

## Roads Task Force – Technical Note 17

### The availability of realistic alternatives to car

#### Introduction

In this note we present a new analysis of the London Travel Demand Survey (LTDS) used to answer the question: for how many car driver trips made by London residents in London is there a realistic alternative mode available? The note identifies the characteristics of trips with and without realistic alternatives, and the nature of these alternatives including which mode they are. This paper forms one of a series of thematic analyses, produced to contribute to the Roads Task Force Evidence Base.

This paper analyses current journeys made by London residents by car as a driver in London, in order to identify whether they could be made by an alternative mode – public transport, walking or cycling. The analysis explores whether the known characteristics of the journey, trip-maker or alternatives are likely to prevent another choice being made. Where journeys are described as ‘feasible by another mode’, this means that another mode appears to be available: this alternative may not be appealing or suitable for the trip-maker and they may not be prepared to switch. The analysis essentially acts as a ‘maximum target market’ for mode shift from the car and can be used to guide more in depth demand analyses in future.

#### Background

The choice to travel by a particular mode reflects the needs, priorities and resources of the trip-maker and in particular will take into account: the relative speed and reliability of the options available; the cost; and the perceived convenience or ‘appeal’. Trip makers do not have perfect information available to them about their options, and will anyway interpret any information based on their own priorities and prejudices. Furthermore, most travel choices are habitual, based on what has been done before, so any evaluation of options happens rarely with long-lasting consequences.

Evidence from the London 2012 Games suggests that around one in ten regular travellers made a change during the Games that they maintained afterwards, generally because the new choice was better for them. Sustained change was more common for journeys made infrequently – for shopping, leisure and personal business – than for regular commute journeys. Although improved information could help ensure that infrequent journeys are made using the best option available, it is likely that a certain level of inefficiency is inevitable, as not everyone will have the time or inclination to seek this information for every journey they make.

If we assume that perhaps 10 per cent of travellers are making a journey that is not optimal for them based on their own criteria, this means that the vast majority are happy with their choice, and would remain happy even if provided with more information about the available alternatives. So, to some extent, we can assume that most travellers would consider there to be a disbenefit in shifting to another mode.

Fundamentally, in order to achieve mode shift on a large scale, the parameters need to change: the current option needs to become slower, less reliable, more expensive or less desirable OR the alternative option needs to become faster, more reliable, cheaper or more desirable.

Nevertheless, it is worthwhile exploring to what extent car drivers have an alternative option available, and the quality of that option at present, in order to be able to target interventions most efficiently at the modes, places and journeys where they may have the most impact.

### **Key findings**

There are 3.7 million car driver trips on an average day made by London residents in London. This represents just under two thirds of all car driver trips made in London on an average day; the remainder are made by London residents to and from London or by non-Londoners driving in London (each around 1 million car driver trips per day).

In total, a third of journeys made by London residents as a car driver in London have no alternative mode available. For the remainder – 2.4 million car driver journeys - an alternative option is available, although for just under half of these journeys factors can be identified which may mean the alternative is slower or more inconvenient.

There are 1.7m car driver trips (45 per cent of all car driver trips on an average day) that could feasibly be made by public transport. Of these, 1.3m are feasible by public transport but factors can be identified which may mean the alternative is slower or more inconvenient; 0.4m are feasible by public transport without any identified disbenefits. The most common reason for trips not being feasible by public transport is the lack of a viable public transport option.

There are 0.4m car driver trips (11 per cent of all car driver trips by London residents) that could feasibly be walked in less than 20 minutes. This is considered a reasonable amount of time to spend walking, but may be slower than the current journey. The primary reason for trips not being walkable is length: 82 per cent of all car driver trips are over 1.5km.

There are 1.3m car driver trips (36 per cent of all car driver trips by London residents) that could feasibly be cycled, of which 1.1m are under 5km in length and could be cycled in less than 20 minutes, and 0.3m are between 5km and 8km, cyclable in under 40 minutes. This may be slower or less convenient than the current journey, although for some, cycling may be faster and more reliable.

### **Limitations**

This analysis does not imply that journeys can be switched from car to another mode with ease. The assessment is based on the characteristics of the car trip and the availability of an alternative option and, as such, the analysis allows us to identify those trips which ‘must’ be made by car. This is not to say that the remaining trips definitely could or would be made by another mode:

- There is much we don’t know about these trips and the people making them that may mean another mode is not viable, for example, how trips are linked in ‘chains’;
- We have not assessed service quality aspects such as crowding, so there may not be ‘room’ on the network for the journeys to be switched;
- Some people are more willing to make changes than others and there are many barriers to change beyond the characteristics of the journey so even a trip classed as ‘green’ here may be very difficult to switch in practice; and
- Fundamentally, how switchable a trip is will depend on interventions made and how responsive the target population is: interventions that have a major impact on the speed, cost, availability or quality of modal options will have the most impact.

So, what this gives us is a sense of the 'maximum market' for mode shift, providing a tool to identify the journeys, locations and people that could be targeted by policy-makers interested in mode shift.

### **Next steps**

A key limitation of this analysis is that whilst it tells us how feasible the journey is by an alternative mode, it does not tell us how amenable to change the trip-maker is likely to be or the likely effectiveness of policy interventions in achieving mode shift. The car is appealing because it is door-to-door, with no need to plan, it's comfortable and private, makes it easy to transport passengers and goods, has a low per journey cost, and being able to travel by car remains a symbol of success for many. The quality of alternatives is just one factor in the decision to travel by car. In order to better understand this question, a Car Driver Market Segmentation Tool has been produced, segmenting the population by how strongly they are attached to travel by car and how amenable to other options they might be. Analysis is underway characterising car driver journeys with an alternative mode available by how amenable to change the trip-maker is.

At present, the analysis presented here looks at public transport, walking and cycling. Powered two wheelers (PTWs) might also offer an alternative option for some car drivers. Further analysis will be undertaken to explore the extent to which car driver journeys could feasibly be made by PTW.

Finally, more detailed analysis of the characteristics of the people and journeys with an alternative mode available is underway and will be reported later in 2013.

### **Conclusion**

This analysis has allowed TfL to identify trips currently made by London residents within London by car (as driver) that could feasibly be made by another mode, using today's network. The results will help TfL, boroughs and others to target transport policies and interventions to where they may be most effective, as well as 'reality checking' assumptions made elsewhere about the potential to change the modal mix of journeys in London.

In total, a third of journeys made by London residents as a car driver in London have no alternative mode available. For the remainder, an alternative option is available, although for at least half of these journeys factors can be identified which may mean the alternative is slower or more inconvenient.

The remainder of this paper describes the methodology employed for this analysis and presents the results in more detail, overall and by mode

## Methodology

### Overview

In order to establish the extent of car trips in London that could feasibly be made by an alternative mode, there are three fundamental questions that need to be asked of each trip:

1. Are the characteristics of the trip, trip-maker or others with whom they are travelling such that it could only feasibly be made by car, or could not feasibly be made by the alternative mode?
2. Is an alternative mode available for this trip?
3. Are there identified disbenefits to switching mode for this trip?

If a trip can feasibly be made by a mode other than the car AND there is a viable alternative available then the trip is considered to be feasible by an alternative mode.

The assessment has been carried out separately for each mode, so that each car driver trip in the LTDS dataset has been assessed as to whether it could be made by walk, cycle or public transport. For 65 per cent of car driver trips on an average day at least one alternative option is considered feasible. In some cases, two or even three modal options may be feasible (for example, a car driver journey could feasibly be walked or made by public transport).

### *Step 1: Feasibility of alternative mode and necessity of using the car*

The characteristics of the trip, trip-maker or their party can make travelling by modes other than the car more difficult or unappealing. This varies by mode, so that for example, people may be more willing to travel by Tube late at night than on foot. A series of criteria have been identified and applied to car driver trips to assess how viable they would be by each alternative mode. The criteria differ for each mode, as presented in Table 1. Further, the application of these criteria is different in that:

- When assessing whether a trip could feasibly be made by **public transport**, each criteria was allocated a 'strike', and trips were only considered not feasible if three or more criteria applied – a 'three strikes and you're out' system. So, for example, if someone was carrying luggage the trip would still be considered viable, but if someone was carrying luggage and travelling at night and had a disability affecting their travel, the trip would not be considered viable by public transport.

This reflects the pattern of journeys made at present; analysis of mode shares found that there are very few occasions where one single aspect of a trip would either necessitate or preclude travel by car (as indicated by an exceptionally high or low car mode share).

It effectively treats all criteria as equally disadvantageous, but in reality certain factors or combinations of factors may be more off-putting than others in terms of discouraging travel by other modes. More evidence would be required to assess this fully.



- When assessing whether a trip could feasibly be made by **walking or cycling**, the criteria were applied differently, on a ‘one strike and you’re out’ system, so that if any of the criteria applied, the trip was not considered feasible by walk or cycle. This reflects the patterns of travel at present, and also ensures consistency with previous analyses looking at potentially cyclable and walkable trips.

The criteria applied for each mode are shown in Table 1 below.

Table 1 Criteria applied to assess the feasibility of switching from a car to each mode

Attribute	Public transport	Walk	Cycle
<b>Time of day (night-time)</b>	One strike applied if trip started between 21:00 and 05:00	Trip excluded if trip started between 20:00 and 06:00	Trip excluded if trip started between 20:00 and 06:00
<b>Carrying equipment</b>	One strike applied if trip-maker was carrying some form of luggage or equipment	Trip excluded if trip-maker was carrying some form of luggage or equipment	Trip excluded if trip-maker was carrying some form of luggage or equipment
<b>Age of trip-maker</b>	No age criteria applied	Trip excluded if trip-maker was over 75	Trip excluded if trip-maker was over 65
<b>Disability of trip-maker</b>	One strike applied if trip-maker had a long-term disability affecting their travel	Trip excluded if trip-maker had a long-term disability affecting their travel	Trip excluded if trip-maker had a long-term disability affecting their travel
<b>Group Size</b>	One strike applied if 4 or more people were travelling together	Trip excluded if 4 or more people were travelling together	Trip excluded if 4 or more people were travelling together
<b>Children under 5 in party</b>	One strike applied if the party included at least one child under 5	Trip excluded if the party included at least one child under 5	Trip excluded if the party included at least one child under 5
<b>Purpose</b>	One strike applied if the trip was for the purposes of delivering something, or to escort someone to work or healthcare	Trip excluded if the trip was for the purposes of delivering something, or to escort someone to work or healthcare	Trip excluded if the trip was for the purposes of delivering something, or to escort someone to work or healthcare
<b>Trips excluded if...</b>	<i>Three or more ‘strikes’ applied to the trip</i>	<i>Any of the above criteria apply to the trip</i>	<i>Any of the above criteria apply to the trip</i>

**Notes on the application of criteria**

All trips made by car, as driver, have been assessed according to the above criteria, which are based upon the characteristics of current walk, cycle and public transport trips. This is not intended to act as a limit on mode shift: TfL recognises that many of the trips excluded by the filter criteria could and would be shifted. Equally, there is much we do not know about the trips and it is likely that many of the trips identified here as being feasibly by another mode

may in practice not be viable by that mode. For example, journeys may be linked together in a 'chain' that necessitates a car. Nevertheless, the filters are designed to reflect the characteristics of the majority of trips currently made by walk, cycle and public transport and act as a 'rule of thumb' to identify those trips most likely to be considered feasible by those modes, by most people.

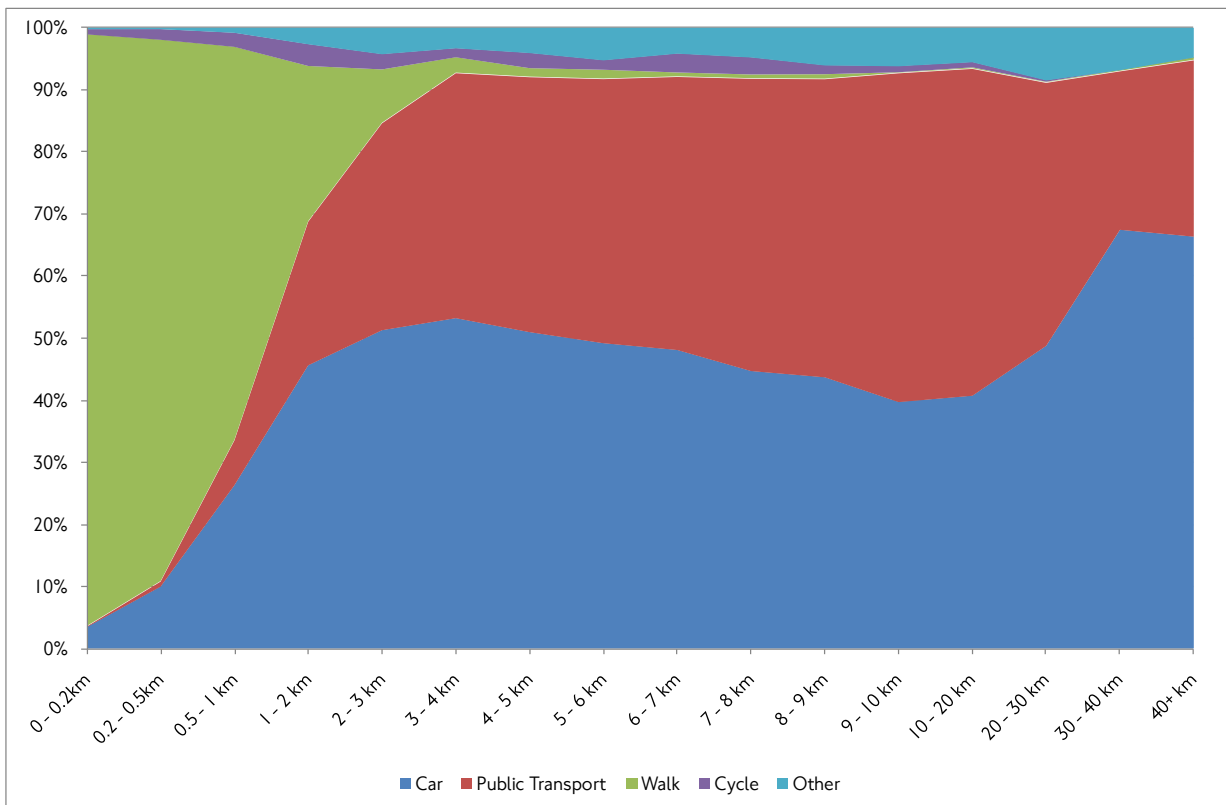
**Step 2: Availability of alternative modes**

The availability of walk and cycle as an option has been assessed based upon the length of the trip:

- For **walk**, the mode is assumed to be unavailable, or impractical, as a choice for journeys longer than 1.5km, that would take more than 20 minutes to walk. At present, the mode share for walking drops substantially after 1.5km. On average, most people are willing to walk journeys up to 20 minutes long.
- For **cycle**, the mode is assumed to be unavailable, or impractical, as a choice for journeys longer than 8km, that would take more than 40 minutes to cycle. Journeys are considered feasible to cycle under 5km, and cyclable but with possible disbenefits between 5km and 8km.

The current mode share of trips made by London residents is shown in Figure 2.

Figure 1 Mode Shares by Trip Length



Source: LTDS 09/10

In order to assess the availability of **public transport** options, trips have been characterised by the accessibility of public transport at the origin and destination of the journey. TfL’s Public Transport Accessibility Level (PTAL) measure has been used for this assessment: in this measure, a value of 1a represents the lowest level of access to public transport, and 6b the highest level.

As shown in Figure 2, as the PTAL increases (and accessibility to public transport improves), so does the public transport mode share. In particular, the change in mode share from PTAL 6a to 6b is very pronounced, particularly when the other end of the trip has a low PTAL.

Figure 2 Public Transport mode share by PTAL combination (for trips over 1.5km)

Origin PTAL	Destination PTAL							
	1a	1b	2	3	4	5	6a	6b
1a	5.6%	10.1%	16.1%	19.5%	33.8%	25.3%	34.1%	62.9%
1b	8.2%	16.3%	21.4%	21.4%	28.1%	30.9%	49.4%	72.1%
2	14.1%	23.0%	22.9%	32.7%	29.7%	44.2%	55.0%	74.3%
3	19.4%	19.8%	32.1%	38.4%	40.5%	42.4%	66.0%	82.6%
4	25.3%	28.3%	29.7%	41.0%	53.0%	59.9%	62.8%	81.1%
5	26.2%	34.9%	44.4%	41.7%	59.0%	63.7%	76.5%	72.4%
6a	36.2%	44.8%	56.1%	61.8%	62.7%	69.7%	73.5%	74.7%
6b	74.5%	78.7%	73.3%	82.9%	71.9%	77.2%	77.0%	78.5%

Source: LTDS 09/10

Based on this analysis, it has been assumed that if the current public transport mode share is less than 30% for a given PTAL combination, then any trips in that combination are not viable by public transport – the impact of this is shown in Figure 3.

Figure 3 Viability of public transport, by PTAL at origin and destination

Origin PTAL	Destination PTAL								
	1a	1b	2	3	4	5	6a	6b	
1a	Excluded as not viable by public transport								
1b	Excluded as not viable by public transport								
2	Excluded as not viable by public transport								
3	Excluded as not viable by public transport								
4	Excluded as not viable by public transport								
5	Excluded as not viable by public transport								
6a									
6b									

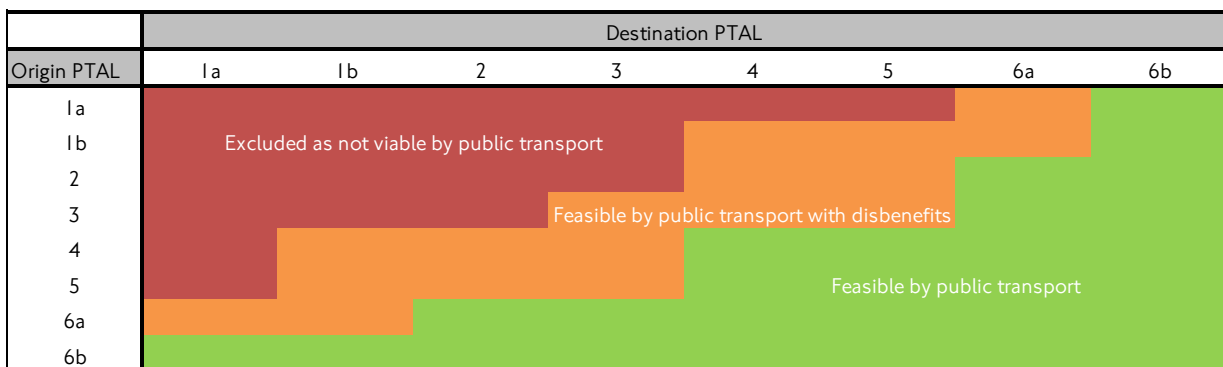
Source: LTDS 09/10

**Step 3: Identification of disbenefits of switching**

It is recognised that some journeys could feasibly be made by another mode, but that the trip-maker may face disbenefits in doing so. This has been assessed as follows:

- All car driver trips that have been assessed as feasible by **walk** are considered walkable without identified disbenefits, although we recognise that they may be slower than the car.
- Of those car driver trips that have been assessed as feasible by **cycle**, trips under 5km are considered cyclable without disbenefits (Green), and between 5km and 8km are considered cyclable but with possible disbenefits (Amber). Again, we recognise that even those trips categorised as ‘cyclable without disbenefits’ may be slower or more inconvenient than the current option, although some are likely to be faster and more reliable.
- Of those car driver trips that have been assessed as feasible by **public transport**, the average journey time impact of switching from car to public transport has been assessed by comparing the car journey times given by respondents to the survey with public transport journey times for the same journeys calculated using the Capital model (shown in Figure 4).
  - **Amber:** If the current public transport mode share is between 30% and 50% for a given PTAL combination, then any trips in that combination are considered viable by public transport but would be expected to be slower. On average, journeys in this category were around 10 minutes slower by public transport than car.
  - **Green:** If the current public transport mode share is above 50%, then any trips with that combination are considered viable by public transport within similar journey times.

**Figure 4** Viability of public transport and categorisation of quality of public transport as an alternative, by PTAL at origin and destination



Source: LTDS 09/10

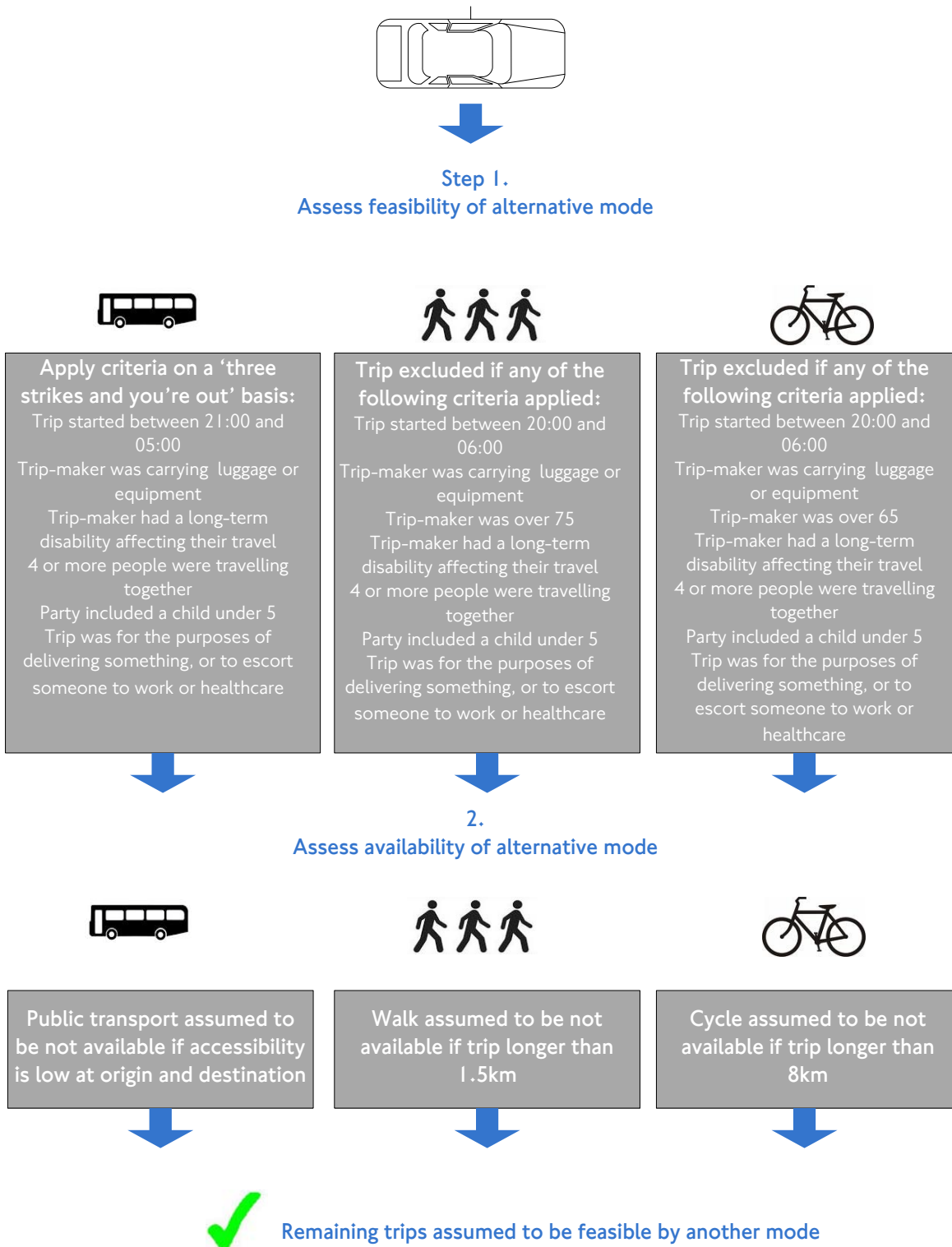
In addition, trips were identified as feasible by public transport but with potential disbenefits if they had one or two ‘strikes’ against them (trips with three or more ‘strikes’ were excluded). It is possible for trips to be feasible but with a likely time disbenefit and to have one or two characteristics making public transport less convenient. In total, 40% of the journeys scored as ‘Amber’ (feasible by PT but with possible disbenefits) were likely to suffer a time disbenefit, 24% had characteristics that made travel by PT less appealing, and 35% were likely to suffer a time disbenefit and had characteristics that made travel by PT less appealing.



**Summary of Methodology**

Figure 5 Summary of methodology (note that initial analysis does not include PTWs)

Identify existing car driver trips, made by Londoners in London



Source: LTDS 09/10

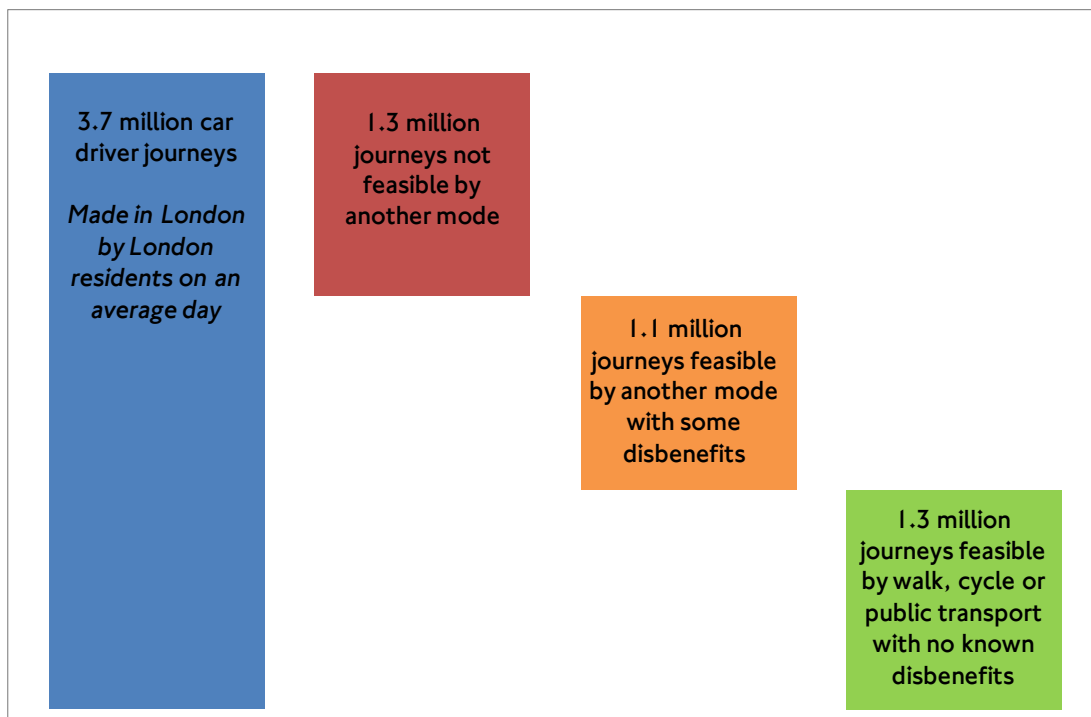
### Limitations of this analysis

- The analysis is limited to London residents and to journeys made wholly within London.
- There are some factors that have not been included due either to the lack of available data, or due to the complexity of the calculations required.
- There is much we don't know about these trips and the people making them that may mean another mode is not viable, for example, how trips are linked in 'chains'
- Service quality aspects such as crowding, have not been assessed so there may not be 'room' on the network for the journeys to be switched
- Some people are more willing to make changes than others, there are many barriers to change beyond the characteristics of the journey so even a trip classed as 'green' here may be very difficult to switch in practice
- Fundamentally, how switchable a trip is will depend on the interventions made and how responsive the target population is: interventions that have a major impact on the time, cost, availability or quality of modal options will have the most impact

### Initial Findings

In total, 65% of all car driver trips made by London residents could feasibly be made by another mode, 2.4m trips. Of these, 1.3m (or 34% of all trips) could feasibly be made by another mode without any identified disbenefits.

Figure 6 Summary of results



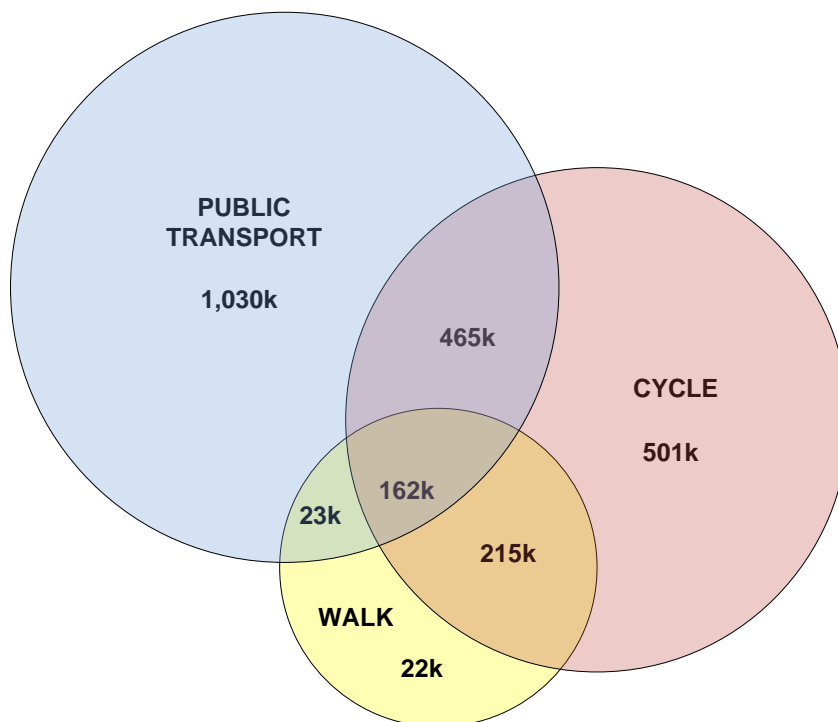
Source: LTDS 09/10

Of the 2.4 million trips that have an alternative option available (although that option may bring some disbenefits):

- 1.5m could feasibly be made by a single alternative mode (public transport, walk or cycle);
- 703k could feasibly be made by two of the three alternative modes; and
- 162k could be made by any of the three alternative modes, so by public transport, cycle or on foot.

1.7m car driver trips could feasibly be made by public transport, 0.4m on foot and 1.3m by cycle. The number switchable to any mode is less than the sum of those switchable to each mode individually since there are some trips which can be switched to more than one mode.

Figure 7 Car driver trips that could feasibly be made by another mode, by mode



Source: LTDS 09/10

### Public Transport

In total, 1.7m car driver trips could feasibly be made by public transport. Of those car driver trips not deemed feasible by public transport:

- 88k were excluded in step one (as described in the methodology section), on the basis that the characteristics of the trip or trip-maker meant that the journey would be more difficult by public transport; and
- 1.95m were excluded in step two, on the basis that there was not a suitable public transport option available.

Figure 8 shows the number of journeys excluded under step one with a ‘strike’ against each of the criteria meaning that public transport would not be suitable for the journey.

Figure 8 ‘Strikes’ against journeys deemed not feasible by public transport



Source: LTDS 09/10

Of the 1.7m car driver trips that could feasibly be made by public transport:

- 1.3m are feasible by PT but some disbenefits have been identified in terms of journey time or other aspects making the journey potentially more inconvenient; and
- 370k could be made by PT without any identified disbenefits.

### Walking

In total, 0.4m car driver trips could feasibly be walked.

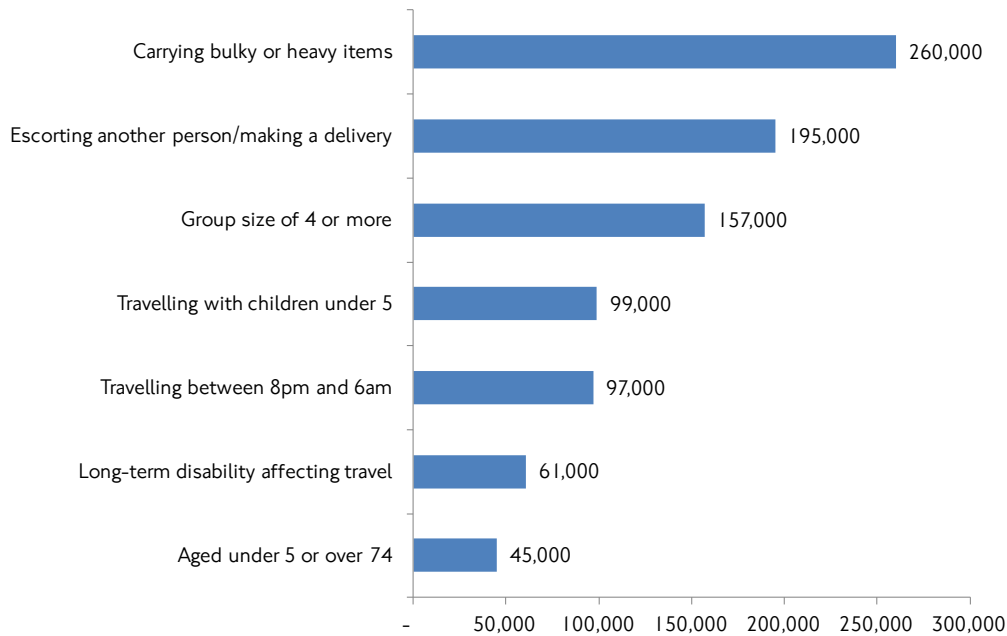
Of the 3.3m car driver trips that were deemed as not feasibly walkable:

- 609k were excluded in step one, on the basis that the characteristics of the trip or trip-maker meant that the journey would be more difficult on foot; and
- 2.67m were excluded in step two, on the basis that the trip was longer than 1.5km.

Figure 9 shows the number of journeys excluded under step one with a ‘strike’ against each of the criteria meaning that walking would not be suitable for the journey.



Figure 9 'Strikes' against journeys deemed not walkable



Source: LTDS 09/10

## Cycling

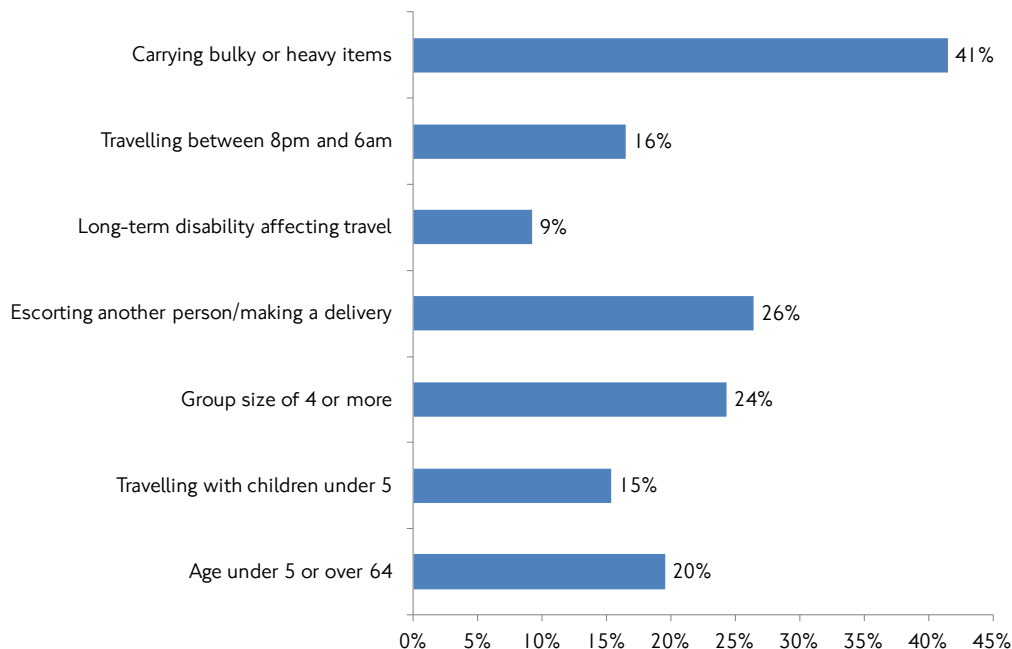
In total, 1.3m car driver trips could feasibly be cycled.

Of the 2.4m trips that were deemed as not feasibly cyclable:

- 1.84m were excluded in step one, on the basis that the characteristics of the trip or trip-maker meant that the journey would be more difficult by bicycle; and
- 540k were excluded in step two, on the basis that the trip was longer than 8km.

Figure 10 shows the number of journeys excluded under step one with a 'strike' against each of the criteria meaning that cycling would not be suitable for the journey.

Figure 10 'Strikes' against journeys deemed not cyclable



Source: LTDS 09/10

Of the 1.3m car driver trips that could feasibly be cycled:

- 270k are feasible by bicycle but the journey would take more than 20 minutes to cycle; and
- 1.1m could be cycled in less than 20 minutes.

### Conclusion

This analysis has allowed TfL to identify trips currently made by London residents within London by car (as driver) that could feasibly be made by another mode, using today's network. The results will help TfL, boroughs and others to target transport policies and interventions to where they may be most effective, as well as 'reality checking' assumptions made elsewhere about the potential to change the modal mix of journeys in London.

Further analysis is underway to explore the characteristics of car driver journeys that could feasibly be made by other modes, and to look at the potential opportunities offered by additional modes such as Powered Two Wheelers. A new Car Driver Market Segmentation tool has been created that allows analysis of journeys based on how amenable to change the trip-maker may be and this is also underway. Fuller results will be published in a report later in 2013.

### References

TfL (2009/10) London Travel Demand Survey: TfL