Provisional Road Traffic Estimates (Quarterly): Background Quality Report

Department for Transport

Introduction

This background quality report relates to the quarterly 'Provisional road traffic estimates for Great Britain' publication which is part of the Road Traffic Statistics series available here: www.gov.uk/government/collections/road-traffic-statistics

The purpose of this document is to provide users of the statistics with information about the methodology adopted and quality of the outputs, measured against various dimensions of statistical quality, as set out by the Code of Practice for Statistics.

Provisional Road Traffic Estimates are designated as National Statistics. National Statistics are produced to high professional standards as set out in the Code of Practice for Statistics. They undergo regular quality assurance to ensure they meet customer needs: code.statisticsauthority.gov.uk

Comments and feedback on this report, or any other aspect of these statistics are welcome, and can be given via the Road Traffic Statistics Team inbox: roadtraff.stats@dft.gov.uk.

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Further information
media enquiries: 020 7944 3066
public enquiries: 020 7944 3095   roadtraff.stats@dft.gov.uk

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1. Background to the statistics

1.1 Definitions

Traffic

Traffic refers to the total distance travelled by vehicles. This combines the number of vehicles on the road and how far they drive. Three vehicles travelling for four miles each would account for 12 vehicle miles worth of traffic. In the report released as part of this publication, traffic is measured in vehicle miles for the year ending with the publication quarter.

Flow

Flow refers to the number of vehicles travelling along a given stretch of the road network. Annual Average Daily Flow (AADF) is the average number of vehicles travelling along a given stretch of road per day (24 hours) in a full calendar year.

Vehicle Types

Automatic Traffic Counters (ATCs) record some of the physical properties of passing vehicles which are used to classify traffic by type. Vehicle categories are summarised in this publication into the following groups:

- *Cars* - Includes passenger vehicles with nine or fewer seats, three wheeled cars and four wheel-drive 'sports utility vehicles'. Cars towing caravans or trailers are counted as one vehicle.

- *Van / Light Commercial Vehicle (LCV)* - Goods vehicles not exceeding 3.5 tonnes gross vehicle weight. Includes all car-based vans and those of the next largest carrying capacity such as transit vans. Also included are ambulances, pickups and milk floats.

- *Lorry / Heavy Goods Vehicle (HGV)* - Includes all goods vehicles over 3.5 tonnes gross vehicle weight.

- *Other Motor Vehicles* - Including two-wheeled motor vehicles, buses and coaches.
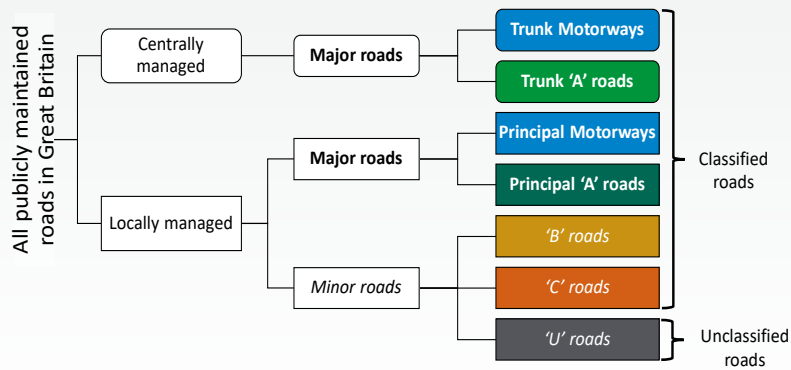
Note that pedal cycles are outside of the scope of this publication.

Road Types

The provisional road traffic estimates publication summarises traffic on roads using the following categories:

- *Motorways*
- *Rural 'A' roads*
- *Urban 'A' roads*
- *Minor rural roads*
- *Minor urban roads*

Roads in Great Britain

By length, most roads in Great Britain are **managed locally** (by a local highway authority or Transport for London). This includes **all minor roads** ('B', 'C' and 'U' roads), and **some major roads** (**principal** 'A' roads and motorways).

The rest of the **major roads** (**trunk** motorways and 'A' roads) are **managed centrally** by National Highways (formerly the Highways England and the Highways Agency), Transport Scotland, and the Welsh Government.

Motorways, 'A', 'B' and 'C' roads are **classified** roads, and 'U' roads are **unclassified**. 'U' roads are typically residential streets or rural lanes.

Urban and Rural Area Classification

By applying the urban and rural area classifications, 'A' roads and minor roads are categorised as either urban or rural roads.

- *Urban roads* - These are roads that sit within a built-up area, with a residential population of more than 10,000 in England and Wales or more than 3,000 in Scotland.

- *Rural roads* - These are roads that sit outside urban areas.

These classifications are sourced from the ONS for England and Wales and from the Scottish Government:

- England and Wales - geoportal.statistics.gov.uk/datasets/built-up-areas-december-2011-boundaries-v2

- Scotland - www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/settlements-and-localities

1.2 Data Sources

ATCs

Traffic flow data is collected continuously (24 hours a day, 365 days a year) from the Department's national network of around 300 Automatic Traffic Counters (ATCs). In addition to counting traffic in each direction, the ATCs record some physical properties of passing vehicles which are used to classify traffic by type (see 'Vehicle Types'). ATCs operate across a range of road types and geographical regions; the data they collect is used to estimate changes in traffic flow throughout Great Britain.

Annual road traffic estimates

The Department for Transport publishes annual estimates of road traffic in Great Britain. Road traffic estimates from the previous year are used alongside data collected from ATCs to calculate provisional estimates of quarterly road traffic.

The latest annual statistics, and previous releases, can be found at:
www.gov.uk/government/collections/road-traffic-statistics

1.3 Methodology

Provisional traffic estimates for each quarter of the current calendar year are derived by using data from the network of ATCs to measure the change in traffic in the given quarter compared to the previous calendar year. The previous year's final annual estimate is then multiplied by this estimate of the change to create the provisional quarterly estimate of road traffic across Great Britain. An overview of the methodology is provided below and more detail is available in the Annex.

- Raw ATC data is cleaned using a combination of automated and manual processes to check, validate and impute data where necessary.

- The average daily flow for the quarter is calculated for each ATC.

- ATCs are split into categories based on the type of road and area. The sum of the average daily flow for all the ATC in a category is calculated. This gives the total average daily flow for a category for the quarter.

- The change in road traffic from the previous calendar year is calculated for every vehicle type and category.

- These proportional changes, calculated from only ATC data, are applied to the previous year's final annual estimate to create the provisional road traffic estimates for Great Britain for the quarter.

This process is repeated to create provisional road traffic estimates for each quarter in the current reporting year. Road traffic estimates remain provisional until after they have been constrained by the final annual estimates each year.

2. Quality assessment of the statistics

2.1 Relevance
Relevance is the degree to which a statistical product meets user needs in terms of content and coverage

Published information

The statistical outputs presented within the quarterly 'Provisional Road Traffic Estimates for Great Britain' include:

- A statistical release summarising provisional estimates of road traffic in Great Britain by vehicle type and road class. This includes key findings and trends over time. The predominant metric presented in these publications is 'vehicle miles', which combines the number of vehicles on the road and how far they drive.

- ODS data tables offering further detail to what is presented in the statistical release. This includes rolling annual road traffic estimates from 1994 to present, rolling annual index numbers, percentage change on previous year, and 3-month quarterly road traffic estimates.

- Guidance documents including definitions and methodology notes.

Users of the statistics

Within DfT, these statistics are used to inform roads policy. Examples include:

- The Department for Transport's National Transport Model uses the traffic outputs to make forecasts and to inform policy decisions on a broad range of issues.

- The production of road accidents and safety statistics, where traffic estimates are used to compare casualties to the number of vehicle miles travelled. These statistics are available here: www.gov.uk/government/collections/road-accidents-and-safety-statistics

- Data from ATCs are used in the production of road congestion and travel time statistics, available here: www.gov.uk/government/collections/road-congestion-and-reliability-statistics

- The outputs are used to quality check early operational indicators during the Covid-19 pandemic, and EU exit analysis, and operational crisis response.

Road traffic statistics are used to produce the National Atmospheric Emissions Inventory (NAEI), a legal requirement for EU Air Quality Directives, and for the UN Framework Convention on Climate Change.

These statistics are also useful to academic researchers, the media, and the general public in providing objective, timely estimates of the levels of traffic on the road network.

Developments to improve relevancy

Since March 2020 the department has adapted the processing for this quarterly publication to provide provisional change in road traffic estimates on a daily basis to assess the ongoing disruption caused by the coronavirus (Covid-19) pandemic. These updates have been published weekly as part of the statistics on [Transport use during the coronavirus (COVID-19) pandemic](#).

In future the department looks to share the underlying ATC data used for this publication on the Road Traffic Statistics website found here: [roadtraffic.dft.gov.uk](#)

2.2 Accuracy
Accuracy refers to how close the estimated value in the output is to the true result

Provisional estimates are based on data from around 300 automatic traffic counters and give an indication of changes in traffic levels for different types of vehicle and on different types of road in Great Britain as a whole. In addition to this data, final annual estimates make use of data from around 8,000 manual traffic counts and from automatic traffic counters operated by National Highways, Transport Scotland, and Transport for London. Final annual statistics can estimate traffic levels in local areas and on specific road links, which cannot be produced from the provisional data.

The automatic traffic counters used as the data source in this publication classify vehicle types based on characteristics such as axle-spacing and vehicle length. This creates the possibility for misclassification of vehicles with atypical characteristics, meaning that provisional estimates for different vehicle types are less robust than the final estimates, which also utilise the more accurate manual count data. The classification algorithms are continually developed to ensure that vehicle classification is as accurate as possible.

Due to the methodology used to produce provisional traffic estimates, historic figures are subject to revision. However, these revisions are typically minor and will not affect qualitative patterns in the data. Provisional quarterly and annual traffic estimates for all motor vehicles have historically been accurate (typically within 1.5%) when compared with the final estimates.

ATC data goes through an automatic and manual validation check. Hourly flows that fail the validation test are removed and replacement values are imputed. The validation and imputation methods were reviewed by DfT statisticians and an external methodological expert from the ONS as part of the Traffic Statistics Methodology Review, which was completed and improvements implemented in July 2018. The reports can be found here:
[www.gov.uk/government/publications/road-traffic-statistics-methodology-review](#)

The department regularly reviews methodology and available data sources to ensure that provisional traffic estimates are as robust as possible. The current methodology for calculating provisional traffic estimates detailed above has been derived based on the findings of the methodology review. Further detail can be found in the document 'Traffic statistics methodology review: quarterly methods'.

2.3 Timeliness & Punctuality

Timeliness describes the time between the date of publication and the date to which the data refers, and punctuality describes the time between the actual publication and the planned publication of a statistic

'Provisional Road Traffic Estimates for Great Britain' is published quarterly, except for the final quarter of the calendar year which is covered by the annual publication. The production of these quarterly reports commences after the final month's data for a given quarter is received. A provisional publication month for this release is agreed 12 months in advance with the date being finalised at least 4 weeks in advance of publication. Dates are published on the GOV.UK release calendar: www.gov.uk/government/statistics/announcements

The department aims to publish the statistical release within 3 months after the end of the period to which the statistics relate. To date, all provisional road traffic statistics have been published to the scheduled pre-announced date.

2.4 Accessibility & Clarity

Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice

The outputs are published on the GOV.UK DfT statistics page in accessible formats. Statistical releases and are available as PDFs, which are made accessible for those who use assistive technologies. Data tables are available in ODS file format which can be accessed by using freely available software.

The statistical release uses plain language, in which technical terms, acronyms and definitions are defined where appropriate. The main findings are presented using a combination of text, charts and infographics. The report includes background information detailing strengths and weaknesses of the data.

Further guidance regarding definitions, methodology, and developments are published alongside the statistical release and can be found here:
www.gov.uk/government/publications/road-traffic-statistics-guidance

Developments to improve accessibility and clarity

The department plans to convert the statistical release to HTML format which offers several accessibility benefits, including:

- *improved readability on mobile devices*
- *alternate text on images which can be read by screen readers*
- *improved accessibility from search engines*

In future the department looks to share the underlying ATC data used for this publication on our Road Traffic Statistics website found here: roadtraffic.dft.gov.uk

2.5 Comparability & Coherence

Comparability is the degree to which data can be compared over time and domain. Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar

Comparability

The report and data tables in this publication cover trends from 1994. Changes to methodology have been applied retroactively to create a consistent time series. This includes changes implemented from the 2016-18 methodology review and the 2019 minor roads benchmarking exercise.

At the end of a calendar year all quarterly provisional road traffic estimates are constrained by final annual estimates. This creates a break in the series between provisional estimates for the current reporting year and final estimates for all previous years. This break is marked clearly in Chart 1 of the statistical release and within footnotes of all data tables.

Coherence

In addition to provisional road traffic estimates the department produces statistics on the following topics related to traffic:

- Road traffic estimates in Great Britain: Statistics include final road traffic estimates after provisional estimates have been constrained. These statistics are available here: www.gov.uk/government/collections/road-traffic-statistics

- Road congestion and travel time: Statistics and data about road congestion and travel times on the Strategic Road Network and local 'A' roads. www.gov.uk/government/collections/road-congestion-and-reliability-statistics

- Journey time: Statistics and data of journey times to key services, covering food stores, education, health care, town centres and employment centres. www.gov.uk/government/collections/journey-time-statistics

- Vehicle speed compliance: Statistics and data about the vehicle speed compliance on roads in Great Britain. www.gov.uk/government/collections/speeds-statistics

- Road freight: Statistics and data about domestic and international road freight activity. www.gov.uk/government/collections/road-freight-domestic-and-international-statistics

2.6 Output / Quality Trade-offs
Trade-offs between output quality components describes the extent to which different aspects of quality are balanced against each other

The department conducts a range of validation checks to ensure that data is robust. The impact of this trade-off is reduced timeliness, in return for ensuring improved accuracy.

A relatively small network of around 300 ATCs is used to calculate provisional road traffic estimates for the entire road network of Great Britain. This is a trade-off that balances cost and efficiency with accuracy. This impact on accuracy only affects provisional road traffic estimates for the current reporting calendar year as figures are constrained by final annual estimates. Methodology and outputs are regularly reviewed to make best use of the ATC data to ensure suitably accurate provisional estimates.

Based on current methodology, data from a new ATC cannot be used to calculate quarterly provisional traffic estimates for up to two years after installation. This is a trade-off that improves accuracy by allowing provisional estimates to be made based on directly comparable data from the previous year.

2.7 Assessment of User Needs & Perceptions
Assessment of user needs and perception covers the processes for finding out about users and uses, and their views on the statistical products

DfT regularly engages with users by social media, email, and face to face methods when possible. This includes requesting feedback on the quarterly statistics series, with contact details provided in every statistical release.

The department publishes considerations for methodology review in advance of large-scale changes in order to gain feedback. When methodological considerations are being made these documents can be found here:
www.gov.uk/government/collections/road-traffic-statistics#about-the-road-traffic-statistics-data-and-reports

2.8 Performance, Cost & Respondent Burden

Performance, cost and respondent burden describes the effectiveness, efficiency, and economy of the statistical output

The department regularly reviews data collection methods and statistical methodology to ensure that customer needs continue to be met as efficiently and cost effectively as possible. Data collection contracts are competitively let to ensure value for money.

Maintaining the ATC network on this scale requires a significant financial investment. The ATC network captures approximately two billion vehicle observations in a typical year. ATCs operate 24 hours a day, 365 days a year. Manual counting methods would be significantly more expensive and would not capture the same wealth of data offered by the ATC network.

The data referenced in this statistical release is collected by observation. As such there is no respondent burden.

2.9 Confidentiality, Transparency and Security

Confidentiality, transparency and security refers to the procedures and policy used to ensure sound confidentiality, security and transparent practices

All data is stored, accessed and analysed in a secure SQL environment where access to data is controlled in accordance with departmental policy.

The information used to compile these statistics provides details on individual events, although sensitive personal or identifiable personal data is not sent to the DfT. Therefore, the published statistics do not reveal any private information about any individual or organisation. No statistical disclosure control methods are applied to the outputs, as the variables included in the statistics are not considered to be sensitive.

Traffic counts themselves are not personal data, as the counts of vehicles by type do not include any information which could be used to identify an individual. However, in carrying out and quality assuring the counts some personal data may be collected (e.g. in still photographs of ATCs carried out for quality assurance purposes). Therefore, strict controls are applied to minimise the incidental capture of personal information in the first place, and to the subsequent handling and processing of this information, to minimise the risk of it being disclosed or used inappropriately.

DfT adheres to the principles and protocols laid out in the Code of Practice for Statistics and comply with pre-release access arrangements. The pre-release access lists are available here: www.gov.uk/government/publications/pre-release-access-lists-for-road-traffic-speeds-and-congestion-series

Guidance published alongside this release, and all road traffic statistical releases, includes methodology notes, planned and implemented development work, and this background quality report. These guidance documents can be found here: www.gov.uk/government/collections/road-traffic-statistics#about-the-road-traffic-statistics-data-and-reports

3. Summary and conclusions

This Background Quality Report presents information for users of 'Provisional Road Traffic Estimates for Great Britain' covering different aspects of its quality. The Department concludes, on the basis of the assessment outline above, that the statistics are of a quality which is considered fit for the purposes for which the statistics are being used.

Comments and feedback on this report, or any other aspect of these statistics are welcome, and can be provided by email to roadtraff.stats@dft.gov.uk

Annex: Calculation method

The calculation process has four stages, and is set out in detail (with equations) in Annex A. The stages of the process are:

- Stage 1: sum up a quarter's traffic data and divide this by 91.25 days to get the 'average daily flow for each quarter', for each site and direction.

  ATC site (by direction) counts z_i for quarter q, in Strata s.

$$x_{sq} = \sum_s \frac{\Sigma_q z_i}{91.25}$$

- Stage 2: sum up the 'average daily flow of the quarter' to stratification level, and divide this by the total for the previous year to produce a ratio.

$$r_{sq} = x_{sq} / \Sigma_{y-1} x_{sq}$$

- Stage 3: multiply this ratio by the final traffic level for the previous year's for the stratum $W_{(s,y-1)}$ from the final annual estimates. This gives the preliminary estimate

$$Q_{cq}^P = \sum_c r_{sq} W_{s,y-1}$$

- Stage 4: constrain the preliminary traffic estimates, so that the quarterly traffic estimates now sum to the final annual figures (where available).

$$Q_{cq}^F = Q_{cq}^P + \left(\frac{Q_{cq}^P}{\Sigma_y Q_{cq}^P} * W_{s,y}\right)$$

The stratification used for estimating quarterly traffic is:

> 01 Trunk Motorway
> 02 Trunk Urban 'A' roads
> 03 Trunk Rural 'A' roads
> 04 Principal Urban 'A' roads & Principal motorways
> 05 Principal Rural 'A' roads
> 06 London 'A' roads
> 07 London 'B' roads
> 08 London *'C' and unclassified* roads
> 09 'B' Roads outside London
> 10 'C' and unclassified roads outside London