

Managed Motorways
All lane running
Concept of Operations v2.0
(to accompany IAN 161/13)



Version Control

Version	Status	Date
0.1	Draft for HA review (Subject Matter Experts and Programme Board)	31 Jan 2012
0.2	Draft for Steering Group Review	5 March 2012
0.3	Draft for final comment by SRO	21 March 2012
1.0	Circulated version (v1.0)	23 March 2012
1.1	Draft at 2012/13 MROD contract end, highlighting areas which will need to be updated in support of IAN 161/13	25 March 2013
1.2	Version to support TPB review of draft IAN 161/13	12 July 2013
2.0	Issued version (v2.0)	16 August 2013

Approvals

Version	Approved by	Date
1.0	Mike Wilson	23 March 2012
2.0	Mike Wilson	16 August 2013

For more information, please contact:

MMOperations@highways.gsi.gov.uk

Table of Contents

1. Introduction	4
1.1 Purpose of Document.....	4
1.2 Relationship to MM ALR Implementation Guidance and other Documents	5
1.3 Further Information or Clarifications.....	5
2. The Managed Motorways Design	6
2.1 The Case for Evolving the Managed Motorways Design.....	6
2.2 Physical Design Elements	6
2.3 Key Features of the MM ALR Design.....	7
2.4 Operational Implications of the MM ALR Design.....	9
3. Operating Regimes	11
3.1 Off-Peak Operation.....	11
3.2 Operation During Peak Times.....	12
3.3 Provision of Driver Information.....	12
4. Compliance and Enforcement	15
4.1 Compliance Issues Specific to MM ALR	15
4.2 Achieving Compliance on Individual Schemes.....	15
4.3 Agreements with Enforcing Bodies	16
4.4 Achieving Compliance with Specific MM ALR Features	17
5. Management of Incidents and other Heightened Situations	19
5.1 Dealing with Incidents - Key Differences on an MM ALR Scheme	19
5.2 General Approach to Managing Incidents	21
5.3 Operational Challenges posed by MM ALR	21
5.4 Emergency Responder National Agreements and Guidance	25
6. Meeting the Road Worker Safety Objective	26
6.1 Designing for Maintenance	26
6.2 The 'ERIC' approach to reducing risk	27
7. Determining the Approach to Maintenance	30
7.1 Contractual Requirements	30
7.2 Delivering Efficiencies	30
8. Impact of MM ALR on Maintenance	32
8.1 Planning Maintenance Activities	32
8.2 Scheduling Maintenance	33
8.3 Conducting Maintenance	34
9. RCCs and the Traffic Officer Service	37
9.1 Staffing Levels.....	37
9.2 RCC Space Requirements	37
9.3 Traffic Officer Procedures for Managed Motorways	37
9.4 Learning Requirements	38
10. Glossary.....	39

1. Introduction

1.1 Purpose of Document

- 1 This Concept of Operations document sets out, at a high level, guidance around the operational elements of managed motorway schemes designed to IAN 161/13. For convenience, this design will be known throughout the rest of this document as MM ALR (Managed Motorways – All Lane Running). The intended audience for this Concept of Operations is all those who will be responsible for either the design or operation of MM ALR schemes; including those involved in incident management or maintenance activities, as well as those involved with communicating the details of MM ALR to customers and stakeholders.
- 2 The material contained within this Concept of Operations is based both on the experience gained by the Highways Agency and its stakeholders in operating those parts of the network with features similar to those proposed by the MM ALR design; from consultation with subject matter experts from within the Highways Agency and its supply chain; through scheme designers sharing ideas and identifying best practice; and from the feedback gained during simulation exercises, surveys, and trials.
- 3 This high level document has purposefully been written to accompany the physical design guidance, and is intended to demonstrate that an MM ALR scheme designed to IAN 161/13 can be safely operated and maintained. Detailed operational procedures and processes have been prepared, and training will be given on their use in advance of the first MM ALR scheme becoming operational, and so they are not described in depth within this document.
- 4 Reasons why the operation of a particular scheme might vary from this guidance should be discussed with, and approved by, the scheme's Senior User (normally the Network Delivery and Development Directorate Regional Divisional Director); and recorded in the appropriate Project Control Framework ("PCF") products.
- 5 The specific PCF products that will be informed by material within this Concept of Operations are:

PCF Product	Relevant Chapters
Operating Regime: Combined Product <ul style="list-style-type: none">• Operating Regime• Compliance Strategy• Core Responders	Chapter 3 Chapter 4 Chapter 5 & 9
Maintenance and Repair Strategy Statement	Chapters 6-8
Civils Maintenance Handover Documentation & Certificate	Chapters 6-8
Technology Maintenance Handover Documentation & Certificate	Chapters 6-8
RCC Technology and Capacity Implications Report	Chapter 9
TOS Training Requirements	Chapter 9
Operational (RCC) Handover Documentation & Certificate	Chapter 9

1.2 Relationship to MM ALR Implementation Guidance and other Documents

- 6 This MM ALR Concept of Operations supports the Interim Advice Note IAN 161/13 that provides guidance on the design, construction, and implementation of MM ALR¹.
- 7 The material contained within this document should be considered alongside existing standards, guidance and procedures governing how the strategic road network (SRN) is operated and maintained; the vast majority of which will continue to apply to an MM ALR scheme.
- 8 Highways Agency documents of particular importance in this regard are:
- the “*Traffic Officer Manual*”;
 - the HA/ACPO “*Network Operations National Guidance Framework*”;
 - the “*Network Management Manual*” (NMM);
 - the “*Routine and Winter Service Code*” (RWSC);
 - the “*Asset Maintenance and Operational Requirements*”(AMOR)²;
 - the “*Technology Management & Maintenance Manual*” (TMMM);
 - the HA/ACPO “*Traffic Incident Management Guidance Framework*” (TIM GF);
 - the “*HADECS3 Implementation Guidance*”;
 - the “*Highways Agency policy for the use of Variable Signs and Signals*”, [IAN 162];
 - the “*Managed Motorways Commissioning and Handover Guidance*”, [IAN 165]; and
 - “*Designing for Maintenance*”, [IAN 69].
- 9 A bibliography giving details of the latest version of all of the documents referenced within this Concept of Operations is available from the email address below.

1.3 Further Information or Clarifications

- 10 Any requests for further information, and any comments or suggestions for changes to this guidance, should be sent to the following address:

MMOperations@highways.gsi.gov.uk

¹ Controlled All Lane Running (CALR) links within an MM HSR scheme are covered by the relevant documentation for those schemes (IAN 111/09 and IAN 112/09) even though those links do not themselves have a dynamic hard shoulder, as in all other respects they can be considered as MM HSR where the hard shoulder is always open.

² AMOR is the replacement for the Highways Agency's current Routine and Winter Service Code and Network Management Manual (RWSC & NMM) in use by incumbent Providers. The AMOR represents a shift to a more outcome based approach, to encourage efficiency savings for the Highways Agency and innovation by the Provider, with no compromise to safety.

2. The Managed Motorways Design

2.1 The Case for Evolving the Managed Motorways Design

¹¹ Evaluation of the M42 Active Traffic Management (ATM) pilot^{3,4} demonstrated that managed motorways are able to deliver clear benefits in terms of: improved journey time reliability through reduced congestion; at lower cost and with less environmental impact than conventional widening programmes; and without negatively impacting the safety performance. The subsequent programme to roll-out managed motorways with dynamic hard shoulder running designed to IAN 111 (referred to as MM HSR) has delivered comparable benefits to conventional road widening programmes, but at significantly lower cost. Experience from these schemes suggested that there was scope to further reduce both the capital and operating costs, whilst continuing to meet the congestion and safety objectives. This led to the introduction of the MM ALR design, described in IAN 161.

2.2 Physical Design Elements

¹² The physical design elements of an MM ALR scheme include:

- Conversion of the hard shoulder to a permanent traffic lane;
- Variable mandatory speed limits (VMSL) with an associated automated enforcement/compliance system;
- Driver information, including lane availability, provided at intervals not exceeding 1500m. Information will be provided through a mixture of signs and signals capable of displaying appropriate combinations of: mandatory speed limits; lane closure information; pictograms; and text legends, and will also include entry slip signals;
- A queue protection system and congestion management system;
- Pan-Tilt-Zoom (PTZ) CCTV coverage⁵;
- Refuge areas provided at maximum intervals of 2500m. Refuge areas may either be bespoke facilities such as an emergency refuge area (ERA); or alternatively may be converted from an existing facility, for example a wide load bay. A Motorway Service Area (MSA), the hard shoulder on an exit slip/link road, or the hard shoulder of an intra-junction link may also be considered to provide a suitable refuge;
- Central reserve rigid concrete barrier (in accordance with TD 19)⁶;
- Emergency Roadside Telephones (ERT) provided in all dedicated refuge areas. Existing ERT elsewhere will be removed, apart from those within a junction where the existing hard shoulder is retained.
- Permanent through junction running as the default position at all junctions⁷.

³ "M42 ATM Monitoring and Evaluation: Project Summary Report" – Issued November 2009.

⁴ "M42 MM Monitoring and Evaluation: Three Year Safety Review" – Issued January 2011.

⁵ CCTV coverage is provided to support event management, in line with TD17/85 and MCH 2530.

⁶ Required unless it can be demonstrated that the road worker safety objective can be met through alternative mitigation.

⁷ With the exception of motorway to motorway interchanges with free flowing link roads; and terminal junctions at scheme boundaries.

2.3 Key Features of the MM ALR Design

- 13 The key feature of the MM ALR design is the replacement of the hard shoulder with a controlled running lane. When compared to the MM HSR design, permanently removing the hard shoulder eliminates the complex operational processes associated with dynamically opening and closing it. By extension, the hard shoulder monitoring cameras and the associated technology and systems used on MM HSR schemes to confirm that the hard shoulder can be opened safely will not be required on MM ALR schemes, and do not form part of the physical design.
- 14 The permanent removal of the hard shoulder is expected to impact the management of incidents to some degree, as it will affect the ability to move broken down or damaged vehicles from the live traffic lane into a dedicated hard shoulder, or to use the hard shoulder as an emergency access route as is currently the case on the majority of the motorway network. Maintenance access will now involve stopping in live traffic lanes, and as such will require an appropriate mechanism to ensure the risks to roadworkers are mitigated So Far As Is Reasonably Practicable (SFAIRP).
- 15 Eliminating the dynamic hard shoulder element will serve to reduce any potential confusion over whether or not it is available as a running lane at a particular time, and will therefore eradicate hard shoulder abuse/misuse within the scheme (since there will no longer be a hard shoulder).
- 16 Refuge areas are included in the design requirements at up to 2.5km intervals, providing a place for vehicles to stop in emergency or breakdown. The 2.5km spacing is consistent with the frequency with which lay-bys are provided on the all purpose trunk road network, as set out in TD 69/07⁸. Refuge areas may also be used to provide maintenance access, or to assist with the recovery of vehicles or removal of debris during incident management. Bespoke emergency refuge areas (ERA) are provided with a dedicated Emergency Roadside Telephone (ERT), as are any retained sections of intra-junction hard shoulder.
- 17 Provision of sufficient variable signing and signalling infrastructure is necessary to ensure that drivers receive adequate guidance of the mandatory speed limits and lane availability. Increasing the permitted distance between consecutive information points, while migrating the majority of signalling information to verge mounted variable message signs (rather than utilising lane specific signals on every gantry) is expected to make a significant contribution to both capital and operational cost savings⁹.
- 18 Figure 1 (overleaf) provides a “driver’s eye” perspective of a typical MM ALR scheme. The various operational regimes and associated methods of driver information provision are discussed in more detail in Chapter 3.

⁸ TD 69/07: “The location and layout of lay-bys and rest areas”
<http://www.dft.gov.uk/ha/standards/dmrb/vol6/section3/td6907.pdf>

⁹ In comparison with the construction, operation, maintenance and renewal costs of an MM HSR scheme designed to IAN 111/09



Figure 1 – a “driver’s eye” view of the MM ALR environment

- 19 Where strategic signing capability currently exists (including where driver information is provided through shared access to signs nominally provided for tactical use), that capability is to be retained. Additionally, the first MS4s installed on each link will be configured so as to be capable of displaying strategic messages (see Section 3.3.2 for further details). The exact strategic signing capability that will be included will be agreed for each scheme in discussions between TMD and the scheme’s Senior User.
- 20 Creating and preserving the controlled environment on MM ALR schemes will largely depend on the ability to achieve compliance with the posted speed restrictions and lane closures. The compliance and enforcement strategy is covered in more detail in Chapter 4. The setting of signs and signals forms part of the safe system of work by providing notification of lane closures, and will deliver some protection to roadworkers, contributing to the achievement of the safety objective.
- 21 Control room operators will have access to images from PTZ CCTV cameras, positioned to provide full coverage of the managed motorway sections of the network. Operators will be able to use the CCTV images to remotely confirm incidents¹⁰, as well as conduct general observation of conditions on the network. The management of incidents and other heightened situations is described in Chapter 5.

¹⁰ The MM ALR design does not require RCC resource to conduct close monitoring of CCTV images solely for the purposes of incident detection.

2.4 Operational Implications of the MM ALR Design

- 22 The MM HSR schemes currently in operation have successfully demonstrated how the provision of additional capacity on busy parts of the network can have a positive impact on performance metrics such as journey time variability and safety.
- 23 Delivering a controlled environment encourages compliant driver behaviour, which is a key element in ensuring that managed motorway schemes can be safely operated. The design features outlined in Section 2.2 are intended to ensure clear, appropriate and unambiguous information is provided to drivers, for example regarding speed limits or lane availability. Information should be delivered to the driver in such a way that it does not cause overload or leave the driver in doubt as to what compliant behaviour is required of them.
- 24 Simulator work^{11,12} has been used to provide assurance that the design will perform as expected, prior to actual on-road implementation. A range of different trials were designed: to measure the effect of varying the distance between successive gantries; compare driver responses to overhead and verge mounted information; test comprehension of different sign configurations; and evaluate sign obscuration on driver behaviour.
- 25 The “*Demonstration of Meeting Safety Objective Report*”¹³ shows that the generic safety objective for all road users (as defined in GD 04/12: “*Standard for Safety Risk Assessments on the Strategic Road Network*”¹⁴), can be met.
- 26 The philosophy of MM ALR is to reduce the amount of infrastructure required to operate safely (which will have a corresponding impact on the amount of maintenance required) though by its very nature this will be greater than for a D3M. In comparison with the MM HSR design defined by IAN 111/09, the MM ALR design will completely eliminate the requirement for dedicated hard shoulder monitoring (HSM) CCTV cameras, and their associated control systems, and lead to a corresponding drop in civil infrastructure expenditure: with fewer gantries being required; fewer dedicated refuge areas constructed; and in many cases a reduced amount of near side vehicle restraint system needed - since there will be fewer assets to protect.
- 27 The MM ALR design is also expected to result in lower whole-life operational costs. Eliminating the need to check the dynamic hard shoulder is clear before opening it will remove this element of operational workload in the control room, which on current schemes is typically concentrated in the peak periods approaching the morning and evening rush hours. Reducing the amount of technology installed while improving the ability to remotely detect, diagnose, and repair faults will further reduce the costs of maintenance, though ensuring safe maintenance access without a dedicated hard shoulder will introduce certain challenges, which are addressed further in Chapters 6-8.

¹¹ <http://www.highways.gov.uk/knowledge/projects/managed-motorways-2-concept-development>

¹² <http://www.highways.gov.uk/knowledge/projects/future-managed-motorways-concept-development-simulation-studies/>

¹³ Copy available at: <http://www.highways.gov.uk/knowledge/projects/managed-motorways-all-lane-running/>

¹⁴ <http://www.dft.gov.uk/ha/standards/dmrb/vol0/section2/qd0412.pdf>

-
- 28 Providing and preserving the controlled environment is expected to contribute towards a scheme meeting the road user safety objective, through a reduction in frequency and severity of collisions. This will have a corresponding impact on the resources required for incident management. The implications of operating an MM ALR scheme on the HA's Traffic Management Directorate, including the Traffic Officer Service, are discussed in more detail in Chapter 9.
- 29 Further resourcing benefits may be realised in future through increasing the centralisation of certain functions (for example, re-routing all ERT calls to a single location). This is not currently possible for MM HSR schemes, given the need for localised operation of a dynamic hard shoulder.
- 30 With the majority of driver information now being provided through verge mounted signs (as opposed to solely through AMIs on overhead gantries), both the frequency of traffic management associated with offside lane closures and the challenges of conducting emergency and routine repair and maintenance of infrastructure positioned above live lanes are expected to reduce significantly. Provision of concrete central reserve barrier will also contribute to a reduction in maintenance activity on the off-side of the carriageway.
- 31 The MM ALR design ensures that the additional capacity provided by the extra lane is available by default, meaning there are no critical technology faults that would prevent the extra lane from being made available to traffic.
- 32 Unlike MM HSR schemes, this additional capacity will be available at all times, without necessarily requiring speed restrictions to be implemented.
- 33 The MM ALR design is not fundamentally different to those sections of the existing motorway and multi lane all purpose trunk road network that do not have a hard shoulder. However, it has the added advantage of having technology capable of detecting and monitoring events 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 the necessary controlled, compliant environment.
- 34 In an emergency, drivers can exit the network at the next available downstream junction, or stop in a refuge area. The hard shoulder adjacent to an exit slip may also be considered to provide a safe location to stop, however they will not usually be fitted with an ERT.
- 35 There will be no automatic alert to RCC operators whenever a vehicle enters or leaves an ERA¹⁵, however the driver will be instructed by fixed signs in the ERA to contact the RCC using the ERT. Operators will be able to monitor the vehicle using CCTV, and if necessary dispatch a TOS patrol and/or set signs and signals to assist the vehicle's safe exit.

¹⁵ There is no automatic alert to the RCC when a vehicle enters an ERA because there is no dynamic lane alongside the ERA for the RCC to manage as there is in the MM HSR design, and provision of the alert does not mitigate any specific hazards. This is in line with the rest of the network, where there is no automated alert if a vehicle enters the hard shoulder or lay by. There is no requirement for the RCC to monitor an ERA unless alerted via the ERT or some other means that they need to do so.

3. Operating Regimes

- 36 The following operating regimes describe, in broad terms, how a generic MM ALR scheme built to IAN 161/13 would be operated under 'normal' conditions, during both the peak and off-peak periods¹⁶.
- 37 They set out the principles of how the Highways Agency and other stakeholders will respond to certain circumstances in order to ensure the intended benefits of the scheme are realised.
- 38 RCC Operators will be able to remotely monitor network conditions, confirm incidents and (where they are visible) verify signal settings by utilising the PTZ CCTV coverage provided throughout the scheme. The MM ALR design and operation does not of itself require additional close monitoring for schemes, although given that MM ALR schemes tend to be on the busiest parts of the network, TMD may consider them higher priority in terms of supervision and monitoring.
- 39 The scenarios outlined below do already exist on the network. For example, there are sections of motorways without a dedicated hard shoulder, and this environment is typical on the multi lane APTR network. Maintenance work is conducted on these sections, and incidents do occur and are managed. Therefore in many cases, there will be existing policy and procedures that may be suitable for use in these situations with only slight modification or extension. On-road and control room based staff will be provided with (and trained in the use of) suitable procedures prior to the first MM ALR scheme becoming operational in that region.

3.1 Off-Peak Operation

- 40 The off-peak period is expected to occur typically on weekdays; starting in the late evening, and continuing overnight. Off-peak conditions may also apply throughout the weekends; or between the morning and afternoon peak periods (the "inter-peak"), depending on the location and traffic patterns.
- 41 By definition, during off-peak operation traffic volumes will be at their lowest. With all lanes available for traffic to use, headways will be large, with traffic flowing freely. The national speed limit will apply, and electronic signs and signals will not be required for purposes relating to the operation of MM ALR, and as such will remain blank (if not required for other, non-managed motorways related purposes such as strategic signing, or campaign messages, etc).
- 42 There are no additional requirements introduced by an MM ALR scheme during these periods of off-peak operation, (over and above the normal roles and responsibilities of operational staff). The off-peak period provides the most appropriate conditions to perform maintenance or other activities that may impact network availability, without unduly compromising network performance.

¹⁶ Management of 'abnormal' conditions, including the presence of debris or broken down vehicles, abnormal load movements, severe weather, and road works are addressed in Chapter 5 of this document.

3.2 Operation During Peak Times

- 43 The peak period will usually occur on weekdays: typically starting in the morning and extending into the early evening. Certain locations may also routinely experience peak conditions outside of these times – this will usually be apparent from the traffic flow profiles generated as an early deliverable by scheme designers and recorded in the Operating Regime (combined) PCF product; but may also be generated by infrequent demand increasing events (e.g. concerts, sporting events, etc).
- 44 During peak times traffic volumes will be higher. The extra capacity provided by the conversion of the hard shoulder to an additional running lane may help to increase headways, but on occasions, flow breakdown may still occur.
- 45 The queue protection system will continuously monitor the flow of vehicles, and when necessary the congestion management system will trigger the automatic setting of appropriate mandatory speed restrictions, applicable to the entire carriageway, in an attempt to first prevent, and subsequently limit the effects of flow breakdown.

3.3 Provision of Driver Information

3.3.1 Tactical Driver Information

- 46 To encourage compliant driver behaviour, information relating to current network conditions (e.g. speed restrictions, lane availability, etc) will be provided through roadside infrastructure. Although some driver information will be provided through lane specific overhead signals, the majority will be displayed using verge mounted variable message signs (MS4).
- 47 Modifications to the signal control software will enable a single variable message sign to display three simultaneous elements: in addition to the speed restriction and supporting text legend, the sign will also be able to display either a warning pictogram (typically a 'red triangle') as shown here:



Or alternatively, a lane closure aspect, as indicated in the example below:



-
- 48 Initial discussions with DfT identified the need to develop a lane closure aspect capable of conveying an immediate lane closure. Research led to the development of the 'red X' variant indicated above. The HA have now agreed the relative locations of display elements with the various sign manufacturers, and are working with DfT to formally introduce the sign into relevant legislation.
- 49 All message signs will retain the capability to display a higher priority message should the need arise. Newly approved messages will be incorporated into the VMS message prioritisation hierarchy prior to the first MM ALR scheme becoming operational. A revised version of IAN 162/12 (HA Policy for the use of Variable Signs and Signals) is also due to be released prior to the launch of the first scheme, which will for the first time encompass the use of signs and signals on all variants of Managed and Controlled Motorway designs.

3.3.2 Strategic Driver Information

- 50 When variable message signs are used to display combinations of speed limits, lane closure aspects or pictograms, they will not be available to display text associated with strategic traffic management or driver information. This is because of the potential confusion for road users if the tactical information is displayed on the same sign as strategic information.

Retained infrastructure

- 51 To ensure that the strategic signing capability is not lost during the peak hours of operation, pre-existing strategic VMS (usually 3x18 MS3s) will be retained. There may be a need to re-position these signs within the link to ensure the sequence of sign and signalling installations on the approach to a junction follows the design set out in IAN 161/13.
- 52 At some locations, other (non-strategic) VMS are regularly used by the National Traffic Operations Centre (NTOC) to display Strategic Traffic Management or Driver Information messages, and this capability may also need to be retained. The exact level of provision on each scheme will be determined by the Senior User, following consultation with NTOC.
- 53 Messages generated by the MIDAS subsystem usually have a higher priority than strategic message settings, and as such would overwrite them. To prevent this, any retained messages signs will be prevented from displaying MIDAS-generated queue protection information. This can be achieved within the site data by removing the retained signs from MIDAS pointers, where such systems exist.

Additional infrastructure

- 54 The IAN 161/13 design requires the first gantry downstream of a merge to house both lane specific AMI signals and an MS4 message sign. As information relating to lane availability and/or speed restrictions will be provided at that location using the AMIs, the MS4 sign is available to show supporting text legends of a strategic nature.
- 55 The MS4 signs co-located with AMIs on the gateway portal gantry should therefore be prioritised for strategic use within the message hierarchy. NTOC will be granted lower priority access to the other MS4s within the scheme, thereby permitting strategic use when not otherwise required for tactical purposes.

3.3.3 Speed restrictions

- 56 One key difference between a conventional and managed motorway is that variable speed limit(s) displayed within a managed motorway scheme will be mandatory, whereas on a conventional motorway they are advisory. To prevent conflicting information being provided to drivers, any signalling infrastructure retained within a scheme will be configured such that it is no longer capable of displaying advisory speed limits.
- 57 The speed limit will be enforced using strategically positioned HADECS cameras able to detect and record speeding offences and initiate the prosecution process. It is therefore critical that the displayed speed limit is appropriate to prevailing traffic conditions to protect the credibility of the system and enforcement regime.
- 58 The congestion management system will determine the speed limit(s) necessary to keep traffic flowing smoothly: where a speed restriction is generated, signals and/or message signs will display appropriate mandatory speed limits.
- 59 Where the national speed limit is in operation, the signs and signals will either be blank (e.g. if there is no congestion), or will display the standard national speed limit symbol (e.g. to communicate that a previous speed restriction no longer applies). This will be determined by the signalling rules.
- 60 At locations where speed restrictions are communicated using lane specific signals, the same speed limit will be displayed above all the open lanes of a particular carriageway¹⁷.
- 61 Although DMRB permits a maximum drop in the speed limit displayed on consecutive signals of 30mph; for safety reasons, operational policy is that the speed limit should not drop by more than 20mph. There may be instances on MM ALR schemes where the distance between signals makes even a 20mph drop in speed limit undesirable. Each Scheme needs to consider this issue when preparing their Operating Regime (combined) PCF product.
- 62 When a primary signal is set, the signal sequencing rules will result in appropriate secondary supporting information being automatically set, based on the primary settings and the distance between signals.
- 63 Configuration settings for the queue protection system (e.g. speed/flow threshold) will need to be tuned and reviewed regularly to ensure that appropriate speed limits continue to be set. RCC operators should note any instances of inappropriate speed limits so that these can be considered as part of this review, for example, sections where queues on the exit slip routinely build back onto the mainline generating speed limits over all lanes where the offside lane is free flowing. This is particularly important on a managed motorway given that speed limits are mandatory and there is a requirement to protect the credibility of the enforcement regime.

¹⁷ With the exception of lane specific signal gantries which span multiple carriageways – for example those at complex junctions which extend across both the mainline carriageway and a parallel exit slip road or diverge.

4. Compliance and Enforcement

- 64 A compliant environment is one in which drivers understand what is expected of them and behave accordingly. This is particularly important with MM ALR, where speed limits and lane configurations may change dynamically, and where the controlled environment provides the mitigation for some of the hazards associated with the removal of the hard shoulder, contributing to the design meeting the safety objective.
- 65 In undertaking the design, Designers should have due regard for the operation of the scheme and ensure that the creation of a compliant environment is undertaken in a holistic way for the entirety of the scheme, including the lead-in from the section immediately upstream and the lead-out into the next adjacent section downstream.
- 66 In designing for and evidencing that compliance can be achieved, Designers should consider the application of “the 4 E’s” (Engineering, Education, Encouragement and Enforcement) and how, when appropriately implemented, these will achieve a compliant and operable environment that meets the scheme objectives.

4.1 Compliance Issues Specific to MM ALR

- 67 The MM ALR design introduces a number of areas where compliance may be affected:

Area of potential Non Compliance	Comment
Exceeding Variable Mandatory Speed restrictions	Does not arise on a conventional motorway where any variable speed limits are advisory
Driving under Stop Indicator (Solid Red X) signals displayed above running lanes, or past closures set using lane closure aspects on a message sign	Potential for more abuse on an MM ALR scheme due to the greater volume of signals and higher propensity for their use Also expect more frequent lane closures (due to the increase in live lane breakdowns) and greater use of signals to support maintenance.
Non emergency stops in ERA	Does not arise on a conventional motorway, (although unauthorised stops on the hard shoulder are observed)

4.2 Achieving Compliance on Individual Schemes

- 68 As part of the Operating Regime (combined) PCF product, each MM ALR scheme is required to produce a compliance strategy which should highlight any exceptions to the “HADECS3 Implementation Guidance”. This Project Control Framework (PCF) product will define the actions being taken by the scheme to ensure that an appropriate level of compliance is achieved.

-
- 69 The advice in the “HADECS3 Implementation Guidance” regarding the deployment of enforcement cameras, coupled with the generic compliance strategy, forms part of the work of NetServ and the Emergency Services Liaison Team. This advice is to be complied with unless exceptional circumstances warrant a departure, which must: be discussed with the Regional Enforcement Co-ordinator; be agreed by the Scheme Senior User; be accepted by the prosecuting authorities; and not conflict with the documented enforcement agreements.
- 70 The compliance section of the Operating Regime (combined) PCF product includes a requirement to assess the potential for non-compliance with specific rules; identifying any safety hazards that non-compliance would affect, in order to determine the overall impact on achieving the safety objective.
- 71 This assessment should take account of aspects such as: the physical characteristics of the road; the proportion of different vehicle types expected to use the scheme; and levels of motorist familiarity with managed motorways, recognising that the latter two may vary by time and day. It should consider engineering, education, encouragement and enforcement measures that could be deployed to improve compliance.
- 72 Compliance with signs and signals improves when drivers understand why they have been set. Wherever possible, supporting information (pictograms or text) will be set on the message signs to explain why lane closures and/or reduced speed limits have been implemented.

4.3 Agreements with Enforcing Bodies

- 73 For MM HSR schemes, the HA’s Emergency Services Liaison Team agreed a National Enforcement Strategic Agreement between the Highway Agency, the Association of Chief Police Officers (ACPO), the Crown Prosecution Service (CPS) and Her Majesty’s Courts Service (HMCS) on the enforcement regime for contravention of Variable Mandatory Speed Limits. A revised version has been produced to reflect the MM ALR design.
- 74 The intention is that the processing of offenders is conducted by one or two centralised Police Fixed Penalty Offices within a given region; with the payment of fixed penalties centralised into one or two Court Offices and the prosecution of offenders in one or two Magistrates’ Courts per region. Processing will be done regionally to encourage consistent standards. Regional Enforcement Coordinators within NDD Directorate will be responsible for managing the evidential trail to ensure that variable mandatory speed limits can be enforced; and for maintaining local Memoranda of Understanding (MoU) with the Police, which will be set up during scheme delivery.
- 75 Similarly a jointly agreed MM Enforcement National Guidance Framework (ENGF) document sets out the national principles, processes and procedures for enforcement. This framework forms the baseline for local agreements, and will be revised to incorporate the MM ALR design features prior to the first scheme becoming operational.

4.4 Achieving Compliance with Specific MM ALR Features

4.4.1 Variable Mandatory Speed Limits

- 76 Variable Mandatory Speed Limits (VMSL) will be enforced through the Highways Agency Digital Enforcement Compliance System (HADECS).
- 77 The HA will reimburse the local Police Forces for the resource to process and prosecute Variable Mandatory Speed Limit offences on MM ALR schemes. The enforcement of the national speed limit will remain at the discretion of the local Police Force.
- 78 Each scheme will need to consider how many HADECS cameras it requires and where they should be deployed, in accordance with the “HADECS3 Implementation Guidance”.
- 79 If the RCC identify or are made aware of instances where automatically set speed limits are not credible or appropriate to traffic conditions, they should take immediate action to remove or amend those speed restriction settings. Where displayed limits are clearly not reasonable, compliance will be affected both on the link on which they are signed, as well as potentially on nearby links.
- 80 Once an incorrect or inappropriate sign has been removed, the RCC should notify both the Police, so that compliance with speed limits is not enforced during this period; and Traffic Technology Division, so that the cause of the incorrect setting can be investigated.
- 81 The Police may refuse to enforce limits that are clearly not reasonable, or which regularly lack credibility in their setting.

4.4.2 Lane Closures

- 82 As with the rest of the network, any enforcement of Red X (Stop) signals will need to be carried out by the Police at the scene.
- 83 Similarly, Police at the scene may prosecute drivers for dangerous driving offences, including failure to comply with lane closure aspects. Full carriageway closure aspects are mandatory when accompanied by flashing red lanterns.

4.4.3 Non Emergency Stops in ERAs

- 84 Data collected from MM HSR schemes indicates that refuge areas are routinely used for non-emergency (and therefore unlawful) stops. Evidence from sections of the network where there is reduced provision for stopping (such as through road works, on bridges, or on elevated sections of road) shows that the location of refuge areas can influence the frequency of vehicle stops, according to whether they are seen as a desirable place to stop by the public.
- 85 It is anticipated that MM ALR schemes will experience a reduced rate of non-emergency stops compared to the levels observed before the scheme was built. The hazards associated with the entry, occupancy and exit of ERAs are also a factor that has been considered in determining their provision within the MM ALR design.

-
- 86 Engineering design will have a particular impact on the appropriate use of Emergency Refuge Areas, given their potential attractiveness to drivers as a place to make short duration stops. Observed examples of non-emergency (and therefore illegal) use include drivers stopping for phone calls, comfort breaks, map reading, tachograph breaks, etc.
- 87 Education of road users is an important tool to remind them of the lawful purposes of ERAs, and of the dangers inherent in making stops in ERAs for non-emergency use. Scheme designers should consider the particular demographic of the expected users of their scheme to understand what type of non-emergency stops might be expected. For example, evidence suggests that where freight users constitute a high proportion of traffic, ERAs may be used more frequently for tachograph breaks. These issues will be addressed in the scheme's Communications Plans PCF Product.
- 88 The MM ALR design requires each ERA to be fitted with a pair of fixed "No stopping except in emergency" signs (to TSRGD diagram 642.3) to further discourage unlawful use.

5. Management of Incidents and other Heightened Situations

- 89 Experience has shown that creating and maintaining a controlled driving environment can result in a reduction in both the frequency and severity of collisions. However, 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 or exit slip, and will therefore have no option but to stop in one of the live lanes.
- 90 Once an RCC operator is made aware of an incident (for example: through an automated alert from the queue protection system, a phone call, or by some other means) the CCTV cameras can be used to validate the location and confirm the key features of the incident.
- 91 The RCC operator has the ability to set a lane closure pattern with supporting information messages and appropriate reduced mandatory speed limits. This will warn approaching drivers of the potential hazard, enabling them to safely reduce their vehicle's speed to appropriate levels whilst merging into the remaining available lanes past the scene.

5.1 Dealing with Incidents - Key Differences on an MM ALR Scheme

- 92 On both MM HSR and MM ALR schemes, as compared to a conventional motorway, there is a greater need for agreements (see Section 5.4) and clear communication between the Highways Agency, and "Core Responders". In this context, the term '*Highways Agency*' is used to include the RCC and on-road Traffic Officer Service, as well as Maintenance Service Providers, the National Vehicle Recovery Manager and any other parties contracted by the HA. The term '*Core Responders*' is used to refer to the Emergency Services, to Vehicle Recovery Services, and to private Motorist Assistance Organisations involved in responding to or otherwise managing an incident.
- 93 This greater need for commonly agreed processes and procedures arises due to the different operating environments encountered between managed motorway schemes and conventional motorways. The increased deployment of technology on the network provides staff in the relevant control rooms with greater knowledge of what is happening during incidents on the strategic network, as well as the opportunity to assist the on-road response by setting supporting signs and signals and providing information to responders, even while they are still en-route to the scene.
- 94 As with incidents on any road, the management process can be considered in four distinct phases, namely: Incident Detection & Verification; Initial Response & Access; Scene Management; and Network Restoration.
- 95 From the perspective of responding to and managing incidents and other 'unusual' situations, the main differences between a standard three lane motorway (D3M), and an MM ALR scheme are described overleaf:

- **Incident Detection & Verification:**
 - The controlled environment and additional capacity mean there is likely to be a reduction in both the frequency and the severity of collisions on MM ALR when compared to D3M; however most incidents will now affect a live lane.
 - During busy periods, a live lane obstruction will quickly result in congested conditions, enabling slow moving or stationary vehicles to be detected by the queue protection system. This will automatically set message signs designed to help prevent secondary incidents and will also serve to alert the control room.
 - During off-peak conditions (typically high speed / low flow environments), the majority of vehicles would be able to 'coast' to a place of refuge¹⁸.
 - CCTV camera coverage will enable any incident to be quickly verified and an appropriate response determined by the control room, enabling the setting of lane closures using signs and signals to further protect the scene.
 - As with all live lane incidents, details should be passed to NTOC for onward dissemination;
- **Initial Response & Access:**
 - With the conversion of the hard shoulder to a controlled running lane, responders will need to attend incidents without relying on a dedicated access route.
 - Signs/signals can be set to facilitate responder access using appropriate lane(s);
- **Scene Management:**
 - Mandatory Speed Limits, whether automatically generated by a queue protection system, or manually set by the operator, help to create and maintain a controlled environment to protect those involved in managing the incident;
 - Mandatory Speed Limits may be shown on either signs or signals, with consecutive information points provided at maximum intervals of 1500m to ensure all drivers receive adequate guidance;
 - Using verge mounted variable message signs provides operational flexibility, as the speed restriction can be accompanied by appropriate combinations of lane closure aspects, pictograms, or text on a single piece of infrastructure;
 - Information and instructions displayed on the variable message signs are applicable to the entire carriageway;
 - The lack of hard shoulder will mean that the RCC may be requested to set signs and signals, for example to protect a lane for police/TOS to stop or escort vehicles, or to assist with the recovery of a live lane obstruction;
- **Network Restoration:**
 - With no hard shoulder, a greater proportion of incidents will now be expected to impact live lanes;
 - Vehicles will need to be recovered to an off-carriageway location, such as an ERA. Debris will also need to be cleared from live lanes;
 - Refuge areas may be utilised as temporary off-network storage locations. The requirement in IAN 161/13 that refuge areas are provided at intervals not greater than 2.5km will typically result in the provision of at least one refuge area per link.

¹⁸ http://assets.highways.gov.uk/specialist-information/knowledge-compendium/2011-13-knowledge-programme/MM-ALR_Evaluation_of_the_Provision_of_Refuge_Areas.pdf

5.2 General Approach to Managing Incidents

- 96 Variable signs and signals are the primary mechanism through which the RCC can control traffic on a managed motorway.
- 97 Before the lanes that are affected by an incident are confirmed, all signs and signals set will be non lane specific (i.e. the same advice applies to all lanes). Current policy¹⁹ dictates that until a report is confirmed, a 50mph restriction is put in place, supported by message signs bearing a legend such as “Incident”.
- 98 Once the lanes that are affected by an incident have been confirmed, lane specific closures will be set on the most appropriate signals (for example displaying a ‘lane closure aspect’ on a variable message sign, or stop signals on gantries with lane specific AMIs).
- 99 Once a lane closure has been set, the signal sequencing rules will set secondary signals (including upstream lane diverts, downstream ‘end’ aspects, and appropriate speed restrictions throughout the area). At any time RCC operators may override an automated speed restriction with a lower speed limit. RCC operators should ensure that all appropriate signs and signals are set (or cleared) according to the requirements of the Lead Responder on scene.
- 100 Compared to a conventional motorway, the increased provision of signs and signals on MM ALR means that many more drivers will be able to see messages displayed at the roadside. This increases the potential benefit from signing as it enables the Highways Agency to communicate with trapped traffic following an incident, a strategy that is currently being considered as part of the signs and signals policy review.

5.3 Operational Challenges posed by MM ALR

- 101 The MM ALR design will affect the way in which some operational tasks are carried out, and the manner in which some existing services are delivered. The following sections discuss some of these operational challenges in more detail.

5.3.1 Ability to Confirm Incidents

- 102 The “*Highways Agency policy for the use of Variable Signs and Signals*” set out in IAN 162 states that lane specific signals and VMS messages related to an incident can only be set once the location and the lanes that are affected by the incident have been confirmed by an approved source agreed by the Traffic Officer Service (these approved sources include a Police Officer, Traffic Officer, traffic incident management vehicle at the scene, MAC/MSP, TechMAC/RTMC, or NTOC).
- 103 Once alerted, the full PTZ CCTV coverage will usually enable RCC operators to remotely confirm the presence and details of an incident, and provide an appropriate response.

¹⁹ The current version of IAN 162: “*Highways Agency policy for the use of Variable Signs and Signals*” was released in December 2011. An update is planned to be released prior to the first operational MM ALR scheme.

5.3.2 Accessing the Scene

- 104 As soon as possible after confirmation of an incident, the RCC Operator should identify the most appropriate access route for Emergency Responders and advise them accordingly. Once confirmed by the Emergency Responders, the RCC should set the signs and signals necessary to clear and protect this route. Guidance exists in procedures as to the factors to consider when selecting which is the most appropriate lane to close.
- 105 If the TOS can convert a lane into a sterile area and can manage the incident from there to release the traffic, this should be their first choice, enabling access to the scene for other responders. If they cannot clear a lane (and if the situation warrants it) they may consider implementing reverse flow, in readiness for larger response vehicles and recovery operators.

5.3.3 Broken Down and Abandoned Vehicles

- 106 Traffic Officers have powers under the Removal and Disposal of Vehicles (Traffic Officers) (England) Regulations 2008 that enable them to deal with vehicles that have broken down and are either causing an obstruction or danger to others; are in contravention of a restriction or prohibition; or appear to have been abandoned without lawful authority.
- 107 On the rest of the network, where a vehicle has stopped in a location such that it does not cause an obstruction or danger (and if there is no police interest in the vehicle), drivers are given a "reasonable" time to organise their own recovery. If suitable arrangements are not or cannot be made, a statutory removal may be invoked by Traffic Officers.
- 108 As an MM ALR scheme has no hard shoulder, all lanes are live lanes. Any vehicle that is unable to leave the main carriageway (by continuing to the next exit slip road, or stopping in a refuge area), will by definition become a live lane breakdown, as it will cause an obstruction.
- 109 If Traffic Officers are suitably trained and equipped, they will clear broken down vehicles to the nearest place of safety, which may be an ERA, a motorway service area, or a hard shoulder. This could regularly involve towing vehicles for distances up to 2.5km, and in instances where the nearest place of safety is occupied or otherwise unavailable there may be a requirement to tow for even greater distances.
- 110 If Traffic Officers are unable to clear the vehicle (for example due to it being overweight, or damaged), they will set out emergency traffic management and follow the usual Statutory Removal process. Once in attendance they are to remain with the vehicle until it is removed or otherwise protected. Work is underway with the Vehicle Recovery Team to determine the best way to enhance response times on MM ALR sections for those vehicles that the TOS cannot clear.
- 111 If a vehicle is broken down in (or cleared to) a refuge area or the hard shoulder of a slip road, the on road TOS patrol - as for any other road - should make an assessment of the obstruction or danger posed by that vehicle to determine whether a statutory removal is justified, or whether "owner's choice" of vehicle recovery can be used.

5.3.4 Debris Retrieval

- 112 As elsewhere on the network, debris is categorised as either that requiring immediate collection (e.g. debris of a distressing or hazardous nature); or routine debris (e.g. tyre or exhaust debris).
- For “immediate collection” debris, an incident assessment will be made by the attending Traffic Officer who will determine whether the debris should be removed to the edge of the carriageway (or verge), or left in situ awaiting removal by the maintenance service provider.
 - If the debris is to be left in situ, the TO will remain at scene, and deploy appropriate live lane procedures.
 - If the debris is to be left at the edge of the carriageway, the TO may need to return to support the Service Provider.
 - For “routine collection” debris, the TOS may need to deploy a 4 lane rolling road block to temporarily hold traffic while the debris is removed to the verge and placed near to a marker post. The Maintenance Service Provider will return in periods of lower flow, or when other maintenance work requires lane closures to collect the debris. Supporting signs and signals will be set, as per agreed procedures, by the RCC.

5.3.5 Severe Weather

- 113 The combination of message signs capable of displaying lane availability with supporting text and pictograms, coupled with the ability to implement mandatory speed limits, provides the operator with useful tools to mitigate the impacts of severe weather on traffic.
- 114 Certain weather conditions (e.g. fog, heavy rain) can reduce visibility and increase the risk of accidents. This risk is primarily related to excess speed. If drivers are driving slowly due to the conditions, the queue protection / congestion management system will automatically set appropriate speed restrictions to reduce the associated risk of accidents. More information regarding the use of message signs to communicate abnormal weather information is contained within the *“Highways Agency policy for the use of Variable Signs and Signals”*.
- 115 The Severe Weather Plan (SWP) produced by each Asset Support Contractor describes the procedures and operational arrangements necessary for the delivery of an effective winter service, and as such should identify network features (such as managed motorway sections or ERAs) or local issues (such as high altitude or steep gradients) which require special consideration.
- 116 The Severe Weather Plan will also define the process for snow clearance, for example by setting out the number of lanes to be kept clear for a particular route, and the order in which lanes should be cleared if a ‘phased’ approach is followed. Message signs and signals can be utilised to display warning information, or inform motorists if certain lanes are not available for use.

5.3.6 Road Works Management

- 117 As on the rest of the network, road works will generally be scheduled to take place at times that minimise the impact on traffic. This means works will generally happen at night; in periods of lower flow in the middle of the day; or at weekends. As these periods are dependent on traffic flows, they will need to be agreed on a scheme by scheme basis adopting the principles of intelligence based road space management²⁰.
- 118 During road works, the contractor may request that the RCC set signs and signals to support the set up, modification or removal of Traffic Management.
- 119 The current policy governing requests from contractors for signal settings is set out in Annex F of IAN 162/12, the “*Highways Agency policy for the use of Variable Signs and Signals*”. However the HA’s “Aiming for Zero” programme is anticipated to drive significant developments regarding TTM design and advance signing provision over the coming years.

5.3.7 Abnormal Load Movements

- 120 Managed motorways do not fundamentally affect the preferred times or routes for abnormal loads and normal guidance should be followed in scheduling such movements on an MM ALR scheme. As for other parts of the network, deviation from the agreed routes should not be made without appropriate consultation²¹.
- 121 Managed motorways provide significantly enhanced capabilities to monitor the movement of the abnormal load. The NTOC will have (if possible) established communication with the driver of the abnormal load, and the RCC should communicate via the NTOC to ensure that the driver is aware of downstream traffic conditions, and to facilitate communication should an incident occur.

²⁰ For example, a road works management tool which uses historic data to predict lane demand through road work schemes. This allows for lane closures to be planned so as to cause minimal congestion, thereby reducing delays and other impacts of congestion.

²¹ For Special Order Movements no deviation from the agreed route should be made without consultation with the Highways Agency. For all other abnormal loads, no deviation from the agreed route should be made without consultation with the Police Abnormal Loads Officer and/or Highway and Bridge authorities or RCC Team Manager outside office hours. Any deviation must be considered suitable by them before being used.

5.4 Emergency Responder National Agreements and Guidance

5.4.1 National Agreements

- ¹²² Responding to incidents on MM ALR schemes requires a collaborative approach that reflects the national character of the managed motorways programme.
- ¹²³ To support the above, the Highways Agency has established jointly-agreed national positions with: the Association of Chief Police Officers; the Chief Fire Officers Association; and the National Health Service Ambulance Chief Executive Group, regarding the emergency response to incidents on existing MM HSR schemes. Work is underway to reach similar agreements covering the response on MM ALR schemes, and to update the Network Operations National Guidance Framework (NGF) to cover all managed motorways.

5.4.2 Regional and Scheme Level Agreements

- ¹²⁴ Each scheme will establish suitable regional agreements with the Emergency Services. These agreements should replicate the principles of the national agreement, unless a strong justification can be provided to deviate from them. Any variance should first be agreed with the HA Traffic Management Directorate, and subsequently approved by the Scheme's Senior User.
- ¹²⁵ The preference is for each region to have a single agreement, signed by all three of the Emergency Services, as an addendum to the existing "Detailed Regional Operational Agreements" that were set up when the Traffic Officer Service was created. However, it is recognised that this may not be possible or desirable in all cases, and that individual agreements with the Police, Fire and Ambulance services separate from the existing Detailed Regional Operational Agreements may be necessary in exceptional cases.
- ¹²⁶ Regardless of the precise form, these agreements will need to take the principles of the national agreements, apply them to the characteristics of the individual scheme, and record the agreed operating practices based on scheme-specific requirements. It is anticipated that these agreements would record acceptance of the national principles apart from where specific exceptions are deemed necessary; these exceptions are to be included in chapter 5 of the scheme's Operating Regime (combined) PCF product: "Management of Incidents and other Heightened Situations".

6. Meeting the Road Worker Safety Objective

- 127 The “Standard for Safety Risk Assessments on the Strategic Road Network” (GD 04/12) defines road workers as either:
- People directly employed by the Highway Agency who work on the SRN (e.g. Traffic Officers); or
 - People in a contractual relationship with the Agency, including Agency National Vehicle Recovery Contract operatives, all workers engaged in traffic management activities and incident support services, and any other activities where live traffic is present, (such as persons carrying out survey and inspection work).
- 128 There is no numerical objective or target for road worker accidents on MM ALR schemes, but the risk must be managed ‘So Far As Is Reasonably Practicable’ (SFAIRP).
- 129 The MM ALR “*Demonstration of Meeting Safety Objective*” report contains a qualitative risk comparison for specific road user groups; and shows that on balance, the safety objective for road users is likely to be achieved.
- 130 The above report also concludes that the road worker safety objective can also be met through the provision of concrete central reserve barrier, application of the ERIC²² methodology, and introduction of fixed taper points and controlled signing for the installation of temporary traffic management. The Highways Agency’s “Aiming for Zero” strategy may also be applied to further reduce the risk to road workers (particularly during maintenance and operation).
- 131 Designers retain a statutory duty through the Construction (Design and Management) Regulations 2007 to reduce health, safety and welfare risks for (amongst other things) the maintenance of completed highway schemes. Generic guidance exists²³ regarding the issues which must be considered by Designers and Maintenance Service Providers.
- 132 Each scheme should undertake its own specific review of the hazards associated with maintenance, and ensure that the scheme has been designed in such a way that it can be operated and maintained so that the risks are As Low As Reasonably Practicable (ALARP).

6.1 Designing for Maintenance

- 133 There are two main threads to the strategy of reducing the risk exposure of maintenance operatives through the scheme design:
- Design the scheme to minimise the frequency with which future maintenance interventions are required;
 - Design the scheme so that when a maintenance intervention is required, it can be safely carried out.

²² The mnemonic ERIC (Eliminate, Reduce, Isolate, Control) is used to identify a hierarchy of risk control measures.

²³ IAN 105/08: “Implementation of Construction (Design & Management) 2007”
<http://www.dft.gov.uk/ha/standards/ians/pdfs/ian105.pdf>

134 In order to identify opportunities to lower the risk exposure of road workers, an ERIC assessment considered all maintenance activities likely to be undertaken within a typical MM ALR scheme. It then determined how frequently they occur, how they are currently performed, and how they might be performed in future. This enabled mitigation measures to be identified, allowing the risks to be managed in accordance with the ALARP principle.

6.2 The 'ERIC' approach to reducing risk

135 The following sections provide examples of risk reduction strategies under each of these four headings (*Eliminate, Reduce, Isolate and Control*). Note that these items do not constitute an exhaustive list, as each scheme will have specific local issues; and this guidance does not detract from the Designer's responsibilities under the CDM regulations.

6.2.1 Eliminate

136 The most effective hazard reduction strategy is to simply eliminate the requirement to conduct maintenance at all. This could be achieved as follows:

Removal of Assets

137 Designers should catalogue all the assets that are currently installed within the scheme boundary, identify all redundant or potentially redundant infrastructure, and assess whether it should be removed. As is the policy for the rest of the network, non-essential infrastructure or technology, including soft estate, should be removed.

6.2.2 Reduce

138 If a particular maintenance activity cannot be eliminated, it may be possible to reduce the frequency with which maintenance access is required, or reduce the length of time the maintenance activity takes. Opportunities include:

Reduce Site Visit Requirements

139 Designers should, in designing for maintenance, make every effort to reduce or eliminate the need for roadside maintenance activities for new and existing equipment on the mainline carriageway. Maintenance and repair should be undertaken away from the network unless there is no other alternative.

140 Where possible, roadside technology should have remote access capabilities, allowing faults to be detected, interrogated and in some cases resolved without requiring a site visit. (This is covered in more detail in Section 8.3.5).

Bring Forward Renewal Programmes

141 In advance of the MM ALR scheme construction, the Highways Agency, designers and maintenance providers should consider undertaking maintenance interventions that are scheduled to take place during (or shortly after) the implementation of the MM ALR scheme.

142 Assets should be left with at least a minimum residual life (to be agreed with the Senior User, but likely to be 3 to 5 years) after the scheme has gone live. This activity will reduce the amount of maintenance that needs to take place once the scheme is operational.

Utilise Low Maintenance Items

- 143 Designers should consider the use of longer life and/or lower maintenance items and assets where they will need to be replaced or installed as part of the scheme. This consideration should also include assets that have extended reactive maintenance periods (e.g. curing of concrete on bridge repairs) as this will greatly reduce planned and reactive maintenance requirements.

Plan for Access Restrictions

- 144 Maintenance Service Providers should take advantage of the TTM installed for the construction period of the scheme to undertake any necessary longer term maintenance activities, such as soft estate management, vegetation clearance for visibility, and other routine maintenance activities. This will enable Maintenance Service Providers to reduce the time spent performing maintenance activities once the MM ALR scheme becomes operational.

Renew 'Problem' Assets

- 145 Designers should work with the existing maintenance service provider to identify whether any existing technology assets are known to either be unreliable; or have unreasonably short maintenance intervention intervals, and should consider replacing those assets with more reliable alternatives or components requiring less frequent maintenance. Another example might be to implement a policy of regularly operating 'remote control' signs to improve their reliability.

6.2.3 Isolate

- 146 A risk can be isolated by separating the hazardous activity from the individuals exposed to it, either by physical protection (e.g. through the provision of guarding) or by limiting access (e.g. through the requirement for maintenance activity to only occur within predetermined 'working windows'). Examples include:

Re-Positioning of Assets

- 147 Designers should assess all existing assets to ascertain whether any could be repositioned to enable their maintenance activities to be conducted either off network, or from within a designated area for maintenance. Where appropriate, items located in the former hard shoulder (such as manhole covers) should be removed from what will become a permanent running lane. The capital cost of moving the items should be weighed against the operational costs and risks of maintenance, and the associated loss of capacity over the life of the scheme.

Provision of Off-Network Access

- 148 It may be possible to provide safe maintenance access to both new and existing assets without recourse to the motorway network (for example by locating the asset near to an over-bridge with pedestrian access). However, locations which can be easily accessed by maintainers may also increase the opportunity for asset theft, and so the guidance provided within the HA Metal Theft Toolkit should be observed.

Combining Asset Locations

- 149 When installing new assets, designers should consider co-locating them to enable multiple maintenance activities to be undertaken within the same deployment of Temporary Traffic Management. The capital cost of co-locating items should be weighed against the operational costs and risks of maintenance and the associated loss of capacity over the life of the scheme.

6.2.4 Control

- 150 Control measures make it safer for the contractor to perform each maintenance activity, for example by providing a greater degree of protection, or by reducing the exposure time. Examples of controls include:

Improved Accessibility of New Assets for Maintenance

- 151 Designers should ensure new assets are positioned to facilitate maintenance access. This could include locating components in refuge areas, or within a designated area for maintenance. This may mean additional assets are required in certain circumstances, but improving maintenance access is expected to deliver an overall safety and operational benefit. Designers should also consider providing mechanical access facilities to assets as part of the design.
- 152 The HA's 'Aiming for Zero' strategy includes eliminating all carriageway crossings required to establish TTM signing. This approach is being driven by the HSE and is fully endorsed by HA Senior Management.

Fixed Taper Positions & Remote Signalling

- 153 Where off-network access cannot be safely provided, designers should identify fixed points at which a cone taper can be installed in order to support the setting out and removal of traffic management.
- 154 Sufficient taper locations should be identified to allow all the assets, including any signage required to support traffic management, to be maintained within a suitable temporary traffic management layout. Therefore, the frequency and location of the taper positions needs to be agreed by scheme designers and the maintaining agent. (See also Section 8.3).

Improved Installation / Access Techniques

- 155 Designers and Maintenance Service Providers should review the technology assets to be installed, and consider methods to enable easier/quicker swap out of faulty equipment to reduce the time spent performing maintenance actions.
- 156 In accordance with current standards²⁴ gantries are not to be provided with a fixed means of access for inspection and maintenance. A departure from standard will be required if a fixed means of access is required.

²⁴ IAN 86/07: "Amendments to design requirements for Portal and Cantilever Sign/Signal Gantries".
<http://www.dft.gov.uk/ha/standards/ians/pdfs/ian86.pdf>

7. Determining the Approach to Maintenance

7.1 Contractual Requirements

157 The “*Asset Maintenance and Operational Requirements*” (AMOR) and the “*Technology Management & Maintenance Manual*” (TMMM) together set out the HA’s requirements in relation to the carrying out of maintenance and operational activities on the network. These documents serve as the replacements to the *Network Management Manual* (NMM) and the *Routine & Winter Service Code* (RWSC).

158 Contained within the AMOR and TMMM specifications is the requirement that the Maintenance Service Provider adopts a risk based approach to the execution of maintenance and operational activities, in order to deliver value for money whilst demonstrating that risks are acceptably mitigated, with no detriment to the safety of either road users or road workers.

159 The AMOR defines the primary risks to be mitigated by the maintenance service provider. These are grouped in two key areas; safety and network availability:

- **Safety:** risks must be mitigated to ensure that:
 - the Area Network is not dangerous to traffic;
 - the Area Network does not present an intolerable risk to road user or road worker safety; and
 - the Highways Agency is provided with a ‘special defence’ under Section 58 of the Highways Act 1980²⁵.
- **Availability:** risks must be mitigated to ensure the Maintenance Provider:
 - secures the expeditious movement of traffic on the HA’s Area Network; and
 - facilitates the expeditious movement of traffic on road networks for which another authority is the traffic authority.

7.2 Delivering Efficiencies

160 A requirement of AMOR is that the Maintenance Service Provider prioritises their activities to optimise the use of (and achieve the best value from) the available resources. They are required to produce a Quality Plan, to include fully detailed Processes, Procedures and Timescales in relation to inspection, make safe, and repair of the asset; detailing exactly what activities the Provider will undertake to deliver the required outcomes whilst maintaining a tolerable safety risk for the road user.

161 For an MM ALR scheme, this Quality Plan should reflect the fact that their ability to access certain assets may be compromised by factors including physical access (e.g.: no hard shoulder), or other restrictions (e.g.: no routine maintenance permitted during peak periods).

²⁵ Section 58 provides the defence that “*the Authority had taken such care as in all the circumstances was reasonably required to secure that part of the highway to which that action related was not dangerous for traffic.*”

-
- 162 The Maintenance Service Provider is also required to produce a Maintenance Requirements Plan, detailing:
- the planned Programme of Inspections;
 - the Response and Repair timescales, covering defect identification, verification, response and repair; and
 - how work will be packaged to minimise network occupancy (including road space booking requirements, traffic management requirements, and temporary traffic regulation orders).
- 163 Designers and Maintenance Service Providers are to give careful consideration to the requirement to minimise network occupancy, both from the point of view of reducing lane closures and reducing the exposure of road workers to the risks of working adjacent to live traffic. Hence the number of traffic management maintenance interventions should be minimised.
- 164 The Maintenance Service Provider is required to deliver (and comply with) a Network Occupancy Plan, containing occupancy booking procedures and pro-formas. They are to also maintain a fully populated record of all occupancies and any activities which cause an adverse impact on road users; with a view to optimising all occupancies, and minimising the effect of activities.
- 165 There are no additional operational requirements for a “Permit to Access” system specific to managed motorway schemes. The requirements set out in AMOR for a Network Occupancy Plan which outlines the Provider’s Processes and Procedures for Managing Network Occupancy are deemed to be sufficient. Under the ASC contract these general requirements are considered to be a lump-sum duty which will not incur additional costs to the Agency.
- 166 Effective communication systems will be needed to ensure that if the RCC needs to request that maintenance personnel leave the network, the maintainer is able to comply with that request in an expeditious manner. Any system employed should ensure that the MAC/ASC is able to monitor and make contact with all contractors, including third-party maintainers. Any ICT systems used to track road space bookings are to be operated entirely by the MAC/ASC themselves, with no expectation placed on the RCC to access these systems in order to obtain information.
- 167 AMOR also requires that separate plans are produced for key operational areas, including the Severe Weather Service and Incident Response. These plans should detail the activities which will be undertaken to deliver the required outcomes and avoid danger to users of the highway.

8. Impact of MM ALR on Maintenance

168 MM ALR schemes comprise a specific mix of technology and civil infrastructure. These assets require maintenance in order to remain functional, and so deliver the operational and safety benefits required of the scheme. However, the scheme's design itself changes how Maintenance Service Providers carry out maintenance, due to factors including:

- the pressure of road space booking, arising from the need to access the additional technology assets, roadside infrastructure and field electronics installed as part of the scheme design;
- operational restrictions on the time periods during which maintenance activities are able to be conducted, including the need to avoid lane closures during periods of high demand; and
- the lack of a hard shoulder from which to carry out maintenance, access roadside infrastructure, or set out temporary traffic management (TTM).

169 The following sections describe some of the likely impacts that the MM ALR design is expected to have on the ability to plan, schedule, and conduct maintenance activities; as well as suggesting potential opportunities to mitigate those impacts.

8.1 Planning Maintenance Activities

8.1.1 Asset Inventory

170 With access to MM ALR schemes expected to provide additional challenges (when compared to D3M sections), survey work may prove more difficult and so the planning of routine maintenance activities needs to be more rigorous. During the construction phase of the MM ALR scheme the scheme designer (supported by the maintenance service provider, delivery partner and construction contractor) should collate a full asset inventory, containing all assets, their quantities, location and condition, together with details of the date and nature of the most recent maintenance activity.

171 This inventory is to be kept up to date during the construction period. Once the scheme is operational, any survey activities necessary to keep the inventory current will need to be carefully planned to maximise the utilisation of any temporary traffic management being set out for maintenance work so as not to require any additional traffic management installations.

172 The asset inventory should be used to establish appropriate asset management plans, enabling work to be scheduled accordingly.

8.1.2 Plan for Incident / Longer Term Maintenance

173 Designers and Maintenance Service Providers will need to review both existing and new structures within the MM ALR scheme to identify any structures or assets that require TTM to be left in place for an extended period (i.e. longer than overnight), in order to allow a repair to be completed.

-
- 174 Examples might include the repair of a bridge parapet where the curing of the concrete requires protection for several days until the required minimum strength has been reached, or assets where non-stock materials are needed to make a repair, but traffic needs to be kept away from the vicinity while those materials are sourced.
- 175 Action plans for these circumstances need to be established and agreed, as it is a requirement of AMOR that they are included in the Maintenance Requirements Plan.

8.1.3 Plan for Severe Weather

- 176 The permanent conversion of the hard shoulder into a controlled running lane will have an implication on the procedures and operational arrangements necessary for the delivery of an effective winter service plan for MM ALR schemes. Snow accumulations are likely to be ploughed and stored in running lanes for a longer period of time; if snow is moved to lane 1 arrangements for clearing slip roads will have to be made. Wider carriageways will typically need echelon ploughing. Salting will require two passes instead of one to effectively cover four lanes of running traffic. These arrangements will be defined in the Severe Weather Plan (see also Section 5.3.5 for implications on the RCCs).

8.2 Scheduling Maintenance

- 177 The high traffic volumes that MM ALR schemes are expected to experience during a typical weekday means that the main opportunity to conduct maintenance works will be overnight. Closing lanes during working days is likely to create significant congestion and delays to travellers. Hence weekday, inter-peak closures are not feasible (except for emergency works). Therefore the majority of activities will need to be scheduled at night, with additional temporary lighting provided as appropriate.
- 178 Intelligence based road space management will establish when it may be possible to permit lane closures during daylight hours to allow activities that are deemed to be unfeasible, or too high risk, to be carried out in the dark (e.g. litter picking, soft estate clearance). This will be scheme specific: Designers and Maintenance Service Providers should not assume that such a window exists; and so alternative methods of scheduling maintenance access may be required.

8.2.1 Scheduling Planned Maintenance Activities

- 179 There is increased pressure to minimise the number of occasions when TTM is in place, to minimise the safety risks to both road workers and road users, and to improve the efficiency of maintenance activities.
- 180 The Maintenance Requirements Plan introduces the need to minimise network occupancy, meaning the number of activities that are carried out during a single installation of temporary traffic management will be increased wherever possible.
- 181 Adopting this approach becomes even more crucial on MM ALR schemes, where the opportunities for maintenance access are reduced. However the ability to group maintenance activities together is subject to maintainers having adequate resources available to conduct the work, and there being no adverse impacts on safety associated with the undertaking of a number of activities within the same area.

182 Consideration also needs to be given to the safety risk of the road user of delaying the intervention of separate maintenance activities into a single traffic management intervention.

8.2.2 Scheduling Reactive Maintenance

183 Defects and equipment failures are inevitable. Except where the item can be safely accessed from off the network with the necessary tools, plant and materials; all repairs will require TTM. Both the frequency with which faults or defects occur, and the time needed to make a repair are key factors in determining the need for TTM.

184 Deciding when to undertake reactive maintenance requires an assessment of the operational criticality of each component to enable the network to continue to be safely operated despite the presence of a fault: either until a planned maintenance activity with the required temporary traffic management layout is in place; or until sufficient 'other' faults occur to enable them all to be repaired in a single maintenance intervention.

185 An exercise has been carried out to determine the availability requirements for each roadside technology type from both an operational and safety perspective. These will then be used to influence the target response / restore times defined within TMMM. This forms the basis of the risk based approach outlined in AMOR, and should be accommodated in the Maintenance Requirements Plan.

186 There is also the reverse opportunity in that some planned activities could be re-scheduled to make use of a TTM installation required to fix a fault or defect.

8.3 Conducting Maintenance

8.3.1 Generic Safe Method for Placing TTM

187 Safe installation of TTM for maintenance has been identified as a key challenge for MM ALR designers and operators. One potential approach to meeting this challenge is demonstrated by the 'generic safe method'²⁶, a guidance document produced in consultation with the Road Worker Safety Forum (RoWSaF) which includes features such as fixed taper positions and dedicated advance signage.

188 Designers and maintainers are not required to emulate the generic safe method; rather they should apply design for maintenance principles to ensure road worker hazards for a particular scheme are adequately managed. The generic safe method merely demonstrates one such approach.

8.3.2 Installation of Temporary Traffic Management

189 Where the need for a maintenance intervention cannot be avoided, TTM will be required. The main differences when installing TTM on a road with four live lanes without a hard shoulder involve the safe installation of the advance warning signs and the initial set up of the taper. Once these are in place then the remainder of the installation is the same as for a conventional motorway.

²⁶ http://www.dft.gov.uk/ha/standards/tech_info/files/Generic%20Safe%20Method%20for%20Placing%20TTM%20FINAL.pdf

-
- 190 There are two key issues relating to the installation of TTM in an MM ALR environment: the initial positioning of signs and taper cones has to take place in live lanes; and setting out the offside signs to Chapter 8 would otherwise require workers to cross four lanes of traffic. With concrete central barrier there is no effective position of refuge for a road worker installing a sign adjacent to the barrier.
- 191 To combat this, the Aiming for Zero programme is currently sponsoring a number of projects aimed at eliminating or reducing road worker exposure to risk during set up of TTM, particularly those risks relating to the crossing of the carriageway on foot. For example, project 1C1 is assessing the suitability of using AMIs to display variable mandatory speed limits to support the setting up and taking down of TTM; while projects 1C2 and 1C3 are reviewing the use of variable signs and signals to communicate static lane closures in advance of the works.
- 192 The Aiming for Zero programme is a rapidly developing workstream, and designers and maintainers should be aware of potential TTM relaxations published in IANs during scheme development and operation phases.

8.3.3 Pre-determined Taper Positions and Fixed Traffic Management Signs

- 193 Pre-determined taper positions and remotely operated traffic management signs may be used to aid in the setting out of TTM. Dedicated electronic (or electromechanical) signs installed upstream of each selected taper location at the distances described in Chapter 8 of the Traffic Signs Manual eliminate the safety hazards to the road maintainer created by the requirement to physically place temporary fixed plate signs adjacent to a live running lane. These signs may be mounted in either the verge or central reserve as required, and can be operated remotely from an approaching maintenance vehicle (such as an Impact Protection Vehicle) or from an accessible, secure, safe location (e.g. the RCC).
- 194 Aiming for Zero Project 1U will deliver guidance and specification requirements for the use of post-mounted, remote-controlled message signs at roadworks; and is expected to deliver by December 2013. Designers should consider whether the benefits of their installation can be shown to outweigh the dis-benefits of introducing additional 'permanent' assets, particularly in the central reserve; especially as project 1S4 is considering the removal of all offside signs on the approach to roadworks.
- 195 Sufficient taper locations are to be identified which allow all the assets, including any signage required to support traffic management, to be maintained within a suitable temporary traffic management layout. Therefore, the frequency and location of the taper positions needs to be agreed by scheme designers and the maintaining agent.

8.3.4 Electronic Sign Utilisation

- 196 The number of dedicated signs required solely for advance warning of road works could be reduced if the electronic signs and signals within the MM ALR design for driver information and control are used to form part of the advance signing. For example, a fixed taper location could be positioned ~1500m downstream from a sign or signal, which would be used to display the appropriate legends and aspects for the 1 mile advance warning under Chapter 8. This eliminates the risk to the road maintainer associated with placing the equivalent fixed sign in a live running lane.

8.3.5 Remote Access to Technology Assets

- ¹⁹⁷ Remote access to technology assets is being developed and delivered in two phases. Phase 1 will deliver remote access to the latest generation of signs and signals; while Phase 2 will add remote access capability to all IP-enabled devices, including CCTV cameras.
- ¹⁹⁸ Maintenance Service Providers should, wherever possible, make use of this facility to minimise visits to the roadside. The Maintenance Service Provider will need to obtain permission from the RCC to take over control of the piece of equipment, as they would currently for physical repairs, to ensure that the equipment is not simultaneously required for operational purposes.

9. RCCs and the Traffic Officer Service

9.1 Staffing Levels

- 199 An exercise is being carried out by the Managed Lanes & Policy Team to assist TMD in reviewing their future staffing needs. The approach takes account of the resource requirements that will be necessary to safely operate MM ALR schemes as intended. Therefore no additional work will be needed to assess staffing levels for individual MM ALR schemes in isolation.
- 200 The Operating Regime (combined) PCF Product for each scheme will need to record that an assessment has been completed, and that the staffing requirements to operate the scheme have been agreed.

9.2 RCC Space Requirements

- 201 As MM ALR schemes do not have a dynamic hard shoulder, there is no need for a hard shoulder monitoring (HSM) subsystem to be housed within the RCC, so it is not anticipated that any additional server space will be required for this purpose.

9.3 Traffic Officer Procedures for Managed Motorways

- 202 To ensure national consistency across managed motorways operations, a single, standardised set of core procedures have been produced by the TOS Procedures Team, for approval by both the National Health & Safety Team (NHST) and the Resource and Capability Group²⁷ (R&CG).
- 203 It is the responsibility of each scheme to identify any specific considerations that require a “non-standard” operational procedure. In particular, the scheme will need to identify any hazards that may not have been included in the MM ALR generic hazard log, and where necessary determine appropriate mitigations.
- 204 The national TOS Procedures Team will work with each scheme to develop a set of procedures to cover such scheme specific conditions and to gain the necessary approvals. Where applicable these will form a set of regional procedures that will be described for each TOS region. Such procedures may include setting of variable signs and signals for TTM, and will need to ensure that operation of any permanent advance signs do not conflict with signs and signals set by the RCC.
- 205 The core and regional (scheme specific) procedures will be held and maintained centrally on the Traffic Officer Procedures Index on the Highways Agency Portal by the TOS Procedures Team.

²⁷ R&CG was formerly known as the Traffic Learning Centre (TLC)

9.4 Learning Requirements

- 206 The HA's Traffic Management Division, through the Resource and Capability Group (R&CG), will coordinate the national approach to all Traffic Officer learning requirements associated with MM ALR schemes.
- 207 To deliver this work, R&CG will analyse the competence requirements associated with the operation of each scheme for all TOS roles (mapping legal, safety and national standards requirements), and determine whether any gaps exist between the current operational standards, and any new standards required to safely operate MM ALR schemes.
- 208 This will enable new learning interventions and assessments to be created which deliver the required competence standards, and allow for individual achievements against the standards to be recorded.
- 209 Detailed training delivery plans will be agreed with each TOS region, to ensure that the relevant personnel have been appropriately trained before the first MM ALR scheme in the region becomes operational.

10. Glossary

Term	Definition
ACPO	Association of Chief Police Officers
ADS	Advance Direction Sign
Airwave	The Highways Agency's preferred communications technology between Core Responders for incident management
AMM	Area Management Memo
AMOR	Asset Maintenance & Operational Requirements – the replacement for the RWSC and NMM which sets out the HA's requirements for the delivery of routine maintenance and operational service within the ASC.
ASC	Asset Support Contract – the replacement for the Managing Agent Contractor (MAC) contracts, which form the basis of maintenance agreements on most parts of the Agency's network.
ATM	Active Traffic Management
CCTV	Closed Circuit Television
CFOA	Chief Fire Officers' Association
COBS	Control Office Based System: In-station software and servers enabling RCC operators to interact with roadside infrastructure and equipment.
Core Responders	Those organisations involved in responding to incidents on the HA network. The Traffic Incident Management Guidance Framework defines Core Responders as: the Highways Agency, (including the RCC and on-road Traffic Officer Service, Service Providers and their Traffic Incident Management Vehicles, the National Vehicle Recovery Manager and any other party contracted by the HA); and the Emergency Services, Vehicle Recovery Services and Motorist Assistance Organisations involved in responding to an incident.
CPS	Crown Prosecution Service
D3M	Dual 3-lane motorway
D4M	Dual 4-lane motorway
DfT	Department for Transport
DLOA	Detailed Local Operating Agreements
DLS	Driver Location Sign: A sign by the side of a motorway that gives the road number, direction of travel and distance from the start of the motorway of that location.
ENGF	Enforcement National Guidance Framework
ERA	Emergency Refuge Area
ERT	Emergency Roadside Telephone
ESS	Entry Slip Signals
FOM	Future Operating Model – a series of projects intended to create and shape the future of TMD in terms of sustainable, affordable service delivery.
HA	Highways Agency
HADECS	Highways Agency Digital Enforcement Compliance System
HMCS	Her Majesty's Courts Service
IAN	Interim Advice Note
ISU	Incident Support Unit

Term	Definition
Link	A length of motorway between consecutive junctions
MAC	Managing Agent Contractor. Being replaced by ASC.
MIDAS	Motorway Incident Detection and Automatic Signalling
MM HSR	A managed motorway scheme designed to IAN 111/09 standards
MM ALR	A managed motorway scheme designed to IAN 161/13 standards
MSA	Motorway Service Area
MSS	Message Sign Subsystem (of COBS)
NDD	Network Delivery and Development Directorate (of the Highways Agency)
NGF	National Guidance Framework
NHST	National Health & Safety Team
NMCS2	National Motorway Communications System 2
NMM	Network Management Manual
NPUG	National Procedures User Group
NRTS	National Roadside Telecommunication Service
NSCRG	National Safety Control Review Group
NTIS	National Traffic Information Service
NTOC	National Traffic Operations Centre
Operating Regime (combined)	A PCF product developed for each Scheme which sets out any divergence from this Concept of Operations document that may be necessary to deal with scheme specific issues capable of affecting operational practice. This product has been revised since its original inception to include the former Compliance Strategy and Implications on Core Responders Products, hence the reference to “combined” in the title.
PCF	Project Control Framework - This is a joint Department for Transport (DfT) and Highways Agency approach to managing major projects.
PTZ	Pan-Tilt-Zoom (CCTV cameras)
RCC	Regional Control Centre
RDD	Regional Divisional Director
R&CG	Resource and Capability Group (formerly Traffic Learning Centre)
ROM	Regional Operations Manager
RTMC	Regional Technology Maintenance Contract (replacement for TechMAC)
RWSC	Routine & Winter Service Code (replaced by AMOR)
SHARE	Sharing Highways Agency Records Electronically: the HA electronic file sharing system
SRN	Strategic Road Network
SRO	Senior Responsible Owner
TechMAC	Technology Managing Agent Contracts. Being replaced by RTMC
TMD	HA Traffic Management Directorate
TMMM	Technology Maintenance and Management Manual – a document setting out the HA’s performance requirements in relation to the carrying out of maintenance services on all traffic technology systems.
TOS	(Highways Agency) Traffic Officer Service
TTD	HA NDD Traffic Technology Division
VMS	Variable Message Sign
VMSL	Variable Mandatory Speed Limit

This page is intentionally blank

If you need help using this or any other Highways Agency information, please call **0300 123 5000** and we will assist you.

© Crown copyright 2012.

You may re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence: visit <http://www.nationalarchives.gov.uk/doc/open-government-licence/> write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email psi@nationalarchives.gsi.gov.uk.

This document is also available on our website at www.highways.gov.uk

If you have any enquiries about this publication email ha_info@highways.gsi.gov.uk or call **0300 123 5000**. Please quote the Highways Agency publications code

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