Albury Wodonga Integrated Transport Strategy Background Report

Prepared for AlburyCity and the City of Wodonga

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Institute for Sensible Transport

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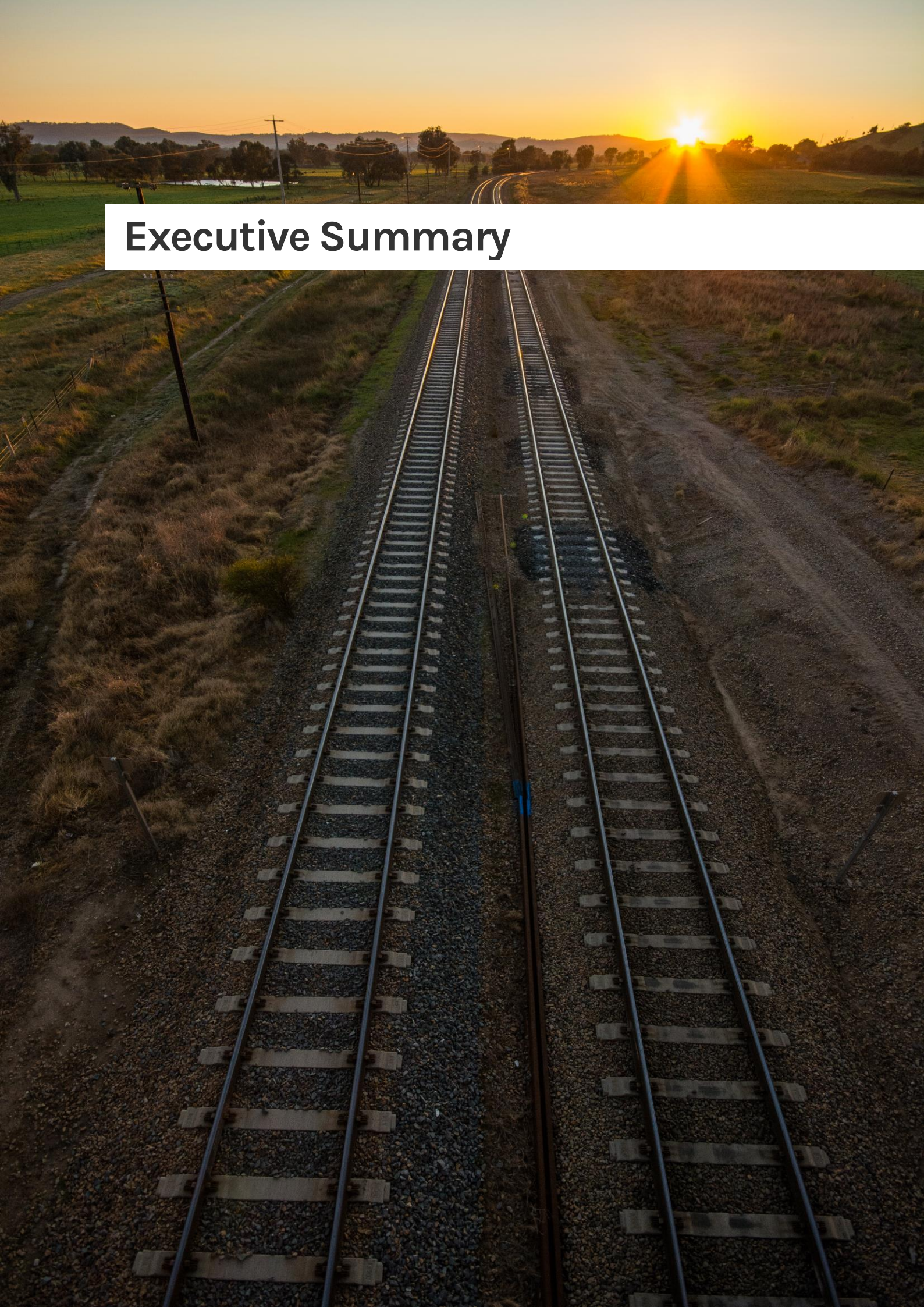


Executive Summary

The purpose of this project is to provide background information and data relevant to the development of the *Albury Wodonga Integrated Transport Strategy.* This report covers most modes of transport, from walking through to freight and aviation. This project originated from the *Two Cities One Community* initiative of AlburyCity and the City of Wodonga.

Guiding principles

Both councils have established a set of guiding principles and these will be used to inform our approach to the Literature Review and Background Report. These principles include:

- Connected and reliable
- Supportive of liveable places
- Facilitates growth and movement
- Equitable and accessible
- Safety, health and wellbeing
- Sustainable
- Intelligent.

This project recognises that the future Integrated Transport Strategy needs to be about more than simply the movement of people or goods. It needs to also prioritise creating successful, vibrant *places* and help the region achieve its sustainability goals.

A key goal of this project is to provide a robust set of data and evidence to enable both Councils to develop an Integrated Transport Strategy that makes Albury Wodonga an even better place to live, work and visit.

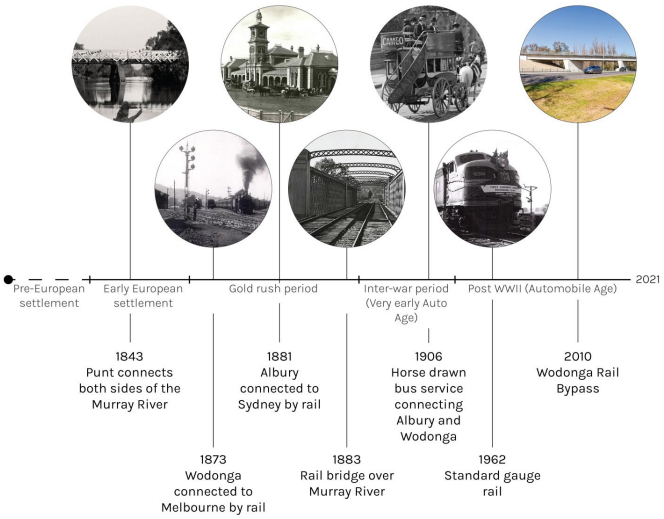
Overall findings

The below figure provides a synthesis of the key issues and barriers to a safer, more sustainable transport system, as well as opportunities to consider for the future *Integrated Transport Strategy*.

Topic	Issues / barriers		Opportunities	
Walking	Limited safe pedestrain crossings in CBD	Reduced safety to pedestrains from motor vehicles	Promote walking through more pedestrain focused design	
Cycling	Low levels of cycling due to under-developed network Poor coverage of bike network	Bike network is shared, disjointed, and not connected to key destinations	Connect key destinations, future infrastructure, shared paths with high quality cycling options	Investigate options to provide paths along Albury's open drains
Public transport	Newer developments built outside of public transport catchment No local buses to either Albury or Wodonga railway station	Limited harmonization between NSW and Victoria's services Takes longer and more expensive compared to car	Advocate for an Albury Wodonga Bus Review	Create a Murray River Transport Authority to harmonise public transport
Motor vehicles and parking	High levels of car dependency	High provision of car parking but low occupancy rates	Reduce speed limit within both CBDs and residential streets to 30km/h Use parking policy as a demand management tool	Behaviour change programme focused on sharing roads with active transport
Freight	Heavy vehicle traffic along neighbourhood streets	High levels of transport emissions from heavy vehicle traffic	Work with state governments and freight companies to shift freight from road to rail	Promote environmentally friendly freight options (e.g. electric or hydrogen)
Aviation	No bus service connecting the airport	No plan to reduce emissions associated with an estimated growth in flights	Advocate for more train services between Albury Wodonga, and Melbourne and Sydney as an alternative to flying	
Public realm and vibrancy	Limited vibrancy/people focused town centres.		Conduct a Circulation Plan for creating a pedestrianised or low traffic volume shared zone	Implement a policy for use of parking spaces as parklets

Historical developments in transport

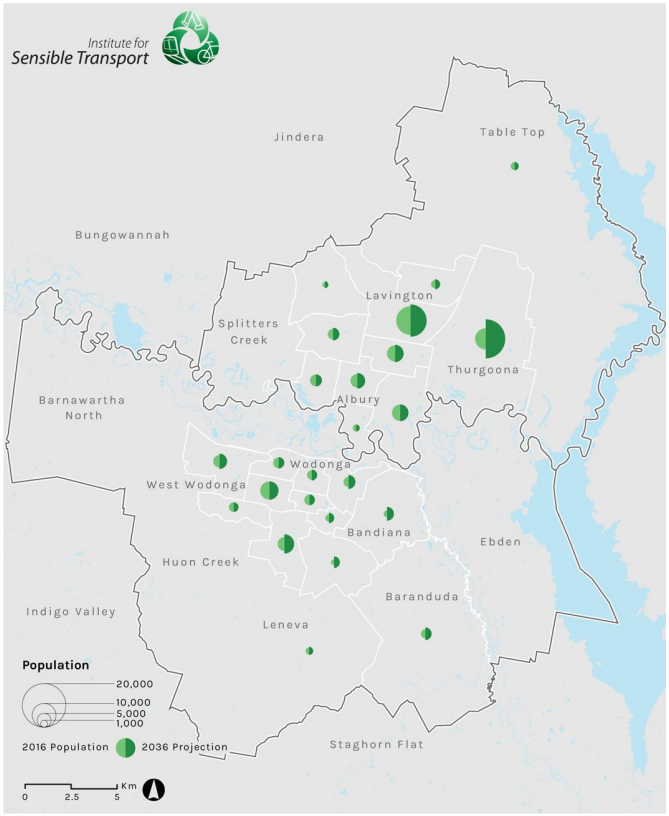
Section 3 provides an overview of key historical developments in Albury Wodonga, with a particular focus on transport. A snapshot of key developments is shown below.



Population and demographics

The estimated residential population of Albury and Wodonga is 97,717, as of June 2020. Most people live within the existing urban boundaries of Albury and Wodonga. In fact, approximately 90% of the population live on just 9% of the land. It is expected the combined Albury Wodonga population will reach 124,741 by 2036.

The figure on the right illustrates the magnitude of expected population growth between 2016 and 2036. Thurgoona is predicted to see major growth between now and 2036.



As part of our demographic analysis, we found that Albury and Wodonga's demographic centres are shifting further apart over time and growth to be highest on the periphery. This introduces new transport challenges, as it becomes harder to run a sustainable transport system in a more heavily dispersed settlement pattern.

Socioeconomics and health

A socio-economic assessment found that Albury Wodonga has some areas of significant disadvantage. These populations may experience transport disadvantage, limiting their ability to access important services.

The level of obesity and overweight is significantly higher in Albury Wodonga than averages in NSW and Victoria. A lack of physical activity has also been identified. The lack of walking and cycling participation is one contributing factor to this poor health outcome.

Car parking

An analysis of car parking requirements and policies found that the existing frameworks served to entrench rather than reduce car dependence and that on the whole, Albury Wodonga has a surplus of car parking, even in the central city.

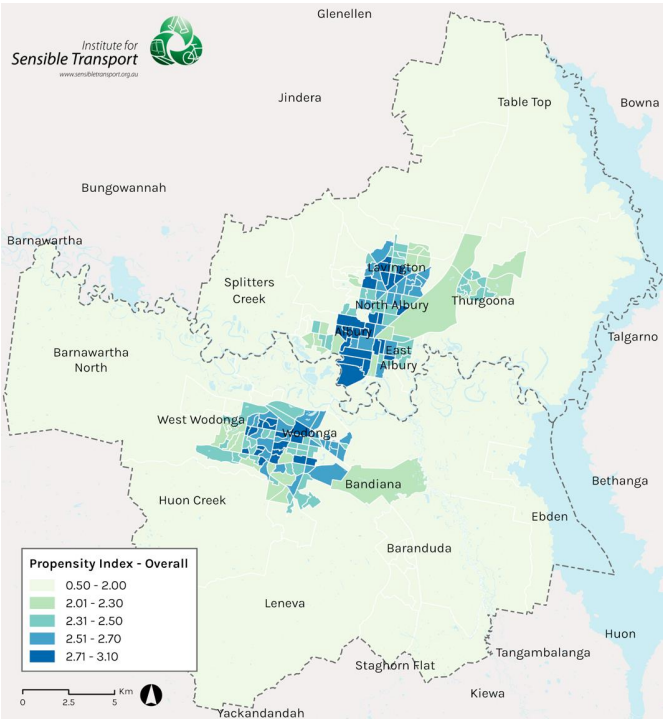
Parking cash in lieu schemes may not result in desirable outcomes.

By contrast, planning requirements for the provision of bicycle parking is insufficient to enable high bike ownership rates, despite being relatively cheap to provide.

If Councils desire more sustainable townships and more vibrant city centres, they may be better served by reducing parking overall while providing better choices for a more diverse set of transport options, including walking, cycling, and buses.

Understanding latent demand for cycling

A *Bike Use Propensity Index* was produced for the Albury Wodonga region, highlighting the relatively high latent demand for areas close to the CBDs, with lower demand in outer lying areas.



Many of the areas rating high on the Index were found to have insufficient bicycle infrastructure to capitalise on this latent demand.

Current transport patterns and networks

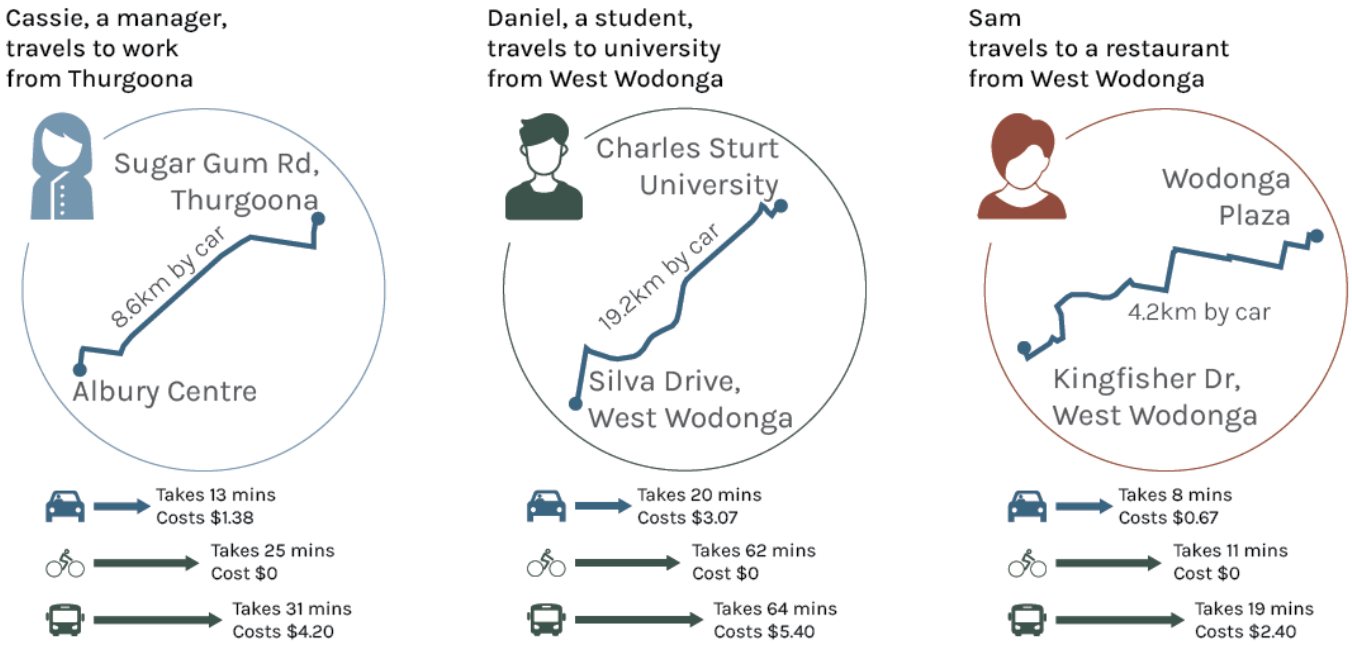
Since 2006, the car has been steadily increasing its dominance of the transport system, now accounting for 92.2% of all trips to work. Even for trips to work under 5km, 86.4% of people drive. Our analysis of the transport system found that in many cases, the car is the fastest, most convenient mode of transport and a lack of suitable alternatives has resulted in a level of *forced car use.*

More than one third of all trips to work are under 5km and half are under 7km.

The Albury Wodonga region is served by passenger rail, regional coaches, and public transport town buses. The usability of the system is compromised by a lack of harmonisation that fails to offer seamless travel between NSW and Victorian. Incompatible fares, concession entitlements and timetabling make public transport less attractive than car use for most if not all trips.

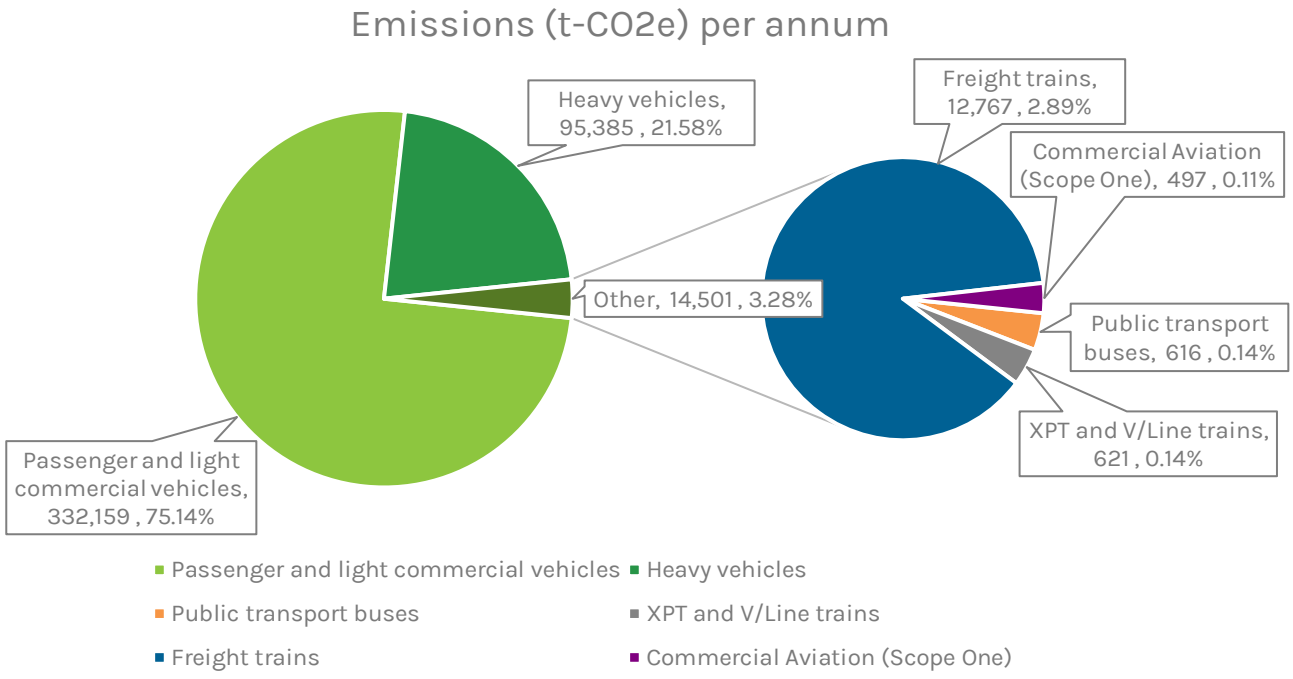
An analysis of 12 different journey types was undertaken, to compare how long it takes and how much it costs to travel by car, bike and public transport. A selection of three of these scenarios is provided below. This shows that on average, a bus takes three times as long as a car and that bus travel is also more expensive. In some cases, a bike can be faster than taking the bus. The effect of double charging for public transport that crosses the Murray is likely to encourage car trips over public transport.

Despite many trips in Albury Wodonga being within a cyclable distance, very few people cycle. The cycling network is fragmented, lacks connection between off road paths and between these paths and the CBDs of both Albury and Wodonga. Neither university is connected to the CBD with bicycle lanes.



Transport emissions

Well over 90% of all transport emissions in Albury Wodonga are due to car use. This is a direct consequence of the car dependence that has resulted in almost all trips, even those of short distance, to be done by car. Aviation is a relatively small emissions contributor, but the growth projections and an absence of any emissions reduction strategy for aviation suggests this is likely to be a larger emissions contributor in the future.



Transport safety

Transport safety has emerged as an area of growing importance, both in NSW and Victoria, and both states have adopted the *Safe Systems* approach to road safety, in which the fallibility of the road user is recognised. A key tenant of the Safe Systems approach is to design streets in such a way that harm is minimised, and a mistake on the part of a road user does not result in death or serious injury.

The chance of a pedestrian survival in a collision is 1.5/10 at 50km/h and 9/10 when speeds are reduced to 30km/h.

Evidence shows that the chance of a pedestrian survival in a collision is 1.5/10 at 50km/h and 9/10 when speeds are reduced to 30km/h. This usually causes delay to motorists of mere seconds.

Over the last five years there were 11 fatalities, 250 serious injuries, and 508 other injury crashes recorded.

This report has found there are important opportunities to minimise the harm caused by road traffic injury through improved street design and the adoption of safer speeds across all streets in Albury and Wodonga, especially within the CBDs of both Albury and Wodonga.

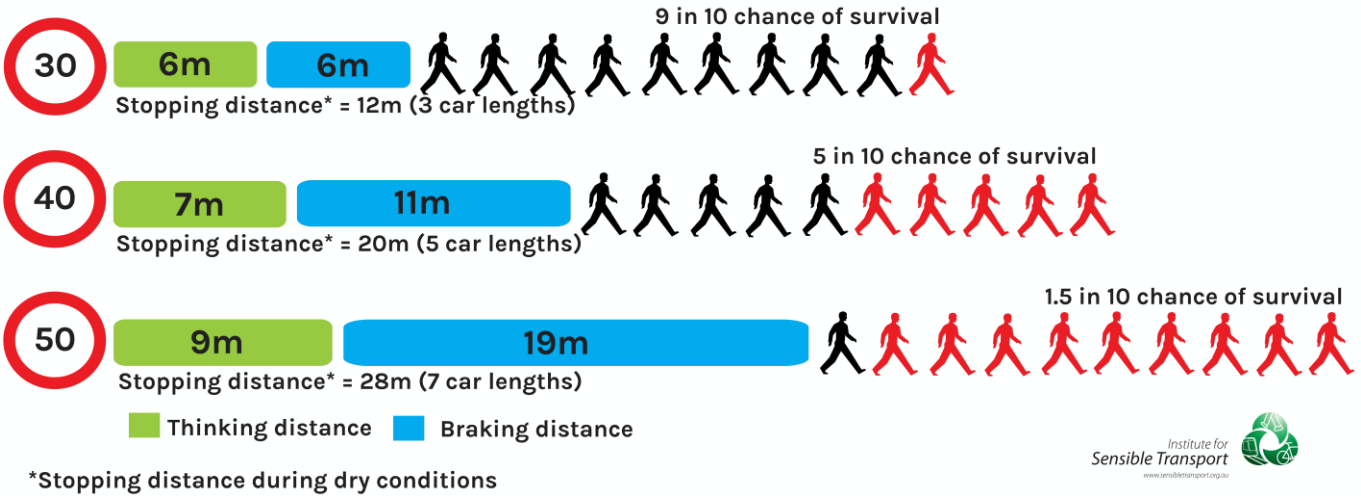
Professional stakeholder consultation

A series of professional stakeholder consultation sessions were held as part of the development of this report. The overarching theme to emerge from these discussions was related to enhanced public transport and a more attractive, welcoming environment for walking and cycling. Creating more vibrant, people focused CBD, with interesting streetscapes was also considered important for enhancing Albury Wodonga's appeal as a growing regional city.

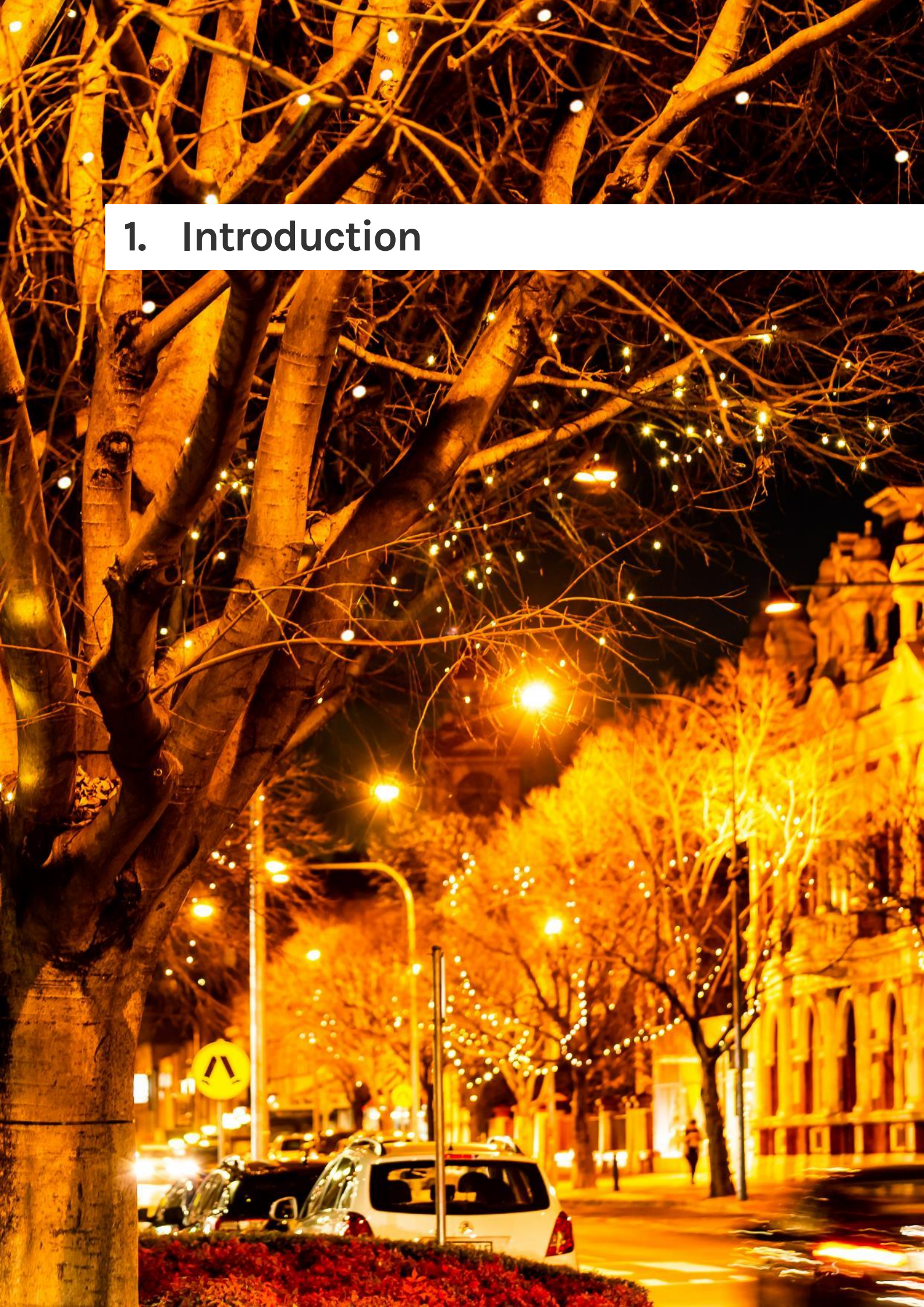
Next steps

Following the opportunity for both councils to review this report, a workshop will be held to present the report's findings and receive feedback from council staff. A *Summary Report* (a distilled, public facing report) will then be produced, reviewed by both councils before a final report is completed.

These documents will then provide important input for the development of the *Albury Wodonga Integrated Transport Strategy*, which will be prepared by council staff.



1. Introduction



The purpose of this project is to provide background information and data relevant to the development of the *Albury Wodonga Integrated Transport Strategy.* This report covers all modes of transport, from walking, through to freight and aviation. This is an initiative of the *Two Cities One Community* initiative of AlburyCity and the City of Wodonga, in recognition of their inter-linked communities.

The *Two Cities One Community* Action Plan 2017 – 2021; had two actions of relevance to this project:

1. Action 1.4.1 Develop an Integrated Transport Strategy
2. Action 1.4.2 Develop a Cycling Strategy

1.1 What will the Integrated Transport Strategy need to cover?

The future *Integrated Transport Strategy* will need to cover the following areas, and has therefore acted as a guide for the development of this Background Report:

- All modes of transport, including air travel.
- Sustainability and emissions reduction
- The need to create more vibrant townships and a reduction in short car trips.
- Health and safety
- Connection between Albury and Wodonga, as well as the smaller townships
- Strengthening economic outcomes
- Transport technology and emerging transport options.

1.2 Guiding principles

Both Councils have established a set of guiding principles and these will be used to inform our approach to the Literature Review and Background Report. These principles include:

- Connected and reliable
- Supportive of liveable places
- Facilitates growth and movement
- Equitable and accessible
- Safety, health and wellbeing
- Sustainable
- Intelligent.

This project recognises that the future Integrated Transport Strategy needs to be about more than simply the movement of people or goods. It needs to also prioritise creating successful, vibrant *places* and help the region achieve its sustainability goals.

A key goal of this project is to provide a robust set of data and evidence to enable both Councils to develop an Integrated Transport Strategy that makes Albury Wodonga an even better place to live, work and visit.

1.3 Key project stages

Figure 1 highlights the key stages of this project. The *Literature Review* component will be prepared as a separate but related report focusing on reviewing relevant policies and strategies, across both local government areas, as well as NSW and Victorian state government policies/legislation.

Figure 1 Key project stages

2. Historical context

This section provides a brief overview of the key historical developments related to transport in the Albury Wodonga region. Figure 3 provides an illustration of these developments.

2.1 Pre-European

The Albury Wodonga region has been occupied by Aboriginal people for some 40,000 years. The traditional owners of the Albury and Wodonga area are the Wiradjuri, Waveroo and Dhudhuroa. The lands south of the Murray are contested. The lands north of the Murray is Wiradjuri Country, the largest Aboriginal language group in NSW. Wiradjuri means 'people of the three rivers'. The three rivers are the *Wambool*, *Kalare* and *Murrumbidjeri,* known today by their European names of the Macquarie, Lachlan and Murrumbidgee. For the Wiradjuri people, the three rivers were their livelihood and supplied a variety of consistent and abundant food. The Wiradjuri People lived a semi-nomadic lifestyle moving around in small family groups, using the river flats, open land and waterways (Heritage Office and Department of Urban Affairs and Planning, 1996).

2.2 Colonial and industrial

In 1824, Hume and Hovell arrived, and over the next 12 years the first non-Aboriginal settlements began, including cattle grazing, markets and in 1838, the first map of Albury. Ten years later, the Albury Street network was extended, to the North.

A punt connecting both sides of the Murray River began operation in 1843. Wodonga was established in 1854 and one of the earliest forms of motorised transport was a paddle steamer, which began operating the following year, from South Australia. Around this time, the population of Albury stood at 645 people.

Wodonga was first connected to Melbourne by rail in 1873. In 1880, the Great Southern Railway connected Albury with Sydney and the following year the Albury Railway Station was completed. The rail bridge spanning the Murray River was completed in 1883, allowing for the rail connect from Melbourne to extend to Albury.

The first bus service connecting Albury and Wodonga commenced operation in 1906. This was a horse-drawn service. Martin's bus service commenced in 1932.

The *Spirit of Progress* offered an express service between Melbourne and Wodonga, beginning in 1937 (see Figure 2). The *Riverina Daylight Express* was introduced in 1949 and provided connection between Albury and Sydney. North East standard gauge rail line did not open in Victoria until 1962.

Lavington and Thurgoona were separate from Albury, from a local government perspective until 1962. Planning for the airport (Aerodrome) began in 1938.

Figure 2 Spirit of Progress
Source: https://tinyurl.com/4pa84u68

2.3 Contemporary

In 2008, the upgrade of the North East line commenced, standardising existing tracks between Melbourne and Albury. The older broad gauge line between Seymour to Wodonga was handed over from V/Line to ARTC in preparation for the conversion. A 5.5 kilometre bypass around Wodonga was also included to provide a double-track railway line and eliminated 11 level crossings.

The original Melbourne-Sydney line was decommissioned in 2010 when the bypass was completed, and the old Wodonga Railway station was repurposed into a commercial use. Parts of the abandoned rail line were used for redevelopment, which included a revitalisation of Wodonga CBD, and installation of a linear park and bikeway. A new railway station on the northern edge of Wodonga, with one platform, was opened in 2011.

2.4 Post-COVID-19 changes

The public health response during the COVID-19 pandemic has highlighted difficulties for cross-border communities. A system of border permits and exemptions was implemented, to allow workers and residents across the Murray River.

This also highlighted the need for, and role of, Cross Border Commissioners in Victoria and New South Wales. Commissioners are intended to bridge the divide between communities, facilitating greater cooperation between government agencies.

COVID-19 has also affected property prices and transport patterns. As of November 2021, average property prices in the suburbs of Albury and Wodonga are approximately 30% higher than they were in 2019.[1] Traffic has increased, especially following lockdowns, as people resume travelling, are wary of modes other than car, and are satisfying unmet need during lockdown for travel associated with retail and holiday.

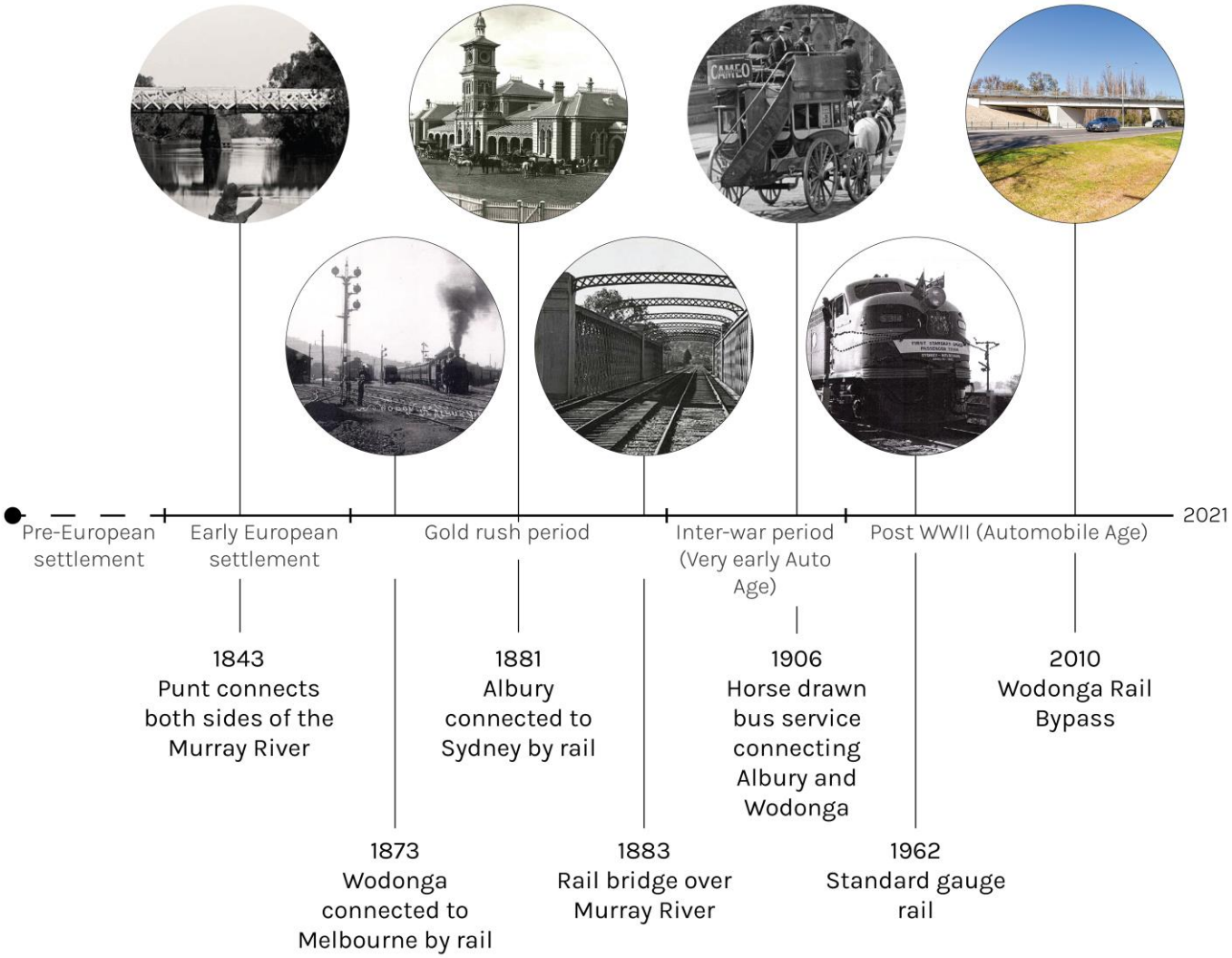


Figure 3 Major historical developments in Albury Wodonga's transport system

[1] Albury – New South Wales 2640, realestate.com.au < https://www.realestate.com.au/neighbourhoods/albury-2640-nsw >

Wodonga – Victoria 3690, realestate.com.au < https://www.realestate.com.au/neighbourhoods/wodonga-3690-vic >

3.Population and demographics

This section describes current population and demographic patterns of relevance to transport and access in Albury Wodonga.

3.1 Current population

The estimated residential population for Albury and Wodonga as of June 2021 was 97,717in 2016 was just over 88,000 people. Figure 4 illustrates the spatial distribution of the combined population, where one dot represents five people, based on their residential location, as of the 2016 census.

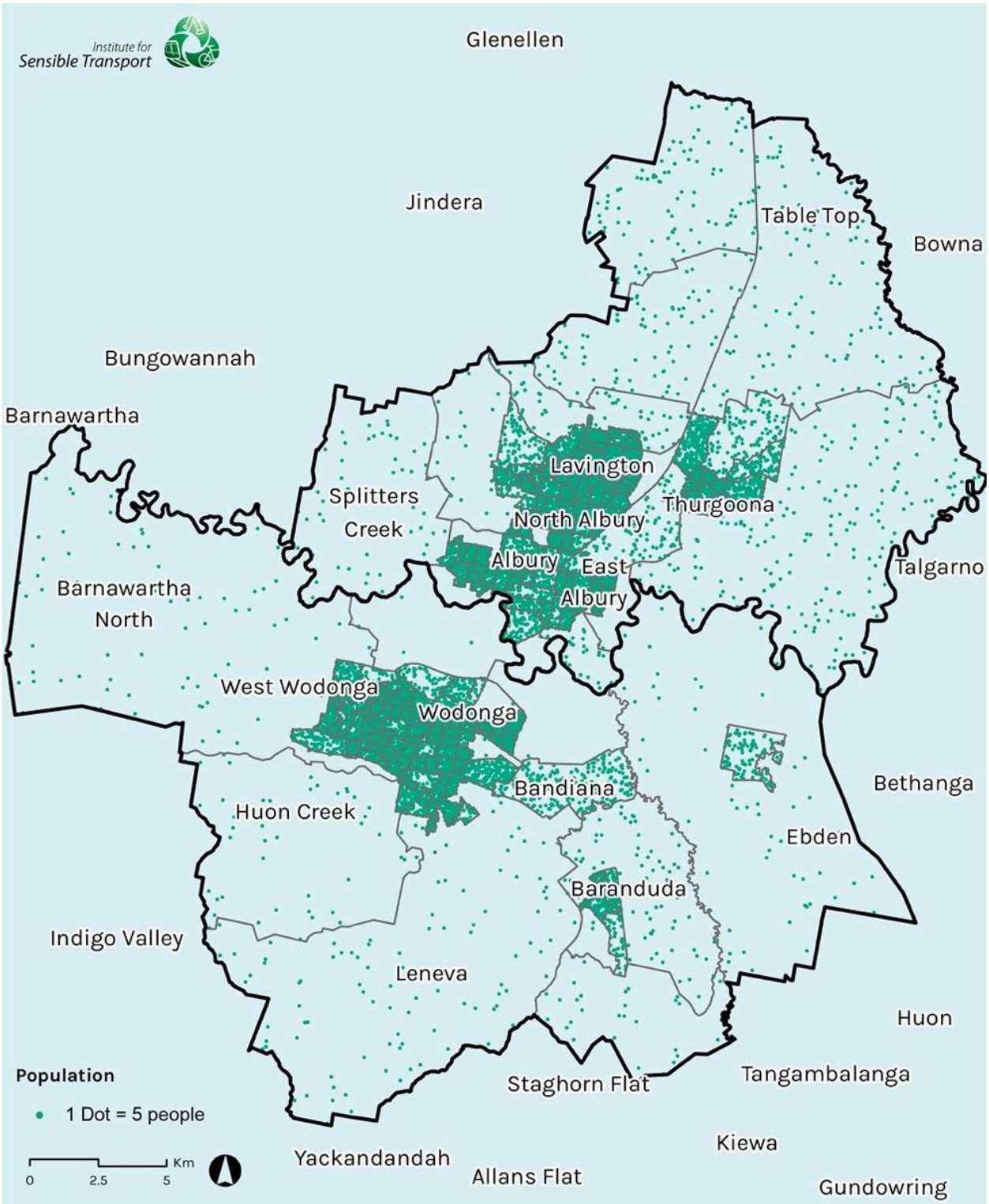


Figure 4 Population of Albury and Wodonga in 2016
Source: ABS 2017

One fact to emerge from this examination of population densities with implications for the future ITS is that most people live within the existing urban boundaries of Albury and Wodonga. In fact, approximately 90% of the population live on just 9% of the land. Figure 5 highlights the 9% of land that contains 90% of the population. This highlights the relatively compact urban environment of the two cities. This makes the task of providing an effective, sustainable transport system easier than if the population was evenly distributed across both LGAs.

Around 90% of the population live within just 9% of the land.

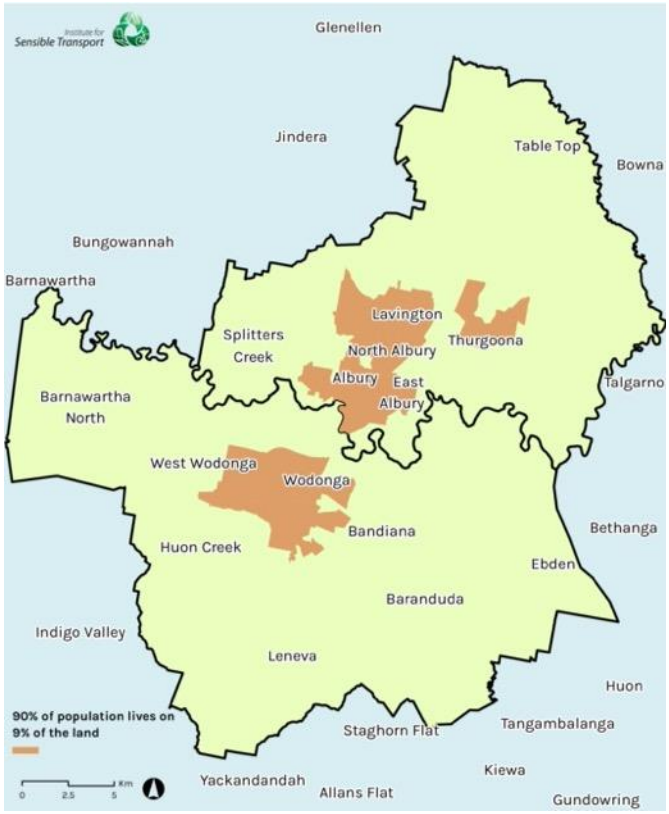


Figure 5 90% of the population live on 9% of the land

Source: ABS 2017

Figure 6 provides a population density map for the region, which is better able to highlight density differences within the built-up area. This represents the population per hectare at the Statistical Area Level 1 (SA1) scale in Albury and Wodonga.

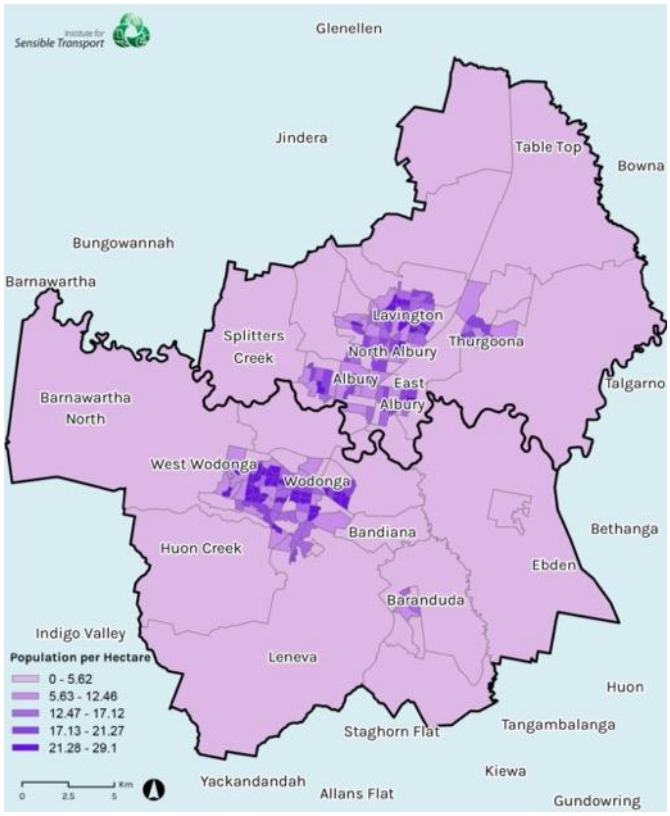


Figure 6 Population per hectare in 2016

Source: ABS 2017

3.1.1 Age of population

Figure 7 shows the age profile of Albury and Wodonga compared to the Victorian average. It shows that the variation in age groups largely follow the Victorian average, though Albury and Wodonga have a slightly higher proportion of young people and slightly less 20–50-year-olds.

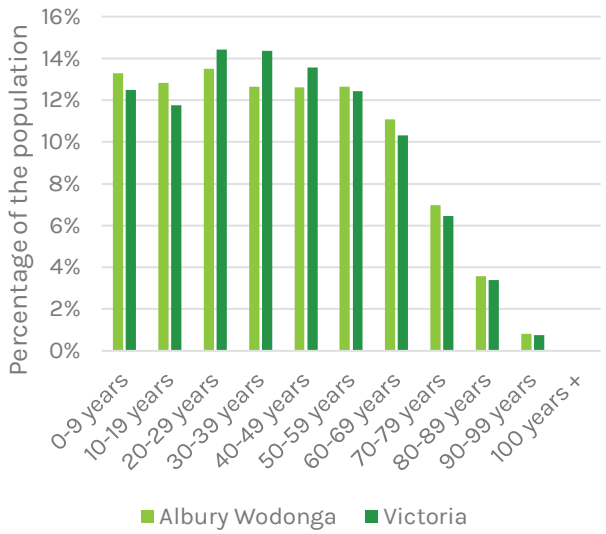


Figure 7 Age-groups in 2016

Source: ABS 2017

3.2 Future population

Population trends and projections in Albury Wodonga are shown in Figure 8 and in Table 1. Albury Wodonga's population was 92,009 in 2016, growing to 100,435 as of 2021. In 2036 population is projected to rise in Albury Wodonga to 124,741. By 2036, an additional 24,306 are projected to be living in Albury Wodonga from 2021, a rate of growth of 24% over 15 years.

Table 1 id. Projected population growth in Albury and Wodonga

	2016	2021	2036
Albury	52,165	56,159	67,427
Wodonga	39,844	44,276	57,314
Total	92,009	100,435	124,741

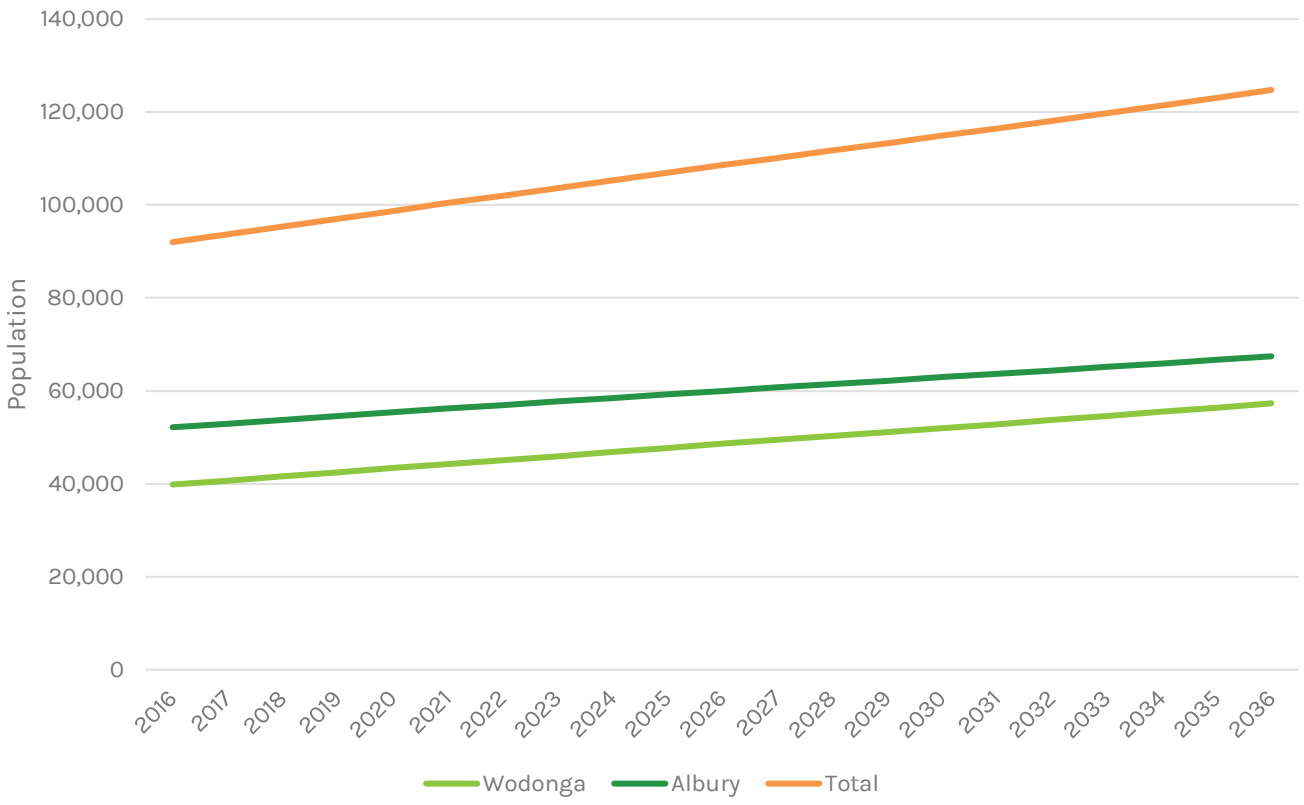


Figure 8 Projected population growth in Albury and Wodonga

Source: .id[2, 3]

[2] .id Albury City | population forecast < http://forecast.id.com.au/albury >

[3] .id City of Wodonga | population forecast < https://forecast.id.com.au/wodonga >

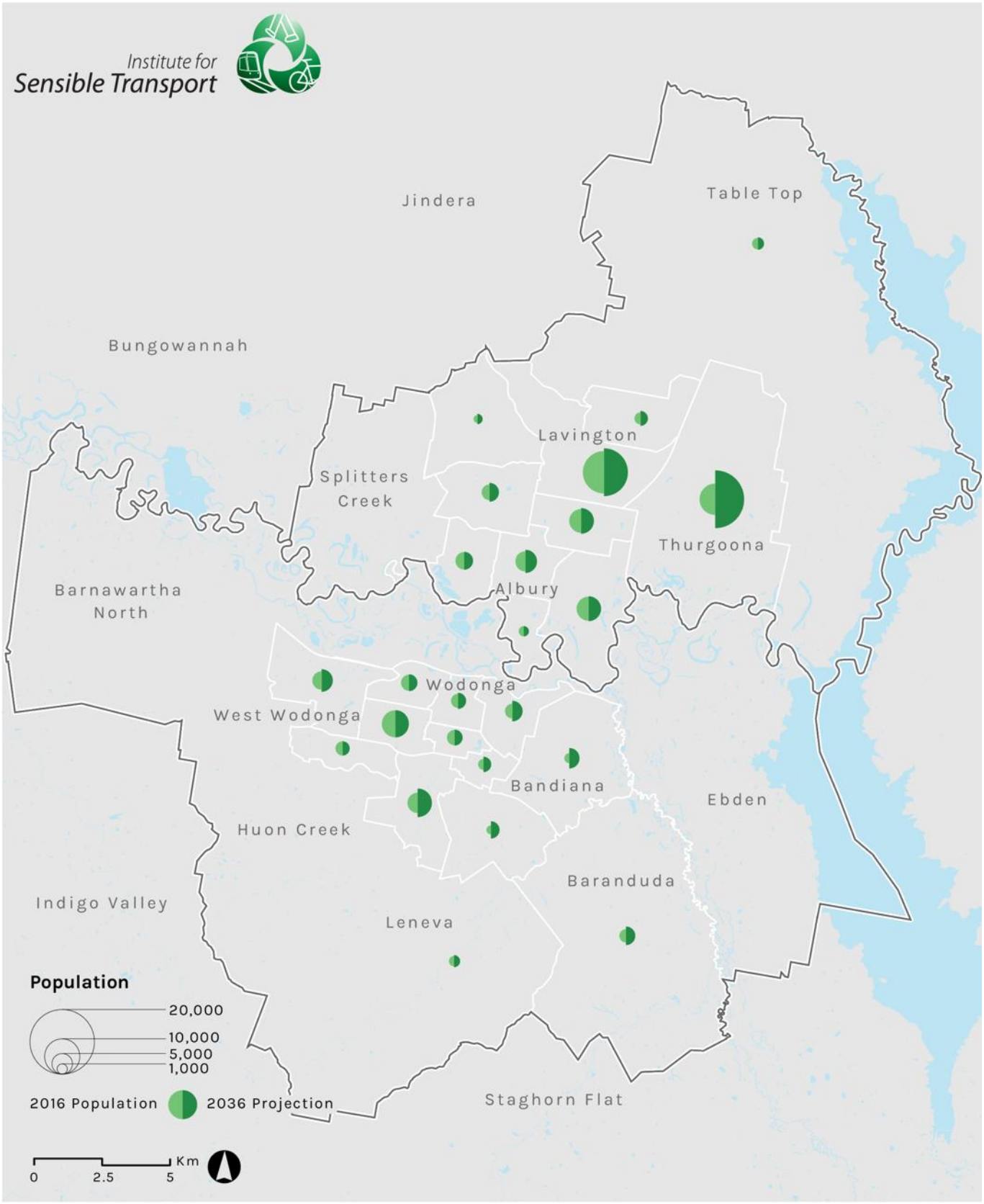


Figure 9 Projected population growth in Albury and Wodonga, 2016 to 2036

Development in Albury and Wodonga has shifted the population centre over the last 15 years, and is expected to continue to do so, as shown in Figure 10. The Albury population weighted centre is shifting northeast, while the Wodonga population weighted centre is shifting southeast. This means that, effectively, Albury and Wodonga are growing apart, increasing travel distance. This is likely to increase car dependence, as it favours the car over public transport, walking and cycling.

There is a trend for the Albury and Wodonga demographic centres to be shifting further apart over time and for growth to be highest on the periphery.

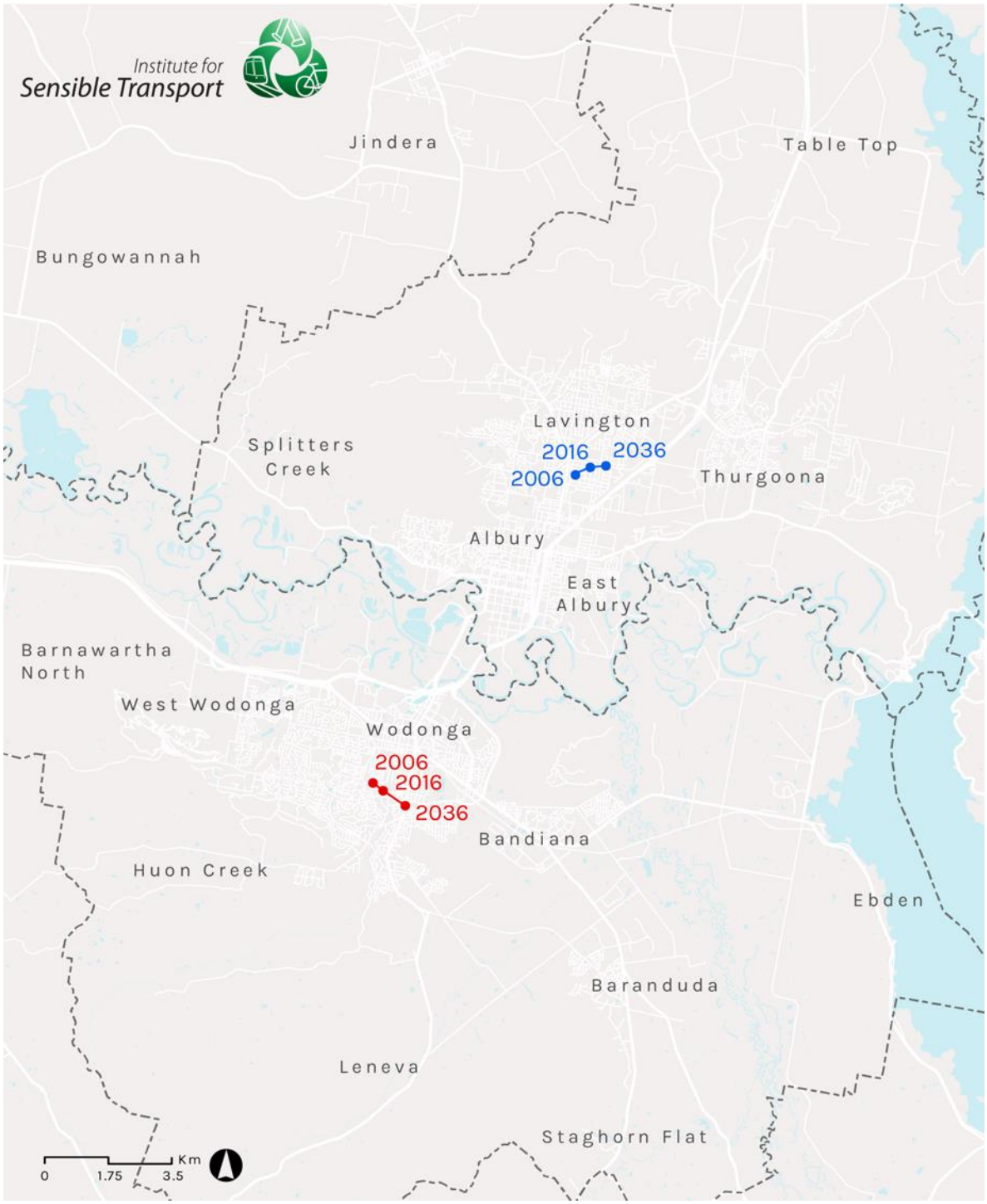


Figure 10 Centres of population for Albury and Wodonga over time

3.3 Socio-economic profile

The Australian Bureau of Statistics has produced its Socio-Economic Indexes For Areas (SEIFA) index following each census since 1986. SEIFA contains an *Index of Relative Socio-economic Advantage and Disadvantage* (IRSAD), which ranks all Statistical Area Level 1s (SA1) in Australia out of ten; ten being most advantaged and one being most disadvantaged.

Figure 11 shows the IRSAD decile for each SA1 in the Albury Wodonga area. There are 121 SA1s in Albury, and 92 SA1s in Wodonga. Across Australia, there are an equal number of SA1s for each IRSAD index decile, but Albury and Wodonga have a higher number of SA1s with lower scores, indicating more disadvantage, and a lower number of very high scores.

The most advantaged suburbs are Table Top, Splitters Creek, and Bonegilla in NSW, and Castle Creek and Huon Creek in Victoria, which all have suburb level IRSAD scores of nine or ten. Conversely, Springdale Heights, Lavington, North Albury, West Albury, and South Albury in NSW, and Wodonga in Victoria are highly disadvantaged, with suburb level IRSAD scores of one or two.

Our analysis reveals that populations of both Albury and Wodonga are disproportionately disadvantaged compared to the whole of Australia, New South Wales, and Victoria.

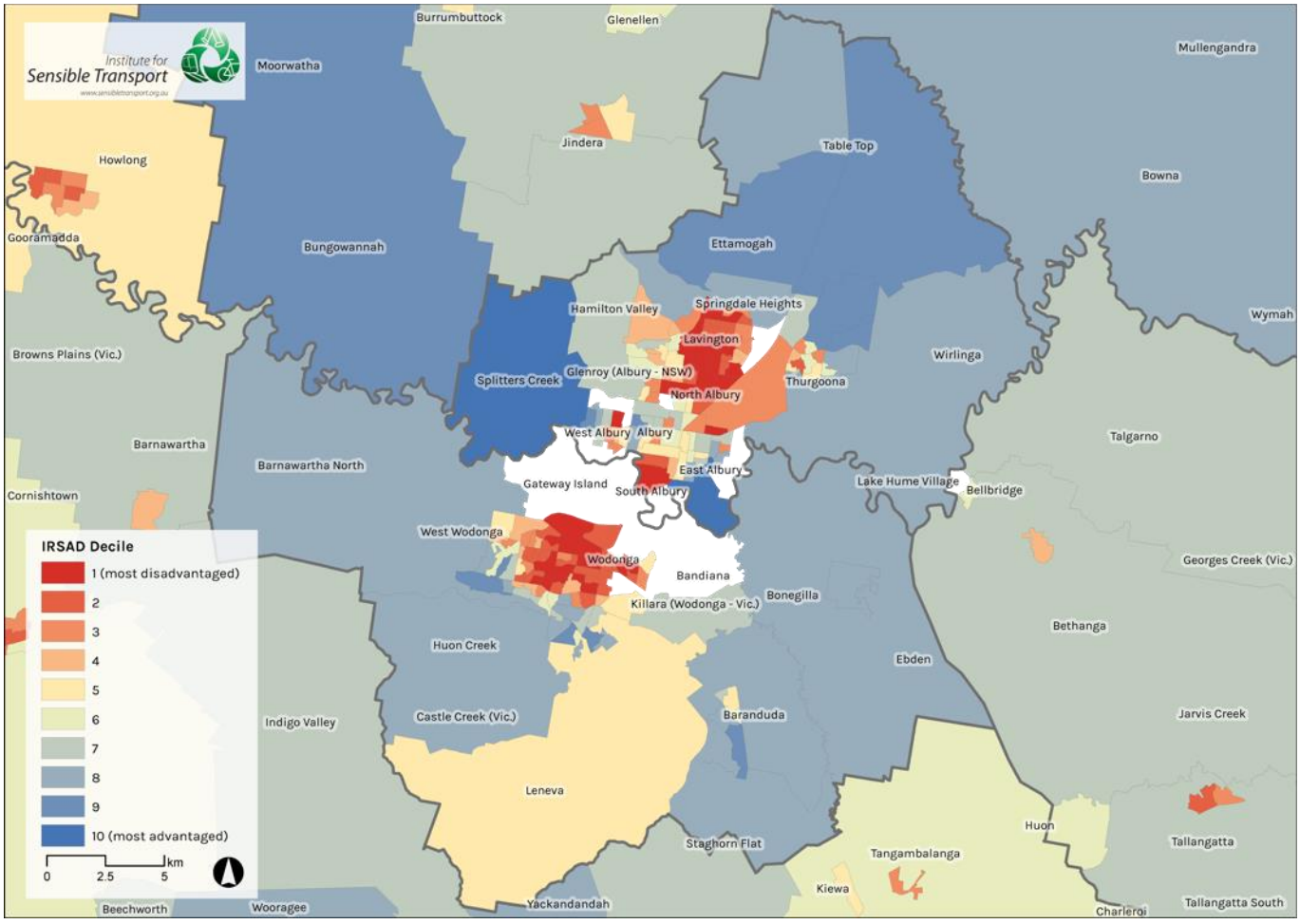


Figure 11 IRSAD Decile per SA1 in Albury Wodonga

The percentage of the total Albury Wodonga population per IRSAD decile is shown in Figure 11 (based on population per SA1). Across Australia, there is roughly 10% of the population in each decile, which is not the case in Albury Wodonga. There is a large skew towards low IRSAD decile scores. With 47% of the population residing in SA1s with an IRSAD three or below; compared with 28% of the Australian population. Conversely, only 18% of the population live in SA1s with an IRSAD eight or higher, compared with 31% of the Australian population.

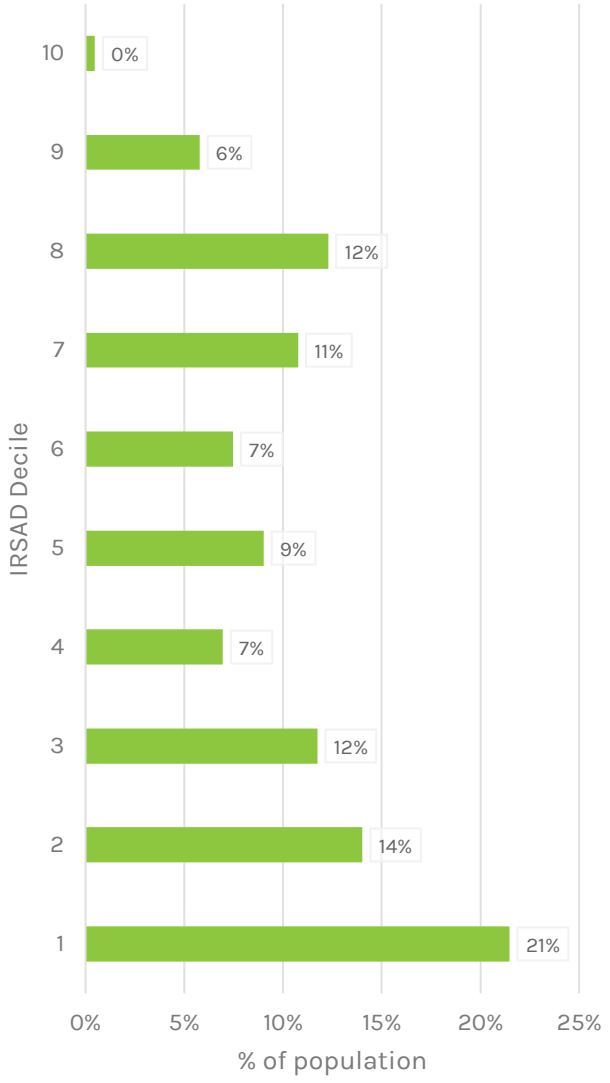


Figure 12 Total Albury Wodonga population per IRSAD decile

A comparison of the population per IRSAD decile in Albury and Wodonga is shown in Figure 13. This demonstrates that the relative levels of advantage and disadvantage within Albury and Wodonga are roughly similar. In Albury, 46% of the population live in SA1s three or below, while 48% of the Wodonga population live in SA1s three or below. In Albury, 18% of the population live in SA1s eight or higher, while in Wodonga 19% live in SA1s eight or higher.

There is a slightly larger number of people living in SA1s in the middle of the IRSAD scale (between four and seven) in Albury than in Wodonga. This indicates a slightly less skewed population. Notably though, the percentage of the population living in SA1s of one is higher in Albury than in Wodonga, as is the percentage of the population living in SA1s of ten.

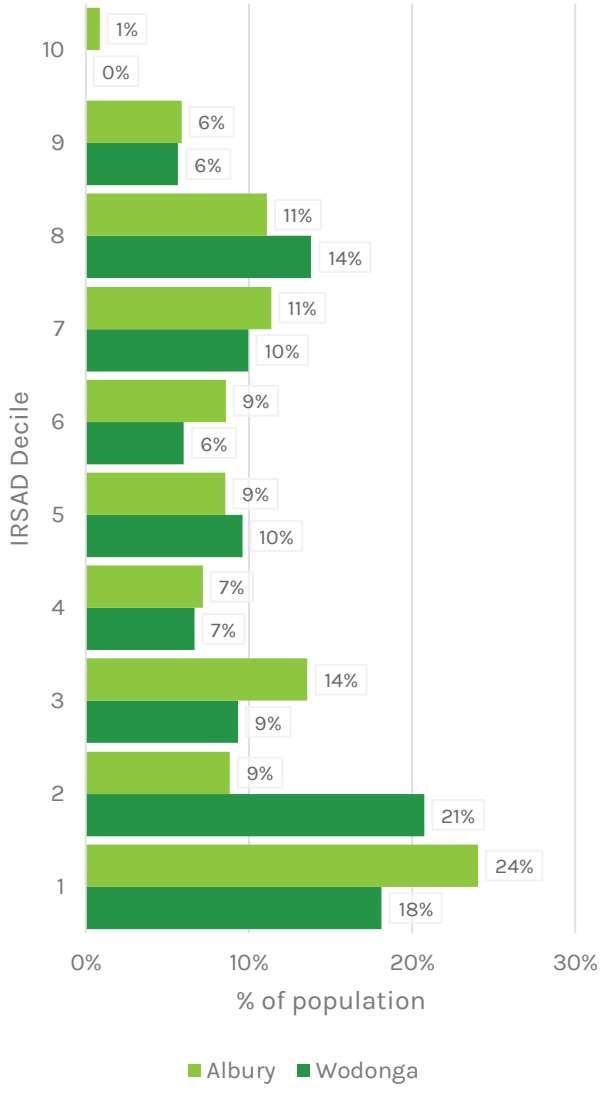


Figure 13 Comparison of Albury and Wodonga population per IRSAD decile

A comparison of the population per IRSAD decile in Albury and New South Wales is shown in Figure 14. This highlights the higher levels of disadvantage, and lower levels of advantage in Albury, compared with New South Wales as a whole. It is noteworthy

that Albury has a much greater share of its population living in SA1s with a IRSAD of one, and a much lower share of its population living in SA1s with an IRSAD of ten than New South Wales.

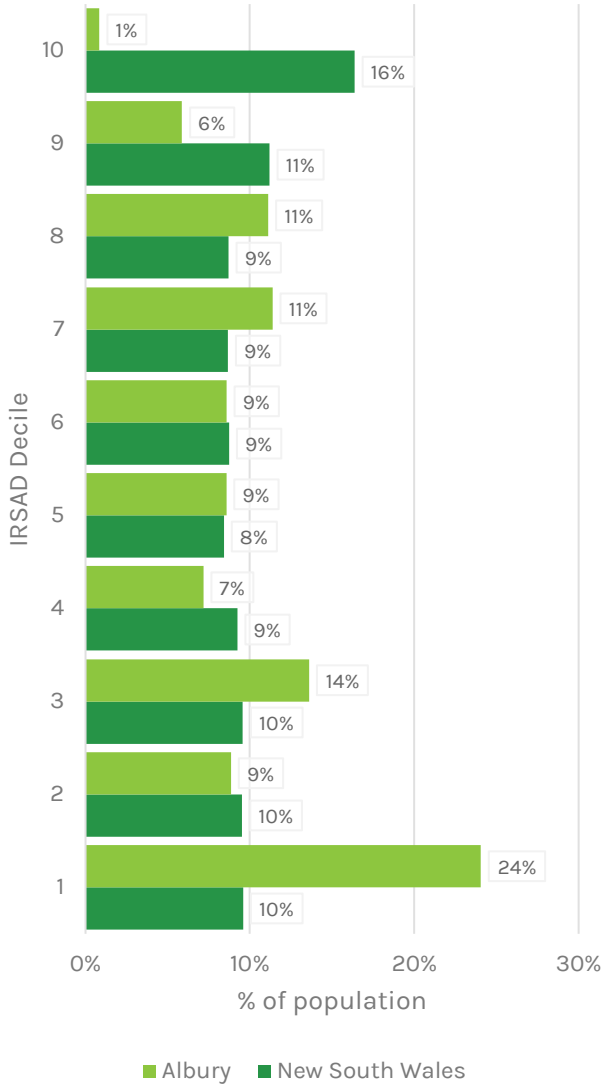


Figure 14 Comparison of Albury and New South Wales population per IRSAD decile

A comparison of the population per IRSAD decile in Wodonga and Victoria is shown in Figure 15. As is the case with Albury compared with New South Wales, this highlights the higher levels of disadvantage, and lower levels of advantage in Wodonga, compared with Victoria as a whole. It is noteworthy that Wodonga has a much greater share of its population living in SA1s with a IRSAD of one, and a much lower share of its population living in SA1s with an IRSAD of ten than Victoria.

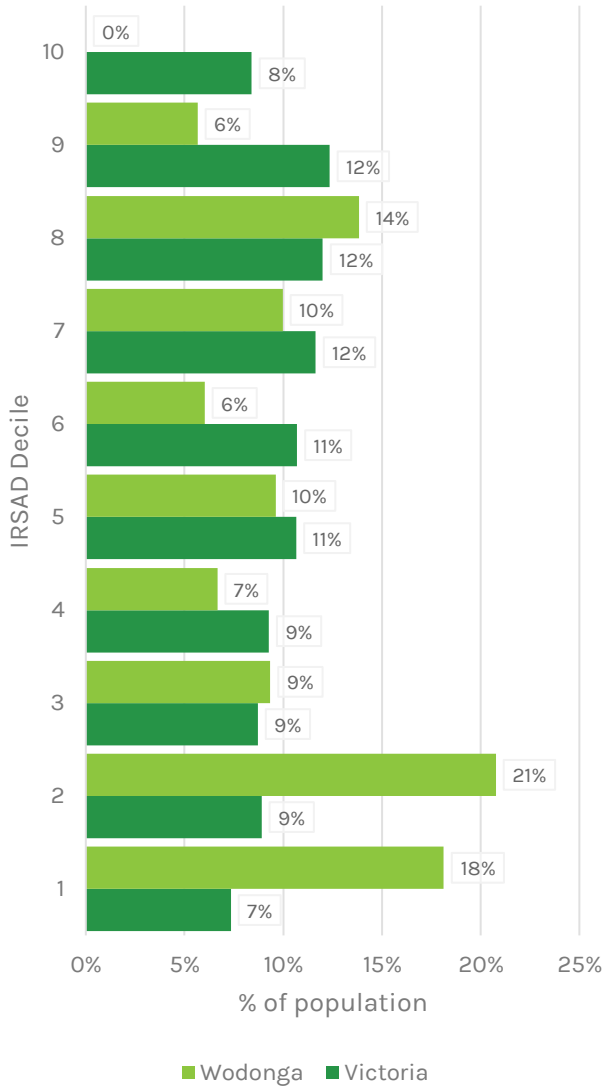


Figure 15 Comparison of Wodonga and Victoria population per IRSAD decile

This analysis reveals that populations of both Albury and Wodonga are disproportionately disadvantaged compared to the whole of Australia, New South Wales, or Victoria (it should be noted that this is a trend across many regional areas, which generally score lower than capital cities). There are greater numbers of people residing in very low IRSAD scored SA1s and decreased numbers of people residing in high IRSAD scored SA1s. However, the distribution is uneven, with the city centres and immediate surrounds showing higher levels of disadvantage, and lower density surrounds showing less disadvantage and more advantage (as shown in Figure 11).

3.4 Understanding population health variability

Government information on population health is separately listed for Albury and Wodonga, as each state manages health information separately.

3.4.1 Albury

The Murrumbidgee health profile prepared by NSW Health provides general information about the population health status of those who live in the Murrumbidgee catchment. This includes Albury, as well as other surrounding regions of NSW. While it is not possible to provide disaggregated spatial information for Albury specifically, there are some general population health data of relevance, as captured in the following points:

- 17% of adults smoke
- 69% of the population is overweight or obese, compared to 53% for NSW.
- 57% of adults do not get enough exercise and this percentage has been rising over recent years. A lack of physical activity is a significant cause of morbidity and mortality.
- Almost half (48%) of children report sedentary behaviours
- One quarter of adults experience psychological distress, compared to 18% for NSW
- 17% of adults have diabetes
- 5.5% of the population reported needing assistance with core activities and this proportion increased to 15% for the over 65s population.
- Albury has a significantly higher rate of *avoidable deaths* than the NSW average.
- Motor vehicle crashes are the second leading cause of death by injury after suicide (males) and are the third leading cause of death by injury for females.
- 587 cardiovascular deaths were recorded in the most recent year reported in Murrumbidgee, which is a disease significantly reduced by regular walking and cycling (30 minutes per day). More than one quarter (27%) of all deaths in Murrumbidgee are due to cardiovascular disease.

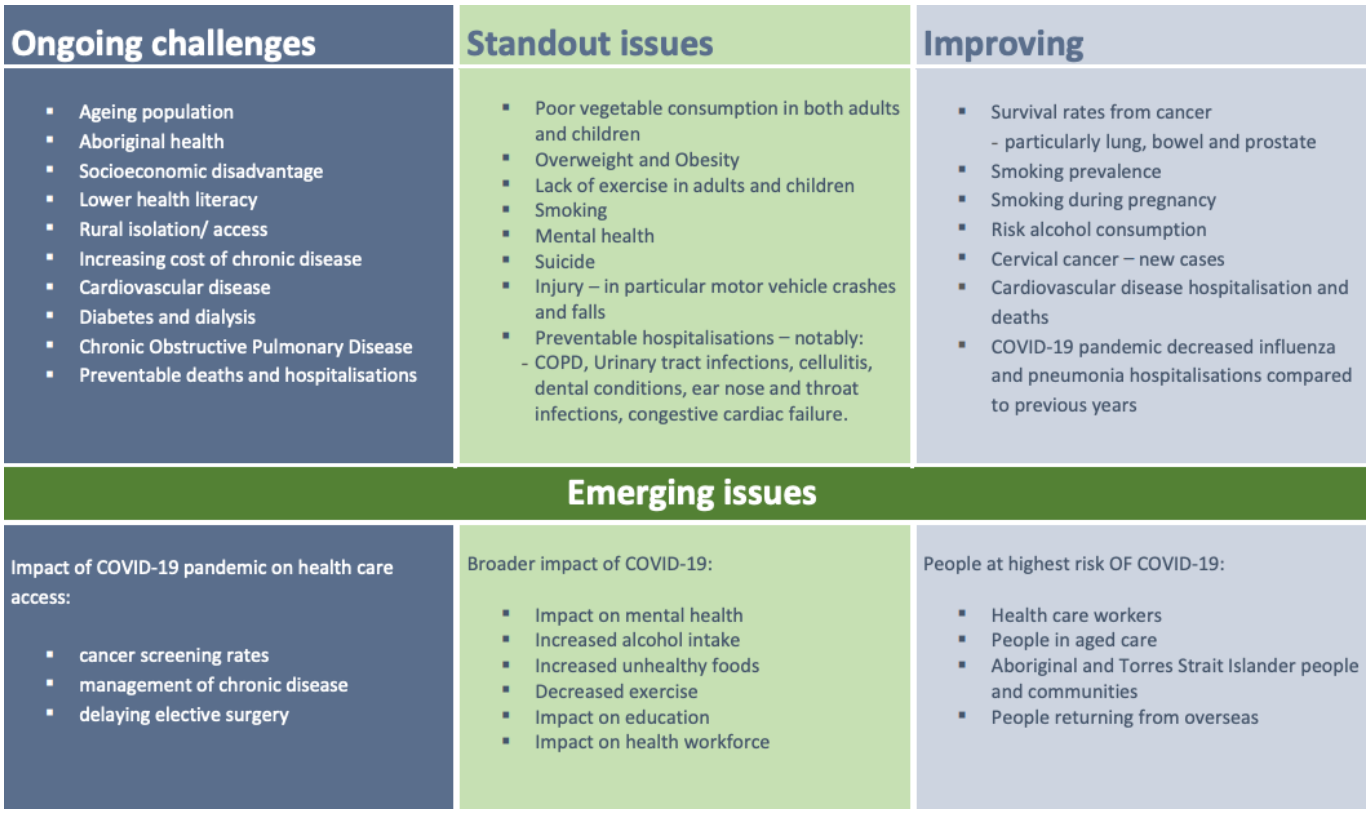


Figure 16 Population health - major issues in Murrumbidgee

Source: https://www.mlhd.health.nsw.gov.au/getmedia/a1dabc5b-bd15-413d-b0f2-3e694ab1ca9e/Report-The-Murrumbidgee-Profile-OCTOBER-2020-Full-report

Figure 17 highlights data from NSW Health illustrating the sharp rise in overweight and obesity attributable hospital admissions. While the NSW average has been stable, Albury's population has suffered from rising levels of unhealthy weight leading to hospital presentations.

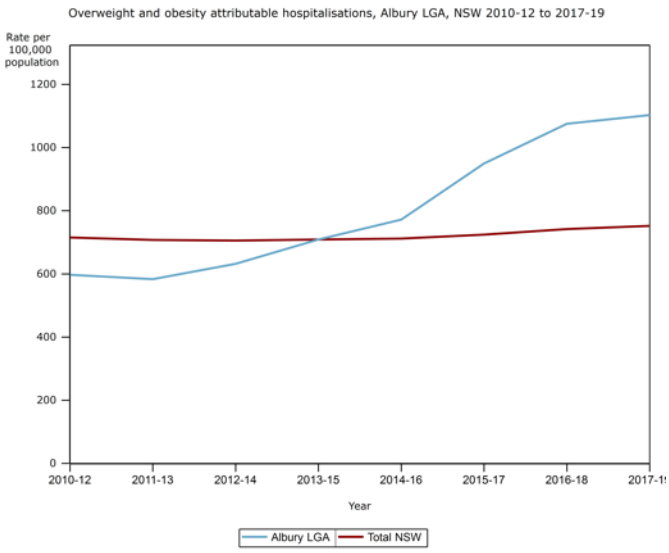


Figure 17 Rise in overweight and obesity in Albury
Source: https://tinyurl.com/5e45uwd7

3.4.2 Wodonga

As with other LGAs in Victoria, Wodonga Council must prepare a *Municipal Public Health and Wellbeing Plan* every four years. It is designed to support the Council Plan and has seven priority areas, as identified below:

1. Support individual mental wellbeing and community resilience
2. Prevent violence against women by promoting gender equality
3. Support healthy, active lifestyles
4. Support community agility in adapting to climate change
5. Increase access to appropriate affordable housing
6. Promote access to services and public transport
7. Foster diversity and inclusion

Many of these priority areas have direct relevance to transport and access, including 3, 4, and 6 especially. Given the growth in car use and reduction in the proportion of trips done by active and public transport, there is an opportunity for the future ITS to support Wodonga's health and wellbeing goals.

The City of Wodonga's Physical Activity Strategy 2021-2026 identifies a number of concerning findings that active transport has the capacity to improve, including:

- More than half the Wodonga population have a sedentary occupation, that requires mostly sitting. This has been linked to reduced health outcomes.
- Wodonga's overweight and obesity rate among men is 70.6%, compared to 58.2% for the Victorian average. More than half of women in Wodonga are overweight or obese, which is significantly higher than the Victorian average.
- Children's rate of sedentary behaviour is rising fast, with 4 out of 5 Australian children not meeting recommended levels of physical activity.

Creating environments more conducive to walking, cycling and public transport will help integrate physical activity into people's everyday life, which is considered a *'best buy'* in population health terms.[4] Researchers have found that the most effective method of growing participation in cycling is by making it *safe* and *convenient*.[5]

Climate change is expected to have major impacts on population health in the Albury Wodonga region as well, with more days of extreme heat. With over 50% of Australian household greenhouse gas emissions attributable to transport, and very high rates of car use, even for short trips, much more can be done to make lower emission transport compelling for trips under 4 – 5km. The future ITS can play a critical role in providing the blueprint for a lower carbon transport system for the Albury Wodonga region.

Finally, the Wodonga Integrated Transport Strategy cites findings from *Healthy by Design – a planner's guide to environments for active living* (Australian Heart Foundation 2008) that underpins key policy 2.4 *Healthy cities promote safe walking and cycling*.

[4]https://www.tandfonline.com/doi/full/10.1080/01441647.2015.1057877
[5]https://www.tandfonline.com/doi/full/10.1080/01441647.2015.1114271?src=recsys

Fostering road designs that encourage lower, safer speed is a core element in creating environments conducive to active transport. The pathways through which reduced vehicle speeds leads to higher active travel levels is identified in Figure 18.

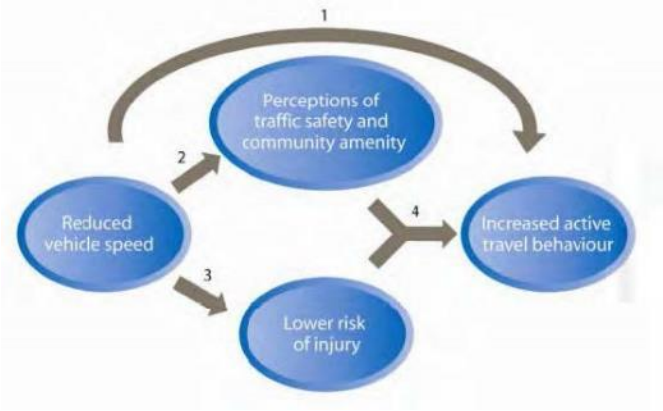


Figure 18 Proposed relationships between vehicle speed and active travel behaviour

Source: Wodonga Integrated Transport Strategy, 2015

It also adopts VicHealth and World Health Organisation recommendations for healthy transport, which means less driving and more walking and cycling, backed by a better public transport.

4.Land use

This section describes the land use policies and legislation that influence transport behaviour. Additional material related to land use can be found in the *Literature Review*.

It should be noted that several documents reviewed in the Literature Review and here are planned for imminent review. This report will feed into these reviews.

Both planning schemes have a vision for sustainable transport. Albury LSPS Priority 5 includes actions for an integrated transport network. Wodonga Planning Scheme Clause 18 includes a series of policies related to integrated transport planning.

4.1 Zoning

Albury and Wodonga have different planning systems, as a consequence of being in different states. Albury is planned subject to the *Albury Local Environmental Plan 2010 (NSW)*, while Wodonga is subject to the Wodonga Planning Scheme and the *Planning and Environment Act 1987 (Vic).* Both planning systems have variations in zoning requirements and mechanisms.

Despite these differences, they have commonality in stipulating how land is envisioned to be used and developed. A consolidation of land use zones, based on broad categories of use is shown in Figure 19.

Both planning instruments envisage centres of population and commercial activity, with a rural surround. The Wodonga scheme identifies land to the south east for development, while Albury has seen development in the north east.

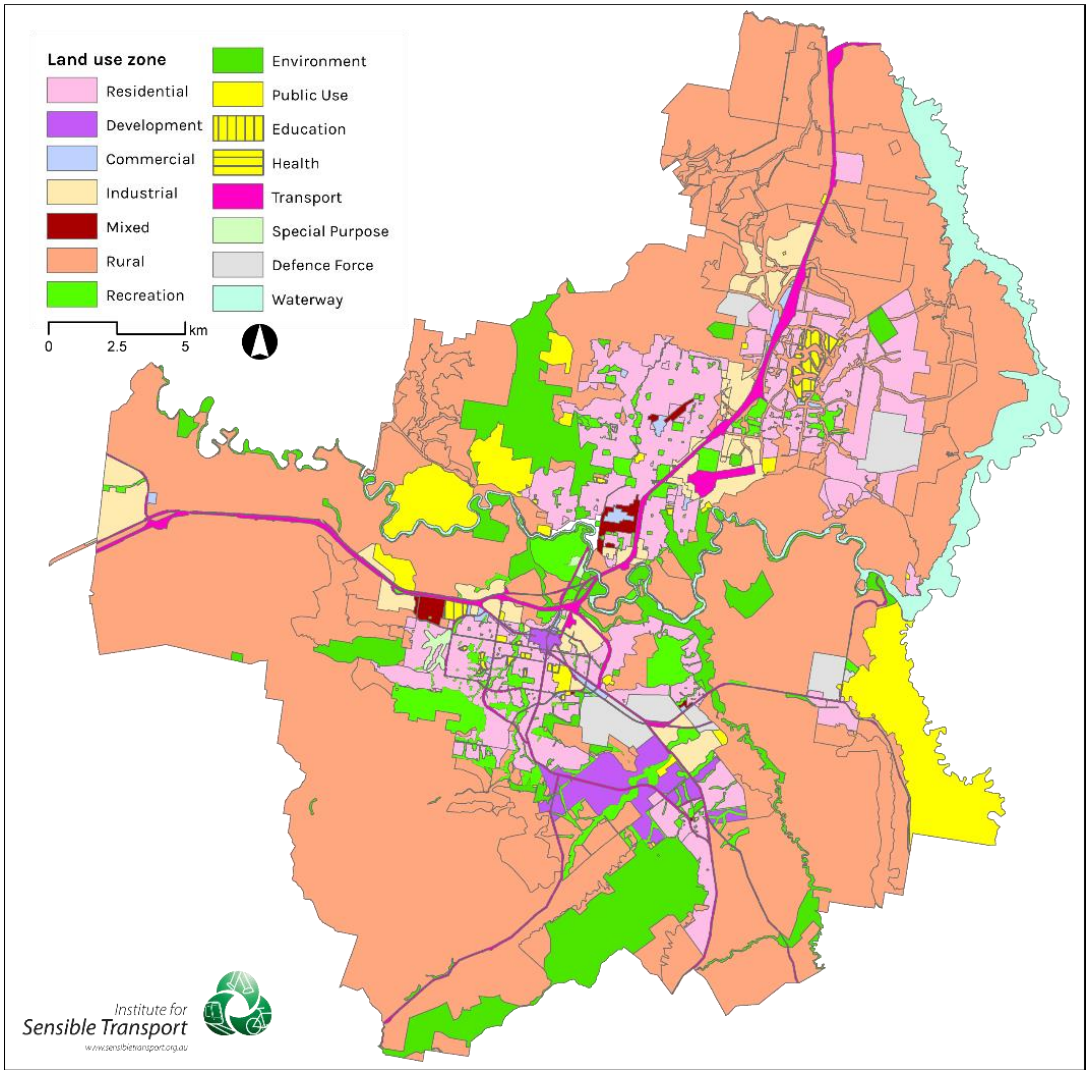


Figure 19 Planning scheme zones for Albury and Wodonga

4.1.1 Car parking requirements

Development and land use in Albury and Wodonga is subject to car parking requirements. A comparison of these requirements for several major uses is provided in Table 2.

Both Albury and Wodonga require the same amount of parking to be provided for dwellings (residential), but Albury requires more visitor parking. Conversely, the requirements in Wodonga are generally higher for other uses. A restaurant of 50 seats and ten staff would require 15 spaces in Albury (10 customer and five staff); and 20 spaces in Wodonga. Retail premises in Albury require one space per 30 or 40 square metres of gross floor area (depending on overall size), while in Wodonga, one space is required per 25 square metres. Similarly, office spaces in Albury require one space per 40 square metres of gross floor area, while in Wodonga, one space is required per 27.5 square metres. The methods underlying car parking ratios have received criticism for lacking any basis in evidence.[6]

For general, non-residential uses, there is normally a requirement for more car spaces in Wodonga than Albury. The Wodonga Planning Scheme contains provisions for reduced requirements in the CBD. Both schemes give Council discretion in approving applications for reductions.

4.1.1.1 Albury car parking requirements

Car parking requirements are stipulated in *Albury DCP 2010 Part 17*. Along with car parking, it is a requirement that:

'Car parks with 30 or more spaces are to provide 1 motorcycle space per 30 car parks or part thereof.'

The controls state that *'Car parking spaces are to be provided in accordance with the standards set out in Table 17.1'* and with Council granted discretionary powers to approve reductions.

However, a contribution in lieu of car parking is permitted in the Albury CBD and Lavington CBD areas. This mechanism allows Albury City Council to accept cash instead of parking. The objective of the contribution is:

'To permit the payment of monetary contributions in the Albury and Lavington CBD areas for car parking spaces not provided on a development site.'

The rates of contribution are set out in Albury City Council's *Section 94 Development Servicing Plan 2005*. A base rate of $15,000 per space was established in 2005.

Table 2 Comparison of car parking requirements in Albury and Wodonga[7]

Use		Albury	Wodonga
Dwelling	One or two bedrooms	1 per dwelling (social housing reductions to 0.4 for one bedroom and 0.5 for two bedroom)	1 per dwelling
	Three or more bedrooms	2 per dwelling (social housing reductions to 1)	2 per dwelling
	Visitor	1 for 1-4 dwellings. 2 for 5-8 dwellings. More than 8 dwellings - 2 designated visitor spaces plus 1 visitor space for every 3 or part thereof additional dwellings.	1 for every 5 dwellings for developments of 5 or more dwellings
Restaurant		1 per 5 seats or 1 per 10m^2 GFA, plus 1 per 2 employees	0.4 per patron
Pub/bar		1 space per 3.5m^2 GFA	0.4 per patron
Retail premises		<3000m^2 GFA - 1 per 40m^2 GFA >3000m^2 GFA - 1 per 30m^2 GFA	4 per 100sq m of leasable floor area
Office		1 per 40m^2 GFA	3.5 per 100sq m of net floor area

[6] www.routledge.com/Parking-and-the-City/Shoup/p/book/9781138497122

[7] Source: Albury Development Control Plan 2010; NSW State Environment Planning Policy (Affordable Rental Housing) 2009; Wodonga Planning Scheme

Albury has recently adopted a CBD Parking Strategy which seeks to review parking rates, and a recommendation to implement maximum rates.

The cash in lieu scheme allows for a reduction to $10,000, via the *'carparking subsidy'* for applications in Albury CBD. The goals of the subsidy are to:

- *'Encourage commercial development within the City and stimulate economic growth*
- *Encourage higher density development within the CBD*
- *Encourage contribution toward centralised carparking solutions and minimising small ineffective parking development at the rear of properties.'*

4.1.1.2 Wodonga car parking requirement

Car parking is required in the *Wodonga Planning Scheme*, pursuant to state-wide requirements of Victoria Planning Provision Clause 52.06. Local Government Areas may vary parking requirements by using a *Parking Overlay*. A permit application may seek to *'reduce (including reduce to zero) the number of car parking spaces required'*, for requirements under either Clause 52.06 or a Parking Overlay.

Wodonga Council have established a Parking Overlay which covers the CBD. The objectives of the overlay are:

- *'To provide an appropriate level of parking within the Wodonga Central Business Area that caters for demand and supports a future reliance on private vehicle usage.*
- *To consolidate existing car parks to maximise the sharing of parking supply between different land uses.*
- *To improve both public car parking provision and sustainable transport infrastructure within the centre.*
- *To provide for the collection of financial contributions in lieu of parking waiver to contribute to the construction of publicly-accessible off-street parking facilities and other sustainable transport infrastructure initiatives within the Wodonga Central Business Area.'*

The first of the above points appear to conflict with best practice sustainable transport policy and this will be explored further in the *Opportunities* section.

The Parking Overlay applies different rates to four uses, and lower (Column B) rates to all other uses. A comparison of Parking Overlay and Clause 52.06 parking requirements is shown in Table 3.

Table 3 Parking requirements in Wodonga

Use	Standard Rates (Column A)	Column B Rates	PO1 Rates
Dwelling	1	1	Column B Rates
	2	2	Column B Rates
	1 for every 5 dwellings for developments of 5 or more dwellings	0	Column B Rates
Restaurant	0.4 per patron	N/A	3.0 per 100 sq m of leasable floor area
Bar	0.4 per patron	3.5 per 100 sq m of leasable floor area	Column B Rates
Retail premises	4 per 100sq m of leasable floor area	3.5 per 100 sq m of leasable floor area	Column B Rates
Office	3.5 per 100sq m of net floor area	3 per 100sq m of net floor area	Column B Rates
Food and drink premises	4 per 100 sq m of leasable floor area	N/A	3.0 per 100 sq m of leasable floor area
Hotel	0.4 per patron	N/A	3.0 per 100 sq m of leasable floor area
Place of assembly	0.3 per patron	N/A	3.0 per 100 sq m of leasable floor area

Source: Wodonga Planning Scheme[8]

Victorian Parking Overlays also allow for cash in lieu of parking. Like Albury City Council, Wodonga Council has included provision for a cash in lieu scheme, with a contribution of $10,000 per space stipulated. Contributions do not apply to dwellings, and the policy allows for less spaces to be provided in residential developments where the *'responsible authority is satisfied that a lesser number is sufficient.'*

The cash in lieu is only applicable for land subject to the Parking Overlay. For all other land, requirements in Clause 52.06 are required, unless Wodonga Council grants a permit for reduced provision.

4.1.1.3 Cash in lieu schemes

Cash in lieu schemes are generally established to generate revenue to deliver more car parking, but this may not be a desirable outcome. This follows a 'predict and provide' ethos, where the vehicle generation rates are predicted, and then ample supply to satiate predicted demand is provided. However, this will do little to alter transport demand or patterns, and is likely to exacerbate the already high levels of car dependence. If Councils desire denser and more vibrant city centres, they may be better served to reduce parking overall while providing better choices for a more diverse set of transport options, including walking, cycling, and buses. It should be noted that Wodonga has the capacity to direct funding towards other transport options, which ameliorates some disadvantages of cash in lieu schemes.

Parking cash in lieu schemes generate revenue to deliver more car parking, but this may not be a desirable outcome.

Cash in lieu schemes can also be viewed as a 'fine' for not providing parking, which developers seek to avoid through the provision of parking on site. This, again, may have consequences which are not aligned with Council desires and visions for Albury and Wodonga. An alternative approach would be reductions in parking requirements, and clearer exemption or reduction mechanisms in the planning documentation. These issues will be addressed in the *Opportunities* section. Figure 20 provides an example of the re-allocation of parking bays to enhance amenity and vibrancy.

If Councils desire more sustainable townships and more vibrant city centres, they may be better served by reducing parking overall while providing better choices for a more diverse set of transport options, including walking, cycling, and buses.

Figure 20 Creative re-use of former parking bays

[8] Wodonga Planning Scheme, VPP 52.06 – Car Parking; LPP 45.09 – Schedule to Parking Overlay < https://www.planning.vic.gov.au/schemes-and-amendments/browse-planning-scheme/planning-scheme?f.Scheme%7CplanningSchemeName=wodonga >

Understanding parking behaviour through Albury sensor data

The introduction of parking sensors enables the automated collection of data on car parking occupancy, and a range of other variables that help better manage car parking. Sensor data for key streets in the Albury CBD reveal:

- Kiewa Street, between Dean and Smollett Street have the highest occupancy levels overall, at around 70%.
- Kiewa Street between Swift and Dean Street has the lowest occupancy levels, at 56%.
- Thursdays are the bust time for on street parking in Albury and Sunday is the quietest.
- Parking is busiest around midday.

The continued use of remote sensor will help better understand how the parking asset is used, and improve its management.

4.1.2 Bicycle parking

Planning for Albury and Wodonga also requires the provision of bicycle parking. A comparison of these requirements for several major uses is provided in Table 4.

In Albury, there is a single rate of bicycle parking required, which is tied to the number of car parking spaces provided. It should be noted that bike parking requirements are based on what is provided (i.e., car spaces not provided through cash in lieu reduce the required number of bicycle spaces).

Wodonga's requirements are stipulated in state-wide Victoria Planning Provision Clause 52.34. The number of bike spaces required is not dependent on car parking spaces and varies depending on use. Additionally, Clause 52.34 requires the provision of showers for employees:
'If 5 or more employee bicycle spaces are required, 1 shower for the first 5 employee bicycle spaces, plus 1 to each 10 employee bicycle spaces thereafter.'

Change rooms can also be required, with:
'1 change room or direct access to a communal change room to each shower. The change room may be a combined shower and change room.'

Overall, bicycle parking requirements in Wodonga are likely to be higher than in Albury (and more likely to cover more developments). However, in both cases bike parking requirements are unable to facilitate sufficient space for all residents of higher density dwellings to own a bicycle. As examples:

- A multi-unit development in Albury would need to contain at least 23 two-bedroom dwellings to meet the car parking threshold to require three bicycle spaces. In Wodonga, that same development would require six spaces (assuming it were four-stories). Bicycle ownership rates are considerably higher now.
- An office in Albury would need to be 1,200 sq m to require three bicycle spaces. In Wodonga, an office of that size would require five spaces

Should Councils desire to increase cycling participation, higher rates must be provided. For dwellings, it may be more appropriate to require one bicycle space per bedroom.

Table 4 Comparison of bike parking requirements in Albury and Wodonga

Use	Albury	Wodonga
Dwelling	Car parks with 30 or more spaces are to provide 1 bicycle rack space for each 10 spaces.	Residents: In developments of four or more storeys, 1 to each 5 dwellings Visitors: In developments of four or more storeys, 1 to each 10 dwellings
Restaurant		Employees: 1 to each 100 sq m of floor area available to the public Visitors: 2 plus 1 to each 200 sq m of floor area available to the public if the floor area available to the public exceeds 400 sq m.
Pub/bar		–
Retail premises		Employees: 1 to each 300 sq m of leasable floor area Visitors: 1 to each 500 sq m of leasable floor area
Office		Employees: 1 to each 300 sq m of leasable floor area if the net floor area exceeds 1000 sq metres Visitors: 1 to each 1000 sq m of leasable floor area if the net floor area exceeds 1000 sq metres

Source: Albury Development Control Plan 2010[9]; Wodonga Planning Scheme[10]

[9] Albury Development Control Pan 2010, Part 17 – Off Street Car Parking < https://www.alburycity.nsw.gov.au/property/plan/planning-controls/albury-development-control-plan-2010 >

[10] Wodonga Planning Scheme, VPP 52.34 – Bicycle Facilities < https://www.planning.vic.gov.au/schemes-and-amendments/browse-planning-scheme/planning-scheme?f.Scheme%7CplanningSchemeName=wodonga >

4.2 Structure Plans

4.2.1 Thurgoona Wirlinga Precinct Structure Plan

The Thurgoona Wirlinga Precinct Structure Plan guides the development of the area until 2045. It is a greenfield development approximately 7km from the Albury town centre. It includes the creation of new activity centres, schools, and community centres. The existing population is approximately 6,000 but is expected to reach 50,000 by 2068.[11]

The Vision for the Thurgoona Wirlinga Precinct Structure Plan contains a number of transport relevant issues, as highlighted below (verbatim from the Plan):

'To establish a living environment that promotes and is defined by a 'sense of place' and a 'sense of community' that is uniquely Australian and reflects the rural heritage of the district.

A sustainable living environment that offers all members of its community convenient and affordable access to a wide range of recreational, educational, residential and employment opportunities.

An inclusive community that has access to efficient public transport, bike paths and walkable proximity to diverse and extensive open space networks.

A community that values both its heritage and natural environment, while considering the needs of both today's residents and the residents of tomorrow.

A community that is proud of this safe and vibrant place that draws inspiration and life from its heritage and connection to the majestic Murray River.'

The Structure Plan's chapter on transport recognises that the low-density development will be car dependent and that expansion of the road network will be required to cater to this demand. This *'predict and provide'* theme becomes a self-fulfilling prophesy and makes it difficult to achieve the ambitions included in the *Vision*. Expansion of the cycling and walking network are identified as priorities. From a public transport perspective, there are some problematic statements, such as:

- *'… low density housing away from the major activity centres is not compatible with the provision of high amenity public transport'.*
- *'The location of the Study Area relative to employment opportunities also limits public transport opportunities as bus travel times and costs will not be competitive with private vehicles'.*
- *'The best opportunities for public transport, based on existing usage, appear to be with the operation of private group transport'.*

While the above statements may reflect the period in which the Plan was prepared (2013), it does conflict with the *vision*, which included *'access to efficient public transport'.* Moreover, as will be discussed in the following paragraphs, more recent work, conducted with the Thurgoona community shows public transport to be important to residents.

The *Growing Thurgoona Community conversation*, which was conducted in 2018, mostly with residents, found the following issues to be important. Illustrated in Figure 21, the results show the following transport relevant issues are important to people in Thurgoona:

- Feeling safe
- Traffic
- Walking paths
- Environmental sustainability
- Schools close by
- Cycle facilities
- Access to public transport.

[11] https://eservice.alburycity.nsw.gov.au/ACCPublicDocs/DocumentViewer.aspx?DocID=2162921#:~:text=The%20Thurgoona%20Growth%20Area%20encompasses,in%20the%20next%2050%20years.

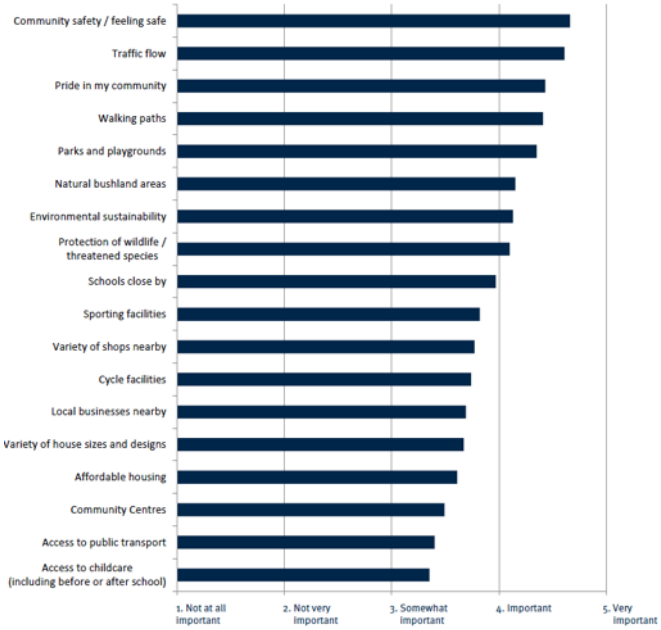


Figure 21 What's important to people in Thurgoona

4.2.2 Leneva-Baranduda Precinct Structure Plan 2018

Leneva-Baranduda is an Urban Growth Zone located southeast of Wodonga. This Precinct Structure Plan (PSP) covers 1062.7 ha of land that is transitioning from non-urban land to urban land.

While it is not geographically significant for cross border considerations, there are good design guidelines shown in the PSP for active transport. Cross sections for roads show:

- Pedestrian, cycling and shared paths
- Buffers between active transport paths and roads
- On-street parking is not shared with cycle lanes

The PSP also provides a healthy living map, illustrated in Figure 22, identifying connector streets between pedestrian, and cycling paths to open spaces

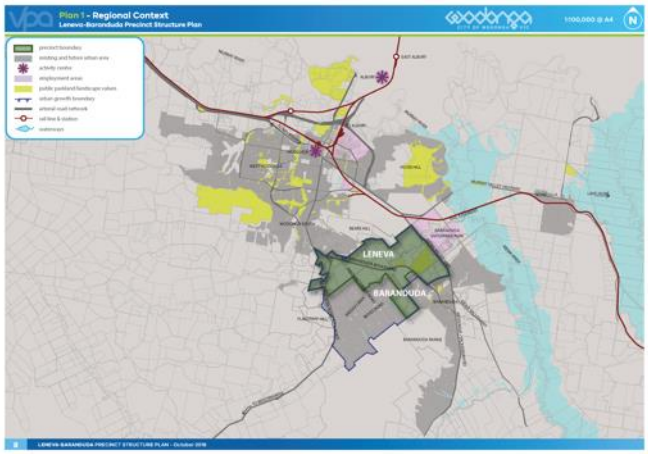


Figure 22 Connector streets between pedestrian and cycling networks

The estimated 15,395 future residents will add considerable traffic onto existing roads however, it isn't clear if improvements to the existing road network will be required to address this burden.

4.2.3 Gateway Island Master Plan 2018

The location of Gateway Island centrally between Wodonga and Albury provides community facilities and open space which may be considered the 'heart of the community'.

The plan covers overarching recommendations for the island, then breaks down into more specific recommendations for each of the six precincts that have been identified. The recommendations are grouped into the following themes:

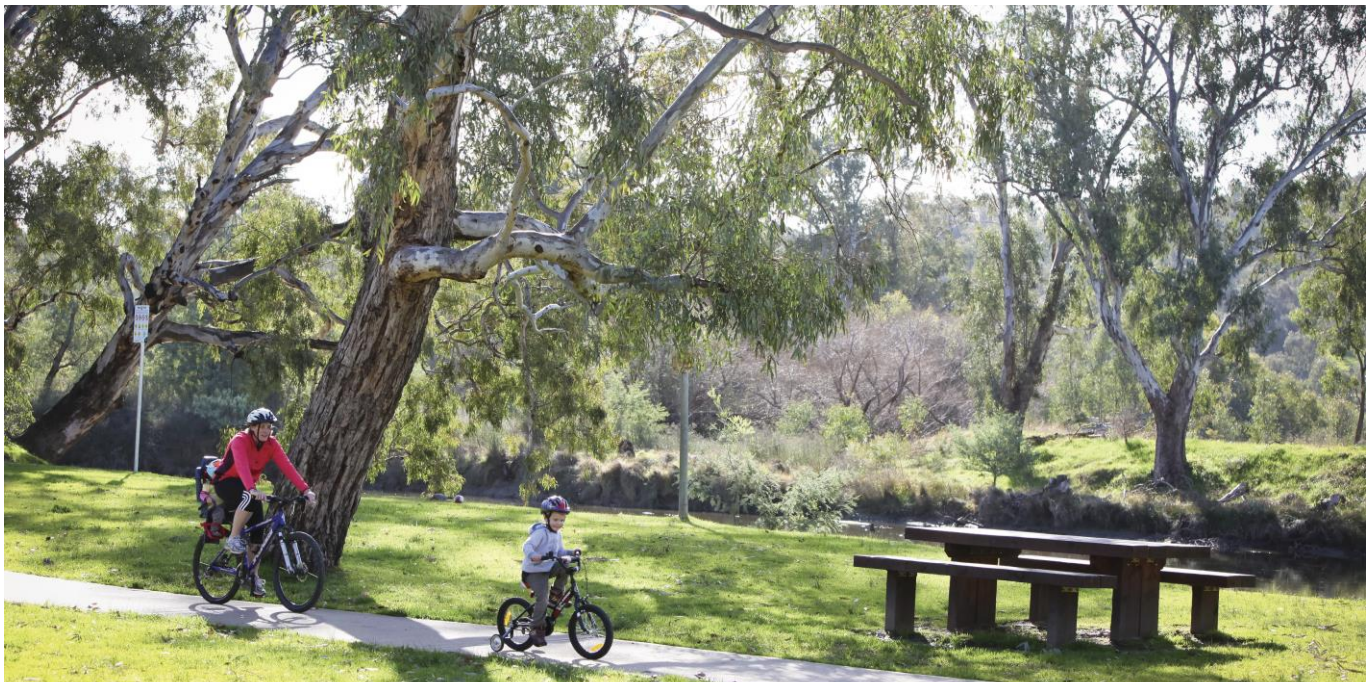
- River
- Environment
- Social / Activity / Amenity
- Connectivity
- History / Arts / Culture
- Tourism (Economic)
- Maintenance
- Governance / Coordination
- Education

Accessibility is a recurrent theme for the recommendations, with the success of the island dependent on improving existing connections and creating new ones.

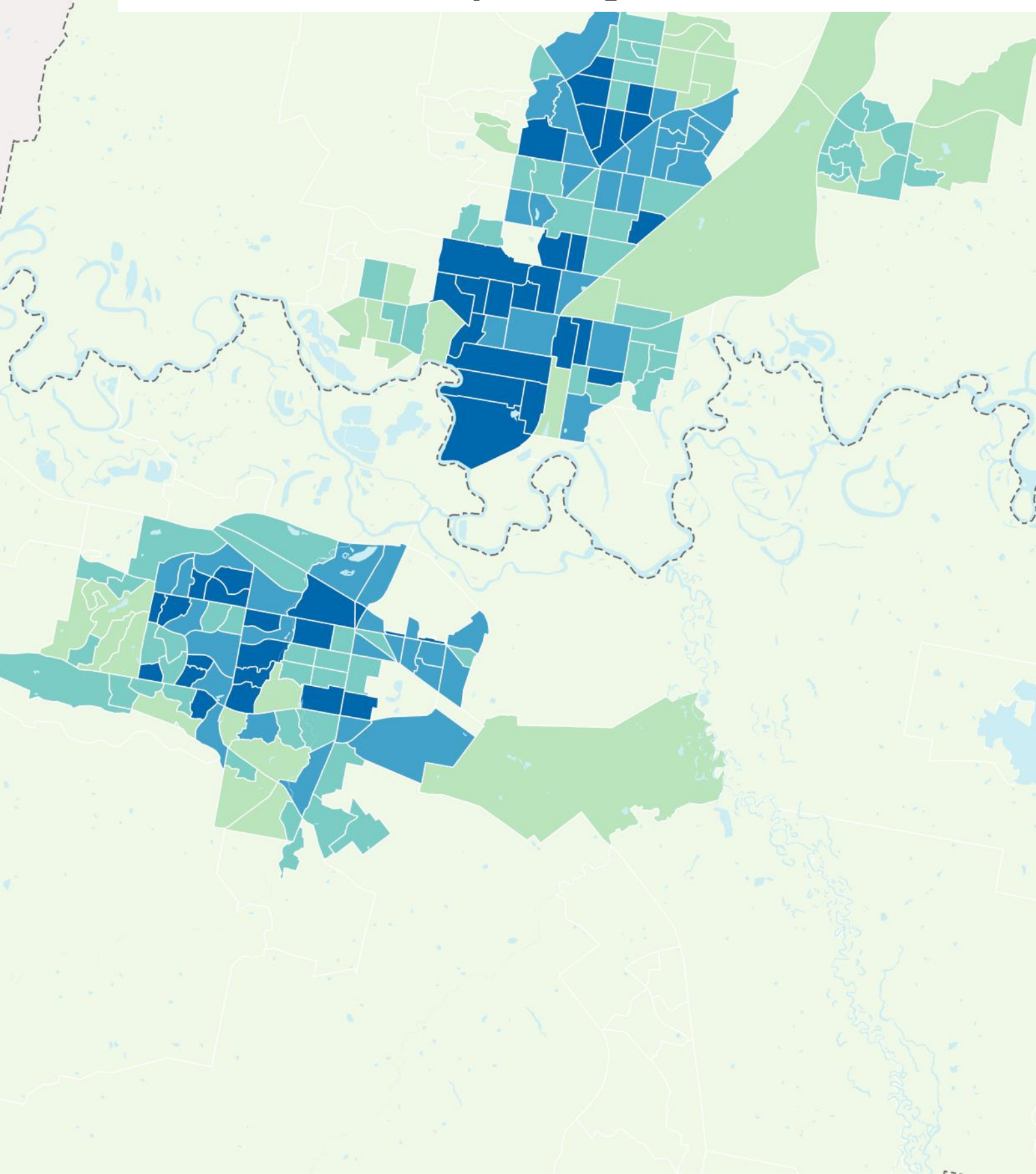
The connectivity analysis provides detailed recommendations on how to provide better access

to the island and in turn strengthen the connection between Wodonga and Albury. Key considerations raised that impact transportation between both cities are:

- Former Sydney – Melbourne Railway line traverses through the island
- Identified as an opportunity to connect Gateway Island to Wodonga Town Centre
- Investigate conversion of existing footpath on Wodonga Creek Bridge to commuter cycle path.
- Use of road reserves in Precinct 5 to connect to Wodonga City Heart
- Provision of a crossing across Hume Hwy (Precinct 5 Lincoln Causeway) to link Precinct 1 The Village to Precinct 3 Events Area (21.3.1)
- Improve pedestrian safety at traffic signals
- Improve wayfinding through signs, strategically placed artwork and landscaping treatments.
- Review bus access and event traffic management
- Lincoln Causeway is noted to provide the principal vehicular access for locals between the two cities, but also serves as the primary connection to Gateway Island. While the Master Plan advocates for better accessibility to the island, it does not address the regional impact for locals as road pressure Increases due to internal and foreign tourism.



5. Bike Use Propensity Index



High quality bicycle infrastructure can be expensive and government budgets are limited. It is therefore important, when planning a future cycling network to determine spatial variation in the latent demand for cycling. Through peer reviewed research, a number of Census collected variables have been isolated, in order to provide a heat map of latent demand for cycling, known as the *Bike Use Propensity Index*.

The Institute for Sensible Transport developed the Bike Use Propensity Index to identify spatial differences in latent demand for cycling in a city or region. The Index is based on seven Census collected variables that are statistically significant predictors of bike use.[12] In sum, these maps provide a clear illustration of the spatial variation in latent demand for cycling in Albury Wodonga.

The Propensity Index can help guide areas for future investment in cycling infrastructure by identifying the areas where the greatest uptake in cycling is likely to occur. Actions focusing on high propensity areas are likely to include infrastructure projects, but should also consider behaviour change initiatives and other support programs to encourage greater cycling uptake.

5.1 Methodology

The Bike Use Propensity Index combines seven variables, all of which are collected as part of the ABS Census. The statistical basis for the Index was developed through the collection of data on riding behaviour and demographic factors. This data was analysed using binary logistic regression in SPSS and STATA. The results, published in Transportation Research Part A revealed that there are some statistically significant factors for propensity to cycle.

The data that forms the basis of the Index is collected from the following variables, derived directly from the 2016 Census:

1. Residential population density, measured as people per hectare (SA1)
2. Density of young adults measured as number of people aged 18 – 34 per hectare. (SA1)
3. Low motor vehicle ownership measured as number of households with zero or one cars per hectare. (SA1)
4. Bicycle use - origin measured as number of people riding to work per hectare. (SA1)
5. Employment density measured as number of people working per hectare. (DZN)
6. Bicycle use – destination measured as number of people riding to work per hectare (DZN)
7. Short car trips– destination measured as number of people driving to work between 0 and 5 km per hectare. (DZN)

The Bike Use Propensity Index has been designed to show the variation in the relative propensity to cycle, at the highest possible level of spatial detail.

The Index contains more residential-oriented variables than it does employment, or destination, variables. To ensure that employment rich areas that have comparatively lower residential populations are not undervalued, such as the Albury or Wodonga CBDs, the employment variables in the index are weighted the same as residential factors. Doing this helps ensure important bike destinations, such as employment hubs, are adequately considered in the Index.

Geographic areas are given an absolute score, of between 0 and approximately 5[13] for each of the variables. These scores are then averaged to reveal an overall bike use propensity score of between 0 and approximately 5. A score close to 0 indicates a low propensity to cycle, while a score of 5 indicates a high propensity to cycle. The mapped values are aggregates of the attributes' scores.

[12] https://www.sciencedirect.com/science/article/abs/pii/S0965856414002638?via%3Dihub

[13] It is possible, in limited circumstances, such as areas with very high population or employment density, for a score to exceed 5. This is by design, as it allows the index to compare across Australia, and across time (e.g., comparing scores from Albury with Sydney or from 2011 Census with 2016 Census).

SA1's that receive very high Index scores will have scored highly across all the variables included in the Index. In almost all cases, an SA1 that scores above 4.5 will have been highest scoring in most variables. The maps used in this report have been colour-scaled to be comparable within the study area. However, the score is relative to all other areas in Australia (for example, the Melbourne and Sydney CBDs have areas with scores above 4.5).

5.2 Results

The Bike Use Propensity Index, for all seven factors, for Albury Wodonga, is shown in Figure 23.

Areas with relatively high propensity include the Central Albury, South Albury, and Lavington, and the Wodonga CBD, and pockets of West Wodonga. Areas on the edge of, and outside of, the urban area have very low propensity for cycle use (e.g., Leneva and Table Top).

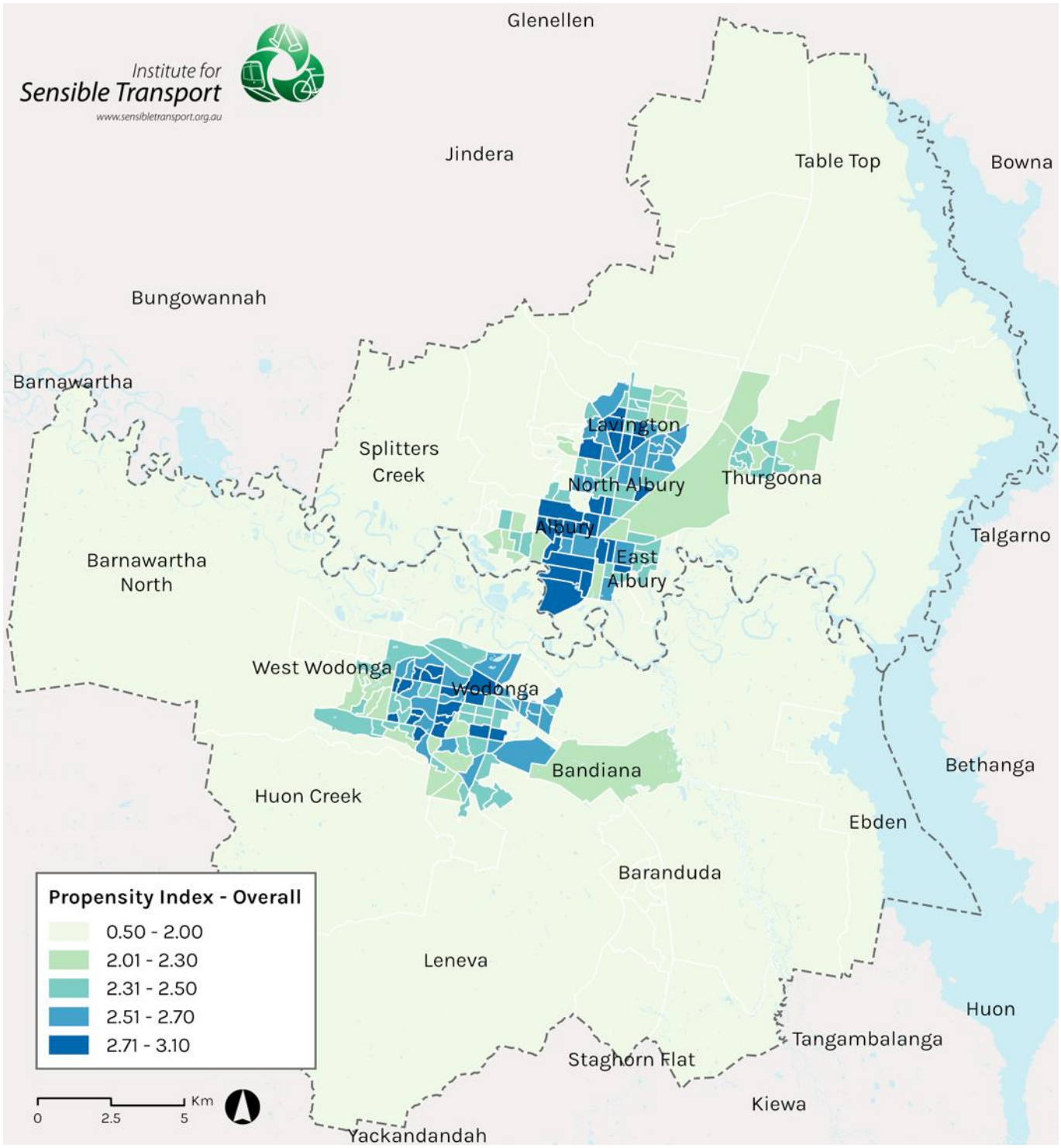


Figure 23 Bike Use Propensity Index for Albury Wodonga

The origin (residential) factors of the Bike Use Propensity Index are shown in Figure 24. The highest score is 3.2, in residential areas, which are largely surrounding Wodonga, Albury, and Lavington. Newer growth areas of Thurgoona and Baranduda show moderate bike use propensity.

This highlights areas where residents have a higher likelihood to consider riding a bike for transport, relative to other areas.

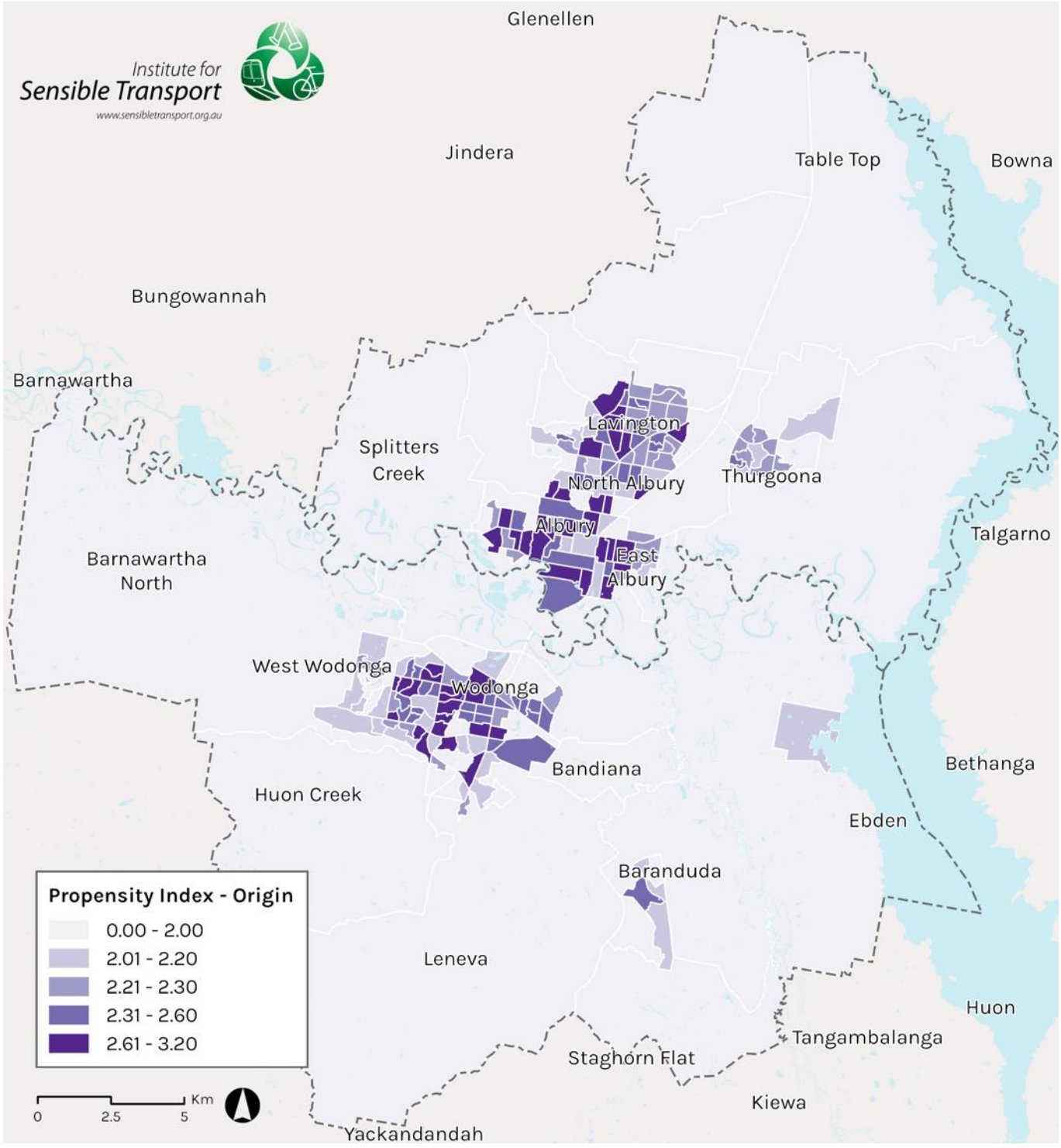


Figure 24 Bike Use Propensity Index origin scores for Albury Wodonga

The destination (employment) factors of the Bike Use Propensity Index are shown in Figure 25. The highest score is 3.5, in the commercial areas of Albury, Wodonga, and West Wodonga. Newer growth areas of Thurgoona and Baranduda show lower propensity for cycling use, likely a result of lower levels of employment.

These areas are likely to have people ride to work for commuting, should infrastructure be provided to support their choice to cycle.

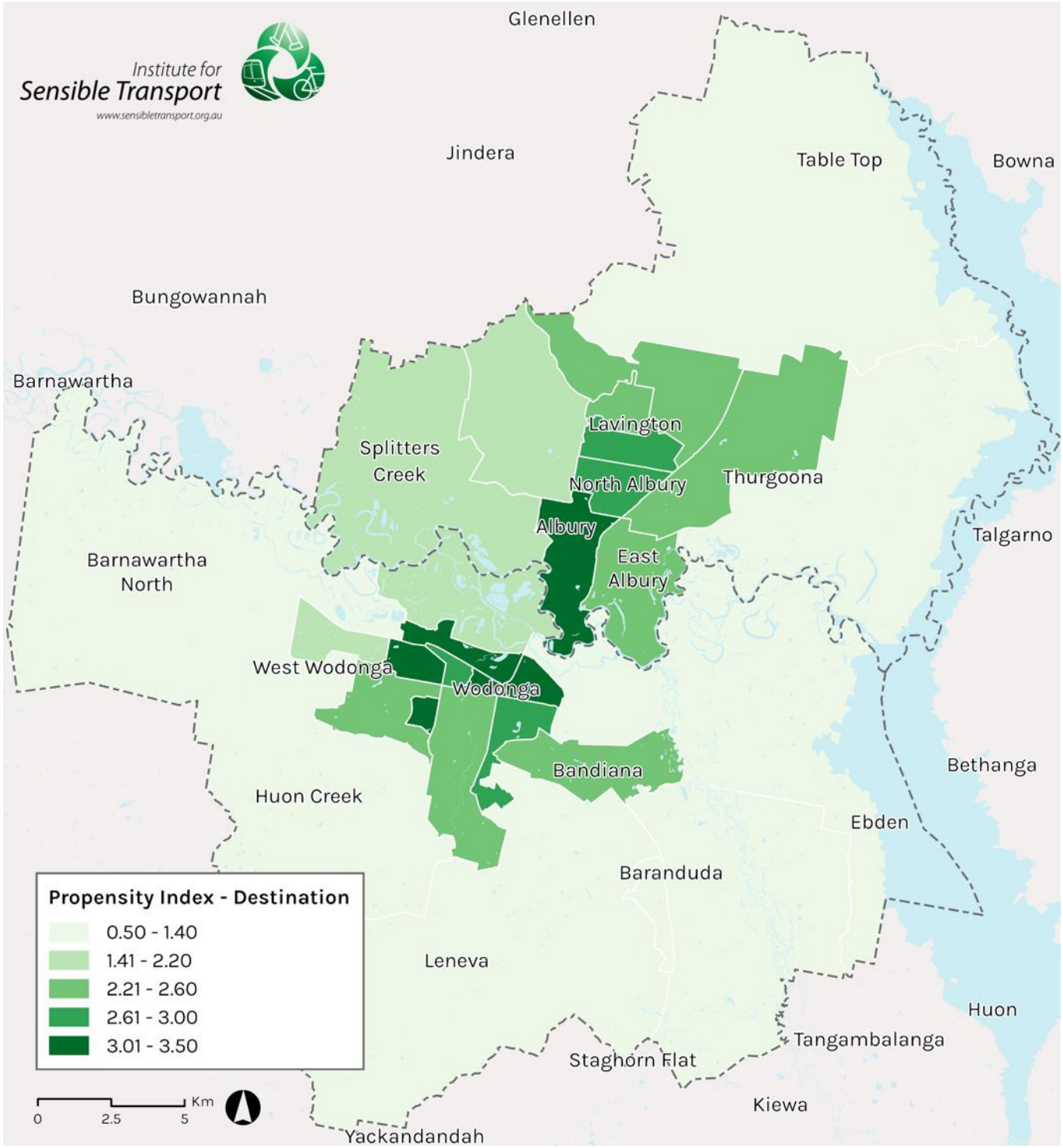


Figure 25 Bike Use Propensity Index destination scores for Albury Wodonga

5.3 Implications

The Bike Use Propensity Index highlights how Albury and Wodonga can make prudent bicycle network investment decisions focused on maximising people's opportunity to cycle. The bicycle infrastructure opportunities will include how different bike infrastructure typologies (e.g., painted bike lane, separated bike lane) can be used to maximise the appeal of cycling, especially in those areas of Albury and Wodonga with higher latent demand. Figure 26 shows the cycling network, layered on the Index.

Based on the Index, key areas of high propensity which should be a focus for future cycling infrastructure includes:

- Central Albury, Central Wodonga, and Central Lavington
- Albury to Lavington, via North Albury
- Albury to Albury TAFE
- Wodonga to West Wodonga, along Lawrence Street
- Wodonga to Willow Park area.

It is clear that newer growth areas such as Thurgoona and Baranduda have depressed levels of cycling propensity, due to lower destination scores. As bike use is sensitive to distance, it is likely that bike use in these areas will remain depressed so long as there are fewer destinations within a 5km radius.

Increasing diversity of land use in both existing and growth areas is critical to facilitating cycle use. Lavington provides an example of this, it is a distinct node within the urban area, with many shops and businesses which act as attractions and sources of employment. This increases the potential for cycling activity, as indicated in the Bike Use Propensity Index, while also increasing urban vibrancy.

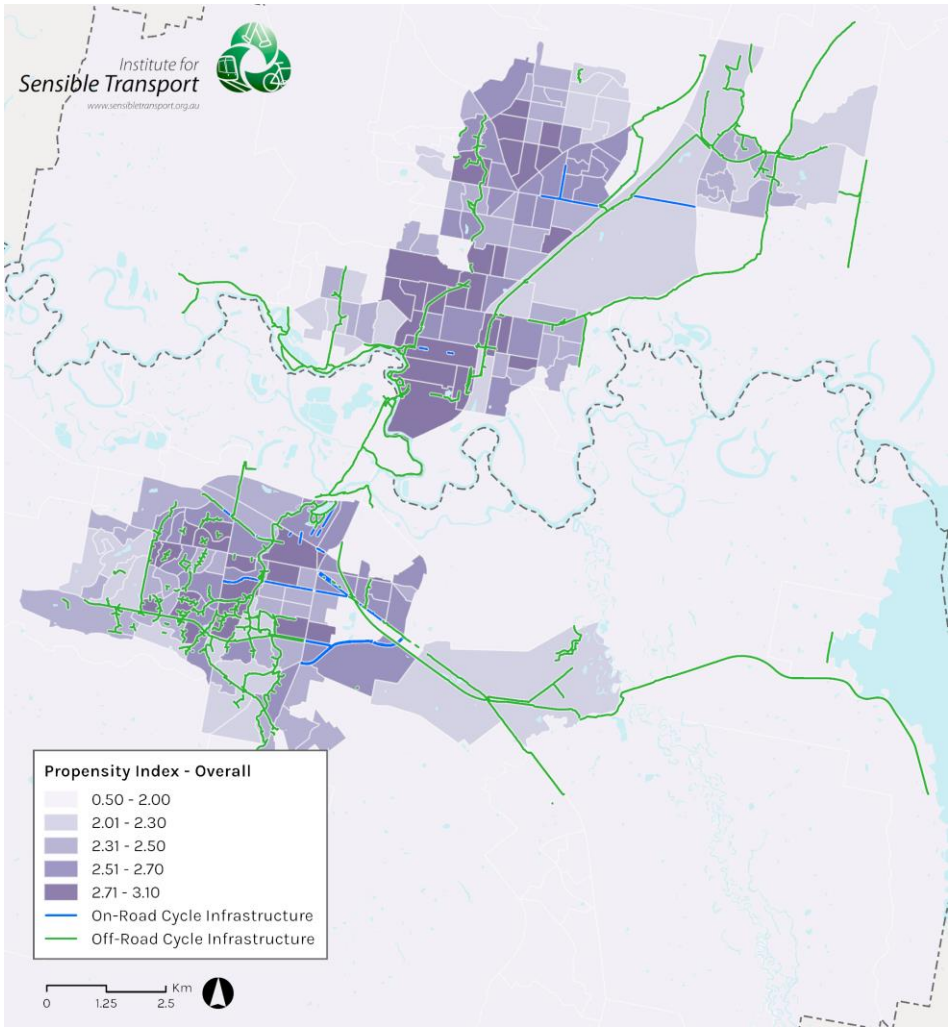


Figure 26 Bike Use Propensity Index and cycling infrastructure in Albury Wodonga

6. Review of current transport patterns and networks

This section uses data on existing transport behaviour and networks to offer an overview of the transport system and how it is used in Albury Wodonga. Developing a strong understanding of travel patterns will be critical to future stages of this project, particularly in relation to identifying opportunities to better align the transport system with Albury Wodonga's strategic ambition for a more sustainable and vibrant future.

6.1 Transport patterns

6.1.1 Journey to work

The Census asks respondents how they travelled to work, and this is asked in August, every five years. It is the only transport question in the Census. Figure 27 and Figure 28 provide the results to this question, across all main modes, for the last 3 Census years. This shows a relatively stable mode share percentage between 2006 to 2016, with a small increase in car use and corresponding decrease in walking. However, because the population of Albury and Wodonga has increased, maintaining the same mode share means that total car trips increased. Figure 28 shows about 3,600 *extra* car commutes are made each day in 2016 compared to 2006.

Albury Wodonga has become gradually more car dependent over time. Coupled with population growth, this has resulted in 3,600 extra weekday car trips.

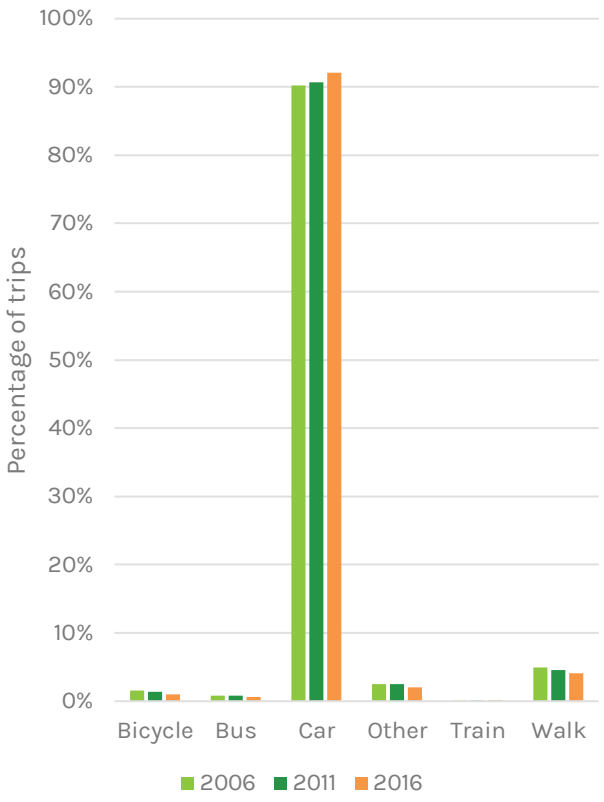


Figure 27 Journey to work per cent - 2006 to 2016
Source: ABS Census, 2016

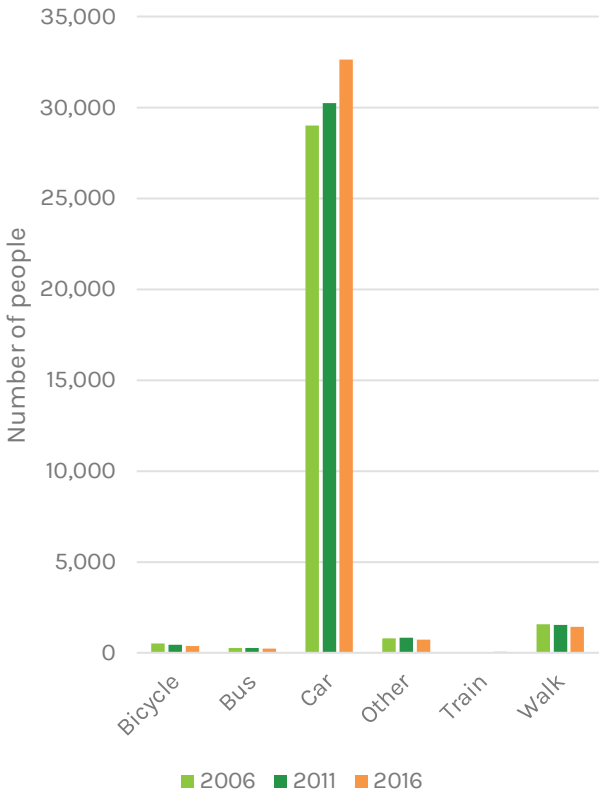


Figure 28 Journey to work total trips - 2006 to 2016
Source: ABS Census, 2016

The spatial distribution of journey to work mode share is shown in Figure 29. The blue dots show car trips, which dominate both Albury and Wodonga. Active transport (walking and cycling) can be seen near the Albury CBD, with some clusters around the army barracks in Bandiana and Ebden.

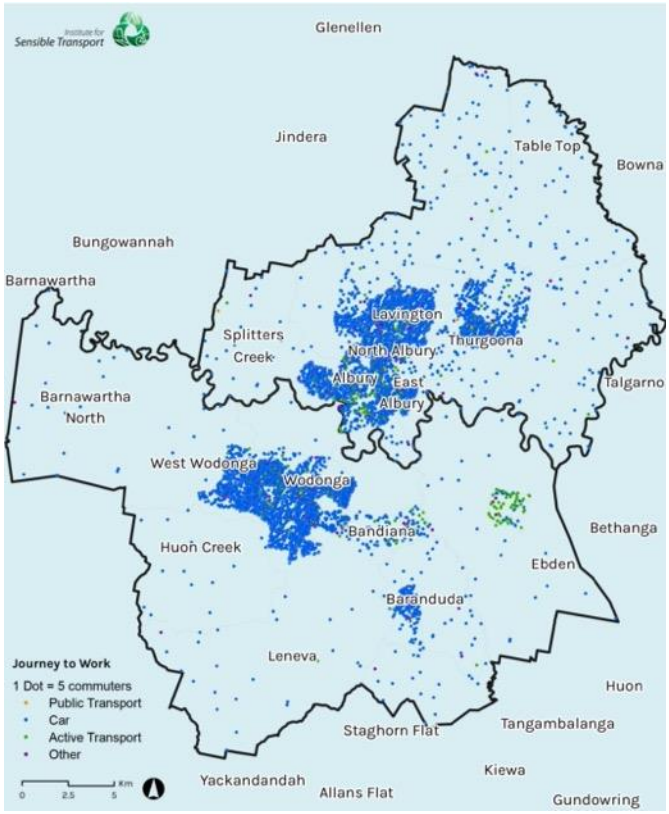


Figure 29 Journey to work – origin
Source: ABS Census, 2016

6.1.1.1 Trip distance

It is important to consider trip distance in any analysis of travel behaviour. One of the reasons this is important from a strategic transport perspective is because when seeking to create a more sustainable transport system, it is useful to focus on those trips short enough to be viable to convert to walking and cycling. Thus, in Figure 30 we have provided mode share for all distances, (top chart) as well as just for trips under 5km (bottom chart).

As has been established earlier, the Albury Wodonga region is highly car dependent. However, when looking just at trips 5km or less, almost one in 10 trips are by foot.

For trips under 5km, almost one in 10 are by foot.

Our analysis also reveals that considerable opportunity exists to bring down the 86.4% of trips to work under 5km that are currently by car.

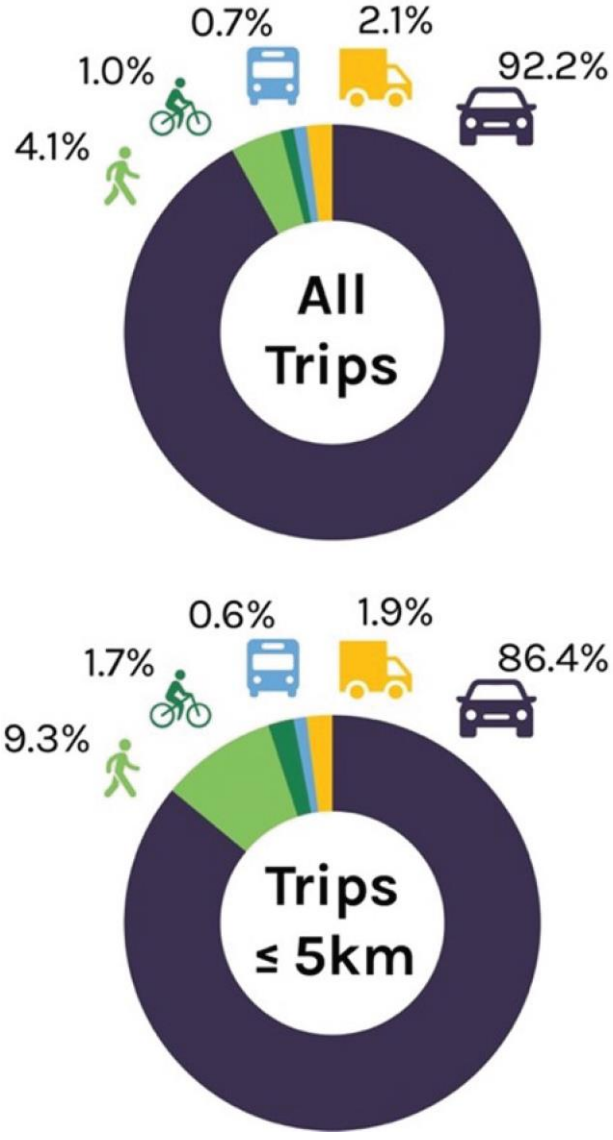


Figure 30 Journey to Work Mode Share in Albury and Wodonga
Source: ABS Census, 2016

Figure 31 shows the cumulative distance of Albury and Wodonga residents when they travel to work. While there are some in the region who make longer commute trips, a significant number are within a bike-able distance. It shows that 38% of trips are 5km or less. Again, the purpose of producing this analysis is to identify the potential for converting some of these car trips to active travel.

It is important to recognise that while the focus of the above maps have been on *journey to work*, we are aware that these are just one trip type, constituting ~20% of trips. As part of this project we will apply methodology we have used previously that scales up journey to work to estimate *all-purpose* journeys.

More than one third of all trips to work are under 5km and half are under 7km.

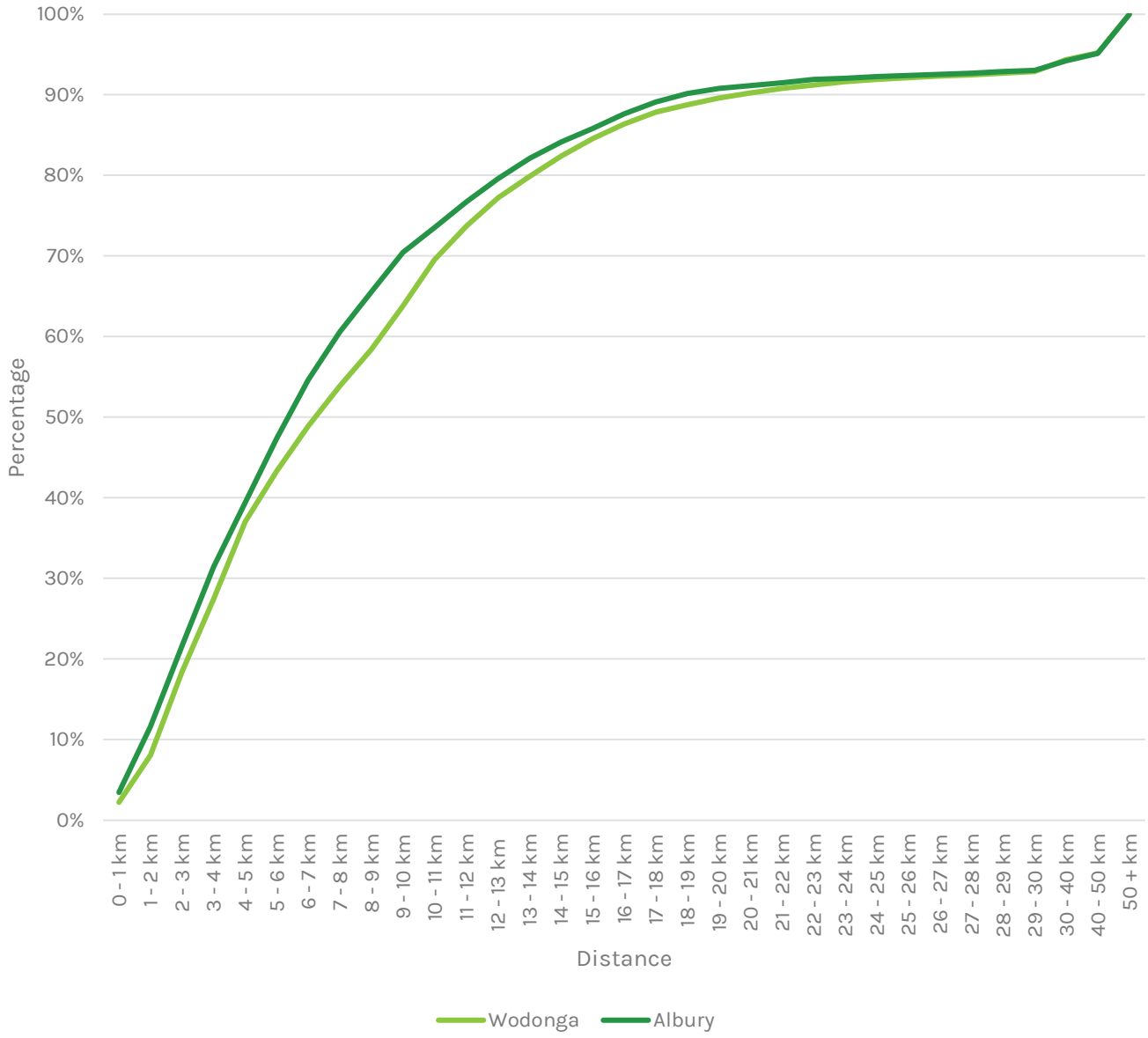


Figure 31 Cumulative distance to work

NB: destination zones for Albury and Wodonga residents

Figure 32 shows the cumulative percentage trips by distance, for each mode of transport. Results for both Albury and Wodonga were combined.

It shows 83% of walking trips are less than 3km, and 77% of train trips are greater than 50km (not graphed). All the other modes, including bus, bike, car, and other (truck, motorbike, taxi, etc) follow similar trajectories. Except for train, most trips are relatively short. For example, half of all car trips to work in either Albury or Wodonga are less than 7km (27% of all car trips are 4km or less), while 50% of bike trips are 4km or less. Just over 80% of all car trips are 14km or less, highlighting the short distances most people in the area cover for their commute to work.

The Census reveals that many trips are currently short enough to walk and cycle. It is likely that the fragmented cycling network reduces the opportunity for people to make this choice. The Census data also demonstrates the importance of promoting *20 minute neighbourhood* type concepts to encourage shorter travel distances.

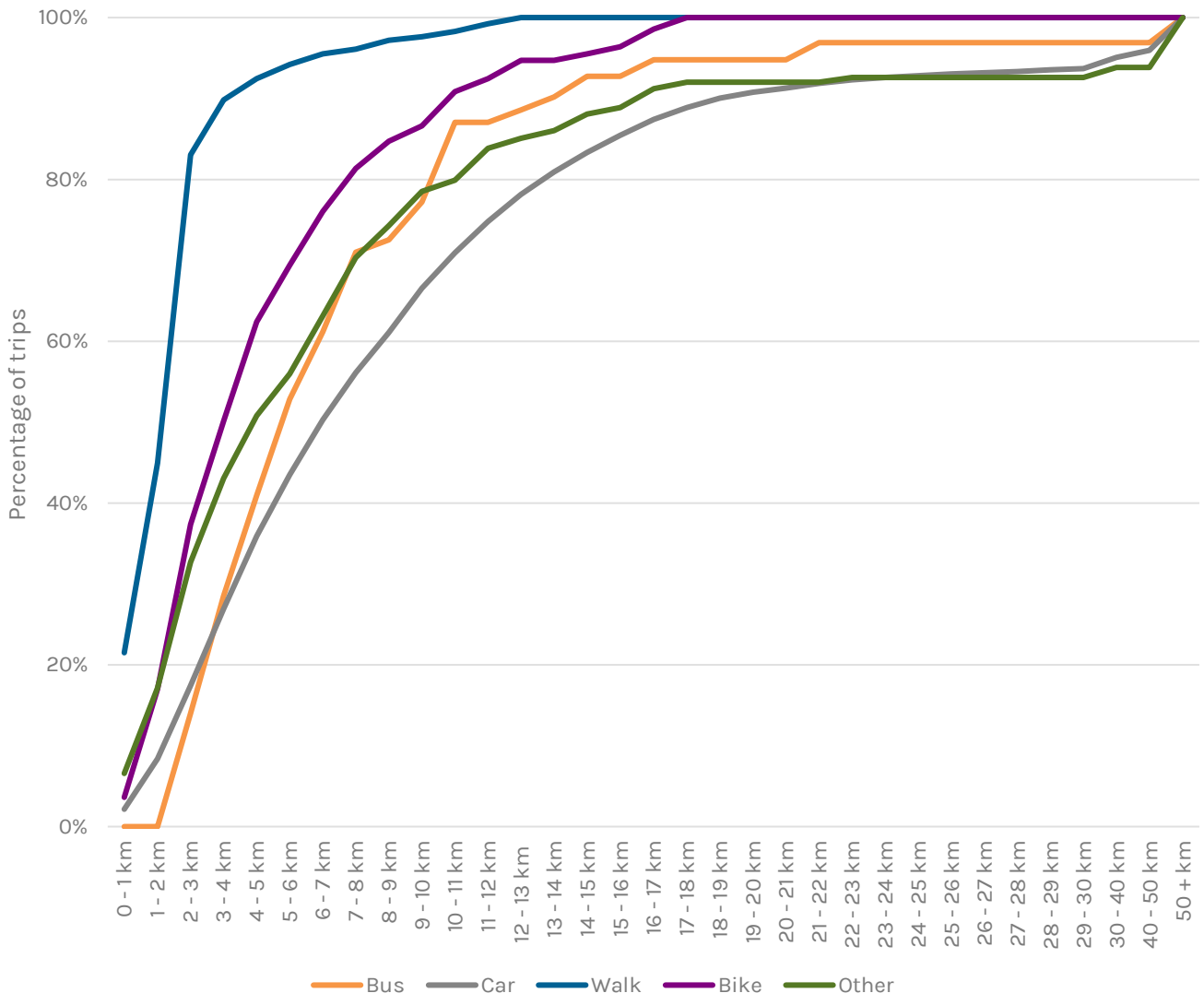


Figure 32 Cumulative distance to work by mode

Source: ABS 2016

Figure 33 uses Census data to visualise *journey to work* trip patterns. What this tells us is that there are some very high-volume movement corridors between different areas of Albury and between Albury and Wodonga. One of the implications stemming from the visualisation of journey to work movements in Figure 33 is that there are considerable benefits from focusing on the core of Albury and Wodonga, and the connections between these townships, while not losing sight of the satellite villages on the periphery of the region.

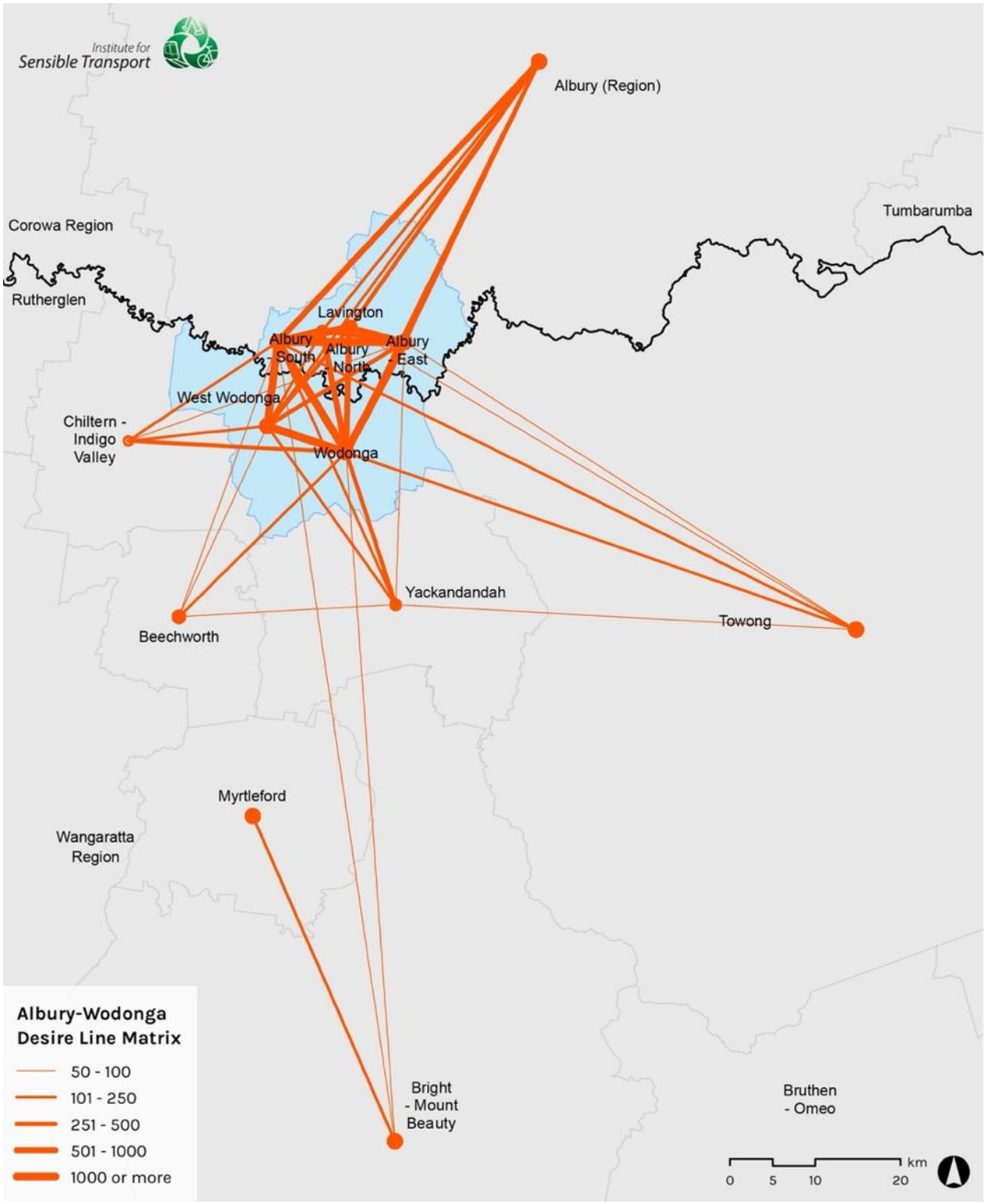


Figure 33 Work trip patterns in the Albury / Wodonga region

NB: This map is conceptual and is based on the centroid of ABS SA2 geographic boundaries

Source: ABS Census, 2016

Figure 34 offers a zoomed in map of work trips within Albury and Wodonga, which provides a more detailed view of commute patterns between these centres. The red circles indicate trips that start and end within the same SA2 (suburb), indicating a short trip. This information will be an important part of supporting decision making regarding possible improvements to the public transport system, as well as walking and cycling networks.

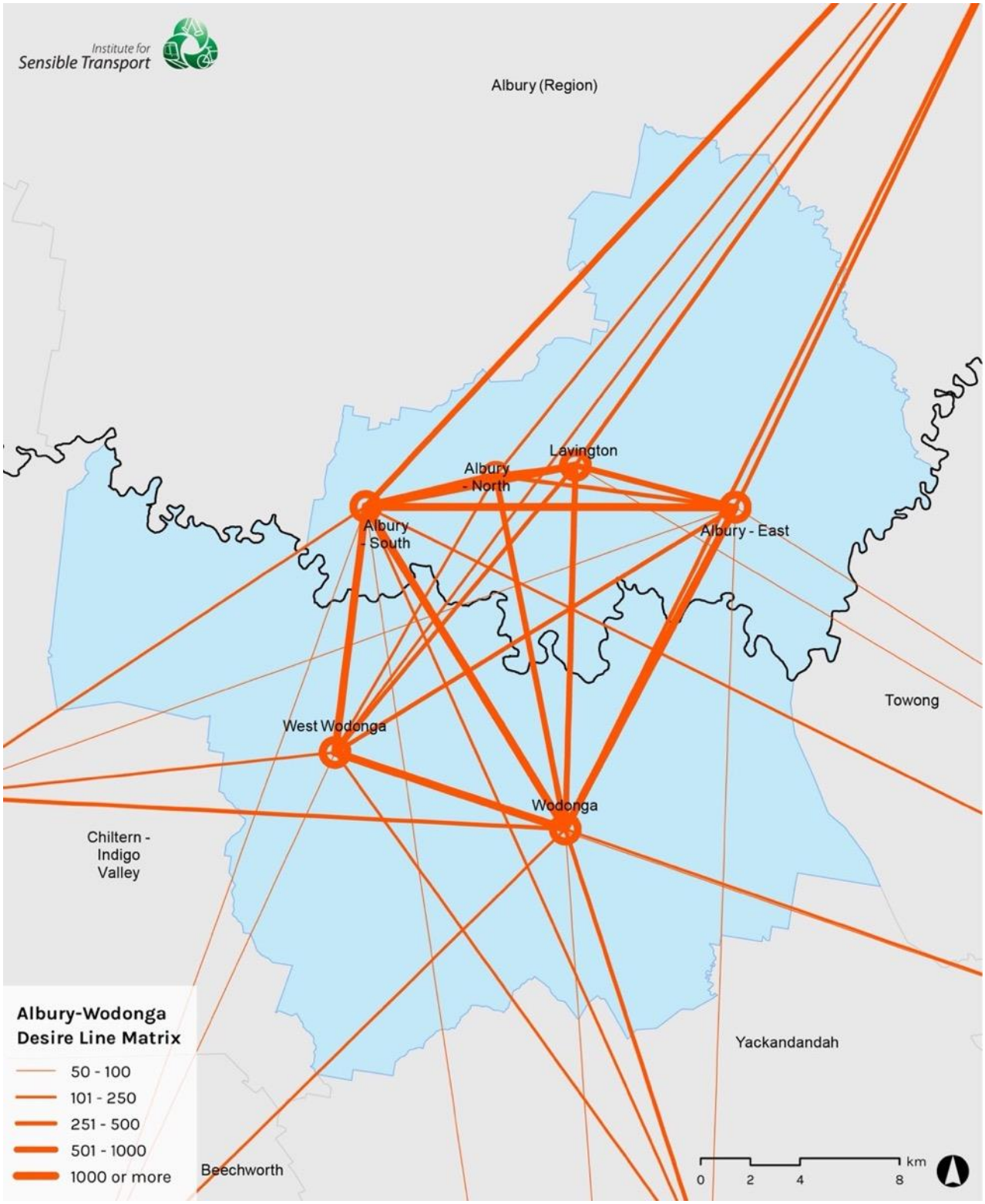


Figure 34 Work trips within Albury and Wodonga

NB: This map is conceptual and is based on the centroid of ABS SA2 geographic boundaries

Source: ABS Census, 2016

6.1.1.2 Walk Origin Destination (OD) Desire Line Matrix

Figure 35 offers a view of work trips done by walking in Albury and Wodonga. The most walked journeys to work are in Albury, East Albury, Lavington, Bandiana, and Wodonga. Walking journeys to work in Bandiana are most likely associated with the army barracks (those who live and work on base). Other walks to work largely occur in areas containing employment and residences, and start and finish in the same suburb. Again, a circle indicates trips that start and finish in the same suburb.

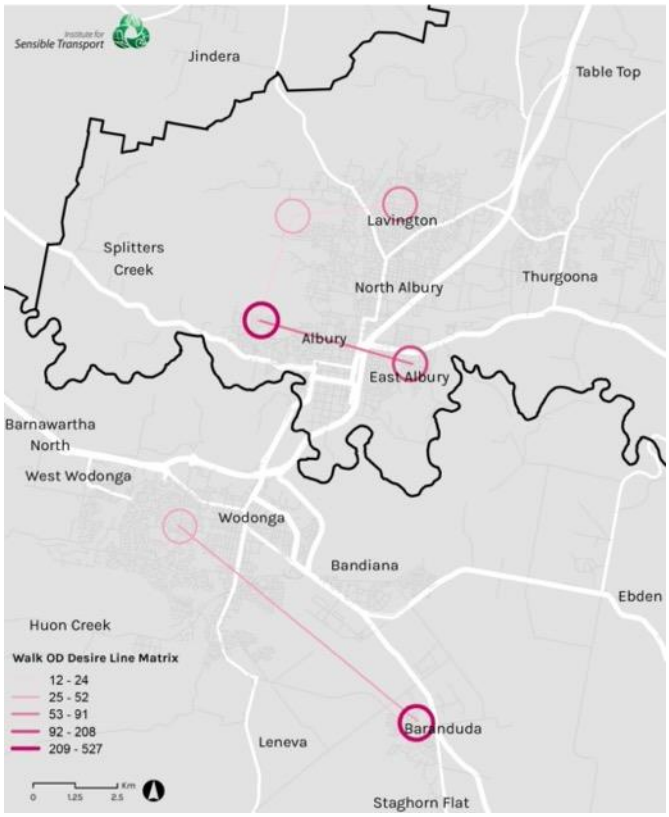


Figure 35 Work trips walked, within Albury and Wodonga

Source: ABS Census, 2016

6.1.2 Motor Vehicle Ownership

Motor vehicle ownership is collected by the ABS during the Census. As shown Figure 36, most households either own one car (37%) or two cars (39%), 16% own 3 or more cars, while 7% do not own a car at all, indicating these occupants almost entirely rely on walking, cycling, or public transport for all their transport needs. The one car households (37% of all households) may also rely on non-car transport options for some of their everyday needs.

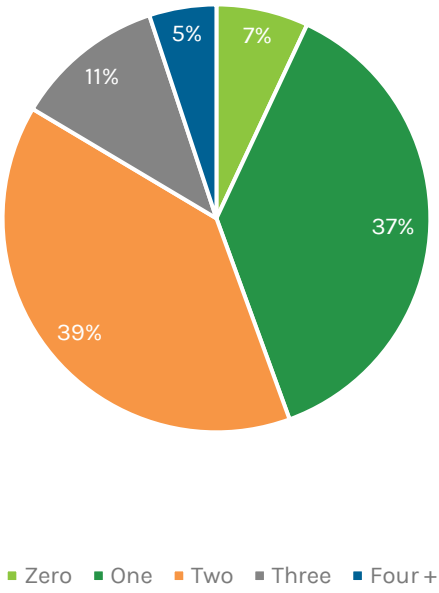


Figure 36 Motor Vehicle Ownership per cent of all households

Source: ABS Census, 2016

Figure 37 shows the spatial distribution of these low car households (zero or one car). It shows most parts of urban Albury and Wodonga have high proportions of low-car households.

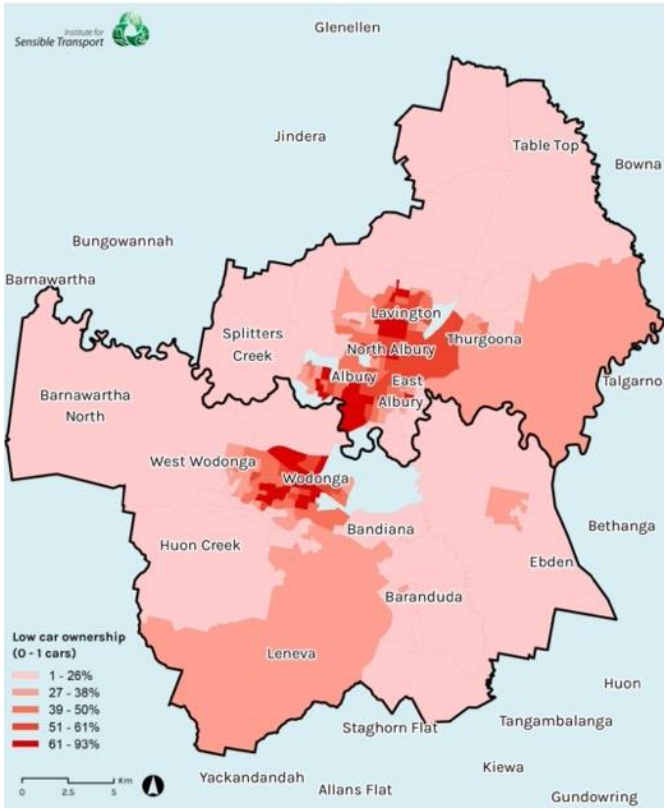


Figure 37 Low car households

Source: ABS Census, 2016

The inverse of Figure 37 is high car ownership and this is shown in Figure 38. The highest proportion of households with two or more cars can be found in the non-urbanised areas.

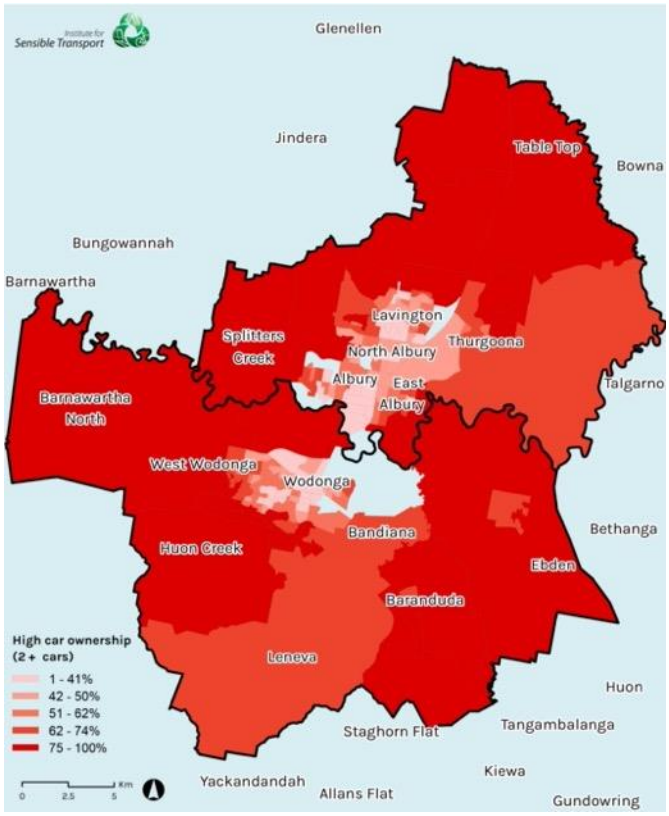


Figure 38 High-car households

Source: ABS Census, 2016

6.1.2.1 Bus patronage

The 2016 ABS Census recorded 111 bus journeys which started in Albury or Wodonga. Figure 39 represents bus trips across Albury or Wodonga with one dot per trip. This reveals the areas of patronage, at an ABS Statistical Area Level 1 (SA1) scale. For the most part, public transport bus patronage is within a walkable catchment of bus routes. This suggests that proximity is one of the elements critical to achieving higher bus public transport use, but, this should not be seen as the only element, with directness, travel time, frequency, and ease of use also critically important.

Bus patronage data can also be viewed at a Statistical Area Level 2 (SA2) scale, which loosely approximates to suburbs, as shown in Table 5. The highest bus use for journey to work trips start in Lavington, followed by Albury North and West Wodonga. All three of these areas are far enough from the central parts of Albury and Wodonga that other means (such as walking or cycling) are less attractive, and have reasonable public transport coverage.

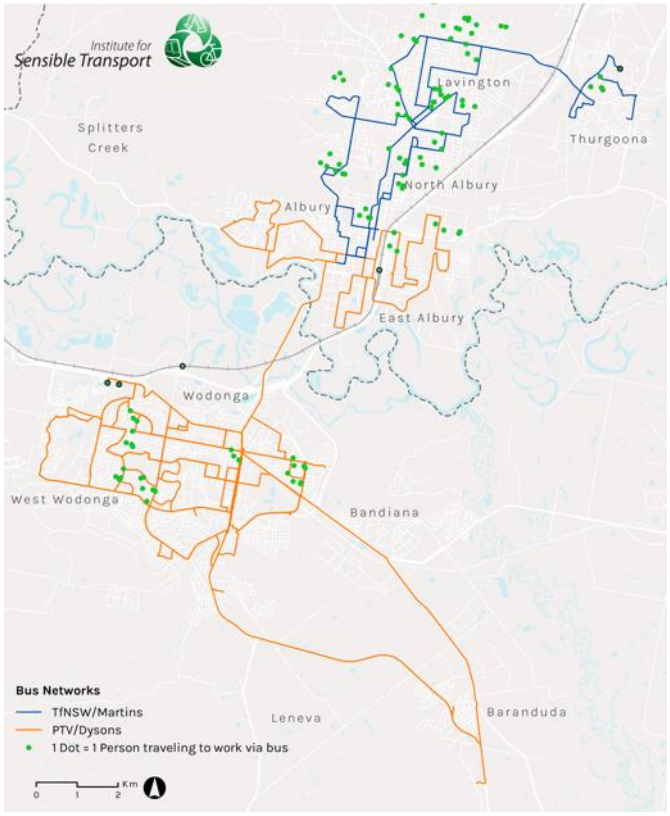


Figure 39 Journey to work by bus in Albury Wodonga, 2016

Source: ABS Census, 2016

Table 5 Journey to work by bus per SA1 in Albury in Wodonga, 2016

SA2	Bus trips
Lavington	41
Albury - North	24
West Wodonga	17
Wodonga	11
Albury - East	11
Albury - South	4
Albury Region	3

Source: ABS Census, 2016

As a reminder, these data related only to the journey to work, as there is no other national travel survey. There is a paucity of data related to other journeys, such as education, leisure, and retail. However, it is known from travel surveys in major population centres that journeys to work only account for around one quarter of all journeys, and have different travel patterns from other journeys. This data is useful in understanding some aspects of bus travel, but cannot be generalised entirely for all trips, due to different factors affecting choice.

6.1.3 Bicycle counts

'Super Tuesday'[14] is a bicycle count program in which volunteers, stationed in strategically located sites count the number and direction of cyclists, during a weekday AM peak period, in March each year. This is a national program run by the organisation *Bicycle Network* and includes the Albury Wodonga region. Figure 40 shows the counts sites across the region. Both LGAs have a relatively comprehensive count site network across the region.

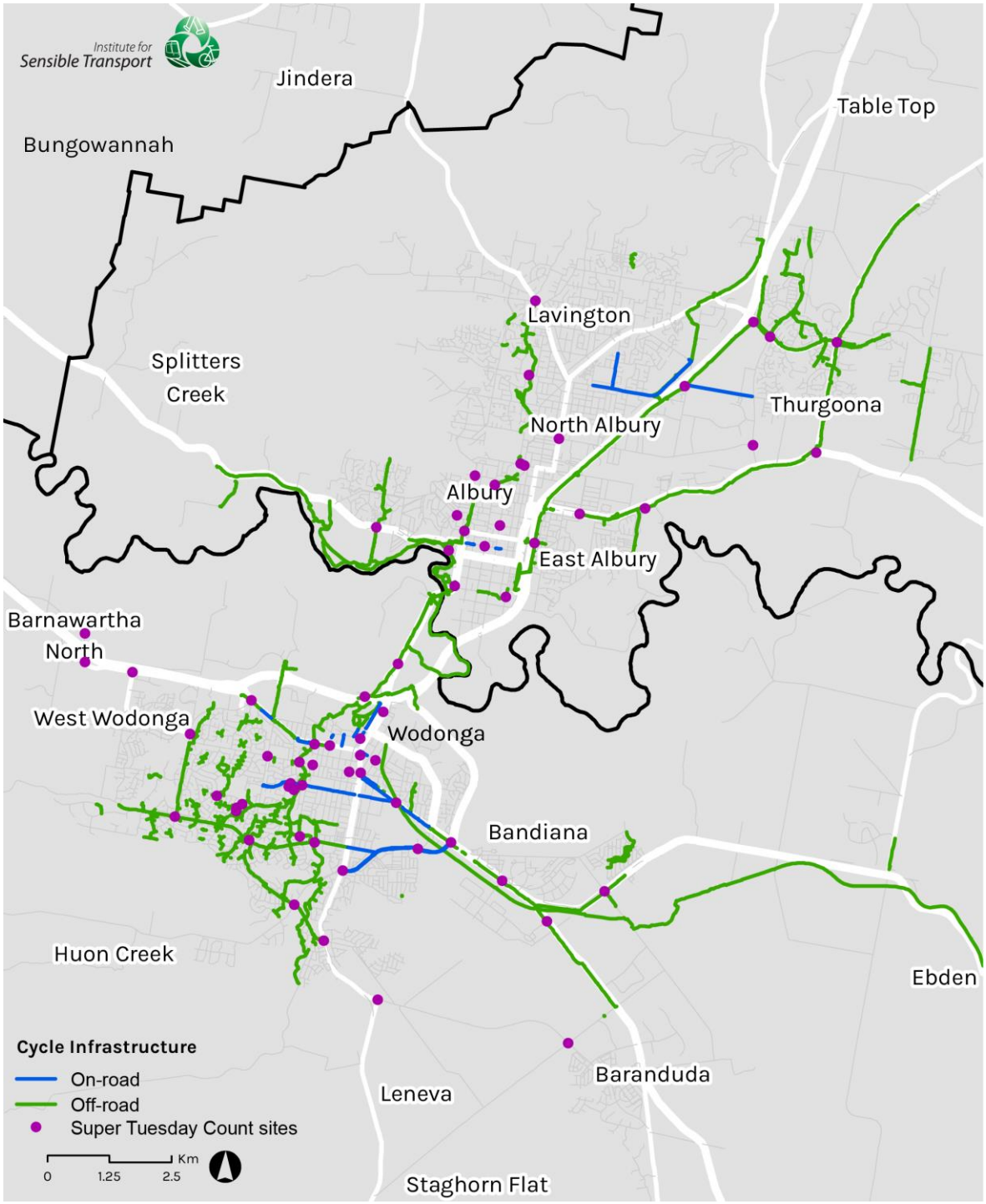


Figure 40 Super Tuesday count sites

Source: Bicycle Network, OpenStreetMap, DELWP 2021

[14] https://www.bicyclenetwork.com.au/our-services/transport-surveys-and-data/data-dashboard/

Table 6 shows the results for each of the counts undertaken between 2011 and 2019. The number associated with each LGA is the sum of counts at all sites for the respective LGA. The maximum temperature and rain for each Super Tuesday is also recorded.

Due to COVID-19, counts since 2019 have not been included as they are unlikely to be representative of general travel patterns.

Table 6 Super Tuesday total counts per year

Super Tuesday Counts				
Year	Albury	Wodonga	Max Temp	Rain (mm)
2011	661	323	22.8	0
2012	538	N/A	26.2	0
2013	780	476	30.9	0
2014	995	1035	32.2	0
2015	717	N/A	32	0
2016	1051	N/A	35.1	0
2017	784	N/A	29.9	0
2018	776	N/A	29.3	0
2019	750	566	35.2	0

Figure 41 shows the trend lines of each area, based on the data in Table 6. For Albury, it shows a gradual drop-off in activity since its 2016 high, though is slightly higher than 2011. Wodonga has seen a similar slight increase from 2011, though a 2014 spike in activity was recorded. No counts were recorded for Wodonga between 2015 – 2018.

Cycling activity has generally stagnant in both Albury and Wodonga between 2011 and 2019, according to the Super Tuesday counts.

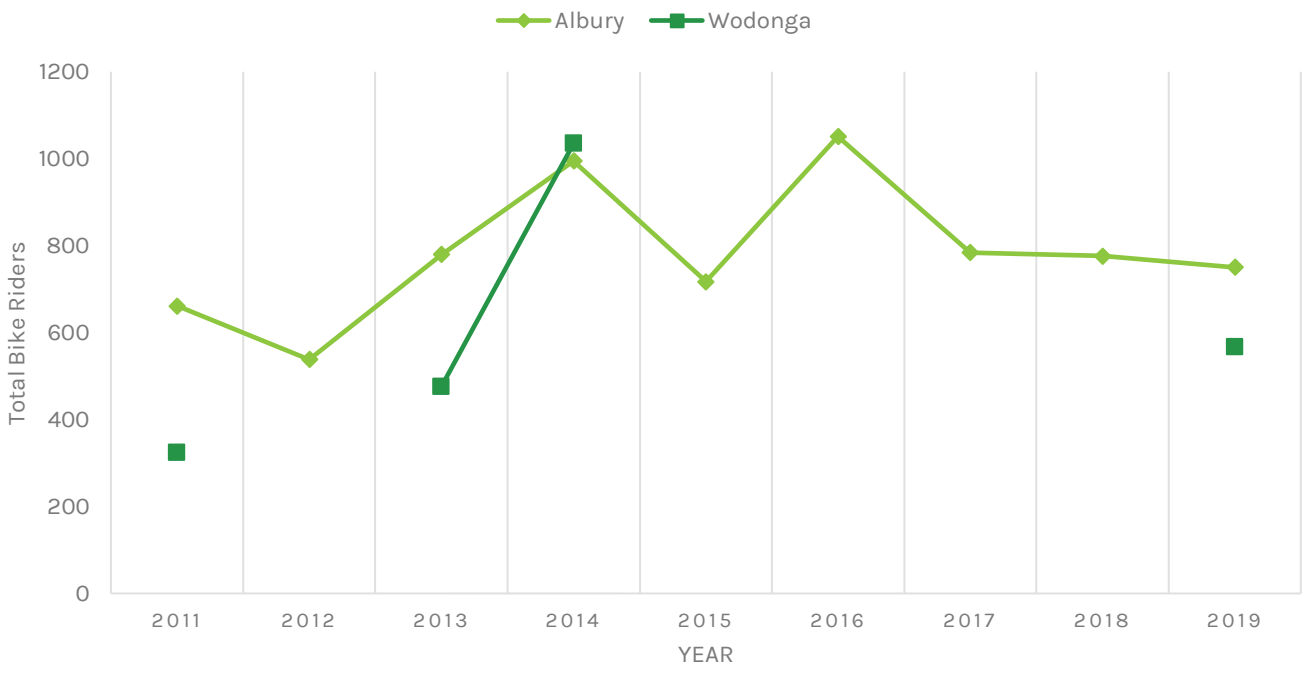


Figure 41 Super Tuesday total counts per year

6.1.4 Taxi and commercial passenger vehicles

Taxies and commercial passenger vehicles are regulated at the state level, causing cross jurisdictional issues for border communities like Albury Wodonga. In Victoria, both taxis and other hire vehicles (including ride-sourcing services like Uber) are regulated by *Commercial Passenger Vehicles Victoria*. In New South Wales, taxi and hire vehicle services are regulated by the *Point to Point Transport Commissioner*.

Cross-border exemptions have been enacted which allow services to operate across Albury and Wodonga, with some restrictions. Any vehicle registered in NSW can operate in Victoria as long as it is registered with Commercial Passenger Vehicles Victoria[15], which costs $55.10 per annum[16]. NSW allows Victorian taxis and hire vehicles to operate, subject to Victorian regulations[17], but must pay the $1 per trip Passenger service Levy.[18]

NSW taxis and hire vehicles may start a trip in NSW and finish in Victoria, and vice-versa. Victorian taxis and hire vehicles may start a trip in Victoria and finish in NSW. Victorian taxis may not work wholly within NSW, nor may NSW taxis work wholly within Victoria. However, hire vehicles registered with NSW (even with Victorian registration) may operate wholly in NSW.[17]

While this allows for some cross border travel, there still remains two separate systems, and those who wish to operate in both markets have higher regulatory costs.

[15] https://cpv.vic.gov.au/vehicle-owners/commercial-passenger-vehicle-owner-responsibilities/providing-cpv-services-in-victorias-border-communities

[16] https://cpv.vic.gov.au/vehicle-owners/fees-and-charges

[17] https://www.pointtopoint.nsw.gov.au/news/cross-border-exemptions-and-arrangements

[18] https://www.revenue.nsw.gov.au/taxes-duties-levies-royalties/passenger-service-levy

6.2 Transport networks

This section provides an overview of the existing transport networks in Albury and Wodonga, broken down by mode of transport.

6.2.1 Motor vehicle

Victoria provides a road network geospatial dataset that encompasses both Wodonga and Albury. The *TR_ROAD* dataset provides an accurate representation of the street alignment, as well as key attribute data.

According to the TR_ROAD network classification, many of the sub-arterial and collector roads in the built-up parts of each Council area are classified as local streets. Figure 42 shows a simplified categorisation of the Albury and Wodonga road network from the TR_ROAD class codes shown in Table 7. Note that these are Victorian classifications, not NSW, but they loosely translate.

Table 7 Victorian TR_Road Class Codes

Class Code	Road type
0	Freeway
1	Highway
2	Arterial
3	Sub-arterial
4	Collector
5	Local
6	Minor
7	Major Track
8	Minor Track
9	Trail

There are three road crossings on the Murray River: Lincoln Causeway/Wodonga Place; Hume Highway; and Trout Farm Road (approx. 10km east of the twin cities). The Hume Highway is the major route, carrying approx. 60,000 vehicles per day, or which Council estimates up to 50,000 of these vehicles are local traffic, indicating the importance of river crossings to the local community.

The small number of crossings creates a pinch point in the overall network. Not only is there a motor vehicle pinch point, but also one for active travel. Increasing the number of crossing opportunities has the potential to create new active transport options, and tie together more areas of Albury and Wodonga.

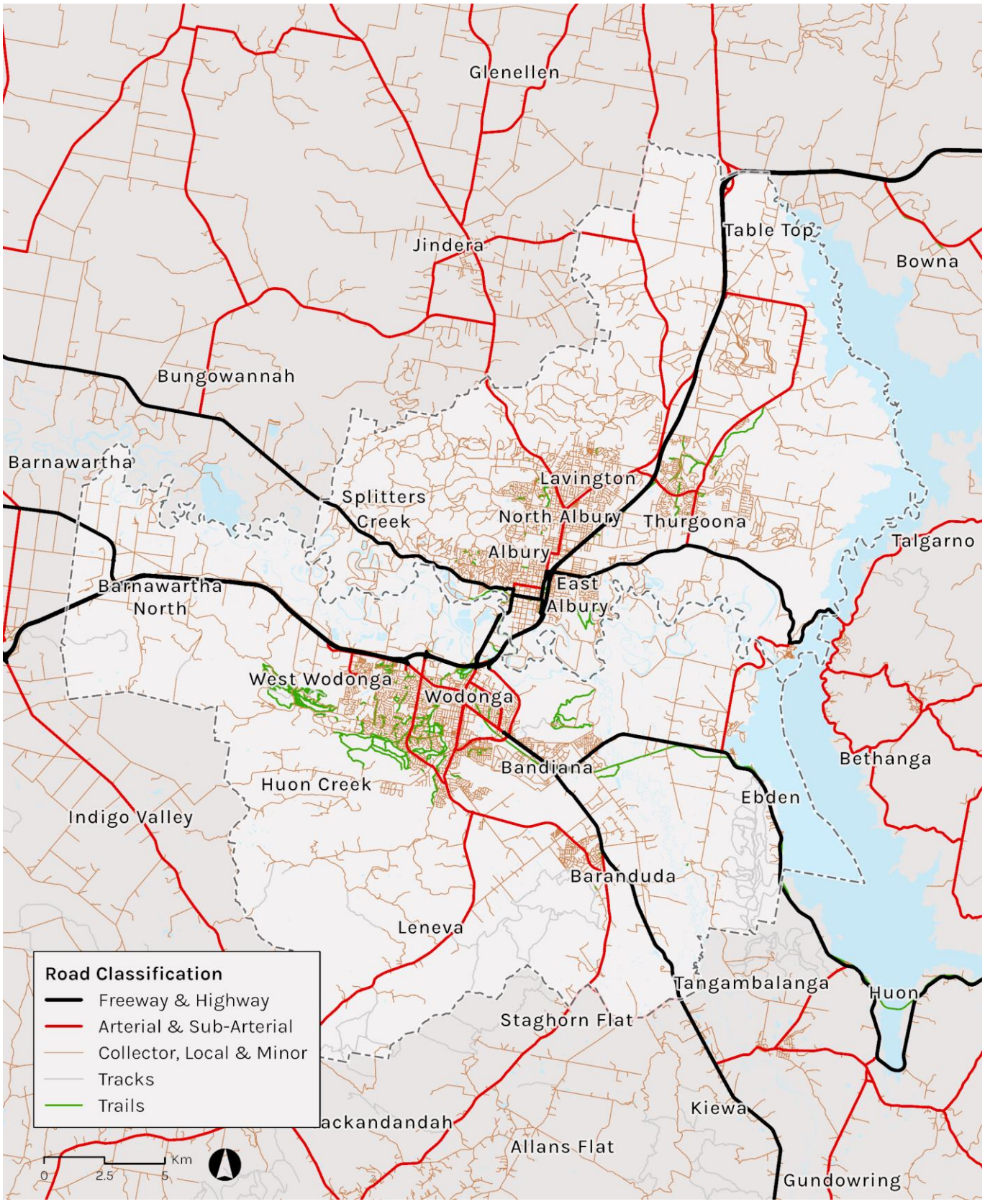


Figure 42 Victorian Road Classification (simplified)

Source: DELWP 2021

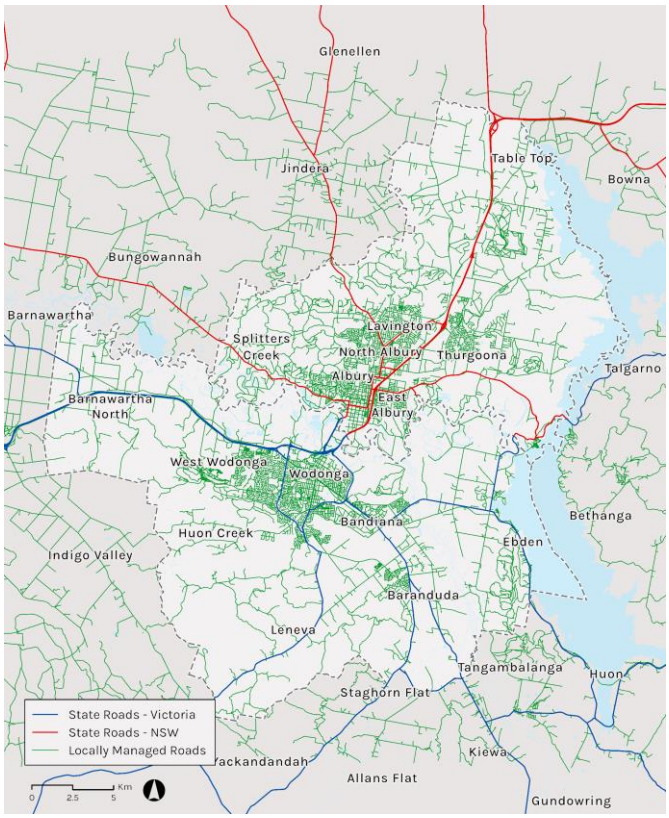


Figure 43 State and Local Government ownership of roads

Source: Transport for NSW, Victorian Department of Transport 2021

Figure 44 Wodonga street design

6.2.1.1 Street hierarchy design

Both Albury and Wodonga have relatively consistent street designs that provide visual and tactile cues to allow people to differentiate between street types. For example, Figure 44 shows the typical street designs for local, collector, and arterial roads in Wodonga.

For local streets, footpaths are typically provided on both sides of the street (in some areas footpaths are only provided on one side of the street, for example, western West Wodonga). Local streets do not have line markings. Intersections with side streets provide pram ramps for pedestrian crossings.

Collector roads in Wodonga have line marking for parking bays and centrelines. Again, footpaths are usually found on both sides of the street.

Arterial roads generally have centre-medians with two lanes of traffic in each direction. Parking lanes may or may not be line-marked. Dedicated right-hand turn lanes are provided at side streets.

Figure 45 shows the same street types for Albury. The biggest difference between Albury and Wodonga in terms of typical street designs is that many local streets in Albury do not have footpaths. While the carriageway of local streets were roughly the same in both areas, the Albury example appears wider and more conducive to faster vehicle speeds.

Collector roads had a range of footpath provision, with most having at least one side provided.

Arterial roads largely mirror designs found in Wodonga. Though street lighting was more likely to be found on the kerbside in Albury and centre-median for Wodonga.

It is noted that outside of Activity Centres, on-street parking levels were found to be very low.

Figure 45 Albury street design

Overall, street designs in both areas are designed around the efficient movement of vehicles and can be reflected in the levels of car use found in the ABS Journey to Work analysis in this report.

6.2.1.2 Freight networks

Albury and Wodonga are key to the nation's freight network. The Hume Highway, which connects the eastern seaboard, and is the key connection between Melbourne and Sydney runs through Albury and Wodonga.

Figure 46 shows the roads in Albury and Wodonga that are permitted by default for B Double Trucks. Other roads may be used; however, they will require a permit from the corresponding responsible road authority.

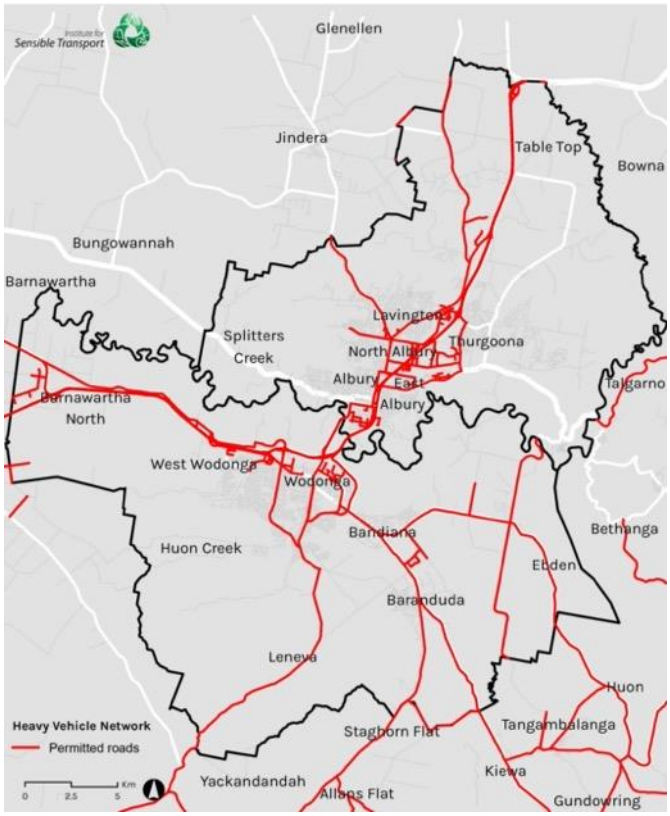


Figure 46 Heavy Vehicle Network

The Sydney–Melbourne rail corridor is a standard gauge railway managed by Australian Rail Track Corporation, which like the Hume Highway is a key connection between Melbourne and Sydney, and is central to linking the eastern seaboard. In the future, the Inland railway will also run through Albury and Wodonga, connecting Melbourne to Brisbane, via regional Victoria, New South Wales and Queensland. Inland rail has the potential to shift road freight to rail.

The Logic Intermodal Hub is located in Wodonga, at the intersection of the Hume Freeway and Murray Valley Highway. The Hub is an industrial estate which offers freight connections to both road and

rail networks, and intermodal transfer. This piece of infrastructure has assisted in shifting road based freight to rail, reducing trucks and emissions.

6.2.1.3 Freight network use

According to Freight Australia, there were 240,380 truck trips that originated in Albury – Wodonga between July 2020 and June 2021.

Figure 47 shows the Top 10 destinations for truck trips that originated in Albury – Wodonga, noting most are within the region, except the outer-Melbourne LGAs of Hume and Mitchell.

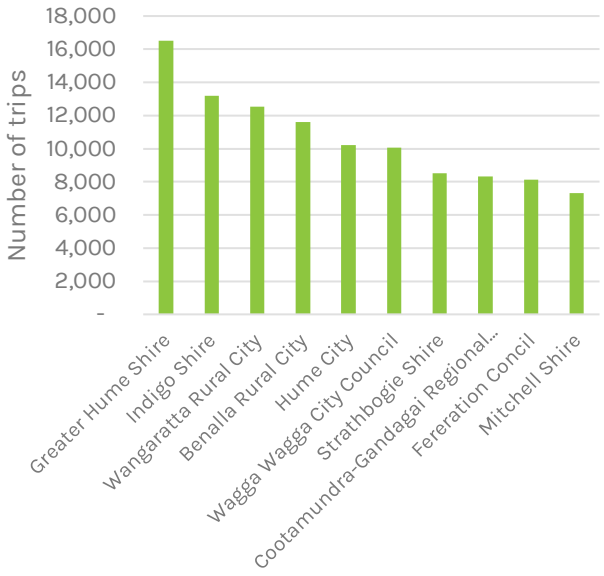


Figure 47 Top 10 destinations for trips from Albury-Wodonga

Source: Freight Australia

Figure 48 shows the number for heavy vehicle trips by type. It shows that most trips are B Doubles, followed by Semi Trailers and Road Train Type 1s.

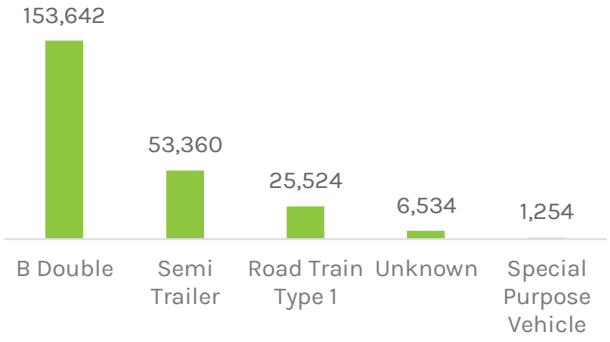


Figure 48 Heavy vehicle type

Figure 49 shows the desire lines for all truck trips originating in Albury – Wodonga. The map highlights the primacy of movements between Melbourne and Sydney, with limited truck movements reaching north of Sydney or west of Bendigo.

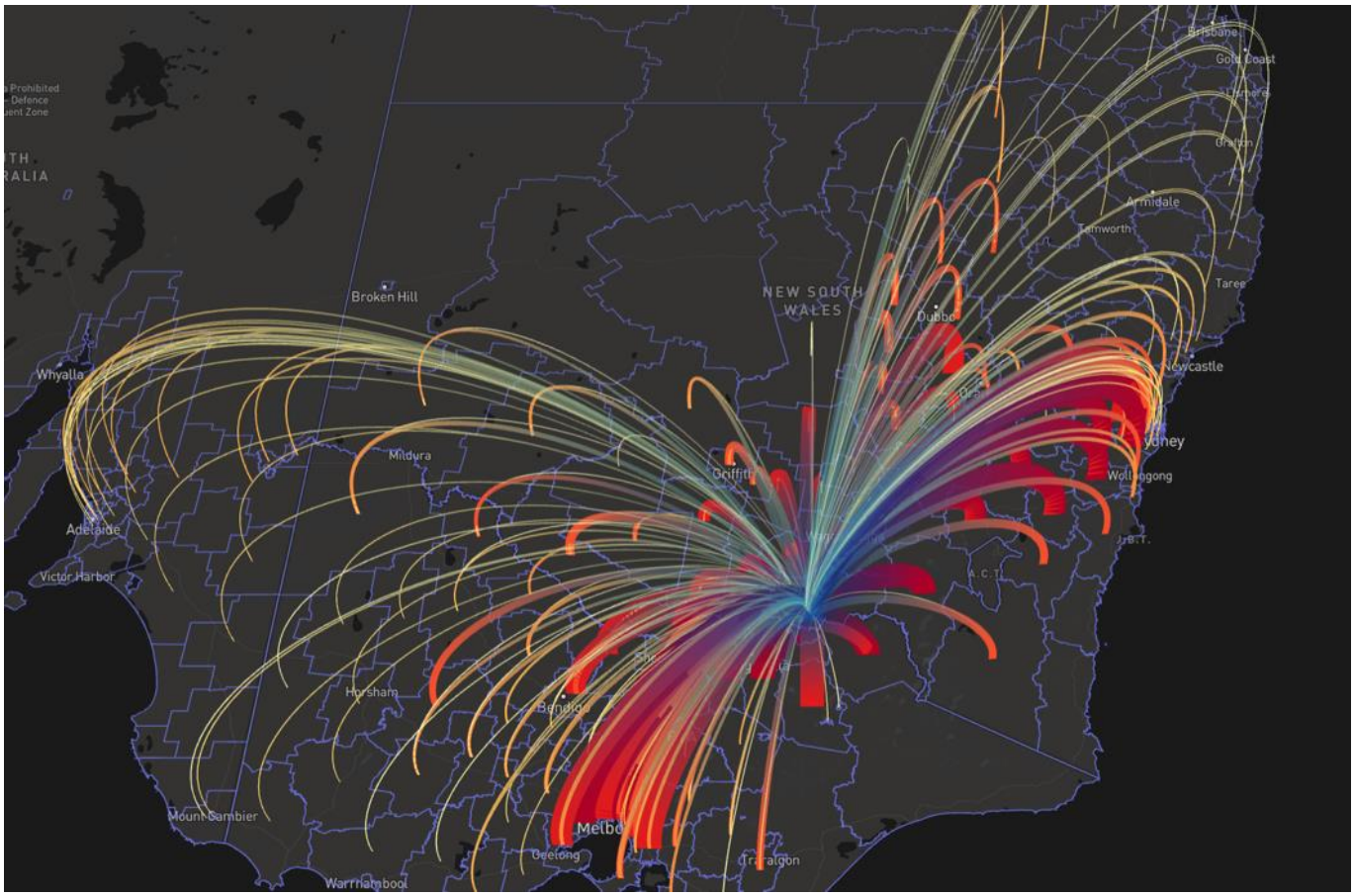


Figure 49 Desire line truck movements from Albury – Wodonga to LGAs across Australia
Source: Freight Australia

6.2.2 Active Transport

Walking and cycling is seen as a recreational activity rather than a form of transport for many in the community (according to AlburyCity's recent *CBD Parking Strategy*). This is partly a consequence of the very limited network of bicycle infrastructure. The lack of on-road cycle lanes in particular are highlighted in the AlburyCity CBD Parking Strategy as contributing to the very low levels of cycling for transport, and this was found to contribute to the high levels of car dependence. In addition to a poor on-road cycling network, there is little to no connection between the off-road trails in Albury. Figure 50 shows the extent of the footpath and off-road path network in Albury and Wodonga. Albury appears to have less footpath coverage in residential areas compared to Wodonga.

6.2.2.1 Walking

In general, many residential streets in Albury do not have a footpath on either side of the street, collector roads will have a footpath on at least one side of the road, with arterial roads and activity centres providing footpaths on both sides. In contrast, most Wodonga residential streets have footpaths along both sides of the street.

6.2.2.2 Cycling

In terms of road space available for the creation of higher levels of service for walking and cycling, both Councils generally have the same width of carriageway, between property boundaries, of 20m in residential areas, though some Wodonga streets have a 17m width.

Both Albury and Wodonga have a core off-road cycle path network that provides minimal connections to their CBDs, to some residential areas, and connections to regional areas. Some important destinations, such as the region's two universities, do not have any dedicated bike lanes to them.

The cycling network is fragmented, lacks connection between off road paths and between these paths and the CBDs of both Albury and Wodonga. Neither university is connected to the CBD with bicycle lanes.

Albury are currently developing a bike loop in the CBD, including protected on-road facilities, intersection treatments, and better end-of-trip facilitates.

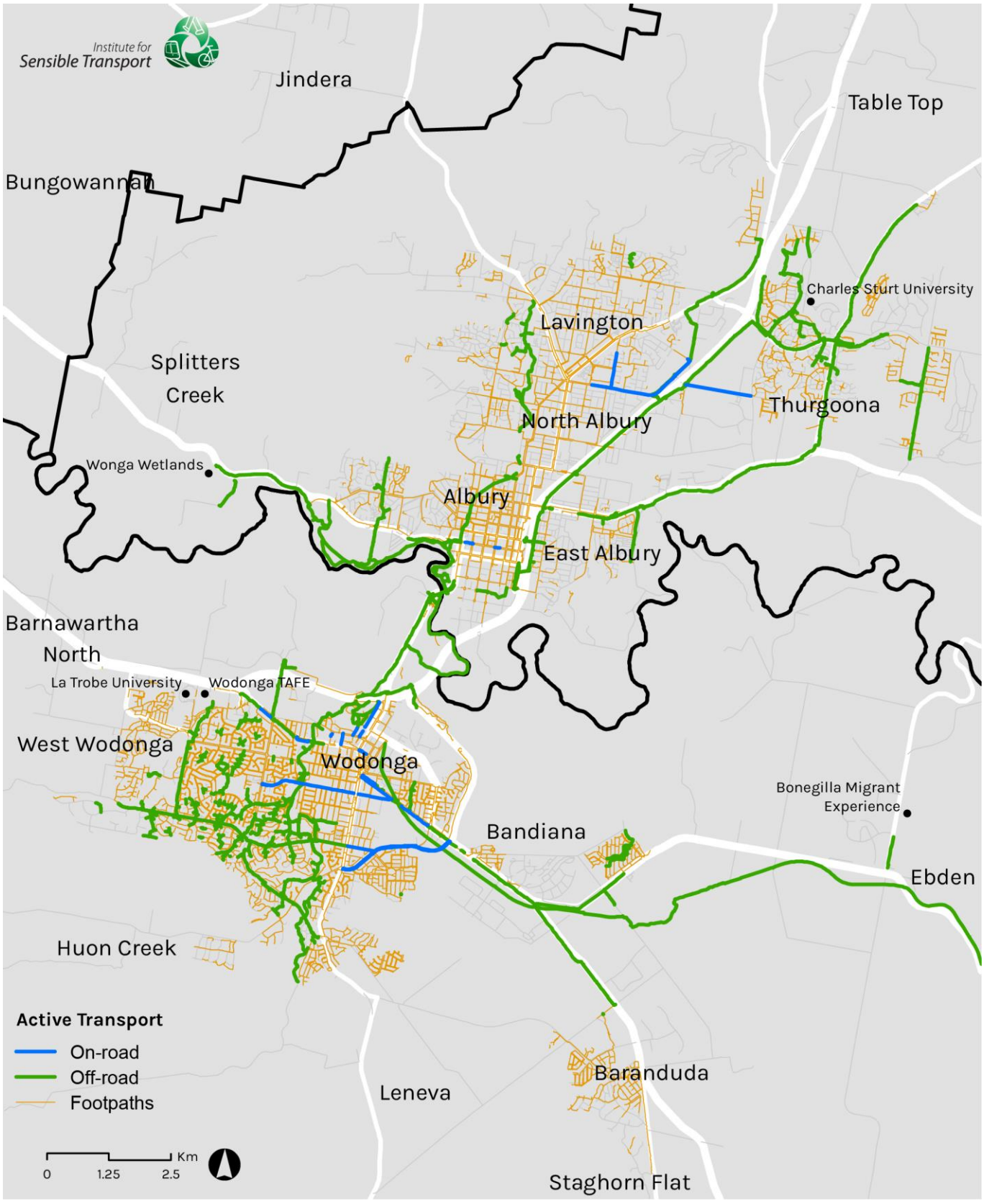


Figure 50 Footpaths and cycle paths

6.2.2.3

6.2.2.4 Off-road network opportunities

During the desktop analysis conducted as part of this report's development, it became apparent that Albury has a relatively dense network of open culverts in the built-up area. Figure 51 shows the open culverts in blue with the off-road cycle path network in green.

As a separate right-of-way that run north-south through Albury, these open drain networks have the potential to offer the opportunity to increase the off-road path network without requiring reallocation of street space. They may also double as opportunities for creek restoration and biodiversity regeneration. Many of Wodonga's existing shared path network follow open watercourses, mainly creeks and streams.

One example where this is happening is the *Reimagining Your Moonee Ponds Creek Program*[19] in Melbourne's west. A project led by Melbourne Water, looks to rehabilitate a concreted creek back to its natural state. It includes a revegetation program and upgrades to the walking and cycling network.

[19] https://www.melbournewater.com.au/building-and-works/projects/reimagining-your-moonee-ponds-creek

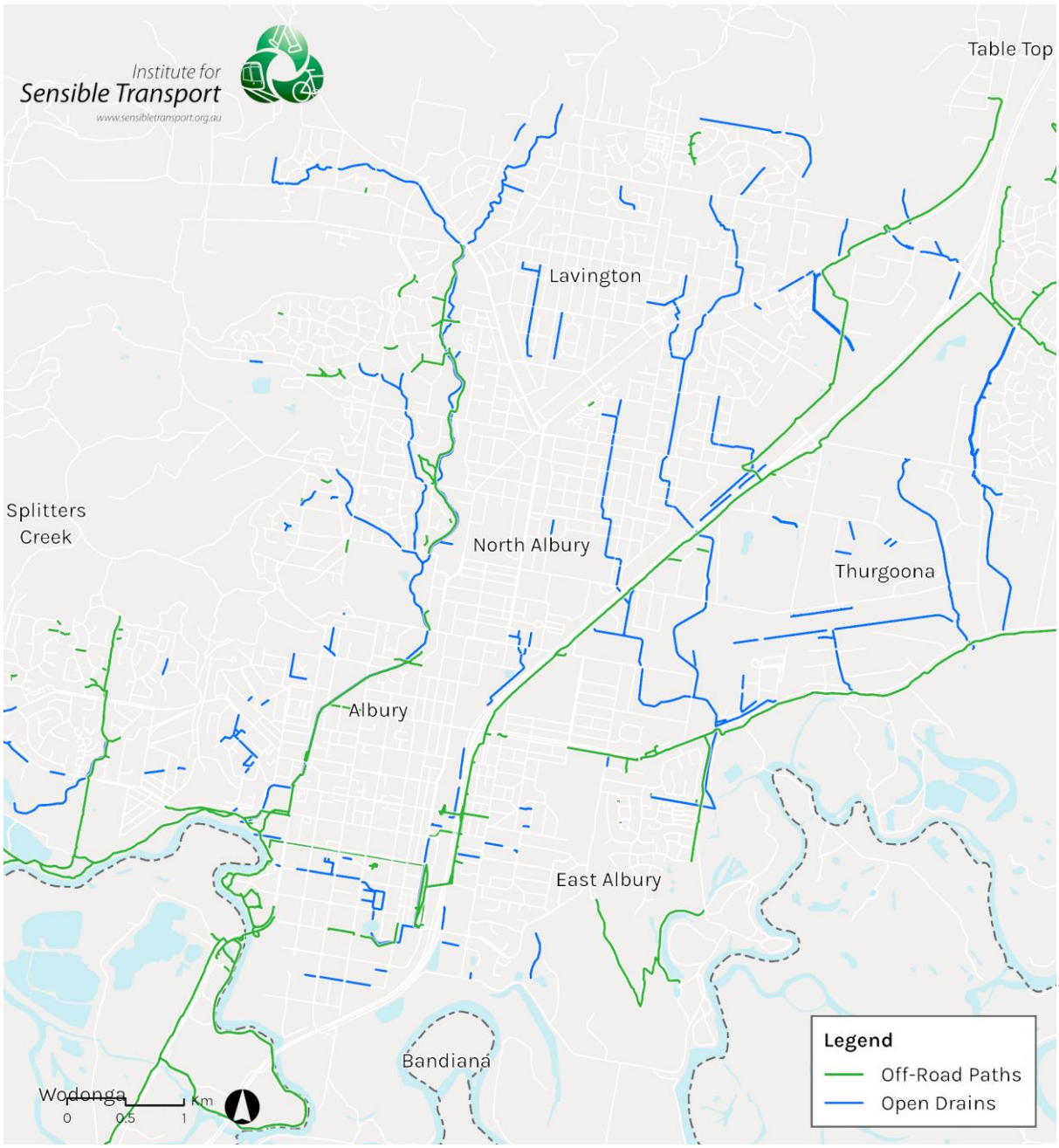


Figure 51 Open drain network – Albury

6.2.3 Public transport

The Albury Wodonga region is served by passenger rail, regional coaches, and public transport town buses. AlburyCity's *CBD Parking Strategy (2020 – 2025)* recognises that the public transport system is fragmented, inconvenient and these barriers to use are exacerbated by the cross-border issues (as discussed later in this). The following sub-sections outline these services, and discuss the complexity surrounding cross jurisdictional public transport provision, particularly fares and concession entitlements.

6.2.3.1 Regional

Albury and Wodonga are connected to the state capitals of Sydney and Melbourne, and their regional hinterland via regional passenger trains and coaches.

A Map of the Southern NSW regional train and coach services is shown in Figure 52, while Victoria is shown in Figure 53.

Figure 52 Southern NSW train and coach network

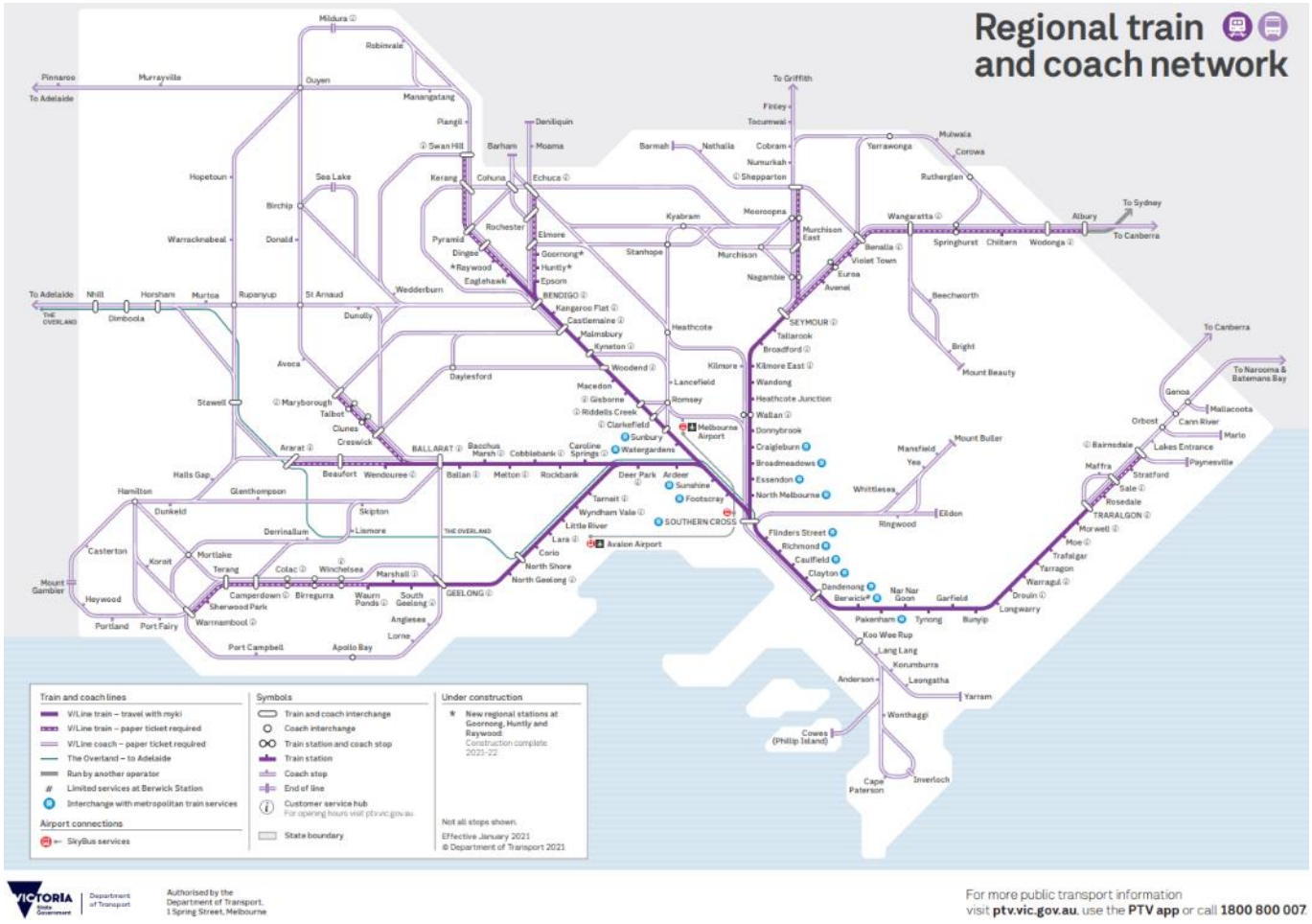


Figure 53 Victorian regional train and coach network

Rail

The XPT service is operated by TrainsNSW and runs twice per day in each direction between Sydney and Melbourne. The XPT does not stop at Wodonga, but does connect to many regional centres, including Wagga Wagga; Junee; Cootamundra and Yass in NSW and Wangaratta; Benalla; and Seymour in Victoria. Further, V/Line operate three return trips per day from Melbourne to Albury Station, stopping at Wodonga Station. Tracks upgrades and six new V/Locity trains will result in faster journey times between Melbourne and Wodonga from 2022.

Relocation of Wodonga's railway station

Wodonga's centrally located railway station was relocated in 2008, as part of the Wodonga Rail Bypass. The station is now on the northern periphery of Wodonga with no connecting local bus service at the time of writing.

Box 1 Wodonga railway station

Coaches

There is a regional coach from Echuca to Albury, operating a single return trip on Tuesdays, Thursdays, and Saturdays.

V/Line operate a daily return coach service, between Albury and Melbourne, Monday to Friday, in addition to the regional rail trips.

V/Line operate a daily coach service in each direction, between Kerang and Albury, which stops at several major townships along the way, including Echuca, Shepparton, and Wodonga.

V/Line operate a daily coach service in each direction between Melbourne and Canberra, which stops at both Wodonga and Albury Stations.

Fares

All fares for regional services are based on destination, and paper-based tickets. However, ticket prices for the same origin-destination may vary depending on service operators. For example, an adult one-way ticket for the V/Line service from

Albury to Melbourne would cost $41.00; an adult one-way ticket for the XPT service from Albury to Melbourne would cost $48.14. The same journey is therefore 17% more expensive to take on the XPT service than V/Line; although it is also quicker (XPT journey time approx. 3 hours 20 minutes, V/Line journey time approx. 4 hours; although this is expected to be quicker following track and rollingstock upgrades).

6.2.3.2 Town Buses

Public transport needs to be easy and convenient to use, to attract people. For public transport to be used, it must be useful to passengers. Conceptually, there are three elements of a public transport network which encourage its use:

- **Legibility**: Public transport must be easy and intuitive to use, with wayfinding directing passengers to where they need to be and bus interchanges made simple.
- **Coverage and convenience**: Public transport must cover locations people want to go to and from, with routes which are direct, quick and convenient.
- **Frequency**: Public transport must have a frequency which avoids unnecessary waiting times.

To be used and useable, public transport must sit in the nexus of these three elements, as illustrated by Figure 54.

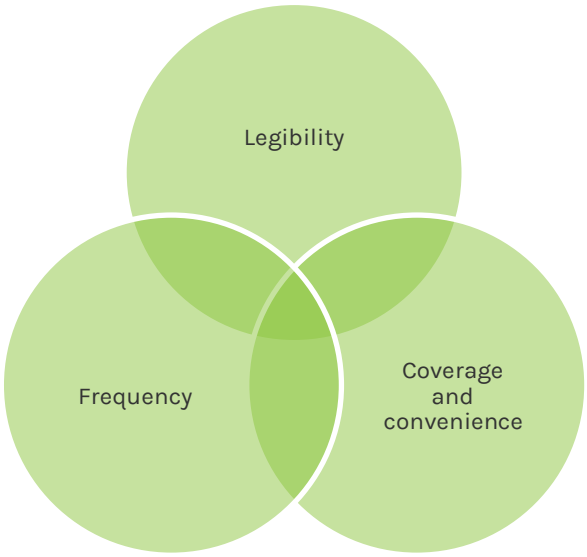


Figure 54 Key elements of a quality public transport system

The Albury Wodonga area is served by local town buses provided under the auspices of both TfNSW (Martin's) and DoT, formerly known as PTV (Dysons). This connects the two cities, but due to differing fare systems, cannot be considered an integrated network.

Networks

There are 19 town bus routes that operate across Albury Wodonga, as shown in Figure 55 and described in Table 8.

Table 8 Town buses in Albury Wodonga

Route	Destination	Operator	Albury	Wodonga
150	Wodonga (South) – Albury (Sat only)	Dysons	Yes	Yes
160	Wodonga (North) - Albury (Sat only)	Dysons	Yes	Yes
B	Baranduda	Dysons		Yes
C	Cambourne Park	Dysons		Yes
E	East Wodonga	Dysons		Yes
F	Federation	Dysons		Yes
G	via Gayview Dr	Dysons		Yes
M	Mayfair	Dysons		Yes
O	West Wodonga	Dysons		Yes
S	South Wodonga	Dysons		Yes
T	TAFE	Dysons		Yes
WS	Wodonga Shopper	Dysons		Yes
AW	Albury - Wodonga	Dysons	Yes	Yes
EA	East Albury	Dysons	Yes	
SA	South Albury	Dysons	Yes	
WA	West Albury	Dysons	Yes	
906	Albury - Lavington	Martin's	Yes	
907	Albury - Glenroy - Quicks Hill	Martin's	Yes	
908	Albury - Thurgoona	Martin's	Yes	

Sixteen routes are operated by Dysons, 11 are under contract with DoT, three with TfNSW, and two joint contract. Additionally, three are operated by Martin's under TfNSW. Ten routes (all Dysons) operate within Wodonga alone, Monday to Friday. Six routes (three Dysons and three Martin's)

operate in Albury alone Monday to Saturday. One route (Dysons) operates across both Albury and Wodonga, Monday to Friday, while an additional two (Dysons) operate across both Albury and Wodonga on Saturdays.

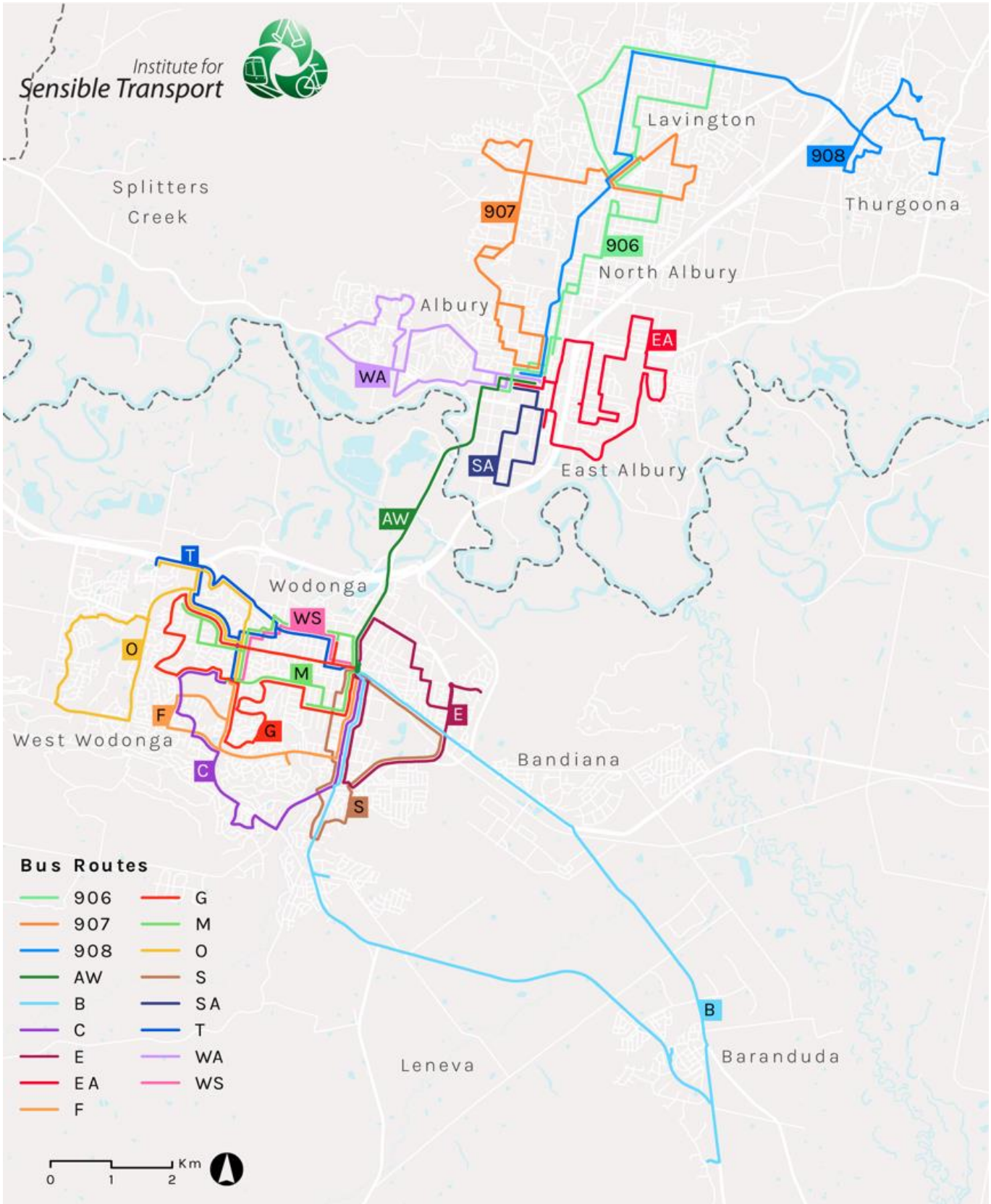


Figure 55 Network map of Monday-Friday town bus routes in Albury Wodonga

Town bus routes, by commissioning body are shown in Figure 56. All of Wodonga, and the southern portion of Albury are served DoT buses, while central and northern Albury are served by TfNSW buses. Without integrated ticket (as discussed on page 77), bus services in Albury and Wodonga are disconnected, with only southern Albury and Wodonga connected, and only central Albury and northern Albury connected.

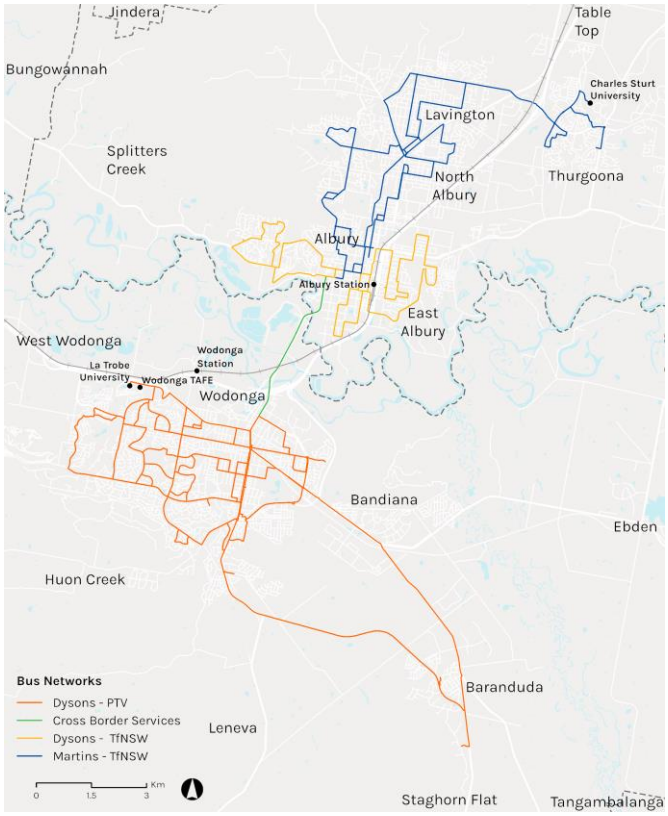


Figure 56 TfNSW and DoT commissioned bus networks

Coverage

Coverage of the Albury and Wodonga bus networks has been analysed by .id in February 2021. The walking catchment of 400m for Albury is shown in Figure 57, and Wodonga in Figure 58 They found that 65% of AlburyCity's population live within 400m of a bus stop. In Wodonga, 56% of the population live within 400m of a bus stop.

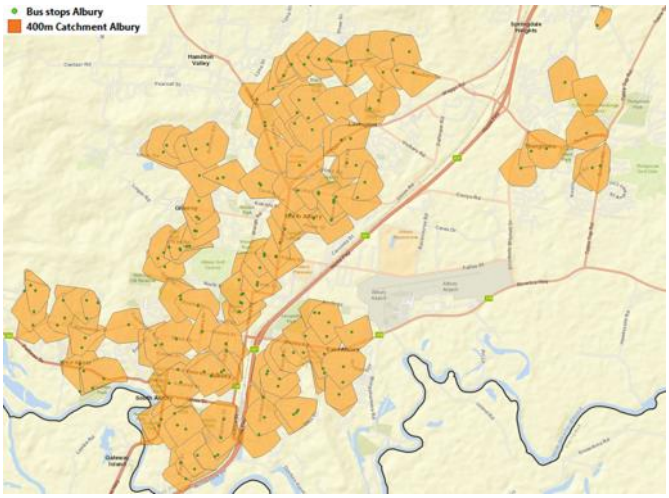


Figure 57 Albury City bus stops and coverage of 400m walking catchments

Source: .id

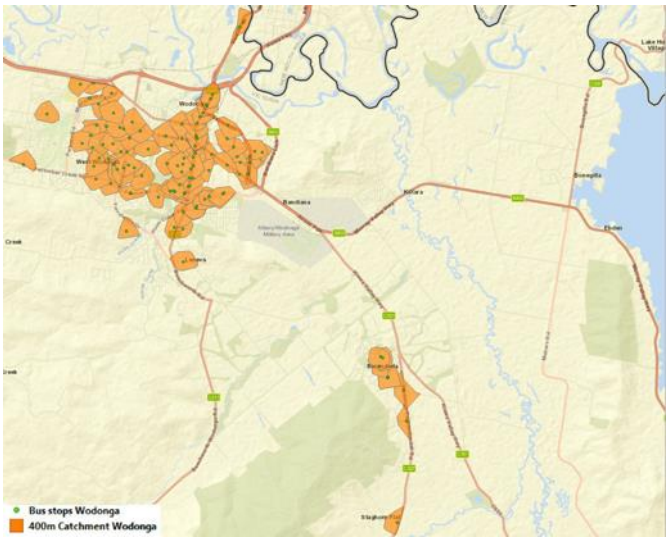


Figure 58 Wodonga City bus stops and coverage of 400m walking catchments

Source: .id

The central areas of both Albury and Wodonga have good proximity to bus stops, with most of the central areas being in walking catchments. However, outer areas have lower service quality.

In Albury there are significant gaps in residential coverage north of the central area. Hamilton Valley has no accessible bus services. There are also substantial residential areas of Thurgoona, Lavington, Glenroy, and North Albury which have gaps in coverage.

In Wodonga, there are significant gaps in residential coverage outside of the central area. Large parts of West Wodonga, particularly west of Parkes Road have very poor coverage. Growth areas

to the south east, particularly Bandiana, Killara, and the southern portion of Wodonga have no viable bus services for most commuters.

Outside of either centres, there are very poor public transport options for employment. The employment centre in Lavington, between Wagga Road and the Hume Highway has no bus coverage. Similarly, the employment centre around the Hume Highway and Melrose Drive is not serviced by buses. In both cases, even if an employee lives near a bus stop, the lack of destination bus stops renders public transport unviable. This renders both these major employment areas as primarily accessible by car alone.

It is also notable that neither Albury nor Wodonga railway stations are served by town buses. The nearest stop to Albury station is on David Street, 450 metres west. The nearest stop to Wodonga station is approximately 1.5 kilometres south, along Melrose Drive. Albury Airport also does not have an adjacent bus stop. This is poor transport integration and means that those wishing to travel to and from Albury or Wodonga by rail or air will likely need some form of private transport at the station (either being picked up or dropped off by a friend of relative, or a taxi).

It is also notable that neither Albury nor Wodonga railway stations are served by town buses.

Lastly, many routes are circuitous, which maximise catchment, but significantly increase journey time. This significantly reduces the convenience of the public transport buses in Albury and Wodonga. Having more direct routes, which take less time, would have a higher level of appeal, and would likely attract more passengers, by offering a higher level of convenience alongside coverage.

There is a demonstrable need for a bus review, which covers all buses in Albury and Wodonga, commissioned by both state governments. It is critical to the success of a bus review, in creating an integrated and cohesive bus network, that both networks be reviewed together, as a single entity, ensuring interchange capabilities and maximising benefits.

Frequency

It is also worth noting that while many areas may be covered by a bus stop, poor frequency levels means that many trips will not be possible on buses. Table 9 shows the number of daily trips for each route, on Weekdays and Saturdays. Most buses run hourly or less, meaning that there is a long wait, and this will strongly discourage any trips that require connection. Generally, public transport is only considered of decent quality when services are every 30 minutes or better, only the Albury – Wodonga shuttle operates reliably at this frequency.

Table 9 Services per day for town buses in Albury Wodonga

Route	Destination	Mon	Sat
150	Wodonga (South) - Albury	0	8
160	Wodonga (North) - Albury	0	7
B	Baranduda	6	0
C	Cambourne Park	8	0
E	East Wodonga	10	0
F	Federation	14	0
G	via Gayview Dr	12	0
M	Mayfair	12	0
O	West Wodonga	8	0
S	South Wodonga	12	0
T	TAFE	6	0
WS	Wodonga Shopper	5	0
AW	Albury - Wodonga	23	0
EA	East Albury	8	3
SA	South Albury	7	4
WA	West Albury	9	4
906	Albury - Lavington	17	9
907	Albury - Glenroy - Quicks Hill	10	9
908	Albury - Thurgoona	9	9

Weekend services run to a very poor frequency. On Saturdays Martin's buses each run nine services, while the Dyson's services in NSW operate three or four services. In Wodonga, there are two Saturday

buses only, which run seven or eight times. There are no buses in the Albury Wodonga area which operate on Sundays. Poor weekend frequency is likely to deter travel by bus for those who have alternative options.

Limited hours of operation also restrict the types of activities which may be done by bus. For example, a lack of late night services will make buses unfeasible for socialisation. Together, the frequency of public transport buses in Albury and Wodonga is insufficient to be attractive enough.

Stop amenity

A desktop review has revealed that many bus stops within Albury and Wodonga provide a very poor level of amenity. Some consist of simply a pole in the ground with stop flag, and timetable/information.

It is important to provide basic amenities to meet *Disability Discrimination Act 1992* requirements for accessibility. The guidelines for accessible transport, adopts the *'social model of disability'* which argues that people are not disabled, but rather it is the environment that disables people. Transport should not disable people, and the ultimate goal for Albury Wodonga's bus network should be ensuring that all elements that make public transport disabling are removed, ensuring all those who want to use public transport can.

...people are not disabled, but rather it is the environment that disables people.

To be boardable, stops should have level access to low floor buses, and be connected to footpaths which meet *Disability Discrimination Act 1992* standards for accessibility. Information provided at bus stops should include the routes which service a bus stop, timetables, and wayfinding. This information should be available in a variety of formats, including visual, audible, and tactile forms. Together, these basic provisions will significantly reduce the ways in which public transport infrastructure can be disabling and undesirable.

Given the current state of the network, and need for greater integration, and review of operations, it is not prudent to categorise existing stops for upgrade. A framework for considering stop amenity has been developed. Four categories of stop are proposed:

- **Tier 1** – local stops for infrequent services, which play a social role
- **Tier 2** – local stops for more frequent services which play a commuter services
- **Tier 3** – minor interchange/destination stops, where two or three services meet, or there are key destinations (e.g., universities, local shops)
- **Tier 4** – major interchange stops, such as Albury centre (e.g., Dean St); Wodonga centre (e.g., the Water Tower); and major shopping centres (e.g., Birallee Shopping Centre or Lavington Square).

The vast majority of stops on any town bus network will be Tier 1 or Tier 2, with only some Tier 3 or 4, but if the bus system were to grow, more higher amenity stops would be required. Appropriate infrastructure and amenity levels for each tier are shown in Table 10.

Table 10 Matrix of amenity appropriate for stop tier

	Tier 1	Tier 2	Tier 3	Tier 4
Level footpath, connected to bus stop pad for level boarding	✓	✓	✓	✓
DDA compliant tactile marking	✓	✓	✓	✓
Route(s) information and a timetable (accessible)	✓	✓	✓	✓
Seating	✓	✓	✓	✓
Shelter	?	?	✓	✓
Waste bins	✗	?	✓	✓
Toilet	✗	✗	✗	✓

Fares

TfNSW and DoT have different fare structures, which means that there is significant variation between tickets bought on TfNSW bus services (Martins') and DoT bus services (Dysons) (including in circumstances where DoT tickets are purchased in Albury).

A comparison between ticket types and costs is provided for full-fare tickets in Table 11 and concession tickets in Table 12. DoT issued tickets are valid for 2-hours (with unlimited interchanges/trips, in any direction), daily, or periodically, with all services in a single zones. Martin's tickets follow TfNSW guidelines, and are available as single trips, returns, daily, or in packs of ten, with up to nine sections of travel in Albury alone. A return trip which takes less than 2 hours would cost significantly more with a TfNSW service than a DoT one.

Table 11 Full-fare public transport ticket fares

Victoria (DoT – Dysons) – Full Fare				
Ticket type	2 Hour	Daily	Weekly	Monthly
Single Zone	$2.40	$4.80	$22.40	$94.80
~~**Two Zones**~~	~~$3.60~~	~~$7.20~~	~~$36.00~~	~~$151.40~~

NSW (TfNSW – Martin's) – Adult				
Ticket type	Single	Return	All Day	Ten Trip
1 to 2 Sections	$2.30	$4.40	$5.00	$18.40
3 to 6 Sections	$3.30	$6.40	$5.00	$26.40
7 to 9 Sections	$4.20	$8.20	$10.00	$33.60

Source: DoT[20] and Martin's[21]

Note: While the DoT fare structure has provision for two zones, only one is in operation in Albury Wodonga.

Lack of integration between the two ticket regimes may also affect travel habits. Some travellers may have to buy two tickets for the single journey. Others may walk past bus stops which would be useful to them as the cost is too high a barrier.

Lastly, some may simply be too confused, and resort to other means of travel.

Table 12 Concession public transport ticket fares

Victoria (DoT – Dysons) – Concession				
Ticket type	2 Hour	Daily	Weekly	Monthly
Single Zone	$1.20	$2.40	$11.20	$47.40
~~**Two Zones**~~	~~$1.80~~	~~$3.60~~	~~$18.00~~	~~$75.70~~

NSW (TfNSW – Martin's) – Concession				
Ticket type	Single	Return	All Day	Ten Trip
1 to 2 Sections	$1.10	$2.10	$2.50	$8.80
3 to 6 Sections	$1.60	$3.10	$2.50	$12.80
7 to 9 Sections	$2.10	$4.10	$5.00†	$16.80

Source: As in Table 11

Notes: † $2.50 for pensioners; While the DoT fare structure has provision for two zones, only one is in operation in Albury Wodonga.

The two different ticketing regimes also have differing concessions entitlements, as summarised in Table 13. There are several major discrepancies. For example, Centrelink payment recipients in NSW must receive the maximum benefit to be eligible, while in Victoria one only needs to be in possession of a Health Care Card (meaning they could be low-income without receiving and form of Centrelink benefit). Hence, the same individual may be eligible to a concession fare in Victoria, but not in NSW.

...the same individual may be eligible to a concession fare in Victoria, but not in NSW.

Further, most concession fare discounts only apply to residents of the state, meaning that many Victorians who travel to NSW will not receive a concession in NSW. This is especially problematic to NSW residents who are eligible for a NSW

[20] Public Transport Victoria Regional Fares < https://www.ptv.vic.gov.au/tickets/fares/regional-fares/ >

[21] Martin's Fares & Sections < https://martinsalbury.com.au/fares/ >

concession, but not for a Victorian concession, whose nearest or most convenient bus service is operated under the auspices of DoT as they receive no concession discount at all.

Table 13 Public transport concession entitlements

	NSW	Victoria
Asylum Seekers	Yes†	Yes‡
Centrelink Benefits	Yes† (must receive the maximum rate of Centrelink Benefit)	Yes‡ (any benefit recipient or Health Care Card holder)
Pensioners	Yes	Yes
Seniors Card	Yes	Yes
Children	4 to 15 (under 4 free)	5 to 18 (under 5 free)
Students	Yes†	Yes‡
Tertiary or TAFE	Yes† (full-time only)	Yes‡ (full-time only; not post-grad)
Tertiary or TAFE - International	Some† (only if receiving a scholarship)	Some‡ (annual only, with iUSEPass)
Apprentice or trainee	Yes†	Yes‡
NSW War Widow/er's	Yes†	
War Veteran/War Widow(er)		Yes‡

Source: DoT[22] and Martin's[23]

Notes: † New South Wales residents only; ‡ Victorian residents only.

[22] Public Transport Victoria Concessions < https://www.ptv.vic.gov.au/tickets/myki/concessions-and-free-travel/ >

[23] Martin's Concession Fares < https://martinsalbury.com.au/concession-fares/ >

6.3 Understanding differences in travel time variation by mode

The transport system analysis conducted as part of this report, as well as the Stakeholder Engagement Workshops held as part of this project has made it clear that major differences exist in the convenience of different modes of transport. In an effort to highlight these differences, a trip analysis of 12 journeys across Albury Wodonga was undertaken, as shown in Table 14. The purpose of this analysis is to highlight how aspects of the transport network may be contributing to the heavy reliance on the motor vehicle evident from the *journey to work* data reviewed earlier. The 12 trips represent three trip purposes:

1. Work
2. Education
3. Retail.

The four journey patterns included:

1. Albury to Albury
2. Albury to Wodonga
3. Wodonga to Wodonga
4. Wodonga to Albury.

Three modes of transport were analysed:

1. Car
2. Bicycle
3. Public transport.

The results of this analysis, from three different journeys, is provided in Figure 59. In all three cases, the car is not only the quickest option, but also significantly cheaper than the bus. This highlights the high relative attractiveness of the car in Albury Wodonga, for many trips.

6.3.1 Method

Commute trips were selected from the ABS census, being the most traffic routes between smaller areas. Education trips are based on areas of Albury and Wodonga with the highest density of students, to La Trobe University and Charles Sturt University. Retail trips are from the areas of highest population density to the major shopping centre of Albury and Wodonga. All trips were routed through Google Maps, to give distance and times for three modes of travel: car, bicycle, and bus. Work and education trips are scheduled to arrive at 9am, while retail was scheduled to arrive around midday.

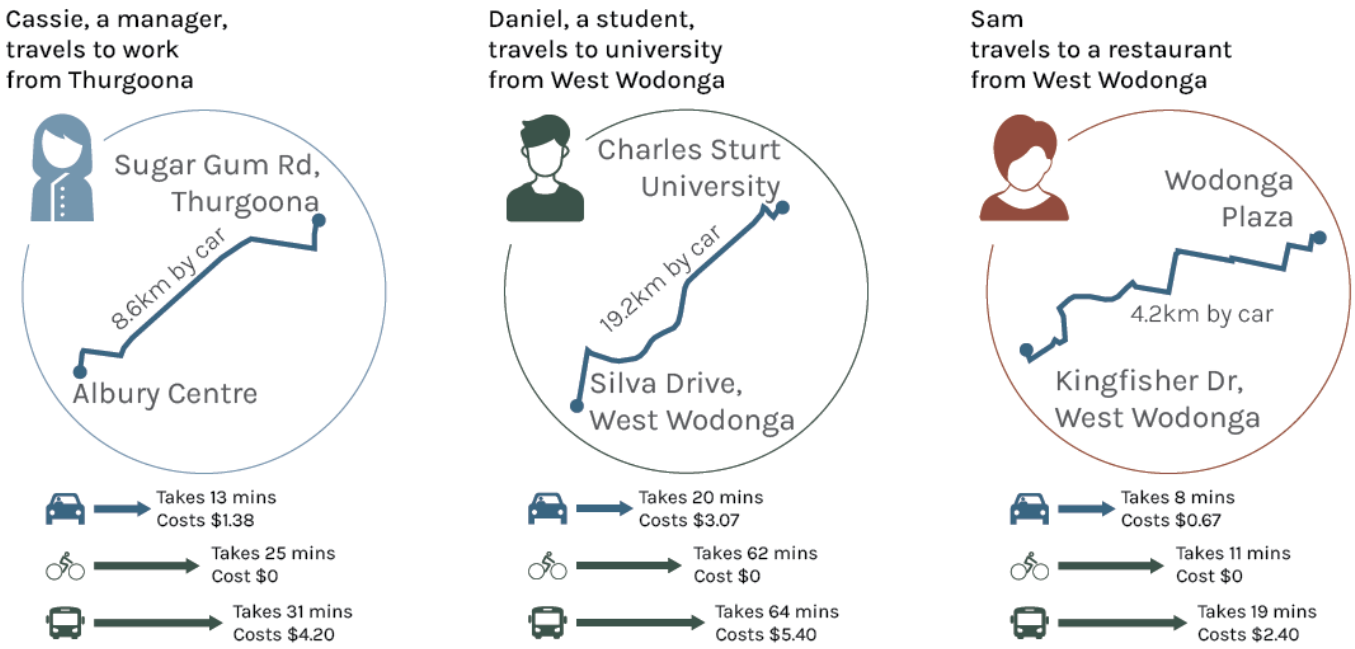


Figure 59 Comparison of mode options, with marginal use costs

6.3.2 Results

For all trips, car is fastest. However, this is not accounting for parking, so trips to Albury and Wodonga central areas may take slightly longer by car than estimated at times of higher parking demand. Bicycle trips are estimated to take roughly double the time of a car trip on average, although this fluctuates from only 38% longer (Kingfisher Drive, West Wodonga to Wodonga centre) to over three times as long (Sugar Gum Rd, Thurgoona to Howard Street Wodonga; and Silva Drive West Wodonga to Charles Sturt University). People are less likely to cycle as the distance and time increases, with the vast majority of bicycle trips being below 10km. As such, only seven of the 12 trips have reasonable potential to be undertaken by bike rather than car, and only three are under 5km. As highlighted earlier, the fragmented bicycle network is likely to be a powerful deterrent to bicycle use, aside from any travel time disadvantage.

Bus travel times are even less favourable compared to car. The shortest trip, by time, is 19 minutes, while the longest is 1 hour and 46 minutes. On average, buses take over three times as long as car trips. However, there is fluctuation, with Saville Ave, Lavington to Albury centre being most time competitive at only double the time, and Silva Drive, West Wodonga being the least, taking eight times as long to travel by bus as by car (five minutes by car, 41 minutes by bus).

On average, a bus takes three times as long as a car making the same trip.

Bus travel is made even less attractive as a consequence of the timetabled options. For example, the earliest bus to Howard St, Wodonga, from Sugar Gum Rd, Thurgoona arrives at 9:40am, after most workplaces would expect their employees to arrive.

There are also cost barriers to bus travel for trips between Albury and Wodonga, as a result of fare structures discussed on page 77. A bus journey from Sugar Gum Rd, Thurgoona to Albury centre would cost $4.20 for a full-fare passenger. A journey from Sugar Gum Rd, Thurgoona to Howard St Wodonga would cost $4.20 for the NSW travel and a further $2.40 for the Victoria section, totalling $6.40. In comparison, based on small car running cost of 16c per km[24] a trip of 15.7km would cost $2.51, making the bus not only much longer in time, but much more costly.

Cross border bus travel is slower *and* much more costly than the same trip by car.

Cost barriers are more acute for those with concession entitlements. A student living in Wodonga but studying in Albury would not be eligible for a concession ticket in NSW, making the total journey cost $5.40 ($1.20 for the Victorian concession ticket and $4.20 for the NSW full fare). This compares to $3.07 by car.

The effect of double charging for public transport which crosses the Murray is likely to encourage car trips over public transport. Further, as the distance of these trips is too far for many to cycle, the car becomes the default mode of transport.

The effect of double charging for public transport that crosses the Murray is likely to encourage car trips over public transport.

[24] Approximately the average calculated by RACV in their 'Drive your dollars 2019' vehicle cost comparison < https://www.racv.com.au/content/dam/racv/documents/on-the-road/buying-a-car/large-car-running-costs-2019.pdf >

Table 14 Comparison of trip time and distance by mode

Purpose	Origin	Destination	Car		Bicycle		Public Transport		
			Distance	Time	Distance	Time	Routes	Time	Arrive
Work	Sugar Gum Rd, Thurgoona	Albury Centre	8.6km	10 - 16 mins	8km	25 mins	908	31 mins	8:25am
Work	Sugar Gum Rd, Thurgoona	Howard St, Wodonga	15.7km	14 - 18 mins	15.3km	48 mins	908; AW; M	1 hour 46	9:40am at earliest
Work	Sadlier St, Wodonga	Albury Centre	11.6km	12 - 18 mins	9.3km	29 mins	S; 7	34 mins	8:40am
Work	Sadlier St, Wodonga	Wodonga Centre	4km	7 - 10 mins	3.9km	13 mins	S	22 mins	8:28am
Education	Bevan St, Lavington	Charles Sturt	5.9km	8 - 12 mins	7.1km	25 mins	908	24 mins	8:51am
Education	Bevan St, Lavington	La Trobe	17.4km	16 - 22 mins	14.2km	46 mins	906; G; O	1 hour 26 mins	9:07am
Education	Silva Drive, West Wodonga	La Trobe	2.6km	5 mins	2.6km	8 mins	F; T	41 mins	8:28am
Education	Silva Drive, West Wodonga	Charles Sturt	19.2km	16 - 24 mins	19.3km	1 hour 2 mins	F; 908	1 hour 4 mins	8:51am
Retail	Saville Ave, Lavington	Albury Centre	6.4km	10 - 18 mins	7.3km	22 mins	908	27 mins	11:40am
Retail	Saville Ave, Lavington	Wodonga Centre	14.9km	16 - 20 mins	13.5km	42 mins	908; AW	50 mins	10:53am
Retail	Kingfisher Drive, West Wodonga	Albury Centre	13.2km	14 - 18 mins	10.4km	31 mins	G; AW	41 mins	11:37am
Retail	Kingfisher Drive, West Wodonga	Wodonga Centre	4.2km	8 mins	4km	11 mins	G	19 mins	11:15am

6.3.3 Aviation

The Albury Wodonga region is serviced by Albury Airport, owned and operated by AlburyCity. As of October 2021, there are commercial passenger flights from Albury to Melbourne and Sydney. However, in 2018 there also were commercial passenger flights to Brisbane and Gold Coast Airport (Coolangatta), and flights to Brisbane are anticipated to return later in 2021.

Total passenger movements between Albury Airport and Sydney, Melbourne, Brisbane and Gold Coast is shown in Figure 60, while aircraft movements are shown in Figure 61.

There are many more passenger and aircraft movements between Albury and Sydney than any other city. Over the 2018-2019 timeframe, around 89% of passenger movements were between Albury and Sydney, compared with 8.6% between Albury and Melbourne. There are several factors that likely contribute to this. Firstly, there are more train trips between Albury and Melbourne than Albury and Sydney. Secondly, the distance between Albury and Melbourne is shorter, which makes driving more attractive than flying. Lastly, there are greater time savings in flying to Sydney than flying to Melbourne, vs train or driving.

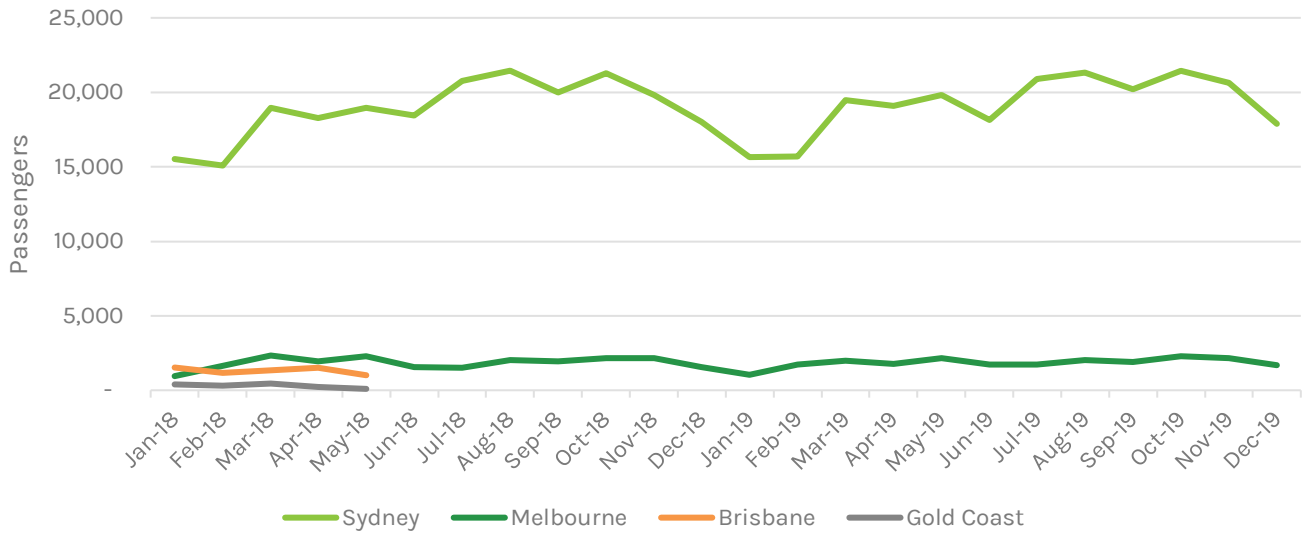


Figure 60 Passenger movements to/from Albury by origin/destination

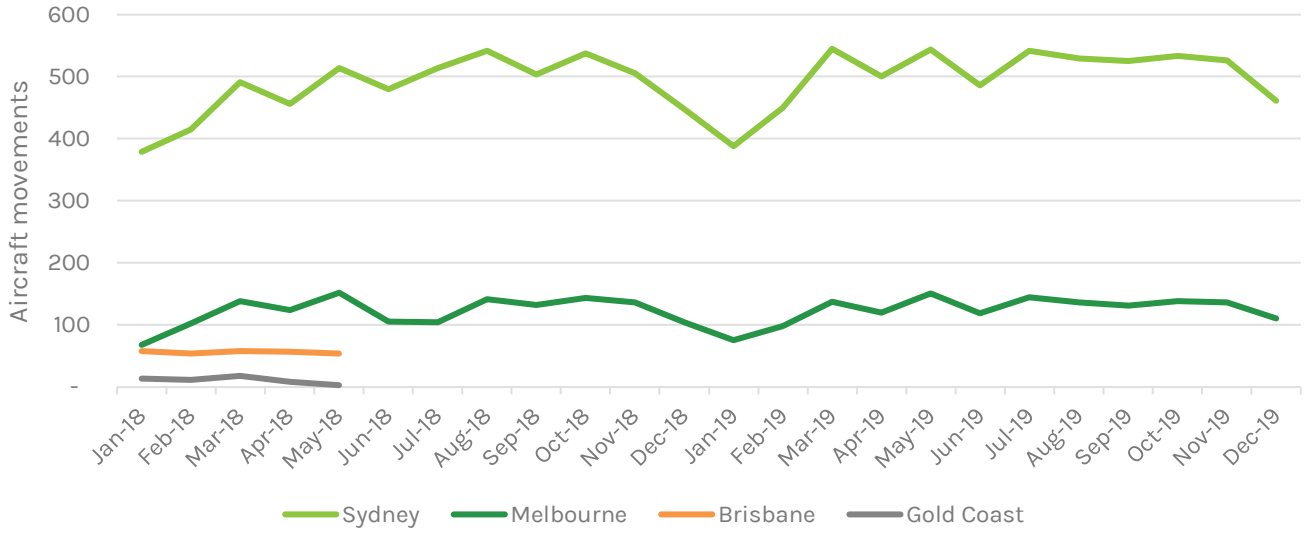


Figure 61 Aircraft movements to/from Albury by origin/destination

A comparison of 2018 and 2019 total passenger numbers is shown in Figure 62, while aircraft movements are shown in Figure 63. There is a noticeable seasonal fluctuation, with winter being busier than summer. There were slightly more passenger and aircraft movements at the start of 2018 than 2019, a reflection of greater destination choice.

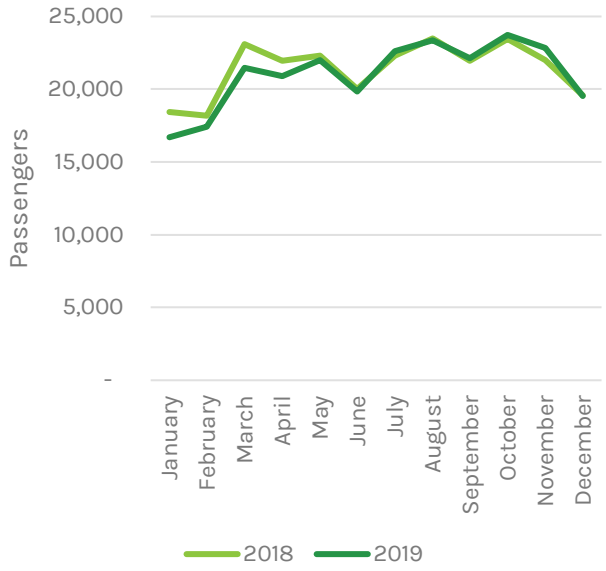


Figure 62 Comparison of passenger movements at Albury in 2018 and 2019

Figure 63 Comparison of aircraft movements at Albury in 2018 and 2019

The decrease in passenger and aircraft movements from Albury Airport has not been totally proportionate to year-on-year change. While there were 8,005 passenger movements between Albury and Brisbane and Gold Coast in 2018, there were only 4,223 fewer passenger movements associated with Albury in 2019 than 2018, as shown in Table 15. Notably, there was an increase in movements between Albury and Sydney, of 3,715. Similarly, there were 336 movements between Albury and Brisbane and Gold Coast in 2018, but an increase of 291 movements between Albury and Sydney and Melbourne in 2019. A substantial number of movements cut from Brisbane and Gold Coast appear to be now attracted to Sydney, potentially as a transit hub. It is assumed that if flights to Brisbane resume, there would be a slight decrease in movements to Sydney.

Table 15 Annual passenger movements from Albury in 2018 and 2019

	2018	2019	Change
Sydney	226,628	230,343	3,715
Melbourne	22,109	22,176	67
Brisbane	6,515	-	-6,515
Gold Coast	1,490	-	-1,490
Total	256,742	252,519	-4,223

Table 16 Annual aircraft movements from Albury in 2018 and 2019

	2018	2019	Change
Sydney	5,787	6,031	244
Melbourne	1,451	1,498	47
Brisbane	281	-	-281
Gold Coast	55	-	-55
Total	7,574	7,529	-45

6.3.3.1 Projections

Projections for growth in passenger and aircraft movements associated with Albury are shown in Figure 64 and Figure 65 (figures for 2020 and 2021 are simulated based on what could have occurred if the COVID-19 pandemic had not occurred, and therefore represent a estimate based on trend, not reality). A baseline of 256,000 passenger movements per year, and 7,570 aircraft movements

per annum, are used. This assumes travel patterns will return to pre-pandemic levels, and that flights to Brisbane will resume. These figures are then inflated based on population growth, estimating potential movements in the future. Assuming there is a direct correlation between population and air travel, it is assumed that movements associated with Albury Airport will rise 30% to 2036, from a 2018 base year. It should be noted that these projections would vary depending on routes (e.g., if more destinations options become available this could increase movements, likewise, if fewer destinations were available this could decrease movements); and technological advances (e.g., E-VTOL[25] at very low cost per trip were to become available, this could increase movements to and from Albury Airport).

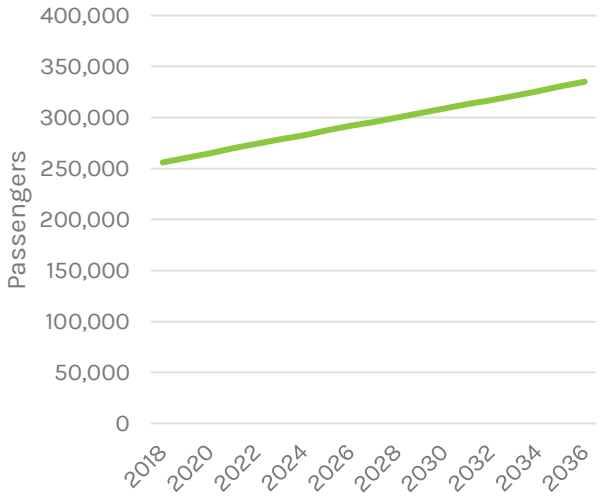


Figure 64 Projected passenger movements from Albury Airport, 2018 to 2036

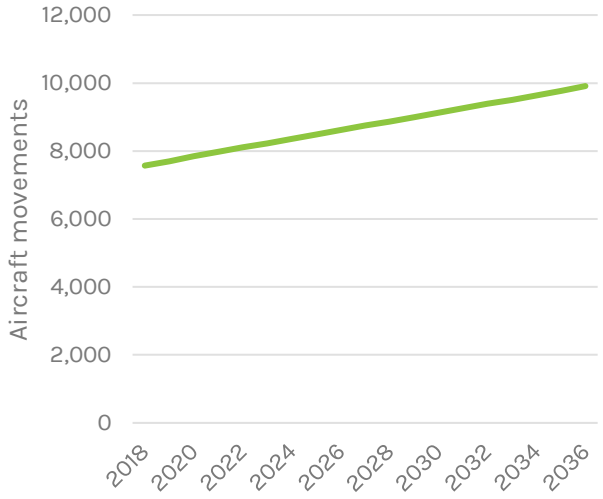


Figure 65 Projected aircraft movements from Albury Airport, 2018 to 2036

The projections shown here will be used as part of the emissions estimates used in Section 7. Section 7 shows that even with incremental increases in aircraft efficiency, the projected growth anticipated by Albury Airport will increase greenhouse gas emissions. This will be explored further in Section 7.

[25] Electric Vertical Take Off and Landing

7. Transport emissions

This section provides estimates of greenhouse gas emissions associated with transport in Albury Wodonga. The importance of this section is underlined by increasing recognition of the need to transition to a net zero emission society by 2050. Unlike many other sectors, transport has not achieved emission reductions, and in fact, emissions have increased with the transport sector in Australia.

7.1 Overview

The following section provides estimates of greenhouse gas emissions associated with transport in Albury Wodonga. The methodology and outputs are compliant with a *Global Protocol for Community-Scale Greenhouse Gas Emission* methodology. These protocols have three scopes.

- **Scope one emissions** – These represent the direct emissions associated with transport activity inside Albury and Wodonga (e.g., an internal combustion engine vehicle being used on the streets of Albury). Scope one emission from all transport is included.
- **Scope two emissions** – Emissions generated elsewhere from the activity (e.g. the electricity generation from charging an EV battery). Due to low Electric Vehicle take-up in Albury Wodonga, and poor data, scope two emissions are not calculated.
- **Scope three emissions** – Emissions which occur outside of the area, but are associated with an activity within the area. Scope three emissions are only counted for aviation, with the emissions associated with air travel to and from Albury Wodonga, which occur outside of Albury Wodonga being counted as Scope Three emissions.

7.1.1 Summary of transport emissions

A summary of transport emissions in Albury Wodonga is provided in Table 17 and Figure 66. Notably, over 96% of transport emissions in Albury and Wodonga are estimated to be from motor vehicle use, as shown in Figure 66. Much of these emissions are from local passenger and light vehicles, while heavy and commercial vehicle through traffic also generates significant emissions.

96% of transport emissions in Albury and Wodonga are estimated to be from motor vehicle use.

Public transport buses and trains combined, contribute less than 0.3% of transport emissions. Similarly, commercial aviation is a small emissions generator relative to motor vehicles.

Within this context, the largest potential to decrease emissions is from reduced motor vehicle usage or increased uptake of EVs, powered by renewable energy.

Table 17 Transport emissions of Albury Wodonga, by source, for 2019

Sector	Component	Emissions (t-CO2e) per annum
Road	Passenger vehicles, light commercial, motorcycles	322,159
Road	Heavy vehicles	95,385
Road	Public transport buses	616
Rail	XPT and V/Line trains	621
Rail	Freight trains	12,767
Aviation	Commercial Aviation (Scope One)	497
Total		432,045

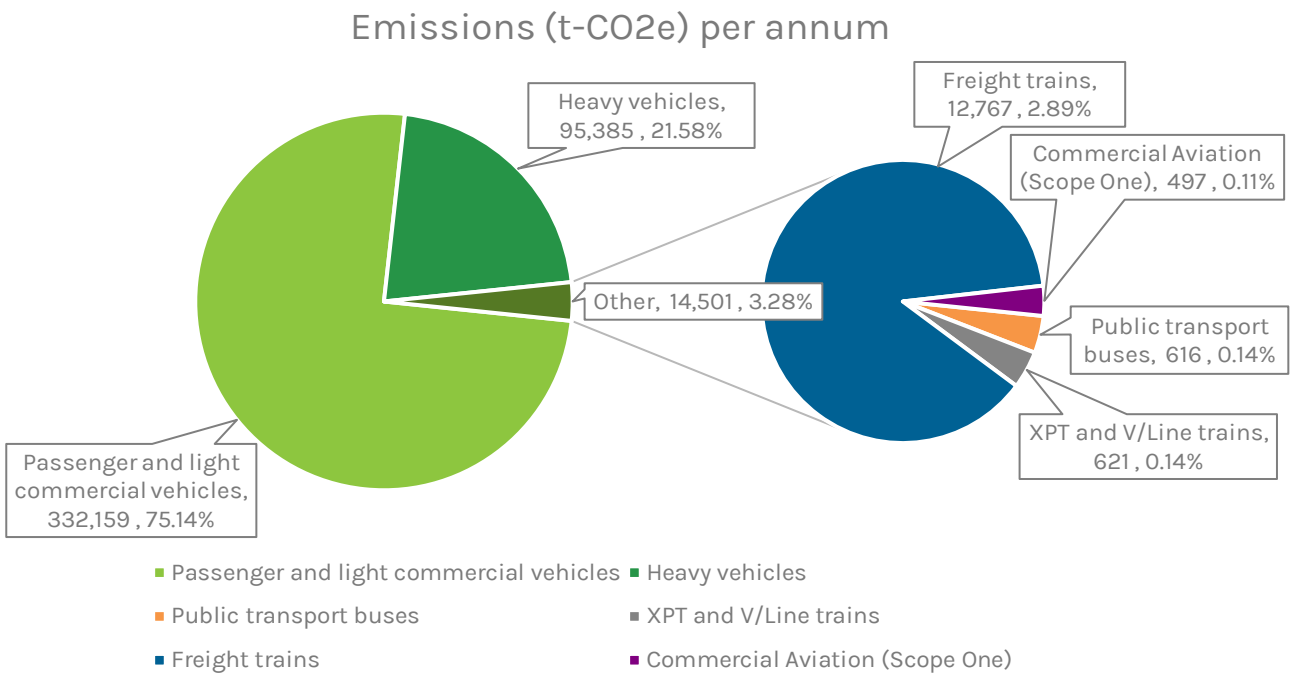


Figure 66 Transport emissions of Albury Wodonga, by source, for 2019

7.2 Methodology

The following sections outline the methodology for calculating emissions from road based transport, rail based transport, and aviation.

Due to a lack of detailed transport usage data, there are generalised estimates made for road based transport, based on car ownership and use data. These estimates are only made for scope one emissions.

Timetabled services, and running distances are used to estimate rail and aviation emissions through LGAs of Albury and Wodonga. Again, these emissions are scope one. For aviation, high level estimates at scope three emissions are made in addition to scope one, to give an indication of overall emissions associated with the sector.

National Greenhouse Accounts Factors 2020[26] were used for all emissions estimates, as shown in Table 18.

Table 18 kgs of CO2-e emissions per litre of fuel

	CO^2	CH^4	N^2O	CO^2-e
Petrol	2.3	0.02	0.05	2.4
Diesel	2.7	>0.00	0.02	2.7
LPG	1.6	0.02	0.02	1.6
Aviation (Kerosene)	2.6	>0.00	0.02	2.6

Source: National Greenhouse Accounts Factors 2020

NB: Numbers may not add up due to rounding.

7.2.1 Road based

Two different methods were used for estimating road based emission:

1. Those associated with vehicle travel *within* LGAs of Albury and Wodonga; and
2. Those associated with vehicle travel *through* LGAs of Albury and Wodonga.

7.2.1.1 Road emissions within

Emissions for travel within the LGAs of Albury and Wodonga is estimated based on car ownership rates and average vehicle use. ABS Motor Vehicle Census data was used to identify how many vehicles are registered in the postcodes of Albury or Wodonga[27]. This data revealed the number of passenger vehicles, light commercial vehicles, and motorcycles per postcode.

The ABS Survey of Motor Vehicle Use was used to determine the number of kilometres each vehicle would travel on average, per annum[28]. An estimate of fuel source was also made, allocating kilometres travelled to different fuel sources[29]. An average consumption per fuel source was applied to each vehicle type, estimating total fuel consumption[30]. Greenhouse gas emissions rates were applied to fuel consumption estimates.

This method provides an estimate of the amount of vehicles kilometres travelled (VKT) and amount of carbon emissions per postcode, which can be aggregated to the study area. It should be noted that this method attributes all emissions from vehicles registered in Albury or Wodonga to the areas of Albury and Wodonga. Similarly, it does not account for vehicles outside of the LGAs of Albury or Wodonga who travel to or through Albury or Wodonga.

These simplifications add some level of irregularity to the estimates. However, the method is simple, and repeatable, allowing for a tracking of change over time. Further, analysis of ABS Census Journey to Work patterns indicates that the vast majority (76%) of vehicle trips which start and/or finish in Albury or Wodonga actually start and finish in Albury or Wodonga. Only 9% of commutes start outside of Albury or Wodonga, and finish in Albury or Wodonga; while only 15% of commutes which start inside Albury or Wodonga finish outside Albury or Wodonga. For these reasons, it is assumed that basing estimates of emissions on cars registered in Albury and Wodonga is broadly

[26] From National Greenhouse Accounts Factors 2020, Table 4 < https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2020 >.

[27] These postcodes are: 2640; 2641; 2642; 3688; 3690; 3691; 3694; 3695; and 3749.

[28] Based on the 'other areas' category of Survey of Motor Vehicle Use Table 8.

[29] Based on Survey of Motor Vehicle Use Table 11.

[30] Based on Survey of Motor Vehicle Use Table 6.

representative of car use and emissions with the LGAs.

7.2.1.2 Road emissions through

While the above method estimates emissions associated with travel *within* Albury and Wodonga, it is important to recognise the significant through traffic associated with the Hume Highway.

These emissions are estimated based on observed traffic count data (which is unavailable in fine enough detail for the rest of Albury and Wodonga's road network). To avoid double counting internal vehicle traffic, count data was sourced from the western edge of Wodonga (based on VicRoads Traffic Count Data[31]).

These count data reveal light and heavy vehicle counts. All light vehicles are assumed to have the same fuel source mix and consumption as passenger vehicles. Heavy vehicles are assumed to be 43% rigid trucks and 57% articulated trucks, all being diesel powered, based on revealed use in the ABS Survey of Motor Vehicles for the national fleet.[32]

The Hume Highway travels for 44.3km through the LGAs of Albury and Wodonga. All counted vehicles are assumed to travel this entire distance, revealing an estimated vehicle kilometres travelled, to which fuel consumption rates[33] and associated emissions are applied.

Public Transport Buses

Emissions from buses were calculated separately. The General Transit Feed Specification (GTFS) were analysed to determine the length of each bus route within the LGAs of Albury and Wodonga. Timetables were analysed to determine how many services per annum are operated.

The route length, multiplied by services revealed the number of kilometres travelled per year. A consumption rate from the ABS Survey of Motor Vehicle Use (based on Victorian buses, as the majority of the fleet are Victorian based) was applied to estimated vehicle kilometres travelled[34]. Lastly, emissions factors were applied to estimated fuel consumption.

7.2.2 Rail

Emissions from rail are estimated based on analysis of timetables. Track distance between the border of City of Wodonga and Albury Station, and Albury Station to the border of Albury City were measured, to determine travel distance within Albury and Wodonga. Timetables were analysed to determine the number of passenger trains per year.

Freight gross tonnage was accessed from BITRE.[35] Total tonnage km between Albury and Tottenham yard was calculated, and then scaled down to the portion of freight rail within Albury Wodonga, to represent movement through Albury Wodonga. Fuel consumption rates were applied per tonne/km. Lastly, emissions factors were applied to estimated fuel consumption.

7.2.3 Aviation

Emissions from commercial aviation are based on data from Albury Airport. The number of flights to the key destinations of Sydney and Melbourne, as well as major aircraft from each route was provided by Albury Airport.

Flight paths to Sydney and Melbourne were measured, determining the total route length, and the portion within LGAs of Albury and Wodonga. Fuel consumption across the entire trip was estimated based on average fuel consumption for each major aircraft. Emissions factors were then applied, and reduced to determine the amount of emissions within the LGAs of Albury and Wodonga,- Scope 1 emissions, which are deducted from total emissions to reveal estimated Scope 3 emissions.

[31] https://vicroadsopendata-vicroadsmaps.opendata.arcgis.com/datasets/traffic-volume/explore?location=-36.086233%2C146.745093%2C13.70

[32] Based on Survey of Motor Vehicle Use Table 11.

[33] Based on Survey of Motor Vehicle Use Table 6.

[34] Based on Survey of Motor Vehicle Use Table 6.

[35] From BITRE Trainline 7, Table 6 < https://www.bitre.gov.au/sites/default/files/publications/train_007.pdf >

7.3 Emission estimates

The following sections estimate the amount of greenhouse gas emissions associated with transport in the LGAs of Albury and Wodonga.

7.3.1 Road based

7.3.1.1 Road emissions within

The ABS Motor Vehicle Census reveals there are 91,200 vehicles registered in postcodes within LGAs of Albury and Wodonga, as shown in Table 19.

Table 19 Registered Vehicles in Albury and Wodonga, 2020

	Passenger vehicles	Light commercial vehicles	Motorcycles
Registered vehicles	65,124	21,115	5,061

Applying ABS Survey of Motor Vehicle Use annual vehicle kilometre travelled figures to the registration data reveals an estimated 907,045,500km is travelled due to vehicles registered in LGAs of Albury and Wodonga, as shown in Table 20.

Table 20 Estimated Vehicle Kilometres Travelled, per vehicle type, 2020

	Passenger vehicles	Light commercial vehicles	Motorcycles
VKT per annum	638,390,000	262,081,800	6,573,700

Applying ABS Survey of Motor Vehicle Use ratios of fuel type, allows for an estimate of consumption of different fuel types for each type of vehicle. This is shown in Table 21.

Table 21 Estimated fuel (litres) consumption per vehicle type and fuel type, 2020

	Passenger vehicles	Light commercial vehicles	Motorcycles
Petrol consumption	47,433,162	5,120,531	400,996
Diesel consumption	20,856,680	27,486,845	-
Other (LPG) consumption	1,601,852	82,661	-

Estimated emissions per vehicle type, using fuel consumption estimates and emissions factors, is shown in Table 22. It is estimated that 260,134 tonnes of CO^2-e emissions are associate with vehicles in Albury and Wodonga for the 2020 year.

Table 22 Estimated CO^2-e emissions (tonnes), per vehicle type, 2020

	Passenger vehicles	Light commercial vehicles	Motorcycles
Emissions (t-CO^2-e) per annum	172,164	87,016	955

7.3.1.2 Road emissions through

VicRoads Traffic Count data reveals that there are 13,900 light vehicles and 5,100 heavy vehicles using the Hume Highway daily. Approx. 44.3km of the Hume Highway is within LGAs of Albury and Wodonga. It is estimated that there are 307,220,500km travelled along the Hume Highway in Albury Wodonga in 2020, as shown in Table 23.

Table 23 Estimated Vehicle Kilometres Travelled along Hume Hwy, per vehicle type, 2020

	Light	Heavy
VKT per annum	224,756,050	82,464,450

Applying ABS Survey of Motor Vehicle Use ratios of fuel type, allows for an estimate of consumption of different fuel types for each type of vehicle. This is shown in Table 24.

Table 24 Estimated fuel (litres) associated with Hume Hwy, per vehicle type and fuel type, 2020

	Light	Heavy
Petrol consumption	17,201,235	-
Diesel consumption	7,513,286	35,100,993
Other (LPG) consumption	411,699	-

Estimated emissions per vehicle type, using fuel consumption estimates and emissions factors, is shown in Table 25. It is estimated that 157,410 tonnes of CO^2-e emissions are associate with vehicles travelling along the Hume Hwy in Albury and Wodonga for the 2020 year.

Table 25 Estimated CO^2-e emissions (tonnes) associated with Hume Hwy, per vehicle type, 2020

	Light	Heavy
Emissions (t-CO^2-e) per annum	62,025	95,385

7.3.1.3 Public Transport Buses

Analysis of GTFS feeds and timetables reveals that public transport buses in Albury and Wodonga travelled an estimated 807,348km in 2020. By applying the Victorian average diesel bus fuel consumption rate, it is estimated that 226,865l of diesel is consumed. It is estimated that public transport buses emitted 616 tonnes of CO^2-e in Albury and Wodonga for the 2020 year.

7.3.2 Rail

7.3.2.1 Passenger

Analysis of passenger rail timetables reveals that the:

- XPT operate between Melbourne and Sydney twice per day (in each direction)[36]
- V/Line operate three return trips per day to Albury[37]

The track distance traversed by the XPT is 43.3km, while V/Line services traverse 23.3km. It is estimated that passenger trains travel 114,245km per annum in Wodonga and Albury. It is estimated passenger rail uses 2 litres per kilometre, equating to 228,490 litres of diesel being consumed per year. It is estimated that passenger rail emitted 621 tonnes of CO^2-e in Albury and Wodonga for the 2020 year.

7.3.2.2 Freight

Analysis of BITRE Data shows there is 10.85 million gross tonnes hauled along the Albury – Tottenham rail corridor in 2017-18. This equates to 3,194 million Gross Tonne Kilometres, along a 294.5km section of track. Scaling this down to the track distance within Albury and Wodonga (43.3km) equates to an estimated 469.8 million Gross Tonne Kilometres. Previous research has revealed average consumption of 10 litres of diesel per 1,000 Gross Tonne Kilometres. Using the consumption rate, it is estimated 4,698,050 litres of diesel is consumed by freight trains within Albury and Wodonga. It is estimated that freight rail emitted 12,767 tonnes of CO^2-e in Albury and Wodonga for the 2020 year.

7.3.3 Aviation

There were 6,031 movements between Albury Airport and Sydney and 1,498 movements between Albury Airport and Melbourne, in 2019 year. Total flight length, and the portion within Albury and Wodonga are shown in Table 2.

Table 26 Aircraft movements from Albury in 2019

Route	Flight distance		Trips	Operators
	Total (km)	In Albury Wodonga (km)		
Sydney - Albury	451	26	6,031	QantasLink; Virgin; Rex
Melbourne - Albury	259	26	1,498	Rex

The most common commercial aircraft at Albury Airport, and estimated fuel consumption per kilometre of flight are shown in Table 27.

Table 27 Common commercial aircraft at Albury Airport

Aircraft	Fuel consumption per km (litres)	Operator
Dash 8-300	1.85	QantasLink
Dash 8-400	2.7	QantasLink
Saab 340	1.38	Rex
ATR 72	1.78	Virgin

Using aircraft capacities, and market share per operator, it is possible to estimate movements per aircraft type. It is estimated that all movements between Albury and Melbourne are conducted with Saab 340 aircraft (Rex). It is estimated that between Albury and Sydney, 909 movements are made with Dash 8-300 (QantasLink); 356 movements with Dash 8-400 (QantasLink); 1009

[36] https://www.vline.com.au/getattachment/90b9a59e-f637-4c36-973c-02e404ba4266/Albury-Wodonga-Melbourne-(via-Wangaratta-Bena)

[37] https://www.vline.com.au/getattachment/90b9a59e-f637-4c36-973c-02e404ba4266/Albury-Wodonga-Melbourne-(via-Wangaratta-Bena)

movements with Saab 340 (Rex); and 740 with ATR 72 (Virgin).

It is estimated that flights between Albury and Sydney account for 2,408,738 litres of aviation fuel being consumed, 5.7% within the LGAs of Albury and Wodonga.

It is estimated that flights between Albury and Melbourne account for 533,475 litres of aviation fuel being consumed, 10% within the LGAs of Albury and Wodonga.

Applying emission factors, it is estimated that Scope One emissions total 497 tonnes of CO^2-e in Albury and Wodonga, and Scope Three emissions 7,105 tonnes of CO^2-e for the 2019 year, as shown in Table 28.

Table 28 Estimated emissions from aircraft in Albury Wodonga, 2019

Route	Emissions (t-CO2-e) per annum		
	Scope One	Scope Three	Total
Sydney - Albury	359	5,865	6,224
Melbourne - Albury	138	1,240	1,378
Total	497	7,105	7,602

Assuming aircraft movements grow at the rate estimated in Section 6.3.3 Aviation, by 2036 emissions associated with air travel would be 31% higher, with Scope One emissions totalling 651 tonnes of CO^2-e, and Scope Three emissions totalling 9308 tonnes of CO^2-e. However, this assumes that air travel patterns remain. The inclusion of an Albury Brisbane flight will increase Scope Three emissions associated with air travel. Further, increased fuel efficiency, including potentially electric planes, would decrease total emissions if charged with renewable energy.

8. Transport Safety

The purpose of this section is to highlight transport safety issues in Albury Wodonga, based on existing crash statistics.

The 2015 Wodonga Integrated Transport Strategy (WITS) called for a lowering of speed limits, including a blanket 40km/h limit for the CBD as well as selected residential areas. The WITS also identified the need to pursue 30km/h zones to both increase safety as well as bolster the economic performance of the CBD.

8.1 Speed limits

Speed limits are important because of the powerful relationship between vehicle speed and the severity of injury, as highlighted in Figure 67.

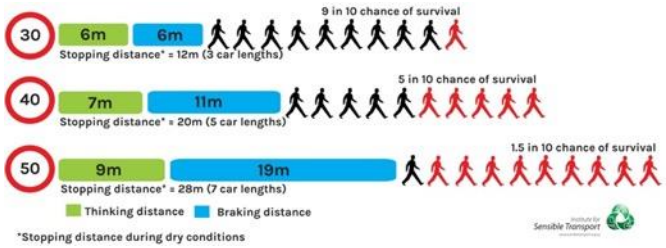


Figure 67 Relationship between vehicle speed and pedestrian fatality

The chance of a pedestrian survival in a collision is 1.5/10 at 50km/h and 9/10 when speeds are reduced to 30km/h.

Figure 68 and Figure 69 show the posted speed limits for the Albury and Wodonga CBDs, respectively.

Albury has 50km/h for most of its CBD, with the exception of a small section in the core which has 40km/h for Smollett and surrounding streets. Wodonga has slightly more coverage of 40km/h in the CBD, which 50km/h on most streets, and 60km/h on several of the arterial roads.

Both CBDs would benefit from a more consistent approach to speed limits, both for pedestrian safety and driver experience.

Figure 68 Speed limits, Albury CBD

Figure 69 Speed limits, Wodonga CBD

8.2 Differences between NSW and Victorian recording of crashes

Both NSW and Victoria provide summary crash statistics for the last five years.

Victoria provides police-reported crashes via their open data portal (data.vic.gov.au). Additional crash statistics from the Traffic and Accident Commission (TAC) are generally not available to the public as they contain personal information relating to the people involved in the crash. NSW provides data from NSW Health, the State Insurance Regulatory Authority (SIRA), icare (Insurance & Care NSW) and the NSW Police Force. NSW provides the data via a dashboard and online map, while Victoria provides the full dataset in geospatial formats. However, for this analysis, we have been provided with the NSW geospatial data.

In practice, the differences in data capture mean that NSW shows more crashes than in Victoria. This is because many of the less significant crashes, such as those which do not record an injury or only property damage, are not captured in the Victorian dataset. Conversely, the Victorian dataset provides more variables that can be analysed, whereas NSW only provides the year of the crash and the severity of the crash (property damage, minor, major, fatality). Other variables are provided via their online crash summary portal.[38]

8.3 Crashes

Figure 70 shows the crashes in Albury and Wodonga in the last five years (2015-2020), broken down by injury severity. It shows a concentration around the built-up areas within both municipalities. However, crashes recorded along the main highways and rural roads were more likely to have serious injuries or fatalities.

In total, there were 11 fatalities, 250 serious injuries, and 508 other injury crashes recorded.

[38] https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?r=eyJrIjoiMDA3OGRhN2UtZjRkNy00N2JmLWE0MjMtZmIyNzFiOTdmMjI3IiwidCI6ImNiMzU2NzgyLWFkOWEtNDdmYi04NzhiLTdlYmNlYjg1Yjg2YyJ9&pageName=ReportSection9f6cf5f75b8d2a5569a2

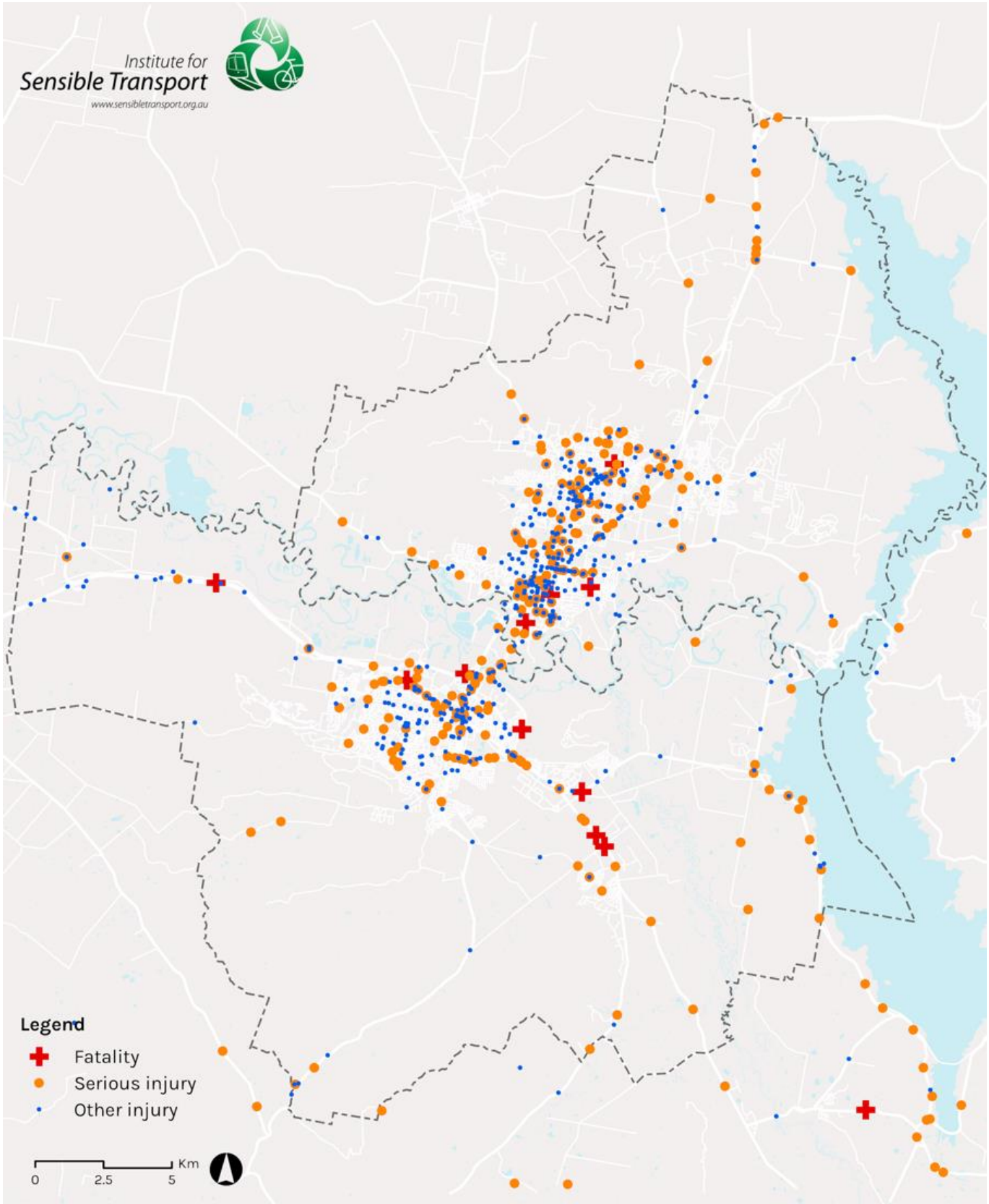


Figure 70 Crashes by severity in Albury Wodonga, 2016-2021

8.3.1 Crashes in Albury

In Albury City, there were 4 fatalities, 143 serious injuries, and 300 other injury crashes recorded.

Figure 71 shows a zoomed in image of crashes in the Albury CBD area. It shows a concentration of crashes at intersections, including a fatality at the intersection of Young and Smollett Streets, and Kiewa and Atkins Streets.

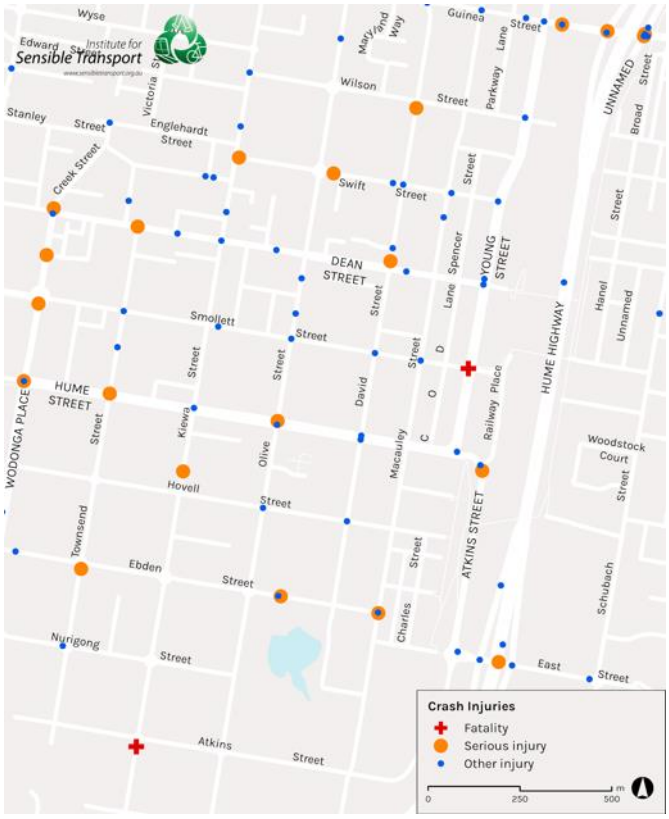


Figure 71 Crashes by severity Albury CBD

8.3.2 Crashes in Wodonga

In the City of Wodonga, there were 7 fatalities, 107 serious injuries, and 208 other injury crashes recorded.

Figure 72 shows crashes in Wodonga, segmented by road user involved. Due to differences in how data is provided from NSW, we are unable to create a similar map for Albury.

In the City of Wodonga, there was a total of 210 crashes involving cars only, 52 involved a person riding a motorcycle, 30 involved someone riding a bike, and 30 involved a pedestrian.

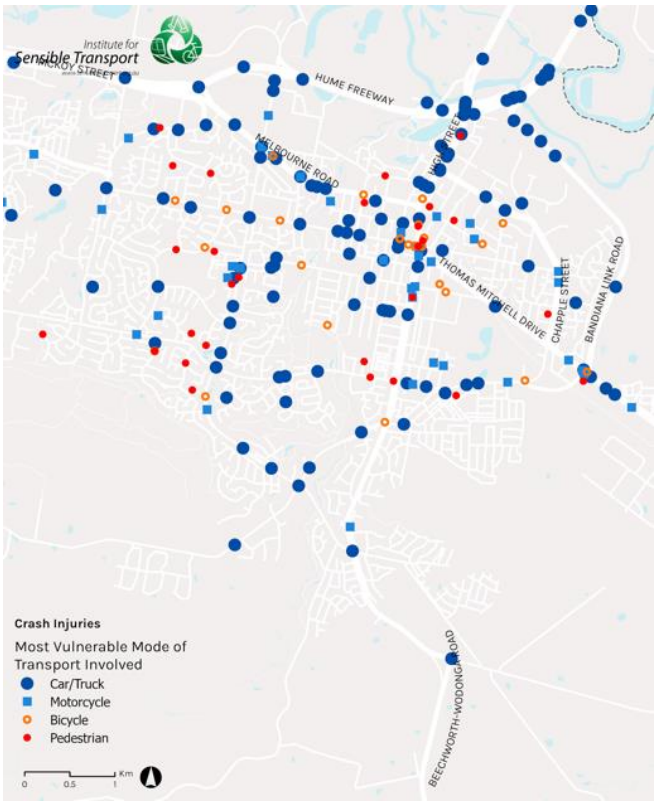


Figure 72 Crashes by road user, Wodonga

Figure 73 shows a zoomed in look at crashes within the Wodonga CBD area. It shows that most crashes occur at intersections. A concentration of crashes occurs at the Thomas Mitchell / Beechworth roundabout; however, these crashes are not severe.

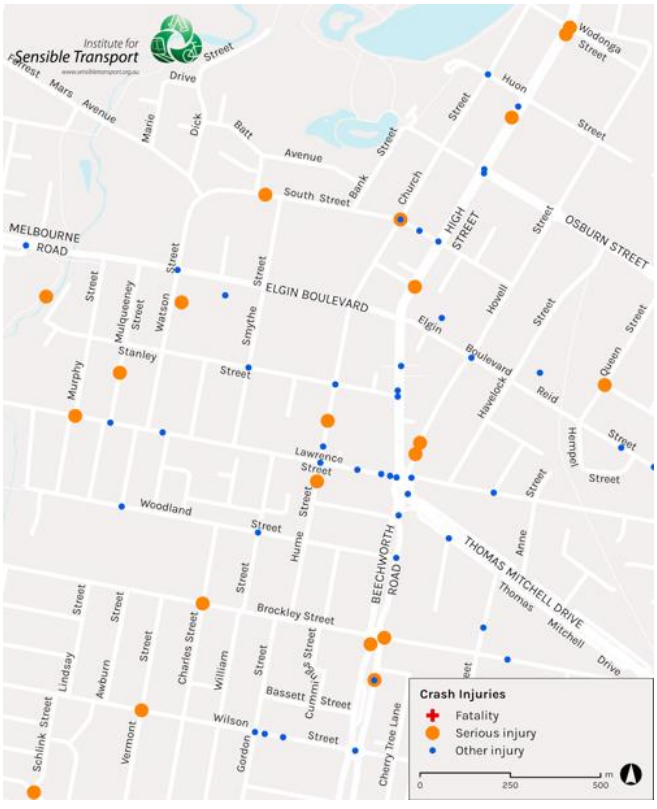


Figure 73 Crashes by severity in Wodonga CBD

9. Professional stakeholder consultation

A series of professional stakeholder consultation sessions was conducted as an early element of this project. The objective of this process was to gain an understanding of the key transport issues and opportunities, as understood by those representing key parts of the Albury Wodonga community.

Due to COVID-19 restrictions these workshops were conducted remotely, using a video conferencing platform.

9.1 What groups did we speak to?

Four workshops were held, as well as small number of one-on-one conversations. In addition, the Albury transport planner spoke separately with the Albury Youth Forum. The four workshops were held with the following groups:

9.1.1 Workshop 1 Business and Economic Development

- Albury Business Connect
- Business Wodonga
- Young Business Edge
- Economic Development Officer, AlburyCity

9.1.2 Workshop 2 Rail and cycling

- Border Rail Action Group (BRAG)
- Pedal Power

9.1.3 Workshop 3 Accessibility and Community groups

- Albury Accessibility Advisory Committee members
- Albury CALD representative
- Wodonga CALD representative
- Albury Wodonga Working Party
- Wiradjuri Elders Group
- Community Planning and Development, Wodonga Council

9.1.4 Workshop 4 NSW and Victorian State Governments

- Transport for NSW
- Victorian Department of Transport

9.2 Key issues - summary of key findings

Participants were asked what they consider to be the key issue impacting negatively on the transport system and Albury Wodonga's liveability. The following provides a synthesis of the consistent themes to emerge from the workshop discussions on this question.

One overarching theme to emerge from these discussions was that car use had, over many decades, been prioritised, often to the detriment of other modes. The notion that walking, cycling and public transport was an afterthought while motor vehicle planning was a priority underpinned many of the more specific comments.

9.2.1 Public transport

- All groups were critical of the location of the new Wodonga railway station and its lack of integration with the centre of the community.
- The bus routes have not changed since 2007 and Albury Wodonga is growing fast, but the bus system is not evolving to meet new population distribution.
- New and established suburbs, such as Thurgoona and Baranduda, and Lavington do not have adequate bus services. Some of the recent subdivisions have street alignments that make it difficult to operate a bus.
- Refugee communities are often located in areas without a good bus connection to the places they need to visit (e.g. Education facilities to learn English)
- Poor bus connection to Albury Wodonga's tertiary institutions
- Lack of high-quality service levels for areas with high Indigenous population. A lack of quality connections between Indigenous communities and health care services.
- Issues of public transport staff discriminating against those with a disability and a lack of

cultural awareness for working with Indigenous people.

- Gaps between train and platform are difficult for those with a disability. This disability may not always be obvious.
- Insufficient disabled access car parking bays at Wodonga railway station.
- DDA compliance at railway stations is poor.
- Local buses do not connect with the railway stations – this was identified by every workshop undertaken.
- Lack of reliability of the bus system.
- Lack of integrated ticketing between NSW and Victoria, as well as other issues related to jurisdictional boundaries.
- New Wodonga station is difficult to access.
- No bus connection with Albury Airport.
- Buses are not frequent enough and do not run late enough to offer a viable alternative to the car.
- Taxis can be difficult when needing to cross the border, as not all taxis will take people from Albury to Wodonga, for instance.

9.2.2 Walking and cycling

- Barriers to cycling included a lack of bicycle infrastructure and a lack of cohesiveness between the paths that do exist. Weather (either too hot or too cold) and a lack of change facilities.
- Growth areas are often developed without adequate footpaths. There was a concern that current and recent development had reinforced car dependency and the style and location of new developments makes it difficult to integrate walking and cycling into everyday lifestyles.
- A real and perceived safety issue prevents more people from choosing to cycle.
- A lack of high-quality bicycle infrastructure connecting the CBDs and key destinations make it difficult for people to ride for transport.
- Poor bicycle infrastructure connecting the Albury and Wodonga railway stations makes multi-modal integration unappealing.
- Speed limits are too high in the CBD to encourage safe pedestrian crossing or cycling.
- Very limited bicycle parking.
- Some riverway shared paths can become flooded easily, including the Causeway.

9.2.3 Car parking

- The business and economic development workshop reported that there is not an actual lack of car parking, but rather an unrealistic expectation that people should always be able to get a park outside the shop they want to visit.
- Any future actions to consolidate car parking should be mindful of those with a disability.

9.2.4 Freight

- Mixing freight and residential traffic was considered an issue.

9.3 Key opportunities – summary of key findings

Participants were asked to consider what opportunities they think would help advance Albury Wodonga's economic, social and environmental future, as well the city's vibrancy. The following provides a synthesis of the consistent themes to emerge from this discussion.

The overarching theme to emerge from these discussions was related to enhanced public transport and a more attractive, welcoming environment for walking and cycling. Additionally, place making and urban vibrancy improvements were consistently mentioned as something that would strengthen Albury Wodonga's ability to attract people to its city centre/s.

9.3.1 Public transport

- Providing high quality local, bus services to both the Albury and Wodonga railway stations.
- Harmonising the public transport system so passengers are not disadvantaged when travelling across the border (e.g., fares, timetables, concession arrangements etc).
- Public transport is often more expensive than the same trip by motor vehicle.
- Provide more frequent and reliable services.
- Review the bus service to ensure it is able to meet the needs of a growing city.

- Expand the timetable, to provide services earlier, and later into the evening.
- Ensure high quality services connect communities to hospitals and other healthcare precincts.
- Integrate the timetables of regional coaches and the regional train service.
- Enhance the usability and accessibility of the railway stations. For instance, the location of the taxi rank at Albury railway station should be closer.
- Ensure bus services better connect populations with higher education campuses.
- Providing charging points at the bicycle storage area of the new Velocity trains, to enable e-bike owners to charge their battery while on board.
- Ensure all public transport and taxi staff receive cultural awareness training, especially regarding working with Indigenous and refugee communities.
- Better signage for public transport to make it easier to understand, with particular consideration for those with disabilities. Audio information will help people with sight issues.

9.3.2 A more walking and cycling friendly city

- Some areas do not have footpaths and cars sometimes park on footpaths, making walking difficult, especially for those with a disability.
- Integrate cycling infrastructure as a standard element of street design, so cycling becomes the first choice for short trips.
- Educate drivers regarding awareness and respect for all road users.
- Create micro mobility options, such as e-scooter or e-bike share once the infrastructure is in place to support it.
- Ensure new subdivisions are planned with high quality walking and cycling environments.
- Providing bicycle racks on buses to help people integrate cycling and public transport.

9.3.3 Creating a vibrant city

- Create opportunities for people to have unique, interesting experiences when they visit the Albury and Wodonga CBDs.
- Activate underutilised areas within the CBDs.
- Creating stronger links between the Albury CBD and the River, as well as a more attractive option for pedestrians and cyclists to cross the River.

9.4 State government public transport planning – synthesis of outcomes

The workshop with the TfNSW and the Victorian Department of Transport discussed a range of transport issues, many of which related to public transport service provision. The following provides a brief distillation of what workshop participants said:

- At this time, the Victorian State Government has not committed to a Wodonga Bus Review
- TfNSW is currently undertaking a review of the Albury Bus network as part of the 16 Regional Cities Services Improvement Program.
- DoT and TfNSW are committed to improving bus connections between the Albury and Wodonga communities during any future network review
- DoT and TfNSW acknowledge there is an opportunity to improve integration of public transport services within Albury and Wodonga
- A harmonised public transport system between the two cities will require collaboration between Victorian and NSW state governments
- Better integration of public transport services within Albury and Wodonga requires a unique policy framework i.e., Albury Wodonga Health Services
- Bus connections to Wodonga Railway Station are problematic due to separation from existing town bus network and current intermittent nature of the train timetable.
- The first three-car VLocity train set will enter service in late 2021
- The intention is that all six VLocity trains will be delivered during 2022

- Bus services to the airport will be investigated as part of the 16 Regional Cities Services Improvement Program.
- Bus services to Albury growth areas will be investigated as part of the 16 Regional Cities Services Improvement Program.
- DoT is investigating the potential for bike racks to be installed on town bus services. A number of complexities are still being worked through.
- TfNSW has previously investigated implementation of bike racks on buses in regional NSW cities. Potential for installation will be dependant on outcome of engagement as part of the 16 Regional Cities Services Improvement Program.

9.5 Youth Strategy Survey 2021

The Youth Strategy Survey 2021 provides insights into the travel behaviours of young people in Albury. There were 800 responses, with 90 under 12 years of age, 587 responses from those aged 13 to 16, and 123 responses from those aged 17 and over (the driving age in New South Wales).

The following responses are relevant to transport and transport choice in Albury Wodonga:

- 87% said that climate action was important to them.
- 20% said they felt unsafe in Albury, with a significant number of women responding that being out alone at night made them feel unsafe.
- Youth were asked why they used public transport, as shown in Figure 74.
  - 45% do not use public transport at all.
  - 37% use public transport as they do not have a driving licence.
  - Notably, 4% used public transport because they felt unsafe walking or riding a bike.
  - Overwhelmingly, youth use public transport for lack of alternative, not because it is attractive.

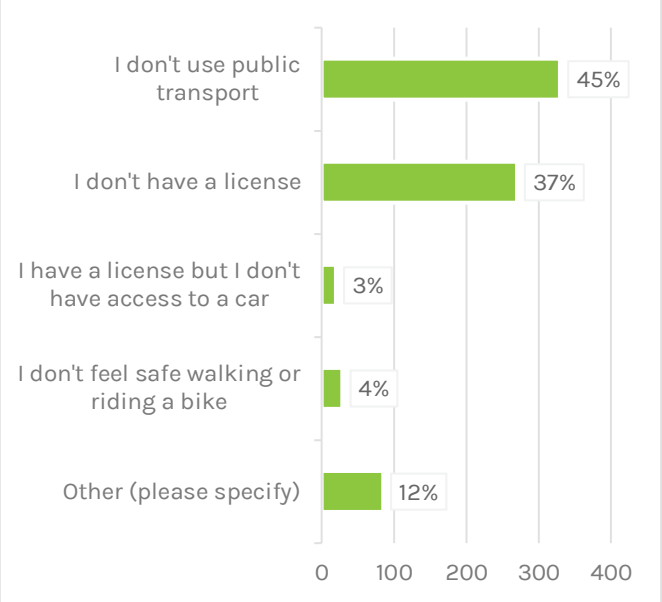


Figure 74 Youth Strategy Survey 2021 reasons for using public transport

- Youth were also asked what the purpose of the public transport trip was, as shown in Figure 75.
  - Getting to school was the top response, at 36%.
  - 9% used public transport for shopping.
  - 8% used public transport to visit others.
  - Only 3% used public transport for work.

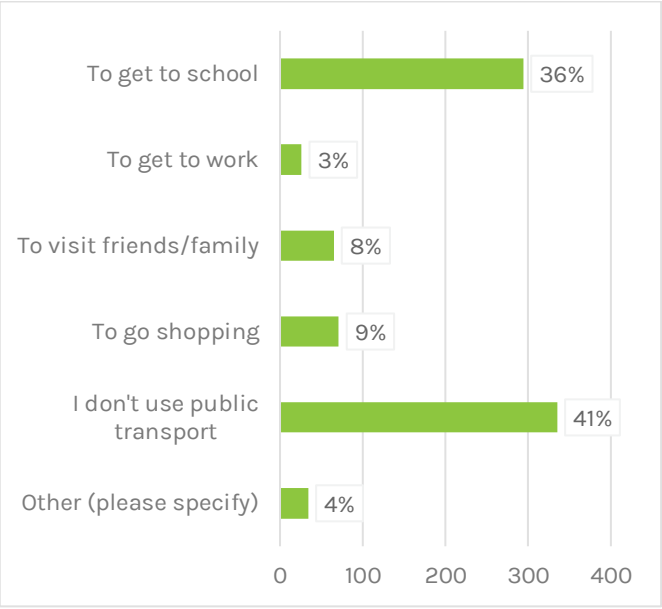


Figure 75 Youth Strategy Survey 2021 public transport trip purpose

- 27% of young people do not feel safe on public transport. However, of the 193 responses, 96 said that they did not use public transport. This indicates that for many, safety on public transport may be ambiguous. Of those who did list a response, anti-social behaviour, crime, lack of knowledge, and sanitation where key reasons for feeling unsafe.
- Youth were asked what would make them more likely to use public transport, with results shown in Figure 76. The top three responses were:
  - Stops closer to home, 33%.
  - More frequent services, 28%.
  - Cheaper tickets, 27%.
  - Only 29% said that they would not use public transport at all, indicating high levels of latent demand.

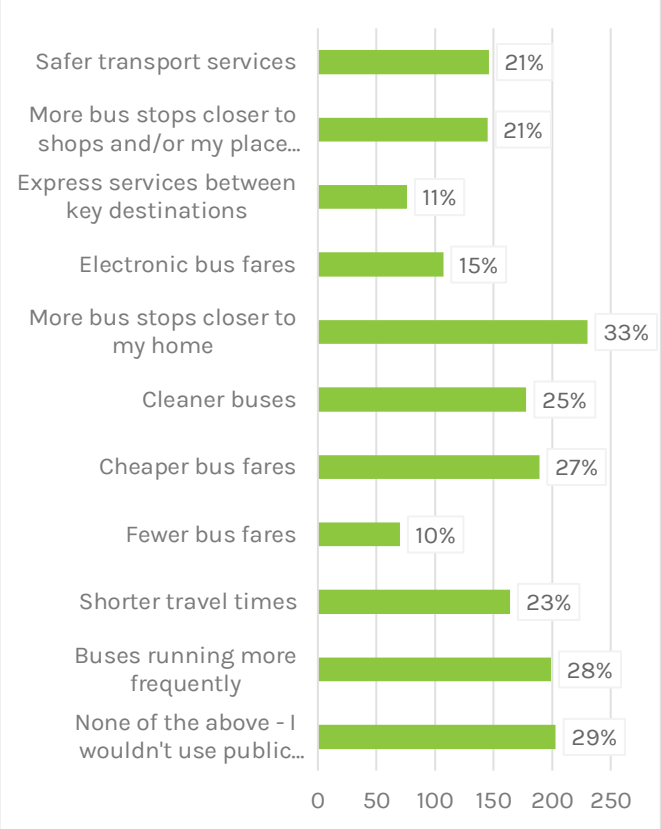


Figure 76 Youth Strategy Survey 2021 public transport improvements

- When asked how to improve transport in Albury, young people suggested:
  - Improving the bus network
  - Increasing safety on the transport network
  - Looking at new technology like e-scooters and shared mobility.
  - Environmental concern was also consistent.
  - Over 5% mentioned improved rail services (including new tram or train routes).
  - Notably, only 7.7% mentioned the car at all, indicating that while private transport dominates, youth want a future with more transport choice.

- Youth were asked specifically about what would make them more likely to use a bicycle, with results shown in Figure 77. The top three responses were:
  - More places to lock up bikes safety, 47%
  - Safer bike lanes, 46%
  - A better network of routes, which connect key destinations, 37%

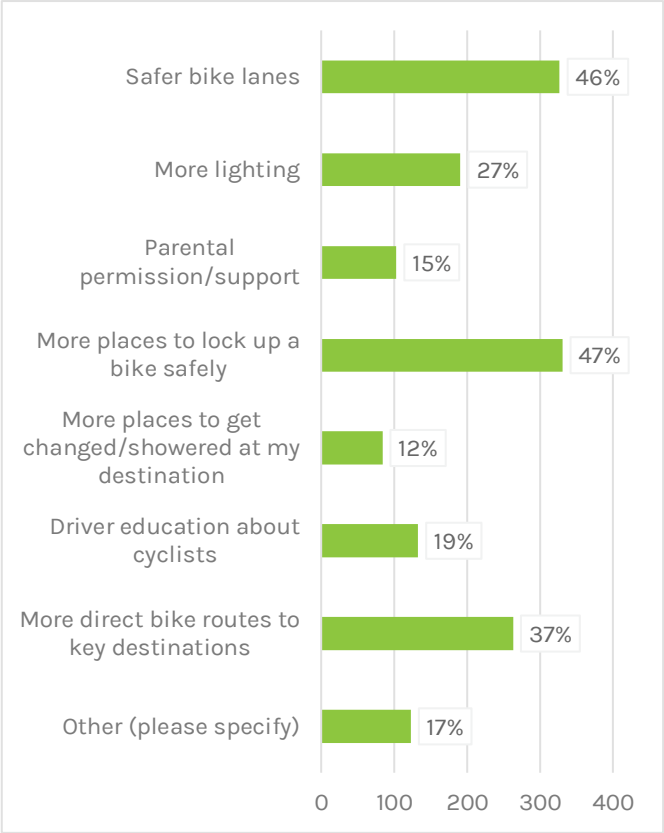
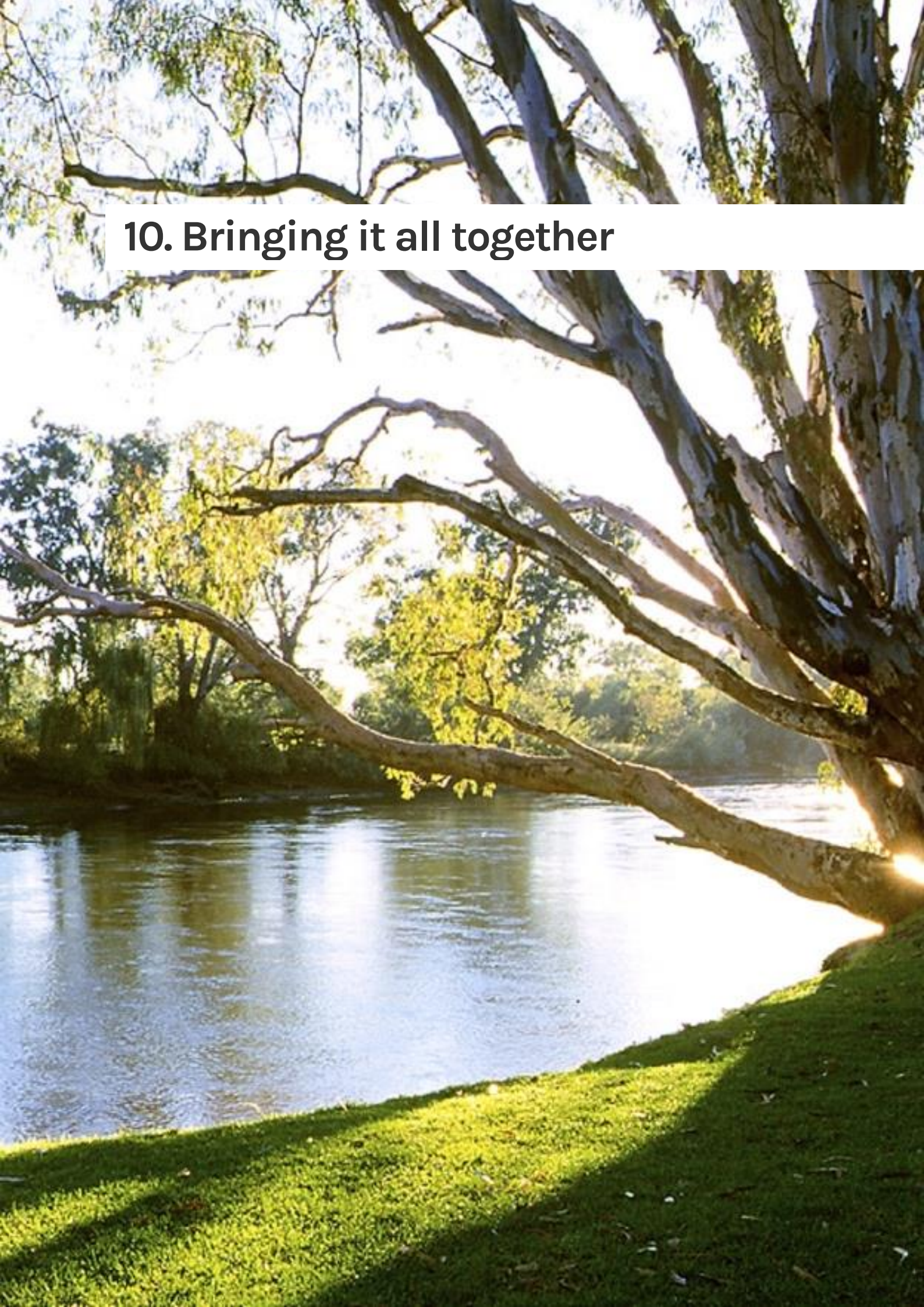


Figure 77 Youth Strategy Survey 2021 bike network improvements

10. Bringing it all together



The analysis conducted in this report has highlighted some key themes of relevance to the future AWITS. Some of the major findings have been captured in Figure 78, with additional material below. A visual summary of the key issues and opportunities is provided in Figure 83 as well.

In essence, Albury Wodonga has a high level of car dependence, even for short trips and for most people, the car is the easiest, fastest form of transport. Barriers to walking, cycling and public transport will need to be overcome for Albury Wodonga to enjoy the benefits of a more sustainable, vibrant city.

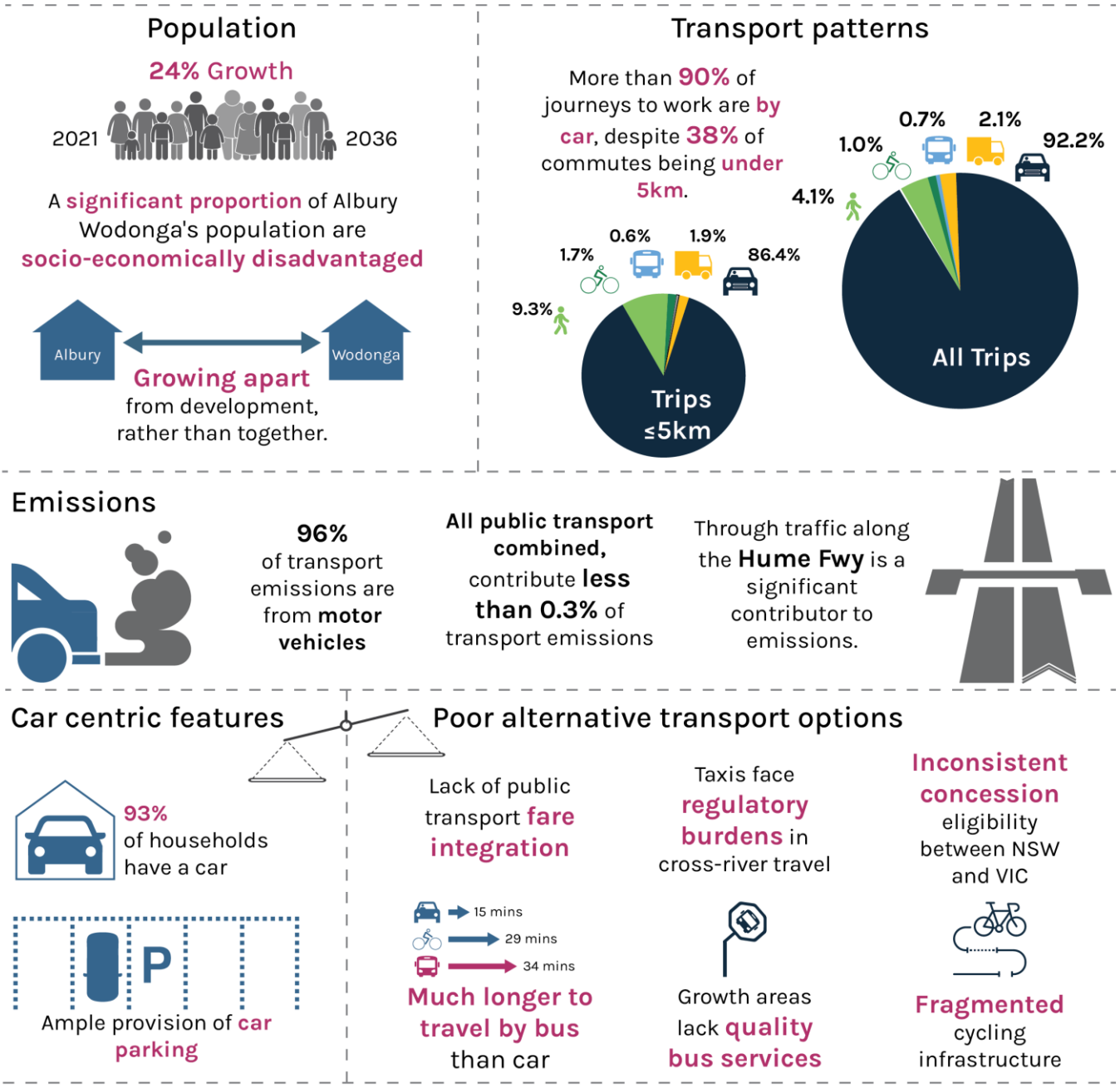


Figure 78 Key themes and insights

11. Best practice case studies

The purpose of this section is to provide some insights from jurisdictions outside the study area that may help Albury Wodonga achieve a more sustainable transport system. Our analysis was unable to find an Australian city or town that had successfully harmonised public transport services across state borders. This section does however detail several international examples in which a public transport system that straddles two or more jurisdictions has been integrated in a manner than provides a seamless service for passengers.

11.1 Cross jurisdictional public transport

Cross-jurisdictional public transport operation is not an issue unique to Albury Wodonga. The USA and Germany provide the most relevant examples of best practice transport integration, as both are, like Australia, federations of states.

11.1.1 United States of America

11.1.1.1 Washington Metropolitan Area Transit Authority

The Washington Metropolitan Area Transit Authority was established in 1967 to provide integrated public transport across the Washington DC metropolitan area. It was formed as a tri-party compact between Washington DC, the State of Maryland, and the Commonwealth of Virginia.

Its 'mission is to plan, build, finance and operate a transportation system in the Washington Metropolitan Area'. The Authority currently covers an area of 1,500 square miles, and a population of approximately 4 million. It operates buses, rail, and paratransit.

Planning on the Washington Metro commenced by the authority in 1969, opening in 1976. Washington Metro currently comprises six rapid transit lines, with a total of 91 stations and 188 km of tracks. Centralised planning across the region has seen a broad coverage area, regardless of jurisdiction.

There is a single ticket across all services operated by the Authority. Metrorail fares range from US$2.00 to US$6.00, depending on distance and time of day. Regular Metrobus tickets are US$2.00, while express services are US$4.25.[39]

Reduced ticket prices are offered to those with disabilities, the elderly, and students.[40] All K-12 (primary and secondary school) students, and college students are eligible to reduced fares. Other transport services within and near The Washington Metropolitan Area Transit Authority also acknowledge these fare reductions, leading to equitable outcomes across the region.

The Authority is funded by a combination of; the federal government, subsidies from participating jurisdictions, and operational revenue, primarily fares. The share each jurisdiction pays is agreed prior to each budget, with figures for 2019 and 2018 shown in Table 29.

Table 29 Jurisdictional funding rates for Washington Metropolitan Area Transit Authority

Jurisdiction	2019	2018
District of Columbia	37.1%	37.5%
Prince George's County, Maryland	20.9%	20.8%
Montgomery County, Maryland	17.0%	16.6%
Fairfax County, Virginia	13.6%	13.5%
All other jurisdictions	11.4%	11.6%

Source: Annual report 2019-2018, section 3, page 31.[41]

[39] https://www.wmata.com/fares/basic.cfm

[40] https://www.wmata.com/fares/reduced.cfm

[41] https://www.wmata.com/about/records/public_docs/upload/Comprehensive-Annual-Financial-Report-for-the-Fiscal-Years-Ended-June-30-2019-and-2018.pdf

11.1.1.2 Bi-State Development

Bi-State Development in an interstate compact established in 1949 between Missouri and Illinois to plan and develop St Louis.[42] Bi-State Development covers the seven counties in the St Louis metro region. Since inception, and ratification by the US congress in 1950, Bi-State Development has undertaken a wide variety of projects. It has operated a powerplant, managed nation parks, and managed sewerage and pollution in the Mississippi river. Bi-State Development also operates transport services. It acquired 15 transport companies in 1963, creating a unified public transport system. In 1964, it acquired the Parks Metropolitan Airport.

Metro Transit, the public transport arm of Bi-State Development, currently operates two light rail lines and 77 bus routes (57 in Missouri and 20 in Illinois).[43] Public transport fares are uniform across the entire system.[44] Single trips cost $1 on bus and $2.50 on rail. Two-hour, and periodical tickets are also available. Fares a reduced for the elderly, disabled, and students across the entire system.[45]

Bi-State Development's public transport funding is largely drawn from local funds. The Metro Transit System budget shows that local funding comes from grants, sales tax, and contractual revenue.[46] A revenue breakdown is provided in Table 30.

City of St Louis and St Louis County have had 0.5% sales taxes since 1973 to fund transport. A further 0.25% sales tax was passed in 1997, and collected from 2010, to fund operating expenses and expansion. St Clair County in Illinois contributes based on a service agreement. This is sourced from County taxes and contributions from Illinois Department of Transportation.

The funding from Counties in the USA is a key difference between federation and local government in the USA and Australia. Counties and cities have a much greater role in service provision, and powers to levy taxes in the USA than in Australia. In an Australian context, an agreement would be required at the state level, not local level as in the USA.

Table 30 Metro Transit revenue sources, 2017 FY

	FY 2017 Actual
Missouri	
City of St. Louis 1/2 cent sales tax	$15,829,927
City of St. Louis 1/4 cent sales tax	$8,914,554
City of St. Louis Prop M2 sales tax	$9,562,561
Total City of St. Louis	**$34,307,041**
St. Louis County 1/2 cent sales tax	$8,104,414
St. Louis County 1/4 cent sales tax	$35,758,756
St. Louis County Prop A sales tax	$78,890,685
Total St. Louis County	**$122,753,855**
Other Local Match - MO	$427,375
Planning and demo reimbursement	$160,000
Total Other Local MO	**$587,375**
General Operating & Special MODOT	$922,734
Total State of Missouri	**$922,734**
Total Missouri local & state:	**$158,571,005**
Illinois	
St. Clair County	$51,424,692
Other Local Match - IL	$21,511
Total Illinois local & state	**$51,446,204**
Total local & state	**$210,017,208**
Federal	
Vehicle maintenance	$16,000,000
Non-capitalized projects	$2,741,857
Other Federal	$491,419
Total Federal:	**$19,233,276**
Total grants, sales tax & contractual revenue	**$229,250,484**

Source: Metro Operating - FY 2019-2021 Budget, p. 37.[46]

[42] https://www.bistatedev.org/about-us/history/
[43] https://www.metrostlouis.org/metro-transit-system-profile/
[44] https://www.metrostlouis.org/fares-and-passes/
[45] https://www.metrostlouis.org/reduced-fare-program/
[46] https://owncloud.metrostlouis.org/index.php/s/AVxioHVwnTOzy7Q

11.1.2 Germany

11.1.2.1 Hamburg

In 1965 Germany's first transport association, the Hamburg Public Transport Association (Hamburger Verkehrsverbund/HVV), was formed in the Hamburg region. HVV is designed to provide a more compelling alternative to private vehicle travel by offering an integrated public transport system, with a single ticket and fare structure.[47]

HVV is currently a public transport association comprising the federal states of Free and Hanseatic City of Hamburg (with an 85.5% stake), Schleswig-Holstein (3.0 % stake) and Niedersachsen (Lower Saxony) (2.0 % stake), and the local counties of Herzogtum Lauenburg, Pinneberg, Segeberg, Stormarn, Harburg, Lüneburg and Stade (9.5% stake). These different partners have different roles in the association, with local rail the responsibility of the states, and counties organising some buses.[48]

The total service area of HVV covers 8,616 square kilometres, with a population of 3.5 million (1.8 million in Hamburg; 1 million in Schleswig-Holstein; and .6 million in Lower Saxony). Within this area, 28 transport operators provide 32 rapid transit routes and 723 bus routes.[49] There is a single fare structure across the region. Tickets are based on fare rings (zones), with concessions available.[50]

HVV has three tiers in its management model. The top, political tier is responsible for funding the services and ensuring there are adequate resources. The second, guidance tier is responsible for coordinating public transport services between different operators. The third, management tier is responsible for day-to-day operation of the transport services.[47]

All ticket revenue is pooled, and then distributed to the operators based on passenger demand, and operational needs. The ticket deficits are reimbursed by either owners (i.e., the states or local counties), contracts for service delivery, or other subsidies.[47]

11.1.2.2 Ulm

Donau-Iller-Nahverkehrsverbund-GmbH (DING) was formed in 1998 as a public transport association for the greater area of the City of Ulm.[51, 52] It was expanded in 2003 to include the district of Biberach.[52]

DING covers an area of about 3410 square km, and a population of approximately 650,000.[51] Approximately one quarter of the population live in Neu-Ulm in Bavaria, while the remaining population live in the City of Ulm and surrounding area, in Baden-Württemberg.

There are a total of 34 transport companies operating in the region. DING is responsible for coordinating these services, providing customer information (such as timetabling), planning the network, and finances such as ticketing and revenue sharing.[52]

The City of Ulm has around 125,405 residents, while the city of Neu-Ulm, on the other side of the Danube River, has around 58,841 residents. This is a population and urban structure more similar to that of Albury Wodonga. DING provides a working example of a public transport association operating in a context more like Albury Wodonga, demonstrating what could be possible to bridge the Murray River.

[47] https://www.hvv.de/resource/blob/2572/873a0e121dfa22eba1cde85821d25f9b/hvv-unternehmensbroschuere-data.pdf

[48] https://www.hvv.de/en/about-us/the-hvv/member-authorities

[49] https://www.hvv.de/resource/blob/27000/5ca760e6c49e5819e5b33cf7ca5fc853/hvv-in-figures-data.pdf

[50] https://www.hvv.de/en/tickets/single-day-tickets/overview

[51] https://www.ding.eu/fileadmin/content/dingfo/2021/01/index.html

[52] https://www.ding.eu/de/ding/ueber-ding/

11.2 Cross jurisdictional planning

11.2.1 Greater South-East Melbourne

Greater South-East Melbourne (GSEM) is a voluntary coalition of Councils that undertake coordinated strategic transport and infrastructure planning work. This allows the group to coordinate project delivery, and to advocate for State and Federal funding.

GSEM includes the shires of Cardinia and Mornington Peninsula, and the cities of Casey, Frankston, Greater Dandenong, Kingston, Knox and Monash, as shown in Figure 79.

The GSEM organisational structure includes an independent Board that provides strategic guidance, manages the development of reports and policy papers, and facilitates advocacy to State and Federal Governments.

Two of the recent strategic projects undertaken by GSEM include a City Deals Position Paper (2020), and a South-East Transport Strategy (2018) – which included Yarra Ranges Council. These both look for State and Federal Government support for the funding and delivery of large-scale transport projects that are beyond the scope and capability of the councils.

So far, GSEM work has focused on advocacy work rather than inter-council coordination of projects. Increasing a focus on inter-council projects would better align transport projects, particularly the standardisation and delivery of walking and cycle projects. It would also provide a forum for Council staff to share knowledge and lessons learned.

Figure 79 Map of GSEM area
Source: GSEM.org.au

11.3 Placemaking

11.3.1 Warrnambool

Warrnambool is a regional centre in the western district of Victoria. It is smaller than either Albury or Wodonga, at 35,000 residents, however, consists of many of the same demographic and employment characteristics.

Liebig Street is the main shopping street in Warrnambool. It is very similar to many streets in Albury and Wodonga in that it has with wide lanes, angled parking, and a mix of local businesses lining the street. Liebig Street has recently undergone a major uplift. The key changes to the street include:

- Repaving and widening the footpath
- Replacing some parking bays with trees
- Easing the kerb between the street and footpath
- Extra seating and shading
- Electric Vehicle charging
- Raised zebra crossings on each leg of the roundabouts
- Reduction in speed limit to 30km/h.

Google Street View provides an excellent time series of change for Liebig Street. Figure 80 shows the street in 2008, with wide travel lanes, no pedestrian priority, and limited street amenity.

Figure 80 Liebig Street (2008), Warrnambool

Figure 81 shows the latest iteration of the street, with zebra crossings installed, more trees and street greening, seating, and a speed limit reduction to 30km/h.

Figure 81 Liebig Street (2018), Warrnambool

Figure 82 show the change between 2014 (left) and 2020 (right) for the same intersection, from a bird's eye view. Liebig Street is an excellent example of making substantial change over time through an incremental approach.

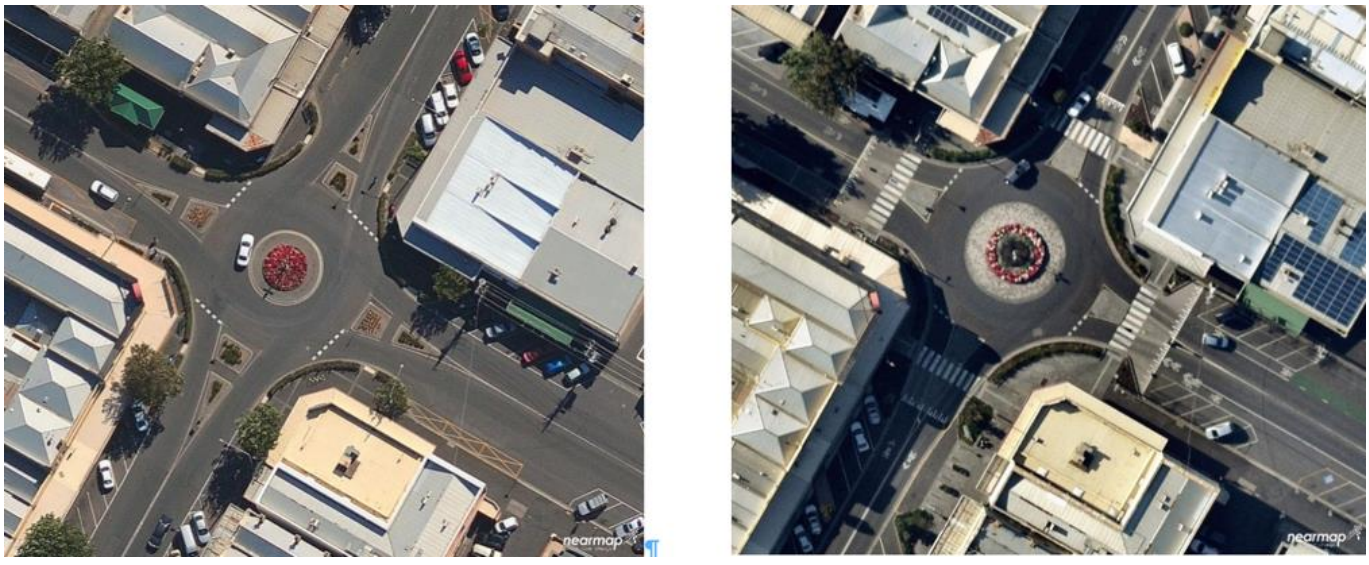


Figure 82 Liebig Street (2014) and (2020)

12. Gaps and opportunities

The following section provides an overview of the gaps and opportunities to improve transport in Albury Wodonga. The prime objectives a transport system should strive for are laid out for each topic. An assessment of barriers or issues facing each transport topic is also provided. Lastly, key opportunities to improve transport performance and choice, while enhancing amenity and liveability are identified.

All opportunities have been assessed via a multi-criteria analysis, to identify key issues and opportunities. Figure 83 provides a summary of the key issues/barriers as well as key opportunities that have been identified as most important to consider in the future AWITS.

The Murray River is a barrier that splits the community. Both state governments are currently investigating river crossing along the Murray. This provides an opportunity to:

- Work with NSW and Victorian State governments to increase crossing opportunities across the Murray River for all modes of transport.

Using the Multi-Criteria Analysis described in Section 12.8, the three top opportunities to improve transport choice and urban liveability in Albury and Wodonga are:

- Develop a *Circulation Plan* in order to create a more people-friendly, low traffic volume city centre with pedestrianised areas in both Albury and Wodonga.
- Reduce the speed limit within both CBDs, to 30km/h.
- Advocate for an Albury Wodonga Bus Review that seeks solutions to the provision of services in new developments, connection of the local bus service to both railway stations, and ensures integrated bus operation and fare structure.

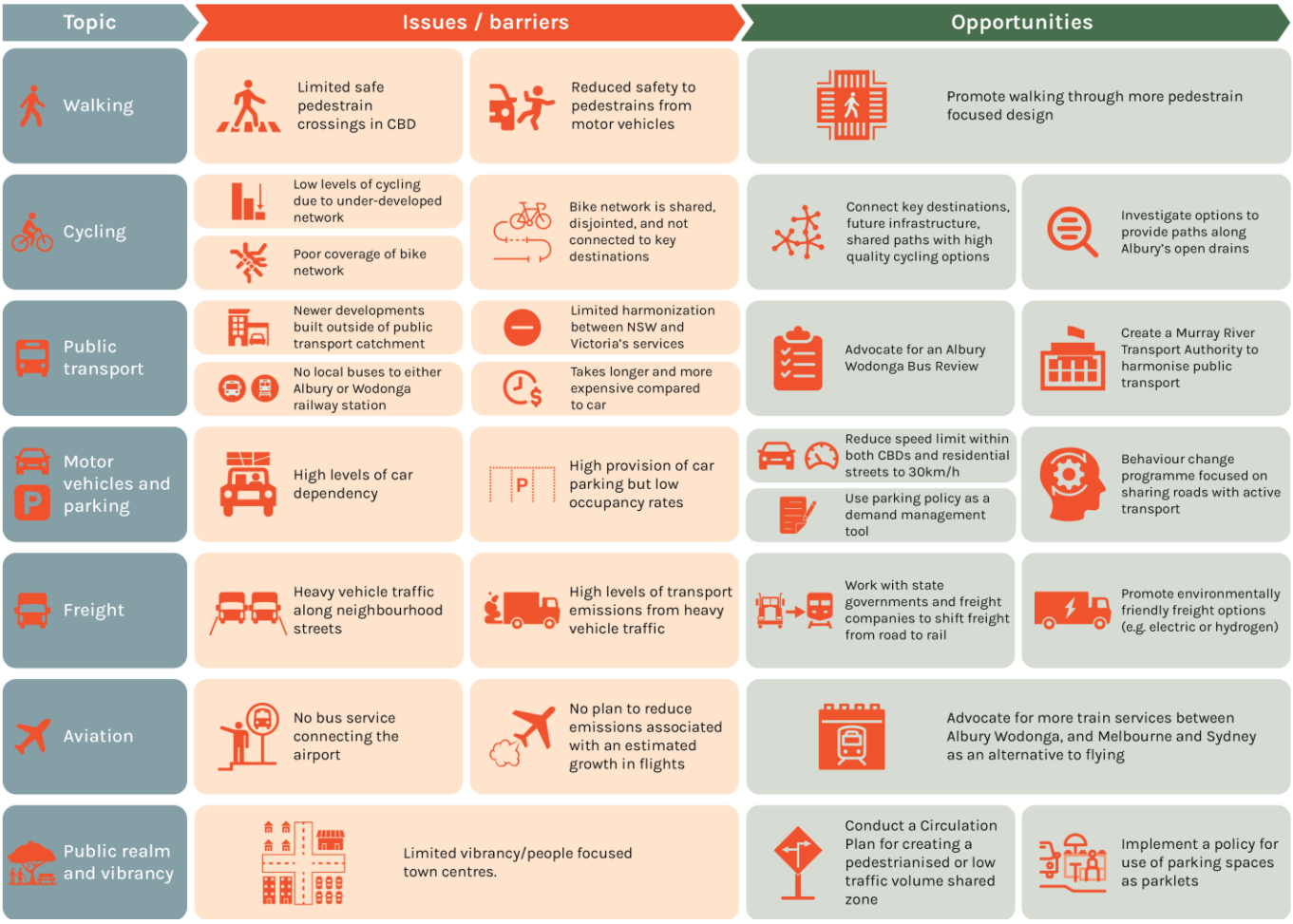


Figure 83 Summary of key issues and opportunities

12.1 Walking

Walking participation is best facilitated by having a supportive built form. This includes a comprehensive network of safe paths, including footpaths and off-road shared paths, safe crossings, and safe traffic speeds. There are currently several issues and barriers related to walking Albury and Wodonga including:

- That some neighbourhood streets, especially in Albury's suburbs, lack footpaths.
- There are limited safe pedestrian crossings in the central areas of Albury and Wodonga, as well as smaller shopping strips.
- There is reduced safety to pedestrians from motor vehicles.
- The built form is low density, with a low density of destinations from most dwellings.

12.1.1 Opportunities

The following are opportunities to addressing the above issues and barriers, and make walking more attractive and accessible:

- Install footpaths on at least one side of the street for a local street, and both sides for collector and arterial roads.
- Provide raised zebra crossings at key intersections and mid-blocks within both CBDs.
- Reduce the speed limit within both CBDs, to 30km/h.

12.2 Cycling

A number of built form and street infrastructure characteristics influence people's willingness to cycle. This includes a comprehensive network of on and off-road lanes/paths. In areas with higher traffic volumes and speeds, a greater level of protection is needed. A good cycling environment should make everyone, aged 8 to 80, feel safe and confident to cycle. Currently, the main barrier to cycling participation is:

- An under-developed cycling network, including no on road protected bike lanes.
- An absence of cycling infrastructure to key destination.
- Limited cohesiveness of the shared paths (i.e., they don't connect to each other or the CBDs).

Further, like walking, a diversity of destinations within an easy cycle is necessary to support people's decision to ride.

12.2.1 Opportunities

The following opportunities offer a way to support and encourage cycling in Albury Wodonga:

- Connect the shared path network.
- Develop an on-road protected network of bike lanes and prioritise the implementation of the Strategic Cycling Corridors in Wodonga.
- Connect future on-road lanes with the shared path network.
- Provide a dense network of bicycle infrastructure within the CBD and connections to suburbs.
- Investigate options to provide paths along Albury's open drain network.
- Connect key destinations such as both universities, and transport hubs with high quality cycling options.
- Construct a shared path along the former railway alignment in Wodonga to Albury.
- Consider shared micro mobility programs (e-scooter and e-bike) once the network to support it has been implemented.

12.3 Public transport

Public transport can be one of the most accessible modes of transport. Passengers do not need any equipment or training. When done well, public transport increases transport options for those of limited mobility and people with disabilities. Guiding principles include, good coverage and frequency, an easy and cheap ticketing system, and accessible vehicles and stops. There are several major issues and barriers which decrease the attractiveness of public transport in Albury Wodonga, including:

- Limited harmonisation and integration between public transport services between NSW and Victoria, which adds complexity and cost to public transport, reducing the attractiveness of the service.

- Poor time and cost competitiveness between public transport compared to car use, with buses taking significantly longer than the car, due in part to circuitous routes and poor frequency.
- Poor stop facilities, with many lacking seating, shelter, and accessibility features such as tactile markings.
- Newer developments that have been built outside of the public transport catchment, and the bus network has not been expanded to sufficiently cover these new areas.
- No local buses to either Albury or Wodonga railway station.

12.3.1 Opportunities

The following are opportunities to improve public transport across the Albury Wodonga region, increasing the attractiveness of public transport compared to other modes. The opportunities draw on experiences in other cities, where public transport crosses jurisdictional lines, to create seamless, passenger focused services.

- Create a *Murray River Transport Authority* to harmonise the provision of public transport services in border communities, including fares, timetabling etc.
- Advocate for an Albury Wodonga Bus Review that seeks solutions to the provision of services in new developments, connection of the local bus service to both railway stations, and ensures integrated bus operation etc.
  - This should include advocacy for emerging technology that offer a pathway to higher quality services with lower environmental impacts.
- Advocate for a high-quality bus service connecting Albury Airport with the Albury and Wodonga CBDs as well as the Albury Railway Station.
- Provide bike racks on all local and regional buses.
- Advocate for more train services and greater reliability between Albury Wodonga, and Melbourne and Sydney
- Upgrade bus stops to meet minimum standards of service

12.4 Motor vehicles

Motor vehicles are the main mode of transport in Albury Wodonga, accounting for over 90% of all journeys to work. Motor vehicles are also the major source of greenhouse gas emissions, accounting for 96% of emissions. Passenger and light vehicles account for almost 75% of all transport emissions, compared with just 0.3% for public transport. High levels of motor vehicle use also result in road trauma and decreased urban amenity.

While the car will remain an important part of the transport mix, there is a need to diversify transport options to increase urban amenity and liveability, while meeting climate change ambitions. However, the following are issues and barriers which hamper efforts to provide more transport choice:

- The built form and road environment creates high levels of car dependence, which means that even short trips are taken by car.
- High levels of car parking provision and low levels of average occupancy, which further encourage car use, and occupy valuable urban space.
- There are planning and regulatory mechanisms that limit the relative attractiveness of sustainable forms of transport and exacerbate car dependence.

12.4.1 Opportunities

The following are opportunities to support a shift to cleaner vehicles, and improve transport choice and sustainability in Albury Wodonga:

- Remove cash in lieu schemes for parking.
- Require all new multi-dwelling and non-residential developments to have provision for EV charging.
- Implement a policy for use of parking spaces as parklets.
- Reduce the speed limit within both CBDs, to 30km/h.
- Advocate for greater integration of taxi and ride sharing services across the Murray River.

12.5 Freight

There is a significant amount of road-based freight in the Albury Wodonga region, as a result of the

twin-city being between Australia's two largest capital cities. This freight traffic contributes a significant amount to overall transport greenhouse gas emissions, accounting for over 20% of transport emissions.

The high level of heavy vehicle traffic along the Hume Freeway is the key issue related to freight in Albury Wodonga.

12.5.1 Opportunities

Work with state governments and freight companies to shift more freight from road to rail. This would assist in reducing greenhouse gas emissions associated with freight, and improve urban amenity and liveability, as well as road safety. Reducing the environmental impacts of freight via electric and hydrogen trucks should also be explored.

12.6 Aviation

Aviation is an important part of the transport landscape in Albury Wodonga. Commercial flights operate to Melbourne and Sydney, while flights are planned to commence to Brisbane in the near future. Aviation is a small contributor to emissions, but reducing emissions without decreasing flights is difficult. The major issues or barriers facing aviation in Albury is:

- There is no bus service connecting the airport, leaving passengers reliant on private motor vehicles or taxis.
- There is no plan to reduce emissions associated with an estimated growth in flights.

It is further notable that high amounts of passengers between Albury and Sydney is likely a consequence of poor rail services.

The following are opportunities which can reduce the greenhouse gas impact of aviation, while attempting to maintain mobility and accessibility to the broader region, and Australia, from Albury and Wodonga.

12.6.1 Opportunities

- Conduct a feasibility study for low carbon aviation operation to/from Albury Airport.
- Work with TfNSW to provide a high-quality bus service connecting Albury Airport with the Albury and Wodonga CBDs as well as the Albury Railway Station.
- Advocate for more train services between Albury Wodonga, and Melbourne and Sydney as an alternative to flying.

12.7 Place making

Good transport options should look beyond movement, to also capture the *quality of place*. Good places make attractive destinations for people to visit, and linger. This concept is central to the Victorian DoT *Movement and Place in Victoria* and TfNSW *Movement and Place* frameworks.

Both AlburyCity and Wodonga Council have made great efforts to improve streetscapes in a way which enhances sense of place. However, there remain many areas where there is scope for further enhancement of public spaces.

The main issue regarding place making in Albury and Wodonga remains:

- Limited vibrancy, or people focused town centres.

12.7.1 Opportunities

The following are opportunities to improve the sense of place and vibrancy in Albury Wodonga, in line with the *Movement and Place* framework that have been established in both NSW and Victoria.

- Develop a *Circulation Plan* that is focused on minimising the harmful impacts of central city traffic. By re-orienting unnecessary traffic away from high value central areas, a more vibrant city heart can flourish, making for a more people-focused, unique experience in both Albury and Wodonga.
- Coordinate planning of Albury and Wodonga to ensure cohesive and integrated growth.
- Implement a policy for use of parking spaces as parklets.

12.8 Multi-criteria analysis of opportunities

The Guiding Principles developed by Council in preparation for the ITS and are shown below and have been used to construct the multi-criteria analysis (MCA) framework. An MCA is helpful to determine how to prioritise different opportunities, in terms of how well they are likely to support the objectives of the project. The Guiding Principles are that our transport system will be:

- Connected and reliable
- Supportive of liveable places
- Facilitates growth and movement
- Equitable and accessible
- Safety, health and wellbeing
- Sustainable
- Intelligent.

Figure 84 uses the above guiding principles to form the MCA. We have assessed how each of the *Opportunities* included in this section perform using the MCA.

The MCA uses a Likert scale of 1 to 5 for the following criteria:

- **Safety** – The potential for the opportunity to reduce road trauma or risk, including actual and perceived transport safety.
  1 = low potential – 5 = high potential.
- **Transport accessibility** – The potential for the opportunity to increase transport accessibility.
  1 = low potential – 5 = high potential.
- **Cost to council** – A high level estimate of the cost of the opportunity which would be borne by Councils (rather than total cost of the opportunity, for opportunities which would be funded by other bodies).
  1 = high cost to council – 5 = low cost to council.
- **Street amenity** – The potential for the opportunity to improve the amenity of streets and urban environments.
  1 = low potential – 5 = high potential.
- **Urban liveability** – The potential for the opportunity to improve overall liveability in Albury and Wodonga.
  1 = low potential – 5 = high potential.
- **Reduced emissions** – The potential for the opportunity to reduce overall transport emissions (rather than reducing emissions for that particular segment of transport emissions).
  1 = low potential – 5 = high potential.

All opportunities have been assessed with the MCA, as shown in Table 31.

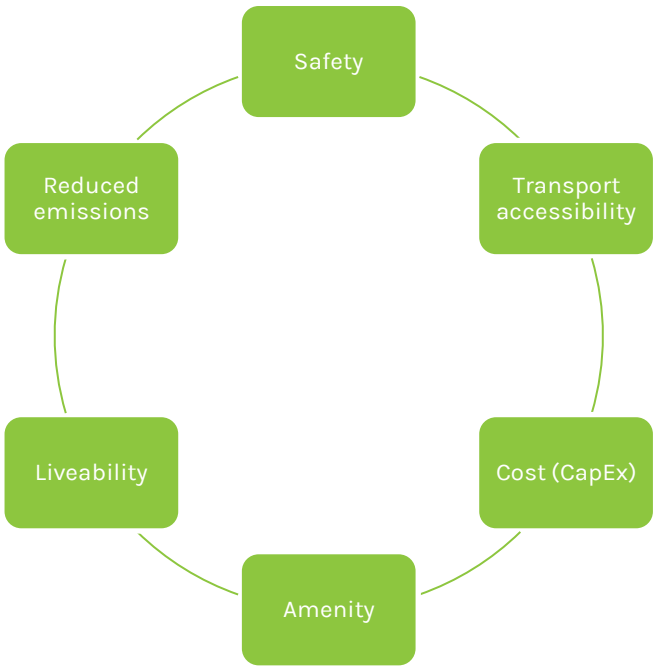


Figure 84 MCA Factors

Table 31 Opportunities with MCA assessment

Transport area	Opportunity	Safety	Transport accessibility	Cost to council	Street amenity	Urban liveability	Reduced emissions	Total
All	Work with NSW and Victorian State governments to increase crossing opportunities across the Murray River for all modes of transport.	4	5	2	3	5	1	**20**
Walking	Install footpaths on at least one side of the street for a local street, and both sides for collector and arterial roads.	4	5	1	4	4	2	**20**
Walking	Provide raised zebra crossings at key intersections and mid-blocks within both CBDs	5	4	3	4	4	2	**22**
Walking	Reduce the speed limit within both CBDs, to 30km/h	5	3	5	5	5	2	**25**
Cycling	Connect the shared path network	4	5	2	4	5	2	**22**
Cycling	Develop an on-road protected network of bike lanes	4	4	1	4	4	3	**20**
Cycling	Connect future on-road lanes with the shared path network	4	4	3	3	4	3	**21**
Cycling	Provide a dense network of bicycle infrastructure within the CBD and connections to suburbs	4	4	1	3	4	3	**19**
Cycling	Investigate options to provide paths along Albury's open drain network.	3	4	4	4	4	3	**22**
Cycling	Connect key destinations such as both universities, and transport hubs with high quality cycling options	4	4	3	3	4	3	**21**
Cycling	Construct a shared path along the former railway alignment in Wodonga to Albury	3	4	4	2	5	2	**20**
Cycling	Consider shared micro mobility programs (e-scooter and e-bike) once the network to support it has been implemented.	2	4	4	3	4	2	**19**
PT	Create a Murray River Transport Authority to harmonise the provision of public transport services in border communities, including fares, timetabling etc.	1	5	4	3	5	4	**22**

Transport area	Opportunity	Safety	Transport accessibility	Cost to council	Street amenity	Urban liveability	Reduced emissions	Total
PT	Advocate for an Albury Wodonga Bus Review that seeks solutions to the provision of services in new developments, connection of the local bus service to both railway stations, and ensures integrated bus operation etc	2	5	5	3	5	4	**24**
PT	Advocate for a high quality bus service connecting Albury Airport with the Albury and Wodonga CBDs as well as the Albury Railway Station.	1	5	5	2	3	2	**18**
PT	Provide bike racks on all local and regional buses	1	4	5	3	3	2	**18**
PT	Advocate for more train services between Albury Wodonga, and Melbourne and Sydney	3	5	5	2	3	4	**22**
PT	Upgrade bus stops to meet minimum standards of service	3	5	3	3	4	2	**20**
Cars and parking	Remove cash in lieu schemes for parking	1	2	4	3	3	2	**15**
Cars and parking	Require all new multi-dwelling and non-residential developments to have provision for EV charging	1	2	5	2	2	5	**17**
Cars and parking	Implement a policy for use of parking spaces as parklets	2	2	5	5	5	3	**22**
Cars and parking	Reduce the speed limit within both CBDs, to 30km/h	5	3	5	5	5	2	**25**
Cars and parking	Advocate for greater integration of taxi and ride sharing services across the Murray River	3	4	5	2	4	2	**20**
Freight	Work with state governments and freight companies to shift freight from road to rail	4	1	5	3	3	5	**21**
Aviation	Conduct a feasibility study for low carbon aviation operation to/from Albury Airport.	1	1	5	2	2	2	**13**

Transport area	Opportunity	Safety	Transport accessibility	Cost to council	Street amenity	Urban liveability	Reduced emissions	Total
Aviation	Advocate for a high quality bus service connecting Albury Airport with the Albury and Wodonga CBDs as well as the Albury Railway Station.	1	5	5	2	3	2	**18**
Aviation	Advocate for more train services between Albury Wodonga, and Melbourne and Sydney	3	5	5	2	3	4	**22**
Public realm / vibrancy	Develop a Circulation Plan which identify opportunities to create a pedestrianised or low traffic volume shared zone within the centre of both Albury and Wodonga.	5	5	4	5	5	3	**27**
Public realm / vibrancy	Coordinate planning of Albury and Wodonga to ensure cohesive and integrated growth	1	3	4	4	5	4	**21**
Public realm / vibrancy	Implement a policy for use of parking spaces as parklets	2	2	5	5	5	3	**22**

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