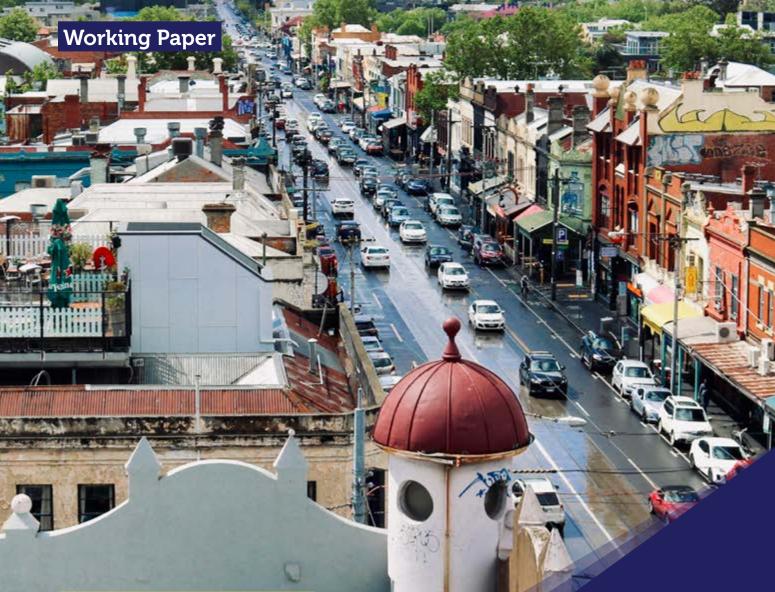




Street space allocation and use in Melbourne's activity centres



Dr Chris De Gruyter Seyed Mojib Zahraee Emeritus Professor William Young

What's next...

Street space allocation and use in Melbourne's activity centres

Working Paper

September 2021

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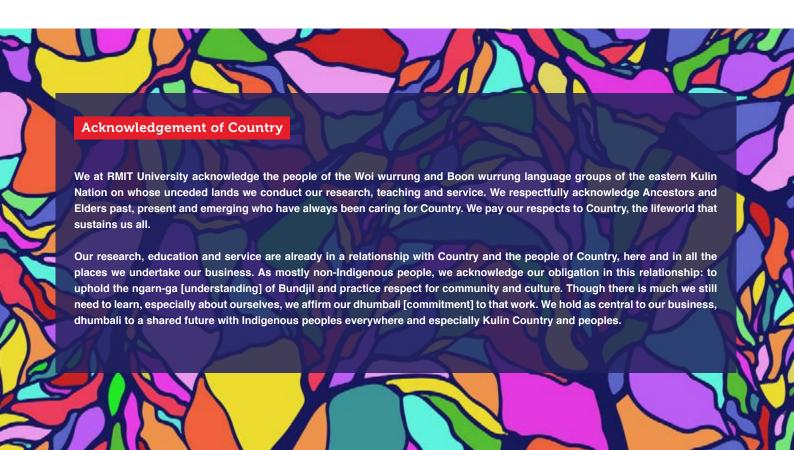


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The allocation of street space is strongly contested in many cities, particularly in locations such as activity centres where high traffic flows conflict with popular places and key destinations in their own right. Despite the stated importance of allocating street space in an equitable manner, few studies have explicitly measured how much actual street space is allocated and used by each mode of transport, particularly in Australian cities. Using a case study of Melbourne, the aim of this research was to understand how much street space is allocated to each mode of transport and how this compares to the use of each mode of transport.

A total of 57 sites located in major activity centres, generally within 10 km of Melbourne's CBD, were selected. Each site was measured in terms of the amount of street width provided to each mode of transport, including shared space. Observational person counts, classified by transport mode, were then undertaken at each site and converted to a measure of concentration, of people per kilometre, to account for differences in average travel speeds between modes.

When averaged across all sites, space for pedestrians was found to be significantly undersupplied – footpaths accounted for only 33% of total street space, yet pedestrians accounted for 56% of all people per

kilometre of road space. Exclusive tram lanes were only slightly oversupplied (22% of total space vs. 18% of total people), as were shared general traffic/tram/bus lanes (35% of total space vs. 30% of total people). However, other street elements were greatly oversupplied, particularly bicycle lanes (12% of total space vs. 2% of total people), on-street car parking (21% of total space vs. 13% of total people) and shared general traffic/bus lanes (42% of total space vs. 29% of total people).

A key implication from the findings is that space for pedestrians could be increased at some activity centres, potentially through converting existing on-street parking, as is the case with the recent emergence of parklets. However, considerable variability was found in the results when viewed across individual sites, so this highlights the importance of developing a site-specific approach to street space reallocation. In addition, while recognising that the reallocation of street space involves a range of governance, political and ethical considerations, efforts to reallocate street space should be informed by empirical evidence of street space allocation and use where possible. This will help to ensure that street space can be distributed more equitably to users and support broader goals for increasing the uptake of more sustainable forms of transport.



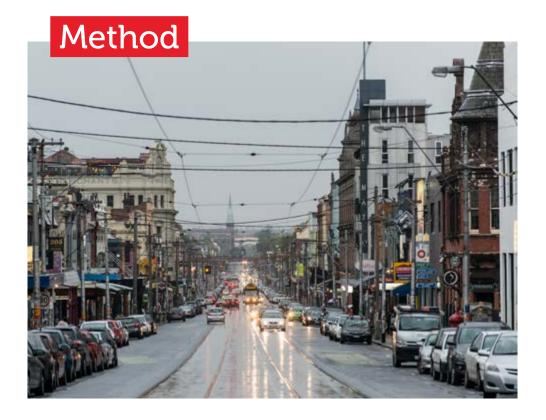
The allocation of street space is strongly contested in many cities. This is particularly relevant in activity centres where high traffic flows conflict with popular places and key destinations in their own right. Various frameworks have been developed to acknowledge the diverse role of streets by classifying them based on the significance of their link/movement and place functions 1.2.3.

Previous research on the topic of street space allocation has considered a range of governance and political issues⁴, ethical principles⁵ and methods for allocating street space^{6,7}. However, very few studies have explicitly measured how much actual street space is allocated and used by each mode of transport, particularly in Australian cities. This is despite the stated importance of allocating street space in a fair and equitable manner^{5,8}.

Using a case study of Melbourne's activity centres, the aim of the research underlying this working paper is to understand how much street space is allocated and used by each mode of transport. The research is informed by multi-modal observational person counts and street space measurements undertaken at 57 different locations within 36 activity centres across Melbourne during 2020.

For the purpose of this research, an activity centre is defined as a community hub providing a broad range of goods and services, focusing on mixed-use development such as offices, retail, entertainment, higher density housing, education and medical services⁹. Examples of activity centres range from local shopping strips to CBDs. A key feature of activity centres is their concentration of people-activity¹⁰.

An understanding of street space allocation and use can help identify locations where street space could be allocated more equitably to users. This is particularly relevant in areas where movement and place objectives are in conflict with one another, such as activity centres, and where cities are looking to provide greater priority to more sustainable forms of transport, e.g. walking, cycling and public transport¹¹. It is also relevant in the context of COVID-19, where greater space for pedestrians and cyclists is being sought to support increased uptake of these forms of transport¹², alongside efforts to increase outdoor dining opportunities through converting onstreet parking to 'parklets'¹³.



Methods used in previous studies

Methods used in previous studies to measure allocation of street space by transport mode include manual physical measurements⁵ and automated means such as the use of digital satellite imagery and geographic information systems^{8,14,15,16}. While automated means generally allow for street space to be measured across all streets, they can be limited by the accuracy and recency of available datasets. Manual physical measurements, while more resource intensive, can help identify any recent changes made to the streetscape and also any features that may not be identified through satellite imagery/GIS alone, particularly any space that is shared among various transport modes.

Methods used in previous studies to measure use of street space by transport mode include direct observational counts⁵ and analysis of secondary data such as household travel surveys^{8,14,15,16}. While observational counts allow for analysis at the individual street level, they are limited to certain locations as it is generally not possible to collect count data for every street. However, the use of household travel survey data, usually available at a city-wide level, requires assumptions to be made in assigning trips to individual streets (e.g. shortest path between an origin-destination pair). Households travel

surveys also tend to exclude visitor/tourist trips and may underreport short trips, e.g. by walking¹⁷.

further methodological issue associated with measuring the use of street space is how and/or whether to account for inherent differences between modes. For example, each mode of transport tends to differ in terms of its physical space requirement (e.g. one car takes up more space than one pedestrian) and average trip distance (e.g. people in cars tend to travel longer distances). In a previous study of street space allocation in Amsterdam⁸, adjustments were made for physical space requirements and average trip distances by mode. However, these adjustments were not considered to necessarily support a sustainable transport agenda as greater weight was inherently given to the car which takes up more space and is associated with longer trip distances. It has therefore been suggested to focus on speed instead, arguing that a city dominated by shared spaces at low speeds might be more equitable than a city with traffic segregation and high speeds8. In a separate study of street space allocation in Berlin⁵, adjustments were made based on average travel speeds by mode. However, these adjustments gave greater weight to transport modes with higher speeds (i.e. cars), placing an emphasis on 'movement' and further discriminating against sustainable transport modes, particularly walking. In general, very limited attempts have been made to adjust for differences in average travel speeds by mode, often focusing on flow/movement rather than people concentration.

Site selection

Melbourne's activity centres were used as a sampling frame to select survey sites for this research as these locations tend to experience greater street space allocation challenges. As noted in Victoria's Movement and Place Framework¹, activity centres provide access to shops and services by various transport modes, and in these locations, there tends to a 'high demand for movement as well as place with a need to balance different demands within the available road space' (p. 21).

Melbourne has a total of 120 metropolitan and major activity centres¹⁸. However, it was not possible to survey all of these activity centres with the resources available, so the selection of sites was mainly limited to major activity centres located within 10 km of Melbourne's CBD, where access by all transport modes tends to be more evident.

The site selection process resulted in a total of 36 activity centres. Depending on the size and diversity of the activity centre, either one or two sites were chosen for surveying. Across all selected activity centres, consideration was given to ensuring a range of street space layouts were represented, including those with and without the following: car parking, clearways, landscaping, bicycle lanes, exclusive general traffic lanes, exclusive tram lanes, plus shared lanes for general traffic, trams and buses. In total, 57 sites were selected for surveying across the 36 activity centres. Fig. 1 shows the location of these sites across Melbourne.

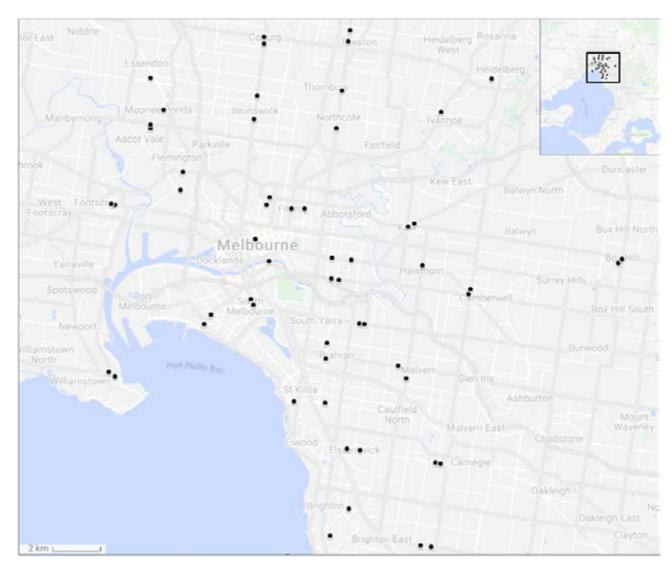


Fig. 1. Location of survey sites across metropolitan Melbourne.

Source: map created by authors using Google 'My Maps'.

Data collection

At each site, multi-modal observational person counts were undertaken by the researchers positioned on the footpath at each site, facing perpendicular to the street. A form was used to separately record the number of people passing an imaginary line (perpendicular to the street) in both directions using each mode of transport. The counts were undertaken on weekdays (excluding public holidays) for two separate periods of 45 minutes each, covering peak and off-peak conditions and totalling 1.5 hours per site. This amount of survey time is generally consistent with previous street space allocation studies that have used observational counts^{11,19}. As some activity centres are not particularly active until late morning (some shops do not open until 10am), the surveys were restricted to afternoon periods only.

While each site could have been surveyed for a longer time period, a trade-off was made between the number of sites covered and the duration of each survey, particularly given the large number of activity centres located across Melbourne. However, to understand how the use of street space changes over the day, the first site (667 Glenferrie Road, Hawthorn) was surveyed over a continuous 10-hour period (8am-6pm) on a weekday. This showed that average conditions were generally observed in the afternoon period, corresponding to when the surveys for all other sites were undertaken. While these other sites were surveyed for only 1.5 hours each in total, over 2,000 people were counted on average at each site over this limited time period, providing a relatively large sample for analysis purposes. The locations and survey periods for each site are detailed in Table 1.

Table 1. Site locations and survey periods

ID	Site location	Date	Survey period 1	Survey period 2
1	667 Glenferrie Road, Hawthorn	1/10/2020	8:00am - 6:00pm	
2	210 High Street, Kew	6/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
3	146 High Street, Kew	6/10/2020	2:00pm – 2:45pm	
3C	146 High Street, Kew (clearway)	6/10/2020	4:30pm – 5:15pm	
4	206 Camberwell Road, Camberwell	7/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
5	795 Burke Road, Camberwell	7/10/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
6	Opposite 35A Carrington Road, Box Hill	8/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
7	605 Station Street, Box Hill	8/10/2020	2:00pm – 2:45pm	
7C	605 Station Street, Box Hill (clearway)	8/10/2020	4:30pm – 5:15pm	
8	1125 High Street, Armadale	13/10/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
9	177 Glenferrie Road, Malvern	13/10/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
10	451 Toorak Road, Toorak	14/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
11	533 Toorak Road, Toorak	14/10/2020	2:00pm – 2:45pm	
11C	533 Toorak Road, Toorak (clearway)	14/10/2020	4:30pm – 5:15pm	
12	473 Chapel Street, Prahran	15/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
13	137 Chapel Street, Prahran	15/10/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
14	170 Swan Street, Richmond	20/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
15	258 Swan Street, Richmond	20/10/2020	2:00pm – 2:45pm	
15C	258 Swan Street, Richmond (clearway)	20/10/2020	4:30pm – 5:15pm	
16	185 Bridge Road, Richmond	21/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
17	415 Bridge Road, Richmond	21/10/2020	2:00pm – 2:45pm	
17C	415 Bridge Road, Richmond (clearway)	21/10/2020	4:30pm – 5:15pm	
18	464 Centre Road, Bentleigh	22/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
19	358 Centre Road, Bentleigh	22/10/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
20	76 Church Street, Brighton	27/10/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
21	327 Bay Street, Brighton	27/10/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
22	1134 Glen Huntly Road, Glen Huntly	28/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
23	1190 Glen Huntly Road, Glen Huntly	28/10/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
24	481 Glen Huntly Road, Elsternwick	29/10/2020	1:00pm – 1:45pm	3:30pm – 4:15pm

ID	Site location	Date	Survey period 1	Survey period 2
25	324 Glen Huntly Road, Elsternwick	29/10/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
26	262 Carlisle Street, Balaclava	4/11/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
27	99 Acland Street, St Kilda	4/11/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
28	270 Clarendon Street, South Melbourne	5/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
29	338 Clarendon Street, South Melbourne	5/11/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
30	245 Bay Street, Port Melbourne	10/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
31	67 Bay Street, Port Melbourne	10/11/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
32	Princes Bridge, Melbourne	11/11/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
33	St Francis Church, Elizabeth Street, Melbourne	11/11/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
34	249 Lygon Street, Carlton	12/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
35	181 Elgin Street, Carlton	12/11/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
36	201 Brunswick Street, Fitzroy	17/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
37	261 Smith Street, Fitzroy	17/11/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
38	317 Sydney Road, Brunswick	18/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
39	649 Sydney Road, Brunswick	18/11/2020	2:00pm – 2:45pm	
39C	649 Sydney Road, Brunswick (clearway)	18/11/2020	4:30pm – 5:15pm	
40	409 Sydney Road, Coburg	19/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
41	87 Bell Street, Coburg	19/11/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
42	687 High Street, Thornbury	24/11/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
43	243 High Street, Northcote	24/11/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
44	437 High Street, Preston	25/11/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
45	303 High Street, Preston	25/11/2020	2:00pm – 2:45pm	
45C	303 High Street, Preston (clearway)	25/11/2020	4:30pm – 5:15pm	
46	120 Burgundy Street, Heidelberg	26/11/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
47	189 Upper Heidelberg Road, Ivanhoe	26/11/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
48	132-134 Hopkins Street, Footscray	1/12/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
49	166-168 Barkly Street, Footscray	1/12/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
50	329 Racecourse Road, Flemington	2/12/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
51	503 Macaulay Road, Kensington	2/12/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
52	191 Union Road, Ascot Vale	3/12/2020	1:00pm – 1:45pm	3:30pm – 4:15pm
53	103 Maribyrnong Road, Ascot Vale	3/12/2020	2:00pm – 2:45pm	4:30pm – 5:15pm
54	Opposite 41 Rose Street, Essendon	8/12/2020	1:00pm – 1:45pm	2:00pm – 2:45pm
55	85 Puckle Street, Moonee Ponds	8/12/2020	3:30pm – 4:15pm	4:30pm – 5:15pm
56	19-21 Douglas Parade, Williamstown	10/12/2020	1:00pm – 1:45pm	3:30pm – 4:15pm

In addition to undertaking counts, the amount of street width (in centimetres) given to each of the following street elements on each side of the road (where present) was recorded using a measuring wheel at each site: footpath, landscaping, car parking, bicycle lane, exclusive general traffic lane, exclusive tram lane, shared general traffic/tram lane, shared general traffic/bus lane, and shared general traffic/tram/bus lane. At some sites, clearways were in place during the survey periods where greater space is given to general traffic and/or cyclists through prohibiting on-street parking. At these sites, the street measurements were recorded separately for clearway and non-clearway conditions.

The data collection was undertaken between October to December 2020. During this time, Melbourne was subject to various forms of restrictions associated with COVD-19.

Data analysis

As the person counts were based on movement/flow, this typically resulted in more people being counted in cars than slower modes such as walking, even if more pedestrians could be observed along a street segment than people in cars at a given point in time. To account

for this difference, the count data was converted into a measure of 'concentration' using average travel speeds for each transport mode²⁰. This provided a more suitable measure of street space use by estimating the number of people per kilometre using each transport mode.

For each site, the percentage of street space allocated to each mode of transport was estimated from the street measurement data. This was then compared to the percentage of people observed using each mode of transport, based on the measure of concentration (people per kilometre). Where space was shared among different transport users, such as in shared general traffic/tram lanes, the percentage of street space allocated to that

shared space was compared against the percentage of people using each mode of transport available within that shared space. Where clearways were present at a site, the results were analysed separately for clearway and non-clearway conditions.

The comparisons of street space allocation and use were then used to indicate the extent to which each site was over or under supplied in terms of street space by transport mode. This comparison adopted the principle of 'egalitarianism', in which the distribution of street space is considered fair where space is distributed to each mode according to its demand¹⁶.



Fig. 2 details the street width of each site (both directions) by street element. Most of the sites are approximately 20 metres wide in total, equivalent to one surveyor's chain (66 feet). The remaining sites are mostly 30 metres wide (approximately) in total, equivalent to 1.5 surveyor's chain (99 feet) and reflecting the historical requirement for the width of streets in Melbourne's Hoddle Grid²¹. As

can be seen by Fig. 2, all of the sites have footpaths, while almost all (except five sites) have car parking. Other street elements include a mixture of landscaping, bicycle lanes, exclusive general traffic lanes, exclusive tram lanes, plus shared lanes for general traffic, trams and/or buses.

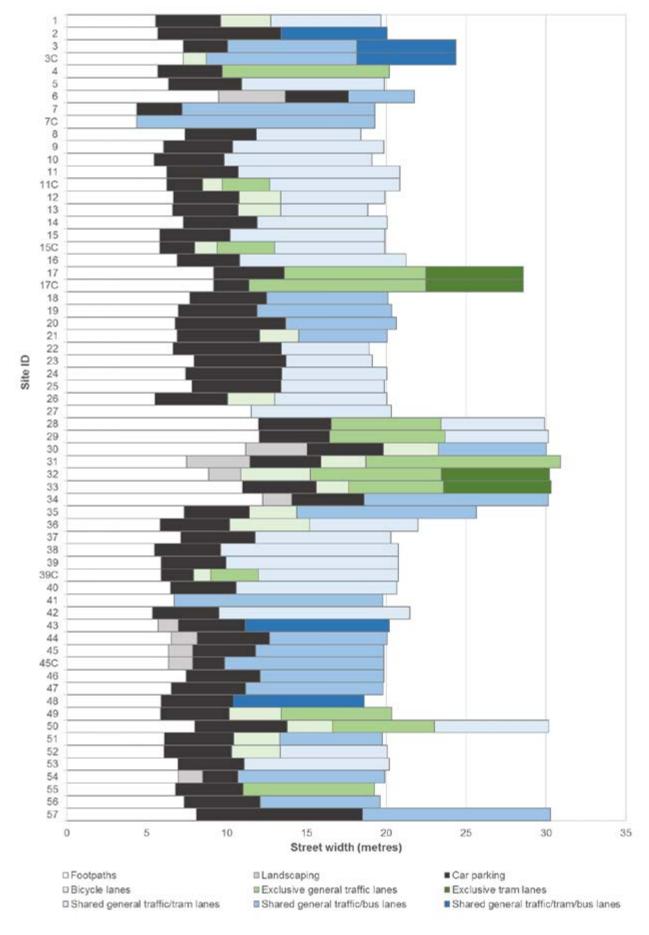


Fig. 2. Street widths by site (both directions).

Fig. 3 provides a comparison of street space allocation and use, averaged across all sites. The percentage of total space given to footpaths on average (33%) was far less than the percentage of total people observed using footpaths on average (56%), indicating an undersupply of space for pedestrians. Exclusive tram lanes were only slightly oversupplied (22% of total space vs. 18% of total

people), as were shared general traffic/tram/bus lanes (35% of total space vs. 30% of total people). However, other street elements were greatly oversupplied, particularly bicycle lanes (12% of total space vs. 2% of total people), car parking (21% of total space vs. 13% of total people) and shared general traffic/bus lanes (42% of total space vs. 29% of total people).

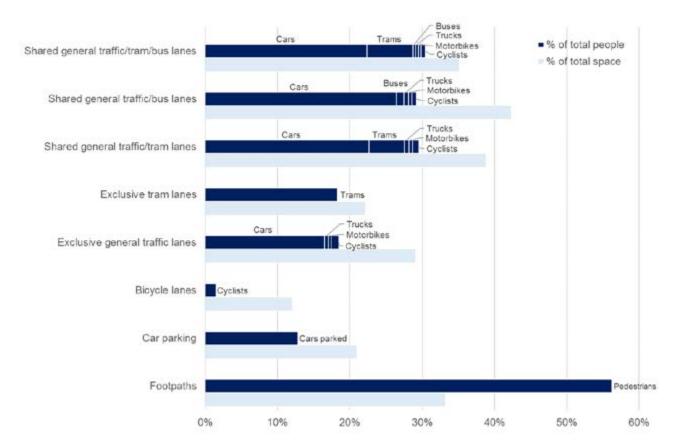


Fig. 3. Average street space allocation vs. use across all sites. Note: calculation of averages excludes zero values, e.g. sites where street elements were not present. Percentages therefore sum to greater than 100%.

While Fig. 3 provides an indication of the amount of under/oversupply of street elements in the activity centres that were surveyed, these results represent averages only. Fig. 4-11 therefore present a comparison of street space allocation and use across individual sites, by street element. This highlights considerable variability in street

space allocation vs. use for different street elements, showing that at some sites, contrary to the average results in Fig. 3, space for footpaths is oversupplied while space for car parking and shared general traffic/bus lanes is undersupplied. However, space for bicycle lanes is found to be consistently oversupplied at all sites.

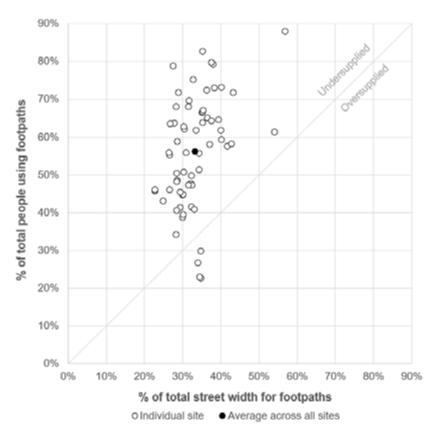


Fig. 4. Street space allocation vs. use across individual sites – footpaths.

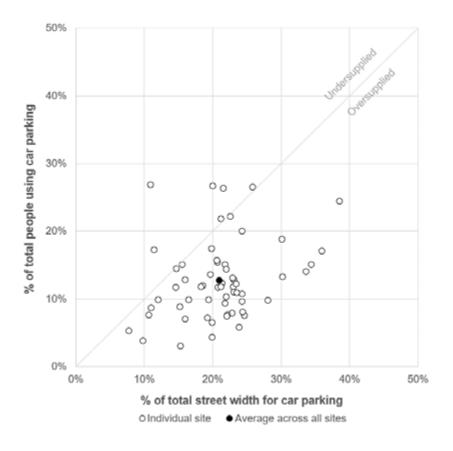


Fig. 5. Street space allocation vs. use across individual sites – car parking. Note: calculation of average excludes zero values, e.g. sites where street element was not present.

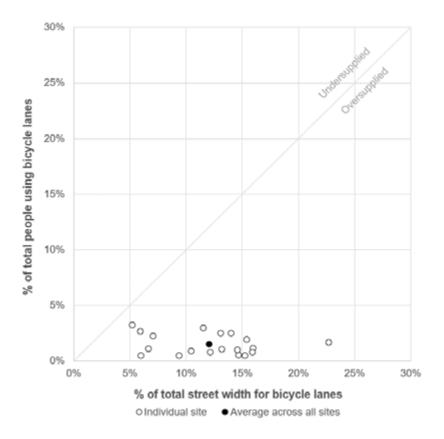


Fig. 6. Street space allocation vs. use across individual sites – bicycle lanes. Note: calculation of average excludes zero values, e.g. sites where street element was not present.

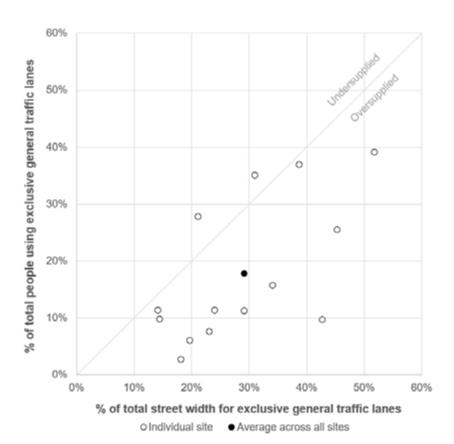


Fig. 7. Street space allocation vs. use across individual sites – exclusive general traffic lanes. *Note: calculation of average excludes zero values, e.g. sites where street element was not present.*

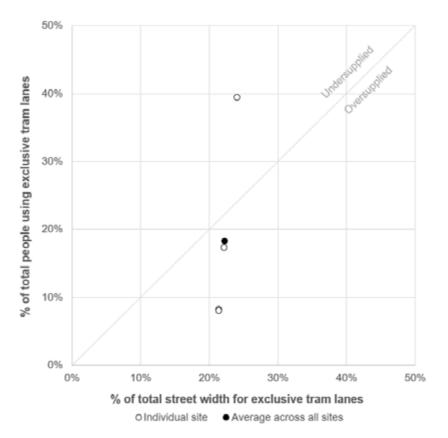


Fig. 8. Street space allocation vs. use across individual sites – exclusive tram lanes. *Note: calculation of average excludes zero values, e.g. sites where street element was not present.*

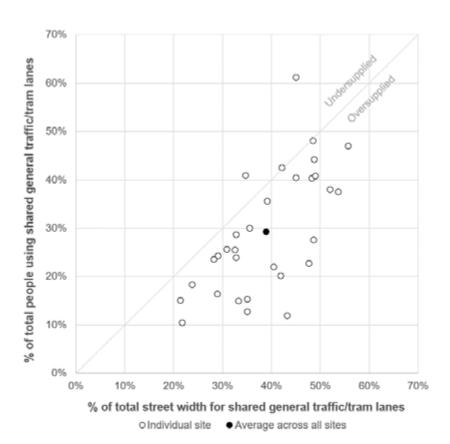


Fig. 9. Street space allocation vs. use across individual sites – shared general traffic/tram lanes. *Note: calculation of average excludes zero values, e.g. sites where street element was not present.*

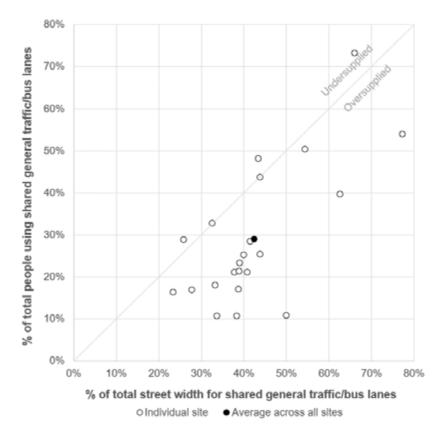


Fig. 10. Street space allocation vs. use across individual sites – shared general traffic/bus lanes. *Note: calculation of average excludes zero values, e.g. sites where street element was not present.*

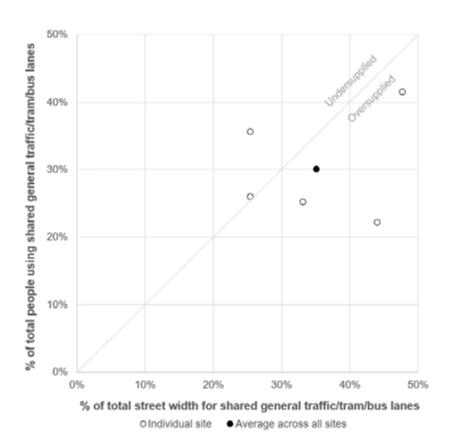


Fig. 11. Street space allocation vs. use across individual sites – shared general traffic/tram/bus lanes. *Note: calculation of average excludes zero values, e.g. sites where street element was not present.*



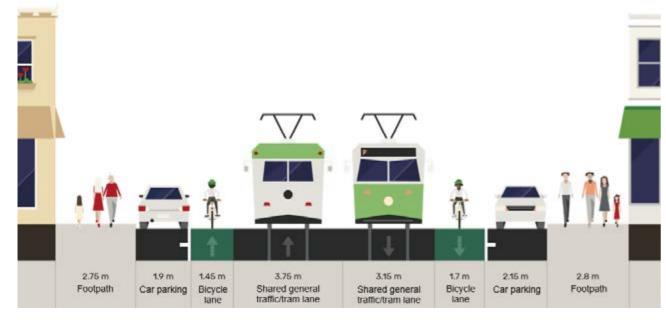
The results from the analysis have shown that, on average, pedestrian space in the form of footpaths was significantly undersupplied, while bicycle lanes, car parking and shared general traffic/bus lanes were greatly oversupplied. However, when viewed across individual sites, considerable variability was found in street space allocation vs. use. A key implication from the research is that space for pedestrians could be increased at some sites, potentially through converting existing on-street parking, as is the case with the recent emergence of parklets¹³. While space for bicycle lanes was found to be oversupplied, caution would need to be taken in reducing or eliminating cycling facilities as this would not necessarily progress a sustainable transport agenda8. Any reallocation of space would also need to be considered against minimum width requirements for each street element.

Another implication from this research is that the use of averages to denote street space allocation and use across activity centres should generally be avoided. These can mask differences found at individual locations where changes to street space allocation may be implemented in practice. This highlights the importance of considering the local context and developing a site-specific approach to street space reallocation.

Finally, while recognising that the reallocation of street space involves a range of governance, political and ethical considerations, efforts to reallocate street space should also be informed by empirical evidence of street space allocation and use where possible. This will help to ensure that street space can be distributed more equitably to users and support broader goals for increasing the uptake of more sustainable forms of transport. It will also require further measurement of street space allocation and use over time to better support decision-making.



Fig. 12. Site characteristics: 667 Glenferrie Road, Hawthorn.



35.8

Fig. 13. Street cross-section: 667 Glenferrie Road, Hawthorn. Image created via Streetmix.

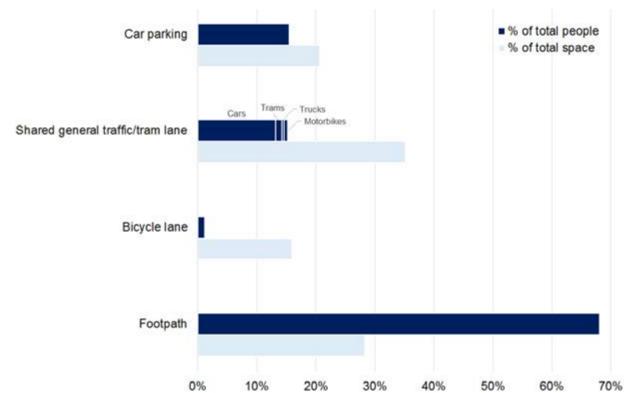


Fig. 15. Street space allocation vs. use: 667 Glenferrie Road, Hawthorn.

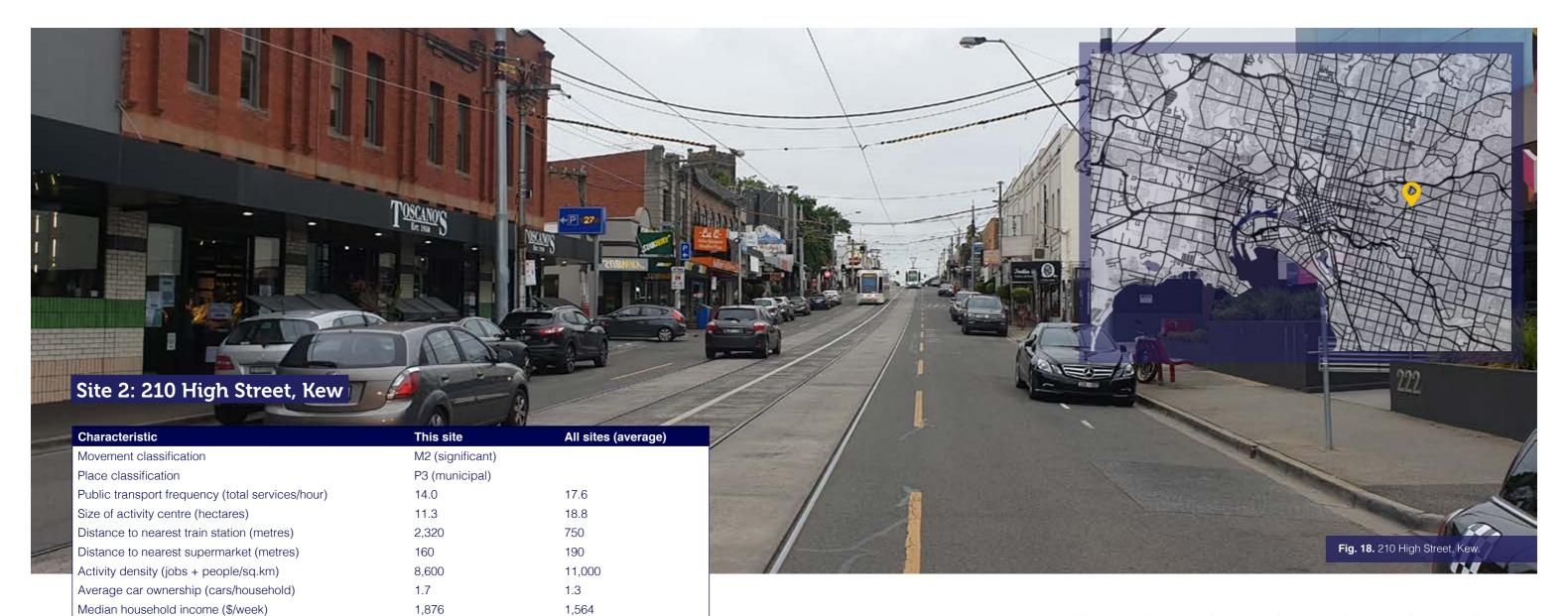
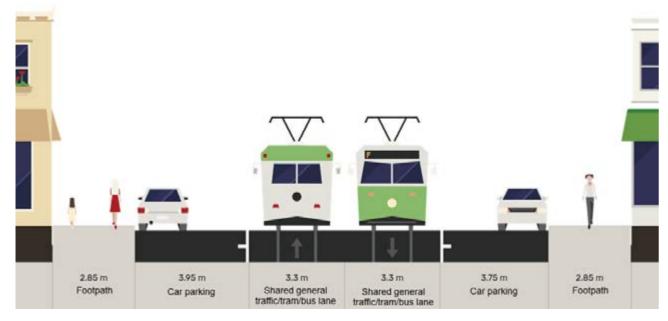


Fig. 16. Site characteristics: 210 High Street, Kew.



40.0

Fig. 17. Street cross-section:210 High Street, Kew. Image created via Streetmix.

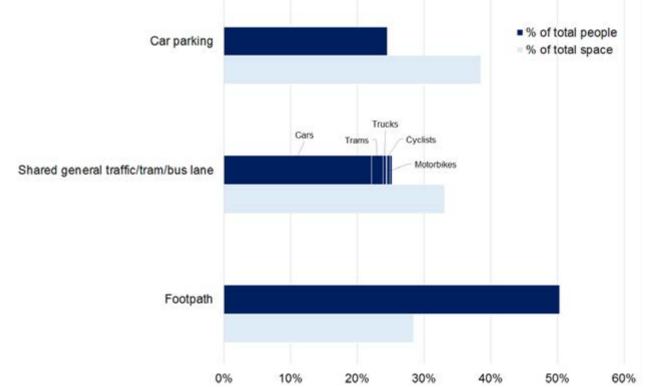


Fig. 19. Street space allocation vs. use: 210 High Street, Kew.

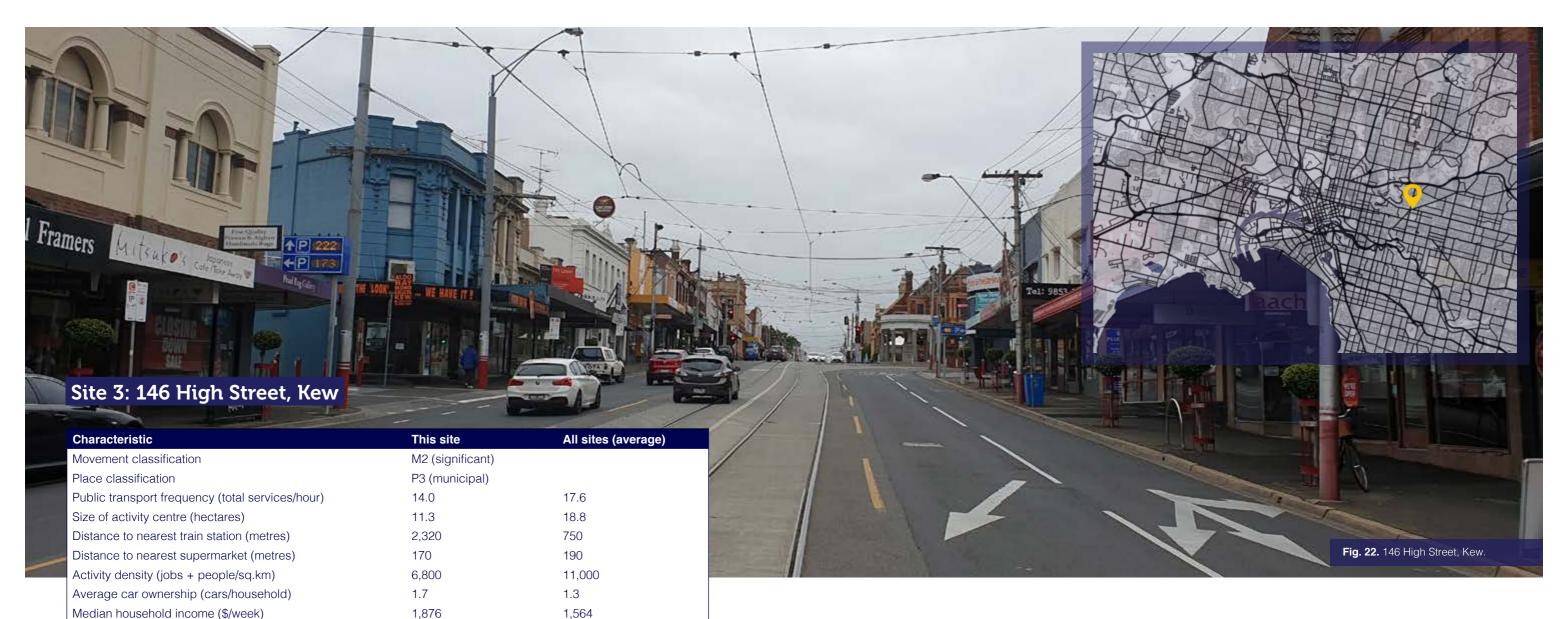
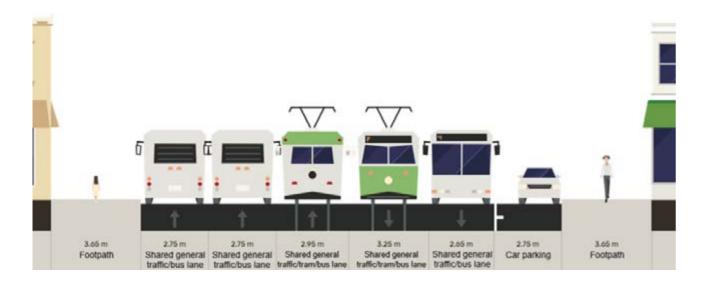


Fig. 20. Site characteristics: 146 High Street, Kew.



40.0

Fig. 21. Street cross-section: 146 High Street, Kew. Image created via Streetmix.

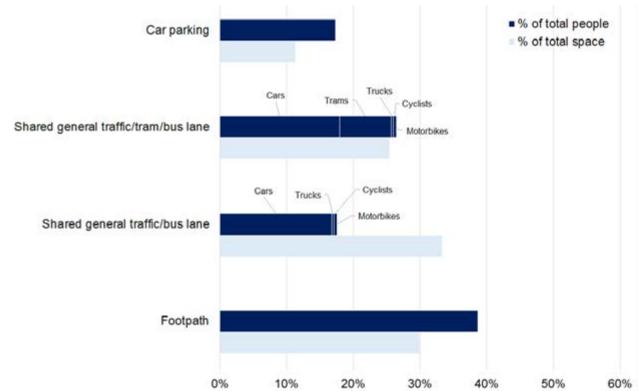


Fig. 23. Street space allocation vs. use: 146 High Street, Kew.

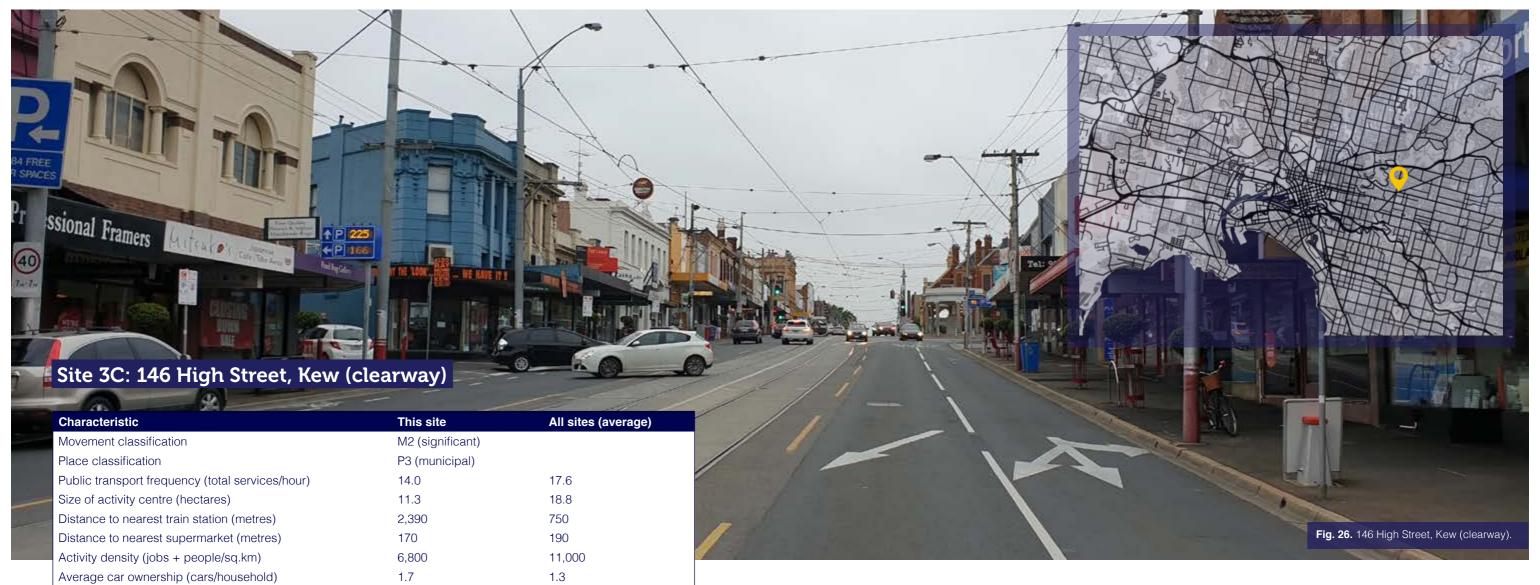
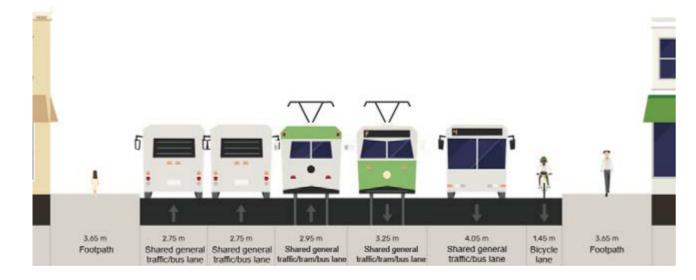


Fig. 24. Site characteristics: 146 High Street, Kew (clearway).

Average resident age (years)



1,876

40.0

1,564

Fig. 25. Street cross-section:146 High Street, Kew (clearway). Image created via Streetmix.

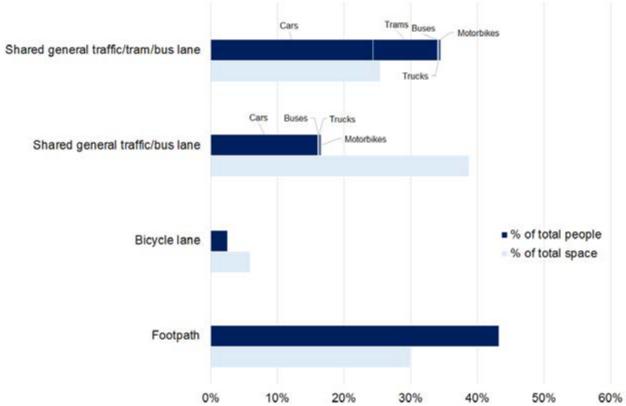


Fig. 27. Street space allocation vs. use: 146 High Street, Kew (clearway).

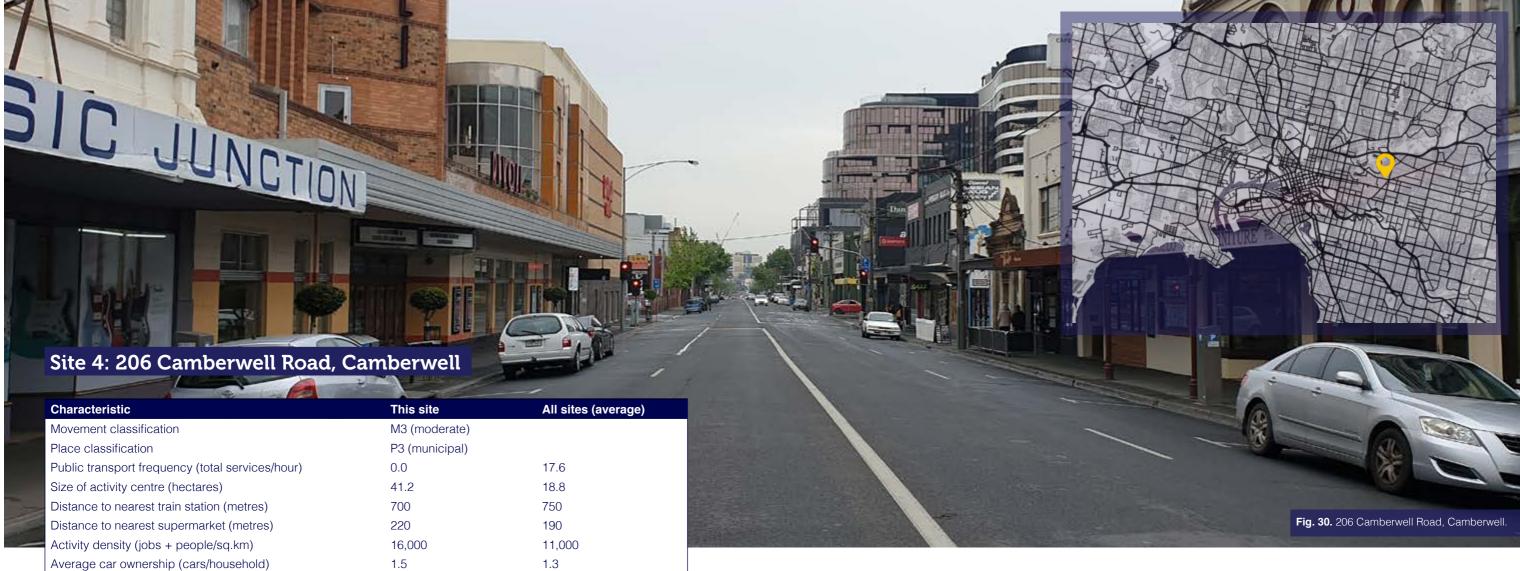
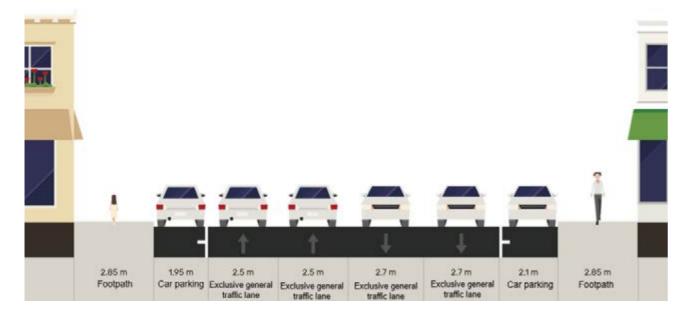


Fig. 28. Site characteristics: 206 Camberwell Road, Camberwell.

Average resident age (years)



1,760

37.0

1,564

Fig. 29. Street cross-section: 206 Camberwell Road, Camberwell. Image created via Streetmix.

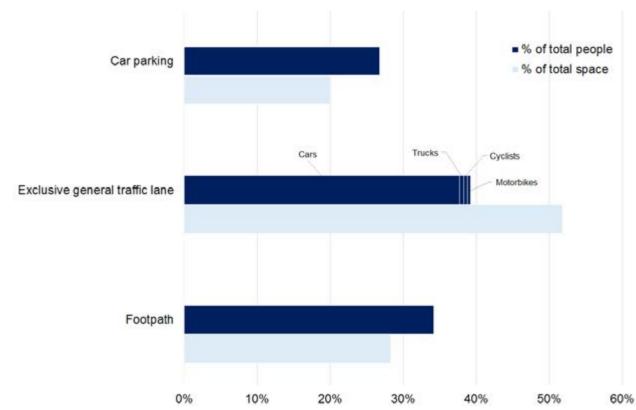


Fig. 31. Street space allocation vs. use: 206 Camberwell Road, Camberwell.

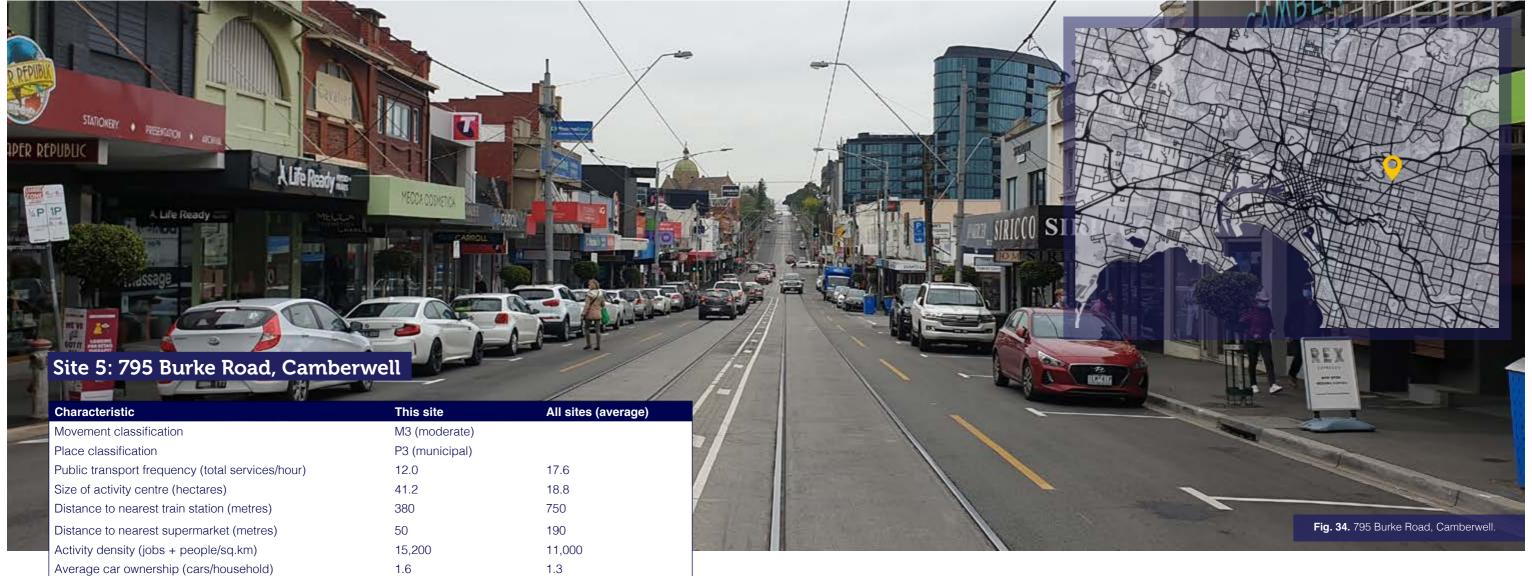
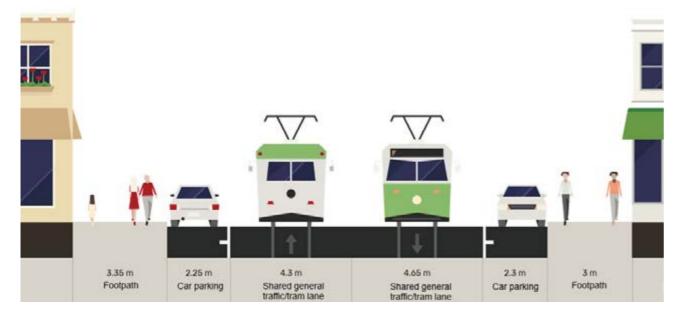


Fig. 32. Site characteristics: 795 Burke Road, Camberwell.

Average resident age (years)



1,822

38.8

1,564

Fig. 33. Street cross-section: 795 Burke Road, Camberwell. Image created via Streetmix.

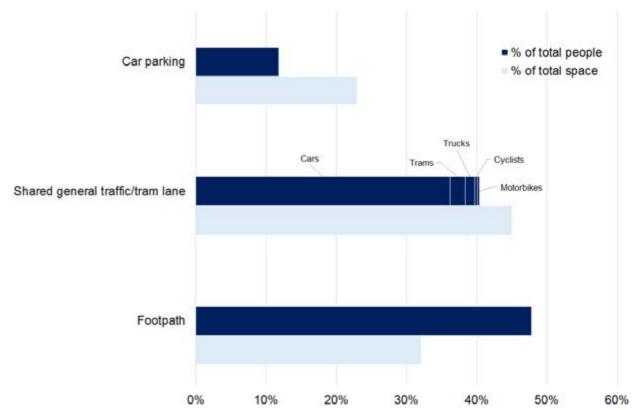


Fig. 35. Street space allocation vs. use: 795 Burke Road, Camberwell.

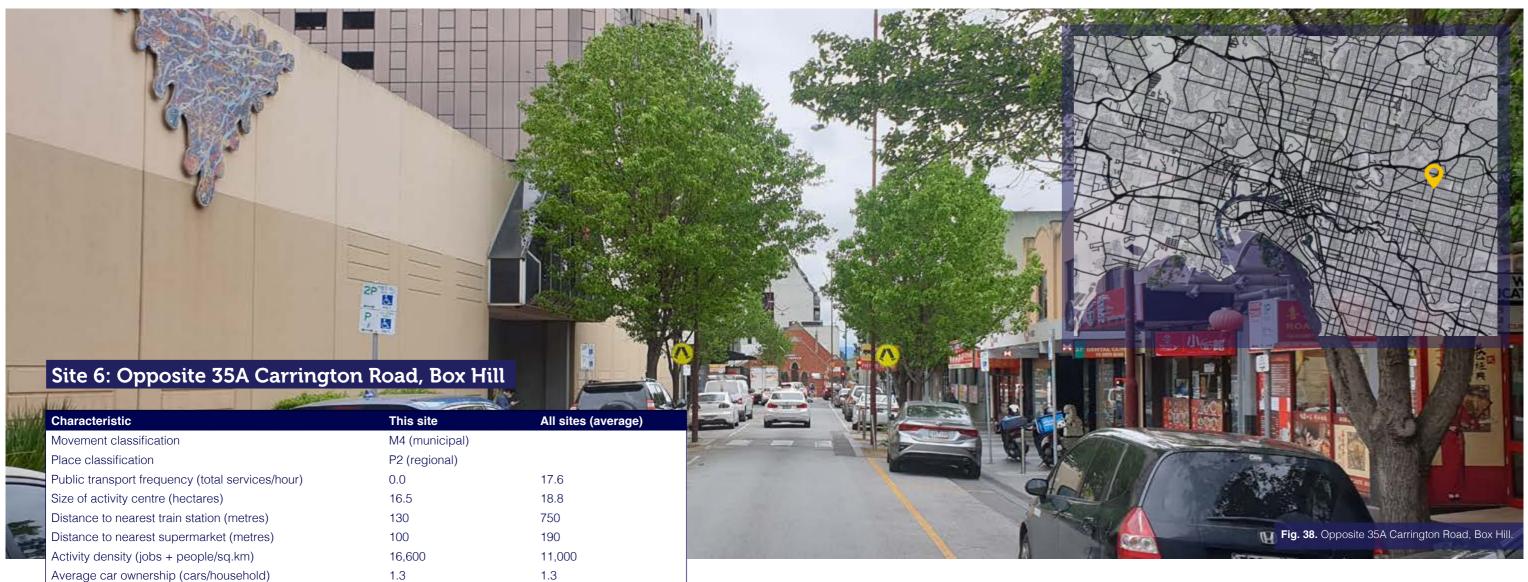
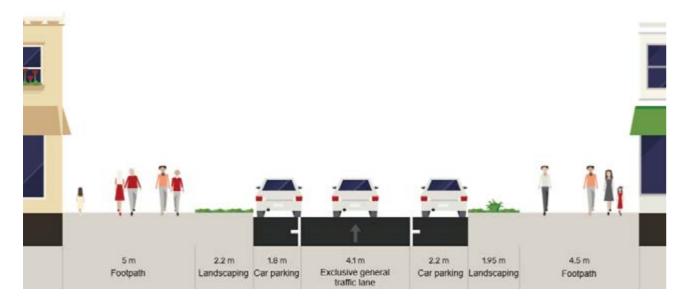


Fig. 36. Site characteristics: Opposite 35A Carrington Road, Box Hill.

Average resident age (years)



1,078

37.3

1,564

Fig. 37. Street cross-section: Opposite 35A Carrington Road, Box Hill. Image created via Streetmix.

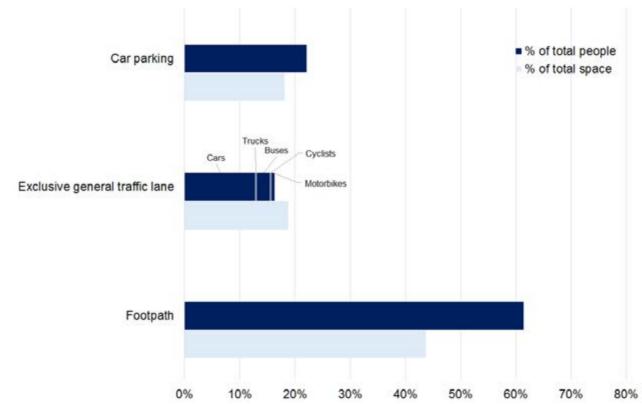


Fig. 39. Street space allocation vs. use: Opposite 35A Carrington Road, Box Hill.

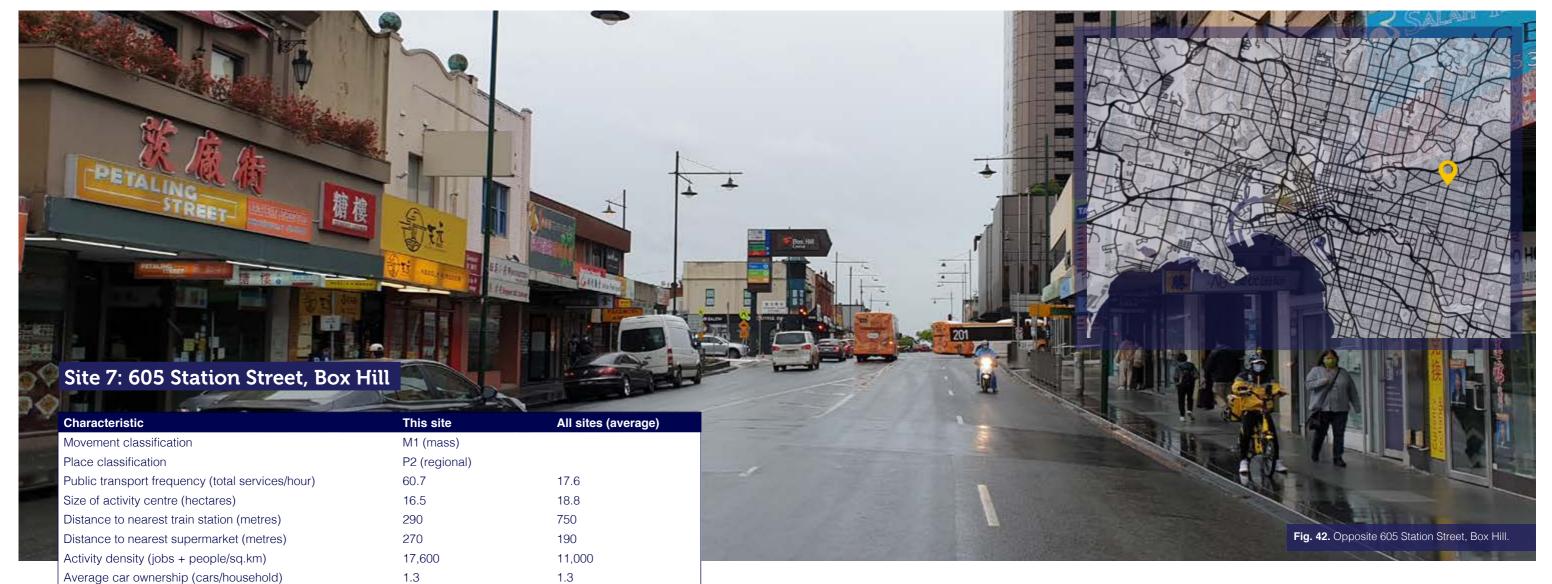
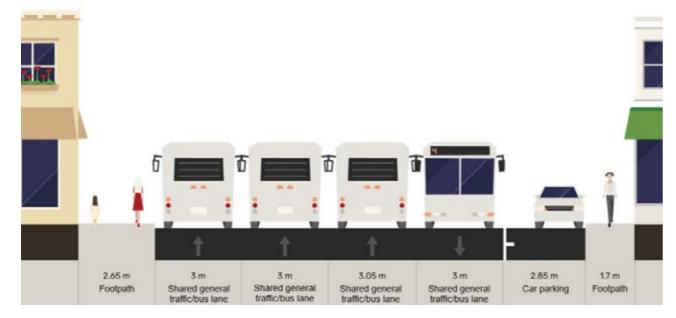


Fig. 40. Site characteristics: 605 Station Street, Box Hill.

Average resident age (years)



1,078

37.3

1,564 37.9

Fig. 41. Street cross-section: 605 Station Street, Box Hill. Image created via Streetmix.

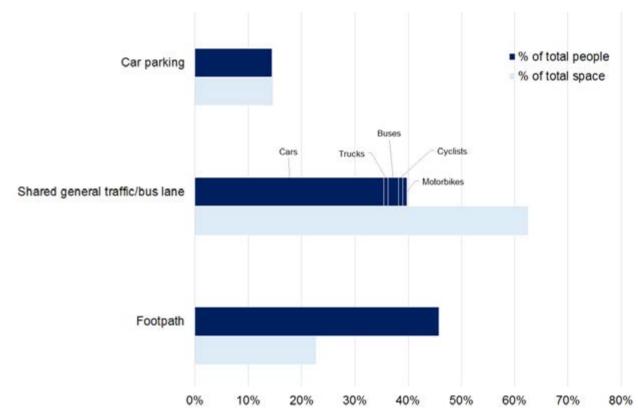
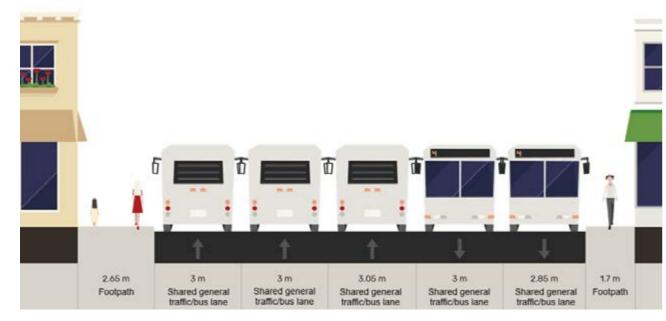


Fig. 43. Street space allocation vs. use: 605 Station Street, Box Hill..



Fig. 44. Site characteristics: 605 Station Street, Box Hill (clearway).

Average resident age (years)



1,078

37.3

1,564

Fig. 45. Street cross-section: 605 Station Street, Box Hill (clearway). Image created via Streetmix.

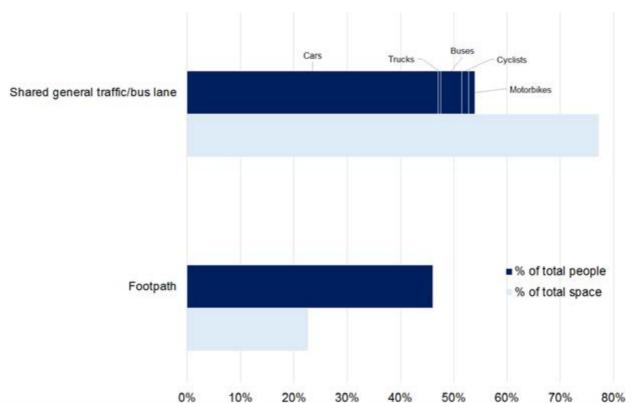


Fig. 47. Street space allocation vs. use: 605 Station Street, Box Hill (clearway).

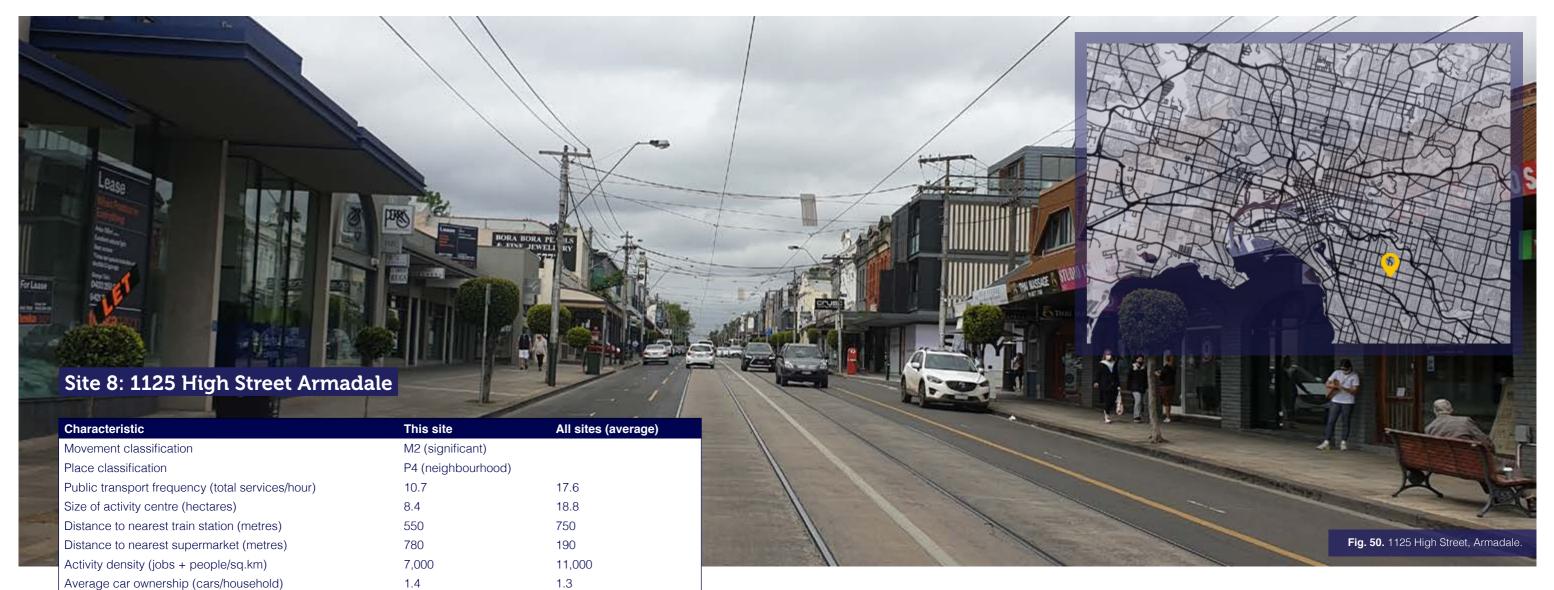
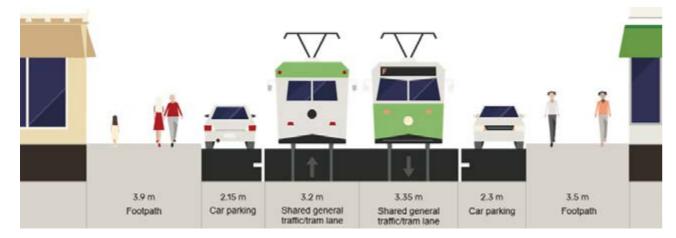


Fig. 48. Site characteristics: 1125 High Street, Armadale.

Average resident age (years)



1,770

40.0

1,564

Fig. 49. Street cross-section: 1125 High Street, Armadale. Image created via Streetmix.

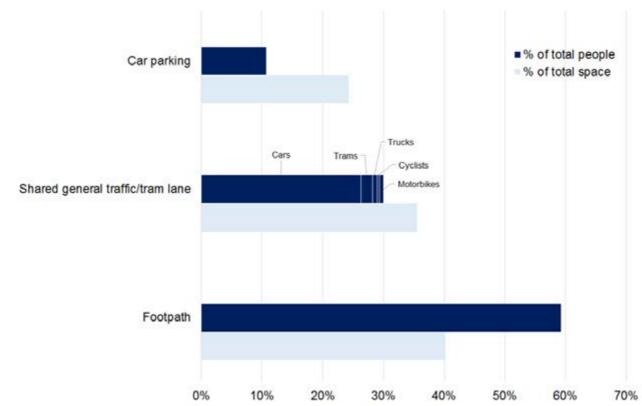


Fig. 51. Street space allocation vs. use: 1125 High Street, Armadale.

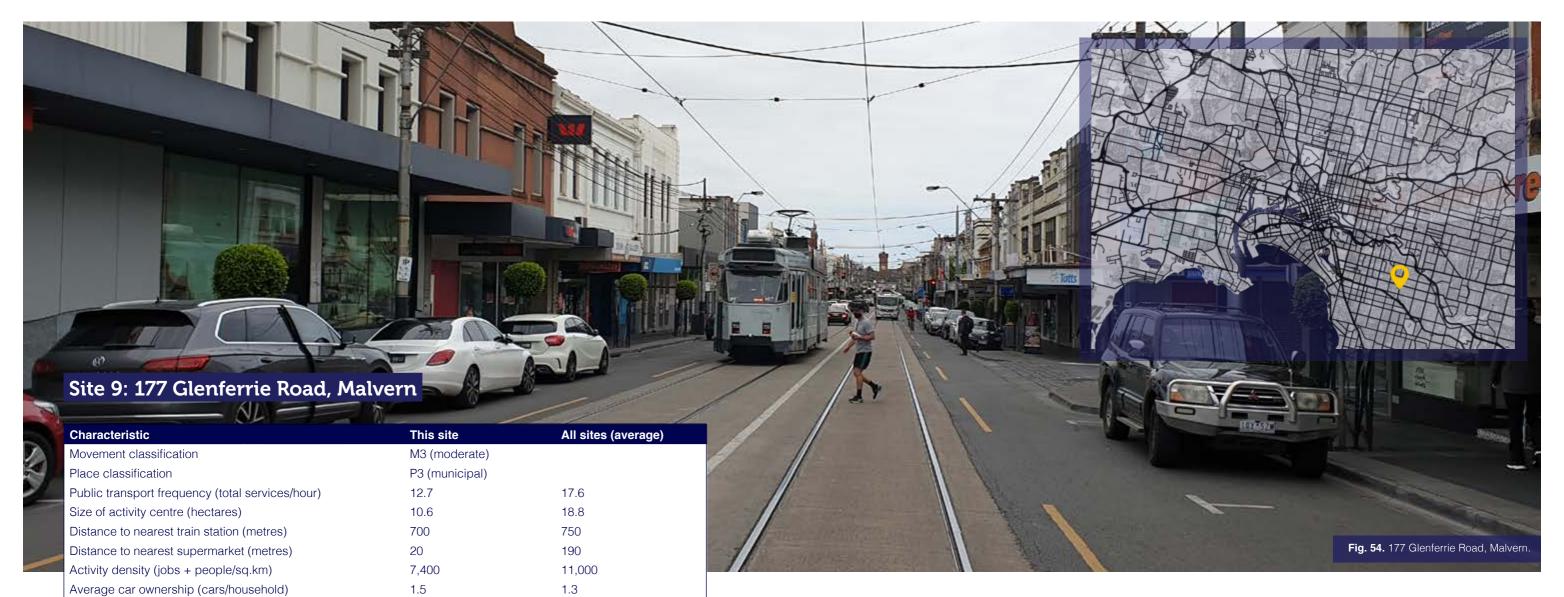
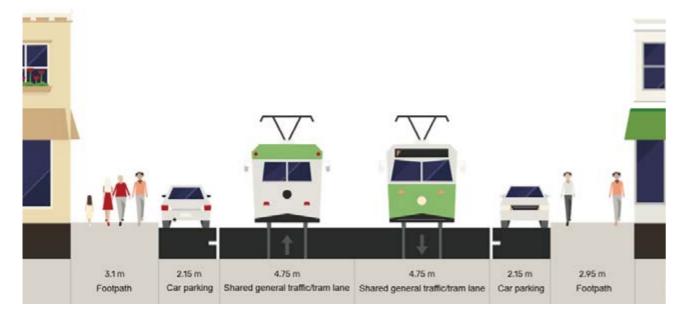


Fig. 52. Site characteristics: 177 Glenferrie Road, Malvern.

Average resident age (years)



1,788

39.7

1,564 37.9

Fig. 53. Street cross-section: 177 Glenferrie Road, Malvern. Image created via Streetmix.

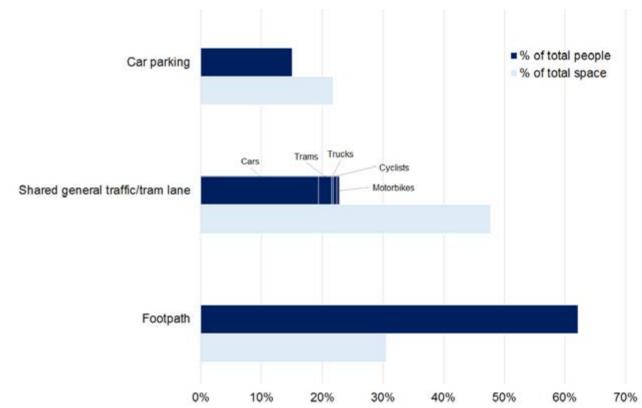


Fig. 55. Street space allocation vs. use: 177 Glenferrie Road, Malvern.

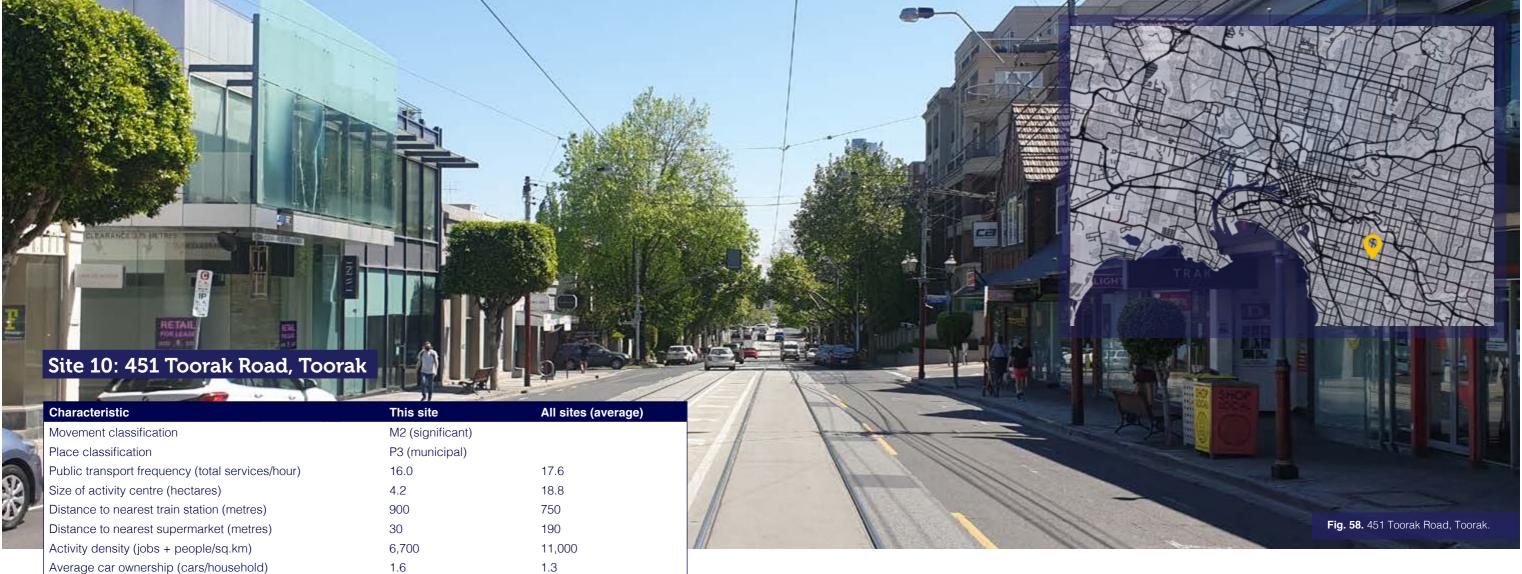
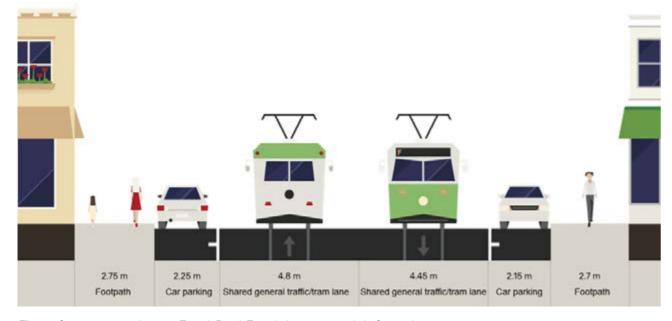


Fig. 56. Site characteristics: 451 Toorak Road, Toorak.

Average resident age (years)



1,937

44.7

1,564

Fig. 57. Street cross-section: 451 Toorak Road, Toorak. Image created via Streetmix.

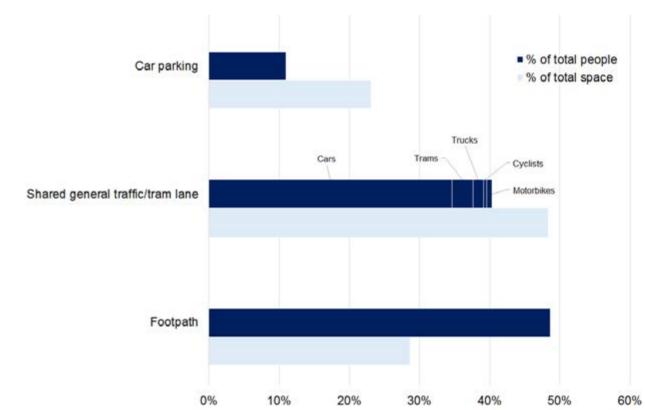


Fig. 59. Street space allocation vs. use: 451 Toorak Road, Toorak...

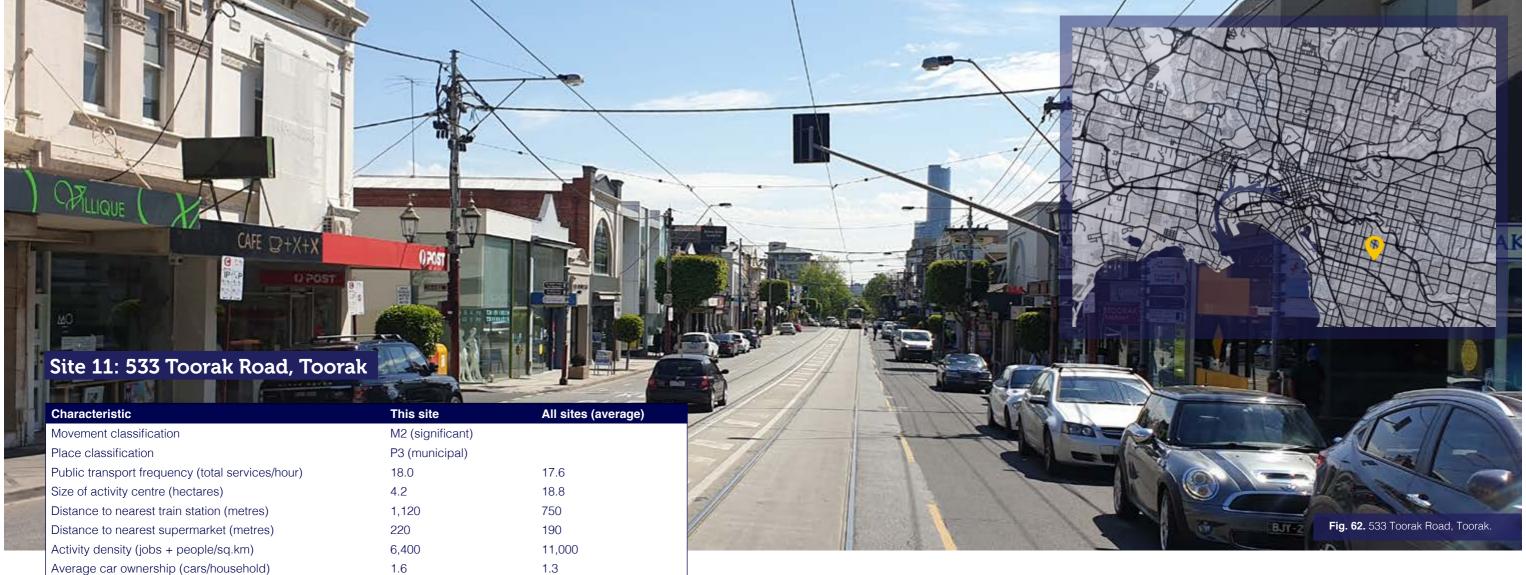
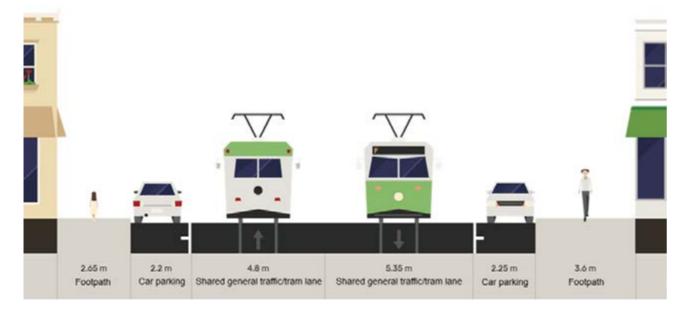


Fig. 60. Site characteristics: 533 Toorak Road, Toorak.

Average resident age (years)



1,937

44.7

1,564

Fig. 61. Street cross-section: 533 Toorak Road, Toorak. Image created via Streetmix.

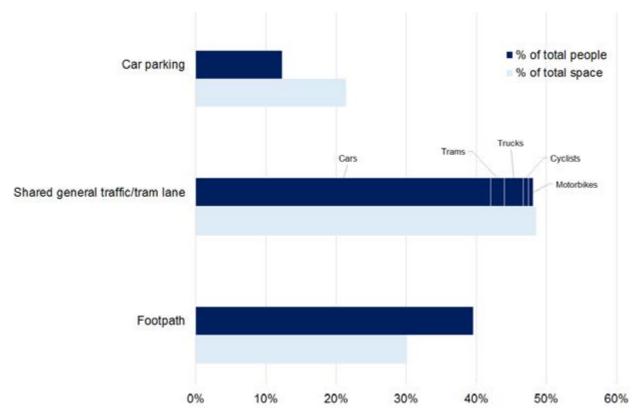


Fig. 63. Street space allocation vs. use: 533 Toorak Road, Toorak...

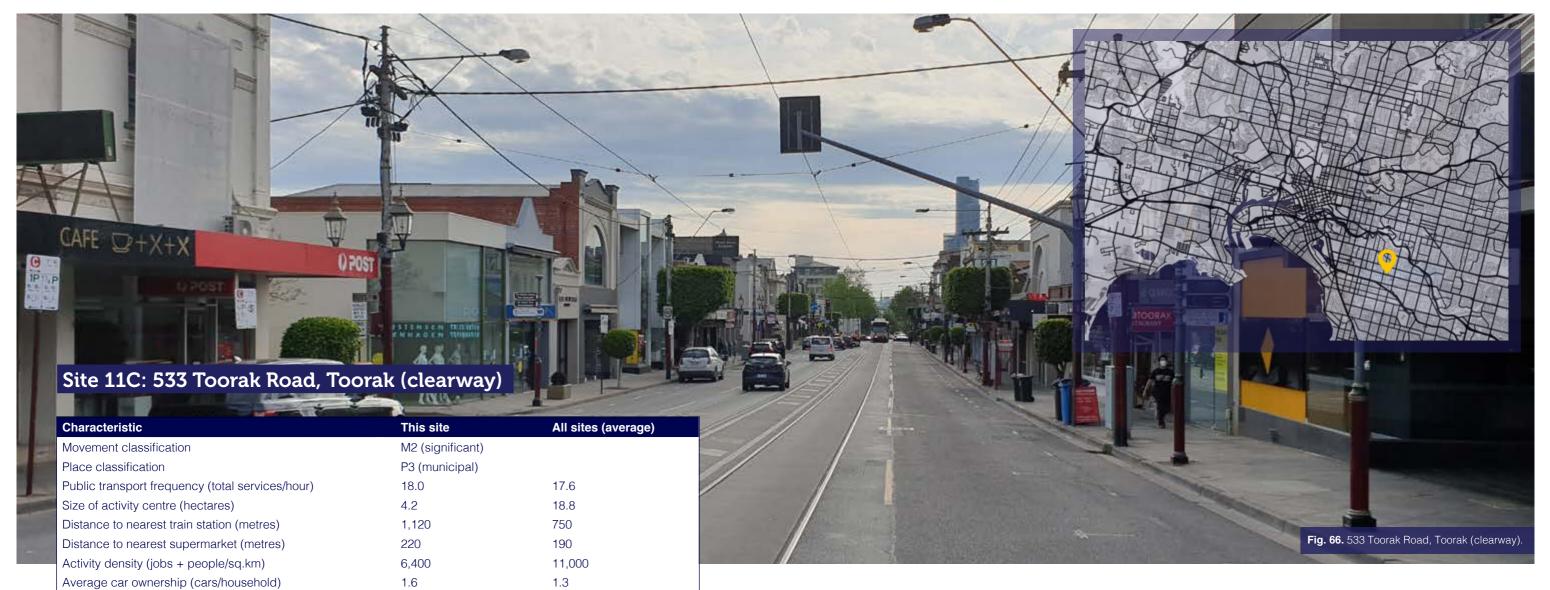
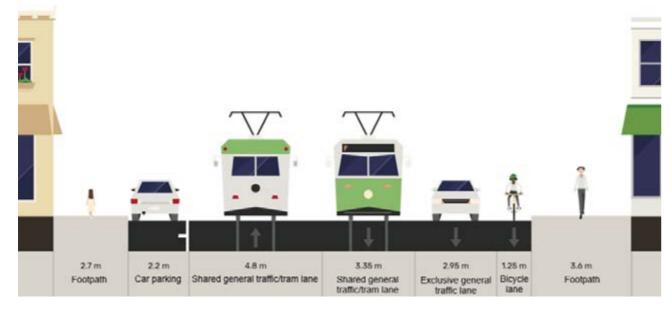


Fig. 64. Site characteristics: 533 Toorak Road, Toorak (clearway).

Average resident age (years)



1,937

44.7

1,564

Fig. 65. Street cross-section: 533 Toorak Road, Toorak (clearway). Image created via Streetmix.

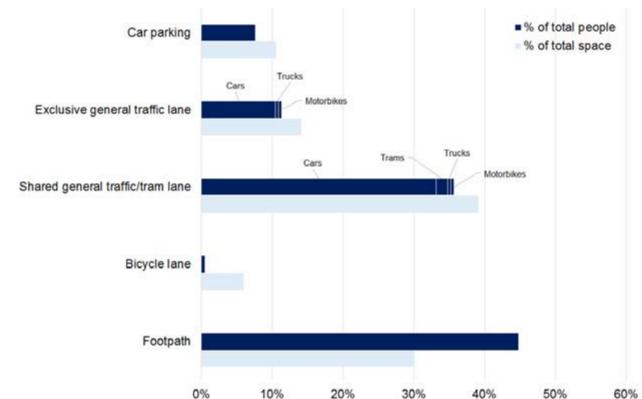


Fig. 67. Street space allocation vs. use: 533 Toorak Road, Toorak (clearway)..

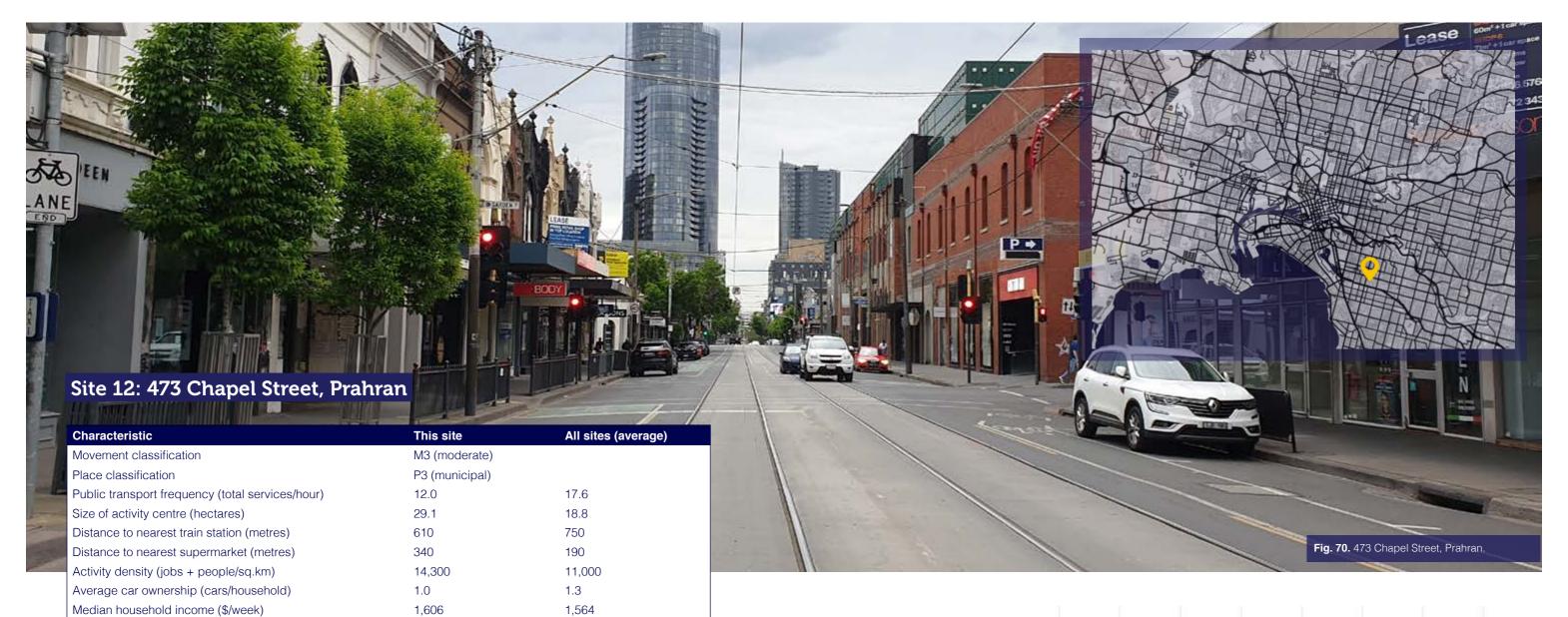
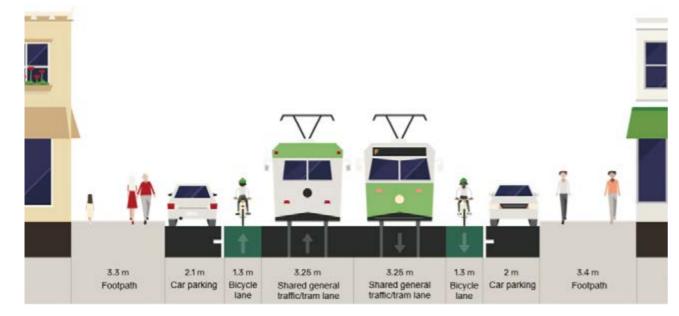


Fig. 68. Site characteristics: 473 Chapel Street, Prahran.



36.4

Fig. 69. Street cross-section: 473 Chapel Street, Prahran. Image created via Streetmix.

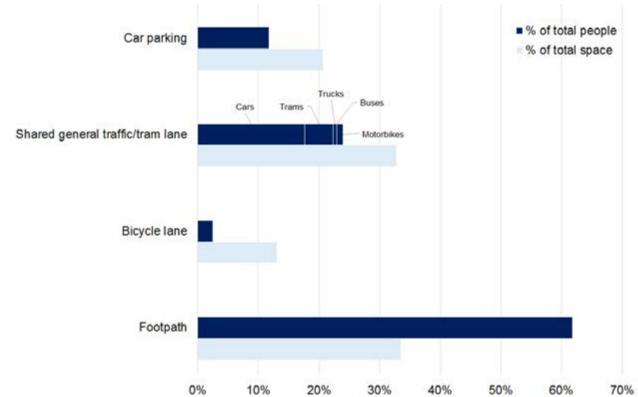


Fig. 71. Street space allocation vs. use: 473 Chapel Street, Prahran...

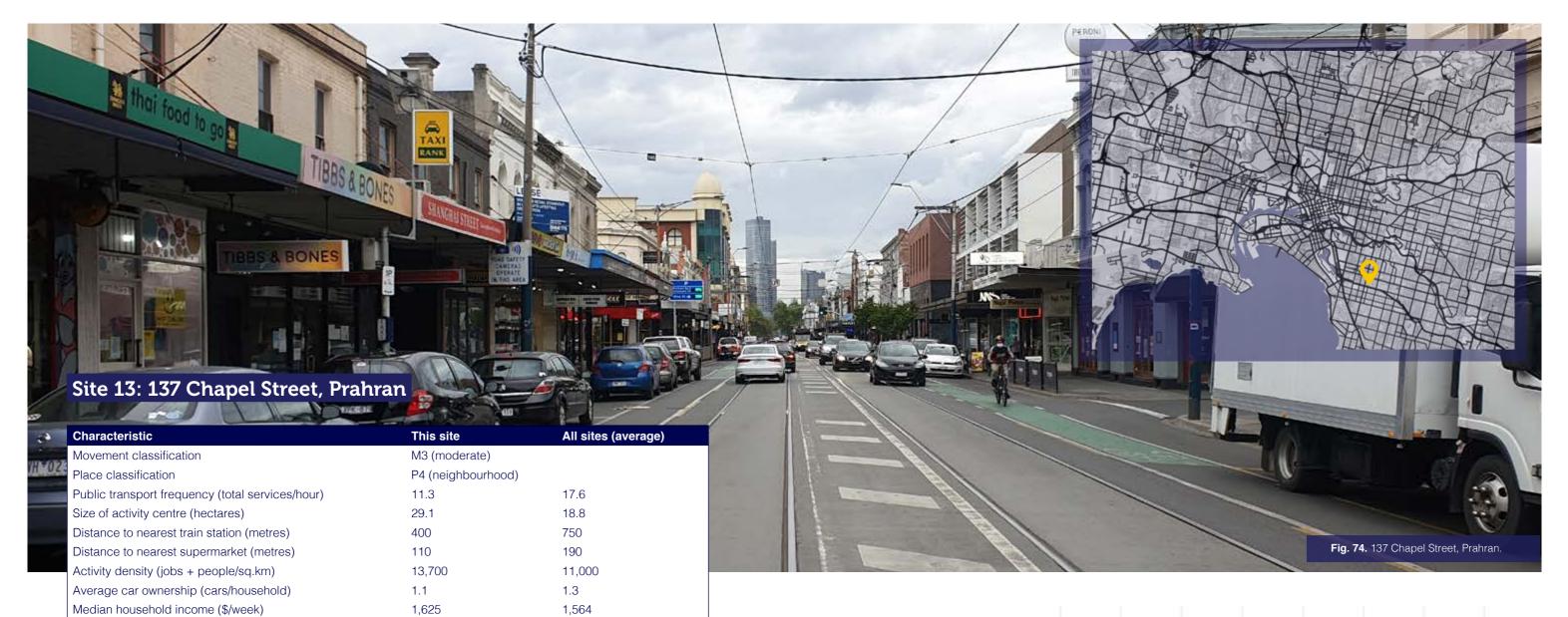
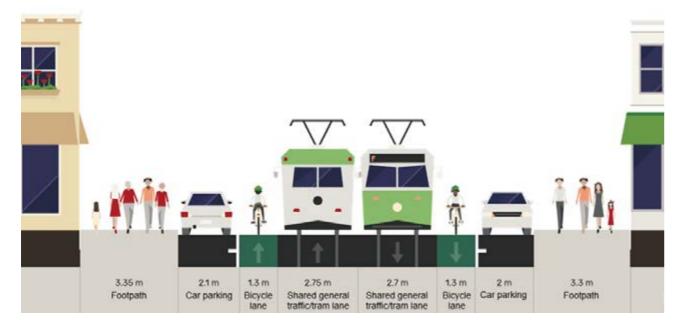


Fig. 72. Site characteristics: 137 Chapel Street, Prahran.



37.7

Fig. 73. Street cross-section: 137 Chapel Street, Prahran. Image created via Streetmix.

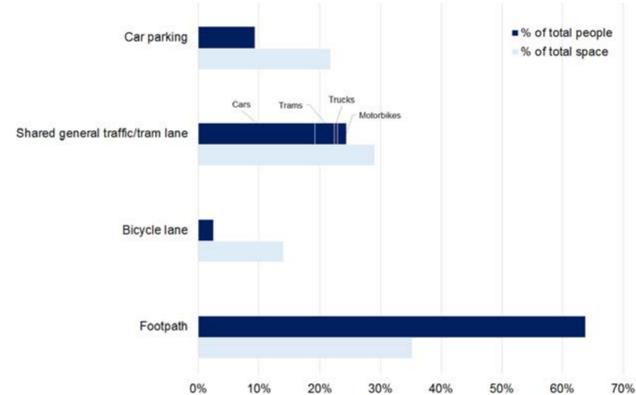


Fig. 75. Street space allocation vs. use: 137 Chapel Street, Prahran..

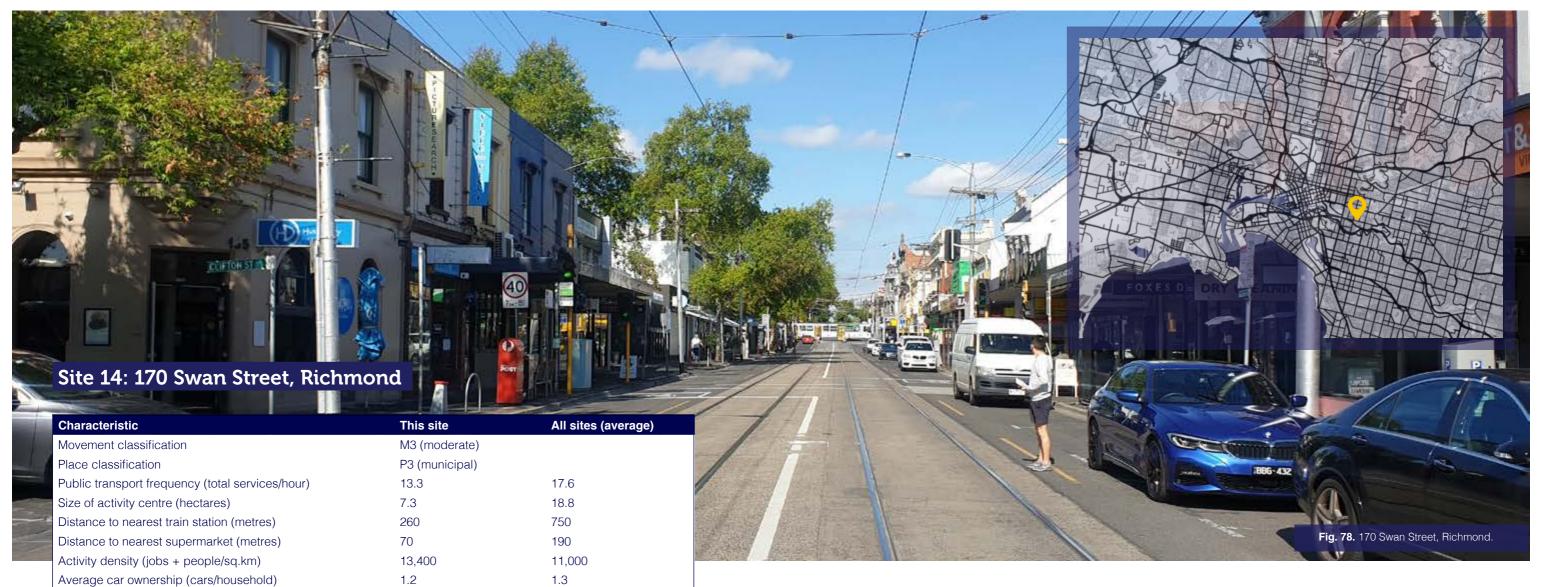
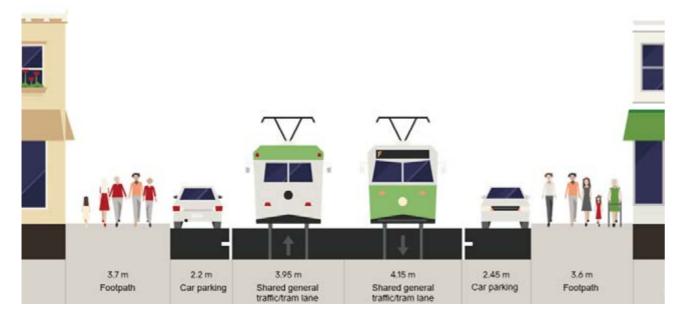


Fig. 76. Site characteristics: 170 Swan Street, Richmond.

Average resident age (years)



1,772

36.8

1,564

Fig. 77. Street cross-section: 170 Swan Street, Richmond. Image created via Streetmix.

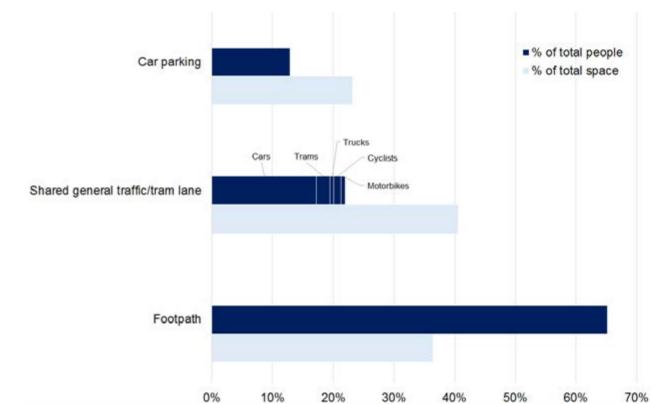


Fig. 79. Street space allocation vs. use: 170 Swan Street, Richmond.

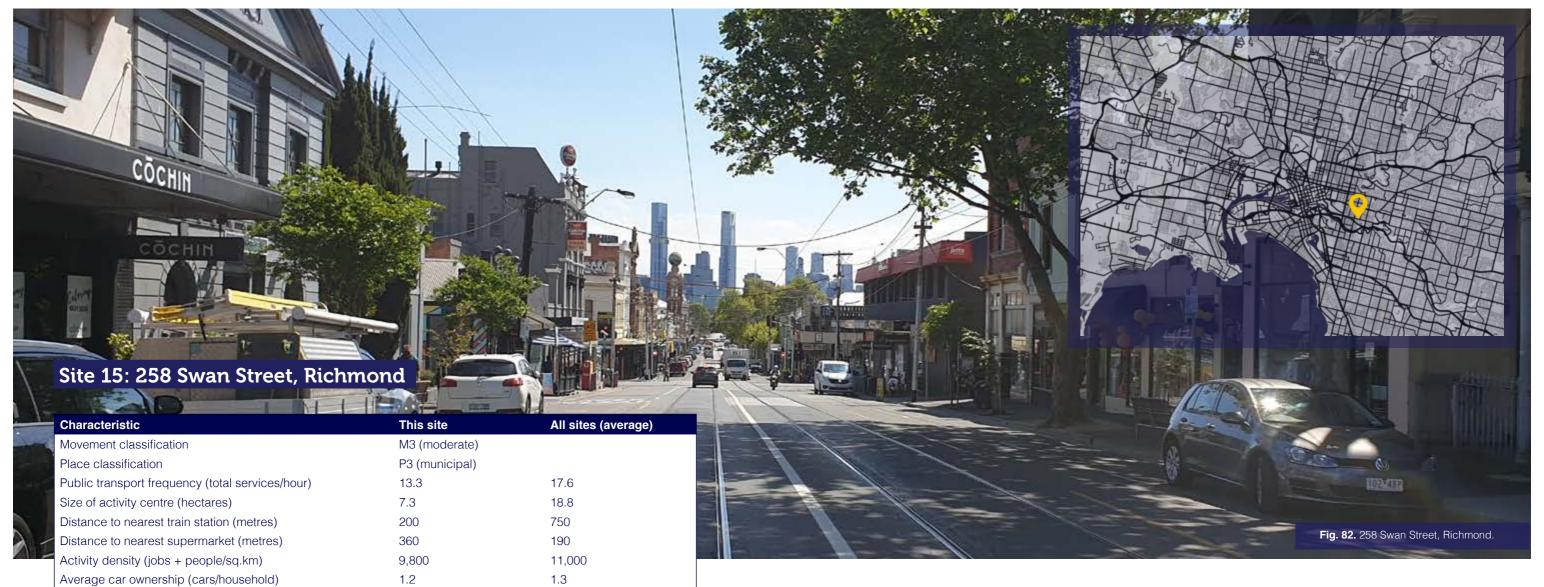
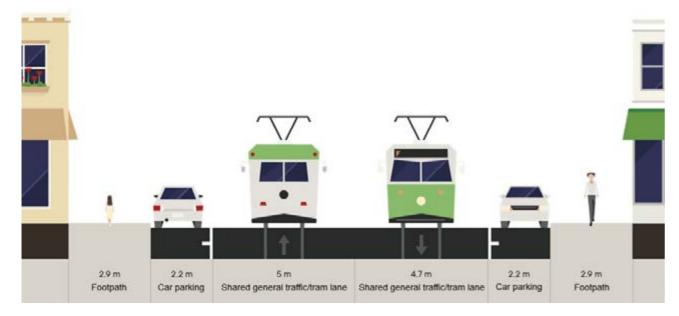


Fig. 80. Site characteristics: 258 Swan Street, Richmond.

Average resident age (years)



1,772

36.8

1,564 37.9

Fig. 81. Street cross-section: 258 Swan Street, Richmond. Image created via Streetmix.

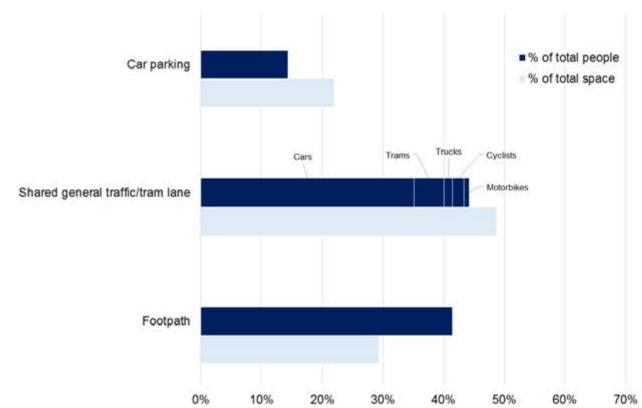


Fig. 83. Street space allocation vs. use: 258 Swan Street, Richmond.

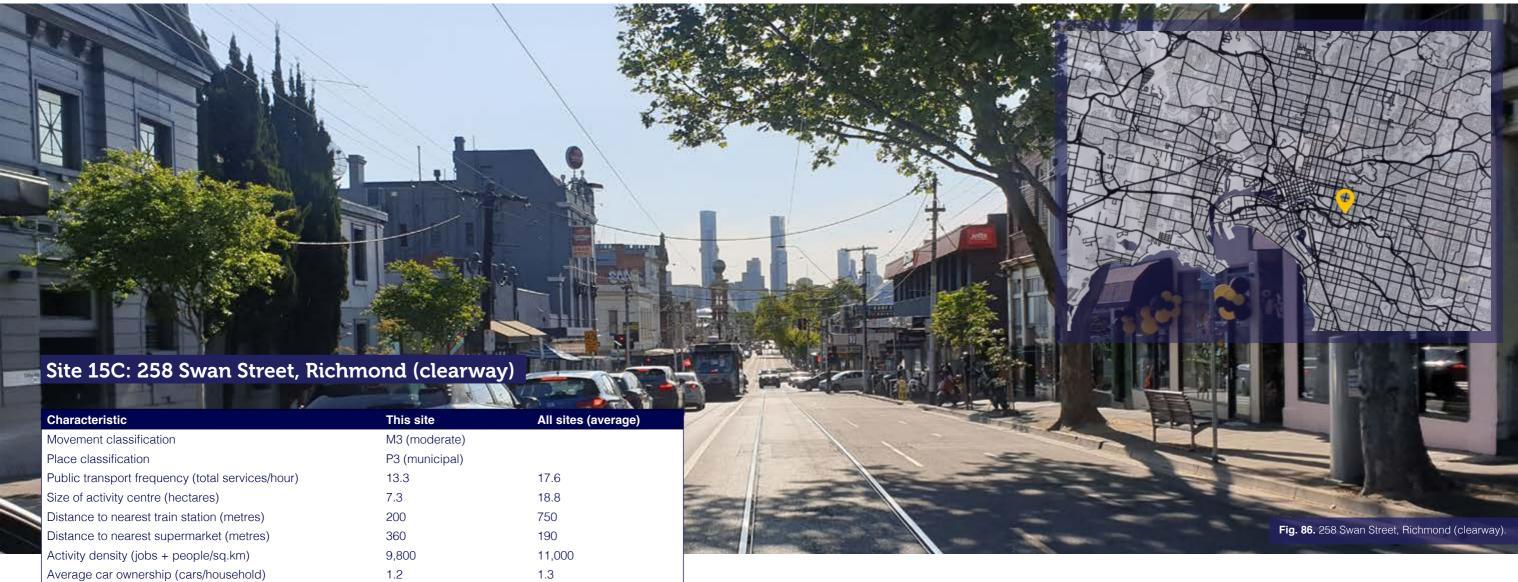
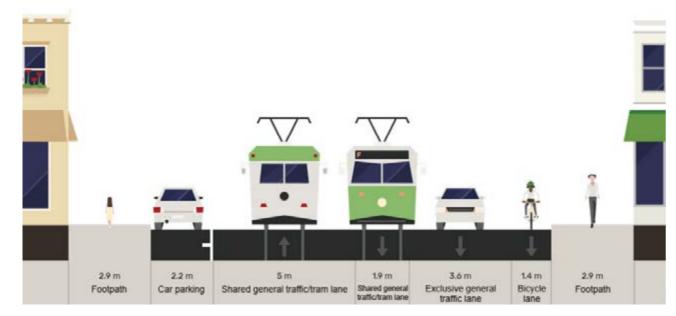


Fig. 84. Site characteristics: 258 Swan Street, Richmond (clearway).

Average resident age (years)



1,772

36.8

1,564

Fig. 85. Street cross-section: 258 Swan Street, Richmond (clearway). Image created via Streetmix.

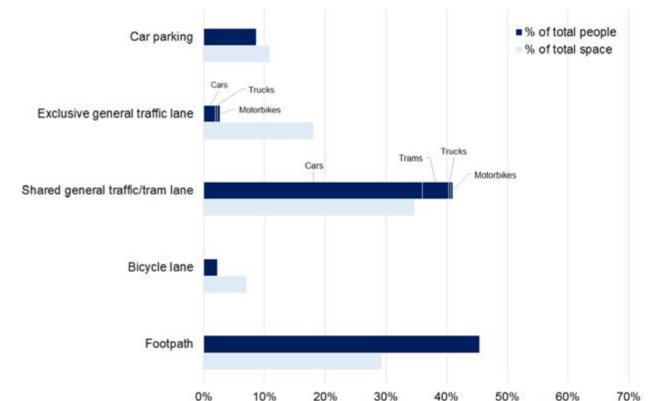
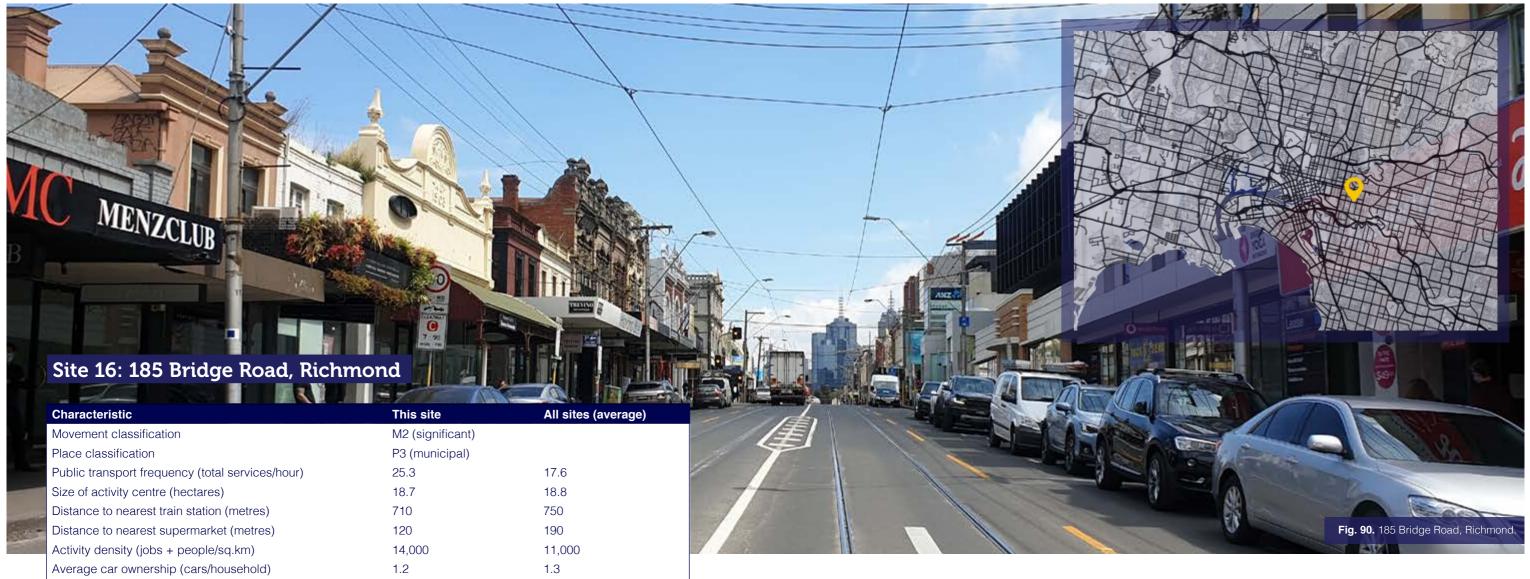
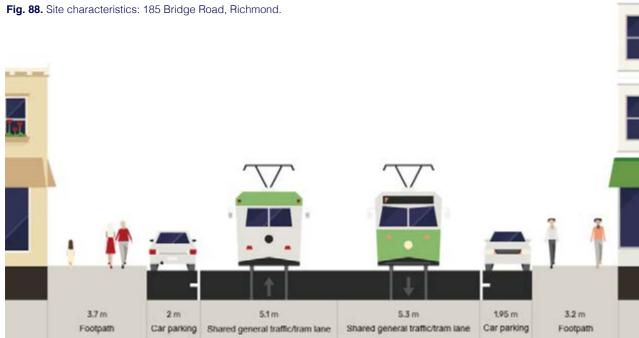


Fig. 87. Street space allocation vs. use: 258 Swan Street, Richmond (clearway).





1,772

36.8

1,564

37.9



Median household income (\$/week)

Average resident age (years)

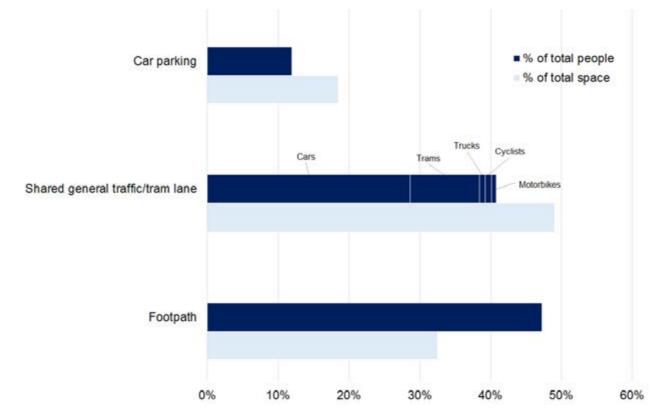


Fig. 91. Street space allocation vs. use: 185 Bridge Road, Richmond.

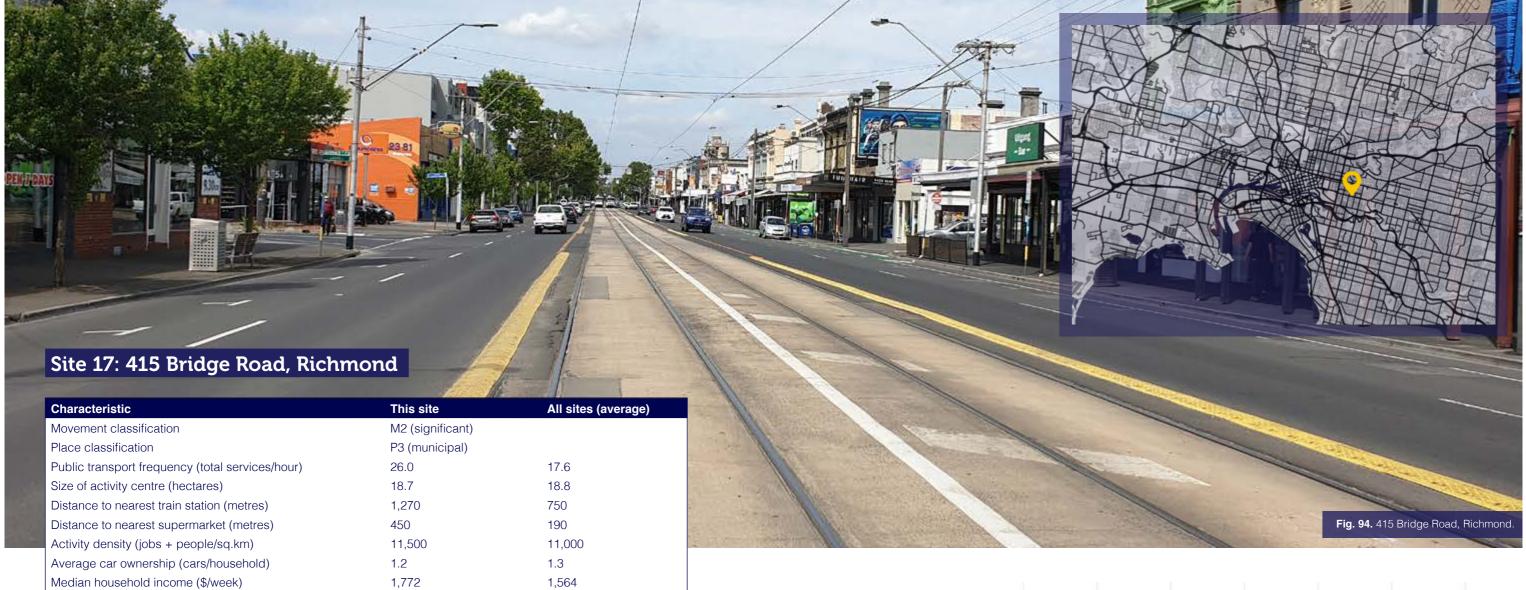
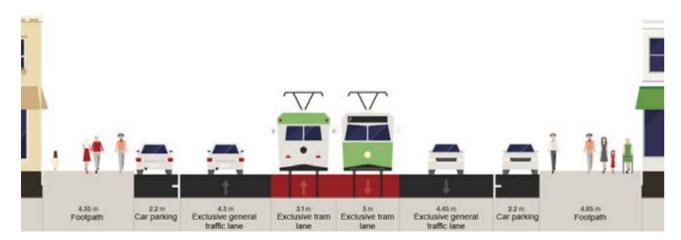


Fig. 92. Site characteristics: 415 Bridge Road, Richmond.



1,772 36.8

Fig. 93. Street cross-section: 415 Bridge Road, Richmond. Image created via Streetmix.

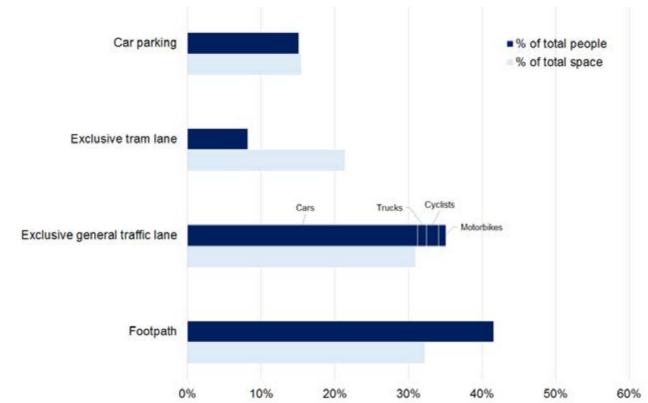


Fig. 95. Street space allocation vs. use: 415 Bridge Road, Richmond.

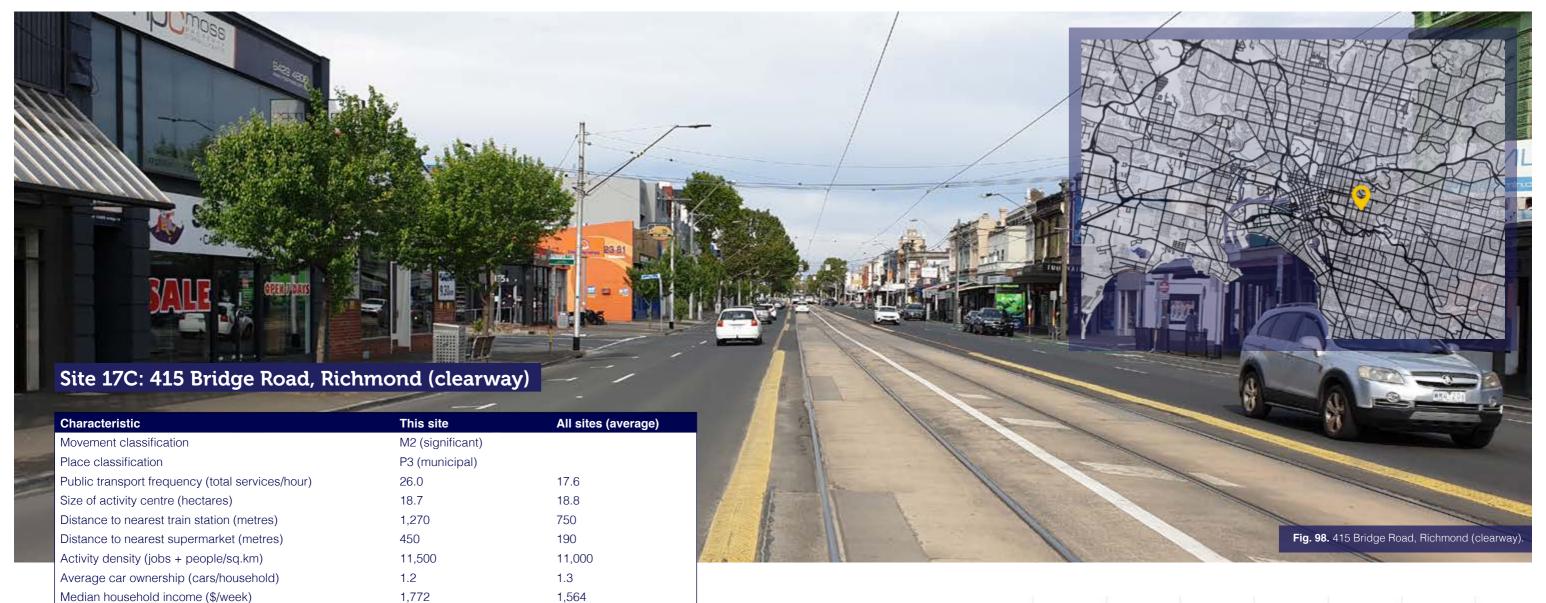
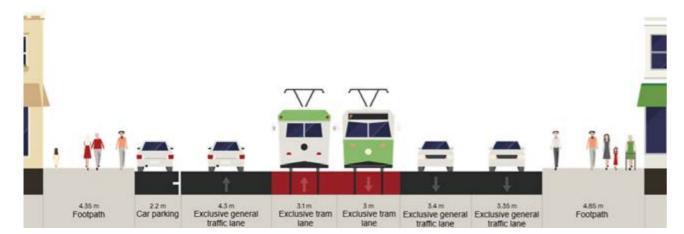


Fig. 96. Site characteristics: 415 Bridge Road, Richmond (clearway).



36.8

Fig. 97. Street cross-section: 415 Bridge Road, Richmond (clearway). Image created via Streetmix.

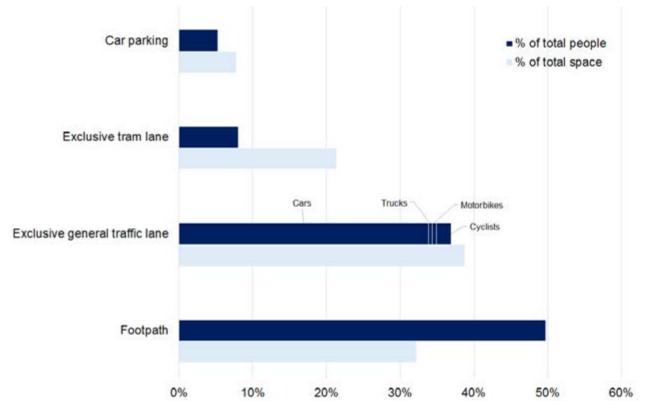
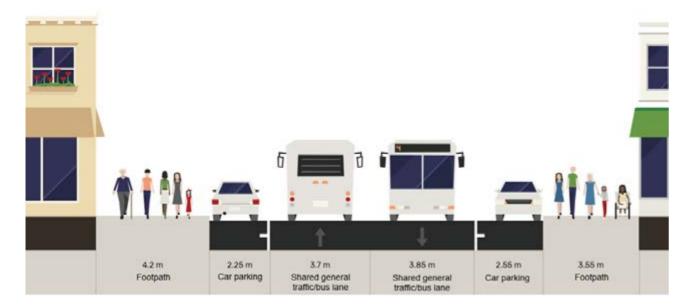


Fig. 99. Street space allocation vs. use: 415 Bridge Road, Richmond (clearway).



Fig. 100. Site characteristics: 464 Centre Road, Bentleigh.

Average resident age (years)



1,627

39.1

1,564

Fig. 101. Street cross-section: 464 Centre Road, Bentleigh. Image created via Streetmix.

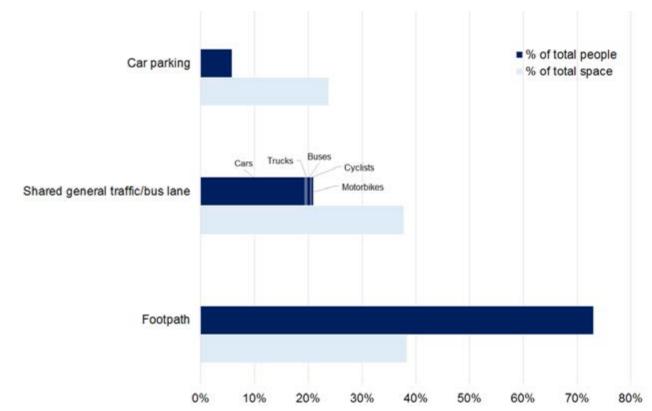


Fig. 103. Street space allocation vs. use: 464 Centre Road, Bentleigh.

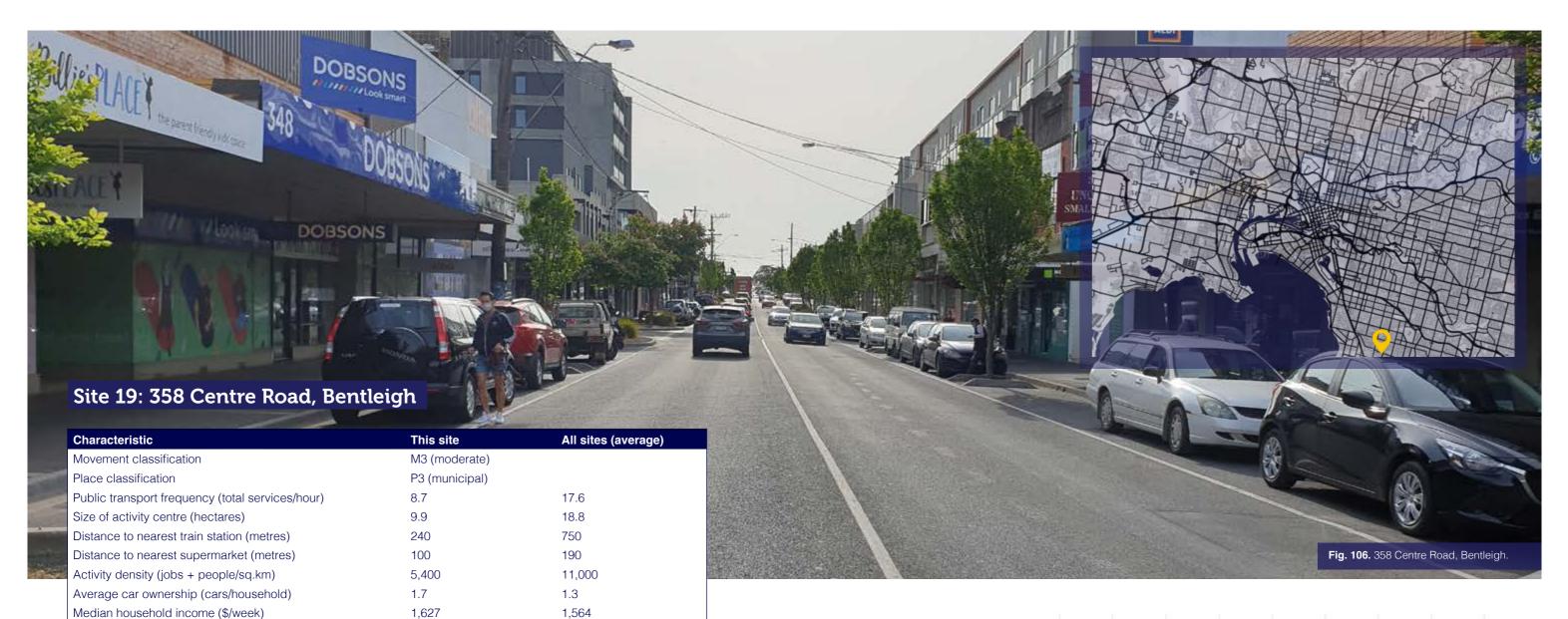
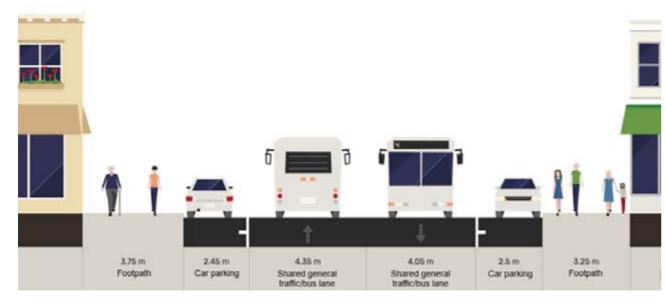


Fig. 104. Site characteristics: 358 Centre Road, Bentleigh.



39.1

Fig. 105. Street cross-section: 358 Centre Road, Bentleigh. Image created via Streetmix.

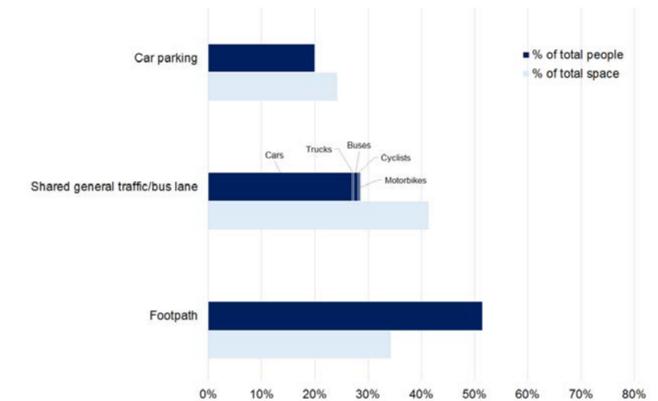
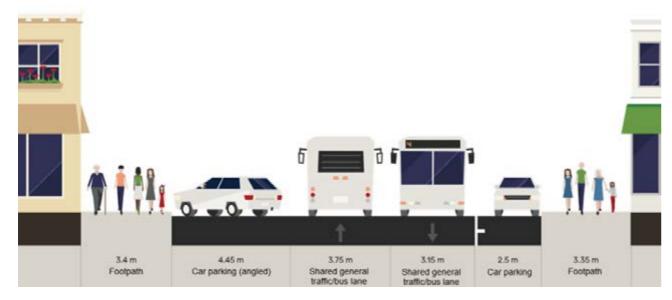


Fig. 107. Street space allocation vs. use: 358 Centre Road, Bentleigh.



Fig. 108. Site characteristics: 76 Church Street, Brighton.



43.0

Fig. 109. Street cross-section: 376 Church Street, Brighton. Image created via Streetmix.

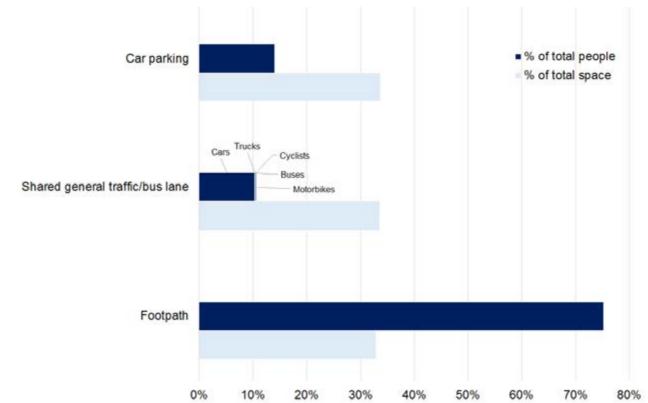


Fig. 111. Street space allocation vs. use: 76 Church Street, Brighton.

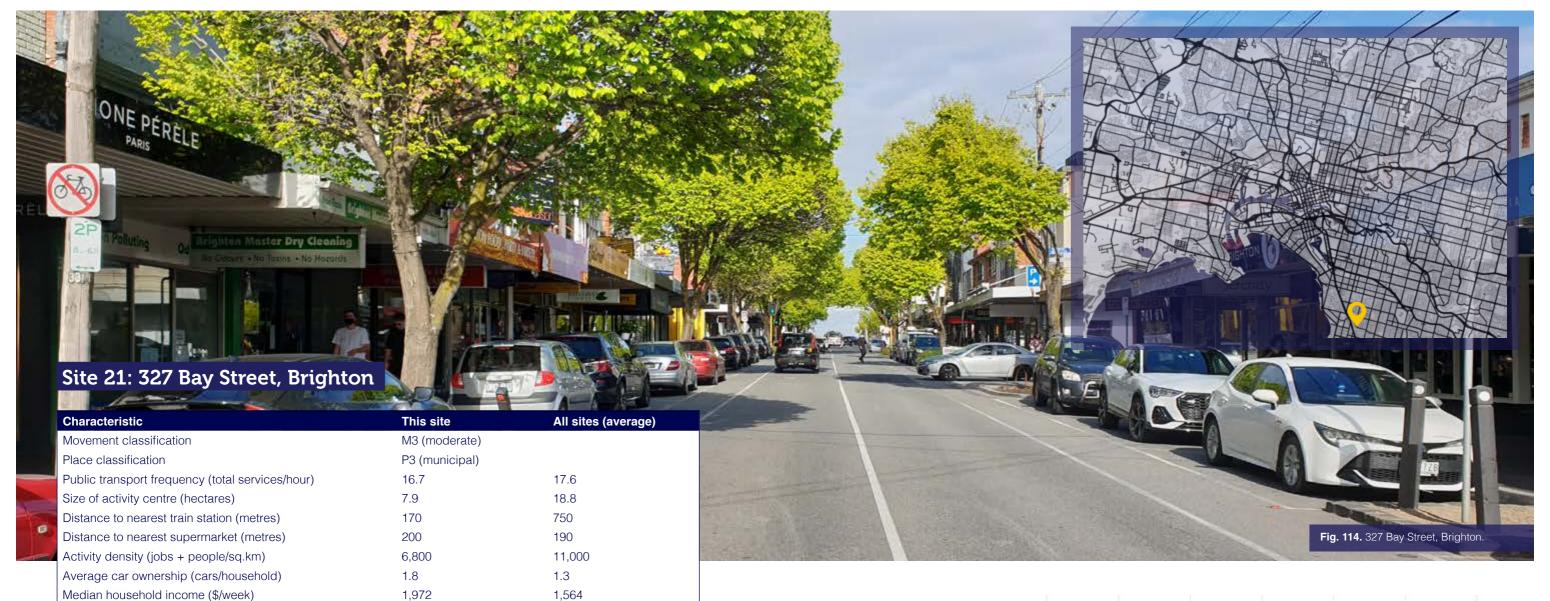
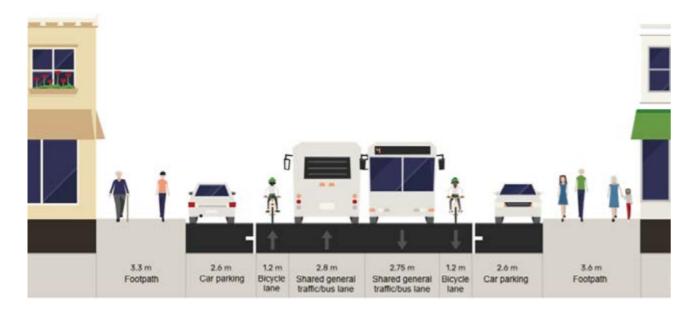


Fig. 112. Site characteristics: 327 Bay Street, Brighton.



43.0

Fig. 113. Street cross-section: 327 Bay Street, Brighton. Image created via Streetmix.

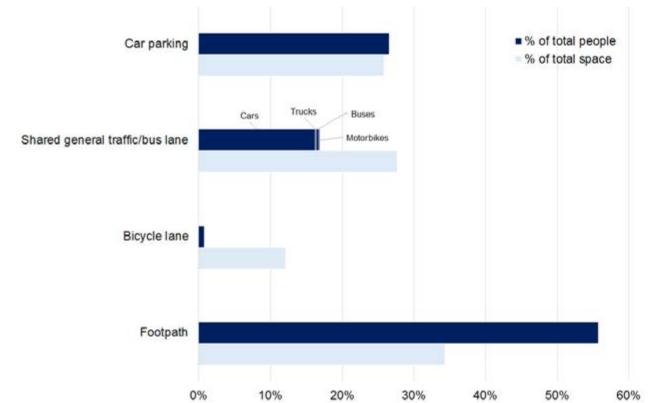


Fig. 115. Street space allocation vs. use: 327 Bay Street, Brighton.

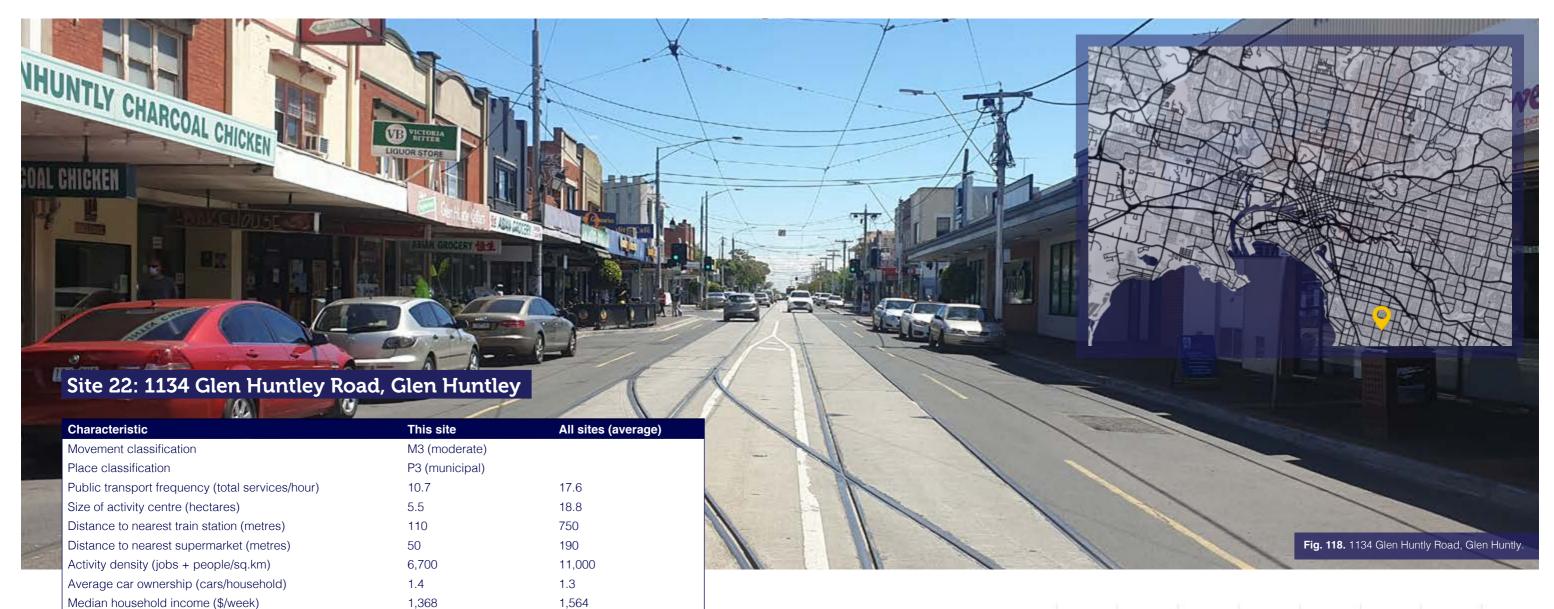
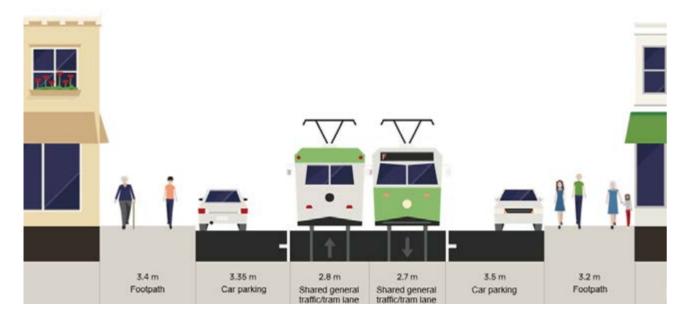


Fig. 116. Site characteristics: 1134 Glen Huntly Road, Glen Huntly.

Average resident age (years)



1,368

36.2

Fig. 117. Street cross-section: 1134 Glen Huntly Road, Glen Huntly. Image created via Streetmix.

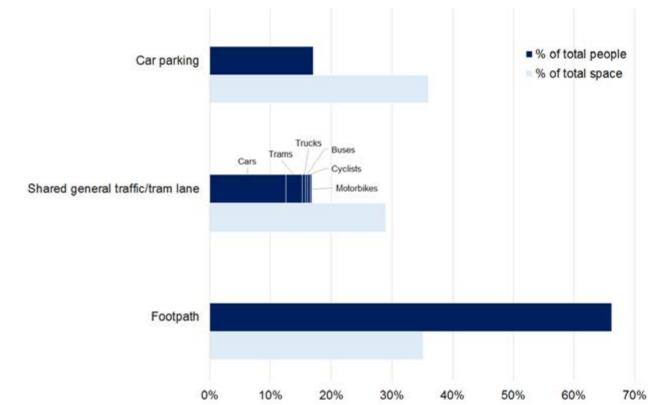


Fig. 119. Street space allocation vs. use: 1134 Glen Huntly Road, Glen Huntly.

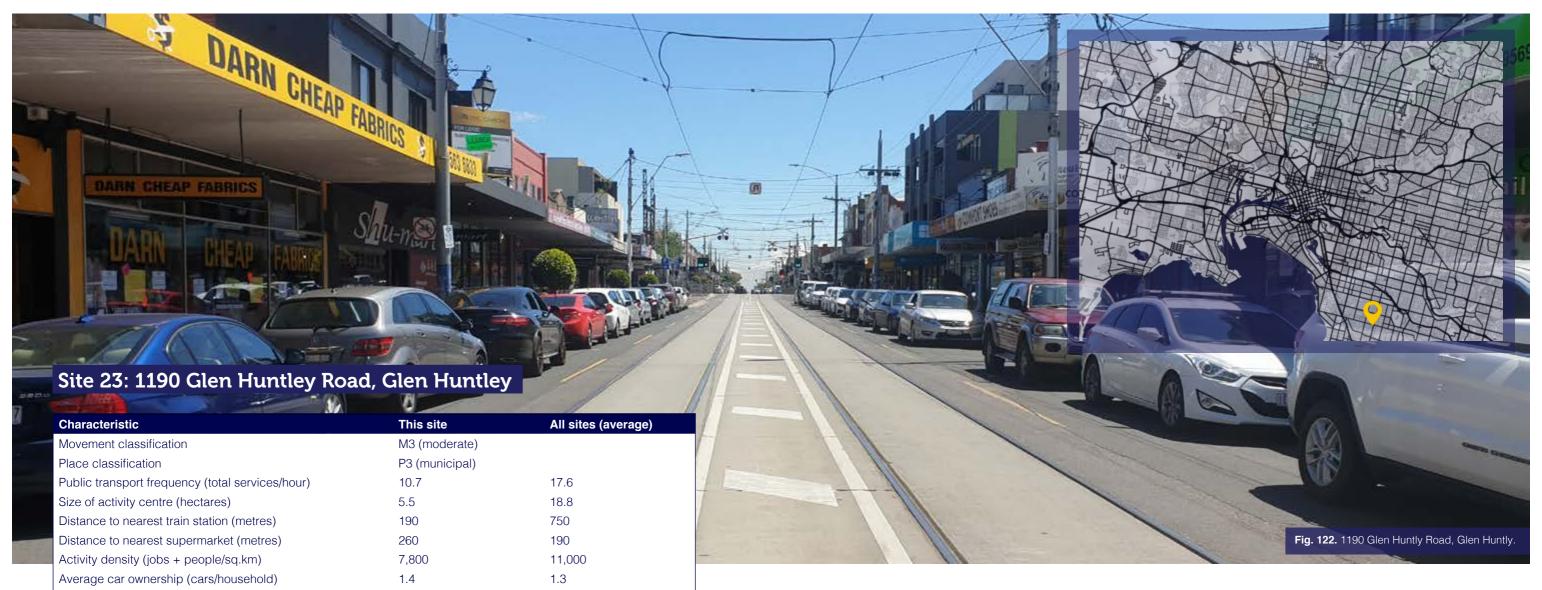
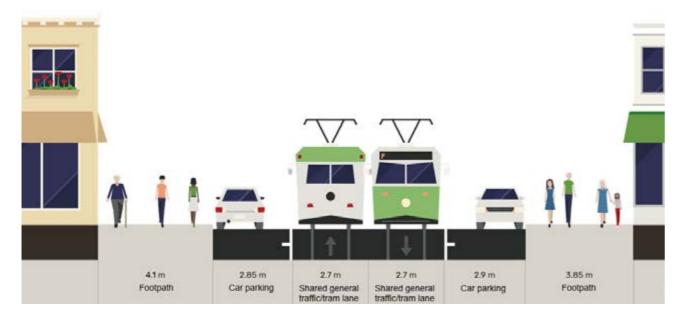


Fig. 120. Site characteristics: 1190 Glen Huntly Road, Glen Huntly.

Average resident age (years)



1,368

36.2

1,564

Fig. 121. Street cross-section: 1190 Glen Huntly Road, Glen Huntly. Image created via Streetmix.

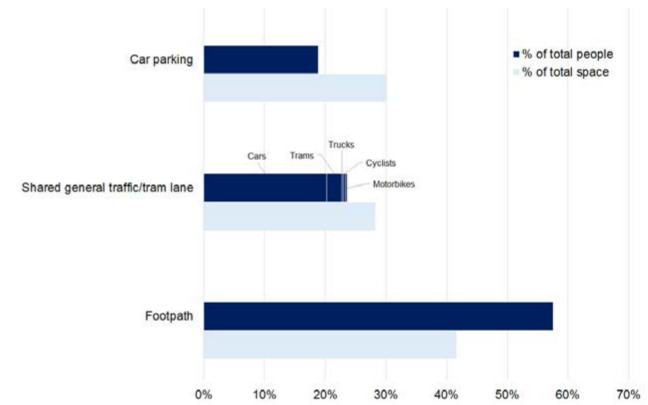


Fig. 123. Street space allocation vs. use: 1190 Glen Huntly Road, Glen Huntly.

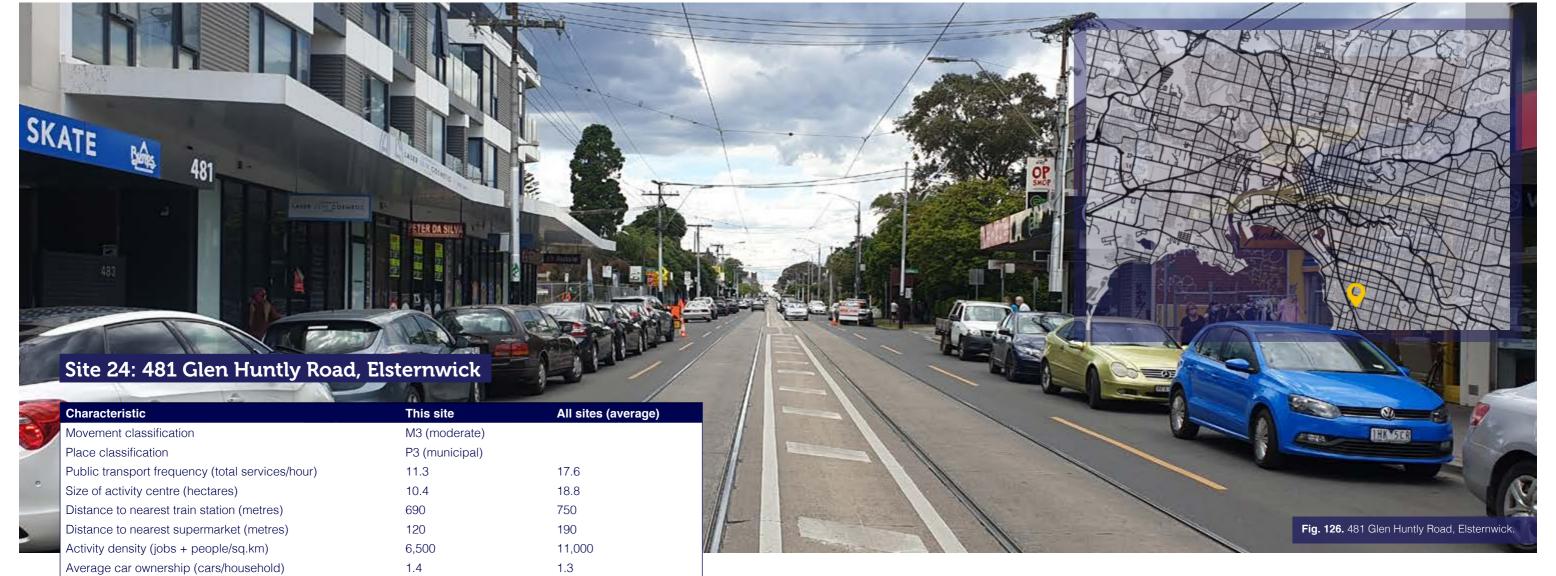
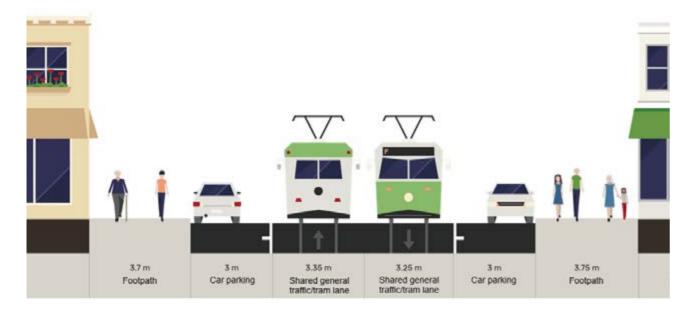


Fig. 124. Site characteristics: 481 Glen Huntly Road, Elsternwick.

Average resident age (years)



1,662

38.5

1,564

Fig. 125. Street cross-section: 481 Glen Huntly Road, Elsternwick. Image created via Streetmix.

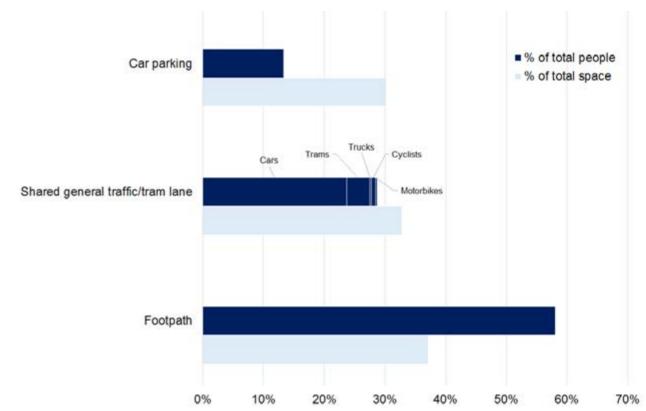


Fig. 127. Street space allocation vs. use: 481 Glen Huntly Road, Elsternwick.

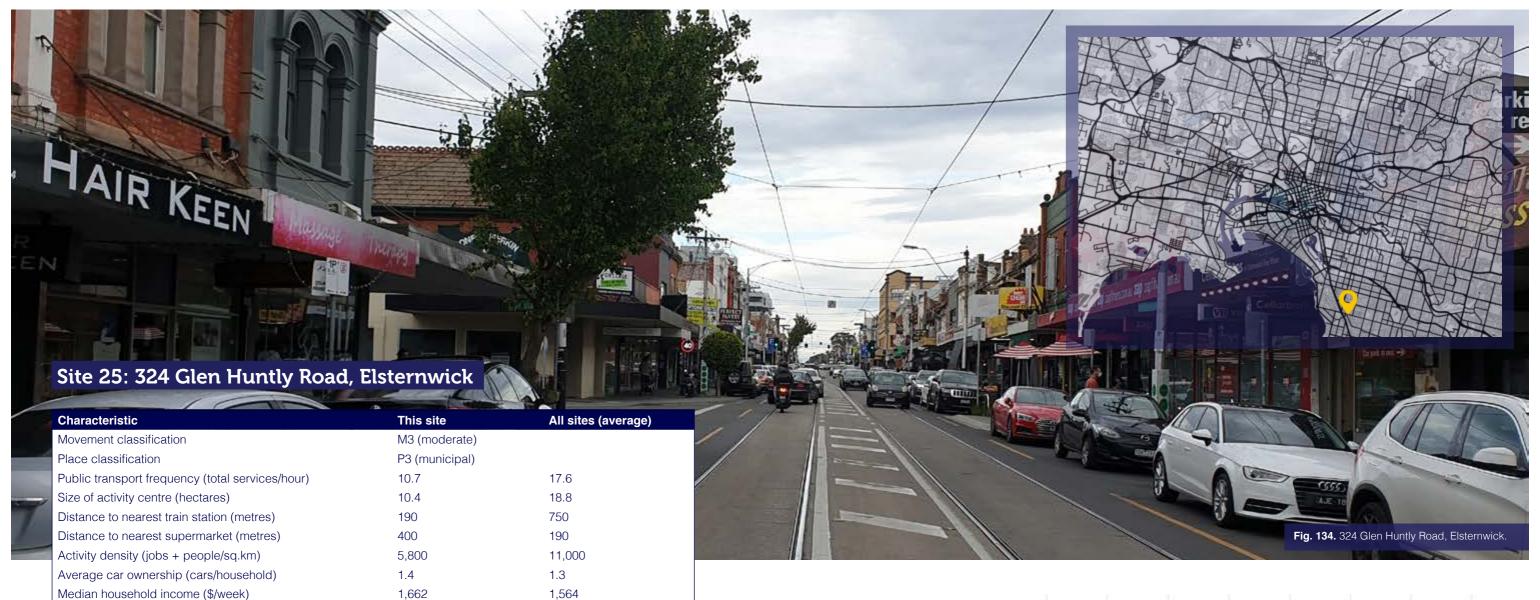
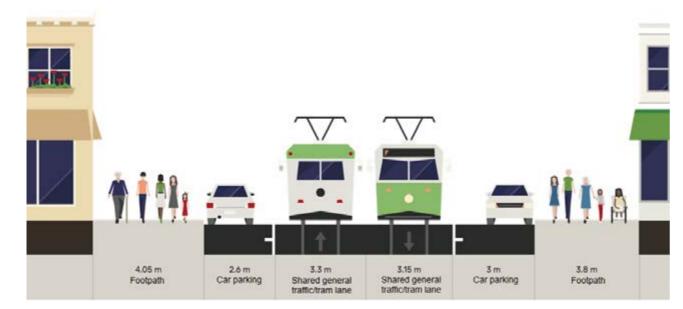


Fig. 132. Site characteristics: 324 Glen Huntly Road, Elsternwick.

Average resident age (years)



1,662

38.5

Fig. 133. Street cross-section: 324 Glen Huntly Road, Elsternwick. Image created via Streetmix.

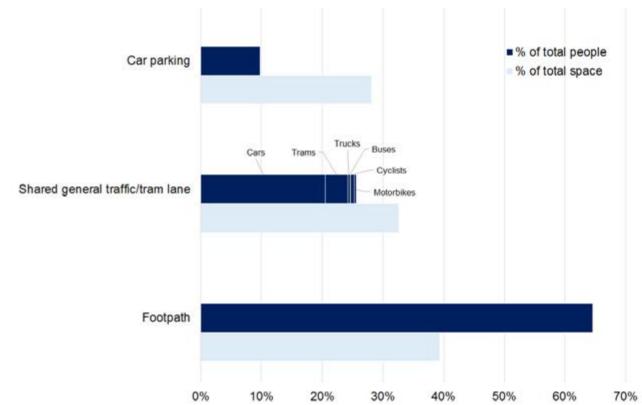
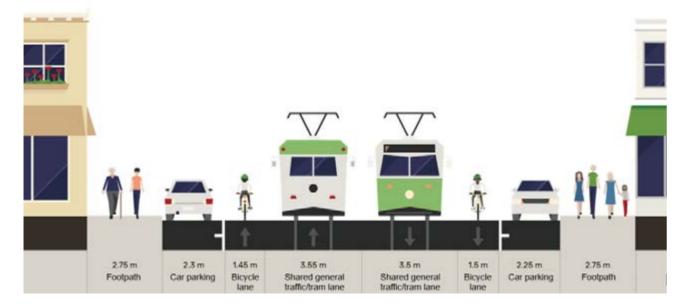


Fig. 135. Street space allocation vs. use: 324 Glen Huntly Road, Elsternwick.



Fig. 136. Site characteristics: 262 Carlisle Street, Balaclava.



35.5

Fig. 137. Street cross-section: 262 Carlisle Street, Balaclava. Image created via Streetmix.

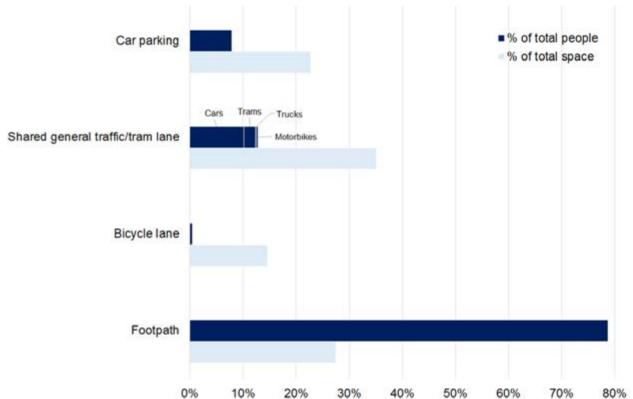


Fig. 139. Street space allocation vs. use: 262 Carlisle Street, Balaclava.

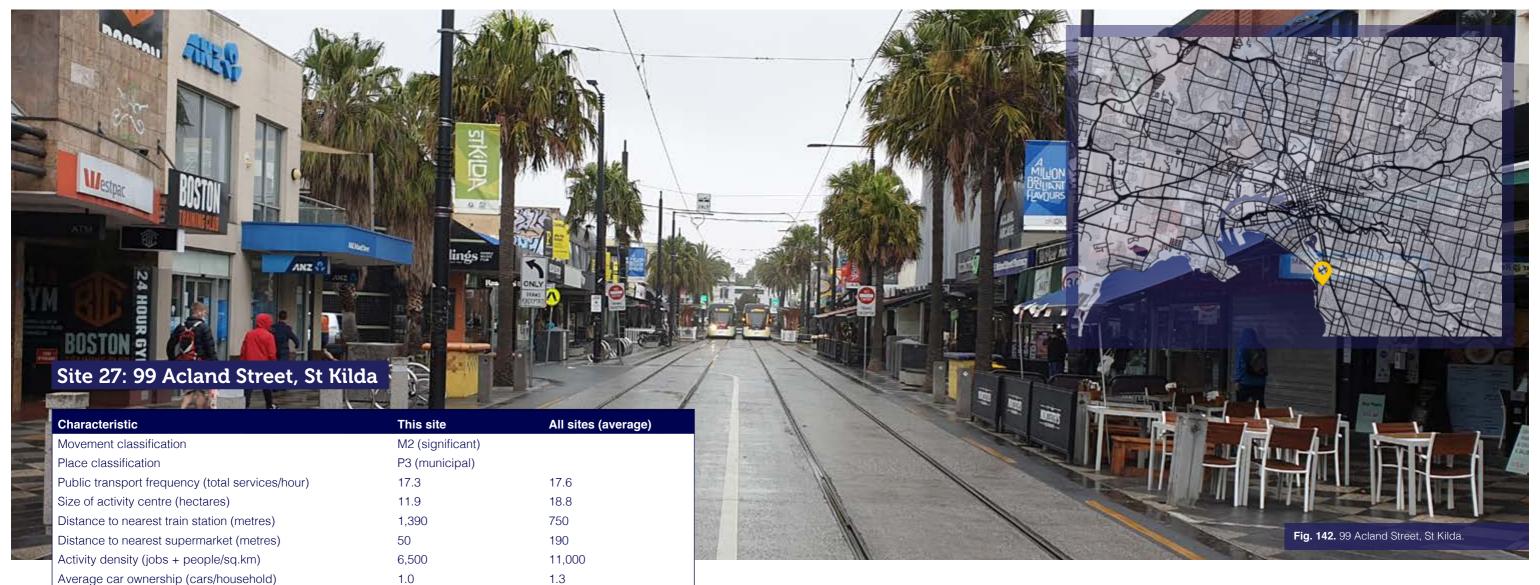
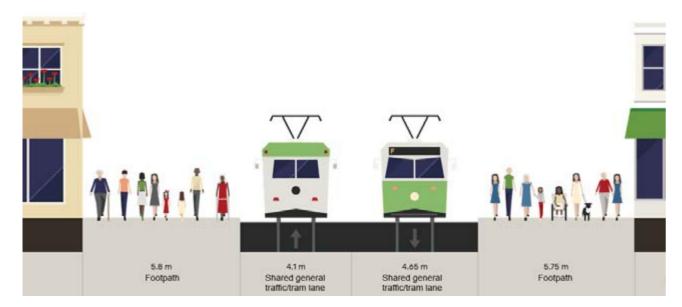


Fig. 140. Site characteristics: 99 Acland Street, St Kilda.

Average resident age (years)



1,404

38.2

1,564

Fig. 141. Street cross-section: 99 Acland Street, St Kilda. Image created via Streetmix.

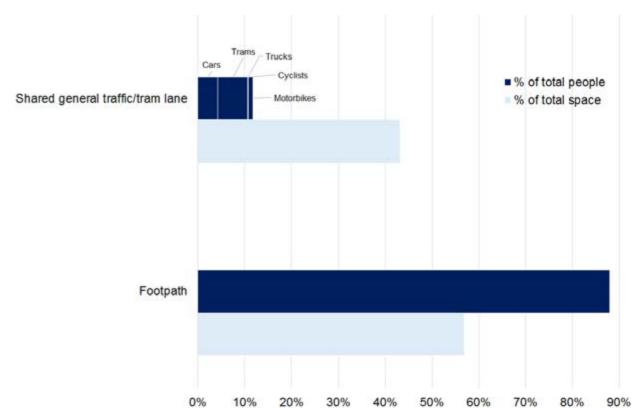


Fig. 143. Street space allocation vs. use: 99 Acland Street, St Kilda.

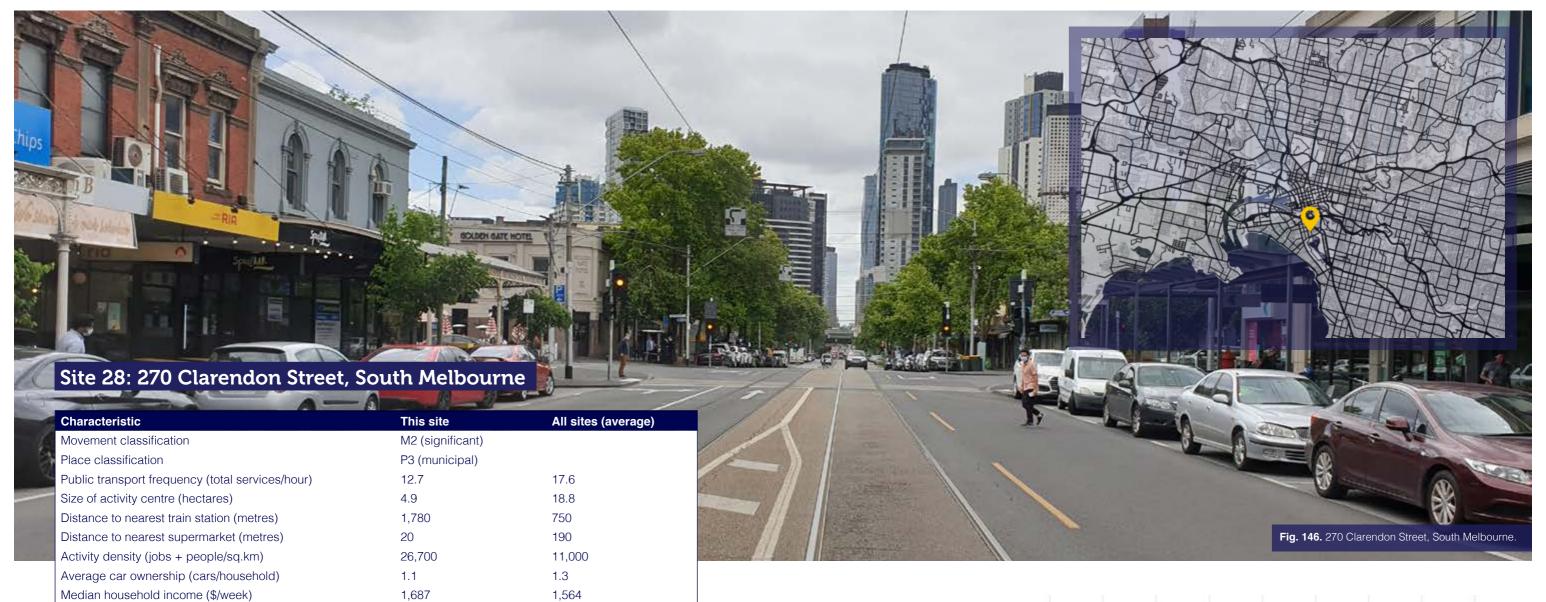
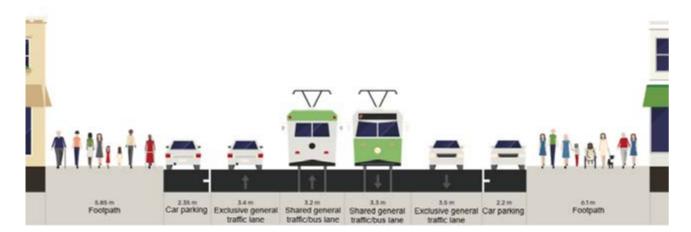


Fig. 144. Site characteristics: 270 Clarendon Street, South Melbourne.



39.9

Fig. 145. Street cross-section: 270 Clarendon Street, South Melbourne. Image created via Streetmix.

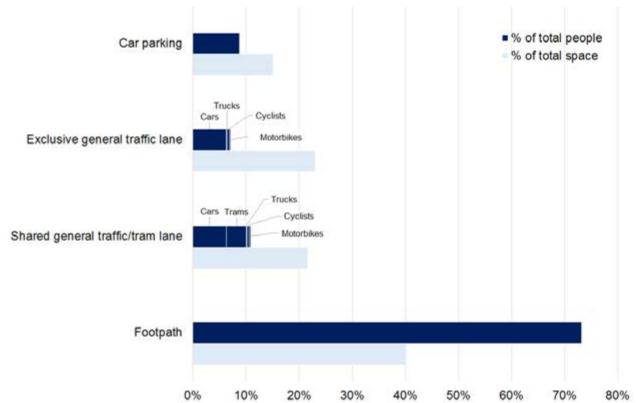
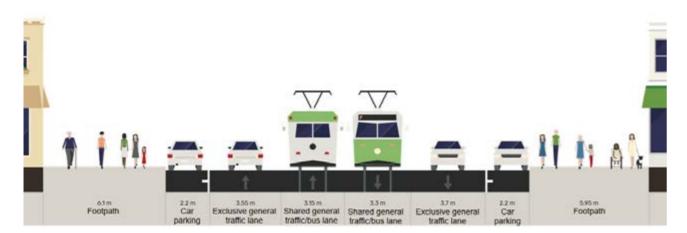


Fig. 147. Street space allocation vs. use: 270 Clarendon Street, South Melbourne.



Fig. 148. Site characteristics: 338 Clarendon Street, South Melbourne.



39.9

Fig. 149. Street cross-section: 338 Clarendon Street, South Melbourne. Image created via Streetmix.

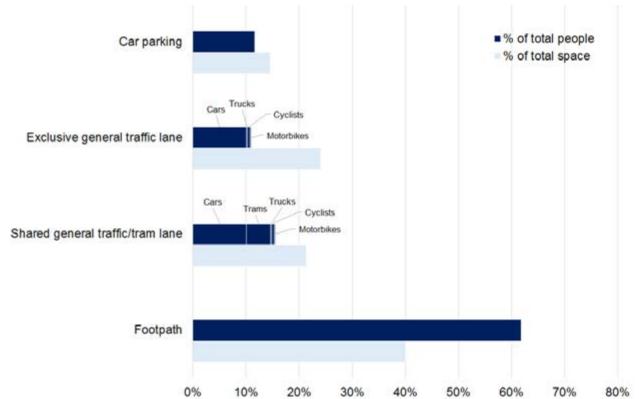
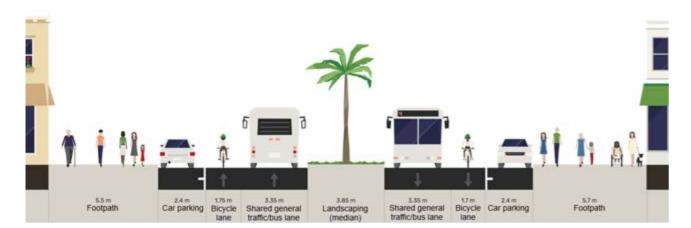


Fig. 151. Street space allocation vs. use: 338 Clarendon Street, South Melbourne.



Fig. 152. Site characteristics: 245 Bay Street, Port Melbourne.



40.4

Fig. 153. Street cross-section: 245 Bay Street, Port Melbourne. Image created via Streetmix.

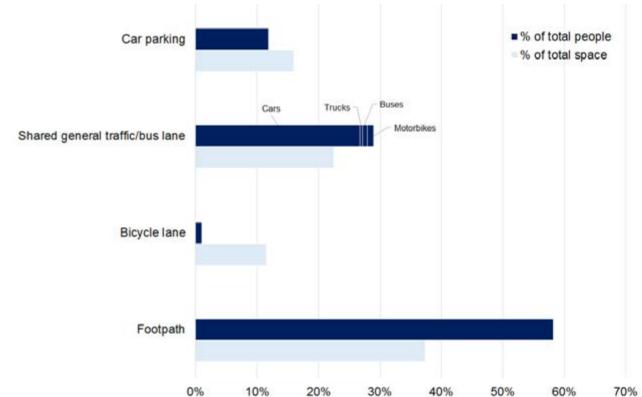
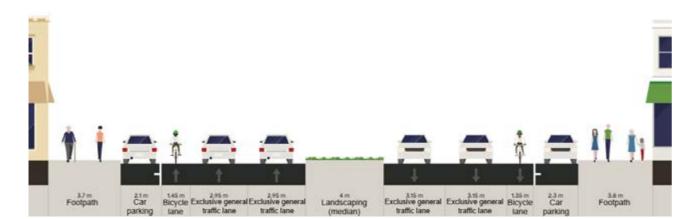


Fig. 155. Street space allocation vs. use: 245 Bay Street, Port Melbourne.



Fig. 156. Site characteristics: 67 Bay Street, Port Melbourne.



40.4

Fig. 157. Street cross-section: 67 Bay Street, Port Melbourne. Image created via Streetmix.

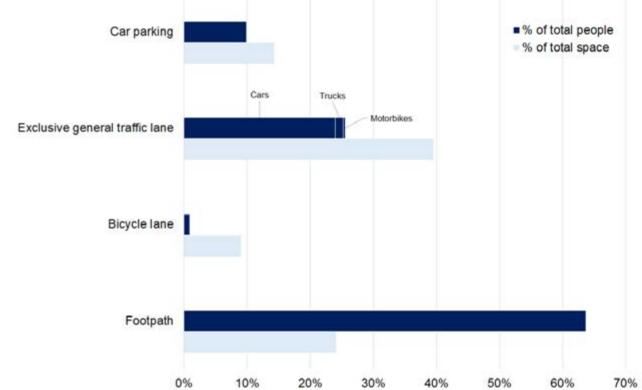


Fig. 159. Street space allocation vs. use: 67 Bay Street, Port Melbourne.

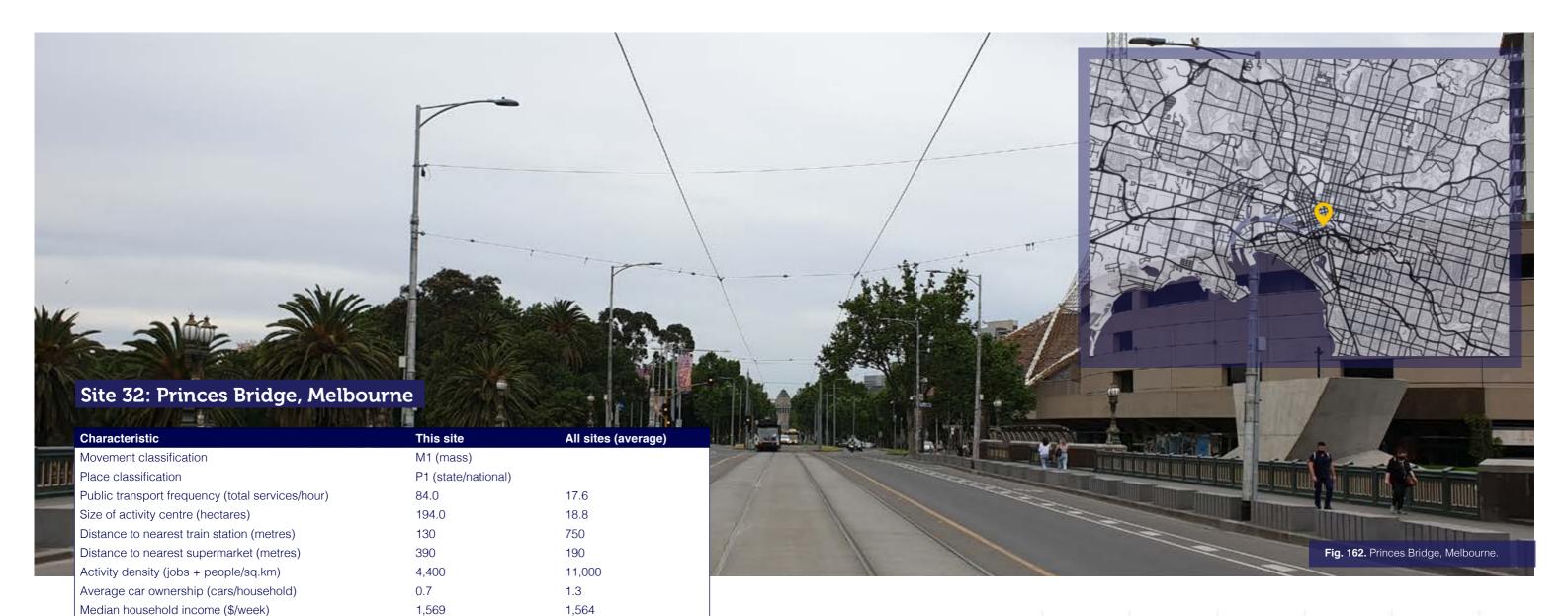
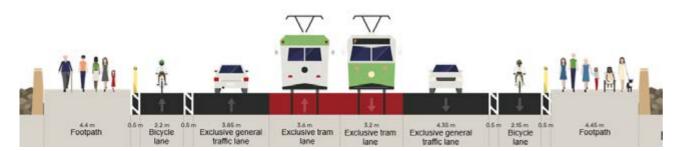


Fig. 160. Site characteristics: Princes Bridge, Melbourne.



35.1

Fig. 161. Street cross-section: Princes Bridge, Melbourne. Image created via Streetmix.

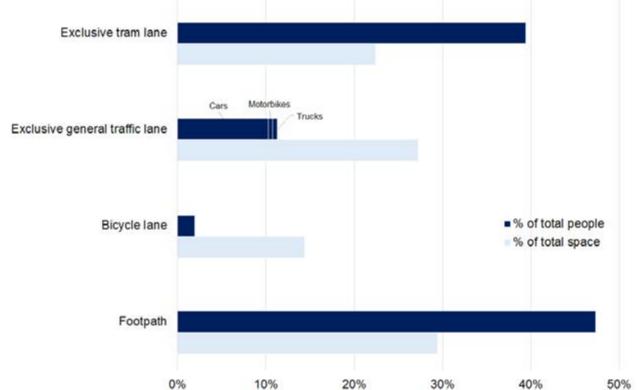


Fig. 163. Street space allocation vs. use: Princes Bridge, Melbourne.

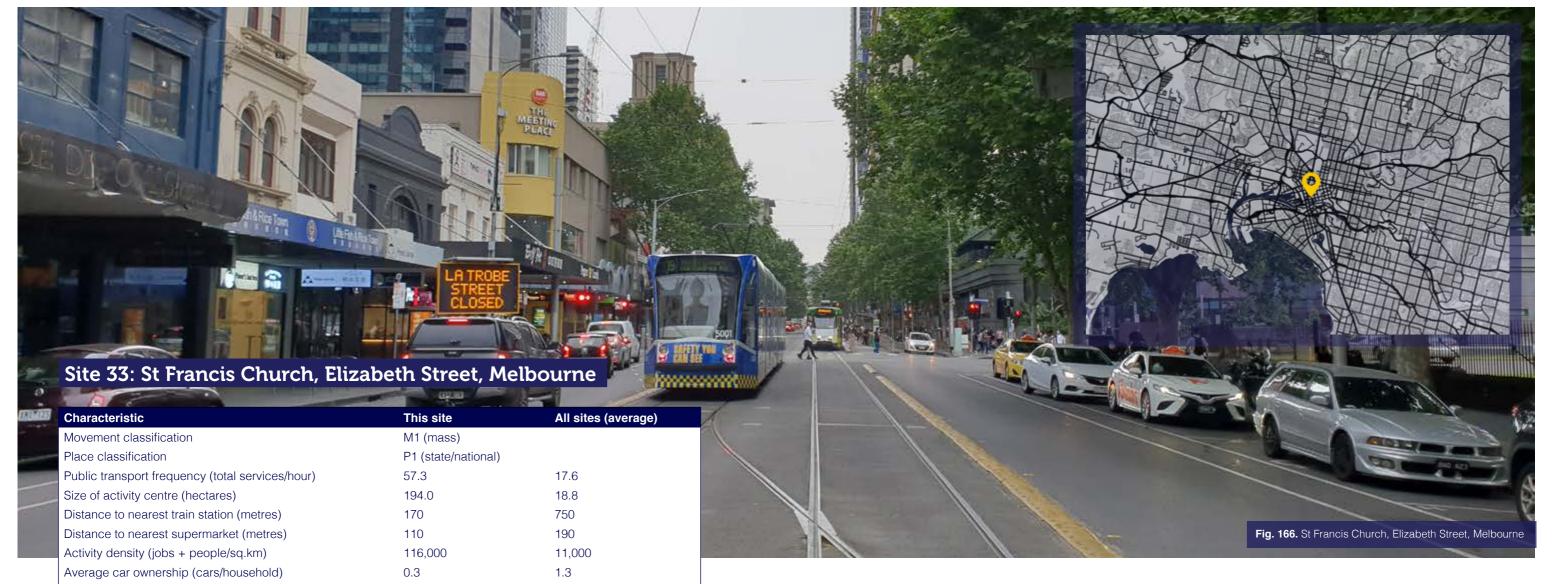
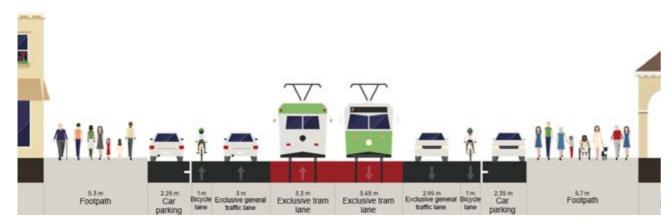


Fig. 164. Site characteristics: St Francis Church, Elizabeth Street, Melbourne.

Average resident age (years)



1,052

28.9

1,564

Fig. 165. Street cross-section: St Francis Church, Elizabeth Street, Melbourne. Image created via Streetmix.

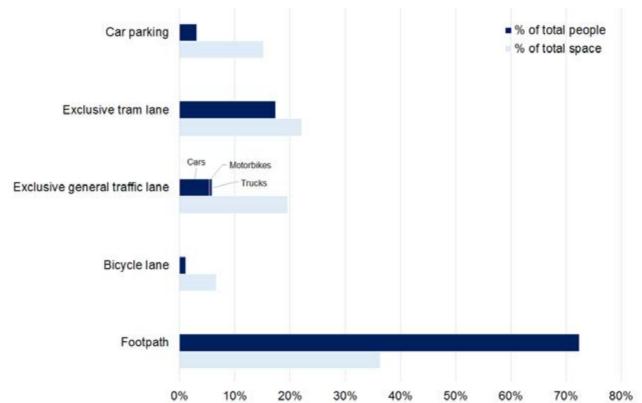
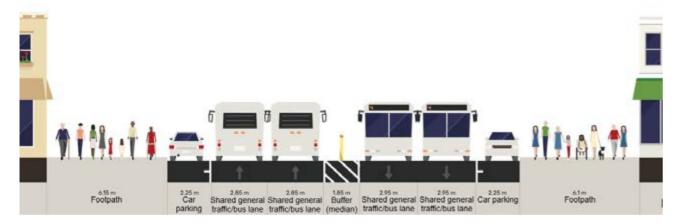


Fig. 167. Street space allocation vs. use: St Francis Church, Elizabeth Street, Melbourne.



Fig. 168. Site characteristics: 249 Lygon Street, Carlton.

Average resident age (years)



840

29.7

1,564

Fig. 169. Street cross-section: 249 Lygon Street, Carlton. Image created via Streetmix.

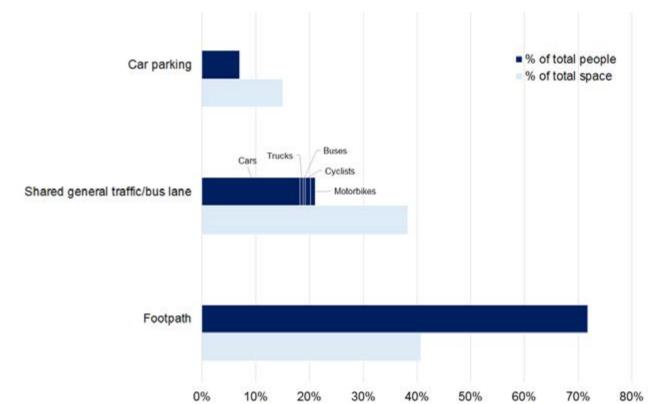


Fig. 171. Street space allocation vs. use: 249 Lygon Street, Carlton.

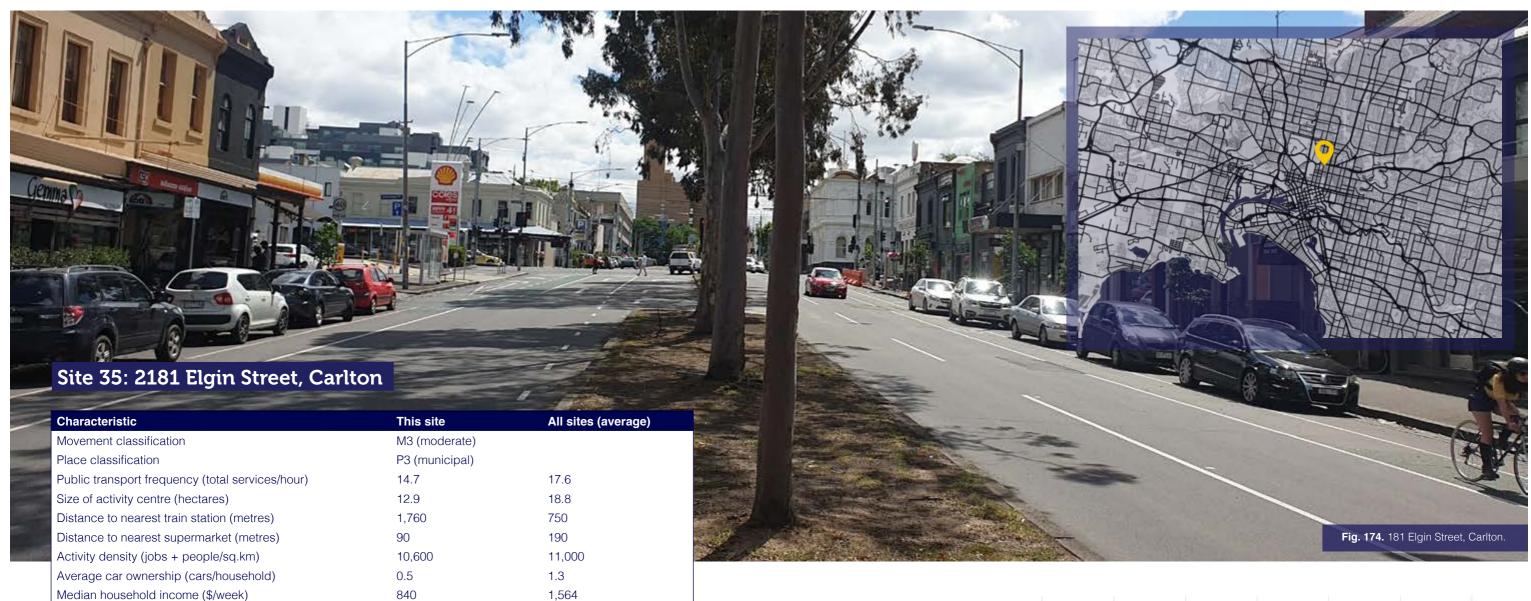
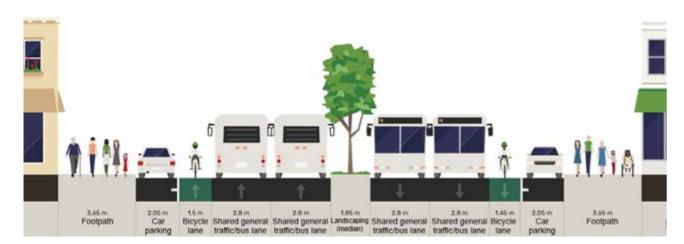


Fig. 172. Site characteristics: 181 Elgin Street, Carlton.



29.7

Fig. 173. Street cross-section: 181 Elgin Street, Carlton. Image created via Streetmix.

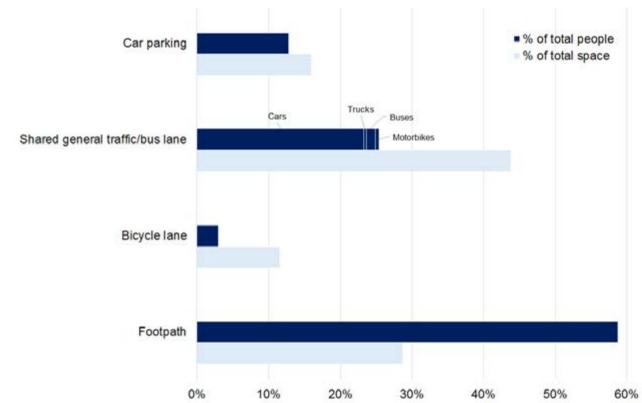


Fig. 175. Street space allocation vs. use: 181 Elgin Street, Carlton.

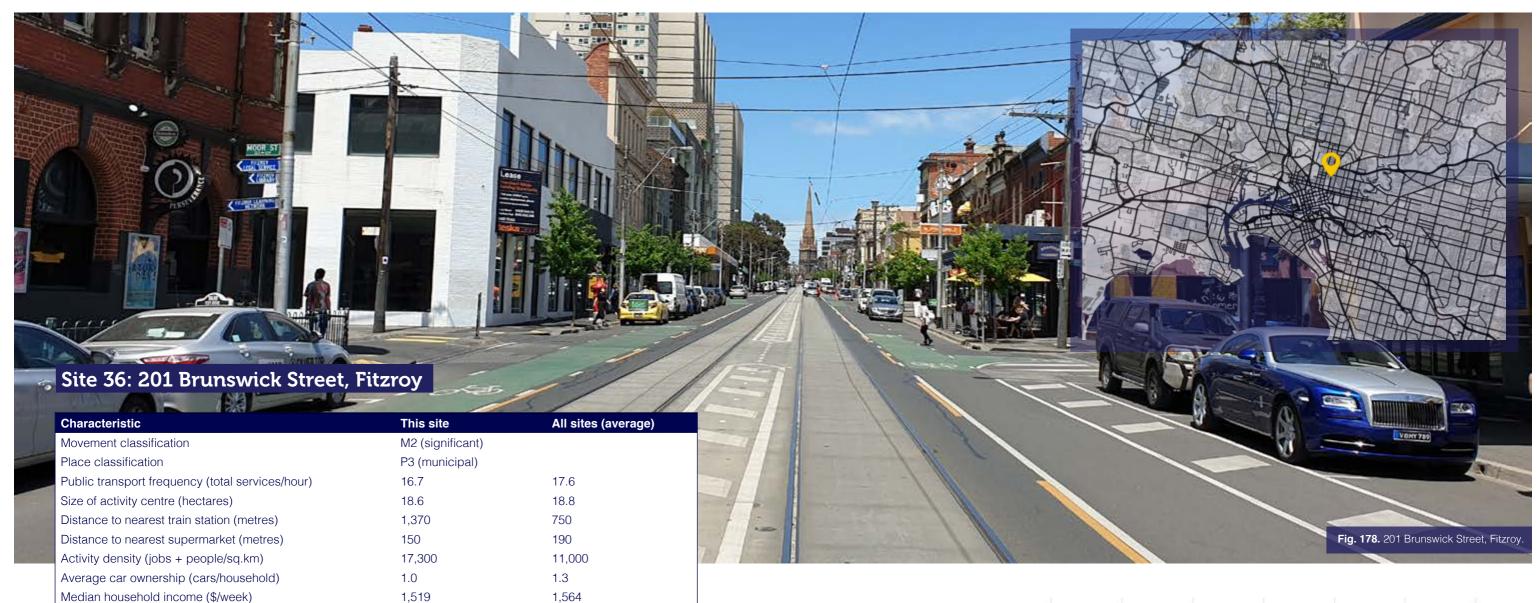
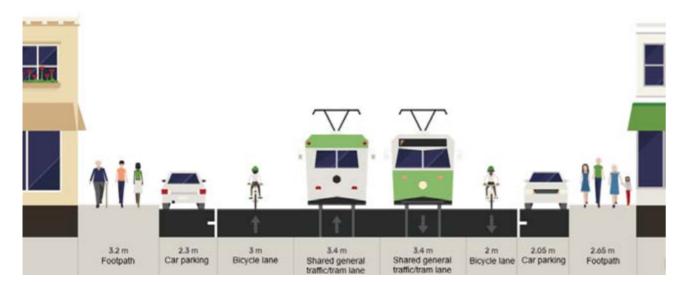


Fig. 176. Site characteristics: 201 Brunswick Street, Fitzroy.



36.9

Fig. 177. Street cross-section: 201 Brunswick Street, Fitzroy. Image created via Streetmix.

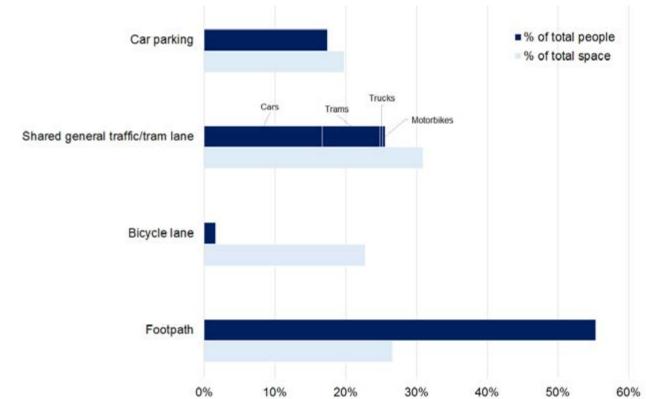


Fig. 179. Street space allocation vs. use: 201 Brunswick Street, Fitzroy.

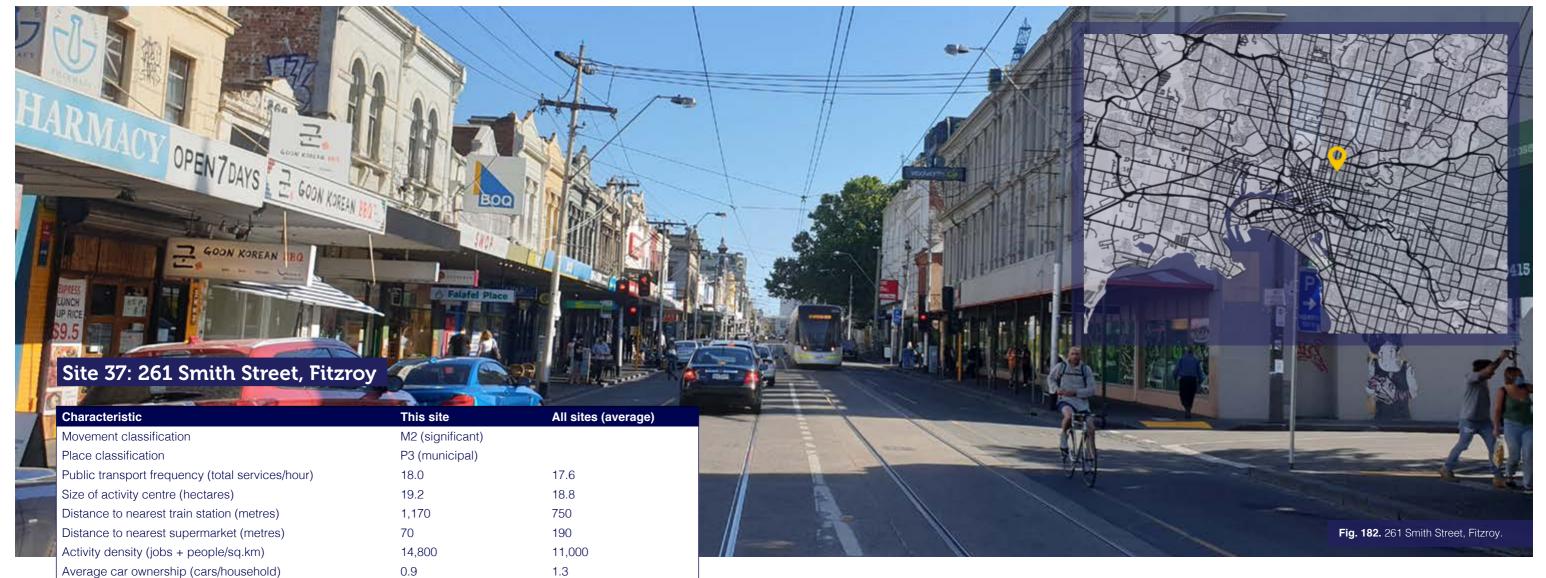
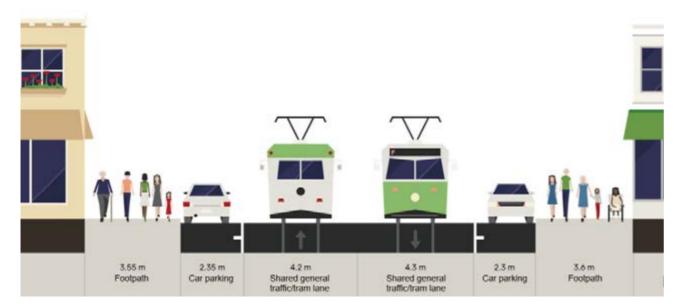


Fig. 180. Site characteristics: 261 Smith Street, Fitzroy.

Average resident age (years)



1,511

35.8

1,564

Fig. 181. Street cross-section: 261 Smith Street, Fitzroy. Image created via Streetmix.

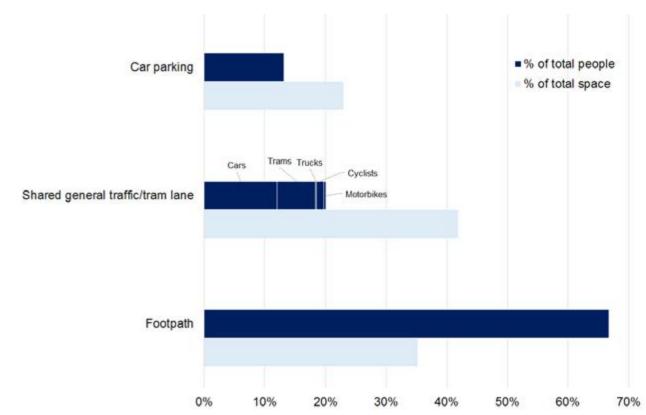


Fig. 183. Street space allocation vs. use: 261 Smith Street, Fitzroy.

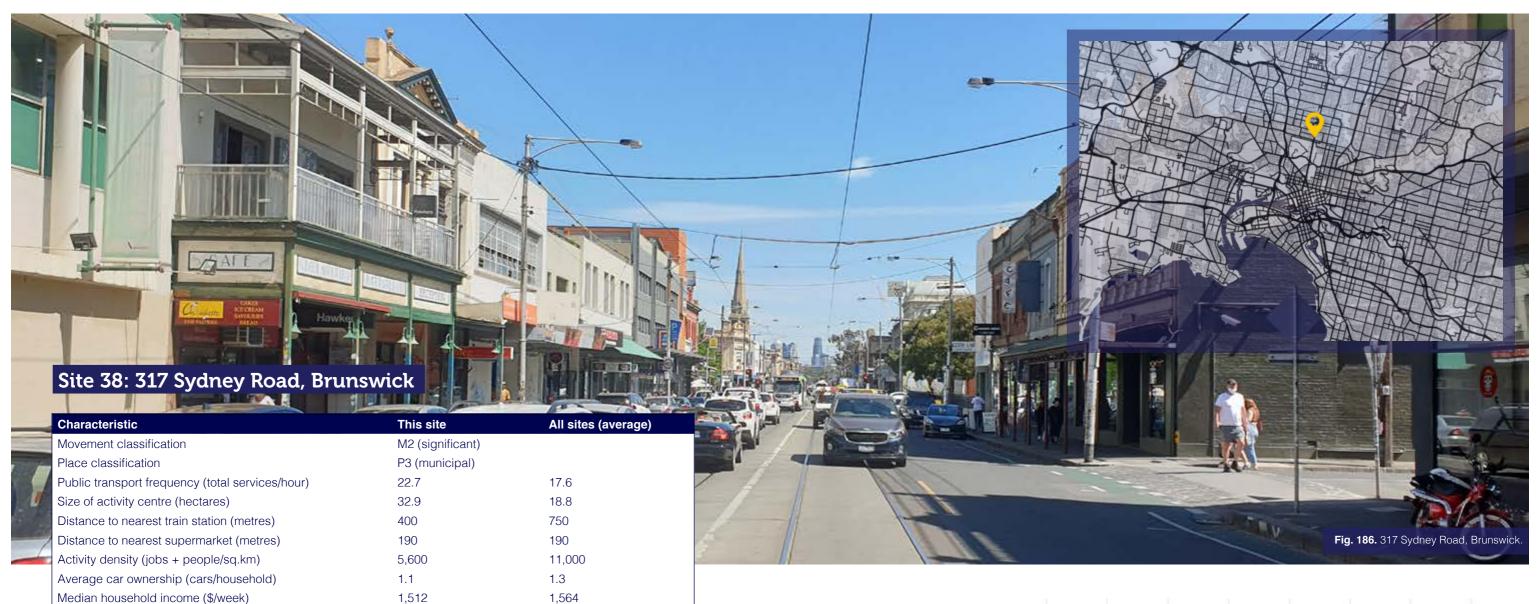
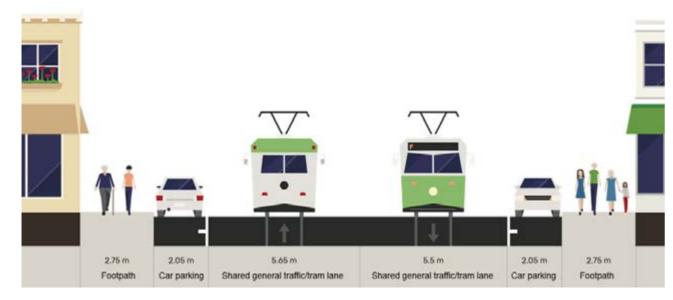


Fig. 184. Site characteristics: 317 Sydney Road, Brunswick.



1,512

36.4

Fig. 185. Street cross-section: 317 Sydney Road, Brunswick. Image created via Streetmix.

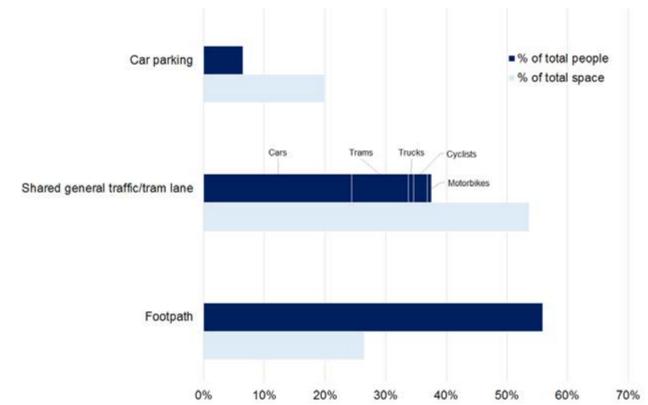


Fig. 187. Street space allocation vs. use: 317 Sydney Road, Brunswick.

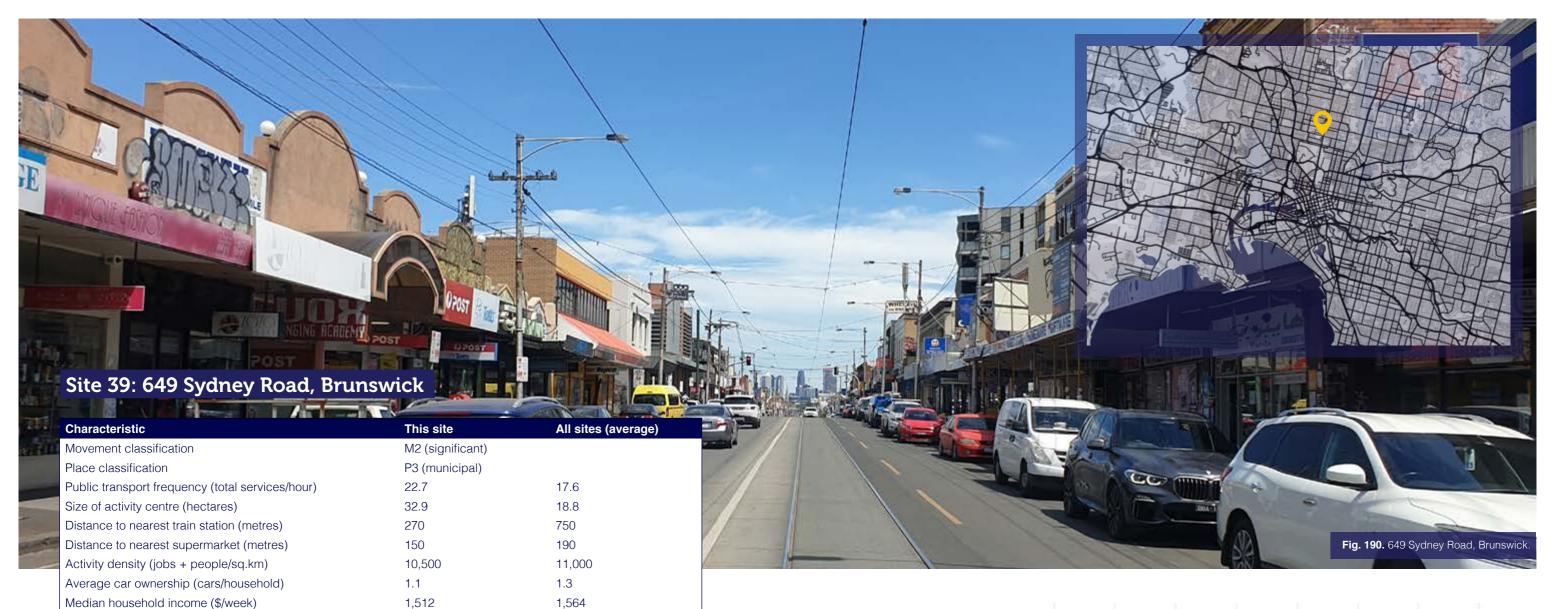
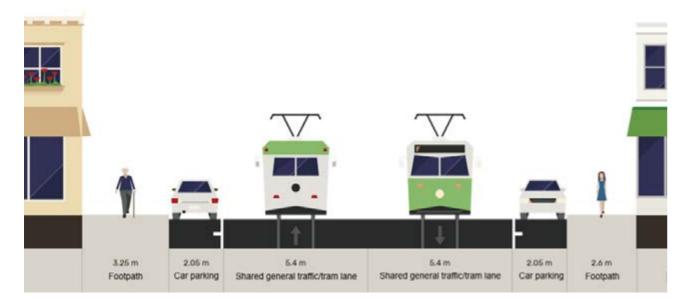


Fig. 188. Site characteristics: 649 Sydney Road, Brunswick.



36.4

Fig. 189. Street cross-section: 649 Sydney Road, Brunswick. Image created via Streetmix.

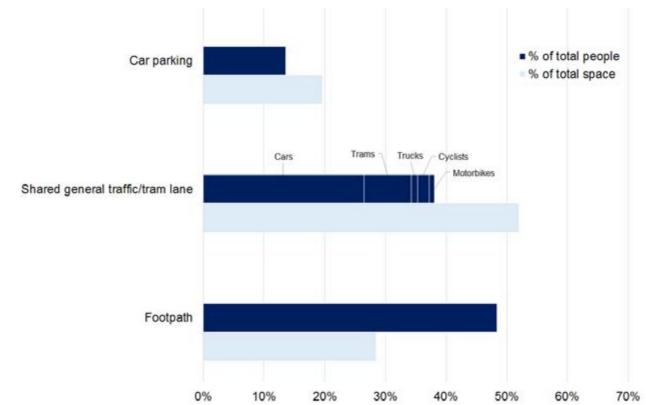


Fig. 191. Street space allocation vs. use: 649 Sydney Road, Brunswick.

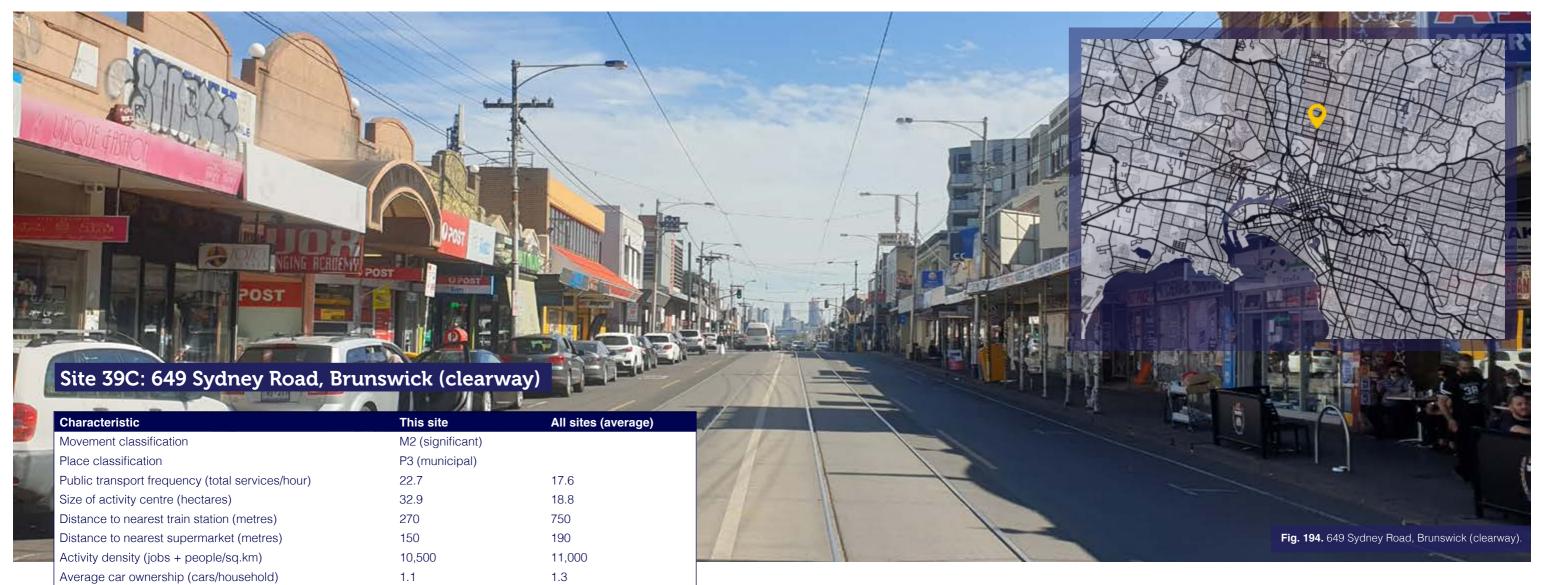
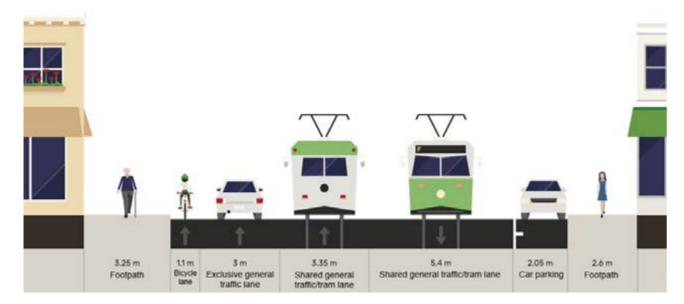


Fig. 192. Site characteristics: 649 Sydney Road, Brunswick (clearway).

Average resident age (years)



1,512

36.4

1,564

Fig. 193. Street cross-section: 649 Sydney Road, Brunswick (clearway). Image created via Streetmix.

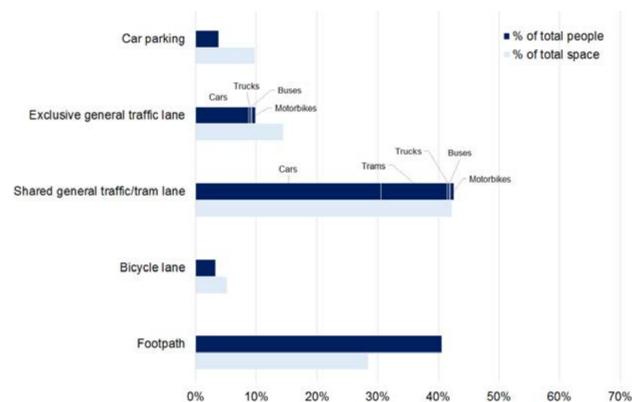


Fig. 195. Street space allocation vs. use: 649 Sydney Road, Brunswick (clearway).

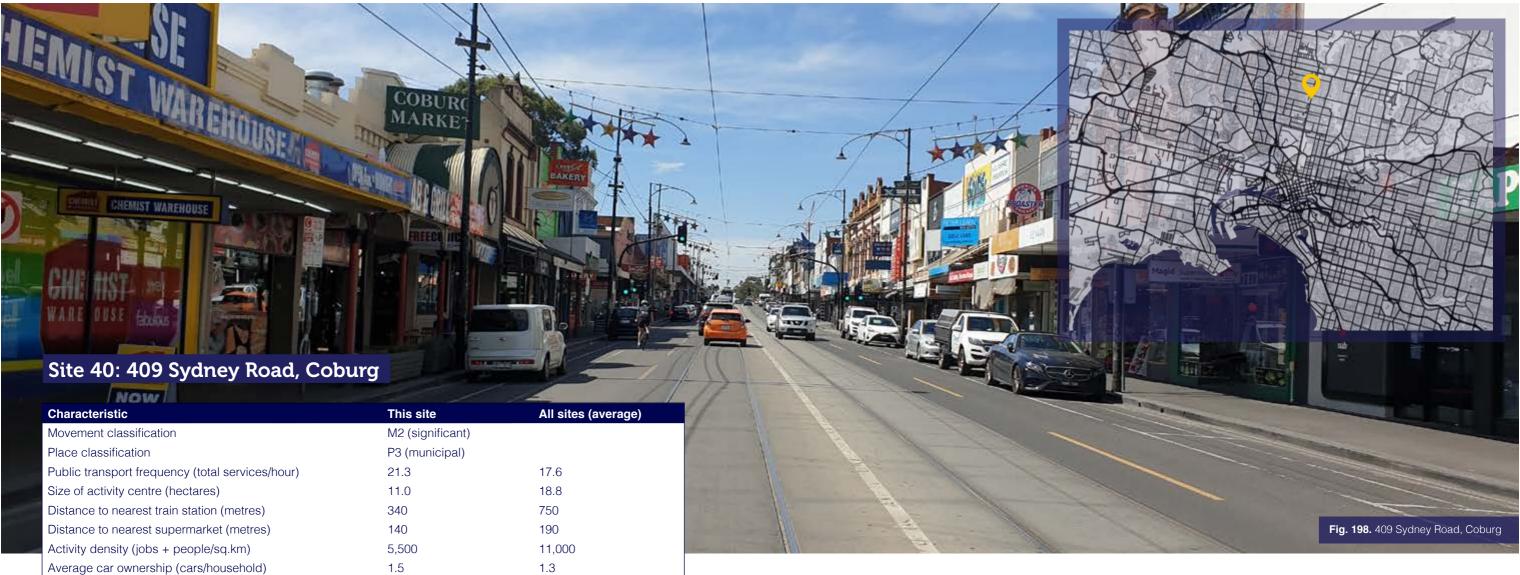
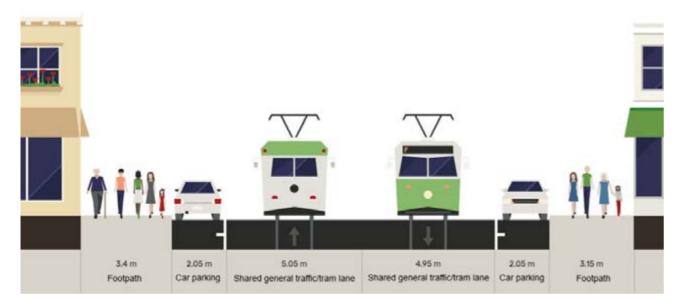


Fig. 196. Site characteristics: 409 Sydney Road, Coburg

Average resident age (years)



1,420

37.7

1,564

Fig. 197. Street cross-section: 409 Sydney Road, Coburg. Image created via Streetmix.

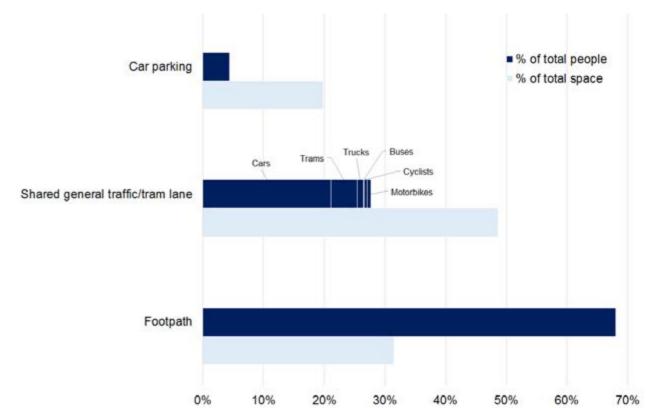


Fig. 199. Street space allocation vs. use: 409 Sydney Road, Coburg

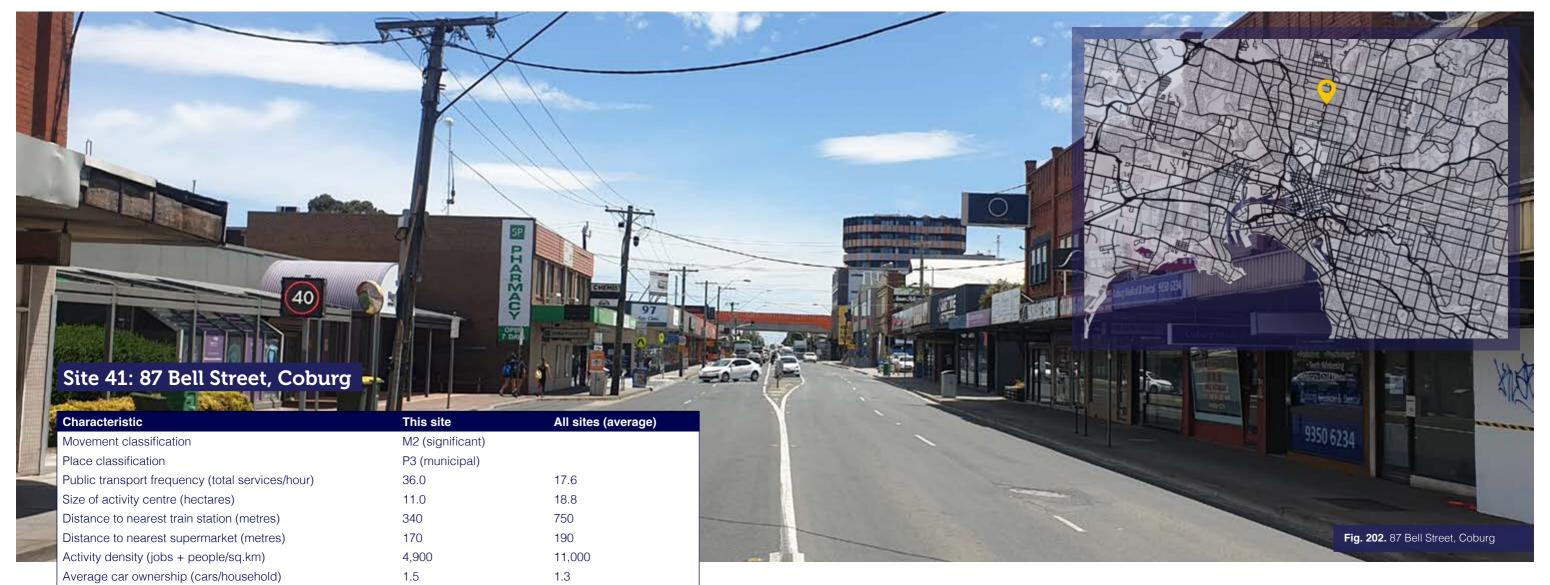
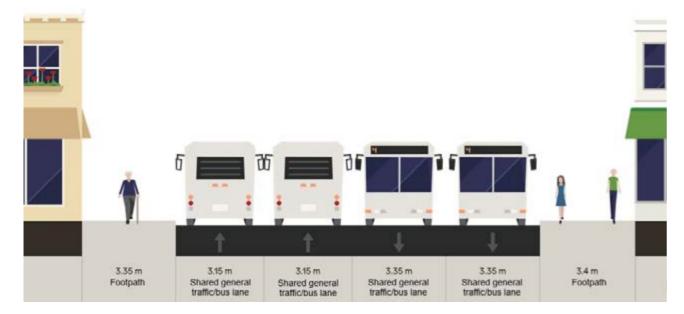


Fig. 200. Site characteristics: 87 Bell Street, Coburg

Average resident age (years)



1,420 37.7 1,564

Fig. 201. Street cross-section: 87 Bell Street, Coburg. Image created via Streetmix.

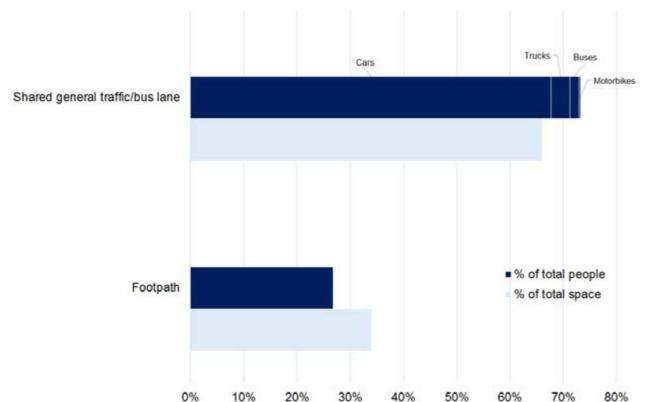


Fig. 203. Street space allocation vs. use: 87 Bell Street, Coburg

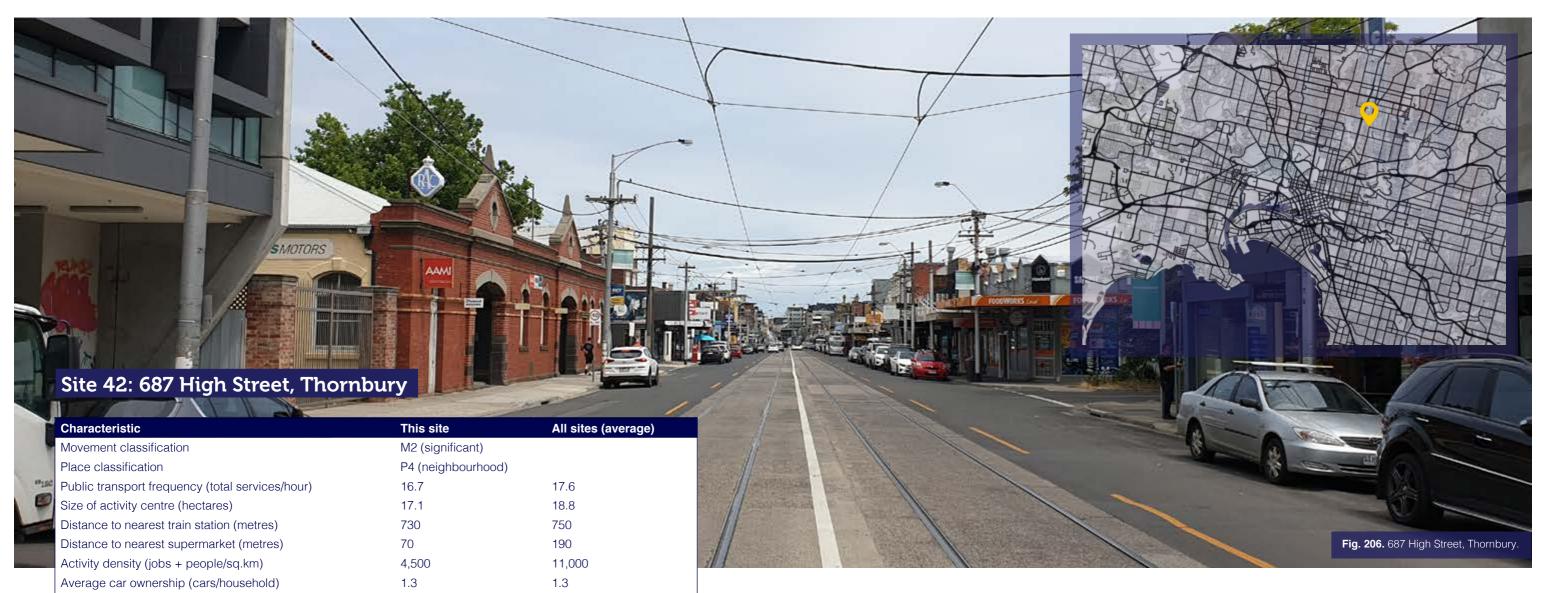
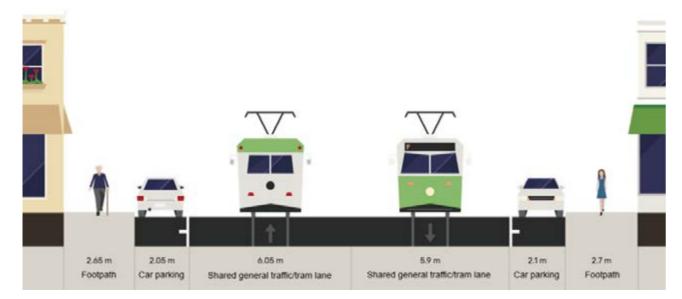


Fig. 204. Site characteristics: 687 High Street, Thornbury.

Average resident age (years)



1,314

37.9

1,564

Fig. 205. Street cross-section: 687 High Street, Thornbury. Image created via Streetmix.

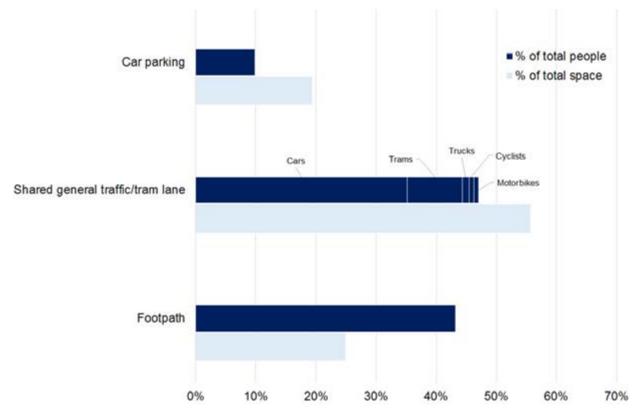


Fig. 207. Street space allocation vs. use: 687 High Street, Thornbury.

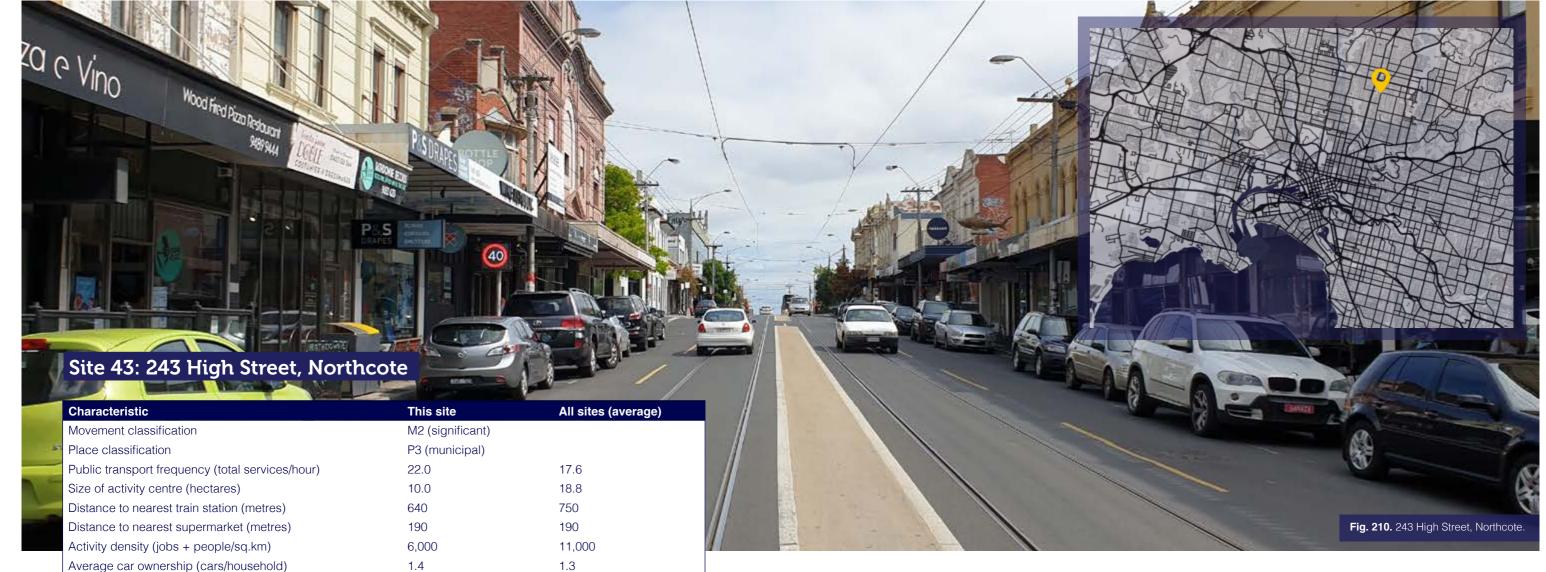
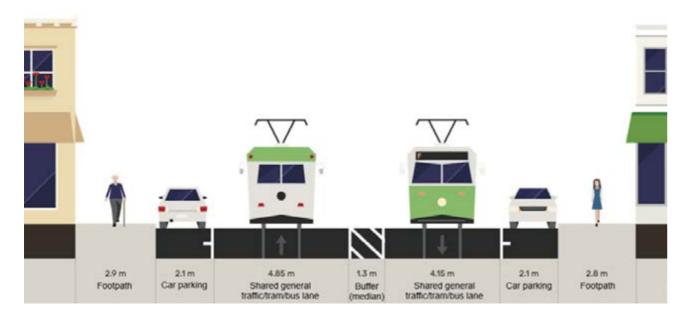


Fig. 208. Site characteristics: 243 High Street, Northcote.

Average resident age (years)



1,635 37.8 1,564

Fig. 209. Street cross-section: 243 High Street, Northcote. Image created via Streetmix.

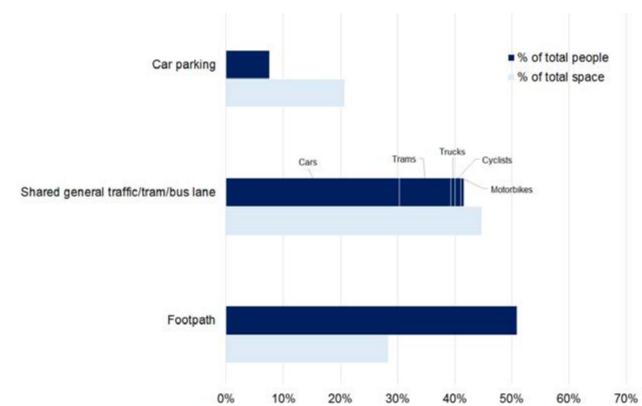


Fig. 211. Street space allocation vs. use: 243 High Street, Northcote.

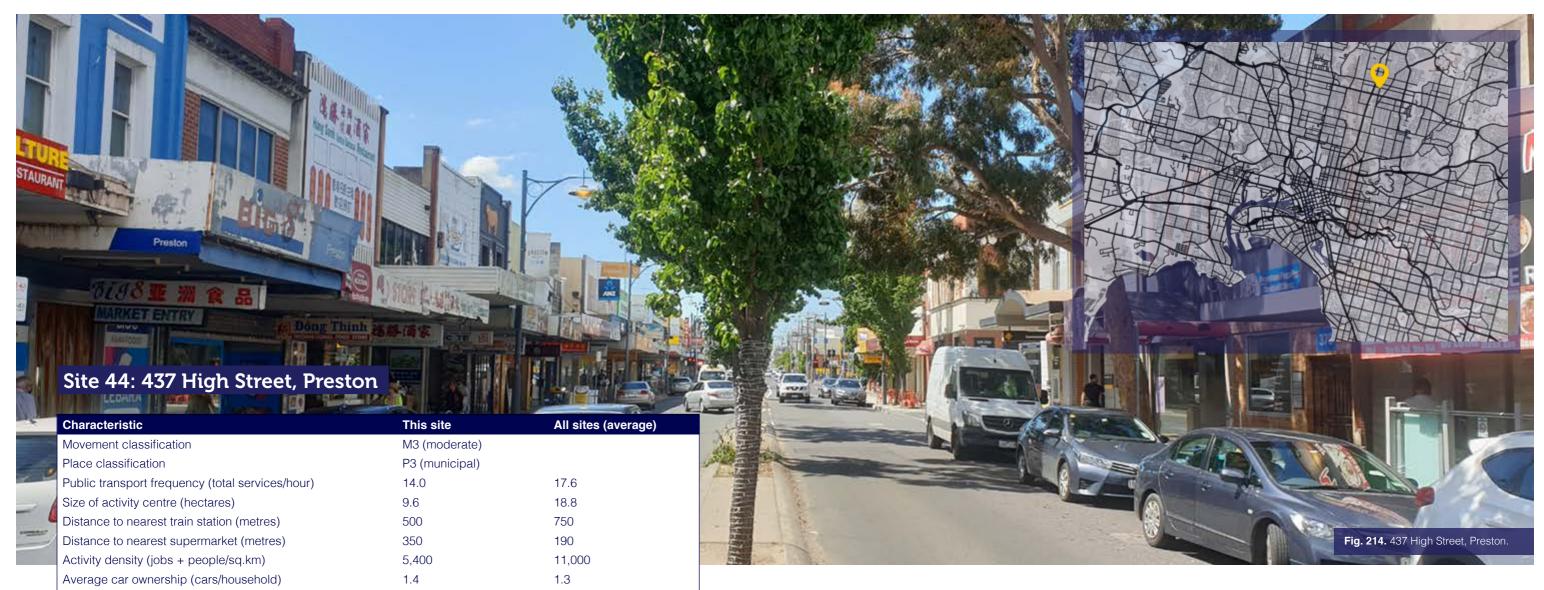
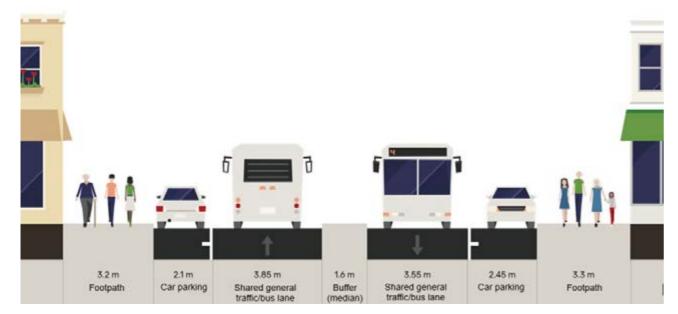


Fig. 212. Site characteristics: 437 High Street, Preston.

Average resident age (years)



1,166

37.8

1,564

Fig. 213. Street cross-section: 437 High Street, Preston. Image created via Streetmix.

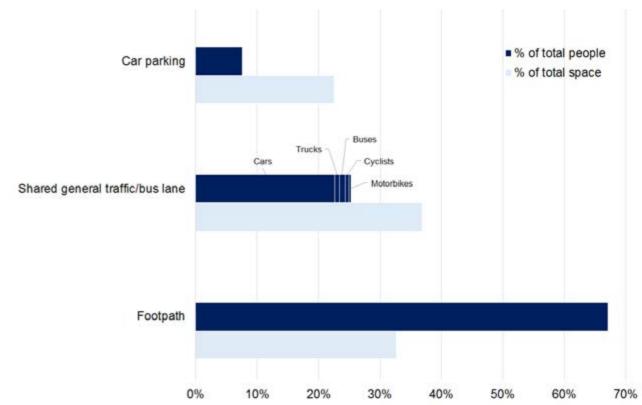
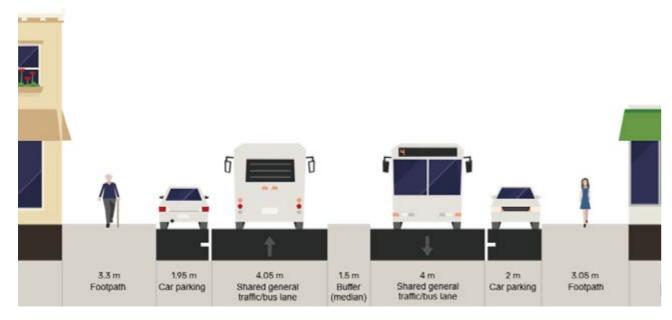


Fig. 215. Street space allocation vs. use: 437 High Street, Preston.



Fig. 216. Site characteristics: 303 High Street, Preston.

Average resident age (years)



1,166

37.8

Fig. 217. Street cross-section: 303 High Street, Preston. Image created via Streetmix.

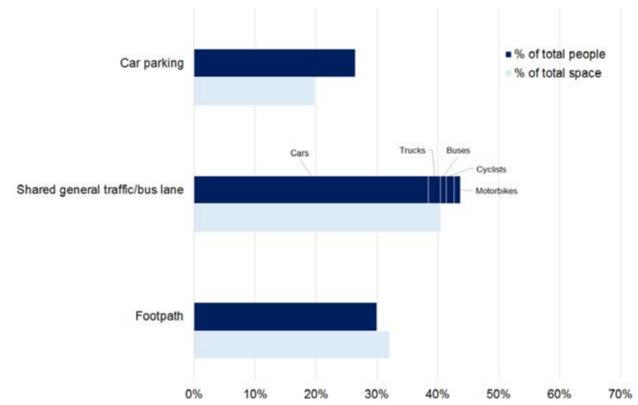


Fig. 219. Street space allocation vs. use: 303 High Street, Preston.

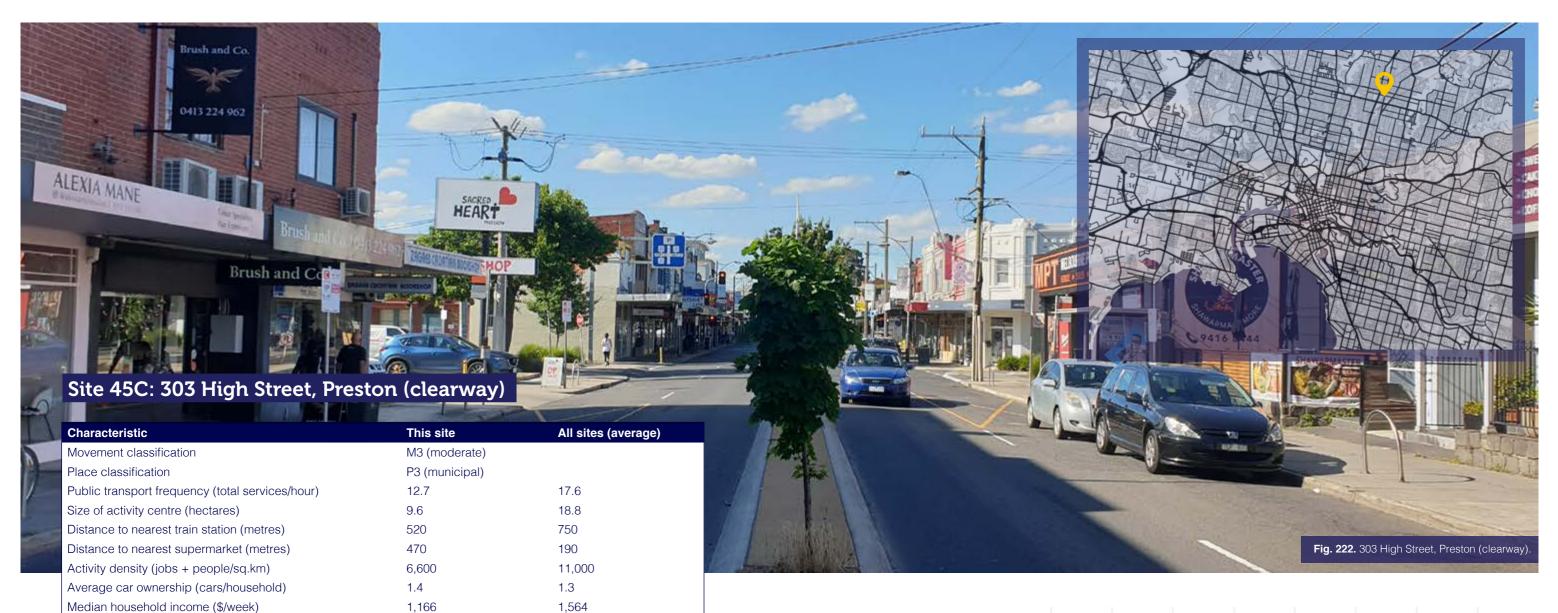
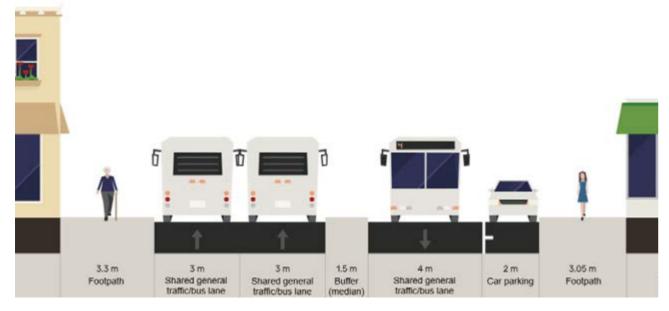


Fig. 220. Site characteristics: 303 High Street, Preston (clearway).



37.8

Fig. 221. Street cross-section: 303 High Street, Preston (clearway). Image created via Streetmix.

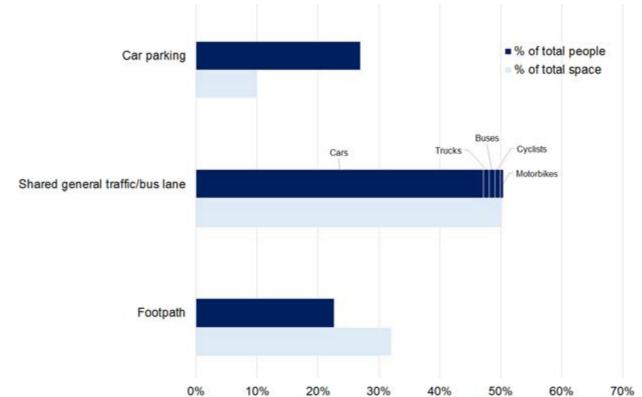
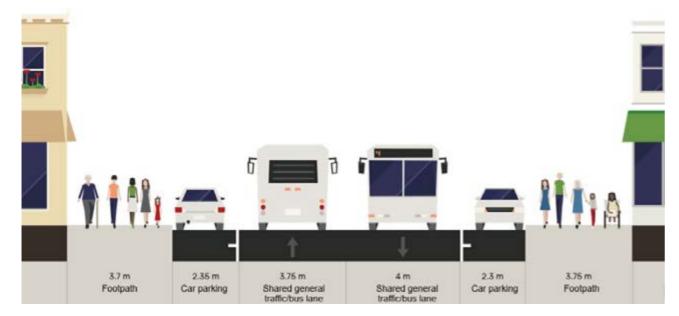


Fig. 223. Street space allocation vs. use: 303 High Street, Preston (clearway).



Fig. 224. Site characteristics: 120 Burgundy Street, Heidelberg.

Average resident age (years)



1,508

40.4

Fig. 225. Street cross-section: 120 Burgundy Street, Heidelberg. Image created via Streetmix.

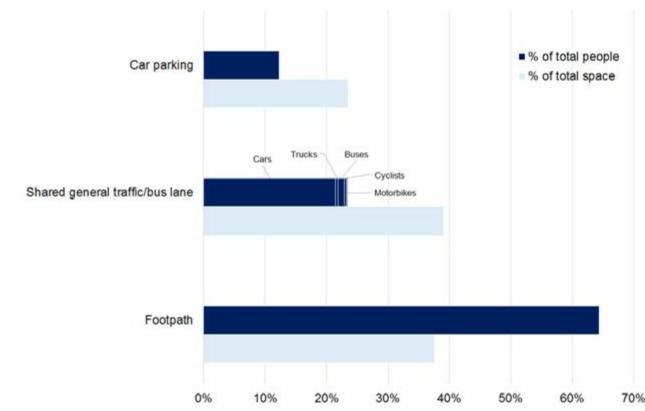


Fig. 227. Street space allocation vs. use: 120 Burgundy Street, Heidelberg.

1,564

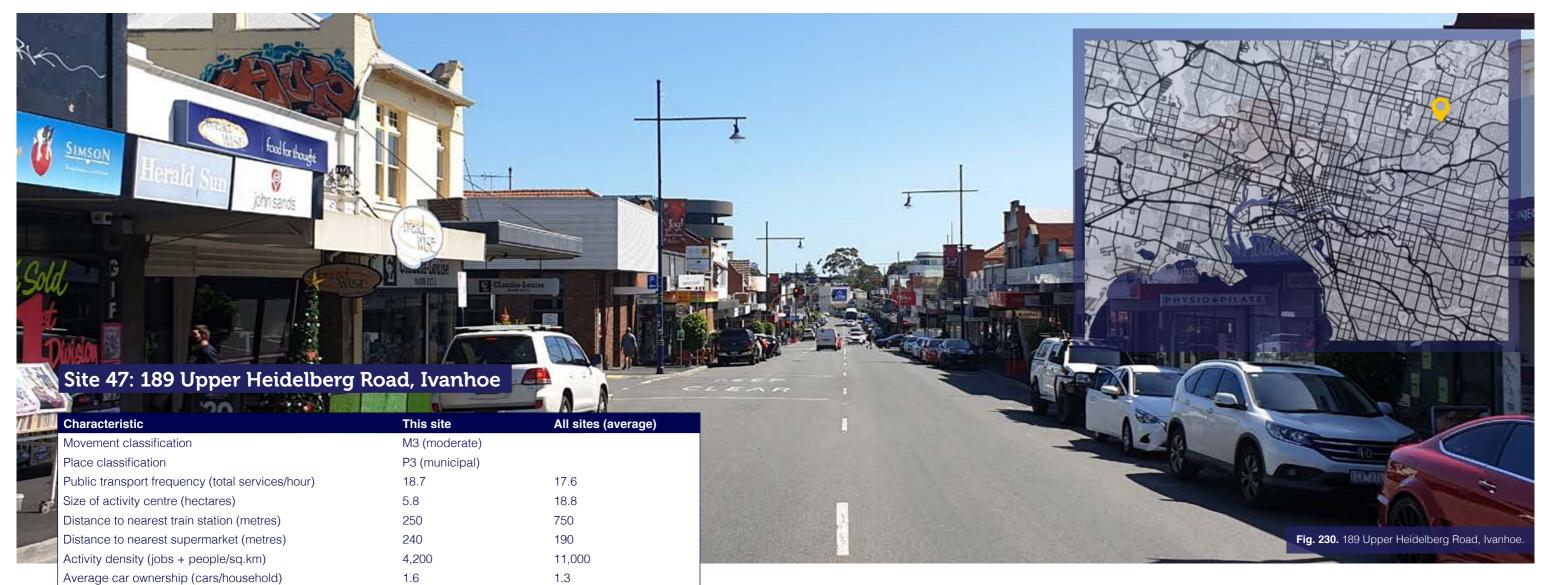
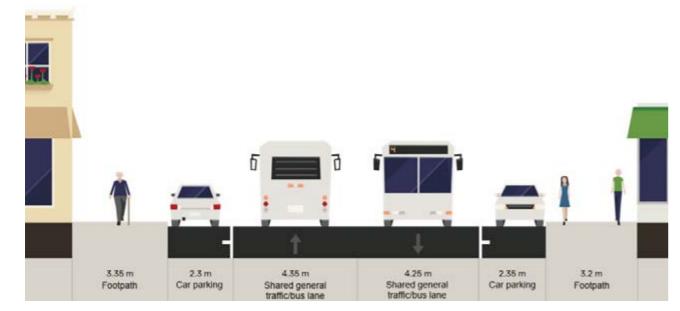


Fig. 228. Site characteristics: 189 Upper Heidelberg Road, Ivanhoe.

Average resident age (years)



1,711

39.5

1,564

Fig. 229. Street cross-section: 189 Upper Heidelberg Road, Ivanhoe. Image created via Streetmix.

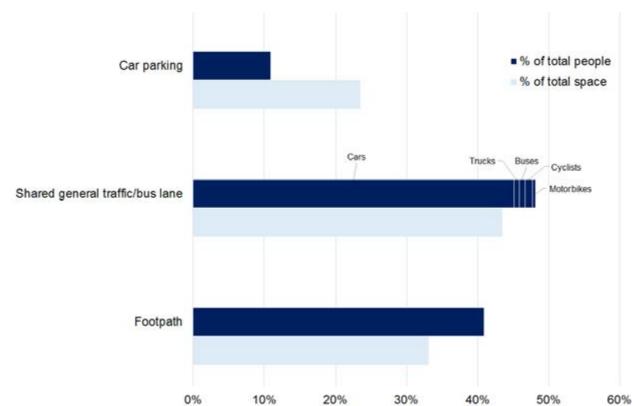


Fig. 231. Street space allocation vs. use: 189 Upper Heidelberg Road, Ivanhoe.

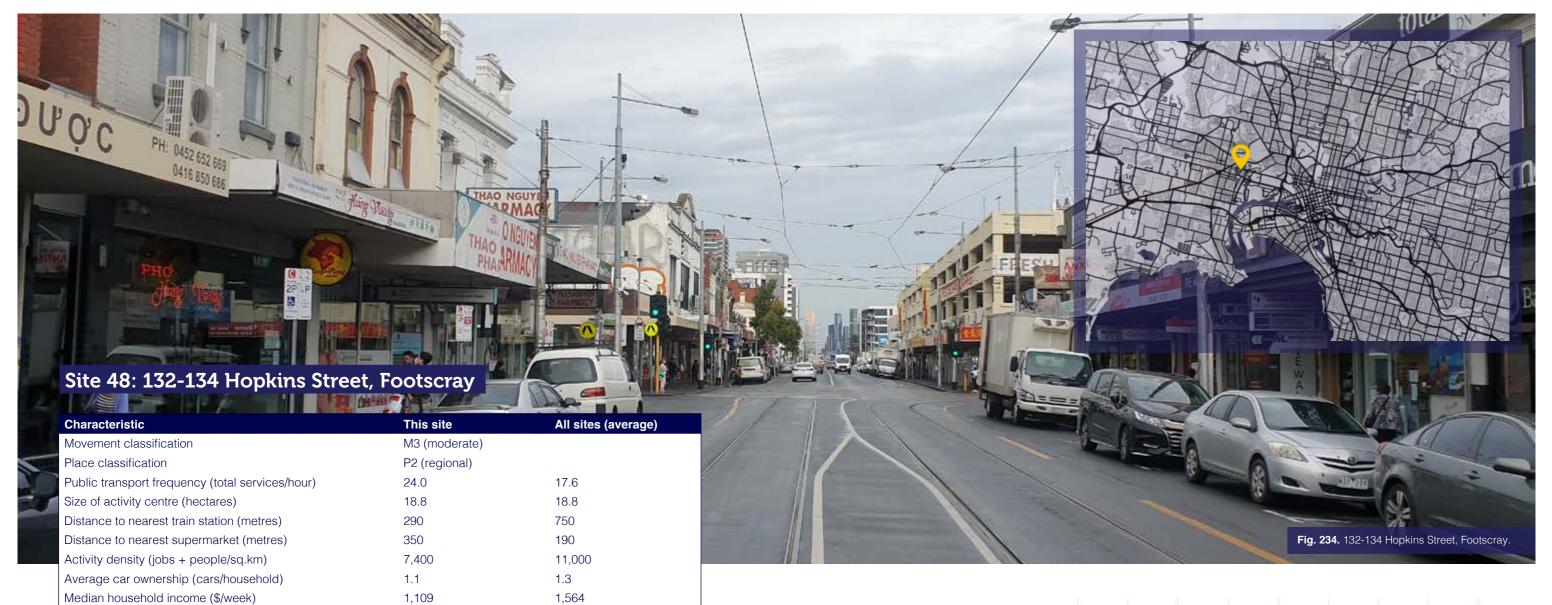
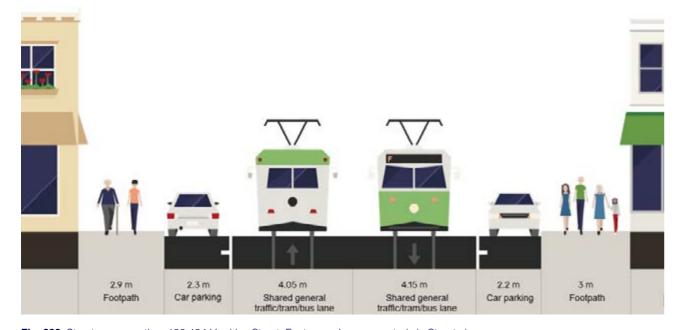


Fig. 232. Site characteristics: 132-134 Hopkins Street, Footscray.



35.7

Fig. 233. Street cross-section: 132-134 Hopkins Street, Footscray. Image created via Streetmix.

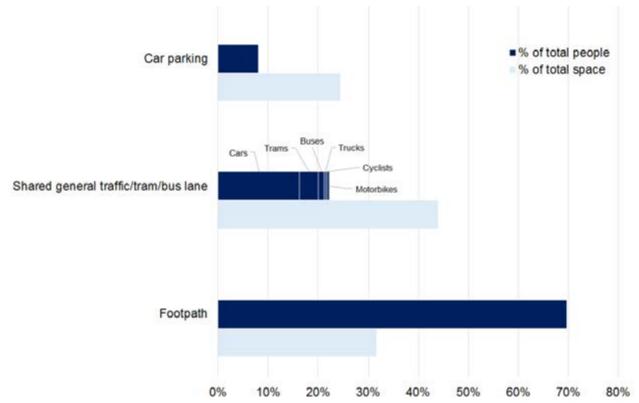


Fig. 235. Street space allocation vs. use: 132-134 Hopkins Street, Footscray.

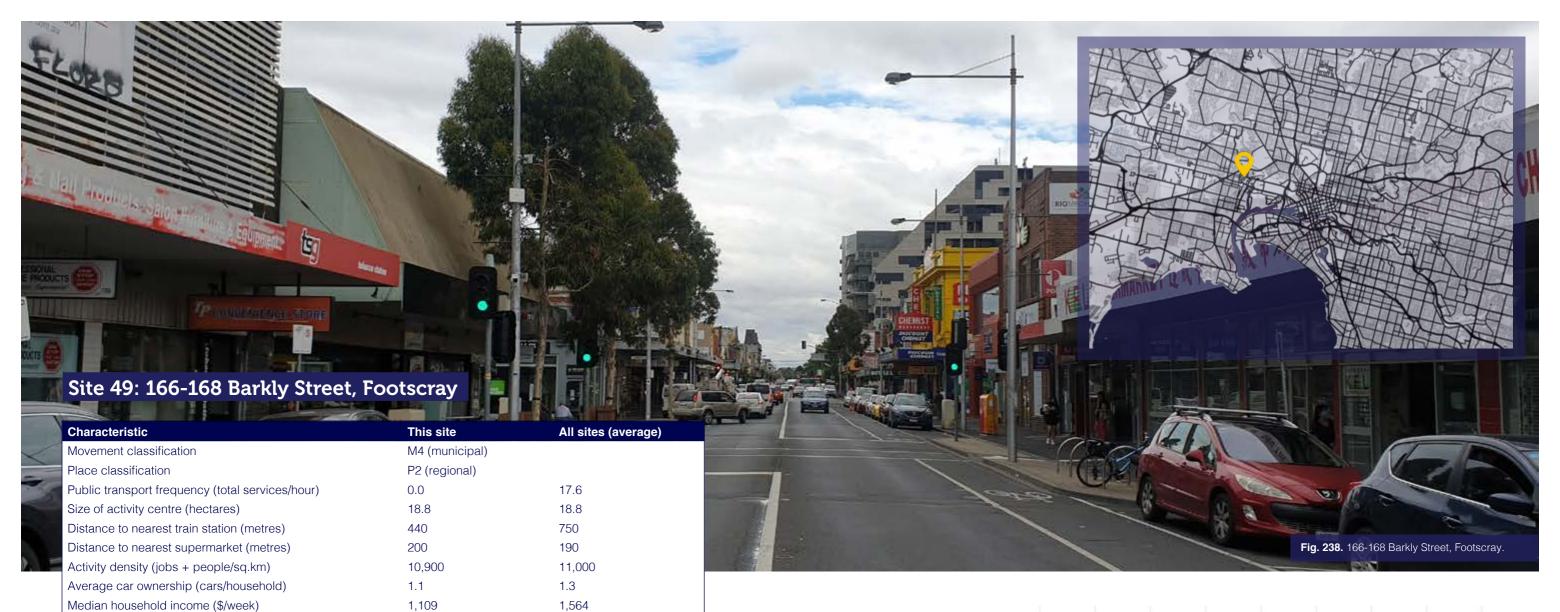
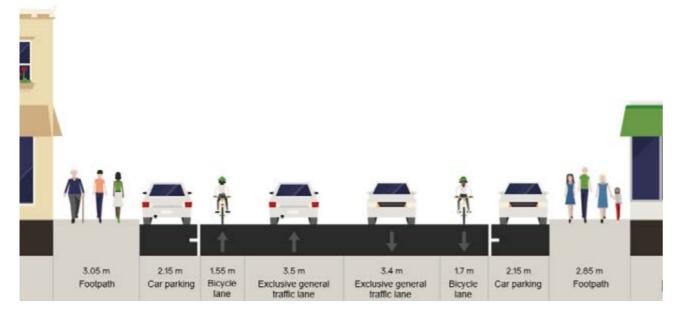


Fig. 236. Site characteristics: 166-168 Barkly Street, Footscray.



35.7

Fig. 237. Street cross-section: 166-168 Barkly Street, Footscray. Image created via Streetmix.

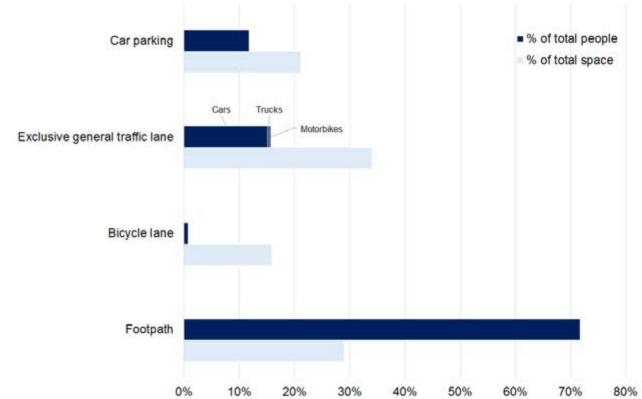


Fig. 239. Street space allocation vs. use: 166-168 Barkly Street, Footscray.

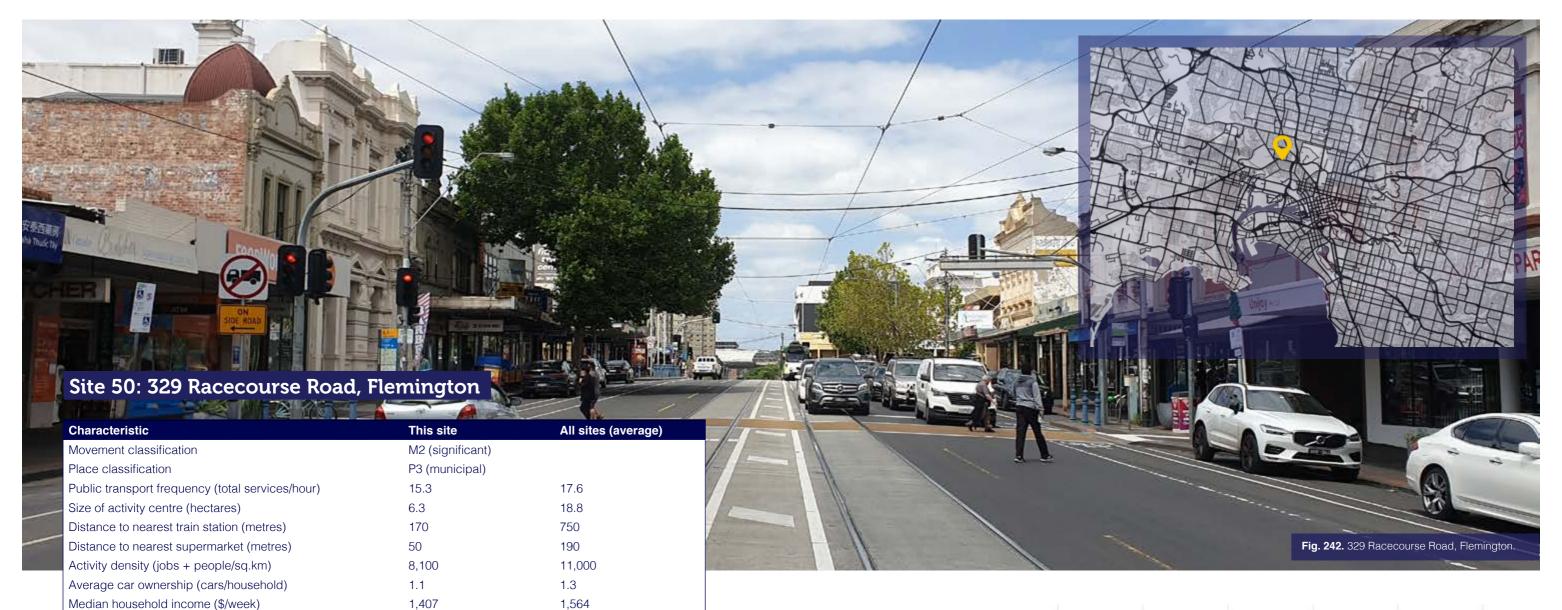
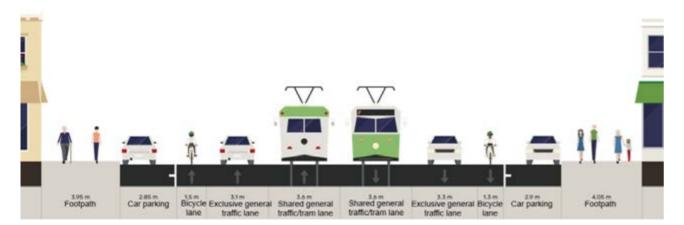


Fig. 240. Site characteristics: 329 Racecourse Road, Flemington.



34.9

 $\textbf{Fig. 241.} \ \textbf{Street cross-section: 329 Race course Road, Flemington. Image created via Street mix.}$

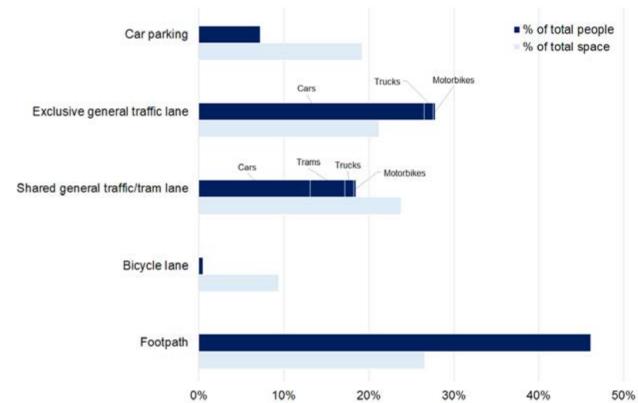
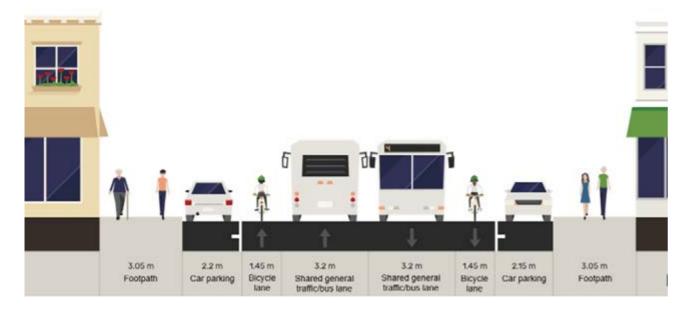


Fig. 243. Street space allocation vs. use: 329 Racecourse Road, Flemington.



Fig. 244. Site characteristics: 503 Macaulay Road, Kensington.



1,738

35.1

Fig. 245. Street cross-section: 503 Macaulay Road, Kensington. Image created via Streetmix.

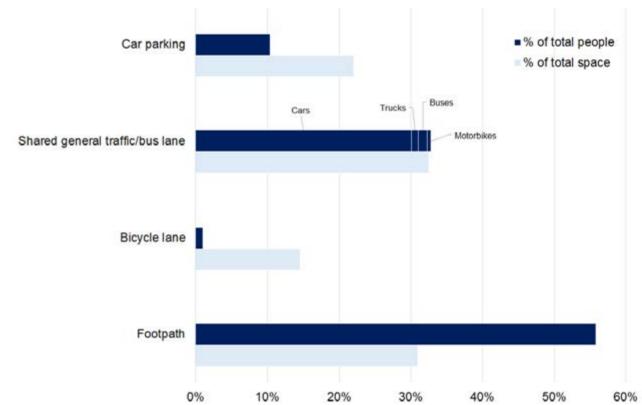


Fig. 247. Street space allocation vs. use: 503 Macaulay Road, Kensington.

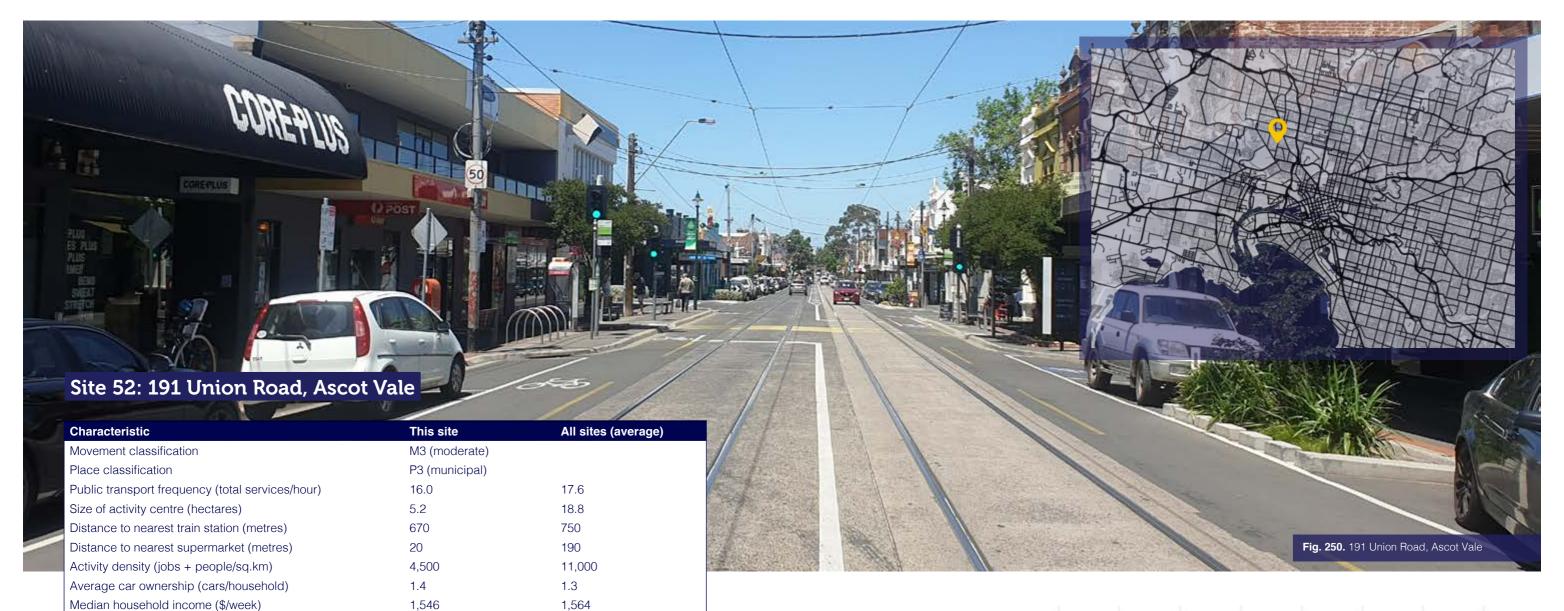
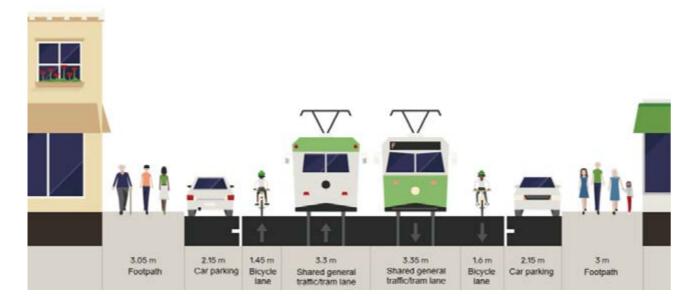


Fig. 248. Site characteristics: 191 Union Road, Ascot Vale.



36.4

Fig. 249. Street cross-section: 191 Union Road, Ascot Vale. Image created via Streetmix.

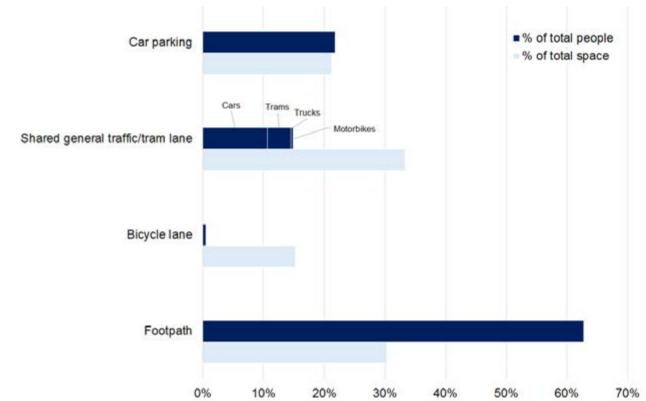


Fig. 251. Street space allocation vs. use: 191 Union Road, Ascot Vale.

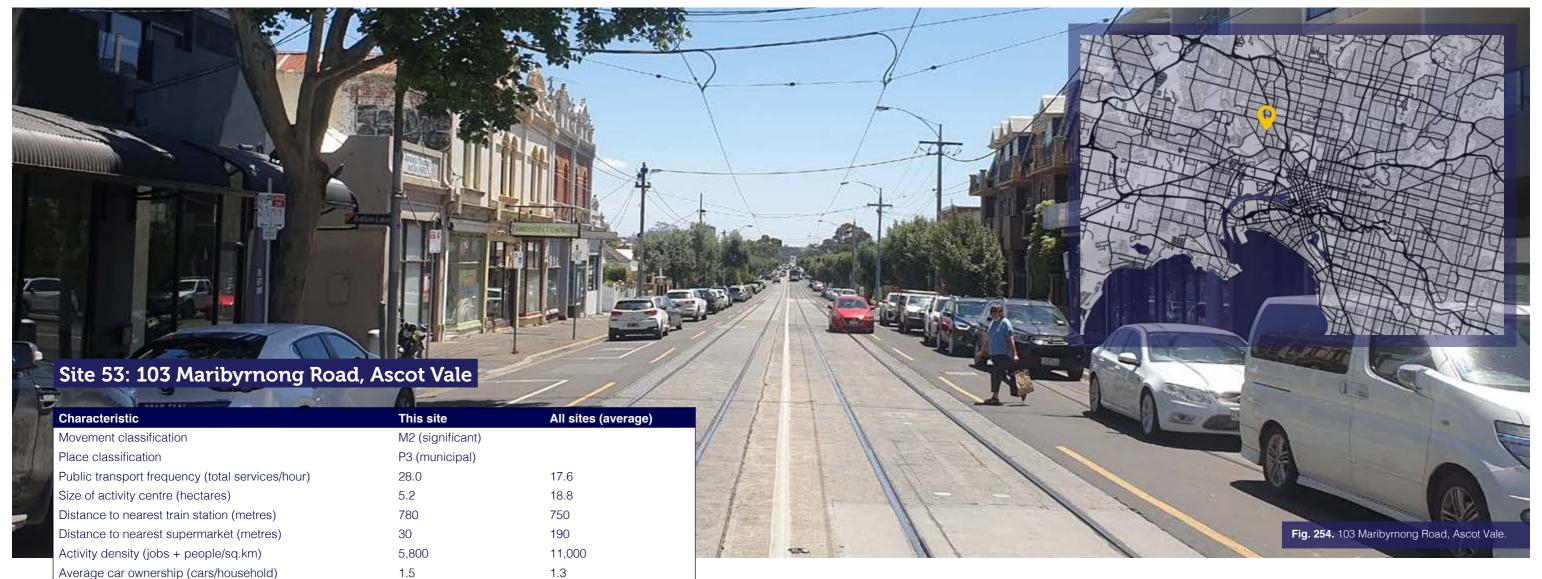
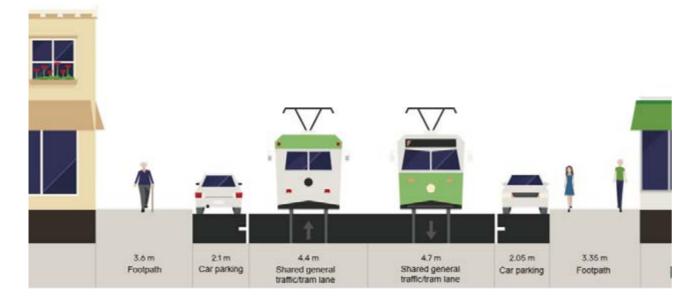


Fig. 252. Site characteristics: 103 Maribyrnong Road, Ascot Vale.

Average resident age (years)



1,588

37.8

1,564

Fig. 253. Street cross-section: 103 Maribyrnong Road, Ascot Vale. Image created via Streetmix.

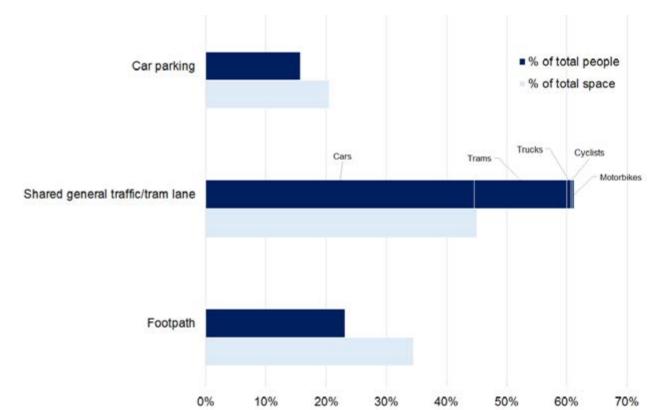
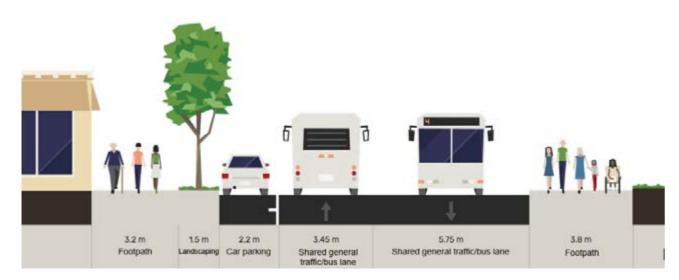


Fig. 255. Street space allocation vs. use: 103 Maribyrnong Road, Ascot Vale.



Fig. 256. Site characteristics: Opposite 41 Rose Street, Essendon.

Average resident age (years)



1,569 38.7 1,564

Fig. 257. Street cross-section: Opposite 41 Rose Street, Essendon. Image created via Streetmix.

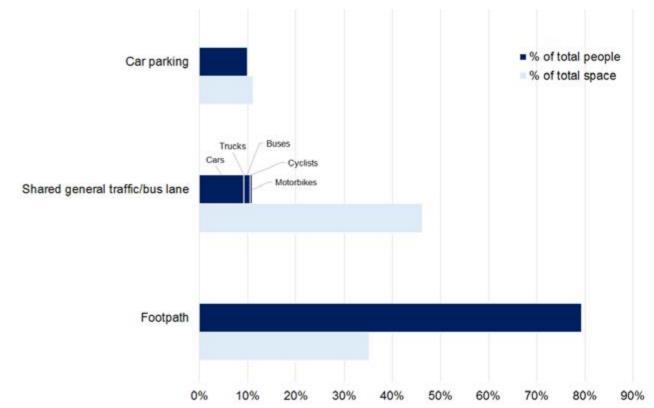


Fig. 259. Street space allocation vs. use: Opposite 41 Rose Street, Essendon.

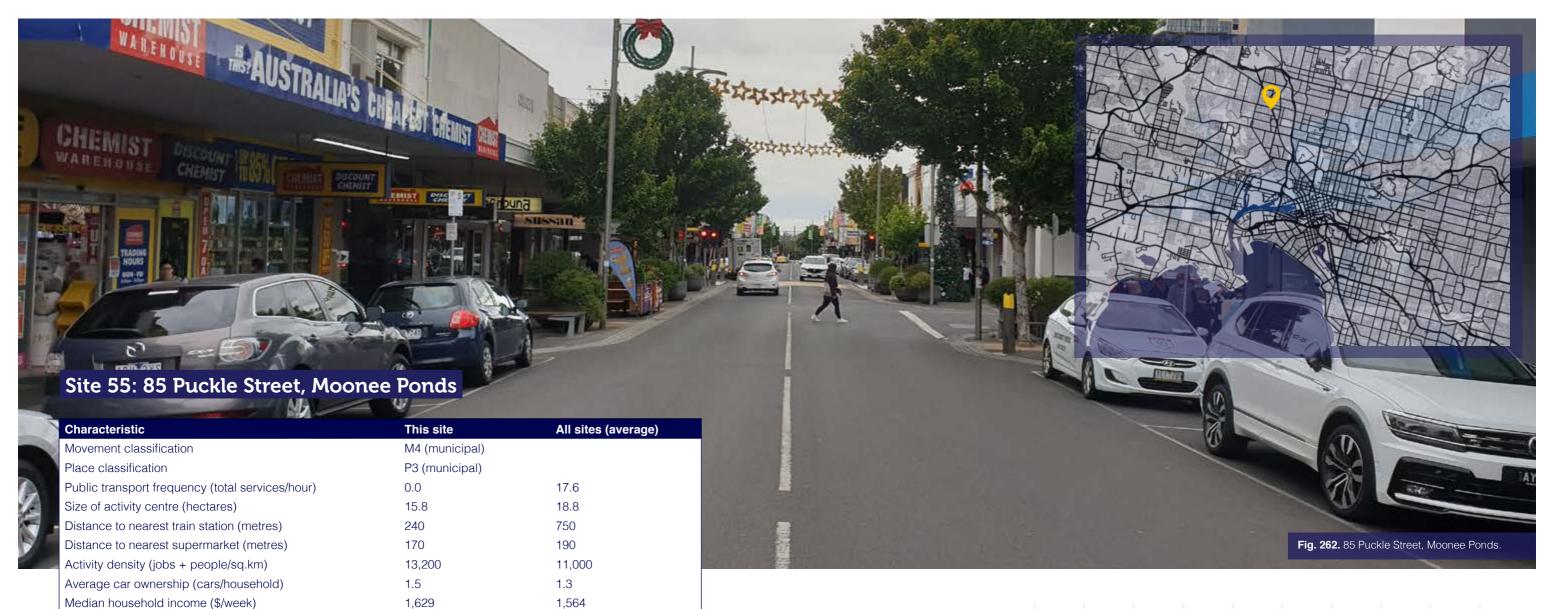
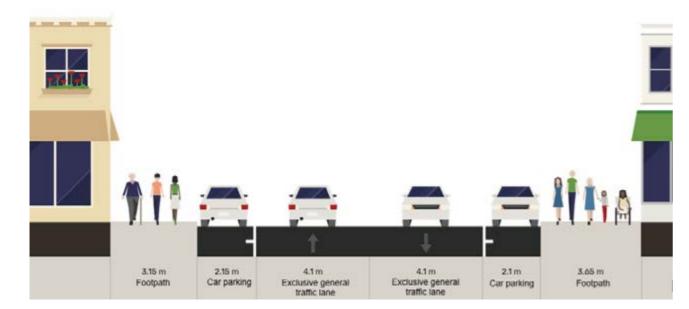


Fig. 260. Site characteristics: 85 Puckle Street, Moonee Ponds.

Average resident age (years)



1,629 39.1

Fig. 261. Street cross-section: 85 Puckle Street, Moonee Ponds. Image created via Streetmix.

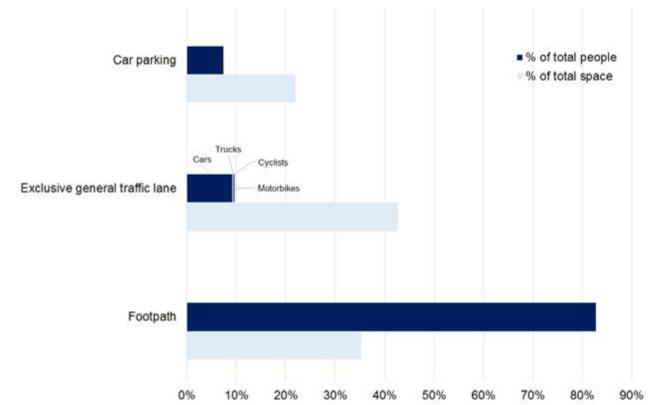
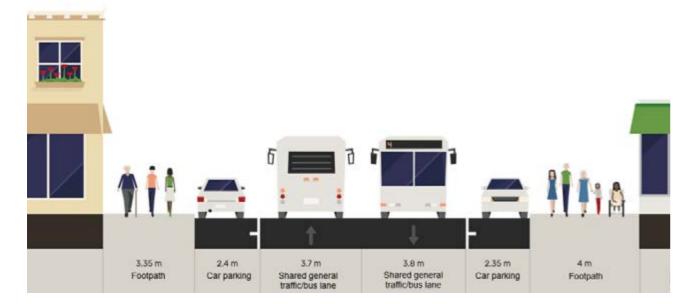


Fig. 263. Street space allocation vs. use: 85 Puckle Street, Moonee Ponds.



Fig. 264. Site characteristics: 19-21 Douglas Parade, Williamstown.

Average resident age (years)



1,769 39.9 1,564

Fig. 265. Street cross-section: 19-21 Douglas Parade, Williamstown. Image created via Streetmix.

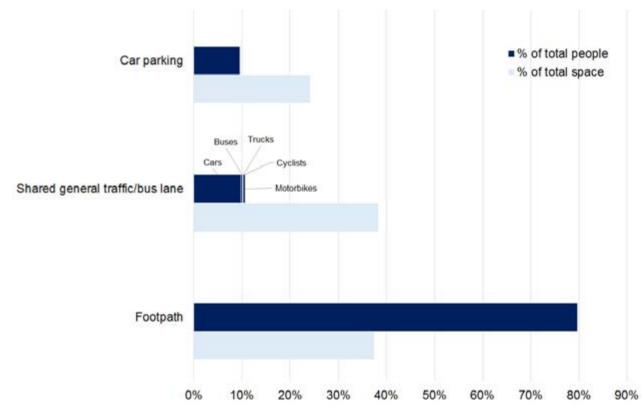


Fig. 267. Street space allocation vs. use: 19-21 Douglas Parade, Williamstown.

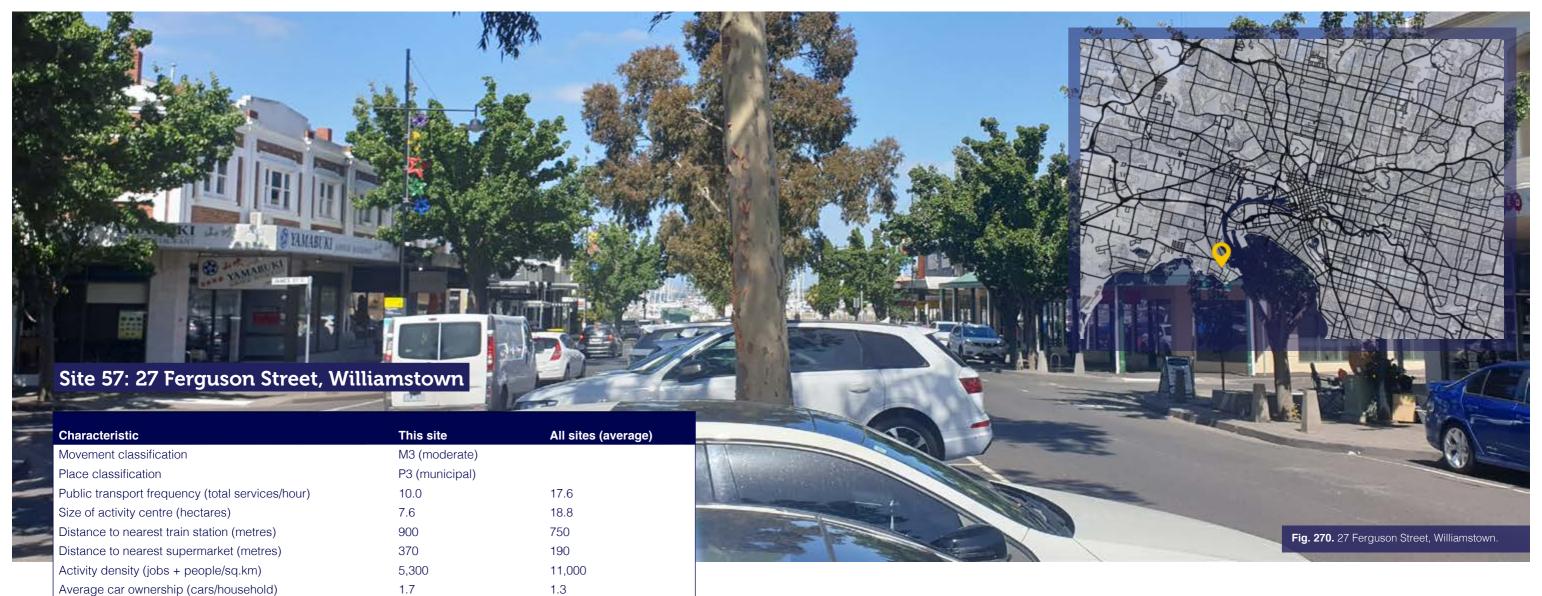
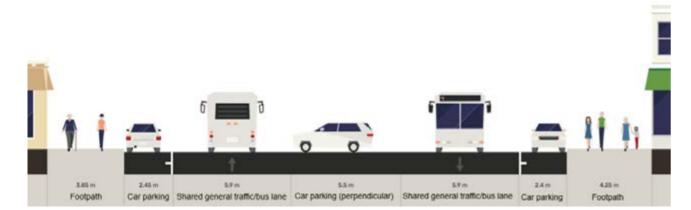


Fig. 268. Site characteristics: 27 Ferguson Street, Williamstown.

Average resident age (years)



1.7

1,769 39.9

1.3 1,564

Fig. 269. Street cross-section: 27 Ferguson Street, Williamstown. Image created via Streetmix.

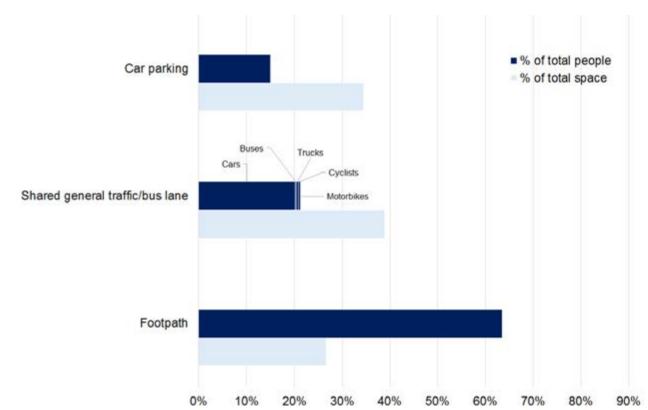


Fig. 271. Street space allocation vs. use: 27 Ferguson Street, Williamstown.

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