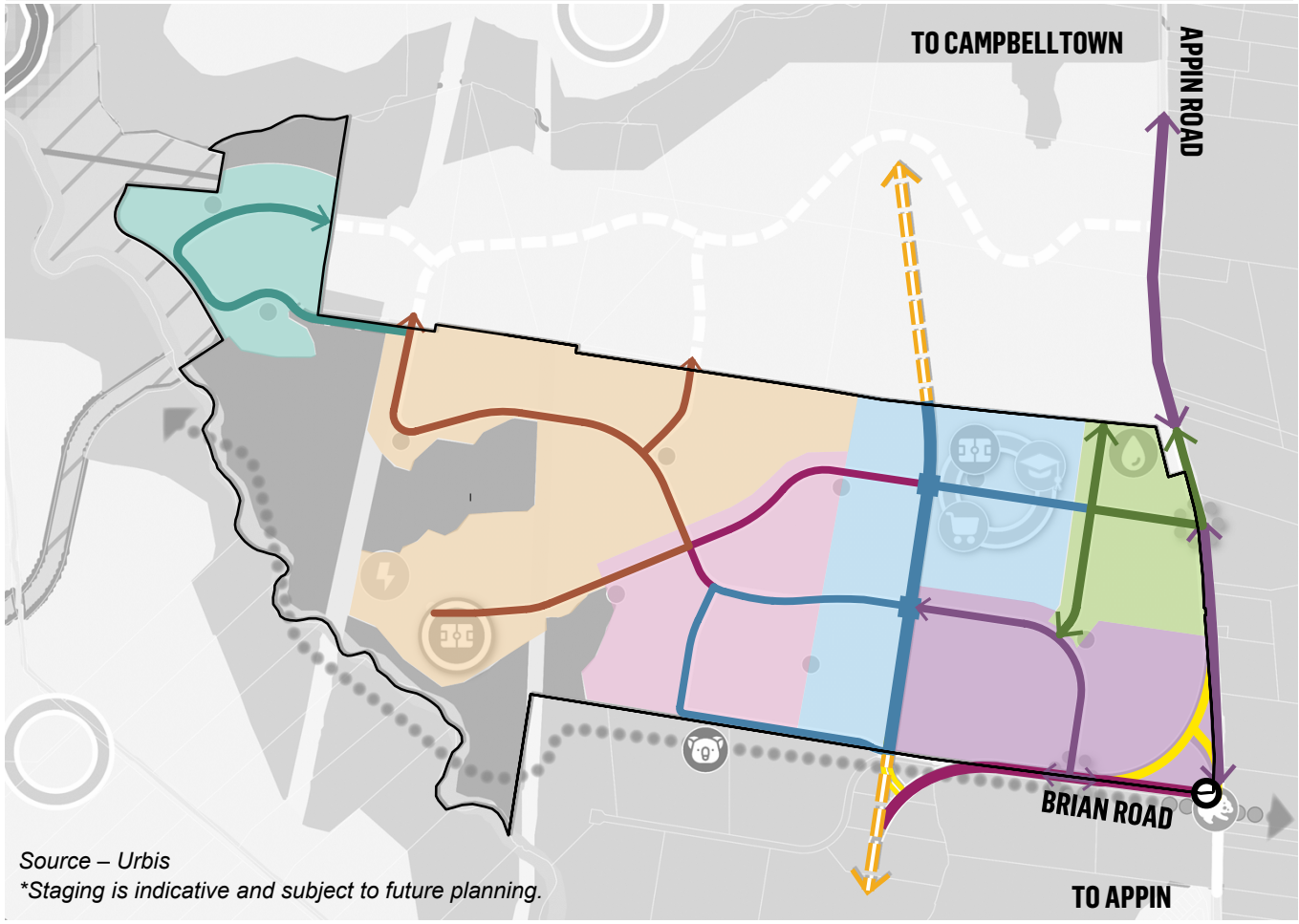
ROAD DELIVERY STAGING

ROAD DELIVERY OVERVIEW

Figure 10 shows an indicative road delivery staging plan. This plan outlines which roads will be delivered in each stage, along with the precincts that can be serviced by the infrastructure.

The Brian Road intersection roundabout upgrade is anticipated to be completed by TfNSW and suitable to accommodate the early stages of the proposal. At some point in the future, this intersection will need to be upgraded and signalised to accommodate future traffic. This upgrade may follow the existing alignment of Brian Road or the east-west connector, subject to future planning. As a result, the staging shown at the interface of Brian Road and Appin Road should be interpreted as indicative.

FIGURE 10 ROAD DELIVERY STAGING



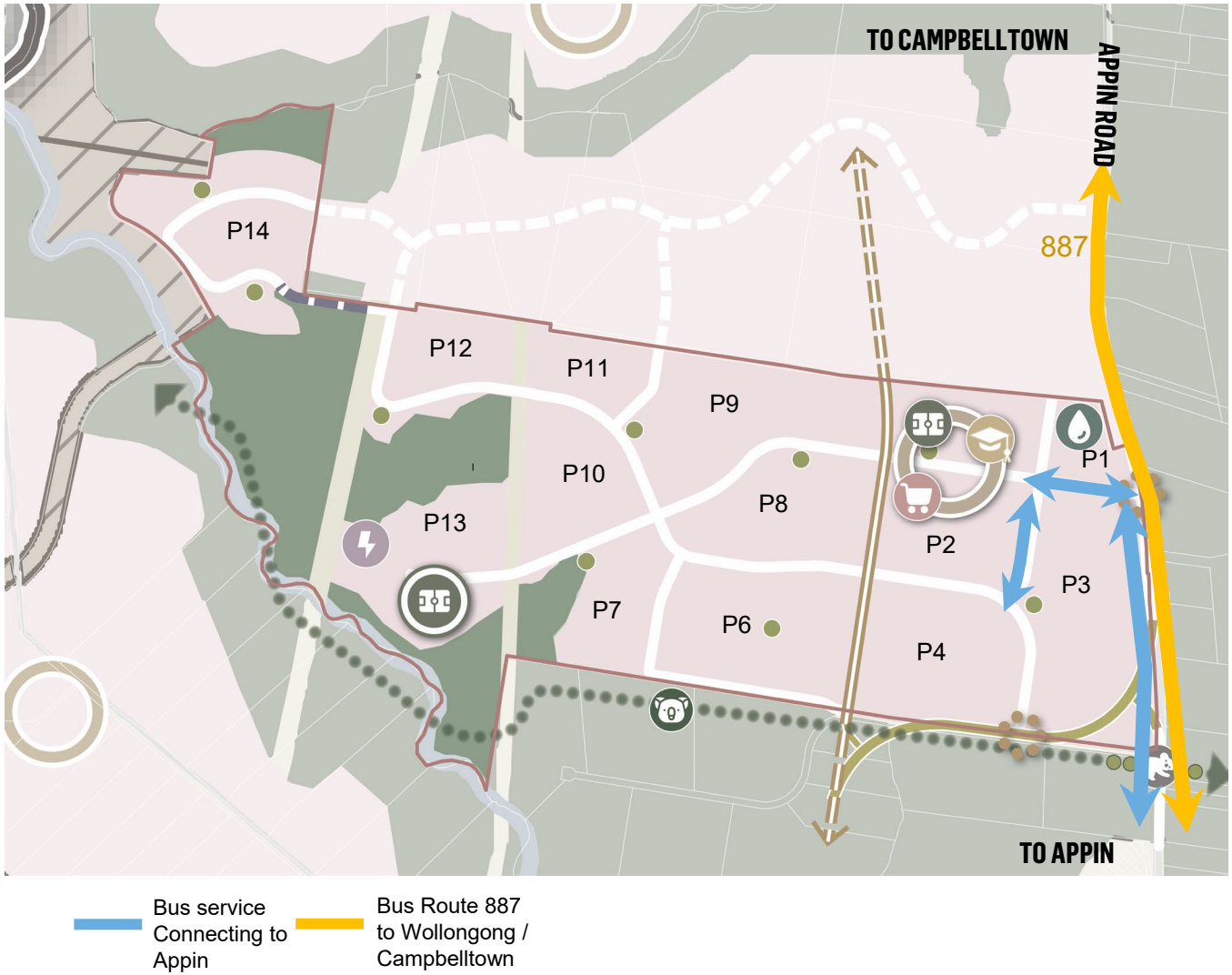
PRECINCT 1 & 2 TRANSPORT

PUBLIC TRANSPORT DELIVERY OVERVIEW

This stage will include the extension of the existing bus network from Appin to service the initial collector roads. Bus Route 887 to Wollongong / Campbelltown will also provide access along Appin Road for regional transport access.

This is indicative public transport staging will be subject to further planning from TfNSW and the relevant bus operator.

FIGURE 11 PRECINCT 1 & 2 PUBLIC TRANSPORT DELIVERY



Source – Urbis

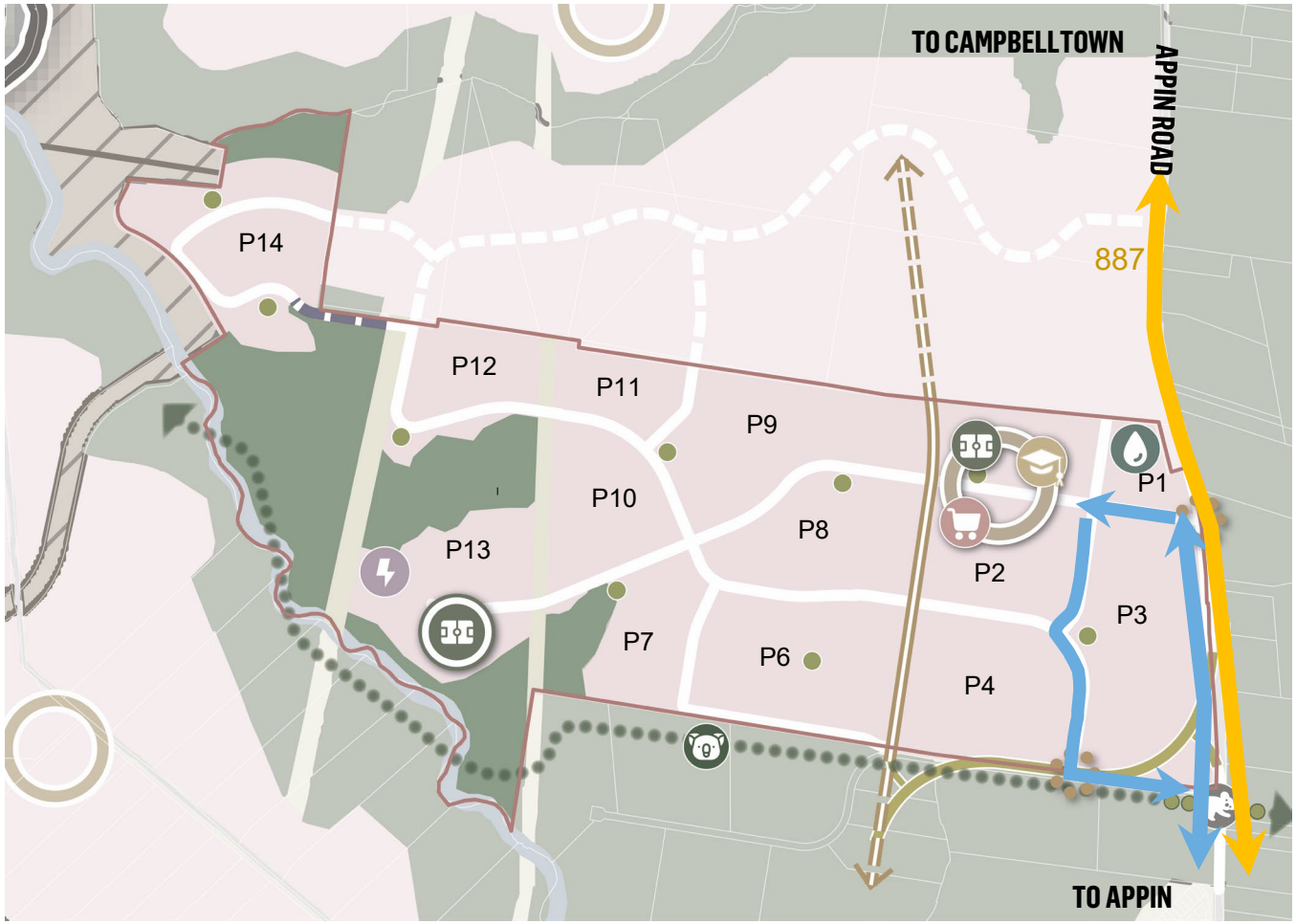
PRECINCT 3, 4 & 5 TRANSPORT

PUBLIC TRANSPORT DELIVERY OVERVIEW

This stage will include the extension of the existing bus network from Appin to service the developing collector roads. Bus Route 887 to Wollongong / Campbelltown will provide access along Appin Road for regional transport access.

This is indicative public transport staging will be subject to further planning from TfNSW and the relevant bus operator.

FIGURE 12 PRECINCT 3, 4 & 5 PUBLIC TRANSPORT DELIVERY



Source – Urbis

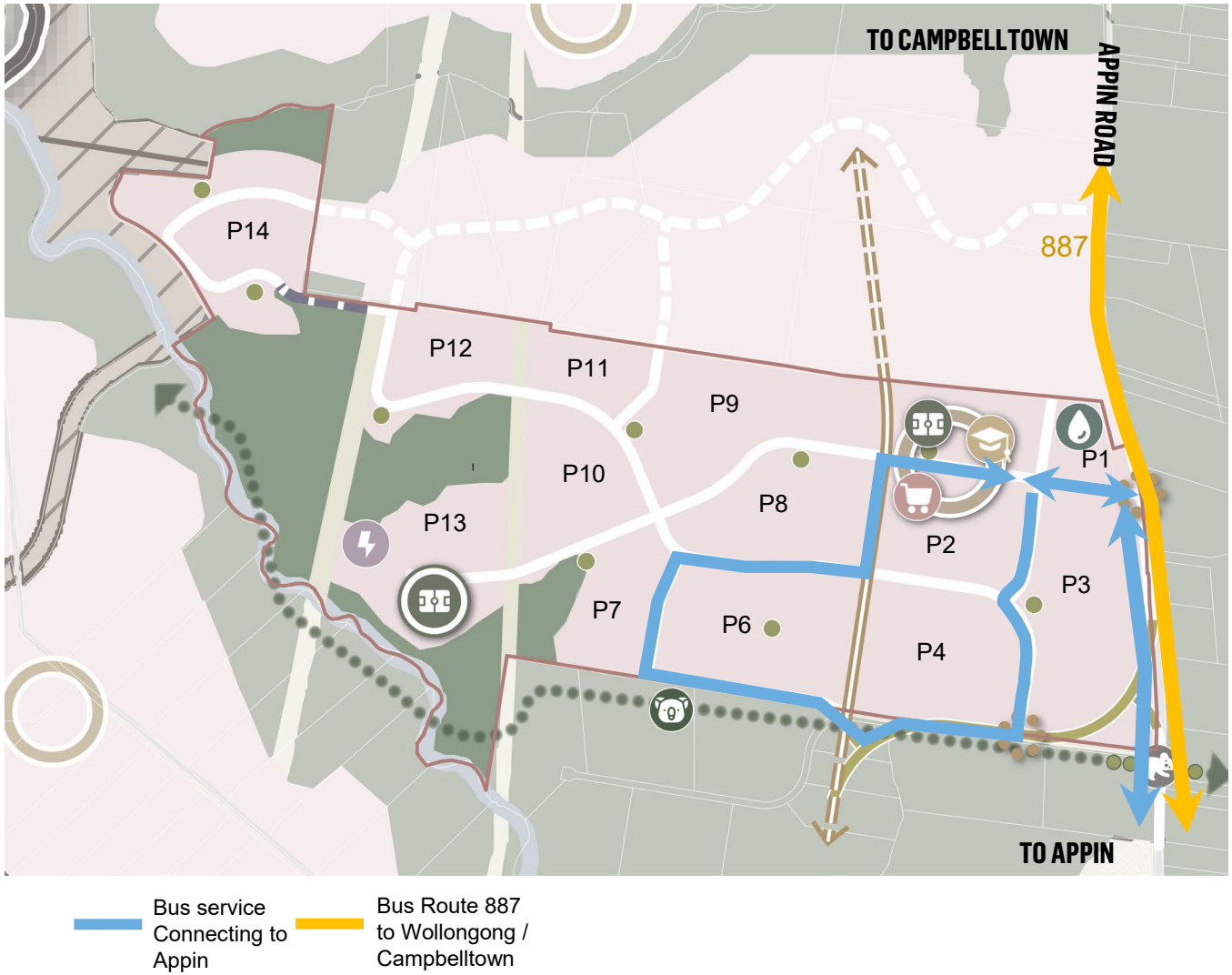
PRECINCT 6, 7 & 8 TRANSPORT

PUBLIC TRANSPORT DELIVERY OVERVIEW

This stage will include the extension of the existing bus network from Appin to service the developing collector roads. Bus Route 887 to Wollongong / Campbelltown will provide access along Appin Road for regional transport access.

This is indicative public transport staging will be subject to further planning from TfNSW and the relevant bus operator.

FIGURE 13 PRECINCT 6, 7 & 8 PUBLIC TRANSPORT DELIVERY



Source – Urbis

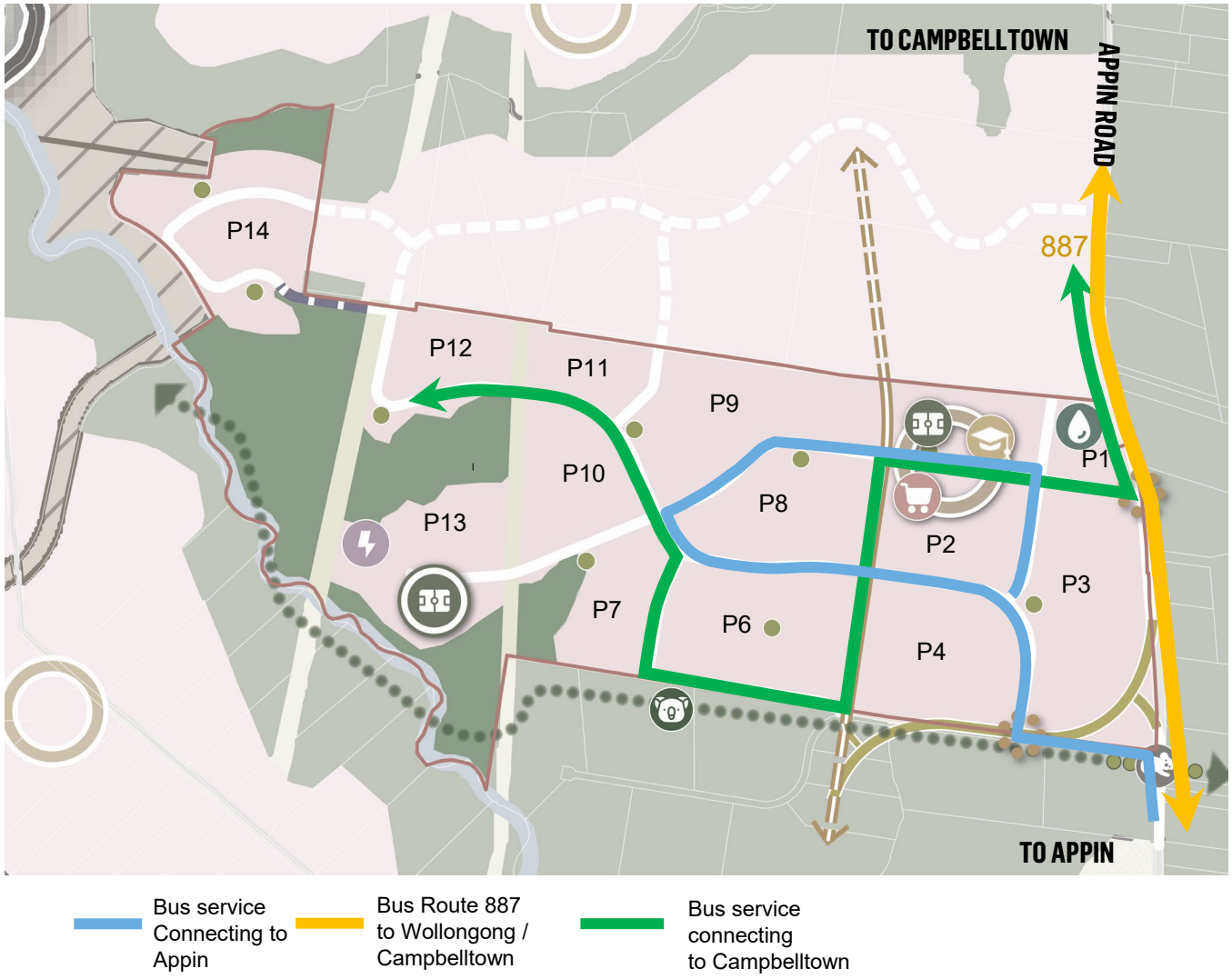
PRECINCT 10, 11, 12, 13 & 14 TRANSPORT

PUBLIC TRANSPORT DELIVERY OVERVIEW

This stage will include the extension of the existing bus network from Appin and Campbelltown to service the developing precincts. Bus Route 887 to Wollongong / Campbelltown will provide access along Appin Road for regional transport access.

This is indicative public transport staging will be subject to further planning from TfNSW and the relevant bus operator.

FIGURE 14 PRECINCT 10, 11, 12, 13 & 14 PUBLIC TRANSPORT DELIVERY



Source – Urbis

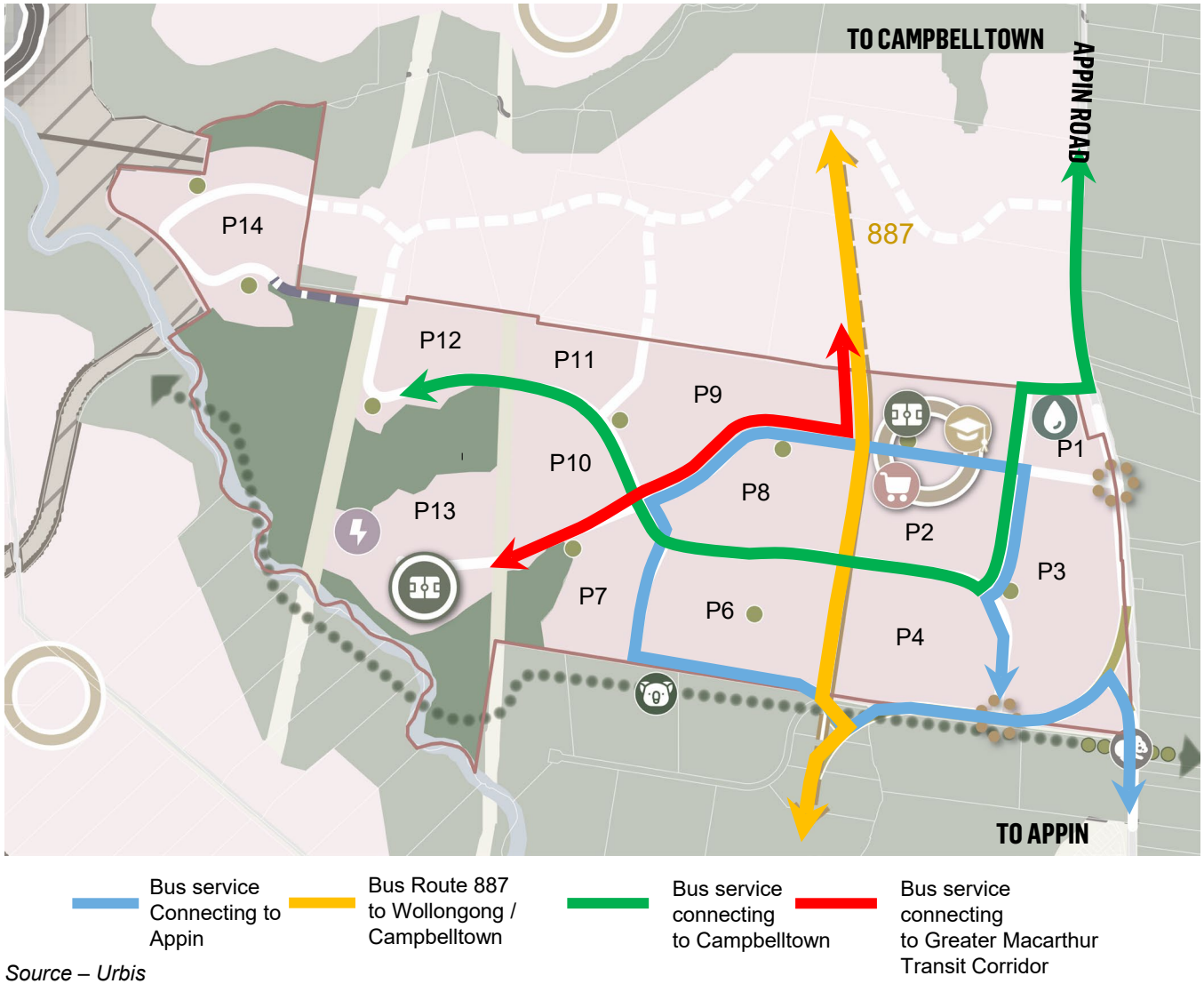
PRECINCT 10, 11, 12, 13 & 14 TRANSPORT

PUBLIC TRANSPORT DELIVERY OVERVIEW

This stage will include the completion of the public transport network for the precinct, after the completion of the Greater Macarthur Transit Corridor and the East-west connection (Appin bypass via Brian Road).

This is indicative public transport staging will be subject to further planning from TfNSW and the relevant bus operator.

FIGURE 15 PRECINCT 10, 11, 12, 13 & 14 PUBLIC TRANSPORT DELIVERY



Source – Urbis

TRAFFIC GENERATED BY THE DEVELOPMENT IN 2036 – EXTERNAL TRIPS

EXTERNAL TRIPS

External trips generated will flow onto Appin Road northbound towards Campbelltown and Macarthur or southbound towards Appin, Wollongong and Wollondilly. External trips generated are broken down as follows

- 1,978 external vehicle trips in the AM peak hour are generated on a weekday.
- 2,049 external vehicle trips in the PM peak hour are generated on a weekday.

ASSUMPTIONS

1. For background growth there has been no assessment of the precincts to the southwest of North Appin.
2. The North Appin (part) Precinct will comprise approximately 3,000 residential dwellings.
3. Development will commence in 2026 and will be completed in 2036 with approximately 300 dwellings per year.
4. Some of the Infrastructure assumptions include

- The through connections on the Greater Macarthur Transit Corridor beyond North Appin (part) precinct will not be operational in full by 2036.
- All east-west traffic within the North Appin (part) Precinct will be managed by demonstrated infrastructure in the Draft Structure Plan.
- Appin Road from Gilead northwards will require an upgrade from 2 lane to 4 lane triggered by Gilead Stage 1 development in 2023. This involves a 5.4-kilometre section of road upgrade between Mount Gilead and Ambarvale.
- The upgrade of Appin Road to two lanes in each direction between Brian Road and the southern-most entrance to the Gilead development.
- Brian Road should be upgraded to serve as an east-west connection for the wider region between Appin Road and the Greater Macarthur Transit Corridor.

5. Weekday average AM peak hour total vehicle trip rate of 0.95 for low-density dwellings and 0.39 for medium-density dwellings.
6. Weekday average PM peak hour total vehicle trip rate of 0.99 for low-density dwellings and 0.37 for medium-density dwellings.
7. Internal roads are sized to accommodate internal site traffic, through traffic to be on Greater Macarthur Transit Corridor or Appin Road.
8. Based on location of employment and attractor sites, the geographic traffic split for both AM and PM vehicle trips are assigned as 74% towards/from Gilead/Campbelltown and 26% towards/from Appin along Appin Road.
9. For the AM peak hour, the directional split is 68% outgoing and 32% incoming.
10. For the PM peak hour, the directional split is 40% outgoing and 60% incoming.

TRAFFIC GENERATED BY THE DEVELOPMENT IN 2036 – INTERNAL TRIPS

INTERNAL TRIPS

Internal vehicles trips generated will flow towards the school in the north of the site via the Greater Macarthur Transit Corridor or the Northern Collector road or the local centre via the Greater Macarthur Transit Corridor. Internal trips generated are broken down as follows

- 661 internal vehicle trips in the AM peak hour are generated on a weekday.
- 762 internal vehicle trips in the PM peak hour are generated on a weekday.

ASSUMPTIONS

1. Internal trip generation rate have been assumed as 25% of total external trips for each development phase in both the AM and PM peak hours.
2. Internal vehicle trips are attracted to/from the following land uses

- Primary school (1000 students from the site), applying a trip rate of 0.67 per student.
- Retail and commercial centre within the local centre.

3. For the AM peak hour, the directional split for the school is 70% to and 30% from, and the directional split for the commercial centre is 50% to and 50% from.
4. For the PM peak hour, school traffic is excluded as it operates on an earlier PM peak hour, and the directional split for the commercial centre is 50% to and 50% from.

TRAFFIC ANALYSIS OF KEY INTERSECTIONS

KEY INTERSECTIONS

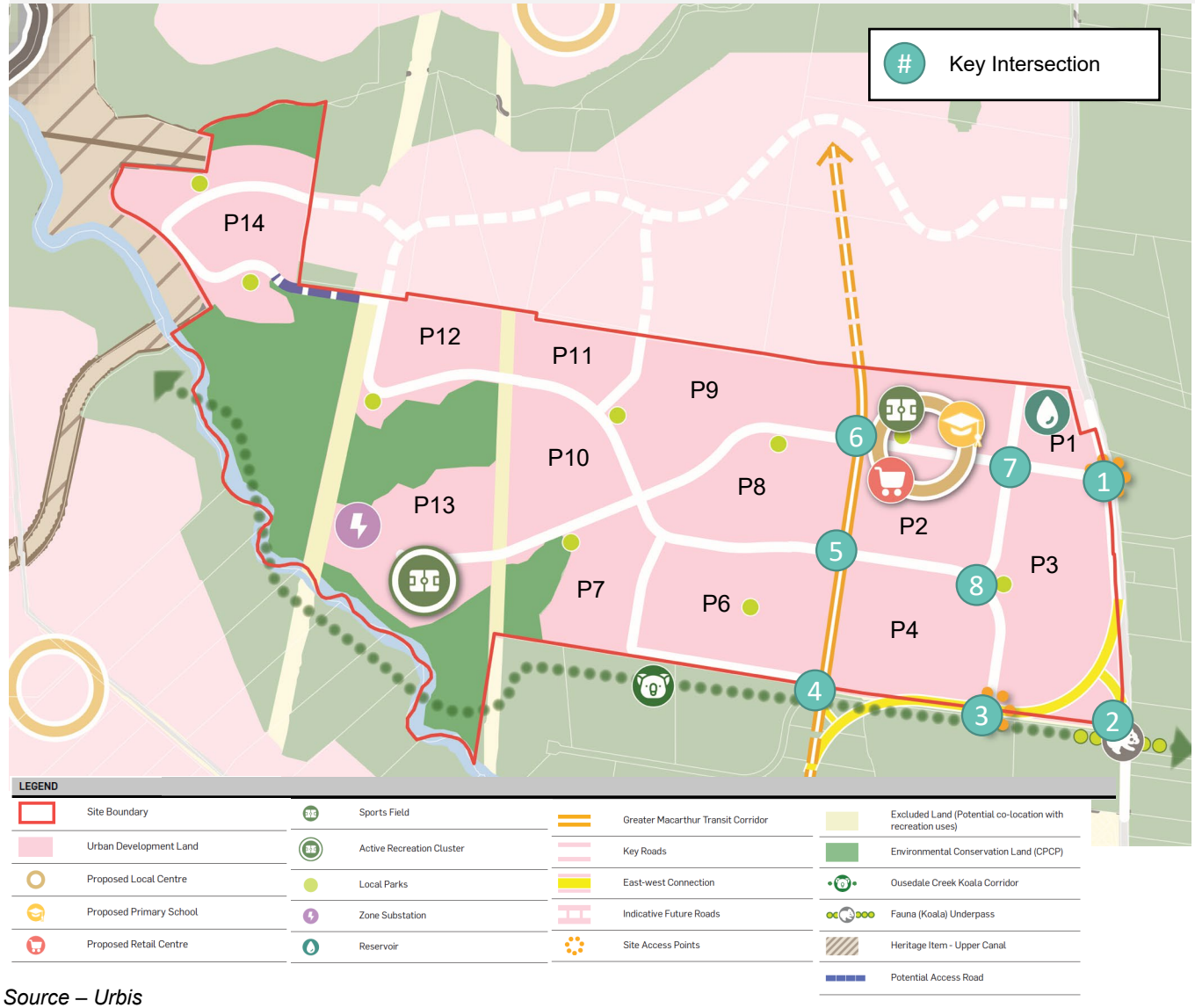
8 key intersections have been analysed in greater detail using SIDRA INTERSECTION modelling, as shown in **Figure 16**. These intersections include

1. Appin Road / Northern Collector.
2. Appin Road / Brian Road (left in, left out intersection).
3. Brian Road / Middle Collector.
4. Greater Macarthur Transit Corridor (N) / Greater Macarthur Transit Corridor (S).
5. Greater Macarthur Transit Corridor / Middle Collector.
6. Greater Macarthur Transit Corridor / Northern Collector.
7. Northern Collector / North-South Collector.
8. Middle Collector / North-South Collector.

Note that for the purposes of the SIDRA INTERSECTION analysis, the east-west connection between Appin Road and the Greater Macarthur Transit Corridor has not been considered operational. This is because the east-west connection is not required for the functionality of the traffic generated by the proposal.

As means of providing a conservative and robust analysis, Intersection 2 has been assumed as a signalised intersection at Appin Road / Brian Road.

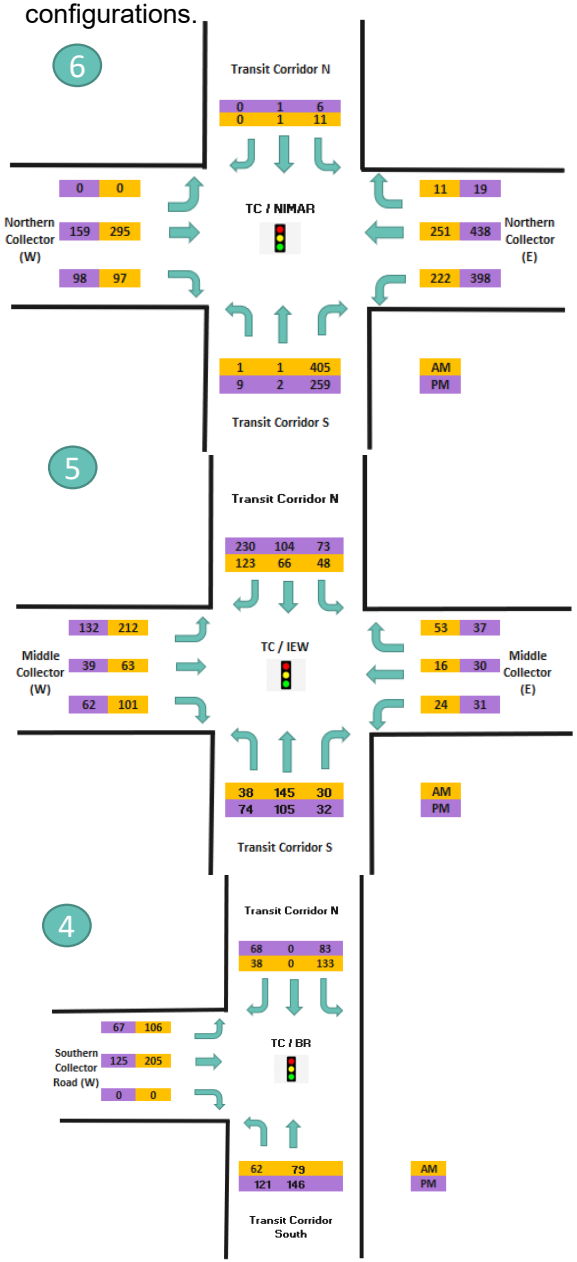
FIGURE 16 OVERVIEW OF KEY INTERSECTIONS

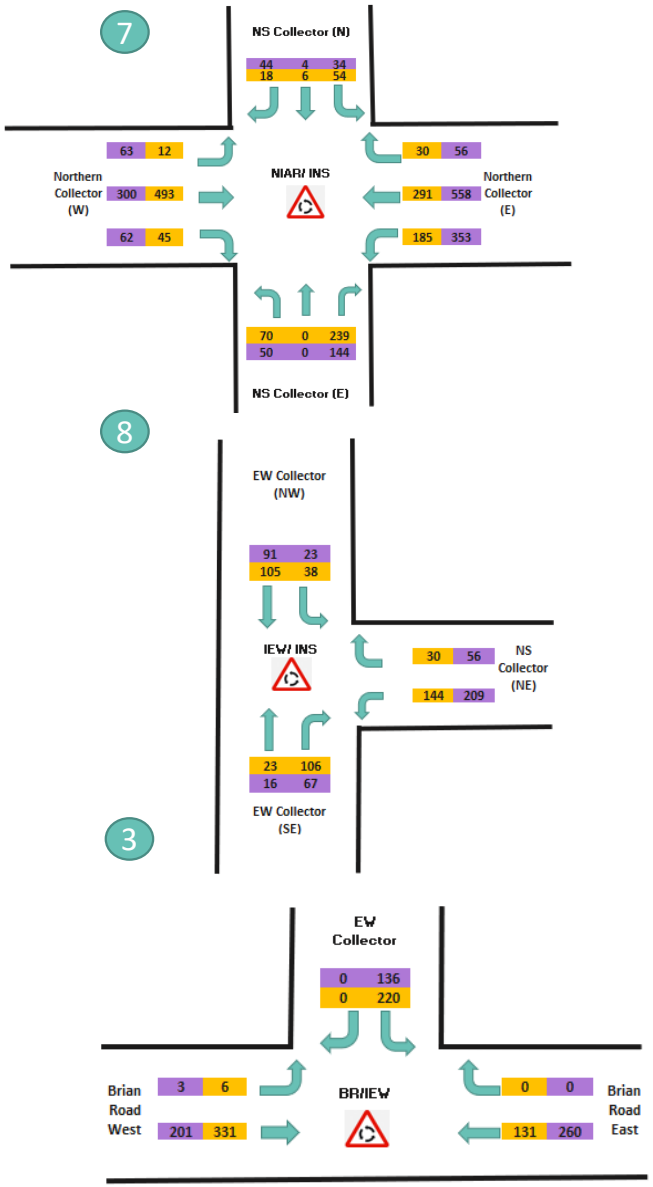


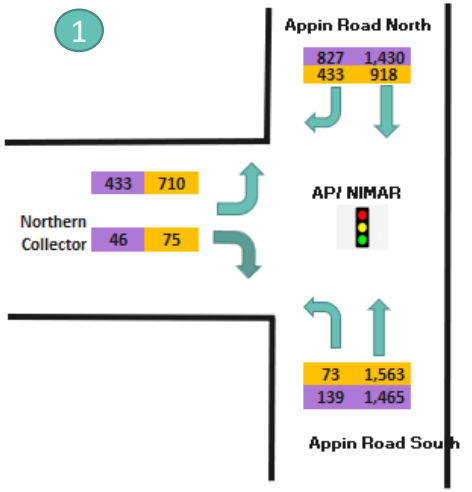
Source – Urbis

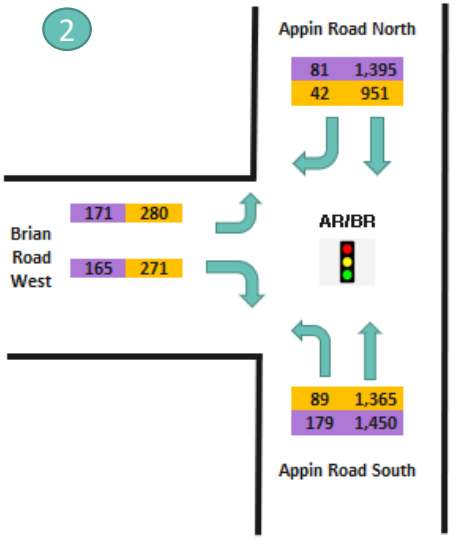
KEY INTERNAL INTERSECTION VOLUMES

AM and PM peak hour external and internal vehicle movements for a weekday are summarised for each of the key intersections below. Refer to Appendix A for detailed lane configurations.









INTERNAL INTERSECTION OPERATION

INTERSECTION OPERATION

The operation of the key internal intersections surrounding the site has been assessed using SIDRA Intersection. The commonly used measure of intersection performance, as defined by Transport for New South Wales (TfNSW) is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service (LOS).

SIDRA INTERSECTION results for key intersections surrounding the site are shown in **Table 7**, which provides a summary of the operation of the surveyed intersections. Based on the results shown below, the major internal intersections can accommodate the proposal.

TABLE 7 INTERNAL INTERSECTION OPERATION 2036

Intersection ID	Location (ID)	Time	Level of Service	Degree of Saturation	Average Delay (s)	Average Queue Length (m)
4	TC (N) / TC (S)	AM Network Peak	B	0.339	19.8	37
5	TC / EWC		C	0.562	34.6	42.5
6	TC / NC		C	0.506	36.8	66.4
3	BR / EWC		A	0.218	1.8	0.0
8	EWC / NSC		A	0.144	5.7	5.9
7	NC / NSC		A	0.315	6.2	10.3
4	TC (N) / TC (S)	PM Network Peak	C	0.385	20.2	32.3
5	TC / EWC		C	0.585	34.6	67.2
6	TC / NC		C	0.703	37.5	134.8
3	BR / EWC		A	0.172	1.2	0.0
8	IEW / NSC		A	0.209	5.5	9.0
7	NC / NSC		A	0.343	5.9	15.2

TC – Transit Corridor, BR – Brian Road, AR – Appin Road, NC – Northern Collector, EWC – East-West Collector (Middle Collector), NSC – North-South Collector

EXTERNAL INTERSECTION OPERATION

INTERSECTION OPERATION

The operation of the key external intersections fronting Appin Road from the site has been assessed using SIDRA Intersection. The commonly used measure of intersection performance, as defined by Transport for New South Wales (TfNSW) is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service (LOS).

SIDRA INTERSECTION results for key intersections surrounding the site are shown in **Table 8**, which provides a summary of the operation of the surveyed intersections. Based on the results shown below, the major external intersections can accommodate the proposal.

TABLE 8 EXTERNAL INTERSECTION OPERATION 2036

Intersection ID	Location (ID)	Time	Level of Service	Degree of Saturation	Average Delay (s)	Average Queue Length (m)
1	AR / NC	AM Network Peak	C	0.938	32.3	325.6
2	AR / BR		C	0.874	32.9	235.5
1	AR / NC	PM Network Peak	C	0.960	34.7	238.6
2	AR / BR		C	0.779	35.6	196.9

AR – Appin Road, BR – Brian Road

Source – Urbis

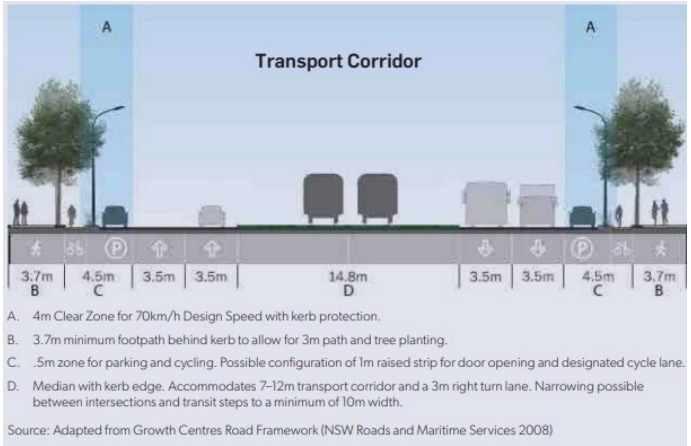
NUMBER OF MIDBLOCK LANES REQUIRED FOR NORTH APPIN

MIDBLOCK LANE ASSUMPTIONS

The number of midblock lanes required to serve North Appin (part) precinct traffic was determined for the major collector roads within the proposal site. Brian Road only requires one lane in each direction to function effectively for the precinct, however space for two lanes will be reserved for the fuure east-west connector road to be built by others. The configuration of the Greater Macarthur Transit Corridor will generally be designed as per the indicative layout found in the Greater Macarthur Interim Plan and shown below in **Figure 18**, consisting of two general traffic lanes per direction. It should be noted that North Appin (part) precinct only requires one lane of traffic for the Greater Macarthur transit corridor, and space will be reserved for an additional lane to the built by others.

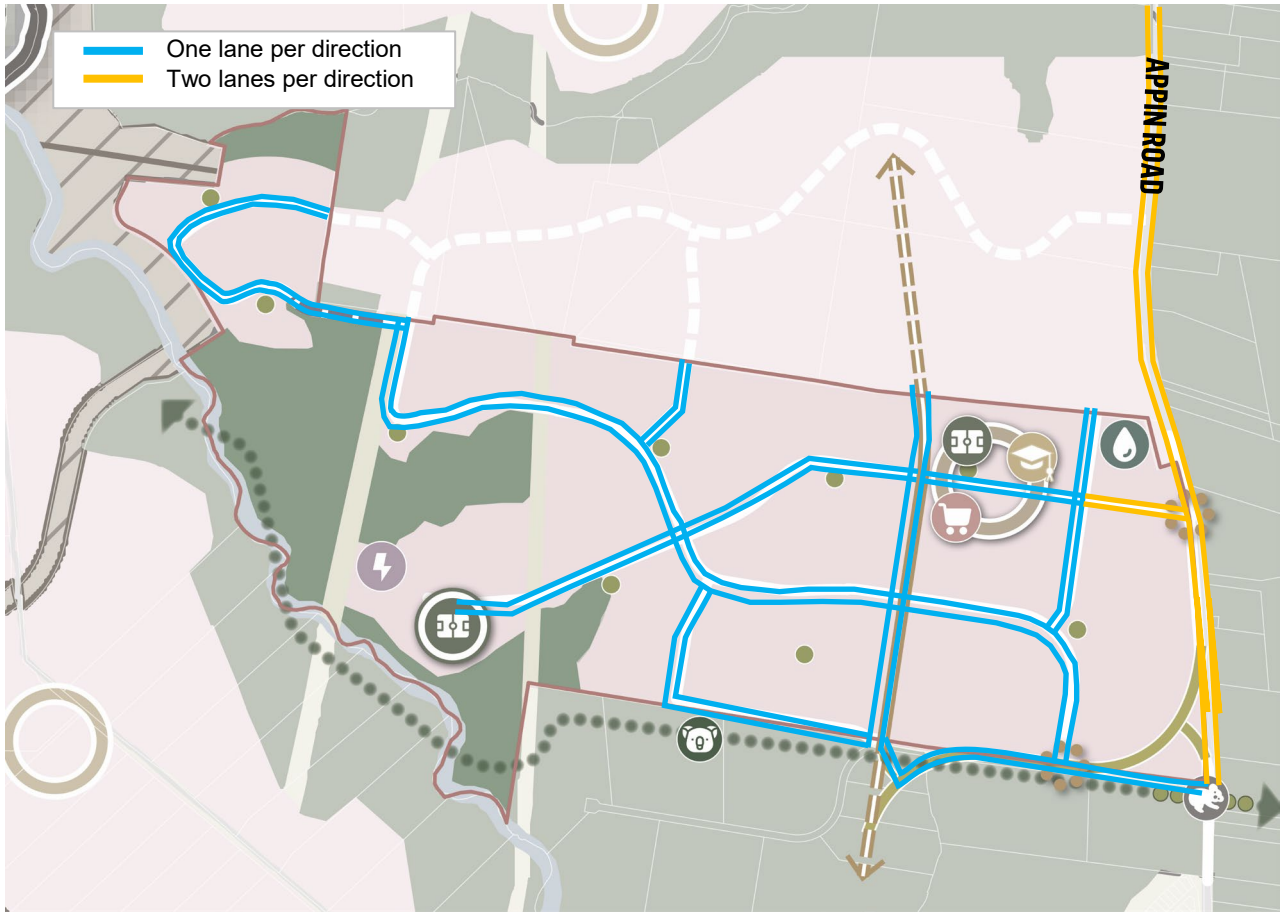
Based on a lane capacity of 900 vehicles per lane per direction, the midblock lane requirements have been specified in **Figure 17**.

FIGURE 18 TRANSPORT CORRIDOR CROSS SECTION



**Indicative layout*

FIGURE 17 MIDBLOCK LANE REQUIREMENTS



Source – Urbis

STRUCTURE PLANNING CONSIDERATIONS

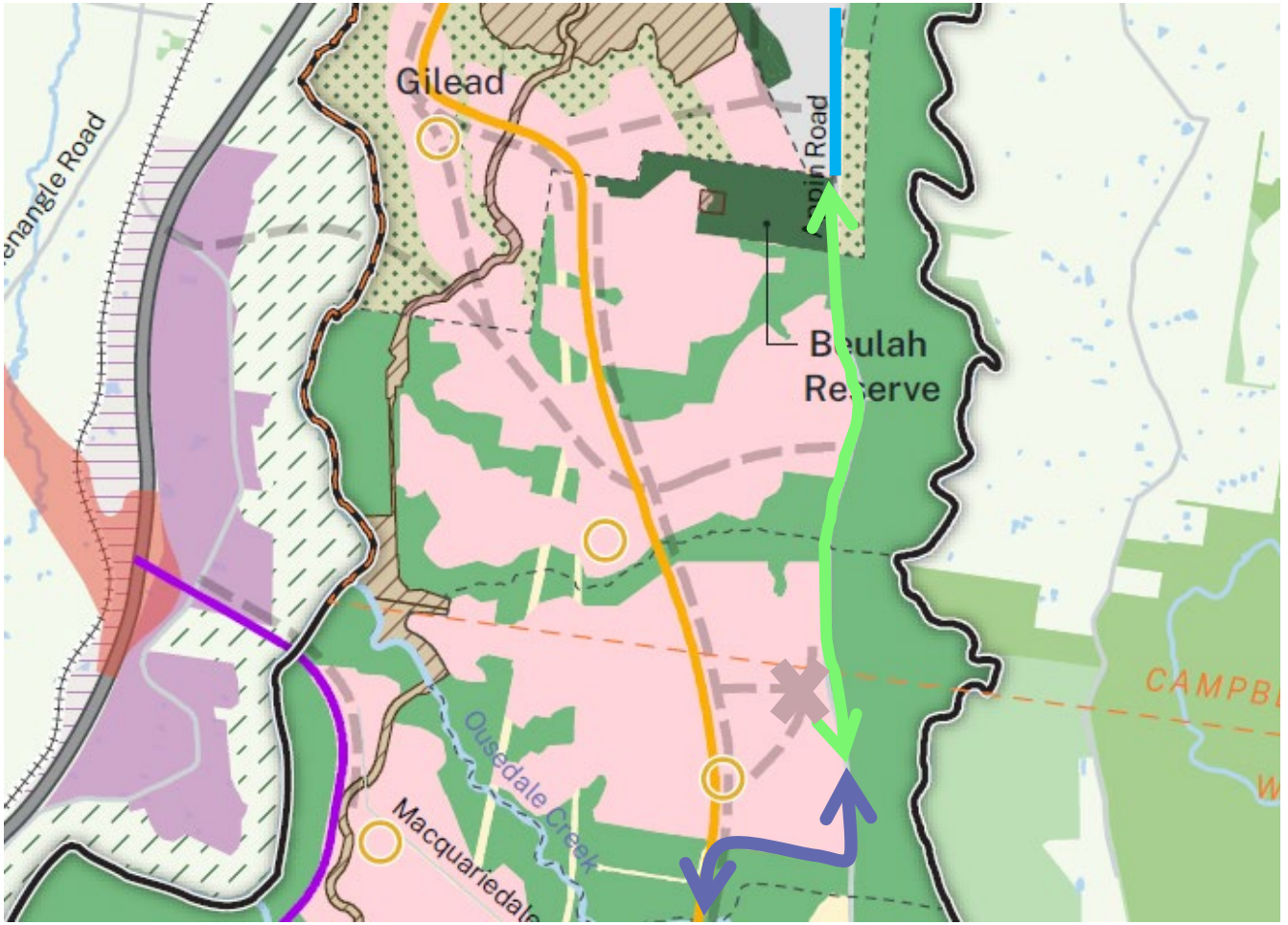
EAST-WEST CONNECTION

A potential alignment for an east-west connection connecting Appin Road to the Greater Macarthur Transit Corridor is referred to in November 2022 GMGA Structure Plan. This shows the alignment of a potential bypass cutting through the North Appin (part) Precinct. This would create a negative outcome for the future community as a major traffic-carrying road would dissect an urban area, impacting amenity. Any future east-west connection should utilise Brian Road as an alignment. Brian Road provides an existing corridor and is away from existing and future urban areas. Consultation with TfNSW has demonstrated that they support the existing Brian Road alignment as a viable east-west connection.

REGIONAL NETWORK

Appin Road will be the primary traffic-carrying road for all external trips away from the site towards employment, recreation, retail and services. Appin Road can support the majority of the development. Further traffic demand can be supported by the future Greater Macarthur Transport Corridor.

FIGURE 19 STRUCTURE PLANNING CONSIDERATIONS



Source – Urbis

TRAFFIC MITIGATION MEASURES

Indicative mitigation measures to manage the increased trips generated by the development are below. These will be further refined during the TMAP process.

A Strategic upgrading of Brian Road between Appin Road and the Greater Macarthur Transit Corridor to two lanes in each direction with shared paths to support the increased traffic volumes using Brian Road to access Appin Road. This supports the east-west connector road (Appin bypass).

B Provide a northern major access road, which will provide the primary connection between the precincts, school and Appin Road.

C Provide a signalised intersection at the Northern Collector to support the flow of vehicles to and from the site.

D The Brian Road intersection roundabout upgrade will be completed by TfNSW. This will need to be signalised in the future. This upgrade may follow the existing alignment of Brian Road or the east-west connector, subject to future planning.

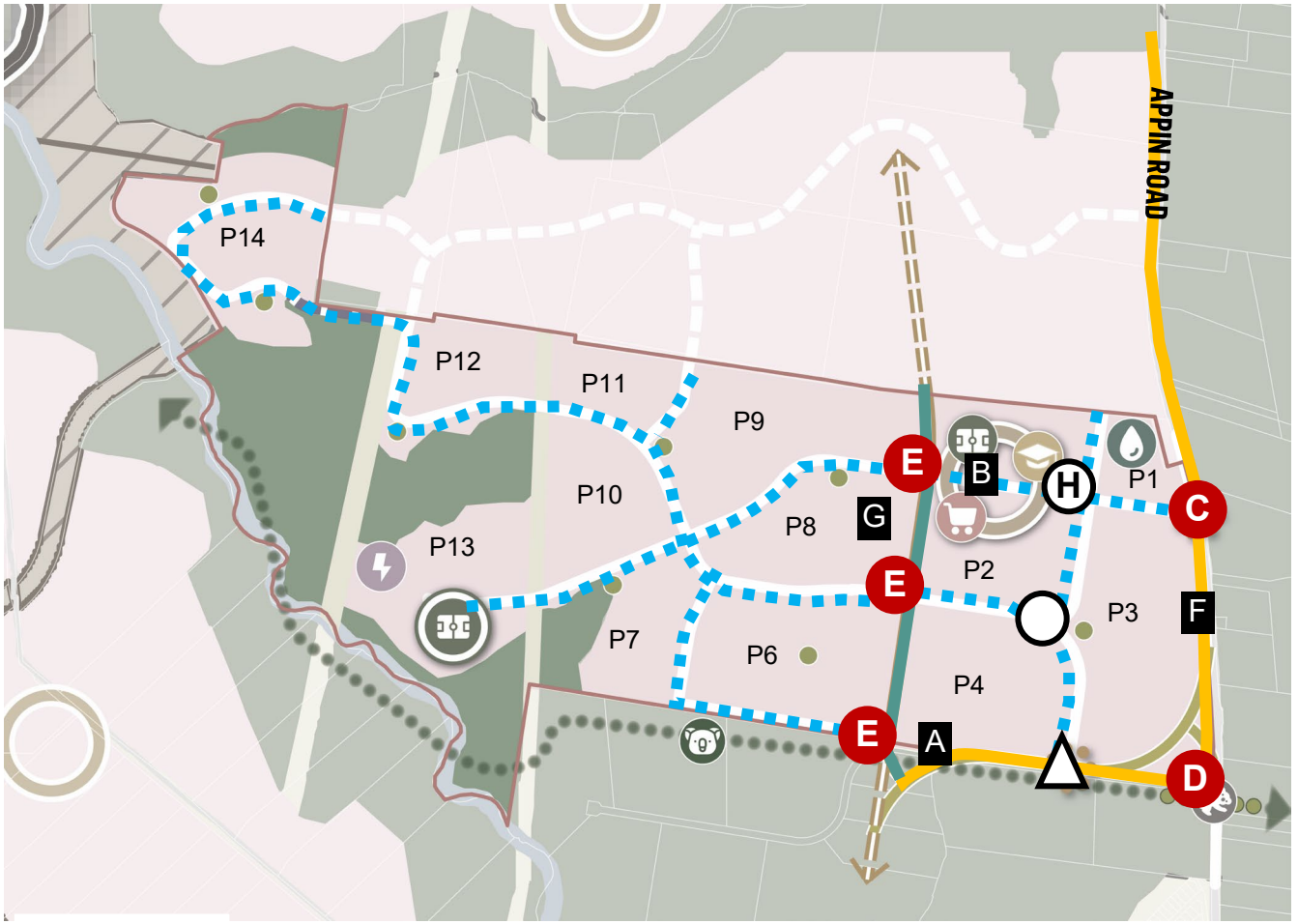
E Provide signalised intersection along the Greater Macarthur Transit Corridor.

F Upgrade of Appin Road north of Brian Road to provide for two lanes of traffic in each direction. The extent of this will be subject to further planning in consideration of the east-west connector road.

G Provide the segment of the Greater Macarthur Transit Corridor, which allows space for two lanes of traffic in each direction, and a 14.8-metre central median separation that can accommodate mass rapid transit in the future.

H Provide a Roundabout with pedestrian crossing facilities to allow for pedestrian movement at a major intersection near the proposed school.

FIGURE 20 TRAFFIC MITIGATION MEASURES



Indicative Layout subject to future planning as part of the TMAP process

Signalised intersection | Proposed roundabout | Left in Left out intersection | Proposed connection roads | Greater Macarthur Transit Corridor | Upgraded Road

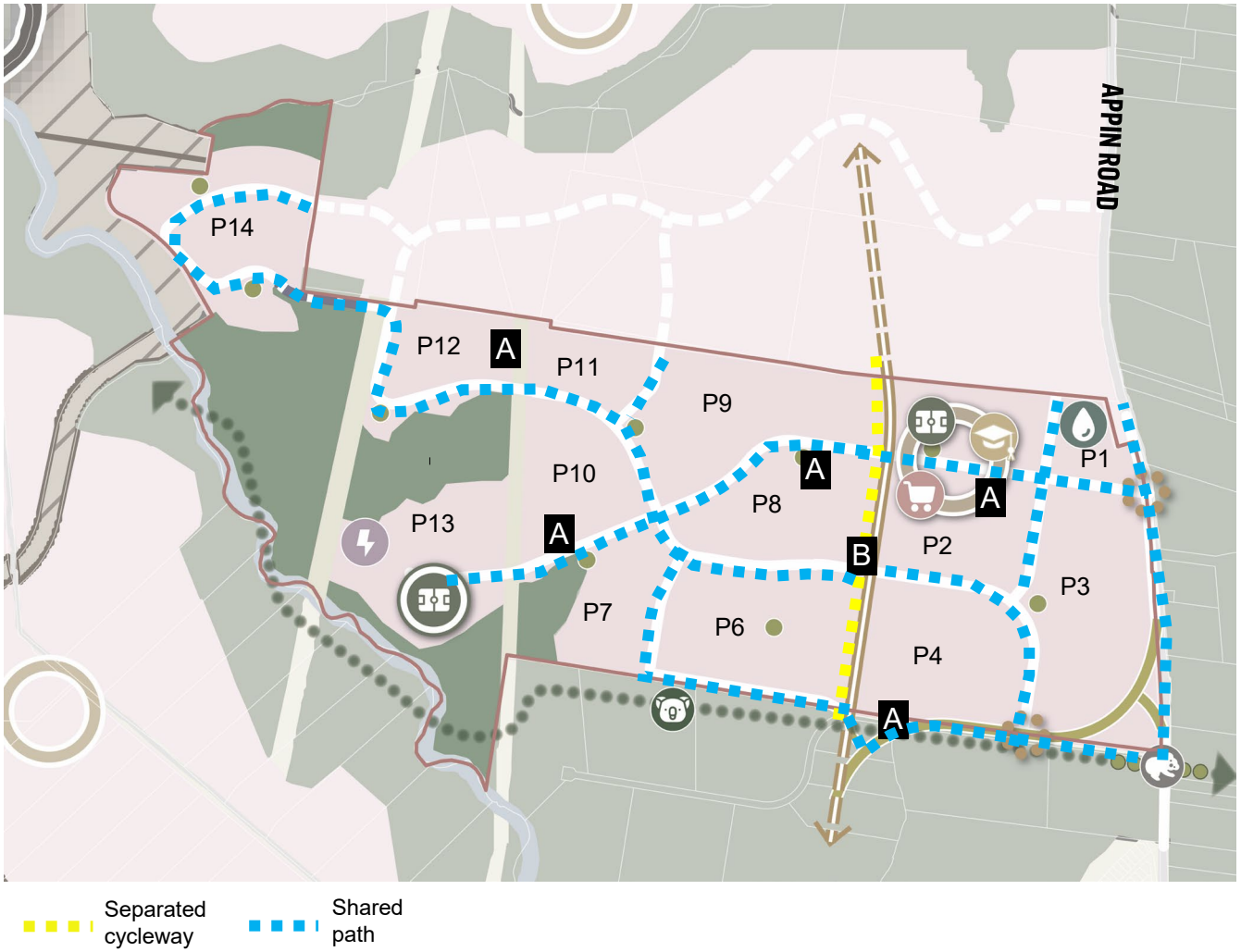
Source – Urbis

ACTIVE TRANSPORT INFRASTRUCTURE

Infrastructure and measures that support active transport are indicated below.

A	Provide a share path network along all connection roads within the site.
B	Provide a uni-directional separated cycling lane on each side of the Greater Macarthur Transit Corridor to facility cycling long distances to work and ensuring rider safety.

FIGURE 21 INDICATIVE ACTIVE TRANSPORT INFRASTRUCTURE MEASURES



Source – Urbis

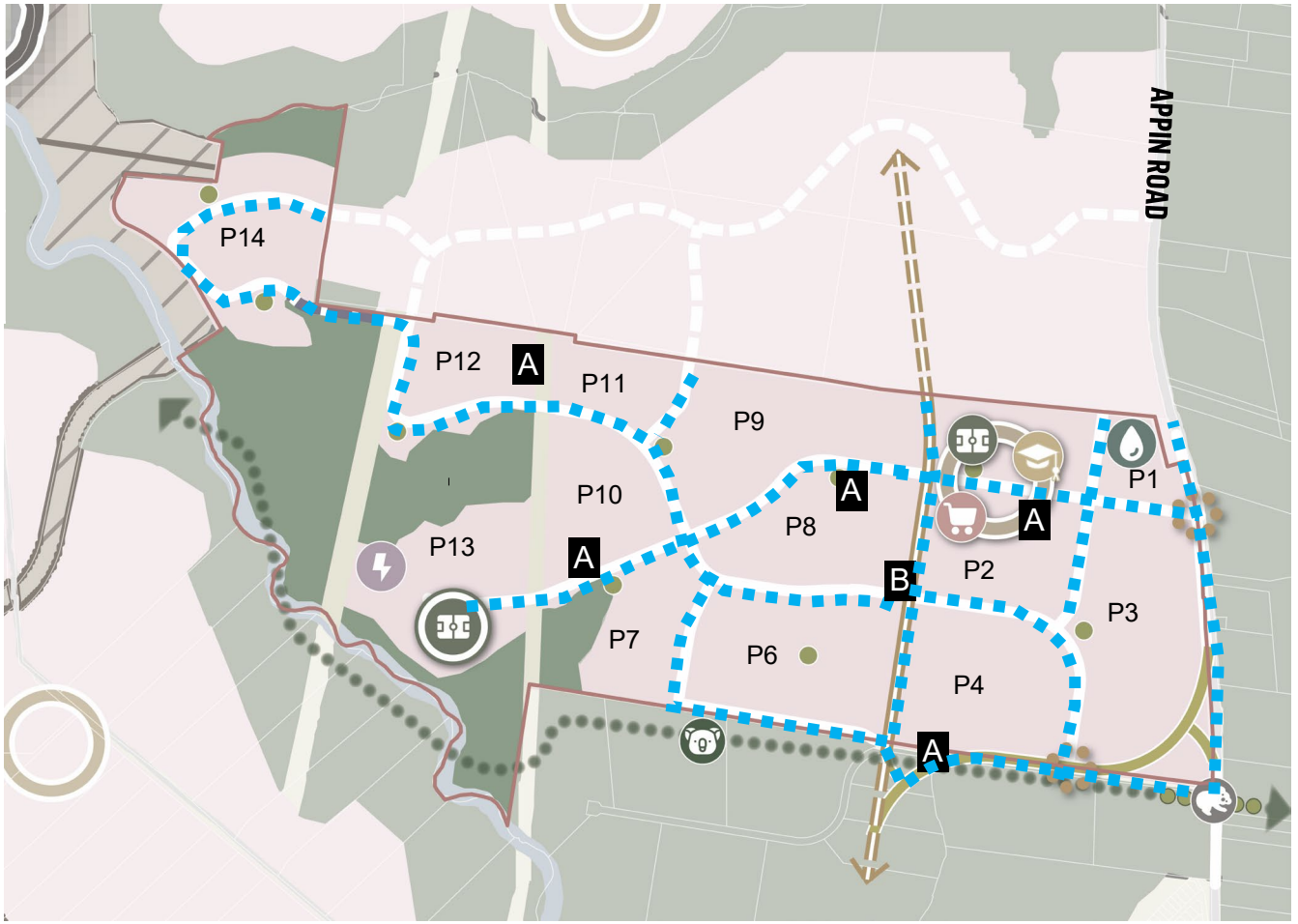
Indicative Layout subject to future planning as part of the TMAP process

EMERGENCY SERVICES ACCESS

Infrastructure and measures that support emergency services access and egress are indicated below.

A	Emergency services access into North Appin (part) Precinct is accommodated via the two main access points on Appin Road.
B	Future emergency services access into North Appin (part) Precinct will be accommodated via the two main access points on the Greater Macarthur Transit Corridor.
C	All collector and sub-arterial roads will have lanes of 3.5m wide to accommodate emergency services vehicles.

FIGURE 22 EMERGENCY SERVICES ACCESS



Primary emergency services vehicle access

Source – Urbis

Indicative Layout subject to future planning as part of the TMAP process

SUMMARY AND CONCLUSIONS

SUMMARY

The North Appin (part) Precinct consists of a mix of approximately 3,000 low and medium density development lots, along with a local centre and school, with a proposed take-up rate of 300 dwellings/annum from 2027.

The Precinct will construct a range of internal roads which will service the development traffic and two Greater Macarthur transport corridors serving a more strategic function (Appin Road and the Greater Macarthur Transit Corridor).

Appin Road is an existing state controlled road which connects to Campbelltown. To the north of the site, this is intended to be upgraded to four lanes as part of the Gilead Stage 1 development by approximately 2024.

The Greater Macarthur Transit Corridor is proposed to connect through to Macarthur and provide a dual function. Its primary function will be to support a central transit link through the GMGA. A secondary function is to connect traffic from each of the Sub-precincts in the Growth Area.

The proposed development will ensure that sufficient land is set aside within Appin Road and to achieve the appropriate transit infrastructure within the Greater Macarthur Transit Corridor including to construct the two travel lanes in either direction within the site boundary.

The precinct will accommodate active transport connections to allow for internal connections to key travel nodes and connect with external intersections. Appropriate emergency access, circulation and egress will be provided within the precinct.

The TMAP process will further detail and confirm the transport infrastructure required to accommodate the proposal.

CONCLUSIONS

This proposal is aligned with the GMGA vision of providing new homes and local centres, creating local jobs and improving transport connections.

The internal road network in North Appin (part) Precinct has been sized to accommodate all internal traffic predicted by the full build out of approximately 3,000 dwellings plus a school and local centre. The internal roads do not require or intend to serve a more strategic purpose.

The delivery of the majority of development precincts can be permitted under the current two lane configuration of Appin Road.

The upgrade of Appin Road from two lanes to four lanes will be able to accommodate the latter precincts of development with no adverse traffic implications. IPG will contribute to the upgrading of Appin Road. The scope of the upgrade will be confirmed following the adoption of the TMAP for the project.

Additionally, the future east-west connector and Greater Macarthur Transit Corridor will further relieve pressure on the road network to accommodate the North Appin (part) Precinct.

Brian Road has been identified as the optimum alignment of a future east-west connection (between Appin Road and the Greater Macarthur Transit Corridor) as it uses an existing road corridor, promotes positive Movement & Place outcomes for the region and does not funnel strategic traffic through a proposed residential community as compared to the other proposed options.

Regional infrastructure is being reviewed by TfNSW separately to inform regional transport infrastructure requirements and staging. Once this has been concluded, further detail regarding the design of internal road staging and accesses will be provided as part of a TMAP process.

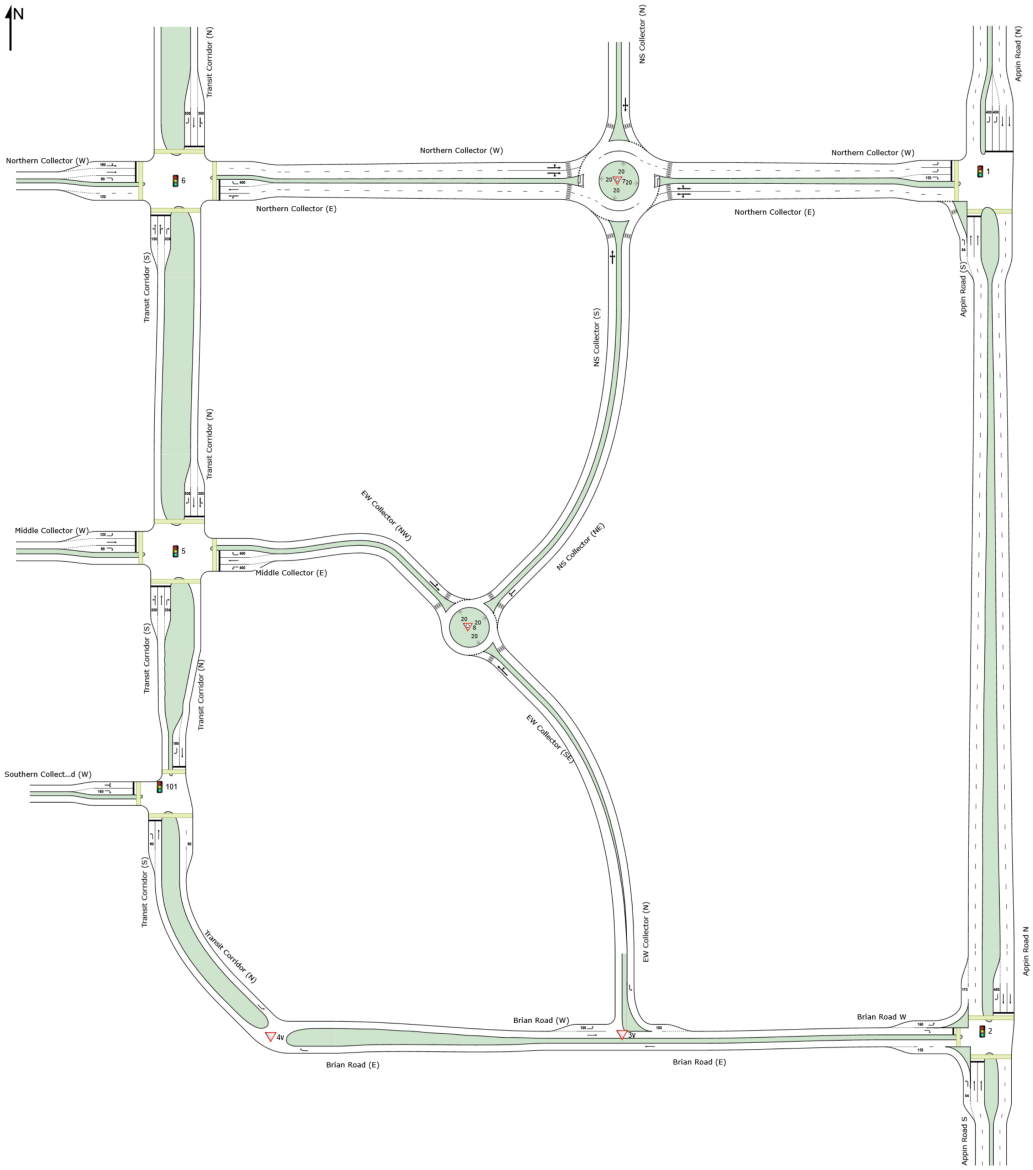
APPENDIX A – SIDRA INTERSECTION CONFIGURATION

NETWORK LAYOUT

Network: N101 [2036 Dev_AM (Network Folder: 2036_Dev)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Note that 2 lanes are only applied at the intersection approaches to Appin Road South

SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
4v	NA	2036_Dev_AM_Transit Corridor / Brian Road
5	NA	2036_Dev_AM_Transit Corridor / EW Collector
6	NA	2036_Dev_AM_Transit Corridor / Northern Collector
1	NA	2036_Dev_AM_Appin Road / Northern Collector
2	NA	2036_Dev_AM_Appin Road / Brian Road
8	NA	2036_Dev_AM_Middle Collector / NS Collector
7	NA	2036_Dev_AM_Northern Collector / NS Collector
101	NA	2036_Dev_AM_Transit Corridor/Southern Collector Road
3v	NA	2036_Dev_AM_Brian Road / EW Collector

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