



Department for Transport

# Travel time measures for the Strategic Road Network and local 'A' roads, England: January to December 2017

In 2017, average delay on the Strategic Road Network was similar to 2016 (up 0.2%), and average delay on local 'A' roads increased by 1.1 seconds per vehicle per mile (2.3%).



### Please note

The values for the Strategic Road Network and local 'A' roads are not directly comparable. See [p12](#) for further details.

### About this release

This statistical release presents information about travel times on Strategic Road Network (roads managed by Highways England) and local highway authority managed 'A' roads in England. The measures in this release are estimated using in-vehicle Global Positioning Systems.

### In this publication

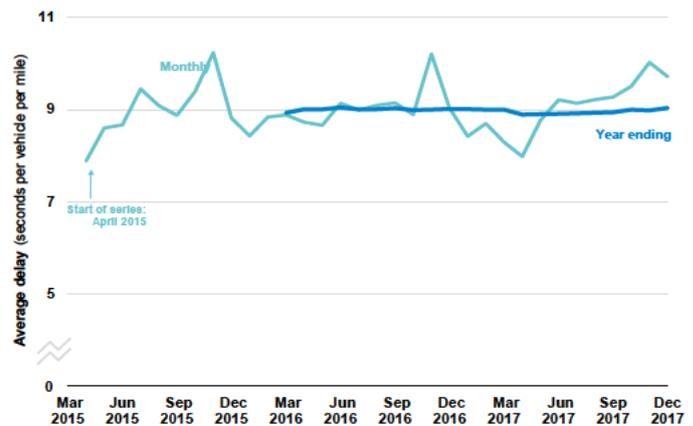
- SRN figures [p4](#)
- Local 'A' road figures [p7](#)
- Background [p12](#)

### Key Statistics

On the Strategic Road Network (SRN) in 2017:

- ▶ The **average delay** is estimated to be **9.0 seconds per vehicle per mile compared to free flow**, similar to 2016 (up 0.2%)
- ▶ The **average speed** was **59.4 mph**, similar to 2016 (up 0.1%).

Figure 1: Average delay, compared to free flow, on the Strategic Road Network (Table [CGN0402](#))



- ▶ The reliability of travel times is measured using the Planning Time Index. This presents **67.7% of additional time needed compared to free flow**, on average, on individual roads sections to ensure on time arrival. This is down 0.9 percentage points compared to the previous year.

On local 'A' roads in 2017:

- ▶ The **average delay** is estimated to be **46.9 seconds per vehicle per mile compared to free flow**, a 2.3% increase on the previous year.
- ▶ The **average speed** was **25.2 mph**, the same as in the previous year (down 0.1%).

Figure 2: Average delay, compared to free flow, on local 'A' roads (Table [CGN0502](#))



Definitions

**Average speed** is in miles per hour and is an estimate of the physical level of congestion.

**Free flow speed** is the estimated speed of the traffic if there was no congestion. This is calculated differently for SRN and local 'A' roads.

**Average delay** is the difference between free flow travel times and average journey times.

↔ represents negligible change (less than 0.5%)

**LCV** - Light Commercial Vehicles

## Strategic Road Network, in 2017

### Average delay

seconds per vehicle per mile (spvpm)



**9.0**  
spvpm

↔ **0.0** spvpm  
similar compared to 2016  
(up 0.2%)

### Sample

100 %  
cars



Up to  
50,000 cars

### Average speed

miles per hour (mph)



**59.4** mph

↔ **+ 0.1** mph

similar compared to 2016  
(up 0.1%)

### Reliability



**67.7%**

additional time is  
needed compared  
to free flow

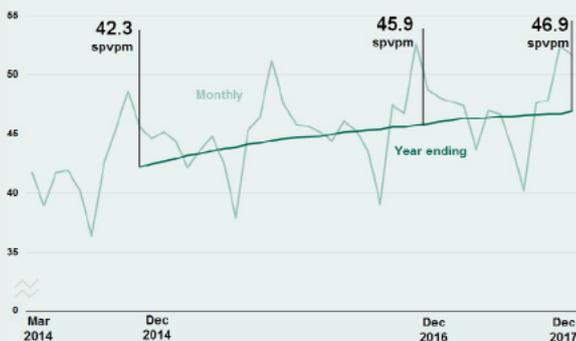


down 0.9 percentage points  
on 2016

## Local 'A' Roads, in 2017

### Average delay

seconds per vehicle per mile (spvpm)



**46.9**  
spvpm

↑ **+1.1** spvpm  
2.3% increase on 2016



**Urban**

**77.5** spvpm



**Rural**

**21.6** spvpm



**Weekday morning**  
(7am - 10am)

**56.1** spvpm



**Weekday evening**  
(4pm - 7pm)

**65.8** spvpm

### Sample



**63%**

**37%**



Up to 140,000 cars and LCVs

### Average speed



**0.0** mph

**25.2** mph

similar compared to 2016  
(down 0.1%)

## Note about Strategic Road Network (SRN) and local 'A' road figures

### Please note

The figures produced in this publication are average measures across the whole network, and these figures are likely to differ from the average value for specific sections of road, time periods and vehicle types.

### Caution comparing between the SRN and local 'A' road figures

This release brings together figures from the SRN and local 'A' roads. It presents an overview of the national measures for congestion across the two road networks and helps highlight methodological differences. The statistical measures calculated for both networks are shown in the table below. There are figures for average speed and average delay across both networks, with an additional measure for the SRN and further breakdowns provided for local 'A' roads.

Figure 3: Travel time measures calculated for SRN and local 'A' roads

	SRN	Local 'A' roads
<b>Measures</b>		
Average delay	✓	✓
Average speed	✓	✓
Reliability	✓	-
<b>Breakdowns</b>		
Urban / rural	-	✓
AM / PM peak	-	✓
Region / Local Authority	-	Produced annually (Feb)
Road level	-	-

Where breakdowns are presented for both local 'A' roads and SRN, there are some methodological differences (see page 11) so **figures should not be directly compared for the two road networks.**

### Introduction to average delay

Delay (or 'time lost') is calculated by subtracting derived 'free flow' travel times from observed travel times for individual road sections.

This measure is weighted by traffic flows, see [p11](#) for more details.

### Note for average delay

Average delay is presented across all 24 hours of the day, on a seconds per vehicle per mile basis. Average delay is commonly used as a measure of relative congestion as it takes account of different free flow speeds (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 perceive delay relative to their expected (or average) journey time rather than free flow conditions.

### Change to publication schedule

We no longer intend to publish a quarterly travel times report. Instead, we will publish this once a year only (in February), though we will continue to update the tables on a quarterly basis. This means that the tables will be next updated in May 2018, and we will publish the next written report in February 2019. We have previously sought feedback on this change, and received no objections. If you have comments or questions, please contact us on [congestion.stats@dft.gsi.gov.uk](mailto:congestion.stats@dft.gsi.gov.uk)

## Geographical network for SRN

These travel time measures are based on data matched to Highways England's National Traffic Information Service (NTIS) network in England.

## SRN: Summary figures of average delay, speed and reliability

The summary table below (Figure 4) presents average speed and delay on the SRN in 2017, in 2016, and the percentage change.

**Figure 4: Summary of recent changes in average speed, average delay compared to free flow and reliability on SRN in England**

(Tables [CGN0401](#), [CGN0402](#) and [CGN0403](#))

	This year 2017	Last year 2016	Change from 2016
<b>Average speed (miles per hour)</b>	<b>59.4</b>	<b>59.3</b>	↔ <b>0.1%</b>
<b>Average delay (seconds per vehicle per mile)</b>	<b>9.0</b>	<b>9.0</b>	↔ <b>0.2%</b>
<b>Reliability (% additional time)</b>	<b>67.7%</b>	<b>68.7%</b>	⬇ <b>-0.9 pp</b>

pp = percentage point

## Introduction to average speed on SRN

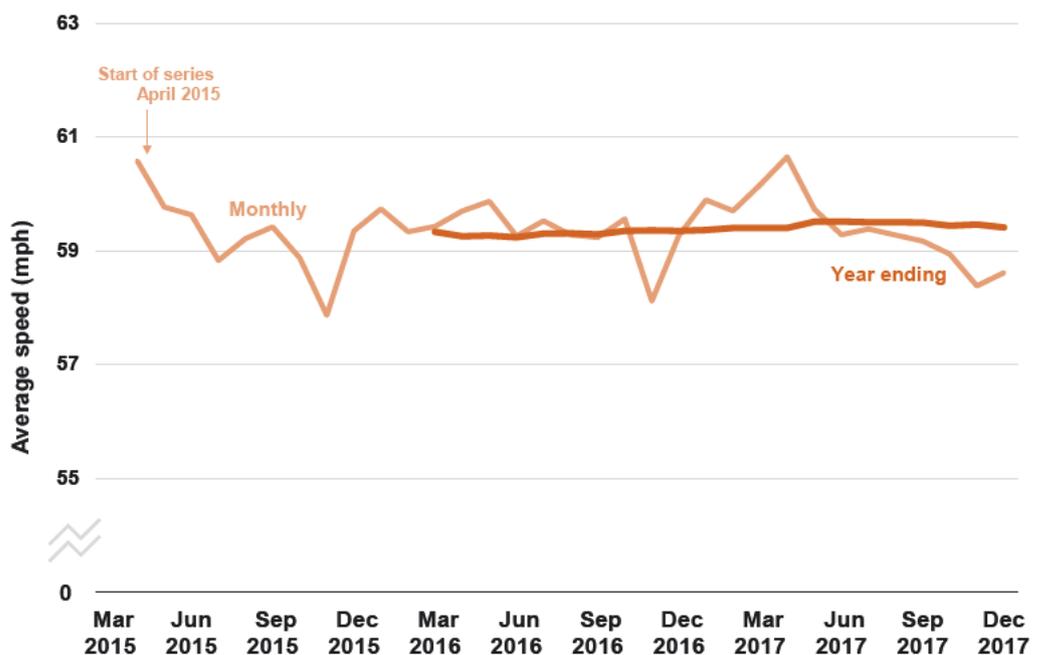
This measure reflects the average speed of cars on the SRN across the entire day (24 hour period).

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 (as for average delay).

## SRN: Average speed

For 2017, the average speed on the SRN was 59.4 mph. This is broadly similar to 2016 (up 0.1% or 0.1 mph), which means on average vehicles were moving at around the same speed.

**Figure 5: Average speed on the Strategic Road Network (Table [CGN0401](#))**



## Free Flow on SRN

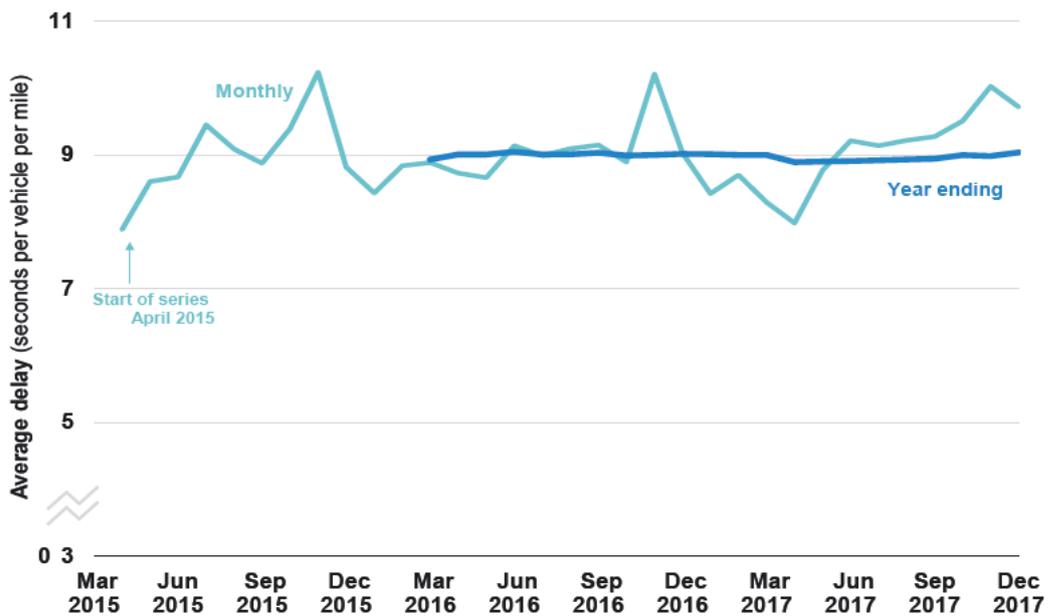


Free flow travel times, which apply to both the average delay and reliability measures, are currently set equivalent to the speed limit, for each individual road section.

## SRN: Average delay

For 2017, the **average delay on the SRN** is estimated to be **9.0 seconds per vehicle per mile (spvpm)** compared to free flow. This is **the same as in 2016**, which means on average there was a similar amount of delay (up 0.2%).

**Figure 6: Average delay on the Strategic Road Network** (Table [CGN0402](#))



### Average Delay Example

Consider a road section of 10 miles, with a free flow speed of 60 mph. If a vehicle was able to travel at the free flow speed, it would take 10 minutes to traverse this section of road

If, instead, the vehicle is only able to travel at an average speed of 50 mph, it would take 12 minutes to traverse the road section.

As this would take an extra 2 minutes (or 120 seconds) to travel the 10 miles, the average delay for this vehicle per mile would be 12 seconds.

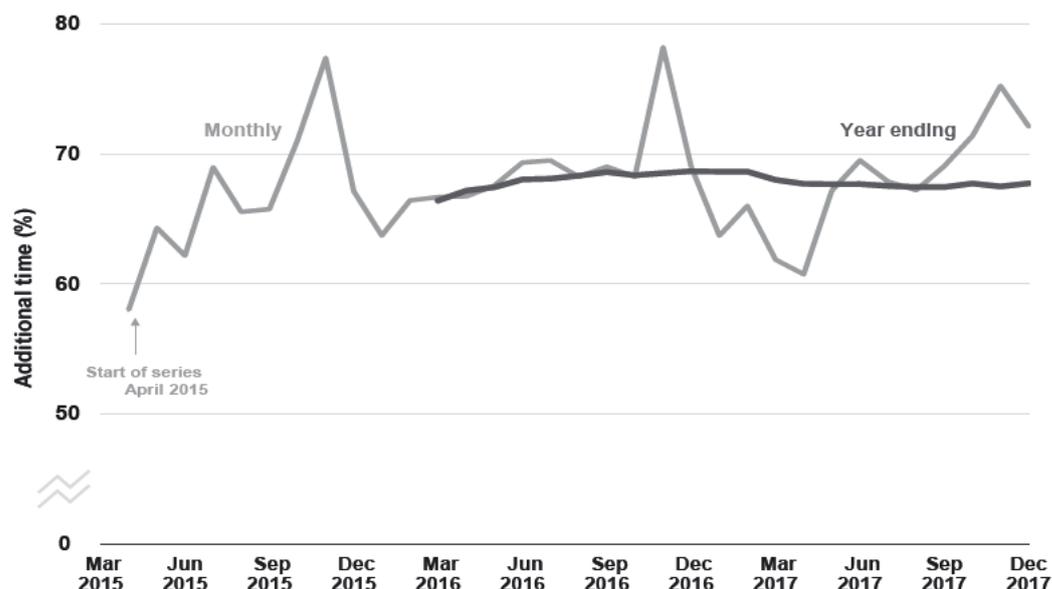
## Technical note for reliability on SRN

Unlike the average delay and average speed figures (which are calculated across all 24 hours of the day), the reliability figures presented in this release are calculated across daytime hours (6am to 8pm) - where network demand is at its highest - and across the entire Strategic Road Network.

## SRN: Reliability

For 2017, on average, **67.7% of additional time was required compared to free flow**, to ensure on time arrival on individual road sections of the SRN. This is **down 0.9 percentage points** compared to 2016, so on average, a **smaller proportion of additional time** is required to ensure on time arrival. This means on average the network is more reliable.

**Figure 7: Additional time needed compared to free flow to ensure on time arrival on the Strategic Road Network** (Table [CGN0403](#))



## Further definitions for reliability on SRN

For reliability measure there are several further definitions. A 'journey' represents travel across one link on the network. An 'on time journey' is defined as one which is completed within a set reference time. Free flow reference times are based on actual speed limits.

The Planning Time Index (PTI or Reliability) monitors the amount of time that would need to be added to free flow travel times to have a 95% chance of a journey arriving at a destination on time. This is measured as a percentage.

Reliability on the SRN as a whole is calculated by averaging the Planning Time Index (PTI) across individual road sections, weighting by daytime (6am to 8pm) traffic flows for each section. The PTI does not represent the reliability of start to end journeys, across several road sections.

It should be emphasised that the PTI compares observed travel times with free flow times, rather than with expected travel times. Therefore, if a user rarely experiences free flowing conditions on an individual road section during the daytime, 60% additional time compared to free flow on that road section, for example, may reflect a typical travel time to them.

## Reliability Example

As an illustrative case, consider an individual road section with a PTI of 60%, for a given year. If the travel time for this section in free flow conditions is 10 minutes, 95% of users leaving 16 minutes to traverse that road section would have arrived on time. Equivalently, users leaving 16 minutes to traverse the same road section would have been on time 19 times out of 20 in the year.

## Local 'A' road fact

The local 'A' road network accounts for around 10% of all English roads by length, but carries around a third of all traffic.

## Revision of statistics

Some of the previously published congestion figures for local 'A' roads in 2017 have been revised. The main impact is to the local 'A' road morning peak figures for January and February 2017.

All changes have been clearly marked in the relevant tables ([CGN0501a](#) and [CGN0502a](#)). For further information, please see the revision note on our [release page](#).

## Local 'A' roads: Summary figures of average speed and delay

The summary table below (Figure 8) presents average speed and delay on local 'A' roads in England, for specified time periods and by road type, in 2017. The value for the previous year (2016), and the percentage change in average speeds and delays are also shown.

**Figure 8: Summary of recent changes in average speed and average delay compared to free flow on local 'A' roads in England**

(Tables [CGN0501a](#) and [CGN0502a](#))

	This year 2017	Last year 2016	Change from 2016
<b>Average speed (miles per hour)</b>			
<b>All day (24 hour period)</b>	<b>25.2</b>	<b>25.2</b>	↔ -0.1%
<b>Peak times</b>			
Weekday morning (7am-10am)	23.7	23.8	↔ -0.5%
Weekday evening (4pm-7pm)	22.2	22.2	↔ 0.0%
<b>Road classification</b>			
Urban roads	18.4	18.5	↔ -0.4%
Rural roads	36.2	36.5	⬇️ -0.8%
<b>Average delay (seconds per vehicle per mile)</b>			
<b>All day (24 hour period)</b>	<b>46.9</b>	<b>45.9</b>	⬆️ 2.3%
<b>Peak times</b>			
Weekday morning (7am-10am)	56.1	54.4	⬆️ 3.0%
Weekday evening (4pm-7pm)	65.8	64.9	⬆️ 1.4%
<b>Road classification</b>			
Urban roads	77.5	75.5	⬆️ 2.6%
Rural roads	21.6	20.6	⬆️ 4.9%

## Introduction to average speed on local 'A' roads

This measure reflects the average speed of vehicles on local 'A' roads across the entire day (24 hour period).

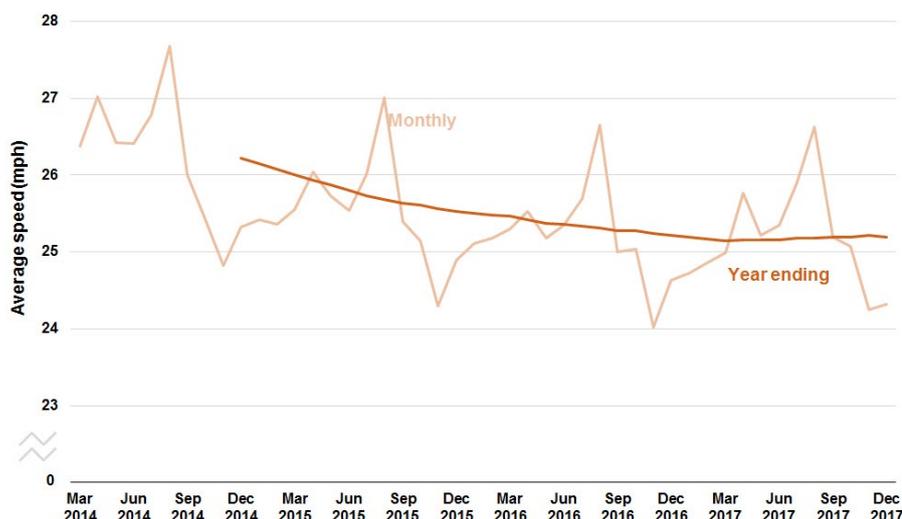
The measure weights speed observations from a sample of vehicles by associated traffic flows so that it is representative of traffic volumes on the roads in different locations and at different times of day (as for average delay). The weighting for local 'A' roads also weights by hour, day type, month, urban and rural classification and local authority.

## Local 'A' roads: Average speed

### National overview of average speed

The **average speed on local 'A' roads in England** across 24 hours in the **2017** is estimated to be **25.2 mph**. There has been no change in average speed compared to the previous year (**down 0.03 mph**), which means on average vehicles were moving at a similar speed.

**Figure 9: Average speed on local 'A' roads in England** (Table [CGN0501a](#))



Between the year ending December 2014 and the year ending December 2017, average speeds (across the entire 24 hour period) have decreased by 1.0 mph (or 3.9%).

### Definition

For statistical purposes, DfT defines 'urban' roads to be those within a settlement of 10,000 people or more. This is consistent with the [Rural and Urban Area Classification 2011](#). All other roads are defined as 'rural'.

### Average speed at peak times and in urban and rural areas

Average speeds on local 'A' roads during the **weekday morning peak (7am to 10am)** and the **weekday evening peak (4pm to 7pm)** were **23.7 mph** and **22.2 mph, respectively**, in 2017.

Since 2014, decreases in average speed have been observed during both the weekday morning peak (7am to 10am) and the weekday evening peak (4pm to 7pm). Over this time period, the decrease in average speed was greater for evening peak (4.6%) than for morning peak (3.9%).

On **urban classified local 'A' roads**, average speeds were **18.4 mph** in 2017, compared to **36.2 mph on rural local 'A' roads**. Since 2014, there has been a similar reduction in average speed for both urban and rural local 'A' roads (0.9 and 1.0 mph respectively), although the percentage change is greater on urban roads (a decrease of 4.7%) compared to rural roads (a decrease of 2.7%).

## Free flow on local 'A' roads



Free flow travel times (used to calculate the average delay measure) are currently calculated using the 85th percentile speed observation, for each individual road section. These are 'capped' at national speed limits.

## Geographical network for local 'A' roads

These travel time measures are based on data matched to the Ordnance Survey ITN mastermap representation of the local 'A' road network in England.

## Local 'A' road fact

Almost one third of the English local 'A' road network is classified as urban with the remaining two-thirds classified as rural.

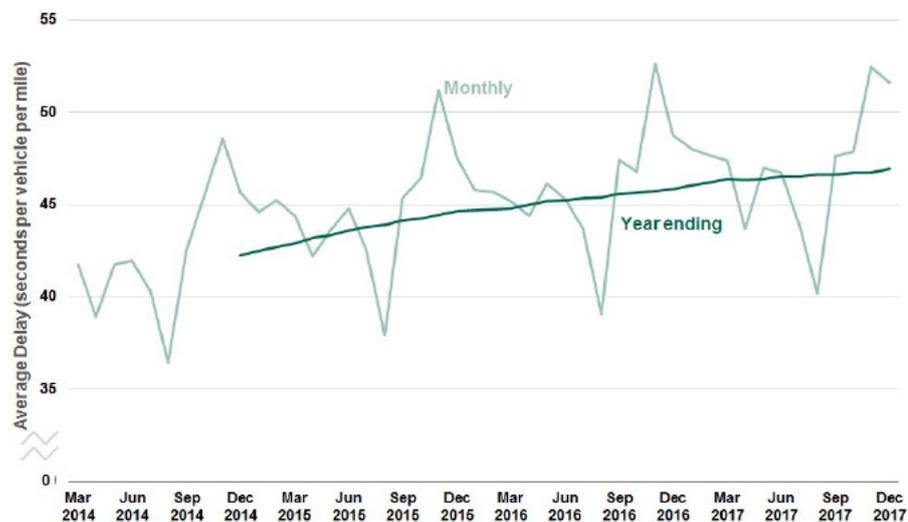
## Local 'A' roads: Average delay

### National overview of average delay

The **average delay on local 'A' roads in England** across all time periods in the **2017** is estimated to be **46.9 seconds per vehicle per mile (spvpm)** compared to free flow. This is a **1.1 spvpm increase** or **2.3% increase** compared with 2016, which means that on average there was more delay.

Between the start of the series (year ending December 2014) and the year ending December 2017, average delay compared to free flow has increased by 4.7 spvpm (or 11.1%).

Figure 10: Average delay on Local 'A' roads (Table [CGN0502](#))



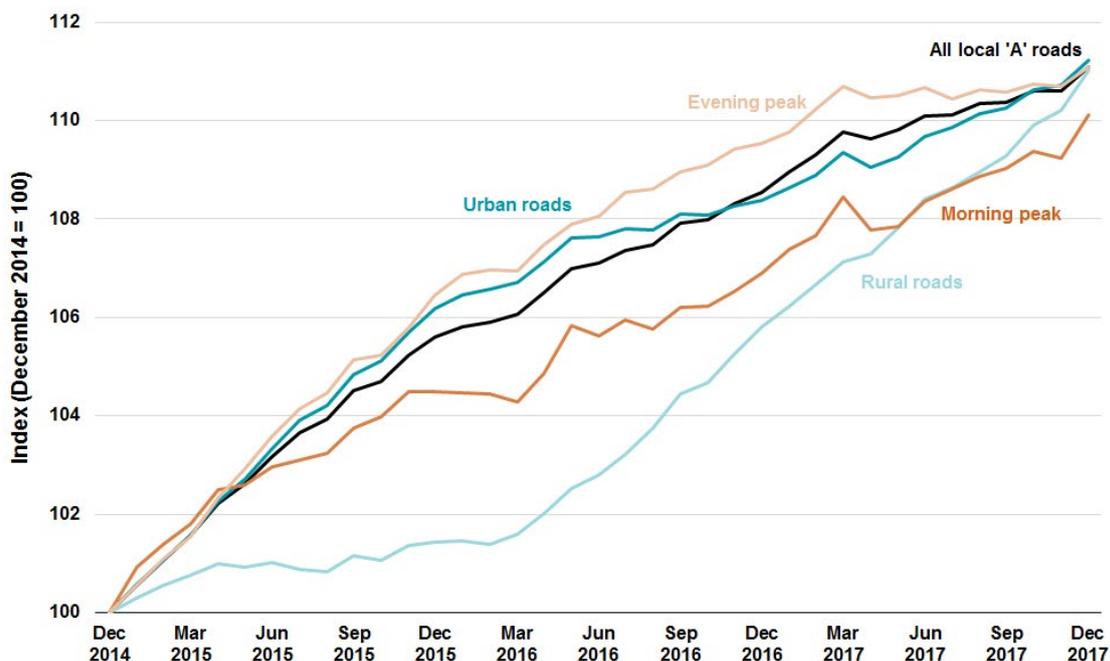
### Average delay at peak times and in urban and rural areas

In 2017, average delay on local 'A' roads during the **weekday morning peak (7am to 10am) was 56.1 spvpm** and **weekday evening peak (4pm to 7pm) was 65.8 spvpm** compared to free flow. This represents a 1.6 spvpm (or 3.0%) increase for weekday morning peak, and a 0.9 spvpm (or a 1.4%) increase for weekday evening peak, compared with 2016.

Since the start of the time series (the year ending December 2014), average delay during weekday morning peak has increased by 5.2 spvpm (10.1%). Average delay during the weekday evening peak has increased by 6.6 spvpm (11.1%) over the same time period.

Due to the small variation in the series, a small decline in delay produces a proportionally larger effect on the index. Users should take caution when drawing conclusions from any small changes shown in Figure 11.

**Figure 11: Average delay (indexed) on local 'A' roads in England: Rolling 12-month average from 2014 (Table CGN0502a)**

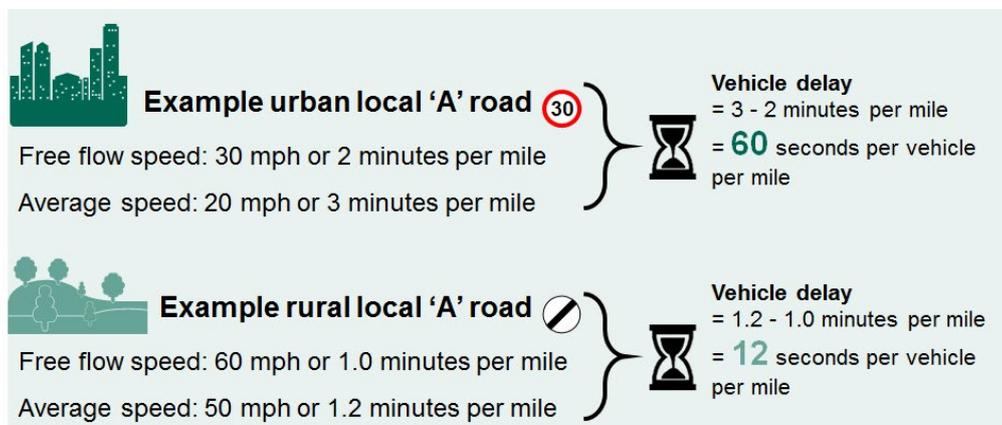


On urban classified local 'A' roads, average delay was 77.5 spvpm in 2017, compared to 21.6 spvpm on rural classified local 'A' roads.

Since December 2014, this represents a rise in average delay of 7.8 spvpm (or 11.2%) on urban local 'A' roads and 2.1 spvpm (or 11.0%) on rural local 'A' roads (see Figure 11).

It is important to note that urban roads generally have lower free flow speeds than rural roads. As a result, a fixed absolute decrease in observed speeds will generally translate into a higher level of delay on urban roads relative to rural roads. An example of this is illustrated in Figure 12.

**Figure 12: Illustrative example of average delay on urban and rural local 'A' roads**



### Regionally and Local Highway Authority figures

The annual **average speed** for each region and local highway authority can be found in Table [CGN0501b](#).

The annual **average delay** for each region and local highway authority can be found in Table [CGN0502b](#).

### Average speed

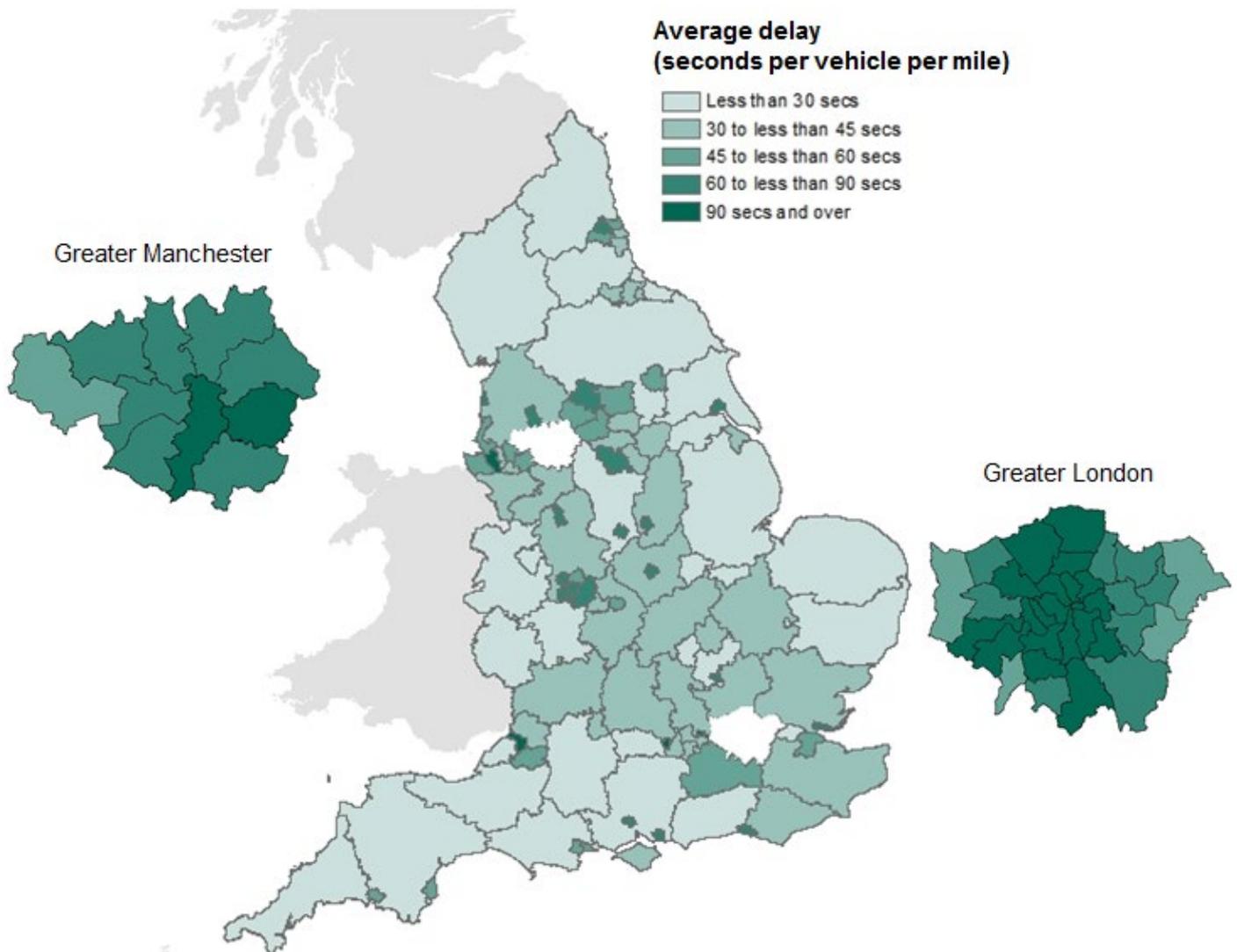
Whilst the average speed at the national level remained constant in 2017, there is no overall trend at the regional level. East Midlands, North East, North West and West Midlands all experienced a decline of more than 0.5% in average speed, whereas all other regions had very little or no change overall.

### Average delay

In line with the national figures, average delay has risen in each region across England in 2017. Although London remains as the region with the highest level of average delay at 101.9 spvpm, it experienced the lowest percentage increase between 2016 and 2017.

The average delay on local 'A' roads in each local authority for 2017 is shown in Figure 13. Overall, levels of average delay are generally higher in local highway authorities in and close to major urban centres.

**Figure 13: Average delay on local 'A' roads by local highways authority in 2017**



### Request for feedback



We are keen to receive feedback from users of transport statistics. If you have any comments about how the statistics in this release are presented or analysed, please contact us using the details listed on the front page of this release.

### Context and user feedback

Measures for the Strategic Road Network (SRN) were developed as part of the first Road Investment Strategy (RIS1), which sets out a long-term programme for England's SRN, and the stable funding platform needed to plan ahead effectively. The local 'A' road measures presented in this release were developed to provide a more complete picture of travel times on local 'A' roads and also to align with measures introduced for the SRN.

We will continue to review the content and presentation of these statistics, which we expect to develop further over time. Please contact us using the details at the bottom of the front page with any feedback you have, or if you would like further information.

### Methodology and technical details

1. This is the third quarterly publication on travel time measures that has combined the measures for the SRN and local authority 'A' roads into one publication. It is important to note that although there are figures for average speed and average delay on both networks, they are not directly comparable. This is because the methodology for calculating average speed and delay on each of the networks differs. These differences are tabulated below (see Figure 14).

**Figure 14: Methodological differences between the SRN and local 'A' roads**

Methodological differences	SRN	Local 'A' roads
Geography Network	The data is matched to the NTIS network, a bespoke network model developed by Highways England	The data is matched to the Ordnance Survey ITN mastermap.
Sample fleet size and composition	Travel times from up to 50,000 Cars	Travel times from over 100,000 Cars and Light Commercial Vehicles (LCVs)
Definition of Free Flow on each network link	Free flow travel times are currently calculated using the national speed limits.	Free flow travel times are currently calculated using the 85th percentile speed observation. These are 'capped' at national speed limits (i.e. 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.
Weighting	Measures are weighted by profile flows. Profile flows are created by averaging observations from Highways England's automatic traffic counters for each link and time period.	Measures are weighted by annual average traffic flow as well as an indexed weighted flow for each hour, day type, month, road type and urban/rural classification for each link.

National Statistics are produced to high professional standards set out in the [Code of Practice](#) for Statistics. They undergo regular quality assurance reviews to ensure they meet customer needs.

Details of ministers and officials who receive pre-release access to these statistics up to 24 hours before release can be found [here](#).

## DfT's congestion statistics

For further information, a concise [introduction to the Department's road congestion and reliability statistics](#) is available.

2. In this publication changes in average speed and delay on the SRN are measured on a year-to-year basis rather than comparing to the previous quarter. Therefore the SRN measures now cover the same time period to those for local 'A' roads. The percentage changes in the publication represent year-on-year changes not quarterly change.

3. Users should exercise caution when reviewing the statistics over short periods of time when temporary factors such as road works or bad weather may have had an impact on the measures reported. This is particularly important when interpreting the data for relatively small areas where a small change on one or two roads may have a relatively large effect on the overall speeds or delays presented. In addition users should be cautious when comparing road travel time measure outputs reported for different local authorities or regions as a measure of the relative levels of congestion within these areas. Physical differences in the types of roads in these areas and their speed limits will also have a large bearing on travel times.

4. The travel times are estimated using Global Positioning Systems (GPS) data. All measures use real, observed travel time data with a good temporal match where available.

- a. For local 'A' roads, where there is insufficient data for individual road sections for a particular time period, travel times are imputed using corresponding monthly and hourly averages from individual road sections with similar road characteristics. Imputation figures can be found [here](#).
- b. For SRN, where there is insufficient data for individual road sections, national daytime and night-time averages, for each road type ('A' road single carriageway, 'A' road dual carriageway and motorway) are used for these measures. For the reliability measure, national daytime (6am to 8pm) averages, by road type, are used to impute individual road sections with fewer than 100 car observations, during the daytime, in the month. Imputation figures can be found [here](#).

5. The underlying datasets used to produce the statistics on local 'A' roads are similar to those used for the previous [average speeds on local A roads during the weekday morning peak statistics](#).

6. The underlying datasets used to produce the analysis in this report are similar to those used for the ['On Time' Reliability Measure \(OTRM\)](#), the previous reliability statistics that DfT published for the SRN. The travel times are estimated using Global Positioning Systems (GPS) data and traffic flows are estimated using Highways England automatic traffic counters. These flows are calculated in a different way to those used to produce the [Road Traffic Statistics](#) that DfT publish.

7. The average speed and average delay measures published for the SRN from April 2015 show higher imputation levels than those recorded for the previous OTRM measure. This is due to a combination of factors, including the use of cars only, the change in geographical representation of the SRN, and a reduction in the sample size of cars from August 2015.

## Other sources of information

8. In addition to these travel time statistics, the Department also publishes [Journey Time statistics](#). These provide estimates of journey times to key local services (food stores, health care, education, town centres & employment centres) and to key strategic locations (e.g. transport hubs like major airports).
9. An '[Analysis of Travel Times on the SRN](#)' was published in July 2015 to introduce the travel time measures to users and to seek feedback. Statistics in this release are not directly comparable with those published in the analysis, however, due to changes in the way the underlying data are captured and processed.
10. The Department for Transport publishes a separate statistics series on [free flow vehicle speeds](#) on roads in Great Britain. That series focuses more on the speeds at which drivers choose to travel and their compliance with speed limits. Free flow speeds presented in that release are calculated in a different way and use a different data source to the free flow speeds used in this release.
11. Attitudes on road congestion can be found in the British Social Attitudes Survey, which is available at: [British Social Attitudes Survey: 2016](#).

### Next update

As explained on page 3 of this publication, we no longer intend to publish a quarterly travel time measures report. We will, however, continue to update the tables each quarter.

The next tables in this series are expected to be published in May 2018. This will contain monthly, and annual (year ending) figures, for the period April 2017 to March 2018. This will include new figures for the period January to March 2018.

The next written report is expected to be published in February 2019, and will contain annual figures for 2018.

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