

ACT BUS NETWORK INFRASTRUCTURE STUDY

FINAL REPORT



PREPARED FOR

TRANSPORT CANBERRA AND CITY SERVICES DIRECTORATE



ACT Bus Network Infrastructure Study

PROJECT NO. 21-031

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1.0 Introduction and overview

This report is the final deliverable in the ACT Bus Network Infrastructure Study. The purpose of this study is to align Transport Canberra's future infrastructure investment with its strategic needs and priorities.

Through the preceding deliverables we have:

- Articulated the ACT's public transport network's future service objectives and principles
- Developed a suite of optimisation parameters to capture service objectives and principles in a quantifiable form
- Developed assumptions for the ACT's public transport network at six future horizons, and
- Provided advice on the options for expanding bus depot capacity in northern Canberra.

In the following chapters, this final deliverable builds on the preceding deliverables and evaluates what infrastructure is likely to be necessary to support the ACT's future bus network.

This has included:

- Analysing likely fleet requirements and opportunities for operational efficiencies
- Considering where bus priority is likely to be required based on future service frequencies and forecast traffic congestion
- Estimating future bus layover requirements and exploration of potential layover solutions
- Identifying the requirements of major interchanges and stops based on the network's evolution, and
- Proposing where new shelters and benches be installed at minor stops.

We have also highlighted the opportunities that could be unlocked by adjusting the industrial agreement with drivers and outlined the next steps that flow from this document.

1.1 Summary of key risks

Through our analysis we have identified risks in several domains.

1.1.1 BELCONNEN

We understand that there could be pressure to decommission the existing Belconnen Depot due to urban intensification. If this were to occur, it could result in:

- A less efficient bus network (especially if a new layover location at the western end of Cohen Street is not secured)
- A larger peak vehicle requirement, and thus higher fleet costs, and
- Increased difficulty in delivering early morning and late-night services.

Because of its ideal position in the network, we recommend that some bus storage capability be retained on the Belconnen Depot site, even if this is in a scaled down form.

As development in Belconnen intensifies, there could be pressure to repurpose other space currently allocated for use by buses. To continue to provide high quality mass transit connectivity to the Belconnen town centre, adequate space for buses will need to be retained, failing to do so risks:

- Limiting the operation of the bus network, and
- Sub-optimal integration between buses and the light rail.

The Westfield Belconnen stop is one of the territory's busiest and is likely to get busier and more complicated once light rail is built, as such there is the risk that the rate of stop failure could increase.

1.1.2 INCREASED TRAFFIC CONGESTION IN THE ACT

Increased traffic congestion on the territory's road network could significantly delay bus services and erode reliability. Moving buses through the Commonwealth Avenue corridor will be particularly challenging during construction of light rail stage 2.

Buses are also affected by traffic on the north western side of Gungahlin. There is the risk that this congestion will worsen in the future, impacting on routes feeding the light rail.

1.1.3 BUS LAYOVERS ACROSS THE ACT

There is the risk that as urban development in Gungahlin intensifies, areas which are currently used for bus layover will be repurposed. Pushing bus layovers further from the interchange will increase unproductive running and the cost of running the network.

There is also the risk that inadequate space is set aside for buses to layover at the new termini in Molonglo and Ginninderry. Ideally layovers should be positioned as close as possible to the new interchanges to minimise out of service running.

1.1.4 STOP INFRASTRUCTURE ACROSS THE ACT

As the next stages of light rail are built through Civic and Belconnen, light rail infrastructure and other associated redevelopment could result in space currently used for bus stops being repurposed. Planning should consider how to create the best possible environment for public transport overall and optimise integration between light rail and buses.

As part of the response to the Covid-19 pandemic, rear door boarding was enacted on the ACT's buses in early 2020. The network is not set up to support this at all stops, particularly in the suburbs.

1.1.5 ZERO EMISSION BUSES

To meet the target that 100 per cent of the fleet be zero emission by 2040, we estimate that Transport Canberra will need to procure over 500 zero emission buses (ZEBs) over the next two decades. This significant investment will require substantial funding, and any funding shortfall could result in a missed target.

Once ZEBs make up a significant proportion of the fleet, it would be ideal to have charging/fuelling infrastructure at all depots. Depots with no or limited charging infrastructure may not be able to house ZEBs and lead to inefficiencies and a skewed distribution of ZEBs across the network.

1.1.6 INDUSTRIAL AGREEMENT

The current industrial agreement limits the span of service that the bus network can offer. Decommissioning the Belconnen Depot and replacing it with one in a less central location could further limit the start time of the network's earliest services and the finish time of the network's latest services due to longer out of service running movements between the depot and trip start and end points.

1.2 Next steps

The next steps flowing from this study involve more detailed assessment of the key issues identified in this exercise. The way in which light rail will impact key parts of Canberra's public transport network is currently unclear, which makes planning bus services in key parts of the network difficult. For instance, the path light rail will take through both the Belconnen town centre and east-west through Civic is currently unknown.

While light rail in these corridors is some way off, it would be useful for Transport Canberra to have a strategy to inform decision making about the operation of buses in these areas in the interim. This work could articulate the minimum requirements for buses in Belconnen and Civic to help ensure successful bus operations during light rail construction and upon its completion. The Belconnen bus stop planning study would help ensure the best possible integration of buses and light rail in Belconnen.

Buses are currently delayed on approach to the Gungahlin town centre. A bus circulation study could further develop the solutions identified in this study and make the passage of buses through Gungahlin faster and more

reliable. This work could also further develop the proposed layover solution for Gungahlin.

Finally, it would be useful for the ACT to have a public transport infrastructure manual. Such a manual would outline infrastructure standards and would be used to evaluate existing facilities and design new ones. The development of the manual could leverage other manuals (such as

Queensland Transport and Main Road's Public Transport Infrastructure Manual), as well as the existing corporate knowledge within Transport Canberra.

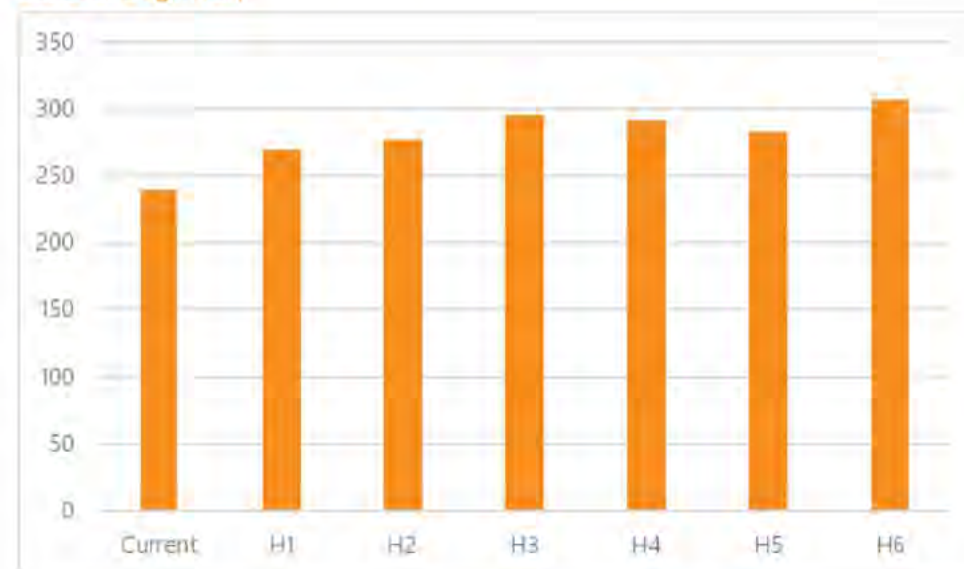
2.0 Future network assumptions

The future network assumptions adopted in this study were set out in the Future networks report.

To establish how these assumptions are likely to impact on the amount of infrastructure required we have compiled a table which outlines the assumed frequency for each bus route at each horizon (Appendix Table D-1).

While more details of these assumptions can be found in the Future networks report, Figure 2-1 illustrates the increase in bus service hours that the assumptions would result in. Assuming H6 represents a 2041 year, the assumptions used in this study would see service hours grow at about 1.25 per cent per year. This is slightly below the rate at ACT's population has been growing over the previous decade¹. Nevertheless, as light rail will replace bus routes over the coming decades the total increase in public transport service hours will be larger.

Figure 2-1: Approximate 7.30 to 8.30 AM service hours (excluding school buses and light rail)



¹ ACT population projections 2018 to 2058, ACT Government, January 2019, https://apps.treasury.act.gov.au/_data/assets/pdf_file/0005/1305581/ACT-Population-Projections-Paper-FINAL.pdf

3.0 Fleet

In this section we provide a high-level overview of the make-up of Transport Canberra's bus fleet as it grows and transitions to zero emission vehicles. We have also considered the likely impact of the closure of the Belconnen Depot and the opening of new depots.

We have identified the following key risks:

- Transport Canberra could miss its 2040 zero emissions target if funding to purchase around 500 ZEBs is not available.
- The closure of the Belconnen Depot will reduce the efficiency of the bus network, increase the network's peak vehicle requirement and make it more difficult to deliver early morning and late-night services.
- The failure to install adequate zero emission charging/fuelling infrastructure at depots could reduce the efficiency of the network or exclude ZEBs from certain parts of the network.

3.1 Fleet size

The size of the bus fleet required to operate the network is determined by service levels during the AM peak (which is the busiest time of day). The current peak vehicle requirement (PVR) in Canberra is about 400 buses².

The operation of these 400 buses has been optimised using the Hastus scheduling software. As such the scheduling of buses is complicated, with an individual bus not necessarily staying on the same route for each of its trips throughout the day. Instead, buses may swap between different routes, with pauses built into their operations to allow for delays and driver breaks.

Without the use of Hastus it is not possible to precisely predict the 'optimised' PVR for future scenarios. Given Hastus modelling is beyond the

scope of this work we have instead used a spreadsheet-based approach to estimate 'simple' PVR.

The simple PVR assumes that each bus stays on the same route and takes a five-minute break (or recovery time) after each trip. The number of buses needed for each route is assumed to be the cycle time divided by the headway rounded up to a whole number. The simplified PVR can be calculated as the sum of this for each route:

$$PVR = \sum \text{roundup}\left(\frac{\text{cycle time}}{\text{headway}}\right)$$

For example, in our methodology if a bus were operating on route R3, it would be assumed to originate as an outbound R3 five minutes after terminating as an inbound R3. The amount of time it takes a bus to complete a round trip as an R3 is known as its cycle time. The R3 currently has a cycle time of about 150 minutes, which is made up of two ~70-minute trips and two five minute breaks.

The R3 currently operates at a 15-minute headway in the AM peak, thus the number of buses needed to operate the R3 is ten. If the number of buses calculated to be needed were 10.5, this would be rounded up to 11 buses.

Using this approach, we estimate that the simple PVR of non-school routes in 2021 is approximately 320 buses. This is 80 buses less than the known 2021 PVR. This difference is likely to be driven by the school buses and the fact that the network doesn't operate in such a simplified way. In the real-world, some buses would have to wait much more than five minutes between trips, increasing the number of vehicles required.

Despite its limitations, we have used simple PVR to give us insight into the increase in the number of buses likely to be needed at each horizon. We then added this to the known PVR of 400 to give an estimated PVR for future horizons (Table 3-1).

² This is for a July 2021 school day before the introduction of the 'interim' network due to a Covid-19 outbreak.

Table 3-1: Fleet estimations

	Current	H1	H2	H3	H4	H5	H6
Simple PVR	320	347	361	374	369	360	381
Increase		27	41	54	49	40	61
Estimated PVR	400	427	441	454	449	440	461
Potential fleet size (+10% spares)	470	485	499	494	484	507	

It is standard practice to assume that operators hold at least 10 per cent more vehicles than their PVR. With these 'spares', we estimate that the bus fleet may have to grow to over 500 buses by horizon 6.

3.2 ZEB procurement

Over the coming decades Transport Canberra will be transitioning its fleet to zero emission buses as a part of the *Zero emissions transition plan*.

The *Zero emissions transition plan for Transport Canberra* targets:

- 100 per cent zero emission buses (ZEBs) by 2040,
- 47 per cent ZEBs by 2030, and
- 17 per cent by 2026 (Figure 2-1).

The plan sets out the battery electric buses are the more proven technology in the short term but that hydrogen fuel (or other technologies) should not be precluded in the long term.

To estimate how many ZEBs will be required over the coming decades we have linked the fleet size estimates from the previous subsection to the targets set out in the transition plan (Table 3-2).

Transport Canberra has recently undertaken a market sounding exercise for the procurement of 90 electric buses by 2024. It has also put out a tender for the leasing of at least eight ZEBs in the short term (as part of a tender to

lease 34 modern buses). Thus, we have assumed that by horizon 1 there will be 99 ZEBs in the fleet (Table 3-2). We have also assumed that aside from the 34 buses which will be leased soon, all buses procured by Transport Canberra in the future will be ZEBs.

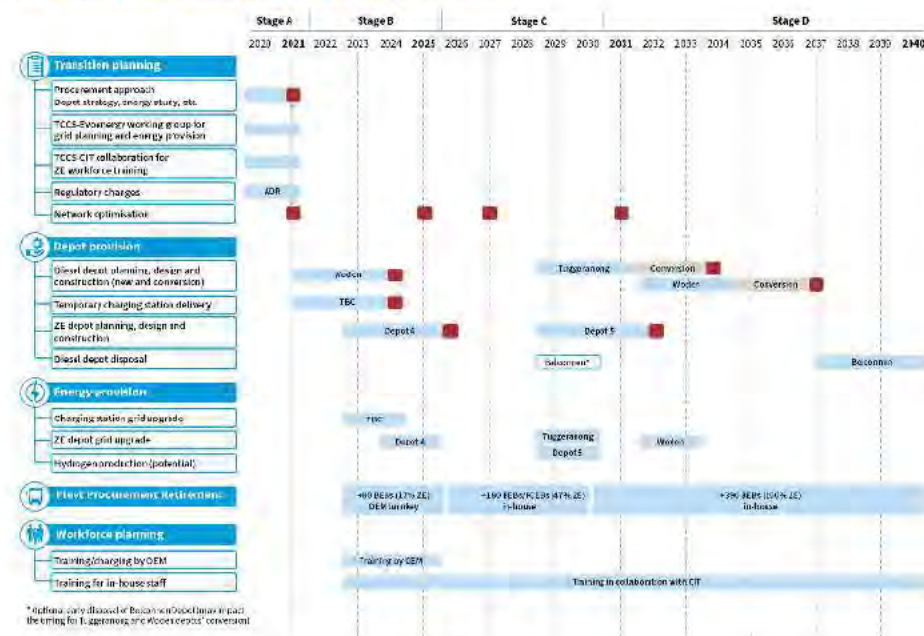
To achieve a 47 per cent share of ZEBs by 2031, we estimate that Transport Canberra will need about 228 ZEBs. This would require the procurement of around 129 ZEBs between 2026 and 2031.

To reach 100 per cent ZEBs by 2041, we estimate that Transport Canberra will need to procure 288 ZEBs between 2031 and 2041. This could be done through the procurement of 70 ZEBs at horizons three to five, and 78 at horizon 6. At or shortly after horizon 6, the 90 ZEBs that the current market sounding exercise is being performed for may also need replacement.

Table 3-2: ZEB share and procurement

	2021	2026	2031	2036	2041		
	Current	H1	H2	H3	H4	H5	H6
Fleet size	451	470	485	499	494	484	507
ZEB%		21%	47%	60%	74%	90%	100%
Number of ZEBs	1	99	228	298	368	438	507
ZEB procurement		98	129	70	70	70	78

Figure 3-1: Preferred transition pathway (from Zero emissions transition plan for Transport Canberra, ACT Government)



3.3 Fleet retirements

Transport Canberra's current bus fleet consists of about 450 vehicles. Most are diesel buses, with a small number of compressed natural gas buses (Table 3-3).

Table 3-3: Transport Canberra's bus fleet (reproduced from Zero emissions transition plan for Transport Canberra, ACT Government)

Bus type	No.	Average age	Fuel	DDA	Euro-emissions standard
Renault PR100-2	34	29.5	Diesel	No	No
Irisbus AGROALINE	19	19	Diesel	Yes	2
SCANIA CNG	54	16.5	Gas	Yes	3
MAN CNG	16	13	Gas	Yes	4
MAN DIESEL	89	11	Diesel	Yes	4/5
SCANIA 14.5	26	10.5	Diesel	Yes	5
SCANIA Articulated	44	7	Diesel	Yes	5/6
Scania Euro VI	168	4	Diesel	Yes	6
Yutong E12 ³	1	1	Electric	Yes	NA

The ACT Government has already gone to market to replace the 34 Renault PR100-2s. We have assumed that eight of the replacement buses will be electric, while the remaining 26 will be diesel.

We have also assumed that the replacement of the remaining fossil fuel buses will follow a similar approach, with the oldest, most polluting models prioritised for replacement.

³ The trial period of the Yutong E12 ended in 2021 and it is no longer in operation in the ACT

Based the ZEB procurement schedule set out in Table 3-2 we have scoped out how vehicle retirements might be staged (Table 3-4).

In addition to the 34 buses which they will lease, Transport Canberra are also in the process of procuring 90 electric buses. Thus, by horizon 1, we assume that 124 new buses will be added to the fleet. This will see all the Renault PR100-2's retired – these are the oldest buses in the fleet and are not DDA compliant. The compressed natural gas (CNG) buses have a set tank life which cannot be exceeded, they also require different fuelling infrastructure to the diesel buses. Thus, we have assumed that Transport Canberra's CNG buses will be replaced by horizon 1.

Figure 3-2: An in service Renault PR 100-2



To meet the target of 47% ZEBs in the fleet by 2031, 129 ZEBs will need to be procured by horizon 2. The Irisbus AGROALINE and MAN diesel buses could also be retired by horizon 2, as well as seven of the Scania 14.5 metre buses. To maintain the carrying capacity of the fleet these 14.5 metre buses would need to be replaced by similarly sized electric buses.

We estimate that most of Transport Canberra's articulated buses will be retired at horizon 3, with the remainder to be retired at horizon four. The need to replace the articulated buses with electric vehicles of similar passenger capacity may evolve over time, particularly as light rail replaces some of the bus networks busiest corridors. Nevertheless, we recommend that Transport Canberra plan to replace the articulated buses in a way that does not significantly decrease capacity. If peak demand becomes less intense over the coming years, it may be possible to review the need for a like for like replacement.

By horizon 4 and 5 Transport Canberra's Scania VI buses will be approaching retirement age, with the older vehicles likely to be replaced at horizon 4. We have assumed that about 80 would be replaced at horizon 5 and that about 20 of the newest buses might continue in operation until horizon 6. Upon their retirement, Transport Canberra's fleet would become 100 per cent zero emissions.

At horizon 6, the buses currently being procured would likely need replacement (referred to as '2022 diesels' and '2022 BEB' in Table 3-4). Shortly after this, it may also be necessary to replace the 90 ZEBs which will be acquired soon.

Table 3-4: Prospective staging of fleet procurements and retirements

	2021	2026	2031	2032 to 2036		2037 to 2041		
	Current	H1	H2	H3	H4	H5	H6	H6+
ZEB procurement		98	129	70	70	70	78	90
Diesel procurement		26						
Retirements		105	114	56	75	80	55	90
Renault PR100-2		34 retired (~30 y.o)						
Irisbus AGROALINE		1 retired (~25 y.o)	18 retired (~30 y.o)					
SCANIA CNG		54 retired (~20 y.o)						
MAN CNG		16 retired (~20 y.o)						
MAN DIESEL			89 retired (~20 y.o)					
SCANIA 14.5			7 retired (~20 y.o)	19 retired (~20 y.o)				
SCANIA Articulated				37 retired (~20 y.o)	7 retired (~20 y.o)			
Scania Euro VI					68 retired (~15 y.o)	80 retired (~20 y.o)	20 retired (~20 y.o)	
2022 diesels (26)							26 retired (~15 y.o)	
2022-2024 battery electric buses							8 retired (~15 y.o)	90 retired (~15 y.o)
Fleet size	450	469	484	498	494	483	507	507
Number of ZEBs	0	98	227	297	367	437	507	507
ZEB%	0%	21%	47%	60%	74%	90%	100%	100%

3.4 Depots

Future depots

In this project we have considered how to address Transport Canberra's bus storage requirements north of Lake Burley Griffin, as the existing Belconnen bus depot may either close or be significantly downsized in the future. The *New depots report* (a deliverable in this study) set out options for either replacing, or substantially downgrading the role of the Belconnen depot.

In the *New depots report* we undertook a multi-criteria analysis to assess the shortlisted site options based on their physical characteristics and their operational efficiency.

This analysis highlighted that the current Belconnen Depot location is very efficient in terms of minimising the amount of out of service running. The alternative sites analysed all underperformed the Belconnen depot as buses had to travel further between their first/last stop and the depot. This increase in out of service running would increase the peak vehicle requirement and operating costs of the network. Over a quarter of driver meal breaks (around 250) take place at the Belconnen Depot each weekday, the depot's closure would require these breaks to be moved to other (likely less efficient) locations.

Further, the enterprise bargaining agreement (EBA) that the territory's bus drivers have with Transport Canberra has set 'gate times' which stipulate the earliest time buses can leave the depot at the start of the day and the latest they can return to the depot at the end of the day. Gate times already result in some bus services being unable to meet the first or last light rail services of the day. Moving the depot to a less central location would further limit the bus network's span of service.

Given the drawbacks of closing the Belconnen Depot, we recommend that it be maintained for as long as possible, even if it is in a scaled down state.

KEY RISK:

The closure of the depot at Belconnen will reduce the efficiency of the bus network, increase the network's peak vehicle requirement and make it more difficult to deliver early morning and late-night services.

Of the new depot locations, the multi-criteria analysis suggested that sites A, E and F be progressed to more detailed investigations.

Of the new sites, site A was identified as being the best located in terms of operational efficiency, but not large enough to fully replace Belconnen without housing the major unit overhauls workshop elsewhere.

Sites E and F are the largest sites identified and would be able to replace both the bus storage and major unit overhaul functions of Belconnen. However, both site E and F are currently occupied, and it is unclear if they will become available in the timeframe required. As such we recommend that Transport Canberra look to reserve site A for a bus depot as a priority.

Figure 3-3: Sites considered in the depot multi criteria analysis



Zero emission buses

As the number of ZEBs in Transport Canberra's fleet increases, the distribution of charging infrastructure to support them will need to be considered. Early planning by Transport Canberra assumes that nearly all ZEBs will be housed at depots south of Lake Burley Griffin. However, in the later part of the 2020s and into the 2030s, depots north of the lake will need to be equipped to charge/refuel ZEBs. It is likely that retrofitting zero-emissions infrastructure into the Tuggeranong depot will reduce its capacity temporarily. During this period, extra storage of buses will have to occur at the yet to be constructed Woden Depot and Belconnen. This emphasises the importance of retaining sufficient space at Belconnen and of planning for the transition period. Issues of equity may even arise if communities north of

Lake Burley Griffin feel that the new ZEBs are primarily being used on routes south of the lake.

KEY RISK:

Once ZEB buses make up a significant proportion of the fleet, it would be ideal to have charging/fuelling infrastructure at all depots. Depots with no or limited charging infrastructure may not be able to house ZEBs. This could increase out of service running or lead to ZEBs being excluded from certain parts of the network.

4.0 Bus priority

As congestion in urban areas increases, bus priority infrastructure can be used to maintain on time running. Where congestion is severe, bus priority can also help public transport better compete with the travel times private vehicles provide. As such to improve customer service levels and attract new customers, additional bus priority infrastructure should be considered in Canberra, particularly as bus frequencies on a particular corridor increase. In this section we consider where and how bus priority could be implemented; we have done this on a corridor basis.

Transport Canberra have shared driver feedback with us, indicating where they have observed the worst congestion affecting bus routes (Figure 4-1). We have also reviewed the outputs of the CSTM strategic model (Appendix Figure C-1) to identify bus corridors which are expected to be congested in the future.

This information helped us to develop a short list of corridors where bus priority could be considered (Figure 4-2).

Using the assumptions adopted in this study we then estimated the volume of buses likely to be using each corridor in the AM peak at each horizon (Table 4-1).

We then assessed the high level feasibility of implementing bus priority measures in each of the short listed corridors.

Based on the information outlined above, we have provided our assessment of the importance of implementing bus priority, this is intended to guide Transport Canberra as to which corridors they should concentrate their efforts. The corridors that we think most need additional bus priority treatments have been included first in this main body section of the report. Without priority treatments, there is the risk that buses could be substantially delayed on the following key corridors:

- Hindmarsh Drive
- Coppins Crossing Road (future John Gorton Drive)
- Mouat Street

- Commonwealth Avenue
- Gungahlin north western access roads
- Cotter Road
- Athllon Drive

We have also outlined potential treatments on the corridors listed directly below, we assess to be of moderate precedence:

- Belconnen Way
- Constitution Avenue
- Gundaroo Drive
- Ginninderra/Aikman Drive
- Southern Cross Drive
- Baldwin Drive
- Yamba Drive
- Wentworth Avenue/Canberra Avenue
- Langdon Avenue
- Parkes Way/Morshead Drive/Pialligo Avenue
- John Gorton Drive/Cotter Road
- Parkes Way/William Hovell Drive
- Southern Cross Drive

The corridors that we assess to be of lower priority for treatments have been included in the appendix.

Figure 4-1: Key bus corridors in Canberra which are or could become congested



Figure 4-2: Shortlisted corridors



Table 4-1: Estimated volumes on shortlisted corridors

ID	Road	Btwn x and y	Direction	Buses per hour in the AM peak						
				H0	H1	H2	H3	H4	H5	H6
1	John Gorton Dr	Denman Prospect and Tuggeranong Pkwy	EB	11	14	16	20	22	22	24
1	John Gorton Dr	Denman Prospect and Tuggeranong Pkwy	WB	11	14	16	20	22	22	24
2	Hindmarsh Dr	Cooleman Court and Athllon Dr	EB	16	16	16	20	20	20	20
2	Hindmarsh Dr	Cooleman Court and Athllon Dr	WB	13	13	13	19	19	19	19
3	Drakeford Dr	Taverner St and Lanyon Marketplace	NB	8	8	6	8	8	12	8
3	Drakeford Dr	Taverner St and Lanyon Marketplace	SB	2	2	0	0	0	4	0
4	Ashley Dr	Johnson Dr and Isabella Dr	NB	16	16	18	19	19	17	19
4	Ashley Dr	Johnson Dr and Isabella Dr	SB	8	8	9	9	9	13	9
6	Yamba Dr	Mawson Dr and Launceston St	NB	15	18	18	24	24	24	24
6	Yamba Dr	Mawson Dr and Launceston St	SB	12	16	16	23	23	23	23
7	Kings Ave	National Circuit and Parkes Way	EB	9	9	9	11	11	11	15
7	Kings Ave	National Circuit and Parkes Way	WB	7	7	7	8	8	8	12
8	Wentworth Ave	Barton and Fyshwick	EB	12	14	14	18	10	10	12
8	Wentworth Ave	Barton and Fyshwick	WB	10	12	12	15	7	7	9
9	Parkes Way	Airport and Kings Ave	EB	7	7	7	3	3	3	3
9	Parkes Way	Airport and Kings Ave	WB	7	7	7	3	3	3	3
10	Fairburn Ave	Majura Pkwy and Northcott Dr	EB	3	3	3	3	3	3	3
10	Fairburn Ave	Majura Pkwy and Northcott Dr	WB	3	3	3	3	3	3	3
11	Mouat Street	Ginninderra Dr and Northbourne Ave	EB	22	22	22	24	24	24	30
11	Mouat Street	Ginninderra Dr and Northbourne Ave	WB	16	16	16	19	19	19	27
12	Belconnen Way	Haydon Dr and existing priority	EB	25	27	23	15	15	5	6
12	Belconnen Way	Haydon Dr and existing priority	WB	25	27	21	14	14	4	6
13	College Street Haydon Drive	Belconnen Way and Eastern Valley Way	EB	32	34	30	22	22	12	13
13	College Street Haydon Drive	Belconnen Way and Eastern Valley Way	WB	32	34	28	20	20	10	12

			Buses per hour in the AM peak							
ID	Road	Btwn x and y	Direction	H0	H1	H2	H3	H4	H5	H6
14	Southern Cross Drive	Starke St and Coulter Dr	EB	6	8	14	16	16	6	6
14	Southern Cross Drive	Starke St and Coulter Dr	WB	6	8	14	16	16	6	6
15	Ginninderra Dr	Kingsford Smith Dr and Gundaroo Dr	EB	0	0	3	3	3	3	3
15	Ginninderra Dr	Kingsford Smith Dr and Gundaroo Dr	WB	0	0	3	3	3	3	3
16	Ginninderra Dr and Aikman Dr	Gundaroo Dr and University of Canberra Hospital	NB	10	9	9	10	12	12	12
16	Ginninderra Dr and Aikman Dr	Gundaroo Dr and University of Canberra Hospital	SB	10	10	10	10	12	12	12
17	Baldwin Dr	Maribyrong Ave and Ginninderra Dr	NB	12	12	12	12	12	12	13
17	Baldwin Dr	Maribyrong Ave and Ginninderra Dr	SB	10	10	10	11	11	11	13
18	Commonwealth Ave	State Cir and Parkes Way	NB	47	55	38	42	36	36	42
18	Commonwealth Ave	State Cir and Parkes Way	SB	42	49	35	37	31	31	37
19	Gungahlin Dr	Gundaroo Dr and Lexcen Ave	EB	6	6	6	6	6	6	6
19	Gungahlin Dr	Gundaroo Dr and Lexcen Ave	WB	7	7	7	7	7	7	7
20	Mirrabei Dr	Gundaroo Dr and Paul Coe Cres	EB	10	10	10	10	10	10	10
20	Mirrabei Dr	Gundaroo Dr and Paul Coe Cres	WB	11	11	11	11	11	11	11
21	Horse Park Dr	Francis Forde Blvd and Gundaror Dr	NB	3	3	3	3	3	3	3
21	Horse Park Dr	Francis Forde Blvd and Gundaror Dr	SB	4	4	4	4	4	4	4
22	Anthony Rolfe Ave, Gozzard St, Ernest Cavanagh St, Gungahlin PI		EB	25	25	25	25	27	27	27
22	Anthony Rolfe Ave, Gozzard St, Ernest Cavanagh St, Gungahlin PI		WB	25	25	25	25	27	27	27
23	Cotter Rd	Tuggeraong Pkwy and McCulloch St	EB	12	14	16	18	20	20	22
23	Cotter Rd	Tuggeraong Pkwy and McCulloch St	WB	8	10	12	12	14	14	16
24	Yamba Dr	Hindmarsh Dr and Dookie St	NB	6	6	6	9	9	9	9
24	Yamba Dr	Hindmarsh Dr and Dookie St	SB	5	5	5	9	9	9	9
25	Athllon Dr	Hindmarsh Dr and Sulwood Dr	NB	21	21	25	26	26	26	18
25	Athllon Dr	Hindmarsh Dr and Sulwood Dr	SB	18	18	21	22	22	22	18
26	Parkes Way	Coppins Crossing Rd and Commonwealth Ave	EB	0	0	0	0	4	4	4

ID	Road	Btwn x and y
26	Parkes Way	Coppins Crossing Rd and Commonwealth Ave
27	Constitution Ave	Anzac Parade and Reg Saunders Way
27	Constitution Ave	Anzac Parade and Reg Saunders Way
28	Coppins Crossing Rd	Holborow Ave and William Hovell Dr
28	Coppins Crossing Rd	Holborow Ave and William Hovell Dr
29	Gundaroo Dr	Barton Hwy and Ginninderra Dr
29	Gundaroo Dr	Barton Hwy and Ginninderra Dr
30	Langdon Ave	Athllon Dr and Sternberg Cres
30	Langdon Ave	Athllon Dr and Sternberg Cres
31	Gungahlin Place extension	Ernest Cavanagh Street
31	Gungahlin Place extension	Ernest Cavanagh Street
32	Southern Cross Dr	Macfarlane Burnet Ave and Starke St
32	Southern Cross Dr	Macfarlane Burnet Ave and Starke St

Direction	Buses per hour in the AM peak						
	H0	H1	H2	H3	H4	H5	H6
WB	0	0	0	0	4	4	4
EB	13	13	13	11	11	11	15
WB	12	12	12	9	9	9	13
NB	0	3	3	7	7	7	7
SB	0	3	3	7	7	7	7
NB	7	7	7	7	9	9	9
SB	9	9	9	9	11	11	11
NB	8	8	13	13	13	13	13
SB	6	6	12	12	12	12	12
NB	40	40	40	41	43	43	43
SB	42	42	42	43	45	45	45
EB	8	10	18	23	23	9	9
WB	10	12	20	24	24	10	10

4.1 Hindmarsh Drive

Corridor ID: 2

Section: Between Cooleman Court and Athllon Drive

Current AM peak bus volumes: 16 bph eastbound

Future AM peak bus volumes: 20 bph east bound

Current choke points: Currently drivers report that buses are impacted by congestion. Congestion occurs in the AM peak on approach to Tuggeranong Parkway.

Future congestion: The CSTM 2031 modelling indicates very high levels of AM peak congestion.

Possible bus priority interventions:

Bus lanes and jumps could be implemented at the intersections of Tuggeranong Parkway (Figure 4-3) and Melrose Drive.

There is the risk that the substantial number of buses using Hindmarsh Drive could be significantly delayed as congestion increases in coming decades. Once light rail is built to Woden and the new CIT precinct is finalised, public transport demand in this corridor will increase and is best served with improved bus priority.

Precedence level: High



Figure 4-3: Proposed bus lanes and jumps at Tuggeranong Parkway



4.2 Coppins Crossing Road

Corridor ID: 28

Section: Between Holborow Avenue and William Hovell Drive.

Current AM peak bus volumes: 1 bph in each direction.

Future AM peak bus volumes: 7 bph in each direction.

Current choke points: Current levels of congestion on Coppins Crossing Road are limited.

Future congestion: The CSTM 2031 modelling indicates there could be some significant congestion along Coppins Crossing Road in the future.

Possible bus priority interventions: Coppins Crossing Road is being redesigned into John Gorton Drive and will have two-lanes in each direction. The northern section between William Hovell Drive and Hazel Hawke Avenue has already been duplicated. In the future it may be worth installing bus priority signals at the intersection of William Hovell Drive. As the southern part of this corridor is upgraded and new intersections are added, consideration should be given to how buses can be prioritised.

Given the opportunity to implement bus infrastructure before development occurs, we recommend that a high precedence be put on providing bus priority in this corridor.

Precedence level: High



4.3 Mouat Street

Corridor ID: 11

Section: Between Ginninderra Drive and Northbourne Avenue

Current AM peak bus volumes: 22 bph east bound

Future AM peak bus volumes: 30 bph west bound

Current choke points: Drivers report that buses are delayed by major congestion during peak times. The worst congestion is likely to be between Brigalow Street and Northbourne Avenue. East bound buses can be delayed by traffic on approach to Northbourne Avenue where they must merge from the left lane after serving the Southwell Park bus stop to one of the right lanes to turn right at Northbourne Avenue (Figure 4-4 and Figure 4-5). This corridor is used by the R9 Rapid route.

Future congestion: The CSTM modelling for 2031 indicates very severe congestion on Mouat Street in the future. With increased bus volumes and higher frequency on the Northbourne Avenue light rail corridor adding further demand.

Possible bus priority interventions:

On the western side of Northbourne Avenue heading eastbound there is limited space to accommodate intense peak demand. Currently there are two right turn lanes and one through lane (Figure 4-6). Converting a general traffic lane into a bus jump may not be justifiable as it would decrease the capacity of this strategic intersection, especially given an extra signal phase would also be needed. As such, implementing a bus jump on the east bound approach is likely to require the intersection be widened. The benefit of introducing a bus jump would be improved flow of buses, reduced delays and increased reliability (especially important for the R9 rapid route).

In the west bound direction Mouat Street is only one lane between Goodwin Street and Brigalow Street where Mouat Street crosses Sullivans Creek. If this

section is ever widened, a peak period bus lane should be considered given the significant bus volumes.

Precedence level: High



Figure 4-4: East bound bus movement on Mouat Street



Figure 4-5: Buses queuing in morning peak traffic east bound on Mouat Street, April 2022



Figure 4-6: Layout of Mouat Street east bound at Northbourne Avenue.



4.4 Commonwealth Avenue

Corridor ID: 18

Section: Between State Circle and Parkes Way

Current AM peak bus volumes: 47 bph north bound

Future AM peak bus volumes: 55 bph north bound horizon 1, then decreasing to around 40 bph in the longer term.

Current choke points: Bus drivers report congestion south bound on Commonwealth Avenue from Albert Hall to bus lane (Figure 4-7).

Future congestion: The CSTM 2031 modelling indicates high levels of congestion on Commonwealth Avenue in the future.

Possible bus priority interventions:

There is already a short bus lane north bound on Commonwealth Avenue (between Kaye Street and Flynn Drive). Bus volumes on Commonwealth Avenue are expected to peak in the near term then decrease with the implementation of light rail to Woden. Nevertheless, bus volumes will remain substantial enough (just under 40 bph north bound) to justify a bus lane after light rail has been built to Woden. It is currently unclear how light rail will cross Lake Burley Griffin and if it will require the repurposing of an existing traffic lane across the bridge. Nevertheless, given the large number buses using Commonwealth Avenue before and after light rail, we recommend that bus lanes be implemented on Commonwealth Avenue. Implementing bus lanes on Commonwealth Avenue is in line with the vision and network development principles set out in the ACT Transport Strategy 2020, in particular that:

- The network be efficient and “uses space and resources well to carry the greatest amount of people and goods around the city”.
- The network provides for choices which reduce greenhouse gases.
- The network is reliable and predictable.

As a constrained piece of infrastructure, the space on Commonwealth Avenue must be used as efficiently as possible which public transport can do

better than private vehicles. Public transport also has a lower carbon footprint per person moved. **Thus, to provide reliable and predictable travel times in this key corridor, we recommend that a high precedence be put on providing additional bus priority in Commonwealth Avenue.**

Precedence level: High



Figure 4-7: Morning congestion on Commonwealth Avenue southbound



Figure 4-8: On Commonwealth Avenue northbound the bus lanes finish just before the Commonwealth Avenue Bridge



4.5 Gungahlin north western access

(Anthony Rolfe Avenue, Gozzard Street and Ernest Cavanagh Street)

Corridor ID: 22

Current AM peak bus volumes: 25 bph in each direction.

Future AM peak bus volumes: 27 bph in each direction.

Current choke points: Bus drivers report that buses are delayed in accessing and egressing the Gungahlin Bus Interchange because of traffic entering and exiting the Marketplace Gungahlin shopping centre on Ernest Cavanagh Street (Figure 4-11).

Future congestion: The CSTM 2031 modelling indicates there will continue to be congestion around the Gungahlin Town Centre during peak periods in the future, particularly around the Gundaroo Drive intersection.

Possible bus priority interventions:

Today buses use the Gozzard and Ernest Cavanagh Streets to access Gungahlin Interchange. Our analysis suggests that in the AM peak around 50 in-service buses use Ernest Cavanagh and Gozzard Street. Given there is a layover on Anthony Rolfe Avenue, there is also likely to be a substantial number of out of service buses using corridor 22 to travel to/from the Gungahlin interchange. Ideally priority measures would be implemented along these streets (Figure 4-9). However, given that Gozzard and Ernest Cavanagh Streets are a single lane in each direction, implementing meaningful bus priority may require extensive road widening – undesirable in a town centre. As such, strategies for ensuring the efficient circulation of buses through the Gungahlin Town Centre require further study.

One option for reducing delay to inbound buses is the introduction of a turning lane east bound on Ernest Cavanagh Street (Figure 4-10). This would allow buses to pass traffic turning right into the Marketplace Gungahlin carpark (Figure 4-11) and would only require a slight widening of a 30 metre section of Ernest Cavanagh Street.

Another solution – and the most efficient for buses – would be to remove them from Gozzard and Ernest Cavanagh Streets. This could be done through extending Gungahlin Place north as a bus only link to Anthony Rolfe Avenue (Figure 4-12). There appears to be enough room in this corridor for two 3.5 metre bus only lanes (Figure 4-13 and Figure 4-14).

Precedence level: High

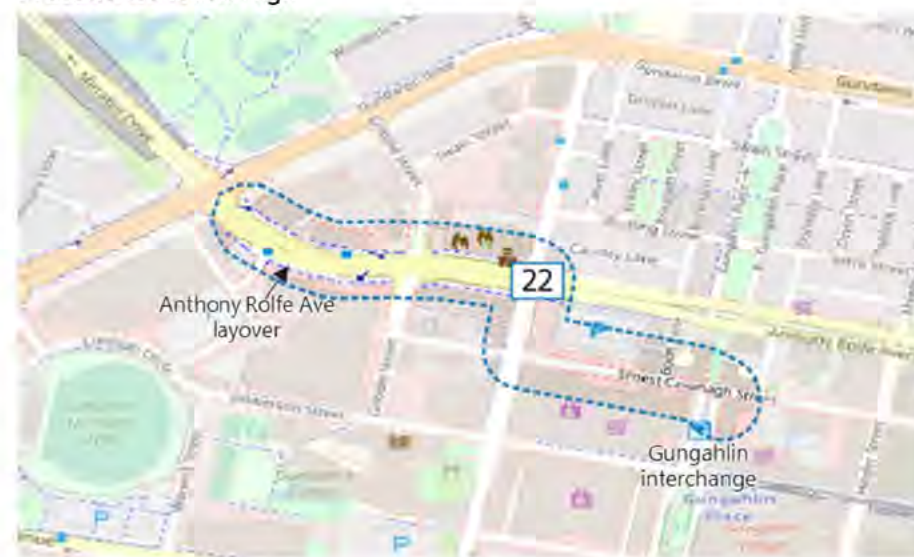


Figure 4-9: North Western access for buses on Gozzard Street and Ernest Cavanagh Street



Figure 4-10: Proposed turning lane into Gungahlin Market Place on Ernest Cavanagh Street

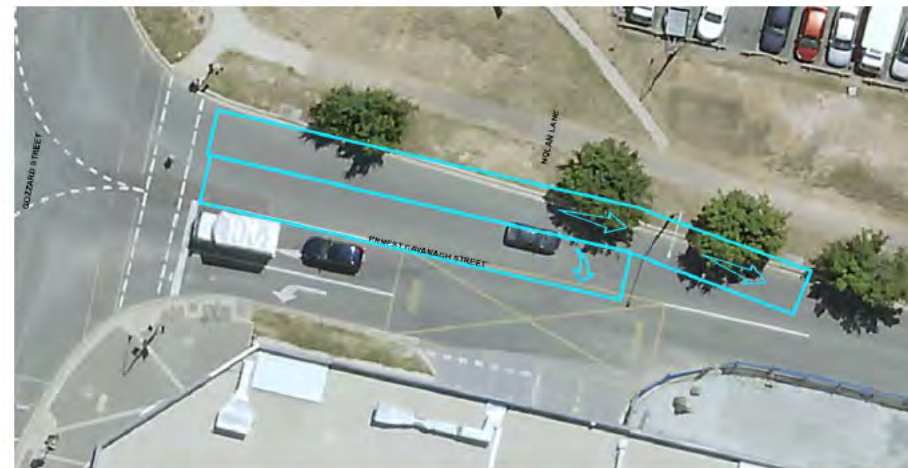


Figure 4-11: Entrance to Gungahlin Marketplace on Ernest Cavanagh Street



Figure 4-12: Proposed Gungahlin Place extension bus only link



Figure 4-13: Potential layout of Gungahlin Place extension bus only link



Figure 4-14: Potential Gungahlin Place extension as it is today (photo taken looking south from Anthony Rolfe Avenue)



4.6 Cotter Road

Corridor ID: 23

Section: Between Tuggeranong Parkway and McCulloch Street.

Current AM peak bus volumes: 12 bph in each direction.

Future AM peak bus volumes: 22 bph in each direction.

Current choke points: Drivers have reported peak period congestion on Cotter Road, particularly at the Tuggeranong Parkway intersection.

Future congestion: The CSTM 2031 modelling indicates peak period congestion along Cotter Road in the future.

Possible bus priority interventions: The bulk of the congestion stems from the Tuggeranong Parkway intersection. Bus lanes in the lead up to the Tuggeranong Parkway overpass and jumps at the traffic signals could help insulate buses from congestion (Figure 4-15).

Precedence level: High

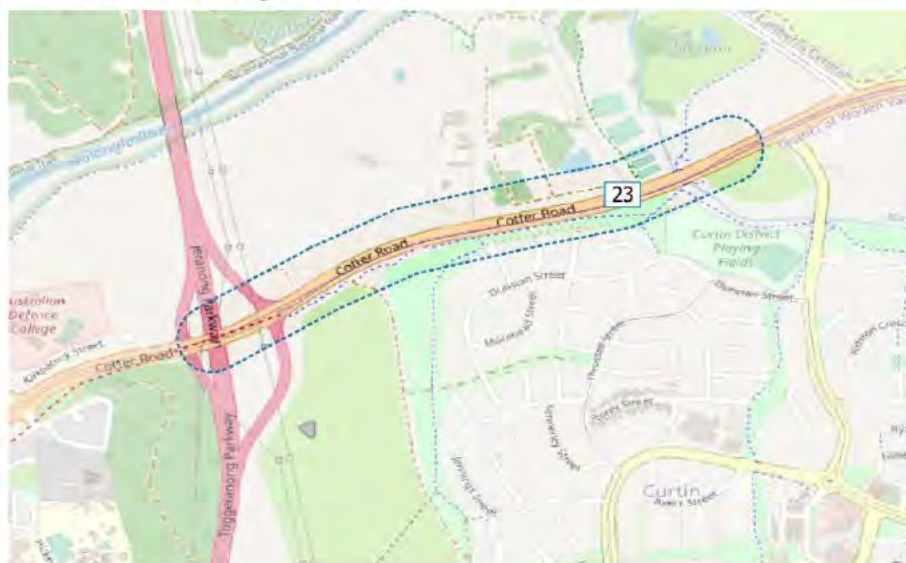
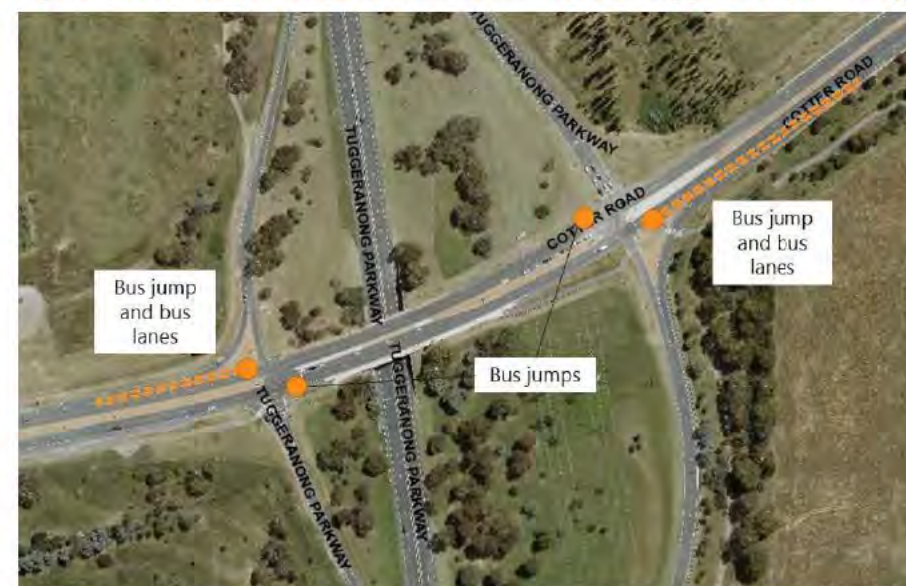


Figure 4-15: Proposed bus priority on Cotter Road at Tuggeranong Parkway



4.7 Athllon Drive

Corridor ID: 25

Section: Between Hindmarsh Drive and Sulwood Drive.

Current AM peak bus volumes: 21 bph in each direction.

Future AM peak bus volumes: 26 bph in each direction at H3 to H5, then reduced to 18 bph in each direction in H6.

Current choke points: Athllon Drive sees some significant congestion in the north bound direction during the AM peak. This is reversed in the PM peak.

Future congestion: The CSTM 2031 modelling indicates continued congestion on Athllon Drive in the future.

Possible bus priority interventions: Athllon Drive is largely a two-lane road, but becomes a single lane north of Melrose Drive. Planning is currently underway to duplicate a 600-metre section of Athllon Drive between Melrose Drive and Shea Street. This project is set to include a north bound bus lane and the signalisation of intersections at Shea Street, Parramatta Street and Melrose Drive (Figure 4-16). At these new signals, bus priority (in both north and south bound directions should be considered. In addition, bus priority signals could also be installed at the Beasley Street intersections.

Further, given that:

- Two of Canberra's most productive rapid routes (the R4 and R5) use Athllon Drive
- This corridor is a precursor to light rail
- The construction of the new Woden Bus Depot will see many out of services buses use Athllon Drive

We recommend that southbound bus lanes also be considered on Athllon Drive.

Precedence level: High

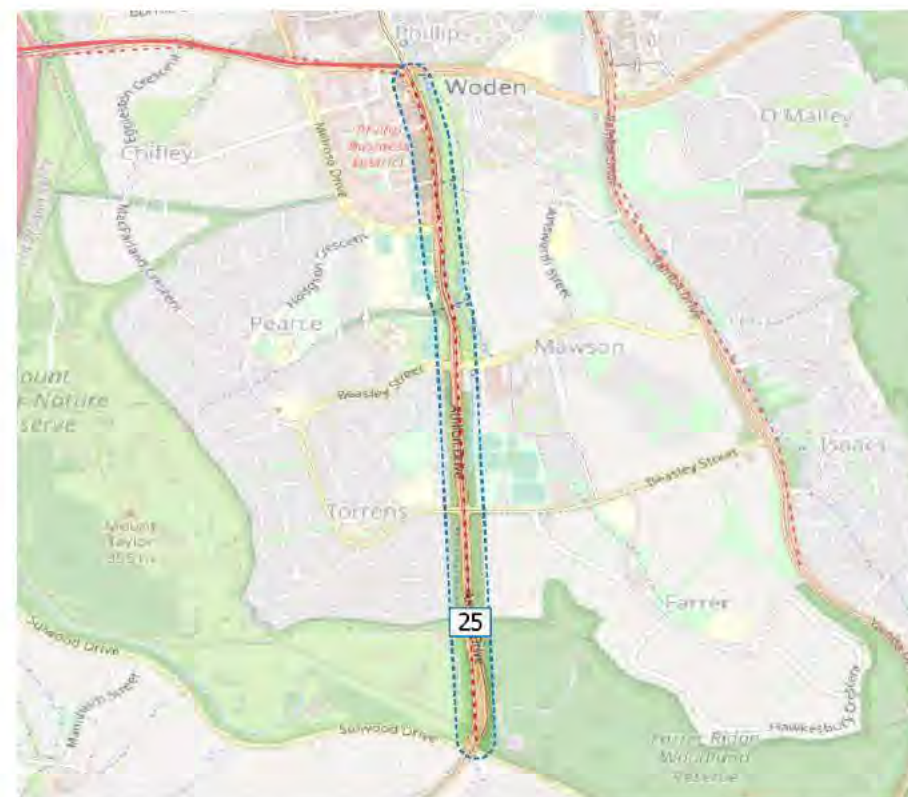


Figure 4-16: Athllon Drive northern section upgrades (as currently proposed by Transport Canberra)



4.8 College Street / Haydon Drive

Corridor ID: 13

Section: Between Belconnen Way and Eastern Valley Way

Current AM peak bus volumes: 32 bph in each direction

Future AM peak bus volumes: 12 bph in each direction

Current choke points: Drivers report that buses are impacted by congestion during peak periods.

Future congestion: The CSTM 2031 modelling indicates some congestion on College Street and Haydon Drive in the future.

Possible bus priority interventions:

There are existing bus lanes at the eastern end of College Street, including an east bound bus jump at the intersection of Haydon Drive. Implementing bus lanes on Haydon Drive would likely require widening of the roadway. Although there looks to be enough room for the roadway to be widened, there are energy services on the eastern verge of Haydon Drive, which could make widening costly (Figure 4-17).

Precedence level: Moderate

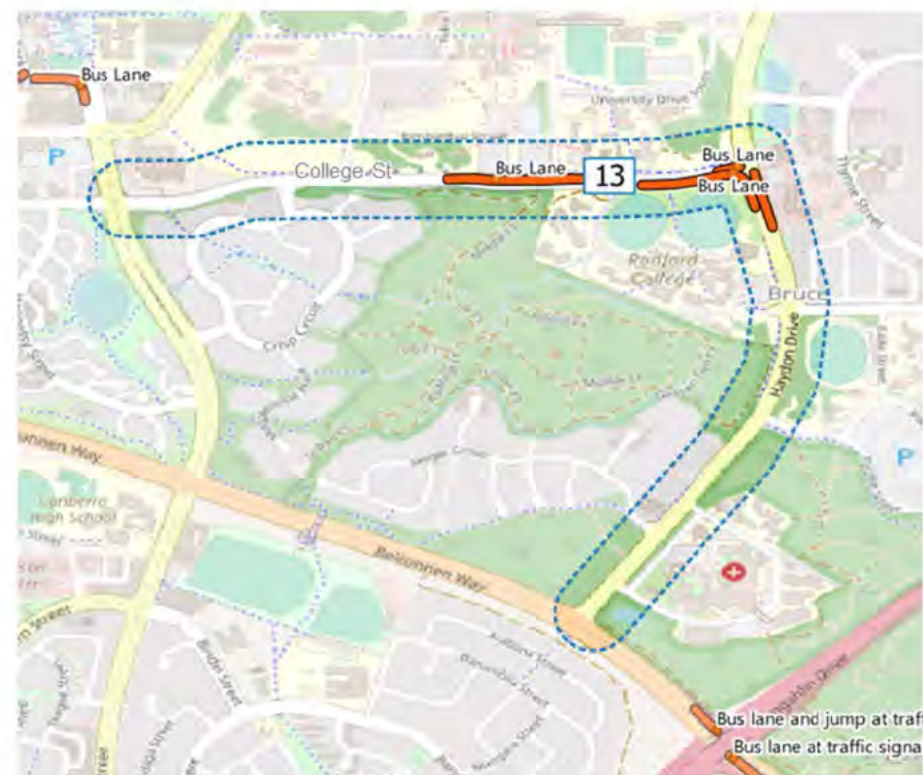


Figure 4-17: Energy utilities on the eastern side of Haydon Drive



4.9 Belconnen Way

Corridor ID: 12

Section: Between Haydon Drive and existing bus lanes.

Current AM peak bus volumes: 25 bph in each direction

Future AM peak bus volumes: 6 bph in each direction

Current choke points: Some congestion at peak times.

Future congestion: The CSTM 2031 modelling indicates some congestion on Belconnen Way in the future

Possible bus priority interventions:

Belconnen Way features three key rapid routes, the R2, R3 and R4. By horizon 3 these routes will be replaced by light rail, which will see bus volumes through this corridor reduced significantly.

East bound there is currently a bus jump at Gungahlin Drive, with the bus lane continuing under and beyond the overpass. Beyond this point buses must merge with traffic before a dedicated bus lane begins again east of Fairfax Street. Buses are unlikely to be significantly delayed on this section unless traffic begins to regularly backup west of Fairfax Street. If this does occur filling in this gap in priority could be considered, however ultimately the rapid routes using this corridor will be replaced by light rail.

West bound there is also a bus lane under Gungahlin Drive, this assists buses by getting them into one of the two right hand lanes to make the right turn at Haydon Drive. This is likely to offer significant priority unless congestion on Belconnen Way becomes bad enough to prevent buses getting into this priority lane, if this occurs this west bound bus lane may need to be extended so that it begins further east.

Precedence level: Moderate



4.10 Constitution Avenue

Corridor ID: 27

Section: Between Anzac Parade and Reg Saunders Way

Current AM peak bus volumes: 13 bph in each direction.

Future AM peak bus volumes: 15 bph in each direction.

Current choke points: There is currently some traffic congestion on Constitution Avenue during peak periods particularly at the Blamey Crescent intersection.

Future congestion: The CSTM 2031 modelling indicates significant congestion along Constitution Avenue in the future.

Possible bus priority interventions: The number of lanes along Constitution Avenue ranges between one and two, with some sections of road being used for parking. It may be possible to create a temporary bus priority lane during the peak periods.

Precedence level: Moderate



4.11 Gundaroo Drive

Corridor ID: 29

Section: Between Barton Highway and Ginninderra Drive.

Current AM peak bus volumes: 9 bph in each direction.

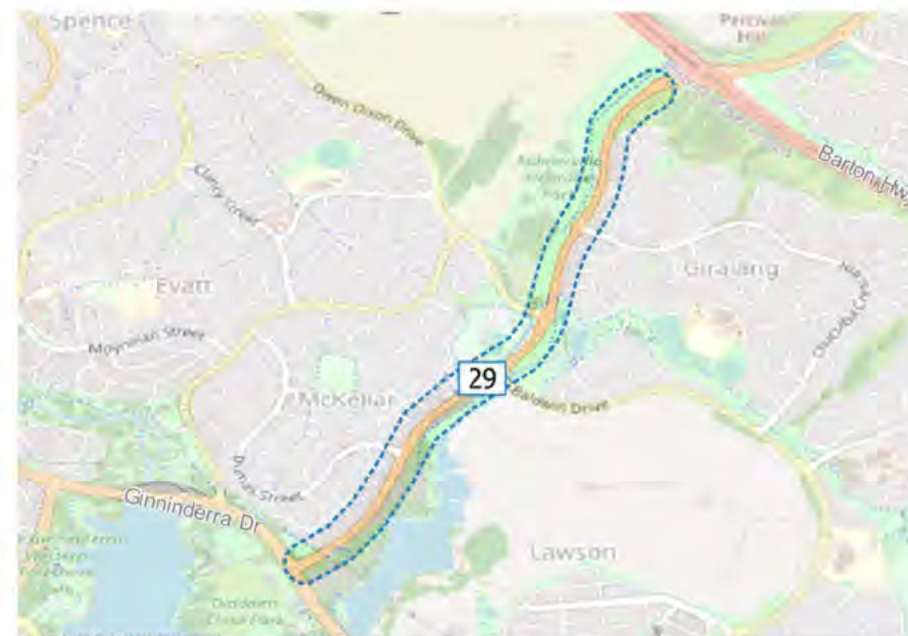
Future AM peak bus volumes: 11 bph in each direction.

Current choke points: Gundaroo Drive is a significant choke point for traffic, with congestion observed north of Owen Dixon Drive when travelling northbound, and throughout all sections in the southbound direction.

Future congestion: The CSTM 2031 modelling indicates significant congestion along Gundaroo Drive in the future.

Possible bus priority interventions: Gundaroo Drive is currently a single-lane road, but is being duplicated between Barton Highway and Ginninderra Drive. The upgrade also includes additional bus stops and upgrading of existing ones, as well as signalised intersections where there are currently roundabouts. At these new signalised intersections providing bus jumps should be considered.

Precedence level: Moderate



4.12 Southern Cross Drive

Corridor ID: 14

Section: Between Starke Street and Coulter Drive

Current AM peak bus volumes: 6 bph in each direction

Future AM peak bus volumes: 16 bph before decreasing again when light rail is extended

Current choke points: Drivers report that buses are affected by congestion in this corridor.

Future congestion: The CSTM modelling indicates significant congestion on Southern Cross Drive during peak periods in the future.

Possible bus priority interventions:

By horizon 5, light rail is assumed to be extended to Kippax via Southern Cross Drive. It would be optimal to pre-empt light rail with additional bus priority in this corridor.

The *West Belconnen Transit Stops and Termini Feasibility Study 2013* recommended that bus lanes be installed in this corridor. Currently, there is a small section of east bound bus lane on Southern Cross Drive. However, the existing priority does not appear to be as extensive as was proposed in the 2013 study.

In the eastbound direction between Kingsford Smith Drive and Coulter Drive, Southern Cross Drive alternates between three traffic lanes and two traffic lanes and a bus/bike lane. Where Southern Cross Drive has three lanes, a bus lane could be implemented in the third lane without widening the roadway. Where there are only two lanes, the bike lane could be converted into a bus lane (potentially requiring a slight widening in some places).

At present, in the east bound direction along Southern Cross Drive between Kingsford Smith Drive and Coulter Drive, cyclists must switch between lane sharing and on-road bicycle lanes. We propose a continuous bus lane be implemented and that the existing on-road bicycle lane be replaced by an

upgraded off-road path (Figure 4-19). Because the bicycle lane is not as wide as the bus lane that would replace it, slight road widening might be needed in some places.

For the cyclists using this corridor, there is a path on the north side of Southern Cross Drive. However it is unclear if this is a designated bicycle path for its entire length or if riders have to connect to another bike path which diverts via Boas Place (Figure 4-18).

Precedence level: Moderate



Figure 4-18: Current conditions eastbound on Southern Cross Drive

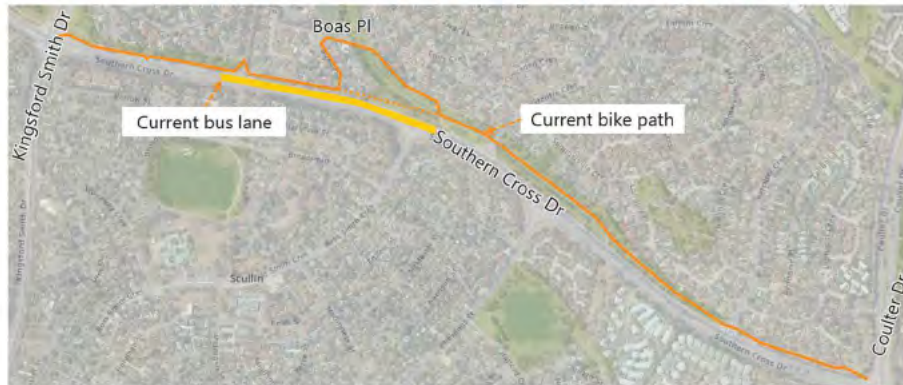
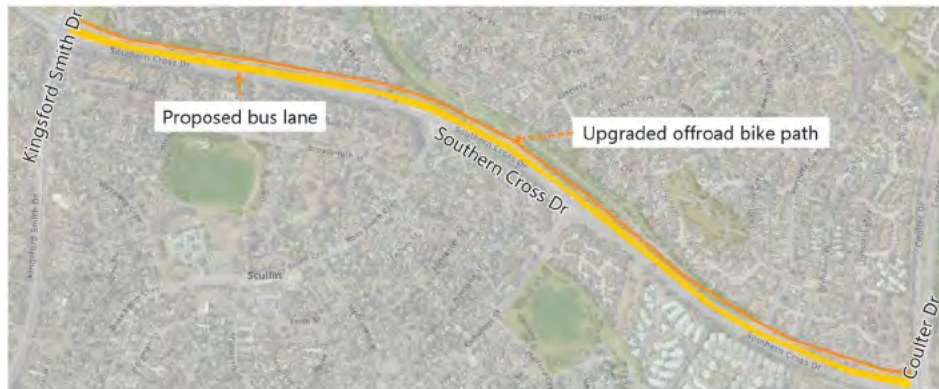


Figure 4-19: Proposed continuous bus lane on Southern Cross Drive from Kingsford Smith Drive to Coulter Drive



4.13 Yamba Drive

Corridor ID: 6

Section: Between Mawson Drive and Launceston Street

Current AM peak bus volumes: 15 bph north bound

Future AM peak bus volumes: 24 bph north bound

Current choke points: Traffic congestion outside Canberra Hospital

Future congestion: The CSTM 2031 modelling indicates AM peak congestion outside Canberra Hospital.

Possible bus priority interventions:

In the future Transport Canberra are considering realigning routes R6, 60, 61 to use Ainsworth Street and Kitchener Street instead of Yamba Drive. If this is to occur, priority could be considered to provide east bound buses priority access to the Kitchener Street/Yamba Drive intersection. This could be done by redesigning Kitchener Street at Yamba Drive.

Currently, Kitchener Street has two west bound lanes west of Yamba Drive, these lanes merge into one almost immediately (Figure 4-20). There is one lane east bound. We propose that one of the west bound lanes be converted into an east bound right turn lane, with buses given a dedicated lane upstream to give them priority access (Figure 4-21). This would see one of the west bound lanes on the east side of Yamba Drive converted into a right turn only lane.

If this proposal were implemented it may make sense to re-align routes 72, 76 and 77 to use Kitchener Street, this would reduce their length – making their trip between Tuggeranong and Woden more direct. Realigning these routes would see future bus volumes increase to around 20 buses per hour in the AM peak at horizon 6.

Precedence level: Moderate

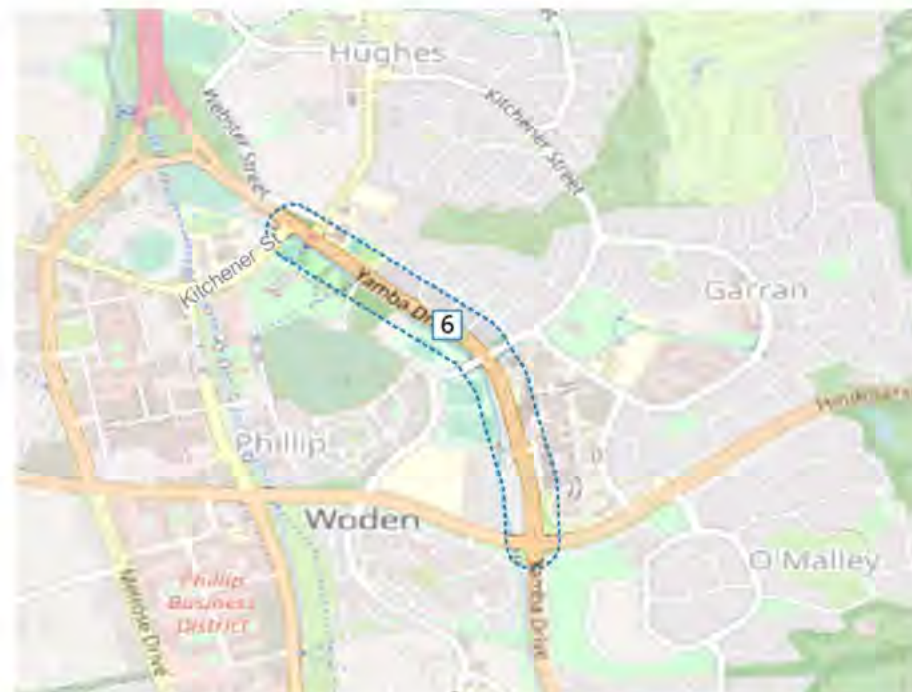


Figure 4-20: Current Kitchener Street layout at Yamba Drive

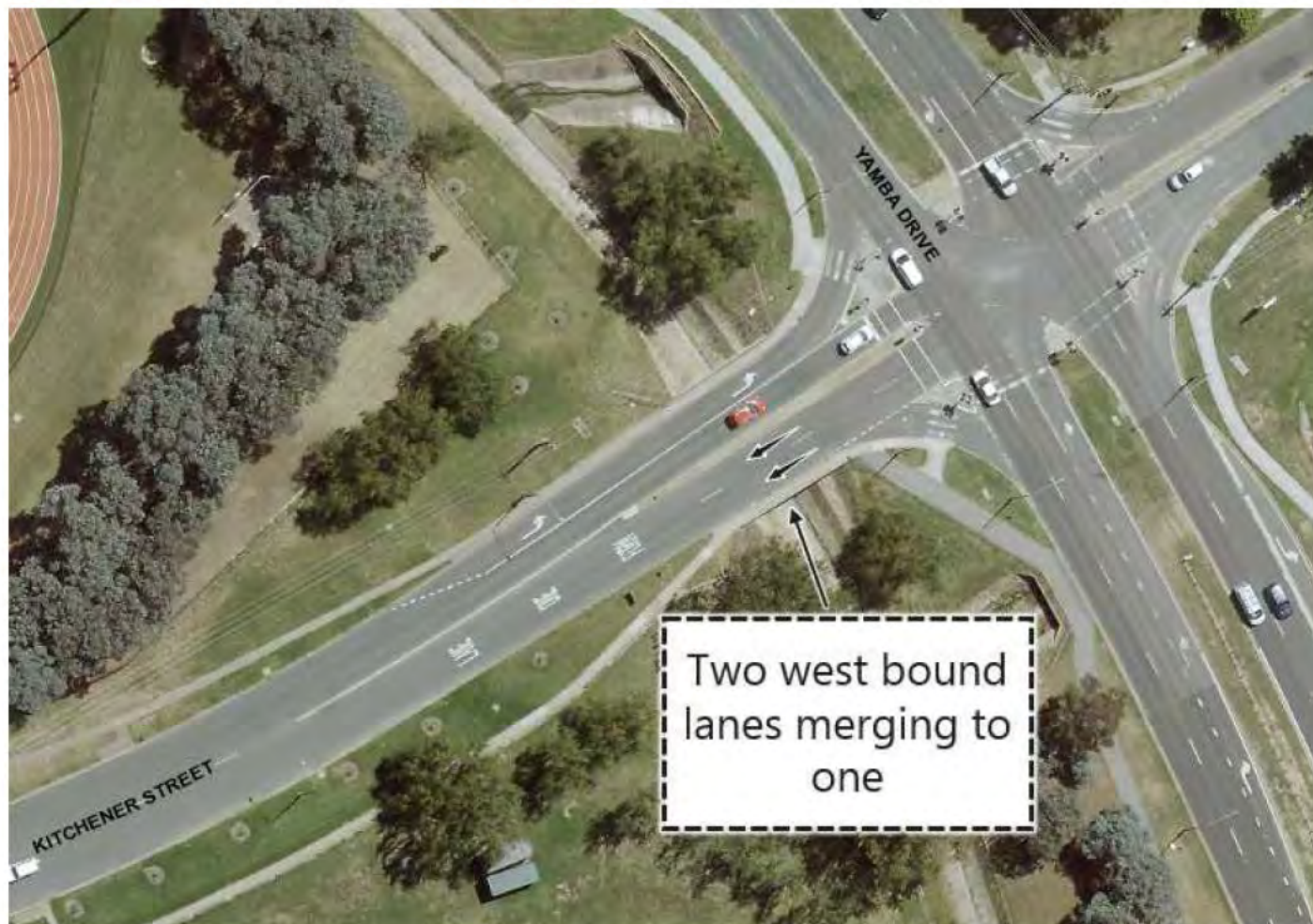


Figure 4-21: Proposed Kitchener Street layout at Yamba Drive



4.14 Wentworth Avenue/Canberra Avenue

Corridor ID: 8

Section: Between Barton and Fyshwick

Current AM peak bus volumes: 10 bph east bound

Future AM peak bus volumes: 15 bph east bound

Current choke points: AM peak congestion between the Monaro Highway and Sturt Avenue.

Future congestion: The CSTM 2031 modelling indicates high levels of congestion along this corridor in the future.

Possible bus priority interventions:

There are currently bus lanes between Whyalla Street and the Monaro Highway, as well as two sets of bus jumps. Future priority interventions could see bus lanes extended further west, however it may not be practical to have bus lanes over Jerrabomberra Creek because either the roadway would need to be widened or an existing general traffic lane would need to be repurposed. West of the Creek bus lanes could be more feasible. This could take the form of a bus jump at the Nyrang Street intersection (Figure 4-22).

West of Sturt Avenue, Wentworth Avenue has a very wide median (Figure 4-23). If this road is ever triplicated, the minimum requirement for public transport would be for peak period bus lanes and bus jumps at the intersections.

The Wentworth/Canberra Avenue corridor is used by the R2 Rapid route, and light rail is planned along this corridor by horizon 4. As a future light rail corridor, it would be optimal to precede the introduction of the corridor with some form of bus priority.

Precedence level: Moderate



Figure 4-22: Proposed bus jumps at Nyang Street



Figure 4-23: Wentworth Avenue north west of Sturt Avenue



4.15 Langdon Avenue

Corridor ID: 30

Section: Between Athllon Drive and Sternberg Crescent.

Current AM peak bus volumes: 8 bph in each direction.

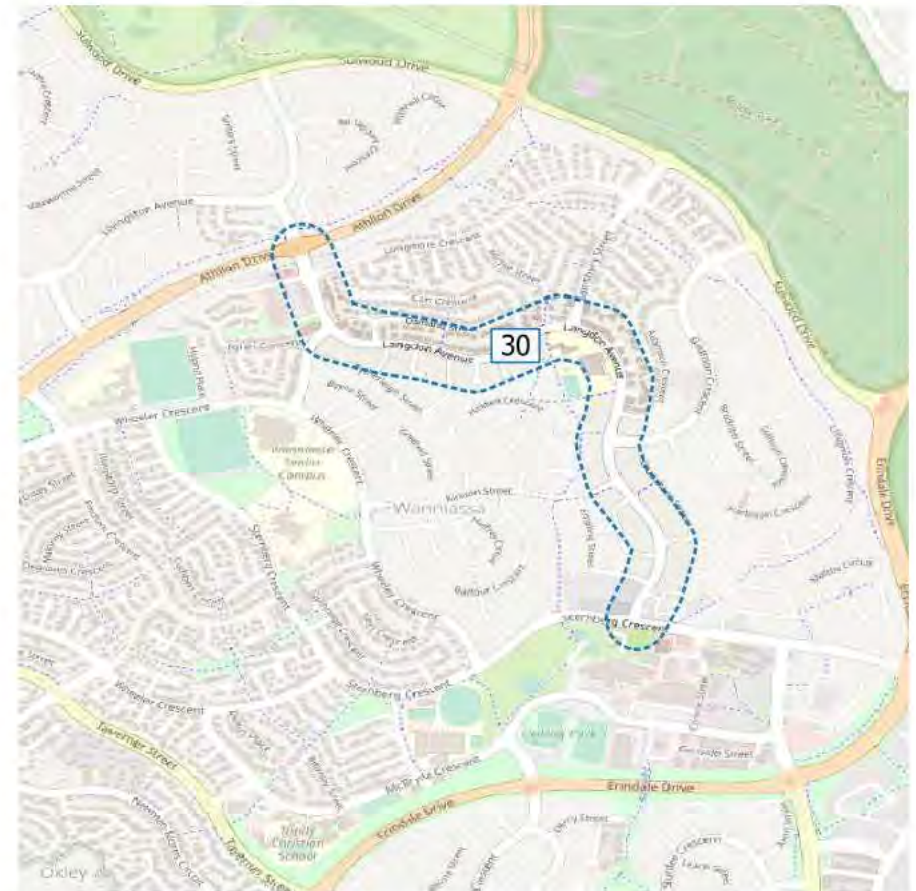
Future AM peak bus volumes: 13 bph in each direction.

Current choke points: Athllon Drive contributes towards congestion on Langdon Avenue.

Future congestion: The CSTM 2031 modelling indicates some congestion on approach to Athllon Drive.

Possible bus priority interventions: Planning is underway for the duplication of Athllon Drive between Sulwood Drive and Drakeford Drive with the intersection of Langdon Avenue and Athllon Drive to be signalised. This presents the opportunity to provide bus jumps at the intersection of Langdon Avenue and Athllon Drive.

Precedence level: Moderate



4.16 Parkes Way/Morshead Drive/Pialligo Avenue

Corridor ID: 9

Section: Between the Airport and Kings Avenue

Current AM peak bus volumes: 7 bph in each direction

Future AM peak bus volumes: 3 bph in each direction

Current choke points: Some congestion.

Future congestion: The CSTM modelling of 2031 indicates high levels of congestion on Morshead Drive in the future.

Possible bus priority interventions:

This corridor is used by the R3, which we have assumed will be replaced by light rail at horizon 3. There may be the opportunity to implement a bus jump on Pialligo Avenue on approach to the Monaro Highway entrance ramp (Figure 4-24).

Precedence level: Moderate



Figure 4-24: Pilalligo Avenue proposed bus jump



4.17 John Gorton Drive/ Cotter Road

Corridor ID: 1

Section: Between Denman Prospect and Tuggeranong Parkway

Current AM peak bus volumes: 11 bph in each direction

Future AM peak bus volumes: 24 bph in each direction

Current choke points: Currently there is relatively limited AM peak congestion.

Future congestion: The CSTM 2031 modelling indicates very high levels of AM peak congestion.

Possible bus priority interventions:

There are already bus lanes and jumps at the major intersections on John Gorton Drive. If congestion worsens, the bus lanes could be extended further back from the intersections to enable buses to bypass queued traffic (Figure 4-25), however this would likely require that the road be widened.

If this corridor is ever triplicated, the minimum provision for public transport should be peak period bus lanes.

Precedence level: Moderate

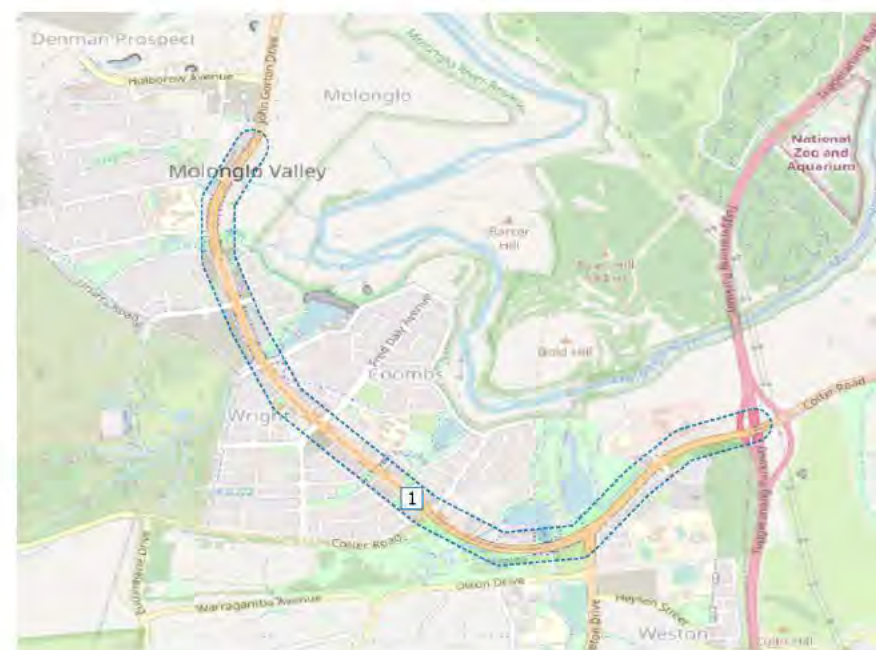


Figure 4-25: Proposed extension of bus lanes further from intersection



4.18 Parkes Way / William Hovell Drive

Corridor ID: 26

Section: Between Coppins Crossing Road and Commonwealth Avenue.

Current AM peak bus volumes: 0 bph in each direction.

Future AM peak bus volumes: 4 bph in each direction.

Current choke points: The section between Clunies Ross Street and Commonwealth Avenue sees the bulk of the congestion along Parkes Way. The intersections where traffic from Caswell Drive and Bindubi Street join Parkes Way are also choke points, where joining traffic is backed up along these roads.

Future congestion: The CSTM modelling indicates significant congestion on Parkes Way by 2031.

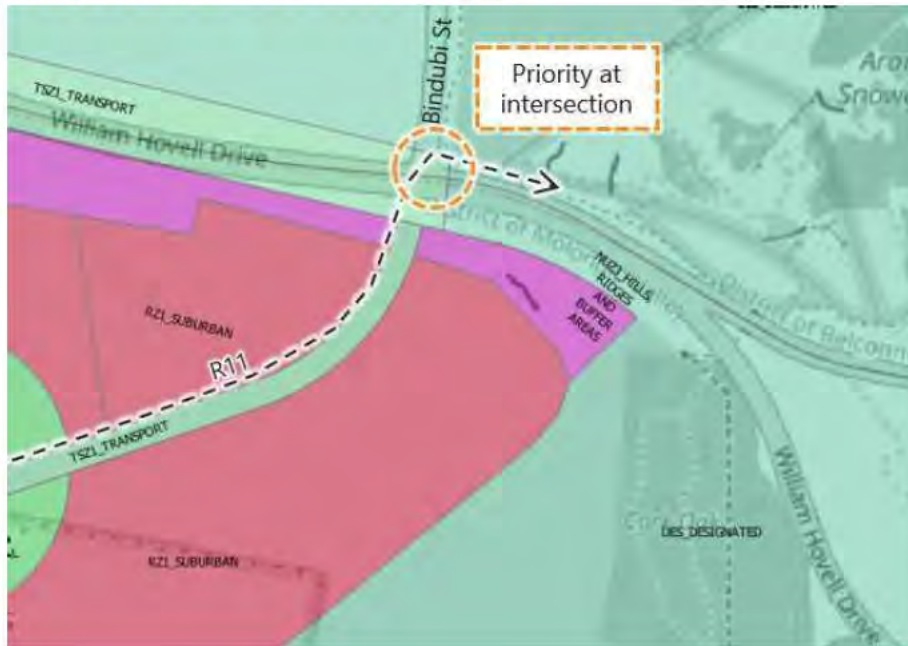
Possible bus priority interventions:

While buses do not currently use Parkes Way and William Hovell Drive, in this study we have assumed that in the future the new R11 route serving Molonglo stage three will use this corridor to access the city. Between Coppins Crossing Road and Glenloch Interchange, there is little opportunity to provide any bus priority infrastructure without the addition of a new lane, which would be impractical given the low volume of buses. Instead we propose that when the new R11 is introduced it be supported with priority at the Bindubi Street intersection (Figure 4-26).

Precedence level: Moderate



Figure 4-26: Proposed bus priority at Bindubi Street intersection, (land use zoning shown to indicate future development)



4.19 Southern Cross Drive

Corridor ID: 32

Section: Between Macfarlane Burnet Avenue and Starke Street.

Current AM peak bus volumes: 10 bph in each direction.

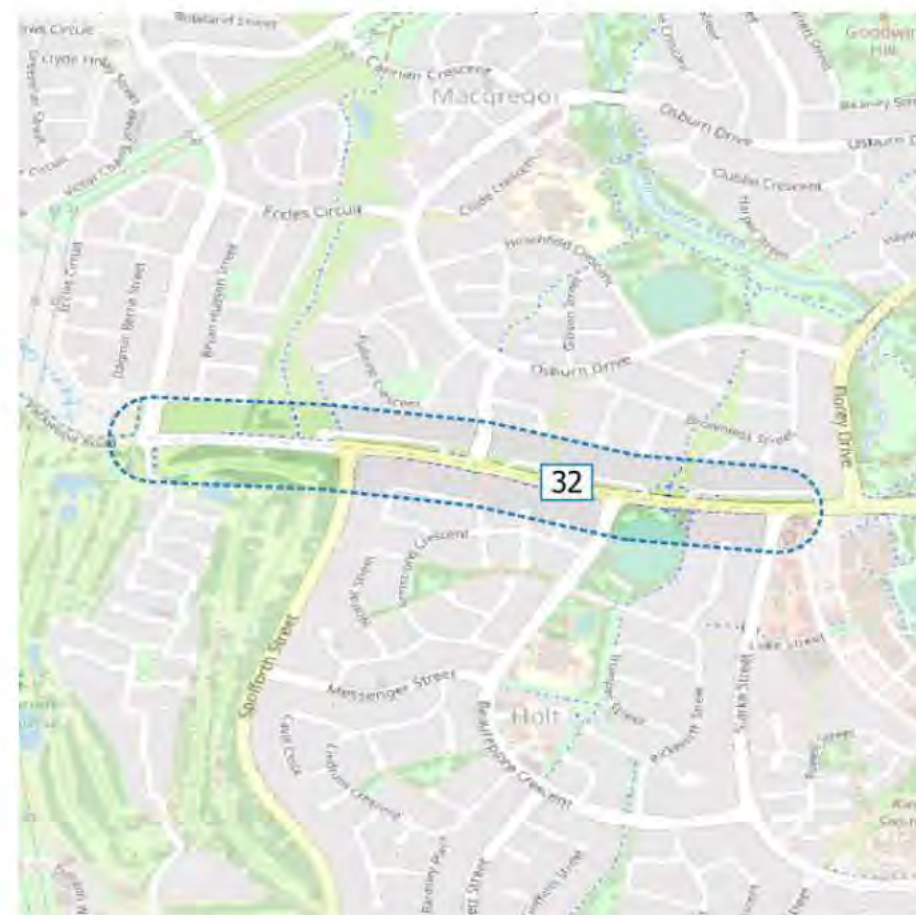
Future AM peak bus volumes: 24 bph in each direction at H3 and H4, then back to 10 bph in each direction in H6.

Current choke points: Slight congestion in the eastbound direction between Macfarlane Burnet Avenue and Spofforth Street, and between O'Reilly Street and Forey Drive.

Future congestion: The CSTM 2031 modelling does not indicate significant future congestion. However, the modelling may not have accounted for the level of growth which is now planned for Ginninderry.

Possible bus priority interventions: Southern Cross Drive is currently a single lane road in both directions. Should the road be duplicated in the future, bus priority infrastructure should be implemented as it is likely to be used by a rapid route which will serve the extensive Ginninderry growth area.

Precedence level: Moderate



5.0 Layovers

Bus layovers are areas where buses park between services and allow drivers to have their allocated breaks. Having an adequate number of well positioned bus layovers is important as it minimises the amount of out of service unproductive running buses must undertake. In this chapter we provide a high-level assessment of the ACT's bus layover requirements for the coming decades. This assessment has been undertaken using the network assumptions outlined in the Future networks report.

The Belconnen and Tuggeranong depots have plenty of layover space, however it is inefficient for services which do not originate close to the depots to layover at these locations. Thus, there are bus layover facilities spread around the territory (Appendix Table B-1), which includes spaces at interchanges such as Cohen Street Belconnen and Tuggeranong.

Some of the layovers that are currently in use are slated for closure, most notably the Valley Avenue layover in Gungahlin. Other facilities may require upgrades.

This analysis has identified the following key risks that:

- The Valley Avenue layover will close, and other existing layovers might also be lost as urban development intensifies in Gungahlin. This could see layovers pushed further from the interchange, increasing unproductive running and the cost of running the network.
- If the Belconnen Depot closes, another area for buses to layover at the western end of Cohen Street will be needed, so failure to secure an alternative could substantially decrease operational efficiency.
- Due to development pressures, no space for buses to layover is provided close to the new termini in Molonglo and Ginninderry.

5.1 Future layover demand

As Transport Canberra's public transport network evolves, the demand placed on layover facilities will change. We have undertaken an assessment of the likely demand at key terminals during the AM peak (assumed to be the busiest period). To do this we have used the network assumptions developed with Transport Canberra (documented in the Future networks report). The scheduling of driver breaks is a very complicated process, however our method is simplified and thus the results of this process are indicative of the scale of future demand.

The method we used to estimate layover demand was:

1. Estimate the number of originating movements at each of the future horizons

This was done based on AM peak bus volumes using the future network assumptions, each originating service was assigned to its closest layover.

2. Make assumptions about the type and duration of each layover

Staging/recovery movements were assumed to account for 85 per cent of layovers and have a duration of 10 minutes. Crib breaks were assumed to account for about 10 per cent of layovers and have a duration of 20 minutes. Only 5 per cent of layovers were assumed to be meal breaks and have a duration of 45 minutes.

3. Apply a 'safety' factor of 1.5

To account for bus bunching (multiple buses arriving simultaneously) we have applied a 'safety' factor of 1.5. This results in the following formula, which can be compared to the layover capacity at each location.

$$Spaces\ req = N_o \times 1.5 \times \frac{P_{rec} \times 10\ mins + P_{CRIB} \times 20\ mins + P_{Meal} \times 45\ mins}{60\ mins}$$

N_o = number of originating movements

Using this method, we produced an estimate of the minimum number of layover spaces required at each horizon (Table 5-1). We then validated these numbers against the maximum number of layovers required today.

A limitation of this method is that it assumes meal and crib breaks can occur at any layover, in reality the locations where these breaks can occur is dependent on driver agreements, thus it is likely that more layovers will be required at centres such as Gungahlin and Woden where there are better driver facilities.

RESULTS

Our analysis highlighted that the amount of space needed at layovers will increase at nearly every location, with the greatest demand at Gungahlin, Belconnen, the City, Woden and Tuggeranong (Table 5-1). However, as light rail replaces key bus corridors, layover requirements may temporarily stabilise in the City and at Belconnen.

Of the existing suburban centres, more layover space is likely to be needed at Kippax, Dickson, Weston Creek and Watson.

We have assumed that new layover facilities will be built in Denman Prospect, Ginninderry, and Molonglo stage three. We estimate that at least three spaces will be needed at Denman Prospect/ Future Molonglo town centres, and at least two layover spaces will be required near the Molonglo stage 3 town centre. At the future Ginninderry town centre, we estimate that at least three layover spaces will be needed.

We estimate that the number of layovers needed at the Fraser West terminus is likely to remain relatively stable based on the assumptions outlined in the Future networks report. After finalising these assumptions and our calculations, Transport Canberra informed us that the services to Fraser West might be reduced in the near term, reducing pressure on layovers. This means that the current number of layovers at Fraser West is likely to be adequate going forward.

Table 5-1: Current and likely future layover capacities and number of layover spaces likely to be needed at each horizon

Location	Capacity		Notes	Number of layovers needed							Key finding
	Current	Future		H0	H1	H2	H3	H4	H5	H6	
Gungahlin	20	10	Valley Ave layover to be lost	19	21	21	22	22	22	22	Overcapacity in short term
Spence	5	5		4	4	4	4	4	4	4	
Fraser West	4	4	Reduced pressure due to service change	6	7	5	5	5	5	5	
Kippax	5	0	Town centre layovers may be lost	5	5	3	3	3	5	5	Replacement needed
Aikman Drive	8	8		5	5	8	14	14	11	11	Overcapacity with LR
Belconnen depot	>100	>100	Depot and Cohen St interchangeable but both maybe lost in future	15	17	17	16	17	17	19	
Cohen Street Interchange	4	0									
City	13	25	City West likely to close, replaced by Turner	19	21	21	26	24	24	30	Overcapacity in long term
Fairbairn	2	2	R3 replaced by light rail at H3	2	2	2	0	0	0	0	
Dickson	3	3		4	4	4	5	5	5	7	Overcapacity
Weston Creek	4	4		5	6	6	6	6	6	6	Overcapacity
Fyshwick - Tom Price Street	4	4		3	4	4	4	1	1	1	
Fyshwick - Lithgow Street	2	2	Not used	0	0	0	0	0	0	0	
Woden Interchange	22	35	Phillip Oval & Easty St layovers to open	20	24	30	35	35	35	36	
Woden Depot	>100	>100	When built, can take overflow from interchange								
Erindale	4	4		2	2	2	2	2	2	2	
Tuggeranong Bus Station	14	14		17	18	16	17	17	17	14	Overcapacity
Tuggeranong Depot	>100	>100	Can take overflow from interchange	1	1	1	1	1	1	1	
Lanyon	7	7		8	8	8	8	8	8	8	
Cooleman Court	4	4		4	3	3	3	3	3	3	
Watson	2	2		4	4	4	4	4	4	5	Overcapacity
Narrabundah	4	4		1	1	1	1	1	1	1	
Molonglo town centre	0	0		2	5	5	5	5	5	5	Infrastructure needed
Ginninderry	0	0		0	0	5	6	6	4	4	Infrastructure needed
Molonglo stage 3	0	0		0	0	2	2	2	2	2	Infrastructure needed

5.2 Future bus layovers

In addition to the layovers we have assumed will be built in growth areas such as Ginninderry and Molonglo, Transport Canberra has provided us with a list of potential layover sites spread across Canberra. Some of these sites have been identified in response to the likely closure of existing facilities.

As the proportion of ZEBs in the fleet increases, the potential for opportunity charging at layovers should be considered. Opportunity charging is likely to be most viable at locations where drivers take longer breaks (meals).

5.2.1 GUNGAHLIN

Current operations and issues

Bus originating in Gungahlin can currently layover at:

- Anthony Rolfe Avenue (10 spaces)
- Valley Avenue (10 spaces)
- Gungahlin Place (7 spaces)
- the interchange itself.

The layover on Valley Avenue will become unavailable in the future once development begins of the block immediately adjacent to it.

Driver feedback has highlighted that travel between Anthony Rolfe Drive and the Gungahlin Interchange is impacted by increasing traffic congestion. As such, the loss of the Valley Avenue layover space is problematic as it will mean more layover movements will need to occur through the busy corridor between Anthony Rolfe Drive and Gungahlin Interchange.

Factoring in network expansion and service uplift, we estimate that the minimum number of layovers spaces needed in Gungahlin will increase (peaking at about 22 spaces in the near future).

Figure 5-1: Layovers near Gungahlin Interchange



Potential replacement solution for Valley Avenue layover

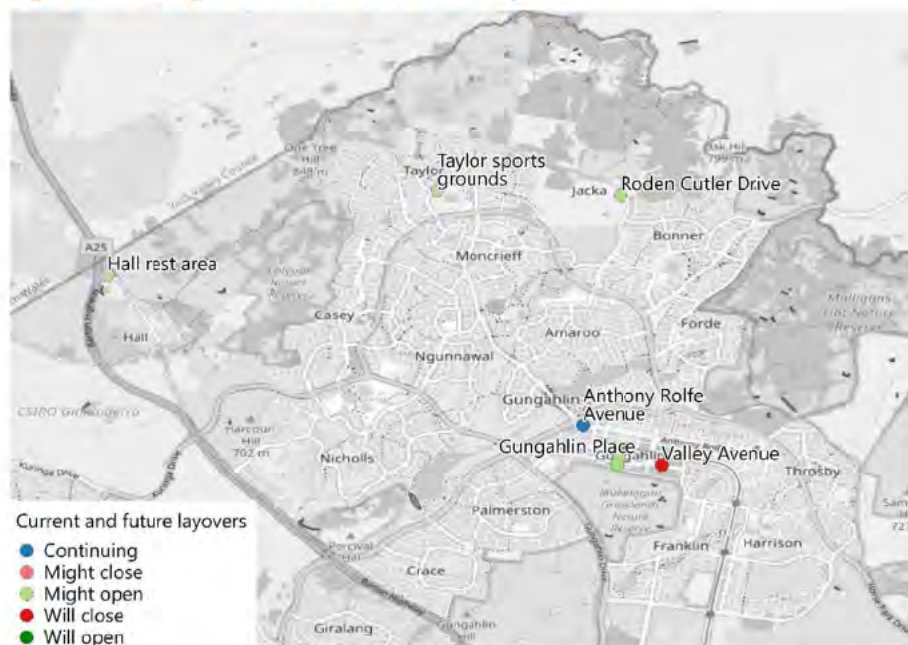
The Valley Avenue layover provides space for around ten buses to layover, it also has a driver break facilities building. Positioned to the southwest of the interchange, The Valley Avenue layover is useful for northbound services, which can proceed directly to the northbound platform without having to turn around. The closure of the Valley Avenue layover could increase dead running and will put more pressure on other layovers – particularly Gungahlin Place, as it is also positioned on the south side of the interchange.

To replace the function and capacity lost through the closure of the Valley Avenue layover, we have examined options for increasing layover capacity in Gungahlin (Figure 5-2). Our preferred option is the formalisation of the Gungahlin Place layover, into an off-street facility.

KEY RISK:

There is the risk that as urban development in Gungahlin intensifies, areas which are currently used for bus layover will be repurposed. Pushing bus layovers further from the interchange will increase unproductive running and the cost of running the network.

Figure 5-2: Gungahlin current and future layovers



Gungahlin Place

At Gungahlin Place, buses currently park on the western side of section 38 (just north of The Valley Avenue) and on the eastern side of section 250 (just south of the Valley Avenue). With layover capacity to be lost on the south side of the interchange and congestion impacting buses using the Anthony

Rolfe Avenue layover, we recommend that the Gungahlin Place layover be consolidated into an off-street facility on the vacant land just south of The Valley Avenue (section 250, as shown in Figure 5-3).

Figure 5-3: Proposed consolidation of the Gungahlin Place layover



Compared to the other options for layovers (Figure 5-), Gungahlin Place has the advantage of being much closer to the interchange, minimising the amount of out of service running.

The advantage of having bus layovers close to the Gungahlin Interchange must be balanced against the noise and pollution fossil fuel buses produce – decreasing the amenity of the Gungahlin Town Centre. In this case, we think section 250 is far enough from the busiest parts of Gungahlin to avoid decreasing its amenity. Furthermore, the amenity impacts of Transport Canberra's bus fleet will decrease as more zero emission buses are procured (ZEBs are much quieter and produce no pollution).

Since section 250 would replace The Valley Avenue – a layover with driver break facilities – the Gungahlin Place layover should also have driver facilities. Currently there is no shelter at the Gungahlin Place layover (Figure 5-4, Figure 5-5 and Figure 5-6). Driver facilities would enable longer breaks to take place at Gungahlin Place, making the layover more useful.

Should section 250 not be available, section 38 is a viable alternative.

Figure 5-4: Bus layover on the west side of section 38, driver taking a break



Figure 5-5: Bus layover on the east side of section 250



Figure 5-6: Proposed additional layover site on the western side of section 250



Hall

A currently unused layover at Hall could potentially be upgraded to take pressure off Gungahlin. This parcel of land (referred to as the Hall rest area here) is just east of the Barton Highway and just north of Victoria Street. The Hall rest area is currently zoned as Transport.

A major disadvantage of the Hall rest area is that it is located around seven kilometres drive from the nearest terminal (Casey Market Town) and 10 kilometres from Gungahlin Place. Use of this layover would require a substantial amount of unproductive running. As such we do not recommend that it is used for bus layovers.

Figure 5-7: Hall rest area



Taylor

Bus parking has been provided at the sports grounds in Taylor. The sporting field facilities to the west of the carpark are yet to be completed, presenting the opportunity to include driver amenities in any clubhouse which might be constructed nearby.

The Taylor sports grounds are adjacent to routes 25 and 26, however these routes have their terminus at Gungahlin Place, which is located around 6 kilometres drive away. With the current network structure, having layovers at Taylor would result in a substantial amount of unproductive running. However, the amount of unproductive running could be reduced in the future if routes 25 and 26 were converted into two separate bi-directional routes with a terminus in Taylor. Redesigning the network in this area may need to occur as the population grows, potentially making this location more viable.

Figure 5-8: Taylor sports grounds



Jacka

A layover could also be located along the yet to be extended Roden Cutler Drive. The Jacka masterplan indicates that sporting fields will be constructed to the south, which could potentially allow driver amenities to be included in the construction of a clubhouse. There is the opportunity to ensure that the layover facilities be built as a part of the future road extension.

The potential Roden Cutler Drive layover is located around 5 kilometres from Gungahlin Place which would mean a substantial amount of unproductive running. The amount of unproductive running could be reduced in the future if routes 25 and 26, as well as routes 19 and 20 were converted into two bi-directional routes. Given that this is a growth area, a network redesign may be necessary as the population grows, potentially making this location more viable for layovers.

Figure 5-9: Roden Cutler Drive layover, Jacka



Depot layovers

If a new depot is built in Mitchell, there may be the opportunity for buses to layover there, particularly for longer meal breaks. However, this will probably add around five kilometres of unproductive running in each direction

Gungahlin layovers summary

From an operational perspective it would be ideal to keep the layover facilities as close to Gungahlin Place as possible. As such, we recommend that the layover at Anthony Rolfe Avenue be retained. **We recommend that a new off-street layover be built on the vacant land at section 250.**

Any proposal to repurpose layover space in Gungahlin must be weighed against the increased operating costs to the public transport network of moving layovers further from the interchange.

To mitigate the risk of losing layover space at Gungahlin we also recommend that new layover facilities should be secured in the northern suburbs of Gungahlin. While these layovers are not efficient with the current network structure, population growth could enable network changes which would make these suburban layover sites more viable. Of the suburban layover sites, the sites in Taylor and Jacka are likely to be the most viable.

5.2.2 DICKSON

Outside of the interchange itself there are two layover locations in Dickson, one on Cowper Street and another on Antill Street. The Cowper Street layover is adjacent to a public toilet block.

Our analysis suggests that in the long term, Dickson may need as many as seven layover spaces to cope with peak demand.

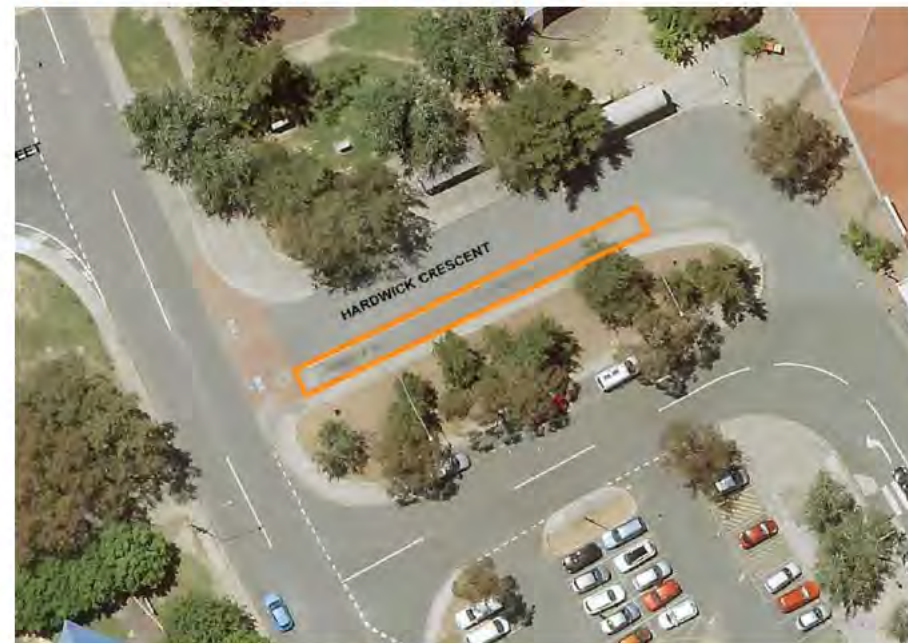
Figure 5-10: Current Dickson layovers



5.2.3 KIPPAX

At the Kippax interchange, layovers currently occur in Hardwick Crescent where there is ample space.

Figure 5-11: Current Kippax Interchange layovers



The *Kippax Group Centre Master Plan* proposes that the bus layovers are moved south from their current location at the interchange to either Powell Street or to Starke Street (Figure 5-12). Our analysis indicates that space for at least three buses will be needed at Kippax in the future.

Given current bus volumes, we estimate that moving layovers from the interchange to Powell Street will add around 60 kilometres of out of service running on a weekday. If the Starke Street layover is used over 80 kilometres of out of service running would be added to the network each weekday.

While retaining layover space at the interchange would be preferential, if the layover does need to be moved, we recommend that Transport Canberra

advocate for the Powell Street layover as it would require less unproductive running, than Starke Street

Figure 5-12: Kippax Group Centre Master Plan, with two proposed layover locations circled in orange



5.2.4 WESTON CREEK TERMINUS EXTENSION

The Weston Creek Terminus is located at the western end of Hindmarsh Drive. The formal layover parking area has space for approximately four buses, although drivers have also been parking on the grass area just west of the formal layover (Figure 5-13).

Figure 5-13: Current Weston Creek Terminus



Our analysis indicates that the minimum number of layover spaces required at the Weston Creek terminus will increase slightly (to around six spaces) in the future. However, as the Weston Creek layover can help supplement the Woden town centre and given growth in nearby Molonglo, providing additional space here will be beneficial both in the short term (during the Woden redevelopment) and long term.

We recommend that the informal bus parking area at the western end of the current layover (Figure 5-13) be asphalted, this is likely to require confirmation of who owns the land just west of the existing layover.

5.2.5 WODEN

The Woden interchange is currently being redeveloped, and two new layover facilities will be implemented alongside it. One at Phillip Oval and one on Easty Street, with a combined capacity of 35 spaces. Our analysis indicates that in the long term (horizon 6) all of these spaces will be needed, however overflow buses would also be able to use the soon to be constructed Woden Depot.

5.2.6 WATSON

There is currently a layover located in northern Watson in Aspinall Street. This layover has space for two buses and is equipped with an aging toilet block (which may need replacement at some point). Urban development in this area is likely to impact operations around this layover in the future, with the blocks close to the Aspinall Street layover identified as future urban areas in the territory plan.

Figure 5-14: Current Aspinall Street Layover



Our analysis indicates that five layover spaces will be required at horizon 6. Given the pressure that increased urban development is likely to place on

layovers in this area, we recommend that an additional layover be secured to provide additional capacity and flexibility. Transport Canberra have identified two potential locations for new layovers in Watson.

The first site is a parcel of land located just to the west of the Canberra Park Hotel, near where the new extension of Old Wells Station Road meets the Federal Highway (Figure 5-15). This parcel of land is zoned as broadacre and “designated”.

Figure 5-15: Old Wells Station Drive potential layover



The second parcel of land is located north of the Federal Highway, near to where a future extension of Morisset Road will connect with Antill Street (Figure 5-16 and Figure 5-17). This parcel of land is zoned as broadacre, hills, ridges and buffer areas.

Both the Old Wells Station Road layover and the Morisset Road extension parcels are further from the current Watson terminus than the existing

layover. With today’s network, the Morisset Street site would require about 1.1 kilometres of out of service running between layover and terminus, while the Old Wells Station Drive layover would require about 1.4 kilometres of out of service running. Nevertheless, given the development slated for Watson, routes R9 and 50 may need to be extended in the future which would likely decrease unproductive running to the new sites.

Figure 5-16: Morisset Road extension potential layover



Figure 5-17: Morisset Road extension potential layover (land use zones shown)



5.2.7 FYSHWICK

Currently buses layover at an area just east of Tom Price and Iron Knob Streets (Figure 5-18). The site is unpaved, but a toilet and kitchenette were recently installed. Transport Canberra reports that buses have become bogged during wet weather. There is the risk that this could continue in the future and disrupt operations. As such, we recommend that a more durable surface be laid, and that this area is formalised as a permanent bus only zone.

There is also an unused layover area in Lithgow Street Fyshwick, however it is much further from route termini.

Figure 5-18: Current Fyshwick layover



5.2.8 CITY

Currently the City West layover provides the bulk of layover capacity in the city and is operating near or at its capacity. In addition to the City West layover, there are currently in-stop layover spaces on East Row (rear of platform 2) and Mort Street (rear of platform 9), however these spaces only allow for short stays. There is also a coach parking area on London Circuit, but this is not used for Transport Canberra services. Thus, while there are existing layover locations outside of City West, they cannot be relied upon. Especially if redevelopment occurs on either side of Mort Street, as the new land uses may not be compatible with bus layovers.

A new layover has been built just north of Barry Drive in Turner and can accommodate around 25 buses (Figure 5-20). The new Turner layover will replace the City West layover which is likely to be redeveloped. Our analysis indicates that the new Turner layover should be able to provide enough space for layovers in the city up until horizon 5. At horizon 6, more space may be needed.

Once the Turner layover opens there is the opportunity to extend routes 5, 6, 7 and 10 to the Australian National University (Rimmer Street). This would reduce unproductive running and provide customers with a direct connection between the university and Molonglo, Weston Creek and Lanyon, removing the need for students and staff to transfer or walk a considerable distance.

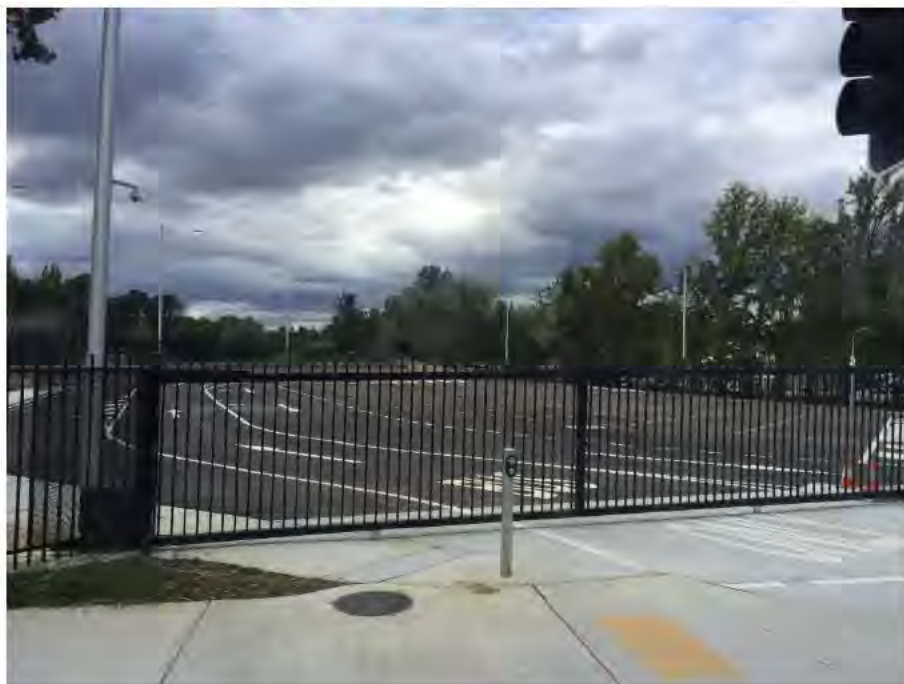
Notwithstanding capacity considerations it would be advantageous to have another layover location on the east side of the city to be used by services commencing in the south and heading north/west. Instead of having to

travel east from the Turner layover to start their trips in the city before backtracking north/west, these routes could layover on the east side of the city – reducing unproductive running.

Figure 5-19: Current and future city layovers



Figure 5-20: New bus layover at Turner



5.2.9 BELCONNEN

Currently there are two main layover sites in Belconnen. One, at the southern end of Aikman Drive where there is layover space for about eight buses. The other is at the Belconnen Depot/Cohen Street Interchange. Having layovers positioned at either end of the busy Cohen Street bus corridor is beneficial, as it allows for efficient operations and flexibility (for example buses waiting to head east bound can use the depot layover, while those waiting to head west bound can use the Aikman Drive layover).

The arrival of light rail will mean that a greater proportion of routes will originate/terminate at Belconnen instead of passing through. This will

increase layover requirements in Belconnen, which could be problematic if the Belconnen Depot is closed and the layover space at the depot is not replaced. As such, we recommend that even if most of the Belconnen Depot land is repurposed, at least some be retained for bus storage.

KEY RISK:

If the Belconnen Depot is closed, a new location for buses to layover at the western end of Cohen Street will be required. Failure to secure sufficient layover space could substantially decrease operational efficiency.

Our analysis also indicates that the Aikman Drive layover may not be large enough at horizon 3, when around 14 spaces may be needed. This is largely because at horizon 3 more bus routes will be truncated to meet light rail at Belconnen (rather than running into the City as they did previously). It will be most efficient for these west bound services to layover at Aikman Drive before beginning their trips west (Figure 5-21).

Figure 5-21: Likely operational changes affecting Aikman Drive layover



5.2.10 TUGGERANONG

Our analysis indicates that there is already more demand for layover at Tuggeranong than the interchange can provide, forcing buses to layover on local streets which is undesirable, or at the depot which results in increased out of service running. Securing additional layover space at the interchange would allow more efficient operations, and potentially enable drivers to take meal breaks there.

5.2.11 LANYON

Our analysis indicates that there are about the right number of layovers at Lanyon, and that demand is not expected to increase substantially.

5.2.12 DENMAN PROSPECT/MOLONGLO TOWN CENTRE

Planning for Molonglo outlines that a new town centre will be developed just to the east of Denman Prospect. As Molonglo is developed and its population grows the number of routes serving it and the frequencies on these routes will increase. We estimate that the new Molonglo town centre will require space for at least five buses to layover during the AM peak. Planning for the town centre should ensure that bus layovers be positioned as close to the Molonglo town centre interchange as possible.

5.2.13 GINNINDERRY

Extensive greenfield development is planned for the western part of the Belconnen area, with a new town centre planned at Ginninderry. In this exercise we have assumed that in the future, several bus routes will originate and terminate at this town centre. We estimate that the Ginninderry town centre layover will need space for at least six buses during peak times. Ideally these layovers should be positioned as close to the Ginninderry terminus as possible to minimise unproductive running.

5.2.14 MOLONGLO STAGE THREE

In addition to the main town centre on the western side of the Molonglo River, a new smaller centre is planned for Molonglo stage three. In this exercise we have assumed that a new local route will originate at this new centre and we estimate that there will need to be space for at least two buses to layover during peak periods.

KEY RISK:

There is the risk that insufficient space is set aside for buses to layover at the new termini in Molonglo and Ginninderry. Ideally layovers should be positioned as close as possible to the new interchanges to minimise out of service running.

6.0 Interchanges and major stops

We have undertaken analysis looking at likely future bus volumes at major stops and interchanges in the territory. The purpose of this analysis is to assess how this infrastructure will cope with the network changes assumed in this study.

This analysis has identified the following key risks:

- Failure to adequately consider the space requirements for buses in the planning for light rail at Belconnen could limit the operation of the network and lead to sub-optimal bus-light rail integration. For example, the Belconnen Depot may be decommissioned in the future, if this occurs, retaining at least some of the site for bus storage would be optimal.
- Increased customer demand and higher volumes of buses are likely to increase the rate of stop failure at the Westfield Belconnen stop.
- When the east-west light rail corridor is built through the city, there is the risk that space currently used by buses will be lost. The positioning and layout of bus stops in the city must optimise the experience of both light rail and bus customers by enabling seamless transfers.

We also recommend that:

- The future Molonglo town centre interchange will require at least two stopping bays in each direction.
- In Mawson bus stops will need to be retained on Athllon Drive even when light rail is built to Tuggeranong.
- The Fyshwick Park & Ride stop in Iron Knob Street be lengthened.
- The Tuggeranong Interchange be rejuvenated to improve customer experience.
- The future Ginninderry town centre interchange will require at least two stopping bays in each direction.

6.1 Kippax

Kippax is the nearest group centre to Ginninderry where extensive green field development and population growth is expected. As a result, an increased number of services are expected to pass through Kippax in the future.

The R2 is the rapid route connecting Kippax to Belconnen, the City and Fyshwick. Frequencies on the R2 are expected to increase to ten buses per hour in the peak periods in the medium term (by horizon 3).

It is proposed that light rail will be built to Belconnen in the medium term (horizon 3). This will mean that local services which currently terminate at Kippax (such as the 903) will be extended to Belconnen to avoid customers needing to make two transfers to access the city. In the longer term, it is proposed that light rail be further extended from Belconnen to Kippax (horizon 5). This will likely see some services which previously passed through Kippax, truncated at the new light rail terminus.

Based on the assumptions adopted in this study we estimate that AM peak bus movements at Kippax could increase by over 50 per cent by horizon 4, with the interchange likely to need to be able to accommodate around 50 buses per hour. **The increased number of services using the interchange will need to be factored into any redevelopment which occurs at Kippax.** In addition, once light rail is extended to Kippax, the interchange will still need to accommodate a large volume of buses and facilitate high quality transfers between buses and the light rail.

6.2 Major Belconnen stops

There are three major bus stops in Belconnen: the Cohen Street Interchange, Westfield Belconnen and the Belconnen Interchange. These are some of the busiest stops in the network, with over 120 buses per hour passing through them in the AM peak.

Figure 6-1: Major Belconnen stops



The number of services at each of these stops is expected to increase further over the coming decades as frequencies are increased on existing routes and new routes are introduced to the network (Figure 6-2). Subsequently, the number of bus arrivals and departures at Belconnen will remain high, even when light rail is built between the city and Belconnen in the future (horizon 3).

Figure 6-2: AM peak hour current and future movements at Westfield Belconnen



The key network changes affecting Belconnen are assumed to be:

Horizon 1

- The introduction of a new route connecting Denman Prospect and Belconnen (via Whitlam)

Horizon 2

- The extension of the R10 from Molonglo to Belconnen
- The introduction of a new Fraser West local route (replacing the R2 which will be realigned to serve Ginninderry)
- The extension of 903 from Kippax to Belconnen
- The introduction of a new Ginninderry-Belconnen local route (via Ginninderra Drive)

Horizon 3

- The introduction of light rail connecting Belconnen to the city, R4 removed from Belconnen.

- The deletion of the R3, to be replaced by a new Spence-Belconnen local route.

Horizon 4

- Light rail extended to Kippax.
- R2 removed from Belconnen (shortened to Kippax)

It is unclear what the alignment of light rail will be through Belconnen, for the purposes of this exercise we have assumed that it will run through the existing Cohen Street bus corridor. This will have a major impact on bus operations during construction of the light rail. It is also unclear how the light rail will be integrated with the three major stops, for example these stops may need to be redesigned or relocated.

KEY RISK:

The alignment of the future light rail corridor through Belconnen will need to retain space for buses. Failure to retain adequate space could limit the operation of the network and lead to sub-optimal integration between buses and the light rail.

When light rail arrives in Belconnen, the R2 and R3 corridors will likely be truncated at the Belconnen Interchange stop, even if the light rail is built further west to the Westfield stop. This will be necessary to avoid inbound bus customers having to make a transfer to reach the Belconnen Interchange.

The arrival of light rail will mean that a greater proportion of routes will originate/terminate at Belconnen instead of passing through. This will increase layover requirements in Belconnen, which could be problematic if the layover space at the Belconnen Depot is lost.

When light rail is extended to Kippax (horizon 5) the number of bus movements will stabilise as the R2 will be removed.

As explained above, bus volumes at Belconnen will increase in the future. As such even when light rail arrives, **the amount of space needed for buses will not decrease.**

KEY RISK:

As development in Belconnen intensifies, there could be pressure to repurpose space currently allocated for use by buses. To continue to provide high quality mass transit connectivity to the Belconnen Town Centre, adequate space for buses will need to be retained. In particular, the land that the Belconnen Depot sits on might be redeveloped, if this occurs retaining at least some of the site for bus storage should be considered.

6.2.1 COHEN STREET INTERCHANGE

The Cohen Street bus interchange has on street stops in Cohen Street and off street stops adjacent the Belconnen Interchange. The volume of buses using these stops will increase in the future as new routes are added (such as the extension of the R10) and service frequencies increase. Our analysis indicates that the stops on the south side of Cohen Street (the west bound direction) are the most likely to come under pressure, potentially resulting in unacceptable levels of stop failure (where buses must wait for others to leave before they serve a stop). The pressure on this side of Cohen Street could be somewhat alleviated by moving the final stops of some of the terminating routes (23, 24, 30, 31, 32, 43 and 901) to the off street stops.

When light rail is built to Belconnen is unclear whether it will make it as far west as the Cohen Street Interchange or if the final stop will be Westfield. If the initial stage of light rail does make it to Cohen Street, it will become the main transfer point between buses and light rail. This will increase dwell times and increase the capacity pressures on the bus stops. If a bus-light rail interchange were built in Cohen Street, it would significantly impact on

general traffic flow (potentially requiring its closure as will be done in Callam Street for the Woden Interchange).

Figure 6-3: Current Cohen Street Interchange



6.2.2 WESTFIELD BELCONNEN

The Westfield Belconnen stops consist of two off street platform stops adjacent to the Westfield shopping Centre. These stops accommodate a high volume of buses – over 70 buses per hour per direction in the peak hour. Our analysis indicates that this could increase to almost 90 buses per hour in the future and light rail will also need to be integrated with this stop.

Buses at the Belconnen Interchange currently operate head of queue which maximises its capacity but makes it slightly more difficult for customers to find their service (due to bus headboards being obscured by the bus in front).

The large volume of buses using the Westfield Belconnen Interchange mean that it is likely to already be operating with a non-trivial rate of stop failure – particularly during peak periods when bus volumes and passenger loads are highest. Given that the bus volumes through the interchange are likely to increase in the future, the failure rate at Westfield will also likely increase. This will increase bus run times and degrade conditions for customers.

Figure 6-4: Current Westfield Belconnen stop



KEY RISK

The Belconnen – City corridor is one of Canberra’s busiest transport corridors, and the Westfield Belconnen stop is one of the territory’s busiest. Population growth, more intense development at the town centre and the extension of light rail will increase the demand placed on the interchange and increase the incidence of stop failure.

6.2.3 BELCONNEN INTERCHANGE

The current Belconnen Interchange is a bus only facility with six platforms (Figure 6-5). In the future, volumes at the Belconnen interchange are likely to increase to almost 90 buses per hour per side in the peak direction. Because it is a large, high-quality facility with dedicated running ways and off-line stops, the Belconnen Interchange should be able to accommodate the projected increase in bus volumes without the failure rate increasing to an unacceptable level. However, when light rail is built to Belconnen it is likely that it would pass down the centre of the current interchange, requiring it to be redesigned.

Figure 6-5: Current Belconnen Interchange



6.3 Gungahlin Place

The Gungahlin Interchange consists of two 75-metre-long platform stops on either side of Gungahlin Place (Figure 6-6). Currently, each side of the interchange serves around 40 buses at peak times. This is well within the interchange’s capacity to handle. According to the assumptions adopted in this study, the maximum volume of buses using the interchange is only expected to increase to around 45 buses per hour, which will still be well within the interchange’s capacity.

Figure 6-6: Gungahlin Place



6.4 City

As the central node of Canberra's public transport network, the city is served by a large number of bus routes.

The key network changes affecting the city are assumed to be:

Horizon 1

- Light rail built to Commonwealth Park.

Horizon 2

- Light rail built between Commonwealth Park and Woden, resulting in the R4's deletion between these two points. As a result, the 'R4 northern' and 'R4 southern' are introduced. The R5 is truncated at Woden and no longer reaches the City.

Horizon 3

- Light rail built between the city and Belconnen, resulting in:
 - the R3's deletion
 - the splitting of the R2 into an 'R2 northern' and an 'R2 southern'
 - the 'R4 northern' deletion
- New Rapid from Molonglo introduced: the 'R11'

Horizon 4

- Light rail built between the City and Fyshwick resulting in the deletion of the 'R2 southern'

Currently, over 100 trips arrive in the city in the AM peak on a weekday morning, spread across more than 10 stops (Figure 6-7).

In the future we estimate that the number of trips arriving in the city will increase in the short term, then decrease as key bus corridors are replaced by light rail (Figure 6-8). However, the number of arrivals in the city would be higher than we anticipate if frequencies are increased more than we have assumed.

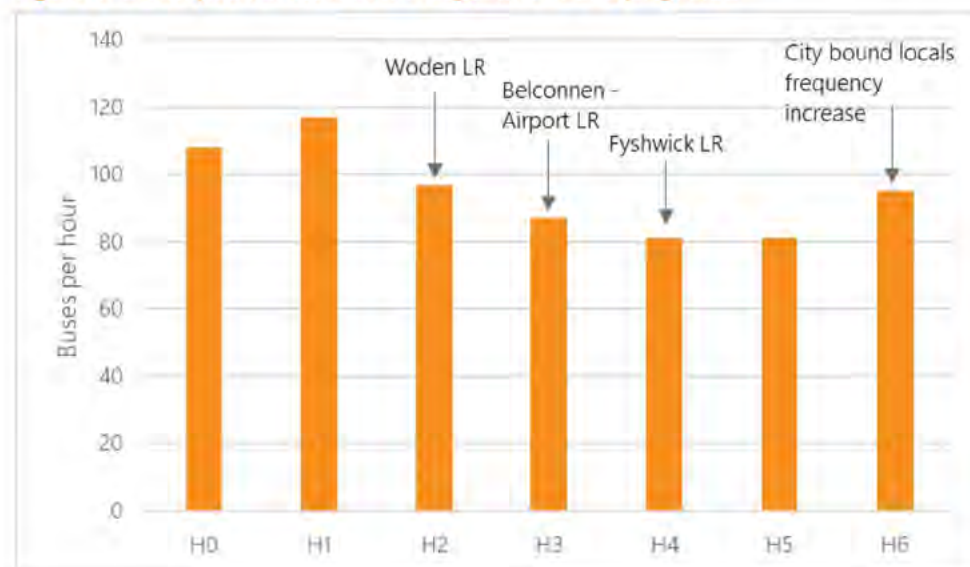
The structure of future bus operations in the city is currently uncertain with the key unknown being the alignment of the Belconnen – Airport light rail. If the light rail uses Alinga Street some stops may need to be relocated. If light rail is built on London Circuit it could impact on bus access to East Row and Mort Street. The alignment of the east-west light rail corridor through the city will have a substantial impact on bus operations. This must be considered in the alignment choice and the design of the light rail.

With light rail alignments currently unknown, we have not undertaken a detailed assessment of the likely capacity of stops in the city.

Figure 6-7: City interchange – departure platforms



Figure 6-8: AM peak arrivals in the City, current and projected



KEY RISK:

As the next stages of light rail are built through Civic, light rail infrastructure and other associated redevelopment could result in space currently used for bus stops being repurposed. Planning should consider how to create the best possible environment for public transport overall, and optimise integration between light rail and buses, i.e., by providing seamless transfers between modes.

6.5 Barton Bus Station

The Barton Bus Station consists of two stops on either side of National Circuit (Figure 6-9). Bus volumes are expected to increase as the frequency of routes serving Barton increase. Nevertheless, we expect that even with these increases, the Barton Bus Station stop will have adequate capacity to handle these increases.

Figure 6-9: Barton Bus Station



When light rail is built to Fyshwick it is likely that the light rail corridor will be built through Barton Bus Station. At this point it is possible that the R2 will

be replaced by light rail, however the R6 will remain a bus service thus the Barton Interchange will need to facilitate both buses and light rail.

6.6 Dickson Interchange

The Dickson Interchange consists of two platform stops on Cape Street and a northbound stop on the western side of Northbourne Avenue (Figure 6-10).

Figure 6-10: Dickson Interchange



Our analysis indicates that the platform stops have ample capacity for current and future bus volumes. The Northbourne Avenue stop should also have enough capacity until horizon 5. At Horizon 6 the increase in frequency of routes 50 and 51 to a 10-minute headway, would likely require that the

existing Northbourne Avenue platform be extended, so there is enough room for two buses to use it at one time (Figure 6-11).

Figure 6-11: Long term upgrade for stop 4552



6.7 Cooleman Court Interchange

The Cooleman Court Interchange consists of two stops on Parkinson Street and two on Brierly Street. Two new routes are assumed to be introduced to Cooleman Court:

- a New Woden to Molonglo local route
- the new R11 Woden to City (via Molonglo) Rapid

Despite this, we do not expect the Cooleman Court stops to operate over their ideal capacity as they have recently been upgraded.

Figure 6-12 Cooleman Court Interchange



6.8 Denman Prospect/Molonglo Town Centre

The current terminus of routes in Molonglo is in Felstead Vista opposite the Denman Prospect shops. There is very limited space at this location, and it could become overwhelmed once more routes are added in the Molonglo area. As such, it is understood that the main Molonglo terminus will be moved to a site on the eastern side of John Gordon Drive in the future, ideally this should happen before the new R11 rapid route is introduced (Figure 6-13).

In the future, Molonglo will be served by:

- the R10
- the new R11
- a new Denman to Belconnen via Whitlam local (the 47)
- a new Denman - Woden local
- a new Molonglo stage 3 local route.

Our analysis indicates that the future Molonglo town centre interchange will need to be able to cater to 23 buses in each direction by horizon 6, this is likely to require at least two bus spaces in each direction.

Figure 6-13: Future terminus of Molonglo routes



6.9 Woden Interchange

Planning is underway for light rail to be extended from the city to Woden Interchange, this will see Woden Interchange rebuilt, integrating it with a new precinct.

In this study we have assumed that light rail will be extended to Woden at horizon 2, and then further extended to Tuggeranong at horizon 6.

This will result in the following network changes:

Horizon 1

- Addition of a new Woden – Fyshwick local route
- Addition of a new Denman – Woden local route

Horizon 2

- Extension of light rail to Woden, resulting in the truncation of the R4 and the R5 at Woden.
- Extension of Tuggeranong local routes to Woden (routes 74, 75 and 78)

Horizon 3

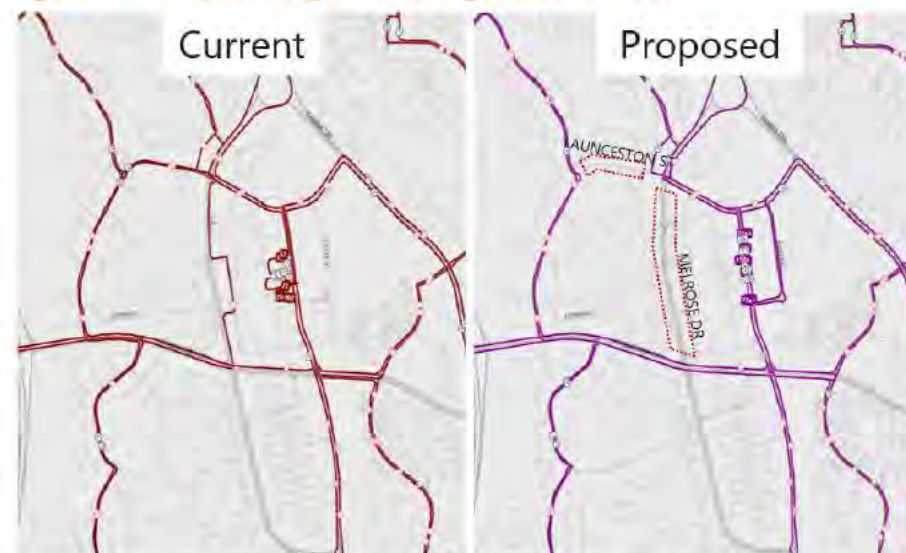
- Addition of the new route 11 Woden to City (via Molonglo)

Horizon 6

- Light rail extended from Woden to Tuggeranong
- Deletion of the 'R4 southern'

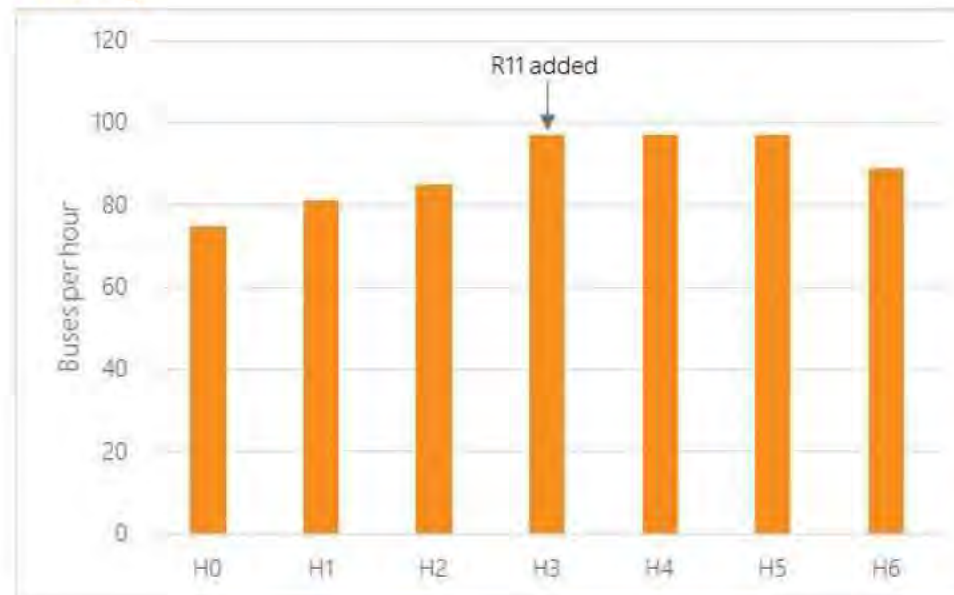
Transport Canberra have instructed us that in the future scenario all routes should be removed from Launceston Street (between Marrawah Street and Devonport Street), and from Melrose Drive between Launceston Street and Hindmarsh Drive (Figure 6-14).

Figure 6-14: Proposed alignment changes around Woden



Based on the assumptions outlined above, the AM peak hour demand at north bound stops at the Woden Interchange is expected to grow to just under 100 buses per hour (Figure 6-15).

Figure 6-15: North bound AM peak hour bus movements at Woden Interchange



6.10 Mawson

Currently the Southlands Shopping Centre in Mawson is served by two sets of stops. One set on Athllon Drive – used by the R4 and R5 Rapid routes, and another by local routes 60, 61 and 62 in Heard Street.

Figure 6-16: Bus stops in Mawson



In the future light rail will be built along Athllon Drive which will replace the R4. Our analysis indicates that the current stops should provide enough capacity at Mawson until light rail is built.

Even when light rail is built, **bus stops will need to be retained on Athllon Drive** as it would be optimal to maintain a direct connection between Lanyon and Woden (the R5). These stops should be as close to the future light rail station as possible – ideally this would mean moving the north

bound bus stop on the north side of Beasley Street to the south side, and potentially installing a pedestrian underpass under Athllon Drive.

6.11 Calwell

Our analysis indicates at bus volumes at the Calwell Shops will remain relatively stable, and that the existing stop infrastructure should provide adequate capacity.

Figure 6-17: Existing stop at Calwell Shops



Figure 6-18: Existing stops in Benham Street



6.12 Chisholm

Our analysis indicates at bus volumes at the Chisholm shops will remain relatively stable, and that the existing stop infrastructure in Benham Street should provide adequate capacity.

6.13 Fraser West

Our analysis indicates at bus volumes at the Fraser West terminus will increase slightly before decreasing when the R2 is moved to Ginninderry. The current stop infrastructure should be adequate to handle the volume of buses expected.

Figure 6-19: Existing stops in Shakespeare Crescent

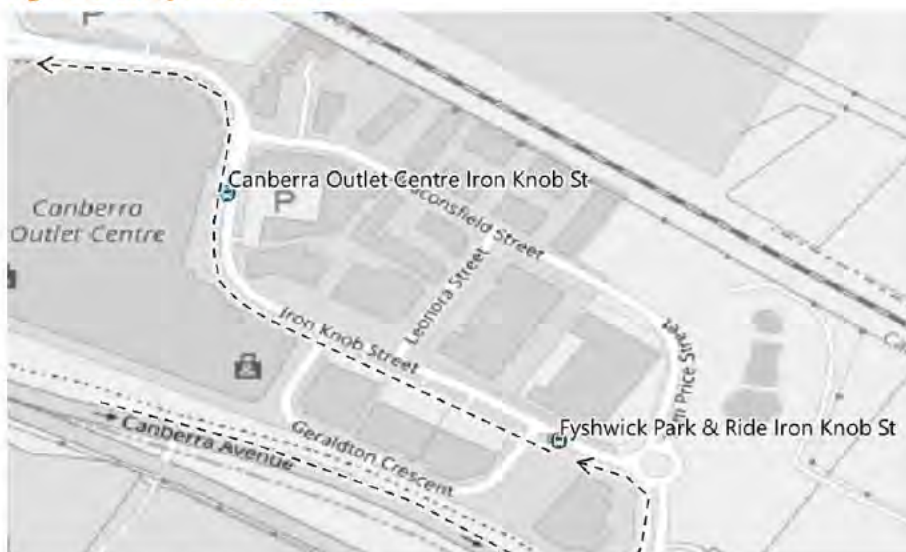


6.14 Fyshwick

The Fyshwick terminus consists of two stops in Iron Knob Street, one at the Canberra Outlet Centre and one at the Park and Ride (Figure 6-20). Buses only run west bound through Iron Knob Street, meaning that both originating and terminating trips use stops on the southern side of the street.

In this study we have assumed that the route 56 will be truncated at CIT Fyshwick and be replaced at the Fyshwick terminus by a new Fyshwick – Woden route. We have also assumed that the R2 will have its frequency increased to 8 buses per hour. We have assumed that light rail will be built to Fyshwick by horizon 4, which will see the R2 deleted.

Figure 6-20: Fyshwick terminus



Our analysis indicates that the Fyshwick Park and Ride stop may operate over capacity after the R2 frequency is increased to a 7.5-minute headway. Currently, there is only a single stopping bay at the Fyshwick Park and Ride stop (Figure 6-21). The higher frequency of Transport Canberra services, plus

route 831 and 834 QCity Transit routes, may result in bus volumes of almost 25 buses per hour using this stop.

As such we recommend that this stop be lengthened so that it can accommodate two buses at once.

Figure 6-21: Fyshwick Park and Ride stop in Iron Knob Street



6.15 Lanyon

Bus volumes using the Lanyon terminus stops are not expected to increase materially into the future. There is ample space at Lanyon to service current and future bus volumes.

However, the customer shelter facilities at the Lanyon Marketplace are limited in capacity. Given the high patronage, additional or larger capacity shelter is recommended.

Figure 6-22: Lanyon terminus stops



6.16 Tuggeranong Interchange

The Tuggeranong Interchange is a large facility (Figure 2-1); during peak times there around 80 bus movements per hour. Our analysis indicates that the interchange should be able to accommodate the future volumes of buses the network requires. However, the interchange is now over 30 years old and would benefit from a rejuvenation to improve the customer environment (Figure 6-25). We have assumed that light rail will be built to Tuggeranong at horizon 6, which is likely to be at least two decades away.

As such a busy interchange we recommend that moderate priority should be given to improving customer environment. Such a renewal

would not need to be extensive – there is adequate space and shade – but rather the fit out could be modernised.

Figure 6-23: Eastern side of the Tuggeranong Interchange



Figure 6-24: Tuggeranong Interchange



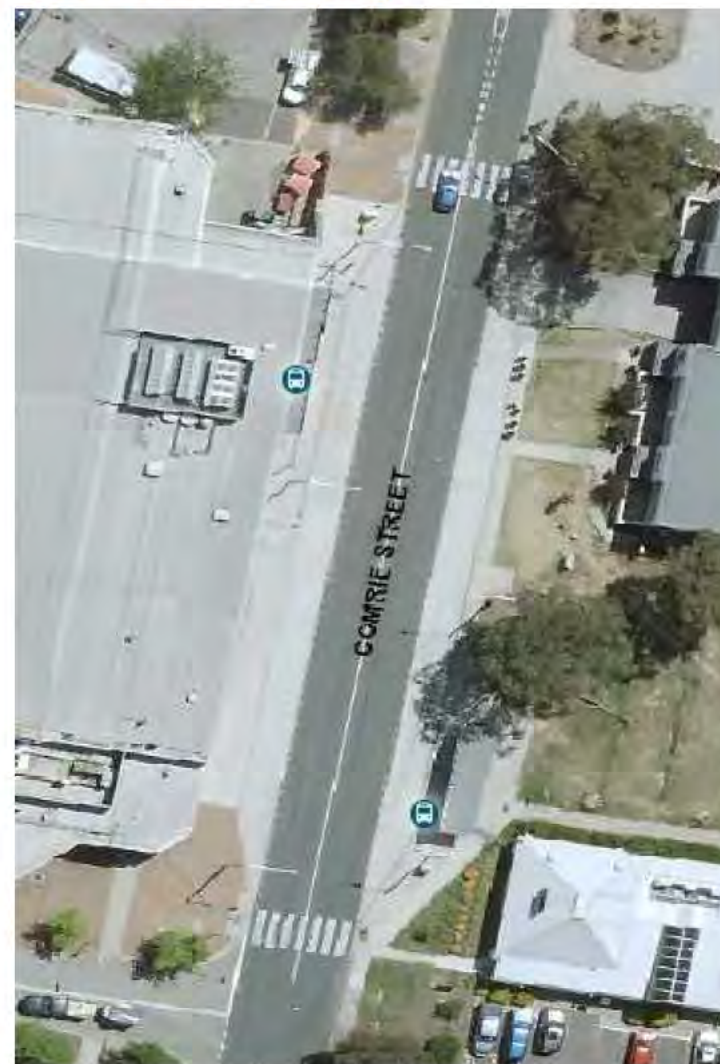
Figure 6-25: Current customer environment at Tuggeranong Interchange



6.17 Erindale

The Erindale Interchange consists of two 60-metre-long platforms on either side of Comrie Street (Figure 6-26). While bus volumes through the interchange are expected to increase in the future, our analysis indicates that there are unlikely to be any capacity issues at the Erindale Interchange.

Figure 6-26: Erindale Interchange



6.18 Ginninderry Interchange

In the future an interchange will be required at the yet to be developed Ginninderry Town Centre. This interchange is expected to be the terminus for the R2 rapid, a new Ginninderry – Belconnen (via Ginninderra Drive) local route, and an extended version of route 903. When light rail is extended to Kippax, we have assumed that the R2 will be replaced by a Ginninderry – Kippax frequent local service. We estimate that these services would result in around 16 buses per hour leaving the inbound platform of the future Ginninderry Interchange in the AM peak. Allowing for school services as well, the Ginninderry Interchange should ideally have at least two bus bays in the eastbound and westbound directions, (four stopping bays in total).

7.0 Minor stop infrastructure

Using MyWay card data from November 2019 we have identified stops which average more than 25 boardings on a weekday. We then checked what infrastructure these stops have currently, using a list of infrastructure maintained by Transport Canberra and cross checked this with Google Streetview. As per the parameters set out in the *Service Design and Optimisation Report* we suggest that a shelter be installed at stops with an average of 50 or more boardings per day. At stops with an average of 50 to 25 boardings per day we suggest that a bench be installed. In total we suggest that around 15 benches and 31 new shelters are installed. This proposed infrastructure is mapped in Figure 7-1 and outlined in Appendix Table E-1 and Appendix Table E-2.

Many of these stops are located at schools and we have noted the stops which are inside school grounds. There are also some stops which are not connected to the footpath (see the notes column of Appendix Table E-1 and Appendix Table E-2 for these details).

Given that school students tend to arrive at bus stops at similar times in the afternoon providing a single bench or shelter outside a school may not be adequate. For instance, at the Southlands Shops on the east side of Athllon Drive, students have been observed sitting on the ground due to a lack of seating (Figure 7-3). While it would not be possible to provide seating for every student, we recommend that Transport Canberra liaise with the schools identified in this study to understand if there is a need to improve the waiting environment for students. After all, these are the future full fare customers for the network.

Figure 7-1: Proposed shelters and benches



Figure 7-2: Southlands Shops stops on the east side of Athllon Drive,



Figure 7-3: School students waiting for buses at the Southlands Shops stops on the east side of Athllon Drive, March 2022



KEY RISK:

As part of the response to the Covid-19 pandemic rear door boarding was enacted on buses in early 2020. The network is not set up to support this at all stops, particularly in the suburbs where bus pads may not extend to the rear doors of the bus.

8.0 Opportunities for reform

The industrial agreement with bus drivers, ticketing and fare structures are key areas where reform could be pursued. Transport Canberra is currently procuring advice to inform the roll-out of a next generation ticketing solution.

From an industrial relations perspective, Transport Canberra continues to work with drivers to improve customer experience. One risk identified in this study was the potential for depot gate times (the time at which the industrial agreement stipulates buses can begin operations) to limit how early services can be operated. Currently, the normal operating hours or gate times are:

Monday to Friday - 5:00AM to 1:30AM

Saturday - 5:30AM to 1:30AM

Sunday - 6:30AM to 10:30PM

Bus drivers can operate outside these hours but must be paid an additional 75 per cent.

Routes which start or finish further away from depots are most likely to have limits imposed on their operating hours by gate times. This could particularly become an issue if the Belconnen Depot was replaced by a depot in Ginninderry. If this was to occur it is possible that bus services originating in suburban Gungahlin to feed the light rail, may not be able to begin operations early enough to meet the first light rail service.

KEY RISK:

The current industrial agreement limits the span of service that the bus network can offer. Decommissioning the Belconnen Depot and replacing it with one in a less central location could further limit the start time of early morning services and/or the finish time of evening services.

9.0 Next steps

The way in which light rail will impact key parts of Canberra's public transport network is currently unclear, this makes planning bus services in key parts of the network difficult. For instance, the path light rail will take through the Belconnen town centre will determine how buses will operate around it.

Belconnen bus stations planning study

A logical solution would be for light rail to use the existing corridor through Cohen Street and terminate at Westfield. This would see the Westfield stop become the key transfer point between buses and light rail.

While light rail in Belconnen is somewhat off, it would be useful for Transport Canberra to have a strategy to inform decision making about the operation of buses in Belconnen in the lead up to light rail. This work would guide planning for buses in Belconnen, for instance it could explore the future of the three major stations in Belconnen, providing a basis for making decisions about investments and operations at these stops. This study could also articulate the minimum requirements for buses at the Belconnen stations to ensure that once the light rail project team starts work, the bus operations side of Transport Canberra are armed with document setting out what will be needed to ensure successful bus operations during light rail construction and upon its completion. The Belconnen bus stations planning study would help ensure the best possible integration of buses and light rail in Belconnen.

In this document we have highlighted that the closure of the Belconnen Depot risks significantly increasing operational costs. As such, the Belconnen bus stations planning study could also explore potential strategies for minimising unproductive running in the event of the depots closure.

Gungahlin bus circulation study

This report has identified some risks for the bus network at the Gungahlin town centre, including that buses can be delayed on approach to Gungahlin and that space for layovers may become contested. We propose that

Transport Canberra undertake a study to flesh out solutions to these issues. This work could also outline a strategy for the circulation of buses at Gungahlin to ensure efficient operations as the centre continues to grow. The circulation study could include detailed investigation of the feasibility and potential benefits of solutions outlined in this document, including the proposal to introduce a turning lane on Ernest Cavanagh Street and to extend Gungahlin Place north as a bus link.

Civic bus stop planning study

This study has highlighted that bus volumes in Civic are likely to increase in the future, before decreasing slightly as light rail replaces key bus corridors. We propose that Transport Canberra commission a bus stop planning study to investigate the current performance of stops in Civic and highlight opportunities for improving customer experience in the short term, potentially through reorganising stop groupings. This study would take into consideration how operations may have to change with the closure of the City West layover site and the opening of the Turner layover site. For example, we have identified that there is the opportunity to extend routes 4, 6, 7 and 10 to the Australian National University. The Civic bus stop study would analyse if any infrastructure changes and improvements would be needed to facilitate this.

In the longer term an east-west light rail corridor will be built through the city. The Civic bus stop planning study would explore how this corridor would affect bus operations in Civic and articulate the minimum requirements for buses in the City. The study would be designed to arm Transport Canberra with a document setting out what will be needed to ensure successful bus operations during light rail construction and upon its completion.

ACT Bus Infrastructure Manual

The Department of Main Roads and Transport in Queensland have a Public Transport Infrastructure Manual (PTIM) which outlines "best practice planning and design principles to public transport infrastructure. It defines the elements of good public transport facilities, helps with evaluating

existing facilities and should be used as a design tool when developing new infrastructure within the Translink network.⁴ The PTIM, features guiding principles of public transport development as well as mode specific infrastructure chapters which outline the standard of infrastructure that should be provided at stops, stations and other facilities.

Figure 9-1: Public Transport Infrastructure Manual PTIM overview (source: PTIM)



It would be useful for the ACT to have an equivalent manual to guide the development and renewal of the territory's public transport infrastructure.

We suggest that Transport Canberra commission such a manual, with the development of the manual leveraging as much as possible from Queensland's PTIM and existing Transport Canberra corporate knowledge.

⁴ <https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Public-transport-infrastructure-manuals>

Appendix A Lower priority bus corridors

A.1 DRAKEFORD DRIVE

Corridor ID: 3

Section: Between Taverner Street and Lanyon Marketplace

Current AM peak bus volumes: 8 bph north bound

Future AM peak bus volumes: 8 bph north bound

Current choke points: Relatively limited traffic congestion.

Future congestion: 2031 indicates very high levels of AM peak congestion on approach to Isabella Drive.

Possible bus priority interventions:

A bus lane could be added on approach to the Drakeford Drive/Isabella Drive roundabout (Figure 9-2). This would likely require widening of the roadway. However, given the limited volumes of buses using this corridor, we recommend that implementing bus priority on this corridor is likely to be unnecessary.

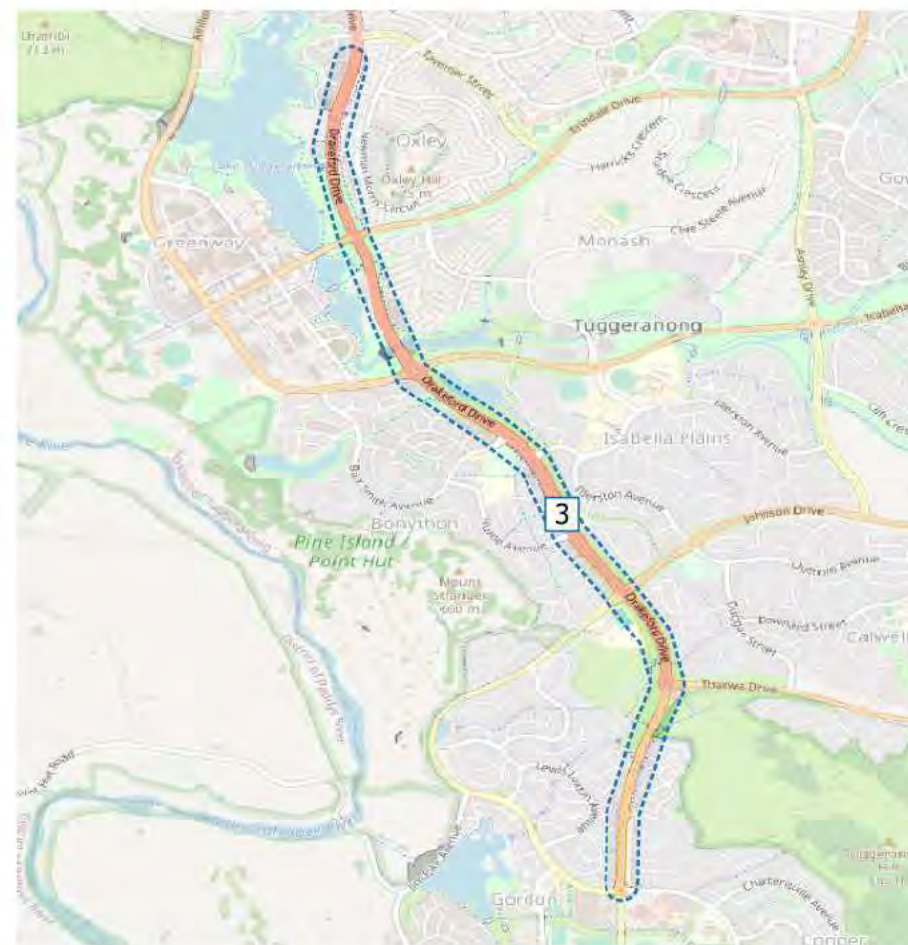


Figure 9-2: Proposed bus lane on approach to Isabella Drive



A.2 ASHLEY DRIVE

Corridor ID: 4

Section: Between Johnson Drive and Isabella Drive

Current AM peak bus volumes: 16 bph north bound

Future AM peak bus volumes: 19 bph north bound

Current choke points: Relatively limited traffic congestion.

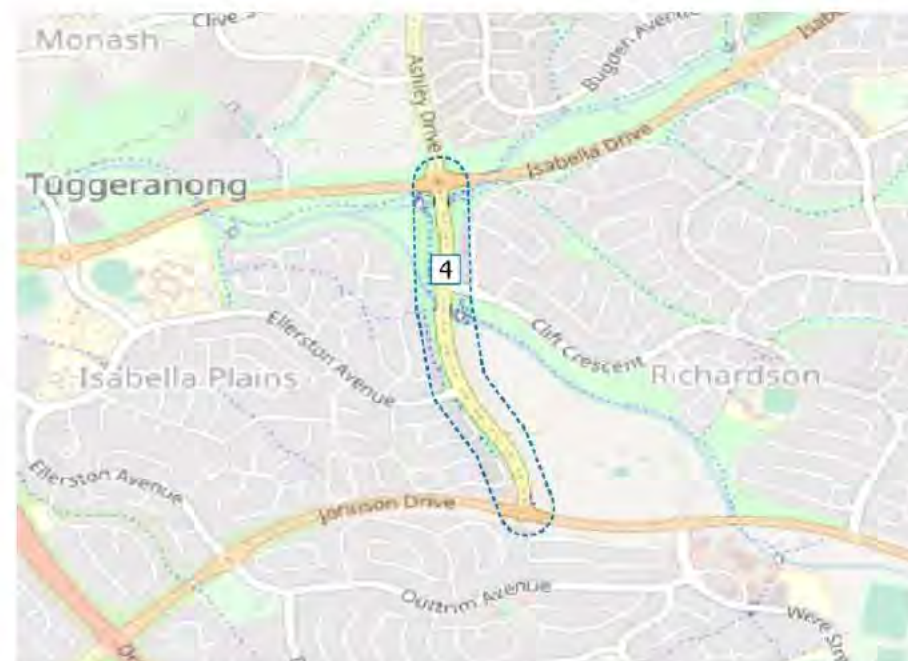
Future congestion: 2031 modelling indicates some AM peak congestion north bound on approach to Isabella Drive.

Possible bus priority interventions:

Ashley Drive passes over a bridge just south of Isabella Drive. Thus, adding a bus lane will require either:

- the bridge be widened, or
- an existing general traffic lane be reallocated as a bus lane.

As such we do not recommend that priority infrastructure be implemented on this corridor.



A.3 BALDWIN DRIVE

Corridor ID: 17

Section: Between Maribyrnong Avenue and Ginninderra Drive

Current AM peak bus volumes: 12 bph north bound

Future AM peak bus volumes: 13 bph north bound

Current choke points: Minor congestion at intersection of Baldwin Avenue and Ginninderra Drive.

Future congestion: The CSTM modelling indicates very significant congestion on Baldwin Drive during peak periods in the future.

Possible bus priority interventions:

This corridor is currently used by local routes and carries relatively modest bus volumes. These volumes are not expected to grow much in the future, as such while we considered if a bus jump could be installed on Baldwin Avenue on the south bound approach to Ginninderra Drive (Appendix Figure A-1). However, this would require that one of the two south bound through lanes to be converted into a bus lane, significantly decreasing its capacity. To avoid a reduction in capacity, Baldwin Drive would need to be widened. Given that the volume of buses using this corridor is not very high, we do not think bus priority can be justified.

Precedence level: Low



*Appendix Figure A-1: Considered but not recommended bus jump on
Baldwin Drive at Ginninderra Drive*



A.4 KINGS AVENUE

Corridor ID: 7

Section: Between National Circuit and Parkes Way

Current AM peak bus volumes: 9 bph east bound

Future AM peak bus volumes: 15 bph east bound

Current choke points: Some traffic congestion at peak times.

Future congestion: The CSTM modelling indicates very severe congestion on Kings Avenue in 2031.

Possible bus priority interventions:

Instituting a bus lane on Kings Avenue would require either:

- The Kings Avenue bridge be widened, or
- An existing general traffic lane be converted into a bus lane.

The current and future volumes of buses using Kings Avenue are not large enough to justify the investment required to widen the bridge. Given that no Rapid routes use this section of Kings Avenue, bus volumes are probably not sufficient to justify the repurposing of a general traffic lane.



A.5 FAIRBURN AVENUE

Corridor ID: 10

Section: Majura Parkway and Northcott Drive

Current AM peak bus volumes: 3

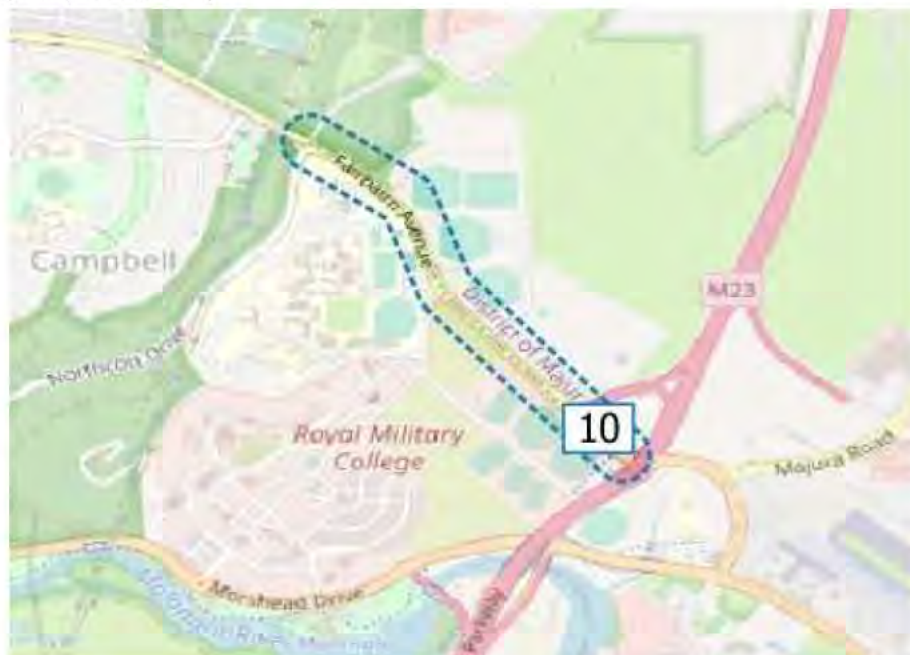
Future AM peak bus volumes: 3

Current choke points: No significant congestion.

Future congestion: The CSTM 2031 modelling indicates high levels of congestion in the future.

Possible bus priority interventions:

The current and future bus volumes on this corridor and not sufficient to justify bus priority.



A.6 GINNINDERRA DRIVE

Corridor ID: 15

Section: Kingsford Smith Drive and Gundaroo Drive

Current AM peak bus volumes: Zero

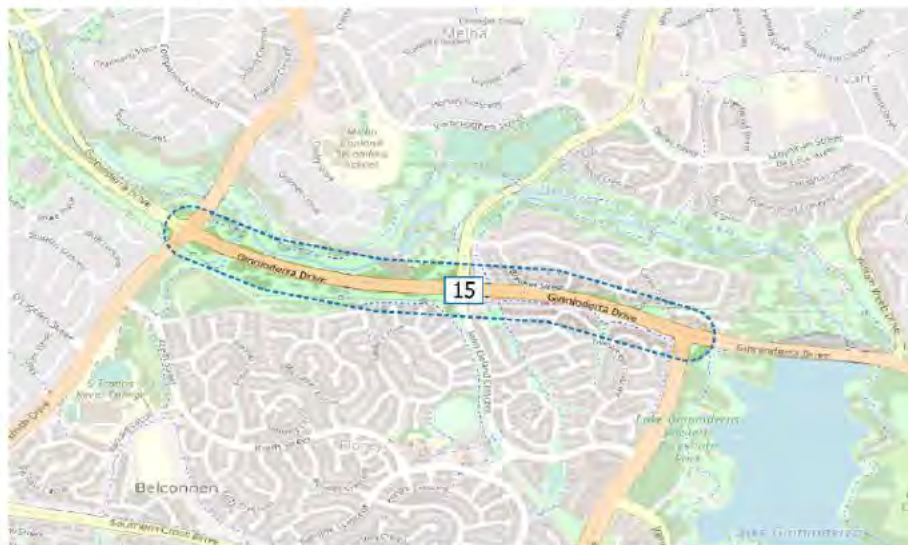
Future AM peak bus volumes: 3 bph

Current choke points: Limited congestion.

Future congestion: The CSTM 2031 modelling indicates significant congestion on Ginninderra Drive during peak times in the future.

Possible bus priority interventions:

Given that no buses currently use this corridor and only three bus per hour *may* use this corridor in the future, we do not recommend any priority treatments for this corridor.



A.7 GUNGALIN DRIVE

Corridor ID: 19

Section: Between Gundaroo Drive and Lexcen Avenue.

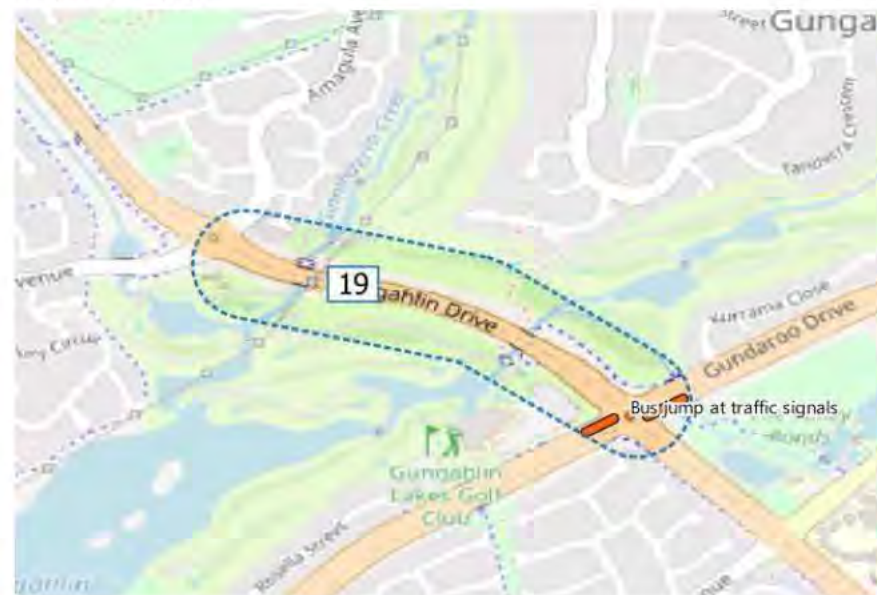
Current AM peak bus volumes: 7 bph in each direction.

Future AM peak bus volumes: 7 bph in each direction.

Current choke points: The southeast bound direction of the Gungahlin Drive corridor sees some significant congestion between Gundaroo Drive and Lexcen Avenue. This is also reported by bus drivers.

Future congestion: The CSTM 2031 modelling indicates significant congestion on Gungahlin Drive in the future.

Possible bus priority interventions: The corridor has a single lane in each direction, as well as two bridges. As such, implementing bus priority on this corridor would likely be impractical and unnecessary given the relatively low volume of buses.



A.8 HORSE PARK DRIVE

Corridor ID: 21

Section: Between Francis Forde Boulevard and Gundaroo Drive.

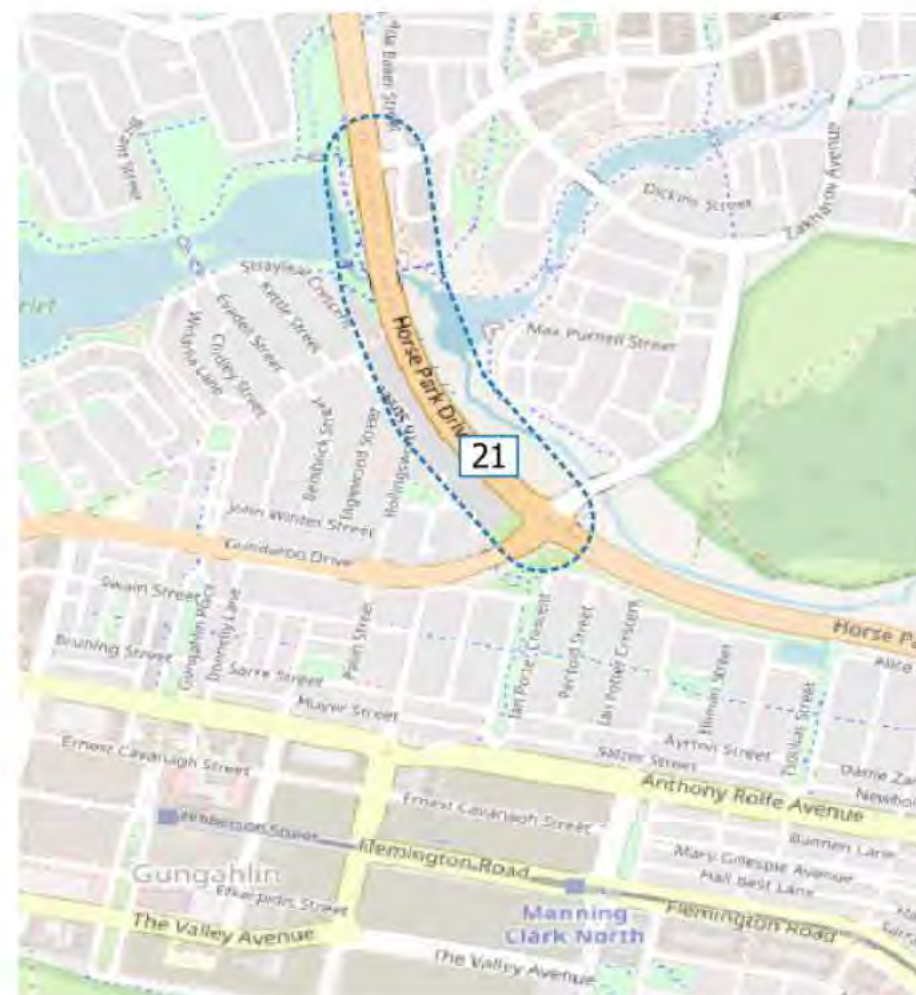
Current AM peak bus volumes: 4 bph in each direction.

Future AM peak bus volumes: 4 bph in each direction.

Current choke points: The south/east bound direction of the Horse Park Drive corridor sees some significant congestion between Francis Forde Boulevard and Gundaroo Drive. This is also reported by bus drivers.

Future congestion: The CSTM 2031 modelling indicates significant congestion along this corridor and extending towards Anthony Rolfe Avenue in the future.

Possible bus priority interventions: There may be an opportunity to provide buses with priority jumps at the Francis Forde Boulevard and Gundaroo Drive intersections. However, given the low volume of buses using this corridor we do not recommend this as a priority.



A.9 GINNINDERRA DRIVE / AIKMAN DRIVE

Corridor ID: 16

Section: Between Gundaroo Drive and University of Canberra Hospital

Current AM peak bus volumes: 10

Future AM peak bus volumes: 12

Current choke points: Some peak period congestion.

Future congestion: The CSTM 2031 modelling indicates very significant congestion on Ginninderra Drive during peak times in the future.

Possible bus priority interventions:

Given that around 10 bph use this corridor, the most appropriate form of priority could be a bus jump at the intersection of Ginninderra Drive and Aikman Drive. However, implementing a bus jump in the eastbound direction on Ginninderra Drive approaching Aikman Drive would require the conversion one of the two through lanes, greatly decreasing the capacity of the intersection. Given the moderate volume of buses (around ten per hour at peak times), we do not think this is justified.

Precedence level: Low



Figure 9-3: Layout of Gininderra Drive eastbound at Aikman Drive



A.10 YAMBA DRIVE

Corridor ID: 24

Section: Between Hindmarsh Drive and Dookie Street.

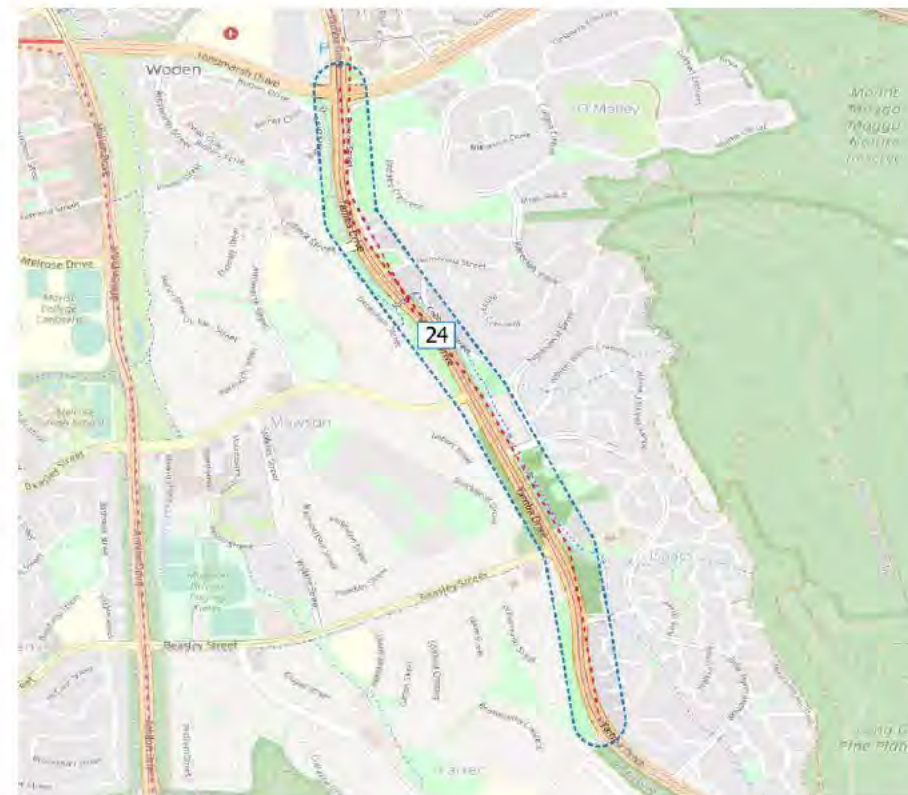
Current AM peak bus volumes: 6 bph in each direction.

Future AM peak bus volumes: 9 bph in each direction.

Current choke points: Yamba Drive sees some significant congestion in the north bound direction during the AM peak. This is reversed in the PM peak.

Future congestion: The CSTM 2031 modelling indicates that there could be significant congestion on Yamba Drive in the future.

Possible bus priority interventions: The signalised intersections along Yamba Drive provide opportunities to install bus jumps to assist buses waiting at the traffic lights to get ahead of traffic. This includes the intersections at Dorsch Street, Beasley Street, Mawson Drive, and Hindmarsh Drive. However, given that the parallel Athllon Drive is slated as the main bus corridor and relatively low volumes of buses use Yamba Drive, we do not recommend additional priority measures.



Appendix B Inventory of current layover infrastructure

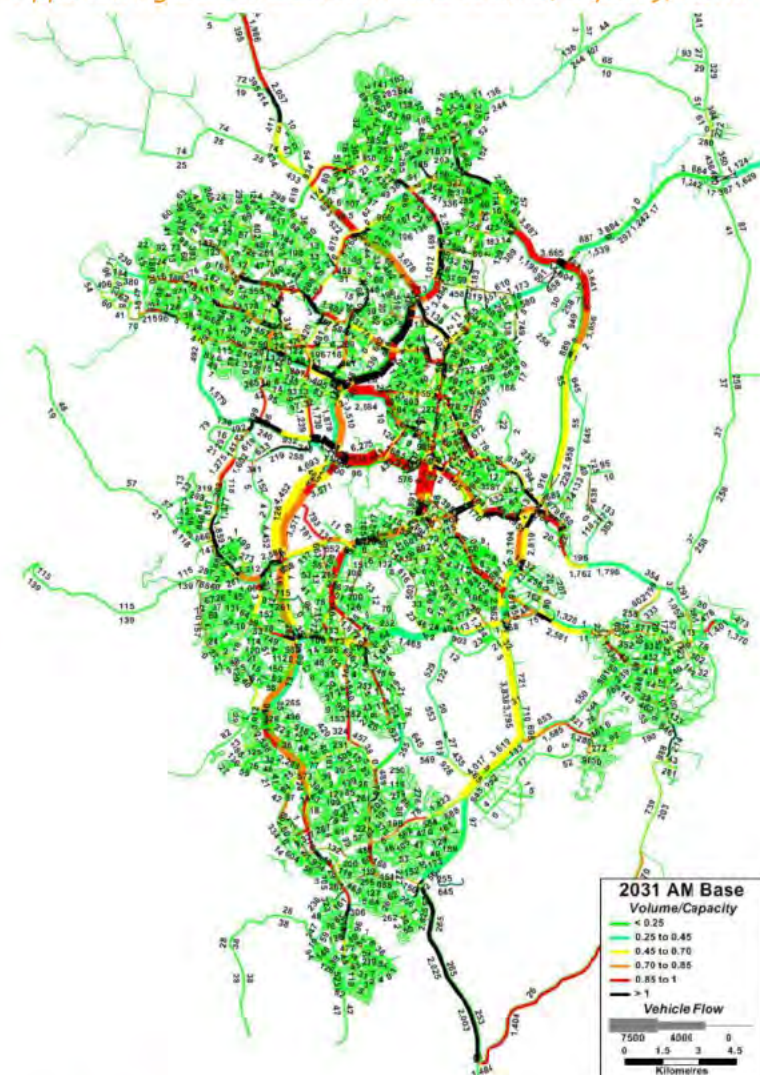
Appendix Table B.1: Inventory of current layover infrastructure (provided by Transport Canberra, 2021)

Facility	Meal	Toilet facility	Notes	Bus Layover Capacity	Current State of Facilities / Upgrades required
Anthony Rolfe Ave Gungahlin	10	x		13	Satisfactory
Valley Avenue	10	x	Temporary location	10	Satisfactory
Spence Terminus		x		5	Old facility, could do with an Upgrade
Fraser West Terminus Shakespeare Cr		x	Temporarily extended to increase capacity to 12	4	Old facility, could do with an Upgrade
Kippax Bus Station Holt				2	Satisfactory
Kippax - On street Hardwick Crescent		x		3	Old facility, could do with an Upgrade
Aikman Drive		x		8	Satisfactory
Belconnen Depot	Not limited	x	Cohen Street parking	4	Satisfactory
City Bus Station Rear of Platform 9			short stay only	1	
City Bus Station Rear of Platform 2			short stay only	0	
London cct				0	Coach Parking
City West	12	x		12 formal	Satisfactory but overloaded with buses
Campbell Park Offices		x		2	Old facility, could do with an Upgrade
Fairbairn Park		x	Shared toilet facility?	2	Satisfactory
Dickson - Cowper Street		x		1	Old facility, could do with an Upgrade
Dickson - Antil Street				2	Satisfactory
Weston Creek Terminus		x		4	
Fyshwick DFO - Tom Price Street Layover		x		4	
Fyshwick Terminus - Lithgow Street		x	Currently not used	2	Old facility, could do with an Upgrade

Facility	Meal	Toilet facility	Notes	Bus Layover Capacity	Current State of Facilities / Upgrades required
Woden Bus Station	15	x		8 Long Stay, 3 Short Stay	
Woden Bus Station Off Bowes Street			Uses Woden bus station facilities	10	
Erindale - Comrie Street Station		x		4	
Tuggeranong Bus Station	4	x	small meal room within Station office	14	
Tuggeranong Depot	Not limited	x		28 Meal	Parking in shed
Box Hill Ave - Lanyon Marketplace		x		4	
Coolman Court Back of Liardet			Uses brierly street toilet	2	
Coolman Court front Brierly Street		x		2	Old facility, Could do with an Upgrade
Watson - Aspinall Street Terminus		x		2	Old facility, Could do with an Upgrade
Narrabundah Terminus		x		4	Old facility, Could do with an Upgrade

Appendix C Canberra Strategic Transport Model congestion output

Appendix Figure C-1: 2031 AM traffic volume / capacity, CSTM



Source: 2016 CSTM Recalibration Future Base Model Outputs and Observations

Appendix D Assumed bus frequencies

Appendix Table D-1: Assumed AM peak frequencies

Route and direction	2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
2_Inbound	6	8	8	10	10	zero	zero
2_Outbound	6	8	8	10	10	zero	zero
3_Inbound	4	4	4	zero	zero	zero	zero
3_Outbound	4	4	4	zero	zero	zero	zero
4_Inbound	10	10	6	zero	zero	zero	zero
4_Outbound	12	12	6	zero	zero	zero	zero
5_Inbound	6	6	6	6	6	6	6
5_Outbound	7	7	6	6	6	6	6
6_Inbound	5	8	8	8	8	8	8
6_Outbound	4	8	8	8	8	8	8
7_Inbound	4	6	6	6	6	6	6
7_Outbound	4	6	6	6	6	6	6
8_Inbound	4	4	4	4	6	6	6
8_Outbound	4	4	4	4	6	6	6
9_Inbound	5	5	5	5	5	5	6
9_Outbound	4	4	4	4	4	4	6
10_Inbound	4	4	6	6	8	8	10
10_Outbound	4	4	6	6	8	8	10
NEW R11_Inbound	-	-	3	4	4	4	4
NEW R11_Outbound	-	-	3	4	4	4	4

	2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
Route and direction							
NEW R2 southern_Inbound	-	-	-	8	zero	zero	zero
NEW R2 southern_Outbound	-	-	-	8	zero	zero	zero
NEW R4 southern_Inbound	-	-	8	8	8	8	zero
NEW R4 southern_Outbound	-	-	4	4	4	4	zero
Locals							
18_Inbound	2	2	2	3	3	3	3
18_Outbound	2	2	2	3	3	3	3
19_Counter-clockwise	3	3	3	3	3	3	3
20_Clockwise	4	4	4	4	4	4	4
21_Counter-clockwise	3	3	3	3	3	3	3
22_Clockwise	3	3	3	3	3	3	3
23_Inbound	3	3	3	3	3	3	3
23_Outbound	3	3	3	3	3	3	3
24_Inbound	3	3	3	3	3	3	3
24_Outbound	3	3	3	3	3	3	3
25_Counter-clockwise	3	3	3	3	3	3	3
26_Clockwise	4	4	4	4	4	4	4
27_Inbound	3	3	3	3	3	3	3
27_Outbound	3	3	3	3	3	3	3
28_Inbound	3	3	3	3	3	3	3
28_Outbound	3	3	3	3	3	3	3
30_Inbound	4	4	4	4	4	4	4
30_Outbound	3	3	3	3	3	3	3

	2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
Route and direction							
31_Inbound	5	5	5	5	5	5	6
31_Outbound	3	3	3	4	4	4	6
32_Inbound	5	5	5	5	5	5	6
32_Outbound	3	3	3	4	4	4	6
40_Inbound	3	3	3	3	3	3	3
40_Outbound	2	2	2	3	3	3	3
41_Inbound	3	3	3	3	3	3	3
41_Outbound	2	2	2	3	3	3	3
42_Inbound	2	2	2	3	3	3	3
42_Outbound	2	2	2	3	3	3	3
43_Inbound	3	3	3	3	3	3	3
43_Outbound	2	2	2	3	3	3	3
44_Inbound	4	4	4	4	4	4	4
44_Outbound	2	2	2	3	3	3	3
45_Inbound	3	3	3	3	3	3	3
45_Outbound	2	2	2	3	3	3	3
50_Inbound	3	3	3	4	4	4	6
50_Outbound	3	3	3	4	4	4	6
51_Inbound	3	3	3	4	4	4	6
51_Outbound	3	3	3	4	4	4	6
53_Inbound	4	4	4	4	4	4	6
53_Outbound	3	3	3	4	4	4	6
54_Counterclockwise	3	3	3	3	3	3	3

	2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
Route and direction							
55_Counter-clockwise	3	3	3	3	3	3	3
56_Inbound	3	3	3	4	4	4	6
56_Outbound	3	3	3	4	4	4	6
57_Inbound	3	3	3	4	4	4	6
57_Outbound	3	3	3	4	4	4	6
58_Inbound	3	3	3	4	4	4	6
58_Outbound	3	3	3	4	4	4	6
59_Inbound	4	4	4	4	4	4	6
59_Outbound	4	4	4	4	4	4	6
60_Clockwise	2	2	2	3	3	3	3
61_Counter-clockwise	2	2	2	3	3	3	3
62_Outbound	3	3	3	3	3	3	3
63_Inbound	3	3	3	3	3	3	3
63_Outbound	3	3	3	3	3	3	3
64_Inbound	3	3	3	3	3	3	3
64_Outbound	2	2	2	3	3	3	3
65_Inbound	4	4	4	4	4	4	4
65_Outbound	3	3	3	3	3	3	3
66_Inbound	4	3	3	3	3	3	3
66_Outbound	3	4	4	4	4	4	4
70_Inbound	3	3	3	3	3	3	3
70_Outbound	3	3	3	3	3	3	3
71_Inbound	3	3	3	3	3	3	3

	2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
Route and direction							
71_Outbound	2	2	2	3	3	3	3
72_Inbound	2	2	2	3	3	3	3
72_Outbound	2	2	2	3	3	3	3
73_Inbound	2	2	2	3	3	3	3
73_Outbound	2	2	2	3	3	3	3
74_Counterclockwise	2	2	zero	zero	zero	zero	zero
75_Counterclockwise	2	2	zero	zero	zero	zero	zero
76_Inbound	2	2	2	3	3	3	3
76_Outbound	2	2	2	3	3	3	3
77_Inbound	2	2	2	3	3	3	3
77_Outbound	1	1	1	3	3	3	3
78_Outbound	3	3	zero	zero	zero	zero	zero
79_Inbound	3	3	zero	zero	zero	zero	zero
79_Outbound	3	3	zero	zero	zero	zero	zero
80_Inbound	3	3	3	3	3	3	3
80_Outbound	3	3	3	3	3	3	3
81_Inbound	3	3	3	3	3	3	3
81_Outbound	3	3	3	3	3	3	3
180_Inbound	2	2	2	3	3	3	3
181_Inbound	2	2	2	3	3	3	3
182_Inbound	2	2	2	3	3	3	3
902_Counterclockwise	1	1	1	3	3	3	3
903_Clockwise	4	4	zero	zero	zero	zero	zero

	2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
Route and direction							
NEW Woden-Fyshwick local_Inbound	-	3	3	3	3	3	3
NEW Woden-Fyshwick local_Outbound	-	3	3	3	3	3	3
NEW Denman-Woden local_Inbound	-	3	3	3	3	3	3
NEW Denman-Woden local_Outbound	-	3	3	3	3	3	3
NEW Denman-Belconnen local (via Whitlam)_Inbound	-	3	3	3	3	3	3
NEW Denman-Belconnen local (via Whitlam)_Outbound	-	3	3	3	3	3	3
NEW 74_Inbound	-	-	3	3	3	3	3
NEW 74_Outbound	-	-	3	3	3	3	3
NEW 75_Inbound	-	-	3	3	3	3	3
NEW 75_Outbound	-	-	3	3	3	3	3
NEW 78_Inbound	-	-	3	3	3	3	3
NEW 78_Outbound	-	-	3	3	3	3	3
NEW Fraser West-Belconnen local_Inbound	-	-	3	3	3	3	3
NEW Fraser West-Belconnen local_Outbound	-	-	3	3	3	3	3
NEW 903_Inbound	-	-	3	3	3	3	3
NEW 903_Outbound	-	-	3	3	3	3	3
NEW Ginninderry-Belconnen local (via Ginninderra Drive)_Inbound	-	-	3	3	3	3	3
NEW Ginninderry-Belconnen local (via Ginninderra Drive)_Outbound	-	-	3	3	3	3	3
NEW Denman-Belconnen local (via Stage 3)_Inbound	-	-	3	3	3	3	3
NEW Denman-Belconnen local (via Stage 3)_Outbound	-	-	3	3	3	3	3
NEW Spence-Belconnen local_Inbound	-	-	-	4	4	4	4
NEW Spence-Belconnen local_Outbound	-	-	-	4	4	4	4
NEW Ginninderry-Kippax frequent local (R2 replacement)_Inbound	-	-	-	-	-	6	6

Route and direction

NEW Ginninderry-Kippax frequent local (R2 replacement)_Outbound

2021	H1 - 2026 (Comm Pk LR)	H2 - 2031 (Woden LR)	H3 - 2036 (Belco- Airport LR)	H4 - 2036 (Fyshwick LR)	H5 - 2041 (Kippax LR)	H6 - 2041 (Tuggeranong) LR
-	-	-	-	-	-	6
						6

Appendix E Proposed minor stop infrastructure

Appendix Table E-1: Stops at which shelters are proposed

Stop	Description	Latitude	Longitude	Street	Notes	Average weekday boardings (November 2019)
1600	Trinity Christian School McBryde Cr	-35.4075	149.0868	MCBRYDE CR	In a school	134
1608	St Clares College McMillan Cr SSO	-35.3232	149.1462	MCMILLAN CR		100
1609	St Edmunds College McMillan Cr SSO	-35.3232	149.146	MCMILLAN CR		252
1613	Marist College School Grounds SSO	-35.3601	149.0882	PRIVATE RD	In a school	350
1614	Melrose HS Marr St SSO	-35.3633	149.0883	MARR ST		113
2264	Gilmore Cr opp Garran PS	-35.344	149.1014	GILMORE CR		61
2555	St Francis Xavier College Barnard Cct SSO	-35.2247	149.0418	BARNARD CCT		258
2558	Daramalan College Cowper St	-35.2526	149.1394	COWPER ST		121
2569	Melba HS School Grounds SSO	-35.2139	149.0491	PRIVATE RD	In a school	86
2571	Narrabundah College Jerrabomberra Av	-35.3359	149.1479	JERRABOMBERRA AV		83
2580	Telopea Park School New South Wales Cr SSO	-35.3151	149.1338	NEW SOUTH WALES CR		72
2581	Brindabella Christian College Brigalow St	-35.2493	149.1274	BRIGALOW ST		95
2688	Athllon Dr after Parramatta St	-35.354	149.0913	ATHLLON DR		77
3356	Legislative Assembly London Cct	-35.2813	149.1315	LONDON CCT		650
4003	Canberra HS Bowman St SSO	-35.2517	149.0721	BOWMAN ST		218
4797	Campbell HS Treloar Cr SSO	-35.2789	149.1477	TRELOAR CR		146

Stop	Description	Latitude	Longitude	Street	Notes	Average weekday boardings (November 2019)
4814	Gold Creek HS Kelleway Av	-35.1803	149.0932	KELLEWAY AV		79
4860	Hardwick Cr before Flack St	-35.2243	149.0205	HARDWICK CR		55
5083	The Valley Av opp Burgmann School Valley Campus	-35.1869	149.1241	THE VALLEY AV		108
5084	Burgmann Anglican School Valley Campus	-35.1878	149.1233	THE VALLEY AV		72
5105	Mt Stromlo HS School Grounds SSO	-35.355	149.0544	PRIVATE RD	In a school	111
5107	Merici College Wise St SSO	-35.2675	149.1364	WISE ST		63
5122	MacKillop College School Grounds SSO	-35.4254	149.0932	PRIVATE RD	In a school	85
5128	Alfred Deakin High School Grounds SSO	-35.3241	149.0935	ALFRED DEAKIN HIGH SCHOOL GROUNDS	In a school	303
5132	Belconnen HS School Grounds SSO	-35.2469	149.0398	PRIVATE RD	In a school	76
5182	John Paul College School Grounds SSO	-35.1771	149.1003	JOHN PAUL COLLEGE DRIVEWAY	In a school	168
5901	Burdekin Av opp Amaroo School	-35.1657	149.1268	BURDEKIN AV		51
6165	Burgmann Anglican School Forde Campus	-35.1708	149.1438	FRANCIS FORDE BVD		131
6175	Amaroo Shops Katherine Av	-35.1651	149.1307	KATHERINE AV		58
8888	Regatta Point Commonwealth Av	-35.2884	149.1278	COMMONWEALTH AV		75
9001	Telopea Park School New South Wales Cr SSO	-35.3142	149.1332	NEW SOUTH WALES CR		79

Appendix Table E-2: Stops at which benches are proposed

Stop	Description	Latitude	Longitude	Street	Notes	Average weekday boardings (November 2019)
1620	St Anthony's PS School Grounds SSO	-35.3942	149.0805	LOCAL RD	In a school	26
2018	Curtin Shops Carruthers St	-35.325	149.083	CARRUTHERS ST		36
2220	Canberra Girls Grammar Senior School Gawler Cr	-35.3172	149.1133	GAWLER CR	No footpath	37
2564	St John the Apostle PS Barnard Cct SSO	-35.2249	149.0418	BARNARD CCT		47
2577	St Matthews PS Stutchbury St SSO	-35.2399	149.0425	STUTCHBURY ST		29
2591	Namatjira Dr after Parkinson St	-35.3431	149.0574	NAMATJIRA DR		26
2647	Namatjira Dr before Badimara St	-35.3534	149.0526	NAMATJIRA DR		40
3008	Constitution Av opp Anzac Park East	-35.2903	149.1429	CONSTITUTION AV		40
4830	Holy Spirit PS Kelleway Av	-35.1806	149.1015	KELLEWAY AV		27
5028	Southern Cross Dr after 1st Ratcliffe St	-35.232	149.0498	SOUTHERN CROSS DR		40
5104	Orana Steiner School Hickey Ct SSO	-35.3276	149.0595	HICKEY CT		45
6000	Amaroo School Burdekin Av	-35.1656	149.1274	BURDEKIN AV		37
6154	Katherine Av opp Amaroo Shops	-35.1645	149.1306	KATHERINE AV		46
6158	Nullarbor Av after Flemington Rd	-35.2009	149.1486	NULLARBOR AV		49
6330	Bonner Shops Mabo Bvd	-35.1613	149.1396	MABO BVD	Poorly connected to footpath	25



Member of the Surbana Jurong Group



SMEC INTERNAL REF. 30021237

Technical Report

ACT Multimodal Network Plan

Client Reference No. 30639-NCT-110

Prepared for: Transport Canberra and City Services

2 August 2024

Through our specialist expertise, we deliver advanced infrastructure solutions for our clients and partners.

Leveraging our 70-year history of delivering nation-building infrastructure, we provide technical expertise and advanced engineering services to resolve complex challenges.

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Executive Summary

Canberra's transport network is integral in connecting its people and places, facilitating over a million trips a day. This network includes many different modes of transport, enabling residents living in the capital and in the wider Canberra region to access jobs and services, as well as supporting a range of commercial activities that keeps the city moving.

Historically, planning and investment in Canberra's transport network has focused on road expansion to support urban growth. The *ACT Transport Strategy* is clear that this will no longer meet strategic objectives or capacity needs, with a rebalance needed towards public transport, walking, and cycling to encourage more sustainable travel. While its strategic objectives are clear, the ACT Government has several historic and emerging challenges with planning that are impacting the implementation of the strategy, such as:

- Network planning traditionally focussing on planning for individual modes, rather than planning a single transport network and coordinating planning activities across all modes.
- Siloed governance structure with no internal processes within the ACT Government to ensure that internal teams are working towards common strategy objectives. This is related to a limited "line of sight" between the *ACT Transport Strategy* and infrastructure projects and policy initiatives, which means it is unclear how strategic objectives will be translated into tangible actions.
- The impact of the global COVID-19 pandemic, with changed patterns of travel and transit patronage still returning to pre-pandemic levels.
- A need to incorporate scenario planning into the ACT Government's processes to help account for the inherent uncertainty with planning for the future.

Investment in single modal solutions in isolation will no longer meet the strategic objectives or capacity needs of the ACT, and a robust approach is needed to prioritise projects in a holistic manner that addresses all modes. As a result, the ACT Government has commissioned SMEC to develop the *ACT Multimodal Network Plan* to provide the next level of detail to enable the objectives of the *Transport Strategy* to be achieved. The primary purpose of the MNP is to identify the foundational infrastructure provision for 2045 to meet the ACT's Vision for the transport network, prioritise this infrastructure and then identify and prioritise key corridors and areas for more detailed planning, such as *Corridor Studies* or *Area Network Plans*.

The development of the MNP has adopted a 'vision and validate' approach, instead of the historical 'predict and provide', and aligns with both ATAP's guidance on multimodal network planning and the recently adopted *ACT Movement and Place Framework*. Key components in the development of the MNP are summarised below:

- Establish the Vision for the ACT network by 2045 and objectives in line with the *Transport Strategy*.
- Develop Network Performance Indicators for the MNP by considering existing targets and performance measures for the ACT Government.
- Determine the strategic transport corridors and key areas that comprise the 'Strategic Transport Network' for consideration as part of the MNP.
- Establish Movement and Place typologies and Modal Priorities on this strategic network to assist with subsequent project development.
- Assess the capacity of the existing transport network to accommodate forecast growth along with an assessment of the multimodal deficiencies in the short- to medium-term.



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Glossary of Terms

Area Transport Plans	Identifies the multimodal transport problems throughout key areas and the potential initiatives and priorities to address those problems
Corridor Transport Plans	Identifies the multimodal transport problems throughout key corridors and the potential initiatives and priorities to address those problems
Foundational infrastructure	Initiatives such as duplication, grade separation, bus lanes, light rail extension, and trunk path connections as opposed to localised upgrades, such as signalisation of an intersection or off-road shared path upgrades outside of the Principal Cycle Network
Modal deficiency	Performance of an individual mode using a transport corridor
Modal hierarchy	Hierarchy of importance within each mode, for example differentiating between Rapid and Local services for Public Transport or Principal and Main Cycle Routes for Cycling
Modal priority	Relative importance of each mode along a transport corridor, with space to be allocated first to the modes which it primarily design to serve
Movement and Place	Approach to ensure competing transport (or movement) and place needs and opportunities are balanced at a corridor or area level
Multimodal deficiency	Performance of all modes using a transport corridor combined through a composite score
Predict and Provide	Approach to transport policy that passively addresses forecast travel demands based on current and historical conditions
Rapid transit	Public transport routes that are concentrated on high demand corridors with a high frequency of service and priority infrastructure, including both rapid bus services and light rail
Scenario Planning	Exercise to help in contemplating how future travel behaviours may change to make sense of uncertainty when planning transport networks
Strategic Transport Network	The strategic transport corridors and key areas that have been identified that will have a significant impact on network performance and travel behaviours
Vision and Validate	Approach to transport policy that actively shapes the patterns of demand to meet a set of desired high-level outcomes

1. Introduction

Canberra's transport network is integral in connecting its people and places, facilitating over a million trips a day. This network includes many different modes of travel, enabling residents living in the capital and in the wider Canberra region to access jobs and services, as well as supporting a range of commercial activities that keeps the city moving.

The *ACT Transport Strategy 2020* (the 'Transport Strategy') sets out the Australian Capital Territory (ACT) Government's approach to achieving a world class transport system that supports a compact, sustainable, and vibrant city. While the *Transport Strategy* provides a framework for planning and investment in transport for the next 20 years, it also identifies the need to refocus network planning and design to increase city building efforts by better integrating transport and land use. As a result, the ACT Government has commissioned SMEC to develop the *ACT Multimodal Network Plan* (MNP).

The MNP is intended to define the future transport network form and function required to support sustainable growth. This report summarises the development of the MNP and provides recommendations on how the ACT Government can implement its principles into day-to-day planning and design.

1.1 Project Background

The *Transport Strategy* was developed to consider the significant growth in Canberra over recent years and the planned future growth through to 2045. This includes dramatic population growth and a greater emphasis on urban infill within Canberra's inner precincts. The *Transport Strategy* has been developed alongside the *ACT Planning Strategy 2018* (the 'Planning Strategy') and *Climate Change Strategy 2019-2025* (the 'Climate Change Strategy') so that the partnership between transport and land use is optimised.

There are, however, several historic and emerging challenges with network planning for the ACT Government, such as:

- Network planning traditionally focussing on planning for individual modes, rather than planning a single transport network and coordinating planning activities across all modes.
- Siloed governance structure with no internal processes within the ACT Government to ensure that internal teams are working towards common strategy objectives. This is related to a limited "line of sight" between the *Transport Strategy* and infrastructure projects and policy initiatives, which means it is unclear how strategic objectives will be translated into tangible actions.
- The impact of the global COVID-19 pandemic, with changed patterns of travel and transit patronage still returning to pre-pandemic levels.
- A need to incorporate scenario planning into the ACT Government's processes to help account for the inherent uncertainty with planning for the future.

Investment in single modal solutions in isolation will no longer meet the strategic objectives or capacity needs of the ACT, and a robust approach is needed to prioritise projects in a holistic manner that addresses all modes. There is also an opportunity to move away from a 'predict and provide' attitude towards the provision of transport infrastructure in favour of a 'vision and validate' philosophy that could encourage different investment strategies to support the strategies laid out by the ACT Government.

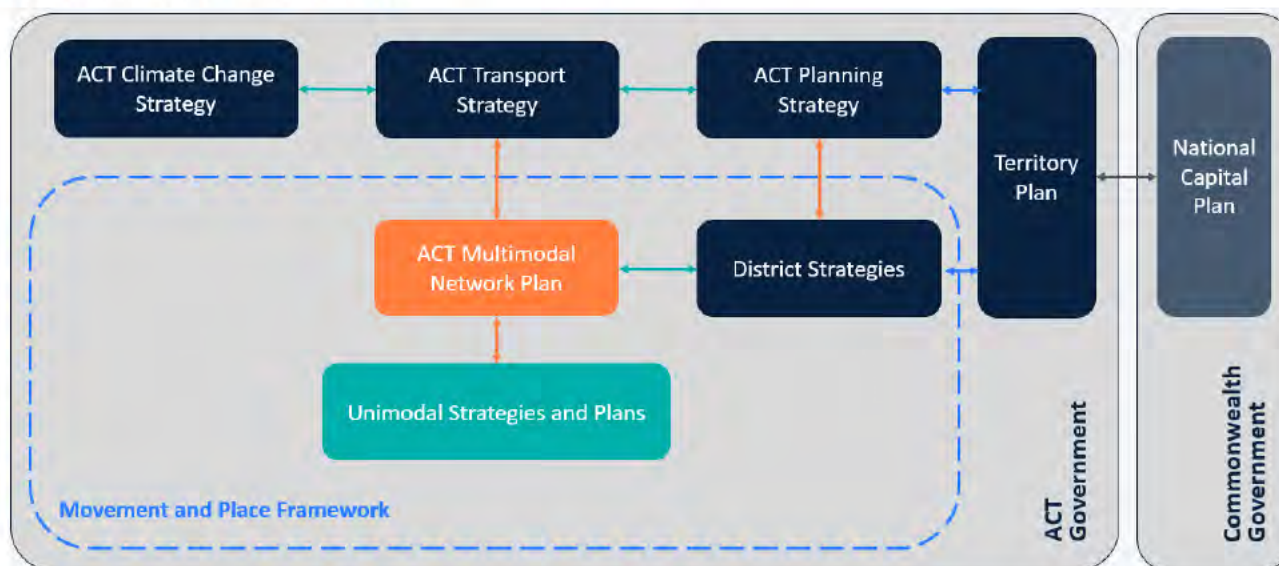
1.2 Purpose of the Multimodal Network Plan

Given the ACT's historic and emerging challenges with network planning, the primary purpose of the MNP is to:

- Identify the foundational infrastructure provision requirements to 2045 to meet the ACT's Vision for the transport network
- Prioritise this foundational infrastructure provision for a range of modes
- Identify and prioritise key corridors and areas for more detailed planning, such as *Corridor Transport Plans* or *Area Transport Plans*.

The MNP will also assist in increasing awareness of multimodal network planning best practice throughout the ACT, along with integrating ‘movement’ and ‘place’ principles into the strategic transport network. The proposed fit of the MNP within the ACT’s policy framework is illustrated in **Figure 1-1**.

Figure 1-1: Proposed Fit for Multimodal Network Plan

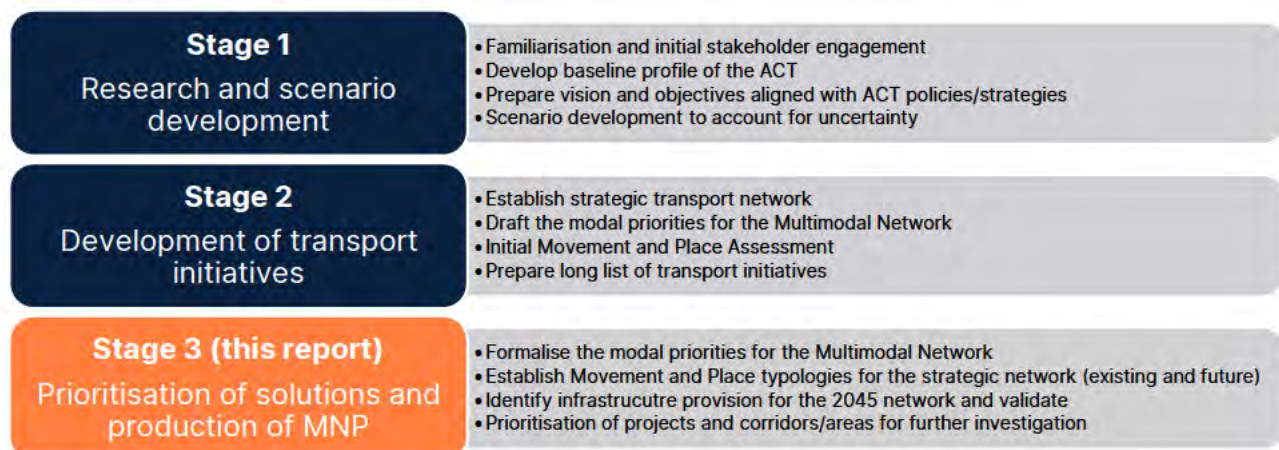


This figure illustrates how the MNP will be integrated within the planning framework, aligning with key strategy documents and the statutory plans for the ACT in the *Territory Plan* and the *National Capital Plan*. It is proposed that the MNP will co-exist with other unimodal strategies and plans (e.g. the *Active Travel Plan*), and will also provide the foundation for more detailed corridor and area transport plans, as recommended by Australian Transport Assessment and Planning (ATAP). Further details about the proposed interface with these more detailed planning documents is provided in Section 9.

1.3 Study Methodology and Scope

The development of the MNP has included three stages (**Figure 1-2**), adopting a ‘vision and validate’ approach instead of the historical ‘predict and provide’. This approach incorporates the interwoven modal elements in supporting desired transport and land use outcomes, recognising that the system needs to be coordinated in order to optimise performance, as opposed to focussing on individual corridors, links, nodes, or modes in isolation.

Figure 1-2: Study Methodology (Stages and Key Tasks)



A literature review has been undertaken to confirm the MNP is being developed in line with best practice. National and international guidance has been analysed along with other examples of multimodal network plans to identify any gaps in the proposed methodology. This review has identified a wide range of approaches that are being adopted throughout the world, with the methodology to develop the MNP sharing many common themes, such as adopting a Movement and Place approach, incorporating scenario planning, and establishing modal priority.

The study methodology has been developed in line with ATAP guidelines, which recommends the following four steps in multimodal network planning:

1. Determine multimodal network objectives, performance indicators and targets
2. Define the multimodal transport networks and their functions
3. Develop multimodal network strategies to achieve system objectives and performance targets. These should take into account the analysis contained in network assessments and any government policy settings
4. Determine affordable, multimodal intervention benchmarks (or standards) for infrastructure investment, ensuring that the benchmarks are consistent with system objectives and strategies (optional step).

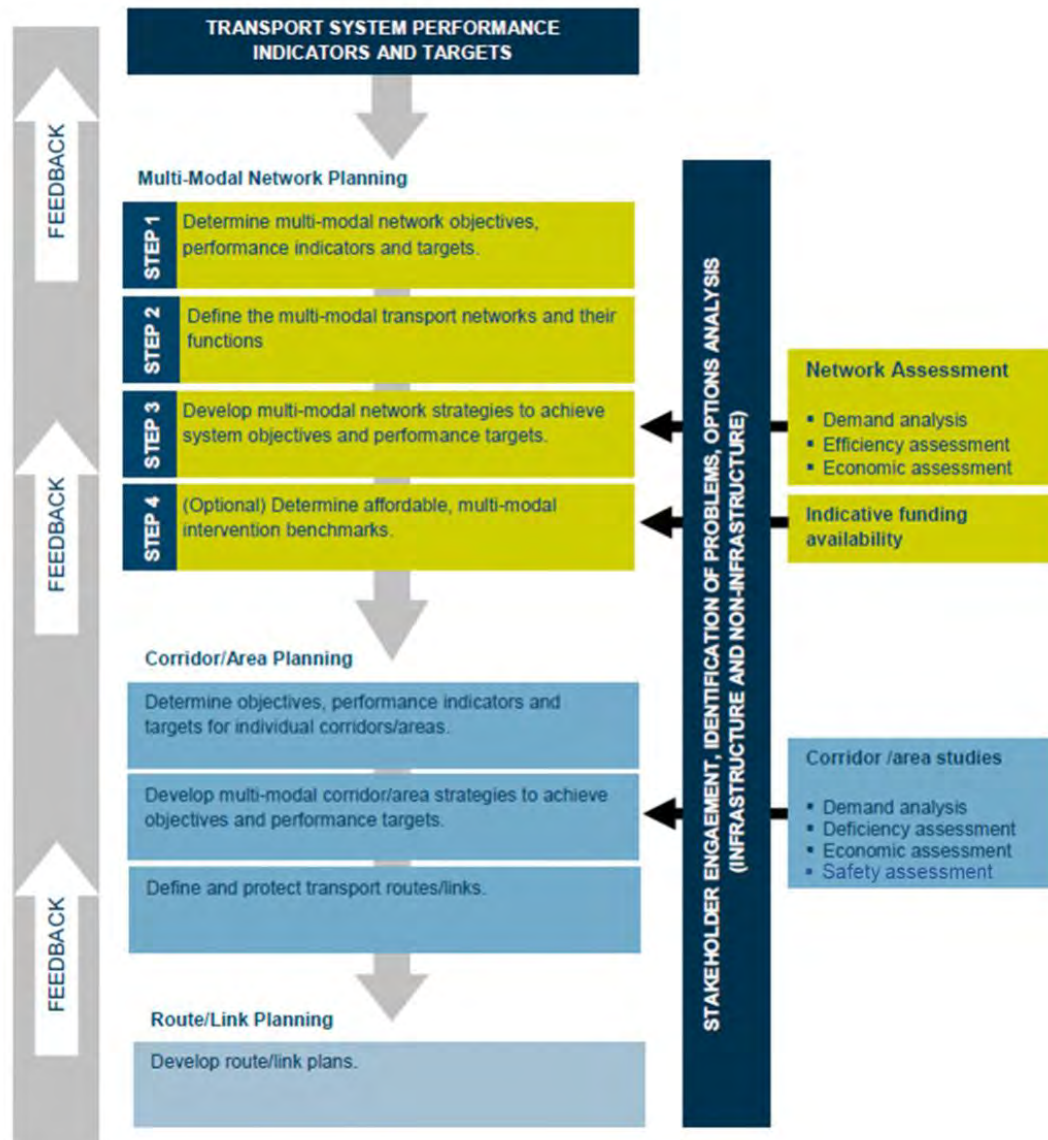
Figure 1-3 shows how this process can link network planning to corridor and area planning, and route and link planning, highlighting the iterative nature of the process, and the need for feedback loops in the on-going development of the MNP. While many of these steps have been followed by the ACT Government in the development of the *Transport Strategy*, the strategy does not provide the next level of detail in terms of performance indicators and targets for the network, which is a key purpose of the MNP.

In line with ATAP's recommendations, the MNP also identifies corridors and areas for more detailed analysis as part of *Corridor Transport Plans* and *Area Transport Plans* (refer Section 7.1 for further details). It is noted that corridor plans are already being developed by the ACT Government, such as the *Parkes Way and South West Corridor studies*, which will provide important feedback loops in the on-going development of the MNP.

Due to its strategic nature, there are limitations on what the MNP will be able to achieve. It is important to note that the MNP will not:

- Include detailed design or economic appraisals for foundational transport infrastructure
- Replace detailed operational planning or remove the need for further detailed planning
- Solve all modal conflicts, particularly at a local level
- Develop new policy for each transport mode, for example light rail warrants or parking minimums.

Figure 1-3: Flowchart of System Planning



Source: ATAP

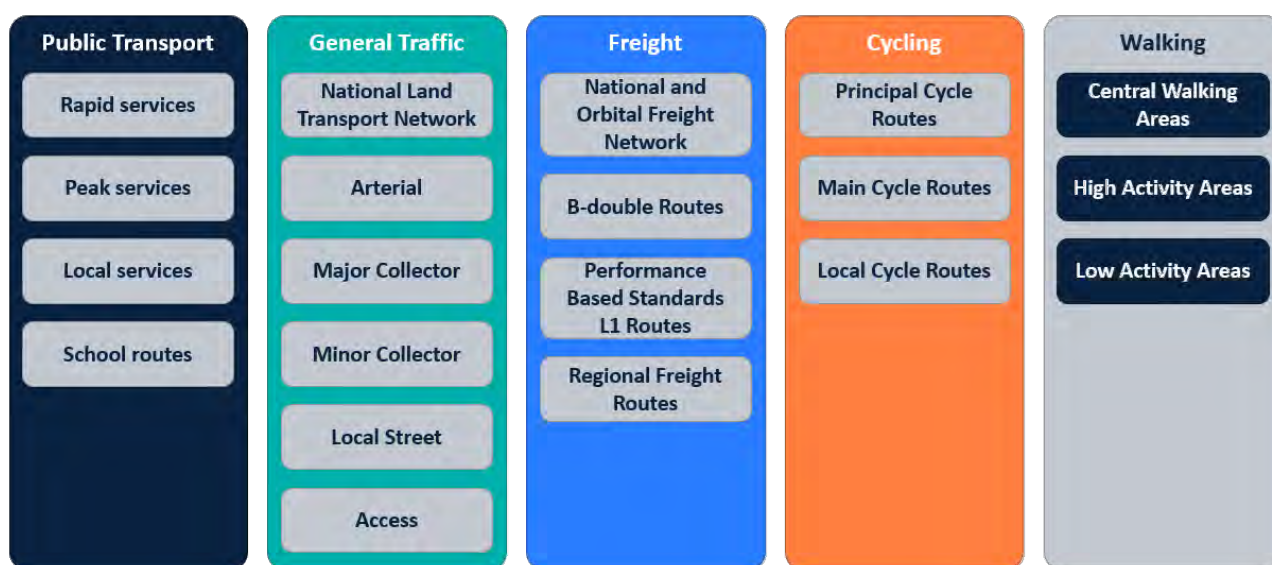


2. Setting the Scene

2.1 Challenges with Unimodal Planning

Network planning throughout Australia has historically focused on planning for individual modes of travel, with an emphasis on the road network to make it easier for people to drive their cars and other private vehicles such as vans and trucks. Over the past twenty years there has been a shift in transport planning as communities began to realise the inequitable and undesirable consequences of focusing only on cars and increasing road capacity to deal with congestion, with an increasing emphasis on other modes such as walking, cycling and public transport. This has led to the development of separate networks for each mode, typically with a dedicated hierarchy for each mode. This is the case for the ACT, with the current hierarchies for each mode shown in **Figure 2-1**.

Figure 2-1: ACT Modal Hierarchies



While these modal networks are a positive step in encouraging more sustainable travel, they are often developed in isolation or with limited coordination with other modes. This can lead to gaps in planning (such as the walking network not connecting well to a public transport hub) or conflicts (such as cycling routes conflicting with a busy freight route) that reduce efficiency of all modes.

There is also no mechanism to compare the relative importance of these different hierarchies between modes, which can make it difficult to identify which modes to emphasise in the design of a corridor or given a constrained funding environment. These challenges have led to both ATAP and Austroads recommending that modal planning should be replaced or preceded by integrated multimodal network planning.

2.2 Strategic Targets

The *Transport Strategy* recognises the need for multimodal planning, highlighting that “investment in single modal solutions in isolation, will no longer meet our strategic objectives or capacity needs.” This strategic direction is stated in the *Transport Strategy* and other supporting policies and strategies developed by the ACT Government, with the following strategic targets established:

- Net Zero Emissions:** With Canberra already using 100 per cent renewable electricity, transport is now the ACT’s largest source of greenhouse gas emissions and is the priority for emissions action¹. The ACT Government is committed to net zero emissions by 2045, and to achieve this have set targets to reduce emissions (from 1990 levels) by 40% by 2020, 50-60% by 2025, 65-75% by 2030 and 90-95% by 2040². The government is currently focussing on achieving a zero-emission public transport system by 2040³, as well as seeking to reduce the

¹ ACT Zero Emissions Vehicles Strategy 2022-30.

² ACT Climate Change Strategy 2019-2025, 2019. Environment, Planning and Sustainable Development Directorate, ACT Government.

³ Zero-Emission Transition Plan for Transport Canberra, 2020. Transport Canberra and City Services Directorate, ACT Government.

emissions produced by the car fleet by transitioning to 80-90% new light vehicle sales being zero emission vehicles by 2030¹.

- **Vision Zero:** the ACT Government is committed to Vision Zero⁴, which means no deaths or serious injuries on the transport network. Vision Zero acknowledges that deaths and serious injuries on the road network are preventable and is the central philosophy guiding the approach to road safety. Through continued investment in safety initiatives, there has been a downward trend in fatalities on the ACT road network since 1998. While this progress is encouraging, continued investment in evidence-based road safety engineering measures, road safety policy and education and road transport technology is needed to achieve the goal of Vision Zero, especially considering the recent increase in fatalities post-COVID and forecast population growth to 2045.
- **30-Minute City:** as outlined in the *2016: Canberra: A Statement of Ambition* (2016), there is an aspiration for Canberra to offer access to daily needs such as jobs and services generally within 30 minutes of people's homes. This is also a key theme in the *Transport Strategy* and reflects the vision of a compact, sustainable, and vibrant city. However, it is important that this access is available across multiple modes – not just by private vehicle – to achieve sustainable outcomes. For example, analysis of the existing network has shown that most residents in the ACT cannot access the City Centre within 30 minutes by using the public transport network when including walk time from peoples' homes to public transport stops and the average wait time for services (see Section 6.2). There is a clear need for competitive journey times from public transport to shift residents from using their car or other private vehicle.
- **Mode Share:** the private vehicle is the dominant mode of transport in the ACT, accounting for nearly 75% of all trip purposes in the 2022 Household Travel Survey. The 2022 survey shows that Canberrans tend to walk and cycle more in inner districts where distances to destinations are shorter and travel choice is greater. Private vehicle travel is more prevalent in outer districts when distances are longer and travel choices can be more limited. There is a need for Canberra to grow in the compact urban form envisioned by the *Planning Strategy* for walking, cycling and public transport to become the natural choice for more Canberrans.

These strategic targets have been the basis for developing network performance indicators for the MNP, with further details provided in Section 4.3. These targets are particularly important considering the future growth envisioned for the Territory by 2045.

2.3 Future Growth in the ACT

The ACT has a strong, growing economy and increasing population, with ambitions to be one of the world's most liveable and competitive cities. To achieve this goal, there is a clear need for sustainable transport options that move people, goods, and services around the ACT to prevent gridlock, enhance air quality and make it safer to walk and cycle around local neighbourhoods.

Forecasts produced by the ACT Government indicate that the population of the ACT will increase from 454,000 in 2021 to 540,000 in 2031, 620,000 in 2041 and 704,000 in 2051, representing a 19%, 37% and 55% cumulative increase, respectively⁵. **Figure 2-2** spatially shows the forecast population change from 2021 to 2031 and 2021 to 2041, with this growth expected to compound the challenge of achieving net zero emissions and Vision Zero due to more trips of all types (work, education, leisure etc.). This will likely result in an increase in transport emissions and crashes unless there is a significant change in the use of more sustainable modes and safety throughout the network.

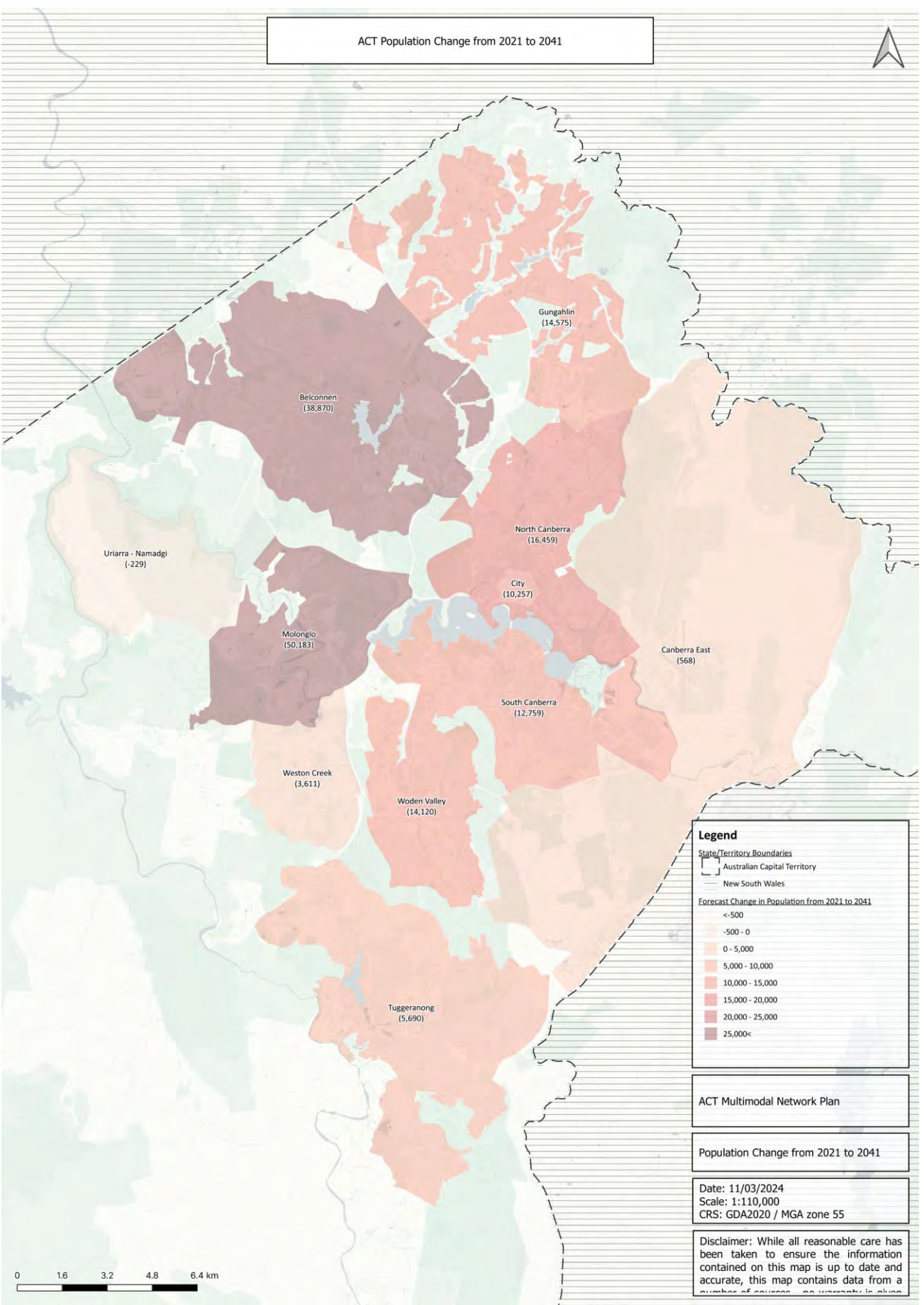
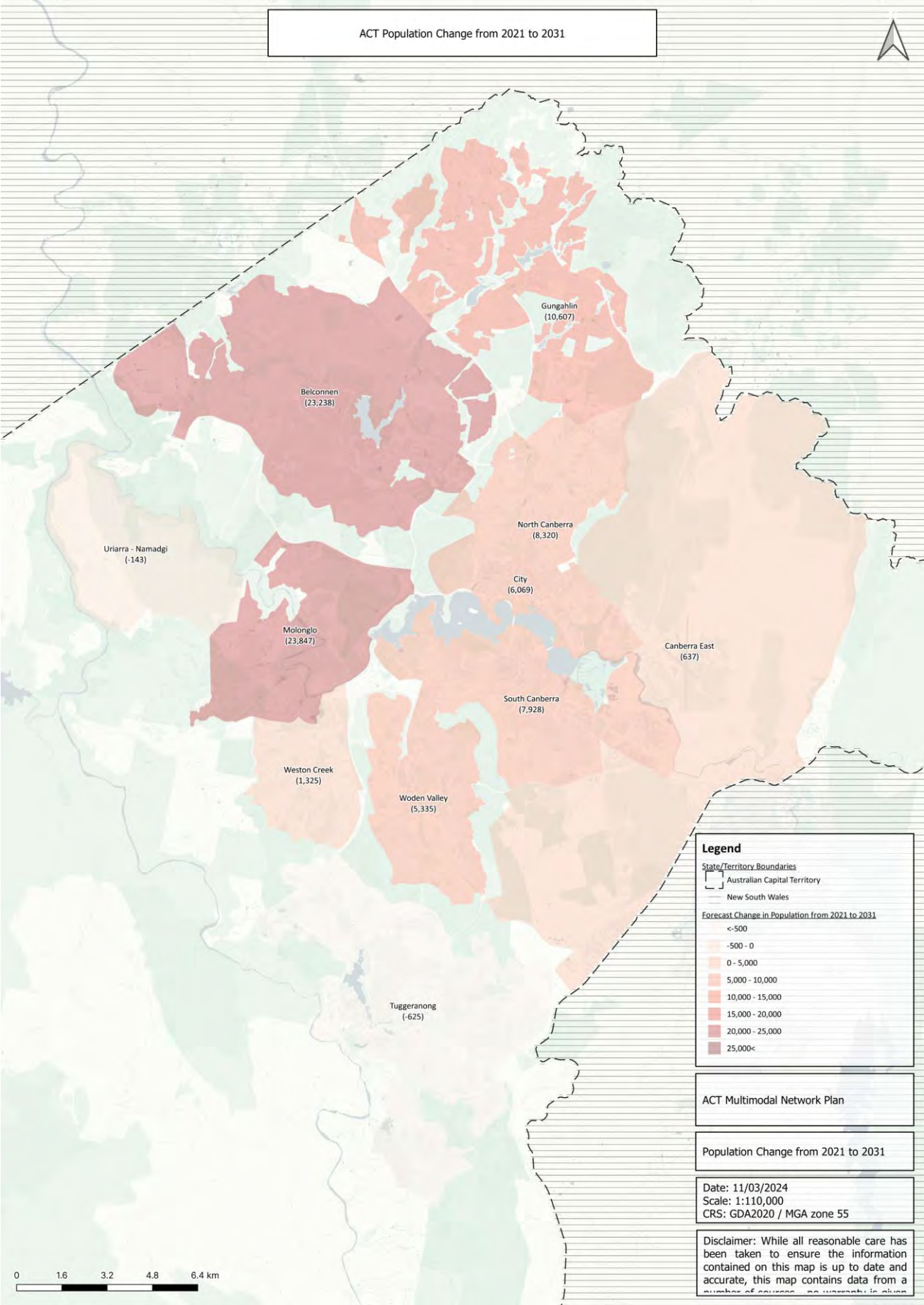
The ACT Government is aiming for future urban growth to be supported by delivering up to 70% of new homes as infill development in line with the *Planning Strategy*. Areas that will be targeted for urban intensification and infill development include the corridor from the City Centre to the north through Dickson, Mitchell, and Harrison to Gungahlin, as well as the Belconnen and Woden town centres. Molonglo Valley and other greenfield areas to the west are also earmarked for residential growth.

A key challenge for the ACT Government is to provide efficient and effective transport choices for these predominantly residential areas to access employment, as jobs in Canberra are currently concentrated in the City Centre, town centres and in and around the Canberra Airport (Canberra East). Future employment growth is being targeted in these areas, which will exacerbate the spatial disparity with the residential population which generally has a higher density on the western side of the city. This highlights a key transport challenge in providing efficient and reliable east-west transport links.

⁴ ACT Road Safety Strategy 2020-2025, 2020. Justice and Community Safety, ACT Government.

⁵ ACT Government land use forecasts from August 2023 for input into the Canberra Strategic Transport Model.

Figure 2-2: Forecast Population Growth from 2021 to 2031 and 2021 to 2041

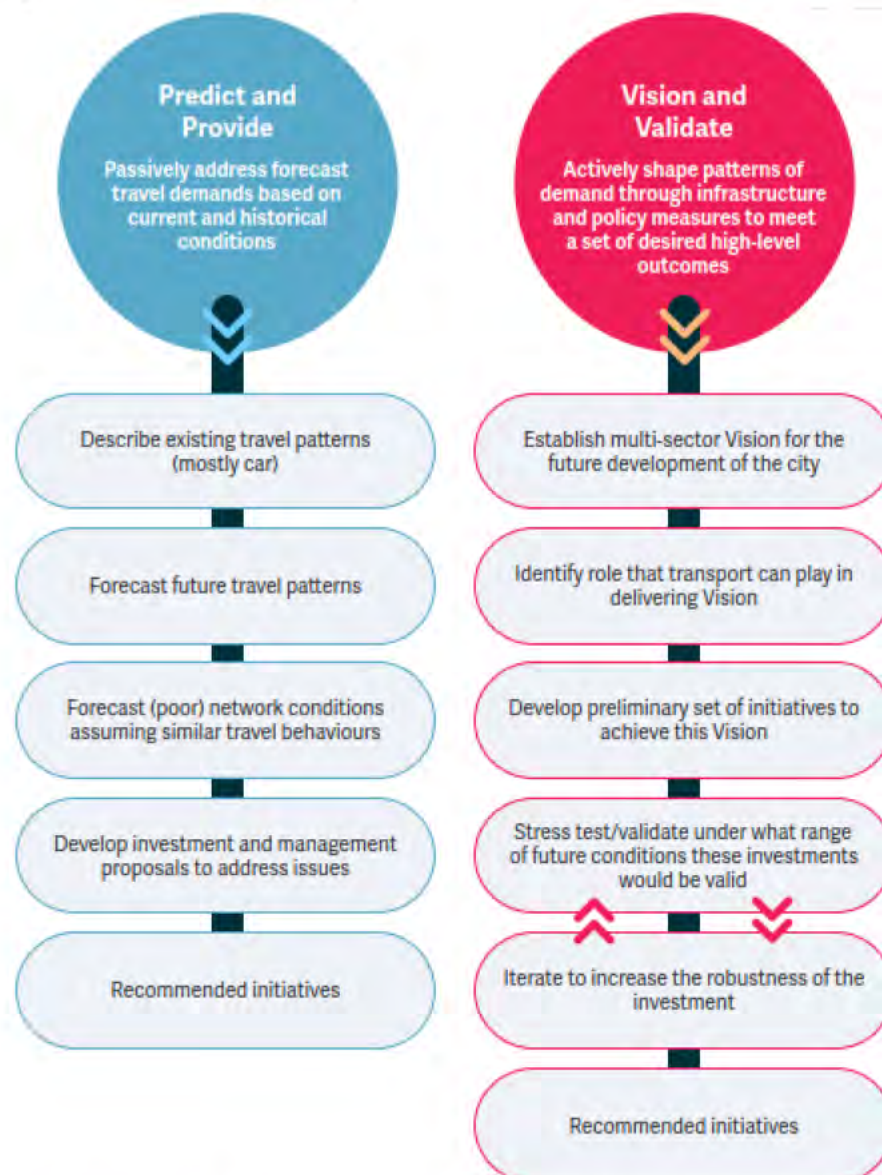


2.4 A Need for Change

Planning and investment in the ACT's transport network has previously relied on a 'predict and provide' approach. This approach has the underlying aim of (passively) meeting and addressing the consequences of forecast travel demands, based on current and historical conditions. As a result, 'predict and provide' has encouraged investment in infrastructure for general traffic and limited the ability to shape travel behaviours in the future. In recent years, many jurisdictions have identified the need for a new approach, primarily due to the growing uncertainty in future transport needs stemming from different political, economic, social, technological, and environmental trends.

The MNP is adopting a 'vision and validate' approach to help achieve the ACT's strategic objectives. This new approach more actively shapes patterns of demand to best meet a set of desired high-level outcomes (for example Net Zero emissions) and identifies transport investments to work towards the preferred future in a way that can accommodate uncertainty. Key differences between the 'predict and provide' and 'vision and validate' approaches are illustrated in Figure 2-3.

Figure 2-3: Differences between 'predict and provide' and 'vision and validate'



Details on how the 'vision and validate' approach has been incorporated into the MNP is provided in Section 3.3.

3. Strategic Alignment

The ACT Government has an established policy framework that integrates transport and land use planning. Policies such as the *Planning Strategy*, *Climate Change Strategy* and *Transport Strategy* have been developed to address the many challenges facing the ACT. The MNP has been developed to provide the next level of detail for the *Transport Strategy* and integrate with other key policy documents such as the *ACT Movement and Place Framework* (the 'Movement and Place Framework'). The MNP also adopts a 'Vision and Validate' approach to work towards the *Transport Strategy's* vision for the future and incorporates scenario planning to accounting for uncertainty.

3.1 ACT Transport Strategy

The *Transport Strategy* sets out the ACT Government's approach to achieving a world class transport system that supports a compact, sustainable, and vibrant city. It provides a framework for planning and investment in transport for the next 20 years and has been developed alongside the *Planning Strategy* and *Climate Change Strategy* so that the partnership between transport and land use is optimised to achieve the ACT Government's strategic objectives. Key themes from the *Transport Strategy* are outlined below.

3.1.1 Rebalancing Investment

Historically, planning and investment in Canberra's transport network has focused on road expansion to support urban growth. The *Transport Strategy* is clear that this will no longer meet strategic objectives or capacity needs, with a rebalance needed towards public transport, walking, and cycling to encourage more sustainable travel. The ACT Government's focus for transport investment will therefore be on upgrades to achieve a sustainable transport network, with more investment in walking and cycling infrastructure and prioritising public transport services and supporting infrastructure.

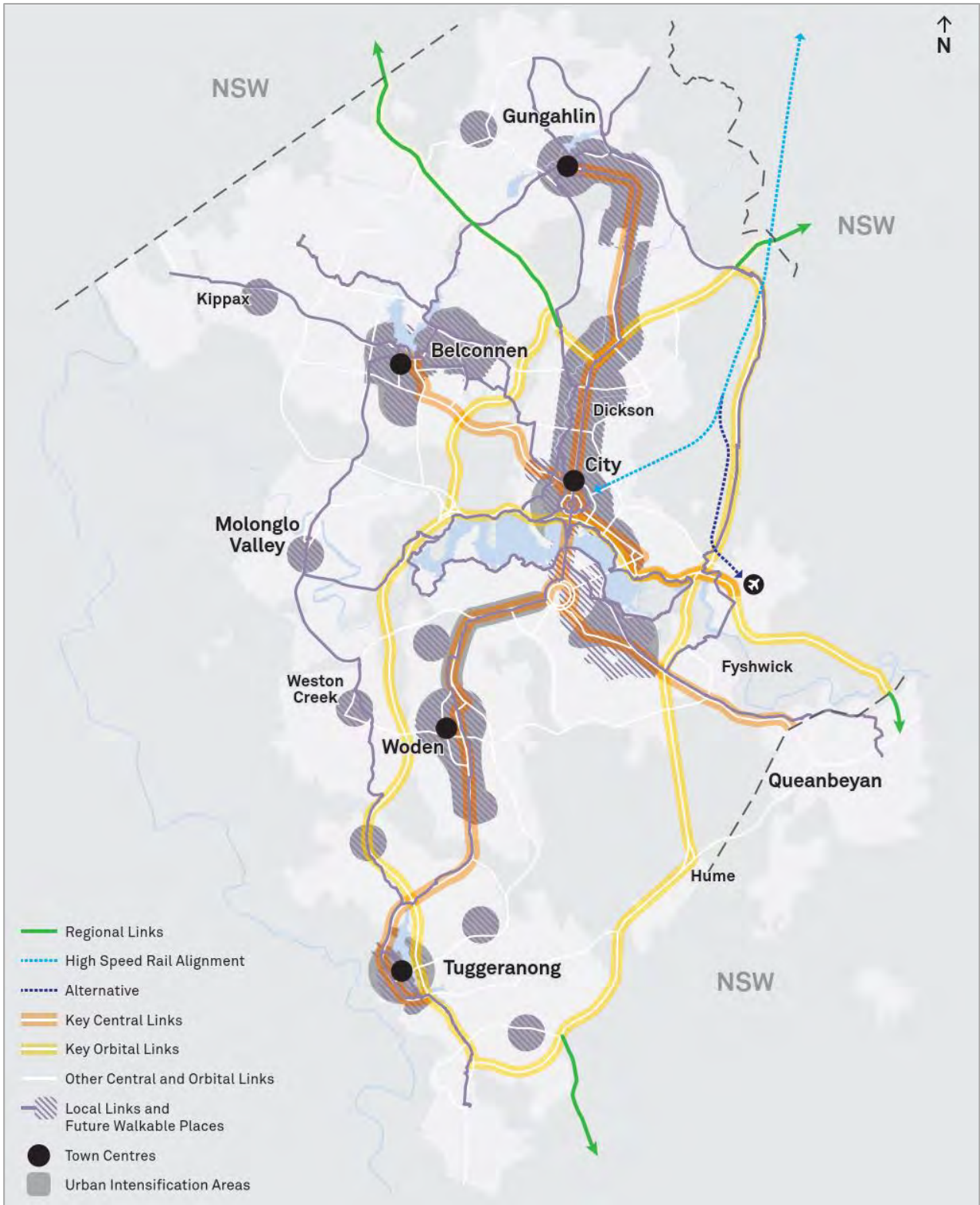
The *Transport Strategy* does, however, recognise the need for car trips for some journeys throughout Canberra, highlighting that the "transport network will need to support a shift towards public transport, cycling and walking, while recognising the need for car trips for cross city journeys and freight movements." The importance of these cross-city journeys and freight movements are emphasised on "Orbital Links", which are intended to "maintain the private vehicle journey times we all rely on to get around Canberra quickly." These statements reflect the challenges of achieving a shift in travel to more sustainable modes to reach strategic objectives while still encouraging growth in the ACT (with additional population and employment leading to more travel).

3.1.2 Refocusing Network Planning

The MNP has been developed in direct response to one of the *Transport Strategy's* main avenues of bringing about the transport system of the future: "refocused network planning and design which will increase our city building efforts by better integrated transport and land use". The *Transport Strategy* reconsiders the structure of the ACT transport network as local, central, orbital, and regional links to reflect the interwoven modal elements in supporting desired transport and land use outcomes. This structure is illustrated in **Figure 3-1** and has been a consideration in determining the strategic transport network for the MNP (refer to Section 4.4).

The *Transport Strategy* also identifies future networks for public transport, active transport, and freight, as shown in **Figure 3-2**, which have been incorporated into the assumed Future Network Changes to the network by 2045.

Figure 3-1: Conceptual Transport Network 2045 from ACT Transport Strategy



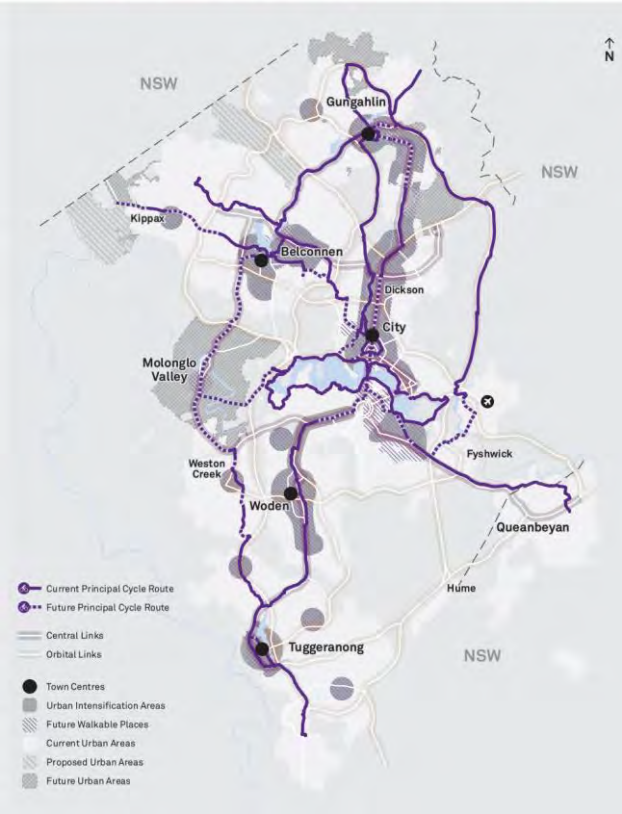
Source: ACT Transport Strategy 2020, August 2020. Transport Canberra and City Services, ACT Government.

Figure 3-2: Modal Networks in the ACT Transport Strategy

MAP 2 ACT Transport Strategy – Central links and public transport network



MAP 3 ACT Transport Strategy – Local links, cycling network and walkable places



MAP 5 ACT Transport Strategy – Orbital links and freight network



Source: ACT Transport Strategy 2020, August 2020. Transport Canberra and City Services, ACT Government.

3.2 ACT Movement and Place Framework

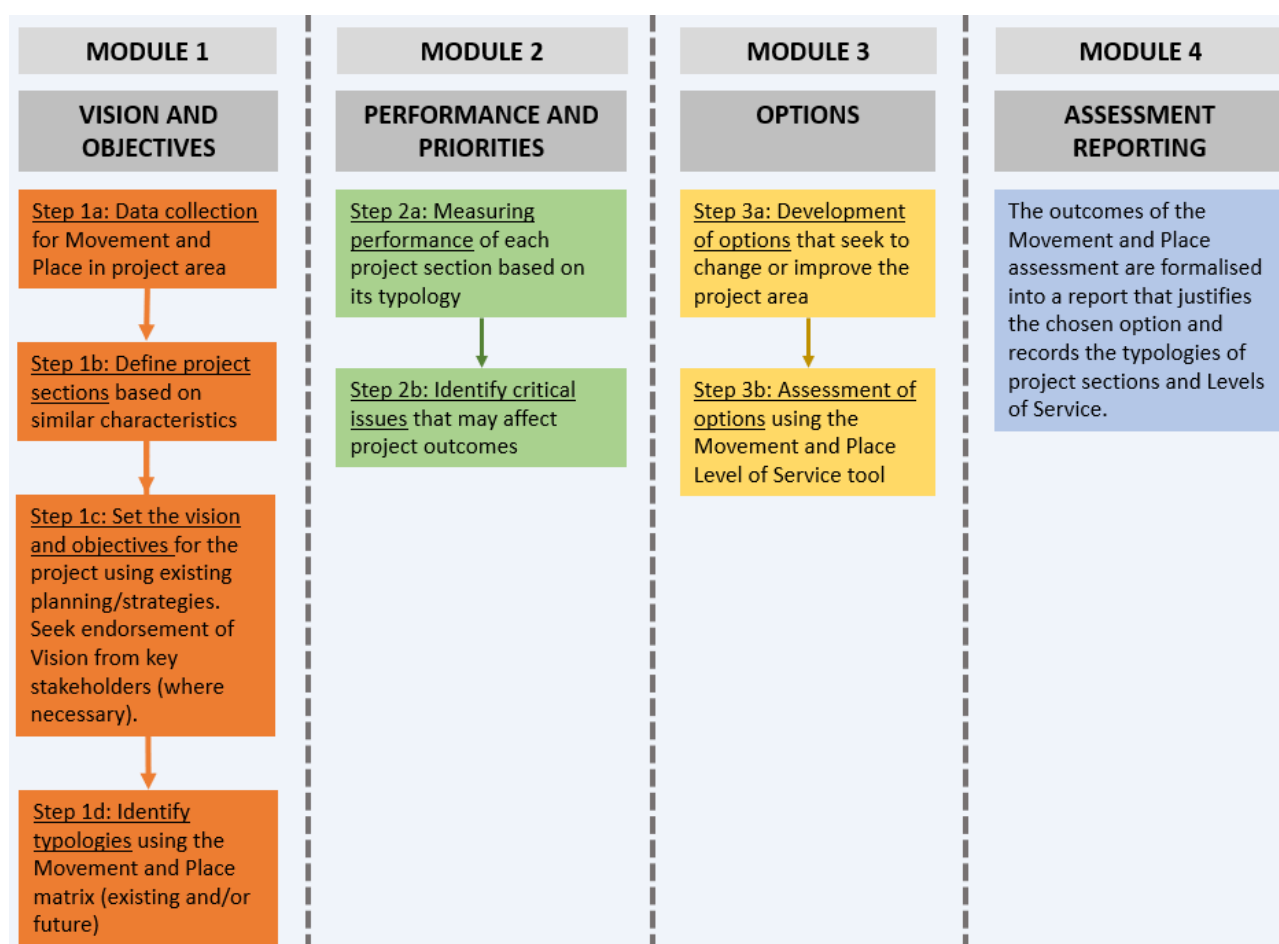
A 'Movement and Place Framework' is a strategic tool for transport, urban planning, and other built environment practitioners to ensure competing transport (or movement) and place needs and opportunities are balanced at a corridor or area level. The first need, 'Movement', is to allow the efficient movement of people and goods from one destination to another. The second need, 'Place', recognises that a transport corridor is part of the built environment and can enable many of the important placemaking functions of society to occur, including shopping, leisure activities and socialising.

The *Movement and Place Framework* has been developed to guide planning, design and investment decisions in a manner that is consistent with the strategic direction set by the *Transport Strategy* and the *Planning Strategy*. The framework has been developed to be utilised at multiple stages of the planning process, with three broad levels at which it can be applied:

- A **strategic-level network assessment**, such as the *Multimodal Network Plan*
- An **area-level precinct assessment** such as a suburb or a group of suburbs. For example, this assessment may be used to better understand the needs of the immediate network around a Group Centre or a Local Centre, while ensuring that the place-making needs of each street are also considered
- A **local-level project assessment** to assess a single transport corridor or a small network, typically to assess options and help to choose the option that best aligns with Movement and Place principles.

The *Movement and Place Framework* offers detailed guidance to planners and practitioners on how to conduct a Movement and Place assessment, as summarised in **Figure 3-3**.

Figure 3-3: Overview of the Movement and Place Assessment Process



With the recent introduction of the *Movement and Place Framework* into the ACT's policy framework, it is important that the MNP clearly aligns with its key principles and approach to network planning. Given the strategic-level network

planning of the MNP, the steps in Module 1 and Module 2 of the *Movement and Place Framework* have been incorporated into its development as shown in **Table 3-1**.

Table 3-1: Alignment between ACT Movement and Place Framework and Multimodal Network Plan

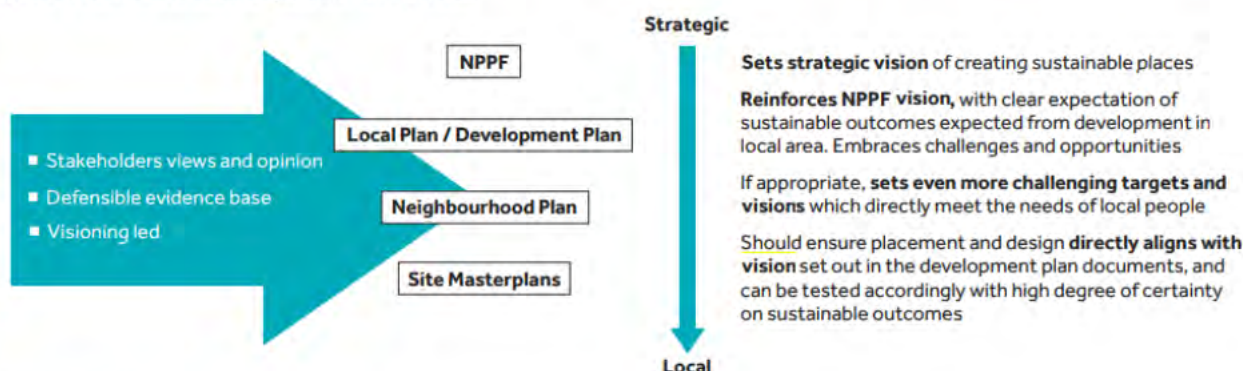
Movement and Place Framework		Consideration in Multimodal Network Plan
Module 1	Step 1a: Data collection	Data gathering has occurred throughout the MNP, particularly to identify the current and future modal hierarchies (Section 4.4.1) and determine the multimodal deficiency of the strategic transport network (Section 4.8)
	Step 1b: Define project sections	Identified the strategic transport network for the MNP as outlined in Section 4.4.3
	Step 1c: Set the vision and objectives	Established the Vision and Objectives for the MNP in line with the <i>Transport Strategy</i> (Section 4.2)
	Step 1d: Identify typologies	Developed Movement and Place typologies for the strategic transport network (Section 4.5) in line with the <i>Movement and Place Framework</i> to consider as part of the project development of future infrastructure provision (Section 5.6) and for undertaking subsequent Movement and Place assessments (Section 9.1)
Module 2	Step 2a: Measuring performance	Determined the multimodal deficiency using performance measures consistent with the <i>Movement and Place Framework</i> , with weighting by modal hierarchy where appropriate (Section 4.8).
	Step 2b: Identify critical issues	Undertake high-level assessment of capacity of the existing network to accommodate future demands (Section 4.7) and identify additional multimodal deficiencies that require intervention (Section 5.5)

This table demonstrates alignment between the *Movement and Place Framework* and development of the MNP. Another key theme for both documents is the need to pursue a vision-led approach, with further details about the MNP's 'vision and validate' approach provided below.

3.3 Vision and Validate

In the United Kingdom, best practice recommends 'vision and validate' is adopted at the strategic level through to the development level, as advocated by TRICS⁶ in their *Guidance Note on the Practical Implementation of the Decide & Provide Approach* (February 2021) and shown in **Figure 3-4** (noting NPPF refers to the UK's National Planning Policy Framework). This guidance has been adopted by jurisdictions such as Oxfordshire County Council, which have recently published their *Implementing 'Decide & Provide': Requirements for Transport Assessments* document in 2022.

Figure 3-4: Vision and Validate throughout the Planning Process

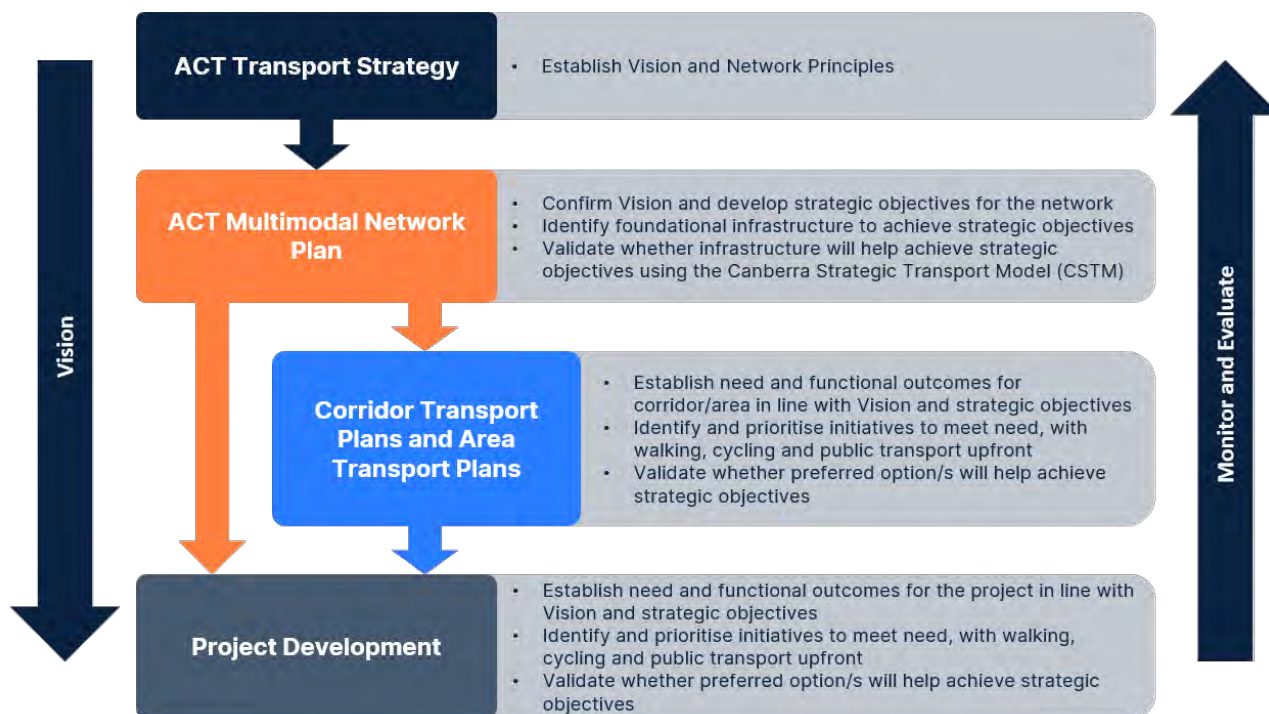


Source: CIHT

⁶ TRICS is the system of trip generation analysis for the UK and Ireland

A ‘vision and validate’ approach has been adopted in the development of the MNP to help the ACT remain one of the world’s most liveable regions. This vision led approach will ensure that the Vision from the *ACT Transport Strategy* is incorporated into all levels of transport planning and design in the ACT, from the MNP through to subsequent *Corridor Transport Plans/Area Transport Plans* (refer Section 7.1) and specific project development (refer Section 9.1). This line of sight is illustrated in **Figure 3-5**.

Figure 3-5: Vision led approach for the Multimodal Network Plan and subsequent planning



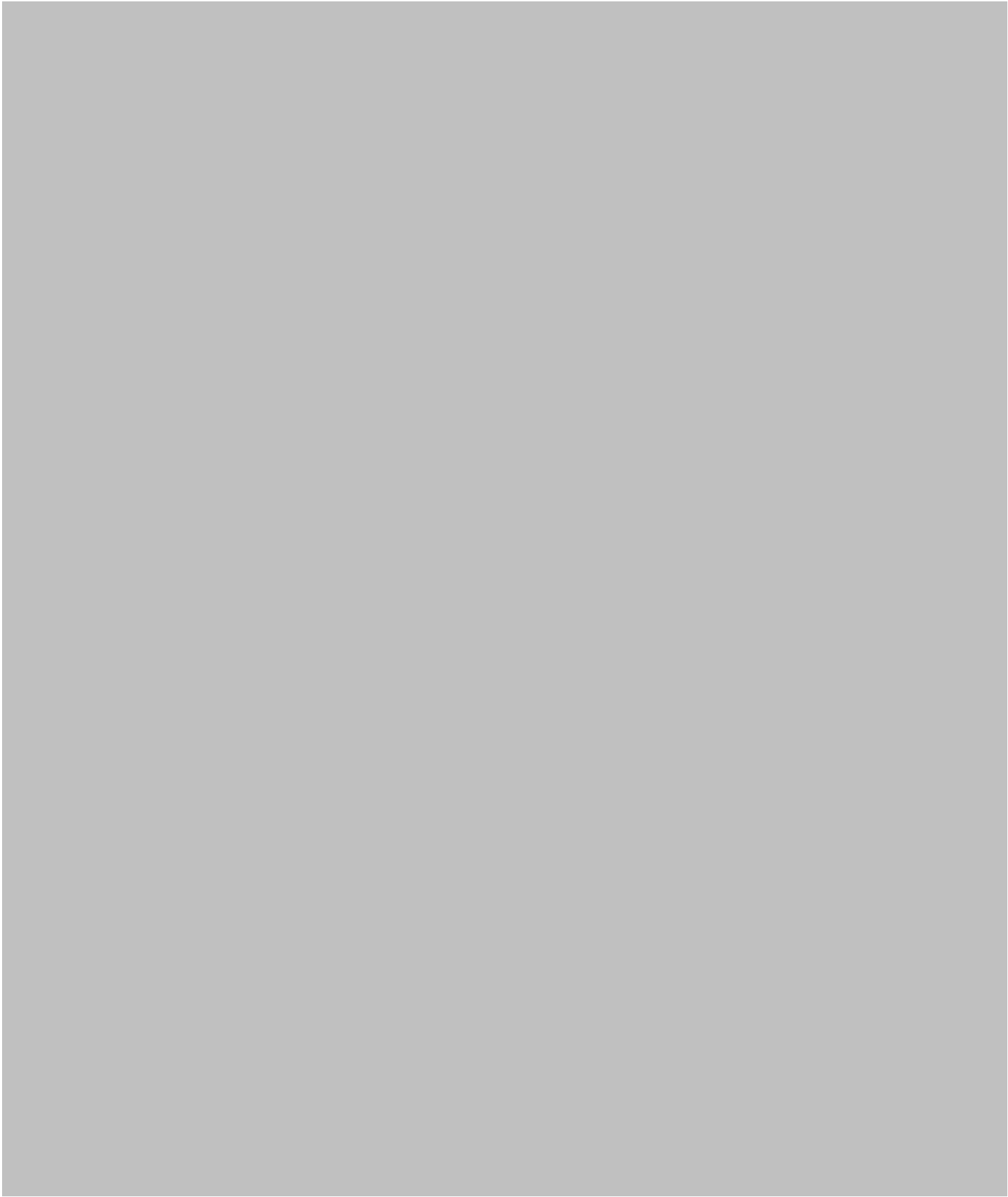
Previous planning and analysis tools have not been ignored with the new approach. The Canberra Strategic Transport Model (CSTM), for example, has still been used in the development of the MNP to consider the capacity of the existing network to accommodate future growth (refer Section 4.7 **Error! Reference source not found.**). This is consistent with guidance from the United Kingdom, which recommends that strategic models are used to inform whether road capacity should be increased or decreased, not as a pass/fail device.

It is important to note that the CSTM is not being used to assess individual projects, which it would have been under ‘predict and provide’. It will, however, be used to validate the proposed infrastructure provision in response to the Vision of the network, as discussed in Section 6.

3.4 Accounting for Uncertainty

Planning for future transport needs is complex, requiring an understanding of multiple interlinking social, economic, and technological issues. While past trends provide a guide to where people want to live, how and where they might work, shop and play, trends change and can be changed. This is acknowledged in the *Transport Strategy*, which notes that “the way we live now is different to how we might have lived 20 years ago and will be different 20 years into the future.” Scenario planning helps in contemplating how this future may develop and can be especially useful when needing to make sense of uncertainty when planning our transport networks. It can also be used to guide planning activities towards more desirable states.

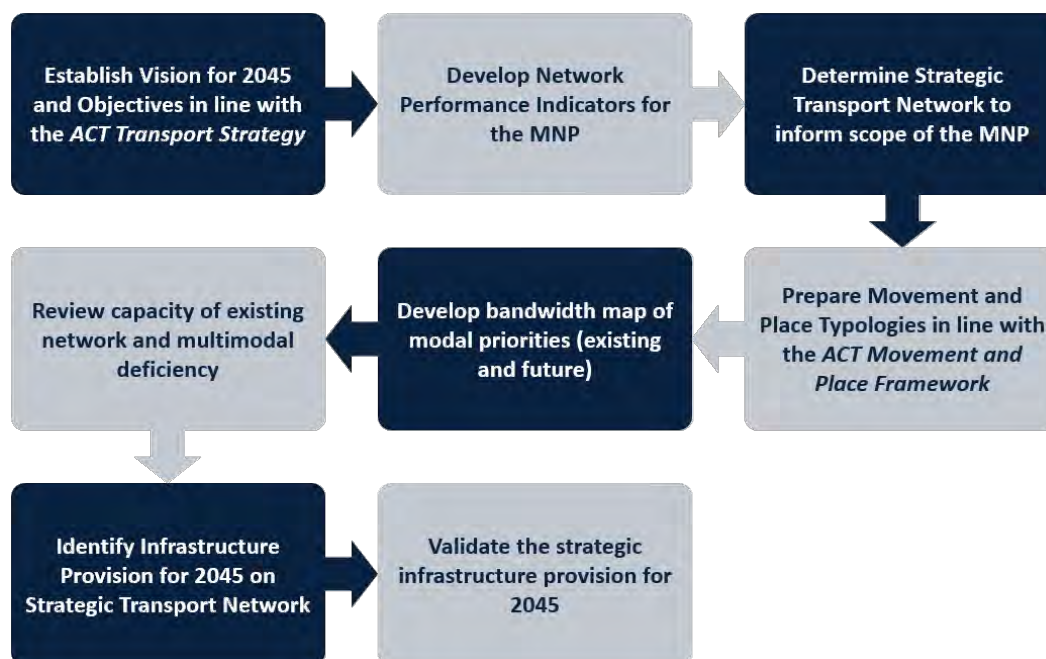
Scenario planning has been incorporated into the development of the MNP to explore how different political, economic, social, technological, and environmental trends might evolve to create different versions of the future to 2045. This will help ensure that the future infrastructure provision identified for the strategic network is resilient under different alternative futures, as well as aligning with the *Transport Strategy* and wider ACT policy.



4. Developing the Multimodal Network Plan

A key purpose of the MNP is to identify the foundational transport infrastructure needed to achieve the ACT's Vision for the transport network. To establish this infrastructure provision, a process has been developed using guidance from ATAP and other international examples, as is shown in **Figure 4-1**. The details of each component of the MNP are provided in the following sections, with the identification of infrastructure provision for 2045 summarised in Section 5 and the prioritisation of investment detailed in Section 8.

Figure 4-1: Process of Developing the Multimodal Network Plan



4.1 Guiding Principles

Multimodal network planning has gained prominence in recent decades as transport planners have sought to reduce people's reliance on private vehicles. Put simply, it is a method of planning that considers all modes for transport, such as walking, cycling, public transport, private vehicles, and others. Planning for multiple modes within one urban area provides residents with a wide array of options, from which they can choose the most suitable one(s) for their needs.

The development of the MNP has been underpinned by a range of principles:

- High-quality public transport and active travel is essential to encourage more sustainable travel, which is reflected in the *Transport Strategy* to highlight that a rebalancing of investment is needed towards public transport and active travel
- Key multimodal corridors and areas should have clearly established modal priorities to help balance conflicting demands for 'Movement' and 'Place'
- Providing additional road capacity without multimodal considerations will induce demand for car travel and will be detrimental to shifting people to more sustainable travel modes
- Additional capacity in the transport network (across all modes) is required to support growth and maintain a high quality of life for Canberrans (for example maintaining a 30-minutes city), with foundational transport infrastructure needed to provide additional capacity in the right locations and at the right time to maximise return on investment
- Upgrades to the network should be prioritised on need, not want
- The proposed infrastructure provision should be robust under a range of alternative futures.

Other key components that have been incorporated are a 'vision and validate' approach to achieve the ACT's Vision for the transport network.

4.2 Vision and Objectives

Defining a clear vision is a key element of strategic planning. A compelling vision can guide land use and transport planning decision making and provide the wider community with a degree of certainty and purpose, while objectives then set outcomes that a jurisdiction is aiming to achieve.

As part of the *Transport Strategy*, the ACT Government has set a vision of:

A world class transport system that supports a compact, sustainable, and vibrant city.

The vision from the *Transport Strategy* has been adopted for the development of the MNP, with objectives adapted from the *Transport Strategy's* ten principles to guide the future development of the transport network. These development principles have been used to develop specific objectives for investing in the transport network.

- **People Focused:** Provide an affordable, inclusive, and accessible transport network that meets the diverse needs of all Canberrans with high-quality customer experience.
- **Safe:** Improve the safety performance of our network to enable safe and secure travel by all transport types with no fatalities or serious injuries.
- **City Shaping:** Integrate the transport network with land use planning to support sustainable urban growth close to centres and along key transit corridors, adopting the *Movement and Place Framework* so that investment benefits the dual role of streets as movement corridors and places.
- **Future Focused:** Implement a 'smart' transport network that uses digital technology to manage transport demand, encourages shared transport and embraces emerging mobility choices.
- **Connected:** Improve transport connectivity throughout the ACT and the wider Canberra Region to expand labour market catchments, increase business efficiency and increase clustering effects of key sectors.
- **Flexible:** Deliver an integrated transport network that focuses on passengers, making it simpler and easier to plan and pay for journeys and to use and interchange between different forms of transport throughout the day.
- **Reliable:** Provide a reliable transport network that is more resilient to incidents, natural hazard events and the impacts of a changing climate.
- **Efficient:** Maximise the use and performance of our existing transport network to improve whole-of-life economic, social, and environmental benefits.
- **Sustainable:** Reduce transport-related carbon emissions to help achieve net zero by 2045, minimising the contribution of transport and travel to climate change.
- **Healthy:** Deliver a network that promotes active travel and active lifestyles to improve the health and wellbeing of all Canberrans.

It is recommended that these objectives are considered as part of all future project development to ensure there is a clear line of sight between the *Transport Strategy*, the *Multimodal Network Plan*, and individual projects. This should apply to small-scale projects (such as an intersection or footpath upgrade) through to large-scale projects (such as corridor duplication or light rail extension), as each project should demonstrate how it aligns with the ACT's strategic objectives and explain how it will contribute toward the ACT's Vision.



Table 4-1: Network Performance Measures for the MNP

Measure	Baseline	2045 target
Net zero emissions		
Net emissions by ACT public transport system	33 kt CO ₂ -e Source: Climate Change Strategy	
Vision Zero by 2050		
Road fatalities per capita	2.55 fatalities per 100,000 population Source: TCCS Annual Report 2020-21	
30-minute city		
Proportion of population within 30-minutes of the City Centre by public transport	26.7% Source: CSTM 2021 AM peak ⁸	
Proportion of population within 30-minutes to town centres by cycling	99.9% Source: CSTM 2021 AM peak ⁸	
Proportion of population within 30-minute walk to group/town centres	71.1% Source: CSTM 2021 AM peak ⁸	
Average travel time for trips to work (private vehicle)	20.2 minutes Source: CSTM 2021 AM peak ⁸	
Mode share		
Proportion of people travelling to work by bike or walking	7% (4% bike, 3% walk) Source: 2022 HHTS	
Proportion of people travelling to work by public transport	7% Source: 2022 HHTS	
Proportion of people travelling to school by sustainable transport	31% (bike, walk and public transport) Source: Draft <i>Active Travel Plan</i>	

⁷ Interim targets for net emissions by public transport system of 33 per cent reduction by 2026, 50 per cent reduction by 2031 and net-zero by 2041.

⁸ Determined using the CSTM Enhancements Stage 1 project.

4.4.1 Existing Modal Hierarchies and Future Network Changes

There are currently five modes with corresponding hierarchies for the ACT's transport network, as shown previously in **Figure 2-1**. These modal hierarchies identify the varying levels of purpose and importance within each mode of transport, with a summary of each mode provided in **Table 4-2**. Note that the Walking and Cycling network have been grouped in this table as they are presented together in the draft *Active Travel Plan*, one of the ACT Government's unimodal transport plans.

These modal hierarchies have been mapped in **Appendix A** to illustrate the existing transport network, with the active transport network separated into the Cycling network and Walking network. It should be noted that the local access roads and peak/school routes have been excluded from the maps for legibility, with the public transport network also illustrated so it is mode agnostic, i.e. does not differentiate between rapid bus services or light rail.

⁹ *Multimodal System Design Guidelines*, 2020. Virginia Department of Rail and Public Transport.

¹⁰ The Virginia Department of Rail and Public Transport describes 'Multimodal Corridors' as roadways that generally accommodate multiple modes of travel, while 'Multimodal Districts' are portions of an urban area with a good level of multimodal connectivity.

Table 4-2: Existing Modal Hierarchies

Mode	Summary
Freight network	Freight transport and logistics services are essential to an efficient, modern, functioning economy, providing a variety of different services to a wide range of different businesses and customers. Nearly all freight (by volume) into and out of the ACT is road based. Road freight flows are primarily importing into the ACT rather than exports, with the majority originating from New South Wales. The heavy vehicle network is characterised by restrictions to General Mass Limits, B-doubles, or other restrictions that govern load limits and turning movements.
General Traffic network	The classification of roads in the ACT is based on a formal road hierarchy. The classification fundamentally relates to the main function of a road and to the extent to which it serves the two basic purposes of the road network, i.e., the movement of traffic and access to property. A road's physical characteristics and traffic volume will reflect its function and role in the network. The ACT has adopted Austroads guidance on the provision and management of transport infrastructure and has issued a series of documents to reflect this development in standards and specifications for practice in the ACT, classifying roads as either Trunk Roads (Arterials) or Local Roads (Major Collector Roads, Minor Collector Roads and Access Streets). In addition to the ACT road network, there are also sections of the National Land Transport Network (NLTN) within the ACT, which is a network of nationally important road and rail infrastructure links and their intermodal connections. The Federal Highway, Barton Highway and Majura Parkway are all classified as part of the NLTN, along with parts of Fairbairn Avenue and Pialligo Avenue.
Active transport network (Walking and Cycling)	The ACT has an extensive network of paths for walking, cycling and the use of micro-mobility devices. The release of the draft <i>Active Travel Plan</i> for consultation in July 2022 presented a revised hierarchy that differentiates between the cycling network (Principal Cycle Routes, Main Cycle Routes, Local Cycle Routes) and walking areas (Central Walking Areas, High Activity Areas and Low Activity Areas).
Public transport network	The ACT's urban public transport network consists of a comprehensive network of bus services and a single light rail line between Gungahlin and the City. The philosophy behind the current network aligns with best practice of exploiting the 'network effect' where public transport service is concentrated in high demand corridors (the Rapid routes) supported by lower frequency feeder/coverage services (local routes). Transport Canberra's public transport network has a clear hierarchical system of service types that currently includes 10 Rapid services, 52 Local services, 3 Peak services and School routes.



4.5 Movement and Place Typologies

A key step in the *Movement and Place Framework* is to identify/classify the functional importance of the network in terms of scale and proportion (Module 1, Step 1d). Movement and Place typologies have therefore been assessed for the 'Strategic Transport Network' as part of the MNP to assist with identifying the future infrastructure provision during project development and for undertaking subsequent Movement and Place assessments (Section 9.1). Sections of the 'Strategic Transport Network' that are primarily PCN (i.e. off-road shared paths) have not been assessed for Movement and Place typologies as their function is clearly for active travel.

The general principles of assessing typologies in the *Movement and Place Framework* are:

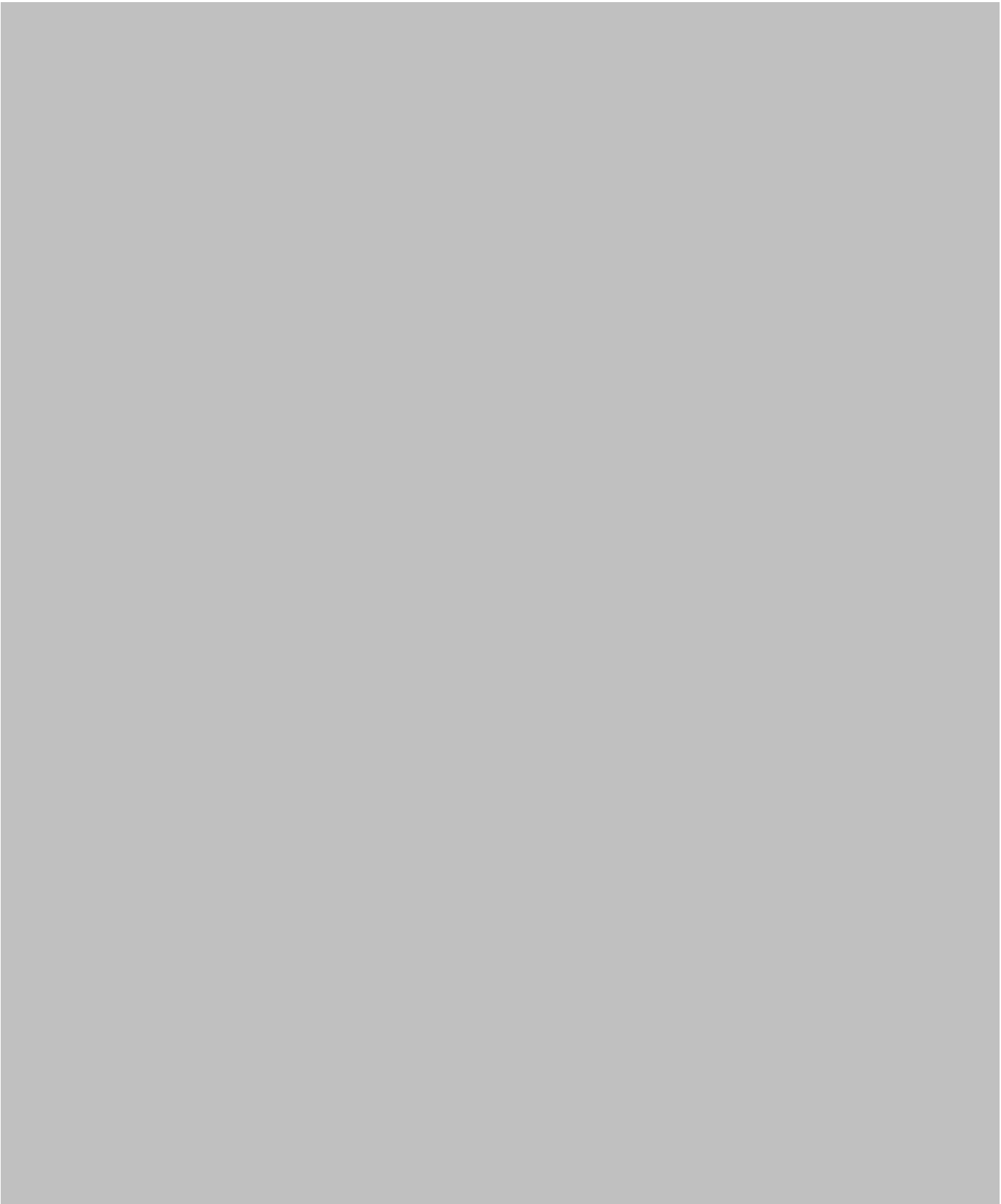
- Each road segment within the project is assigned a typology from the nine options in the matrix (shown in **Figure 4-4**)
- Each segment is assigned a Movement (M1, M2, M3) and Place (P1, P2, P3) typology for the existing situation (current year) and/or a future 'vision', with a future year of 2045 for the MNP
- Typologies are built up by categories outlined in the *Movement and Place Framework*, i.e. the six modal categories for Movement and the four Place categories
- A cumulative approach has been adopted to assess typologies, which allows high value movement and place corridors to be built up from component elements.

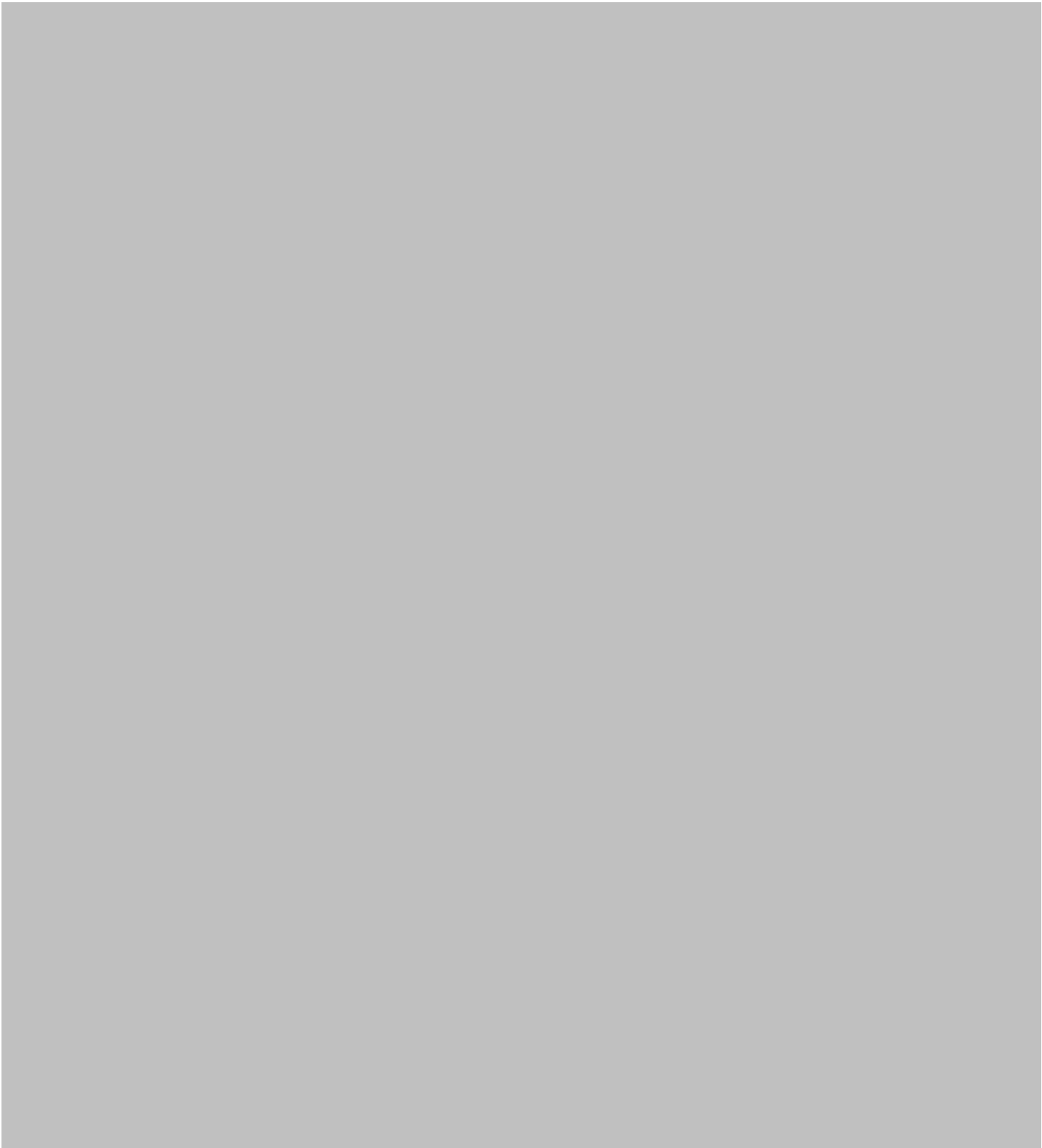
Figure 4-4: Movement and Place Typology Matrix



It is also noted in the *Movement and Place Framework* that developing typologies can make use of a variety of datasets to develop these scores, and depending on the scale of the assessment, use geographic buffers (with GIS software) to define scores. A GIS analysis has therefore been undertaken as part of the MNP to identify the Movement

and Place typologies for both the existing and future Strategic Transport Network. While Movement Networks have been refined over several years, this represents the first time the network has been broken into Place typologies. It is noted that these Place typologies will likely mature over time as they are adopted more broadly into ACT planning and design processes.





¹¹ No data is available for future ‘points of interest’ or potential changes to the zoning schemes for the ACT and National Capital Plan

Future Situation



4.6 Modal Priorities

According to the Virginia Department of Rail and Public Transportation, the principle of ‘Modal Emphasis’ (or Modal Priority) is one of the most important within multimodal network planning¹². This principle calls for a transport corridor to emphasise certain modes within the design of its cross-section. While other modes may still be accommodated within the transport corridor, space should be allocated first to the modes which it is primarily designed to serve. Secondary modes may be accommodated with constraints, whereas the primary modes should be designed to provide the best transport experience possible for its users.

The modal priorities of the ‘Strategic Transport Network’ have therefore been identified as part of the MNP to illustrate the proposed future multimodal network to achieve the Vision of the *Transport Strategy*, as well as inform the cross-section of foundational transport infrastructure through further planning/design (Section 9.1). It is important to note that these modal priorities should not be used in isolation to discount road space reallocation. Instead, practitioners are recommended to investigate this as an option using the *Movement and Place Framework*.

4.6.1 Methodology

Modal priority has been identified by developing a ‘bandwidth’ map using the scores for the six modal categories for Movement (from the *Movement and Place Framework*) on the Strategic Transport Network. The ‘bandwidth’ then shows the proportion of each modal categories against the total Movement score to illustrate the relative importance of each mode. The sections of the ‘Strategic Transport Network’ that are primarily PCN (i.e. off-road shared paths) have not been assessed for Modal Priority as their function is clearly for active travel and other modes (i.e. public transport, freight and general traffic) do not use these sections.

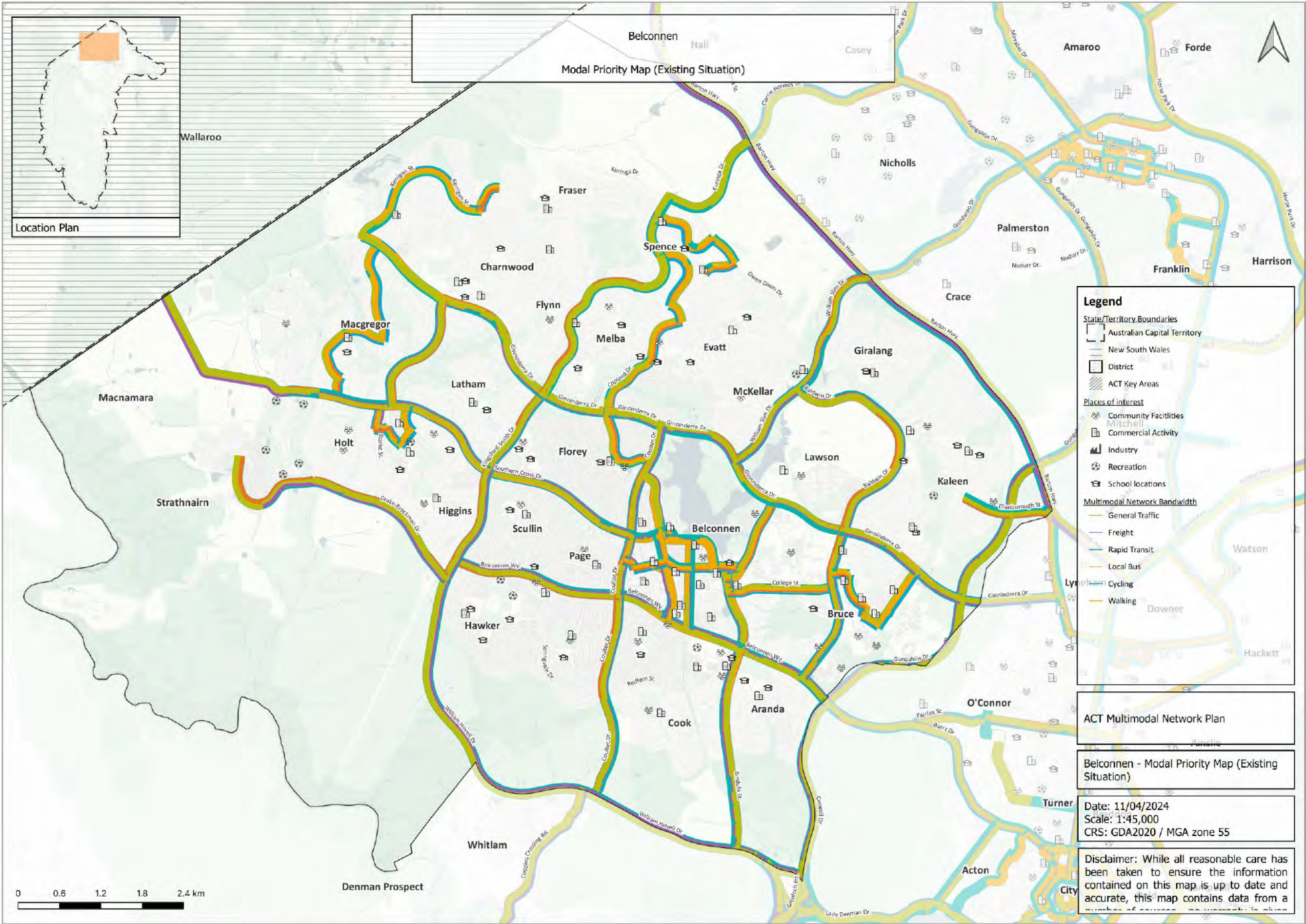
It is important to note that the MNP is not recommending specific changes to the network hierarchies for each transport mode. Instead, the MNP seeks to collate existing information (including the future multimodal network outlined in the *Transport Strategy*) to better inform practitioners within the ACT about the multimodal network function now and into the future. It is recommended that these modal priority maps are revised following further updates to the modal hierarchies.

4.6.2 Strategic Transport Network

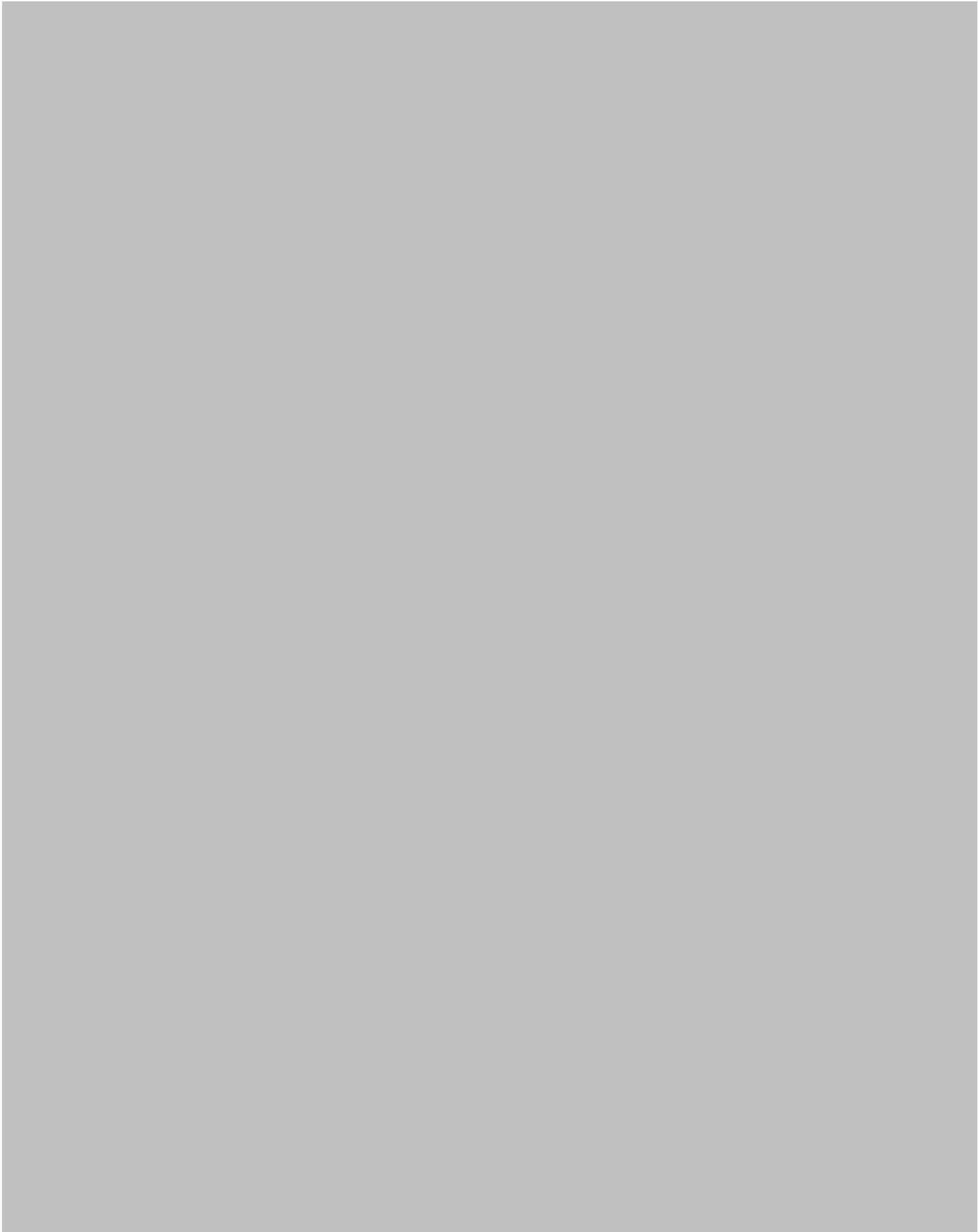
The existing modal priorities has been prepared using the existing modal hierarchies as outlined in Section 4.4.1. An example of the Modal Priorities for Belconnen is shown in **Figure 4-1**, with similar maps for the rest of the ‘Strategic Transport Network’ attached as **Appendix E**. This map illustrates several locations where routes are attempting to provide a high modal hierarchy across several modes, such as Southern Cross Drive, which can present suboptimal outcomes when encouraging more sustainable transport modes. While overlapping modal priorities are not necessarily an issue, they can impact the uptake of more sustainable modes without the appropriate priority.

¹² Multimodal System Design Guidelines, 2020. Virginia Department of Rail and Public Transportation.

Figure 4-8: Modal Priority Map for Belconnen District (Existing Situation)



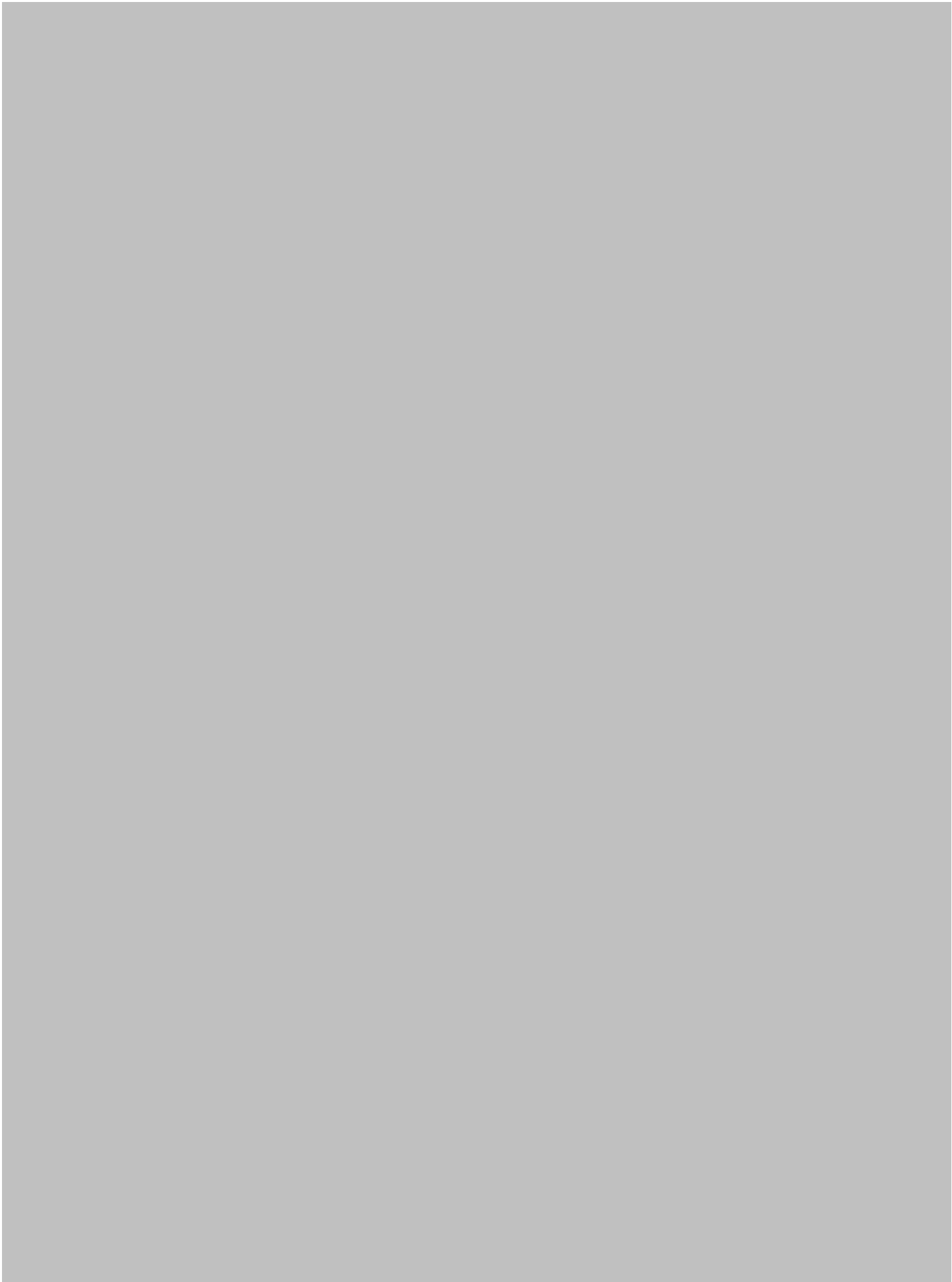






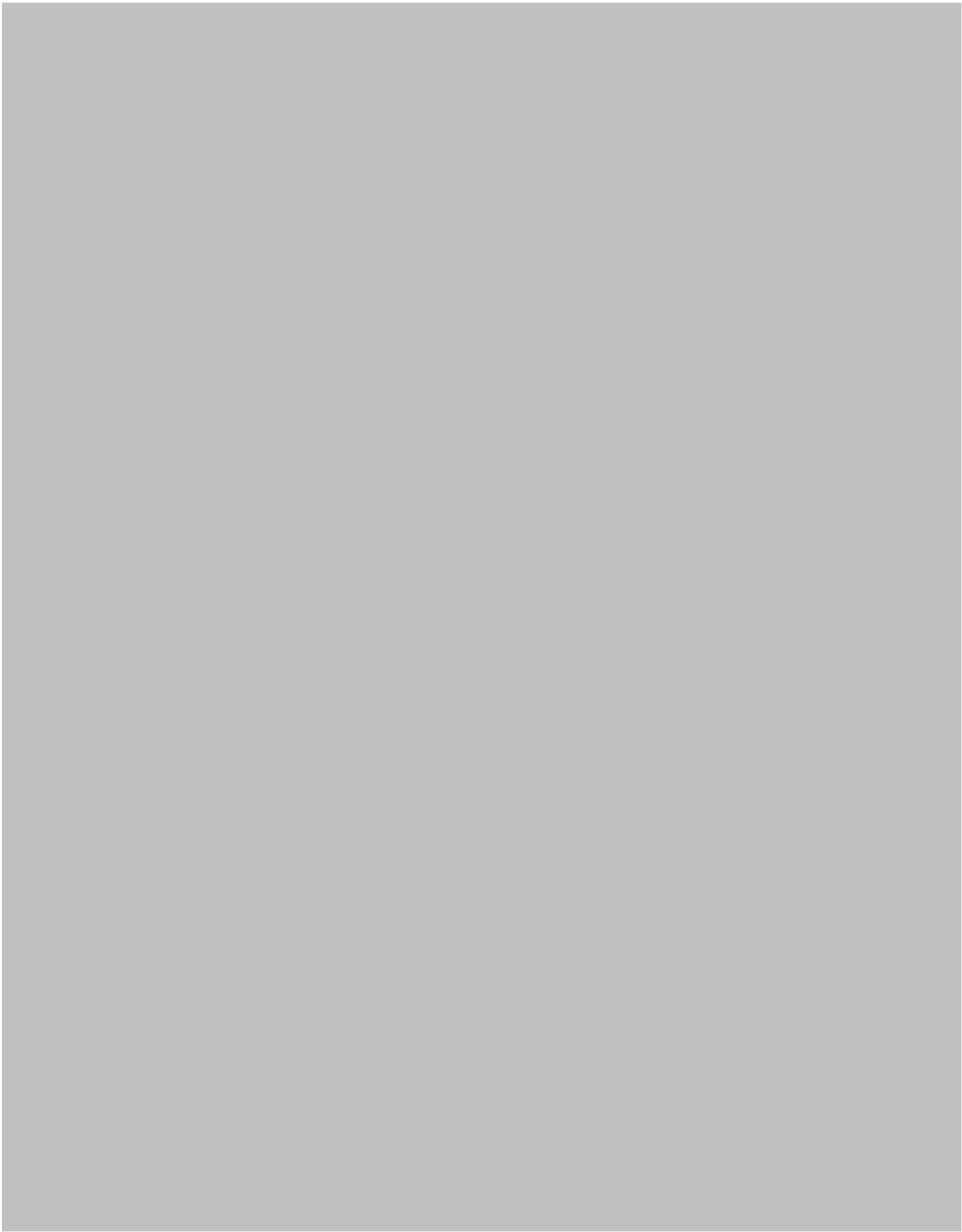






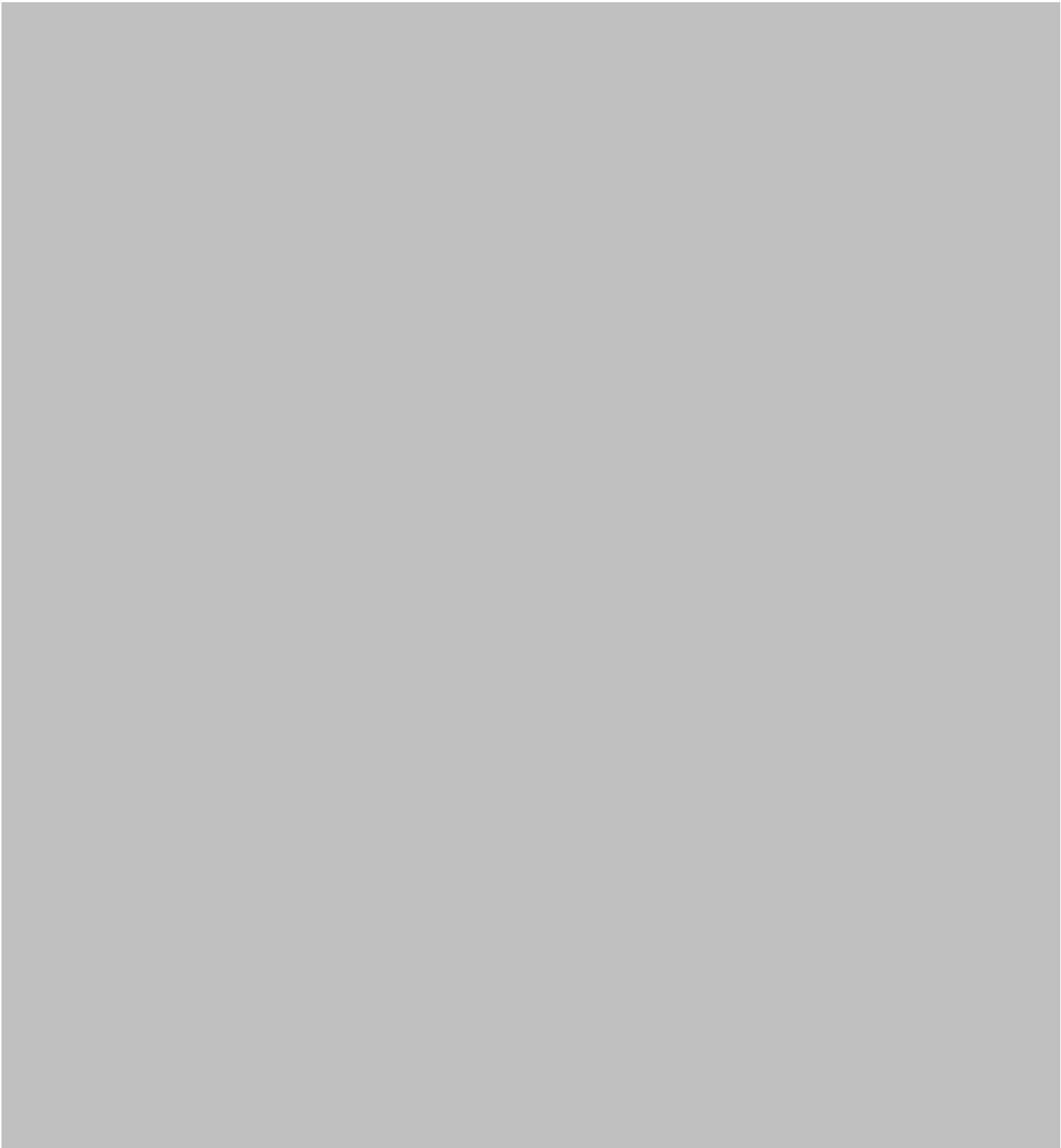












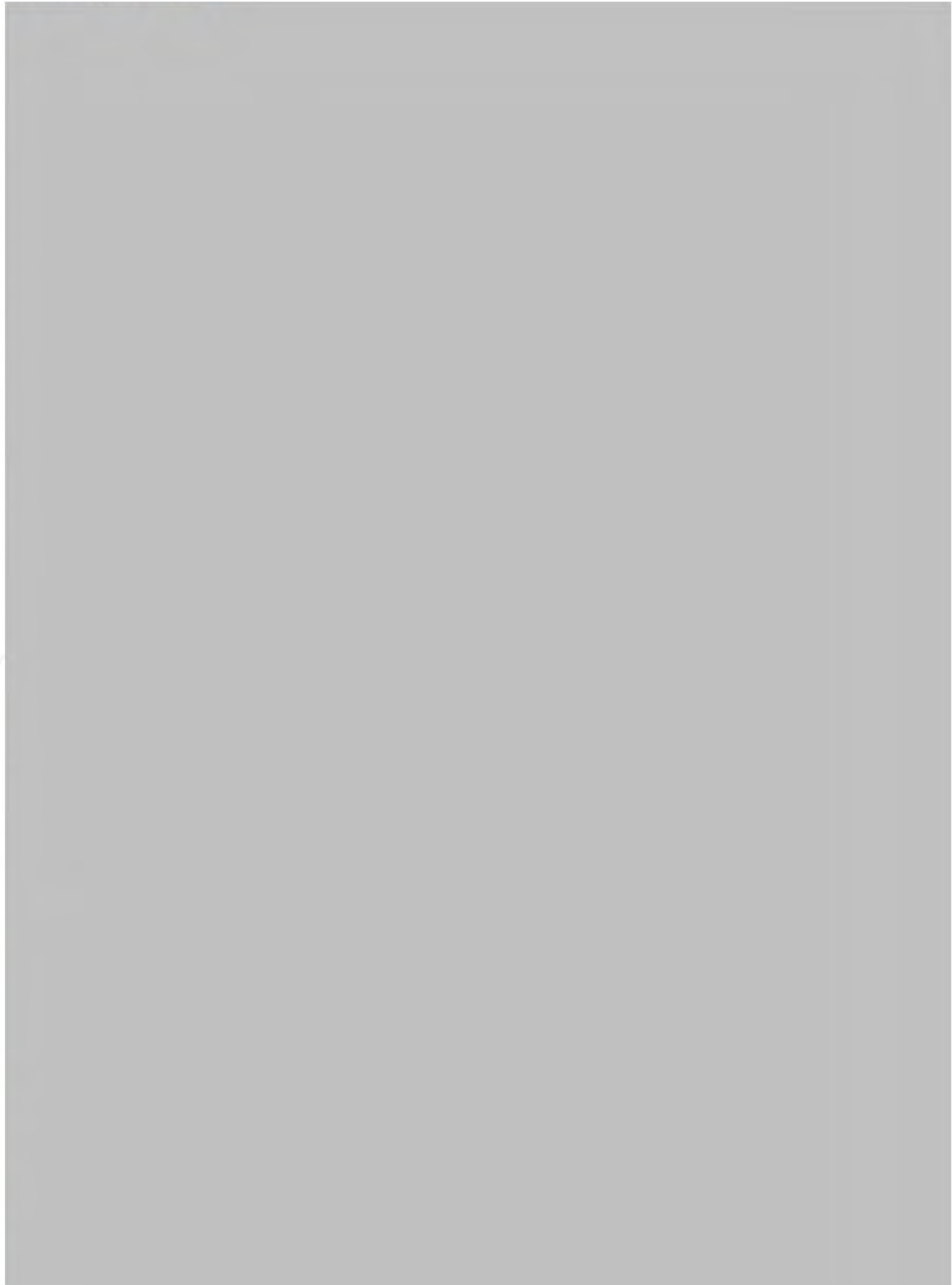
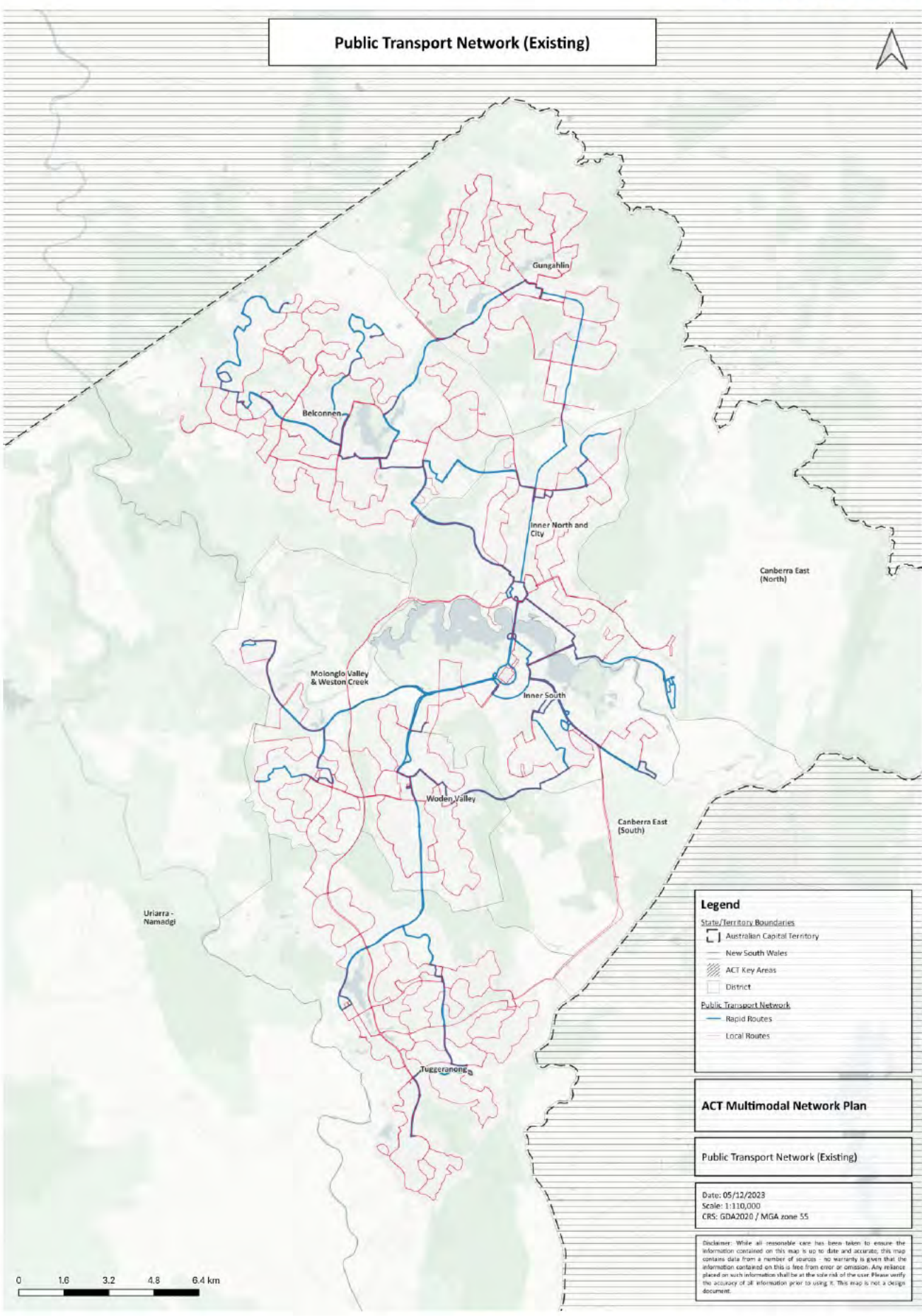




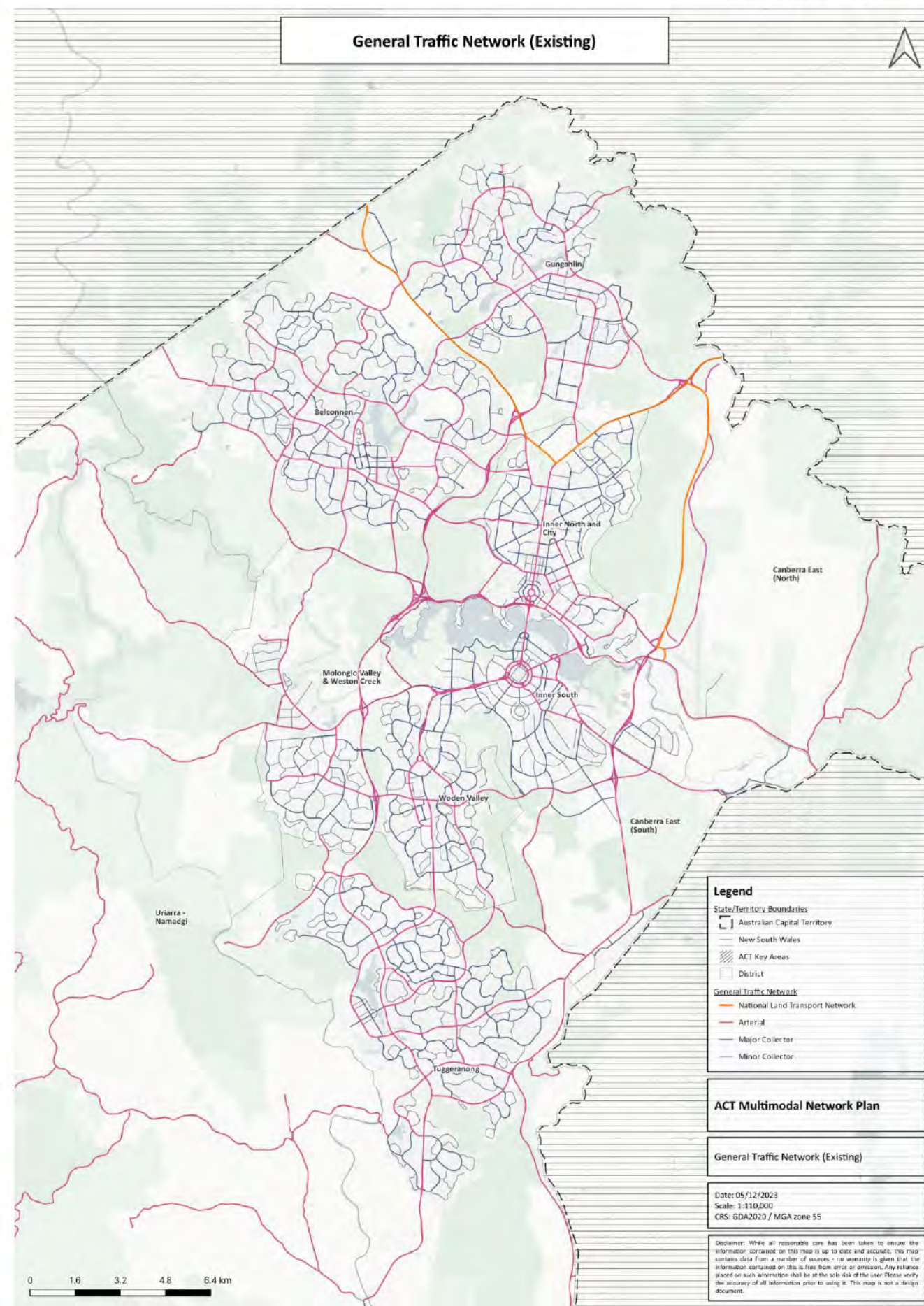


Appendix A – Existing Modal Hierarchies and Future Network Changes

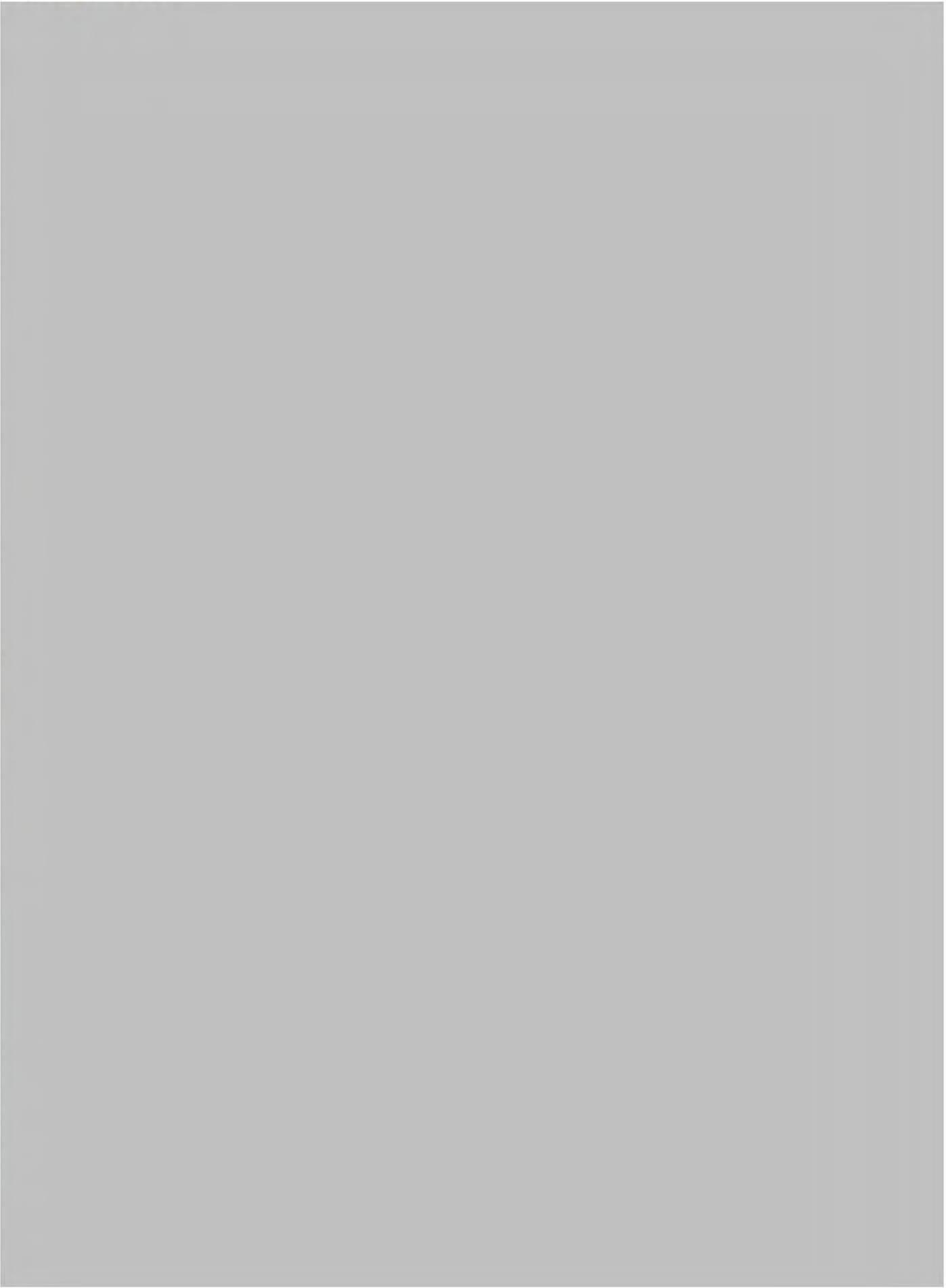
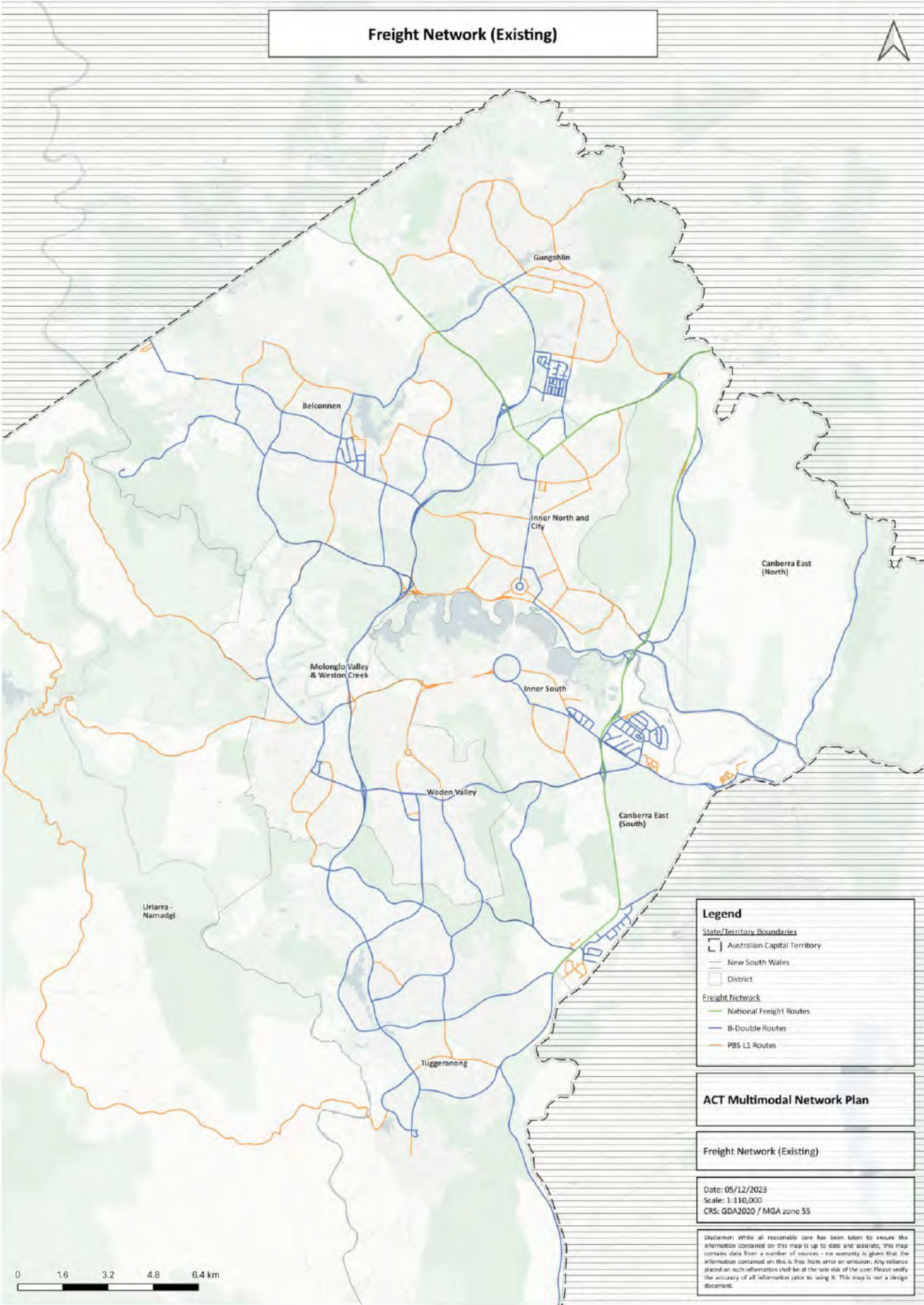
Future Changes to the Public Transport Network



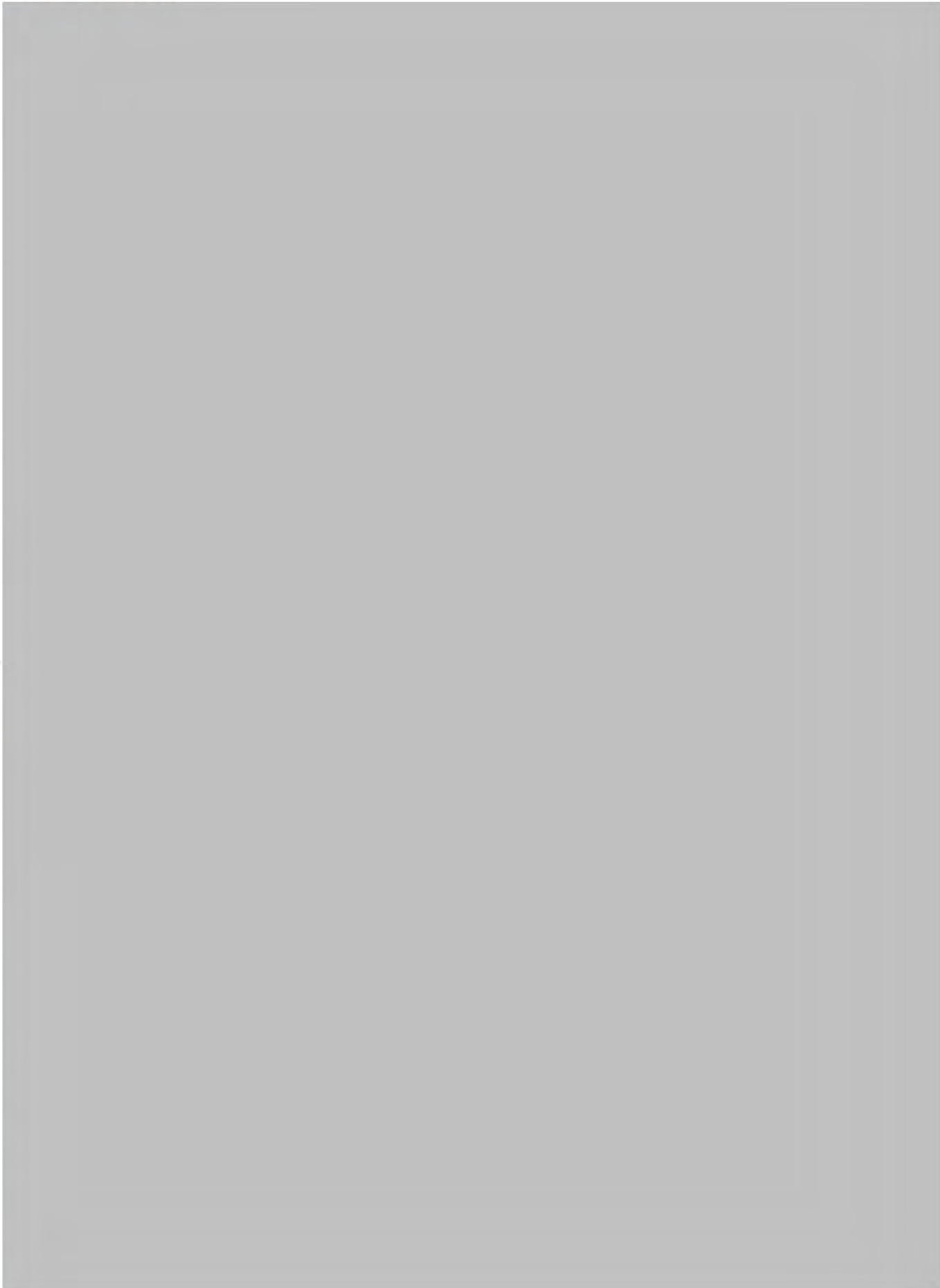
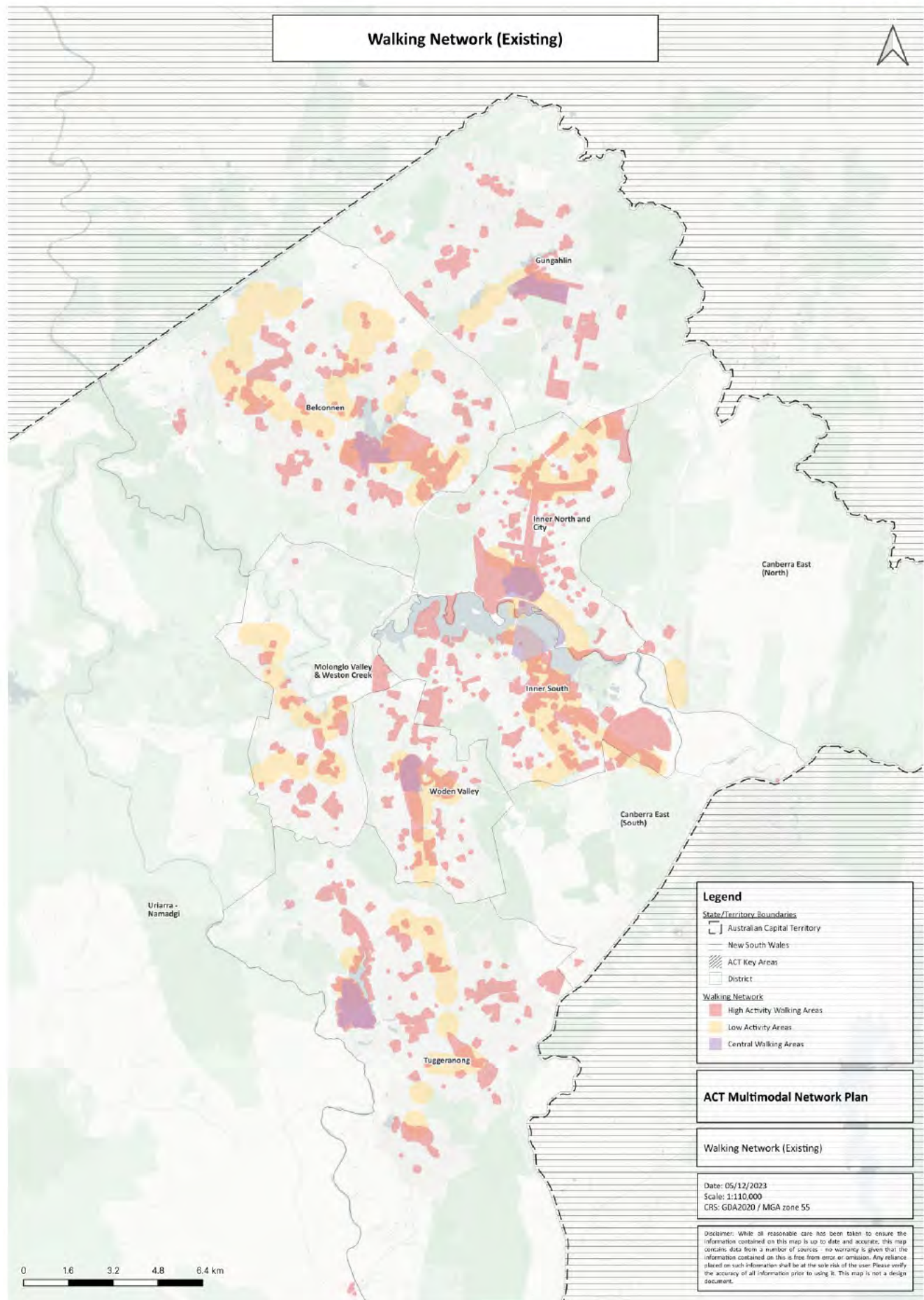
Future Changes to the General Traffic Network



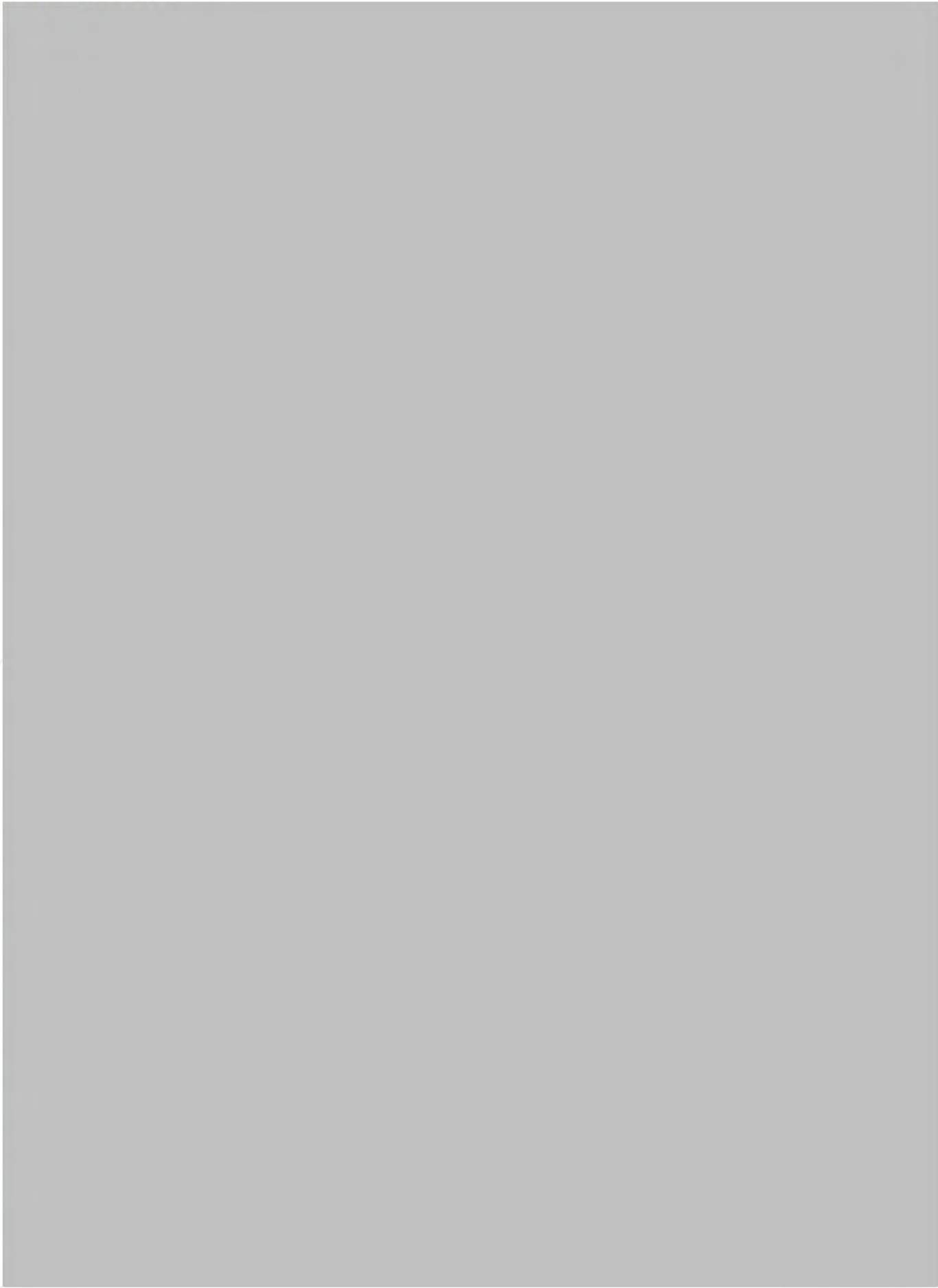
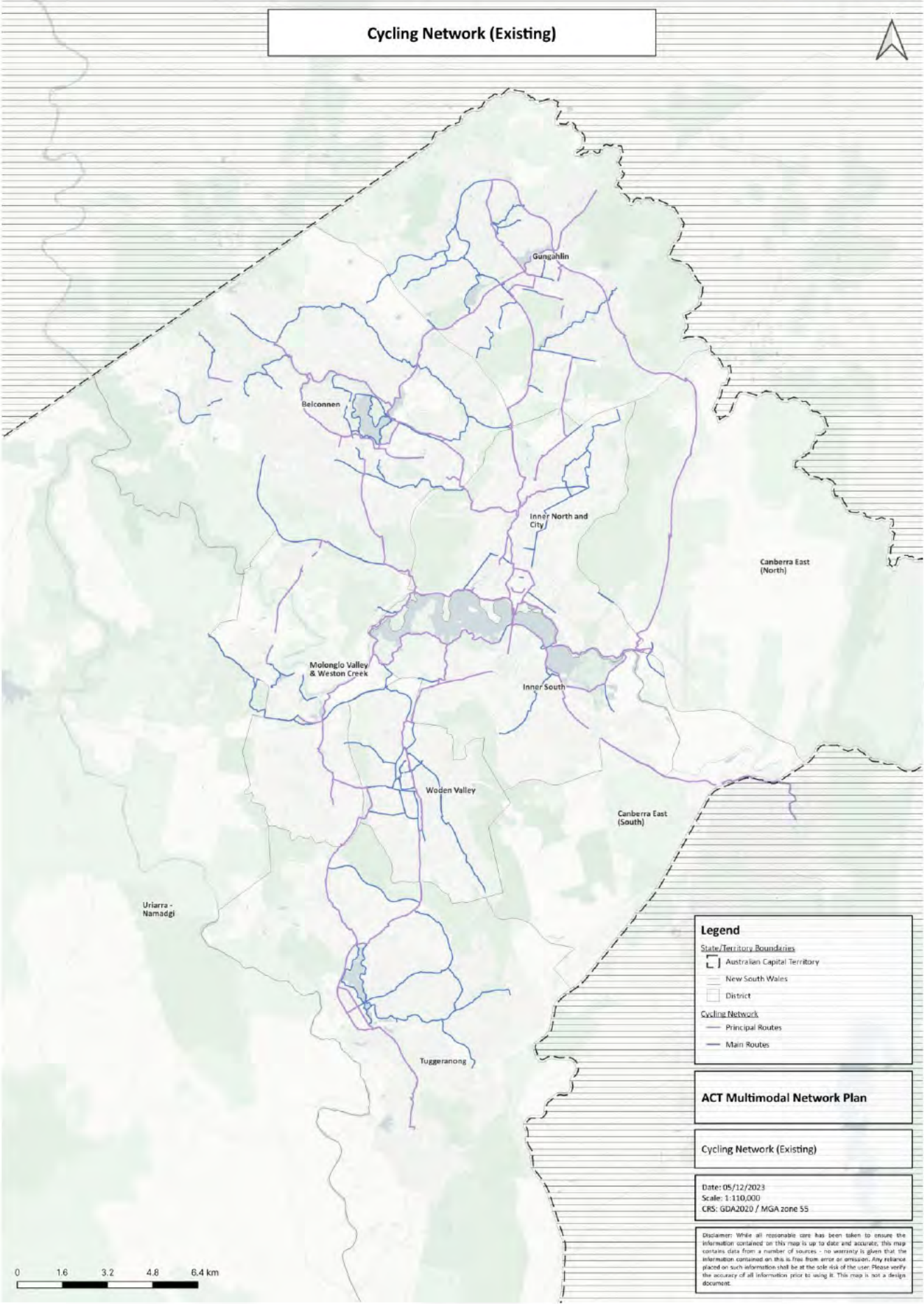
Future Changes to the Freight Network



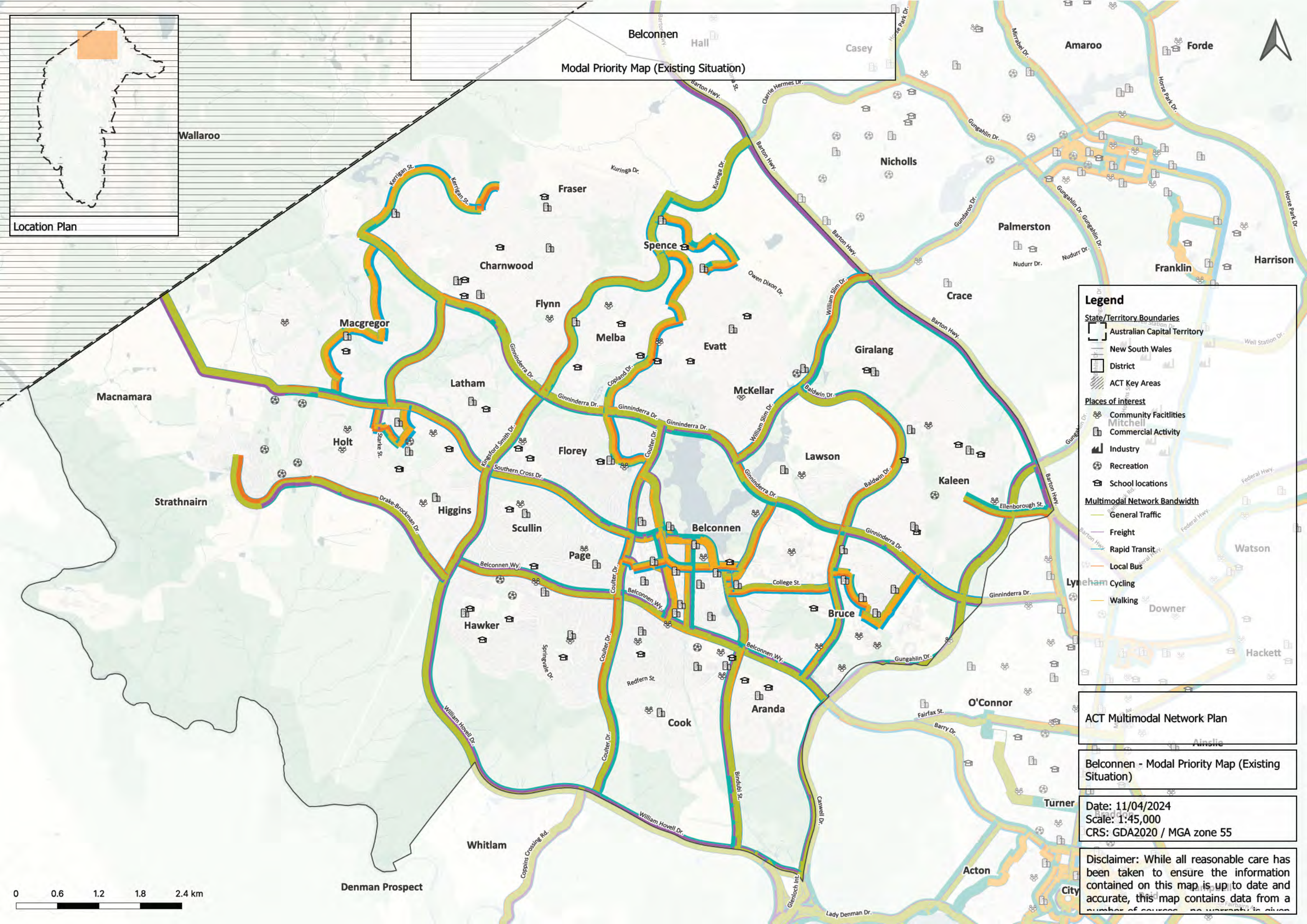
Future Changes to the Walking Network



Future Changes to the Cycling Network



Appendix E – Existing Modal Priorities



Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

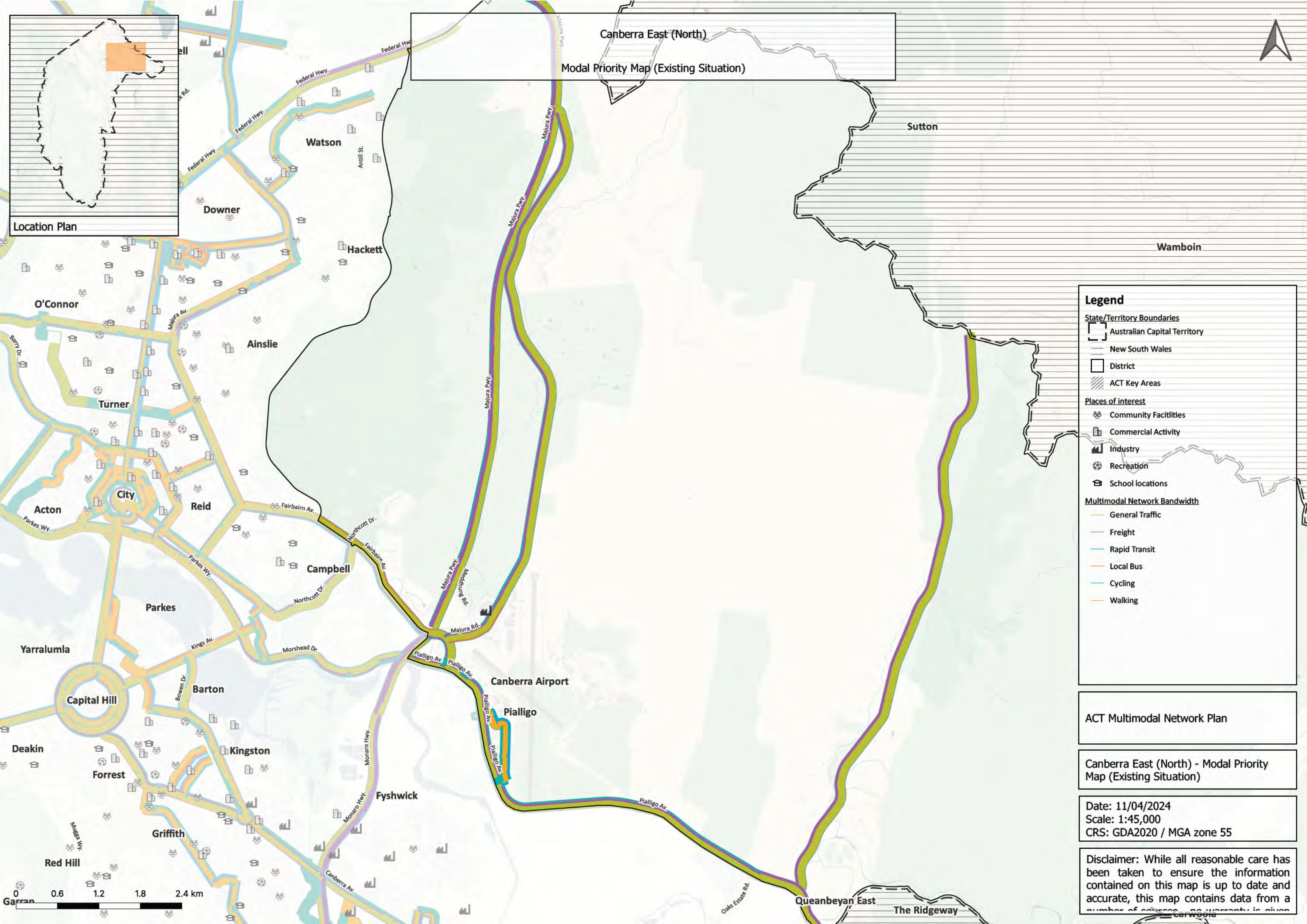
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Belconnen - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources, no warranty is given



Canberra East (North)
Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

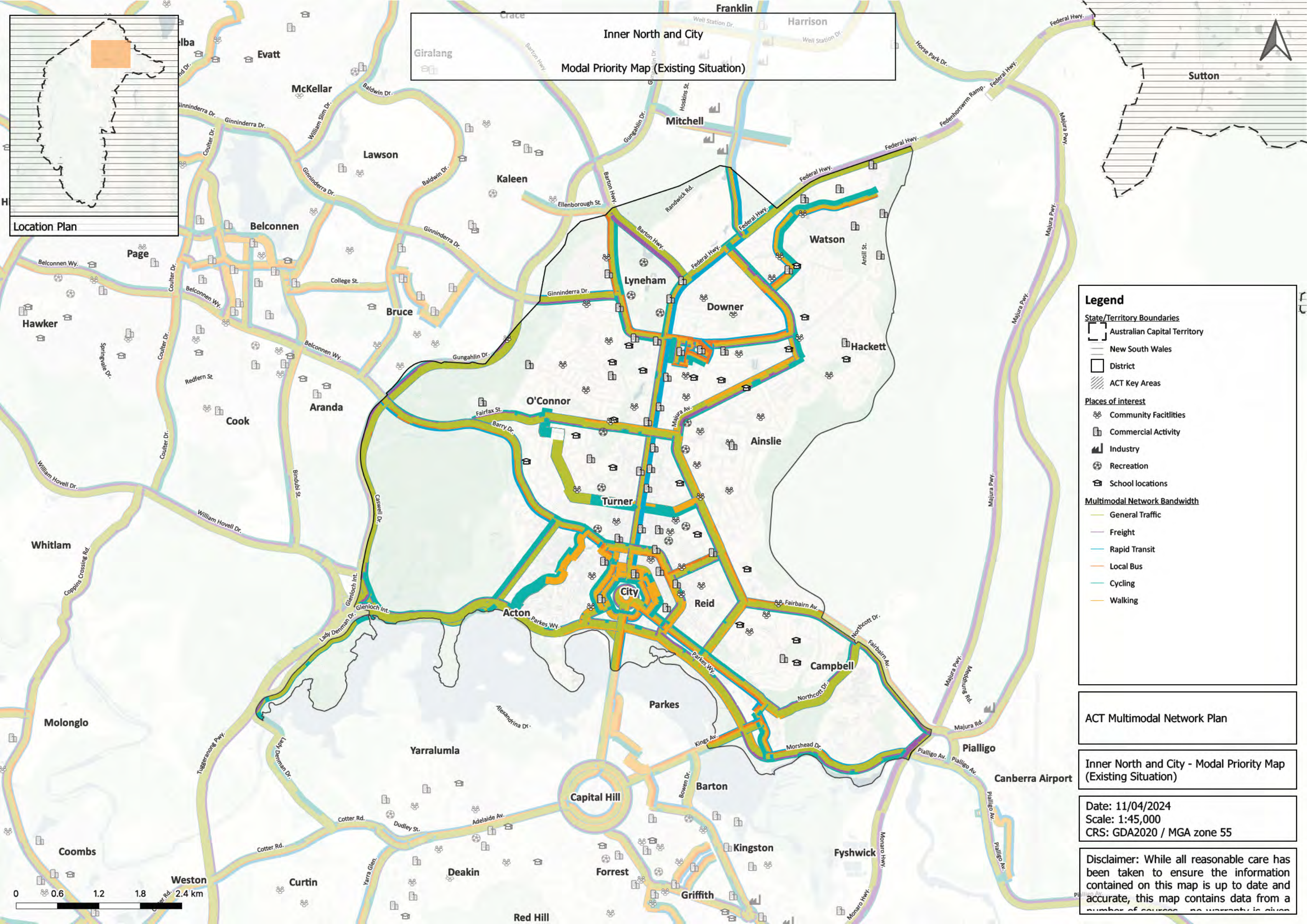
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Canberra East (North) - Modal Priority
Map (Existing Situation)

Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has
been taken to ensure the information
contained on this map is up to date and
accurate, this map contains data from a
number of sources. No warranty is given



Inner North and City
Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Inner North and City - Modal Priority Map
(Existing Situation)

Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.



Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

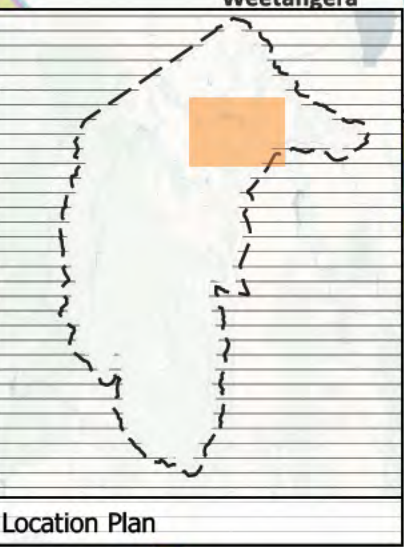
ACT Multimodal Network Plan

Inner South - Modal Priority Map (Existing Situation)

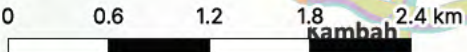
Queanbeyan West

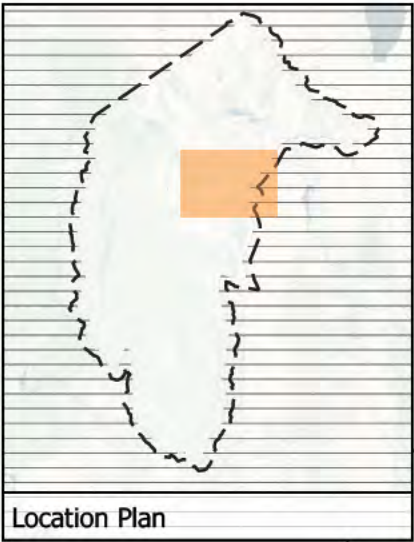
Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources, no warranty is given

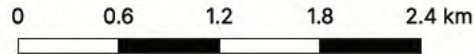


Location Plan





Modal Priority Map (Existing Situation)



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

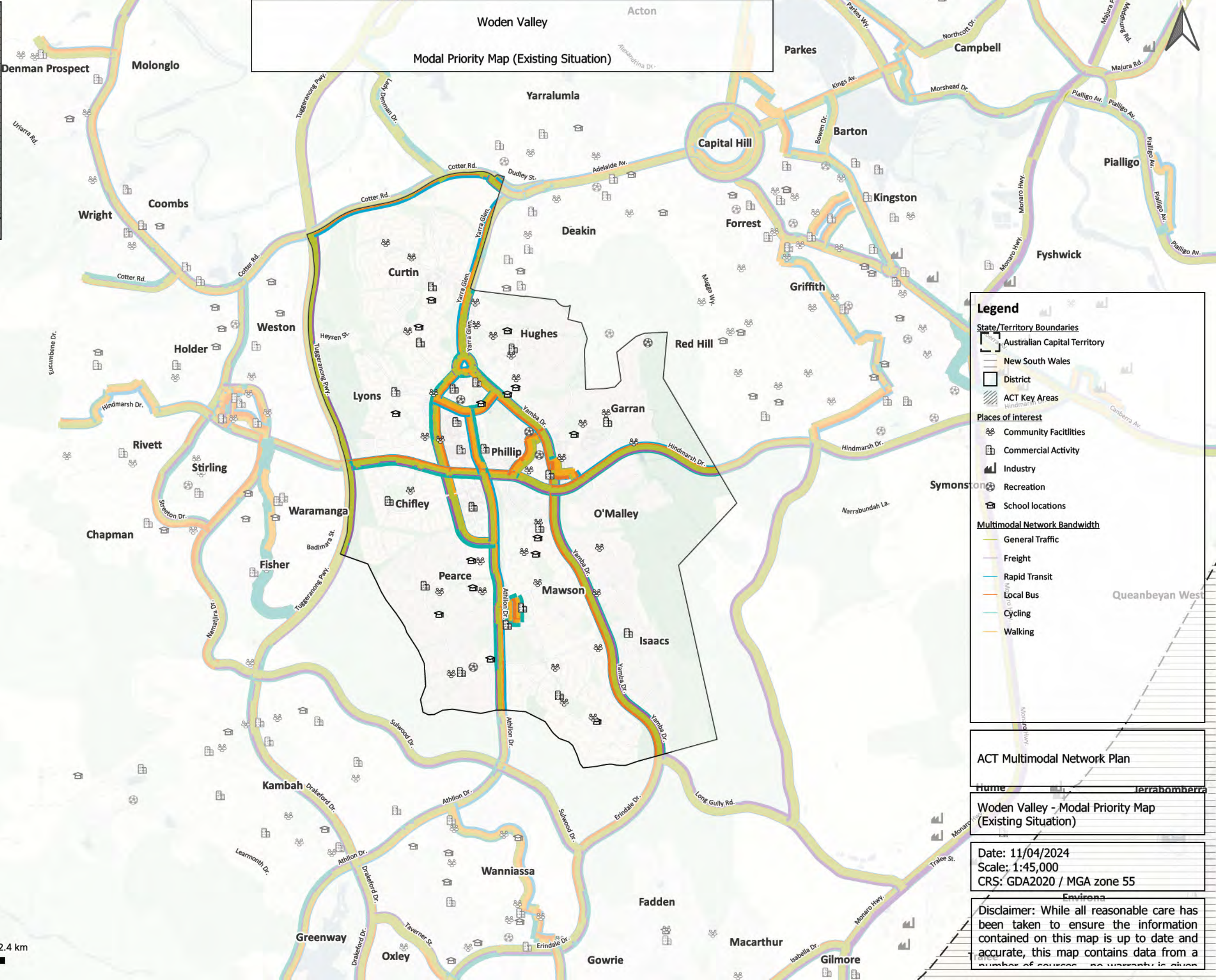
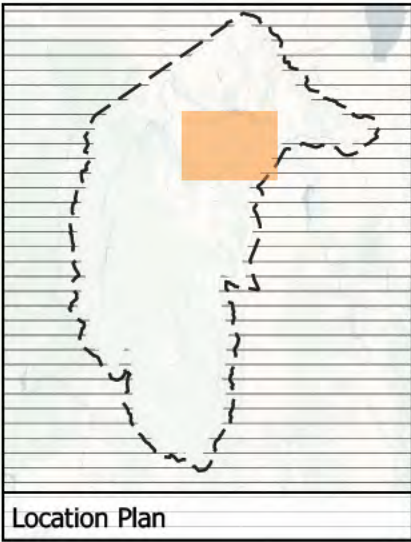
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan **Googong**

Tuggeranong - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

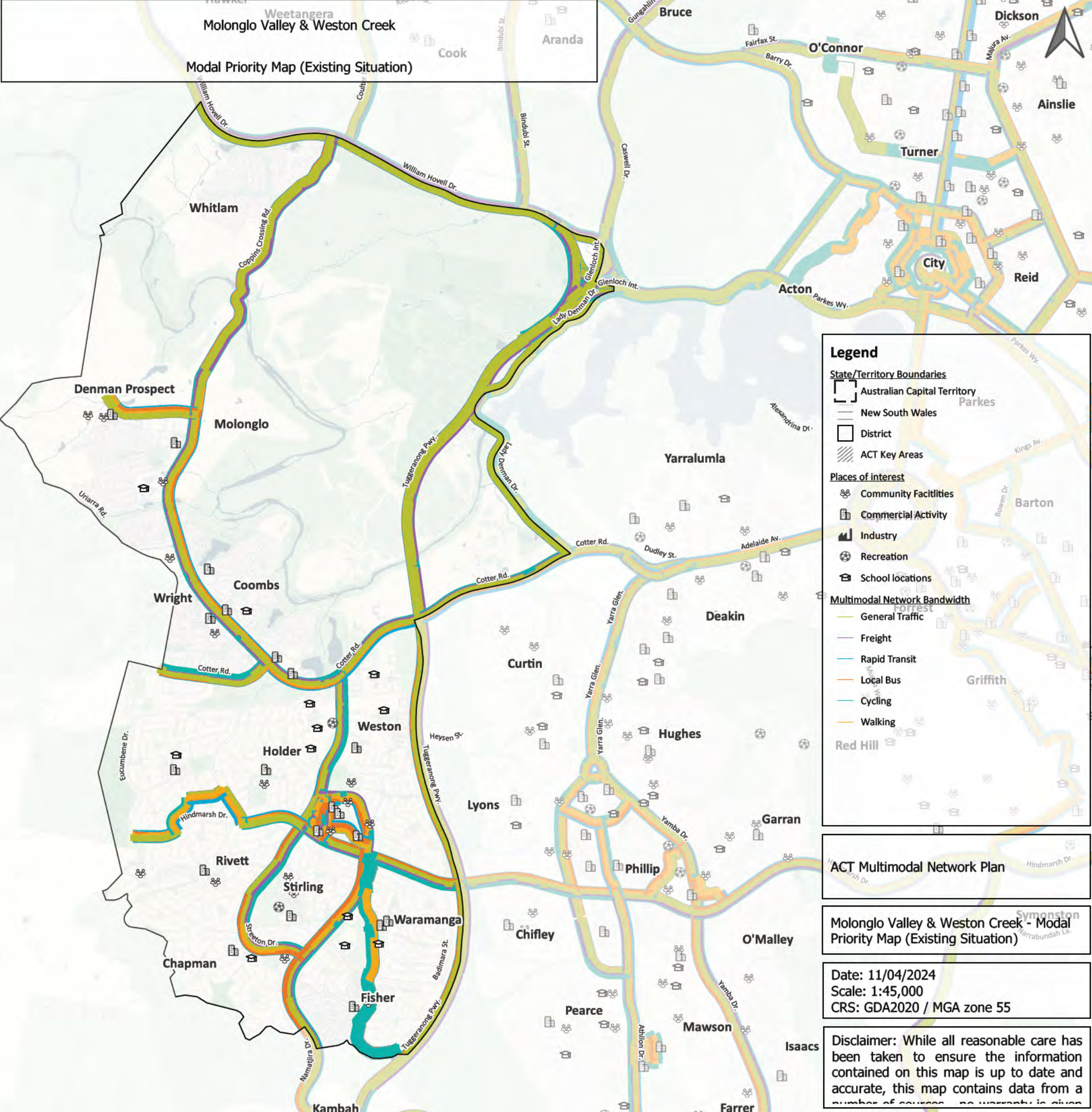
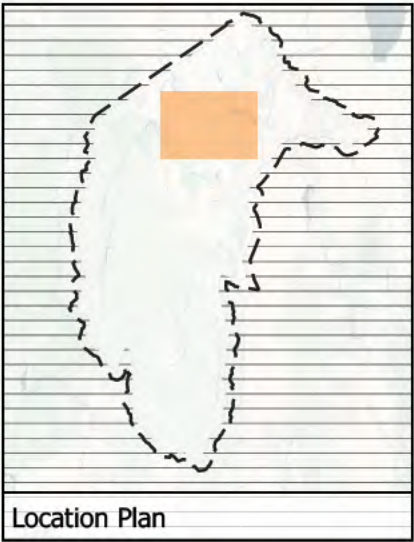
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Woden Valley - Modal Priority Map
(Existing Situation)

Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.





Canberra East (South)
Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

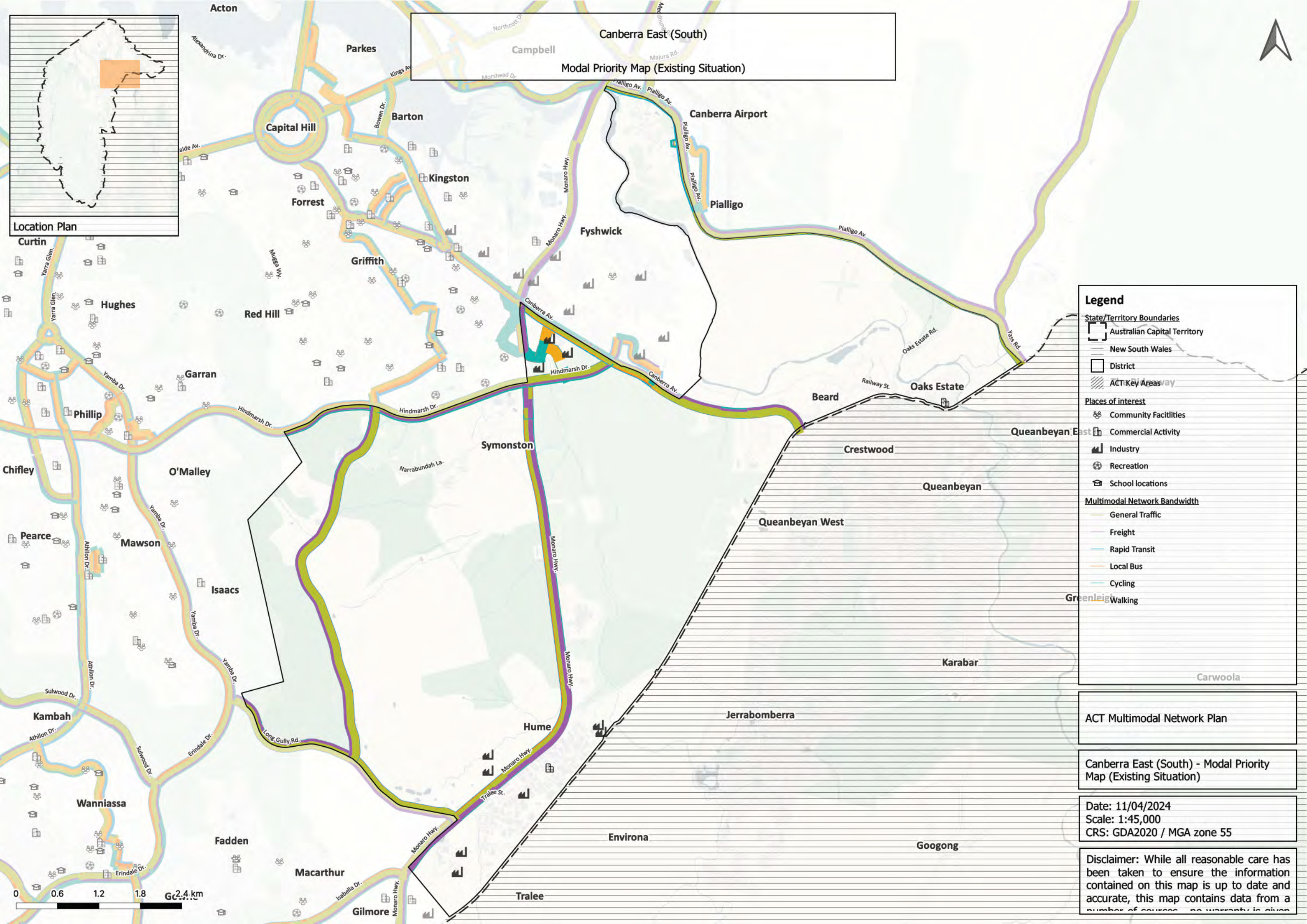
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

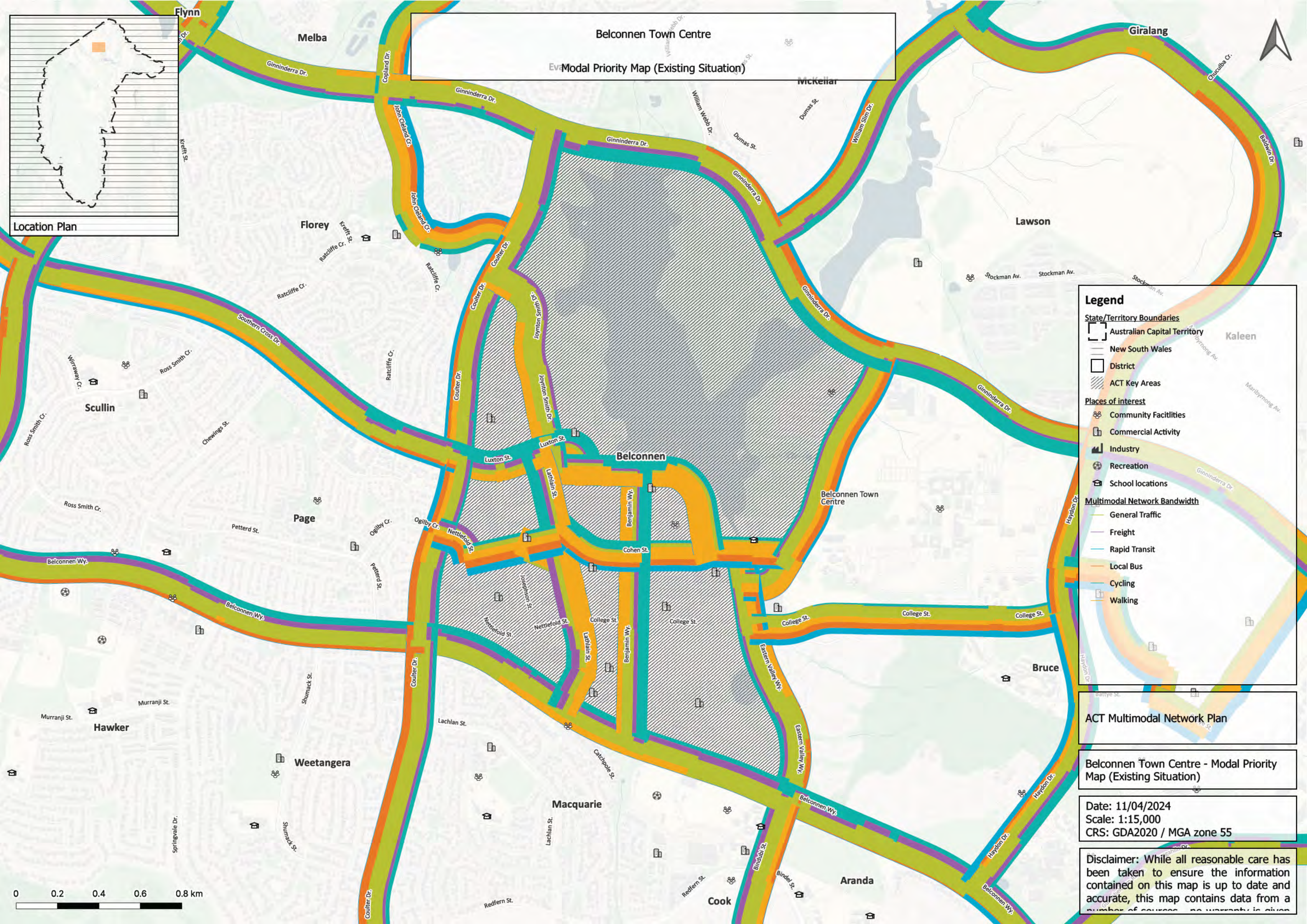
ACT Multimodal Network Plan

Canberra East (South) - Modal Priority
Map (Existing Situation)

Date: 11/04/2024
Scale: 1:45,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has
been taken to ensure the information
contained on this map is up to date and
accurate, this map contains data from a
number of sources, no warranty is given





Belconnen Town Centre
Existing Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

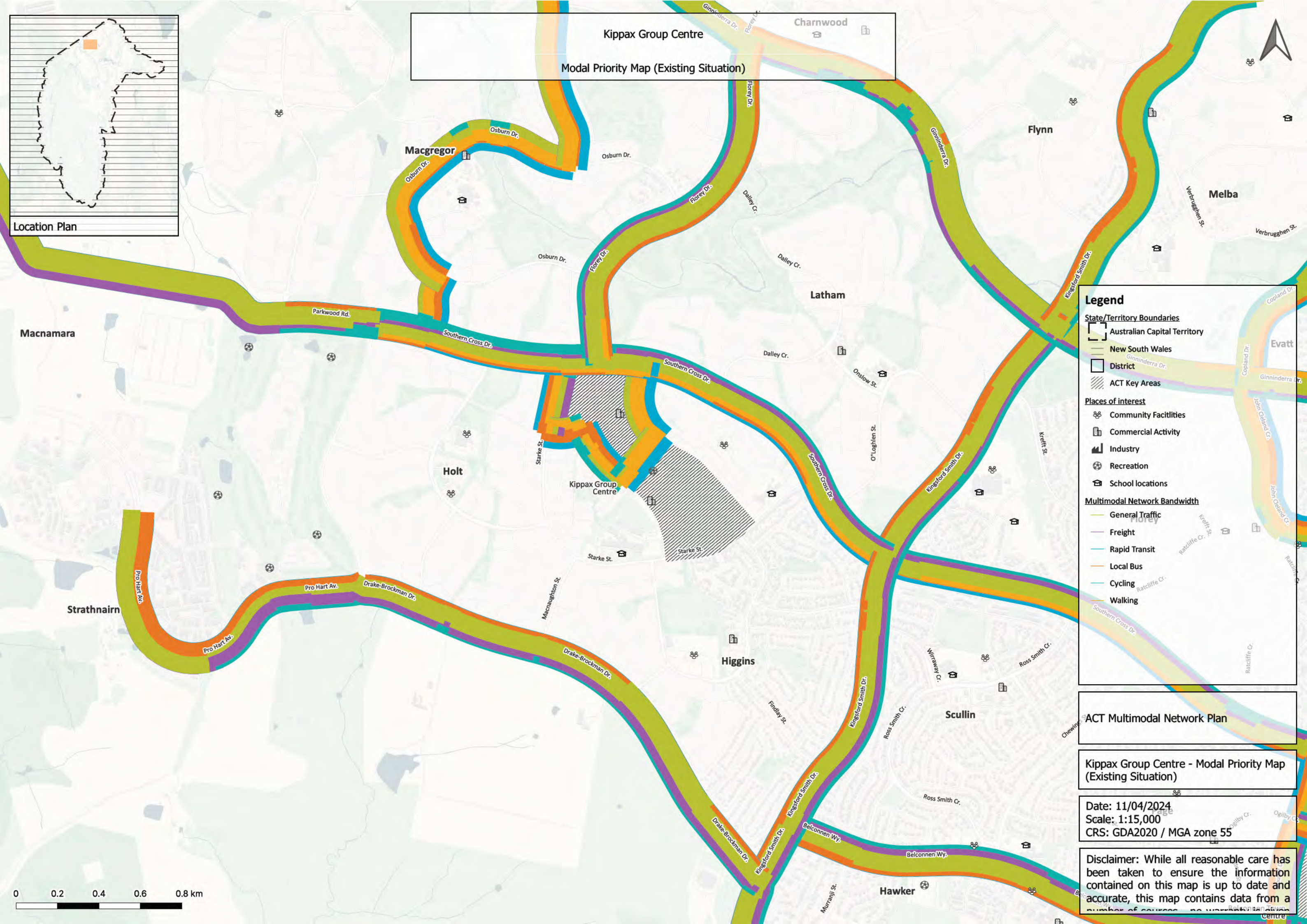
Belconnen Town Centre - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.

Location Plan

0 0.2 0.4 0.6 0.8 km



Kippax Group Centre
Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

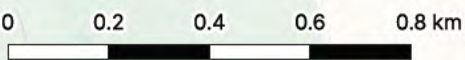
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

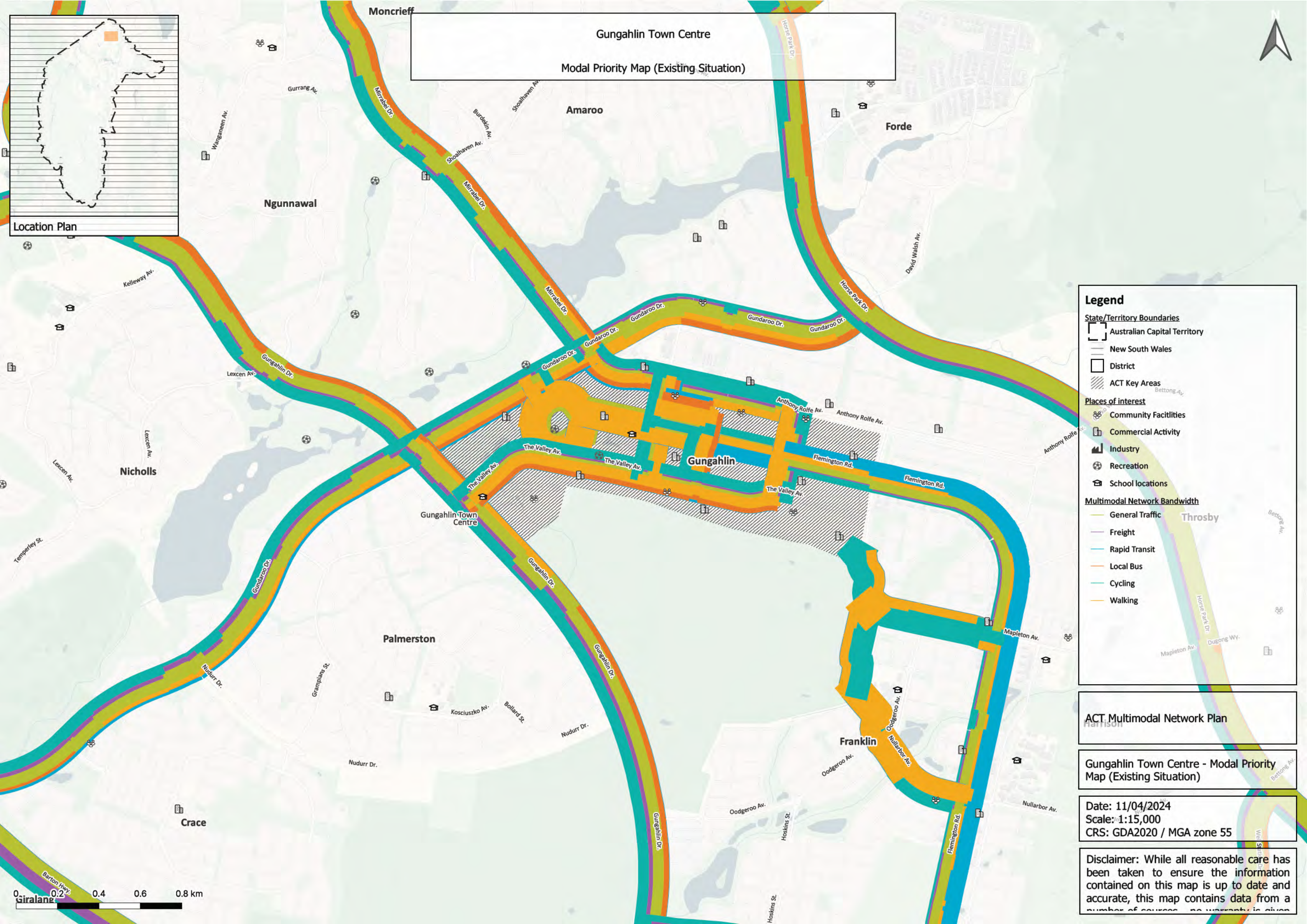
ACT Multimodal Network Plan

Kippax Group Centre - Modal Priority Map
(Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is made by the ACT Government for the accuracy or completeness of the information.





Gungahlin Town Centre

Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

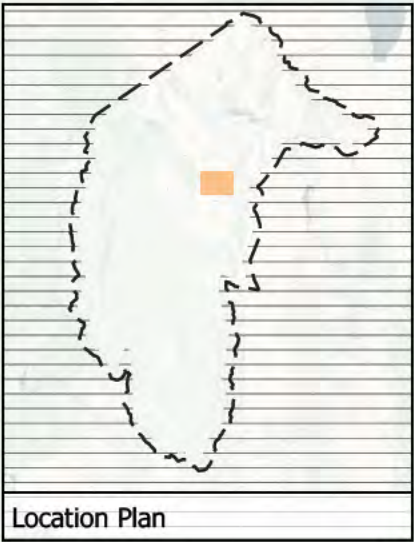
Gungahlin Town Centre - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

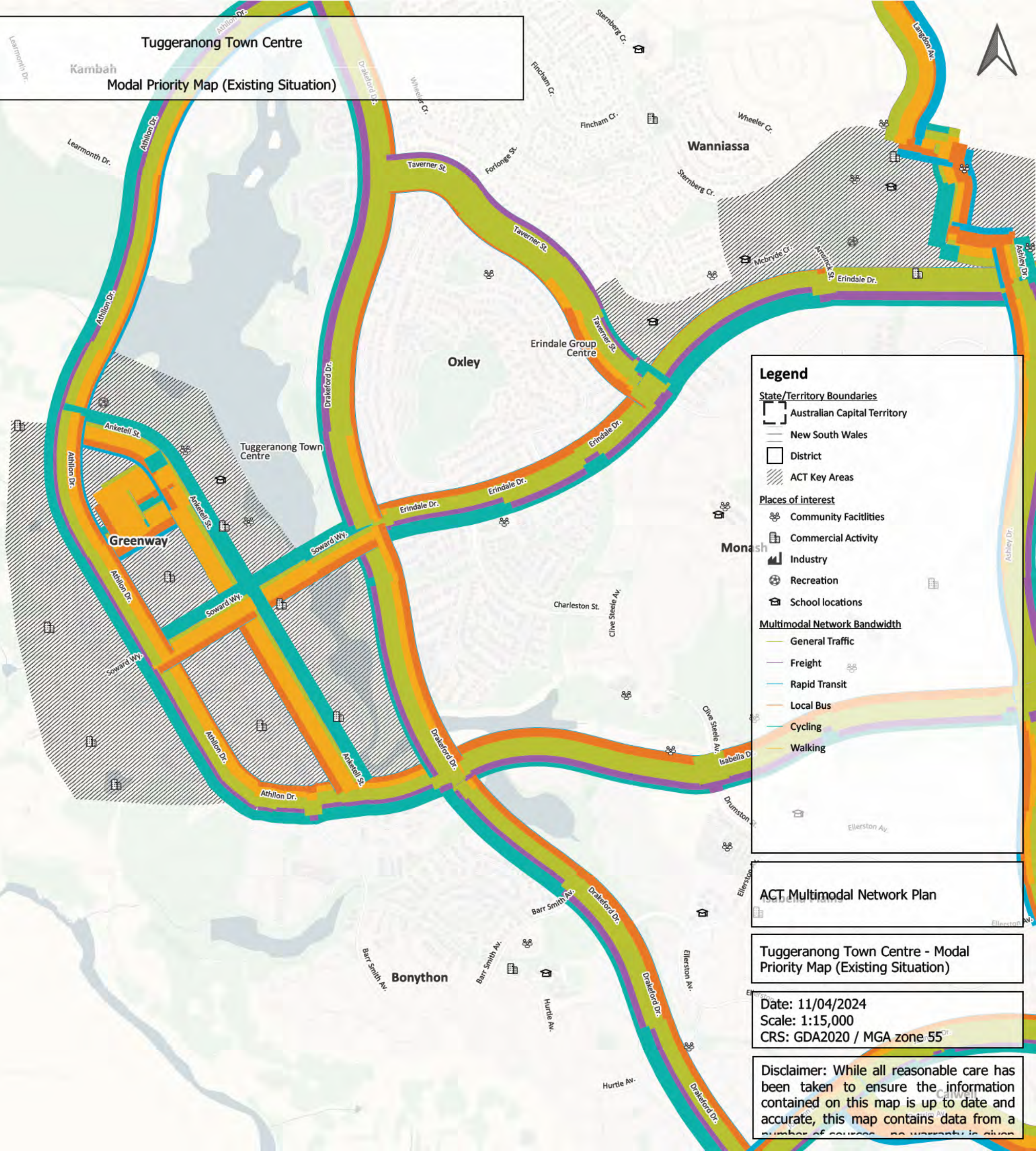
Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources, no warranty is given

Location Plan

0 0.2 0.4 0.6 0.8 km



Tuggeranong Town Centre
Modal Priority Map (Existing Situation)



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Tuggeranong Town Centre - Modal
Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources, no warranty is given



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

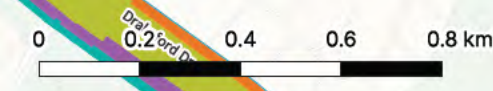
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Mawson Group Centre - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.

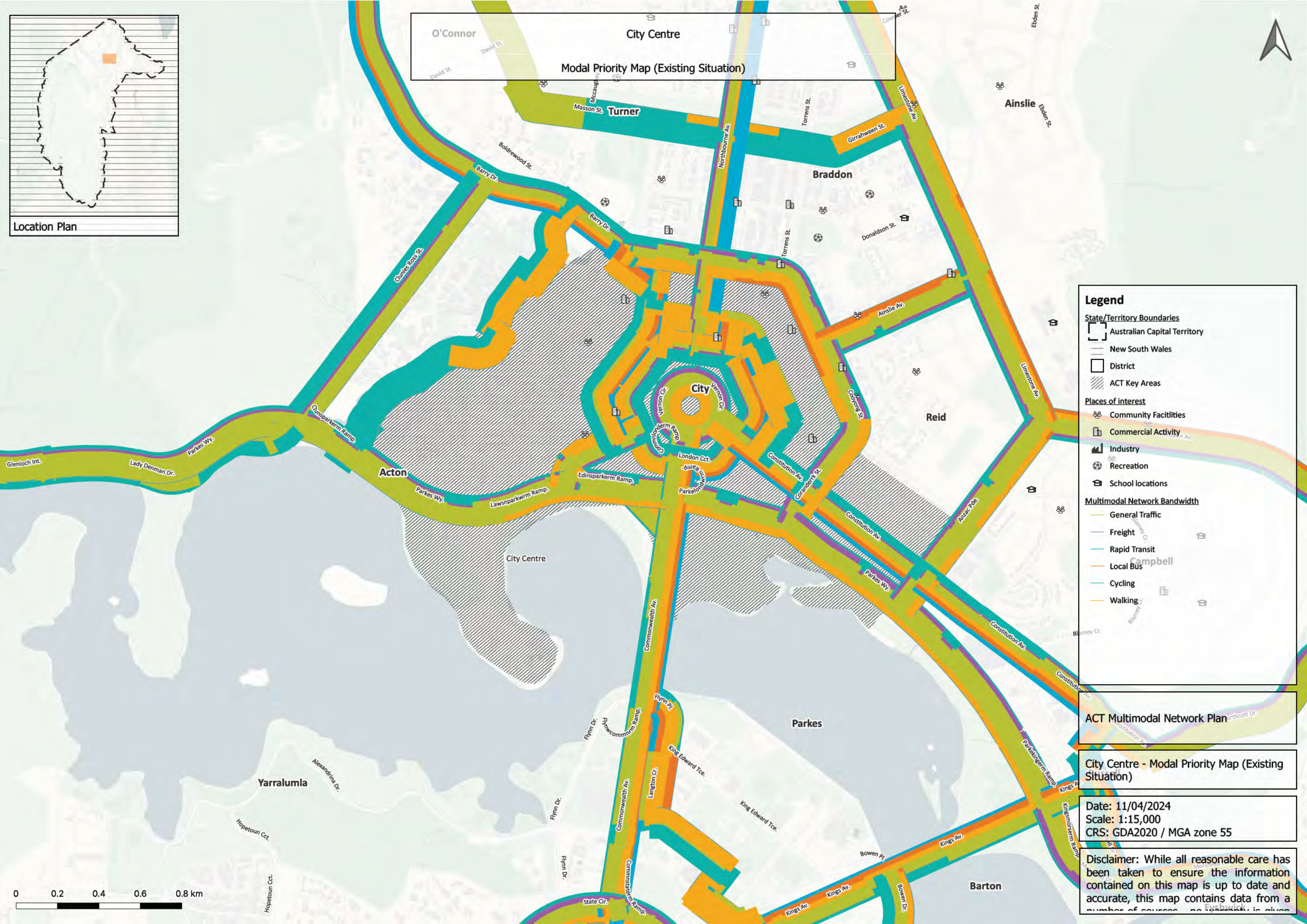




O'Connor

City Centre

Modal Priority Map (Existing Situation)



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

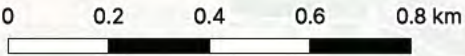
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

City Centre - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources, no liability is given





Molonglo Valley Group Centre
Modal Priority Map (Existing Situation)



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Molonglo Valley Group Centre - Modal
Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.

0 0.2 0.4 0.6 0.8 km



Dickson Group Centre
Modal Priority Map (Existing Situation)

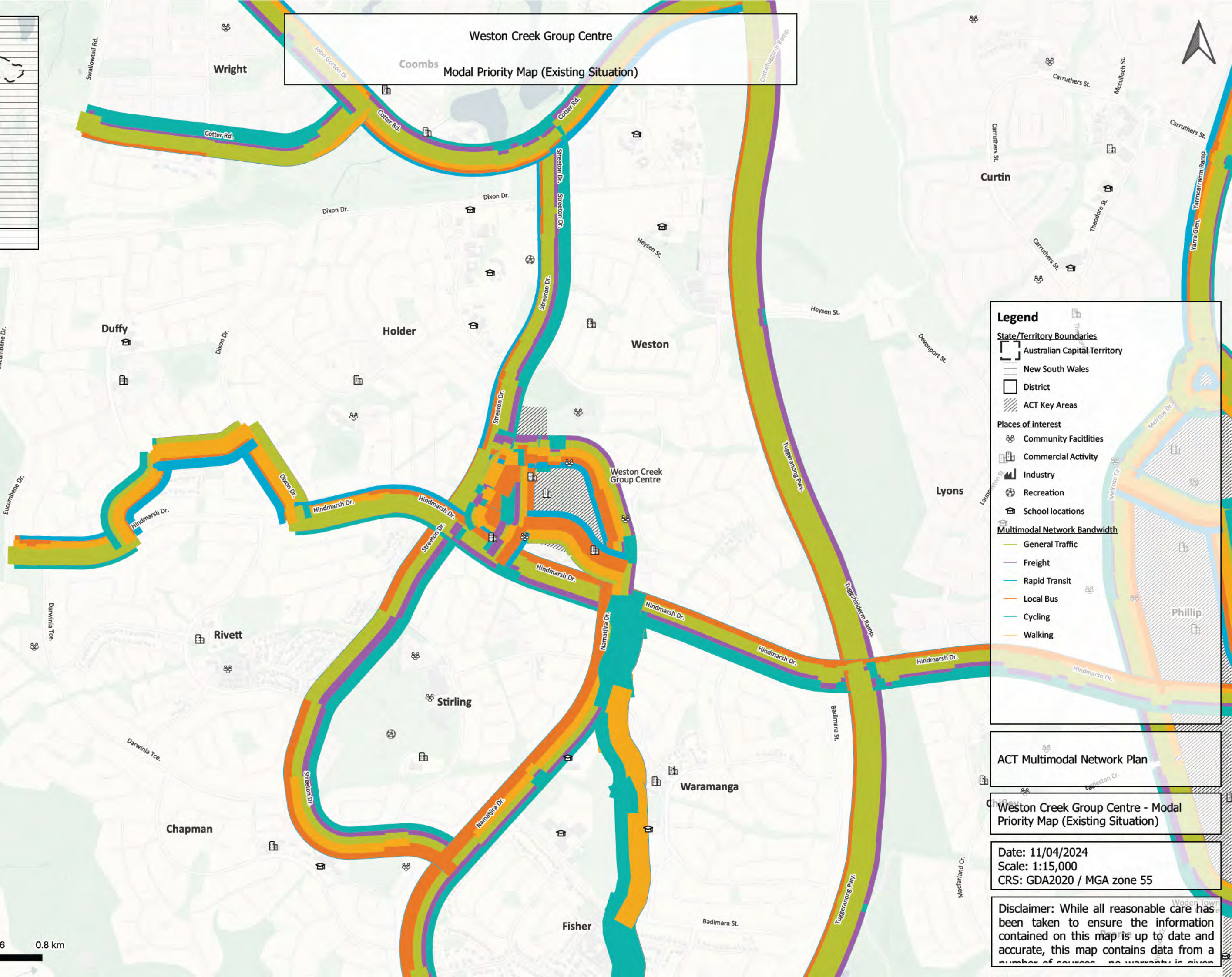
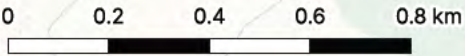
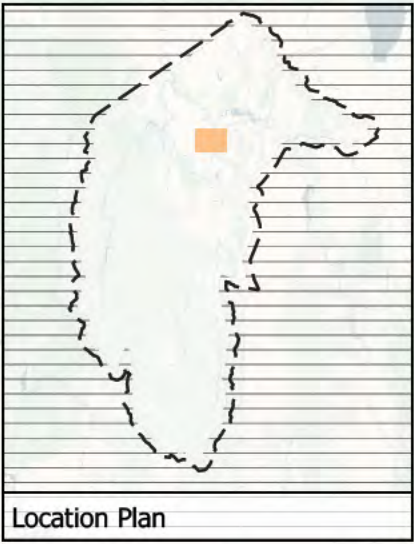
- Legend**
- State/Territory Boundaries
- Australian Capital Territory
 - New South Wales
 - District
 - ACT Key Areas
- Places of interest
- Community Facilities
 - Commercial Activity
 - Industry
 - Recreation
 - School Locations
- Multimodal Network Bandwidth
- General Traffic
 - Freight
 - Rapid Transit
 - Local Bus
 - Cycling
 - Walking

ACT Multimodal Network Plan

Dickson Group Centre - Modal Priority
Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

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Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

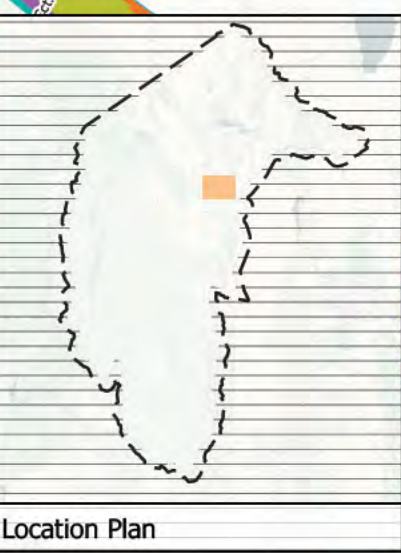
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Weston Creek Group Centre - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

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Erindale Group Centre
Modal Priority Map (Existing Situation)



Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

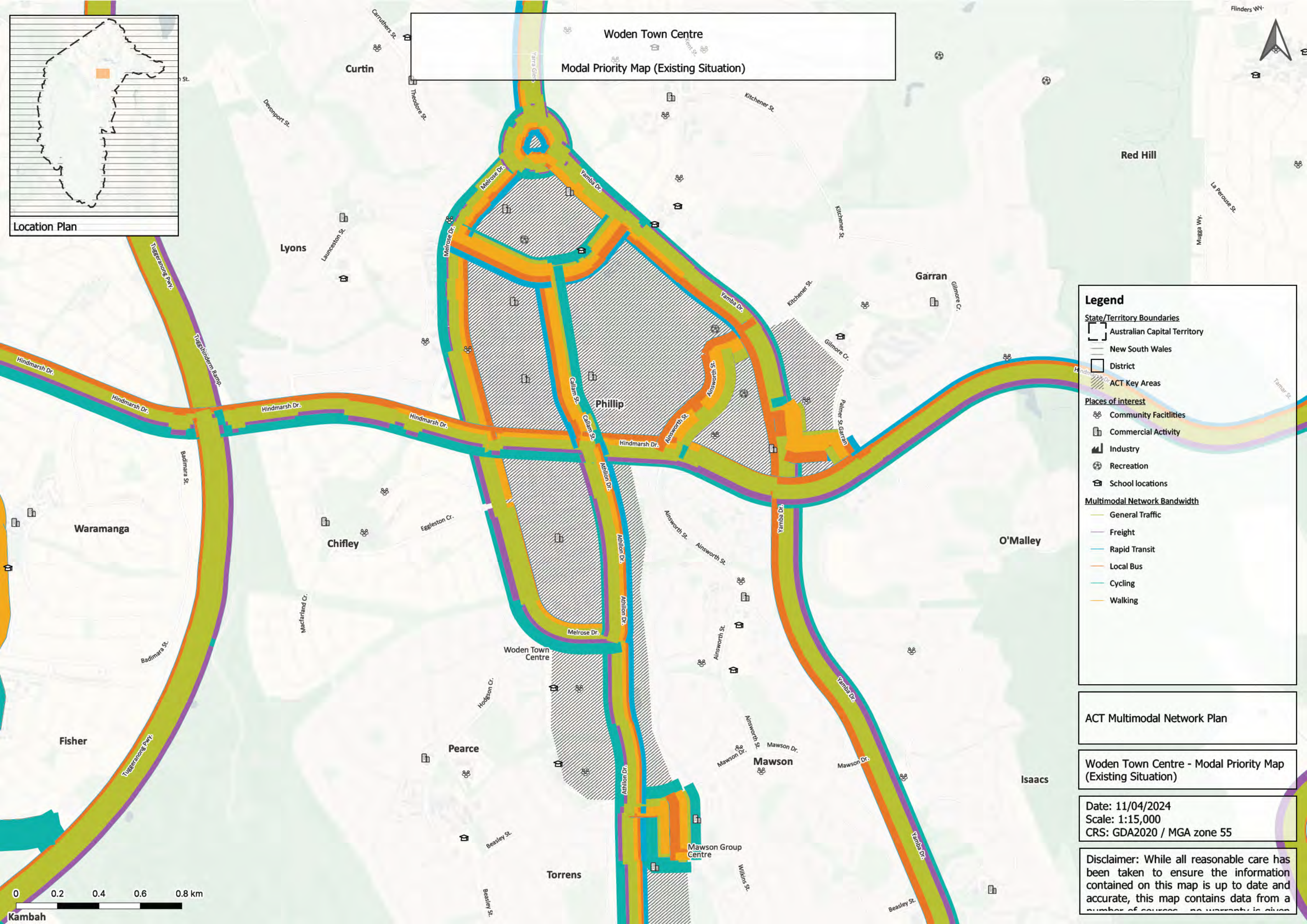
- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Erindale Group Centre - Modal Priority Map (Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

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Woden Town Centre
Modal Priority Map (Existing Situation)

Legend

State/Territory Boundaries

- Australian Capital Territory
- New South Wales
- District
- ACT Key Areas

Places of interest

- Community Facilities
- Commercial Activity
- Industry
- Recreation
- School locations

Multimodal Network Bandwidth

- General Traffic
- Freight
- Rapid Transit
- Local Bus
- Cycling
- Walking

ACT Multimodal Network Plan

Woden Town Centre - Modal Priority Map
(Existing Situation)

Date: 11/04/2024
Scale: 1:15,000
CRS: GDA2020 / MGA zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources. No warranty is given.

Appendix G – Multimodal Deficiency Assessment Technical Note

Technical Note

Subject	Multimodal Deficiency Assessment	Date of Issue	11 April 2024
Project Title	ACT Multimodal Network Plan	Project No.	30021237
Document No.	30021237-TN-08	Revision	01
Author			
Reviewed by		Approved by	
Prepared for	ACT Government	Attention to	
Attachments	N/A		

1. Introduction

1.1 Overview

Canberra's transport network is integral in connecting its people and places, facilitating over a million trips a day. This network includes many different modes of travel, enabling residents living in the capital and in the wider Canberra region to access jobs and services, as well as supporting a range of commercial activities that keeps the city moving.

The *ACT Transport Strategy 2020* (the 'Transport Strategy') sets out the Australian Capital Territory (ACT) Government's approach to achieving a world class transport system that supports a compact, sustainable, and vibrant city. While the *Transport Strategy* provides a framework for planning and investment in transport for the next 20 years, it also identifies the need to refocus network planning and design to increase city building efforts by better integrating transport and land use. As a result, the ACT Government has commissioned SMEC to develop the *ACT Multimodal Network Plan* (MNP).

The MNP is intended to define the future transport network form and function required to support sustainable growth. This Technical Note summarises the assessment of the multimodal deficiencies on the ACT's Strategic Transport Network.

1.2 Project Background

The *Transport Strategy* was developed to consider the significant growth in Canberra over recent years and the planned future growth through to 2045. This includes dramatic population growth and a greater emphasis on urban infill within Canberra's inner precincts. The *Transport Strategy* has been developed alongside the *ACT Planning Strategy 2018* (the 'Planning Strategy') and *Climate Change Strategy 2019-2025* (the 'Climate Change Strategy') so that the partnership between transport and land use is optimised.

There are, however, several historic and emerging challenges with network planning for the ACT Government, such as:

- Network planning traditionally focussing on planning for individual modes, rather than planning a single transport network and coordinating planning activities across all modes.
- Siloed governance structure with no internal processes within the ACT Government to ensure that internal teams are working towards common strategy objectives. This is related to a limited "line of sight" between the *Transport Strategy* and infrastructure projects and policy initiatives, which means it is unclear how objectives will be translated into tangible actions.

- The impact of the global COVID-19 pandemic, with changed patterns of travel and transit patronage still returning to pre-pandemic levels.
- A need to incorporate scenario planning into the ACT Government's processes to help account for the inherent uncertainty with planning for the future.

Investment in single modal solutions in isolation will no longer meet the strategic objectives or capacity needs of the ACT, and a robust approach is needed to prioritise projects in a holistic manner that addresses all modes. There is also an opportunity to move away from a 'predict and provide' attitude towards the provision of transport infrastructure in favour of a 'vision and validate' philosophy that could encourage different investment strategies.

Appendix I – Review of Infrastructure Provision and Multimodal Deficiencies



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