Written evidence submitted by the Department for Transport (RSM0113)

This evidence is submitted by the Department on behalf of the Secretary of State for Transport.

Introduction

The Secretary of State for Transport has shared the concerns of many motorists regarding smart motorways, and any question about safety on our road network must be taken with the upmost seriousness. In October 2019, the Secretary of State commissioned a Stocktake to gather the facts on the safety evidence and to make recommendations to raise the bar on safety. While the evidence has suggested that All Lane Running (ALR) motorways, smart motorways without a hard shoulder, are in most ways as safe as, or safer than, conventional ones, the Government is determined to do all it can to help drivers feel safer and be safer on our roads – all our roads.

To this end, in March 2020, the Department published the *Smart Motorway Safety Evidence Stocktake and Action Plan*, and announced a package of 18 measures, costing £500million, including the rollout of a radar-based stopped vehicle detection (SVD) technology across the ALR motorway network. One year on the Secretary of State commissioned from Highways England (HE), a report setting out progress along with proposals for how those actions could be sped up.

The publication of HE's *Smart Motorways Stocktake First Year Progress Report 2021* (referred throughout as 'Progress Report') does not mark the end of the process of continuous improvements to safety. This report will be provided to the Committee for its inquiry. The Progress Report also contains the latest safety data which updates analysis contained in the Stocktake report published in March 2020. The Secretary of State has said he is determined to ensure all possible actions to make ALR motorways safer still are explored. The Department will continue to work with HE on developing possible future options, working closely with road safety groups and Parliamentarians such as the Transport Select Committee.

HE is now able to commit to accelerating a number of actions so that the completion dates set out in HE's Strategic Business Plan 2020-25 are brought forward.

On existing ALR motorways:

- By the end of September 2022, six months earlier than previously committed:
    - On existing ALR motorways HE will have completed the installation of radar technology which detects stopped vehicles (radar SVD technology)
    - HE will have installed around 1,000 additional signs to better inform drivers of the distance to the next place to stop in an emergency
- By the end of September 2022, 10 months earlier than previously committed:

    - HE will have upgraded cameras that automatically detect vehicles passing illegally under a 'Red X' or entering the lane beyond a Red X[1], so the police can take enforcement action. HE are doing this for the safety of those in the closed lanes and because it's illegal to enter the lane beyond a Red X, until such time that you pass a sign and signal cancelling the restriction;
- HE will continue to consider a national programme of retrofitting additional emergency areas on existing smart motorways where places to stop in an emergency are more than one mile apart. This review will be complete by April 2022.

On ALR motorways under construction:

- HE will ensure that every new smart motorway will have radar SVD technology in place when it opens.

For ALR motorways in the design phase:

- SVD technology will be in place before any scheme opens
- Going forward, and as previously announced, drivers will reach places to stop in an emergency[2] every three-quarters of a mile where feasible, with a maximum spacing of one mile[3].

The latest safety evidence drawn from the data and analysis of the 2019 STATS19 official statistics has been produced by HE and is contained within the Progress Report. This Progress Report shows that in terms of fatality rates, smart motorways are the safest roads in the country.

In more detail, it also shows that approximately per mile travelled:

• Fatal casualty rates are a third higher on conventional motorways (0.16 per hundred million vehicle miles (hmvm)) compared to ALR (0.12 per hmvm). Fatal casualty rates on strategic road network A-roads (0.44 per hmvm) are three and a half times the rate on ALR.

• Serious casualty rates are a tenth lower on conventional motorways (1.12 per hmvm) compared to ALR (1.24 per hmvm). Serious casualty rates on strategic road network A-roads (3.04 per hmvm) are two and a half times the rate on ALR.

• Slight casualty rates on conventional motorways (9.63 per hmvm) are similar to ALR (9.73 per hmvm) and are double on strategic road network A-roads (19.27 per hmvm) compared to ALR.

This is in line with the findings of the 2020 Stocktake that "overall, what the evidence shows is that in most ways, smart motorways are as safe as, or safer than, the conventional ones. But not in every way".

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[1] it is illegal to enter the lane beyond a Red X, until such time that you pass a sign cancelling the restriction (the Red X)
[2] places to stop in an emergency include motorway services, emergency areas and remaining sections of hard shoulder, such as on slip roads
[3] with some exceptions where not feasible to construct additional emergency areas, such as where junctions intersect or on bridges

These figures have been compiled on a five-year basis (2015-19 inclusive), because single-year figures are too low and variable to draw consistent conclusions from. For the year 2019, the total number of deaths on all motorways was 85, of which 15 were on ALR and Dynamic Hard Shoulder Running (DHS) motorways. This was a rise of four since 2018, reflecting in part the increase in traffic on the motorway network generally and on these roads in particular. We will continue to monitor and evaluate safety on our network.

There has been considerable public and media interest in understanding motorway accident and fatality data, therefore the Office of Rail and Road (ORR) has been tasked with independently reviewing the data to provide further analytical assurance and ensure that the conclusions arrived at are robust. The ORR is the independent statutory monitor of HE and its management of the Strategic Road Network (SRN).

The different types of Smart Motorways

Throughout this document there is reference to different types of smart motorways.

ALR motorways have been the standard type of smart motorway since 2012 and the smart motorway type envisaged for the future. This document will refer to 'smart motorways' generally and will also refer to 'ALR motorways' when referring specifically to this motorway type, to distinguish it from the other types of smart motorways that exist.

The term 'smart motorways' describes a set of three motorway designs, comprising:

- **Controlled Motorways (CM)**, which add variable and mandatory speed limits to a conventional motorway to control the speed of traffic, while retaining a permanent hard shoulder. Overhead electronic signs display messages to drivers, such as warning of an incident ahead;

- **All Lane Running (ALR) motorways,** which apply the controlled motorway technology, permanently convert the hard shoulder as a running lane, and feature emergency areas. Emergency areas are places to stop in an emergency. They are approximately 110 yards long (the average length of a football pitch) by fifteen feet wide and set back from the left-hand edge of the motorway. An emergency telephone from which to alert HE of an issue and call for help is provided in each emergency area and they also have orange surfacing to make them more visible. Emergency areas should be used when a driver has no alternative but to stop and it is not possible to leave the motorway or reach a motorway service area. Other places to stop in an emergency include sections of remaining hard shoulder, such as on slip roads at junctions; and

- **Dynamic Hard Shoulder Running (DHS) motorways**, which apply the above controlled motorway technology. The hard shoulder is used as a live running lane when traffic flow is heavy and additional capacity is needed to reduce congestion. Electronic signs inform drivers when it is safe to use the

hard shoulder for live running. Emergency areas are installed as on ALR motorways.

Table 1 shows the number of miles of each type of operational motorway on the SRN and how this has changed over time.

Table 1 – Composition of the SRN by road type[4]

Road Class	Road Length (Miles)									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Conventional Motorway	1,778	1,755	1,700	1,697	1,651	1,657	1,617	1,583	1,576	1,564
Controlled Motorway	51	73	115	117	121	121	124	135	137	141
Dynamic Hard Shoulder	16	22	38	51	67	67	67	67	67	63
All Lane Running	-	-	-	-	29	29	62	105	123	141
All SRN 'A' Roads	2,570	2,582	2,583	2,571	2,574	2,570	2,563	2,578	2,611	2,608

1. The benefits of smart motorways, for instance to reduce congestion on busy sections of motorway, and how necessary they are

Improving capacity is one of the principal benefits of smart motorways. ALR motorway schemes provide more journey capacity and are designed to smooth traffic flows and achieve their congestion benefits with technology. This reduces stop-start driving and improves journey reliability.

By creating capacity and reducing congestion, we encourage and enable drivers to switch from other roads, such as rural or A roads, onto motorways, which we know are significantly safer. This means the numbers of people killed and seriously injured are lower than they otherwise would have been. The number of miles driven on motorways in England has increased by 23% since 2000.[5] Smart motorways have raised the capacity of our busiest motorways by up to a third. A smart motorway can carry 1,600 additional vehicles an hour in each direction and studies on the M25 have shown that these roads have enabled an additional 11,000 journeys a day, some of which would otherwise have been taken on different roads, which are less safe than motorways. For example, on the M6 Junctions 16 to 19 smart motorway,

[4] Source: Highways England scheme information and DfT Road Length Statistics on the strategic road network in England from 2010-19

[5] DfT statistics on road length and traffic: https://www.gov.uk/government/organisations/department-for-transport/about/statistics. Comparison between vehicle miles driven in 2000 and 2018, the latest year for which data is available.

around Crewe, the total average commuting time has decreased by an average of 40 minutes and journey reliability has also demonstrably improved.

The alternatives, such as building new motorways or widening existing ones is time-consuming, costly and destructive. Widening motorways causes far more disruption than conversion to an ALR motorway - not just to road users on the motorway itself, but to the roads and railways which cross it, since it often requires bridges across the motorway to be demolished and rebuilt.

The alternative to ALR motorways is the destruction of people's homes and hundreds of acres of space to build additional lanes. We have estimated that the smart motorway network, including DHS and Controlled motorways (in operation or planned) has saved, or will save, land equivalent to more than 700 Wembley Stadium-sized football pitches from being converted into a carriageway.

Smart motorways currently in operation have started to deliver £10.6bn worth of benefits to the UK economy. Smart motorways at a portfolio level achieve high value for money (VfM).

2. The safety of smart motorways, the adequacy of safety measures in place and how safety could be improved

The safety of everyone who uses or interacts with the SRN, is the first responsibility for both the Department and HE. The SRN is the most heavily used part of the national road network, carrying a third of all traffic and two-thirds of all freight. It provides businesses with the means to get products and services to their customers, gives access to labour markets and suppliers and encourages trade and new investment.

Evidence Stocktake and Action Plan

In March 2020 the Department published the Smart Motorway Evidence Stocktake and Action Plan after carrying out the first detailed evidence review of available data to gather the facts and make recommendations. Substantial effort has been made to build the evidence base on the relative safety of smart motorways over many years and the Stocktake and Action Plan of March 2020 considered several sources of evidence to assess the relative safety of different motorway types. High-level statistics (e.g. casualty rates based on STATS19 and DfT road traffic data) helped to understand safety performance as the network stands. Before and after studies (e.g. Post Opening Project Evaluations (POPEs), which are an evaluation of schemes after they open against their intended objectives; and other overarching evaluation reports) were used to consider the effect of converting a section of motorway, like-for-like; as was the modelling of potential and observed risks, which additionally was useful for looking at the nature of risks.

Overall, what the evidence set out in the Evidence Stocktake and Action Plan shows is that in most ways smart motorways are as safe as, or safer than, the conventional ones, but not in every way. The statistics show that fatal casualty rates are lower on

smart motorways when compared to conventional motorways while injury rates may be slightly higher. The risk modelling suggests that when converting conventional motorways to ALR, many risks decrease, while some increase. For example, the risks of a vehicle being driven too fast, and of a vehicle drifting off the carriageway, reduce whilst the risks of unsafe lane changing and of a vehicle stopping in a live lane increase. This is consistent with expectations relating to risk: for example, certain risks are expected to reduce on ALR including collisions involving speeding or tailgating, while risks expected to increase included collisions involving vehicles stopped in a live lane. Before and after studies also found that for the first nine ALR schemes, the overall casualty rate declined significantly, following the conversion to ALR, by 18% compared to what might have been expected without the conversion, with slight increases in fatal and serious injuries within the statistical margin of error (i.e. not a statistically significant finding).

Safety on smart motorways[6]

The 2020 Stocktake provided a comprehensive summary of the safety of all types of smart motorways by considering all available data sources. The report concluded that overall, smart motorways are in most ways as safe as, or safer than the conventional ones, but not in every way. It set out an action plan to further improve safety on the smart motorway network, to make them safer in every way.

Now, 12 months after the publication of the 2020 Stocktake, HE is building on the evidence base contained within that using the latest safety evidence and publishing those in their *Smart Motorway Stocktake First Year Progress Report 2021*. This new evidence includes 2019 safety data and metrics, such as casualty rates (i.e. casualties per hundred million vehicle miles - hmvm), fatal and weighted injury rates (i.e. FWI per hmvm) and casualty trends. By considering these safety metrics, there is a consistent comparison across schemes with different traffic levels. All metrics and underpinning calculations have followed the methodology adopted for the first 2020 Stocktake.

In addition, since the 2020 Stocktake there has been understandable interest in incidents where vehicles have stopped in a live-lane, so we have considered additional data on live-lane fatalities (both moving and stopped).

Data on road traffic casualties on the roads in Great Britain are collected via the STATS19 process[7]. These statistics are collected by police forces, either through officers attending the scene of incidents, from members of the public reporting the incident in police stations after the incident, or more recently online and then validated and published annually by the Department for Transport. The analysis presented here is developed by HE using STATS19 data (unless stated otherwise).

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[6] The 2020 Stocktake considered smart motorways to include ALR, DHS and controlled motorways.
[7] The STATS19 database is a collection of all road traffic accidents that resulted in a personal injury and were reported to the police within 30 days of the accident. More information can be found at: https://data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data

Like other transport authorities across the UK the key metric we use to assess the safety of roads is Fatal and Weighted Injuries (FWI). This gives a fatality 10 times the weight of a serious casualty, and a serious casualty 10 times the weight of a slight casualty. In effect, it takes all the non-fatal injuries and adds them up using a weighting factor to give a total number of 'fatality equivalents'. This FWI figure is used to compare one year with another. The actual fatalities are also listed as it is possible for the FWI to go down even if the actual number of fatalities has gone up, due to a reduction in the number of less- severe accidents.

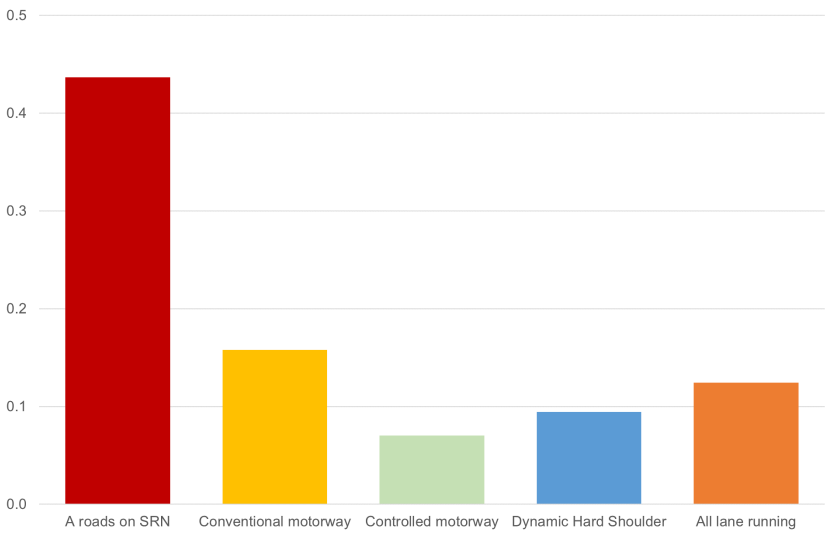
Casualty data can change significantly from year to year, depending on circumstances in any given year, and casualty rates can be sensitive to small changes in the absolute number of casualties. Volatility is also an issue as it can obscure more meaningful conclusions that can be drawn from the data. When considering casualty statistics, looking at the average over a recent set of years reduces the impact of volatility and helps identify trends.

Evidence from 2015-2019 used in the Smart Motorway Stocktake First Year Progress Report 2021

This latest evidence presents the last five years of available data (2015-2019). Overall, the data shows that fatality rates i.e. the rate of fatalities per hundred million vehicle miles (hmvm) travelled, averaged across all years between 2015 and 2019 are lower on smart motorways at 0.09 per hmvm versus conventional motorways at 0.16 per hmvm. Furthermore, each type of smart motorway has a lower rate of fatalities than conventional motorways: controlled is 0.07 per hmvm, DHS is 0.09 per hmvm and ALR is 0.12 per hmvm. This is illustrated in Figure 1 below.

Figure 1 highlights that ALR has a slightly higher fatal casualty rate in comparison to DHS. DHS are an existing type of smart motorway where the hard shoulder is used as a traffic lane to increase capacity temporarily only when it is needed most. The 2020 Action Plan highlighted that this type of smart motorway has the potential to cause confusion for motorists because the hard shoulder is sometimes in use for traffic and sometimes not. Also, as time goes on and the motorway becomes busier, the hard shoulder is in use as a traffic lane for longer periods of time and the motorway essentially acts as an ALR motorway. We acknowledge that there is a risk of confusion of operating a relatively intermittent hard shoulder on a DHS motorway and therefore, as set out in the 2020 Stocktake, DHS motorways are being converted to ALR to reduce confusion.

Figure 1 - Annual average fatal casualties per hundred million vehicle miles travelled, by SRN road type (2015-19 average)



Source: Data from HE based on STATS19.

A similar analysis using the FWI metric, over the same 2015 to 2019 period shows that smart motorways have a FWI rate of 0.33 per hmvm, lower than conventional motorways at 0.37 per hmvm. The FWI for smart motorways are 0.32, 0.34 and 0.35 per hmvm for controlled, DHS and ALR respectively.

Whilst the rate of fatalities and the FWI metric demonstrate that all types of smart motorways are safer than conventional motorways, it remains the case that they are not safer in every way.

In more detail:

- Casualty rates on all motorway types are lower than A Roads on the SRN, for each type of severity and the Fatal and Weighted Injuries measure
- Fatal casualty rates on controlled (0.07 per hmvm) and DHS (0.09 per hmvm) are lower than on conventional motorways (0.16 per hmvm), while ALR are lower (0.12 per hmvm)
- Fatal and Weighted Injury rates on controlled (0.32 per hmvm), DHS (0.34 per hmvm) and ALR (0.35 per hmvm) schemes are slightly lower than on conventional motorways (0.37 per hmvm)
- Serious casualty rates on controlled (1.14 per hmvm) and ALR (1.24 per hmvm) schemes are slightly higher compared to conventional motorways (1.12 per hmvm), while DHS are slightly lower (1.10 per hmvm)
- Slight casualty rates are higher on controlled (13.59 per hmvm) and DHS (13.83 per hmvm) compared to conventional motorways (9.63 per hmvm), while ALR roads are slightly higher (9.73 per hmvm)

This means that based on the updated casualty data alone, the latest safety analysis is consistent with the conclusions of the 2020 Stocktake, that in most ways, smart motorways are as safe as, or safer than, the conventional ones, but not in every way. Furthermore, data from the 2021 *Progress Report* shows that ALR motorways are one of the safest types of road in the country in terms of fatalities. The statistics

highlight that drivers on these roads are 25% less likely to be involved in a fatal accident than on a conventional motorway.

We are determined to do all we can to help drivers feel safer and be safer on our roads – all our roads. Through monitoring and evaluation activities, we will continue to assess the overall safety of smart motorways and the effectiveness of the interventions outlined in the 2020 Stocktake. Additionally, Post Opening Project Evaluation (POPE) reports for specific schemes will be published to compare the safety impact before and after a project is delivered.

Fatalities on motorways without a permanent hard shoulder

The risk of a live lane collision between a moving vehicle and a stopped vehicle is greater on ALR and DHS motorways. But the risk of a collision between two or more moving vehicles is lower. This is because ALR and DHS motorways have variable mandatory speed limits to smooth traffic flow, and electronic signs to warn drivers of incidents ahead. This means less speeding, tailgating and fewer rapid changes of speed, which gives drivers more time to react if something happens.

In 2019, 50,995 live lane breakdowns (LLB) incidents were reported on the SRN. Half of these took place on conventional motorways, whereas approximately a quarter took place on motorways without a permanent hard shoulder (ALR and DHS). While these figures indicate the total number of breakdown incidents, most LLBs do not lead to fatal or serious casualties.

Since the publication of the 2020 Stocktake there has been significant interest in the number of LLBs on motorways without a permanent hard shoulder (i.e. ALR and DHS motorways). Breaking down in a live lane is the main concern drivers have about smart motorways. By using STATS19 data, HE has focused on all live-lane fatalities for the period 2015- 2019.

Table 2 – Live lane fatalities on motorways

Live Lane Fatalities (moving and stopped vehicles)	2015	2016	2017	2018	2019	Total (2015-19)
Fatalities on live lanes of **conventional motorways**	76	65	78	62	60	**341**
Fatalities on live lanes of **controlled motorways**	5	1	3	8	5	**22**
Fatalities on live lanes of **DHS motorways**	2	2	1	1	6	**12**
Fatalities on live lanes of **ALR motorways**	0	1	4	10	9	**24**

Source: STATS19, HE Statistics on live lane casualties in England, and DfT Road Traffic Statistics on the SRN in England from 2015-19

Table 3 – Live lane fatality rates on motorways

Live Lane Fatality Rates (moving and stopped vehicles)	2015	2016	2017	2018	2019	Total (2015-19)
Fatality rates (per hundred million vehicle miles) on live lanes of **conventional motorways**	0.16	0.14	0.17	0.14	0.13	**0.15**
Fatality rates (per hundred million vehicle miles) on live lanes of **controlled motorways**	0.08	0.02	0.05	0.11	0.07	**0.06**
Fatality rates (per hundred million vehicle miles) on live lanes of **DHS motorways**	0.07	0.06	0.03	0.03	0.18	**0.08**
Fatality rates (per hundred million vehicle miles) on live lanes of **ALR motorways**	0.00	0.04	0.10	0.19	0.14	**0.12**

Source: STATS19, HE Statistics on live lane casualties in England, and DfT Road Traffic Statistics on the SRN in England from 2015-19

Taking traffic flow into account, ALR motorways are safer. Over the period 2015-2019, conventional motorways had an average of 0.15 live lane fatalities per hundred million vehicle miles compared to 0.12 for ALR motorways.

Based on data and metrics between 2015- 2019, this evidence shows fatality rates in live lanes are lower on ALR motorways compared to those on conventional motorways.

To give a further level of robustness to the data, in March 2021, the Secretary of State called on the Office of Rail and Road to conduct their own review into the safety evidence. This will also ensure that all the dimensions available to assess the evidence to hand is sufficiently covered.

Safety Improvements

Alongside the stocktake findings, the Secretary of State announced a package of the following 18 measures, set out in the 2020 Action Plan, designed to *"to raise the bar on smart motorway safety"*. They are set out as follows, along with implementation dates and information on progress to date. We also include areas where we are going further and faster than originally intended in the 2020 Action Plan. Further detail on progress is also contained below and in HE's 2021 Progress Report. The

Actions are divided into three categories of targeted improvements: **Giving clarity to drivers**; **finding a safe place to stop**; and **being safer in moving traffic**.

Giving clarity to drivers

- **More communication with drivers:** In March 2021, HE launched their 'Go Left' public information campaign on what to do in the event of a breakdown.

- **Ending the use of dynamic hard shoulder (DHS) motorways by March 2025**: There are 7 schemes which will all complete their preliminary design and survey stages by June 2021.

- **An update of The Highway Code by the Autumn 2021, ahead of HE's original commitment of March 2022**: A national public consultation took place in March 2021 and HE are now assessing the responses received.

- **Closer working with the recovery industry by September 2020:** Complete – in March 2020 HE signed a strategic partnership agreement with the independent recovery industry.

- **Review the use of red flashing lights to commence immediately by March 2021**: An independent review of evidence into the use of red flashing lights has been completed. The Department has agreed to off-road trials to understand the impact of using red flashing lights for road recovery operators, and to work with the recovery industry to promote best working practices and develop guidance on vehicle lighting.

Finding a safe place to stop

- **Committing to a new standard for spacing of places to stop in an emergency by November 2020**: Complete – new technical standards were published in October 2020. This new standard will apply to smart motorway schemes entering the design phase.

- **Delivering ten additional emergency areas on the M25 by December 2020:** Complete - the new areas were open for traffic in December 2020. Now that these 10 emergency areas are open for traffic, HE are monitoring their impact on live lane breakdown rates to understand if they have reduced the level of live lane stops. In the original 2020 Action Plan, HE committed to complete the monitoring period by 31 December 2021. **HE is accelerating this commitment to complete the monitoring and present a report to the Department for Transport by the end of August 2021.**

- **Considering a national programme to install more EAs on existing smart motorways by April 2022**: The 2020 Action Plan called on HE to consider a programme to install more places to stop in an emergency on existing smart motorways, where places to stop in an emergency were more than one mile apart. This review was to be completed by April 2022. In recognition of the concerns about the spaces between places to stop in an emergency, HE will explore the feasibility of a national rollout programme of emergency areas between September 2021 and March 2022.

- **Making emergency areas more visible by May 2020:** Complete - all existing emergency areas (over 300) now have visible orange surfacing and marked stopping areas with clearer, easier to understand and more frequent signage.

  More traffic signs giving the distance to the next place to stop in an emergency by September 2022 – ahead HE's original commitment of March 2023: Initial surveys are complete. It has been estimated that approximately 1,000 additional new signs will be required for the operational smart motorway network.

- **Places to stop in an emergency shown on your satnav by March 2022:** HE have created a database with location identification information of emergency areas and a product to show the information on a map. This was provided to SatNav providers in March 2021.

- **Reviewing existing Emergency Areas where the width is less than the current standard by December 2020:** HE is working on completing safety risk assessments to help guide the next steps for widening any narrow emergency areas.

Being safer in moving traffic

- **Faster rollout of Stopped Vehicle Detection (SVD) radar technology on existing ALR schemes by September 2022 – ahead of HE's original commitment of March 2023:** SVD on the M3 J2-4a and on the M20 J3-5 is complete. Work is underway on the M1 J32-35a. Current DHS motorway sections will have radar SVD technology installed as part of being converted to ALR by March 2025. HE is also **making a new commitment** that all new schemes will have radar SVD technology installed before they open, including the six schemes currently in construction: M4 Junction 3 to 12, M1 Junction 13 to 16, M27 Junction 4 to11, M6 Junction 13 to 15, M56 Junction 6 to 8 and M6 Junction 21a to 26.

- **Displaying ‘report of obstruction’ messages on overheard signs by March 2023**: HE is on target to deliver, by March 2023, the automated display of ‘report of obstruction’ messages on overhead signals when radar SVD technology identifies a potential incident.

  Faster attendance by more HE traffic officer patrols by July 2021: HE will continue to work to support the aim, that by July 2021, they will have reduced the time it takes traffic officers to attend incidents from 17 to 10 minutes.

- **Making it easier to call for help if broken down:** HE have worked with the Society of Motor Manufacturers and Traders (SMMT) to build greater awareness of eCall and bCall functions in cars and communicate the benefits to motorists.

- **Complete upgrade of special cameras, known as HADECS3 cameras, to enforce Red X by September 2022 – 10 months earlier than HE’s original commitment of July 2023**: To date HE has upgraded 33 of the 85 cameras and they will upgrade the remainder 10 months earlier than planned, so that they can be used to spot and prosecute motorists who choose to ignore the red X signs and drive illegally down closed lanes, putting themselves and others in danger.

- **Investigate M6 Bromford viaduct and sections of the M1**: This is an ongoing action – HE is finalising the details of the measures it will take forward to enhance the safety of these sections of motorway. HE intend to publish the findings of their safety reviews in June 2021.

- **Working with fleet operators:** This measure is about launching the ‘Driving for Better Business programme’ to urge businesses to not switch off Automatic Emergency Braking. **This is a new commitment** HE has since made and announced in their 2021 *Progress Report*.

3. Whether All Lane Running is the most suitable type of smart motorway to roll out or if there are better alternatives

ALR motorways have tended to be introduced on the busiest, most congested, sections of the SRN. Motorways, whether smart or conventional, are already far safer than any other major roads for many reasons including the lack of pedestrians or cyclists including far fewer junctions, and those that do exist are designed to allow traffic to join or leave in greater safety.

The All Lane Running safety system

Conventional motorways have permanent hard shoulders as the main safety intervention. On ALR the hard shoulder is removed to give space for more traffic, and provide overall safer capacity for drivers on the road. That is because, the extra capacity draws traffic from less safe roads where there are tragically more deaths and injuries.

ALR motorways also benefit from a whole system built in to help protect road users. This safety system includes CCTV technology to enable HE control room operators to identify hazards or accidents on the road, set signs and signals to close lanes with a red X, and vary speed limits to slow down traffic approaching an incident. This safety system also includes emergency areas, which are wider than hard shoulders, set back off the carriageway, and contain a telephone allowing control room operators to pinpoint drivers who need help.

The different motorway types

Since the introduction of the first Controlled Motorway in 1995, smart motorways have been progressively introduced to the SRN. The first DHS motorway opened in 2006 and the first major ALR motorways in 2014. They are an enhancement of the existing motorway network aiming to achieve the benefits of increasing capacity, reducing congestion, and applying technology to manage traffic, while keeping the road as safe as, or safer than, the road it replaced.

Controlled motorways are like conventional motorways in that they consist of a hard shoulder but are different in that controlled motorways use technology to improve the flow of traffic. To meet the demand for greater capacity, controlled (and conventional) motorways would need to be widened.

During the 2020 Stocktake Report, we considered the use of dynamic hard shoulder running as a type of motorway, which is where the hard shoulder is used as a traffic lane to increase capacity temporarily only when it is needed most. We took account of HE's operational experience with this early version of smart motorway. The DHS motorway type has the potential to cause confusion for motorists because the hard shoulder is sometimes in use for traffic and sometimes not, which is why we are converting all DHS to ALR by March 2025.

The Department announced in March 2020 that HE would convert all existing dynamic hard shoulder smart motorways into ALR by the end of March 2025 so there will be only one type without a permanent hard shoulder. This will provide a more consistent experience for motorists. ALR has been the standard for smart motorways since 2012. ALR motorways increase capacity while maintaining the overall level of safety achieved by conventional motorways. Unlike DHS motorways, ALR give a more consistent experience to motorists and provides immediate extra capacity rather than needing to be changed when it is needed most, which will occur more often in the anticipation of growing demand for motorway space.

4. Public confidence in using smart motorways and how this could be improved

Whilst the safety data supports the Government's view that ALR motorways are in most ways as safe, or safer than, conventional motorways, but not in every way, we recognise the need to work to improve safety, and tackle the public perception of smart motorways and instil public confidence in them. A number of measures in the 2020 Stocktake Action Plan and subsequent 2021 Progress Report will support these aims. HE's progress in delivering the 18 Actions of the 2020 Stocktake Report is set out in **Section 2** of this document.

One action from the 2020 Stocktake Report was to invest £5million on national and targeted education and motorway safety campaigns. The 'Go Left' public information campaign launched in early March and gives advice about what to do in the event of a breakdown.

Also, recognising that many motorists use a satnav (satellite navigation) device to follow a route to their destination, another action for HE was to work with satnav providers to ensure that places to stop in an emergency, such as motorway services, emergency areas and remaining areas of hard shoulder such as on slip roads, are shown on the screen of the device when needed most. HE has since provided data to satnav providers so that places to stop in an emergency can be shown on the screen of the device when needed and is working with car manufacturers to build greater awareness of eCall, an automatic emergency telephone calling system in cars.

A further commitment in the Action Plan was to update The Highway Code to provide more guidance for motorists to improve safety for users of motorways and high-speed roads. The proposed changes that were consulted on included new and additional guidance on:

- The availability, appearance, and safe use of emergency areas.
- The use of variable speed limits to manage congestion
- The use of the red 'X' sign to close lanes and provide a safer area for the people and vehicles involved in incidents and roadworks
- The use of hard shoulders that become extra lanes during periods of congestion
- How road users can help keep themselves safe in the event of a breakdown
- How safety cameras are employed to promote compliance with speed limits and lane closures

The consultation closed on 29 March 2021 and HE are now analysing the many responses received on this matter. While HE's Delivery Plan 2020-2025 commits to the updated The Highway Code being published by March 2022, Highways England has rescheduled this programme and are working at pace to deliver on this action even earlier by the Autumn of this year, recognising the need to make drivers aware of important safety information.

Going further

In recognition of the importance of going further to improve public confidence in smart motorways, HE is also accelerating several Actions from the 2020 Stocktake.

- The 2020 Action Plan had a challenging target for HE to install radar SVD technology on 21 schemes by March 2023. HE is now **accelerating the installation of SVD technology on every existing ALR scheme by the end of September 2022, six month earlier than planned**; and making a **new commitment** that every new ALR motorway will have radar SVD technology in place when it opens.

- **Also being delivered six months earlier than planned** are additional signs in between places to stop. HE is accelerating the completion of their sign installation programme so that by September 2022 they will have installed 1,000 additional signs in between places to stop.

- The Highway Code update will be completed in Autumn 2021, **ahead of the original commitment of March 2022**.

- HE will monitor live lane breakdown rates following 10 additional emergency areas being installed on the M25, to understand if they reduce the level of live lane stops. HE are committing to complete the monitoring period by the end of August 2021, **four months earlier than planned.**

- **By the end of September 2022, 10 months earlier** than previously committed HE will have upgraded cameras that automatically detect vehicles passing illegally under a 'Red X' or entering a closed lane beyond a Red X, so the police can take enforcement action.

- HE is **introducing a new commitment** to work with fleet operators through a 'Driving for Better Business' programme to urge businesses to not switch off Automatic Emergency Braking.

Research conducted by Transport Focus

In November 2020, Transport Focus, which provides the watchdog function for strategic network users, conducted qualitative research with 59 people engaged in focus groups and individual interviews with vulnerable road users about driver communication and perceptions of ALR motorways. The purpose of the study was to elicit an in-depth understanding of factors shaping attitudes toward ALR smart motorways, rather than to achieve a representative sample of user perceptions.

The research sought to illustrate the perspectives of those who use all-lane running motorways and found that: (i) participants expressed a variety of attitudes towards ALR smart motorways, including support, neutrality and opposition; (ii) some participants felt that ALR smart motorways had positive impacts, including a reduction in traffic congestion; (iii) there were concerns over their safety (e.g.

breaking down in a live lane) and a lack of understanding as to how the technological components of ALR Smart Motorways work together in a collective or systemic way.

Based on these findings, seven recommendations were made that broadly align with the department's and HE's existing concerns. For instance, the recommendations emphasise the need to continue communicating with drivers about what to do in the event of a breakdown and to also consider ways of maximising compliance with 'red X' violations as compliance is viewed as weak by drivers. We have changed the law to enable automatic detection of Red X violations and enforce this by using cameras. HE are upgrading cameras across the whole smart motorway network to enable automatic detection of Red X violations which can then be enforced by the police.

5. The impact of smart motorways on the usage and safety of other roads in the strategic road network

ALR motorways provide much needed additional capacity on England's busiest and safest roads. Without increasing motorway capacity to meet growing demand, motorway journeys would become less reliable, less predictable and less safe due to increased congestion. As a result, it would be less attractive for road users to drive on motorways for all or part of their journey. Given that motorways are the safest roads in Great Britain, this trend would lead to an overall reduction in safety on the SRN and on local roads.

It is difficult to quantify the exact impact of smart motorways on the wider road network, although increasing capacity on our safest roads is good for the overall safety performance of the network.

HE have undertaken a high-level analysis to determine what the possible safety implications would be if ALR motorways were to return to a conventional layout with a hard shoulder, as some critics have called for. By closing one lane on a four-lane ALR motorway, the capacity of that motorway would be reduced by 25%. If that lost capacity was directly displaced onto A-roads, it is estimated that it could lead to an additional 25 fatalities and 224 serious casualties per year. This would be an over-estimation, as not all traffic would likely be displaced. If it is assumed instead that 1% of traffic is displaced, likely an underestimate, then an additional 0.6 fatalities and 2.4 serious casualties per year can be expected to occur.

As a result of increased levels of congestion, the economic cost of the 25% displacement scenario is estimated as £2.85bn per year and £350m per year in the 1% scenario.

6. The effectiveness of HE's delivery of the smart motorways programme, the impact of construction works, and the costs of implementation.

HE achieved the RIS1 programme objective of starting work on 19 smart motorway schemes and opening 12, in effect delivering an additional 301.4 smart motorway

lane miles against their target of 286 miles. HE invested £2.7bn in the development of smart motorways in RIS1 against an allocated budget of 2.6bn. HE also delivered over £300m of efficiency savings within the smart motorways programme.

The increased capacity that has been delivered by smart motorways has resulted in journey time savings of over 28 million hours, an economic value of £350m. If HE had invested the same funding to increase capacity through conventional motorway widening then it is estimated to have achieved an equivalent journey time saving of 11.4 million hours and less than half the economic return of smart motorways. Over their 60-year economic appraised period, it is estimated that the economic value of smart motorways currently in operation will be £10.6bn.

To minimise its impact on road users during the construction of smart motorways, HE maintains three narrow running lanes to keep traffic moving in each direction, and where it is possible to do so, imposes speed limits to improve safety and provides an emergency recovery service for vehicles which are forced to stop.

In recognition of the ambitious scale of the smart motorways programme, HE developed a ‘Smart Motorways Alliance’ of contractors as a way of controlling and delivering this volume of work and sharing best practice. Over the next decade, HE will deliver all new smart motorways through its alliance model which commenced in March 2020. This enables HE to partner with suppliers to design, assemble and manage smart motorway technology. In addition, by aligning objectives it allows for a reduction in design costs and shorter construction stages. This method will further enhance the effectiveness of HE’s delivery of the smart motorways programme.

Ends.

April 2021