

This annual report tracks the safety of the main 'A' roads where most of Britain's roads deaths are concentrated, and which can be targeted.

This year's survey shows, overall, the number of deaths on Britain's roads has changed little since 2011. For the first time, the surveys compare the major route networks which are the responsibilities of different authorities.

Striking progress has been made in Scotland. Over three years, the risk of death and serious injury has fallen by 6-7% on both the roads managed both by national government (motorways and all major routes) and on all other local authority 'A' roads. Scotland notably has adopted international best practice by having a formal target for casualty reduction with detailed supporting partnerships. Travel on Scottish major routes now has a death and serious injury rate of 13 per billion vehicle kilometres, the safest in Britain and one of the safest in the world. Scotland now has the lowest deaths per head in Britain overall.

The risk of death and serious injury on the network managed by the Welsh government is nearly 40% higher (18 fatal and serious crashes per billion vehicle kilometres) than in Scotland.

In England, the management of major routes is being changed. A new Major Road Network (MRN) is being created to complement the relatively sparse Strategic Road Network (SRN) run by Highways England (a network dominated by heavily trafficked motorways and high-quality dual carriageways). This new local authority run MRN will receive part-funding from the same pot as the SRN.

**When England's networks of strategic and major roads are combined the risk is 15 fatal and serious crashes per billion vehicle kilometres - safer than the equivalent Welsh network (18) but not as safe as Scotland's (13).**

The safety of strategic and major roads in England is of vital national importance to casualty reduction as nearly a quarter of all English road deaths are concentrated on this relatively short length.

However, the report reveals that it is the poor performance of the newly defined Major Road Network which is disturbing - more than 4 times riskier (35 fatal and serious crashes per billion vehicle kilometres) to travel on than Highways England's Strategic Road Network (8). Despite being only slightly longer and only carrying one third of the traffic, there were more deaths on the Major Road Network in 2017 (212 deaths).

By creating the network, Ministers have created a significant opportunity to act and address its safety as a first priority. The report highlights though that the government is yet to commit to safety performance goals for this complementary Major Road Network in the same disciplined way as for the Strategic Road Network.

The safety (and reliability) of England's Major Road Network can be tackled with packages of investment along whole routes identified by modern safety engineering tools. These generate very high economic returns (not least benefitting regional health and long-term care budgets). Leading authorities are already in the vanguard of this work.

This annual report identifies Britain's most improved roads and persistently higher risk roads. It calls for a new tranche of high return investment from the successful Safer Roads Fund to address 75 persistently higher risk road sections identified.

Corresponding author: Brian Lawton  
brian.lawton@roadsafetyfoundation.org

Road Safety Foundation  
Worting House  
Basingstoke  
Hampshire  
RG23 8PX

icanhelp@roadsafetyfoundation.org

Road Safety Foundation is registered  
in England & Wales under company  
number 02069723. Registered UK  
Charity number 295573.

Registered office: 60 Trafalgar Square,  
London, WC2N 5DS, UK.

© Copyright Road Safety  
Foundation 2019.

Content from this report, except for  
photographs, maps and illustrations,  
may be reproduced for non-commercial  
purposes providing the source is  
acknowledged.

Published by the Road Safety  
Foundation, July 2019.

Publication No.: RSF 01/2019

British EuroRAP Results 2019

# HOW SAFE ARE YOU ON BRITAIN'S MAIN ROAD NETWORKS?

In partnership with Ageas

ageas

FOUND  
ROAD  
SAFETY  
ATION

EuroRAP  
EUROPEAN ROAD ASSESSMENT PROGRAMME





# How Safe Are You on Britain's Main Road Networks?

## CONTENTS

2	HOW SAFE ARE BRITAIN'S MAIN ROAD NETWORKS?
11	KEY FINDINGS
19	PERFORMANCE TRACKING ANALYSIS
27	RISK MAP OF GREAT BRITAIN
34	COMPARING NETWORK PERFORMANCE BY COUNTRY
41	STRATEGIC ROAD RISK MAP
49	EXPLORATORY URBAN VERSUS RURAL ROAD ANALYSIS
65	REGIONAL AND NETWORK COMPARISONS IN ENGLAND
75	SOCIETAL COST AND PRIORITIES FOR INVESTMENT
83	ABOUT OUR WORK
86	ABOUT US
89	ACKNOWLEDGEMENTS



# FOREWORDS

**Our main road networks need to be safe. So much of our travel is on these intensely used networks that any flaw in their in-built safety means tragedy sooner rather than later.**



**LORD WHITTY OF CAMBERWELL**  
Chairman,  
Road Safety Foundation

England's Strategic Road Network is the most intensely used of all Britain's main road networks. It is only 4,300 miles long but carries a third of the nation's road travel.

This report shows that even though this network is by far the safest, more than 200 people lost their lives on it during 2017 alone. There remains significant room for improvement and Highways England's systematic approach towards a goal of preventing all death and injury by 2040 is showing what needs to be done. But plans need to be put into action as quickly as possible.

This report shows that years of work in Scotland during this decade have delivered results. Scotland has set formal casualty reduction targets - and more importantly established the detailed multi-agency partnerships working to deliver them. Coming from behind, Scotland's main road network is now safer than England's and is also significantly safer than that of Wales.

Scotland's devolved government, like that in Wales, manages a more extensive major route network of motorways and trunk roads from central government.

The government in England too has now defined a new major road network to complement the sparse network run by Highways England: this major road network, run by local authorities, will be part funded from the same pot. The newly defined major road network offers a significant opportunity as the findings of this report are disturbing. The major road network is over four times riskier to travel on than Highways England's network. It carries one third of the travel that takes place on the strategic road network and, despite being only slightly longer, more people lost their lives on it in 2017.

I am grateful to Ageas for their continuing support that makes this important annual report possible. This year's report identifies two clear actions the government can take immediately which will both reduce road trauma significantly and deliver high economic returns.

The first action is to set disciplined safety goals for the new major road network which complement those already in place for the strategic road network. By 2030, England's major road network must be made safe.

The second action is to release the next tranche of funding from the successful Safer Road Fund to address the 75 persistently higher risk roads identified in this report.

**Ageas has supported the Road Safety Foundation in preparing this important annual report since 2012. The report shines a light on the road trauma that takes place on thousands of individual road sections across Britain.**



**ANDY WATSON**  
Chief Executive,  
Ageas (UK) Limited

We believe it is part of Ageas's role to help reduce death and injury on the road. As one of Britain's largest motor insurers, our employees handle the distress and practical consequences of road crashes that our customers face daily.

We're proud that our continuous support for the Road Safety Foundation has allowed the impact of their work to accumulate. Today, authorities across Britain are making changes to their road networks as a direct consequence of the charity's analysis and work. Highways England has inspected their entire network to measure its in-built safety and develop major investment plans. Some 30 local authorities are implementing improvements to the 50 highest risk 'A' roads identified by this annual report.

This annual report is continuously improving too. Last year, the analysis was based on a completely new digital database. This year, for the first time, the analysis compares the performance of main road networks which are the responsibility of different authorities.

Some exploratory analysis has been prepared for consultation with professionals which looks deeper into urban main road crashes.

Overall, this detailed analysis covers the roads which carry 60% of all Britain's road deaths. The report makes two very clear recommendations and Ageas fully supports both.

Firstly, the safety of the newly defined major road network in England requires urgent improvement. It cannot be right that it is more than four times riskier for our customers to travel on this network of national importance than on our busiest motorways and trunk roads. The safety of this major road network needs to be managed with the same professionalism.

Secondly, the 75 road sections which this report finds are persistently higher risk need immediate attention. Human trauma and suffering aside, this report reveals the estimated societal cost of reported serious crashes alone on these road sections exceeded £1bn in the last three year survey period. The government's innovative and successful Safer Road Fund has shown how quickly effective action can be taken. Ageas believes it should release the next tranche of funding to tackle these persistently higher risk roads without delay.



# HOW SAFE ARE BRITAIN'S MAIN ROAD NETWORKS

1,793 people were killed on Britain's roads in 2017, a figure which has changed little since 2011 despite on-going improvements in the safety of vehicles on the road. Last year's report called for action to 'get back on track' to meet international road safety targets and break the stagnating number of road deaths in Great Britain. One of the key opportunities now recognised globally<sup>1</sup> is targeted action on infrastructure safety addressing the roads on which road trauma is concentrated.

The report suggested that if Britain were to get back on track towards zero road deaths by 2050, it must return to actions which result in halving road deaths every decade. This will require applying specific safety management skills with dedicated budgets such as the Safer Roads Fund rather than relying on safety being delivered as a by-product of other programmes.

The UK's initiative in establishing the innovative Safer Roads Fund was presented by the government at a Ministerial conference of 33 European nations in 2017. It is now cited as an example of international best practice. The Safer Roads Fund demonstrated that a £100 million investment could prevent an estimated 1,450 fatal and serious injuries over its economic life with a benefit-cost ratio at least as high as any other in the transport budget.

This year's report provides a fresh look at the safety performance of the individual road networks managed by different authorities which together make up Britain's main road network. In total, 60% of all deaths are concentrated on the 12.5% of road length surveyed in this report.

There are key opportunities revealed particularly in:

- ➔ Tackling Britain's persistently high risk 'A' roads through a next tranche of funding from the Safer Roads Fund (see Societal Cost and Priorities for Investment section)
- ➔ Introducing formal safety performance management to the new Major Road Network so it complements the systematic discipline already being applied to the Strategic Road Network (see recommendations at the end of this section) in line with WHO recommendations.

<sup>1</sup> [www.who.int/violence\\_injury\\_prevention/road\\_traffic/12GlobalRoadSafetyTargets.pdf](http://www.who.int/violence_injury_prevention/road_traffic/12GlobalRoadSafetyTargets.pdf)



BRITAIN’S ROAD NETWORKS

In each country of Great Britain, there are strategic roads (comprising most motorways and some ‘A’ roads (sometimes known as trunk roads)) which are overseen by national governments and important ‘A’ roads (and just 40 miles of motorway) managed by local authorities.

In England, the Strategic Road Network (SRN) is managed by Highways England. Motorways and strategic ‘A’ roads in Scotland and Wales are managed by Transport Scotland and the Welsh Government respectively. The network of strategic roads in Scotland and Wales is much more extensive than that in England, with many major local ‘A’ roads being included in these networks in the 1990s following local government reform.

Meanwhile, in England, there has been de-trunking (changing from strategic to local oversight) so that a number of single carriageway roads have been passed to local government. The SRN accounts for 21% of the motorway and ‘A’ road network in England and 56% of the traffic, whereas Scottish motorways and strategic ‘A’ roads account for 31% of the length and 64% of traffic and Welsh strategic roads account for 39% of the length and 60% of the traffic.

The government has committed to create and invest in a Major Roads Network (MRN) to support the SRN.

This will contain the most important local ‘A’ roads and continue to be managed by local authorities.

When combined, the SRN and MRN in England carries a similar proportion of the fatal and serious crashes as strategic roads in Scotland and Wales, and together they have a similar crash risk per billion vehicle kilometres as strategic roads in Scotland and Wales. In this report it makes sense to combine results on the SRN and MRN in England to provide a useful comparison with Scottish and Welsh motorways and strategic ‘A’ roads. The devolved government structures in Scotland and Wales mean these government effectively act as both a strategic and major road authority.

TABLE 1: ROAD LENGTH (KM) ON DIFFERENT NETWORK TYPES IN EACH COUNTRY OF GREAT BRITAIN

	England		Scotland	Wales
Strategic motorways and ‘A’ roads	MRN	7,253km (22%)	3,323km (31%)	1,695km (39%)
	SRN	6,881km (21%)		
	SRN+MRN	14,404km (43%)		
Local authority ‘A’ roads and motorways <sup>2</sup>	19,029km (57%)		7,235km (69%)	2,653 (61%)

<sup>2</sup> Excluding proposed MRN in England

While the strategic road flows in Scotland and Wales are slightly lower proportionally (reflecting population density), the function of these roads remains to link people and places and so they have similarities to the aims of the SRN and MRN in England.

TABLE 2: ANNUAL TRAFFIC (BILLION VEHICLE-KILOMETRES) ON DIFFERENT NETWORK TYPES IN EACH COUNTRY OF GREAT BRITAIN (2015-2017)

	England		Scotland	Wales
Strategic motorways and ‘A’ roads	MRN	64 (19%)	23 (64%)	13 (60%)
	SRN	193 (56%)		
	SRN+MRN	257 (75%)		
Local authority ‘A’ roads and motorways <sup>3</sup>	85 (25%)		13 (36%)	9 (40%)

PERFORMANCE ON BRITISH NETWORKS

Table 3 shows the percentage change in crash risk between 2012-14 and 2015-17 by country and network. This shows there has been little change in crash risk in England, though if considered separately from the SRN, the MRN has shown a 2% reduction in risk.

In Wales risk has gone up on strategic roads by 4% and reduced by 3% on local authority roads. In Scotland, risk has reduced by 6% and 7% on the strategic and local roads respectively.

TABLE 3: PERCENTAGE CHANGE IN CRASH RISK (FATAL AND SERIOUS CRASHES PER BILLION VEHICLE KILOMETRES TRAVELLED) FROM 2012-14 TO 2015-17

	England		Scotland	Wales
Strategic motorways and ‘A’ roads	MRN	-2%	-6%	+4%
	SRN	+3%		
	SRN+MRN	-1%		
Local authority ‘A’ roads and motorways <sup>4</sup>	+1%		-7%	-3%

<sup>3</sup> Excluding proposed MRN in England

<sup>4</sup> Excluding proposed MRN in England



There is some evidence to support the view that countries achieve better casualty reduction when they adopt a formal casualty reduction target to mobilise and coordinate action. The significant improvement in Scotland may reflect the national casualty reduction targets adopted by the Scottish Government which has resulted in a partnership of all stakeholder authorities, agencies and NGOs adopting the same targets and putting in place supporting road safety strategies and action plans. In 2017, Scotland’s performance on its main roads helped its national fatality rate per million population to fall to 27 and so, for the first time, below that of England (28). The per capita rate for Wales was 33.

TABLE 4: ANNUAL AVERAGE NUMBER OF FATAL AND SERIOUS CRASHES ON DIFFERENT NETWORK TYPES IN EACH COUNTRY OF GREAT BRITAIN (2015-2017)

	England		Scotland	Wales
Strategic motorways and 'A' roads	MRN	2,230 (25%)	297 (36%)	236 (43%)
	SRN	1,603 (18%)		
	SRN+MRN	3,833 (43%)		
Local authority 'A' roads and motorways <sup>5</sup>	5,102 (57%)		529 (64%)	315 (57%)

TABLE 5: FATAL AND SERIOUS CRASHES PER BILLION VEHICLE KILOMETRES ON DIFFERENT NETWORK TYPES IN EACH COUNTRY OF GREAT BRITAIN (2015-2017)

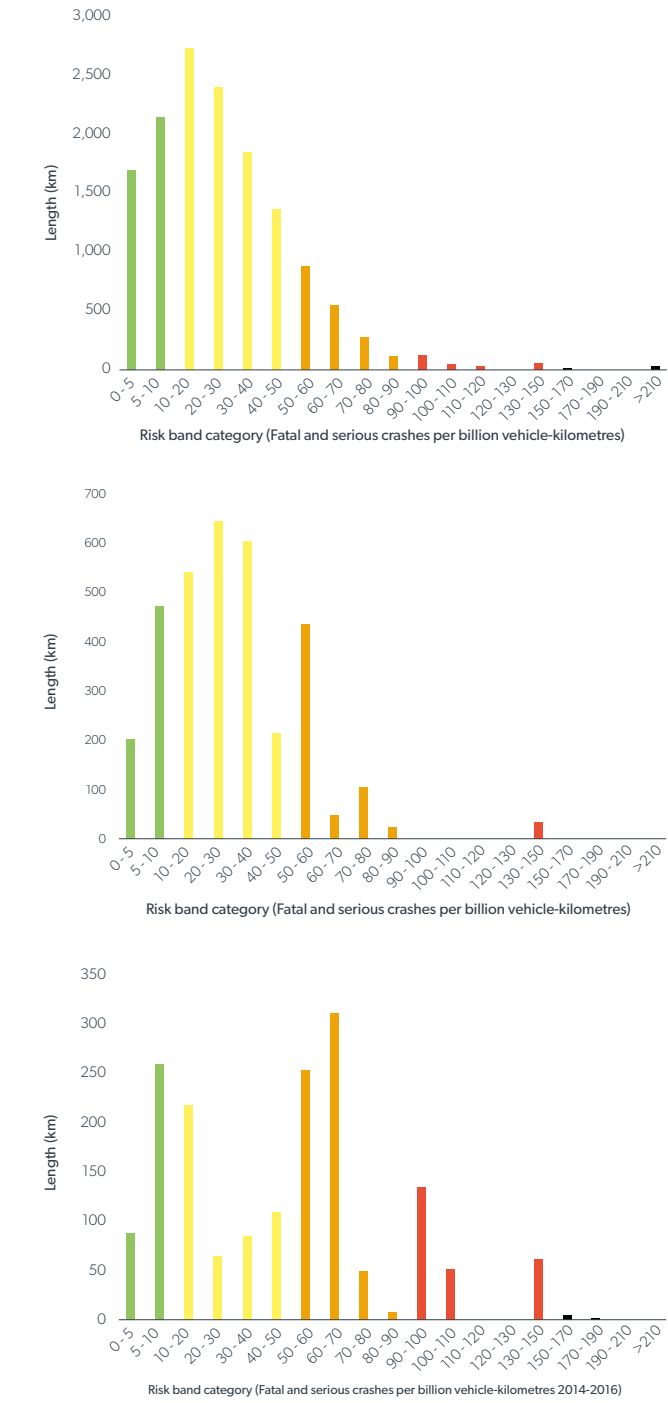
	England		Scotland	Wales
Strategic motorways and 'A' roads	MRN	35	13	18
	SRN	8		
	SRN+MRN	15		
Local authority 'A' roads and motorways <sup>6</sup>	60		41	26

<sup>5</sup> Excluding proposed MRN in England

<sup>6</sup> Excluding proposed MRN in England

Figure 1 shows the risk distributions for the English SRN and MRN combined, Scottish strategic roads and Welsh strategic roads.

FIGURE 1: RISK RATE DISTRIBUTION FOR ENGLISH SRN AND MRN COMBINED (TOP), SCOTTISH STRATEGIC ROADS (MIDDLE) AND WELSH STRATEGIC ROADS (BOTTOM)<sup>7</sup>



In England, crash risk is lowest on the SRN. However, it is more than four times as high on the MRN and is nearly twice as high again on local authority non-MRN roads.

On the SRN, 'A' roads alone are half the risk of roads on the MRN. Only 10% of travel on the MRN is on low risk sections, and 18% of travel is on medium or higher risk sections (compared to just 1% of travel on strategic roads). These roads should therefore be tackled as a priority to ensure that they are as safe as should be expected of major roads.

<sup>7</sup> Risk bandings: Black = high risk, red = medium-high risk, orange = medium-risk, yellow = low-medium risk and green = low-risk





OPPORTUNITIES ON BRITISH NETWORKS

The international and European aspiration<sup>8</sup> is that, by 2050, we should achieve close to zero road deaths meaning road travel would be as safe as air and rail.

Both Highways England and TfL have committed to as close as possible to zero harm on their networks by 2040 while other authorities have committed to vision zero but have not put a timescale against this commitment.

TABLE 6: SHORT-TERM TARGETS AND LONG-TERM VISIONS BY NETWORK

Network	Fatality reduction target	Long term vision
English SRN	40% reduction in KSIs against the 2005-09 average baseline by 2020.	Close as possible to zero harm by 2040
English MRN	None	None
English non-MRN local roads excluding TLRN	A few local authorities have adopted a casualty reduction target	A few local authorities have started to move towards Safe Systems/Vision Zero
Transport for London (TLRN)	65% fewer killed or seriously injured than 2005-09 baseline by 2022	By 2041 all fatal and serious injuries will be eliminated
Scottish strategic	40% reduction from 2010 baseline by 2020	A steady reduction in the numbers of those killed and those seriously injured, with the ultimate vision of a future where no-one is killed on Scotland's roads, and the injury rate is much reduced (timescale not specified)
Scottish local	Typically, local authorities have adopted the national casualty reduction target of 40% reduction from 2010 baseline by 2020	
Welsh strategic	40% reduction from 2004-08 baseline (844 KSIs) by 2020	Reaffirmed commitment to vision zero (timescale not specified)
Welsh local	There are national casualty reduction targets (the same as those for strategic roads) that have been adopted by the Welsh Local Government Association; the extent to which these are adopted at the local level is unknown	Reaffirmed commitment to vision zero (timescale not specified)

Only one of these road authorities has a specific commitment relating to the measurable safety performance of its road infrastructure (i.e. a performance indicator that relates to infrastructure safety).

Highways England has committed that, by 2020, 90% of travel will be on 3-star roads or above

Highways England has undertaken an iRAP survey and will repeat the exercise in 2020, allowing the organisation to understand where high return road infrastructure investment may reduce casualties, and what level of investment would be required to achieve desired levels of casualty reduction.

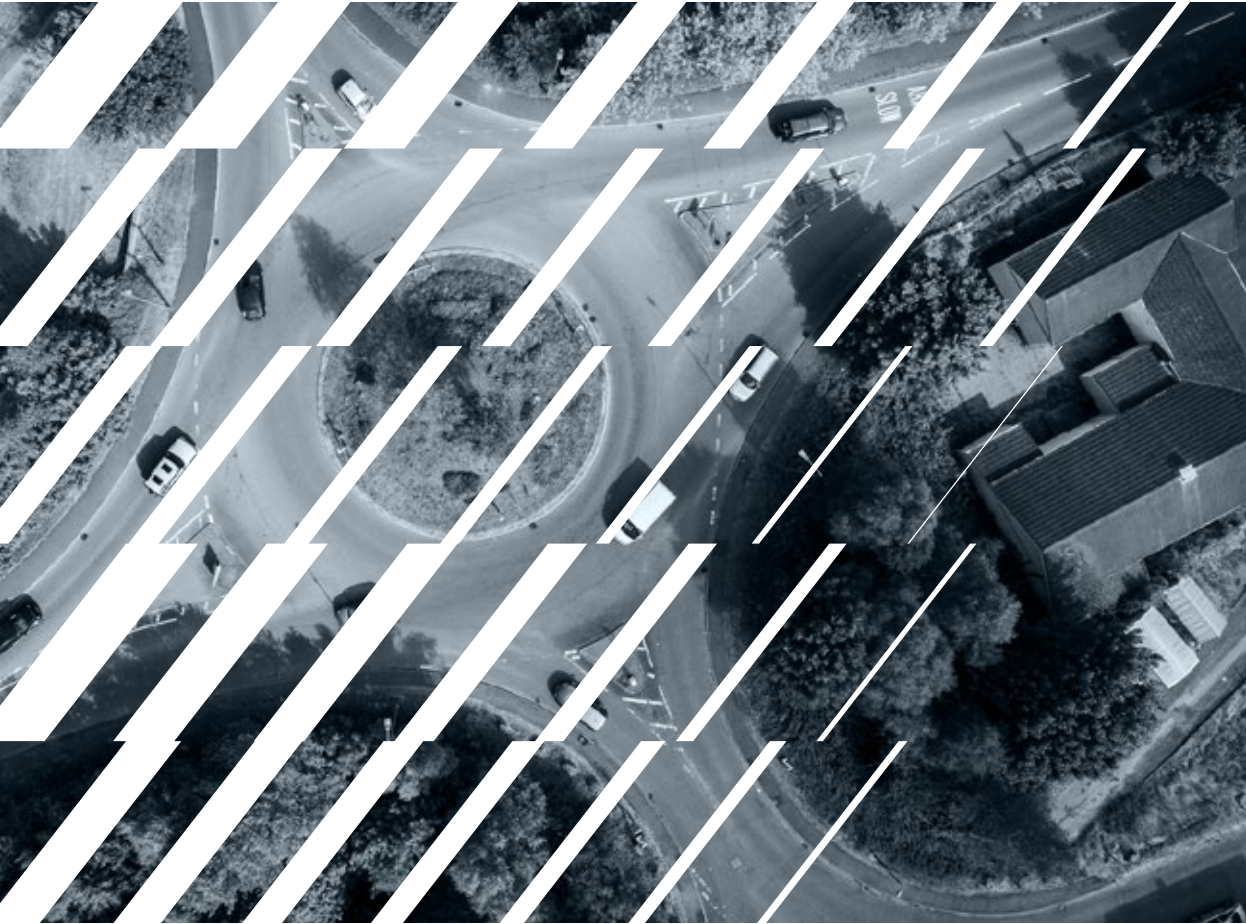
<sup>8</sup>[https://ec.europa.eu/transport/road\\_safety/what-we-do\\_en](https://ec.europa.eu/transport/road_safety/what-we-do_en)



It would seem reasonable to focus attention on reducing fatalities to zero on strategic and major roads (including major roads in cities) by 2040, with similar endeavours to achieve zero fatalities on local roads by 2050. Table 7 provides a very basic indication of how fatal crash numbers might need to change over the coming decades to reach these long-term ambitions.

TABLE 7: HALVING FATAL CRASHES EVERY DECADE FROM 2017 BY NETWORK

Network	Fatal crashes in 2017	Fatal crashes by 2020	Fatal crashes by 2030	Fatal crashes by 2040	Fatal crashes by 2050
English SRN	207	168	84	42	21
English MRN	212	172	86	43	22
English non-MRN local roads excluding TLRN	394	320	160	80	40
Transport for London TLRN	45 <sup>9</sup>	37	18	9	5
Scottish strategic	39	32	16	8	4
Scottish local	66	54	27	13	7
Welsh strategic	30	24	12	6	3
Welsh local	34	28	14	7	3



<sup>9</sup>12 of these were also on the MRN

Achieving the necessary crash/casualty reduction will require re-invigoration of approach.

**FOR STRATEGIC ROADS IN ENGLAND, SCOTLAND AND WALES THIS WILL MEAN:**

1. Setting ambitious targets for the next decade to 2030 (with interim targets for 2025)
2. Measuring the baseline safety performance of road infrastructure at 2020, and setting infrastructure performance indicators that will drive performance to 2025 and 2030
3. Adopting proactive survey methodologies already used by Highways England in line with WHO performance reporting recommendations that can also help support evaluation of where the greatest casualty reduction opportunities lie across these networks and the levels of investment necessary to achieve goals

**FOR THE MAJOR ROAD NETWORK IN ENGLAND THIS WILL MEAN:**

1. Setting ambitious targets for 2030 (with interim targets for 2025) to complement those of the SRN
2. Measuring the baseline safety performance of MRN road infrastructure at 2020 to complement the SRN inspections as being piloted by leading local authorities and setting infrastructure performance indicators that will drive performance to 2025 and 2030
3. Adopting iRAP proactive survey methodologies to complement the SRN that will indicate where the greatest casualty reduction opportunities lie across the MRN and levels of investment necessary to achieve goals
4. Ensuring that funding criteria for the MRN enable major projects which raise the safety performance of whole routes ('Safer Road Investment Plans')
5. Ensuring adequate human resource and training is available to analyse safety performance, and plan and implement safety remedial measures

**FOR MAJOR URBAN NETWORKS (E.G. THOSE MANAGED BY TRANSPORT FOR LONDON, TRANSPORT FOR GREATER MANCHESTER ETC.) THIS WILL MEAN:**

1. Setting ambitious targets for 2030 (possibly 2025 as an interim), for some authorities building on the foundations of 2020 casualty reduction targets
2. Determining a methodology for representing risk across a city road network and benchmarking performance through the establishment of an urban risk benchmarking group
3. Ensuring adequate human resource and training is available to analyse safety performance, and plan and implement safety remedial measures
4. Considering application of proactive risk management approaches (e.g. iRAP urban), allowing performance indicators to be set to 2025 and 2030 and allowing scoping of investment packages

**FOR OTHER LOCAL 'A' ROADS THIS WILL MEAN:**

1. Baselining and setting ambitious casualty reduction targets for 2030 at a local level
2. Setting infrastructure performance indicators for higher flow roads that will drive performance
3. Focusing on treating priority roads – those that are persistently higher risk or have unacceptable levels of risk in the first instance
4. Adopting iRAP proactive survey methodologies on higher flow roads and priority roads that will indicate where the greatest casualty reduction opportunities lie across these networks and levels of investment necessary to achieve targets
5. Ensuring necessary funding, human resource and training is available to analyse network performance and plan and implement safety remedial schemes

# KEY FINDINGS

## ALL BRITISH ROADS<sup>10</sup>

**1,793 people were killed on Britain's roads in 2017, a figure which has changed little since 2011 despite on-going improvements in the safety of vehicles on the road.**

### In 2017:

- The societal cost<sup>11</sup> of road traffic crashes was £35 billion
- An average of 73 people were killed or seriously injured on Britain's roads every day
- Motorcycle fatalities increased by 9% from 319 in 2016 to 349
- 60% of fatal casualties occurred on rural roads
- 5.5% of fatal casualties occurred on motorways



<sup>10</sup> From 'Reported Road Casualties Great Britain: 2016 Annual Report'. Available at: [www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2016](http://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2016)

<sup>11</sup> 'Societal costs' are the value of prevention of crashes as calculated and reported by the DfT

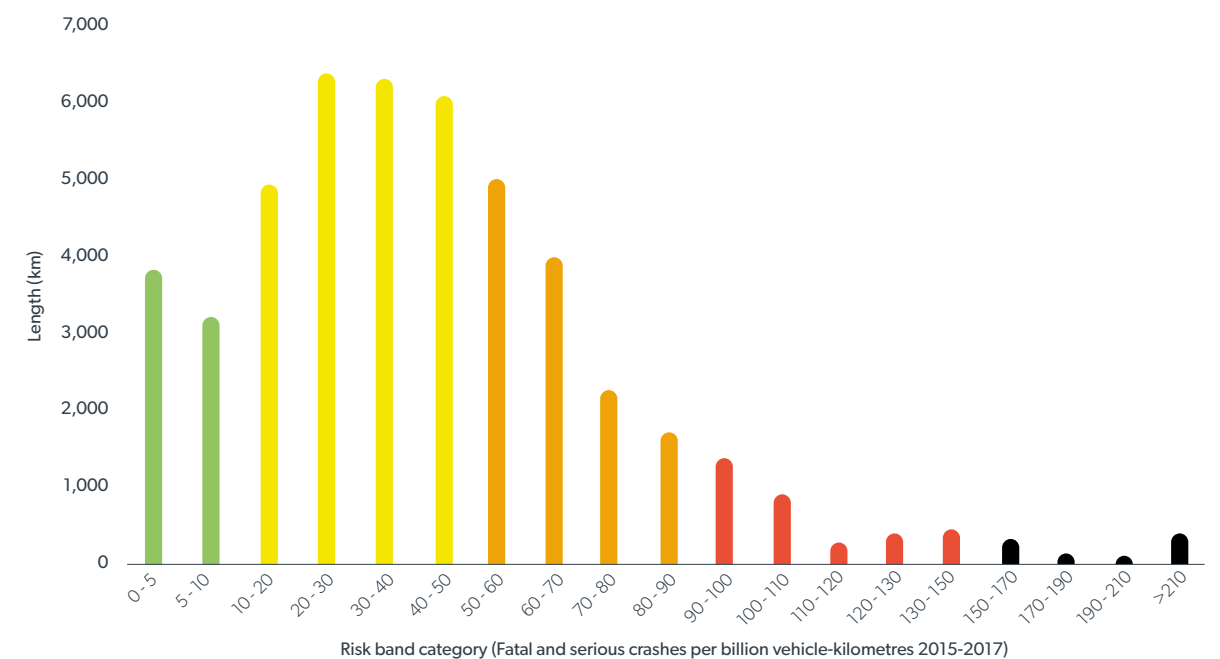
## BRITISH EURORAP NETWORK

The British EuroRAP network has been expanded substantially this year and now consists of all motorways and 'A' roads except for some of the more minor 'A' roads within Greater London<sup>12</sup>. It accounts for around 12.5% of the total road network, upon which 60% of fatalities occurred between 2015-17.

**The number of fatal and serious crashes on the network has increased by more than 4% between 2012-14 and 2015-17, and the number of fatal crashes alone by 5%. In the same period fatal and serious crash risk per billion vehicle kilometres travelled has reduced by just over 1%.**

Between 2015 and 2017, the societal cost of all reported injury crashes<sup>13</sup> on the EuroRAP network alone was £16.4 billion; comprising £1.4 billion on motorways, £2.5 billion on strategic 'A' roads, and £12.5 billion on local 'A' roads. These figures should be considered very conservative since the costs of damage only crashes are not included, and there has been no correction for under reporting.

**FIGURE 2: RISK RATE DISTRIBUTION (EURORAP NETWORK)<sup>14</sup>**



<sup>12</sup> Defined as roads which are not on the Strategic Road Network, proposed Major Road Network or the Transport for London Road Network and which also have three or more digits in their 'A' number

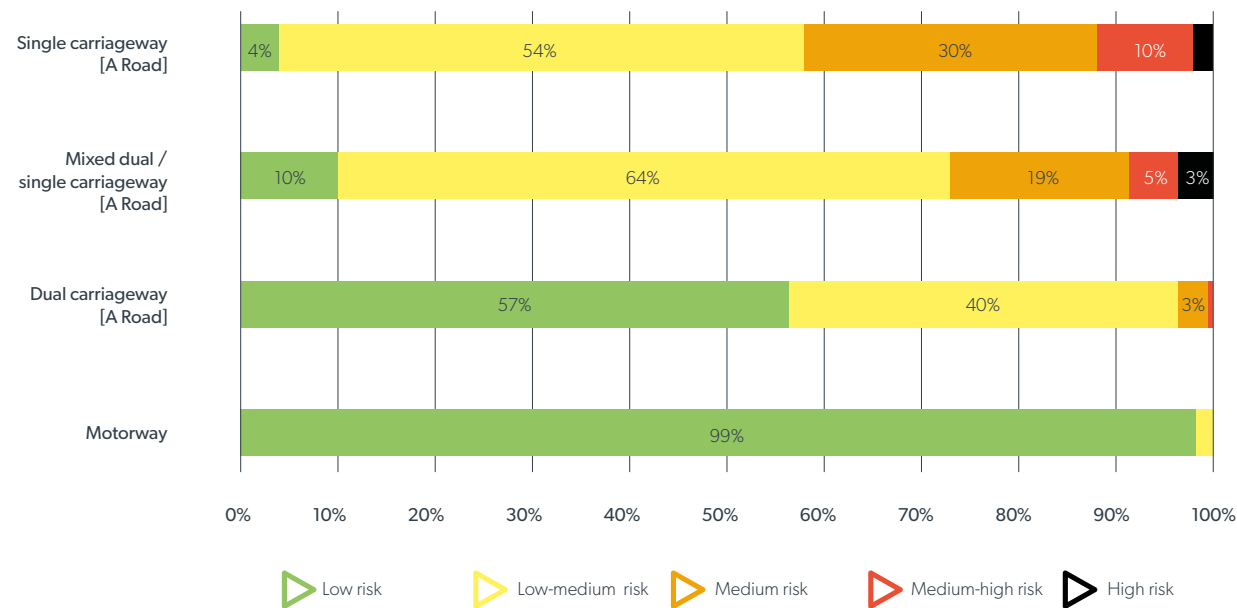
<sup>13</sup> Based on 2016 DfT values of prevention of fatal, serious and slight crashes; the figure excludes damage only crashes and any correction for under-reporting of injury crashes

<sup>14</sup> Risk bandings: Black = high risk, red = medium-high risk, orange = medium-risk, yellow = low-medium risk and green = low-risk



Road users are almost 40 times as likely to be involved in a fatal or serious crash on our high risk roads than on our low risk roads.

FIGURE 3: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE



On average, 'A' roads have more than seven times the risk of motorways. Single carriageway 'A' roads have ten times the risk of motorways and three and a half times the risk of dual carriageway 'A' roads.

- ▷ 4% of vehicle travel is on unacceptably higher risk roads<sup>15</sup>, 12% on medium, 33% on low-medium and 51% on low risk roads.
- ▷ 11% of the network length is unacceptably higher risk, 25% is medium risk, 46% is low-medium risk and 18% is low risk.
- ▷ 99% of motorway travel, but only 4% of travel on single carriageway 'A' roads, was on roads rated as low risk.

<sup>15</sup> Unacceptably higher risk roads are high or medium-high risk and have an average crash risk of more than 20 times that of low risk roads



PERFORMANCE TRACKING RESULTS

Just 0.6% of road sections on the British EuroRAP network have shown a significant reduction in the number of fatal and serious crashes between 2012-14 and 2015-17.

The number of fatal and serious crashes on the 8 most improved roads in our list this year fell by 71%, equating to an annual value of prevention of fatal and serious crashes of £14 million and a projected 20-year Net Present Value of £104 million.

There are 75 persistently higher risk road sections that are not yet being addressed through the Safer Roads Fund, including seven of those listed in the top 10 persistently higher risk rural roads table.

COMPARING NETWORK PERFORMANCE

Between 2012-14 and 2015-17, risk (fatal and serious crashes per billion vehicle kilometres) reduced on the British EuroRAP network by 1.3%. In Scotland risk reduced by 7% while risk in England and Wales only reduced by 0.8%.

Overall crash risk is highest in England and lowest in Scotland. Motorways in England, Scotland and Wales perform similarly well, with low crash risk. Dual carriageway ‘A’ roads in England have the highest crash risk (16 fatal and serious crashes per billion vehicle kilometres) when compared to crash risk in Scotland (10) and Wales (9). Single carriageway roads in England also have the highest crash risk (54) when compared with Wales (49) and Scotland (42).

STRATEGIC ROADS

Crash risk on strategic roads (managed by Highways England, Transport Scotland and Welsh Government) have much lower risk (9 fatal and serious crashes per billion vehicle kilometres) than those managed by local authorities (48). Strategic ‘A’ roads are higher risk in Wales (24), than in Scotland (21) and England (14). The lower risk rate in England reflects a rather different network composition as described in the earlier section.

Between 2012-14 and 2015-17 the number of fatal and serious crashes increased by 8.5% on strategic roads<sup>16</sup>; fatal crashes decreased by less than 0.5% to 860.

99% of motorway travel, but only 2% of travel on strategic single carriageway ‘A’ roads, is on roads rated as low risk sections. 5% of travel on strategic single carriageway ‘A’ roads is on unacceptably higher risk sections<sup>17</sup>.

<sup>16</sup> Some of this increase may be attributable to changes in recording in the new CRASH system.

<sup>17</sup> High or medium-high risk roads

EXPLORATORY URBAN VERSUS RURAL ANALYSIS

This year additional urban roads have been included in the EuroRAP network. This is an important step towards benchmarking performance by city, and key to understanding the risk faced by vulnerable road users. However, allocating crashes to an urban network is rather more difficult than in a rural network due to the complexity of roads, and it is difficult to capture the true exposure in an urban environment (to do so vehicular flows would need to be combined with pedestrian and cyclist flows which are not readily available on a consistent basis nationwide). So, the analysis presented in this report must be considered a first step towards consultation rather than a fair representation.

Rural ‘A’ road risk is similar in England, Scotland and Wales, all around 30 fatal and serious crashes per billion vehicle kilometres. Urban road risk appears to be higher in England (54 fatal and serious crashes per billion vehicle kilometres), than in Scotland (37) and Wales (32).

Rural

The total number of fatal crashes on local authority rural ‘A’ roads between 2015-17 was 1,322.

5% of travel on local authority rural ‘A’ roads is on high risk or medium-high risk sections and as such has an unacceptably higher level of risk. With the exception of three routes, all local rural dual carriageway ‘A’ road travel is on low or low-medium risk roads.

The largest single cause of death on rural roads on the EuroRAP network was head-on crashes.

Urban

The total number of fatal crashes on the local authority urban EuroRAP network was 799, of which 16% were in London.

15% of travel on local authority urban ‘A’ roads is on high risk or medium-high risk sections and as such has an unacceptably higher level of risk.

The largest single cause of death on urban roads on the EuroRAP network was crashes involving Vulnerable Road Users (VRUs).



PERFORMANCE IN ENGLAND

Regional Comparisons

There is significant regional variation in crash risk reduction between 2012-14 and 2015-17. Risk has reduced most in the North West between the two data periods, by 9%. Risk in the West Midlands has risen the most between the two data periods, by 10%.

The risk of a fatal or serious crash is highest in the South East and in Yorkshire & the Humber (27 fatal and serious crashes per billion vehicle kilometres) and lowest in the East of England (22).

Performance by Network

Crash risk is calculated by dividing the number of fatal and serious crashes by the traffic volume, measured in billion vehicle-kilometres, to express the number of crashes per billion vehicle-kilometres driven.

Crash risk is lowest on the SRN, is more than four times as high on the MRN and is nearly twice as high again on local authority non-MRN roads. On the SRN, ‘A’ roads alone are less than half the risk of roads on the MRN.

TABLE 8: OVERVIEW OF PERFORMANCE ON THE EURORAP NETWORK BY SRN, PROPOSED MRN AND LOCAL AUTHORITY NON-MRN ROADS (2015-17)

	Strategic Road Network (SRN)		Proposed Major Road Network (MRN)		Local roads (non-MRN)	
Length (kms)	6,881	21%	7,523	22%	19,092	57%
Annual traffic (billion vehicle kilometres)	193	56%	64	19%	85	25%
Fatal and serious crashes	1,603	18%	2,230	25%	5,102	57%
Crash risk per billion vehicle kilometres travelled	8		35		60	

The proposed MRN carries 19% of the traffic on the English EuroRAP network yet has 25% of the fatal and serious crashes. 18% of travel on the MRN is on medium or higher risk sections.

SOCIETAL COSTS AND PRIORITY SECTIONS FOR INVESTMENT

There are still 831 kilometres of persistently higher risk local roads in Great Britain...

...(excluding those roads being tackled by the Safer Roads Fund), the cost of reported injury crashes on these roads was £1,008 million between 2015 and 2017.

We estimate that the investment necessary to implement remedial treatment programmes on this current tranche of persistently higher risk roads is around £117 million and should prevent around 3,450 fatal and serious injuries over 20 years<sup>18</sup>. The potential investment would be £109m in England preventing around 3,350 fatal and serious injuries over 20 years, £6m in Scotland preventing around 90 fatal and serious injuries over 20 years and £1m preventing around 10-15 fatal and serious injuries over 20 years in Wales.



There are 4,418 kilometres of unacceptably higher risk local roads on the EuroRAP network. Assuming two-thirds of these sections would make good candidates for investment, we estimate that the cost of treating these roads would be £83 million per year over a 5-year period, which should prevent around 6,850 fatal and serious injuries over a 20-year period<sup>19</sup>.

<sup>18</sup>Based on an assumption of a similar investment per km and percentage reduction in fatal and serious injuries to the first tranche of the Safer Roads Fund, taking into account background trend

<sup>19</sup>Based on an assumption of a similar investment per km and percentage reduction in fatal and serious injuries to the first tranche of the Safer Roads Fund, taking into account background trend



# PERFORMANCE TRACKING ANALYSIS

In addition to the motorways and rural 'A' roads we have included in our analysis in previous years, this year, for the first time, we have included numerous urban 'A' roads in our analysis. We have now included all 'A' roads in Britain, except for some of the more minor 'A' roads within Greater London<sup>20</sup>. These urban roads have been included in the Most Improved Roads list where they meet criteria but excluded from the top ten persistently higher risk roads list because their inclusion is exploratory at this stage and we are conscious of some data limitations that are discussed in the exploratory urban versus rural analysis.

## MOST IMPROVED ROADS

Improved roads are those where there has been a statistically significant reduction in the number of fatal and serious crashes over time measured using a Poisson test that considers background trend.

**Around 0.6% of road sections on the EuroRAP network have shown a significant reduction in the number fatal and serious crashes.**

The top 8 'most improved roads' are shown in Table 9. In the earlier data period (2012-14) the 8 roads listed together had a risk more than three times that of the later data period (2015-17).

Between 2012-14 and 2015-17, the number of fatal and serious crashes on the roads listed in Table 9 fell by 71% from 161 to 47. The annual value of the reported injury crashes prevented (effectively the societal benefit) was £14 million in 2016 values, or £86,000 per kilometre road length, with a Net Present Value worth £104 million over 20 years. Note that this calculation does not include any benefits from preventing damage only crashes or make any correction for under-reporting of injury crashes.

This year's most improved road stretch is part of the A11 between the A14 near Newmarket and the A134 north of Thetford and is managed by Highways England. The road was part converted to dual carriageway in 2015/16 and a bypass was created around the village of Elveden. Fatal and serious crashes fell from 31 in the first data period (2012-14) to 9 in the second data period (2015-17).

<sup>20</sup> Defined as roads which are not on the Strategic Road Network, proposed Major Road Network or the Transport for London Road Network and which also have three or more digits in their 'A' number





TABLE 9: BRITAIN’S MOST IMPROVED ROADS (2012-14 TO 2015-17)<sup>21</sup>

Road no.	Location description	Highway Authority/ ies (100% unless stated)	Road length (km)	Road type	Fatal and serious crashes (12-14)	EuroRAP risk rating (12-14)	Fatal and serious crashes (15-17)	EuroRAP risk rating (15-17)	% decrease in F&S crashes over time	Confidence level	Measures implemented include
A11	Between the A14 near Newmarket and the A134 north of Thetford	Highways England	28	Dual	31	30	9	8	71%	99%	The Fiveways to Thetford Major Projects scheme was finished in 2015/16 which included conversion of part of the road to dual carriageway and completion of a by-pass around Elveden.
M5	Between junctions 16 and 23	Highways England	59	Motorway	32	5	12	2	63%	99%	Smart motorway between J15 and J17 was opened in January 2014. In addition, at various locations the steel central reserve barrier has been changed to concrete, there have been drainage improvements between junctions 17 and 18, and improvements have been made to the junction 18 slip roads.
A161	Between the A18 and the M62	57% East Riding of Yorkshire 43% North Lincolnshire	23	Single	11	147	1	13	91%	98%	The north-west end of the A161 was re-routed, by-passing an industrial area on a short dual carriageway section, joining the M62 directly rather than going through the industrial area. Engagement with motorcyclist groups concerning a surprisingly sharp bend at one end.
A626	Between the M60 and Dodley Lane	Stockport	4	Single	11	108	1	10	91%	98%	Improved junctions; road widening to create footways / cycleways; improved crossing facilities for cyclists and pedestrians.
A10	Between the M11 and the A120	60% Hertfordshire 40% Cambridgeshire	35	Single	21	38	6	10	71%	98%	Removed the slip lane at Frog End to turn left into Cambridge Road. Shared use 2.5m-3.0m wide cycle lane / footway introduced between Melbourn and Harston. Speed limit reductions.

<sup>21</sup> Ranked by the level of confidence in the reduction in the number of fatal and serious (F&S) crashes between the two data periods, measured using a Poisson test and taking account of background trend; EuroRAP Risk Rating based on the number of fatal and serious crashes per billion vehicle kilometres travelled: black (high risk), red (medium-high risk), orange (medium-risk), yellow (low-medium risk), green (low-risk); measures implemented based on road authority responses to pre-publication consultation.

Road no.	Location description	Highway Authority/ ies (100% unless stated)	Road length (km)	Road type	Fatal and serious crashes (12-14)	EuroRAP risk rating (12-14)	Fatal and serious crashes (15-17)	EuroRAP risk rating (15-17)	% decrease in F&S crashes over time	Confidence level	Measures implemented include
A397	Between the A3 and the A27	Portsmouth	1	Mixed	10	296	1	31	90%	98%	The Northern Road Bridge had a major reconstruction in 2013. It gained a southbound bus lane and widened footways to incorporate shared cycle use. Three puffin crossings were upgraded to toucan facilities with associated shared paths in 2015. Western Rd A27 (including the Portsbridge Roundabout had a speed limit reduction from the national limit to 50mph in late 2016.
A4174	Between the A4 and Bedminster Road	Bristol, City of	7	Mixed	16	103	4	25	75%	97%	A red light camera at the junction with Creswick Road was switched on in 2015. A red light camera at the Novers Lane junction was upgraded to cover the two lane approach. Junctions were amended, and cycle and pedestrian facilities and bus lanes were added in 2017.
A666	Between Town's Moor and Queen's Road, Whitehall, including the junction with the M65	Blackburn with Darwen	8	Single	29	182	13	82	55%	96%	A bus lane has been introduced, a number of improvements have been made to pedestrian crossings, a new road and roundabout and revised access to a number of sites in Ewood have been introduced.

### PERSISTENTLY HIGHER RISK RURAL ROADS

Each year, the Road Safety Foundation identifies 'persistently higher risk' roads. Roads that are persistently higher risk are a cause for significant concern. These roads had an average of at least one fatal or serious crash per mile along their length in the three-year survey period, and so meet the density requirement and were rated high (black) or medium-high (red) risk in both data periods (2012-14 and 2015-17). The roads identified in Table 10 had an average AADT of just over 7,500 vehicles, ranging from around 4,700 AADT to around 12,100 AADT.

Three of the top ten persistently higher risk roads identified are being treated through the Department for Transport's (DfT's) Safer Roads Fund.

**In total there are 75 persistently higher risk roads that are not being addressed by the Safer Roads Fund, with a total road length of 831 kilometres**

A total of 4,400 fatal and serious crashes occurred on these roads between 2012 and 2017, and the associated societal cost of reported injury crashes between 2015 and 2017 was £1,008 million<sup>22</sup>.

This year, more than half of the crashes on two of the top 10 roads involved motorcyclists.

The road at the top of this year's list is the A5004 in Derbyshire. This 12km section of road had the same number of fatal and serious crashes in 2015-2017 as it did in 2012-2014, despite a slight reduction in traffic, continuing to have an average of almost three fatal and serious crashes each year. All but one of these in the last three-year period involved a motorcyclist, and more than a third were head-on crashes.

This road will be improved through the Safer Roads Fund in 2020/21. Derbyshire County Council will implement improvements to the roadside, junctions and the median along the route and subsequently expects to reduce the number of deaths and serious injuries on the route by 33 over the following 20 years.

<sup>22</sup> Based on 2016 DfT values of prevention of fatal, serious and slight crashes; the figure excludes damage only crashes and any correction for under-reporting of injury crashes





TABLE 10: BRITAIN’S PERSISTENTLY HIGHEST RISK RURAL ROADS (2012-14 AND 2015-17)<sup>23</sup>

Road no.	Location description	Being addressed through DfT's Safer Roads Fund	Highway Authority/ies (100% unless stated)	Road length (km)	Road type	Fatal and serious crashes (12-14)	EuroRAP risk rating (12-14)		Fatal and serious crashes (15-17)	EuroRAP risk rating (15-17)	% of crashes with motorcyclist involvement (15-17)	% contribution by crash types (15-17)					
												Pedestrians/cyclists	Junctions	Run-offs	Head-ons	Rear end shunts	Other
A5004	Between the A6 and the A53	Yes	Derbyshire	12	Single	8	118		8	122	88%	0%	25%	25%	38%	0%	13%
A3055	Between the A3054 near Freshwater and the A3054 in Ryde	No	Isle of Wight	49	Single	31	109		34	119	24%	32%	29%	24%	6%	0%	9%
A645	Between the A638 and the A639	No	Wakefield	9	Single	10	92		12	107	8%	58%	33%	0%	8%	0%	0%
A909	Between the M90 and the A921	No	Fife	14	Single	11	133		9	104	33%	33%	22%	11%	22%	11%	0%
A57	Between the A628 and Sandy Gate	No	76% Derbyshire 22% Sheffield 2% Tameside	37	Single	32	121		28	104	32%	18%	7%	32%	25%	0%	18%
A683	Between the A65 and the A6	Yes	Lancashire	24	Single	20	144		15	103	47%	7%	40%	33%	13%	7%	0%
A290	Between the A299 and the A28	Yes	Kent	9	Single	14	112		13	101	0%	62%	0%	23%	15%	0%	0%
A272	Between the A30 and the A3	No	Hampshire	31	Single	27	111		26	100	73%	8%	35%	15%	12%	0%	31%
A3054	Between the A3055 near Freshwater and the A3055 in Ryde	No	Isle of Wight	29	Single	35	106		34	98	26%	59%	21%	12%	3%	0%	6%
A361	Between the A377 and the A399	No	Devon	23	Single	19	88		20	88	40%	30%	25%	25%	0%	0%	20%

<sup>23</sup> Ranked by EuroRAP Risk Rating 2015-17; no significant reduction in the number of F&S crashes between data periods at the 95% confidence level; minimum of 6 F&S crashes in both data periods; minimum F&S crash density of 1 F&S/mile in both data periods; EuroRAP Risk Rating is either high risk (black) or above average of medium-high risk (red) roads in both data periods; EuroRAP Risk Rating based on the number of fatal and serious crashes per billion vehicle kilometres travelled: black (high risk), red (medium-high risk), orange (medium-risk), yellow (low-medium risk), green (low-risk); percentages may not sum due to rounding; some of the roads listed may have had measures implemented since the analysis period.

# RISK RATING OF BRITAIN'S MOTORWAYS AND 'A' ROADS



This map shows the statistical risk of a fatal or serious injury crash occurring on Britain's motorway and 'A' road network for 2015-2017. 60% of Britain's road fatalities are on the British EuroRAP network, which covers 49,500km in total, representing around an eighth of Britain's road network, and which carries more than three-quarters of the traffic.

The risk is calculated by comparing the frequency of road crashes resulting in death and serious injury on every stretch of road with how much traffic each road is carrying. For example, the risk on a road carrying 10,000 vehicles a day with 20 crashes is ten times the risk on a road that has the same number of crashes but which carries 100,000 vehicles.

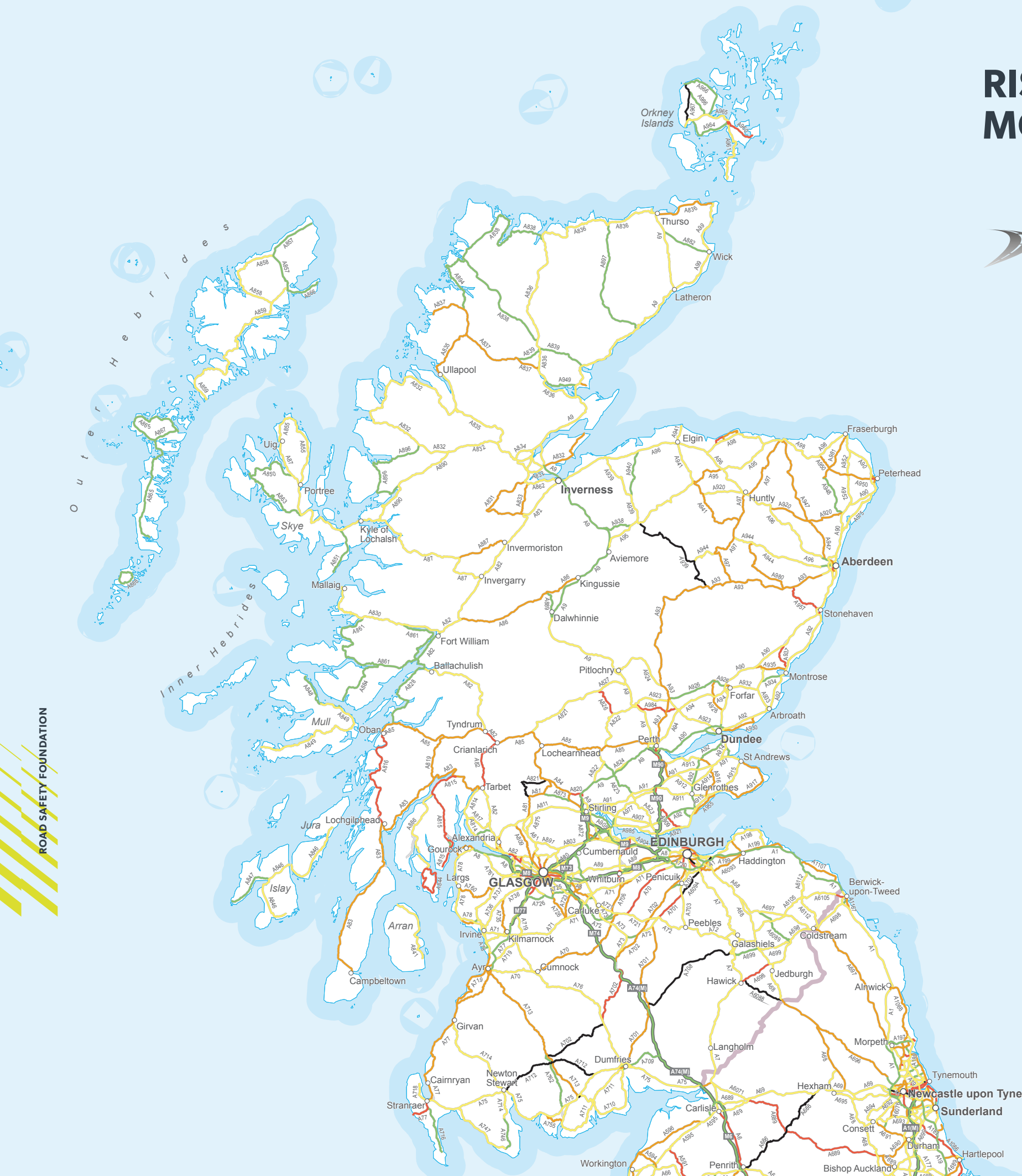
Some of the roads shown have had improvements made to them recently but, during the survey period, the risk of a fatal or serious injury crash on the black road sections was almost 40 times that of the safest (green) roads.

The map excludes roads that are not statistically robust enough for analysis, shown in grey, and some more minor 'A' roads in larger city centres, shown in white.

In addition to the motorways, rural 'A' roads and select urban 'A' roads included in previous years, we have expanded the urban network considerably. The EuroRAP network now includes all motorways and 'A' roads in Britain except for some of the more minor 'A' roads within Greater London<sup>24</sup>. All mapping relating to urban areas should be considered exploratory due to various data limitations discussed in the exploratory urban versus rural analysis section.

For more information on the Road Safety Foundation go to [www.roadsafetyfoundation.org](http://www.roadsafetyfoundation.org).

For more information on the statistical background to this research, visit the EuroRAP website at [www.eurorap.org](http://www.eurorap.org).





Low risk (safest) roads

Low-medium risk roads

Medium risk roads

Medium-high risk roads

High risk roads

Motorway

Single and dual carriageway

Unrated roads

Scale

01020304050 miles

01020304050607080 kms



© Road Safety Foundation 2019. Digital Map Data © Collins Bartholomew Ltd 2019. Contains Ordnance Survey data © Crown copyright and database right 2015. The Foundation is indebted to the Department for Transport (DfT) for allowing use of data in creating the map. This work has been financially supported by Ageas. Crash information is for 2015-2017. Traffic is calculated using the averages for 2015-2017 weighted by section length. Risk rates on road sections vary but it is expected that, on average, those off the 'A' road network will have higher rates than sections on it. Generally, motorways and high-quality dual carriageway roads function in a similar way and are safer than single carriageway or mixed carriageway roads. Prepared under licence from EuroRAP AISBL using Risk Bands 2020 protocols © Copyright EuroRAP AISBL. This map may not be reproduced without the consent of the Road Safety Foundation.

\* Defined as roads which are not on the Strategic Road Network, proposed Major Road Network or the Transport for London Road Network and which also have three or more digits in their 'A' number.

DATA LIMITATIONS

The two main pieces of data that we use in creating the risk maps are the number of fatal and serious crashes assigned to a given road section in our network, and the amount of traffic using the road section. Both are somewhat imperfect and the limitations to our data are therefore described, along with some potential ways in which these could be improved for everyone to use.

ISSUE

ASSIGNING CRASHES TO THE EURORAP NETWORK

Every year, RSF commissions a data provider to assign or ‘snap’ crashes to the EuroRAP network. This necessarily involves an estimation procedure because some recorded crash locations are incorrect or imprecise. Slightly different results are achieved depending on the methodology used. Our current supplier looks at a combination of road name and proximity to a road to determine where each fatal and serious crash ‘belongs’. One reason that we consult with authorities being named in the main tables in the report is because sometimes local authorities have local intelligence on the location of a crash.

Indeed, local and national road authorities spend a great deal of resource sifting through the crashes that occur on their roads to ensure that they are correctly assigned. They each have their own methodology and commission for ‘snapping’ crashes to their networks.

It may seem surprising that there are such inaccuracies in crash locations when it is possible to get accurate latitudes and longitudes to an accuracy of 1-5m simply by clicking on an app on a mobile phone.

Opportunity

Recording details of road crashes is a vital task but it can be difficult, harrowing and time consuming. The Police could be helped more with modern technology that could reduce the uncertainty and error in crash locations. In turn, this can help enable significant improvement in targeting infrastructure and other safety countermeasures.

More immediately, there should be one exercise to ‘snap’ crashes to the road network for Great Britain such that repeated commissions are not necessary by different authorities and researchers. Adjustments to the crash locations need to be shared so all are working with a final version.

ISSUE

TRAFFIC FLOWS

At present we use the traffic flow database provided by the DfT. While this resource is immensely useful and welcome, it is not without its own limitations. It would not be cost effective for the DfT to undertake flow surveys at every location on an annual basis, and so interim years are estimated.

The estimated flows can be in place for several years and accuracy will reduce over this time.

Opportunity

Modern technology may provide a more cost effective and accurate solution but requires some preliminary work to explore potential. Telematics data harvested from black boxes and mobile phone data, or simply data from mobile mapping services, may provide sufficiently accurate data on traffic flows.

Moreover, these data sources typically can provide excellent speed data (85th percentile and mean speeds) and traces that demonstrate sharp deceleration that may indicate problematic junctions or bends on the road network.

Currently it costs road authorities a great deal of money to commission traffic and speed surveys, while these data could be harvested from other sources that may provide a richer picture across a network, as opposed to individual locations. The data would be used extensively by local and national authorities and could be provided centrally to ensure consistency of approach and greater economies of scale.



## CRASH REPORTING SYSTEM

The new Collision Reporting And SHaring (CRASH) system has been introduced by some police forces to modernise the way road crash data are collected and uploaded by police officers at the crash scene.

The system will soon allow motorists to enter information about a crash they have been involved in but that was not attended by the police. One of the improvements within the new CRASH system is that it removes the subjective assessment of severity by Police Officers, replacing it with a system whereby the Police officer can describe the injuries sustained, which are then automatically assign. This means that the classification of severity is more objective, and as a result some crashes that would have historically been coded as slight are now recognised as serious in the new system. This means that some increases in the number of serious crashes are due, not to a change in crash severity, but because of the system used to classify the crashes.

The system has not been introduced across Great Britain at the same time. By mid-2016, only 22 of the 39 police forces in England were operating CRASH<sup>25</sup>. The Office for National Statistics (ONS) has published an interim report on the impact of CRASH which was not conclusive on how to accurately correct for it.

This has implications for Risk Mapping and Performance Tracking. With the Risk Mapping bands, it is possible that some sections may have been given a higher risk band because CRASH is used locally; however, most will have just been assigned a slightly higher risk score and not moved bands.

For the Performance Tracking, some sections may have improved to medium risk and so not met the criteria for persistently higher risk under the old reporting system.

The Road Safety Foundation has explored a number of options. At the time of writing, it is not possible to adjust at the national level and adjusting serious crash numbers at a route level would be even less possible.

We considered including 'slight crashes' in the risk mapping for the first time, alongside fatal and serious, to remove the issue of changes in classification.

However, slight crashes follow a different pattern to fatal and life-changing serious crashes. This would run counter to both the UK and European policy focus and also the principles of safe system design. The Road Safety Foundation has therefore decided to continue using the data without adjustments to methodology since the impact is likely to be marginal. The charity will continue to consult with leaders in the field for future years on the basis of emerging evidence.

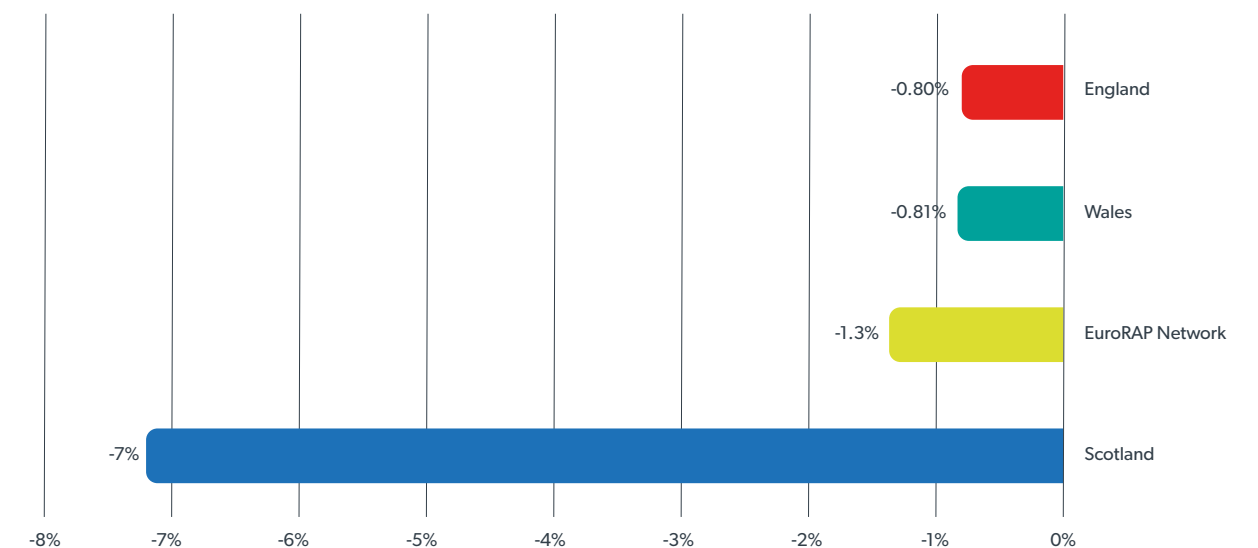
<sup>25</sup> From 'Reported Road Casualties Great Britain: 2017 Annual Report' Available at: <https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2017>

## COMPARING NETWORK PERFORMANCE BY COUNTRY

In all three countries within Great Britain, strategic motorways and 'A' roads are managed by the relevant national highway authority, and the remaining roads are managed by local authorities.

Figure 4 shows the change in risk between 2012-14 and 2015-17 on the EuroRAP network by country. Overall risk reduced on the EuroRAP network over this period by 1.3%, notably the greatest risk reduction was observed in Scotland, with a 7% reduction in risk over the same period. This could reflect the national casualty reduction targets adopted by the Scottish Government, which has resulted in local authorities adopting the same targets and putting in place road safety strategies and action plans.

FIGURE 4: CHANGE IN RISK OVER TIME ON THE EURORAP NETWORK BY COUNTRY



In the two sections that follow we explore more of the performance differences by road type (motorway, dual carriageway and single carriageway) and by strategic versus locally managed roads.

ANALYSIS BY ROAD TYPE

Understanding the Networks

TABLE 11: ROAD LENGTH (KM) ON DIFFERENT ROAD TYPES BY COUNTRY ON THE EURORAP NETWORK

Road type	England	Scotland	Wales	Great Britain
Motorways	2,977 (9%)	426 (4%)	118 (3%)	3,522 (7%)
'A' road dual carriageways	3,523 (11%)	340 (3%)	359 (8%)	4,221 (9%)
'A' road mixed carriageways	5,800 (17%)	905 (9%)	441 (10%)	7,146 (15%)
'A' road single carriageways	21,195 (63%)	8,886 (84%)	3,430 (79%)	33,511 (69%)
All EuroRAP roads	33,496	10,557	4,348	48,401

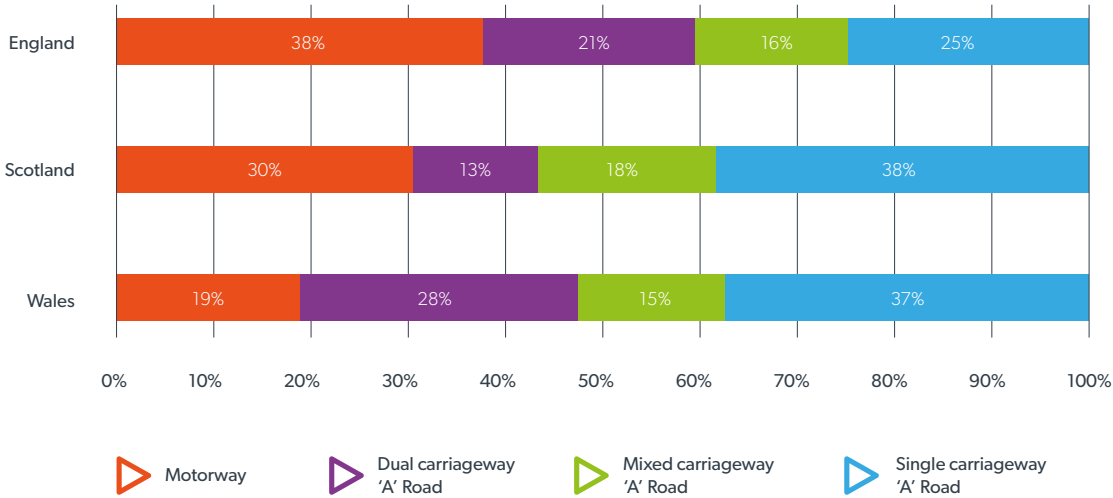
The EuroRAP network in England is just over three times the road length of the network in Scotland and more than seven times the road length of the network in Wales. By length, England has a greater proportion of motorways and dual carriageway 'A' roads than Scotland and Wales.

TABLE 12: ANNUAL TRAFFIC (BILLION VEHICLE-KILOMETRES) ON DIFFERENT ROAD TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-2017)

Road type	England	Scotland	Wales	Great Britain
Motorways	130 (38%)	11 (30%)	4 (19%)	145 (36%)
'A' road dual carriageways	73 (21%)	5 (13%)	6 (28%)	84 (21%)
'A' road mixed carriageways	54 (16%)	6 (18%)	3 (15%)	64 (16%)
'A' road single carriageways	85 (25%)	14 (38%)	8 (37%)	106 (27%)
All EuroRAP roads	342	36	22	400

The amount of traffic on the EuroRAP network in England is nearly ten times that in Scotland and over fifteen times that in Wales. The distribution of travel across the EuroRAP network shows that a greater proportion of traffic travels on motorways in England (38%), when compared to Scotland and Wales (30% and 19% respectively).

FIGURE 5: DISTRIBUTION OF TRAVEL ON DIFFERENT ROAD TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-17)



Fatal and Serious Crashes 2015-2017

TABLE 13: ANNUAL AVERAGE NUMBER OF FATAL AND SERIOUS CRASHES ON DIFFERENT ROAD TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-2017)

Road type	England	Scotland	Wales	Great Britain
Motorways	680 (8%)	54 (7%)	20 (4%)	754 (7%)
'A' road dual carriageways	1,163 (13%)	46 (6%)	57 (10%)	1,266 (12%)
'A' road mixed carriageways	2,486 (28%)	155 (19%)	76 (14%)	2,717 (26%)
'A' road single carriageways	4,606 (52%)	571 (69%)	397 (72%)	5,574 (54%)
All EuroRAP roads	8,935	825	551	10,311

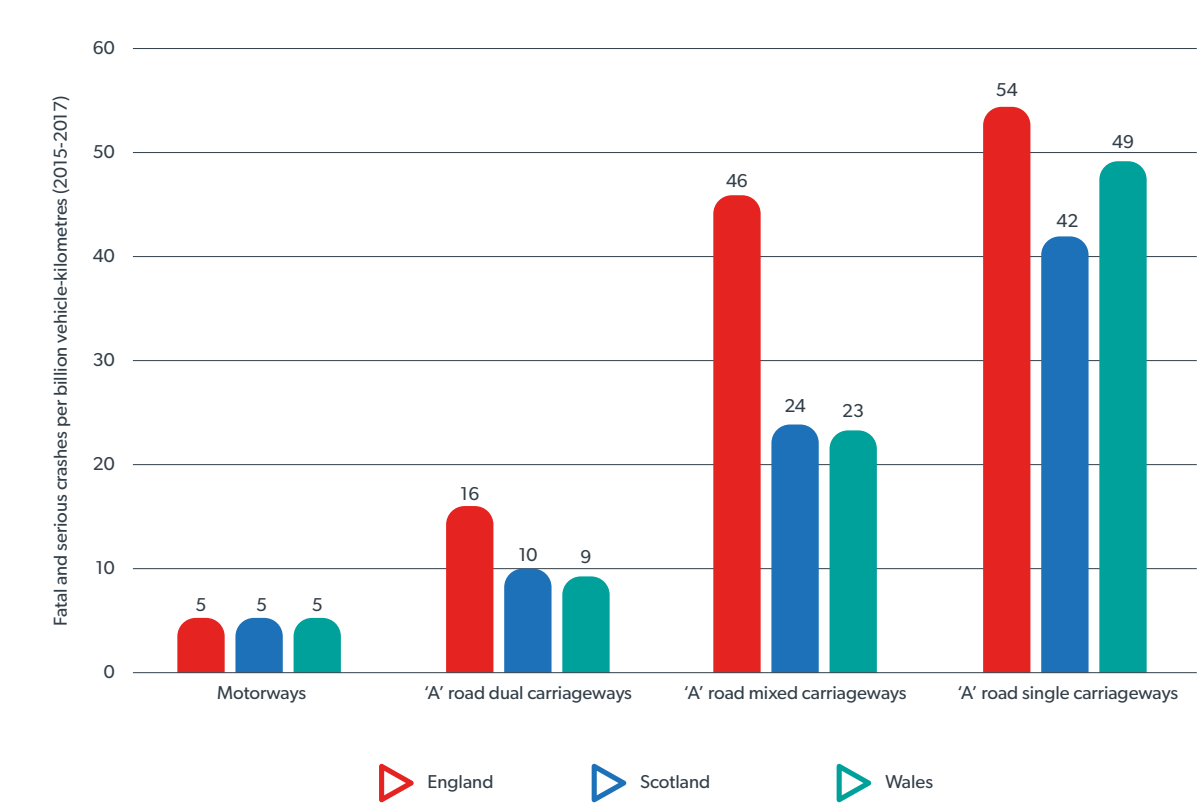
There were more than ten times as many fatal and serious crashes on the English EuroRAP network in 2015-2017 than in Scotland, with Wales having fewer than Scotland; this pattern is reflected across all road types. The majority of fatal and serious crashes were on single carriageway 'A' roads.



Fatal and Serious Crash Risk  
(Crashes per Billion Vehicle-Kilometres)

Crash risk is calculated by dividing the number of fatal and serious crashes by the traffic volume, measured in billion vehicle-kilometres, to express the number of crashes per billion vehicle-kilometres driven.

FIGURE 6: FATAL AND SERIOUS CRASHES PER BILLION VEHICLE KILOMETRES ON DIFFERENT ROAD TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-2017)



The fatal and serious crash risk per billion vehicle kilometres is overall highest in England and lowest in Scotland. Motorways are consistently the roads with the lowest crash risk.

STRATEGIC VERSUS LOCAL PERFORMANCE

Understanding the Networks

TABLE 14: ROAD LENGTH (KM) ON DIFFERENT NETWORK TYPES BY COUNTRY ON THE EURORAP NETWORK

Network type	England	Scotland	Wales	Great Britain
Strategic motorways	2,936 (9%)	426 (4%)	118 (3%)	3,481 (7%)
Strategic 'A' roads	3,945 (12%)	2,896 (27%)	1,577 (36%)	8,419 (17%)
Local motorways	41 (0%)	0 (0%)	0 (0%)	41 (0%)
Local 'A' roads	26,573 (79%)	7,235 (69%)	2,653 (61%)	36,461 (75%)
All EuroRAP roads	33,496	10,557	4,348	48,401

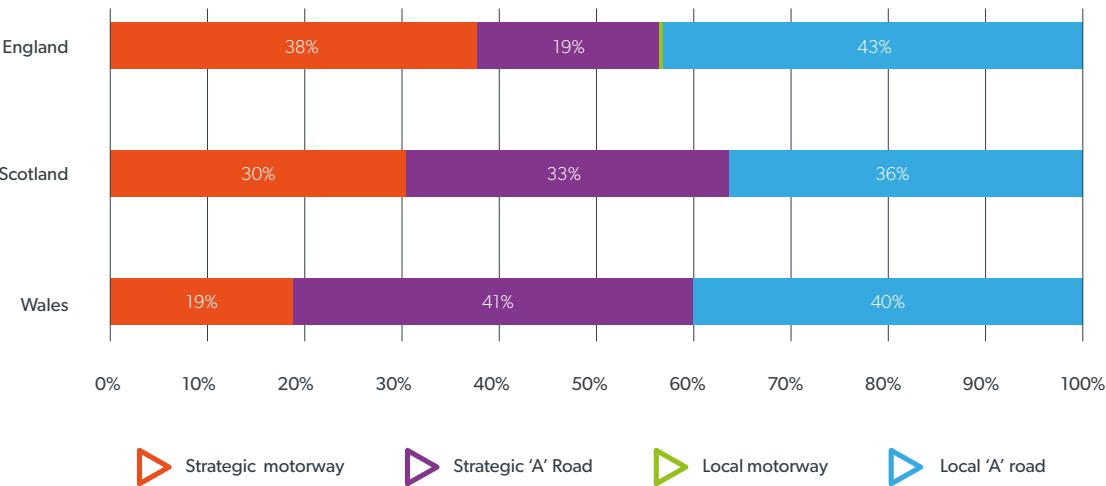
The proportion of the EuroRAP network by length that is strategic in Scotland and Wales is much higher than in England.

TABLE 15: ANNUAL TRAFFIC (BILLION VEHICLE-KILOMETRES) ON DIFFERENT NETWORK TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-2017)

Network type	England	Scotland	Wales	Great Britain
Strategic motorways	129 (38%)	11 (30%)	4 (19%)	144 (36%)
Strategic 'A' roads	64 (19%)	12 (33%)	9 (41%)	85 (21%)
Local motorways	1 (0%)	0 (0%)	0 (0%)	1 (0%)
Local 'A' roads	148 (43%)	13 (36%)	9 (40%)	169 (32%)
All EuroRAP roads	342	36	22	400

A greater proportion of traffic on the EuroRAP network in England travels on strategic motorway; however, the amount of traffic on local roads is a little higher in England than in Wales and Scotland.

FIGURE 7: DISTRIBUTION OF TRAVEL ON DIFFERENT NETWORK TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-17)



Fatal and Serious Crashes 2015-2017

TABLE 16: ANNUAL AVERAGE NUMBER OF FATAL AND SERIOUS CRASHES ON DIFFERENT NETWORK TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-2017)

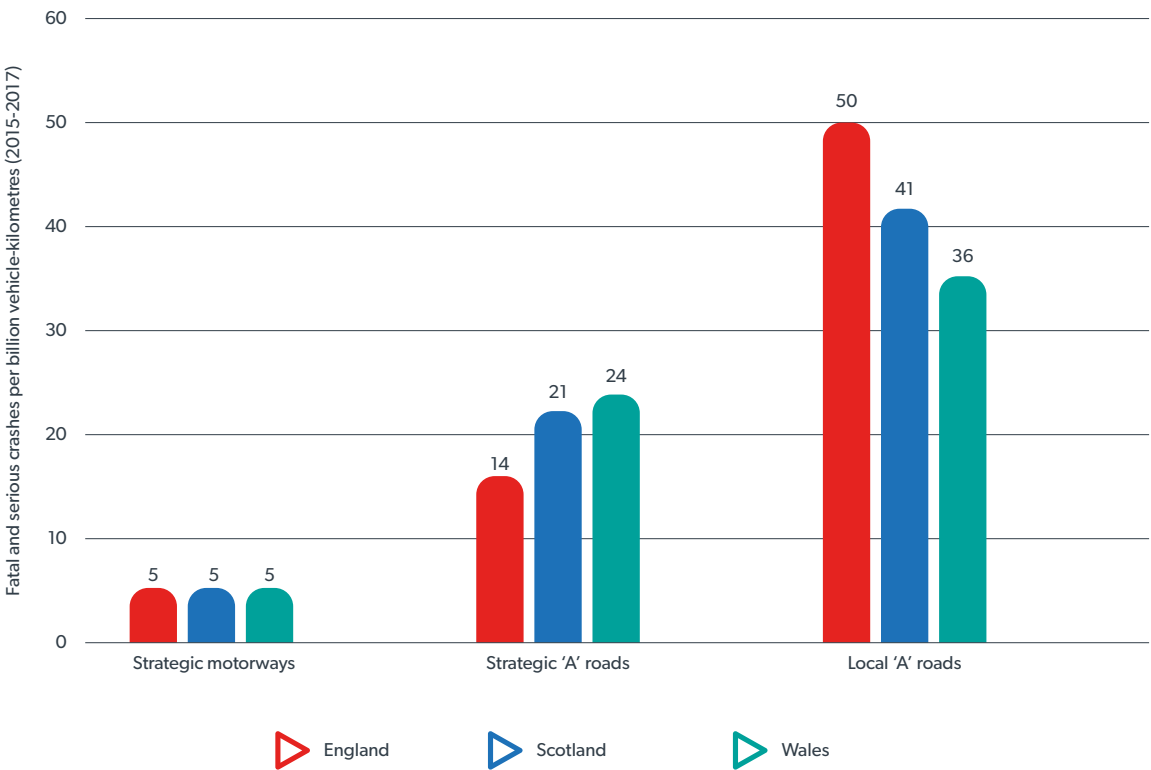
Network type	England	Scotland	Wales	Great Britain
Strategic motorways	670 (8%)	54 (7%)	20 (4%)	744 (7%)
Strategic 'A' roads	933 (10%)	243 (29%)	216 (39%)	1,392 (14%)
Local motorways	10 (0%)	0 (0%)	0 (0%)	10 (0%)
Local 'A' roads	7,322 (82%)	529 (64%)	315 (57%)	8,166 (79%)
All EuroRAP roads	8,935	825	551	10,311

The vast majority of fatal and serious crashes were on local 'A' roads in all three countries. Around 20% of fatal and serious crashes are on strategic roads across the EuroRAP network, though this proportion is higher in Scotland and Wales.

Fatal and Serious Crash Risk  
(Crashes per Billion Vehicle-Kilometres)

Crash risk is calculated by dividing the number of fatal and serious crashes by the traffic volume, measured in billion vehicle-kilometres, to express the number of crashes per billion vehicle-kilometres driven.

FIGURE 8: FATAL AND SERIOUS CRASHES PER BILLION VEHICLE KILOMETRES ON DIFFERENT NETWORK TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-2017)



Overall crash risk is highest in England and lowest in Scotland. Crash risk on motorways is similar for all three countries; however, the rate on strategic 'A' roads is lowest in England followed by Scotland and Wales, with the reverse being true for local 'A' roads.

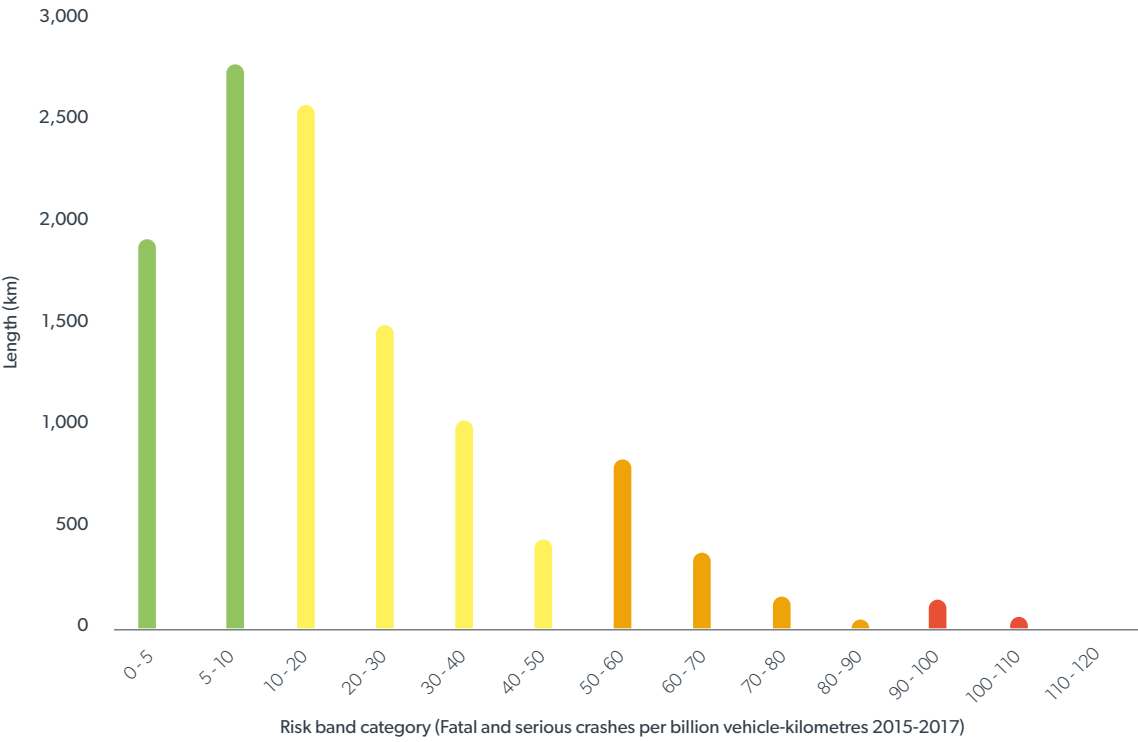


# STRATEGIC ROAD RISK MAP

Since 2015, RSF has published a Risk Map separately for the Strategic Road Network (SRN) in England. This year, the map and analysis has been extended to include strategic roads in Scotland and Wales as well as those in England.

The number of fatal and serious crashes on strategic roads increased by 8.5% between the two data periods. Some of this increase is likely to be attributable to the new crash reporting system. Fatal crashes decreased by less than 0.5% to 860.

FIGURE 9: RISK RATE DISTRIBUTION (STRATEGIC ROADS)<sup>26</sup>



<sup>26</sup> Risk bandings: Black = high risk, red = medium-high risk, orange = medium-risk, yellow = low-medium risk and green = low-risk



Overall on strategic roads, 99% of motorway travel is on low risk sections, the remaining 1% is on low-medium risk sections. 77% of 'A' road travel on strategic dual carriageway roads is on low risk sections. While the majority of travel on single carriageway 'A' roads is on low-medium risk sections, 30% is on medium risk sections and a further 5% is on medium-high risk sections.

The risk rate distributions on strategic roads do not differ a great deal between England, Scotland and Wales, with the notable exception that single carriageway 'A' roads in Wales are higher risk than those in England and Scotland, with 15% of travel being on unacceptably higher risk roads (either high or medium-high risk). Welsh dual carriageway 'A' roads appear to be lower risk than those in England and Scotland; however, there are relatively few single carriageway 'A' roads and dual carriageway 'A' roads on the strategic networks in Scotland and Wales so these findings should not be over-interpreted.

FIGURE 10: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE (STRATEGIC ROADS IN ENGLAND)

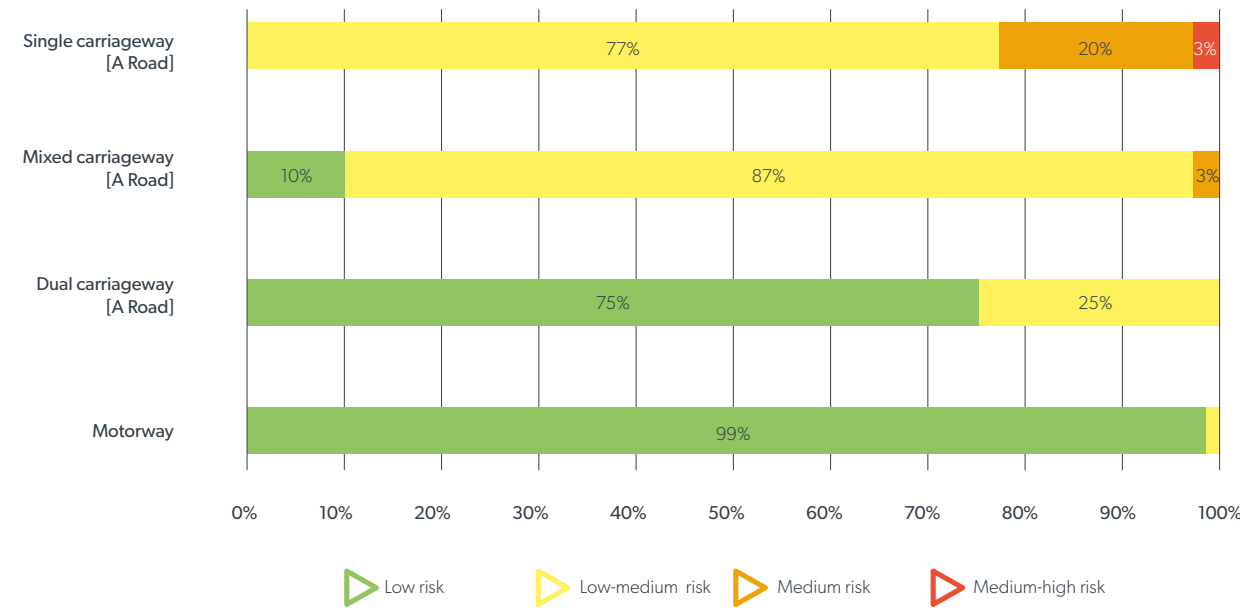


FIGURE 11: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE (STRATEGIC ROADS IN SCOTLAND)

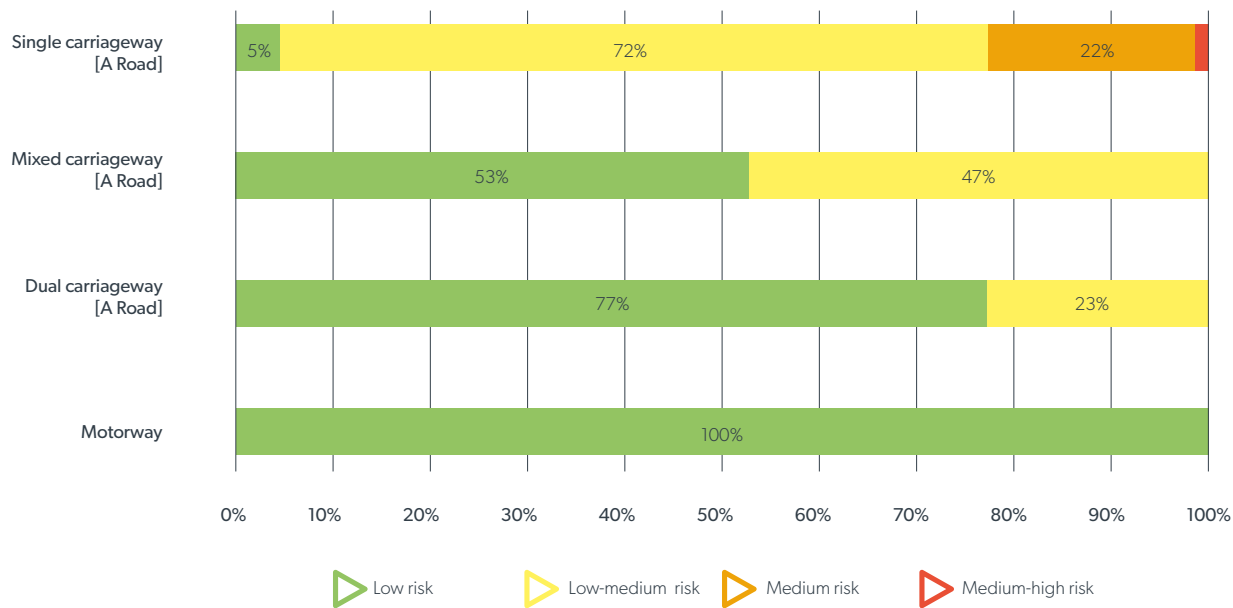
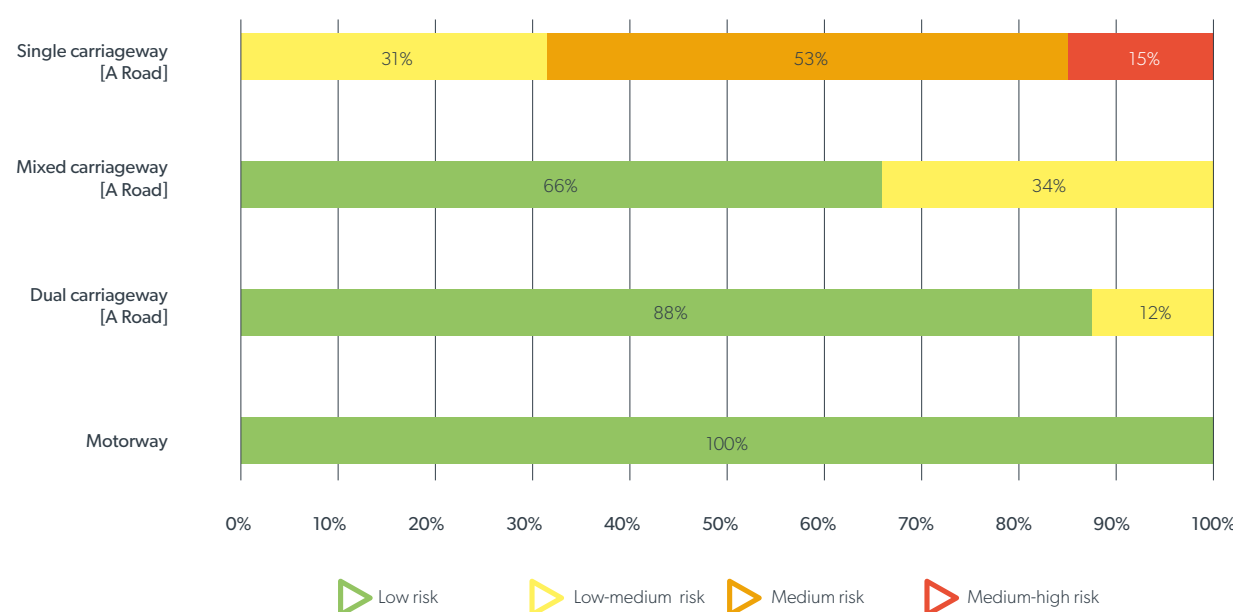
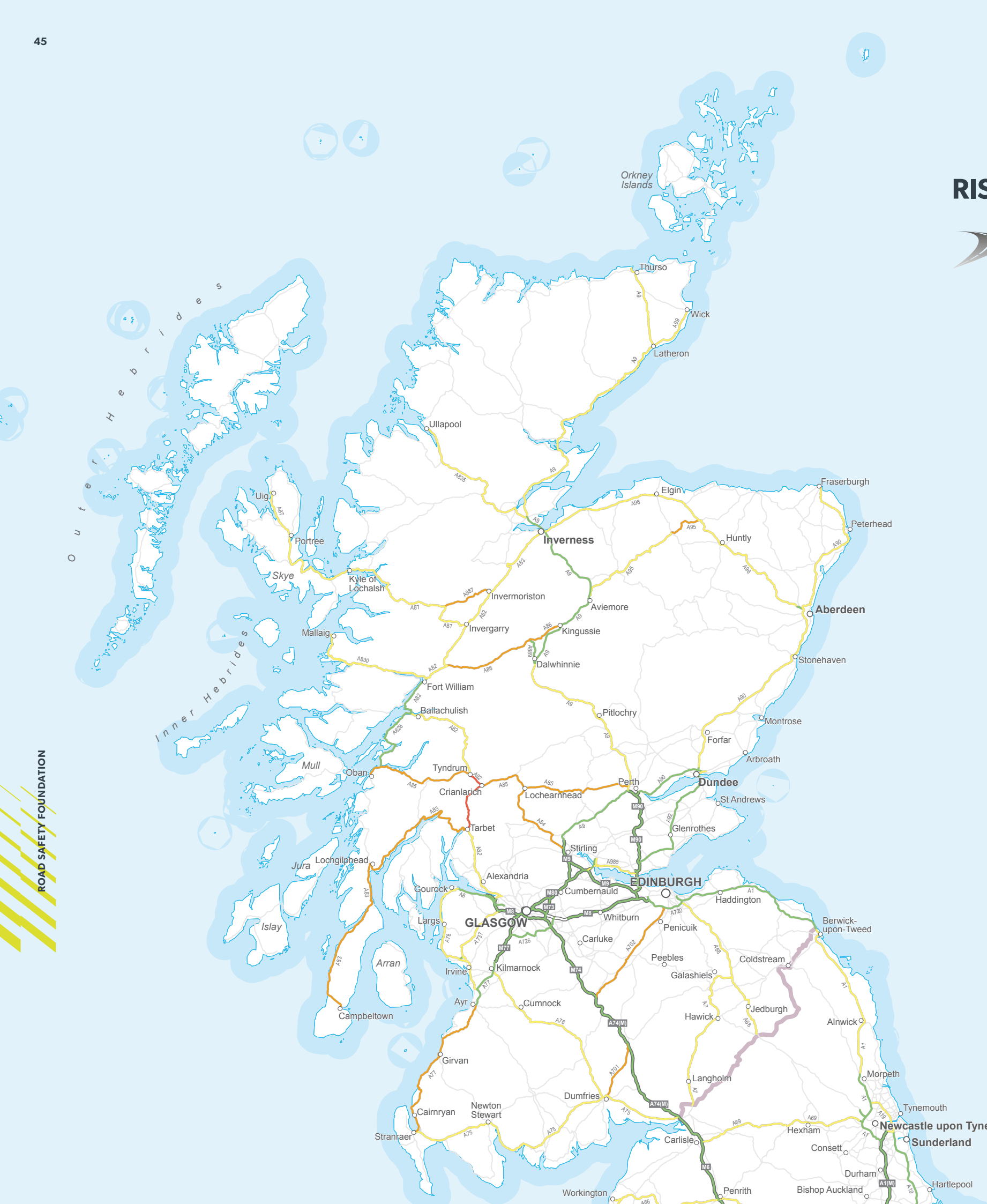


FIGURE 12: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE (STRATEGIC ROADS IN WALES)







# RISK RATING OF BRITAIN'S STRATEGIC ROADS



This map shows the statistical risk of a fatal or serious injury crash occurring on Britain's strategic roads for 2015-2017.

The risk is calculated by comparing the frequency of road crashes resulting in death and serious injury on every stretch of road with how much traffic each road is carrying. For example, the risk on a road carrying 10,000 vehicles a day with 20 crashes is ten times the risk on a road that has the same number of crashes but which carries 100,000 vehicles.

The map excludes roads that are not statistically robust enough for analysis, shown in grey.

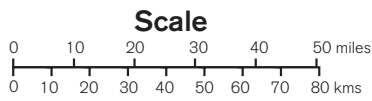
For more information on the Road Safety Foundation go to [www.roadsafetyfoundation.org](http://www.roadsafetyfoundation.org).

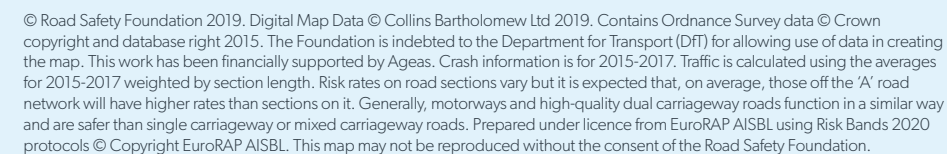
For more information on the statistical background to this research, visit the EuroRAP website at [www.eurorap.org](http://www.eurorap.org).

## Road Assessment Programme Risk Rating

- Low risk (safest) roads
- Low-medium risk roads
- Medium risk roads
- Medium-high risk roads
- High risk roads

- Motorway
- Single and dual carriageway
- Unrated roads







# EXPLORATORY URBAN VERSUS RURAL ROAD ANALYSIS

With walking and cycling being encouraged to promote health and well-being, it is important to capture how well our cities manage to keep vulnerable road users safe. More urban routes have been included in our analysis than ever before. This extension has come with several statistical challenges that means that this section is strictly ‘exploratory’ in nature and early conclusions should not be overstated.

One main challenge relates to allocating (or snapping) crashes to an urban network. The complexity of road systems in urban areas makes one of the criteria for allocation (proximity to a given road) particularly error prone. As a result, the area of tolerance has been reduced for urban areas, but we are conscious that this is still not a failsafe methodology and further work needs to be done to ensure precise results. It is for this reason that urban roads have not been included in the top ten persistently higher risk road table.

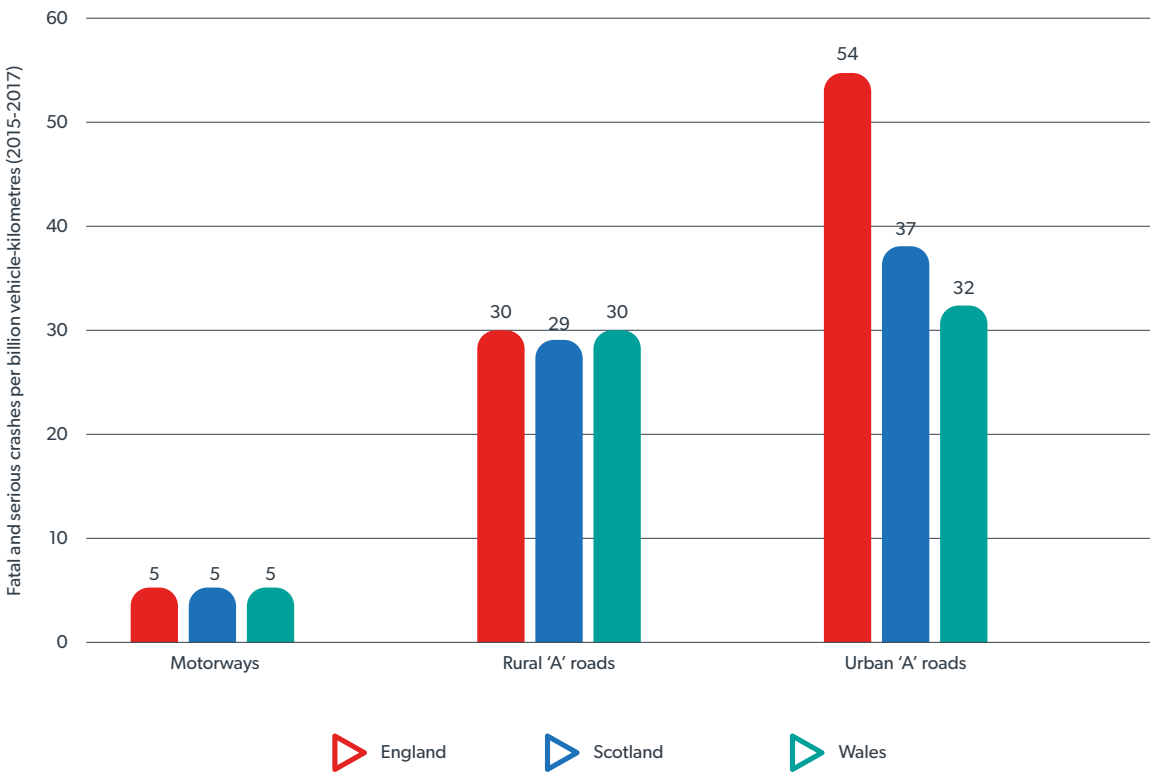
The second challenge relates to our measure of exposure. In our risk rate analyses we divide the number of fatal and serious crashes by the amount of vehicular traffic using a given route. In urban environments much of the exposure experienced relates to pedestrians and cyclists. It is not possible for us to capture this adequately at this stage and so this is a real limitation of both the analyses and urban area mapping, particularly within the ‘urban core’ of cities.

Finally, urban areas necessarily have a greater concentration of junctions with more exposure to conflict.

**In short, comparing Britain’s rural road performance with urban roads needs much more discussion and this year’s report begins this.**

Figure 13 shows that crash risk is similar for each country in Great Britain for both motorways and rural ‘A’ roads; however, crash risk is much higher on English urban ‘A’ roads than for Scottish and Welsh counterparts. Caution in interpretation is advised here however since there just may be more pedestrian and cyclist activity on English urban ‘A’ roads.

**FIGURE 13: FATAL AND SERIOUS CRASHES PER BILLION VEHICLE KILOMETRES ON DIFFERENT ROAD TYPES BY COUNTRY ON THE EURORAP NETWORK (2015-17)**



ANALYSIS BY CRASH TYPE

Figure 14 shows fatal and serious crashes by crash type on the EuroRAP network. The largest single cause of serious injury on urban roads was crashes involving Vulnerable road users. On rural roads, this was crashes at junctions and on motorways the largest single cause was shunt crashes.

FIGURE 14: FATAL AND SERIOUS CRASHES BY CRASH TYPE ON THE EURORAP NETWORK 2015-17

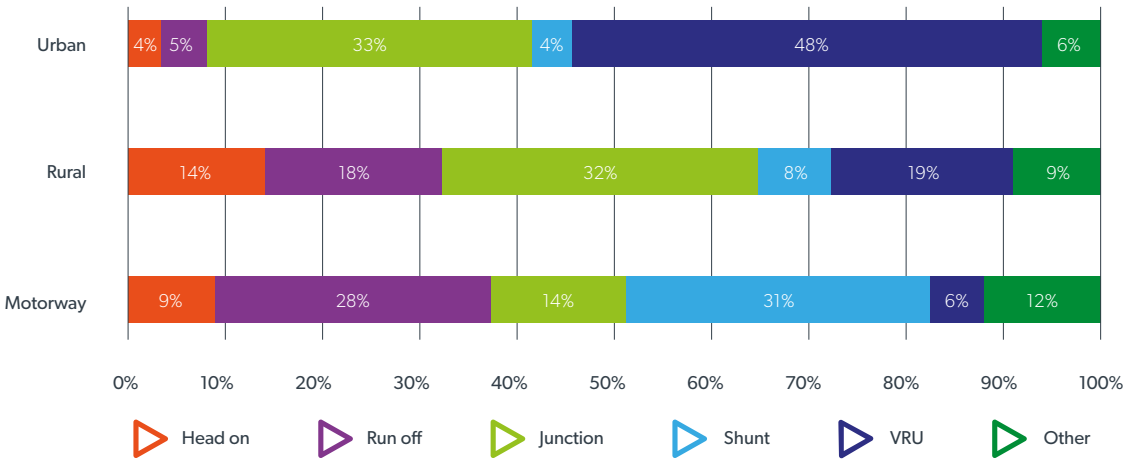
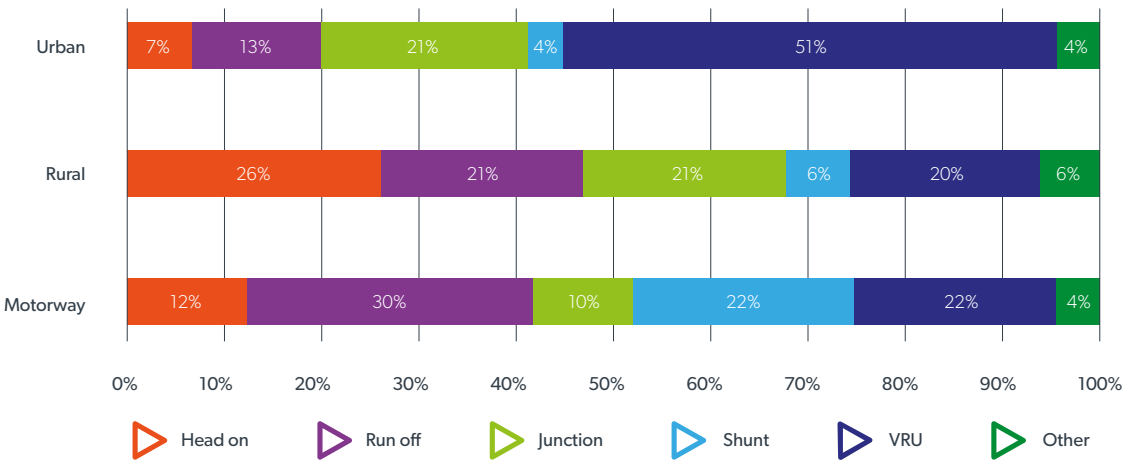


Figure 15 shows fatal crashes by crash type on the EuroRAP network. The largest single cause of death on urban roads was crashes involving Vulnerable road users. On rural roads, this was head-on crashes and on motorways the largest single cause was run-off road crashes.

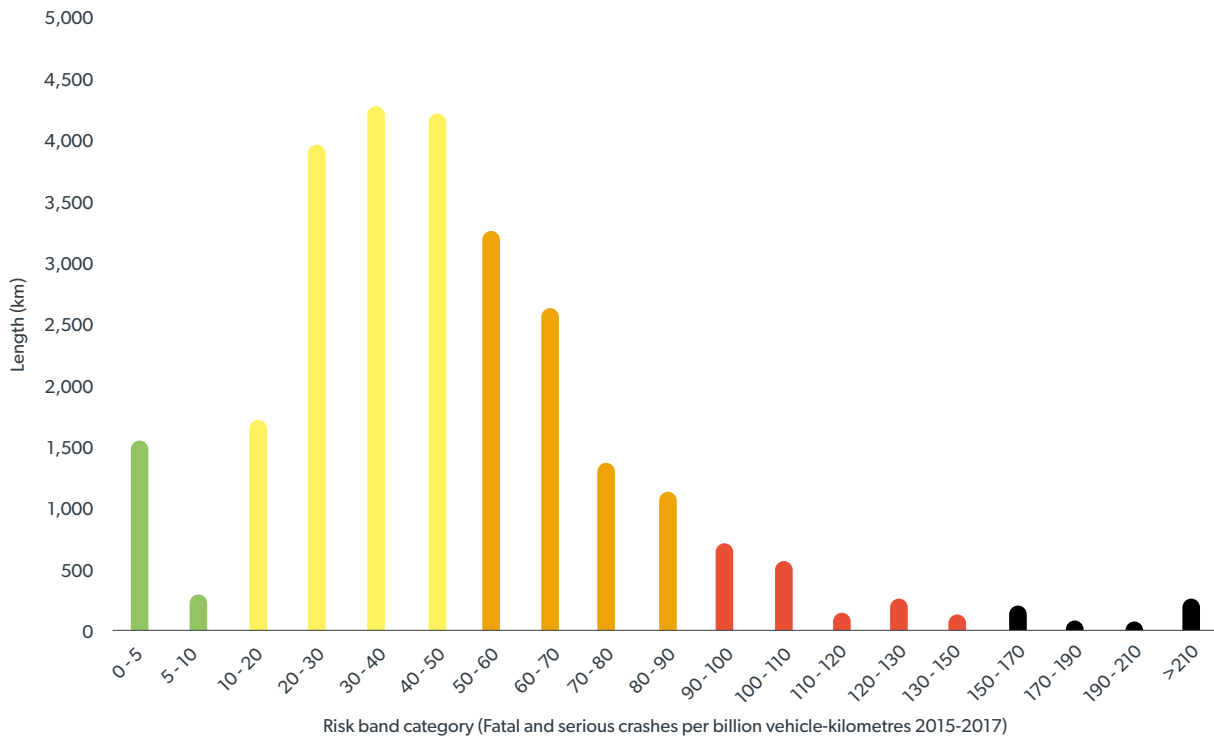
FIGURE 15: FATAL CRASHES BY CRASH TYPE ON THE EURORAP NETWORK 2015-17



LOCAL AUTHORITY RURAL ROADS

Figure 16 shows the risk rate distribution for local authority rural 'A' roads alone. It shows that 5% of local authority rural 'A' road travel is on unacceptably higher risk (either high or medium-high risk) sections.

FIGURE 16: RISK RATE DISTRIBUTION (LOCAL AUTHORITY RURAL 'A' ROADS) <sup>27</sup>



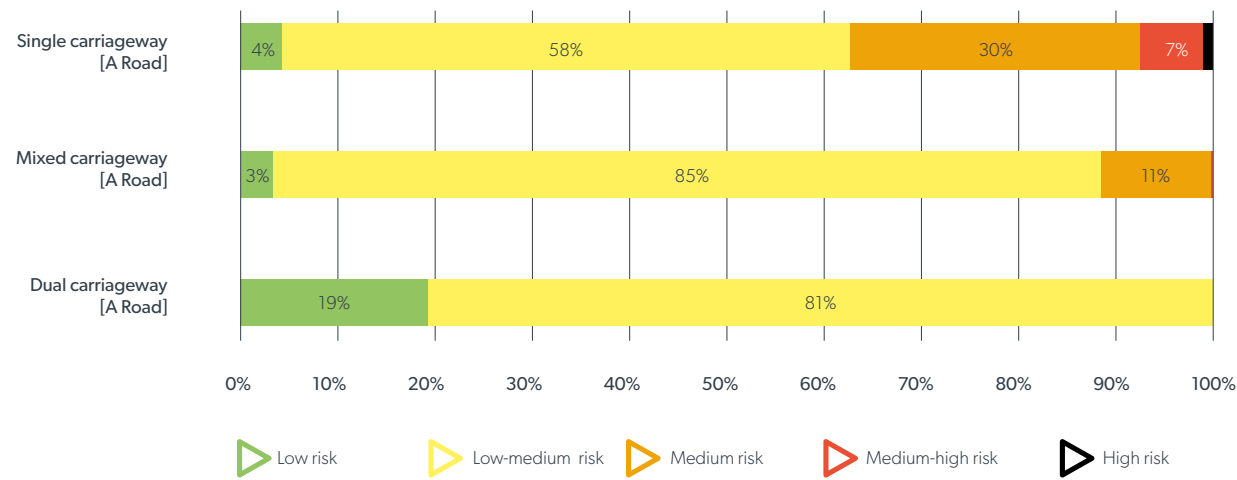
<sup>27</sup> Risk bandings: Black = high risk, red = medium-high risk, orange = medium-risk, yellow = low-medium risk and green = low-risk



Figure 17 shows the proportion of travel (kilometres driven) which occurs on roads in each risk banding, by road type. With the exception of three routes, all local rural dual carriageway ‘A’ road travel is on low or low-medium risk roads. Seven per cent of travel on rural single carriageway local roads is on unacceptably higher risk roads (either high or medium-high risk).



FIGURE 17: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE (LOCAL AUTHORITY RURAL ‘A’ ROADS)



7% of travel on local authority single carriageway rural roads is on unacceptably higher risk roads (either high or medium-high risk) in England, with similar levels of travel on unacceptably higher risk roads in Scotland (7%) and Wales (8%).

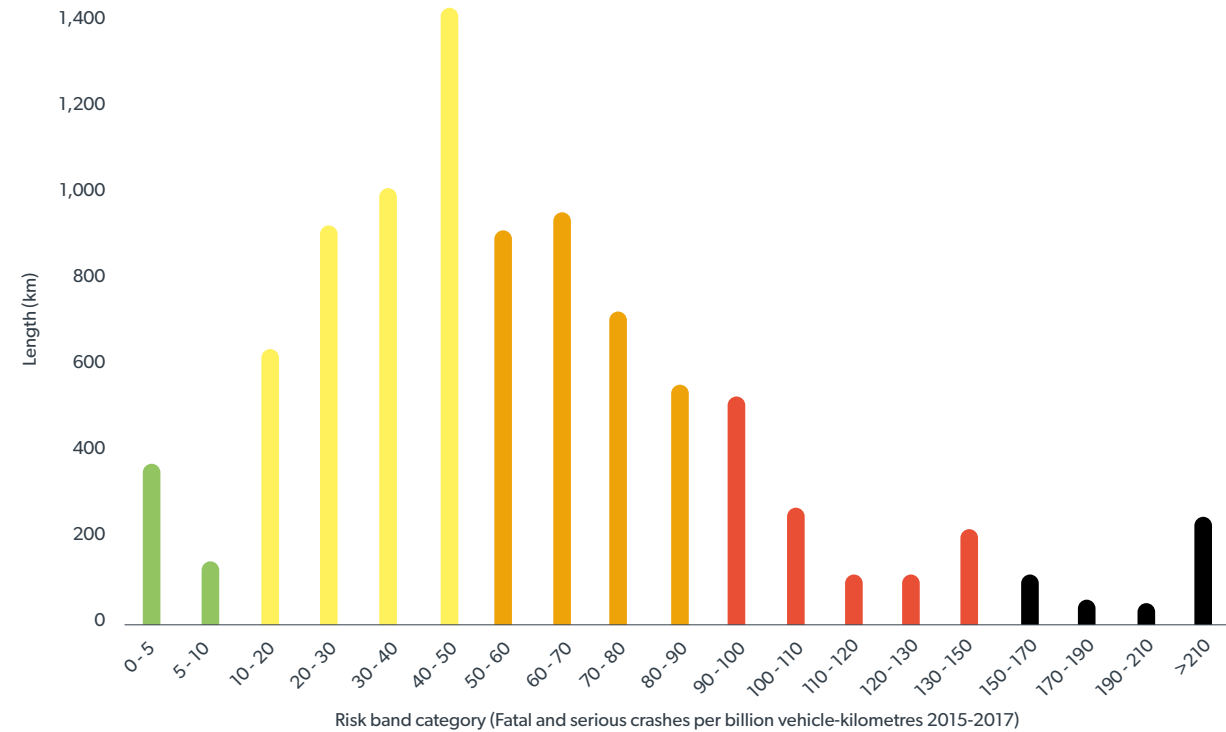
LOCAL AUTHORITY URBAN ROADS

Once again, the limitations described earlier should be considered when reviewing the results presented in this section.

Figure 18 shows the risk rate distribution for local authority urban ‘A’ roads alone. It shows that 15% of local authority urban ‘A’ road travel is on unacceptably higher risk (either high or medium-high risk) sections.

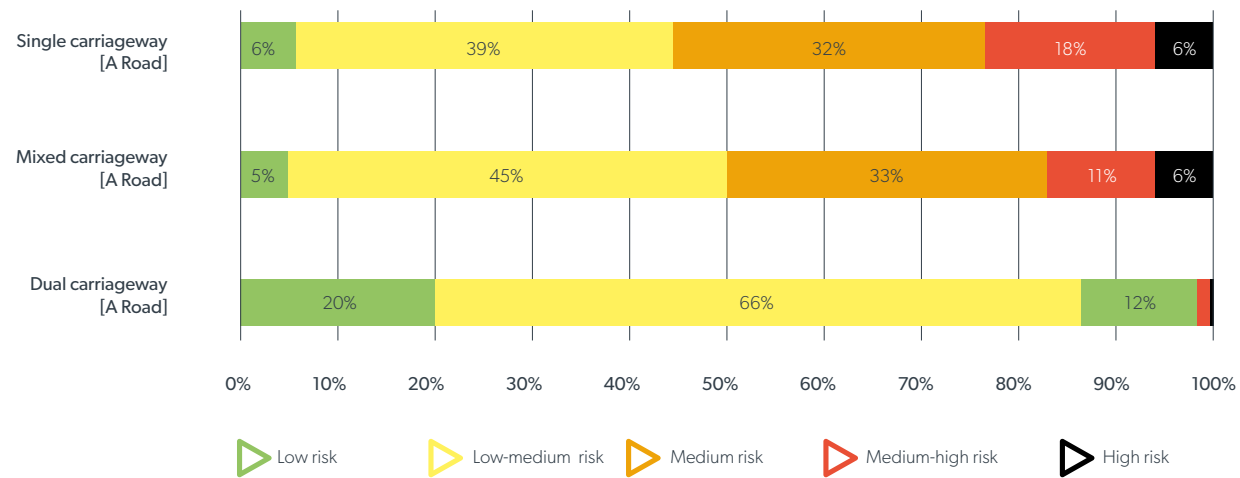
Figure 19 shows the proportion of travel (kilometres driven) which occurs on roads in each risk banding, by road type. 23% of local authority single carriageway urban ‘A’ road travel is on unacceptably higher risk (either high or medium-high risk) sections.

FIGURE 18: RISK RATE DISTRIBUTION (LOCAL AUTHORITY URBAN ‘A’ ROADS)<sup>28</sup>



<sup>28</sup> Risk bandings: Black = high risk, red = medium-high risk, orange = medium-risk, yellow = low-medium risk and green = low-risk

FIGURE 19: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE (LOCAL AUTHORITY URBAN 'A' ROADS)



EXPLORATORY URBAN CONURBATION RISK MAPS

All of the maps presented here should be considered exploratory and caution used when interpreting them.

London

You will notice that fatal and serious crash risk per billion vehicle kilometres travelled is particularly high in the urban core of London. This is likely to be due to the very high level of use of these roads by pedestrians and cyclists, which we cannot capture in our risk mapping at present. When we divide the number of fatal and serious crashes by vehicular traffic flow we simply are not dividing them by enough to reflect level of use.



Transport for London (TfL) is examining how to best capture risk across their network and we look forward to understanding their approach and adopting this where possible in the future for all major urban conurbations in Great Britain, allowing appropriate benchmarking of performance.

**TfL's endeavours in road safety are driven by a strong commitment to Vision Zero, with the Mayor's Transport Strategy setting out a goal that, by 2041, all deaths and serious injuries will be eliminated from London's transport network**

This recognises that it should not be considered inevitable or acceptable for people to be killed or seriously injured when travelling in London.



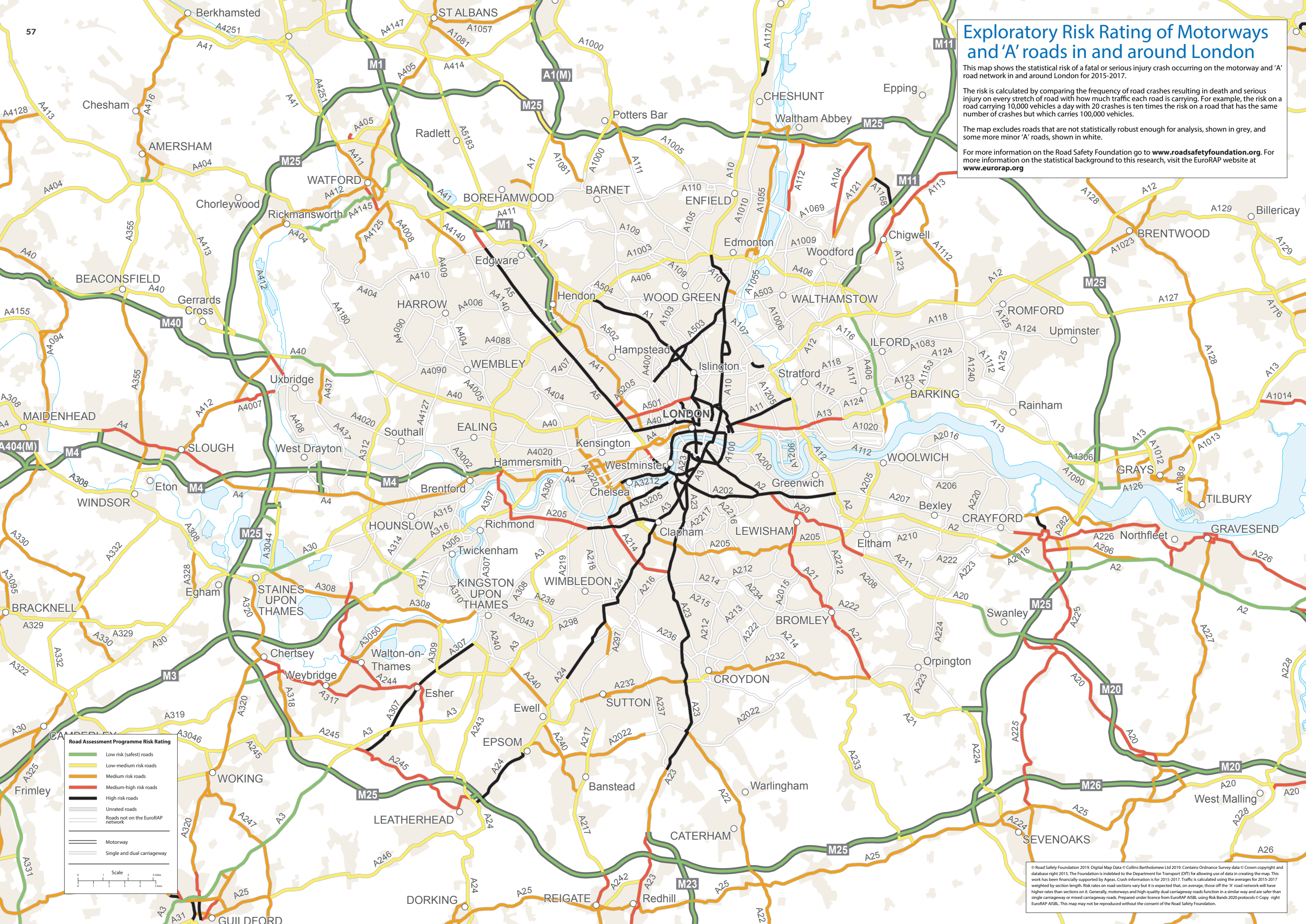
# Exploratory Risk Rating of Motorways and 'A' roads in and around London

This map shows the statistical risk of a fatal or serious injury crash occurring on the motorway and 'A' road network in and around London for 2015-2017.

The risk is calculated by comparing the frequency of road crashes resulting in death and serious injury on every stretch of road with how much traffic each road is carrying. For example, the risk on a road carrying 10,000 vehicles a day with 20 crashes is ten times the risk on a road that has the same number of crashes but which carries 100,000 vehicles.

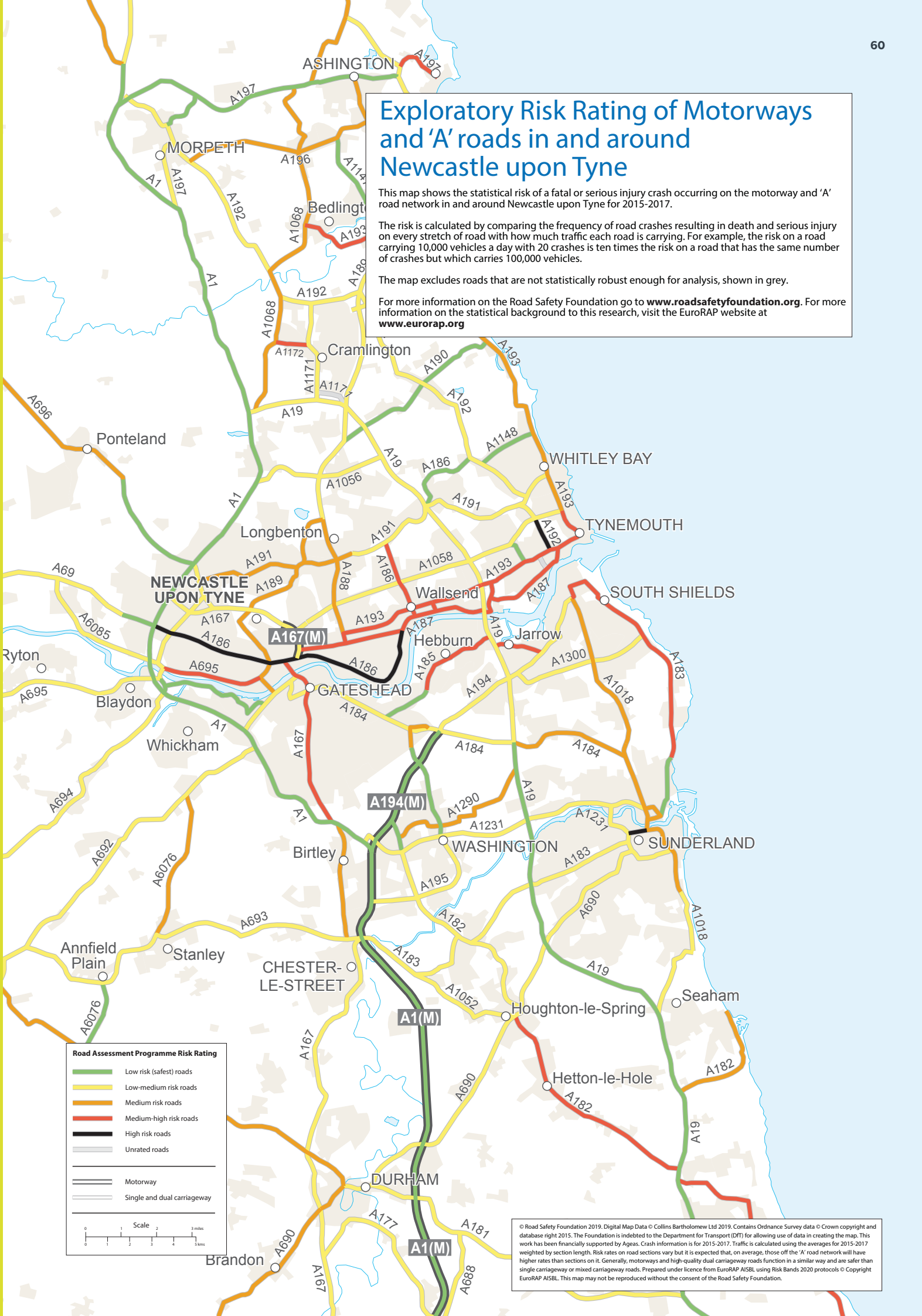
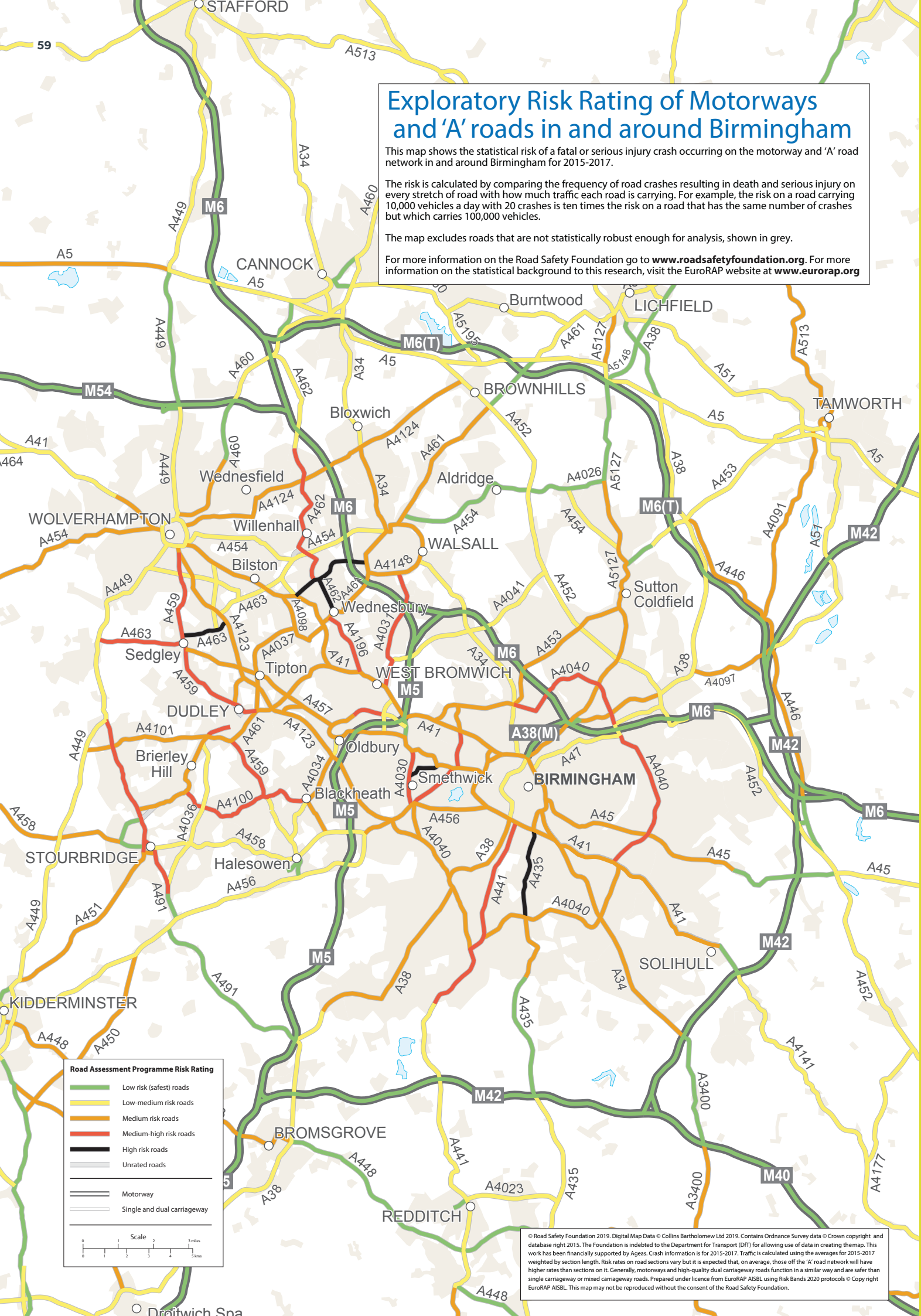
The map excludes roads that are not statistically robust enough for analysis, shown in grey, and some more minor 'A' roads, shown in white.

For more information on the Road Safety Foundation go to [www.roadsafetyfoundation.org](http://www.roadsafetyfoundation.org). For more information on the statistical background to this research, visit the EuroRAP website at [www.eurorap.org](http://www.eurorap.org)

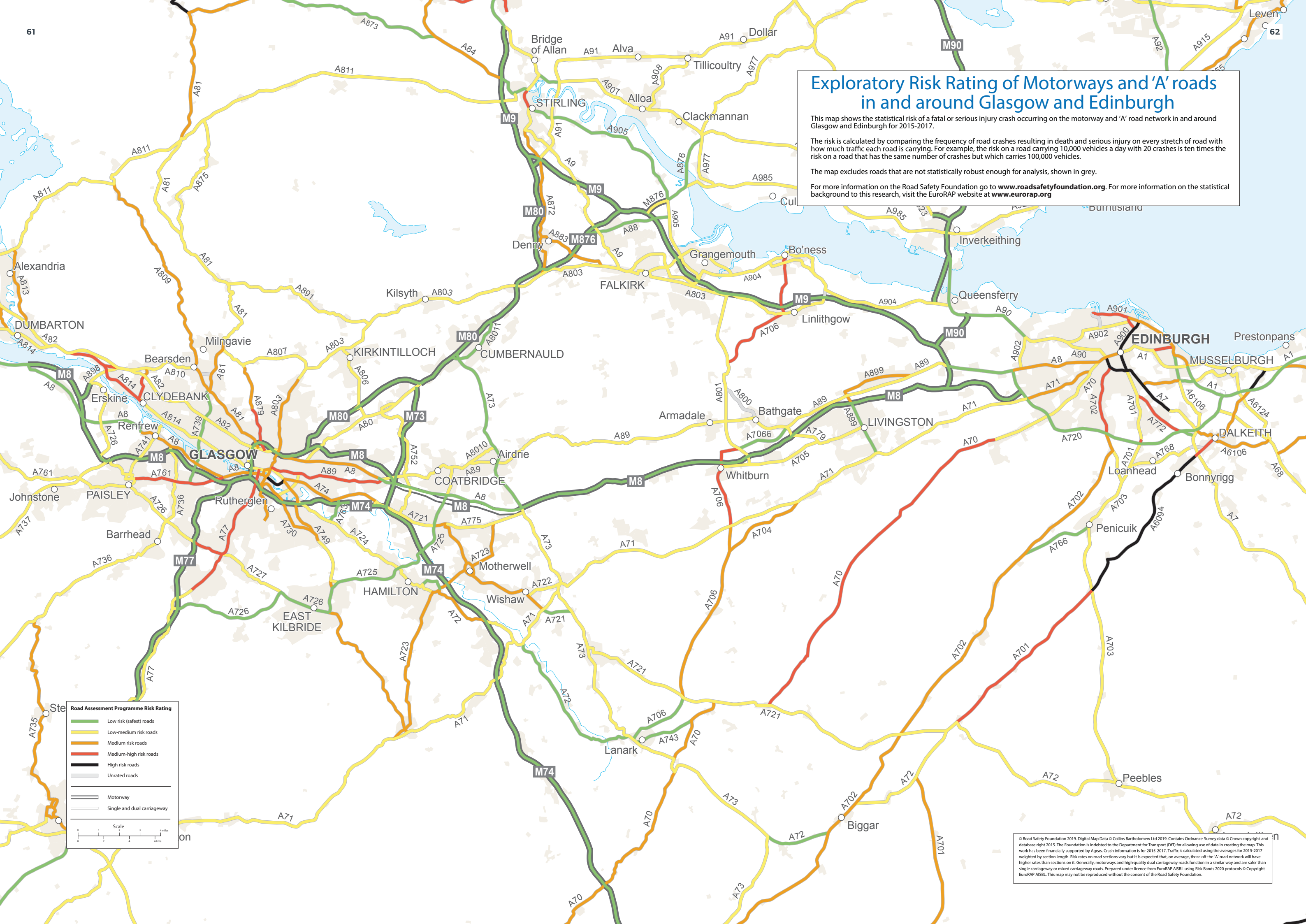


© Road Safety Foundation 2019. Digital Map Data © Collins Bartholomew Ltd 2019. Contains Ordnance Survey data © Crown copyright and database right 2015. The Foundation is indebted to the Department for Transport (DfT) for allowing use of data in creating the map. This work has been financially supported by Ageas. Crash information is for 2015-2017. Traffic is calculated using the averages for 2015-2017 weighted by section length. Risk rates on road sections vary but it is expected that, on average, those off the 'A' road network will have higher rates than sections on it. Generally, motorways and high-quality dual carriageway roads function in a similar way and are safer than single carriageway or mixed carriageway roads. Prepared under licence from EuroRAP AISBL using Risk Bands 2020 protocols © Copy right EuroRAP AISBL. This map may not be reproduced without the consent of the Road Safety Foundation.









## Exploratory Risk Rating of Motorways and 'A' roads in and around Glasgow and Edinburgh

This map shows the statistical risk of a fatal or serious injury crash occurring on the motorway and 'A' road network in and around Glasgow and Edinburgh for 2015-2017.

The risk is calculated by comparing the frequency of road crashes resulting in death and serious injury on every stretch of road with how much traffic each road is carrying. For example, the risk on a road carrying 10,000 vehicles a day with 20 crashes is ten times the risk on a road that has the same number of crashes but which carries 100,000 vehicles.

The map excludes roads that are not statistically robust enough for analysis, shown in grey.

For more information on the Road Safety Foundation go to [www.road-safety-foundation.org](http://www.road-safety-foundation.org). For more information on the statistical background to this research, visit the EuroRAP website at [www.eurorap.org](http://www.eurorap.org)

**Road Assessment Programme Risk Rating**

	Low risk (safest) roads
	Low-medium risk roads
	Medium risk roads
	Medium-high risk roads
	High risk roads
	Unrated roads

	Motorway
	Single and dual carriageway

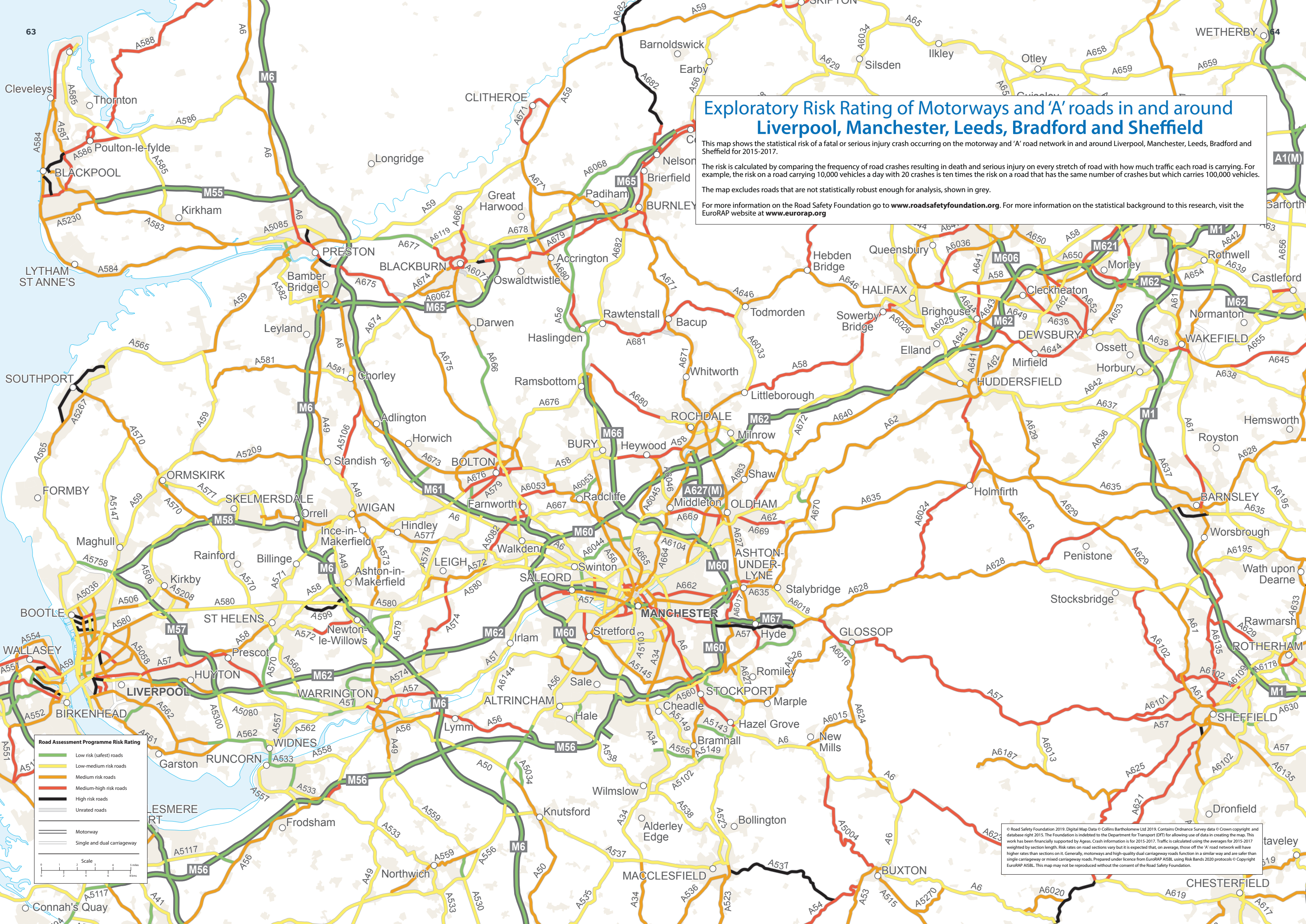
  

Scale

0 1 2 3 4 miles  
0 1 2 3 4 km

© Road Safety Foundation 2019. Digital Map Data © Collins Bartholomew Ltd 2019. Contains Ordnance Survey data © Crown copyright and database right 2015. The Foundation is indebted to the Department for Transport (DfT) for allowing use of data in creating the map. This work has been financially supported by Ageas. Crash information is for 2015-2017. Traffic is calculated using the averages for 2015-2017 weighted by section length. Risk rates on road sections vary but it is expected that, on average, those off the 'A' road network will have higher rates than sections on it. Generally, motorways and high-quality dual carriageway roads function in a similar way and are safer than single carriageway or mixed carriageway roads. Prepared under licence from EuroRAP AISBL. Using Risk Bands 2020 protocols © Copyright EuroRAP AISBL. This map may not be reproduced without the consent of the Road Safety Foundation.





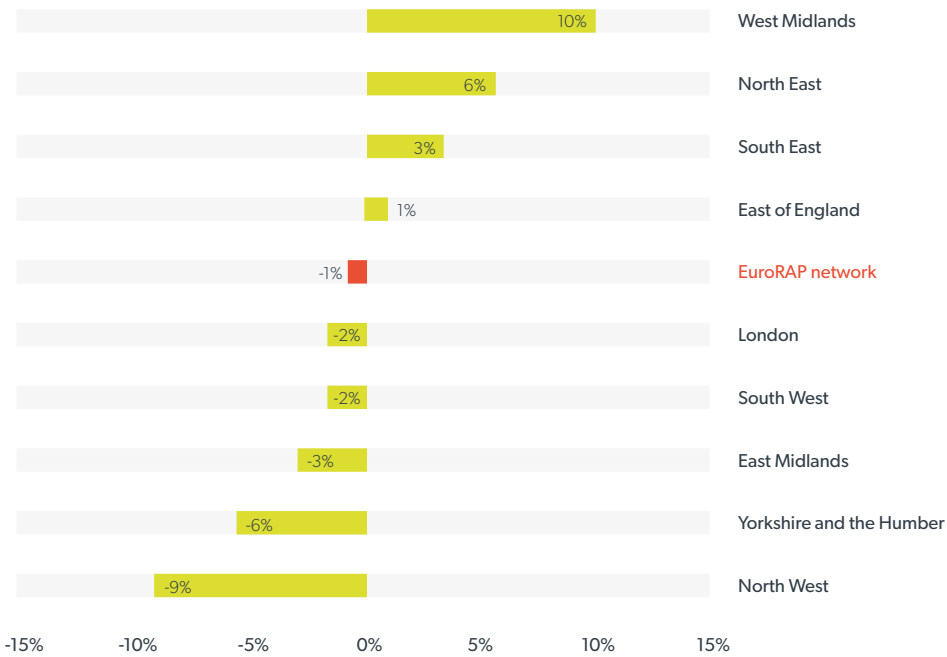


# REGIONAL AND NETWORK COMPARISONS IN ENGLAND

## REGIONAL COMPARISON

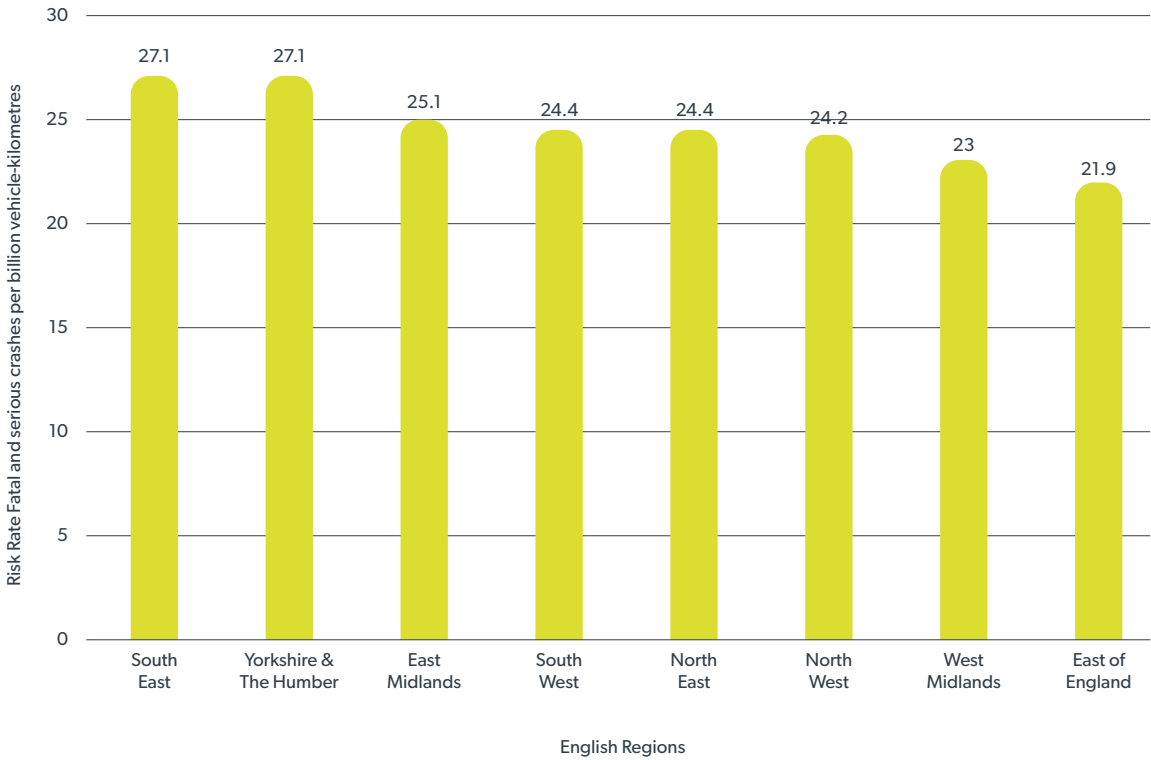
Figure 20 identifies those regions that have seen a reduction in fatal and serious crash risk, and those that have seen an increase over the two data periods (2012-14 and 2015-17). The greatest improvements are evident in the North West. Performance is slipping in the West Midlands, North East, South East and East of England.

FIGURE 20: CHANGE IN RISK OVER TIME ON THE ENGLISH EURORAP NETWORK BY REGION



The South East and Yorkshire and the Humber have the highest rate of fatal and serious crashes per kilometre travelled.

FIGURE 21: AVERAGE RISK OF A FATAL OR SERIOUS CRASH PER BILLION VEHICLE KILOMETRES TRAVELLED ON ALL ROADS ON THE ENGLISH EURORAP NETWORK BY REGION (2015-17)<sup>29</sup>



<sup>29</sup> London is excluded from this analysis because of the limitations of our analysis in urban areas

PERFORMANCE BY NETWORK

In this section we explore performance on the Strategic Road Network (SRN), the proposed Major Road Network (MRN) and Locally managed ‘A’ roads that are not on the MRN. Local authorities and the DfT are still currently agreeing the final composition of the MRN, so the MRN calculations here are based on the original proposed MRN by David Quarmby and Phil Carey<sup>30</sup>. As the precise plans for the MRN evolve, the EuroRAP network descriptors will be updated.

It is important at this juncture to understand performance on the MRN since it is currently proposed that these roads will receive Vehicle Excise Duty funding in the future. At present, although safety is mentioned in the consultation plans for the MRN issued by the DfT in 2018, it is not highlighted as a leading priority. By understanding performance on the MRN and by determining potential investment packages, it is hoped that some of the funding that is currently earmarked for major schemes, might be re-directed towards highly cost-effective life-saving remedial road safety schemes. At present, RSF is working with Kent County Council to scope the potential investment on their MRN roads.

Understanding our Networks

Table 17 provides an overview of performance on the three networks reviewed in this section. The SRN accounts for 21% of the length of the English EuroRAP network, carries 56% of the traffic and 18% of fatal and serious crashes happened on these roads. The MRN accounts for 22% of the length of the English EuroRAP network, carries 19% of traffic, and 25% of fatal and serious crashes happened on these roads. Finally, local non-MRN roads in England account for 57% of the length of the EuroRAP network, carry 25% of the traffic but 57% of fatal and serious crashes occur on these roads.

Crash risk is calculated by dividing the number of fatal and serious crashes by the traffic volume, measured in billion vehicle-kilometres, to express the number of crashes per billion vehicle-kilometres driven.

Crash risk is lowest on the SRN, is more than four times as high on the MRN and is nearly twice as high on local authority non-MRN roads. On the SRN, ‘A’ roads alone are less than half the risk of roads on the MRN.

<sup>30</sup> <http://www.reesjeffreys.co.uk/wp-content/uploads/2016/10/A-Major-Road-Network-for-England-David-Quarmby-and-Phil-Carey-Rees-Jeffreys-Road-Fund-October-2016.pdf>

TABLE 17: OVERVIEW OF PERFORMANCE ON THE EURORAP NETWORK BY SRN, PROPOSED MRN AND LOCAL AUTHORITY NON-MRN ROADS (2015-17)

	Strategic Road Network (SRN)		Proposed Major Road Network (MRN)		Local roads (non-MRN)	
Length (kms)	6,881	21%	7,523	22%	19,092	57%
Annual traffic (billion vehicle kilometres)	193	56%	64	19%	85	25%
Fatal and Serious crashes	1,603	18%	2,230	25%	5,102	57%
Crash risk per billion vehicle kilometres travelled	8		35		60	

The difference in performance on these networks can be explained by reviewing the composition of each of these networks and the amount of traffic travelling on different types of road. Motorway travel is inherently safe in comparison with single carriageway travel because opposing traffic is separated by a median barrier, junctions are grade-separated and infrequent, and pedestrians and pedal cyclists are prohibited.

TABLE 18: ROAD LENGTH (KM) ON DIFFERENT NETWORK TYPES IN ENGLAND ON THE EURORAP NETWORK

Road type	SRN	MRN	Local (non-MRN)	English EuroRAP network
Motorways	2,936 (43%)	28 (0%)	13 (0%)	2,977 (9%)
Dual carriageway 'A' roads	2,018 (29%)	1,120 (15%)	385 (2%)	3,523 (11%)
Mixed carriageway 'A' roads	1,378 (20%)	1,993 (26%)	2,429 (13%)	5,800 (17%)
Single carriageway 'A' roads	549 (8%)	4,382 (58%)	16,264 (85%)	21,195 (63%)
Total	6,881	7,523	19,092	33,496

TABLE 19: ANNUAL TRAFFIC (BILLION VEHICLE-KILOMETRES) ON DIFFERENT NETWORK TYPES IN ENGLAND ON THE EURORAP NETWORK (2015-2017)

Road type	SRN	MRN	Local (non-MRN)	English EuroRAP network
Motorways	129 (67%)	1 (2%)	0 (1%)	130 (38%)
Dual carriageway 'A' roads	46 (24%)	21 (33%)	6 (7%)	73 (21%)
Mixed carriageway 'A' roads	15 (8%)	19 (30%)	20 (24%)	54 (16%)
Single carriageway 'A' roads	3 (2%)	23 (36%)	59 (69%)	85 (25%)
Total	193	64	85	342

The SRN carries 56% of the traffic on the English EuroRAP network, with two-thirds of this traffic travelling on motorways. The MRN carries 19% of the traffic on the English EuroRAP network, with the split of traffic being fairly even across dual, mixed and single carriageway ‘A’ roads. The local authority-managed non-MRN roads carry a quarter of the traffic, with most of this travelling on single carriageway roads.



FATAL AND SERIOUS CRASHES 2015-2017

TABLE 20: ANNUAL AVERAGE NUMBER OF FATAL AND SERIOUS CRASHES ON DIFFERENT NETWORK TYPES IN ENGLAND ON THE EURORAP NETWORK (2015-2017)

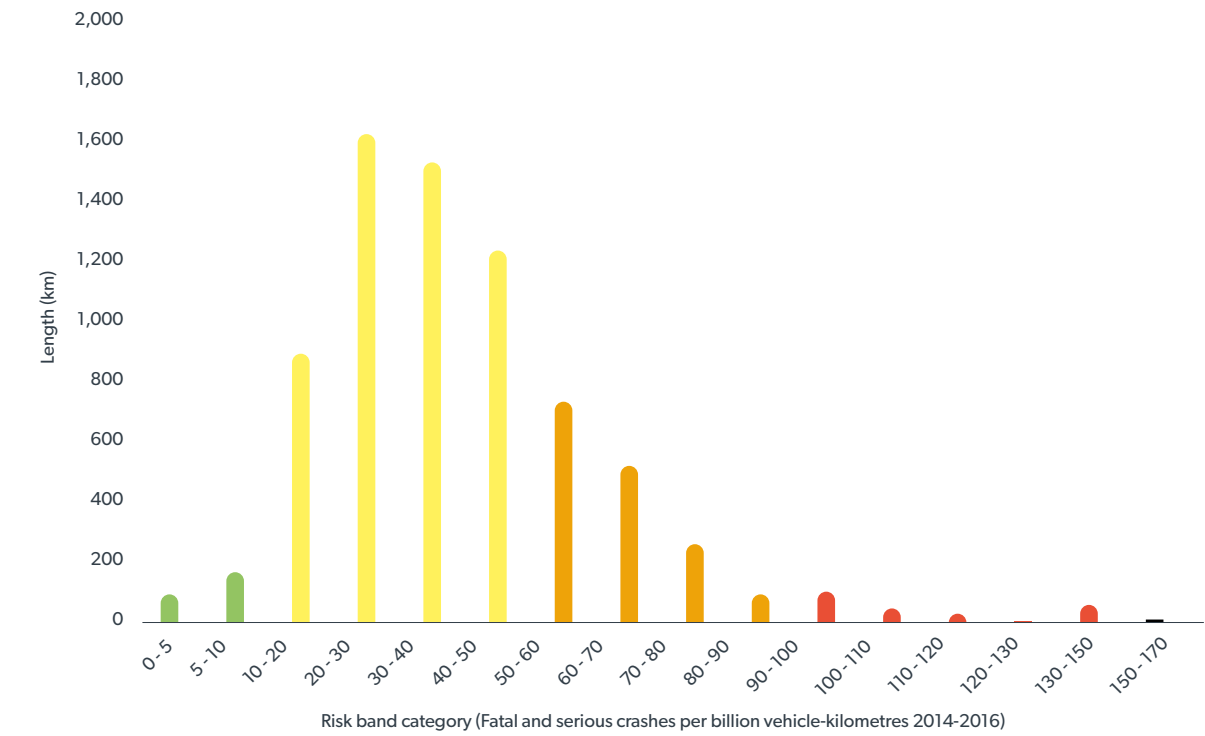
Road type	SRN	MRN	Local (non-MRN)	English EuroRAP network
Motorways	670 (42%)	6 (0%)	4 (0%)	680 (8%)
Dual carriageway 'A' roads	490 (31%)	467 (21%)	206 (4%)	1,163 (13%)
Mixed carriageway 'A' roads	310 (19%)	742 (33%)	1,434 (28%)	2,486 (28%)
Single carriageway 'A' roads	133 (8%)	1,015 (46%)	3,459 (68%)	4,606 (52%)
Total	1,603	2,230	5,102	8,935

PROPOSED MAJOR ROAD NETWORK (MRN) IN ENGLAND

The number of fatal and serious crashes on the proposed Major Road Network in England increased by more than 2% between the two data periods. Some of this increase is likely to be attributable to the new crash reporting system.

Overall on the MRN, 18% of travel is on medium or higher risk sections (compared to just 1% of travel on strategic roads).

FIGURE 22: RISK RATE DISTRIBUTION (PROPOSED MAJOR ROAD NETWORK IN ENGLAND)<sup>31</sup>



<sup>31</sup> Risk bandings: Black = high risk, red = medium-high risk, orange = medium-risk, yellow = low-medium risk and green = low-risk

FIGURE 23: PERCENTAGE OF TRAVEL ON SECTIONS WITH HIGH-LOW RISK BANDINGS BY ROAD TYPE (PROPOSED MAJOR ROAD NETWORK IN ENGLAND)



## RISK RATING OF THE PROPOSED MAJOR ROAD NETWORK IN ENGLAND



This map shows the statistical risk of a fatal or serious injury crash occurring on the proposed Major Road Network in England for 2015/2017.

The risk is calculated by comparing the frequency of road crashes resulting in death and serious injury on every stretch of road with how much traffic each road is carrying. For example, the risk on a road carrying 10,000 vehicles a day with 20 crashes is ten times the risk on a road that has the same number of crashes but which carries 100,000 vehicles.

The map excludes roads that are not statistically robust enough for analysis, shown in grey.

For more information on the Road Safety Foundation go to [www.roadsafetyfoundation.org](http://www.roadsafetyfoundation.org).

For more information on the statistical background to this research, visit the EuroRAP website at [www.eurorap.org](http://www.eurorap.org).





Low risk (safest) roads

Low-medium risk roads

Medium risk roads

Medium-high risk roads

High risk roads

Motorway

Single and dual carriageway

Unrated roads

Scale

02040 miles

0204060 km



© Road Safety Foundation 2019. Digital Map Data © Collins Bartholomew Ltd 2019. Contains Ordnance Survey data © Crown copyright and database right 2015. The Foundation is indebted to the Department for Transport (DfT) for allowing use of data in creating the map. This work has been financially supported by Ageas. Crash information is for 2015-2017. Traffic is calculated using the averages for 2015-2017 weighted by section length. Risk rates on road sections vary but it is expected that, on average, those off the 'A' road network will have higher rates than sections on it. Generally, motorways and high quality dual carriageway roads function in a similar way and are safer than single carriageway or mixed carriageway roads. Prepared under licence from EuroRAP AISBL using Risk Bands 2020 protocols © Copyright EuroRAP AISBL. This map may not be reproduced without the consent of the Road Safety Foundation.

# SOCIETAL COST AND PRIORITIES FOR INVESTMENT

In Great Britain societal costs of crashes are calculated using ‘values of prevention’ published by the DfT annually. These values of prevention include both direct economic costs such as hospital and medical care, and an estimate of the monetised broader societal impact of crashes comprising estimates of lost output and human costs based on the willingness to pay principle.

## In 2017 the value of prevention (or societal cost) of road traffic crashes was £35bn

The cost of road crashes is astonishing. In 2017 the value of prevention (or societal cost) of road traffic crashes was £35bn, equating to 1.7% of Gross Domestic Product<sup>32</sup>. Broadly 60% of this total £35bn loss occurs on the EuroRAP network. Taking only injury crashes reported to the Police on the EuroRAP network, the societal cost between 2015-17 was £16.4 billion. Note that this sum does not include damage only crashes or make any correction for under-reporting and so should be considered very conservative.

In Table 21 the length of roads that are unacceptably higher risk (medium-high or high risk) are identified along with the societal cost of reported injury crashes that occurred on them during the three-year analysis period 2015-17. This table excludes roads being addressed through the Safer Roads Fund.

TABLE 21: SOCIETAL COSTS ASSOCIATED WITH MEDIUM-HIGH RISK AND HIGH RISK ROADS IN GREAT BRITAIN (EXCLUDING THOSE BEING ADDRESSED THROUGH THE SAFER ROADS FUND)

Country	Road type	Road length (km)	Societal costs of reported injury crashes 2015-2017 <sup>33</sup>
England	Strategic roads	26	£13 million
	Local roads	3,304 <sup>34</sup>	£2,770 million <sup>35</sup>
Scotland	Strategic roads	34	£5 million
	Local roads	762	£155 million
Wales	Strategic roads	254	£69 million
	Local roads	352	£77 million
Total		4,731	£3,089 million

<sup>32</sup> The value of prevention of road crashes in 2017 was £35bn from ‘Reported Road Casualties Great Britain: 2017 Annual Report’ Available at: <https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2017> GDP was around £2tn in 2016 according to the World Bank

<sup>33</sup> Based on 2016 DfT values of prevention of fatal, serious and slight crashes; the figure excludes damage only crashes and any correction for under-reporting of injury crashes

<sup>34</sup> Of which 299km were on the MRN

<sup>35</sup> Of which £351 million was on the MRN

Table 22 shows the length of local roads classed as persistently higher risk along with societal costs of the reported injury crashes that occurred on them during the three-year analysis period (2015-17). This table excludes roads being addressed through the Safer Roads Fund.

TABLE 22: SOCIETAL COSTS ASSOCIATED WITH PERSISTENTLY HIGHER RISK<sup>36</sup> LOCAL ROADS IN GREAT BRITAIN EXCLUDING THOSE BEING ADDRESSED THROUGH THE SAFER ROADS FUND

Country	Road length (km)	Societal costs of reported injury crashes 2015-2017 <sup>37</sup>
England	779 <sup>38</sup> of which 105 are on the MRN	£978 million <sup>39</sup> of which £182 million was on the MRN
Scotland	45	£26 million
Wales	7	£3 million
Total	831	£1,008 million

### SAFER ROADS FUND

The Safer Roads Fund has seen grant expenditure of nearly £100 million by the DfT to be spent on 49<sup>40</sup> highest-risk road local authority road sections in England as identified by the Road Safety Foundation’s 2016 analysis. The schemes covered 700 kilometres, with a portfolio spend of £140,500 per kilometre length of eligible road. The estimated benefits of the investment are compelling, since the schemes are estimated to save 1,450 fatal and serious injuries (a 23% reduction) over the next 20 years amounting to a Benefit Cost Ratio (BCR) of 4.4 meaning that for every £1 invested, societal benefit is estimated to be £4.40.

If similar reductions were achieved as with the Safer Roads Fund through treating the remaining local authority persistently higher risk roads (some 831 kilometres), then a £117 million investment could prevent around 3,450 fatal and serious injuries over the next 20 years<sup>41</sup>.

<sup>36</sup> Same methodology as Table 10

<sup>37</sup> Based on 2016 DfT values of prevention of fatal, serious and slight crashes; the figure excludes damage only crashes and any correction for under-reporting of injury crashes

<sup>38</sup> Of which 105km was on the MRN

<sup>39</sup> Of which £182 million was on the MRN

<sup>40</sup> One local authority decided not to submit a proposal to the Safer Roads Fund

<sup>41</sup> Assuming a similar spend per km and percentage reduction as per the Safer Roads Fund and taking into account background trend



Returns may be greater because the persistently higher risk roads have been filtered not just by risk but also by crash density meaning that more crashes can be prevented per kilometre road length through engineering measures.

The potential investment would be £109m in England preventing around 3,350 fatal and serious injuries over 20 years, £6m in Scotland preventing around 90 fatal and serious injuries over 20 years and £1m preventing around 10-15 fatal and serious injuries over 20 years in Wales. It is likely that these road sections would yield greater BCRs than the first Safer Roads Fund sections and pay back to society their costs more than 5 times over.

**In the longer term it is suggested that the local authority unacceptably higher risk roads should be reviewed to determine whether they are likely to be good candidates for investment.**

If two-thirds of these were found to be good candidates, the investment necessary would be £83 million every year for five years. This investment could prevent as many as 6,850 fatal and serious injuries over a 20-year period<sup>42</sup>. The necessary investment would be £62m per year for five years in England, £14m in Scotland and £7m in Wales.

<sup>42</sup> Assuming a similar spend per km and percentage reduction as per the Safer Roads Fund and taking into account background trend

PERSISTENTLY HIGHER RISK ROADS (2012-2017)

In Table 23, the full list of persistently higher risk roads is presented. It was not possible to verify all of the crash, road length and traffic figures with all relevant highway authorities prior to publication. The allocation of crashes to routes in urban areas remains exploratory and is therefore subject to error, with limitations as described.

TABLE 23: PERSISTENTLY HIGHER RISK<sup>43</sup> ROADS IN GREAT BRITAIN

Longest Highway Authority (100% unless stated)	Road Number	Road length (km)	2015-17 Band	2012-2014 Band
Birmingham	A4040	7		
Birmingham	A441	10		
Bolton	A579	6		
Bournemouth	A35	5		
Bradford	A629	12		
Brent (36%)	A5	15		
Brighton and Hove (64%)	A23	14		
Brighton and Hove (85%)	A259	14		
Brighton and Hove	A270	7		
Bristol, City of (63%)	A38	8		
Bristol, City of (87%)	A432	7		
Cambridgeshire	A1134	16		
Cambridgeshire	A603	5		
City of Edinburgh	A7	6		
Conwy (81%)	A548	7		
Derbyshire (76%)	A5004	37		
Derbyshire (88%)	A57	11		
Derbyshire	A6005	12		
Devon	A361	23		
East Riding of Yorkshire (59%)	A165	22		
East Sussex (96%)	A21	33		
East Sussex (Bexhill-Hastings)	A259	6		
East Sussex (Newhaven-Polegate)	A259	6		

<sup>43</sup> Same methodology as Table 10

Longest Highway Authority (100% unless stated)	Road Number	Road length (km)	2015-17 Band	2012-2014 Band
Fife	A909	14		
Glasgow City (57%)	A761	7		
Glasgow City	A89	9		
Hampshire (68%)	A27	6		
Hampshire (71%)	A272	12		
Hampshire	A3	31		
Hampshire	A32	11		
Isle of Wight	A3054	29		
Isle of Wight	A3055	49		
Kent	A290	9		
Kingston upon Hull, City of (54%)	A1105	8		
Lancashire (79%)	A586	5		
Lancashire	A6	11		
Lancashire	A671	6		
Lancashire	A683	24		
Leeds	A58	7		
Leeds	A660	7		
Lincolnshire	A1434	7		
Liverpool (41%)	A57	17		
Manchester (57%)	A662	6		
Newcastle upon Tyne	A186	12		
North Tyneside (63%) (A188-Northumberland Dock Road)	A187	6		
North Tyneside (North Shields-Northumberland Dock Road)	A187	5		
Northamptonshire	A4500	6		
Northamptonshire	A508	5		
Nottingham (65%)	A60	8		
Oxfordshire	A420	9		
Portsmouth	A288	10		
Rochdale (95%)	A58	6		
Sandwell (68%)	A4100	7		

Longest Highway Authority (100% unless stated)	Road Number	Road length (km)	2015-17 Band	2012-2014 Band
Sefton	A565	8		
Sheffield	A6101	6		
Sheffield	A6135	9		
Sheffield	A625	5		
Slough	A4	9		
Southampton	A3024	6		
Southend-on-Sea (52%)	A1015	5		
Southend-on-Sea (65%)	A13	19		
Stockport (54%)	A6	15		
Surrey (98%)	A245	10		
Surrey	A307	10		
Tameside	A57	8		
Tower Hamlets (73%)	A13	7		
Transport for London	A21	13		
Transport for London	A23	20		
Transport for London	A10	14		
Transport for London	A1	8		
Transport for London	A503	12		
Transport for London	A20	8		
Transport for London	A24	12		
Transport for London	A205	9		
Transport for London	A2	10		
Transport for London	A202	6		
Transport for London	A3	7		
Wakefield	A645	9		
Walsall	A462	7		
West Dunbartonshire	A814	8		
Wirral	A551	9		
Wirral	A553	7		







# ABOUT OUR WORK

## RISK MAPPING

The EuroRAP Risk Maps for Britain’s major roads have been published by the Road Safety Foundation since 2002. These well-known colour coded maps show the risk to a road user of being involved in a crash involving death or serious injury.

These annual Risk Maps for Britain’s motorways and ‘A’ roads have become a key national road safety performance indicator revealing measurement of risk on roads across nations, regions and authorities.

The majority of British road deaths (60%) are concentrated on the mapped network (which is around 12.5% of the whole road network).

## PERFORMANCE TRACKING

Performance Tracking uses the data compiled for each risk map to assess how risk on the network as a whole, and on individual roads, has changed over time. It is a way of measuring progress and the effectiveness of investment in safer roads. Prince Michael Road Safety Awards are made annually to an authority with a road section showing strong improvement.

Performance Tracking is carried out in two main stages:

- ➔ Risk Mapping compares consecutive three-year data periods to identify roads for two lists:
  - Those road sections that have improved: shown by a statistically significant reduction in the number of fatal and serious crashes between the two data periods
  - Those road sections that are persistently higher risk: these are busy roads that are medium-high or high risk in both three-year data periods and have not made any significant improvement in performance between the data periods
- ➔ Highway authorities are consulted in order to build up information on specific issues affecting road safety, and on the types of engineering, enforcement or education measures that may have been implemented and any actions planned in the immediate future

## STAR RATING AND SAFER ROADS INVESTMENT PLANS

Much as Euro NCAP tests Star Rate the in-built safety standard of new cars, Star Rating gives a measure of the in-built safety of roads. These ratings are based on road attribute data and provide a simple and objective measure of the level of safety built in to the roads for vehicle occupants, motorcyclists, pedestrians and cyclists. Just under a million kilometres of road have now been surveyed using this methodology worldwide. The Star Ratings reflect risk contributed by each of the road attributes that are coded – the higher the risk, the lower the rating. The risk is calculated using ‘crash modification factors’ that describe relationships between road attributes and crash risk. Star Rating information can be viewed using charts, tables and maps.

Increasing numbers of road authorities around the world are setting Star Ratings as policy targets. This approach can be attractive to senior officers and elected members who are accountable for ensuring that policies are being effective at the macro level, and that funds are well allocated. For example, Highways England has a delivery plan commitment to ensure that 90% of travel on the Strategic Road Network occurs on 3-star roads or better by 2020. Star Ratings can also be applied to designs. This can motivate designers of new and improved roads to think about risk management in a fresh way.

Safer Roads Investment Plans (SRIPs) identify ways in which fatal and serious injuries can be prevented in a cost-effective way. The ViDA software that prepares Star Ratings also calculates the casualty reduction that might be expected from implementing any of around 90 countermeasures individually or in logical combinations. The software examines every 100 metres along an inspected road, comparing the value of crashes that might be prevented against the cost of implementing a countermeasure. The software provides an economic appraisal of a Safer Road Investment Plan (SRIP).

This SRIP can be interrogated at the individual section, region or national (portfolio) level to assess the appropriateness and effectiveness of individual options for improvement. SRIPs can be refined to allow economic appraisal of a locally acceptable treatment programme through modelling a User Defined Investment Plan (UDIP). The appraisal period is normally 20 years, allowing the cost of implementing each measure to be evaluated against the expected casualty savings over the economic life of the investment.

ViDA provides present values (PVs) and Benefit to Cost Ratios (BCRs) for appraisal of each proposed countermeasure (ViDA is extensively documented at [www.irap.org](http://www.irap.org)).



NOTES

Value of prevention/societal costs

A value of crash prevention reflects the societal cost of road crashes. This is calculated for each road of the British EuroRAP network by determining the total value of prevention of the reported injury crashes that have occurred. The DfT’s 2016 values for the prevention of a crashes have been used in this report.

EuroRAP network

The EuroRAP network consists of all motorways and ‘A’ roads except for some of the more minor ‘A’ roads within Greater London; that is, those which are not on the Strategic Road Network, proposed Major Road Network or the Transport for London Road Network and which also have three or more digits in their ‘A’ number.

Though the EuroRAP network comprises only around an eighth of Britain’s road length, 60% of all road deaths occur on it. This annual report therefore provides key indicators that track Britain’s road safety performance.

Major Road Network (MRN)

The Major Road Network (MRN) in England is the term used to describe the proposed network of more important local roads.

Region and nation allocation

A road is allocated to the region or nation in which 80% or more of its length is contained.

Road type

Road type is the road type accounting for 80% or more of the road’s length. The road type assigned is ‘mixed’ if the 80% figure is not reached and the road has lengths that are both single and dual carriageway ‘A’ road.

Strategic roads

Strategic roads is the term used to describe national networks of motorways and primary ‘A’ roads. These motorways and primary ‘A’ roads are the responsibility of national governments in England (Department for Transport), Wales (Welsh Government) and Scotland (Scottish Government).

In England, a new government company, Highways England, became responsible in 2015 for the Strategic Road Network. The Department for Transport has delegated responsibility for the network in England to Highways England. In Scotland, day to day responsibilities are managed by an Agency, Transport Scotland and in Wales, the Welsh Government.

ABOUT US



About the Road Safety Foundation

The Road Safety Foundation is a UK charity advocating road casualty reduction through simultaneous action on all three components of the safe road system: roads, vehicles and behaviour. The charity has enabled work across each of these components and published several reports which have provided the basis of new legislation, government policy or practice.

For the last decade, the charity has focused on developing the Safe Systems approach, and in particular leading the establishment of the European Road Assessment Programme (EuroRAP) and, through EuroRAP, the global UK-based charity, iRAP (the International Road Assessment Programme).

Since the inception of EuroRAP in 1999, the Foundation has been the UK member responsible for managing the programme in the UK (and, more recently, Ireland), ensuring that the UK provides a global model of what can be achieved.

The Foundation plays a pivotal role in raising awareness and understanding of the importance of road infrastructure at all levels, through:

- ➔ Annual publication of EuroRAP Risk Mapping and Performance Tracking in a form which can be understood by the general public, policymakers and professionals alike
- ➔ Supporting use of the iRAP and EuroRAP protocols at an operational level by road authorities, in order to support engineers in improving the safety of the road infrastructure for which they are responsible
- ➔ Proposing the strategies and goals that the government should set in order to prevent tens of thousands of fatalities and disabling injuries

The Road Safety Foundation was a founder member of the FIA Foundation (established as an independent UK registered charity in 2001 by the Fédération Internationale de l’Automobile, FIA) and frequently works with FIA members and other organisations both in Britain and abroad, including the RAC Foundation, the AA, IAM RoadSmart, RoadSafe, PACTS (The Parliamentary Advisory Council for Transport Safety) and professional bodies such as ADEPT (the Association of Directors of Environment, Economy, Planning and Transport).

The formal objectives of the charity, which was founded in the 1980s, are to:

- ➔ Carry out, or procure, research into all factors affecting the safe use of public roads
- ➔ Promote and encourage the safe use of public roads by all classes of road users through the circulation of advice, information and knowledge gained from research
- ➔ Conceive, develop and implement programmes and courses of action designed to improve road safety, which are to include the undertaking of any projects or programmes intended to educate young children or others in the safe use of public roads

The library of the Road Safety Foundation's published work is at  
[www.roadsafetyfoundation.org](http://www.roadsafetyfoundation.org)



#### ABOUT EURORAP

The European Road Assessment Programme (EuroRAP AISBL) is dedicated to saving lives through safer roads and is an international not for profit association registered in Belgium under number 50962003 with company number 0479824257. EuroRAP's registered office is Rue de la Science 41, 1040 Brussels.

EuroRAP works to reduce death and serious injury through a programme of systematic testing of risk, and by identifying the major shortcomings that can be addressed by practical road improvement measures. It forges partnerships between those responsible for a safe road system – civil society, governments, motoring organisations, vehicle manufacturers and road authorities – and aims to ensure that assessment of risk lies at the heart of strategic decisions on road improvements, crash protection and standards of road management.

Its members are automobile and touring clubs, national and regional road authorities, and universities and research institutes. EuroRAP is supported by the FIA Foundation, ACEA, and the International Road Assessment Programme (iRAP).

For more information please visit [www.eurorap.org](http://www.eurorap.org)



#### ABOUT AGEAS

Ageas is a leading general insurer in the UK, backed by an international insurance group with businesses across Europe and Asia. Over 5 million people in the UK choose to insure their cars, homes, travels or businesses with Ageas, benefitting from its award winning service in their time of need.

As a leading UK car insurer, Ageas knows only too well the impact that incidents on the roads can have on its customers, their families and friends, other road users and public services. That's why Ageas has partnered with the Road Safety Foundation since 2012 - helping make Britain's roads safer for everyone.

[www.ageas.co.uk](http://www.ageas.co.uk)  
[@AgeasUK](https://www.instagram.com/ageasuk)



# ACKNOWLEDGEMENTS

The Road Safety Foundation is grateful to Ageas for its continued partnership in completing this important work. The Foundation would like to thank those road authorities that responded to pre-publication consultation of the results and provided detailed information on the specific roads listed.

The data used to produce these results was compiled and assigned to the EuroRAP network by Agilysis.

Analysis and validation were carried out by Brian Lawton, and the report was written by Brian Lawton and Dr Suzy Charman. Pre-publication consultation with road authorities on roads listed in the report was carried out by Brian Lawton and Kate Fuller. Cartography was carried out by Nick Moss using Digital Map Data (c) Collins Bartholomew Ltd 2019. Regional mapping contains Ordnance Survey data (c) Crown Copyright and database right 2019.

Sole responsibility for this report lies with the authors and does not necessarily reflect the opinion of supporters of the Road Safety Foundation or EuroRAP.