



Department
for Transport

MRN Performance Review

Technical Report

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Department for Transport
Great Minster House
33 Horseferry Road
London
SW1P 4DR



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Background

MRN Performance Review Project

Background

The Major Roads Network (MRN) Performance Review Project has been undertaken to learn about the performance of the MRN, to learn how stakeholders evidence performance against its objectives, and to create and analyse a new dataset aimed at revealing more about its performance. The MRN objectives¹ are set out by the Department for Transport (DfT, the Department) and cover the areas of:

- Reducing congestion
- Supporting economic growth and rebalancing
- Supporting housing delivery
- Supporting all road users
- Supporting the Strategic Road Network (SRN)

The Department for Transport (DfT) enlisted the help of consultants to conduct research into how Sub-national Transport Bodies (STBs) and their constituent Local Authorities (LAs) engage and provide evidence against each of the MRN objectives. All seven of the STBs attended one-to-one meetings to discuss this project and were invited to share the approaches they have taken to evidencing performance.

Further research also looked at how other organisations evidence similar objectives on their own road networks to understand whether there are new data sources or approaches to measuring performance that could add value.

A detailed account of the findings along with potential areas for future investment in data were outlined for consideration as a result of this work. Upon digestion of these proposals the Department decided to invest in creating MRN specific safety and congestion datasets which are the focus of this report.

¹ The MRN objectives are set out in detail [here](#).

Purpose of this report

This report focuses on the technical details of how the MRN safety and congestion datasets have been created, the data they are based on, the parameters included in their design, notes on how to use the data and guidance regarding its limitations.

Alongside this report, the Department is publishing a summary report outlining high level findings relating to the performance of the MRN based on the data generated. This is the Major Road Network Performance Review (2019-2023) Summary Report (“Summary Report”) and this aims to provide a brief overview of what the data shows at a national and regional level.

While the **Summary Report** provides a summary of the MRN performance, a detailed set of summary tables relating to the MRN performance is provided in Annex B of this report, showing detailed congestion and safety data for different regions, time periods, seasons, road classes and more.

Purpose of the MRN safety and congestion dataset

The development of the MRN dataset serves a number of purposes:

- It includes much of the data required to write the **Summary Report**.
- It provides a uniform set of data for the whole of the MRN relating to congestion. This is a dataset that is in line with the Department’s preferred approach to measuring congestion (seconds per vehicle per mile). The dataset raises the standard of congestion data across the whole MRN to a similar standard (with more granularity) than was previously available.
- It provides a uniform set of data for the whole MRN relating to safety.
- This data is helpful for a strategic understanding of the MRN, or for initial triaging of where there may be problems that require further in-detail investigation.

The publication of the supporting dataset is intended to provide an opportunity for further research and more detailed analysis of the MRN by any interested parties. Please note however, ***the dataset on its own is not considered sufficient to be used as direct evidence for business cases for investment*** on the MRN. In such instances more localised and targeted data would be expected to be used to make the case.

About the data

The data provided in the MRN dataset is derived from other longstanding statistics reporting that the Department undertakes. Specifically:

- The congestion data is derived from the same work undertaken to deliver the regular congestion statistics published by the Department. This is coupled with data from the Department’s traffic statistics publications.
- The safety data is derived from the Department’s ongoing road safety statistics, which is underpinned by the national work undertaken in conjunction with police forces to create a personal injury collision dataset referred to as STATS19.

In both instances, the MRN dataset constitutes new reporting outputs (new statistics beyond the regular reporting) based on these existing workstreams. This is reduced in geographic extent from the usual reporting level to focus just on the MRN in England.

Notes and definitions

Key terms and definitions

Key terms and definitions used through this document are outlined below:

- **Average Delay:** Delay is measured in seconds per vehicle per mile (spvpm) and is the difference between free flow travel times and recorded average journey times. This metric is indicative of the relative congestion on the network.
- **Average Speed:** Speed is measured in miles per hour and is an estimate of the physical level of congestion across the entire day (24-hour period). The metric uses weights applied to speed observations from a sample of vehicle types so that it is representative of traffic volumes.
- **Casualty:** A person killed or injured in a collision. Casualties are sub-divided into killed, seriously injured, and slightly injured.
 - **Killed:** Human casualties who sustained injuries which caused death less than 30 days (before 1954, about two months) after the accident. Confirmed suicides are excluded.
 - **Seriously injured:** Injured casualties are classified as seriously or slightly injured based on the type of injury sustained, as recorded by the police on the basis of information available within a short time of the accident. This generally will not reflect the results of a medical examination but may be influenced according to whether the casualty is hospitalised or not. Injuries classed as serious include: fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment, and injuries causing death 30 or more days after the accident
 - **Slightly injured:** An injured casualty that is not classified as seriously injured, having an injury of a minor character such as a sprain (including neck whiplash injury), bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. This definition includes injuries not requiring medical treatment.
- **Collision:** Involves personal injury occurring on the public highway (including footways) in which at least one road vehicle or a vehicle in collision with a pedestrian is involved and which becomes known to the police within 30 days of its occurrence. Damage-only collisions with no human casualties or accidents on private roads or car parks are not included. Note that these are sometimes referred to as “accidents”, though the term “collisions” is preferred.
- **Collision severity:** The severity of a collision is based on the severity of the most severely injured casualty, as outlined in *casualty* definition.
- **Free Flow Speed:** Free Flow on the MRN is derived to reflect the uncongested speed for each individual road section, as though there was no congestion. The current congestion statistics release uses an estimate of free-flow speed based on the 85th percentile of speeds and speed limits for each road link (where known).
- **Heavy Goods Vehicle (HGV):** Goods vehicles with a maximum permissible gross vehicle weight of over 3.5 tonnes. Percentage HGV is the percentage of such vehicles as a proportion of all vehicles.
- **KSI:** The aggregation of killed and seriously injured data. See *Casualty*, *Seriously Injured* and *Killed*.

- **Major Roads Database (MRDB):** The MRDB is a simplified version of the road network created by DfT which contains links representing unique sections of road that make up the major roads (motorways and A roads) in Great Britain.
- **Major Road Network (MRN):** The MRN forms a middle tier of the country's busiest and most economically important local authority 'A' roads, sitting between the national Strategic Road Network (SRN) and the rest of the local road network.
- **SPVPM:** See *Average Delay*.
- **STATS19 data:** The core set of statistical data which the police have agreed to provide about personal-injury road traffic accidents.
- **Strategic Road Network (SRN):** Strategic Road Network. The SRN covers 'A' roads and motorways that are operated by National Highways.
- **Sub-national Transport Body (STB):** The STBs are transport bodies formed of multiple local highways authorities to provide large-scale strategic governance. STBs are given statutory power through secondary legislation.

Notes on symbols and conventions used

Rounding of figures: In tables where figures have been rounded, there may be a slight discrepancy between the sum of the constituent items and the total as shown.

Contents of dataset

Structure of dataset

There are six files that make up the MRN safety and congestion dataset. The files are as follows:

- **MRN_Congestion_Data_2019.gbkg**: containing the congestion data for 2019
- **MRN_Congestion_Data_2023.gbkg**: containing the congestion data for 2023
- **MRN_Congestion_Data_2019_Summer.gbkg**: containing the congestion data for summer 2019
- **MRN_Congestion_Data_2023_Summer.gbkg**: containing the congestion data for summer 2023
- **MRN_GISsafety_Collisions.gdb**: containing the collision data for 2019 and 2022
- **MRN_GISsafety_CollisionRates.gdb**: containing the RSF collision rate data for the years 2019-2021

Each of these files are on the same mapping layer, based on a version of the MRDB road network from 2019, reduced to line segments that make up the MRN. If for any reason there is no data for a specific line segment, a null value is provided so that each line segment is included in all files.

There are two types of data we are providing regarding the Major Road Network. The first type, referred to as **Unidirectional Data**, includes separate statistics for each direction of travel. This means that data for the southbound and northbound roads are recorded independently. The second type, termed **Bidirectional Data**, aggregates the statistics for both directions into a single combined metric, providing an overall view of the traffic in both directions.

In terms of the outputs:

- The congestion data is unidirectional (there are separate rows for information relating to each direction) whereas the safety data is bidirectional (each row contains information for both directions combined).
- The congestion data is split into separate year (2019 and 2023) and season (all year, summer) versions whereas the safety data is a single data covering multiple years (2019 to 2022).

This section of the document provides the schema of each of the files with a definition of each variable. The four congestion files share the same schema, whereas the safety file has its own schema. These are therefore outlined separately below. Full description of each variable is provided later in **Data definitions**.

Congestion data schema

The congestion data files contain the following variables (variables are in bold):

- **cp_number** - The count point associated with the road link as defined by the MRDB network. Can be considered an identifier for the road link.
- **cp_dir** - The road direction (for example, North, South, East, West).
- **road_classification_number** - The road number (e.g. A1).
- **la_code** - The local authority code the respective link is located within.
- **region_name** – The region the respective link is located within.
- **sd_carriageway** - Whether the carriageway type is single or dual.
- **urbrur** - Whether the link is located in a rural or urban location.
- **length_miles** - The length of the given road link in miles.
- **avg_spd_TimePeriod** – The average speed on that road link for the specified TimePeriod².
- **ffspd_capped_TimePeriod** – The free flow speed on that road link for the specified TimePeriod².
- **delay_spvpm_TimePeriod** – The average delay in SPVPM on that road link for the specified TimePeriod².

Safety data schema

The safety data files for collisions contain the following variables (variables are in bold):

- **accident_index** – As recorded by STATS19.
- **accident_year**– As recorded by STATS19.
- **accident_reference** – As recorded by STATS19.
- **date** – The date of the accident (as recorded by STATS19).
- **first_road_class** – The road classification (as recorded by STATS19).
- **first_road_number** – The road classification number (as recorded by STATS19).
- **road_type** – The details of the road type (as recorded by STATS19).
- **speed_limit** – The speed limit (as recorded by STATS19).
- **junction_detail** – The details of the junction type (as recorded by STATS19).
- **MRN_road_flag** – Identifying that the collision has occurred on the MRN.

The safety data files for collision rates contain the following variables (variables are in bold):

- **CP_Number** - The road link number as defined by the MRDB network.
- **RoadNumber** - The road classification number (e.g. A1).
- **Rate_Bd** – The collision rate band (as recorded by RSF).
- **Shape_Length** – This is an auto-generated field from Esri (ArcPro). It is not for use.

² Time period definitions are given in the Time Periods section of this report.

Data definitions

This section of this technical report outlines the definition of key fields and variables used within the data. The fields within the provided data fall into broad categories, and so this section has been structured to match these categories. The section is split as follows:

- **Geographic disaggregation:** These are the fields and variables that are used to split the national data into geographic sections. This includes defining the network model used in the shapefile data, along with data relating to the spatial location and area classifications of the road section within.
- **Temporal disaggregation:** These are the fields and variables that are used to split the data temporally (i.e. by units of time and date). This allows years, time periods, and seasons to be understood and communicated.
- **Reporting output definitions:** These are the fields and variables used to report on the performance of the MRN for each geographic area and time considered. These are the safety and congestion statistics which make up the outputs of this dataset.

Geographic disaggregation

In this sub-section the fields and variables relating to the data's place in space are discussed. These fields and variables are split into sub-sections relating to the:

- **Road segment data:** Explaining the information provided to define each section of road in the network, including its attributes such as direction, carriageway standard and length.
- **Locational data:** Explaining the different regions that each road section falls within and how the data is structured into recognised regional definitions.
- **Area characteristic data:** Explaining the contextual data relating to the types of areas that each road section falls within.

Within these sub-sections the field or variable will be ***named in bold italics***, with the definition following thereafter.

Road segments

CP_number (CP is an abbreviation for "Count Point"): Major roads in Great Britain are represented by a series of links, which are unique sections of road that make up the entirety of the major roads network. A location on each of these links is used to count or estimate the number of vehicles that pass it, and this location is given a unique reference number called a count point number or CP. In the provided dataset, there is a line within

the shapefile representing geographically the location of the road. It is important to note that:

- There is a separate line for each direction in the dataset for the congestion data (it is unidirectional).
- There is only one line representing both directions in the dataset for the safety data (it is bidirectional).

CP_Dir: CP_Dir refers to the direction of flow (towards, so north equates to northbound)) on a CP_number line segment. In the congestion data, the direction of travel that the output data relates to is indicated by a letter in this field. The following table explains interpretation of the letters adopted.

| Category | Category Description |
|----------|-----------------------------------|
| N | North |
| S | South |
| E | East |
| W | West |
| X | Unknown or complex directionality |

road_classification_number: This field denotes the official designation of the road that the line segment represented by the CP_number depicts, as per the Great Britain road numbering scheme. It includes a single letter followed by a number, which together represent the road's category and specific identifier. For example, A50, A500, and A38 are publicly adopted names for roads, indicating their classification and route number.

length_miles: The length in miles of the road that the line segment represented by the CP_number is depicting.

sd_carriageway: This field indicates the type of carriageway to which the data pertains. It can take one of the following values:

- **Single:** Refers to a single carriageway road, where traffic in both directions shares the same road space without a central reservation.
- **Dual:** Refers to a dual carriageway road, where traffic in each direction is separated by a central reservation, providing two distinct carriageways.

Locational data

The following fields representing locational information are provided, based on Office of National Statistics information.

LA_Code: This field represents the Local Authority code, a unique identifier assigned to each local authority area within England. It is used to link data to specific administrative regions for analysis and reporting purposes. In this dataset, each CP_number line segment is assigned to an LA_code.

Region_Name: This field specifies the name of the region in which the data is collected. It corresponds to the official regional divisions used by the Department for Transport for planning and statistical analysis. In this dataset, each CP_number line segment is assigned to a Region. The data provided applies to England only, and so contains the

following values: North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East and South West.

Area Characteristic

Urbrur: This is an abbreviation of urban and rural. This field specifies the area characteristic that each road segment is within. Variables within this field are defined below.

- **Urban roads:** These are major and minor roads within an urban area with a population of 10,000 or more. The definition is based on the 2011 Census definition of Urban Settlements, as published by the Office for National Statistics³.
- **Rural roads:** These are major and minor roads outside urban areas (the urban areas have a population of more than 10,000 people).

Temporal disaggregation

Note: Temporal disaggregation only applies to the congestion datasets provided.

Temporal (over time) splits of the data are provided in three ways; by time period, by year, and by season.

Time Periods

Time periods are not a variable but instead used in field names to indicate which period the output data relates to. For example, the various output fields defined later in this section are each provided with the naming system “Output_ TimePeriod”, where time period takes on the below definitions.

The time periods used within the data are defined below. Further information on why these time periods were selected is provided in Annex A.

- **AM Peak:** The AM Peak was defined as 07:00 – 10:00, on weekdays only
- **Inter Peak:** The Inter Peak was defined as 10:00 – 16:00, on weekdays only
- **PM Peak:** The PM Peak was defined as 16:00 – 19:00, on weekdays only
- **Off Peak:** The Off Peak was defined as 19:00 – 07:00, on weekdays only
- **Weekend:** The Weekend time period was defined as 10:00 – 18:00, Saturday and Sunday
- **All Day:** The All Day time period was aggregated from every hour of the day, across all days of the week (weekday and weekend)

Years and Seasons

Years and Seasons are not variables but instead used to split the congestion output data into separate files. There are separate output files for each year and for each season.

³ <https://data.gov.uk/dataset/15e3be7f-66ed-416c-b0f2-241e87668642/built-up-areasdecember-2011-boundaries-v2>

The years adopted for this analysis are defined below. Further information on why these years were chosen is provided in Annex A.

- **2019:** Data from the calendar year 2019
- **2023:** Data from the calendar year 2023

The seasons adopted for this analysis are defined below. Further information on both how and why these were adopted is provided in Annex A.

- **All Year:** The All Year season was derived from every month of each year (January – December, inclusive)
- **Summer:** The Summer season was derived from the months of July and August only

Reporting output definitions

The output datasets contain three congestion metrics and two safety metrics that together provide information on the performance of the MRN. Note that the congestion and safety metrics are provided in separate files due to congestion data being unidirectional data and safety data being bidirectional data.

The two congestion metric outputs are defined below, with further detail on the calculation of each metric provided in the methodology section of this report. These are provided as fields in the output data.

- **avg_speed:** Average speed of vehicles in miles per hour for a given road segment in the given time period.
- **ffspd_capped:** Free flow speed of vehicles in miles per hour for a given road segment in the given time period.
- **delay_spvpm:** Delay in seconds per vehicle per mile. Delay is measured relative to free flow speed. For example, if the free-flow travel time for a mile of road is 60 seconds and the recorded average journey time is 72 seconds, the delay would be 12 seconds per vehicle per mile (spvpm). This is the Department's preferred mechanism for measuring delay.

The two safety metric outputs are defined below, with further detail on the calculation of each metric provided in the methodology section of this report. These are provided as fields in the output data.

- **MRN_road_flag:** Identifying that the collision has occurred on the MRN.
- **Rate_Bd:** The collision rate band (as recorded by RSF).

Methodology notes

MRN Geospatial Layer

Where has this data been derived from?

MRN Geospatial Layer source data is derived from two main sources. One is the MRN correspondence dataset received from the Department, the other is [Major Roads Database \(MRDB\) Shape files](#):

- **MRN correspondence:** Gives the list of Count Point link identifiers in the 2022 MRDB that are considered MRN links.
- **MRDB shapefiles:** Shapefiles of the MRDB network for years 2019 and 2022.

Supporting documentation

For further documentation, including detail on the source data and methodology used by the Department for the processing of geospatial data, please see the latest information on [Road length statistics](#).

Data processing

The following steps are taken to process the geospatial data:

- **Filtering to the MRN:** The MRN correspondence providing the list of MRN Count Point link identifiers is provided on the 2022 MRDB definition. The 2019 and 2023 congestion data are provided on the 2019 MRDB definition. Therefore, the 2019 MRDB definition was filtered to include only Count Point link identifiers classified as MRN in the 2022 definition.
- **Missing / Unmatched links:** In some instances, Count Point link identifiers had changed between the 2019 MRDB definition and the 2022 MRDB definition. In total there were 169 MRN Count Point link identifiers from the 2022 MRDB definition which were not present in the 2019 MRDB definition i.e., the Count Point link identifiers for these parts of the network had changed between 2019 to 2022. To identify the relevant 2019 Count Point link identifiers, a manual mapping process was undertaken using geospatial software to visually determine equivalent links.

Verification

A series of verification and validation checks have been conducted on the process and outputs. This includes:

- All scripts used to process the data have been written in a repeatable manner and have been subject to our consultant's check and review process.
- Upon issues being found (e.g. missing data, mismatches, duplicates, resolution differences) these have been raised and discussed with the Department's traffic and congestion teams. In all instances these have been recognised data complications and the way forward has been agreed with the Department.
- All expected MRN road segments (Count Point link identifiers) are included in the output shapefile data.

Congestion Data

Where has this data been derived from?

Congestion statistics data

The congestion data used to create the MRN dataset is based on the Department's own congestion statistics work. The congestion statistics are released by the Department in regular publications and based on a long-held methodology which is outlined online⁴. The congestion statistics published by the Department cover a multitude of roads including the strategic road network, major road network and other national and local roads. A web-portal showing some of the Department's congestion statistics is available for interactive viewing.

The MRN dataset builds upon the Department's congestion statistics work to create a new, supplementary dataset which:

- Geographically covers just the Major Road Network (MRN).
- Provides greater temporal disaggregation than the existing data published (i.e., breaks the data into time periods and seasons).
- Provides additional statistics beyond those in the existing published data (i.e., further free flow speed information).

To undertake this work, our consultants were provided a pre-aggregated version of the congestion statistics data used to create the regular publications. The data was provided in hourly format by section of road to provide flexibility in how the MRN dataset output could be created.

These statistics used to monitor road congestion and journey time reliability are compiled from journey time data from in-vehicle global positioning systems (GPS).

⁴ The full congestion statistics publication and methodology reports can be found at the following link: <https://www.gov.uk/government/collections/road-congestion-and-reliability-statistics>

Supporting documentation

For further documentation including detail on the source data and methodology used by the department for the processing of congestion and traffic volume data, please see the latest information on the [Road Congestion and Travel Time website](#).

Data processing

The congestion statistics are provided as hourly data assigned to each road section link (defined on MRDB Count Point link identifier). This section outlines how the congestion statistics are processed, cleaned, reduced to the MRN, and finally aggregated into the reporting outputs outlined in the schema section.

Congestion statistics data processing

The congestion statistics data received was processed as follows:

- **Filtering to MRN:** The data were filtered from all data to just Major Road Network data by using the MRN on MRDB definition created in the MRN Geospatial Layer process outlined earlier in this section.
- **Combining annual input data:** The 2019 and 2023 congestion datasets were joined together to create a single dataset, containing only data for the MRN.
- **Null values:** Where there were missing data on the MRN (i.e. either or both the 2019 and 2023 input data do not have data for a given section of MRN) this is represented as a null value, to ensure the whole MRN is included.
- **Cleaning of directional data:** Cleaning of inconsistent directional data between the 2019 and 2023 input data was handled. More information on this is provided in the explainer box below.

Note on the cleaning of directional data

Upon receipt of the 2019 and 2023 congestion data on the MRDB mapping layer, it was discovered that there are not always a consistent set of directions listed for each Count Point Link (section of road). For example, a road may be listed as having directions north and south in 2019, and may have north, east and west in 2023. There are a wide range of mismatching scenarios found that required a solution to create a single dataset for the MRN.

To handle this, an iterative approach to adding congestion data to the MRN dataset was undertaken, prioritising best match data first, before handling more complex issues. The process applied is outlined as:

- **Perfect match:** Those that are a complete match are added to the MRN dataset first. For Count Points where the list of directions is a perfect match for both years, these are retained to the output dataset.
- **Directions provided in just one year:**
 - Where there is no direction in 2023 but there is a direction in 2019, the 2019 direction is taken.
 - Where there is no direction in 2019 but there is a direction in 2023, the 2023 direction is taken.

- **Priority to known directions:** Some of the congestion data is listed as unknown direction (marked with an “X”). Priority is given to the year with a known direction over the year with unknown directions for all these cases.
- **Any matches:** For the remaining road segments, any matching directions between the two years are kept and everything else is removed. This means that if there are no matching directions in 2019 and 2023, data will be removed at this point. Any road sections with no directions at all will also be removed.

This process should provide a consistent and high-quality set of directional data between the 2019 and 2023 congestion data.

Congestion calculations for MRN dataset

With the congestion data processed to a consistent MRN dataset for both 2019 and 2023, the hourly data could then be processed into its final form for the purposes of the MRN reporting. Specifically, this involves moving from hour-by-hour data throughout the year to the fields outlined in the schema section of this report:

- Set time periods representing distinct flow profiles of the week.
- Set seasons representing different conditions.
- Set reporting outputs relevant to understanding performance (speed, delay).

Prior to aggregating to the time period and seasons, new fields are required to ultimately facilitate the calculation of the final reporting outputs. These new fields are outlined as follows:

Fields created for each hour of the year

Total delay in seconds:

$$TotalSecondsDelay = 60 \times (hourly_flow \times daysinmonth \times delaysmpvm_capped \times length_miles)$$

Total vehicle miles driven on road section:

$$TotalVehicleMiles = hourly_flow \times daysinmonth \times length_miles$$

Total time travelled on road section:

$$TotalTimeTravelled_hours = (hourly_flow \times daysinmonth \times \frac{length_miles}{avgspdmph})$$

Hypothetical total time travelled on road section, if travelled at free flow speed:

$$TotalTimeTravelled_hours_ffspd_capped \\ = (hourly_flow \times daysinmonth \times \frac{length_miles}{ffspd_capped})$$

Where the following fields from the department’s congestion statistics data are used:

delaysmpvm_capped=the delay in minutes relative to free flow speed, where free flow speed is capped at the speed limit.

length_miles= the length of the road segment (Count Point Link) in miles.

avgspdmph= the average observed speed of GPS users traversing the road section.

ffspd_capped= the free flow speed of GPS users traversing the road section.

Note that more fields were used to create the MRN dataset than are provided in the dataset.

Aggregation is then undertaken to create the time periods and seasonal versions of the data. When aggregating the delay, vehicle miles, travelled time and traffic flow fields are all summed to create a new total at the time period and season level.

Following aggregation to time periods, the MRN reporting outputs are calculated as follows:

$$\begin{aligned} \text{delay_spvpm} &= \frac{\text{TotalSecondsDelay}}{\text{TotalVehicleMiles}} \\ \text{AvgSpd} &= \frac{\text{TotalVehicleMiles}}{\text{TotalTimeTravelled_hours}} \\ \text{ffspd_capped} &= \frac{\text{TotalVehicleMiles}}{\text{TotalTimeTravelled_hours_ffspd_capped}} \end{aligned}$$

Verification

A series of verification and validation checks have been conducted on the process and outputs. This includes:

- All scripts used to process the data have been written in a repeatable manner and have been subject to our consultant's check and review process.
- Comparing the 'all day' time period output to the published data on the Department's ArcGIS online portal⁵. This demonstrated that the MRN dataset returns the same speed and delay statistics as the online portal.
- Upon issues being found (e.g., missing data, directional data mismatches) these have been raised and discussed with the Department's congestion statistics team. In all instances these have been recognised data complications and the way forward has been agreed with the Department's congestion statistics team.
- The mathematical operations for transforming data have been agreed with the Department's congestion statistics team.
- Time period data follows normative traffic trends observed across the network (e.g., AM and PM peaks demonstrating high volume and lower speeds than other time periods).
- Traffic speed data follows expected patterns (e.g., observed speeds are always less than free-flow speeds, where free-flow speeds refer to the speeds expected if no congestion were present on the road segment).
- All expected MRN road segments (Count Point Link) are included in the output data.

⁵ [Local A Roads Speed and Delay \(arcgis.com\)](https://arcgis.com)

Safety Data - Collisions

Where has this data been derived from?

The safety data used to create the MRN collisions dataset is based on the Department's own road safety statistics work. The road safety statistics are released by the Department in regular publications⁶. Most of the statistics published are accredited official statistics.

Road collisions in Great Britain are reported by the police to the Department for Transport using the STATS19 reporting system. The collisions that occurred on a public highway involving at least one motor vehicle, horse rider or pedal cyclist, and where at least one person was injured, are included in accredited official statistics published by DfT.

Interactive tools which provide access to bespoke tabulation, visualisation and mapping of road collision and casualty data are made available by the Department⁷.

Supporting documentation

Guidance on reported road casualty statistics including notes and definitions, quality and methodology information and supporting technical documents are made available by the Department⁸. This includes specific guidance on injury-based reporting and severity adjustments⁹.

The data and the numbers shown in the MRN safety datasets and described in the MRN **Summary Report** should be read in context alongside the DfT published accredited official statistics on reported collisions and casualties on public roads in Great Britain and their associated annual reports⁶. These consider casualty patterns both in terms of absolute counts and in terms of casualty rates, describing any general trends in the data.

Data processing

Road casualty statistics cover the whole of Great Britain. They contain information as to whether a collision occurred on the SRN but this is the only road network covered. A new methodology was developed internally in the Department for this piece of work to identify collisions considered to have occurred on the MRN. The method has been designed in such a way that it can also be applied to any other road network, such as the SRN, and to any road classification, such as B-Roads.

Input datasets

Road casualty statistics for 2019 & 2022 were acquired and converted from csv to GIS file formats using the Easting/Northing coordinates provided in the statistics (the collisions are reported in British National Grid). To ensure accuracy in MRN collision identification, the

⁶ [Road safety statistics - GOV.UK](#)

⁷ [Road safety statistics: interactive data tools - GOV.UK](#)

⁸ [Road safety statistics: guidance - GOV.UK](#)

⁹ [Guide to injury-based reporting and severity adjustments for road casualty statistics](#)

authoritative road network dataset from Ordnance Survey - OS MasterMap Highways Network (OSMMHN) Road Link - was selected.

Methodology – first pass

The input datasets were loaded into GIS and the road network for collisions to be matched to created. For this work, the MRN network has been created from OSMMHN Road Link and the OS Open Roads release of the MRN. The MRN is then extracted as a standalone GIS file ready for the collision matching process to begin.

Collisions within a radius of the MRN are identified and are then snapped (moved) to the closest section of MRN OSMMHN Road Link. The distance the collisions are moved by is recorded and maintained for use later in the process.

All road collisions reported contain information about the road on which the collision occurred. Similar road attribute information is detailed in the OSMMHN Road Link authoritative dataset. Attribution information between the input datasets are then compared, for example the road classification number (e.g A28). The amount of positive or negative matching between the two sets of attribution information, combined with the distance the collisions have been moved by, provides an initial matching result. This 'On MRN' or 'Not On MRN' result is provided with a confidence score alongside it. This supports the next step of checking the results.

Methodology – second pass

Once the initial results are known, three quality checks are performed. These checks look at those collisions that are on the confidence score boundary of being matched or not matched to the MRN. They consider the intricacies of the detail of the road network and its attribution as well as considering the reporting accuracy of the collision. They also check on distances to the closest section of non-MRN OSMMHN Road Link. These checks update the matching result and confidence scores.

A final additional quality check is then undertaken to check to see whether an 'On SRN' match has previously been assigned to a collision. The road casualty statistics datasets include a 'trunk_road_flag' field which is where National Highways have identified collisions as occurring on the SRN. Where both an 'On SRN' and 'On MRN' result is found, the confidence scores are looked at and any update to the results made. A hierarchy is applied here where the SRN takes priority over the MRN.

The final matching results are now recorded.

Full details

The full methodology, including the maths and GIS processes undertaken, has been shared by the Departments Roads Geography team (who undertook the work) with the Departments Road Safety Statistics team.

Verification

The Departments new methodology was initially verified using the SRN. The results were directly compared with the National Highways matched 'trunk_road_flag' results and agreed at a level of better than 97%.

The Departments Roads Geography team have been fully transparent with the Departments Road Safety Statistics team throughout the evolution of the methodology. Discussions provided confidence that the new methodology was up to an acceptable

accuracy level, with the Roads Safety Statistics team supporting the roll out to identifying MRN collisions. The full MRN collision results have been shared and discussed between the teams to provide a level of assurance in the approach.

Details on the validation and verification of the input data of roads casualty statistics are provided as supporting documentation made available by the Department¹⁰.

Safety Data – Collision Rates

To analyse collision data in more detail it is common to calculate collision rates. Collision rates are the number of collisions relative to the total number of vehicles using the road (calculated as collisions per billion vehicle-kilometre). They provide a measure of individual risk that can be useful for understanding the performance of a road network.

Where has this data been derived from?

The data used in this project is from the Road Safety Foundation (RSF)¹¹. The RSF are a UK charity that advocates road casualty reduction. They publish data for collision rates for all major roads in Great Britain. The data are released in 3-year time periods the latest of which (at time of the project) is 2019-2021. The Department reached out to the RSF who kindly supplied their 2019-2021 collision rates (and collision density) results in GIS file format. The Department are grateful to RSF's support.

Supporting documentation

The RSF publish crash risk mapping results which are updated annually. This includes an interactive tool¹² which provides users with the ability to visualise and query collision rates and collision densities for all major roads in GB.

The RSF use collision rate bands to show the severity of risk on roads using KSI collision rate calculations and following international protocols. The international protocols are available from the International Road Assessment Programme, iRAP¹³. The iRAP Crash Risk Mapping Manual details the principles of the Crash Risk Mapping protocol, how networks are constructed and the rationale for the selection of routes and their related parameters in building a dataset. It also sets out the technical specification for iRAP Crash Risk Maps to an internationally consistent and standardised format and style.

¹⁰ [Reported road casualty statistics: background quality report - GOV.UK](#)

¹¹ [RoadSafetyFoundation.org | Road Safety Foundation](#)

¹² [Road Safety Foundation Crash Risk Mapping Results 2024](#)

¹³ [iRAP Specification, Manuals and Guides - iRAP](#)

Data processing

The RSF create a specific route network that segments major roads in a way that is meaningful to road users and has statistically robust results. In many cases RSF routes contain both MRN and non-MRN road sections. The RSF data and mapping results have therefore been clipped by the Department to extract MRN road sections only. No changes have been made to the collision rate bands during the clipping to the MRN.

It is noted that since the project work has been completed, the RSF have added a filter to their interactive map on their latest 2020-2022 collision rates data that enables users to select the road network type. A selection for 'Major Local' can be made which appears to be essentially the MRN. When using this filter, it appears that the RSF have applied the same logic that the Department has made in this project in that no changes are made to the collision rate bands when clipping (or filtering) to the MRN (or Major Local).

Verification

The RSF confirmed their approach in calculating collision rates and collision rate bands with the Department. The RSF methodology follows that described in the iRAP Crash Risk Mapping Manual with the RSF clarifying a couple of additional necessary elements that are undertaken as part of the calculations. These un-published elements have been shared within the Department.

Usage notes and limitations

Congestion data

As with any data, the processed congestion data have known limitations all users should be aware of prior to engaging with the data. These are summarised in the table below.

| Limitation Summary | Limitation Description |
|--|---|
| Missing data | <p>For some MRN links, no congestion data was available. Data can be unavailable for 2019, or 2023, or both years. Where this is the case, the link is still included in the reported dataset to provide a complete set of MRN links, but no data is reported i.e., null values are observed.</p> <p>Users should be aware that, for certain links, this makes comparisons of 2019 versus 2023 delay impossible due to missing data.</p> |
| Duplicated Count Point link identifiers | <p>It is possible for longer MRN links to lie across multiple Local Authorities or across multiple road names. Where this is the case, the Count Point link identifier is repeated multiple times for each relevant Local Authority and/or road name. The data on each row relates to the journey times and delay on the sub-section of the link that lies within the specified Local Authority and/or road name.</p> <p>Users should be aware that, if requiring a unique identifier for congestion analysis, it is recommended to use a composite ID containing Count Point link identifier (cp_number), direction (cp_dir), road name (road_classification_name), and Local Authority code (la_code).</p> |
| Conflicting link length data | <p>The length of a link can differ in the 2019 and 2023 congestion data due to changes between the two years. Where this is the case, for the benefit of consistency, only the 2019 link length is retained. This approach has been agreed with the Department's congestion statistics team.</p> |
| Relationship between link length and delay reporting granularity | <p>The geospatial definition of a link can fundamentally change the output variables. For example, delay reporting on shorter links is at a higher granular and therefore more able to highlight congestion hotspots. On longer links, if part of the link is a congestion hotspot but the rest of the link performs well, the congestion hotspot is masked by the better performance elsewhere and therefore makes it less easy to identify or unidentifiable.</p> <p>Note the same logic applies to safety collision hotspots. If there is a high density of collisions on a 300m section of road, but the segment covering the problem area is 6km long, then the segment collision data will dampen down the understanding of the high collision density. This is due to the 300m collision hotspot being combined with 5.7km of lower collision density road.</p> <p>Users should be aware of this when interpreting the link-based data, and not assume longer links are uncongested based on this data if local knowledge and/or alternative datasets suggest otherwise.</p> |

Each of the limitations stated above is inherited from the congestion data that was ingested for this task. Therefore, all limitations have been accepted and it is the responsibility of the user to be aware of these limitations and how they can be handled.

Safety data

As with any data, there are known limitations all users should be aware of prior to engaging with the safety data. These are summarised in the tables below.

Collisions

| Limitation Summary | Limitation Description |
|-------------------------------|---|
| Input collision data accuracy | The input collision data recorded through the STATS19 reporting process can contain errors in the attribution of collisions and in the collision location. Where this is the case, collisions may be mis-matched to the MRN or collisions that occurred on the MRN may not be matched. |
| MRN collision methodology | Users should be aware that accuracy in the Departments desk-based MRN collision methodology cannot be completely guaranteed. To increase the accuracy further would need work to evolve past a desk study and involve manually looking at individual collisions, potentially contacting police forces, to determine if that collision has occurred on the MRN or not. |
| Road network | Users should be aware that the OSMMHN Road Link authoritative road network dataset is complex and can lead to mis-matches and inconsistencies in reporting. The road network is continually changing meaning there will be some small differences between the MRN collision matching in 2019 and 2022. |

As noted in the Scoping Report of this MRN Performance Review, there are caveats on the accuracy of matching collisions to road networks. Accuracy cannot be completely guaranteed as there may be errors in the recorded input data, the road network, or the desk-based information matching process. A key problem area tends to be where roads intersect (either at a junction or a roundabout), where attributing the collisions to the correct road can be challenging and require a more sophisticated algorithm to grow confidence in the attribution result.

Collision rates

| Limitation Summary | Limitation Description |
|---------------------------|--|
| Road network sections | In many cases, RSF road links contain both MRN and non-MRN road sections. In such cases, the RSF road links have been clipped by the Department to extract MRN road sections only. No changes have been made to the collision rate bands during the clipping to the MRN. |

| | |
|--------------|--|
| Missing data | For a small number of MRN links, no RSF data was available. Where this is the case, the link is still included in the reported dataset to provide a complete set of MRN links, but no data is reported i.e., null values are observed. |
|--------------|--|

| | |
|------------------------|--|
| AADF traffic flow data | Users should be aware that the Departments traffic flow AADF statistics for the years of 2020 & 2021 were affected by the Covid-19 pandemic. |
|------------------------|--|

Annex A: Background to Temporal Definitions

Years in the MRN dataset

Congestion data

The congestion data provided for the MRN dataset is based on 2019 and 2023 calendar year data. A range of factors were considered when determining the years to include in the dataset, including:

- **Covid-19 pandemic:** There was a desire to avoid including data that would be impacted by the pandemic. It is well recognised that the pandemic had a large impact on traffic volumes, and as a result would lead to congestion data that is atypical. The Department do want to recognise that some behaviours have been long-term changes since the pandemic, but want to avoid using data from in-the-moment short-term changes in behaviour that occurred due to pandemic related changes in network demand (e.g., national and regional lockdowns).
- **Change over time:** There was a desire to provide more than one year's worth of congestion data, so that an understanding of changing performance over time could be explored. As such, at least two data points were desired.
- **Calendar years:** There was a desire to use complete calendar years rather than part years or inconsistently defined year periods.

As a result of these considerations, the years 2019 and 2023 were selected. These represent the most recent complete calendar year prior to the pandemic and the first complete calendar year following the Department's definition of the end of the pandemic. Based on the Department's ongoing road traffic statistics work, it is believed that 2023 represents more stable traffic conditions following the pandemic on which to base reporting.

Safety data

The safety data set is based on data recorded between 2019 and 2022.

The Department is aware that the traffic flow AADF statistics for the years of 2020, 2021 and 2022 were affected by the Covid-19 pandemic. This has been discussed within the Department but hasn't changed the selection of safety data years which have been chosen as they are the latest available.

Limitations in the choice of years

The Department recognise that the inconsistent use of years between congestion and safety datasets is a limitation. The main impact of this limitation is that the data cannot be considered together to understand performance at a consistent point in time.

Seasons in the MRN dataset

Note: This section relates only to the congestion data, as there are no seasons provided in the safety data.

The consultation period of this project discovered that multiple Sub-national Transport Bodies (STBs) named the visitor economy during the summer as a major influence on the functioning of their sections of the MRN. The Department recognises that the summer period can place a different demand on the MRN, and as such it was decided to include a summer period within the congestion dataset to allow this to be understood further.

The definition of summer chosen was the whole calendar months of July and August. The “all year” data covers all months of the year *including* the summer period.

The decision to select July and August to represent the summer period was based on analysis of traffic statistics by month. While this shows a number of months with above average traffic volume in the middle of the year, July and August represent the absolute peak of the year. The Department’s interest in including the summer period is to represent the highest demand part of the year and thus capture the absolute peak demand.

Time Periods in the MRN dataset

Note: This section relates only to the congestion data, as there are no time periods provided in the safety data.

Traffic demand on England’s road network is long established to follow temporal patterns in which there are periods of higher and lower demand. It is therefore informative to consider congestion statistics on the MRN during different time periods to be able to articulate how the MRN functions.

The Department selected the following time periods to be included in the congestion dataset, with the justifications provided alongside:

- **AM Peak:** 07:00 – 10:00, on weekdays only. This time period definition has been selected to remain consistent with the Department’s travel time measures official statistics definition.
- **Inter Peak:** 10:00 – 16:00, on weekdays only. This time period definition has been selected to remain consistent with the Department’s travel time measures official statistics definition.
- **PM Peak:** 16:00 – 19:00, on weekdays only. This time period definition has been selected to remain consistent with the Department’s travel time measures official statistics definition.
- **Off Peak:** 19:00 – 07:00, on weekdays only. The off peak has been selected to be the hours not defined by the three peak periods. By the confirmed definition of the peaks, these are the remaining hours which must constitute the off peak. These

have been confirmed with traffic volume data to have lower traffic volumes than the 12 hours covered by the AM, inter and PM peak periods.

- **Weekend:** 10:00 – 18:00, on Saturday and Sunday. Analysis was conducted on traffic volumes throughout the day on weekends. This demonstrated a bell curve with growth in traffic and steep decline in traffic around a central period of sustained traffic flows in the middle of the day. The Department's objectives were to capture the part of the day that represents the highest traffic volumes experienced during the weekend. Due to this the time period was defined as the 10:00-18:00.

Annex B: Data Tables

Major Road Network (MRN) Data Summary Tables

This appendix provides aggregated summary statistics on the congestion performance of the MRN based on the main variable available in the datasets: year, season, time period, region, location (urban or rural) and carriageway type.

This appendix should be considered a reference for MRN level statistics. The data in these tables was used in the writing of the accompanying the Summary Report.

National MRN Congestion Data

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | | |
|--------------------------|-----------------------|---------------------|------|--------|-------|---------------|--------|---|-------|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | | |
| Overall | | | | | | | | | |
| National | 37.3 | 26.5 | 26.4 | ↓ | -0.3% | 39.6 | 40.2 | ↑ | 1.5% |
| Regional | | | | | | | | | |
| East Midlands | 39.7 | 29.6 | 30.0 | ↑ | 1.1% | 30.2 | 29.6 | ↓ | -1.9% |
| East of England | 47.1 | 35.4 | 36.5 | ↑ | 3.1% | 23.6 | 22.1 | ↓ | -6.4% |
| London | 34.0 | 21.5 | 20.3 | ↓ | -5.6% | 64.5 | 71.9 | ↑ | 11.5% |
| North East | 38.4 | 26.5 | 27.0 | ↑ | 1.9% | 39.1 | 39.5 | ↑ | 1.0% |
| North West | 34.5 | 23.9 | 24.1 | ↑ | 0.6% | 45.3 | 45.4 | ↑ | 0.2% |
| South East | 38.2 | 27.0 | 27.0 | ↑ | 0.0% | 38.7 | 39.1 | ↑ | 1.0% |
| South West | 36.9 | 27.1 | 27.1 | ↑ | 0.2% | 36.4 | 35.4 | ↓ | -2.6% |
| West Midlands | 34.7 | 24.9 | 24.7 | ↓ | -1.0% | 42.3 | 42.4 | ↑ | 0.2% |
| Yorkshire and the Humber | 34.8 | 25.7 | 25.9 | ↑ | 0.9% | 36.4 | 36.1 | ↓ | -1.0% |
| Time of day/week | | | | | | | | | |
| AM | 37.3 | 24.5 | 24.7 | ↑ | 1.0% | 50.5 | 49.2 | ↓ | -2.6% |
| Interpeak | 37.3 | 26.4 | 26.1 | ↓ | -1.3% | 39.7 | 41.6 | ↑ | 4.8% |
| PM | 37.3 | 23.5 | 23.7 | ↑ | 0.7% | 56.3 | 55.3 | ↓ | -1.7% |
| Offpeak | 37.3 | 31.4 | 31.2 | ↓ | -0.6% | 18.7 | 19.6 | ↑ | 5.2% |
| Weekend | 37.3 | 27.8 | 27.4 | ↓ | -1.7% | 32.8 | 35.0 | ↑ | 6.9% |
| All Day | 37.3 | 26.5 | 26.4 | ↓ | -0.3% | 39.6 | 40.2 | ↑ | 1.5% |
| Seasons | | | | | | | | | |
| All year | 37.3 | 26.5 | 26.4 | ↓ | -0.3% | 39.6 | 40.2 | ↑ | 1.5% |
| Summer | 37.6 | 27.2 | 27.1 | ↓ | -0.3% | 36.6 | 37.2 | ↑ | 1.6% |
| Location | | | | | | | | | |
| Rural | 44.8 | 34.9 | 35.0 | ↑ | 0.5% | 22.7 | 22.5 | ↓ | -0.5% |
| Urban | 29.4 | 19.2 | 18.9 | ↓ | -1.3% | 66.5 | 68.5 | ↑ | 3.0% |
| Carriageway | | | | | | | | | |
| Dual | 40.1 | 27.3 | 27.1 | ↓ | -0.6% | 41.9 | 43.0 | ↑ | 2.6% |
| Single | 35.0 | 25.7 | 25.7 | ↓ | 0.0% | 37.5 | 37.6 | ↑ | 0.3% |

Regional MRN Congestion Data – East Midlands

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | | |
|---------------------|-----------------------|---------------------|------|--------|-------|---------------|--------|---|-------|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | | |
| Overall | | | | | | | | | |
| East Midlands | 30.0 | 29.6 | 30.0 | ↑ | 1.1% | 30.2 | 29.6 | ↓ | -1.9% |
| Time Periods | | | | | | | | | |
| AM | 28.1 | 27.7 | 28.1 | ↑ | 1.3% | 38.3 | 37.3 | ↓ | -2.5% |
| Interpeak | 29.3 | 29.3 | 29.3 | ↓ | -0.2% | 31.2 | 32.3 | ↑ | 3.4% |
| PM | 27.8 | 27.0 | 27.8 | ↑ | 3.0% | 41.7 | 38.7 | ↓ | -7.4% |
| Offpeak | 34.7 | 34.1 | 34.7 | ↑ | 1.5% | 14.5 | 14.0 | ↓ | -3.7% |
| Weekend | 31.9 | 31.7 | 31.9 | ↑ | 0.6% | 22.3 | 22.3 | ↑ | 0.2% |
| All Day | 30.0 | 29.6 | 30.0 | ↑ | 1.1% | 30.2 | 29.6 | ↓ | -1.9% |
| Season | | | | | | | | | |
| All Year | 30.0 | 29.6 | 30.0 | ↑ | 1.1% | 30.2 | 29.6 | ↓ | -1.9% |
| Summer | 30.6 | 30.4 | 30.6 | ↑ | 0.6% | 27.8 | 27.7 | ↓ | 0.0% |
| Carriageway | | | | | | | | | |
| Single | 30.0 | 29.7 | 30.0 | ↑ | 1.1% | 27.9 | 27.4 | ↓ | -2.0% |
| Dual | 29.9 | 29.5 | 29.9 | ↑ | 1.3% | 36.3 | 35.6 | ↓ | -1.8% |
| Location | | | | | | | | | |
| Urban | 19.4 | 19.3 | 19.4 | ↑ | 0.7% | 62.8 | 62.3 | ↓ | -0.9% |
| Rural | 35.9 | 35.5 | 35.9 | ↑ | 1.1% | 20.1 | 19.6 | ↓ | -2.1% |

Regional MRN Congestion Data – East of England

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | | |
|---------------------|-----------------------|---------------------|------|--------|------|---------------|--------|---|--------|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | | |
| Overall | | | | | | | | | |
| East of England | 36.5 | 35.4 | 36.5 | ↑ | 3.1% | 23.6 | 22.1 | ↓ | -6.4% |
| Time Periods | | | | | | | | | |
| AM | 34.2 | 32.8 | 34.2 | ↑ | 4.5% | 31.9 | 28.7 | ↓ | -9.9% |
| Interpeak | 36.6 | 36.1 | 36.6 | ↑ | 1.4% | 21.8 | 22.0 | ↑ | 0.8% |
| PM | 33.4 | 31.6 | 33.4 | ↑ | 5.5% | 35.7 | 31.3 | ↓ | -12.4% |
| Offpeak | 41.4 | 40.3 | 41.4 | ↑ | 2.7% | 11.6 | 10.9 | ↓ | -6.1% |
| Weekend | 38.6 | 38.1 | 38.6 | ↑ | 1.4% | 16.6 | 16.9 | ↑ | 1.3% |
| All Day | 36.5 | 35.4 | 36.5 | ↑ | 3.1% | 23.6 | 22.1 | ↓ | -6.4% |
| Season | | | | | | | | | |
| All Year | 36.5 | 35.4 | 36.5 | ↑ | 3.1% | 23.6 | 22.1 | ↓ | -6.4% |
| Summer | 37.4 | 36.2 | 37.4 | ↑ | 3.1% | 21.7 | 20.5 | ↓ | -5.8% |
| Carriageway | | | | | | | | | |
| Single | 33.6 | 33.3 | 33.6 | ↑ | 1.1% | 22.1 | 21.8 | ↓ | -1.4% |
| Dual | 39.6 | 37.6 | 39.6 | ↑ | 5.4% | 24.9 | 22.3 | ↓ | -10.3% |
| Location | | | | | | | | | |
| Urban | 23.8 | 23.0 | 23.8 | ↑ | 3.6% | 50.9 | 46.7 | ↓ | -8.1% |
| Rural | 39.6 | 38.6 | 39.6 | ↑ | 2.6% | 19.5 | 18.6 | ↓ | -4.8% |

Regional MRN Congestion Data – London

| | Free Flow Speed (mph) | Average Speed (mph) | | | Delay (spvpm) | | | | |
|---------------------|-----------------------|---------------------|------|--------|---------------|-------|--------|---|-------|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | | |
| Overall | | | | | | | | | |
| London | 20.3 | 21.5 | 20.3 | ↓ | -5.6% | 64.5 | 71.9 | ↑ | 11.5% |
| Time Periods | | | | | | | | | |
| AM | 18.3 | 19.0 | 18.3 | ↓ | -3.6% | 86.1 | 90.7 | ↑ | 5.3% |
| Interpeak | 20.9 | 22.4 | 20.9 | ↓ | -6.7% | 57.7 | 66.6 | ↑ | 15.5% |
| PM | 17.2 | 18.1 | 17.2 | ↓ | -5.1% | 95.2 | 103.3 | ↑ | 8.5% |
| Offpeak | 25.1 | 26.7 | 25.1 | ↓ | -5.7% | 32.2 | 37.8 | ↑ | 17.4% |
| Weekend | 20.4 | 22.0 | 20.4 | ↓ | -7.4% | 60.5 | 71.0 | ↑ | 17.3% |
| All Day | 20.3 | 21.5 | 20.3 | ↓ | -5.6% | 64.5 | 71.9 | ↑ | 11.5% |
| Season | | | | | | | | | |
| All Year | 20.3 | 21.5 | 20.3 | ↓ | -5.6% | 64.5 | 71.9 | ↑ | 11.5% |
| Summer | 21.2 | 22.4 | 21.2 | ↓ | -5.2% | 58.1 | 64.8 | ↑ | 11.5% |
| Carriageway | | | | | | | | | |
| Single | 13.1 | 13.1 | 13.1 | ↓ | -0.2% | 117.0 | 115.3 | ↓ | -1.5% |
| Dual | 23.1 | 24.9 | 23.1 | ↓ | -7.5% | 53.1 | 62.4 | ↑ | 17.4% |
| Location | | | | | | | | | |
| Urban | 19.1 | 20.3 | 19.1 | ↓ | -5.7% | 69.8 | 77.6 | ↑ | 11.2% |
| Rural | 30.3 | 31.9 | 30.3 | ↓ | -5.0% | 35.4 | 40.5 | ↑ | 14.3% |

Regional MRN Congestion Data – North East

| | Free Flow Speed (mph) | Average Speed (mph) | | | Delay (spvpm) | | | | |
|---------------------|-----------------------|---------------------|------|--------|---------------|------|--------|---|-------|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | | |
| Overall | | | | | | | | | |
| North East | 27.0 | 26.5 | 27.0 | ↑ | 1.9% | 39.1 | 39.5 | ↑ | 1.0% |
| Time Periods | | | | | | | | | |
| AM | 25.7 | 24.9 | 25.7 | ↑ | 2.9% | 47.6 | 46.5 | ↓ | -2.3% |
| Interpeak | 27.0 | 26.4 | 27.0 | ↑ | 2.1% | 39.6 | 39.7 | ↑ | 0.3% |
| PM | 25.3 | 25.1 | 25.3 | ↑ | 0.9% | 46.7 | 48.3 | ↑ | 3.5% |
| Offpeak | 30.1 | 29.7 | 30.1 | ↑ | 1.6% | 25.4 | 26.3 | ↑ | 3.8% |
| Weekend | 27.8 | 27.1 | 27.8 | ↑ | 2.8% | 36.3 | 35.6 | ↓ | -1.9% |
| All Day | 27.0 | 26.5 | 27.0 | ↑ | 1.9% | 39.1 | 39.5 | ↑ | 1.0% |
| Season | | | | | | | | | |
| All Year | 27.0 | 26.5 | 27.0 | ↑ | 1.9% | 39.1 | 39.5 | ↑ | 1.0% |
| Summer | 27.1 | 27.0 | 27.1 | ↑ | 0.4% | 37.9 | 39.7 | ↑ | 4.9% |
| Carriageway | | | | | | | | | |
| Single | 24.1 | 24.0 | 24.1 | ↑ | 0.4% | 39.1 | 41.3 | ↑ | 5.5% |
| Dual | 29.1 | 28.3 | 29.1 | ↑ | 2.9% | 39.1 | 38.4 | ↓ | -1.7% |
| Location | | | | | | | | | |
| Urban | 21.5 | 20.9 | 21.5 | ↑ | 3.0% | 57.4 | 57.4 | ↓ | 0.0% |
| Rural | 33.5 | 33.4 | 33.5 | ↑ | 0.4% | 25.2 | 26.0 | ↑ | 3.1% |

Regional MRN Congestion Data – North West

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | | |
|---------------------|-----------------------|---------------------|------|--------|-------|---------------|------|--------|-------|
| | | 2019 | 2023 | Change | | 2019 | 2023 | Change | |
| Overall | | | | | | | | | |
| North West | 24.1 | 23.9 | 24.1 | ↑ | 0.6% | 45.3 | 45.4 | ↑ | 0.2% |
| Time Periods | | | | | | | | | |
| AM | 22.7 | 22.2 | 22.7 | ↑ | 2.2% | 56.7 | 54.1 | ↓ | -4.5% |
| Interpeak | 23.5 | 23.5 | 23.5 | ↓ | -0.2% | 47.5 | 48.8 | ↑ | 2.6% |
| PM | 21.6 | 21.3 | 21.6 | ↑ | 1.5% | 63.6 | 62.2 | ↓ | -2.2% |
| Offpeak | 28.9 | 28.9 | 28.9 | ↑ | 0.0% | 20.3 | 21.3 | ↑ | 4.8% |
| Weekend | 25.2 | 25.5 | 25.2 | ↓ | -1.2% | 36.1 | 38.7 | ↑ | 7.2% |
| All Day | 24.1 | 23.9 | 24.1 | ↑ | 0.6% | 45.3 | 45.4 | ↑ | 0.2% |
| Season | | | | | | | | | |
| All Year | 24.1 | 23.9 | 24.1 | ↑ | 0.6% | 45.3 | 45.4 | ↑ | 0.2% |
| Summer | 25.0 | 24.8 | 25.0 | ↑ | 0.9% | 41.3 | 41.2 | ↓ | -0.3% |
| Carriageway | | | | | | | | | |
| Single | 23.9 | 23.7 | 23.9 | ↑ | 0.8% | 41.7 | 41.8 | ↑ | 0.3% |
| Dual | 24.2 | 24.1 | 24.2 | ↑ | 0.5% | 48.7 | 48.7 | ↑ | 0.2% |
| Location | | | | | | | | | |
| Urban | 18.3 | 18.3 | 18.3 | ↑ | 0.4% | 67.9 | 68.7 | ↑ | 1.1% |
| Rural | 34.1 | 33.5 | 34.1 | ↑ | 1.6% | 24.5 | 23.7 | ↓ | -3.3% |

Regional MRN Congestion Data – South East

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | | |
|---------------------|-----------------------|---------------------|------|--------|-------|---------------|------|--------|-------|
| | | 2019 | 2023 | Change | | 2019 | 2023 | Change | |
| Overall | | | | | | | | | |
| South East | 27.0 | 27.0 | 27.0 | ↑ | 0.0% | 38.7 | 39.1 | ↑ | 1.0% |
| Time Periods | | | | | | | | | |
| AM | 25.3 | 25.0 | 25.3 | ↑ | 1.3% | 49.5 | 48.0 | ↓ | -2.9% |
| Interpeak | 26.9 | 27.1 | 26.9 | ↓ | -0.6% | 38.3 | 39.6 | ↑ | 3.3% |
| PM | 24.4 | 24.2 | 24.4 | ↑ | 0.9% | 53.9 | 52.9 | ↓ | -1.8% |
| Offpeak | 31.6 | 31.8 | 31.6 | ↓ | -0.4% | 19.1 | 20.0 | ↑ | 4.6% |
| Weekend | 27.7 | 28.1 | 27.7 | ↓ | -1.6% | 33.3 | 35.7 | ↑ | 7.2% |
| All Day | 27.0 | 27.0 | 27.0 | ↑ | 0.0% | 38.7 | 39.1 | ↑ | 1.0% |
| Season | | | | | | | | | |
| All Year | 27.0 | 27.0 | 27.0 | ↑ | 0.0% | 38.7 | 39.1 | ↑ | 1.0% |
| Summer | 27.6 | 27.5 | 27.6 | ↑ | 0.3% | 36.9 | 36.9 | ↓ | 0.0% |
| Carriageway | | | | | | | | | |
| Single | 24.5 | 24.8 | 24.5 | ↓ | -1.0% | 40.7 | 41.6 | ↑ | 2.3% |
| Dual | 30.2 | 29.8 | 30.2 | ↑ | 1.3% | 36.6 | 36.4 | ↓ | -0.6% |
| Location | | | | | | | | | |
| Urban | 18.0 | 18.1 | 18.0 | ↓ | -0.6% | 71.3 | 72.7 | ↑ | 2.0% |
| Rural | 34.2 | 34.1 | 34.2 | ↑ | 0.2% | 25.0 | 25.1 | ↑ | 0.4% |

Regional MRN Congestion Data – South West

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | |
|---------------------|-----------------------|---------------------|------|---------|------|---------------|---------|--|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | |
| Overall | | | | | | | | |
| South West | 27.1 | 27.1 | 27.1 | ↑ 0.2% | 36.4 | 35.4 | ↓ -2.6% | |
| Time Periods | | | | | | | | |
| AM | 25.8 | 25.4 | 25.8 | ↑ 1.6% | 45.0 | 42.0 | ↓ -6.6% | |
| Interpeak | 26.4 | 26.6 | 26.4 | ↓ -0.7% | 38.4 | 38.7 | ↑ 0.6% | |
| PM | 24.8 | 24.4 | 24.8 | ↑ 1.5% | 50.6 | 47.7 | ↓ -5.8% | |
| Offpeak | 31.9 | 32.2 | 31.9 | ↓ -0.9% | 15.9 | 16.3 | ↑ 2.4% | |
| Weekend | 28.1 | 28.3 | 28.1 | ↓ -0.8% | 30.3 | 30.6 | ↑ 0.8% | |
| All Day | 27.1 | 27.1 | 27.1 | ↑ 0.2% | 36.4 | 35.4 | ↓ -2.6% | |
| Season | | | | | | | | |
| All Year | 27.1 | 27.1 | 27.1 | ↑ 0.2% | 36.4 | 35.4 | ↓ -2.6% | |
| Summer | 27.3 | 27.5 | 27.3 | ↓ -0.6% | 35.0 | 34.9 | ↓ -0.3% | |
| Carriageway | | | | | | | | |
| Single | 27.9 | 28.2 | 27.9 | ↓ -1.1% | 31.6 | 31.3 | ↓ -1.0% | |
| Dual | 25.8 | 25.1 | 25.8 | ↑ 2.4% | 45.4 | 43.3 | ↓ -4.5% | |
| Location | | | | | | | | |
| Urban | 18.0 | 18.1 | 18.0 | ↓ -0.2% | 70.2 | 69.8 | ↓ -0.7% | |
| Rural | 33.1 | 33.3 | 33.1 | ↓ -0.3% | 23.7 | 23.1 | ↓ -2.7% | |

Regional MRN Congestion Data – West Midlands

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | |
|---------------------|-----------------------|---------------------|------|---------|------|---------------|---------|--|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | |
| Overall | | | | | | | | |
| West Midlands | 24.7 | 24.9 | 24.7 | ↓ -1.0% | 42.3 | 42.4 | ↑ 0.2% | |
| Time Periods | | | | | | | | |
| AM | 23.4 | 23.3 | 23.4 | ↑ 0.3% | 52.0 | 50.1 | ↓ -3.7% | |
| Interpeak | 24.0 | 24.5 | 24.0 | ↓ -2.2% | 44.5 | 46.4 | ↑ 4.2% | |
| PM | 22.1 | 22.0 | 22.1 | ↑ 0.2% | 61.1 | 59.3 | ↓ -2.9% | |
| Offpeak | 29.5 | 29.9 | 29.5 | ↓ -1.4% | 18.8 | 19.2 | ↑ 2.2% | |
| Weekend | 26.3 | 26.9 | 26.3 | ↓ -2.2% | 31.5 | 33.0 | ↑ 4.8% | |
| All Day | 24.7 | 24.9 | 24.7 | ↓ -1.0% | 42.3 | 42.4 | ↑ 0.2% | |
| Season | | | | | | | | |
| All Year | 24.7 | 24.9 | 24.7 | ↓ -1.0% | 42.3 | 42.4 | ↑ 0.2% | |
| Summer | 25.6 | 25.9 | 25.6 | ↓ -1.2% | 38.0 | 38.3 | ↑ 0.8% | |
| Carriageway | | | | | | | | |
| Single | 25.0 | 25.3 | 25.0 | ↓ -0.9% | 39.1 | 39.5 | ↑ 1.0% | |
| Dual | 24.3 | 24.6 | 24.3 | ↓ -1.2% | 45.3 | 45.1 | ↓ -0.4% | |
| Location | | | | | | | | |
| Urban | 18.4 | 18.6 | 18.4 | ↓ -1.0% | 67.1 | 66.8 | ↓ -0.4% | |
| Rural | 35.4 | 36.0 | 35.4 | ↓ -1.7% | 20.1 | 20.8 | ↑ 3.5% | |

Regional MRN Congestion Data – Yorkshire and the Humber

| | Free Flow Speed (mph) | Average Speed (mph) | | | | Delay (spvpm) | | | |
|--------------------------|--------------------------|---------------------|------|--------|-------|---------------|--------|---|-------|
| | | 2019 | 2023 | Change | 2019 | 2023 | Change | | |
| Overall | | | | | | | | | |
| Yorkshire and the Humber | 25.9 | 25.7 | 25.9 | ↑ | 0.9% | 36.4 | 36.1 | ↓ | -1.0% |
| Time Periods | | | | | | | | | |
| AM | 24.6 | 24.1 | 24.6 | ↑ | 2.2% | 45.5 | 43.1 | ↓ | -5.3% |
| Interpeak | 24.9 | 25.0 | 24.9 | ↓ | -0.2% | 39.7 | 40.9 | ↑ | 2.8% |
| PM | 23.5 | 23.0 | 23.5 | ↑ | 2.1% | 52.2 | 49.8 | ↓ | -4.7% |
| Offpeak | 31.1 | 31.0 | 31.1 | ↑ | 0.3% | 13.1 | 13.7 | ↑ | 4.9% |
| Weekend | 27.0 | 27.1 | 27.0 | ↓ | -0.4% | 28.8 | 30.0 | ↑ | 4.1% |
| All Day | 25.9 | 25.7 | 25.9 | ↑ | 0.9% | 36.4 | 36.1 | ↓ | -1.0% |
| Season | | | | | | | | | |
| All Year | 25.9 | 25.7 | 25.9 | ↑ | 0.9% | 36.4 | 36.1 | ↓ | -1.0% |
| Summer | 26.7 | 26.4 | 26.7 | ↑ | 1.3% | 33.6 | 32.8 | ↓ | -2.3% |
| Carriageway | | | | | | | | | |
| Single | 26.3 | 26.2 | 26.3 | ↑ | 0.4% | 33.6 | 33.8 | ↑ | 0.7% |
| Dual | 25.0 | 24.5 | 25.0 | ↑ | 2.1% | 43.7 | 41.9 | ↓ | -4.3% |
| Location | | | | | | | | | |
| Urban | 19.2 | 19.0 | 19.2 | ↑ | 0.8% | 59.4 | 58.7 | ↓ | -1.2% |
| Rural | 34.0 | 33.7 | 34.0 | ↑ | 0.9% | 20.8 | 20.7 | ↓ | -0.4% |