Analysis of travel times on local 'A' roads, England: 2014

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Overview

This paper brings together introductory analysis of travel times on local 'A' roads ('A' roads managed by local highway authorities) in 2014. The analysis focuses on three travel time measures:

1. Average speed
2. Average delay
3. Reliability (or 'predictability' of travel times)

The measures were developed to provide a more complete picture of travel times on local 'A' roads and also align with measures recently introduced in our Strategic Road Network statistics. This allows us to compare travel times on local and strategic roads more easily.

This analysis is being published now in line with best practice as an introduction to these three new measures. The analysis is intended to be transparent and to inform users. It is our intention to start producing statistics series of a similar nature later in 2016, so any feedback on this analysis via the contact details above is very welcome. We have proposed replacing the current statistical series on average speeds during the weekday (non-school holiday) morning peak period with new series using the measures above.

Average speeds on local 'A' roads

Introduction

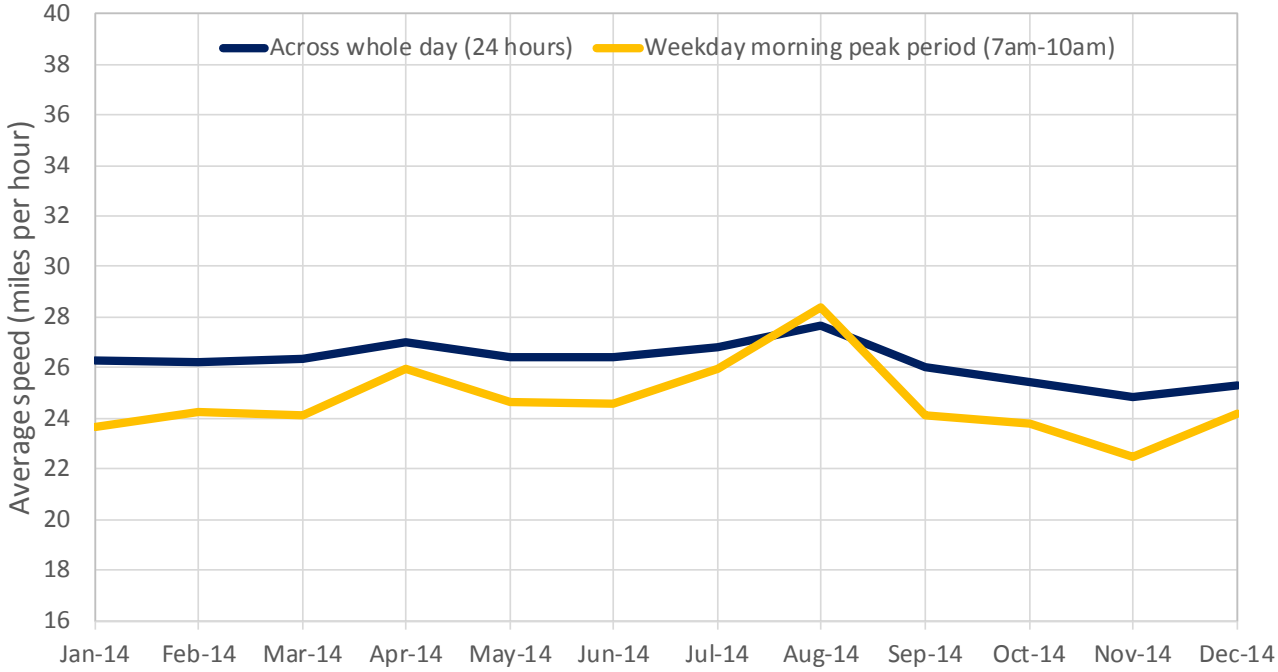
This measure reflects the average speeds of vehicles on locally managed 'A' roads across the entire day (24 hourly period). The measure weights speed observations from a sample of vehicles by associated traffic flows so that it is representative of traffic volumes on the roads in different locations and at different times of day.

National overview of average speeds

The average speed of vehicles on the local 'A' road network in 2014 is estimated to be **26.2 mph**. Looking at individual months in 2014, the month exhibiting the highest average speed was August, during the summer school holiday period, with an average speed of 27.7 mph. November had the slowest average speeds of 24.8 mph.

It should be noted that the average speeds presented above are calculated across all 24 hours of the day and across the entire locally managed 'A' road network. As such, it would not be appropriate to use these averages to represent 'typical' speeds on any individual section of the network or time of day.

Figure 1: Average speeds on local 'A' roads in 2014



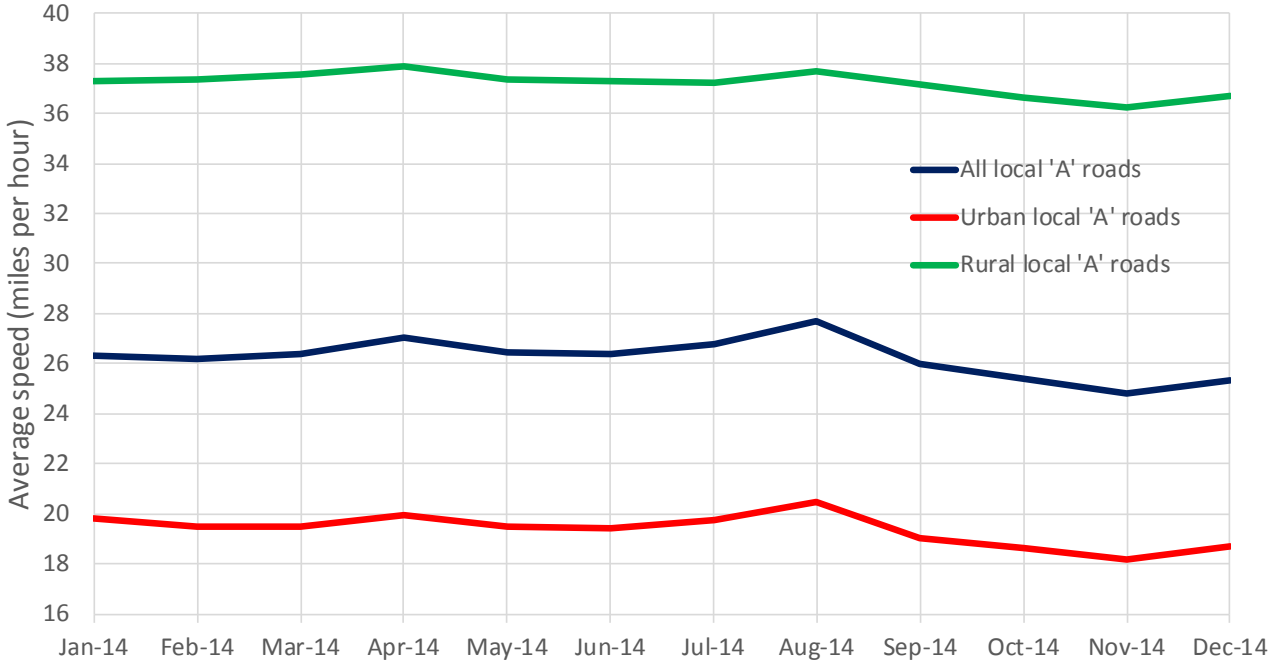
Initial analysis suggests that the lower average speeds during months towards the last quarter of the calendar year have been observed in previous years and are likely to be as a result of seasonal effects (e.g. traffic levels or weather).

Average speeds on urban and rural local 'A' roads

In 2014, the average speed of vehicles on urban local 'A' roads is estimated to be **19.3 mph** and on rural local 'A' roads is estimated to be **37.2 mph**.

Looking at individual months in 2014; on urban local 'A' roads, average speeds were highest in August reaching 20.5 mph, during the summer holiday period, and lowest during November dropping to 18.2 mph. On rural local 'A' roads, average speeds were highest in April at 37.9 mph, and lowest in November dropping to 36.2 mph. It can be seen in Figure 2 that there is less variation in average speeds on rural roads in individual months than there is on urban roads.

Figure 2: Average speed on rural and urban local 'A' roads in 2014

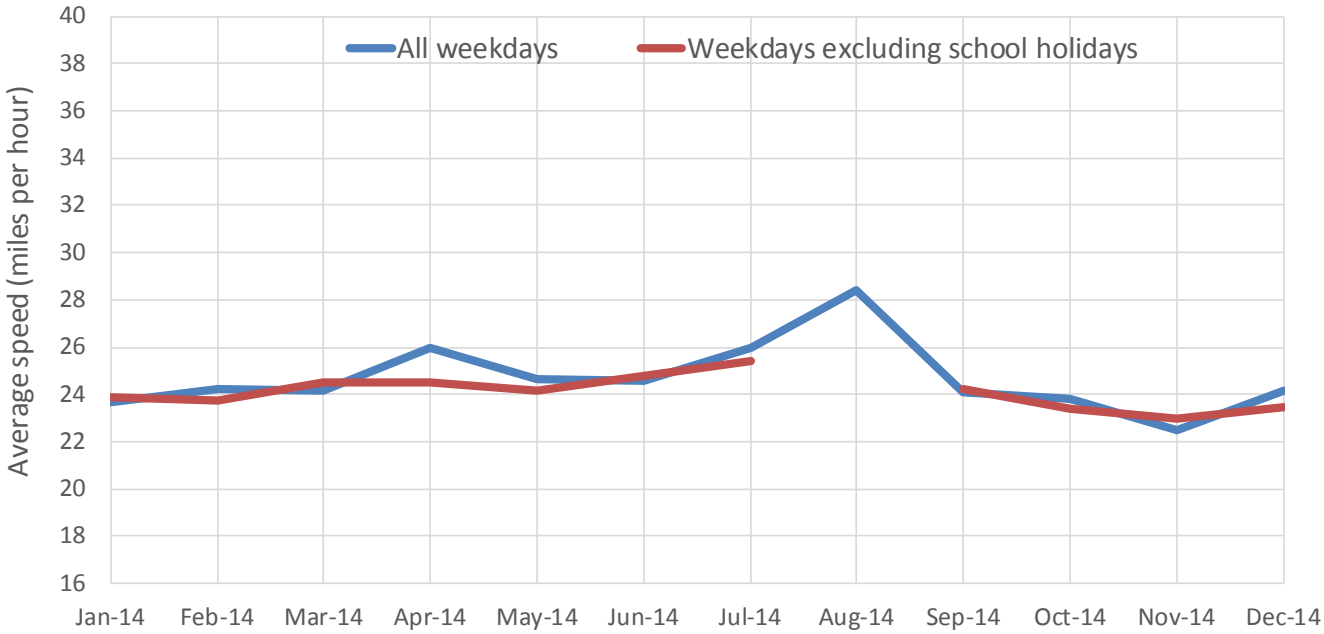


Comparing the new average speed measure with previously published average speed statistics

The chart below compares the new 'average speeds during weekday (no exclusions) morning peak period' analysis, based on the new average speed methodology, with the previous average speed statistics during the same time period (with school holiday periods excluded).

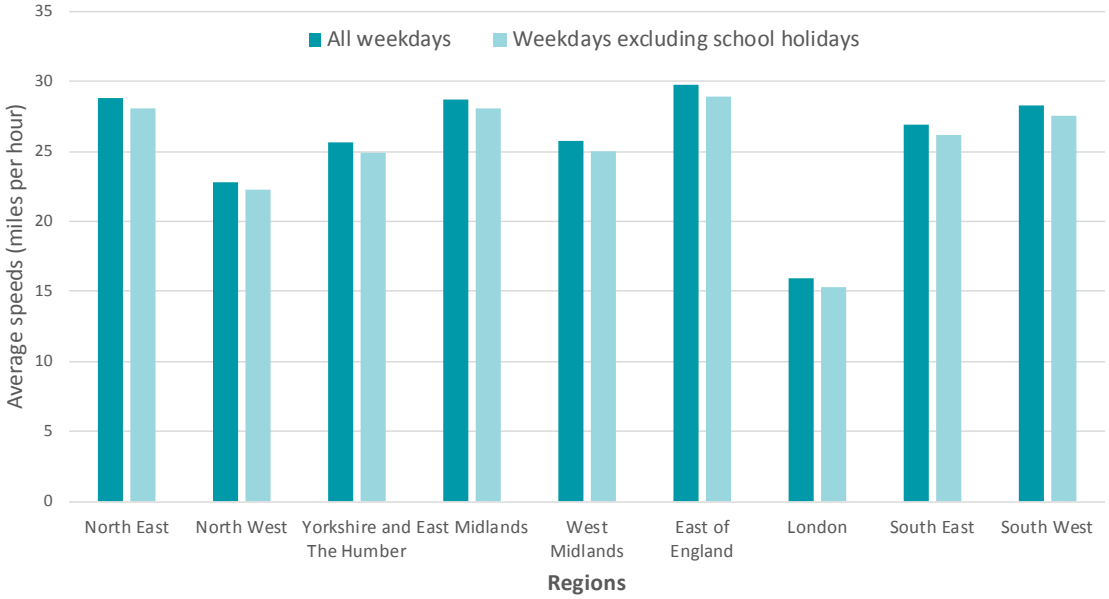
It can be observed that the new average speeds series is very similar to the previous average speeds statistics. The small larger differences between the two series in individual months can be largely explained by the inclusion of school holiday periods in the new measure.

Figure 3: Average speeds during the weekday morning peak period on local 'A' roads in 2014



The chart below compares the regional 2014 annual average figures for the new 'average speeds during weekday (no exclusions) morning peak period' analysis, based on the new methodology, with the previous average speeds statistics observed during the same time period (7am - 10am) but excluding school holiday periods. It can be seen that the new average speeds observed across each of the nine regions in England are very similar to those observed from the previous average speed statistics. The slight difference between the two series can be largely explained by inclusion of school holiday periods in the new measure.

Figure 4: Average speeds during the weekday morning peak period (7am - 10am) in 2014 by region in England



Average delay on local ‘A’ roads

Introduction

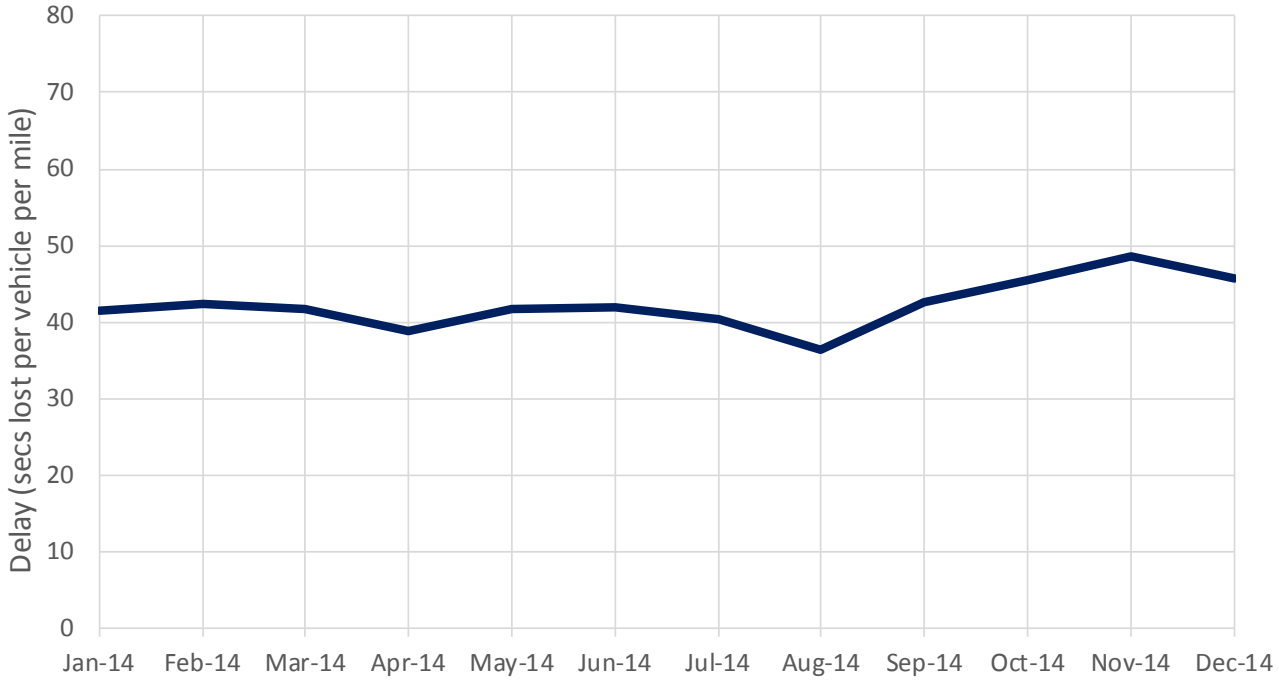
Delay (or ‘time lost’) is calculated by subtracting derived ‘free flow’ travel times from observed travel times for individual road sections. Average delay is calculated by aggregating delay estimates from individual road sections and weighting observations by associated traffic flows so that it is representative of traffic volumes on the roads (as for average speeds). Average delay is presented across all 24 hours of the day and on a per vehicle per mile basis. Average delay is commonly used as a measure of relative congestion. One advantage it has over the average speed measure is that it takes account of different free flow speeds (often associated with different speed limits) allowing road sections to be compared more easily.

It is important to note that road users often do not expect to encounter free flow conditions (particularly during peak times) and consciously build in additional time for their journey based on their own experience. As a result, drivers may percieve delay relative to their expected (or average) journey time rather than free flow conditions.

National overview of average delay

The average delay on local ‘A’ roads in 2014 is estimated to be **42.3 seconds per vehicle per mile**. Looking at individual months in 2014, the month with the lowest average delay was August with an average delay of 36.4 seconds per vehicle per mile. The month with the highest average delay was November with an average delay of 48.6 seconds per vehicle per mile.

Figure 5: Average delay on local ‘A’ roads in 2014



Average delay on rural and urban local ‘A’ roads

In 2014, the average delay to vehicles travelling on urban local ‘A’ roads is estimated to be **69.7 seconds per vehicle per mile** and on rural local ‘A’ roads is estimated to be **19.5 seconds per vehicle per mile**.

Looking at individual months in 2014; on urban local ‘A’ roads, average delay was lowest in August at 60.2 seconds per vehicle per mile and highest in November at 79.9 seconds per vehicle per mile. On rural local ‘A’ roads, average delay was lowest in April at 17.9 seconds per vehicle per mile and highest in November at 21.6 seconds per vehicle per mile. It is important to note that urban roads generally have lower free flow speeds relative to rural roads and therefore small changes in observed speeds will translate into higher levels of delay experienced on the urban road network. The example below illustrates this.

Figure 6: Example of average delay experienced on urban and rural local ‘A’ roads

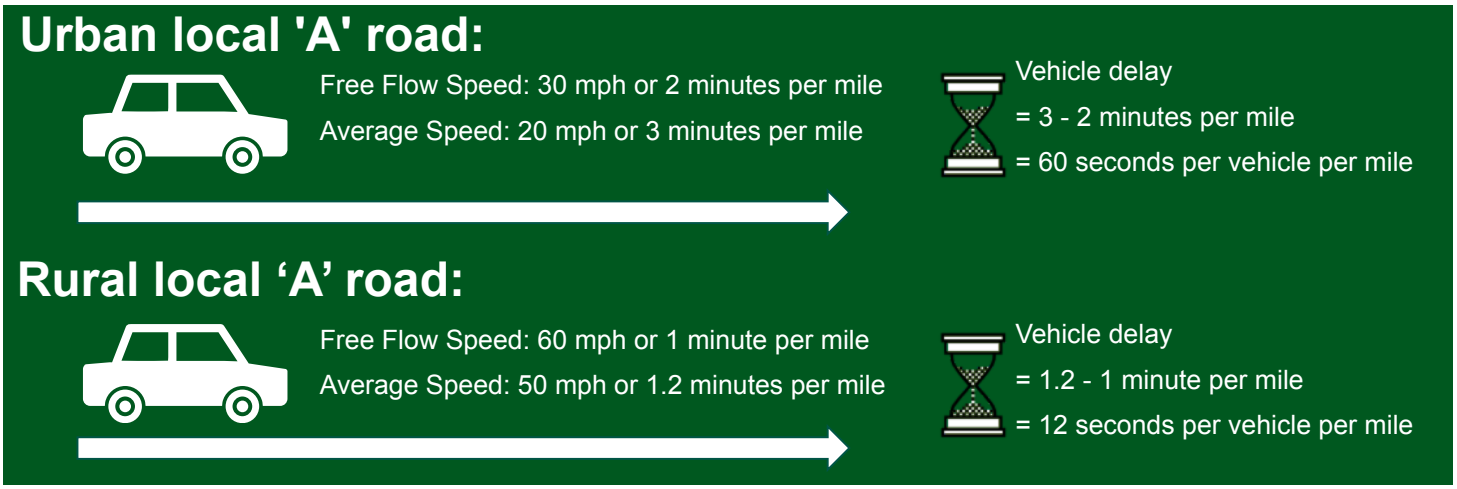
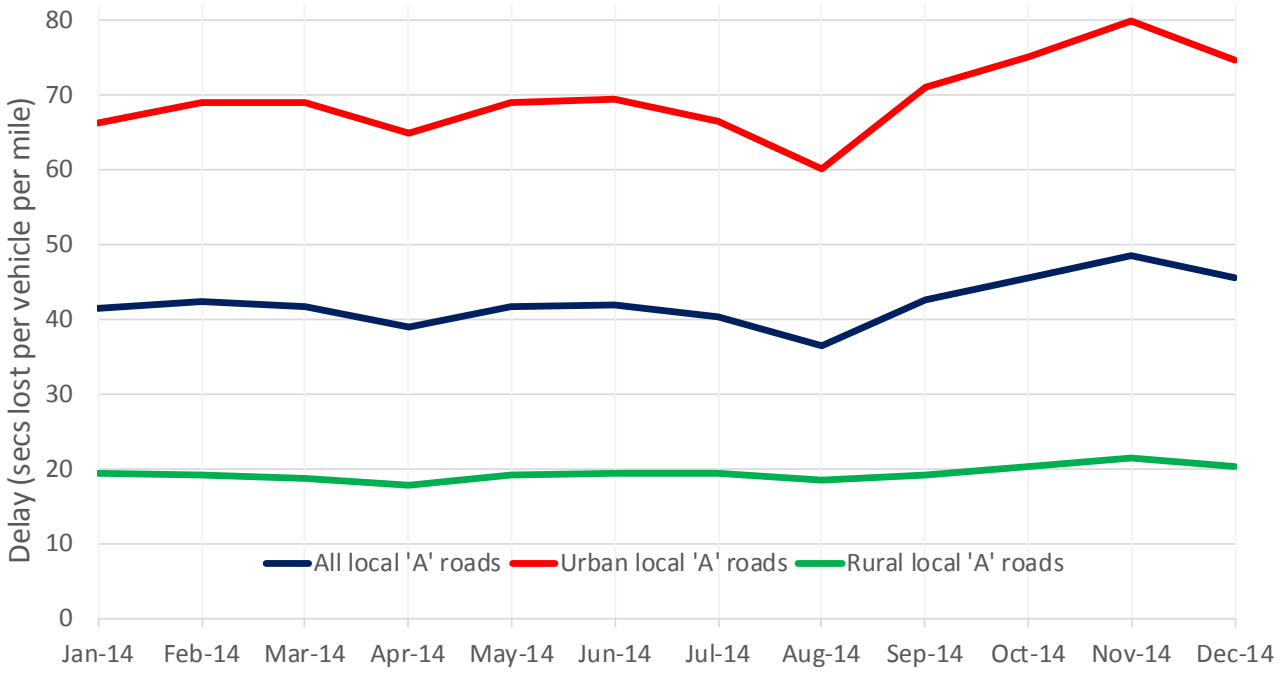


Figure 7: Average delay on rural and urban local ‘A’ roads in 2014



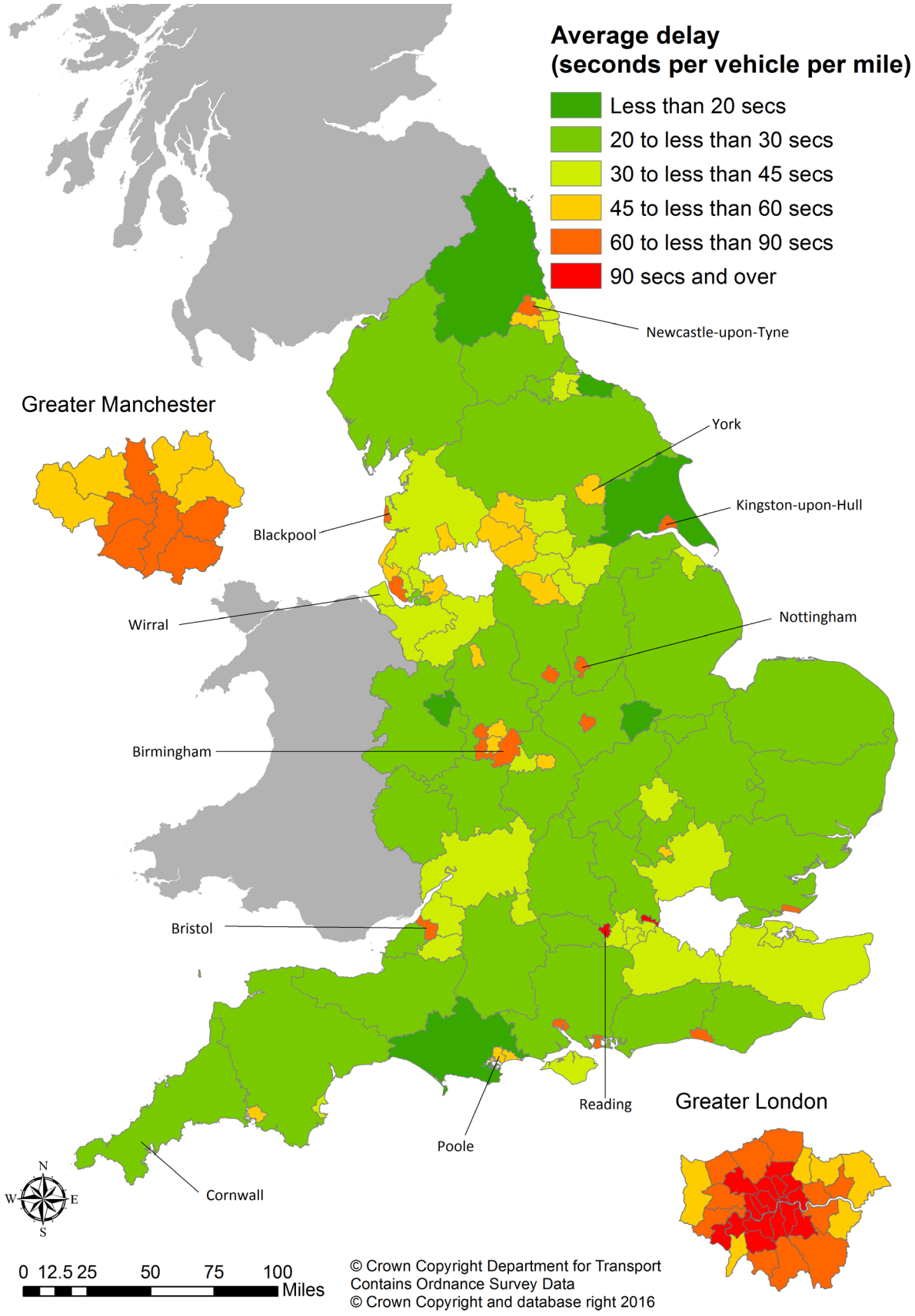
Similar to average speeds, average delays presented above are calculated across the entire 24 hours period of the day and across the local ‘A’ road network. As such, it would not be appropriate to use these averages to represent ‘typical’ delays on any individual section of the network or time of day. It can be seen in Figure 7 that there is less variation in average delay on rural roads in individual months than there is on urban roads.

Initial analysis suggests the higher average delays during months towards the end of the calendar year have been observed in previous years and are likely to be as a result of seasonal effects (e.g. traffic levels or weather).

Map of average delay on local ‘A’ roads in 2014

The map below presents the average delay for individual local highway authorities in 2014 across the entire 24 hourly period of the day. To note, the green and light green coloured local authorities indicate low levels of delay whereas the orange and red coloured local authorities indicate high levels of delay.

Figure 8: Average delay experienced on local ‘A’ roads by local highway authority area



Reliability of travel times on local ‘A’ roads

Introduction

The measure of reliability presented in this paper is the Planning Time Index (PTI). The PTI tells us about the predictability of travel times during the daytime (6:00am-8:00pm), and aims to measure the additional time (compared to free flow conditions) that drivers need to leave on individual road sections to ensure that they arrive on time. The time period 6.00am to 8.00pm is used as this is the period where traffic is highest and delays and journey unreliability are more likely. This measure is the ratio of the 95th percentile travel time to the free flow travel time. The PTI can also be presented as a percentage, as in the analysis below.

An individual road section on the local ‘A’ road network is defined as a single stretch of road in one direction, having uniform characteristics, between two main junctions.

It should be noted that road users often do not expect free flow conditions (particularly during peak times) and consciously build in additional time for their journey based on their own experience. As a result drivers may perceive delay relative to their expected (or average) journey time rather than free flow conditions.

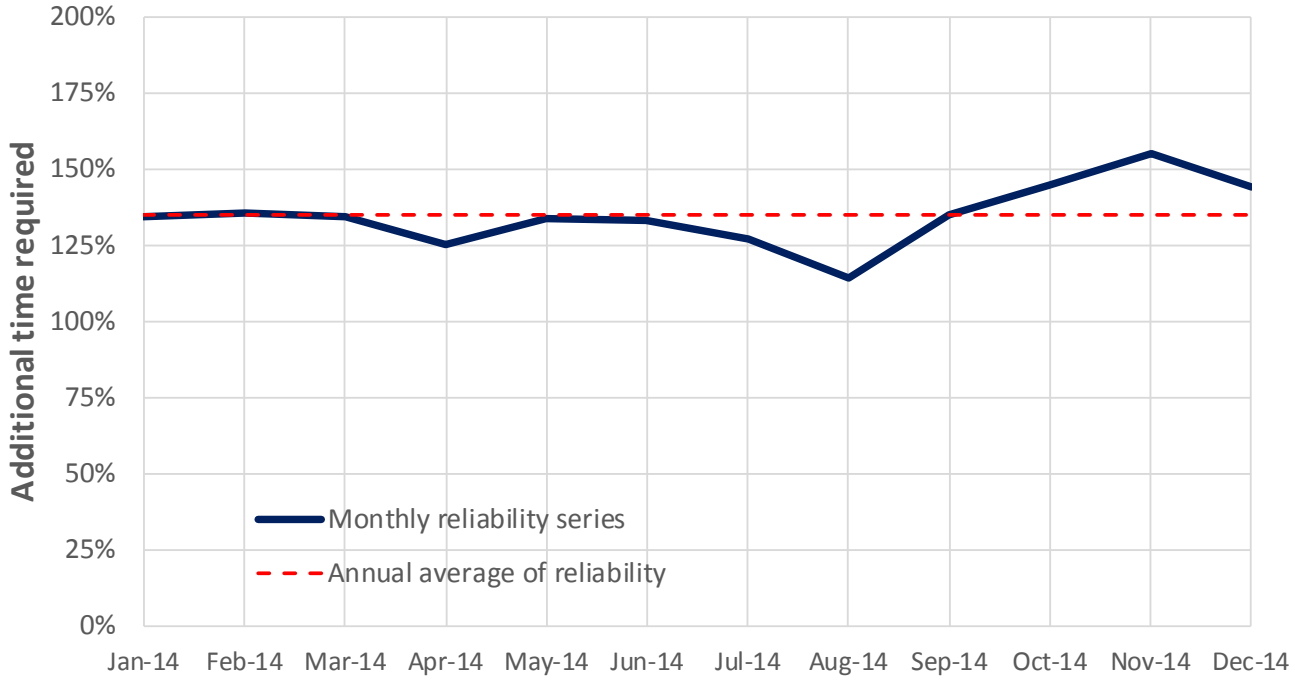
National overview of reliability

In 2014, **135%** of additional time needed to be left by road users on individual road sections on average to ensure on time arrival.

As an illustrative case, consider an individual road section with a PTI of 120%, for a given period. If the travel time for this section in free flow conditions is 10 minutes, 95% of users leaving 22 minutes to traverse that road section would have arrived on time. Equivalently, users leaving 22 minutes to traverse the same road section, would have been on time 19 times out of 20 in the month.

Looking at estimates of reliability for individual months in 2014, the month with the least amount of additional time needed was August where 114% additional time needed to be added on average to ensure on time arrival. The month with the largest amount of additional time needed was November where 155% additional time needed to be added on average to achieve on time arrival.

Figure 9: Average additional time needed on individual road sections to achieve on time arrival on local 'A' roads in 2014

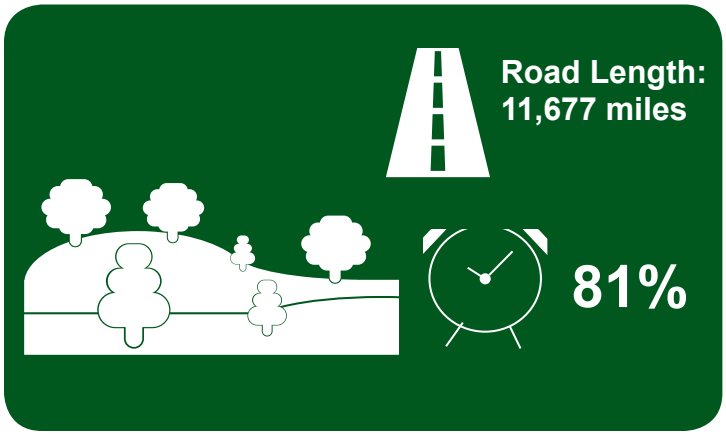


The average additional times needed presented above are calculated for day time only (6.00am-8.00pm) across the entire local 'A' road network. As such, it would not be appropriate to use these averages to represent 'typical' additional times needed on any individual section of the local 'A' road network or time of day.

Similar to average speeds and delays, initial analysis suggests that the higher levels of additional time needed during months towards the end of the calendar year (October to December) have been observed in previous years and are likely to be as a result of seasonal effects (e.g. traffic levels or weather).

Reliability on rural and urban local 'A' roads

In 2014, users of the local urban 'A' road network needed to leave **200%** additional time on individual road sections on average to ensure they arrived on time. In contrast, users of the local rural 'A' road network needed to leave **81%** additional time on individual road sections on average to ensure they arrived on time.



It is important to note that the additional time required to ensure on time arrival for urban and rural roads is provided as an average across all the respective local 'A' road sections and is measured relative to driving on individual road sections during free flow conditions.

Further information

Methodology and technical detail

1. Users should exercise some caution when interpreting the analysis in this paper, particularly when looking over short periods of time. Travel times (and the measures in this paper) are likely to be affected by a range of factors such as traffic levels, weather, roadworks, or changes to speed limits.

2. The underlying datasets used to produce the analysis in this paper are similar to those used for the current average speeds on local A road statistics. The data are based on travel times estimated using Global Positioning Systems (GPS) and traffic flows estimated using Department for Transport's traffic count information.

3. All measures in this paper use travel time information from car and light commercial vehicle (LCV) only. We have not included HGV travel time information due to low sample sizes. Over 100 thousand cars and LCVs each month were used to calculate the measures for 2014. All measures are weighted by associated expected traffic flows to ensure that they represent traffic volumes on the roads in different locations and at different times of day.

4. All measures use real, observed travel time data with a good temporal match where available. For the average speed and average delay measures, where there is insufficient data for individual road sections for a particular month and hourly period, journey times are imputed using corresponding monthly and hourly averages from individual road sections having similar road characteristics (e.g. urban/rural and single/dual carriageway definition). Similarly for the reliability measure, in the few cases where there is insufficient data for individual road sections, monthly averages from individual road sections having similar road characteristics are used.

5. The reliability measure (Planning Time Index) is based on travel taking place between 6.00am and 8.00pm. This is the period where traffic (and sample sizes) is highest and delays and journey unreliability are more likely.

6. For the average delay and reliability measures, free flow travel times are derived by taking the 85th percentile speed across all car and light commercial vehicle observations over year, 'capped' to current national car speed limits (e.g. 60 mph for single carriageway and 70 mph for dual carriageway). As such there may be cases where derived free flow speeds are greater than the legal speed limit on some road sections.

7. The Department for Transport publishes a separate statistics series on free flow vehicle speeds on British roads. The series focusses more on the speeds at which drivers choose to travel and their compliance with speed limits. Free flow speeds presented in the series are calculated in a different way and using a different data source to the free flow speeds used for the analysis presented in this paper.