

# Journey Time Statistics



Department  
for Transport

## Notes and definitions

This note provides information on the methodology used, the source data and definitions of key terms used for calculating [Journey Time Statistics](#).

These annual statistics were first published in December 2015 for the year 2014 and have been developed from the earlier Accessibility Statistics covering statistics between 2007 and 2013.

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## 1. Overview

The Journey Time Statistics produced by DfT consists of theoretical journey times calculated by modelling journeys between known sets of origins and destinations. They use information on the road network, traffic speeds and public transport timetables in England.

The Journey Time Statistics calculation is varied for origins and destination to meet a variety of needs. There are two sets of analysis published:

- Access to key services; and
- Connectivity

## 2. Definitions

### Origins

These indicators measure the number of different services in a particular area that users can reach within a given time.

### Destinations

These indicators measure the proportion of users that can access a service within a certain time.

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The 'user' populations used for each service in the destination indicators are:

Employment	16-74 year olds
Primary schools	5-10 year olds
Secondary schools	11-15 year olds
Further education	16-19 year olds
All other services	All households

## Key services

**Employment centres:** The data tables include results for employment centres of three different sizes (100-499 jobs, 500-4,999 jobs and 5,000 and over jobs) in a Lower Super Output Area (LSOA).

**Education:** Locations of all open primary schools, secondary schools, further education and sixth form colleges.

**General Practice (GP) surgeries:** Destinations are based on the list of practices maintained by the Organisational Data Service of the Health & Social Care Information Centre.

**Hospitals:** All organisations that are registered with the Care Quality Commission (CQC) and are managed by Acute Trusts.

**Food stores:** Locations of groceries, supermarkets or convenience stores.

**Town centres:** Locations of Town centres using a central focal point for the town mapped to the nearest road.

## Geography

### Local authorities

In some parts of England there are two tiers of local authorities, and in others a single unitary authority. Statistics have been calculated for around 360 of both authority types. These vary considerably in population size.

### Lower layer Super Output Areas (LSOA)

These are the basis of the small area statistics published. There are 32,844 LSOAs in England, designed for use with the 2011 Census. They were defined so that they usually have a population of between 1,000 and 3,000.

### Urban and rural definitions

This report uses the Defra Rural-Urban Classification, based on 2011 Output Areas. The Rural-

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Urban Classification is an Official Statistic and is used to distinguish rural and urban areas. The Classification defines areas as rural if they fall outside of settlements with more than 10,000 people. See [Defra's Definitions and Local Authority Classification](#) for more details.

### 3. Journey times calculation

The journey time calculations are carried out using a commercially available software package called TRACC, owned by Basemap. TRACC is a desktop application that uses public transport and highways data to create journey times from origins to destinations. It uses timetable information showing both arrival and departure times at stops from public transport services against a specific time/day period. Highways information from road networks are used to fill the gaps between public transport services by creating a linear network that connects the origins, destinations and stops together. This provides a fully routable network of nodes and lines which is saved on file as a graph network. The graph network has various constraints which can be altered to suit the user need such as distance travelled, interchange delays on public transport and stopping limitations on road networks. The TRACC software then queries the graph network with origin and destination co-ordinates and uses the Dijkstra shortest path algorithm to route between these points. This is an algorithm for finding the shortest distance for travel between the graph networks.

For a public transport journey, the journey time produced includes all walking elements of the journey i.e. the walk from the origin of the journey to the road, from the road to the public transport stops, any interchange of public transport using the road and then from the final stop to the destination via the road, and finally from the nearest point on the road network to the destination. The journey assumes arrival at the first stop one minute before the initial departure, with any subsequent interchange waiting times included as part of the final journey time.

Car, cycle or walk only journeys are similar except that once the road network is reached the journey proceeds link by link along the road network at speeds governed by data held in the model. These are specific to the mode, the road type, and in some cases the individual road link.

The 10 shortest journey times from each origin (i.e. Output Area) are calculated for each destination type. For the public transport / walking mode these consist of the 10 shortest journey times by either walking or public transport, after applying a 5 minute penalty for any journeys using public transport (to represent travellers arriving slightly early at the first stop).

The journey times are representative of the 'morning peak'. This is made explicit for public transport / walking by requiring the journey to be completed between 7 and 10am, and for car journeys by using average traffic speeds for between 7 and 10am. For the cycle mode no actual speed data are available. The cycle speeds used are default assumptions, and are not based on a particular time of day.

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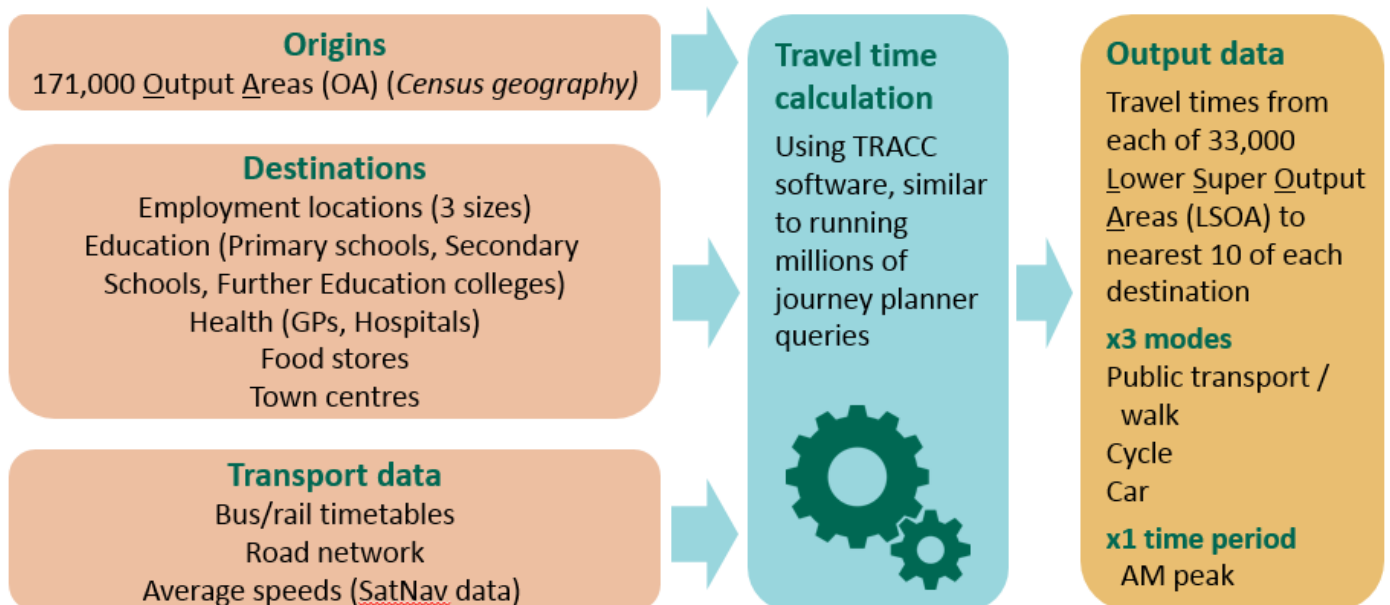
## Access to key services

The Access to Services analysis applies the Journey Times methodology to origins consisting of residential neighbourhoods and destinations consisting of centres of employment and a range of key local services. Journey times are calculated for three modes of transport: public transport; driving; and cycling. These journey times are then used to generate further indicators, as described in the Outputs section.

The Access to Services calculation process and the coverage of the data set are very similar to those of the Accessibility Statistics from which they were developed. However, the calculation algorithm and a number of other features of the design are different, so the results are not directly comparable.

The statistics are designed to represent as much as possible the situation on a Tuesday in October of the year to which they relate. Data for the second week of October are used in the analysis, since this provides a fairly typical week, unaffected by major national holidays, school holidays or other seasonal effects. The origins, destinations and public transport timetables used are as far as possible for this date. The traffic data are averages for the preceding 12 months up to and including August. The road networks are those current at the start of the traffic data year.

### Outline of access to services calculation process



## Access to Services – Model Parameters and Assumptions

General parameters	Assumption
Maximum journey time	2 hours
Maximum journey distance	100 km

Walking	
<p><i>These apply to both:</i></p> <ul style="list-style-type: none"> <li><i>walking between origin / destination and the transport networks at both ends of a journey by any mode;</i></li> <li><i>walk only journeys as part of the public transport / walk mode</i></li> </ul>	
Maximum straight line distance between origin / destination and road network ( <i>Algorithm will always use nearest point on network. For cycle or car modes, travel by cycle or car begins from this point. For public transport/walk, traveller walks along road network to the most suitable public transport stop, or direct to the destination if this is quicker.</i> )	2 km
Walking speed on road/path network	4.8 km/h
Walking speed off road/path network	4.0 km/h

Public transport	
Interval within which door-to-door journey must be completed (required for timetable selection)	7-10 am on a Tuesday
Maximum walk distance - this applies to walks from origin to first public transport stop, from last stop to destination, and also walking directly from origin to destination without using public transport at all.	3 km
Maximum number of potential first public transport stops considered in routing algorithm (starting with the closest to origin)	100
Allowance for catching first public transport service - added to any journey that involves boarding one or more public transport services	5 minutes
Public transport speed – this is provided implicitly by the timetable	<i>Not applicable</i>

information	
Interchange time (minimum interval allowed between arriving at a stop and catching another service)	5 minutes
Maximum straight line distance between public transport interchanges	500 m
Stop clustering – groups' together public transport stops within this distance of one another to speed up processing. The individual timetables for each service are retained.	150 m

<b>Cycling</b>	
Parking time - added to all cycle journeys	5 minutes
<b>Cycling speed</b>	
Motorway	0.0 km/h
Urban Motorway	0.0 km/h
A road	16.0 km/h
B road	16.0 km/h
Minor road	16.0 km/h
Local street	16.0 km/h
Private road – restricted access	4.8 km/h
Private road – public access	16.0 km/h
Pedestrian street	4.8 km/h
Alley	4.8 km/h
<b>Time at junctions</b>	
Road normalisation – converts each road link to a straight line to speed up processing. The true link length is retained for accurate speed/time calculations, but there could be a small effect on the calculation of shortest distance from the road network to destination points. Effect for origins minimal, due to origins being constrained to road nodes.	Road normalisation is used

<b>Car</b>			
Minimum journey time for a journey that uses a car	5 minutes		
<b>Car speed</b>			
<i>Derived from Trafficmaster data 7-10am for individual links where there are more than 200 records per year. For other links, annual average Trafficmaster speeds by road type were used as follows:</i>	<b>2014</b>	<b>2015</b>	<b>2016</b>
	<i>Units: km/h</i>		
Motorway	79.5	77.0	77.5
Urban Motorway	79.5	77.0	77.5
A road	42.7	43.7	43.3
B road	41.6	43.0	42.2
Minor road	36.8	37.5	36.8
Local street	19.2	17.8	18.8
Private road – restricted access	17.0	16.7	16.2
Private road – public access	14.8	15.2	15.1
Pedestrian street	0.0	0.0	0.0
Alley	0.0	0.0	0.0
Time at junctions	<i>None</i>		
<i>Road normalisation – as for Cycling (above)</i>			

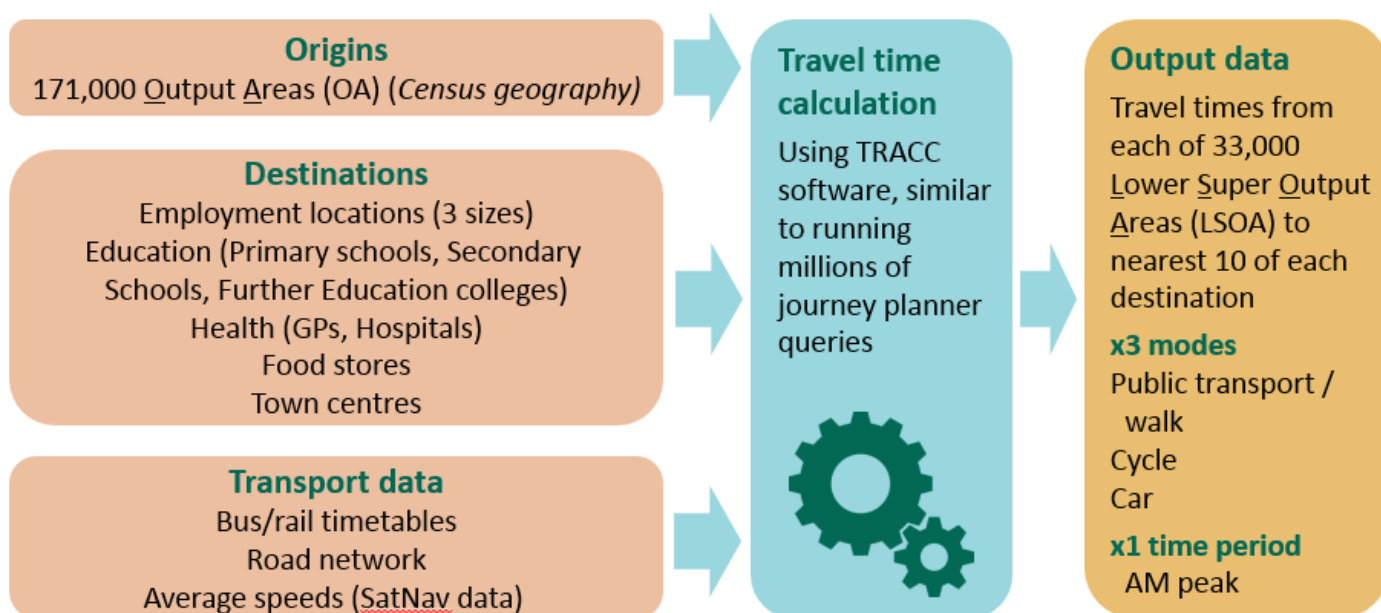
## Connectivity

These experimental analyses are intended to apply the Journey Times methodology to a range of more strategic or economically significant destinations than the primarily local services covered by the Access to Services analyses; including airports and railway stations. The principle difference in the Connectivity approach from that of the Access to Services analyses is that journey times are calculated, as far as possible, to all accessible locations, rather than to just the nearest 10 examples. This tends to result in a much larger data set being generated. In some cases a longer

maximum journey time may be allowed although this may depend on what is considered reasonable for the type of destination. Given these factors, a less detailed origin data set may be used than for Access to Services. This is both necessary, to limit the size of the data set, and acceptable where the typical journey lengths are longer.

The first connectivity analyses published using the new Journey Time methods were released in Journey Time Statistics 2015, published in April 2017, for two destination sets – airports and rail stations. These analyses using the Journey Times methods superseded two earlier Connectivity Statistics reports published in 2014 and 2015 based on the old accessibility statistics methods, in the same way that the new Access to Services analyses have replaced the earlier Accessibility Statistics. Again, the connectivity results produced using the old and new methods are not directly comparable.

### Outline of Connectivity calculation process



### Connectivity – Model Parameters and Assumptions

<b>Origins</b>	Population weighted centroids (the central point) of 32,844 English LSOAs as specified in the 2011 Census geography. These points were then constrained to the nearest road node, as for Access to Services method.
<b>Destinations</b>	26 airports in England. This is virtually all passenger airports with regular scheduled services in 2015, excepting those on or mainly serving islands. In many of the summary tables published, a narrower group of 12 larger airports is used, all of which handled more than 1% of UK terminal passengers in 2015.



	79 rail stations in England, consisting of those classified as category A, B or C1 in table 3.1 of the Network Rail <a href="#">Network Route Utilisation Strategy</a> of August 2011, with C1 as defined in the 2009 report for DfT <a href="#">Better Rail Stations</a> ). In the absence of any obvious newer alternatives, this list has been retained unchanged since the first Connectivity Statistics report in 2014, except for the removal of Scottish and Welsh stations outside the geographical scope of the current model. In many published summary tables, a shorter list of the category A and B stations is used.
<b>Transport Network Data</b>	As for Access to Services.
<b>Journey Time Calculation</b>	As for Access to Services, for public transport / walking and car modes only, except that a maximum journey time of 240 minutes and maximum straight line distance of 400km is allowed.
<b>Outputs</b>	Generally similar to Access to Services, with different journey time classifications as appropriate. Journey time results to specific destinations are included – this is the key difference in the Connectivity analyses. ‘Average journey times’ and ‘nearest’ destinations should be used with caution. The average journey times exclude results for areas with no available connection under 240 minutes, which may become significant in remote areas and for destinations are a great distance from the origin. The ‘nearest’ destination is the destination with the shortest average journey time across the whole area considered – which will be relatively large in the case of local authority level results.

## 4. Data sources

This section sets out the processing that is done on the input data: the origin points, the destination points, and the modes of travel.

### Origins

The origins used for all Access to Services calculations are the 171,372 English Output Areas

(OA) as specified in the 2011 Census geography<sup>1</sup>.

To provide the actual journey start point in each OA, the population weighted centroid of the OA was shifted to the nearest node (i.e. junction) on the road network. This was to avoid biasing the journey time results where the centroid of the OA was a long way from a road. In fact it is rare for an OA centroid to be more than about 100 metres from a road – only a tiny handful of OA in remote areas have centroids as much as 1km from a road. The OA centroids have been shifted onto the nearest road node rather than the nearest point on a road in order to reduce issues arising from normalising the road network.

Origin	Data source for the origin points
All	<p><b>Data:</b> Population centroid of each Output Area in 2011.</p> <p><b>Source:</b> ONS 2011 Census Boundaries.</p> <p><b>Further information:</b> <a href="https://geoportal.statistics.gov.uk/geoportal/catalog/main/home.page">https://geoportal.statistics.gov.uk/geoportal/catalog/main/home.page</a></p>

## Destinations

The destinations used consist of three different sizes of employment centre and the locations of seven other types of key local service. For each of these key services a nationally consistent data set has been identified or derived – further information on these is provided in this section.

Each destination is located by a 6-figure National Grid reference. For the employment destinations this is taken to be the population weighted centroid of the LSOA.

Destination	Number of locations in:		
	2014	2015	2016
Employment centres (small)	16,465	16,625	16,930
Employment centres (medium)	9,235	9,460	9,707
Employment centres (large)	645	676	719
Primary schools	16,463	16,484	16,655
Secondary schools	3,365	3,376	3,381

<sup>1</sup> Available at <http://www.ons.gov.uk/ons/guide-method/geography/products/census/spatial/centroids/index.html>.

Further education colleges	2,624	2,606	2,418
GPs	9,257	11,167	9,128
Hospitals	296	278	290
Food stores	19,549	19,746	21,665
Town centres	1,211	1,211	1,211

The data sources for GP surgeries and hospitals were reviewed and replaced for 2014. In both cases, commercially obtained data were replaced by open data sources, which can be shared more easily.

This table refers to data collected for year X (where X = 2014 onwards).

## Access to key services

Destinations	Data source for the locations of the service	Data source for users of the service
Employment	<p><b>Data:</b> Number of jobs available in a LSOA in year X.</p> <p><b>Source:</b> ONS Business Register Employment Survey.</p> <p><b>Further information:</b>  <a href="https://www.nomisweb.co.uk/default.asp">https://www.nomisweb.co.uk/default.asp</a></p>	<p><b>Data:</b> Number of 16-74 year olds in each output area.</p> <p><b>Source:</b> ONS mid-year population estimates for year X-1.</p> <p><b>Further information:</b> ONS mid-year population estimates:  <a href="http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates">http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates</a></p>
Primary schools	<p><b>Data:</b> Location of all open primary schools in September of year X.</p> <p><b>Source:</b> The Department for Education (DfE) Edubase.</p> <p><b>Further information:</b>  <a href="http://webarchive.nationalarchives.gov.uk/20130103064253/http://education.gov.uk/edubase/home.xhtml;jsessionid=5BE27F43FE8F6613426DAD0FC25AA6C8">http://webarchive.nationalarchives.gov.uk/20130103064253/http://education.gov.uk/edubase/home.xhtml;jsessionid=5BE27F43FE8F6613426DAD0FC25AA6C8</a></p>	<p><b>Data:</b> Number of 5-10 year olds in each output area.</p> <p><b>Source:</b> ONS mid-year population estimates for year X-1.</p> <p><b>Further information:</b> ONS mid-year population estimates:  <a href="http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates">http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates</a></p>

Destinations	Data source for the locations of the service	Data source for users of the service
Secondary schools	<p><b>Data:</b> Location of all open secondary schools in September of year X.</p> <p><b>Source:</b> DfE Edubase.</p> <p><b>Further information:</b>  <a href="http://webarchive.nationalarchives.gov.uk/20130103064253/http://education.gov.uk/edubase/home.xhtml;jsessionid=5BE27F43FE8F6613426DAD0FC25AA6C8">http://webarchive.nationalarchives.gov.uk/20130103064253/http://education.gov.uk/edubase/home.xhtml;jsessionid=5BE27F43FE8F6613426DAD0FC25AA6C8</a></p>	<p><b>Data:</b> Number of 11-15 year olds in schools in each output area.</p> <p><b>Source:</b> ONS mid-year population estimates for year X-1.</p> <p><b>Further information:</b> ONS mid-year population estimates:  <a href="http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates">http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates</a></p>
Further education colleges	<p><b>Data:</b> Location of all open further education and sixth form colleges/school sixth form in September of year X.</p> <p><b>Source:</b> DfE Edubase.</p> <p><b>Further information:</b>  <a href="http://webarchive.nationalarchives.gov.uk/20130103064253/http://education.gov.uk/edubase/home.xhtml;jsessionid=5BE27F43FE8F6613426DAD0FC25AA6C8">http://webarchive.nationalarchives.gov.uk/20130103064253/http://education.gov.uk/edubase/home.xhtml;jsessionid=5BE27F43FE8F6613426DAD0FC25AA6C8</a></p>	<p><b>Data:</b> Number of 16-19 year olds in each output area.</p> <p><b>Source:</b> ONS mid-year population estimates for year X-1.</p> <p><b>Further information:</b> ONS mid-year population estimates:  <a href="http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates">http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Estimates</a></p>
GPs	<p><b>Data:</b> Locations of GP surgeries.</p> <p><b>Source:</b> Health and Social Care Information Centre - EPRACUR and EBRANCHES datasets.</p> <p><b>Further information:</b>  <a href="https://data.england.nhs.uk/datas/ods-gps-gp-practices-nurses-and-pharmacies">https://data.england.nhs.uk/datas/ods-gps-gp-practices-nurses-and-pharmacies</a></p> <p>*see below for further information.</p>	<p><b>Data:</b> Number of households in each output area.</p> <p><b>Source:</b> 2011 Census + Local Authority (LA) updates from the Ministry of Housing, Communities &amp; Local Government (MHCLG) mid-year household projections of year X-1.</p> <p><b>Further information:</b> 2011 Census:  <a href="http://www.nomisweb.co.uk/census/2011">http://www.nomisweb.co.uk/census/2011</a></p> <p>MHCLG mid-year household projections:  <a href="https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections">https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections</a></p>

Destinations	Data source for the locations of the service	Data source for users of the service
Hospitals	<p><b>Data:</b> Location of hospitals.</p> <p><b>Source:</b> Care Quality Commission - Directory of places that provide care.</p> <p><b>Further information:</b>  <a href="http://www.cqc.org.uk/content/how-get-and-re-use-cqc-information-and-data">http://www.cqc.org.uk/content/how-get-and-re-use-cqc-information-and-data</a></p> <p>*see below for further information.</p>	<p><b>Data:</b> Number of households in each output area.</p> <p><b>Source:</b> 2011 Census + LA updates from MHCLG mid-year household projections of year X-1.</p> <p><b>Further information:</b> 2011 Census:  <a href="http://www.nomisweb.co.uk/census/2011">http://www.nomisweb.co.uk/census/2011</a></p> <p>MHCLG mid-year household projections:  <a href="https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections">https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections</a></p>
Food stores	<p><b>Data:</b> Location of grocery/supermarkets or convenience stores in March of year X+1.</p> <p><b>Source:</b> Retail locations.</p> <p><b>Further information:</b>  <a href="http://www.retaillocations.co.uk/">http://www.retaillocations.co.uk/</a></p>	<p><b>Data:</b> Number of households in each output area.</p> <p><b>Source:</b> 2011 Census + LA updates from MHCLG mid-year household projections of year X-1.</p> <p><b>Further information:</b> 2011 Census:  <a href="http://www.nomisweb.co.uk/census/2011">http://www.nomisweb.co.uk/census/2011</a></p> <p>MHCLG mid-year household projections:  <a href="https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections">https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections</a></p>
Town centres	<p><b>Data:</b> Location of town centres in 2004.</p> <p><b>Source:</b> MHCLG Town Centre and Retail planning statistics for England and Wales.</p> <p><b>Further information:</b>  <a href="https://www.gov.uk/government/collections/planning-applications-statistics">https://www.gov.uk/government/collections/planning-applications-statistics</a></p>	<p><b>Data:</b> Number of households in each output area.</p> <p><b>Source:</b> 2011 Census + LA updates from MHCLG mid-year household projections of year X-1.</p> <p><b>Further information:</b> 2011 Census:  <a href="http://www.nomisweb.co.uk/census/2011">http://www.nomisweb.co.uk/census/2011</a></p> <p>MHCLG mid-year household projections:  <a href="https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections">https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections</a></p>

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## **GP destination data**

The GP surgery destinations used from 2014 onwards are based on the list of practices maintained by the Organisational Data Service of the Health & Social Care Information Centre, and published at <https://data.england.nhs.uk/dataset/ods-gps-gp-practices-nurses-and-pharmacies>. This was supplemented with information on branch surgeries from the same source. Grid references were derived from the postcode using the Office for National Statistics (ONS) Postcode Address File. Practices with identical postcodes were taken to be duplicates or co-located, and all additional records after the first were removed.

## **Hospital destination data**

The starting point was the Care Quality Commission's (CQC) list of 'active locations' dataset, which is thought to be the most-up-to date and freely available source of data on individual National Health Service (NHS) and social care 'sites' or hospitals. A criteria was developed in consultation with the Department of Health to reduce the list down to capture only the key hospitals. The following have been removed and individual records have been inspected to remove further examples of these cases and for any duplicates: care home records; non-NHS providers; sites not associated with acute providers; any remaining sites that are associated with Specialist Trusts (usually single specialty Trusts or Sites); and records where it is evident from the name that the record is not a hospital (e.g. headquarters, specialist units)

This gave a final list of 278 hospitals run by Acute (non-specialist) Trusts. As well as covering all general hospitals this will still include some with a largely or entirely community or rehabilitation role, where these happen to be managed by an Acute Trust. It was considered on balance better to leave these in the list, rather than risk adding further subjectivity to the selection. Whilst not perfect, it is considered that the resulting list is a significant improvement on that used previously.

## Connectivity

Destinations	Data source for the locations of the service	Data source for users of the service
Airports	<p><b>Data:</b> Location of GB airports excluding highlands and islands of Scotland</p> <p><b>Source:</b> National Public Transport Access Nodes</p> <p><b>Further information:</b>  <a href="https://data.gov.uk/dataset/ff93ffc1-6656-47d8-9155-85ea0b8f2251/national-public-transport-access-nodes-naptan">https://data.gov.uk/dataset/ff93ffc1-6656-47d8-9155-85ea0b8f2251/national-public-transport-access-nodes-naptan</a></p>	<p><b>Data:</b> Number of households in each output area.</p> <p><b>Source:</b> 2011 Census + LA updates from MHCLG mid-year household projections of year X-1.</p> <p><b>Further information:</b> 2011 Census:  <a href="http://www.nomisweb.co.uk/census/2011">http://www.nomisweb.co.uk/census/2011</a></p> <p>MHCLG mid-year household projections:  <a href="https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections">https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections</a></p>
Railway stations	<p><b>Data:</b> Location of larger (category A, B and C1) rail stations in GB</p> <p><b>Source:</b> Network rail classification</p> <p><b>Further information:</b>  <a href="http://webarchive.nationalarchives.gov.uk/20101007153226/http://www.dft.gov.uk/pgr/rail/passenger/stations/betterairstations/">http://webarchive.nationalarchives.gov.uk/20101007153226/http://www.dft.gov.uk/pgr/rail/passenger/stations/betterairstations/</a>  <a href="http://archive.nr.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/network/working%20group%202%20-%20stations/networkrusstations.pdf">http://archive.nr.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/network/working%20group%202%20-%20stations/networkrusstations.pdf</a></p>	<p><b>Data:</b> Number of households in each output area.</p> <p><b>Source:</b> 2011 Census + LA updates from MHCLG mid-year household projections of year X-1.</p> <p><b>Further information:</b> 2011 Census:  <a href="http://www.nomisweb.co.uk/census/2011">http://www.nomisweb.co.uk/census/2011</a></p> <p>MHCLG mid-year household projections:  <a href="https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections">https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections</a></p>

## Transport Network Data

Travellers moved between their original and their destination via one or more of the following transport networks, depending on the mode of transport being modelled. For all modes, travellers will probably also need to walk between their origin / destination and the transport network. For

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some short journeys, it may be quicker for travellers to walk directly to their destination, rather than using public transport at all – this is why public transport / walking results are modelled as a combined mode.

### Public transport

National public transport timetable data are publically available. Data for bus, local coach and other local transport services (e.g. light rail, metro, and ferry) are captured in the Traveline National Data Set (TNDS), rail timetable data are published by the Association of Train Operating Companies (ATOC), and national coach services in the National Coach Data Set (NCDS).

### Walk

The walking network is represented by the road and urban path elements of the Integrated Transport Network produced by the Ordnance Survey.

### Cycle

The cycling network is represented by the road network including cycle paths and bridleways from the Integrated Transport Network. Cycle journeys are also allowed to use footpaths at walking pace.

### Car

The car network is represented by the road component of the Integrated Transport Network. Data on actual vehicle speeds on each road network link (generally the stretch of road between 2 nodes, or junctions) is obtained from Trafficmaster Satnav devices and are used to estimate car speeds. These data are used to calculate annual average traffic speeds on each link of the road network (by direction if the link is bi-directional). These are used as the link speeds for cars in the modelling. Where the Trafficmaster sample for an individual link is too small, national averages of the same data for the particular road type are used instead. This is an innovation from 2014. Previously the sample was too small and the model reverted to default assumptions for car speed based on road type which were much higher than the Trafficmaster averages, resulting in some inconsistency in the model.



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## 5. Outputs

The journey time results are used to create the following indicators for publication:

Indicator	Description
Minimum journey time	The shortest of the ten journey time results.
Origin indicators	Four measures, the number of destinations (up to the maximum of 10) that can be reached from a given origin within 15, 30, 45 and 60 minutes.
Destination indicators	Four measures, the percentages of service users within the given geographical area who can access at least one service location within 15, 30, 45 and 60 minutes.

Each of these indicators is calculated for each mode and each destination type, and at a number of geographical scales as follows:

- England
- Region
- Local Authorities, including London Boroughs, Metropolitan districts, Unitary authorities, Counties and non-Metropolitan districts, also Inner and Outer London and former Metropolitan counties
- 2011 Lower layer Super Output Area
- 2011 Defra Rural/Urban Classification

The indicators for each geography are calculated as population weighted averages. In other words, the average minimum journey time for an area, B, is:

$$mjt(B) = \sum_{i=1}^n \frac{mjt(OA_i) \times pop(OA_i)}{pop(B)}$$

where  $mjt(B)$  is the minimum journey time in area B,  $mjt(OA_i)$  is the minimum journey time of the  $i^{th}$  of n output areas making up area B, and  $pop(B)$  and  $pop(OA_i)$  are the user populations resident in area B and output area i respectively.

The service user populations used in the above weighting, and in the destination indicators, depend on the destination type, as follows:

Destination type	Service user population basis
Employment centres	Resident population of working age (16-74 years)
Primary schools	Population aged 5-10
Secondary schools	Population aged 11-15
Further education colleges	Population aged 16-19
GPs, hospitals, food stores, town centres	Number of households
Average key services	Resident population of working age (16-74 years)

## 6. Strengths and weaknesses

In using the data, the following points should be kept in mind:

- All journey times are compiled on a consistent basis across the country.
- The statistics are based on the calculation of theoretical journey times, they are not based on real journeys. They are however based on actual public transport times, and average traffic speeds on the road network.
- Although the statistics are calculated to a high level of geographical detail, some assumptions and simplifications are necessary in the modelling (for example assigning the start point of journeys to a single point in each Output Area, road speeds, interchange times for public transport).
- For 2016 we have used the 2015 BRES data to designate Lower Super Output Areas as employment centres. The 2015 BRES is the first year to use LSOAs based on the 2011 census, and although the majority of these are an exact match to the 2001 LSOAs, there are some that were merged, split or had other boundary changes. For these areas journey times from earlier years are not comparable to the 2016 journey times. This effect is more pronounced for large employment centres, as there are fewer destinations to route to.
- For particular areas, local authorities and other experts may have more detailed information allowing them to produce more accurate or detailed models of the local situation.
- Demand responsive services (e.g. bus services which have to be booked) are only included to the extent that they can be plausibly modelled, in the Traveline National Data Set.

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- Since new journey calculation software has been adopted for 2014, along with a significant number of other changes to the methodology, 2014 results are not directly comparable with those for earlier years.

## 7. Symbols and conventions

Symbols used are defined below:

- . = not applicable
- = less than half final digit shown
- .. = not available
- b = break in time series
- c = confidential
- r = revised