



An annual series of road traffic estimates are published by the Department for Transport, approximately 6 months after the end of the reference year.

Data Collection

There are three main data sources which are used to calculate annual traffic estimates. **Manual traffic counts** are carried out at a number of sites throughout the counting season which runs between March and October. This raw data is then combined with information from a network of **automatic traffic counters** (ATCs) to calculate a series of annual average daily flows¹ (average vehicles per day) for each count point. These daily flows are combined with **road lengths** to calculate the number of vehicle miles travelled each year by vehicle type, road category and region.

Manual Traffic Counts

Annual traffic estimates are mainly based on around 8,000 manual counts which are conducted each year, where trained enumerators count traffic by vehicle type over a 12 hour period.

Manual counts are held on both major and minor roads on days in the year which have been assigned the status: 'neutral day'. A neutral day is a weekday between March and October, excluding all public holidays and school holidays; this is because it is on any of these days that traffic is expected to behave similarly. There are usually 110 neutral counting days in a calendar year.

Major roads in Great Britain are represented by a series of links, which are unique sections of road which make up the entirety of the major roads network. A location on each of these links is used to count vehicles and this location is given a unique reference number called a count point number or CP; referred to as CPs. It is not possible to count every single link every year; therefore, the sections of road are surveyed on either an annual basis or on a cycle of every 2 years, every 4 years or every 8 years (and in Scotland and Wales, every 12 years). This means not every link in the major road network has a 12 hour count in each year.

Minor road estimates are calculated differently to major road estimates. Due to the large number of minor roads in Great Britain it is not possible to count them all, instead a representative sample of minor road sites are counted each year. The change in traffic levels between the two years is then applied to overall minor road estimates to calculate estimates for the latest year.

¹ Annual average daily flow (AADF) is the number of vehicles estimated to pass a given point on the road in a 24 hour period on an average day in the year

Automatic Traffic Counters (ATCs)

Traffic data is also collected continuously from a national network of around 300 Automatic Traffic Counters (ATCs). In addition to counting traffic, the ATCs record some of the physical properties of passing vehicles which are used to classify traffic by type. The ATCs produce two outputs which are used in the production of annual estimates: expansion factors and growth factors.

Expansion factors

Expansion factors are used to convert the manual count 12 hour totals into flow figures that represent traffic in an average 24 hour period, or annual average daily flow (AADF). In order to do this, roads in Great Britain are split into 10 strata, based on the type of road, the location, and the estimated AADF. See Annex A for details of these strata. These 10 strata are called the expansion factor stratification and each ATC is placed into one of these strata.

Each ATC records a 12 hour day figure from 7 am to 7 pm, and a 12 hour night figure, from 7 pm to 7 am, and also a 24 hour figure which is just the sum of these two 12 hour figures, for each day in the year. Expansion factors for each individual ATC are created by calculating the average of the 24 hour totals over 365 (or 366) days of the year: this is effectively calculating an AADF for each ATC. Then, for each neutral day (days on which manual counts are conducted), the ATC's AADF is divided by the 12 hour (7 am to 7 pm) total to give an expansion factor for every neutral day for each ATC.

To produce the final expansion factors a median of the individual ATC expansion factors in each of the 10 expansion factor stratum for each neutral day is calculated. This is done for the different vehicles types. This results in 7,590 unique expansion factors (110 neutral days by 10 expansion factor strata by 7 different vehicle types, excluding any for pedal cycles on motorways).

HGVs: The data from the ATCs is grouped into rigid and articulated HGVs and expansion factors are created for these two vehicle types. When a manual count is carried out 6 different classifications of HGV are recorded: 3 rigid types and 3 articulated types. The same expansion factors are applied to all 3 rigid types, and the same expansion factor is applied to all 3 articulated types.

Converting the 12 hour raw totals into AADF figures is done by multiplying the 12 hour total by the relevant expansion factor depending on vehicle type, count date and expansion factor strata.

Growth factors

Where a manual count has not taken place in the reference year, growth factors are applied to the previous year's AADF's in order to bring them in line with growth at the national level. Growth factors are calculated from the change between the reference year and the previous year. They are calculated from data from every ATC in the 10 growth factor strata and for the 11 vehicle types ATC data is grouped into.

By applying either expansion factors to manual counts or growth factors to the previous year's AADF's we get a full set of up-to-date AADF's for every link of road on the major road network, and for the minor roads on which counts have been carried out.

Creating AADF's

The expansion factors are applied to all CPs which have had a manual count. At this point major and minor road AADF's are separated as traffic volume is calculated differently for major and minor roads. The growth factors are then applied to the previous year's AADF of any remaining major road CPs. There are some CPs which are estimated differently, they are defined as either *dependent*, *derived* or *ATC* CPs.

CPs are defined as *dependent* if the road to which they're associated crosses through a local authority boundary. We do this because we publish our traffic estimates by local authority. When this happens the link is simply broken into two parts and the AADF is equal for each section. Therefore all the dependent CPs are calculated after all other AADF's to ensure all data is available.

CPs are defined as *derived* if the link that is to be counted is very small (less than 300m) or is considered too dangerous to count. In these situations, surrounding roads have been studied and a formula created to calculate the flow on the derived link using the flows of the other links.

Some roads have automatic traffic counters on them managed by other organisations. Those managed by National Highways, Transport Scotland and Transport for London, supply DfT with the ATC data for all motor vehicles. From this, the all motor vehicle AADF is calculated for these roads by dividing the total count by the number of days of available data.

Once an AADF for the latest year has been calculated for all of the links of the major road network, and for the sample of minor road sites counted each year, the figures are combined with road lengths to produce estimates for the amount of vehicle miles driven in the year.

Road Lengths

Methodology on the calculation of major and minor road length statistics is available at <https://www.gov.uk/government/publications/road-length-statistics-information>.

Major road traffic

At this stage we have calculated AADFs for every link of road in the major road network. Traffic volume is measured in vehicle miles, where one vehicle mile is equal to one vehicle travelling one mile. For each CP in our database we have associated information, and one detail is the length of each link.

To convert the AADFs into traffic volume we multiply each AADF with its associated link length; we then multiply it by the number of days in the year to get an annual total.

$$\text{Traffic}_{\text{CP}} = \text{AADF}_{\text{CP}} \times \text{Length}_{\text{link}} \times 365 \text{ (or 366)}$$

$$\text{Total traffic} = \sum \text{Traffic}_{\text{CP}}$$

As we have traffic volume figures for every link of the major road network, these figures can then be summed to create total major traffic volume figures for Great Britain, regions and local authorities.

Minor road traffic

Minor road traffic estimates are grown from a baseline which is periodically updated by once-a-decade minor road benchmarking exercises. In the base year, for each minor road class in each local authority, an AADF is estimated based on a sample of traffic counts, including those projected forward from counts done in earlier years. These AADFs are then multiplied by the total road length for the relevant minor road category to give an estimate of traffic for that road category.

The minor roads are made up of six road categories, 'B', 'C' and unclassified roads, which are often grouped into four categories: 'B' roads and 'C' and unclassified roads. This is further split into rural and urban areas. Minor road traffic estimates are split by the same 11 vehicle categories as the major road estimates.

Traffic for the latest year is obtained by calculating changes in traffic flows from a sample of minor road manual counts which are counted every year. Minor road AADFs are calculated as detailed above for all of the growth sample of minor road count points.

For each region and road type, the median AADF is found for the current year and the previous year for the different vehicle types from the growth sample. All CPs in the sample are included in this calculation where valid data is available for both years. This gives a median AADF for all splits of data for the latest and the previous year for each region, for example, cars on rural B roads in North West.

These medians are used to produce a series of "minor traffic factors" for each split of data. These are calculated as the change in the regional medians between the two years.

Growth factors for the road length in each category are also produced so that any changes in road length between years are reflected in the latest estimates.

These two sets of growth factors are then applied to the previous year's minor roads estimates to calculate the latest year's estimates. So for cars on rural B roads the latest year's traffic estimate is calculated using the following formula for each local authority:

$$\text{Cars on rural B roads}_y = \text{Cars on rural B roads}_{y-1} \times \text{Growth}_{\text{traffic}} \times \text{Growth}_{\text{length}}$$

Where:

Growth_{traffic} is the growth in the traffic (median AADF) for cars on rural B roads in the relevant region between y-1 and y

Growth_{length} is the growth in rural B road length in the relevant local authority between y-1 and y

The same formula is used to grow the traffic estimates from the previous year for the 4 (or 6) road categories and 11 vehicle types which make up the minor road estimates.

For further information on these statistics please email roadtraff.stats@dft.gov.uk.

This methodology note relates to the "Annual Road Traffic Estimates" statistics (tables and charts) and statistical release published on the DfT website at:

<https://www.gov.uk/government/collections/road-traffic-statistics>

Annex A:

Stratification used in the calculation of traffic estimates

Box 1: Road Traffic Statistics Stratification

- 01 Trunk Motorway
- 02 Principal Motorway
- 03 Trunk Urban 'A' roads <20,000
- 04 Trunk Urban 'A' roads >20,000
- 05 Trunk Rural 'A' roads <20,000
- 06 Trunk Rural 'A' roads >20,000
- 07 Principal Urban 'A' roads <20,000
- 08 Principal Urban 'A' roads >20,000
- 09 Principal Rural 'A' roads <20,000
- 10 Principal Rural 'A' roads >20,000
- 11 Outer London 'A' roads
- 12 Inner London 'A' roads
- 13 London 'B' roads
- 14 London 'C' and Unclassified roads
- 15 Urban 'B' roads
- 16 Urban 'C' and Unclassified roads
- 17 Rural 'B' roads
- 18 Rural 'C' and Unclassified roads

Expansion Factor Stratification

- 01 Motorways
- 02 Urban 'A' roads with flows over 20 thousand vehicles a day
- 03 Urban 'A' roads with flows under 20 thousand a day
- 04 Rural 'A' roads with flows over 20 thousand vehicles a day
- 05 Rural 'A' roads with flows under 20 thousand a day
- 06 Outer London 'A' roads
- 07 Inner London 'A' roads
- 08 Urban Minor roads
- 09 Rural Minor roads
- 10 London Minor roads

Growth Factor Stratification

- 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