

Technology Management and Maintenance Manual

Version 2.1

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Acronyms

ALR	All lane running
AMI	Advanced motorway indicators
AMP	Asset Management Plan
APTR	All-purpose trunk road
ASC	Asset Support Contract
CAR	Control of Asbestos Regulations
CHARM	Common Highways Agency and Rijkswaterstaat Model
CMI	Controlled motorway indicator
DDS	Dynamic display systems
EMI	Enhanced matrix indicator
ERT	Emergency roadside telephone
IFA	Interface Agreement
MI	Matrix Indicator
MIDAS	Motorway Incident Detection and Automatic Signalling
MROD	Managed Roads Operational Development
MS4	Message Signal Mk4
NRTS	National Roads Telecommunications Services
NTIS	National Traffic Information Service
OOS	Out of service (assets)
OR	Operational regime
OSA	Operationally Significant Asset
PTS	Professional and Technical Solutions
RAP	Remote Access Protocol
RCC	Regional Control Centre
RMAS	Remote Maintenance Access Service
RTMC	Regional Technology Maintenance Contract
SDS	Streamlined Data Services
SLA	Service Level Agreement
SVD	Stopped Vehicle Detection
TAME	Traffic appraisal monitoring economics
TM	Traffic Management
TMMM	Technology Management and Maintenance Manual
TMU	Traffic Monitoring Unit
TNAMP	Technology National Asbestos Management Plan
TOS	Traffic Offer Service
TPMS	Technology Performance Management Service
TTM	Traffic Technology Maintainer
TRAMP	Technology Regional Asbestos Management Plan
VMSL	Variable mandatory speed limits

1. Introduction

This section provides an outline of the document structure, a definition of its scope, and instructions on how the document should be used.

1.1. Background

Highways England has key objectives to provide safer roads, a free-flow core network, maintain and improve road user satisfaction levels. Effective maintenance of the traffic technology systems which support the network plays an important role in achieving these objectives.

Under the Highways (Miscellaneous Provisions) Act 1961, highway authorities have an obligation to maintain public highways to reasonable standards. The current provisions are incorporated into the Highways Act 1980, Section 41 (duty to maintain) and Section 58 (special defence in actions for damages for non-repair). The importance of Section 58 is that it provides the defence "*that the Authority had taken such care as in all the circumstances was reasonably required to secure that the part of the highway to which that action related was not dangerous for traffic*".

1.2. Purpose

This document sets out Highways England's Performance Requirements in relation to the restoration to full service of technology assets that have incurred a fault(s).

1.3. Using this document

This document is structured to inform the Traffic Technology Maintainer (TTM) of the Performance Requirements for fixing faults that occur on a technology asset. These faults are defined by the function that is inhibited on the technology asset. Note that trial equipment is outside of the scope of TMMM and shall require separate agreements.

Performance Categories have been developed to provide the TTM with grouped metrics for fixing faults. The faults which are subject to each Performance Category have been identified in section 3.

In addition to ensuring that faults are resolved according to the relevant Performance Category, the TTM is expected to meet targets set by the Performance Metrics (see section 2.3) and monitor assets in accordance with general requirements that are specified in section 3.1.

Whilst the TTM shall reasonably use all tools and systems available to them in order to reduce time needed to fix an asset, it should be noted that this document does not enforce the use of systems such as Remote Access Protocol (RAP) or Remote Maintenance Access Service (RMAS) or any other specific initiative tool, system or process. These systems are provided to facilitate the TTM in carrying out their work more quickly and safely.

Failure by the TTM to deliver fault resolutions according to the Performance Metrics within this document (without an authorised ‘clock stop’ event – see section 2.4) shall be deemed to be a nonconformity.

1.4. Philosophy

In the context of the TMMM, a risk-based approach means that the TTM develops their maintenance plan using data and information about the assets, the needs of the network and the provision of customer service. This should underpin intelligent decisions as to where and when to undertake planned preventative maintenance work.

The primary risks that the TTM must mitigate against are:

- Safety – avoid the network becoming hazardous to highway users and negate the risk to road-worker safety (including traffic officers)
- Availability – avoid risk of restricting free flow traffic

These risks should be considered within the context of the operational regimes (OR) – the combination of methods / functions used to manage a section of the strategic road network (SRN) for example: smart motorways, all lane running (ALR), controlled motorways, ramp metering, etc. If an OR is inhibited in its performance, the safety and the availability of this section of the SRN can be compromised. It is the responsibility of the TTMs to ensure that Operationally Significant Assets (OSA) (defined in section 5.1) which underpin these ORs are not subjected to prolonged outages due to Service Affecting Faults.

The TMMM Performance Metrics have been designed to prioritise the restoration to service of Operationally Significant Assets which are subject to Service Affecting Faults.

The greater the operational significance of a technology asset, the greater the urgency required in restoring the technology asset to service. The degree to which a fault will degrade a technology asset’s functionality will also determine the level of performance required to restore the asset. With reference to these variables, three fault categories have been identified as per Table 1.

Table 1: Fault and Performance Category identification table

	Urgent Resolution Faults	Service Affecting Faults	Other Faults
Operationally Significant Assets	Performance Category 1	Performance Category 2	Performance Category 3
Other Assets	Not applicable	Not applicable	Performance Category 3

The TTM is required to resolve faults in line with the Performance Categories which are defined in section 2.3.

The TTM may be accountable to further Performance Metrics over and above those required by this document and according to their individual area contracts, but must, as a minimum, measure performance using the metrics described in this document.

1.5. Key operational processes for the TTM

The following are key operational processes that the TTM is required to perform:

- The TTM carries out work in a manner that will provide the Customer with a “special defence” under Section 58 of the Highways Act 1980.
- The TTM adopts / develops the key procedures and processes that may be required by the asset specific requirements shown in section 3 - Asset fault categories and specific requirements.
- The requirements of this document are minimum requirements, and the TTM must supplement them with any activity required to meet their contractual obligations.
- The TTM must include detailed procedures in the Quality Plan in relation to the inspection, making safe and repair of the asset.

1.6. General obligations

The TTM must deliver these performance requirements in accordance with the following general obligations:

- In compliance with all laws, statutes, regulations, by-laws, directives, rules and government orders applicable to the TTM.
- In accordance with all health and safety requirements stated in, but not limited to, the service information.
- The TTM ensures that the routine maintenance is carried out in a manner that supports Highways England in delivering its obligations under all relevant legislation.
- The TTM ensures that any routine maintenance is carried out in a manner that supports delivery of Highways England’s strategic objectives.
- The TTM adopts the asset management principles described in the contract documents.
- The TTM ensures that the routine maintenance is carried out in a manner that supports delivery of the current Highways England Sustainability Development Action Plan.
- The TTM will provide general input and guidance, when requested, to inform scheme designs and to facilitate successful handover into maintenance.
- The TTM shall adhere to any and all data requirements or processes advocated by Highways England.

- The TTM should use processes and procedures that are cost efficient, ensuring non-value adding work is minimised, and waste is eliminated. Continual improvement opportunities must be sought.
- The TTM should act proactively to facilitate any 3rd parties/contractors/suppliers which contribute to their maintenance regimes, and performance requirements specified in this document.
- Where any document or procedures are referenced in these Performance Requirements, they are deemed to be the latest versions.
- All hold points are observed and the TTM has a documented release mechanism in place.
- In line with the general requirement to continually improve the delivery of Services, the TTM shall understand its performance at all levels i.e. outcome, deliverable, process and procedure. The TTM shall develop and document performance improvements in agreement with Highways England, and use the measurement information to improve the delivery of the Performance Requirements.
- In developing a Quality Plan in respect of these Performance Requirements, the TTM must closely observe the quality policy themes covered by the contract documents.
- The TTM shall ensure that all equipment is appropriately calibrated such that it operates within the manufacturers stated tolerances and meets the performance criteria for which it has been installed. For example, this includes the performance of MIDAS detection equipment that may be used by the National Traffic Information Service (NTIS).
- Any asset disposal shall be completed in line with applicable legislation in place at the time, including the WEEE directive where appropriate.

2. Performance Requirements

The Performance Requirements specify the targets and behaviours expected of the TTM's when responding to faults to technology assets.

The Performance Metrics and requirements within this document apply to all assets handed into maintenance in alignment with MCH1349.

2.1. Fault identification

The TTM is responsible for ensuring all faults are reported. All faults affecting Operationally Significant Assets shall be raised on the Fault Management System within 1 hour of the time at which the fault symptom was first discovered.

The TTM is also required to report faults manually on the Fault Management System where the fault is not automatically recorded, with the fault start time being the time when it first occurred. All manually entered faults are required to be added to the system within 1 hour of being identified, and are subject to the same performance targets as those faults that are automatically added to the Fault Management System.

2.2. Maintenance levels

The maintenance levels for Traffic Technology Systems are split into 3 types – 'first', 'second' and 'third' line maintenance. Each level is described below and has been translated into the associated requirements within section 3.

- 'First line' maintenance is mainly on-site repair of a system, by replacing hardware or software.
- 'Second line' maintenance involves the swapping of modules or repairs of equipment at the TTM's depot.
- 'Third line' maintenance is triggered when 'first' and 'second' line maintenance actions have not resolved the problem (it is possible to move from 'first line' to third where 'second line' maintenance would not be appropriate). The faulty equipment will be sent to the Highways England National Distribution Centre and subsequently to a third line repair facility or returned to the manufacturer for repair.

2.3. Performance Metrics

The intention of the Performance Metrics is to address 3 key issues:

- 1) The time that an individual technology asset is unavailable for service due to a fault, lack of traffic management / safe access or lack of spares or engineers. This should be kept to a minimum to allow for the maximum availability to be realised from all assets.
- 2) Lack of clarity and/or manipulation of fault data to show an overall technology asset availability figure that is not representative.
- 3) Finally, these metrics should remove the overuse of repeated quick-fix resets that hide an underlying fault condition. Instead, the metrics are designed to encourage permanent fixes for these assets.

In order to prevent the situation where an asset is continually reset, and apparently restored to full functionality, only for a fault to reappear when the Regional Control Centre (RCC) attempts to use the asset, a maximum number of times that an individual asset can be reported as having a Service Affecting Fault in the assessment period is specified. The standard assessment period is 1 calendar month.

Any faults which occur to the technology assets shall be rectified according to the Performance Category that the fault is subject to. The TTM must ensure that resolution of these faults complies with the Performance Metrics that each Performance Category is subject to and presented in table 2 below.

Table 2: Performance Metrics for Performance Categories 1, 2 & 3

No.	Metric Description	Performance Category 1	Performance Category 2	Performance Category 3
1	Percentage of faults restored within 56 days	100%	100%	100%
2	Percentage of faults restored within 168hrs	100%	100%	90%
3	Percentage of faults restored within 48hrs	100%	100%	60%
4	Percentage of faults restored within 24hrs	100%	80%	Early fix priority must always be given to Performance Category 2.
5	Percentage of faults restored within 12hrs	100%	60%	Early fix priority must always be given to Performance Category 2.
6	Percentage of faults restored within 2hrs This time is extended to 4 hours for the following assets within tunnels: CCTV, signals and ERTs.	100%	Early fix priority must always be given to Performance Category 1.	Early fix priority must always be given to Performance Category 1.
7a	Maximum number of faults that have not been fixed within the Assessment Period in which they are reported, and that remain unfixed throughout the subsequent Assessment Period.	0 (zero)	0 (zero)	Not applicable – see metric 7b.
7b	Maximum number of faults that have not been fixed within the Assessment Period in which they are reported, and that remain unfixed throughout the subsequent 2 Assessment Periods.	Not applicable – see metric 7a	Not applicable – see metric 7a.	0 (zero)
8	Number of Assessment Periods where no more than 4 faults can occur against any individual asset.	1 Assessment Period	1 Assessment Period	2 Assessment Periods
9	No (zero) single assets within the Performance Category to have less than the stated percentage availability during an Assessment Period.	99%	93%	N/A as Performance Category 3 allows a single asset to have a fault lasting > 1 Assessment Period.
10	Average availability for all assets in the Performance Category within an Assessment Period.	99.99%	99.9%	97.5%

Note: an Assessment Period is 1 month unless agreed otherwise with the Regional Director.

Note: the Performance Category relates to the urgency of the fault – this takes into account the type of fault and the importance of the functionality impaired / unavailable for service.

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2.4. Performance Metrics and 'clock stopping'

The TTM may not always be held responsible for failing Performance Metrics where the time taken to restore a faulty asset is significantly delayed by the action / inaction of a third party. For example, failure to provide TM within the agreed Service Level (if external from the TTM) could delay the TTM who cannot access the asset for repair. The occurrence of a special circumstance event, such as a flood limiting access to the technology asset, could also fall within what is an allowable 'clock stop' as it would be unsafe for an engineer to attend the asset.

The TTM shall be measured against all time attributable to them, including that within the Service Level Agreements (SLA) of others. For example; the TTM requests TM within 2 hours of a fault occurring and the TM is delivered in 30 hours and the fault fixed in 1 more hour. The time attributable to the TTM would be 33 hours. A second example is; the TTM requests TM within 2 hours of a fault occurring and the TM is delivered in 60 hours - despite an SLA of 36 hours being in place - and the fault is fixed in 1 more hour. The time attributable to the TTM would be 39 hours (2+36+1). The time attributable to the TM provider would be 24 (60-36).

Clock stopping shall only be allowable where the three conditions (below) apply, and the reasons logged so that there is a full audit trail:

1. The TTM must have made every reasonable effort to remove the obstacle and facilitate the required third party resource. Where a third party is delaying the provision of a resource, multiple requests must be made by the TTM, and the issue escalated if the third party remains unresponsive.
2. The delay experienced by the TTM must not be negligible – i.e. it must constitute a significant delay so as to render conformance with a Performance Metric impossible to achieve, and as a minimum be over any agreed SLA.
3. Clock stopping must be approved by an authorised Signatory. The Signatory will be a Highways England Regional Director – or a designated representative thereof. The Signatory must agree that a clock stop is justified in the circumstances, and that the TTM made every reasonable effort to resolve the delay.

2.5. Out of service assets (OOS)

OOS assets are not currently included within the performance data generated by TPMS. Technology assets should only be made OOS with the written approval of the Contract Manager. Making an asset OOS should never be approved for fault fixing or maintenance repairs as these activities are designed to be measured by the Performance Metrics.

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3. Asset fault categories and specific requirements

The TTM should use the tables in the following subsections as a look-up of the Performance Category attributed to the asset fault. The fault descriptions are intentionally written as high level to provide easy identification of technology asset faults, and to provide transferable definitions for future Fault Management System(s). The TTM should agree a mapping of fault terms used in the following subsections against the detailed fault definition as defined in the Fault Management System used (e.g. the TPMS fault type).

The asset types included within individual sections below are:

- Closed circuit television (CCTV) and mast ancillary equipment
- Emergency roadside telephones (ERT) & all-purpose trunk road (APTR) phones
- Highways England digital enforcement cameras (HADECs)
- Highways England weather monitoring equipment
- Instation equipment (including Traffic Learning Centre)
- Matrix signs
- Message signs and associated equipment
- Motorway incident detection and automatic signalling (MIDAS)
- NTIS automatic number plate recognition (ANPR) cameras
- NTIS traffic appraisal monitoring and economics (TAME) sites
- NTIS traffic monitoring unit (TMU) sites
- Over height detectors
- Tidal flow equipment
- Road traffic signals
- Ramp metering equipment, including signal aspects
- Traffic detector equipment
- Ambient light monitor (ALM) equipment
- Barriers (where applicable)

This list is not exhaustive of current and future technology assets and any new assets and their Performance Category should be agreed with the contract manager until this document is updated.

3.1. General requirements

The TTMs are required to ensure that the following outcomes are achieved for all assets:

1. The technology asset continues to fulfil its intended purpose;
2. The technology asset operates efficiently and without premature reduction of equipment life; and,
3. The technology asset does not present a hazard to road users or TTMs.

For the TTM to achieve the required outcomes above, the Customer requires that the TTM will deliver the following:

1. Ensure that the technology asset is fully operational; and
2. Ensure that the technology asset is free from physical, software and electrical defects which can present a hazard(s) to road users or TTMs.

The TTM shall be expected to deliver these outcomes and deliverables by undertaking the following general process requirements:

1. Assess and record the condition of all technology assets and installations using Highways England provided systems where applicable.
2. Ensure that all current legislative requirements are met.
3. Maintain the performance of all technology asset components and installations and to rectify any defects which will prevent achievement of the required outcomes or increase the rate of deterioration of the technology asset.
4. Any faults which occur on the technology asset will be rectified according to the Performance Category that the fault is assigned to, as indicated in its specific sub-section within this section.

The TTM is expected to deliver procedures for the following:

1. Ensure that all technology assets have identification markers for logging within the fault management system that are clearly located and clearly visible and legible. The identification details included within the fault management system must also contain the correct asset information at all times.
2. Prepare and maintain an Asset Management Plan (AMP) that includes time and/or risk based approaches for undertaking condition assessments, assessing and prioritising defects and undertaking maintenance. The AMP will also include the methodology for undertaking repairs in accordance with the current fault management requirements.
3. Assess the condition of and maintain all components of the technology asset equipment in accordance with the approved AMP.

4. Record all technology asset equipment maintenance activities within Highways England's fault management system's asset management database.
5. Ensure that all technology asset equipment maintenance and repairs comply with the relevant standards and regulations.
6. Ensure that all technology asset equipment is maintained with parts obtained in accordance with stores operational procedures or via Highways England SLA with manufacturers.
7. The TTM shall undertake maintenance in accordance with the table below, unless otherwise agreed with the Customer or their agreed representative, or documented within the individual sub-sections below

Maintenance Level	Requirement
'First line'	On-site repair/reset (including SIM card replacement for some assets)
'Second line'	Swap modules or return to TTM's depot for repair
'Third line'	Send to Highways England National Distribution Centre. The equipment will subsequently be sent to a third line repair facility or returned to the manufacturer for repair

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3.2. Closed circuit television and mast ancillary equipment

CCTV equipment is located on the network to capture and transmit real time images of the network. The cameras are intended to give a clear real time view of what is happening on the network supporting operational decision making

The CCTV system as a whole allows operators to monitor the operation of the network, traffic conditions and manage incidents which enable a faster response and clearance of incidents to be achieved.

CCTV camera masts, poles and mountings, give the cameras an optimal position from which to monitor the network and are located at strategic positions in order to secure the effectiveness of the CCTV Cameras. They may also enable CCTV cameras to be lowered and raised for maintenance purposes.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
CCTV (hard shoulder monitoring) HSM cameras	Including but not limited to camera, housing and associated cabling and connections	CCTV Failure within tunnel or within 1km of a tunnel portal (both directions)	<ul style="list-style-type: none"> Cannot view a stable or valid image 	All other faults
CCTV Fixed Cameras	Including but not limited to camera, housing and associated cabling and connections		<ul style="list-style-type: none"> Cannot view a stable or valid image 	
CCTV PTZ cameras	Including but not limited to camera, housing and associated cabling and connections		<ul style="list-style-type: none"> Cannot view a stable or valid image Cannot operate camera correctly 	
CCTV roadside equipment	Including but not limited to housing and associated cabling and connections		<ul style="list-style-type: none"> Cannot Communicate 	
CCTV mast ancillary equipment	Including but not limited to associated cabling, winch systems, pan/tilt/zoom mechanisms and mountings associated with ANPR cameras and CCTV (PTZ and fixed and AID) cameras		<ul style="list-style-type: none"> Equipment Failure affecting movement of camera and image 	

Note: PC1 fault on a CCTV asset within a tunnel will have a 4 hour target fix time.

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3.3. Emergency roadside telephones (ERT) & all-purpose trunk road (APTR) phones

ERTs are provided on motorways and some all-purpose trunk roads as a service to road users to call for assistance in case of emergency, breakdown or incident. ERTs provide road users with a direct speech connection to the Regional Control Centre and constitute an emergency “999” telephone service.

The Road Users Charter sets the requirement for the ERT systems with published standards of service. Testing and cleaning of ERTs shall be undertaken to ensure a satisfactory service to road users in line with these standards.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault ¹	PC 3 - Other Fault
APTR phones	Including but not limited to handset, housing and associated cabling	<ul style="list-style-type: none"> ERT Failure within Tunnel (4 hours fix target) or within 1km of a tunnel portal (both directions, 2 hours fix target) Two or more consecutive ERTs in a single direction with PC2 faults should be considered as PC1. 	<ul style="list-style-type: none"> All ERT (including those in emergency refuge area (ERA)) that do not allow caller to communicate with call handler. 	All other faults
Emergency Roadside Telephone (ERT)	Including but not limited to handset, housing and associated cabling			

The TTM is required to undertake the following further procedures for ERT assets:

1. If the ERT is faulty or non-operative, the TTM shall cover the ERT with a “**NOT IN USE**” bag

¹ Two or more consecutive ERTs in a single direction with PC2 faults should be considered as PC1.

3.4. Highways England digital enforcement compliance system

Parts of the network employ HADECS enforcement equipment as a mechanism to improve compliance with variable mandatory speed limits (VMSL) displayed on advanced motorway indicators (AMIs).

For each aspect displayed by the AMI there is a corresponding threshold which, when exceeded, will cause the enforcement equipment to capture evidential data for the generation of a 'Notice of Intended Prosecution' (NIP). Evidence provided by the enforcement equipment and forming part of the NIP must be admissible in a court of law. As a consequence, the majority of maintenance responsibilities for the HADECS system are retained by the supplier who is the HADECS Maintainer, in accordance with MCH1788.

HADECS fault reporting is currently carried out by the HADECS Maintainer, these reports will be escalated to other parties where they have responsibility to act (e.g. RTMC may be required to fix a power to cabinet fault).

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Highways England Digital Enforcement Cameras (HADECS)	Including but not limited to camera, housing and associated cabling	N/A	<ul style="list-style-type: none"> Faults resulting in a loss of power to the cabinet. 	All faults

The TTM is required to undertake the following further procedures for HADECS assets

1. The TTM is responsible for fixing equipment connecting power to the cabinet, the cabinet itself and annual power tests.
2. The TTM provides support to the HADECS Maintainer in accordance with the SLA / IFA between the TTM and the HADECS Maintainer.
3. The TTM must act upon fault reports complied by the HADECS Maintainer in the same way as if notified by any other Fault Management System and log that fault on the Fault Management System.
4. The TTM shall work with the HADECS Maintainer to fix equipment, sharing and coordinating TM where appropriate.

3.5. Weather monitoring equipment

Severe Weather Information Service (SWIS) environmental sensor stations (ESS) and Met sensors (which include anemometers and fog detectors) are used to provide accurate and timely weather information to Highways England and its partners. The information gathered by these systems is used to assist Highways England in fulfilling its role as a network operator, particularly in times when adverse weather conditions prevail.

The data gathered by the ESS transmits weather information to the Highways England Weather Central Service and is primarily used for forecasting. ESS is crucial to keeping regional maintainers informed so that they can plan proactive responses to severe weather expected on their network. Met sensors use the Met Sub-system to communicate real-time data to the local RCC for processing and interfacing into the COBS (Control Office Base Station). Data from Met sensors appear on dynamic display system (DDS) within an RCC control room, the data is also used to set automated weather plans (fog warnings on VMS etc.).

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Environmental Sensor Stations (ESS)	Including but not limited to control room equipment pertaining to the communication and presentation of weather information.	N/A	<ul style="list-style-type: none"> The only forecasting site within a domain is affected. Primary forecasting site is affected within the same domain as a failed secondary forecasting site. Secondary forecasting site is affected within the same domain as a failed primary forecasting site Any Met sensor failure. 	All other faults
MET sensors	Also including but not limited to housing and associated cabling.			

3.6. Instation technology equipment at the regional control centres and Traffic Learning Centre

The RCC provide a 24 hour traffic management and information service every day of the year.

The RCC is primarily responsible for the management and operations of the Traffic Officer Service and will be focused on responding to traffic incidents which includes ensuring that the media are broadcasting accurate, up to date and factually correct information to road users.

Other RCC responsibilities include:

- planning for roadworks
- monitoring road conditions (through CCTV and detection technologies)
- allocating resources
- establishing diversion alternatives
- setting electronic road signs.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
CCTV instation equipment	Including but not limited to associated control room equipment.	<ul style="list-style-type: none"> • Service down/full operational failure 	All other system faults	N/A
Dynamic display systems (DDS)	Including but not limited to associated control room equipment.			
Road traffic signal instation equipment	Including but not limited to associated control room equipment.			
Highways England traffic management system (HATMS)	Including but not limited to control room equipment pertaining to the HATMS system			
Tidal flow traffic system instation	Including but not limited to control room equipment pertaining to the instation			
Telephone text controller (TTC)	Including but not limited to associated control room equipment.			

The TTM is required to undertake the following further procedures:

1. Assess and record the condition of all instation technology equipment and installations.
2. Ensure that all current legislative requirements are met.
3. Rectify any defects which will prevent achievement of the required outcomes or increase the rate of deterioration of the instation technology or other equipment.

Maintenance Level	Requirement
'First line'	HATMS including all subsystems (subject to any relevant software maintenance contracts) , CCTV, DDS, TTC and road traffic signal instation equipment
'Second line'	CCTV (hardware only), DDS, TTC and road traffic signal instation equipment. Note: all HATMS and subsystem issues beyond first line to be reported to the software maintenance contractor and recorded on NFDB
'Third line'	CCTV, DDS and road traffic signal and TTC instation equipment. Note: all HATMS and Tidal Flow System issues beyond first line to be reported to the software maintenance contractor and recorded on the NFDB

3.7. Matrix signals

Matrix Signal equipment is safety related and used to display advisory and mandatory restrictions, instructions or warnings to drivers. They are an integral part of the National Motorway Communication System (NMCS) and may be fitted in various combinations to NMCS access and non-access structures as follows:

- Matrix indicator (MI) fitted to either portal gantry or post structures.
- Enhanced matrix indicator (EMI) forming the signal elements of a Motorway Signal Mark 2/3 fitted to a cantilever.
- Controlled motorway indicator (CMI) fitted to either portal gantry, or post structures.
- Advanced motorway indicators (AMI) fitted to either portal gantry, or post structures.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Advanced motorway indicator (AMI)	Including but not limited to matrix signal (LED and optical fibre), signal drivers, signal structures, signal transponders installed at the roadside and associated cabling.	<ul style="list-style-type: none"> • Tunnel Matrix Signal Failure (4 hour fix target) 	<ul style="list-style-type: none"> • Cannot display required mandatory speed • Cannot display required advisory speed • Cannot display "red X" or "lane divert" • Cannot display "green arrow" 	All other faults

Note: PC1 faults on tunnel matrix signals/AMI will allow 4 hours

The TTM is required to undertake the following further procedures for matrix signal assets:

1. The TTM shall undertake maintenance in accordance with the table below:

Maintenance Level	Requirement
'First line'	LED matrix signals AMI (version 1) AMI (version 2) CMI
'Second line'	AMI (version 2) CMI
'Third line'	Send to Highways England NDC. The equipment will subsequently be sent to a third line repair facility or returned to the manufacturer for repair

3.8. Message signs and associated equipment

Message sign equipment comprises of all types of enhanced message signs (EMS) and variable message signs (VMS). These signs are safety related and are used to convey driver information or instructions to motorists. They are an integral part of the National Motorway Communication System (NMCS) and may be fitted in various combinations to NMCS structures.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
MS1	Including but not limited to message sign (LED, flip-dot, optical fibre and fixed text), message sign drivers, message sign structures, message sign transponders at the roadside and associated cabling.	N/A	<ul style="list-style-type: none"> Cannot display required advisory speed Cannot display required "wicket signs" 	All other faults
MS2			<ul style="list-style-type: none"> Cannot display a legend Cannot display required legend 	All other faults
MS3			<ul style="list-style-type: none"> Cannot display required legend Cannot display required diversion message at critical location 	All other faults
MS4			<ul style="list-style-type: none"> Cannot display required speed Cannot display required advisory speed Cannot display required legend Cannot display required "wicket signs" Cannot display required "FOG" legend 	All other faults

System / Asset	Scope	Performance Category			
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault	
Enhanced message signs (EMS)	Including but not limited to message sign (LED, flip-dot, optical fibre and fixed text), message sign drivers, message sign structures, message sign transponders at the roadside and associated cabling.	N/A	<ul style="list-style-type: none"> Cannot display required speed Cannot display required "wicket signs" Cannot display required diversion message at critical location 	All other faults	
Fixed text message signs (FTMS)			<ul style="list-style-type: none"> Cannot display required legend 	All other faults	
Lane control signs (LCS)			<ul style="list-style-type: none"> Cannot display required advisory speed Cannot display "red X" or "lane divert" Cannot display "green arrow" 	All other faults	
Remotely operated temporary traffic management signs			Includes all signs for warning of traffic management that the TTM is responsible for maintaining.	<ul style="list-style-type: none"> Cannot display required "wicket signs" Cannot display required speed Cannot display required legend Cannot display required diversion message at critical location Cannot communicate 	All other faults
Portable VMS			Including but not limited to associated cabling	<ul style="list-style-type: none"> N/A 	All faults
FTMS controllers			Including but not limited to associated cabling	<ul style="list-style-type: none"> Cannot communicate 	All other faults

The TTM is required to undertake the following further procedures for message sign assets:

1. The TTM shall undertake maintenance in accordance with the table below:

Maintenance Level	Requirement
'First line'	EMS VMS (MS2) VMS (MS3) VMS (MS4)
'Second line'	EMS VMS (MS2) VMS (MS3) VMS (MS4)
'Third line'	TTM to contact the ASC to manage the spares / equipment replacement process and engage with Highways England NDC as appropriate. The equipment will subsequently be sent to a third line repair facility or returned to the manufacturer for repair

3.9. MIDAS

MIDAS equipment is safety related and used to provide automatic queue protection through automatic signal and message sign settings in dynamic response to traffic conditions such as congestion and incidents. It seeks to prevent incidents due to congestion and “secondary incidents” by providing advance warning of slow moving/stationary traffic, and to improve traffic flows on busy motorways by applying appropriate speed limits on Controlled Motorways and Managed Motorways.

It is also used to provide traffic data to support the operation of ramp metering systems. MIDAS also collects real time traffic data used for performance analysis of the road network and for design purposes.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault ²	PC 3 - Other Fault
MIDAS detectors	Including but not limited to inductive loops, radar detectors, and equipment installed in the carriageway or at the roadside and associated cabling	N/A	<ul style="list-style-type: none"> Cannot measure detector occupancy Cannot measure speed or flow 	<ul style="list-style-type: none"> Midas not sufficiently calibrated for NTIS needs. All other faults
MIDAS outstation	Including but not limited to Motorway Incident Detection and Automatic Signalling (MIDAS) system, cabinets, transponder and associated cabling.		<ul style="list-style-type: none"> Cannot process detector data Cannot communicate 	

² PC2 category faults that relate to a single MIDAS loop failure within an array - and do not affect the operation of queue protection - can be treated as PC3. The subsequent PC2 failure of another loop within that array must be treated as PC2.

3.10. NTIS automatic number plate recognition (ANPR) cameras

The NTIS is the hub of the English motorway network and plays a key role in supporting the Highways England in delivering its strategic aims of "safe roads, reliable journeys and informed travellers". NTIS uses ANPR cameras to:

- provide accurate real-time traffic information to the public
- minimise the congestion caused by incidents, roadworks and events taking place on or near the motorway and trunk road network
- providing information on diversions to help motorists avoid the queues

In order to achieve these objectives the NTIS collects the journey time information via ANPR cameras which is analysed and subsequently disseminated in the form of useful travel information.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
ANPR Roadside controller	Including but not limited to housing and associated cabling	N/A	N/A	All faults
Automatic number plate recognition cameras	Including but not limited to camera, housing and associated cabling			

3.11. NTIS traffic appraisal monitoring and economics (TAME)

NTIS uses TAME equipment to:

- minimise the congestion caused by incidents, roadworks and events taking place on or near the motorway and trunk road network
- providing information on diversions to help motorists avoid the queues

In order to achieve these objectives the NTIS collects traffic monitoring data from TAME sites which is analysed and subsequently used for historical analysis of traffic flows.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Traffic appraisal monitoring and economics (TAME) loops	Including but not limited to traffic appraisal monitoring and economics (TAME) count sites installed in the carriageway or at the roadside.	N/A	N/A	All faults
TAME outstation	Including but not limited to associated cabling	N/A	All faults	N/A

3.12. NTIS traffic monitoring unit (TMU)

NTIS uses TMU equipment to:

- provide accurate real-time traffic information to the public
- minimise the congestion caused by incidents, roadworks and events taking place on or near the motorway and trunk road network
- providing information on diversions to help motorists avoid the queues

In order to achieve these objectives the NTIS collects data from TMU sites, which is analysed and subsequently disseminated in the form of useful travel information.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Traffic monitoring unit (TMU) loops	Including but not limited to cabinets, optical equipment, detector loops, push button or tactile facilities.	N/A	N/A	All faults
TMU outstation	Including but not limited to associated cabling	N/A	All faults	N/A

3.13. Overheight and high vehicle detectors

Overheight vehicle detector (OVD) and high vehicle detectors (HVD) are located to protect low structures by detecting overheight vehicles on the approaches to such structures. The OVD and the HVD provide the functionality to detect overheight or high vehicles at a defined height above the road surface and in the specific direction approaching the restricted height structure. On detection of overheight or high vehicles they inform drivers through a message displayed on the associated VMS.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Vehicle presence detectors	Including but not limited to associated equipment and cabling installed at the roadside	N/A	All faults	N/A
Height detectors				
High vehicle detectors				
Overheight vehicle detectors				
Structure incident detectors				
Controller				

3.14. Tidal flow traffic system equipment

Tidal Flow Traffic System equipment is used to control the direction of traffic on multiple lane roads usually with no central reservation. The equipment can be set to control the number of running lanes in each direction to suit traffic volumes and reduce congestion.

The number of running lanes in each direction is controlled by the RCC and is usually set employed to assist traffic flows at peak times but can also be used outside of these times if required. The RCC operator uses the Tidal Flow subsystem to change the gantry mounted signals on the main carriageway and often on associated slip roads to set the required flow state.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Tidal Flow Traffic System roadside equipment	Including but not limited to Tidal Flow Traffic System equipment, and associated roadside equipment.	<ul style="list-style-type: none"> Cannot Communicate 	N/A	All other faults
Message Signs	Including but not limited to Message sign (LED, flip-dot, optical fibre and fixed text), message sign drivers, message sign structures, message sign transponders at the roadside and associated cabling.	<ul style="list-style-type: none"> Cannot display required legend Cannot display required "wicket signs" 	N/A	

3.15. Road traffic signals

Red, amber, green (RAG) Traffic Signals and associated equipment are employed to prevent exit queuing on the motorway slips, entry control, traffic safety, congestion reduction and integration of traffic into the surrounding highway network. The control of the road traffic signals is subject to location and may comprise of urban traffic control (UTC) / split cycle offset optimisation technique (SCOOT), vehicle actuation (VA) or microprocessor optimised vehicle actuation (MOVA) systems.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Traffic light signals (RAG)	Including but not limited to road traffic signals, traffic signal controller (and any other equipment located inside the controller case) and any other case forming part of the site, detector cases, roadside transmission cabinets, miscellaneous equipment	<ul style="list-style-type: none"> All Traffic Signal Failure within tunnel or within 1km of a tunnel portal (both directions) All Traffic Signal Failure at a roundabout. All Traffic Signal Failure at a junction 	<ul style="list-style-type: none"> All other faults. This includes all Traffic Signal Loop Failure that still allow the junction to run in fail mode. Where this facility is not available, PC2 faults that would fully prevent service should be treated as PC1). 	N/A

The TTM is required to undertake the following further procedures for road traffic signal assets:

1. The TTM shall undertakes maintenance in accordance with the table below:

Maintenance Level	Requirement
'First line'	On site repair/reset (including SIM Card replacement for some assets)
'Second line'	Swap modules or return to TTM's depot for repair
'Third line'	Note: Highways England does not provide spares or repair facilities for traffic signal equipment.

2. Operational parameters of road traffic signals are optimised, monitored and amended to ensure the desired outcomes are achieved.
3. Prepare and maintain a Traffic Signal Failure Contingency Plan

3.16. Ramp metering system equipment

Ramp Metering System equipment is used to manage the number of vehicles joining a motorway at peak periods. Its purpose is to prevent or delay the onset of flow breakdown on the main carriageway.

Ramp metering currently uses traffic signals on the slip road which only come into operation when traffic sensors on the main carriageway indicate congestion. The loops on the mainline along with queue detection loops on the slip road enable the system to determine the size of vehicle platoons joining the main carriageway.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Ramp metering on-slip detectors / mainline MIDAS	Including but not limited to associated cabling	N/A	<ul style="list-style-type: none"> • Cannot measure detector occupancy 	All other faults
Ramp metering outstation	Including but not limited to associated cabling		<ul style="list-style-type: none"> • Cannot communicate 	
Traffic light signals	Including but not limited to road traffic signals, traffic signal controller (and any other equipment located inside the controller cabinet) and any other case forming part of the ramp metering site, detector cases, roadside transmission cabinets, miscellaneous equipment		<ul style="list-style-type: none"> • Lanterns cannot display • Lanterns cannot display required 	

3.17. Traffic detector equipment

Traffic Detector equipment is safety related and used to provide automatic queue protection through automatic signal and message sign settings in dynamic response to traffic conditions such as congestion and incidents. It seeks to prevent incidents due to congestion and “secondary incidents” by providing advance warning of slow moving/stationary traffic, and to improve traffic flows on busy motorways by applying appropriate speed limits on Controlled Motorways and Managed Motorways.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Traffic detectors	Including but not limited to associated cabling	N/A	<ul style="list-style-type: none"> Cannot measure detector occupancy Cannot measure speed or flow 	All other faults
Stopped vehicle detectors (SVD)	Including but not limited to associated equipment and cabling installed at the roadside		<ul style="list-style-type: none"> Cannot detect stopped vehicle 	All other faults

3.18. Ambient light monitor equipment

Ambient Light Monitors are provided to set the brightness of other technology assets, such as Message Signs and AMI’s on the same gantry.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Ambient light monitor (ALM)	Including but not limited to housing and associated cabling	N/A	N/A	All faults

3.19. Barrier systems

Barrier systems can be used to control access/egress, and could be linked to HATMS to warn of use or linked to signals and message signs to warn motorway traffic of operation. Note that 'barrier systems' refers to any assets that are included within the Technology Maintainer's contract and/or interface agreements.

System / Asset	Scope	Performance Category		
		PC 1 - Urgent Resolution Fault	PC 2 - Service Affecting Fault	PC 3 - Other Fault
Motorway access barriers	Including but not limited to barriers for access/egress at HGV yards, tunnel approaches, motorway access from compounds / access roads.	N/A	<ul style="list-style-type: none"> Barrier defect that prevents correct operation. 	All other faults
Sign / signal barriers	Including but not limited to barriers which affect signals or message signs or could be controlled or affected by HATMS.			
Other barriers	Technology controlled barriers		N/A	All faults

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4. Additional requirements

This section sets out processes and obligations that will contribute towards enabling the TTM to achieve the requirements of the TMMM. It does not prescribe a method for the maintainer to adopt.

4.1. Key operational processes for the TTM

The TTM is required to perform the following:

- Carry out work in a manner that will provide the Customer with a “special defence” under Section 58 of the Highways Act 1980.
- Supplement the minimum requirements set out in this document with any further activity required to meet its contractual obligations.
- Set out detailed procedures in a Quality Plan in relation to the inspection, making safe and repair of the asset.

4.2. Specific Obligations

The TTM must deliver the Performance Requirements in accordance with the following specific obligations:

- The TTM shall deliver any Highways England objectives in addition to the Performance Requirements.
- Processes shall be included in the Quality Plan and must include those stated here as being required. The processes must be designed in a manner that successfully achieves the deliverables.

Performance shall be measured and reported using the stated metrics and in accordance with the requirements of the contract documents.

4.3. Incident management

For the purposes of TMMM, the definition of an ‘Incident’ is included below and within the Conditions of Contract; an Incident requires a response within 2 hours.

- An unforeseen event which directly or indirectly affects the Traffic Technology assets, and causes, or has the potential to cause, disruption to the free flow of traffic. Alternatively or as well as, an incident with immediate or imminent threat to the integrity of any part of the network or Traffic Technology assets, or to land adjacent to the network likely to be affected by events on the network;
- Faults or defects involving Traffic Technology assets causing an immediate or imminent risk to the safety of the public, the TTM’s workforce or others.

An immediate response is required for these incidents and for requests to make assets “safe” that are received from the:

- Regional Control Centre,
- Police and other emergency organisations,
- Customer's Asset Support Contractor or other agreed body,
- Traffic officers and;
- Others who are responding to or notifying the TTM of an Incident affecting the network.

If for whatever reason, corrective action or repair is not reasonably practical within the specified period, the TTM shall implement temporary measures to make safe or mitigate the effects of the Incident, defect or fault. The TTM shall immediately instigate procedures to affect the full repair in the most effective and efficient manner possible, and in line with the Performance Requirements within this document.

The TTM shall ensure that all relevant parties are fully informed and updated before the end of the next working day, and on the status of any Incident, defect, fault repair or other actions undertaken.

4.4. Fault management system

The TTM shall use and fully populate the relevant fault management system and any ancillary systems that Highways England requires for the management of faults on the Strategic Road Network. Data accuracy within the Fault Management System, including all applicable fields for each asset, should be at least 99.5%.

The TTM shall be aware of the main features that the fault management system offers with respect to monitoring technology asset faults such as:

- Fault reporting - including manual and automatic reporting;
- Dashboard of health;
- Availability data;
- Contractor service performance; and,
- Fault and repair time data.

4.5. Interface agreements

Where the TTM's work needs to be co-ordinated with others (e.g. Customers, contractors, etc.) or different parts of the Customer's organisation (e.g. traffic officers) the TTM shall ensure that the work interfaces are effectively and efficiently managed such that any adverse impact of the TTM's ability to deliver the outcomes is minimised.

In particular, the TTM is highly dependent on the availability of NRTS transmission services and the services of others that interface with it because they are integral to the

performance of the Traffic Technology Systems that the TTM is responsible for maintaining. Therefore, a good and efficient working relationship between the TTM and other organisations it interfaces with (including NRTS Co.) is essential.

Whenever faults occur in the vicinity of the NRTS/Technology Maintainer Interface (i.e. near the Service Delivery Points) the Technology Maintainer is responsible for determining whether the fault is the responsibility of the Technology Maintainer or of the NRTS Co. Should the fault be determined the responsibility of another party, such as the NRTS or DNO, the Technology Maintainer must raise that fault in a timely and appropriate manner, as agreed with third parties and Highways England, and provide support to that party in resolving the fault.

In the case of TTM maintained equipment using legacy protocols (RS485 and HDLC) the TTM will use a NRTS End Customer Tester (NECT) to accurately allocate the faults to the correct party. The use of the NECT to support fault allocation by the TTM is further defined in MCH2551. The NECT testers will be issued free to the TTM to allow the implementation of the fault allocation process.

Training in the use of the NECT may be provided for up to 8 personnel, at the start of the contract or when the use of the NECT is introduced. The TTM will subsequently be required to train any additional staff involved in fault finding activities. The TTM will be required to nominate a “NECT champion” through which any issues relating to the use of the NECT and faults identified by the NECT can be shared with Highways England and its contractors (in particular the NRTS Co.) through a process of regular liaison.

Specific information relating to NRTS and the location of NRTS Service Delivery Points are defined in:

- a) MCH 1146 NRTS Guide for RMC
- b) MCH 1148 NRTS Guides Supporting Information Services and Interfaces
- c) MCH 1149 NRTS Guides Supporting Information Assets and Responsibilities
- d) MCH 2551 NRTS / RTMC Handover Process: (Legacy Services)

The TTM shall ensure that the Agreements are always up to date and store these within their QMS and produce them for review by the Customer within 24 hours of any request.

Interface Agreements are intended to address the physical, institutional, and operational details of the interface between each party at all working levels. The objective is to produce a partnering agreement where the obligations and responsibilities of each party are consistent, clearly understood, respected and implemented efficiently and fairly. Any IFA should include how each party will prioritise their work to ensure that they can work collaboratively in order to help meet the strategic goals of Highways England.

The TTM shall liaise with and co-operate with other organisations it interfaces with (including NRTS Co.) in producing an ‘Interfacing Agreement’ that meets these objectives and in ensuring that all the procedures between other organisations and the TTM are efficient and compatible and in the wider interests of the Customer. The TTM shall cooperate with NRTS Co. by providing information on performance issues and

data relating to the equipment maintained by the TTM that exhibits communication related faults.

The Interface Agreements shall include (but are not limited to) procedures for:

- The use of specific MCH documents and interface test equipment (for example, the NECT, as required by NRTS).
- Compliance with service delivery points as defined within the relevant NRTS MCH documents.
- Fault notification and clearance
- Routine maintenance
- Repair and reinstatement of damage and recovery of costs
- Location of cables and buried infrastructure
- Co-ordination of planned works
- The interfaces and management process between all parties (including interface diagrams)
- Access arrangements
- Electrical testing of shared supplies
- Disconnection & reconnection of road side systems
- Road space
- Use of traffic management provided by Others
- Priority access
- Service Levels agreed

4.6. Stores operating procedures

The National Distribution Centre (NDC) is generally responsible for replenishing the TTM's regional stores. This is to ensure that the TTM is able to replace defective assets effectively. The TTM shall be proactive in working with the NDC and/or other responsible parties for the provisioning of spares to enable it to fulfil its requirements as detailed within this document. The fault timer shall not be stopped due to a lack of spares. To enable the NDC and other responsible parties to undertake stock replenishment, the TTM shall – as a minimum;

- Monitor the stock levels for the stores and provide weekly updates on stock levels to the NDC and other responsible parties;
- Request any changes to the min-max levels to be agreed with the NDC and other responsible parties;
- Pro-actively avoid any shortage of spares, including cables, and report any stock levels which have fallen below the minimum accepted level to the NDC or other responsible parties within one day of identification.

- Make any necessary emergency requests to the NDC and other responsible parties for the provision of technology assets which are required for the rectification of fault.

The TTM is required to comply with MCH 2538 (Technology Maintenance Stock Management Operating Procedures) which was published to give maintainers traffic technology stock operating procedures (including Warehouse Management System (WMS) procedures) for the roll out of a centralised national Stock Management System (SMS).

MCH 2538 explains how to utilise the system-based and none system-based processes, and how these processes interface with Highways England's financial system.

These operating procedures are for all stock that is held at a maintainer's network, store, satellite compounds and engineers' vehicles irrespective of the status of stock. It should be noted that these procedures do not cover stock management processes and accounting within the National Distribution Centre.

4.7. Asbestos management

The management of asbestos associated with Highways England assets has been defined in the General Asbestos Management Plan and associated documents prepared by Highways England to fulfil its obligations under Regulation 4 of Control of Asbestos Regulations (CAR) for all HA assets. Specific guidance on the management of asbestos in Traffic Technology Systems is given in the Technology National Asbestos Management Plan (TNAMP) which conforms to the overarching principles defined within those documents.

The duties required for compliance with CAR are therefore the responsibility of the TTM to implement in accordance with procedures defined by Highways England.

Notwithstanding that Highways England assumes the ultimate 'Duty to Manage' these assets through procedural requirements outlined in the general documentation (e.g. by authorisation of Asbestos Management Plans which are required to be produced annually by the TTMs).

The TTM also has duties under CAR, notably Regulation 11 and those associated with implementation of works to and in the presence of asbestos products. These duties relate to their employees and other persons who may be affected by the works.

Highways England has assigned the day to day management of its technology assets to the regional technology service TTMs and has required each incumbent to produce a Technology Regional Asbestos Management Plan (TRAMP) and associated Asbestos Action Plans (AAP).

Guidance on the production of a TRAMP is available within the TNAMP.

4.8. Maintenance at or near tunnels

Highways England, through its service providers, manages a number of tunnels. It is essential that equipment and procedures are in place to manage the tunnel operation 24 hours a day and to satisfy European Union Tunnel Safety Directives. The tunnel bores are constantly monitored to confirm the safe transit of vehicles through the tunnel. There are also a series of stringent safety procedures and various safety equipment in place which become active should an Incident occur within the tunnel.

The equipment used to manage tunnel safety is varied and is managed and maintained through various operational contracts. This document specifically addresses Highways England requirements for those parts of the system that are overseen and monitored by the RCCs.

Listed below are the Traffic Technology System assets which are referred to in Section 3 of this document and which convey data to the HATMS located within the RCC:

- Tunnel road traffic signals
- Tunnel matrix signals
- Tunnel emergency roadside telephones
- Tunnel CCTV

Faults that occur in any of the above assets which are located within a tunnel are assigned to Performance Category 1.

It should be noted that tunnel equipment maintenance arrangements vary depending upon any local agreements which are in place for each tunnel. Those agreements should be read in conjunction with this document. The tunnel agreements will indicate which of the above assets are monitored by the tunnel control room and consequently which assets are outside the scope of this document.

4.9. Traffic management

The TTM is responsible for initiating a Traffic Management (TM) booking for the purposes of fault rectification. The time durations allowable within the Performance Requirements are inclusive of the time it takes for the TTMs and their 3rd parties to arrange, book and implement TM. The time should be represented as an SLA and agreed between all parties, including Highways England.

In order for fault rectification to be efficiently undertaken on the SRN, the TTM is subject to the following requirement:

- All faults present on a section of the network subject to TM shall be resolved before TM is removed or before the Performance Metric dictates (whichever is the shortest fault duration);

4.10. Non-reactive / preventative maintenance

The TTM shall detail the process for non-reactive and preventative maintenance within their Quality Management Plan and record the attendance within the appropriate management system.

5. Annex

5.1. Annex 1 term definitions

Assessment Period	1 calendar month
Conditions of Contract	The need for the TTM to identify efficiencies and improvements as contractually obliged.
Customer	Highways England
Fault Duration	The elapsed time between the time at which a fault symptom is reported and the time at which the asset is restored to service.
Fault Management System	The Highways England Supplied system for managing and tracking technology asset faults.
Fault timer	A measure of the time duration that a fault is present on a technology asset.
HADECS Maintainer	Generally the supplier of HADECS equipment as defined in MCH1788.
Interface Agreements	Agreements intended to address the physical, institutional, and operational details of the interface between each party at all working levels.
Operational Regimes	The combination of methods/functions used to manage a section of the Strategic Road Network (SRN) (e.g. all lanes running [ALR], smart motorways, controlled motorways, Ramp Metering).
Operationally Significant Assets	An asset which underpins the performance of the operational regimes and determines the ability to provide the required functions.
Others	“Others” are parties who contribute to the performance of the maintenance of technology assets.
Performance Category	A group of measures, called metrics, which a fault is assigned to. The Performance Category is determined by the severity of the fault to the asset – and the relative importance.
Service Affecting Faults	A fault which prevents an Operationally Significant Asset from performing the functions it is required to undertake.
Service Level Agreement	The contractual level/standard of service that must be provided.
Traffic Technology Maintainer (TTM)	Any party who has contractual responsibility to repair a fault on any individual technology asset to the timescales set out by the Performance Requirements in this document.
Traffic Technology Systems	An umbrella term for technology assets that are used for the operational, control, monitoring or informational purposes of the Highways England SRN and APTR.