Transport for London

Central London Rail Termini:

Analysing passengers' onward travel patterns

MAYOR OF LONDON

Transport for London

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Analysing passengers' travel patterns

Policy Analysis Research Report

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Executive summary

Purpose of the report

There are over half a million passenger travelling through the central London rail termini in the morning peak period (07:00-10:00) with over a quarter of a million passengers in the busiest hour (08:00-09:00). Rail is a key mode for accessing central London, particularly during the peak periods. The termini are the points at which the majority of rail passengers reach central London, but although the termini are at the end of the rail line they are rarely the end of the journey. This report presents new information collected specifically about people travelling through central London's rail termini and their onward journeys.

Catering for the efficient dispersal of the large volumes of rail passengers alighting at central London's rail termini is of importance to the functioning of London's economy. With the number of rail passengers travelling into central London projected to rise over the next 20 years, the need for efficient onward dispersal will become even greater.

Already, crowding is an issue at many of the termini with the capacity of some public transport (particularly Underground) services unable to meet peaks in demand. In order to improve understanding of trips through the stations and patterns of onward distribution, a survey of passengers was undertaken at each terminus on a representative weekday in either spring or autumn 2010 (not during school holidays) during the morning and evening peaks, between 7:00 to 10:00 and 16:00 to 19:00. A full passenger count was conducted and postal return origin-destination questionnaires were distributed to capture journey patterns. This report presents the results of analysis of surveys carried out at 13 central London rail termini in 2010 (Blackfriars station was not surveyed as it was affected by closures during the station redevelopment programme). The analysis presented includes the potential for the use of walking and cycling for onward travel to increase which can contribute to Mayoral targets for increasing walking and cycling in London.

Who uses the central London termini?

More than half a million passengers were observed at the central London termini over the weekday morning peak period, with a similar number observed during the evening peak period. Just over half (54 per cent) of these were arriving passengers. The busiest of the termini was Waterloo handling 20 per cent of all central London passengers during the peak periods.

The majority of people travelled to or from central London during the peak periods for work related purposes, with 72 per cent travelling to their usual workplace and a further nine per cent stating that they were travelling for 'other work'. There were variations among the stations with those in or around the City of London having the highest proportions of commuters, while those stations with long distance connections to the UK regions saw greater numbers of business trips.

Given the high level of commuting and work related journey purposes it is not surprising that 78 per cent of peak time passengers make the journey at least three times per week.

Onward distribution

The majority of onward journeys to and from the central London termini were made either by Underground (40 per cent) or on foot (36 per cent). A further 10 per cent were made by bus while nine per cent of passengers made a rail to rail interchange at the termini.

The mode used for onward travel was closely correlated with the distance travelled, with different modes dominating different distances. Eighty-nine per cent of onward trips made on foot were shorter than 2 kilometres. Bus use was generally restricted to onward journeys between 1 and 5 kilometres, with 87 per cent of bus journeys in this range. Eighty-eight per cent of Underground journeys were longer than 2 kilometres. An individual's mode choice is of course affected by multiple factors.

Passengers travelling to and from the rail termini during the peak periods make more than 400,000 Underground journeys and over 100,000 bus journeys in central London. This is a significant part of London's public transport system with some stations or services suffering from severe crowding problems.

Have travel patterns changed over time?

The results of the central London termini surveys in 2010 have been compared with the rail surveys of the London Area Transport Survey (LATS) 2001. Overall, 145,000 more rail passengers arrived or departed across the two peak periods, an increase of 18 per cent. Waterloo remained the busiest station among the central London termini stations.

The demographic profile of rail passengers is changing with an increase in the percentage of women and a shift towards an older age profile.

The overall mode shares for onward journeys in central London have not changed significantly with Underground and walk remaining the most popular modes. In comparison, bus and cycling saw the greatest increase with the share for both modes increasing by one and a half percentage points.

How do Londoners' travel patterns differ from those of non-Londoners?

Just over half of all rail journeys to and from the central London termini started or finished outside Greater London. This equates to around 580,000 daily journeys. Passengers arriving at Marylebone, King's Cross and Euston stations are the most likely to have come from outside Greater London, closely followed by St Pancras. This of course reflects the services available at these stations.

Among non-Londoners, seven in ten trips involved commuting while one in ten journeys were for other work purposes. This compares with only one in twenty people travelling within Greater London making a journey for other work purposes (not commuting).

People starting or ending their journey outside Greater London are less likely to make the journey every day of the week than people travelling solely within Greater London. Non-

Londoners are also more likely to be very infrequent travellers with one in ten people travelling once a year or less.

Non-Londoners are less likely to walk and more likely to use the Underground for their onward journey in central London compared with Londoners. They are, however, more likely to cycle both at the central London end and non central London end of their journey.

Travel patterns outside central London

The survey also captured access and egress patterns at the end of the rail journey outside central London. This is referred to as the 'non-central' end of the trip.

Over 80 per cent of journeys are between home and a usual workplace in central London while one in ten journeys has a usual workplace as its destination at the non-central end.

The most popular onward mode at the non-central end of the journey is walk at 66 per cent, followed by bus at 15 per cent. The mode share for car is nine per cent at the non-central end but is negligible as an onward mode at the central London termini. Conversely Underground, which is the most popular onward mode in central London, is used by just one per cent of people to access the non central London rail station.

Walking and cycling are more popular at the non-central end of the journey, with people more likely to have ever walked or cycled at the end of their journey outside central London. Those who ever walk or cycle also do so more frequently outside central London.

The five most used non-central stations (based on the number of trips between these stations and the central London termini) are East Croydon, Clapham Junction, Surbiton, Wimbledon and Putney, which together handle 57,000 passengers travelling to or from central London rail termini over the peak periods. This is for rail trips originating or ending at those stations and excludes interchange between rail services.

Opportunities for walking

At present, 36 per cent of journeys to and from central London rail termini are walked, amounting to 380,000 walk journeys during the peak periods. The walk mode share ranges from 80 per cent at Cannon Street to 12 per cent at St Pancras and largely reflects the average distances travelled for onward journeys. Ninety-one per cent of onward journeys shorter than 1km and 55 per cent of those between 1 – 2m are walked.

Analysis was carried out to identify journeys less than 2km that are currently made by a mechanised mode but could potentially be walked. In total, 123,200 potentially walkable journeys were identified – 12 per cent of journeys by all modes and 19 per cent of journeys by mechanised modes. Fifty per cent of these journeys were between 1.5 and 2km, the upper limit of what is considered potentially walkable.

Opportunities for cycling

At present, 1.8 per cent of journeys to and from central London rail termini are cycled, amounting to approximately 19,000 cycle journeys during the peak periods. The cycle mode share to and from central London rail termini ranges from 0.3 per cent at Cannon Street to 4.5 per cent at Paddington, and largely reflects the average distance travelled for onward journeys. Eighty-three per cent of cycled journeys are up to 4.5km. Cycling is dominated by a particular demographic: 82 per cent of cycle journeys are made by men; 60 per cent of cyclists are aged between 25 and 44.

In the autumn surveys, questions were asked to ascertain the types of bicycles used from central London rail termini. Fifty-seven per cent of people cycled on their own bicycle, the majority of whom used a non-folding bicycle. Thirty-seven per cent of people cycling from a central London rail terminus did so using a Barclays Cycle Hire bicycle.

Market segmentation is used to group together the range of people that use TfL services to understand their current travel behaviour and the triggers for maintaining or changing future travel behaviours. Over 50 per cent of the cycle market is comprised of individuals living in postcodes categorised as 'urban living' and 'suburban lifestyles'. People in these segments tend to be well educated, reasonably well off and tend to cycle for leisure as well as for commuting to work.

Further information

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Introduction

This report presents the results of analysis of surveys carried out at 13 central London rail termini in 2010. Rail is a key mode for accessing central London, particularly during the peak periods: it is the most popular mode in the morning peak period, accounting for 43 per cent of people who travel into central London (CAPC survey 2010, Travel in London Report 3). The vast majority of these rail trips pass through the central London termini, and this report focuses on new information collected specifically about people travelling through those stations.

Background

The Mayor's Transport Strategy (MTS) published in 2010 identifies the need for congestion relief and efficient onward distribution at central London termini:

> "Increasing population and employment, plus the additional capacity on much of London's rail network through the current rail investment programme, means rail arrivals into central London termini are forecast to increase by about 25 per cent by 2031. This will result in increased strain on National Rail termini, and on the transport networks and services within central London."
>
> - *MTS, 2010*

Already, crowding is an issue at many of the termini with the capacity of public transport services unable to meet peaks in demand. Crowding on the Underground can lead to closures and delays. This reduces the efficiency of onward distribution, with consequences for London's economy. The capacity of the National Rail network into London is growing, and without intervention the further growth in London's population and employment will exacerbate crowding at stations and on modes used for onward travel.

It is important that we improve our understanding of trips made into central London by rail and patterns of onward distribution. A survey of passengers at the central London termini was undertaken to collect information about their characteristics and travel choices. This new information will provide a useful resource in work to mitigate some of the current issues around onward travel, and will also to assist in planning for efficient distribution in light of the predicted growth in travel in central London.

Central London's rail termini: a special case in London's transport network

Huge numbers of passengers pose unique challenges
Passenger flows at some of central London's rail termini dwarf those at London's Underground stations, with even the busiest Underground stations handling less than half the number of passengers using Waterloo rail terminus during the morning peak period. Peak time rail passenger flows at London Bridge, Liverpool Street and Victoria also greatly exceed Underground passenger flows from Bank, Canary Wharf and Oxford Circus. Moreover, as well as catering for these vast rail passenger flows, most termini also house an Underground station – which are in many cases among London's busiest stations in their own right.

The end of the line may not mean the end of the journey
The major radial rail routes into London funnel many thousands of passengers every hour from outlying areas to the 13 central London termini. But while these stations may be the end of the rail line, they are often not the end of the journey. This means that while some passengers are able to walk the last few minutes of their journey, thousands more depend on fast, reliable onward connections to reach their ultimate destination.

Making vital connections between employees and businesses
As well as handling a large proportion of commuter traffic into central London, central London's rail termini are often vitally important gateways for business travel between central London and the UK's most economically active areas, and many of the thousands of passengers travelling through them each day are travelling on business. The efficient onward distribution of this high value travel is therefore of significant importance for the economies of London and the UK as a whole.

Realising the benefits of line upgrades will require close collaboration
With the capacity of trains on routes into central London expected to increase in coming years, the requirement for efficient onward distribution will become even greater if the maximum potential for economic growth is to be realised. Since responsibility for operations at each of central London's rail termini is typically shared between Network Rail, one or more Train Operating Companies and TfL, these stakeholders must collaborate closely to manage large passenger flows and plan for growth.

Introducing the surveys

The 13 central London termini rail stations were surveyed during 2010. A survey was not carried out at Blackfriars as it was affected by closures during the station redevelopment programme. The surveys sought to obtain information on passenger journeys including origins and destinations, as well as modes used to access the station.

Surveys were carried out at each station on a representative weekday in either spring or autumn 2010 (not during school holidays) during the morning and evening peaks, between 7:00 to 10:00 and 16:00 to 19:00. A full passenger count was conducted and postal return origin-destination questionnaires were distributed to capture journey patterns. In total, over one million passengers were counted arriving and departing during the peak periods and more than 46,000 questionnaires were returned across all termini, providing a sample of 4.4 per cent of the total peak time rail passenger population. For more details on the survey methodology see the note in the Appendix. All the findings presented in this report are based on analysis of the responses expanded to the total passenger numbers at each station. The analysis generally combines the data for the AM and PM peak periods throughout the report (unless otherwise stated). The AM and PM figures are generally similar: the vast majority of passengers (9 in 10 respondents) also make a return journey through the central London termini.

Structure of the report

The report is divided in two parts; part one consists of chapters presenting the analysis of the central London termini surveys under different themes while part two presents key survey results at individual stations.

Part 1

Chapter 1 provides an overview of travel at the termini looking at the number of passengers arriving or departing during the weekday peak period, the purpose of their journeys and how frequently they make them. It also includes some passenger demographics.

Chapter 2 presents detailed analysis of onward travel in central London, looking at the modes used and the distances travelled by passengers between the termini and the end of their trip in central London. It also looks at where these passengers contribute to or are impacted by current crowding issues on central London's public transport network.

Chapter 3 presents a comparison of the results of the central London termini surveys in 2010 with the results of similar surveys undertaken in 2001 as part of the London Area Transport Survey (LATS). It examines at how travel patterns have changed over a decade which has seen many aspects of transport change in London.

Chapter 4 describes travel patterns of passengers travelling to and from the central London termini from areas outside the Greater London Authority (GLA) area and makes comparisons between the travel patterns of non-Londoners and those of Londoners.

Chapter 5 presents analysis of rail passengers' travel patterns outside central London, looking at onward travel at rail stations within Greater London (but outside central London).

Chapter 6 presents analysis of onward trips made on foot and explores the potential for growth in onward trips by walking.

Chapter 7 presents analysis of onward travel by bicycle in central London and looks at the potential for growth in onward trips by cycling.

Part 2

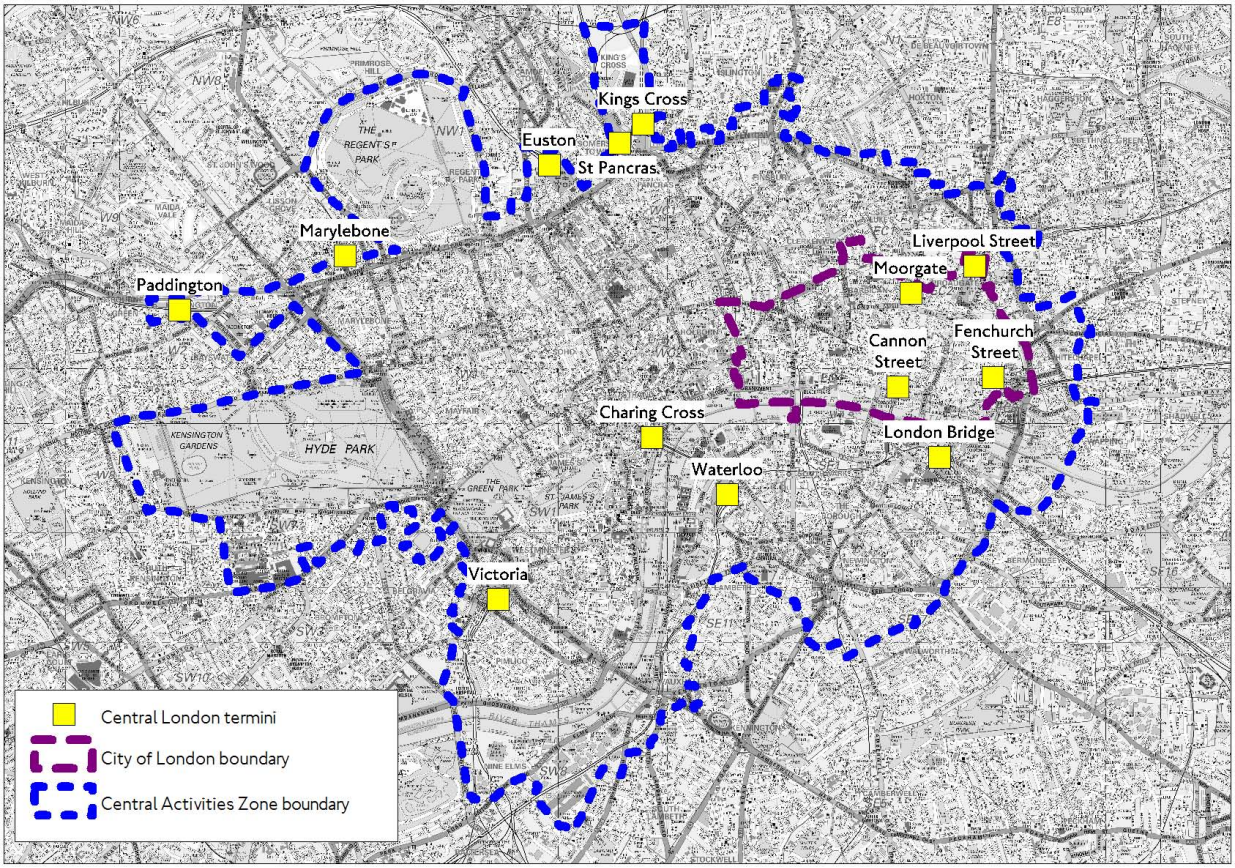
Chapters 8-20 present more detailed results for each station.

Characteristics of the central London termini

The central London rail termini are a product of the history of the development of London. Dating from as long ago as the 1830s in some cases, the sites of the termini were determined to allow greater numbers of people to access central London faster and from further away than had been possible ever before. The termini were developed independently and for commercial purposes, and while they act as endpoints of fast radial routes to central London, their locations were not part of an integrated plan for the development of London.

The termini can be divided into three broad groups based on their locations and the areas they serve. Five termini – Cannon Street, Fenchurch Street, Liverpool Street, London Bridge and Moorgate – are situated in or close to the City of London. Euston, King's Cross, Marylebone, Paddington and St Pancras are situated along the northern border of the Central Activities Zone and generally have longer distance services. Finally Charing Cross, Victoria and Waterloo are situated close to the historic centre of Westminster.

Locations of the thirteen central London termini surveyed in 2010



Part One

Chapter 1 Who uses the central London termini

Key findings

- In total, just over a million people arrived at and departed from the central London termini over the weekday morning and evening peak periods. Just over half (54 per cent) of these were arriving passengers.
- Waterloo is the busiest of the termini handling 20 per cent of all central London passengers during the peaks. The other busiest stations are London Bridge, Victoria and Liverpool Street, with these four accounting for 60 per cent of passengers at the central London termini.
- The number of male and female passengers were broadly equal among the passengers surveyed, while the age profile showed around half in the 25-44 age group and a further third in the 45-60 age group.
- The majority of people travelled to or from central London during the peak periods for work related purposes, with 72 per cent travelling to their usual workplace and a further nine per cent stating that they were travelling for 'other work'. There were variations among the stations with those in or around the City of London having the highest number of commuters.
- Given the high level of commuting and work related journey purposes it is not surprising that 78 per cent of passengers make the journey at least three times per week. The stations with the highest number of infrequent travellers are Euston, St Pancras, Paddington and King's Cross.

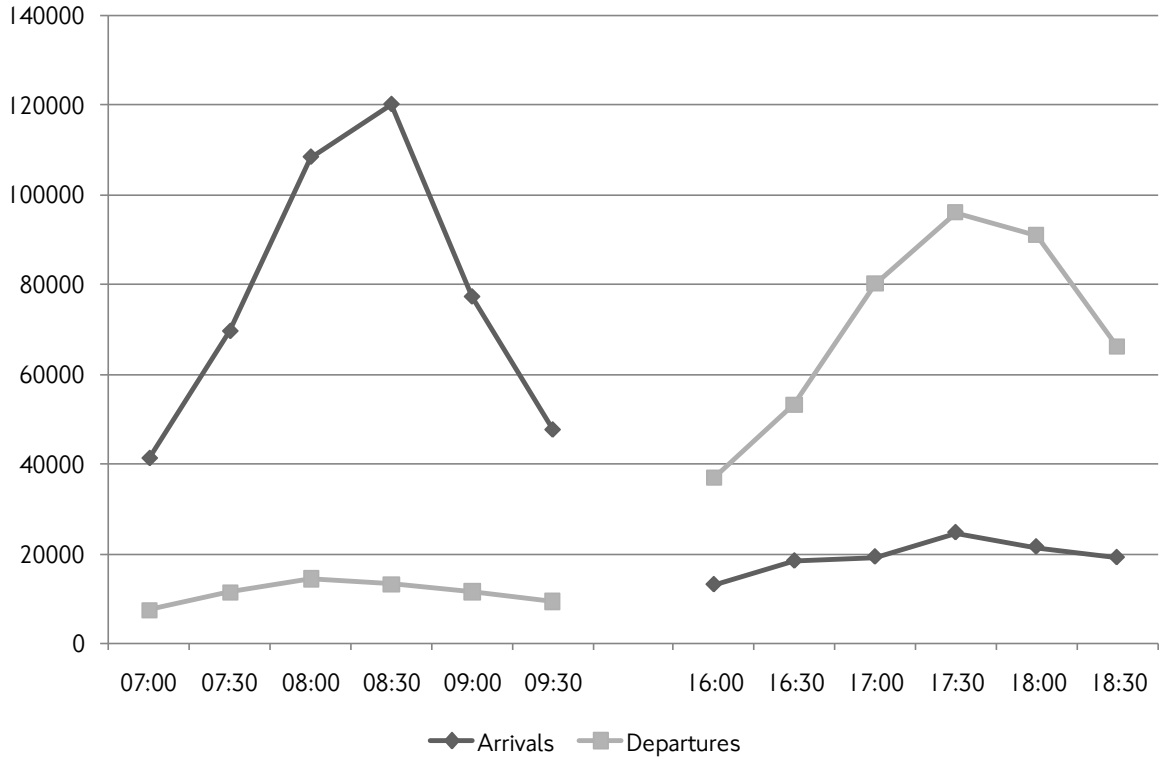
This chapter presents summary results from the 2010 central London termini surveys, providing information on passenger volumes and characteristics, presenting an overview of rail travel in central London during weekday peak periods. It provides information on the total number of arrivals and departures, the characteristics of those journeys and the demographic profiles of the people making them.

Rail passengers in and out of central London

In total, just over one million (1.07 million) passengers used the central London termini during the two three-hour peak periods on the weekdays surveyed. Just over half (54 per cent) of these passengers were arriving in central London. Figure 1.1 shows the breakdown of arriving and departing passengers by half-hour periods.

Note that passenger flows quoted in this report are those observed during the surveys and are therefore a snapshot of peak period demand on just one day. Due to fluctuations in passenger numbers these may not represent the most accurate estimates of passenger flows. Estimates of passenger flows on an average weekday can be found in other datasets.

Figure 1.1 Central London arrivals and departures by half hour period, all stations



Source: Central London Rail Termini Surveys 2010

Arrivals were at their greatest between 08:30 and 09:00, with a fifth of all passengers arriving in this half hour. Around two fifths of all people arriving in the AM peak period arrived between 08:00 and 09:00.

Departures in the evening peak did not reach the same level within any half hour time period as those seen at the height of the morning peak. The greatest volume of departures was seen between 17:30 and 18:00, when a fifth of passengers departed, while a similar share departed in the following half hour.

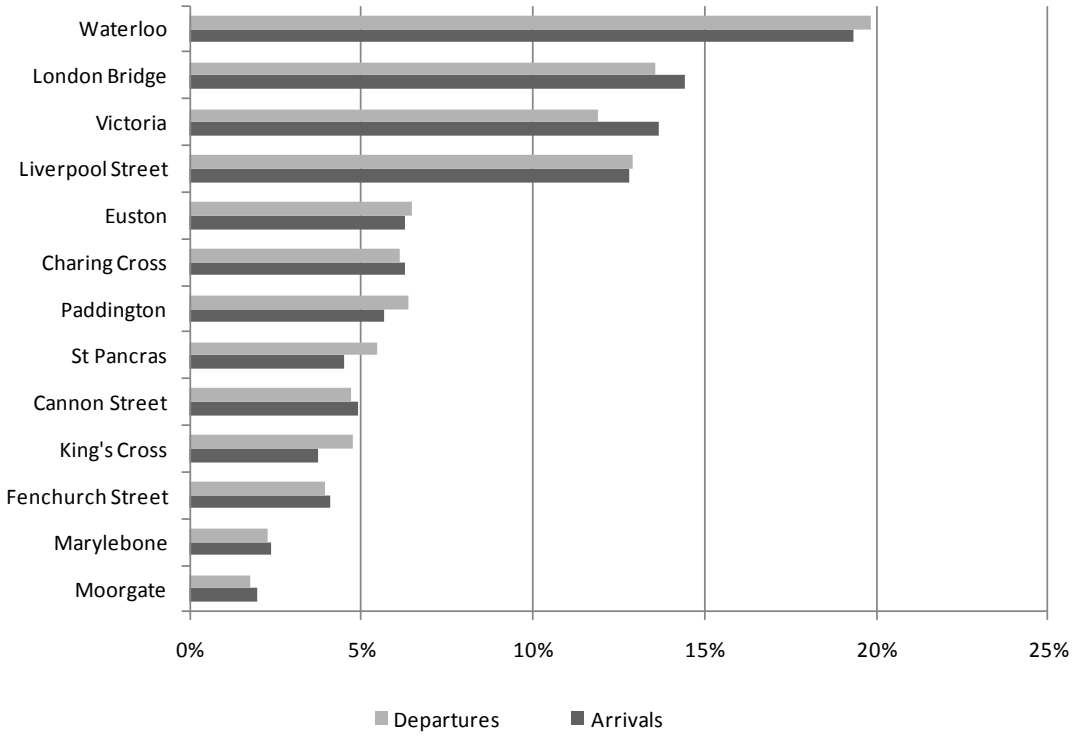
Both arrivals and departures formed definite peaks around the busiest half-hour, with volumes up to almost three times as large at these times compared with the beginning or end of the peak periods.

Rail travel to central London is particularly tidal – travel is dominated by a flow toward central London in the morning and away from London in the evening. The volumes of passengers departing in the morning peak and arriving in the evening peak were therefore relatively small. There was a slight peak in the middle of the peak periods, but the maximum volumes were less than 25,000 per half-hour period – only 15 to 25 per cent of the peak directional flow.

The number of passengers using each of the termini varies substantially. Sixty per cent of passengers arrived at or departed from just four stations, while 20 per cent of all passengers went through Waterloo, the busiest of all the termini. The other three busiest stations are London Bridge, Victoria and Liverpool Street. The least used of the termini are Moorgate and

Marylebone with each handling around two per cent of passengers arriving to or departing from central London termini during the peaks. Figure 1.2 shows the breakdown of arrivals and departures by station.

Figure 1.2 Breakdown of central London arrivals and departures by station

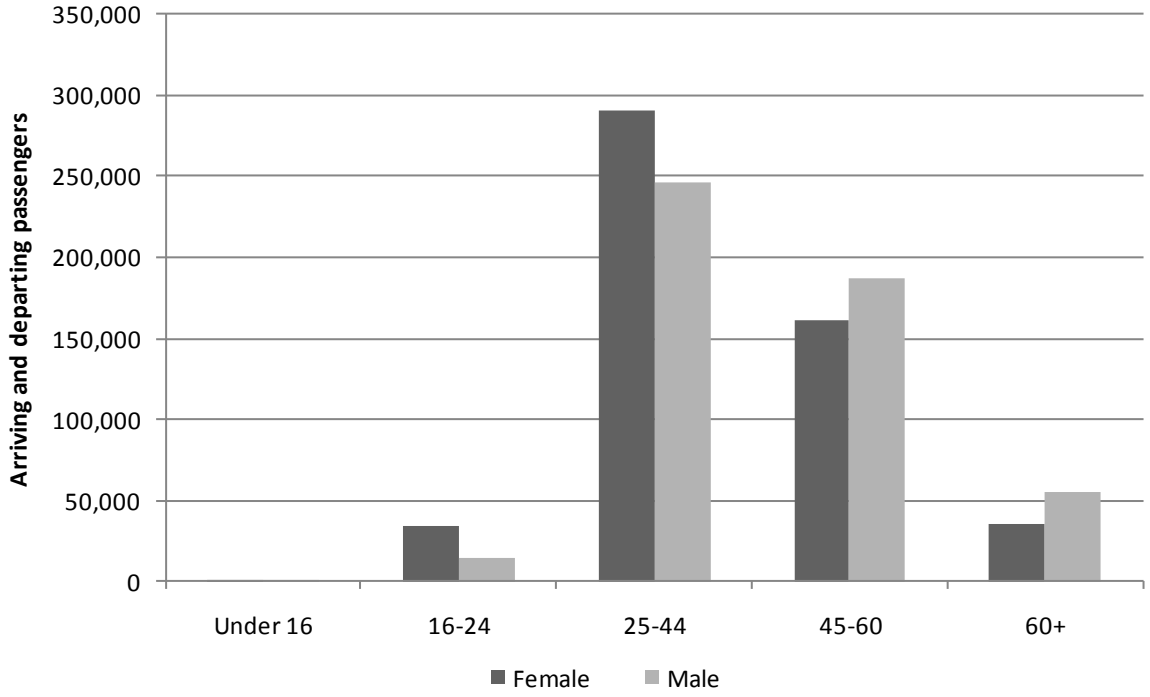


Source: Central London Rail Termini Surveys 2010

Passengers by age and gender

As expected, the majority of passengers using the central London termini stations during the peak periods were of working age, with around half in the 25-44 age group and a further third in the 45-60 age group. The split between male and female passengers was equal across all stations. Figure 1.3 shows the age and gender profile of rail passengers surveyed.

Figure 1.3 Age and gender profile, all stations, arriving and departing passengers



Source: Central London Rail Termini Surveys 2010

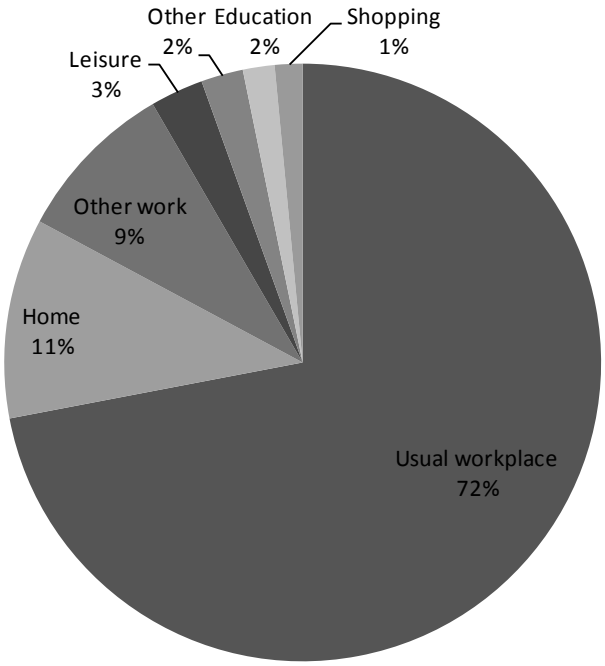
Why people are travelling

The majority of people are travelling to or from central London for work related purposes during weekday peak periods. Figure 1.4 shows the central London purpose breakdown of arrivals and departures during the morning and evening peak periods. The vast majority of passengers (72 per cent) travelled to their usual workplace, and a further nine per cent travelled to other work destinations, meaning work related trips make up over 80 per cent of peak time rail trips at the termini.

Figure 1.5 shows the percentage of trips for work related purposes by station. Passengers travelling for work form the vast majority at stations in or in the vicinity of the City of London with more than 80 per cent travelling to their usual workplace at Cannon Street, Fenchurch Street, Moorgate, Charing Cross and Liverpool Street. At Marylebone, London Bridge, Victoria and Waterloo 7 in 10 passengers surveyed travelled to their usual workplace while at King's Cross that fell to 6 in 10 people. The stations where commuting accounted for only around 50 per cent of the journeys at peak times were Paddington, Euston and St Pancras. St Pancras also had the lowest share of work related journeys overall at 65 per cent.

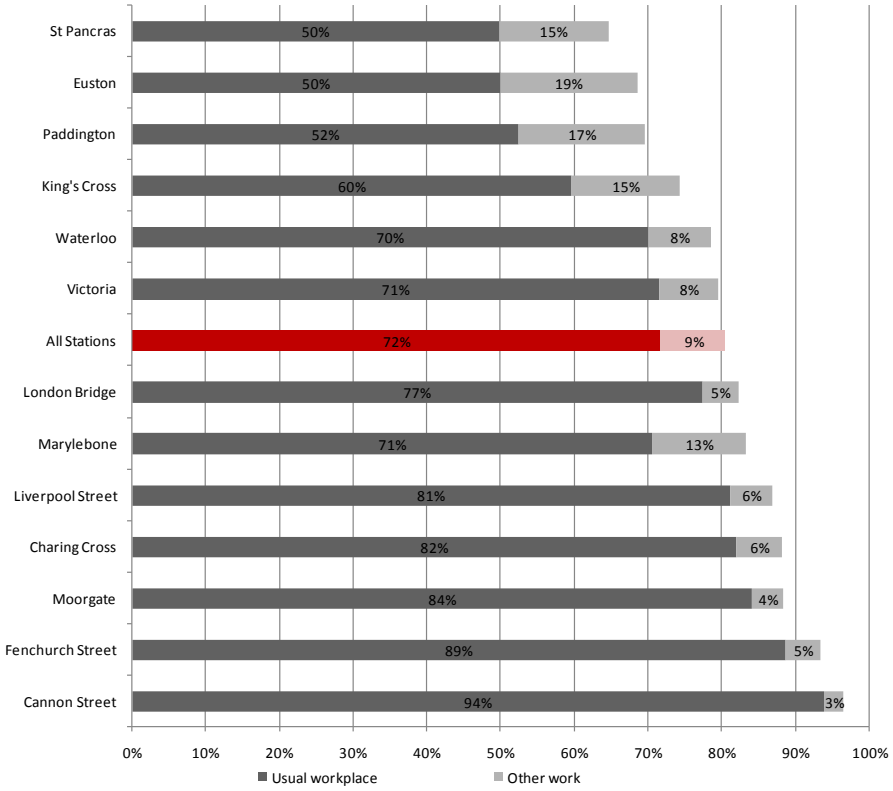
At some stations the percentage of 'other work' journeys was significantly higher than the average across all stations: Euston at 19 per cent, Paddington at 17 per cent, King's Cross and St Pancras at 15 per cent and Marylebone at 13 per cent.

Figure 1.4 Breakdown of rail trips by journey purpose, all stations



Source: Central London Rail Termini Surveys 2010

Figure 1.5 Rail journeys by journey purpose and station



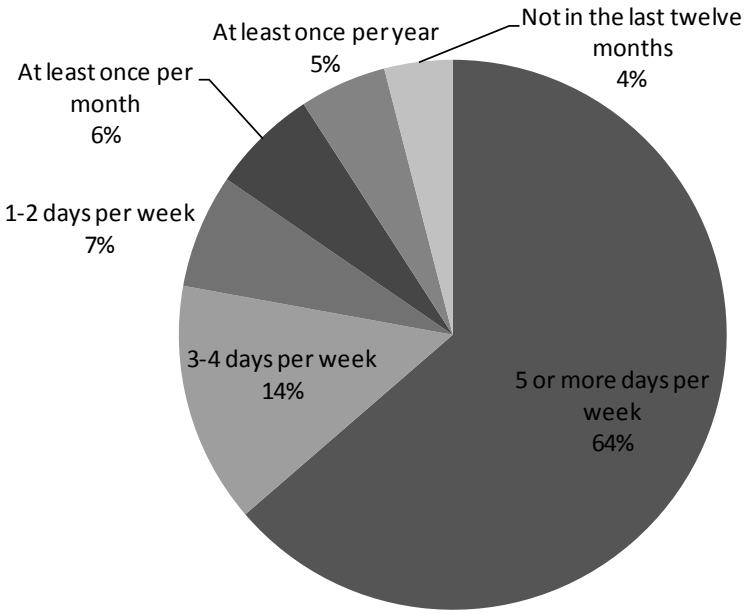
Source: Central London Rail Termini Surveys 2010

Travel by journey frequency

Given that a large majority of the trips reported in the survey were work related, it is not surprising that the frequency with which people made those journeys was high. Seventy-eight per cent of passengers said they made the journey at least three times per week (see Figure 1.6). Only 1 in 10 said they made the journey less than once per month. This may mean that the majority of passengers had a good level of familiarity with the station, the area and the transport options available to them.

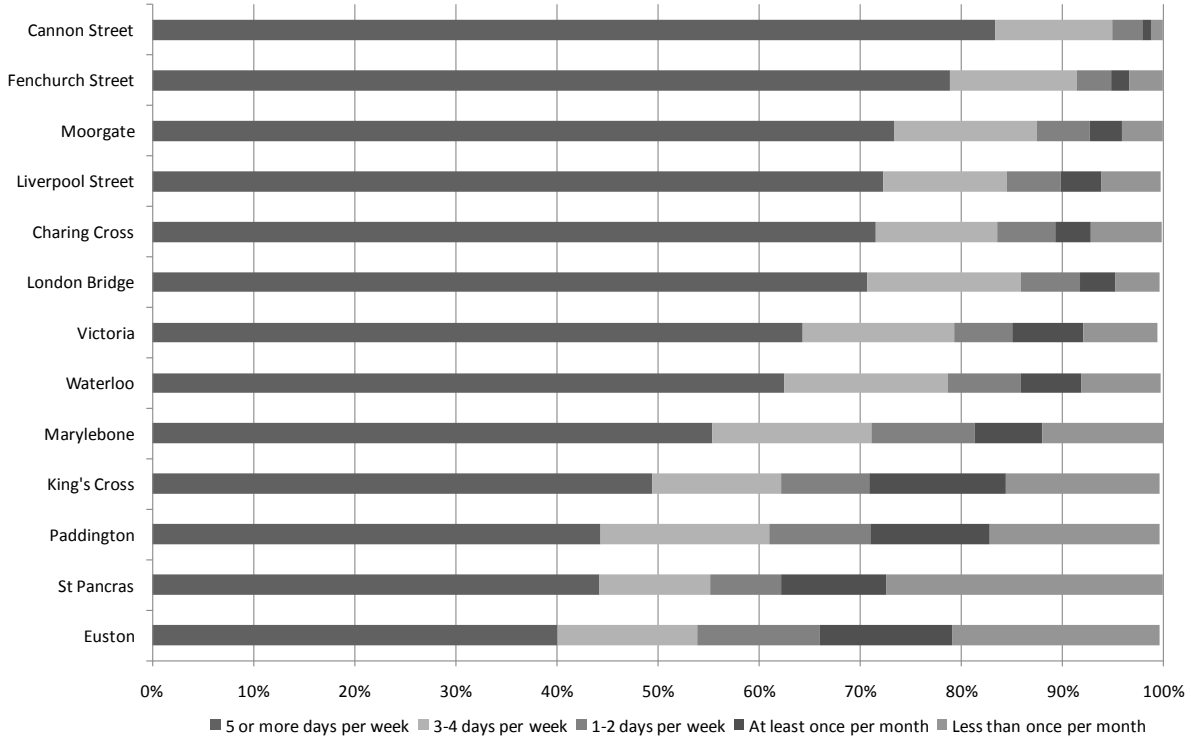
Figure 1.7 shows the frequency of travel by station. Stations with the highest proportion of commuters, such as those serving the City of London, also saw the greatest proportion of frequent travellers. Stations with the highest volumes of infrequent travellers included Euston, St Pancras, Paddington and King's Cross. There is potential at these stations for providing more information to passengers regarding the options available to them in order to help them make the right decisions for an efficient onward journey.

Figure 1.6 Breakdown of rail trips by frequency, all stations



Source: Central London Rail Termini Surveys 2010

Figure 1.7 Frequency of rail journeys by station



Source: Central London Rail Termini Surveys 2010

Chapter 2 Onward distribution

Key findings

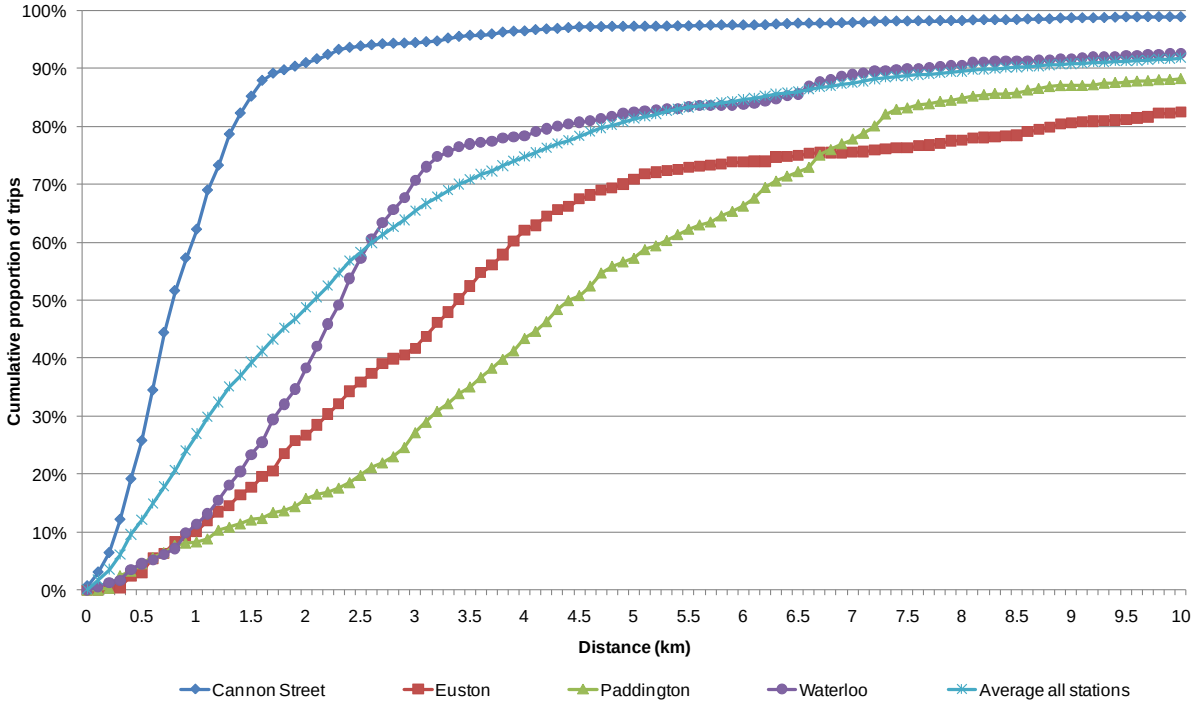
- The majority of onward journeys to and from the central London termini were made either by Underground (40 per cent) or on foot (36 per cent). A further 10 per cent were made by bus while nine per cent of passengers made a rail to rail interchange at the stations.
- The mode share for onward journeys varied substantially between the different termini with Cannon Street having the highest walk mode share at 80 per cent while Paddington had the lowest at 12 per cent.
- The mode used for onward travel was closely correlated with the distance travelled, with different modes dominating different distances. Eighty-nine per cent of onward trips made on foot were shorter that 2 kilometres. Bus use was generally restricted to onward journeys between 1 and 5 kilometres, with 87 per cent of bus journeys in this range. Eighty-eight per cent of Underground journeys were longer than 2 kilometres.
- More than 100,000 bus journeys and over 400,000 Underground journeys in central London are generated by passengers travelling to and from the rail termini during the peak periods. This puts a significant burden on London's public transport system with some stations or services suffering from severe crowding problems.

This chapter describes and analyses onward travel journeys from central London rail termini stations. It describes the modes used and the distances travelled between the rail stations and the origin/destination of the journey. It also seeks to quantify the impact rail passengers have on some of the known constraints of the public transport system in central London.

Distance of onward journeys

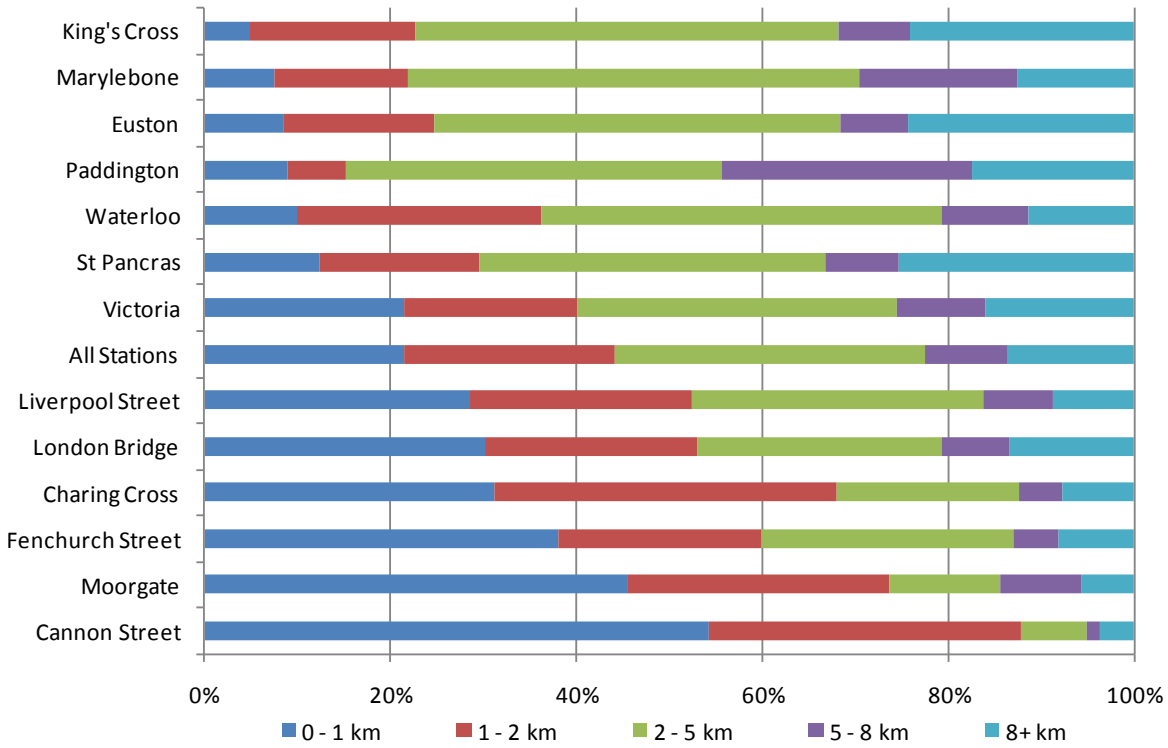
Figure 2.1 shows the distance travelled by passengers arriving at Cannon Street, Euston, Paddington and Waterloo as well as the average distance for all stations. Onward journeys of less than 1.5 kilometres accounted for 85 per cent of arrivals at Cannon Street but only 12 per cent of arrivals at Paddington. These two stations present two different examples of distribution patterns and reflect the station locations in relation to key employment locations. Passengers using termini in or around the City of London have shorter onward distances to travel. Figure 2.2 shows the onward distance travelled by station.

Figure 2.1 Distance travelled by arriving passengers for all stations and example stations



Source: Central London Rail Termini Surveys 2010

Figure 2.2 Distance travelled for onward journeys by station



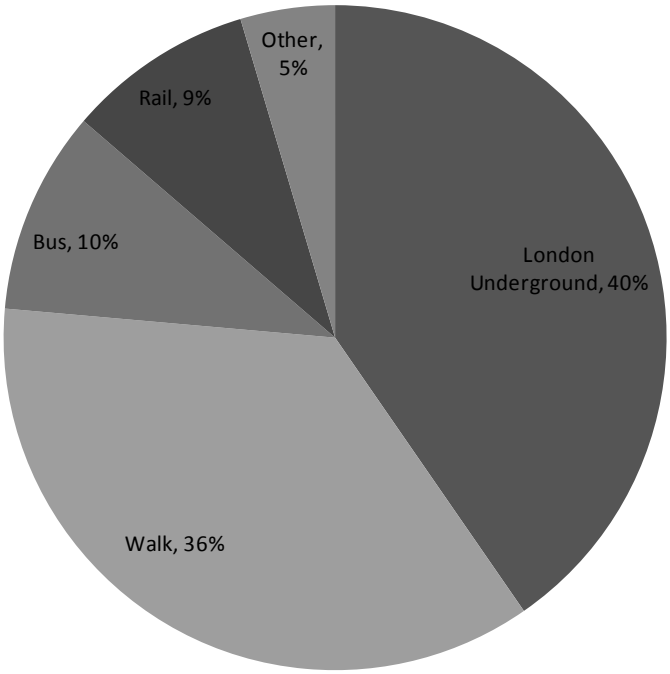
Source: Central London Rail Termini Surveys 2010

Mode share for onward journeys

The most popular mode for onward journeys in central London was Underground with 40 per cent of arriving and departing passengers stating that they used it on the day of the survey, as shown in Figure 2.3. With 36 per cent mode share, walking was the next most popular mode for onward journeys in central London while bus was used by 10 per cent of passengers. Nine per cent of passengers made an interchange between rail services at the termini, continuing their journey with another rail service. Finally, five per cent used other modes, including 1.8 per cent cycling, 1.2 per cent using taxis and 0.5 per cent using car.

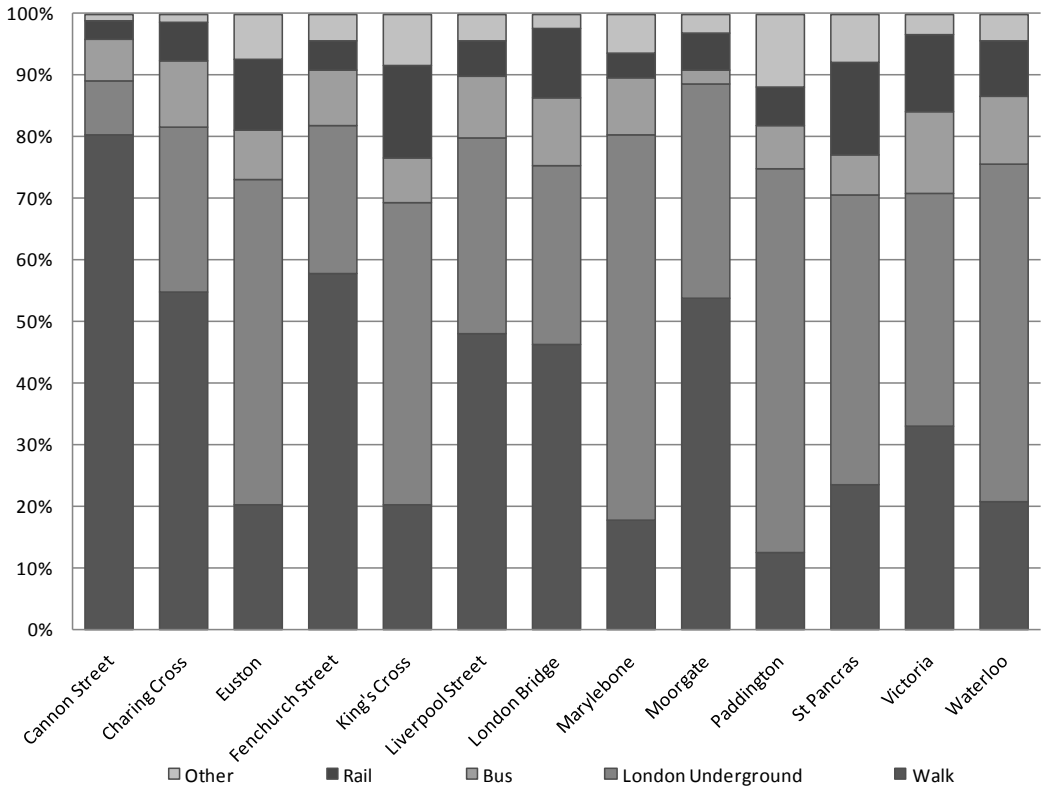
The use of different modes varied among stations as Figure 2.4 shows. Cannon Street for example, had an 80 per cent walk mode share for onward journeys while Paddington at the other extreme had a walk mode share of just12 per cent. The use of Underground at these stations was at opposite extremes as well with 62 per cent of passengers using it at Paddington, while only nine per cent of passengers at Cannon Street used it for their onward journey.

Figure 2.3 Onward travel mode share, all stations



Source: Central London Rail Termini Surveys 2010

Figure 2.4 Onward travel mode share by station



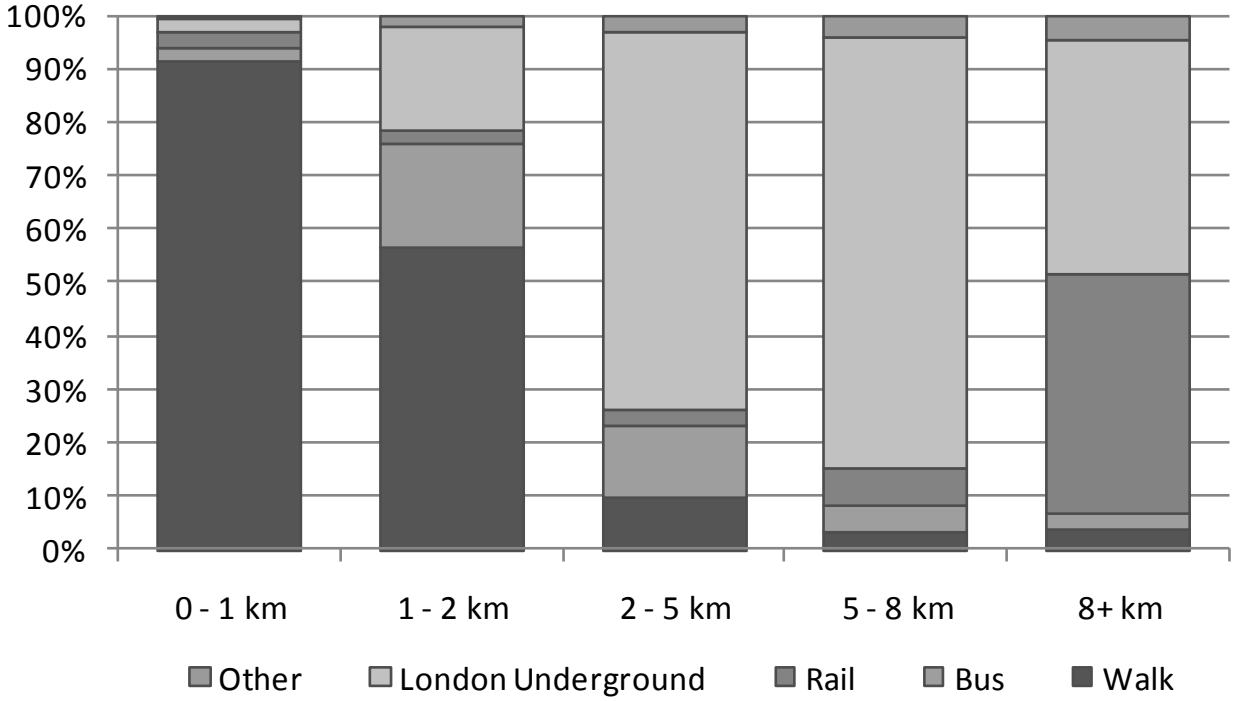
Source: Central London Rail Termini Surveys 2010

Onward journeys mode share and distance travelled

The use of different modes is closely correlated with the distances travelled. As Figure 2.5 shows, the majority of journeys (91 per cent) under 1 kilometre were made on foot. Walking was the most frequently used mode for journeys between 1 and 2 kilometres but at that distance many people also chose a mechanised mode; 19 per cent chose Underground and a further 19 per cent chose bus. Underground was the predominant mode for journeys between 2 and 5 kilometres and 5 and 8 kilometres with 68 per cent and 79 per cent of journeys respectively. For onward journeys over 8 kilometres, the share of trips made by Underground reduces to 43 per cent, and rail becomes a well used mode, accounting for 44 per cent of passengers.

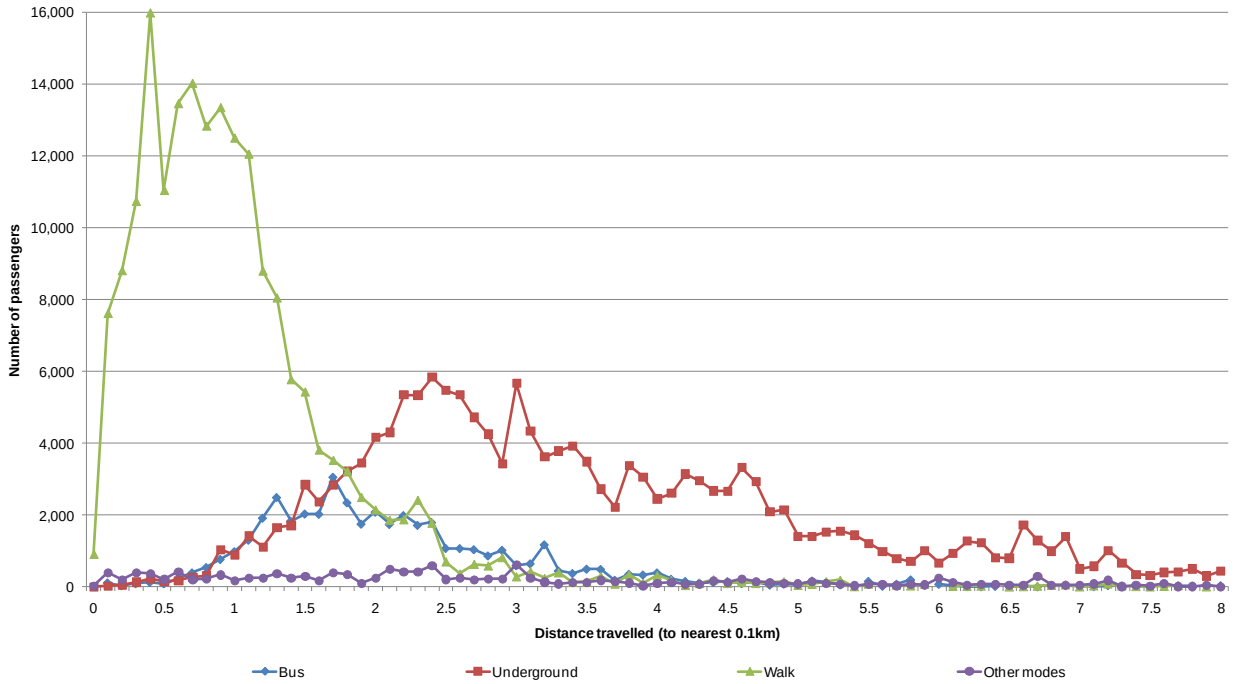
Figure 2.6 shows the distribution of distance travelled by mode for those arriving at the termini in the morning peak. It demonstrates clearly the correlation between mode used and distance travelled from the rail station to the final destination. Eight-nine per cent of walk trips are up to 2 kilometres while a similar proportion of bus journeys (87 per cent) are between 1 and 5 kilometres and Underground journeys were generally longer than 2 kilometres (88 per cent). There is a 'tipping point' at around 1.5 kilometres, beyond which walking ceases to account for the majority of trips. Although distance travelled is not the only factor affecting mode share it is a very significant one which needs to be carefully considered when planning initiatives to achieve mode shift.

Figure 2.5 Onward distance travelled by mode, all stations



Source: Central London Rail Termini Surveys 2010

Figure 2.6 Onward journeys by mode and distance travelled, AM peak period arrivals at all termini

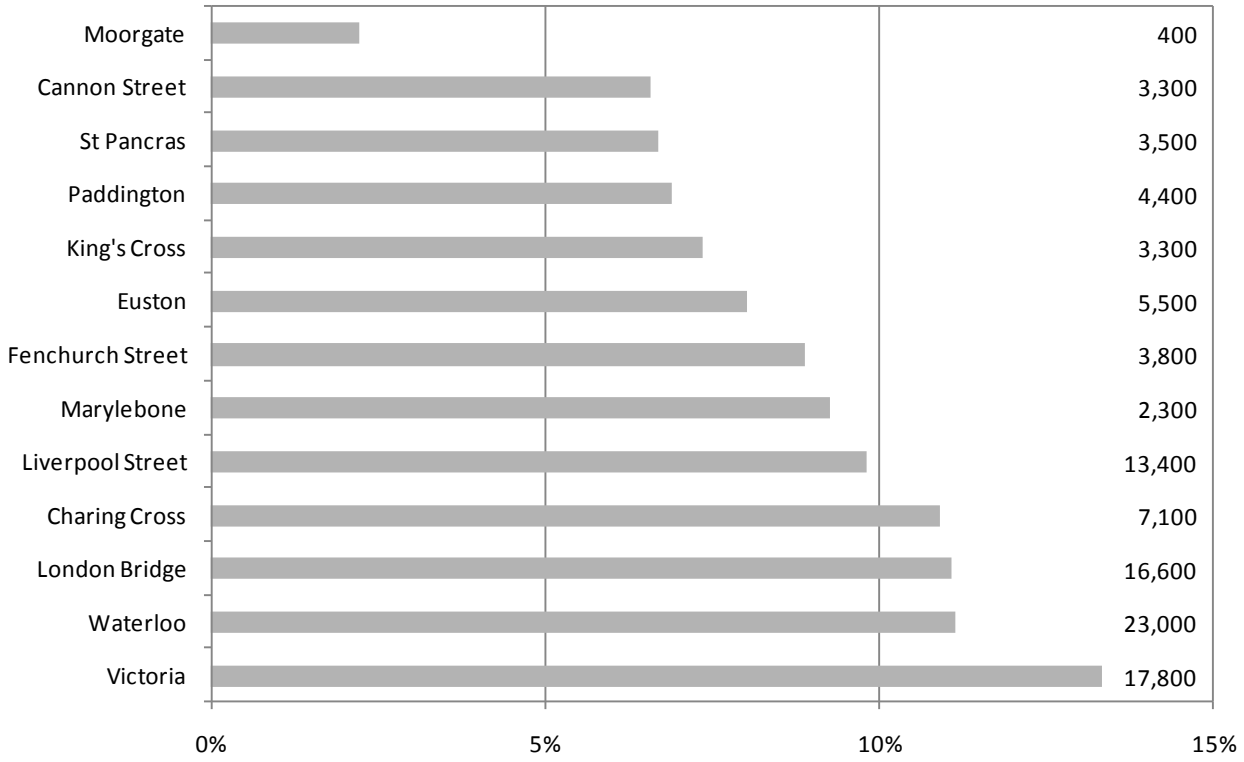


Source: Central London Rail Termini Surveys 2010

The use of bus for onward journeys

As seen above, bus accounted for 10 per cent of onward journeys which is around 100,000 bus journeys to and from the central London termini. Figure 2.7 shows the bus mode share by station as well as the number of journeys made. Victoria has the highest bus mode share at 13 per cent; 17,800 bus journeys were made to and from the station during the peaks. The bus station at Victoria is crowded and these journeys can exacerbate problems there. Other stations with large numbers of bus journeys are Waterloo (23,000), London Bridge (16,600) and Liverpool Street (13,400). The bus corridors from Waterloo and London Bridge to destinations north of the River Thames suffer from crowding during the peak periods. Potential for mode shift away from the bus could be beneficial at Victoria, Waterloo and London Bridge. Chapters 7 and 8 examine opportunities for increasing walking and cycling for onward journeys.

Figure 2.7 Bus mode share and number of onward journeys by station



Source: Central London Rail Termini Surveys 2010

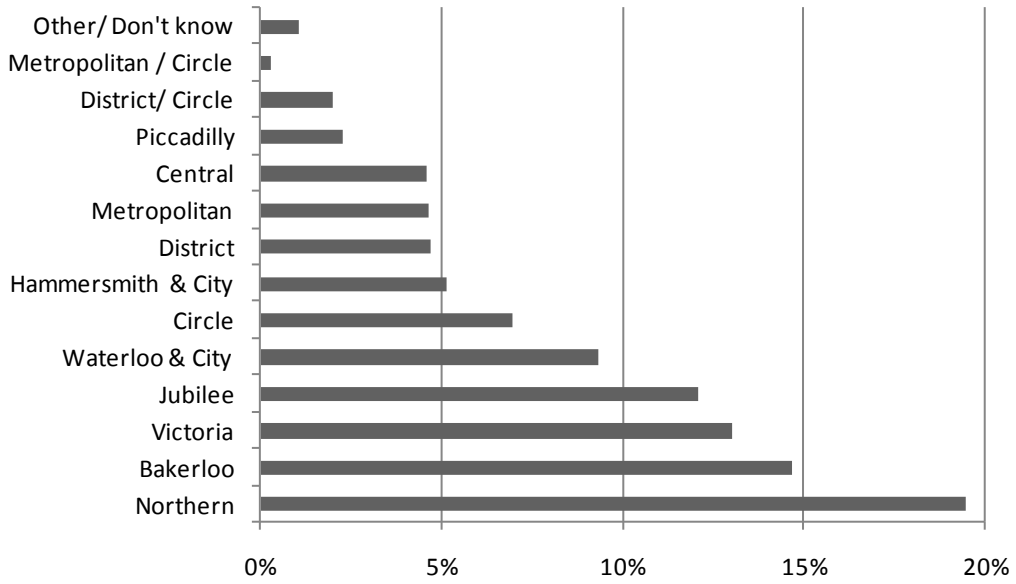
Use of Underground for onward journeys

Underground was the most used mode for onward journeys at the central London termini, used by 40 per cent of all rail passengers over the peak periods. This meant over 400,000 journeys on the Underground were made by arriving or departing rail passengers at the termini. This has a significant impact on the Underground operations both in terms of the lines themselves but also the Underground stations adjacent to the termini.

Figure 2.8 shows the use of different Underground lines in terms of share of onward travel at the termini. The Northern line is the most used line with 19 per cent of rail passengers making a

journey on the Northern line. It is followed by the Bakerloo line at 15 per cent, the Victoria line at 13 per cent and the Jubilee line at 12 per cent. Table 2.1 shows the number of onward journeys by Underground line.

Figure 2.8 Use of Underground lines for onward travel



Source: Central London Rail Termini Surveys 2010

Table 2.1 Onward journeys by Underground line

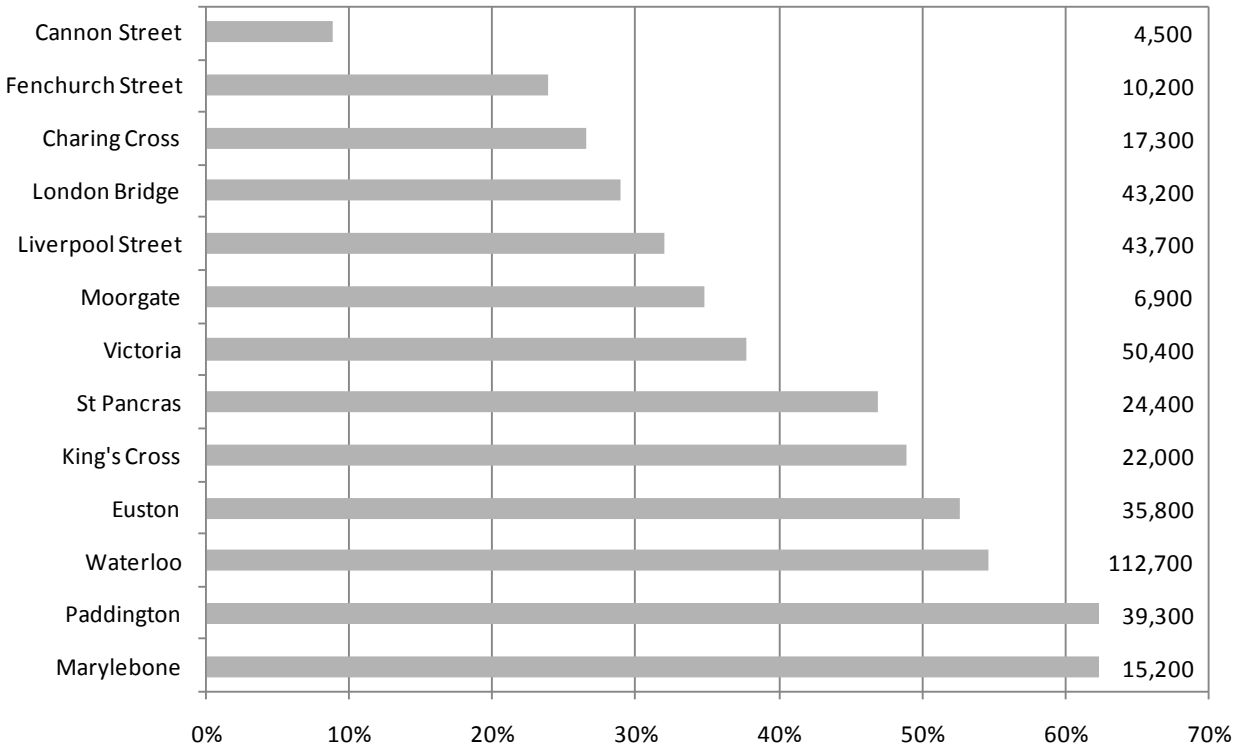
Line	Arrivals	Departures	All journeys
Northern	45,600	37,200	82,800
Bakerloo	36,400	26,000	62,400
Victoria	28,500	26,900	55,400
Jubilee	23,800	27,700	51,500
Waterloo & City	25,800	13,800	39,600
Circle	16,100	13,500	29,500
Hammersmith & City	9,600	12,300	21,900
District	11,100	8,800	19,800
Metropolitan	10,800	8,900	19,700
Central	8,200	11,100	19,400
Piccadilly	5,000	4,600	9,600
District/Circle	3,500	4,900	8,400
Metropolitan/Circle	400	800	1,200
Other/Don't know	4,100	200	4,400
Total	228,900	196,700	425,600

Source: Central London Rail Termini Surveys 2010

Figure 2.9 shows the Underground mode share by station as well as the number of onward journeys made to and from that particular station by Underground. Waterloo, as the busiest of

the termini, had the highest number of onward journeys by Underground (112,700). Victoria had the second highest number of underground journeys (50,400) while there were over 46,400 journeys at King's Cross and St Pancras. Other stations where high numbers of Underground journeys were generated by termini passengers include Liverpool Street, London Bridge and Paddington.

Figure 2.9 Underground mode share and number of onward journeys by station



Source: Central London Rail Termini Surveys 2010

Underground crowding and rail passengers' contribution

The surge of rail passengers arriving at the central London termini in the morning generates significant demand for the Underground services adjacent to the termini. Here we look at this demand along with some of the known crowding issues on Underground stations and services.

Waterloo had 55,000 Underground journeys by arriving passengers in the morning peak period. Although the Waterloo Underground station does not suffer from congestion under normal conditions, several of the lines serving it do. During the morning peak there is crowding on the Northern line in the northbound direction, the Waterloo and City line to Bank and both directions of the Jubilee line, although the eastbound direction is more critical. With 4 in 10 passengers using the Waterloo and City line this is the line used for most onward journeys at Waterloo.

Victoria had 22,100 Underground journeys by arriving passengers in the morning peak. Victoria station frequently has significant congestion issues, particularly the area from the ticket hall to the Victoria line platforms. The station often shuts during the morning peak and crowd

management is employed to regulate people entering the station. In terms of the lines serving Victoria station there is crowding on the District line as well as severe crowding on the Victoria line northbound. More than half of the rail passengers making an onward journey by Underground used the Victoria line (52 per cent) while a further 36 per cent used the District line.

At London Bridge there were 19,100 Underground journeys in the morning peak. The Underground station at London Bridge does suffer from congestion and a one-way system for passengers is often introduced for access to the Jubilee line. Both lines serving the station suffer from crowding with severe crowding on the Northern line northbound to Bank and the Jubilee line eastbound to Canary Wharf during the morning peak.

At Liverpool Street 16,400 arriving passengers stated they used the Underground for their onward journey in the morning peak. Liverpool Street Underground station suffers from some congestion but the most significant problem there is crowding on the Central line. During the morning peak there is severe congestion on the westbound direction of the Central line. Thirty-four per cent of rail passengers use the Central line for their onward journey. In future this station will be served by Crossrail, which will change the distribution patterns of passengers.

There were 16,800 arriving passengers at either King's Cross or St Pancras rail stations in the morning peak who made an onward journey by Underground. Some lines serving King's Cross/St Pancras Underground station do suffer from crowding. During the morning peak there is severe crowding on the southbound direction of both the Victoria and Piccadilly lines as well as the eastbound direction of the Northern line. Two-thirds of passengers making an onward journey by Underground use one of these three lines.

Paddington saw 13,400 arriving passengers making an onward journey by Underground in the morning peak. There are no significant crowding issues at Paddington, with the eastbound Hammersmith and City/Circle line the only line with crowding greater than three passengers per square metre during the morning peak. However, 6 in 10 passengers travelling on the Underground use the Bakerloo line at Paddington.

At Euston 12,700 arriving passengers made an onward journey by Underground in the morning peak. Euston Underground station does suffer from crowding and during peak times there are often queues of people wishing to access the station who pass through the ticket hall/gate line. Euston Square station nearby does not have any capacity related issues. However, some of the lines serving the station are crowded before reaching Euston. During the morning peak there is severe crowding on the Victoria line southbound while there is also crowding on the City Branch of the Northern line. Eight in ten passengers travelling on the Underground used one of the two lines on the day of the survey.

At Charing Cross 7,600 arriving passengers stated they made an onward journey by Underground dung the morning peak. Fourty-three per cent of these used the Northern line which suffers from crowding in the northbound direction.

At Marylebone there were 6,400 onward journeys by Underground (at Marylebone and nearby Baker Street stations) by arriving passengers in the morning peak, with one in two passengers using the Bakerloo line which is crowded in the southbound direction.

At Fenchurch Street 5,400 arriving passengers made an onward journey by Underground in the morning peak. There is some crowding on the District and Circle lines in the eastbound direction through Tower Hill but this is less than three passengers per square metre.

Cannon Street saw 2,200 arriving passengers making an onward journey by Underground, the majority of them using the District or Circle lines from the Underground station with 1 in 10 using the Central line (from Bank). The District and Circle lines do suffer from crowding but this is less than three passengers per square metre.

Chapter 3 Have travel patterns changed over time?

Key findings

- The results of the central London termini surveys in 2010 are compared with the rail surveys of the LATS 2001. Overall, 145,000 more rail passengers arrived or departed across the two peak periods, an increase of 18 per cent.
- St Pancras saw the greatest increase in passenger numbers between 2001 and 2010 while other stations which saw significant growth include London Bridge, Euston and Waterloo.
- Passenger numbers declined at Moorgate, Fenchurch Street, Charing Cross, Cannon Street and Victoria between 2001 and 2010 particularly the number of departing passengers in the evenining peak period.
- Waterloo remained the busiest station among the central London termini.
- The demographic profile of rail passengers is changing with an increase in the percentage of women and a shift towards an older age profile.
- The overall mode shares for onward journeys in central London have not changed significantly with Underground and walk remaining the most popular modes. The greatest increase was observed in the use of cycling with almost 400 per cent more journeys between 2001 and 2010 leading to an increase in the cycling mode share of 1.5 per cent.

This chapter compares the results from the central London termini survey 2010 programme with the results from the rail survey in the LATS in 2001. It provides comparison of rail passenger volumes, key traveller characteristics and onward distribution patterns in central London.

The 2001 survey had been undertaken as part of a wider survey programme and has been the key source of information for rail passengers' travel patterns in central London, and the 2010 survey programme provided a timely update of this dataset. The 2001 data was extracted from the National Rail Travel Survey (NRTS) database, with journeys involving central London termini identified based on origin/destination station. Travel during the peak periods was identified using the First Train Departure/ Last Train Arrival times. The same dataset also contained journeys that involved an interchange at one of the central London termini. However, it was not possible to identify what time the interchange would have taken place and therefore it was necessary to exclude these from the comparison. Accordingly, journeys from the central London rail termini surveys 2010 dataset that involved an interchange with rail were excluded for the purposes of this analysis.

The two surveys employed broadly comparable methodologies but the sample sizes between them differ considerably, with the 2001 survey having a sample size 10 times larger than the

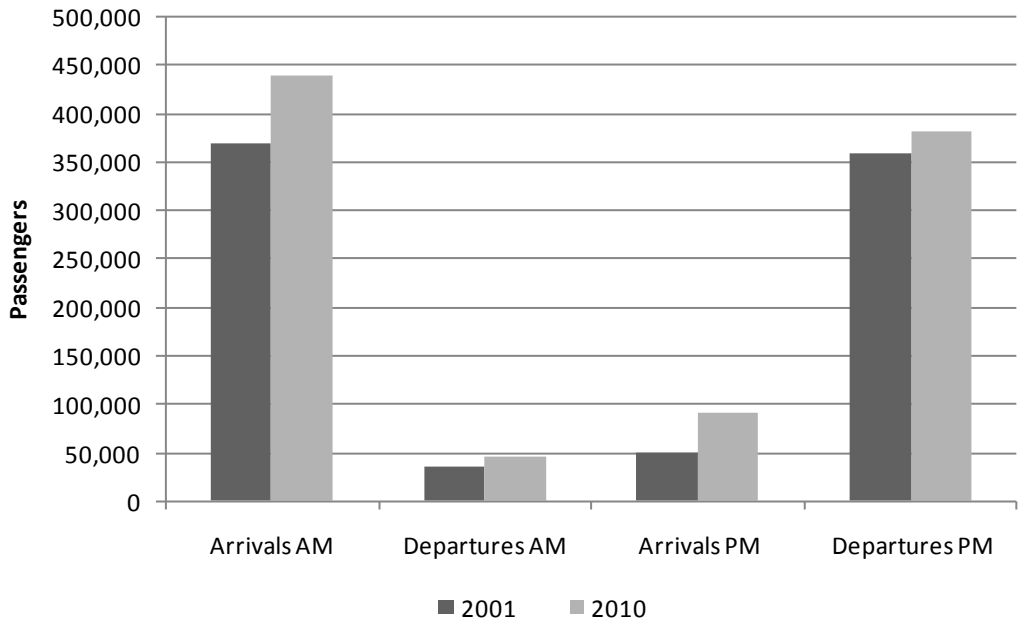
2010 survey (460,000 people interviewed). However, the analysis presented here is confined at an aggregate level which provides a reasonable degree of confidence in the data. For example, for a characteristic shared by 50 per cent of the population (such as gender) the confidence interval at the 95 per cent level with a sample size of 43,000 (the 2010 sample size) is +/-0.5 per cent, while with a sample size of 460,000 (the 2001 sample size) is +/-0.1 per cent.

Passenger volumes and use of stations

Figure 3.1 compares the total numbers of passengers arriving or departing on National Rail services, excluding interchanges, based on LATS 2001 and the central London termini surveys 2010. The data indicated an overall increase in passenger numbers across all periods. Overall, 145,000 more rail passengers arrived or departed across the two peak periods, an increase of 18 per cent. The largest increase was seen in passengers arriving in the morning peak. The largest increase in terms of percentage change was seen in arriving passengers in the evening, with numbers almost doubling between the two survey years.

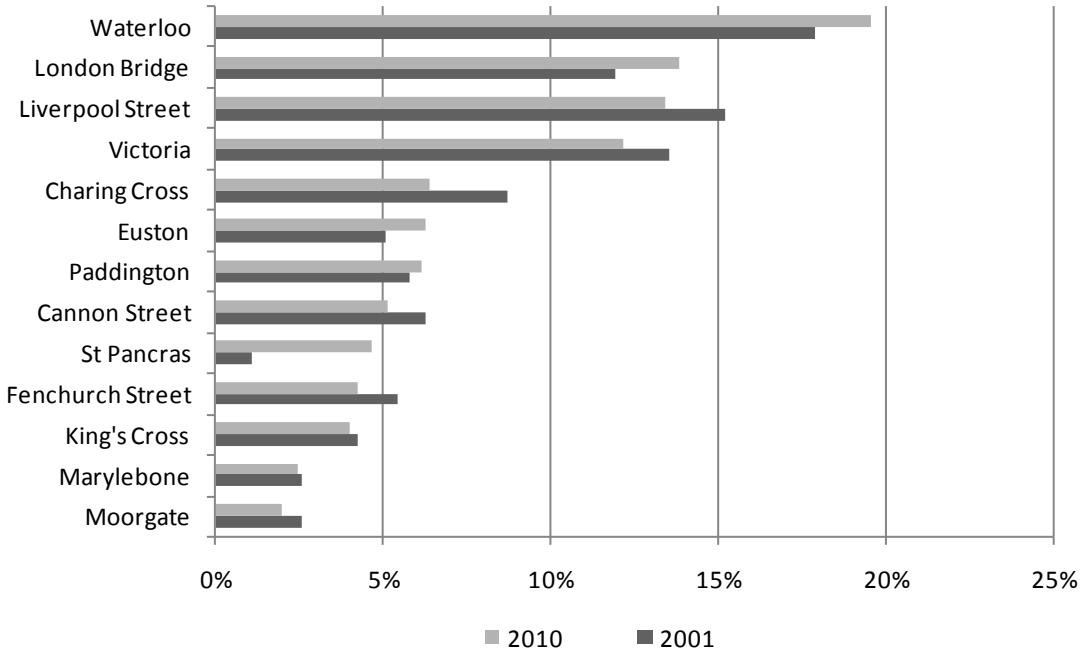
The largest increase was seen at St Pancras station where the number of passengers arriving in the morning peak period grew threefold in the period between 2001 and 2010 reflecting the change in rail services now available at the station, including the addition of Thameslink and High Speed services. Other stations with substantial growth in passengers numbers include London Bridge, Euston and Waterloo. In some stations passenger numbers declined between 2001 and 2010, particularly the number of departing passengers in the evening peak period. These stations are Moorgate, Fenchurch Street, Charing Cross, Cannon Street and Victoria. Waterloo station remains the busiest station among the central London rail termini (see Figure 3.2).

Figure 3.1 Comparison of arriving and departing rail passengers



Source: Central London Rail Termini Surveys 2010

Figure 3.2 Comparison of passenger distribution across central London termini

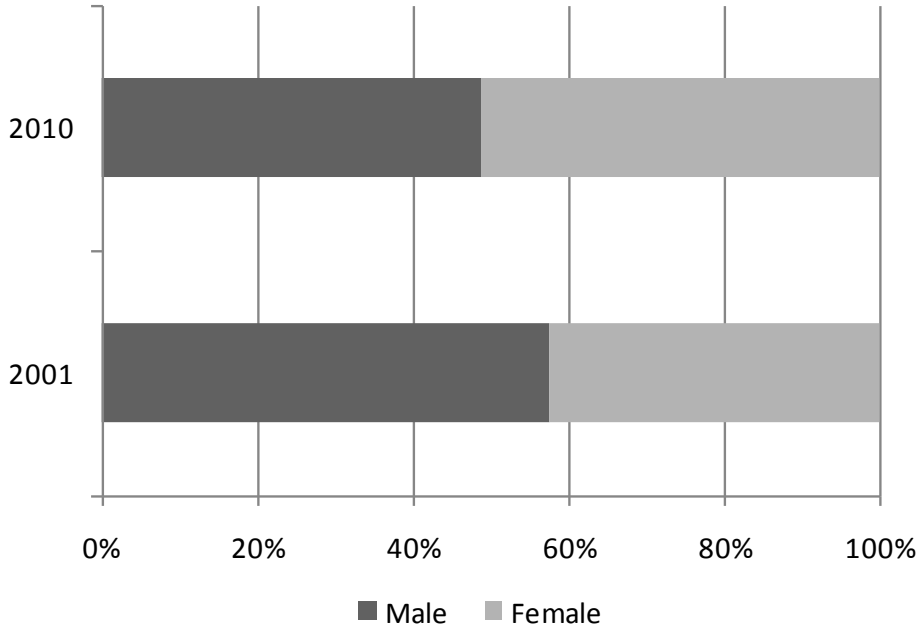


Source: Central London Rail Termini Surveys 2010

Demographic profile of passengers

There has been a significant increase in the number of women traveling into and out of central London by rail between 2001 and 2010. The overall number of women passengers increased by 138,000 in the morning and evening peak periods, representing half of the total number of rail passengers as Figure 3.3 shows. In 2001 women represented 42 per cent of the total.

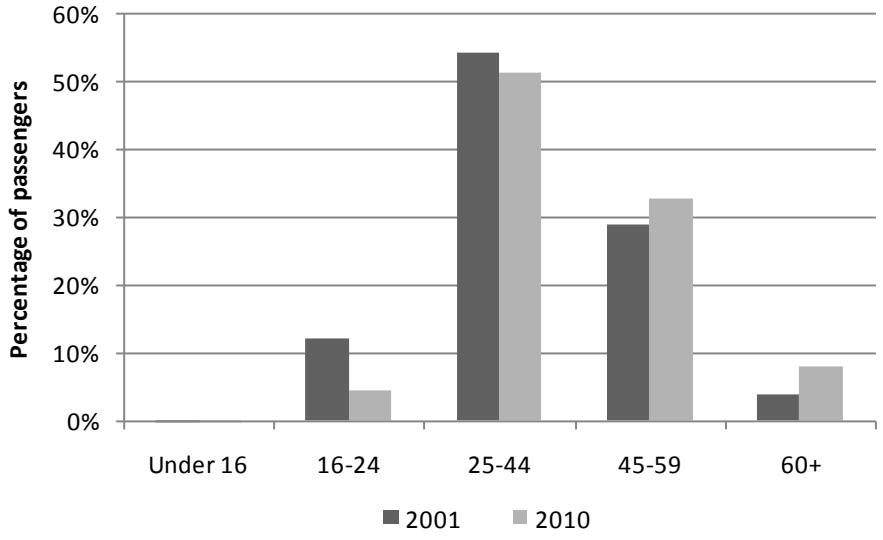
Figure 3.3 Comparison of passengers by gender



Source: Central London Rail Termini Surveys 2010

Figure 3.4 shows the age profile of passengers travelling to and from the central London termini in 2001 and 2010. It shows that there was a shift towards an older age profile between the two survey years, with the share of passengers from the younger age groups declining and corresponding increases in the older age groups. In particular the percentage of passengers aged 60 and over doubled between 2001 and 2010 from four per cent of all passengers to eight per cent.

Figure 3.4 Comparison of passengers' age profile

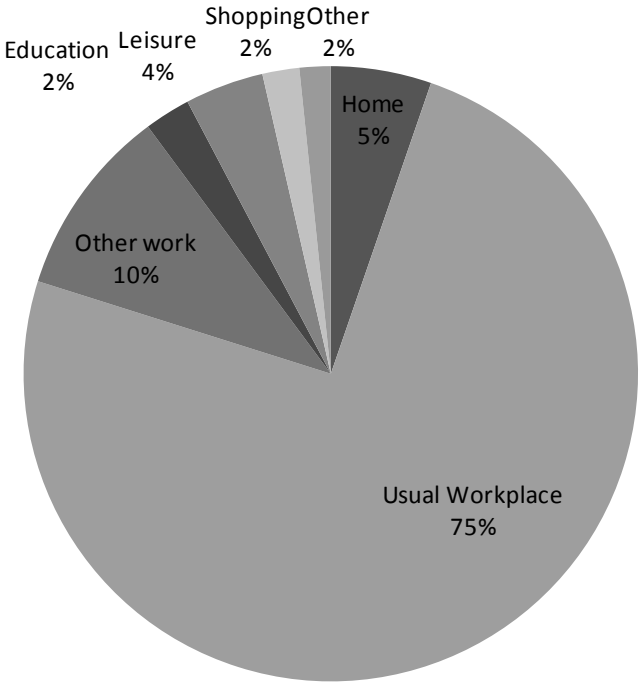


Source: Central London Rail Termini Surveys 2010

Rail journeys by purpose

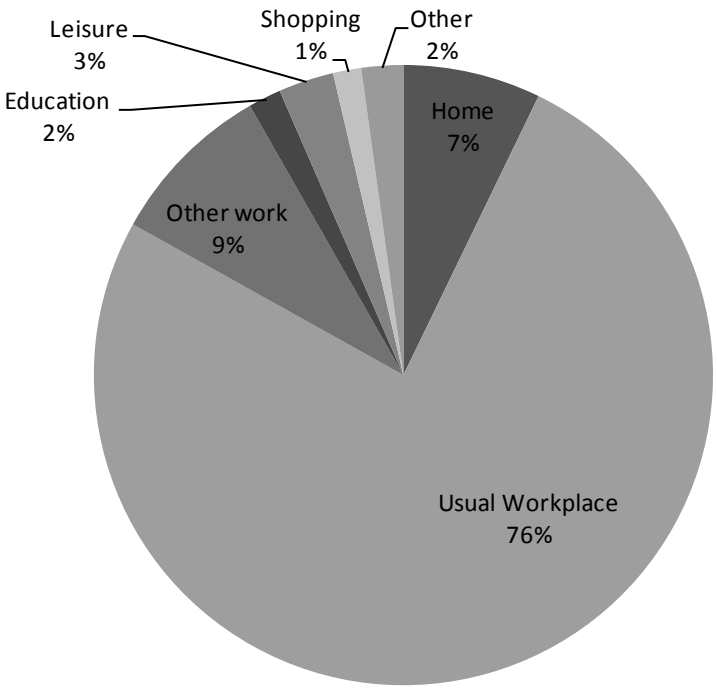
Figure 3.5 and Figure 3.6 show the purpose of rail journeys in 2001 and 2010 respectively. There has been no change between the two survey years with work related journeys being the predominant reason for rail travel to and from central London during the peak periods.

Figure 3.5 Rail journeys by purpose, 2001



Source: Central London Rail Termini Surveys 2010

Figure 3.6 Rail journeys by purpose, 2010

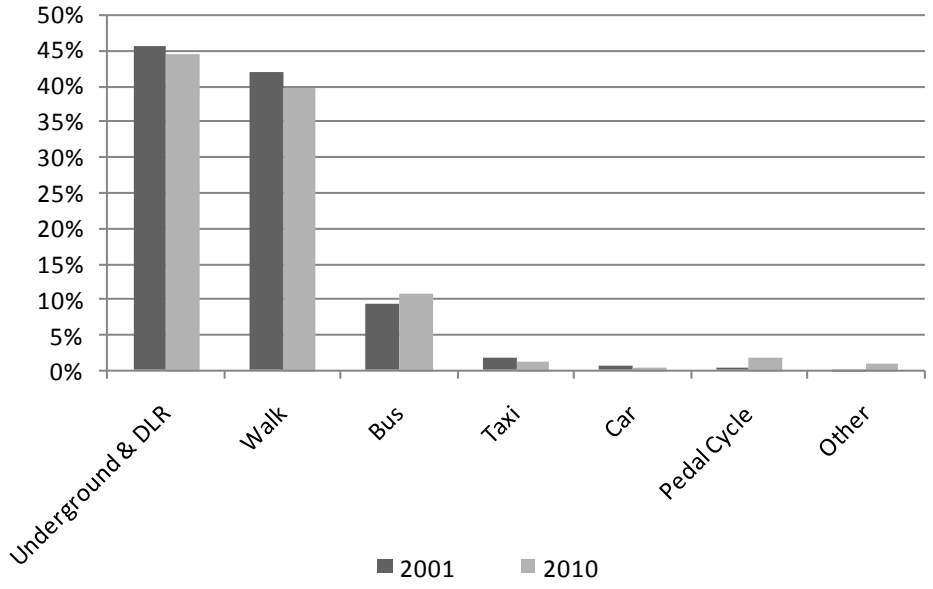


Source: Central London Rail Termini Surveys 2010

Mode share for onward journeys

Figure 3.7 shows the overall mode share for onward journeys in central London in 2001 and 2010. Although the majority of onward journeys are by walk and Underground in both survey years, both modes saw a drop in their share between 2001 and 2010. In comparison, bus and cycling saw the greatest increase with the share for both modes increasing by 1.5 percentage points. The actual number of onward journeys by pedal cycle increased by almost 400 per cent between the two survey years. Note that, as Table 3.1 shows, the number of onward journeys increased across all modes with the exception of car and taxi.

Figure 3.7 Comparison of mode share of onward journeys



Source: Central London Rail Termini Surveys 2010

Table 3.1 Comparison of onward journeys by mode

Mode	2001	2010
Bus	76,000	104,600
Car	6,100	5,200
Pedal cycle	3,900	19,200
Taxi	14,600	12,700
Underground & DLR	371,200	425,800
Walk	341,100	380,100
Other	1,000	10,900
All modes	813,900	958,600

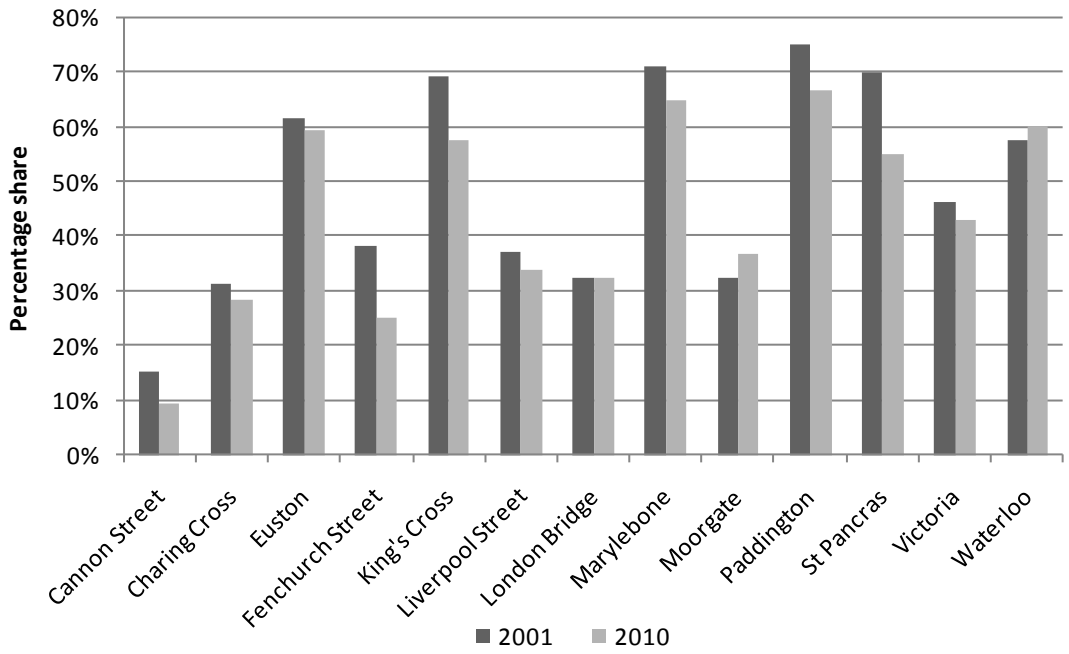
Source: Central London Rail Termini Surveys 2010

These modest changes in the overall mode share for onward journeys cover a greater variation in the changes seen at different stations. Figure 3.8 shows the changes in the share of onward journeys by Underground between 2001 and 2010 by station. The stations where the greatest declines were observed are Fenchurch Street, St Pancras, King's Cross, Paddington and Marylebone. Some of these stations – St Pancras, Fenchurch Street and King's Cross – saw a significant increase in the share of onward journeys made by bus (see Figure 3.9). Other stations with significant increases in the use of bus for onward journeys include Moorgate, Cannon Street and Liverpool Street.

Although the cycle mode share was fairly small in both survey years some stations saw a significant increase in the use of cycling as an onward mode. Figure 3.10 shows that the stations with the greatest growth in cycling mode share are Moorgate, Fenchurch Street, London Bridge

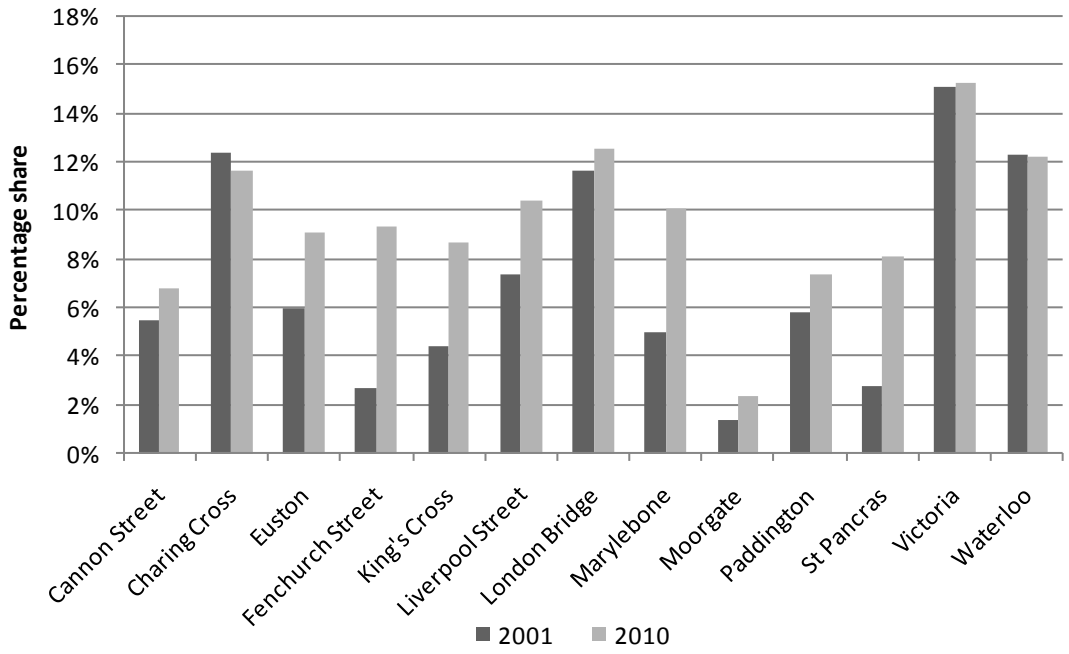
and Charing Cross. This increase equates to 15,000 cycling trips in central London during the morning and evening peak periods. As Figure 3.11 shows the changes in the walk mode share have been fairly small between 2001 and 2010 with the greatest increase at St Pancras and the greatest drop at Moorgate.

Figure 3.8 Share of onward journeys by Underground & DLR



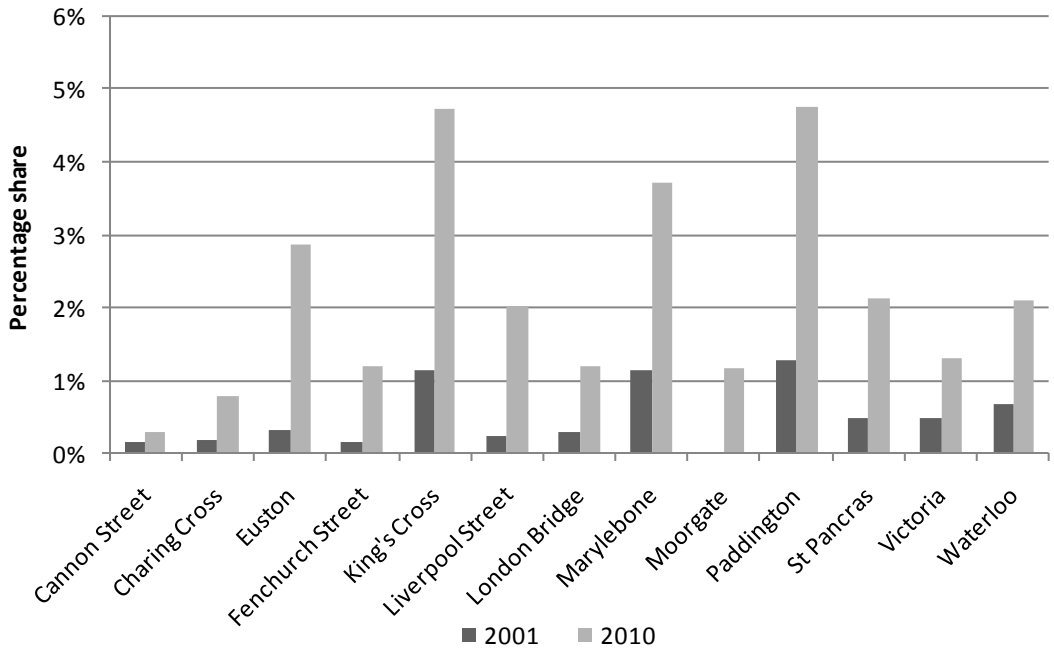
Source: Central London Rail Termini Surveys 2010

Figure 3.9 Share of onward journeys by bus



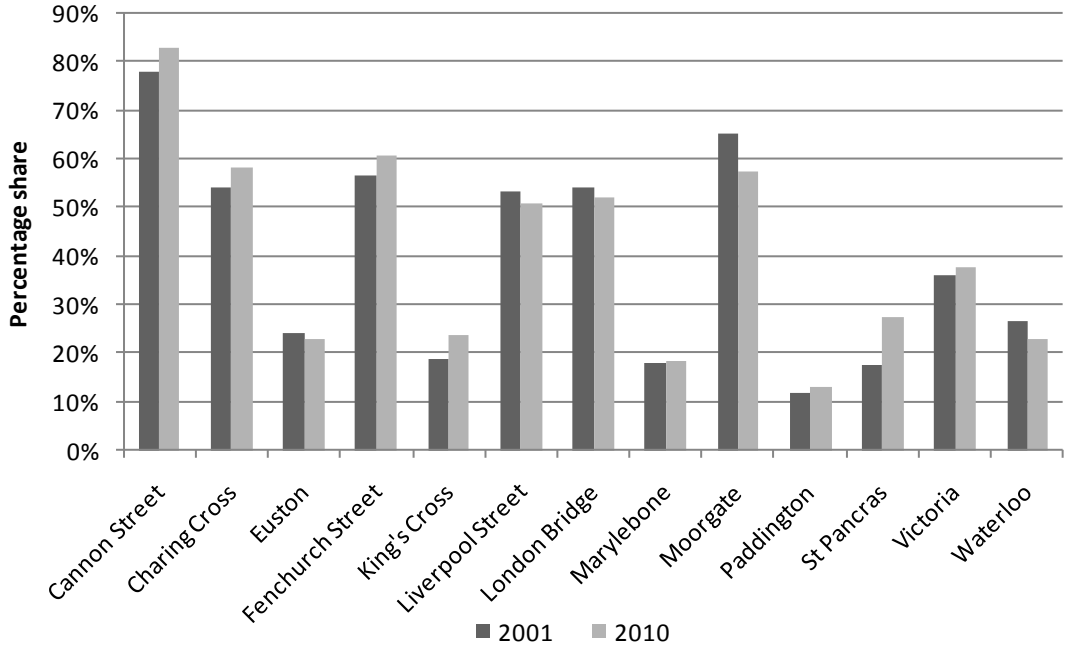
Source: Central London Rail Termini Surveys 2010

Figure 3.10 Share of onward journeys by cycling



Source: Central London Rail Termini Surveys 2010

Figure 3.11 Share of onward journeys by walking



Source: Central London Rail Termini Surveys 2010

Chapter 4 How do Londoners' travel patterns differ from those of non-Londoners?

Key findings

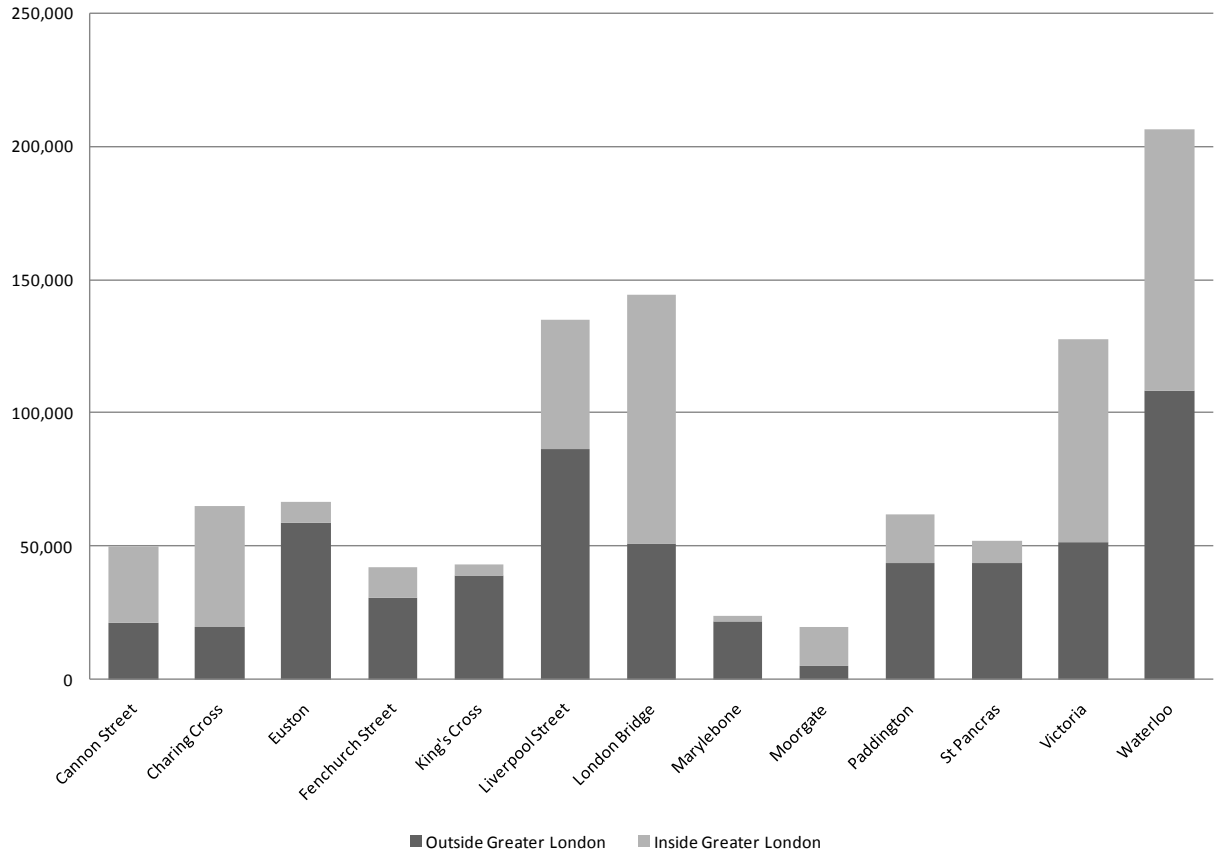
- Just over half of all rail journeys to and from the central London termini stations started or finished outside Greater London. This equates to around 580,000 daily journeys.
- Passengers arriving at Marylebone, King's Cross and Euston stations are the most likely to have come from outside Greater London, closely followed by St Pancras. This of course reflects the services available at these stations.
- Seven in ten non-Londoners made a commuting journey while one in ten journeys were for other work purposes. This compares with only one in twenty people travelling within Greater London making a journey for other work purposes (not commuting).
- People starting or ending their journey outside Greater London are less likely to make that journey every day of the week compared with people travelling solely within Greater London. Non-Londoners are also more likely to be very infrequent travellers with one in ten people travelling once a year or less.
- Non-Londoners are less likely to walk and more likely to use the Underground for their onward journey in central London compared with Londoners. They are, however, more likely to cycle both at the central London end and non central London end of their journey.

This chapter describes travel characteristics of passengers travelling between the central London termini stations and locations outside the GLA boundary. It describes the characteristics of rail journeys made and of the people making those journeys and explores any key differences between Londoners – people starting or ending their journey inside Greater London – and non-Londoners – people who travel between the central London termini and stations outside the GLA boundary.

Overview of travel to or from outside Greater London

Just over half of all rail journeys to and from the central London termini stations started or finished outside Greater London. This equates to around 580,000 daily journeys. The busiest stations for passengers arriving from or departing to outside Greater London are Waterloo, Liverpool Street and Euston, which is partly reflected in the relative size of these termini (see Figure 4.1).

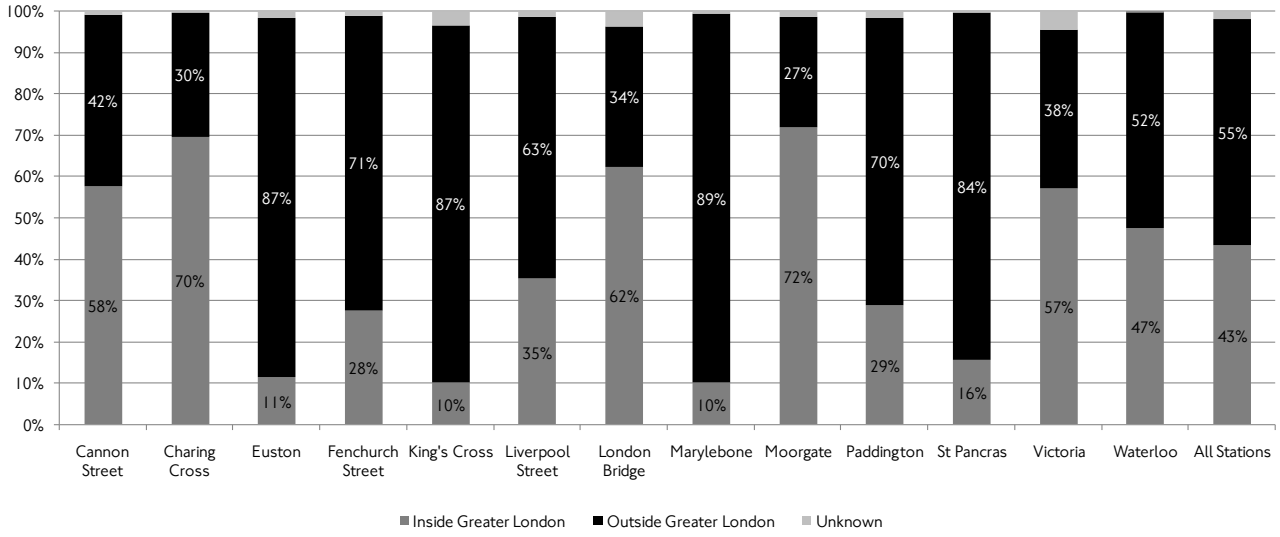
Figure 4.1 Passengers travelling between central London termini stations and stations outside Greater London



Source: Central London Rail Termini Surveys 2010

Figure 4.2 shows the split of passengers travelling between London's termini stations and stations inside or outside the GLA boundary. The passengers arriving at Marylebone were the most likely to have come from outside Greater London, with almost nine in ten having done so. The share was similar at King's Cross and Euston stations, closely followed by St Pancras. The stations that saw the smallest shares of passengers coming from outside Greater London are Charing Cross and Moorgate, both of which saw less than three in ten passengers starting or ending their journey outside Greater London. This is of course a reflection of the services available at each of the stations. It also highlights which of the termini have passengers who are more likely to have travelled longer distances to reach central London and also have a higher percentage of more infrequent travellers.

Figure 4.2 Passengers with origins or destinations inside or outside Greater London

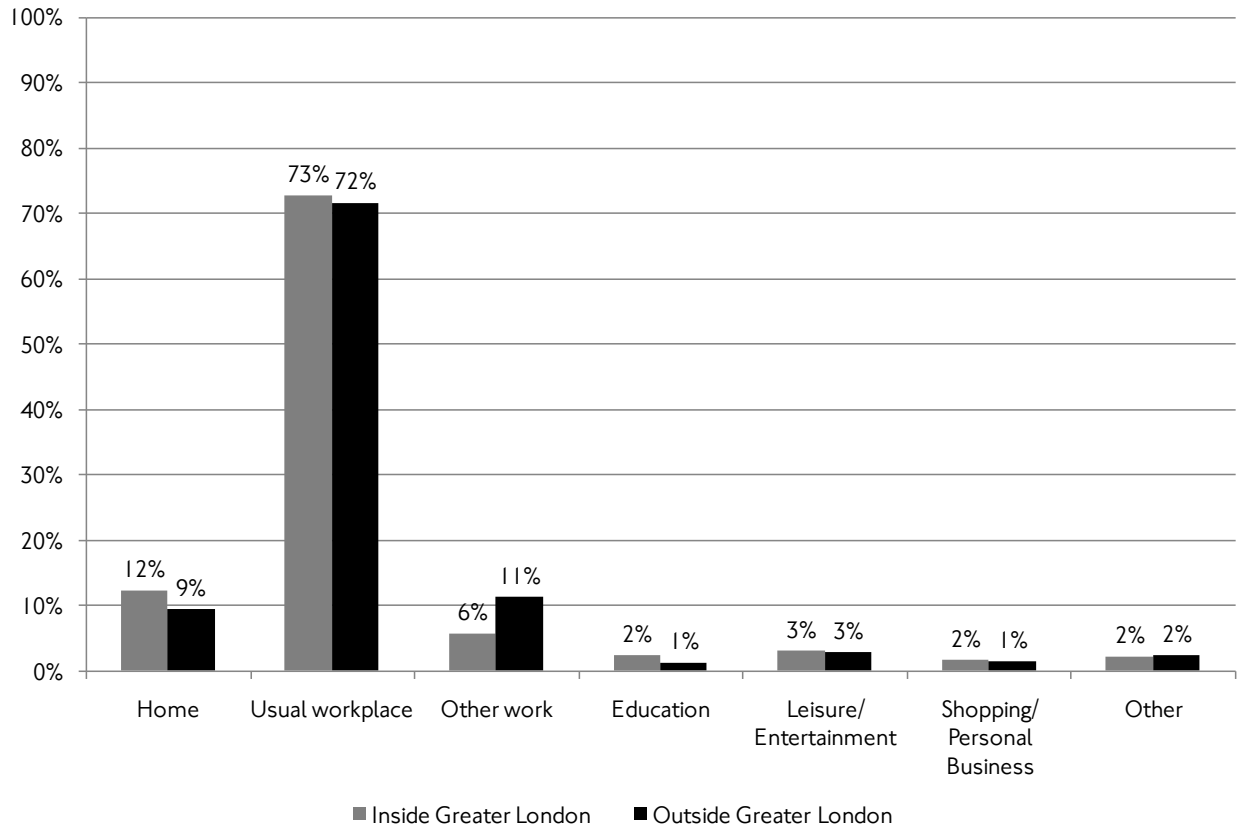


Source: Central London Rail Termini Surveys 2010

Journeys to or from outside Greater London by journey purpose

The majority of onward journeys made by non-Londoners, seven in ten, were for commuting purposes while one in ten journeys were for other work. The latter was higher for non Londoners compared with people travelling solely within Greater London, with only one in twenty having made a journey for other work purposes. As Figure 4.3 shows there was very little difference between people from inside or outside Greater London in relation to all other journey purposes.

Figure 4.3 Comparison of journey purpose by origin or destination inside and outside Greater London

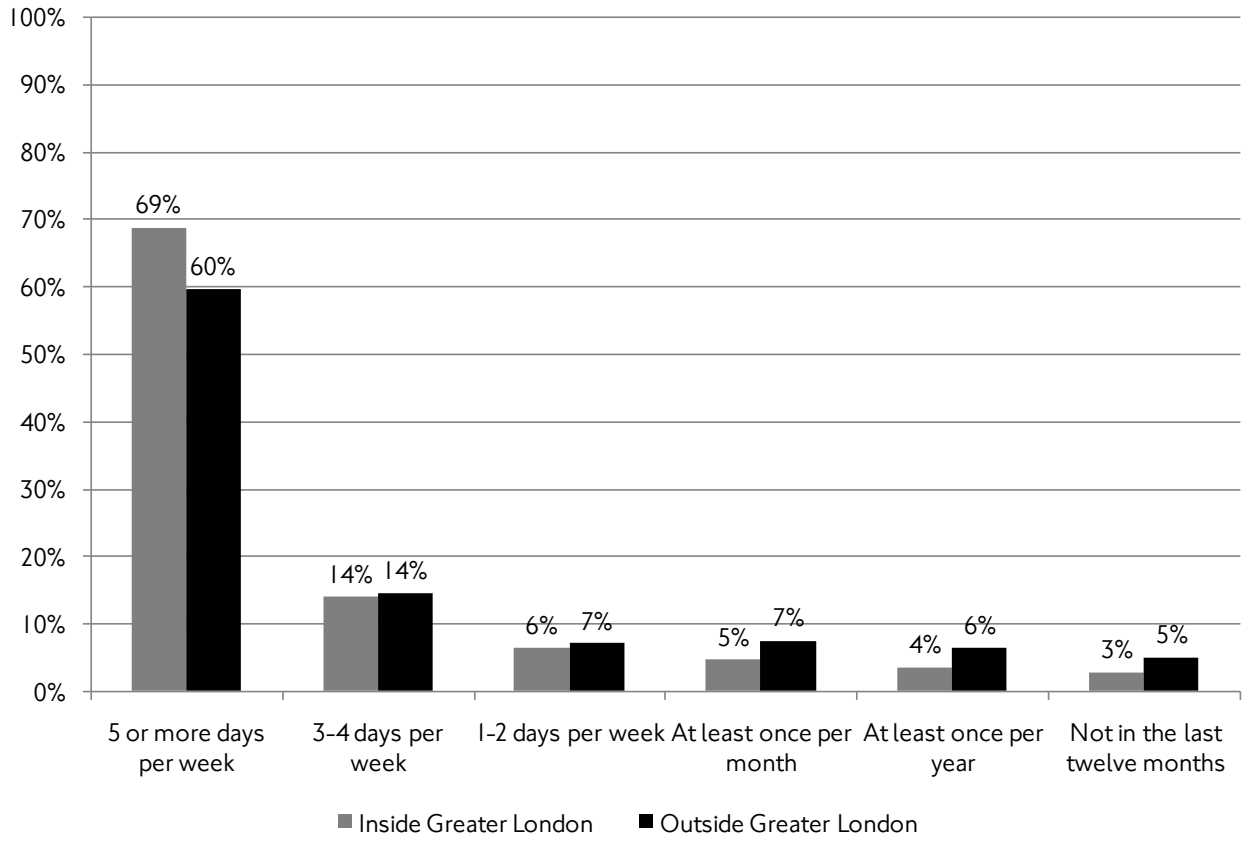


Source: Central London Rail Termini Surveys 2010

Journeys to or from outside Greater London by journey frequency

The fact that non-Londoners tend to make more ad hoc business trips by rail is supported by the reported frequency of travel. Figure 4.4 shows that people starting or ending their journey outside Greater London said they were less likely to make that journey every day of the week compared with people travelling entirely within Greater London. People making journeys on a very infrequent basis were more likely to be non-Londoners as well with one in ten respondents travelling once a year or less, compared with one in twenty people from within London. People making such infrequent journeys to central London are bound to be less familiar with the area and the transport options available to them for their onward journey from the termini stations.

Figure 4.4 Comparison of arriving passengers by origin or destinations inside and outside Greater London – frequency of making trip



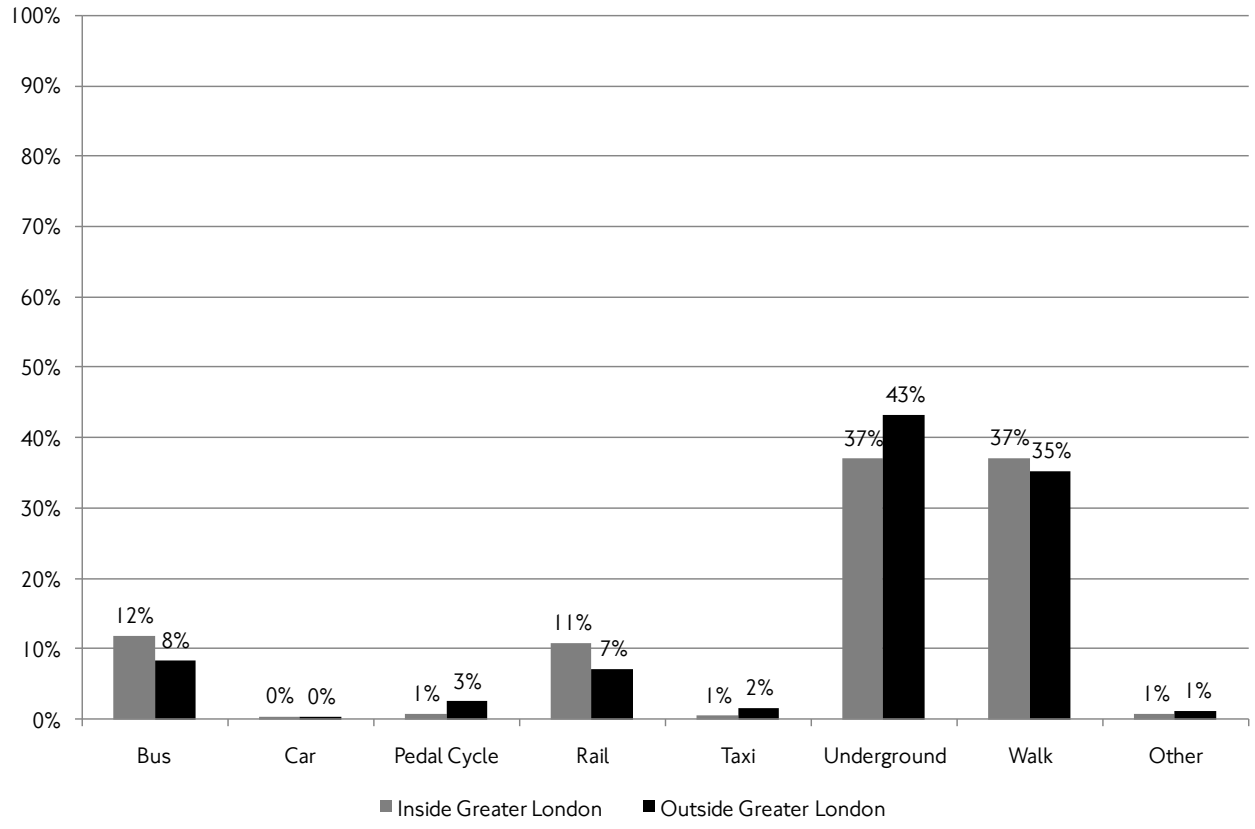
Source: Central London Rail Termini Surveys 2010

Onward mode used – comparing Londoners and non-Londoners

Figure 4.5 shows the modes used by Londoners and non-Londoners to travel to and from the termini in central London. The use of different modes is not significantly different between the two sets of people, with the largest differences seen in the use of Underground, bus and walking, the first used more by non-Londoners, while the latter two used more by those travelling wholly within London. This could be due to the lack of familiarity with central London among some of the more infrequent travellers coming from outside the Capital. Route and way-finding information are key for less frequent passengers in order for them to identify the options available for an efficient onward journey.

It is noticeable that non-Londoners were more likely to use cycling as their onward mode. At three per cent it still represents a minority of the total number of journeys, however compared with only one per cent of Londoners who cycled to and from the termini it is significantly higher.

Figure 4.5 Comparison of passengers by origin or destination inside and outside Greater London – onward mode used at the central London end of the journey

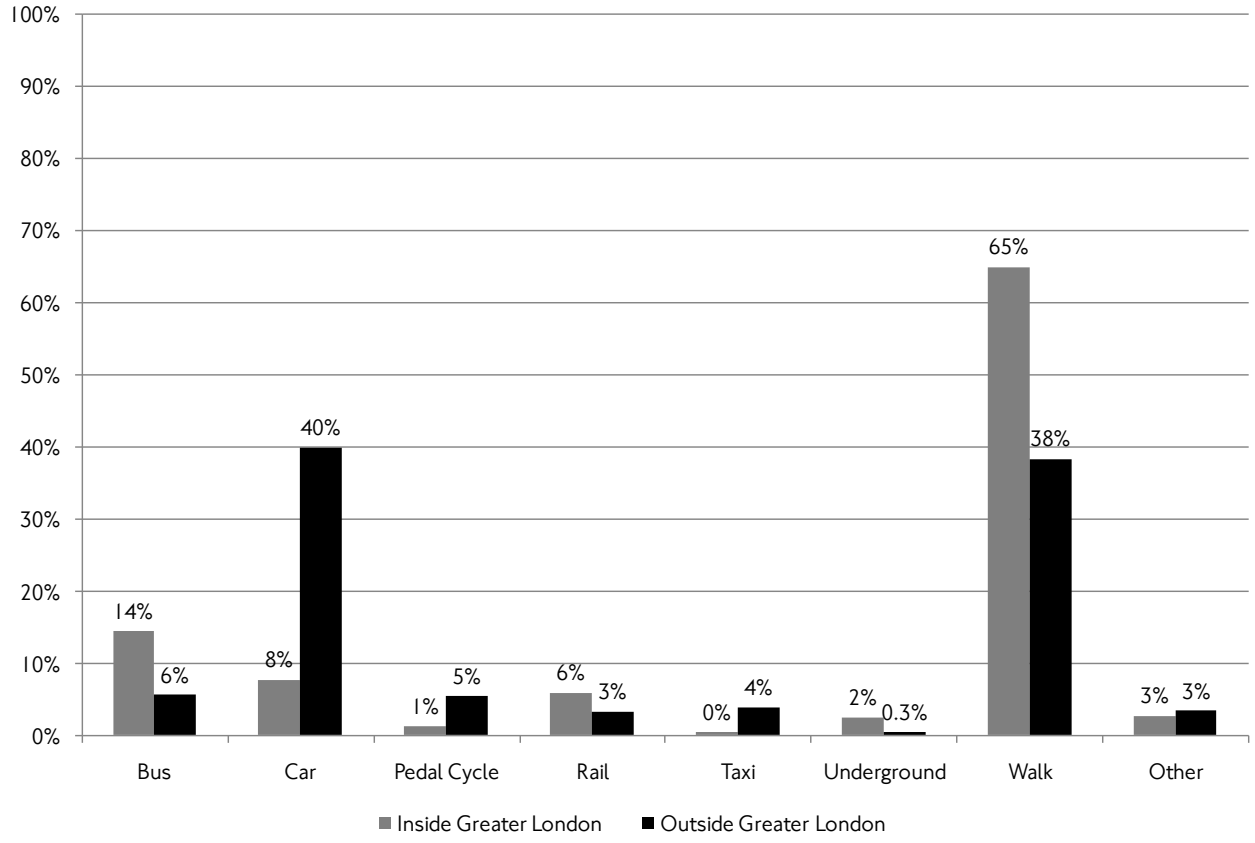


Source: Central London Rail Termini Surveys 2010

There are greater differences in the modes people used at the non-central London end of their journey. As shown in Figure 4.6 travel between stations inside Greater London was most likely to be on foot (65 per cent), while a much smaller proportion of passengers outside Greater London walked to and from their rail station. Despite this, walking was still one of the two key modes used by these passengers; the other was car, which was used by two fifths of passengers outside Greater London. Compared to those from outside Greater London, car was mentioned by a minority of those from within Greater London. Cycle and taxi were also mentioned by a larger share of those from outside Greater London, while all public transport modes were mentioned by larger shares of those travelling from inside the Capital. This is partly due to the distances people outside London have to travel in order to reach a rail station, compared with Greater London.

Again, the proportion of non-Londoners cycling was significantly higher compared to those inside Greater London – five per cent compared with one per cent. It is not clear whether this is due to the distances people travel for their onward journey outside Greater London, the infrastructure, facilities, ticketing options available to them, or whether it is personal preferences. It is likely, however, that the answer is a combination of the above.

Figure 4.6 Comparison of passengers by origin or destination inside and outside Greater London – onward mode used at the non-central London end of the journey



Source: Central London Rail Termini Surveys 2010

Chapter 5 Travel patterns outside central London

Key findings

- Around 40 per cent (400,000) of the rail journeys to or from central London termini stations during weekday peak periods have a start or end point within the GLA boundary.
- Over 80 per cent of journeys are between home and work (usual workplace or other work) in central London while one in ten journeys have work at the non central London end.
- The most popular onward mode at the non-central London end of the journey is walk, followed by bus. The mode share for car is nine per cent at the non central London end but is negligible as an onward mode at the central London termini. Conversely Underground, which is the most popular onward mode in central London, is used by just one per cent of people to access the non central London rail station.
- Walking and cycling are more popular at the non-central London end of the journey with people more likely to have ever walked or cycled outside central London for their onward journey. Those who ever walk or cycle are also more likely to do so more frequently outside central London.
- The five busiest non-central stations (based on the number of trips between these stations and the central London termini) are East Croydon, Clapham Junction, Surbiton, Wimbledon and Putney which handle 57,000 passengers travelling to or from central London rail termini. This is for rail trips originating or ending at those stations and excludes interchange between rail services.

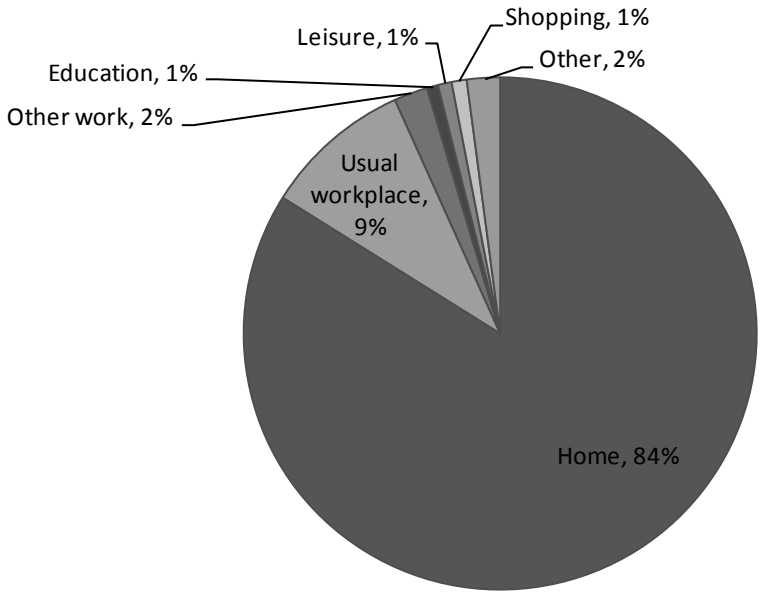
This chapter describes travel patterns of passengers travelling through central London termini stations at the non-central London end of their journey. The first section gives a general overview of all journeys involving a non-central station within Greater London while the second section provides key statistics for journeys involving each of the five busiest non-central stations; East Croydon, Clapham Junction, Surbiton, Wimbledon and Putney. Note that these are the busiest stations purely in terms of volumes of rail passengers travelling between these stations and the central London Rail termini and exclude interchange between rail services.

Around 38 per cent of rail journeys to/from central London termini stations originate or terminate at rail stations within the GLA boundary. This is over 400,000 rail journeys daily. In total the busiest five stations handle around 57,000 National Rail passengers travelling to or from the central London rail termini, equating to 14 per cent of total rail passengers within the Greater London Area. The remainder are distributed across just over 290 rail stations throughout London.

Non-central London journeys by purpose

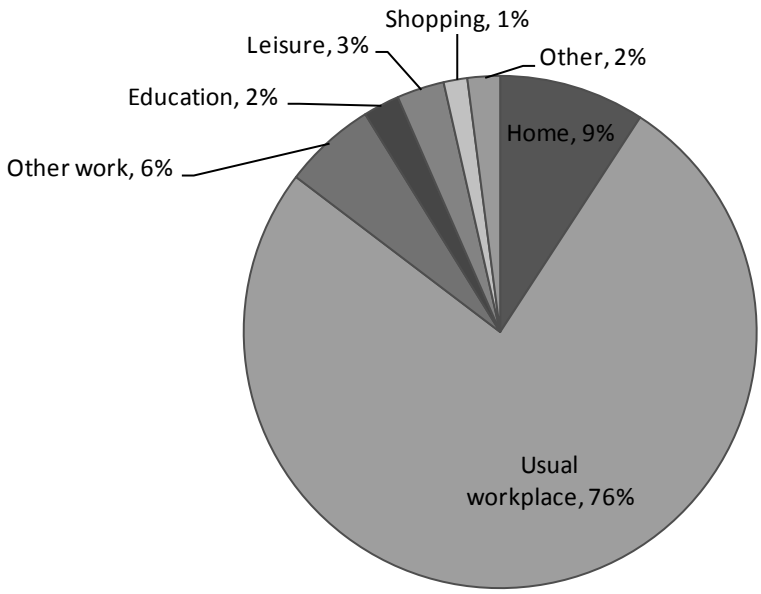
Figure 5.1 shows the non-central London purpose breakdown of journeys to and from rail stations outside central London, but within the GLA boundary, while Figure 5.2 shows the purpose at the central London end of these journeys. Unsurprisingly, over 80 per cent of journeys have home as the non-central London purpose and work as the purpose at the central London end. Around one in ten passengers, however, seem to be making the reverse type of journey from home in central London to a work location outside of central London.

Figure 5.1 Journey purpose at the non central London end



Source: Central London Rail Termini Surveys 2010

Figure 5.2 Journey purpose at the central London end



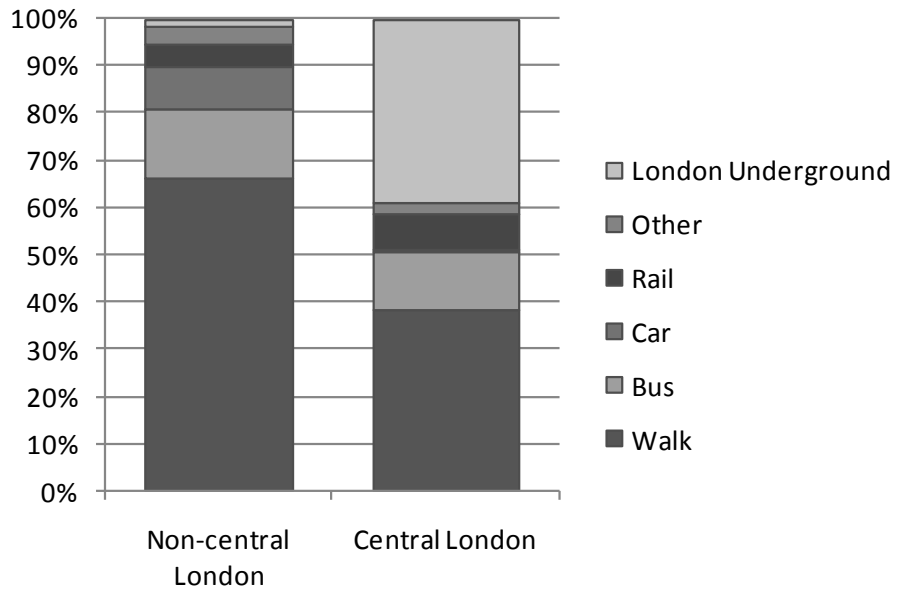
Source: Central London Rail Termini Surveys 2010

Onward mode at the non-central London end

Figure 5.3 shows the breakdown of mode used to access/egress all non-central London rail stations within Greater London, compared with the modes used by the same people for their onward journey at the central London termini.

The use of different modes varies significantly between the two ends. Around two thirds of passengers walk at the non-central London end of their journey, compared with around 38 per cent of those at the central London end. The proportions of people travelling by bus at either end of the journey are similar. Nine per cent of people travel by car to access their non-central London station while the use of car as an onward journey mode does not feature at all in central London. Conversely the use of Underground at the non-central London end is negligible while 39 per cent of onward journeys are by Underground in central London.

Figure 5.3 Onward mode at the non-central London end compared with mode used at the central London end of journey



Source: Central London Rail Termini Surveys 2010

As well as being asked to describe the trip they were making at the time of the survey, respondents were also asked whether they ever walk or cycle to access the rail station at either end of their journey. Analysis of this information reveals some differences between the propensity to walk or cycle at the non-central London end, compared with the central London end of the journey.

Eighty-two per cent of respondents said they ever walk the journey to or from the rail station outside central London compared with 57 per cent ever doing so at the central London end. Moreover, around 58 per cent of those who ever walk at the non-central London end of their journey do so five or more times per week. The equivalent figure of those walking in central London five or more times per week is 49 per cent.

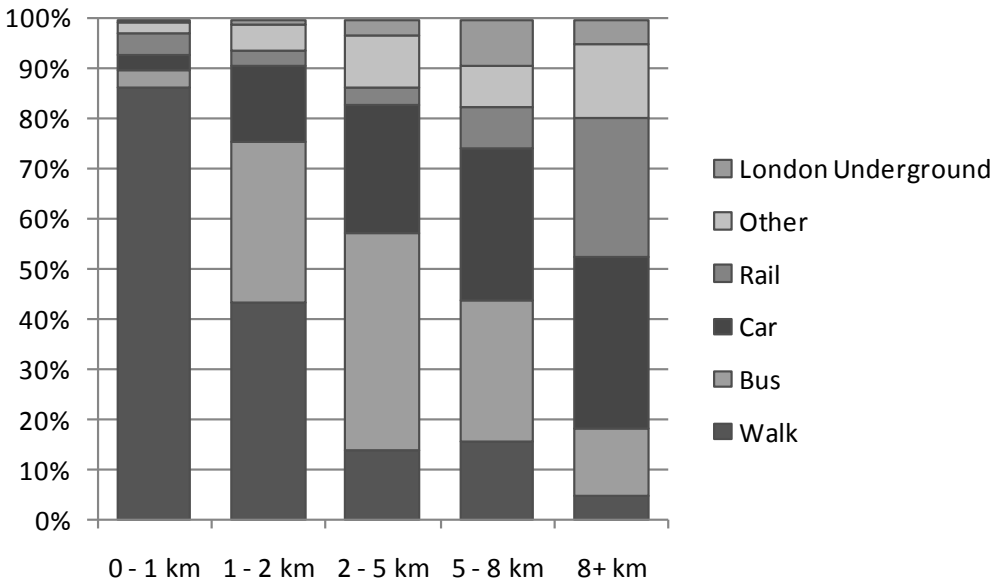
The percentage of respondents who ever cycle is similar (four per cent) at both the central and non central London end of their journeys. The frequency of cycling is different, however, with 28 per cent of respondents saying they cycle five or more times per week at the non central London end compared with 16 per cent in central London.

It seems that walking and cycling are more popular outside of central London and people are prepared to use them on a more frequent basis.

Onward mode at the non-central London end by distance

The use of different modes by distance outside central London is similar to that within central London to travel to or from the central London termini (see Chapter 2). Eighty-six per cent of journeys under 1km are made on foot. As distance increases the proportion of walk journeys decreases and the use of bus and car rises. Interestingly, one in five journeys less than 2km is made by car. Only around three per cent of journeys cover distances greater than 5km, which reflects the number of options available within Greater London.

Figure 5.4 Onward mode at the non-central London end by distance

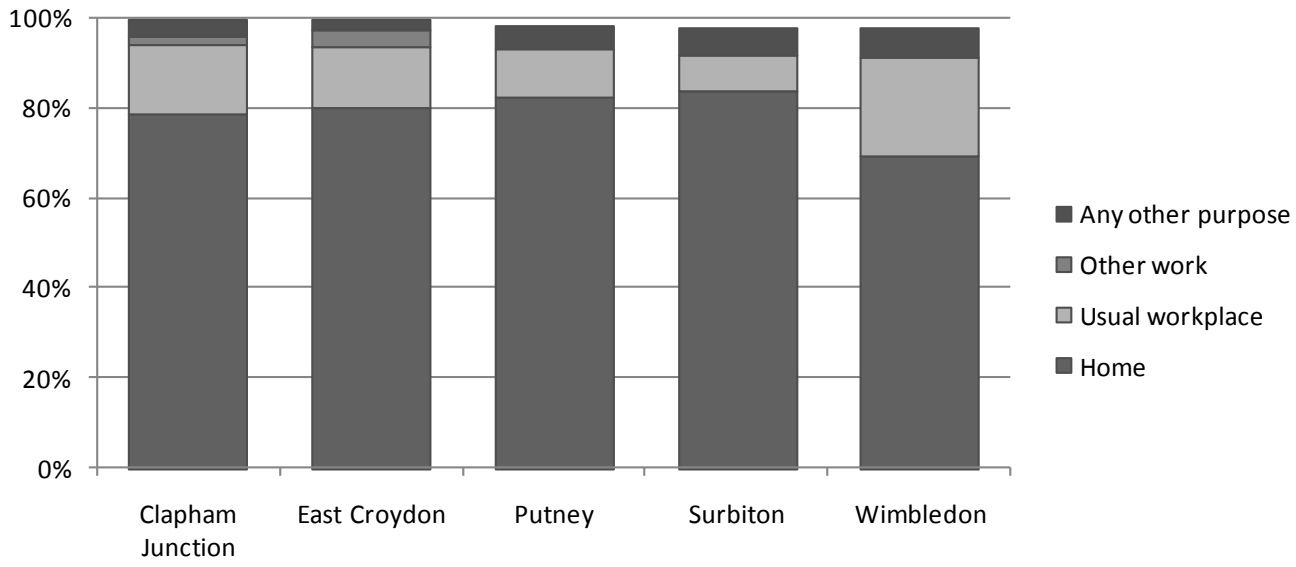


Source: Central London Rail Termini Surveys 2010

Travel at the five busiest non-central London rail stations

This section presents some key statistics for journeys involving each of the five busiest non-central stations; East Croydon, Clapham Junction, Surbiton, Wimbledon and Putney. East Croydon serves London Bridge and Victoria while the other four stations all serve Waterloo. Figure 5.5 shows the journey purpose of passengers boarding trains to or from the central London termini at the five busiest non-central London stations. The most common purpose for all stations is home. However, work journeys represent a significant proportion of all journeys, particularly in Wimbledon where one in five people travelling through the station are travelling to or from work.

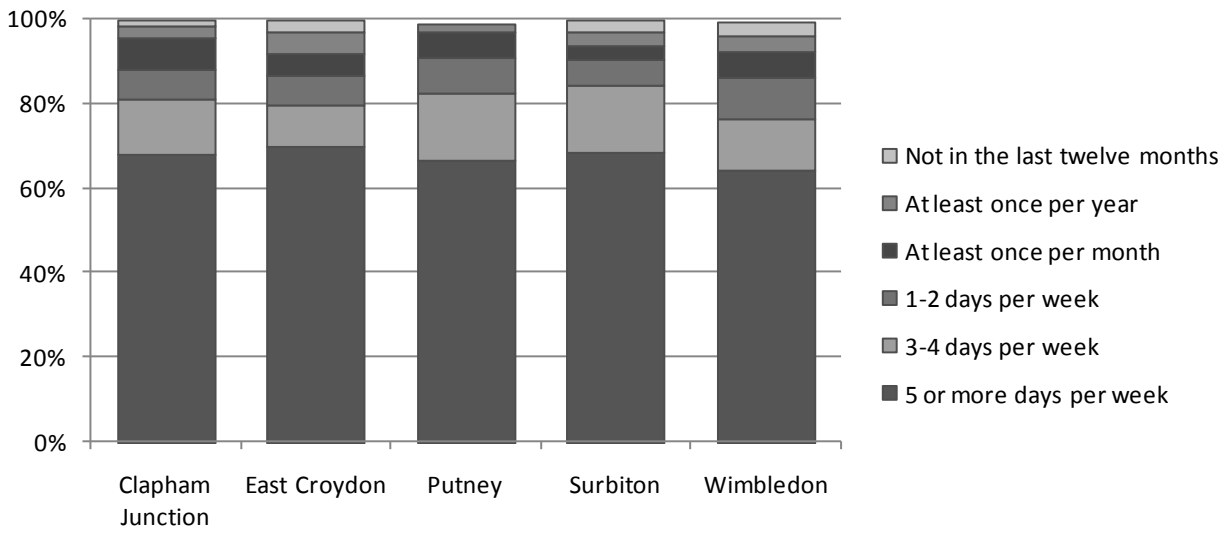
Figure 5.5 Journey purpose at the non-central London end, busiest five stations



Source: Central London Rail Termini Surveys 2010

People travelling between these stations and the central London termini are frequent travellers with two in three people making the journey at least five times per week (see Figure 5.6). This reflects the fact that the majority of travel is for commuting or other work related purposes and indicates the familiarity passengers are likely to have with the stations and services concerned.

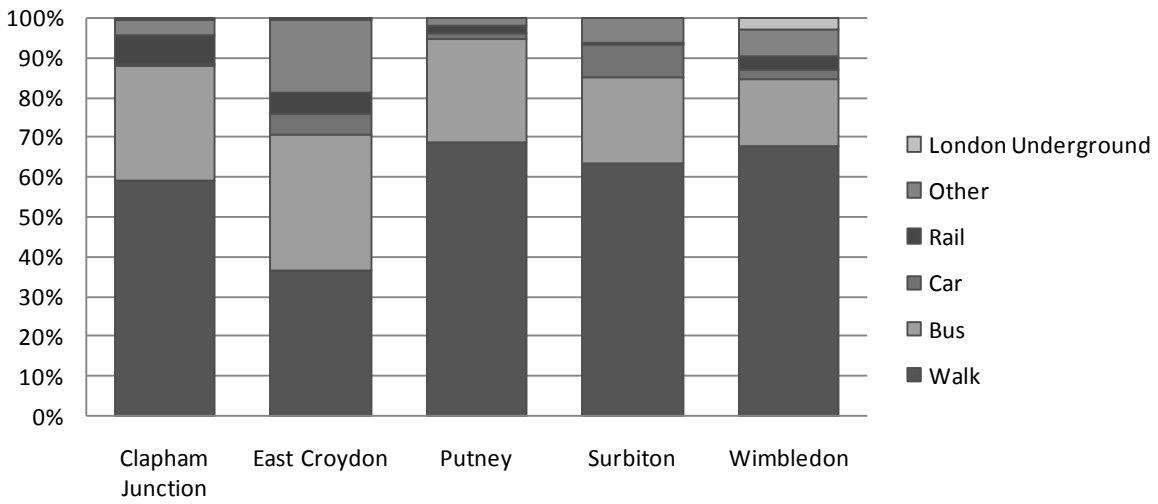
Figure 5.6 Journey frequency at the busiest five stations



Source: Central London Rail Termini Surveys 2010

Figure 5.7 shows the onward mode used for access or egress at the five busiest stations outside central London. Walk is the most popular mode across all five stations, although the walk mode share ranges from 68 per cent in Putney to 36 per cent in East Croydon. Surbiton has the highest cycle mode share at four per cent, followed by East Croydon at three per cent. Interestingly, these stations also have the highest car mode share; nine per cent in Surbiton and five per cent in East Croydon. This most likely reflects the distances people are travelling to access these particular stations. East Croydon has a significant share of passengers travelling by other modes, which is most likely to be tram.

Figure 5.7 Onward mode at the non central London end, busiest five stations



Source: Central London Rail Termini Surveys 2010

Chapter 6 Opportunities for walking

Key findings

- At present, 36 per cent of journeys to and from central London rail termini are walked, amounting to 380,000 walk journeys during the peak periods.
- The walk mode share ranges from 80 per cent at Cannon Street to 12 per cent at St Pancras and largely reflects the average distances travelled for onward journeys. Ninety-one per cent of onward journeys shorter than 1km and 55 per cent of those between 1 and 2km are walked.
- Ninety-five per cent of onward walk journeys are made for work purposes and just over half those making an onward walk journey had travelled into central London from outside the GLA area.
- Half of the respondents said that they ever walk their onward journey; 72 per cent of those who said they ever walk had walked on the survey day.
- Analysis was carried out to identify journeys less than 2km that are currently made by a mechanised mode but could potentially be walked. In total, 123,200 potentially walkable journeys were identified; 12 per cent of journeys by all modes and 19 per cent of journeys by mechanised modes. Fifty per cent of these journeys were between 1.5 and 2km, the upper limit of what is considered potentially walkable.

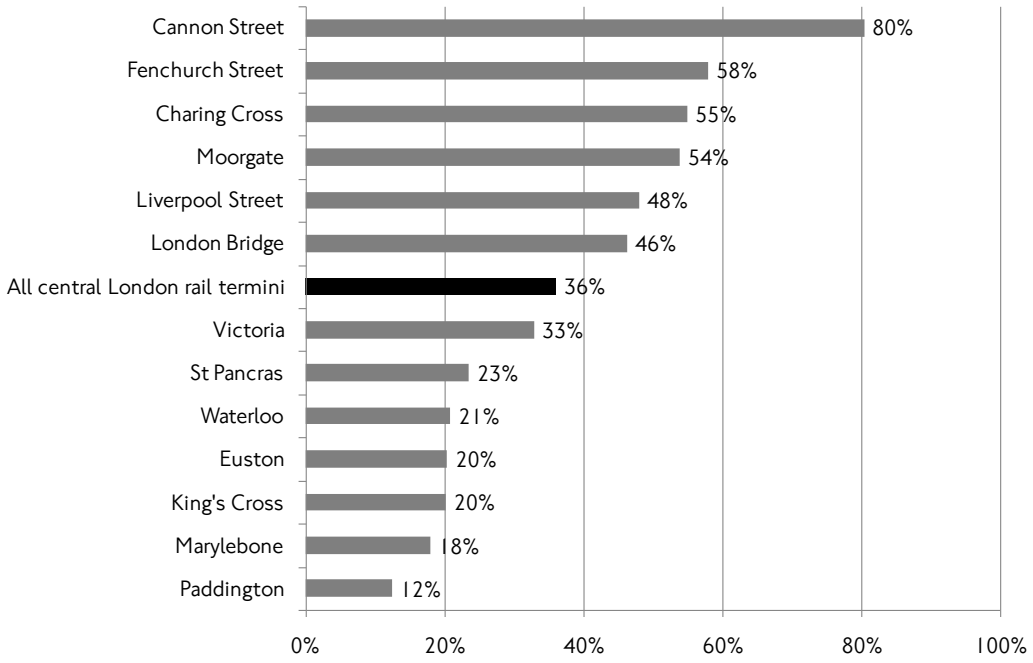
This chapter describes onward travel patterns to and from central London rail termini. It describes the nature and extent of walk travel between rail stations and journey origins and destinations, the characteristics of journeys made and of the people making them, and also seeks to identify the potential for increasing walking for this purpose.

Current walk travel to and from central London rail termini

At present, 36 per cent of journeys to and from central London rail termini are walked (see Figure 6.1), amounting to 380,000 walk journeys during the peak periods. The walk mode share ranges from 80 per cent of those arriving or departing from Cannon Street, to just 12 per cent of those travelling to or from St Pancras.

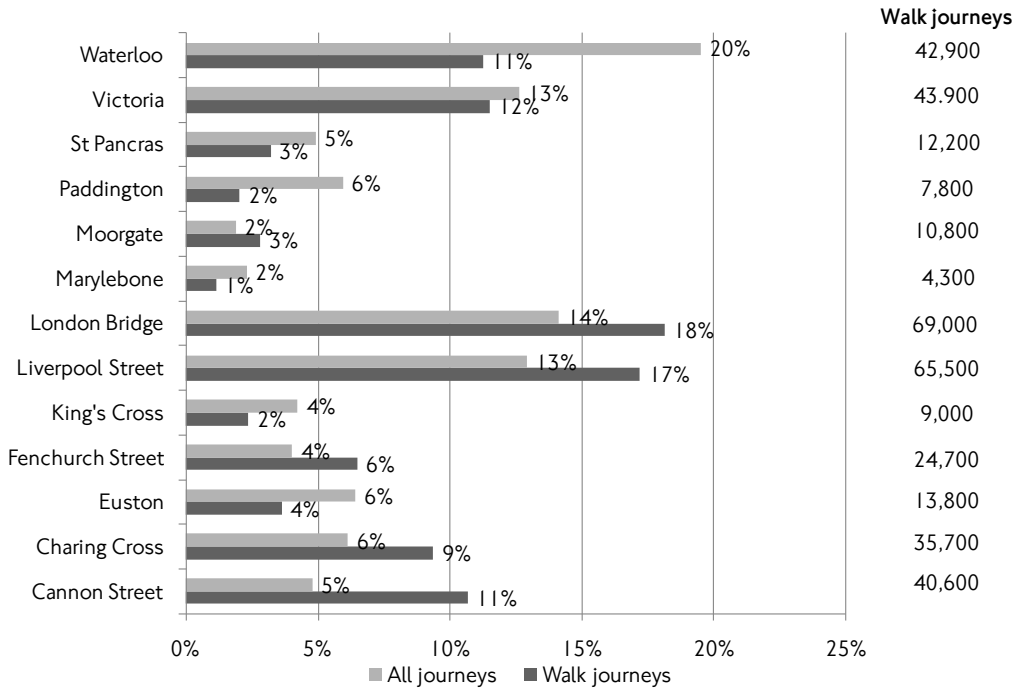
Figure 6.2 compares the share of onward journeys by station with the share of walked journeys by station showing that, for example, although Waterloo is the largest of the termini in terms of passenger flows (20 per cent), it only accounts for 11 per cent of walk travel. In comparison, although Cannon Street and Charing Cross make up a relatively small proportion of onward journeys (five and six per cent respectively), they account for a fifth of walk journeys between them. The stations generating the greatest volume of onward walk journeys were London Bridge (69,000) and Liverpool Street (65,500).

Figure 6.1 Walk mode share for onward travel of arrivals and departures at central London rail termini



Source: Central London Rail Termini Surveys 2010

Figure 6.2 Comparison of share of walking and journeys by any mode, central London rail termini



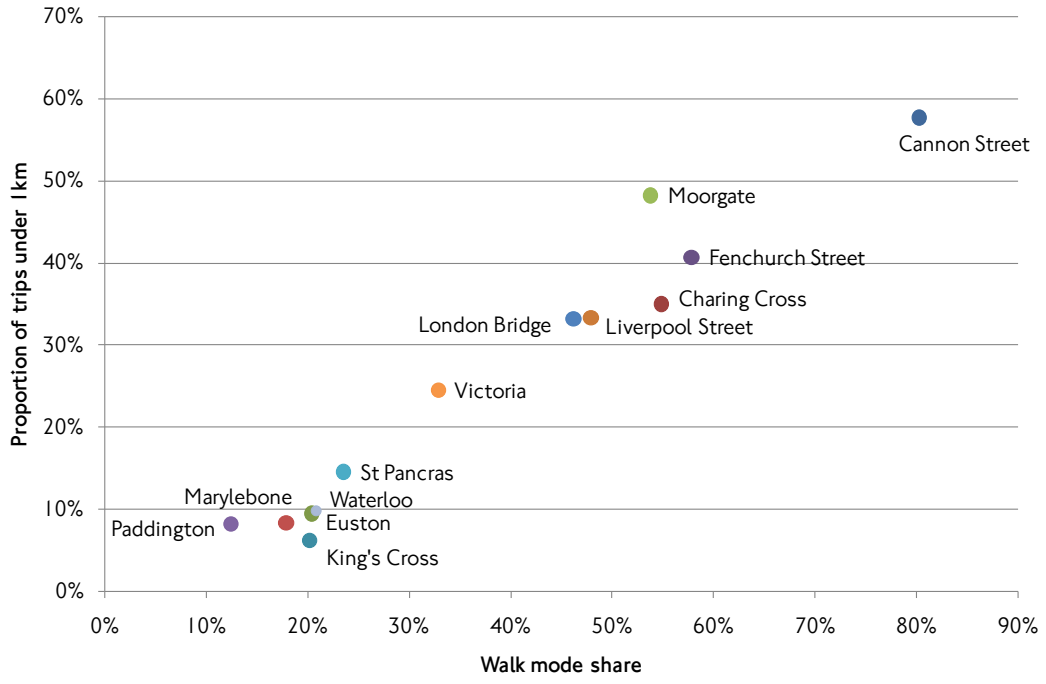
Source: Central London Rail Termini Surveys 2010

Onward walk journeys by trip distance

In large part, the walk mode share reflects the distance travelled from the rail station to the final destination. As seen in chapter 2, 91 per cent of onward journeys shorter than 1km and 55 per cent of those between 1km and 2km are made on foot. Walk is the most commonly used mode for trips up to just over 1.5km.

Figure 6.3 compares the walk mode share with the share of onward journeys less than 1km by station. This demonstrates the clear correlation between trip distance and mode choice: the stations with the highest walk mode shares have the highest share of very short journeys, those with low walk mode shares also have a low proportion of onward journeys under 1km. It is not possible to identify any stations that stand out as having an inappropriate walk mode share given the distance profile of onward journeys.

Figure 6.3 Comparison of walk mode share and share of onward journeys under 1km

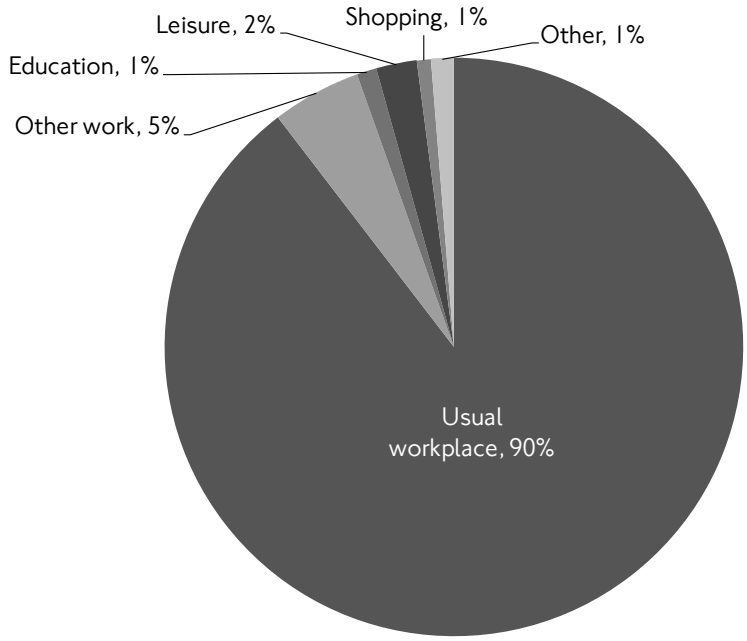


Source: Central London Rail Termini Surveys 2010

Onward walk journeys by purpose

The vast majority of onward walk journeys are to commute to work – nine in ten – and a further five per cent are for other work purposes. Only one in twenty onward walk journeys are for a purpose other than work.

Figure 6.4 Onward walk journeys by purpose



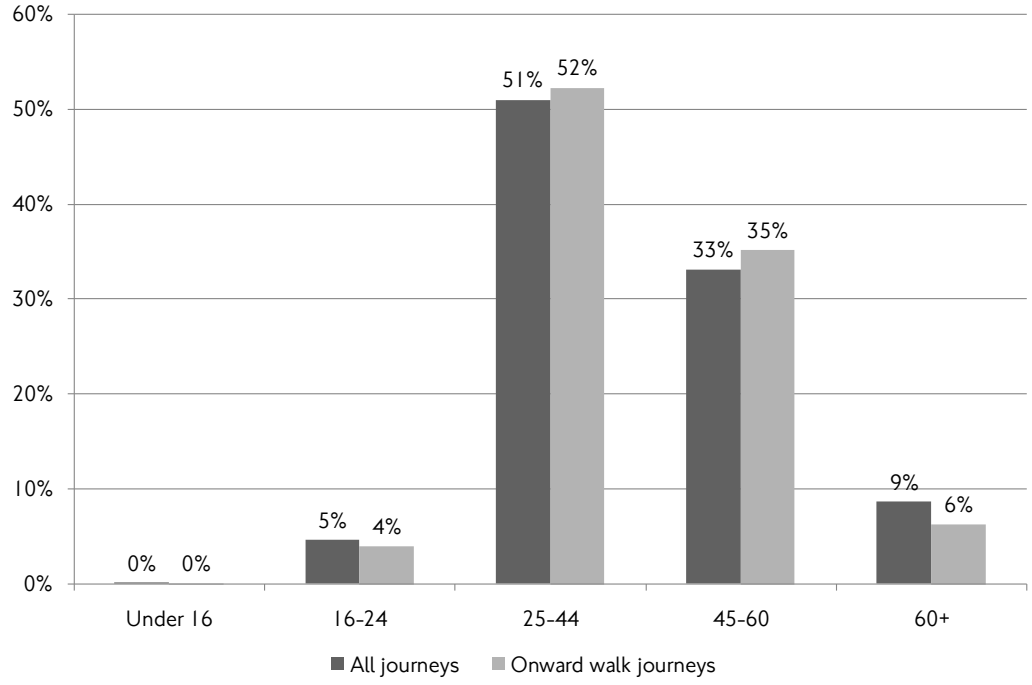
Source: Central London Rail Termini Surveys 2010

Onward walk journeys by characteristics of trip maker

Men and women each make 50 per cent of onward walk journeys. As shown in Figure 6.5, those making onward journeys on foot were slightly more likely to be aged 25 to 60 (87 per cent) than the total population making onward journeys (84 per cent).

Just over half (54 per cent) of those making an onward walk journey had travelled into London from outside the GLA boundary, 204,600 walk journeys overall, equivalent to 116,300 arrivals and 88,300 departures during the weekday peak periods.

Figure 6.5 Onward walk journeys by age



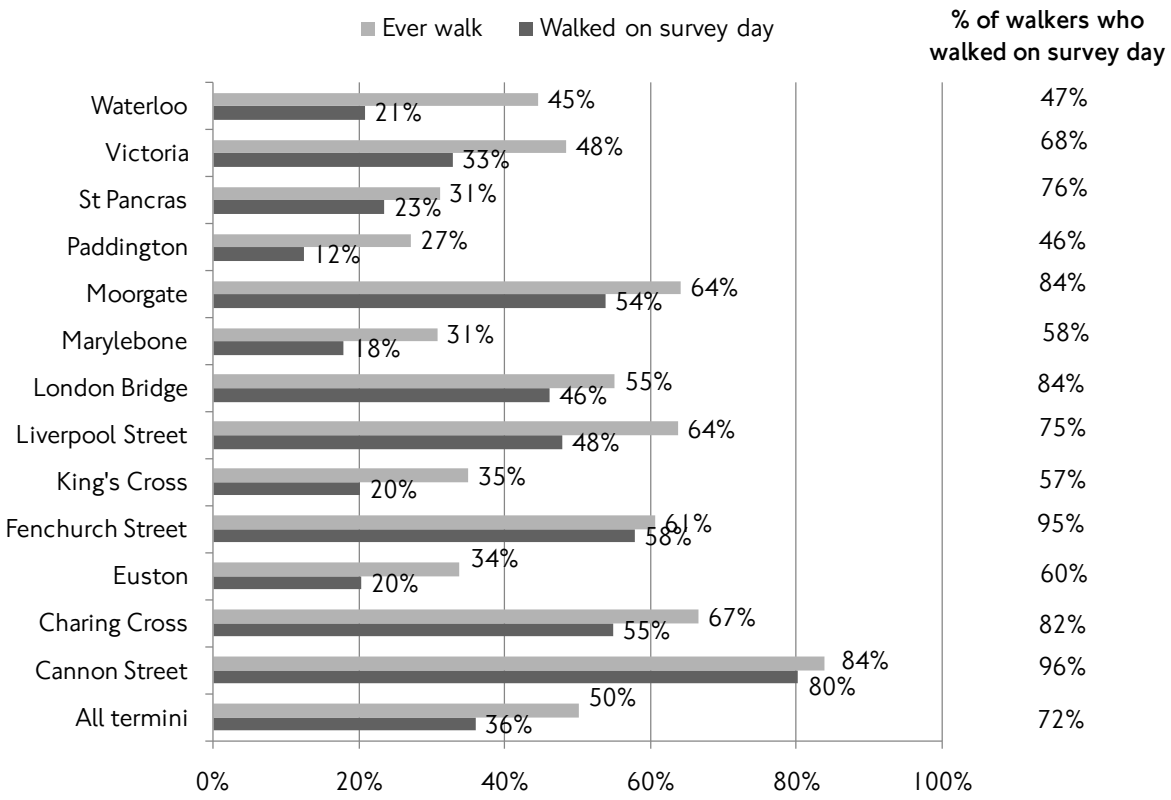
Source: Central London Rail Termini Surveys 2010

Whether passengers ever walk for their onward journey

As well as being asked to describe the trip they were making at the time of the survey, respondents were also asked whether they ever walk for their onward journey between the central London terminus and their final destination (see Figure 6.6). In total, half of those arriving at, or departing from, the central London termini during peak periods said that they sometimes walked for their onward journey. In total, 72 per cent of those who ever walk had actually walked on the survey day. This varied significantly between stations. Typically, at stations with a high walk mode share, most of those who ever walked had actually walked on the survey day, whereas a lower proportion of those who ever walked had walked on the survey day at stations such as King's Cross and St Pancras, which have a much lower walk mode share. It is likely that this can be explained by the average distance of onward journeys from stations with a low walk mode share. Where onward journeys are longer, it is likely that people may choose to walk occasionally, for example on a sunny summer day, but will use faster mechanised modes most

of the time. Where onward journey distances are very short, walking will be the obvious or only choice for most people.

Figure 6.6 Comparison of respondents who ever walk and those who walked on the survey day



Source: Central London Rail Termini Surveys 2010

Potentially walkable onward journeys

Analysis has been carried out to identify journeys less than 2km that are currently made by a mechanised mode but could potentially be walked. In total, 123,000 journeys were identified that could potentially be walked but are not walked at present. This amounts to 12 per cent of onward journeys by all modes and 19 per cent of journeys by mechanised modes. Table 6.1 shows the potential for walking by station. There is greatest potential for increased walk travel at Waterloo (37,600 potentially walkable journeys), London Bridge (16,600) and Victoria (15,300). Note that where the potentially walkable trips make up a particularly high proportion of journeys by mechanised modes, this often simply reflects existing high mode shares for walk and low volumes of trips by mechanised modes.

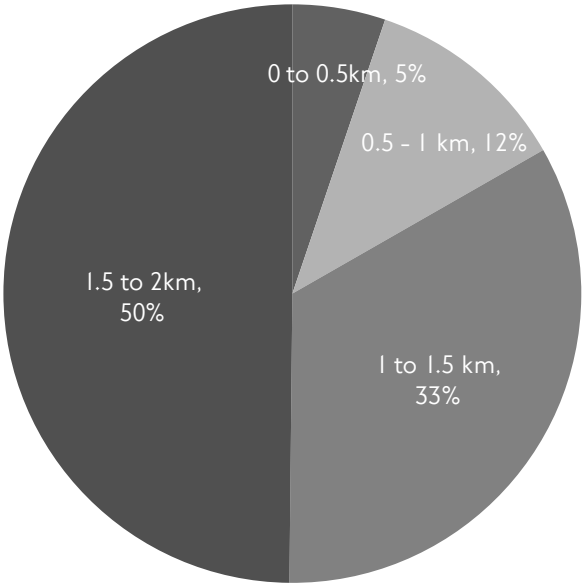
Table 6.1 Potentially walkable onward journeys by station

Station	Potentially walkable journeys	As a proportion of journeys by all modes	As a proportion of journeys by mechanised modes
Cannon Street	5,100	10%	52%
Charing Cross	10,500	16%	36%
Euston	5,300	8%	10%
Fenchurch Street	3,200	7%	18%
King's Cross	3,000	7%	9%
Liverpool Street	12,900	9%	19%
London Bridge	16,600	11%	21%
Marylebone	1,900	8%	10%
Moorgate	4,100	21%	46%
Paddington	3,000	5%	6%
St Pancras	4,700	9%	12%
Victoria	15,300	11%	18%
Waterloo	37,600	18%	24%
All central London termini	**123,200**	**12%**	**19%**

Source: Central London Rail Termini Surveys 2010

Notably, potentially walkable journeys tended to be at the higher end of the distance considered walkable, with 50 per cent between 1.5 and 2km and 83 per cent over a kilometre (See Figure 6.7). The average distance of potentially walkable onwards journeys was 1.4km. This suggests that it may be more difficult to realise the potential as walking will be relatively uncompetitive on time.

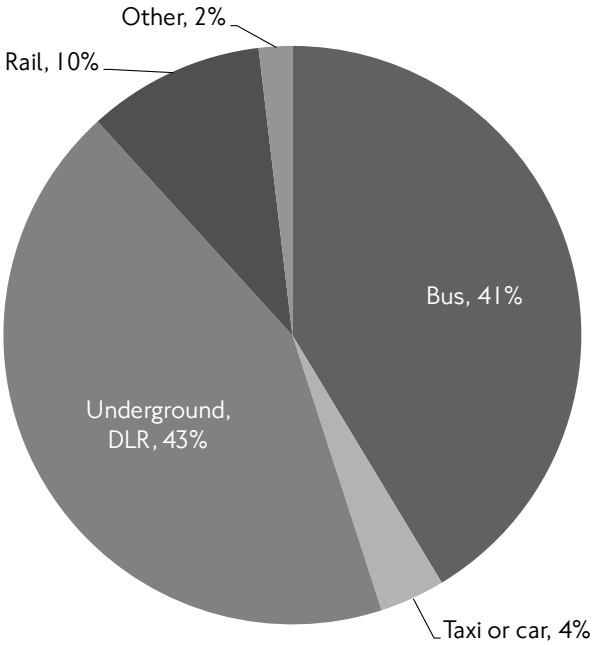
Figure 6.7 Potentially walkable onward journeys by distance



Source: Central London Rail Termini Surveys 2010

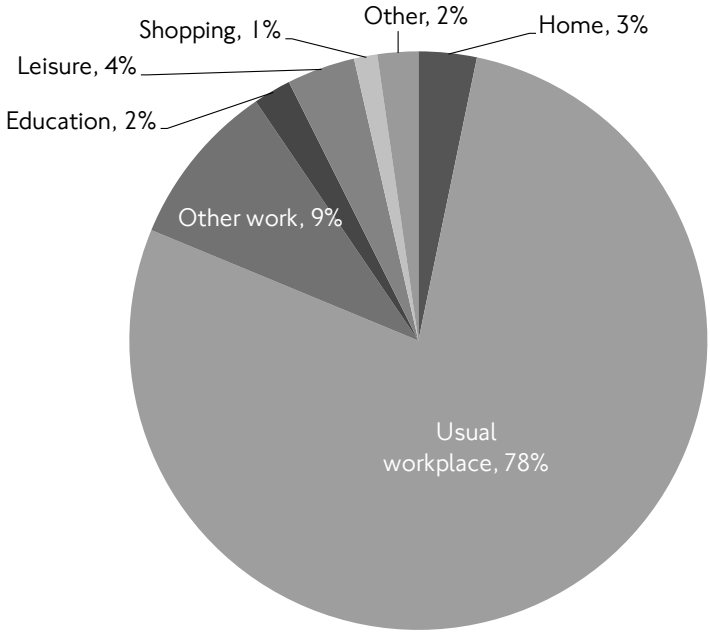
As shown in Figure 6.8, around four in ten potentially walkable journeys were made by Underground (43 per cent) and bus (41 per cent). The vast majority of potentially walkable trips were made for commuting (78 per cent) or travel on business (nine per cent) – see Figure 6.9.

Figure 6.8 Potentially walkable onward journeys by current mode



Source: Central London Rail Termini Surveys 2010

Figure 6.9 Potentially walkable onward journeys by purpose

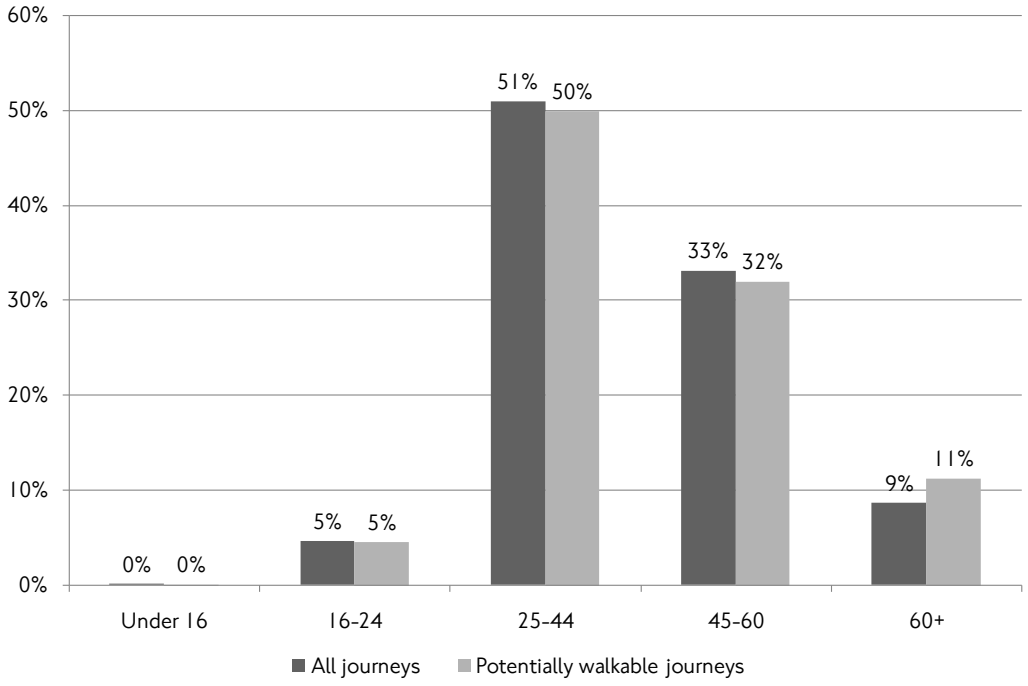


Source: Central London Rail Termini Surveys 2010

Who is making potentially walkable onward journeys?

Sixty per cent of those making potentially walkable onward journeys say that they sometimes walk for their onward journey, suggesting that there may be potential to increase the frequency with which they do so. Strikingly, although equal numbers of men and women were travelling through the termini by all modes, women were more likely to be making a short journey by a mechanised mode, with 58 per cent of potentially walkable journeys made by women. The age profile of those making potentially walkable trips was similar to the overall traveller profile, as shown in Figure 6.10.

Figure 6.10 Comparison of age of traveller, potentially walkable journeys and all journeys



Source: Central London Rail Termini Surveys 2010

Chapter 7 Opportunities for cycling

Key findings

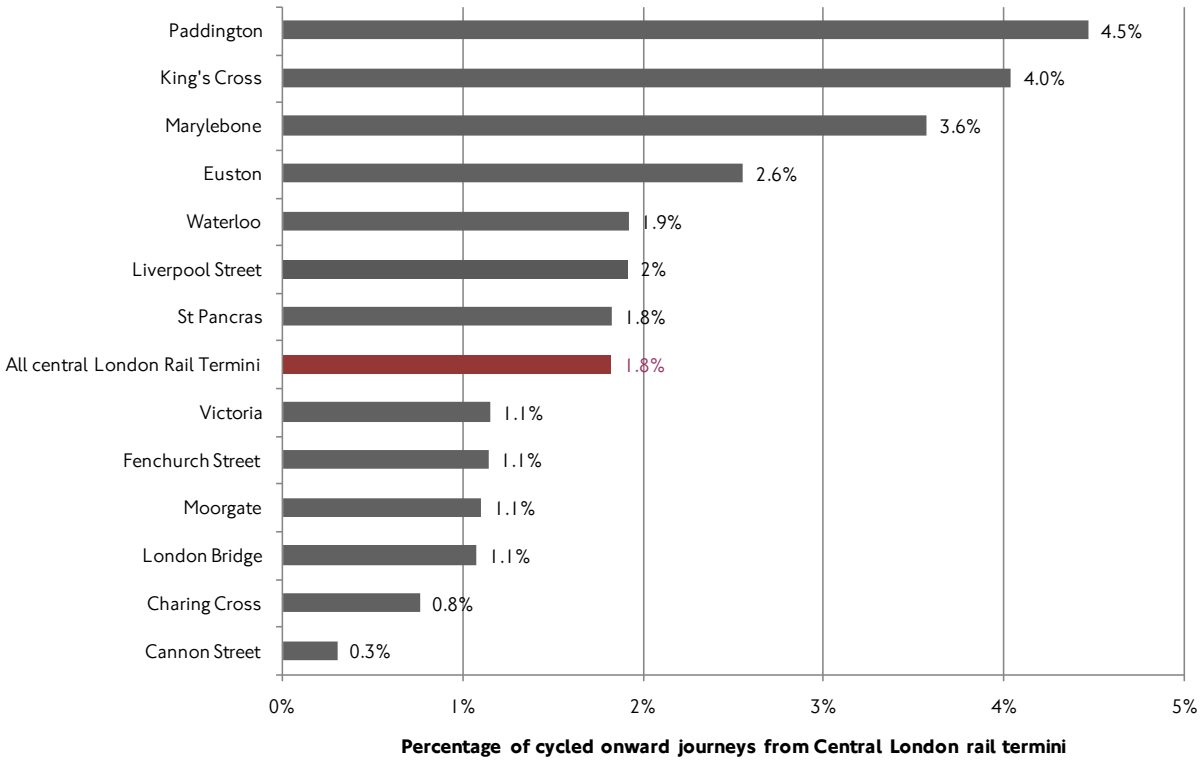
- At present, 1.8 per cent of journeys to and from central London rail termini are cycled, amounting to approximately 19,000 cycle journeys during the peak periods.
- The cycle mode share to and from central London rail termini ranges from 0.3 per cent at Cannon Street to 4.5 per cent at Paddington, and largely reflects the average distance travelled for onward journeys. Eighty three per cent of cycled journeys are up to 4.5km.
- Journeys for work purposes generate the most significant cycle demand in the morning and evening peaks – 84 per cent of cycle journeys from/to central London rail termini are made for this reason.
- Cycling is dominated by a particular demographic. Eighty two per cent of cycle journeys are made by men and 60 per cent of cyclists are aged between 25 and 44.
- Five per cent of people arriving at, or departing from, central London termini during peak periods said that they sometimes cycle for their onward journey. Of those who said that they ever cycle for their journey, 39 per cent cycled on the survey day.
- In the autumn surveys, questions were asked to ascertain the types of bicycles used at the central London rail termini. Fifty seven per cent of people cycled on their own bicycle, the majority of whom used a non-folding bicycle. Thirty seven per cent of people cycling to/from central London rail termini did so using a Barclays Cycle Hire bicycle.
- Cycling is the dominant mode used by central London cyclists to access their non-central London station. Fifty six per cent of people cycling from their central London rail terminus also cycled to their non-central London station.
- Market segmentation is used to group together the range of people that use TfL services to understand their current travel behaviour and the triggers for maintaining or changing future travel behaviours. This applies to London residents only. Over 50 per cent of the cycle market is comprised of individuals living in postcodes categorised as 'urban living' and 'suburban lifestyles'. People in these segments tend to be well educated, reasonably well off with a tendency to cycle for leisure as well as for commuting to work.

This chapter describes the nature of cycle journeys between rail stations and journey origins/destinations, and the demographic composition of the people making them. The chapter also explores the potential to increase the proportion of people making cycle journeys to and from central London rail termini.

Current cycle travel to and from central London rail termini

At present, 1.8 per cent of journeys to and from central London rail termini are cycled (see Figure 7.1), amounting to approximately 19,000 cycle journeys during the peak periods. Chapter 3 described how this has increased by nearly 400 per cent since 2001. The proportion of passengers cycling to and from their central London rail terminus ranges from 0.3 per cent at Cannon Street to 4.5 per cent at Paddington.

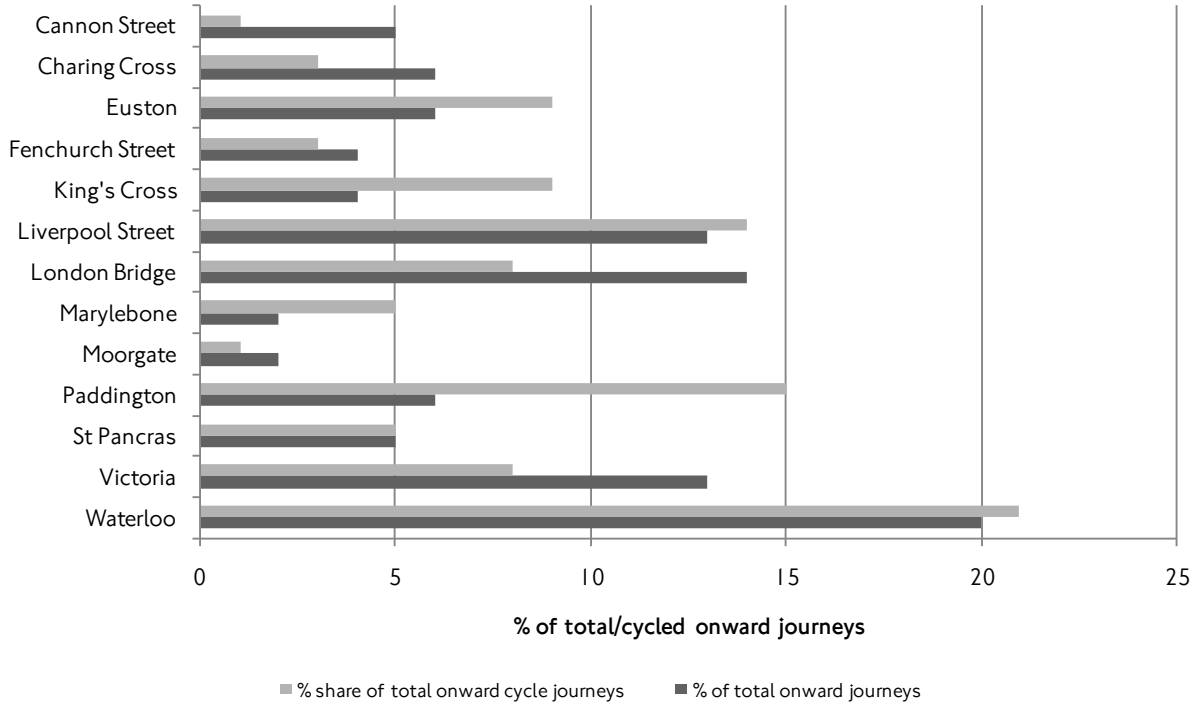
Figure 7.1: Cycle mode share for onward travel of arrivals and departures at central London rail termini



Source: Central London Rail Termini Surveys 2010

Figure 7.2 compares the share of onward journeys by station with the share of cycle journeys per station. The graph indicates locations to and from which cycling is prominent, and those to and from which cycling is a less significant mode. Waterloo, the largest of the termini in terms of passenger flows (20 per cent), also accounts for the largest share of onward cycle travel (21 per cent). Paddington and Cannon Street account for similar shares of all onward journeys (six per cent and five per cent respectively), but Paddington accounts for 15 per cent of onward cycle journeys whereas Cannon Street accounts for only 1 per cent. The stations generating the largest number of overall cycle journeys were Waterloo, Paddington and Liverpool Street.

Figure 7.2: Comparison of share of cycling and onward journeys by any mode from central London rail termini

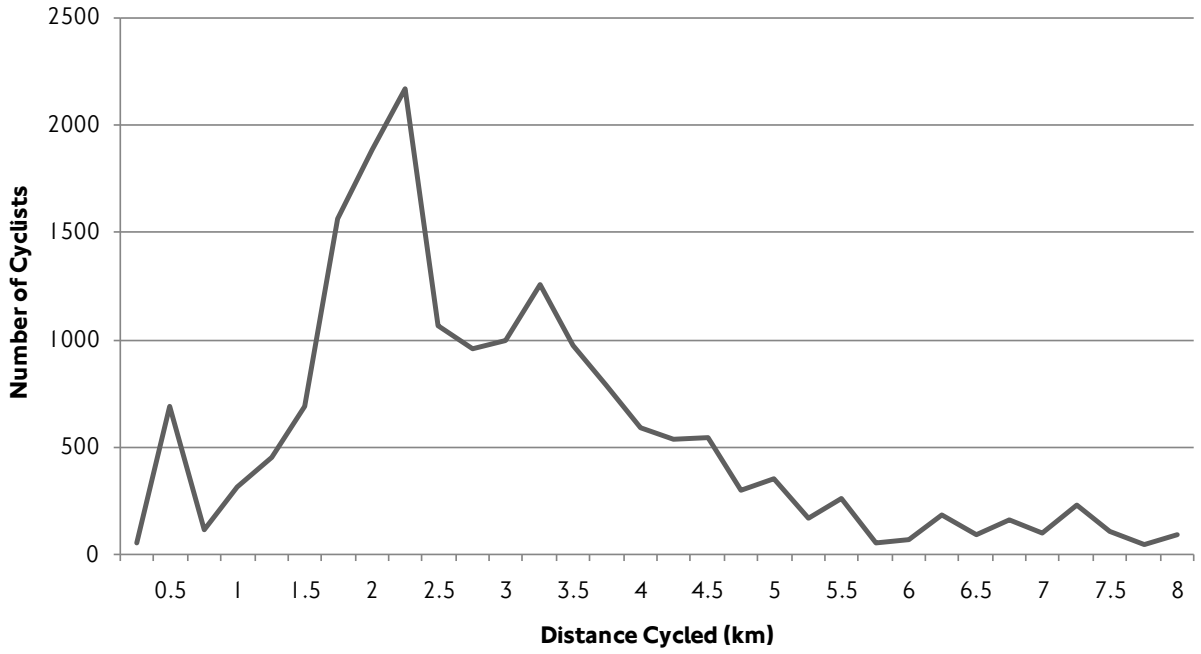


Source: Central London Rail Termini Surveys 2010

Distance of cycle travel

To a considerable degree, the cycle mode share reflects the average distance of onward travel to/from the central London rail termini. Figure 7.3 shows that 83 per cent of cycle journeys are under 4.5km, while 49 per cent of cycle journeys are between 1.25km and 3km. The distance between the point at which walking begins to decline and Underground usage peaks could be targeted as particularly suitable for cycling (see chapter 2 for distances travelled by walk and Underground).

Figure 7.3: Onward journeys: distance travelled by cycle from central London rail termini

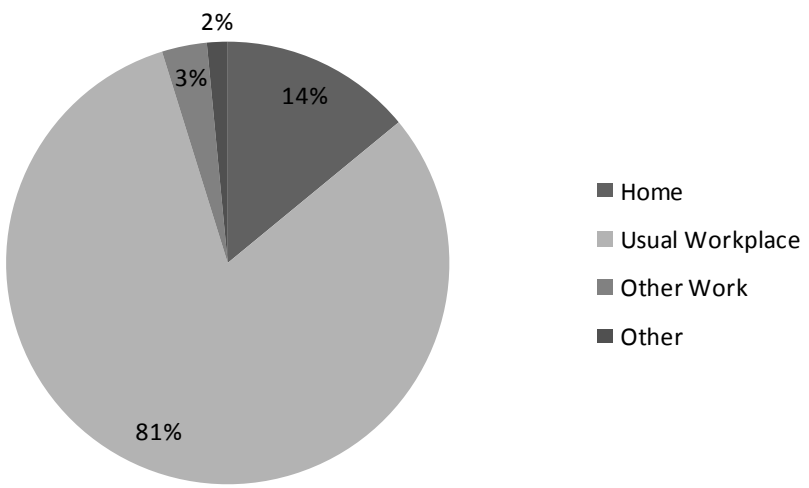


Source: Central London Rail Termini Surveys 2010

Onward cycle journeys by purpose

The vast majority of onward cycle journeys are to commute to work – eight in ten – and a further three per cent are for other work purposes. Only 16 per cent of cycle journeys to and from central London rail termini at peak times are for a purpose other than work.

Figure 7.4: Onward cycle journeys by purpose



Source: Central London Rail Termini Surveys 2010

Onward cycle journeys by characteristics of trip maker

The gender demographic of onward cycling is skewed; men make 82 per cent of onward cycle journeys, women just 18 per cent. Of the total number of passengers, 50 per cent were female and 50 per cent were male. Ninety-four per cent of cyclists are aged between 25 and 60; 6 in 10 cyclists are aged between 25 and 44. In the total population making onward journeys, 84 per cent of respondents were aged between 25 and 60, with 51 per cent between the ages of 25 and 44. This suggests a slightly greater propensity to cycle among those aged between 25 and 44.

Forty-three per cent of arrivals and departures from central London rail termini are made by people travelling within the GLA boundary. Such journey-makers display a lower than average propensity to cycle, with just 0.9 per cent of this demographic cycling the central London leg of their journey. By contrast, 2.6 per cent of those travelling outside of the GLA boundary cycled the central London leg of their journey.

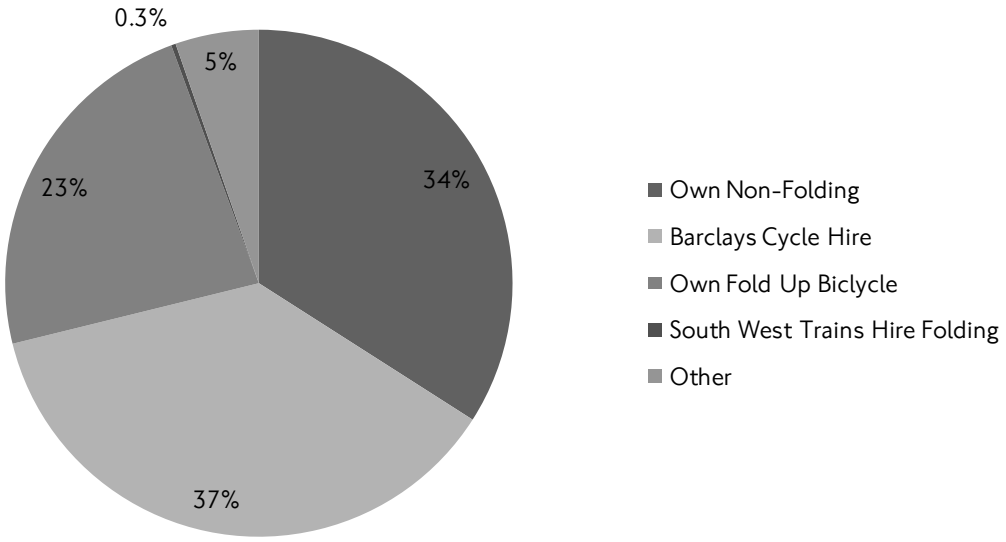
Type of cycle

A question was added to the surveys conducted in autumn 2010 asking what type of cycle respondents used. Data is available for Euston, King's Cross, Liverpool Street, London Bridge, Moorgate, Paddington, Victoria and Waterloo. It is important to note that the survey was carried out before the launch of the Cycle Hire station at Waterloo.

Figure 7.5 shows the types of bicycle used by cyclists from their central London rail terminus. Thirty-seven per cent of people used a Barclays Cycle Hire Scheme bicycle which, when the survey was conducted, had been operational for three months. Fifty-seven per cent of people used their own bicycle (of whom 59 per cent used their own non-folding bike and the remaining 41 per cent used their own folding bike).

It is not clear from this data precisely how individuals using their own bicycles are doing so. It is likely that people cycling on their own fold-up bicycle use this same cycle to travel to and from both their non-London station and their central London rail terminus. Worth noting, however, is that on most services in the morning peak carrying non-folding bicycles is prohibited. People in this category may therefore be accessing their non-London station using a different mode, or using different bicycles to access their non-central London station to the ones that they use in central London. In turn, this has infrastructural implications at central London rail termini as it means that individuals within the 'two bicycle market' are likely to store a bike at their central London rail terminus overnight.

Figure 7.5: Types of bicycle used by cyclists to or from central London rail termini

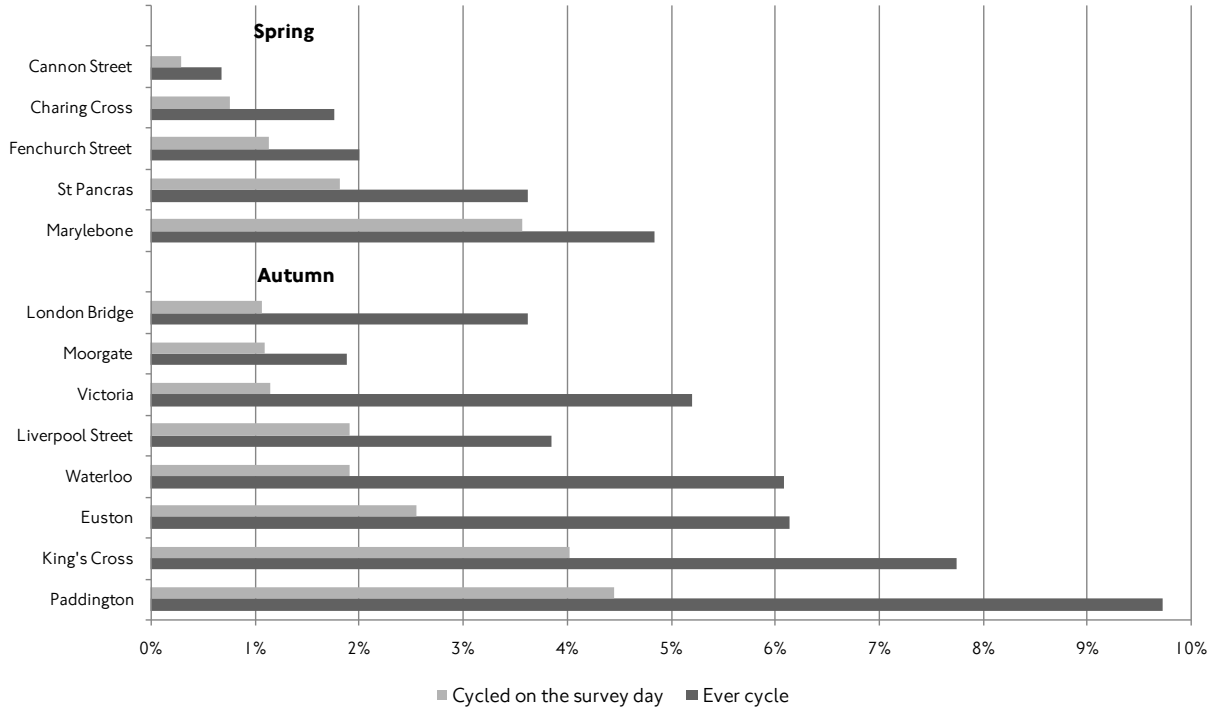


Source: Central London Rail Termini Surveys 2010

Whether ever cycle for their onward journey

In addition to being asked to describe the trip that they were making at the time of the survey, respondents were also asked whether they ever cycle their onward journey to and from their central London terminus. Figure 7.6 shows that, in total, five per cent of those arriving at, or departing from, central London termini during peak periods said that they sometimes cycle for their onward journey. Of those who said that they ever cycle in central London, 39 per cent cycled on the survey day. The proportion of declared cyclists that cycled on the survey day varied between the termini. The highest proportion of cyclists that cycled on the survey day travelled onwards from Marylebone (74 per cent). Though Waterloo and Victoria exhibited similar proportions of passengers that ever travel by bicycle, their proportions of cyclists cycling on the day of the survey were significantly lower (31 per cent and 22 per cent respectively). Variability in figures between those who ever cycle and those that cycled on the survey day may reflect weather conditions on the survey day, or the time of year that the survey was carried out.

Figure 7.6: Comparison of respondents who ever cycle and those who cycled on the survey day

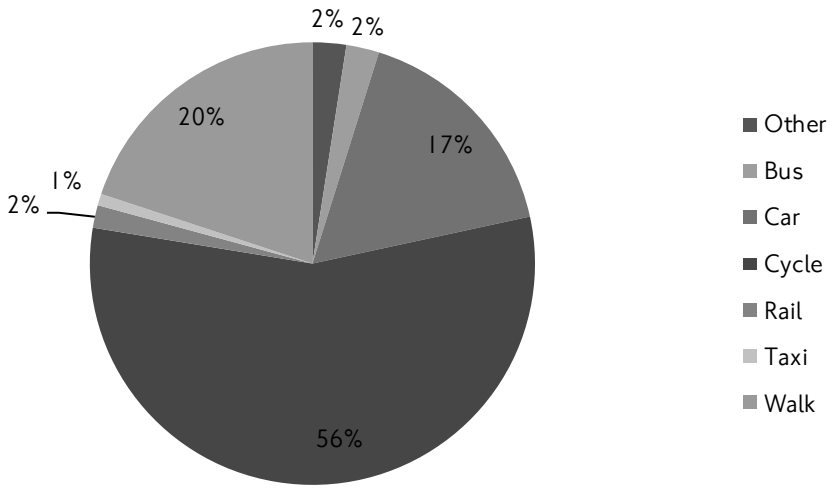


Source: Central London Rail Termini Surveys 2010

Cycling at the non-central London end of the journey

As shown in Figure 7.7, among those that cycle from their central London terminus, over three in four access their non-central London station using an active travel mode (56 per cent cycling; 20 per cent walking).

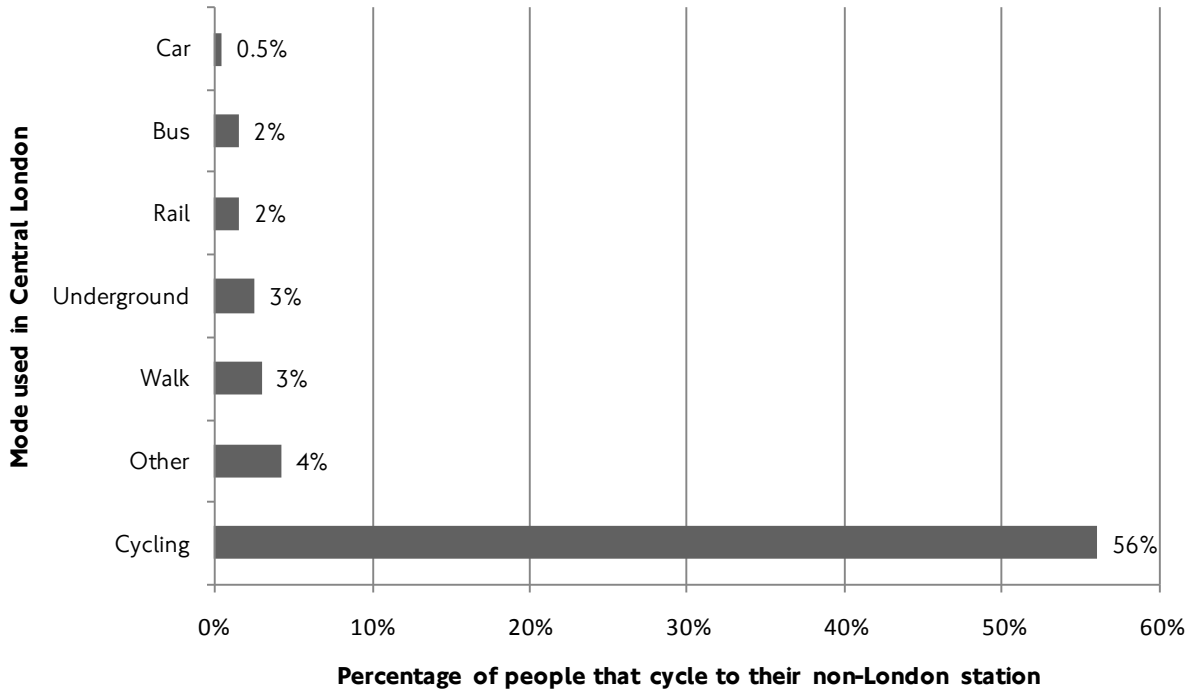
Figure 7.7: Non-central London modes used by central London cyclists



Source: Central London Rail Termini Surveys 2010

From Figure 7.8, 56 per cent of people cycling to and from their central London rail terminus had also cycled to and from their non-central London station. A higher proportion of people cycle the outer leg of their journey, that is the portion to and from their non-central London station, than cycle the central London portion of their journey, to and from their terminus.

Figure 7.8: Central London modes used by non-central London cyclists



Source: Central London Rail Termini Surveys 2010

Market segmentation of cyclists and non-cyclists

Market segmentation is concerned with grouping together the diverse range of people who use TfL services to understand their current travel behaviour and the likelihood and triggers for maintaining or changing their travel behaviours in the future. The MOSAIC Cycling segmentation was developed as an aid to cycling policy development, planning, implementation and evaluation. In its 2010 Mosaic Cycling Segmentation Report, TfL attached one of several categories to each postcode within the GLA boundary. This process drew upon data collected in the 2009 Segmentation Survey, Attitudes to Cycling Survey 2007-2009, LTDS and MOSAIC 2007.

Individuals fall into a number of categories in terms of their likelihood to cycle: it is not nearly as simple as dividing people into cyclists and non-cyclists. 'Rejectors' – people for whom cycling, for either physical or attitudinal reasons, is not a possible mode of travel – are a minority. The majority of people are potential cyclists, albeit that this potential is of varying degrees. In terms of a market segmentation, nearly two thirds of the population falls into the broadly positive groups and nearly a third into the harder to interest segments. Only 14 per cent are categorised as absolute rejectors.

The cycle market is segmented into seven groups, broadly categorised along socio-economic lines. Listed below are the key characteristics of each of these market segments:

- Urban living – these are the prime target for cycling, particularly cycling for a purpose. They tend to be quite young, well educated and reasonably well-off. They have busy lifestyles and usually live close to town or city centres. Many choose to live without a car. This segment comprises 23 per cent of London's population.

- High earning professionals – people in this segment are well educated and affluent, with many working in large multinationals. They tend to use personal rather than public transport. Men in this segment are a good prospect for cycling to work while female high earning professionals present more of a challenge. This segment comprises 15 per cent of London's population.

- Young couples and families – these are fair prospects for cycling because their car ownership is quite low. They are of a prime age for cycling and many have young children who are likely to be exposed to cycling initiatives at school. On the other hand, their finances are likely to be tight, and their ethnic background is not necessarily aligned with a cycling culture. This segment comprises 17 per cent of London's population.

- Suburban lifestyle – those in the *suburban lifestyle* segment tend to earn average income and to be heavily reliant on their car (in part as a consequence of living away from a town centre). It appears that men in this segment are far more likely than women to be interested in cycling, and cycling for leisure is as likely as cycling for purpose. This segment comprises 17 per cent of London's population.

- Hard pressed families – this segment offers poor prospects for cycling, in part due to greater concerns over family finances. Ethnic background is also possibly a factor. Those that live in inner city flats and tower blocks (a significant proportion) could also have problems with bike storage. This segment comprises 21 per cent of London's population.

- Manual trades – one of the least attractive prospects for cycling, largely due to a social influence which seems to be linked with the manual occupations which dominate this segment. This means that, unlike most other segments, men are hardly more likely to cycle than women. This segment comprises five per cent of London's population.

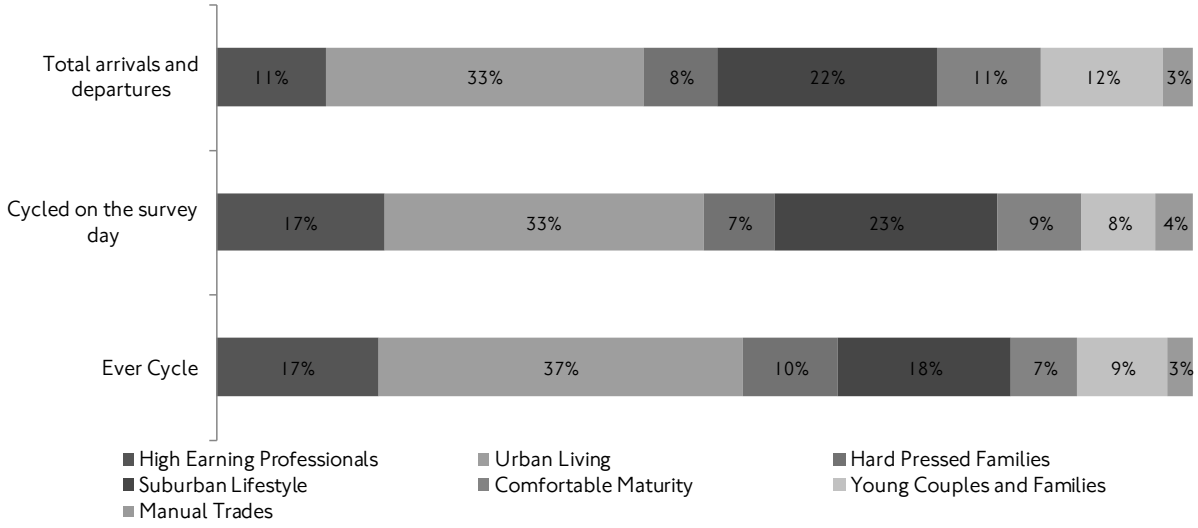
- Comfortable maturity – people in this segment are not generally in scope for cycling due to their age. They tend to be reasonably well off, with some time available, and live in more suburban areas near parkland, so there may be some potential for off-road leisure cycling. This segment comprises eight per cent of London's population.

Respondents to the central London Rail Termini Survey were classified into segments based on their home postcode. Only London residents are included in this analysis (40 per cent of all passengers). Figure 7.9 shows, by market segment, the proportion of the total arrivals and

departures at central London rail termini, the cyclists on the survey day and those that ever cycle.

The largest component of the cycle market from central London rail termini is derived from those categorised as 'urban living' and 'suburban lifestyle'. Together, individuals from these categories represent over half of the cycle market. Those categorised as 'high earning professionals' represented 16 per cent of the market on the survey day and 17 per cent of those that ever cycled. By contrast, those categorised in the 'comfortable maturity' and 'young couples and families' segments represent nine per cent and eight per cent respectively of those that cycled on the survey day and seven per cent and nine per cent respectively of those that ever cycle.

Figure 7.9: Proportion of each segment of the cycle market in the total arrivals and departures from central London rail termini, those that cycled on the survey day, and those that ever cycle



Source: Central London Rail Termini Surveys 2010

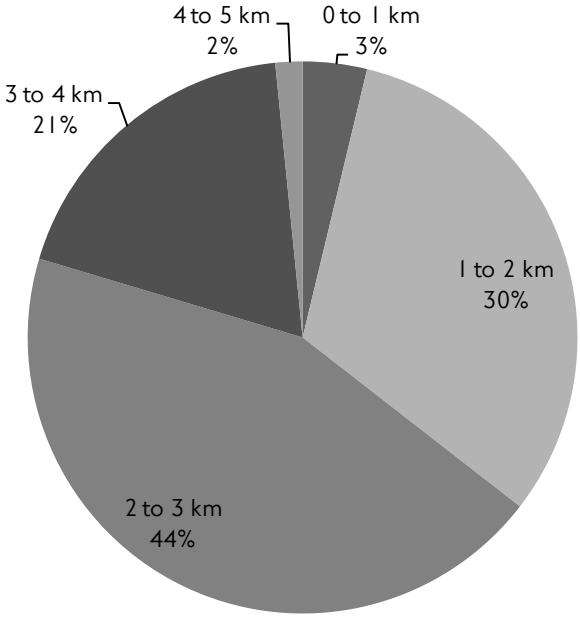
Potentially cyclable journeys

Analysis was carried out to identify journeys of up to 5km by bus and up to 3.5 km by Underground, where the trip-maker is under 60 years old. These journeys, currently completed by a mechanised mode, are deemed cyclable. Using these criteria, 255,000 journeys to and from central London rail termini have been identified that could feasibly be cycled, but are not cycled at present.

Ninety-five per cent of journeys identified as potentially cyclable were between 1km and 4km (as shown in Figure 7.10). The average distance of potentially cyclable journeys was around

2.3km. Cycle journey times over such distances would typically be around the same as those by mechanised modes and may offer time savings and reliability benefits for some journeys.

Figure 7.10 Potentially cyclable journeys by distance



Source: Central London Rail Termini Survey 2010

Three in ten journeys identified as potentially cyclable are made by bus, seven in ten by Underground. Nine in ten potentially cyclable trips are made for commuting or business purposes.

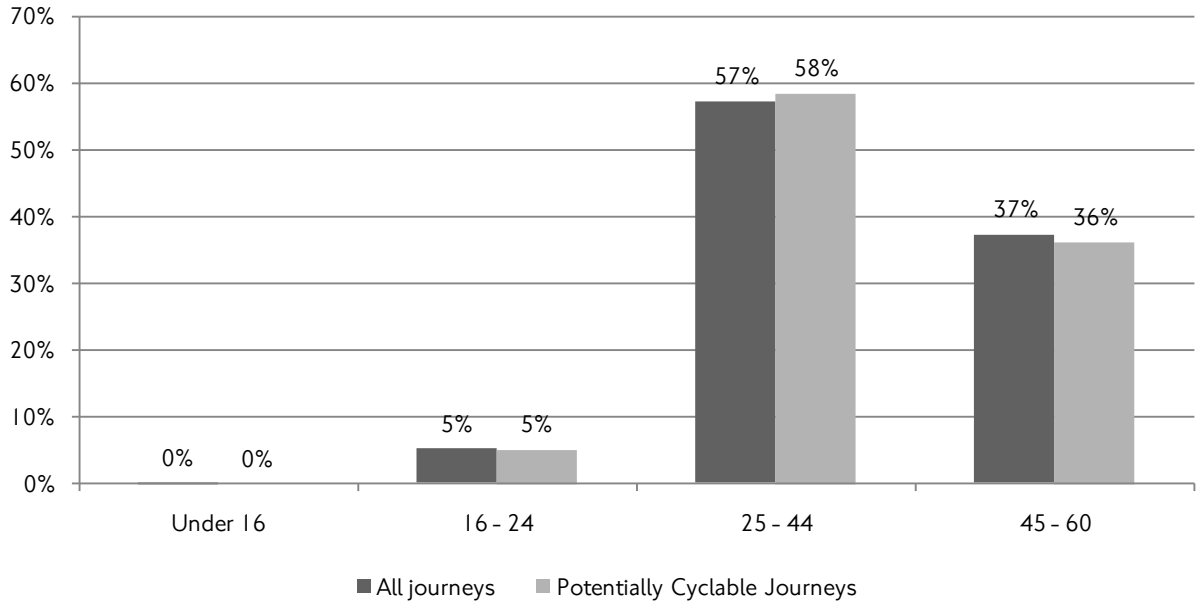
Who is making potentially cyclable journeys?

Four per cent of those currently travelling by bus or Underground over distances deemed potentially cyclable report that they ever cycle their journey to or from their central London rail terminus. Given that 1.8 per cent of journeys to and from central London are currently cycled, there is some latent potential within this four per cent to cycle more frequently than they currently do.

Although broadly equal numbers of men and women were travelling through the termini by all modes, women were slightly more likely to be making journeys over a potentially cyclable distance by a mechanised mode: 56 per cent of potentially cyclable journeys were made by women.

Trips are deemed potentially cyclable if the trip-maker is under 60. Figure 7.11 shows the age profile of all journey makers, and those making potentially cyclable journeys, with those over 60 years old excluded. It is clear that the age profile of those making potentially cyclable trips was similar to the overall traveller profile.

Figure 7.11 Comparison of age of traveller, potentially cyclable journeys and all journeys



Source: Central London Rail Termini Survey 2010

Part Two

Chapter 8 Summary of findings at Cannon Street

Figures quoted are for all AM and PM peak arrivals and departures based on 3,682 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	27,500
AM busiest hour	0800 - 0900
arrivals	15,000
AM peak departures	*[1]
scale of contraflow in proportion to arrivals	1%

PM passenger flows	
PM peak departures	22,500
PM busiest hour	1700 - 1800
departures	12,500
PM peak arrivals	500
scale of contraflow in proportion to departures	3%

Share of connecting modes in central London	
Walk	80%
Underground	9%
Bus	7%
Rail	3%

London Underground line used	
District / Circle	81%
Central	13%
Northern	5%

Purpose in central London	
Usual workplace	94%
Other work	3%
Home	2%

Journey frequency	
5 or more days per week	83%
3 or 4 days per week	12%
1 or 2 days per week	3%
less than one day per week	2%

Onward distance travelled in central London	
1st quartile	0.6 km
2nd quartile (median)	0.9 km
3rd quartile	3.8 km

Location of trip end outside central London	
Within GLA	58%
Outside GLA	42%

[1] Less than 250.

Figure 8.1 Passenger distribution at Cannon Street, AM and PM peak arrivals and departures

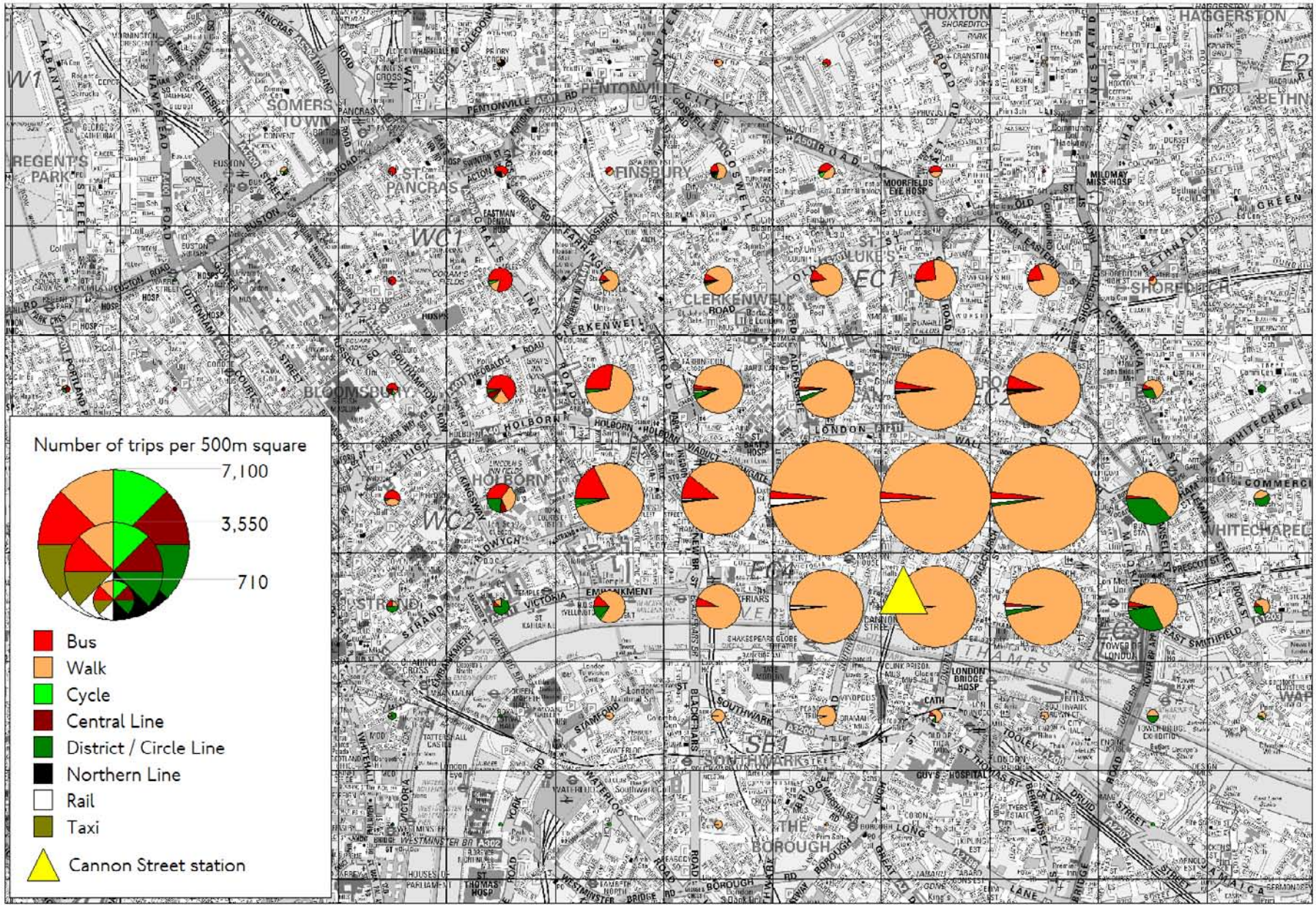
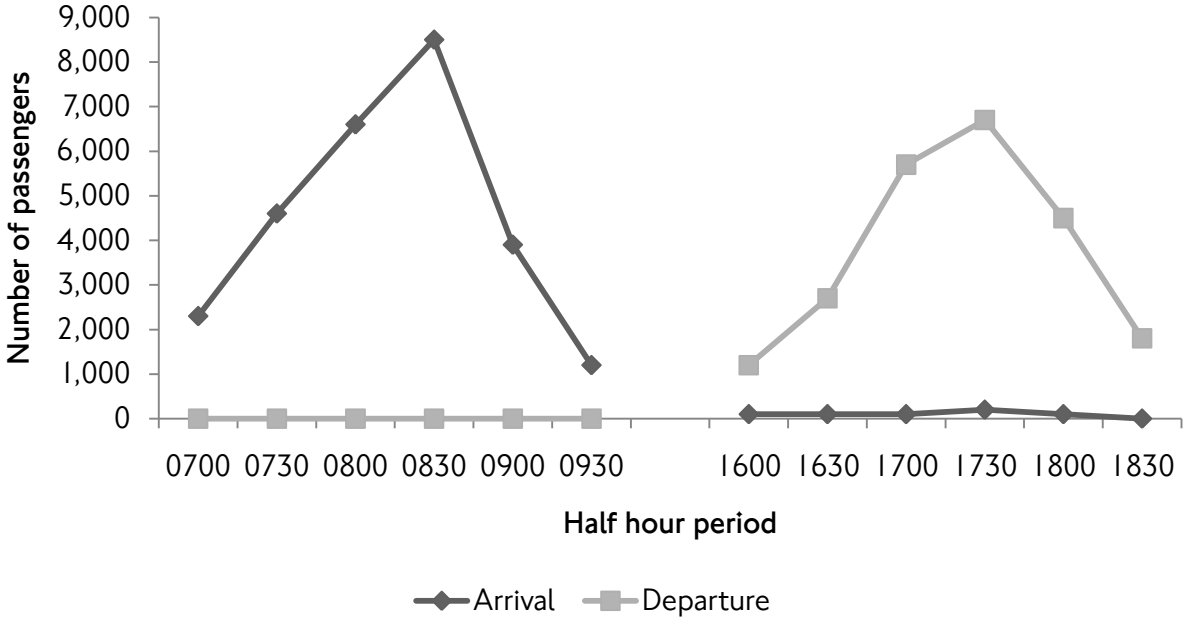
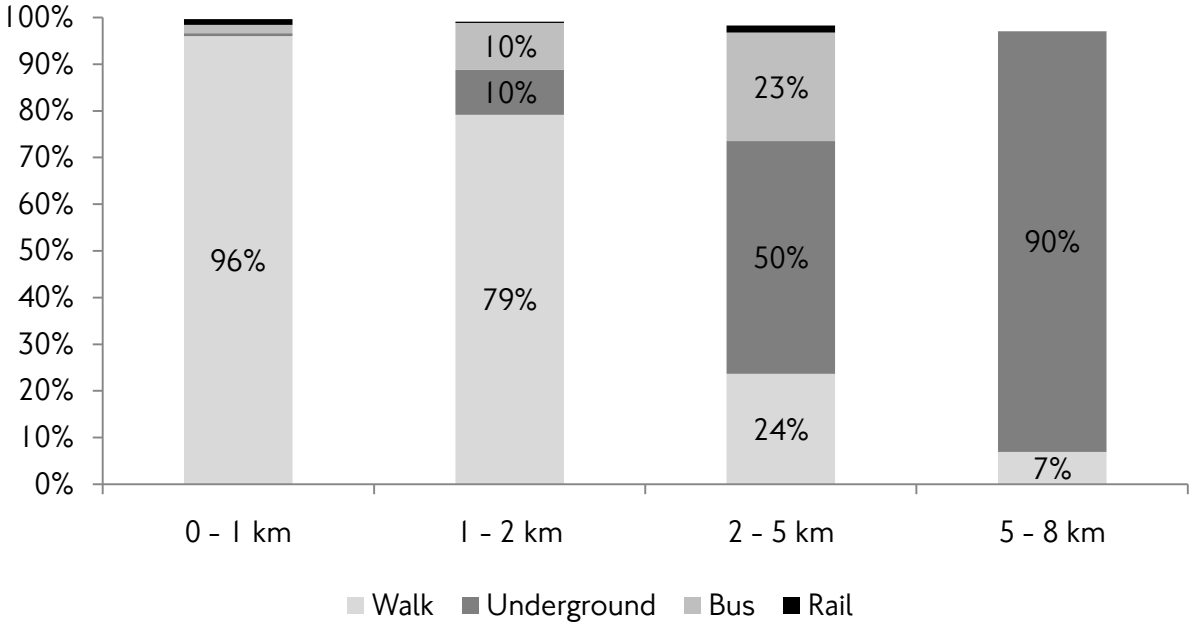


Figure 8.2 Cannon Street passenger flows



Cannon Street saw particularly tidal flows, with fewer than 1,000 contraflow passengers across both peaks.

Figure 8.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



Cannon Street had the highest walk share among the stations, largely due to the large proportion of short onward trips. However, even among the shortest distance bands, Cannon Street saw a higher share of walking trips than other termini.

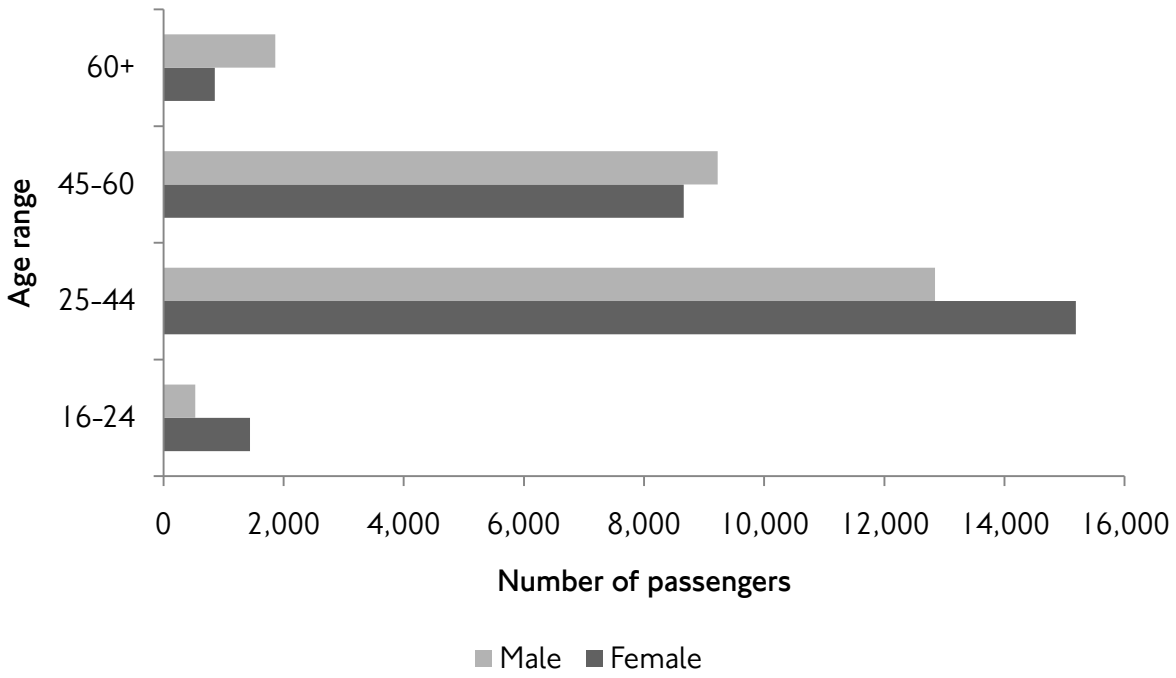
Cannon Street: Frequency of cycling and walking

Very few passengers at Cannon street stated that they ever cycle their onward journey in central London. Almost all those who stated that they ever walk did so on 5 days in the week prior to the survey.

Table 8.1 Cannon Street Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		<1%	84%
Share who ever use from station to destination		<1%	84%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	17%	3%
	1	8%	2%
	2	17%	3%
	3	6%	6%
	4	-	5%
	5	52%	81%
	6	-	-
	7	-	*

Figure 8.4 Cannon Street passenger demographics, AM and PM peak arrivals and departures



Chapter 9 Summary of findings at Charing Cross

Figures quoted are for all AM and PM peak arrivals and departures based on 3,200 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	30,500
AM busiest hour	0800 - 0900
arrivals	15,500
AM peak departures	1,000
scale of contraflow in proportion to arrivals	4%

PM passenger flows	
PM peak departures	29,000
PM busiest hour	1730 - 1830
departures	12,500
PM peak arrivals	5,500
scale of contraflow in proportion to departures	19%

Share of connecting modes in central London	
Walk	55%
Underground	27%
Bus	11%
Rail	6%
Cycle	1%
Taxi	1%

London Underground line used	
Northern	42%
Bakerloo	39%
District / Circle	19%

Purpose in central London	
Usual workplace	82%
Other work	6%
Home	4%
Leisure/ Entertainment	3%

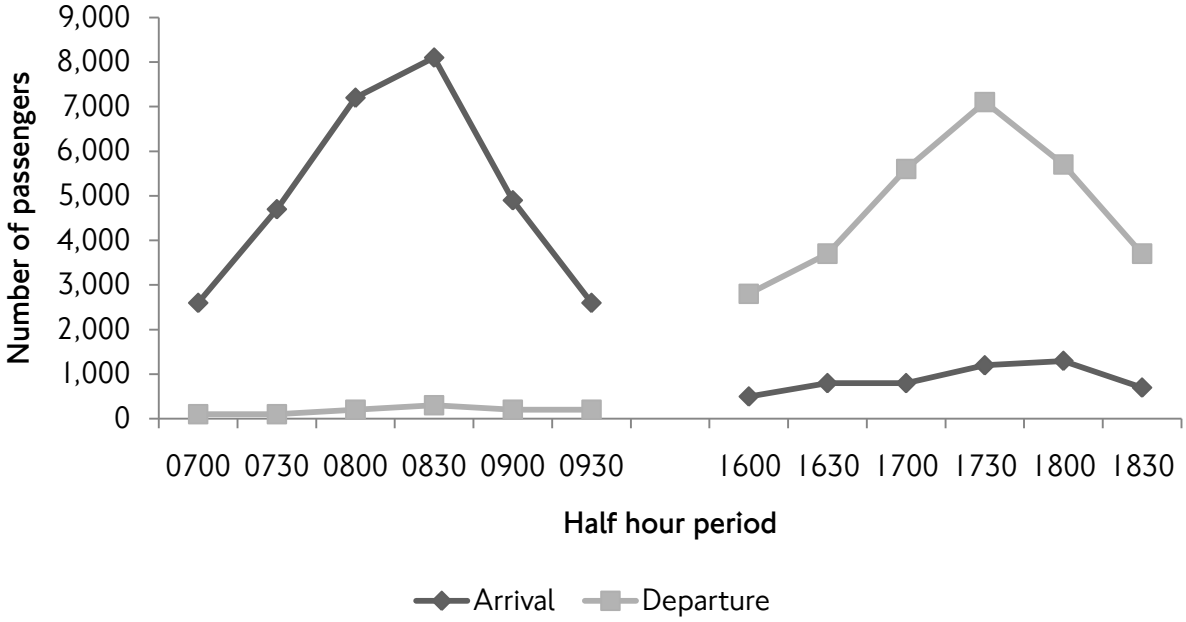
Journey frequency	
5 or more days per week	72%
3 or 4 days per week	12%
1 or 2 days per week	6%
less than one day per week	11%

Onward distance travelled in central London	
1st quartile	0.8 km
2nd quartile (median)	1.3 km
3rd quartile	2.3 km

Location of trip end outside central London	
Within GLA	70%
Outside GLA	30%

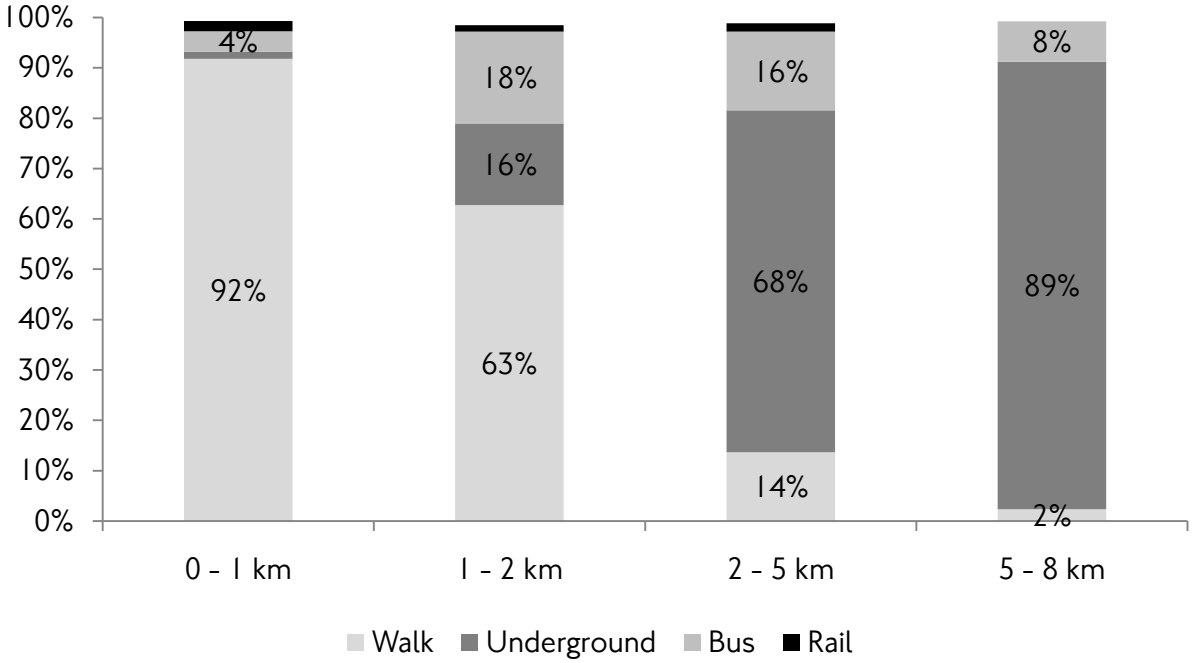
Figure 9.1 Passenger distribution at Charing Cross, AM and PM peak arrivals and departures

Figure 9.2 Charing Cross passenger flows



Charing Cross saw the fifth highest number of passengers arriving in the AM peak, but few departing passengers.

Figure 9.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



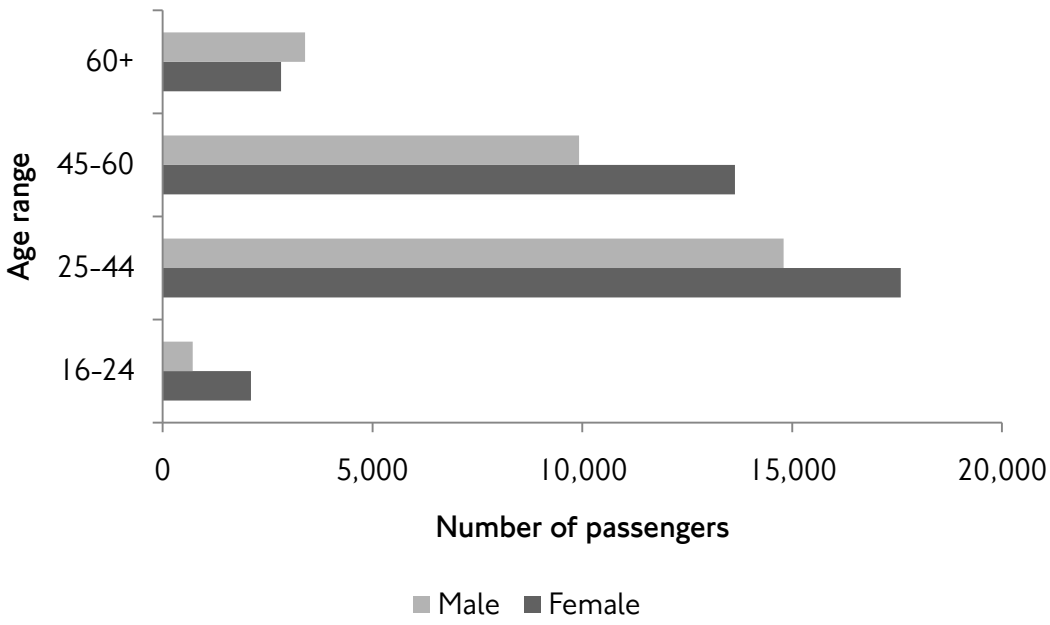
Charing Cross: Frequency of cycling and walking

While 59 per cent of passengers walked their onward journey on the survey day, a total of 70 per cent stated that they ever walked the onward journey. The majority of these had walked on 5 days in the previous week, although over 20 per cent walked on only two days or fewer. Few passengers at Charing Cross stated that they ever cycle their onward journey.

Table 9.1 Charing Cross Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		<1%	59%
Share who ever use from station to destination		1%	70%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	15%	7%
	1	-	8%
	2	21%	7%
	3	12%	6%
	4	19%	8%
	5	33%	64%
	6	-	-
	7	-	-

Figure 9.4 Charing Cross passenger demographics, AM and PM peak arrivals and departures



Chapter 10 Summary of findings at Euston

Figures quoted are for all AM and PM peak arrivals and departures based on 3,479 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	23,500
AM busiest hour	0800 - 0900
arrivals	11,500
AM peak departures	8,000
scale of contraflow in proportion to arrivals	35%

PM passenger flows	
PM peak departures	23,500
PM busiest hour	1730 - 1830
departures	9,500
PM peak arrivals	13,000
scale of contraflow in proportion to departures	55%

Share of connecting modes in central London	
Underground	53%
Walk	20%
Rail	12%
Bus	8%
Taxi	3%
Cycle	3%

London Underground line used	
Northern	46%
Victoria	37%
Metropolitan	8%
Hammersmith & City	5%
Circle	4%

Purpose in central London	
Usual workplace	50%
Home	21%
Other work	19%
Leisure/ Entertainment	3%

Journey frequency	
5 or more days per week	40%
3 or 4 days per week	14%
1 or 2 days per week	12%
less than one day per week	33%

Onward distance travelled in central London	
1st quartile	2.1 km
2nd quartile (median)	3.6 km
3rd quartile	8.6 km

Location of trip end outside central London	
Within GLA	11%
Outside GLA	87%

Figure 10.1 Passenger distribution at Euston, AM and PM peak arrivals and departures

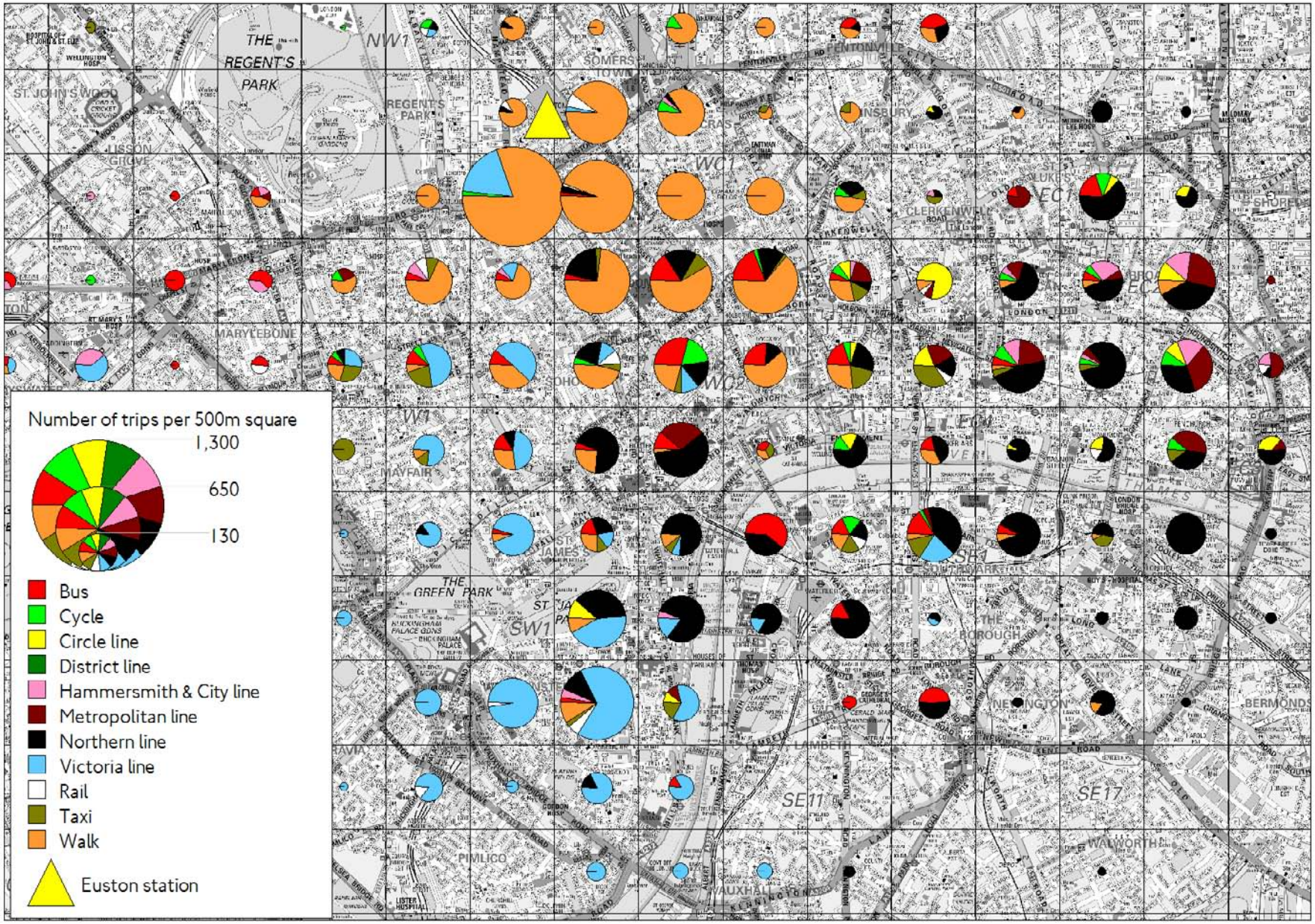
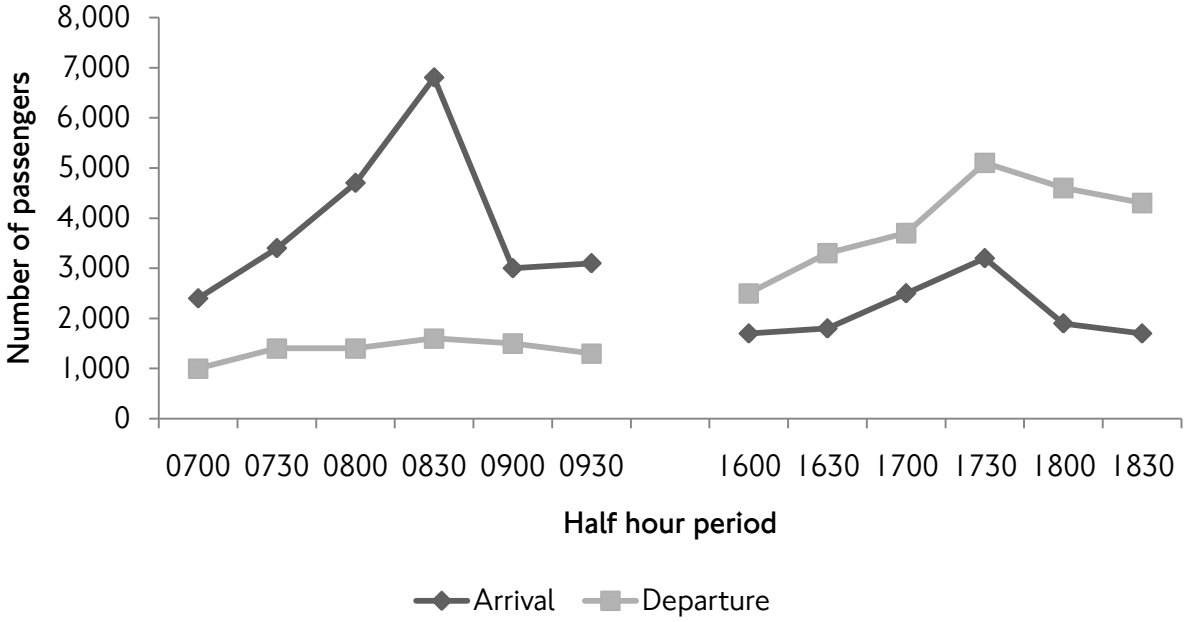
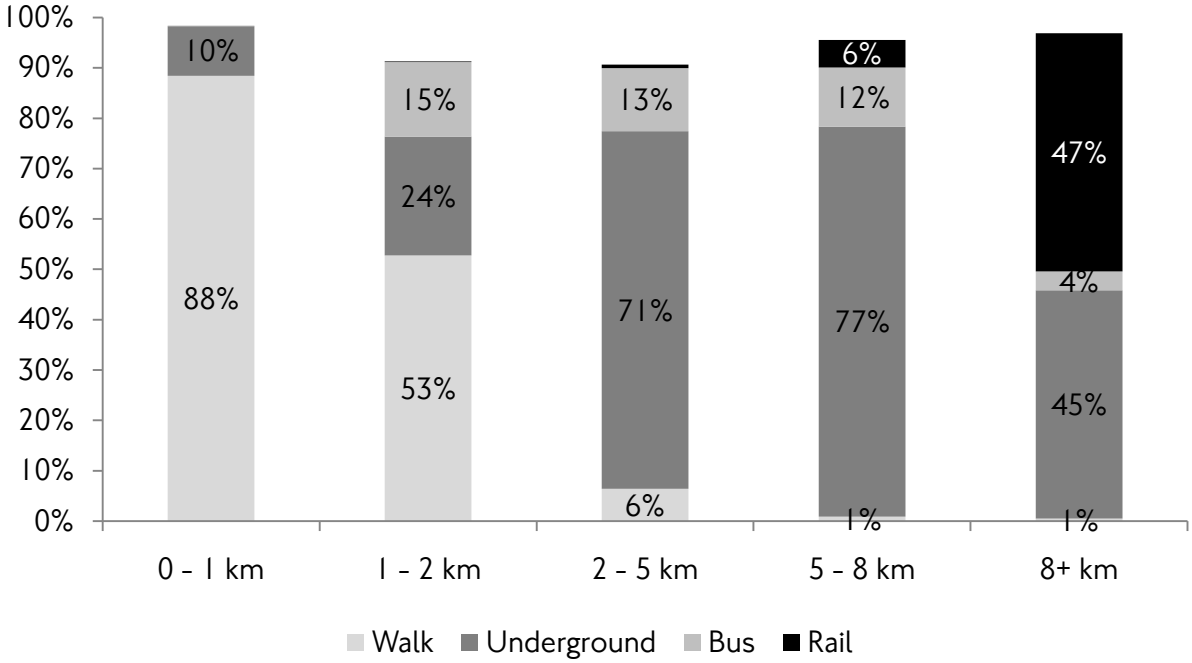


Figure 10.2 Euston passenger flows



At Euston more passengers were observed in the PM peak than in the AM peak. Contraflow passengers accounted for a high proportion, with over half as many arrivals as departures in the PM peak.

Figure 10.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



Euston: Frequency of cycling and walking

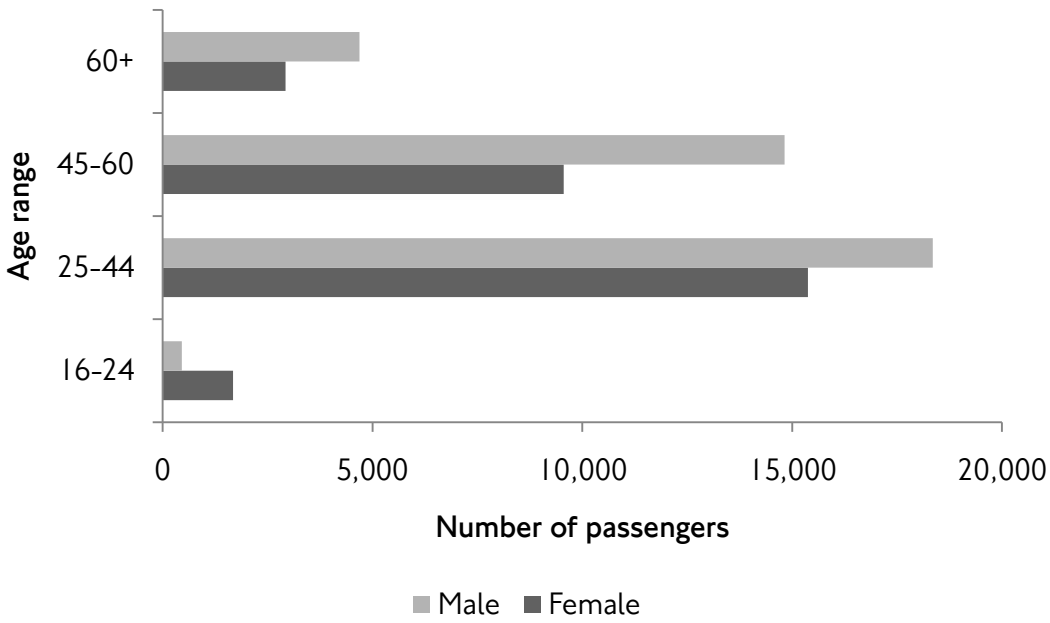
Only 20 per cent of onward journeys were walked at Euston, reflecting the relatively long distances of onward travel at the station. Among those who stated that they ever walked the onward journey only 30 per cent had done so on five days of the previous seven, with almost 40 per cent doing so on only two days or fewer.

While 3 per cent of passengers cycled their onward journey on the survey day, a further 3 per cent stated that they sometimes cycle the onward journey. Only 9 per cent of those who ever cycle had not done so within the previous week, but over one third did so on only one or two of the previous seven days.

Table 10.1 Euston Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		3%	20%
Share who ever use from station to destination		6%	33%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	9%	10%
	1	20%	19%
	2	17%	10%
	3	7%	7%
	4	9%	7%
	5	20%	30%
	6	<1%	1%
	7	2%	14%

Figure 10.4 Euston passenger demographics, AM and PM peak arrivals and departures



Chapter 11 Summary of findings at Fenchurch Street

Figures quoted are for all AM and PM peak arrivals and departures based on 1,116 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	22,500
AM busiest hour	0800 - 0900
arrivals	11,500
AM peak departures	500
scale of contraflow in proportion to arrivals	2%

PM passenger flows	
PM peak departures	19,000
PM busiest hour	1700 - 1800
departures	9,500
PM peak arrivals	1,000
scale of contraflow in proportion to departures	6%

Share of connecting modes in central London	
Underground	58%
Walk	24%
Bus	9%
Rail	5%
Cycle	1%
Taxi	1%

London Underground line used	
District / Circle	87%
Metropolitan	12%

Purpose in central London	
Usual workplace	89%
Other work	5%
Home	3%
Leisure/ Entertainment	1%

Journey frequency	
5 or more days per week	79%
3 or 4 days per week	13%
1 or 2 days per week	3%
less than one day per week	5%

Onward distance travelled in central London	
1st quartile	0.6 km
2nd quartile (median)	1.4 km
3rd quartile	4 km

Location of trip end outside central London	
Within GLA	28%
Outside GLA	71%

Figure 11.1 Passenger distribution at Fenchurch Street, PM peak arrivals and departures

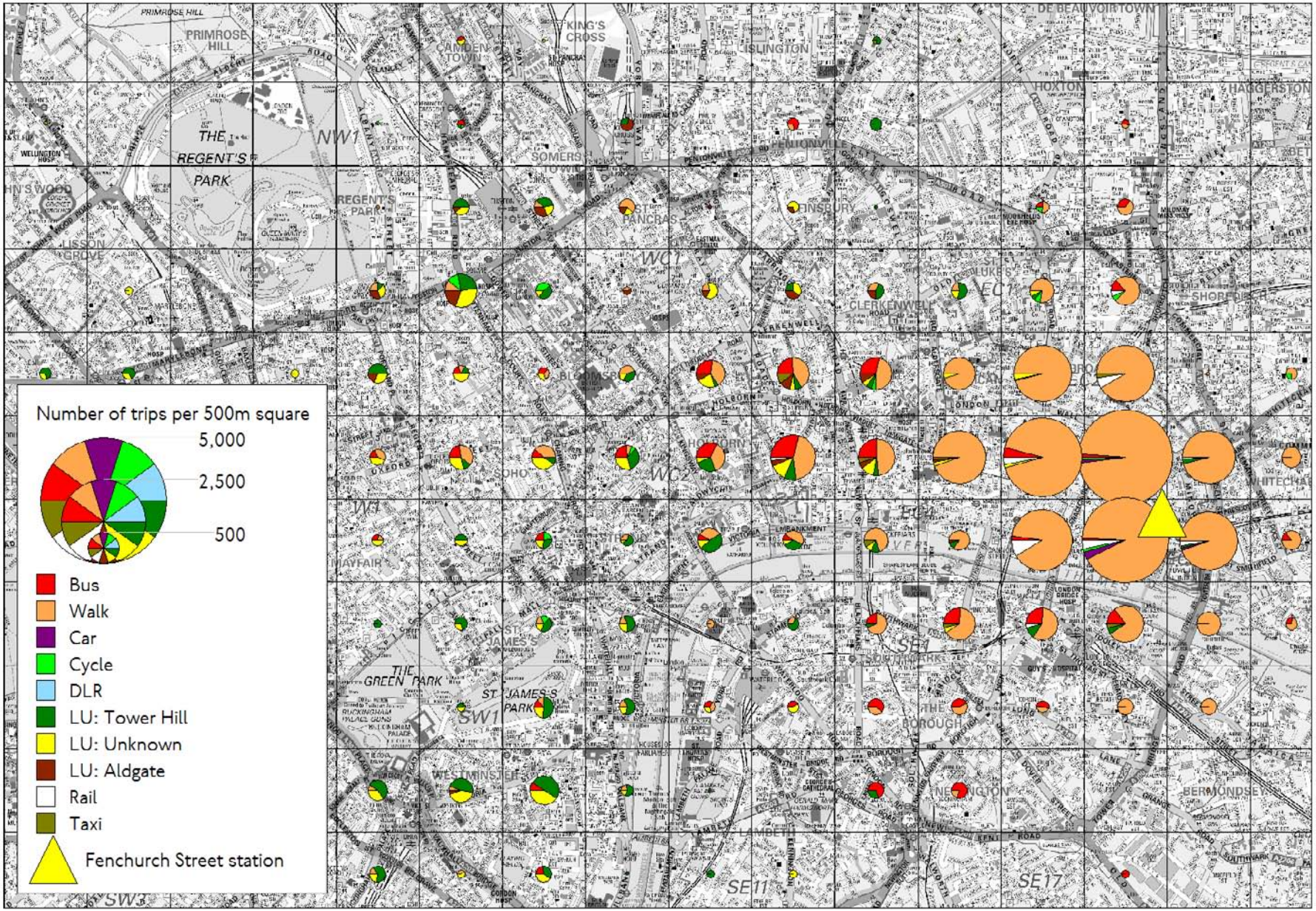
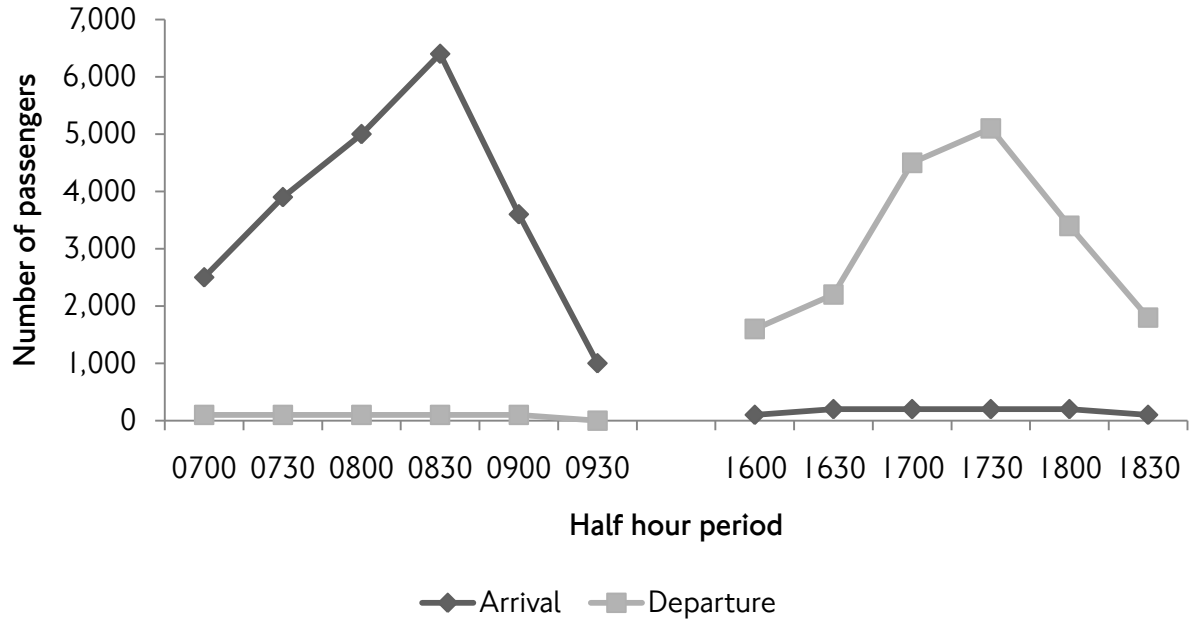
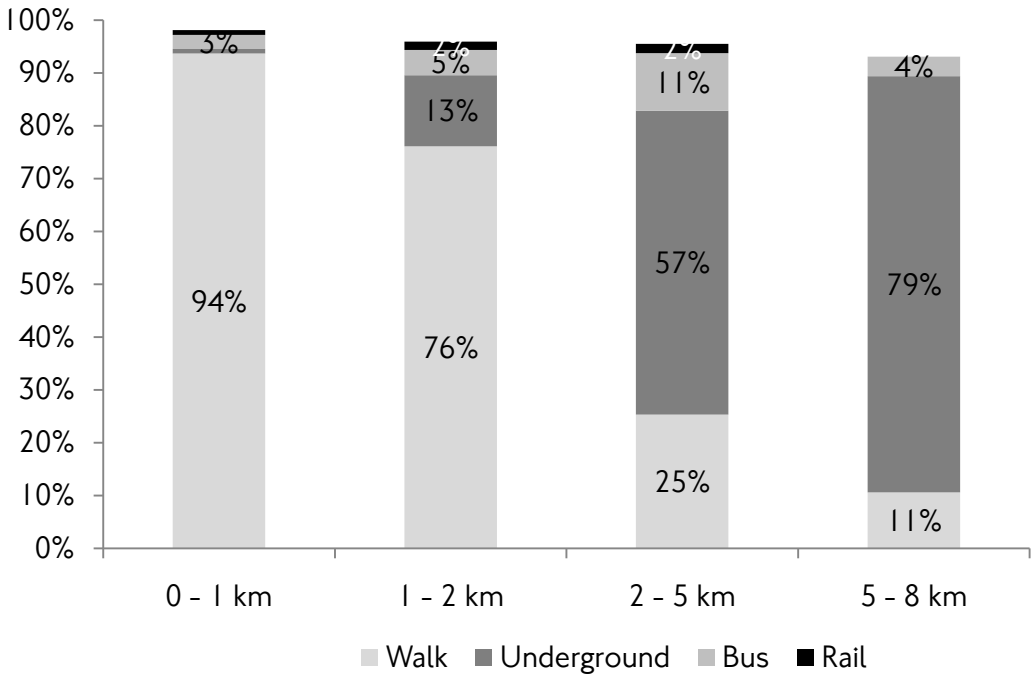


Figure 11.2 Fenchurch Street passenger flows



Fenchurch Street saw pronounced tidal flows of passengers, with only 1,500 contraflow passengers across both the AM and PM peaks.

Figure 11.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



Note: due to an error in the operation of the survey some records may be inaccurate and the results shown above should be treated as indicative.

Fenchurch Street: Frequency of cycling and walking

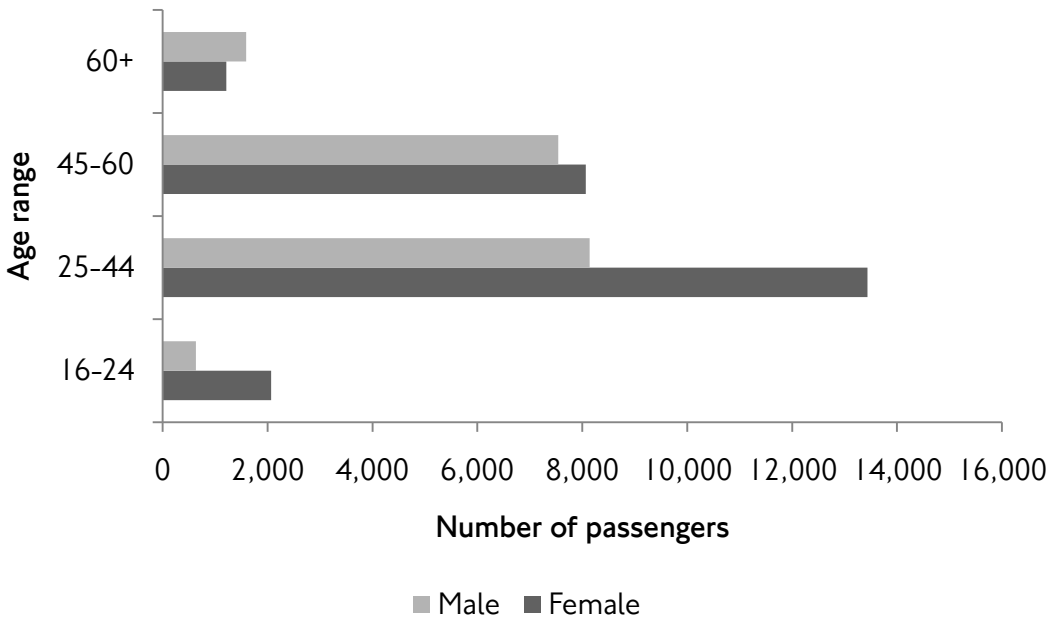
Among the 61 per cent of passengers at Fenchurch Street who stated that they ever walked the onward journey, nearly three quarters did so on five of the previous seven days.

2 per cent of passengers stated that they ever cycled their onward journey, but half had only done so on one or no days in the previous week.

Table 11.1 Fenchurch Street Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		1%	61%
Share who ever use from station to destination		2%	61%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	19%	4%
	1	31%	4%
	2	7%	6%
	3	8%	7%
	4	7%	5%
	5	27%	73%
	6	-	-
	7	-	-

Figure 11.4 Fenchurch Street passenger demographics, AM and PM peak arrivals and departures



Chapter 12 Summary of findings at King's Cross

Figures quoted are for all AM and PM peak arrivals and departures based on 1,873 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	15,500
AM busiest hour	0800 - 0900
arrivals	7,500
AM peak departures	3,500
scale of contraflow in proportion to arrivals	24%

PM passenger flows	
PM peak departures	19,500
PM busiest hour	1730 - 1830
departures	8,000
PM peak arrivals	6,000
scale of contraflow in proportion to departures	30%

Share of connecting modes in central London	
Underground	49%
Walk	20%
Rail	15%
Bus	7%
Cycle	4%
Taxi	3%

London Underground line used	
Metropolitan / Hammersmith & City / Circle	34%
Victoria	30%
Northern	20%
Piccadilly	16%

Purpose in central London	
Usual workplace	60%
Home	16%
Other work	15%
Shopping/ Personal Business	3%

Journey frequency	
5 or more days per week	549%
3 or 4 days per week	13%
1 or 2 days per week	9%
less than one day per week	29%

Onward distance travelled in central London	
1st quartile	2.1 km
2nd quartile (median)	3.6 km
3rd quartile	8.1 km

Location of trip end outside central London	
Within GLA	10%
Outside GLA	87%

Figure 12.1 Passenger distribution at King's Cross, AM and PM peak arrivals and departures

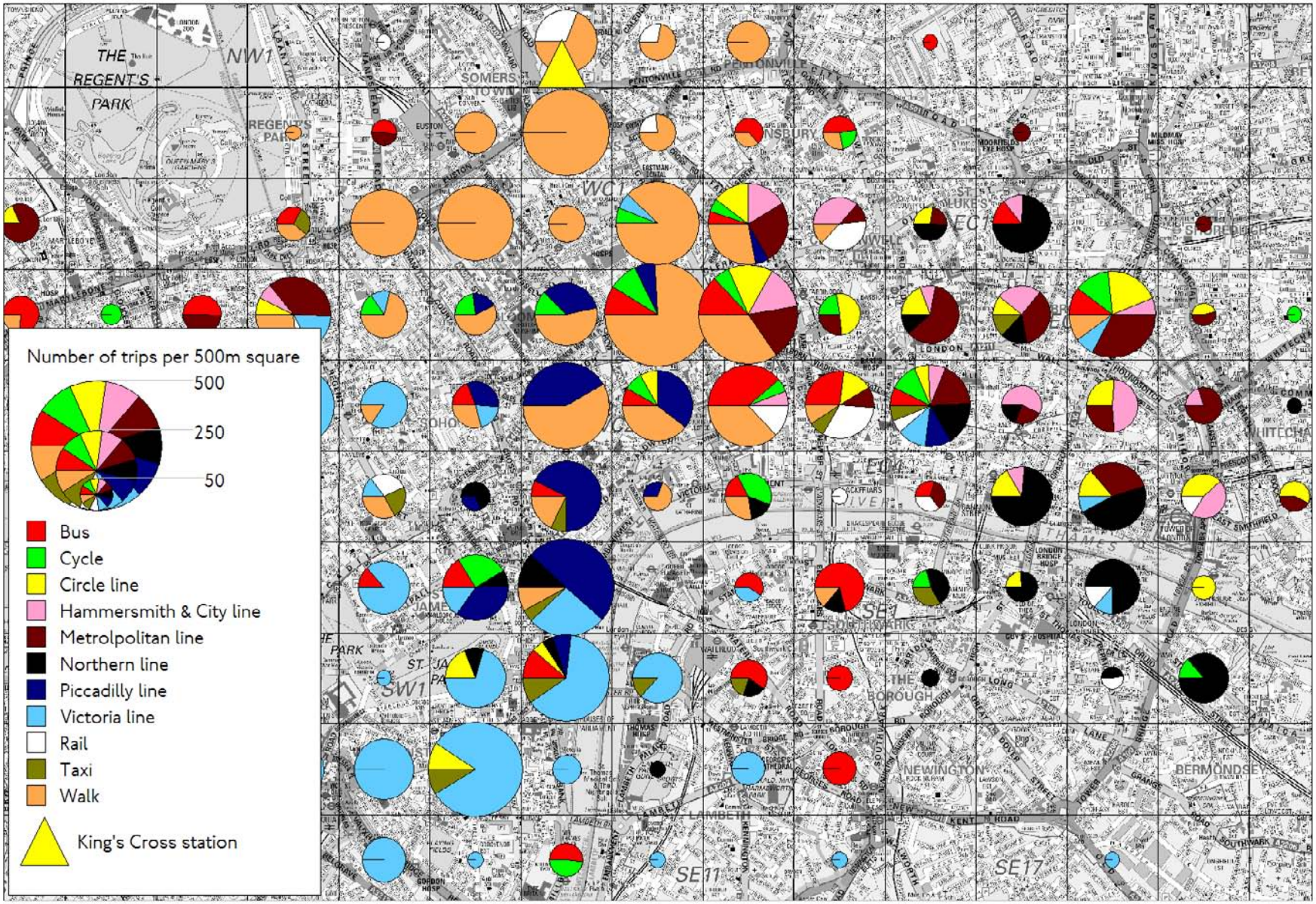
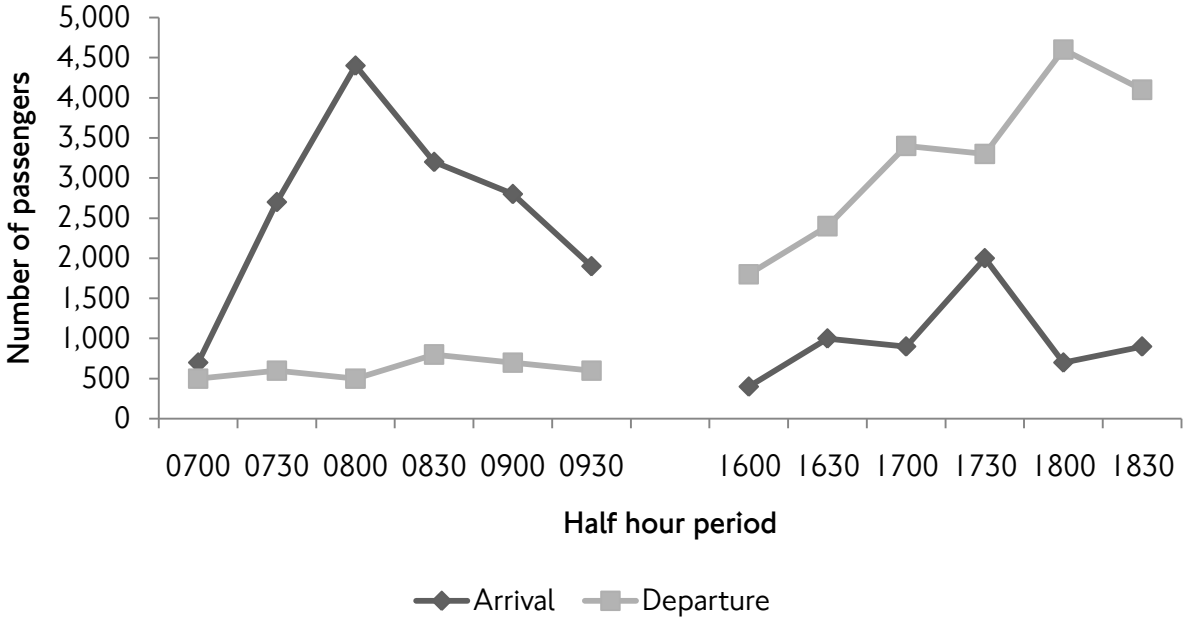
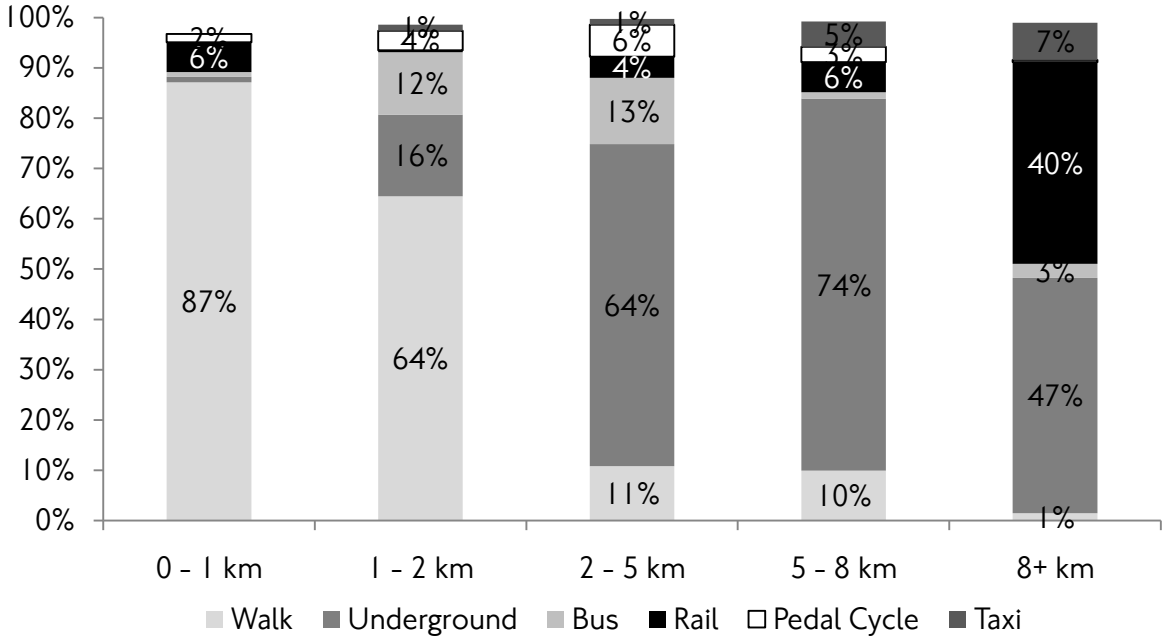


Figure 12.2 King's Cross passenger flows



King's Cross saw a greater number of passengers in the PM peak than in the AM peak. Many of these passengers were travelling against the peak flow, with contraflow passengers accounting for around one quarter of all passengers in the PM peak.

Figure 12.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



King's Cross saw relatively high cycle mode shares for onward trips between 1km and 8km. 6 per cent of onward journeys between 2km and 5km were made by bicycle.

King's Cross: Frequency of cycling and walking

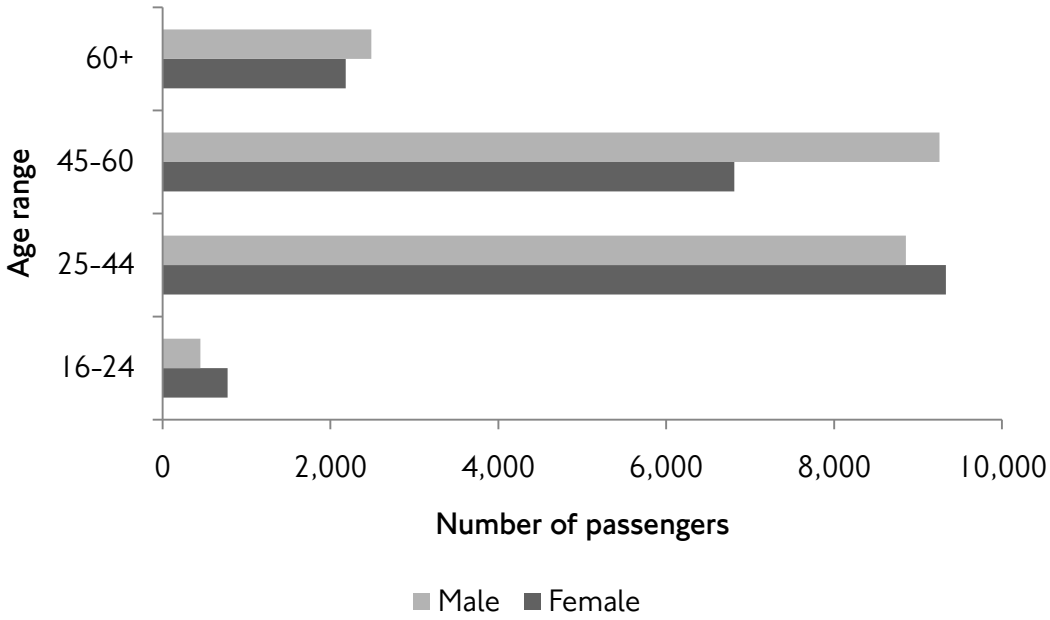
While 38 per cent of passengers at King's Cross stated that they ever make their onward journey by walking, only 23 per cent did so on the survey day. Among those who ever walk, less than 30 per cent did so on 5 or more days in the previous week.

There was a relatively high proportion of onward trips made by bicycle at King's Cross, with 4 per cent of passengers travelling by bicycle on the survey day. 7 per cent of passengers stated that they ever make their onward journey by bicycle, but as was observed with walking, many passengers appeared only to cycle the onward journey infrequently.

Table 12.1 King's Cross Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Cycle mode share on survey day		4%	23%
Share who ever cycle from station to destination		7%	38%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	29%	24%
	1	13%	14%
	2	5%	8%
	3	4%	6%
	4	12%	8%
	5	31%	25%
	6	6%	1%
	7	2%	3%

Figure 12.4 King's Cross passenger demographics, AM and PM peak arrivals and departures



Chapter 13 Summary of findings at Liverpool Street

Figures quoted are for all AM and PM peak arrivals and departures based on 7,359 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	63,500
AM busiest hour	0800 - 0900
arrivals	32,500
AM peak departures	4,500
scale of contraflow in proportion to arrivals	7%

PM passenger flows	
PM peak departures	58,500
PM busiest hour	1700 - 1800
departures	26,500
PM peak arrivals	10,000
scale of contraflow in proportion to departures	17%

Share of connecting modes in central London	
Walk	48%
Underground	32%
Bus	10%
Rail	6%
Cycle	2%

London Underground line used	
Central	41%
Circle	22%
Metropolitan	19%
Hammersmith & City	11%
Northern	7%

Purpose in central London	
Usual workplace	81%
Home	6%
Other work	6%
Leisure/ Entertainment	2%

Journey frequency	
5 or more days per week	72%
3 or 4 days per week	12%
1 or 2 days per week	5%
less than one day per week	10%

Onward distance travelled in central London	
1st quartile	0.9 km
2nd quartile (median)	1.9 km
3rd quartile	4.2 km

Location of trip end outside central London	
Within GLA	35%
Outside GLA	63%

Figure 13.1 Passenger distribution at Liverpool Street, AM and PM peak arrivals and departures

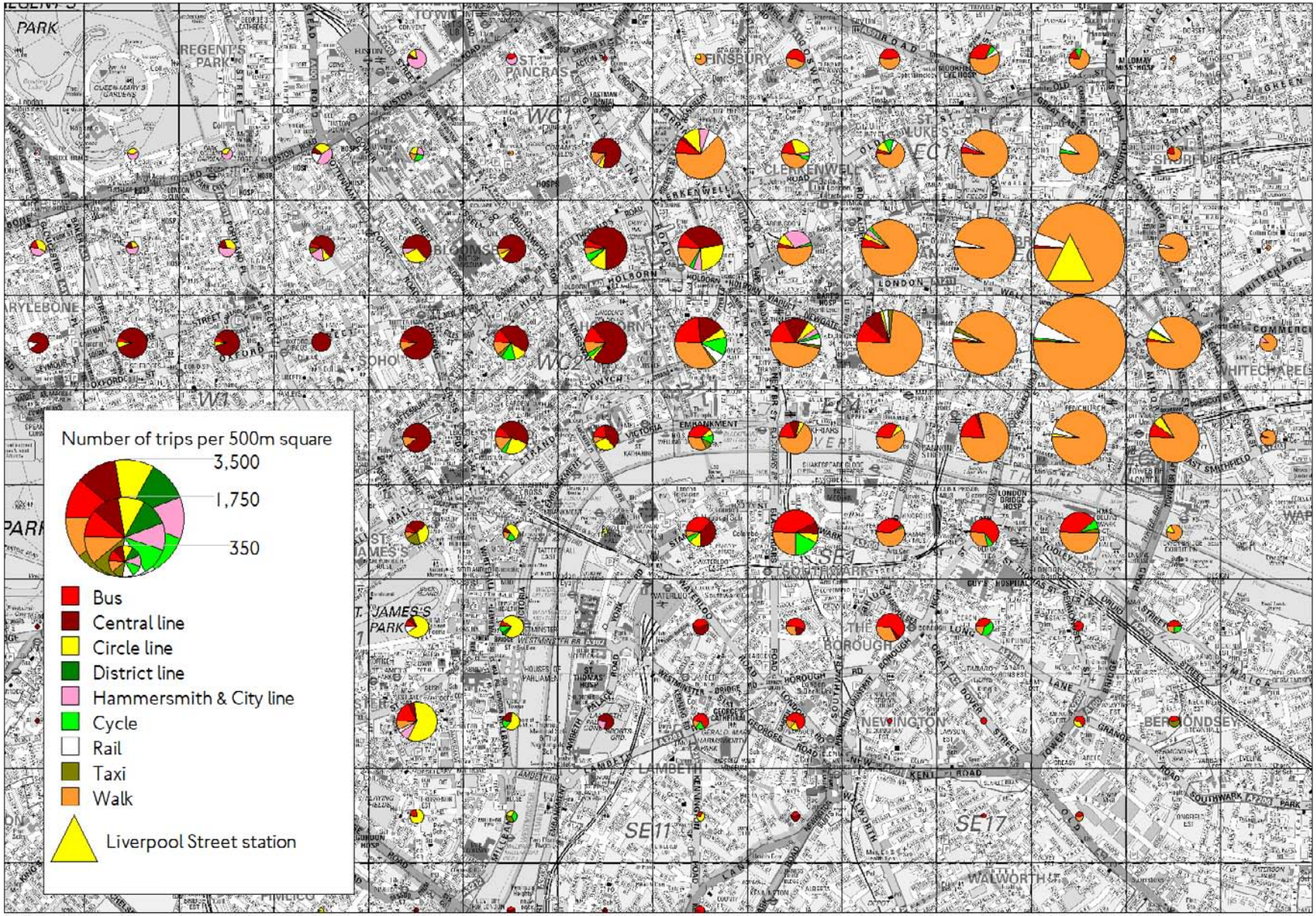
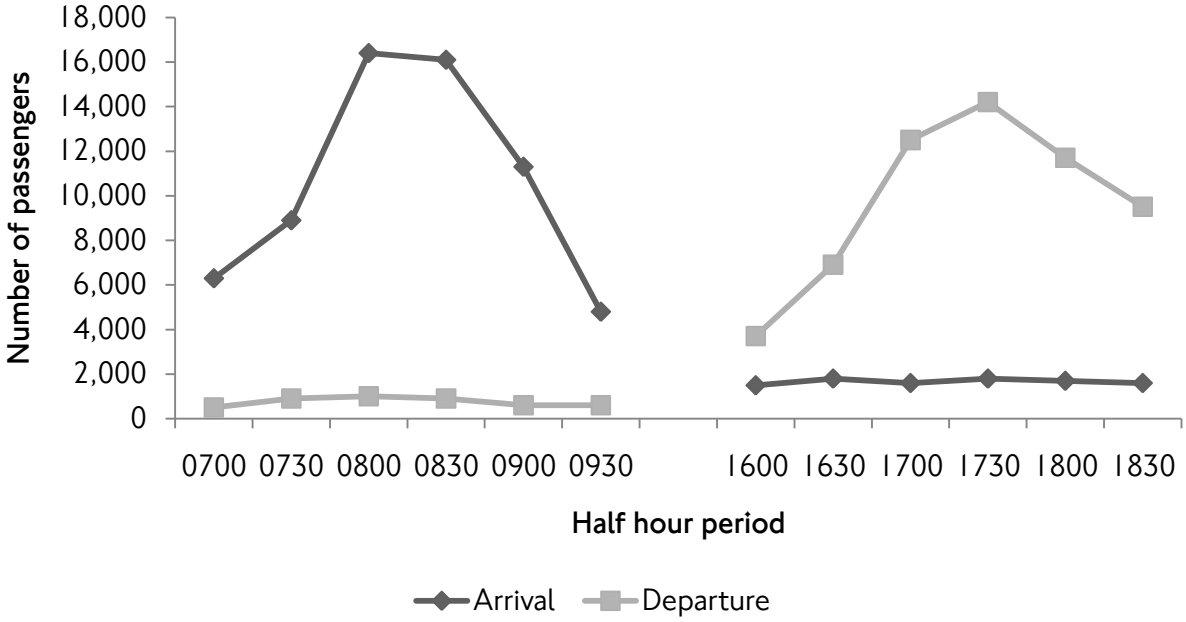
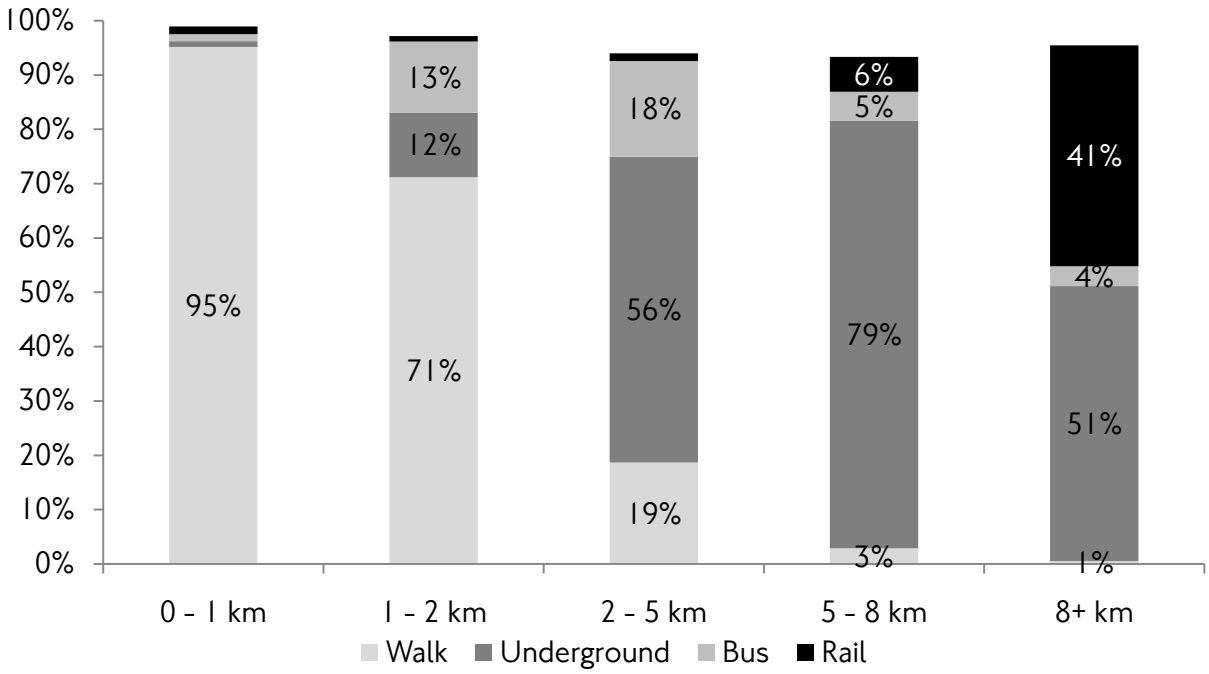


Figure 13.2 Liverpool Street passenger flows



Liverpool Street is among the four busiest termini with AM peak flows dominated by passengers arriving in central London.

Figure 13.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



The proximity of Liverpool Street to the City means many onward trips were relatively short, with over half under 2km. A large proportion of onward trips under 2km were walked.

Liverpool Street: Frequency of cycling and walking

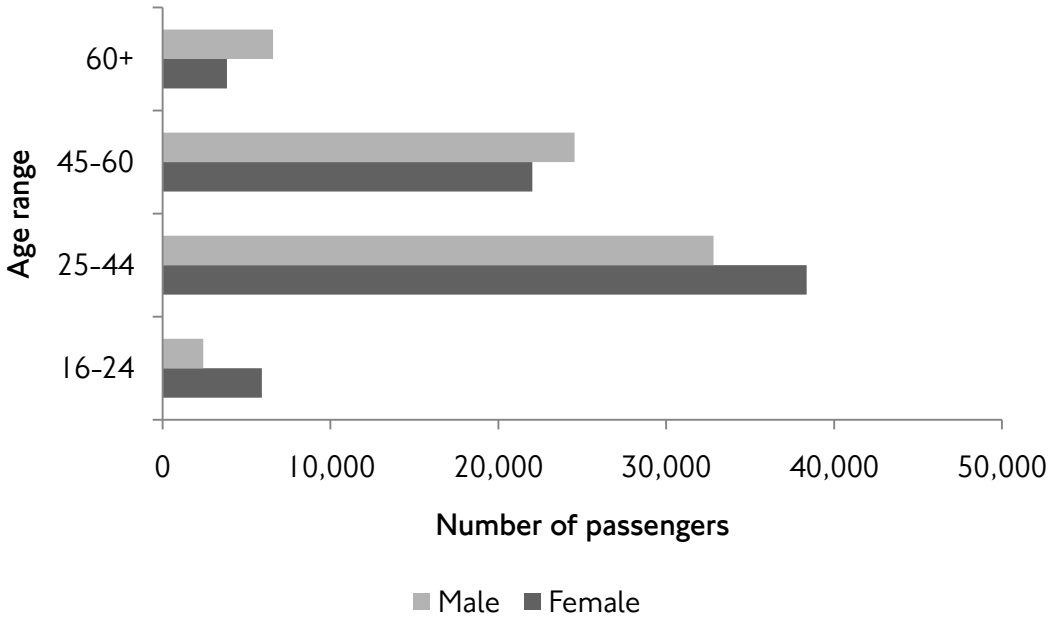
While 40 per cent of passengers walked on the survey day, another 17 per cent stated that they ever do so. Around a quarter of those who stated that they ever walked had only done so on two or fewer of the previous seven days.

Of the 5 per cent of respondents who stated that they ever cycle the onward journey, almost one quarter had not done so in the seven days prior to the survey.

Table 13.1 Liverpool Street Departures – Central London mode share cycle and walk

		Cycle	Walk
Cycle mode share on survey day		2%	40%
Share who ever cycle from origin to station		5%	57%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	23%	9%
	1	13%	9%
	2	9%	6%
	3	9%	7%
	4	10%	8%
	5	32%	46%
	6	1%	1%
	7	5%	4%

Figure 13.4 Liverpool Street passenger demographics, AM and PM peak arrivals and departures



Chapter 14 Summary of findings at London Bridge

Figures quoted are for all AM and PM peak arrivals and departures based on 4,064 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	68,000
AM busiest hour	0800 - 0900
arrivals	31,000
AM peak departures	7,000
scale of contraflow in proportion to arrivals	11%

PM passenger flows	
PM peak departures	59,000
PM busiest hour	1730 - 1830
departures	26,500
PM peak arrivals	15,000
scale of contraflow in proportion to departures	25%

Share of connecting modes in central London	
Walk	46%
Underground	29%
Rail	11%
Bus	11%
Cycle	1%

London Underground line used	
Jubilee	54%
Northern	45%

Purpose in central London	
Usual workplace	77%
Home	10%
Other work	5%
Education	3%

Journey frequency	
5 or more days per week	71%
3 or 4 days per week	15%
1 or 2 days per week	6%
less than one day per week	8%

Onward distance travelled in central London	
1st quartile	0.8 km
2nd quartile (median)	1.8 km
3rd quartile	4.8 km

Location of trip end outside central London	
Within GLA	62%
Outside GLA	34%

Figure 14.1 Passenger distribution at London Bridge, AM and PM peak arrivals and departures

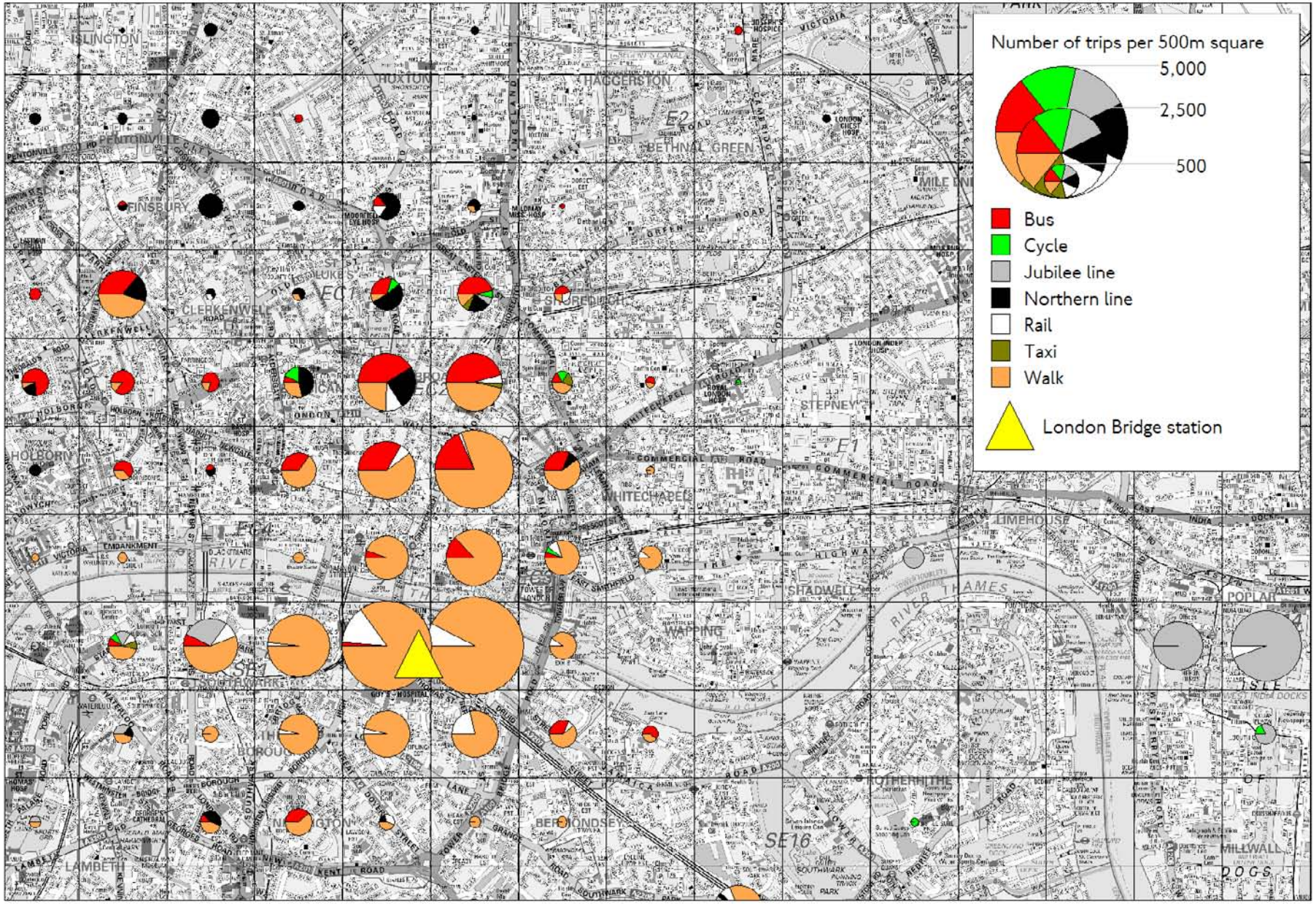
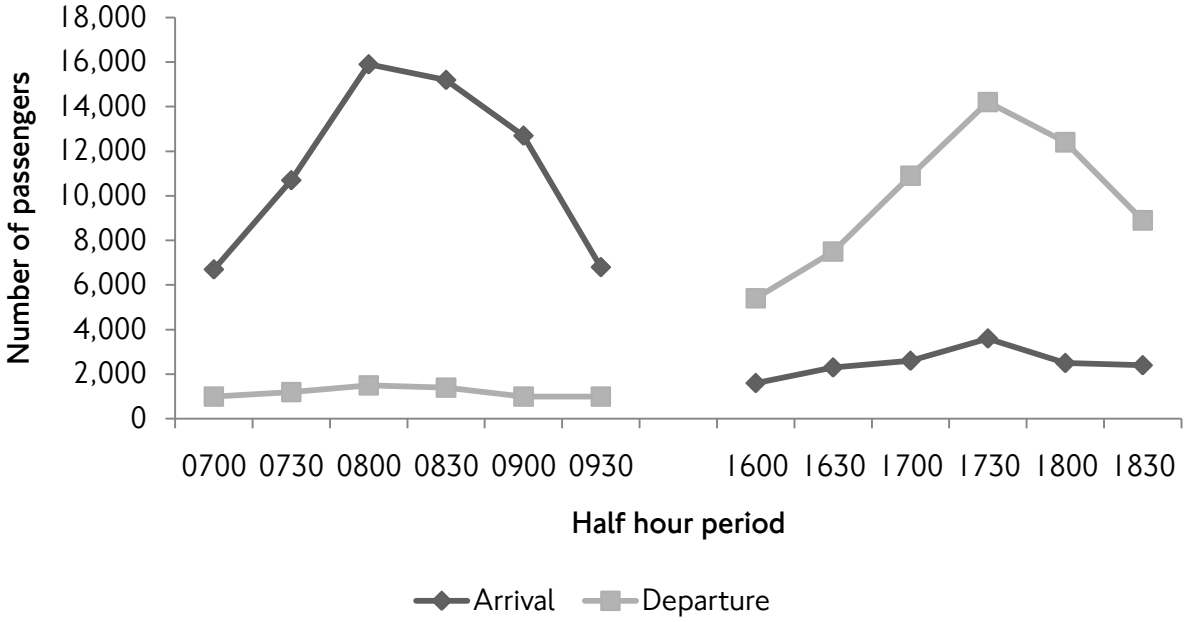
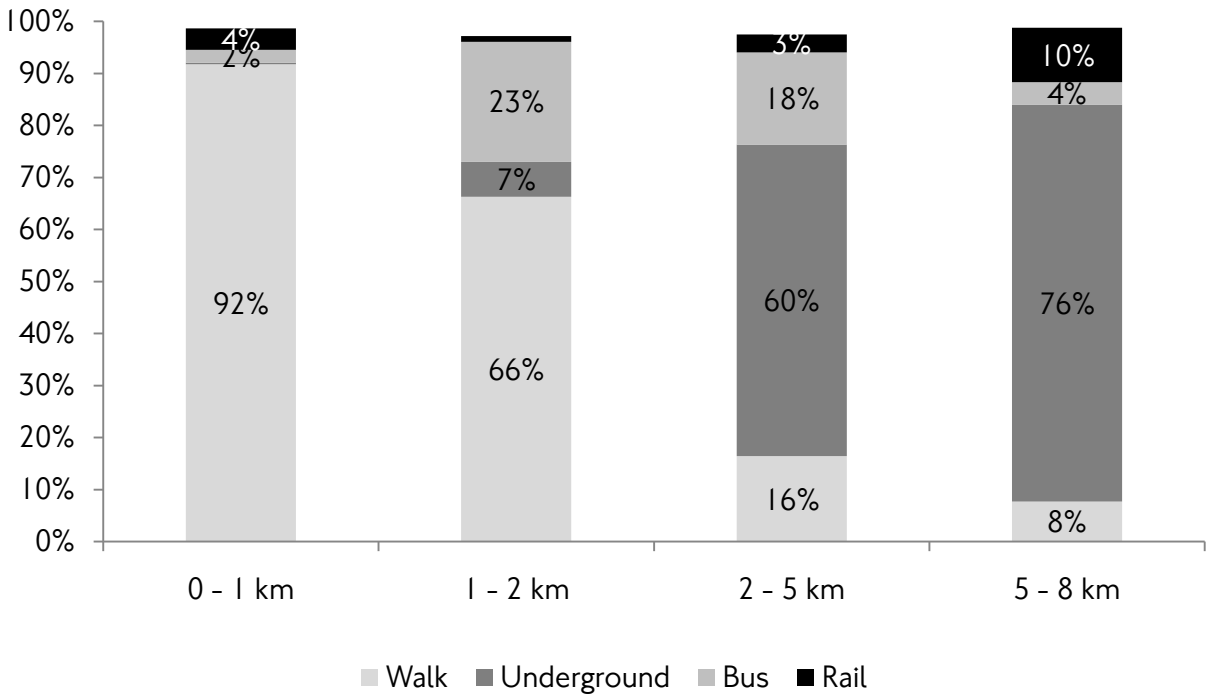


Figure 14.2 London Bridge passenger flows



London Bridge is among the busiest termini. During the PM peak contraflow passengers represented one fifth of the total.

Figure 14.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



A relatively large proportion of onward trips between 1km and 2km were made by bus, mostly by passengers crossing the Thames to reach the City. Around one quarter of onward trips were between 2km and 5km, including a significant number to Canary Wharf using the Jubilee line.

London Bridge: Frequency of cycling and walking

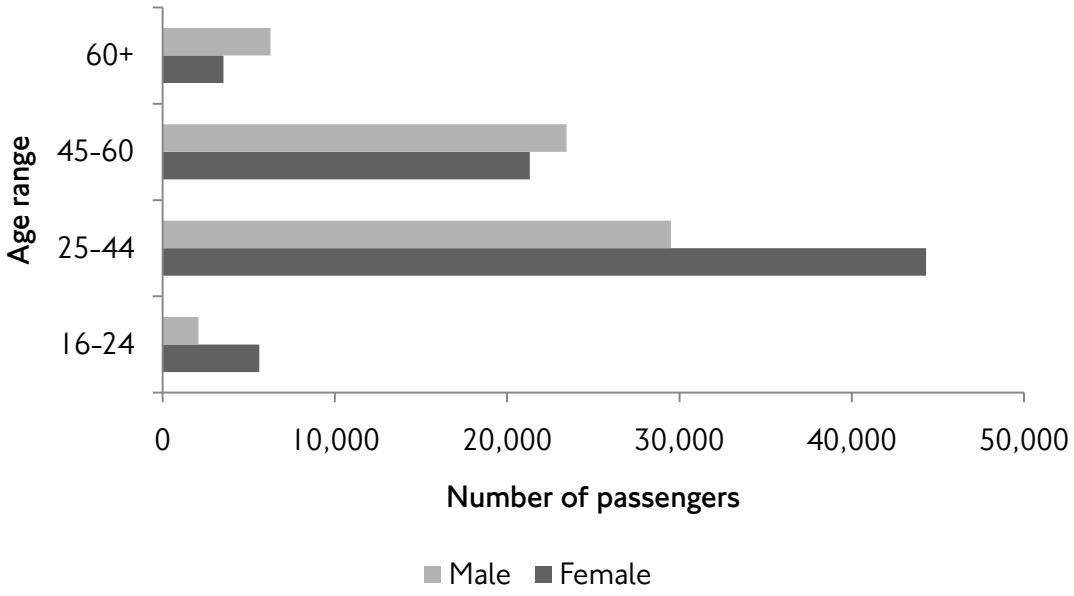
57 per cent of passengers stated that they ever walked their onward journey, the vast majority of whom did so on the survey day.

A relatively small proportion of passengers stated that they ever cycled their onward journey, and even among those who do cycle almost 60 per cent had done so on 2 days or fewer of the seven days prior to the survey.

Table 14.1 London Bridge Arrivals – Central London mode share cycle & walk

		Cycle	Walk
Mode share on survey day		1%	51%
Share who ever use from station to destination		3%	57%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	29%	8%
	1	11%	7%
	2	19%	6%
	3	9%	7%
	4	2%	7%
	5	28%	56%
	6	1%	1%
	7	1%	7%

Figure 14.4 London Bridge passenger demographics, AM and PM peak arrivals and departures



Chapter 15 Summary of findings at Marylebone

Figures quoted are for all AM and PM peak arrivals and departures based on 1,308 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	10,500
AM busiest hour	0800 - 0900
arrivals	5,500
AM peak departures	1,500
scale of contraflow in proportion to arrivals	14%

PM passenger flows	
PM peak departures	9,500
PM busiest hour	1730 - 1830
departures	4,500
PM peak arrivals	3,000
scale of contraflow in proportion to departures	33%

Share of connecting modes in central London	
Underground	62%
Walk	18%
Bus	10%
Rail	4%
Cycle	4%
Taxi	2%

London Underground line used	
Bakerloo	59%
Jubilee	18%
Metropolitan	15%
Hammersmith and City	4%
Circle	4%

Purpose in central London	
Usual workplace	71%
Other work	13%
Home	8%
Leisure/ Entertainment	4%

Journey frequency	
5 or more days per week	55%
3 or 4 days per week	16%
1 or 2 days per week	10%
less than one day per week	19%

Onward distance travelled in central London	
1st quartile	2.2 km
2nd quartile (median)	3.5 km
3rd quartile	5.4 km

Location of trip end outside central London	
Within GLA	10%
Outside GLA	89%

Figure 15.1 Passenger distribution at Marylebone, AM and PM peak arrivals and departures

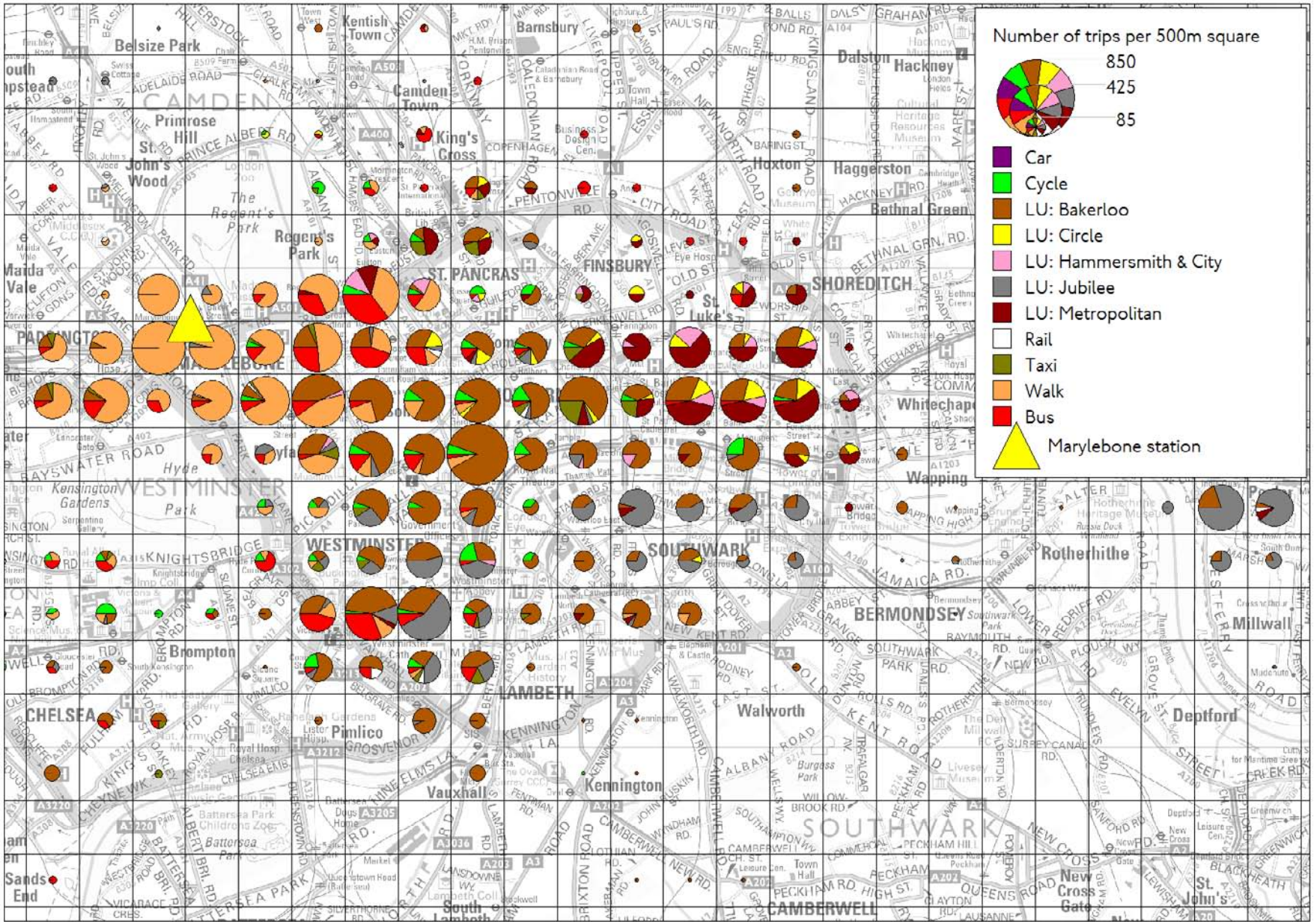
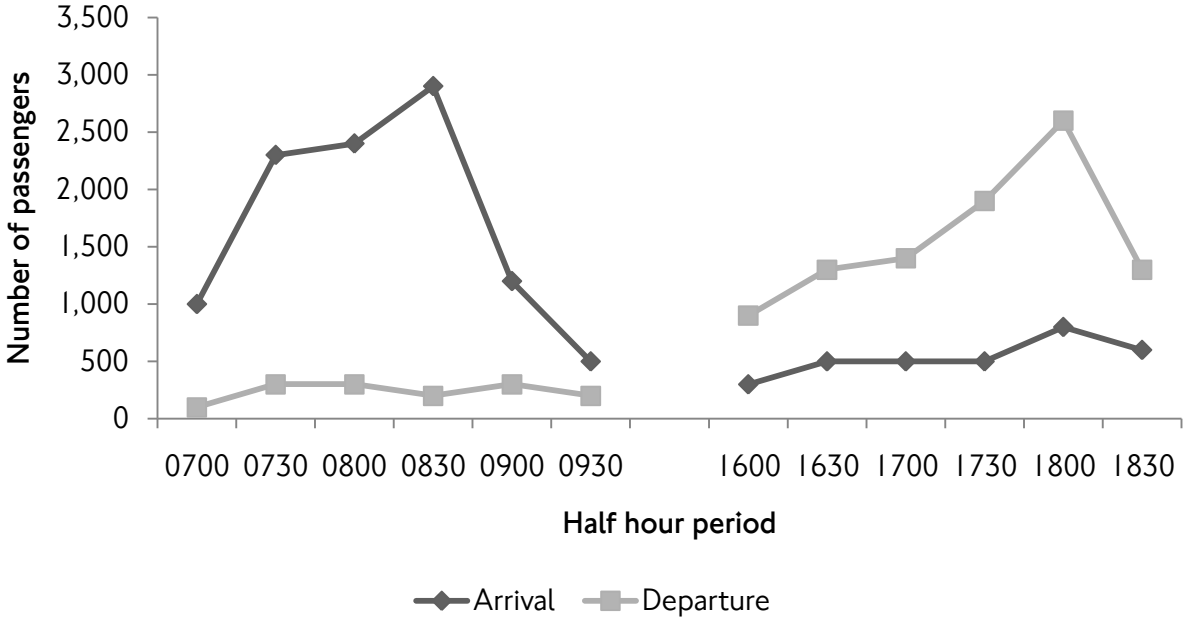
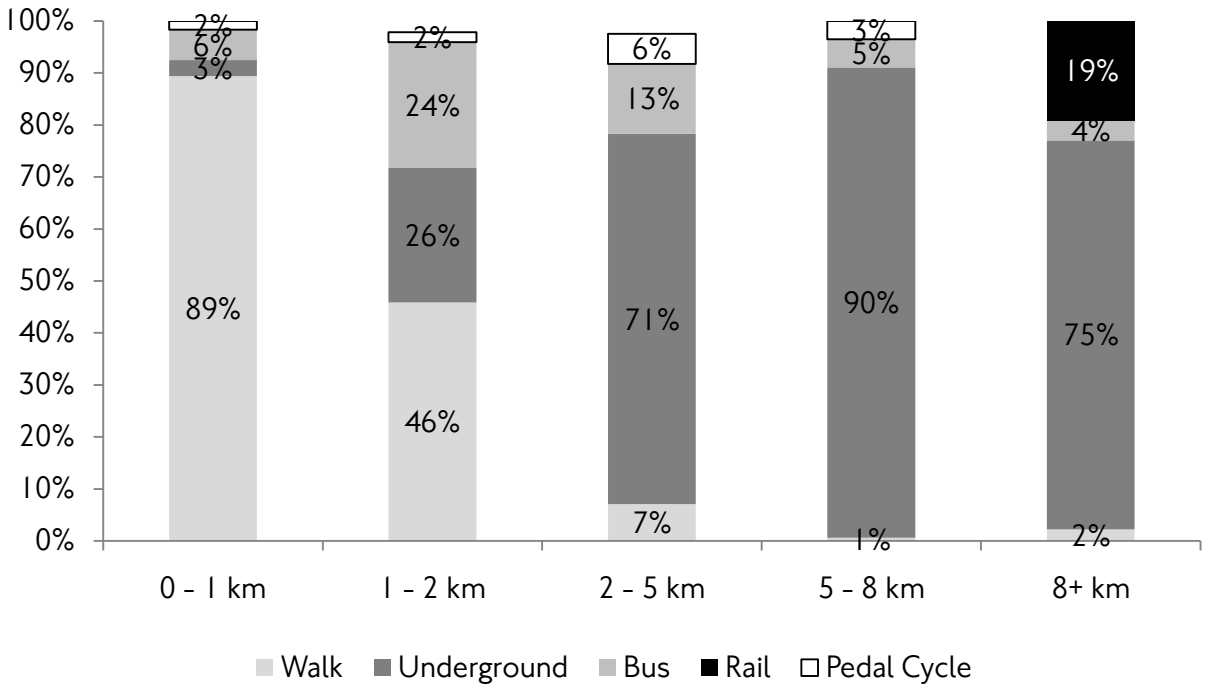


Figure 15.2 Marylebone passenger flows



Marylebone saw passenger flows among the lowest of the termini. The busiest hour saw around 5,000 passengers arriving.

Figure 15.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



There were relatively few short onward trips at Marylebone, with onward destinations spread equally throughout central London and some in Canary Wharf. Many of the onward trips made by London Underground involved passengers making a short walk to Baker Street.

Marylebone: Frequency of cycling and walking

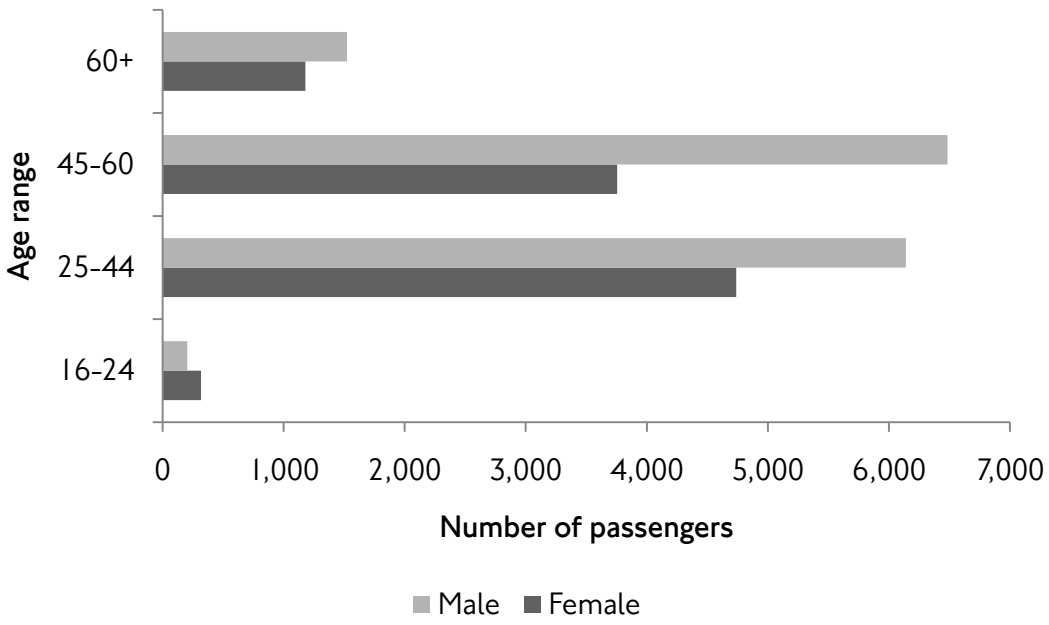
Cycle mode share was among the highest seen at the termini, due in part to the large proportion of trips between 2km and 5km . Of the 5 per cent of passengers who stated that they ever cycle their onward journey, almost half had done so on five of the previous seven days.

The small proportion of short onward trips at Marylebone meant that the share of trips walked at Marylebone was relatively low.

Table 15.1 Marylebone Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		4%	18%
Share who ever use from station to destination		5%	30%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	20%	18%
	1	10%	15%
	2	5%	8%
	3	7%	6%
	4	10%	9%
	5	48%	44%
	6	-	-
	7	-	-

Figure 15.4 Marylebone passenger demographics, AM and PM peak arrivals and departures



Chapter 16 Summary of findings at Moorgate

Figures quoted are for all AM and PM peak arrivals and departures based on 1,489 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	10,000
AM busiest hour	0800 - 0900
arrivals	5,500
AM peak departures	500
scale of contraflow in proportion to arrivals	5%

PM passenger flows	
PM peak departures	8,500
PM busiest hour	1730 - 1830
departures	4,000
PM peak arrivals	1,500
scale of contraflow in proportion to departures	17%

Share of connecting modes in central London	
Walk	54%
Underground	35%
Rail	6%
Bus	2%
Cycle	1%

London Underground line used	
Northern	63%
Metropolitan	18%
Hammersmith & City	11%
Circle	8%

Purpose in central London	
Usual workplace	84%
Home	5%
Other work	4%
Education	2%

Journey frequency	
5 or more days per week	73%
3 or 4 days per week	14%
1 or 2 days per week	5%
less than one day per week	7%

Onward distance travelled in central London	
1st quartile	0.6 km
2nd quartile (median)	1.1 km
3rd quartile	2.5 km

Location of trip end outside central London	
Within GLA	72%
Outside GLA	27%

Figure 16.1 Passenger distribution at Moorgate, AM and PM peak arrivals and departures.

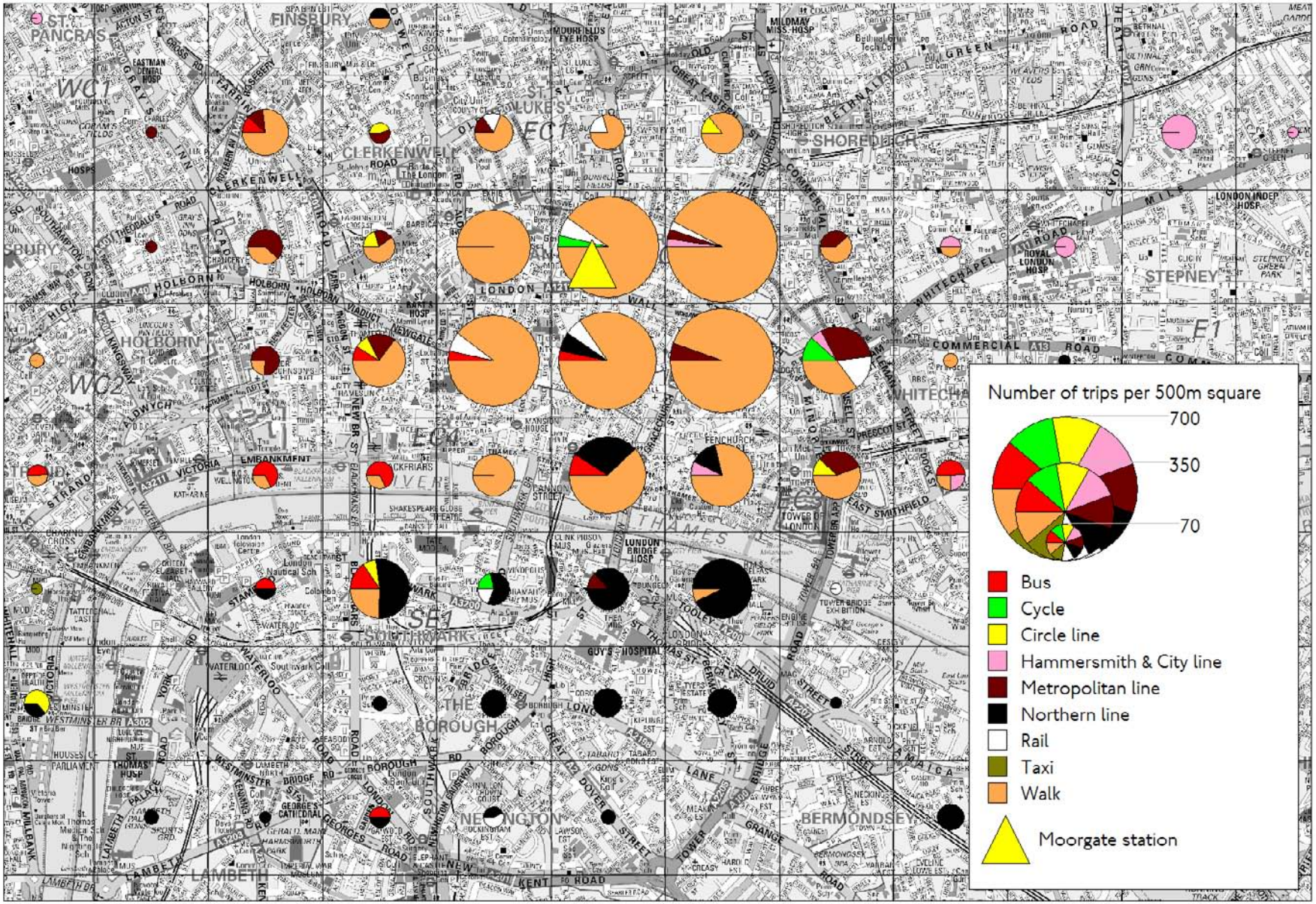
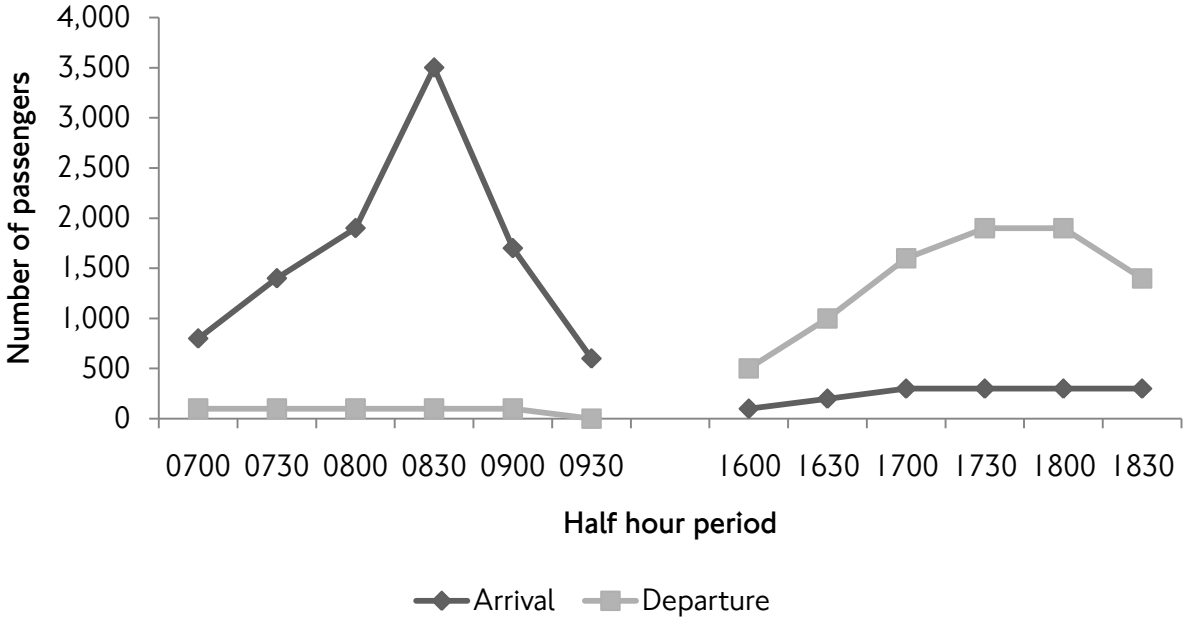
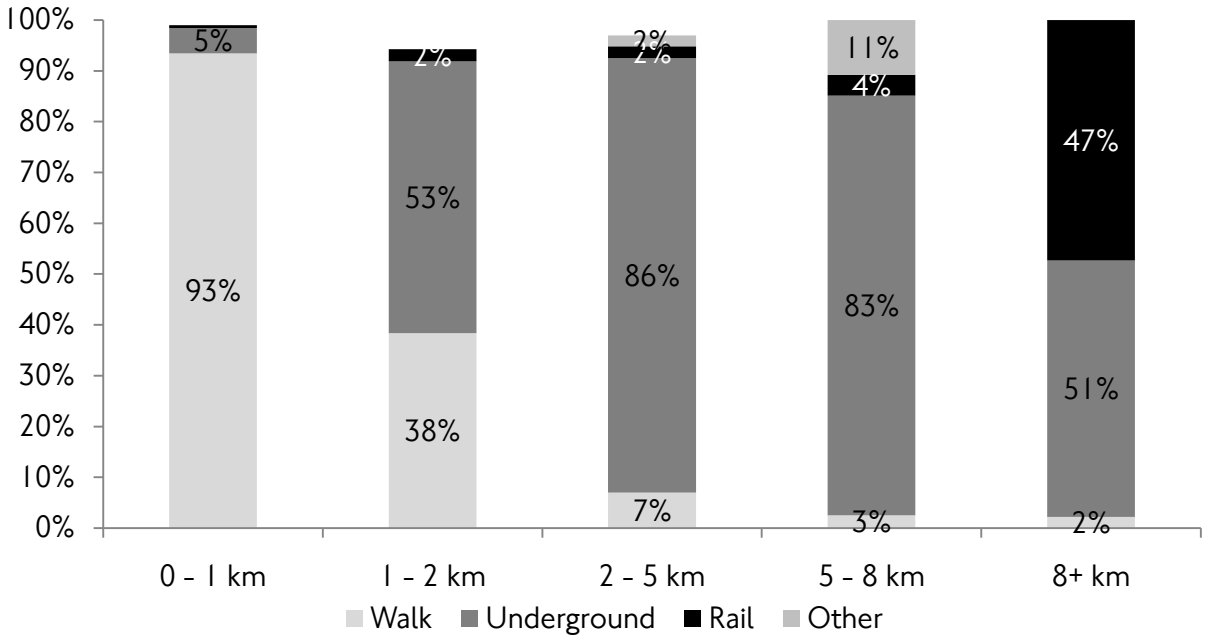


Figure 16.2 Moorgate passenger flows



Moorgate saw the lowest number of passengers among the termini. While there was a strong peak in arrivals between 0830 and 0900, the PM peak saw passengers spread across the period.

Figure 16.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



Almost half of onward trips were under 1km, 93 per cent of which were walked. Over half of trips between 1km and 2km were made by Underground.

Moorgate: Frequency of cycling and walking

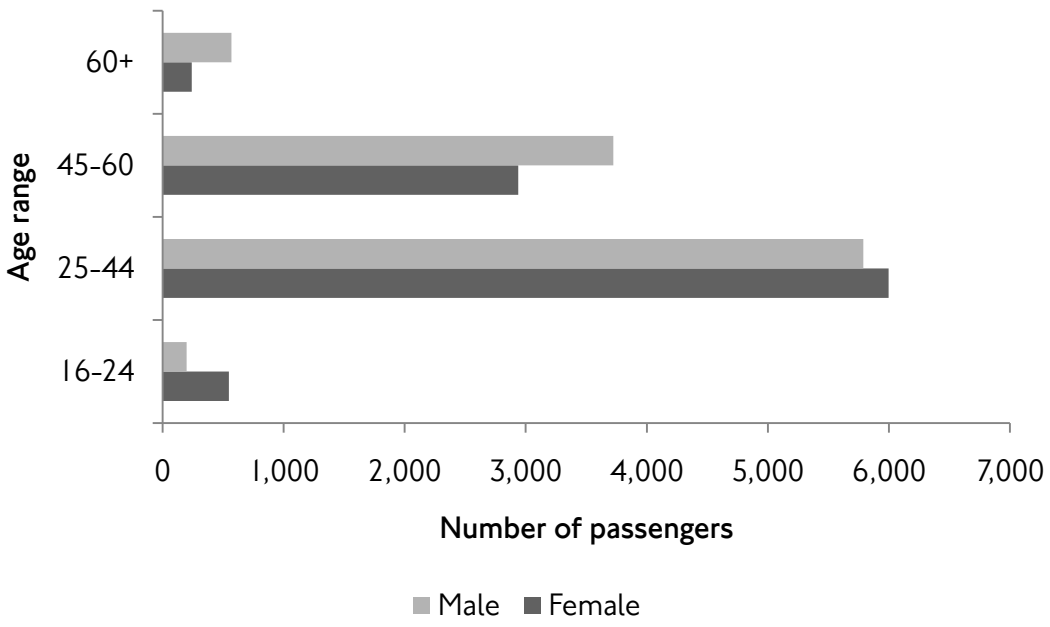
A high proportion of those passengers who stated that they ever walked their onward trip did so frequently.

Around one third of passengers who stated that they ever cycle the onward journey did so only once or not at all in the seven days prior to the survey.

Table 16.1 Moorgate Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		1%	58%
Share who ever use from station to destination		2%	66%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	23%	9%
	1	11%	9%
	2	7%	5%
	3	4%	6%
	4	16%	3%
	5	31%	57%
	6	-	2%
	7	-	6%

Figure 16.4 Moorgate passenger demographics, AM and PM peak arrivals and departures



Chapter 17 Summary of findings at Paddington

Figures quoted are for all AM and PM peak arrivals and departures based on 3,400 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	22,000
AM busiest hour	0800 - 0900
arrivals	10,500
AM peak departures	8,000
scale of contraflow in proportion to arrivals	37%

PM passenger flows	
PM peak departures	23,000
PM busiest hour	1730 - 1830
departures	10,000
PM peak arrivals	10,500
scale of contraflow in proportion to departures	45%

Share of connecting modes in central London	
Underground	62%
Walk	12%
Bus	7%
Rail	6%
Cycle	4%
Taxi	4%

London Underground line used	
Bakerloo	55%
Hammersmith & City	23%
Circle	17%
District	3%
Central	2%

Purpose in central London	
Usual workplace	52%
Home	20%
Other work	17%
Shopping / Personal Business	3%

Journey frequency	
5 or more days per week	44%
3 or 4 days per week	17%
1 or 2 days per week	10%
less than one day per week	29%

Onward distance travelled in central London	
1st quartile	3 km
2nd quartile (median)	4.6 km
3rd quartile	7.2 km

Location of trip end outside central London	
Within GLA	29%
Outside GLA	70%

Figure 17.1 Passenger distribution at Paddington, AM and PM peak arrivals and departures.

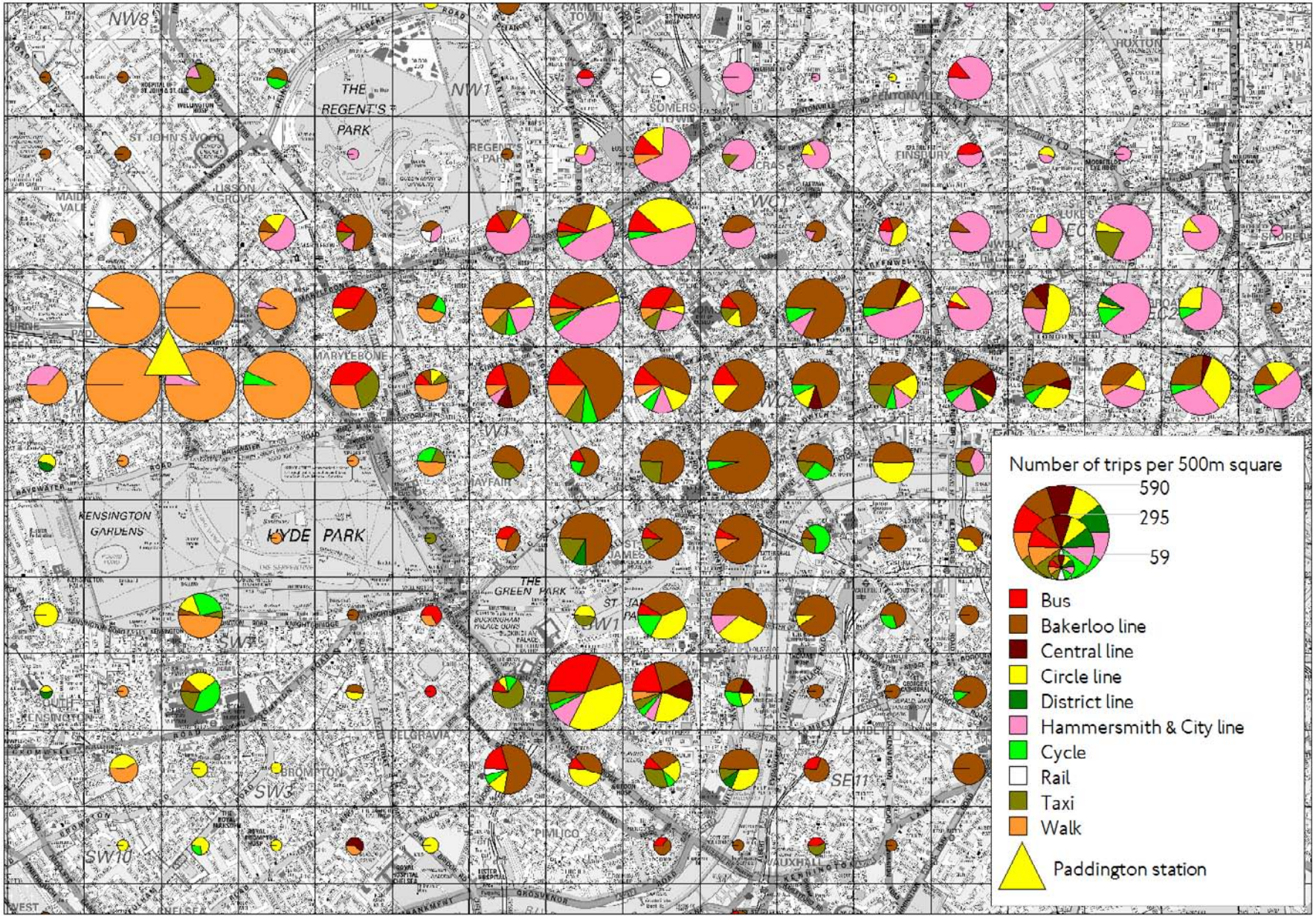
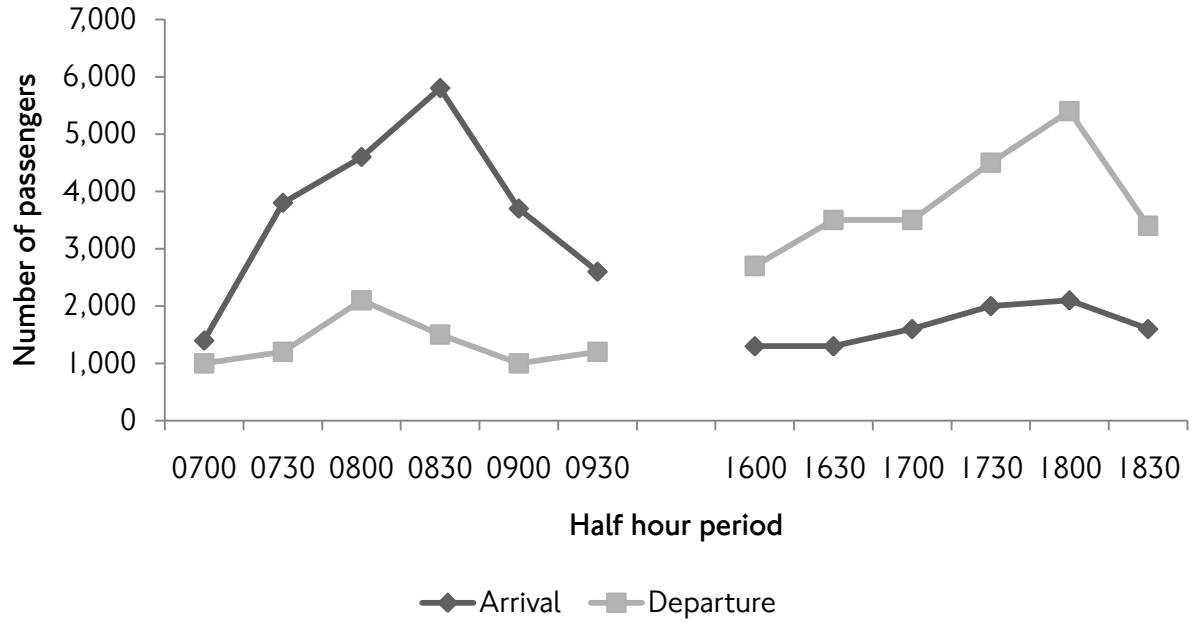
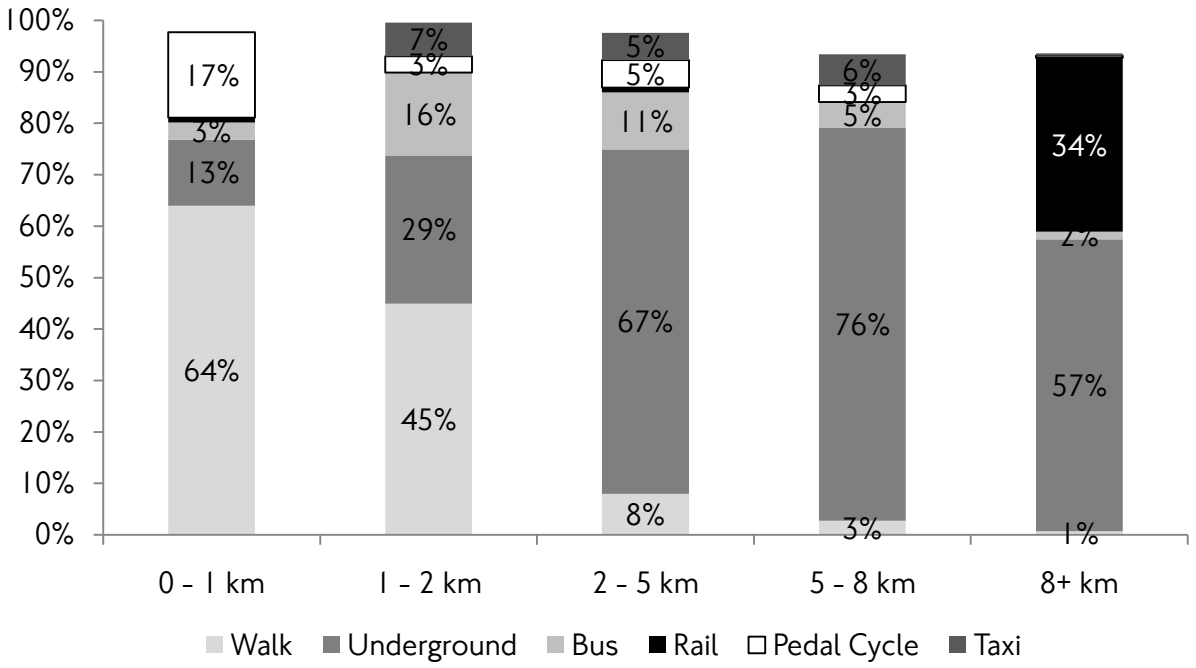


Figure 17.2 Paddington passenger flows



Paddington saw a high proportion of contraflow passengers in both peaks. The busiest half hour in the PM peak was between 1800 and 1830.

Figure 17.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



With very few trips below 2km , many passengers relied on bus, Underground or pedal cycle for their onward journey.

Paddington: Frequency of cycling and walking

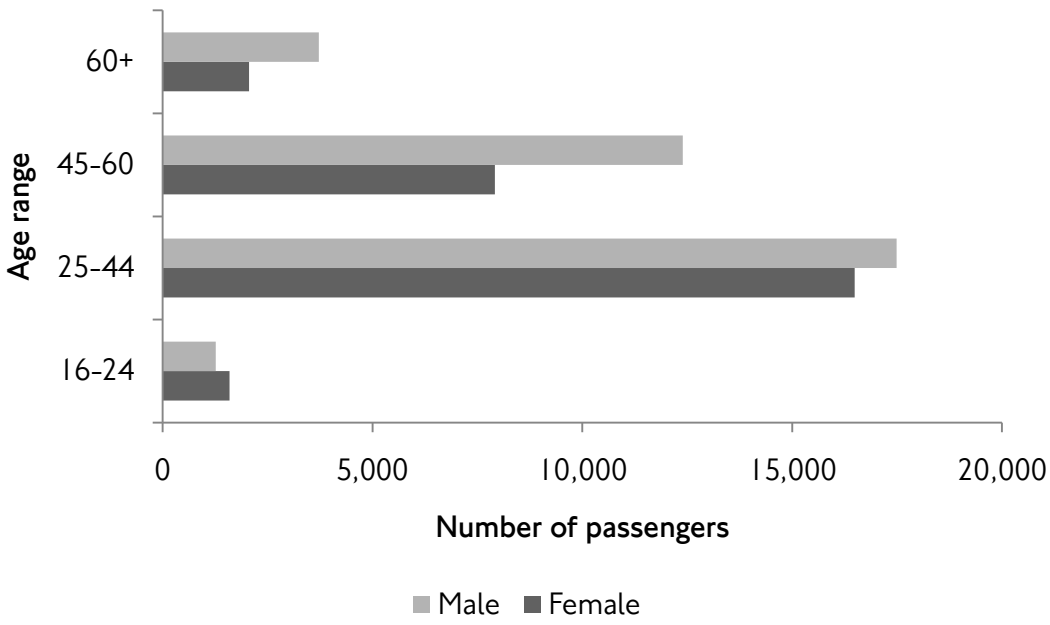
An exceptionally high proportion – 10 per cent – of passengers at Paddington stated that they ever cycle their onward journey. Half of that proportion cycled their onward journey on the survey day.

Few short onward trips meant the share of trips walked was relatively low at 12 per cent.

Table 17.1 Paddington Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		5%	12%
Share who ever use from station to destination		10%	27%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	24%	24%
	1	7%	15%
	2	15%	8%
	3	4%	5%
	4	12%	5%
	5	18%	27%
	6	-	*%
	7	15%	3%

Figure 17.4 Paddington passenger demographics, AM and PM peak arrivals and departures



Chapter 18 Summary of findings at St Pancras

Figures quoted are for all AM and PM peak arrivals and departures based on 2,758 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	17,500
AM busiest hour	0800 - 0900
arrivals	9,000
AM peak departures	7,500
scale of contraflow in proportion to arrivals	44%

PM passenger flows	
PM peak departures	19,000
PM busiest hour	1730 - 1830
departures	7,500
PM peak arrivals	8,500
scale of contraflow in proportion to departures	45%

Share of connecting modes in central London	
Underground	47%
Walk	23%
Rail	15%
Bus	7%
Taxi	4%
Cycle	2%

London Underground line used	
Victoria	30%
Metropolitan / Hammersmith & City / Circle	30%
Piccadilly	24%
Northern	16%

Purpose in central London	
Usual workplace	50%
Home	22%
Other work	15%
Leisure / Entertainment	5%

Journey frequency	
5 or more days per week	44%
3 or 4 days per week	11%
1 or 2 days per week	7%
less than one day per week	38%

Onward distance travelled in central London	
1st quartile	1.7 km
2nd quartile (median)	3.3 km
3rd quartile	8.2 km

Location of trip end outside central London	
Within GLA	16%
Outside GLA	84%

Figure 18.1 Passenger distribution at St Pancras, AM and PM peak arrivals and departures

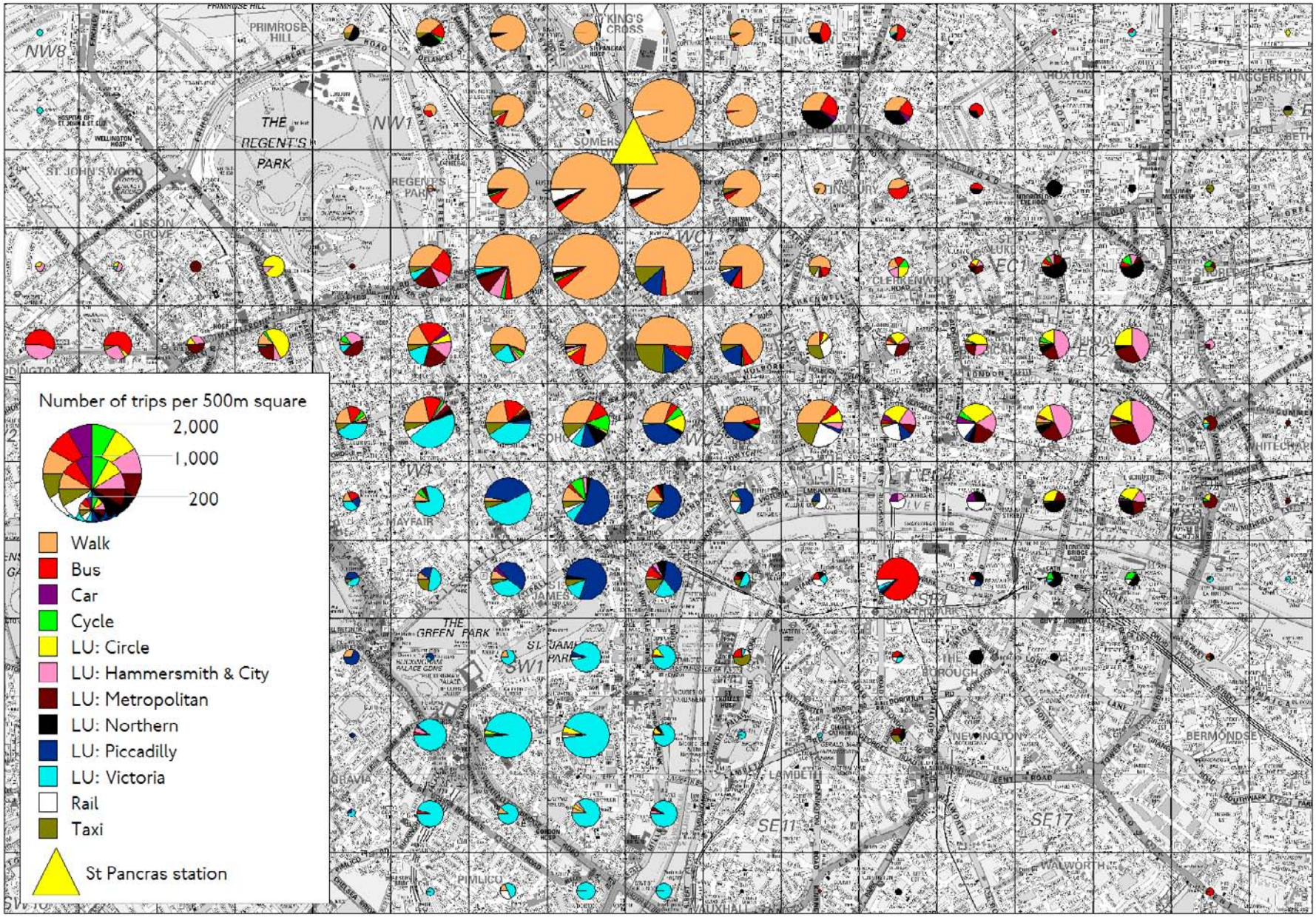
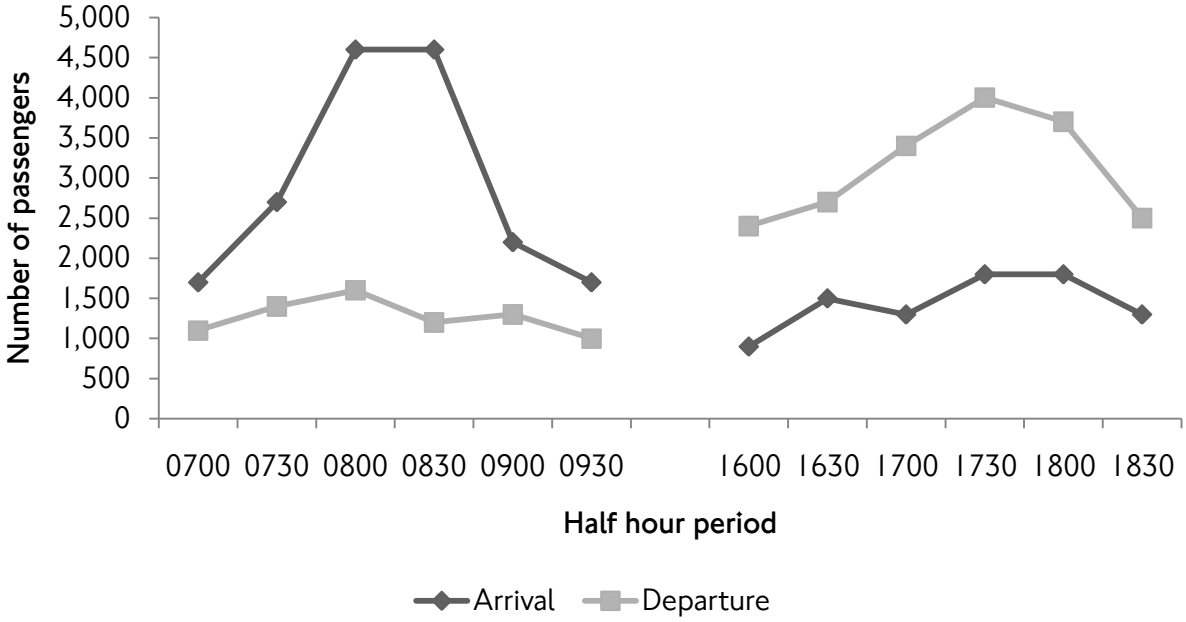
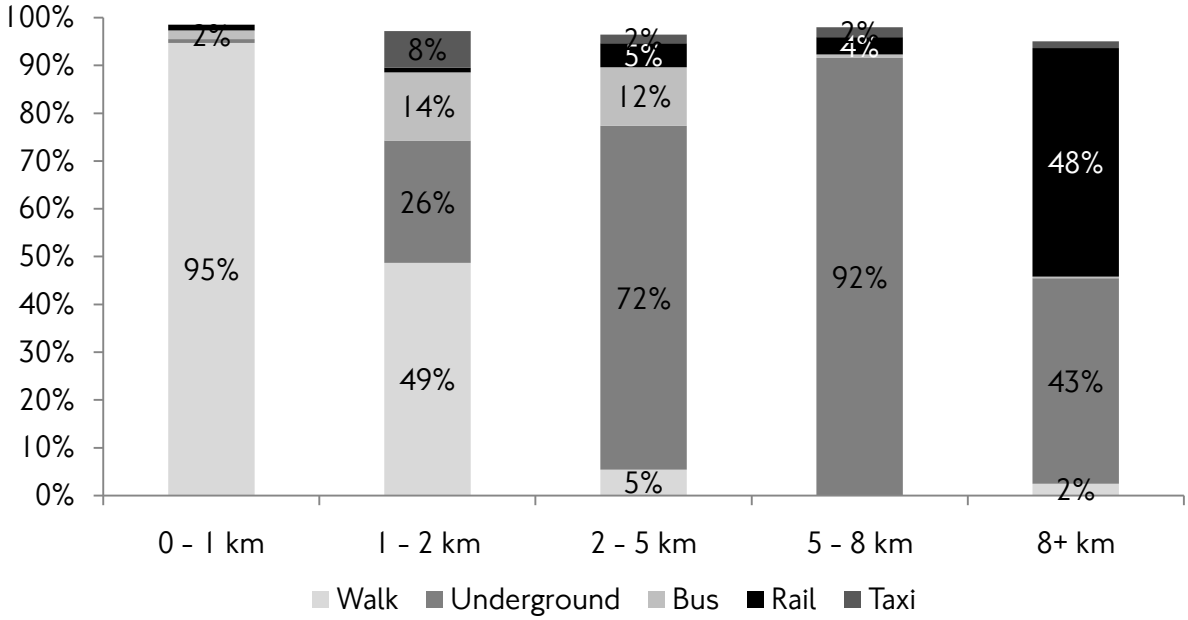


Figure 18.2 St Pancras passenger flows



St Pancras saw a high proportion of contraflow passengers in both peaks. While the AM peak was pronounced between 0800 and 0900, the PM peak saw passengers spread across the period.

Figure 18.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



The majority of trips between 2km and 5km were made by Underground. Taxis accounted for a relatively large share of trips between 1km and 2km.

St Pancras: Frequency of cycling and walking

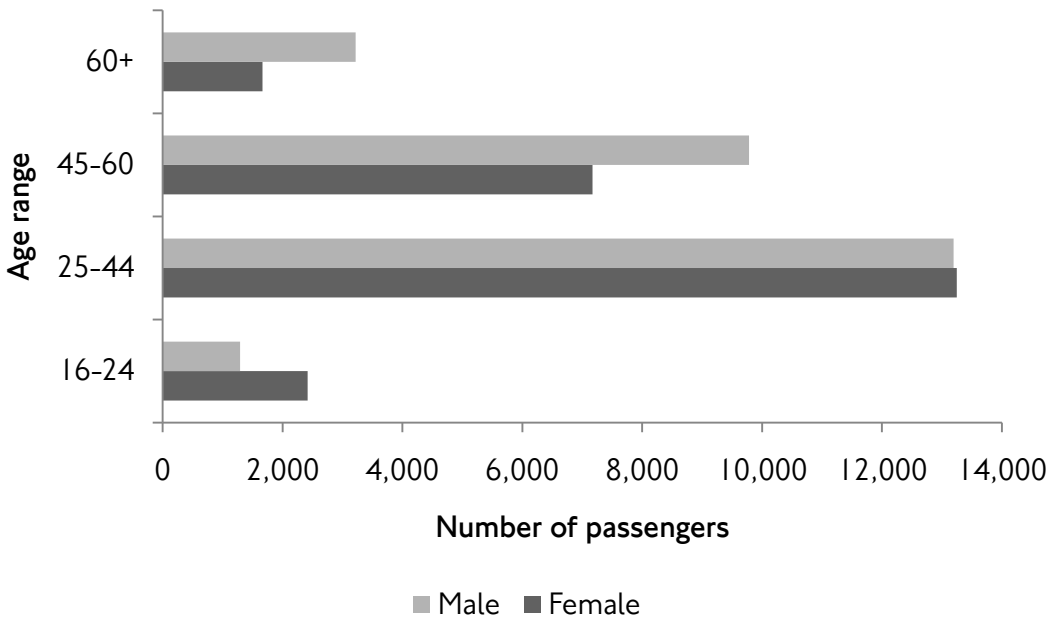
4 per cent of passengers stated that they ever make their onward trips by cycling, although almost half of these had not done so in the seven days prior to the survey.

One third of passengers stated that they ever walked their onward journey, while 22 per cent of passengers walked on the survey day.

Table 18.1 St Pancras Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		2%	22%
Share who ever use from station to destination		4%	33%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	47%	15%
	1	7%	13%
	2	7%	9%
	3	1%	8%
	4	6%	8%
	5	32%	47%
	6	-	-
	7	-	-

Figure 18.4 St Pancras passenger demographics, AM and PM peak arrivals and departures



Chapter 19 Summary of findings at Victoria

Figures quoted are for all AM and PM peak arrivals and departures based on 2,855 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	59,500
AM busiest hour	0800 - 0900
arrivals	28,500
AM peak departures	7,500
scale of contraflow in proportion to arrivals	13%

PM passenger flows	
PM peak departures	50,000
PM busiest hour	1730 - 1830
departures	21,000
PM peak arrivals	16,500
scale of contraflow in proportion to departures	33%

Share of connecting modes in central London	
Underground	38%
Walk	33%
Bus	13%
Rail	12%
Cycle	1%

London Underground line used	
Victoria	56%
District	32%
Circle	10%

Purpose in central London	
Usual workplace	71%
Home	10%
Other work	8%
Education	3%

Journey frequency	
5 or more days per week	64%
3 or 4 days per week	15%
1 or 2 days per week	6%
less than one day per week	14%

Onward distance travelled in central London	
1st quartile	1.1 km
2nd quartile (median)	2.7 km
3rd quartile	5.6 km

Location of trip end outside central London	
Within GLA	57%
Outside GLA	38%

Figure 19.1 Passenger distribution at Victoria, AM and PM peak arrivals and departures.

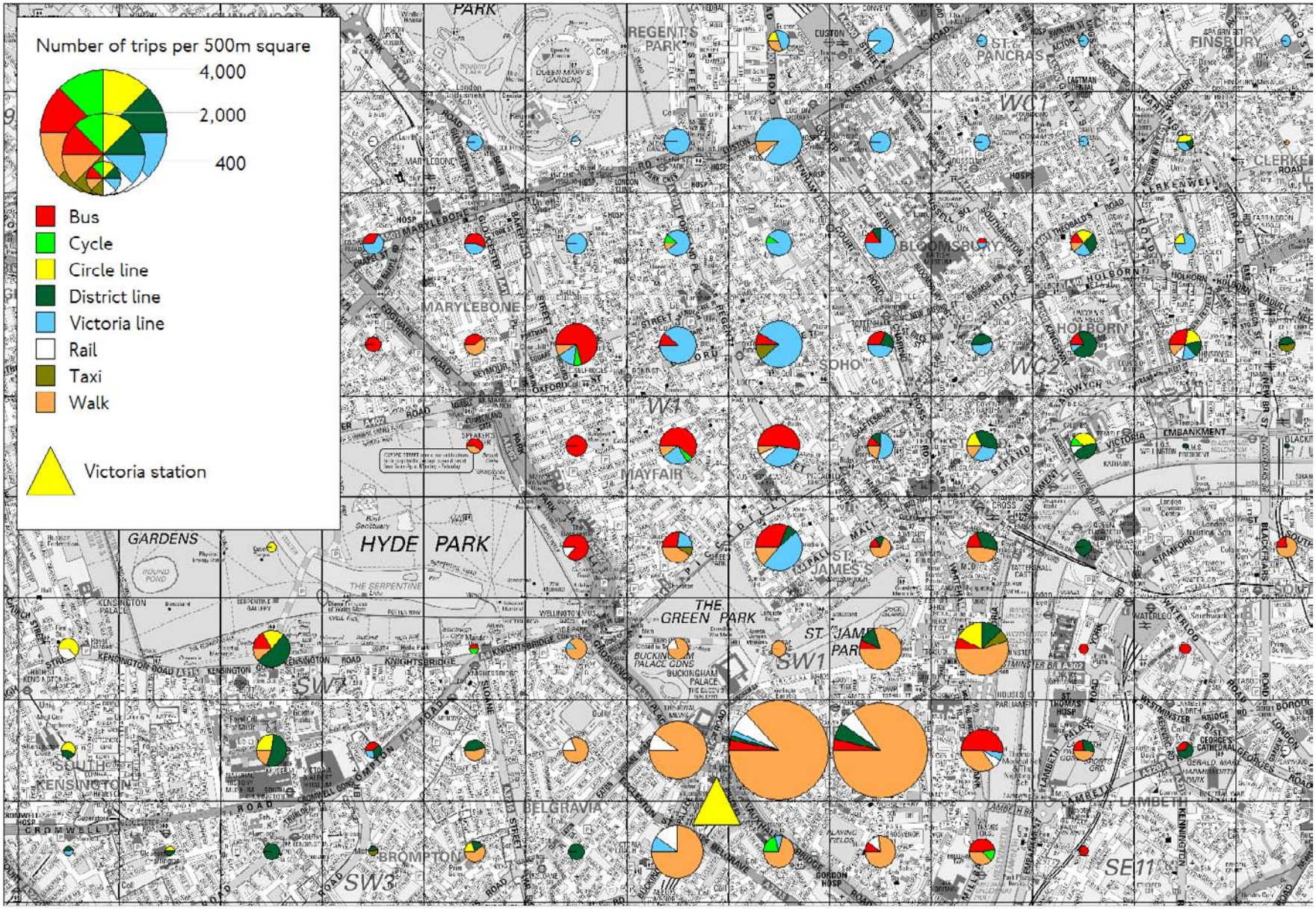
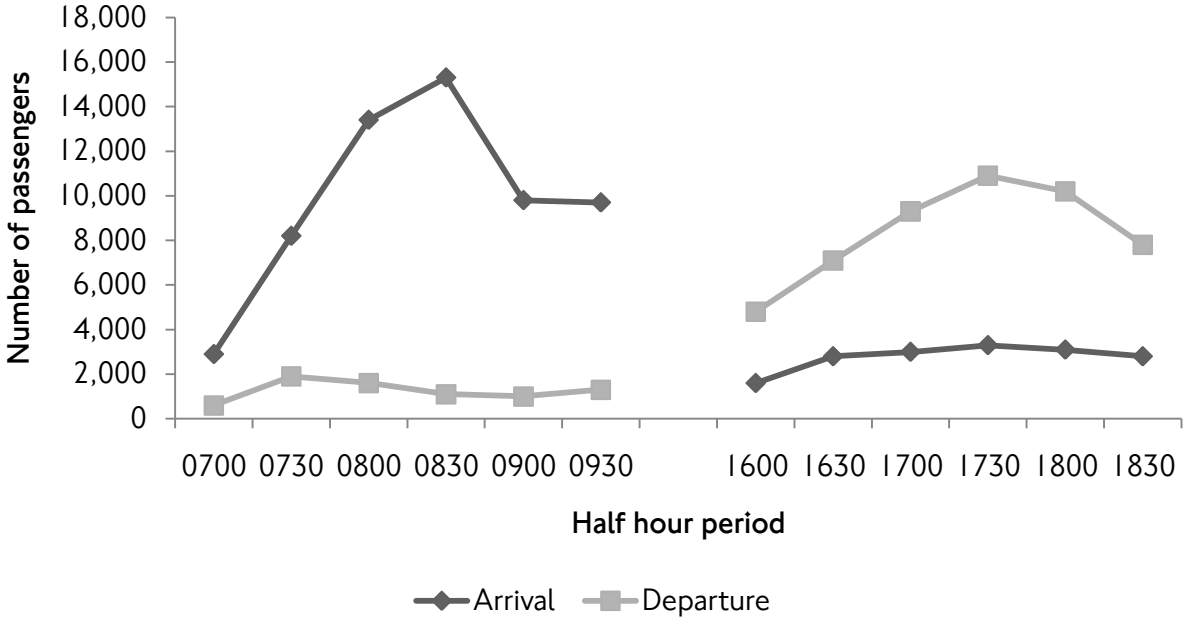
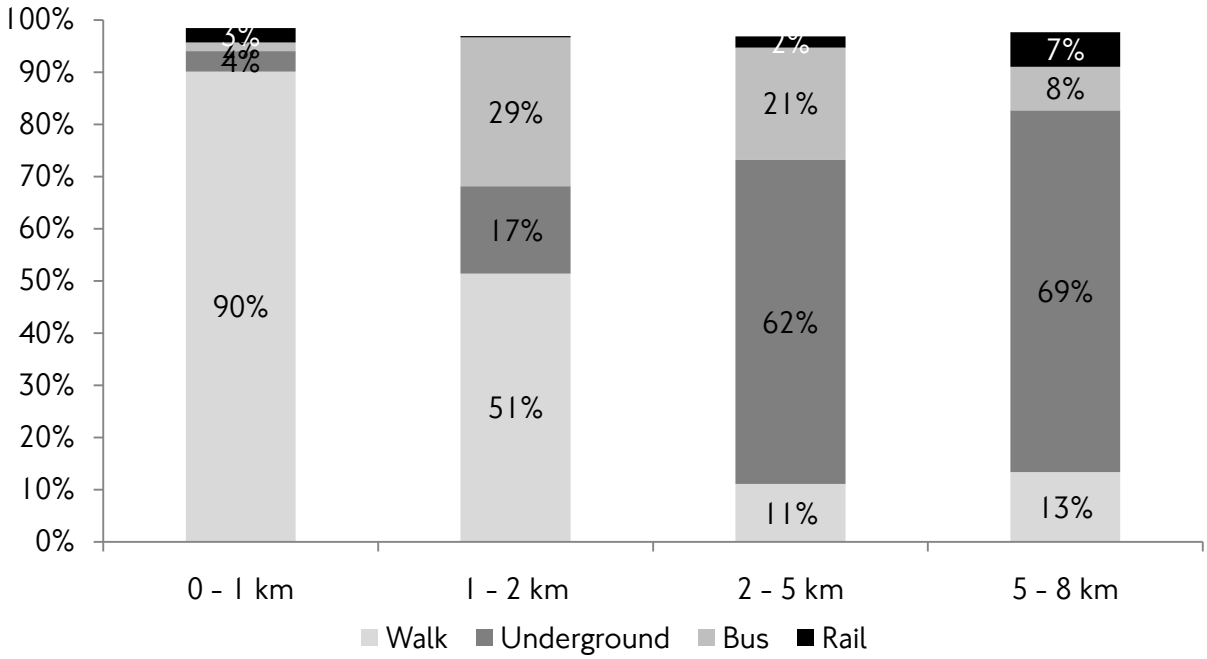


Figure 19.2 Victoria passenger flows



Victoria was among the busiest of the termini, with 25,000 passengers arriving in the busiest hour of the AM peak.

Figure 19.3 Mode shares by distance bands of onward journey, AM and PM peak arrivals and departures



Around half of onward trips were between 2km and 5km, most of which were made by Underground. One quarter of onward trips were under 1km meaning a large number of passengers walked to their final destination.

Victoria: Frequency of cycling and walking

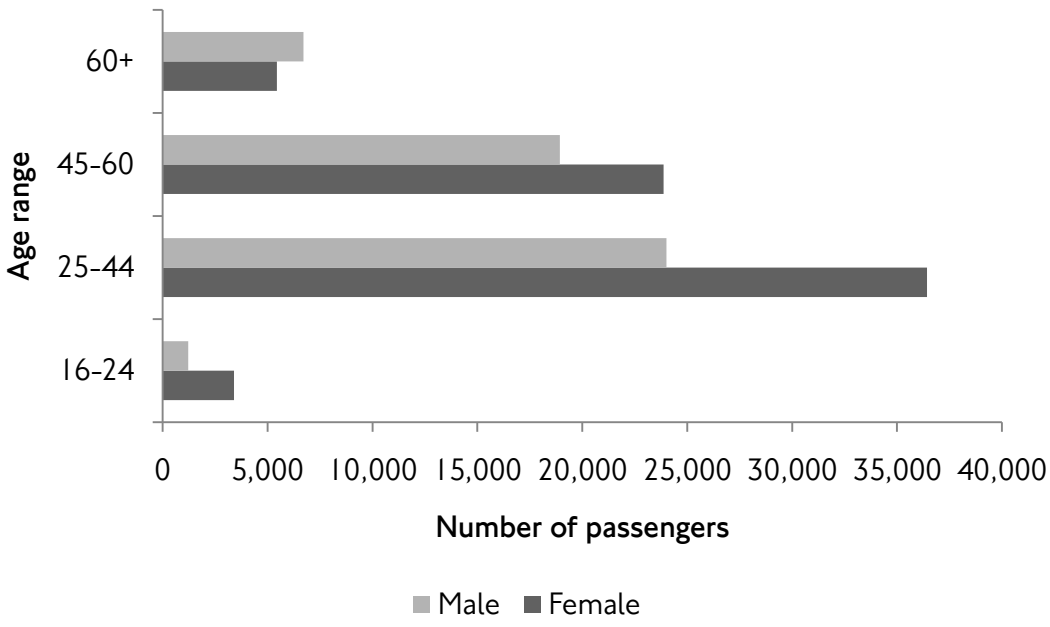
While 5 per cent of passengers at Victoria stated that they ever cycle their onward journey, only 1 per cent did so on the survey day. Over half had not cycled the onward journey in the previous seven days.

16 per cent of passengers stated that they sometimes walk their onward journey but did not walk on the survey day.

Table 19.1 Victoria Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		1%	38%
Share who ever use from station to destination		5%	54%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	55%	11%
	1	11%	21%
	2	7%	6%
	3	2%	5%
	4	7%	5%
	5	17%	44%
	6	2%	1%
	7	-	6%

Figure 19.4 Victoria passenger demographics, AM and PM peak arrivals and departures



Chapter 20 Summary of findings at Waterloo

Figures quoted are for all AM and PM peak arrivals and departures based on 9,652 responses. Passenger flows are rounded to the nearest 500.

AM passenger flows	
AM peak arrivals	85,500
AM busiest hour	0800 - 0900
arrivals	45,500
AM peak departures	15,500
scale of contraflow in proportion to arrivals	18%

PM passenger flows	
PM peak departures	81,500
PM busiest hour	1730 - 1830
departures	37,500
PM peak arrivals	24,000
scale of contraflow in proportion to departures	30%

Share of connecting modes in central London	
Underground	55%
Walk	21%
Bus	11%
Rail	9%
Cycle	2%
Taxi	1%

London Underground line used	
Waterloo & City	35%
Bakerloo	22%
Jubilee	22%
Northern	21%

Purpose in central London	
Usual workplace	70%
Home	12%
Other work	8%
Leisure/ Entertainment	5%

Journey frequency	
5 or more days per week	63%
3 or 4 days per week	16%
1 or 2 days per week	7%
less than one day per week	14%

Onward distance travelled in central London	
1st quartile	1.6 km
2nd quartile (median)	2.4 km
3rd quartile	3.8 km

Location of trip end outside central London	
Within GLA	47%
Outside GLA	52%

Figure 20.1 Onward modes of AM peak National Rail arrivals at Waterloo station by final trip destination

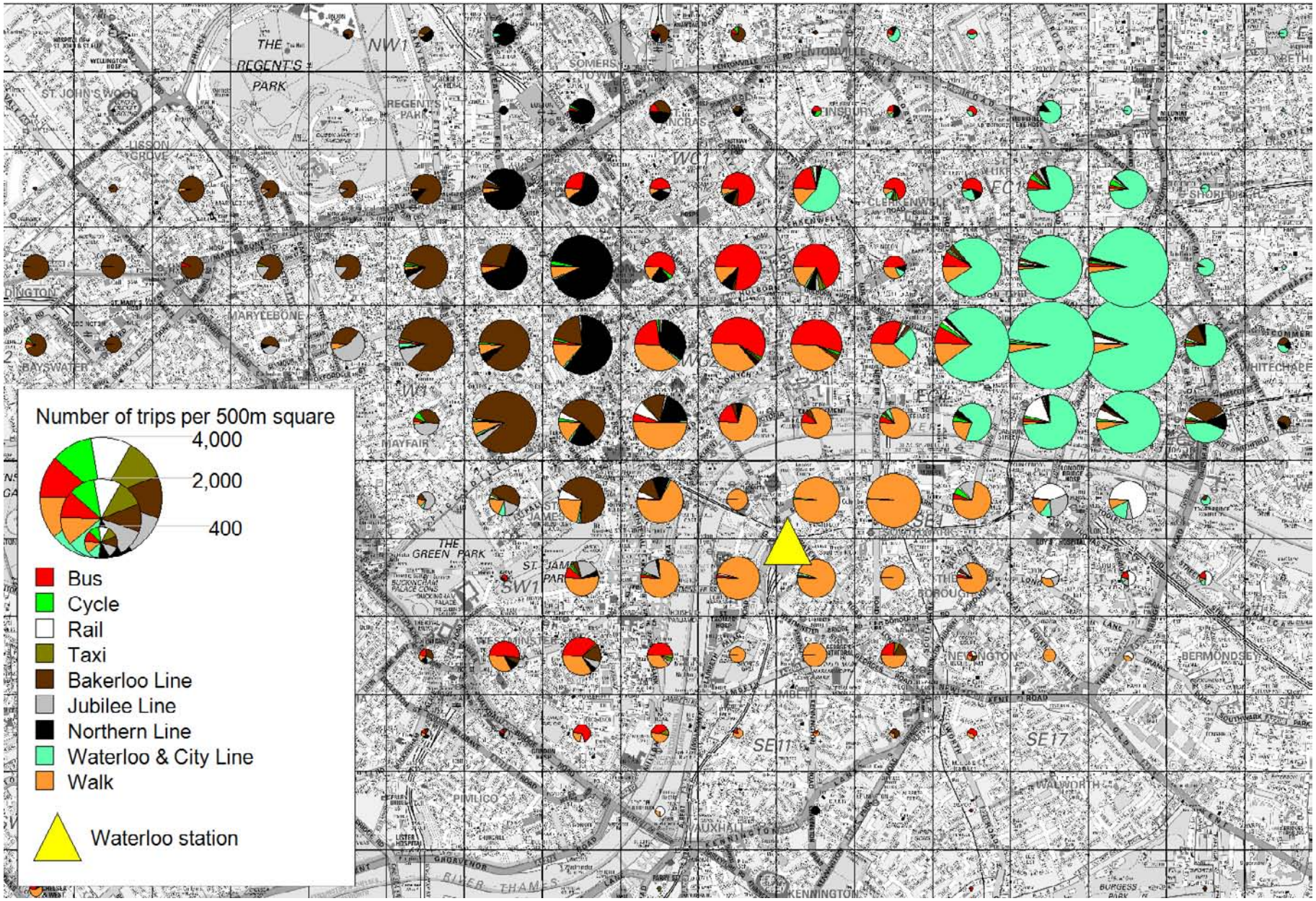
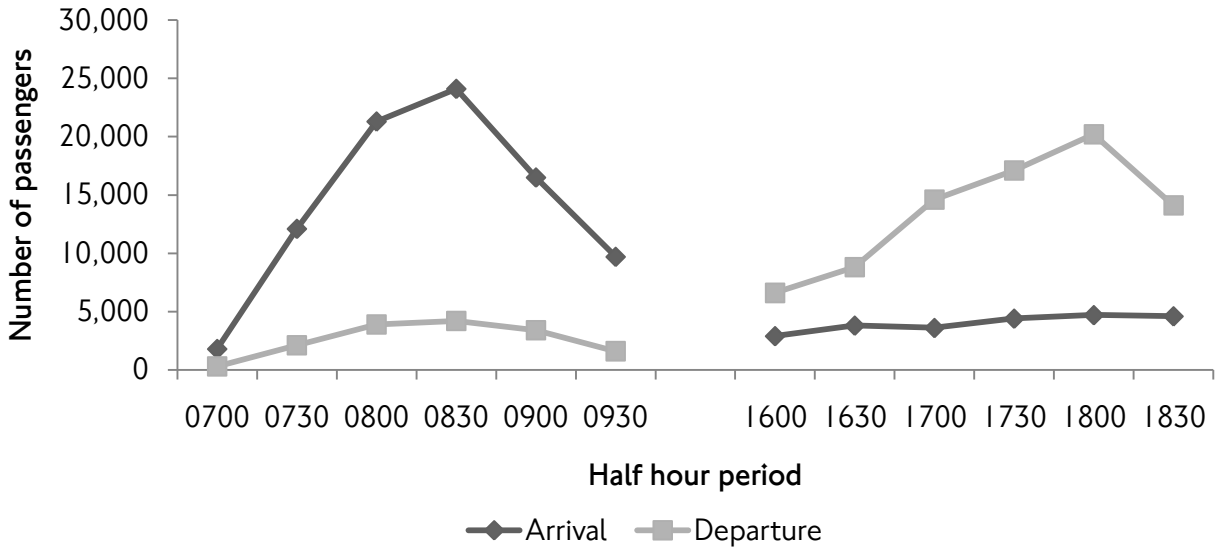
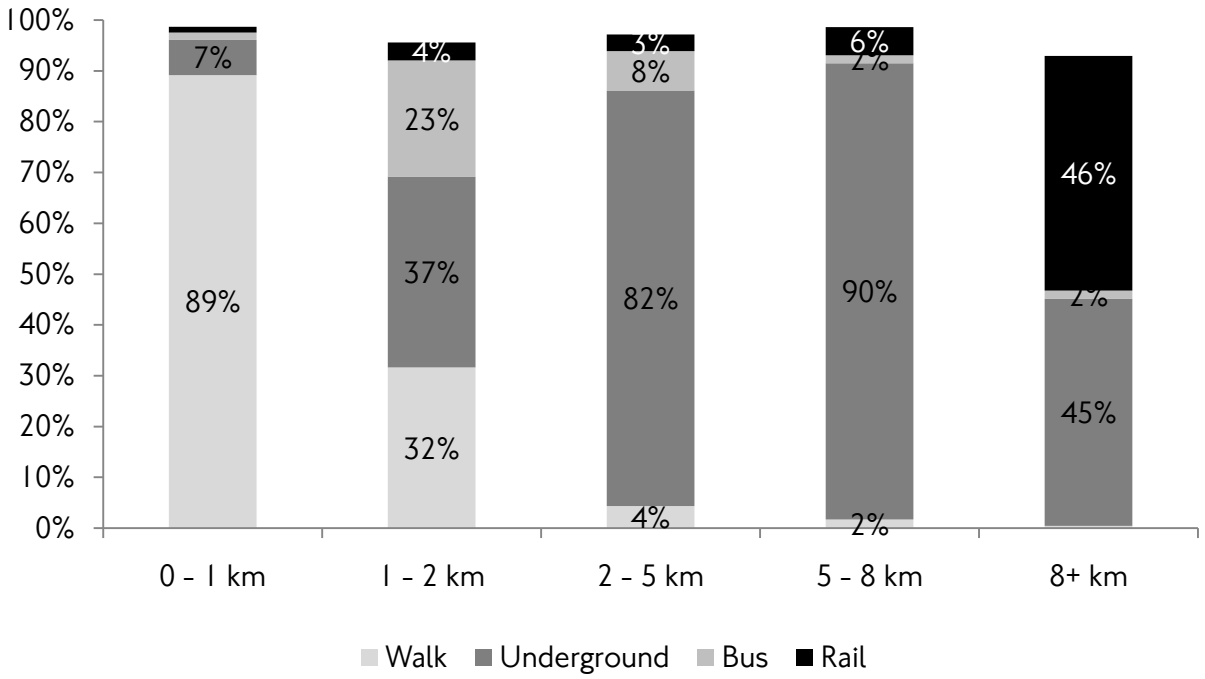


Figure 20.2 Waterloo passenger flows



Waterloo is the busiest of the central London termini. Between 0830 and 0930, 24,000 passengers were counted arriving at Waterloo – more passengers than were observed over the entire AM peak at most of the termini.

Figure 20.3 Mode shares for trips made within distance bands among arriving passengers



A high proportion of onward trips were between 2km and 5km and the majority of these were made by Underground, with the Waterloo & City line carrying many passengers directly to the City. Around one quarter of trips between 1km and 2km were made by bus. Many of these involved crossing the Thames to reach areas around Holborn.

Waterloo: Frequency of cycling and walking

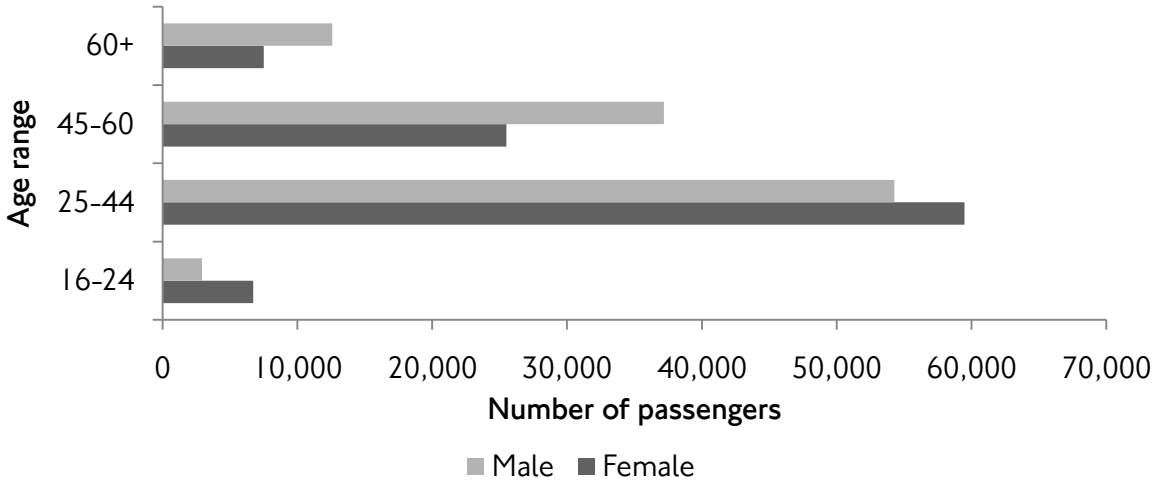
5 per cent of passengers stated that they ever cycled their onward journey, although only 1 per cent did so on the survey day. Over half of those who ever cycle had not done so during the seven days prior to the survey.

44 per cent of passengers stated that they ever walked the onward journey, but less than one in five did so on the survey day.

Table 20.1 Waterloo Arrivals – Central London mode share cycle and walk

		Cycle	Walk
Mode share on survey day		1%	19%
Share who ever use from station to destination		5%	44%
Days mode used from station to destination in week prior to survey (share of those who ever use)	0	52%	32%
	1	11%	19%
	2	7%	7%
	3	6%	7%
	4	6%	5%
	5	12%	23%
	6	1%	*%
	7	1%	2%

Figure 20.4 Waterloo passenger demographics, AM and PM peak arrivals and departures



Appendix

Methodology note

The thirteen central London termini rail were surveyed during 2010. The survey sought to obtain information on passenger journeys including origins and destinations, as well as modes used to access the station.

The surveys were conducted over two phases with five stations in the first phase in spring 2010 and eight stations in the second phase in autumn 2010. Table A1 shows the stations by survey date and survey period.

Each station was surveyed on a single day, between 07:00-10:00 and 16:00-19:00, with passengers arriving and departing by all services included in the sample at each station.

Table A1 Project phases and survey dates

Station	Survey period	Survey date
Cannon Street	Spring	07/07/2010
Charing Cross	Spring	08/07/2010
Fenchurch Street	Spring	24/06/2010
Marylebone	Spring	01/07/2010
St Pancras	Spring	30/06/2010
Euston	Autumn	14/10/2010
Liverpool Street	Autumn	21/10/2010
Moorgate	Autumn	13/10/2010
Paddington	Autumn	19/10/2010
King's Cross	Autumn	20/10/2010
London Bridge	Autumn	19/10/2010
Victoria	Autumn	21/10/2010
Waterloo	Autumn	24/11/2010

The survey methodology involved distribution of self-completion questionnaires at each station. These could be returned by freepost or, for some stations, respondents could alternatively complete the survey online at the web address printed on the questionnaire. The online option was taken up by only a small proportion of respondents.

While the questionnaires were generally the same at each station, they were produced separately for each station. They included the name of the station in the question text and some key station-specific differences:

- Respondents were asked to select the rail service they had/were going to use at stations serving more than one line;
- The list of access/egress modes was tailored to feature those Underground lines available from each station, as per Table A2, in order to provide additional detail on travel patterns.

Table A2 Underground options included on each station questionnaire

LU line	Cannon Street	Charing Cross	Euston	Fenchurch Street	King's Cross	Liverpool Street	London Bridge
Bakerloo		✓					
Central	✓ (Bank)					✓	
District/ Circle	✓			✓ (Tower Hill)			
Circle		✓ (Embankment)	✓		✓	✓	
District		✓ (Embankment)	✓			✓	
Hammersmith & City			✓		✓	✓	
Jubilee							✓
Metropolitan			✓		✓	✓	
Metropolitan/ Circle				✓ (Aldgate)			
Northern	✓ (Bank)	✓	✓		✓	✓	✓
Piccadilly					✓		
Victoria			✓		✓		
Waterloo & City	✓ (Bank)						

LU line	Marylebone	Moorgate	Paddington	St Pancras	Victoria	Waterloo
Bakerloo	✓	✓	✓			✓
Central						
District/ Circle						
Circle	✓ (Baker St)	✓	✓	✓	✓	
District		✓	✓		✓	
Hammersmith & City	✓ (Baker St)	✓	✓	✓		
Jubilee	✓ (Baker St)					✓
Metropolitan	✓ (Baker St)	✓		✓		
Metropolitan/ Circle						
Northern		✓		✓		✓
Piccadilly				✓		
Victoria				✓	✓	
Waterloo & City						✓

Different questionnaires were also produced for each direction of travel (arriving and departing), so at least two questionnaires were available for each station[2]. This was necessary so that the order and tense of the questions were suitable for the direction of travel and enabled respondents to understand and complete the questionnaire correctly.

The questionnaire remained largely the same between the spring and autumn surveys. The only change made was the addition of the question 'If you ever cycle to/from [name] station, what type of bicycle do you use? Tick all that apply' (Q13c).

Questionnaires were handed out by survey staff on the station concourse. The number of staff and locations within the station were dependent on the layout of each station. The aim was to give surveys to around 1 in 4 passengers at most stations. Only rail passengers were in scope, and the exclusion of users of other modes had to be considered at stations where there were pedestrian routes and interchanges between other modes, whereby some people at the station were not rail users. Questionnaires returned by non-rail users were removed at the data cleaning stage.

[2] Some stations also had specific questionnaires for individual services/routes

Questionnaire distribution was monitored by survey supervisors, who noted the ID of pre-numbered/ordered questionnaires by surveyor at regular periods during the survey. Table 3 summarises the details of the survey handout and the achieved sample.

Table A3 Survey handout distribution and sample

Station	No of questionnaires distributed	Headcount	Distribution rate	No of questionnaires returned	Sample rate
Cannon Street	14,000	51,147	27%	3,694	7%
Charing Cross	13,771	66,091	21%	3,243	5%
Euston	16,789	67,956	25%	3,497	5%
Fenchurch Street	6,476	42,978	15%	1,127	3%
King's Cross	9,004	44,885	20%	1,990	4%
Liverpool Street	34,755	136,936	25%	7,410	5%
London Bridge	20,181	149,368	15%	4,268	3%
Marylebone	4,907	24,696	20%	1,331	5%
Moorgate	6,334	20,000	32%	1,599	8%
Paddington	15,683	63,852	25%	3,421	5%
St Pancras	15,247	53,638	28%	2,798	5%
Victoria	20,382	133,539	15%	3,015	2%
Waterloo	35,870	206,247	17%	9,659	5%

A headcount of rail passengers was conducted at the same time as the questionnaire handout. Additional survey staff recorded the total number of passengers entering and exiting the platforms across the peaks, broken into 30-minute periods.

This allowed distribution and response rates to be calculated, so that the data could be weighted to represent all passengers during the survey periods. The expansion factors were calculated to match the number of responses to the total passenger flow per train service, direction and 30-minute period.

Survey notes, issues, observations and interruptions

Survey supervisors noted any issues during the surveys which may have affected respondents or passenger volumes.

- **Cannon Street**

  Between 07:30 and 08:30 most services suffered delays of just over 15 minutes. Between 08:50 and 10:00 some services were delayed (around 10 minutes). Questionnaires ran out at 09:30, due to a higher than expected handout rate. This did not affect the PM peak distribution.

  Construction works were underway at the station.

- **Charing Cross**

  There were no delays in either period. Delays occurred on the District and Circle lines at around 08:30.

- **Euston**

  There were no delays to rail services.

  Minor delays to Victoria line occurred during AM peak.

  There was a part suspension to the Metropolitan line and delays to the Central, Circle and Hammersmith & City lines during PM peak.

- **Fenchurch Street**

  There were no delays in either period.

  An error occurred in the distribution of the AM surveys, meaning that surveys were distributed the wrong way round; this was corrected at the data cleaning stage.

- **King's Cross**

  There were no disruptions to services.

  Construction works were underway at the station.

- **Liverpool Street**

  There were no delays to rail services.

  The Jubilee line was part suspended and the Piccadilly line had severe delays in the AM peak.

  There were severe delays during the PM peak on the Jubilee line, and delays on the Piccadilly and Metropolitan lines.

- **London Bridge**

  There were no disruptions to services.

  There was a police presence in the PM peak due to football fans using the station. The survey had to be suspended at 18:50.

  Construction works were underway at the station.

- **Marylebone**

  There were no delays in the AM peak period.

  Two arrivals were delayed in the PM peak (less than 15 minutes).

- **Moorgate**

  Due to the layout of the station, rail passengers merged with Underground passengers. A number of questionnaires were given to Underground (non-rail) passengers. These were removed at the data cleaning stage.

  There were no delays to rail services.

  Metropolitan line delays occurred during the PM peak.

- **Paddington**

  A small number of respondents used the Central line from nearby Lancaster Gate station. This was not included on the questionnaire but was entered manually by some. This was dealt with during data cleaning.

  There was an error on the survey form. Q12 of the arrivals questionnaire referred to 'Liverpool Street' rather than Paddington. There did not appear to be any impact on respondents.

  The 07:15 service to Cardiff was delayed (around 15 minutes).

  Delays to the Circle and District lines throughout the AM peak. Minor delays were also recorded on the Hammersmith & City and Metropolitan lines. Part suspensions occurred on the Northern and Victoria lines after 09:30.

  Delays occurred to the Bakerloo and Metropolitan lines during the PM peak.

- **St Pancras**

  The survey covered passengers using all services at St Pancras including Eurostar.

  There were small delays on the Thameslink service (mostly less than 15 minutes), and one Bedford service was cancelled during the AM peak.

  Some small delays occurred on Eurostar arrivals during the AM peak (less than 10 minutes).

  Severe delays and suspensions occurred on the Circle and Hammersmith & City lines during AM peak.

- **Victoria**

  There were delays to sign in processing so counts and survey distribution started slightly late in AM peak.

- **Waterloo**

  There were no major delays. In the PM peak at around 18:30 a number of arriving services were slightly delayed.

In the AM peak (at around 08:30), the Underground station was overcrowded and access was limited while the station was cleared. This caused delays on the Jubilee line and the queuing of passengers on the main station concourse.

It took longer than anticipated to get staff signed in on the morning of the survey; as a result the counts and survey distribution did not start until 07:15.