



# REVIEW OF HOW HIGHWAYS ENGLAND PRIORITISES INVESTMENTS TO IMPROVE SAFETY OUTCOMES

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## About the Road Safety Foundation

The Road Safety Foundation is a UK charity founded in 1986 which focuses on road casualty reduction through simultaneous action on all components of a Safe System approach: safe roads, safe vehicles, safe speeds, safe road use and post-crash care.

The charity has enabled work across each of these components. Several of the charity's published reports have provided the basis of new legislation or government policy.

With 1.2 million now killed annually on the world's roads, the charity helps ensure that the UK can provide a global model of what can be achieved with an evidence based Safe System approach.

The charity led the establishment of the European Road Assessment Programme (EuroRAP) in 1999 which in turn received a Prince Michael International Road Safety Award for establishing the global International Road Assessment Programme (iRAP). iRAP's protocols have been applied in more than 100 countries as part of the UN road safety collaboration led by the World Health Organisation.

In Britain, the Foundation plays a pivotal role in raising awareness and understanding of the importance of road infrastructure safety through:

- annual publication of EuroRAP safety rating measures which can be understood by the general public, policy makers and professionals alike;
- issuing guidance on the use of RAP protocols and working with road authorities to improve the safety of the road infrastructure for which they are responsible; and
- proposing the strategies and goals that the Government might set in order to save tens of thousands of lives and disabling injuries.

The Road Safety Foundation frequently supports others abroad and is a founder member of the global philanthropy, the FIA Foundation.

The charity works closely in the UK with government, authorities, insurers and other road safety organisations and professional bodies such as ADEPT. Its Board of Trustees is chaired by former Roads Minister, Lord Whitty, and includes former CEOs of TRL, FTA and other leaders in relevant fields such as marketing. Its annual report tracking UK infrastructure safety performance to the EuroRAP Crash Risk Mapping protocol in the UK has been sponsored by major motor insurer Ageas UK since 2012.

Recently, the charity has

- supported DfT's Safer Roads Fund helping train 30 authorities in developing a £100m portfolio of 50 schemes to address the 50 highest risk Local Authority 'A' roads;
- undertaken the strategic analysis of infrastructure safety performance in 12 European countries in the EU SENSOR project which provided unique evidence underpinning the extension of the revised European Road Infrastructure Safety Management Directive now in force; and
- led the Older Drivers Task Force report with government support to develop the national Older Driver Strategy *Supporting Safe Driving into Old Age*.

### For more information

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## Context

The study team has sought to address key questions asked of it by the Office of Rail and Road (ORR) and has identified clear actions for further consideration and technical work where necessary by Highways England. The findings and recommendations also address the activity of Highways England's closest partners in so far as they

directly affect Highways England's capacity to address its goals and targets. It is clear, however, that the desired road safety performance of the strategic road network (SRN) necessitates intervention, not just by Highways England, but by the wider road safety partnership to deliver the internationally recognised and multi-sectoral Safe System approach of Safe Roads and Roadsides, Safe Speeds, Safe Vehicles, Safe Road Use and Post-Crash Care. In making recommendations, the team has referred to country examples and cited international good practice in network safety management to illustrate what can be achieved in specific contexts.

In discussions with Highways England it was underlined that their investment decisions need to reflect the Roads Investment Strategy (RIS) 1 and 2 and the objectives and commitments they are set by government covering a range of areas of which safety is only one. Additionally, delivery of safety sits inside a much broader ecosystem of constraints in which they must operate.

It should be noted that at the time of writing this report, the effects of Covid 19 on traffic patterns and road behaviour was unquantified and as such, the findings in this report do not reflect any of these effects.

## Acknowledgements

The authors note with appreciation the contributions and assistance of senior management of the Department for Transport (DfT), Highways England and the ORR to this study, as well as those of a selected group of key stakeholders who agreed to be interviewed and provided key data.

This study has been carried out with the support of ORR and Highways England staff. The authors thank ORR and HELM (Highways England Licensing and Monitoring) for their assistance in arranging meetings and for providing key documents.

## Disclaimer

This report represents the Road Safety Foundation's (RSF) independent advice to the ORR in relation to how Highways England prioritises its investments to improve safety outcomes. RSF accepts no liability for use of this report or any information contained therein by ORR or any other third party.

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## Executive Summary

The Road Safety Foundation (RSF) has carried out an independent review for the Office of Rail and Road (ORR) to consider how Highways England prioritises investments to improve safety outcomes on the strategic road network (SRN) to ensure that it delivers the maximum benefit for road users.

### **Highway's England's High Level Safety Performance Framework is World Class**

This review into how Highways England prioritises its safety investments on the SRN found commitment to safety throughout Highways England reflecting strong leadership from its Board and CEO. Taken together, the company's long term goal that no-one should come to harm on the network by 2040, the concrete interim targets for death and serious injury and the regulated environment provide a world class high level safety performance management framework.

### **The Use of Safety Performance metrics is a Work in Progress**

The framework was initiated only in 2015 and real progress has been made. The use of safety performance metrics to guide investment to achieve goals and targets is however a work in progress.

Adopting a 'towards zero' goal is important and non-trivial. The OECD and other leading countries have recognised the struggle required to reorient policies, practices and designs. Outside the company's road safety specialists, this review found that there was a prevailing belief that if long standing procedures were adhered to, the network will become as safe as it can be with unrealistic expectations as to what relatively small 'softer' safety programmes, increasing vehicle automation or new design standards, might achieve.

### **The 2020 Target and 2040 Goal are unlikely to be met**

Highways England's investment in 'softer' safety interventions - such as safety communications, working with enforcement agencies and working with businesses - is worthwhile and often innovative. All activities reviewed met their objectives although there were no expected outcomes in terms of sustained killed and seriously injured (KSI) reductions. This spending needs to be seen as essential 'hygiene' expenditure that maintains focus on customers' own responsibilities for their behaviour and that can make a contribution to long term goals.

Improving vehicle safety has been a key component of improved trends and this will continue. Looking towards 2030, new General Vehicle Safety Regulations aim to accelerate introduction of individual vehicle safety technologies (particularly forms of autonomous emergency braking and intelligent speed assistance) but there are also headwinds such as increasing traffic growth.

Investment in infrastructure safety to achieve safe speeds on safe roads can achieve substantial and sustainable transformations in serious and fatal crash rates. Significant outcomes in Britain have been tracked annually in Britain across the motorway and 'A' road network for nearly 20 years<sup>1</sup>. Highways England and its predecessor have featured in the 'top ten' improvements table, typically with 75% reductions in deaths and serious injuries as a result of major schemes such as grade separation or upgrading dual carriageways. Other authorities in the tables demonstrate significant safety savings can also be achieved with targeted safety measures alone in the right circumstances.

All of the pillars set out by the DfT's British Road Safety Statement –Safe Roads and Roadsides, Safe Speeds, Safe Vehicles, Safe Road Use and Post-Crash Care - need to be pursued as a comprehensive and systematic approach. No single pillar is a cure-all.

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<sup>1</sup> Road Safety Foundation GB EuroRAP Results Risk Mapping and Performance Tracking annual reports 2002-2019

If the current rate of reduction achieved since 2010 were to continue, falling by an average 0.2% per year, then there would still be 200 people killed or seriously injured annually on the network by 2040. The current level of SRN investment in specific casualty reduction activity is very small in relation to total road investment. Spending on the legacy RIS1 and RIS2 programmes is focused on a small proportion of the network, not necessarily high risk, with goals of reducing congestion and increasing capacity. The £11bn RIS1 programme will deliver less than 10% of the required 40% reduction target for 2020.

### **Investment along the SRN's length is needed prioritising sections with high trauma costs**

However, if the right steps are taken now, the platform that the new Company has quickly built can allow transformation to international best practice by 2030 in line with the focus of the international community. The Company not only has historic crash data but, in line with the new World Health Organisation's (WHO) global performance reporting framework, it has already collected rich Star Rating data at 100 metre intervals describing the in-built infrastructure safety of its entire network. New EU law, for example, requires all EU countries to have this by 2024.

Achieving the Company's 2040 goal will require further targeting action to address known high risks along the length of the SRN on all road types prioritising the sections with high trauma and economic loss. Were SRN infrastructure safety improved to give customers the same infrastructure safety level that Sweden expects to achieve by 2025 following its major investment programme targeted at safety, then death and serious trauma on Highways England's network as a whole might fall by more than 50%.

The Company therefore has a major opportunity to address its long-term safety goal once the overhang of the legacy portfolio in RIS1 and RIS2 of major schemes work through the pipeline. Achieving the 2040 goal requires sustained investment systemically prioritising the removal of known high risks where injury costs are highest and where they can be efficiently reduced.

### **Urgent work should begin now generating a RIS3 portfolio with high return safety investment**

Urgent preparation work should begin now generating a RIS3 portfolio with high return safety investment. The OECD advise focus on the economic loss from road crashes. On the SRN, some 60% of the loss lies on 40% of the network with broadly equal lengths on motorways, on dual carriageways and on single carriageways. The loss equates to a net present value on each of these miles of millions when evaluated on a best practice whole life cost basis. There is ample scope for high return countermeasures.

The Department for Transport's (DfT) £100m Safer Road Fund forecasted a portfolio benefit-cost ratio of 4.4 over a 20 year appraisal period with lower per mile losses using appraisal comparable with other transport investment. Around £1bn is lost in reported injury crashes on the SRN every year. Fatal and serious crashes on Highways England's network are responsible for more than 10% of the losses in fatal and serious crashes for England as a whole. Including unreported crashes and damage only crashes, the total loss is typically around three times that of reported injury crashes alone. The Company should continue discussions with DfT economists and adopt best practice assessment on major and, particularly, minor schemes.

In Australia, the Transport Accident Commission in Victoria operates in a similar corporate environment to Highways England with funding from ringfenced annual licence payments to cover bodily injury claims which may be used to support infrastructure safety spending, safety campaigns and emergency care. Based on robust evaluation, it has increased its latest safer road investment programme to more than AU\$1bn (£500m) for a community of just six million people.

DfT's Safer Road Fund initiative demonstrated that it was possible quickly to train 30 authorities to apply new 'safe system' value engineering techniques in a very short period to help target countermeasures at the 50 most risky local authority 'A' roads. This Review found that some engineers in Highways England's regions had benefited from training enabled by the Company and were already squeezing 'fence to fence' safety upgrading into maintenance schemes.

### **Highways England should establish a 'Safer Roads Task Force'**

The Review recommends establishing a Safer Roads Task Force reporting to the CEO or a Committee of the Board for three years. This will create an empowered cadre to lead transformation of policies, practices and designs in safety performance management focusing on its core engineering expertise.

The proposed remit of the Task Force should include:

- developing model designs for retro-fitting existing roads to halve at least their existing risk
- implementing a fast-track demonstration portfolio addressing 30 roads on the SRN
- generating a high return RIS3 portfolio consistent with achieving the 2040 goal through:
  - major improvement schemes;
  - 'fence to fence' remodelling programmes to be undertaken during maintenance;
  - portfolios of specific safety schemes; and
  - reduction of shunt crashes on high speed roads.
- reviewing and revising Highways England's 'Safe System' definitions to include Safe Speeds and ensuring that appraisal procedures for targeted safety programmes are consistent with DfT's other major transport appraisal, are statistically robust and in line with good international practice;
- collaborating with Local Authority safety teams in line with the Licence to develop a common approach to safety performance management on the SRN and its new complementary MRN; and
- developing internal communications on goals, progress and achievements of the Task Force.

### **Highways England should seek support in generating high return safety programmes**

The Company is a large, busy organisation with many constraints. DfT and ORR should support the Company in making the transformation. The Company should continue to reach out to stakeholders for support.

# 1 Introduction and Background

This independent review has been carried out for the Office of Rail and Road (ORR) by the Road Safety Foundation (RSF), supported by Jeanne Breen Consulting and Castello Consultancy Services. The task was to consider how Highways England prioritises investments to improve safety outcomes on the strategic road network (SRN) to ensure that it delivers the maximum benefit for road users. Work was carried out over four months and involved a broad scan of policies and processes aided by contributions from interviews with a range of individuals and organisations. Formal interviews of around 35 Highways England personnel, partners and stakeholders have been undertaken and scores of documents have been reviewed.

The Review was undertaken between 31<sup>st</sup> October 2019 and 31<sup>st</sup> March 2020. The study team has sought to identify clear actions for further consideration and technical work where necessary.

This report is laid out in the following sections:

- Section 1 provides the introduction and the study questions;
- Section 2 provides an overview of the overarching Key Findings;
- Section 3 details the study questions together with specific findings which form the basis of the Key Findings in Section 3 and also provides recommendations under each Study Question area;
- Section 4 provides a table of recommendations; and
- Section 5 provides some case studies.

## 1.1 Study Questions

ORR asked that the review consider the following study questions:

### Study questions

The overarching objective of this work is to review how Highways England prioritises its safety investments on the SRN to ensure that it delivers the maximum benefit for road users and contributes towards its safety goals and targets for the medium and longer term.

1. How resources are prioritised between delivering ‘softer’ projects, such as information campaigns, and infrastructure projects to improve safety on the network.
2. How the Company prioritises the location and type of scheme to deliver.
3. How these decisions are informed or influenced by performance against Highways England’s key performance indicators and other performance indicators.
4. How the Company takes account of the safety Star Rating of the network when making investment decisions.
5. How the Company considers safety outcomes in its economic appraisal of future schemes.
6. How the Company evaluates the success of safety schemes, and how this subsequently informs future investment priorities.
7. What interaction there is between the cycling, safety and integration ring-fenced fund and safety improvements which are delivered as part of major schemes.
8. In relation to the above, how safety investment on Smart Motorways is appraised, prioritised and evaluated.

## 2 Overarching Key Findings

The study questions posed by ORR set an ‘overarching objective’ of this Review to examine how Highways England prioritises its safety investments to contribute to its medium and long-term goals. This Report is an overview prepared to be of relevance at senior levels in DfT, Highways England’s Board, ORR and stakeholders.

More detailed information which supports the findings and recommendations in this report has been provided to ORR in a separate technical annex.

### 1. Highways England’s Commitment to Safety and High-level Safety Performance Framework is World Class

The Review found commitment to safety throughout Highways England which reflects the strong leadership from its Board and CEO and its encouragement of partners and stakeholders. Highways England’s investment decisions and use of metrics are guided by the RIS and Performance Specification set by DfT and reflected in Highways England’s licence.

When taken together,

- i) the Company’s challenging long-term goal that no-one should come to harm while travelling or working on their network by 2040;
- ii) the formal interim targets both for the reduction in the number of people who are killed and seriously injured (KSI) and the targets for the in-built safety (Star Rating) of its infrastructure; and
- iii) the transparent and regulated environment in which goals and targets are set

are world class as a high-level performance framework for monitoring and measuring safety outcomes.

There is real strength in the passion of staff, the transparent and regulated safety targets and the measurement of infrastructure safety performance. Britain is respected for its global contribution to road safety and Highway’s England was, for example, recently able to contribute at the government’s international conference in Lancaster House<sup>2</sup> alongside its peers in Sweden and Australia who have much longer standing Vision Zero policies.

### 2. The Use of Safety Performance Metrics to Prioritise Investment is a Work in Progress

Highways England’s use of safety performance metrics to guide investment to achieve goals and targets is – unsurprisingly – a work in progress given the framework was initiated as recently as 2015. Highways England and government’s adoption<sup>3</sup> of a ‘Safe System’ approach on its establishment in 2015 aimed at delivering the safety performance metrics and informing thinking is in line with the 2008 OECD recommendation<sup>4</sup> calling for governments to focus systematically on the economic case for road safety investment to prevent death and serious injury.

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<sup>2</sup> <https://www.itf-oecd.org/departement-transport-international-road-safety-conference>

<sup>3</sup> 2015 Road Safety Statement

<sup>4</sup> Towards Zero: Ambitious Road Safety Targets and the Safe System Approach <https://www.itf-oecd.org/sites/default/files/docs/08targetssummary.pdf>

More than 10% of the total value of prevention of fatal and serious crashes on England’s roads are concentrated on Highways England’s network – some 15% of all road deaths in England are on the SRN. The value of prevention of all reported injury crashes on Highways England’s network is around £1bn per year, though the value of prevention of reported injury crashes is only, on average, around a third of the total value of prevention of all crashes when including unreported injury crashes and damage only crashes.

Adopting a ‘towards zero’ goal is non-trivial. The 2008 OECD report<sup>5</sup> highlighted *“the institutional management changes required in many countries to implement effective interventions through a strong focus on results”*. Cultural and organisational change is needed at many levels and by internal and external actors.

The OECD report’s opening explains that adopting goals towards zero death and serious injury *“will alter the community’s view of the inevitability of road trauma, alter institutional and societal responsibilities and accountability and change the way in which road safety interventions are shaped.”*

Other countries have found the change challenging. For example, evidence given to the 2018 Australian inquiry into road safety strategy speaks of the *“struggle”* to deal with the legacy approach and the need to *“re-orient policies, practices and designs”*. Sweden had substantial debate in its Parliament and among its professionals as it launched Vision Zero.

The challenge arises because of the sheer number of constraints and goals that Highways England must meet. In addition to those set by DfT and its licence, these range from the environmental (including air quality, noise, biodiversity), the practical (such as design options and the skills available to itself and its partners) through statutory procedures (such as land acquisition, consultation, public inquiries and speed limits) to the financial (including budget management and complex procurement processes). In this ecosystem, many requirements are codified much more stringently than public safety (even road worker safety.)

In this Review’s interviews, there was a prevailing belief outside the Company’s road safety specialists that if Highways England and its contractors adhere to long standing procedures, the SRN will become as safe as it can be. This is not, of course, what its specialist professionals know nor what relevant parts of the Company’s Operational Metrics Manual identifying risks to delivery say.

Highways England rightly prides itself that safety is built into it all does. However, as accountability for safety diffuses, there is a common belief within the Company that its goal for improved safety performance will come from elsewhere – from the small scale safety campaigns run by the Health, Safety and Wellbeing Division or the improved quality of design standards adopted on new schemes or from automated vehicles, and so on.

The Review agrees with the Company’s analysis on the very long lead times before any automated vehicles could penetrate the fleet and make a contribution to casualty reduction. This is consistent with analysis elsewhere. The decisions taken to accelerate adoption of individual safety technologies in the new General Vehicle Safety Regulations (e.g. forms of autonomous emergency braking) reflect the same conclusion.

The Review’s detailed recommendations therefore include a programme of internal communications alongside appealing safety programmes which can motivate staff and accelerate learning of how to implement a Safe System approach and use of available tools. This would emulate the Safer Roads

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5 Towards Zero: Ambitious Road Safety Targets and the Safe System Approach <https://www.itf-oecd.org/sites/default/files/docs/08targetssummary.pdf>

Fund programme that DfT ran with 30 Local Authorities in 2017 as a portfolio investment to tackle the ‘50 highest risk ‘A’ roads’ or the tackling of the ‘100 highest risk junctions’ in New Zealand. One key function of the Safer Roads Task Force recommended later is to accelerate this ‘learning through doing’.

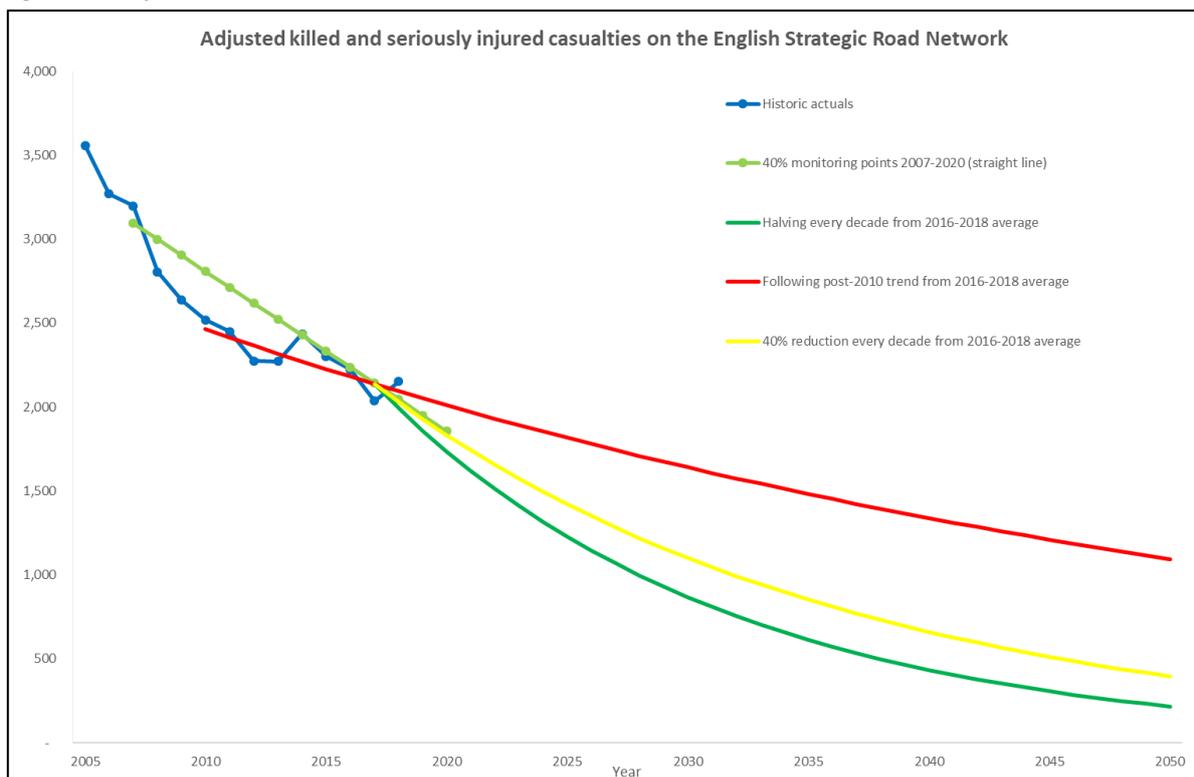
**3. The 2020 Target and the 2040 Goal are unlikely to be met by current activity**

The increase in the number of people who were killed or seriously injured on the SRN in 2018 puts the company’s delivery of its safety target at risk. The Review considers that it is also unlikely that the 2040 zero harm goal could be met with current activity: the overall reduction in the number of deaths and serious injuries on the SRN in England since 2010 equates to an average reduction of 2% a year; during this period, fatalities have been falling by an average of just 0.2% a year, and have actually increased every year since 2014.

There have been changes to the Collision Reporting And SHaring system (CRASH) to modernise the Police reporting of injury crashes. These have been introduced by various Police forces over a period of time; subsequently, there is an element of uncertainty in the numbers of serious injuries when tracking trends – some increases in the reported numbers of serious injuries are due to the changes to the system, rather than due to a genuine increase in the number of serious injuries. The Office for National Statistics (ONS) has recommended adjusting the numbers of serious injuries reported prior to the adoption of CRASH using a logistic regression approach, while urging caution about the interpretation of adjusted figures at a detailed level. For this trend analysis, therefore, adjusted figures have been used.

Figure 1 shows the trajectory of the number of people who will be killed or seriously injured in red should the post-2010 rate of reduction continue – ‘business as usual’ can reasonably be expected to result in more than 1,000 people a year being killed or seriously injured on Highways England’s network even in 2050, including more than 200 fatalities.

**Figure 1: Adjusted KSI casualties on the SRN**



The dark green line in Figure 1 indicates the reductions which would be required to halve the number of people who are killed or seriously injured every ten years – an average reduction of more than 6% each year. Given current levels, even this rate of change would be expected to result in more than 200 people being killed or seriously injured in 2040, including almost 50 fatalities.

The current level of investment specifically in casualty reduction is very small in relation to total road investment given the 2020 target and 2040 goal. There are no current data available in the Company collating investment in safety and outcomes although an analysis is expected in 2020.

Given the lead times for major schemes can be a decade or more, one of the major legacy problems the Company faces is the portfolio of schemes inherited from the former Highways Agency. The inherited £11 billion+ of RIS1 investment will deliver less than 10% of Highway England’s required 40% reduction target for 2020. This is simply because investment appears to be targeted on a small proportion of the network selected largely on the basis of reducing congestion and improving capacity: even the short lengths targeted may not necessarily be priorities in respect of their potential for serious and fatal casualty reduction.

**4. Highways England’s investment in softer safety interventions is essential but will not significantly reduce KSI totals**

Highways England’s investment in ‘softer’ safety interventions - such as safety communications, working with enforcement agencies, working with businesses - is worthwhile and often innovative. All campaigns reviewed met their objectives although there were no expected outcomes in terms of sustained KSI reductions.

The spending needs to be seen as ‘hygiene’ expenditure that maintains focus on customers’ own responsibilities for their behaviour. An individual campaign targeting motorcyclist behaviour on specific routes of concern; or truck companies with disproportionate infringements; or raising awareness of the need to comply with the increasing use of a red X on a gantry to indicate a lane closure cannot itself be expected to reduce the number of total KSI casualties significantly, given it targets only a relatively small proportion of the overall number of crashes on the SRN. However, it is an essential part of the Company’s activities.

Campaigns which deliver measurable KSI reductions are usually associated with enforcement or legislation targeting one of the main risk factors – drink-driving, seat belt-wearing, helmet-wearing, speeding and distraction. Reducing KSIs through campaigns is difficult and uncertain, particularly in better performing countries. In 2019, France quickly achieved broadly a 10% reduction in the number of deaths on its single carriageways which was associated with reducing the general speed limit to 80 kph and related enforcement. Similarly, campaigns to raise seat belt wearing rates or to reduce drink-driving or speeding can deliver measurable short-term reductions in KSIs only when combined with police enforcement.

The limits of what behavioural interventions such as seat belt wearing can achieve is a well understood part of Safe System design given error prone human beings (see, for example, the Netherlands sustainable safety policy document<sup>6</sup>). The crucial role of Safe System designers such as Highway England and vehicle manufacturers is to reduce the likelihood of mistakes and provide protection against the consequences of predictable errors so no-one comes to life-changing harm (e.g. airbags, safety fences).

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<sup>6</sup> <https://www.swov.nl/publicatie/sustainable-safety-3rd-edition-advanced-vision-2018-2030>

The Review noted that:

- there was concern not to ‘duplicate’ the work of DfT campaigns where perhaps a stronger share of voice leveraging DfT investment to apply messages directly to the SRN was a stronger strategy; and
- the role of the specialist road user safety group, whose scarce skills are urgently needed to help develop systemic major and minor engineering programmes was largely involved in the design and monitoring of the softer measures programme, the bulk of which includes activity directly targeted at the SRN’s road users.

##### **5. The Company’s goal requires investment along the SRN’s length prioritising sections with high trauma costs**

Around two thirds (65%) of deaths on the SRN are on the all-purpose trunk road (APTR) network of which between a third and a half are on the single or mixed single/dual carriageway sections.

Achieving the Company’s 2040 goal will require action along the length of the SRN on all road types prioritising the sections with high trauma outcomes and costs.

Sweden took a decade to re-orient its policies, practices and designs to implement a Safe System approach towards its Vision Zero. This was followed by the launch of a further decade of major investment throughout the length of its network with new build and retrofit designs following ‘Safe System’ principles developed in harmony with vehicle safety technologies and attention to speed management.

The Review team estimates that, if the SRN infrastructure safety were improved to give its customers the same level of performance as Sweden expects to achieve by 2025, death and serious trauma on Highways England’s network as a whole might fall by more than 50%.

Such a finding illustrates why performance frameworks globally to manage infrastructure safety are changing to focus on the loss of GDP which is concentrated on busy major networks such as the SRN and its new complementary Major Roads Network (MRN). Almost one third of all road deaths in England are concentrated on the relatively small and targetable length of the SRN+MRN. The global performance framework from the collaboration led by the WHO recommends bringing these networks towards 3-star or better infrastructure safety levels. Highways England is already ahead of both this and also new European legislation which mandates inspections of in-built safety by 2024 on SRN+MRN type ‘primary’ networks.

The Company and its partners therefore have a major opportunity to address its long-term goal once the overhang of the legacy portfolio in RIS1 and RIS2 of major schemes work through the pipeline.

Achieving the 2040 goal requires sustained investment prioritising the removal of known high risks where injury costs are highest and where they can be efficiently reduced.

##### **6. Urgent preparation work should begin now generating a RIS3 portfolio with high return safety investment**

A valuable guide for setting prioritisation strategy for the whole SRN is the distribution of injury costs per km (formally ‘value of prevention’ per km or ‘vop/km’). Value of prevention measures the societal cost of harm at different levels of severity - deaths, serious and slight injuries – in economic terms. The metric ‘vop/km’ normalises this measure by road length so that the figures for roads of different lengths can be compared meaningfully.

**Figure 2: Value of Prevention (vop) per km distribution**

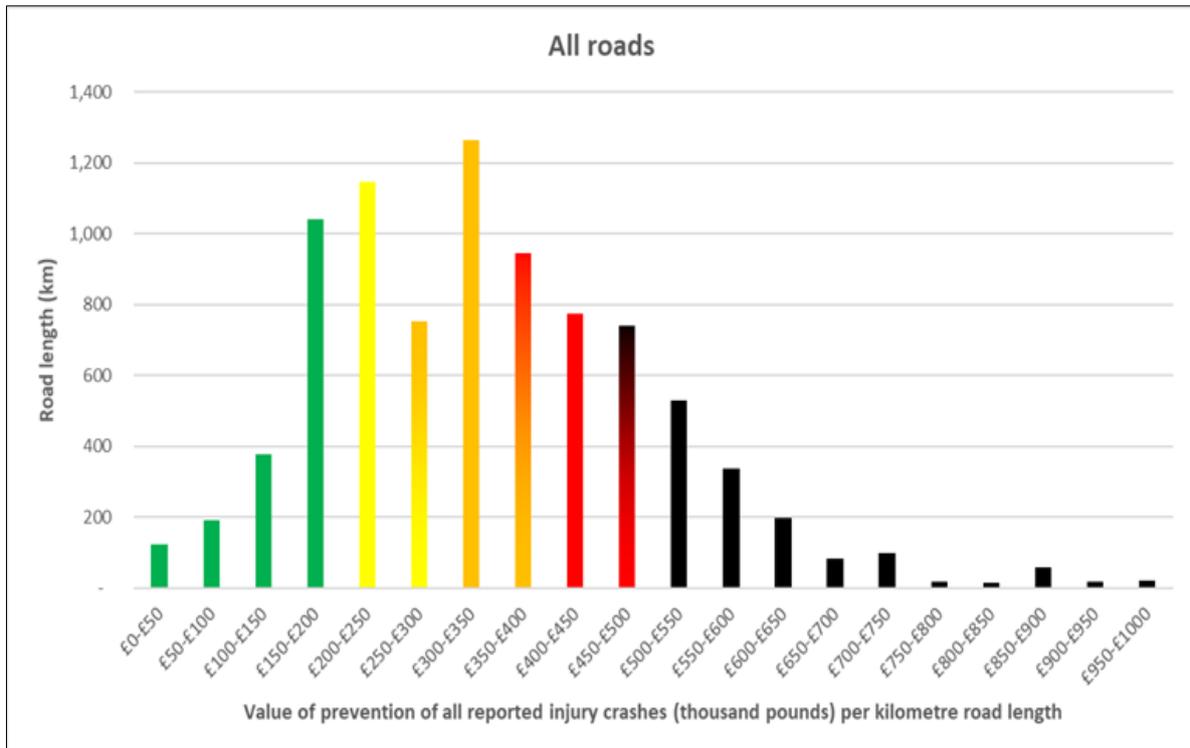


Figure 2 shows how vop/km is distributed on the SRN, the colours splitting the roads into five sets of equal total length. Routes in ‘green’ have a low vop/km where typically £150k per km might be lost in a three year period. Examples of ‘green’ routes include 49km of the M54 in West Mercia and 6km of the single carriageway A46 in Gloucestershire.

Routes in ‘red’ and ‘black’ have a high vop/km; those in black begin around £0.5m per km in just three years and can even rise to over £1m per km. Examples of ‘black’ routes include 13km of the A259 in Sussex, 22km of the A52 in Nottinghamshire and include some lengths of motorway, such as 26km of the M40 in the Thames Valley.

The Net Present Value (NPV) of these ‘red’ and ‘black’ losses is very significant amounting to typically many millions per km when analysed using DfT’s approach<sup>7</sup> to major projects. The black and red routes amount to 40% of the SRN length and provide a simple but telling filter for prioritisation with potential high returns. The higher vop/km sections include roads of all types and tend to carry a higher risk for customers than normal.

**7. The Company should exploit the rich data within Star Rating results to help develop investment programmes**

There are three broadly equal main risks (20-30% of crashes each) on the SRN leading to death and serious injury:

- running off the road (higher on motorways, lower on single carriageways);
- junctions (lower on motorways, higher on single carriageways); and

<sup>7</sup> <https://transportknowledgehub.org.uk/directory/webtag/>

- shunts (higher on motorways, lower on single carriageways).

There are two further significant risks:

- vulnerable road users (account for 5-10% in total but higher on single carriageways and lower on motorways); and
- head-on crashes (account for 5-10% in total but around a quarter of crashes on single carriageways).

Four of these five risks are common to all roads. The global Star Rating system for measuring in-built infrastructure safety is developed around these four. The Company is successfully using iRAP's innovation framework to contribute assessment research for the fifth crash risk, shunts, which is important to SRN safety. This is welcomed by other major road operators who are also investing in extensive ITS or 'smart' equipment.

Head-on crashes involving motorcyclists, for example, can be at least partially addressed by road infrastructure measures, and run-off crashes remain a significant issue on motorways. Speed reduction measures are considered by Star Rating and can reduce e.g. run-off risk on motorways, risk of head-on crashes on single carriageways, and even the risk associated with people not wearing seat belts.

Figure 3 shows a 'Risk Worm' illustrating how the risk of death and serious injury varies along a road's length because of presence or absence of known high risks. The local spikes in the example are at junctions.

The Star Rating data for the SRN contains details every 100 metres of up to 50 attributes which define the safety of each 100 metre section. This data can be manipulated and displayed (for example, sections of poor roadside protection), as shown in the diagram.

**Figure 3: Risk Worm showing the risk of death and serious injury along a road's length**



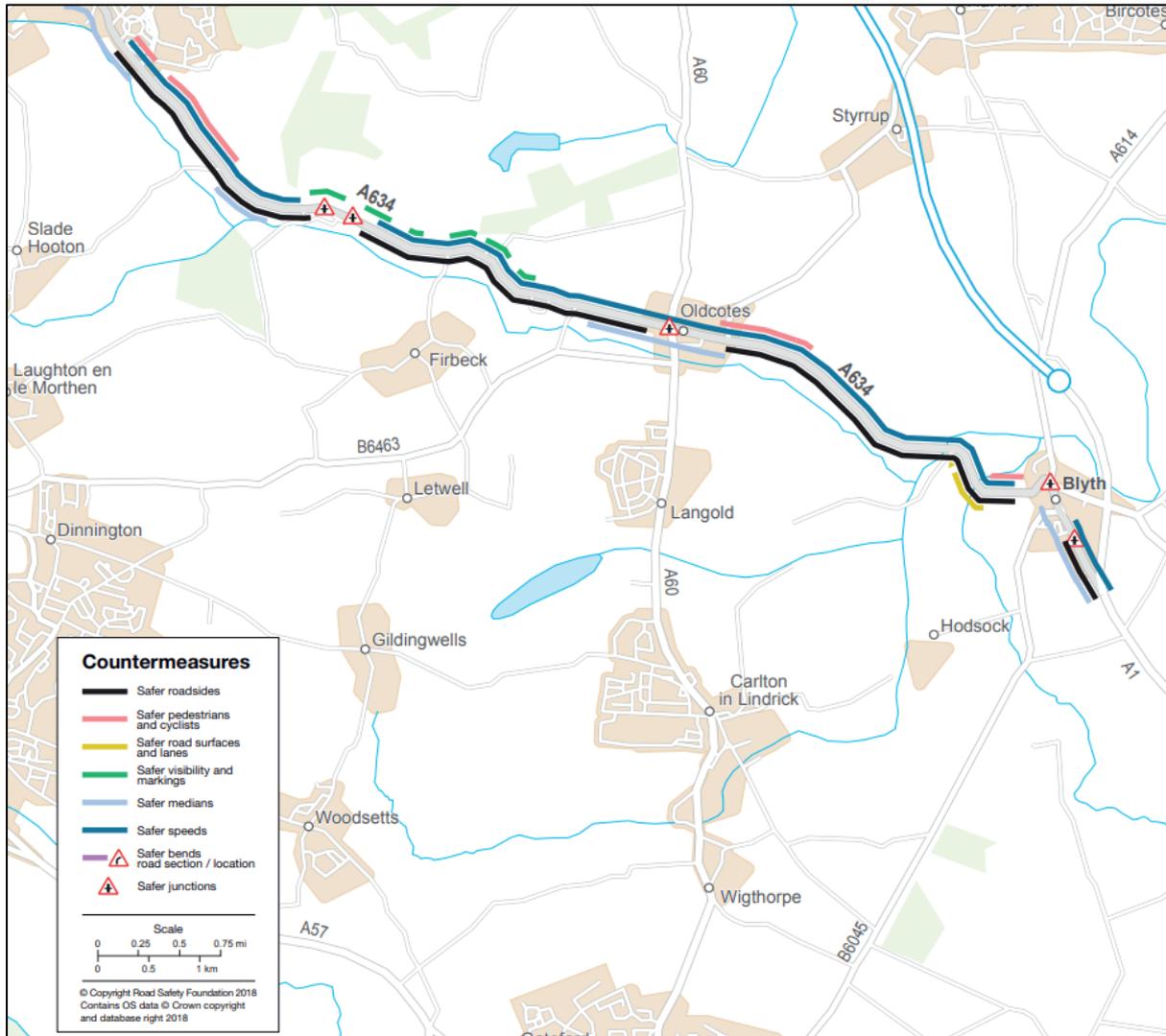
Suggested countermeasures are also automatically generated based on their economic return using their average costs. The limitations can on occasions be significant, for example, specific high local costs or engineering practicality or local preferences. However, engineers in English Local Authorities have found, once understood, the economic signals are valuable as, at the least, a starting point to use the system to test their own preferred solutions economically. An example of a Countermeasure map can be seen in Figure 4.

The Review found that some engineers in Highways England's regions had benefited from training enabled by the Company and were already squeezing 'fence to fence' safety upgrading into

maintenance scheme design. This organic innovation within the Company can be captured and amplified in the Safer Roads Task Force recommended later.

In general, there is strong synergy between quality asset management systems and safety performance management.

**Figure 4: Example of a Countermeasure Map**



Example of Countermeasure Map from DfT’s Safer Roads Fund. In total, some 700km of road lengths were approved for treatment including 300 improved bends, 80 miles of improved medians, 225 improved junctions, 135 new or improved pedestrian crossings, 30 kms of cycle facilities, 600 km of roadside protection, and 240 kms of improved speed limits.

**8. High Level Star Rating Performance Targets should reflect and drive desired casualty savings**

As in the Netherlands, the Company’s first high level Star Rating target was achievable and introduced performance management of infrastructure safety. The Netherlands launched its goal in 2010 to the same Star Rating Protocol (Version 1) adopted by Highways England. The Dutch target was 100% of length at 3-star or better on the national network by the end of 2020. The Dutch target is all but achieved. Cycle casualties have now overtaken vehicle occupant casualties on Dutch roads generally.

Highways England have met their principal target of 90% of travel at 3-Star or more but is unlikely to meet its other delivery plan target to upgrade the majority of 1 and 2-star roads to 3-stars by 2020. This reflects the shape of the RIS1 programme as discussed.

The ‘3-star or better’ benchmark has been selected by the international community for simplicity as risks accelerate below 3-star. The latest Global Tracking Framework 2.0 enables consistent reporting to WHO and includes Star Rating to the latest and very widely used iRAP protocol Version 3. This version should be used by the Company in the global reset for the new decade to 2030. The 5-star scale is in general more discriminating and more demanding than Version 1 and also includes pedestrians and cyclists. It is understood that Highways England are using Version 3 for their current Star Rating work, due for completion in August 2021.

The Company’s network is not homogeneous and at delivery plan level, it is helpful to set this high-level Star Rating metric slightly finer. For example, ‘3-star or better’ in New Zealand is extended to ‘4-star for roads of national significance.’ In Australia, some important corridors have 4-star minimum goals. Draft guidance prepared by the Asian Development Bank takes a threshold of 40,000 vehicles per day and seeks 4-star levels of pedestrian safety in linear settlements.

The vop/km metric will help show that a 4-star goal for many heavily trafficked SRN roads, and even 5-star for the most intensely used motorways, will deliver casualty savings with economic returns. Highways England already has some 5-star 100m sections, and it would be possible to achieve 5-star on more sections by using speed reduction measures, for example, which would be appropriate on the busiest sections of the network

The rate of death and serious injury varies significantly in communities around Britain even at regional level. Typically, those towns and sub-regions that are more reliant on single carriageways for longer distance trips are disadvantaged. As the government moves from away from solely gross value-added evaluation (‘greatest good to the greatest number’) so as to take into account distributional impacts, (‘levelling up’), there are additional grounds to accelerate ensuring the 3-star goal is achieved.

Achieving 3-stars or better on close to 100% of national road length in high income countries should not be unachievable by 2030. Even at the UK’s general 60 mph speed limit, conventional single carriageway roads can exceed this benchmark if they have the engineering to support it.

The most recent English and Scottish local speed limit guidance underlines the importance of engineering. The 2013 English guidance foreshadows that Star Rating was being developed with potential to assist in local speed limit reviews. Star Rating to the current Version 3 can assist in assessing engineering improvements and safe speed limits on existing roads as well as in new schemes. Where re-engineering to ensure driven speeds are suitably safe would be too expensive, reductions in speed (through speed limit reduction and/or enforcement) may be needed instead.

The Review found some suggestion that additional funding from Highways England to pay for back office work by the Police in enforcing speed on Smart Motorways was not being used by the Police to augment their general capacity to process enforcement. There was concern expressed this was impacting high priority sites on the general road network.

## **9. The Company should use whole life costing and portfolio analysis to generate and appraise safety**

The Review found that there was scope for appraising safety projects and programmes in the road sector on the same basis as other transport programmes. A key goal of establishing Highways England was to enable the more stable longer run approach needed for infrastructure investment. Whole life costing is used for major projects so that the recurring costs of maintenance and replacement cycles can be assessed together with the development of benefits streams over time within the NPV. Whole

life costing is the norm in infrastructure industries and was introduced, for example, to assist choice of road pavement type on the SRN more than two decades ago.

Safety projects are currently generated and assessed within the Company on a basis which focuses on small (and declining) numbers of crashes reported to the Police in a short period and then a first-year evaluation of performance. This can lead to investment in sites where clusters have simply occurred by chance and the crash rate will regress to the true mean. This might result in an investment, for example, in a short length of safety fence expensively installed at a random cluster site while the true run-off risk along an entire road section is untreated.

A whole life costing approach allows alternative strategies to be assessed and bulk procurement efficiencies to remove known high risks. Swedish contractors, for example, have developed special equipment to address frequently occurring problems in installing safety fence resulting in long treatment lengths and low unit costs.

The Review found DfT economists generally expected appraisal periods up to 60 years. The assessment of DfT's Safer Roads Fund followed the general global pattern of a 20-year appraisal period (although many countries have much higher discount rates than the UK).

In developing future programmes, it is preferable for safety engineering to be both managed and appraised as a portfolio or fund such which recognises inherent natural variability of individual schemes. In Victoria, Australia the Traffic Accident Commission has run a carefully evaluated Safer Road Investment Programme in a corporate environment for more than a decade. Its 2016-2020 programme was increased to more than AUD\$1bn reflecting the returns.

#### **10. Highways England should establish a 'Safer Roads Task Force'**

The Review recommends the special action of establishing a Safer Roads Task Force within Highways England reporting to the CEO or a Committee of the Board for a period of three years.

This will create an empowered cadre with a core purpose to lead the transformation of policies, practices and designs in safety performance management focusing on Highway England's core engineering expertise.

The proposed remit of the Task Force should be to:

- develop and demonstrate model designs for retro-fitting existing roads which will halve or more their in-built risk and raise safety performance by at least 1-star which, as a rule of thumb, halves crash costs;
- develop and implement a fast-track demonstration portfolio addressing 30 roads on the SRN with high costs of harm using 'fence to fence' remodelling familiar to maintenance teams, which can be implemented within the next two years;
- generate a practical Safer Road Investment Programme portfolio for the RIS3 period 2026-2030 which is of a scale consistent with achieving Highways England's 2040 goal and delivers rates of return at least equal to RIS2. The primary aim of the portfolio will be reduction in the cost of harm through:
  - major improvement schemes;
  - 'fence to fence' remodelling programmes to be undertaken during maintenance;
  - portfolios of specific safety schemes; and
  - reduction of shunt crashes on high speed roads.

- review and revise Highways England’s ‘Safe System’ definitions to include Safe Speeds and ensure that appraisal procedures for targeted safety programmes are consistent with DfT’s other major transport appraisal, statistically robust and in line with good international practice;
- collaborate with selected Local Authority safety teams in line with Highways England’s Licence to develop a common Safe System approach to safety performance management on the SRN and its complementary MRN;
- manage a programme of primarily internal communications which explains to staff through social media, workshops and briefings the goals, progress and achievements of the Task Force;
- work to embed Safe System into the mainstream of Company operational practices; and
- in view of the number of actors and organisations involved in Highways England’s road safety delivery implement a systematic, widespread training programme on the implementation of Safe System and the use of key tools.

Creating a cadre in Highways England with this remit can help capture relatively scarce skills and give a pathfinding licence to introduce the innovation and changes required. DfT, working in collaboration with 30 Local Authorities, was able to develop and appraise 50 schemes to the value of £100m ready for immediate implementation within less than a year. Highways England’s Operations teams similarly have skill sets which can be developed quickly when led.

The Review found that Local Authorities sought stronger collaboration than exists today with Highways England. Safety performance management is straightforward common ground and some authorities retain solid experience in practical safety engineering. Counties like Kent, for example, have already undertaken Star Ratings of parts of their networks and are developing strategies towards 2030.

### **11. The DfT, ORR and others should support Highways England in implementing high return safety programmes**

DfT’s 2019 Road Safety Statement reiterates its commitment to the Safe System approach saying: *“It is a commitment to the idea that road deaths and casualties are not merely the result of poor driving, centrally relevant though that is, but of a transport system as a whole, from signage to road user education, from enforcement to infrastructure design and construction.”*

The costs of emergency services, NHS, and long term care are included in DfT’s £36bn evaluation of the annual cost of road crashes. The Review found that senior DfT economists are discussing the scale of the economic losses on the SRN with Highways England and this is welcome and in line with OECD advice.

Highways England should ensure that it seeks out and uses the advice and support of experienced stakeholders and partners.

It is recommended that DfT and ORR continues to support Highways England in making the transformation necessary and recognises the challenges in a large and busy organisation where custom and practice may not always align with ongoing new economic imperatives. At the high level, it may mean that major schemes promoted for safety reasons will have higher priority and higher returns when generated than schemes for many other objectives. On the front-line it may mean protecting against risks that previously were not regarded as significant enough but have become so as a result of the lack of tolerance of serious injury and economic loss introduced by the demanding 2040 goal.

### 3 Study Questions, Findings and Recommendations

The overarching objective of this work is to review how Highways England prioritises its safety investments on the SRN to ensure that it delivers the maximum benefit for road users and contributes towards its safety goals and targets for the medium and longer term.

This section lists each Study Question and discusses findings and recommendations under each question. The findings provide important context for the overarching study question of how Highways England ensures that it delivers the maximum benefit for road users and contributes towards its safety goals and targets for the medium and longer term. A coloured traffic light status has been assigned to each finding. This comprises red (little or no effective action taken, amber (further work is recommended) and green (going in the right direction and in line with good practice). Recommendations follow the findings.

#### 3.1 All Study Questions - Governance framework, leadership and accountabilities

| Findings   | Status |
|--|--------|
| The governance framework measuring high-level safety performance transparently and concretely in a regulated environment with a long term zero goal and interim targets is world class.  | Green  |
| Commitment to safety exists throughout Highways England which reflects the strong leadership, oversight and ownership from its Board and CEO and the encouragement of its partners. The use of the high-level safety performance metrics to prioritise action and investment is a work in progress. The challenge in re-orientating legacy policies, programmes, practices and designs to implement a Safe System approach is recognised internationally.  | Green  |
| In particular, major projects which can deliver goals have lead times of a decade or more. The current portfolio generated prior to Highway England’s establishment and goals makes a small contribution only to reducing road trauma. Accountabilities for safety are spread widely across Highways England and its regions, although the focus on specific goals and targets is not always evident.  | Yellow |
| <p>Road safety investment was considered to be embedded in everything Highways England does, especially in the Major Schemes programme. However, this meant that measurable benefits could not be easily identified. Similarly, it did not appear to be well understood how much funding would be required to meet its safety targets and to get its programmes sufficiently targeted on track to achieve them.</p> <p>When benchmarked to existing international practice, it was found that there are many opportunities for more highly focussed activity and strengthening of current approaches to deliver the maximum benefits for road users towards a SRN which is virtually free from death and serious injury by 2040.</p> | Yellow |

| Recommendations   |
|---|
| <p>A Safer Roads Task Force should be established within Highways England reporting to the CEO or a Committee of the Board for a period of three years.</p> <p>This will create an empowered cadre with a core purpose to lead the transformation of policies, practices and designs in safety performance management focusing on Highway England’s core engineering expertise.</p> |

## Recommendations

The proposed remit of the Task Force should be to

- develop and demonstrate model designs for retro-fitting existing roads which will halve or more their in-built risk and raise safety performance by at least 1-star which, as a rule of thumb, halves crash costs;
- develop and implement a fast-track demonstration portfolio addressing 30 roads on the SRN with high costs of harm using ‘fence to fence’ remodelling familiar to maintenance teams, which can be implemented within the next two years;
- generate a practical Safer Road Investment Programme portfolio for the RIS3 period 2026-2030 which is of a scale consistent with achieving Highways England’s 2040 goal and delivers rates of return at least equal to RIS2. The primary aim of the portfolio will be reduction in the cost of harm through:
  - major improvement schemes;
  - ‘fence to fence’ remodelling programmes to be undertaken during maintenance;
  - portfolios of specific safety schemes; and
  - reduction of shunt crashes on high speed roads.
- review and revise Highways England’s ‘Safe System’ definitions to include Safe Speeds and ensure that appraisal procedures for targeted safety programmes are consistent with DfT’s other major transport appraisal, statistically robust and in line with good international practice;
- collaborate with selected Local Authority safety teams in line with Highways England’s Licence to develop a common Safe System approach to safety performance management on the SRN and its complementary MRN;
- manage a programme of primarily internal communications which explains to staff through social media, workshops and briefings the goals, progress and achievements of the Task Force;
- work to embed Safe System into the mainstream of Company operational practices; and
- in view of the number of actors and organisations involved in Highways England’s road safety delivery implement a systematic, widespread training programme on the implementation of Safe System and the use of key tools.

Urgent preparation work should begin to assist DfT in the generation a RIS3 portfolio with high return safety investment. The road sections prioritised for remedial action should be the 40% of the network with the highest costs of harm per km. The NPV lost on these sections is many millions per km.

Serious crashes are spread on this 40% of the network broadly equally across each of motorways, dual carriageways and single/mixed carriageways.

Highways England should work and seek support from its partners in the development of high return safety programmes on the SRN, draw learning for itself on the complementary MRN network which contains a concentration of high economic loss equal to the SRN and making the transformation with recognition that legacy practice, procedures and culture may often not align with Safe System and new economic imperatives.

### 3.2 Study Question 1 - How resources are prioritised between delivering ‘softer’ projects, such as information campaigns, and infrastructure projects to improve safety on the network

| Findings  | Status |
|---|--------|
| <p>Highways England’s activity and funding of softer safety interventions is welcomed by stakeholders, uses good practice processes, which are both input and output based, and is filling a gap in traditional road safety capacity. The activity needs to be outcome focused to ensure an impact on KSI reduction.</p> <p><i>Relevance – Prioritising soft v infrastructure projects for safety</i></p> |        |

| Recommendations   |
|---|
| <p>Highways England’s investment in ‘softer’ safety interventions - such as safety communications, working with enforcement agencies, working with businesses - is worthwhile and often innovative. All campaigns reviewed met their objectives although there were no expected outcomes in terms of sustained KSI reductions. This spending needs to be seen as essential ‘hygiene’ expenditure that maintains focus on customers’ own responsibilities for their behaviour and that can make a contribution to long term goals.</p> |

### 3.3 Study Question 2 - How Highways England prioritises the location and type of scheme to deliver

| Findings   | Status |
|--|--------|
| <p>There is evidence of a desire to shift to a proactive KSI risk-based approach from the current reactive approach which is reliant on historic KSI data.</p> <p><i>Relevance - Assessing KSI risk on the network</i></p>   |        |
| <p>Risk assessment is based on traditional good practice processes which are largely reliant on historic data.</p> <p><i>Relevance - Assessing KSI risk on the network</i></p>   |        |
| <p>KSI crash risk mapping is carried out annually by the Road Safety Foundation, including the production of a specific map for the SRN, although more use could be made of this data source.</p> <p><i>Relevance - Assessing KSI risk on the network</i></p>  |        |
| <p>Use of proactive Star Rating to predict KSI risk and determine investment priorities is not fully evident.</p> <p><i>Relevance - Assessing KSI risk on the network</i></p>  |        |
| <p>Although some road safety benefits are derived, monitoring of historic major schemes indicates that reducing journey time and creating new capacity are the main drivers of investment rather than reducing road safety trauma.</p> <p><i>Relevance – Project pipeline selection and prioritisation for safety</i></p>  |        |
| <p>Given the limited forecast contribution of different funds to the KSI target, further opportunities should be sought for a stronger KSI and Star Rating focus in systematic scheme selection across all of the Funds The most cost-effective improvements that could be made are likely to be on roads which are already 3-star or more, so a target for 4-star plus roads would be appropriate. At the</p> |        |

| Findings  | Status |
|---|--------|
| <p>same time, eliminating 1-star roads altogether and maintaining (or increasing) the current amount of 3-star plus roads would ensure that the highest risk roads on the network do not get left behind.</p> <p><i>Relevance – Project pipeline selection and prioritisation for safety</i></p>  |        |
| <p>Mass action programmes e.g. improving compliance with demonstrably effective safety standards such as P4 terminals, implementing average speed cameras, shoulder rumble strips and Safer Road Investment Plans on key sections are not evident.</p> <p><i>Relevance – Project pipeline selection and prioritisation for safety</i></p>   |        |
| <p>DfT safety objectives for transport are broad and include reducing the loss of life, injuries and damage resulting from transport collisions and crime. Clearer policy direction from Government to steer a path away from a traditional collision frequency in project and operational processes to one which is more sensitive to the KPI1 and 2040 goal could help.</p> <p><i>Relevance – Project pipeline selection and prioritisation for safety</i></p>                              |        |
| <p>The role of an overarching Asset Management Plan in helping to deliver a coherent road safety programme was recognised but the embedding of road safety is not yet evident. There was some evidence to show that the approach to Asset Management was somewhat fragmented and may not be applied consistently throughout Highways England and Regional Offices and aligned with central objectives.</p> <p><i>Relevance – Project pipeline selection and prioritisation for safety</i></p> |        |

| Recommendations   |
|---|
| <p>Highways England’s engineering investment to improve safety on the SRN should prioritise sections with high trauma cost</p> <ul style="list-style-type: none"> <li>• If SRN infrastructure safety were improved to give customers the same level of safety Sweden expects to achieve by 2025 then KSIs might fall by more than half on the SRN.</li> <li>• The five main crash types on the SRN resulting in death and serious injury are junction crashes, running off the road, shunts, head-on crashes and pedestrians and cyclists being struck. It should be noted that for the pedestrian figures, around 20 – 25% of these are vehicle occupants who have left their vehicles.</li> </ul> |

### 3.4 Study Question 3 - How these decisions are informed or influenced by performance against Highways England’s key performance indicators and other performance indicators

| Findings   | Status |
|--|--------|
| <p>The long-term goal, interim KSI and Star Rating targets represents leading goal and target setting practice.</p> <p><i>Relevance – Setting the safety performance framework</i></p>   |        |
| <p>Further good practice safety performance indicators are being worked on which are directly related to the desired KSI results, although it is unlikely that these will underpin RIS2 activity.</p> <p><i>Relevance – Setting the safety performance framework</i></p> |        |

| Findings   | Status |
|--|--------|
| <p>Reaching the long-term goal requires the adoption of an ambitious Safe System approach going beyond the business as usual trend.</p> <p><i>Relevance – Addressing the 2040 safety goal</i></p>  | Yellow |
| <p>Caution is advised with the often-expressed hope by government and its agencies that the full roll-out of automated vehicles will allow Highways England to reach this goal in view of Highways England’s and other forecasts for network coverage.</p> <p><i>Relevance – Addressing the 2040 safety goal</i></p>   | Yellow |
| <p>While promoted from top to bottom, the 2040 goal is not yet driving investment and is unlikely to be achieved.</p> <p><i>Relevance – Addressing the 2040 safety goal</i></p>  | Yellow |
| <p>It was commendable that Highways England is prepared to commission more research to enhance their understanding of the Safe System approach and that Safe System training has commenced.</p> <p><i>Relevance – Embedding the Safe System Approach</i></p>   | Green  |
| <p>It was evident that the Safe System approach to road safety and Star Rating was appreciated by senior management as a potential way forward. Conversely, a risk-based approach based on these concepts was not self-evident.</p> <p><i>Relevance – Embedding the Safe System Approach</i></p>   | Yellow |
| <p>Highways England’s road safety strategy and performance would benefit from the adoption of the internationally and nationally understood Safe System model. Safe Roads and Roadsides, Safe Speeds, Safe Vehicles, Safe Road Use and Post-crash care. Adoption of Safe System requires comprehensive review of operational practices covering the planning design, operation and use of the SRN. This includes a risk based approach, speed management and other areas covered below.</p> <p><i>Relevance – Embedding the Safe System Approach</i></p> | Yellow |
| <p>The practical work of developing some of the new processes and systems to implement a Safe System approach, clearly linked to Highways England’s long-term 2040 goal and performance framework, is slow.</p> <p><i>Relevance – Embedding the Safe System Approach</i></p>   | Yellow |
| <p>Embedding Safe System into key processes such as planning, bidding guidance and asset management planning is not evident.</p> <p><i>Relevance – Embedding the Safe System Approach</i></p>  | Yellow |
| <p>The target of 90% of travel on roads with EuroRAP 3-star-ratings to 2020 is likely to be met.</p> <p><i>Relevance – Addressing the 2020 safety targets</i></p>  | Green  |
| <p>There is sparse evidence currently to be confident that Highways England will meet its other Star Rating target to upgrade the majority of 1 and 2-star roads to 3-stars by 2020.</p> <p><i>Relevance – Addressing the 2020 safety targets</i></p>  | Yellow |
| <p>The increase in the number of people who were killed or seriously injured on the SRN in 2018 puts Highway England’s delivery of its safety target at risk. 2,152 people were killed or seriously injured on the SRN in 2018 – an increase of 6% on 2017.</p> <p><i>Relevance – Addressing the 2020 safety targets</i></p>   | Yellow |

| Findings   | Status |
|--|--------|
| <p>A 2016 forecast of RIS1 fund contributions to safety revealed a limited contribution to the KSI target for the investment comprising less than 10% of the required reduction.</p> <p><i>Relevance – Addressing the 2020 safety targets</i></p>            |        |
| <p>While the process has begun, Highways England could further harness the full range of stakeholders to act collaboratively, both internally and externally and share the KSI target goal.</p> <p><i>Relevance – Addressing the 2020 safety targets</i></p> |        |
| <p>KSI value is expected from current ‘softer approaches’ which are unlikely to deliver sufficient (if any, since not measured) KSI outcome towards the 2020 target.</p> <p><i>Relevance – Addressing the 2020 safety targets</i></p>                        |        |

| Recommendations  |
|--|
| <p>Highways England should embrace High Level Star Rating Performance Targets to reflect and drive desired casualty savings.</p> <ul style="list-style-type: none"> <li>• Highways England have met their principal target of 90% of travel at 3-star or more by 2020. It is unlikely to meet its delivery plan target to upgrade the majority of 1 and 2-star roads to 3-stars by 2020. This reflects the shape of the RIS1 programme.</li> <li>• The latest Star Rating protocol (Version 3) which should be used by Highways England from 2020 has a 5-star scale. A ‘3-star <u>or better</u>’ benchmark is used by the international community for reporting to the WHO. Highways England’s network is not homogeneous. At delivery plan level, high level metrics can be refined.</li> <li>• ‘3-star or better’ in New Zealand is extended to ‘4-star for roads of national significance.’ In Australia, important corridors have 4-star goals. The Asian Development Bank suggests a 4-star threshold at 40,000 vehicles per day and 4-star pedestrian safety in settlements.</li> <li>• The Value of Prevention per km metric recommended will likely suggest a 4-star goal for many heavily trafficked SRN roads with 5-star for the most intensely used motorways. These appear likely to deliver significant casualty savings and economic payback. The possibilities to achieve 5-Star ratings is likely to improve as international evidence on effectiveness of ITS systems accumulates.</li> </ul> |

### 3.5 Study Question 4 – How the Company takes account of the safety Star Rating of the network when making investment decisions

| Findings   | Status |
|--|--------|
| <p>Star Rating surveys of the network are carried out every 5 years.</p> <p><i>Relevance – Using Star Rating in safety investments</i></p>   |        |
| <p>Highways England has identified areas where the iRAP model can be adjusted to better reflect the SRN network and is working with the RSF and international partners to develop the model.</p> <p><i>Relevance – Using Star Rating in safety investments</i></p> |        |
| <p>Suggestions for future Star Rating targets to 2025 and beyond are made.</p> <p><i>Relevance – Using Star Rating in safety investments</i></p>   |        |

| Findings  | Status |
|---|--------|
| <p>The Safer Road Investment Plans (SRIPs) automatically generated in Star Rating surveys have not yet been fully exploited to inform investment decisions.</p> <p><i>Relevance – Using Star Rating in safety investments</i></p> |        |

| Recommendations  |
|--|
| <p>Highways England should exploit the rich data within its Star Rating results to develop investment priorities.</p> <ul style="list-style-type: none"> <li>Star Rating results contain data at 100 metre intervals throughout the SRN based on main crash risks: 50 attributes describing a section’s safety can be manipulated and displayed. This data should be used more effectively.</li> <li>Countermeasures based on average costs and economic tests are automatically suggested for an Engineer’s review. In this way, DfT’s Safer Roads Fund enabled 30 authorities to develop a £100m portfolio of 50 schemes within 6-12 months at a benefit cost-ratio (BCR) of 4.4 over a 20 year assessment period. Highways England should consider exploiting this data more.</li> <li>Synergies between asset management and safety performance management should be developed in frameworks and plans.</li> </ul> |

### 3.6 Study Question 5 - How the Company considers safety outcomes in its economic appraisal of future schemes

| Findings   | Status |
|--|--------|
| <p>Highways England has established a variety of protocols and processes for major and minor scheme appraisal with reference to DfT procedures and frameworks.</p> <p><i>Relevance – Project appraisal and safety</i></p>  |        |
| <p>There are historic problems with the way safety benefits are treated in the national appraisal of major and minor schemes which have the unfortunate effect of underestimating safety benefit potential. Highways England is currently looking into aspects such as crash costs, but a comprehensive review of the safety aspects of national scheme appraisal processes is not evident.</p> <p><i>Relevance – Project appraisal and safety</i></p> |        |

| Recommendations   |
|---|
| <p>Highways England should use whole life costing and portfolio analysis to generate and appraise investment.</p> <ul style="list-style-type: none"> <li>A goal of establishing the Company was to enable a stable longer run approach required for infrastructure investment. Whole life costing is the norm in infrastructure industries. It was introduced, for example, for SRN road pavement choice some two decades ago.</li> <li>Major safety projects have rarely been generated historically. Minor safety projects are assessed on the basis of statistically small (and declining) reported serious crash numbers. Evaluation of countermeasures considers first year performance only.</li> <li>The current significant statistical and economic weakness can be overcome, and safety appraisal brought in line with other UK transport investment. The Company has the data and tools for whole</li> </ul> |

**Recommendations**

life costing and portfolio appraisal as applied worldwide and piloted in the UK by DfT economists for its Safer Roads Fund.

### 3.7 Study Question 6 - How the Company evaluates the success of safety schemes, and how this subsequently informs future investment priorities

| Findings   | Status  |
|--|---|
| <p>Highways England is strongly committed to the monitoring and evaluation of all its projects - large and small.</p> <p><i>Relevance – Project monitoring &amp; evaluation and safety</i></p>   |    |
| <p>POPE (Post-opening project evaluation) reports for major and minor schemes are carried out after 1 year and 5 years, although 1 year is not considered a long enough period of time.</p> <p><i>Relevance – Project monitoring &amp; evaluation and safety</i></p>   |    |
| <p>Highways England commissions a range of road safety research.</p> <p><i>Relevance – Project monitoring &amp; evaluation and safety</i></p>  |   |
| <p>Some recent POPE reports have addressed the need to identify background trends.</p> <p><i>Relevance – Project monitoring &amp; evaluation and safety</i></p>  |  |
| <p>Evaluation processes for softer projects are in line with good practice but fall short of measuring KSI outcome.</p> <p><i>Relevance – Project monitoring &amp; evaluation and safety</i></p>   |  |
| <p>The traditional POPE reporting has received historic criticism due to the lack of robustness in statistical monitoring e.g. too short evaluation periods of around 6 – 12 months before and after, the lack of a portfolio monitoring approach to assess scheme outcomes and the need to consider longer background trends, especially relating to economic upturns and downturns and changes in modal use. The under-reporting of serious and other injuries also needs to be taken into account.</p> <p><i>Relevance – Project monitoring &amp; evaluation and safety</i></p> |  |
| <p>Safety investment has increased in recent years but remains a small part of SRN investment and is not commensurate with the value of preventing death and serious injury on this network or sufficient to meet the challenging KSI safety target and 2040 goal.</p> <p><i>Relevance – Making best use of resource for safety</i></p>  |  |

**Recommendations**

Highways England should consider ways of measuring KSI outcomes in softer projects.

Highways England should consider ensuring POPE reports are more robust in statistical monitoring.

### 3.8 Study Question 7 - What interaction there is between the cycling, safety and integration ring-fenced fund and safety improvements which are delivered as part of major schemes

| Findings   | Status |
|--|--------|
| <p>The Regional Offices seemed to be resourceful and entrepreneurial by, for example, squeezing in road safety schemes as part of wider project implementation, such as fence to fence maintenance programmes, as a means to speed up delivery.</p> <p><i>Relevance – Interaction between the cycling, safety and integration ring-fenced fund and major schemes</i></p> |        |
| <p>Cycle proofing of major schemes is a recent development, Highways England reports that it is supported by the Cycling, Safety and Integration (CSI) Fund where appropriate.</p> <p><i>Relevance – Interaction between the cycling, safety and integration ring-fenced fund and major schemes</i></p>  |        |

| Recommendations     |
|---------------------|
| No recommendations. |

### 3.9 Study Question 8 – In relation to the previous questions, how safety investment on Smart Motorways is appraised, prioritised and evaluated

| Findings   | Status |
|--|--------|
| <p>The lack of robustness in previous safety appraisal and evaluation processes is evident in Smart Motorway schemes.</p> <p><i>Relevance – Smart Motorway processes and safety</i></p>  |        |
| <p>In the event of a decision for continuation – the matter is under DfT review – greater use of enforced variable speed limits and retrofit of proven technologies may offer some mitigation.</p> <p><i>Relevance – Smart Motorway processes and safety</i></p> |        |

| Recommendations     |
|---------------------|
| No recommendations. |

## 4 Table of Recommendations

| Number | Recommendation  |
|--------|---|
| 1.     | <p>A <b>Safer Roads Task Force</b> should be established within Highways England reporting to the CEO or a Committee of the Board for a period of three years.</p> <p>This will create an empowered cadre with a core purpose to lead the transformation of policies, practices and designs in safety performance management focusing on Highway England’s core engineering expertise.</p> <p>The proposed remit of the Task Force should be to</p> <ul style="list-style-type: none"> <li>• develop and demonstrate model designs for retro-fitting existing roads which will halve or more their in-built risk and raise safety performance by at least 1-star which, as a rule of thumb, halves crash costs;</li> <li>• develop and implement a fast-track demonstration portfolio addressing 30 roads on the SRN with high costs of harm using ‘fence to fence’ remodelling familiar to maintenance teams, which can be implemented within the next two years;</li> <li>• generate a practical Safer Road Investment Programme portfolio for the RIS3 period 2026-2030 which is of a scale consistent with achieving Highways England’s 2040 goal and delivers rates of return at least equal to RIS2. The primary aim of the portfolio will be reduction in the cost of harm through: <ul style="list-style-type: none"> <li>○ major improvement schemes;</li> <li>○ ‘fence to fence’ remodelling programmes to be undertaken during maintenance;</li> <li>○ portfolios of specific safety schemes; and</li> <li>○ reduction of shunt crashes on high speed roads.</li> </ul> </li> <li>• review and revise Highways England’s ‘Safe System’ definitions to include Safe Speeds and ensure that appraisal procedures for targeted safety programmes are consistent with DfT’s other major transport appraisal, statistically robust and in line with good international practice;</li> <li>• collaborate with selected Local Authority safety teams in line with Highways England’s Licence to develop a common Safe System approach to safety performance management on the SRN and its complementary MRN;</li> <li>• manage a programme of primarily internal communications which explains to staff through social media, workshops and briefings the goals, progress and achievements of the Task Force;</li> <li>• work to embed Safe System into the mainstream of Company operational practices; and</li> <li>• in view of the number of actors and organisations involved in Highways England’s road safety delivery implement a systematic, widespread training programme on the implementation of Safe System and the use of key tools.</li> </ul> |
| 2      | <p>Urgent preparation work should begin to assist DfT in the generation a <b>RIS3 portfolio with high return safety investment</b>. The road sections prioritised for remedial action should be the 40% of the network with the highest costs of harm per km. The NPV lost on these sections is many millions per km.</p> <p>Serious crashes are spread on this 40% of the network broadly equally across each of motorways, dual carriageways and single/mixed carriageways.</p>   |

| Number | Recommendation   |
|--------|--|
| 3      | Highways England should work and seek support from its partners in the development of <b>high return safety programmes</b> on the SRN, draw learning for itself on the complementary MRN network which contains a concentration of high economic loss equal to the SRN and making the transformation with recognition that legacy practice, procedures and culture may often not align with Safe System and new economic imperatives.  |
| 4      | Highways England’s investment in ‘softer’ <b>safety campaigns</b> - such as safety communications, working with enforcement agencies, working with businesses - is worthwhile and often innovative. All campaigns reviewed met their objectives although there were no expected outcomes in terms of sustained KSI reductions. This spending needs to be seen as essential ‘hygiene’ expenditure that maintains focus on customers’ own responsibilities for their behaviour and that can make a <b>contribution to long term goals</b> .  |
| 5      | Highways England’s engineering investment to improve safety on the SRN should <b>prioritise sections with high trauma cost</b> : <ul style="list-style-type: none"> <li>• If SRN infrastructure safety were improved to give customers the same level of safety Sweden expects to achieve by 2025 then KSIs might fall by more than half on the SRN.</li> <li>• The five main crash types on the SRN resulting in death and serious injury are junction crashes, running off the road, shunts, head-on crashes and pedestrians and cyclists being struck. It should be noted that for the pedestrian figures, around 20 – 25% of these are vehicle occupants who have left their vehicles.</li> </ul>  |
| 6      | Highways England should <b>embrace High Level Star Rating Performance Targets</b> to reflect and drive desired casualty savings. <ul style="list-style-type: none"> <li>• Highways England have met their principal target of 90% of travel at 3-star or more by 2020. It is unlikely to meet its delivery plan target to upgrade the majority of 1 and 2-star roads to 3-stars by 2020. This reflects the shape of the RIS1 programme.</li> <li>• The latest Star Rating protocol (Version 3) which should be used by the Company from 2020 has a 5-star scale. A ‘3-star <u>or better</u>’ benchmark is used by the international community for reporting to the WHO. The Company’s network is not homogeneous. At delivery plan level, high level metrics can be refined.</li> <li>• ‘3-star or better’ in New Zealand is extended to ‘4-star for roads of national significance.’ In Australia, important corridors have 4-star goals. The Asian Development Bank suggests a 4-star threshold at 40,000 vehicles per day and 4-star pedestrian safety in settlements</li> <li>• The Value of Prevention per km metric recommended will likely suggest a 4-star goal for many heavily trafficked SRN roads with 5-star for the most intensely used motorways. These appear likely to deliver significant casualty savings and economic payback</li> </ul> |
| 7      | Highways England should <b>exploit the rich data within its Star Rating results</b> to develop investment priorities. <ul style="list-style-type: none"> <li>• Star Rating results contain data at 100 metre intervals throughout the SRN based on main crash risks: 50 attributes describing a section’s safety can be manipulated and displayed. This data should be used more effectively.</li> <li>• Countermeasures based on average costs and economic tests are automatically suggested for an Engineer’s review. In this way, DfT’s Safer Roads Fund enabled 30 authorities to develop a £100m portfolio of 50 schemes within 6-12 months at a benefit cost-ratio (BCR) of 4.4 over a 20 year assessment period. Highways England should consider exploiting this data more.</li> </ul>  |

| Number | Recommendation   |
|--------|--|
|        | <ul style="list-style-type: none"> <li>• Synergies between asset management and safety performance management should be developed in frameworks and plans.</li> </ul>  |
| 8      | <p>Highways England <b>should use whole life costing and portfolio analysis to generate and appraise investment</b></p> <ul style="list-style-type: none"> <li>• A goal of establishing the Company was to enable a stable longer run approach required for infrastructure investment. Whole life costing is the norm in infrastructure industries. It was introduced, for example, for SRN road pavement choice some two decades ago.</li> <li>• Major safety projects have rarely been generated historically. Minor safety projects are assessed on the basis of statistically small (and declining) reported serious crash numbers. Evaluation of countermeasures considers first year performance only</li> <li>• The current significant statistical and economic weakness can be overcome, and safety appraisal brought in line with other UK transport investment. The Company has the data and tools for whole life costing and portfolio appraisal as applied worldwide and piloted in the UK by DfT economists for its Safer Roads Fund.</li> </ul> |
| 9      | Highways England should <b>consider ways of measuring KSI outcomes in softer projects.</b>   |
| 10     | Highways England should consider ensuring <b>POPE reports are more robust in statistical monitoring.</b>   |

## 5 Case studies

Assisted by inputs from Highways England, a number of illustrative case studies for different activities and from different funds are summarised in **Table 1**.

**Table 1: Selected case studies**

|   | RIS Fund/ Other Highways England Budget | Case Study                           | Relevance   |
|---|---|--------------------------------------|---|
| 1 | RIS1 Major schemes                      | A1 Dishforth to Leeming Bar          | An example of POPE evaluation on a high-volume section. |
| 2 | RS2: Designated Fund: Innovation        | SAFETYcam                            | An example of a work-related safety intervention        |
| 3 | RSI1: CSI Designated Fund: Cycling      | A31 St Leonard's Hospital Cycle path | An example of a cycling provision intervention          |
| 4 | Highways England Communications         | REDX                                 | An example of an information campaign intervention      |
| 5 | RSI1: CSI Designated Fund: Safety       | A64 Village Gateways                 | An example of small scheme junction improvements.       |

## 5.1 CASE STUDY 1: A1 DISHFORTH TO LEEMING BAR

**Fund:** Major schemes  
**Value:** £325 million  
**Current status:** Started 2009, Completed March 2012  
**POPE:** 1 year after opening  
**Region:** Yorkshire and the Humber  
**Benefit-Cost Ratio (BCR):** 0.9

Please note that this project took place under the Highways Agency. The outcomes and learning form this project are applicable to Highways England.



### Project description

Located in North Yorkshire, and initially based on a 2002 proposal, the scheme opened to traffic in March 2012 and consisted of the:

- Upgrade of a 13.7 mile (22km) section of the A1 to motorway standard to increase capacity.
- Construction of a Local Access Road (LAR) providing access for local traffic.

### Scheme objectives

- Reduce high level of accidents
- Reduce congestion
- Enhance journey time reliability

There were also special requirements to ensure the needs of non-motorised and public transport users (both local and long distance) are catered for; to provide a single carriageway all-purpose road (Local Access Road) where appropriate, to meet the needs of local and non-motorway traffic; and to work closely with statutory bodies, particularly English Heritage, in relation to archaeological issues.

### Problem to be addressed:

The alignment of the route is generally poor, with a number of sub-standard sections of horizontal and vertical curvature as well as sub-standard junction layouts. There are frequent sub-standard accesses, central reserve crossings and local road junctions;

- The whole of the Dishforth to Leeming section of the A1 identified for improvement experienced heavy traffic flows, carrying between 45,000 and 54,000 vehicles per day (in 2006, dependent on exact location), approximately one quarter of which were heavy goods vehicles as well as slow-moving agricultural traffic;
- The poor layout and junction arrangement in combination with the volume, type and speed of traffic resulted in a poor safety record. Over the five-year period leading up to the scheme's public inquiry (2001-2005), there were 11 fatal, 89 serious and 294 slight injury accidents in the Dishforth to Barton section 1; and
- The volume of traffic in combination with the effects of slower moving heavy goods vehicles and farm traffic led to severe congestion and poor journey time reliability.

### Proposed solution

The old A1 route was constructed during the 1950s and 1960s and as such failed to meet the present-day standard for route layout and alignment. Prior to the scheme, the route contained high numbers of sub-standard accesses, central reserve crossings and local road junctions. To improve upon this situation, the main components of the scheme included:

- Provision of a dual three-lane motorway with a hard shoulder between the Dishforth and Leeming junctions;
- Provision of junctions between the motorway and local road network at Dishforth (J49), A61 Baldersby (J50) and Leeming (J51);
- Provision of a single carriageway Local Access Road (LAR) - the A6055 - between Baldersby (J50) and Leeming (J51), to meet the demand for local and non-motorway traffic;

- Enhancement of existing, or provision of new underpasses at B6267 Sinderby Lane, Oak Tree Underpass, A684 Beadle Road and A6055 Leases Road; and
- Provision of new overbridges and enhancement of existing at A61 Baldersby, Street Lane, Gatenby Lane and Londonderry.

Safety outcome

- Analysis of the observed collision data for the scheme key links which were directly affected by the scheme shows an initial reduction of 22.2 collisions a year. These mainly represent minor injury collisions. This represents a decrease of 64%. The POPE report states that this will be revisited at the five years after opening stage when a larger data set will be available and will allow firm conclusions to be drawn.
- The number of serious collisions has fallen by a slightly greater amount than the average of all collisions, with a 74% reduction.
- The normal POPE method of evaluating the economic value of benefits arising from safety improvements is based upon comparing the observed and forecast collision savings in the opening year. However, it was not possible to use this approach here because no COBA model was available for the scheme nor was any detailed information about safety forecasts available. The evaluation was therefore based on the Project Appraisal Report approach. Outturn safety benefits were higher than forecast. £61.7 million as opposed to £12.8 million

Notable points

- Good attention to traffic counting and long-term traffic trends. The POPE reports that traffic flows on the A1 and local access road have decreased since the scheme opened and are lower than forecast. This reduction is in line with a nationwide reduction in traffic coinciding with the economic downturn. Permanent count data obtained from the TRADS1 database for count locations on the SRN for March 2008 (pre-scheme) and February/March 2013 (OYA); Pre-scheme 24-hr classified Automatic Traffic Count (ATC) data conducted in March 2008, commissioned by Atkins specifically for the purpose of this study; Post-opening 24-hr classified ATC data conducted in September 2013, commissioned by Atkins specifically for the purpose of this study.
- Caveats about the safety impact after 12 months are provided in the POPE given the need for monitoring of the effect over a longer time period and the small numbers involved. Recognition that the factors underlying the long-term trend for casualty reduction are considered to be multi-factorial and include improved safety measures in vehicles and reduced numbers of younger drivers.
- The safety evaluation is limited to overall collision rates rather than consideration of the safety value and impacts of different scheme elements (e.g. the safety impact of central concrete barriers and lighting changes) such as carried out in the environmental evaluation.

## 5.2 CASE STUDY 2: SAFETYcam

**Fund:** Designated Fund - Innovation  
**Region:** Midlands  
**Current status:** Trial began July 2017



### Project description

SAFETYcam is an intelligent site safety innovation protecting road workers currently on trial in the Midlands. The camera system was successfully developed by Carnell and Kier Highways and sponsored through the Innovation Fund. Site-based trials deploying four SAFETYcam vehicles across the SRN have been taking place since July 2017 over a period of 12 months.

The system uses two complementary vehicle detection systems to capture instances of dangerous driving, whilst providing a conspicuous visual deterrent and actively changing driver behaviour. Automatic number plate recognition combined with 360° video, and speed detection cameras are installed within the vehicles to provide comprehensive coverage. When deployed it virtually eliminates deliberate vehicle incursions and substantially reduces the number of site vehicles exceeding site speed restrictions.

### Safety impacts

The trial has proven successful in reducing site speeds with 50% month on month reduction in drivers registered at speeds in excess of 10mph being recorded. This clearly demonstrates a positive change in site driver behaviour. Since the start of the trial on 31 July 2017, the SAFETYcam vehicles have only recorded 3 unauthorised incursions where the drivers have been seeking to gain an advantage.

In addition, a 55% overall reduction in site vehicles speeding through closures within Midlands network where a SAFETYcam vehicle is deployed. Highways England is working closely with Carnell and Kier Highways to explore options to implement this on a wider scale.

The innovation was one of the winners at the Highways England Health, Safety, and Wellbeing awards and NW CIHT Innovation and Safety awards.

### 5.3 CASE STUDY 3: A31 ST LEONARD'S HOSPITAL CYCLEPATH

**Fund:** Designated Fund: Cycling  
**Investment costs:** £1,780.129  
**Current status:** Expected date of opening March 2020  
**Assessment period:** 20 years  
**Benefit-Cost Ratio (BCR):** 1



START OF SCHEME - BOUNDARY LANE ROUNDABOUT

Project description:

The scheme will provide a 2-way cycleway along the westbound carriageway connecting to a subway and footbridge (with ramped access) that spans the dual carriageway. The scheme will also provide street lighting to current standards on both carriageways.

Problem to be addressed:

St Leonards Hospital future housing development will consist of around 200 new homes including a percentage of affordable units. Major destinations for residents including employment, education and leisure are beyond a reasonable walking distance in most cases. The existing non-motorised user infrastructure serving the site was identified as an issue and in need of improving and specifically cycle infrastructure in the vicinity of the housing site. Additionally, the existing street lighting system is not up to current standards and much of it along the westbound carriageway is in the way of the proposed works. The A31 itself at this location is a dual carriageway with a speed limit of 50mph and carrying in excess of 6000 vehicles per day, very few cyclists will risk cycling on the carriageway itself given the volume and speed of traffic and, even without the housing development, cyclists are seen to be using the existing narrow footway when they do need to negotiate this part of the network. The A31 also forms a significant barrier to north – south movements by cyclists in this part of Dorset, severing the urban areas of West Moors, St Leonards, Ashley Heath from principal destinations in Ferndown and beyond by non-car modes

The current number of cycling and pedestrian trips was obtained from a survey undertaken on 29.10.2016 over the period 07:00 hrs to 19:00 hrs. Counts were taken at three sites along the scheme length and averaged. Average number of cyclists = 21, Average number of pedestrians = 30.

Crash analysis between 1<sup>st</sup> April 2012 to 31<sup>st</sup> March 2017 identified 25 injury crashes within the site extents of which 2 were serious and the remaining 23 were slight. In total there were 30 casualties, including 2 serious casualties. One of the collisions involved a cyclist travelling along the carriageway. 4 of the accidents (i.e. 0.8 per annum) occurred during the hours of darkness.

Proposed Solution:

The works would create a shared use footway/cycleway along the east side of the A31 for a distance of 1.65km and include the replacement of the street lighting system on both carriageways between (and including) Boundary Lane and Palmersford roundabouts, except for a 500m section between Azalea Roundabout and the Footbridge. The project will improve the existing cycle routes around St Leonards Hospital by better connecting them, this will make the route safer and local people less dependent on the roads to travel. The 'Impact on Severance' has been set to moderate beneficial to reflect the benefits to be gained by the improvements.

Expected outcome

The proposed cycling works are expected to eliminate cyclist collisions i.e. a saving of 0.2 collisions per year. The upgrading of the street lighting is expected to positively contribute to crash savings during the hours of darkness, with 30% of collisions of this type expected to be saved of 0.3 per annum. Total annual savings are predicted to be 0.2 + 0.3 = 0.5 per annum.

## 5.4 CASE STUDY 4: RED X CAMPAIGNS ON SMART MOTORWAYS AND MAJOR ROUTES

|  |   |
|--|---|
| <p><b>Fund:</b> Communications Budget<br/> <b>Value:</b> Not known<br/> <b>Current status:</b> Ongoing<br/> <b>Benefit-Cost Ratio (BCR):</b> Not conducted<br/> <b>Stakeholders involved:</b> Highways England and other government partners, police and industry</p>  |  |
| <p><u>Project description:</u></p> <p>A Red X sign is used to identify when a lane is closed and indicates that drivers should move onto an open lane to continue their journeys. They are used on Smart Motorways and other major routes with the aim of managing traffic and incidents effectively and efficiently. The Red X programme is a collaborative programme to improve driver behaviour.</p> <p><u>Problem to be addressed:</u></p> <p>The Highways Agency’s National Road User Survey in 2014 showed that almost one third of drivers out of a total of 4156 people surveyed did not know what to do when they saw a Red X sign displayed. Around one in twelve said they would stop if they saw a Red X.</p> <p><u>Project solution:</u></p> <p>Since 2015, Highways England has been running a programme to improve ‘Red X’ mandatory signal compliance. Based on ANPR evidence the Red X programme has issued over 70,000 warning letters. The scheme also makes referrals to the National Motorway Awareness Course and direct contact with business owners whose drivers offend. The campaign activity and monitoring is carried out to DfT guidelines.</p> |   |

## Red X the 'lifesaver' sign

A red X shows that a lane is closed and **MUST** not be used. This is so we can manage an incident or roadworks while creating a safer environment for road users and road workers:

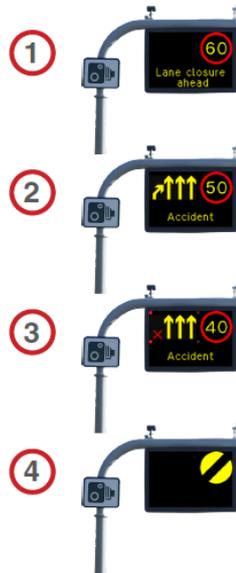
- Driving in a lane with a red X sign is dangerous both to you and anyone working or stopped on the carriageway ahead.
- We sometimes need to set red X signs far in advance of an incident in order to provide access for emergency vehicles.
- Digital cameras can be used by the police to enforce the red X sign.

The red X can be displayed on signs above each lane or large signs on the verge of the carriageway. The illustrations to the right show a typical sequence of signs we use in order to safely manage incidents. Any of the lanes may be closed by a red X and arrows will show the next available lane.

**Never drive in a red X lane!**

## Red X signs on a smart motorway - what you'll see

### Verge mounted signs



### Signs above each lane

60 mph speed limit signs displayed



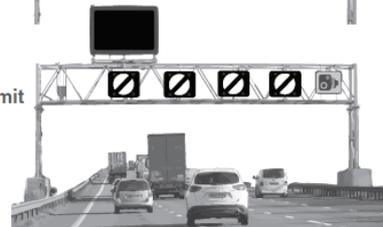
Move to right hand lane arrow displayed (this may be repeated)



Red X displayed in advance of incident



National speed limit applies after the incident



### Outcomes

No information is available to indicate an impact of KSIs.

A digital compliance monitoring tool has shown that non-compliance has improved, creating a safer environment for those using and working on Smart Motorways. Tracking between April to September 2019 conducted by Highways England shows a slow but steady increase in Red X understanding - a 4% increase from 94% to 98% since April 2019 was achieved for user familiarity with rules. Recognition of the campaign images (prompted recall) was relatively low with Red X at 8.89%. Some 89.08% of respondents thought the campaign was telling them to not drive in a lane with a Red X sign

In 2017 the Government amended the Road Traffic Offenders Act to enable Red X offences to be captured by a remote or automated device, but legislation still has to be completed before the technology can be used in enforcement. Highways England is working with the Home Office to provide the required legislation to allow cameras to be used for compliance.

In a survey conducted by the RAC, 23% of drivers surveyed admitted to having broken this new rule of the road by disregarding the red X, either occasionally accidentally (19%), often accidentally (1%) or occasionally on purpose (3%).

### Notable points

- The project activity is carried out in line with good practice and is a collaborative programme involving key stakeholders
- Information is available on inputs and outputs rather than outcomes.
- Understanding of Red X has improved over time.
- Legislation to facilitate compliance with the 2017 legislation is not yet in place.
- Compliance problems remain with almost one fifth of drivers disregarding Red X.

Sources: Highways Agency Press Release 12.1.15. Red X means don't drive in that lane Highways England (2018). Driving safely when you see a red X sign. How Smart Motorways work. Crown copyright 2018. RAC Press Release. 8.3.19.

## 5.5 CASE STUDY 5: A64 VILLAGE GATEWAYS

**Fund:** Designated Fund - Safety  
**Value:** £ 572,843  
**Current status:** Expected opening: July-Sept 2020



**Project description:** This Safety improvement relates to several sites located along the two single carriageway sections of the A64 between Welburn and Staxton, in North Yorkshire. The scheme was generated in response to historical complaints received over many years from residents of the communities (and stakeholder organisations representing them) along the route regarding vehicle speeds, road safety, severance, accessibility and other problems, perceived to be related to inappropriate speed limits through those communities.

**Problem to be addressed:** Lack of consistency in treatment of speed limits and the entry points to villages along the single carriageway sections of A64 resulting in poor speed management, community severance and an increased level of personal injury collisions.

### Scheme identification processes

A scheme appraisal report and route scoping study were completed and a route strategy was compiled. A comprehensive route scoping study was completed in 2018 considering the appropriateness of existing speed limits, and scope for change. The study identified a route strategy for speed limits along this section of the A64. In addition to changing speed restrictions, the study also proposed clear and recognisable demarcation of the limits of communities, using standardised 'village entry gateway' treatments, with each gateway type directly relating to a given change in speed limit.

**Proposed solution:** Installation of a series of consistent Village Gateways determined by a pre-set hierarchy as well as reducing the speed at identified buffer zones on the approaches to each village.

**Expected outcome:** Reduction in future injury and non-injury collisions. Predicted saving in injury crashes in opening year 1.98; 32 KSIs to be saved over 60 years and 104 crashes providing benefit of £6,872,948.