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The travel mode share changes of the 'four types of commuters' in Greater Brisbane between 2011-21

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Abstract

The spatial distribution of 'four types of commuters' per the definition established by Peter Seamer, former CEO of Victoria's Planning Authority, were analysed and established for each SA2 of the Greater Brisbane area as part of previous ATRF papers using ABS 2016 Census Data titled 'How the four types of commuters are distributed spatially throughout Greater Brisbane' (Hayward, et al. 2023) and ABS 2021 Census Data titled 'How Greater Brisbane's 'four types of commuters' were distributed from a spatial and gender perspective in 2021' (Hayward, et al. 2024).

The findings of these papers determined a significant travel demands of the 'inward', 'short', 'circumferential' commuter trip distributions with limited demand for the 'contraflow' direction of travel. The travel mode shares by SA2 for the three major type of commuter demand varied across Brisbane, with a particular contrast between inner city suburbs and middle to outer city suburbs.

Analysis of equivalent Brisbane commuter trip patterns has also highlighted similar trends and challenges for the region as per those highlighted by Seamer for Melbourne. This provides insights for areas where there is significant commuter demand for relatively short and circumferential trips across the network with limited supply in the form of attractive active and public transport facilities. To this end, transport infrastructure and technology investments can be assessed and viewed through a different lens with this analysis to support transport network improvements as the city grows to 3.9 million in 2046.

The population of Australia's largest cities are expected to grow significantly in the coming decades. This will challenge the ability to maintain adequate levels of accessibility as cities grow.

To establish a greater appreciation of commuter travel behaviour patterns, the travel mode shares of the 'four types of commuters' have been analysed by Greater Brisbane SA2 for the ABS Census years of 2011, 2016 and 2021.

This type of segmentation can support bespoke and tactical transport planning strategies to better plan transportation system infrastructure investments at the local and regional level throughout South East Queensland, ensuring projected population growth is accommodated in the most efficient and sustainable form.

1 Introduction

Recent studies focusing on traffic congestion levels and public transport usage indicate Brisbane is the worst performing of Australia's capital cities on both fronts.

In terms of traffic congestion, the INRIX traffic score card (INRIX, 2025) indicated total vehicle delays per driver in Brisbane increased from 74 hours in 2023 to 84 hours in 2024. This ranks Brisbane the city with the 10th most driver delays in the world, and most in Australia.

For public transport accessibility, the Climate Council's Next Stop Suburbia (Climate Council, 2024) reported 33.7% of people have access to all-day frequent public transport services, the

lowest of Australia's five capital cities. Further, there is a degree of inequality to the level of access to public transport in Brisbane with access being 27% lower in lower income suburbs.

Brisbane's traffic congestion and public transport accessibility levels present significant challenges for the quality of future transport levels of service in the region. The planned population growth for Greater Brisbane to increase from approximately 2.5 million in 2021 to 3.9 million in 2046 (DSDILGP, 2023). As part of this population increase, 67% (921,200 people) are planned to reside within the outer Local Government Areas of Greater Brisbane, while these areas will only accommodate 36% of the employment growth (239,300 jobs) (DSDILGP, 2023).

The work commute trip purpose contributes to the longest trip lengths on average in Greater Brisbane, with the average trip length being 16.4km in 2017 (TMR, 2023a). In contrast, other trip purpose lengths range between 7.1km to 9.8km in length on average (TMR, 2023b). Further, work commuting trip lengths of Greater Brisbane have increased by 7% to 15.3km in 2011, while the average time travelled has increased from 30 minutes in 2011 by 13% to 34 minutes in 2017 (TMR, 2023c).

The planned growth across Greater Brisbane will result in continuing increases in work trip lengths through to 2046. In doing so, this will continue to place additional demand and pressure on the transport system, particularly during the peak traffic periods of the morning and evening where work trips can account for up to 37% of all trip purposes on the network (TMR, 2023d).

At a national level, of the additional 11.8 million people residing in Australia between 2016 and 2046, 8.9 million people will reside in Sydney, Melbourne, Perth and Brisbane, equating to 75% (IA, 2018). Infrastructure Australia's paper in 2018 indicates population growth will have an impact on the function and liveability of these four cities in the future.

A method to assess and evaluate the effectiveness of travel performance of urban areas was outlined by Peter Seamer in 2019. This involves categorising commuter trips into four categories of spatial distribution (Seamer, P. 2019a):

1. 'Inward' – trips that travel towards the CBD.
2. 'Short' – trips within their local area of residence.
3. 'Circumferential' – trips with a direction that is broadly perpendicular to the radial direction.
4. 'Contraflow' – trips from the place of residence that have a travel direction away from the CBD, effectively the trip direction that is opposite to 'inward' trips.

Seamer hypothesised an effective solution for future urban and transport planning lies in embracing a non-radial approach to transport infrastructure network upgrades (Seamer, P. 2019b). This could be achieved through encouraging the growth of business and jobs closer to where people live, to move the flow of people and goods away from the Melbourne CBD.

The analysis of Greater Brisbane work trips highlighted that 23% of trips are 'inward', 27% are 'short', 41% 'circumferential', and 9% 'contraflow' (Hayward, et al. 2024). This highlights the potential to ease traffic congestion in the future through increasing the proportion of the other three types of commuting trips. For example, 'short' commuting trips are candidate trips for active travel modes, while residual capacity in the transport system and network can be achieved through aligning and/or increasing 'circumferential' and 'contraflow' commuter trips.

This paper investigates the travel mode shares of the 'four types of commuters' for the Greater Brisbane area between 2011 and 2021. In doing so, the intent of this work is to support and equip industry with analysis, insights and tools to address these challenges of establishing sustainable travel for future urban areas and to increase travel by more sustainable modes .

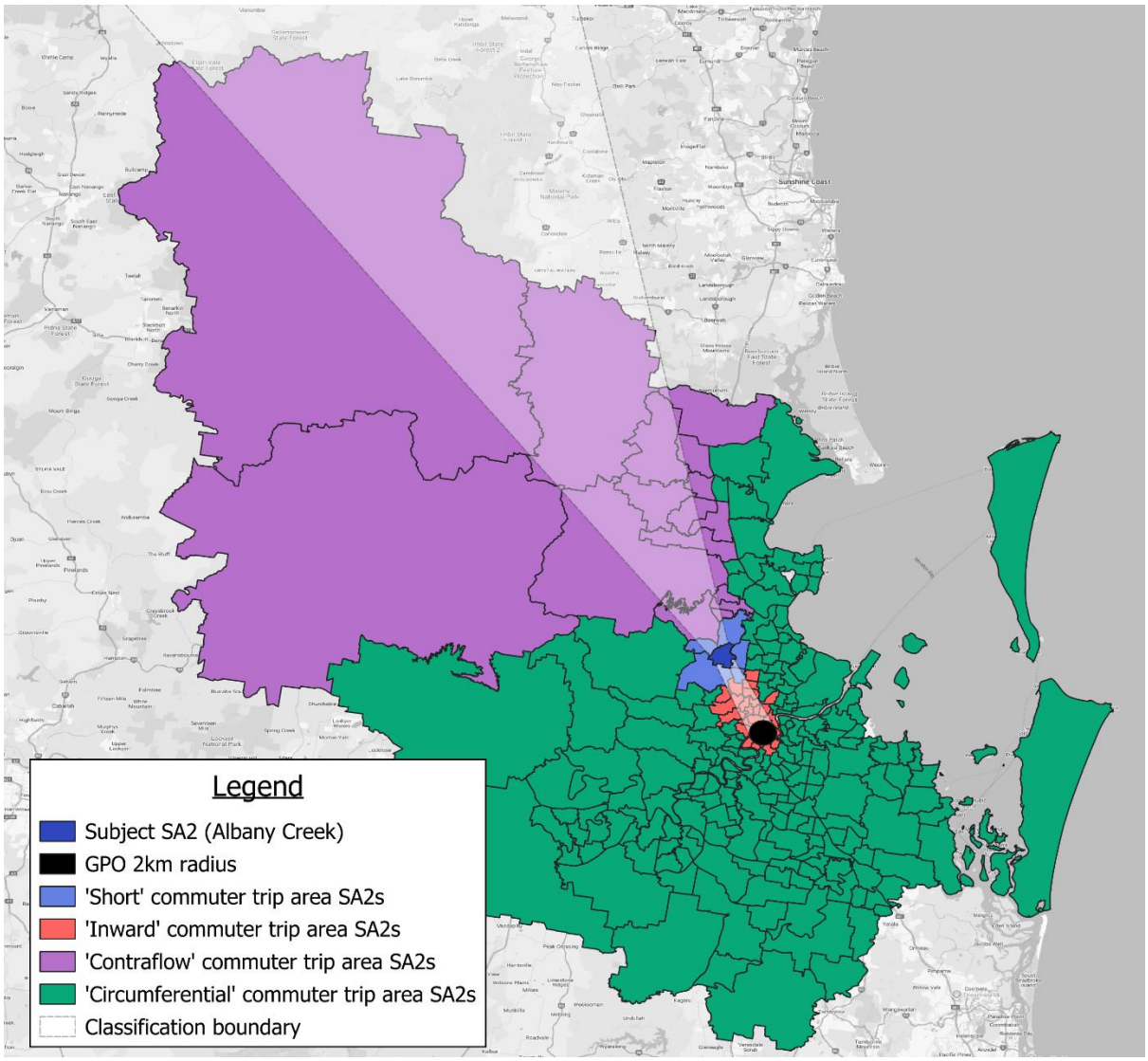
2 Method

The primary data source to analyse the ‘four types of commuters’ for the Greater Brisbane area is the Australian Bureau of Statistics’ (ABS) Table Builder of ‘Census – employment, income and education’ (ABS, 2024) from the 2011, 2016 and 2021 Census. This interactive dataset allows users to summarise journey to work between Statistical Area Level 2 (SA2) regions across Australia, including the provision of aggregated travel mode shares for each SA2.

The definition applied for each of the ‘four types of commuters’ using the ABS SA2 data set is outlined below and presented in Figure 1:

1. ‘Inward’ – work trips that travel to SA2’s located within a 2km radius of the Brisbane General Post Office.
2. ‘Short’ – work trips that travel within its SA2 or adjoining SA2.
3. ‘Contraflow’ – trips that have a travel direction from their SA2 place of residence away from the 2km radius surrounding Brisbane’s General Post Office, effectively a trip direction that is opposite to ‘inward’ trips.
4. ‘Circumferential’ – sum of all remaining work trips.

Figure 1: Categorisation of the ‘four types of commuters’



The data was collected from the ABS Table Builder dashboard and processed within various spreadsheets. Measurements of distance to CBD for each SA2 we conducted using Google Maps referencing the spatial centre of each SA2 and the General Post Office within the Brisbane CBD.

The 2011, 2016 and 2021 ABS Census data have been analysed to understand various travel mode share patterns of each 'type of commuter' across Greater Brisbane, with and without the impacts of the COVID-19 pandemic and associated government lockdown policies at the time.

It is acknowledged this analysis adopts a different geographic scale compared to Seamer's analysis. The purpose of selecting SA2 as the geographic scale for this analysis was to align it with the available ABS data while also to capture a broader appreciation for commuting trips that occur in the local area to where people reside.

3 Greater Brisbane four type of commuter travel mode shares

Analysis of ABS Journey to Work data for 2011, 2016 and 2021 indicates the Greater Brisbane area has had travel mode shares for the 'four types of commuters' as outlined in Table 1, Table 2 and Table 3 respectively. The travel mode shares have been calculated for people that travelled to work on the census day, with the 'worked from home' percentage calculated inclusive of all workers within the SA2s across Greater Brisbane. This provides a more consistent comparison of proportional travel mode shares between 2011-2021 for people that travelled to work, with the context of the level of people working from home in isolation.

Table 1: Greater Brisbane area 'four types of commuter' breakdown (2011)

		Work trip travel mode share				
Type of Commuter	**Total 2011 Proportion**	**Car**	**Public Transport**	**Active Transport**	**Other**	**Worked from home**
Inward	38.2%	57.7%	29.3%	2.7%	10.4%	0.4%
Short	27.4%	69.5%	3.9%	12.4%	14.2%	13.5%
Contraflow	5.9%	83.3%	4.8%	1.3%	10.6%	0.1%
Circumferential	28.5%	88.9%	2.4%	0.3%	8.4%	0.0%
Total trips	623,954	445,089	82,501	28,552	67,812	27,892
Total %	100%	71.3%	13.2%	4.6%	10.9%	4.5%

The analysis of 2011 travel mode shares for each of the four types of commuters revealed the following:

- 'Inward' trips achieved the highest public transport mode share of 29%, more than double the city wide average of 13%
- 'Short' trips achieved the highest active travel mode share of 12.4%, three times greater than the Greater Brisbane average
- 'Circumferential' and 'contraflow' trips achieved car travel mode shares of 89% and 83% respectively, more than 10% greater than the city wide average of 71%
- 4.5% of workers conducted work from their place of residence, approximately 95% of all work from home trips

Table 2: Greater Brisbane area 'four types of commuter' breakdown (2016)

Type of Commuter	Total 2016 Proportion	Work trip travel mode share				Worked from home
		Car	Public Transport	Active Transport	Other	
Inward	38.5%	58.3%	28.8%	2.9%	10.0%	0.6%
Short	26.7%	70.9%	3.8%	12.1%	13.2%	15.1%
Contraflow	6.1%	85.2%	5.2%	1.0%	8.6%	0.1%
Circumferential	28.7%	89.9%	2.7%	0.3%	7.1%	0.1%
Total trips	776,515	562,146	102,405	34,931	77,033	38,936
Total %	100%	72.4%	13.2%	4.5%	9.9%	5.0%

The 2016 travel mode share analysis of the four types of commuters identified the following characteristics and comparisons to 2011:

- 'Inward' trips recorded the highest public transport mode share of 29% as per 2011, more than double the city wide average of 13%
- 'Short' trips achieved the highest active travel mode share of 12.1% similar to 2011, almost three times greater than the Greater Brisbane average, with car travel mode shares of 71% being similar to the city wide average
- 'Circumferential' and 'contraflow' trips recorded car travel mode shares of 90% and 85% respectively, more than 15% greater than the city wide average of 72%
- 5% of workers conducted work from their place of residence, approximately 95% of all work from home trips

Table 3: Greater Brisbane area 'four types of commuter' breakdown (2021)

Type of Commuter	Total 2021 Proportion	Work trip travel mode share				Worked from home
		Car	Public Transport	Active Transport	Other	
Inward	33.3%	64.2%	18.9%	2.2%	14.7%	23.8%
Short	28.4%	72.2%	2.4%	10.1%	15.4%	23.3%
Contraflow	6.8%	83.0%	4.4%	0.7%	12.0%	5.7%
Circumferential	31.5%	88.8%	1.7%	0.1%	9.4%	11.3%
Total trips	841,377	635,250	65,595	30,940	109,592	182,289
Total %	100.0%	75.5%	7.8%	3.7%	13.0%	21.7%

The 2021 travel mode share analysis of the four types of commuters identified the following characteristics and comparisons to 2011 and 2016:

- **'**Inward' trips recorded the highest public transport mode share of 19% reducing by one third compared to 2011 and 2016, while maintaining a proportion of more than double the city wide average of 8%
- 'Short' trips achieved the highest active travel mode share of 10.1%, almost two and a half times greater than the Greater Brisbane average and a reduction on the 12% mode shares in 2011 and 2016
- 'Circumferential' and 'contraflow' trips achieved work trip car travel mode shares of 89% and 83% respectively, which is consistent with the equivalent car travel mode shares of 2011 and well above the Greater Brisbane average of 75.5%

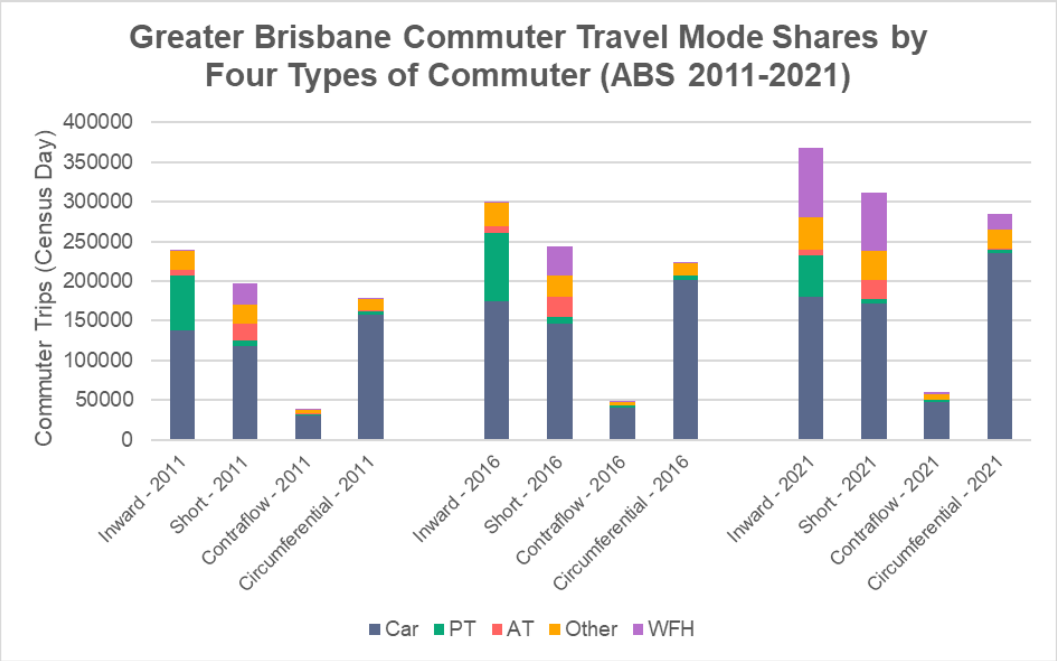
- With the census being completed close to COVID-19 pandemic travel restriction periods in August 2021, 21.7% of workers conducted work from their place of residence, with 'inward' and 'short' tips amounting to approximately two thirds of people not travelling to work.

Overall, there was a proportional reduction in 'inward' trips from 38% in 2011 and 2016 to 33% in 2021. A contributing factor of this trend is the increase in working from home post the COVID-19 pandemic. The 2021 'short' and 'contraflow' commuter trip proportions remained similar to 2011 and 2016, while 'circumferential' commuter trip proportions increased from 29% in 2011 and 2016 to 32% in 2021.

In 2021 car travel mode shares increased proportionally for 'inward' work trips compared to 2011 and 2016. 'Inward' car work trips were consistently fewer than double the combined active travel and public transport travel modes in 2011 and 2016 at approximately 1.8 times the amount. In 2021, this ratio of 'inward' car work trips increased to triple the amount of combined active travel and public transport work trips in 2021.

The total work trips by travel mode for the four types of commuter recorded for 2011, 2016 and 2021 are presented in Figure 2.

Figure 2: Greater Brisbane work trip travel mode shares by four types of commuter (2011-21)



The work trip travel mode summary between 2011 and 2021 highlights the growth in commuter trips through the 10-year period and how travel mode shares have evolved throughout. Greater Brisbane recorded approximately 35% more workers in 2021 compared to 2011, which is double the amount of population growth within the same period for the region (18%).

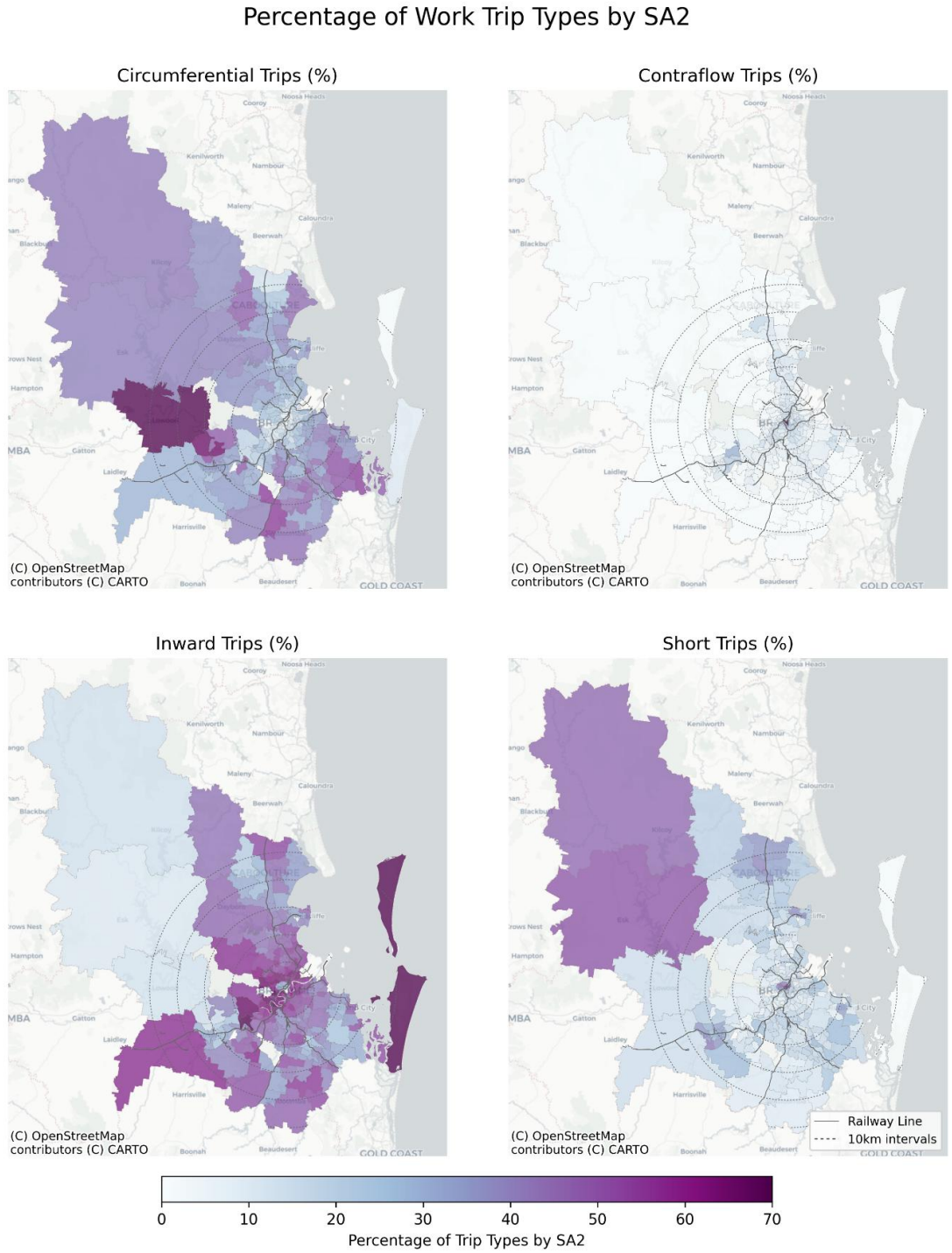
Figure 2 highlights that while there was a 17% (143,000 workers) increase in people working from home in 2021, it did not translate to there being fewer people driving a car to work compared to 2016. Greater Brisbane car travel mode trips increased from 562,146 in 2016 to 635,250 in 2021 (13% increase). The increase in car trips can in part be explained by population growth, reductions in public transport and active travel use, and the commuter type of people who worked from home. This is evidenced by the following statistics and findings:

- Public transport work trips reduced from 102,405 trips in 2016 to 65,595 trips in 2021
- Active travel work trips reduced from approximately 35,000 in 2016 to 31,000 in 2021
- Working from home increased from 1,900 'inward' workers in 2016 to 87,000 in 2021, and from approximately 37,000 'short' trip workers in 2016 to 72,500 people in 2021.

These trends are likely to be contributing factors to the worsening traffic congestion observed in Greater Brisbane in 2024 (INRIX, 2024).

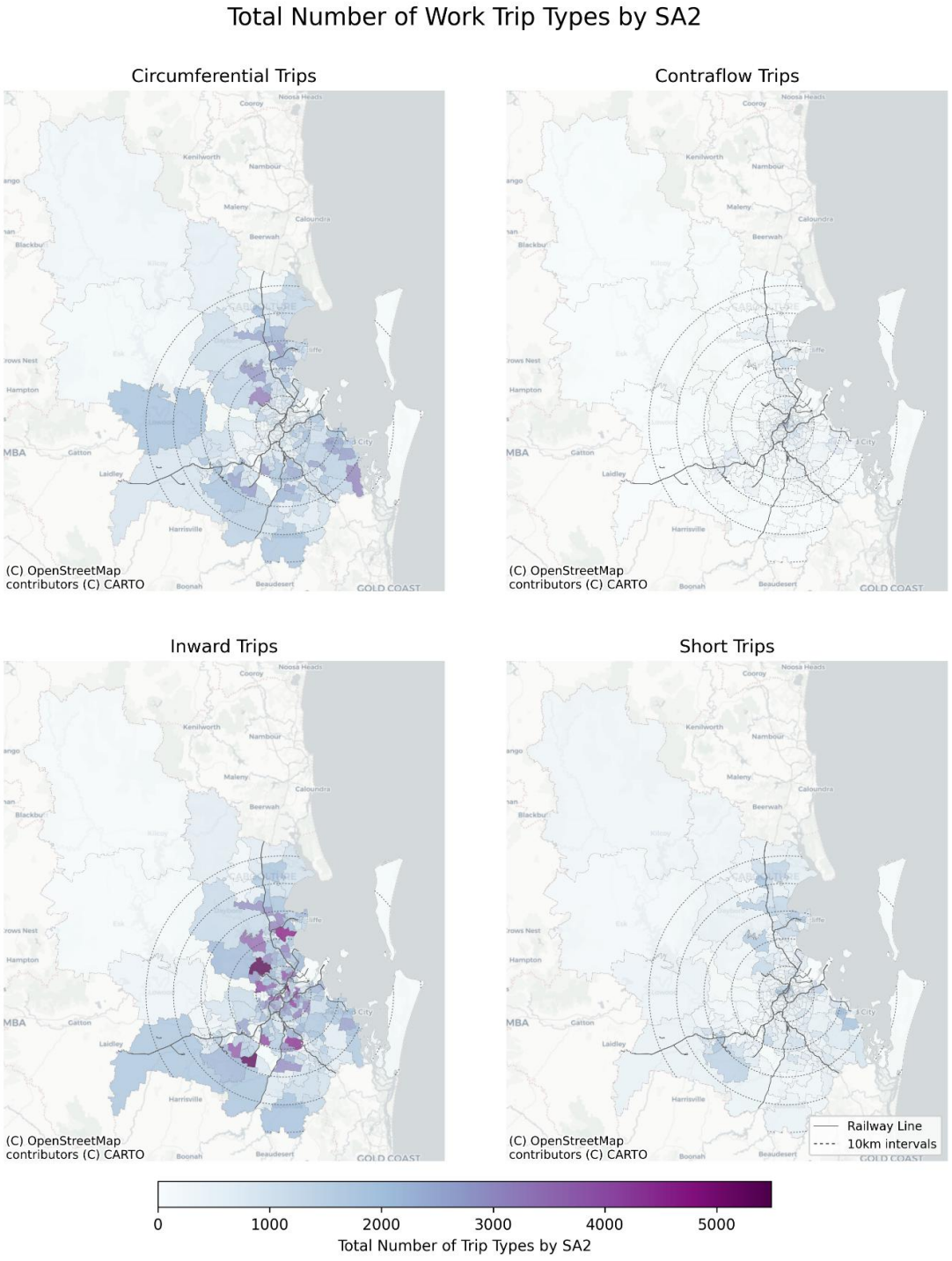
To provide spatial context of the four types of commuter for each SA2 across Greater Brisbane, the proportion of works trips and total work trips are presented in Figure 2 and Figure 4 respectively.

Figure 3: 2021 Map of Greater Brisbane four types of commuter proportions by SA2



The ‘inward’ work trip has the highest proportions for SA2s within the 10km radius of the Brisbane CBD, with ‘circumferential’ work trip having the highest proportions within 10-30km radial ring of the Brisbane CBD.

Figure 4: 2021 Map of Greater Brisbane four types of commuter trip volumes by SA2



The total volume of daily 'inward' work trips are typically the largest for SA2s located adjacent to the passenger rail network lines, with these work trip type volumes declining the further the distance from the Brisbane CBD and rail line. The largest 'circumferential' and 'short' work trip volumes occurred in SA2s within the 10-40km radial ring from the Brisbane CBD, most likely near Brisbane's major activity centres areas with relatively higher levels of employment.

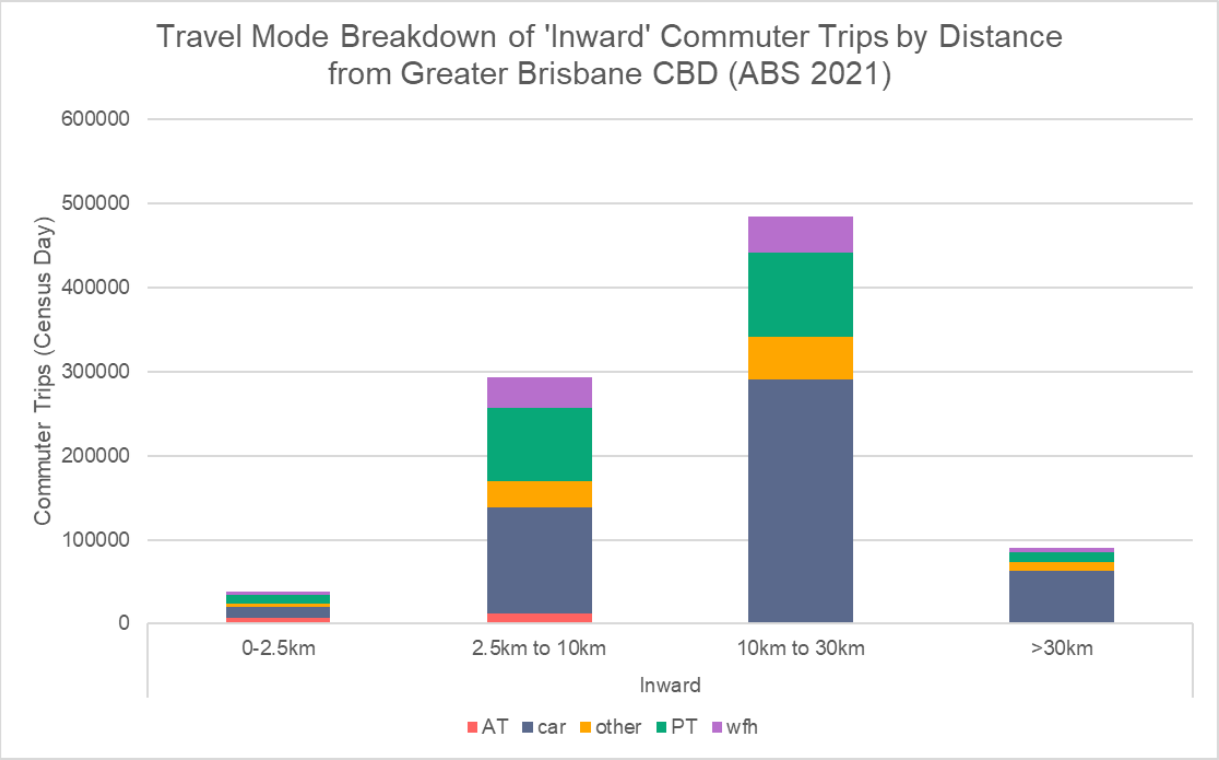
4 Commuter type travel mode changes by distance to inner city

The work trip travel mode shares by four types of commuters have been analysed by distance to the inner city of Greater Brisbane to provide a better understanding of travel patterns and behaviours across the city.

4.1 'Inward' commuter travel mode breakdown by distance from CBD

The 2021 work trip travel mode trip breakdown of 'inward' commuters by distance from the Brisbane CBD is presented in Figure 5.

Figure 5: 2021 Greater Brisbane 'inward' commuter travel mode trips by distance from CBD



The results presented in Figure 5 highlight how car trips are the largest travel mode for each distance category from the CBD for 'inward' commuter trips beyond the 2.5km inner city radius. SA2s located within 2.5km of the Brisbane CBD also recorded car trips almost 20% more patronage compared to public transport trips. This disparity increased to 50% for the 2.5-10km distance range and almost three times for the 10-30km distance range.

4.2 'Short' commuter travel mode breakdown by distance from CBD

The work trip travel mode breakdown of 'short' commuters by distance from the Brisbane CBD in 2021 is presented in Figure 6.

Figure 6: 2021 Greater Brisbane 'short' commuter travel mode trips by distance from CBD

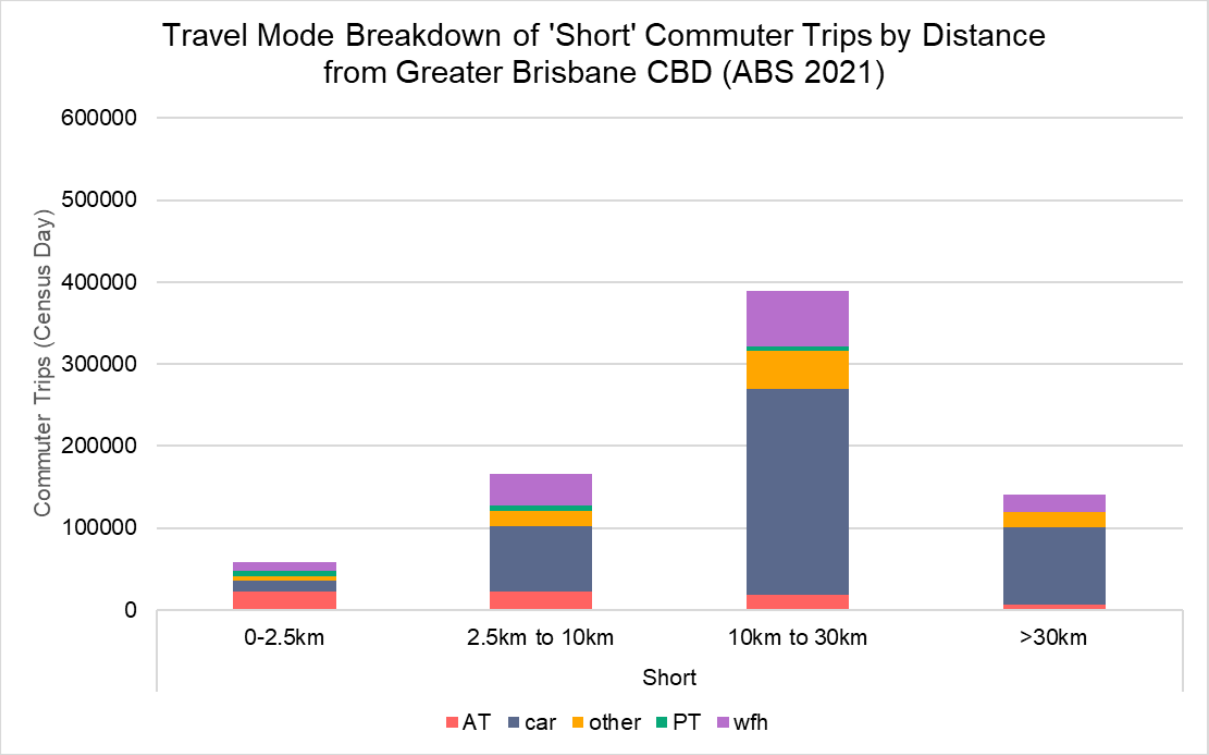
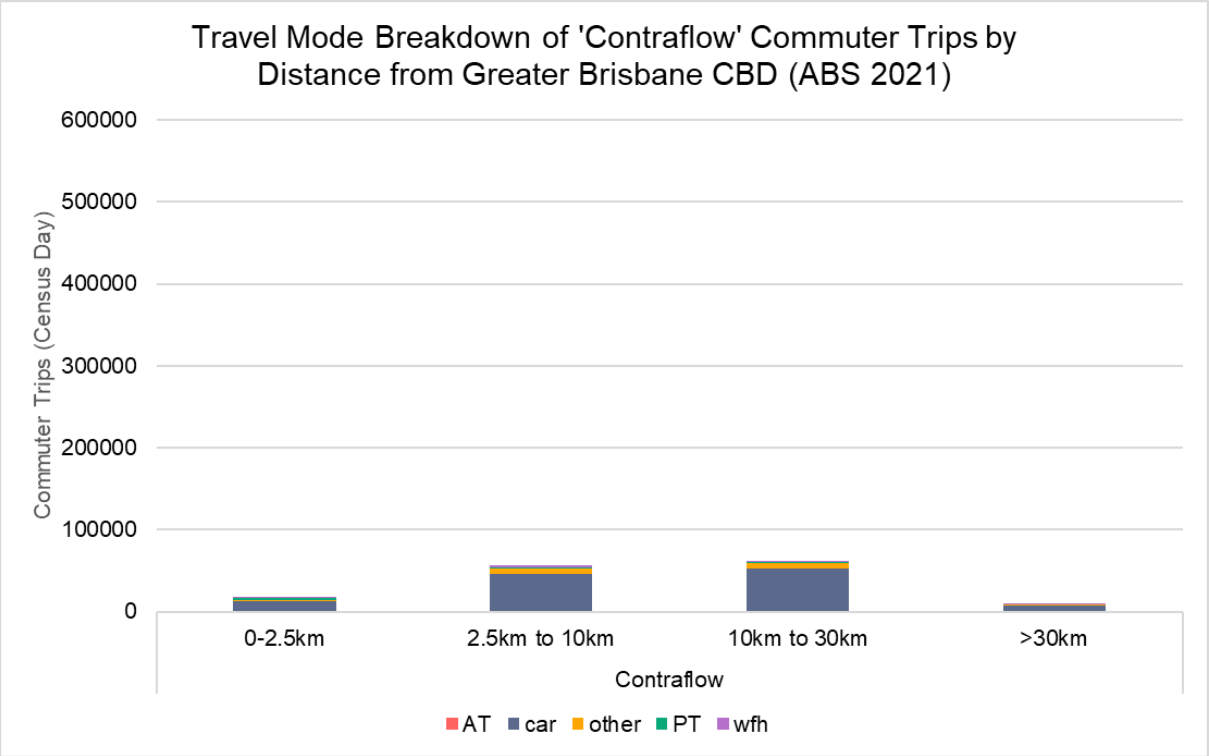


Figure 6 highlights a relatively consistent volume of active travel and public transport users for 'short' commuter trips within 30km of the Greater Brisbane CBD. Car trips are the dominate mode of travel for 'short' commuter trips outside of the inner city 2.5km radius.

4.3 'Contraflow' commuter travel mode breakdown by distance from CBD

The travel mode work trip breakdown of 'contraflow' commuter trips by distance from the Brisbane CBD for 2021 is presented in Figure 7.

Figure 7: 2021 Brisbane 'contraflow' commuter travel mode trips by distance from CBD



As presented in Figure 7, 'contraflow' commuter trips represent the fewest amount of commuters of the four types. Car trips are the most dominant form of travel mode irrespective of the distance from Brisbane's CBD.

4.4 'Circumferential' commuter travel mode breakdown by distance from CBD

The 2021 work trip travel mode trip breakdown of 'circumferential' commuters by distance from the Brisbane CBD is presented in Figure 8.

Figure 8: 2021 Brisbane 'circumferential' commuter travel mode trips by distance from CBD

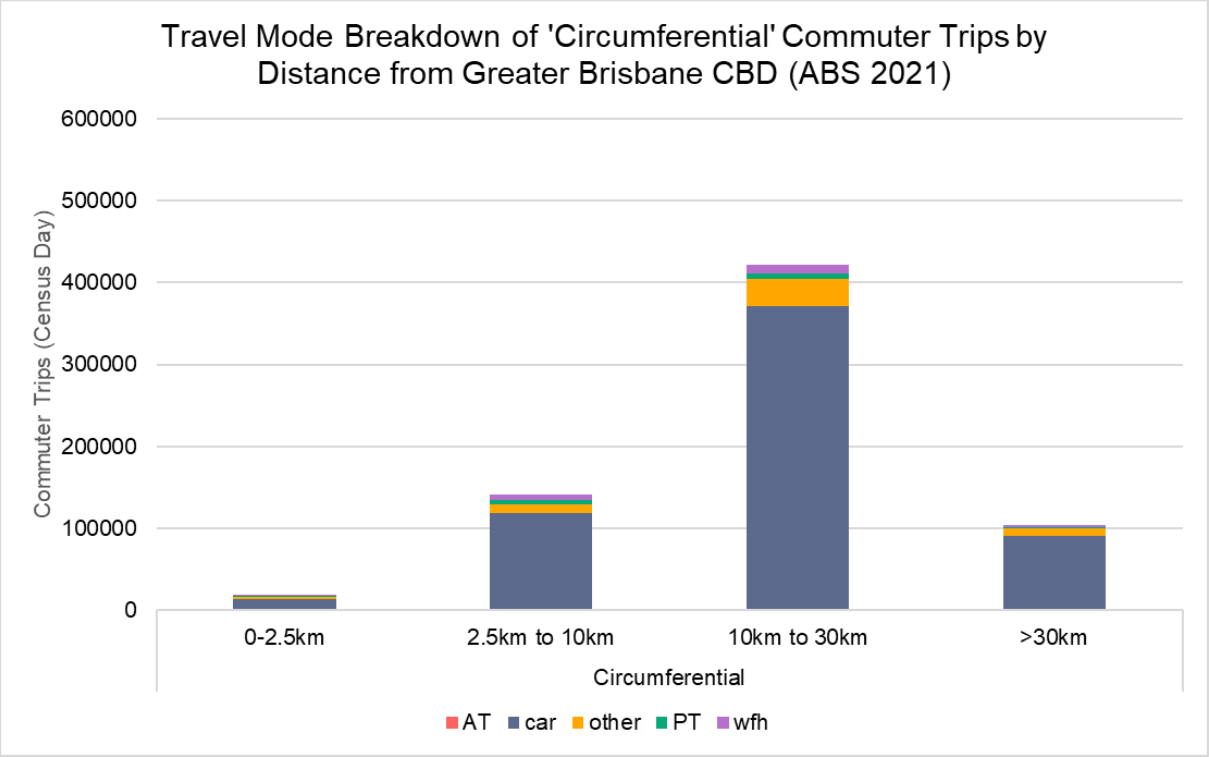


Figure 8 illustrates car travel was recorded as majority travel mode share across the Greater Brisbane area for 'circumferential' work commutes. The second largest demand category of commuter is the 'circumferential' trip for workers residing in the 10-30km radius from the Brisbane CBD ('inward' commuters in this distance range is the highest). Therefore, there is significant potential to improve traffic congestion levels through modal shift to public transport and improve public transport accessibility if more services are provided in these areas.

5 Travel mode share – public transport service level relationship

To better understand and explain the reasons for relatively low public transport usage rates for the four types of commuters across Greater Brisbane in 2021, the total commuter trips by travel mode have been plotted against the number of public transport services by distance from the CBD. The results are presented in Figure 9.

The public transport services reflect 2025 GTFS public transport stop or station departures during the 7-9am period per square kilometre for SA2s within the distance bands of 0-10km from the CBD, 10-20km, 20-30km, 30-40km and 40-50km.

Figure 9: 2021 Greater Brisbane area work trip mode share vs 2025 PT service departure levels

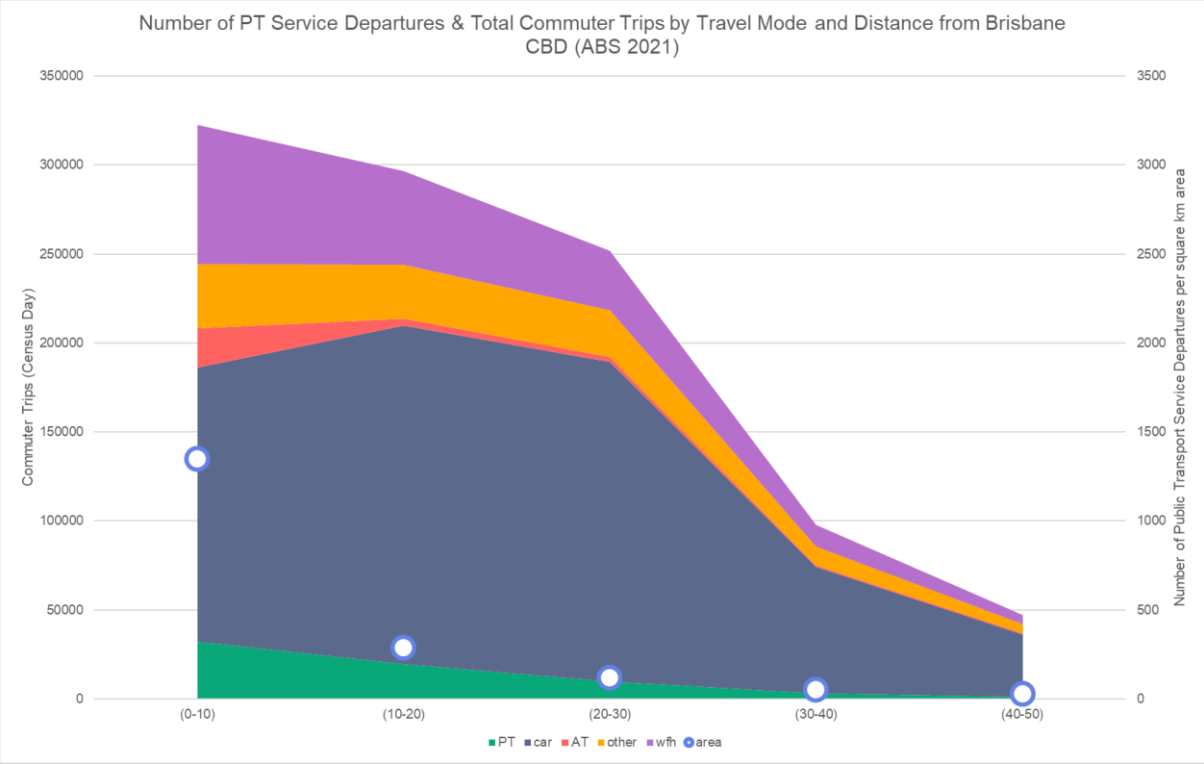


Figure 9 highlights a disproportionate relationship between public transport services per square kilometre within the 10km radius of the CBD (white dot with blue outline on chart) and associated public transport trips (green area of chart). There is a dramatic decline in public transport services immediately beyond the 10km radius that tapers limited public transport service levels at the 50km radius.

The decline in public transport use for commuters is more gradual than the public transport service decline as the distance from the CBD increases, indicating that increasing services beyond the 10km radius of Brisbane for 'short' and 'circumferential' trips have the potential to attract demand increases. This in turn can have the effect of reducing suburban area traffic congestion levels and also increasing accessibility to public transport across the city, resulting in a more sustainable transport future for Greater Brisbane

6 Conclusions

The 2021 ABS journey to work travel mode share analysis of the 'four types of commuters' for the Greater Brisbane area determined the following breakdown across the region as a weighted average of all SA2s:

- **Inward – 33.3%** (including 23.8% of people working from home)
  - Car mode share – 64.2%
  - Public transport mode share – 18.9%
  - Active travel mode share – 2.2%
  - Other travel mode share – 14.7%
- **Short – 28.4%** (including 23.3% of people working from home)
  - Car mode share – 72.2%
  - Public transport mode share – 2.4%
  - Active travel mode share – 10.1%
  - Other travel mode share – 15.4%

- **Contraflow – 6.8%** (including 5.7% of people working from home)
  - Car mode share – 83.0%
  - Public transport mode share – 4.4%
  - Active travel mode share – 0.7%
  - Other travel mode share – 12.0%
- **Circumferential – 31.5%** (including 17.9% of people working from home)
  - Car mode share – 88.8%
  - Public transport mode share – 1.7%
  - Active travel mode share – 1.0%
  - Other travel mode share – 11.1%

Based on the analysis of types of work commuter travel mode share by distance from the Brisbane CBD, and current available public transport services within respective SA2s, there are many candidate trips that could be attracted to sustainable travel mode shifts through the provision of improved services and infrastructure.

There is a significant proportion of 'short' and 'circumferential' work trips across Greater Brisbane (60%), of which collectively recorded public and active transport travel mode shares of 12% and 3% respectively. Analysis of public transport service level frequencies identified relatively low levels beyond 10km of the Brisbane CBD, which coincides with declining public transport mode shares as distance from the inner city increases.

In 2021 car travel mode shares increased proportionally for 'inward' work trips compared to 2011 and 2016. 'Inward' car work trips were consistently fewer than double the combined active travel and public transport travel modes in 2011 and 2016 at approximately 1.8 times the amount. In 2021, this ratio of 'inward' car work trips increased to triple the amount of combined active travel and public transport work trips in 2021.

With Brisbane being regarded has the city with the most traffic congestion in Australia, combined with the lowest levels of access to good public transport services and significant population growth projections, ultimately there lies a significant challenge ahead to ensure the future planned growth of the urban area function and operations are sustainable.

Based on the analysis of the work travel mode shares of the four types of commuters of Greater Brisbane this challenge can be met. Firstly, through policy and investment interventions that provide improved public transport services and active travel facilities beyond the inner city that are better aligned with non-inward work commuter trips. And secondly, by increasing 'short' work commuter trip proportions across the city which will be more attractive to active travel mode use. In doing so, collectively this has the potential play an important role in avoiding further deterioration in traffic congestion levels and public transport accessibility of Greater Brisbane for its future communities.

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