# 5

# Sydney, the Hunter and Illawarra

## 5.1 Sydney has grown – and so has the time and effort it takes to move around the city

### Sydney's transport network performance over the past decade

Between the 2006 and 2016 Census years Sydney's population grew from just over 4.1 million to just under 4.9 million.[28] This is equivalent to a city the size of Canberra being added to the city every five years, or a Mackay or Launceston almost every year.

More people living and working in Australia's largest city has translated directly into a greater transport task. Over the past decade, the distance travelled by users of Sydney's roads has grown by about 6%.[29] Over the 18 years between 2000 and 2018, the number of public transport journeys made in Greater Sydney each year has increased by 45%, from 526 million to 765 million.[30] In particular, the use of rail services in Sydney has grown considerably in recent years. Rail patronage increased by 27% over the five-year period before 2016–17.[31] Sydney has the largest share of journeys to work by public transport nationally of any city. Public transport commuting mode share increased from 23% to 26% between the 2006 and 2016 Census years.[32]

Notwithstanding current investment in extra capacity, the performance of Sydney's transport network has worsened. Road network performance has deteriorated, affecting the drivers, passengers and cargo of cars, trucks and buses alike.[33] This can be seen by comparing road speeds in Sydney with average levels for all Australian cities.

Available evidence suggests that Sydney's public transport has also become more crowded over this period.[34] For instance, in the 24 months between August 2016 and August 2018, the patronage of Sydney Trains services increased by nearly 10%, with over 3 million additional monthly trips made on the network.

## 5.2 There are variations between the 2015 and 2019 Audit forecasts

### There have been substantial changes to the 2019 Audit model inputs and assumptions

Since the 2015 Audit, Sydney, the Hunter and the Illawarra's forecast cost of road congestion has increased by 6% (Table 8 and Figure 5). This is largely due to increases in population forecasts and vehicle kilometers travelled forecasts in the 2019 Audit.

Modelling undertaken in the 2019 Audit differs considerably from work undertaken in 2015 Audit. Changes have been made to the models themselves as well as to the model inputs and assumptions.

The 2015 Audit was based on Veitch Lister Consulting's projection of each city's population based on the most recent ABS forecasts available at the time. The 2019 Audit has slightly higher population and employment projections for Sydney, the Hunter and Illawarra The modelled area is now projected to have 7.5 million people, an increase of 2%. The largest variation in demographic assumptions between the audits is Sydney's inner west, northern and southern suburbs, which is forecast to have larger populations. Areas such as Bringelly, Green Valley, Rouse Hill and McGraphs Hill are forecast to have at least 70% more residents.

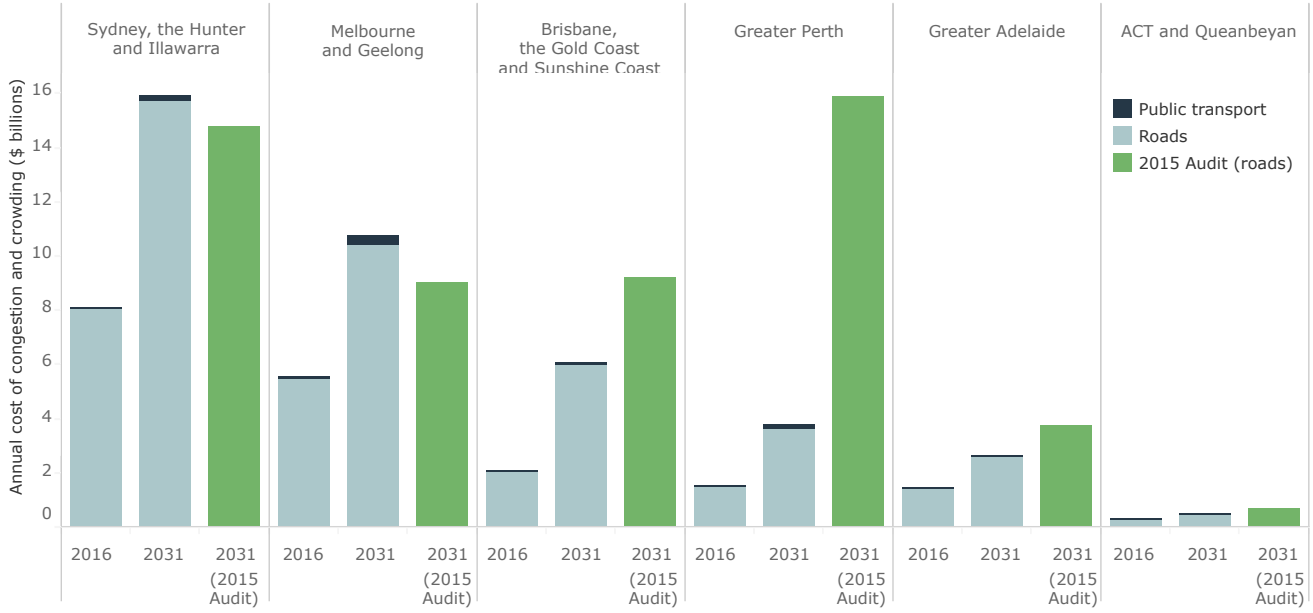
A 5% increase in projected employment has also been projected in the 2019 Audit. The changes of population and employment inputs has led to variations between the Audit's outputs including the annual cost of road congestion and public crowding. Table 9 reflects changes in model inputs and key outputs between the 2015 and 2019 Audit modelling.

**Table 8:** The cost of road congestion and public transport crowding in Sydney, 2016 and 2031

| | Cost of public transport crowding ($ millions) | Cost of road congestion ($ millions) | Total ($ millions) |
|---|---|---|---|
| 2016 (2019 Audit) | 68 | 8,038 | 8,106 |
| 2031 (2019 Audit) | 223 | 15,693 | 15,916 |
| 2031 (2015 Audit) | N/A | 14,790 | N/A |
| 2031 (change from 2015 Audit) | | +903 (+6%) | |

Source: Infrastructure Australia (2015) and Veitch Lister Consulting (2019)[35]

**Figure 5:** The cost of road congestion and public transport crowding, 2016 and 2031




Source: Infrastructure Australia (2015) and Veitch Lister Consulting (2019)[36]

**Table 9:** Changes in key model inputs and outputs between 2015 and 2019 modelling in Sydney, the Hunter and Illawarra

| | | Demographic assumptions | | Network assumptions | | Travel cost assumptions | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Population | Jobs | Road investment | Public transport investment | Fuel | PT fares | Parking | Tolls |
| Change in inputs | | ⇧ Population forecasts have increased (+2%) | ⇧ Employment forecasts have increased (+5%), however the proportion of jobs in Sydney Inner City SA3 reduces slightly | ⇧ More investment in the road network (+~21% network lane km) | ⇧ More investment in the PT network (+~12% service kms) | ⇩ Reduction in fuel price (140 c/L to 104 c/L AUD 2011) | — No change in other transport costs | | |
| Impact on output (AM peak) | Total trips (-24%) | ⇧ Higher total population increases total modelled trips | — Total trips are generated by population assumptions and model parameters only | | | | | | |
| | Car trips (-26%) | ⇧ Higher total population increases total modelled car trips | — The distribution of employment is similar between the audits, as such a decline in overall employment does not substantially alter the balance between car and PT travel | ⇧ Better roads encourage car travel | ⇩ Better PT can encourage more PT travel and fewer car trips | ⇧ Lower fuel prices encourage car travel | — No change = no impact | | |
| | Car vehicle kms travelled (-4%) | — An overall increase in population increases car kilometres, while lower population growth at the urban fringe could reduce this metric. The net effect could be neutral | — The distribution of employment is similar between the audits, as such a decline in overall employment does not substantially alter the balance between car and PT travel | ⇧ Better roads encourage car travel | ⇩ Better PT can encourage more PT travel and fewer car kms | ⇧ Lower fuel prices encourage car travel | — No change = no impact | | |
| | Public transport trips (-18%) | ⇧ Higher total population increases total modelled PT trips | — The distribution of employment is similar between the audits, as such a decline in overall employment does not substantially alter the balance between car and PT travel | ⇩ Better roads encourage car travel and fewer PT trips | ⇧ Better PT can encourage more PT travel | ⇩ Lower fuel prices encourage car travel and reduce PT travel | — No change = no impact | | |

Source: Veitch Lister Consulting (2019)[37]

## New network assumptions

Both audits use a similar approach to developing network assumptions that assumes only projects with funding or significant levels of political commitment will be completed by 2031. For Sydney, there are four key differences in network assumptions. Sydney Metro City and Southwest, Parramatta Light Rail, Newcastle Light Rail and Stage 1 F6 extension are all included in the 2019 Audit, but not the 2015 Audit.

## Variation between road network capacities in 2031

On Sydney's worst-performing corridors, road network volume to capacity ratios are similar between the 2019 Audit and the 2015 Audits. Both audits use the same metric to identify congestion. However, the 2019 Audit shows congestion along a longer stretch of the M4, as well as increased congestion on the M31 and M7. There are also increases to congestion on arterial and local roads in Parramatta and the inner city.

Population growth and the construction of Nancy Bird Walton Airport are forecast to result in congestion on the planned A9 motorway and the A44 and in surrounding arterial roads in Luddenham, Badgerys Creek, Kemps Creek, Kingswood, Cambridge Park and Ropes Crossing. Local and arterial roads in Erskine Park also denote large increases in congestion. More congestion is expected on Camden Bypass and Camden Valley Way.

Higher rates of congestion are forecast on arterial roads and local roads off the M2 and M7, including Beaumont Hills, Schofields and Quakers Hill.

More congestion is also evident on the M31 between Campbelltown and Prestons in the 2019 Audit.

Arterial and local roads in the inner west (Marrickville, Enmore, Newtown, Alexandria) will experience less congestion than forecast in the 2015 Audit. This is also the case with arterial roads connecting the M1 in Kingsford, Kensington, Botany, Daceyville, Roseberry. These decreases are likely to be attributed to WestConnex.

Sydney's worst-performing corridors, forecast in the 2019 Audit, are similar to those in the 2015 Audit. However, the 2019 Audit reflects that delays on these corridors is forecast to be worse. In general, vehicle delays are forecast to increase by more than the corresponding change in traffic volumes. This is a function of the underlying dynamics of traffic flow, which means when additional traffic is added to an already congested road the delay is disproportionately higher than in less congested conditions. In the 2019 Audit during AM and PM peak demand, Northern Beaches bus services are forecast to exceed crush capacity for the majority of the services to the Sydney CBD, while much of the Liverpool – Parramatta T-Way and routes running parallel to the T1 Western line from Parramatta either approach or exceed crush capacity. Bus services planned to travel between Parramatta and Liverpool in the southwest, are also expected to exceed crush capacity. Similarly, the 2015 Audit predicts that bus services operating between the Northern Beaches and the Sydney CBD will experience a large increase in demand.

Table 10 compares corridor-level average traffic and delay hours for the AM peak for the ten most delayed corridors in the 2019 Audit.

## Variation between public transport capacities in 2031

Similar levels of public transport demand have been identified between the 2019 Audit and 2015 Audit.

The main areas of weekday train passenger volume to capacity ratios at the 2031 AM peak are concentrated along the T1 Western, T1 North Shore, T2 Inner West, T4 Illawarra and Cronulla, T8 Airport and South lines. In the 2019 Audit, the area with the highest traffic volume and highest crush capacity in the 2031 AM peak is the T8 Airport line between the CBD and Kingsford Smith Airport, and the T8 South line running south from Parramatta to Yennora. The 2031 PM peak shows similar levels of traffic volumes, however no instances of high traffic volume. The 2015 Audit reflects similar patterns of demand.

In the 2019 Audit during AM and PM peak demand, Northern Beaches bus services are forecast to exceed crush capacity for the majority of the services to the Sydney CBD, while much of the Liverpool – Parramatta T-Way and routes running parallel to the T1 Western line from Parramatta either approach or exceed crush capacity. Bus services planned to travel between Parramatta and Liverpool in the southwest, are also expected to exceed crush capacity. Similarly, the 2015 Audit predicts that bus services operating between the Northern Beaches and the Sydney CBD will experience a large increase in demand.

**Table 10:** Most congested roads ranked by total delay hours, 2031 AM Peak, and ranking in 2015 Audit in Sydney, the Hunter and Illawarra

| City rank (2019 Audit) | Corridor | Direction | Average peak hour traffic volumes | | | Total delay hours | | | City rank (2015 Audit) |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2015 Audit | 2019 Audit | Difference | 2015 Audit | 2019 Audit | Difference | |
| 1 | Central Coast to Sydney corridor (M1) | S/B | 2,300 | 2,500 | 9% | 3,700 | 9,600 | 58% | 6 |
| 2 | Liverpool to Sydney Airport corridor (M5) | E/B | 6,100 | 5,700 | -7% | 5,100 | 9,200 | 81% | 3 |
| 3 | Illawarra to Sydney corridor (A1) | N/B | 2,200 | 2,500 | 15% | 5,300 | 8,400 | 59% | 1 |
| 4 | Mona Vale to Sydney Olympic Park corridor (A3) | S/B | 2,500 | 2,700 | 6% | 5,200 | 7,100 | 37% | 2 |
| 5 | Mittagong to Liverpool corridor (M31) | N/B | 3,400 | 3,400 | -1% | 2,700 | 6,100 | 122% | 9 |
| 6 | Sutherland west to Ryde west corridor (A6) | N/B | 2,200 | 2,300 | 3% | 4,400 | 5,300 | 20% | 4 |
| 7 | Northern Beaches to North Sydney corridor (A8) | S/B | 2,000 | 2,000 | 0% | 4,000 | 4,900 | 22% | 5 |
| 8 | Eastern Creek to Westmead corridor (M4) | E/B | 7,800 | 6,400 | -19% | 3,400 | 4,800 | 41% | 7 |
| 9 | Victoria Road (A40) | E/B | 2,300 | 2,600 | 12% | 2,300 | 4,400 | 90% | 15 |
| 10 | Westmead to Strathfield corridor (M4) | E/B | 5,800 | 6,400 | 10% | 1,800 | 4,100 | 132% | 20 |

Note: N/B, S/B, W/B and E/B represent northbound, southbound, westbound and eastbound, respectively.

Source: Veitch Lister Consulting (2019)[38]

## 5.3 Sydney commuters and businesses are exposed to daily road congestion and crowded public transport

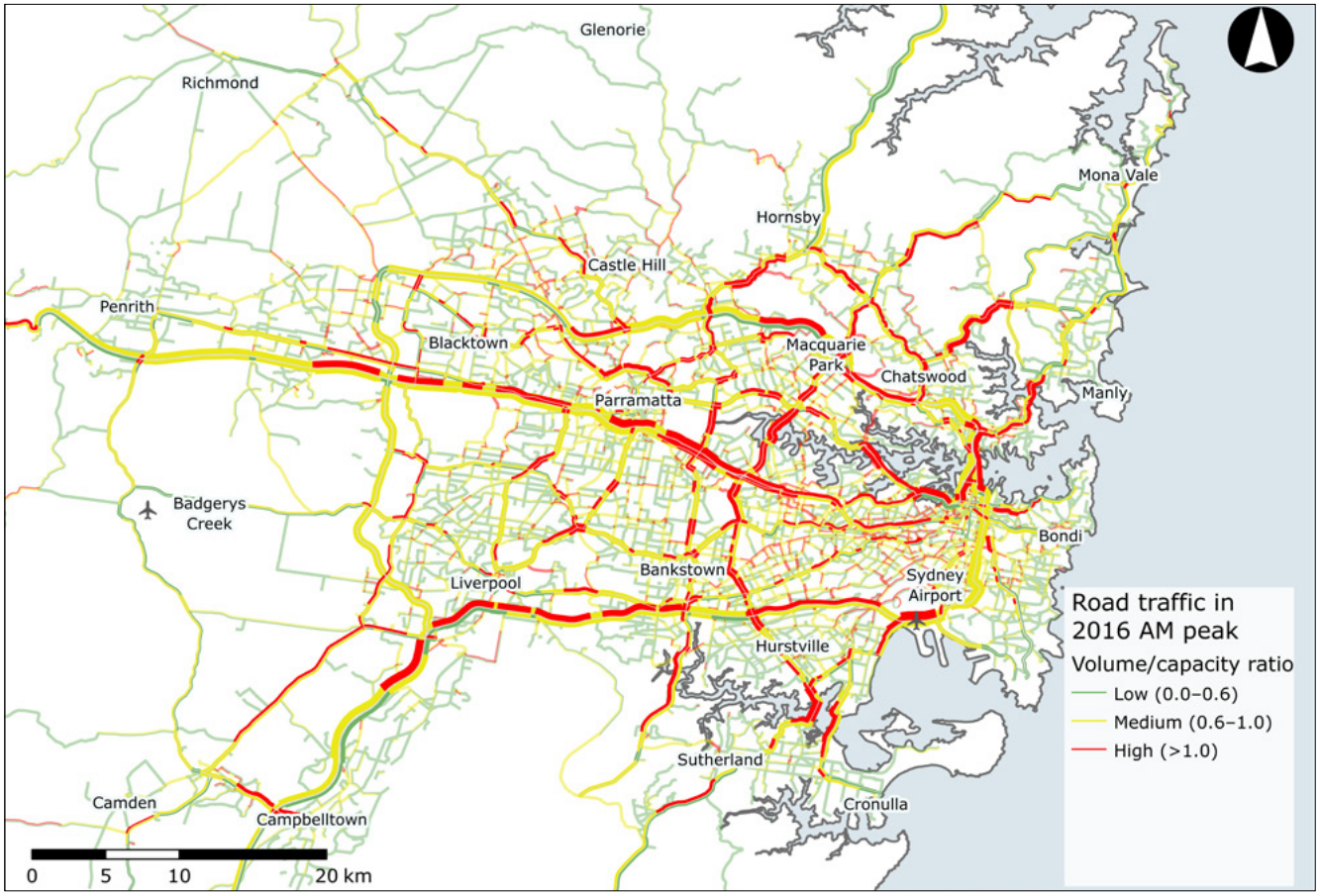
### Snapshot of Sydney's road network in 2016

Sydney's drivers already experience significant congestion. Our modelling indicates the cost of road congestion for Sydney, the Hunter and Illawarra in 2016 was approximately $8.0 billion. Within Sydney, this figure is $6.6 billion. The severity of this congestion is exacerbated during the morning peak period when commutes to work and school overlap (Figure 6). Sydney's major roads also experience similar levels of congestion in the PM peak. Several corridors are affected by substantial two-way congestion in both peak periods, most notably the M4 between Parramatta and the Sydney CBD.

### Sydney's most congested roads in 2016: what the driver experiences

Infrastructure Australia has identified the most congested road corridors in Sydney based on various metrics that relate to a user's experience, including the percentage of total journey time that is spent in congestion. The ten most congested corridors for the AM and PM peaks are shown in Table 11 and Figure 7.

**Figure 6:** Sydney weekday traffic volume / capacity ratio, 2016 AM peak




Note: Volume / capacity ratios show the quantity of traffic relative to a road's capacity. Any link operating at a VCR above 1.0 is coloured red, indicating that more vehicles are using the road than it was designed to accommodate under free-flow conditions.

Source: Veitch Lister Consulting (2019) [39]

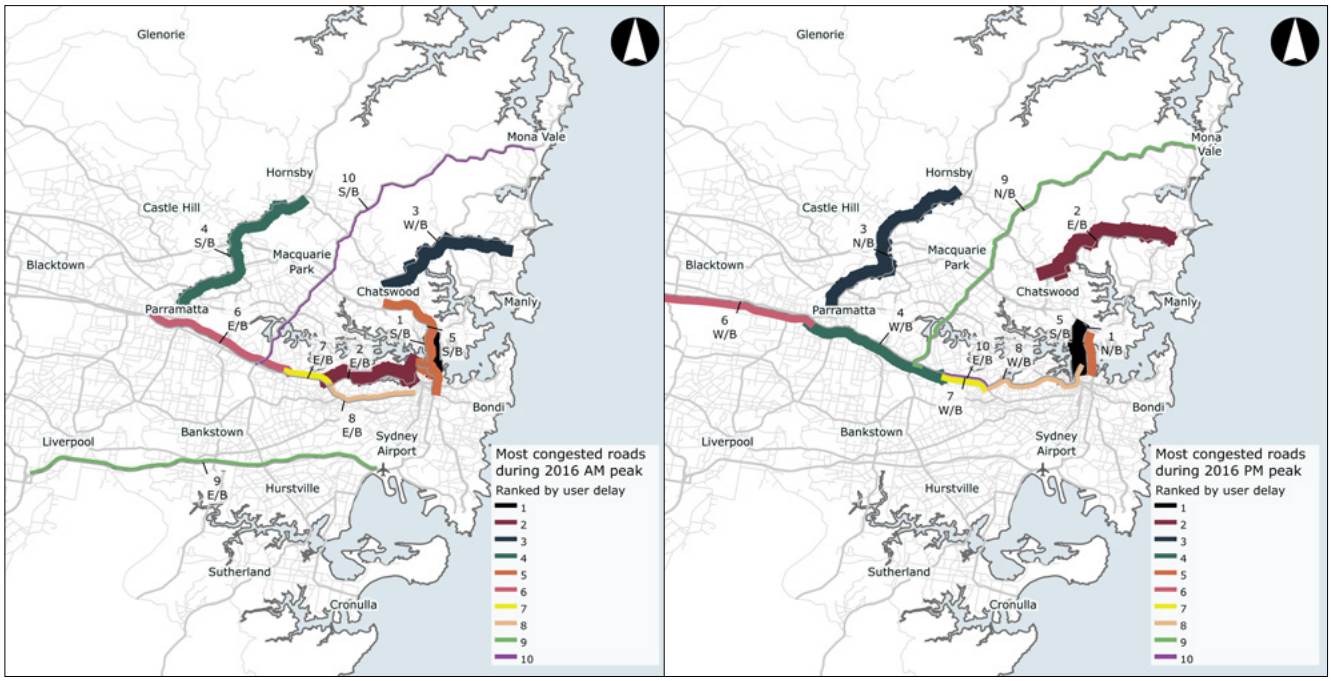
**Table 11:** Sydney's most congested roads (user experience), 2016

| City rank | Corridor including origin / destination connected (direction) | Length (km) | Share of journey time due to congestion | Delay per vehicle (mins) | Cost of congestion for a car | Cost of congestion for a heavy commercial vehicle |
|---|---|---|---|---|---|---|
| AM peak | | | | | | |
| 1. | North Sydney to Sydney CBD via Sydney Harbour Tunnel (S/B) | 4 | 81% | 16 | $4.42 | $19.03 |
| 2. | Ashfield to Sydney CBD via City West Link / Anzac Bridge (E/B) | 9 | 69% | 22 | $6.08 | $26.17 |
| 3. | Narraweena to Chatswood via Warringah Road (W/B) | 12 | 68% | 26 | $7.18 | $30.93 |
| 4. | Hornsby to Parramatta via Pennant Hills Road (S/B) | 16 | 67% | 34 | $9.39 | $40.45 |
| 5. | Artarmon to Surry Hills via Pacific Highway / Sydney Harbour Bridge / Cahill Expressway / Eastern Distributor (S/B) | 11 | 67% | 20 | $5.52 | $23.79 |
| 6. | Westmead to Strathfield via M4 (E/B) | 12 | 67% | 17 | $4.69 | $20.22 |
| 7. | Strathfield to Haberfield via Parramatta Road (E/B) | 4 | 67% | 9 | $2.49 | $10.71 |
| 8. | Haberfield to Broadway via Parramatta Road (E/B) | 7 | 66% | 18 | $4.97 | $21.41 |
| 9. | Liverpool to Sydney Airport via M5 (E/B) | 28 | 65% | 34 | $9.39 | $40.45 |
| 10. | Mona Vale to Sydney Olympic Park via A3 (S/B) | 35 | 62% | 54 | $14.91 | $64.24 |
| PM peak | | | | | | |
| 1. | Sydney CBD to North Sydney via Sydney Harbour Tunnel (N/B) | 4 | 74% | 11 | $3.04 | $13.09 |
| 2. | Chatswood to Narraweena via Warringah Road (E/B) | 12 | 68% | 26 | $7.18 | $30.93 |
| 3. | Parramatta to Hornsby via Pennant Hills Road (N/B) | 16 | 66% | 32 | $8.84 | $38.07 |
| 4. | Strathfield to Westmead via M4 (W/B) | 12 | 66% | 16 | $4.42 | $19.03 |
| 5. | North Sydney to Sydney CBD via Sydney Harbour Tunnel (S/B) | 4 | 66% | 7 | $1.93 | $8.33 |
| 6. | Westmead to Eastern Creek via M4 (W/B) | 12 | 63% | 13 | $3.59 | $15.47 |
| 7. | Haberfield to Strathfield via Parramatta Road (W/B) | 4 | 63% | 7 | $1.93 | $8.33 |
| 8. | Sydney CBD to Ashfield via Anzac Bridge / City West Link (W/B) | 9 | 61% | 15 | $4.14 | $17.85 |
| 9. | Sydney Olympic Park to Mona Vale via A3 (N/B) | 35 | 59% | 49 | $13.53 | $58.29 |
| 10. | Strathfield to Haberfield via Parramatta Road (E/B) | 4 | 59% | 6 | $1.66 | $7.14 |

Note: N/B, S/B, W/B and E/B represent northbound, southbound, westbound and eastbound, respectively.

Source: Veitch Lister Consulting (2019)[40]

**Figure 7:** Sydney's most congested roads (user experience), 2016 AM (left) and PM (right) peak periods




Source: Veitch Lister Consulting (2019)[41]

The city's most congested arterial roads radiate out to the south, west and north from eastern Sydney's 'Global Arc' – between the airport and Macquarie Park – where jobs are concentrated. Widely spaced crossings of Sydney Harbour, Middle Harbour, the Georges River and bushland ridgelines create bottlenecks.

Furthermore, there is significant congestion on roads connecting the west of the city to job centres in the east. The three motorways connecting Greater Western Sydney to the Sydney CBD, Sydney Airport and Port Botany – the M5, M4 and M2 – are congested.

In addition to these Sydney CBD-oriented roads, congestion affects access to Parramatta, and cross-city north-south links such as the A3 corridor (including King Georges Road and Lane Cove Road) that connects the strategic centres of Kogarah, Bankstown, Sydney Olympic Park and Macquarie Park.

In the afternoon peak period (but not in the morning) two road corridors experience 'top 10' congestion in both directions. These are the Warringah Freeway / Gore Hill Freeway corridor north of Sydney Harbour, and the section of Parramatta Road between the current eastern terminus of the M4 and the City West Link.

Unlike Melbourne, Australia's second most congested city, Sydney in 2016 sees congestion beyond the motorway, freeway and arterial network. Local roads, particularly in the suburbs of the inner west, are regularly impacted by significant congestion during peak periods.

## Sydney's most congested roads in 2016: the cost to the community of total vehicle delays

As an indicator of the whole-of-system impacts of congestion (incorporating corridors beyond the metropolitan area of Sydney), Infrastructure Australia has aggregated total delay hours experienced by all vehicles using the most congested road corridors. The ten most congested corridors under this approach for the AM and PM peaks are shown in Table 12 and Figure 8. Delay on these roads accounts for approximately 20% of total delay hours experienced across the Sydney network. The greatest aggregate delays are experienced on long-distance inter-city corridors connecting Sydney with adjacent satellite cities, the Illawarra and Central Coast.

## Sydney's public transport system in 2016

Public transport use in Sydney has also grown substantially in recent years. New railway extensions completed since the 2015 *Australian Infrastructure Audit* include the South West Rail Link and the Inner West Light Rail extension to Dulwich Hill. On the Northern Beaches additional capacity is being provided by the B-Line bus corridor project, which is partially open and will undergo further improvements in coming years.

Increased residential density around many train stations, light rail stops and other interchanges, and the growth of employment within walking distance of stations, make public transport an obvious commuting choice for many Sydneysiders. Network-wide improvements including the roll-out of the Opal integrated ticketing system and the introduction of 'turn up and go' service frequencies on major routes have also supported patronage growth. Increasing road congestion is likely to have made public transport a more attractive option for commuters.

Sydney's increased reliance on public transport results in the users of the busiest train lines experiencing the discomfort of crowded services. More people must stand for longer, and the extra time it takes for people to get on and off contributes to delays.

As shown in Figure 9, the T1 Western and T2 Inner West lines (between Parramatta and the Sydney CBD), the T8 Airport and South line (between East Hills and Sydney Airport) and the T1 North Shore line (between Chatswood and the Sydney CBD) approach – but do not yet exceed – crush capacity in the 2016 base year. For the Audit's transport modelling purposes, crush capacity is defined according to the total number of passengers that a public transport service is designed to carry. For a train service operated using Sydney Trains double-deck rolling stock, crush capacity is exceeded at 1,430 passengers. This is equivalent to 160% of the train's seated load – i.e. for every ten seated passengers six are standing. The crush load of bus and ferry services is similarly based on the seated and designated standing capacity for those modes.

In 2016 Sydney's busiest bus corridors (Figure 10) were at the points of entry to the Sydney CBD for routes with service corridors without a train line. These include the Northern Beaches peninsula, Eastern Valley Way, Victoria Road, the Anzac Parade corridor in south-eastern Sydney, the M2 corridor to the Hills District, and connections to the north-east, north-west and south-west of Parramatta.

Some but not all of Sydney's busiest bus corridors are given priority road space. These include the B-Line / Sydney Harbour Bridge bus lane, the Liverpool–Parramatta T-way and the M2 Busway. Services that operate on corridors with bus priority measures commonly offer faster and more reliable peak period services than driving and local bus routes. Without priority access, these services have to compete with other traffic on congested roads.

Perversely, the popularity of these services can result in crowded buses that take longer to load and unload, reducing their efficiency and attractiveness over time. This can result in bus bunching and delays, even when bus-only lanes are provided. Anecdotal evidence suggests that on some of Sydney's busiest bus corridors the high patronage of bus services is resulting in on-board congestion – or overcrowding – leading to discomfort for passengers and late-running services.

In 2016 passenger volume to capacity ratios were highest for bus services operating on the Northern Beaches (to the Sydney CBD via both Willoughby and Mosman), Anzac Parade, the Liverpool–Parramatta T-way through Smithfield and Merrylands, and the M2 between Old Windsor Road and Windsor Road (east of where the motorway's bus-only lane begins). Figures for the Northern Beaches predate the commencement of B-Line services.

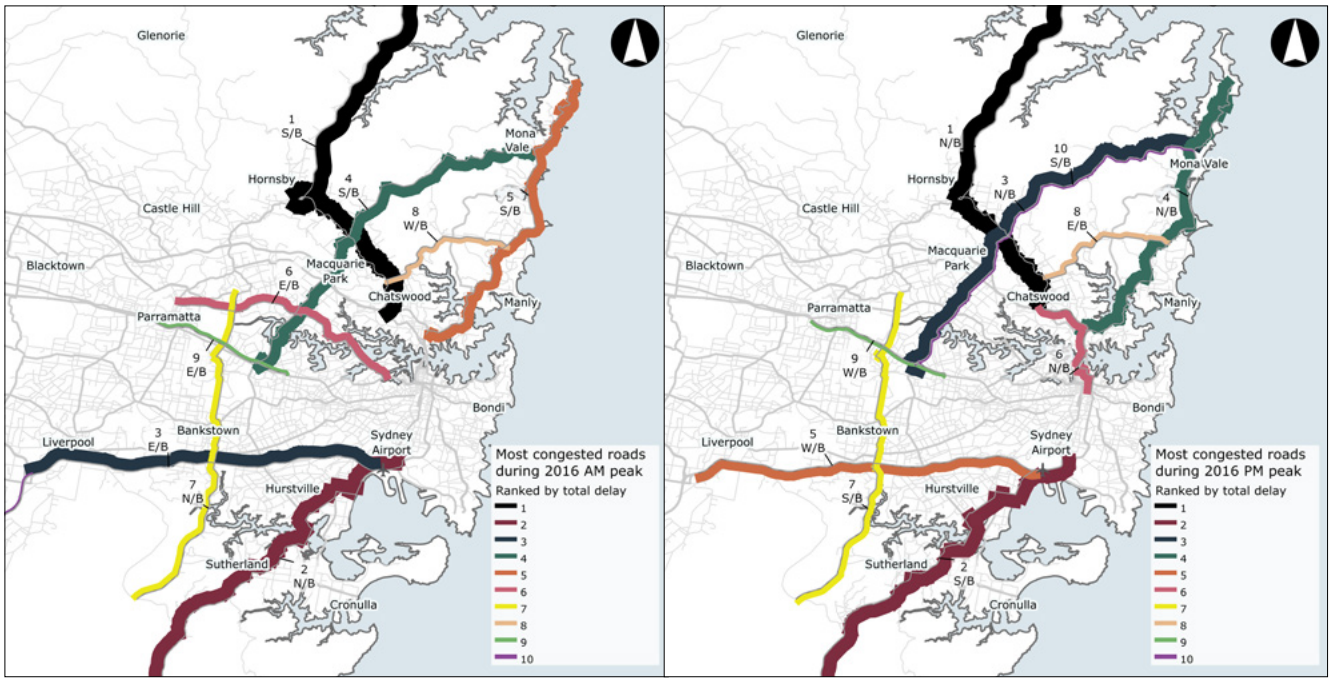
## Table 12: Sydney's most congested roads (total vehicle delays), 2016

| City rank | Corridor | Direction | Total delay hours | Cost of congestion (daily) |
|---|---|---|---|---|
| AM peak | | | | |
| 1. | Central Coast to Sydney corridor (M1) | S/B | 6,200 | $165,000 |
| 2. | Illawarra to Sydney corridor (A1) | N/B | 5,800 | $134,000 |
| 3. | Liverpool to Sydney Airport corridor (M5) | E/B | 4,900 | $109,000 |
| 4. | Mona Vale to Sydney Olympic Park corridor (A3) | S/B | 4,900 | $104,000 |
| 5. | Northern Beaches to North Sydney corridor (A8) | S/B | 3,900 | $78,000 |
| 6. | Victoria Road corridor (A40) | E/B | 3,200 | $67,000 |
| 7. | Sutherland west to Ryde west corridor (A6) | N/B | 3,100 | $67,000 |
| 8. | Narraweena to Chatswood corridor (A38) | W/B | 3,000 | $61,000 |
| 9. | Westmead to Strathfield corridor (M4) | E/B | 2,900 | $62,000 |
| 10. | Mittagong to Liverpool corridor (M31) | N/B | 2,800 | $71,000 |
| PM peak | | | | |
| 1. | Sydney to Central Coast corridor (M1) | N/B | 5,800 | $153,000 |
| 2. | Sydney to Illawarra corridor (A1) | S/B | 4,700 | $108,000 |
| 3. | Homebush Bay to Mona Vale corridor (A3) | N/B | 4,600 | $94,000 |
| 4. | North Sydney to Northern Beaches corridor (A8) | N/B | 3,800 | $75,000 |
| 5. | Sydney Airport to Liverpool corridor (M5) | W/B | 3,500 | $77,000 |
| 6. | Eastern Distributor / Sydney Harbour Bridge / Warringah Freeway / Gore Hill Freeway corridor (M1) | N/B | 2,900 | $65,000 |
| 7. | Ryde west to Sutherland west corridor (A6) | S/B | 2,900 | $62,000 |
| 8. | Chatswood to Narraweena corridor (A38) | E/B | 2,800 | $56,000 |
| 9. | Strathfield to Westmead corridor (M4) | W/B | 2,800 | $60,000 |
| 10. | Mona Vale to Sydney Olympic Park corridor (A3) | S/B | 2,700 | $56,000 |

Note: N/B, S/B, W/B and E/B represent northbound, southbound, westbound and eastbound, respectively.

Source: Veitch Lister Consulting (2019)[42]

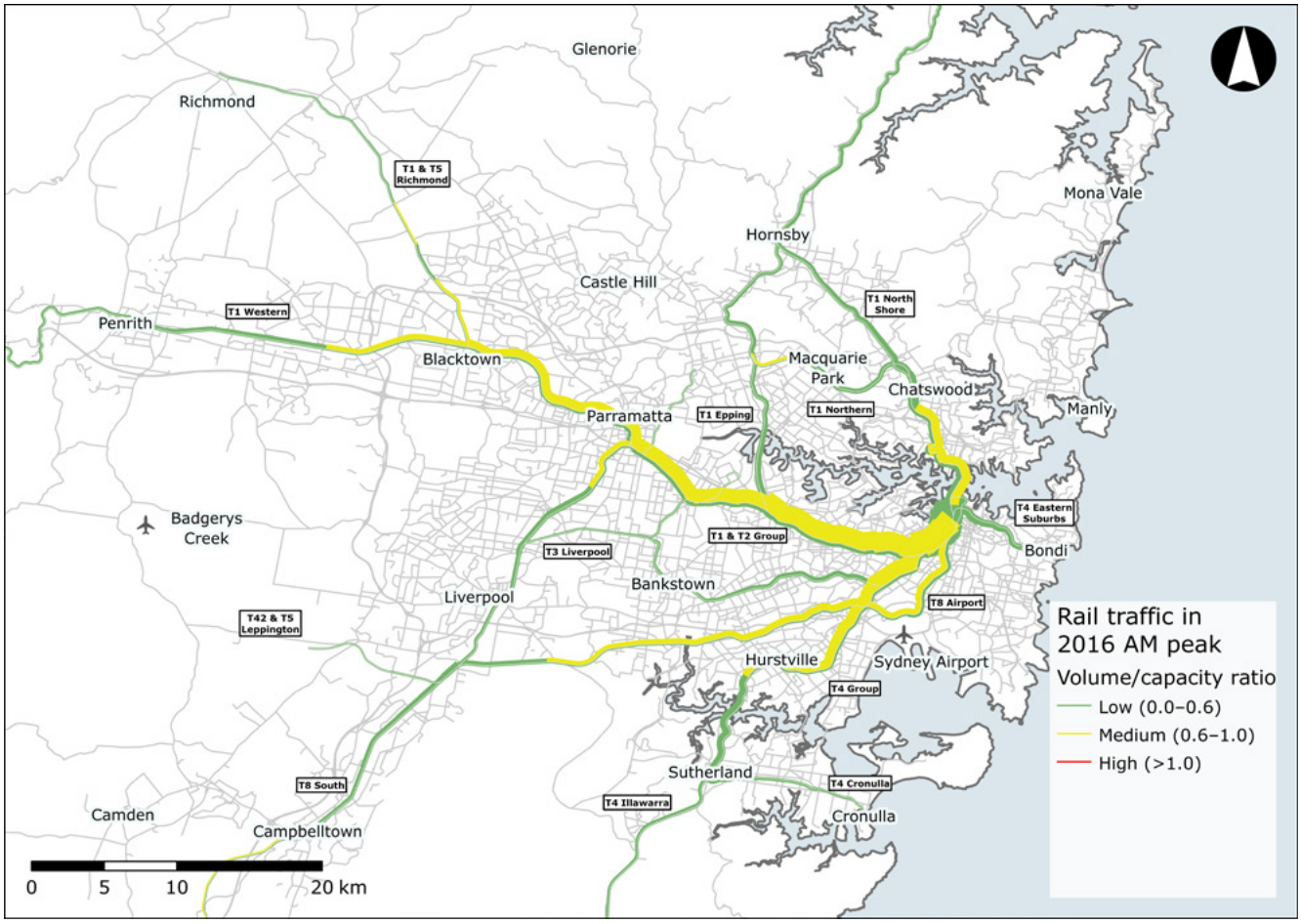
## Figure 8: Sydney's most congested roads (total vehicle delays), 2016 AM (left) and PM (right) peak periods




Note: The Mittagong to Liverpool corridor (10th most congested corridor in AM peak period) is located beyond the map extent, towards the south west.

Source: Veitch Lister Consulting (2019)[43]

**Figure 9:** Sydney weekday train passenger volume / capacity ratio, 2016 AM peak




Source: Veitch Lister Consulting (2019)[44]

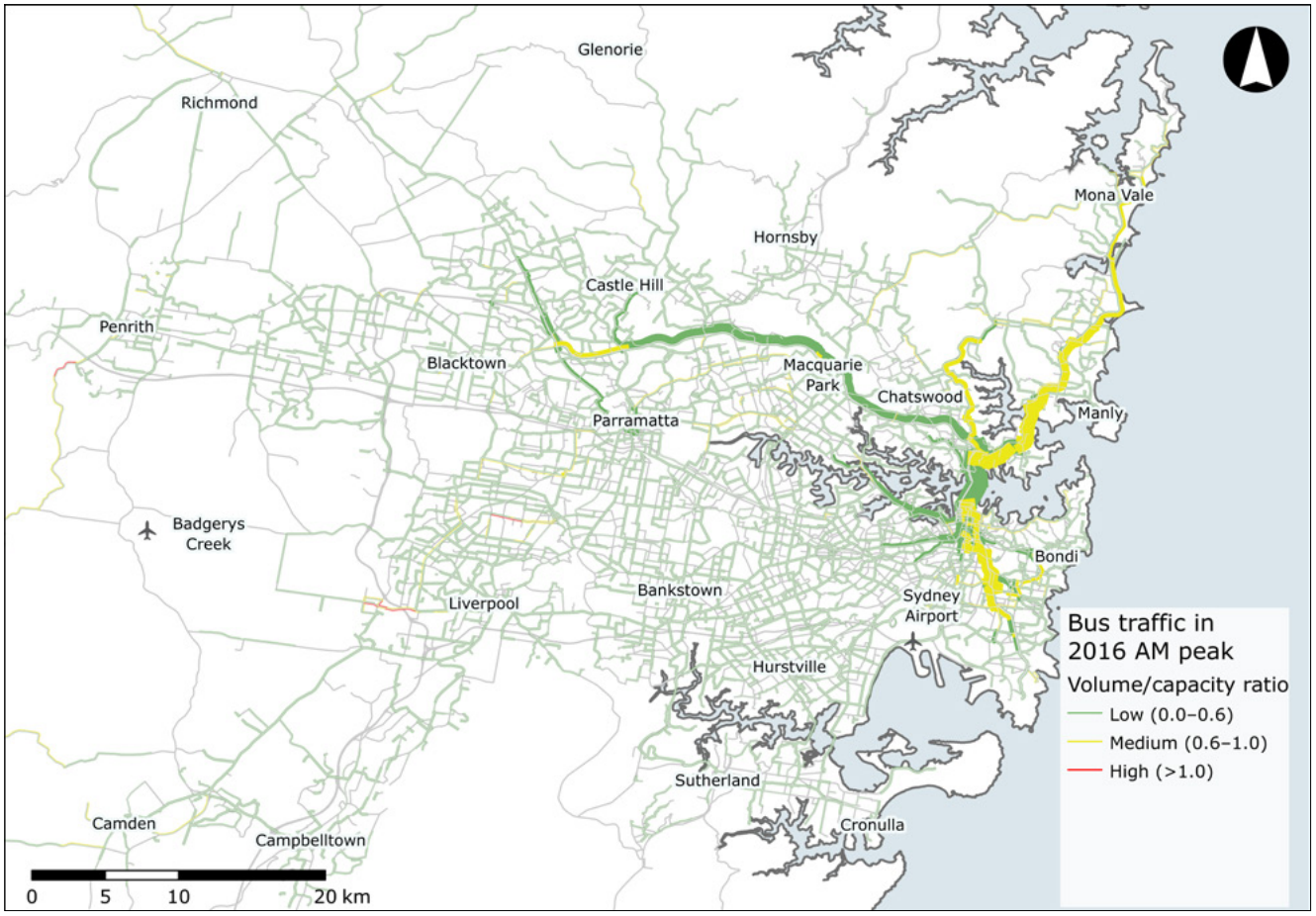
## Sydney's potential transition to a more sustainable transport future

Based on this evidence, the choices for the future development and management of Sydney's transport networks puts the city at a point of transition. As acknowledged by the NSW Government,[45] there is an opportunity to transition Sydney's transport system to a more technologically, environmentally and financially sustainable model.

If this pathway is not taken, there is the risk that further road and public transport congestion will seriously impact the city's liveability. This would damage the city's productivity and global competitiveness.[46] Various external groups which measure and report road congestion currently rate Sydney worse than other Australian cities and various global cities.[47]

A key strategy for mitigating this risk involves spreading Sydney's population and employment growth across a multi-centred metropolis. This theme is at the heart of recently released integrated transport and land use plans for Greater Sydney, with increased focus on liveability. Under these plans a third city - Western Sydney Airport-oriented 'Parkland City' will join the Sydney CBD-focused 'Harbour City', and the Parramatta-centred 'River City'. High-frequency public transport services and improved active transport options will be needed to ensure this urban structure is a success and to achieve the goal of making jobs and services in all the city's centres accessible within 30 minutes of non-car travel time.

**Figure 10:** Sydney weekday bus passenger volume / capacity ratio, 2016 AM peak




Source: Veitch Lister Consulting (2019)[48]

## Findings

- Extended sections of the M5, M4 and M2 motorways that connect Greater Western Sydney to the Sydney CBD and the city's ports are congested in the peak travel direction every weekday, to a distance of as much as 40km from the CBD.
- Sydney's natural topography, bushland and waterways have the effect of concentrating traffic onto a limited number of corridors at gateways to the Sydney CBD, at crossings of the Parramatta, Cooks and Georges rivers, and across large areas of northern and north-western Sydney. This results in severe congestion on associated roads including the Sydney Harbour Bridge and Tunnel, General Holmes Drive, Warringah Road and the A3.
- The best-serviced bus routes, such as the Northern Beaches and Victoria Road corridors, can become a victim of their own popularity. This can lead to diminishing long-run returns from bus priority investment.

## 5.4 Even with programmed investment, Sydney's transport networks are forecast to become more congested

### Snapshot of Sydney's transport networks in 2031

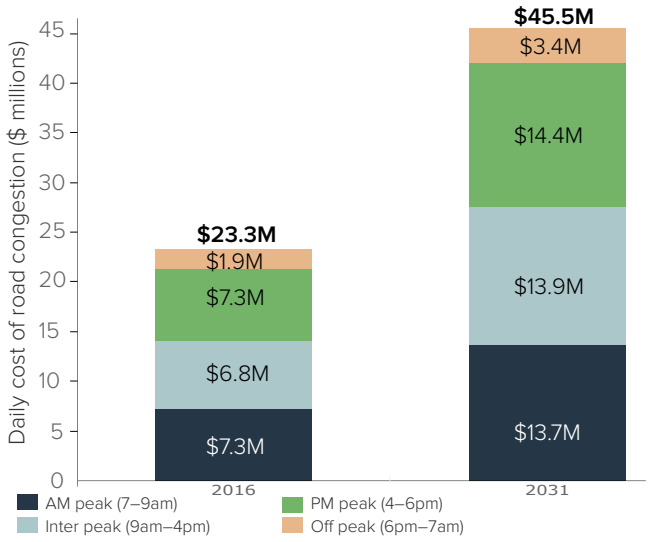
Looking out to 2031, Sydney roads and public transport services will be faced with a substantially larger transport task. The city's population is forecast to grow from 4.9 million to 6.4 million. Nearly 5 million more passenger trips are expected to be made each day. Our modelling indicates the annualised cost of road congestion and public transport crowding for Sydney, the Hunter and Illawarra will be approximately $15.9 billion in 2031.

The extra time spent stuck in traffic and on crowded public transport is expected to contribute to a near-doubled daily cost of congestion – from $23 million to $46 million for the broader region that also includes Newcastle and Wollongong (Figure 11).

The annualised cost of road congestion for Sydney, the Hunter and Illawarra, will increase from $8.0 billion in 2016 to $15.7 billion in 2031. For Sydney, it was $6.6 billion in 2016 and will be $13.1 billion in 2031. The annualised road congestion costs and public transport crowding costs for the broader region will increase from approximately $8.1 billion in 2016 to $15.9 billion in 2031.[49]

Congestion will increase by the greatest rate in the inter-peak period, as the traditional times of heavy traffic delay extends into the middle of the day. Inter-peak congestion costs will overtake AM peak congestion by 2031. Although modelling has only been carried out for weekdays, growth in off-peak traffic is expected to follow a trend that has already seen, over the past decade, an increase in weekend traffic levels also on many major routes in Sydney.[50]

**Figure 11:** Sydney, the Hunter and Illawarra average weekday cost of road congestion, 2016 and 2031




Source: Veitch Lister Consulting (2019)[51]

These forecast outcomes hold despite both the expected rise in public transport mode share and Sydney's historically unprecedented pipeline of transport infrastructure. This comprises projects that were either under construction, under procurement or had funding for construction committed from all relevant governments at the time of Infrastructure Australia's transport modelling for this Audit.[52]

In summary, these major projects were assumed for 2031 forecast purposes:

- Western Sydney Airport road network including M12 motorway
- NorthConnex motorway
- WestConnex motorway
- F6 motorway extension (stage 1)
- Sydney Metro Northwest
- Sydney Metro City & Southwest
- CBD and South East Light Rail (Kingsford / Randwick to city)
- Newcastle Light Rail (Wickham to Newcastle)
- Major bus priority corridors including the Northern Beaches B-Line, Parramatta to city via Ryde, Burwood to city and North Bondi to city.

### Sydney's most congested roads in 2031: what the driver will experience

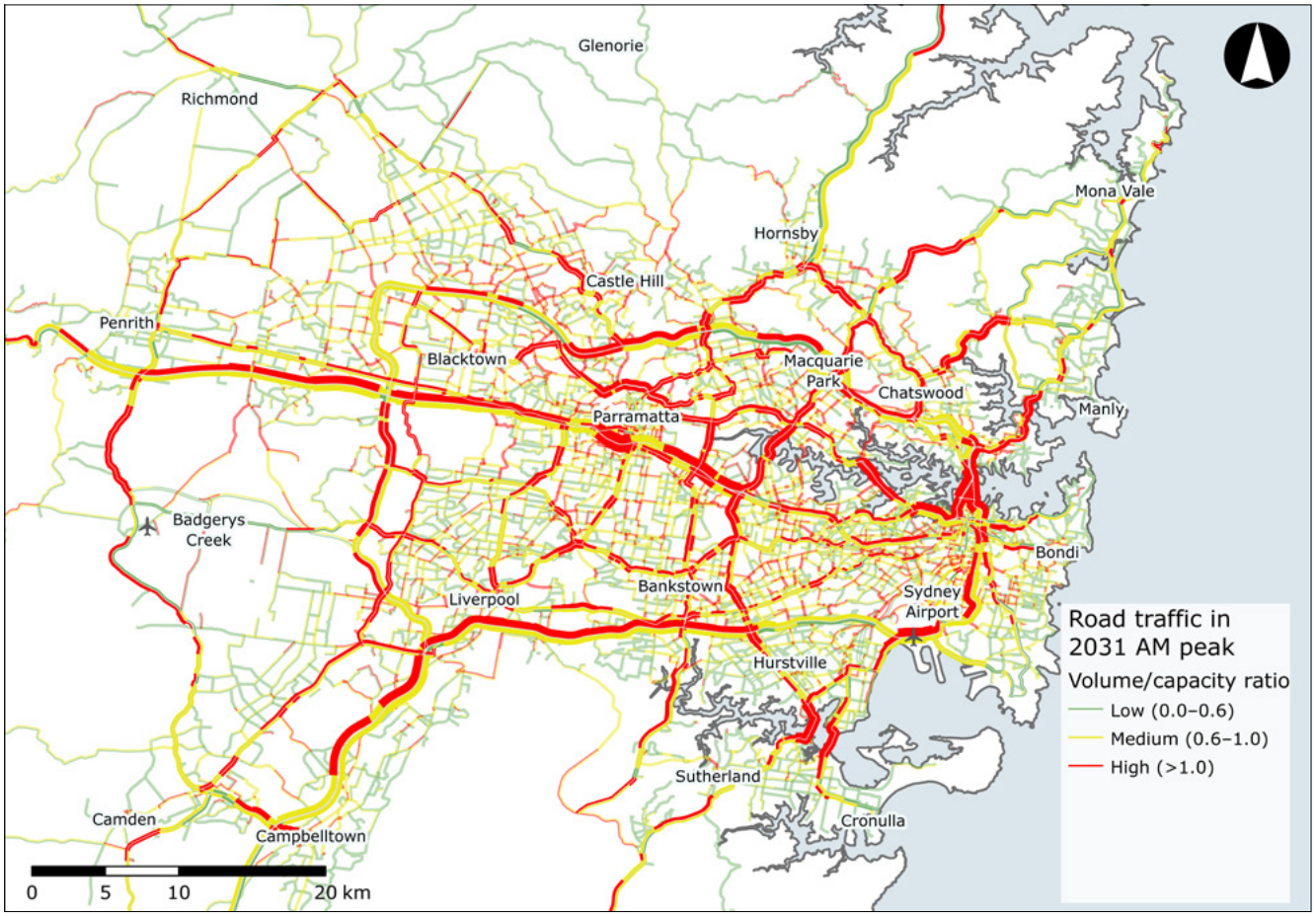
In 2031, Sydney's most congested roads from a user's perspective will broadly be the same as those today (Figure 12, Table 13 and Figure 13).

However, the proportion of the trip that drivers will spend on those roads in congestion is forecast to increase from 60–80% in 2016, to 70–90% in 2031.

By 2031, it will be much more common for peak congestion to be encountered in both directions on Sydney's major routes, as employment grows in north-western and south-western Sydney. The development of Sydney as a multi-centred metropolis will also drive increased congestion on cross-regional north-south routes. These include the M7 and the A3 in addition to the customarily congested routes radial to the Sydney CBD.

As today, the worst bottlenecks in 2031 are expected to include routes that will still be functioning as major bus corridors, the Gore Hill Freeway / Warringah Freeway / Eastern Distributor corridor between the Lower North Shore and the Sydney CBD, and Narraweena (Dee Why) to Chatswood via Warringah Road. M2 corridor bus services will still be crossing Sydney Harbour into the CBD. The Northern Beaches will continue to rely on buses travelling through Frenchs Forest to access Metro and suburban train services at Chatswood.

**Figure 12:** Sydney weekday traffic volume / capacity ratio, 2031 AM peak




Source: Veitch Lister Consulting (2019)[53]

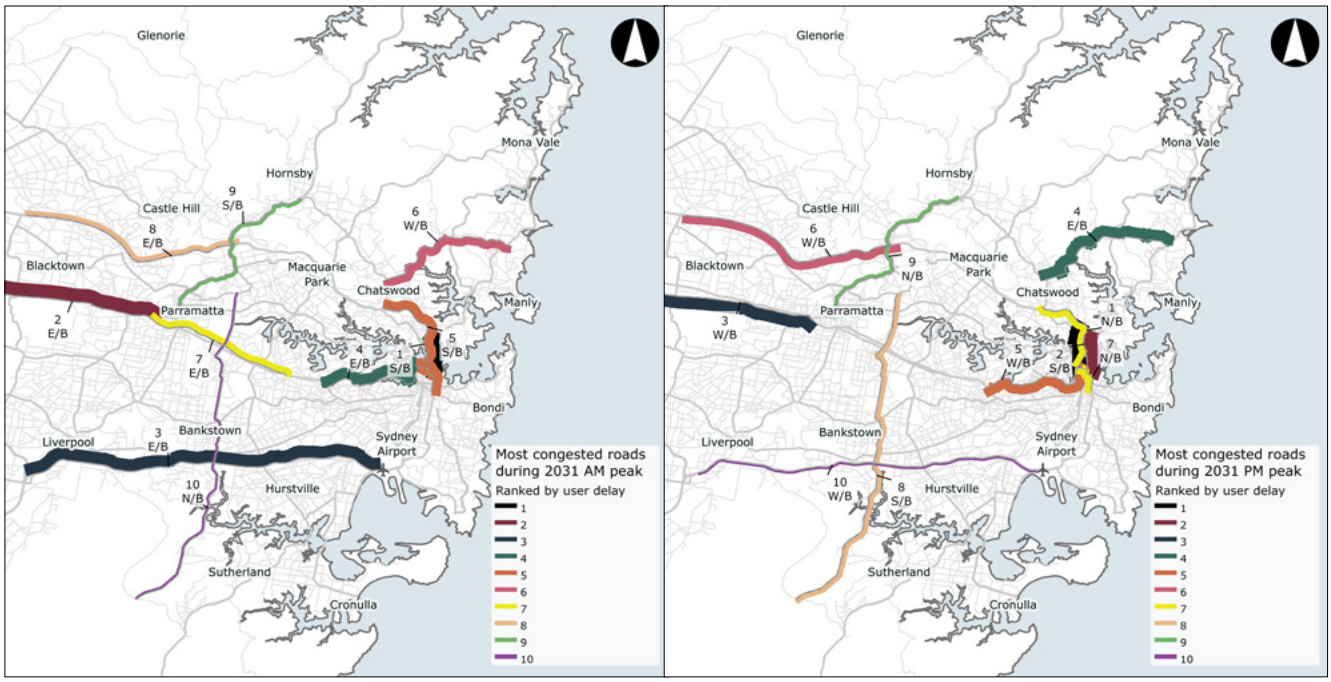
**Table 13:** Sydney's most congested roads (user experience), 2031

| City rank | Corridor including origin / destination connected (direction) | Length (km) | Share of journey time due to congestion | Delay per vehicle (mins) | Cost of congestion for a car | Cost of congestion for a heavy commercial vehicle |
|---|---|---|---|---|---|---|
| AM peak | | | | | | |
| 1. | North Sydney to Sydney CBD via Sydney Harbour Tunnel (S/B) | 4 | 84% | 19 | $5.25 | $22.60 |
| 2. | Mount Druitt to Westmead via M4 (E/B) | 13 | 75% | 25 | $6.90 | $29.74 |
| 3. | Liverpool to Sydney Airport via M5 (E/B) | 28 | 74% | 49 | $13.53 | $58.29 |
| 4. | Ashfield to Sydney CBD via City West Link / Anzac Bridge (E/B) | 9 | 73% | 27 | $7.46 | $32.12 |
| 5. | Artarmon to Surry Hills via Pacific Highway / Sydney Harbour Bridge / Cahill Expressway / Eastern Distributor (S/B) | 11 | 72% | 25 | $6.90 | $29.74 |
| 6. | Narraweena to Chatswood via Warringah Road (W/B) | 12 | 71% | 30 | $8.29 | $35.69 |
| 7. | Westmead to Strathfield via M4 (E/B) | 12 | 71% | 21 | $5.80 | $24.98 |
| 8. | Baulkham Hills to Macquarie Park via M2 (E/B) | 18 | 69% | 26 | $7.18 | $30.93 |
| 9. | Hornsby to Parramatta via Pennant Hills Road (S/B) | 16 | 68% | 36 | $9.94 | $42.83 |
| 10. | Sutherland west (Lucas Heights) to Ryde west (Dundas Valley) via A6 (N/B) | 32 | 68% | 67 | $18.50 | $79.71 |
| PM peak | | | | | | |
| 1. | Sydney CBD to North Sydney via Sydney Harbour Tunnel (N/B) | 4 | 81% | 15 | $4.14 | $17.85 |
| 2. | North Sydney to Sydney CBD via Sydney Harbour Tunnel (S/B) | 4 | 79% | 14 | $3.87 | $16.66 |
| 3. | Westmead to Eastern Creek via M4 (W/B) | 12 | 76% | 25 | $6.90 | $29.74 |
| 4. | Chatswood to Narraweena via Warringah Road (E/B) | 12 | 72% | 32 | $8.84 | $38.07 |
| 5. | Sydney CBD to Ashfield via Anzac Bridge / City West Link (W/B) | 9 | 69% | 22 | $6.08 | $26.17 |
| 6. | Macquarie Park to Baulkham Hills via M2 (W/B) | 18 | 69% | 25 | $6.90 | $29.74 |
| 7. | Surry Hills to Artarmon via Eastern Distributor / Cahill Expressway / Sydney Harbour Bridge / Pacific Highway (N/B) | 12 | 67% | 20 | $5.52 | $23.79 |
| 8. | Ryde west (Dundas Valley) to Sutherland west (Lucas Heights) via A6 (S/B) | 32 | 67% | 63 | $17.40 | $74.95 |
| 9. | Parramatta to Hornsby via Pennant Hills Road (N/B) | 16 | 67% | 34 | $9.39 | $40.45 |
| 10. | Sydney Airport to Liverpool via M5 (W/B) | 27 | 67% | 36 | $9.94 | $42.83 |

Note: N/B, S/B, W/B and E/B represent northbound, southbound, westbound and eastbound, respectively.

Source: Veitch Lister Consulting (2019)[54]

**Figure 13:** Sydney's most congested roads (user experience), 2031 AM (left) and PM (right) peak periods




Source: Veitch Lister Consulting (2019)[55]

An increase in congestion is forecast for the M5 between Liverpool and Sydney Airport, notwithstanding capacity expansion at the eastern end of this corridor under the WestConnex program. Congestion is forecast south of Liverpool also, extending towards Campbelltown and the Greater Macarthur Growth Area.

In contrast, improvements to traffic flows following the delivery of other WestConnex projects are expected to result in Parramatta Road between Strathfield and Haberfield dropping off the list of Sydney's ten most congested roads.

It is expected that Pennant Hills Road between Parramatta and Hornsby will continue to remain congested, despite NorthConnex accommodating most traffic on this corridor. (It should be noted that congestion on Pennant Hills Road could be overstated in the modelling, because the NSW Government's commitment to ensure all trucks use NorthConnex could not be modelled.) Other roads around Parramatta, including James Ruse Drive and the M4, will experience bi-directional congestion due in part to the growth of Sydney's second CBD, Parramatta.

While they are not on the list of Sydney's forecast ten most congested roads in 2031, and expected to be carrying low absolute traffic volumes in that year, it is of note in Figure 12 that routes around the designated Western Sydney (Nancy-Bird Walton) Airport-Aerotropolis precinct are predicted to be operating over capacity in 2031. Even with Australian Government-funded investment in road widening through the Western Sydney Infrastructure Program, roads including The Northern Road, Luddenham Road and Badgerys Creek Road are forecast to be subject to delay.

## Sydney's most congested roads in 2031: the forecast cost to the community of total vehicle delays

As for 2016, the most congested road corridors in Greater Sydney have been forecast for 2031 based on aggregating the total delay hours experienced by all vehicles across the network during the modelled period. The ten most congested corridors under this approach are shown by Table 14 and Figure 14.

Relatively long-distance connections between Sydney and satellite cities, the Central Coast and Illawarra, to its north and south will still be among the worst performers in terms of the total costs of congestion experienced by the community. Compared with 2016, however, the corridor seeing the fastest growth in congestion by this measure could be an inland connection – the M31 / M5 corridor that links south-western Sydney's Greater Macarthur growth precincts to eastern Sydney.

## Sydney's public transport system in 2031

Public transport use in Sydney is forecast to grow substantially by 2031, influenced by investment in the public transport network, road congestion, higher-density development along public transport corridors and the assumed increase in parking costs relative to stable public transport fares.

Given these factors and despite major additions – principally in the form of new or upgraded Sydney Metro train lines and light rail lines – Sydney's public transport system is forecast to become more crowded and at consequent risk of delays.

By 2031 it is expected that most Sydney CBD-bound train services will be operating well above seated capacity in the AM peak (Figure 15). The adoption of Metro technology based on fast loading / unloading rolling stock with limited seating means that standing will be common on these new services. From the passenger's perspective these services will deliver more frequent and less crowded services (compared to double-decker trains), with the trade-off of reduced seating.

However, few of Sydney's lines are forecast to be operating above crush capacity in 2031. Lines that will be the most challenged by demand growth are the T8 Airport line from Mascot to the CBD through Green Square (due to growth in the southern Sydney corridor), the same line between Panania and Revesby (due to growth originating from Greater Macarthur, to the south-west), the T2 Inner West line, and the T5 Cumberland line between Merrylands and Parramatta.

Elsewhere on Sydney's train network, the new Sydney Metro services operating by 2031 will provide significant additional capacity. This is expected to reduce the likelihood of crowding through the North Shore and Sydenham–Bankstown corridors and (with new stations operating in the city core and at Barangaroo) within the Sydney CBD itself.

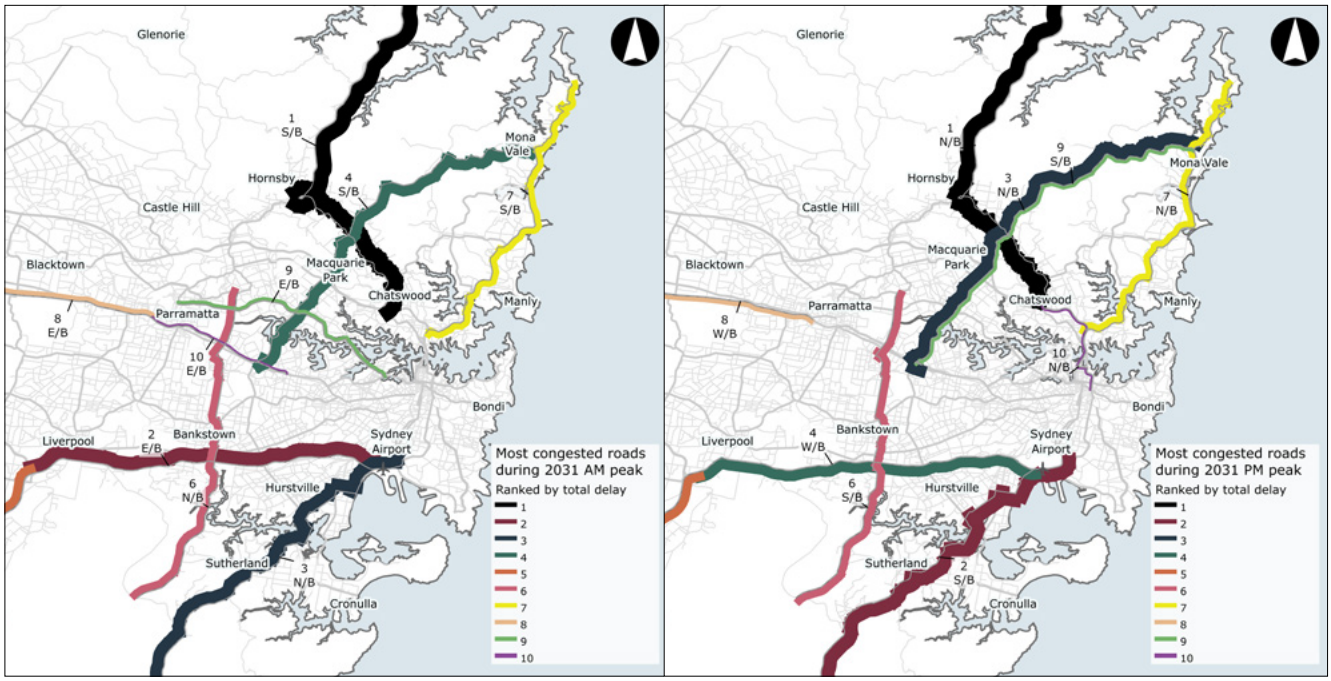
**Table 14:** Sydney's most congested roads (total vehicle delays), 2031

| City rank | Corridor | Direction | Total delay hours | Cost of congestion (daily) |
|---|---|---|---|---|
| AM peak | | | | |
| 1. | Central Coast to Sydney corridor (M1) | S/B | 9,600 | $257,000 |
| 2. | Liverpool to Sydney Airport corridor (M5) | E/B | 9,200 | $198,000 |
| 3. | Illawarra to Sydney corridor (A1) | N/B | 8,400 | $206,000 |
| 4. | Mona Vale to Sydney Olympic Park corridor (A3) | S/B | 7,100 | $148,000 |
| 5. | Mittagong to Liverpool corridor (M31) | N/B | 6,100 | $155,000 |
| 6. | Sutherland west to Ryde west corridor (A6) | N/B | 5,300 | $120,000 |
| 7. | Northern Beaches to North Sydney corridor (A8) | S/B | 4,900 | $100,000 |
| 8. | Eastern Creek to Westmead corridor (M4) | E/B | 4,800 | $103,000 |
| 9. | Victoria Road corridor (A40) | E/B | 4,400 | $93,000 |
| 10. | Westmead to Strathfield corridor (M4) | E/B | 4,100 | $88,000 |
| PM peak | | | | |
| 1. | Sydney to Central Coast corridor (M1) | N/B | 8,700 | $227,000 |
| 2. | Sydney to Illawarra corridor (A1) | S/B | 7,500 | $180,000 |
| 3. | Homebush Bay to Mona Vale corridor (A3) | N/B | 7,100 | $145,000 |
| 4. | Sydney Airport to Liverpool corridor (M5) | W/B | 6,800 | $142,000 |
| 5. | Liverpool to Mittagong corridor (M31) | S/B | 5,400 | $129,000 |
| 6. | Ryde west to Sutherland west corridor (A6) | S/B | 5,400 | $124,000 |
| 7. | North Sydney to Northern Beaches corridor (A8) | N/B | 5,200 | $104,000 |
| 8. | Westmead to Eastern Creek corridor (M4) | W/B | 5,000 | $114,000 |
| 9. | Mona Vale to Sydney Olympic Park corridor (A3) | S/B | 4,800 | $100,000 |
| 10. | Eastern Distributor / Sydney Harbour Bridge / Warringah Freeway / Gore Hill Freeway corridor (M1) | N/B | 4,300 | $98,000 |

Note: N/B, S/B, W/B and E/B represent northbound, southbound, westbound and eastbound, respectively.

Source: Veitch Lister Consulting (2019)[56]

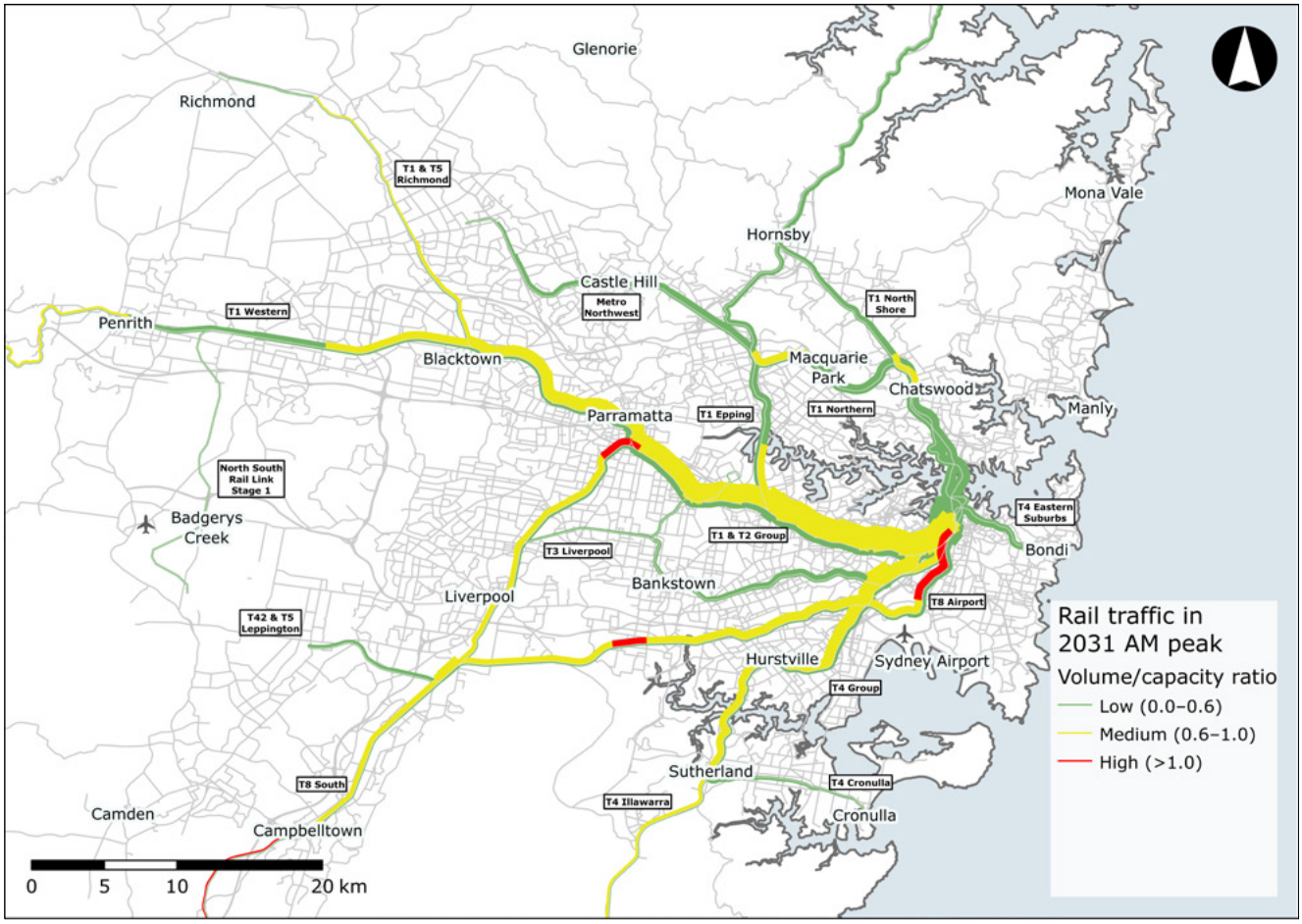
**Figure 14:** Sydney's most congested roads (total vehicle delays), 2031 AM (left) and PM (right) peak periods




Note: The Mittagong to Liverpool corridor (5th most congested corridor in both AM and PM peak periods) is located beyond the map extent, towards the south west.

Source: Veitch Lister Consulting (2019)[57]

**Figure 15:** Sydney weekday train passenger volume / capacity ratio, 2031 AM peak




Source: Veitch Lister Consulting (2019)[58]

Many Sydney bus services are projected to be significantly more crowded in 2031 (Figure 16). Customers travelling on the Northern Beaches corridor are expected to experience congestion and crowding. While urban growth along this corridor is forecast to be low relative to other parts of Sydney to 2031, public transport passengers will continue to have to travel by bus to Chatswood or North Sydney to access train services.

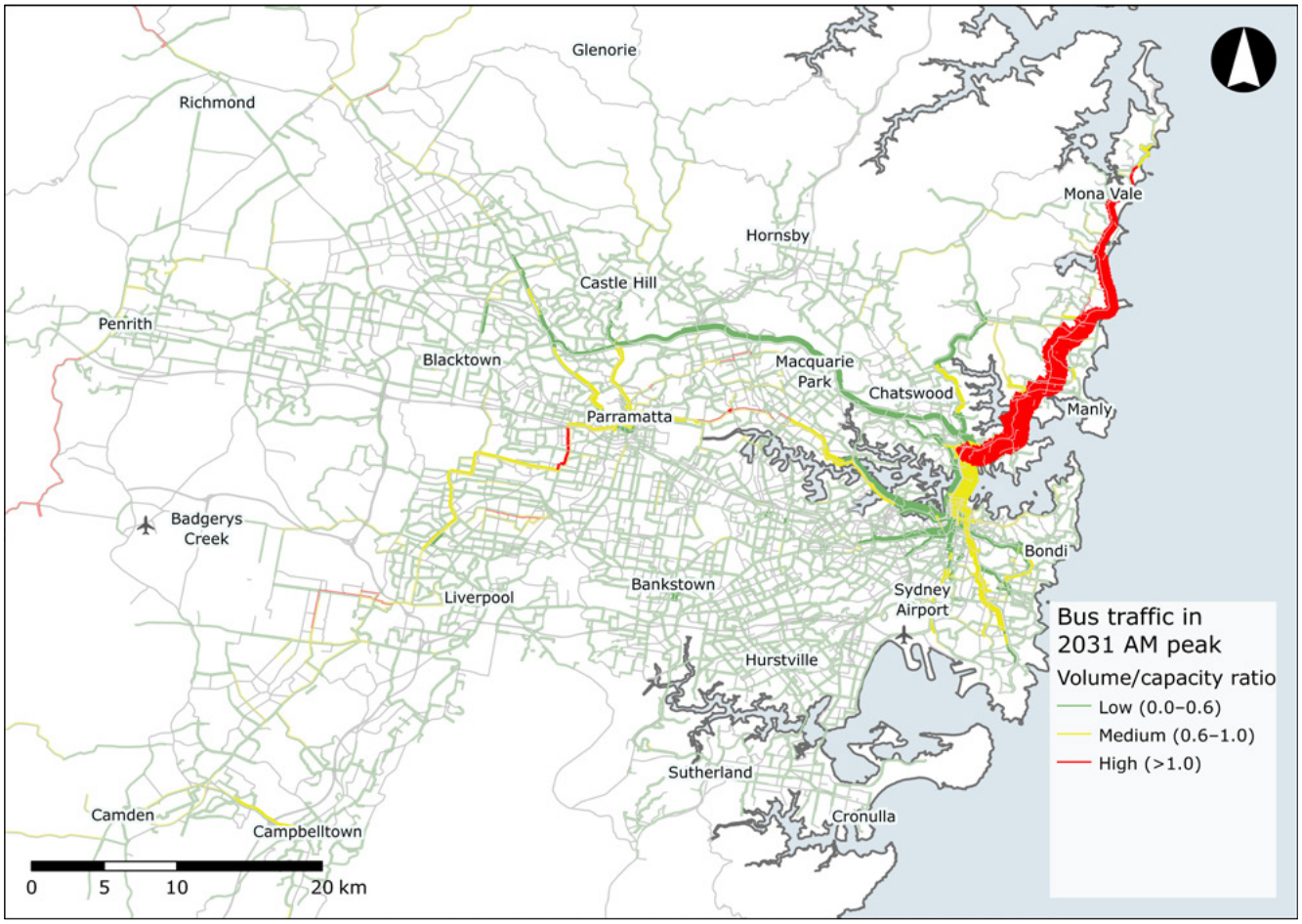
These factors will continue to desire dependence on road-based transport along the full length of the Military, Spit and Pittwater Roads corridor. The provision of bus priority lanes on this corridor is forecast to shift demand to bus services from the use of congested general traffic lanes. In 2031 this demand will, as today, converge with less intensively used M2 Busway services at the northern entry to the Sydney CBD. As a result, services using the Northern Beaches bus corridor are forecast to be operating well in excess of crush capacity all the way from Dee Why to North Sydney in 2031.

In addition, the Liverpool-Parramatta T-Way, and services running along the Victoria Road corridor (where bus priority is assumed to be upgraded) parallel to the T1 Western line, will attract demand in excess of seated capacity. Bus priority measures on these routes mean that they are forecast to offer proportionately faster travel, relative to worsening conditions for driving, in 2031 than they do today. This is forecast to increase demand for travel on these routes, potentially leading to overcrowding and flow-on operating inefficiencies.

By 2031, most bus routes currently operating along the Anzac Parade corridor will have changed to services feeding a higher-capacity light rail system. This is also expected to be the operating model for many bus services connecting to Parramatta Light Rail stops. One exception will be due to ongoing high population growth in the Hills District, which is forecast to increase the use of Old Windsor Road (T-way) and Windsor Road bus services accessing Parramatta.

In contrast to roads around Western Sydney (Nancy-Bird Walton) Airport-Aerotropolis, the first stage of a Western Sydney Airport rail line, between St Mary's and the new airport, is forecast to be operating well under capacity by 2031. This will be a function of the decision to invest in this connection ahead of, and to shape, Aerotropolis land use and transport demand. The importance of this type of integrated land use and transport planning in shaping future travel patterns is explored further in Sydney's Growth Centres.

**Figure 16:** Sydney weekday bus passenger volume / capacity ratio, 2031 AM peak




Source: Veitch Lister Consulting (2019)[59]

## Findings:

- The 2019 Audit forecasts that the annualised cost of road congestion for Sydney, the Hunter and Illawarra will grow from approximately $8.0 billion in 2016 to $15.7 billion in 2031. This is 6% higher than the 2031 forecast cost of road congestion in the 2015 Audit.
- Congestion is expected to grow by the greatest amount for the weekday inter peak, business hours period (9am to 4pm).
- Despite major projects expanding the capacity of Sydney's road network, modelling shows widespread peak congestion in 2031.
- Except in the vicinity of NorthConnex (near Pennant Hills, Beecroft, Thornleigh and Wahroonga) and WestConnex links (near Annandale, Leichardt, Enmore, Newtown, Erskineville and Haberfield), nearly the continuous length of the M5, M4 and M2 motorways are forecast to have insufficient capacity in peak periods, as far west as Campbelltown, Penrith and Seven Hills. Non-motorway arterial roads in areas of northern Sydney will also be congested.
- Key north-south corridors, including the M7, A3 and all Sydney Harbour crossings, are forecast to have very significant congestion in 2031.
- Inter-city routes, particularly links connecting Sydney to the Central Coast and Illawarra regions, will be heavily congested by 2031.
- Train services are expected to get more crowded on western and south-western lines radiating from the Sydney CBD as far as St Marys, Campbelltown and Waterfall. In northern Sydney crowding will be somewhat mitigated by the addition of Sydney Metro Northwest services.
- The only groups of Sydney's train passengers forecast to experience travel in crush conditions are those using services south of Granville (affecting travel between Campbelltown, Liverpool and Parramatta) and on two sections of the T8 Airport Line (which will connect the Greater Macarthur growth corridor and Sydney Airport to central Sydney).
- High levels of bus crowding are forecast for passengers using services on the Northern Beaches peninsula, peaking on the Lower North Shore just north of the Sydney Harbour Bridge and Tunnel gateways to the CBD. Crowding is also expected to increase for passengers using services on Victoria Road and on routes connecting Greater Parramatta to its south-west (the Liverpool-Parramatta T-way) and to Macquarie Park.

## Sydney's growth centres: how integrated land use and transport actions are critical to shaping future travel patterns

Sydney's north-west and south-west growth centres are instructive case studies on how integrated transport and land-use planning is critical in shaping travel demand, particularly in new release areas. While demographically and geographically similar, these two areas have been differently served in transport terms during the first five to 10 years of their respective urban development lifecycles.

Greenfields development areas in the North West Sector were serviced from the time of their release by buses which provided relatively reliable and direct same-seat access to the Sydney CBD and Global Arc via the M2 Busway. The Global Arc is an economic corridor stretching from Macquarie Park to Port Botany through Chatswood, St Leonards, North Sydney, the Sydney CBD and Sydney Airport. The northern precincts in the North West Sector (including Rouse Hill) developed with additional access to the North West T-way, which provided similarly competitive travel times to Parramatta and Blacktown.

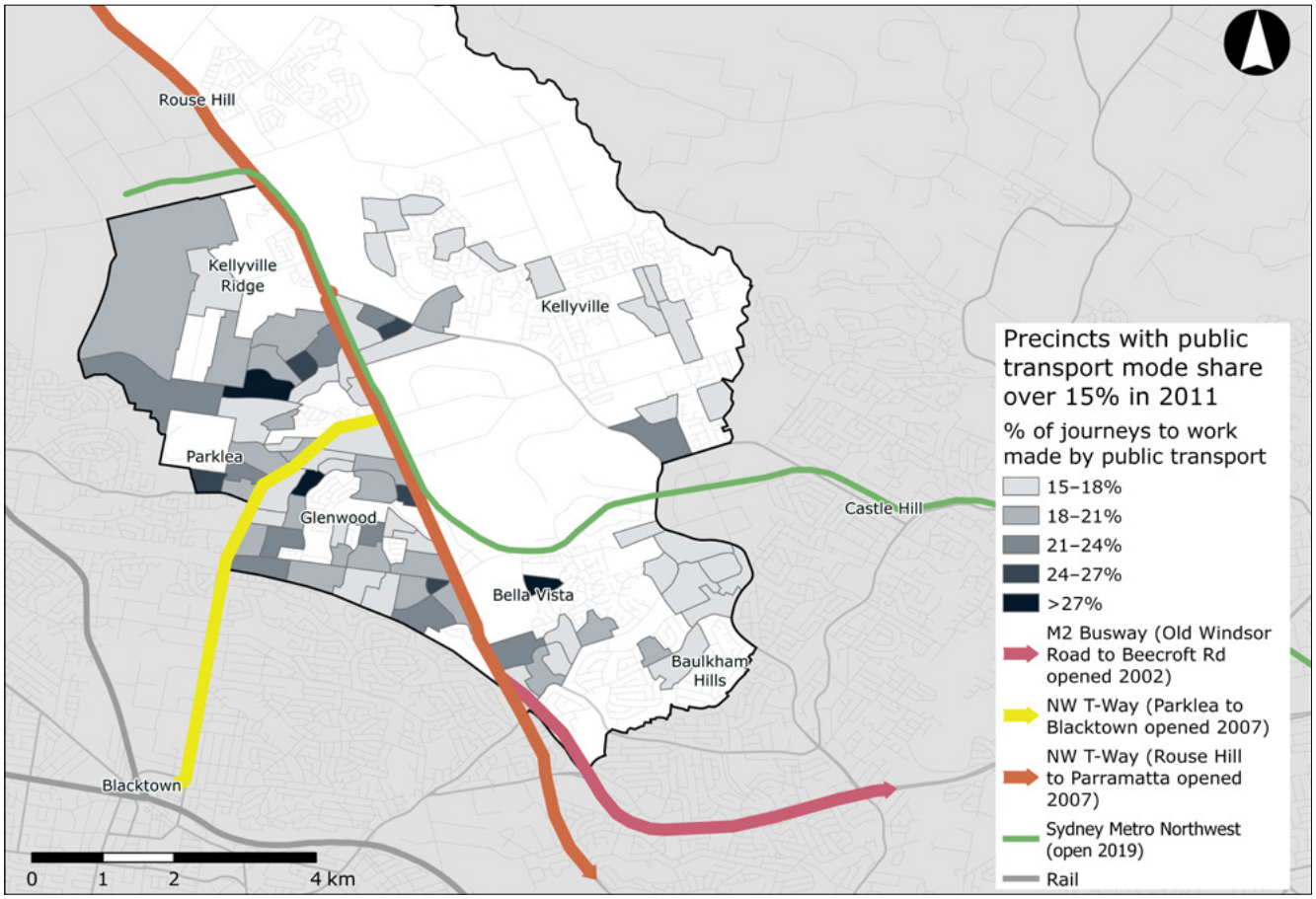
Figure 17 shows public transport journey-to-work mode share for the North West Sector eight years ago, in 2011. Even without direct rail access, the area's rapid bus links had by that year already facilitated its relatively dense development and healthy public transport mode share.

Given forecast ongoing growth in North West Sector population and Global Arc job numbers, it has become necessary to supplement the function of the M2 Busway as the area's primary transit link to the Sydney CBD. The Sydney Metro Northwest opened in May 2019, providing this function for suburbs west of Cherrybrook.

Outcomes in the South West Growth Area, at a somewhat similar stage in its greenfields development lifecycle in 2016 to the north-west five years earlier, contrast markedly with the North West Sector (Figure 17 and Figure 18). This growth area, unlike the North West Sector, was in that year relying on local buses operating in mixed traffic for access to major centres and train services at Campbelltown-Macarthur and Leppington. Only scattered pockets of urban development were generating a 15% public transport mode share.

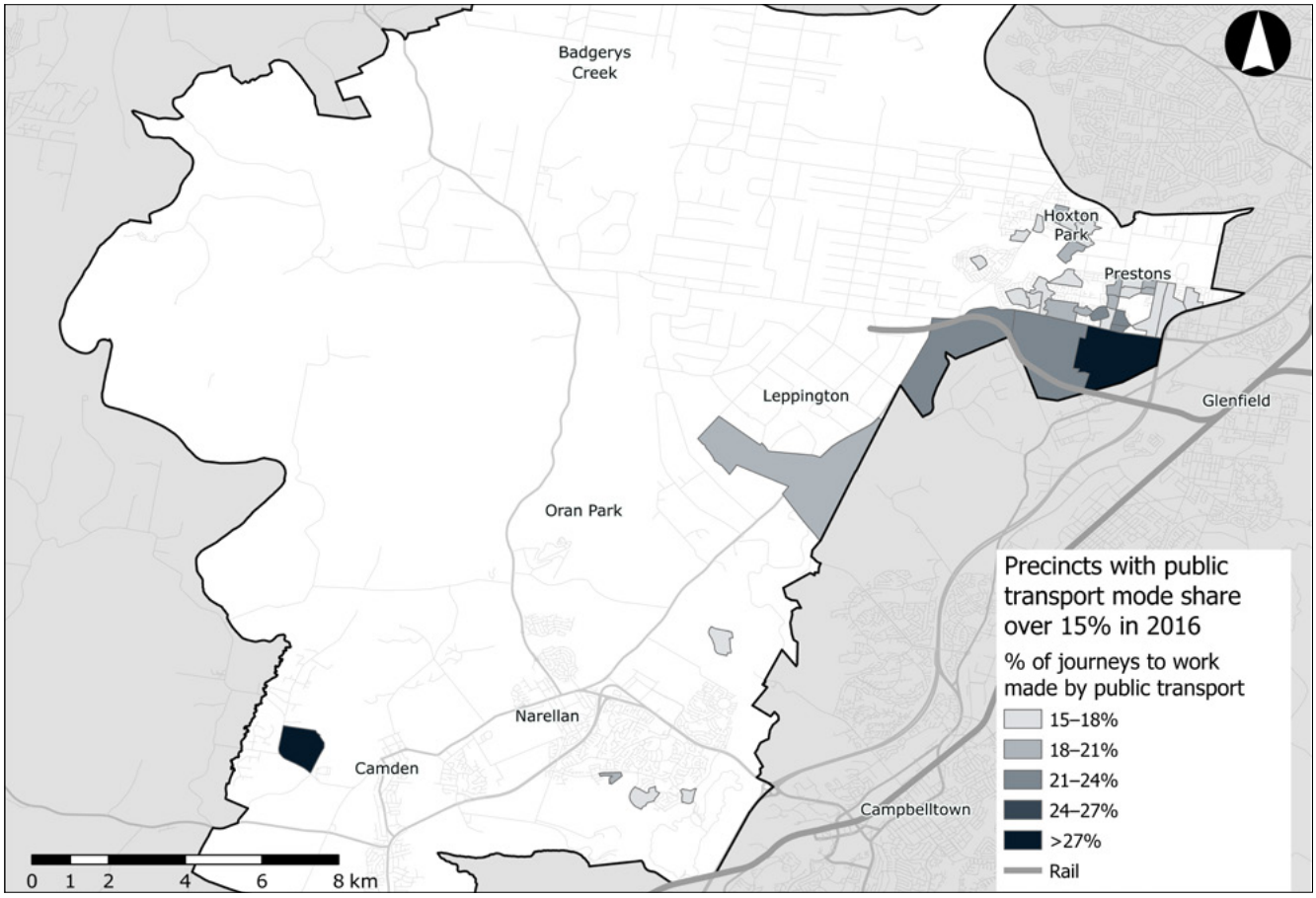
The evidence points towards a significantly greater dependence on driving for commuting and other trip purposes in the south west than the north west areas analysed.

**Figure 17:** Even without direct rail access, public transport mode share is high in the North West Sector




Source: Australian Bureau of Statistics (2011)[60]

**Figure 18:** Unlike the North West Sector, the South West Growth Area has very low public transport mode share




Source: Australian Bureau of Statistics (2016)[61]

## 5.5 Population growth is forecast to result in increased Hunter Region congestion

### Transport network outcomes for Newcastle and its region, today and in 15 years

The population of Newcastle city is forecast to increase by 33,000, or 20%, between 2016 and 2031. There will also be significant growth in surrounding Hunter Region areas, including Maitland (27%) and Port Stephens (24%).

Extra people living, working and visiting the Hunter Region will translate into demand pressures on the region's transport network. Notwithstanding the expected gradual emergence of a stronger public transport culture in Newcastle, increased congestion costs will be experienced across the Hunter Region as a whole. Between 2016 and 2031 the average weekday cost to the region of road congestion is forecast to grow from $3.5 million to $6.6 million, with a minor increase in costs associated with public transport crowding.

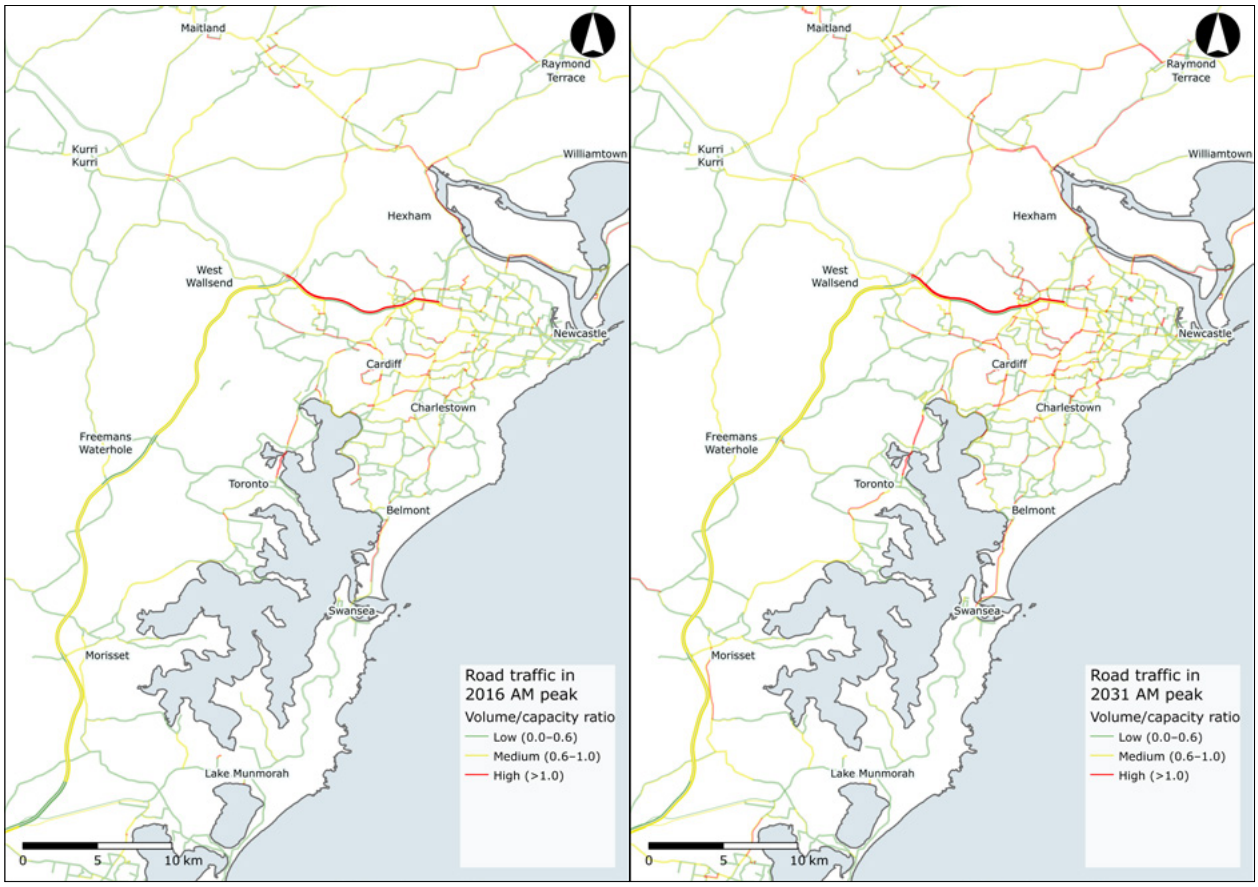
Road congestion is expected to especially affect major connections between central Newcastle and its surrounding region, including the New England Highway (A43 from Maitland), the Pacific Highway (from Swansea) and the Newcastle Link Road (Figure 19).

This congestion will affect access to Newcastle Airport at Williamtown. Closer to Newcastle CBD, delays are forecast on routes to the university and to the Charlestown strategic centre, and further south between Swansea and Belmont along the narrow coastal corridor, acting as a bottleneck for traffic between Lake Macquarie and Newcastle.

While car trips are expected to increase by 20%, public transport travel is forecast to grow (from its current low base) by 43%, on the back of projects including Newcastle Light Rail, and customer-oriented improvements to bus and ferry services under the Transport for Newcastle operating model. Population growth is forecast to result in bus service crowding on routes accessing Raymond Terrace from the east, along the Williamtown–Stockton–University of Newcastle corridor, and at the Charlestown southern gateway into Newcastle CBD (Figure 20).

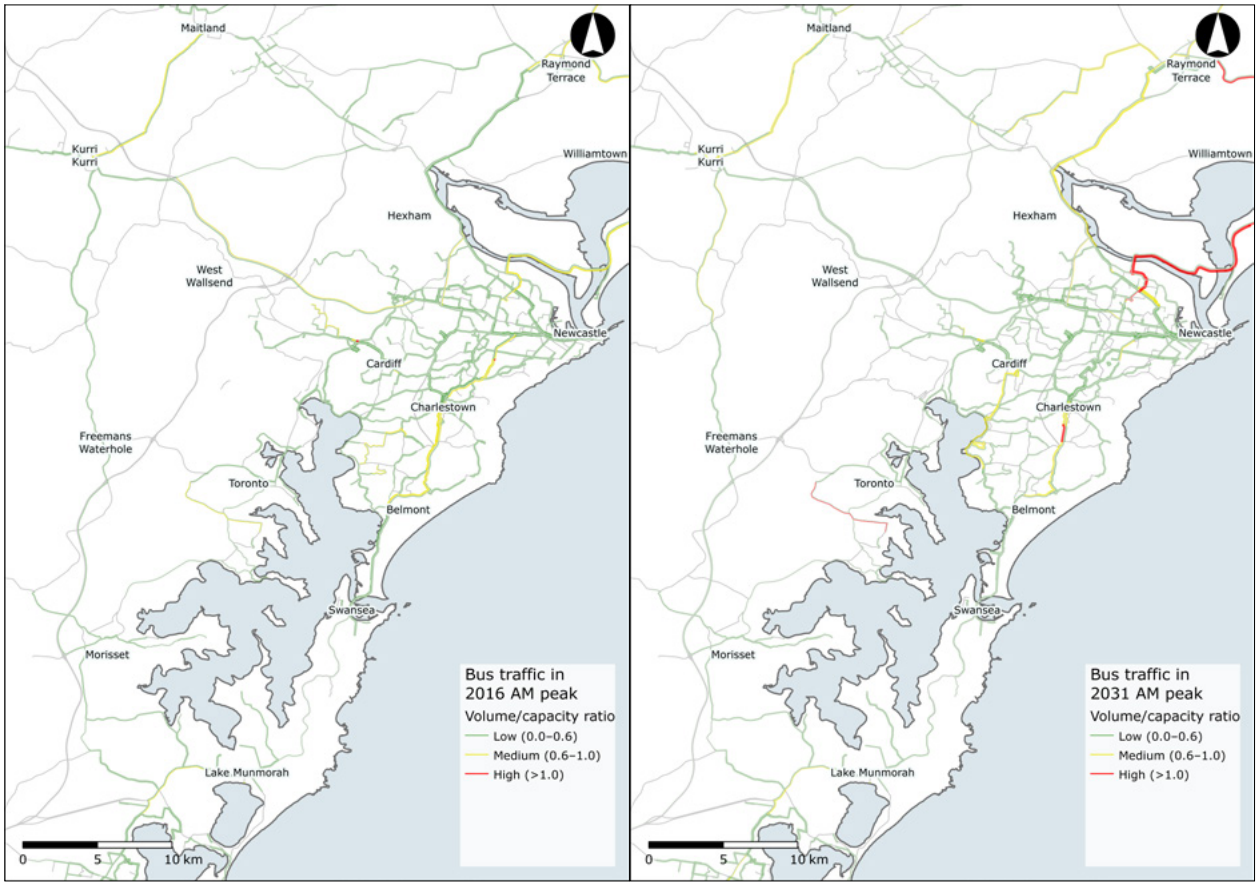
In contrast, modest growth in the patronage of Hunter Region train services is modelled as leading to minor crowding only on the Hunter Line west of Newcastle to Singleton (Figure 21).

**Figure 19:** Hunter Region weekday traffic volume / capacity ratio, 2016 and 2031 AM peak



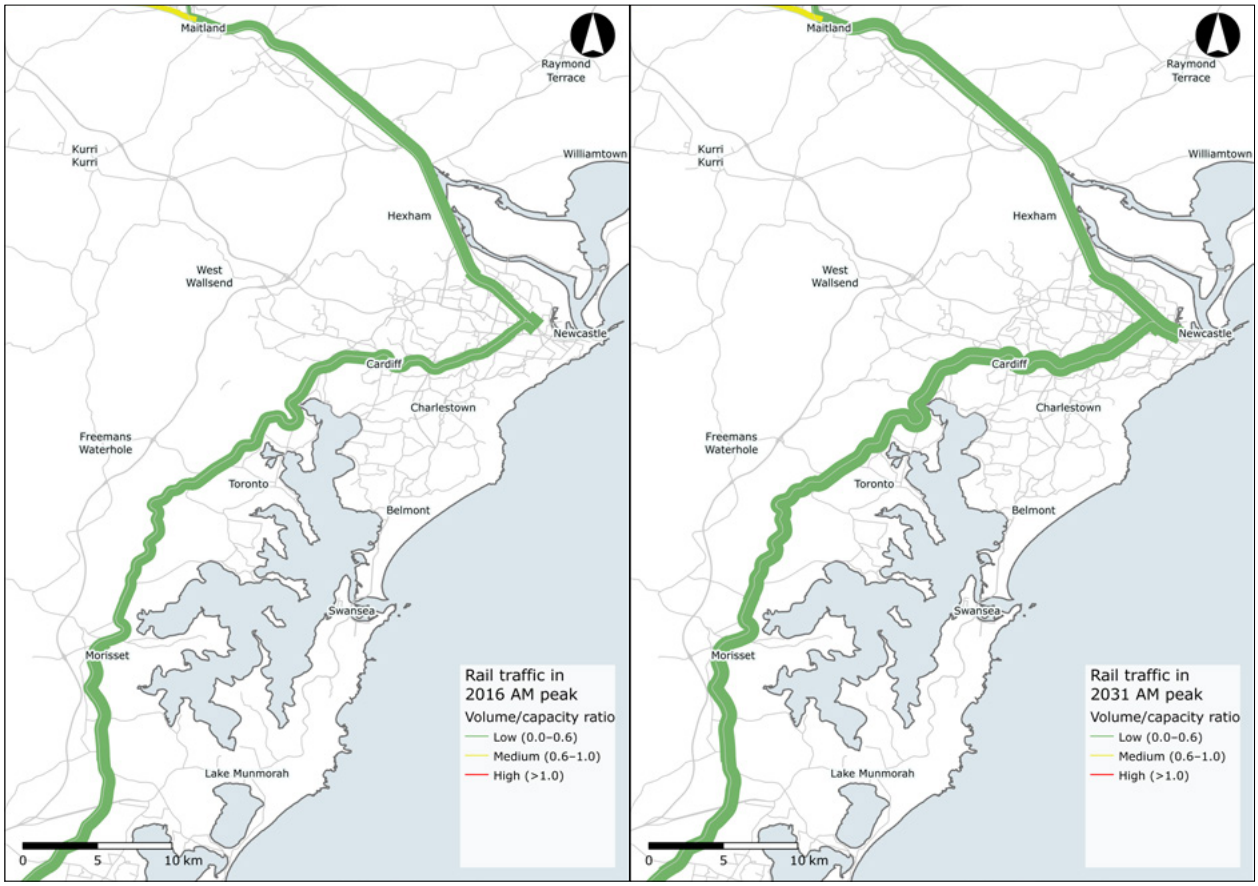

Source: Veitch Lister Consulting (2019)[62]

**Figure 20:** Hunter Region bus passenger volume / capacity ratio, 2016 and 2031 AM peak




Source: Veitch Lister Consulting (2019)[63]

**Figure 21:** Hunter Region train passenger volume / capacity ratio, 2016 and 2031 AM peak




Source: Veitch Lister Consulting (2019)[64]

## Findings

- There will be increased traffic congestion into Newcastle from the north (Raymond Terrace), north-west (Maitland), west (Wallsend) and south (Lake Macquarie) potentially undermining the competitive lifestyle and affordability advantage enjoyed by the city and the Hunter Region in comparison to Sydney.
- Congestion on the New England Highway corridor will impact the productivity of the Newcastle Port and associated industrial and commercial precincts.
- There will be some crowding of bus services that are concentrated onto a single crossing of the Hunter River connecting the University of Newcastle to the north-east.

## 5.6 The Illawarra Region's geography will constrain its connectivity to Sydney and exacerbate local congestion

### Transport network outcomes for Wollongong and its region, today and in 15 years

Given the limits placed on the expansion of a city located between escarpment and ocean, Wollongong is forecast to see relatively low population growth of about 11,000 people (8%) by 2031. Growth is expected to be somewhat higher in adjacent areas including Dapto-Port Kembla (19%) and Kiama-Shellharbour (21%). Over the Greater Sydney border, significant growth is forecast in the Greater Macarthur land release precincts in Wollondilly (30%).

There is expected to be increased demand for the region's transport network. Car trips are forecast to increase by 19%, and public transport by 30%. Between 2016 and 2031 the average weekday cost to the Illawarra Region of road congestion is forecast to grow from $500,000 to $1.1 million, with a minor further increase in costs associated with public transport crowding.

Key access routes into Wollongong from inner northern suburbs such as Fairy Meadow and Corrimal, as well as southern areas like Dapto and Albion Park, will be affected by congestion (Figure 22). As previously shown in Table 14, road delays will increasingly be experienced by users of the Princes Highway, which connects the Illawarra north to Sydney via the Sutherland Shire and south to Dapto and Kiama. Windang Road south of Port Kembla will also suffer increased congestion.

To the north-west of the Illawarra Region, Greater Macarthur corridor growth will increase traffic using the critical Appin and Picton road links that connect the Illawarra to south-western Sydney – and to the growing economic opportunities presented by the Western Sydney (Nancy-Bird Walton) Airport-Aerotropolis. The congestion of this M31 corridor, already demonstrated at an aggregate level in Table 14, will lead to longer travel times for people commuting between the Illawarra and Sydney centres including Campbelltown-Macarthur and Liverpool. The Illawarra Region would therefore find itself relatively isolated from the benefits of business investment and employment growth around Sydney's second airport.

Greater Macarthur growth will also generate its own demand for public transport travel to the north. Modelling shows this being focused on the Southern Highlands Line, resulting in the crush loading of the relatively low-frequency diesel train services that currently connect to Sydney Trains services at Macarthur. As shown in Figure 23, and previously in Figure 15, the more frequent rail connection between the Illawarra and Sydney – via Waterfall – will also be crowded in 2031.

For bus passengers, longer-distance services to south-western Sydney via Appin and Picton roads will become more crowded (Figure 24) as a result of the congestion affecting the only two connections across the escarpment between Wollongong and Greater Macarthur.

**Figure 22:** Illawarra Region weekday traffic volume / capacity ratio, 2016 and 2031 AM peak


Source: Veitch Lister Consulting (2019)[65]

**Figure 23:** Illawarra Region train passenger volume / capacity ratio, 2016 and 2031 AM peak


Source: Veitch Lister Consulting (2019)[66]

**Figure 24:** Illawarra Region bus passenger volume / capacity ratio, 2016 and 2031 AM peak


Source: Veitch Lister Consulting (2019)[67]

## Findings

- The Illawarra's unique geography constrains access to south-western Sydney via only two links across the escarpment (Appin Road and Picton Road) and along the coastal strip to southern Sydney via the Princes Highway.
- Greater Macarthur growth-related congestion of the Appin and Picton road bottlenecks will delay general traffic and longer-distance bus services between Wollongong, Campbelltown-Macarthur and the WSA-Aerotropolis.
- Freight access will compete with passenger movements for access to road and rail links between Port Kembla and Sydney.

## 5.7 Transport decisions impact access to jobs and services

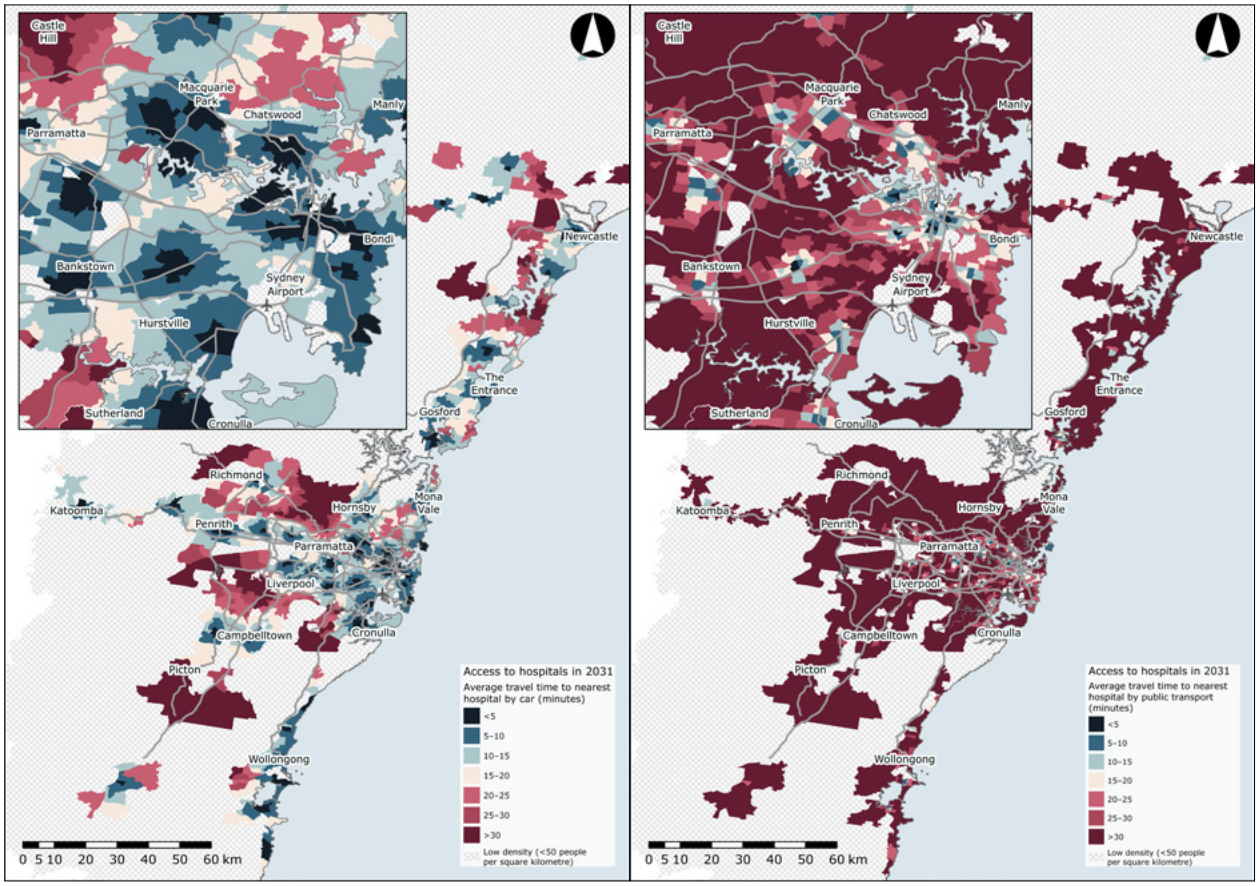
### Hospital access in Sydney, the Hunter, the Central Coast and Wollongong – by car and public transport, in 2031

Greater Sydney and Hunter Region residents' access to critical healthcare is measured as the travel time to their nearest public hospital, or hospital with an emergency department, by car versus public transport (Figure 25).

As can be seen, car accessibility to hospitals is universally superior to that available by public transport. For the modelled areas, the shortest average travel time to the nearest hospital via public transport is just over 20 minutes, for residents in Sydney Inner City, with most other residents needing to travel for more than 30 minutes.

The higher access time to one's nearest hospital by public transport may not be of significant concern to passengers able to drive to an outpatient appointment or to visit a sick family member. However, this can be problematic given the status of hospitals as major regional employers, attracting substantial daily commute flows that may warrant public transport services.

**Figure 25:** Greater Sydney average time to nearest hospital by car (left) and public transport (right), 2031 AM peak




Source: Veitch Lister Consulting (2019)[68]

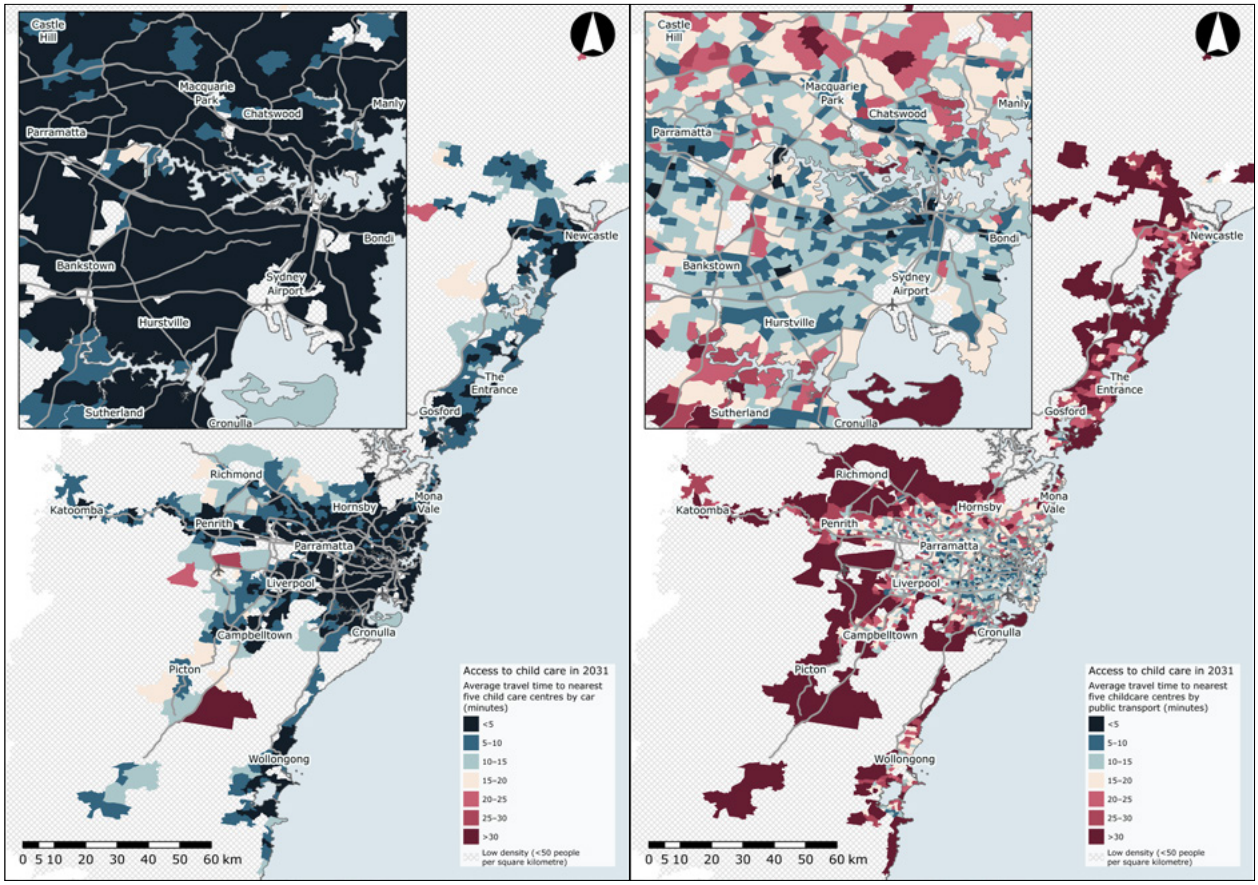
## Access to childcare and schools in Sydney, the Hunter, Central Coast and Wollongong – by car and public transport, in 2031

The modelling indicates that for the Greater Sydney or Hunter Region resident with access to a car, childcare choices and public primary and secondary schools are, on average, accessible within six minutes in 2016, and that this will increase to just seven minutes in 2031 (Figure 26, Figure 27 and Figure 28).

For people using public or active transport by choice or necessity, travel times are much longer, generally approaching 30 minutes for all these social infrastructure destinations in 2016 – and in 2031, even accounting for a modest improvement in average public transport travel times. In the case of childcare centres, best practice integrated land use and transport planning co-locates these with transport interchanges, to facilitate carer drop-off and pick-up being combined with the commuting trip.

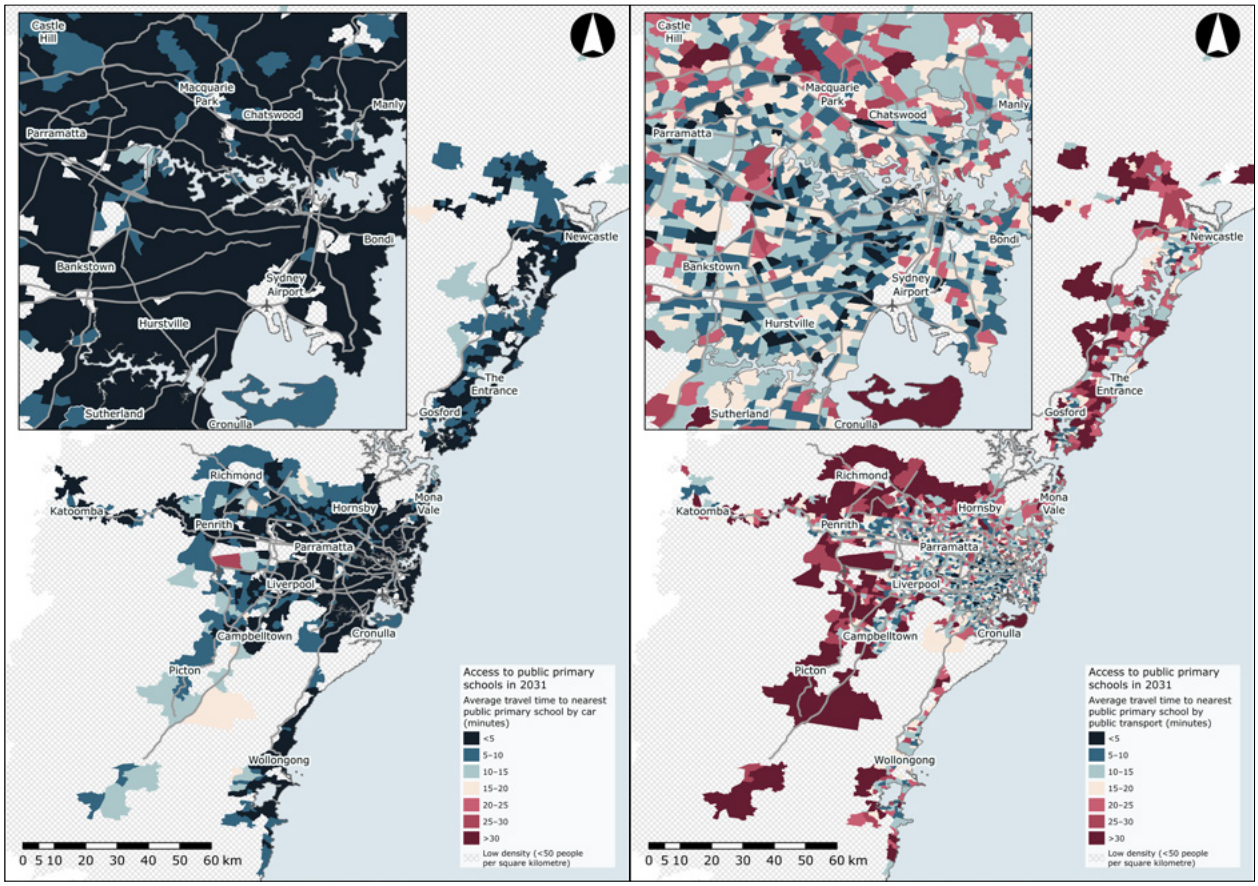
While noting the lower accuracy of this modelling for low-density areas, there is a risk that people who are the most disadvantaged in terms of their access to these three types of social infrastructure live (or will live) in rural residential and future new release areas on the edge of Greater Sydney. These include areas in LGAs such as Hawkesbury, Liverpool / Fairfield (west), the Blue Mountains (south), Wollondilly and Gosford. The supply of both transport and social infrastructure will need to keep pace with significant population growth in designated growth areas to mitigate this risk.

**Figure 26:** Greater Sydney average time to nearest five childcare centres by car (left) and public transport (right), 2031 AM peak



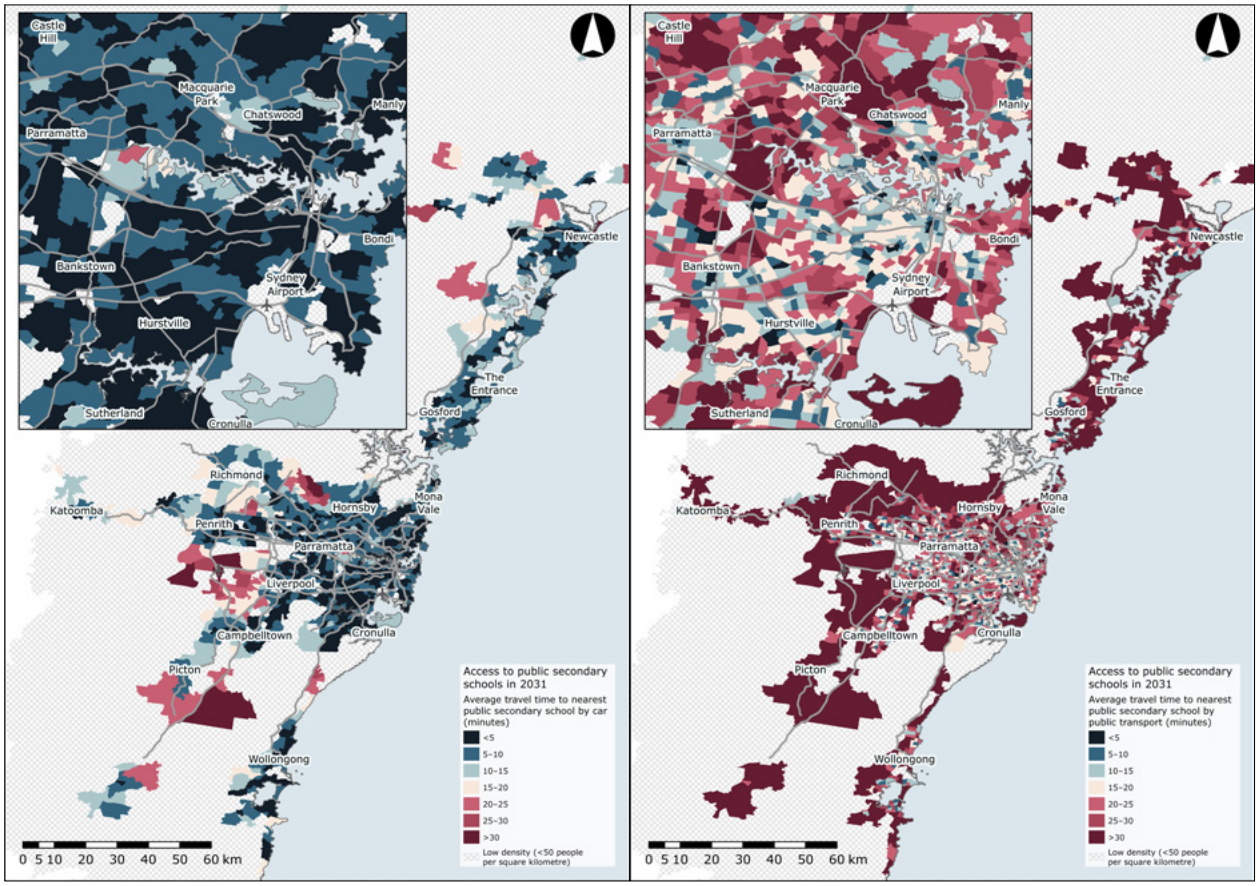

Source: Veitch Lister Consulting (2019)[69]

**Figure 27:** Greater Sydney average time to nearest public primary school by car (left) and public transport (right), 2031 AM peak




Source: Veitch Lister Consulting (2019)[70]

**Figure 28:** Greater Sydney average time to nearest public secondary school by car (left) and public transport (right), 2031 AM peak




Source: Veitch Lister Consulting (2019)[71]

## Access to jobs in Sydney, the Central Coast and Wollongong – by car and public transport, in 2016 and 2031

Employment accessibility has been measured as the percentage of jobs in each of three self-contained areas (Greater Sydney including the Central Coast, the Illawarra, and the Hunter Region) that can be reached within 30 minutes, from homes in every travel zone, by car (Figure 29) and by public transport (Figure 30) in the two modelled years.

Travel time to work is generally accepted to be longer than for childcare, education and hospital access. The high current and future concentration of jobs within the eastern Greater Sydney Global Arc, especially in the Sydney and North Sydney CBDs, mean that people living in these areas will continue to have good access to employment because of existing transport infrastructure and services in this region.

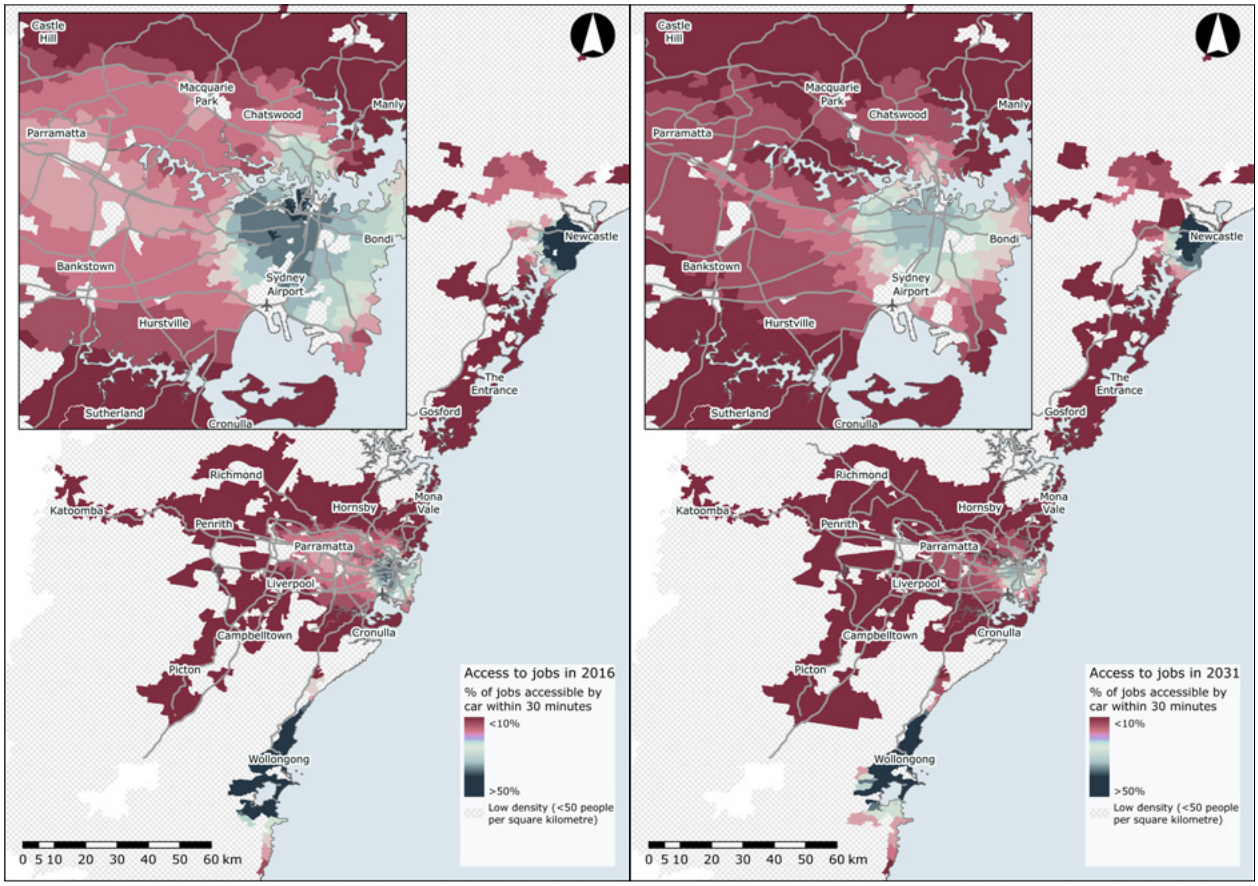
Job accessibility is greater in the smaller regions (the Illawarra and the Hunter) than for Sydney. This does not mean that people in the smaller regions have access to a greater number of jobs, it simply means they have access to a higher percentage of the total jobs in their region.

Job accessibility by car is forecast to generally reduce in the future as a result of road network congestion and dispersed residential development.

Job accessibility by public transport is modelled as relatively stable between 2016 and 2031, with most Greater Sydney residents still not having the choice available to them of reaching their work within a 30-minute train, bus or other transit trip. In both years, the areas with the best public transport job accessibility are Sydney Inner City and North Sydney-Mosman.

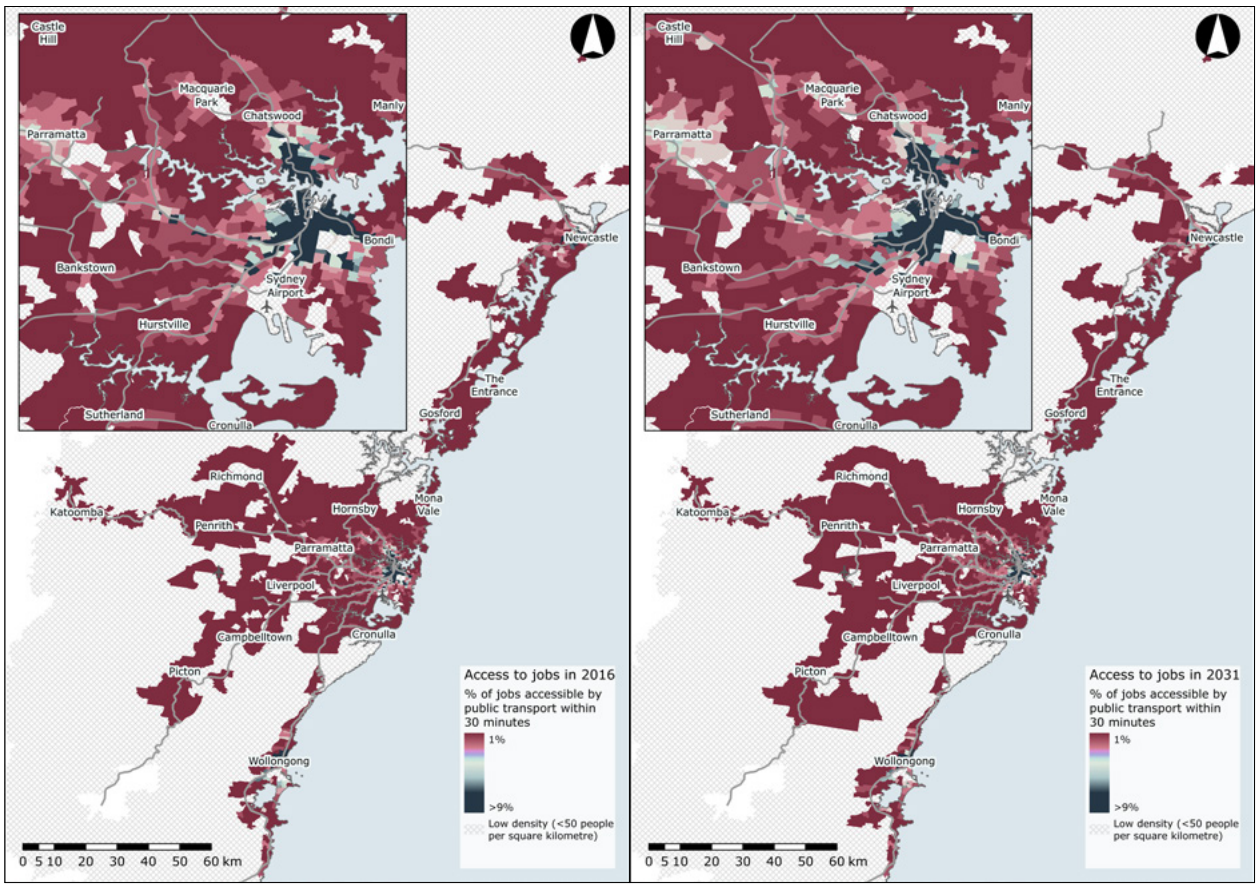
Job accessibility is forecast to be poor for people living in Bringelly-Green Valley, Liverpool, Fairfield and Blacktown due to a mismatch between growth in housing and local employment. Public transport infrastructure assumed for 2031 network performance modelling will not be enough to offer attractive connections to job opportunities across a broader region. Transport disadvantage will therefore persist in these areas.

**Figure 29:** Greater Sydney access to jobs by car, 2016 and 2031 AM peak




Source: Veitch Lister Consulting (2019)[72]

**Figure 30:** Greater Sydney access to jobs by public transport, 2016 and 2031 AM peak




Source: Veitch Lister Consulting (2019)[73]

## Findings

- There is a greater reliance on car use to reach daily needs in newer areas, compared to older areas which have developed with access to rail and other high-frequency public transport services.
- There will be a persistent jobs imbalance in Greater Sydney's outer and newer suburbs, with the largest growth in areas at risk of isolation from employment opportunities being forecast for south-western Sydney.

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