Australian Government
Department of Infrastructure, Transport, Regional Development, Communications and the Arts
Bureau of Infrastructure and Transport Research Economics

Freight vehicle congestion in Australia's five major cities - 2022

Summary

This is the fourth issue of an annual series that uses vehicle telematics data to provide measures of traffic congestion for freight vehicles on 71 selected routes across Australia's five mainland state capital cities—Sydney, Melbourne, Brisbane, Adelaide and Perth. This issue provides congestion measures for 2022.

The selected routes comprise the major motorways, highways and arterial roads within each city that service both passenger and freight vehicles. The data have been used to provide estimates of congestion based on how much longer journeys take (compared to a baseline of free running or uncongested conditions), and uncertainty in travel times (by measuring the variability of trips across each route over the year).

Comparing traffic congestion measures for 2022 with those of 2021 (BITRE 2022b), this report identifies the following notable features across the 71 selected urban routes:

- This is the first year since the initial report, in 2019, where none of Australia's capital cities experienced major lockdowns as part of the COVID-19 pandemic, and city-wide congestion levels have more or less returned to pre-pandemic levels.
- City-wide vehicle congestion, as measured by the mean excess time index, increased (worsened) in Sydney, Melbourne and, to a lesser extent, Adelaide between 2021 and 2022, but decreased (improved) in Brisbane and Perth.
- City-wide congestion uncertainty increased (worsened) in Sydney and Adelaide, between 2021 and 2022, but improved across the other three capital cities.
- City-wide congestion and congestion uncertainty both increased, between 2021 and 2022, in Sydney and Adelaide and both decreased, between 2021 and 2022, in Brisbane and Perth. In Melbourne, however, city-wide congestion increased between 2021 and 2022, but congestion uncertainty decreased over the same period.
- The unexplained 'third peak' noted on many arterial road routes in 2019, 2020 and 2021 is still present on many routes but has reduced in many cases compared to 2021. This may be the result of unrepresentative data at these times.
- Many individual motorway routes exhibit increased congestion at morning and afternoon peaks in 2022 in comparison to 2020 and 2021, yet these are still lower than the pre-pandemic results in 2019. However some routes have peaks that exceed 2019. These will be explored further in a forthcoming publication.

Introduction

This paper, the fourth of an annual series, tracks congestion of selected routes from across Australia's major cities by estimating travel times based on observed speeds of freight vehicles. This report covers calendar year 2022 and includes a comparison of changes in congestion since 2019.

The routes comprise motorways, freeways and major arterial roads within each city that service both passenger and freight vehicles. For each route, separate congestion measures are presented for each travel direction. The following section provides an overview of observed heavy vehicle travel times (and congestion measures) across all routes in each city. More detailed route-specific outputs, including median and interquartile range travel times for each route, are provided in Appendix A and a brief summary of the methods is outlined in Appendix B.

The paper presents two congestion measures for each route.

- The first is the Mean Excess Time Ratio (METR), which reflects how much the average expected travel time across the day exceeds the best (lowest) expected travel time. These best times are usually in the early morning hours, when network traffic volumes are lowest and are assumed to be close to free running conditions.
- The second is the Mean Excess Uncertainty Ratio (MEUR) which reflects how much the average uncertainty measured as the breadth of the interquartile range, or the middle 50 per cent of trips exceeds the lowest observed uncertainty.

The lower the uncertainty, and the narrower the interquartile range, the more certainty a firm can have about how long journeys will take and their ability to provide deliveries at agreed times. Because vehicles are bound by speed limits, this uncertainty usually means more downside risk, with below average travel time more likely to be slower than above average times are swifter. In the travel time figures presented in this paper, the dark blue lines represent the median travel time over the course of the day, while the light blue bands demonstrate the interquartile range.

These measures are only indicators of congestion and may be prone to significant variation, particularly for routes or times of day (such as the early morning) with relatively sparse data. They also do not distinguish between a peak that lasts one hour and a peak that spreads over several.

Composite congestion index results

BITRE has estimated composite indices to represent aggregate changes in congestion across all routes in each city. The influence of each route is weighted by its share of distance and the number of vehicles (as measured by vehicle telematics observations). This ensures shorter routes and those with relatively low freight vehicle volumes, like the M1 in Sydney, do not overly influence results.

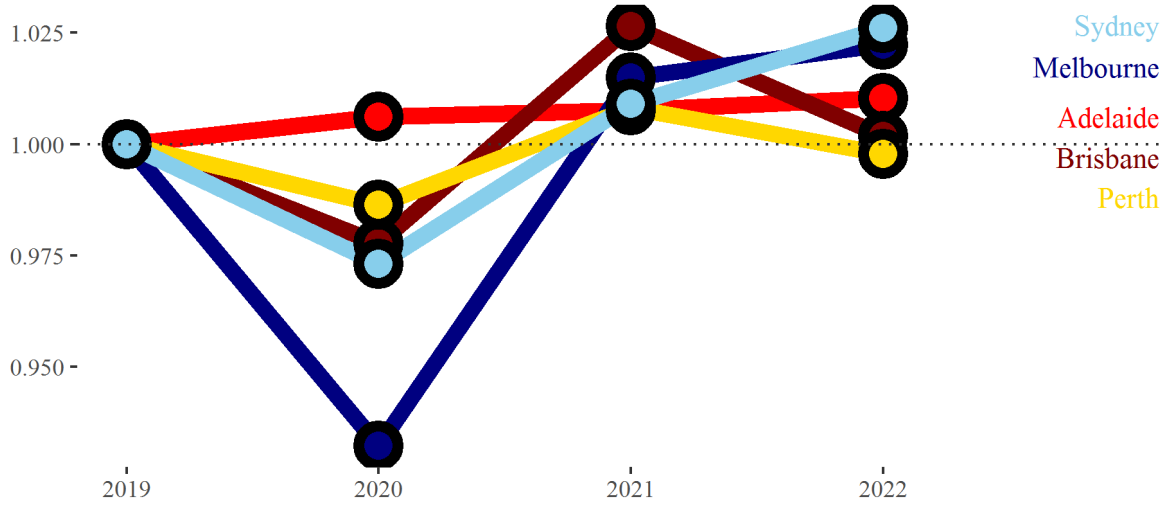
Table 1, and Figures 1 and 2, show the estimated change in freight vehicle congestion, as measured by indexes of the Mean Excess Time Ratio (METR) and Mean Excess Uncertainty Ratio (MEUR), between 2019 and 2022, across each of the five capital cities.

Table 1 Congestion measures of cities studied in this report

	Excess time index				Excess uncertainty index			
City	2019	2020	2021	2022	2019	2020	2021	2022
Sydney	1.000	0.973	1.009	1.026	1.000	0.895	1.027	1.199
Melbourne	1.000	0.932	1.015	1.022	1.000	0.695	1.190	1.078
Brisbane	1.000	0.978	1.027	1.002	1.000	1.061	1.445	1.095
Adelaide	1.000	1.006	1.008	1.010	1.000	1.093	0.842	1.191
Perth	1.000	0.986	1.008	0.998	1.000	0.969	1.148	0.894

Source: BITRE estimates.

Figure 1 Mean Excess Time Index, by capital city, 2019 to 2022

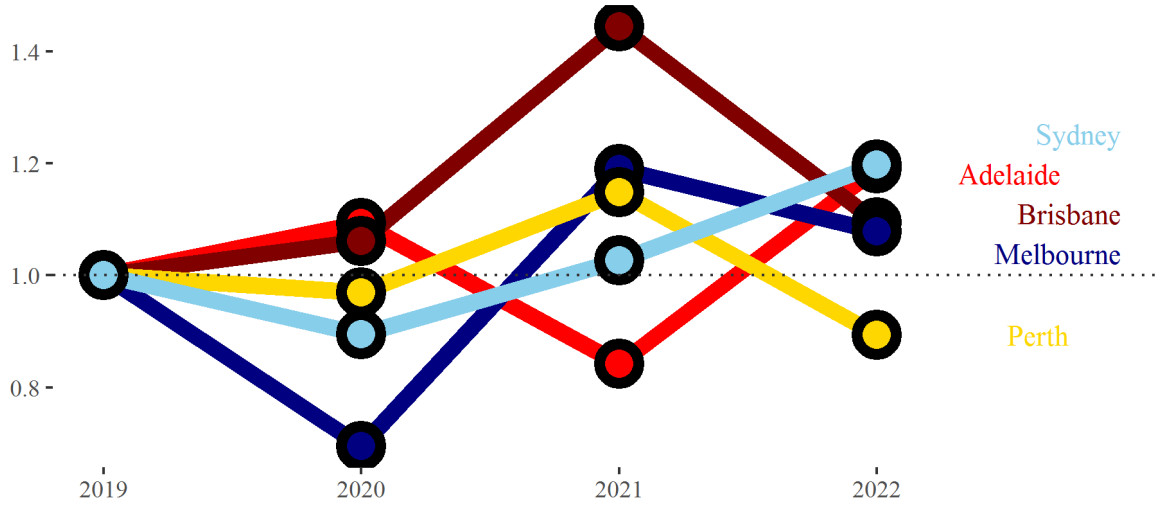


Source: BITRE estimates.

Two cities, Melbourne and Sydney, exhibited increases in congestion as measured by METR index. These two cities, unlike the other three, experienced further COVID-19 related lockdowns in the second half of 2021. The increased congestion in 2022 might reflect, in part, a return to more normal (pre-pandemic) road usage that was interrupted by renewed lockdowns, however congestion measures are now higher than their 2019 levels by between 2 to 3 per cent in both cities. Congestion in Brisbane and Perth, however, declined slightly and congestion in Adelaide exhibited little change.

There was no consistent pattern in mean excess uncertainty across the five capital cities. In Brisbane and Perth, the MEUR index decreased, as did the METR index, and congestion in Sydney rose according to both indexes. However, mean excess uncertainty in Melbourne decreased despite an increase in mean excess travel times in that city, and in Adelaide mean excess uncertainty increases in 2022 despite little change in mean excess travel time congestion.

Figure 2 Mean Excess Uncertainty Index, by capital city, 2019 to 2022



Source: BITRE estimates.

Across different routes within individual cities changes in mean excess time and mean excess uncertainty in 2022 varied. For some routes, changes in mean excess time and mean excess uncertainty varied by direction in 2022.

Several additional routes in both Sydney and Melbourne were included in the 2021 METR and MEUR indices, however indices produced using only routes available in all years produce near identical trends. These alternative indices are available in supplementary materials.

It should be noted the city-wide METR and MEUR indexes, and the METR and MEUR for individual routes, weight all hours in the day equally. This means that were road users to shift journeys into more congested parts of the day the measures would not be significantly affected even as congestion experienced by freight vehicle increases. This is to try and limit the measure to factors largely outside the control of participants in the industry – most urban traffic congestion is due to passenger vehicle traffic. However, as most congestion occurs in daylight hours, which is also when the majority of urban freight vehicle operations occur, the magnitude of the measures and the magnitude of year-to-year changes would be larger if the METR and MEUR indexes were weighted by freight vehicle traffic volumes.

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Australian capital city freight vehicle congestion measures

Sydney

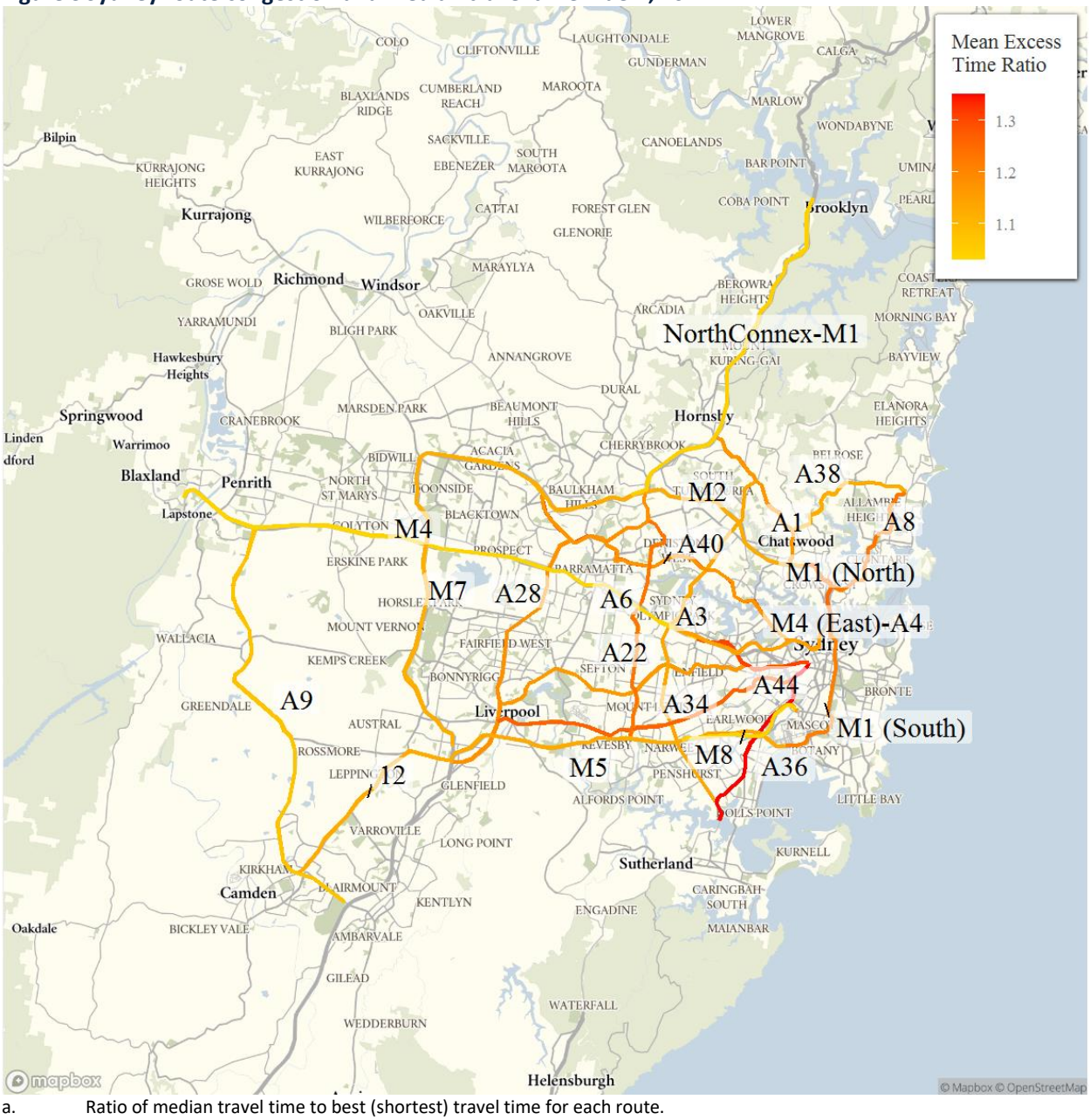
Sydney metropolitan area freight vehicle routes cover the following 22 motorway, freeway and/or major arterial road routes:

- Route 12 - A9 to M7 / M7 to A9
- A1 - Artarmon to Wahroonga / Wahroonga to Artarmon
- A22 - Glebe to Liverpool / Liverpool to Glebe
- A28 - Casula to M2 Motorway / M2 Motorway to Casula
- A3 - Blakehurst to Pymble / Pymble to Blakehurst
- A34 - Liverpool to Newtown / Newtown to Liverpool
- A36 - Broadway to Georges River / Georges River to Broadway
- A38 - Dee Why to Roseville / Roseville to Dee Why
- A40 - Baulkham Hills to Rozelle / Rozelle to Baulkham Hills
- A44 - Camperdown to Strathfield / Strathfield to Camperdown
- A6 - Carlingford to Padstow / Padstow to Carlingford
- A8 - Dee Why to M1 / M1 to Dee Why
- A9 - Hume Freeway to M4 / M4 to Hume Freeway
- M1 (North) - Cahill Expressway to M2 / M2 to Cahill Expressway
- M1 (South) - Cahill Expressway to M5 / M5 to Cahill Expressway
- M2 - M1 to M7 / M7 to M1
- M4 - Glenbrook to Strathfield / Strathfield to Glenbrook
- M4 (East)-A4 - Cahill Expressway to Strathfield / Strathfield to Cahill Expressway
- M5 - Hume Motorway to M1 / M1 to Hume Motorway
- M7 - M2 to M5 / M5 to M2
- M8 - M5 to Mascot / Mascot to M5
- NorthConnex-M1 - Brooklyn to M2 / M2 to Brooklyn

With few exceptions travel time congestion increased on Sydney routes, particularly southbound on the A28 and Northbound on the A6. The city-wide increase in travel time congestion was particularly influenced by increases travel times recorded on the M7 and M4.

There was generally little change in congestion uncertainty across Sydney in 2022, with city-wide increases also heavily influenced by the highly weighted M7 and M4 routes.

Figure 3 Sydney route congestion and median travel time index[a], 2022



a. Ratio of median travel time to best (shortest) travel time for each route.

Source: BITRE estimates.

Figure 4 Sydney route METR and MEUR changes between 2021 and 2022

Note: Shape size denotes 2022 weights in city-wide measures.
Source: BITRE estimates.

Melbourne

Melbourne metropolitan area freight vehicle routes cover the following 20 motorway, freeway and/or major arterial road routes:

- Route 13-49 - Monash Freeway to South Gippsland Highway / South Gippsland Highway to Monash Freeway
- Route 15 - Beach Road to Surrey Hills / Surrey Hills to Beach Road
- Route 22 - Ferntree Gully to M1 / M1 to Ferntree Gully
- Route 3 - Albert Park to Cheltenham / Cheltenham to Albert Park
- Route 32 - Derrimut to Montrose / Montrose to Derrimut
- Route 35 - Hume Highway to M80 / M80 to Hume Highway
- Route 40 - M2 to Doncaster / Doncaster to M2
- Route 55 - Hume Freeway to Montague Street / Montague St to Hume Freeway
- Route 56 - Laverton to Spotswood / Spotswood to Laverton
- Route 58 - Greenvale to Yan Yean Road / Yan Yean Road to Greenvale
- A60 - M3 to Southbank / Southbank to M3
- M1 (East) - City to M420 / M420 to City
- M1 (West) - City to M80 / M80 to City
- M2 - CityLink then Tullamarine / Tullamarine then CityLink
- M3 - Frankston to Hoddle Street / Hoddle St to Frankston
- M420 - Monash Freeway to South Gippsland Highway / South Gippsland Highway to Monash Freeway
- M79 - Essendon to Gap Road / Gap Road to Essendon
- M80 - Altona to Greensborough / Greensborough to Altona
- Princes Freeway - Geelong Ring Road to M80 / M80 to Geelong Ring Road
- Western Freeway - Bacchus Marsh to Derrimut / Derrimut to Bacchus Marsh

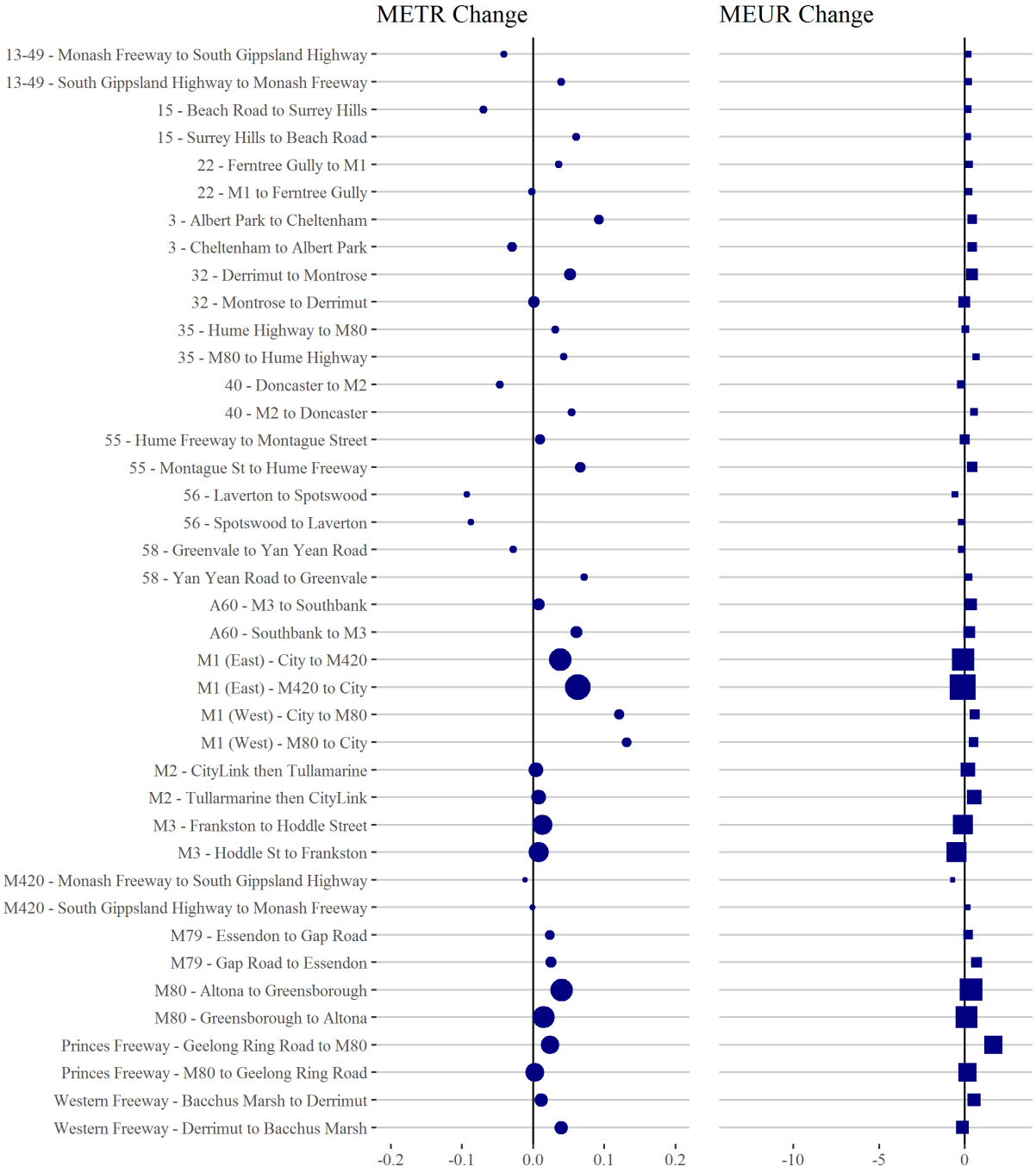
Travel time congestion changed unevenly across Melbourne arterial roads, with both large increases and large decreases, but most motorway routes exhibited increases, particularly on the M1 East (Monash Freeway) and the M80 (the Western Ring Road), both of which are major freight routes. These routes contributed to city wide increases. However, there was little change in congestion uncertainty across most routes, with the notable exceptions of the M1 East and M3 where congestion uncertainty declined, which contributed to a city-wide decrease in congestion uncertainty.

Figure 5 Melbourne congestion routes and median travel time index[a], 2022

a. Ratio of median travel time to best (shortest) travel time for each route.

Source: BITRE estimates.

Figure 6 Melbourne route METR and MEUR changes between 2021 and 2022



Note: Shape size denotes 2022 weights in city-wide measures.
Source: BITRE estimates.

Brisbane

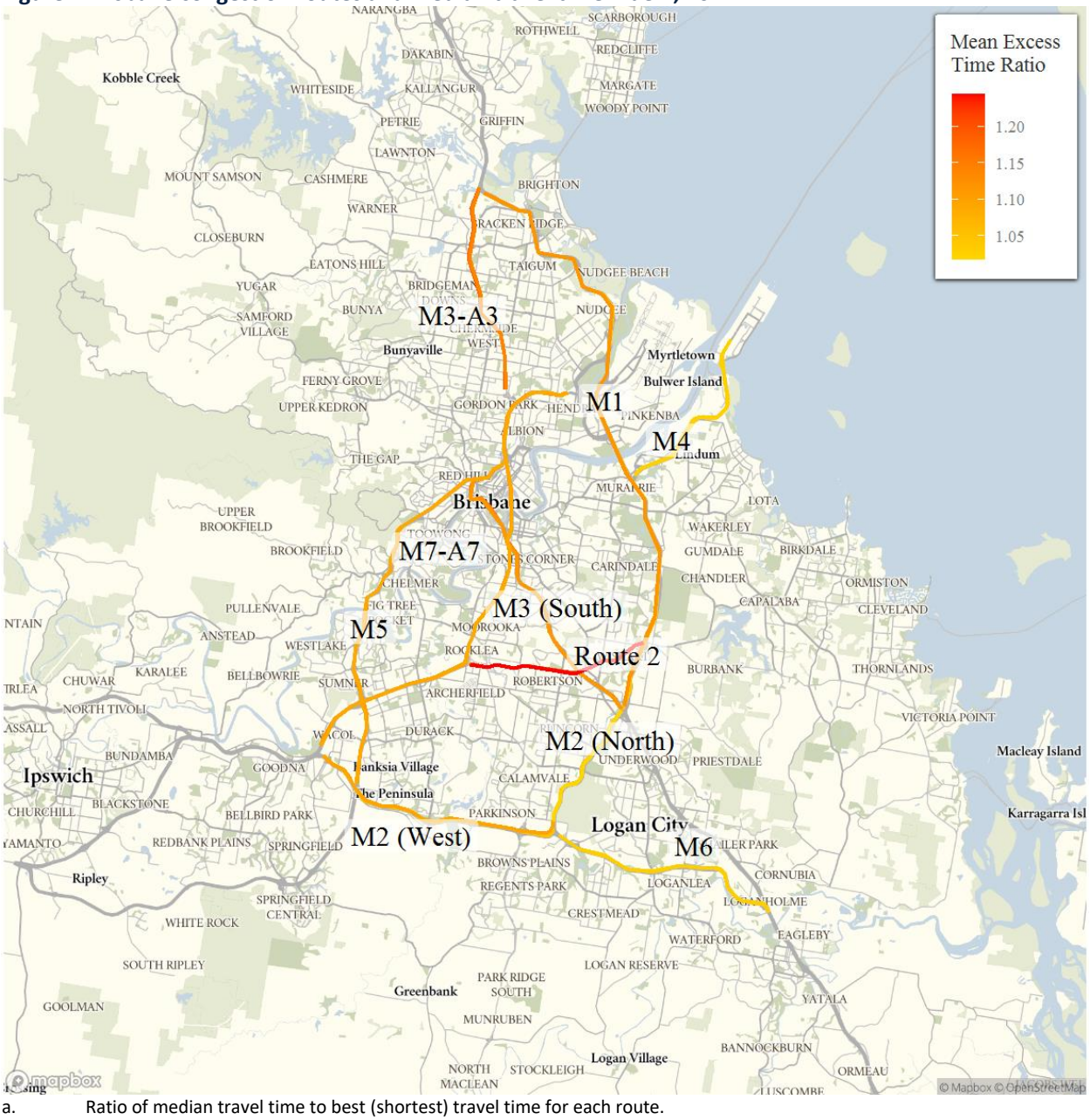
Brisbane metropolitan area freight vehicle routes cover the following 10 motorway, freeway and/or major arterial road routes:

- M1 - Bruce Highway to Pacific Motorway / Pacific Motorway to Bruce Highway
- M2 (North) - Logan Motorway to Pacific Motorway / Pacific Motorway to Logan Motorway
- M2 (West) - Gateway Motorway to Ipswich Motorway / Ipswich Motorway to Gateway
- M3-A3 - Airport Link to M1 / M1 to Airport Link
- M3 (South) - Inner City Bypass to Pacific Motorway / Pacific Motorway to Inner City Bypass
- M4 - Gateway Motorway to Port of Brisbane / Port of Brisbane to Gateway Motorway
- M5 - Bowen Hills to Logan Motorway / Logan Motorway to Bowen Hills
- M6 - Gateway Motorway to Pacific Motorway / Pacific Motorway to Gateway Motorway
- M7-A7 - Logan Motorway to Southern Cross Way / Southern Cross Way to Logan Motorway
- Route 2 - A7 to Gateway / Gateway to A7

Most routes exhibited little change in travel time congestion between 2021 and 2022. The major exception is the lightly-weighted M3-A3, where travel time congestion declined significantly in the southbound direction (i.e. M1 to Airport Link). Modest reductions in travel time congestion across many routes more than offset the slight increase on the highly-weighted M1 to produce a 2.5 per cent decline in the result city-wide mean excess time index.

Similarly, modest decreases in congestion uncertainty across a majority of motorway routes in Brisbane, between 2021 and 2022, more than offset increased uncertainty on the M1 to lead to city-wide falls.

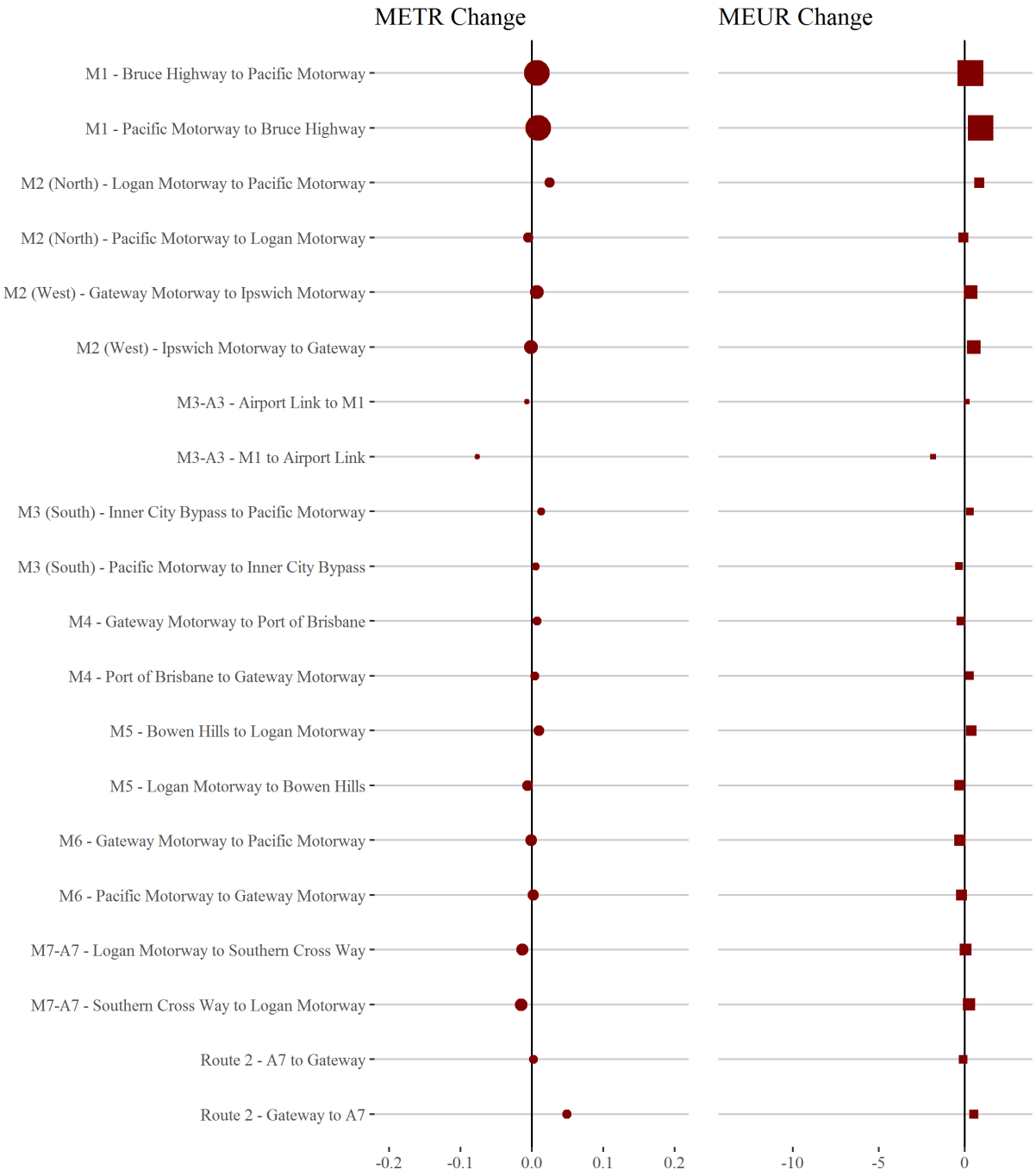
Figure 7 Brisbane congestion routes and median travel time index[a], 2022



a. Ratio of median travel time to best (shortest) travel time for each route.

Source: BITRE estimates.

Figure 8 Brisbane route METR and MEUR changes between 2021 and 2022



Note: Shape size denotes 2022 weights in city-wide measures.
Source: BITRE estimates.

Adelaide

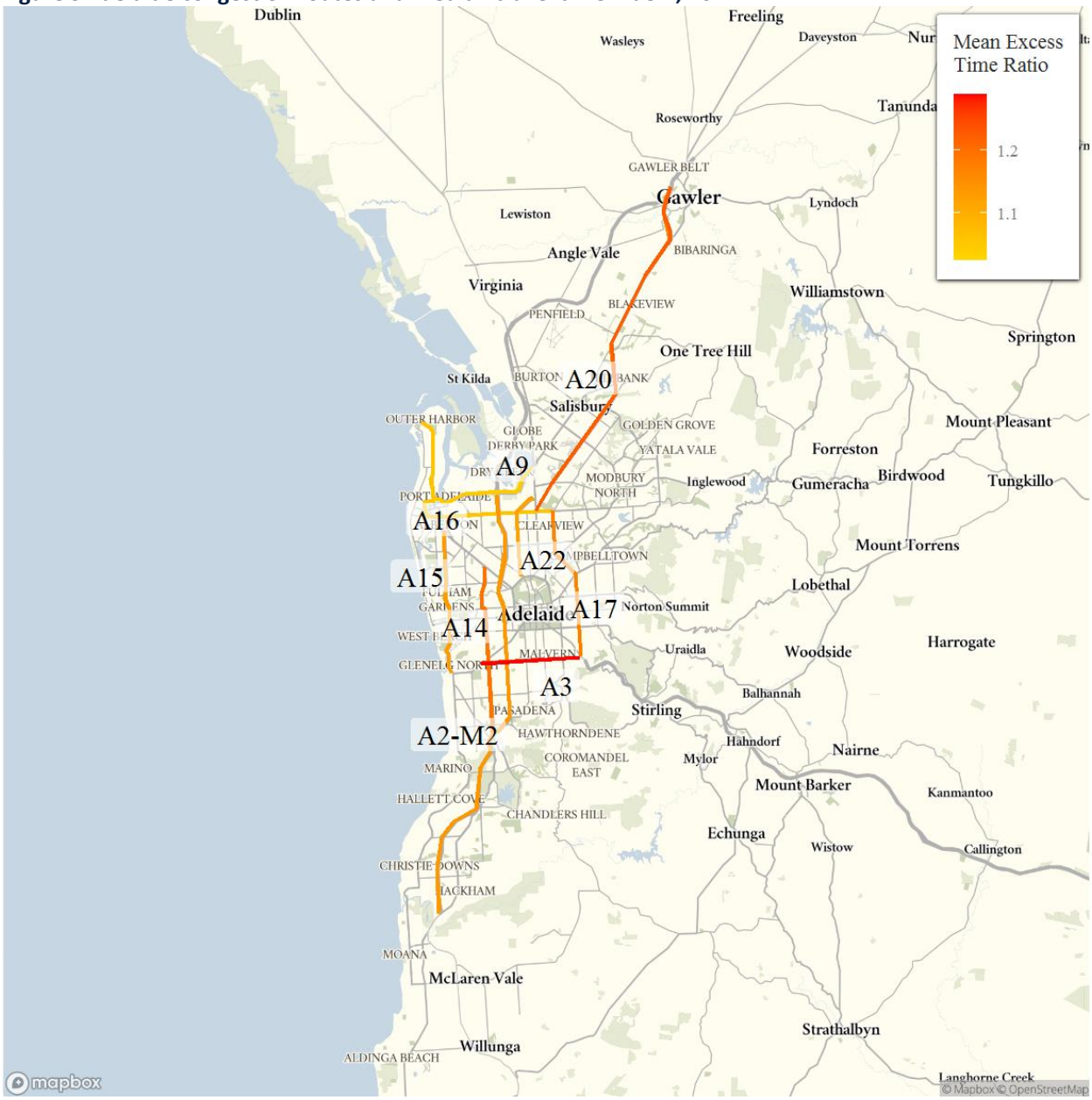
Adelaide metropolitan area freight vehicle routes cover the following 9 motorway, freeway and/or major arterial road routes:

- A14 - Port Road to Southern Expressway / Southern Expressway to Port Road
- A15 - ANZAC Highway to Port Road / Port Road to ANZAC Highway
- A16 - Hampstead Road to Outer Harbor / Outer Harbor to Hampstead Road
- A17 - Grand Junction Road to South Eastern Freeway / South Eastern Freeway to Grand Junction Road
- A2-M2 - Main South Road to Port River Expressway / Port River Expressway to Main South Road
- A20 - Grand Junction Road to Sturt Highway / Sturt Highway to Grand Junction Road
- A22 - Park Terrace to Port Wakefield Road / Port Wakefield Road to Park Terrace
- A3 - ANZAC Highway to South Eastern Freeway / South Eastern Freeway to ANZAC Highway
- A9 - Nelson St to Port Wakefield Road / Port Wakefield Road to Nelson Street

There was no consistent pattern to changes in mean average travel time between 2021 and 2022 across Adelaide metropolitan area key freight vehicle routes. Two routes – the A14 and A22 – exhibited an increase in mean average travel time in one direction and a decrease in the other direction. Average travel times fell between 2021 and 2022 across the majority of routes, however these decreases were almost equally offset by measured increased travel times on the A2-M2 route, such that the city wide METR measure remained stable.

Travel time uncertainty exhibited little change across most routes between 2021 and 2022. However, increases on the heavily-weighted A2-M2 and a large increase in travel time uncertainty on the A20 (southbound) resulted in an increase in the overall city-wide measure.

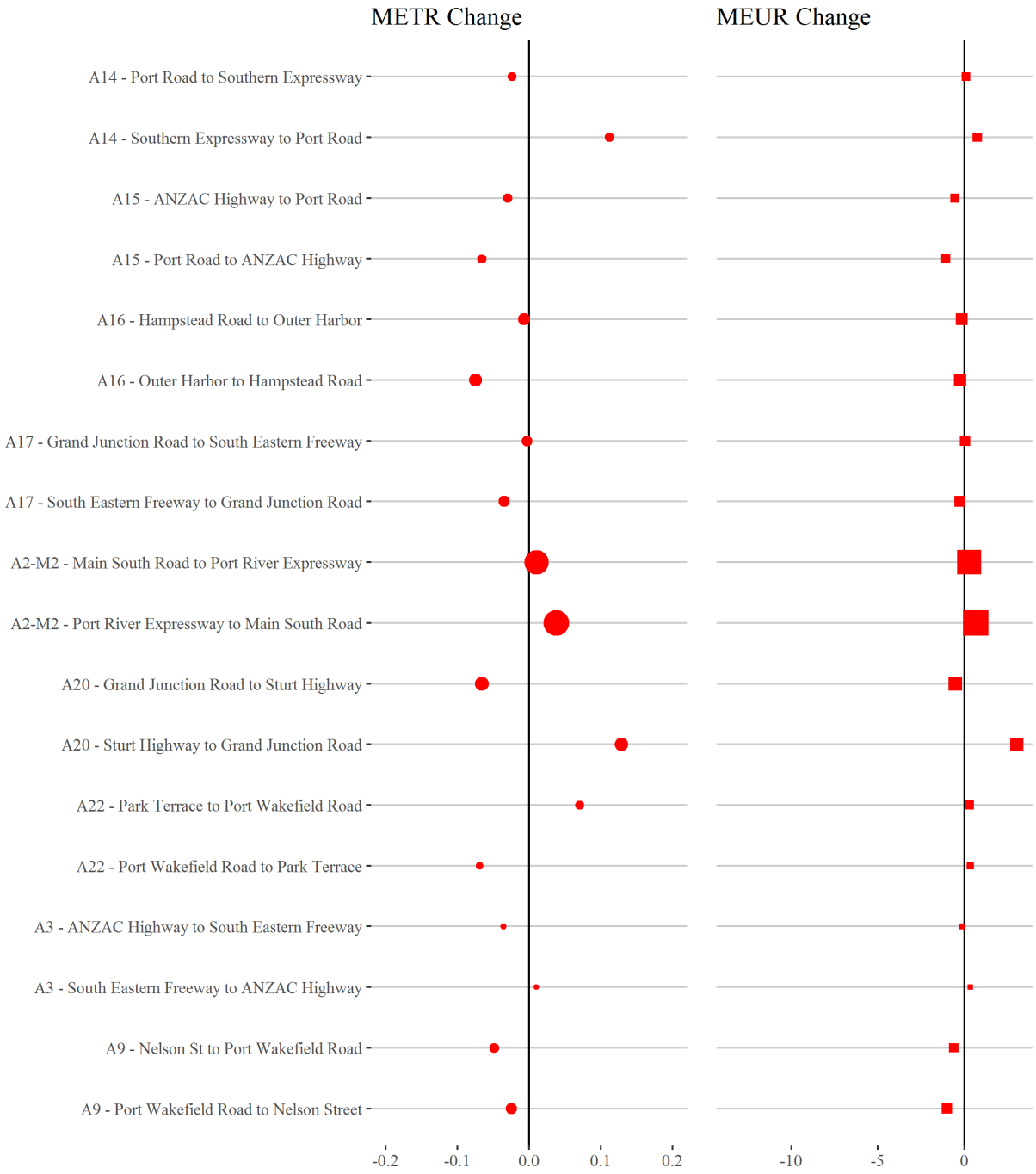
Figure 9 Adelaide congestion routes and median travel time index[a], 2022



a. Ratio of median travel time to best (shortest) travel time for each route.

Source: BITRE estimates.

Figure 10 **Adelaide route METR and MEUR changes between 2021 and 2022**



Note: Shape size denotes 2022 weights in city-wide measures.
Source: BITRE estimates.

Perth

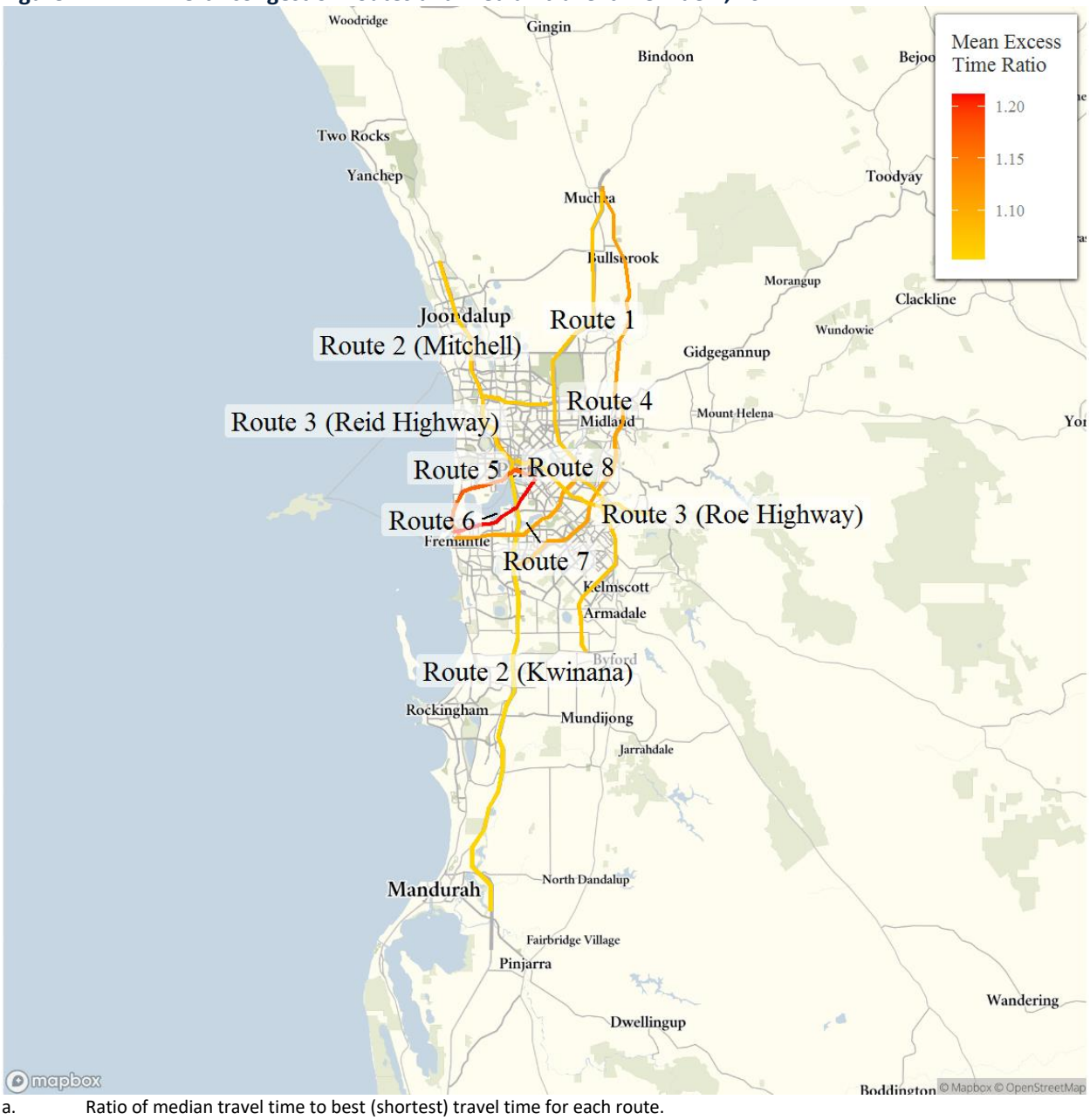
Perth metropolitan area freight vehicle routes cover the following 10 motorway, freeway and/or major arterial road routes:

- Route 1 - Roe Highway to Tonkin Highway / Tonkin Highway to Roe Highway
- Route 2 (Kwinana) - Forrest Highway to Mitchell Freeway / Mitchell Freeway to Forrest Highway
- Route 2 (Mitchell) - Hester Avenue to Swan River / Swan River to Hester Avenue
- Route 3 (Reid Highway) - Mitchell Freeway to Tonkin Freeway / Tonkin Freeway to Mitchell Freeway
- Route 3 (Roe Highway) - Great Northern Highway to Kwinana Freeway / Kwinana Freeway to Great Northern Highway
- Route 4 - Great Northern Highway to Thomas Road / Thomas Road to Great Northern Highway
- Route 5 - Great Eastern Highway to Stirling Highway, High Street / Stirling Highway, High St to Great Eastern Highway
- Route 6 - Fremantle to Great Eastern Highway / Great Eastern Highway to Fremantle
- Route 7 - Stirling Highway to Tonkin Freeway / Tonkin Freeway to Stirling Highway
- Route 8 - Canning Road to Mitchell Freeway / Mitchell Freeway to Canning Road

Mean excess travel time congestion in Perth decreased across most routes between 2021 and 2022, although there were some small increases across a small number of routes.

Similarly, congestion uncertainty generally declined across most routes, and particularly on the heavily weighted Route 2 and Route 4. The low-weighted Route 5 exhibited an anomalously large decrease in congestion uncertainty between 2021 and 2022, that reversed an anomalously large increase in the 2021 report, that was an artefact of the raw data processing procedures.

Figure 11 Perth congestion routes and median travel time index[a], 2022



a. Ratio of median travel time to best (shortest) travel time for each route.

Source: BITRE estimates.

Figure 12 **Perth route METR and MEUR changes between 2021 and 2022**

Note: Shape size denotes 2022 weights in city-wide measures.
Source: BITRE estimates.

Appendix A – Individual route freight vehicle congestion measures

This appendix provides detailed route-specific freight vehicle travel times and congestion measures for calendar year 2022, including median and interquartile range travel times, for each route in each capital city.

The routes are grouped by city and for each route the results comprise a route map, a table of median travel times and variation in travel times, and two sets of graphs showing: i) the hourly distribution of the median and interquartile range of travel time, and ii) changes in the shortest and longest travel times and changes in the smallest and largest interquartile ranges on each route between 2019 and 2022, where available.

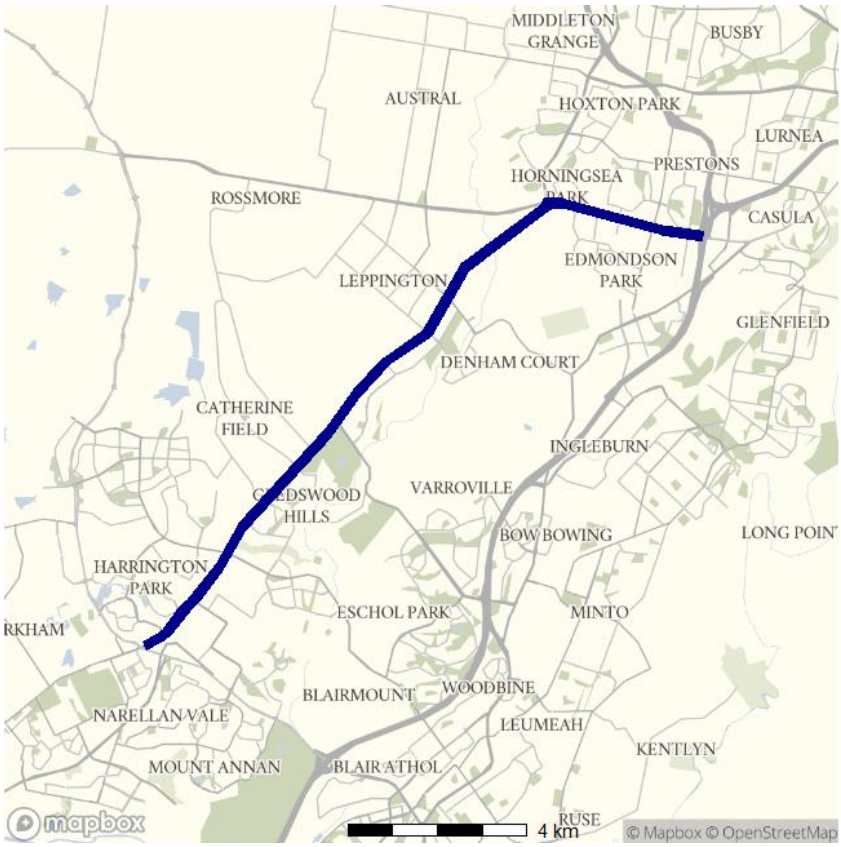
Unless stated otherwise a "decrease" or "increase" refers to the peak or minimum compared to 2021, not the particular hour.

Sydney routes

Route 12 - A9 to M7 / M7 to A9

This route follows surface routes in South Western Sydney from the A9 at Narellan to Casula where the Hume Motorway branches into the M5 and M7. It serves areas adjacent to the Western Sydney Airport currently under construction and some light industrial areas. It runs predominantly along Camden Valley Way.

Figure A.1 Route 12 route map



Source: BITRE estimates.

Table A.1 Route 12 travel times and congestion measures, 2022

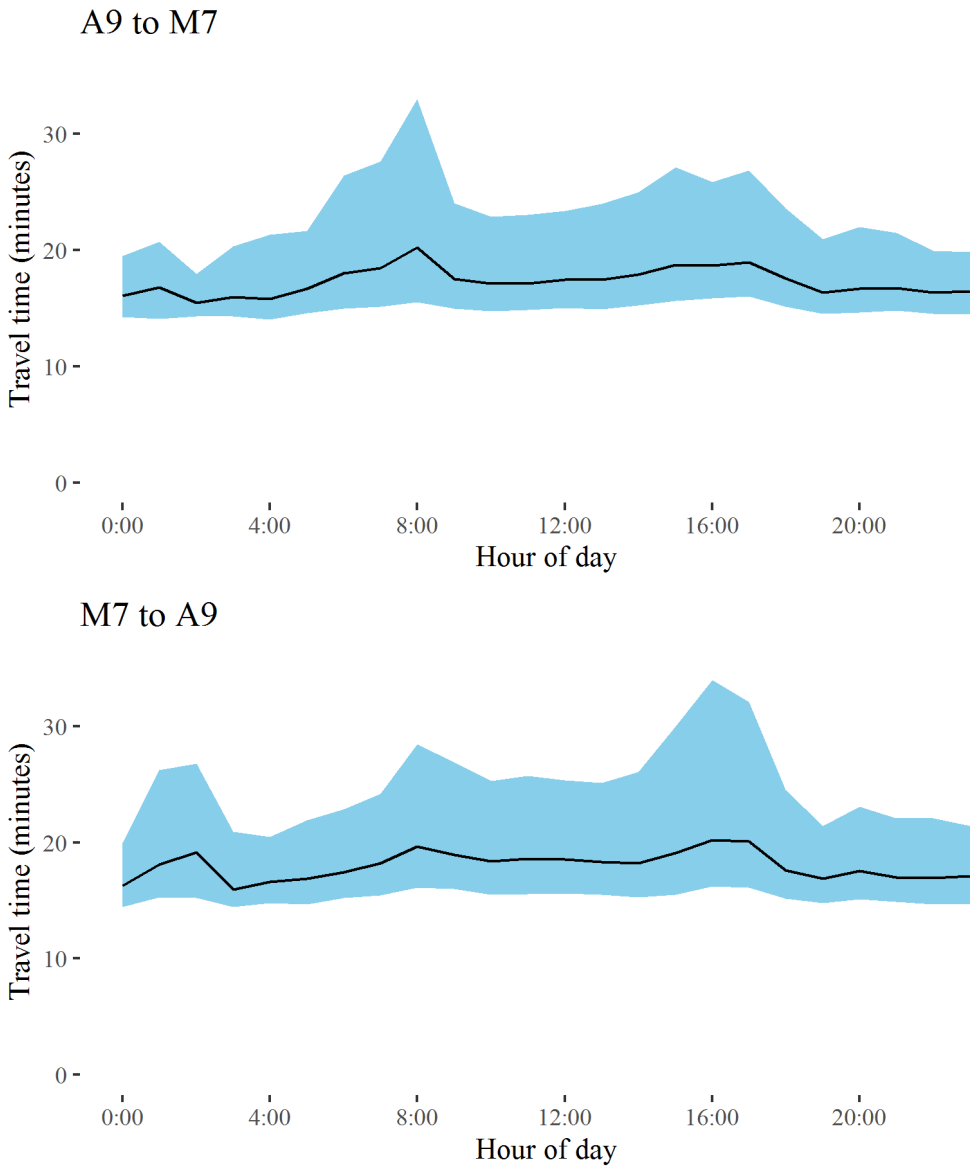
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
A9 to M7	00:15:27	00:20:13	1.118	00:03:38	00:17:28	2.314	17.1
M7 to A9	00:15:56	00:20:13	1.128	00:05:30	00:17:46	1.749	17.1

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the A9 to the M7 were at 2am with a median travel time of around 15 minutes and an interquartile range of around 4 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 20 minutes and an interquartile range of around 17 minutes.

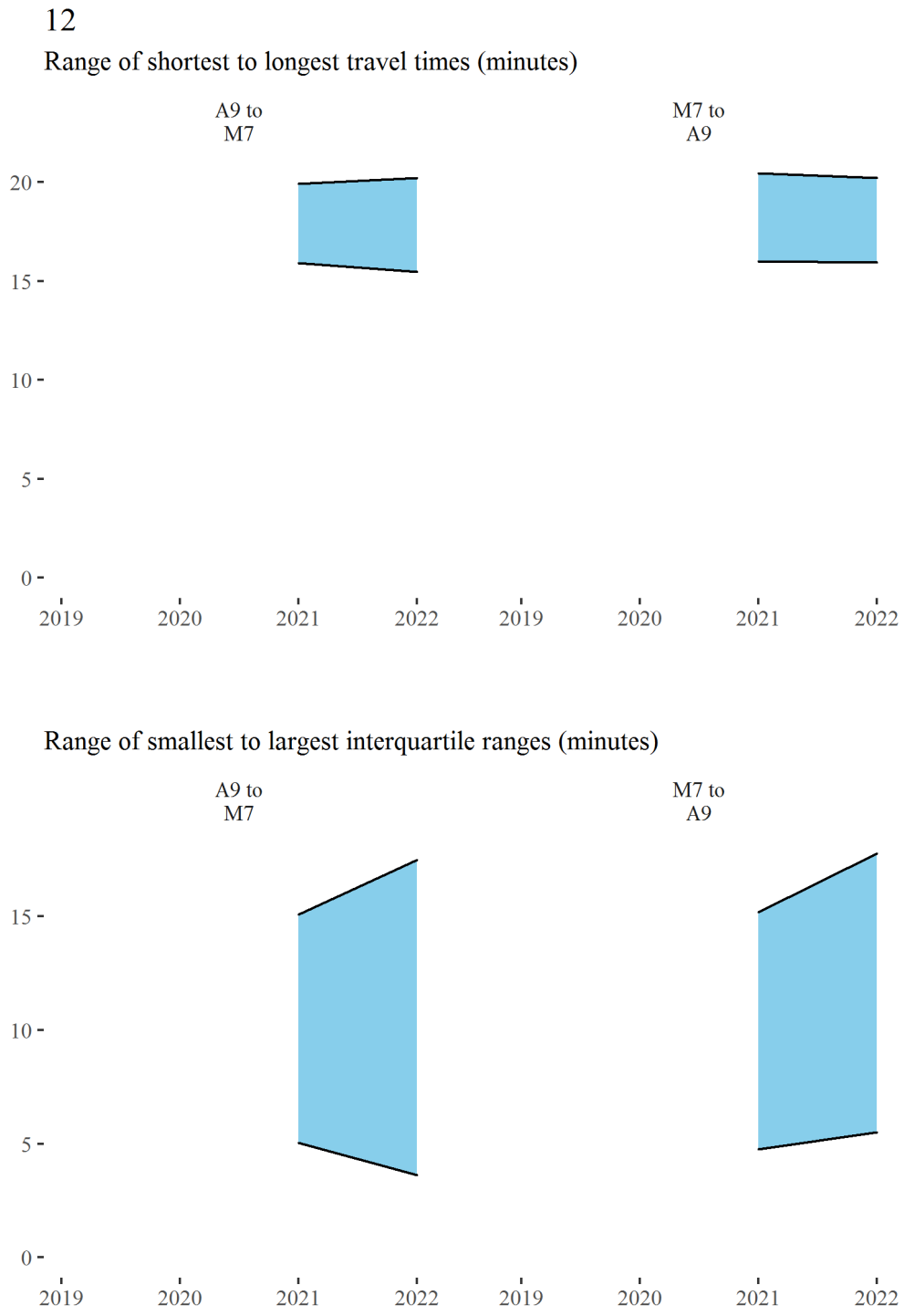
The best median travel times and least uncertainty for journeys from the M7 to the A9 were at 3am, with a median travel time of around 16 minutes and an interquartile range of 5.5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 20 minutes and an interquartile range of around 18 minutes.

Figure A.2 Route 12 median and interquartile range travel times



Source: BITRE estimates

Figure A.3 Route 12 route performance over time

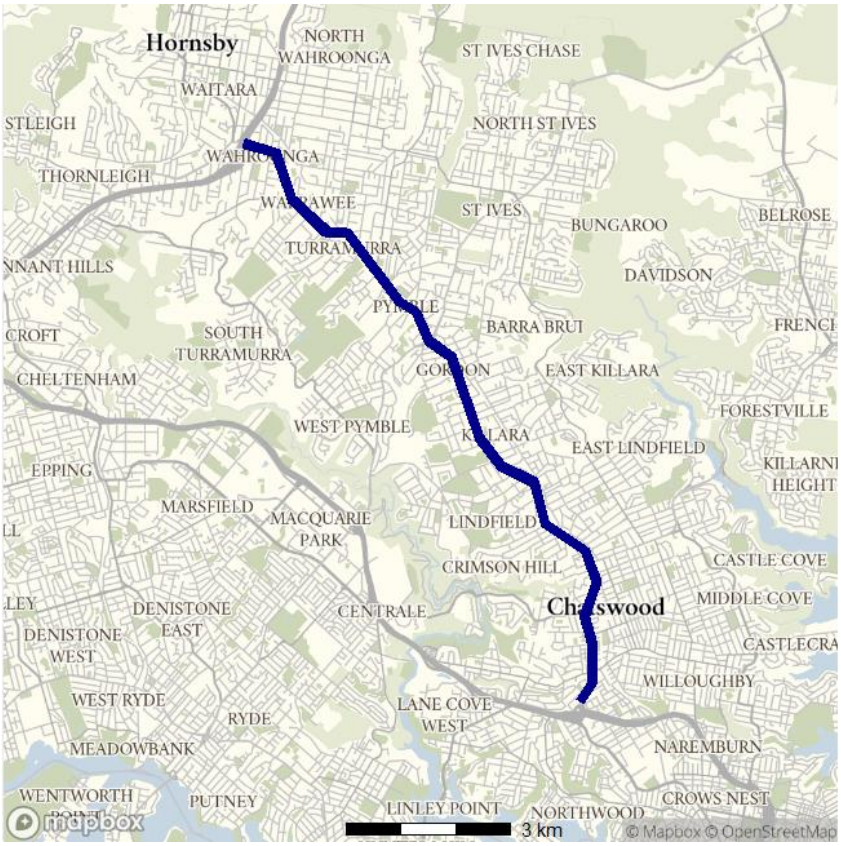


a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates

A1 - Artarmon to Wahroonga / Wahroonga to Artarmon

This route follows the Pacific Highway from the Gore Hill Expressway at Artarmon and the M1 Motorway at Wahroonga. It, along with NorthConnex, is one of two routes connecting the orbital road network to the Pacific Motorway (M1) and the north of the state. It also services most of the Upper North Shore of Sydney.

Figure A.7 A1 route map



Source: BITRE estimates.

Table A.2 A1 route travel times and congestion measures, 2022

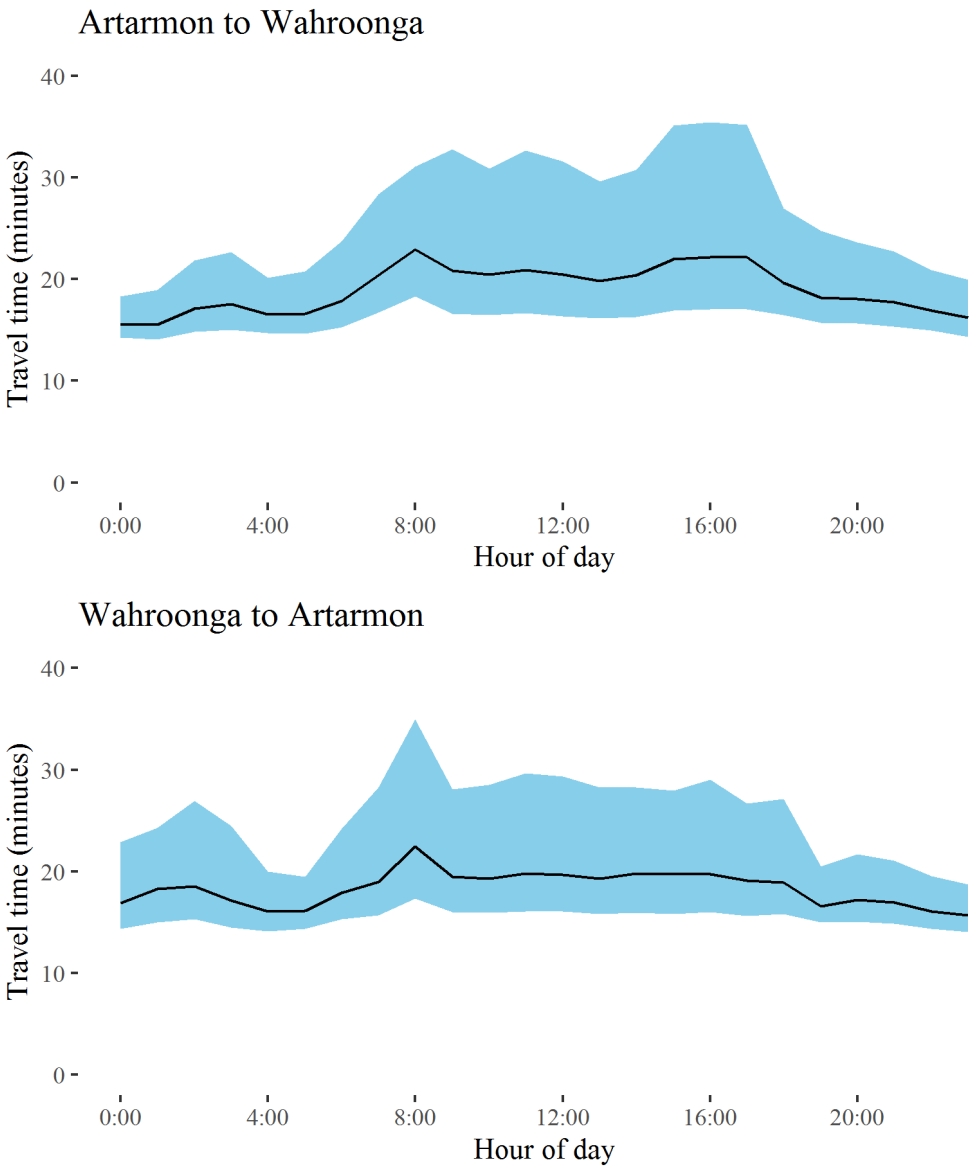
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Artarmon to Wahroonga	00:15:31	00:22:55	1.224	00:04:05	00:18:21	2.638	13.5
Wahroonga to Artarmon	00:15:40	00:22:29	1.169	00:04:42	00:17:38	2.141	13.5

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Artarmon to Wahroonga were at 1am and midnight with a median travel time of around 16 minutes and an interquartile range of 4 minutes. The longest median travel times were around 23 minutes at 8am and the greatest uncertainty were at 4pm with an interquartile range of 18 minutes.

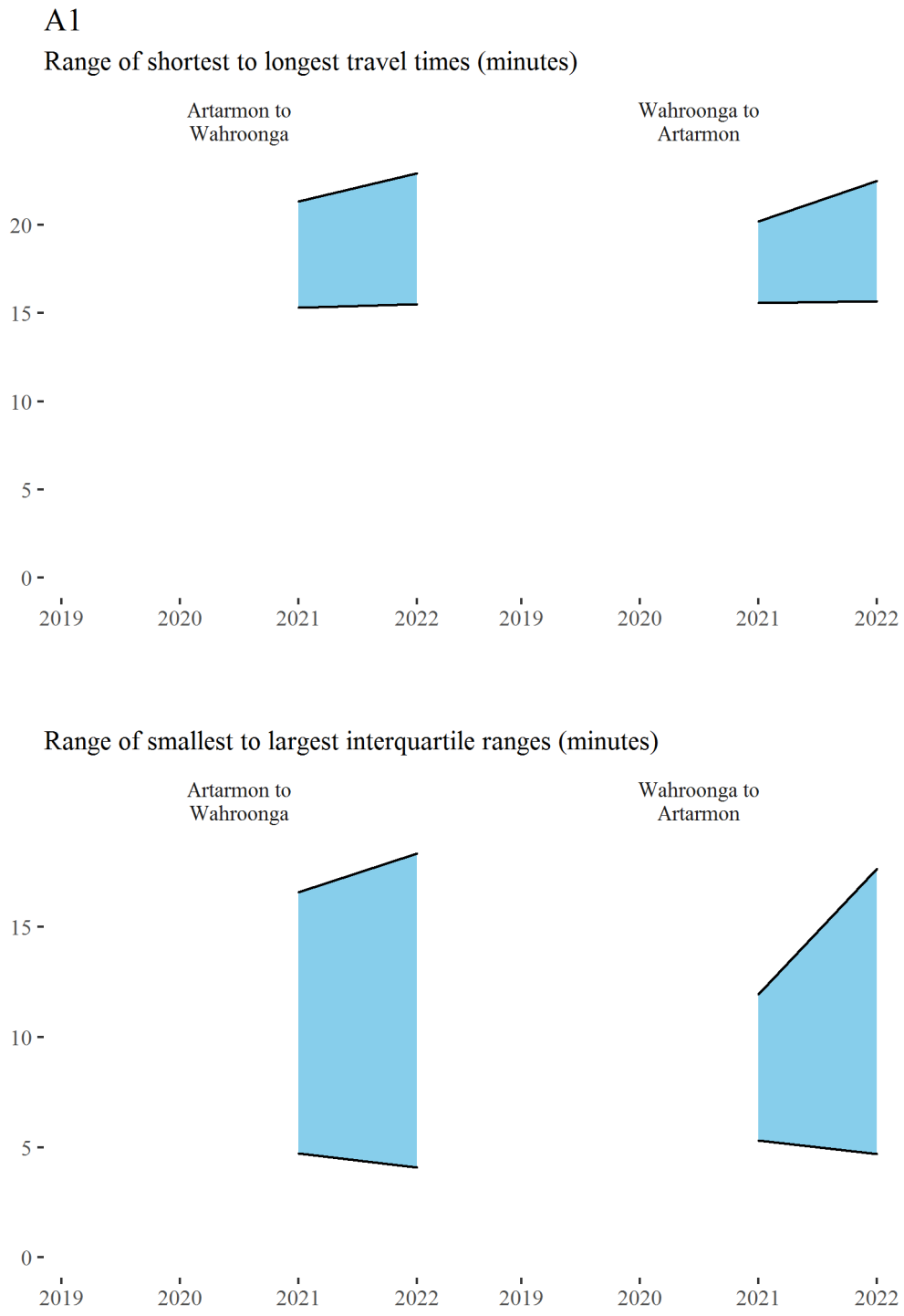
The best median travel times and lowest uncertainty for journeys from Wahroonga to Artarmon were at 11pm with a median travel time of 16 minutes and an interquartile range of approximately 5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of around 22 minutes and an interquartile range of 18 minutes.

Figure A.8 A1 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.9 A1 route performance over time[a]

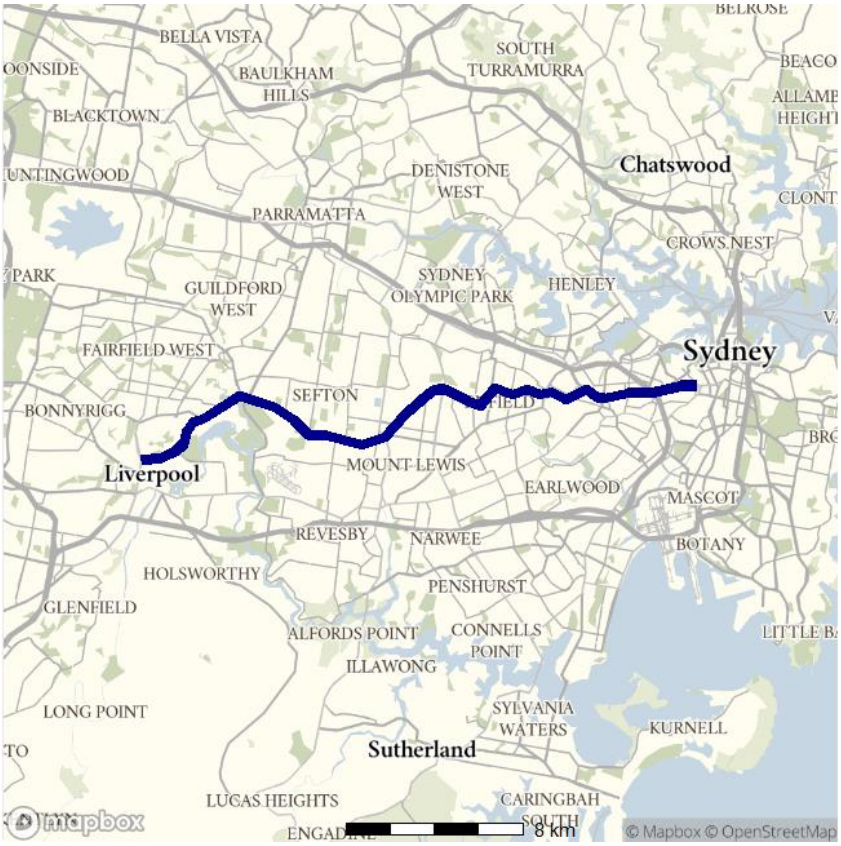


a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates

A22 - Glebe to Liverpool / Liverpool to Glebe

This route follows surface roads between the inner city and the southwest of Sydney via Ashfield and important logistics sites around Chullora. It is known by various names, including Parramatta Road, Liverpool Road and also as the Hume Highway for most of its length.

Figure A.13 A22 route map



Source: BITRE estimates.

Table A.3 A22 route travel times and congestion measures, 2022

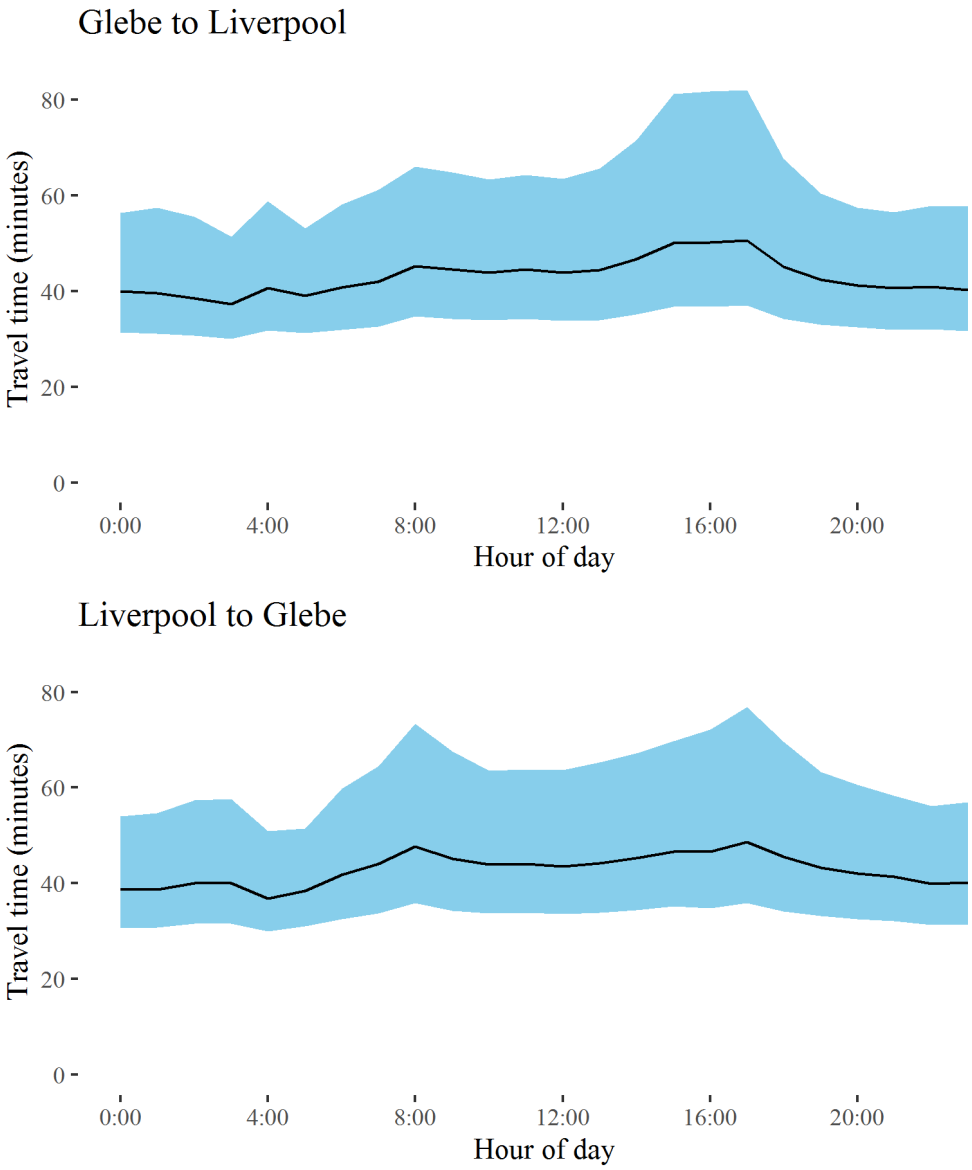
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Glebe to Liverpool	00:37:17	00:50:31	1.153	00:21:21	00:44:58	1.398	29.2
Liverpool to Glebe	00:36:47	00:48:35	1.164	00:20:30	00:40:53	1.436	29.3

Source: BITRE estimates.

The best median travel times for journeys from Glebe to Liverpool were 37 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of around 21 minutes. The longest median travel times were around 51 minutes at 5pm and the greatest uncertainty was at 4pm with an interquartile range of 45 minutes.

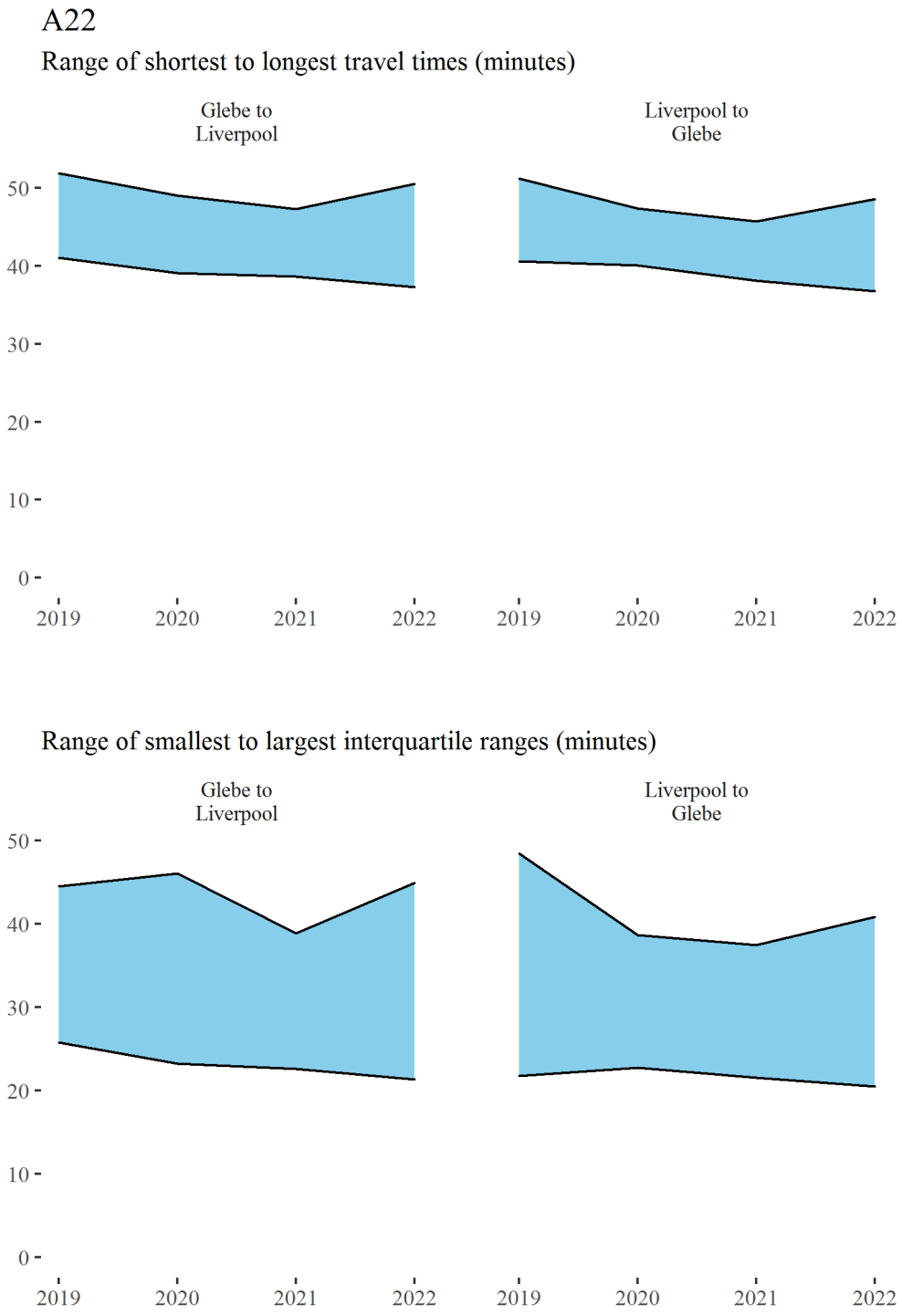
The best travel times and lowest uncertainty travelling from Liverpool to Glebe were at 4am and 5am with a median travel time of 37 minutes and an interquartile range of approximately 20 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of around 49 minutes and an interquartile range of 41 minutes.

Figure A.14 A22 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.15 A22 route performance over time

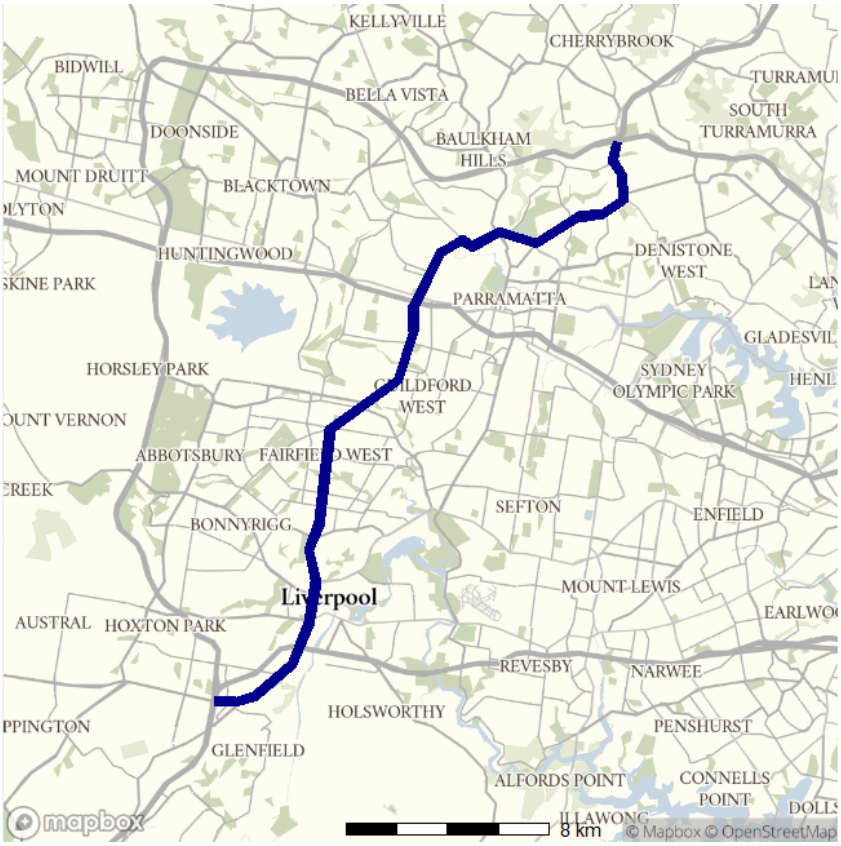


Source: BITRE estimates.

A28 - Casula to M2 Motorway / M2 Motorway to Casula

This surface route traverses much of Western Sydney, from the intersection of the M2 and Pennant Hills Road to the intersection of the Hume Motorway and Camden Valley Way. It passes Wentworthville, Fairfield West, Liverpool and Casula and crosses the A44, M4 and M5 routes.

Figure A.19 A28 route map



Source: BITRE estimates.

Table A.4 A28 route travel times and congestion measures, 2022

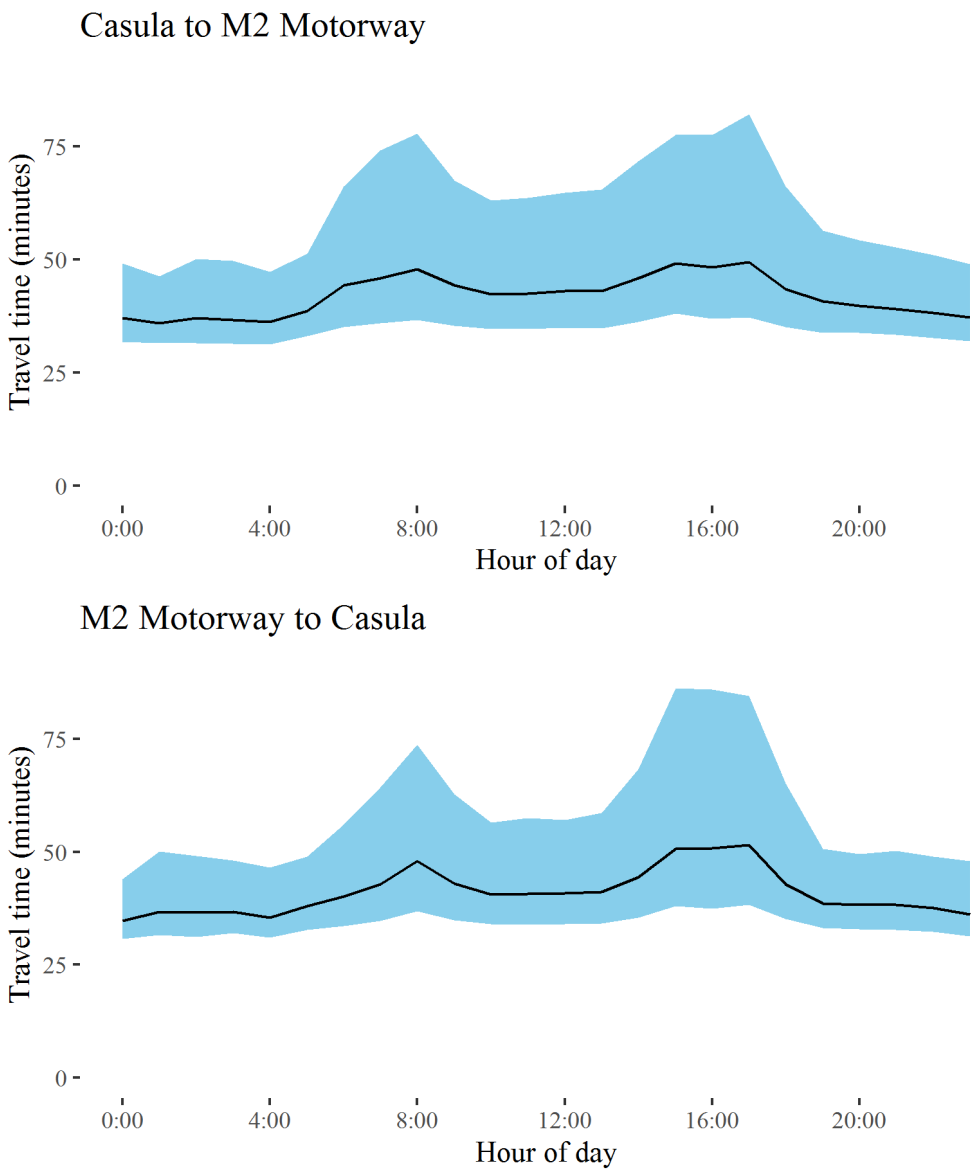
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Casula to M2 Motorway	00:35:59	00:49:26	1.165	00:14:54	00:44:52	1.829	32.8
M2 Motorway to Casula	00:34:43	00:51:29	1.181	00:13:14	00:48:30	1.885	32.9

Source: BITRE estimates.

The best median travel times for journeys from Casula to M2 Motorway were 36 minutes at 1am and the lowest uncertainty was at 1am with an interquartile range of 15 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of around 49 minutes and an interquartile range of just under 45 minutes.

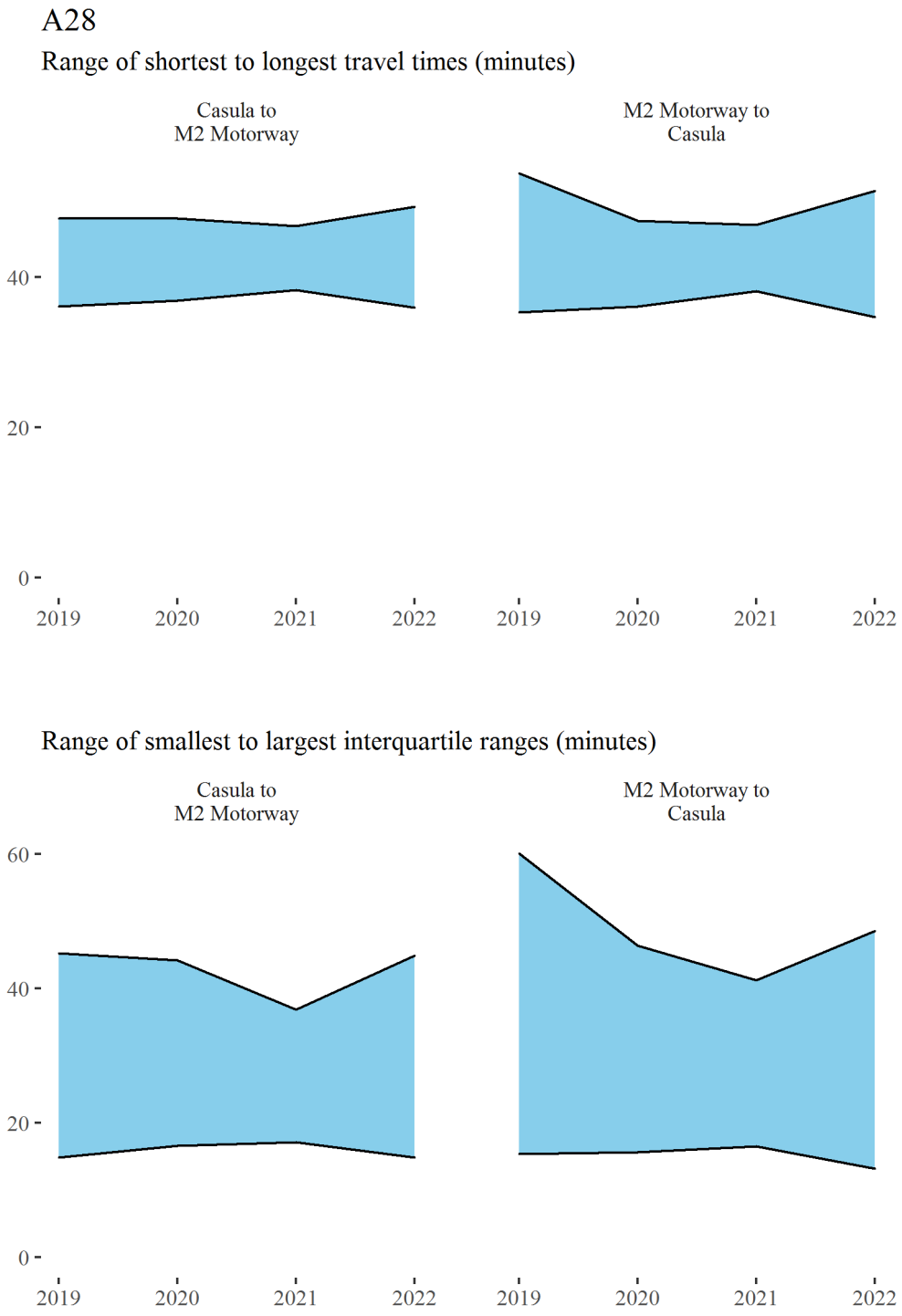
The best median travel times for journeys from M2 Motorway to Casula were around 35 minutes at midnight and the lowest uncertainty was at midnight with an interquartile range of 13 minutes. The longest median travel times were at 5pm with a median of around 51 minutes and the greatest uncertainty at 4pm with an interquartile range of approximately 48 minutes.

Figure A.20 A28 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.21 A28 route performance over time

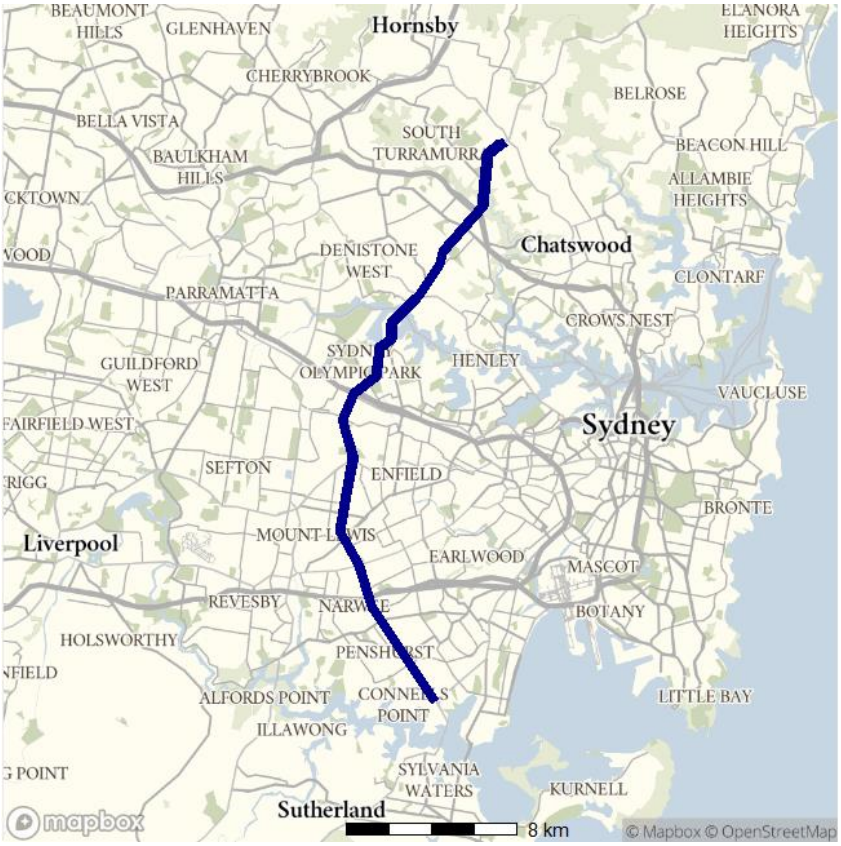


Source: BITRE estimates.

A3 - Blakehurst to Pymble / Pymble to Blakehurst

This route traverses Sydney from the intersection of Ryde Road and the Pacific Highway at Pymble to the Princes Highway at Blakehurst. It passes through Ryde, Strathfield, Roselands and Hurstville along its extent. It intersects with a number of other routes in this report including the M2, M4 and M5 motorways and the A34, A22 and A40.

Figure A.25 A3 route map



Source: BITRE estimates.

Table A.5 A3 route travel times and congestion measures, 2022

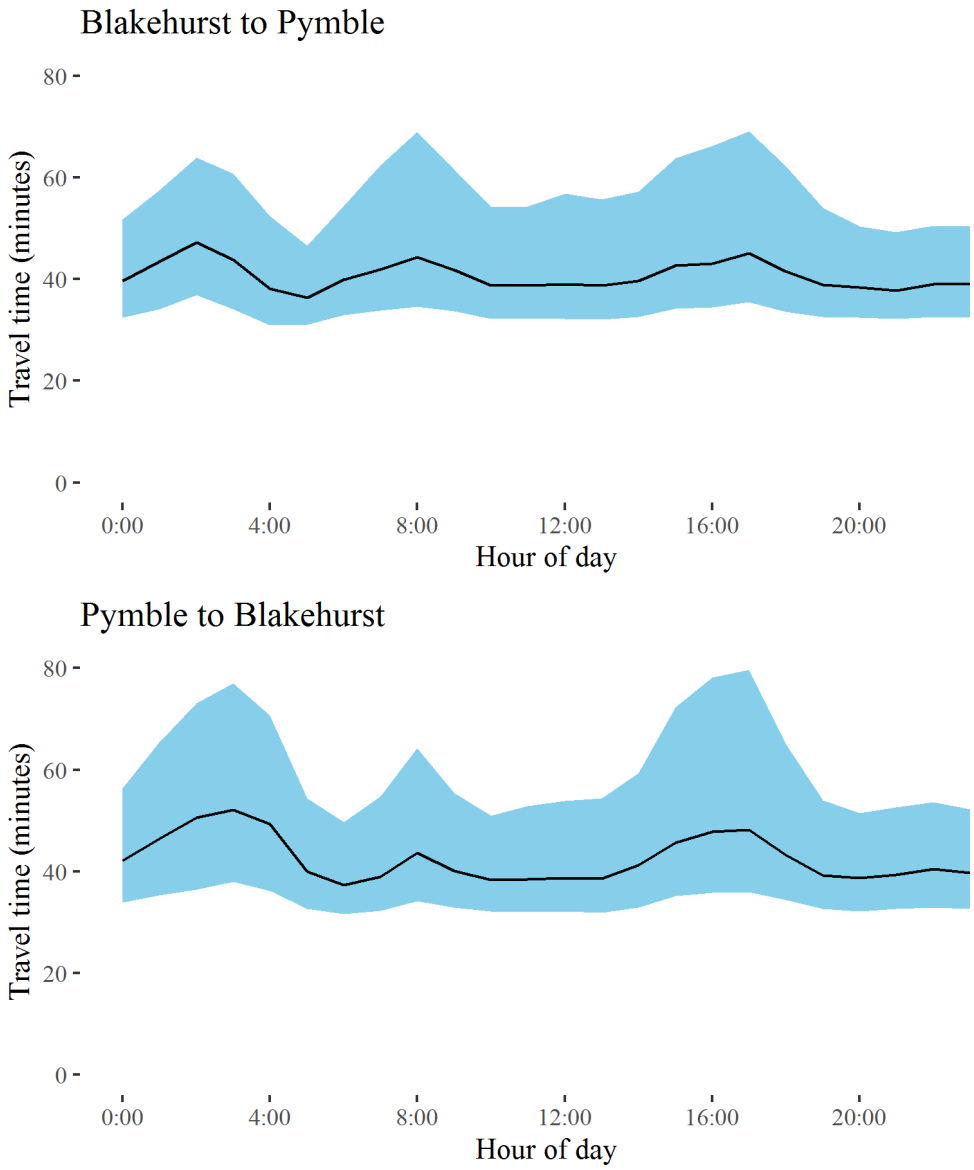
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Blakehurst to Pymble	00:36:24	00:47:09	1.118	00:15:37	00:34:22	1.544	30.5
Pymble to Blakehurst	00:37:20	00:52:03	1.136	00:18:10	00:43:42	1.473	30.8

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Blakehurst to Pymble were at 5am with a median travel time of approximately 36 minutes and an interquartile range of just under 16 minutes. The longest median travel times were at 2am with a median of 47 minutes and the greatest uncertainty at 8am with an interquartile range of around 34 minutes.

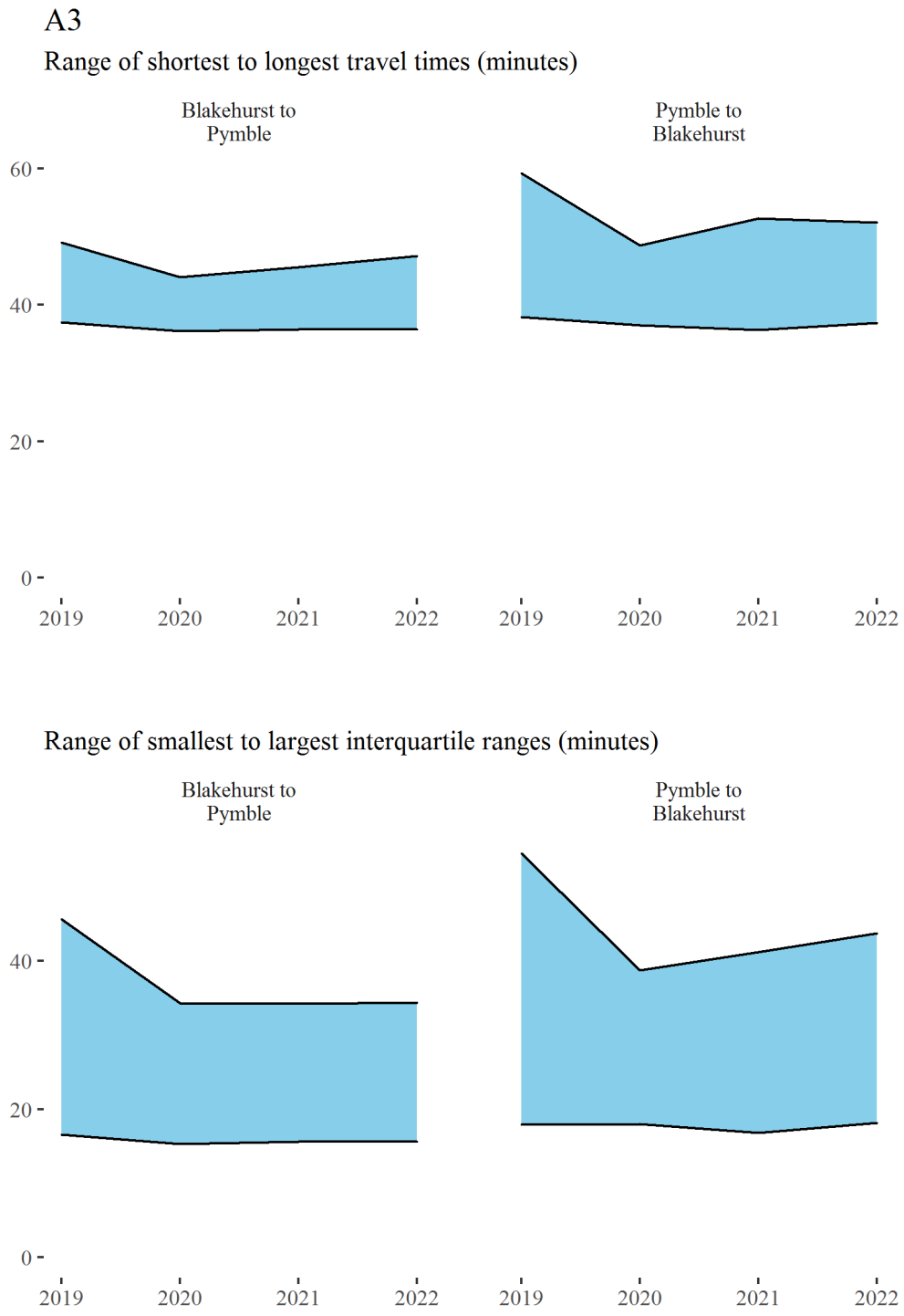
The best median travel times for journeys from Pymble to Blakehurst were 37 minutes at 6am and the lowest uncertainty was at 6am with an interquartile range of 18 minutes. The longest median travel times were at 3am with a median of 52 minutes and the greatest uncertainty at 5pm with an interquartile range of around 44 minutes.

Figure A.26 A3 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.27 A3 Route performance over time

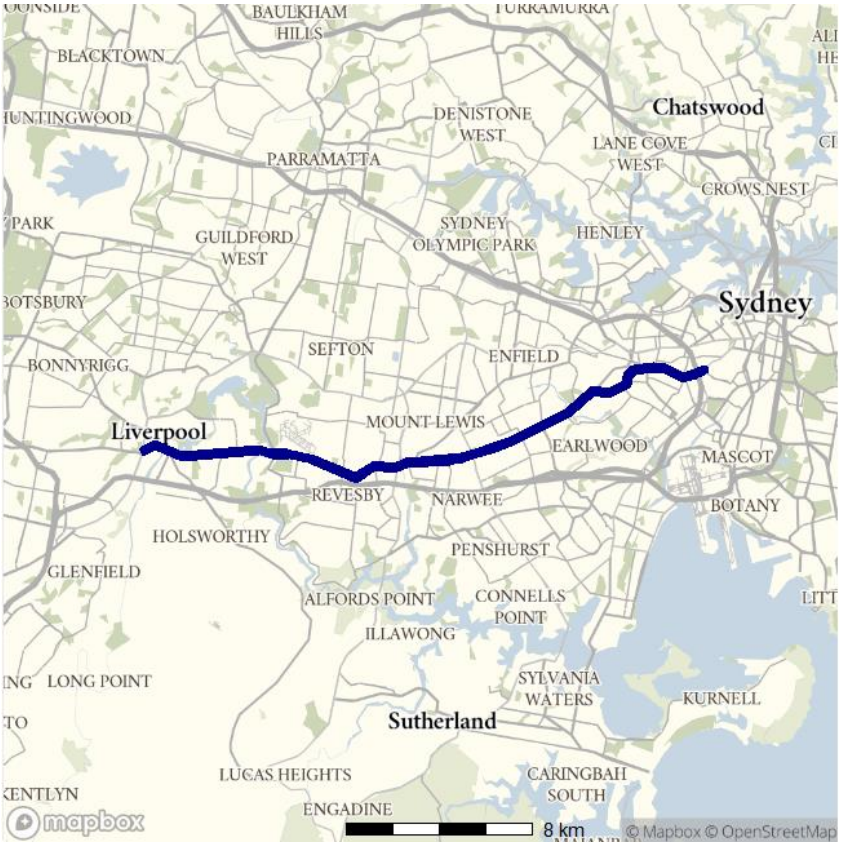


Source: BITRE estimates.

A34 - Liverpool to Newtown / Newtown to Liverpool

This route follows a path almost parallel to the A22, but more southerly, passing through Marrickville, Punchbowl and Milperra. It is known by various names, including Canterbury Road and Milperra Road along its length.

Figure A.31 A34 route map



Source: BITRE estimates.

Table A.6 A34 route travel times and congestion measures, 2022

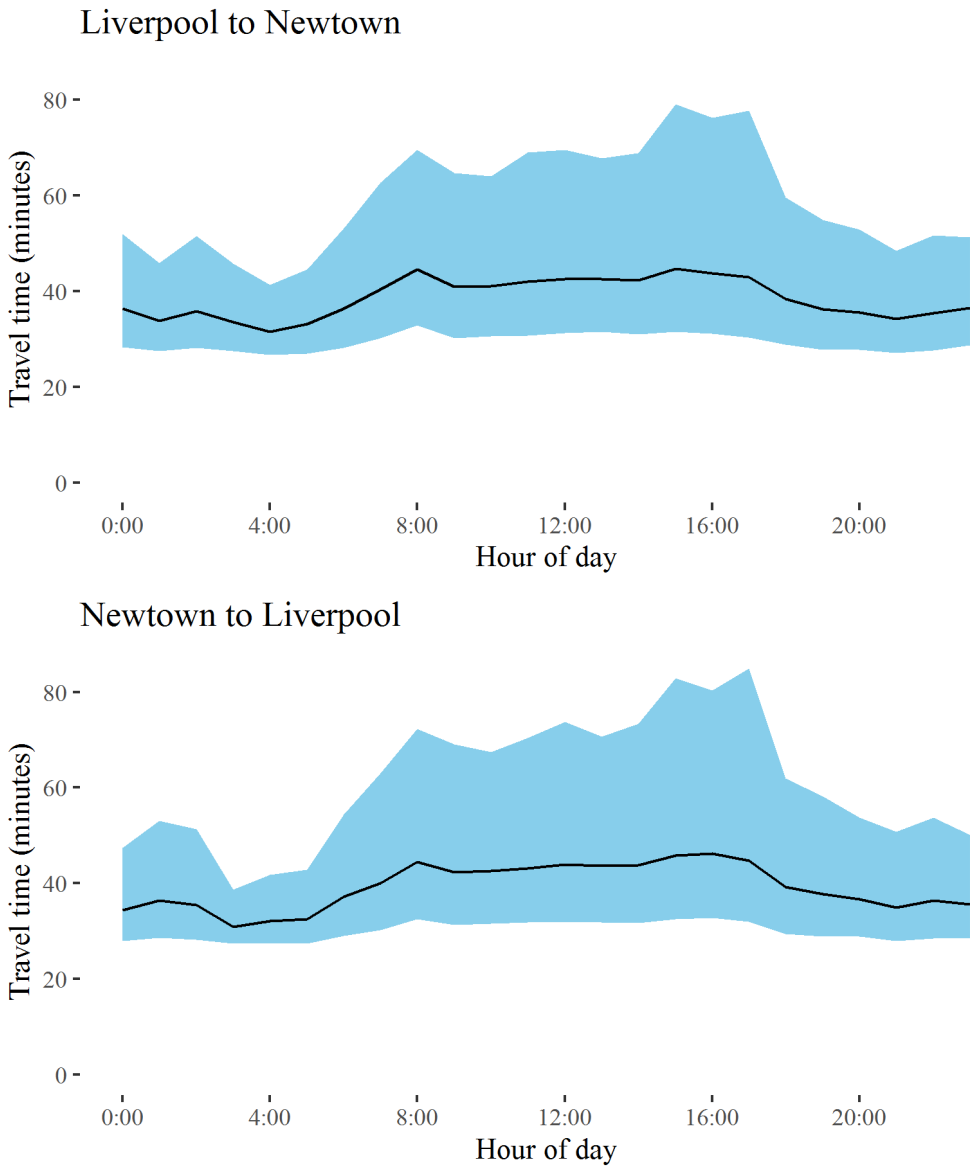
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Liverpool to Newtown	00:31:32	00:44:36	1.221	00:14:42	00:47:39	2.042	26.1
Newtown to Liverpool	00:30:59	00:46:12	1.265	00:11:20	00:52:58	2.746	26.7

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Liverpool to Newtown were at 4am with a median travel time of around 32 minutes and an interquartile range of just under 15 minutes. The longest median travel times and greatest uncertainty were at 3pm with a median of around 45 minutes and an interquartile range of just under 48 minutes.

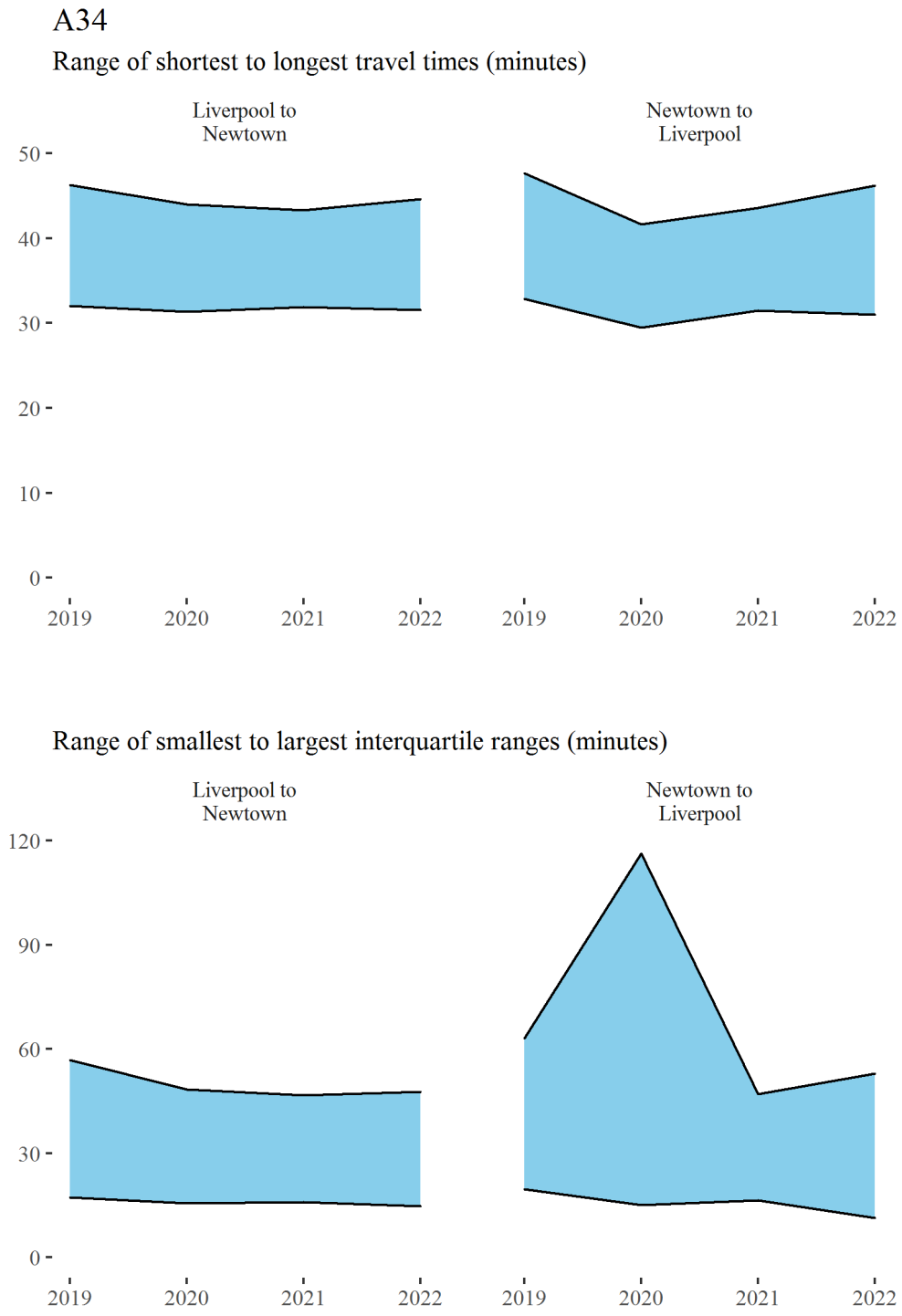
The best median travel times for journeys from Newtown to Liverpool were approximately 31 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of about 11 minutes. The longest median travel times were at 4pm with a median of 46 minutes and the greatest uncertainty at 5pm with an interquartile range of 53 minutes.

Figure A.32 A34 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.33 A34 route performance over time



Source: BITRE estimates.

A36 - Broadway to Georges River / Georges River to Broadway

This route travels south from the inner city at Broadway (Glebe), skirting industrial areas at Alexandria and passing through the St George region before meeting the A3 at Blakehurst. For most of its length it is known as the Princes Highway.

Figure A.37 A36 route map

Source: BITRE estimates.

Table A.7 A36 route travel times and congestion measures, 2022

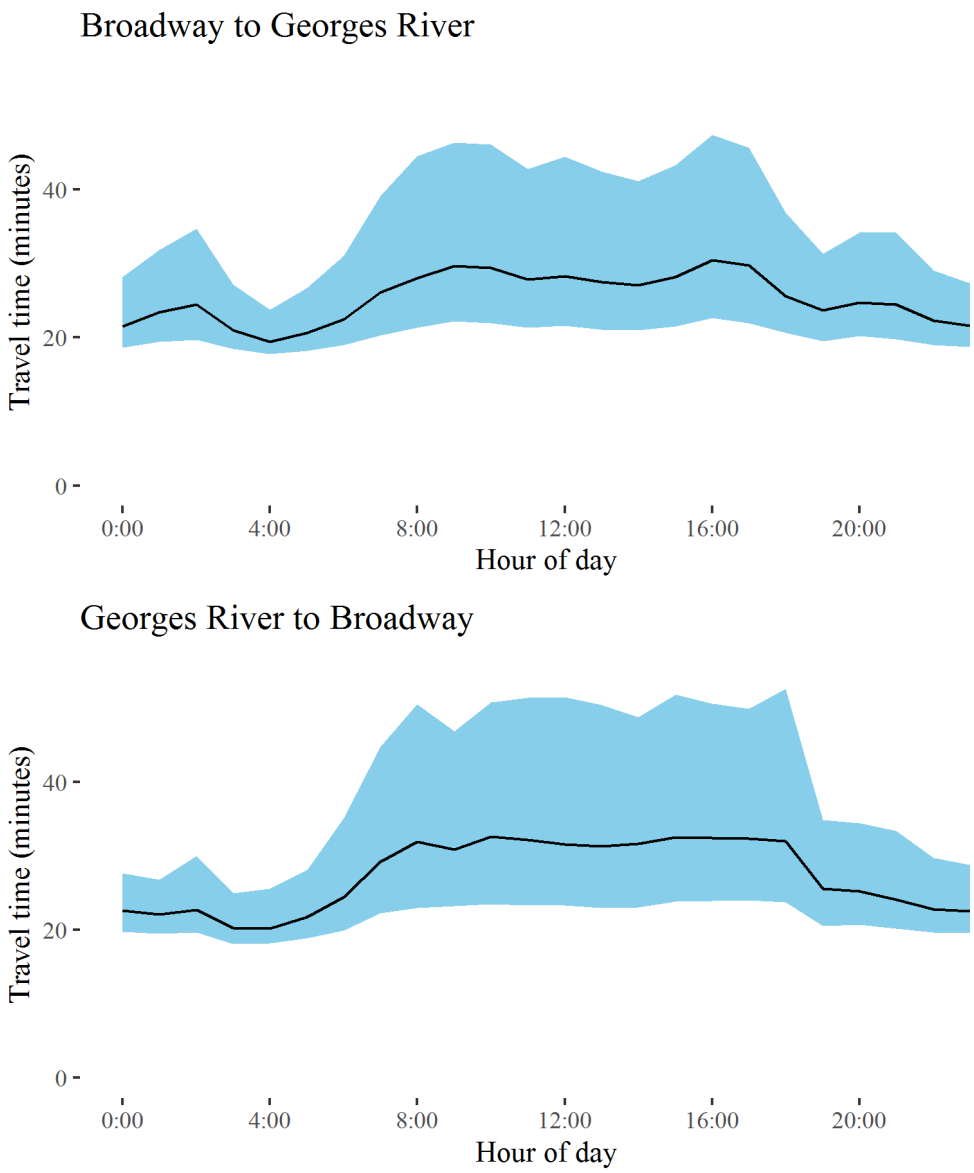
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Broadway to Georges River	00:19:25	00:30:30	1.305	00:05:58	00:24:50	2.755	16.5
Georges River to Broadway	00:20:11	00:32:36	1.352	00:06:52	00:28:51	2.700	16.5

Source: BITRE estimates.

The best median travel times for journeys from Broadway to Georges River were approximately 19 minutes at 4am and the lowest uncertainty was at 4am with an interquartile range of 6 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 30 minutes and an interquartile range of just under 25 minutes.

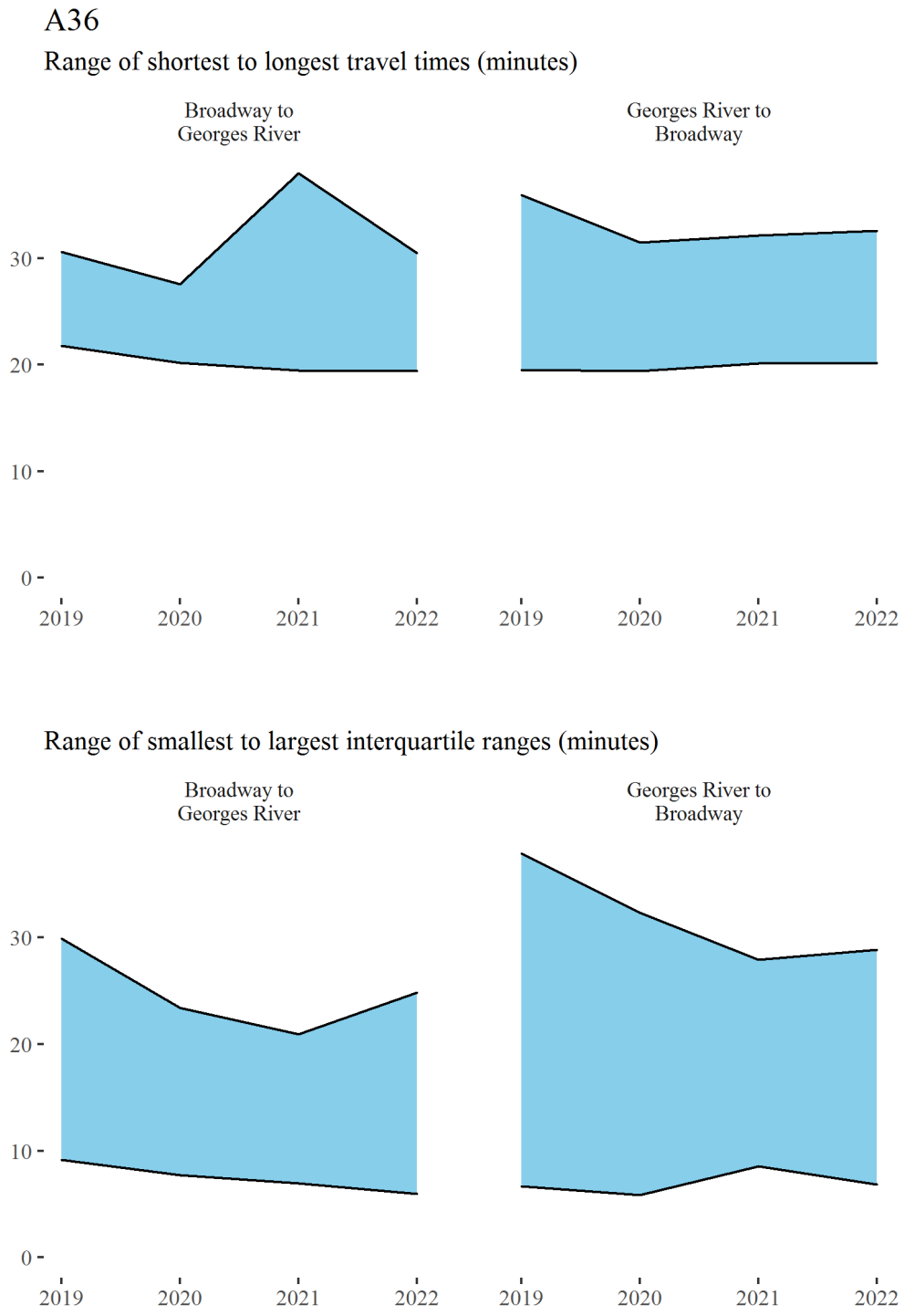
The best travel times and lowest uncertainty travelling from Georges River to Broadway were at 4am and 3am with a median travel time of 20 minutes and an interquartile range of 7 minutes. The longest median travel times were approximately 33 minutes at 10am and the greatest uncertainty were at 6pm with an interquartile range of around 29 minutes.

Figure A.38 A36 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.39 A36 route performance over time

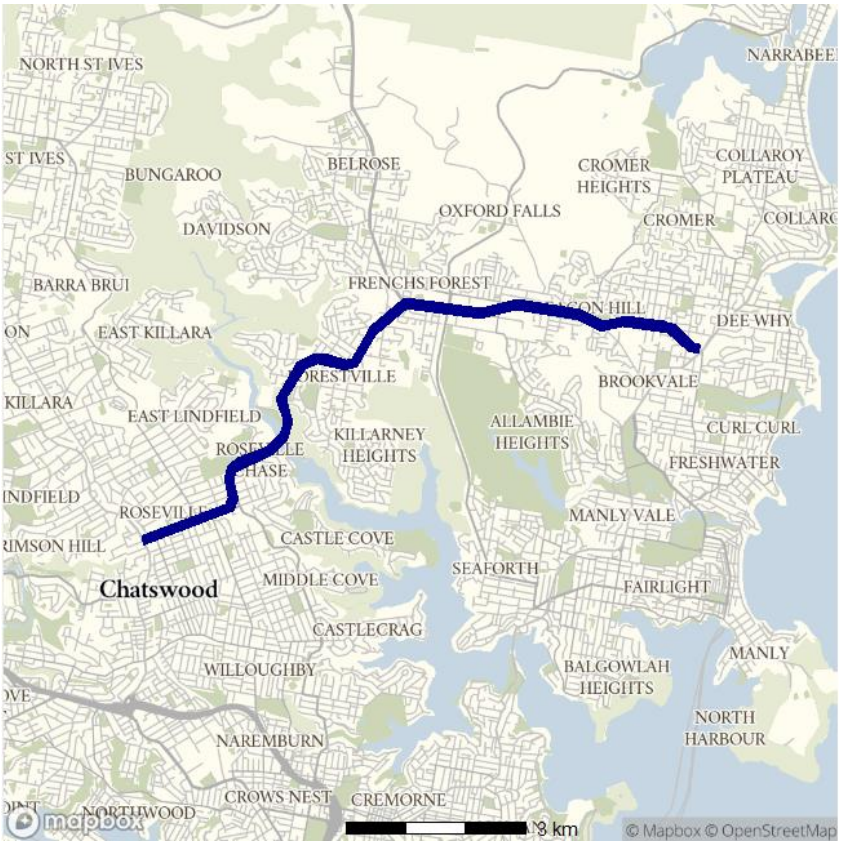


Source: BITRE estimates.

A38 - Dee Why to Roseville / Roseville to Dee Why

This route connects the Upper North Shore and Northern Beaches regions of Sydney, extending from the Pacific Highway (A1) at Roseville to Pittwater Rd (A8) at Dee Why.

Figure A.43 A38 route map



Source: BITRE estimates.

Table A.8 A38 route travel times and congestion measures, 2022

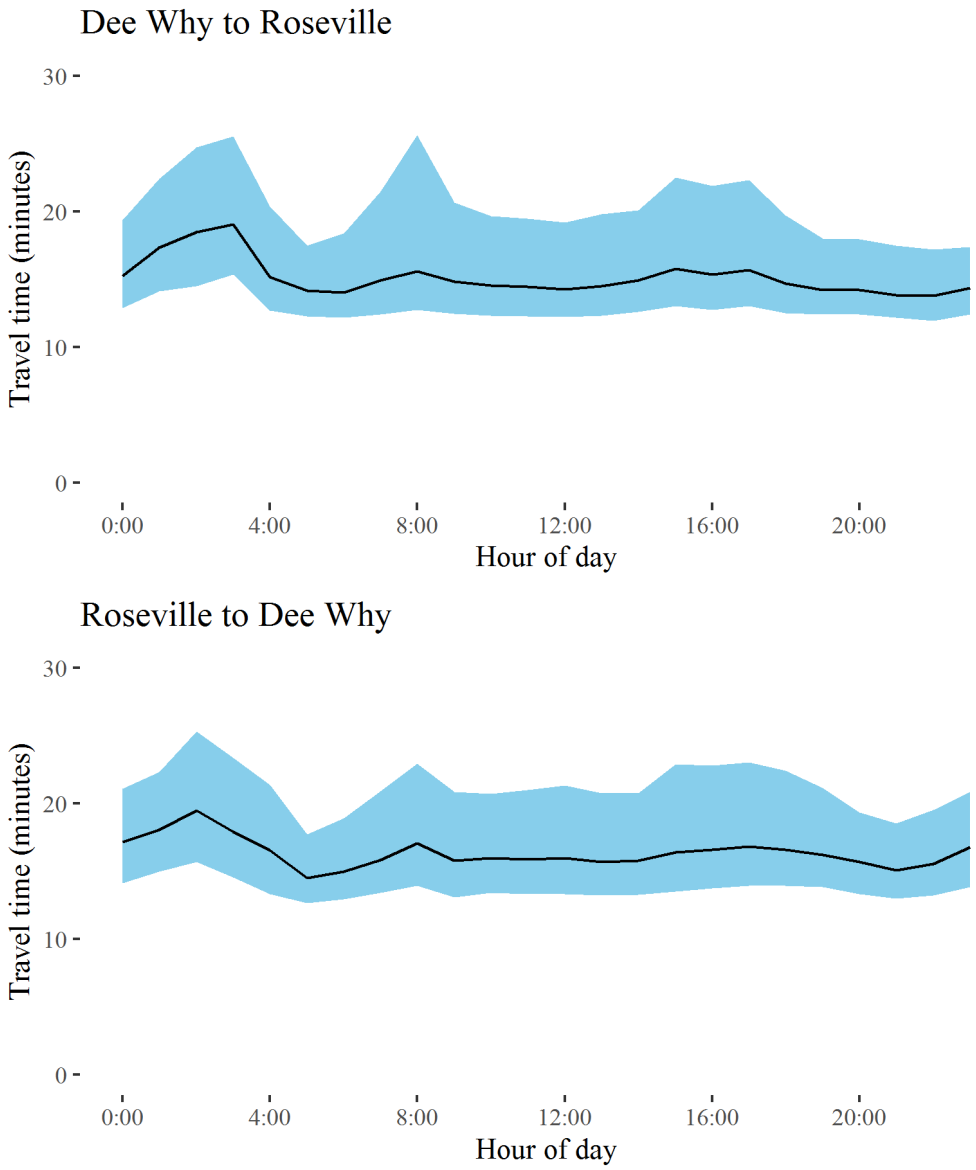
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Dee Why to Roseville	00:13:47	00:19:01	1.097	00:04:58	00:12:53	1.530	12.1
Roseville to Dee Why	00:14:32	00:19:28	1.126	00:05:02	00:09:38	1.509	12.1

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Dee Why to Roseville were at 10pm and 11pm with a median travel time of around 14 minutes and an interquartile range of 5 minutes. The longest median travel times were at 3am with a median of 19 minutes and the greatest uncertainty at 8am with an interquartile range of around 13 minutes.

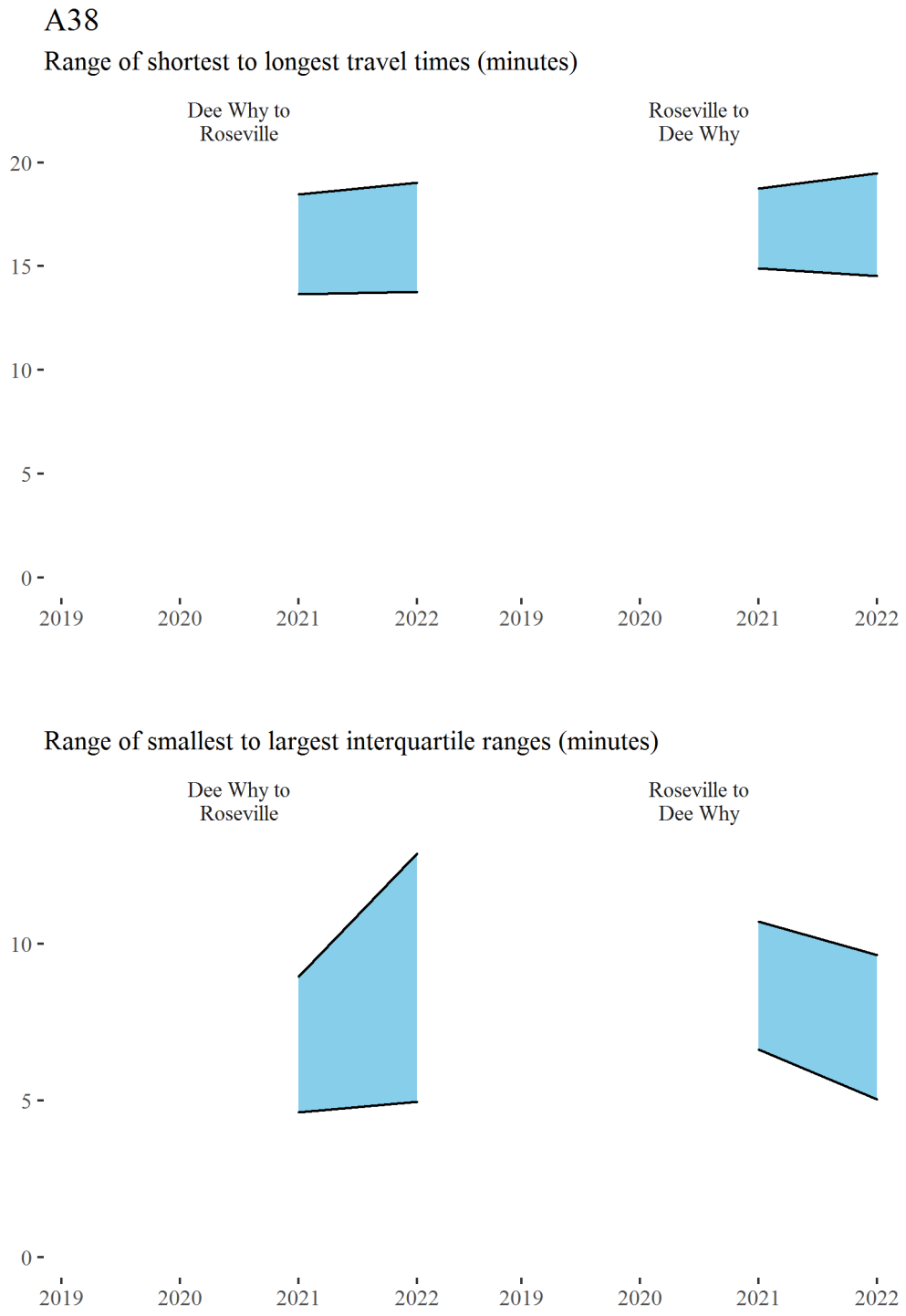
The best median travel times and lowest uncertainty for journeys from Roseville to Dee Why were at 5am with a median travel time of just under 15 minutes and an interquartile range of 5 minutes. The longest median travel times and greatest uncertainty were at 2am with a median of around 19 minutes and an interquartile range of just under 10 minutes.

Figure A.44 A38 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.45 A38 route performance over time

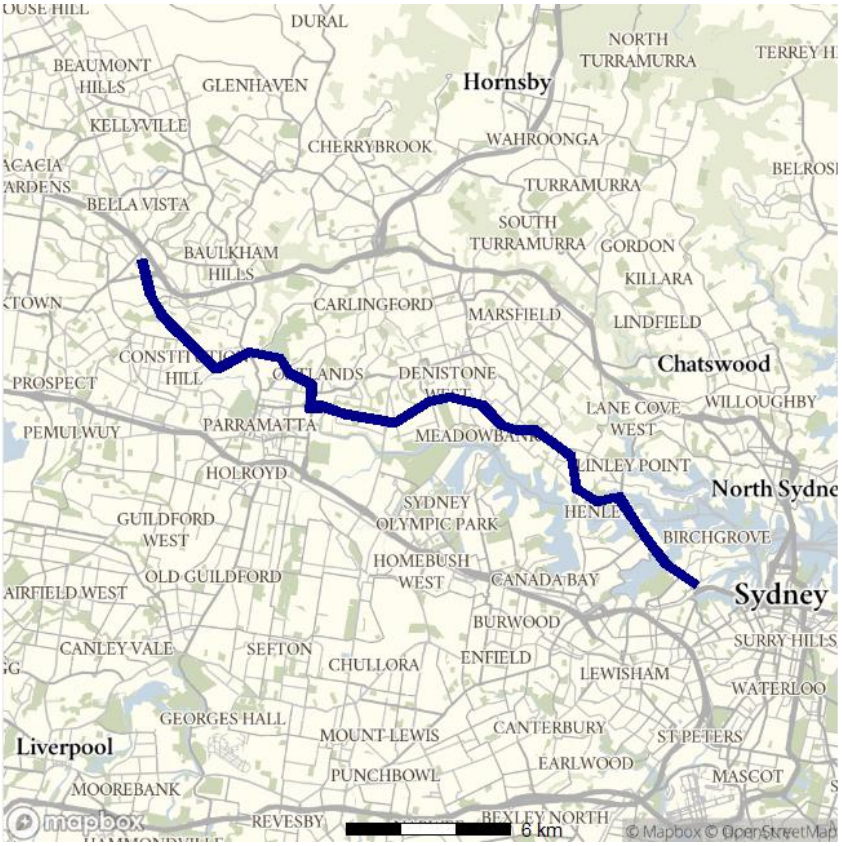


Source: BITRE estimates.

A40 - Baulkham Hills to Rozelle / Rozelle to Baulkham Hills

This route connects the inner city (Rozelle) and the north-west of Sydney passing through Gladesville, Rydalmere and Toongabbie along its path. It is known at different points as Victoria Road, James Ruse Drive and Old Windsor Road.

Figure A.49 A40 route map



Source: BITRE estimates.

Table A.9 A40 route travel times and congestion measures, 2022

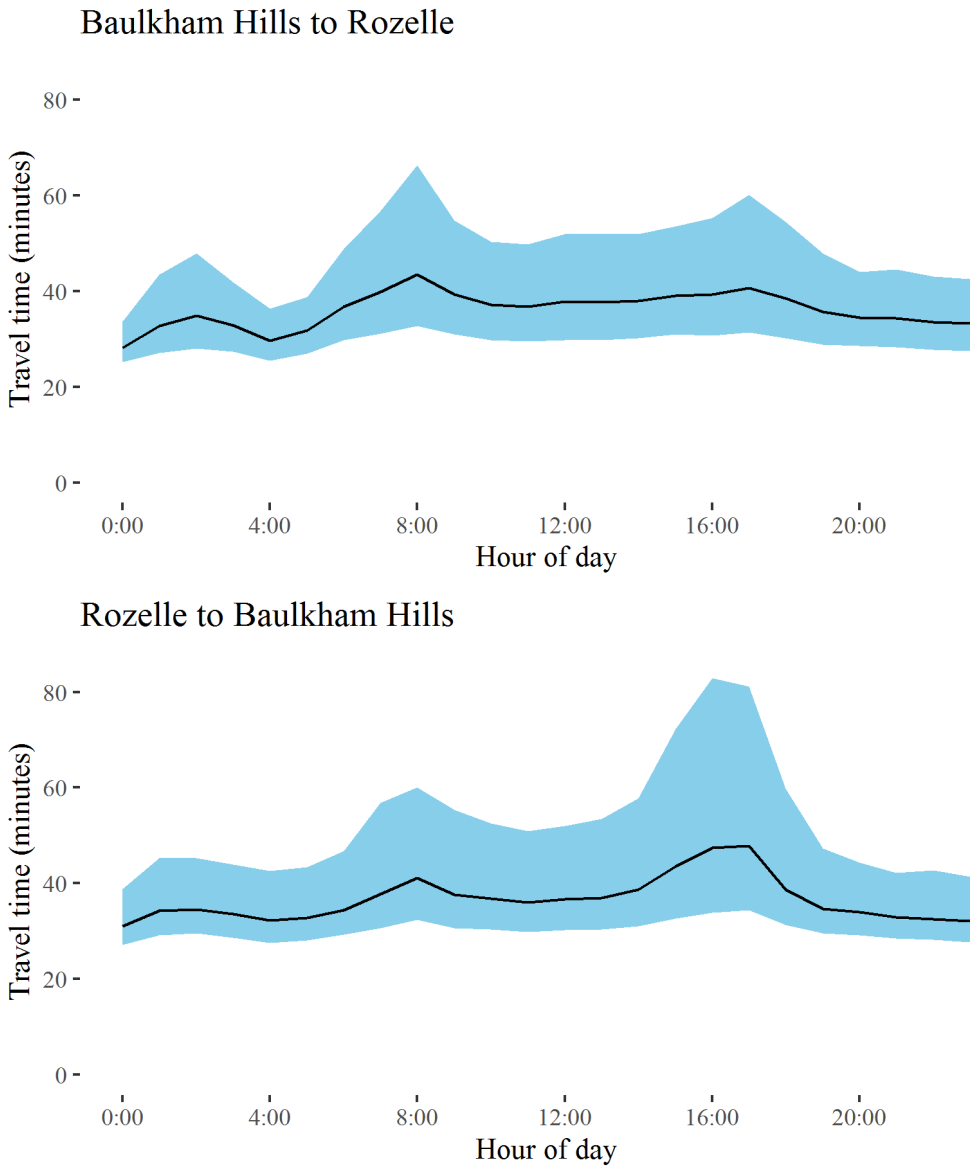
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Baulkham Hills to Rozelle	00:28:06	00:43:24	1.282	00:08:30	00:33:30	2.317	27.8
Rozelle to Baulkham Hills	00:31:06	00:47:47	1.177	00:11:44	00:49:00	1.913	28.1

Source: BITRE estimates.

The best median travel times for journeys from Baulkham Hills to Rozelle were 28 minutes at midnight and the lowest uncertainty was at midnight with an interquartile range of 8.5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of around 43 minutes and an interquartile range of just under 34 minutes.

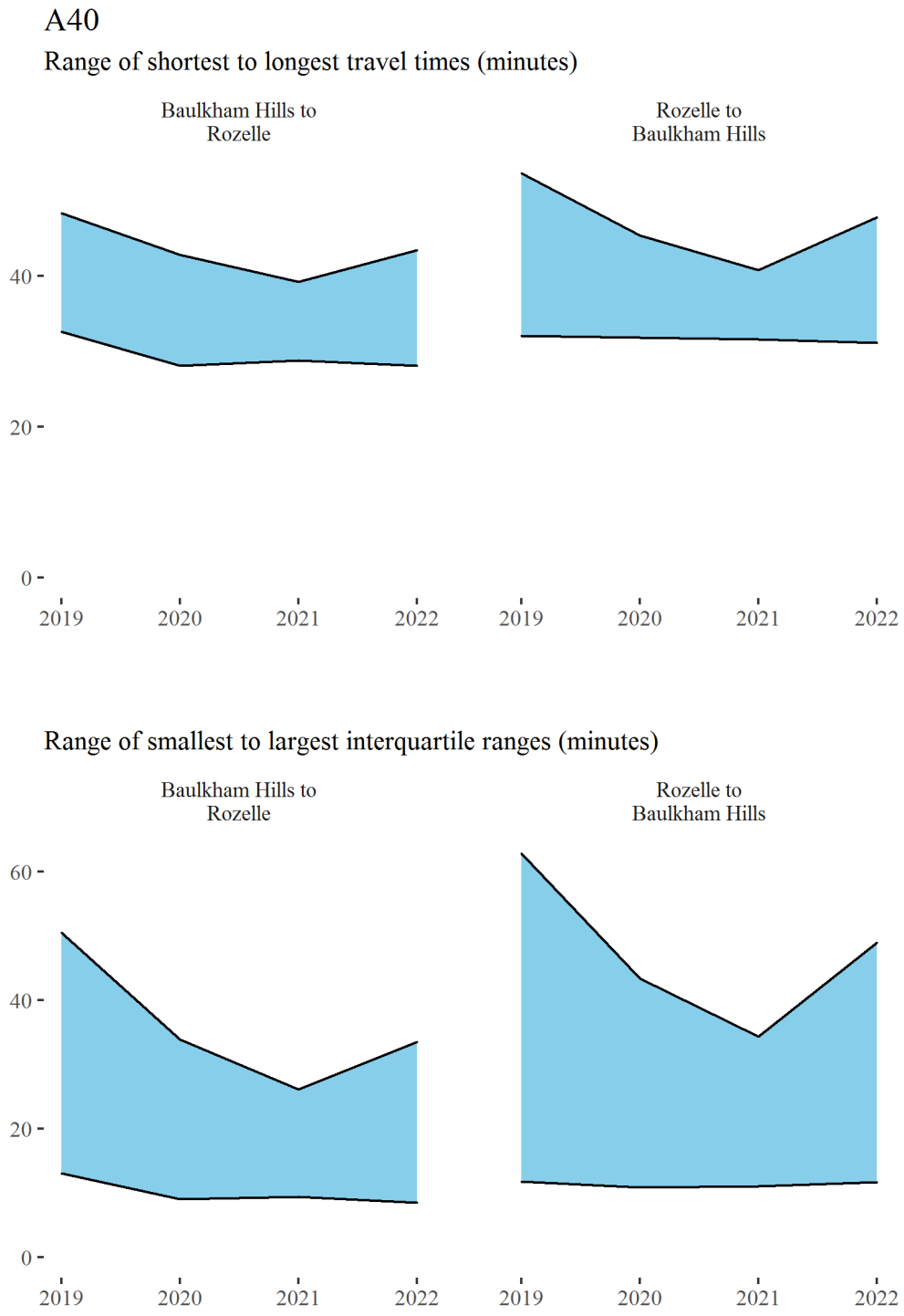
The best median travel times and least uncertainty for journeys from Rozelle to Baulkham Hills were at midnight with a median travel time of 31 minutes and an interquartile range of around 12 minutes. The longest median travel times were at 5pm with a median of 48 minutes and the greatest uncertainty at 4pm with an interquartile range of 49 minutes.

Figure A.50 A40 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.51 A40 route performance over time

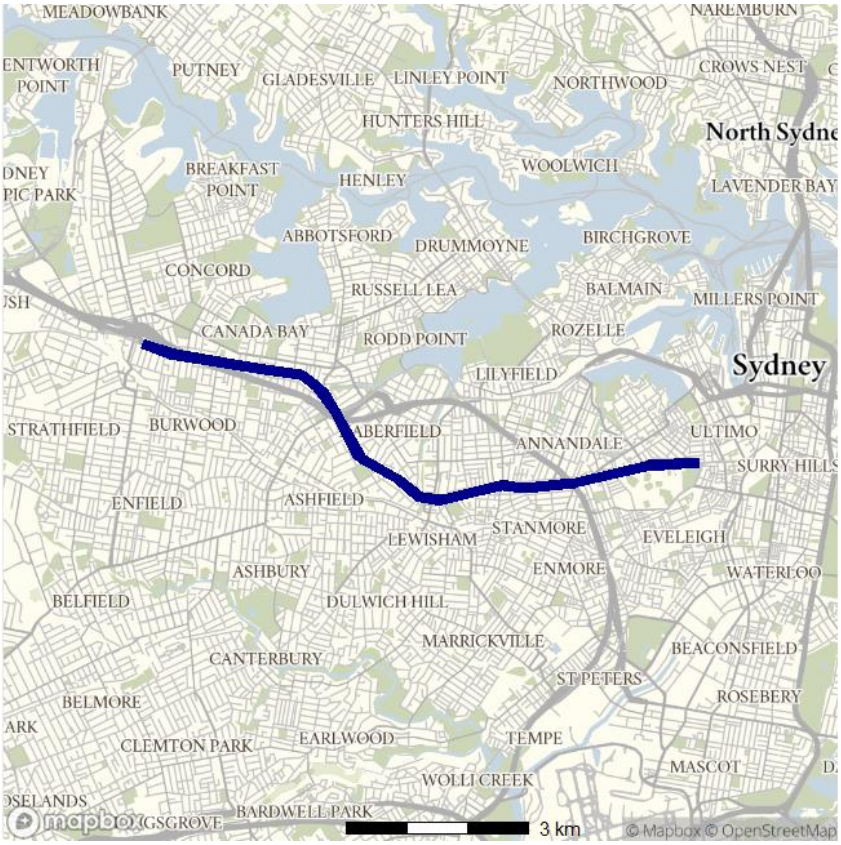


Source: BITRE estimates.

A44 - Camperdown to Strathfield / Strathfield to Camperdown

This route runs from the former end of the M4 Motorway at Strathfield to Camperdown in the inner city and services the Inner West Region of Sydney.

Figure A.55 A44 route map



Source: BITRE estimates.

Table A.10 A44 route travel times and congestion measures, 2022

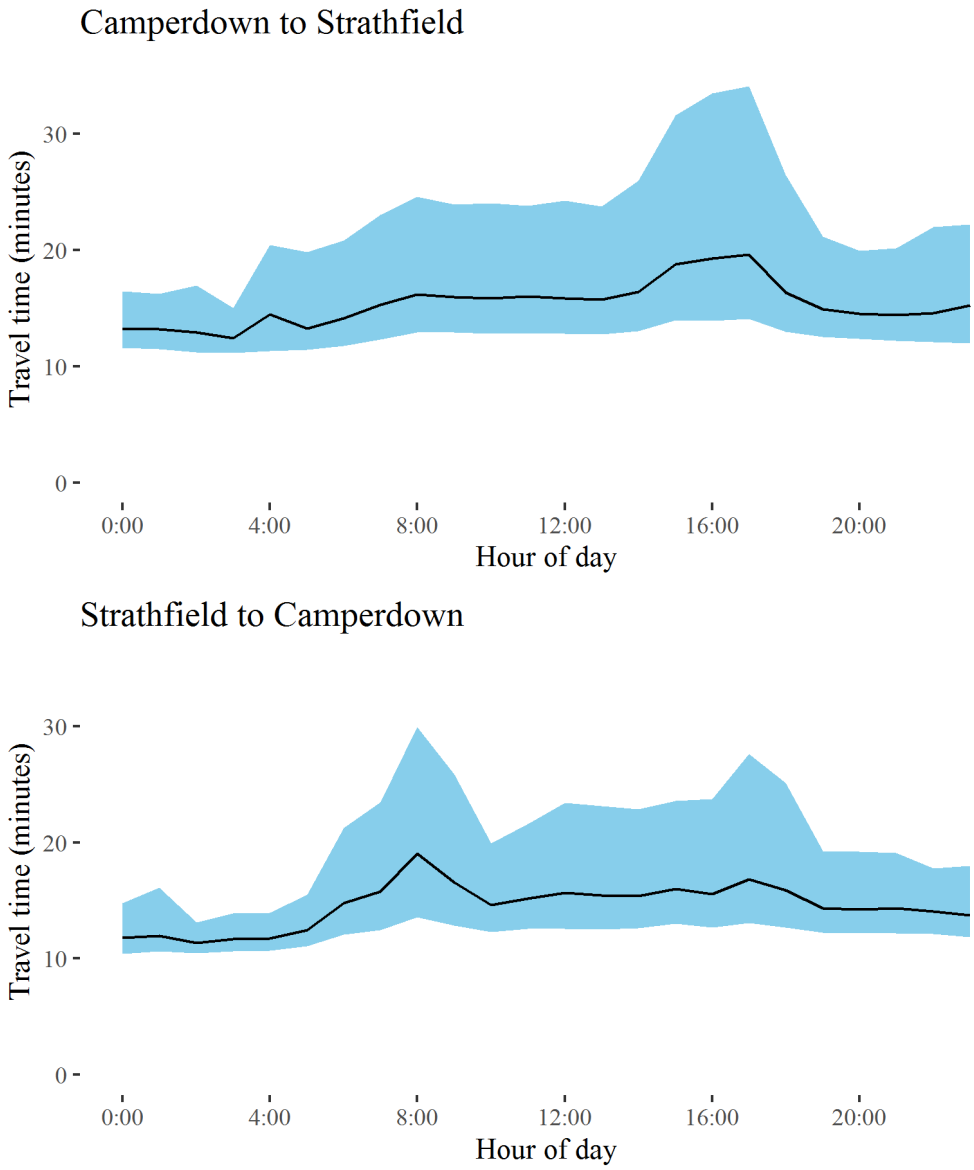
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Camperdown to Strathfield	00:12:24	00:19:35	1.239	00:03:53	00:20:01	2.706	10.2
Strathfield to Camperdown	00:11:21	00:19:03	1.279	00:02:40	00:16:22	3.174	10.2

Source: BITRE estimates.

The best median travel times for journeys from Camperdown to Strathfield were approximately 12 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of around 4 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of around 20 minutes and an interquartile range of 20 minutes.

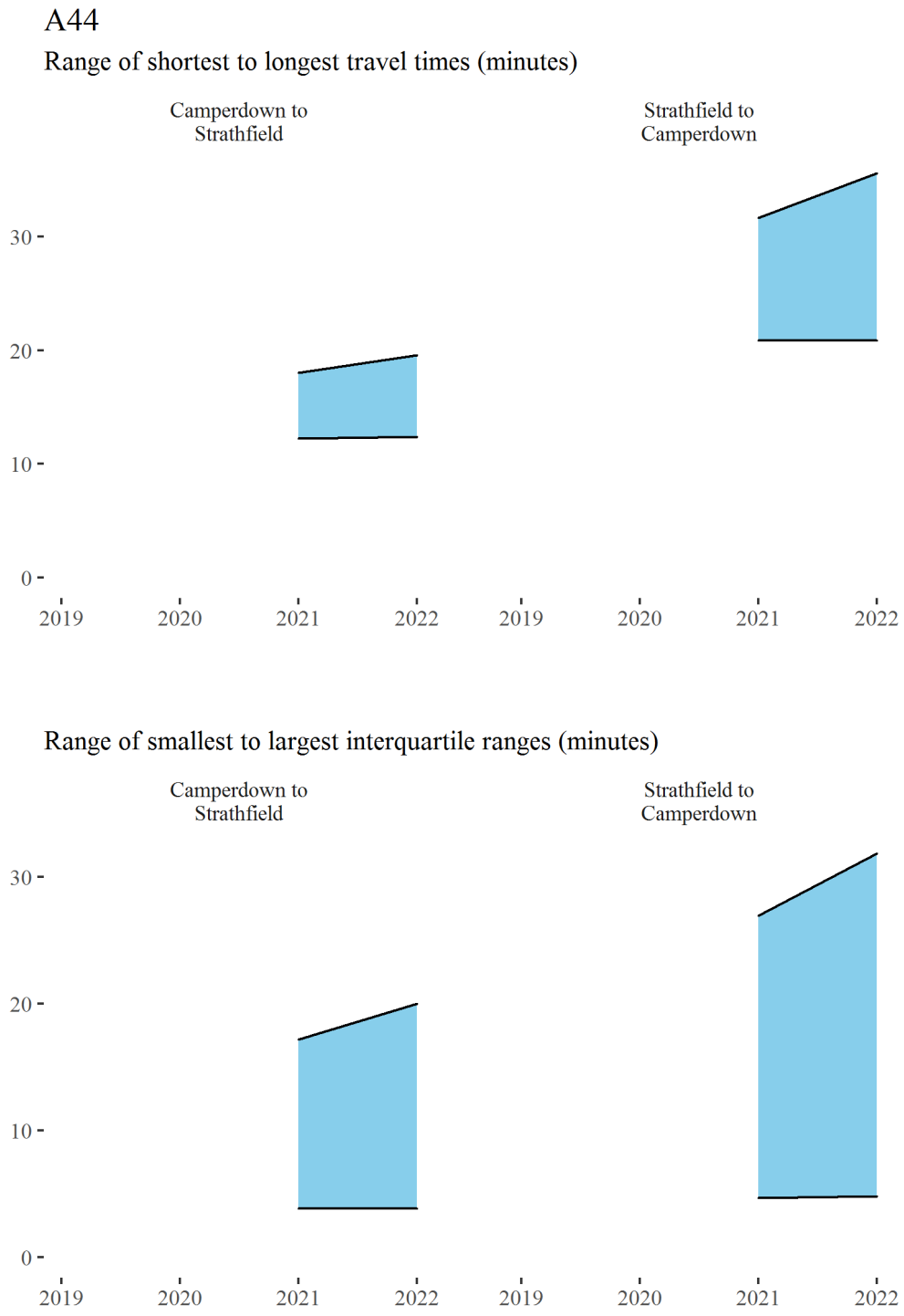
The best median travel times for journeys from Strathfield to Camperdown was approximately 11 minutes at 2am and the lowest uncertainty was at 2am with an interquartile range of just under 3 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 19 minutes and an interquartile range of approximately 16 minutes.

Figure A.56 A44 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.57 A44 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

A6 - Carlingford to Padstow / Padstow to Carlingford

This route traverses Sydney linking Carlingford and Padstow, and roughly parallels the A3 route to the west. It passes through Rydalmere, Lidcombe, Bankstown and the Chullora precinct. This route intersects with the M2, M4 and M7 motorways.

Figure A.61 A6 route map

Source: BITRE estimates.

Table A.11 A6 route travel times and congestion measures, 2022

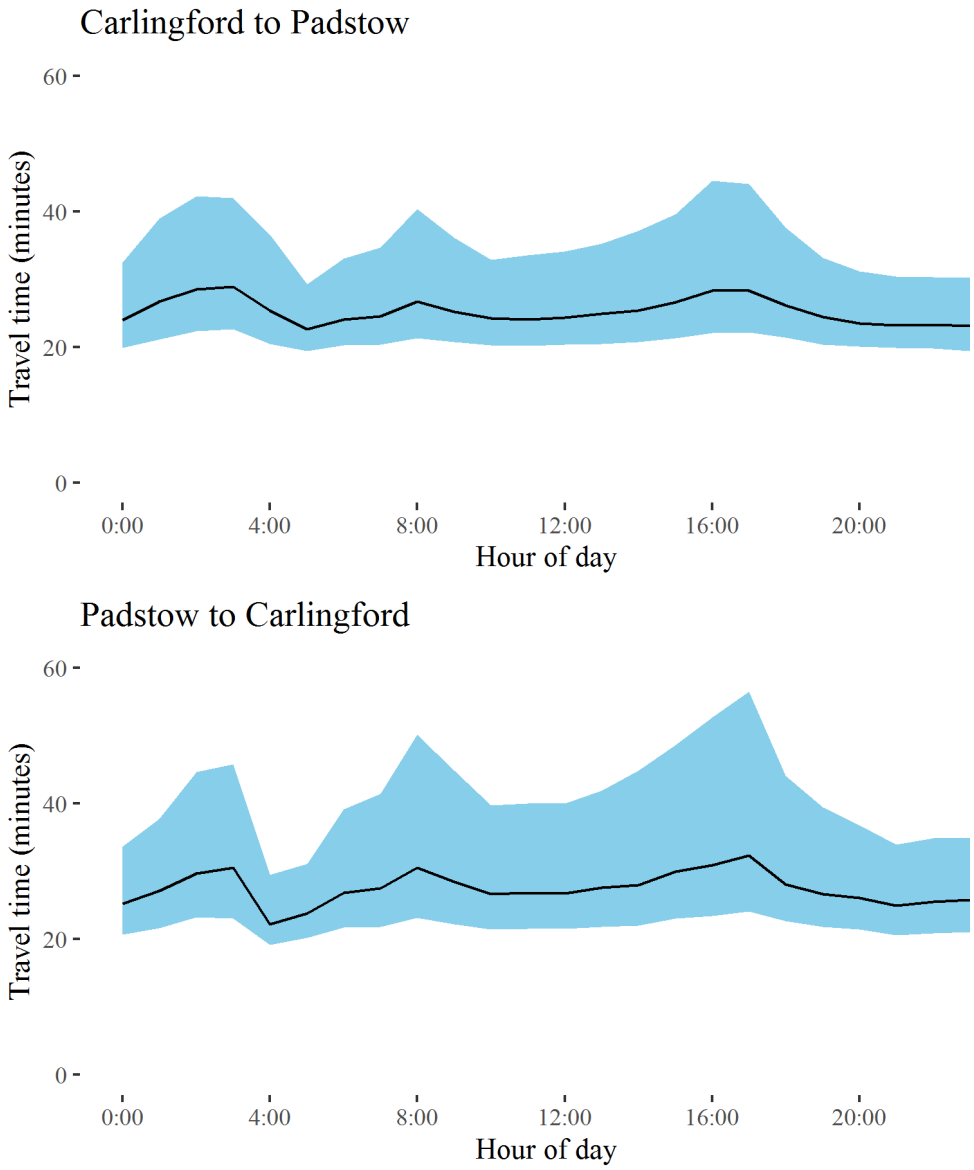
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Carlingford to Padstow	00:22:40	00:28:51	1.115	00:09:52	00:22:29	1.533	19.9
Padstow to Carlingford	00:22:14	00:32:21	1.233	00:10:23	00:32:26	1.856	20.1

Source: BITRE estimates.

The best median travel times for journeys from Carlingford to Padstow were approximately 23 minutes at 5am and the lowest uncertainty was at 5am with an interquartile range of around 10 minutes. The longest median travel times was around 29 minutes at 3am and the greatest uncertainty was at 4pm with an interquartile range of 22.5 minutes.

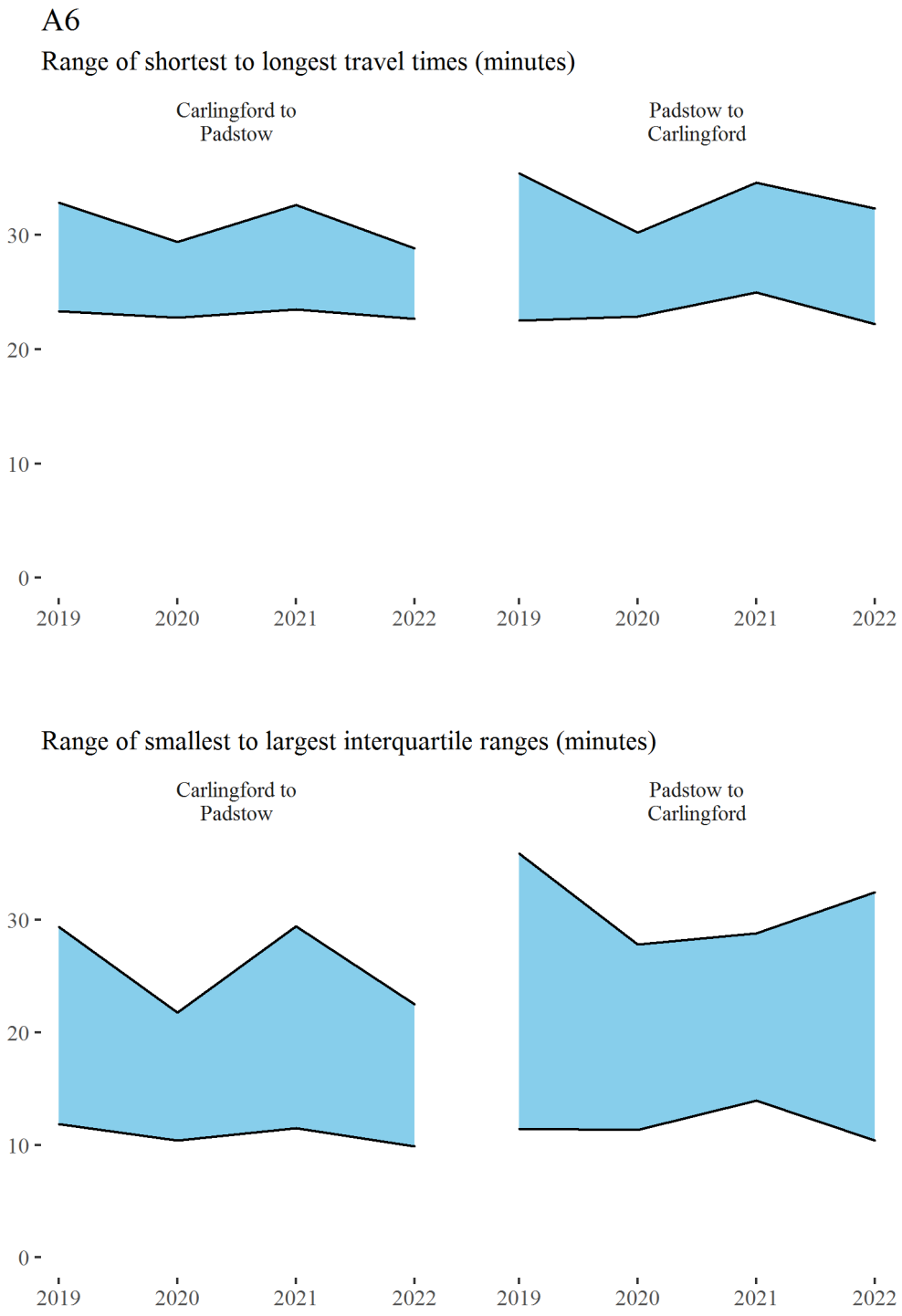
The best median travel times for journeys from Padstow to Carlingford were around 22 minutes at 4am and the lowest uncertainty was at 4am with an interquartile range of approximately 10 minutes. The longest median travel times and greatest uncertainty was at 5pm with a median of around 32 minutes and an interquartile range also around 32 minutes.

Figure A.62 A6 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.63 A6 route performance over time

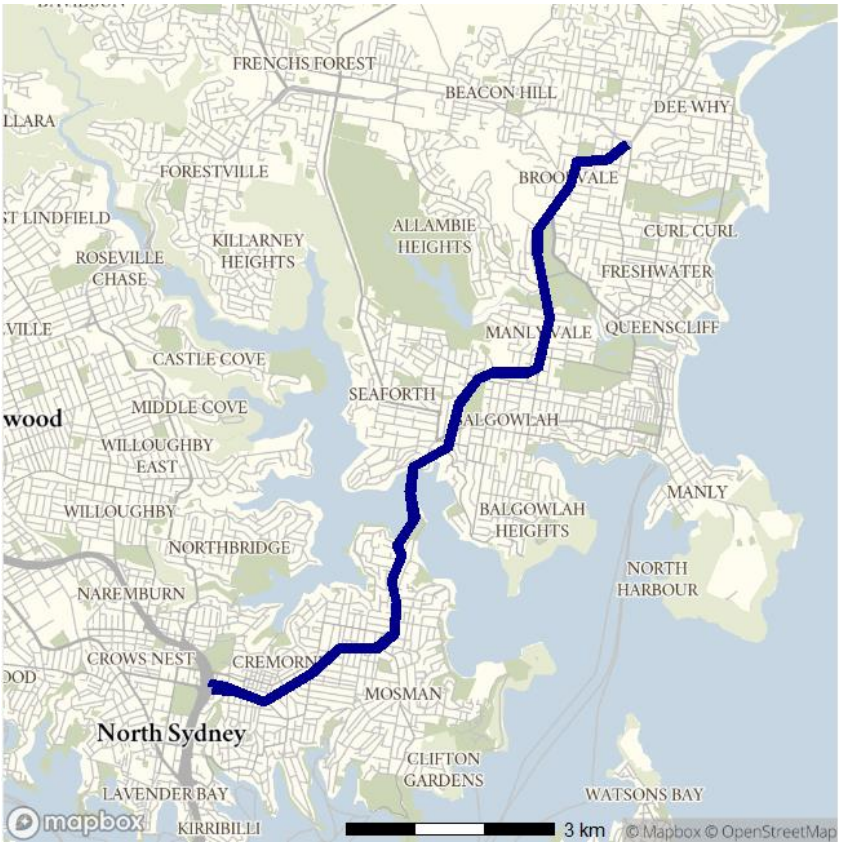


Source: BITRE estimates.

A8 - Dee Why to the M1 / M1 to Dee Why

This route connects the Northern Beaches to the Gore Hill Expressway (and the orbital network) until it meets Warringah Road (A8) at Dee Why. It serves suburbs including Neutral Bay, Balgowlah and Manly and is known by names including Military Road, Spit Road, Burnt Bridge Deviation and Condamine Street.

Figure A.67 A8 route map



Source: BITRE estimates.

Table A.12 A8 route travel times and congestion measures, 2022

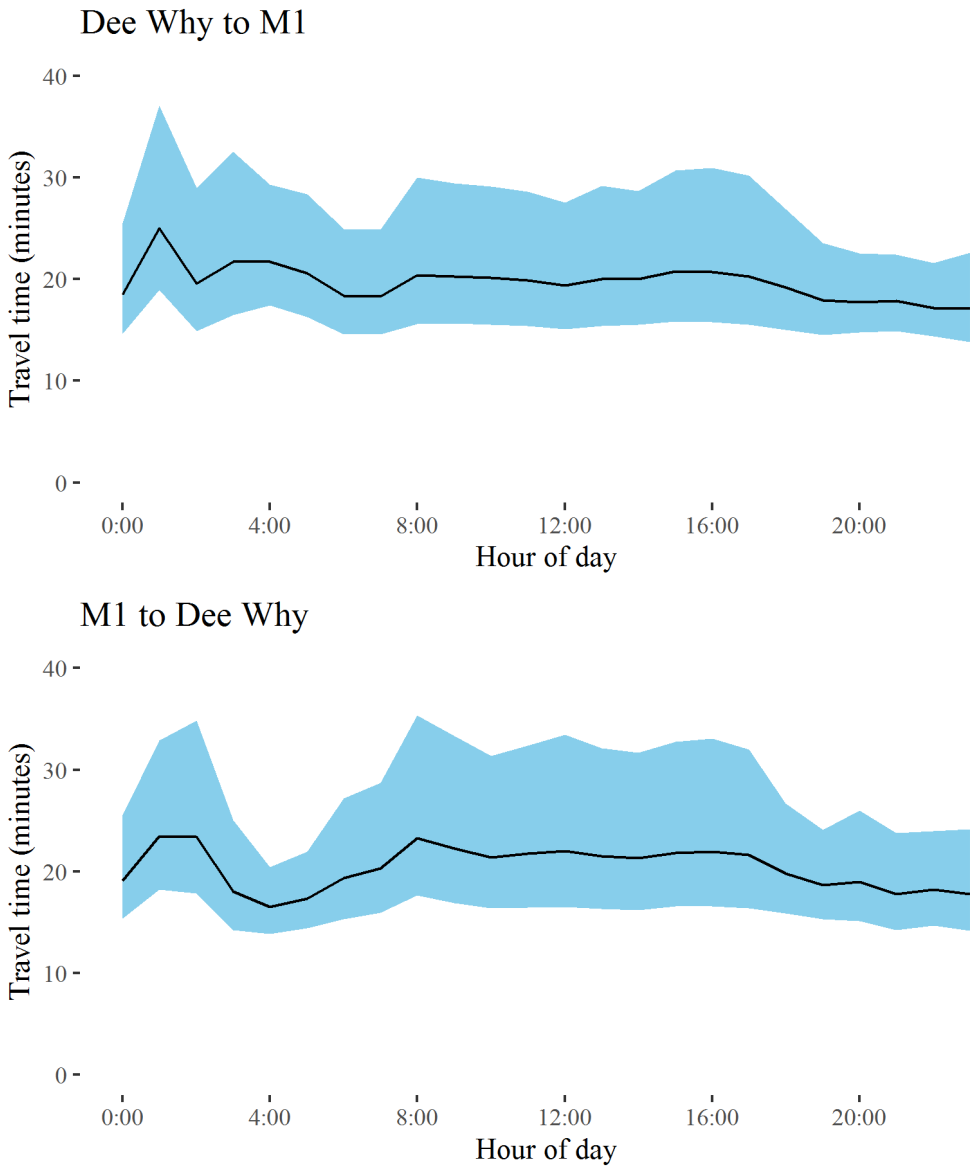
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Dee Why to M1	00:17:06	00:25:00	1.151	00:07:14	00:18:07	1.699	12.3
M1 to Dee Why	00:16:31	00:23:27	1.230	00:06:33	00:17:44	1.984	12.3

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Dee Why to the M1 were at 11pm with a median travel time of 17 minutes and an interquartile range of around 7 minutes. The longest median travel times and greatest uncertainty was at 1am with a median of 25 minutes and an interquartile range of around 18 minutes.

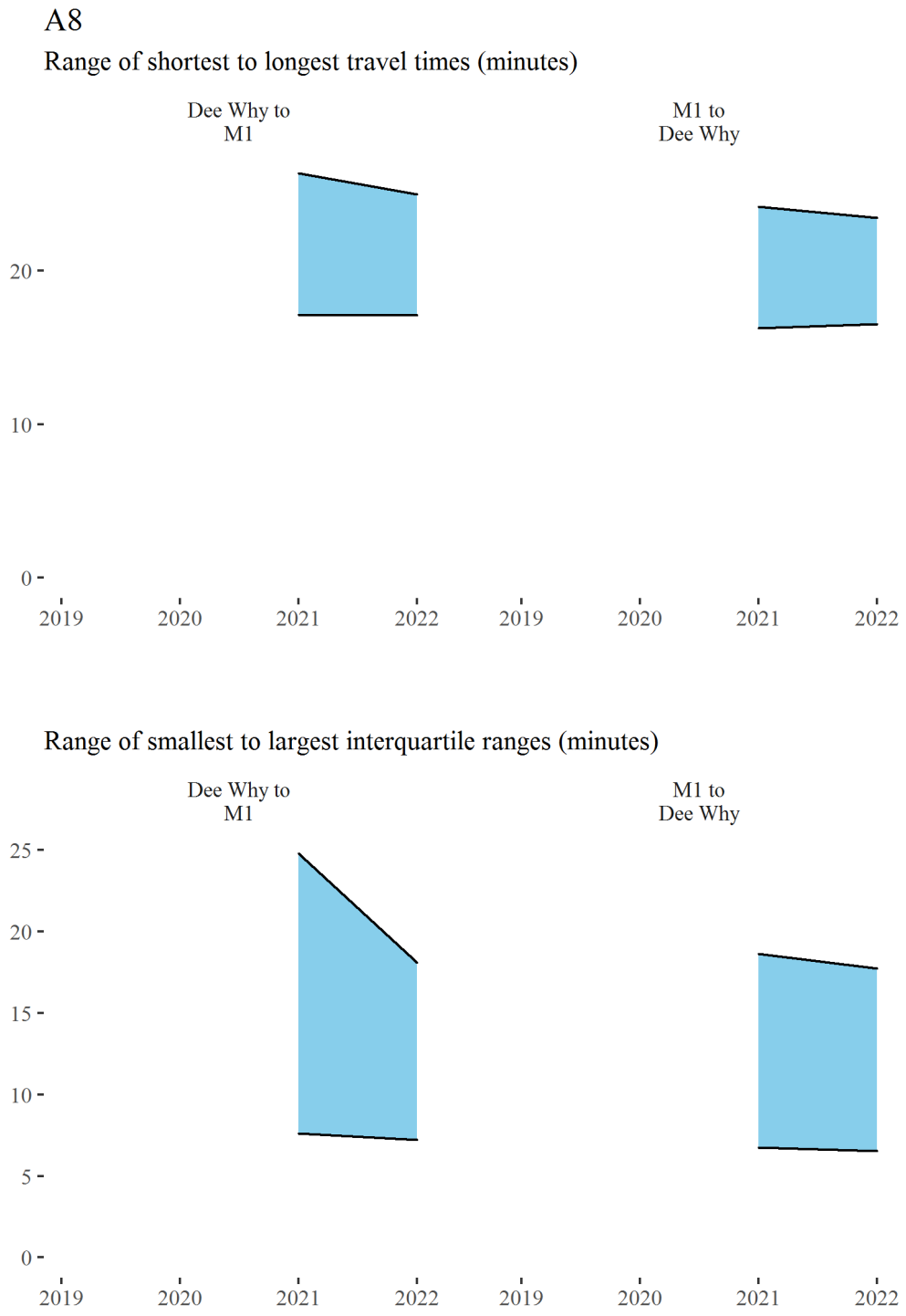
The best median travel times and lowest uncertainty for journeys from the M1 to Dee Why were at 4am with a median travel time of just under 17 minutes and an interquartile range of 6.5 minutes. The longest median travel times were at 1am with a median of 23.5 minutes and the greatest uncertainty at 8am with an interquartile range of around 18 minutes.

Figure A.68 A8 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.69 A8 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

A9 - Hume Freeway to M4 / M4 to Hume Freeway

This route skirts Western Sydney from the Hume Motorway at Mount Annan to the Great Western Highway (M4) at Glenmore Park. It serves areas adjacent to the new Western Sydney Airport precinct and is also known as the Northern Road.

Figure A.73 A9 route map

Source: BITRE estimates.

Table A.13 A9 route travel times and congestion measures, 2022

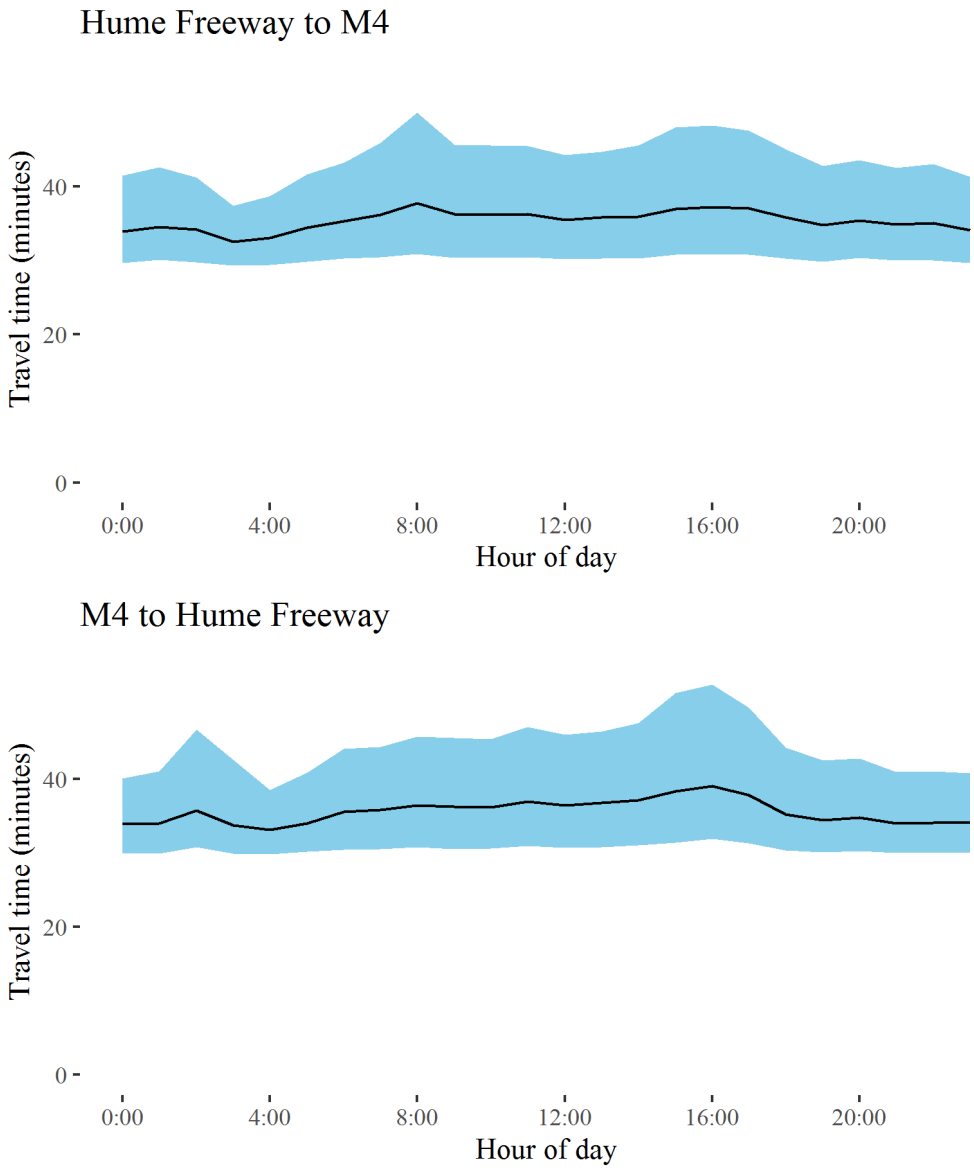
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Hume Freeway to M4	00:32:32	00:37:45	1.088	00:08:05	00:19:03	1.709	37.4
M4 to Hume Freeway	00:33:07	00:39:02	1.074	00:08:43	00:20:51	1.609	37.4

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Hume Freeway to the M4 were at 3am with a median travel time of 32.5 minutes and an interquartile range of around 8 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of around 38 minutes and an interquartile range of 19 minutes.

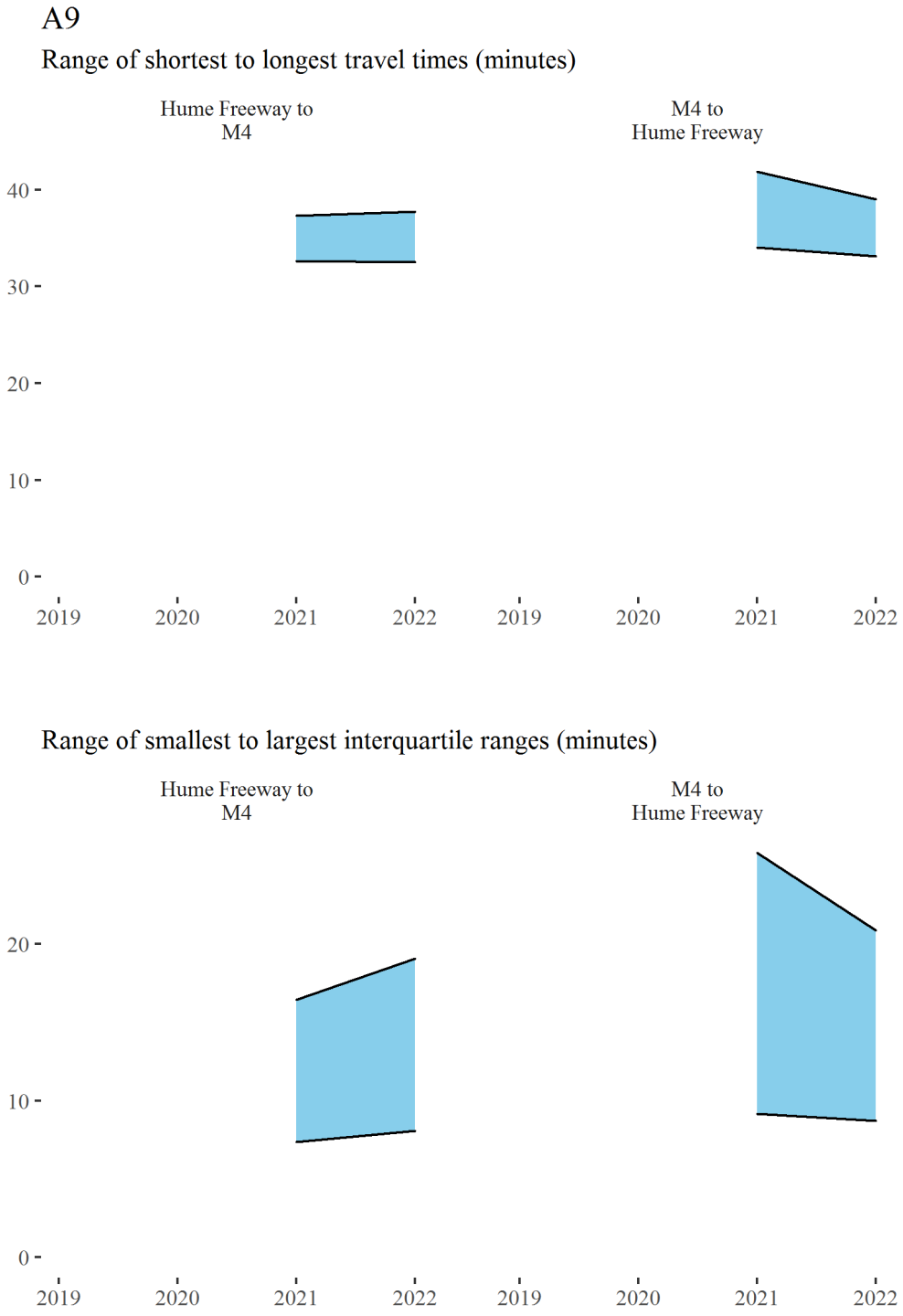
The best median travel times and least uncertainty for journeys from the M4 to Hume Freeway were at 4am with a median travel time of around 33 minutes and an interquartile range of approximately 9 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 39 minutes and an interquartile range of nearly 21 minutes.

Figure A.74 A9 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.75 A9 route performance over time

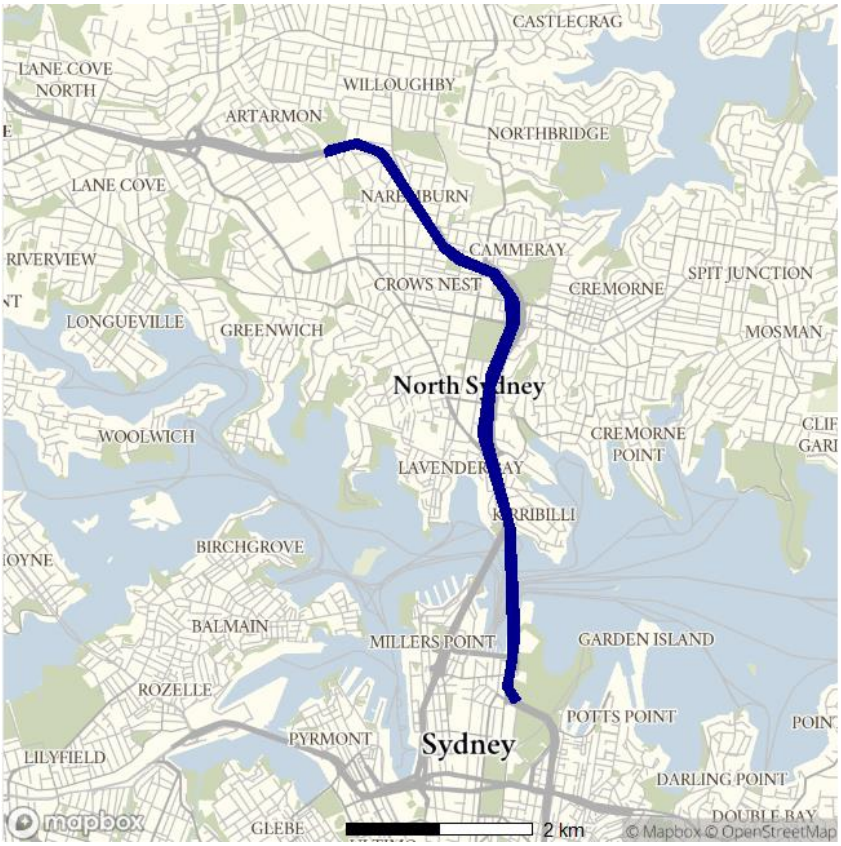


a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

M1 (North) - Cahill Expressway to M2 / M2 to Cahill Expressway

This route links the Sydney CBD to the Lane Cove Tunnel at the beginning of the M2 via the Sydney Harbour Tunnel, the Warringah Freeway and the Gore Hill Freeway. It is a major commuter route but somewhat less important for freight.

Figure A.79 M1 (North) route map



Source: BITRE estimates.

Table A.14 M1 (North) route travel times and congestion measures, 2022

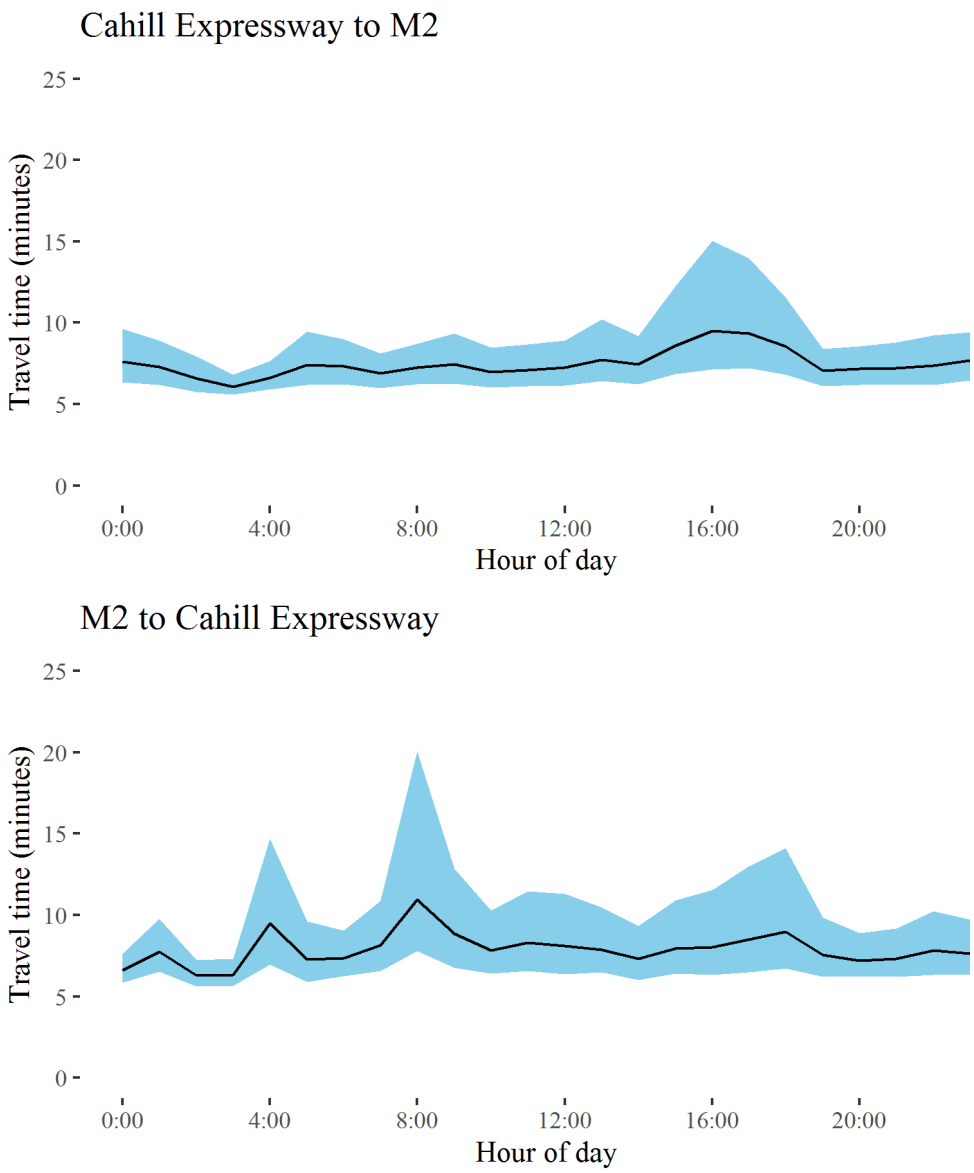
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Cahill Expressway to M2	00:06:05	00:09:29	1.230	00:01:14	00:07:53	2.620	7.3
M2 to Cahill Expressway	00:06:17	00:10:56	1.255	00:01:38	00:12:15	2.729	7.3

Source: BITRE estimates.

The best median travel times for journeys from Cahill Expressway to the M2 was around 6 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of 74 seconds. The longest median travel times and greatest uncertainty were at 4pm with a median of 9.5 minutes and an interquartile range of around 8 minutes.

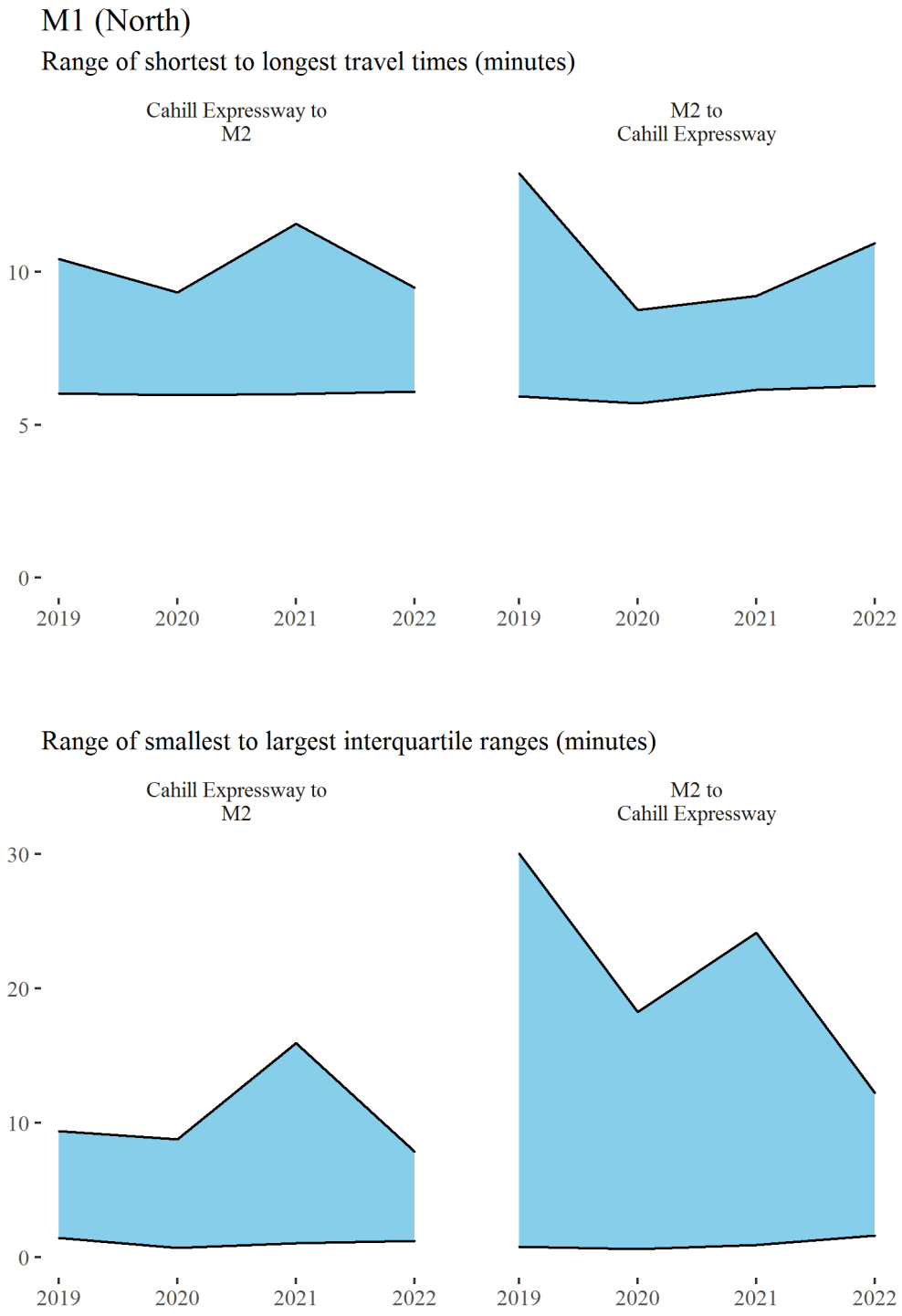
The best median travel times for journeys from M2 to Cahill Expressway was around 6 minutes at 2am and the lowest uncertainty was at 2am with an interquartile range of almost 2 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 11 minutes and an interquartile range of around 12 minutes.

Figure A.80 M1 (North) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.81 M1 (North) route performance over time

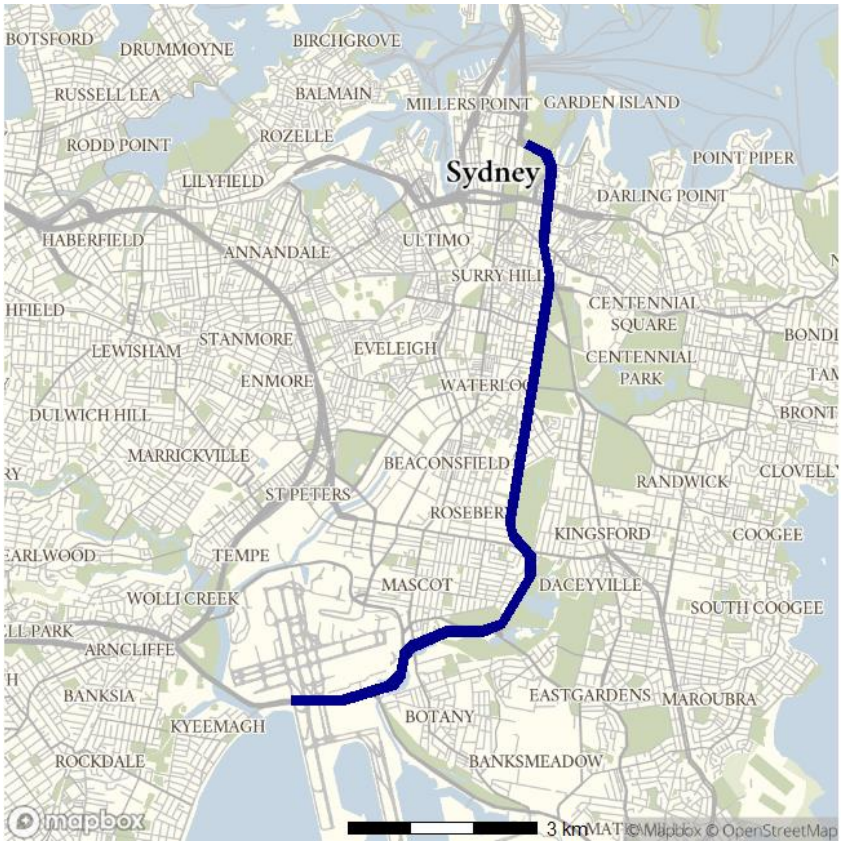


Source: BITRE estimates.

M1 (South) - Cahill Expressway to the M5 / M5 to Cahill Expressway

This route travels between the east of the Sydney CBD and the M5 near Sydney Airport via the Eastern Distributor, South Dowling Street and General Holmes Drive.

Figure A.85 M1 (South) route map



Source: BITRE estimates.

Table A.15 M1 (South) route travel times and congestion measures, 2022

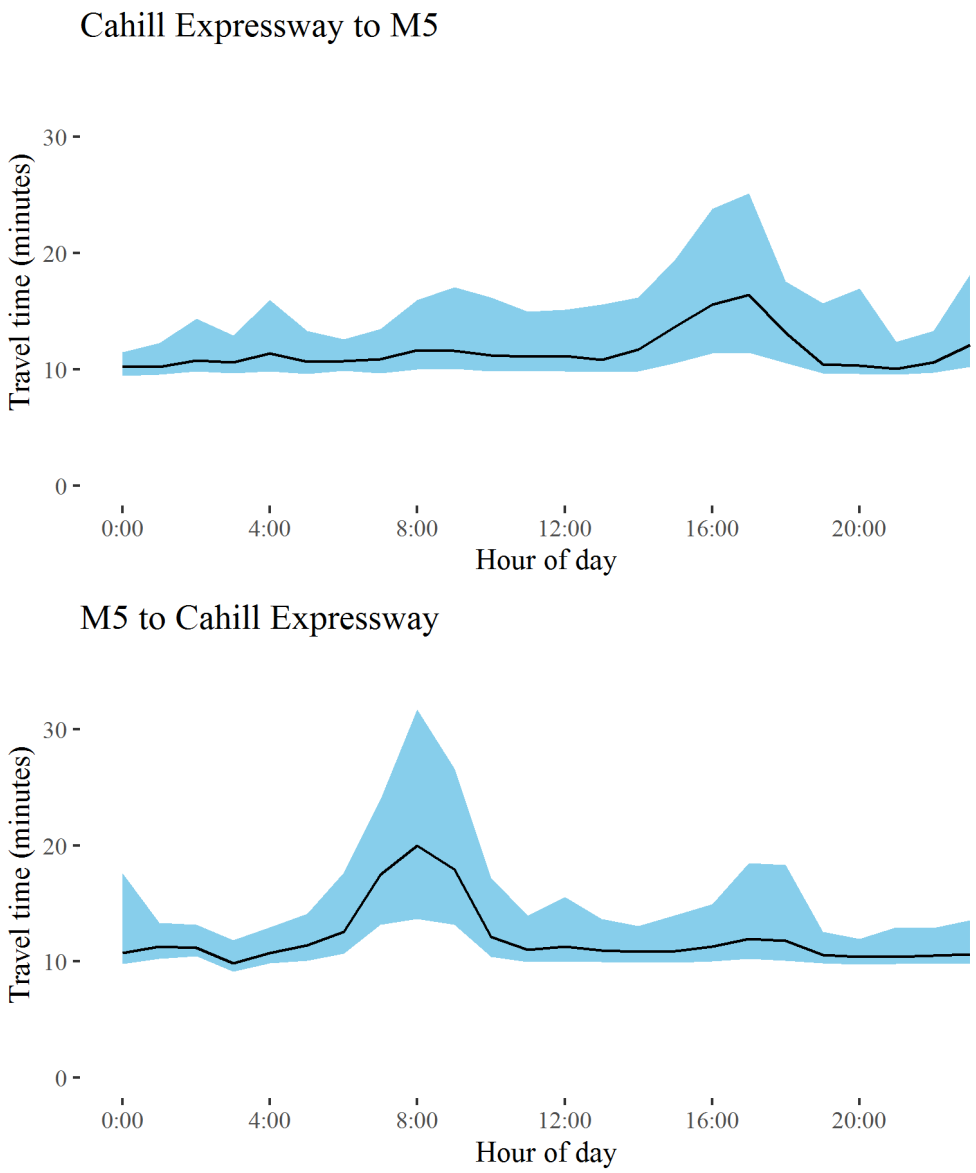
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Cahill Expressway to M5	00:10:03	00:16:25	1.148	00:02:02	00:13:42	2.879	12.1
M5 to Cahill Expressway	00:09:53	00:19:57	1.214	00:02:10	00:18:02	2.632	12.0

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Cahill Expressway to M5 were at 9pm with a median travel time of 10 minutes and an interquartile range of 2 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of around 16 minutes and an interquartile range of just under 14 minutes.

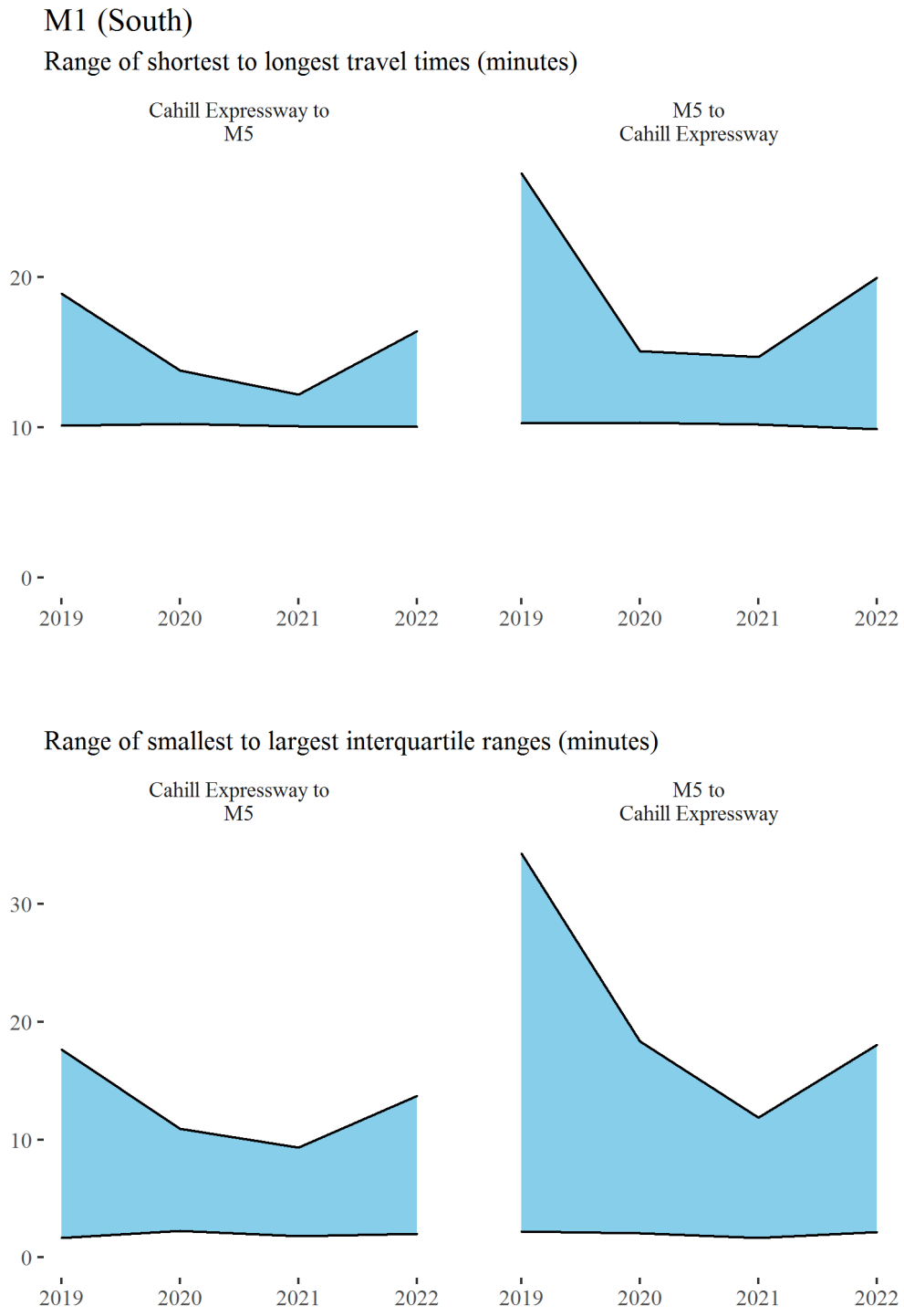
The best travel times and lowest uncertainty travelling from M5 to Cahill Expressway were at 3am and 8pm with a median travel time of around 10 minutes and an interquartile range of 2 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 20 minutes and an interquartile range of 18 minutes.

Figure A.86 M1 (South) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.87 M1 (South) route performance over time

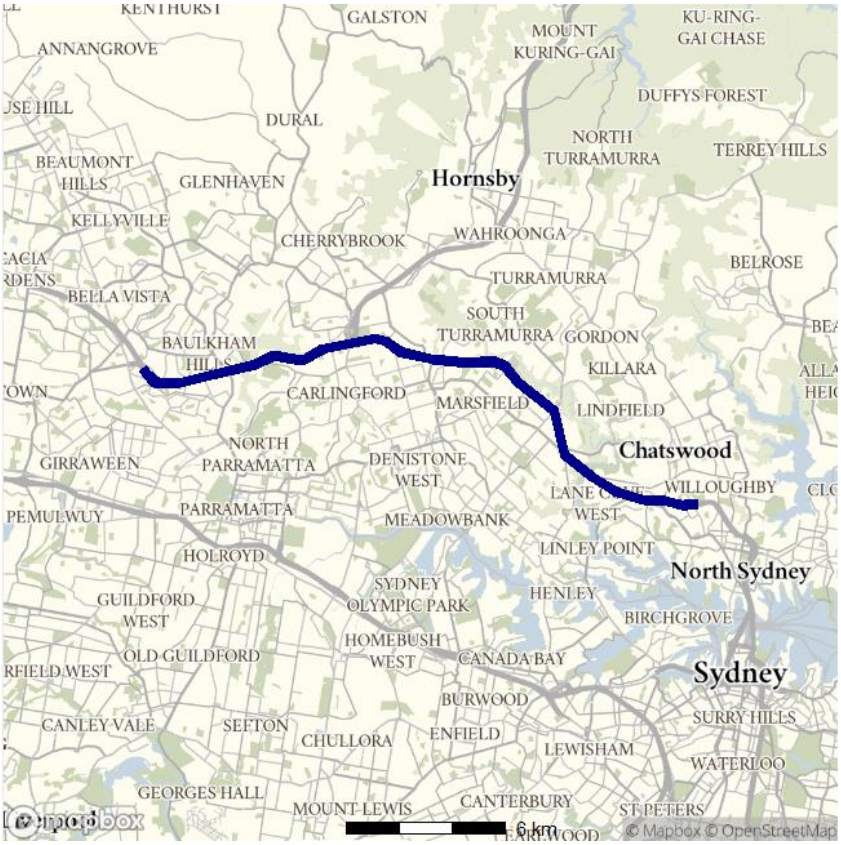


Source: BITRE estimates.

M2 - M1 to M7 / M7 to M1

This route runs between the Hills District and Lane Cove connecting the M7 and M1 via the M2 motorway and the Lane Cove Tunnel. It is an important route for both commuter and freight traffic.

Figure A.91 M2 route map



Source: BITRE estimates.

Table A.16 M2 route travel times and congestion measures, 2022

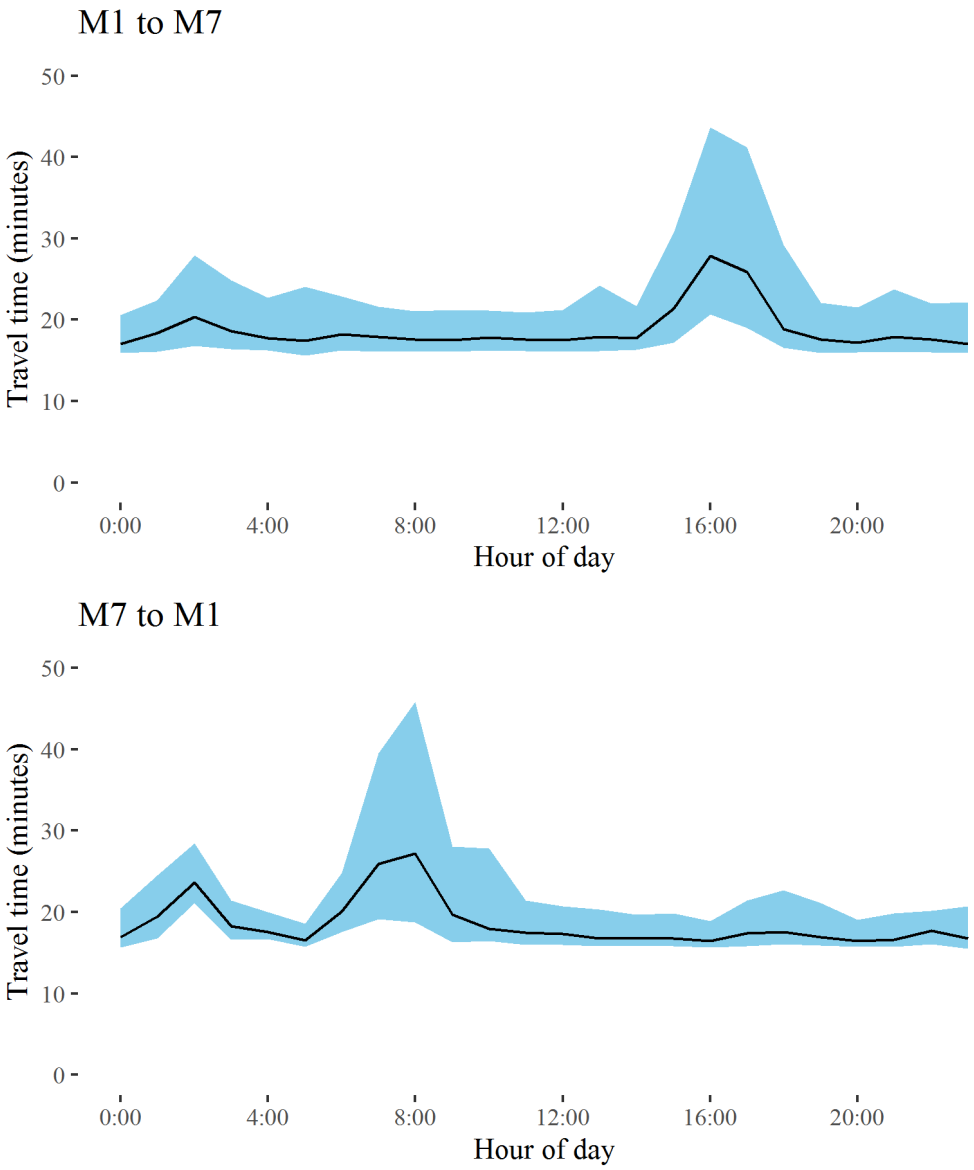
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
M1 to M7	00:17:00	00:27:52	1.104	00:04:44	00:22:59	1.751	24.5
M7 to M1	00:16:26	00:27:13	1.125	00:02:50	00:27:03	2.485	24.3

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the M1 to the M7 were at 11pm with a median travel time of 17 minutes and an interquartile range of just under 5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 28 minutes and an interquartile range of 23 minutes.

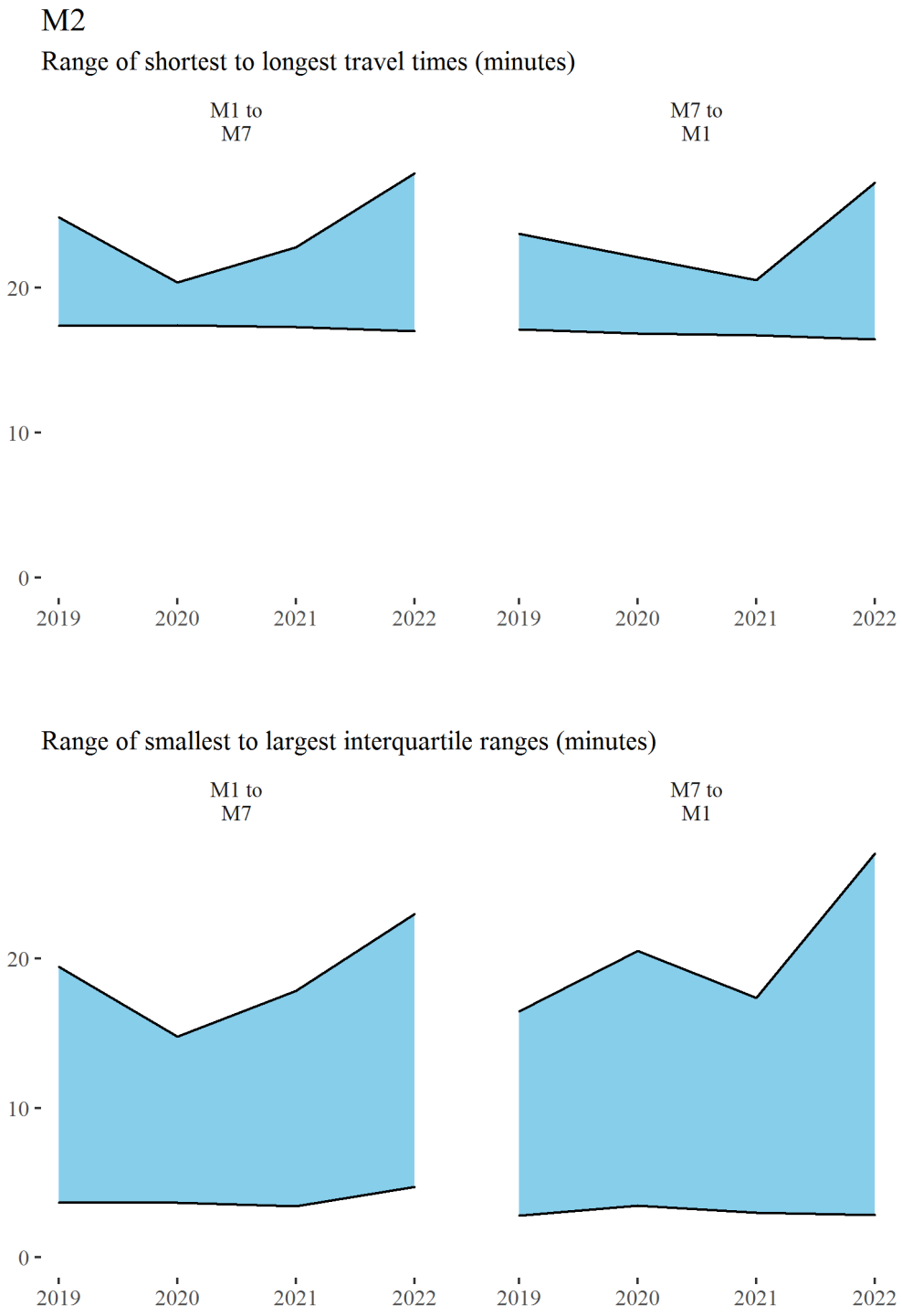
The best median travel times and least uncertainty for journeys from the M7 to the M1 were at 4pm with a median travel time of around 16 minutes and an interquartile range of almost 3 minutes. The longest median travel times and greatest uncertainty were at 8am with a median around 27 minutes and an interquartile range also around 27 minutes.

Figure A.92 M2 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.93 M2 route performance over time



Source: BITRE estimates.

M4 - Glenbrook to Strathfield / Strathfield to Glenbrook

This route connects the A32 at Glenbrook with the former terminus of the M4 at Strathfield. It intersects with several north–south routes presented in this report, including the M7, A28 and A6. It does not incorporate Parramatta Road or the City West Link, nor the M4 East tunnel that opened in July 2020.

Figure A.97 M4 route map

Source: BITRE estimates.

Table A.17 M4 route travel times and congestion measures, 2022

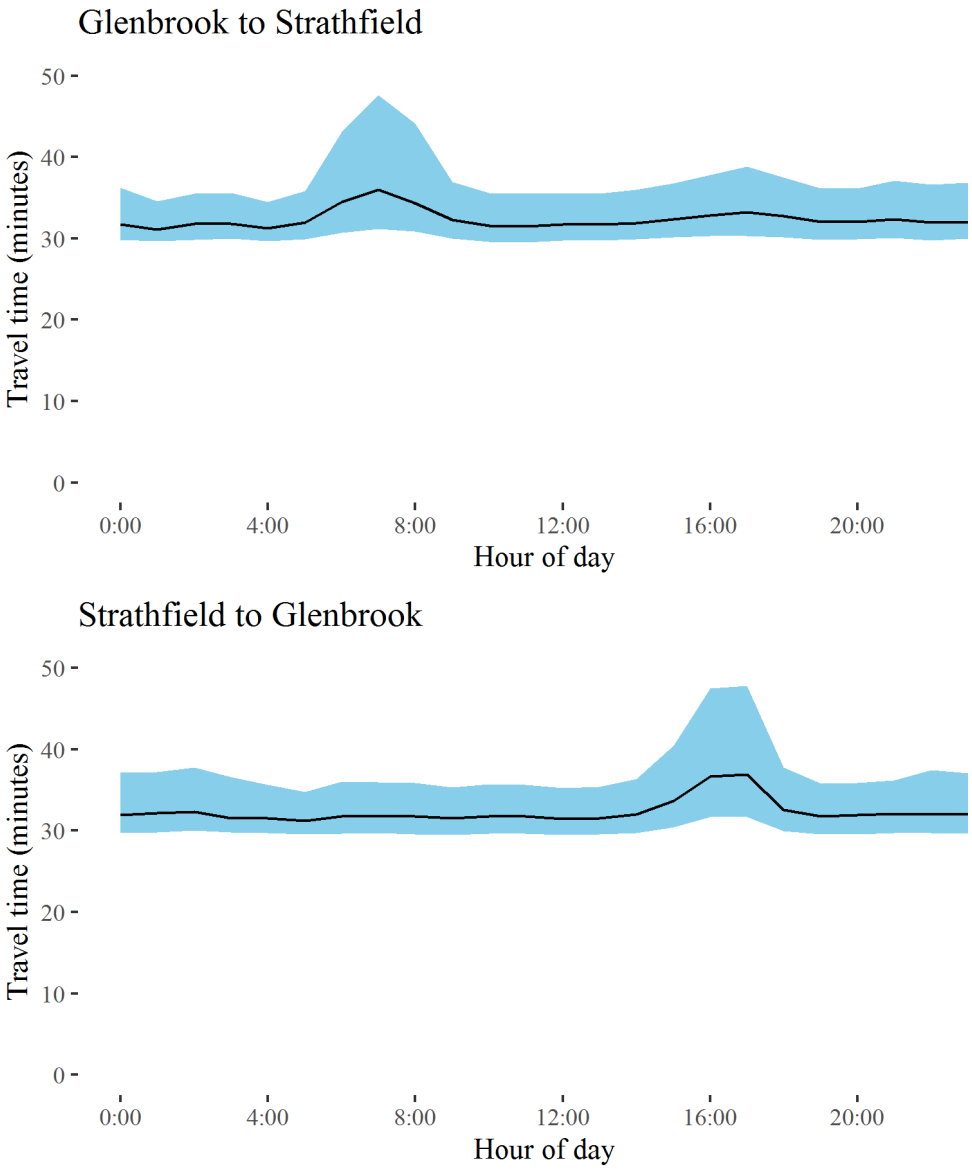
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Glenbrook to Strathfield	00:31:08	00:35:59	1.040	00:04:51	00:16:27	1.507	45.8
Strathfield to Glenbrook	00:31:12	00:36:56	1.036	00:05:12	00:16:07	1.443	45.8

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Glenbrook to Strathfield were at 1am and 4am with a median travel time of around 31 minutes and an interquartile range of just under 5 minutes, respectively. The longest median travel times and greatest uncertainty were at 7am with a median of 36 minutes and an interquartile range of 16.5 minutes.

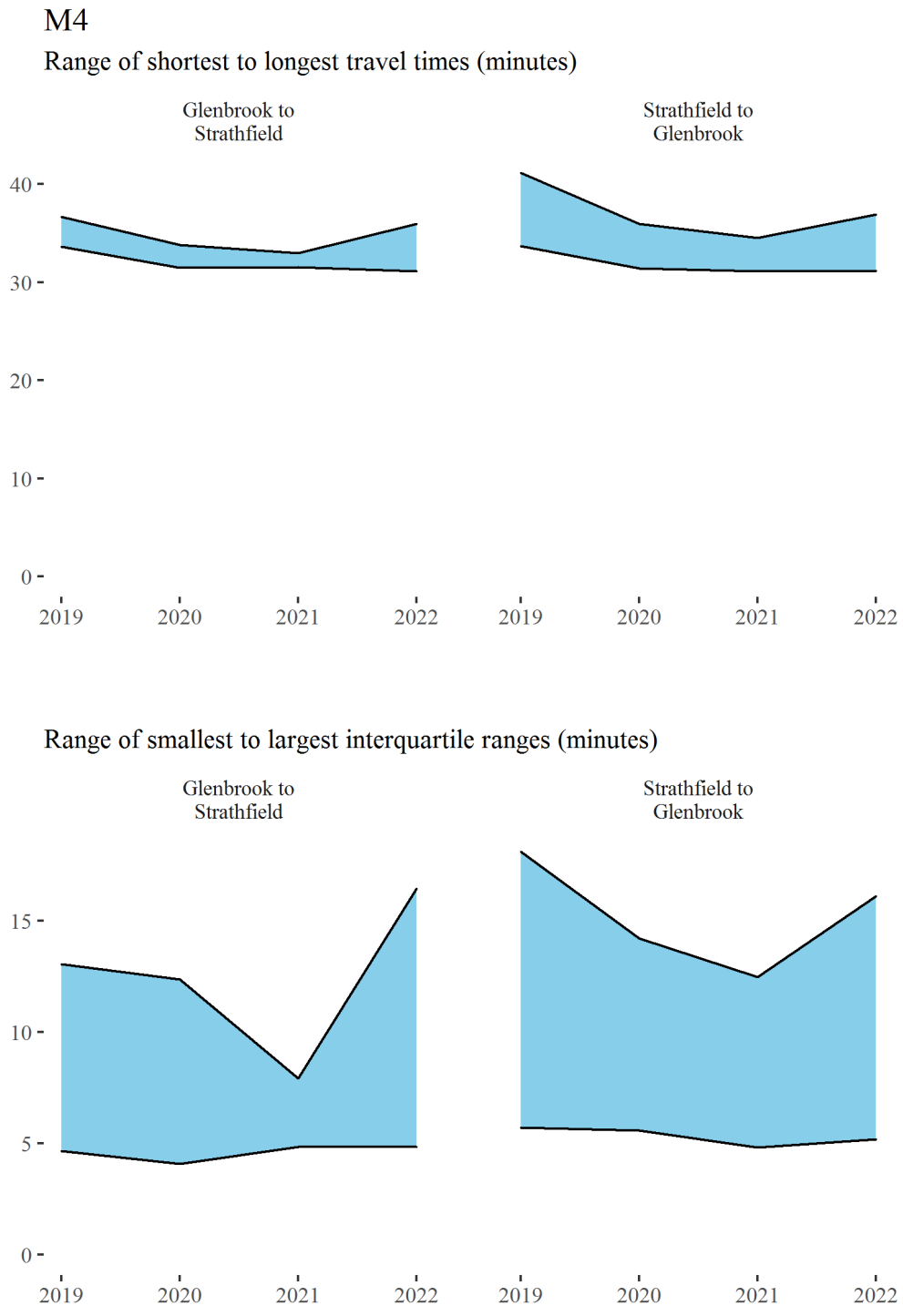
The best median travel times for journeys from Strathfield to Glenbrook was approximately 31 minutes at 5am and the lowest uncertainty was at 5am with an interquartile range of around 5 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of 37 minutes and an interquartile range of 16 minutes.

Figure A.98 M4 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.99 M4 route performance over time

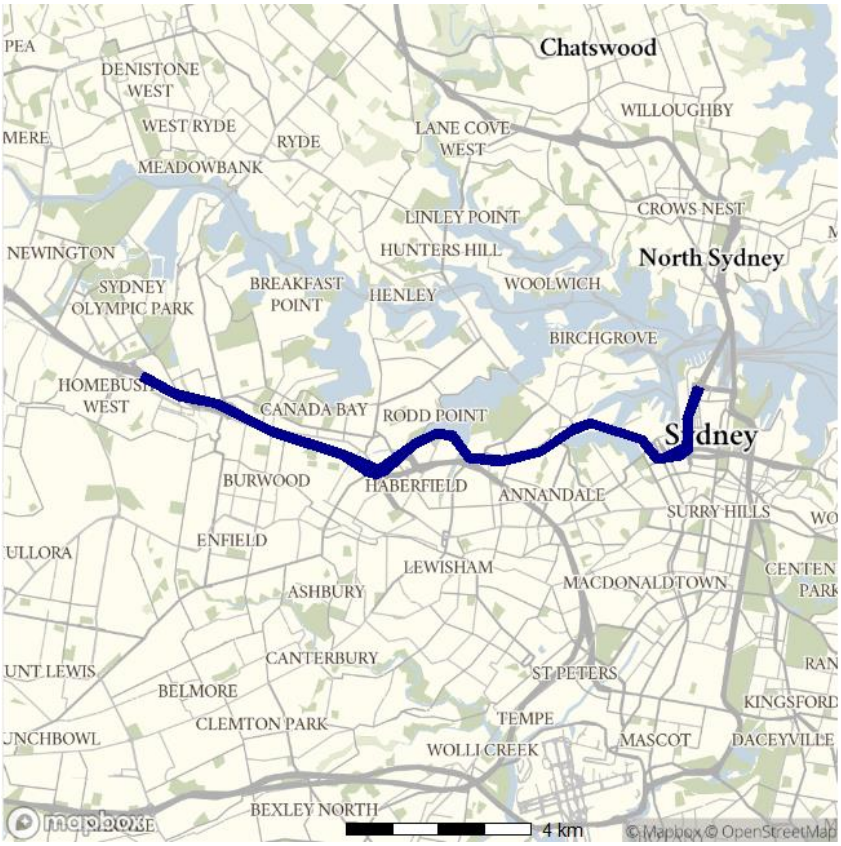


Source: BITRE estimates.

M4 (East)-A4 - Cahill Expressway to Strathfield / Strathfield to Cahill Expressway

This route follows the M4 tunnel from the former terminus of the M4 Motorway at Strathfield to Ashfield and then the A4 (also known as the City West Link) to the Cahill Expressway near the Sydney CBD. It extends the M4 route with new road sections built since 2019 and has been included here as a separate route so data remains consistent.

Figure A.103 M4 (East)-A4 route map



Source: BITRE estimates.

Table A.18 M4 (East)-A4 route travel times and congestion measures, 2022

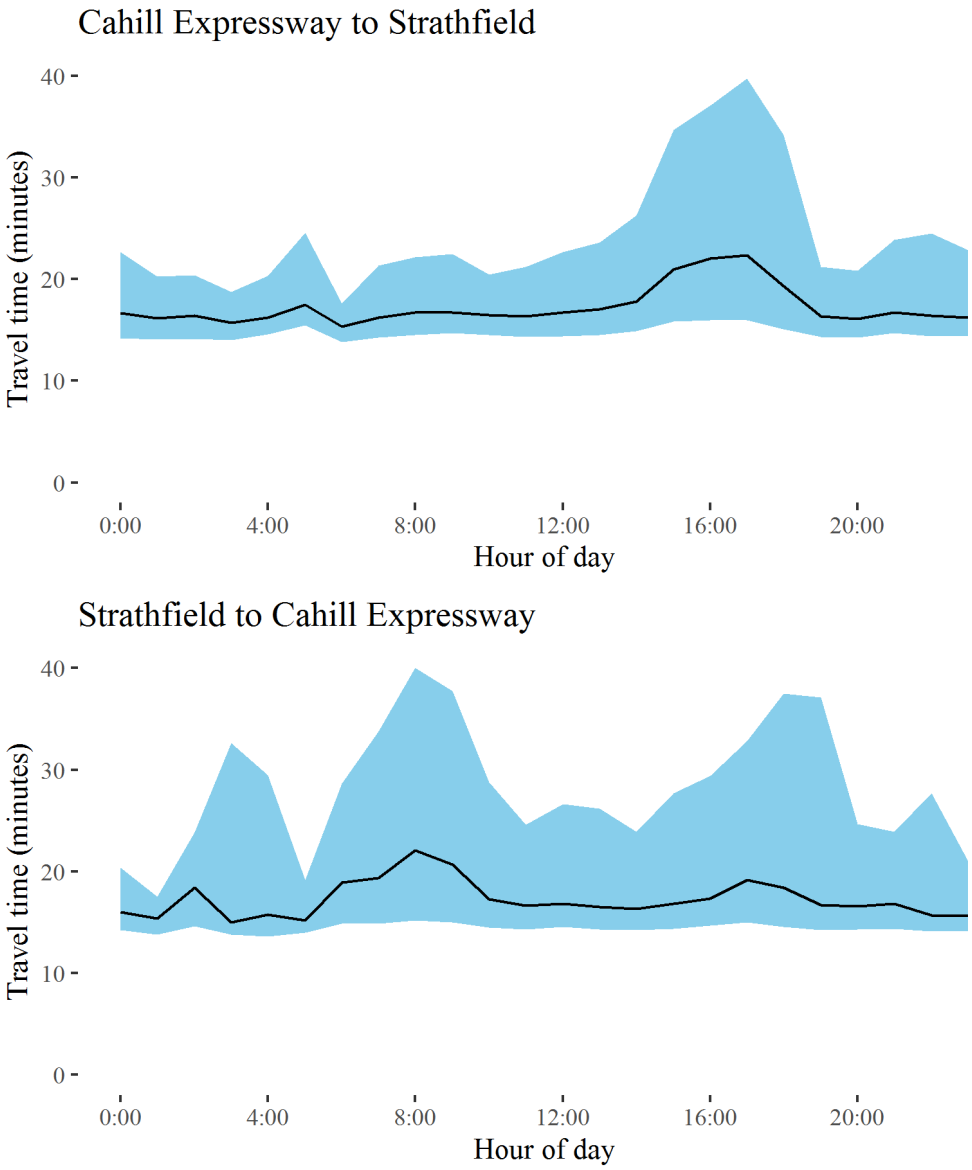
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Cahill Expressway to Strathfield	00:15:21	00:22:22	1.125	00:03:46	00:23:47	2.569	14.8
Strathfield to Cahill Expressway	00:15:00	00:22:04	1.149	00:03:42	00:24:48	3.710	14.6

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Cahill Expressway to Strathfield were at 6am with a median travel time of around 15 minutes and an interquartile range of around 4 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of just over 22 minutes and an interquartile range of around 24 minutes.

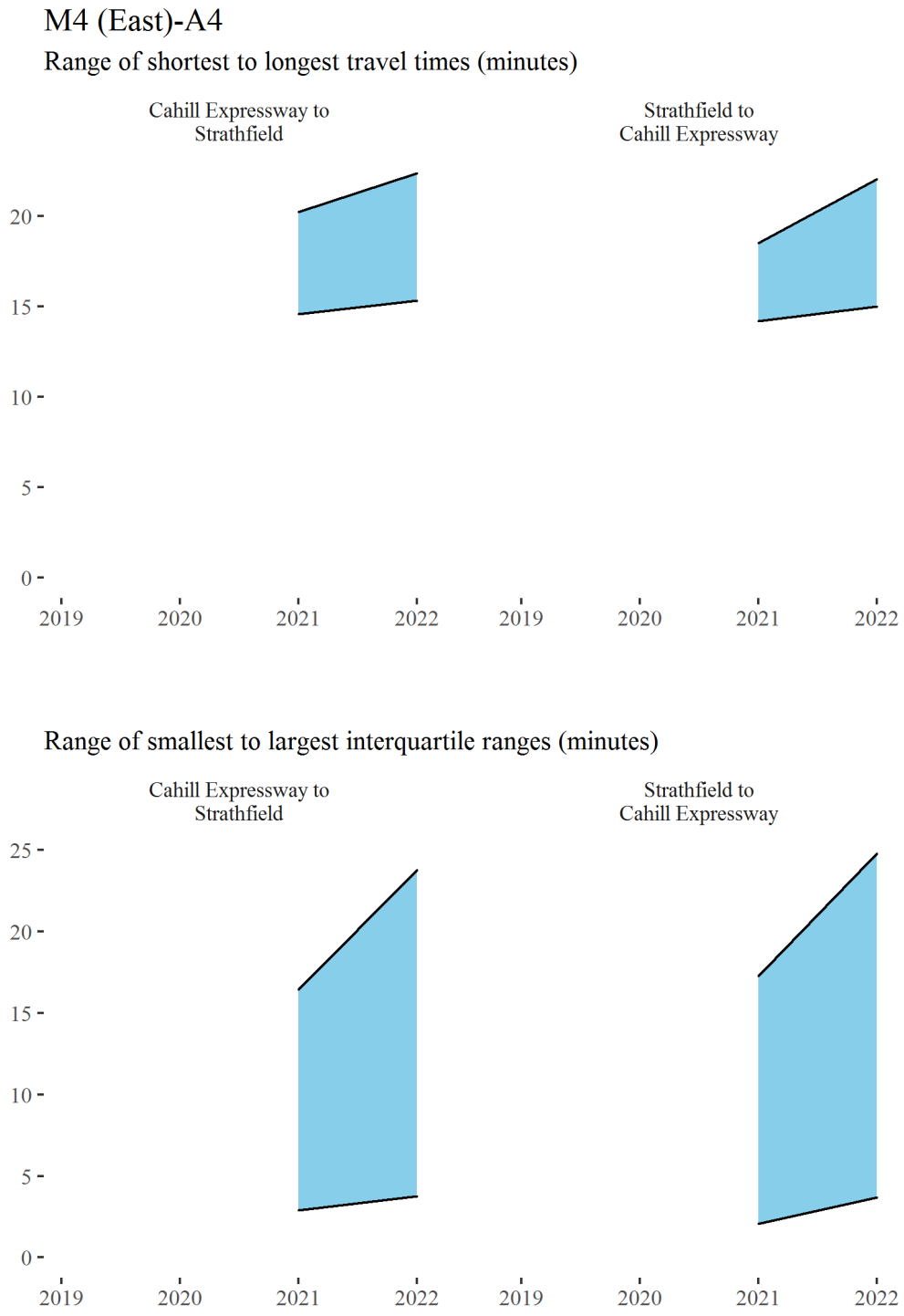
The best travel times and lowest uncertainty travelling from Strathfield to the Cahill Expressway were at 3am and 1am with a median travel time of 15 minutes and an interquartile range of around 4 minutes, respectively. The longest median travel times and greatest uncertainty were at 8am with a median of 22 minutes and an interquartile range of around 25 minutes.

Figure A.104 M4 (East)-A4 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.105 M4 (East)-A4 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

M5 - Hume Motorway to M1 / M1 to Hume Motorway

This route follows the M5 Motorway between the Hume Motorway at Casula and the M1 at General Holmes Drive. It is a major commuter route and also services freight traffic in areas around the Airport and Port Botany.

Figure A.109 M5 route map

Source: BITRE estimates.

Table A.19 M5 route travel times and congestion measures, 2022

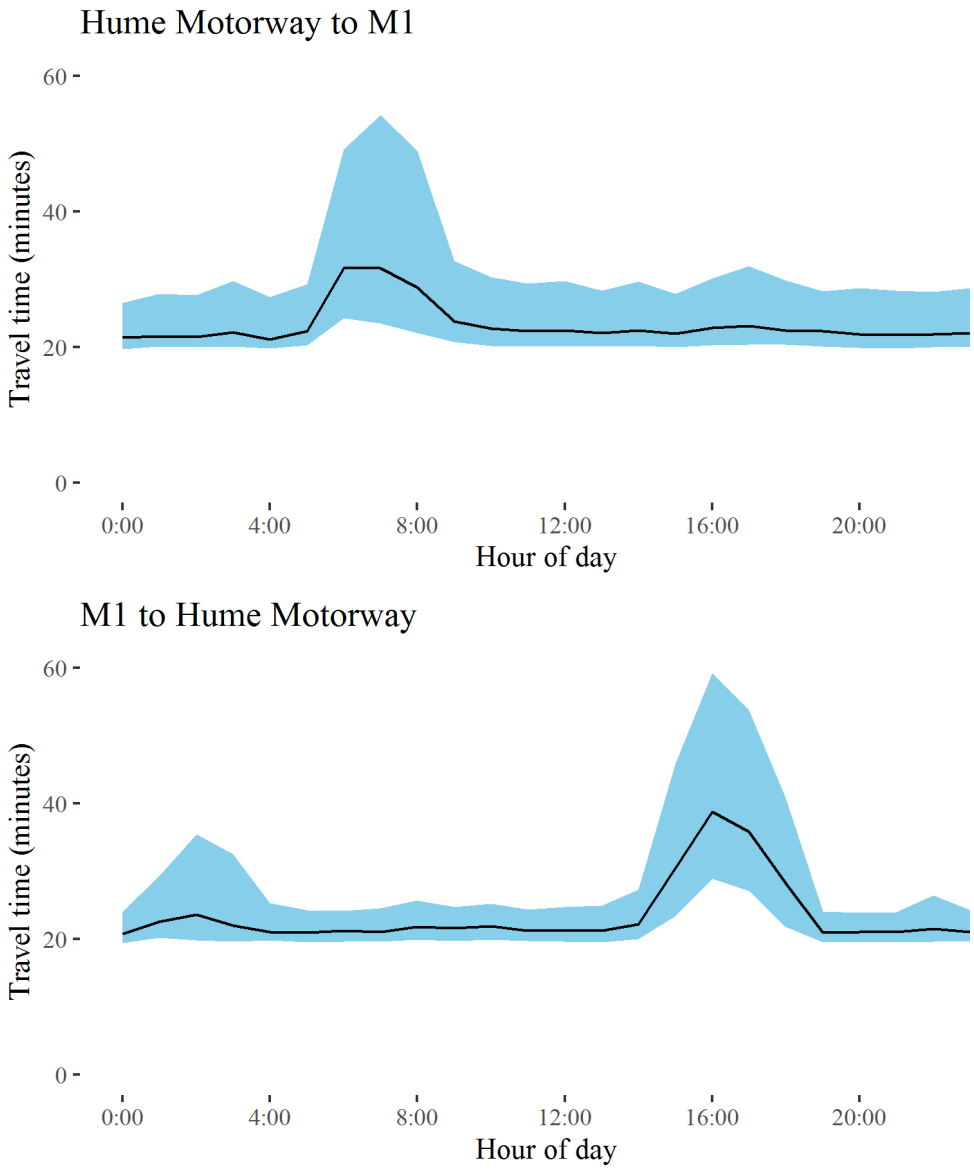
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Hume Motorway to M1	00:21:07	00:31:39	1.101	00:06:47	00:30:41	1.663	29.4
M1 to Hume Motorway	00:20:48	00:38:50	1.130	00:04:22	00:30:20	2.140	29.3

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the Hume Motorway to the M1 were at 4am with a median travel time of around 21 minutes and an interquartile range of just under 7 minutes. The longest median travel times were at 6am with a median of around 32 minutes and the greatest uncertainty at 7am with an interquartile range of approximately 31 minutes.

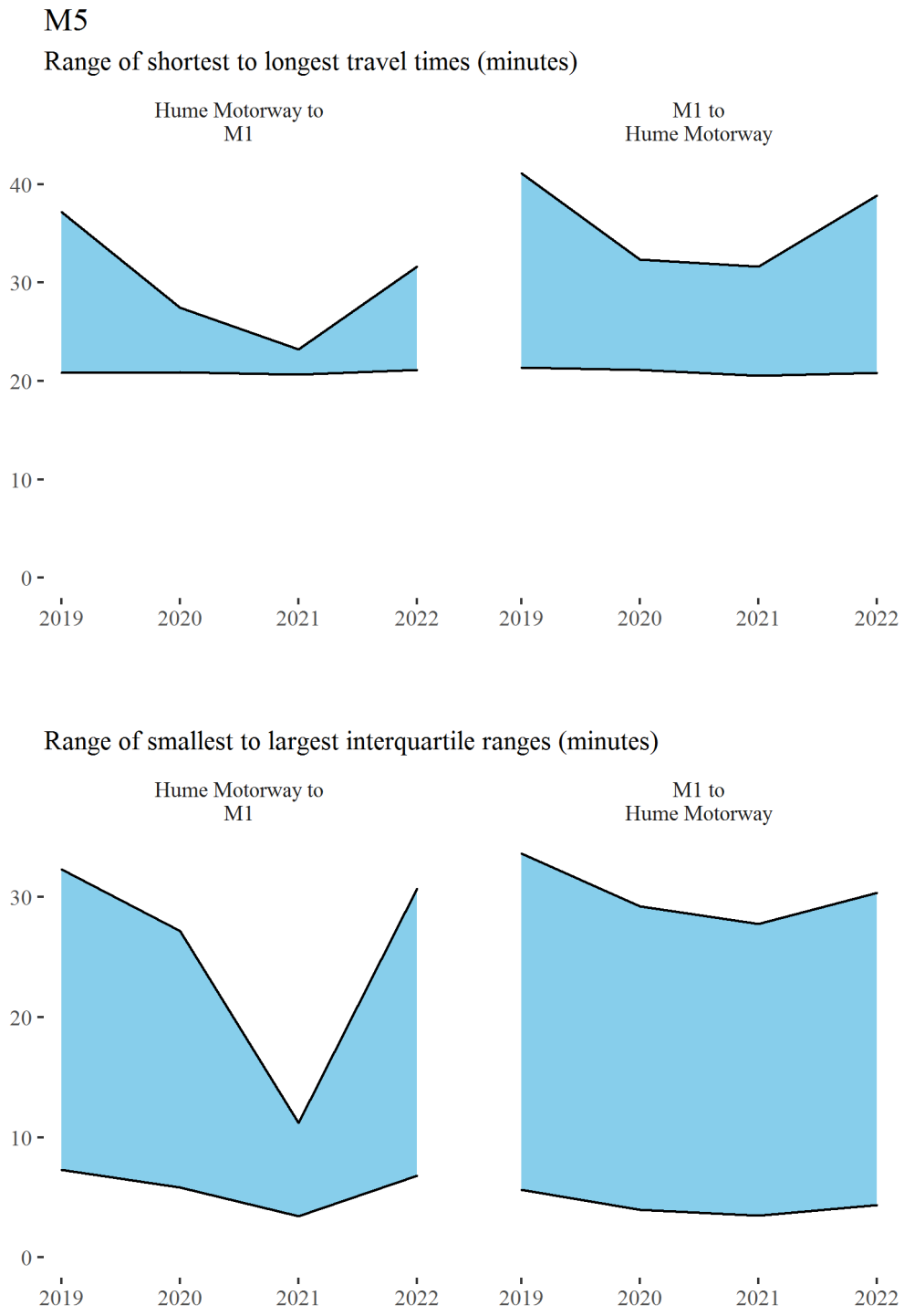
The best median travel times and lowest uncertainty for journeys from the M1 to the Hume Motorway were at midnight with a median travel time of around 21 minutes and an interquartile range of around 4 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 39 minutes and an interquartile range of around 30 minutes.

Figure A.110 M5 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.111 M5 route performance over time



Source: BITRE estimates.

M7 - M2 to M5 / M5 to M2

This route follows the M7 Motorway between its confluence with the M2 in the Hills District and the Hume Motorway at Casula, skirting much of Western Sydney and crossing the M4 Motorway. It is a major route for intercity freight including trips that do not start or end in Sydney.

Figure A.115 M7 route map

Source: BITRE estimates.

Table A.20 M7 route travel times and congestion measures, 2022

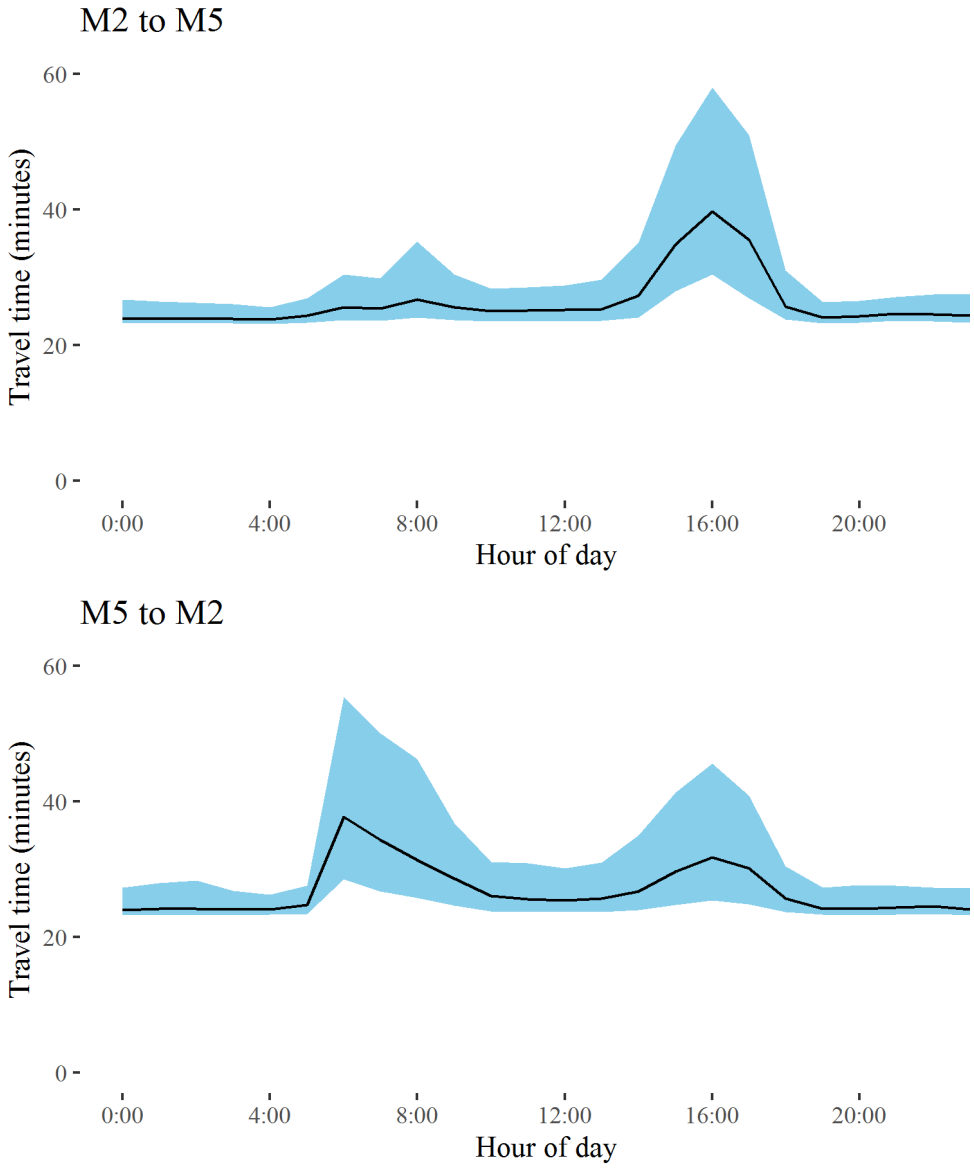
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
M2 to M5	00:23:44	00:39:40	1.109	00:02:28	00:27:39	3.055	38.4
M5 to M2	00:24:01	00:37:43	1.121	00:02:55	00:26:57	3.239	38.5

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from the M2 to the M5 were at 4am with a median travel time of approximately 24 minutes and an interquartile range of 2.5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 40 minutes and an interquartile range of just under 28 minutes.

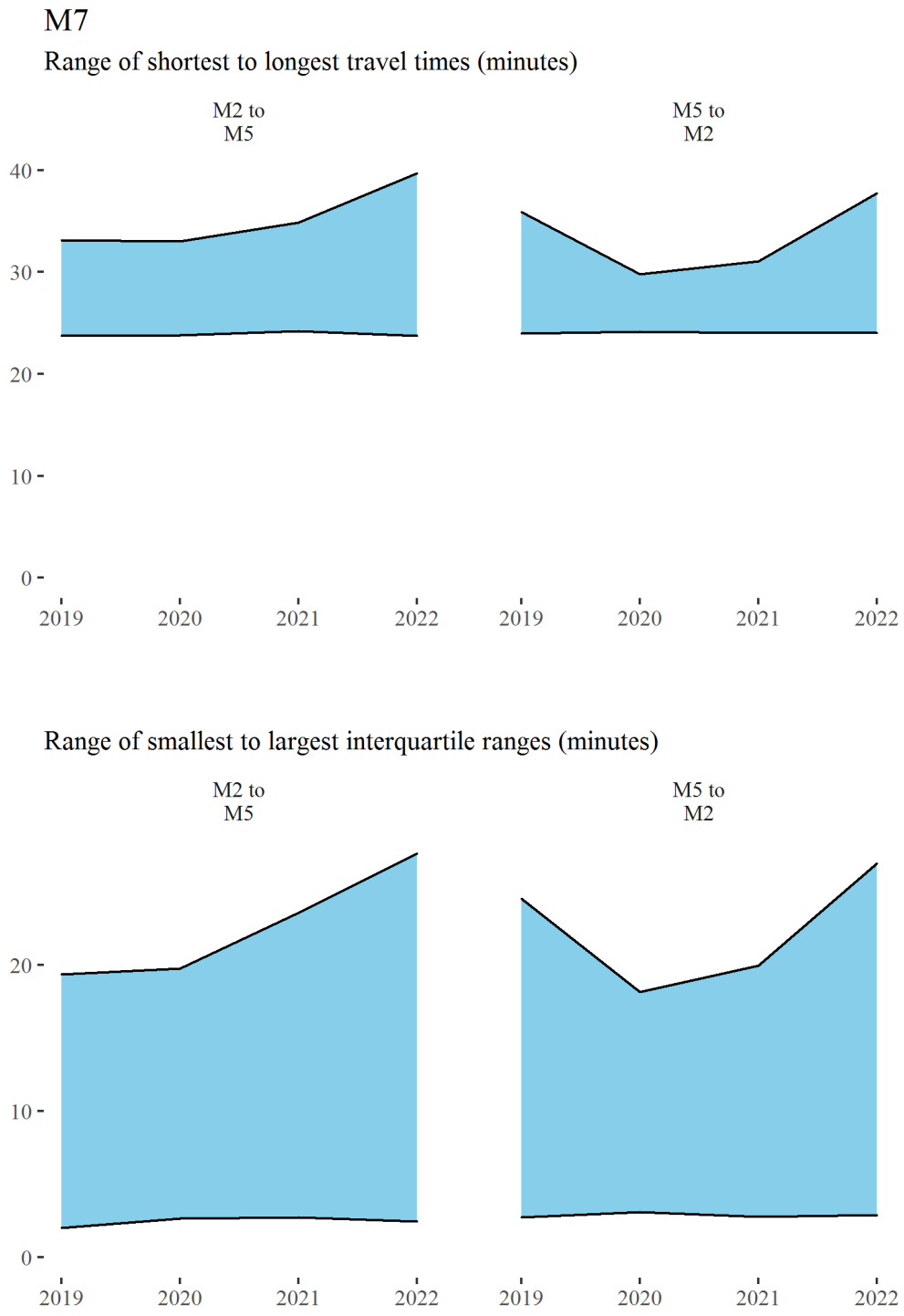
The best median travel times and least uncertainty for journeys from the M5 to the M2 were at midnight with a median travel time of 24 minutes and an interquartile range of around 3 minutes. The longest median travel times and greatest uncertainty were at 6am with a median of around 38 minutes and an interquartile range of 27 minutes.

Figure A.116 M7 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.117 M7 route performance over time

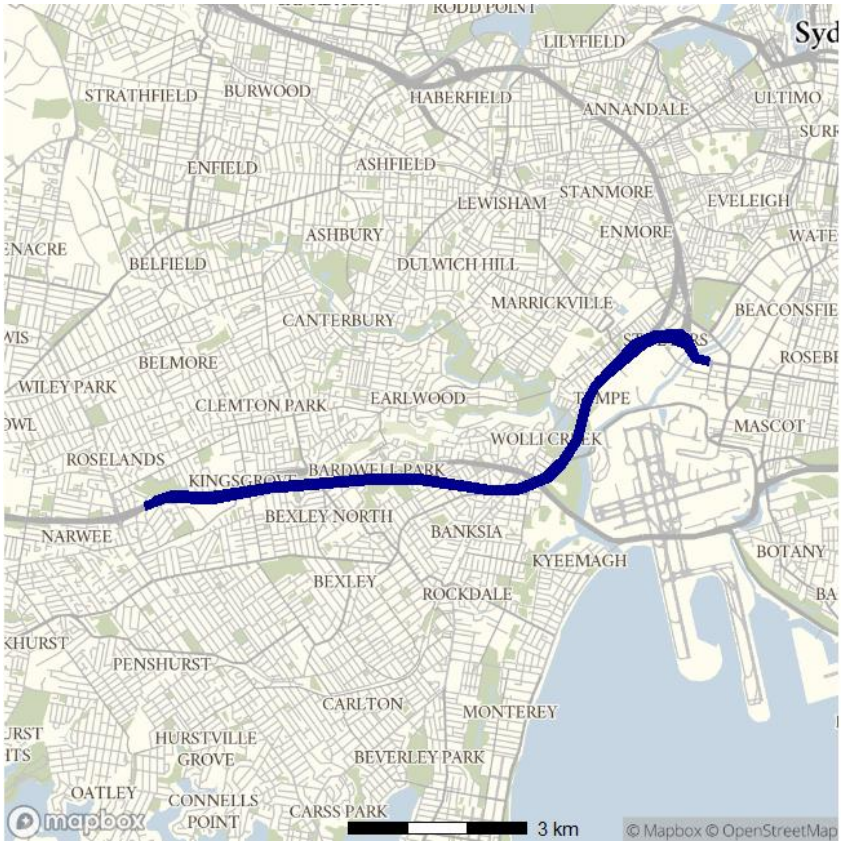


Source: BITRE estimates.

M8 - M5 to Mascot / Mascot to M5

This route follows the recently built M8 tunnel connecting the M5 with Inner Southern Sydney. It services light industrial areas in the vicinity of the port and airport.

Figure A.121 M8 route map



Source: BITRE estimates.

Table A.21 M8 route travel times and congestion measures, 2022

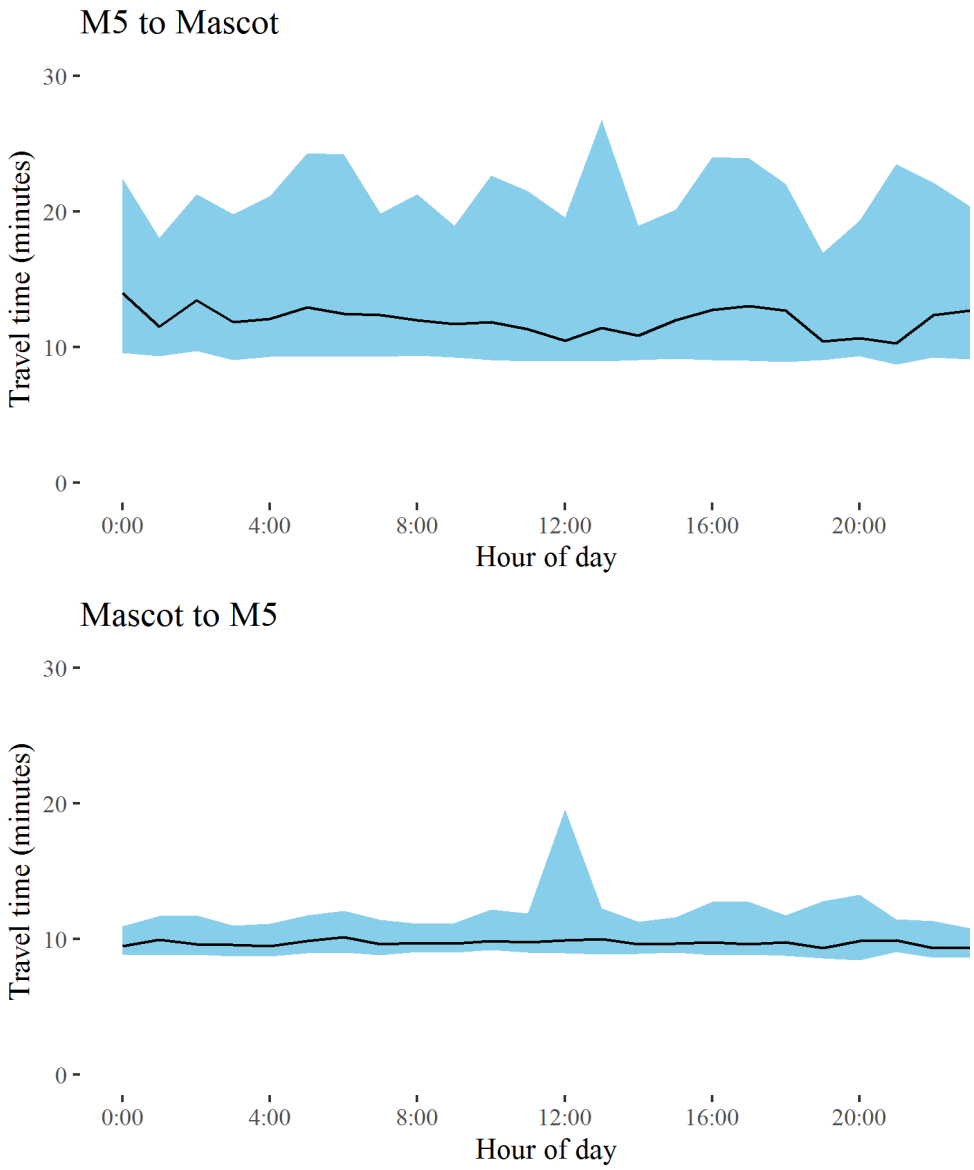
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
M5 to Mascot	00:10:15	00:13:58	1.165	00:07:53	00:17:49	1.548	11.0
Mascot to M5	00:09:20	00:10:08	1.041	00:02:06	00:10:36	1.540	10.9

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from the M5 to Mascot were at 9pm and 7pm with a median travel time of approximately 10 minutes and an interquartile range of around 8 minutes, respectively. The longest median travel times were at midnight with a median of 14 minutes and the greatest uncertainty was at 1pm with an interquartile range of around 18 minutes.

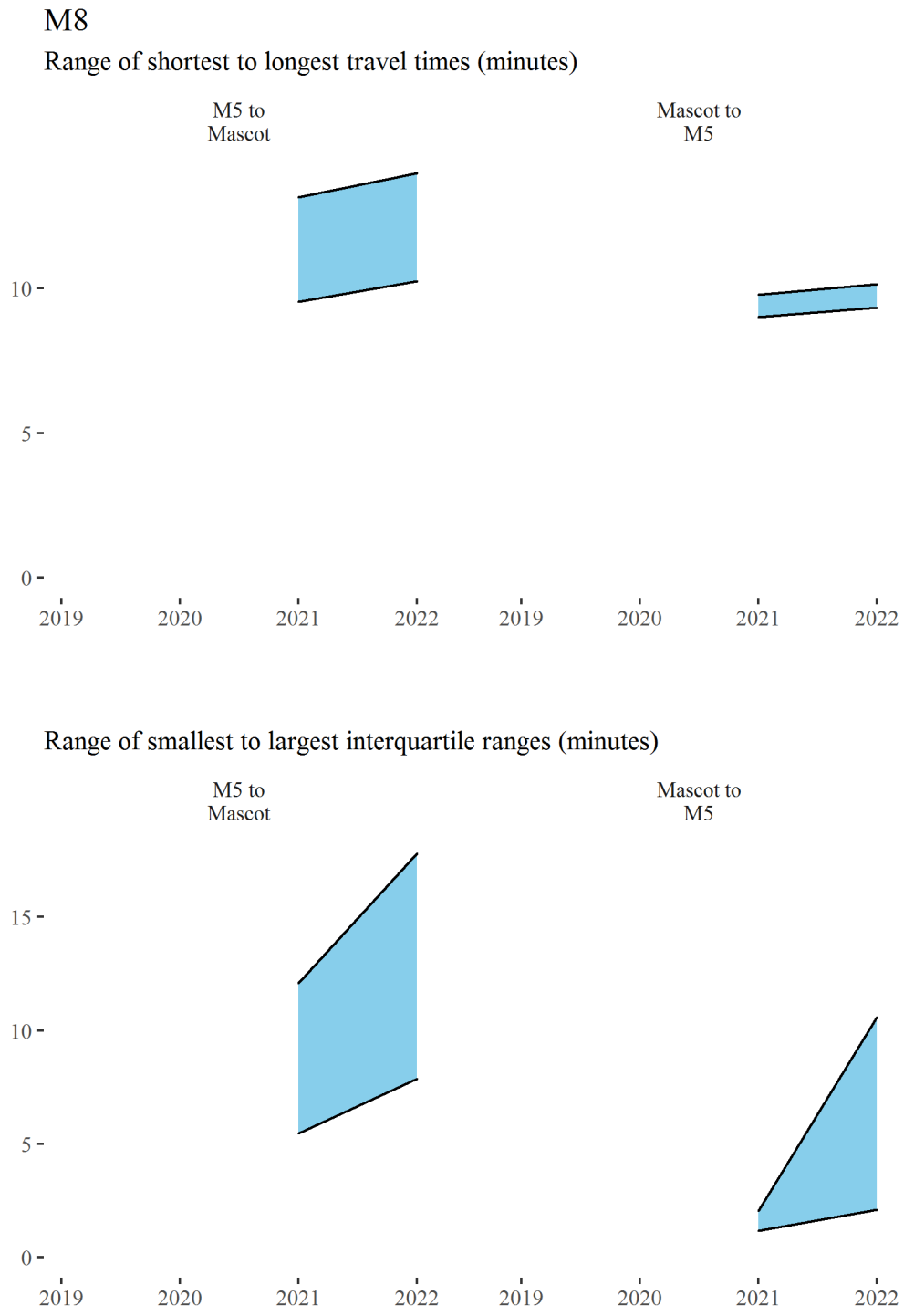
The best travel times and lowest uncertainty travelling from Mascot to M5 were at 7pm and midnight with a median travel time of around 9 minutes and an interquartile range of approximately 2 minutes, respectively. The longest median travel times were at 6am with a median of around 10 minutes and the highest uncertainty at 12am with an interquartile range of almost 11 minutes.

Figure A.122 M8 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.123 M8 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

NorthConnex-M1 - Brooklyn to M2 / M2 to Brooklyn

This route connects the Sydney orbital network to the Pacific Motorway (M1), and connects Sydney to northern NSW and Queensland. It starts at the M2 Motorway at Carlingford and uses the recently built NorthConnex tunnel to the start of the M1 Motorway (commonly referred to as the F3) at Wahroonga and continues until the Hawkesbury River at Brooklyn.

Figure A.127 NorthConnex-M1 route map

Source: BITRE estimates.

Table A.22 NorthConnex-M1 route travel times and congestion measures, 2022

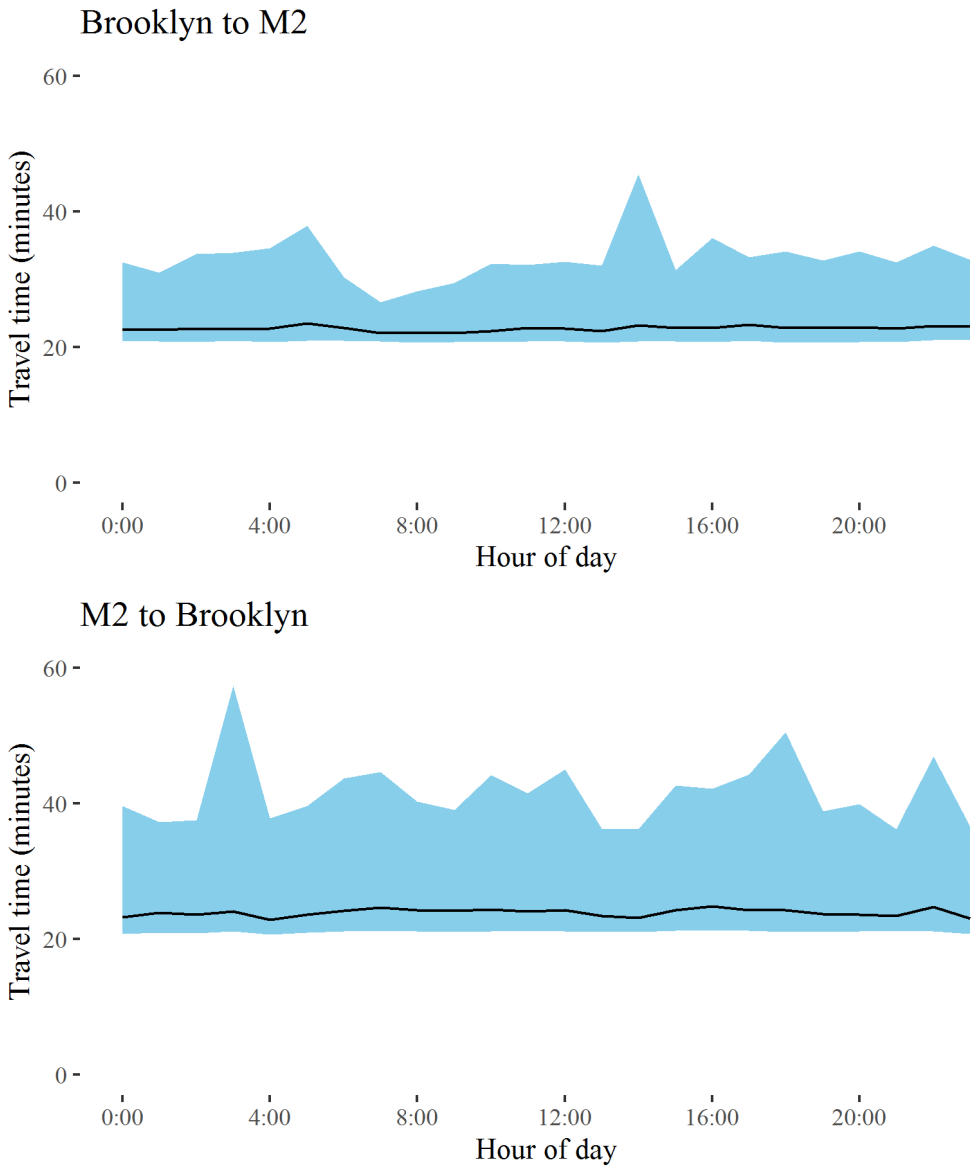
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Brooklyn to M2	00:22:03	00:23:27	1.031	00:05:48	00:24:42	2.122	31.4
M2 to Brooklyn	00:22:52	00:24:51	1.047	00:15:01	00:36:13	1.368	31.7

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Brooklyn to the M2 were at 8am and 7am with a median travel time of 22 minutes and an interquartile range of around 6 minutes, respectively. The longest median travel times were 23.5 minutes at 5am and the greatest uncertainty were at 2pm with an interquartile range of almost 25 minutes.

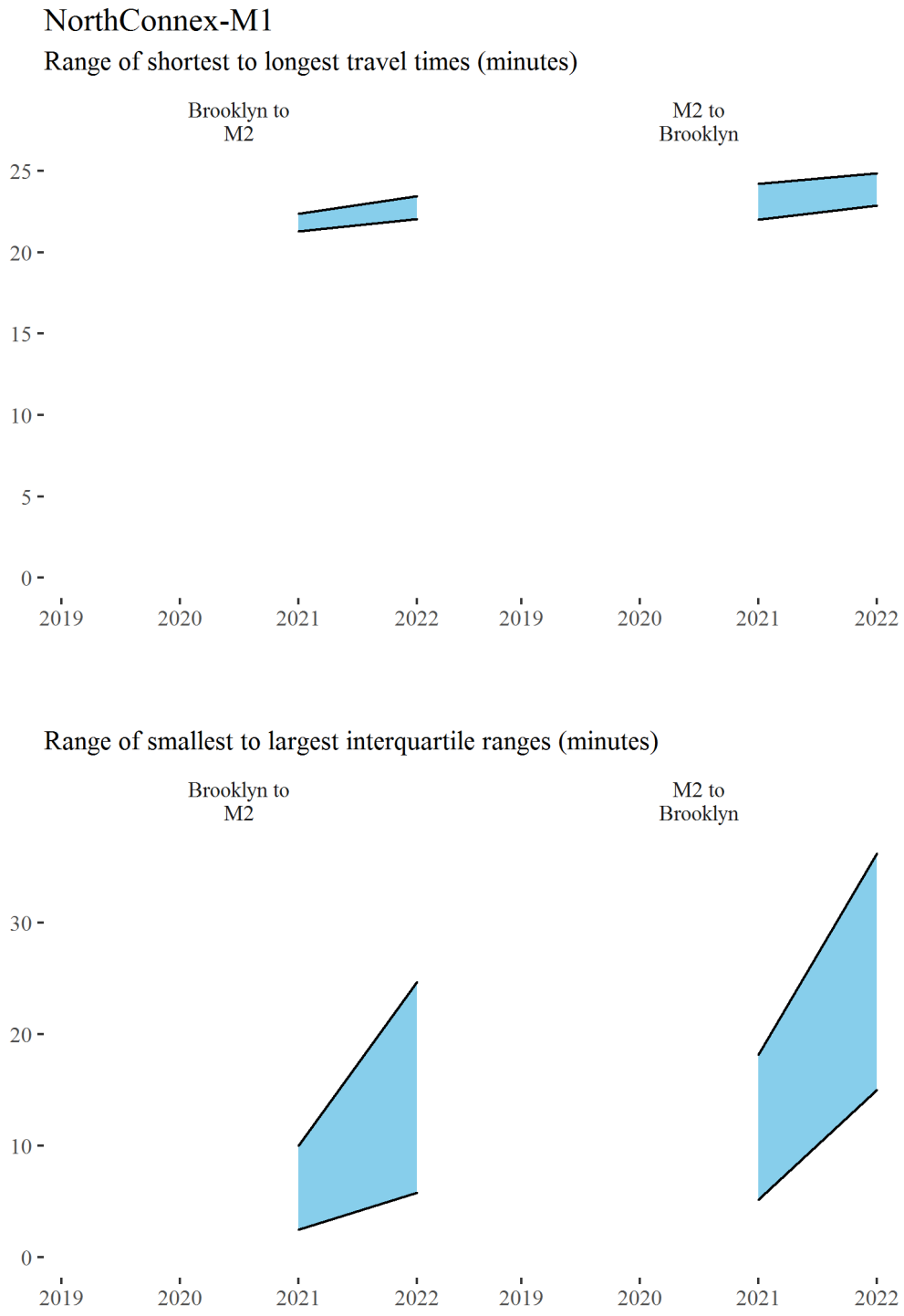
The best median travel times and lowest uncertainty for journeys from the M2 to Brooklyn were at 4am with a median travel time of around 23 minutes and an interquartile range of 15 minutes. The longest median travel times were around 25 minutes at 4pm and the greatest uncertainty was at 3am with an interquartile range of around 36 minutes.

Figure A.128 NorthConnex-M1 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.129 NorthConnex-M1 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Melbourne routes

Route 13-49 - Monash Freeway to South Gippsland Highway / South Gippsland Highway to Monash Freeway

This route arcs through Melbourne's outer south eastern suburbs from the Monash Freeway at Glen Waverley to the South Gippsland Highway, just south of Dandenong. The route traverses the suburbs of Clayton, Springvale and Keysborough, and crosses the M3. It is known by several names including the Dandenong Bypass, Westall Road and Clayton Road and includes a small portion of the Princes Highway.

Figure A.133 Route 13-49 route map

Source: BITRE estimates.

Table A.23 Route 13-49 travel times and congestion measures, 2022

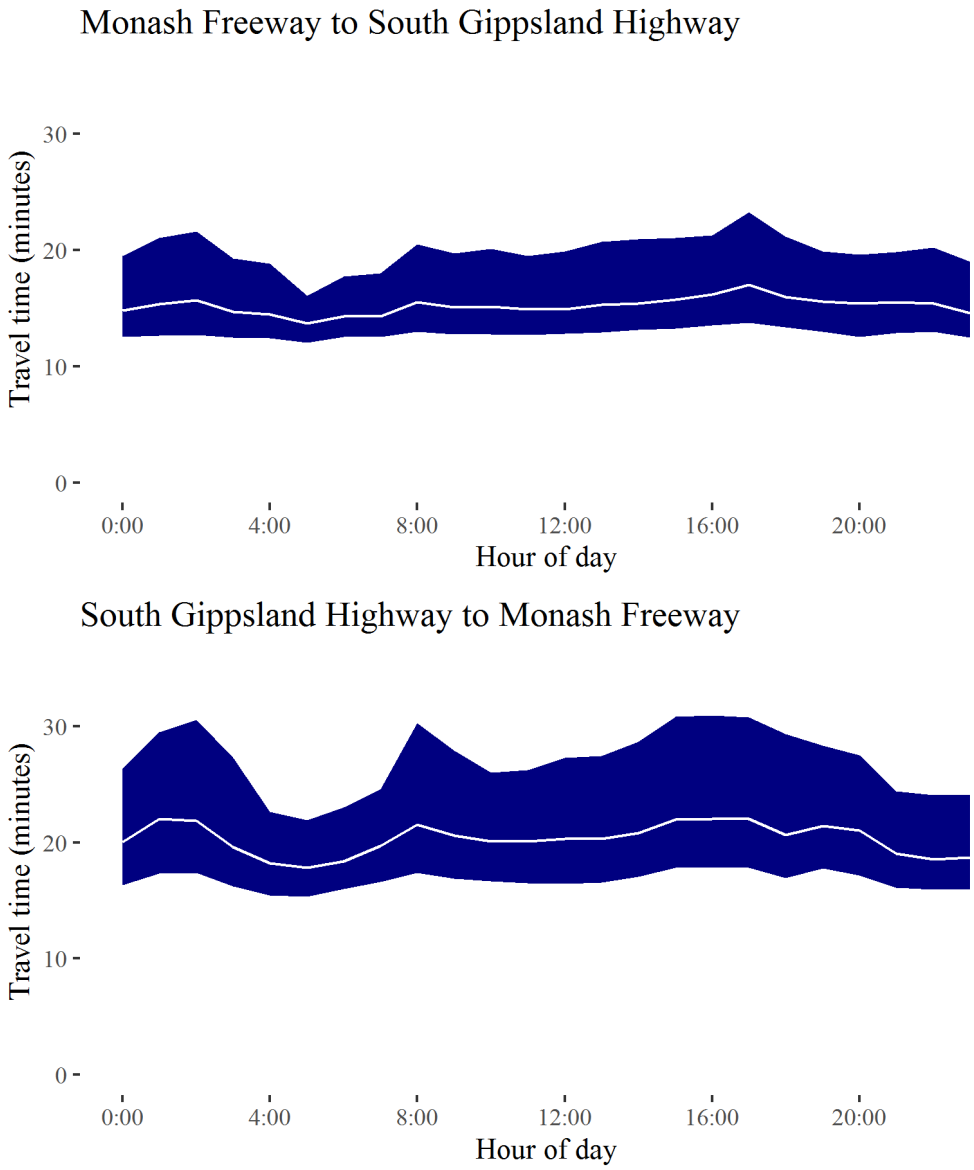
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Monash Freeway to South Gippsland Highway	00:13:40	00:17:02	1.112	00:04:02	00:09:31	1.764	14.8
South Gippsland Highway to Monash Freeway	00:17:49	00:22:02	1.139	00:06:35	00:13:10	1.571	18.2

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the Monash Freeway to South Gippsland Highway were at 5am with a median travel time of just under 14 minutes and an interquartile range of 4 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of 17 minutes and an interquartile range of 9.5 minutes.

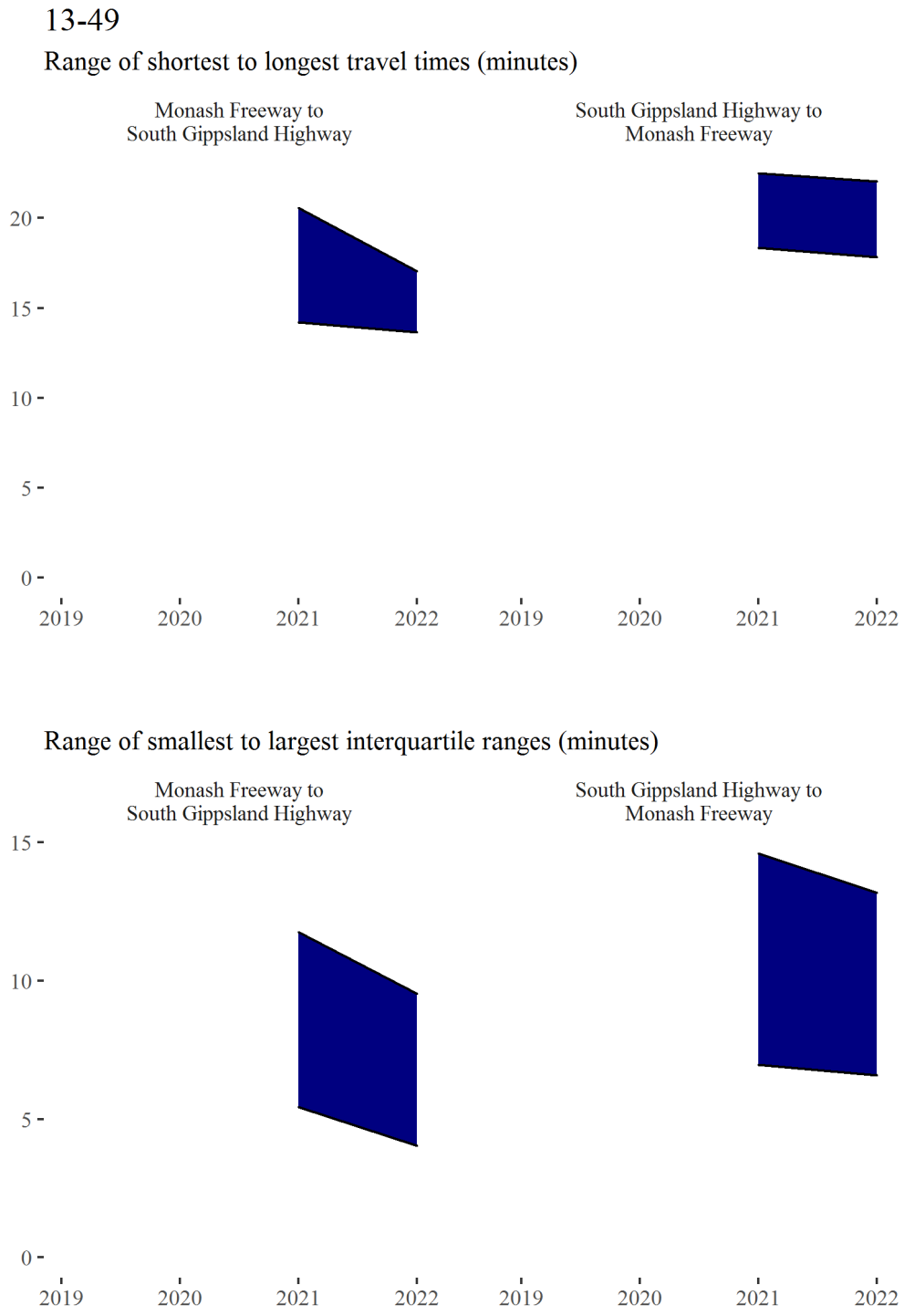
The best median travel times for journeys from South Gippsland Highway to the Monash Freeway were around 18 minutes at 5am and the lowest uncertainty was at 5am with an interquartile range of 6.5 minutes. The longest median travel times were 22 minutes at 1am and the greatest uncertainty was at 2am with an interquartile range of around 13 minutes.

Figure A.134 Route 13-49 median and interquartile range travel times



Source: BITRE estimates.

Figure A.135 Route 13-49 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Route 15 - Beach Road to Surrey Hills / Surrey Hills to Beach Road

This surface route extends from Canterbury Road in Surrey Hills to Beach Road in Parkdale. The route traverses Moorabbin, Oakleigh, the major retail precinct at Chadstone and Burwood in Melbourne's south east, crossing the M1 (East) along the way. It is also known as Warrigal Road.

Figure A.139 Route 15 map

Source: BITRE estimates.

Table A.24 Route 15 travel times and congestion measures, 2022

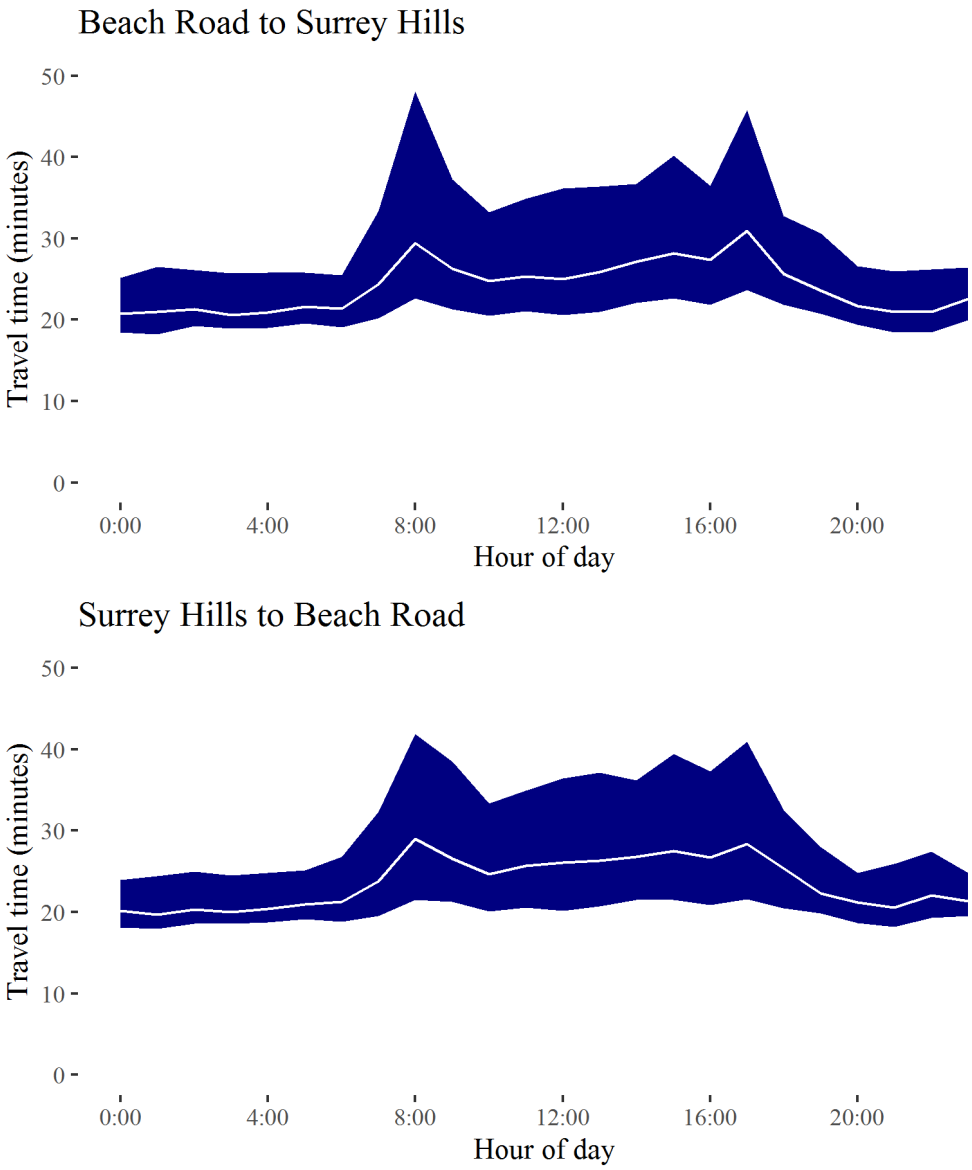
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Beach Road to Surrey Hills	00:20:34	00:30:55	1.17	00:06:12	00:25:24	1.872	18.9
Surrey Hills to Beach Road	00:19:41	00:28:59	1.20	00:05:16	00:20:21	2.143	18.9

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Beach Road to Surrey Hills were at 3am with a median travel time of 20.5 minutes and an interquartile range of around 6 minutes. The longest median travel times were 31 minutes at 5pm and the greatest uncertainty was at 8am with an interquartile range of around 25 minutes.

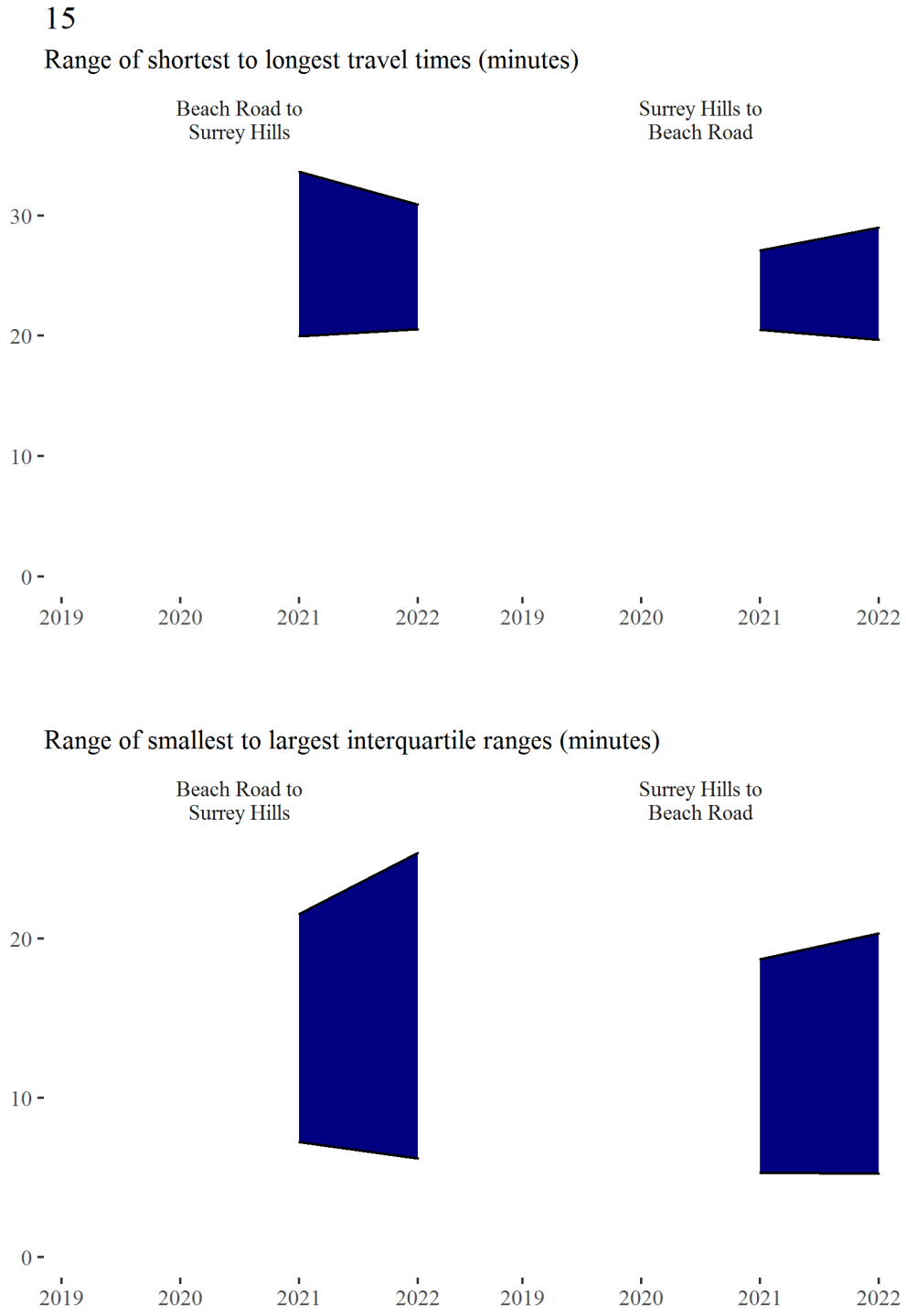
The best median travel times and least uncertainty for journeys from Surrey Hills to Beach Road were at 1am with a median travel time of around 20 minutes and an interquartile range of just over 5 minutes. The longest median travel times and greatest uncertainty was at 8am with a median of 29 minutes and an interquartile range of around 20 minutes.

Figure A.140 Route 15 median and interquartile range travel times



Source: BITRE estimates.

Figure A.141 15 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Route 22 - Ferntree Gully to M1 / M1 to Ferntree Gully

This surface route in Melbourne's East starts at the M1 (east) at Notting Hill and extends east through Wheelers Hill and Knoxfield to Ferntree Gully. It services light industrial areas in the vicinity of the M3. It is also known as Ferntree Gully Road.

Figure A.145 Route 22 map

Source: BITRE estimates.

Table A.25 Route 22 travel times and congestion measures, 2022

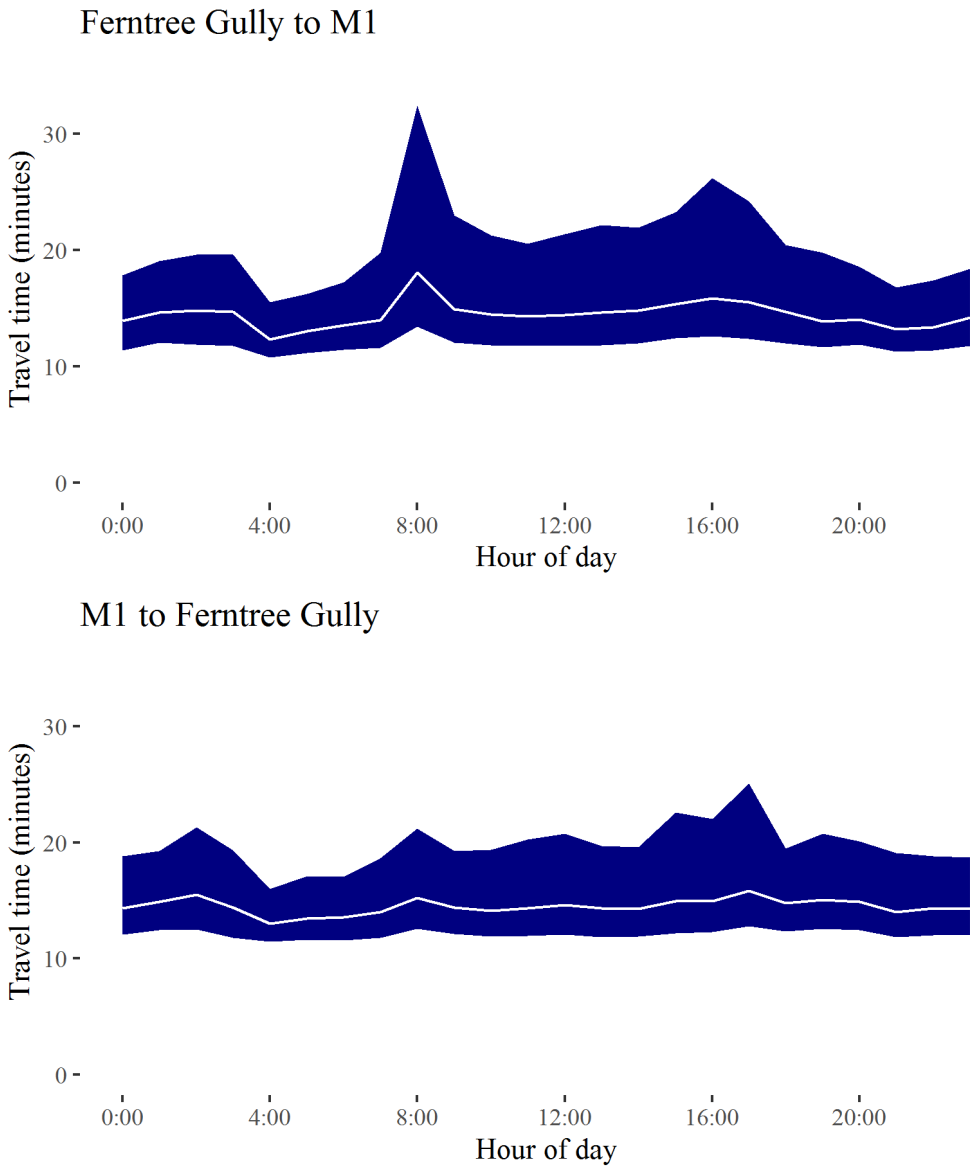
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Ferntree Gully to M1	00:12:18	00:18:03	1.174	00:04:46	00:19:02	1.826	12.6
M1 to Ferntree Gully	00:13:01	00:15:49	1.112	00:04:33	00:12:17	1.687	12.6

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Ferntree Gully to the M1 were at 4am with a median travel time of around 12 minutes and an interquartile range of almost 5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 18 minutes and an interquartile range of 19 minutes.

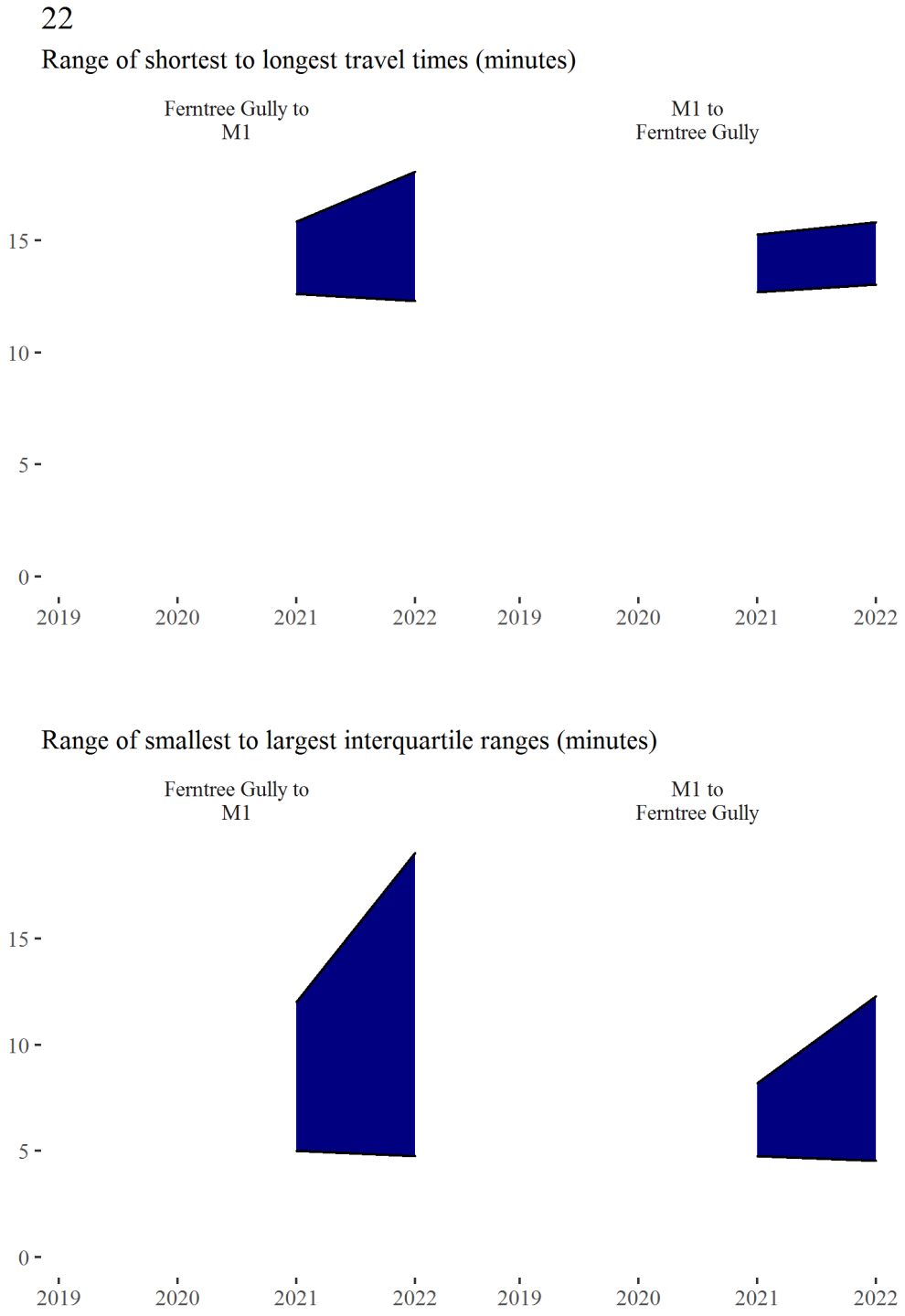
The best median travel times and least uncertainty for journeys from the M1 to Ferntree Gully were at 4am with a median travel time of 13 minutes and an interquartile range of 4.5 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of around 16 minutes and an interquartile range of approximately 12 minutes.

Figure A.146 Route 22 median and interquartile range travel times



Source: BITRE estimates.

Figure A.147 Route 22 performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Route 3 - Albert Park to Cheltenham / Cheltenham to Albert Park

This surface route travels south east from Albert Park, south-east of the Melbourne CBD, through St Kilda, Brighton and Moorabbin, to meet Route 15 (Warrigal Road) at Cheltenham/Mentone. It is also known as the Nepean Highway.

Figure A.151 Route 3 map

Source: BITRE estimates.

Table A.26 Route 3 travel times and congestion measures, 2022

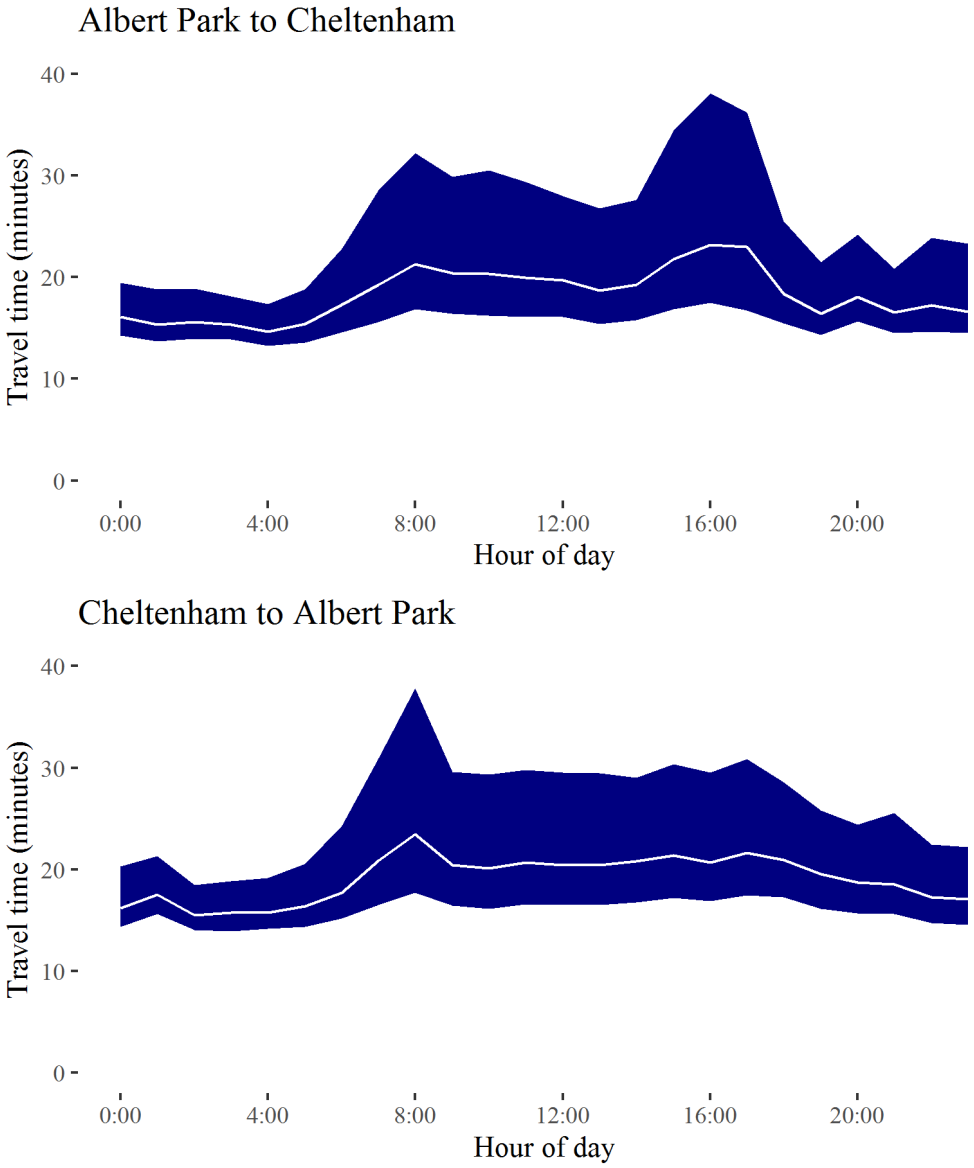
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Albert Park to Cheltenham	00:14:39	00:23:09	1.250	00:04:05	00:20:39	2.542	16.1
Cheltenham to Albert Park	00:15:30	00:23:28	1.231	00:04:26	00:20:06	2.329	16.0

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Albert Park to Cheltenham were at 4am with a median travel time of just under 15 minutes and an interquartile range of 4 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 23 minutes and an interquartile range of around 21 minutes.

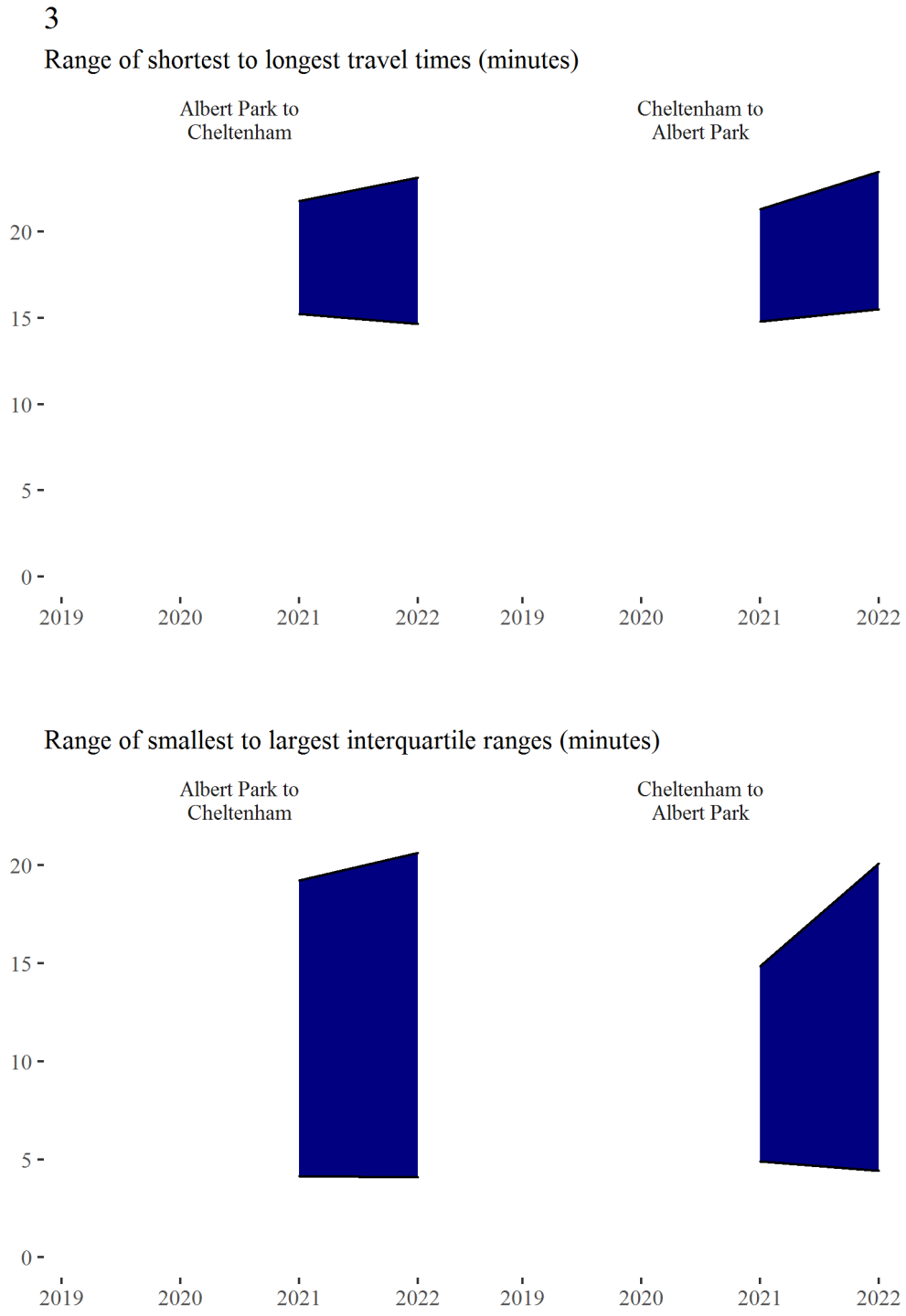
The best median travel times for journeys from Cheltenham to Albert Park was 15.5 minutes at 2am and the lowest uncertainty was at 2am with an interquartile range of 4.5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 23.5 minutes and an interquartile range of around 20 minutes.

Figure A.152 Route 3 median and interquartile range travel times



Source: BITRE estimates.

Figure A.153 Route 3 performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Route 32 - Derrimut to Montrose / Montrose to Derrimut

This 53-kilometre route extends from Derrimut, west of the CBD, to Montrose on the eastern urban fringe. It crosses under the M80, passes Somerville Road, Footscray Road, Port of Melbourne and Victoria Street/Parade at Carlton, Burke Road in Camberwell, Canterbury Road, and intersects with the M3 at Ringwood.

Figure A.157 Route 32 route map

Source: BITRE estimates.

Table A.27 Route 32 travel times and congestion measures, 2022

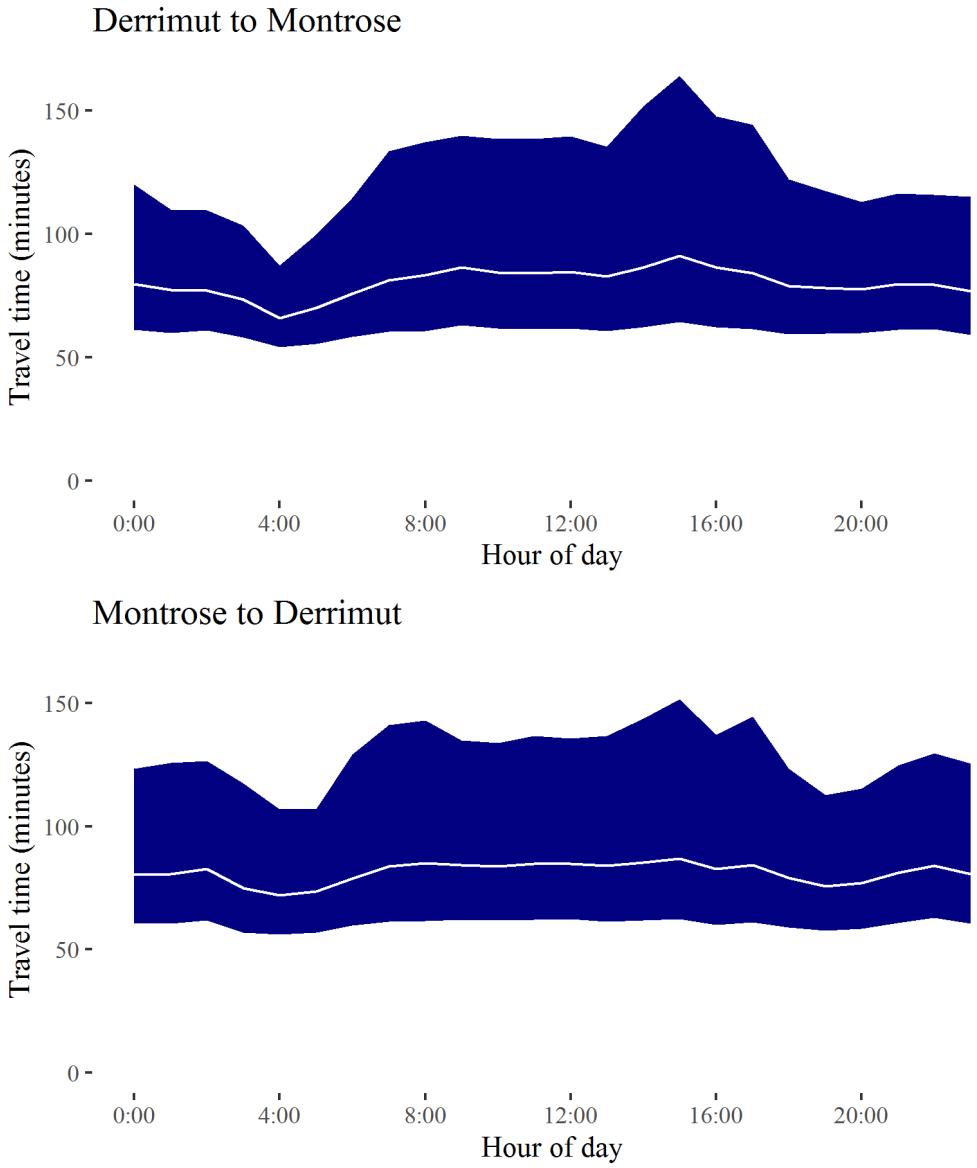
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Derrimut to Montrose	01:05:50	01:31:00	1.217	00:33:14	01:39:49	1.967	52.9
Montrose to Derrimut	01:12:04	01:27:00	1.127	00:50:13	01:29:05	1.373	52.9

Source: BITRE estimates.

The best median travel times for journeys from Derrimut to Montrose was approximately 1 hour and 6 minutes at 4am and the lowest uncertainty was also at 4am with an interquartile range of around 33 minutes. The longest median travel times and greatest uncertainty were at 3pm with a median of 1 hour and 31 minutes and an interquartile range of 1 hour and 40 minutes.

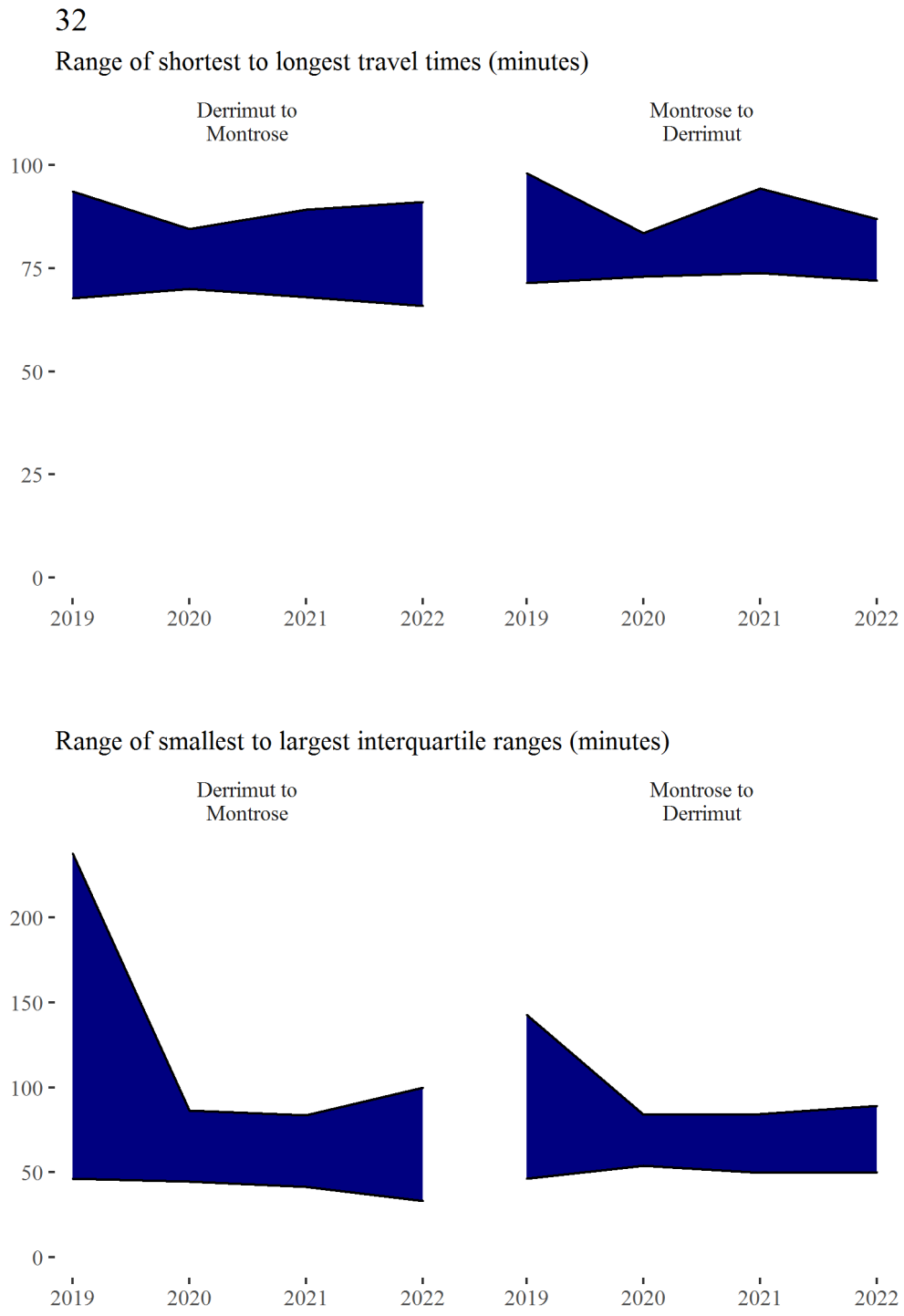
The best travel times and lowest uncertainty travelling from Montrose to Derrimut were at 4am and 5am, respectively, with a median travel time of 1 hour and 12 minutes and an interquartile range of around 50 minutes. The longest median travel times and greatest uncertainty were at 3pm with a median of 1 hour and 27 minutes and an interquartile range of 1 hour and 29 minutes.

Figure A.158 Route 32 median and interquartile range travel times



Source: BITRE estimates.

Figure A.159 Route 32 route performance over time



Source: BITRE estimates.

Route 35 - Hume Highway to M80 / M80 to Hume Highway

This route extends north from the Metropolitan Ring Road (M80) past Broadmeadows to Roxburgh Park and then east through Somerton to the intersection with Sydney Road (old Hume Highway). It serves light industrial areas around Somerton and uses Pascoe Vale and Somerton Roads.

Figure A.163 Route 35 map

Source: BITRE estimates.

Table A.28 Route 35 travel times and congestion measures, 2022

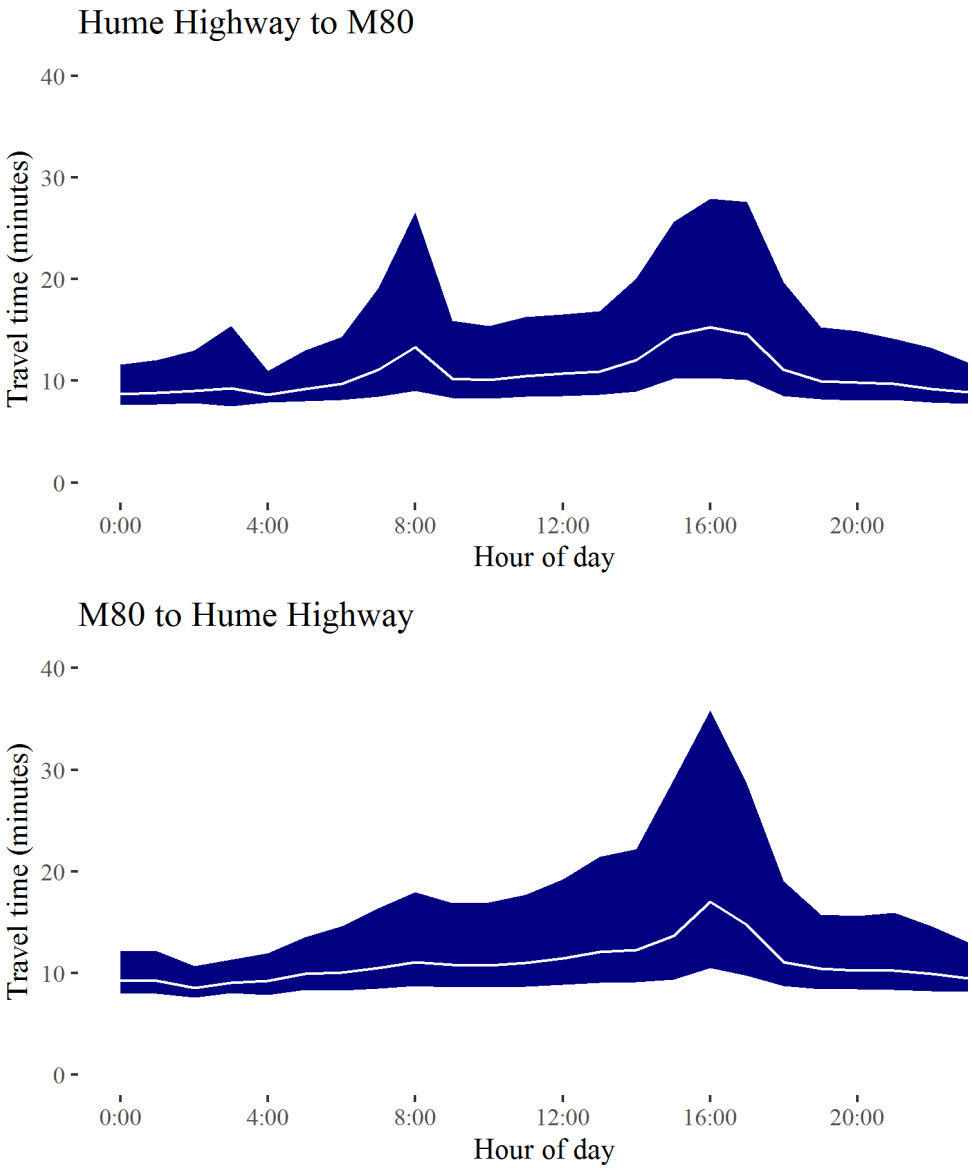
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Hume Highway to M80	00:08:37	00:15:15	1.233	00:03:06	00:17:39	2.750	8.3
M80 to Hume Highway	00:08:32	00:17:03	1.280	00:03:06	00:25:20	2.905	8.3

Source: BITRE estimates.

The best median travel times for journeys from the Hume Highway to the M80 was around 9 minutes at 4am and the lowest uncertainty was at 4am with an interquartile range of around 3 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of approximately 15 minutes and an interquartile range of almost 18 minutes.

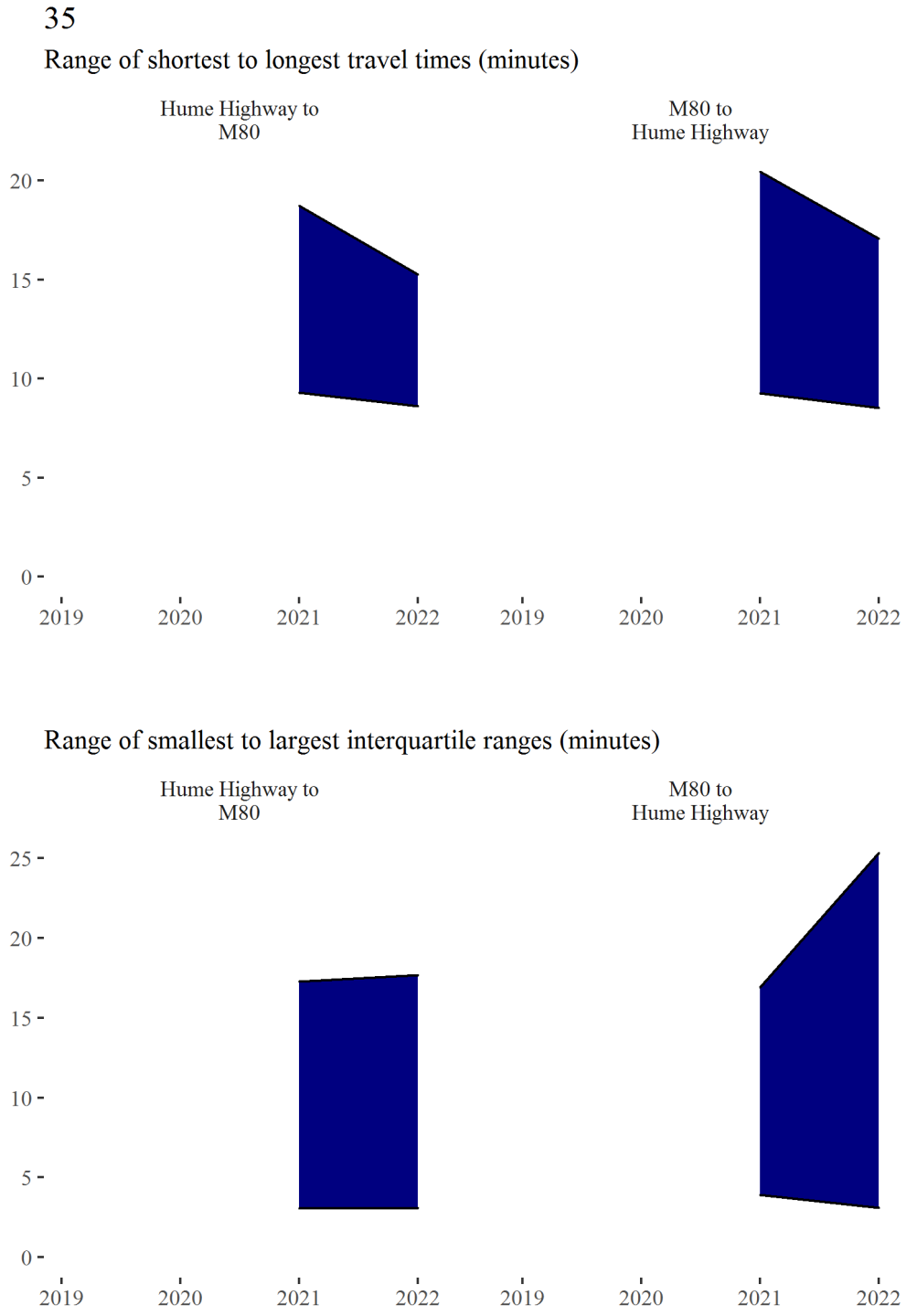
The best median travel times and lowest uncertainty for journeys from the M80 to the Hume Highway were at 2am with a median travel time of 8.5 minutes and an interquartile range of 3 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 17 minutes and an interquartile range of around 25 minutes.

Figure A.164 Route 35 median and interquartile range travel times



Source: BITRE estimates.

Figure A.165 Route 35 performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Route 40 - M2 to Doncaster / Doncaster to M2

This route extends from Doncaster in the east to the M2 at Strathmore, north of the CBD. The route passes suburbs including Heidelberg, Preston and Coburg, incorporating Manningham Road, Banksia Street and Bell Street along its length.

Figure A.169 Route 40 map

Source: BITRE estimates.

Table A.29 Route 40 travel times and congestion measures, 2022

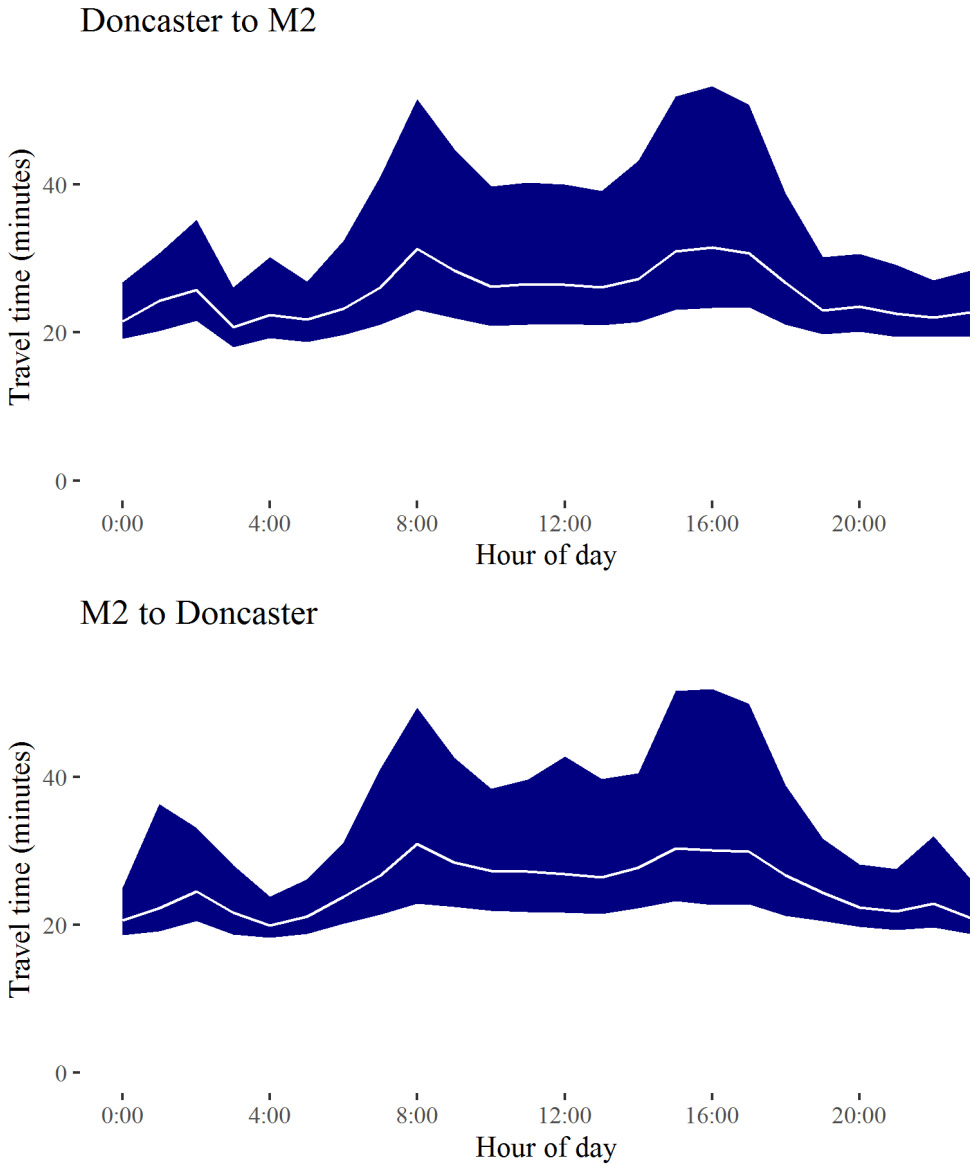
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
M2 to Doncaster	00:19:57	00:30:55	1.264	00:05:33	00:29:10	2.838	18.6
Doncaster to M2	00:20:46	00:31:31	1.228	00:07:38	00:29:58	2.135	18.6

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the M2 to Doncaster were at 4am with a median travel time of 20 minutes and an interquartile range of 5.5 minutes. The longest median travel times was at 8am with a median of approximately 31 minutes and the greatest uncertainty at 4pm with an interquartile range of around 29 minutes.

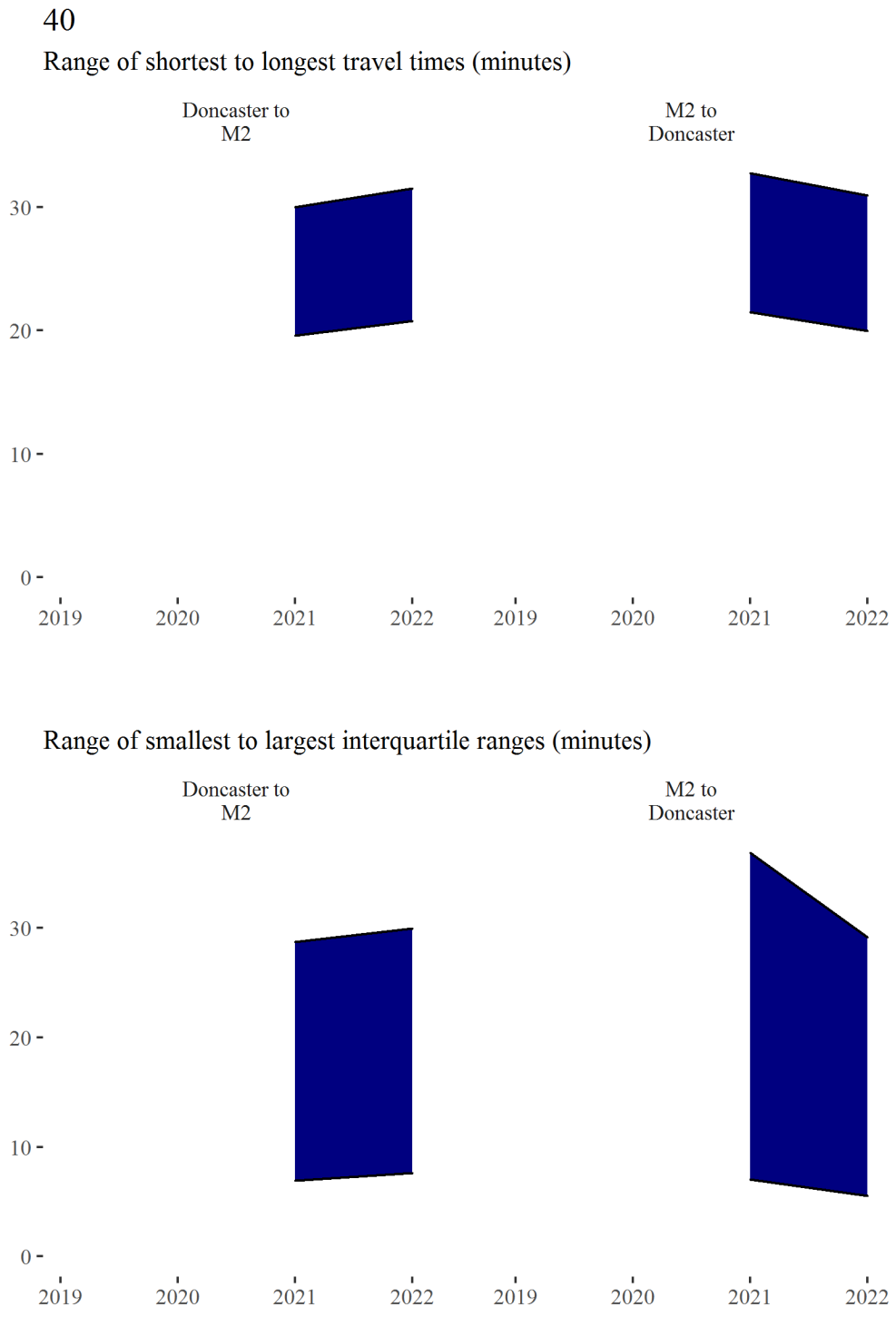
The best travel times and lowest uncertainty travelling from Doncaster to the M2 were at 3am and midnight, respectively, with a median travel time of around 21 minutes and an interquartile range of around 8 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 31.5 minutes and an interquartile range of 30 minutes.

Figure A.170 Route 40 median and interquartile range travel times



Source: BITRE estimates.

Figure A.171 Route 40 performance over time

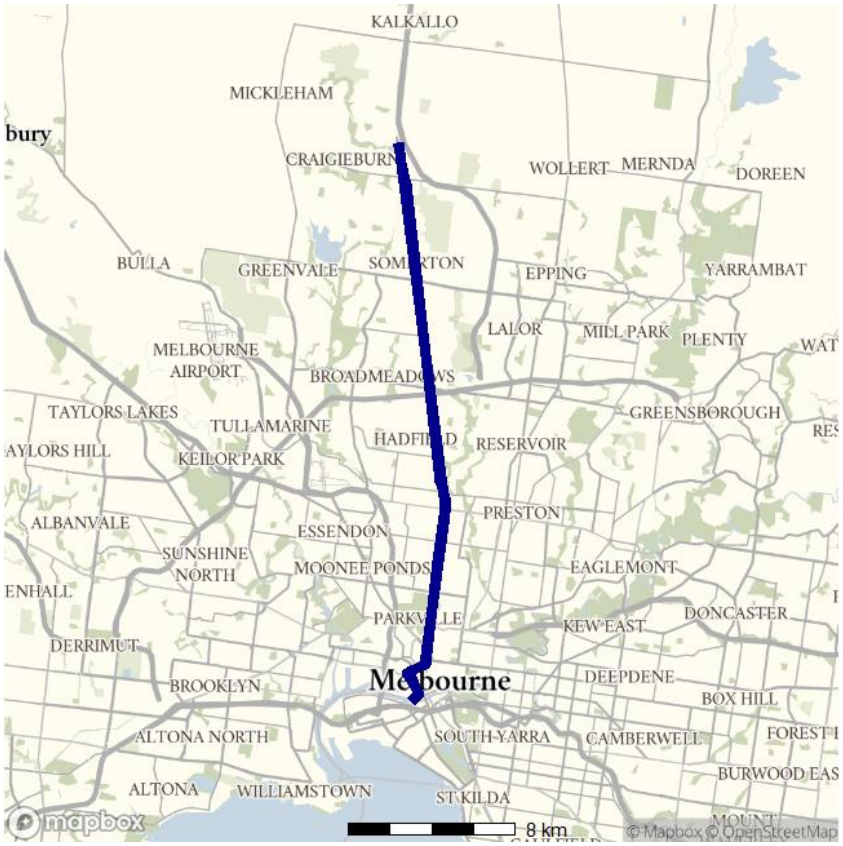


a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Route 55 - Hume Freeway to Montague Street / Montague St to Hume Freeway

This route connects the Hume Freeway at Craigieburn and Montague Street in south Melbourne via Sydney Road through Somerton, Coburg and North Melbourne, skirting the CBD along Dudley Street and Wurundjeri Way.

Figure A.175 Route 55 route map



Source: BITRE estimates.

Table A.30 Route 55 travel times and congestion measures, 2022

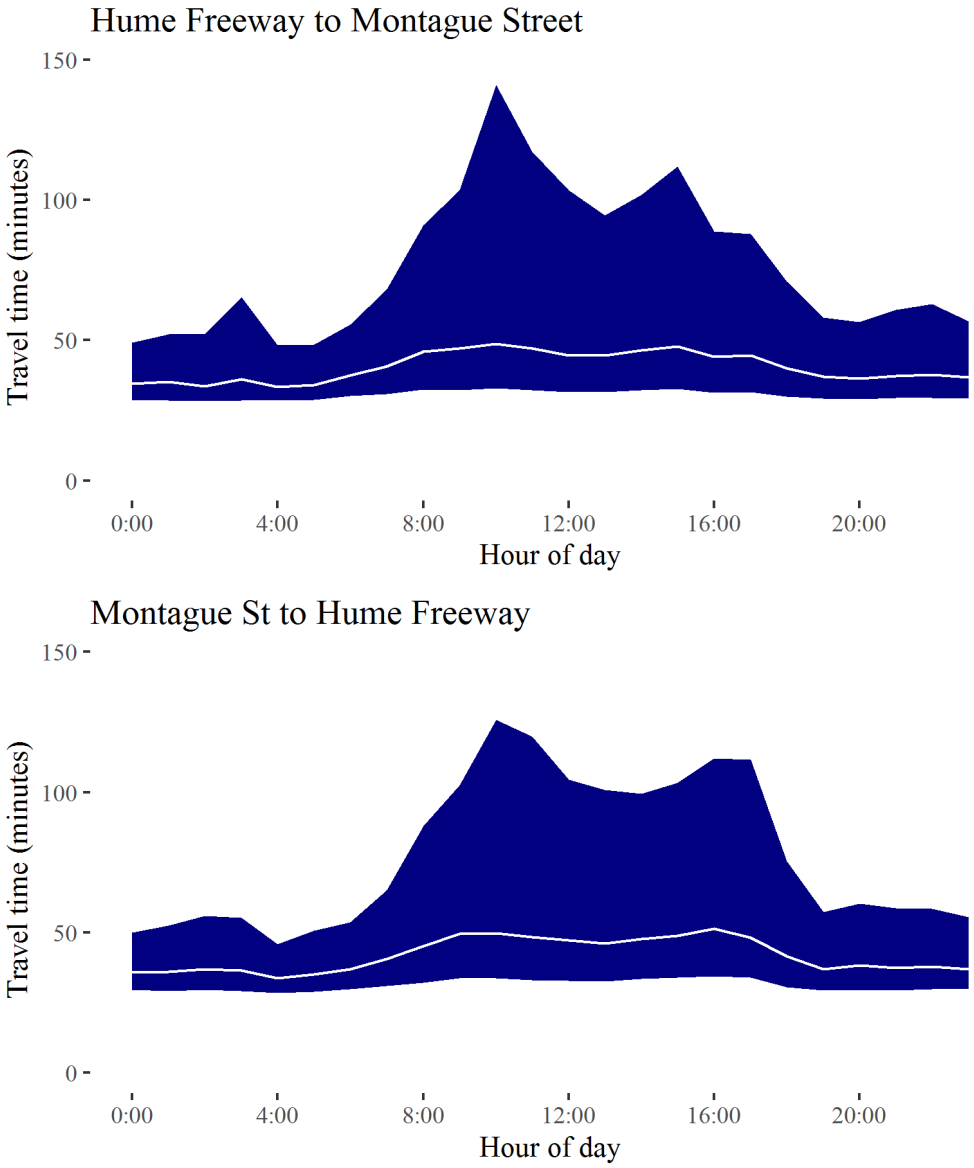
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Hume Freeway to Montague Street	00:33:18	00:48:38	1.215	00:19:43	01:47:57	2.360	28
Montague St to Hume Freeway	00:33:42	00:51:28	1.240	00:17:18	01:32:05	2.685	28

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from the Hume Freeway to Montague Street were at 4am and 5am, respectively, with a median travel time of approximately 33 minutes and an interquartile range of around 20 minutes. The longest median travel times and greatest uncertainty were at 10am with a median of approximately 49 minutes and an interquartile range of 1 hour and 48 minutes.

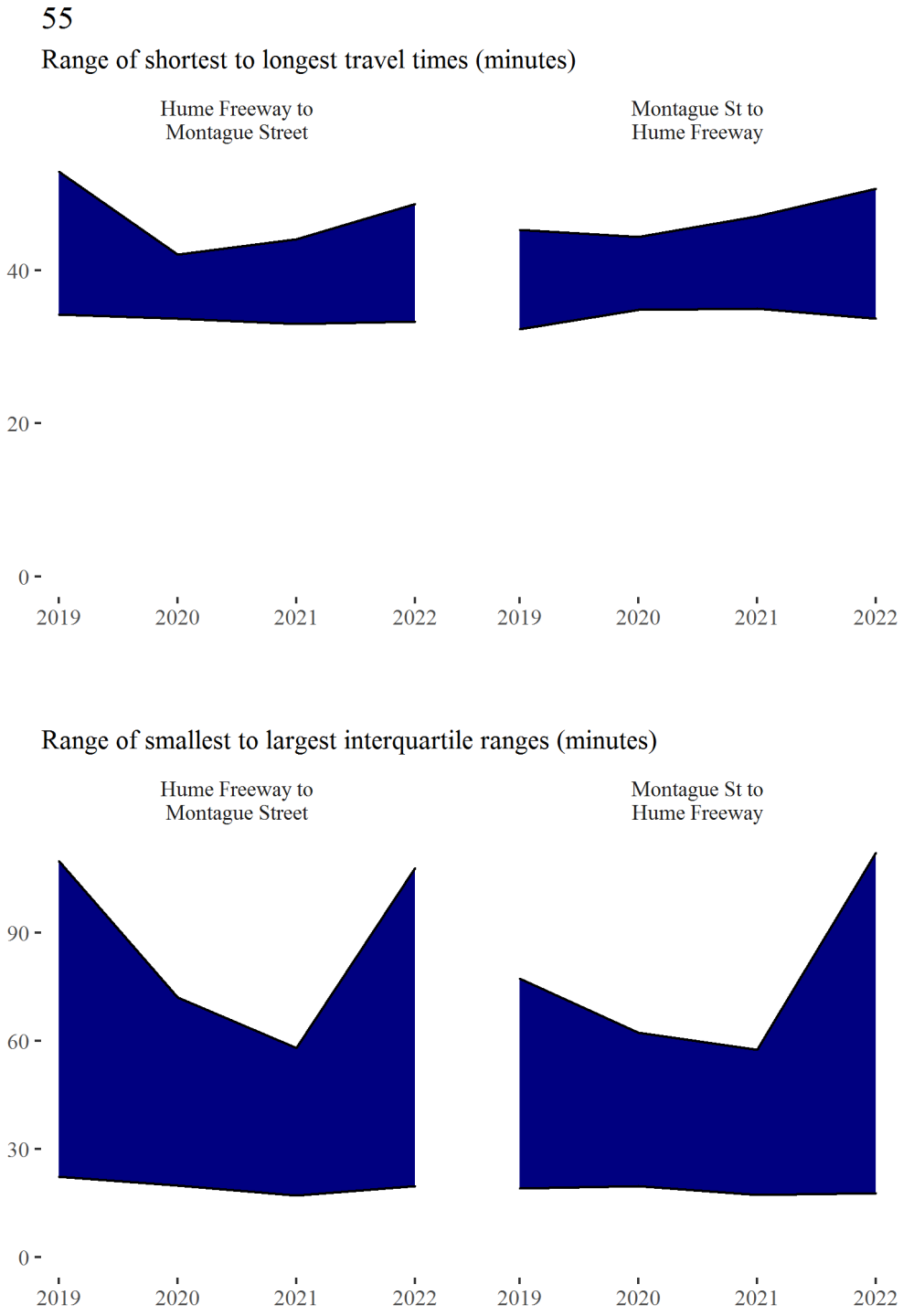
The best median travel times and least uncertainty for journeys from Montague Street to the Hume Freeway were at 4am with a median travel time of approximately 34 minutes and an interquartile range of around 17 minutes. The longest median travel times was 51.5 minutes at 4pm and the greatest uncertainty was at 10am with an interquartile range of 1 hour and 32 minutes.

Figure A.176 Route 55 median and interquartile range travel times



Source: BITRE estimates.

Figure A.177 Route 55 performance over time



Source: BITRE estimates.

Route 56 - Laverton to Spotswood / Spotswood to Laverton

This surface route travels a short distance (9 kilometres) between Laverton and Spotswood in Melbourne's west using Dohertys Road, Grieve Parade and Blackshaws Road and passes a number of light industrial areas.

Figure A.181 Route 56 route map

Source: BITRE estimates.

Table A.31 Route 56 travel times and congestion measures, 2022

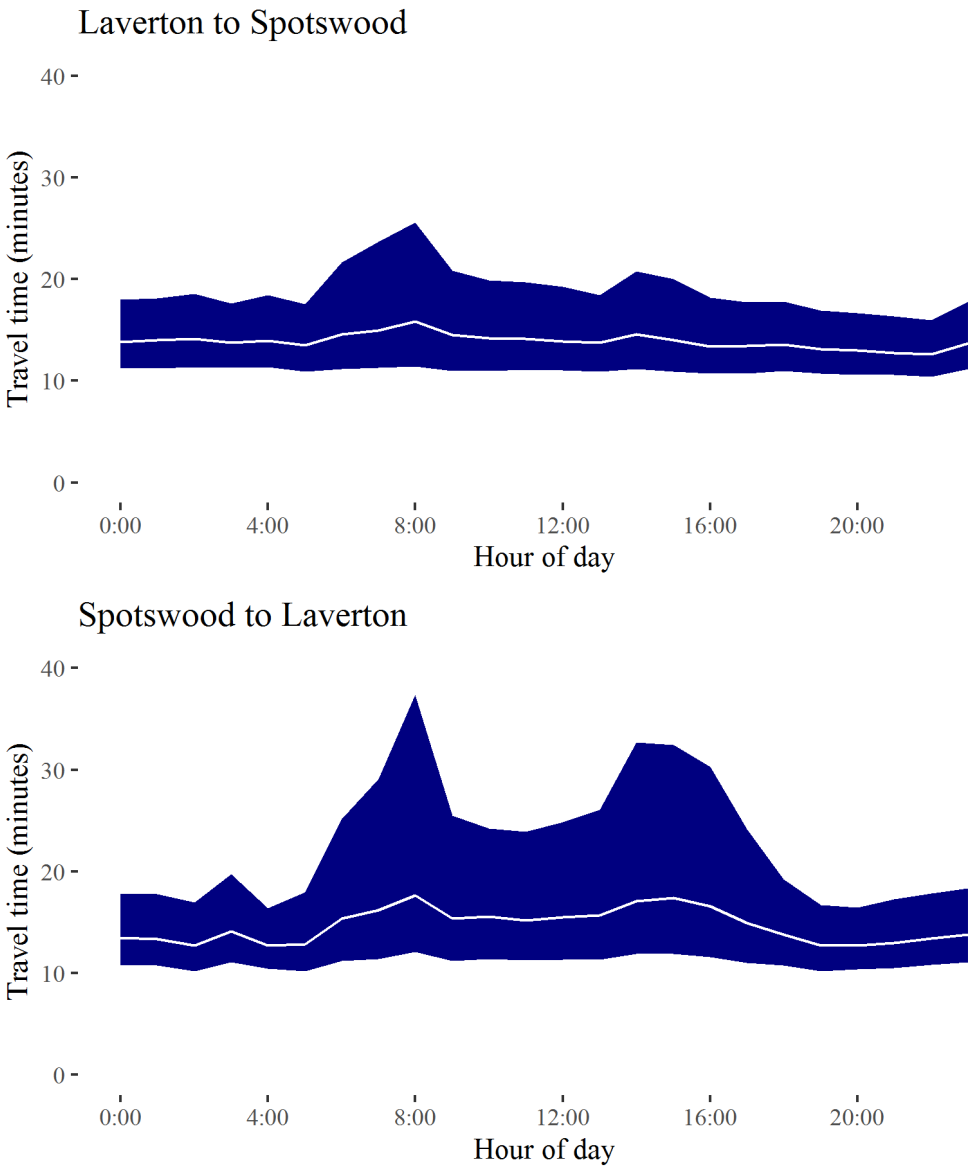
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Laverton to Spotswood	00:12:36	00:15:49	1.101	00:05:32	00:14:06	1.442	9.1
Spotswood to Laverton	00:12:41	00:17:40	1.153	00:05:54	00:25:19	2.001	9.1

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Laverton to Spotswood were at 10pm with a median travel time of just under 13 minutes and an interquartile range of 5.5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of approximately 16 minutes and an interquartile range of 14 minutes.

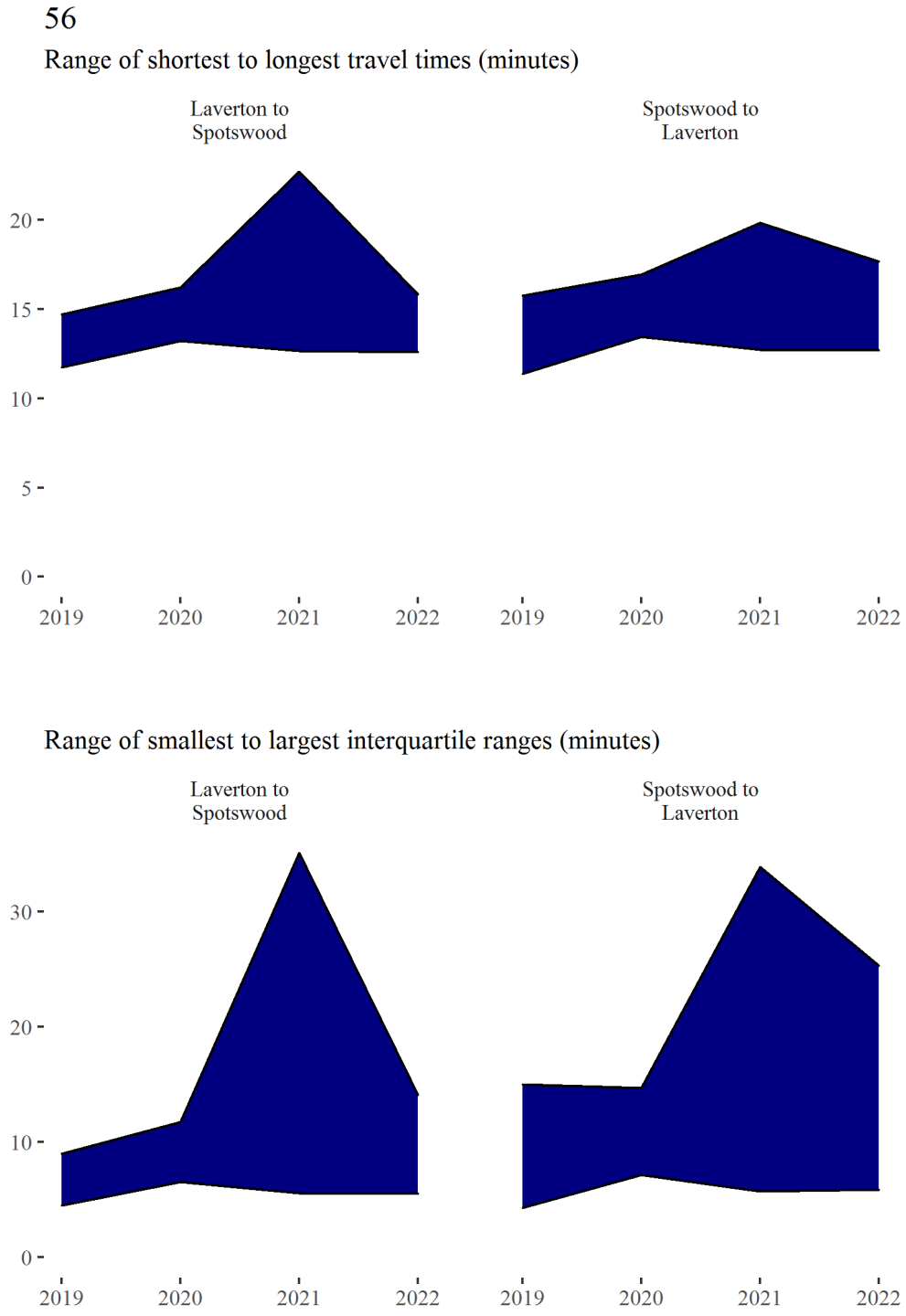
The best median travel times and lowest uncertainty for journeys from Spotswood to Laverton were at 7pm with a median travel time of around 13 minutes and an interquartile range of around 6 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of around 18 minutes and an interquartile range of just over 25 minutes.

Figure A.182 Route 56 median and interquartile range travel times



Source: BITRE estimates.

Figure A.183 Route 56 performance over time



Source: BITRE estimates.

Route 58 - Greenvale to Yan Yean Road / Yan Yean Road to Greenvale

This route extends across Melbourne's northern fringe connecting Mickleham Road in the west and the intersection of Gorge Road and Yan Yean Road near Plenty in northeast Melbourne. It uses Somerton Road, Cooper Street, High Street and McDonalds Road.

Figure A.187 Route 58 map

Source: BITRE estimates.

Table A.32 Route 58 travel times and congestion measures, 2022

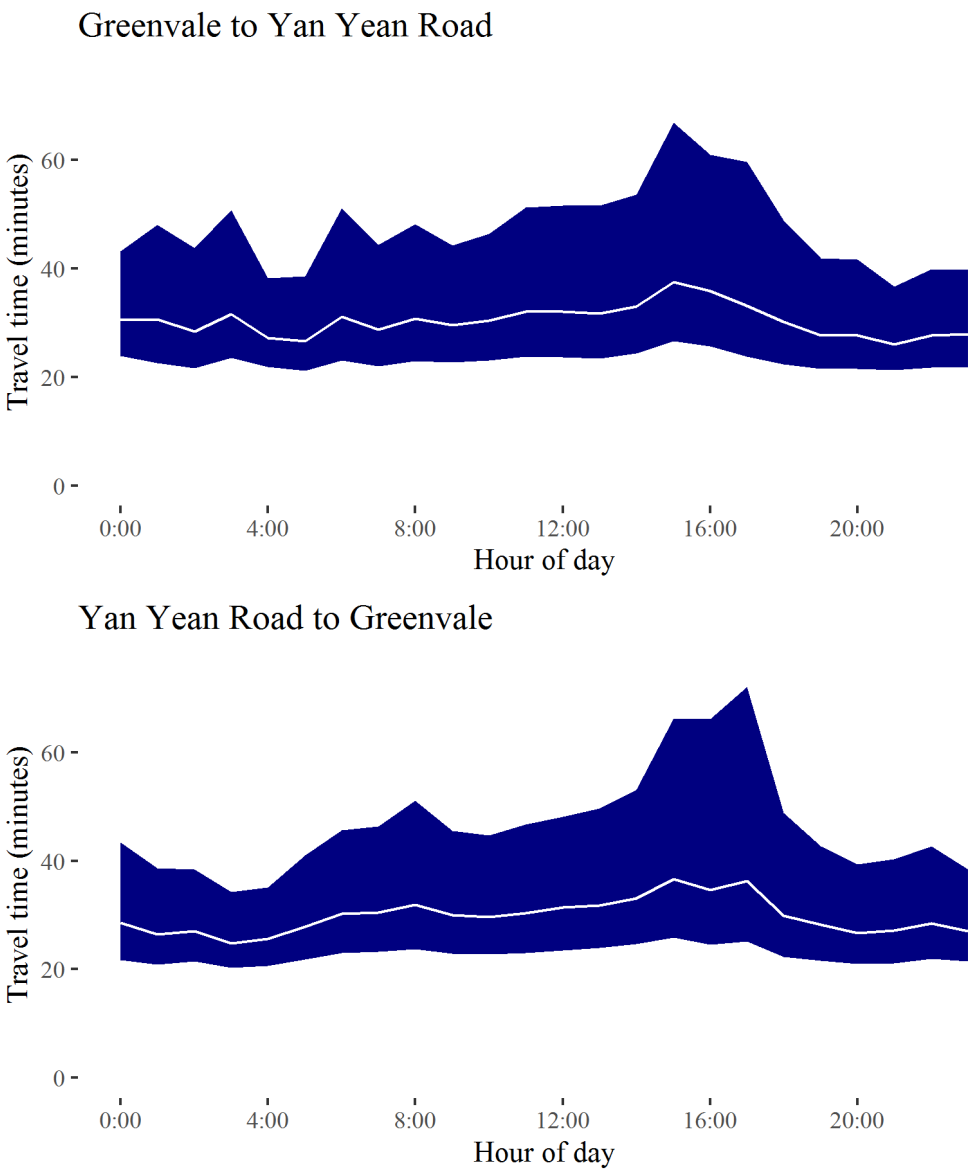
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Greenvale to Yan Yean Road	00:26:02	00:37:29	1.164	00:15:31	00:40:18	1.589	22.3
Yan Yean Road to Greenvale	00:24:47	00:36:37	1.201	00:13:59	00:46:56	1.716	22.2

Source: BITRE estimates.

The best median travel times for journeys from Greenvale to Yan Yean Road was around 26 minutes at 9pm and the lowest uncertainty was at 9pm with an interquartile range of 15.5 minutes. The longest median travel times and greatest uncertainty were at 3pm with a median of 37.5 minutes and an interquartile range of around 40 minutes.

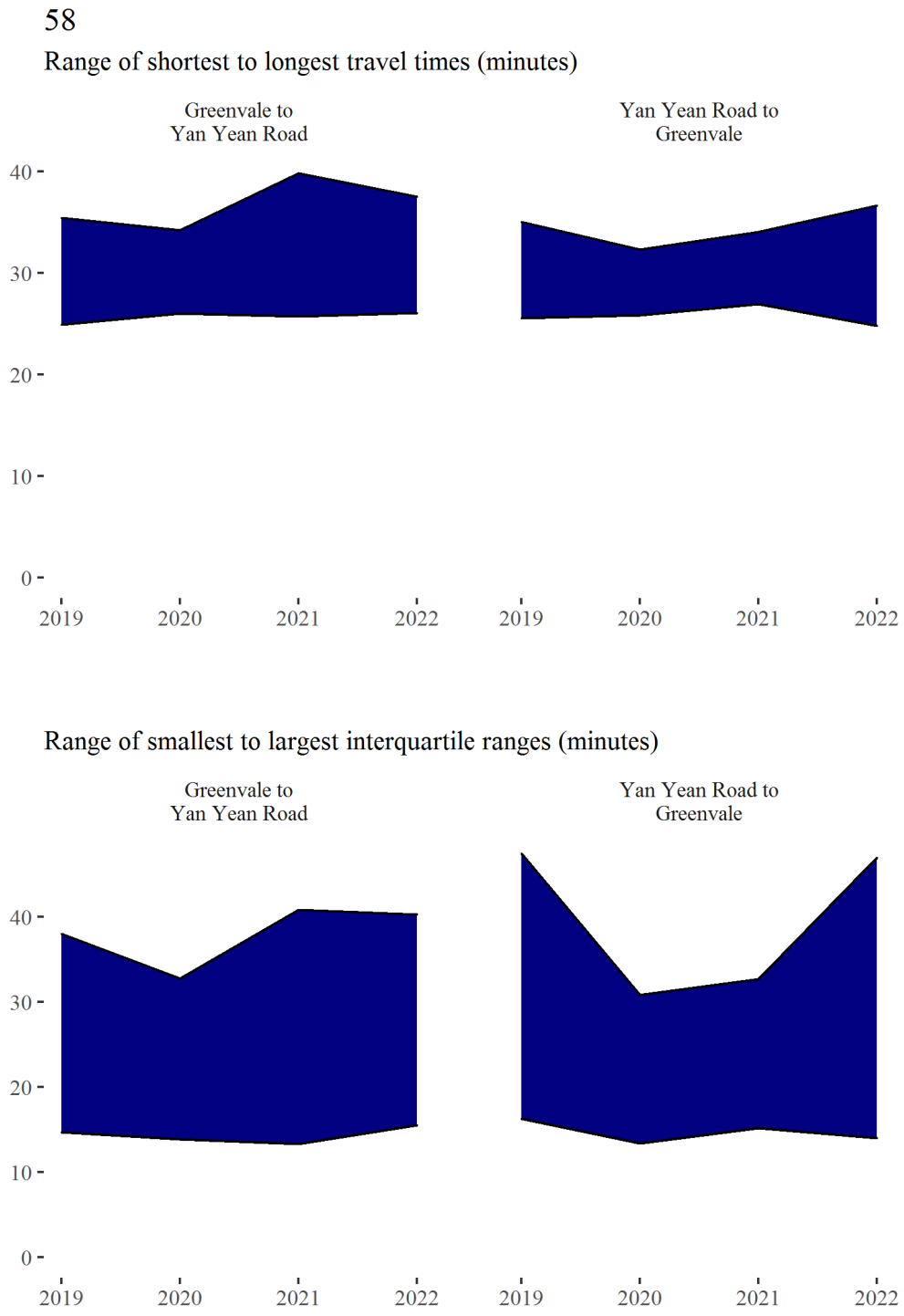
The best median travel times and least uncertainty for journeys from Yan Yean Road to Greenvale were at 3am with a median travel time of around 25 minutes and an interquartile range of 14 minutes. The longest median travel times were around 37 minutes at 3pm and the greatest uncertainty were at 5pm with an interquartile range of 47 minutes.

Figure A.188 Route 58 median and interquartile range travel times



Source: BITRE estimates.

Figure A.189 Route 58 performance over time



Source: BITRE estimates.

A60 - M3 to Southbank / Southbank to M3

This surface route travels southeast from the Melbourne CBD roughly parallel to, but south of, the M1 (East). From Southbank it passes through suburbs including Prahran, Oakleigh and Springvale before meeting the M3 at Noble Park. It is also known as the Princes Highway.

Figure A.193 A60 route map

Source: BITRE estimates.

Table A.33 A60 route travel times and congestion measures, 2022

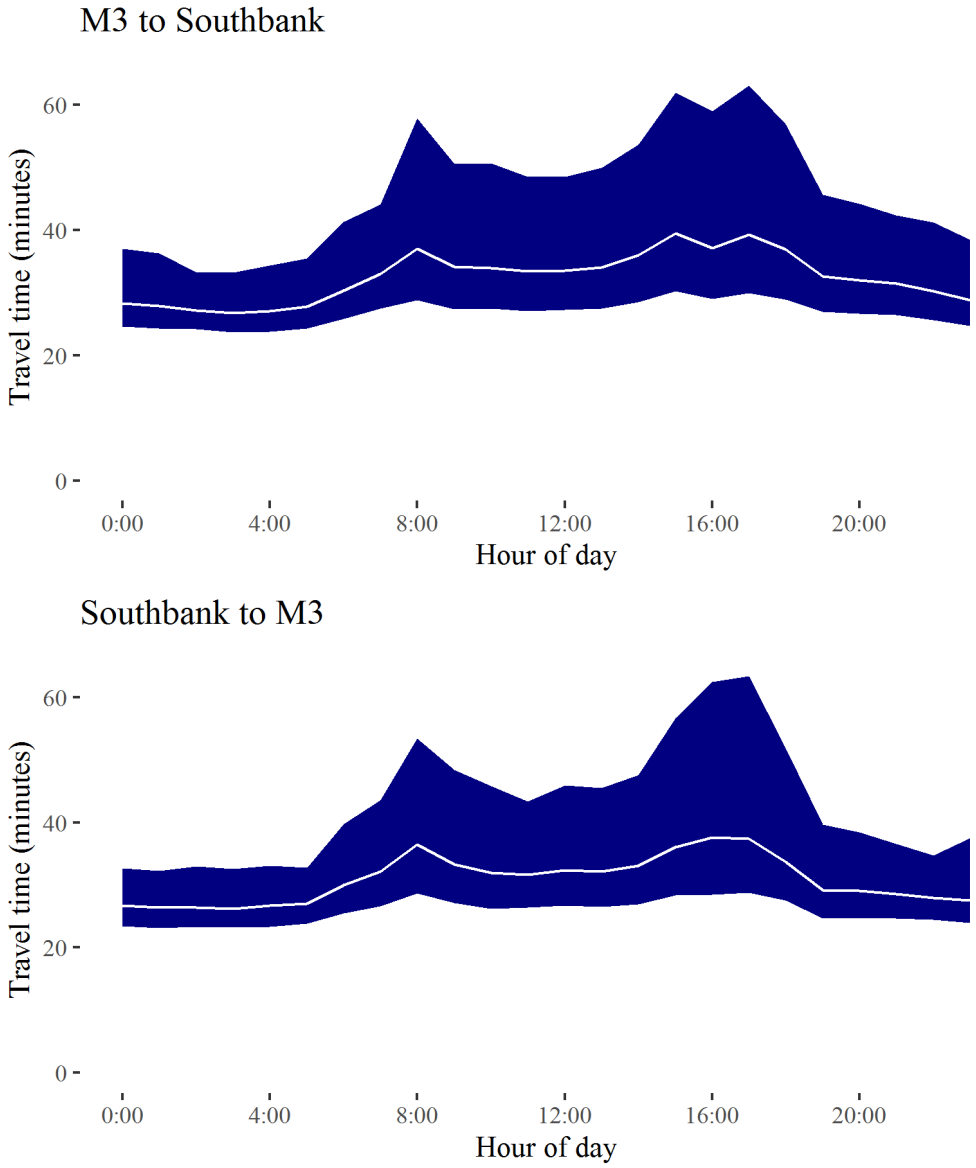
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
M3 to Southbank	00:26:46	00:39:31	1.212	00:09:06	00:33:12	2.142	26.9
Southbank to M3	00:26:12	00:37:38	1.177	00:08:54	00:34:34	1.939	26.8

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from the M3 to Southbank were at 3am and 2am, respectively, with a median travel time of approximately 27 minutes and an interquartile range of around 9 minutes. The longest median travel times was around 39.5 minutes at 3pm and the greatest uncertainty was at 5pm with an interquartile range of around 33 minutes.

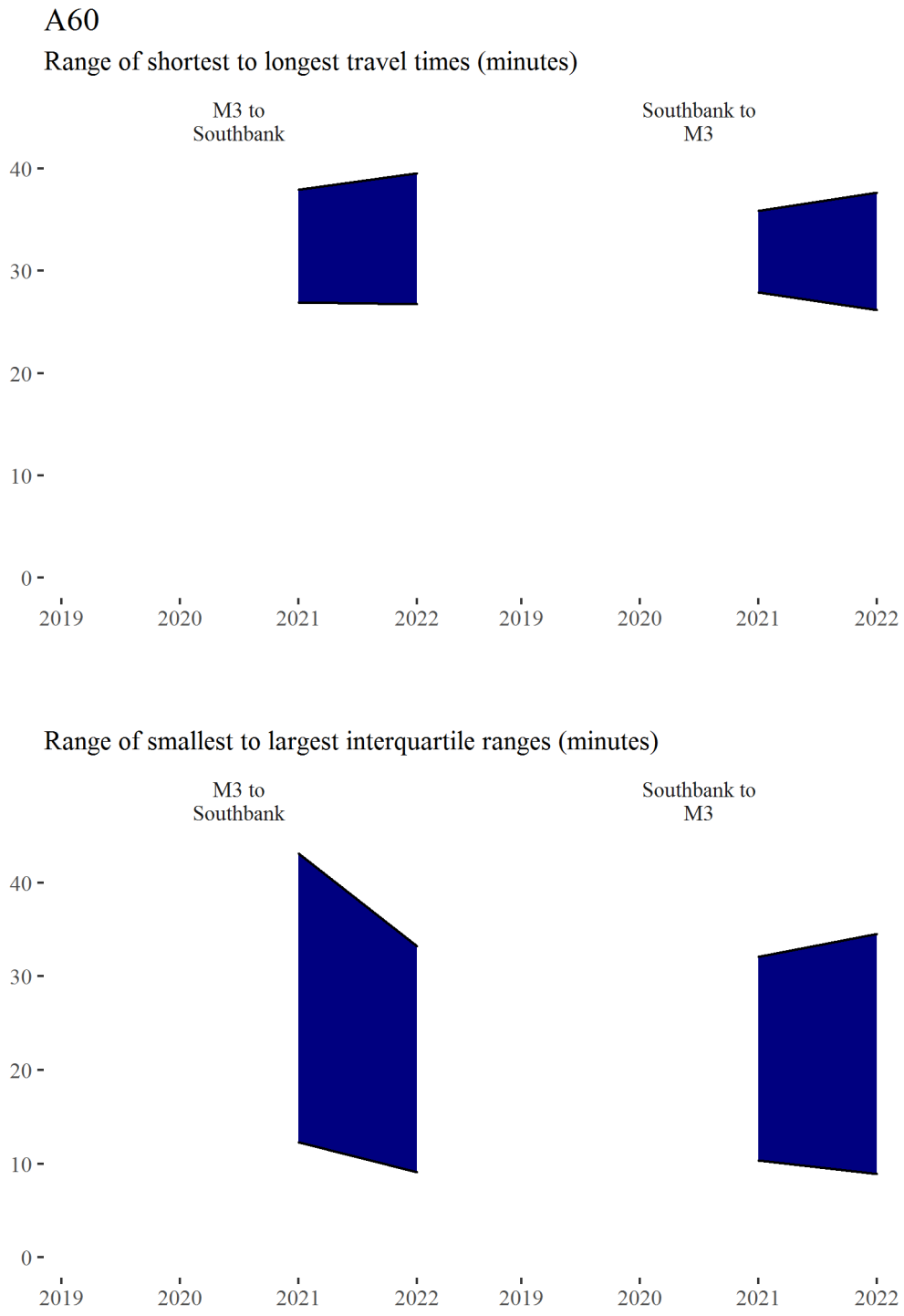
The best travel times and lowest uncertainty travelling from Southbank to M3 were at 3am and 5am, respectively, with a median travel time of approximately 26 minutes and an interquartile range of around 9 minutes. The longest median travel times were approximately 38 minutes at 4pm and the greatest uncertainty were at 5pm with an interquartile range of 34.5 minutes.

Figure A.194 A60 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.195 A60 route performance over time

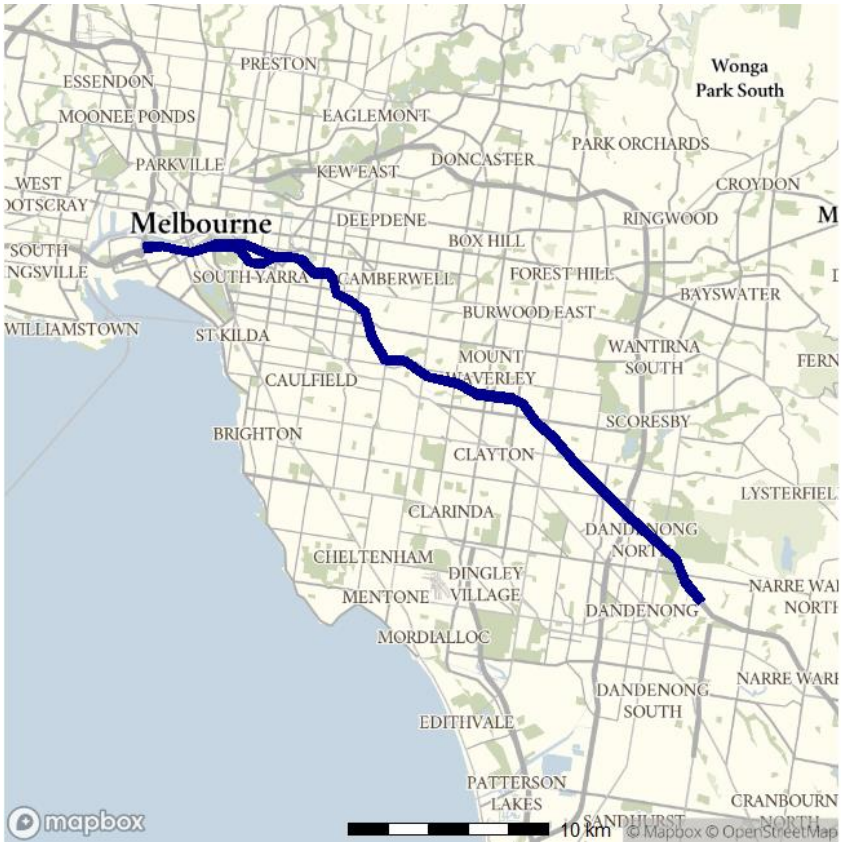


a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

M1 (East) - City to M420 / M420 to City

This route follows the M1 connecting Port Melbourne and the South Gippsland Freeway (M420) on Melbourne's southeast fringe. It serves light industrial areas around Dandenong and interregional freight from Gippsland. For most of its length it is known as the Monash Freeway.

Figure A.199 M1 (East) route map



Source: BITRE estimates.

Table A.34 M1 (East) route travel times and congestion measures, 2022

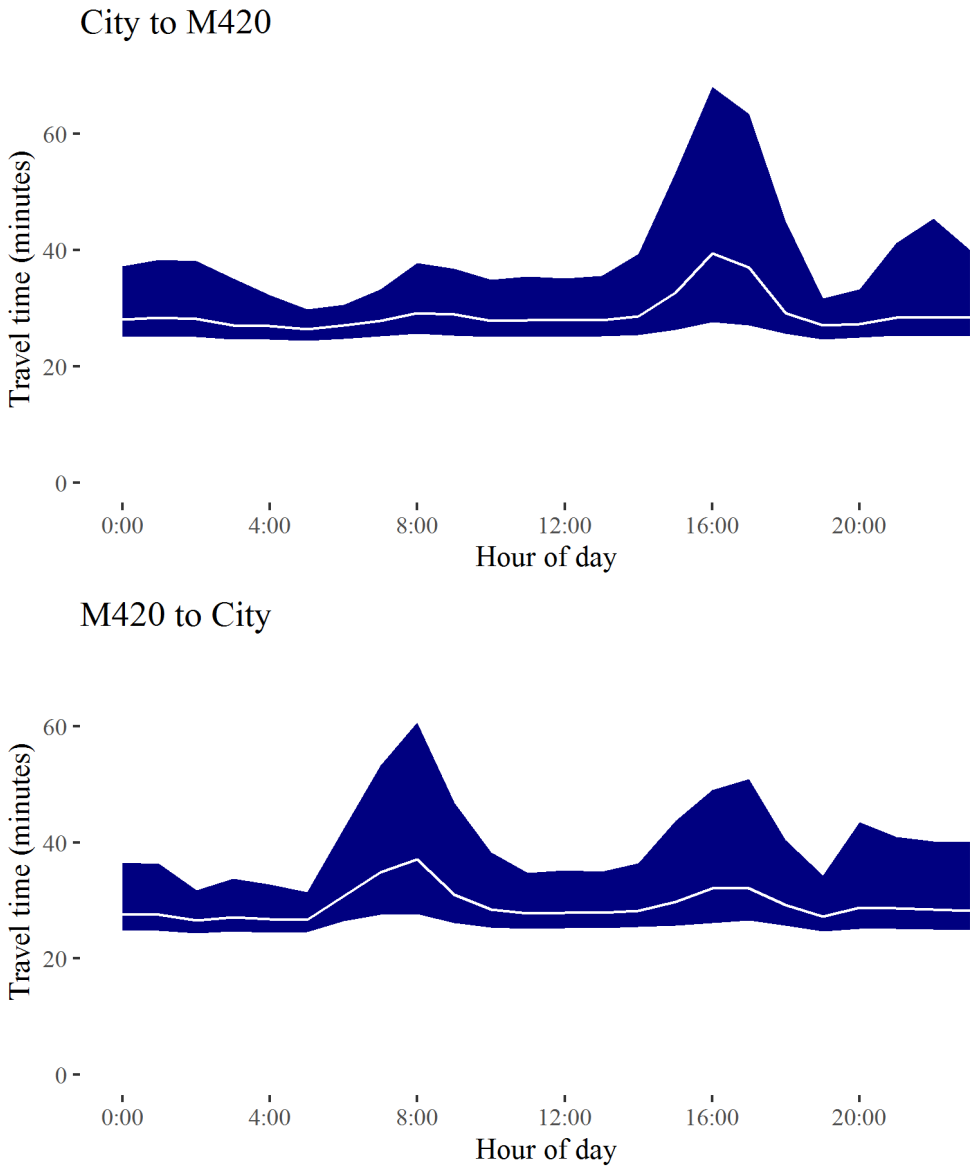
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
City to M420	00:26:23	00:39:29	1.099	00:05:27	00:40:33	2.623	36.0
M420 to City	00:26:31	00:37:02	1.101	00:06:50	00:32:59	2.180	36.5

Source: BITRE estimates.

The best median travel times for journeys from the city to the M420 was around 26 minutes at 5am and the lowest uncertainty was at 5am with an interquartile range of 5.5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 39.5 minutes and an interquartile range of around 41.5 minutes.

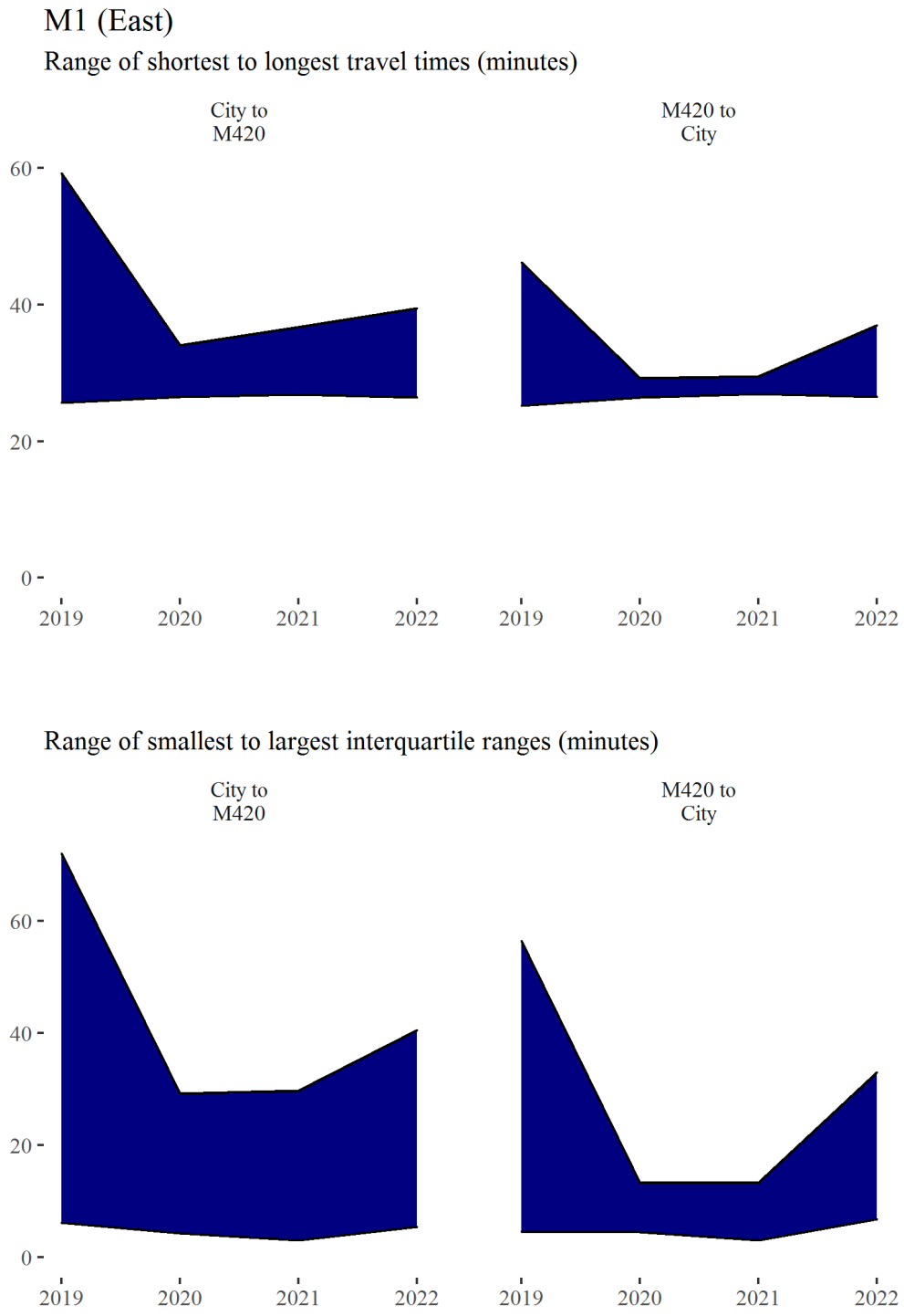
The best travel times and lowest uncertainty travelling from the M420 to the city were at 2am and 5am, respectively, with a median travel time of 26.5 minutes and an interquartile range of around 7 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 37 minutes and an interquartile range of 33 minutes.

Figure A.200 M1 (East) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.201 M1 (East) route performance over time



Source: BITRE estimates.

M1 (West) - City to M80 / M80 to City

This route follows the West Gate Freeway (M1) connecting at its confluence with the Western Ring Road (M80) at Altona and the M2 at Port Melbourne. It serves extensive freight areas around the Port precinct and in Melbourne's west.

Figure A.205 M1 (West) route map

Source: BITRE estimates.

Table A.35 M1 (West) route travel times and congestion measures, 2022

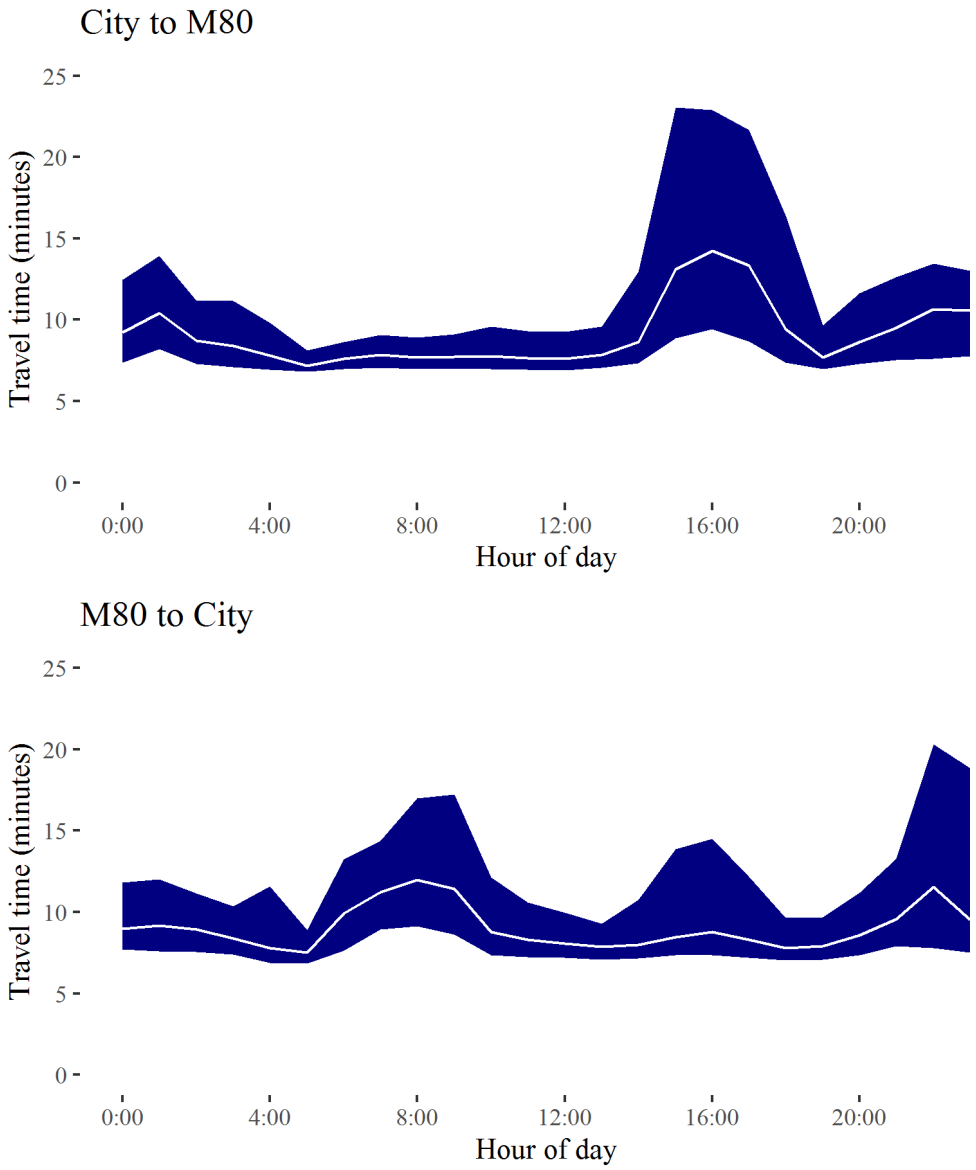
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
City to M80	00:07:11	00:14:14	1.272	00:01:19	00:14:10	3.766	9.0
M80 to City	00:07:32	00:11:58	1.199	00:02:03	00:12:30	2.497	9.0

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the city to the M80 were at 5am with a median travel time of around 7 minutes and an interquartile range of 79 seconds. The longest median travel times was around 14 minutes at 4pm and the greatest uncertainty was at 3pm with an interquartile range of around 14 minutes.

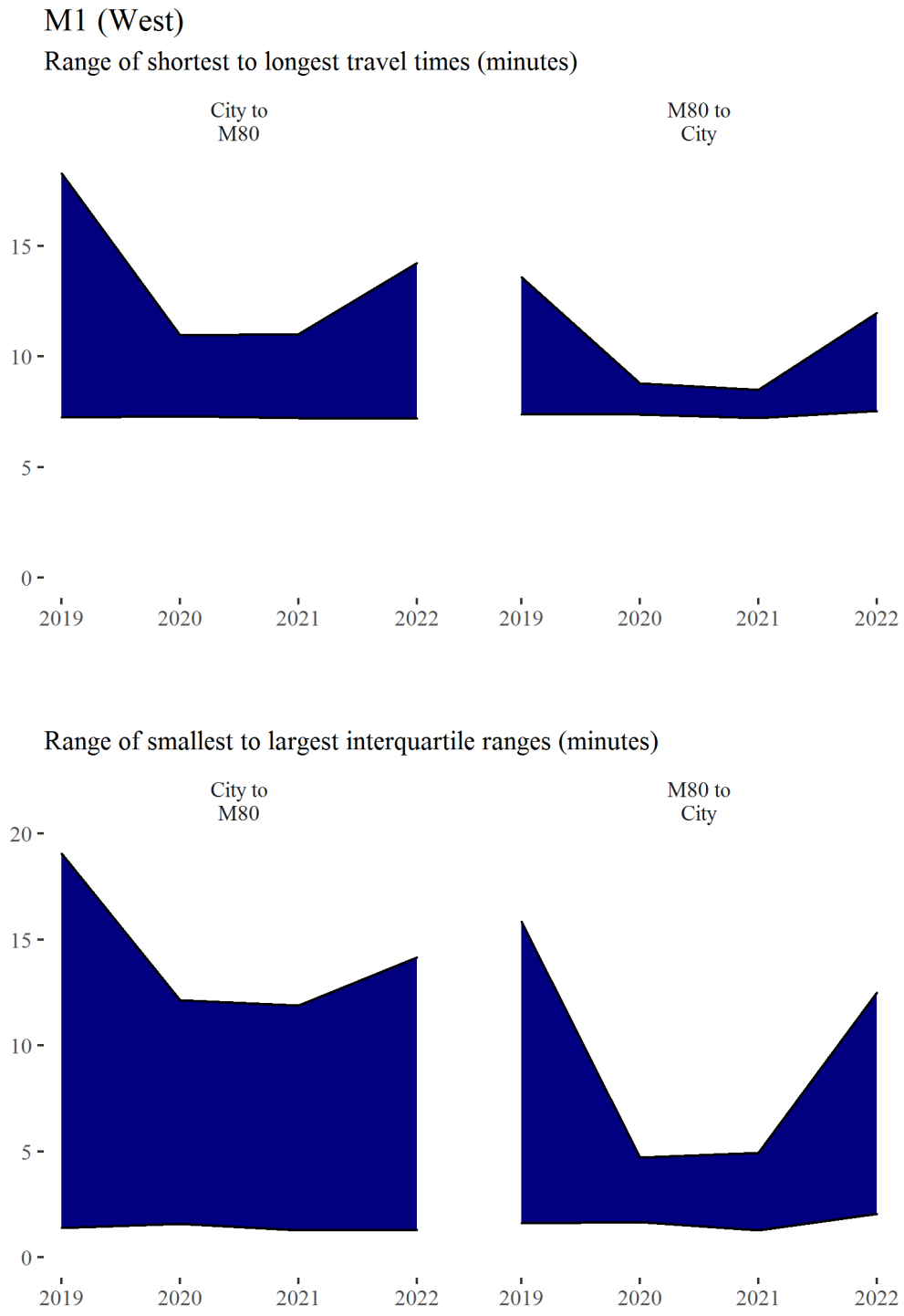
The best median travel times for journeys from the M80 to the city were 7.5 minutes at 5am and the lowest uncertainty was at 5am with an interquartile range of 2 minutes. The longest median travel times were at 8am with a median of 12 minutes and the greatest uncertainty at 10pm with an interquartile range of 12.5 minutes.

Figure A.206 M1 (West) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.207 M1 (West) route performance over time

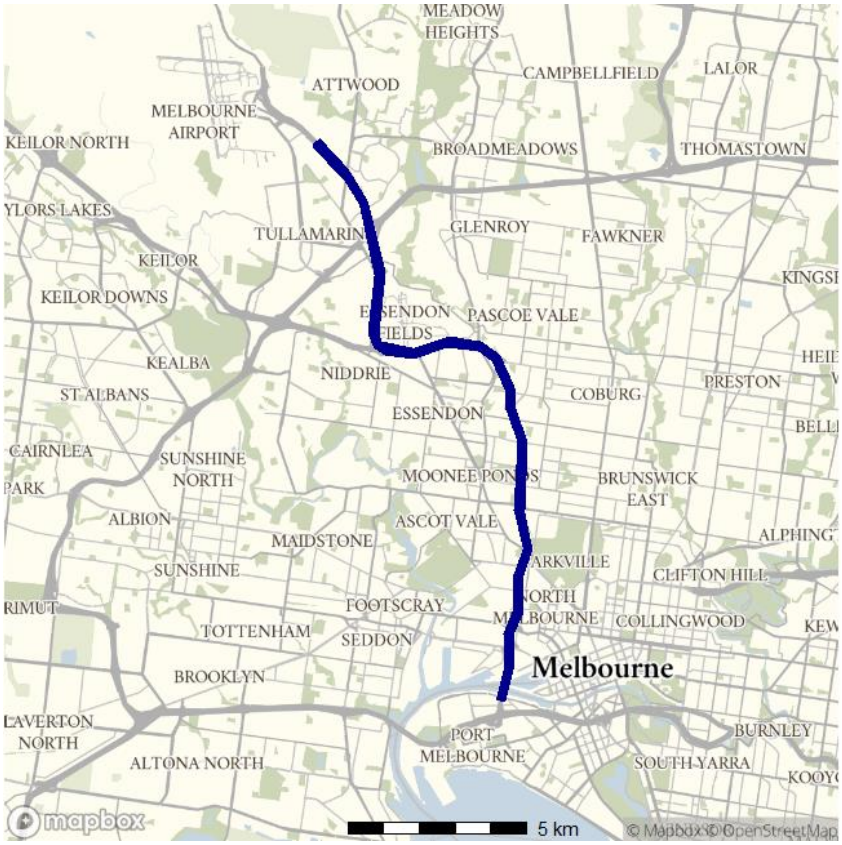


Source: BITRE estimates.

M2 - CityLink then Tullamarine / Tullamarine then CityLink

This route connects Melbourne Airport and the M1 at Port Melbourne via the CityLink toll road and Tullamarine Freeway.

Figure A.211 M2 route map



Source: BITRE estimates.

Table A.36 M2 route travel times and congestion measures, 2022

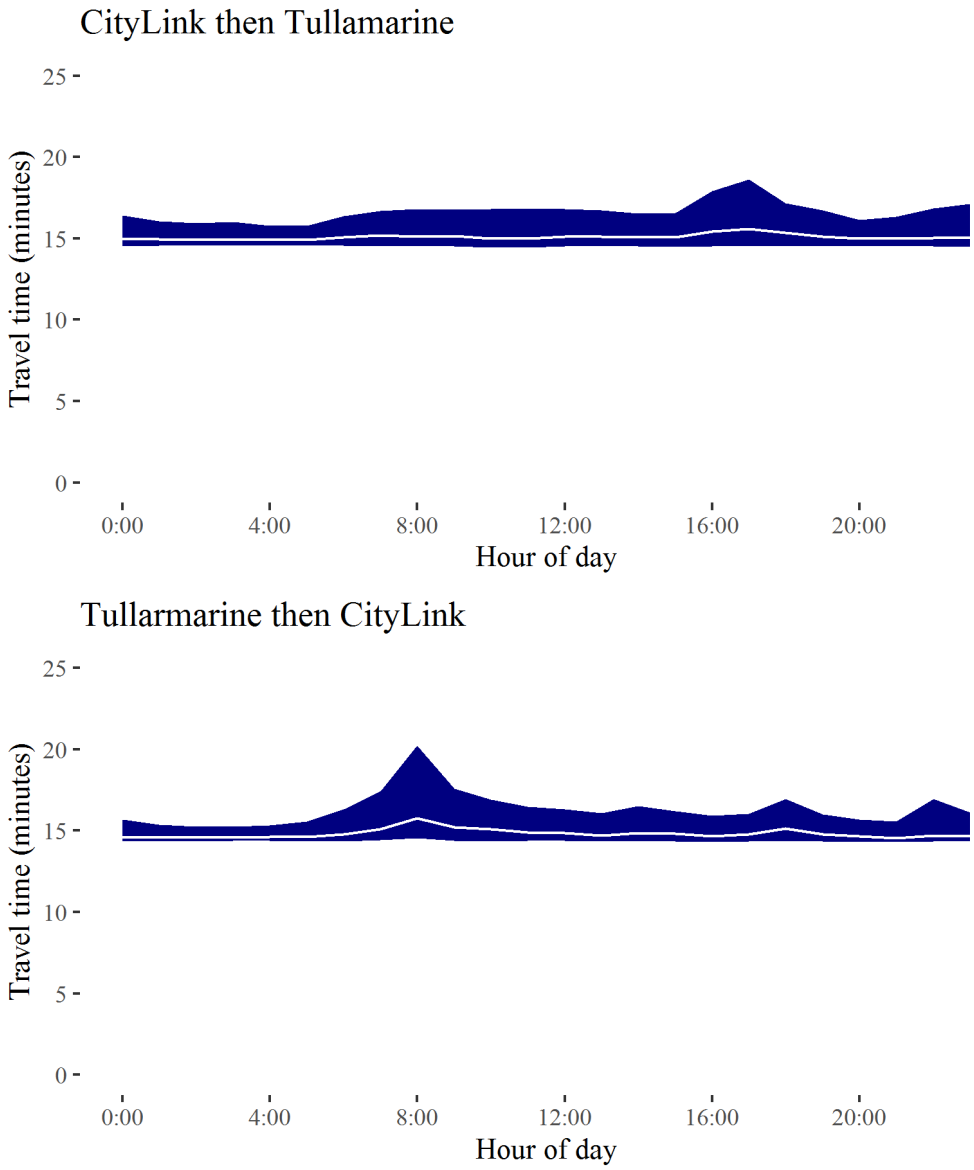
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
CityLink then Tullamarine	00:14:54	00:15:34	1.013	00:01:15	00:04:04	1.716	19.8
Tullamarine then CityLink	00:14:32	00:15:46	1.019	00:00:53	00:05:41	2.214	19.8

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from CityLink then Tullamarine were at 4am with a median travel time of 15 minutes and an interquartile range of 75 seconds. The longest median travel times and greatest uncertainty were at 5pm with a median of around 15.5 minutes and an interquartile range of 4 minutes.

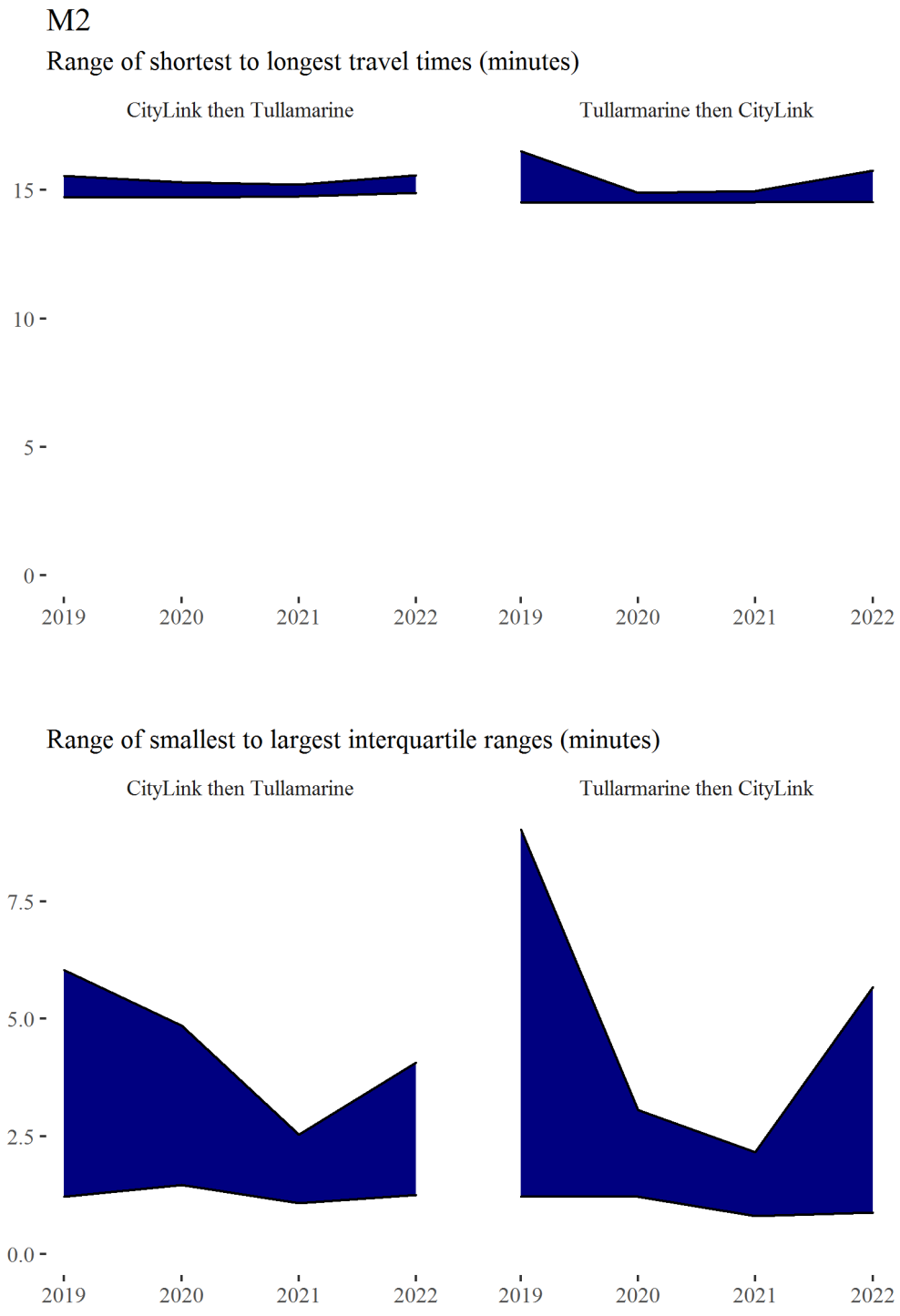
The best median travel times and lowest uncertainty for journeys from Tullamarine then CityLink were at 9pm with a median travel time of 14.5 minutes and an interquartile range of 53 seconds. The longest median travel times and greatest uncertainty were at 8am with a median of around 16 minutes and an interquartile range of approximately 6 minutes.

Figure A.212 M2 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.213 M2 route performance over time

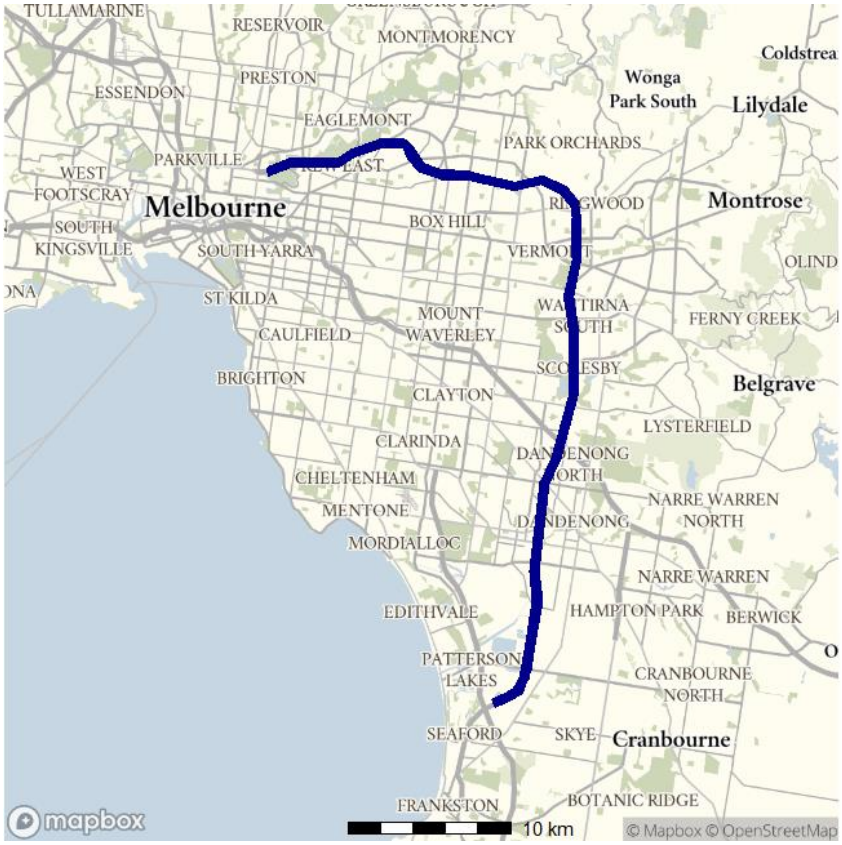


Source: BITRE estimates.

M3 - Frankston to Hoddle Street / Hoddle St to Frankston

This route runs between Abbotsford, northeast of the CBD, and Frankston in Melbourne's far south east. It uses the Eastern Freeway, Eastlink and the Frankston Freeway.

Figure A.217 M3 route map



Source: BITRE estimates.

Table A.37 M3 route travel times and congestion measures, 2022

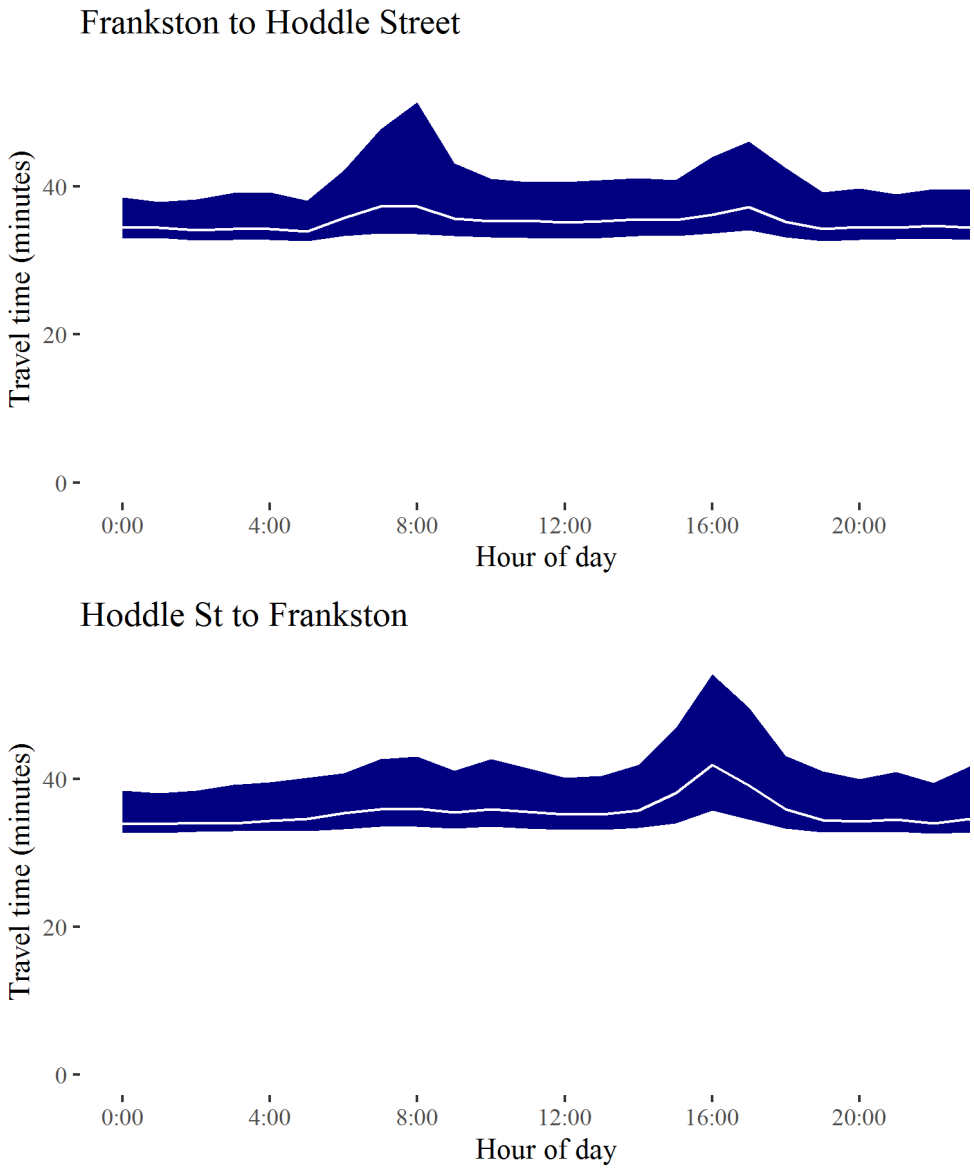
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Frankston to Hoddle Street	00:33:55	00:37:21	1.038	00:04:52	00:17:48	1.679	53.0
Hoddle St to Frankston	00:33:55	00:41:55	1.047	00:05:21	00:18:23	1.606	53.3

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Frankston to Hoddle Street were at 5am with a median travel time of around 34 minutes and an interquartile range of around 5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of approximately 37 minutes and an interquartile range of around 18 minutes.

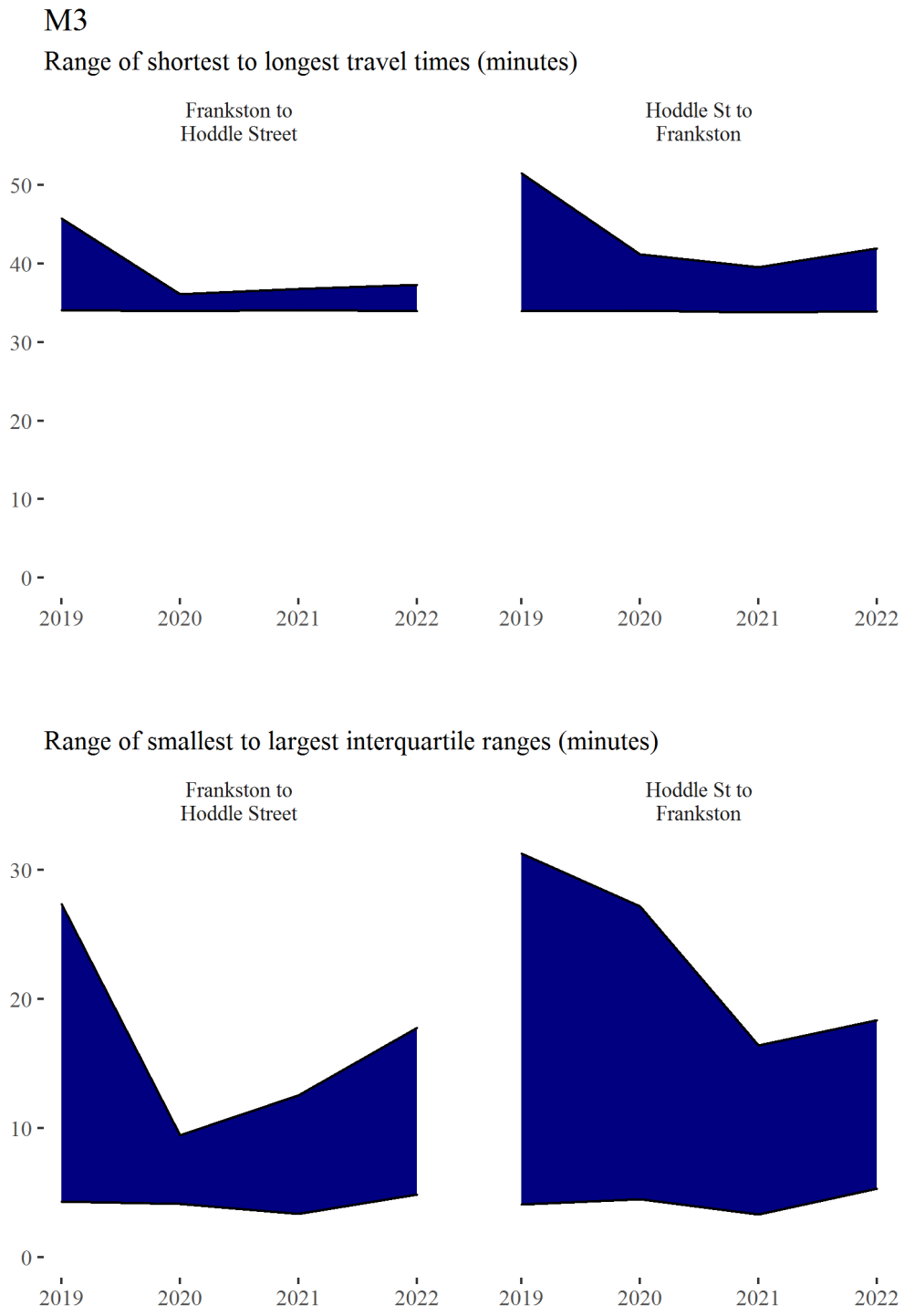
The best median travel times and least uncertainty for journeys from Hoddle St to Frankston were at midnight with a median travel time of approximately 34 minutes and an interquartile range of around 5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 42 minutes and an interquartile range of around 18 minutes.

Figure A.218 M3 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.219 M3 route performance over time



Source: BITRE estimates.

M420 - Monash Freeway to South Gippsland Highway / South Gippsland Highway to Monash Freeway

This short (4.5 kilometre) route connects the M1 (East) to the South Gippsland Highway at Lyndhurst, servicing industrial areas in Melbourne's south east, via the South Gippsland Freeway.

Figure A.223 M420 route map

Source: BITRE estimates.

Table A.38 M420 route travel times and congestion measures, 2022

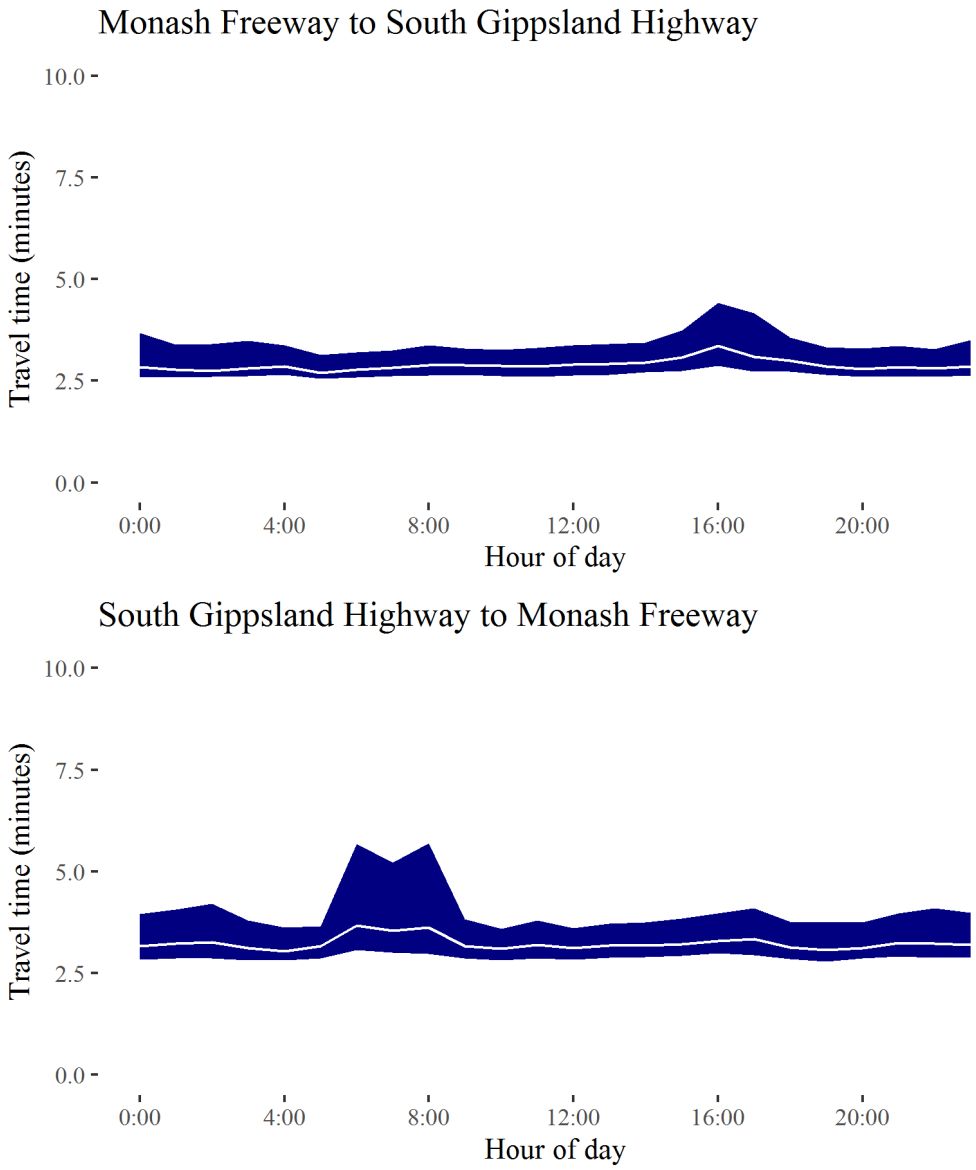
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Monash Freeway to South Gippsland Highway	00:02:41	00:03:22	1.073	00:00:35	00:01:32	1.389	4.2
South Gippsland Highway to Monash Freeway	00:03:03	00:03:40	1.062	00:00:46	00:02:43	1.520	4.6

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the Monash Freeway to South Gippsland Highway were at 5am with a median travel time of approximately 3 minutes and an interquartile range of 35 seconds. The longest median travel times and greatest uncertainty were at 4pm with a median of around 3 minutes and an interquartile range of 1.5 minutes.

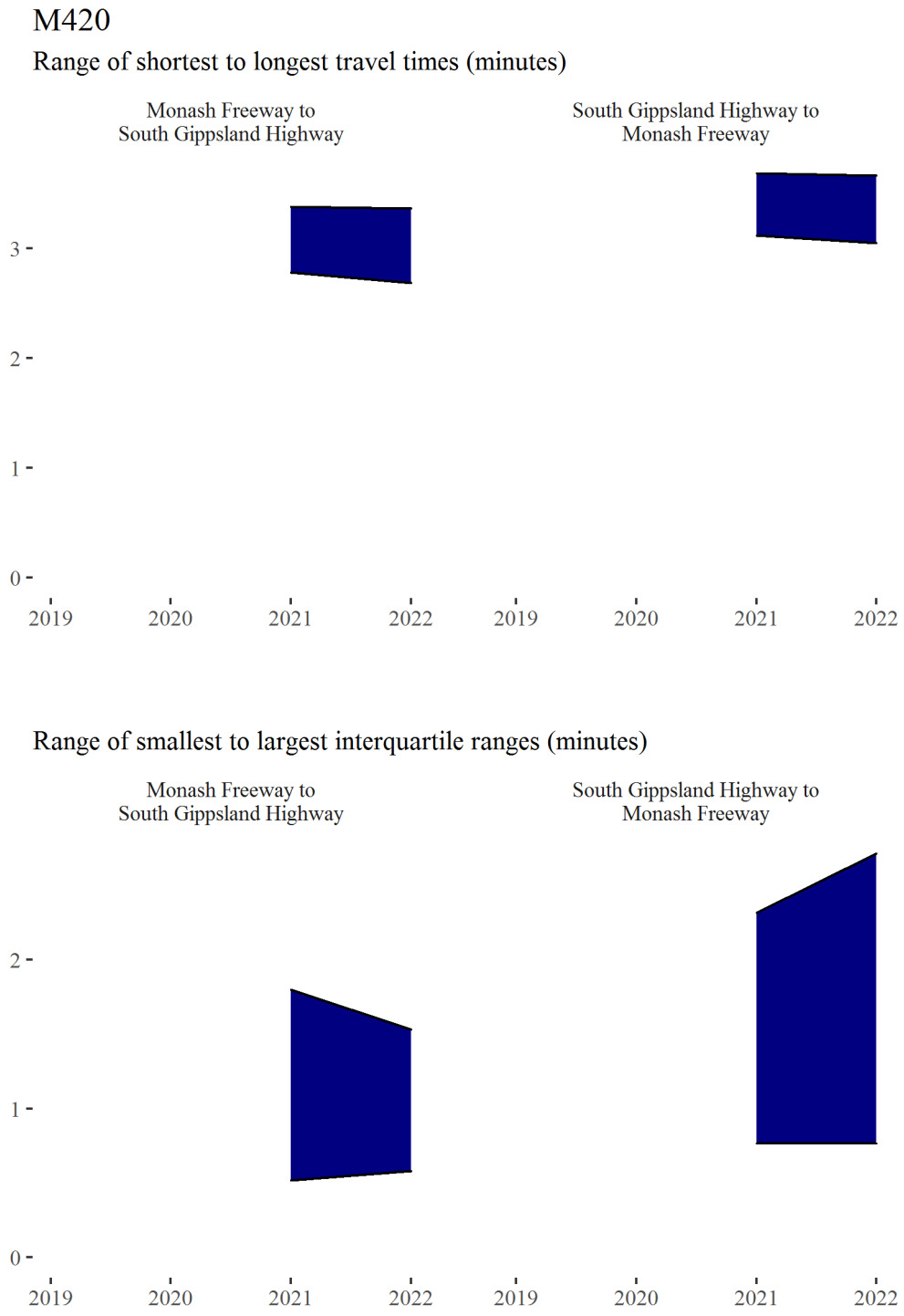
The best median travel times and lowest uncertainty for journeys from South Gippsland Highway to the Monash Freeway were at 4am with a median travel time of around 3 minutes and an interquartile range of 46 seconds. The longest median travel times was at 6am with a median of around 4 minutes and the greatest uncertainty was at 8am with an interquartile range of around 3 minutes.

Figure A.224 M420 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.225 M420 route performance over time



a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

M79 - Essendon to Gap Road / Gap Road to Essendon

This motorway route follows the A79/M79 from Gap Road, west of Sunbury, to Essendon where it joins the CityLink toll road. For most of its length it is known as the Calder Freeway.

Figure A.229 M79 route map

Source: BITRE estimates.

Table A.39 M79 route travel times and congestion measures, 2022

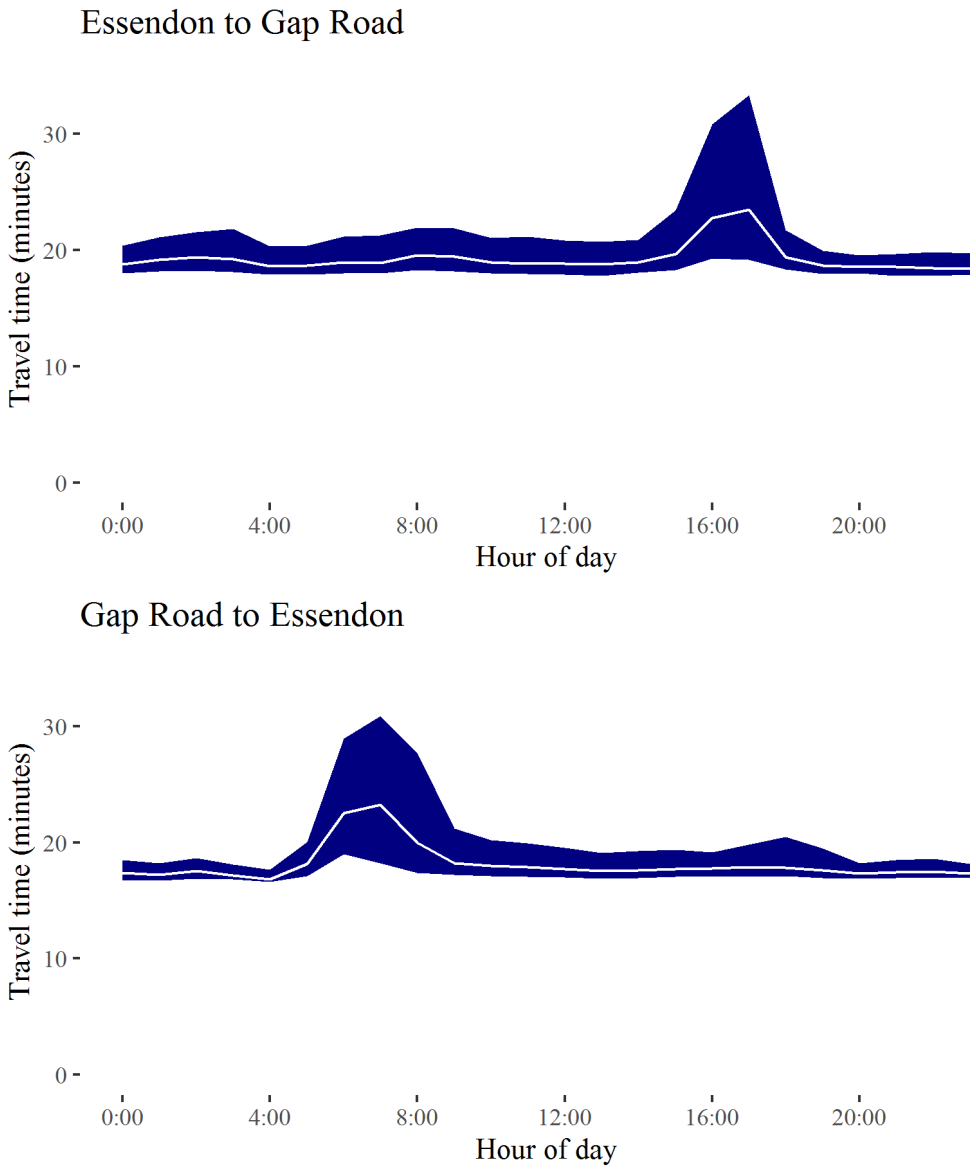
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Essendon to Gap Road	00:18:25	00:23:30	1.048	00:01:31	00:14:10	2.454	27.3
Gap Road to Essendon	00:16:48	00:23:16	1.079	00:01:02	00:12:40	3.166	27.2

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Essendon to Gap Road were at 11pm and 8pm, respectively, with a median travel time of approximately 18 minutes and an interquartile range of 1.5 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of 23.5 minutes and an interquartile range of around 14 minutes.

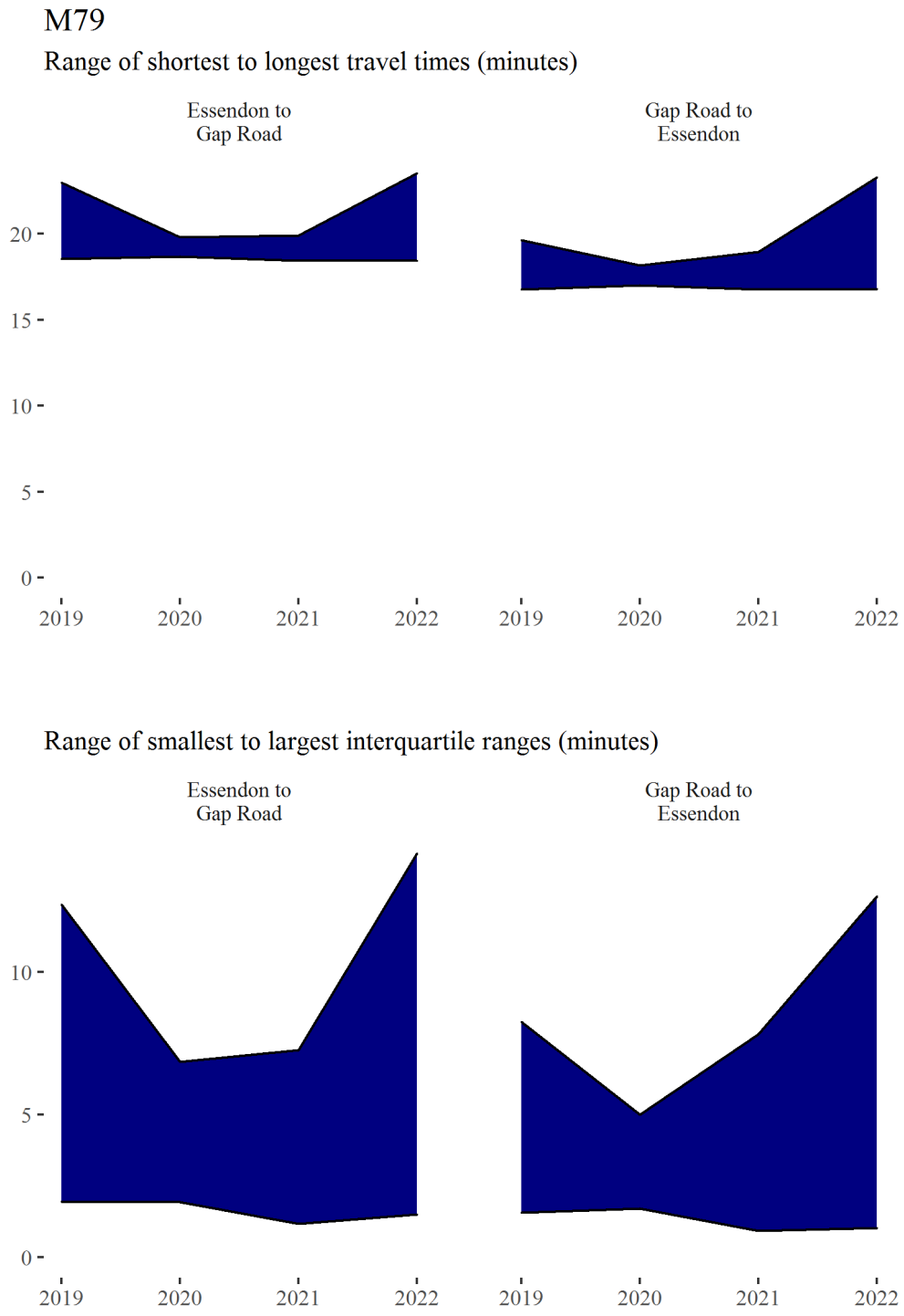
The best median travel times for journeys from Gap Road to Essendon was around 17 minutes at 4am and the lowest uncertainty was at 4am with an interquartile range of just over 1 minute. The longest median travel times and greatest uncertainty were at 7am with a median of approximately 23 minutes and an interquartile range of just under 13 minutes.

Figure A.230 M79 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.231 M79 route performance over time



Source: BITRE estimates.

M80 - Altona to Greensborough / Greensborough to Altona

This 38 kilometre route follows the M80 (Western Ring Road) in the west and north of Melbourne. It passes through the western outskirts of the Melbourne metropolitan area as the Western Ring Road, meets the M1 and proceeds to the Greensborough Bypass in north-east Melbourne as the Metropolitan Ring Road.

Figure A.235 M80 route map

Source: BITRE estimates.

Table A.40 M80 route travel times and congestion measures, 2022

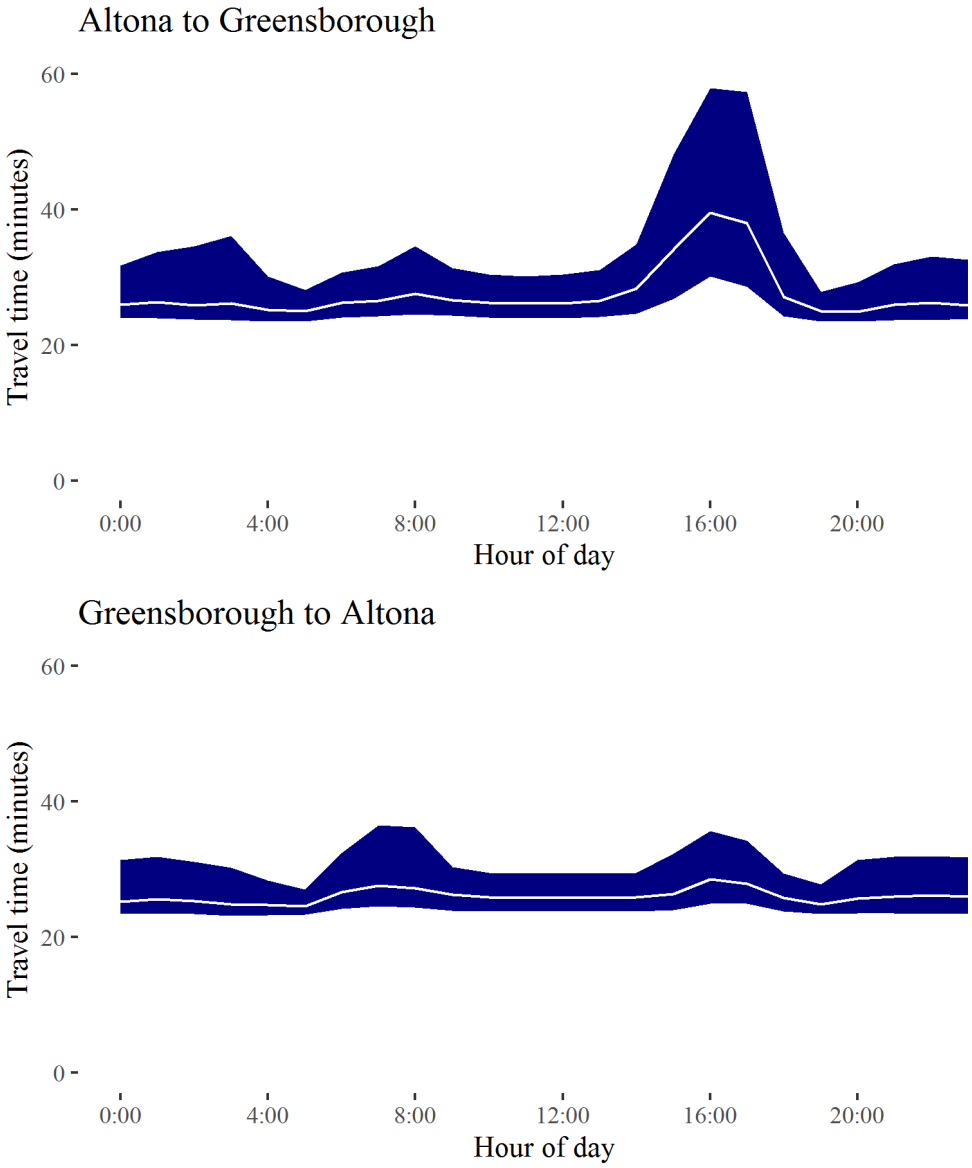
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Altona to Greensborough	00:24:56	00:39:29	1.105	00:04:18	00:28:41	2.377	37.5
Greensborough to Altona	00:24:32	00:28:35	1.061	00:03:42	00:11:52	2.007	37.4

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Altona to Greensborough were at 8pm and 7pm with a median travel time of around 25 minutes and an interquartile range of just over 4 minutes. The longest median travel times were at 4pm with a median of 39.5 minutes and the greatest uncertainty at 5pm with an interquartile range of around 29 minutes.

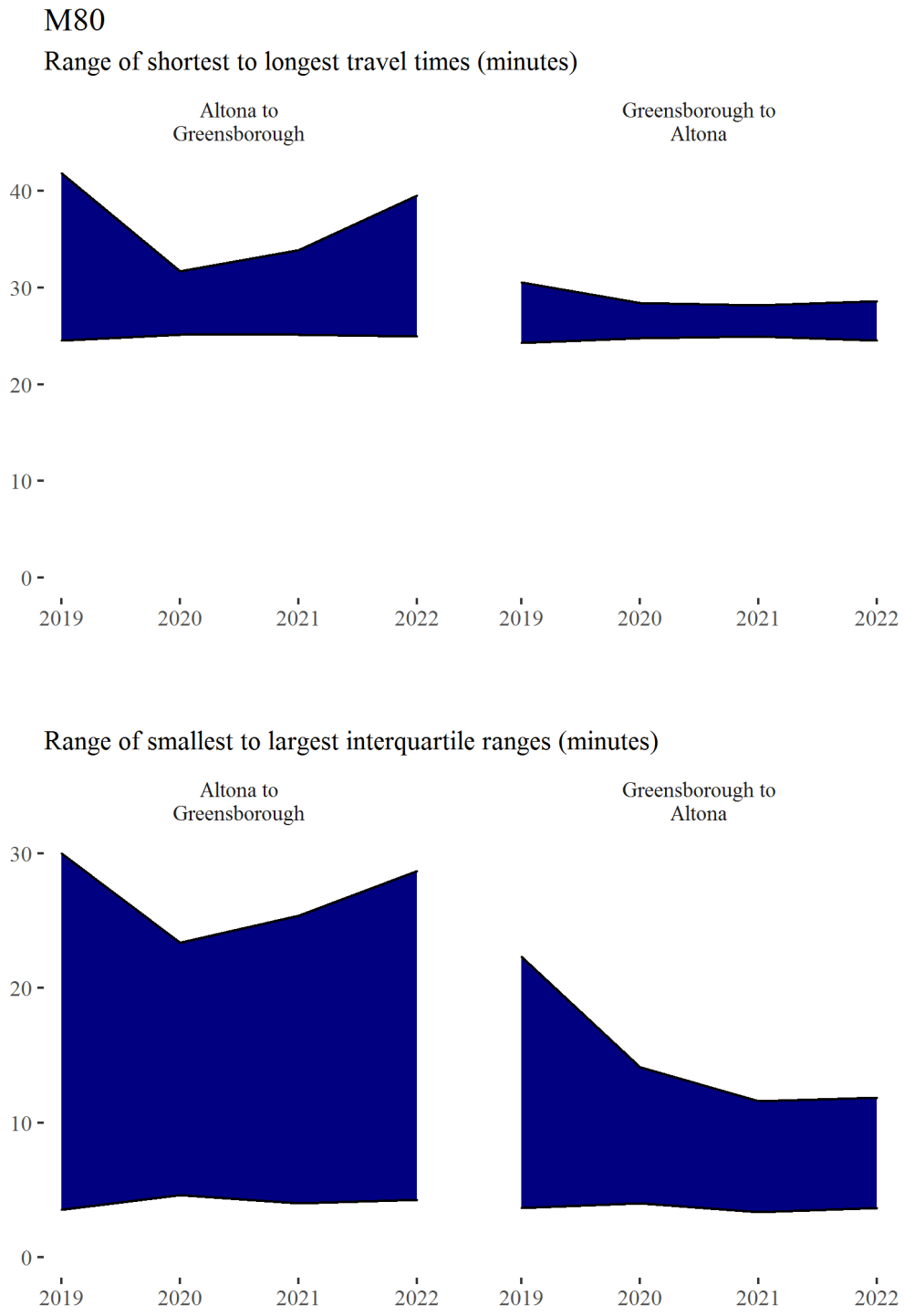
The best median travel times and lowest uncertainty for journeys from Greensborough to Altona were at 5am with a median travel time of 24.5 minutes and an interquartile range of around 4 minutes. The longest median travel times was 28.5 minutes at 4pm and the greatest uncertainty was at 7am with an interquartile range of around 12 minutes.

Figure A.236 M80 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.237 M80 route performance over time



Source: BITRE estimates.

Princes Freeway - Geelong Ring Road to M80 / M80 to Geelong Ring Road

This route connects Geelong to the Melbourne orbital road network. It also serves Melbourne's expanding Western Suburbs.

Figure A.241 Princes Freeway route map

Source: BITRE estimates.

Table A.41 Princes Freeway route travel times and congestion measures, 2022

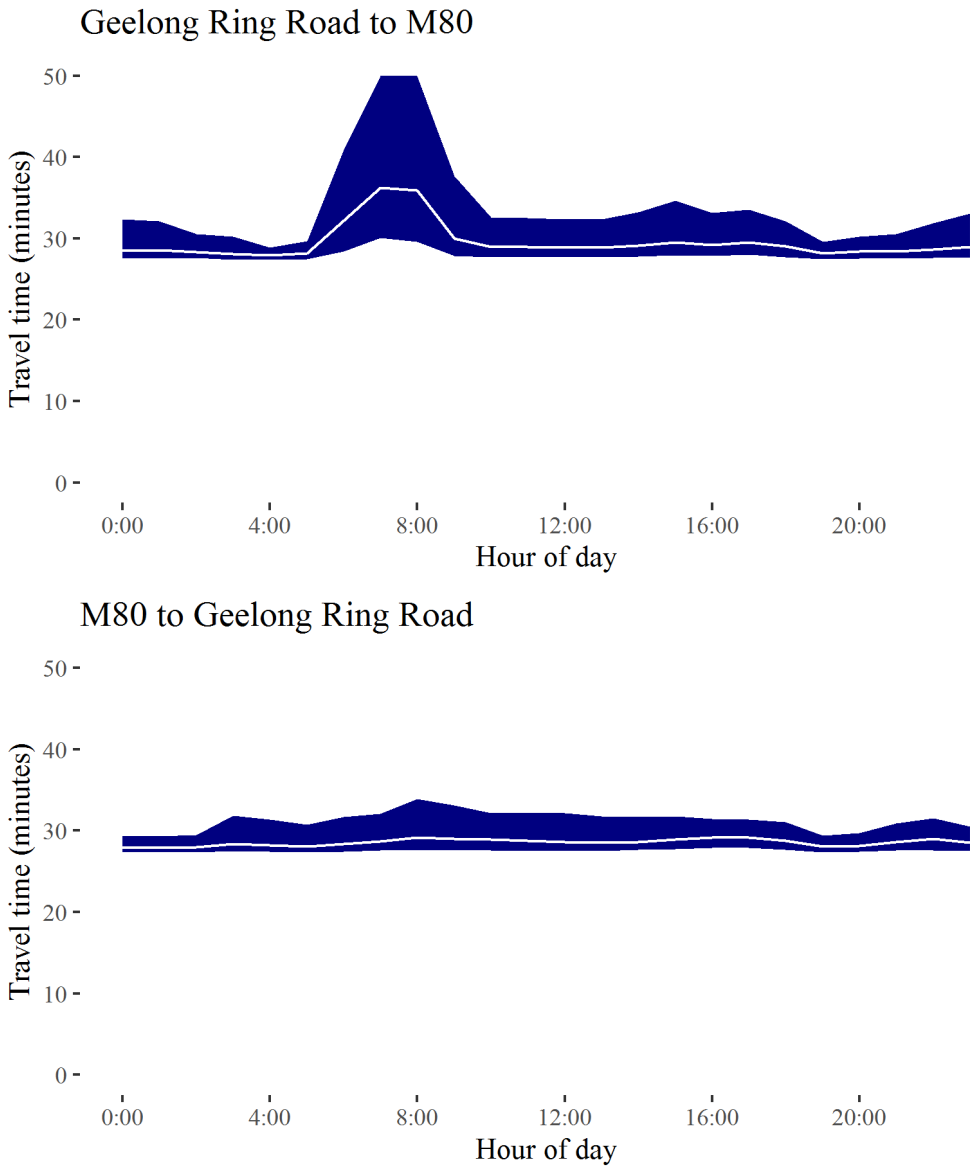
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Geelong Ring Road to M80	00:27:58	00:36:11	1.055	00:01:31	00:20:21	4.009	45.4
M80 to Geelong Ring Road	00:27:53	00:29:11	1.024	00:01:58	00:06:17	1.898	45.1

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Geelong Ring Road to the M80 were at 4am with a median travel time of 28 minutes and an interquartile range of 1.5 minutes. The longest median travel times was around 36 minutes at 7am and the greatest uncertainty was at 8am with an interquartile range of around 20 minutes.

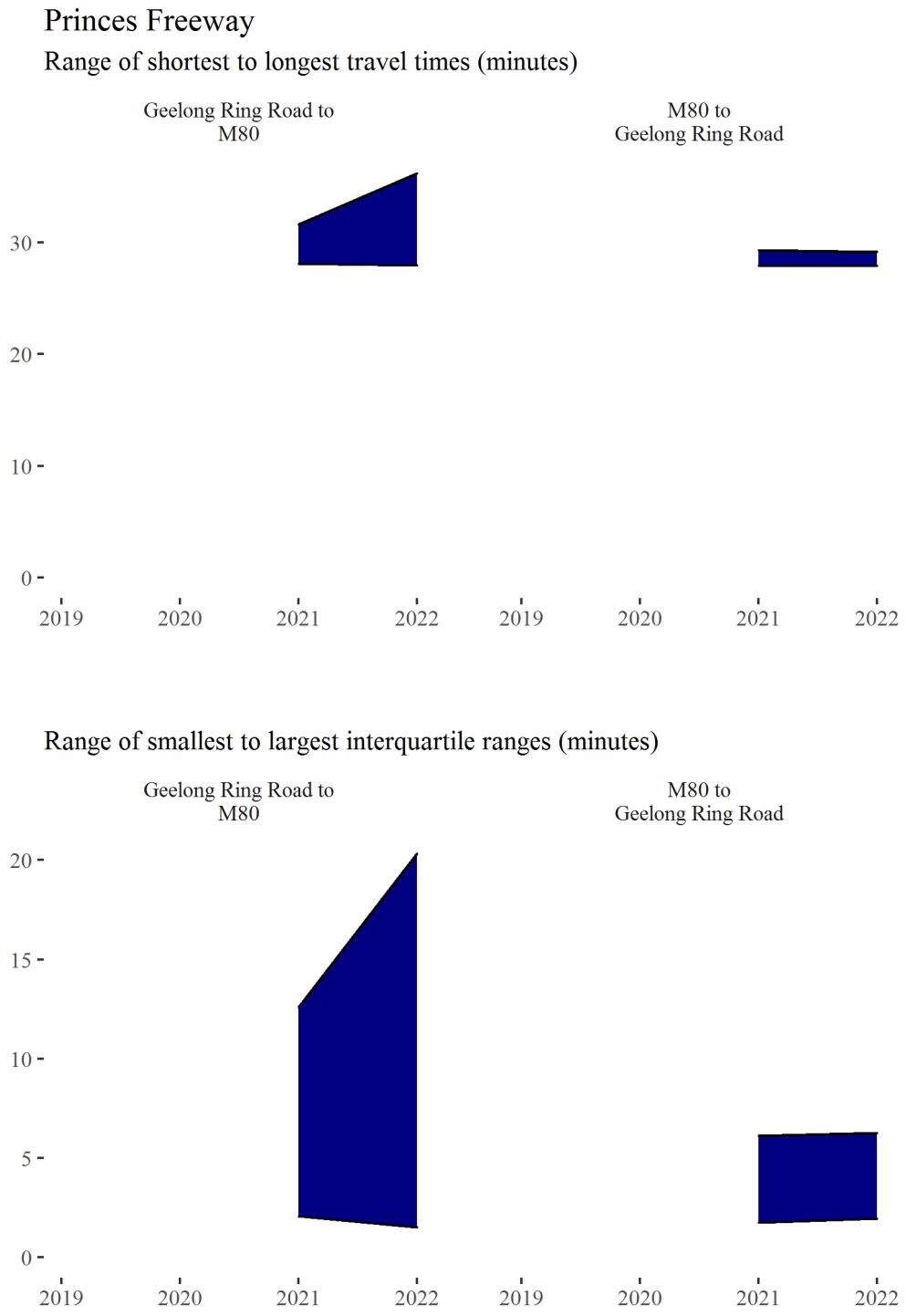
The best median travel times and lowest uncertainty for journeys from the M80 to Geelong Ring Road were at 1am with a median travel time of just under 28 minutes and an interquartile range of 2 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of around 29 minutes and an interquartile range of approximately 6 minutes.

Figure A.242 Princes Freeway route median and interquartile range travel times



Source: BITRE estimates.

Figure A.243 Princes Freeway route performance over time

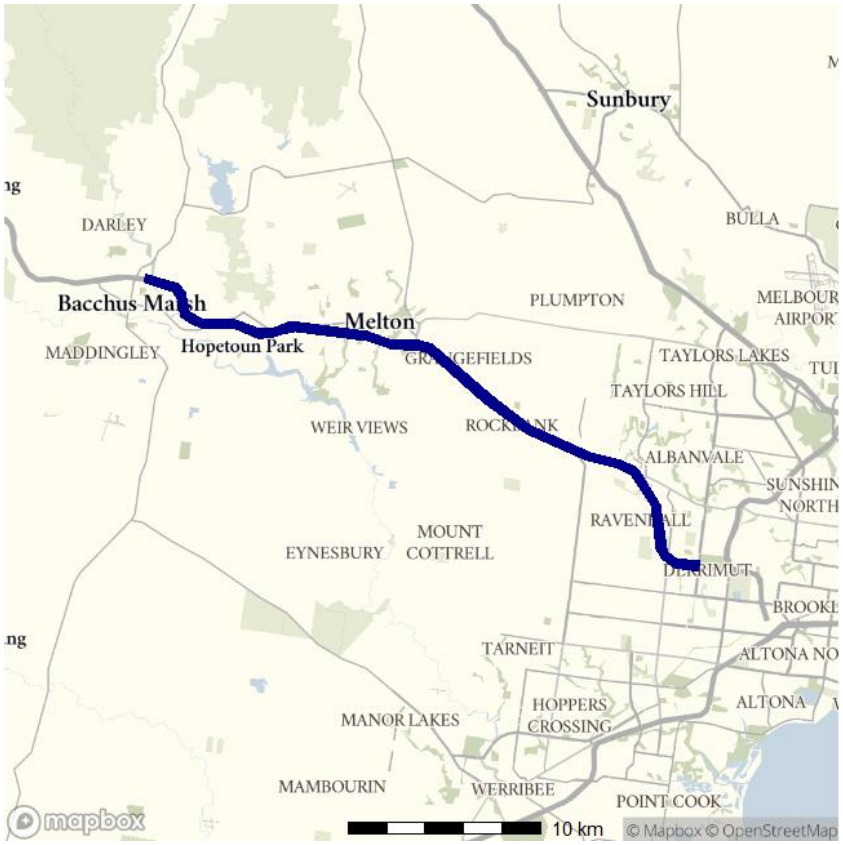


a. Shortest and longest route travel times only available for 2021 and 2022 for this route.
Source: BITRE estimates.

Western Freeway - Bacchus Marsh to Derrimut / Derrimut to Bacchus Marsh

This route follows the Western Freeway (M8) linking Bacchus Marsh west of Melbourne and Derrimut where it meets the M80 (Western Ring Road).

Figure A.247 Western Freeway route map



Source: BITRE estimates.

Table A.42 Western Freeway route travel times and congestion measures, 2022

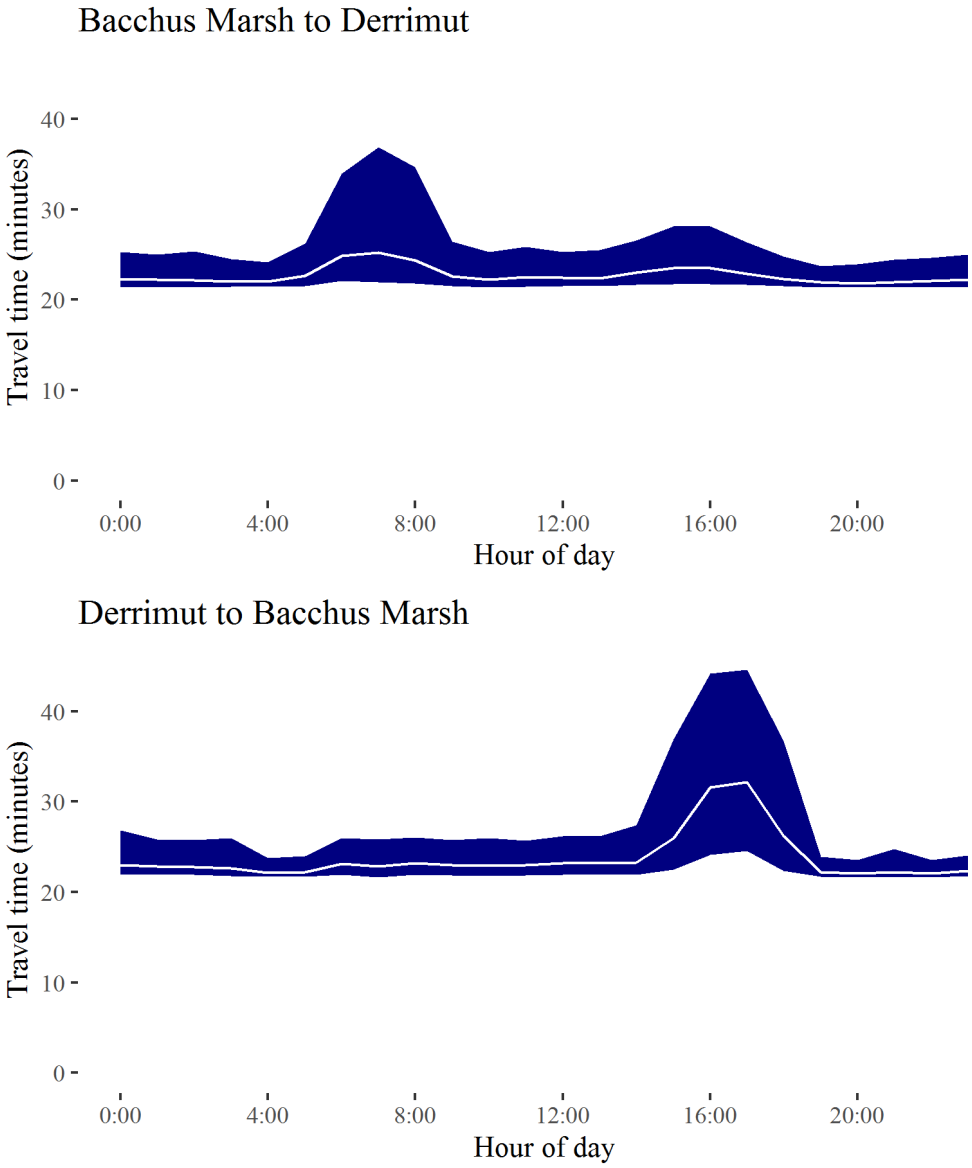
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Bacchus Marsh to Derrimut	00:21:49	00:25:12	1.041	00:02:20	00:14:54	2.190	35.7
Derrimut to Bacchus Marsh	00:22:04	00:32:11	1.077	00:01:56	00:20:04	3.007	35.6

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Bacchus Marsh to Derrimut were at 8pm and 7pm, respectively, with a median travel time of around 22 minutes and an interquartile range of around 2 minutes. The longest median travel times and greatest uncertainty were at 7am with a median of just over 25 minutes and an interquartile range of approximately 15 minutes.

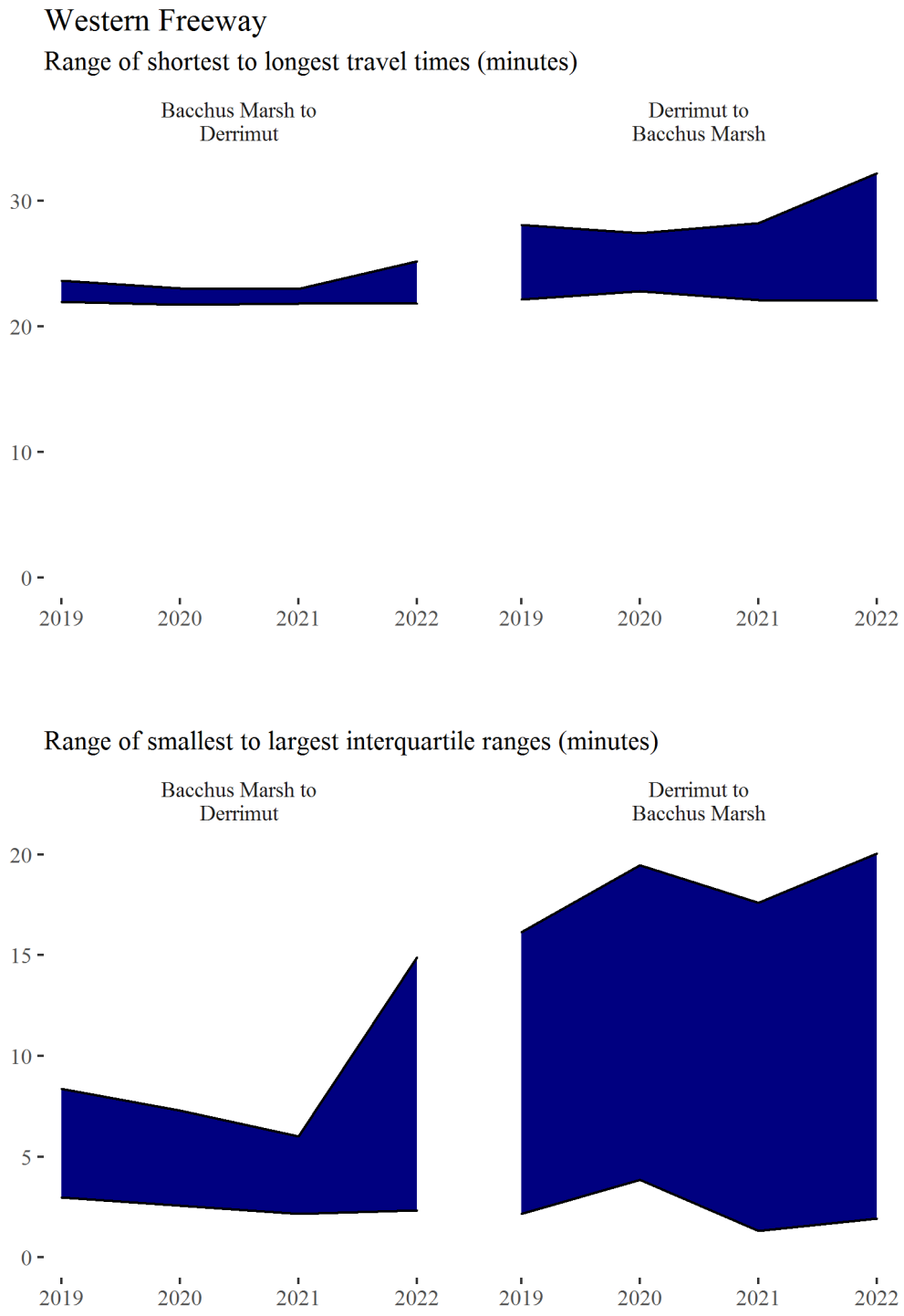
The best median travel times and least uncertainty for journeys from Derrimut to Bacchus Marsh were at 8pm with a median travel time of 22 minutes and an interquartile range of 2 minutes. The longest median travel times was at 5pm with a median of around 32 minutes and the greatest uncertainty was at 4pm with an interquartile range of 20 minutes.

Figure A.248 Western Freeway route median and interquartile range travel times



Source: BITRE estimates.

Figure A.249 Western Freeway route performance over time



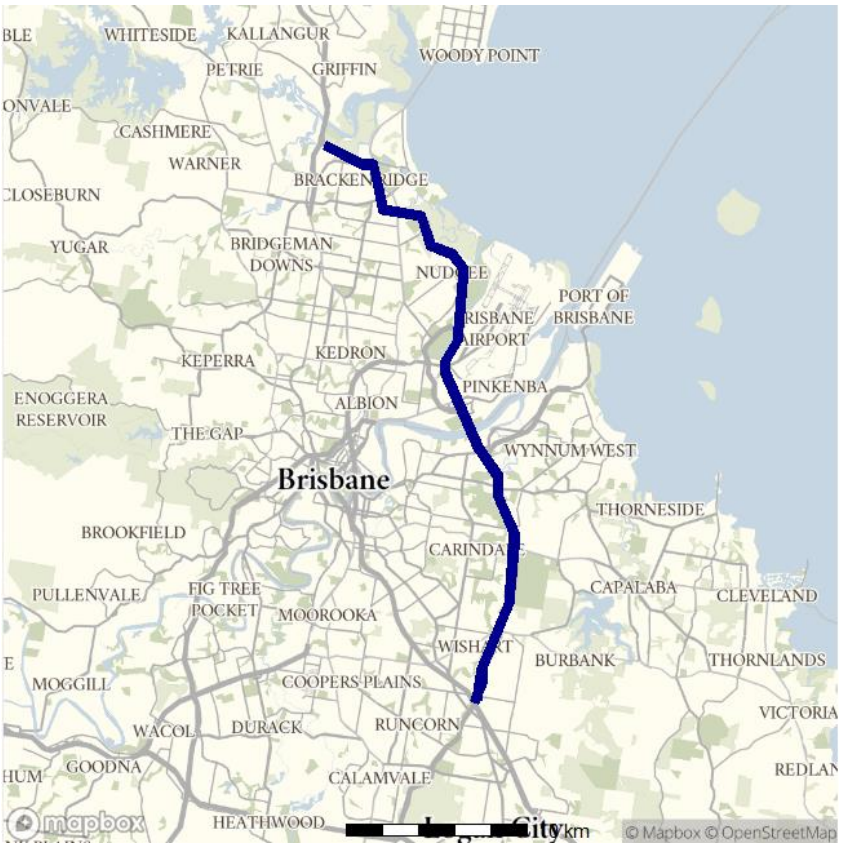
Source: BITRE estimates.

Brisbane routes

M1 - Bruce Highway to Pacific Motorway / Pacific Motorway to Bruce Highway

This route extends from the Gympie Arterial Road (M3) at Bald Hills in the north of Brisbane to Eight Mile Plains in the south of Brisbane, crossing the Brisbane River near Eagle Farm. It encompasses most of the Gateway Motorway. It is a major intercity and interregional route through its connections with the Pacific Motorway and Bruce Highway. This route also connects to the M2, M3, M4, M6 and M7 (via Southern Cross Way) motorways also covered in this report.

Figure A.253 M1 route map



Source: BITRE estimates.

Table A.43 M1 route travel times and congestion measures, 2022

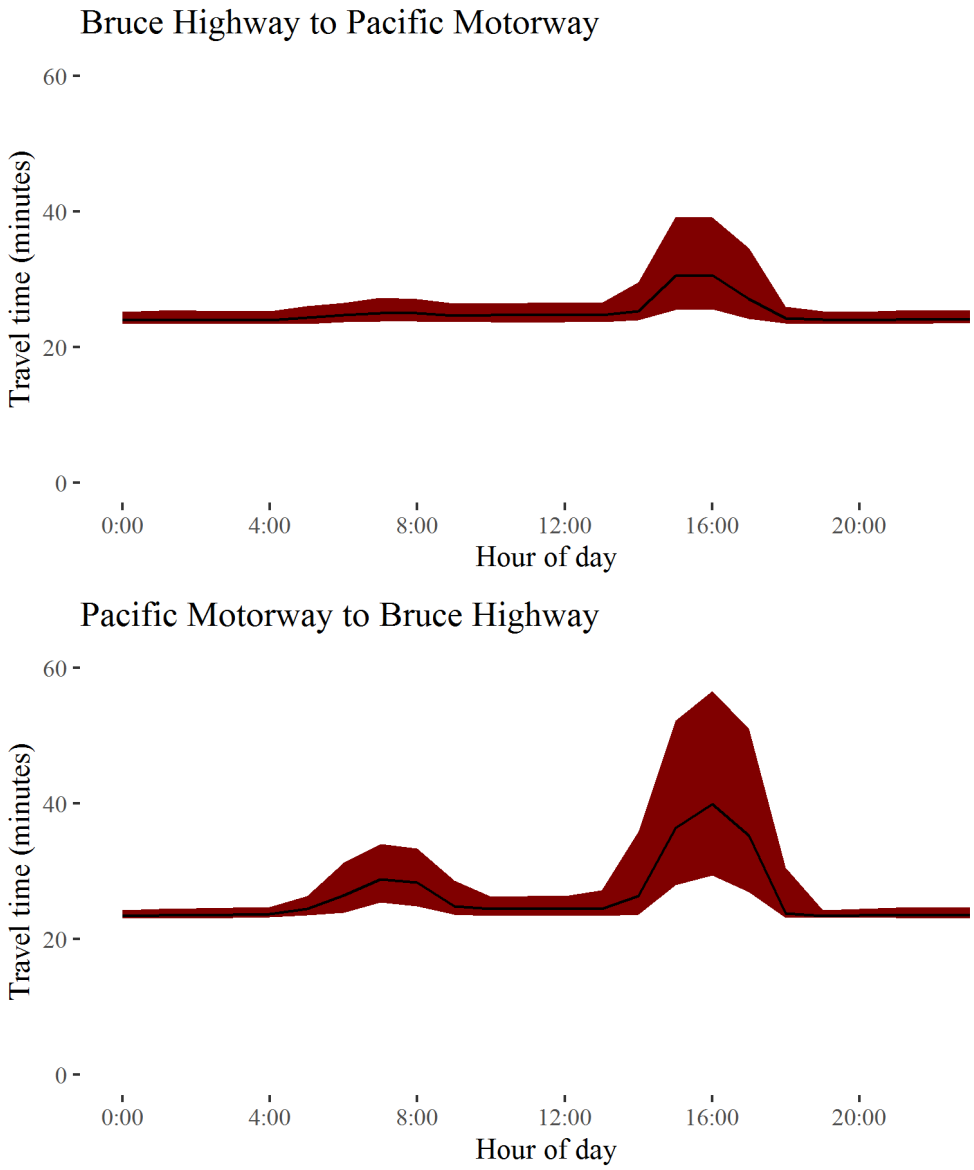
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Bruce Highway to Pacific Motorway	00:23:54	00:30:36	1.046	00:01:48	00:13:43	2.120	37.7
Pacific Motorway to Bruce Highway	00:23:26	00:39:58	1.117	00:01:10	00:27:13	5.555	37.5

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from the Bruce Highway to the Pacific Motorway were at 2am and 8pm, respectively, with a median travel time of approximately 24 minutes and an interquartile range of around 2 minutes. The longest median travel times was around 30.5 minutes at 4pm and the greatest uncertainty was at 3pm with an interquartile range of just under 14 minutes.

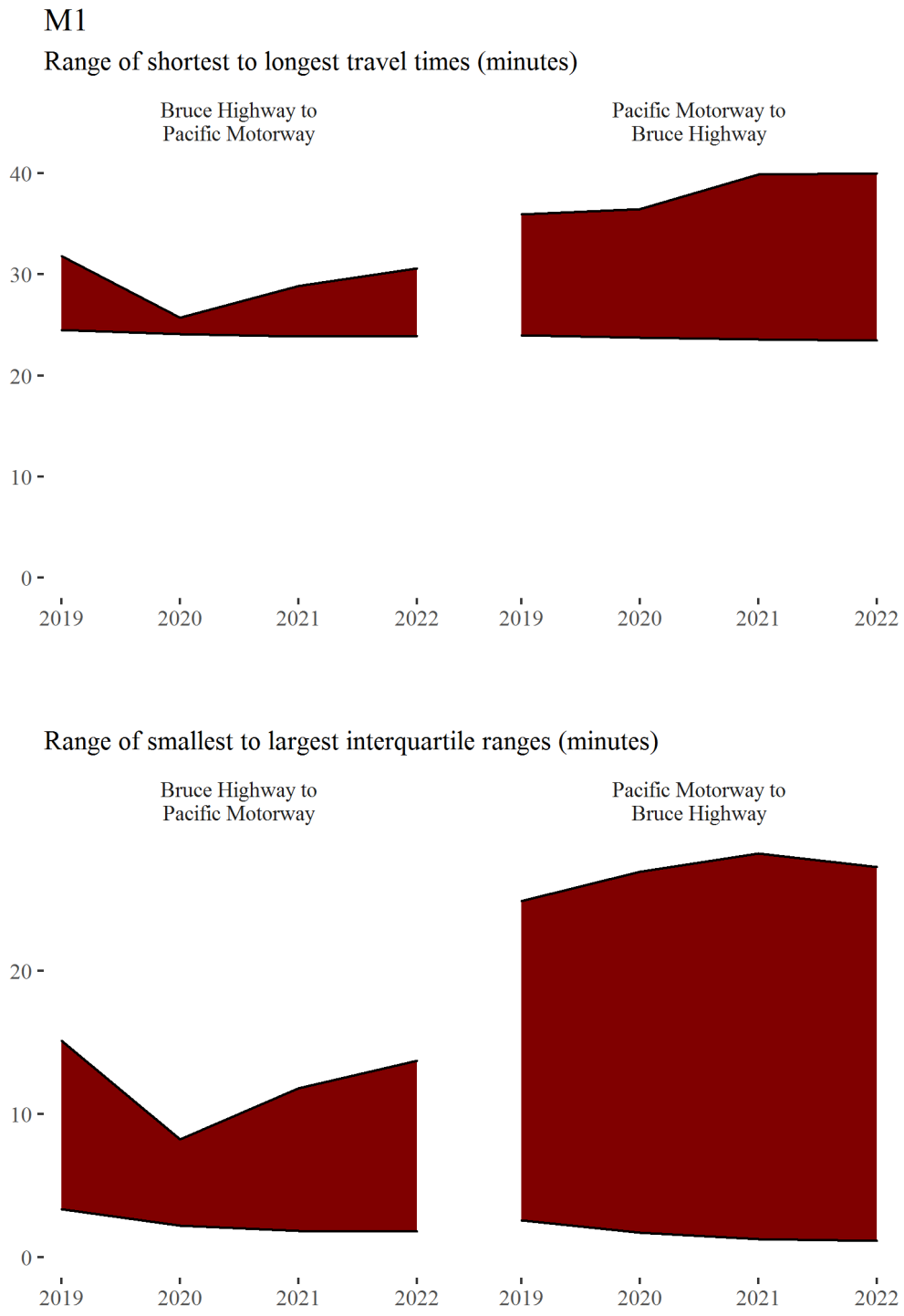
The best travel times and lowest uncertainty travelling from the Pacific Motorway to the Bruce Highway were at midnight and 7pm, respectively, with a median travel time of around 23.5 minutes and an interquartile range of 70 seconds. The longest median travel times and greatest uncertainty were at 4pm with a median of 40 minutes and an interquartile range of around 27 minutes.

Figure A.254 M1 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.255 M1 route performance over time



Source: BITRE estimates.

M2 (North) - Logan Motorway to Pacific Motorway / Pacific Motorway to Logan Motorway

This short (8 kilometre) route consists of the Gateway Motorway section of the M2 linking the M1 and the Logan Motorway at Drewvale in Southern Brisbane.

Figure A.259 M2 (North) route map

Source: BITRE estimates.

Table A.44 M2 (North) route travel times and congestion measures, 2022

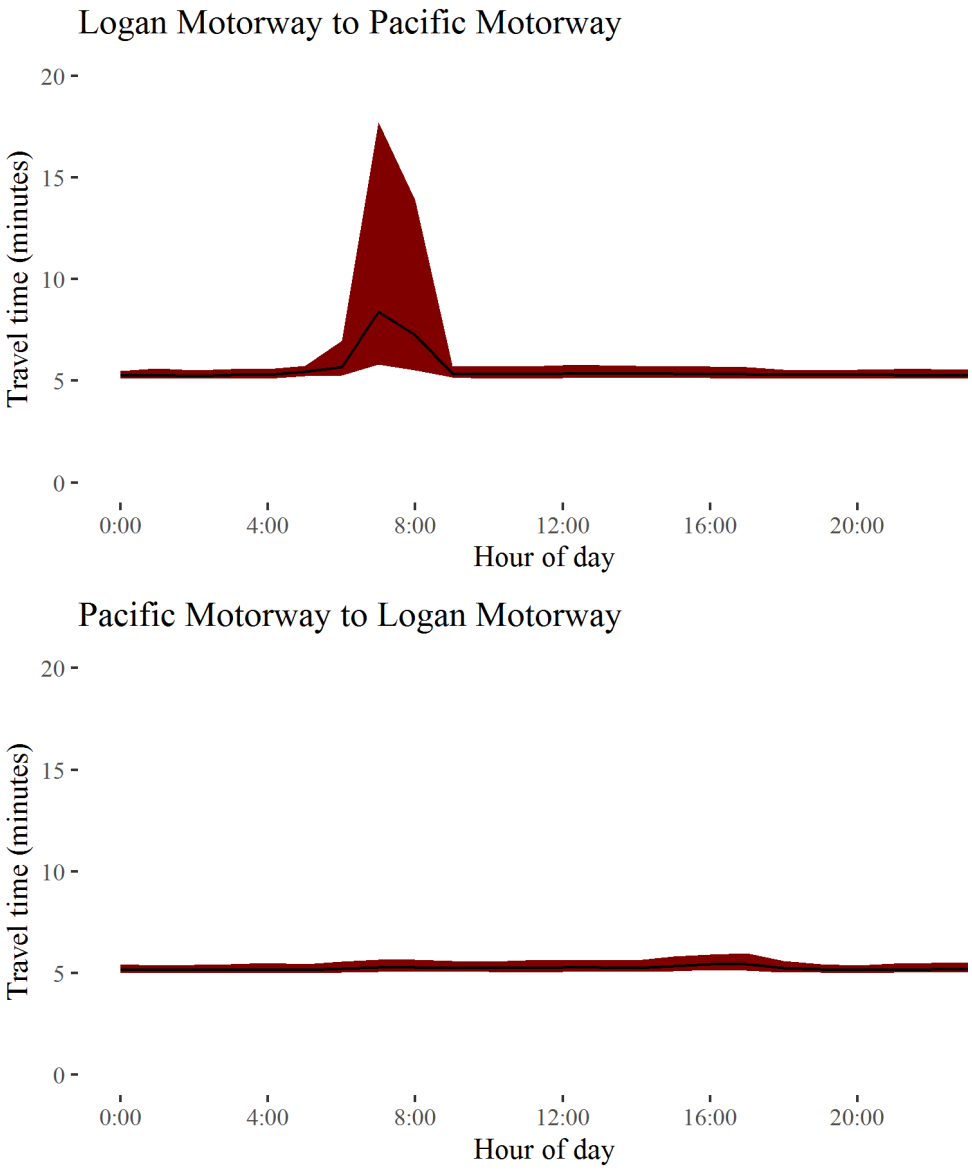
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Logan Motorway to Pacific Motorway	00:05:15	00:08:23	1.056	00:00:22	00:11:55	3.694	8.4
Pacific Motorway to Logan Motorway	00:05:09	00:05:27	1.018	00:00:22	00:00:50	1.413	8.3

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from the Logan Motorway to the Pacific Motorway were at 2am with a median travel time of around 5 minutes and an interquartile range of 22 seconds. The longest median travel times and greatest uncertainty were at 7am with a median of around 8 minutes and an interquartile range of around 12 minutes.

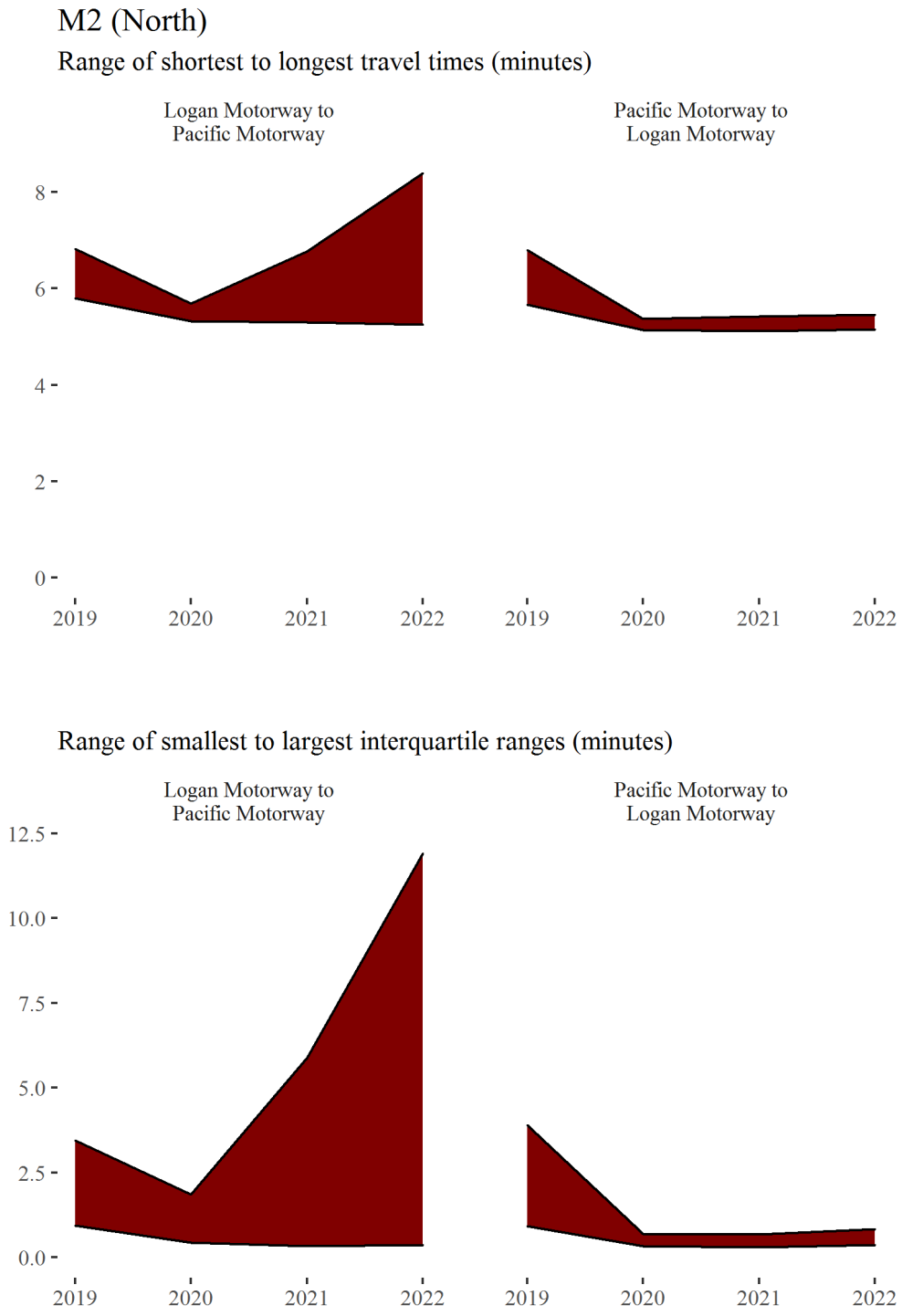
The best median travel times and lowest uncertainty for journeys from the Pacific Motorway to the Logan Motorway were at 5am with a median travel time of around 5 minutes and an interquartile range of 22 seconds. The longest median travel times was at 4pm with a median of 5.5 minutes and the greatest uncertainty was at 5pm with an interquartile range of 50 seconds.

Figure A.260 M2 (North) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.261 M2 (North) route performance over time

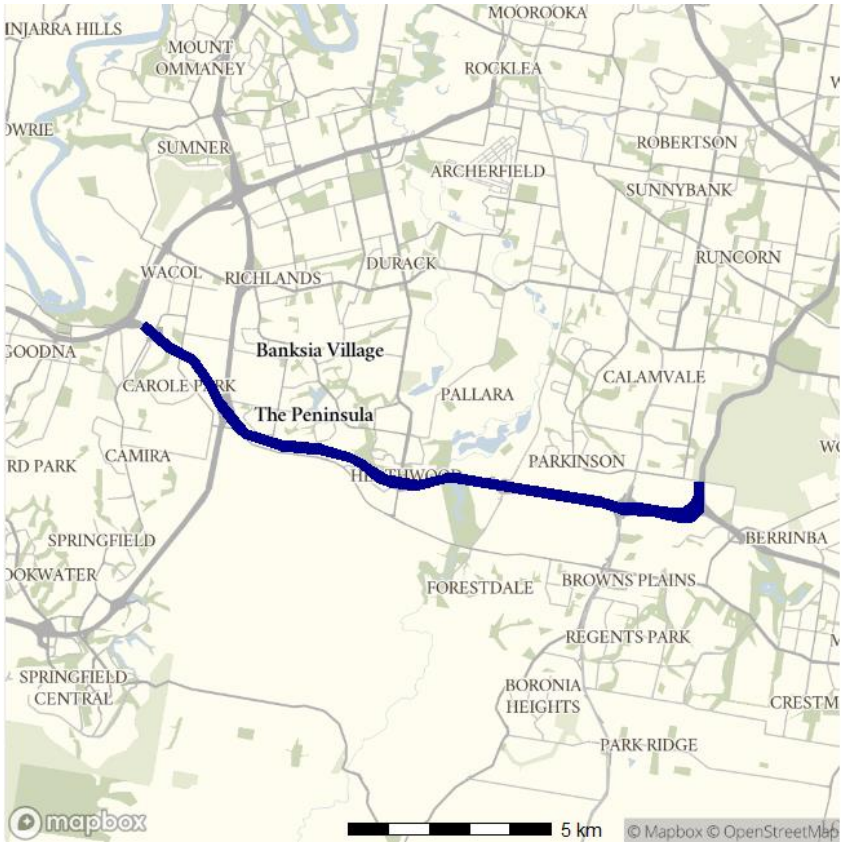


Source: BITRE estimates.

M2 (West) - Gateway Motorway to Ipswich Motorway / Ipswich Motorway to Gateway

This route uses the Logan Motorway section of the M2 between its confluence with the Gateway Motorway (M2 North) and junction with the M7 (Ipswich Motorway) at Gailes. It crosses the M5 (Centenary Highway) at Carole Park.

Figure A.265 M2 (West) route map



Source: BITRE estimates.

Table A.45 M2 (West) route travel times and congestion measures, 2022

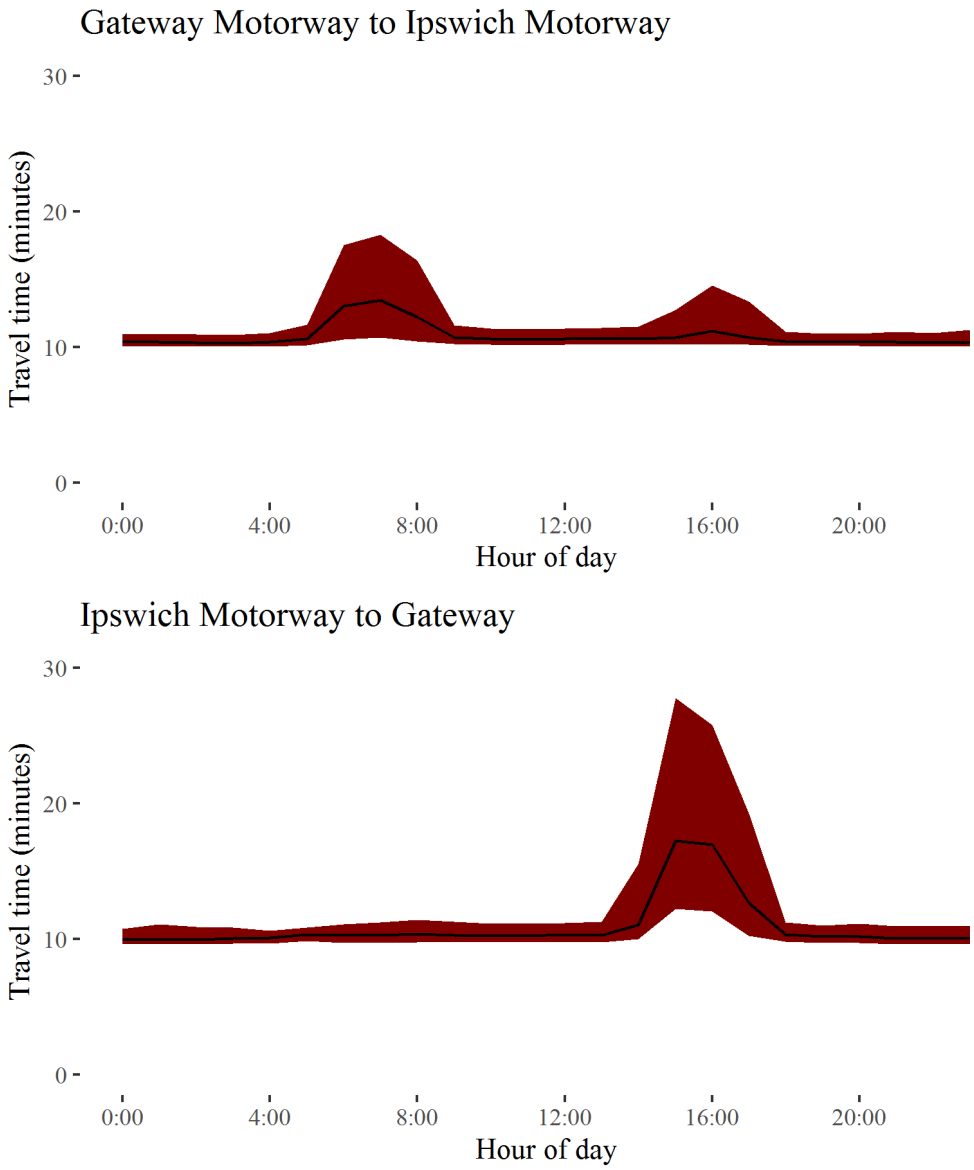
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Gateway Motorway to Ipswich Motorway	00:10:16	00:13:26	1.053	00:00:51	00:07:33	2.467	16.1
Ipswich Motorway to Gateway	00:09:58	00:17:17	1.095	00:00:57	00:15:34	3.106	15.8

Source: BITRE estimates.

The best median travel times for journeys from the Gateway Motorway to Ipswich Motorway was around 10 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of 51 seconds. The longest median travel times and greatest uncertainty was at 7am with a median of approximately 13.5 minutes and an interquartile range of 7.5 minutes.

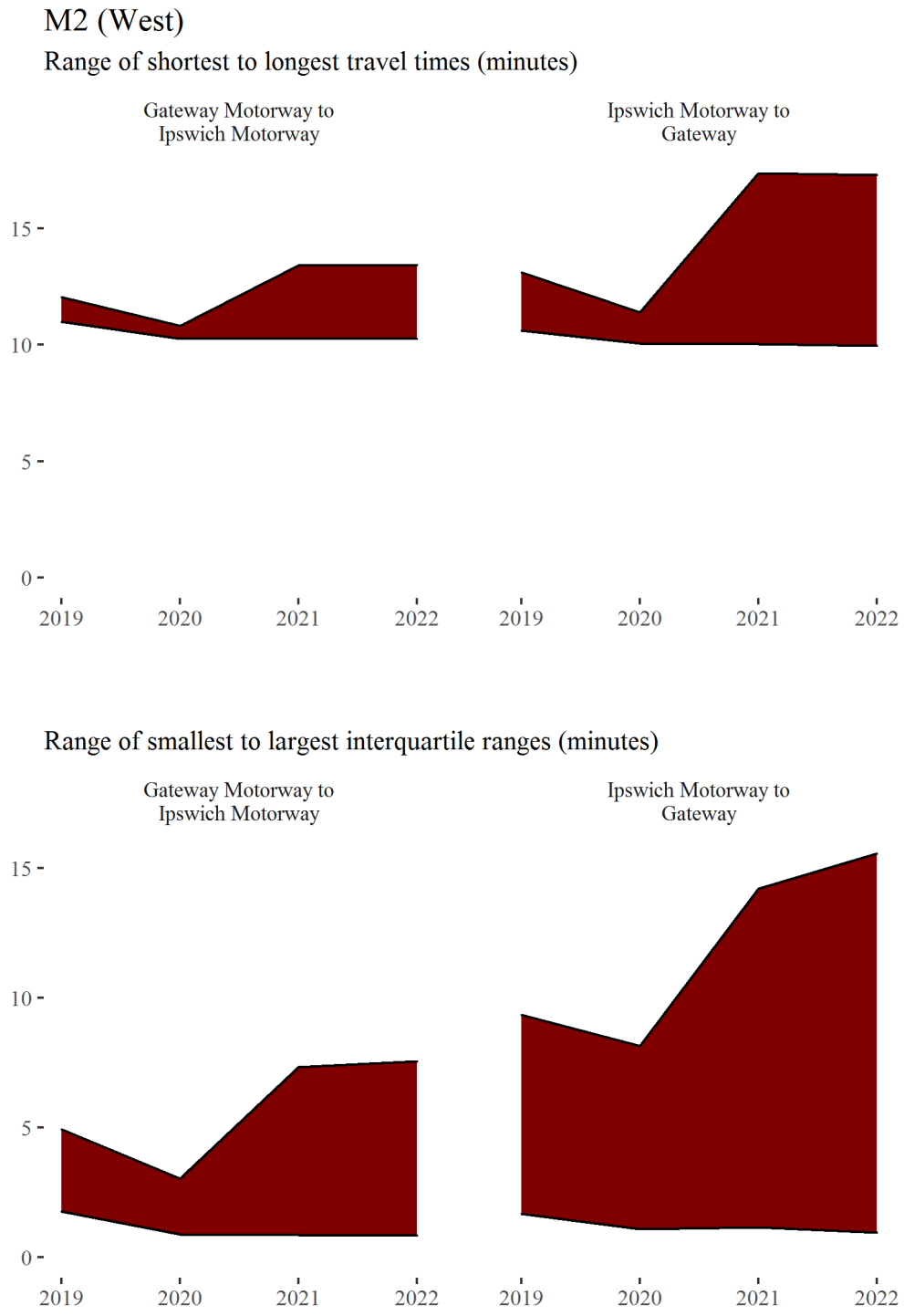
The best median travel times and lowest uncertainty for journeys from Ipswich Motorway to the Gateway Motorway was at 2am with a median travel time of 10 minutes and an interquartile range of just under 1 minute. The longest median travel times and greatest uncertainty was at 3pm with a median of around 17 minutes and an interquartile range of 15.5 minutes.

Figure A.266 M2 (West) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.267 M2 (West) route performance over time



Source: BITRE estimates.

M3-A3 - Airport Link to M1 / M1 to Airport Link

This route follows the M3 and the A3 arterial road with one end merging with the M1 at Bald Hills and the other meeting Airport Link (M7) next to Gordon Park. It is known as Gympie Road when labelled as the A3 and the Gympie Arterial Road when labelled as the M3.

Figure A.271 M3-A3 route map

Source: BITRE estimates.

Table A.46 M3-A3 route travel times and congestion measures, 2022

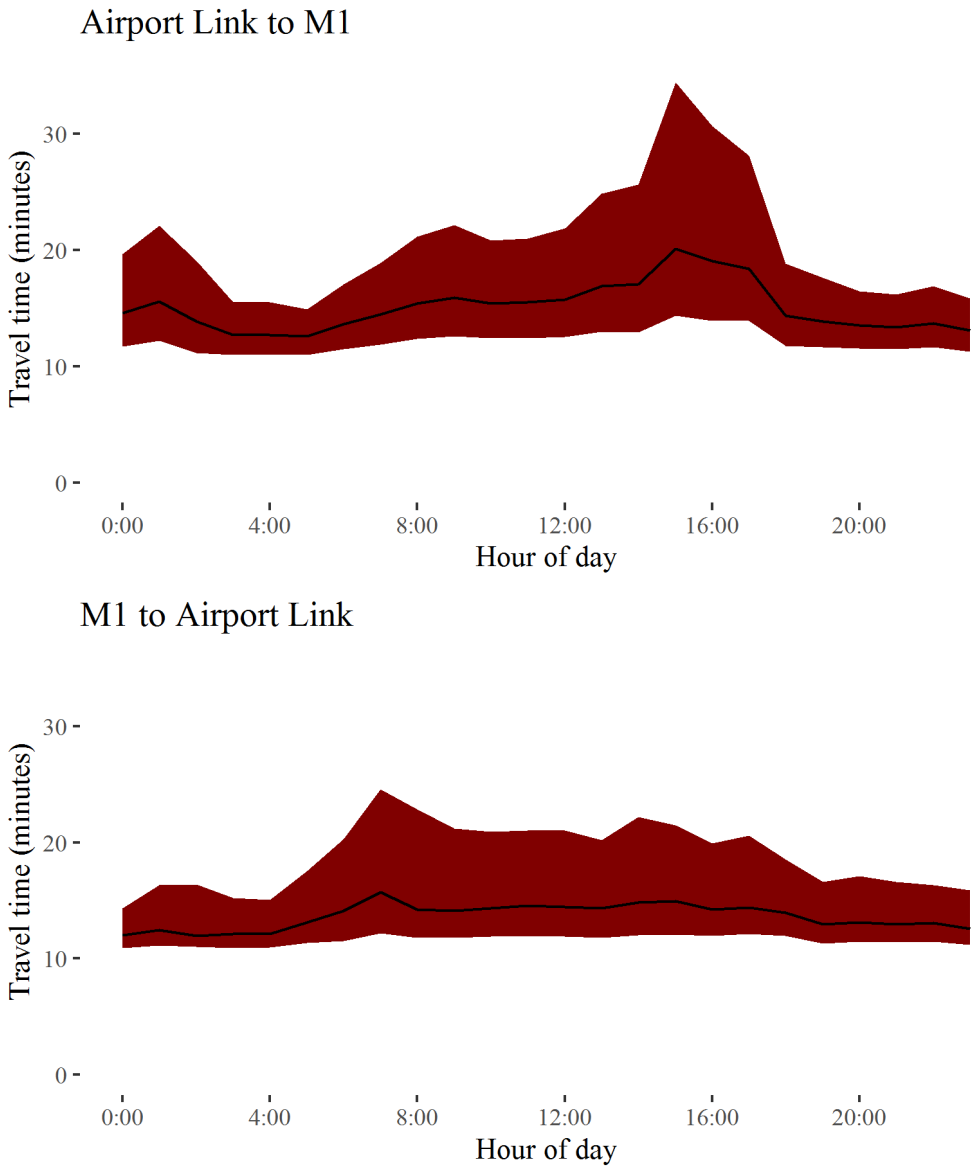
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Airport Link to M1	00:12:35	00:20:06	1.197	00:03:57	00:20:01	2.150	13.0
M1 to Airport Link	00:11:56	00:15:43	1.140	00:03:28	00:12:21	2.089	13.0

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Airport Link to the M1 was at 5am with a median travel time of around 12.5 minutes and an interquartile range of 4 minutes. The longest median travel times and greatest uncertainty were at 3pm with a median of around 20 minutes and an interquartile range of 20 minutes.

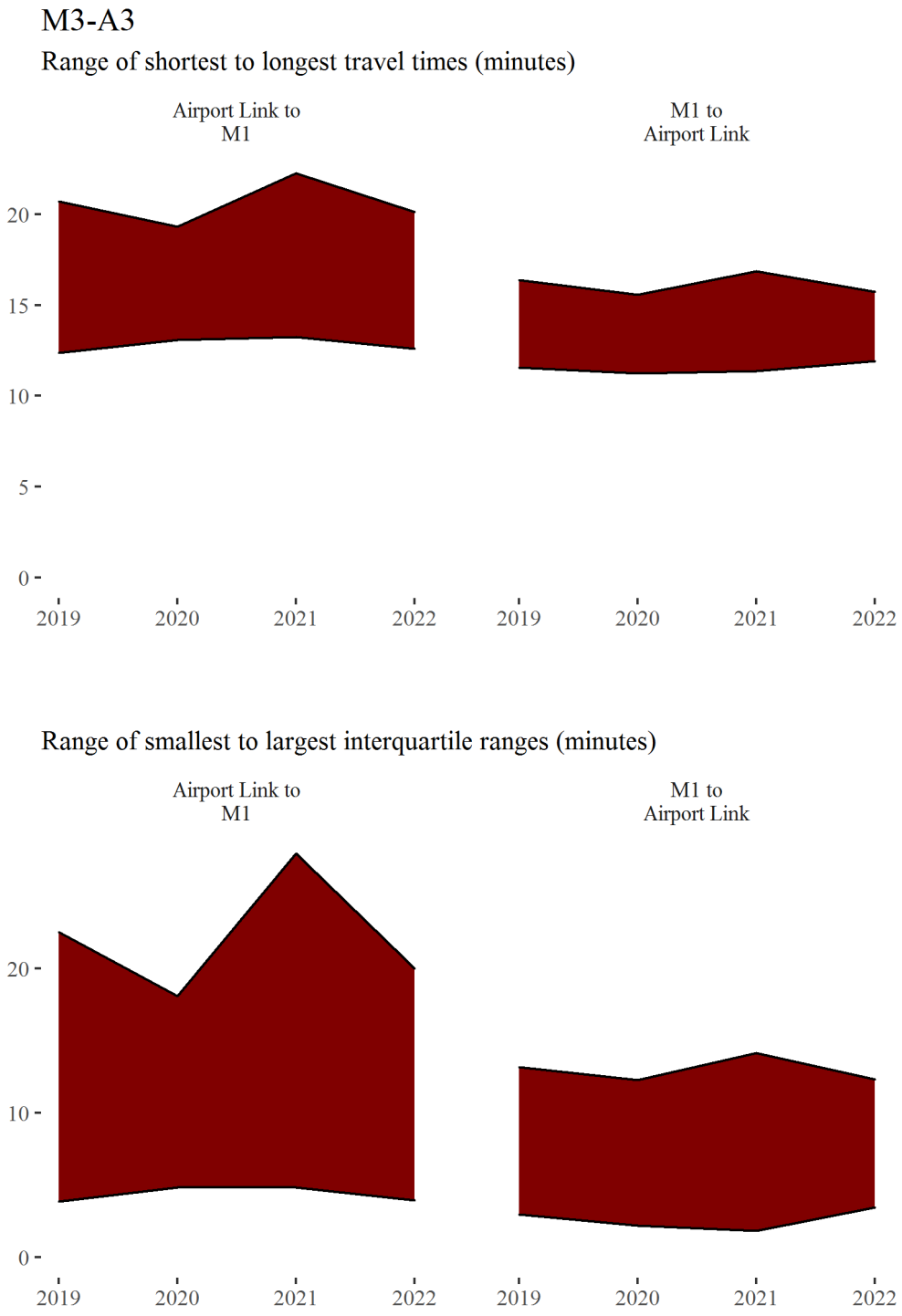
The best median travel times and least uncertainty for journeys from the M1 to Airport Link were at 2am with a median travel time of around 12 minutes and an interquartile range of 3.5 minutes. The longest median travel times and greatest uncertainty were at 7am with a median of approximately 16 minutes and an interquartile range of around 12 minutes.

Figure A.272 M3-A3 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.273 M3-A3 route performance over time



Source: BITRE estimates.

M3 (South) - Inner City Bypass to Pacific Motorway / Pacific Motorway to Inner City Bypass

This route follows the M3 connecting the Inner City Bypass at Bowen Hills and the M1 (Pacific Motorway) at Springwood in Brisbane's southeast. It passes around the western edge of the CBD and crosses the Brisbane River at Woolloongabba and follows the Pacific Motorway.

Figure A.277 M3 (South) route map

Source: BITRE estimates.

Table A.47 M3 (South) route travel times and congestion measures, 2022

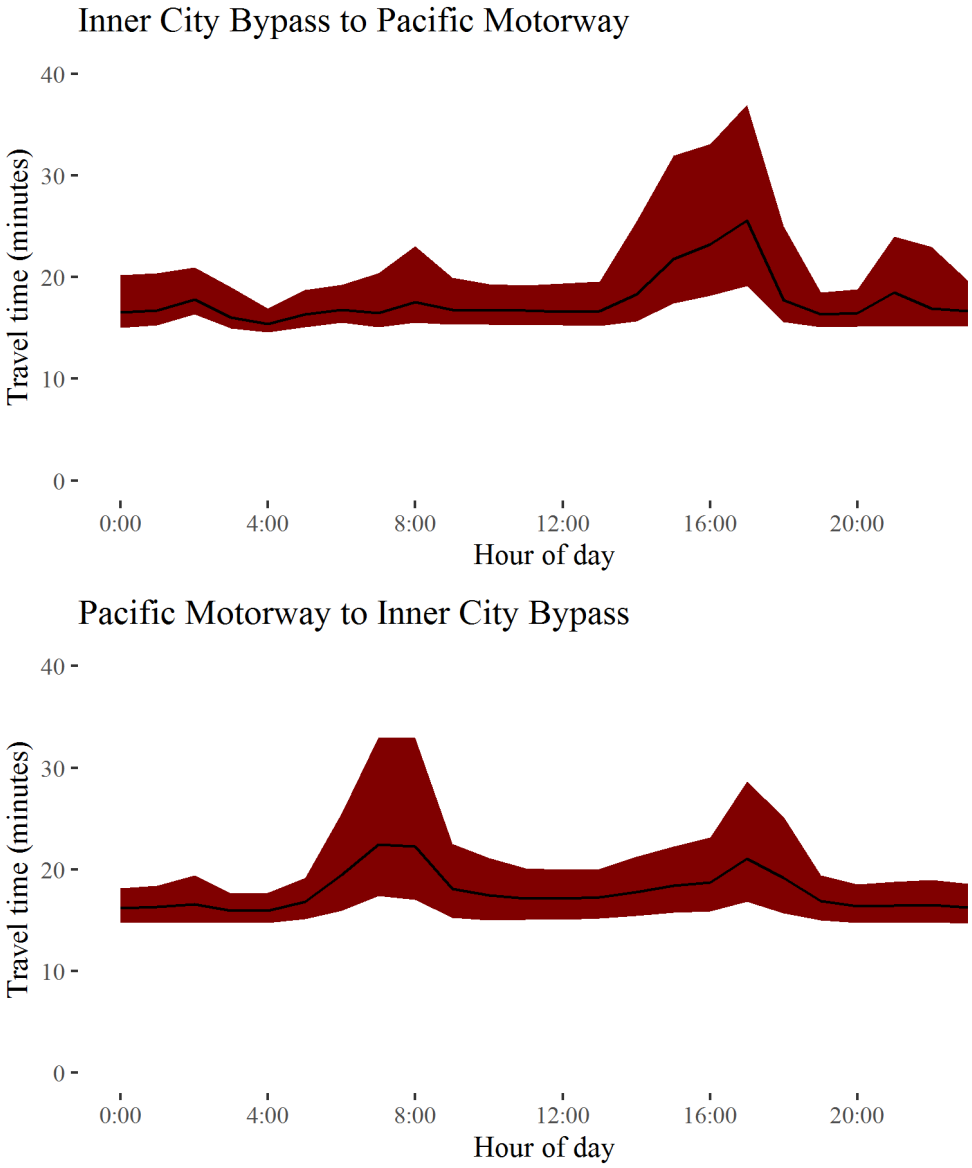
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Inner City Bypass to Pacific Motorway	00:15:24	00:25:33	1.148	00:02:19	00:17:52	2.830	20.1
Pacific Motorway to Inner City Bypass	00:15:57	00:22:27	1.114	00:02:56	00:15:56	2.169	20.1

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Inner City Bypass to Pacific Motorway were at 4am with a median travel time of 15.5 minutes and an interquartile range of around 2 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of 25.5 minutes and an interquartile range of around 18 minutes.

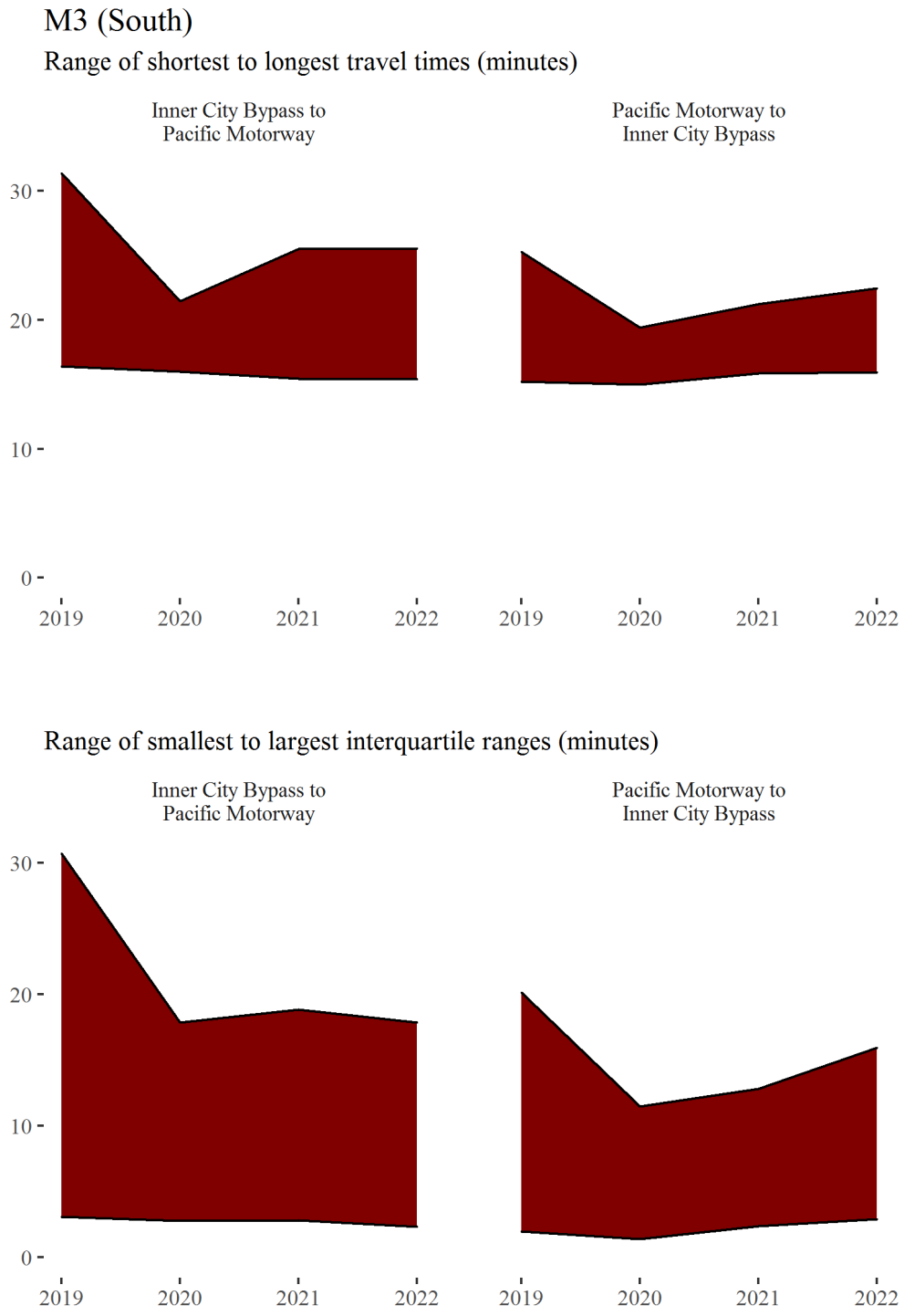
The best median travel times for journeys from the Pacific Motorway to Inner City Bypass was 16 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of around 3 minutes. The longest median travel times was 22 minutes at 7am and the greatest uncertainty was at 8am with an interquartile range of 16 minutes.

Figure A.278 M3 (South) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.279 M3 (South) route performance over time

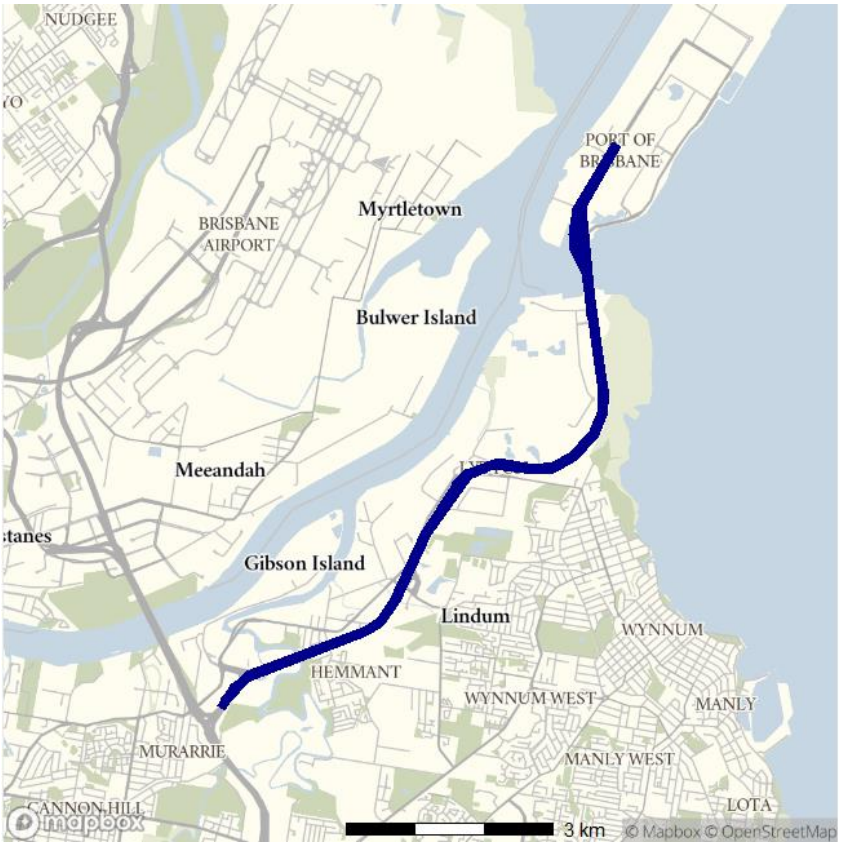


Source: BITRE estimates.

M4 - Gateway Motorway to Port of Brisbane / Port of Brisbane to Gateway Motorway

This route links the Gateway Motorway (M1) at Murarrie and the Port of Brisbane via Port Drive and Port of Brisbane Motorway. It is an important route for freight to and from the Port but is not a major commuter route.

Figure A.283 M4 route map



Source: BITRE estimates.

Table A.48 M4 route travel times and congestion measures, 2022

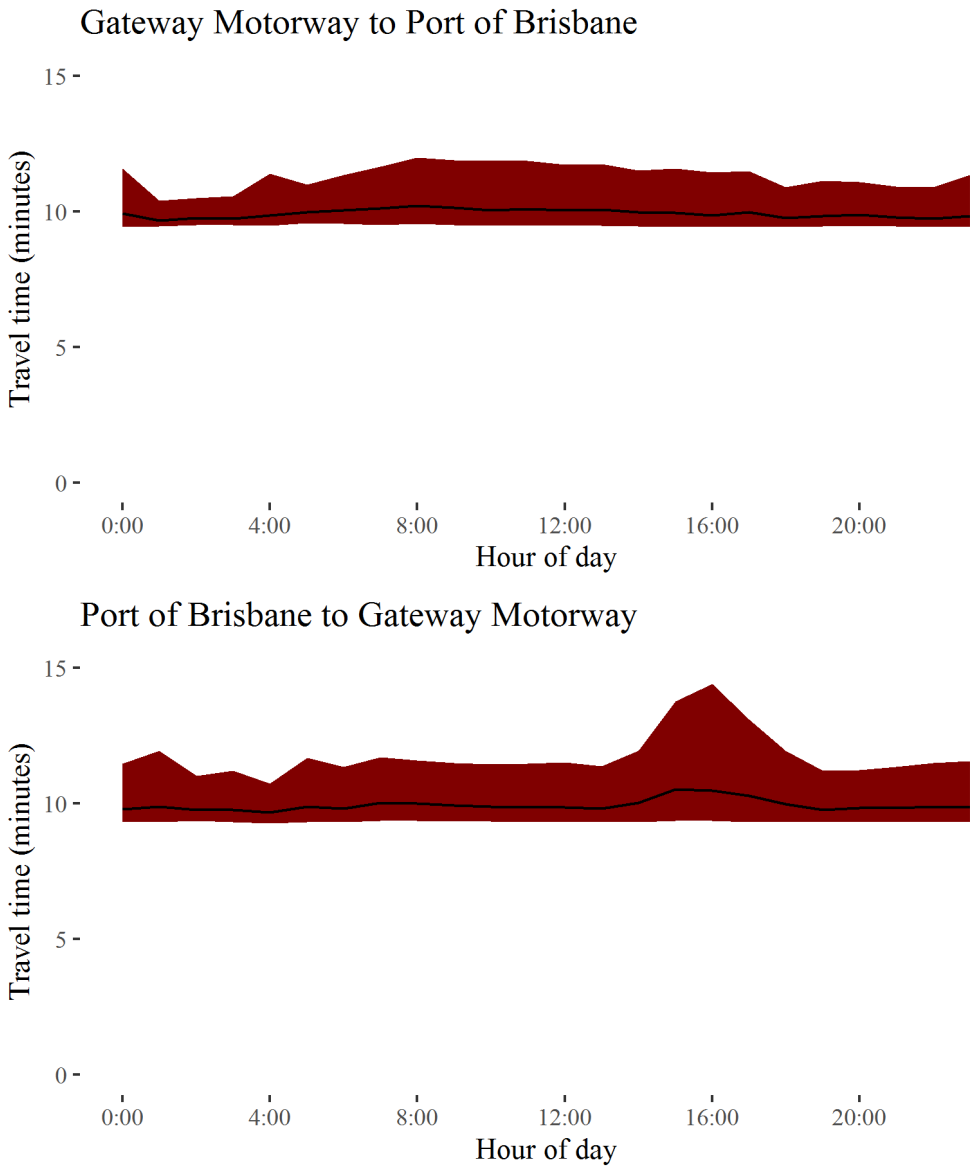
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Gateway Motorway to Port of Brisbane	00:09:40	00:10:12	1.026	00:00:57	00:02:27	1.937	11.7
Port of Brisbane to Gateway Motorway	00:09:41	00:10:32	1.027	00:01:28	00:05:03	1.650	11.7

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Gateway Motorway to the Port of Brisbane was at 1am with a median travel time of around 10 minutes and an interquartile range of just under 1 minute. The longest median travel times and greatest uncertainty was at 8am with a median of around 10 minutes and an interquartile range of 2.5 minutes.

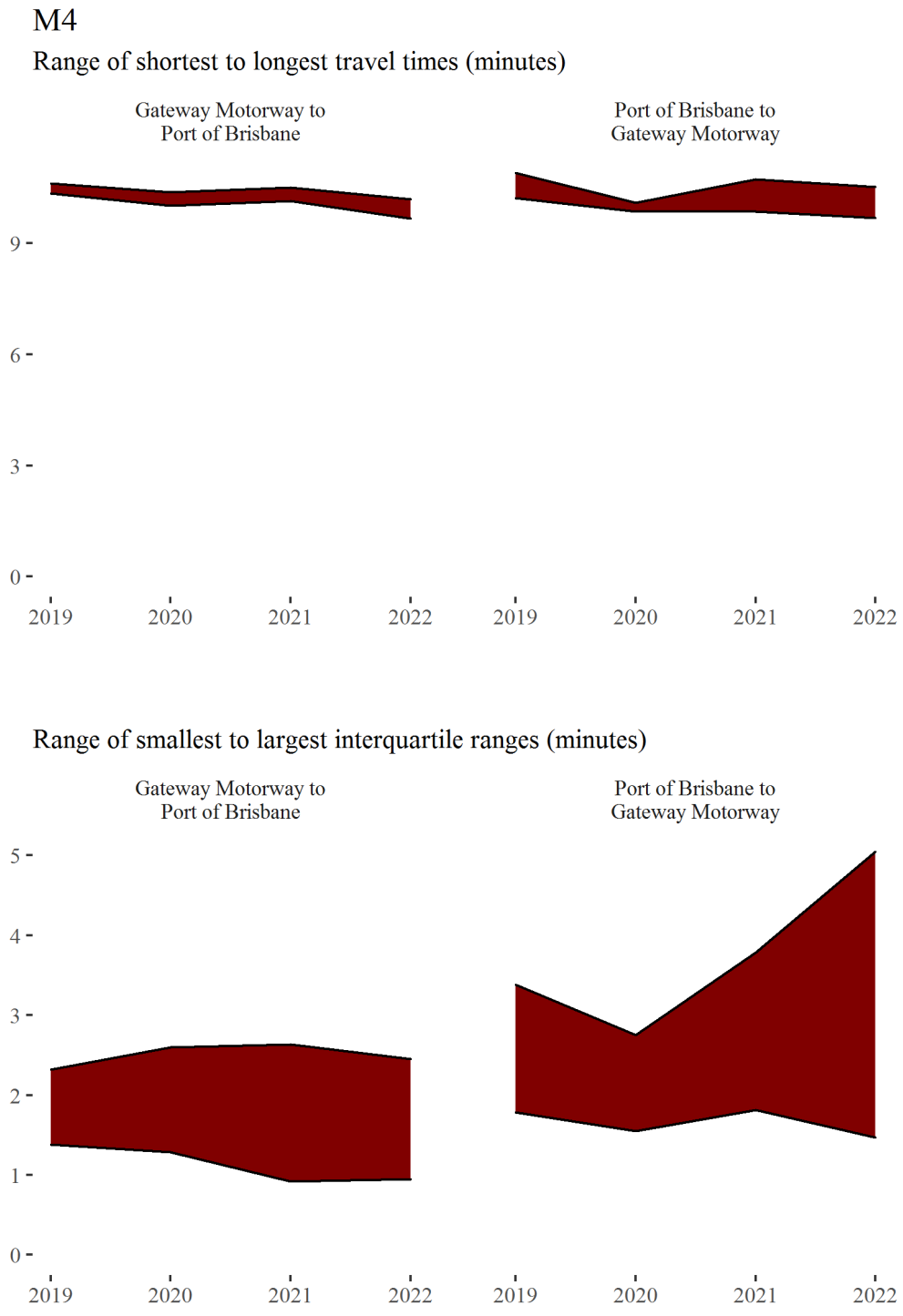
The best median travel times and least uncertainty for journeys from the Port of Brisbane to Gateway Motorway was at 4am with a median travel time of 10.5 minutes and an interquartile range of 1.5 minutes. The longest median travel times was around 10.5 minutes at 3pm and the greatest uncertainty was at 4pm with an interquartile range of 5 minutes.

Figure A.284 M4 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.285 M4 route performance over time



Source: BITRE estimates.

M5 - Bowen Hills to Logan Motorway / Logan Motorway to Bowen Hills

This route follows the M5 from the M3 and M7 motorways at Bowen Hills and meets the Logan Motorway (M2) at Forest Lake. It traverses the southwest fringe of Brisbane and utilises the Inner City Bypass, Legacy Tunnel, Western Freeway and Centenary Highway.

Figure A.289 M5 route map

Source: BITRE estimates.

Table A.49 M5 route travel times and congestion measures, 2022

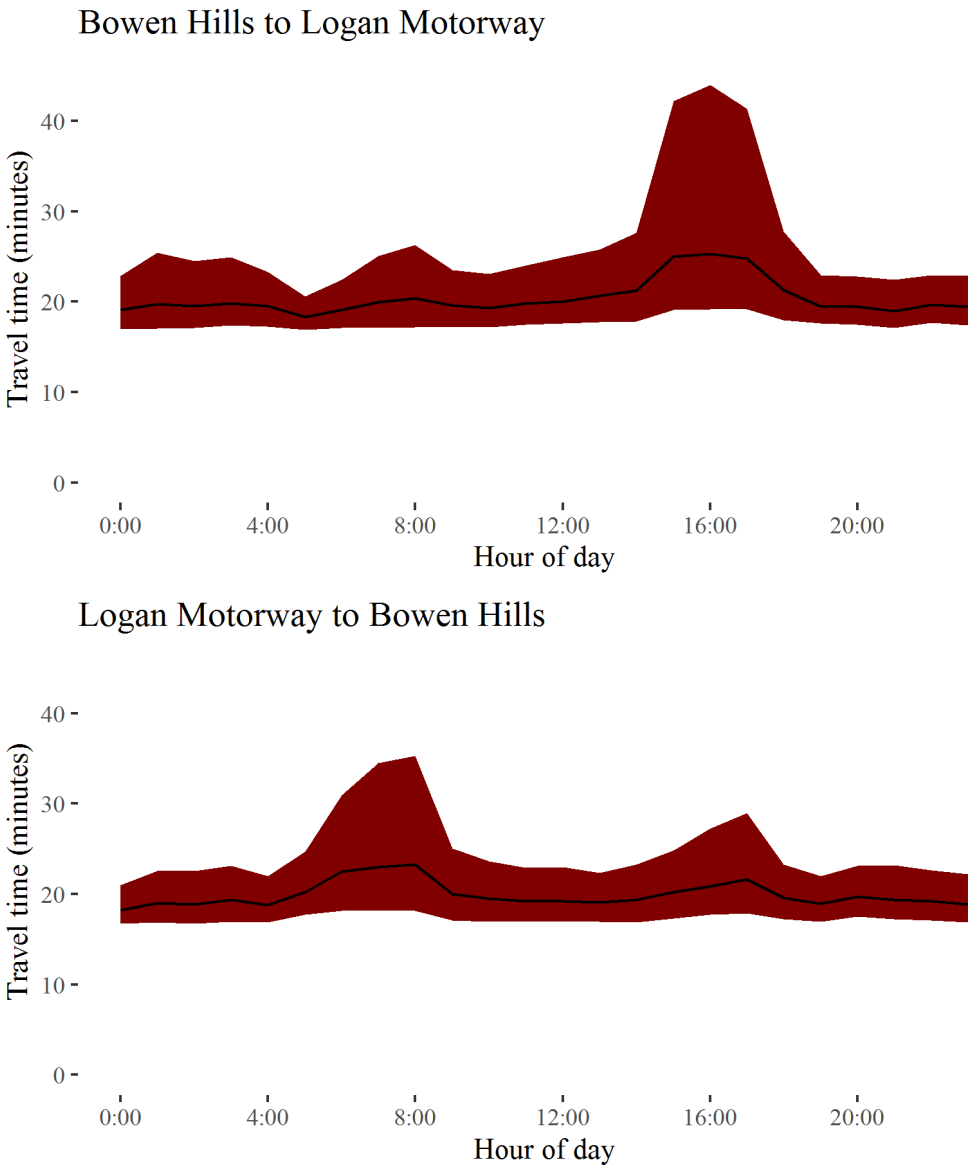
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Bowen Hills to Logan Motorway	00:18:18	00:25:17	1.114	00:03:44	00:24:52	2.370	24.1
Logan Motorway to Bowen Hills	00:18:15	00:23:15	1.091	00:04:17	00:17:07	1.753	24.2

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Bowen Hills to Logan Motorway was at 5am with a median travel time of approximately 18 minutes and an interquartile range of around 4 minutes. The longest median travel times and greatest uncertainty was at 4pm with a median of around 25 minutes and an interquartile range of around 25 minutes.

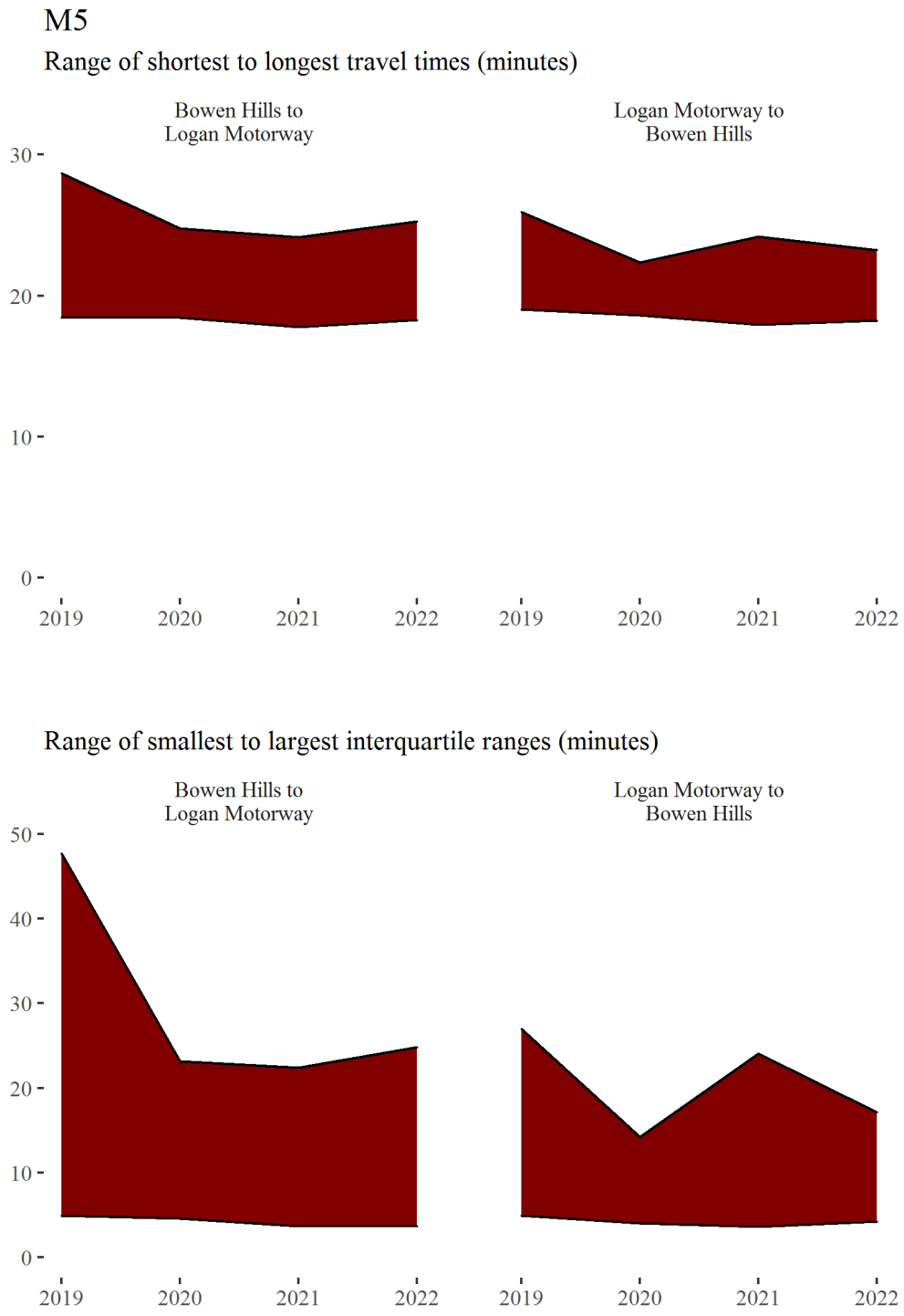
The best median travel times and least uncertainty for journeys from Logan Motorway to Bowen Hills was at midnight with a median travel time of approximately 18 minutes and an interquartile range of around 4 minutes. The longest median travel times and greatest uncertainty was at 8am with a median of around 23 minutes and an interquartile range of around 17 minutes.

Figure A.290 M5 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.291 M5 route performance over time



Source: BITRE estimates.

M6 - Gateway Motorway to Pacific Motorway / Pacific Motorway to Gateway Motorway

The M6 route merges with the M2 at Drewvale and meets the Pacific Motorway (M1) at Loganholme using the Logan Motorway

Figure A.295 M6 route map

Source: BITRE estimates.

Table A.50 M6 route travel times and congestion measures, 2022

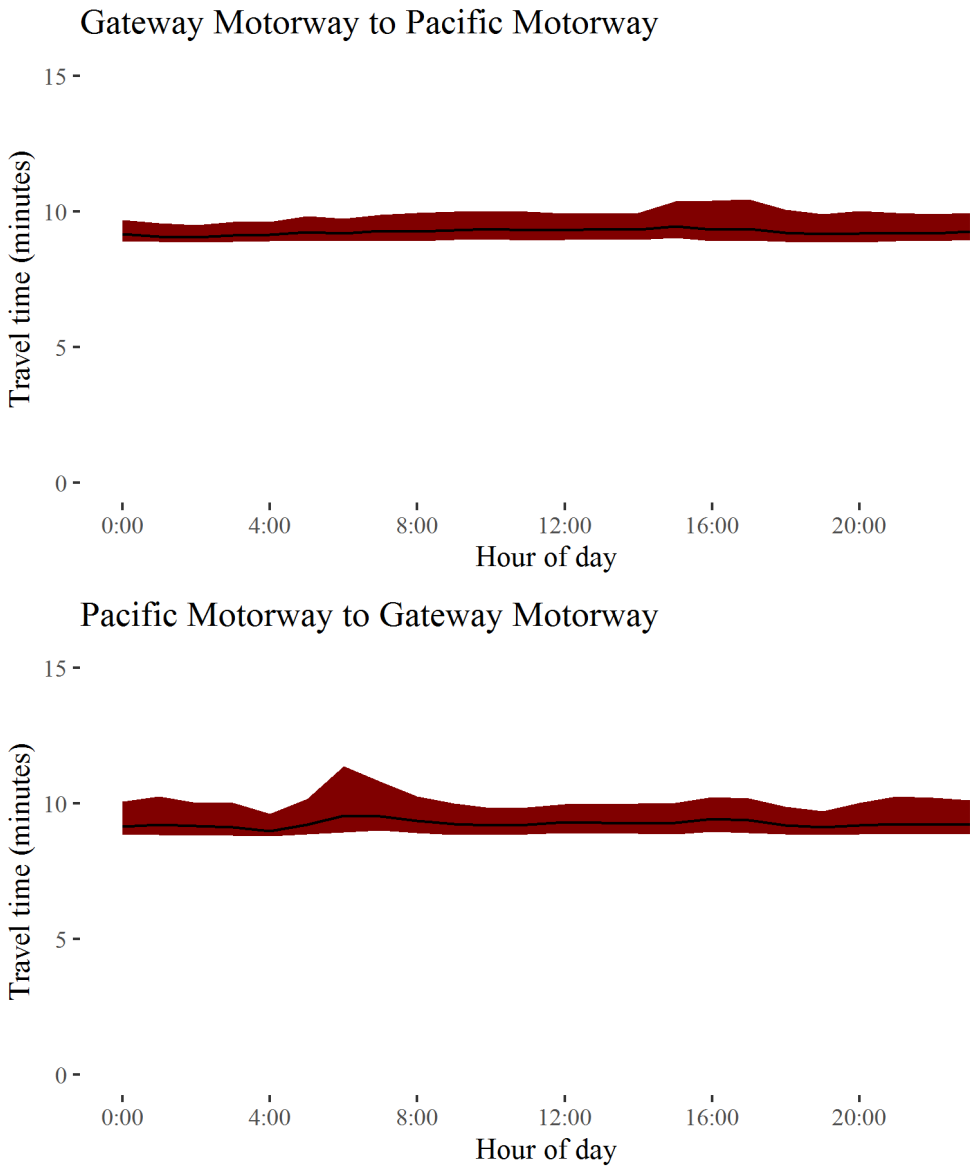
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Gateway Motorway to Pacific Motorway	00:09:03	00:09:27	1.021	00:00:39	00:01:32	1.565	14.6
Pacific Motorway to Gateway Motorway	00:08:59	00:09:33	1.032	00:00:50	00:02:26	1.511	14.5

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from the Gateway Motorway to the Pacific Motorway were at 2am with a median travel time of 9 minutes and an interquartile range of 39 seconds. The longest median travel times was 9.5 minutes at 3pm and the greatest uncertainty was at 5pm with an interquartile range of 1.5 minutes.

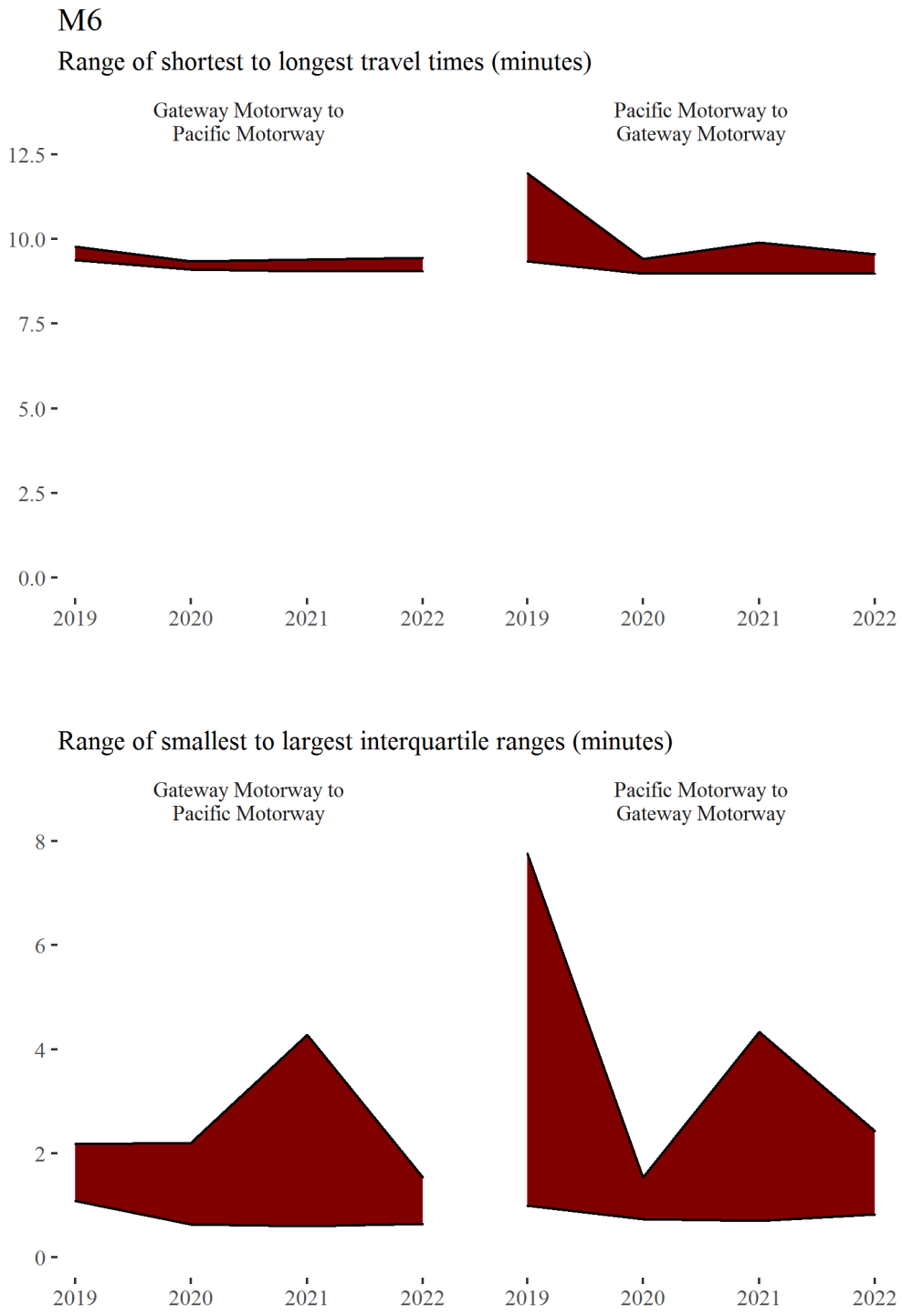
The best median travel times for journeys from the Pacific Motorway to the Gateway Motorway were 9 minutes at 4am and the lowest uncertainty was at 4am with an interquartile range of 50 seconds. The longest median travel times and greatest uncertainty was at 6am with a median of 9.5 minutes and an interquartile range of 2.5 minutes.

Figure A.296 M6 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.297 M6 route performance over time



Source: BITRE estimates.

M7-A7 - Logan Motorway to Southern Cross Way / Southern Cross Way to Logan Motorway

This route follows the A7 and M7 through central Brisbane and links the Logan Motorway (M2) at Gailes in the south and the Southern Cross Way branch of the Gateway Motorway near Brisbane Airport. It uses Ipswich Motorway (M7), Ipswich Road (A7) and Airport Link M7 past the CBD and under the Brisbane River as the Clem Jones Tunnel along its way.

Figure A.301 M7-A7 route map

Source: BITRE estimates.

Table A.51 M7-A7 route travel times and congestion measures, 2022

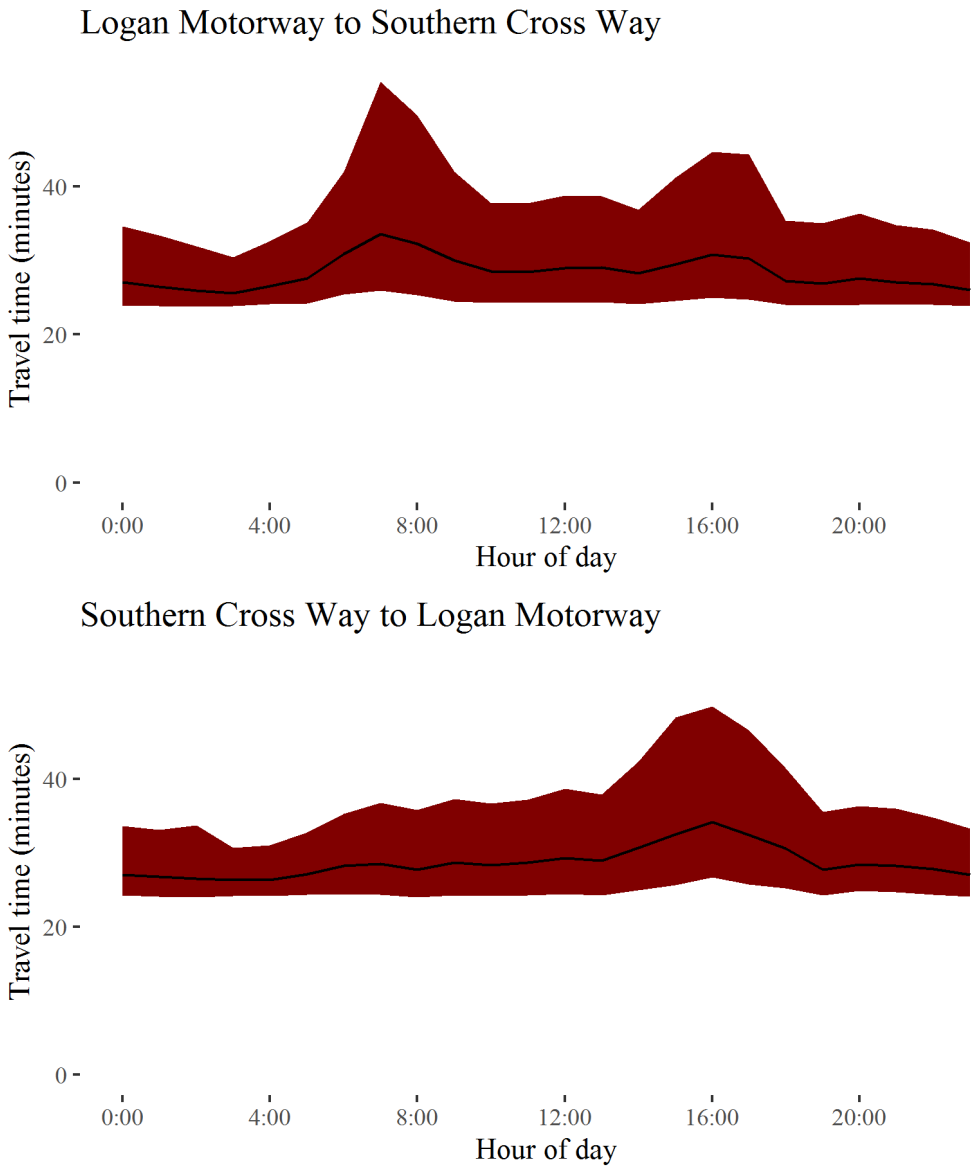
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Logan Motorway to Southern Cross Way	00:25:38	00:33:36	1.109	00:06:39	00:28:15	2.071	30.3
Southern Cross Way to Logan Motorway	00:26:19	00:34:09	1.090	00:06:31	00:23:06	1.952	30.4

Source: BITRE estimates.

The best median travel times for journeys from the Logan Motorway to Southern Cross Way was approximately 26 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of around 7 minutes. The longest median travel times and greatest uncertainty were at 7am with a median of around 34.5 minutes and an interquartile range of around 28 minutes.

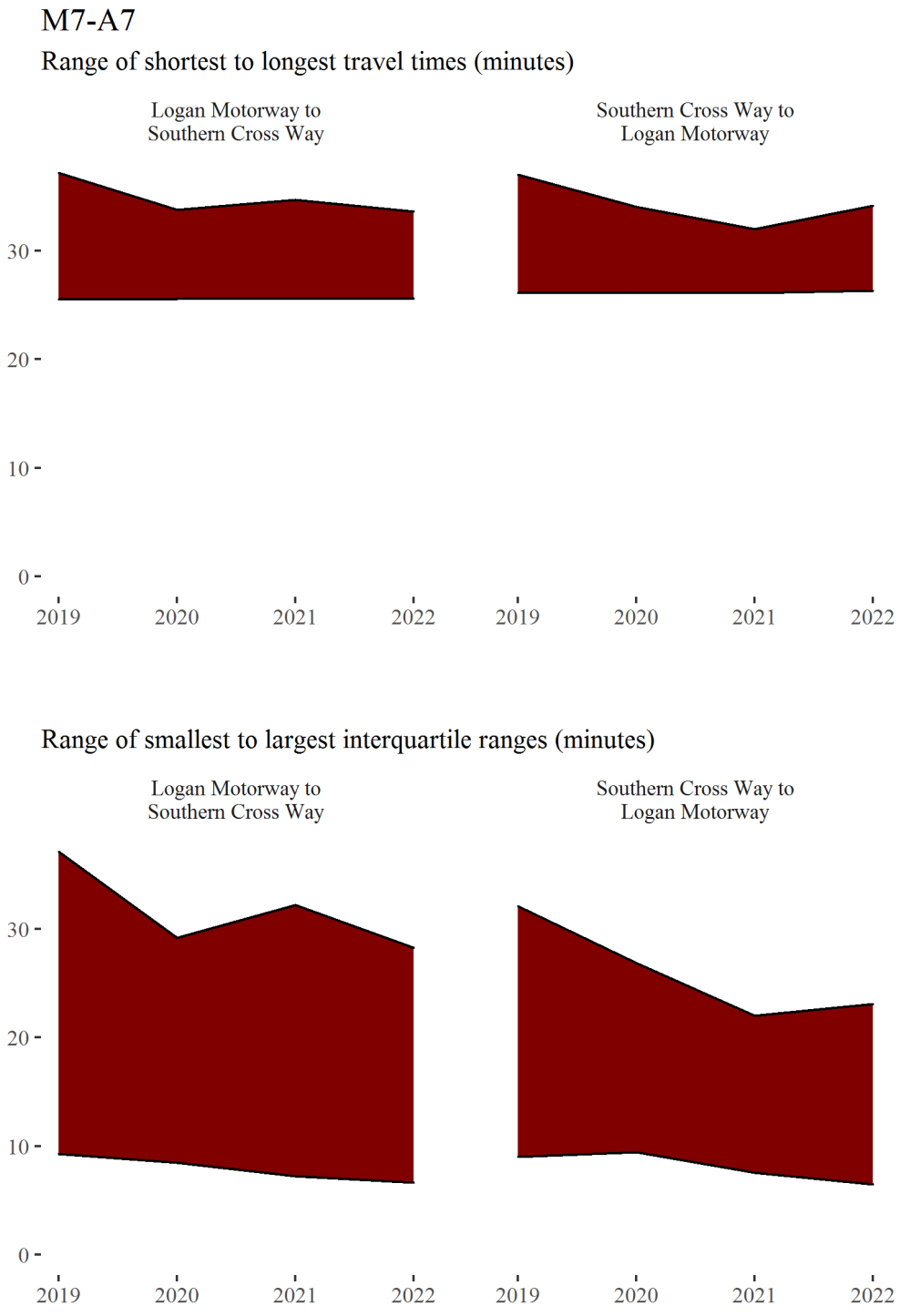
The best median travel times for journeys from Southern Cross Way to the Logan Motorway was around 26 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of 6.5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 34 minutes and an interquartile range of approximately 23 minutes.

Figure A.302 M7-A7 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.303 M7-A7 route performance over time

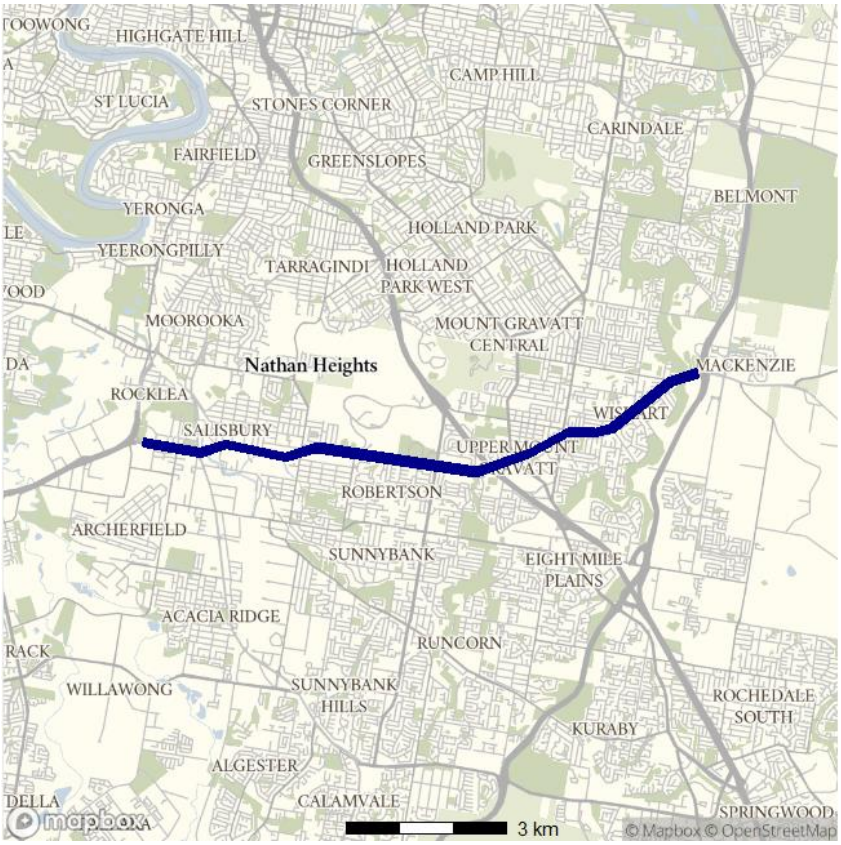


Source: BITRE estimates.

Route 2 - A7 to Gateway Motorway / Gateway Motorway to A7

This short (11 kilometre) surface route links the M7/A7 at Rocklea with the Gateway Motorway (M1) at Mackenzie. It passes the suburb of Robertson and under the Pacific Motorway (M3) along the way.

Figure A.307 Route 2 route map



Source: BITRE estimates.

Table A.52 Route 2 route travel times and congestion measures, 2022

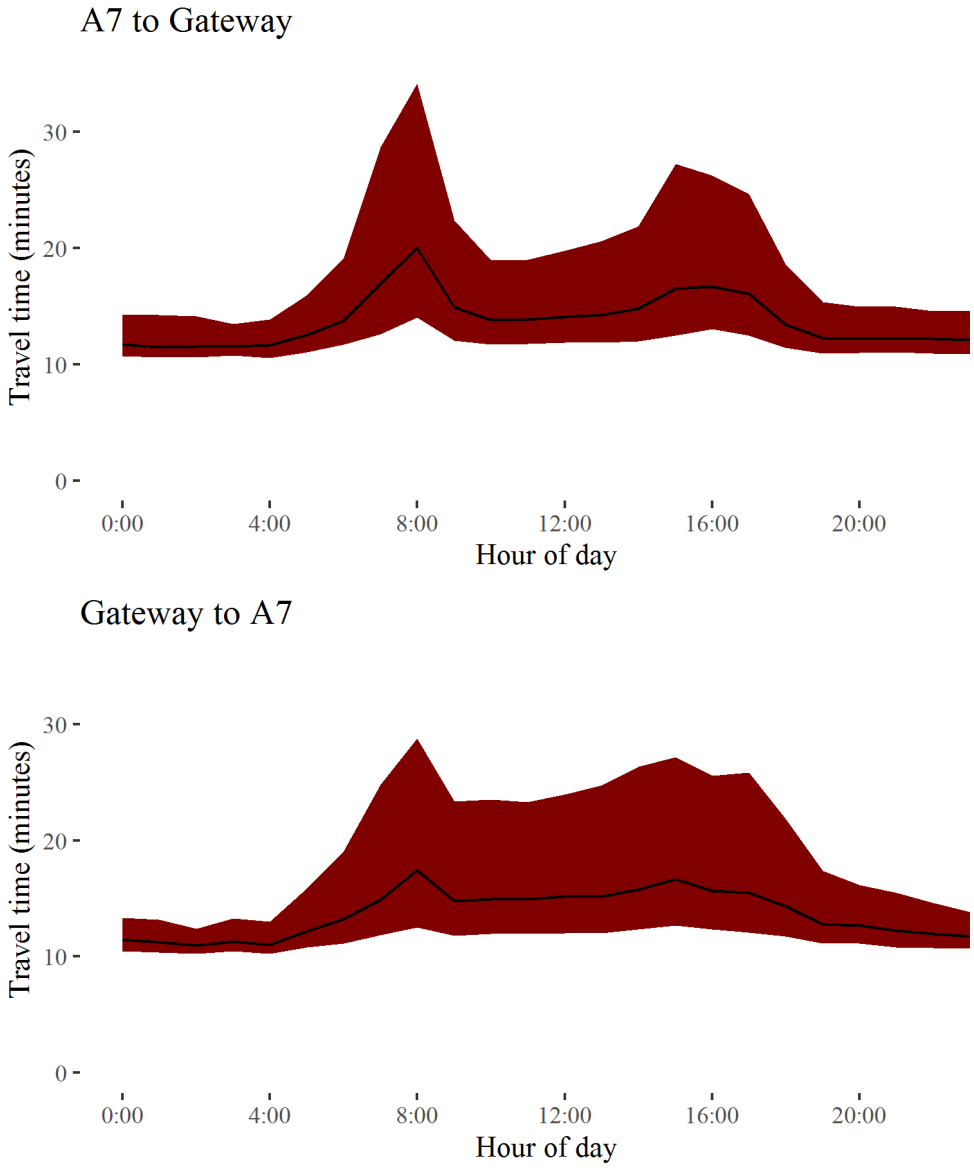
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
A7 to Gateway Motorway	00:11:30	00:20:01	1.197	00:02:42	00:20:08	2.837	11.1
Gateway Motorway to A7	00:10:59	00:17:27	1.245	00:02:08	00:16:15	3.971	11.1

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from A7 to Gateway were at 1am and 3am, respectively, with a median travel time of 11.5 minutes and an interquartile range of under 3 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 20 minutes and an interquartile range of around 20 minutes.

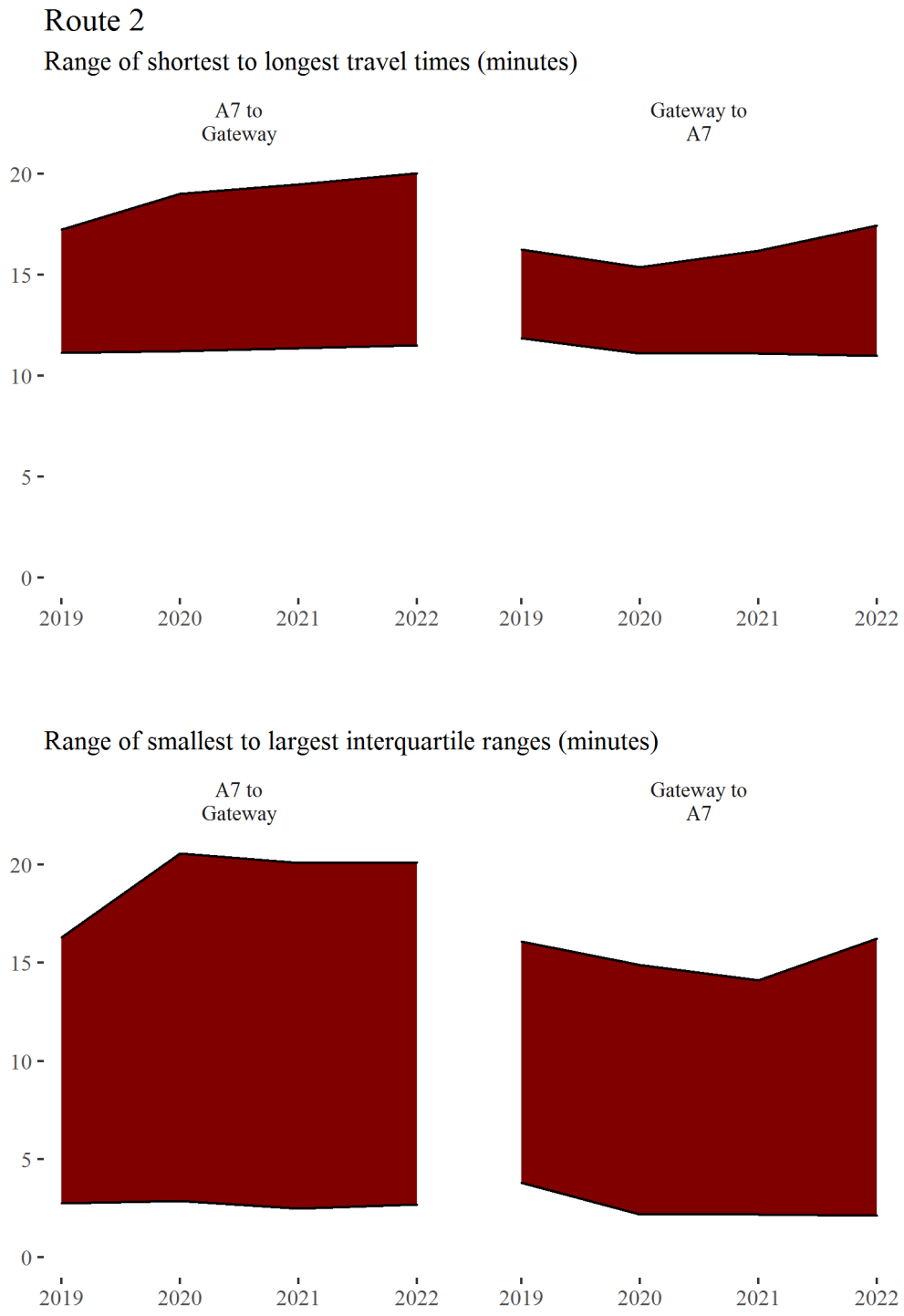
The best median travel times for journeys from Gateway to A7 was 11 minutes at 2am and the lowest uncertainty was at 2am with an interquartile range of just over 2 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of 17.5 minutes and an interquartile range of just over 16 minutes.

Figure A.308 Route 2 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.309 Route 2 route performance over time



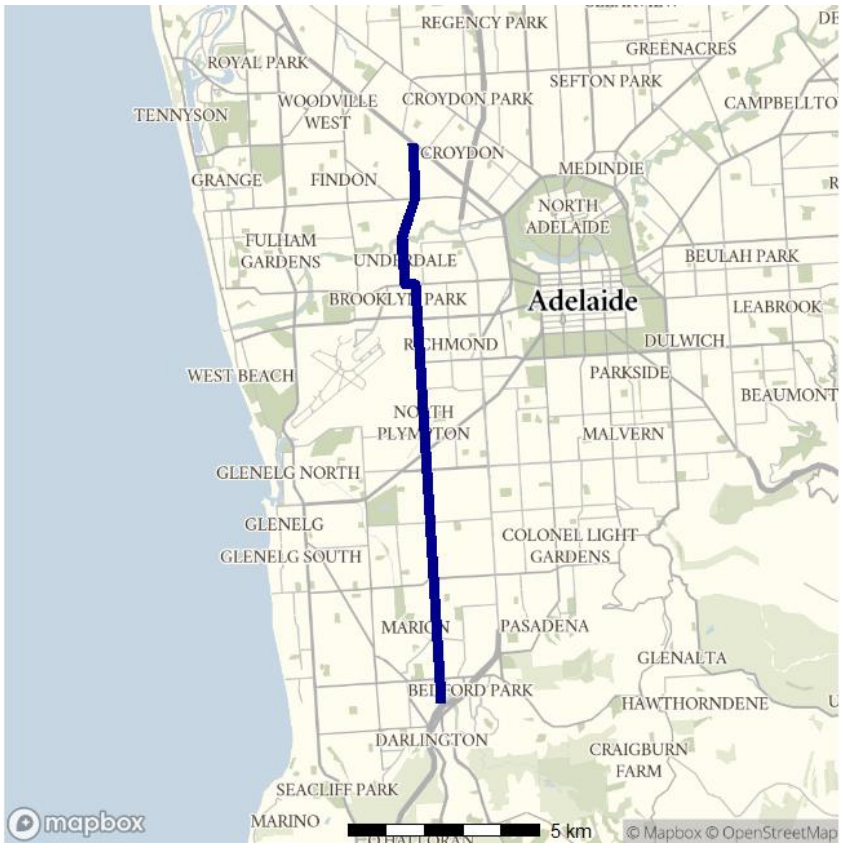
Source: BITRE estimates.

Adelaide routes

A14 - Port Road to Southern Expressway / Southern Expressway to Port Road

This route traverses Adelaide's eastern suburbs and links Port Road (A7) at West Croydon in the north with the A13 at Darlington in the south. It passes Richmond near the Adelaide Airport and Plympton along the way. The route comprises several different roads including Holbrooks Road, Marion Road and Henley Beach Road.

Figure A.313 A14 route map



Source: BITRE estimates.

Table A.53 A14 route travel times and congestion measures, 2022

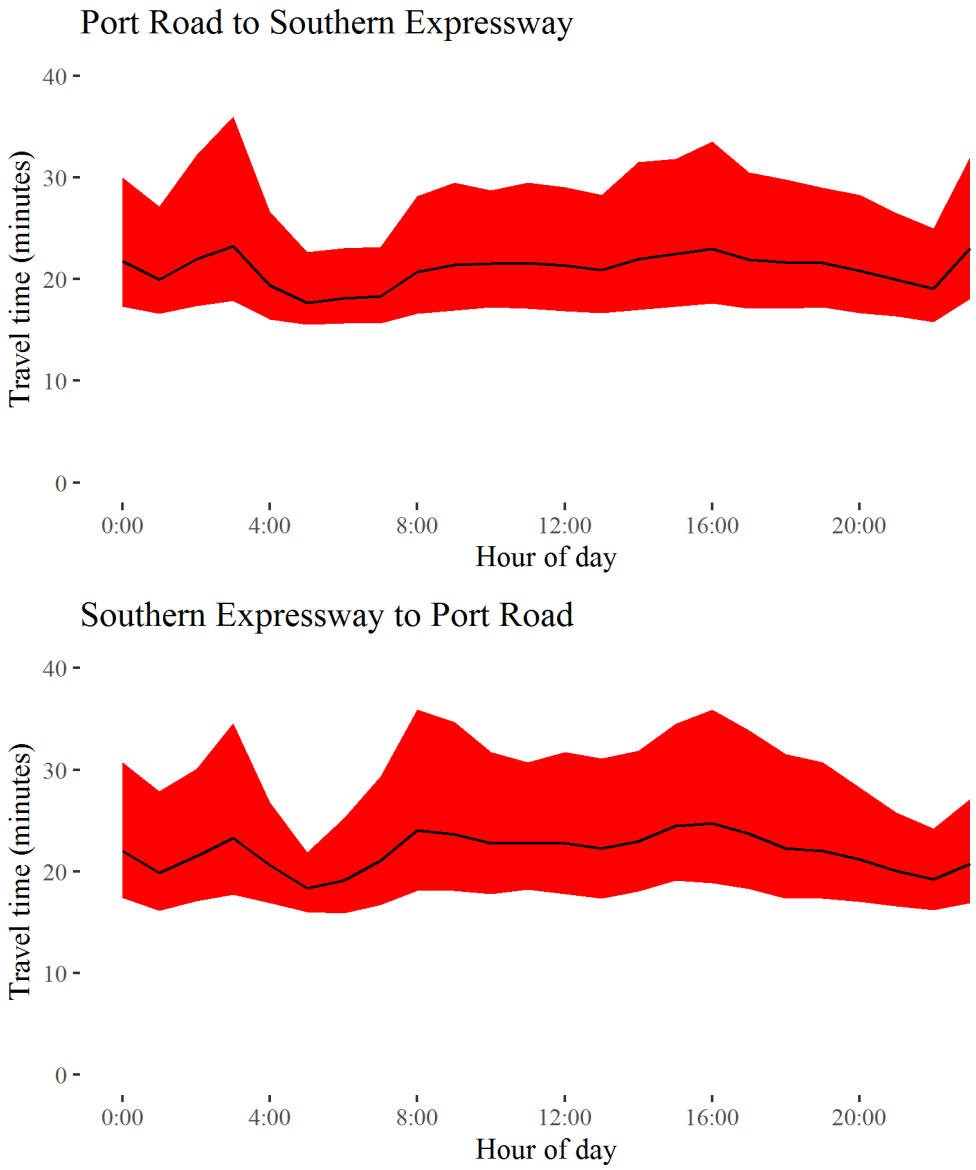
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Port Road to Southern Expressway	00:17:42	00:23:12	1.185	00:07:09	00:18:08	1.682	15.0
Southern Expressway to Port Road	00:18:21	00:24:42	1.193	00:05:54	00:17:50	2.190	15.0

Source: BITRE estimates.

The best median travel times for journeys from Port Road to the Southern Expressway was approximately 18 minutes at 5am and the lowest uncertainty was at 5am with an interquartile range of around 7 minutes. The longest median travel times and greatest uncertainty were at 3am with a median of around 23 minutes and an interquartile range of around 18 minutes.

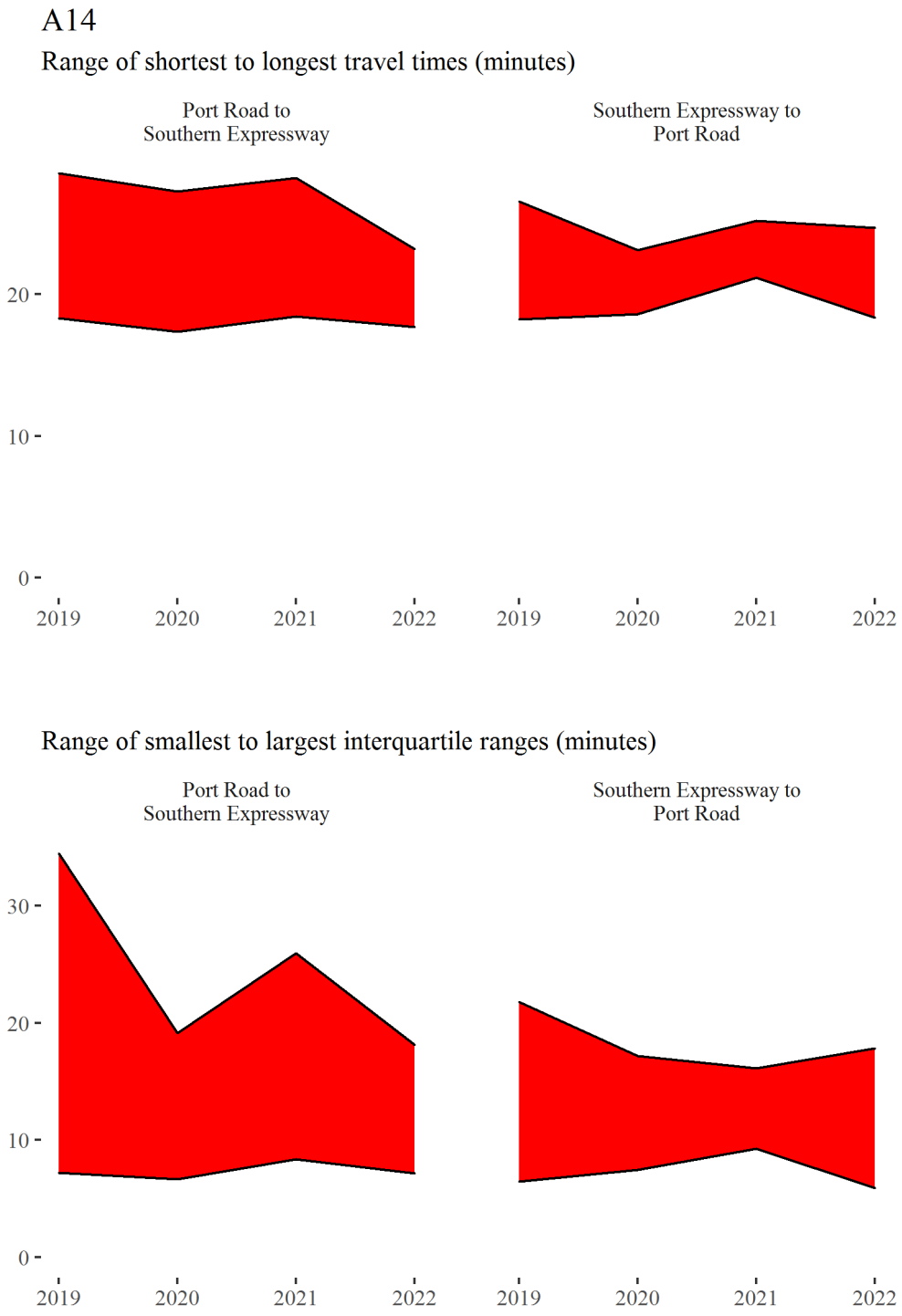
The best median travel times for journeys from the Southern Expressway to Port Road was approximately 18 minutes at 5am and the lowest uncertainty was also at 5am with an interquartile range of around 6 minutes. The longest median travel times was at 4pm with a median of almost 25 minutes and the greatest uncertainty at 8am with an interquartile range of almost 18 minutes.

Figure A.314 A14 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.315 A14 route performance over time

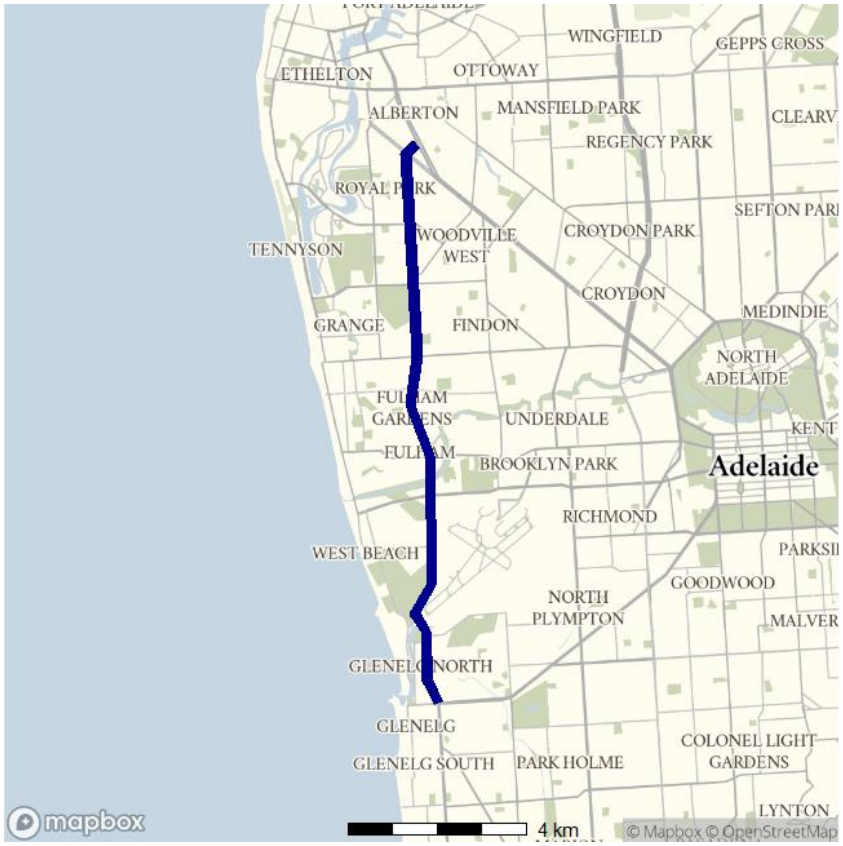


Source: BITRE estimates.

A15 - ANZAC Highway to Port Road / Port Road to ANZAC Highway

This route traverses the western suburbs of Adelaide between Glenelg and Queenstown-Alberton. Its northern sections run parallel to the A14 route (presented above), but passes west of Adelaide Airport. This route is also known as Tapleys Hill Road.

Figure A.319 A15 route map



Source: BITRE estimates.

Table A.54 A15 route travel times and congestion measures, 2022

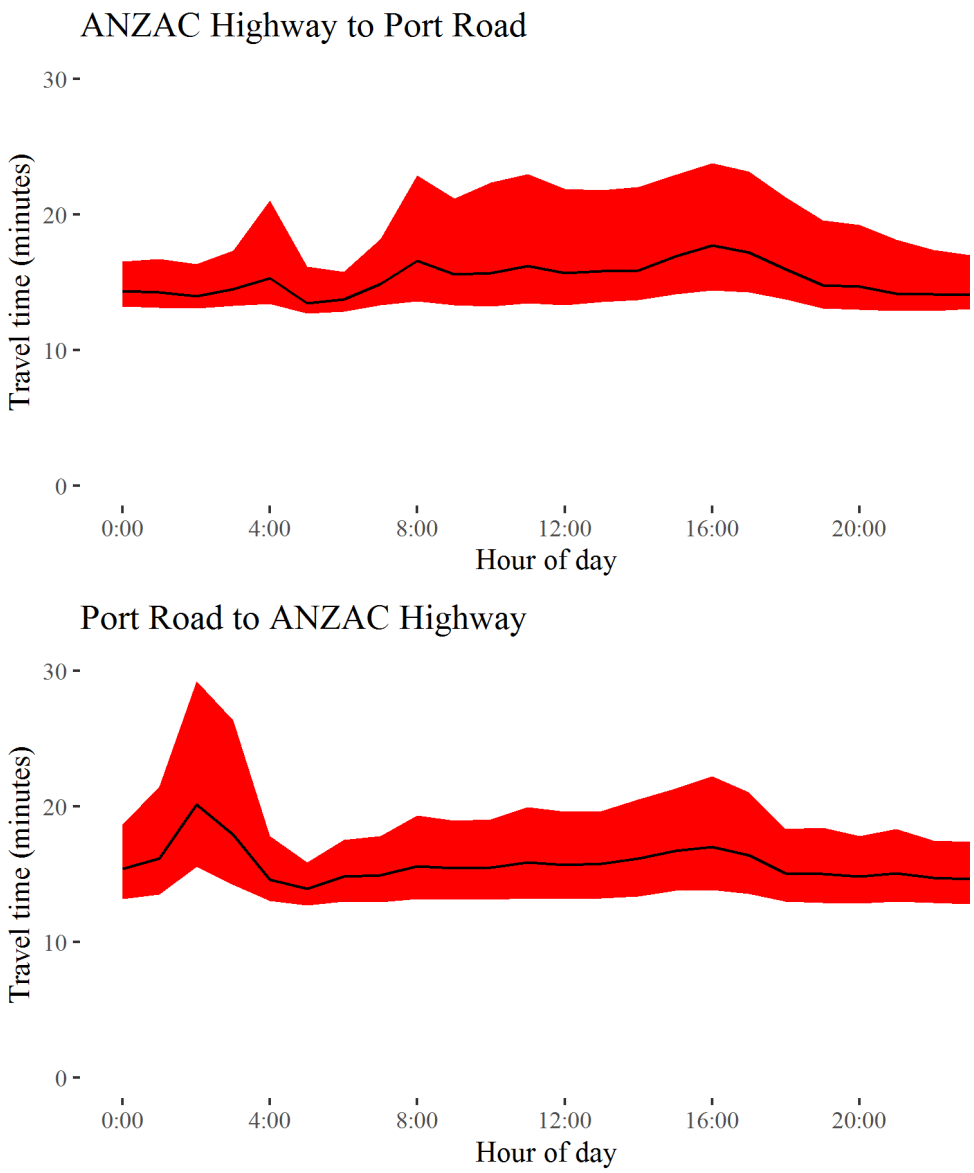
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
ANZAC Highway to Port Road	00:13:26	00:17:42	1.133	00:02:55	00:09:32	2.223	13.1
Port Road to ANZAC Highway	00:13:56	00:20:10	1.130	00:03:10	00:13:41	2.042	13.0

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from ANZAC Highway to Port Road were at 5am with a median travel time of 13.5 minutes and an interquartile range of around 3 minutes. The longest median travel times was at 4pm with a median of almost 18 minutes and the greatest uncertainty at 11am with an interquartile range of 9.5 minutes.

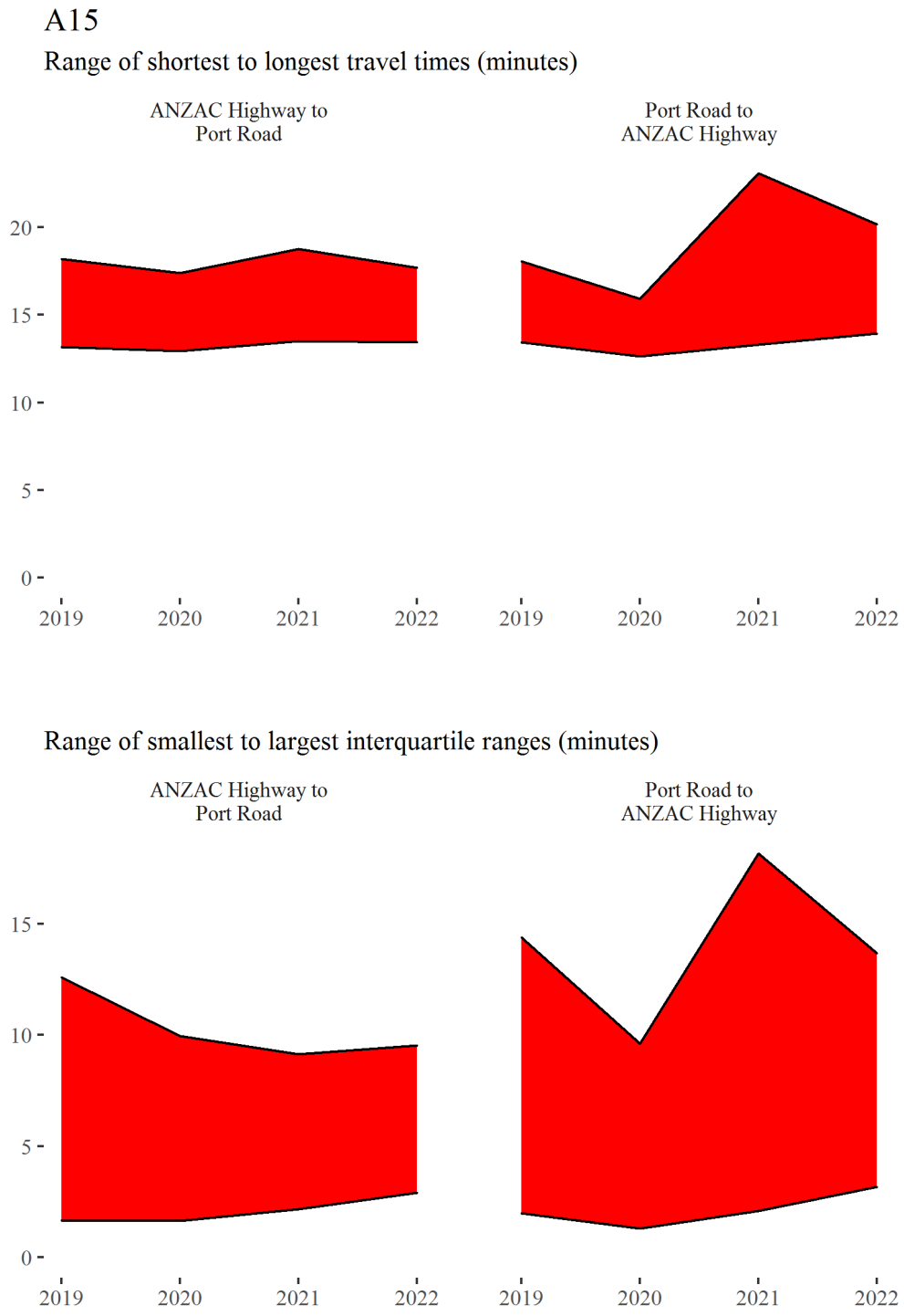
The best median travel times for journeys from Port Road to ANZAC Highway was just under 14 minutes at 5am and the lowest uncertainty was also at 5am with an interquartile range of just over 3 minutes. The longest median travel times and greatest uncertainty were at 2am with a median of around 20 minutes and an interquartile range of just under 14 minutes.

Figure A.320 A15 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.321 A15 route performance over time



Source: BITRE estimates.

A16 - Hampstead Road to Outer Harbor / Outer Harbor to Hampstead Road

This route connects Port of Adelaide, at Outer Harbor, to north Adelaide at Hampstead Road (A17). It uses Grand Junction Road, Causeway Road and Semaphore Road and Victoria Road through the suburbs of Ethelton and Birkenhead.

Figure A.325 A16 route map

Source: BITRE estimates.

Table A.55 A16 route travel times and congestion measures, 2022

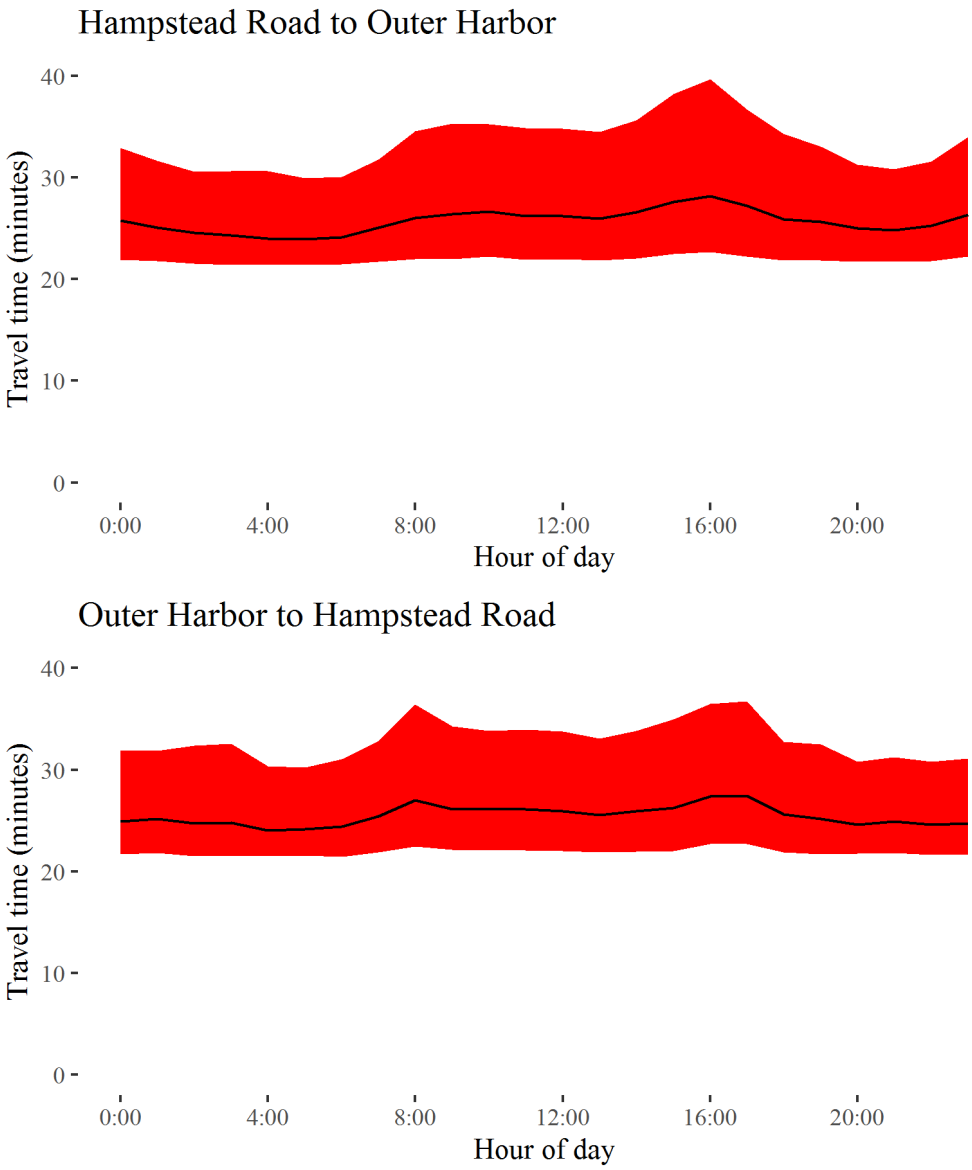
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Hampstead Road to Outer Harbor	00:23:56	00:28:11	1.074	00:08:32	00:16:58	1.354	20.7
Outer Harbor to Hampstead Road	00:24:03	00:27:28	1.059	00:08:40	00:14:02	1.271	20.8

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Hampstead Road to Outer Harbor were at 5am with a median travel time of approximately 24 minutes and an interquartile range of 8.5 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 28 minutes and an interquartile range of 17 minutes.

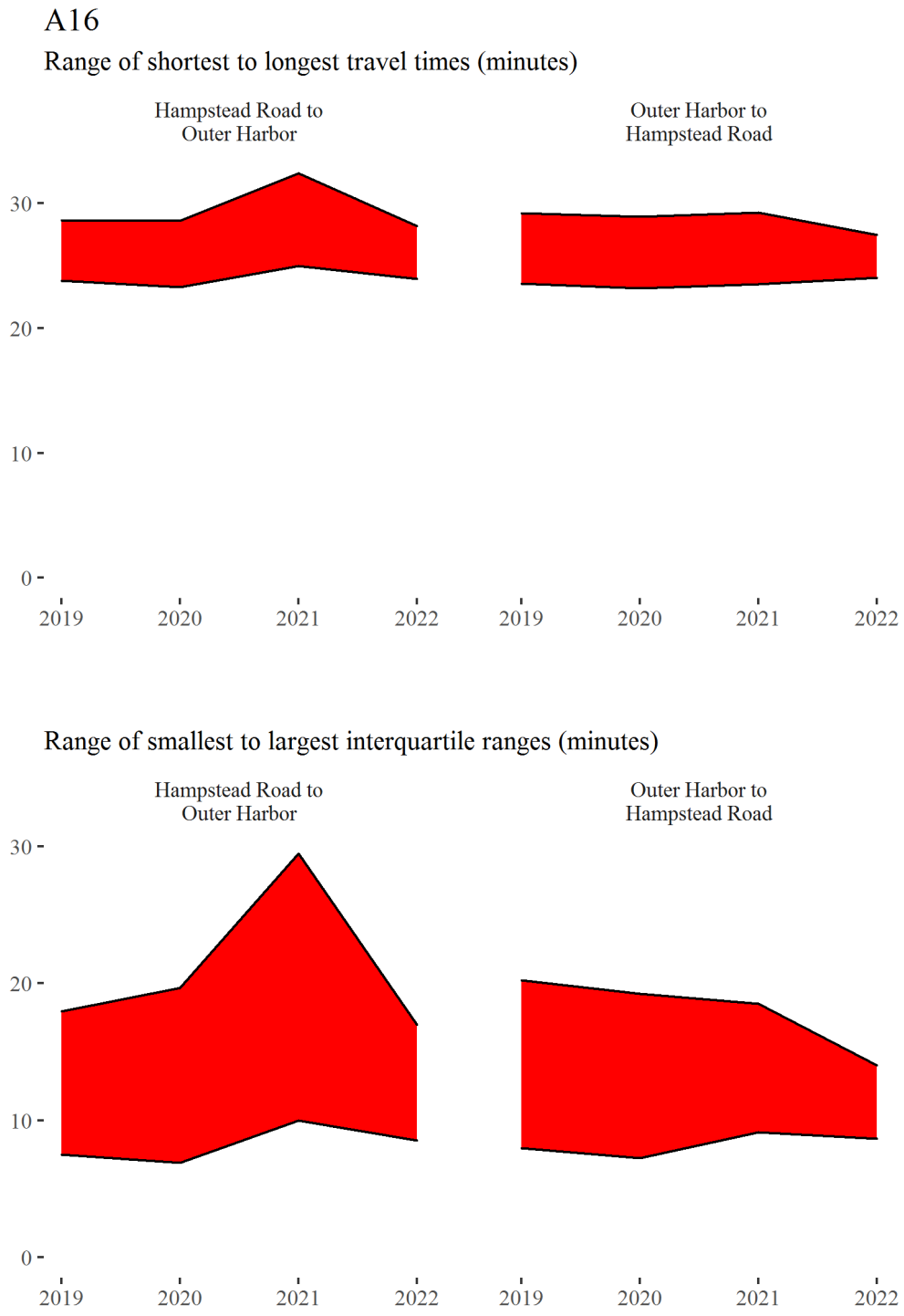
The best median travel times and least uncertainty for journeys from Outer Harbor to Hampstead Road were at 4am with a median travel time of 24 minutes and an interquartile range of almost 9 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of 27.5 minutes and an interquartile range of 14 minutes.

Figure A.326 A16 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.327 A16 route performance over time



Source: BITRE estimates.

A17 - Grand Junction Road to South Eastern Freeway / South Eastern Freeway to Grand Junction Road

This route extends from the A16 (Grand Junction Road) south through Adelaide's eastern suburbs to the junction of the South Eastern Freeway and Cross Road at Glen Osmond. The route traverses Hampstead Road, Ascot Avenue and Portrush Road along its length.

Figure A.331 A17 route map

Source: BITRE estimates.

Table A.56 A17 route travel times and congestion measures, 2022

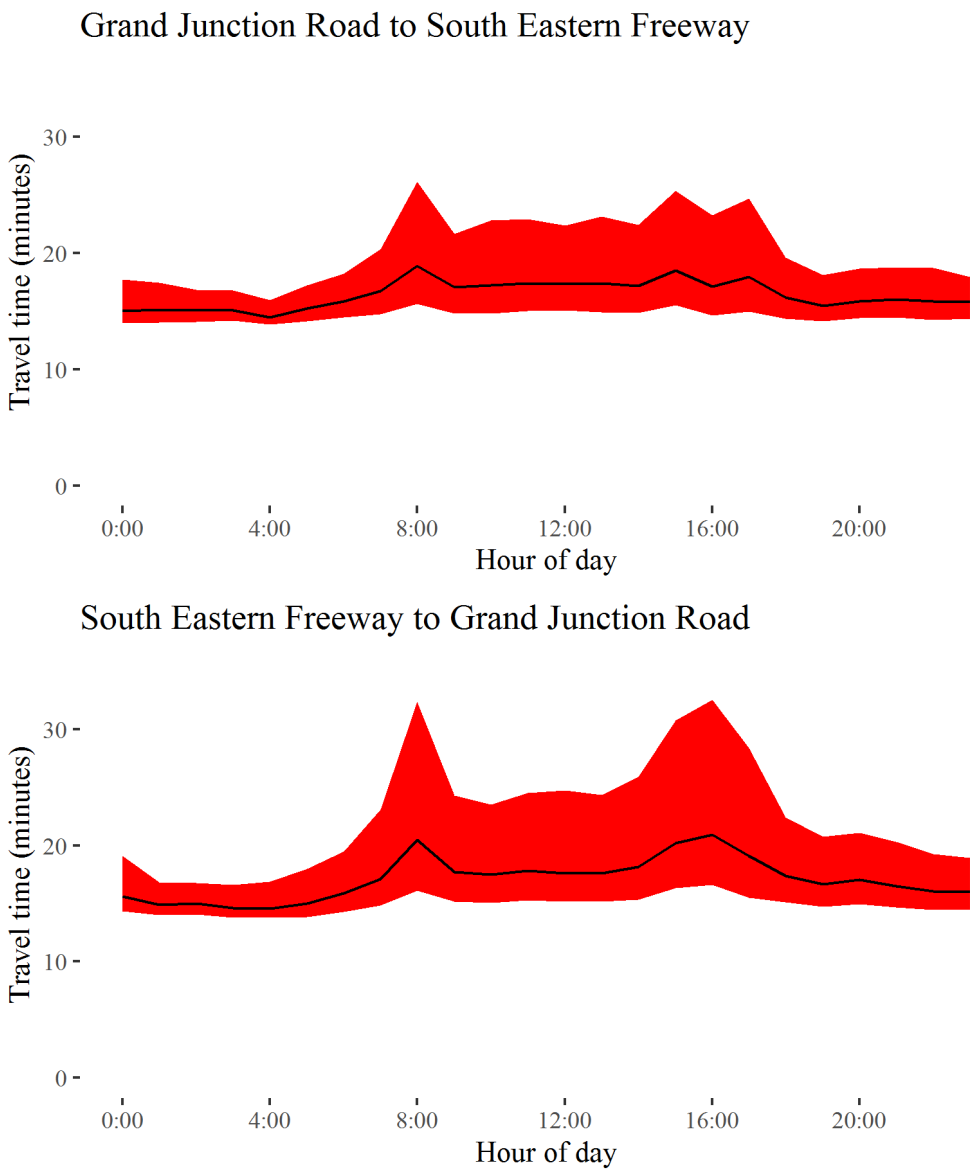
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Grand Junction Road to South Eastern Freeway	00:14:27	00:18:53	1.136	00:02:07	00:10:30	2.710	13.6
South Eastern Freeway to Grand Junction Road	00:14:33	00:20:54	1.172	00:02:41	00:16:16	2.855	13.6

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Grand Junction Road to the South Eastern Freeway were at 4am with a median travel time of 14.5 minutes and an interquartile range of around 2 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of almost 19 minutes and an interquartile range of 10.5 minutes.

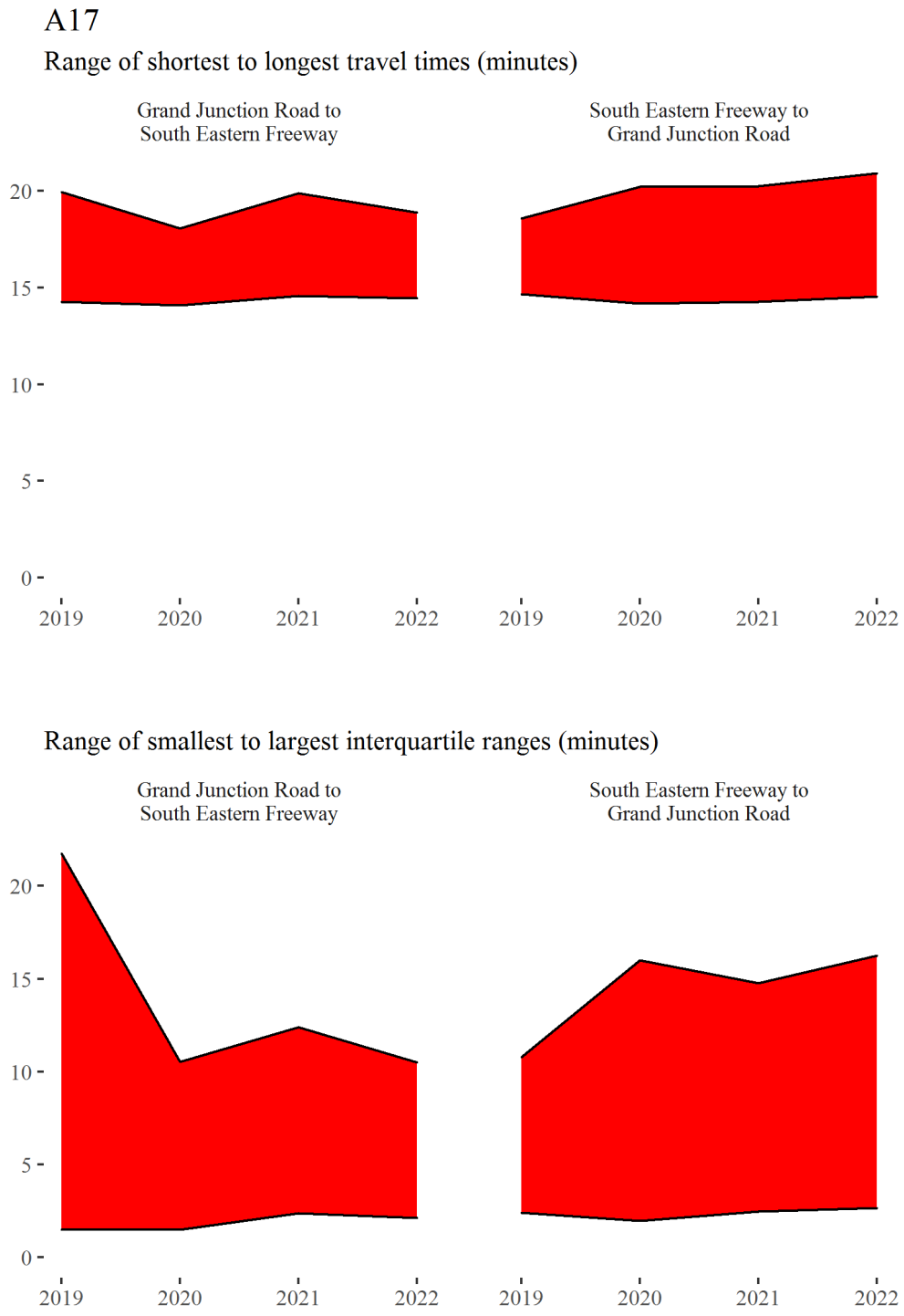
The best median travel times and least uncertainty for journeys from South Eastern Freeway to Grand Junction Road were at 4am with a median travel time of 14.5 minutes and an interquartile range of almost 3 minutes. The longest median travel times were at 4pm with a median of around 21 minutes and the greatest uncertainty at 8am with an interquartile range of just over 16 minutes.

Figure A.332 A17 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.333 A17 route performance over time



Source: BITRE estimates.

A2-M2 - Main South Road to Port River Expressway / Port River Expressway to Main South Road

This route, the only Adelaide route in this report with including motorway sections, traverses Adelaide north to south. It follows the A2 and the M2, from the Port River Expressway (A9) at Angle Park to the Main South Road at Noarlunga Downs. This route uses the Southern Expressway (M2), South Road (A2) and the North-South Motorway (M2). It does not include the Northern Connector opened in March 2020.

Figure A.337 A2-M2 route map

Source: BITRE estimates.

Table A.57 A2-M2 route travel times and congestion measures, 2022

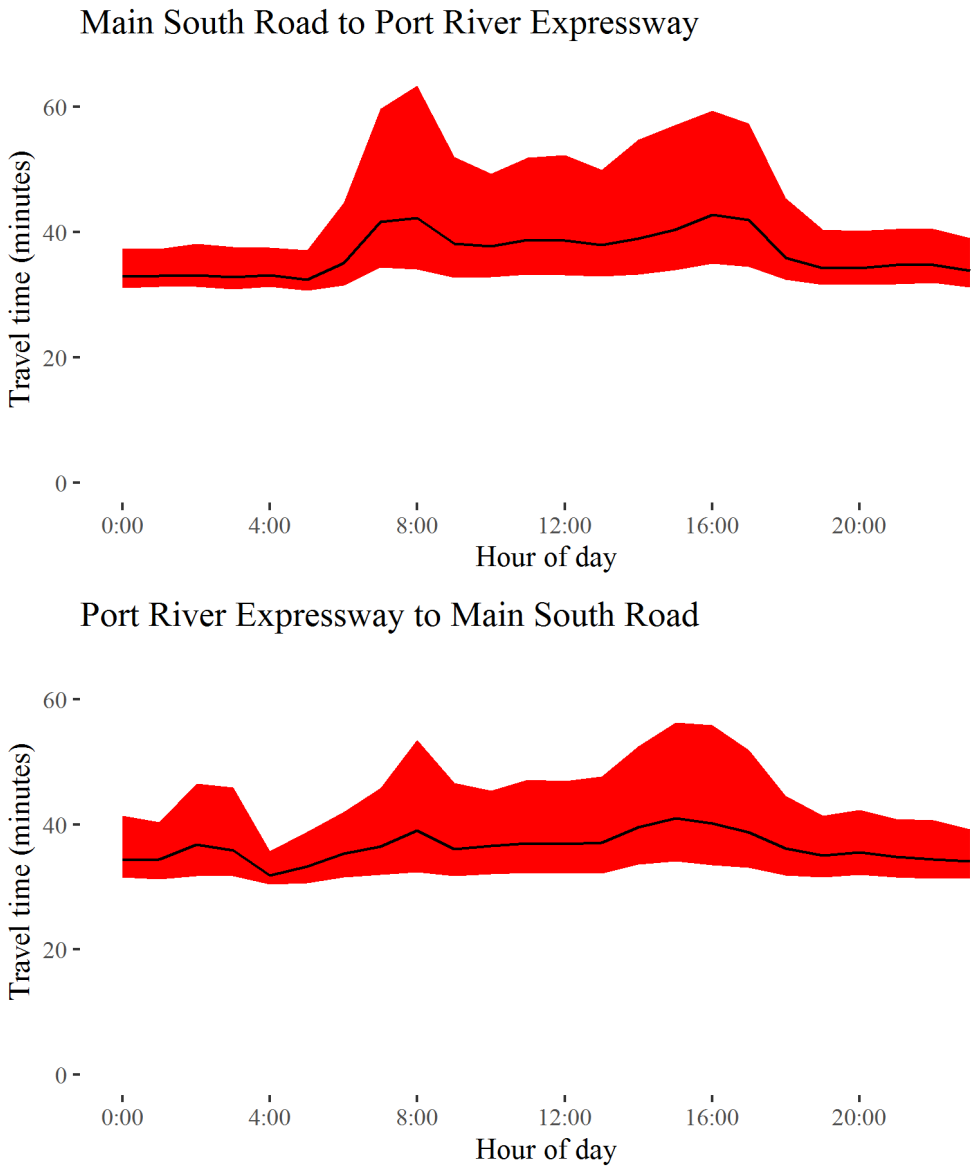
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Main South Road to Port River Expressway	00:32:25	00:42:45	1.131	00:06:04	00:29:23	2.377	40.1
Port River Expressway to Main South Road	00:31:50	00:41:01	1.139	00:05:25	00:22:26	2.480	39.8

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from Main South Road to the Port River Expressway were at 5am with a median travel time of approximately 32.5 minutes and an interquartile range of 6 minutes. The longest median travel times was at 4pm with a median of around 43 minutes and the greatest uncertainty at 8am with an interquartile range of just over 29 minutes.

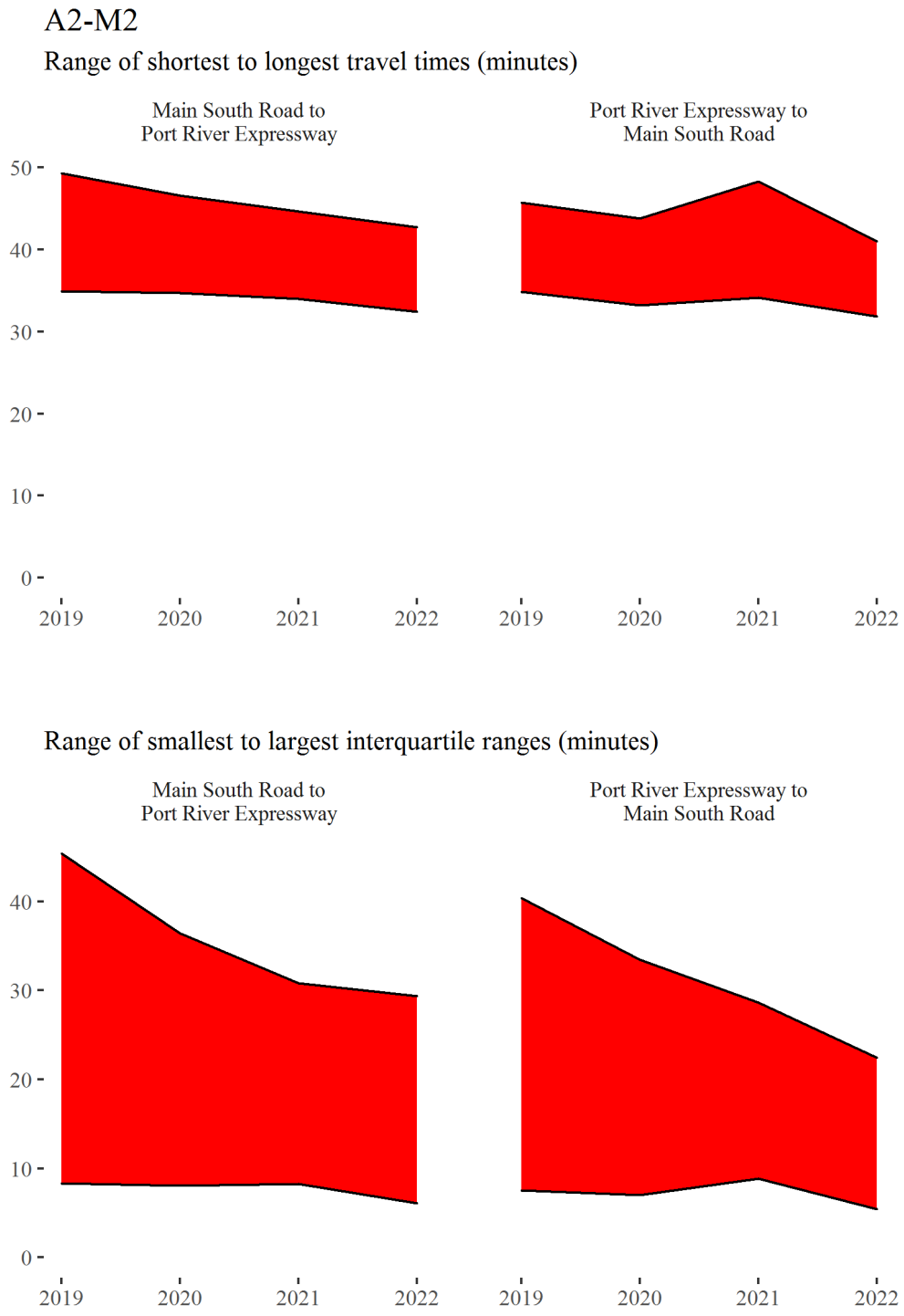
The best median travel times for journeys from the Port River Expressway to Main South Road was around 32 minutes at 4am and the lowest uncertainty was also at 4am with an interquartile range of 5.5 minutes. The longest median travel times was 41 minutes at 3pm and the greatest uncertainty was at 4pm with an interquartile range of around 22.5 minutes.

Figure A.338 A2-M2 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.339 A2-M2 route performance over time



Source: BITRE estimates.

A20 - Grand Junction Road to Sturt Highway / Sturt Highway to Grand Junction Road

This route follows the A20 (comprising Main North Road and the Gawler Bypass) from Grand Junction Road at Gepps Cross north to the Stuart Highway near Gawler, and passes through Evanston Park, Blakeview, Elizabeth, Salisbury Park and Mawson Lakes.

Figure A.343 A20 route map

Source: BITRE estimates.

Table A.58 A20 route travel times and congestion measures, 2022

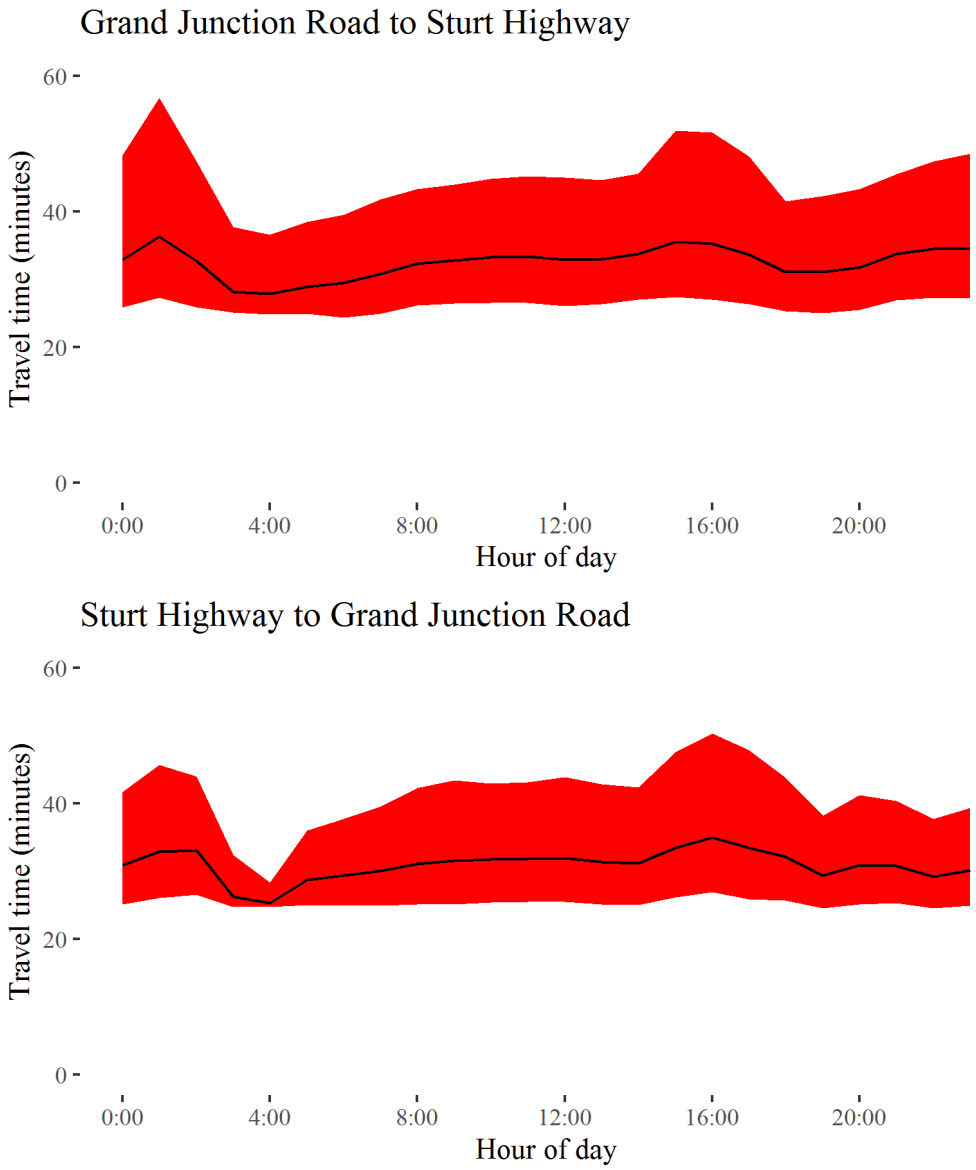
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Grand Junction Road to Sturt Highway	00:27:49	00:36:18	1.166	00:11:47	00:29:30	1.603	32.4
Sturt Highway to Grand Junction Road	00:25:17	00:35:01	1.223	00:03:36	00:23:24	4.460	32.6

Source: BITRE estimates.

The best median travel times for journeys from Grand Junction Road to the Sturt Highway was approximately 28 minutes at 4am and the lowest uncertainty was also at 4am with an interquartile range of almost 12 minutes. The longest median travel times and greatest uncertainty were at 1am with a median of around 36 minutes and an interquartile range of 29.5 minutes.

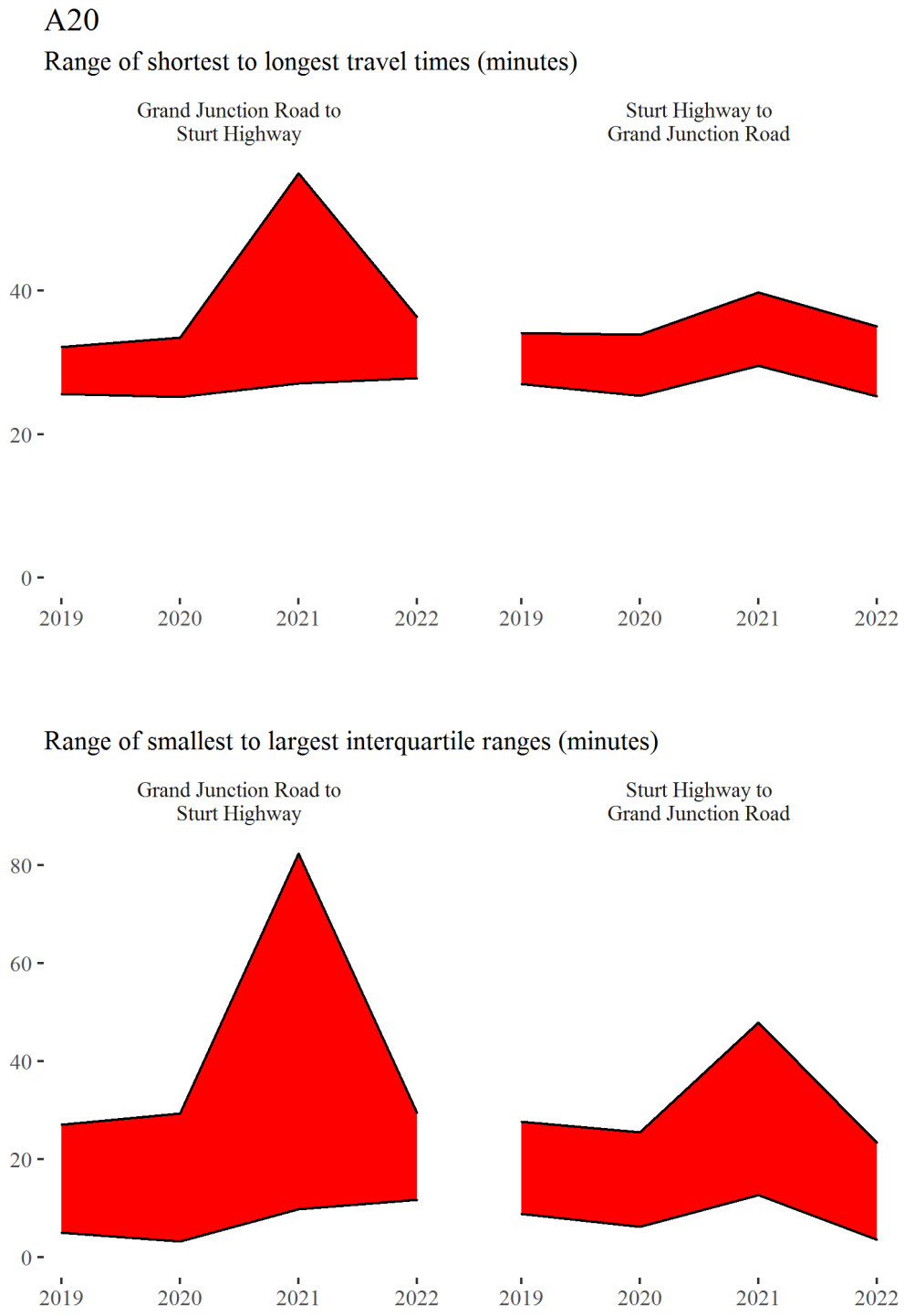
The best median travel times and lowest uncertainty for journeys from the Sturt Highway to Grand Junction Road were at 4am with a median travel time of around 25 minutes and an interquartile range of almost 4 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 35 minutes and an interquartile range of 23.5 minutes.

Figure A.344 A20 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.345 A20 route performance over time

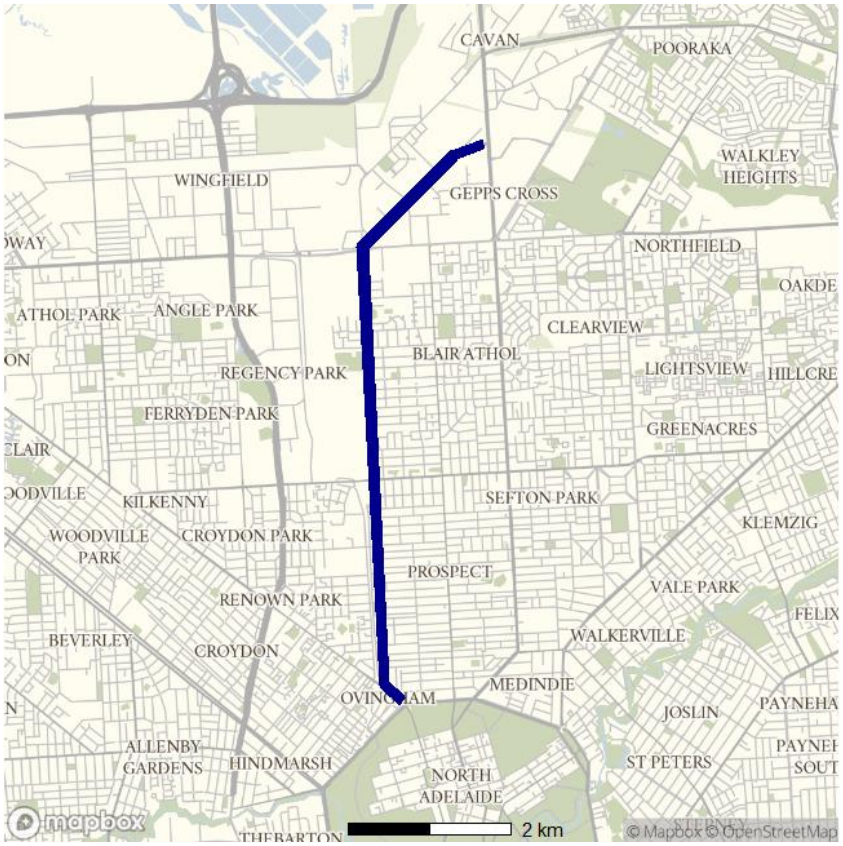


Source: BITRE estimates.

A22 - Park Terrace to Port Wakefield Road / Port Wakefield Road to Park Terrace

This route extends from Park Terrace at north Adelaide north to the Princes Highway (A1, Port Wakefield Road) at Gepps Cross. It uses Churchill Road and Cavan Road, crossing Grand Junction Road (A16) along its length.

Figure A.349 A22 route map



Source: BITRE estimates.

Table A.59 A22 route travel times and congestion measures, 2022

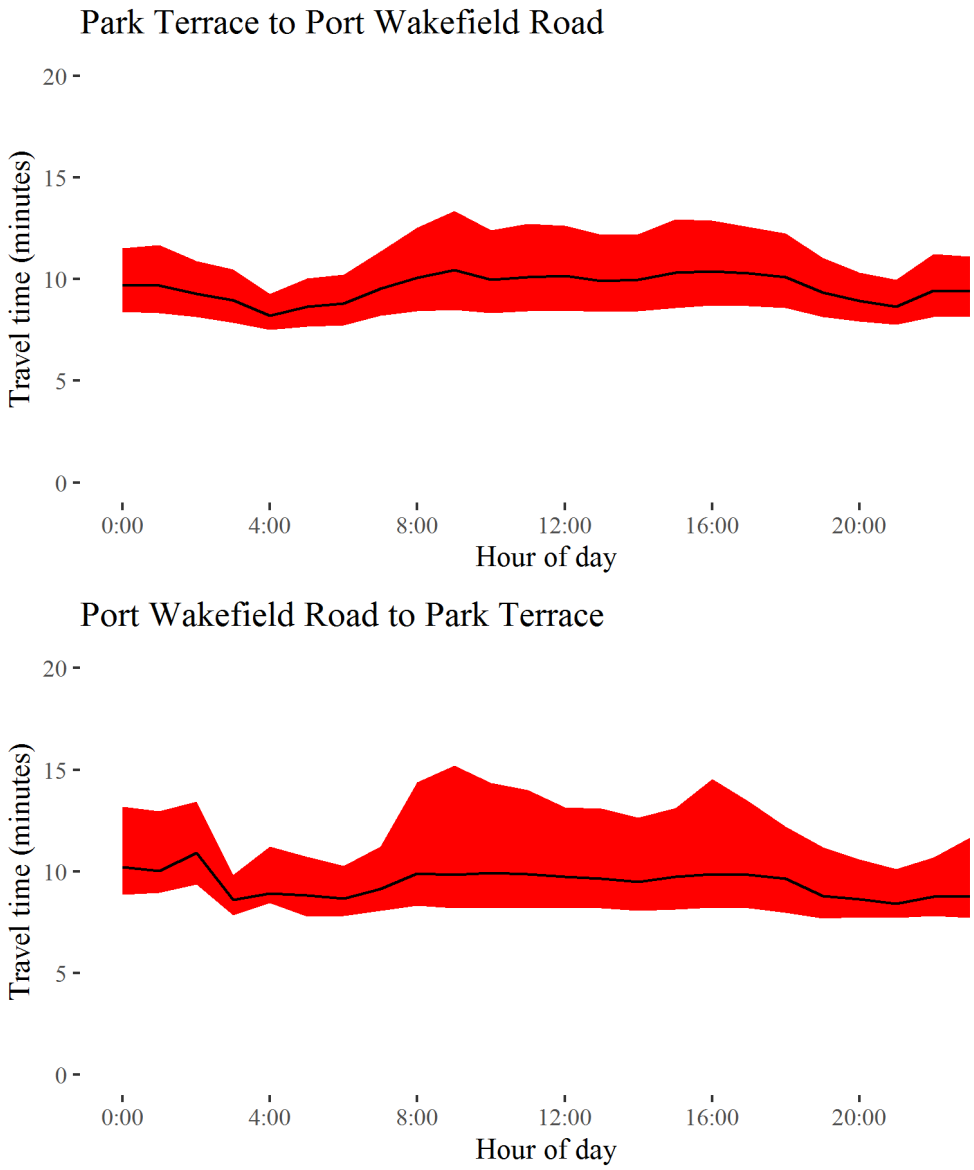
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Park Terrace to Port Wakefield Road	00:08:13	00:10:26	1.168	00:01:47	00:04:52	1.884	7.7
Port Wakefield Road to Park Terrace	00:08:24	00:10:55	1.122	00:01:59	00:07:02	2.143	7.6

Source: BITRE estimates.

The best median travel times for journeys from Park Terrace to Port Wakefield Road was around 8 minutes at 4am and the lowest uncertainty was also at 4am with an interquartile range of almost 2 minutes. The longest median travel times and greatest uncertainty were at 9am with a median of 10.5 minutes and an interquartile range of nearly 5 minutes.

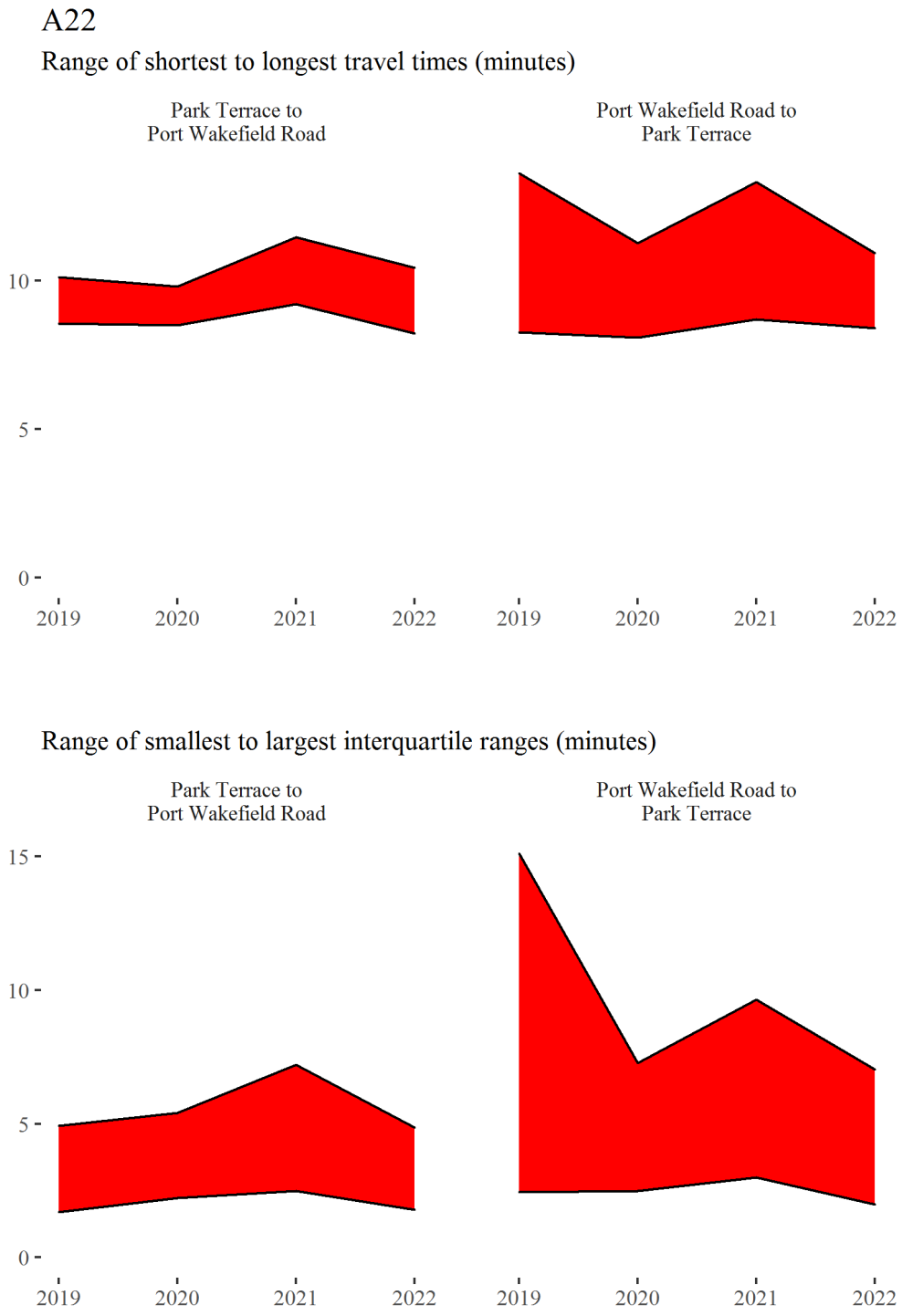
The best travel times and lowest uncertainty travelling from Port Wakefield Road to Park Terrace were at 9pm and 3am, respectively, with a median travel time of 8.5 minutes and an interquartile range of 2 minutes. The longest median travel times was at 2am with a median of around 11 minutes and the greatest uncertainty at 9am with an interquartile range of 7 minutes.

Figure A.350 A22 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.351 A22 route performance over time



Source: BITRE estimates.

A3 - ANZAC Highway to South Eastern Freeway / South Eastern Freeway to ANZAC Highway

This route follows Cross Road (A3) between the ANZAC Highway (A5) and the South Eastern Freeway at Glen Osmond. It traverses Adelaide's Southern Suburbs.

Figure A.355 A3 route map

Source: BITRE estimates.

Table A.60 A3 route travel times and congestion measures, 2022

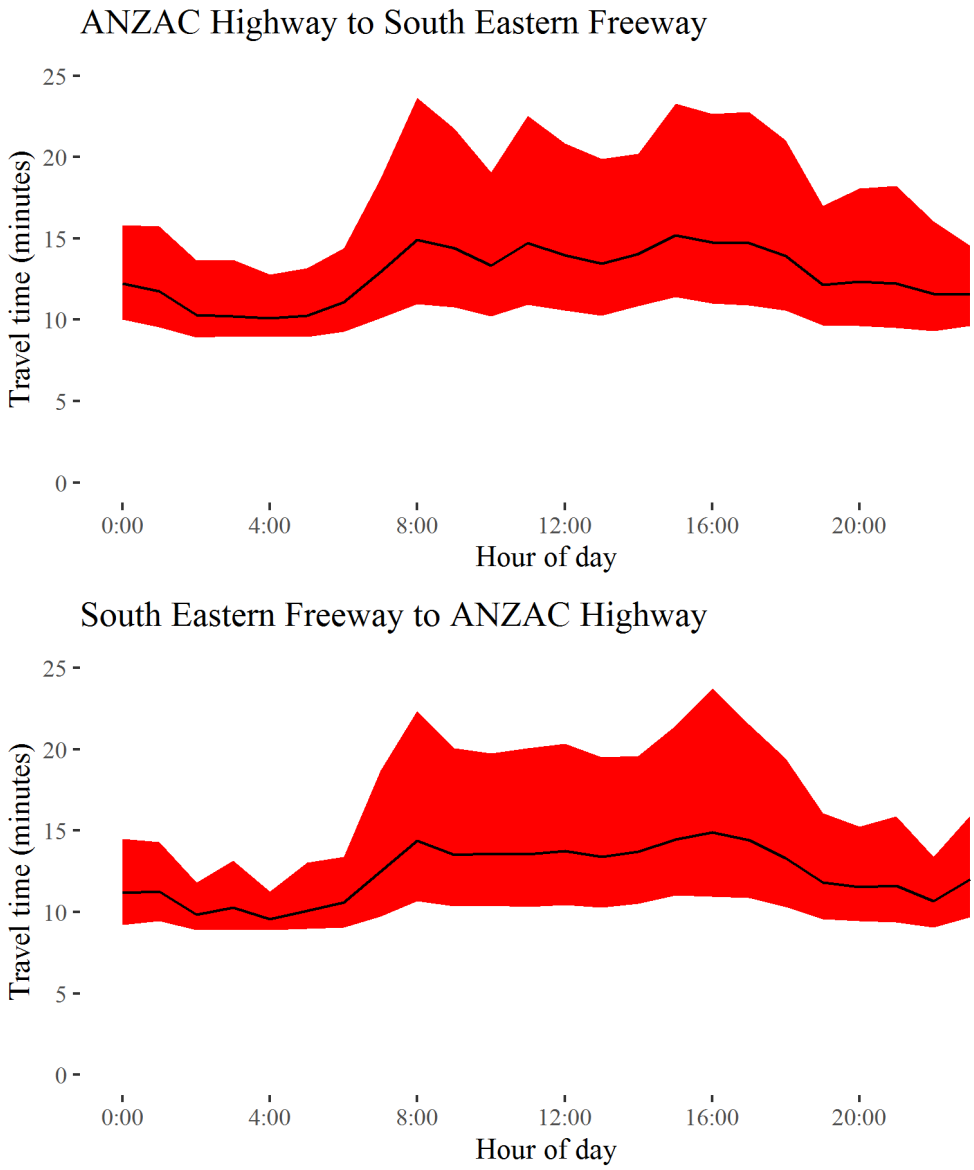
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
ANZAC Highway to South Eastern Freeway	00:10:05	00:15:12	1.266	00:03:52	00:12:41	2.140	8.7
South Eastern Freeway to ANZAC Highway	00:09:34	00:14:54	1.289	00:02:22	00:12:48	3.134	8.7

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from ANZAC Highway to the South Eastern Freeway were at 4am with a median travel time of 10 minutes and an interquartile range of around 4 minutes. The longest median travel times was around 15 minutes at 3pm and the greatest uncertainty was at 8am with an interquartile range of almost 13 minutes.

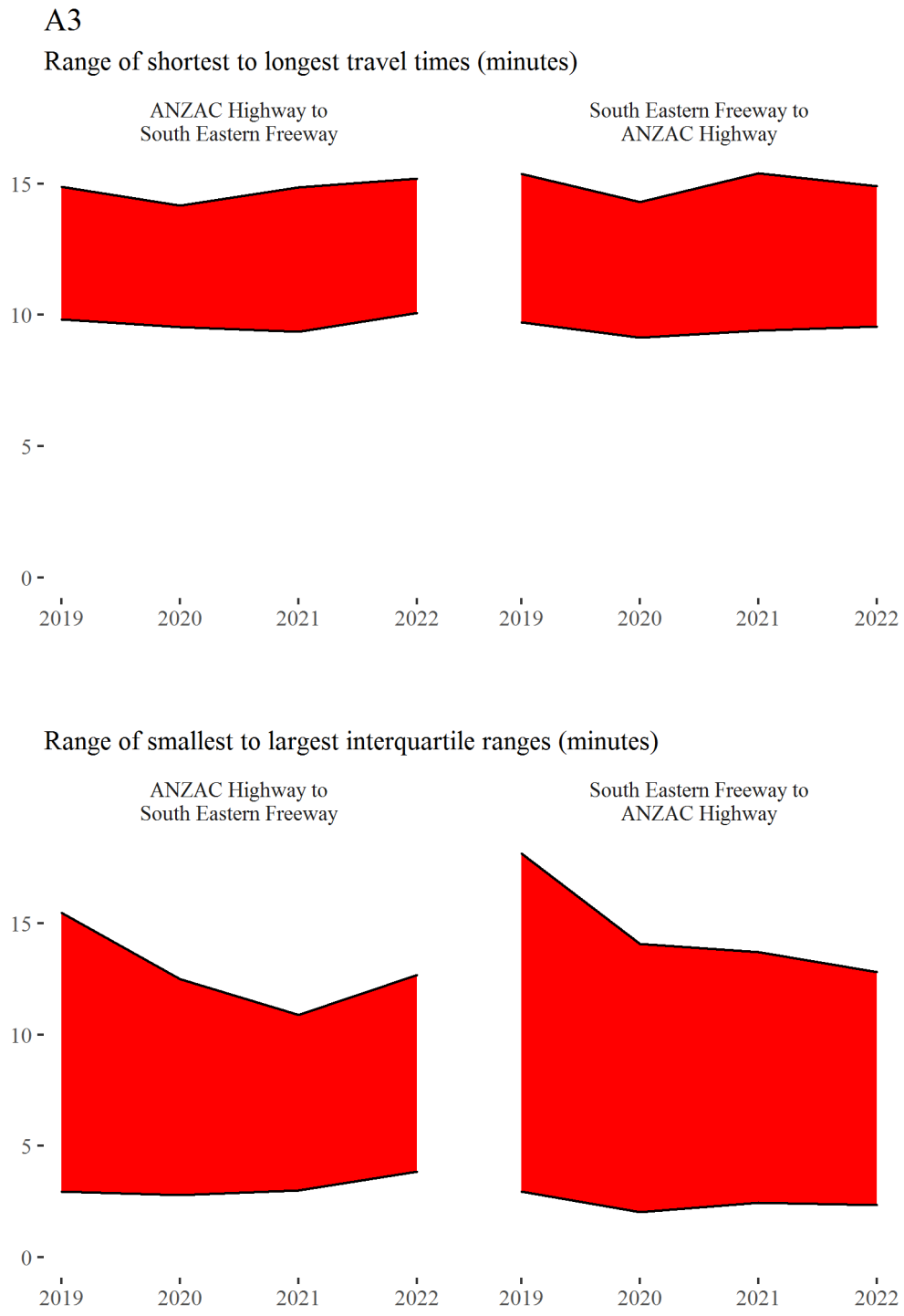
The best median travel times and least uncertainty for journeys from the South Eastern Freeway to ANZAC Highway were at 4am with a median travel time of 9.5 minutes and an interquartile range of approximately 2 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 15 minutes and an interquartile range of nearly 13 minutes.

Figure A.356 A3 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.357 A3 route performance over time

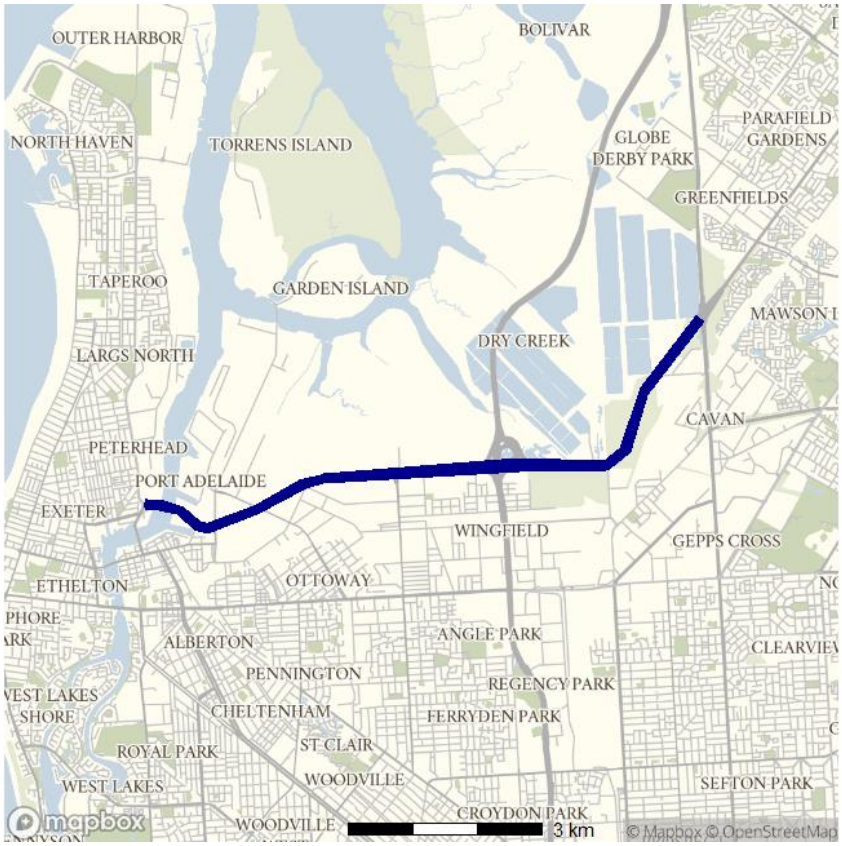


Source: BITRE estimates.

A9 - Nelson St to Port Wakefield Road / Port Wakefield Road to Nelson Street

This route traverses the light industrial areas on Adelaide's northern fringe. It links Victoria Road and Nelson Street at Birkenhead and the Princes Highway (Port Wakefield Road, A1) at Mawson Lakes, and is an important link for freight from northern Adelaide to the port. It is known at different points on its route as the Port River Expressway and the Salisbury Highway.

Figure A.361 A9 route map



Source: BITRE estimates.

Table A.61 A9 route travel times and congestion measures, 2022

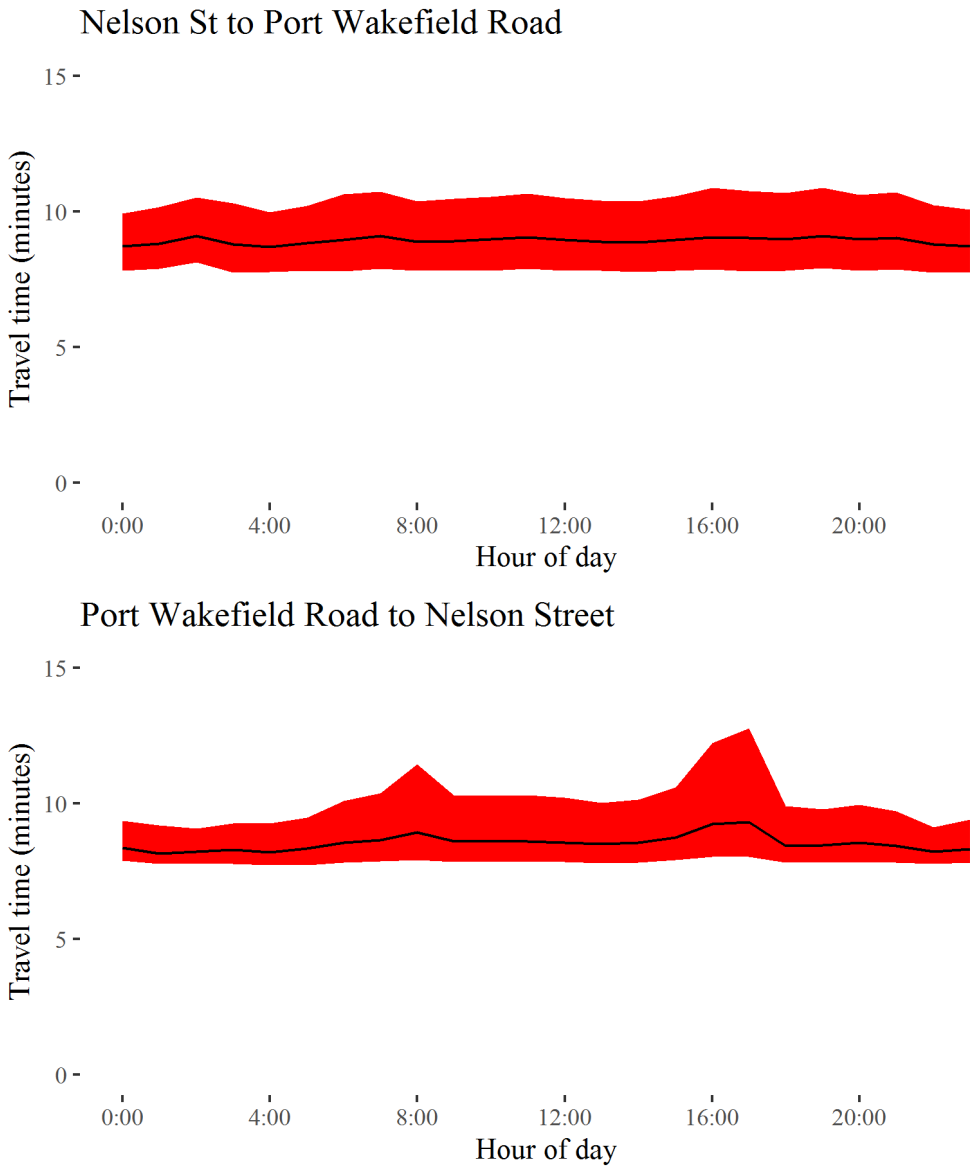
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Nelson St to Port Wakefield Road	00:08:41	00:09:06	1.026	00:02:06	00:03:00	1.253	10.2
Port Wakefield Road to Nelson Street	00:08:09	00:09:19	1.048	00:01:17	00:04:44	1.764	10.2

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Nelson St to Port Wakefield Road were at 4am with a median travel time of around 9 minutes and an interquartile range of just over 2 minutes. The longest median travel times was around 9 minutes at 2am and the greatest uncertainty was at 4pm with an interquartile range of 3 minutes.

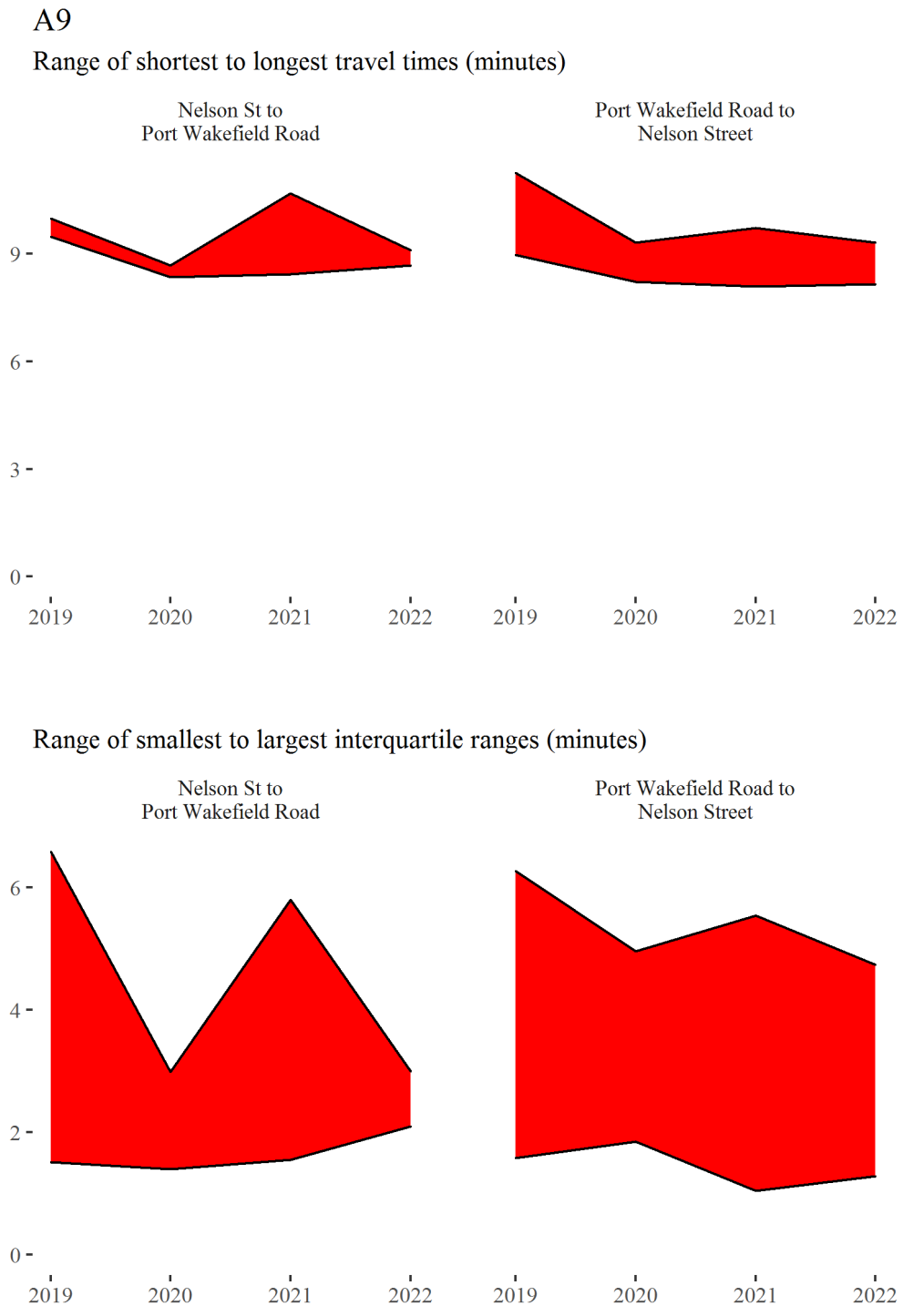
The best median travel times and lowest uncertainty for journeys from Port Wakefield Road to Nelson Street were at 1am with a median travel time of approximately 8 minutes and an interquartile range of 77 seconds. The longest median travel times and greatest uncertainty were at 5pm with a median of around 9 minutes and an interquartile range of just under 5 minutes.

Figure A.362 A9 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.363 A9 route performance over time



Source: BITRE estimates.

Perth routes

Route 1 - Roe Highway to Tonkin Highway / Tonkin Highway to Roe Highway

This route follows the Great Northern Highway north-south between the Tonkin Highway at Muchea and the Roe Highway–Reid Highway junction at Middle Swan. It passes Herne Hill, Upper Swan and Bullsbrook along its length. The BITRE telematics data shows it is a major route for freight heading north out of Perth.

Figure A.367 Route 1 route map

Source: BITRE estimates.

Table A.62 Route 1 route travel times and congestion measures, 2022

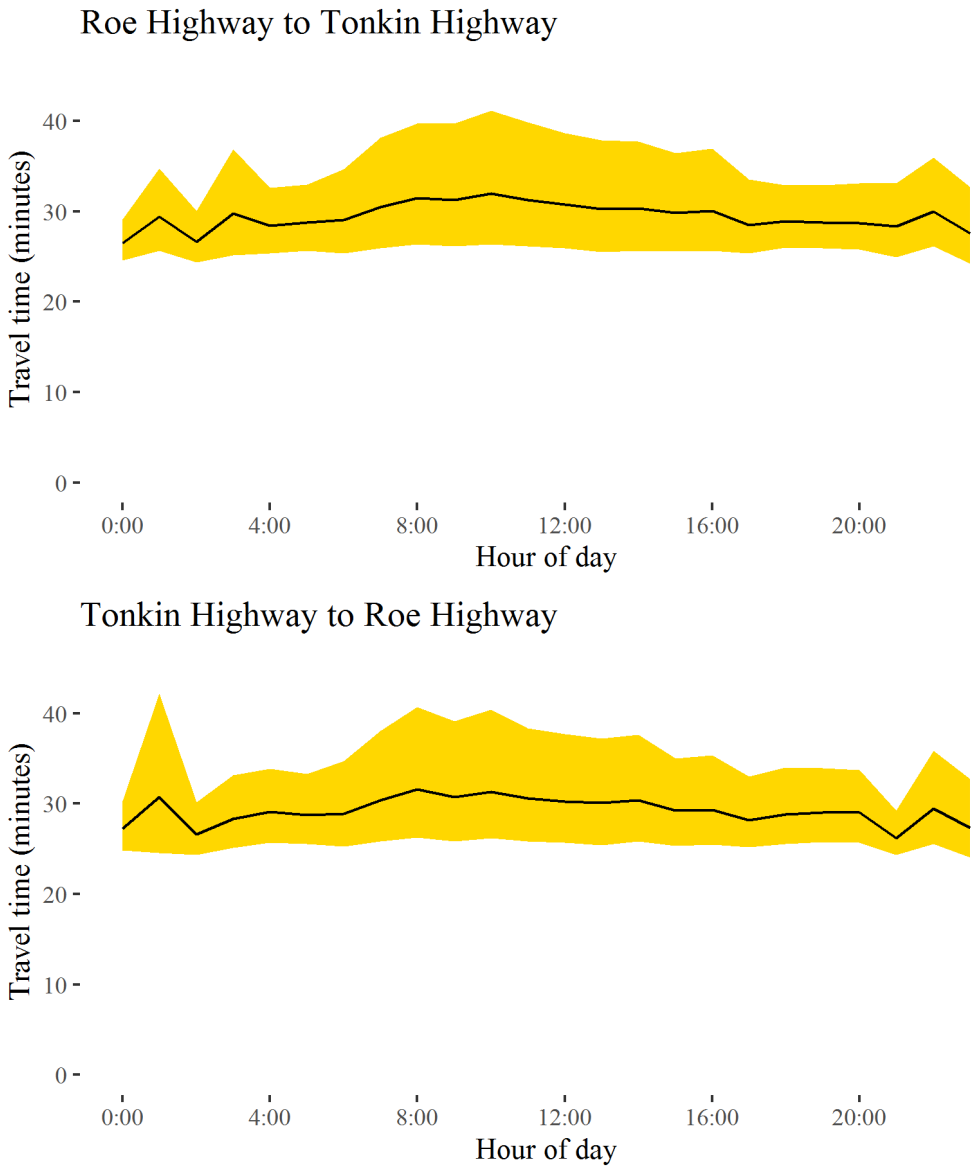
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Roe Highway to Tonkin Highway	00:26:28	00:31:56	1.112	00:04:32	00:14:46	2.183	34.5
Tonkin Highway to Roe Highway	00:26:12	00:31:33	1.115	00:04:56	00:17:36	2.032	34.5

Source: BITRE estimates.

The best median travel times for journeys from the Roe Highway to Tonkin Highway were 26.5 minutes at midnight and the lowest uncertainty was also at midnight with an interquartile range of 4.5 minutes. The longest median travel times and greatest uncertainty were at 10am with a median of 32 minutes and an interquartile range of around 15 minutes.

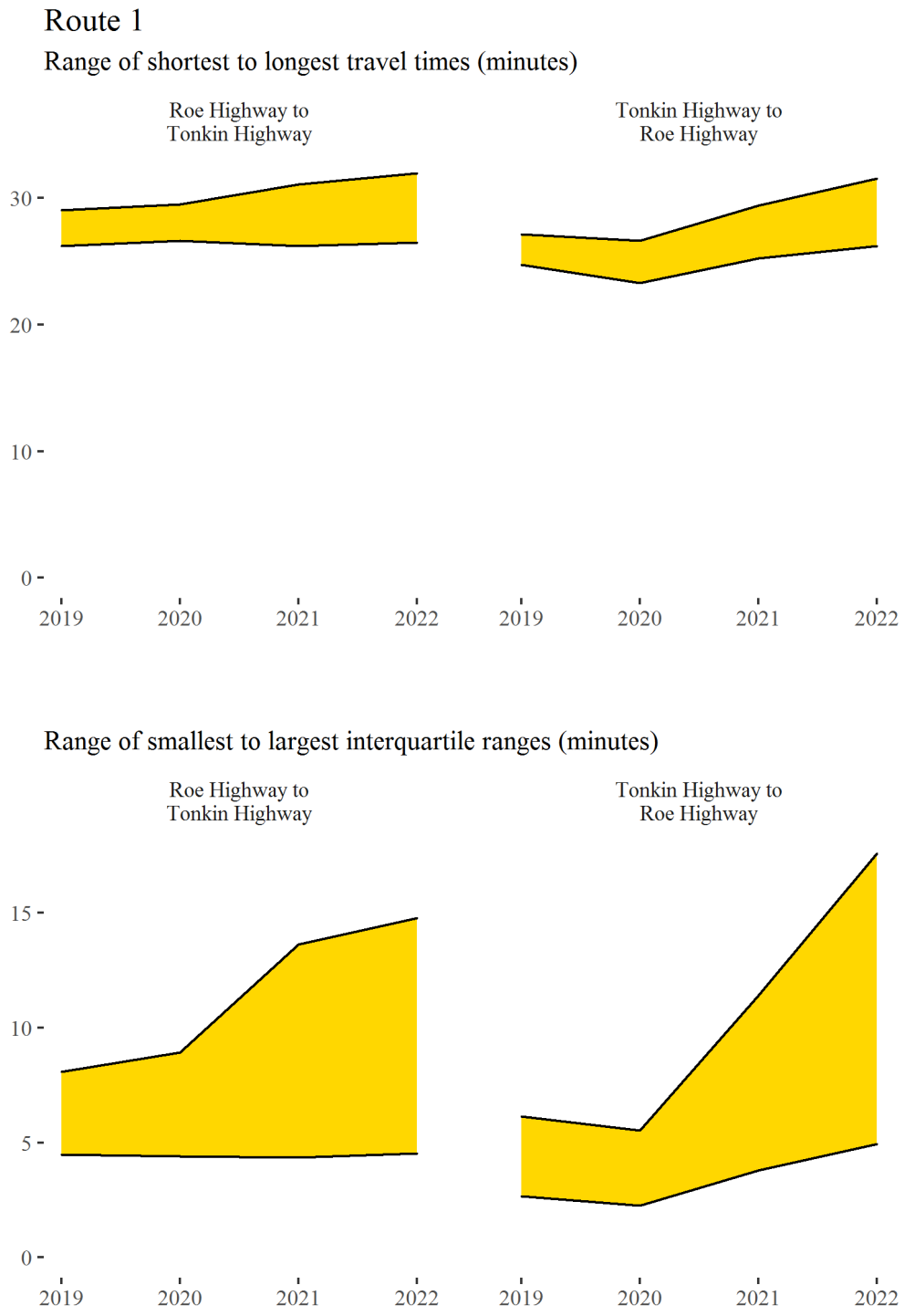
The best median travel times for journeys from Tonkin Highway to Roe Highway was around 26 minutes at 9pm and the lowest uncertainty was at 9pm with an interquartile range of 5 minutes. The longest median travel times was 31.5 minutes at 8am and the greatest uncertainty was at 1am with an interquartile range of around 17.5 minutes.

Figure A.368 Route 1 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.369 Route 1 route performance over time

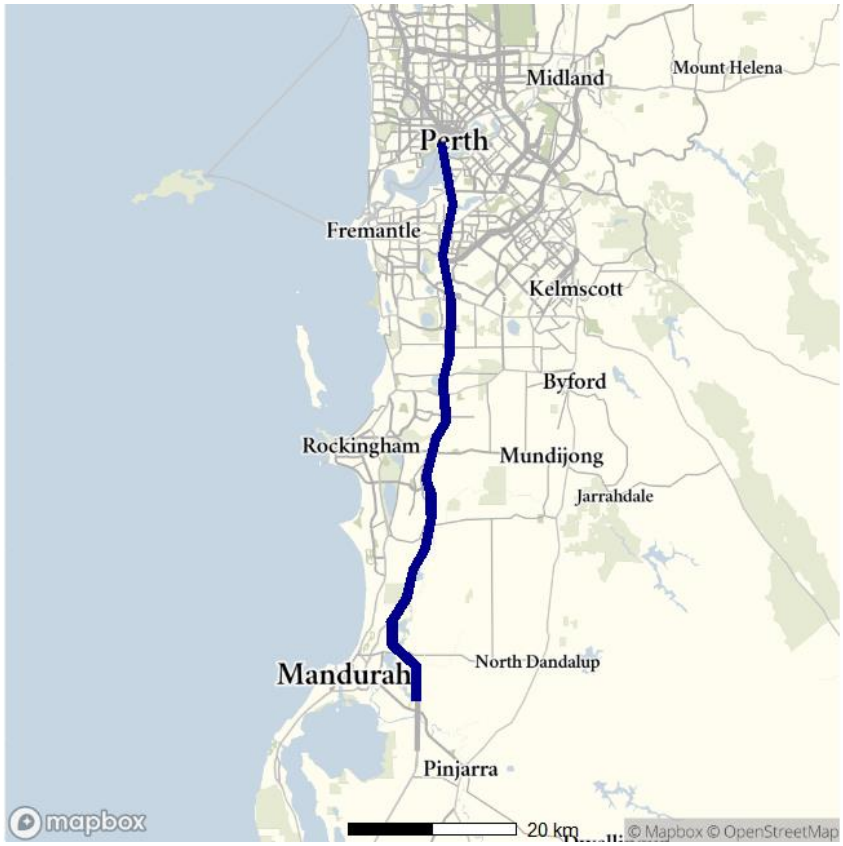


Source: BITRE estimates.

Route 2 (Kwinana) - Forrest Highway to Mitchell Freeway / Mitchell Freeway to Forrest Highway

This route follows the Kwinana Highway connecting the Forrest Highway south of Mandurah and the Mitchell Highway at the Swan River near the Perth CBD. It is one of the main routes servicing Perth's southern suburbs and Rockingham and Mandurah south of Perth.

Figure A.373 Route 2 (Kwinana) route map



Source: BITRE estimates.

Table A.63 Route 2 (Kwinana) route travel times and congestion measures, 2022

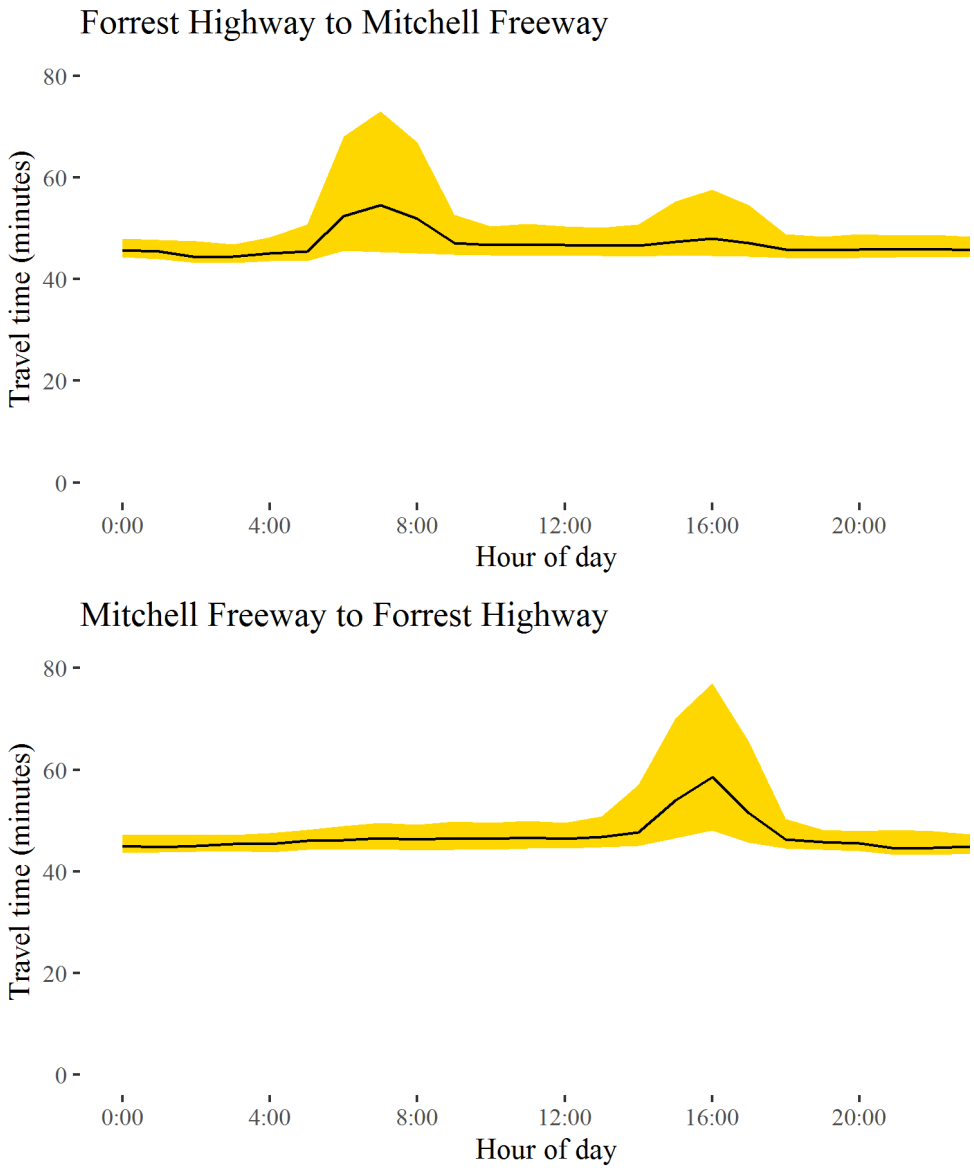
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Forrest Highway to Mitchell Freeway	00:44:22	00:54:35	1.058	00:03:41	00:27:43	2.23	70.7
Mitchell Freeway to Forrest Highway	00:44:35	00:58:33	1.053	00:03:08	00:28:56	2.33	70.7

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from Forrest Highway to the Mitchell Freeway were at 2am with a median travel time of around 44 minutes and an interquartile range of almost 4 minutes. The longest median travel times and greatest uncertainty were at 7am with a median of 54.5 minutes and an interquartile range of nearly 28 minutes.

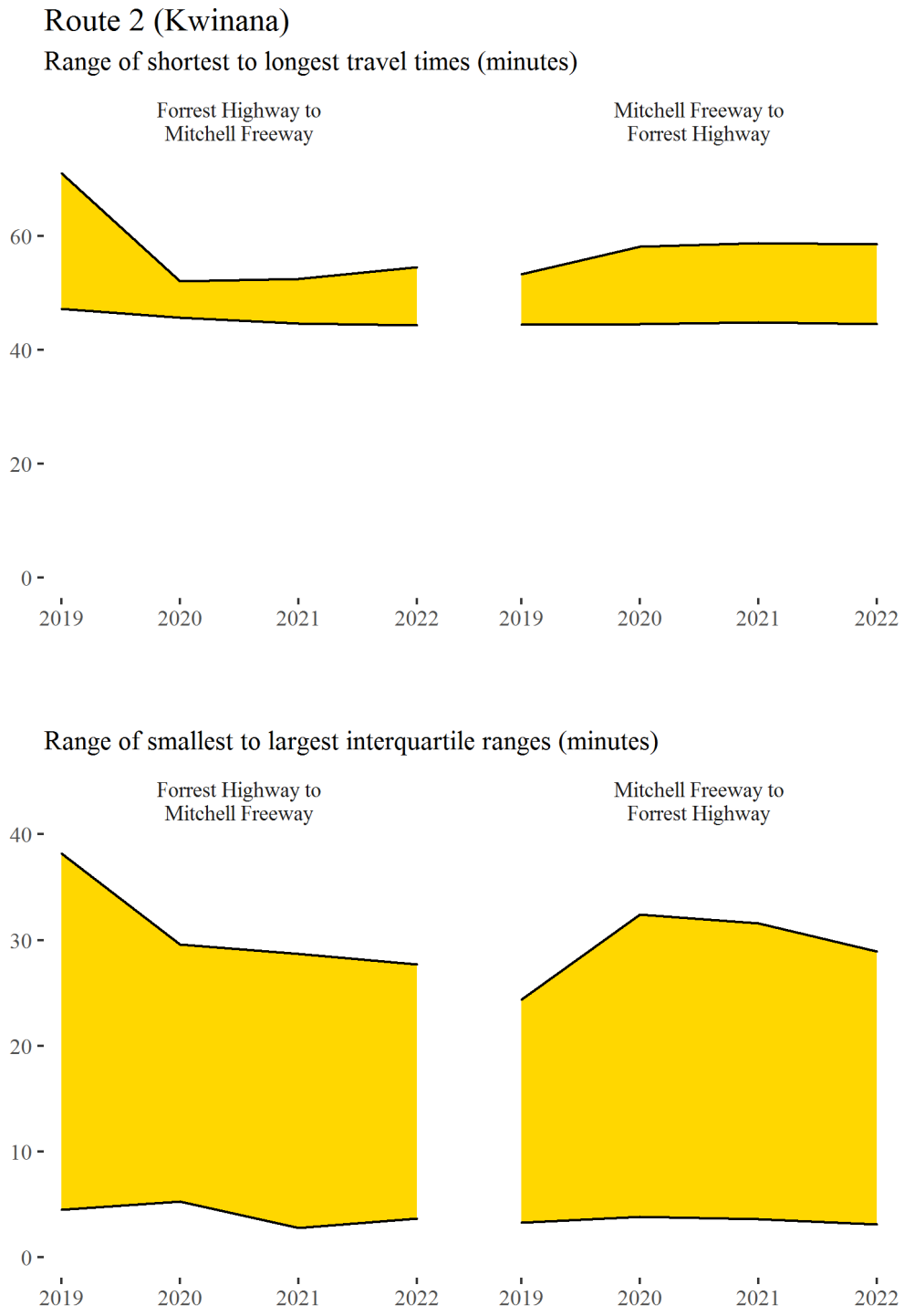
The best travel times and lowest uncertainty travelling from Mitchell Freeway to Forrest Highway were at 9pm and 3am, respectively, with a median travel time of 44.5 minutes and an interquartile range of around 3 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 1 hour and an interquartile range of 29 minutes.

Figure A.374 Route 2 (Kwinana) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.375 Route 2 (Kwinana) route performance over time

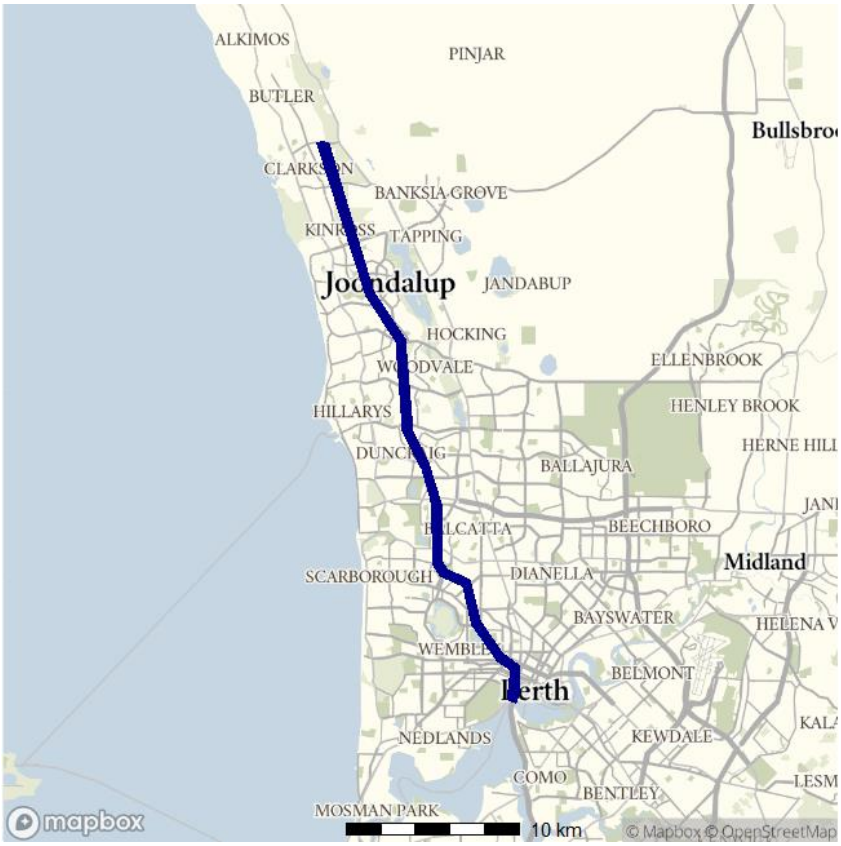


Source: BITRE estimates.

Route 2 (Mitchell) - Hester Avenue to Swan River / Swan River to Hester Avenue

This route follows the Mitchell Highway (Route 2) between Hester Avenue near Ridgewood in Perth's northern suburbs, and the Swan River near the Perth CBD, and is one of the main routes servicing Perth's northern suburbs. It also services freight traffic between Perth and the north west coast of Western Australia.

Figure A.379 Route 2 (Mitchell) route map



Source: BITRE estimates.

Table A.64 Route 2 (Mitchell) route travel times and congestion measures, 2022

Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Hester Avenue to Swan River	00:25:04	00:37:22	1.118	00:02:50	00:23:31	2.674	35.9
Swan River to Hester Avenue	00:23:48	00:37:59	1.066	00:01:38	00:27:20	3.046	35.9

Source: BITRE estimates.

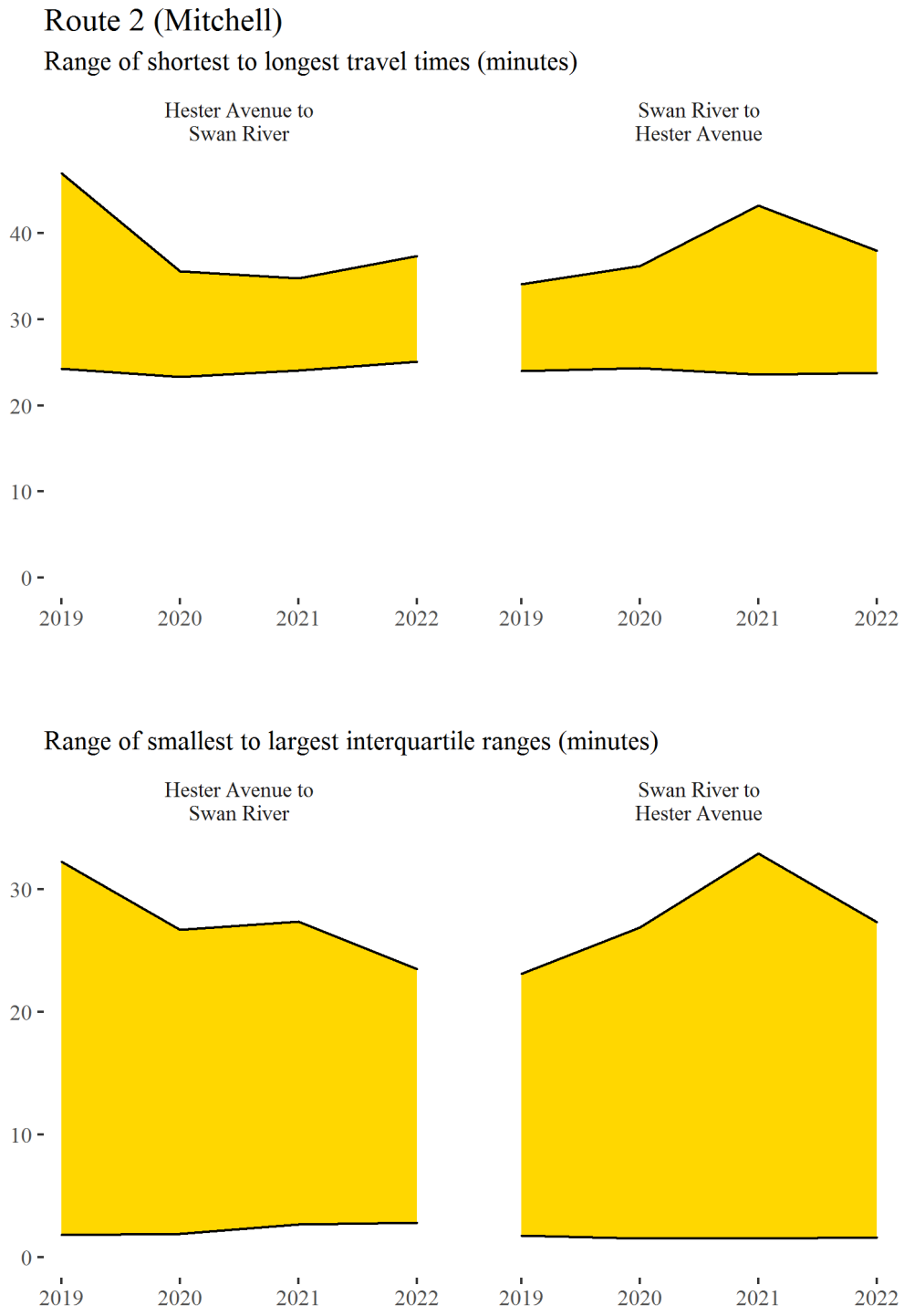
The best median travel times and lowest uncertainty for journeys from Hester Avenue to Swan River were at 5am with a median travel time of 25 minutes and an interquartile range of around 3 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of approximately 37 minutes and an interquartile range of 23.5 minutes.

The best travel times and lowest uncertainty travelling from Swan River to Hester Avenue were at 2am and 3am, respectively, with a median travel time of almost 24 minutes and an interquartile range of just under 2 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of 38 minutes and an interquartile range of around 27 minutes.

Figure A.380 Route 2 (Mitchell) route median and interquartile range travel times

Source: BITRE estimates.

Figure A.381 Route 2 (Mitchell) route performance over time



Source: BITRE estimates.

Route 3 (Reid Highway) - Mitchell Freeway to Tonkin Freeway / Tonkin Freeway to Mitchell Freeway

This route follows the Reid Highway between its connection with the Mitchell Freeway (Route 2) north of Perth's CBD, and its interchange with the Tonkin Freeway (Route 4) at Malaga, in Perth's near northern suburbs. It passes the Perth suburbs of Westminster, Mirrabooka and Noranda.

Figure A.385 Route 3 (Reid Highway) route map

Source: BITRE estimates.

Table A.65 Route 3 (Reid Highway) route travel times and congestion measures, 2022

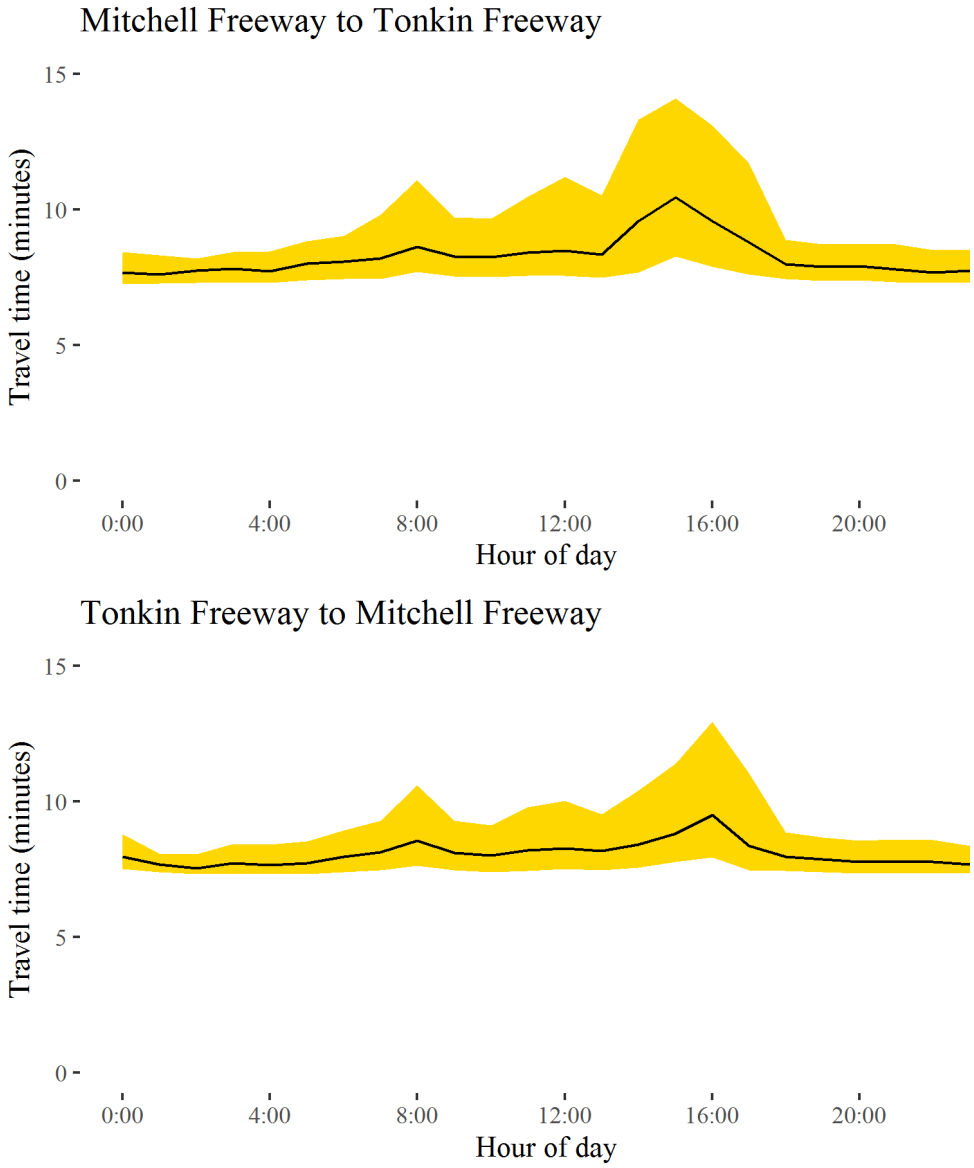
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Mitchell Freeway to Tonkin Freeway	00:07:36	00:10:26	1.088	00:00:53	00:05:50	2.703	10.3
Tonkin Freeway to Mitchell Freeway	00:07:32	00:09:30	1.071	00:00:40	00:05:00	2.819	10.5

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from the Mitchell Freeway to the Tonkin Freeway were at 1am and 2am, respectively, with a median travel time of around 7.5 minutes and an interquartile range of 53 seconds. The longest median travel times and greatest uncertainty were at 3pm with a median of around 10.5 minutes and an interquartile range of nearly 6 minutes.

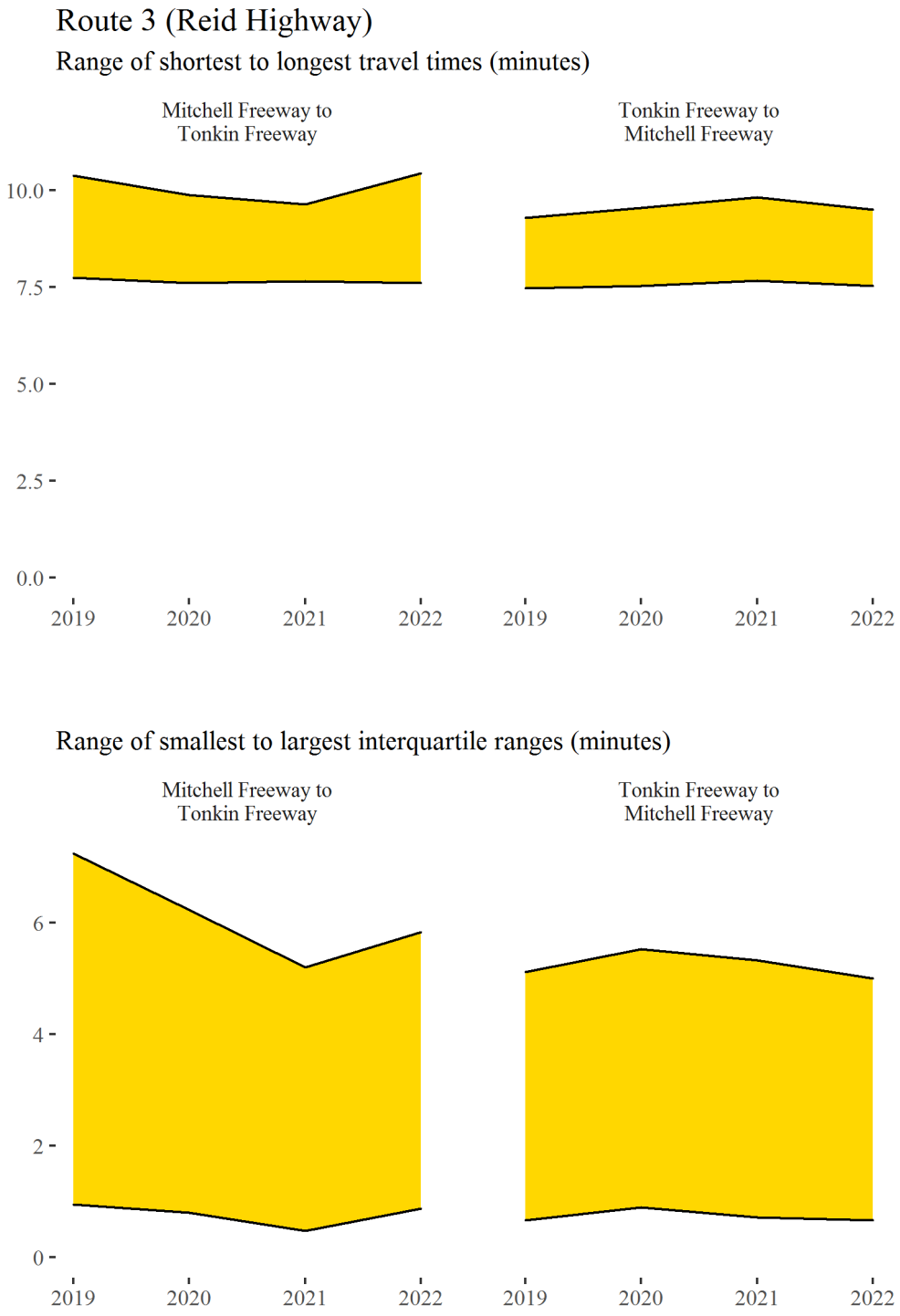
The best travel times and lowest uncertainty travelling from the Tonkin Freeway to the Mitchell Freeway were at 2am and 1am, respectively, with a median travel time of 7.5 minutes and an interquartile range of 40 seconds. The longest median travel times and greatest uncertainty were at 4pm with a median of 9.5 minutes and an interquartile range of 5 minutes.

Figure A.386 Route 3 (Reid Highway) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.387 Route 3 (Reid Highway) route performance over time



Source: BITRE estimates.

Route 3 (Roe Highway) - Great Northern Highway to Kwinana Freeway / Kwinana Freeway to Great Northern Highway

This route follows the Roe Highway between its junction the Great Northern Highway (Route 1) in the north and its connection with the Kwinana Freeway (Route 2) at Leeming in Perth's south.

Figure A.391 Route 3 (Roe Highway) route map

Source: BITRE estimates.

Table A.66 Route 3 (Roe Highway) route travel times and congestion measures, 2022

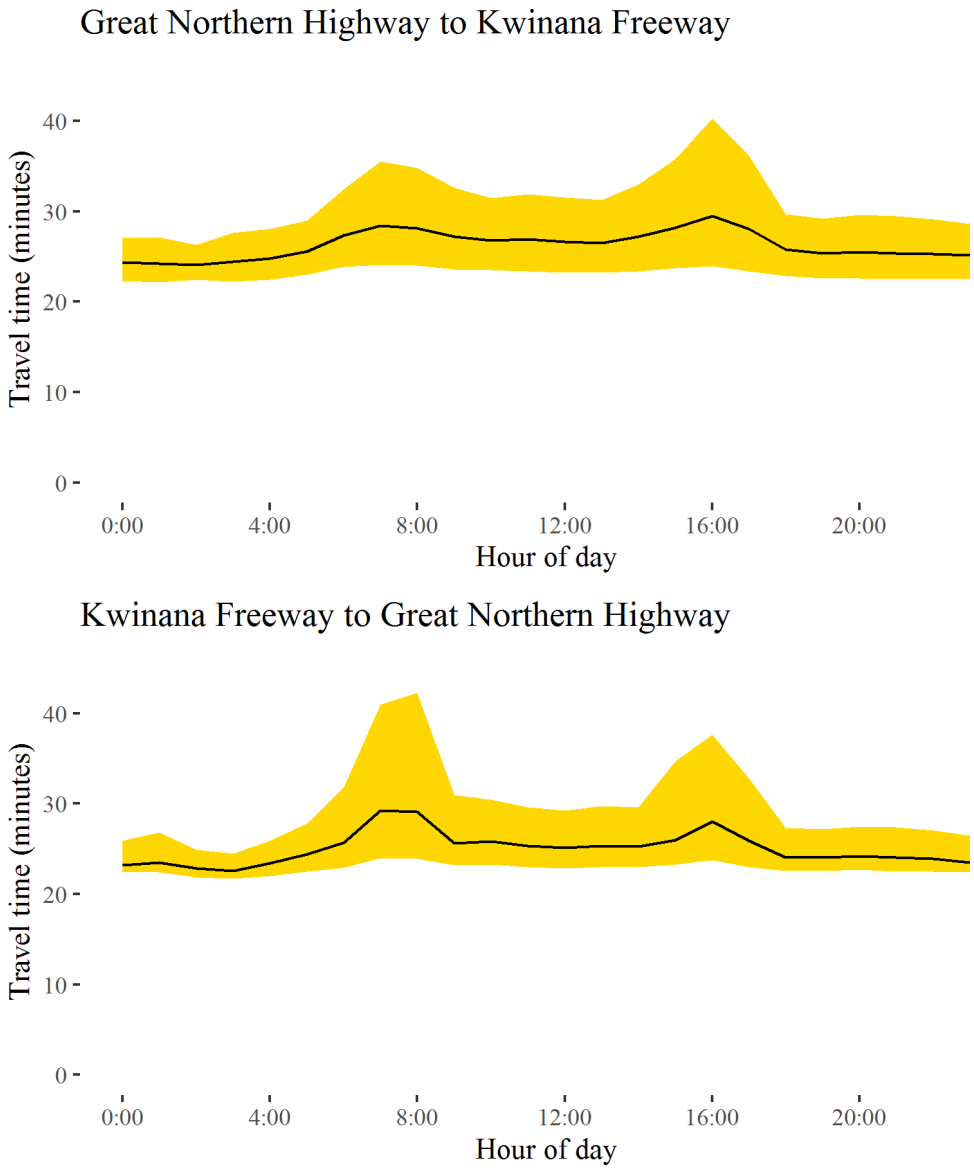
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Great Northern Highway to Kwinana Freeway	00:24:04	00:29:27	1.091	00:03:52	00:16:20	2.097	34.1
Kwinana Freeway to Great Northern Highway	00:22:31	00:29:13	1.110	00:02:46	00:18:20	2.573	34.2

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from the Great Northern Highway to the Kwinana Freeway was at 2am with a median travel time of 24 minutes and an interquartile range of almost 4 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of around 29.5 minutes and an interquartile range of approximately 16 minutes.

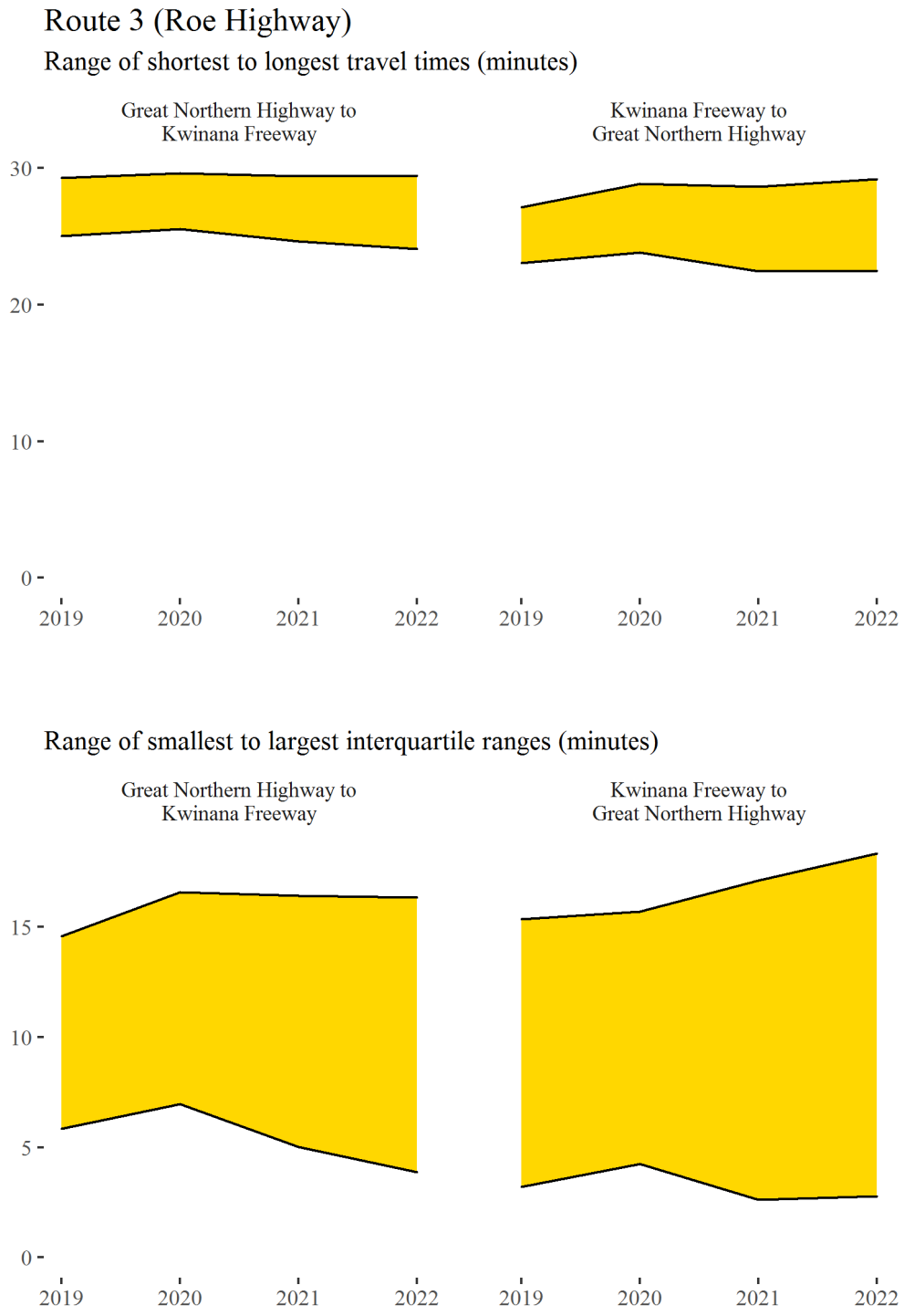
The best median travel times for journeys from the Kwinana Freeway to the Great Northern Highway was 22.5 minutes at 3am and the lowest uncertainty was at 3am with an interquartile range of almost 3 minutes. The longest median travel times was approximately 29 minutes at 7am and the greatest uncertainty was at 8am with an interquartile range of around 18 minutes.

Figure A.392 Route 3 (Roe Highway) route median and interquartile range travel times



Source: BITRE estimates.

Figure A.393 Route 3 (Roe Highway) route performance over time



Source: BITRE estimates.

Route 4 - Great Northern Highway to Thomas Road / Thomas Road to Great Northern Highway

This route follows the Tonkin Highway (Route 4) between its junction with the Great Northern Highway, at Muchea north of Perth, and its terminus at Thomas Road on Perth's southern outskirts. It crosses the Reid Highway (Route 3) north of Morley and the Swan River near Redcliffe, and runs past Perth airport.

Figure A.397 Route 4 route map

Source: BITRE estimates.

Table A.67 Route 4 route travel times and congestion measures, 2022

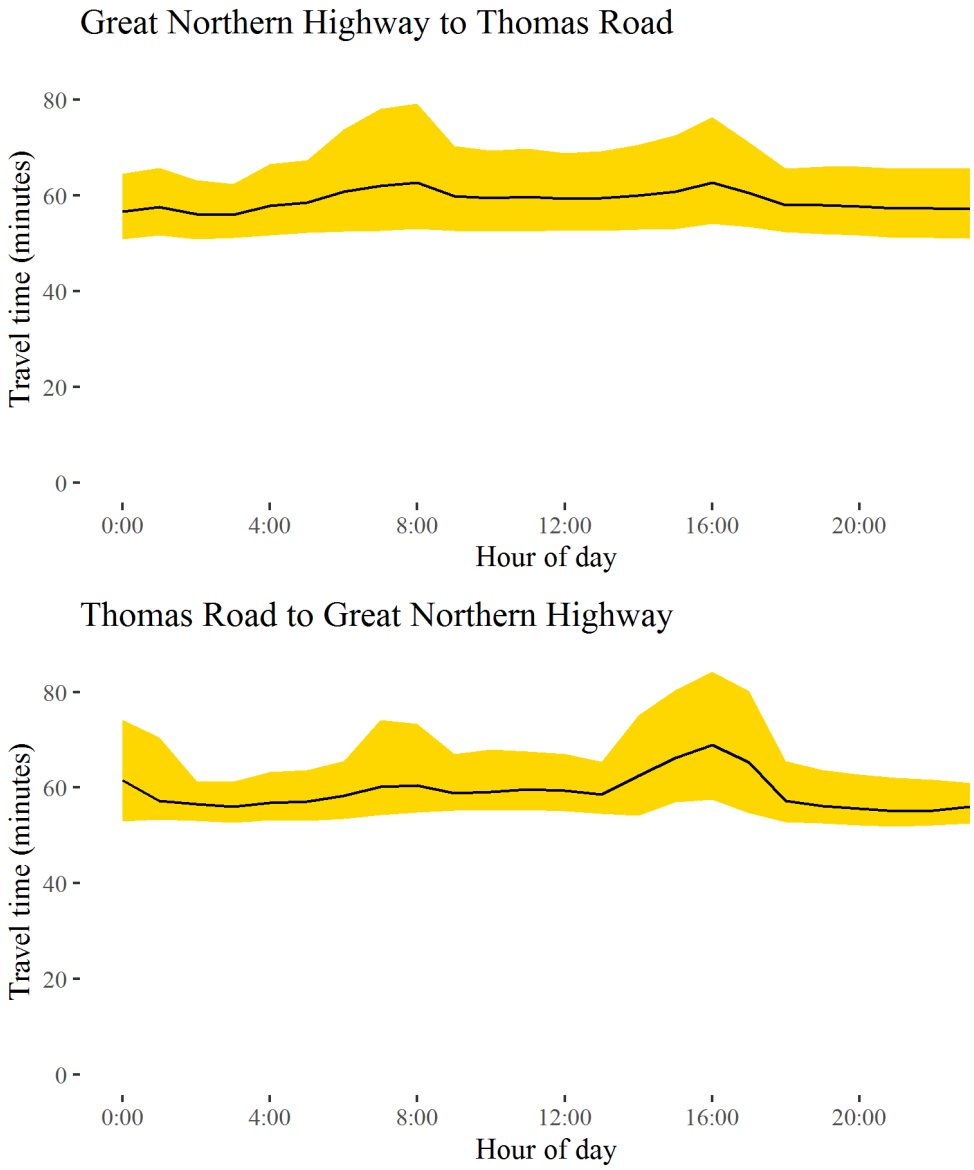
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Great Northern Highway to Thomas Road	00:55:59	01:02:43	1.053	00:11:16	00:26:16	1.489	79.9
Thomas Road to Great Northern Highway	00:55:03	01:08:53	1.073	00:08:14	00:26:39	1.748	79.9

Source: BITRE estimates.

The best median travel times and lowest uncertainty for journeys from the Great Northern Highway to Thomas Road were at 3am with a median travel time of 56 minutes and an interquartile range of around 11 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of just over 1 hour and an interquartile range of approximately 26 minutes.

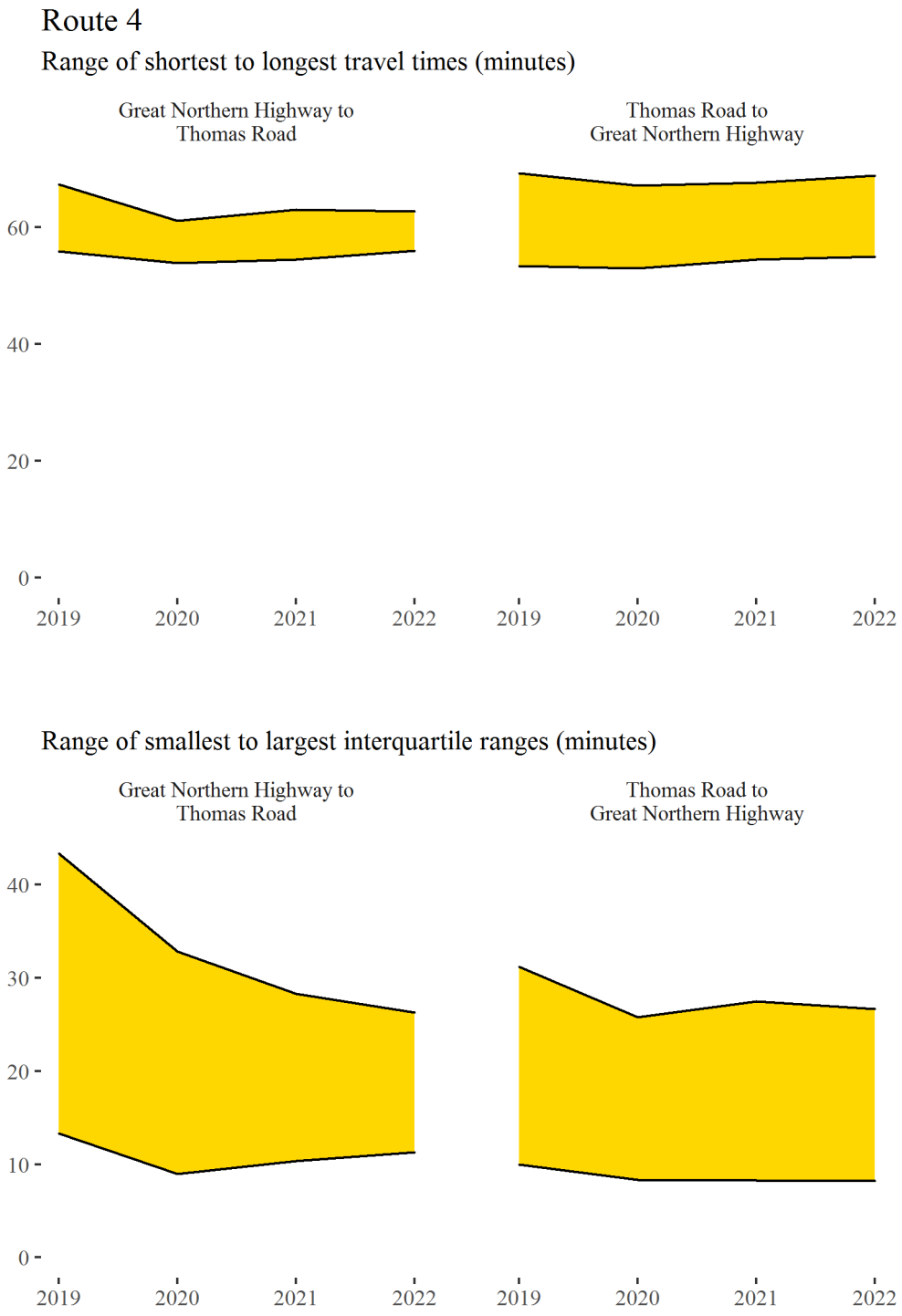
The best travel times and lowest uncertainty travelling from Thomas Road to the Great Northern Highway were at 9pm and 2am, respectively, with a median travel time of 55 minutes and an interquartile range of around 8 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of 1 hour 9 minutes and an interquartile range of just under 27 minutes.

Figure A.398 Route 4 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.399 Route 4 route performance over time

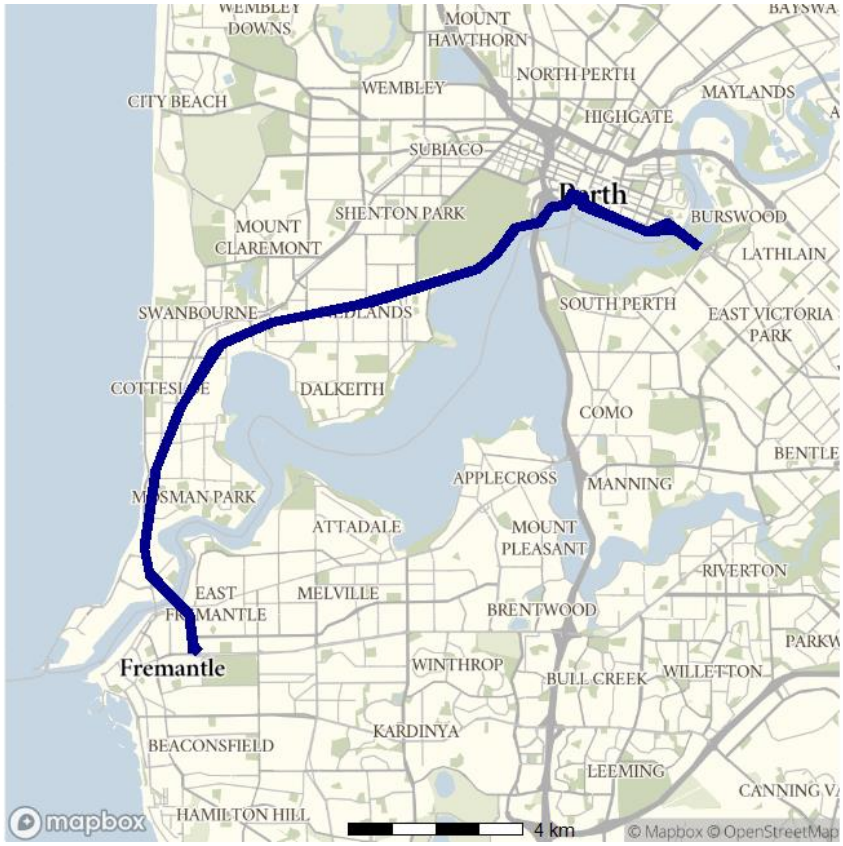


Source: BITRE estimates.

Route 5 - Great Eastern Highway to Stirling Highway–High Street / Stirling Highway–High St to Great Eastern Highway

This route runs between High Street (Route 7) in Fremantle, via the northern side of the Swan River, to the junction of Albany Highway, Great Eastern Highway (GEH) and Canning Highway near Burswood, southwest of the CBD. It traverses the Stirling Highway, Mounts Bay Road, Riverside Drive and the Causeway.

Figure A.403 Route 5 route map



Source: BITRE estimates.

Table A.68 Route 5 route travel times and congestion measures, 2022

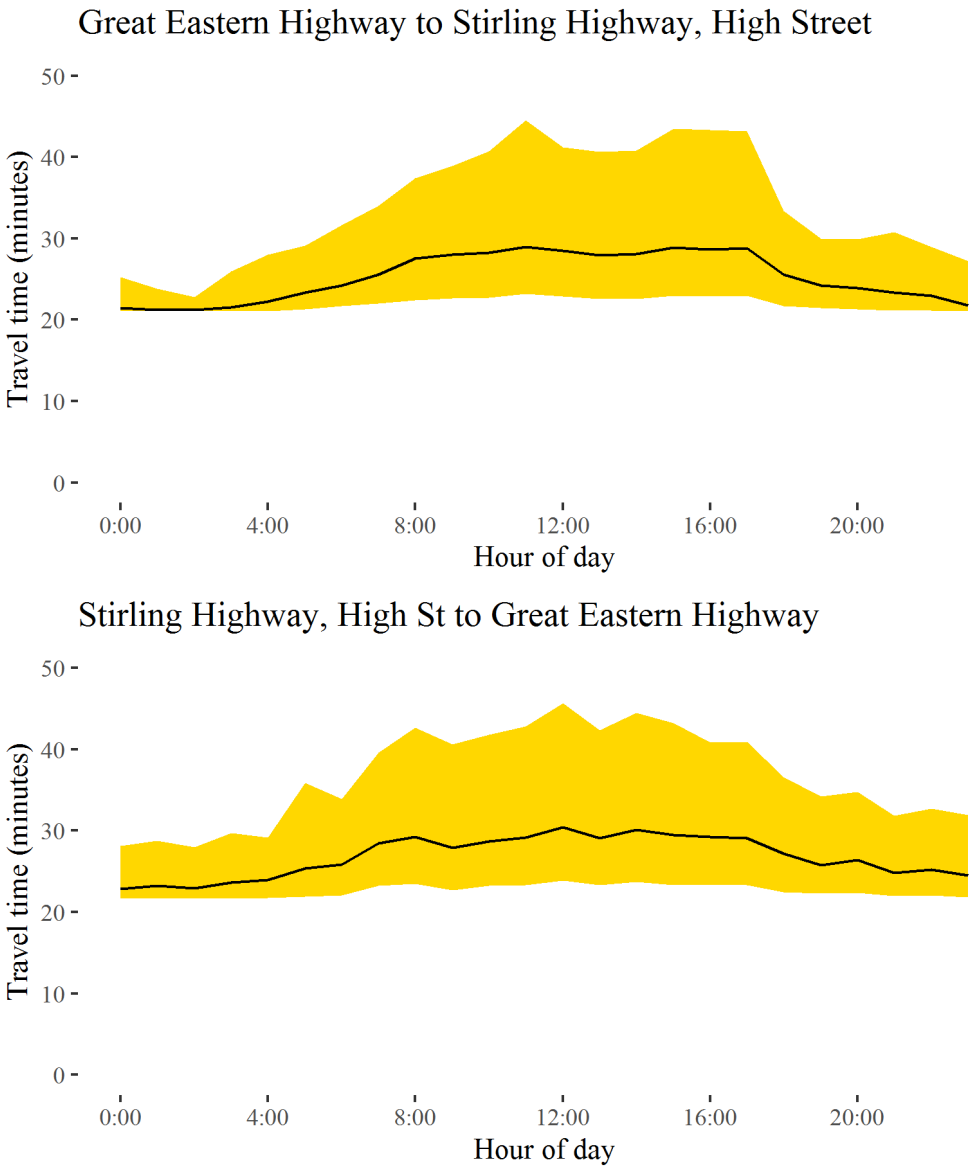
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Great Eastern Highway to Stirling Highway, High Street	00:21:13	00:28:57	1.190	00:01:43	00:21:19	6.994	20.4
Stirling Highway, High St to Great Eastern Highway	00:22:50	00:30:26	1.172	00:06:20	00:21:49	2.229	20.7

Source: BITRE estimates.

The best median travel times and least uncertainty for journeys from the Great Eastern Highway to Stirling Highway–High Street were at 2am with a median travel time of approximately 21 minutes and an interquartile range of almost 2 minutes. The longest median travel times and greatest uncertainty were at 11am with a median of around 29 minutes and an interquartile range of approximately 21 minutes.

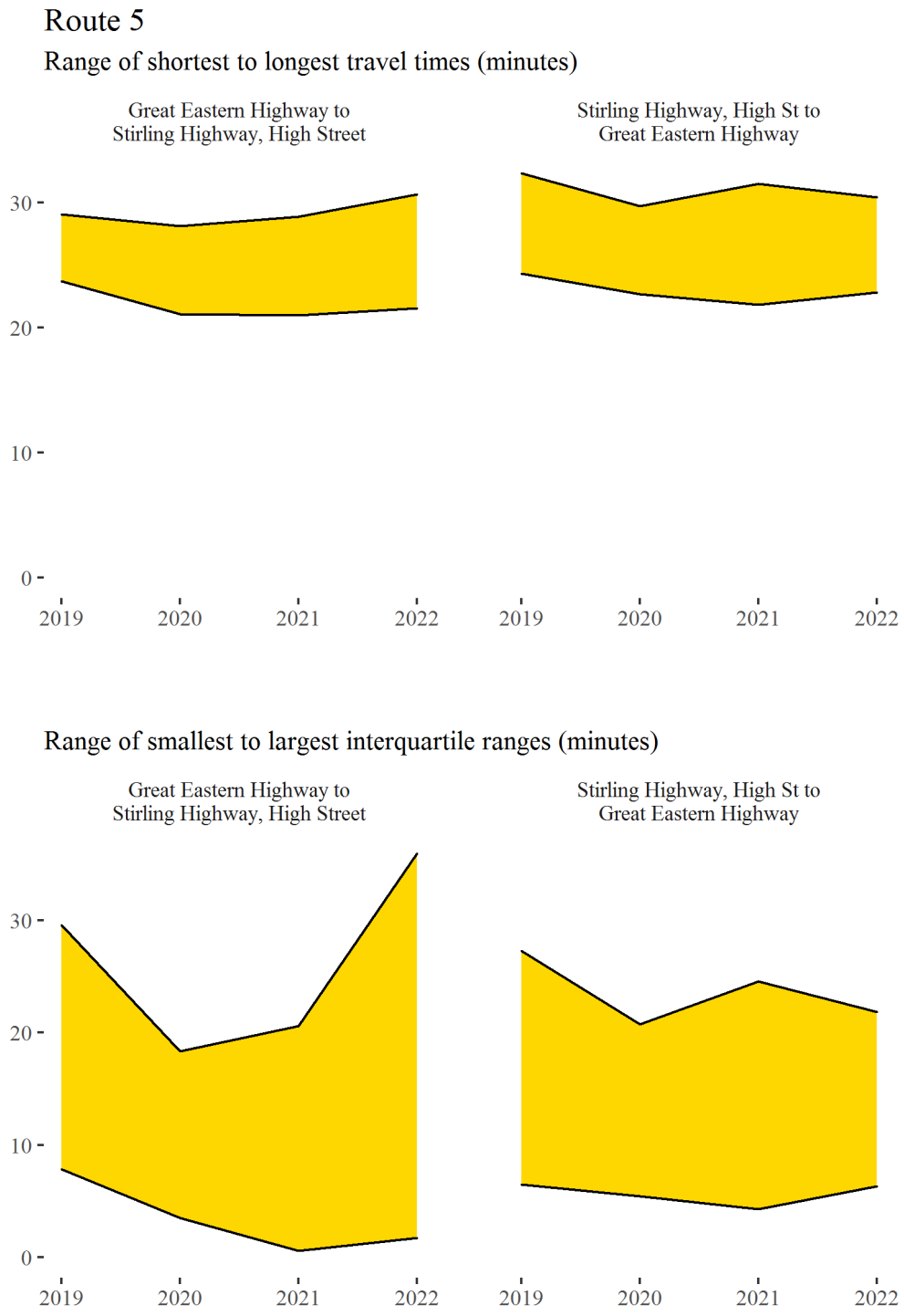
The best median travel times and least uncertainty for journeys from the Stirling Highway–High St to the Great Eastern Highway were at midnight with a median travel time of around 23 minutes and an interquartile range of approximately 6 minutes. The longest median travel times and greatest uncertainty were at 12am with a median of 30.5 minutes and an interquartile range of just under 22 minutes.

Figure A.404 Route 5 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.405 Route 5 route performance over time

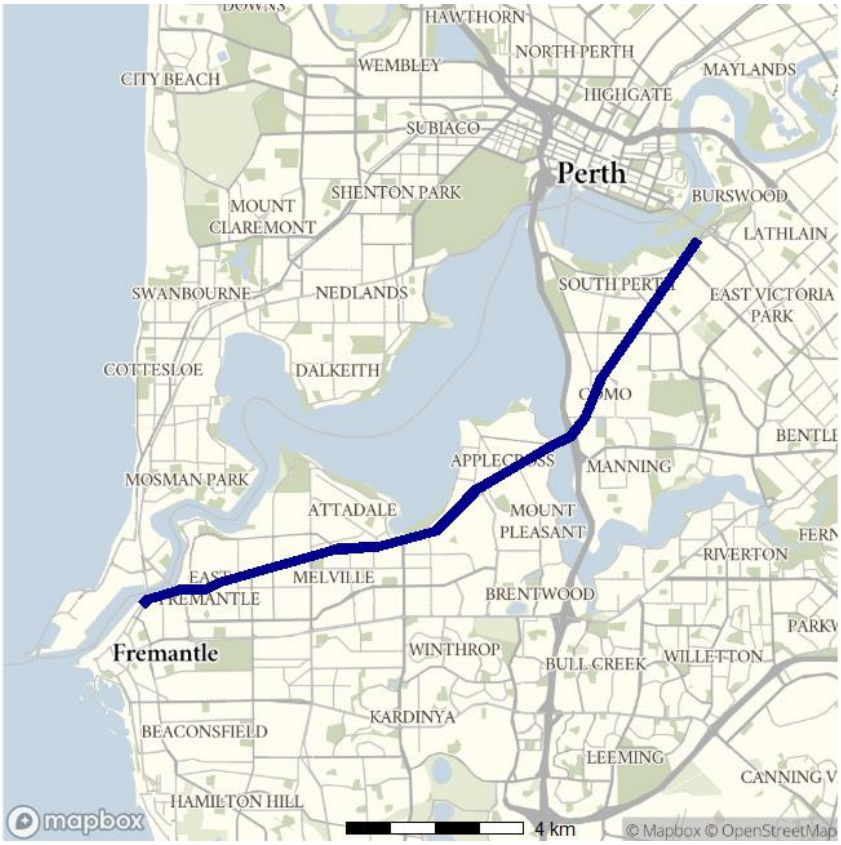


Source: BITRE estimates.

Route 6 - Fremantle to Great Eastern Highway / Great Eastern Highway to Fremantle

This route follows the Canning Highway between Fremantle and the Great Eastern Highway, to the east of the Perth CBD—paralleling Route 5 but south of the Swan River.

Figure A.409 Route 6 route map



Source: BITRE estimates.

Table A.69 Route 6 route travel times and congestion measures, 2022

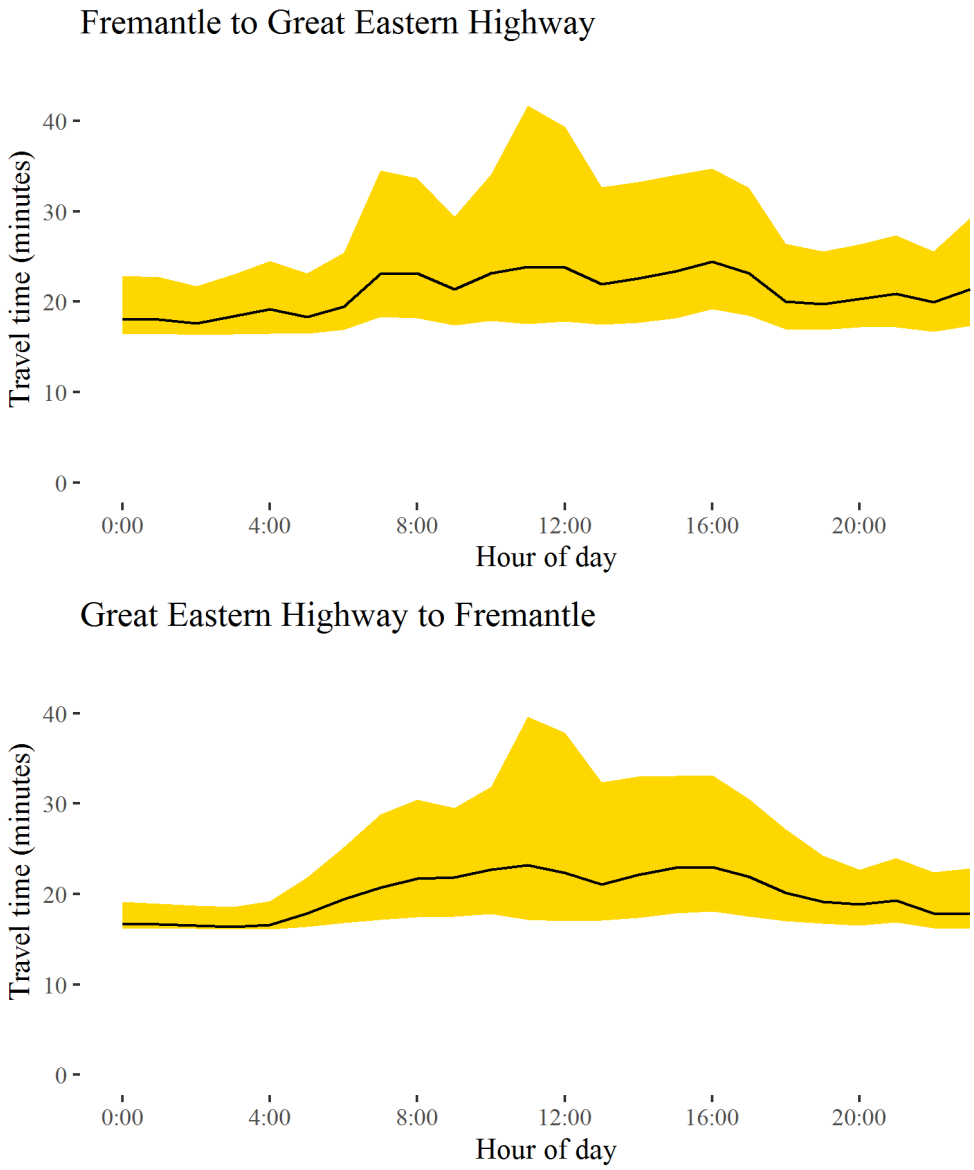
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Fremantle to Great Eastern Highway	00:17:34	00:24:26	1.197	00:05:25	00:24:08	2.221	16.0
Great Eastern Highway to Fremantle	00:16:23	00:23:11	1.212	00:02:28	00:22:26	4.037	15.8

Source: BITRE estimates.

The best median travel times for journeys from Fremantle to the Great Eastern Highway was approximately 17.5 minutes at 2am and the lowest uncertainty was also at 2am with an interquartile range of around 5.5 minutes. The longest median travel times was at 4pm with a median of 24.5 minutes and the greatest uncertainty at 11am with an interquartile range of around 24 minutes.

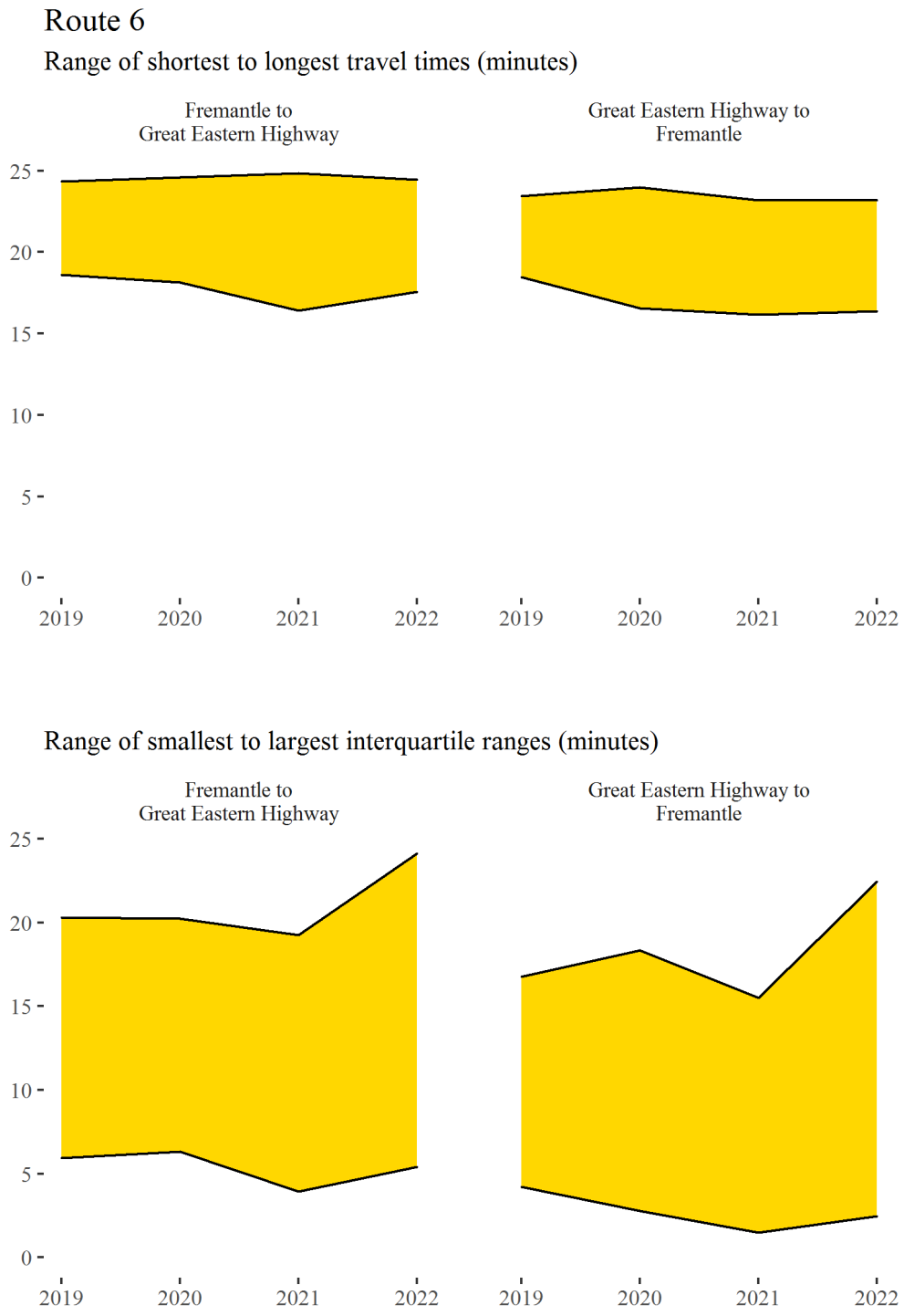
The best median travel times for journeys from the Great Eastern Highway to Fremantle were around 16 minutes at 3am and the lowest uncertainty was also at 3am with an interquartile range of 2.5 minutes. The longest median travel times and greatest uncertainty were at 11am with a median of around 23 minutes and an interquartile range of around 22.5 minutes.

Figure A.410 Route 6 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.411 Route 6 route performance over time



Source: BITRE estimates.

Route 7 - Stirling Highway to Tonkin Freeway / Tonkin Freeway to Stirling Highway

This route follows the Leach Highway (Route 7) between the Stirling Highway (Route 6), at Fremantle, to the interchange with the Tonkin Freeway (Route 4) near Perth Airport.

Figure A.415 Route 7 route map

Source: BITRE estimates.

Table A.70 Route 7 route travel times and congestion measures, 2022

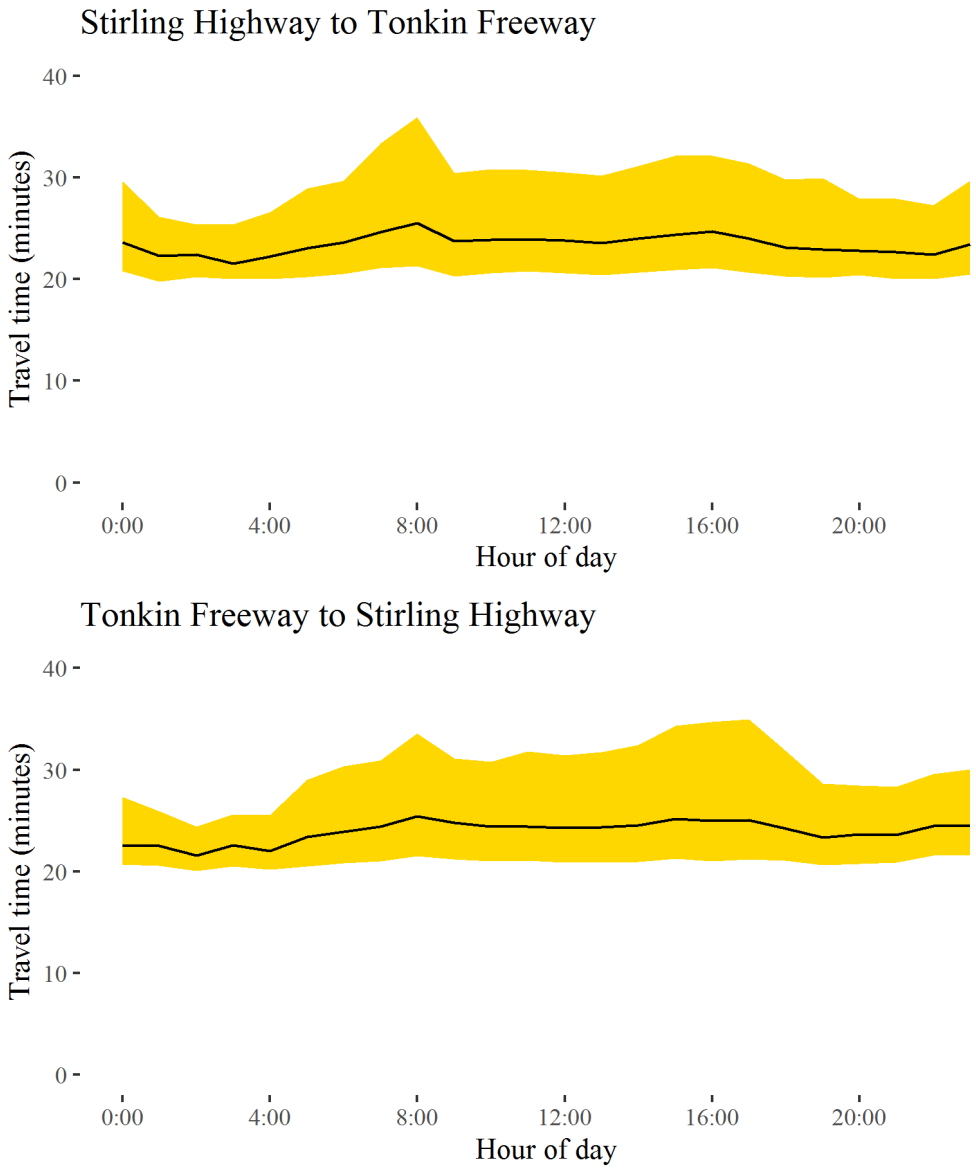
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Stirling Highway to Tonkin Freeway	00:21:32	00:25:32	1.087	00:05:12	00:14:40	1.779	21.9
Tonkin Freeway to Stirling Highway	00:21:35	00:25:25	1.108	00:04:22	00:13:46	2.113	22.2

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from the Stirling Highway to Tonkin Freeway were at 3am and 2am, respectively, with a median travel time of 21.5 minutes and an interquartile range of just over 5 minutes. The longest median travel times and greatest uncertainty were at 8am with a median of around 25.5 minutes and an interquartile range of almost 15 minutes.

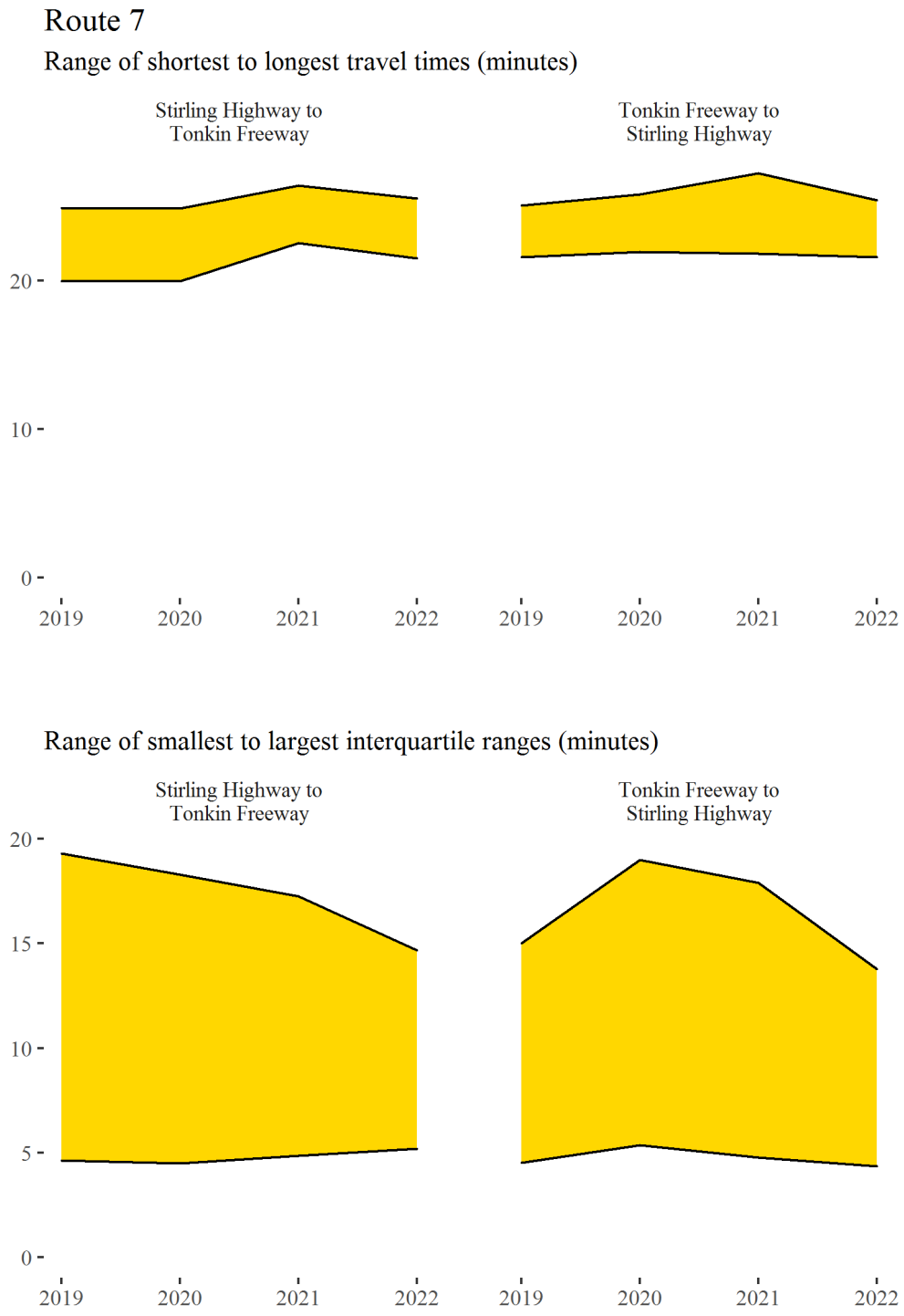
The best median travel times for journeys from the Tonkin Freeway to the Stirling Highway was around 21.5 minutes at 2am and the lowest uncertainty was also at 2am with an interquartile range of around 4 minutes. The longest median travel times was around 25.5 minutes at 8am and the greatest uncertainty was at 5pm with an interquartile range of nearly 14 minutes.

Figure A.416 Route 7 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.417 Route 7 route performance over time

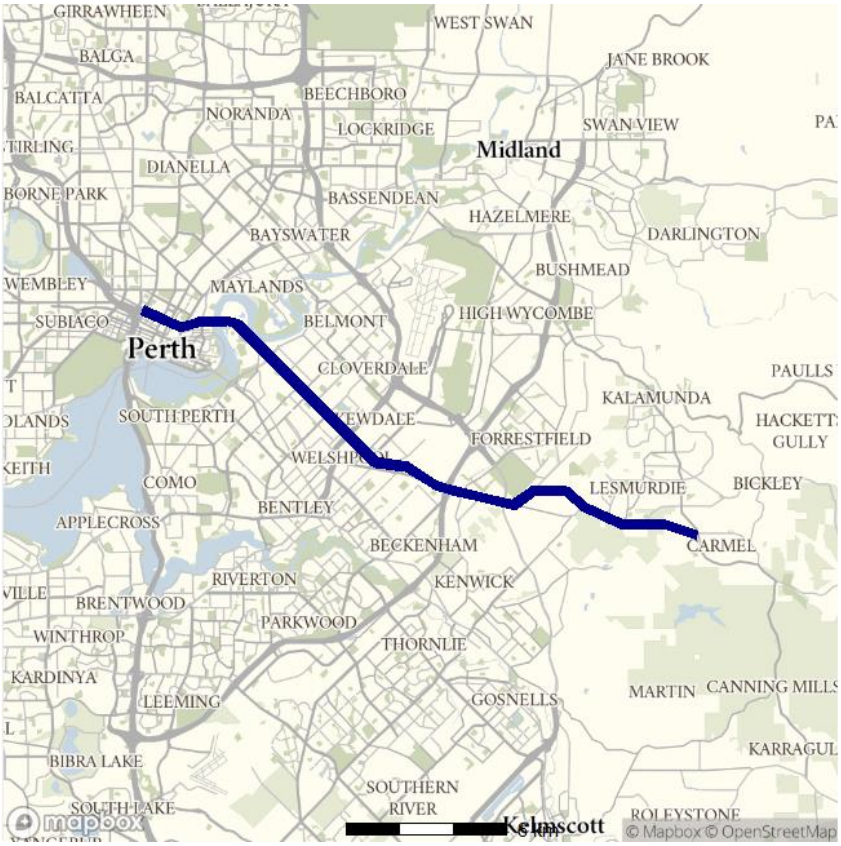


Source: BITRE estimates.

Route 8 - Canning Road to Mitchell Freeway / Mitchell Freeway to Canning Road

This route runs from Canning Road on Perth's eastern fringe, through Perth's eastern suburbs, to the Mitchell Freeway (Route 2) just west of the CBD. The route follows the Graham Farmer Freeway, Orrong Road and Welshpool Road.

Figure A.421 Route 8 route map



Source: BITRE estimates.

Table A.71 Route 8 route travel times and congestion measures, 2022

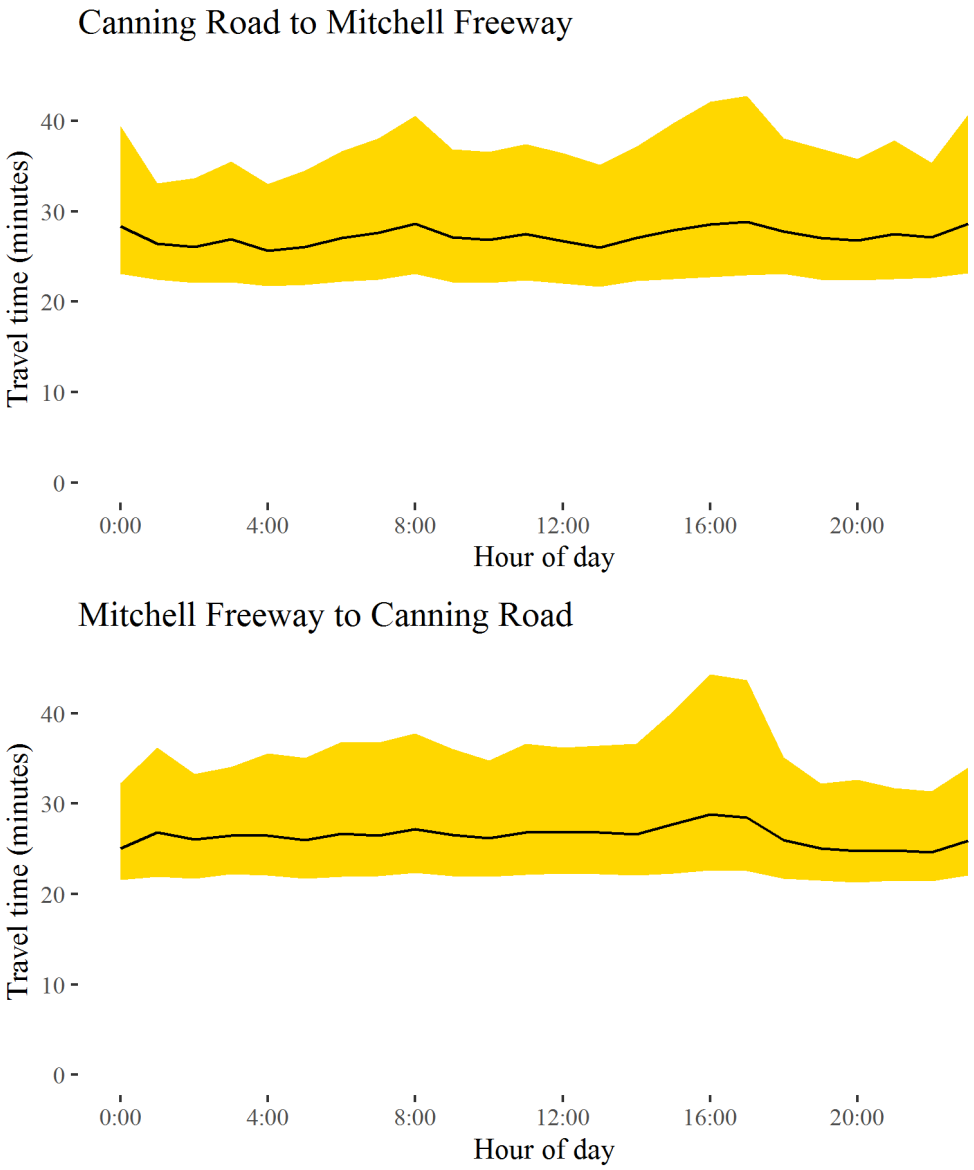
Direction	Shortest median travel time	Longest median travel time	METR	Shortest uncertainty range	Longest uncertainty range	MEUR	Route distance
Canning Road to Mitchell Freeway	00:25:40	00:28:48	1.062	00:10:38	00:19:51	1.392	24.1
Mitchell Freeway to Canning Road	00:24:39	00:28:49	1.070	00:10:00	00:21:38	1.389	24.1

Source: BITRE estimates.

The best travel times and lowest uncertainty travelling from Canning Road to the Mitchell Freeway were at 4am and 1am, respectively, with a median travel time of just under 26 minutes and an interquartile range of almost 11 minutes. The longest median travel times and greatest uncertainty were at 5pm with a median of around 29 minutes and an interquartile range of around 20 minutes.

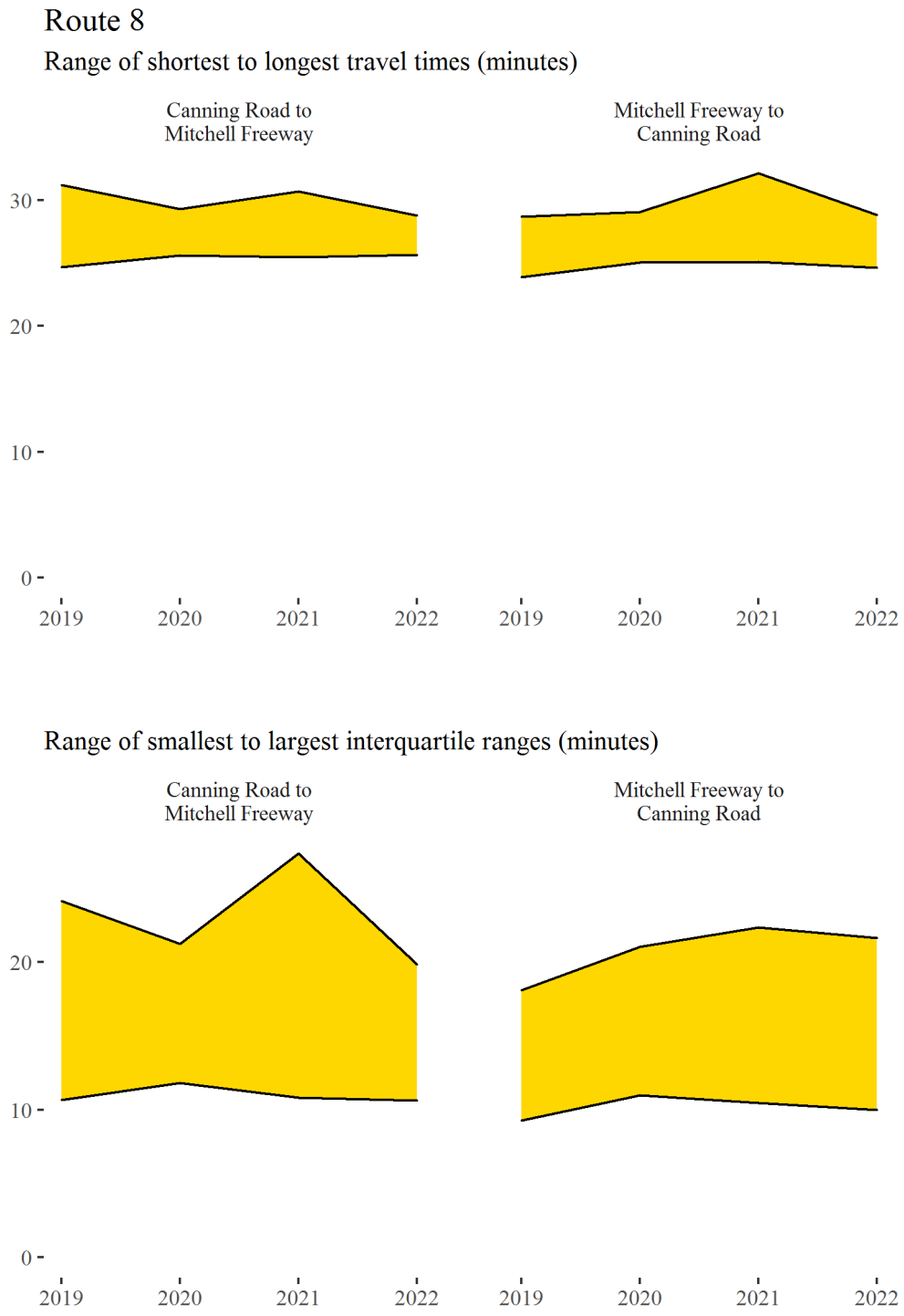
The best median travel times and least uncertainty for journeys from the Mitchell Freeway to Canning Road were at 10pm with a median travel time of around 25 minutes and an interquartile range of 10 minutes. The longest median travel times and greatest uncertainty were at 4pm with a median of almost 29 minutes and an interquartile range of around 22 minutes.

Figure A.422 Route 8 route median and interquartile range travel times



Source: BITRE estimates.

Figure A.423 Route 8 route performance over time



Source: BITRE estimates.

Appendix B – Brief summary of methods and measures

For this paper, BITRE used freight telematics data to collate speeds experienced by freight vehicles on individual road segments ranging in length from several hundred metres up to 80 kilometres in the case of WA Route 4 (Great Northern Highway – Thomas Road). BITRE defined the routes and identified all of road the segments that comprise each route. Median travel times were determined by calculating the time taken if a vehicle experienced the median travel speeds across all segments on the route, and the same method was applied for the interquartile range with speeds at the 1st and 3rd quartiles.

The Mean Excess Time Ratio (METR) is calculated as the mean hourly ratio of median travel times to the best observed median travel time. The Mean Excess Uncertainty Ratio (MEUR) is calculated as the mean hourly ratio of interquartile range to the smallest observed interquartile range.

The aggregate measures for each city are calculated as the mean of these two measures for a city, weighted by the distance and volumes of traffic observed on each route. This ensures congested, but relatively short and less important routes for freight, such as the M1 in Sydney, do not overly affect results.

Some data-sparse segments required Bayesian estimation. Bayesian estimation was implemented via the Stan modelling language for Bayesian analysis (Stan Development Team 2020), implemented through the 'rethinking' package for R (McElreath 2020).

Segment identification was undertaken using a lightly-modified version of the OSRM routing engine (Luxen and Vetter 2011).

Summary data for all routes and segments on this report, and the analysis code used to generate the results, will be available on data.gov.au.

Appendix C – About the BITRE freight telematics program

This paper uses data from the BITRE telematics project. This project transforms GPS traces from freight vehicles of private road freight operators into data about Australia's road freight industry and road freight network, to help inform industry, government and other interested parties. This data can help inform planning and investment in the road network and rest areas, inform industry and government on economic activity and assist trip planning among other potential uses. The project uses BITRE's independently developed *Yulo* framework (Green and Mitchell, 2018, BITRE 2021b). By tracking the entirety of vehicles' journeys it can generate data on more parts of the road network than is practical using conventional road data collection means, such as fixed cameras or pneumatic tubes. This report is based on over 350 million observations from over 7736 road segments whilst the database contains over 5 billion observations on over 1 million road segments.

Previous publications using this data include an analysis of the effect of COVID 19 lockdowns on freight route performance in 2021, 2020 and 2019 (BITRE 2021a, 2021d & 2022) and a display of the freight catchments served by Australian ports (BITRE 2021c).

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