

NSW Legislative Council

Inquiry into Road Tolling Regimes

Portfolio Committee No 6
Transport and Customer Service

23 May 2021

Supporting NSW economy

\$35.8B

in economic benefits
over 30 years¹

>\$13B

invested into Sydney's
motorway network by
Transurban and partners
since 2013

Value for customers²

Up to 56 minutes travel-time savings on afternoon peak westbound M4	60% increase in travel-time savings on M5 East	40% reduction in crashes on M5 East	75% of toll road users believe toll roads provide a more direct route	Approximately 290 incidents managed per week on our network	<\$10 average weekly consumer customer spend
---	---	---	--	--	---

What Sydneysiders are saying about toll roads

The incident response crew even helped us change our tyre, right before a rainstorm hit. It was the end of their shift and they went over and above to make sure we were safe.

NorthConnex customer

It took me 14 minutes from Wattle Street Haberfield to Cumberland Highway Greystanes. Never thought I would see this in my lifetime.

M4 customer

1. Benefits of toll roads accelerated delivery by the private sector. Economic Contribution of Sydney's Toll Roads. KPMG, May 2021
2. Survey conducted by JWS Research in April 2021 of 1,000 residents in Greater Metropolitan Sydney



\$350M

into operating and maintaining our toll roads over past three years

40,000

people involved in WestConnex project

300

Western Sydney businesses supported by NorthConnex project

Community benefits

6,000

trucks removed from Pennant Hills Road daily through NorthConnex project

275,000

people supported through community grants

70km

of pedestrian and cycle paths delivered through major projects

18ha

of open space delivered through WestConnex project

25,000

students supported by road safety educator Blue Datto

Within minutes of our tyre bursting, the (incident) response team were there to help.

NorthConnex customer

I save 15 minutes of my life on a Sunday single trip from Homebush to Ashfield exit. Now please build a time machine so I can go back in time to recover lost hours in traffic and cost prior to this tunnel being built.

M4 customer



Transurban welcomes the opportunity to respond to this inquiry because at its heart, the discussion is about how we can continue to deliver benefits to our customers and our communities through the toll roads we develop and operate.

Our detailed submission presents case studies and the latest data to explore how Sydney's toll road network provides safer, faster, and more reliable journeys. Transurban is proud of our track record in developing and operating toll roads in partnership with government for more than 20 years.

Our purpose—to strengthen communities through transport—drives us to be part of the communities in which we operate and invest in our operations and surrounding neighbourhoods both now and in the future.



Michele Huey
Transurban
Group Executive,
NSW

WestConnex is Australia's largest infrastructure project and central to our vision to better connect people and businesses across New South Wales (NSW).

The continuous 33km motorway network will be the spine of the city's road network, helping motorists move around Sydney safer, easier and faster, while delivering a major economic boost by creating thousands of jobs. The first two stages of WestConnex are now operational, and customers are experiencing significant travel time savings on the M4, M8 and M5 East. The full benefits of WestConnex will be realised once the M4-M5 Link Tunnels open in 2023, with further connections to Rozelle Interchange and Sydney Gateway soon after.

WestConnex is not just about roads, it is delivering an additional 18 hectares of open space for the community, more than a million trees, shrubs and plants, as well as 23km of new and improved cycle paths and walkways for local neighbourhoods to enjoy.



Andrew Head
CEO, WestConnex

Executive summary	4
About Transurban	6
Transurban story in NSW	8
WestConnex: keeping Sydney moving	11
Section 1: Supporting a strong NSW economy	12
Section 2: Evolution of Sydney's toll roads	16
Benefits of private sector involvement	17
Toll contracts and tolling regimes	18
Tolling methods	19
Toll prices for freight	21
Section 3: Delivering value to customers	22
Toll road customers	22
Choice for motorists	24
Quicker, reliable travel	26
Customers' views on the value of toll roads	30
Safer travel	34
Investing in the network	36
Listening to our customers	42
Section 4: More than roads—investing in communities	46
Section 5: Decarbonising transport	48
Section 6: Future transport trends	51
Appendices	52

Terms of reference

	SECTION WHERE ADDRESSED
1. An updated review of the tolling regimes in place on different roads and an explanation for the differences between each	Section 2, and Appendix 1 and 2
2. The total paid by drivers for the WestConnex toll road over the life of its contract, and the extent to which this represents value for money	Section 1 and 3
3. The impact, and the geographical distribution of the impact, of toll costs on NSW drivers and on productivity	Section 1 and 3
4. The extent of toll relief provided in NSW and whether it is adequate	Section 3
5. Opportunities to increase transparency for the public, particularly over how tolling contracts are negotiated and varied, and the extent to which tolls are paid	Section 2 and Appendix 4 <i>(2017 submission, Section 3)</i>
6. The rationale for allowing higher than CPI increases on certain tolls, and for the truck toll being set at three times the toll for car traffic	Section 1, 2 and 3
7. The ability or otherwise of trucking businesses to afford increases in tolling charges and the extent or otherwise of their ability to pass this through	Section 1 and 3
8. Opportunities to increase the assurance to the public that tolling arrangements represent the fairest possible outcome, including the appropriateness of involving an independent agency such as Independent Pricing and Regulatory Tribunal (IPART) in the determination of tolls and their escalation	Appendix 4 <i>(2017 submission, Section 5)</i>
9. The long-term impact on government finances as a result of toll roads being wholly or partly operated by non-government entities	Section 1 and 2
10. Consideration of the impact of direct or debt financing of road projects, including what would have been the impact on regional road projects of the direct financing of WestConnex	Section 2
11. Any other related matter	Section 4, 5 and 6



Executive summary

When the Economist Intelligence Unit releases its Global Liveability Index every year, Sydney invariably ranks among the top cities in the world for quality of life.

In 2019 it was judged the third most liveable city in the world, rising from fifth the year before in the list of 140 cities.

It is a ranking we, residents of this city, would expect. Sydney is one of the world's great cities – rich with history, and opportunities.

But its success has not come without big decisions and investments. Those decisions have helped make the most of this city, which has gradually sprawled from the harbour to the mountains and beyond and become home for almost 5.5 million people.

Governments' and the private sector's ability to partner and work together have played a key role in creating the Sydney of today and the quality of life it offers its citizens.

Over the past 30 years, governments, both Coalition and Labor, have partnered with the private sector to deliver around \$25 billion worth of road infrastructure to help create connections that make moving

around Sydney more efficient, predictable and safe.

Transurban, along with its partners, have contributed more than \$13 billion into Sydney's motorway network since 2013. These funds have gone towards projects such as NorthConnex and WestConnex that have given people and businesses new and faster ways to move around. Our investment has also gone towards upgrading existing roads such as the M2 and M5 to cater for ever increasing amounts of traffic.

The injection of private sector capital has eased pressure on public budgets and allowed government to direct their funds into other priority areas such as schools and hospitals, as well as public transport services that are so critical to complement the roads network, and give consumers a choice about their mode of travel.

It has also allowed much-needed road infrastructure to be built sooner than may have been possible if publicly funded.

Elsewhere in the world, in particular Japan, the United States of America and China, governments have relied on similar user-pays toll roads as a mechanism to generate revenue that can be spent on

other public priorities. In Spain almost 20% of motorways are tolled roads.

In research, commissioned by Transurban, KPMG estimates the total economic benefits from the accelerated delivery of toll roads by the private sector to be \$35.8 billion over the 30 years to 2046.

In that time, businesses and freight users can expect to realise an estimated \$11.8 billion in benefits through travel-time savings, reliability gains and reduced vehicle operating costs. Personal users stand to gain \$9.4 billion in similar benefits.

In our submission we feature a number of case studies that bring to life the value of toll roads to individual motorists, who each rely on the network for different reasons.

KPMG's analysis also estimates the wider economic outcomes from Sydney's toll road network to be \$14.5 billion in benefits from improved access and connections to employment centres, supporting businesses, job seekers and consumers. An average of 5,300 full-time jobs are expected to be created annually over the next 30 years.

Transurban entered the Sydney market almost 20 years ago and some of our



FRESH THINKING

This inquiry has provided us with a unique opportunity to discuss, with all sides of politics, reforms to improve the sector for customers' benefits.

current contracts with governments extend to 2060. We are here for the long term and that is firmly top of mind in all that we do.

That is why we see this inquiry as an opportune time to consider ways that we can further enhance the value that Sydney's toll roads create for customers, the community and our partners in government. We discuss these ideas in sections called "Fresh Thinking" throughout our submission. They are summarised on the right.

Above all, we consider there is an opportunity for a pragmatic look at Sydney's tolling regimes, which have evolved over the years and become a variety of tolling methods and subsidies. A fairer, more equitable, and efficient system would be the foundation of any discussion on reform.

We sincerely hope the process identifies new areas for collaboration and partnership to improve Sydney's toll road network and look forward to further discussions with the Transport and Service Committee.

Working in partnership with government, we will continue to ensure Sydney maintains its global status as one of the most enviable places to live and work.



Network-wide tolling reform
for pricing consistencies (pp 21)



Decision-point signage
to give motorists choice (pp 25)



Consolidated toll notices
to reduce customer charges (pp 45)



Ventilation optimisation trial
to support NSW Government's net-zero commitment (pp 50)

About Transurban

As one of the world's largest toll road developers and operators, our business is to keep cities moving and get people where they want to go as quickly and safely as possible.

Since opening CityLink in Melbourne in 1999, our company has grown to include 21 toll roads in Australia, the United States and Canada. We have 5.5 million customers in Australia, while in North America over 3.3 million drivers choose our roads for faster, safer and more reliable trips.

In addition to our operating assets, we have seven projects in development or delivery in Australia and the United States including the M4-M5 Link Tunnels in Sydney and West Gate Tunnel in Melbourne. Our Australian projects will provide vital alternatives to busy and often congested city roads and remove truck traffic from local neighbourhoods. Our projects in the US will extend our Express Lanes network, which operates alongside free lanes, in northern Virginia and into Maryland.

Over the past two decades we have built a track record of partnering with governments to successfully deliver and manage key road infrastructure, but have also been recognised for developing innovative solutions to improve the safety and efficiency of transport networks.

Our purpose—to strengthen communities through transport—underpins all that we do. From our traffic control room operators who monitor our roads 24/7, to our traffic planners who interrogate travel data to forecast where congestion hot spots could be in a decade's time, our team is focused on making travel easier now and in the future.

However, we recognise that motorways are part of a broader integrated transport system with public transport and active transport links all essential to creating efficient transportation networks in cities.

As an Australian-owned and operated company listed on the Australian Securities Exchange, Transurban represents one of the most significant infrastructure investment opportunities available to Australians. Our largest shareholder, UniSuper, manages the retirement savings of more than 450,000 education sector workers. These people, like all our investors, share in the success of our business.

We employ more than 2,500 people across Australia, as well as tens of thousands of people through the delivery of projects. We foster an engaged and diverse workforce that prides itself on making a significant and lasting contribution to the cities and communities in which we operate.

We also continuously challenge ourselves in the way we respond to social and environmental issues, and invest in both to create social inclusion and manage our environmental impacts. Success for us means we achieve our purpose and create real and lasting benefits for all our stakeholders.



21
roads under
operation



7
projects in development
or delivery



2M
trips daily across
our roads



8.8M
customers and
road users



20+
years of
experience



Top
15
ASX-listed
company



4th
highest ranked transport
company globally on the
Dow Jones Sustainability Index



The Transurban story in NSW

Over the past 20 years, Sydney has grown and changed at an accelerated pace, with the population increasing by more than one million people in this period alone. Major infrastructure is needed to support the way we move and keep us connected, and Transurban has played an integral part in delivering vital missing links to make us better connected than ever before.

Transurban's NSW story started with our partnership to deliver the Westlink M7, which opened to traffic in 2005. Since then, we have been planning, building and operating toll roads that have been game-changers for Sydney's motorists. We have interests in 10 roads across Sydney and employ over 1,000 people across multiple locations.

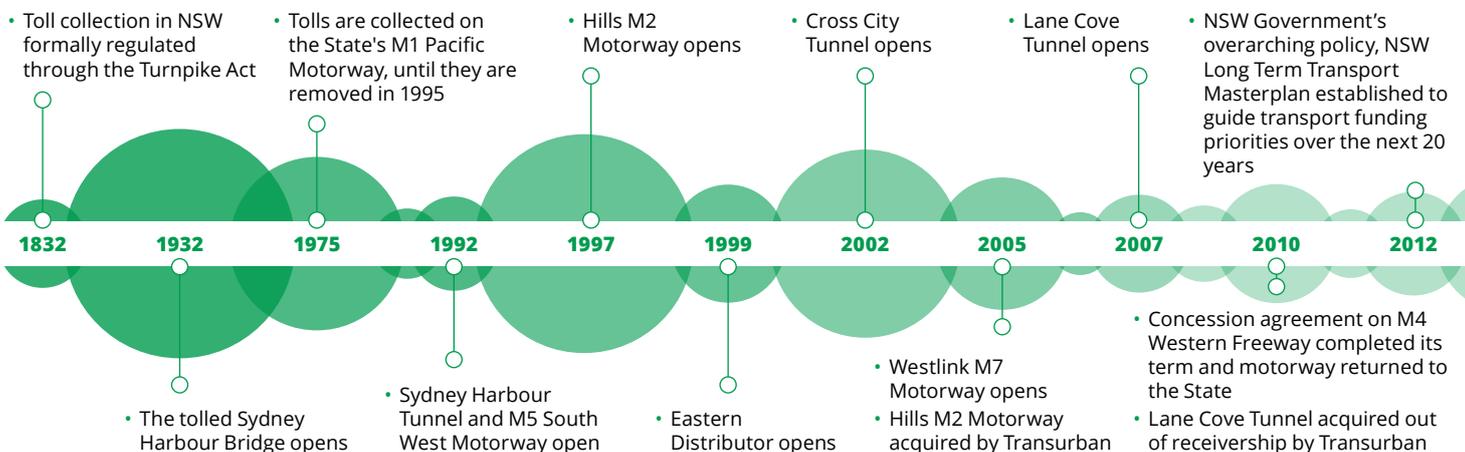
Working with our partners and the NSW Government, we have delivered NorthConnex and continue to deliver WestConnex. We have also made significant investments in our assets including widening the M5 South West and M2 to help ease congestion as our city continues to grow. Supporting thousands of jobs throughout construction, these projects help strengthen the NSW economy, and support productivity by moving people

and freight around our city, faster and more reliably.

More than 900,000 trips are made daily on our roads and through our tunnels. These trips are being monitored 24/7 by our traffic control operators to ensure that the motorway is safe and reliable for our customers. Our incident response crews assist any motorist in need and return the motorway to its free-flowing conditions.

Whether it is saving up to 40 minutes on a journey along the M2 in the evening peak, or 23 minutes for customers travelling westbound along the M5 South West in the morning, our roads are saving customers valuable time.

Transurban's story is reflected in Sydney's story – and we are more than just a roads company. Given our long-term concessions with government, we strive to ensure that we are part of the local communities where we operate. Whether it is partnering with the Salvation Army to teach people in Western Sydney how to drive or supporting over 25,000 NSW students to take part in Blue Datto's 'Keeping Safe' road safety program, we aim to deliver on our purpose – to strengthen communities through transport.





10
operating assets



Approximately
140 km
of lanes across NSW (including WestConnex)



225,000
hours average workday travel-time savings¹



Approximately
290
incidents managed per week on our network



\$350M²
invested in operations and maintenance over the past 3 years



Approximately
1,330
employees working for Transurban NSW and WestConnex

• Cross City Tunnel acquired out of receivership by Transurban

2014

• The Government approves principles for tolling Sydney's motorways to be used as a guide for future tolling decisions

2014

• Construction commences on the first stage of WestConnex, the M4 widening

2015

• WestConnex M4 widening project opens

2017

• Sydney Transport Partners acquires 51% of WestConnex

2018

• WestConnex M4 tunnels open

2019

• WestConnex M8 Motorway opens. M5 East integrated into the WestConnex network
• NorthConnex opens

2020

• WestConnex M4-M5 Link Tunnels due to open

2023

• WestConnex Rozelle Interchange due to open

2024

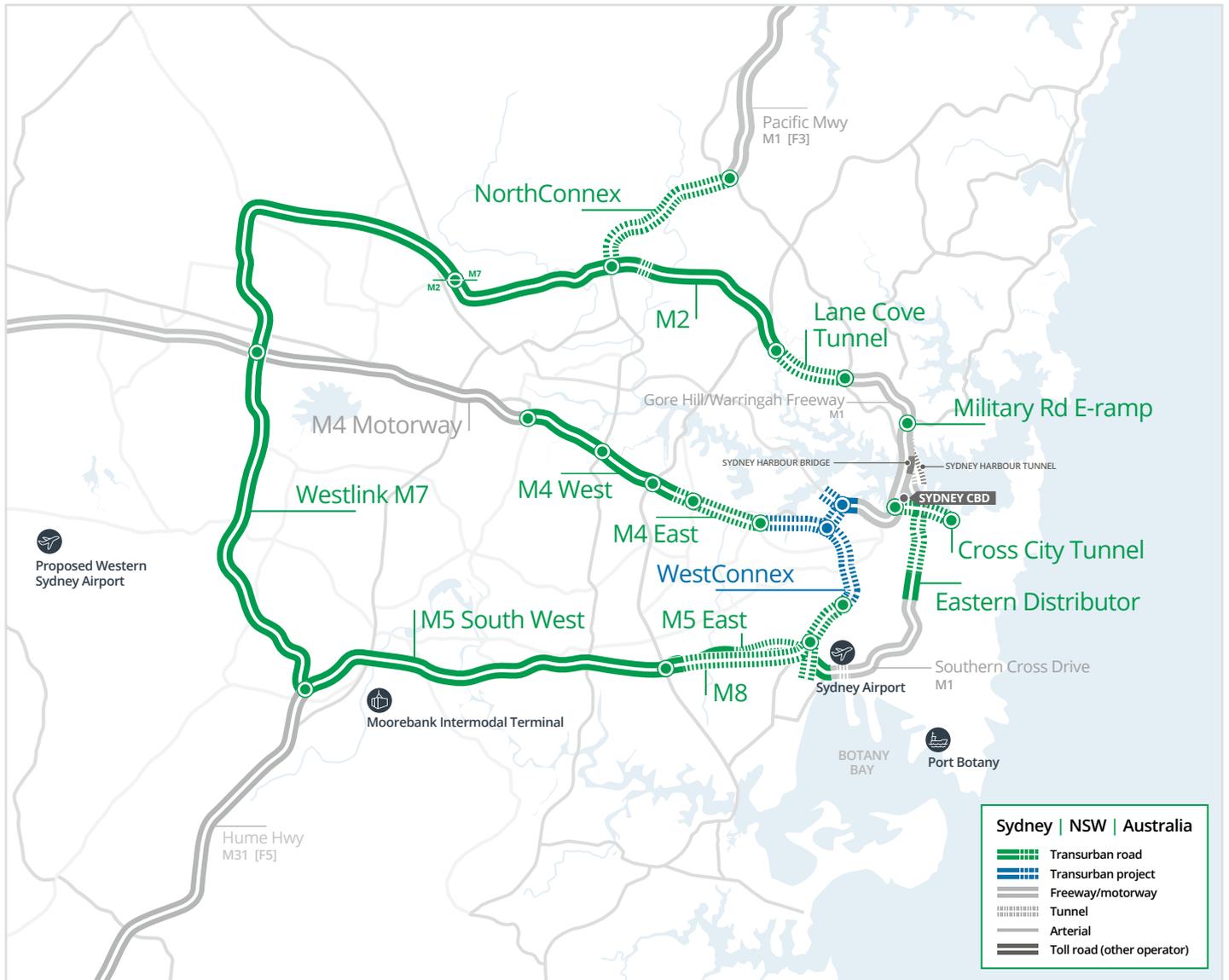
• M5 South West concession becomes part of the WestConnex network

2026

1. Average workday travel-time savings in hours from July 2020 to December 2020. Source: TomTom data

2. Total operations and maintenance spend on all NSW toll roads in which Transurban has an interest in between FY19 and FY21 (actual and forecast)

Figure 1. Sydney's strategic road network



TRANSURBAN OWNERSHIP NSW

M5 South West

Ownership
100%

Concession ends
2026¹

M2

Ownership
100%

Concession ends
2048

Lane Cove Tunnel

Ownership
100%

Concession ends
2048

Cross City Tunnel

Ownership
100%

Concession ends
2035

Eastern Distributor

Ownership
Transurban (75.1%),
IFM Investors (14.4%),
UniSuper (10.5%)

Concession ends
2048

Westlink M7

Ownership
Transurban (50%),
QIC Global Infrastructure
(25%), Canada Pension Plan
Investments (CPP) (25%)

Concession ends
2048

**WestConnex
(M8, M4, M5 East)**

Ownership
Transurban (25.5%)
NSW Government (49%)
AustralianSuper (10.46%)
CPP Investments (10.46%)
Tawreed (4.59%)

Concession ends
2060

NorthConnex

Ownership
Transurban (50%),
QIC Global Infrastructure (25%),
CPP (25%)

Concession ends
2048

1. M5 South West will form part of the WestConnex M5 concession once the current concession expires in December 2026, through to December 2060. During that period Transurban's ownership will be 25.5% based on its current ownership proportion in WestConnex

WestConnex: keeping Sydney moving

WestConnex is the largest and one of the most ambitious single road projects in Australia's history and in just over 10 years, 40% of Sydney's population is expected to live within five kilometres of this network.¹

Its 33 kilometres of new and improved motorways and tunnels provide motorists with a continuous, traffic-light-free motorway network, connecting Sydney's west and southwest suburbs with the CBD, Sydney Airport and Port Botany. It also provides for future projects linking the north shore and northern beaches.

The first two stages of WestConnex, the New M4 Tunnels and the M8 are open and have transformed previously congested corridors, improved travel times and connectivity for motorists and freight.

The full benefits of WestConnex will be realised when the M4-M5 Link Tunnels open in 2023, which will provide the missing link between the M4 and M8 and connections to the Rozelle Interchange and Sydney Gateway, currently under construction. WestConnex also connects to future projects including the Western Harbour Tunnel and the M6.

The NSW Government chose Transurban and its co-investors, Sydney Transport Partners, to be its partner in delivering and operating WestConnex when it sold a 51% stake in the project in 2018.

Tunnelling is more than 90% complete on the M4-M5 Link Tunnels, which has continued throughout government-

imposed lockdowns due to the pandemic, ensuring workers remain at work. The project has helped create tens of thousands of jobs, many for locally based workers in western Sydney.

Transurban has an extensive community consultation program, which engages with the community through every stage of the project, both face-to-face, and through digital and printed communications.

Each year we engage a research agency to track sentiment towards WestConnex projects and assets. The 2020 report shows significant improvement in positive community sentiment across broader Sydney as well as the WestConnex project and feeder areas. More than 2,000 people were surveyed and across Greater Sydney positive sentiment towards WestConnex increased from 56% in 2019 to 68% in 2020 (Figure 2).

This has been achieved through delivering significant travel-time savings for motorists, new and enhanced open spaces including parks and cycleways and building strong relationships with our local communities.

Sydney Transport Partners

Transurban Group 25.5%

Australian Super 10.5%
2.4M members
Australia's largest industry superannuation fund.
\$200B of member savings (as of 31 December 2020).

Canada Pension Plan Investment Board 10.5%
C\$476B of retirement savings under management (as of 31 December 2020)
Canada's national pension plan ranks among the world's 10 largest retirement funds.

Tawreed 4.6%
Wholly-owned subsidiary of Abu Dhabi Investment Authority. ADIA is a public institution established by the Government of Abu Dhabi in 1976 as an independent investment institution.



2024
expected project completion



Up to **40mins**
total travel-time savings Parramatta to Sydney Airport¹



52
traffic lights bypassed²



23km
new and upgraded cycle and shared paths



18ha
of new open space including parks and recreational facilities



More than **1M**
trees and shrubs planted



40,000
people involved in the project to date

1. Parramatta to Sydney Airport once project is completed. WestConnex Updated Strategic Business Case, November 2015
2. Ibid

Figure 2. WestConnex sentiment turnaround



Section 1:

Supporting a strong NSW economy

NSW is Australia's largest economy, accounting for around a third of national output, with most of this driven out of Sydney. Almost a third of all Australians call NSW home.¹

Many factors underpin Sydney's prosperity and contribute to its enviable liveability, one of which is the expansive multi-modal transport networks that connect people and businesses across the city.

While decades of strong population growth have put a strain on Sydney's road and rail networks, there is no denying they still serve as the backbone of the economy. Within this, toll roads play a vital role in facilitating orbital trips around the city, especially for the freight sector.

In independent research, commissioned by Transurban, KPMG estimated that Sydney's toll road network will create \$35.8 billion in economic benefits over 30 years due to its accelerated delivery by the private sector (Figure 3).

Businesses and freight users will realise an estimated \$11.8 billion in benefits through travel-time savings, reliability gains and reduced operating costs. Personal users stand to gain \$9.4 billion in similar benefits, KPMG estimates.

Furthermore, the toll road network will contribute an estimated \$14.5 billion in wider economic benefits by significantly improving access to economic centres and increasing participation in the labour market. The construction of Sydney's toll roads is a major generator of jobs and the consequent travel-time savings and reliability gains boost participation in the labour market.

KPMG estimates Sydney's toll roads and planned capital expansion will generate Gross State Product (GSP) of \$64.5² billion over the 30 years between 2016 and 2046, or \$2.5 billion on average per year. It expects this will lead to annual average job creation of approximately 5,300 full-time equivalent positions over the 30-year period.

WestConnex and NorthConnex have both generated thousands of jobs and the stimulus provided by these projects has been especially important during COVID-19. Despite stagnating population growth, the gridlock looks set to continue. Research commissioned by Transurban found that 8% more people in Sydney intended to use private vehicles every day even once the immediate risk of COVID-19 had passed.³ Toll roads help alleviate network-wide congestion, diverting through-traffic from local and arterial roads and on to free-flowing managed motorways. In 2020 motorists in Sydney were saving 225,000 hours in travel time every workday by using Transurban's toll roads compared to alternate routes.⁴

Figure 3. Total economic contribution of accelerated toll road delivery in Sydney over 30 years (2016–2046)

BENEFITS TO ALL USERS	PRESENT VALUE OVER 30 YEARS
Benefits to business and freight users	\$11.8B
Travel-time savings	\$10.5B
Vehicle operating cost savings	\$0.7B
Travel-time reliability benefits	\$0.6B
Benefits to personal users	\$9.4B
Travel-time savings	\$8.8B
Vehicle operating cost savings	\$0.4B
Travel-time reliability benefits	\$0.2B
Other benefits	\$0.1B
Environmental externalities	\$0.1B
Total direct benefits	\$21.3B
WIDER ECONOMIC BENEFITS	
Agglomeration economies	\$13.2B
Labour market deepening	\$0.4B
Increased output under imperfectly competitive markets	\$0.9B
Total wider economic benefits	\$14.5B
Total benefits	\$35.8B
Productivity benefits	\$25.0B
ECONOMIC IMPACT ANALYSIS	
Gross State Product	\$2.5B (average annual)
Gross State Product per capita	\$300 per person (average annual)
Jobs	5,300 FTE (average annual)

Source: KPMG analysis (monetary values presented in 2021 dollars, real terms and 7% discount rate).

¹ NSW Treasury, About the NSW economy, available: www.treasury.nsw.gov.au/nsw-economy/about-nsw-economy, accessed 6 May 2021

² GSP expressed in present value terms discounted at 7%.

³ Survey conducted by Nature in January 2021, of 3,308 residents across Sydney, Melbourne and Brisbane

⁴ Average workday travel-time savings in hours from July 2020 to December 2020. Source: TomTom data

The value of Sydney's toll road network

KPMG has estimated that over the next 30 years, Sydney's toll roads will deliver an average of \$5.6 billion in annual economic, social, and environmental benefits to all road users—when it compares the real-world development of the network to a hypothetical version of Sydney in which they didn't exist.

KPMG has prepared a counterfactual analysis which isolates the impact of the toll road network on how people, freight and businesses move around Sydney to a scenario where the only toll roads are the Harbour Tunnel, Eastern Distributor and Sydney Harbour Bridge.

\$5.6 billion¹ economic benefits annually for next 30 years



\$3.6 billion annual benefits for all road users

Toll roads help make the entire road network more efficient and reliable. All road users benefit with faster travel times, more reliable journeys and lower fuel consumption and vehicle operating costs.

\$2 billion for all trucks and freight operators including \$35 in economic benefits for every trip that uses a toll road

\$1.6 billion for all car users including \$10 in economic benefits for every trip that uses a toll road



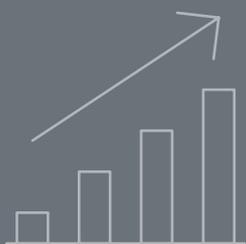
\$2 billion annual benefits connecting communities and businesses

Toll roads improve access and connections to employment centres supporting businesses, job seekers and consumers as well as improving market outcomes.

\$1.8 billion business efficiency
Agglomeration economies with business productivity boosted by better access and connections

\$63 million increased labour supply
Improved access to employment markets for job seekers

\$153 million more goods, services
More efficient transport lowering barriers to competition, increasing supply of goods and services



Economic growth for next 30 years

Productivity improvements, and network capital expansions contribute to the total market value of goods and services supporting job creation and improving personal welfare.

\$7.3 billion Gross State Product (GSP) average annual increase

\$890 GSP per person average annual increase

12,000 jobs average annual increase



Saving fuel, reducing emissions

130 million litres
Reduced fuel consumption annually

10.7 million tonnes
Greenhouse gas (GHG) emissions saved, valued at \$500 million over 30 years

1. KPMG analysis (all dollar values are reported in present value terms using Infrastructure Australia recommended real discount rate of 7%).

Job creation

Sydney's toll road network brings businesses and knowledge centres closer together by improving connections and access.

Reliable and shorter commuting times also encourage job participation, particularly for people juggling caring responsibilities or other commitments.

KPMG's analysis has found Sydney's toll roads will create an average of 5,300 full-time equivalent jobs annually over the next 30 years.¹

For example, to date, more than 40,000 workers have been involved in delivering WestConnex, boosting job opportunities across a range of industries. The project will create an estimated more than \$20 billion in benefits to the state², with around 2,000 contracts signed with NSW subcontractors and suppliers.

More than 40% of the 8,000 workers involved in the M4-M5 Link Tunnels, which are currently being constructed, are from Western Sydney. Around 450 contracts, worth more than \$950 million, have been signed with NSW subcontractors and suppliers on that project.

Over the project lifespan, WestConnex is creating 500 apprenticeships. Our M4 and M8 delivery partners established the WestConnex Training Academy at Homebush in partnership with providers such as TAFE NSW.

The academy focuses on quality, recognised training for workers including Aboriginal and Torres Strait Islanders, women, young people and school leavers, Western Sydney residents and people with disabilities. This training is continuing with similar programs offered on the M4-M5 Link Tunnels project.

Benefits for freight industry

Around 80% of freight in Greater Sydney is moved by road and the current and planned toll road network provides critical connections to ports, airports and intermodal terminals.

The toll road network provides considerable benefits for heavy vehicles in terms of increased safety, reduced fuel consumption, greater travel-time reliability, smoother travel and less wear and tear on

the vehicle, which all contribute to overall operational costs savings.

KPMG has estimated \$4.3 billion in travel-time cost savings for trucks across the greater Sydney network over 30 years as a result of the toll roads being built (Figure 4).

Additionally, the NSW Freight and Ports Strategy estimated that a 1% increase in freight efficiency saves the national economy \$1.5 billion.³

Figure 4. Truck travel times—with and without toll road network⁴

GREATER SYDNEY ROAD NETWORK TRAVEL TIMES			
	2021	2036	2046
Number of truck trips - annual	0.4B	0.5B	0.6B
Without modern motorways			
Vehicle hours traveled (VHT) - annual	0.2B	0.2B	0.3B
Average trip time (min)	24.7min	29.0min	32.1min
Travel time cost (\$) - annual	\$8.7B	\$13.1B	\$16.8B
With modern motorways			
Vehicle hours traveled (VHT) - annual	0.1B	0.2B	0.2B
Average trip time (min)	20.5min	22.0min	23.9min
Travel time cost (\$) - annual	\$7.2B	\$9.9B	\$12.5B
Difference between with and without			
Difference in average trip times (min)	4.2min	7.0min	8.2min
Travel time cost savings (\$)	\$1.5B	\$3.2B	\$4.3B

¹ KPMG report, Economic contribution of Sydney's toll roads, May 2021

² WestConnex Updated Strategic Business Case November 2015

³ Transport for NSW, 2013

⁴ Source: Traffic modelling output and KPMG analysis (monetary values presented in \$2021, real terms and undiscounted).

⁵ Source: TfNSW guideline and KPMG analysis. Note: monetary values presented in \$2021, real terms, and undiscounted



Vehicle operating cost savings

Using toll roads and avoiding stop/start traffic offers significant operating cost savings for all motorists.

Key cost savings are in fuel consumption, repair and maintenance, tyre wear and vehicle capital costs.

KPMG has estimated that businesses and freight operators stand to save around \$700 million vehicle operating

costs over the next 30 years through the use of toll roads, while personal users will save around \$400 million over that period (Figure 3).

Figure 5 shows that as travel speeds increase and stop-start travel decreases, operating costs decline significantly.

Reducing environmental impacts

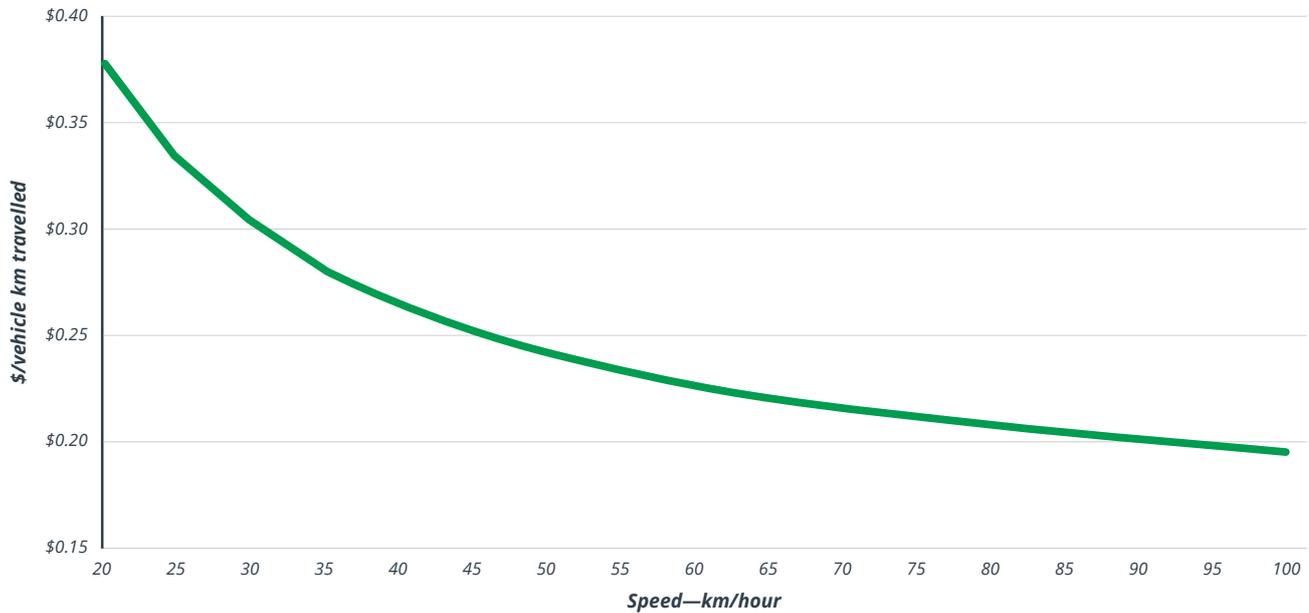
Transport emissions are linked to the amount of fuel consumed and free-flowing

motorways offer significant savings in GHG emissions.

KPMG has estimated that the community could benefit from \$0.1 billion in terms of reduced GHG emissions, over the next 30 years.

Our own modelling shows that on average our customers saved between 30-50% in fuel and GHG emissions per trip compared to alternate routes (See Pages 48-49).

Figure 5. Vehicle cost curve—\$ per vehicle kilometre travelled⁵



Section 2:

The evolution of Sydney's toll roads

Sydney's toll road network – critical for the efficient movement of freight and passenger traffic—is the achievement of successive NSW governments and their support for private financing funded by user-pays models.

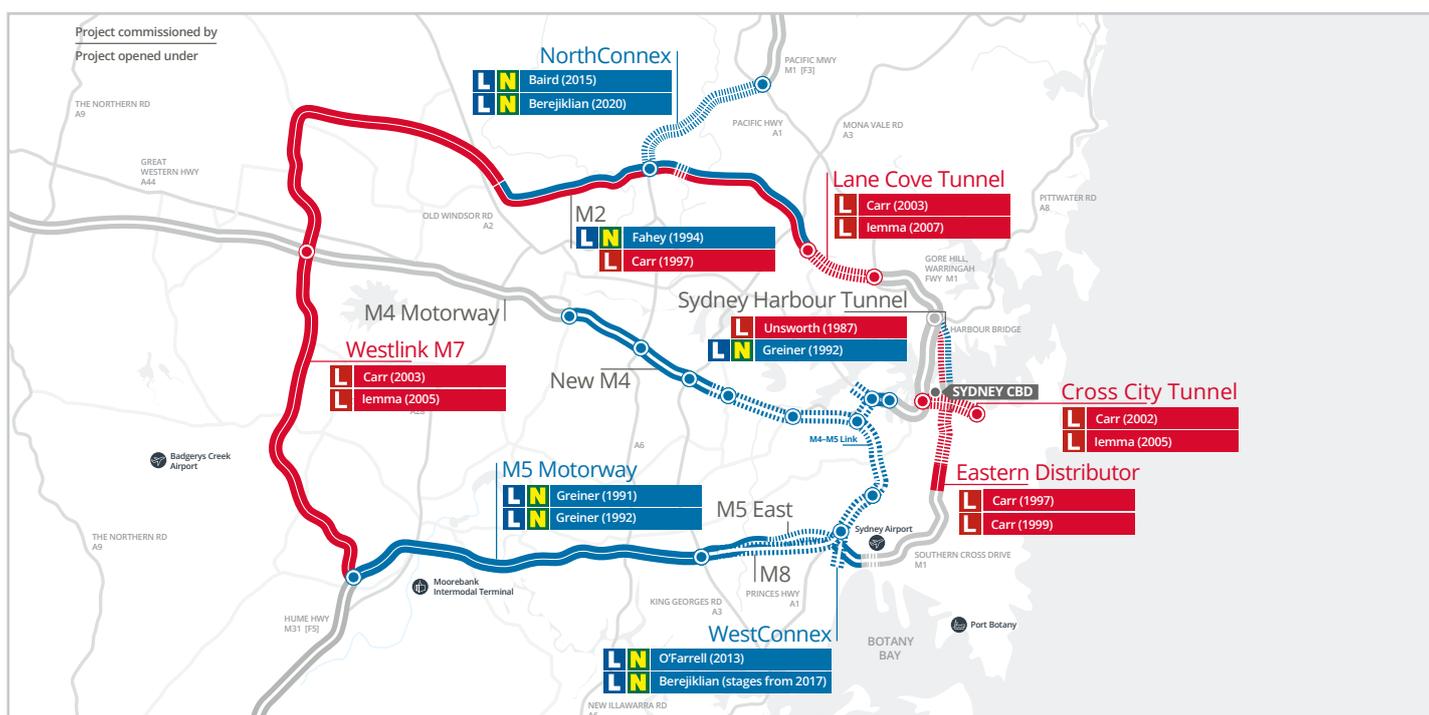


Figure 6. Bipartisan development of Sydney toll roads

Planning for what is now the Sydney orbital road corridor began almost 60 years ago under the “County of Cumberland scheme” and the network – as well as motorway upgrades – have been largely completed using the Public Private Partnership (PPP) model.

These PPPs have taken many forms from traditional build-own-operate-transfer and design-construction-own-operate models to more recent development partnerships or a model such as WestConnex where the government sold a majority stake in the project to fund further construction.

In recent years, governments have sought other approaches to identify good ideas and fast-track projects through the Unsolicited Proposal Framework. Delivery of NorthConnex, regarded as a critical missing link in Sydney's orbital network, was accelerated by more than a decade using this funding model.

The commissioning and delivery, as well as the long-term operations, of this large-scale infrastructure often spans multiple governments, both federal and state, giving the private sector the opportunity to collaborate with different sides of politics.

PROJECT	COMMISSIONING GOVERNMENT*	OPENED
Sydney Harbour Tunnel	Unsworth Labor (1987)	Greiner Liberal National (1992)
M5 South West	Greiner Liberal National (1991)	Greiner Liberal National (1992)
M2	Fahey Liberal National (1994)	Carr Labor (1997)
Eastern Distributor	Carr Labor (1997)	Carr Labor (1999)
Cross City Tunnel	Carr Labor (2002)	Iemma Labor (2005)
Westlink M7	Carr Labor (2003)	Iemma Labor (2005)
Lane Cove Tunnel	Carr Labor (2003)	Iemma Labor (2007)
NorthConnex	Baird Liberal National (2015)	Berejiklian Liberal National (2020)
WestConnex	O'Farrell Liberal National (2013)	Berejiklian Liberal National (stages from 2017)

*Government at project financial close

2.1 Benefits of private sector involvement

Governments' and the private sector's ability to partner and work together to create city-shaping infrastructure has been critical to the prosperity and liveability of Sydney.

PPPs have proven a powerful tool for incentivising the private sector to achieve the best outcomes for their government partners, customers, the community, investors and ultimately the city's transport networks.

The private sector has also proven to be a strong force for driving efficiency and innovation in design, construction and operations and for its comprehensive community and stakeholder engagement programs.

With private sector taking on the construction and patronage risk, governments have been able to deliver the infrastructure, while freeing up their balance sheet for other priorities such as health, education and public transport services (Figure 9).

NSW has benefitted from almost \$25 billion¹ worth of road infrastructure delivered through PPPs since the Sydney Harbour Tunnel opened almost 30 years ago.

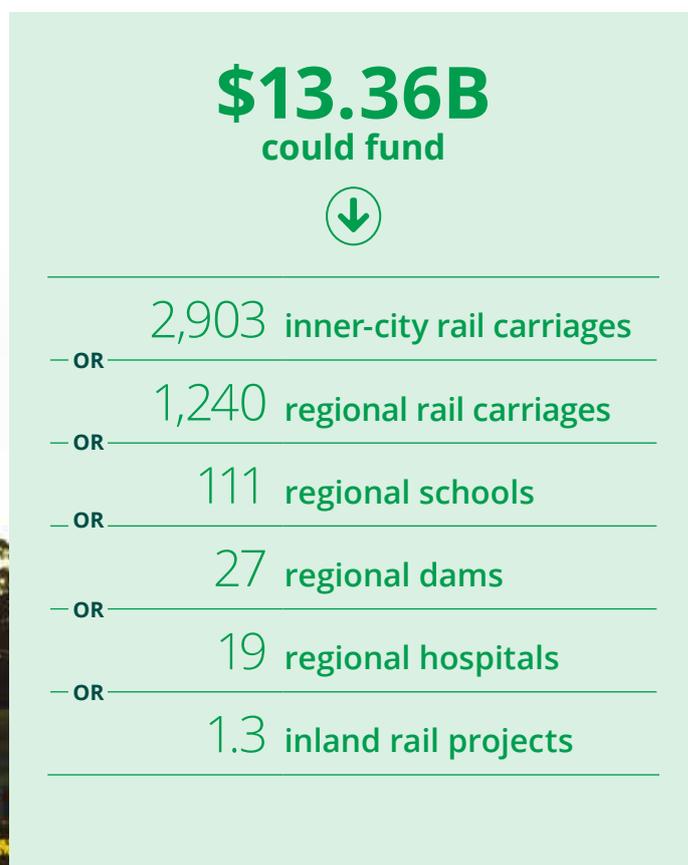
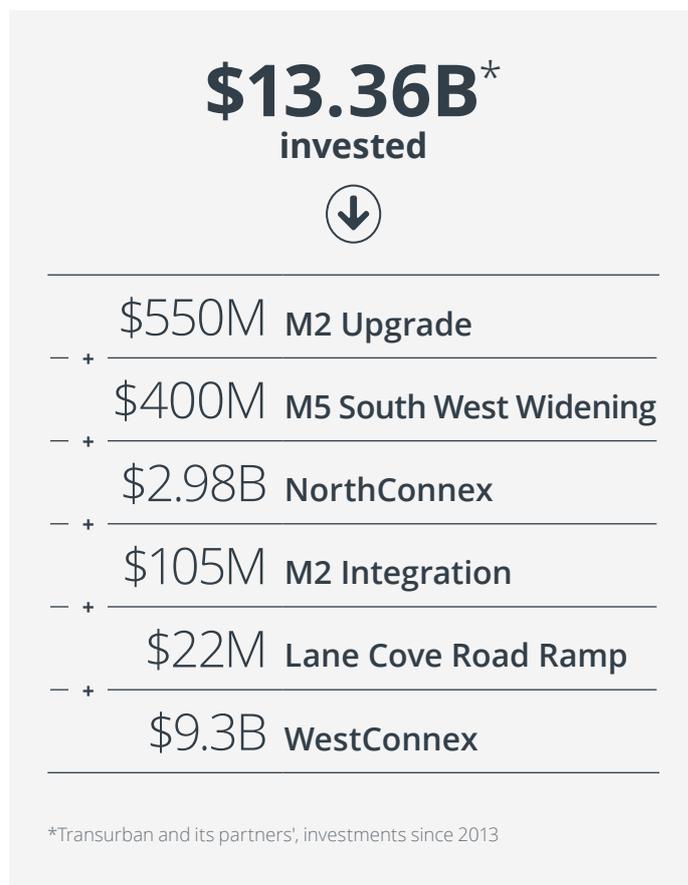
Since 2013, Transurban and its partners have injected more than \$13 billion (Figure 7) into Sydney's motorway network, from upgrading existing assets to delivering new infrastructure that fundamentally changes the way people move around the city.

In 2018, Transurban and its partners purchased a 51% stake of WestConnex for \$9.3 billion, of which \$7 billion has been directed towards the NSW Government's Generation Fund (NGF).

A sovereign wealth fund, the NGF helps lower State debt and supports the State's credit rating while funding community initiatives. Since its inception in 2018, the NGF has grown to \$11.3 billion and almost \$25 million has been invested into 248 local community projects across NSW. This fund would not have been possible without asset recycling and the partial sale of WestConnex.

¹ Ernst & Young: The economic contribution of Sydney's toll roads to NSW and Australia, 2008 and Transurban and partners' investment

Figure 7. Transurban's investments in NSW



2.2 Toll contracts and tolling regimes

Each road is governed by a concession deed, which is the contract between the NSW Government and the successful private sector participant.

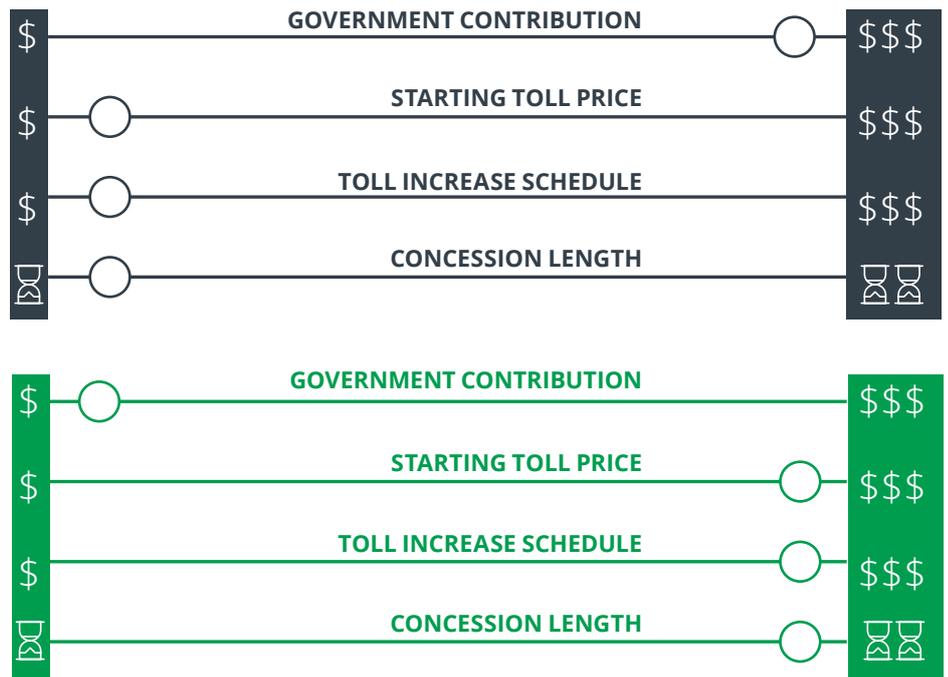
The deed dictates the commercial arrangements for the ownership and operation of each road and sets out the concession term and tolling regime including toll prices and escalation.

Toll price increases essentially smooth the costs of constructing, operating, and maintaining the toll road over the full concession period. Concession deeds are agreed before construction commences and some years before a road opens or before the road is acquired.

In setting the initial toll price and escalation rates, the government decides how to best meet the objectives of funding the project and provide a value-for-money toll proposition that will make paying the toll attractive to motorists through travel-time savings and reliability.

This value proposition is critical in determining appropriate pricing levels.

Figure 8. Major factors governments consider in establishing concession deeds



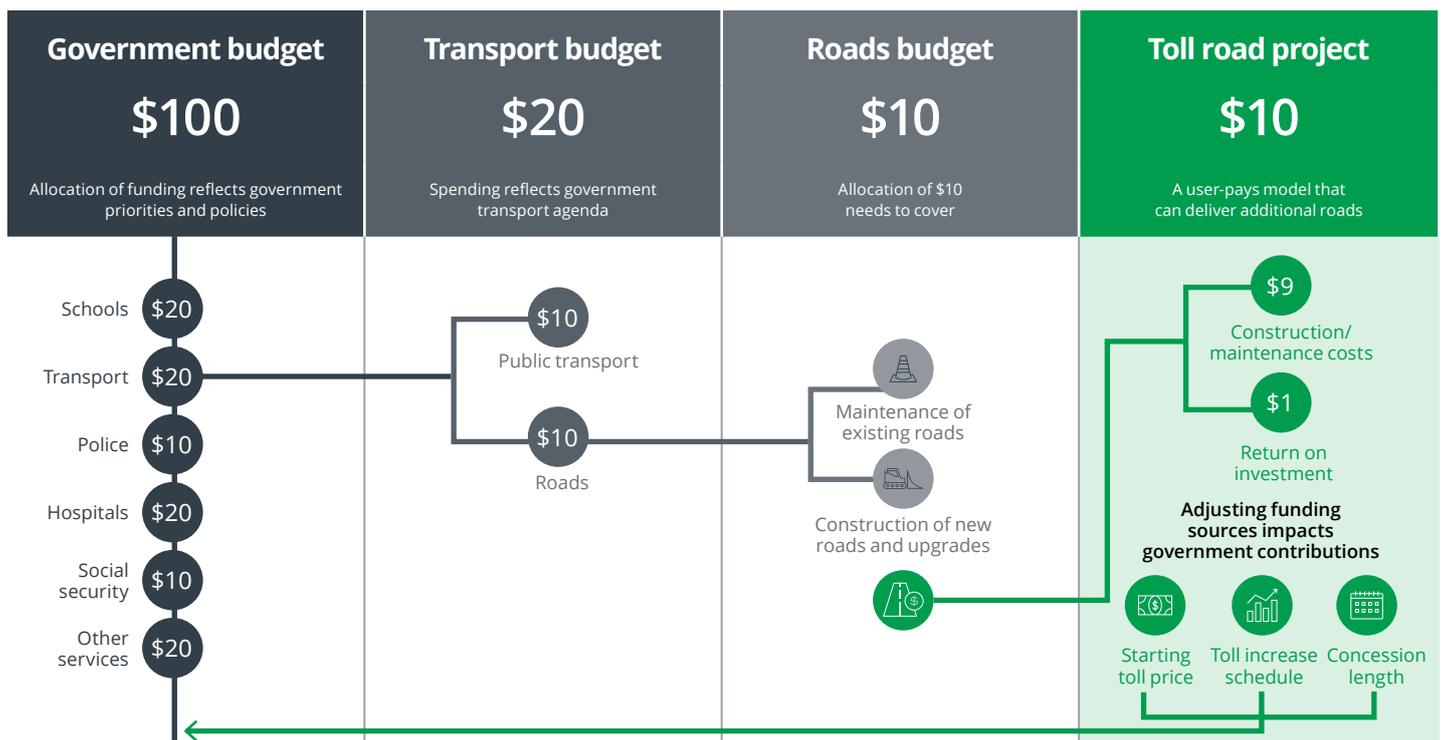
For example, if tolls are set too high, not enough motorists will use the road to maximise the project benefits.

If tolls are set too low or are not escalated at a high enough rate, government face the prospect of a larger funding gap that would need to be made up through a greater contribution (Figure 8).

Each funding source—starting toll price, toll escalation/increase schedule and concession length—can be adjusted up or down depending on the initial government contribution.

Lower tolls and escalation and a shorter concession would require greater government contribution, meaning less public funding for other essential services (Figure 9).

Figure 9. Delivering NSW services – private sector funding compliments government budgets



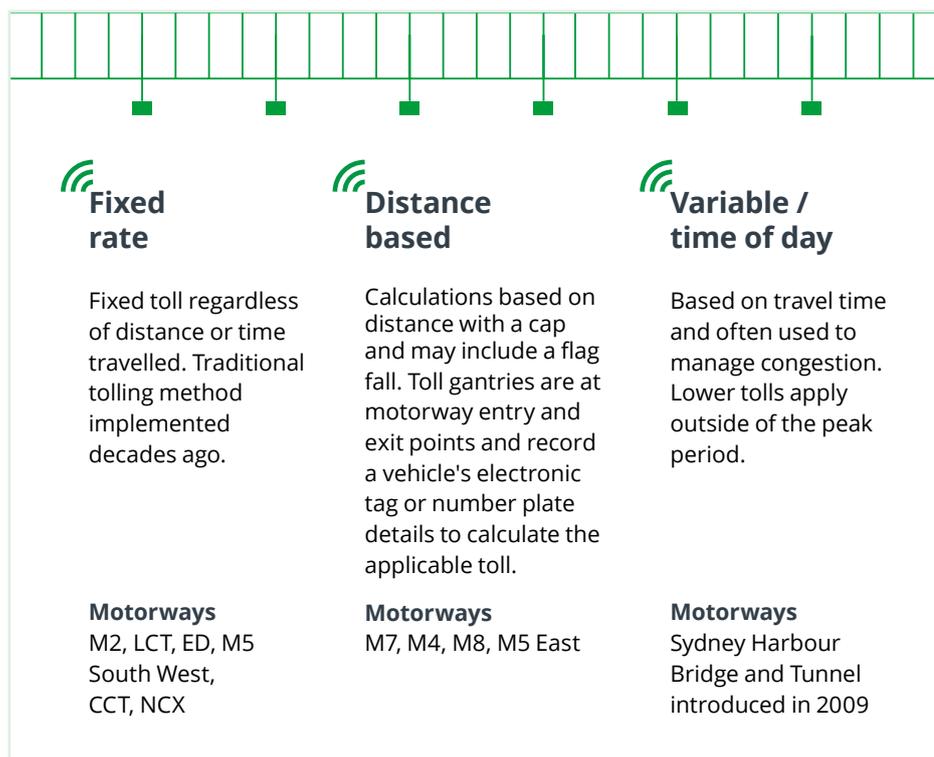
This is a fictitious example to illustrate the various factors considered

2.3 Tolling methods

Three different forms of tolling operate across Sydney's motorway network (Figure 10) reflecting the different approaches of commissioning governments.

Some toll roads were developed under a fixed rate structure, with other roads implementing distance-based tolls.

Figure 10. Sydney tolling methods



In 2014, the NSW Liberal Government approved a broad set of principles (Figure 11) to guide future tolling decisions on Sydney's motorway network.

Appendix 1 outlines the tolling and concession arrangements for Transurban's toll roads.

Figure 11. NSW Government's road tolling principles

- 1 New tolls are applied only where users receive a direct benefit.
- 2 Tolls can continue while they provide broader network benefits or fund ongoing costs.
- 3 Distance-based tolling for all new motorways.
- 4 Tolls charged for both directions of travel on all motorways.
- 5 Tolls charged reflect the cost of delivering the motorway network.
- 6 Tolls take account of increases in expenses, income and comparable toll roads.
- 7 Tolls will be applied consistently across different motorways, to the extent practicable, taking into account existing concessions and tolls.
- 8 Truck tolls at least three times higher than car tolls.
- 9 Regulations could be used so trucks use new motorway segments.
- 10 Untolled alternative arterial roads remain available for customers.



Private sector risk

The risks in large-scale infrastructure are significant and have resulted in some highly publicised failures including the Cross City Tunnel and Lane Cove Tunnel where the projects failed to meet their patronage forecasts. While private investors bore the risk – and the losses – taxpayers benefitted with delivery of and access to improved networks and new, world-class roads and tunnels. More recently, the impact of COVID-19 on traffic levels as a result of government-mandated restrictions was significant, again highlighting the risk borne by the private sector.

Transurban believes private-sector operators with stewardship of the roads they build and manage are best placed to estimate network traffic, to understand operations and maintenance costs and to bear the project risk. They have a vested interest in the asset's ongoing success and providing value for customers, clients and investors.

Australia's transport funding at the crossroads

Globally the shift to an electrified transport future is well underway, spelling the imminent demise of a fuel-sales-based road funding system.

Electric vehicles are predicted to make up to 10% of global passenger vehicle sales by 2025, rising to 58% in 2040¹ and government policies are accelerating the shift particularly in Europe and the US.

Transitioning the national fleet to zero-emission vehicles (ZEVs) is an important step towards a more sustainable future but it will present challenges to government budgets as revenue from fuel excise diminishes, and they contend with how ZEV owners will pay for their road usage.

The Victorian Government is planning to establish a road-user charge for electric vehicles, with the NSW Government also announcing consideration of similar plans in the long term.

While the uptake of ZEVs in Australia has lagged behind other comparable countries, increasingly fuel-efficient vehicles have already made a significant dent on revenue streams. Fuel excise currently contributes more than 55% of Australia's total road-related revenue;² however, this revenue source has been decreasing steadily (Figure 12).

A road-user charging system that replaced all current charges such as fuel excise, registration and associated costs has been recommended by a range of bodies including the Productivity Commission and Infrastructure Australia.

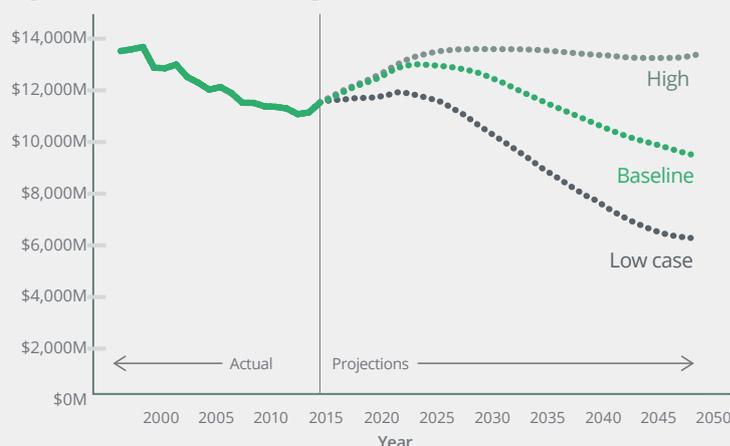
Such a system offers a sustainable funding solution and a direct link between use and the cost of constructing, maintaining and operating road infrastructure. A road usage charge system would also help to address inherent inequities where drivers with less fuel-efficient vehicles currently pay more at the petrol pump.

To compensate for reduced fuel excise funds, state governments have

progressively increased vehicle registration fees. This also presents equity challenges with infrequent and low-demand motorists subsidising frequent, high-demand motorists.

Any new system would need to provide protections for vulnerable and disadvantaged community members; and consider differences between geographical zones; and urban and regional road users to ensure it does not become a form of regressive tax. The success of road-funding reform would be heavily dependent on an effective and integrated transport planning approach that takes into account people's access to genuine and affordable transport alternatives.

Figure 12. Australia's declining fuel excise revenue³



Putting it to the test

In 2016, Transurban completed Australia's first practical study to examine drivers' preferences and awareness when it comes to road funding in Australia. The results of the almost 18-month long study indicate a user-pays system could work in Australia and generate a sustainable funding source to meet our future infrastructure needs.

It showed that participants were open to trying a more direct and transparent way of paying for their road use and that the different charging options tried by participants did not impede their usual driving behaviours.

A series of attitudinal surveys over the course of the study also showed a significant swing in participants' preference from the current system, which they initially knew little about, to a user-pays model. By experiencing a

different way of paying for their road use, participants could see the benefit of a direct and transparent user-pays model over the current system of opaque fees and charges.

Most importantly, direct feedback from the study's 1,635 participants suggested Australians are open to discussing user-pays as a viable alternative to the current system.

changedconditionsahead.com

1. Electric Vehicle Outlook 2020, Bloomberg New Energy Finance

2. Bureau of Infrastructure, Transport and Regional Economics, Australia Infrastructure Yearbook, 2015

3. Source: Transurban analysis; Bureau of Infrastructure, Transport and Regional Economics, Australia Infrastructure Yearbook 2015; CSIRO (Report for the NTC), Projecting future roads transport revenues 2015–2050, May 2015

2.4 Toll prices for freight

In Sydney, large vehicles pay between two-to-three times the car toll, depending on the road.

The higher tolls for large vehicles, in part, reflect the greater value these vehicles derive from the time savings and also the extra costs involved in safely accommodating them on the road.

Sydney's toll road network has been purpose-built for freight vehicles, providing considerable benefits including increased safety, reduced fuel consumption, greater travel-time reliability, smoother travel and less wear and tear on the vehicle, which all contribute to overall operational costs savings (see Section 1).

Toll road design incorporates special features, such as suitable pavement depth and grades, tunnel ventilation and breakdown bays, to accommodate these vehicles, which increases the overall project cost. For example, the M7 was constructed at significant cost using continuously reinforced concrete pavement.

Further additional costs are incurred in the design of tunnel infrastructure to cater for these vehicles. For instance, more gradual inclines are required for trucks, which lengthens the amount of tunnelling, as reflected in the NorthConnex tunnel design.

Modern tunnels are also being built with a taller clearance than they once were to reduce the risk of overheight vehicles colliding with tunnel infrastructure. For example, the Eastern Distributor and Cooks River Tunnel are 4.4 metres high but all new tunnels – including the M4, M8 and NorthConnex – are built to 5.1 metres.

Aside from the extra construction costs the higher tolls also take into account the impact heavy vehicles have on the road infrastructure, which is over five times greater than light vehicles¹, and the additional space they take up on the road.

Heavy vehicles are likely to be commercially owned and operated with those businesses claiming the costs of tolls as a tax deduction. This means the effective vehicle multiplier is less than 3.²

1 Transport for NSW, Economic Parameter Values Version 2.0, June 2020

2 NSW Government Response. Inquiry into Road Tolling in NSW 2017



FRESH THINKING

Network-wide toll reform

The variations in existing tolling methods and subsidies across the Sydney network are the product of decades of toll road development in the city dating back to the Sydney Harbour Bridge almost a century ago.

Since then, the delivery of new and enhanced toll roads and their tolling regimes have reflected the considerations taken by the government in office at the time. Most recent toll roads have been distance based, a method which the current government has committed for future tolled motorways.¹

Different tolling regimes, along with government subsidies and toll cashback for some motorists, (see page 24) have led to inequities with some drivers spending more per kilometre of travel than others. For example:



\$23.75

34km trip from Hornsby to Opera House at 5pm
(NorthConnex + M2 + Lane Cove Tunnel + Sydney Harbor Bridge)



\$8.52

34km trip from Seven Hills to Opera House at 5pm
(WestConnex M4 including tunnels)

With more toll roads planned to be delivered over the next decade, an opportunity for a fresh and pragmatic look at tolling regimes could be considered to ensure greater equity and a simpler proposition for customers. Options could include distance based and capped tolling regimes similar to tolling on WestConnex and the M7.

Transurban welcomes the opportunity to engage with policymakers to consider potential changes to the tolling regimes and needs of all stakeholder groups, in order to deliver a fairer and better outcome for customers and communities.

1 See Figure 11, page 19

Section 3:

Delivering value to customers

Sydney's toll road network delivers motorists significant travel-time savings, safer journeys and more reliable travel.

3.1 Toll road customers

Linkt is Transurban's retail brand, providing customers with convenient options to pay for toll travel. Most Linkt customers use toll roads infrequently. In a recent survey conducted by JWS Research on behalf of Transurban, only 4% of respondents identified as commuters who use toll roads more than once a day.¹ This is supported by earlier market research, which found that the most common reasons for using toll roads were for travel relating to shopping, social and recreational activities (42%), see Figure 14.

Roads and motorways naturally appeal for such trips as they provide the most direct route and are generally quicker than taking public transport.

Across our toll roads, 16% of trips are related to commuting for work or study (noting many respondents would not use toll roads for this purpose every day), while 19% of trips are made for social purposes and 13% for travelling to holiday destinations (Figure 14).²

Infrequent toll road use is reflected in the average amount of money spent on toll roads by Linkt Sydney customers. Between March 2019 and February 2020 22% of Linkt Sydney customers with personal consumer accounts, and 16% with commercial accounts, made no trips on toll roads and paid \$0 in tolls.

Of the Linkt customers that did travel between March 2019 and February 2020 the average motorist travelling in a personal vehicle (consumer account) spent \$9.52 per week, with 74% spending \$10 or less a week. Those with commercial accounts spent \$89 per week, with 88% spending \$100 a week or less (Figure 3).

We have chosen to look at data between March 2019 and February 2020 as it excludes COVID-19 impacts on customer travel and is therefore a more accurate representation of customer spend. The data excludes dormant customer accounts.

Figure 13. Average weekly Linkt customer spend on tolls – consumer and commercial accounts for the period March 2019 to February 2020

Consumer	
Average weekly spend	\$9.52
Average yearly spend	\$495
% spending <\$10 per week	74%
% spending <\$20 per week	86%
% spending <\$50 per week	97%
% spending >\$100 per week	0.4%

Commercial	
Average weekly spend	\$89
Average yearly spend	\$4,628
% spending <\$10 per week	49%
% spending <\$20 per week	62%
% spending <\$50 per week	78%
% spending >\$100 per week	12%

Figure 14. Reasons for toll road use



1 Survey conducted by JWS Research in April 2021 of 1,000 residents in Greater Metropolitan Sydney

2 Transurban commissioned research across general population of greater metropolitan Melbourne, Sydney and Brisbane, December 2016. Respondents were asked for specific reasons why they travelled on toll roads

Regional analysis

We have segmented Greater Sydney into seven districts to demonstrate regional differences for active private and commercial account holders

In terms of average weekly spend, 8% of personal consumer account customers in the North West spend over \$50 a week, compared to 2% in the South. However, across all regions between 74 to 88% of customers spend less than \$20 per week.

Similarly 17% of commercial customers from the North West spend \$100 or more compared to 9% from the Inner and Southern suburbs. Across all regions between 62 to 82% of commercial customers spend \$50 or less a week.

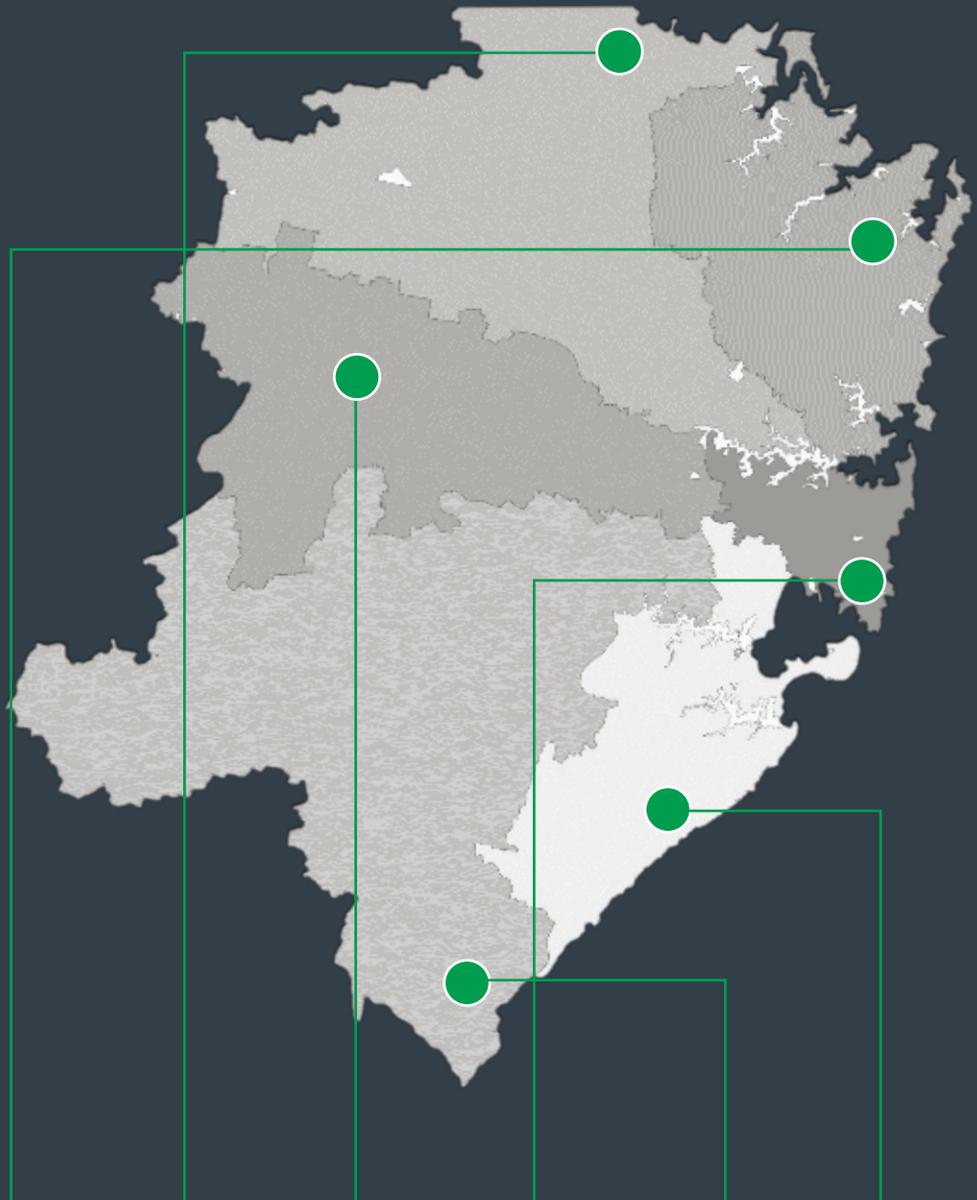
It is clear that a higher percentage of customers in the North West and South West and West spend above \$20 per week on tolls compared to other suburbs. This is in part due to the location of the toll roads providing the option for customers in those areas to conveniently cross the city and/or travel into the CBD.



Consumer



Commercial



	NORTH	NORTH WEST	WEST	INNER SYDNEY	SOUTH WEST	SOUTH	REST OF NSW
% SPEND < \$10PW	65%	56%	62%	67%	61%	76%	93%
	42%	29%	26%	42%	29%	52%	74%
% SPEND < \$20PW	83%	74%	79%	84%	78%	88%	97%
	60%	44%	39%	59%	43%	66%	84%
% SPEND < \$50PW	96%	92%	95%	97%	94%	98%	99.6%
	81%	67%	62%	80%	65%	82%	92%
% SPEND > \$100PW	0.4%	1.2%	0.6%	0.3%	0.6%	0.2%	0.03%
	10%	17%	23%	9%	19%	9%	4%



3.2 Choice for motorists

In 2019, we launched Linkt Trip Compare, a toll calculator provided on the Linkt website, which allows motorists to compare the costs and benefits of using a tolled route versus the alternate untolled route.

The user enters their origin and destination and is provided with information on the cost of the toll along with estimated travel-time and fuel savings.

It's a simple tool that allows people to assess the value of using a toll road to make a more informed choice about how they travel.

In addition to Linkt Trip Compare, navigation tools like Google Maps, Waze or TomTom provide information to customers about their route options, but up until recently these third party apps did not include information on toll prices, which made it hard for customers to weigh up their options. Waze now includes toll pricing in its app.

While most people have access to a computer or smartphone, it can't be taken for granted that everyone has access. Transurban is aware of digital exclusion and the disadvantage this can cause.

To address this and further support motorists in making informed choices about how they travel, we are exploring the use of on-road signage.

Government-funded rebate schemes

A number of NSW Government-funded programs are available to motorists to reduce the costs of tolls or allow motorists to reclaim tolls paid.

M5 South West Cashback Scheme

This scheme allows eligible drivers to claim back tolls for trips on the M5 South West Motorway, excluding GST and other fees. The scheme applies to vehicles registered in NSW for private, pensioner or charitable use. The Carr Labor Government introduced the M4/M5 Cashback scheme in 1997. Refunds for the M4 have now expired.

In the 2019-20 financial year, more than 27.3 million trips across approximately 338,000 accounts were claimed under the scheme, adding up to more than \$119 million in benefits.

Registration rebate

Started in 2018 by the Berejiklian Government, this scheme provides free vehicle registration for drivers who have spent \$1,352 or more on tolls in the previous financial year (an average of \$26 a week). Drivers who spend \$811 or more during the previous financial year (an average of \$16 a week), are eligible for half-price registration.

The scheme came into effect on 1 July 2019 and more than 360,000 customers have benefitted from the scheme with more than 207,000 drivers receiving free registration and the rest getting half price registration.

Large recreational vehicle toll rebate scheme

Drivers towing caravans, boats and horse floats are eligible for cheaper tolls to bring the cost in line with regular cars. The rebate is the difference between the Class B and the Class A toll and applies to private use vehicles only. The rebate is capped at eight tolled trips per monthly billing period.

Class B vehicles are charged a higher toll as they are typically trucks or heavy vehicles, whereas Class A vehicles are typically cars and motorcycles. The scheme applies to all of Sydney's toll roads, with the exception of the Sydney Harbour Bridge and Sydney Harbour Tunnel which has a single toll for all vehicles. The rebate was introduced by the Berejiklian Government in June 2020 and as at December 2020, 484 claims had been paid, totalling approximately \$36,000.





FRESH THINKING

Decision-point signage

To help motorists make an informed decision about their travel, we undertook a pilot in Melbourne, which provided information about travel times on the CityLink toll road compared to the alternate route.

Two travel-time signs were installed at key locations before entrances to CityLink displaying real-time travel times to destinations comparing CityLink with the free alternative route.

Toll price information was not included on the sign under advice that too much information could distract motorists.

Customer feedback from the trial was very positive as they found the information displayed to be valuable in deciding whether or not to take the tolled route or the free alternative route while on the move.

Some of the key findings were:

- Almost 70% of people said they would use the sign to inform future travel choices, and about 40% said the signs helped inform their travel choice on the spot.

- While customer feedback indicated the information was useful, some suggested the signage design could be improved.
- Other feedback included expanding the signage to more locations, additional promotion of the initiative so drivers knew to look out for them and adding more information such as the cost of a trip and whether ramp signals were active.

Transurban would be open to a discussion with NSW Government to adopt a similar approach in NSW to provide customers with more data to inform their travel choices when using the motorway network.

This approach could include decision-point signage at key locations leading towards M8/M5 East, or M1 leading towards NorthConnex and Pennant Hills Road.

3.3 Quicker, reliable travel

In 2019, Sydney ranked 86th out of 416 cities on the TomTom Traffic Index, which measures congestion, above cities such as Singapore, Hong Kong, Shanghai and Berlin. Sydney's congestion index level was 33%, which meant that people spent an average of five days and 18 hours stuck in rush hour traffic every year.

This is time that could have otherwise been spent at work, leisure or with family and friends. Even with the impacts of COVID-19, Sydney's congestion index was 28% in 2020 and lost time in traffic equated to four days and 16 hours.¹

The broader economic impact of congestion is discussed in Section 1, but of equal relevance is the value of lost time on individual motorists, either financial loss, or related to health and wellbeing.

Toll roads provide motorists with the option to save time. As outlined in Figure 15, peak travel-time savings on Transurban's Sydney toll roads range from between 7 to over 55 minutes, depending on the length and location of the road. Not only are these roads quicker and more

reliable than alternate routes, they also connect to form a ring around the city providing motorists with a network that is greater than the sum of its parts.

Businesses who use toll roads to make deliveries or attend jobs provide the clearest example of the value of these travel-time savings. As in Case study 1, a freight operator may choose to use a toll road over an alternative route because the total operational cost savings outweigh the cost of the toll, as well as the business being able to take on more work and be more productive due to time saved.

Depending on the vehicle, operational costs per hour of travel can range from between \$37 for a light commercial truck to \$108 for a B-Double truck (Figure 16). Beyond time saved, the free-flowing conditions on tolled motorways mean that heavy vehicles can avoid the stop-start driving conditions on alternative routes, which can cost around \$1 in fuel for every stop.²

The travel-time savings and reliability of Sydney's toll roads play an important role in supporting many industries, but especially freight and delivery.

A survey conducted by Transurban in August 2020 found that 48% of people

were doing more online shopping since the COVID-19 pandemic, and half of those expected to continue shopping that way.³ Even before the pandemic, the World Economic Forum predicted that demand for last-mile delivery will soar by 78% in the next decade, leading to the number of delivery vehicles in the top 100 cities to increase by 36%.⁴

When it comes to passenger travel, most people use toll roads occasionally for trips relating to shopping, social and recreational activities (Section 3.1, Figure 14). The value of the travel-time saved is therefore much more difficult to quantify but no less real.

Take Case study 3 for example, by using the WestConnex M4 to get to a holiday destination the customer is able to save 56 minutes in travel-time and start their holiday sooner.

In June 2020, Transport for NSW (TfNSW) published economic parameter values for common benefits and costs in transport. It recommends that \$17.72 per person, per hour be used to calculate the value of travel-time savings for private vehicles. Using this figure, the net benefit to the motorists in Case study 3 of using a toll road over the non-tolled alternative route would be around \$27.07.

Figure 15. Table of peak customer savings by asset – April 2021

ROAD	DIRECTION	TRAVEL-TIME SAVING (MINUTES)	AM / PM
Cross City Tunnel	EB	9	PM (3PM)
	WB	11	PM
Eastern Distributor	NB	18	PM
	SB	24	AM
Lane Cove Tunnel	EB	9	PM
	WB	8	PM
M2	EB	30	PM
	WB	40	PM
M5 South West	EB	27	PM
	WB	23	AM
M5 East	EB	15	AM
	WB	19	PM
M7	NB	34	PM
	SB	32	AM
M4	EB	30	PM
	WB	56	PM
M8	EB	16	PM
	WB	20	PM
NCX	NB	8	AM
	SB	9	PM

1. TomTom Traffic Index, Sydney full-year historical traffic data

2. Transport for NSW, Economic Parameter Values Version 2.0, June 2020 – calculated by multiplying 'Fuel consumption per stop (Litres)' for heavy trucks by average price per litre for diesel (average diesel price from NRMA Weekly Fuel Report, 12 April 2020)

3. Survey conducted by Nature in July 2020, involving 4,500 respondents from Sydney, Melbourne and Brisbane in Australia; Greater Washington Area, USA; and Montreal, Canada

4. World Economic Forum. The Future of Last-Mile Ecosystem, January 2020

Case study 1

Value of travel-time savings to Sydney's freight operators

Trucking Company T owns and operates a fleet of articulated trucks out at Ingleburn Industrial Precinct. Its business is to pick up freight from Port Botany and take it to Ingleburn for processing, packaging and redistribution. The business operates between 6am and 8pm. The table below outlines the one-way costs and benefits to the business of using the tolled route versus the untolled route. Each one-way trip delivers a net benefit of \$29.61 to Company T, excluding additional vehicle operating cost benefits. In addition, the time saved by using the tolled route would allow it to make 14 one-way trips each workday (factoring in dwell time), compared to around nine via the untolled route, thereby making the company 56% more productive.



Figure 16. Value per hour of travel-time on urban roads for freight operators⁵

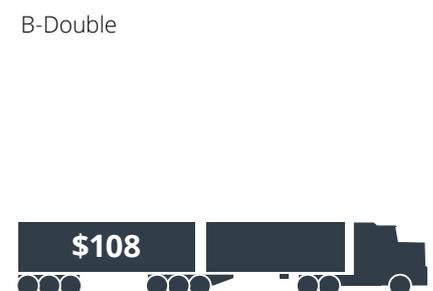
Rigid trucks



Articulated trucks



Combination vehicles



1. Total toll for Class B vehicle using the M5 South West Motorway and M5 East Motorway, as at April 2021
 2. Travel-time savings based on TomTom data for average workday in April 2021
 3. Transport for NSW, Economic Parameter Values Version 2.0, June 2020
 4. NRMA Fuel Report 10th May 2021, Diesel price (month average)
 5. Transport for NSW, Economic Parameter Values Version 2.0, June 2020 – figures calculated by adding 'Value per occupant (\$/per person-hour)' to 'Urban Freight (\$/vehicle-hour multiplied by average occupancy rate) and rounding to the nearest dollar

Case study 2

Value of travel-time savings to working parents

A working parent who works in Macquarie Park is running late to pick up his child from a Blacktown childcare, which charges \$1 per minute in late fees. If he leaves just before 5.30pm on a Monday and takes the M2 and M7 tolled route he will arrive at 6pm, spending \$10.44 on tolls, while saving approximately \$37 in late fees and 1 litre in petrol. The net benefit of using the tolled route is \$39.03, excluding additional vehicle operating cost benefits.

TOLL ROUTE

\$10.44

Travel time

31
mins

Traffic lights

12

Fuel consumed

2
litres

UNTOLLED ROUTE

\$0

Travel time

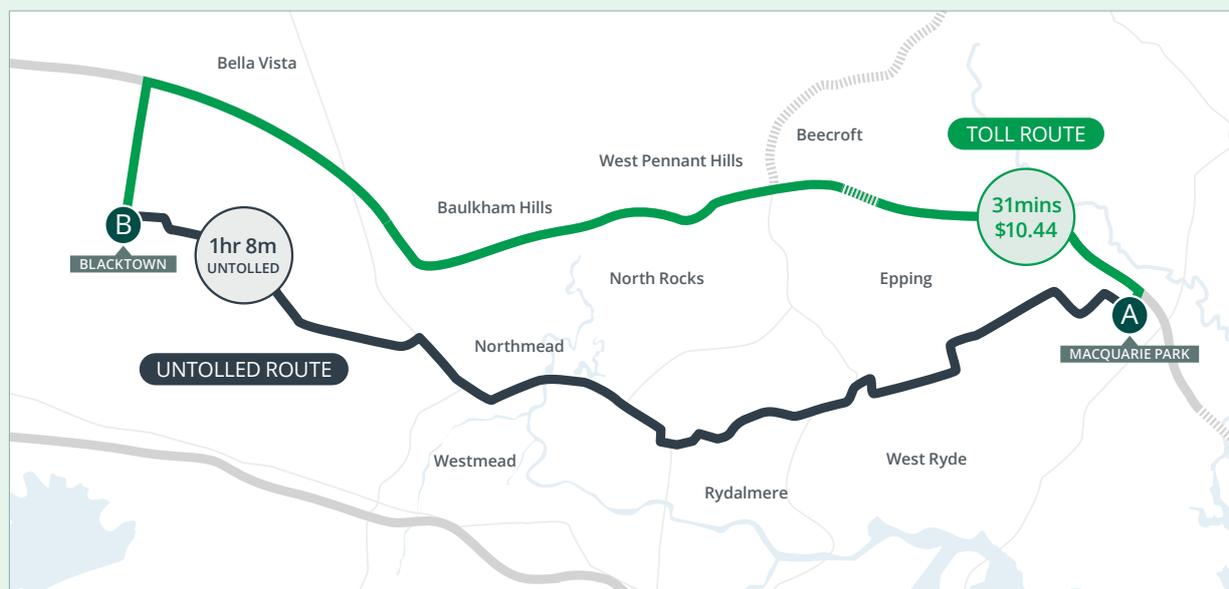
68
mins

Traffic lights

41

Fuel consumed

3.1
litres



**COST /
BENEFIT
TOLLED
ROUTE**

\$10.44
toll paid¹

37mins
saved, equating
to \$37 in late fees,
and \$10.93 in value
of travel time²

29
traffic lights
avoided

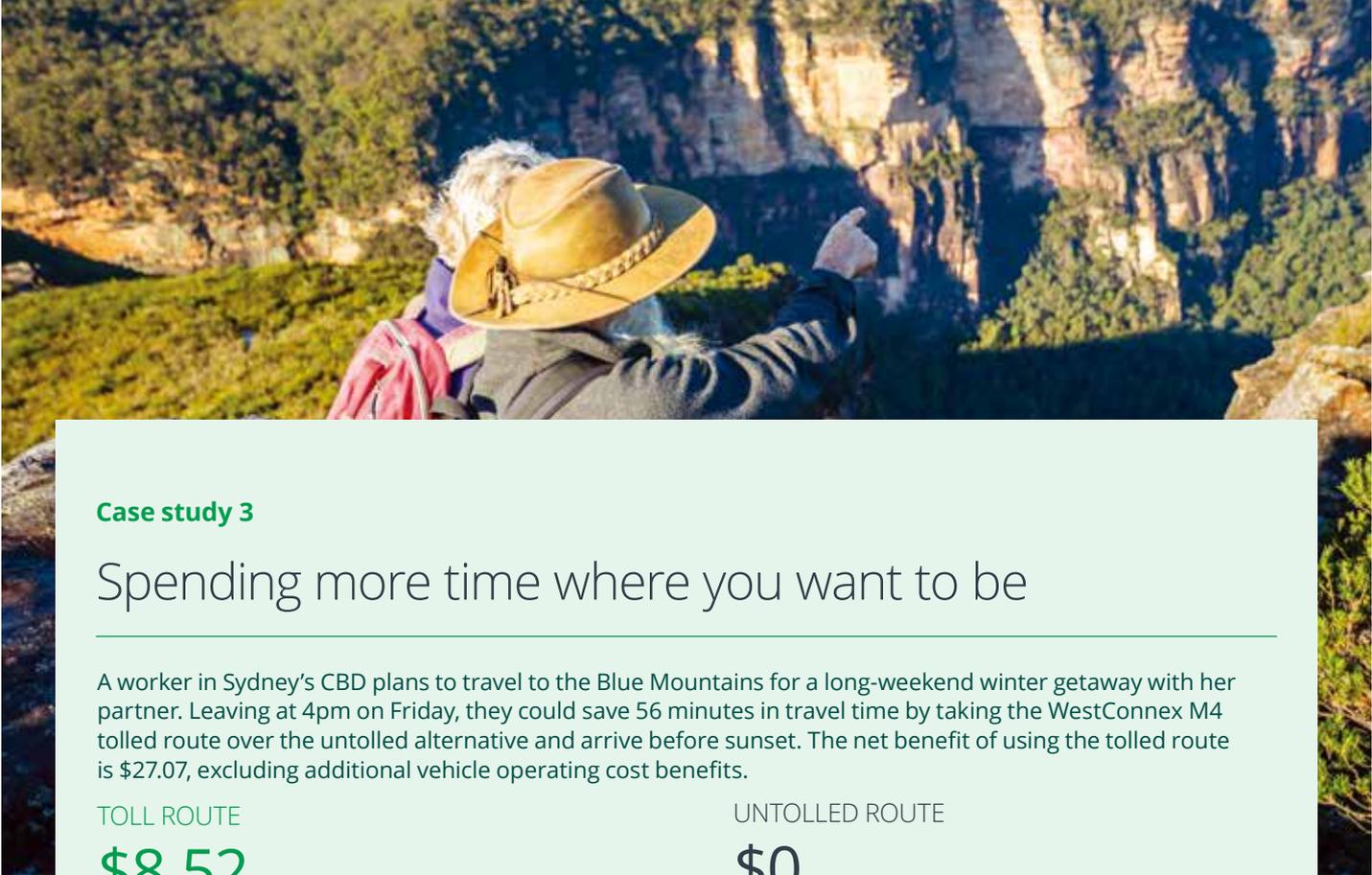
1.1 litres
of petrol saved,
saving approximately
\$1.54 in fuel costs
(assuming an
unleaded price of
\$1.40 per litre)³

\$39.03
net benefit
excluding
additional
vehicle
operating cost
benefits

1. Total toll for Class A vehicle using the M2 Motorway and the Westlink M7 Motorway, as at April 2021

2. Transport for NSW, Economic Parameter Values, Version 2.0, June 2020

3. NRMA Fuel Report 10th May 2021, Unleaded91 price (month average)



Case study 3

Spending more time where you want to be

A worker in Sydney's CBD plans to travel to the Blue Mountains for a long-weekend winter getaway with her partner. Leaving at 4pm on Friday, they could save 56 minutes in travel time by taking the WestConnex M4 tolled route over the untolled alternative and arrive before sunset. The net benefit of using the tolled route is \$27.07, excluding additional vehicle operating cost benefits.

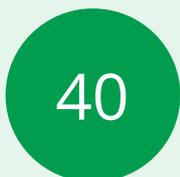
TOLL ROUTE

\$8.52

Travel time



Traffic lights



Fuel consumed



UNTOLLED ROUTE

\$0

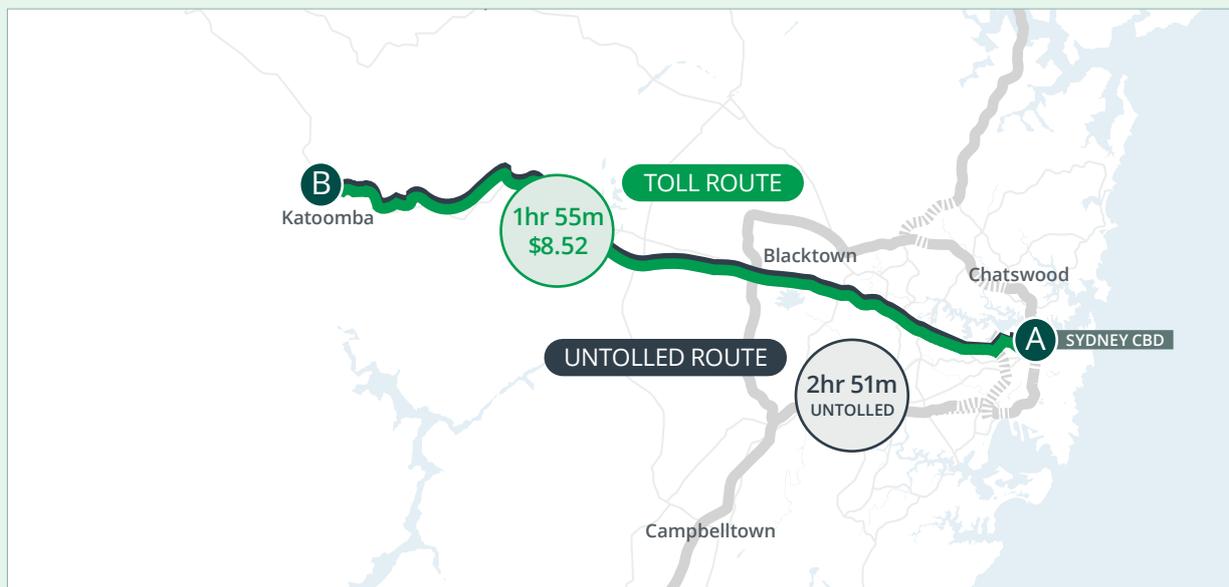
Travel time



Traffic lights



Fuel consumed



**COST /
BENEFIT
TOLLED
ROUTE**

\$8.52
\$8.52¹
(or \$4.26
per person)

56mins
\$33.07
in value of
travel-time
saving²

38
traffic lights
avoided

1.8 litres
of petrol saved, saving
approximately \$2.52
in fuel costs (assuming
an unleaded price of
\$1.40 per litre)³

\$27.07
net benefit
excluding
additional
vehicle
operating cost
benefits

1. Total toll for Class A vehicle using WestConnex, as at April 2021

2. Transport for NSW, Economic Parameter Values, Version 2.0, June 2020

3. NRMA Fuel Report 10th May 2021, Unleaded91 price (month average)

3.4 Customers' views on the value of toll roads

In a recent survey conducted by JWS Research on behalf of Transurban, most frequent users believe that toll roads provide a more direct route than alternatives, saving them time and making their travel time more predictable, see Figure 17.¹

Transurban's Voice of Customer (VoC) Program, which analyses around 250,000 pieces of feedback from our Australian customers each year also provides comprehensive metrics to gauge customers' on-road experience.

It measures a Net Promoter Score (NPS) and Customer Satisfaction (CSAT) over time by collecting and analysing feedback via a post-trip survey sent to account customers after a single trip on a Transurban-owned asset.

NPS is a measure of a customer's willingness to recommend a product or service to family and friends. It measures consumer advocacy on a scale between 0 to 10. Customers scoring between 0 to 6 are classified as detractors, 7 to 8 as passive, and 9 to 10 as promoters. The overall score is calculated by subtracting the percentage of detractors from promoters with a range between -100 to 100.

As seen in Figure 18, Transurban's NPS for on-road experience has been steadily rising from early 2018. As of March 2021, NPS was +11.

An NPS above 0 means the majority of customers surveyed feel positively about their experience on Transurban roads. The aim is to continue to see the score increase over time.

Based on customer feedback from VoC, the openings of NorthConnex, which has an NPS score of +42, and WestConnex tunnels appear to have driven a positive increase in advocacy due to travel-time saved and limited congestion on these roads.

Figure 17. Sydney motorists' attitudes to toll roads—daily or frequent users



Figure 18. Net Promoter Score for on-road experience, from March 2018 to March 2021



¹ Survey conducted by JWS Research in April 2021 involving 1,000 residents in Greater Sydney

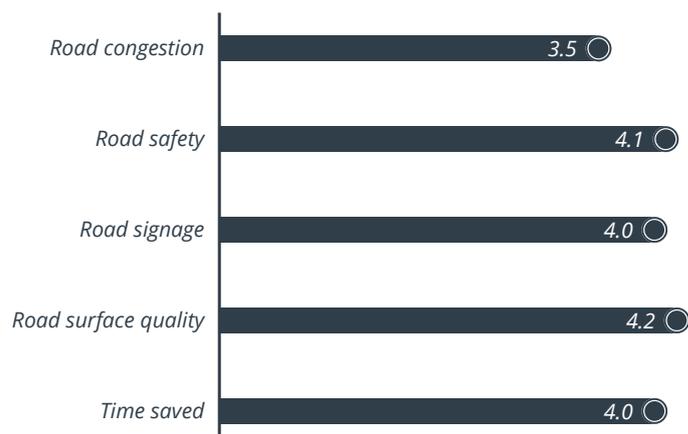
Customer satisfaction—the on-road experience

Customer satisfaction, or CSAT, is a measure of how satisfied customers are with key on-road factors during their trip on a toll road. Customers are asked to rank satisfaction for each factor on a scale of 1 to 5, with 1 being 'Very Dissatisfied' and 5 being 'Very Satisfied'.

The overall score is calculated as an average score between 1 to 5. These factors are road congestion, road safety, road signage, road surface quality and time saved. Average customer responses to each of these factors for the six months to March 2021 are shown in Figure 19.

Satisfaction towards congestion – while high by industry standards – is lower than the other factors, which is largely due to the experience of congestion undermining the benefits of using a toll road during peak periods. For example, if a customer travels on a Transurban toll road in peak hour and encounters congestion they are likely to feel dissatisfied with their experience despite the fact they will have experienced some of the highest travel-time savings possible and avoided heavier congestion throughout the wider network. In this case the customer is unlikely to factor in the congestion they would experience if they had travelled via an alternate route into their calculation of value and satisfaction.

Figure 19. On-road satisfaction average between October 2020 to March 2021



"A quick and easy way through to the city. This well-lit and clearly signposted tunnel makes things so much easier to move into Sydney".

Lane Cove Tunnel customer

"It makes south west Sydney, so much more accessible to the rest of Sydney and beyond."

M5 South West customer



Case study 4

NorthConnex: the missing link transforming travel and communities



37K

average daily
traffic



>6K

trucks per day

The \$3 billion NorthConnex tunnels have transformed the way motorists, commuters, freight and logistics move around Sydney's north-west. It has quickly become an integral part of Sydney's motorway network, addressing one of the city's most critical transport challenges.

Sydney's newest tunnels – which opened in October 2020 – created the much-needed 'missing link' in the National Highway route, providing a bypass to the perennially gridlocked Pennant Hills Road.

The first transport project to come out of the NSW Government's Unsolicited Proposals process, NorthConnex is an excellent example of governments and the private sector working together to fast-track a project to create huge benefits for the community and road users.

A partnership between the Federal and NSW governments, TfNSW, Transurban and its WestLink M7 partners, the twin 9km tunnels connect the M1 Pacific Motorway and the M2 Motorway.

Innovative design, built for the future

Australia's deepest tunnels have been built with innovative and sustainable design features to cater for future traffic growth.

The project has received a "leading" rating for infrastructure sustainability design – the highest possible – from the Infrastructure Sustainability Council of Australia.

Design features include:

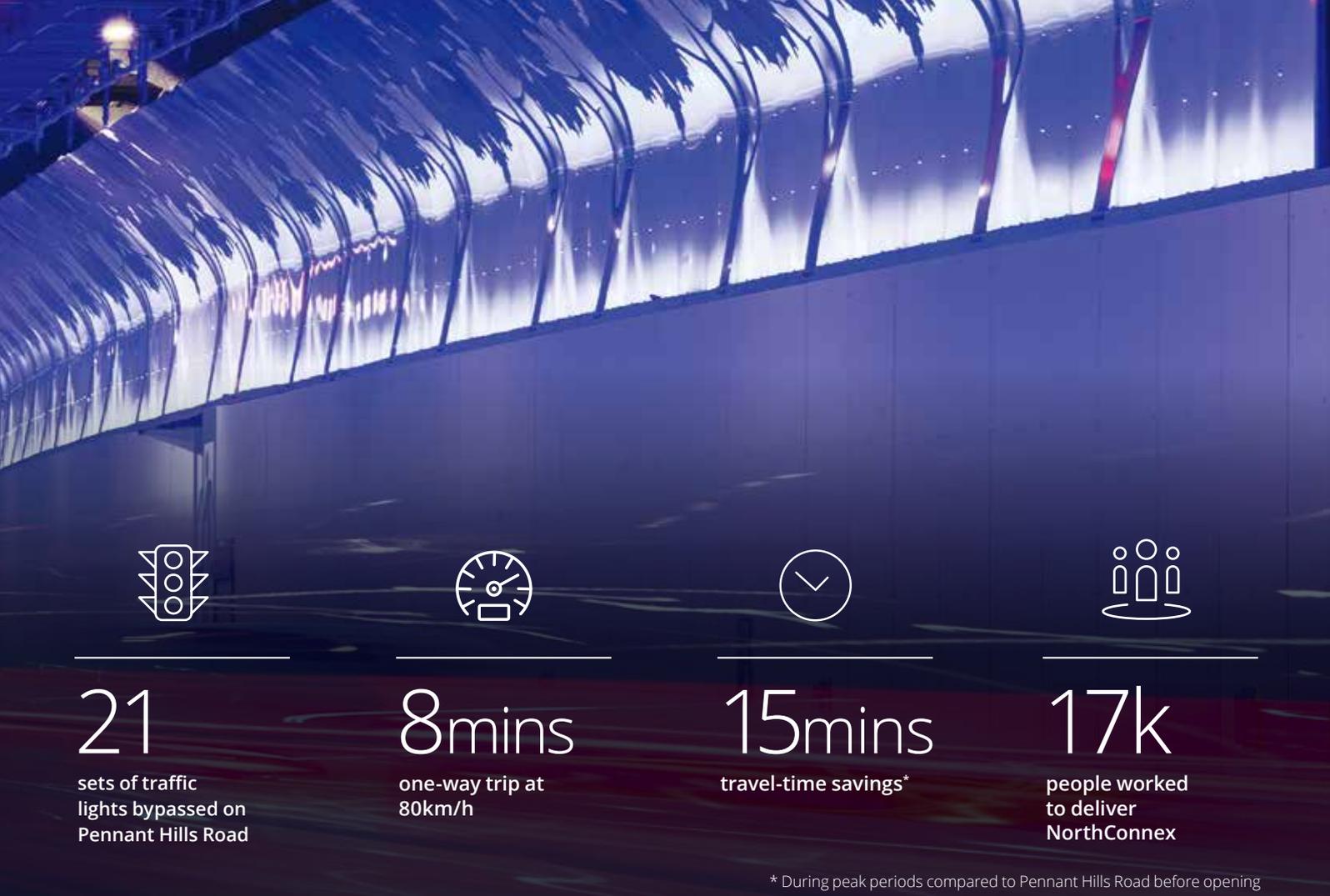
- tunnels wide enough for three-lane capacity in each direction (currently operating as two)
- a 5.1 metre tunnel height clearance making it one of the tallest tunnels in Australia, reducing the likelihood of incidents with over-height vehicles and improving the efficiency of the tunnel's ventilation
- a smoother and flatter road gradient for trucks and freight, compared with the sharp corners and hills on Pennant Hills Road, allowing vehicles to

maintain normal travel speed, resulting in better fuel efficiency, reduced emissions and less need for lane changing for motorists

- a total LED light solution, reducing carbon emissions by an estimated 83,000 tonnes over the life of the tunnels
- variable speed drive fans which adjust the fan speed based on the number of vehicles travelling through the tunnel. They are expected to provide energy savings of 44%.

In an Australian first, the tunnels feature innovative lighting displays to keep drivers alert and focused as they travel through one of the longest road tunnels in the country. Each lighting display has been placed strategically along the tunnel alignment to ensure drivers remain engaged and aware of their surroundings, but not distracted.

The lighting is the result of research into driver behaviours, conducted in partnership with the University of NSW, Austroads and the project sponsors TfNSW and the Federal Government.



21

sets of traffic lights bypassed on Pennant Hills Road



8mins

one-way trip at 80km/h



15mins

travel-time savings*



17k

people worked to deliver NorthConnex

* During peak periods compared to Pennant Hills Road before opening

Creating jobs

NorthConnex has been a major driver of employment, with more than 17,000 people involved throughout construction, including more than 1,500 workers from the Central Coast. Around 300 businesses from the Western Sydney area contributed to the project, creating significant opportunities for local suppliers and contractors.

The NorthConnex Training Hub ran more than 12,700 training sessions, equivalent to more than 87,000 hours of training.

It helped create pathways for the next generation of workers, providing on-the-job training and education across a range of areas including civil construction, mobile plant operation, emergency and crisis management, financial acumen, leadership and cultural heritage awareness.

The training hub was part of a \$10 million investment in training across the entire NorthConnex project.

Giving streets back to the community

A one-way trip on Pennant Hills Road is now 33% faster – with more than 6,000 heavy vehicles a day moved into the tunnel and away from local streets.

For local communities that means less noise and improved safety in their neighbourhood.

Air quality modelling also predicts that NorthConnex will improve air quality along Pennant Hills Road by up to 38% with fewer trucks on the road.¹

Construction of the tunnel also paved the way for transformation and regeneration opportunities in the local area. More than one million cubic metres of excavated shale and sandstone material from tunnelling was used to fill the former Hornsby Quarry. It has laid the foundations for Hornsby Shire Council to transform the site into a \$50 million community recreation facility described as the “Centennial Park of the north”.



“This is a real partnership between Transurban, the State Government and the Federal Government and also the Community.”

NSW Premier Gladys Berejiklian

¹ NorthConnex Environmental Impact Statement - Section 7.3 Air Quality Part 2 page 505, July 2014

3.5 Safer travel

Every day motorists rely on Transurban's Sydney roads and tunnels for safe travel, making more than 930,000 trips across the network.¹

State-of-the-art safety and traffic management technology and 24/7 monitoring, ensure motorists' journeys are as safe as possible, controlling conditions such as speed limits and lane closures. We also have rapid incident response crews ready to deploy to the scene to ensure safe management of incidents.

In FY19, Transurban responded to approximately 290 incidents a week.² Our incident response crews clear an incident within a few minutes, working with first responders if the incident is serious to manage trafficflow and ensure the safety of motorists.

This all contributes to Transurban's roads being safer to drive on than similar roads. Analysis by Melbourne's Monash University Accident Research Centre (MUARC) in 2017/18 found that the crash rates for our NSW roads were 68% lower compared to like roads.

Flow-on benefits

Not only are Transurban's toll roads safer, they can also improve the safety of surrounding roads. This is because of the link between congestion and road crashes. By reducing traffic volumes on the surrounding road network, our toll roads ease congestion and improve safety performance on these local roads.

For example, when the NorthConnex tunnel opened in October 2020, there was a marked improvement in congestion on the surface roads above NorthConnex,

including Pennant Hills Road and the connecting side streets. As shown in Figure 20 and 21, travel on Pennant Hills Road is now 24% to 33% less congested following the opening of NorthConnex, with 24% fewer vehicles using Pennant Hills Road each workday in the two months post-opening, compared to the two months prior.³

The impact of less congestion improving road safety along Pennant Hills Road is illustrated in Figure 22. The map uses data by Compass IOT to show nearmiss incidents along Pennant Hills Road pre- and post-NorthConnex opening. Near-miss incidents are recorded when a vehicle loses traction from a sudden high-force brake or turn. It is clear from the map that the number of near-miss incidents along Pennant Hills Road and side streets have reduced since the opening of NorthConnex.



Case study 5

Research partnership to improve road safety

Our commitment to road safety extends beyond our everyday operations. We invest in research and development that has the potential to improve safety outcomes for motorists across Australia.

In 2020 Transurban entered into a second three-year partnership with Neuroscience Research Australia (NeuRA) to continue our support for its research into road safety.

NeuRA's research program has focused on reducing motorcyclist pelvic injuries, addressing child safety in cars, and improving older driver and passenger protection.

This research has already identified potential improvements for child seats, which the Australian Standards Committee is in the process of reviewing, while new protective equipment for motorcyclists may help improve rider safety.

Research findings from these projects will inform policy, regulation and standards as our transport system transforms through technology aimed at improving the safety of all road users, but which also presents risks in human interaction and reliance.

transurban.com/neura

1 Transurban March Quarter 2021 Update

2 This includes incidents on the M2 Motorway, Lane Cove Tunnel, Eastern Distributor, Cross City Tunnel, M5 South West, M7 Motorway and the M4 Motorway (between Parramatta and Homebush). The M8 Motorway and NorthConnex are not included as these became operational in 2020, and the M5 East is not included as Transurban only assumed ownership in May 2020. FY19 data has been used instead of FY20 data to remove COVID-19 impacts to traffic

3 Transport for NSW, Average Daily Traffic Count, Station ID: 74090, accessed via the online Traffic Volume Viewer

Figure 20. Pennant Hills Road north-bound average speeds pre- versus post-NorthConnex¹



Figure 21. Pennant Hills Road average speeds pre- versus post-NorthConnex opening²

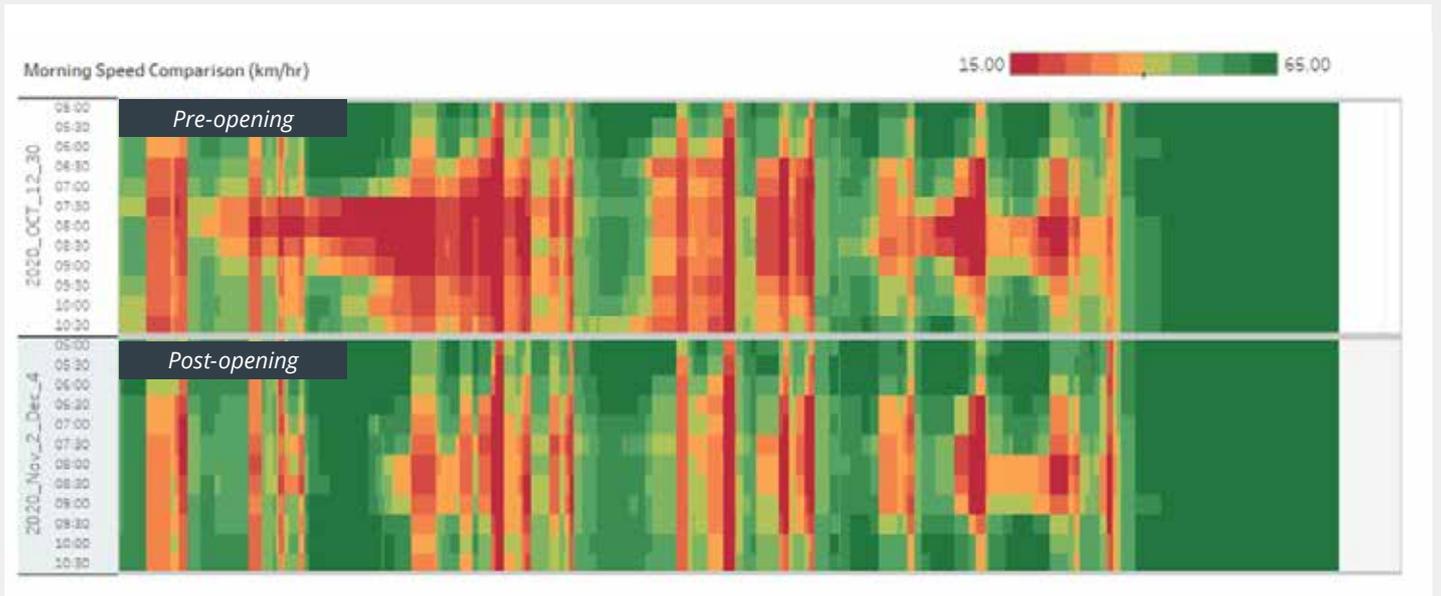


Figure 22. Pennant Hills Road near-miss incidents, pre- versus post-NorthConnex opening³



1 TomTom Congestion data, comparing the two months before opening to the two months after opening
 2 TomTom Congestion data, October 2020 versus November 2020
 3 Compass IOT data

Case study 6

Cleveland Street off-ramp

Transurban's monitoring of the network observed that queuing on the Cleveland Street off-ramp from the Eastern Distributor would cause congestion to spill back on to the motorway and significant delays on the connected arterial network. This led to erratic and last-minute manoeuvres by motorists and turbulent traffic flow, often reducing the busy inner-city motorway down to one lane and causing delays throughout the inner-city suburbs of Waterloo and Surry Hills.

In July 2017, Transurban and TfNSW began a six-month trial, which closed the off-ramp. In the lead up to the trial, we worked with TfNSW to undertake thorough traffic modelling, road safety audits and community engagement, which resulted in the decision to trial the off-ramp closure.

Since the off-ramp closure, weekday motorway speeds have improved by 5%, while weekend journey speeds on local roads have improved by 6%.

Aside from smoother traffic flow and travel reliability, the closure has also increased safety on the motorway and amenity on the local streets for the inner city. The off-ramp remains closed due to the success of the trial.

Pre Trial (typically between 10am - 3pm) During Trial (between 10am - 3pm)



Looking north at South Dowling St and Eastern Distributor (near Crescent St)

Case study 7

M7/M2 proactive speed trial

The M7 Motorway experiences regular workday morning eastbound congestion at the M2 Motorway interface near the Abbott Road merge, often extending back to Norwest Boulevard – a distance of four kilometres – and impacting motorists' safety and travel-time reliability.

To address the problem Westlink M7, which is 50% owned by Transurban, trialled an innovative smart motorway solution using real-time traffic data and Variable Speed Limit Signs to proactively reduce speeds from 100km/h to 80km/h just before the onset of congestion.

The six-month trial began in 2018 and aimed to smooth traffic flow and reduce sudden speed drops to improve road safety and travel reliability. In the 18 months before the trial, this section of the M7 saw 12 crashes. During the trial, no crashes were observed. The smoother traffic flow also reduced the duration of congestion by approximately 10 minutes and queue lengths by about 500 metres.

Given the success of the trial in improving safety and reliability outcomes for motorists on the M7 Motorway it was determined dynamic speed management continue as part of regular operations.

3.6 Investing in the network

The traffic and safety performance of Transurban's roads can impact surrounding roads and vice versa.

Transurban works closely with the NSW Government on short and long-term network planning and invests significantly in operations and maintenance to ensure toll roads remain a safe and reliable part of the broader road network.

Data and analytics are central to Transurban's approach. By combining external sources of data – such as TomTom traffic data measuring average speeds – with data collected from Transurban's roadside Intelligent Transport Systems (ITS), we are able to identify trends in traffic congestion both on and off the motorways as well as safety hot spots.

This data captures the average speed on Sydney toll roads at different times of the day, which can be compared year-on-year. This provides new opportunities to more effectively manage the motorway as a whole. This is shared with government to ensure that investment decisions can be made with the most accurate information.

Solutions may range from new roads to physical road widenings and upgrades such as the M2 Upgrade and the M5 South West Widening Project, or involve smaller network optimisation enhancements or smart motorway technology solutions, see Case studies 6 and 7.

Figure 23. Solution—Congestion resolved

Average speeds in Sydney have been steadily deteriorating during peak periods on certain sections of the orbital network. The charts highlight the positive impact that the opening of the M8 Motorway in 2020 had on average speeds on the M5 South West heading into the city during the AM peak.

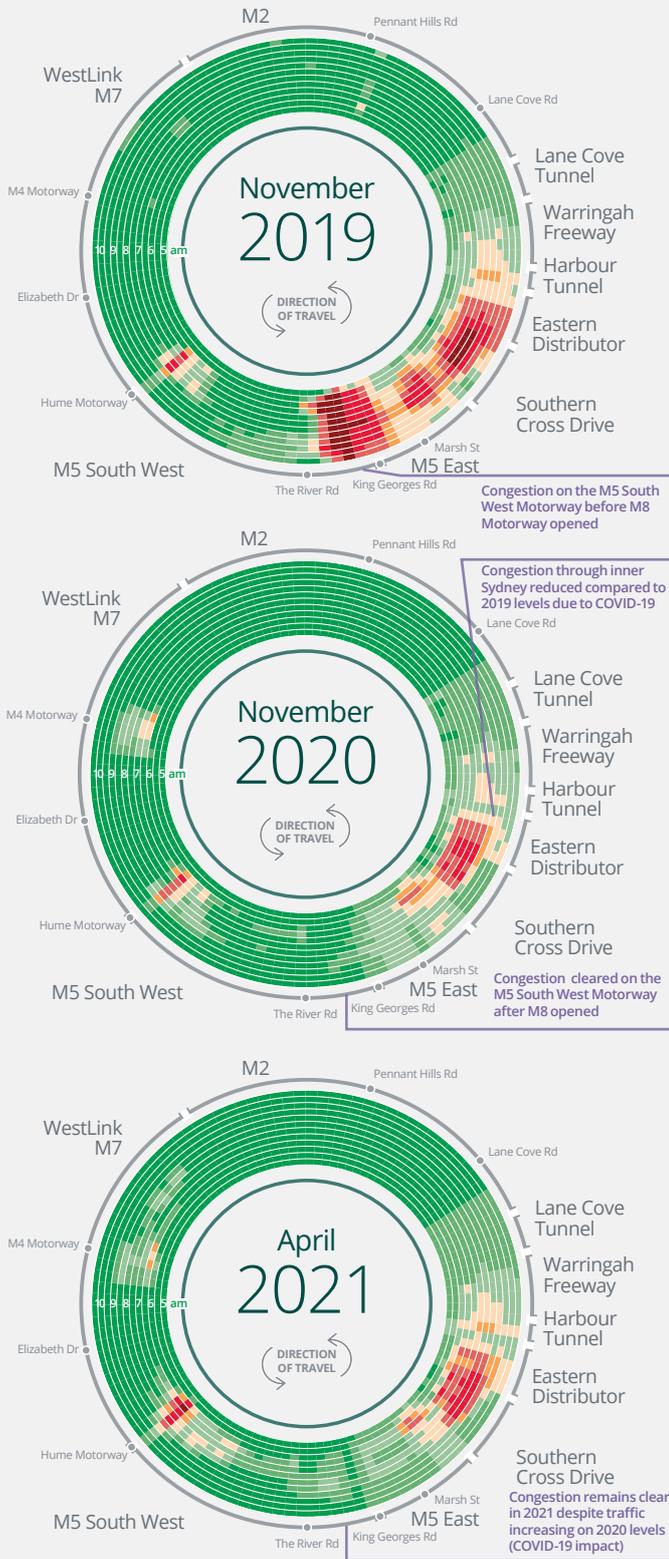
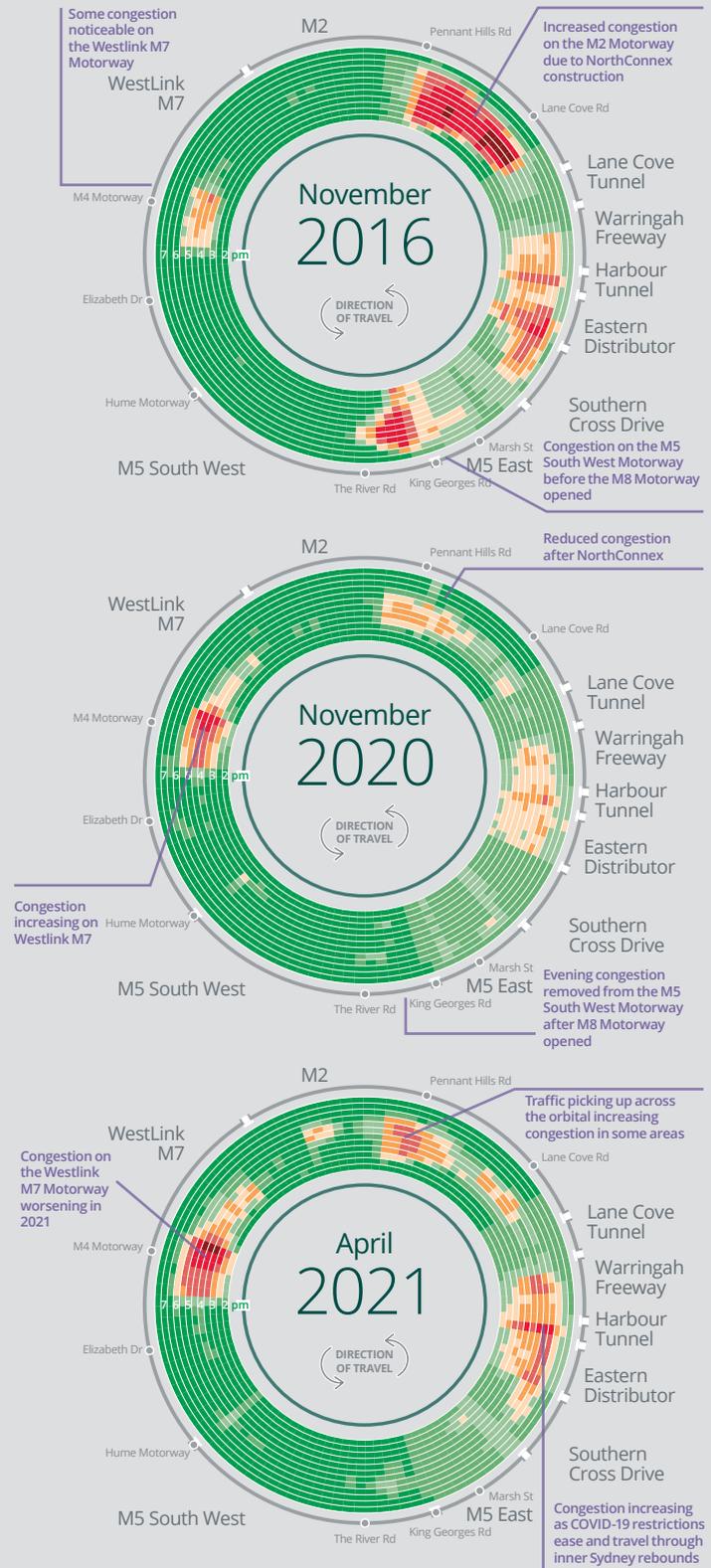


Figure 24. Challenges—Congestion puts pressure on the network

Congestion on the Westlink M7 Motorway increased between 2016 and 2021 during the PM peak. This is an issue Transurban is currently working on with TfNSW to address ahead of the opening of the M12 Motorway that connects Western Sydney Airport to the M7.



Speed Legend

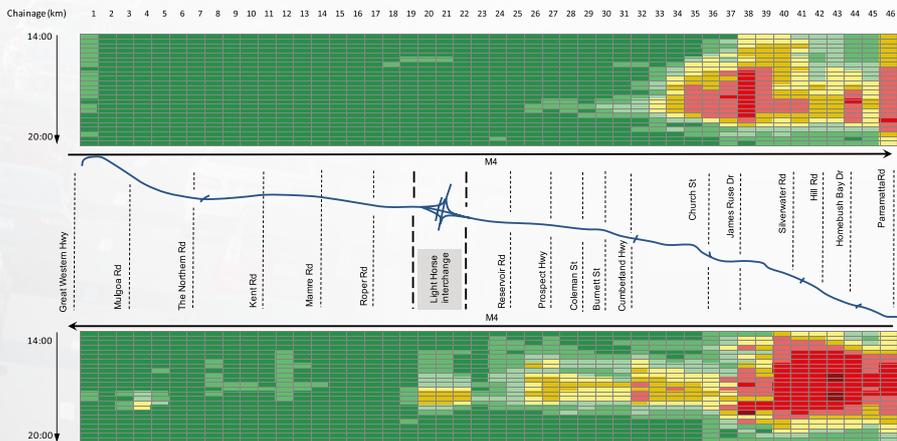


Source: TomTom congestion data

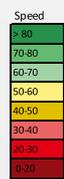
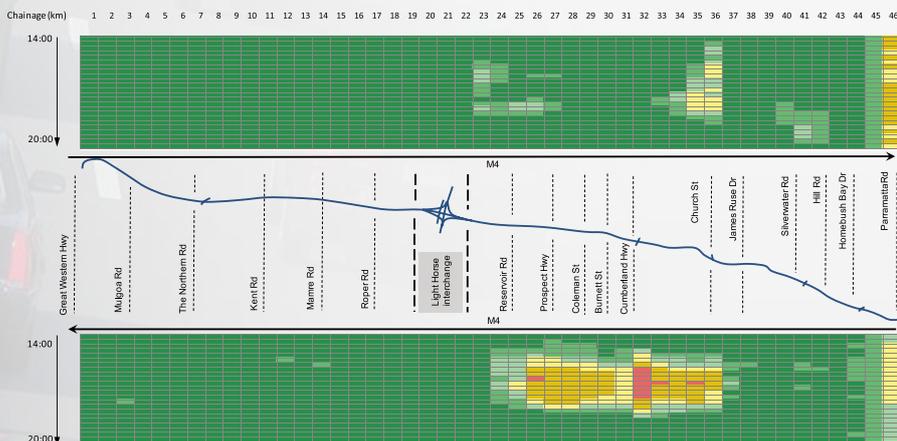
The heat maps below (Figure 25) show the immediate impact of the widening of the M4 Motorway – completed as part of WestConnex – on congestion after it opened to traffic in July 2017. The 7.5km M4 Widening formed part of the first stage of the WestConnex project.

Figure 25. Congestion on the M4 Motorway before and after widening

November 2015—PM peak before widening



November 2020—PM peak after widening



Source: TomTom congestion data



Peak travel-time savings

30mins
return trip



Travel speeds up by

60%



Crashes down by

40%



Invested over

\$4.7m

to upgrade technology,
safety equipment and
maintenance facilities

Case study 8

M5 East: faster, safer travel

Used by around 100,000 motorists every day, the M5 Motorway corridor is a major passenger, commercial and freight route, which provides a vital connection between south-western Sydney and the CBD, Sydney Airport and Port Botany.

Since opening in 2001, the M5 East has been one of the city's busiest motorways but, from the outset, operated at capacity with some of the slowest travel times of any motorway in Sydney.

During peak traffic times, average speeds were down to around 40km/h, creating significant congestion and unreliable travel times for tens of thousands of motorists and freight who relied on the motorway.

The opening of the WestConnex M8 in July 2020 has addressed this transport challenge by doubling capacity of the corridor to four lanes in each direction and halving travel times on the M5 East. Motorists are enjoying smoother, safer journeys and productivity has improved for businesses and freight vehicles.

A toll was applied to the M5 East when the M8 opened reflecting the significant benefit thousands of motorists are experiencing on both tunnels.

While some motorists are choosing to use the toll-free alternative route, the full benefits of the newly tolled corridor won't be realised until the WestConnex and Sydney Gateway projects are complete.

Travel-time savings

Drivers are saving up to half an hour a day on a return trip on the M5 East and average travel speeds have doubled.

A one-way trip using the 5.5km M5 East used to take up to 18 minutes. The same trip now takes around 8 to 9 minutes during peak traffic times.

Average travel speeds along the existing M5 corridor have improved by almost 60%—from 45 to 71 kilometres per hour.

A trip from Campbelltown to the Sydney airport via the M5 East used to take around one hour. Motorists are now saving around 20 minutes on the same trip compared with this time last year, and around 35 minutes compared with the toll-free alternative.

The maximum toll cost for a one-way trip on the M5 East is \$7.23 for cars and motorbikes and \$21.70 for heavy vehicles.¹

¹ Toll, as at April 2021

A safer journey

Since the M8 opened, crashes on the M5 East have also dropped significantly, down by more than 40%, a result of less traffic and smoother traffic flow in the tunnels. Incidents involving over-height vehicles entering the tunnel have dropped by almost half, meaning motorists are spending less time stuck in gridlock while the incident is cleared.

Investing in operations

Since Transurban began operating the M5 East in May 2020, we have invested more than \$4.7 million to upgrade technology, safety equipment, and maintenance facilities to bring the tunnels in line with the rest of the WestConnex network.

This includes:

- \$2.5 million to replace the original water treatment plant, which was commissioned more than 20 years ago
- \$1.5 million to upgrade the Emergency Telephone and Fire Emergency Telephone Systems and replacing more than 300 phones throughout the motorway control centre and tunnel
- a security upgrade of the M5 East to an electronic key entry system and
- upgrading the in-tunnel PA system.

Further projects are planned next financial year with an additional \$2.4 million allocated to:

- replace more than 25 in-tunnel cameras
- upgrade tunnel ventilation fans
- replace fire pumps
- drainage and electrical upgrades.



Operations and maintenance

To keep our roads running smoothly, Transurban invests heavily in the operations and maintenance of each asset. This includes everything from maintaining a 24/7 incident response service on every road, to resurfacing works and technology equipment upgrades.

Across Transurban's NSW assets, \$350 million will have been spent on operations and maintenance between FY19 and FY21.¹ This helps ensure the roads flow smoothly, which reduces wear and tear on customers' vehicles.

The freight industry relies on our roads and heavy vehicles have a greater impact than light vehicles.

Figure 26 shows that while the road damage cost caused by light vehicles is 4.39 cents per vehicle kilometre,

the damage caused by B-doubles is over five times the cost at 25.23 cents per vehicle kilometre.

Our roads and tunnels are also far from just concrete and bitumen and have sophisticated intelligent transport systems installed.

Roadside technologies such as, lane-use management systems, variable speed limit signs, CCTV cameras, automatic incident, height and occupancy detection systems work together to help get the best out of a motorway.

All this is integrated into a central traffic management system that can apply traffic management plans, and in the future will be increasingly automated and coordinated with connected and automated vehicles.

Figure 26. Road damage cost²

VEHICLE TYPE	UNIT COSTS (CENTS / VKT)
Cars and motorcycles	4.39
Rigid truck	5.48
Light rigid (LCV)	4.39
Medium rigid	10.08
Heavy rigid	15.14
Articulated trucks	18.70
4 or less axles	14.91
5 axles	16.57
6 or more axles	19.32
Combination vehicles	24.85
Rigid 3 axle plus trailer	16.45
Rigid 4 axle plus trailer	25.61
B-double	25.23
Double road train	28.39
B-triple	35.63
Buses	8.25
2 axle light bus	4.39
Rigid bus	10.22
Articulated bus 3 axle	11.66
Special purpose vehicles	13.75
Sub-total: Light Vehicles	4.39
Sub-total: Heavy Vehicles	15.08
Total: All Vehicles	5.09

¹ Total operations and maintenance spend on all NSW toll roads in which Transurban has an interest, between FY19 and FY21 (actual and forecast)

² Transport for NSW, Economic Parameter Values Version 2.0, June 2020

Case study 9

Ensuring all systems are go



As one of the longest and deepest tunnels, NorthConnex is equipped with the country's smartest and most sophisticated safety and operational systems designed to manage motorway performance which is critical to operations.

These systems can detect issues which may impact the tunnel such as traffic volumes, speeds, ventilation, air quality, over-height vehicles and incidents, and are used by our operators and incident crews who monitor the motorway 24/7.

Regular maintenance closures take place on a quarterly basis, usually during the night when traffic volumes are lower so as to minimise disruption to our road users. Tunnel ventilation, jet fans, emergency equipment, surveillance including cameras, fire detection systems including water sprinklers and traffic management systems are tested under a range of scenarios to ensure everything is operating as it should by up to 100 workers during the closure.

NorthConnex tunnel technology

Full mobile phone coverage in Australia's deepest tunnel
(up to 90 metres underground)

Digital radio break-in communication systems

Vehicle sensors and barriers at the tunnel entries to stop
over-height and prohibited vehicles from entering the tunnel

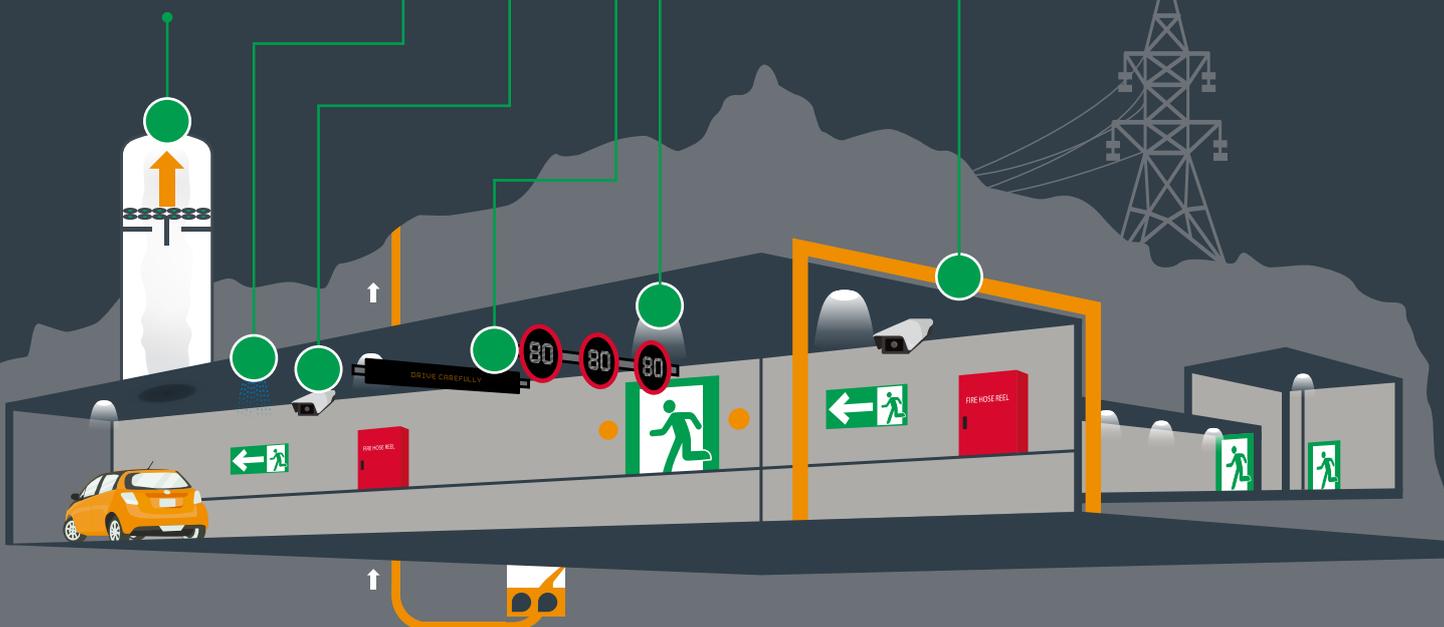
5,000 LED lights

Almost 400 electronic signs in the tunnel including
Variable Message Signs (VMS), speed signs
and traffic management signs

850 cameras provide 100% CCTV coverage.
This includes stopped vehicle detection
cameras to alert of potential incidents

The water sprinkler system provides 100%
coverage of the tunnel. Each water deluge
zone is around 24 metres and water can
flow up to thousands of litres per minute

Tunnel ventilation including
two ventilation outlets, 142 roof
mounted jet fans and more than
60 air monitoring devices



3.7 Listening to our customers

When people choose Transurban roads, they expect faster, more reliable and safer trips than alternative routes offer, as well as exceptional customer experience.

We continually find new ways to listen, understand our customers' needs, and reflect on what we can do to improve the travel experience. We're also continuing to invest in new systems and technology to keep ahead of the pace of innovation and ensure our customers can engage with us across a range of platforms.

Continuous improvement

Through our Voice of the Customer listening program, we analyse around 250,000 pieces of feedback from our Australian customers each year.

Our customer service approach has earned us consistently positive Net Promoter Scores (an industry measure of customer advocacy) in NSW (Figure 29).

Listening and acting on customer feedback has helped us to increase customer satisfaction, reduce the number of complaints we receive and enhance our products and services to improve the overall experience on and off our roads. Results of customer feedback about our on-road performance are in Section 3.4.

Recent improvements made to our customer service channels as a direct result of customer feedback include:

- increasing functionality on our digital platforms to give customers even greater ability to self-service
- providing customers who contact our call centre with an option to receive proactive notifications to help them manage their accounts, including SMS links to our digital platforms to complete self-service transactions
- improving webchat on our Linkt website to make it easier for customers to get answers quickly and extra support to complete tasks. With more customers needing help outside of regular business hours due to impacts from COVID-19, this feature was especially valuable.

In NSW, continuous improvement of our digital channels has seen customer calls decrease while digital interactions trend upwards.

Resolving customer enquiries

With 1.3 million customer accounts in NSW, Transurban is focused on resolving customer enquiries quickly and effectively.

Our Linkt customer service teams are based both in Australia and abroad, with the more complex customer queries and complaints directed to our Customer Resolutions teams in Australia to resolve.

We have a policy of first-contact resolution, closing out around 98% of NSW customer calls in the first contact. Our focus through this process is to resolve queries and complaints in a fair and reasonable way that avoids the need for further escalation.

Importantly, once a matter is resolved, the team provides feedback to the business around key learnings and insights, ensuring opportunities for continuous improvement are captured and actioned.

Our Customer Resolutions team is held to a high standard, with the team independently certified as compliant with the AS ISO 10002—2014 Complaint Handling Standard, and certified by the Customer Service Institute of Australia.

Supporting our customers in difficult times

We work closely with customer and community advocates to identify ways to remove customer pain points and stop people accumulating toll road debt unnecessarily. Simple initiatives such as proactively notifying customers about outstanding toll invoices and requesting they update their account information have contributed to customer complaints being halved over the past six years.

Nonetheless, we recognise that some people have difficulty managing their toll payments, so our Linkt Assist team is in place to provide tailored support for customers going through tough times.

This confidential support can include things like more time to pay for toll road travel, ongoing payment plans and advising state enforcement groups and other toll road operators of a person's situation (with their consent).

"Outstanding customer service and support..."

Linkt ensured that due to my unseen financial circumstances I was looked after."

Customer feedback, 2020⁵

Since launching in 2019, the Linkt Assist program has expanded to include multi-lingual educational resources co-designed with The Salvation Army financial counsellors.

We have also worked with the community legal and financial counselling sectors nationally to design new guidelines to support customers experiencing family violence.

Extra support during COVID-19

Whether it's bushfires or a global pandemic, the last few years have demonstrated that anyone can experience vulnerability at any time, and practical financial support can really help when a crisis hits.

Since the start of the pandemic, Transurban has provided more than \$10.1 million worth of travel to more than 40,000 people as part of our toll credit program.

We know many people will still need support after the COVID-19 risk subsides, so toll credits are now part of our expanded Linkt Assist support program, to cover essential travel for people facing hardship.

Figure 27. Digital interactions NSW customers

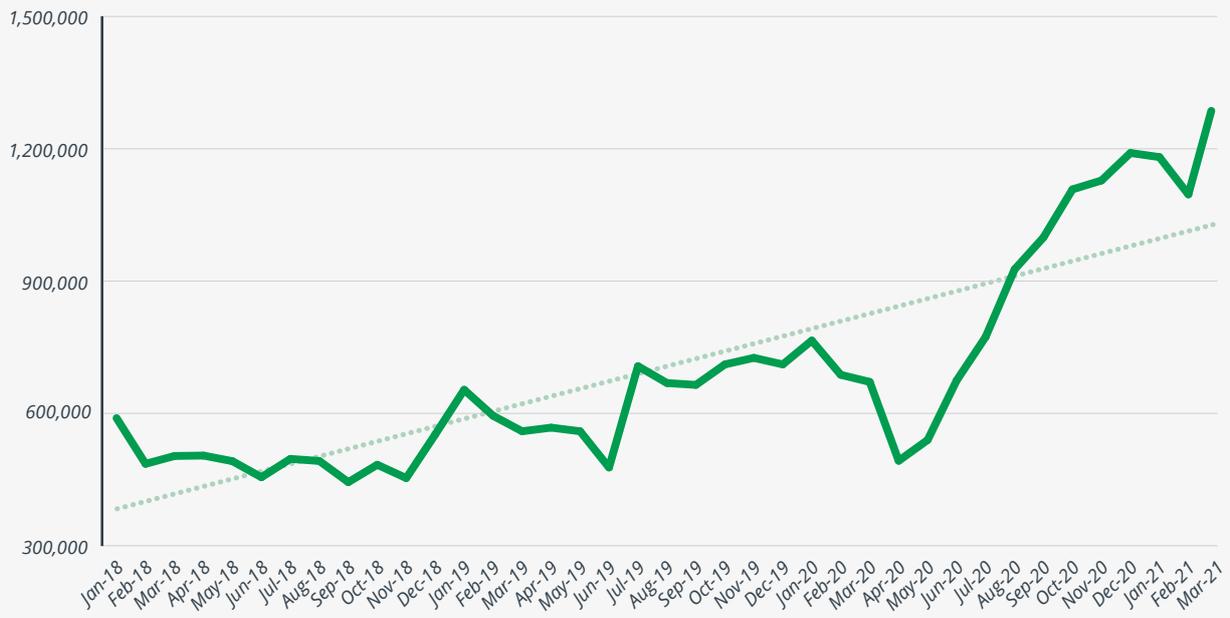


Figure 28. Answered calls NSW

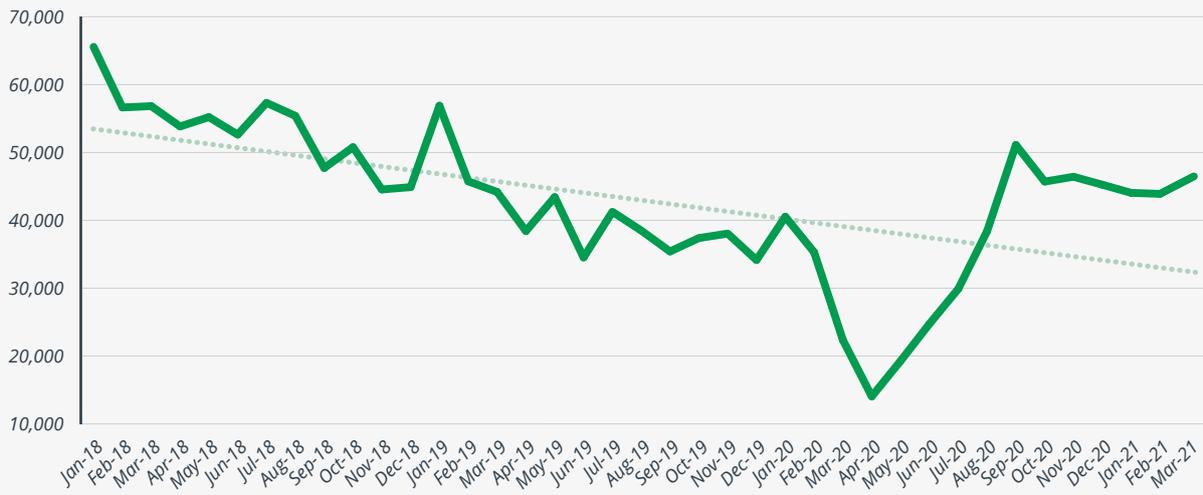
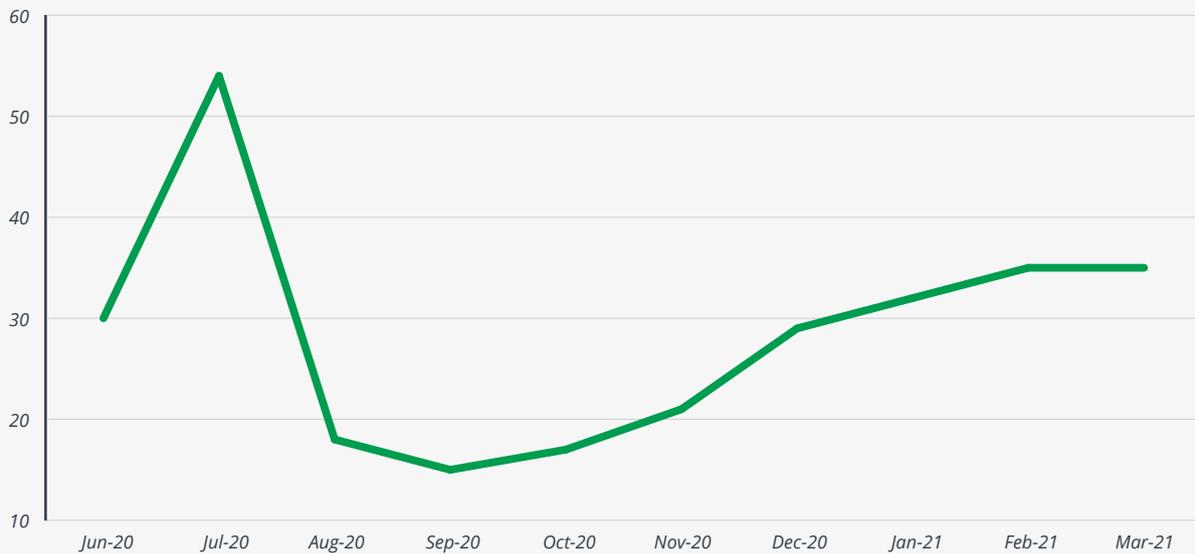


Figure 29. NPS Contact Centre NSW customers





LinktGO

Drive safely

Your safety is our top priority.
Please don't use the app while driving.
LinktGO saves your trips for you to review later.

Case study 10

Helping customers stay out of debt

Most drivers have a 'set and forget' experience when it comes to paying for toll road travel, however occasionally customers travel without a valid payment arrangement in place and fail to respond to toll notices. Until recently a customer needed to travel on a NSW toll road 10 times without a valid payment arrangement in place (without responding to toll notices) before Transurban could send a request to TfNSW for contact details. This meant drivers could accrue significant toll debt – and miss opportunities to access our Linkt Assist hardship support services – before the debt recovery process commenced. Working with TfNSW and the NSW Privacy Commissioner, we improved this process by allowing TfNSW to provide a person's contact details to Transurban after only one unpaid toll notice.

Early notification means we can now understand a customer's personal situation and arrange payment before debt collection activities commence, avoiding additional costs and anxiety. Early awareness also encourages customers to avoid incurring further charges by ensuring they have an arrangement in place for future travel. And to ensure people keep their debts at a manageable level, debt recovery activities now commence if a driver fails to respond to three toll notices for the same road.

Case study 11

LinktGO

While most customers opt to have a toll account, some prefer to pay for their tolls without an ongoing commitment.

Our solution is LinktGO, an innovative way for people to pay for their toll travel. The app uses a phone's GPS, plus geo-fencing along Australian toll roads, to know when a driver has entered and exited a toll road—so people can travel without a tag.

Using LinktGO, customers pay trip-by-trip, with trip details and associated costs displayed in near real-time and prompts to indicate when payment is due. Trips are recorded even if the phone battery dies or data connection is lost.

Since launching in late 2017, LinktGO has been downloaded more than 300,000 times and has processed over 3 million trips.

The app is highly rated in both the App Store at 4.7/5 and Play Store at 4.5/5, and has won 14 awards for product innovation, product design, and customer experience innovation.

Case study 12

Linkt Assist 360

With the continuing economic impacts of COVID-19, Transurban has partnered with Good Shepherd to help Linkt customers in need, to access a wide range of additional support services, through an extended program called Linkt Assist 360.

The program recognises that the most vulnerable Linkt Assist customers are often dealing with issues far more serious than toll debt.

The partnership between Transurban and Good Shepherd means these customers will now be offered personalised, comprehensive support to restore their emotional and financial wellbeing.

The support may include financial counselling, family violence, mental health or homelessness support.

Good Shepherd is a trusted independent provider of community services, and part of a global network spanning more than 70 countries. Good Shepherd has been working with the community for over 200 years to help people feel safe and take control over their own lives through connecting people to a coordinated and diverse range of services to meet their, and their family's needs.



FRESH THINKING

Consolidated toll notices for customers

NSW has the highest rate of 'no arrangement' toll road travel in Australia, with 29 million toll notices issued for Transurban's NSW roads each year.

Under current concession deeds, a motorist who travels on a NSW toll road without a valid payment arrangement in place, or with a suspended account, receives a single toll notice for every trip taken.

This creates a poor customer experience that wastes paper, time and money, with a cost recoverable administration fee of \$10 for each toll notice, increasing to \$20 for subsequent reminder notices.

These fees are significantly discounted to \$1.10 and \$2.20 respectively for customers who transfer their toll debt over to a retail account, however data shows us that many customers with suspended accounts use this fee discount as an incentive to top up their overdrawn accounts once they receive a toll notice, rather than keep up to date with payments. This means that toll road operators absorb much of the administrative cost of issuing toll notices.

Transurban proposes to consolidate toll notices, so a customer only receives one toll notice for three days of travel across the Sydney network. As part of this change, the fee discount would also be removed, to encourage customers to stay out of debt and ensure toll road operators recover toll notice costs.

This change will be fairer for customers, reduce the confusion that comes with receiving multiple toll notices and bring NSW into line with the toll notice process in Victoria and Queensland.

Section 4: More than roads—investing in communities



Partnerships

We invest in partnerships to support and strengthen communities, including:

- KARI Foundation Indigenous Driver Program
- Engineers Australia STEM-focused education
- Neuroscience Research Australia (NeuRA) Road Safety Centre
- Salvation Army's Drive.

WestConnex's partnership with Western Sydney road safety educator the Blue Datto Foundation has enabled more than 25,000 students to participate in its award-winning road safety program, 'Keeping Safe'—ensuring vital education remains accessible to young people who are some of the most at-risk on NSW roads.



Open spaces

In Sydney where green space can be limited, WestConnex is providing more than 18 hectares of new and revitalised open space, and planting around 1 million new plants along the project corridor.

Almost 6,000 homes are now within a 10 minute walk of Ismay Reserve, a previously unused corridor in Sydney's west which has been transformed into a popular new public recreation space.

An artist-designed playground at Simpson Park in St Peters and a pocket park with active transport links in Haberfield have also provided new open spaces for local families and residents in Sydney's inner west to enjoy.



Cycleways

Around 70 kilometres of pedestrian and cycle paths will be delivered as part of the WestConnex, NorthConnex and M7 motorways.

In 2020, the Campbell Street Green Link was extended via a new toll-free bridge as part of the WestConnex M8, providing a new shared path connection between St Peters and the growing Mascot precinct. It also integrates with the Bourke Street cycleway linking previously limited connections and improving cyclist's safety.

Riders in Sydney's north-west are benefiting from a new elevated cycleway and underpass on the M2 cycleway, built as part of NorthConnex. It separates riders from motorway traffic to provide safe travel around NorthConnex and its connections with the M2.



Grants

Over the past five years, almost 360 community grants of up to \$10,000 each have been awarded to local organisations across Sydney, from Hornsby to Beverly Hills.

The grant programs support local initiatives and projects that benefit communities along our motorway corridors and provide lasting outcomes for communities.

These have directly impacted more than 275,000 people to date and have helped deliver a range of legacy projects, including STEM and sports equipment for schools, education programs, new facilities to assist people living with disabilities, sustainability initiatives and heritage restoration projects.



Public art

WestConnex Canal to Creek public art program showcases 18 commissioned artworks, enhancing new and existing parklands between Beverly Hills and St Peters.

Featuring artist-designed playgrounds, large-scale murals and immersive lighting installations, a writer's walk and contemporary sculpture, the art trail will leave a cultural legacy for the community to enjoy.

Canal to Creek to classroom

Inspired by its public art program, WestConnex and Transurban have developed an interactive education arts portal for high school students, which aligns with the NSW curriculum.

The portal enables students to engage with 360 degree imagery of the Canal to Creek artwork, learn directly from acclaimed artists about how their works were created and access other interactive resources.

WestConnex partnered with the Visual Arts Design Educators Association (VADEA) to deliver the initiative, which Co-President Nicole DeLosa said has ensured public art is accessible to students, no matter where they live.

"We believe that the WestConnex Public Art Portal is one of the most innovative and exciting educational experiences we've seen. The portal delivers a truly relevant and unique approach to interact with these commissioned artworks in a relevant and engaging way,"

Nicole DeLosa
Co-President VADEA

Section 5: Decarbonising transport

In line with the NSW Government's commitment, Transurban has a clear decarbonisation strategy in place to help us reach net-zero emissions by 2050.

Our decarbonisation strategy spans everything from designing, building and powering our roads to advocacy and education about how to reduce GHG emissions and fuel while driving (Figure 30).

On average our customers save between 30-50% in fuel and GHG emissions per trip compared to alternate routes.

Our Sustainability Policy is aligned to the United Nations Sustainable Development Goals most relevant to our business, in particular the growth and liveability of cities where we operate.

We have had a climate change strategy in place since 2012 and have developed a detailed understanding of climate-related threats and opportunities and their impact on our operations, asset deterioration and life-cycle planning.

Our GHG reduction targets comprehensively cover scope 1, 2 and 3 emissions and have been externally validated by the Science Based Targets initiative in line with climate science.

Figure 30. Transurban's decarbonising strategy

Our approach to achieving net-zero emissions



Design

Designing and building all of our Australian projects to achieve a rating of "Excellent" or above under criteria set by the Infrastructure Sustainability Council of Australia.

For example: Reducing inclines in road and tunnel designs to limit engine labouring and restoring and regenerating sites next to our roadways.



Construction

Rethinking the way we design and construct assets to reduce direct fuel consumption, increase renewable energy and use low-carbon materials.

For example: partnering with leading Australian climate change think tank, Beyond Zero Emissions, to set ambitious targets to reduce carbon emissions from cement production; supporting the 'circular economy'; protecting biodiversity and minimising potable water use.



Operations

Reviewing and updating the way we operate our assets to reduce energy demand and GHG emissions.

For example: Power Purchase Agreements with wind farms in regional NSW to provide renewable energy; transitioning to low-energy LED lights (Eastern Distributor, the M5 East and South West and the M2); installing solar energy on control rooms and trialling plant breathing walls on the M2 and Eastern Distributor to test their ability to improve air quality.



Customer emissions

Educating customers about fuel-efficient driving and advocating for and supporting the uptake of zero-emission vehicles (ZEVs).

For example: using smart motorway technology to create more free-flow travel; setting contractor targets for fuel efficiency; awareness programs to address barriers to ZEV uptake and promoting our Trip Compare online tool which provides real-time information about travel time, fuel consumption and GHG emissions for trips on our tolls roads versus alternate routes.

OUR RECOGNITIONS

Global Real Estate Sustainability Benchmark—Infrastructure (2020)

14th-highest rated infrastructure group and highest-rated listed infrastructure company

Dow Jones Sustainability Index (2020)

Rated as the leading road infrastructure group and 4th highest rated transport company globally

FTSE4Good

Member of Global Index since 2004

Ethibel Socially Responsible Investment Register

Rated with "Excellence" label in 2020

MSCI

AAA ESG Rating since 2015

Carbon Disclosure Project (2020)

Climate Change "Leadership" benchmark and A- rating

OUR AFFILIATIONS

Global Reporting Initiative (GRI)

Used for our sustainability reporting since 2006

Task Force on Climate-related Financial Disclosures

Implementing recommendations

UN Global Compact

Participant since 2009

IS and Envision

Sustainability ratings for major projects

Sustainability Accounting Standards Board

Used for corporate reporting since 2020

Science Based Targets initiative (SBTi)

Validated greenhouse gas emission reduction targets.

Support The Goals

Member in 2020

Figure 31. Table of peak customer savings, travel-time and fuel/emissions savings, by asset—April 2021

ROAD	TRAVEL ¹	TIME SAVING ²		PASSENGER VEHICLES			LCV ⁴			HCV ⁵ (RIGID)			HCV ⁵ (ARTICULATED)		
		AM / PM		Fuel saved (L)	GHG saved ³	Savings %	Fuel saved (L)	GHG saved ³	Savings %	Fuel saved (L)	GHG saved ³	Savings %	Fuel saved (L)	GHG saved ³	Savings %
Cross City Tunnel	EB	9	PM [3pm]	0.27	0.63	45%	0.42	1.15	54%	0.81	2.20	42%	1.85	5.02	37%
	WB	11	PM	0.29	0.67	45%	0.40	1.10	54%	0.75	2.03	42%	1.73	4.70	36%
Eastern Distributor	NB	18	PM	0.46	1.06	34%	0.85	2.30	49%	1.54	4.18	35%	3.99	10.86	35%
	SB	24	AM	0.67	1.56	45%	1.07	2.90	56%	1.92	5.24	42%	4.82	13.12	43%
Lane Cove Tunnel	EB	9	PM	0.29	0.66	26%	0.52	1.40	39%	1.11	3.02	30%	3.60	9.80	39%
	WB	8	PM	0.24	0.55	18%	0.39	1.06	26%	0.76	2.06	20%	1.98	5.38	18%
M2	EB	30	PM	1.03	2.38	42%	1.64	4.47	53%	3.66	9.96	43%	13.19	35.89	56%
	WB	40	PM	1.28	2.96	42%	2.03	5.53	55%	4.08	11.09	45%	13.32	36.24	54%
M5 South West	EB	27	PM	0.91	2.10	42%	1.26	3.42	48%	2.85	7.74	39%	12.85	34.98	59%
	WB	23	AM	0.80	1.85	39%	1.23	3.35	46%	2.76	7.52	37%	12.02	32.71	58%
M5 East	EB	15	AM	0.53	1.23	46%	0.86	2.35	58%	1.91	5.19	48%	5.85	15.91	53%
	WB	19	PM	0.62	1.43	46%	0.98	2.67	56%	2.06	5.59	46%	5.16	14.05	46%
M7	NB	34	PM	0.78	1.80	25%	1.75	4.76	40%	3.04	8.27	26%	14.24	38.77	46%
	SB	32	AM	0.79	1.82	24%	1.68	4.58	38%	3.01	8.19	25%	14.28	38.88	46%
M4	EB	30	PM	0.91	2.11	48%	1.48	4.02	60%	2.96	8.06	48%	9.06	24.65	55%
	WB	56	PM	1.56	3.62	59%	2.07	5.63	66%	3.75	10.21	52%	9.97	27.14	58%
M8	EB	16	PM	0.52	1.21	43%	0.86	2.33	55%	1.79	4.87	43%	6.19	16.85	53%
	WB	20	PM	0.63	1.45	47%	1.00	2.73	58%	2.04	5.55	46%	6.68	18.17	54%
NCX	NB	8	AM	0.22	0.52	26%	0.35	0.95	35%	0.79	2.15	27%	3.76	10.22	43%
	SB	9	PM	0.27	0.63	30%	0.44	1.20	41%	0.99	2.68	32%	4.24	11.54	46%

1 Direction of travel | 2 Travel-time saving (minutes) | 3 GHG emissions saved (kgCO₂e) | 4 Light Commercial Vehicles | 5 Heavy Commercial Vehicles



FRESH THINKING

Ventilation optimisation trial

In Sydney most tunnel ventilation systems run 24/7 to ensure zero portal emissions, even during periods of low traffic. This means that, at night, we are required to use more electricity, and in turn generate more GHG emissions, than should otherwise be required to maintain local community air quality.

Ventilation systems account for up to 70% of the energy needed to operate road tunnels, so reducing the time they run would have huge environmental benefits. Transurban proposes a trial on one tunnel to allow portal emissions during periods of low traffic flow (such as overnight) and where there is negligible impact to ambient air quality. This simple change could improve the energy efficiency of tunnels across Sydney by up to 14%, delivering substantial energy and GHG savings, in keeping with the NSW Government's commitment to achieve net-zero emissions by 2050.

Importantly, the trial would have negligible impact on ambient air quality. While independent experts typically consider an incremental change of up to 1 in 100,000 particulate matter ($PM_{2.5}$) risk level negligible,¹ Transurban proposes to apply an even more conservative, 1 in 500,000 change in $PM_{2.5}$ risk level. This approach safeguards local air quality while still delivering on NSW Government's energy and GHG reduction objectives. In addition to existing air quality monitoring, additional monitoring is proposed for the trial to confirm the general validity of the modelling and that portal emissions can occur without causing an adverse impact on human health.

The case for allowing tunnel portal emissions will only get stronger as people continue to upgrade to low-and zero-emission vehicles, making ventilation systems that were designed decades ago potentially surplus to requirements in the modern era.

¹ Capon, A & Wright, J 2019, 'An Australian incremental guideline for particulate matter ($PM_{2.5}$) to assist in development and planning decisions', Public Health Research & Practice

Case study 13

Wind-powered roads

From 2021, most of our Sydney roads will be powered by up to 80% renewable energy from wind generation, saving 89,000 tonnes of GHG emissions being released into the atmosphere each year. That's the equivalent to powering nearly 20,000 Australian homes with wind power.

The Sapphire and Bango wind farms in regional NSW will provide the renewable energy to power the Eastern Distributor, Cross City Tunnel, M2, Lane Cove Tunnel, WestConnex M4 and both the existing M5 East Motorway and the recently opened WestConnex M8.

Electricity usage currently represents 97% of Transurban's total emissions across all markets, the bulk of which is used to power lighting on our roads, tunnel ventilation systems and the operation of traffic management centres.

The NSW Power Purchase Agreements are helping us meet our commitment to achieve net-zero GHG emissions by 2050.

Section 6: Future transport trends

The way people move around cities is changing, with new transport technologies and mobility options offering greater convenience and personalised choices.

Transurban recently commissioned research to better understand how people see themselves moving around cities after the pandemic risk has passed. The research informed our reports, Urban Mobility Trends from COVID-19, released in August 2020 and February 2021.

The research showed that while most people expect to do most of their work back in the workplace, they're also seeking flexible work arrangements so they can continue enjoying greater work/life balance and avoid daily peak-period commutes.

Transurban's traffic data shows that making small changes to the way we travel can have a big impact on transport networks, helping spread the peak travel periods and flattening out the congestion curve.

For example, in Sydney, a motorist travelling towards the city on the M2 could save 10 minutes if they delayed their trip until after 9am (Figure 32).

While on the M7, motorists would save around 12 minutes travelling around 6pm instead of 4.30pm when many tradespeople or students are travelling home.

If taken up as a regular part of working life, flexible work could improve the capacity of all modes of transport, but if we return to our pre-COVID-19 routines the negative consequences will be just as impactful.

Mobility as a Service

While the focus to date has been on creating greater convenience for consumers, new community expectations around public health could serve to refocus the role of Mobility as a Service (MaaS) applications.

Ride-hailing and ride-sharing services, multi-modal transport platforms and transport-on-demand apps are already giving people greater certainty, choice and convenience in how they travel, and we continue to see the number of proponents in this market increase.

Across Australia, MaaS apps are already incorporating car parking and bicycle facilities into their offerings and this will become increasingly important as greater numbers of people drive or ride to work. Contactless payments for transport services, like that available in Transurban's LinktGo, are also a benefit.

Connected and autonomous vehicles

With connected and automated vehicles (CAVs) offering significant potential to improve safety and traffic flow, Transurban continues to work with a network of industry partners to pave the way for their safe introduction.

In 2018, Transurban partnered with TfNSW to test CAVs on all kinds of road conditions, including regional roads and Sydney's busiest motorways.

Trial data was captured via an Australian-first, purpose-built app that tracks, records and measures all interactions between CAVs and road infrastructure.

The collective findings are helping vehicle manufacturers, road operators and governments prepare road infrastructure to support automated vehicles, as they become more common on Sydney's roads.

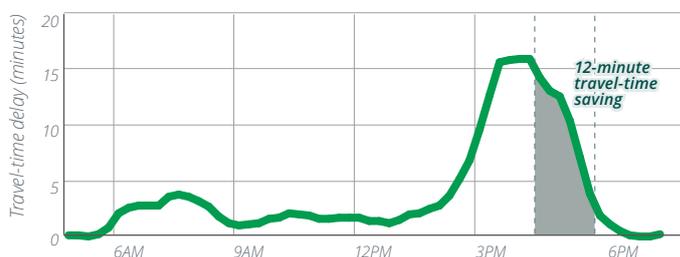
Figure 32. Weekday travel-time savings—AM peak, M2

NOVEMBER 2019 TRAVEL-TIME DATA



Figure 33. Weekday travel-time savings—PM peak, M7

NOVEMBER 2019 TRAVEL-TIME DATA



Appendices



Appendix 1— Tolling arrangements in place on Transurban-operated roads

OVERVIEW	M5 South West	M2	ED	M7	NCX	LCT	CCT
Opening date	August 1992	May 1997	December 1999	December 2005	October 2020	March 2007	August 2005
Cost to build	\$380M	\$644M	\$680M	\$1,540M	\$3B	\$1,142M	\$680M
Date Transurban commenced operating the asset	June 2007	June 2005	June 2007	December 2005	October 2020	August 2010	June 2014
Concession end date	December 2026	June 2048	July 2048	June 2048	June 2048	June 2048	December 2035
PHYSICAL DETAILS							
Length (total)	22km	21km	6km	40km	9km	3.8km	2.1km
Length (surface)	22km	20.5km	4.3km	40km	-	0.2km	-
Length (tunnel)	-	0.5km	1.7km	-	9km	3.6km	2.1km
Lanes	2x3	2x3	2x3 2x2 some sections	2x2	2x2	2x2 2x3 some sections	2x2 2x3 some ramp sections
OWNERSHIP							
Transurban	100%	100%	75.1%	50%	50%	100%	100%
Other			14.4% IFM Investors 10.5% UniSuper	25% CPP Investments 25% QIC Limited	25% CPP Investments 25% QIC Limited		
TOLLING							
Large vehicle multiplier	3x	3x	2x	3x	3x	Min 3x	2x
Toll charge	Flat rate	Flat rate	Flat rate (northbound) Untolled (southbound)	Distance based	Flat rate	Flat rate	Flat rate

OVERVIEW	M5 South West	M2	ED	M7	NCX	LCT	CCT
Current toll charges— CLASS A* <i>As of 1 April 2021</i>	\$4.88 each way	\$8.20 North Ryde (mainline) \$4.10 Pennant Hills Road/NCX \$2.90 Windsor Road \$2.42 Lane Cove Road on-ramp \$4.09 Herring and Christie Roads	\$8.29 (northbound only)	\$0.4204 cents/km capped at \$8.41	\$8.20 each way	\$3.44 main tunnel \$1.72 Military Road	\$5.93 main tunnel \$2.80 Sir John Young
Current toll charges— CLASS B* <i>As of 1 April 2021</i>	\$14.64 each way	\$24.59 North Ryde (Mainline) \$12.30 Pennant Hills Road \$8.70 Windsor Road \$7.27 Lane Cove Road on-ramp \$12.29 Herring and Christie Roads	\$16.58 (northbound only)	\$1.2611 cents/km capped at \$25.23	\$24.59 each way	\$11.51 main tunnel \$5.76 Military Road E-Ramp	\$11.86 main tunnel \$5.60 Sir John Young Crescent
Tolling adjustment schedule	Escalated quarterly by quarterly Sydney CPI. The toll cannot be lowered as a result of deflation.	Escalated quarterly by the greater of quarterly CPI or 1%.	Escalated quarterly by the greater of a weighted sum of quarterly AWE and quarterly CPI or 1%.	Escalated or de-escalated quarterly by quarterly CPI.	Escalated quarterly by the greater of quarterly CPI or 1%.	Class A tolls escalate quarterly by quarterly CPI. class A tolls cannot be lowered as a result of deflation. Class B tolls escalate quarterly by the greater of quarterly CPI or 1%.	Tolls escalate quarterly by quarterly CPI. The toll cannot be lowered as a result of deflation.

Appendix 2— WestConnex tolling structure

OVERVIEW	M4	M8	M5 EAST	M4-M5 LINK	ROZELLE INTERCHANGE
Opening date	1992 May	2020 July	2001 December	Projected 2023	Projected 2023* <small>NSW Govt. estimate</small>
Cost to build	\$4.3B	\$4.3B	\$800M	\$3.2B	\$4B
Date Transurban commenced operating the asset	July 2017	July 2020	May 2020	-	-
Concession end date	December 2060				
PHYSICAL DETAILS					
Length (total)	14km	11km	10km	7.5km	5km
Length (surface)	8.5km	2km	5.5km	-	-
Length (tunnel)	5.5km	9km	4.5km	7.5km	5km
Lanes	2x4 West, 2x3 East	2x2	2x2	2x4	n/a
OWNERSHIP*					
Transurban	25.5%	25.5%	25.5%	25.5%	25.5%
NSW Government	49%	49%	49%	49%	49%
AustralianSuper	10.5%	10.5%	10.5%	10.5%	10.5%
CPP Investments	10.5%	10.5%	10.5%	10.5%	10.5%
Tawreed Investments Limited	4.5%	4.5%	4.5%	4.5%	4.5%
TOLLING					
Large vehicle multiplier	3x	3x	3x	3x	3x
Toll charge* <small>As of 1 April 2021</small>	Distance based				
Current toll charges— CLASS A	\$1.42 flagfall + rate of \$0.5266 per kilometre Maximum toll \$8.52	\$1.42 flagfall + rate of \$0.5266 per kilometre Maximum toll \$7.23	\$1.42 flagfall + rate of \$0.5266 per kilometre Maximum toll \$7.23	-	-
Current toll charges— CLASS B	\$ 4.27 flagfall + rate of \$1.5798 per kilometre Maximum toll \$25.58	\$ 4.27 flagfall + rate of \$1.5798 per kilometre Maximum toll \$21.70	\$ 4.27 flagfall + rate of \$1.5798 per kilometre Maximum toll \$21.70	-	-
Tolling adjustment schedule	Tolls escalate annually by the greater of CPI or 4% to December 2040; the greater of CPI or 0% per annum to concession end.	Tolls escalate annually by the greater of CPI or 4% to December 2040; the greater of CPI or 0% per annum to concession end.	Tolls escalate annually by the greater of CPI or 4% to December 2040; the greater of CPI or 0% per annum to concession end.	Tolls escalate annually by the greater of CPI or 4% to December 2040; the greater of CPI or 0% per annum to concession end.	Tolls escalate annually by the greater of CPI or 4% to December 2040; the greater of CPI or 0% per annum to concession end.

*Ownership % may not add up to 100% due to rounding

Appendix 3— Glossary

ADT	Average Daily Traffic
AWE	Average Weekly Earnings
CCT	Cross City Tunnel
CPI	Consumer Price Index
D&C	Design and Construct
ED	Eastern Distributor
EIS	Environmental Impact Statement
GSP	Gross State Product
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
IS	Infrastructure Sustainability rating scheme administered by ISCA
ISCA	Infrastructure Sustainability Council of Australia
ITS	Intelligent Transport Systems
LCT	Lane Cove Tunnel
LTI	Lost Time Injury
M5	M5 South West Motorway
M7	Westlink M7
M2	Hills M2 Motorway
M4	WestConnex M4 Motorway
M8	WestConnex M8 Motorway
NCX	NorthConnex
NSW	NSW
O&M	Operations and Maintenance
PPP	Public Private Partnership
RICI	Road Injury Crash Index—serious road injury (an individual transported from, or receives medical treatment, at scene) crashes per 100M vehicle km travelled
RMS	Roads and Maritime Services
Roam	Tolling brand
Roam Express	Tolling brand
TMC	Traffic Management Centre

Appendix 4— NSW Inquiry 2017

Please refer to our website for the report.

transurban.com

 Transurban

NSW Legislative Council

Inquiry Into Road Tolling

Transurban Submission

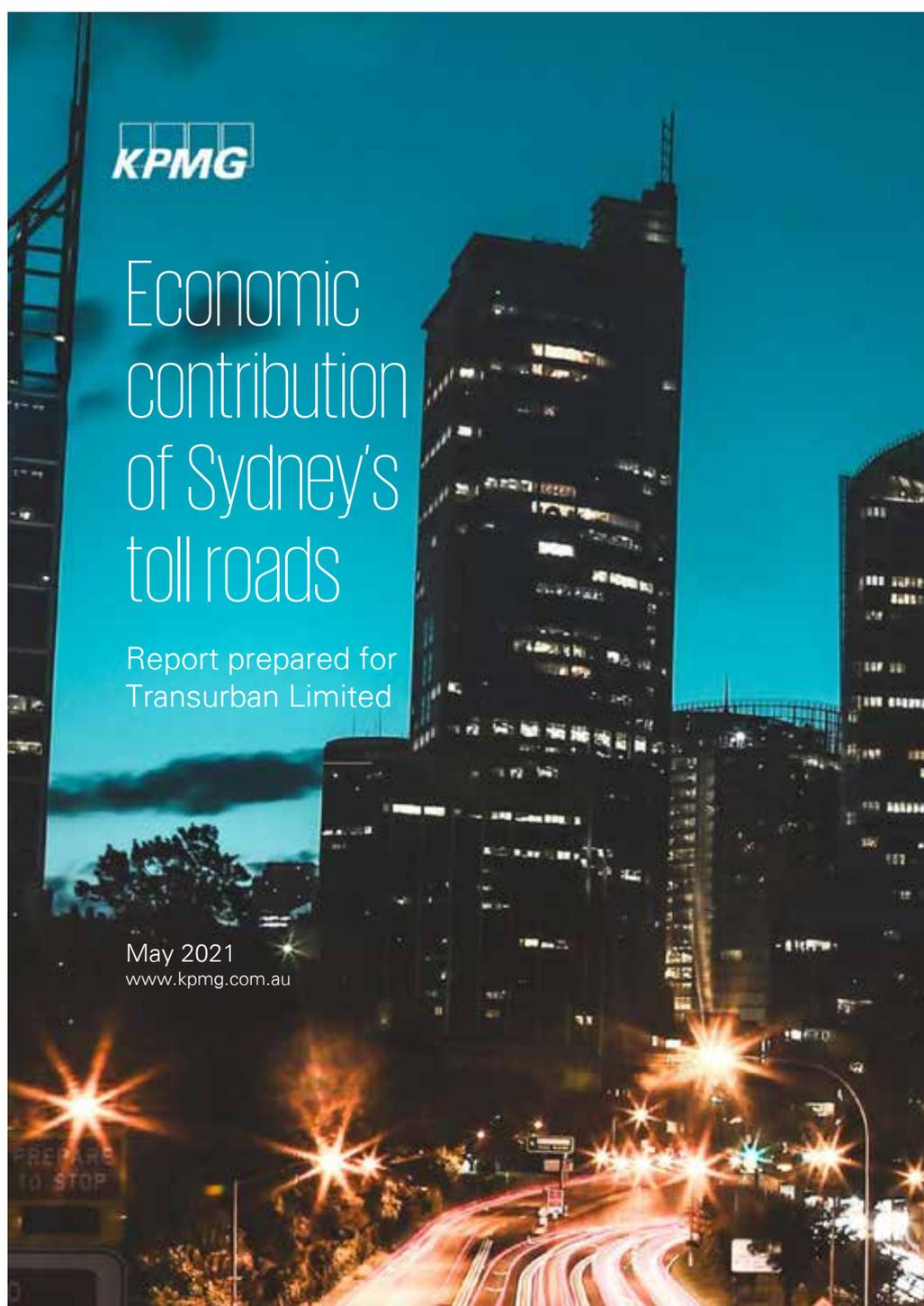
28 February 2017

The image features three horizontal bars at the bottom of the dark blue box. The top bar is a solid green line. The middle bar is a white-to-grey gradient line. The bottom bar is a solid green line.

Appendix 5— KPMG report

Please refer to our website for the report.

transurban.com



This page was intentionally left blank.

This page was intentionally left blank.





Contact details

Michele Huey
Group Executive, NSW
mhuey@transurban.com

Level 9
1 Chifley Square
Sydney
NSW 2000

[transurban.com](https://www.transurban.com)

