Our network

• The Highways Agency manages the strategic road network in England, which is made up of approximately 1,700 miles of motorways and approximately 2,700 miles of trunk roads.

• The network makes up 2.4% of all roads in England, but carries 33% of all road traffic and 67% of all freight traffic.

• Traffic forecasts suggest that traffic growth is returning to pre-recession levels, latest figures from Department for Transport forecast 44% growth between 2010 and 2035.

• Congestion on the strategic road network is estimated to cost £2 billion per annum, so it is important we tackle the causes of congestion to support the economy and get the country moving.

Managed motorways

• Managed motorways support the economy by providing much needed capacity on the busiest motorways, while maintaining safety for road users and those who work on the roads.

• We are introducing managed motorways where it is the best solution to tackle congestion. We use the most appropriate methods and technology to ensure people can make their journeys reliably and safely.

Managed motorways all lanes running

• Is a refinement of the managed motorways design already in operation in various parts of the country – not a whole new concept. It involves making the hard shoulder available for use as a running lane at all times.

• Managed motorways work. They reduce congestion; they improve journey time reliability by smoothing traffic flow – all achieved through using variable speed limits and giving more capacity to road users by making the hard shoulder available as a traffic lane. We also know that using the hard shoulder can be done without worsening safety.

• On the M42 around Birmingham for example, where a managed motorway has been in operation for a number of years, using the hard shoulder as a running lane has not only reduced congestion and improved journey time reliability, but there is also evidence of improved safety, with frequency of accidents falling by more than half on that stretch.

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Managed motorways

Purpose

Managed motorways improve or maintain the excellent safety record of English motorways

- We are confident that as each all lanes running scheme is developed, it will provide the additional capacity required, without worsening overall safety on our motorways which are among the safest roads in the world.
- The new design will be applied to all managed motorway schemes starting main construction from 2013 onwards.

Managed motorways provide:

- Additional capacity by converting the hard shoulder into an additional running lane.
- Earlier realisation of the benefits than would be achieved through implementing a widening scheme.
- Lower environmental impacts and costs compared to a widening scheme, as managed motorways do not require us to use additional land or to construct an additional lane - by maximising the use of what we already have.
- Increased compliance by controlling and managing the motorway through the use of overhead mandatory speed limits, driver information, CCTV coverage and enforcement.
- The ability to inform drivers of unexpected conditions (such as incidents) through the latest generation of roadside variable message signs.
- Systems to detect the presence of slow moving vehicles and automatically warn approaching drivers of the potential for queues ahead.
- Automatic systems to detect slow-moving vehicles, automatically providing drivers with warnings of queues ahead.
- Providing the operators in the regional control centres with an ability to protect any broken down vehicles by using overhead signs to warn drivers and close lanes before emergency and recovery services arrive. Full CCTV coverage will help quickly verify the locations of incidents.

### Managed motorways

<table>
<thead>
<tr>
<th>MM-Dynamic Hard Shoulder schemes in operation</th>
<th>MM-Dynamic Hard Shoulder schemes under construction</th>
<th>MM-All Lanes Running schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>M42 J3a - 7</td>
<td>M6 J25 - 30</td>
<td>M1 J32 - 35a</td>
</tr>
<tr>
<td>M6 J4 - 5</td>
<td>M6 J5 - 8</td>
<td>M1 J28 - 31</td>
</tr>
<tr>
<td>M6 J8 - 10a</td>
<td>M4 J19 - 20 / M5 J15 - 17</td>
<td>M25 J5/6 - 7</td>
</tr>
<tr>
<td>M1 J10 - 13</td>
<td></td>
<td>M60 J8 – 12</td>
</tr>
</tbody>
</table>

**Dynamic hard shoulder**
- 38 miles in operation
- 50 miles under construction

**All lanes running**
- On over 100 miles of motorway in England - all schemes to start work by spring 2015

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1 Road Transport Forecasts 2011 – Results from the Department for Transport's national Transport Model, Department for Transport, January 2012

Printed on paper from well-managed forests and other controlled sources
Managed motorways

Approach to safety

Taking a risk based approach
In order to understand the likely safety performance of an all lanes running scheme, the Highways Agency used a risk based approach. As there is currently no all lanes running motorway scheme in operation, the Highways Agency cannot rely only on past accident statistics to estimate the expected risk of such a scheme. Instead the Highways Agency need to undertake a risk assessment to determine the expected safety performance. This uses a hazard analysis that takes account of road users and road workers and is a proven technique used in many industries such as nuclear, oil and gas, automotive, railways, aviation and defence.

The Hazard Log
A hazard log is a database that contains a list of operational hazards, the associated risk from each hazard, and mitigations to reduce the risk to an acceptable level. The Highways Agency’s generic hazard log contains 135 hazards that specifically relate to managed motorways. Each hazard is assessed to understand how often it occurs, how likely it will be to lead to an accident, how severe a typical accident is likely to be and how the risk can be managed. A hazard log approach was first used for the M42 pilot scheme that introduced the successful use of the hard shoulder as a running lane in the UK. The hazard log developed for the M42 has been updated to reflect the different operation of an all lanes running scheme. In addition the Highways Agency have been able to examine the safety performance of all-purpose dual carriageways and motorways in order to predict the relative performance of the all lanes running generic design. The diagram below shows the comparative safety performance of different network types.

Our motorways are amongst the safest in the world and the introduction of all lanes running should not compromise this performance

A risk based approach is used to determine the expected safety performance of an all lanes running scheme.

A hazard log is used to assess the risks of an all lanes running scheme and how the risks can be managed.

The hazard log provides a strong prediction of the expected safety performance of an all lanes running scheme.

The hazard log shows that the all lanes running design is likely to provide safety benefits over and above those on a basic three lanes motorway.

Comparison of risk for different carriageway configurations

<table>
<thead>
<tr>
<th>Network Type</th>
<th>Risk Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTR (actual)</td>
<td>100%</td>
</tr>
<tr>
<td>D3M without MIDAS (inferred)</td>
<td>100%</td>
</tr>
<tr>
<td>D3M with MIDAS (predicted)</td>
<td>100%</td>
</tr>
<tr>
<td>D4M no hard shoulder (predicted)</td>
<td>100%</td>
</tr>
<tr>
<td>D4M no hard shoulder with MIDAS (predicted)</td>
<td>100%</td>
</tr>
<tr>
<td>MM-ALR (predicted)</td>
<td>90%</td>
</tr>
<tr>
<td>M42 ATM Pilot (actual)</td>
<td>85%</td>
</tr>
</tbody>
</table>
**Managed motorways**

**Approach to safety**

**Comparing risk assessment results and accident data**

A comparison between the risks predicted in the M42 hazard log and actual accident performance showed that the hazard log provided a good prediction of the safety performance of the scheme. The same can be expected for all lanes running schemes.

**STATS 19 - Personal injury accidents**

**M42 MM Scheme**

**What are the top hazards – how are they affected by MM-ALR?**

The 20 highest scoring hazards account for around 90% of the total risk and include: driver fatigue, driving too fast, rapid change of general vehicle speed, tailgating, vehicle stopping in a running lane, pedestrians in running lanes and vehicle recovered from refuge area. From analysis the top nine scoring hazards were (in descending order of magnitude):

- Driver fatigued – unable to perceive hazards effectively
- Individual vehicle is driven too fast
- Vehicle stops in running lane – Off Peak
- Pedestrian in running lane – live traffic
- Tailgating
- Vehicle stops in running lane – Peak
- Rapid change of general vehicle speed
- Maintenance workers setting up and taking down work site
- Vehicle recovered from emergency refuge area

Some of the hazards can be mitigated, and the design and use of technology to create a controlled environment where drivers comply with signs and speeds, have allowed the Highways Agency to manage these risks to an acceptable level. So for instance, the hazards of a vehicle being driven too fast or the occurrence of tailgating are mitigated through the use of variable mandatory speed limits and enforcement.

**How can we change risk – what can drivers do?**

The design and operation mitigates some of these hazards, through the use of technology and infrastructure including automatic queue protection, automatic setting of mandatory speed limits, depending on traffic flows and the provision of signs and refuge areas.

Drivers also have a major role to play in helping to reduce the risk of incidents on all lanes running schemes by:

- Leaving enough space between vehicles, and complying with all signs, especially speed limits and lane closure signs, e.g. Red X.
- Only stopping in an emergency if absolutely necessary and using motorway service areas, on-slips, off-slips or refuge areas whenever possible.
- Preparing the vehicle and themselves prior to undertaking a journey e.g having enough fuel, regularly serviced vehicle, etc.

Graph1: Source: STATS 19, M42 Active Traffic Management (ATM) Hazard Log; Notes: ATM specific accident categories, e.g. ‘Accident in or around Emergency Refuge Areas’ have been taken out of the ATM Hazard Log analysis to make the analysis more readily comparable to the STATS19 data.
Vehicle breakdowns on the English motorway network:

- The Highways Agency has recorded the following annual rates of causes of breakdowns, some of which could be prevented by drivers being more prepared and properly servicing their vehicles:
  - 11,200 run out of fuel
  - 38,700 tyre failures of which approx. 4,700 require lane closures
  - 1,650 vehicle fires

(Source: Highways Agency command and control incident log April 2010 – Sept 2011)

- Stopping unnecessarily on a hard shoulder is a dangerous activity. On a dual three lanes motorway, hard shoulder accidents account for approximately 8% of fatal accidents. As hard shoulder accidents only account for about 2% of all personal injury accidents, this demonstrates that they have a higher severity than the norm. This is likely to be attributable to the large speed differential between a live lane and the hard shoulder.

Managed motorway all lanes running does not reduce breakdown rates – but it will:

- Minimise illegal ‘comfort’ stops which outnumber legitimate breakdowns by 5 to 10 times
- Provide safe refuge areas at a maximum spacing of 2.5km in which vehicles may stop in the event of a breakdown. It is likely that the majority of all breakdowns will be able to reach these areas of refuge:
  - Estimates from an analysis of RAC breakdown call out information suggests that 71% of vehicles suffered faults that would have allowed them to drive to an area of refuge regardless of the distance between refuges (24 months of data to 30 September 2010). Of the remaining 29% there would be a percentage that were able to reach a refuge or exit the network if it were close enough. The Highways Agency’s analysis assumes that a conservative figure of 50% can reach a refuge.
  - The high proportion of vehicles able to continue to a refuge area is also supported by the presence of significantly reduced breakdown rates observed on motorway sections where the layout discourages unnecessary stops i.e. where there is no hard shoulder.
- Minimise the length of barrier on the verge, used to restrain vehicles, wherever safe and practical, so that in the event of a breakdown motorists can access the verge and move their vehicle off the live lane. For example:
  - M1 J32-35A – 25% of the verge will not be behind barriers
  - M1 J28-31 – 32% of the verge will not be behind barriers

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### Managed motorways – All lanes running (MM-ALR)

#### Live lane breakdowns

<table>
<thead>
<tr>
<th>Total stops in existing situation (dual 3-lane motorway (D3M))</th>
<th>4.68 stops on the hard shoulder and in a live lane</th>
<th>100%</th>
<th>12 breakdowns per million vehicle miles illegal stops at a rate of 5 x the breakdown rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of illegal stops with MM-ALR and removal of hard shoulder: leaves breakdowns</td>
<td>0.78 breakdowns</td>
<td>16.7%</td>
<td></td>
</tr>
<tr>
<td>Removal of breakdowns that can continue to a refuge area under MM-ALR (50% reduction)</td>
<td>0.39 breakdowns not reaching refuge</td>
<td>8.3%</td>
<td>Breakdowns retaining motive power (supported by RAC figures)</td>
</tr>
<tr>
<td>Removal of breakdowns that can pull into the verge (10% reduction)</td>
<td>0.35 breakdowns in a live lane</td>
<td>7.5%</td>
<td>Generic hazard log assumes 10% of vehicles that cannot reach refuge area pull into the verge: takes account of safety barrier in the verge</td>
</tr>
</tbody>
</table>

*Based on an average daily single direction flow of 65,000 vehicles

#### What to do if you breakdown:

**Managed motorway all lanes running**

- **If you cannot leave the motorway, you should try to get to an emergency refuge area.**
  - From here, contact our staff via emergency roadside telephone for help and information.

- **If you cannot leave the motorway or reach an emergency refuge area, if possible, try to get your vehicle off the carriageway or onto the verge if it is safe to do so.**

- **If you have no other choice, but to stop in a live lane, if possible try to steer to the central barrier or the grass verge.**
  - Put on your hazard warning lights to help other drivers and our staff to see you. If you are in the left hand lane, exit the vehicle via the left-hand door if it is safe to do so (and wait behind the barrier if possible).
  - If for any reason you cannot, or believe that it would be unsafe to, exit the vehicle, or there is no other place of relative safety to wait, you should remain in the vehicle with your seat belt on.

- **If you stop in an emergency refuge area, you need to contact our control room to alert them to your broken down vehicle.**
  - If you stop in a live lane, as traffic builds we’ll be made aware of a problem and be able to verify your location via CCTV cameras.
  - We will use the signs and signals to close lanes in order to protect your stranded vehicle until help arrives. We may also close lanes to allow access for emergency vehicles.

**What to do if you breakdown:**

- Leave the motorway if possible;
- If you cannot leave the motorway, try to get to an emergency refuge area;
- If you cannot get to an emergency refuge area, try to get your vehicle off the carriageway or onto the verge if it is safe to do so;
- If you have no other choice but to stop in a live lane, if possible try to steer into the grass verge, failing that the central barrier.

**If an emergency forces you to stop:**

- Leave your sidelights on and turn on the hazard warning lights;
- Get out of the vehicle by the left-hand door and make sure that all your passengers do the same;
- Leave animals in the vehicle or, in an emergency, keep them under proper control on the verge;
- If you have reflective jackets in the vehicle wear them. Do not use a warning triangle on the hard shoulder;
- Make sure that passengers keep away from the carriageway and hard shoulder, and that children are kept under control. It is best to retreat up the bank, or behind a barrier if this is possible.

**Don’t attempt even simple repairs.**
Instructions and information for drivers will be shown on overhead signs.

As part of the all lanes running design, we will be using signs known as MS4s in a new way to display information more flexibly than the Highways Agency have done before. The signs will show combinations of speed limits, lane availability patterns, pictograms and text as shown below. Driver information will be provided at intervals no greater than 1500m.

This combination enables the Highways Agency control room operators to use signs to:

- Manage incidents
- Reduce congestion
- Provide timely information to motorists
- Improve the performance of the network and
- Support the safety of road users, road workers and emergency responders.

When in operation, variable mandatory speed limits will be clearly displayed on overhead signs. The variable speed limits will also be displayed on signs mounted on posts on entry slip roads.

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Managed motorways

The Controlled Environment

Driver information will be provided at intervals not exceeding 1500m

On all lanes running, driver information will be provided on overhead variable message signs

Enforcement cameras will be utilised to ensure compliance

Managed motorways will see improved speed compliance compared to a section of dual three lanes motorway

Speed compliance contributes to reducing risk on all lanes running schemes

The ability to dynamically set lower speed limits provides greater protection for road workers, our Traffic Officers and the emergency services.
Variable mandatory speed limits
When a variable mandatory speed limit is displayed, it applies across all lanes of the motorway from that point on, until a de-restriction (national speed limit, or amended speed) is displayed.

When no speed limit is displayed, the national speed limit will apply.

Enforcement of speed compliance
Through the use of fixed message signs, drivers will be advised when they are entering a speed enforcement area. Mandatory speeds displayed on sections of managed motorway all lanes running will be enforced using digital enforcement cameras, enabling the detection and collection of evidence in relation to speeding offences, and supporting the prosecution process.

Expected benefits/ Impact on driver behaviour
- Existing managed motorway schemes have shown very good speed compliance at 50, 60 and 70mph [1], but lower compliance with 40mph speeds.
- Based on this and other motorway environments, such as controlled motorways and existing managed motorway schemes, the Highways Agency expect to see an improvement in speed compliance compared to a dual three lanes motorway.
- Speed compliance contributes to reducing risk on managed motorway all lanes running schemes.
- This is accounted for in the all lanes running hazard assessment.
- The aim is for drivers to comply with the signs and speed limits. Enforcement is one element to achieving this, along with educating, providing information so that drivers understand what is required of them and why.
- There will be speed enforcement signs as part of this.

Ongoing review of usage of reduced speed limits
With lower compliance at 40mph on other managed motorway schemes, we have reviewed how they are used. As a result the 40mph limit will not be used so far in advance of a lane closure. The first signal that the driver will see will typically be for 60mph, the next signal(s) with divert arrows will have 50mph, with 40mph only used at the lane closure itself.

In order to provide us with increased assurance of the managed motorways all lanes running design concept and to test optimum design configurations, a series of simulator and computer based assessments were carried out at the Transport Research Laboratory (TRL). The trials, involving selected members of the public, tested driver behaviour and understanding of the new concept. Participants were representative of the UK driving population, and had no previous experience of driving on managed motorways.

**A speed limit spacing simulator study**

A driving simulator trial was undertaken to investigate the effects on driver behaviour of information signs provided at varying intervals of between 500m and 3,000m. A combination of the simulator and questionnaires were used with 96 members of the public to assess their compliance with speed limits and the effect that the mandatory nature of speed limits had on their behaviour.

This trial demonstrated that drivers time spent above the speed limit, plus 10%, was only significant for the longest spacing between information points of greater than 2000m. Based on these findings an optimum spacing of up to 1500m was deemed appropriate.

**Understand the signs**

A computer-based trial was undertaken to investigate the speed and accuracy of drivers’ understanding of information presented on different technology. This study found that:

- The comprehension of information presented on the verge mounted variable message sign (known as MS4s) was found to be greater than or equal to the same information displayed on a gantry;
- For both options (MS4 & gantry), the accuracy levels of the participants’ responses to speed limit and lane closure information was very high (more than 95%);
- Response times to speed limit and lane closure information communicated via either MS4 or gantries did not differ considerably;
- The differences in response times for varying designs of lane closure depicted on a MS4 sign were negligible.
- The results of this study support the use of MS4 signs to provide driver information.

**Design comparison simulator study**

We used a driver simulation to examine driver behaviour in three scenarios (MS4 only, portal gantry only, and a mix of both). This study showed that across the three different designs:-

- Only a very small difference in mean speeds (1mph);
- No statistically significant difference in “surfing” behaviour;
- No statistically significant difference in the percentage of time spent more than 10% above speed limit;
- Participants reported a high degree of certainty of speed limit across all three scenarios.

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TRL Driving Simulator

Understanding guidance in a managed motorway all lanes running environment

Participants were asked approximately 300m after passing an MS4 sign:
“\textit{What is the speed limit?}”
Then
“\textit{How confident are you that your answer is correct?}”

- After seeing a 60mph on a gantry then an MS4 sign: 91% of participants correctly identified the speed limit
- After seeing a 40mph for the first time on an MS4 sign: 75% of participants correctly identified the speed limit

Participants were asked either at the beginning of the all lanes running section or shortly before the diverge at the end of the section:
“\textit{In an emergency, if you needed to stop your vehicle, where would be a safe place to do so?}”

Having just passed the “\textit{Refuge areas for emergency use only}” sign:
Majority (50%) said emergency refuge area, with 15% saying the verge. Some also said Lane 1 (19%) or hard shoulder (15%).

Summary of results

Simulator trials showed that a managed motorway all lanes running layout could maintain the controlled environment demonstrated by existing dynamic hard shoulder managed motorway schemes.

Visibility trials showed that an MS4 sign provides all the necessary optical performance for providing driver information in a managed motorways environment.

There is no compelling evidence from observed driver behaviour on existing schemes to suggest that managed motorways all lanes running will operate in a significantly different way to other managed motorways.

The Highways Agency has commissioned studies that have demonstrated, to a high level of confidence, that the managed motorways all lanes running design will provide road users with “\textit{adequate guidance}”.

First Study - MM2 Concept Development Simulation Studies

Second Study - Future Managed Motorways Concept Development Simulation Studies

Footnote 1 [Section 85 (1) of the Road Traffic Regulation Act 1984 (RTRA) states that:
“For the purpose of securing that adequate guidance is given to drivers of motor vehicles as to whether any, and if so what, limit of speed is to be observed on any road, it shall be the duty of the Secretary of State, in the case of a road for which he is the traffic authority to erect and maintain traffic signs in such positions as may be requisite for that purpose.”]
Managed motorways all lanes running

The design of managed motorways all lanes running is fundamentally different to those sections of the existing motorway network that do not have a hard shoulder. However, it has the added advantage of providing technology to detect and monitor incidents that are happening on the network, coupled with dedicated systems able to communicate appropriate advice or instructions to drivers, such as lane availability or mandatory speed limits. When these are used together, they help to create a controlled environment that leads to safer and more reliable journeys with smoother traffic flows.

The design features of a managed motorway all lanes running scheme include:

- Permanently removing the hard shoulder, to eliminate the complex operational processes required on existing dynamic managed motorways that inform drivers when the hard shoulder is available for use;
- A queue protection system to continuously monitor the flow of vehicles and alert drivers to slow moving or stationary vehicles ahead;
- A congestion management system to determine the speed limit(s) necessary to keep traffic flowing smoothly;
- Signs to display mandatory speed limits as appropriate when a speed restriction is generated, as well as lane closure details and other instructions and information.
- Signs to display messages about accidents and congestion that may have occurred several junctions ahead to allow drivers to slow down or to take an alternative route;
- Emergency refuge areas at a maximum of 2,500m. These can include purpose built refuge areas as well as hard shoulders on slip roads, motorway service areas, and exiting the network completely.

On an all lanes running section of motorway, drivers do not have to question whether the hard shoulder is open or not.

http://www.highways.gov.uk/managedmotorways

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For more details see: Interim Advice Note 161 Managed Motorways – All lanes running http://www.dft.gov.uk/ha/standards/ians/
Instruction and information for drivers will be shown on overhead message signs (MS4). Managed motorways all lanes running utilises over head signs in a new way to display information more flexibly than has been done before, showing combinations of speed limits, lane closure patterns, pictograms and text.

Traffic Officer patrols are likely to be able to clear the majority of vehicles that break down in live lanes to an emergency refuge area, which are provided at regular intervals.

With the removal of the hard shoulder, the number of live lane obstructions is expected to increase. Since a proportion of the vehicles that would previously have stopped on the hard shoulder will now be unable to reach the next refuge area, exit slip or get onto the verge, they will therefore have no option but to stop in one of the live lanes. The Highways Agency has tried and tested procedures to deal with vehicles broken down in live lanes, and is able to move most vehicles to a refuge area.

Comprehensive CCTV coverage means that incident details can be verified quickly.

All sections of managed motorway all lanes running will have full CCTV coverage, allowing regional control room operators to confirm incidents quickly, set the most appropriate signs for that incident and allow them to set the most appropriate lane closures for emergency responders access if required.

The managed motorway all lanes running design provides a controlled environment.

The use of reduced speed limits in congested conditions will tend to reduce the number and severity of accidents, and will protect the back of a queue from the risk of secondary incidents.
### Procedures for managed motorways dynamic hard shoulder

| Incidents can be detected by equipment such as loops in the road, CCTV, or calls from the public via emergency roadside telephones and mobile phones. When aware of an incident, the Highways Agency Regional Control Centre (RCC) operator will look to confirm its location, number of lanes blocked and any other characteristics via CCTV. If an emergency responder discovers an incident, they should confirm it to the regional control centre as soon as possible, by providing the relevant details and preferably using the recognised communications channels. | The RCC will make a decision on the most appropriate access route for emergency responders and advise them accordingly. This may need to change during the course of the incident. Where appropriate, signs and signals will be set to clear and protect this route. Typically a red X sign will be set above the selected access route to close the lane(s) to traffic. Supporting variable message signs will be set to reinforce the closure instruction and warn approaching motorists. If the hard shoulder is not open it will generally provide the most effective route for emergency responders to access the incident. | Once at an incident scene the lead responder should instruct the setting of signs and signals in the vicinity of the scene. Wider area signalling is the responsibility of the RCC. Temporary physical closures will be implemented by attending traffic officers. The RCC will not vary any of the signs and signals in the vicinity of the incident without first informing the lead responder, unless an immediate safety need becomes evident through CCTV. Signs and signals will be set to protect the incident and the back of the queue. The RCC will continue to monitor traffic conditions throughout the duration of each incident to ensure that the signs and signals set remain appropriate to the conditions. | The RCC is responsible for setting signs and signals to facilitate the re-opening of the carriageway and the safe dispersal of trapped or congested traffic. The RCC will set signs and signals to manage the traffic in the vicinity of the incident and upstream of the incident to assist in the return to normal operations. If the hard shoulder is to be opened to traffic after the incident has been cleared, the RCC will follow the normal hard shoulder operating procedure. The RCC will ensure that all signs and signals relating to the incident and associated traffic management measures have been cleared at the appropriate time in accordance with existing procedures. |

### Procedures for managed motorways all lanes running

| Incidents will be detected in exactly the same way as current managed motorway schemes. Access to the scene will be facilitated in the same way as on current managed motorway schemes. Appropriate signs and signals will be set on MS4s rather than overhead gantries and the preferred access route will be considered. | The scene will be managed in the same way as current managed motorway sections. | The scene will be managed in the same way as current managed motorway sections. | The return of the network to normal operating conditions will be carried out in the same way as on current managed motorway sections. |
Road workers do a vital job, but theirs is one of the highest risk occupations in the UK. The Highways Agency places road worker safety as a priority and has worked alongside the industry to apply ‘design for maintenance’ principles to the development of all lanes running schemes.

Reduced maintenance requirements compared to existing managed motorways
• The design specification for all lanes running reduces the overall amount of roadside infrastructure requiring maintenance, for example:
  o One verge-side variable message sign, known as an MS4, can do the job of a gantry that would have five separate matrix units;
  o Requirements for CCTV coverage have been amended so that the overall number of units can be rationalised (while ensuring that coverage still gives a safely operable scheme).
• Most of the technology on all lanes running schemes will be able to be accessed remotely. This means that investigations of any faults and re-boots can be carried out from a control centre, reducing the need for engineers to work on the motorway network.

Reducing risk to maintenance providers
• The Agency has developed an approach to setting out roadworks on sections of all lanes running, which will facilitate safe working:
  o Safe locations to start cone tapers are identified in advance. This will allow all lanes running sections to be broken into fixed lengths, so that maintenance lane closures will always start from a fixed point;
  o Permanently placed variable message signs will provide road users with information as they approach the closure and eliminate the highest risk activity for road workers – that of placing out the advance information signs;
  o Once advance signs are remotely activated, coning out of a works area can continue as on any other motorway from the nearside or the offside. Carriageway crossings are not required;
  o The Agency is trialling solutions to allow the all lanes running technology such as MS4s to help inform the travelling public at road works.
• The Agency has worked closely with maintainers, designers and experts to develop new solutions; for example a well received industry day was hosted in March 2013 to share progress and ideas.

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Traffic Management
Strategy

The removal of the hard shoulder means that conventional methods of installing temporary traffic management can not be retained. A strategy for the placing, maintaining and removal of temporary traffic management incorporates the use of permanently located remote controlled advance warning signs in the verge and central reserve, operated by the maintenance service provider and in conjunction with fixed taper locations.

This will provide advance temporary traffic management signing coverage for all lane closures.

To further support these signs, relevant lane closure information will be shown by the overhead signs for the placing, maintaining and removal of temporary traffic management through a request to the local Highways Agency Regional Control Centre.

Job brief
- The Supervisor, or other competent person should ensure that a pre-works briefing is undertaken for all of the traffic management operatives prior to the commencement of works, this includes location of closure (fixed taper point ID) type and length of closure
- Prior to leaving the depot, the traffic management vehicle will be checked by the TM operatives to ensure all beacons, directional arrow and warning lights are in good working order and that only equipment in an acceptable condition is deployed.

Advance Signing
- Prior to placing the advanced signing, traffic counts should be taken from a place of safety (this could be an upstream junction, motorway service area, on-slip)
- At the same safe location, the Regional Control Centre should be contacted to provide details of the closure and request that the variable signs and signals are set to support the placement of the closure
- The supervisor will activate the remote controlled ground level signs associated to the fixed taper point to display the lane closure configuration
- The TM crew will drive towards the location of the fixed taper point, viewing the advance signs so to ensure they are accurately set.

Installation of the closure
- Following installation of the taper and works access, the on foot operator will position themselves in the footwell of the TM vehicle
- The traffic management vehicle will progress forward with the TM operative placing cones and lamps out at specified spacings from the live traffic side of the vehicle working from the footwell or working platform. This operation continues to the designated end of the closure
- Once the closure has been fully installed, the RCC should be contacted to switch off the variable signs and signals that were set to support the placement of the closure
- The Supervisor will contact the relevant maintenance contractor to advise them that the closure has been established.

Removal of the taper
- 800 yards yards to the closure the traffic management vehicle is to take up a position relevant to the lane closure, switch on vehicle warning beacons/bar lights before starting to slow down. The vehicle's cushion will be lowered and light arrow switched on so that it is directing the flow of traffic away from the closed lane
- Upon arrival at the fixed taper point, the vehicle will be brought to a halt and two TM operatives will exit the vehicle from the non-trafficked side one positioning themselves on the back of the vehicle to drop off the cones and the other on the non-trafficked side of the carriageway
- With the TM vehicle now in position at the start of the taper, the first cones will be dropped off the TM vehicle and positioned to create the taper, then by placing the sequential lamps
- A works access sign will be installed at the end of the taper showing access into the closure.

Establishing the taper
- 800 yards yards to the closure the traffic management vehicle is to take up a position relevant to the lane closure, switch on vehicle warning beacons/bar lights before starting to slow down. The vehicle's cushion will be lowered and light arrow switched on so that it is directing the flow of traffic away from the closed lane
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- With the TM vehicle now in position at the start of the taper, the first cones will be dropped off the TM vehicle and positioned to create the taper, then by placing the sequential lamps
- A works access sign will be installed at the end of the taper showing access into the closure.

Removal of the closure
- Upon receiving notification from the maintenance contractor that all works are complete the TM crew proceed to a place of safety and observe traffic flows so to ensure they are sufficiently low enough
- At the same safe location, the Regional Control Centre should be contacted to request that the variable signs and signals are set to support the removal of the closure
- The TM crew will drive towards the location of the closure, viewing the advance signs so to ensure they are accurately set.
- The traffic management vehicle will enter the closure via the works access, switch on the vehicles warning beacons/bar lights and lowering the vehicles cushion before switching on the light arrow so that it is directing the flow of traffic away from the closed lane and travel forward within the closure to the last cone
- Starting at the last cone the traffic management vehicle will reverse back through the closure, while the TM operative working from the footwell will remove the cones off the carriageway and onto the traffic management vehicle back to the taper.
- Following by contacting the RCC and requesting that the supporting variable signs and signals are also switched off.
**The need for driver information**

There are various safety risks on the motorway. For all lanes running, we have tackled some of these through design, and others can be reduced through driver behaviour. In fact, some of the top hazards the Highways Agency have identified on sections of all lanes running are the same as those on other sections of motorway – those stemming from driver behaviour such as fatigue, speeding, tailgating, etc.

For example, over 11,200 people broke down on the motorway in 2012 because they ran out of fuel; 38,700 people broke down because their tyres failed. If these breakdowns were eliminated through good preparation and maintenance, it could make all roads – not just all lanes running schemes – safer.

**The messages we need to get across**

A new driver awareness campaign has been developed for all lanes running, building on the concepts of the ‘make time for winter’ campaign. The campaign’s aim is to help drivers understand how to drive on different types of managed motorways, understand the environment and know what to do if they break down. Key areas of the campaign are:

<table>
<thead>
<tr>
<th>Red X</th>
<th>Understanding and complying with signs such as Red X</th>
</tr>
</thead>
<tbody>
<tr>
<td>What You’ll See</td>
<td>Features of managed motorways, with links to individual scheme pages</td>
</tr>
<tr>
<td>Incidents</td>
<td>Management, traffic officers, emergency services, setting signs</td>
</tr>
<tr>
<td>Facts</td>
<td>Facts regarding safety, congestion</td>
</tr>
<tr>
<td>Hard Shoulder</td>
<td>Messages about hard shoulder abuse and safety</td>
</tr>
<tr>
<td>If you breakdown</td>
<td>Advice for drivers in the event of a breakdown . . . what do I do?</td>
</tr>
<tr>
<td>Your vehicle</td>
<td>Advice, how to avoid breakdowns, planning journeys</td>
</tr>
</tbody>
</table>

This last element is about drivers being prepared for their journey and ensuring that their vehicle is regularly serviced so that they are less likely to break down.

The Highways Agency is working closely with their partners to ensure consistency and make the most of opportunities to join-up activity. The Highways Agency will be making a toolkit of information and materials available to partners to use when talking about managed motorways to audiences throughout 2013-14, and onwards.

http://www.highways.gov.uk/managedmotorways

An executive agency of the Department for Transport
The messages we need to get across

The following diagram shows how the top hazards for our motorways build up the risk profile for the baseline of a dual three lanes motorway (D3M) and for managed motorways all lanes running (MM-ALR). The size of each hazard represents the size of the risk.

The hazards above could be influenced by a driver information campaign, for example through:

- Advising drivers to take regular breaks on a long journey to prevent fatigue;
- Reducing speed related risk by reminding drivers about compliance with mandatory speed limits;
- Reminding drivers to avoid stopping their vehicle in live lanes and to use the emergency refuge areas;
- Reminding drivers only to use a refuge area for emergency stops;
- Explaining to drivers the risks faced by our maintenance workers and asking them to take care when workers are setting up and taking down works sites.

Through the information campaign, the Highways Agency aim is that drivers will understand and appreciate the safety benefits of the controlled environment. Correctly interpreting the information provided through a combination of regularly spaced mandatory speed signals, speed enforcement, and comprehensive CCTV coverage will reduce these risks significantly.