highways england

Our ref: 19185431
Your ref:

Jim O'Sullivan
Chief Executive
Highways England
Bridge House
1 Walnut Tree Close
Guildford
GU1 4LZ

Lilian Greenwood MP
Chair of the Transport Committee
By Email: transcom@parliament.uk

25 September 2019

Dear Lilian

All lane running (ALR)

Thank you for your letter of 27 August 2019, regarding all lane running smart motorways.

The safety of all those who travel and work on the Strategic Road Network is Highways England's priority. We are unequivocal in our ambition that no one should be harmed when travelling or working on our roads.

Our motorways are amongst the safest roads in the world and they are the safest roads in the country – four times safer than A-roads and eight times safer than single carriageway A-roads. We now have twelve all-lane running smart motorways in operation across the country and the statistics and evidence tell us that they are maintaining and improving the high levels of safety associated with traditional motorways.

We recognise that safety is not just about being safe. We want everyone who travels or works on our roads to feel safe. We will continue to work with road users, motoring groups and the recovery industry on these important issues. The watchdog, Transport Focus, recently published the Strategic Roads User Survey for 2018/19 and reported that 94% of people feel safe on motorways.

We address each of the questions you raise overleaf and provide a short summary of the progress we have made on all lane running since the previous Transport Select Committee concluded its inquiry in 2016. I would be pleased to meet with you to discuss these matters in more detail.

Yours sincerely

Jim O'Sullivan
Chief Executive

disability confident COMMITTED

Progress on our commitments for All lane running since 2016

Since the previous Transport Select Committee concluded its inquiry in 2016 we have:

- Enhanced the visibility of over 140 existing emergency areas on smart motorways, by improving signage and using high-visibility orange surfacing.
- Reduced the maximum spacing of places to stop in an emergency, including emergency areas, on new smart motorway schemes, beginning construction in 2020 to one mile.
- Commenced design work to retrofit 10 additional emergency areas on the M25 to provide greater reassurance to drivers. These will be complete by December 2020.
- Worked collaboratively with the roadside recovery industry at an event at the National Fire Service College, Moreton-in-Marsh which:
    - Confirmed emergency areas are an appropriate size to accommodate safe recovery.
    - Identified the optimum place for a vehicle to stop to facilitate effective recovery.
    - Helped to develop new guidance and training[1] for the roadside recovery industry, with the Institute of Vehicle Recovery (IVR) and SURVIVE.
    - Developed professional driver training courses (CPC accredited) on smart motorways for recovery workers[2] and commercial drivers[3].
- Developed a relationship with the APPG on Roadside Rescue and Recovery, including meeting with Sir Mike Penning MP and Tracey Crouch MP.
- Worked with the Home Office and the Department for Transport to introduce a change in legislation (10 June 2019) allowing the automated detection of red X offences using camera equipment; enabling police enforcement authorities to prosecute any such offences.
    - Following subsequent home office type approval, cameras are being upgraded and tested as part of a national roll-out programme. Enforcement is due to start this autumn. In the meantime, drivers who ignore the law will continue to receive warning letters to remind them of the dangers of travelling in a closed lane.
- Begun to rollout out stopped vehicle detection capability to all lane running schemes:
    - M3 J2-4a in 2019/20.
    - All ALR schemes beginning construction from March 2020.
- Delivered communication campaigns around how to drive on smart motorways, including; vehicle checks, variable speed limits, red x, keeping left and what to do in a breakdown.
- Collaborated with a range of key stakeholders:
    - Transport Focus – engaging with recommendations in the 'Getting to the Heart of Smart' report.

[1] https://highwaysengland.co.uk/advice-for-recovery-operators-on-highways-englands-smart-motorway-network/
[2] https://www.gov.uk/government/news/roadside-recovery-industry-offered-smart-training-by-highways-england
[3] https://www.gov.uk/government/news/smart-safety-advice-for-commercial-drivers

- Disabled Motoring UK – creating an educational film for disabled drivers using smart motorways.
- Launching our Driving For Better Business campaign.
- Made a step change in engaging with customers through Facebook Live, collaborating with Mumsnet and the RAC.
- Deepened our understanding of customer sentiment towards smart motorways through our customer insight activities; surveying up to 20,000 customers, conducting research on smart motorways, breakdowns and gathering better insights around driver behaviours and perceptions.

I address each of the points in your letter in turn below:

1. **The evidence HE relies on to demonstrate that ALR schemes deliver comparable safety to traditional motorways.**

Each all lane running (ALR) scheme must meet a strict safety objective, which is to be at least as safe as the traditional motorway it replaced, and we monitor all schemes after delivery to ensure this is met.

There are twelve all lane running smart motorways in operation in England. We assess the safety performance of our roads using the Fatal Weighted Injury (FWI[4]) rate. The FWI rate gives greater weight to more serious incidents and enables us to compare roads by taking vehicle journey numbers into account.

Monitoring of the first two ALR schemes on the M25 showed that they improved upon this safety objective, while at the same time reducing congestion. Over the first three years of operation, these schemes demonstrated a 27% improvement in safety performance, and enabled many more journeys, improving journey reliability, whilst maintaining journey times.

The Transport Select Committee report of 2016 called for a halt to the roll out of all lane running smart motorways until the three-year safety data on the M25 schemes was available. We present this data below:

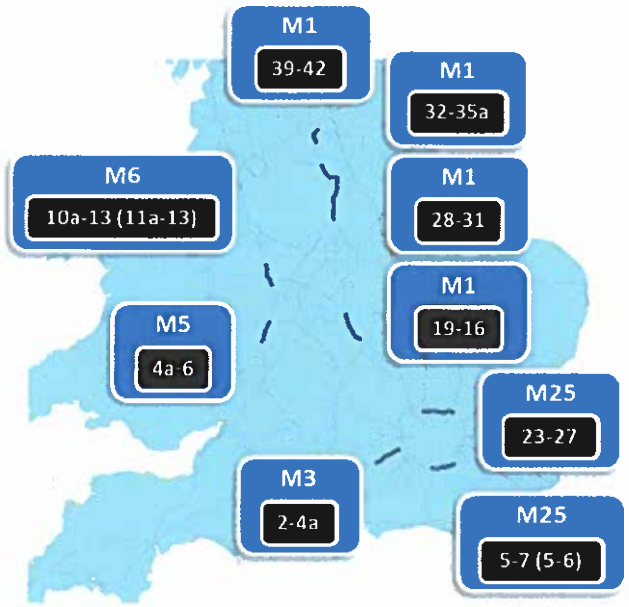
FWI rate as a traditional motorway	FWI rate after one year operating as an ALR smart motorway	FWI rate after two years operating as an ALR smart motorway	FWI rate after three years operating as an ALR smart motorway
0.5	**0.42**	**0.41**	**0.36**

FWI / Casualty rates in the above table is expressed per hundred million vehicle miles (HMVM).

The data shows a 27% reduction in the FWI rate on the M25 schemes after their first three years of operation.

Recently we have evaluated an additional seven ALR schemes, combining data from their first year of operation with the data we already have from the M25. This broader evidence base shows that ALR is again outperforming its published safety objective, delivering improved levels of safety compared to traditional motorways.
The nine all lane running schemes included in this evaluation are shown in the figure below:

[4] Fatal and weighted injury (FWI) is calculated based on the number of fatal, serious and slight casualties as weighted proportions, to adjust for the severity. The FWI rate allows a comparison between road sections of different flows and lengths and is used to define the scheme's safety objective. FWI equals (number of fatalities) + 0.1 x (number of serious) + 0.01 x (number of slight casualties).



- The M25 schemes have been operational for three years;
- The other seven schemes have been operational for one year;
- The FWI rate across the nine schemes is now 0.31 per hundred million vehicle miles travelled (HMVM), compared to 0.41/HMVM when operating as traditional motorways;
- The casualty rate across the nine schemes is now 12.08/HMVM compared to 16.76/HMVM when operating as traditional motorways.

These results show:

- **a 25% reduction in the FWI rate,** which is a 23% improvement over the national motorway trend.
- **a 28% reduction in the casualty rate,** outperforming the national trend by 10%.

2. An analysis of the reasons drivers have stopped on ALR motorways; a breakdown of how many and what proportion of motorists who stopped made it to an emergency refuge area; and how many and what proportion stopped in a live lane.

The table below shows all incidents involving a breakdown on all lane running, in 2017 and 2018 combined that Highways England are aware of and recorded on our incident management system. The amount of ALR smart motorway increased during this time, due to new schemes opening.

Breakdown location	Number	Percentage
Live lane	19,316	38%
Not live lane	28,547	56%
Not recorded	3,246	6%
Total	**51,109**	**100%**

'Not live lane' covers stops in an emergency area, as well as other locations such as the nearside verge, hatched areas or short sections of hard shoulder. Some emergency area stops may not be recorded, if the driver left without calling for assistance.

A vehicle stop is typically recorded as a breakdown if the driver informs Traffic Officers that they have broken down, but this will include minor faults which did not require an immediate stop, and from which the driver was able to drive off rather than needing recovery.

Traffic Officers do not systematically collect data about the driver's reason for stopping, as their priority is to ensure safety at the scene. However, we know that a quarter of all motorway breakdowns are punctures - this is supported by our work in collaboration with Tyre Safe[5][6] which indicates that over 10 million tyres on the UK's roads could be illegal. Nearly 5% are due to running out of fuel or using the wrong fuel.

Most breakdowns occur in daytime conditions when traffic flows are higher and average speeds lower, resulting in reduced risk.

The main contributory factor in most injury collisions is human error. We have carried out extensive communications campaigns to emphasise the importance of vehicle checks in preventing avoidable stops, and ensure drivers understand what to do in a breakdown. We are also doing research to understand driver perceptions and assess the guidance we provide around unplanned incidents, to ensure more evidence-led communication with customers.

3. An explanation of how HE determines emergency refuge area size and spacing, the evidence underpinning this standard and what steps HE intends to take in respect of ALR schemes that do not conform to the standard.

The size of emergency areas was first determined following trials with motoring and vehicle recovery organisations at the Fire Service College at Moreton-in-Marsh in 2004. The design and size of these are based on the emergency laybys used on our All-Purpose Trunk Road network. The design standard for the size has remained the same ever since the first dynamic hard shoulder running scheme was introduced on the M42 in 2006. We now have over thirteen years of operational experience of working with emergency areas, and during this period no fundamental issues have been identified.

However, following concerns raised to the Transport Select Committee in 2016 we undertook to review the size of emergency areas. In 2017 we repeated the trials at the National Fire Service College at Moreton-in Marsh, working with key stakeholders to test the operational capabilities of the emergency area design and the effectiveness of the associated recovery procedures. Twenty-eight organisations and over 70 individuals were involved in the event, which tested several scenarios using a full-scale emergency

[5] https://www.gov.uk/government/news/tyre-safety-blitz-as-highways-england-works-to-drive-down-incidents
[6] https://www.tyresafe.org/campaigns/tyre-safety-month-2018/get-involved/case-studies/highways-england-2018/

area. Following these tests, vehicle recovery operators agreed the size of an emergency area was appropriate for recovery purposes.

The position of the vehicle being recovered was identified as a crucial element of safe and efficient recovery, and in response to this a marked-out parking box was added to the emergency area design, to enable a recovery vehicle to position itself in front of or behind the stranded vehicle.

This event was filmed and used to create visual training material which has been shared across the recovery industry to highlight best practice. We have recently launched a professionally accredited training course called 'Smart motorways awareness for the roadside rescue and recovery industry', which is the first course of its kind for recovery operators.

It is worth highlighting that drivers are encouraged via signage to contact us for assistance before re-entering the carriageway from an emergency area. We use smart motorways infrastructure to assist drivers exiting an emergency area; this includes informing approaching drivers of a vehicle leaving via signage, temporarily closing lane 1 with a Red X or sending a Traffic Officer patrol to assist. Drivers are not expected to accelerate to traffic speed from within the emergency area.

Regarding the spacing of emergency areas, the original smart motorway pilot scheme had a high concentration of infrastructure with places to stop in an emergency, including emergency areas, at a nominal spacing of 500m. Monitoring of a section of this scheme with a spacing of around 800m indicated that this wider spacing did not compromise its operation. As part of the development of ALR in 2012, comprehensive hazard analysis and extensive research and testing involving the Transport Research Laboratory concluded that the maximum spacing of places to stop in an emergency (including emergency areas) could be extended to 1.5 miles (2.5km). This spacing was chosen as it is consistent with the design standard for emergency lay-bys on All Purpose Trunk Road dual carriageways.

In 2017 we commissioned in-depth analysis of the number of live lane breakdowns on ALR sections and could find no consistent correlation with emergency area spacing. However, to increase customer confidence of reaching a place to stop in an emergency, we agreed to reduce the maximum spacing to 1 mile on future schemes to be constructed from 2020 onwards. It should be noted that whilst 1.5 miles (2.5km) is the maximum spacing, the average spacing on all ALR schemes to date is approximately 1.2 miles (2km).

In addition, we are installing ten additional emergency areas on the M25 in locations with the greatest existing spacing and with the highest live lane breakdown rates.

We are also enhancing existing emergency areas by installing high-visibility orange surfacing, to make them as easy as possible to spot and to discourage drivers from using them in non-emergency situations. This is supported by newly designed signage at more

frequent intervals to advise drivers of the distance to the next emergency area; the signs use the internationally recognised SOS symbol and match the shape and colour of the emergency areas.

We are currently delivering these enhancements across the smart motorway network, with over 140 emergency areas already enhanced with new signs and surfacing. We intend to complete this roll out by Spring 2020, with a total of 267 upgraded emergency areas in place across the entire smart motorway network. All new schemes open with these enhancements as standard.

We are monitoring the impact of the changes we are making to emergency areas, including engaging with customers on the difference they make to feeling safe when driving on all lane running sections.

4. **An analysis of where stopped vehicle detection (SVD) systems have been deployed and how well they are working, along with a description of any plans HE has for further deployment of such systems, how much they will cost and what the timeframe for deployment is.**

All lane running schemes are based on a comprehensive safety assessment and hazard analysis which allows them to be designed, built and operated safely. The use of roadside technology to display speed and lane information to drivers and provide automatic detection of offences, creates a controlled environment which helps to improve driver compliance.

This is in addition to our Motorway Incident Detection and Automatic Signalling (MIDAS) system which is operational on all smart motorway sections. MIDAS detects slow moving traffic and warns drivers by setting appropriate messages and speed limits without operator intervention, to protect vehicles at the back of a queue. This is a proven safety system which, along with comprehensive CCTV coverage, helps to mitigate the risk to stopped vehicles when traffic flows are higher.

As such, all lane running schemes are designed to operate safely without the need for any further detection technology.

However, as part of our commitment to create a driving environment where people feel safe, we have developed a stopped vehicle detection (SVD) system to automatically detect individual stationary stopped vehicles on the carriageway, which enables us to set speed limits and lane closures more quickly to warn oncoming drivers and protect the stranded motorist.

Following initial trials, we have deployed a radar-based SVD system on M25 J5-6 and M25 J23-27, which covers all 25 miles of ALR on the M25. Evaluation of the system demonstrates it is working as expected, with a detection rate for single stopped vehicles of 90%. We have also found that it can be a valuable extra tool to help spot non-breakdown related incidents more quickly.

We are therefore progressing with the roll-out of this system on M3 J2-4a, due to become operational next year. The capability to detect stopped vehicles is also being designed into other ALR schemes which are scheduled to be delivered between Autumn 2021 and Autumn 2022 - A1(M) J6-8, M3 J9-14 and M25 J10-16.

The cost of deploying the radar-based system on operational schemes to date has been £150,000 - £200,000 per kilometre; however, the costs and timescales would be different depending on the type of technology used, and on schemes that the system is incorporated into the design and not retrofitted. We are planning to incorporate SVD in all future smart motorway schemes as a standard part of the design.

At the same time, we are exploring how we can provide the same benefits on all existing all lane running sections. This could potentially be done via alternative SVD technologies. These have the potential to be more cost effective, can be implemented more quickly, and could eventually be deployed across the whole strategic road network; as live lane stops are not unique to smart motorways.

5. An explanation of how HE measures compliance with red-x controls and misuse of emergency refuge areas; and what you are doing or plan to do to improve compliance.

We measure compliance with the Red X by monitoring lane use through sensors on smart motorway schemes. This indicates that currently the level of compliance is around 93% of the total traffic flow while Red X signals are set.

We have undertaken a comprehensive programme of activities to raise awareness of Red X signals, improving drivers' understanding of their purpose and the need for compliance. This has included multi-media campaigns focusing on the Red X, supported by public information and social media activities and guidance to customers, for example our How to Drive on a Smart Motorway[7] page on www.gov.uk; and better on-road information on the reasons for signal settings.

95% of our customers surveyed as part of our customer panel (20,000 members) indicate they know that a Red X signal means a lane is closed.

In conjunction with the Police, we have issued over 190,000 advisory letters to the registered keepers of vehicles contravening Red X signals, supported by targeted activities with non-compliant businesses. The Police have also been carrying out enforcement against Red X misuse where they observe it, and drivers have been prosecuted as a result.

We are currently upgrading smart motorway speed enforcement sites to allow automated detection of Red X offences. We are working closely with the relevant Police authorities, with enforcement commencing this Autumn. Drivers who are caught contravening a Red

[7] https://www.gov.uk/guidance/how-to-drive-on-a-smart-motorway

X signal will receive a £100 fine and three points on their licence, or be referred for a driver awareness course. We will continue to take forward activities to raise awareness of Red X signals, in parallel with enforcement by the Police.

We continue to monitor levels of compliance which we expect will improve following the start of automated camera enforcement.

Regarding misuse of emergency areas, we recently carried out CCTV monitoring of 88 emergency areas to assess rates of compliance. On average, one stop was observed per emergency area every four hours, and 71% of stops were not related to an emergency. This compares to the initial figure of 81% which was observed on the first ALR schemes on the M25.

The total occupancy time is more relevant than the number of stops; non-emergency stops lasted for an average of 2 minutes 35 seconds, compared with 14 minutes 10 seconds for genuine stops. Previous research has found that emergency areas are occupied on average for 3% of the time, and the probability of a driver encountering one which is already occupied when they need to stop on ALR is 2.2%. Each emergency area can accommodate several vehicles at once, as demonstrated in our 2017 event at Moreton-in-Marsh referenced earlier.

Unnecessary stops also take place on hard shoulders, where they create additional risk – 8% of fatalities on standard motorways are caused by collisions on the hard shoulder – and this was one of the criteria behind the introduction of emergency areas as a safer location to stop, since they are set back from the live carriageway.

We have anecdotal reports that the visibility improvements which we have recently introduced are helping to reduce emergency area misuse, and we are currently formally assessing their impact. As part of these improvements we have also introduced signs warning drivers that CCTV is recording their presence, to accompany the existing signs advising these facilities are for emergency use only. This acts as an additional deterrent to non-emergency use.

To reduce the misuse of emergency areas, we are developing a customer campaign to be launched in Spring 2020 to raise greater awareness of emergency areas, their locations and purpose.

6. An analysis of the number and duration of faults in the technology deployed on ALR schemes, how long it takes to repair these faults and how this affects the safety of such schemes.

All lane running smart motorways provide enhanced safety features which are not available on traditional motorways, or on sections of A-road with no hard shoulder. They are designed to be dynamic and resilient in responding to the needs of the traffic, and to create a controlled environment using variable mandatory speed limits, lane control and enforcement technology to ensure the safety and reliability of our customers' journeys.

The roadside technology which underpins this, including variable message signs and traffic detection systems, has been tried and tested over many years of use across the strategic road network. We demand high standards of technology performance from our equipment suppliers, and constantly monitor the availability and functionality of every device we use at the roadside.

As with all technology there are faults and failures which can occur, and although these are not common, we have designed all lane running to be as resilient as possible in the event of a fault. Should a catastrophic fault happen such as a power cut to a regional control centre, we have contingencies in place to maintain levels of service across the motorway network.

In the unprecedented event that all the roadside technology fails, all lane running is designed to default to a standard motorway, with emergency areas in place of a hard shoulder. The additional technology on smart motorways is designed to reduce risks to drivers, but does not take away a driver's responsibility to "take the road as they find it" should that technology not be working for a short period of time.

Most technology faults that occur do not affect safety or customer experience on smart motorways, and are resolved without any disruption to traffic. In the rare event that we are unable to display mandatory information to customers, such as speed limits, we have robust procedures in place to address the faults within a defined period of time, as documented in our Technology Management and Maintenance Manual[8].

7. An analysis of vehicle recovery operations on ALR schemes since 2016, including -

- **A breakdown showing how many vehicles were recovered and who was responsible for their recovery**
- **How many and what proportion of recoveries were from -**
  - **i. emergency refuge areas**
  - **ii. the main carriageway; and**
  - **iii. elsewhere on the motorway**
- **How many and what proportion of vehicle recoveries required -**
  - **i. closure of a live lane**
  - **ii. use of a Highways England impact vehicle**
  - **iii. some other defensive measure**
- **The number of times commercial operators have refused to recover a stranded vehicle because of concerns about safety, what specific concerns they cited and how HE resolved the situation**

The table below shows all incidents recorded on Highways England's incident management system involving vehicle recovery on ALR in 2017 and 2018. It also shows whether a lane was closed, although some closures may not have related to the recovery.

[8] http://www.standardsforhighways.co.uk/ha/standards/tmmm/docs/TMMM%20Version%202-1%20Final.pdf

Recovery type	Lane closure	No lane closure	Grand Total	%
Private	12,176	18,017	30,193	76%
Police	322	127	449	1%
NVRM	2,175	525	2,700	7%
Other	2,735	3,544	6,279	16%
Grand Total	**17,408**	**22,194**	**39,621**	**100%**

The location of a recovery, and the number of vehicles recovered each time, were not previously recorded in a way which can be easily extracted. We have recently improved the way breakdown and incident data is collected, and this will allow more detailed analysis in future.

Most recoveries will be in relation to a breakdown, although some will be for other reasons such as a traffic collision, abandoned vehicle or a driver being taken ill at the wheel; for this reason, the figures are not directly comparable with the data provided in the answer to question two.

If a vehicle stops in a live lane, Highways England Traffic Officers will clear it to a place of safety such as an emergency area, from where it can be privately recovered. If the vehicle cannot be moved - for example, because it is too badly damaged - they will call our specialist recovery contractor, known as NVRM (National Vehicle Recovery Management). Vehicle recovery by the Police is less common, and is only done if they have an interest in the vehicle.

All live lane recoveries will involve the closure of that lane, usually via a rolling roadblock carried out by a Traffic Officer vehicle, and supported by deployment of emergency traffic management. A lane closure involves Red X signals, reduced speed limits and warning messages displayed on the overhead electronic signs, along with temporary signs, cones and the presence of a Traffic Officer vehicle in the affected lane.

Recovery type 'other' includes situations where no recovery was needed as the driver was able to resolve the fault, as well as 'unofficial' recovery by family or friends of the driver.

Impact protection vehicles are primarily used at roadworks; some of our larger traffic management vehicles have impact protection which Traffic Officers can call upon, but this rarely happens.

We are not aware of any examples of a commercial operator refusing to recover a stranded vehicle because of concerns about safety on smart motorways.

We have worked with the industry to develop and promote guidance on safe recovery from smart motorways; the key message is that recovery operators are never expected

to work in a live lane. Control measures (including cones, temporary signs, Red X signals, reduced speed limits and Traffic Officer support) need to be in place before operators can attend a broken-down vehicle. They can attend breakdowns in emergency areas, which are safer than a hard shoulder for recovery operations, as they are set back from the carriageway.

This message is reinforced by the professional training course we have just launched, which trains recovery operators to evaluate safe working practices and formulate a recovery plan when attending a breakdown or collision on a smart motorway.