A303 Amesbury to Berwick Down (Stonehenge)

Volume 2 – Scope

Part 4 – Maintenance Period Requirements

April 2022

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Table of Contents

Section Page

1. Introduction

1.1. Maintenance Services

1.1.1. The Maintenance Services shall be provided for the Affected Property.

1.1.2. The Maintenance Services shall

- be provided in accordance with the Service Standards included in section 2 (Service Standards) of this document,
- include all activities and requirements in accordance with section 3 (Mobilisation for the Maintenance Period) of this document,
- include all operations and interface requirements in accordance with section 4 (Operations) of this document,
- include all asset management and maintenance requirements in accordance with section 5 (Asset management and maintenance) of this document and
- include handover requirements in accordance with section 6 (Handover at Maintenance Completion Date) of this document.

1.1.3. The Maintenance Services shall be provided to avoid adverse impacts to the *Client*'s and Wiltshire Council's roads and infrastructure.

1.1.4. If the Maintenance Services cannot be provided to avoid adverse impacts, the Contractor shall

- agree with the *Client* and Wiltshire Council the proposed mitigation measures and
- implement the agreed mitigation.

1.1.5. The delivery of the Maintenance Services shall

- be provided in accordance with the *Client*'s South West Maintenance Requirements Plan[1] and
- align with the delivery of maintenance and operation activities taking place on adjacent sections of the A303 outside of the Affected Property.

1.1.6. The Maintenance Services shall be provided in a manner that supports the *Client* in undertaking its duties as required by The Road Tunnel Safety Regulations 2007 / SI 1520.

1.2. Maintenance Period

1.2.1. The Maintenance Period shall be as defined in Volume 1 (Contract Data) of the contract.

1.3. Affected Property

1.3.1. The Affected Property shall comprise

- within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200[2] (Extents of Affected Property), all assets and

[1] Refer to the Data Room [25] for the *Client*'s South West Maintenance Requirements Plan.
[2] Refer to Volume 4 (Contract Drawings) of the contract for drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property).

infrastructure listed in Table 1-1 (Assets and infrastructure comprising the Affected Property) and

- all tunnel related systems or technology installations which have been provided as part of the *works* outside of the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property).

1.3.2. The list of assets and infrastructure included within the Affected Property that are subject to the requirements of this Volume 2 Part 4 (Maintenance Period Requirements) shall be updated by the *Contractor* to

- reflect the *Contractor*'s final design solution and
- include any additional assets or infrastructure which have been provided as part of the *works* and are associated with the Asset Categories listed in Table 1-1 (Assets and infrastructure comprising the Affected Property).

Table 1-1: Assets and infrastructure comprising the Affected Property

Asset Category No.	Asset Category	Description of assets and infrastructure included
1	Pavements and paved areas, including kerbs and hard standing areas	The new eastbound A303 within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
		The new westbound A303 within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
		Longbarrow Junction north-east facing slip road
		Longbarrow Junction south-east facing slip road
		Countess Roundabout north-west facing slip road
		Countess Roundabout south-west facing slip road
2	Road markings and road studs (associated with Asset Category No. 1)	Carriageway markings within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200
		Road studs within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
3	Road restraint systems (associated with Asset Category No. 1)	Verge side barriers within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
		Central reserve barrier within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
		Traffic control barriers within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
		Crossover barriers
4	Road traffic signs (associated with Asset Category No. 1)	Fixed traffic signs within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
5		Countess Roundabout Flyover (East and West)

	Structures (including all Elements[3])	Countess Roundabout Flyover - South West Retaining Wall
		Countess Roundabout Flyover - North West Retaining Wall
		Countess Roundabout Flyover - North Central Retaining Wall
		Countess Roundabout Flyover - South Central Retaining Wall
		Countess Roundabout Flyover - North East Retaining Wall
		Countess Roundabout Flyover - South East Retaining Wall
		Longbarrow Junction (Green Bridge 3)
		Longbarrow Land Bridge (Green Bridge 4)
		Western Tunnel Portal Approach North Retaining Wall
		Western Tunnel Portal Approach South Retaining Wall
		Longbarrow North Retaining Wall
		Longbarrow South Retaining Wall
		Eastern Tunnel Portal Approach North Retaining Wall
		Eastern Tunnel Portal Approach South Retaining Wall
6	Tunnel structure (Stonehenge Tunnel) (including all Elements[4])	Eastern and western tunnel services buildings
		Bored tunnel
		Cross passages
		Eastern cut and cover tunnel section
		Western cut and cover tunnel section
7	M&E and technology (including all Elements[5])	All tunnel drainage infrastructure
		High-voltage (HV) electrical systems (including Plant and Materials)
		Low-voltage (LV) electrical systems (including Plant and Materials)
		Mechanical and electrical (M&E) and technology related systems, controls, fixtures and fittings
		Ventilation systems (including Plant and Materials)
		Smoke and fire detection alarm systems (including Plant and Materials)
		Firefighting and fixed firefighting suppression systems (including Plant and Materials)
		Drainage pumps and systems (including Plant and Materials)
		Lighting systems (including Plant and Materials) (tunnel and green bridge four)
		Tunnel services buildings systems (including Plant and Materials)

[3] Refer to annex 5 (Structures Performance Requirements) of section 5 (Asset Management and Maintenance) of this document for the list of structures Elements.
[4] Refer to Annex 6 (Tunnel Structure Performance Requirements) of section 5 (Asset Management and Maintenance) of this document for the list of tunnel structure Elements.
[5] Refer to Annex 7 (M&E and Technology Performance Requirements) of section 5 (Asset Management and Maintenance) of this document for the list of M&E and technology Elements.

		Systems (including Plant and Materials) associated with the tunnel control and management system (TCMS)
		Variable message signs
		Communications systems (including Plant and Materials), including emergency and maintenance telephones
		Power and communications cabling
		CCTV and PA systems (including Plant and Materials)
		Incident detection and management systems (including Plant and Materials)
		Speed control and enforcement systems (including Plant and Materials)
		Overheight vehicle detection systems (including Plant and Materials)
		Tunnel closure systems (including Plant and Materials)
		Speed limit indicators
		Traffic monitoring and management systems (including Plant and Materials)
		Queue detection systems (including Plant and Materials)
		Weather monitoring systems (including Plant and Materials)
		Security and evacuation systems (including Plant and Materials)
		Cabinets and plinths
		Technology systems (including Plant and Materials) associated with the operation of the tunnel that extend beyond the extents as shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)
		All sensors and asset performance monitoring and fault management technology and systems (including Plant and Materials) provided as part of the *works*
8	Drainage and service ducts (to the point of outfall) (associated with Asset Category No. 1)	All drainage features outside the tunnel and within the extents shown on drawing HE551506-AMW-GEN-SW_GN_000_Z-DR-CH-4200 (Extents of Affected Property)

1.4. Maintenance Services plans and strategies

1.4.1. Table 1-2 (Maintenance Services strategies and plans) lists the plans and strategies that shall be developed and implemented as part of the Maintenance Services.

1.4.2. Once the plans and strategies listed in Table 1-2 (Maintenance Services strategies and plans) are accepted by the *Project Manager* the *Contractor* shall comply with them.

1.4.3. The *Client* and the *Project Manager* shall be provided with all data and information which is required to allow the *Client* to develop its own plans or strategies prior to, and throughout, the Maintenance Period.

1.4.4. All plans and strategies shall be developed in conjunction with, and to be compliant with, the Obligations of the DCO including any requirements or information contained in the Handover Environmental Management Plan (HEMP).

1.4.5. All plans and strategies shall be

- provided in accordance with the requirements of the Service Standards and
- aligned to the *Client*'s South West Maintenance Requirements Plan.

Table 1-2: Maintenance Services strategies and plans

Strategy or Plan	
Operations Interface Plan	
Incident Response Plan	
Asset Management Strategy	
Asset Management Forward Plan	Annual Asset Management Plan
	Five-year Asset Management Plan
	Ten-year Asset Management Plan
Condition Reports	Initial Condition Report
	Monthly Condition Report
	Annual Condition Report
Maintenance Services Handover Schedule	

1.5. Network availability

1.5.1. The Maintenance Period shall be split into

- Embargo Periods,
- Peak Periods and
- off-peak periods.

1.5.2. The Maintenance Services shall be provided to achieve the requirements for Availability for

- the section of the new A303 within the Affected Property and
- each year of the Maintenance Period.

1.5.3. The following requirements for Availability shall be achieved

- a minimum Availability of 99.9% during Embargo Periods,
- a minimum Availability of 99.0% during Peak Periods and
- a minimum annual Availability of 98.0%.

1.5.4. The requirements for Availability shall include planned and unplanned maintenance activities.

1.5.4a No planned maintenance activities that impact Availability shall be permitted during Embargo Periods.

1.5.5. The requirements for Availability shall not include closures that result from incidents caused by the Road User.

1.5.6. Embargo Periods shall be

- from 06:00 Friday to 22:00 Monday each week,
- all bank holidays and public holidays of England,
- the summer and winter Solstices,
- vernal and autumnal Equinoxes and
- three (3) calendar days preceding and three (3) calendar days following each bank holiday, each public holiday, each Solstice day and each Equinox day.

1.5.7. Except where already defined as an Embargo Period, Peak Periods shall be

- from 06:00 to 22:00 each day and
- thirteen (13) weeks from 06:00 on the second (2nd) Friday of June to September.

1.5.8. Planned closures within the Affected Property shall be limited to a maximum of two (2) lanes closed simultaneously.

1.5.9. Where both lanes of a tunnel bore are closed, the other tunnel bore shall operate under contraflow.

1.5.10. Contraflow shall only be permitted between the hours of 22:00 and 06:00.

1.5.10a Single lane closures in the Affected Property shall not be permitted for planned maintenance.

1.5.10b Except for the following conditions, single lane closures in the Affected Property shall not be permitted for unplanned maintenance

- in lane two (2) to gain access to cross passages and
- for a period not exceeding thirty (30) minutes.

1.5.11. In the event of incidents caused by the Road User, hours that overrun the approved road space booking time-slot shall be subject to the Availability requirements, for both the

- immediate response and
- corresponding permanent repair.

2. Service Standards

2.1.1. The Maintenance Services shall as a minimum be provided in accordance with the following Service Standards

- Design Manual for Roads and Bridges (DMRB) [1],
- Manual of Contract Documents for Highway Works (MCHW) [2],
- Asset Delivery Asset Maintenance requirements (ADAMr) [3],
- Asset Delivery Asset Inspection requirements (ADAIr) [4],
- the Operational Requirements for Network Occupancy [5],
- the Severe Weather Requirements [6],
- the Incident Management Requirements [7] and
- Asset Data Management Manual (ADMM) [8].

2.1.2. Any reference in the Service Standards to an asset type, category or area shall be interpreted as reference to the equivalent Asset Category, Asset, Element or Sub-Element comprising part of the Affected Property.

2.1.3. The Maintenance Services shall be provided to satisfy

- the outcome, deliverables, processes and procedures as defined within the Service Standards,
- the Performance Requirements and
- any additional requirements of this Volume 2 Part 4 (Maintenance Period Requirements).

2.1.4. A reference to any provision of a Service Standard shall be deemed to include a reference to any other provision of the Service Standards required to interpret or give meaning to the provision.

3. Mobilisation for the Maintenance Period

3.1.1. Prior to the Maintenance Period, all mobilisation activities for the provision of the Maintenance Services shall be completed, including

- the requirements contained in Volume 2 Part 2 (Design and Technical Requirements) of the contract,
- all inspection, testing and commissioning and handover requirements in accordance with GG 182 'Major schemes: Enabling handover into operation and maintenance' [9],
- submitting the Tunnel Closure Management Plan (TCMP[6]) for acceptance by the *Project Manager*,
- familiarisation with the *works* and training for all persons involved in delivery of the Maintenance Services,
- trialling, testing and verification of all plans, strategies and systems that will be required by the *Contractor* and the *Client* during the Maintenance Period,
- participation in emergency exercises including in accordance with CS 452 'Inspection and records for road tunnel systems' [10], CM 430 'Maintenance of road tunnels' [11] and 'PIARC Best Practice' for road tunnel emergency exercises,
- population and testing of the Asset Management System and training in its use,
- satisfying the requirements in relation to the *Client*'s asset management systems in accordance with section 5.10 (Asset Management System) of this document,
- confirmation of all required interfaces and communication channels between the *Contractor* and the *Client*,
- training of the *Client*'s and the *Contractor*'s staff in relation to the Maintenance Services, including for the tunnel control and management system (TCMS),
- providing all information and data to allow the *Client* to assume operational control of the *works* both inside and outside the Affected Property,
- providing all information and data to allow the *Client* to assume their maintenance responsibility for assets outside of the Affected Property and
- any additional activities required for the Maintenance Services to be immediately and seamlessly implemented at the start of the Maintenance Period.

[6] Refer to action or commitment MW-TRA12 of the OEMP.

4. Operations

4.1. General Requirements

4.1.1. Operational responsibilities for the Maintenance Period shall be split as defined in Table 4-1 (Operational responsibilities during the Maintenance Period).

4.1.2. The following operational activities shall be provided as part of the Maintenance Services

- attending and assessing the condition of the Affected Property following an incident,
- the making safe following an incident,
- permanent repairs and renewals of the Affected Property following an incident at the request of the *Project Manager*,
- safety patrols and safety inspections of the Affected Property,
- surveys and inspections of the Affected Property,
- machine surveys (e.g. TRACS, skid resistance) of the Affected Property,
- the design and installation of traffic management for planned and unplanned maintenance activities, in accordance with the Operational Requirements for Network Occupancy [5],
- providing traffic management for incidents where instructed and
- the collection, storage and transfer of data and information for Green Claims and Red Claims.

Table 4-1: Operational responsibilities during the Maintenance Period

Activity	Responsibility of the *Contractor*	Responsibility of the *Client*
Strategic operational control		✓
Payment of utilities costs and waste disposal costs		✓
Operation of tunnel signals and traffic signals		✓
Operation of crossovers		✓
Incident management and clearance		✓
Vehicle recovery		✓
Attend and assess asset condition following an incident	✓	
Make safe and permanent repair / renewal of assets following an incident	✓	
Safety patrols and safety inspections	✓	
Machine surveys (e.g. TRACS, skid resistance)	✓	
Condition surveys and inspections	✓	
Network occupancy and road space booking management		✓
Design and installation traffic management (planned and unplanned maintenance)	✓	
Provide traffic management for incidents where instructed	✓	

Severe weather management and decision making		✓
Severe weather treatments		✓
Litter picking	✓	
Landscape and ecology maintenance (soft estate management, including grass cutting and vegetation clearance)		✓
Management of Green Claims and Red Claims		✓
Data and Information collection for Green Claims and Red Claims	✓	

4.1.3. All information and data that is required by the *Client* to perform their operational activities and responsibilities as listed in Table 4-1 (Operational responsibilities during the Maintenance Period) shall be provided.

4.1.4. Information that is required by the *Client* to investigate and manage Green Claims and Red Claims shall be provided.

4.1.5. The contact details of stakeholders shall be established and maintained, including

- the Regional Operations Centre (ROC),
- the *Client*'s maintenance staff, including adjacent route service providers,
- emergency services,
- Wiltshire Council,
- the Environmental Agency,
- English Heritage (including the Stonehenge Visitor Centre),
- adjacent landowners and
- community forums and groups.

4.1.6. The contact details for stakeholders shall be updated as

- a minimum every ninety (90) calendar days through the Maintenance Period or
- soon as the *Contractor* is notified of a change.

4.1.7. The primary point of contact for all communications in the event of an incident or emergency shall be the ROC.

4.1.8. The *Project Manager* shall be notified within twenty-four (24) hours of all communications that are sent directly to the ROC.

4.1.9. Communication links shall be maintained to allow twenty-four (24) hours a day communication with the ROC.

4.1.10. The following shall be maintained through the Maintenance Period

- up-to-date communication channels and systems with all required stakeholders and
- all data and communication security protections and protocols.

4.1.11. A record shall be maintained, within the Asset Management System, of all the activities that have been undertaken in relation to the Maintenance Services including

- the interfaces, instructions and activities undertaken as part of the Maintenance Services,
- all actions undertaken by the *Client*'s operators through the *Contractor*'s instruction,
- all voice commands and communications from the *Client*,
- any activities undertaken in relation to incidents in accordance with section 4.3 (Incident response) of this document and
- any unauthorised access to the Affected Property by prohibited road users.

4.1.12. The record shall be

- kept up to date through the Maintenance Period and
- made available at the request of the *Client* or the emergency services for use in investigating incidents.

4.1.13. Severe weather service requirements shall include

- providing all information, data and suitably qualified resource to attend meetings to allow the *Client* to develop its severe weather service in accordance with the Severe Weather Requirements [6],
- providing all required training to the *Client* in regard to Assets or Plant and Materials which have been provided as part of the *works* and are to be used during severe weather.

4.1.14. Two (2) days of training per year in respect of severe weather service shall be attended by the *Contractor*.

4.1.15. Litter picking shall be undertaken to maintain the Affected Property to grade A standard in accordance with the Code of Practice on Litter and Refuse (Defra) [12].

4.2. Operations Interface Plan

4.2.1. An Operations Interface Plan shall be submitted for acceptance by the *Project Manager* a minimum of six (6) months prior to the start of the Maintenance Period, which contains the details and procedures for

- planning, managing and delivering the operational activities,
- all required interfaces between the *Client*, the ROC, stakeholders and the *Contractor* in relation to the Maintenance Services,
- communication channels and frequencies with each stakeholder in relation to providing the Maintenance Services,
- any activities required to be undertaken by the *Client* to allow the *Contractor* to provide the Maintenance Services,
- the priority and primacy of controls and all operating protocols for all equipment and systems used in in relation to the operational activities,
- works involving utilities within the Affected Property, including access and interfacing with third parties,
- managing the operational protocols between the *Contractor*, the *Client* and any other stakeholders in relation to the operational activities,
- responding to emergencies and incidents in the interest of maintaining public safety and making safe of the Assets,
- the booking and planning of traffic management in accordance with the Operational Requirements for Network Occupancy [5] for planned maintenance activities and

- resources, data and information that will be provided to allow the *Client* to develop its winter and severe weather service.

4.2.2. The Operations Interface Plan shall be aligned with the latest accepted version of the

- Asset Management Strategy,
- Detailed Local Operating Agreement,
- Combined Operations and
- Maintenance and Repair Strategy Statement.

4.2.3. The Operations Interface Plan shall be aligned with the *Client*'s South West Maintenance Requirements Plan.

4.2.4. For the duration of the Maintenance Period, the Operations Interface Plan shall be reviewed, updated and re-submitted for acceptance by the *Project Manager*

- as a minimum annually and
- following any incidents of road closure which have been caused by incidents or severe weather which require the Operations Interface Plan to be updated.

4.3. Incident response

4.3.1. Incident response shall be provided as part of the Maintenance Services.

4.3.2. Incident response shall include the requirements and responsibilities, as listed within the *Client*'s South West Incident Response Plan[7], for the "Contractor", the "Contractor's Duty Supervisor (Bronze Commander)" and the "Specialist Contractor", including

- attending and assessing the condition of the Assets following an incident,
- the making safe of Assets following an incident,
- undertaking all permanent repairs and renewals to the Assets following an incident in accordance with section 5.5 (Repairs and renewals) of this document.

4.3.3. All incident response activities shall be provided in accordance with the Incident Management Requirements [7].

4.3.4. Staff shall be provided for four (4) days every year to participate in the *Client*'s emergency exercises and incident response training to align the *Contractor*'s and the *Client*'s incident management and response procedures.

Incident Response Plan

4.3.5. An Incident Response Plan shall be submitted for acceptance by the *Project Manager* a minimum of three (3) months prior to the start of the Maintenance Period which includes

- details of the operational and interface protocols between the *Contractor*, the ROC, the *Client*, the *Client*'s recovery and response service, the emergency services and any other stakeholders in relation to incident response,
- details of the interface management and communications relating to temporary traffic management and network occupancy following an incident,

[7] Refer to the Data Room [25] for the *Client*'s South West Incident Response Plan.

including lines of communications, command structure and protocols for decision making,
- the response times following the notification of an incident,
- the procedures for attending, assessing and making safe of Assets following the notification of an incident,
- details of the personnel, plant, equipment and materials to be deployed in response to incidents,
- detail any specific measures or procedures required in relation to incident response for each Asset Category,
- set out the procedures for response to incidents where there may be a requirement to use equipment, systems or other infrastructure not forming part of the Affected Property,
- details of the contingency procedures and measures which will be implemented in the event of failure of any action, decision or other measure by any person (including the *Client*'s operational staff), equipment or system in relation to incident response and
- engagement and participation in emergency exercises, including frequencies, activities and resource.

4.3.6. The Incident Response Plan shall be

- provided in accordance with the Incident Management Requirements and
- aligned with the *Client*'s South West Incident Response Plan.

4.3.7. Following each incident

- the procedures, activities and timeframes for incident response shall be reviewed to continuously improve the response and
- the Incident Response Plan shall be updated and resubmitted for acceptance by the *Project Manager*.

4.4. Network occupancy

4.4.1. The *Client*'s Operational Requirements for Network Occupancy [5] shall be complied with for all required road space bookings and traffic management.

4.4.2. For the duration of the Maintenance Period, agreement shall be obtained from the *Project Manager* for all road space bookings and traffic management planning using the Operational Requirements for Network Occupancy [5].

4.4.3. The *Client* shall be assisted in

- abnormal load routing for high, wide and long vehicles and
- the processing of requests for movements under vehicle special orders.

4.5. Safety patrols and safety inspections

4.5.1. Safety patrols and safety inspections of the Affected Property shall be undertaken in accordance with the Service Standards to identify safety issues and Highway Asset Defects.

4.5.2. Where a Highway Asset Defects or safety issue is identified by the *Client* or the *Contractor*, that Highway Asset Defect or safety issue shall be managed, prioritised and rectified in accordance with section 5.4 (Highway Asset Defects) of this document.

4.6. Minimum Operating Requirements (MOR)

4.6.1. The Minimum Operating Requirements (MORs) for the Assets shall be provided in accordance with the requirements of Volume 2 Part 2 (Design and Technical Requirements) of the contract.

4.6.2. The Affected Property shall be maintained to meet the MOR.

4.6.3. The *Client* shall be provided with all information to allow the *Client* to update the MORs for the Affected Property during the Maintenance Period.

5. Asset management and maintenance

5.1. Asset management

5.1.1. All asset management and maintenance processes and activities shall be provided to align with ISO 55000 Asset Management Standard, including

- to give a transparent, efficient and economic whole life cost approach to asset management,
- to develop knowledge and understanding of the condition of the Affected Property,
- to demonstrate understanding of the link and interdependencies between asset condition, asset maintenance and asset performance and
- using updates and improvements in technology.

5.2. Routine and cyclic maintenance

5.2.1. The planning and programming of all routine and cyclic maintenance activities required for the effective maintenance of the Affected Property shall be

- provided using an intelligence-led approach, including using performance data and feedback to continuously improve and evolve the routine and cyclic maintenance activities and frequencies,
- use the latest technology, systems and methodologies to minimise human intervention so far as is practicable and
- communicated and coordinated with the *Project Manager*, *Client* and the *Client*'s adjacent route service providers.

5.2.2. Routine and cyclic maintenance activities shall be undertaken for the Affected Property

- to satisfy the baseline maintenance requirements in accordance with the Service Standards,
- to satisfy the Performance Requirements in accordance with section 5.6 (Performance Requirements) of this document and annex 1 to annex 9 of this section 5 (Asset Management and Maintenance) and
- in accordance with the latest Annual Asset Management Plan.

5.2.3. All planned routine and cyclic maintenance activities shall be recorded in the Annual Asset Management Plan.

5.2.4. Where it is proposed that the baseline maintenance requirements are varied, the proposals, the variation and the justification shall be recorded in the next iteration of the Annual Asset Management Plan and submitted for acceptance by the *Project Manager*.

5.2.5. The baseline maintenance requirements may be varied

- using asset intelligence to determine if an alternative frequency or activity may be safely used,
- so long as the Performance Requirements are satisfied,
- where the variation is recorded in the next iteration of the Annual Asset Management Plan and
- where that Annual Asset Management Plan is accepted by the *Project Manager*.

5.3. Inspections and surveys

5.3.1. Condition inspections and surveys shall be provided for the Affected Property in accordance with the with the Service Standards.

5.3.2. The frequency of condition inspections and surveys shall be in accordance with the Service Standards, unless the frequency has been adjusted in accordance with annex 1 to annex 8 of this section 5 (Asset Management and Maintenance).

5.3.3. If the manufacturer's recommendations for surveys and inspections is more frequent or onerous than the baseline survey and inspection requirements, the manufacturer's recommendations shall be followed.

5.3.4. Machine surveys shall be undertaken in accordance with the Service Standards.

5.3.5. The most recent available machine survey data from the *Client*'s asset management systems shall be used for the purposes of assessing the Performance Requirements.

5.4. Highway Asset Defects

5.4.1. Highway Asset Defect identification, prioritisation and rectification shall be undertaken for all Assets within the Affected Property.

5.4.2. Highway Asset Defect identification, prioritisation and rectification shall be undertaken in accordance with

- the Service Standards and
- the *Client*'s South West Highway Inspection Guide - Safety Critical Defects[8].

5.4.3. A register shall be prepared, maintained and updated for Highway Asset Defects for the duration of the Maintenance Period which includes details of

- who has identified the Highway Asset Defect,
- the type of Highway Asset Defect,
- the location of the Highway Asset Defect,
- the response time for rectification of the Highway Asset Defect and
- the rectification method (making safe, temporary or permanent) or permanent repair of the Highway Asset Defect.

5.5. Repairs and renewals

5.5.1. All permanent repairs, renewals or any new works required for Assets during the Maintenance Period shall be

- provided to satisfy the Availability requirements contained in section 1.5 (Network Availability) of this document,
- provided to satisfy the Performance Requirements as detailed in section 5.6 (Performance Requirements) of this document,
- provided to satisfy the requirements contained in Volume 2 Part 2 (Design and Technical Requirements) of the contract,
- designed as a minimum in accordance with the requirements of the DMRB [1] and
- constructed as a minimum in accordance with the MCHW [2].

[8] Refer to the Data Room [25] for the *Client*'s 'South West Highway Inspection Guide - Safety Critical Defects'.

5.5.2. Materials and finishes for repairs or renewals to Assets shall be

- consistent with the existing materials and finishes of the Asset and
- provided to maintain a consistent appearance and finish throughout the *works*.

5.5.3. Proposals and designs for repairs or renewals shall be submitted for acceptance by the *Project Manager*.

5.5.4. If a permanent repair cannot be carried out in accordance with the Scope, then

- an alternative proposal shall be submitted for acceptance by the *Project Manager* and
- the permanent repair shall be undertaken in accordance with the accepted alternative proposal.

5.5.5. Replacements and renewals of *Client* Issued Equipment (CIE) during the Maintenance Period shall be procured in accordance with the requirements contained in section 18.4 (Client Issued Equipment) of Volume 2 Part 2 (Design and Technical) of the contract.

5.6. Performance Requirements

5.6.1. The Affected Property shall be maintained and managed to demonstrate compliance against a set of Performance Requirements as detailed in annex 1 to annex 8 of this section 5 (Asset Management and Maintenance).

5.6.2. Assets and Sub-Elements shall

- be assigned a Condition Category and
- thereafter maintained to satisfy the Performance Requirement, based on the condition, as detailed in annex 1 to annex 8 of this section 5 (Asset Management and Maintenance).

5.6.3. The Condition Category shall be determined for each Asset or Sub-Element, in accordance with annex 1 to annex 8 of this section 5 (Asset Management and Maintenance), where the categories are consistent in severity across all Asset Categories and can be categorised as

- A = sound, in a very good condition overall,
- B = some deterioration, in a good condition overall,
- C = moderate deterioration, in a fair condition overall,
- D = high deterioration, in a poor condition overall or
- E = severe deterioration, in a very poor condition overall.

5.6.4. Where the measured performance against the different Condition Thresholds for an Asset or Sub-Element results in different Condition Categories being assigned, the worst-case Condition Category shall be selected for that Asset or Sub-Element.

5.6.5. Where the level of performance drops below the Performance Requirement the *Project Manager* shall be notified within twenty-four (24) hours stating the improvement action or remedial measures that will be undertaken to rectify the performance.

5.6.6. For the purposes of assessing compliance against the Performance Requirements, condition shall be determined using

- the latest data collected through inspections and surveys,

- additional investigations undertaken by the *Client* or *Contractor*,
- Highway Asset Defect notification and
- automated condition monitoring.

5.6.7. Where a Performance Requirement is failed, the *Client* may close the new A303, or portions thereof, until such time as it can be demonstrated that the Performance Requirement has been satisfied.

5.6.8. The strategies and plans included in Table 5-1 (Asset management strategies and plans) shall be prepared, maintained, updated and implemented for the Affected Property.

Table 5-1: Asset management strategies and plans

Strategy or plan		Reference
Asset Management Strategy		In accordance with section 5.7 (Asset Management Strategy) of this document.
Asset Management Forward Plan	Annual Asset Management Plan	In accordance with section 5.8 (Asset Management Forward Plan) of this document.
	Five-Year Asset Management Plan	
	Ten-Year Asset Management Plan	

5.7. Asset Management Strategy

5.7.1. An Asset Management Strategy shall be submitted for acceptance by the *Project Manager* a minimum of six (6) months prior to the start of the Maintenance Period which

- is aligned with the latest accepted Operations Interface Plan, Detailed Local Operating Agreement, Combined Operations and Maintenance Repair Strategy Statement,
- is aligned with the *Client*'s South West Maintenance Requirements Plan,
- describes the management structure for delivery of the Maintenance Services,
- covers all Assets forming part of the Affected Property for a period covering twenty-five (25) years from the start of the Maintenance Period,
- describes the strategy to satisfy the Performance Requirements,
- uses a risk and intelligence-based approach to the management of Assets,
- provides the strategy for dealing with, and incorporating, changes in technology and technology opportunities, including the need to phase out outmoded technologies,
- includes any proposed research and development in relation to improving or changing maintenance requirements for the Assets,
- provides details of the IT systems or other technology to be used in delivery of the Maintenance Services,
- contains all recommendations and assumptions relating to the *Client*'s resources and activities in delivering its responsibilities inside and outside of the Affected Property,
- provides procedures regarding any works to utilities and for third-party access and

- incorporates into the lifecycle renewal strategy of the Assets the latest research, innovation and adaption to climate and social change.

5.8. Asset Management Forward Plan

5.8.1. An Asset Management Forward Plan (AMFP) shall be developed and implemented to cover the management, maintenance and renewal of all Assets within the Affected Property.

5.8.2. The first iteration of the AMFP shall be submitted for acceptance by the *Project Manager* a minimum of six (6) months prior to the Maintenance Period to cover

- the first year of the Maintenance Period, in the form of an Annual Asset Management Plan,
- the first five (5) year period, in the form of a Five-Year Asset Management Plan and
- the first ten (10) year period, in the form of a Ten-Year Asset Management Plan.

5.8.3. The AMFP shall be reviewed, updated and re-submitted for acceptance by the *Project Manager* on a rolling annual basis to cover

- the next year, in the form of an Annual Asset Management Plan,
- the next five (5) year period, in the form of a Five-Year Asset Management Plan and
- the next ten (10) year period, in the form of a Ten-Year Asset Management Plan.

5.8.4. Each iteration of the AMFP shall be reviewed and updated to align with the

- Operations Interface Plan,
- Asset Management Strategy and
- the *Client*'s South West Maintenance Requirements Plan.

5.8.5. The AMFP shall be categorised by, and structured around, each Asset Category.

5.8.6. The Service Standards and the Performance Requirements of the Assets shall be used as the basis for development of the AMFP.

5.8.7. The AMFP shall adopt a risk-based approach to maintenance and lifecycle renewals of the Assets through condition monitoring.

5.8.8. The AMFP shall be aligned with, and provide the content requirements of, a Maintenance Requirements Plan in accordance with ADAMr, including details of

- the inspection, maintenance and lifecycle renewal activities which will be undertaken to manage condition and performance of the Assets and
- any intelligence and information led variations to the baseline maintenance requirements, activities and lifecycle renewals, including justification and impacts of the variation.

5.8.9. Where it is proposed that any maintenance or inspection activity or frequency is updated, the proposed change and justification shall

- be based on the measured performance of the Asset or Sub-Elements and following the completion of safety risk-assessments in accordance with Service Standards,
- be included within the next iteration AMFP,
- be supported using asset intelligence evidence from the Condition Reports and
- continue to satisfy the minimum Performance Requirements for the Asset or Sub-Elements.

5.8.10. The AMFP shall contain details of all Asset inspection and survey activities including

- the detailed programme for inspections and surveys of the Assets,
- the inspection types, frequencies and activities, including the baseline survey and inspection requirements contained in annex 1 to annex 8 of this section 5 (Asset Management and Maintenance),
- any intelligence and information led variations to the baseline survey and inspection requirements including justification and impacts of the variation,
- a demonstration of how inspections and surveys will be undertaken to minimise disruption to road users,
- the competencies and skill levels of inspection staff to ensure a consistent approach to inspections and surveys,
- processes for the management of inspection and survey data,
- how Asset condition data is accurately reflected and validated on the Asset Management System and
- any additional inspection and survey activities that will be undertaken to gain further information on the deterioration and condition of the Assets.

5.8.11. The AMFP shall contain details for maintenance and renewal activities of the Assets, including

- estimated costs, targets and key priorities for action for maintenance and renewals of the Assets,
- the resources to be deployed in delivery of the Maintenance Services,
- a detailed programme of all routine and cyclic maintenance activities including litter picking,
- safety patrol frequencies and activities,
- a plan for identifying, managing and rectifying Asset deficiencies,
- assessment of, and assumptions in respect of, the expected deterioration of the Assets,
- all assumptions made regarding the categorisation, prioritisation, response and repair of Highway Asset Defects, including timescales,
- demonstration of how the Performance Requirements of the Assets or Sub-Elements will be achieved,
- demonstration of how knowledge of Asset condition and performance is improving, and explaining how this has influenced the Asset management approach,
- demonstration of how the outcomes of inspections, surveys and condition assessments will be used to develop maintenance activities and
- any activities which are required, or assumed, to be undertaken by the *Client*, including outside of the Affected Property.

5.9. Asset reporting

5.9.1. Reporting of Asset condition data shall be provided to the *Client* for the duration of the Maintenance Period.

5.9.2. A minimum of thirty (30) calendar days prior to the start of the Maintenance Period, an Initial Condition Report shall be submitted for acceptance by the *Project Manager* which

- sets out the results as held on the Asset Management System for all Assets within the Affected Property and
- summarises the Condition Category of each Asset or Sub-Element.

5.9.3. A maximum of seven (7) calendar days after each calendar month-end, a Monthly Condition Report shall be submitted to the submitted for acceptance by the *Project Manager* which

- summarises the current Condition Category for each Asset or Sub-Element within the Affected Property,
- lists any Assets or Sub-Elements within an Asset which are failing the Performance Requirements,
- summarises the month period's Availability any periods of lane closures in the month and reasons therefore,
- summarises, on a rolling three (3) month period, the planned versus cyclic maintenance activities,
- summarises, on a rolling three (3) month period, the planned inspections programme versus actual inspections undertaken,
- summarises, on a rolling three (3) month period, the current Highway Asset Defects register and
- summarises, on an accumulation basis, any incidents recorded within the Affected Property and
- reports on the condition of the Asset information and data.

5.9.4. Every three (3) months, an updated programme of planned activities shall be submitted for acceptance by the *Project Manager* which covers inspections, maintenance and lifecycle renewals for the forthcoming six (6) months.

5.9.5. Throughout the Maintenance Period, and a minimum of one (1) month prior to the end of each anniversary of the *access date* for *section* 3, an Annual Condition Report shall be submitted for acceptance by the *Project Manager* which

- is aligned with the AMFP,
- summarises the annual change in Condition Category for each Asset or Sub-Elements within an Asset,
- summarises the total annual period of any lane closures and annual Availability,
- summarises the annual number of Highway Asset Defects repaired under each Asset Category and
- summarises the current number of Highway Asset Defects as recorded on the Asset Management System.

5.10. Asset Management System

5.10.1. An Asset Management System shall be provided for the Maintenance Services.

5.10.2. The Asset Management System and asset information shall be provided in accordance with the requirements of Volume 2 Part 5 (Digital Construction Requirements) of the contract.

5.10.3. The Asset Management System shall be fully operational one (1) month prior to the start of the Maintenance Period.

5.10.4. The Asset Management System shall be

- developed from, and fully integrated with, the Project Information Model,
- capable of storing asset data in accordance with the data requirements of the ADMM [8] and Volume 2 Part 5 (Digital Construction Requirements) of the contract.
- capable of exchanging data with all of the *Client*'s asset data management systems as described in the ADMM [8],
- capable of being remotely accessed via a secure web-based system to provide a portal for robust and secure access,
- capable of providing auto-generated reports on predefined report templates and
- capable of including all equipment and systems within the tunnel.

5.10.5. The Asset Management System shall provide the *Client* and the *Project Manager* with full 'read only' access at all times, in order to allow

- interrogation of Asset condition information,
- inspection planning and
- predefined reports to be run.

5.10.6. All Asset information within the Asset Management System shall be sent live to the Data Hub.

5.10.7. The following information and data shall be maintained within the Asset Management System

- full Asset inventory including the Elements and Sub-Elements,
- utilities information,
- planning and programming of inspections,
- all activities maintenance and lifecycle renewal,
- all information contained on the Highway Asset Defects register,
- the location of any identified Highway Asset Defects or other incidents (e.g. flood events or accidents),
- records of all inspections, assessments, surveys, maintenance activities, repairs, replacements and renewals of all Assets,
- the current Condition Category of the Assets or Sub-Elements and
- any additional data or information for the provision of the Maintenance Services.

5.10.8. The Asset Management System shall include the following utilities information

- materials,
- manufacturer and contact details,
- cross sectional dimension and capacity of ducts or pipes,
- installation contractor,

- date of installation and any subsequent interventions or repairs,
- colour and
- function and any applicable safety information.

5.10.9. The Asset Management System, and all information within it, shall be kept current for the duration of the Maintenance Period.

5.10.10. The Asset Management System shall be

- capable of reflecting Asset deterioration for each Asset Category and
- ultimately used as the evidence basis to demonstrate changes to maintenance activities or frequencies in the AMFP.

5.10.11. Data arising from each inspection shall be inputted into the Asset Management System within forty-eight (48) hours of the inspection, to allow the Asset Management System to update the Asset condition and to determine whether a failure of the Performance Requirements has occurred.

5.10.12. A monthly review of the data on the Asset Management System shall be undertaken to check and confirm the accuracy and validity of the data.

5.10.13. An annual check (gap analysis) of inventory data on the Asset Management System shall be undertaken.

5.10.14. A minimum of one (1) month prior to the start of the Maintenance Period, the *Contractor* shall populate the *Client*'s asset management systems with all Assets in accordance with the data requirements of the ADMM [8].

Annex 1 of Section 5 Paved Areas Performance Requirements

A1.1. Asset definition

A1.1.1. The paved areas Asset Category shall be divided into Assets for the purposes of demonstrating compliance against the Performance Requirements.

A1.1.2. Each paved areas Asset shall be defined as each one hundred (100) metre length and

- divided between Assets inside the bored tunnel and outside the bored tunnel,
- divided by direction of traffic flow and
- inclusive of both lanes, shoulders and adjacent hard standings.

A1.1.3. Any end sub-section of paved area below one hundred (100) metre long shall be defined as an Asset.

A1.2. Inspections

A1.2.1. A rolling process of surveys and inspections shall be undertaken for paved areas Assets for performance monitoring and prioritisation of pavement interventions.

A1.2.2. The inspection and survey programme and methodology for paved areas Assets shall include the baseline survey and inspection requirements in accordance with Table A1-1 (Baseline survey and inspection requirements).

A1.2.3. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A1-1: Baseline survey and inspection requirements

Inspection or survey type	Lane	Frequency
TRACS survey	Lane 1	Annually
	Lane 2 (including lane 2 slips)	Year 1, year 3 and year 5 of Maintenance Period
	Lane 1 slips	Annually
skid resistance survey	Lane 1	Annually
	Lane 2 (including lane 2 slips)	Year 1, year 3 and year 5 of Maintenance Period
	Lane 1 slips	Annually
video/visual survey	Lane 1	Year 1 and year 5 of Maintenance Period
	Lane 2 (including lane 2 slips)	Year 1 and year 5 of Maintenance Period
	Lane 1 slips	Year 1 and year 5 of Maintenance Period

A1.3. Condition Categories

A1.3.1. The Condition Thresholds and corresponding Condition Categories[9] for the paved areas Assets shall be as defined in Table A1-2 (Condition Thresholds for paved areas Assets).

A1.3.2. The Condition Categories shall be assigned to the worst performing lane within each Asset based on an eighty-five (85) percentile level of certainty that all condition values within that lane are satisfied.

Table A1-2: Condition Thresholds for paved areas Assets

	Condition Threshold				
Condition Category	**= CSC – IL (L1 only)**	**Rutting (mm)**	**LPV3 (mm²)**	**LPV10 (mm²)**	**Texture (mm)**
A	> 0.15	≤ 6	≤ 0.7	≤ 1.6	> 1.5
B	0.10 < - ≤ 0.15	6 < - ≤ 11	0.7 < - ≤ 2.2	1.6 < - ≤ 6.5	1.1 < - ≤ 1.5
C	0.05 < - ≤ 0.10	11 < - ≤ 15	2.2 < - ≤ 3.3	6.5 < - ≤ 10.6	0.8 < - ≤ 1.1
D	-0.05 < - ≤ 0.05	15 < - ≤ 20	3.3 < - ≤ 4.4	10.6 < - ≤ 14.7	0.4 < - ≤ 0.8
E	≤ -0.05	> 20	> 4.4	> 14.7	≤ 0.4

A1.4. Performance Requirements

A1.4.1. All paved areas Assets shall be maintained to satisfy the Performance Requirements in accordance with Table A1-3 (Performance Requirements for paved areas Assets), based on the Condition Categories which result from the Condition Thresholds.

A1.4.2. The Performance Requirements for the paved areas Assets shall be the maximum permissible total % of paved areas Assets under each cumulative combined set of Condition Categories as defined in Table A1-3 (Performance Requirements for paved areas Assets).

A1.4.3. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

[9] Condition Categories for paved areas Assets are developed in line with CS 228 ‘Skidding resistance’ [21] and CS 229 ‘Data for pavement assessment’ [22].

Table A1-3: Performance Requirements for paved areas Assets

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Assets at each combined set of Condition Categories at any time: paved areas Assets outside the bored tunnel	0%	3%	10%	100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: paved areas Assets inside the bored tunnel	0%	0%	1%	50%	100%

Annex 2 of Section 5 Road Markings and Road Studs Performance Requirements

A2.1. Asset definition

A2.1.1. The road markings and road studs Asset Category shall be divided into Assets for the purposes of demonstrating compliance against the Performance Requirements.

A2.1.2. Each road markings and road studs Asset shall be defined as all road markings and all road studs in each defined paved areas Asset.

A2.2. Inspections

A2.2.1. The inspection and survey programme and methodology for road markings and road studs Assets shall include the baseline survey and inspection requirements in accordance with Table A2-1 (Baseline survey and inspection requirements).

A2.2.2. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A2-1: Baseline survey and inspection requirements

Assets	Inspections	Frequency
Road markings	CS 126 'Inspection and assessment of road markings and road studs' [13] road markings inspections	One (1) day and one (1) night inspection every twelve (12) months
Road studs	CS 126 'Inspection and assessment of road markings and road studs' [13] road studs inspections	One (1) day and one (1) night inspection every twelve (12) months

A2.2.3. All road markings and road studs shall be inspected at the same inspection.

A2.2.4. Inspections shall be undertaken

- during the day to determine condition and
- at night to determine retro reflectivity.

A2.3. Condition Categories

A2.3.1. The Condition Thresholds and corresponding Condition Categories[10] for the road markings and road studs Assets shall be as defined in Table A2-2 (Condition Thresholds for road markings Assets) and Table A2-3 (Condition Thresholds for road studs Assets).

[10] Condition Categories for road markings and road studs Assets are developed in line with CS 126 'Inspection and assessment of road markings and road studs' [13].

Road Markings

Table A2-2: Condition Thresholds for road markings Assets

	Condition Thresholds	
Condition Category	**Visual Assessment Scoring**	**Retro reflectivity mcd/m2/lux**
A	CS 126 'Inspection and assessment of road markings and road studs' [13] Visual Assessment Score 50 (no obvious wear)	> 150 and the age of the road marking is less than one year old
B	CS 126 'Inspection and assessment of road markings and road studs' [13] Visual Assessment Score 40 (very little wear)	> 150 and the age of the road marking is greater than one year old
C	CS 126 'Inspection and assessment of road markings and road studs' [13] Visual Assessment Score 30 (marginal – some visible wear, larger bare spots)	120 < - ≤ 150
D	CS 126 'Inspection and assessment of road markings and road studs' [13] Visual Assessment Score 20 (visible, but has randomly spaced small bare spots)	80 < - ≤ 120
E	CS 126 'Inspection and assessment of road markings and road studs' [13] Visual Assessment Score 10 or 0 (barely visible or non-existent)	≤ 80

Road Studs

Table A2-3: Condition Thresholds for road studs Assets

	Condition Thresholds		
Condition Category	**% of missing studs or studs with no reflectivity within tunnel**	**% of missing studs or studs with no night reflectivity outside tunnel**	**Assessment of retro-reflecting road studs[11]**
A	0% < - ≤ 5%	0% ≤ - < 10%	• as new condition.
B	5% < - ≤ 10%	10% ≤ - < 20%	• no action required or • no visual defect during day or night.
C	10% < - ≤ 15%	20% ≤ - < 30%	• non-critical defect or • one (1) in ten (10) consecutive studs with non-compliance with the characteristics for retro-reflecting road studs as in paragraph 3.19 of

[11] All references to defects within the Condition Thresholds for road studs Assets shall mean Highway Asset Defects.

			CS 126 'Inspection and assessment of road markings and road studs' [13].
D	15% ≤ - < 20%	30% ≤ - < 40%	• non-critical defect, • more than one (1) in ten (10) consecutive studs with non-compliance with the characteristics for retro-reflecting road studs as in paragraph 3.19 of CS 126 'Inspection and assessment of road markings and road studs' [13] or • more than one (1) in ten (10) consecutive studs have poor retroflection properties at night.
E	≥ 20%	≥ 40%	• critical defect, • loss of road stud, missing or defective inserts where studs are a legal requirement, • loose or displaced road stud on carriageway, • loose casing or • more than three (3) in ten (10) consecutive studs with poor reflection properties at night.

A2.4. Performance Requirements

A2.4.1. All road markings and road studs Assets shall be maintained to satisfy the Performance Requirements in accordance with Table A2-4 (Performance Requirements for road markings and road studs Assets), based on the Condition Categories which result from the Condition Thresholds.

A2.4.2. The Performance Requirements for the road markings and road studs Assets shall be the maximum permissible total % of road markings and road studs Assets under each cumulative combined set of Condition Categories as defined in Table A2-4 (Performance Requirements for road markings and road studs Assets).

A2.4.3. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A2-4: Performance Requirements for road markings and road studs Assets

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Assets at each combined set of Condition Categories at any time: road markings Assets	1%	20%	50%	100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: road studs Assets	5%	20%	50%	75%	100%

Annex 3 of Section 5 Road Restraint Systems Performance Requirements

A3.1. Asset definition

A3.1.1. The road restraint systems Asset Category shall be divided into Assets for the purposes of demonstrating compliance against the Performance Requirements.

A3.1.2. Each road restraint systems Asset shall be

- split between concrete and steel,
- defined as eastbound, westbound or central reserve safety barrier aligned to the adjacent defined paved areas Asset and
- each terminal.

A3.1.3. Crossovers shall be included as part of the central reserve restraint system.

A3.2. Inspections

A3.2.1. The inspection and survey programme and methodology for road restraint systems Assets shall include the baseline survey and inspection requirements in accordance with Table A3-1 (Baseline survey and inspection requirements) and Table A3-2 (Baseline survey and inspection requirements).

A3.2.2. All vehicle restraint systems (safety fences) and pedestrian restraint systems (guardrails) shall be included within the inspection regime.

A3.2.3. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A3-1: Baseline survey and inspection requirements

Asset	General Inspections	Detailed Inspections (include tension and post tests)
Steel road restraint systems including safety barriers and terminals	Every six (6) months	Every twenty-four (24) months

Table A3-2: Baseline survey and inspection requirements

Asset	General Inspections	Detailed Inspections (targeted areas)
Concrete road restraint systems including safety barriers and crossovers	Every six (6) months	Every twenty-four (24) months

A3.3. Condition Categories

A3.3.1. The Condition Thresholds and corresponding Condition Categories[12] for the road restraint systems Assets shall be as defined in Table A3-3 (Condition Thresholds for steel road restraint systems Assets) and Table A3-4 (Condition Thresholds for concrete road restraint systems Assets).

A3.3.2. A picture book for the road restraint systems Assets shall be

- provided to define what level of condition meets each of the Condition Categories and
- submitted for acceptance by the *Project Manager* a minimum of sixty (60) calendar days prior to the start of the Maintenance Period.

Table A3-3: Condition Thresholds for steel road restraint systems Assets

	Condition Thresholds				
Condition Category	**Age since installed**	**Visual (defined by picture book)**	**Accidental damage (defined by picture book)**	**Corrosion (defined by picture book)**	**Bolts and components per Asset**
A	≤ 5 years	as new	no accident damage	no corrosion	no missing bolts or components
B	5 < - ≤ 10 years	no visual defects	minor non-superficial accident damage	no corrosion	no missing bolts or components
C	10 < - ≤ 20 years	fair structural condition	moderate to severe non-superficial accident damage	minor corrosion	1-3 missing bolts or components
D	20 < - ≤ 40 years	poor structural condition	minor to moderate non-superficial accident damage	moderate corrosion	4 - 7 missing bolts or components
E	> 40 years	imminent hazard (e.g. failed posts)	severe non-superficial accident damage	severe corrosion	8+ missing bolts or components

Table A3-4: Condition Thresholds for concrete road restraint systems Assets

	Condition Thresholds			
Condition Category	**Age since installed**	**Visual (defined by picture book)**	**Accidental damage (defined by picture book)**	**Spalling and cracking (defined by picture book)**
A	≤ 5 years	as new	no accident damage	no spalling or cracked concrete
B	5 < - ≤ 10 years	no visual defects	minor non-superficial accident damage	no spalling and/or cracked concrete

[12] Condition Categories for road restraint systems Assets are developed in line with CD 377 'Requirements for road restraint systems' [23].

C	10 < - ≤ 30 years	minor staining	moderate to severe non-superficial accident damage	minor sections of spalling or cracked concrete
D	30 < - ≤ 50 years	out of alignment	minor to moderate non-superficial accident damage	moderate sections of spalling or cracked concrete
E	> 50 years	imminent hazard (e.g. loose material, exposed steel)	severe non-superficial accident damage	large sections of spalling or cracked concrete

A3.4. Performance Requirements

A3.4.1. All road restraint systems Assets shall be maintained to satisfy the Performance Requirements in accordance with Table A3-5 (Performance Requirements for road restraint systems Assets), based on the Condition Categories which result from the Condition Thresholds.

A3.4.2. The Performance Requirements for the road restraint systems Assets shall be the maximum permissible total % of road restraint systems Assets under each cumulative combined set of Condition Categories as defined in Table A3-5 (Performance Requirements for road restraint systems Assets).

A3.4.3. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A3-5: Performance Requirements for road restraint systems Assets

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Assets at each combined set of Condition Categories at any time: steel road restraint systems including safety barriers and terminals	0%	5%	10%	100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: concrete road restraint systems including safety barriers and crossover points	0%	5%	15%	100%	-

Annex 4 of Section 5 Road Traffic Signs Performance Requirements

A4.1. Asset definition

A4.1.1. The road traffic signs Asset Category shall be divided into Assets for the purposes of demonstrating compliance against the Performance Requirements.

A4.1.2. Each road traffic signs Asset shall be defined as each individual road traffic sign and its sign support structure.

A4.1.3. Where multiple road traffic signs are supported on a single post or frame, the sign support structure shall be allocated to the largest road traffic sign for Asset definition.

A4.1.4. Electrical cabling and ducting from the back of the road traffic sign to the source feeder pillar or previous feed electrical Asset shall be included under the road traffic sign Asset.

A4.2. Inspections

A4.2.1. The inspection and survey programme and methodology for road traffic signs Assets shall include the baseline survey and inspection requirements in accordance with Table A4-1 (Baseline survey and inspection requirements).

A4.2.2. Where the manufacturer's recommendations for surveys and inspections is more frequent or onerous than the baseline survey and inspection requirements contained in Table A4-1 (Baseline survey and inspection requirements), the manufacturer's recommendations shall be followed.

A4.2.3. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

A4.2.4. Inspections for road traffic signs Assets shall cover

- visual performance,
- structural integrity,
- electrical safety and
- the need for removal or replacement.

A4.2.5. Portal or gantry sign structures that fall under the scope of CS 450 'Inspection of highway structures' [14] shall be surveyed in accordance with CS 450 'Inspection of highway structures' [14].

Table A4-1: Baseline survey and inspection requirements

Asset component	Inspection Type	Frequency
Sign face and fixings	Routine visual	Annually
Posts	Routine visual	Annually
Lighting units	Routine visual	Annually
Electrical or mechanical testing	Specialist check	Year one (1) and year five (5) of Maintenance Period, or more

		frequently as required by manufacturer's recommendations
Retro-reflectivity	Targeted to 10% of road traffic signs Assets	Annually

A4.3. Condition Categories

A4.3.1. The Condition Thresholds and corresponding Condition Categories[13] for road traffic signs Assets shall be as defined in Table A4-2 (Condition Thresholds for road traffic signs Assets).

Table A4-2: Condition Thresholds for road traffic signs Assets

	Condition Thresholds	
Condition Category	**Coefficient of retroreflection cd/lx/m² (dependent on performance class of sign)**	**Visibility and safety hazards[14]**
A	≥ 100 % of Row A minimum coefficient of retroreflection from CS 125 'Inspection of traffic signs' [15] for a new sign, and sign is less than one (1) year old.	• as new condition.
B	≥ 100 % of Row A minimum coefficient of retroreflection from CS 125 'Inspection of traffic signs' [14] for a new sign, and sign is more than one (1) year old.	• no visual defects or obscuration to sign.
C	90 ≤ - < 100% of Row A minimum coefficient of retroreflection from CS 125 'Inspection of traffic signs' [14] for a new sign.	• slight obscuration by dirt, graffiti, posters, vegetation or other traffic signs, street furniture or structures that is not enough to affect the legibility of the traffic sign.
D	80 ≤ - < 90% of Row A minimum coefficient of retroreflection from CS 125 'Inspection of traffic signs' [14] for a new sign.	• failure to meet one (1) of the following - the minimum clear visibility distance needed, the legibility of the traffic sign, the illumination of the traffic sign, or the traffic sign lighting unit from functioning, operating during darkness only or being correctly aligned, • any defect or failure which is affecting or can affect the service life of the structure or • structural elements, fixtures or fittings are not present, not serviceable or not securely attached in accordance with the manufacturer's installation and maintenance instructions.
E	< 80% of Row A minimum coefficient of retroreflection from CS 125 'Inspection of traffic signs' [14] for a new sign (which is equal to Row B).	• failure to meet two (2) or more of the following - the minimum clear visibility distance needed, the legibility of the traffic sign, the illumination of the traffic sign, or the traffic sign lighting unit from

[13] Condition Categories for road traffic signs Assets are developed in line with CS 125 'Inspection of traffic signs' [15] or for large sign structures CS 450 'Inspection of highway structures' [14].
[14] All references to defects within the Condition Thresholds for road traffic signs Assets shall mean Highway Asset Defects.

		functioning, operating during darkness only or being correctly aligned, • any structural integrity defect or failure which is presenting or can present a safety hazard to road users, road workers or other parties, • any electrical safety defect or failure which is presenting or can present a safety hazard to road users, road workers or other parties or • any other critical defect in accordance with CS 125 'Inspection of traffic signs' [14].

A4.4. Performance Requirements

A4.4.1. All road traffic signs Assets shall be maintained to satisfy the Performance Requirements in accordance with Table A4.3 (Performance Requirements for road traffic signs Assets), based on the Condition Categories which result from the Condition Thresholds.

A4.4.2. The Performance Requirements for the road traffic signs Assets shall be the maximum permissible total % of road traffic signs Assets under each cumulative combined set of Condition Categories as defined in Table A4.3 (Performance Requirements for road traffic signs Assets).

A4.4.3. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A4-3: Performance Requirements for road traffic signs Assets

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Assets at each combined set of Condition Categories at any time: road traffic signs Assets inside the bored tunnel	0%	10%	50%	100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: road traffic signs Assets outside bored tunnel	5%	30%	80%	100%	-

Annex 5 of Section 5 Structures Performance Requirements

A5.1. Asset definition

A5.1.1. The structures Asset Category shall be divided into Assets, Elements and Sub-Elements for the purposes of demonstrating compliance against the Performance Requirements.

A5.1.2. Each structures Asset shall be defined in accordance with PMHS (2007) 'Guidance Document for Performance Measurement of Highway Structures' [16], CG 302 'As-built, operational and maintenance records for highway structures' [17] and CS 450 'Inspection of highway structures' [14], as each

- bridge,
- culvert,
- small culvert or small span structure,
- retaining wall,
- road tunnel,
- sign/signal gantry,
- high mast and
- other structure type.

A5.1.3. The list of structures Assets, Elements and Sub-Elements shall be updated to reflect the design solution.

A5.2. Inspections

A5.2.1. The inspection and survey programme and methodology for the structures Assets shall include the baseline survey and inspection requirements in accordance with Table A5-1 (Baseline survey and inspection requirements).

A5.2.2. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A5-1: Baseline survey and inspection requirements

Assets	General Inspection frequency	Principal Inspection frequency
Large culverts	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter
Small span structures	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter
Retaining walls	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter
Sign/signal gantries	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter

High masts	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter
Underpasses	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter
Bridges	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter

A5.3. Condition Categories

A5.3.1. The Condition Thresholds and corresponding Condition Categories for the structures Assets and Sub-Elements shall be as defined in Table A5-10 (Condition Thresholds and Condition Categories for structures Assets and Sub-Elements).

Condition Methodology

A5.3.2. Inspection and survey data shall be used to determine two (2) types of Condition PI scores which are

- an Asset Condition PI (av) and
- a Sub-Element Condition PI.

A5.3.3. The Asset Condition PI (av) and the Sub-Element Condition PI shall be calculated

- in accordance with the methodology set out in the PMHS (Guidance Document for Performance Measurement of Highway Structures) [16] and
- as summarised in Figure 1 (Condition and performance methodology).

A5.3.4. Using the steps summarised in Figure 1 (Condition and performance methodology), the Asset Condition PI (av) scores and the Sub-Element Condition PI scores shall be calculated between 0 and 100, where

- 0 represents the worst possible condition and
- 100 represents the best possible condition.

Figure 1 : Condition and performance methodology

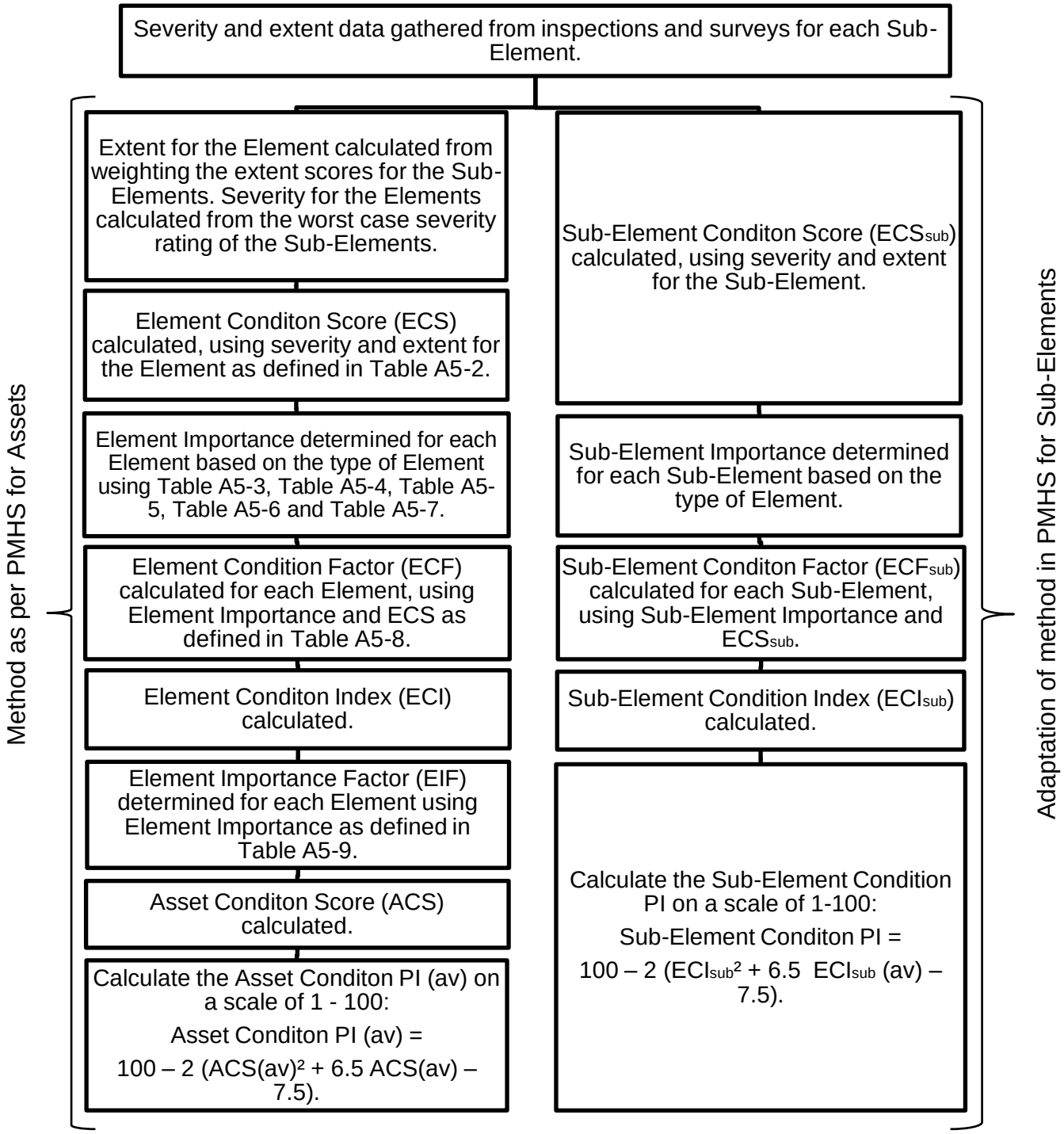

Table A5-2: Element Condition Score (ECS)

		severity									
		-	1	-	2	3	-	4	-	-	5
damage causing defects		-	D1	-	D2	D3	D3S	D4	-	D4S	D5
paint coatings and protective systems		-	P1	-	P2	P3	-	P4	P4S	-	P5
appearance related defects		-	A1	A2	A3	A4	-	-	-	-	-
defects[15] adjacent elements		X1	X2	-	X3	X4	X4S	X5	-	-	-
extent	A	1.0	1.0	-	-	-	-	-	-	-	-
	B	1.0	1.0	1.1	2.0	3.0	3.1	4.0	4.1	4.2	5.0
	C	1.0	1.1	1.2	2.1	3.1	3.2	4.1	4.2	4.3	5.0
	D	1.0	1.3	1.4	2.3	3.3	3.4	4.3	4.4	4.5	5.0
	E	1.0	1.7	1.8	2.7	3.7	3.8	4.7	4.8	4.9	5.0

Table A5-3: Element Importance for bridges

Element Description	Element Importance
primary deck element	very high
transverse beams	very high
secondary deck element	very high
half joints	very high
tie beam/rod	very high
parapet beam or cantilever	very high
deck bracing	high
foundations	high
abutments (including arch springing)	high
spandrel wall / head wall	high
pier / column	very high
crosshead / capping beam	very high
bearings	high
bearing plinth / shelf	medium
superstructure drainage	medium
substructure drainage	medium
water proofing	medium
movement / expansions joints	high
finishes: deck elements	medium
finishes: substructure elements	medium

[15] Reference to defects within Table A5-2 (Element Condition Score (ECS)) shall mean Highway Asset Defects.

finishes: parapets / safety fences	medium
access / walkways / gantries	medium
handrail / parapets / safety fences	high
carriageway surfacing	medium
footway / verge / footbridge surfacing	low
invert / riverbed	medium
aprons	medium
fenders / cutwaters / collision protection	medium
river training works	medium
revetment / batter paving	low
wing walls	high
retaining walls	medium
embankments	low
machinery	medium
approach rails / barriers / walls	not included (see other Asset Categories)
signs	
lighting	
services	
diaphragms	high
cable anchor group	very high
cable system group	very high
cable hanger group	very high

Table A5-4: Element Importance for small culverts

Element Description	Element Importance
culvert	very high
headwall	high
parapet / guardrail / road restraint system	high
wingwall	high
revetment	medium
apron	medium

Table A5-5: Element Importance for retaining walls

Element Description	Element Importance
foundations	high
retaining wall: primary	very high
retaining wall: secondary	very high
parapet beam / plinth	high

drainage	medium
movement / expansion joints	medium
surface finishes: wall	medium
surface finishes: handrail / parapet	medium
handrail / parapets / safety fences / road restraint system	high
carriageway: top of wall	low
carriageway: foot of wall	low
footway / verge: top of wall	low
footway / verge: foot of wall	low
embankment: top of wall	low
embankment: foot of wall	low
invert / riverbed	medium
aprons	medium
signs	not included (see other Asset Categories)
lighting	
services	
anchoring system	very high

Table A5-6: Element Importance for sign gantries

Element Description	Element Importance
foundations	high
truss / beams / cantilever	very high
transverse / horizontal bracing elements	very high
columns / supports / legs	very high
surface finishes: truss / beams / cantilever	medium
surface finishes: columns/ supports / legs	medium
surface finishes: other elements	low
access / walkway / deck	high
access ladder	high
handrails / guard rails	high
base connections	very high
support to longitudinal connection	very high
sign and signal supports	medium
signs/signals	not included (see other Asset Categories)
lighting	
services	
road restraint system	high

Table A5-7: Element Importance for high masts

Element Description	Element Importance
mast	very high
foundation	very high
base connection	high
paint system	medium
lighting	not included (see other Asset Categories)
signs	

Table A5-8: Element Condition Factor (ECF)

Element Importance	Element Condition Factor
very high	0.0
high	0.3 – [(ECS – 1) x 0.3 / 4]
medium	0.6 – [(ECS – 1) x 0.6 / 4]
low	1.2 – [(ECS – 1) x 1.2 / 4]

Table A5-9: Element Importance Factor (EIF)

Element Importance	Element Importance Factor
very high	2.0
high	1.5
medium	1.2
low	1.0

Table A5-10: Condition Thresholds and Condition Categories for structures Assets and Sub-Elements

	Condition Thresholds	
Condition Category	Sub-Element Condition PI score for Sub-Element level	Asset Condition PI (av) score for Asset level
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

A5.4. Performance Requirements

A5.4.1. All structures Assets shall be maintained to satisfy the Performance Requirements, in accordance with Table A5-11 (Time Performance Requirements for structures Assets), for each rolling twelve (12) month period based on the Condition Categories which result from the Condition Thresholds.

Table A5-11: Time Performance Requirements for structures Assets

Performance Requirements:	Time permissible for Assets at each Condition Category per year				
	A	B	C	D	E
Large culverts Assets	-	-	≤ 6 months	0 months	0 months
Small span structures Assets	-	-	≤ 6 months	≤ 2 months	≤ 1 month
Retaining walls Assets	-	-	≤ 6 months	0 months	0 months
Sign/signal gantries Assets	-	-	≤ 6 months	≤ 2 months	≤ 1 month
High masts Assets	-	-	≤ 6 months	≤ 2 months	≤ 1 month
Bridges Assets	-	-	≤ 6 months	0 months	0 months

A5.4.2. All structures Sub-Elements shall be maintained to satisfy the Performance Requirements in accordance with Table A5-12 (Quantity Performance Requirements for structures Sub-Elements), based on the Condition Categories which result from the Condition Thresholds.

A5.4.3. The Performance Requirements for the structures Sub-Elements shall be the maximum permissible total % of structures Sub-Elements under each cumulative combined set of Condition Categories as defined in Table A5-12 (Quantity Performance Requirements for structures Sub-Elements).

A5.4.4. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A5-12: Quantity Performance Requirements for structures Sub-Elements

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Sub-Elements within each Element: bridge Assets	0%	10%	10%	40%	100%
Maximum permissible % of Sub-Elements within each Element: large culverts Assets	0%	10%	10%	40%	100%
Maximum permissible % of Sub-Elements within each Element: small span structures Assets	5%	15%	15%	50%	100%

Maximum permissible % of Sub-Elements within each Element: retaining walls Assets	0%	10%	10%	40%	100%
Maximum permissible % of Sub-Elements within each Element: sign/signal gantries Assets	5%	15%	15%	50%	100%
Maximum permissible % of Sub-Elements within each Element: high masts Assets	5%	15%	15%	50%	100%

Annex 6 of Section 5 Tunnel Structure Performance Requirements

A6.1. Asset definition

A6.1.1. The tunnel structure Asset Category shall be divided into Assets, Elements and Sub-Elements in accordance with Table A6-1 (Tunnel structure Assets and Elements)[16], for the purposes of demonstrating compliance against the Performance Requirements.

A6.1.2. The list of tunnel structure Elements and Sub-Elements in Table A6-1 (Tunnel structure Assets and Elements) shall be updated to reflect the design solution.

Table A6-1: Tunnel structure Assets and Elements

Asset Category	Asset	Element	Sub-Element
Tunnel structure	Tunnel structure westbound	primary lining	each primary lining item
		secondary lining	each secondary lining item
		tunnel cladding	each tunnel cladding item
		ceilings	each ceiling
		foundations	each foundation
		wing walls	each wing wall
		retaining walls	each retaining wall
		embankments	each embankment
		portals	each portal
		service buildings	each service building
		pump house	each pump house
		drainage sumps	each drainage sump
		plant room	each plant room
		waterproofing	each waterproofing item
		drains and gullies	each drain and gully
		expansion joints	each expansion joint
		surfacing	each surfacing item
		parapet / handrails	each parapet / handrail
		access gantries / walkways	each access gantry / walkway
	Tunnel structure eastbound	split as per tunnel structure westbound Asset	split as per tunnel structure westbound Asset

[16] The definitions for tunnel structures Assets, Elements and Sub-Elements are developed in line with CS '452 Inspection and records for road tunnel systems' [24] and CM 430 'Maintenance of road tunnels' [11].

A6.2. Inspections

A6.2.1. The inspection and survey programme and methodology for tunnel structure Assets and Sub-Elements shall comply with the requirements and advice in the Service Standards and include the baseline survey and inspection requirements in accordance with Table A6-2 (Baseline survey and inspection requirements).

A6.2.2. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A6-2: Baseline survey and inspection requirements

Asset, inclusive of all Elements	General Inspection frequency	Principal Inspection frequency
Tunnel structure eastbound	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter
Tunnel structure westbound	Year three (3) of Maintenance Period and two (2) yearly thereafter	Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter

A6.3. Condition Categories

A6.3.1. The Condition Thresholds and corresponding Condition Categories[17] for the tunnel structure Assets and Sub-Elements shall be as defined in Table A6-7 (Condition Thresholds and Condition Categories for tunnel structure Assets and Sub-Elements).

Condition Methodology

A6.3.2. Inspection and survey data shall be used to determine two (2) types of Condition PI scores which are

- an Asset Condition PI (av) and
- a Sub-Element Condition PI.

A6.3.3. The Asset Condition PI (av) and the Sub-Element Condition PI shall be calculated

- in accordance with the methodology set out in the PMHS (Guidance Document for Performance Measurement of Highway Structures) [16] and
- as summarised in Figure 2 (Condition and performance methodology).

A6.3.4. Using the steps summarised in Figure 2 (Condition and performance methodology), the Asset Condition PI (av) scores and the Sub-Element Condition PI scores shall be calculated between 0 and 100, where

- 0 represents the worst possible condition and
- 100 represents the best possible condition.

[17] Condition Categories for the tunnel structure Assets and Elements are developed in line with CS 452 'Inspection and records for road tunnel systems' [10], CS 450 'Inspection of highway structures' [14] and CM 430 'Maintenance of road tunnels' [11].

Figure 2 : Condition and performance methodology

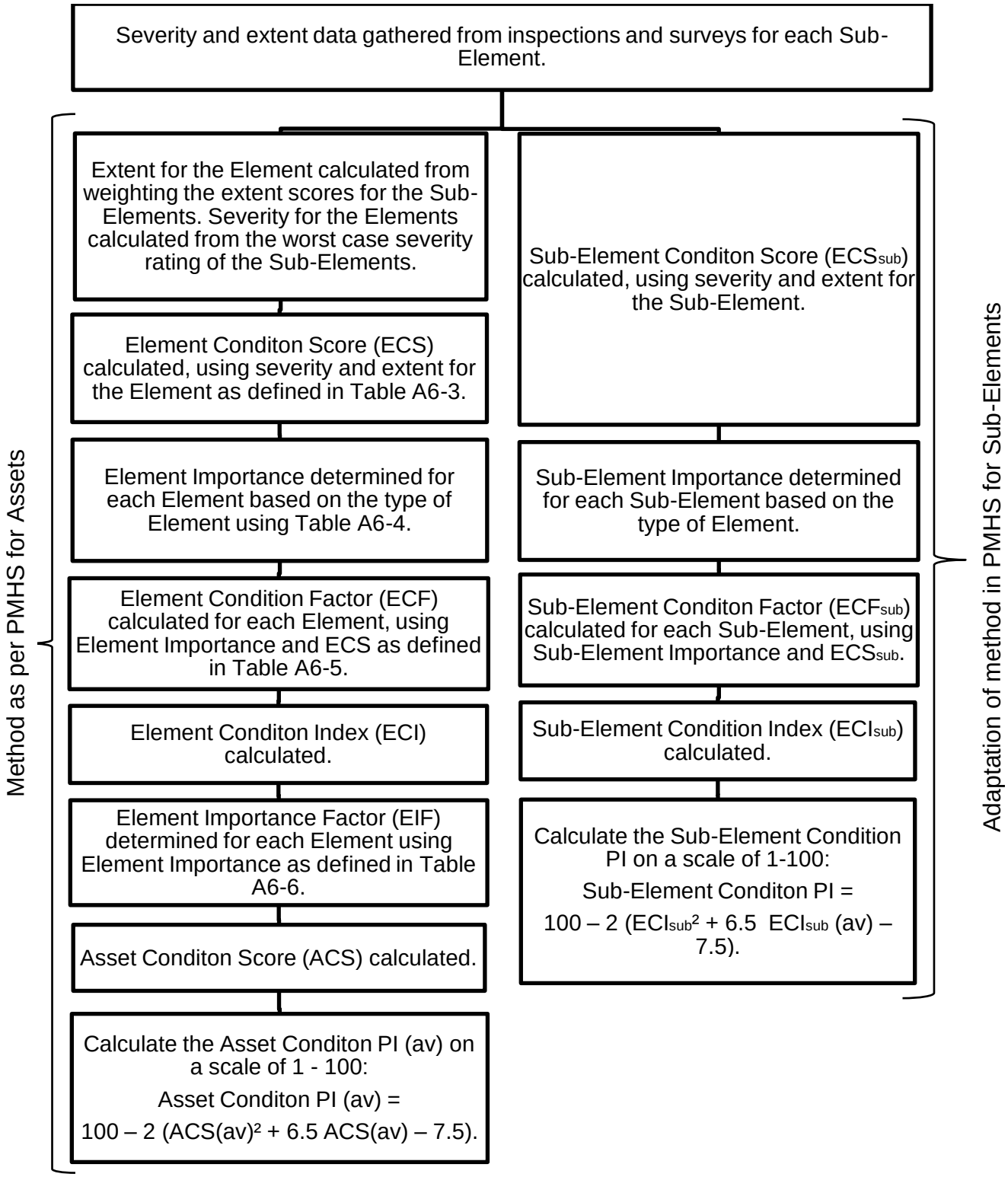

Table A6-3: Element Condition Score (ECS)

		severity									
		-	1	-	2	3	-	4	-	-	5
damage causing defects		-	D1	-	D2	D3	D3S	D4	-	D4S	D5
paint coatings and protective systems		-	P1	-	P2	P3	-	P4	P4S	-	P5
appearance related defects		-	A1	A2	A3	A4	-	-	-	-	-
defects [18]adjacent elements		X1	X2	-	X3	X4	X4S	X5	-	-	-
extent	A	1.0	1.0	-	-	-	-	-	-	-	-
	B	1.0	1.0	1.1	2.0	3.0	3.1	4.0	4.1	4.2	5.0
	C	1.0	1.1	1.2	2.1	3.1	3.2	4.1	4.2	4.3	5.0
	D	1.0	1.3	1.4	2.3	3.3	3.4	4.3	4.4	4.5	5.0
	E	1.0	1.7	1.8	2.7	3.7	3.8	4.7	4.8	4.9	5.0

Table A6-4: Tunnel structure Element Importance

Element	Element Importance
primary lining	very high
secondary lining	very high
tunnel cladding	low
ceilings	low
foundations	high
wing walls	high
retaining walls	high
embankments	medium
portals	very high
service building	high
pump house	high
drainage sumps	high
plant room	very high
waterproofing	low
drains and gullies	high
expansion joints	very low
surfacing	low
parapet / handrails	low
access gantries / walkways	low

[18] Reference to defects within Table A6-3 (Element Condition Score (ECS)) shall mean Highway Asset Defects.

Table A6-5: Element Condition Factor (ECF)

Element Importance	Element Condition Factor
very high	0.0
high	0.3 – [(ECS – 1) x 0.3 / 4]
medium	0.6 – [(ECS – 1) x 0.6 / 4]
low	1.2 – [(ECS – 1) x 1.2 / 4]

Table A6-6: Element Importance Factor (EIF)

Element Importance	Element Importance Factor
very high	2.0
high	1.5
medium	1.2
low	1.0

Table A6-7: Condition Thresholds and Condition Categories for tunnel structure Assets and Sub-Elements

	Condition Thresholds	
Condition Category	Sub-Element Condition PI score for Sub-Element level	Asset Condition PI (av) score for Asset level
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

A6.4. Performance Requirements

A6.4.1. The tunnel structure Assets shall be maintained to satisfy the Performance Requirements, in accordance with Table A6-8 (Time Performance Requirements for tunnel structure Assets), for each rolling twelve (12) month period based on the Condition Categories which result from the Condition Thresholds.

Table A6-8: Time Performance Requirements for tunnel structure Assets

Performance Requirements:	Time permissible for Assets at each Condition Category per year				
	A	B	C	D	E
Tunnel structure westbound Asset	-	-	≤ 6 months	≤ 1 month	0 months
Tunnel structure eastbound Asset	-	-	≤ 6 months	≤ 1 month	0 months

A6.4.2. All tunnel structure Sub-Elements shall be maintained to satisfy the Performance Requirements in accordance with Table A6-9 (Quantity Performance Requirements for tunnel structure Sub-Elements), based on the Condition Categories which result from the Condition Thresholds.

A6.4.3. The Performance Requirements for the tunnel structure Sub-Elements shall be the maximum permissible total % of tunnel structure Sub-Elements under each cumulative combined set of Condition Categories as defined in Table A6-9 (Quantity Performance Requirements for tunnel structure Sub-Elements).

A6.4.4. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A6-9: Quantity Performance Requirements for tunnel structure Sub-Elements

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Sub-Elements within each Element: tunnel structure westbound Asset	0%	10%	30%	80%	100%
Maximum permissible % of Sub-Elements within each Element: tunnel structure eastbound Asset	0%	10%	30%	80%	100%

Annex 7 of Section 5 M&E and Technology Performance Requirements

A7.1. Asset definition

A7.1.1. The M&E and technology Asset Category shall be divided into Assets, Elements and Sub-Elements, in accordance with Table A7-1 (M&E and technology Assets and Elements)[19], for the purposes of demonstrating compliance against the Performance Requirements.

A7.1.2. The list of M&E and technology Assets, Elements and Sub-Elements in Table A7-1 (M&E and technology Assets and Elements) shall be updated to reflect the design solution.

Table A7-1: M&E and technology Assets and Elements

Asset Category	Asset	Element	Sub-Elements
M&E and Technology	Ventilation westbound	fans	each fan
		motors	each motor
		mountings	each mounting
		bearings	each bearing
		ventilation ducts / dampers	each ventilation duct / damper
		CO monitors	each CO monitor
		visibility monitors	each visibility monitor
		air speed monitors	each air speed monitor
		ventilation control	each ventilation control
		filters / grills	each filter / grill
	Ventilation eastbound	as per split for ventilation westbound	as per split for ventilation westbound
	Lighting westbound	tunnel luminaires	each tunnel luminaire
		light system, service building and plant room	each light system, service building and plant room
		luminaires switching circuits	each luminaire switching circuit
		photometers / lighting controls	each photometer / lighting control
		emergency lighting	each emergency lighting
		lighting control system	each lighting control system
	Lighting eastbound	as per split for lighting westbound	as per split for lighting westbound
		pumps	each pump

[19] The definitions for M&E and technology Assets, Elements and Sub-Elements are developed in line with CS 452 ‘Inspection and records for road tunnel systems’ [10] and CM 430 ‘Maintenance of road tunnels’ [11].

	Drainage/sumps westbound	ventilation / gas detectors	each ventilation / gas detector
		fire precautions	each fire precaution item
	Drainage/sumps eastbound	as per split for drainage/sumps westbound	as per split for drainage/sumps westbound
	Fire safety system westbound	cross connections	each cross connection
		fire extinguishers	each fire extinguisher
		fire hydrants / hoses	each fire hydrant / hose
		fixed firefighting suppression	each fixed firefighting suppression item
		smoke and fire detection equipment and alarm system	each smoke and fire detection equipment and alarm system
	Fire safety system eastbound	as per split for fire safety system westbound	as per split for fire safety system westbound
	Communications and traffic controls westbound	emergency / external / internal phones	each emergency / external / internal phone
		CCTV	each CCTV item
		radio system/leaky feeders	each radio system/leaky feeder
		communication operator / police	each communication operator / police item
		overheight detector	each overheight detector
		speed control and enforcement equipment	each speed control and enforcement equipment
		variable message signs	each variable message sign
		detectors	each detector
	Communications and traffic controls eastbound	as per split for communications and traffic controls westbound	as per split for communications and traffic controls westbound
	Plant control westbound	plant monitor	each plant monitor item
		plant control	each plant control item
		data logging	each data logging item
		telemetry system	each telemetry system
	Plant control eastbound	as per split for plant control westbound	as per split for plant control westbound
	Electrical power westbound	cables	each cable item
		trunking	each trunking item
		earthing	each earthing item
		HV system	each HV system item
		LV system	each LV system item
		UPS	each UPS item
		standby generator	each standby generator
		switch gear	each switch gear item

	Electrical power eastbound	as per split for electrical power westbound	as per split for electrical power westbound
	Building services west	lighting	each lighting item
		HVAC	each HVAC item
		fire suppression system	each fire suppression system item
		intruder detection system	each intruder detection system item
		CCTV	each CCTV item
		power	each power item
	Building services east	as per split for building services west	as per split for building services west

A7.2. Inspections

A7.2.1. The inspection and survey programme and methodology for M&E and technology Assets, Elements and Sub-Elements shall comply with the requirements and recommendations in the Service Standards and include the baseline survey and inspection requirements in accordance with Table A7-2 (Baseline survey and inspection requirements).

A7.2.2. If the manufacturer's recommendations for surveys and inspections is more frequent or onerous than the baseline survey and inspection requirements in Table A7-2 (Baseline survey and inspection requirements), the manufacturer's recommendations shall be followed.

A7.2.3. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A7-2: Baseline survey and inspection requirements

Assets, Elements and Sub-Elements	General Inspection Frequency	Principal Inspection Frequency
Ventilation	Year two (2) and year four (4) of Maintenance Period and annually thereafter	Year one (1), year three (3) and year five (5) of Maintenance Period and three (3) yearly thereafter
Lighting		
Drainage/sumps		
Fire safety		
Communications and traffic controls		
Plant control		
Electrical power		
Building services		

A7.3. Condition Categories

A7.3.1. The Condition Thresholds and corresponding Condition Categories[20] for the tunnel M&E and technology Assets and Sub-Elements shall be as defined in

- Table A7-9 (Condition Thresholds for ventilation Assets and Sub-Elements),
- Table A7-10 (Condition Thresholds for lighting Assets and Sub-Elements),
- Table A7-11 (Condition Thresholds for drainage/sumps Assets and Sub-Elements),
- Table A7-12 (Condition Thresholds for fire safety Assets and Sub-Elements),
- Table A7-13 (Condition Thresholds for communications and traffic controls Assets and Sub-Elements),
- Table A7-14 (Condition Thresholds for plant control Assets and Sub-Elements),
- Table A7-15 (Condition Thresholds for electrical power Assets and Sub-Elements) and
- Table A7-16 (Condition Thresholds for building services Assets and Sub-Elements).

Condition Methodology

A7.3.2. Inspection and survey data shall be used to determine two (2) types of Condition PI scores which are

- an Asset Condition PI (av) and
- a Sub-Element Condition PI.

A7.3.3. The Asset Condition PI (av) and the Sub-Element Condition PI shall be calculated

- in accordance with the methodology set out in the PMHS (Guidance Document for Performance Measurement of Highway Structures) [16] and
- as summarised in Figure 3 (Condition and performance methodology).

A7.3.4. Using the steps summarised in Figure 3 (Condition and performance methodology), the Asset Condition PI (av) scores and the Sub-Element Condition PI scores shall be calculated between 0 and 100, where

- 0 represents the worst possible condition and
- 100 represents the best possible condition.

[20] Condition Categories for M&E and technology Assets, Elements and Sub-Elements are developed in line with CS 452 ‘Inspection and records for road tunnel systems’ [10], CS 450 ‘Inspection of highway structures’ [14] and CM 430 ‘Maintenance of road tunnels’ [11].

Figure 3: Condition and performance methodology

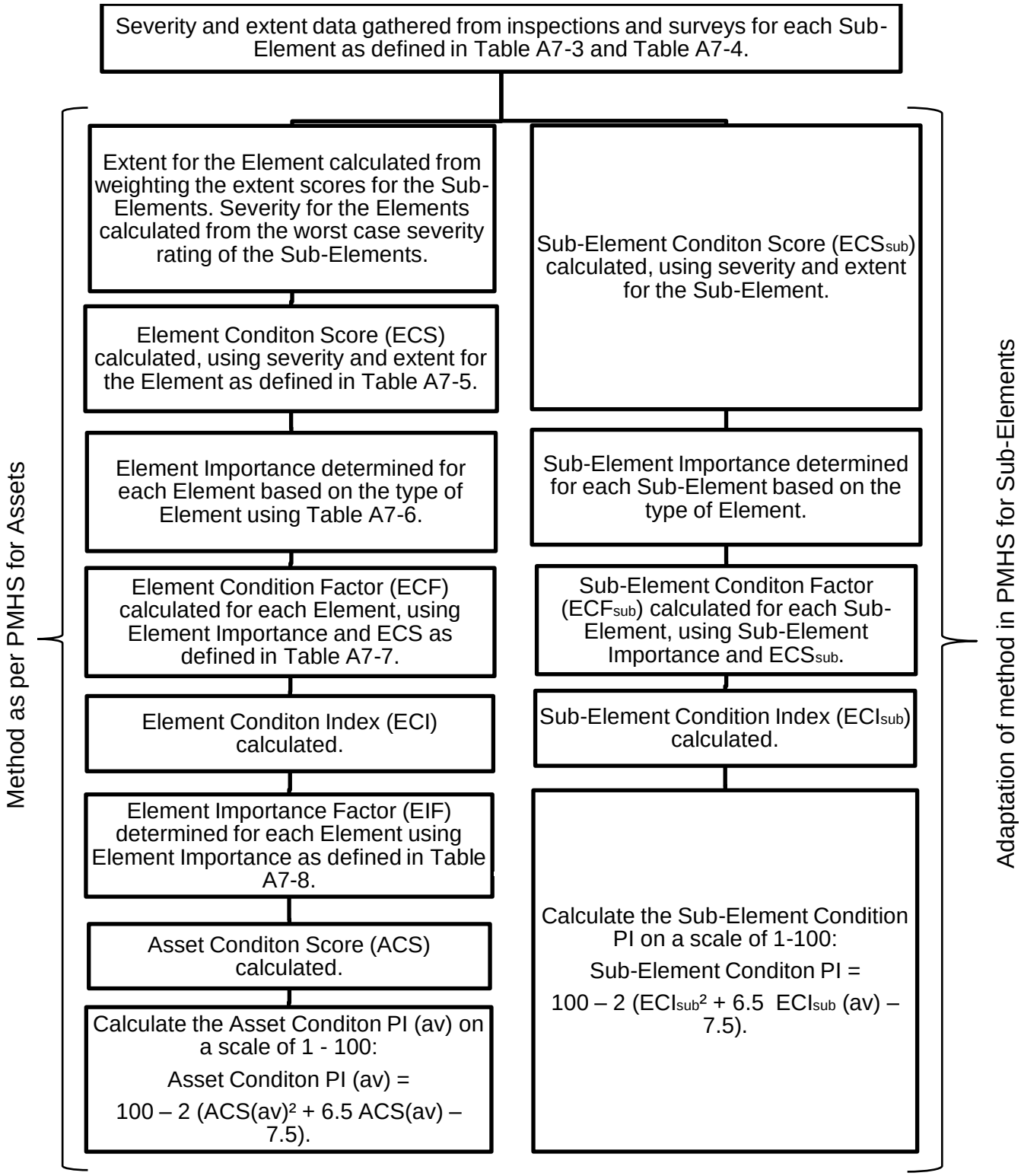

Table A7-3: Severity for M&E and technology Sub-Elements

Severity	Condition Description	Criteria category
1	as new	as new condition and fully operating to operational and maintenance requirements.
2	more than satisfactory	operating to operational and maintenance requirements.
3	satisfactory	minor visible deterioration and requiring only preventative maintenance or equipment operating satisfactorily to operational and maintenance requirements.
4	less than satisfactory	equipment showing signs of wear and tear and requiring 'call out' care or equipment not delivering intended function, operating to operational and maintenance requirements.
5	nearing end of serviceable life	equipment in need of replacement and imminent risk to tunnels operation or equipment not operating to operational and maintenance requirements.

Table A7-4: Extent for M&E and technology Sub-Elements

Extent	Condition description
A	not significant
B	slight, not more than 5% of surface area/length/number dependent on element
C	moderate, 5-20% of surface area/length/number dependent on element
D	wide, 20-50% of surface area/length/number dependent on element
E	extensive, more than 50% of surface area/length/number dependent on element

Table A7-5: Element Condition Score (ECS)

		severity				
		1	2	3	4	5
extent	A	1.0				
	B		2.0	3.0	4.0	5.0
	C		2.1	3.1	4.1	
	D		2.3	3.3	4.3	
	E		2.7	3.7	4.7	

Table A7-6: M&E and technology Element Importance

Assets	Elements	Element Importance
Ventilation eastbound / westbound	fans	very high
	motors	very high
	mountings	high
	bearings	very high
	ventilation ducts / dampers	very high
	CO monitor	medium

	visibility monitor	medium
	air speed monitor	medium
	ventilation control	very high
	filters / grills	medium
Lighting eastbound / westbound	tunnel luminaires	very high
	light system, service building and plant room	high
	luminaries switching circuits	high
	photometers / lighting controls	high
	emergency lighting	very high
Drainage / sumps eastbound / westbound	pumps	high
	ventilation / gas detectors	very high
	fire precautions	very high
Fire safety eastbound / westbound	cross connections	very high
	fire extinguishers	very high
	fire hydrants/hoses	very high
	fixed firefighting suppression	very high
	smoke and fire detection equipment and alarm system	very high
Communications and traffic controls eastbound / westbound	emergency/external/internal phones	very high
	CCTV	very high
	radio system/leaky feeders	high
	communication operator/police	high
	overheight detector	very high
	speed control and enforcement equipment	very high
	variable message sign	very high
	detectors	high
Plant control eastbound / westbound	plant monitor	high
	plant control	high
	data logging	high
	telemetry system	high
Electrical power eastbound / westbound	cables	very high
	trunking	low
	earthing	high
	HV system	very high
	LV system	very high
	UPS	very high
	standby generator	medium
	switch gear	medium

Building services eastbound / westbound	lighting	low
	HVAC	medium
	fire suppression system	high
	intruder detection system	high
	CCTV	high
	power	medium

Table A7-7: Element Condition Factor (ECF)

Element Importance	Element Condition Factor
very high	0.0
high	0.3 – [(ECS – 1) x 0.3 / 4]
medium	0.6 – [(ECS – 1) x 0.6 / 4]
low	1.2 – [(ECS – 1) x 1.2 / 4]

Table A7-8: Element Importance Factor (EIF)

Element Importance	Element Importance Factor
very high	2.0
high	1.5
medium	1.2
low	1.0

Table A7-9: Condition Thresholds for ventilation Assets and Sub-Elements

	Condition Thresholds for ventilation		
	Sub-Elements		Assets
Condition Category	Ventilation Sub-Element Condition PI	Jet fan age against manufacturer's design life	Ventilation Asset Condition PI (av)
A	90 ≤ PI ≤ 100	≤ 20% of life	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	20 < age ≤ 60% of life	80 ≤ PI < 90
C	65 ≤ PI < 80	60 < age ≤ 95% of life	65 ≤ PI < 80
D	40 ≤ PI < 65	95 < age ≤ 120% of life	40 ≤ PI < 65
E	0 ≤ PI < 40	>120% of life	0 ≤ PI < 40

Table A7-10: Condition Thresholds for lighting Assets and Sub-Elements

	Condition Thresholds for lighting		
	Sub-Elements		Assets
Condition Category	Lighting Sub-Element Condition PI	Lamp unit age against manufacturer's design life	Lighting Asset Condition PI (av)
A	90 ≤ PI ≤ 100	≤20% of life	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	20 < age ≤ 60% of life	80 ≤ PI < 90

C	65 ≤ PI < 80	60 < age ≤ 95% of life	65 ≤ PI < 80
D	40 ≤ PI < 65	95 < age ≤ 120% of life	40 ≤ PI < 65
E	0 ≤ PI < 40	>120% of life	0 ≤ PI < 40

Table A7-11: Condition Thresholds for drainage/sumps Assets and Sub-Elements

	Condition Thresholds for drainage/sumps		
	Sub-Elements		Assets
Condition Category	Drainage/sumps Sub-Element Condition PI	Sump pump age against manufacturer's design life	Drainage/sumps Asset Condition PI (av)
A	90 ≤ PI ≤ 100	≤20% of life	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	20 < age ≤ 60% of life	80 ≤ PI < 90
C	65 ≤ PI < 80	60 < age ≤ 95% of life	65 ≤ PI < 80
D	40 ≤ PI < 65	95 < age ≤ 120% of life	40 ≤ PI < 65
E	0 ≤ PI < 40	>120% of life	0 ≤ PI < 40

Table A7-12: Condition Thresholds for fire safety Assets and Sub-Elements

	Condition Thresholds for fire safety	
	Sub-Elements	Assets
Condition Category	Fire safety Sub-Element Condition PI	Fire safety Asset Condition PI (av)
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

Table A7-13: Condition Thresholds for communications and traffic controls Assets and Sub-Elements

	Condition Thresholds for communications and traffic controls	
	Sub-Elements	Assets
Condition Category	Communications and traffic controls Sub-Element Condition PI	Communications and traffic controls Asset Condition PI (av)
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

Table A7-14: Condition Thresholds for plant control Assets and Sub-Elements

	Condition Thresholds for plant control	
	Sub-Elements	Assets
Condition Category	Plant control Sub-Element Condition PI	Plant control Asset Condition PI (av)
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

Table A7-15: Condition Thresholds for electrical power Assets and Sub-Elements

	Condition Thresholds for electrical power	
	Sub-Elements	Assets
Condition Category	Electrical power Sub-Element Condition PI	Electrical power Asset Condition PI (av)
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

Table A7-16: Condition Thresholds for building services Assets and Sub-Elements

	Condition Thresholds for building services	
	Sub-Elements	Assets
Condition Category	Building services Sub-Element Condition PI	Building services Asset Condition PI (av)
A	90 ≤ PI ≤ 100	90 ≤ PI ≤ 100
B	80 ≤ PI < 90	80 ≤ PI < 90
C	65 ≤ PI < 80	65 ≤ PI < 80
D	40 ≤ PI < 65	40 ≤ PI < 65
E	0 ≤ PI < 40	0 ≤ PI < 40

A7.4. Performance Requirements

A7.4.1. The M&E and technology Assets shall be maintained to satisfy the Performance Requirements, in accordance with Table A7-17 (Time-based Performance Requirements for M&E and technology Assets), for each rolling twelve (12) month period based on the Condition Categories which result from the Condition Thresholds.

Table A7-17: Time-based Performance Requirements for M&E and technology Assets

Performance Requirements:	Time allowed for Assets at each Condition Category per year				
	A	B	C	D	E
Ventilation westbound Ventilation eastbound	-	-	≤ 6 months	≤ 1 month	0 months
Lighting westbound Lighting eastbound	-	-	≤ 6 months	≤ 1 month	0 months
Drainage/sumps westbound Drainage/sumps eastbound	-	-	≤ 6 months	≤ 1 month	0 months
Fire safety westbound Fire safety eastbound	-	-	≤ 3 months	≤ 2 weeks	0 months
Communication and traffic controls westbound Communication and traffic controls eastbound	-	-	≤ 3 months	≤ 2 weeks	0 months
Plant control westbound Plant control eastbound	-	-	≤ 6 months	≤ 1 month	0 months
Electrical power westbound Electrical power eastbound	-	-	≤ 6 months	≤ 1 month	0 months
Building services westbound Building services eastbound	-	-	≤ 12 months	≤ 2 months	≤ 1 month

A7.4.2. All M&E and technology Sub-Elements shall be maintained to satisfy the Performance Requirements in accordance with Table A7-18 (Quantity-based Performance Requirements for M&E and technology Sub-Elements), based on the Condition Categories which result from the Condition Thresholds.

A7.4.3. The Performance Requirements for the M&E and technology Sub-Elements shall be the maximum permissible total % of M&E and technology Sub-Elements under each cumulative combined set of Condition Categories as defined in Table A7-18 (Quantity-based Performance Requirements for M&E and technology Sub-Elements).

A7.4.4. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A7-18: Quantity-based Performance Requirements for M&E and technology Sub-Elements

Performance Requirements:	Combined sets of Condition Categories				
	E	D (or worse)	C (or worse)	B (or worse)	A (or worse)
Maximum permissible % of Sub-Elements within each Element:	0%	10%	30%	100%	100%

Ventilation Asset					
Maximum permissible % of Sub-Elements within each Element: lighting Asset	0%	10%	20%	80%	100%
Maximum permissible % of Sub-Elements within each Element: drainage system Asset	0%	10%	30%	100%	-
Maximum permissible % of Sub-Elements within each Element: fire safety Asset	0%	10%	20%	80%	100%
Maximum permissible % of Sub-Elements within each Element: communication and traffic controls Asset	0%	10%	20%	80%	100%
Maximum permissible % of Sub-Elements within each Element: plant control Asset	0%	10%	30%	100%	-
Maximum permissible % of Sub-Elements within each Element: electrical power Asset	0%	10%	30%	100%	-
Maximum permissible % of Sub-Elements within each Element: building services Asset	0%	20%	50%	100%	-

Annex 8 of Section 5 Drainage Performance Requirements

A8.1. Asset definition

A8.1.1. The drainage Asset Category shall be divided into Assets for the purposes of demonstrating compliance against the Performance Requirements.

A8.1.2. Each drainage Asset shall be defined according to the asset groups as defined in CD 535 'Drainage asset data and risk management' [18] and as each

- chamber,
- inlet and outlet,
- pipe,
- filter drain,
- ditch and channel,
- pond and
- ancillary drainage item.

A8.1.3. The list of drainage Assets shall reflect the design solution.

A8.2. Inspections

A8.2.1. The inspection and survey programme and methodology for drainage Assets shall include the baseline survey and inspection requirements in accordance with Table A8-1 (Baseline survey and inspection requirements).

A8.2.2. A valid calibration certificate shall be present with every survey vehicle or piece of equipment used.

Table A8-1: Baseline survey and inspection requirements

Survey	Asset type	Frequency
An all asset condition and connectivity survey in accordance with CS 551 'Drainage surveys' [19], including recording of structural and service condition grade.	Chambers	Year one (1) and year five (5) of the Maintenance Period and 10% a year thereafter
	Inlets and outlets	Annually
	Pipes	Year one (1) and year five (5) of the Maintenance Period and 10% a year thereafter
	Filter drains	Annually
	Ditches and channels	Year one (1) and year five (5) of the Maintenance Period and 20% a year thereafter for the ditches annually for the linear channels
	Ponds	Year one (1), year three (3) and year five (5) of the Maintenance Period and every two (2) years thereafter
	Ancillary drainage items	Annually

A8.3. Condition Categories

A8.3.1. The Condition Thresholds and corresponding Condition Categories for the drainage Assets shall be as defined in Table A8-2 (Condition Thresholds for drainage Assets).

A8.3.2. Pipework condition descriptions shall be in accordance with “Internal Condition Grades” as set out in

- Table NG 90/1 in part 3 of section 9 of volume 5 of the MCHW ‘Series NG 9000 – Notes for Guidance’ [2] and
- CD 535 ‘Drainage asset data and risk management’ [18].

Table A8-2: Condition Thresholds for drainage Assets

	Condition Thresholds		
Condition Category	**Table NG 90/1 MCHW Condition Grade (pipes only)**	**CS 551 Structural Grade**	**CS 551 Service Grade**
A	Internal condition grade 1	1	1
B	Internal condition grade 2	2	2
C	Internal condition grade 3	3	3
D	Internal condition grade 4	4	4
E	Internal condition grade 5	5, 9 or 0	5, 9 or 0

A8.4. Performance Requirements

A8.4.1. All drainage Assets shall be maintained to satisfy the Performance Requirements in accordance with Table A8-3 (Performance Requirements for drainage Assets), based on the Condition Categories which result from the Condition Thresholds.

A8.4.2. The Performance Requirements for the drainage Assets shall be the maximum permissible total % of drainage Assets under each cumulative combined set of Condition Categories as defined in Table A8-3 (Performance Requirements for drainage Assets).

A8.4.3. If a Performance Requirement is failed for any single combined set of Condition Categories, the whole Asset Category shall fail to meet is Performance Requirements.

Table A8-3: Performance Requirements for drainage Assets

Performance Requirements:	**Combined sets of Condition Categories**				
	E	**D (or worse)**	**C (or worse)**	**B (or worse)**	**A (or worse)**
Maximum permissible % of Assets at each combined set of Condition Categories at any time: chambers	0%	≤ 5%	≤ 30%	≤ 100%	-

Maximum permissible % of Assets at each combined set of Condition Categories at any time: inlets and outlets	0%	≤ 5%	≤ 30%	≤ 100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: pipes	0%	≤ 5%	≤ 20%	≤ 100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: filter drains	0%	≤ 5%	≤ 30%	≤ 100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: ditches and channels	0%	≤ 5%	≤ 20%	≤ 100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: ponds	0%	≤ 5%	≤ 30%	≤ 100%	-
Maximum permissible % of Assets at each combined set of Condition Categories at any time: ancillary drainage items	0%	≤ 5%	≤ 30%	≤ 100%	-

6. Handover at Maintenance Completion Date

6.1.1. Prior to the Maintenance Completion Date and handover of the Maintenance Services to the *Client*, the requirements contained in GG 182 'Major schemes - Enabling handover into operation and maintenance' [9] and MCH 1980 'Process for commissioning and handover of technology schemes' [20] shall have been satisfied.

6.1.2. All Assets shall be provided to the *Client* at the Maintenance Completion Date such that they satisfy the Performance Requirements.

6.1.3. Prior to the Maintenance Completion Date, all materials (including documentation), training and handover activities shall be provided to permit the *Client* to assume complete control of the *works.*

6.1.4. A list of spares for the Affected Property, and any Equipment required to maintain or manage the Plant and Materials, shall be maintained for the duration of the Maintenance Period.

6.1.5. On, or prior to, the Maintenance Completion Date, as part of the transition to the new maintenance service provider, all spares for the Affected Property, and any Equipment required to maintain or manage the Plant and Materials, shall be transferred to the *Client* or the new maintenance service provider, unless otherwise agreed with the *Project Manager*.

6.1.6. A minimum of six (6) months prior to the Maintenance Completion Date, the *Project Manager* shall be provided with all materials relating to the handover of the Maintenance Services, including

- all handover PCF products in accordance with the requirements contained in Volume 1 Part 1 (General Requirements) of the contract,
- user, reference and training manuals,
- original equipment manufacturer user manuals,
- maintenance manuals,
- the minimum retained spares list and
- any additional materials required to permit the *Client* to assume complete control of the *works.*

6.1.7. Prior to the Maintenance Completion Date, accompanied orientation site visits shall be provided for nominated personnel from the *Client* or other stakeholders to

- become familiarised with the *works*,
- be shown the access and maintenance arrangements and
- understand the safe maintenance of the *works*.

6.1.8. Safe, effective and quality training shall be provided to cover the procedures and safe implementation related to

- normal operation,
- maintenance activities applicable to each Asset Category or Asset,
- routine inspection and
- fault diagnosis and assessment.

6.1.9. A minimum of six (6) months prior to the Maintenance Completion Date, a Maintenance Services Handover Schedule shall be submitted for acceptance by the *Project Manager*.

6.1.10. The Maintenance Services Handover Schedule shall include

- the content requirements of the Handover Schedule PCF product,
- summary of the condition of the Assets,
- a description of all elements or activities associated with the Maintenance Services that require training,
- the proposed requirements and contents of the training,
- the nominated personnel required to undertake training,
- the proposed time periods and a programme for all training and handover activities,
- proposed locations for the training,
- resource and details of any Staff to be provided to support the *Client* and its maintenance service provider and
- the programme for handover of all materials.

Reference List

[1] Highways England, “Design Manual for Roads and Bridges,” [Online]. Available: http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm. [Accessed April 2020].

[2] Highways England, “Manual of Contract Documents for Highway Works,” [Online]. Available: http://www.standardsforhighways.co.uk/ha/standards/mchw/index.htm. [Accessed April 2020].

[3] Highways England, “GM 701 Asset delivery asset maintenance requirements”.

[4] Highways England, “GS 801 Asset delivery asset inspection requirements”.

[5] Highways England, “GM 702 Operational requirements for network occupancy”.

[6] Highways England, “GM 704 Severe weather requirements”.

[7] Highways England, “GM 703 Incident Management Requirements”.

[8] Highways England, “Asset Data Management Manual,” [Online]. Available: https://www.standardsforhighways.co.uk/ha/standards/admm/index.htm.

[9] Highways England, “GG 182 Major Schemes - Enabling handover into operation and maintenance”.

[10] Highways England, “CS 452 Inspection and records for road tunnel systems”.

[11] Highways England, “CM 430 Maintenance of road tunnels”.

[12] Department for Environment Food and Rural Affairs, “Litter and refuse: code of practice,” [Online]. Available: https://www.gov.uk/government/publications/code-of-practice-on-litter-and-refuse.

[13] Highways England, “CS 126 Inspection and assessment of road markings and road studs”.

[14] Highways England, “CS 450 Inspection of highway structures”.

[15] Highways England, “CS 125 Inspection of traffic signs”.

[16] Highways England, “Guidance Document for Performance Measurement of Highway Structures,” 2007. [Online]. Available: https://www.adeptnet.org.uk/system/files/documents/Guidance%20Document%20for%20Performance%20Measurement-%20Part%20B1%20Condition%20PI.pdf.

[17] Highways England, “CG 302 As-built, operational and maintenance records for highway structures”.

[18] Highways England, “CD 535 Drainage asset data and risk management”.

[19] Highways England, “CS 551 Drainage surveys”.

[20] Highways England, “MCH 1980 Process for commissioning and handover of technology schemes”.

[21] Highways England, “CS 228 Skidding resistance”.

[22] Highways England, “CS 229 Data for pavement assessment”.

[23] Highways England, “CD 377 Requirements for road restraint systems”.

[24] Highways England, “CS 452 Inspection and records for road tunnel systems”.

[25] Highways England, “Data Room,” [Online]. Available: https://a303stonehenge.sharepoint.com/sites/DataRooms/procurement/main-works/Shared%20Documents/Forms/AllItems.aspx. [Accessed April 2020].