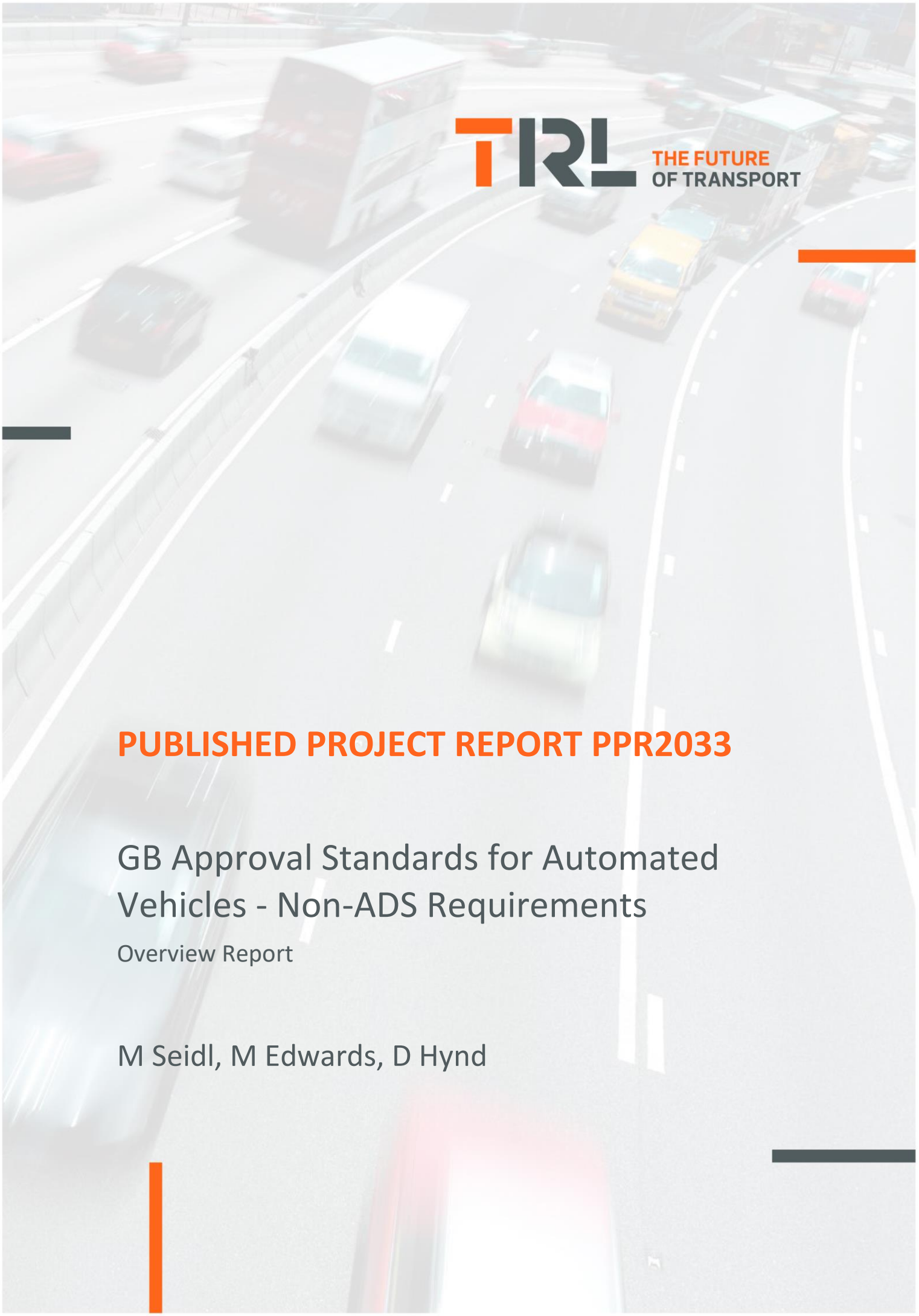

THE FUTURE OF TRANSPORT

PUBLISHED PROJECT REPORT PPR2033

GB Approval Standards for Automated Vehicles - Non-ADS Requirements

Overview Report

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Report details

Report prepared for:	Department for Transport, International Vehicle Standards		
Project/customer reference:	TFTS1007		
Copyright:	© TRL Limited		
Report date:	March 2024		
Report status/version:	Final		
Quality approval:			
C Booth (Project Manager)		D Hynd (Technical Reviewer)	

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Executive summary

The Department for Transport has an objective to develop a vehicle approval scheme in order to allow the safe and secure deployment of fully automated vehicles in Great Britain[1]. This project developed proposals for administrative, procedural and technical requirements for all technical aspects which do not relate to the automated driving system (ADS).

Vehicle categorisation and the grades of automation by which the technical requirements are structured were defined during the course of the project in collaboration with the Department. Figure 1 structures the possible grades of automation and shows which are within the project scope.

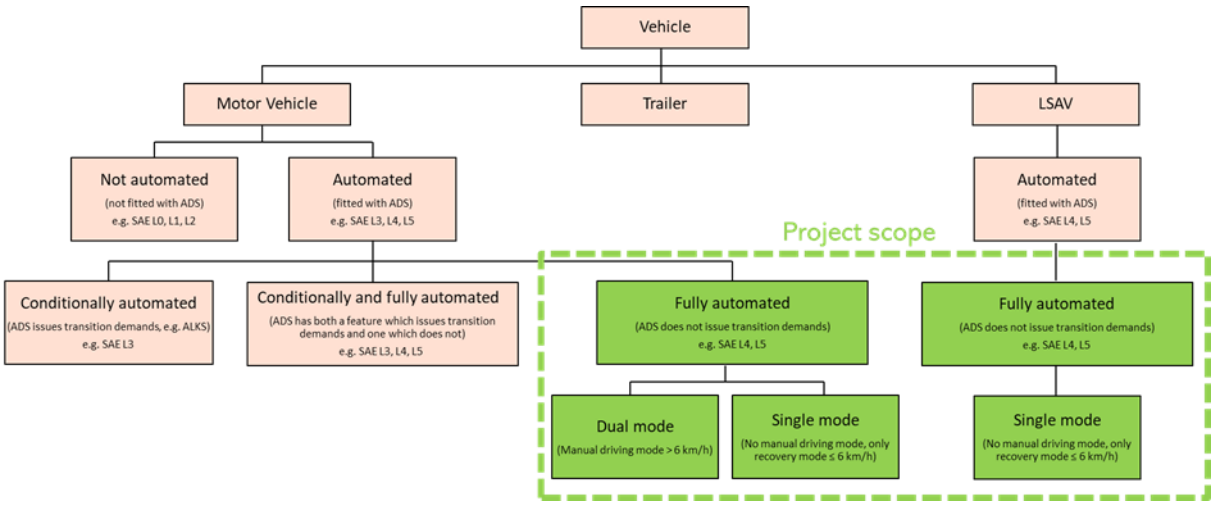

Figure 1: Taxonomy of automation for M-category, N-category and Low Speed Automated Vehicles with indication of scope of current project; SAE levels indicated to aid interpretation only

The project scope included vehicles, the design of which is equivalent to conventional vehicle categories M_1, M_2, M_3, N_1, N_2, N_3, L2e, L5e, L6e and L7e. For M- and N-category vehicles, additional proposals should be developed for low speed automated vehicles (LSAVs) within each category. The proposed categorisation for fully automated vehicles on the basis of existing categorisation criteria is shown in Figure 2 for M- and N-category and LSAVs, and in Table 1 for L-category.

[1] Connected & Automated Mobility 2025: Realising the benefits of self-driving vehicles in the UK

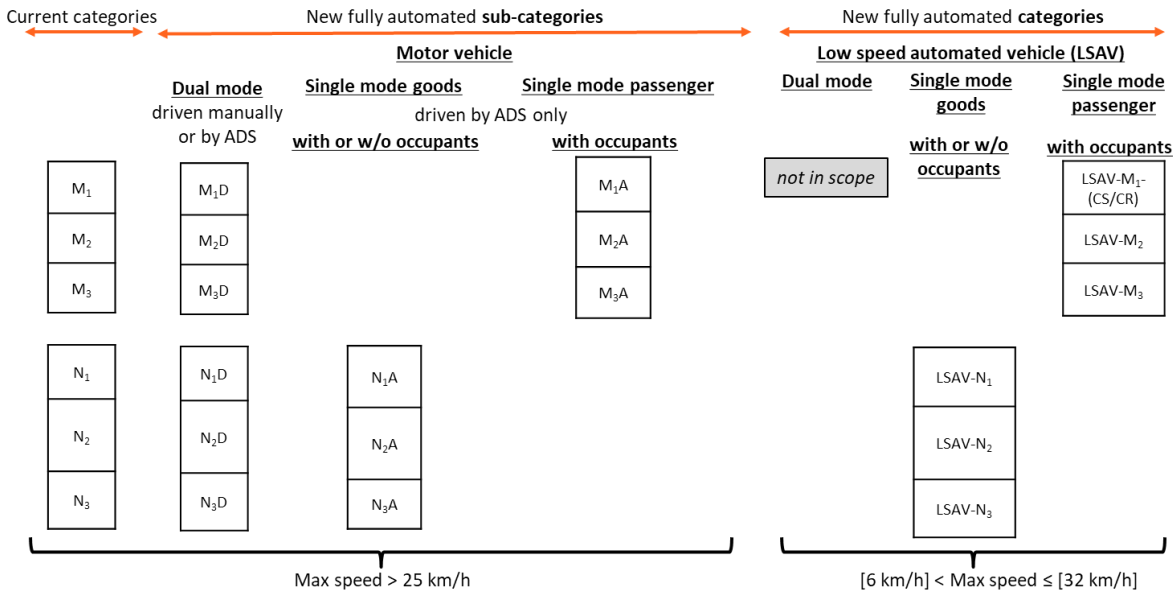

Figure 2: Proposed categorisation of fully automated vehicles (M-/N-category). Note: LSAV-M_1 sub-divided into crashworthiness approval level (CAL) Standard (CS) and Reduced (CR) for standard and reduced risk Operational Design Domains, respectively

Table 1: Proposed categorisation of fully automated vehicles (L-category)

Category / Sub-category	Name	Common classification criteria
LA	Fully automated lightweight vehicle	(1) Fully automated vehicle (2) length ≤ 3,700 mm (3) width ≤ 1,500 mm (4) height ≤ 2,500 mm (5) Propelled with an electric engine
LA-U4 (based on current L7e-CU category)	Automated heavy quadri-mobile for utility purposes	(6) four wheels (7) exclusively designed for the carriage of goods with no seats for passengers/riders (8) maximum continuous rated power ≤ 15 kW (9) maximum design vehicle speed ≤ 90 km/h (10) mass in running order ≤ 600 kg
LA-U3 (based on current L5e-B category)	Automated commercial tricycle	(6) three wheels (7) exclusively designed for the carriage of goods with no seats for passengers/riders (8) maximum continuous rated power ≤ 15 kW (9) maximum design vehicle speed ≤ 90 km/h (10) mass in running order ≤ 600 kg

Proposed regulatory text was developed to include these new categories of automated vehicles into the relevant framework regulations.

An outline approval process for fully automated vehicles and LSAVs in series production, including unlimited series and medium series production, with options for single stage (complete vehicle), multi-stage (incomplete vehicle) and multi-stage (completed vehicle), as well as individual vehicle approval, was developed. The process involves six steps between the manufacturer and the Vehicle Certification Agency (VCA), as the United Kingdom's appointed type approval authority: Scheme selection, definition of vehicle category and definition of requirements, gathering and submitting evidence of compliance with the requirements, compliance decision, and additional checks.

Proposals for pre-deployment, non-ADS technical requirements and test procedures were developed, as far as possible, by application and modification of existing technical regulations within the existing M-/N- and L-category framework regulations, namely the GB assimilated version of Regulation (EU) 2018/858 and the GB assimilated version of Regulation (EU) No 168/2013, respectively. Most technical regulations were found to require at least some level of modification to clarify their interpretation in the absence of vehicle elements referred to (e.g. a driver, driver's seat or steering wheel). Further reaching technical changes were proposed, for instance, to the regulations governing steering equipment, braking system, electromagnetic compatibility, external projections, lighting installation, safety glazing, as well as pedestrian protection and full-scale crash tests for LSAVs. Some changes to the standardised information documents for the approval process are required as a consequence.

For the relevant in-use regulations – Construction and Use, Lighting and Authorisation of Special Types – proposals were developed for modifications which ensure that vehicles approved to the proposed pre-deployment requirements will be compliant, and which remove other potential barriers to compliance, for instance related to the lack of a driver's seat and controls. The majority of in-use items were found to not require modification; changes were proposed, for instance, in order to add definitions, modify braking requirements and specify tyre and seat belt requirements for LSAVs.

A two-stage stakeholder consultation was performed to solicit views and comments on TRL's proposals from five relevant experts on the regulatory framework outline (overall approach, scope of automated vehicles to include, automated vehicle categorisation and implementation) and the pre-deployment requirements and test procedures proposed. Stakeholder comments were taken into account for the final version of these elements.

During the course of project aspects which require further consideration by the Department, also in the context of developing the ADS regulation, were collated for the Department's attention.

1 Introduction

The Department for Transport has an objective to develop a vehicle approval scheme in order to allow the safe and secure deployment of fully automated vehicles in Great Britain[2]. This project developed proposals for administrative, procedural and technical requirements for all technical aspects which do not relate to the automated driving system (ADS).

The project scope included developing pre-deployment requirements and test procedures, and in-use requirements for vehicles, the design of which is equivalent to vehicle categories M_1, M_2, M_3, N_1, N_2, N_3, L2e, L5e, L6e and L7e. For M- and N-category vehicles, additional proposals have been developed for low speed automated vehicles (LSAVs) within each category, to build on the outcomes of a previous TRL study on behalf of the Department[3] which had a more limited scope in terms of the vehicle categories and propulsion system technologies considered. For M- and N-category vehicles, the project considered all propulsion system technologies; for L-category only battery electric propulsion. Proposals were developed for unlimited series type-approval, national small series type-approval (NSSTA) and individual vehicle approval (IVA) of the above-mentioned categories. The project scope did not include vehicles intended to carry dangerous goods, special purpose vehicles or wheelchair-accessible vehicles.

This report provides a summary overview of key considerations and project outcomes on administrative and procedural requirements in Section 2, pre-deployment requirements and test procedures in Section 3, and in-use requirements in Section 4. Stakeholder feedback gathered during course of the project is reported in Section 5.

More detail, including the exact wording of proposals, was provided to the Department in separate deliverables. Aspects identified during the course of the project which require further consideration by the Department are summarised in Sections 3.2.1.4, 3.2.2.2, 4.2.1.2, 4.2.2.2 and 4.2.3.2 of this report.

[2] Connected & Automated Mobility 2025: Realising the benefits of self-driving vehicles in the UK

[3] GB LSAV Approval Scheme: Work Package 4 – Non-ADS requirements

2 Regulatory framework and non-technical provisions

2.1 Regulatory framework

The type-approval and market surveillance of motor vehicles (M-, N- and O-category vehicles and the proposed Low Speed Automated Vehicle category), and of systems, components and separate technical units intended for such vehicles, is controlled by the GB assimilated version of Regulation (EU) 2018/858. This is supported by the GB assimilated version of Commission Implementing Regulation (EU) 2020/683, which defines the administrative requirements for the approval and market surveillance of these vehicles, e.g. the standardised information document that a manufacturer must provide to an approval authority when applying for type-approval. Similarly, the type-approval and market surveillance of two- and three-wheeled vehicles and quadricycles (L-category vehicles) is controlled by the GB assimilated version of Regulation (EU) No 168/2013, supported by Commission Implementing Regulation (EU) No 901/2014.

2.1.1 M-, N-, LSAV-M and LSAV-N category (Regulation 2018/858)

Motor vehicle categorisation and the grades of automation by which the requirements are structured were defined as shown in Figure 3 in collaboration with the Department. As shown in Figure 3, the project is concerned with fully automated vehicles, i.e. those where the ADS does not issue transition demands and hence no intervention by a driver is required at any time. For M- and N-category vehicles, these may include dual-mode vehicles, which have both manual controls to enable manual driving and an ADS to drive fully automated in certain operational design domains (ODDs).

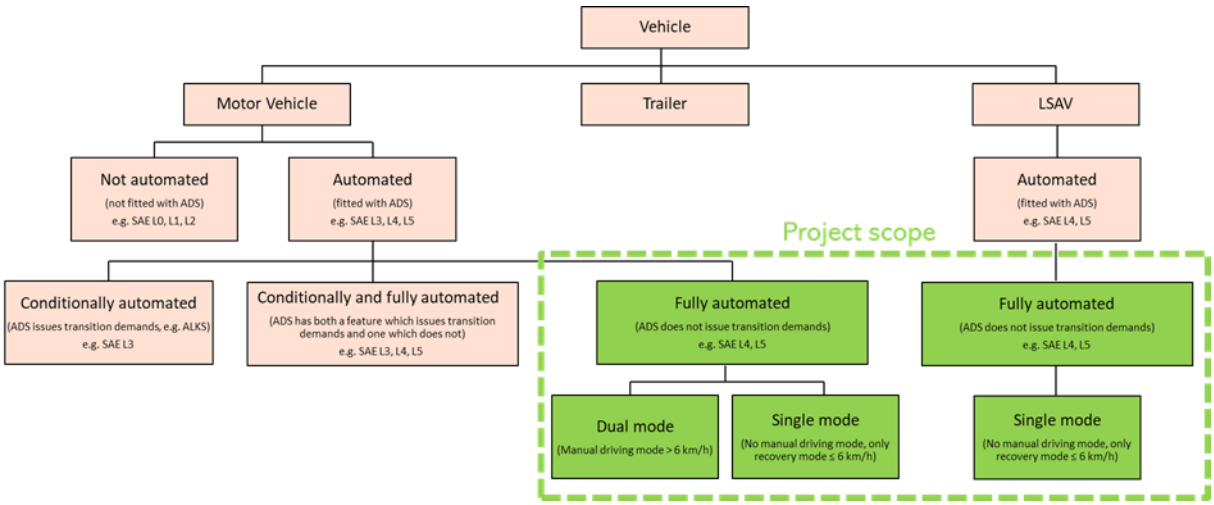

Figure 3: Taxonomy of automation for M-category, N-category and Low Speed Automated Vehicles with indication of scope of current project; SAE levels indicated to aid interpretation only

Remote driving is not in scope of this study, but vehicles may have a remote assistant, who could perform certain non-driving task related activities, such as route planning or assisting passengers.

The proposed categorisation[4] for fully automated vehicles with four or more wheels is shown in Figure 4. The existing categorisation criteria of categories M_1, M_2, M_3 and N_1, N_2, N_3 (such as number of seating positions or vehicle mass) are maintained with the letter D or A appended to indicate dual mode vehicle (DMV) or automated single mode vehicle (SMV, i.e. no driver controls) sub-categories, respectively. Note that goods vehicles may or may not have occupant positions. Additionally, an LSAV category was included to enable the approval of vehicles which are limited to a maximum speed not greater than 20 mph (32 km/h) and operate on roads with a speed limit not exceeding 30 mph (48 km/h) with appropriately tailored requirements.

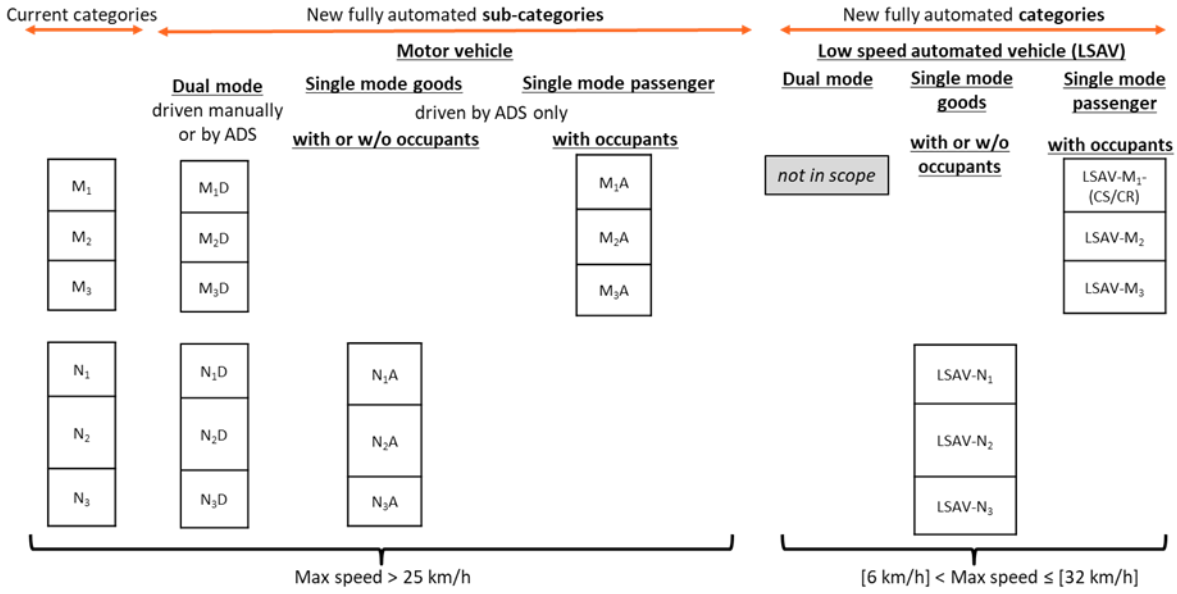

Figure 4: Proposed categorisation of fully automated vehicles (M-/N-category). Note: LSAV-M_1 sub-divided into crashworthiness approval level (CAL) Standard (CS) and Reduced (CR) for standard and reduced risk Operational Design Domains, respectively

To help understand the application of the vehicle categorisation shown in Figure 4, Table 2 shows classification of automated vehicles according to their maximum speed in automated and manual driving modes. Note that dual mode LSAVs have not been considered as part of the scope of this project. Also, the minimum speed for LSAVs has been proposed as greater than 6 km/h (to align with L-category lower limit), so vehicles with a maximum speed of 6 km/h or less are also outside the scope of approval.

[4] Note that in parallel to this project, categorisation and definitions are under consideration internationally through the work of the UNECE.

Table 2: Classification of automated vehicles according to their maximum speed in automated and manual driving modes

		Max speed manual mode		
		≤ 6 kph (or no manual driving mode)	**> 6 kph ≤ 25 kph**	**> 25 kph**
Max speed automated mode	**≤ 6 kph**	Out of scope of type-approval*	Out of scope of type-approval*	Dual mode (M_xD or N_xD)
	> 6 kph ≤ [32] kph	LSAV-M_x or LSAV-N_x	Out of scope of type-approval**	Dual mode (M_xD or N_xD)
	> [32] kph	Single mode M or N (M_xA or N_xA)	Dual mode M_xD or N_xD***	Dual mode (MxD or NxD)

Notes:

* Currently out of scope of type-approval.

** In the future, once potential cases are more clearly understood (e.g. road sweepers, line painters, cone layers, etc.), recommend review if dual mode LSAVs are required.

*** In the future, once potential use cases more clearly understood, recommend review if full manual technical provisions necessary for automated vehicles that can only be driven manually at low speeds.

Dual mode LSAVs have been excluded from the scope of this work. LSAV-N sub-categories were proposed based on the boundaries of the current N-categories as regards the vehicle mass (see Table 3).

Table 3: LSAV-N (goods) classification

Sub-category	Maximum mass
N_1	≤ 3.5t

N_2	> 3 .5t & ≤ 12t
N_3	> 12t

The following approach was used to propose LSAV-M subcategories:

- Allow standing passengers in small (M_1 sized) LSAVs where ODD has sufficiently low risk (CAL-Reduced)
- Offer equivalent protection to current non-automated vehicles noting that the main factors of good occupant protection levels on current city buses are their high mass (which reduces deceleration levels in a crash) and high seating positions (which reduces intrusion related injuries in a crash)
- Match current M categories as much as possible

On this basis the criteria for the classification of LSAV-M subcategories were proposed as shown in Table 4.

Table 4: Criteria for the classification of LSAV-M subcategories

Sub-category	Max. no. of seats (excl. folding seats)	Max. no. of passengers	Max. mass	
M_1	≤ 9	≤ [15]		Both reqs. to be met for M_1 classification
M_2	> 9	> [15]	≤ 5 t	One req. to be met for M_2 & M_3 classifications
M_3	> 9	> [15]	> 5 t	
		For M_1 CAL-standard, max no. passengers ≤ 9 because seated only		

2.1.2 L-category (Regulation 168/2013)

The regulatory framework outline proposes that provisions to allow the approval of fully automated electric goods vehicles (quadricycles and tricycles) should be included within the motorcycle framework regulation (GB assimilated version of Regulation (EU) No 168/2013). It is expected that these vehicles would be used on public roads to deliver goods in urban / suburban areas.

The scope of the L-category automated vehicles proposed to accommodate in Regulation 168/2013 is:

- Quadricycles and tricycles, i.e. vehicles equivalent to current vehicle categories, quadricycles (L6e, L7e) and tricycles (L2e, L5e)
- Goods carrying only, i.e. these vehicles will only carry goods and will not carry any passengers, vehicles equivalent to current vehicle categories, quadricycles (L6e-BU, L7e-CU) and tricycles (L2e-U, L5e-B)
    - On the basis that it is expected that these vehicles will be used on public roads to deliver goods in urban / suburban areas, they will not be designed to tow trailers or carry dangerous goods; for these activities it is anticipated that larger M/N-category type vehicles would be used
- Battery Electric powered only, i.e. as defined by 'pure electric vehicle' in Regulation 168/2013.
    - This definition does not include 'hydrogen fuel cell vehicles' which are also zero emission vehicles; these vehicles could be included in the scope in the future with additional work
    - Note that although current regulation for fuel storage (EU44/2014, Annex IX) contains provisions for vehicles using liquified petroleum gas (LPG) and compressed natural gas (CNG) through reference to the requirements of UN R67 and R110, respectively, it does not contain provisions for vehicles using hydrogen (i.e. UN R134), which would be required for hydrogen fuel cell vehicles
- Operate in a fully automated mode only (single mode), i.e. these vehicles will not incorporate a manual driving mode.

It should be noted that, given their expected ODD, namely urban and sub-urban areas, vulnerable road user (VRU) impact countermeasures may need to be fitted to these vehicles. Specification of these measures was outside the scope of this project and should be considered in further work.

Within the development of the framework two approaches were considered for the introduction of provisions for automated vehicles within Regulation 168/2013, namely the introduction of a new category for automated vehicles and the addition of automated sub-categories to current vehicle categories. The approach to introduce a new automated vehicle category was chosen because it allowed category boundaries to be defined more easily and should help minimise potential unintended consequences of the regulatory amendments necessary.

To cover the scope described above, it was proposed to introduce a new automated vehicle category split into two sub-categories, one for automated goods quadricycles based on the current L7e-CU sub-category, and the other for automated goods tricycles based on the current L5e-B subcategory. It was decided not to introduce automated sub-categories based on L6e and L2e because it was thought that automated vehicles should be able to meet the more stringent requirements for the heavier and more powerful L7e and L5e categories and it was not necessary to introduce a multitude of sub-categories at this time.

In summary, the new automated vehicle category proposed was as follows:

- Category LA vehicle (fully automated lightweight vehicle), sub-categorised into:

  (i) LA-U4 fully automated lightweight vehicle (automated heavy quadri-mobile for utility purposes): automated utility vehicle exclusively designed for the carriage of goods

  (ii) LA-U3 fully automated lightweight vehicle (automated commercial tricycle): automated utility tricycle exclusively designed for the carriage of goods

It was proposed that (non-ADS) technical requirements for these new automated vehicle categories should be based on those for non-automated vehicles of the same category as follows:

- Automated LA-U4 based on non-automated L7e-CU
- Automated LA-U3 based on non-automated L5e-B

On this basis criteria for the classification of automated vehicles were proposed as shown in Table 5.

Table 5: Proposed categorisation of fully automated vehicles (L-category)

Category / Sub-category	Name	Common classification criteria
LA	Fully automated lightweight vehicle	(1) Fully automated vehicle (2) length ≤ 3,700 mm[1] (3) width ≤ 1,500 mm[1] (4) height ≤ 2,500 mm (5) Propelled with an electric engine
LA-U4 (based on current L7e-CU category)	Automated heavy quadri-mobile for utility purposes	(6) four wheels (7) exclusively designed for the carriage of goods with no seats for passengers/riders (8) maximum continuous rated power ≤ 15 kW (9) maximum design vehicle speed ≤ 90 km/h (10) mass in running order ≤ 600 kg
LA-U3 (based on current L5e-B category)	Automated commercial tricycle	(6) three wheels (7) exclusively designed for the carriage of goods with no seats for passengers/riders (8) maximum continuous rated power ≤ 15 kW[2] (9) maximum design vehicle speed ≤ 90 km/h[2] (10) mass in running order ≤ 600 kg[3]

Notes:

1. Propose to restrict the dimensions of all L-category automated vehicles, including commercial tricycles, to same value as for L7e-CU quadri-mobile.

2. Propose to add requirements for max power and speed to align with automated quads.

3. Propose to reduce mass requirements from 1,000 kg to 600 kg to align with automated quads.

2.2 Approval process

Figure 5 (page 16) shows the type-approval process for series production, including GB unlimited series, GB medium series and GB small series production, with options for single stage (complete vehicle), multi-stage (incomplete vehicle) and multi-stage (completed vehicle), as well as the approval process for individual vehicle approval.

The flowchart shows the vehicle manufacturer as the applicant for vehicle approval because this is usually the case. Note, however, that the role of the manufacturer can be undertaken by the manufacturer's representative, an importer or other qualified applicant as permitted by the regulations referenced in this document.

The flowchart groups the process into six steps:

1. Scheme selection

   The vehicle manufacturer decides to seek approval either via GB type-approval for unlimited series production, medium series production, small series production, or individual vehicle approval. For unlimited, medium and small series production, the manufacturer also selects whether to seek single-stage approval for a complete vehicle, multi-stage approval for an incomplete vehicle or multi-stage approval for a completed vehicle.

2. Definition of vehicle category and definition of requirements

   The manufacturer and the Vehicle Certification Agency (VCA), as the United Kingdom's appointed type approval authority, determine the appropriate categorisation of the vehicle, as well as the appropriate requirements and evidence based on the approval scheme selected and the category of vehicle or system to be approved.

3. Gathering and submitting evidence of compliance with the requirements

   The manufacturer compiles the information document and supporting evidence of compliance with all relevant requirements.

4. Compliance decision

   VCA determines whether the application is complete and whether all relevant requirements have been satisfied.

5. Additional checks

   VCA confirms that the vehicle(s) to be placed on the market match what was presented in the application and, where applicable, that the manufacturer has appropriate controls in place to ensure subsequent vehicles will conform to the approved type. For series production, this is covered by Conformity of Production (CoP) audit and clearance; for IVA this is covered by an inspection of the specific vehicle to be approved.

6. Granting of vehicle approval

   VCA confirms that all requirements have been satisfied and that appropriate controls are in place, then grants the approval certificate for the approved type or vehicle.

It is also worth noting that there will likely be other differences in the approval process for a vehicle with an automated driving system compared to a manually driven vehicle. These are outside the scope of this report, but may include:

1. The ODD for the ADS will have to be agreed between the manufacturer and VCA at the beginning of the process and included in the approval documentation.
2. Multi-stage approval for different vehicle builds with essentially the same ADS could likely occur, so interfaces will need to be thought about carefully to define requirements. For example, the ADS may be part of the first stage approval, but the bodywork applied in a second stage may have implications for the correct functioning of sensors.

2.3 Administrative requirements

The objective for this part of the work was to develop text to implement the new categories of automated vehicles into regulations, and to update the administrative requirements defined in supporting regulations to reflect the new categories and to support the implementation of updated requirements for non-ADS requirements of automated vehicles.

As noted in Section 2.1, the type-approval and market surveillance of motor vehicles (M-, N- and O-category vehicles and the proposed LSAV categories), and of systems, components and separate technical units intended for such vehicles, is controlled by the GB assimilated version of Regulation (EU) 2018/858. Similarly, the type-approval and market surveillance of two- and three-wheel vehicles and quadricycles (L-category vehicles) is controlled by the GB assimilated version of Regulation (EU) No 168/2013. Together, these are known as the framework regulations. Proposed approaches to the implementation of in-scope automated vehicles in the framework regulations were developed at the beginning of the project, including new vehicle categories and supporting definitions. The proposed approaches were refined through the stakeholder engagement (see Section 5) and the resulting additions and amendments are shown in detail in Appendix A.

Each framework regulation is supported by an implementing regulation that defines the administrative requirements, e.g. the standardised information document that a manufacturer must provide to an approval authority when applying for type-approval, certificates of conformity and so forth. In order to develop proposals for additions and amendments to the administrative requirements, all of the requirements were reviewed in detail along with all of the proposed amendments to the pre-deployment requirements and test procedures (see Section 3). All necessary additions and amendments are shown in Appendix B.

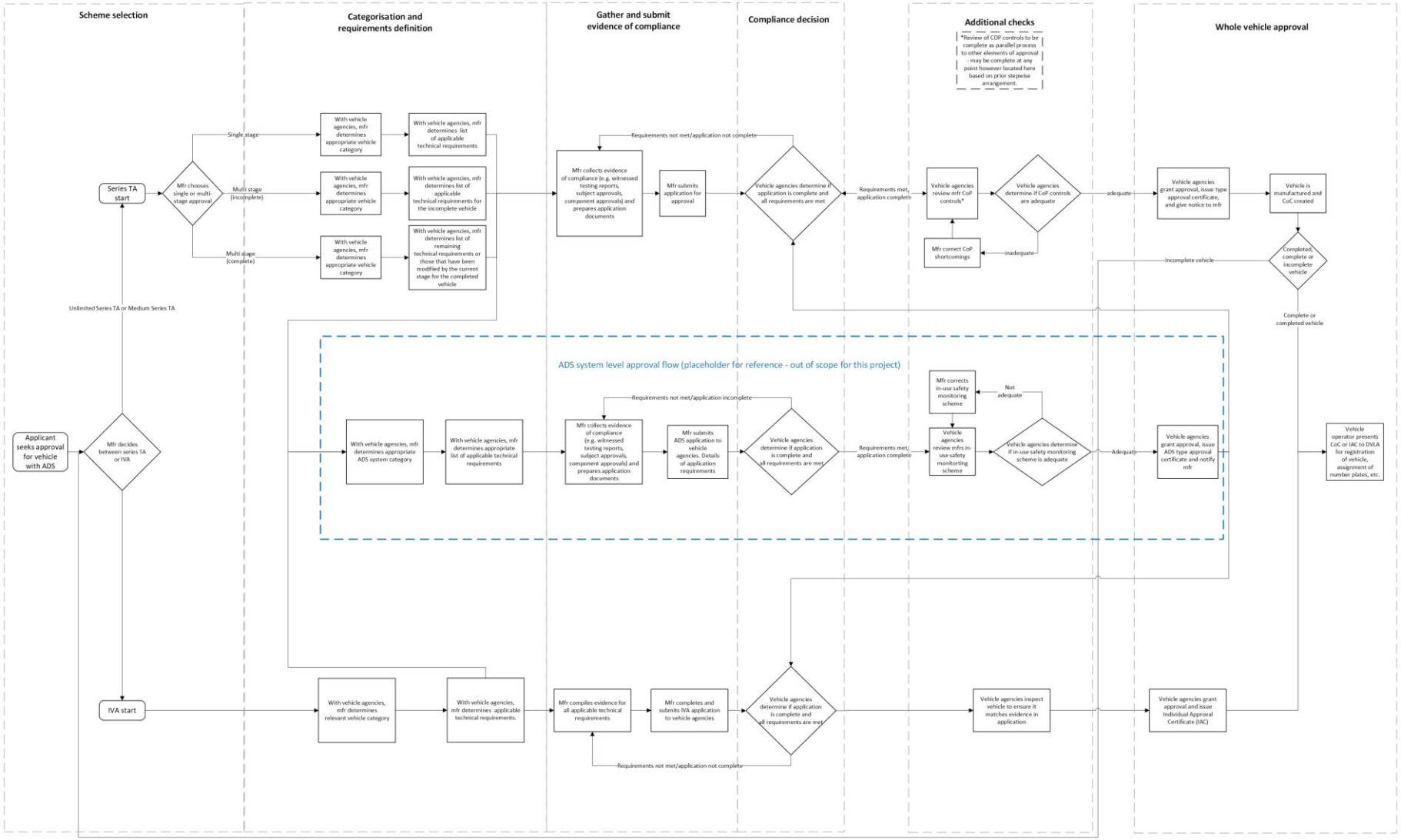

Figure 5: Flowchart showing series production and individual vehicle type-approval processes

3 Pre-deployment requirements and test procedures

3.1 Approach

Vehicles have to be approved before they can be deployed, i.e. registered for GB road use. At the choice of the manufacturer and depending on the number of vehicles to be produced, approval can be performed as unlimited series type-approval, NSSTA or IVA. The approval process and the framework regulations governing it are described in more detail in Section 2. The framework regulations refer to a large number of UN Regulations and assimilated EU Regulations which set out the technical requirements and test procedures for various aspects of the vehicle design.

This project developed proposals for technical requirements and test procedures for pre-deployment approval of non-ADS aspects of fully automated vehicles and LSAVs, as far as possible by application and modification of existing technical regulations within the existing M-/N- and L-category framework regulations, namely the GB assimilated version of Regulation (EU) 2018/858 and the GB assimilated version of Regulation (EU) No 168/2013, respectively.

The approach for the Regulation 2018/858 developed modifications for the following types of fully automated vehicles and LSAVs:

- Dual mode vehicles (DMVs) operating in an automated mode – ($M_{\#}D$, $N_{\#}D$)
- Single mode vehicles (SMVs) which carry occupants – ($M_{\#}A$, $N_{\#}A$)
- SMVs which do not carry occupants, i.e. carry goods only - ($N_{\#}A$)
- Low speed automated vehicles (LSAVs) which carry occupants (single mode) – (LSAV-$M_{\#}A$)
- LSAVs which do not carry occupants (single mode) – (LSAV- $N_{\#}A$)

and consisted of the following steps:

Step 1 – To collate lists of applicable regulatory items for the types of fully automated vehicles and LSAVs above. This step involved:

  - The elimination of regulatory items which are not relevant because they relate to regulated systems which are intended to support the driver (e.g. mirrors, windscreen wipers) or which are related to the dynamic-driving task and therefore outside the non-ADS scope of this project (e.g. lane departure warning, advanced emergency braking).
  - The addition of two regulatory items considered highly relevant for the safety of fully automated vehicles and LSAVs, namely:
    - Protection of vehicle against cyberattacks
    - Software update and software updates management system

And for LSAVs it also involved:

- The development and addition of three new regulatory items to cover additional safety-relevant technical aspects identified for LSAVs:
  - Maximum vehicle speed limitation
  - Manual operation at very low speeds
  - Static vehicle stability

Step 2 – To analyse the technical requirements and test procedures of the regulatory items within the collated lists and develop modifications in the form of specific provisions to make each item suitable for application to the types of fully automated vehicles and LSAVs noted above. The specific provisions were proposed in the format of additional draft regulatory text to facilitate application of each relevant regulatory item. Where elements were identified that required modifications in a large number of regulatory items (e.g. definition of 'driver side', how to treat bi-directional vehicles, etc.), these were summarised in a new overarching item, referred to as 'cross-cutting prescriptions'. A high-level summary of these specific provisions is provided in the subsequent sections.

- For LSAVs, it was found that large modifications were required to ensure that requirements are proportionate to the low-speed use case and are not over-burdensome for smaller manufacturers in the following areas:
  - Occupant restraint and crashworthiness
  - Vulnerable road user protection
  - Vehicle stability
  - Protection against unauthorised use and security

  To develop these modifications an overarching approach was developed based on the guiding principle to provide 'at least equivalent safety'. This meant offering levels of protection comparable to those of current vehicles used in similar scenarios, while ensuring that requirements are proportionate to the low-speed use case.

Step 3 – To assess suitability of proposed unlimited series technical requirements for application to existing NSSTA and IVA items in lieu of the currently referenced older technical requirements. This involved a review of existing exemptions and modifications granted in NSSTA and IVA to decide which should continue to apply for the updated technical requirements.

The approach followed for Regulation 168/2013 was similar to that for Regulation 2018/858 but simpler because it was only necessary to consider one type of fully automated vehicles, namely an SMV which does not carry occupants, i.e. carry goods only, and is pure electric. However, three-wheeled tricycle (LA-U3) and four-wheeled quadricycle (LA-U4) versions of this were considered. The approach consisted of the following steps:

Step 1 – To collate a list of applicable regulatory items for the type of fully automated vehicles described above. This step involved:

- The elimination of regulatory items which are not relevant because they relate to regulated systems which are intended to support the driver such as:

- Glazing, windscreen wipers and washers, and defrosting and demisting systems
- Driver-operated controls including identification of controls, tell-tales and indicators
- Rearward visibility
- Roll-over protective structures
- Safety belt anchorages and safety belts

or, noting that these are pure electric vehicles, they relate to internal combustion engines such as test procedures related to exhaust sound.

Step 2 – To analyse the technical requirements and test procedures of the regulatory items within the list and develop modifications in the form of specific provisions to make them suitable for application. In a similar manner to above, the specific provisions were proposed in the format of additional draft regulatory text. In the case that both UN and EU regulations were identified as applicable, appropriate modifications were developed for both. It should be noted that Regulation (EU) No. 3/2014 Annex I 'List of UNECE regulations that apply on a compulsory basis' has not been updated to take into account updates made to the UN Regulations to update and consolidate the UN lighting regulations to Regulation 148 'Light signalling devices', Regulation 149 'Road illumination devices' and Regulation 150 'Retro-reflective devices'.

3.2 Summary of results

The following sections summarise, at a high-level, the key proposed modifications to technical regulations. Note that many of the proposed modifications concerned simple changes to the wording of the regulations to clarify their interpretation in the absence of vehicle elements referred to (e.g. a driver, driver's seat or steering wheel); for conciseness, these are not summarised in this overview report. Full lists of technical items collated for consideration, the proposed technical regulations and their proposed applicability are provided in Appendix C.

Additional aspects identified (but out of scope of this project) which should be considered by the Department when developing the ADS regulation are also summarised below.

3.2.1 M-, N-, O-, LSAV-M and LSAV-N category

3.2.1.1 Proposed modifications to technical regulations

Cross-cutting prescriptions, which should apply in the context of all technical regulations, contained the following key elements:

- Prohibition of vehicles designed to carry or haul dangerous goods, in order to allow time to gain sufficient experience with the operation of fully automated vehicles and potentially required emergency procedures

- Clarification that no prescriptions in the technical regulations shall require SMVs or LSAVs to have a driver's seating position, driver's compartment and driver controls (steering wheel, pedals, buttons, adjustment controls, etc.)
- Clarification of the terms 'driver side' and 'passenger side' of a vehicle as it's right and left side, respectively, with respect to the direction of travel
- Definition of what constitutes a 'bi-directional' vehicle based on its maximum speed in either direction, clarification that applicable requirements must generally be fulfilled in both directions, and prohibition of bi-directional articulated vehicles
- Clarification that information required to be presented to the driver or other vehicle occupants (e.g. tell-tales, indicator or warning lights or acoustic warnings) shall generally be sent to the ADS or remote assistant instead
- Requirement for vehicles without conventional driver controls to be designed so as to allow performing the required tests, for example by allowing temporary manual control or by offering an automated test mode performed by the ADS; test modes or functions must be protected against unauthorised use in production vehicles
- The feasibility, efficiency and effectiveness of the periodic roadworthiness tests must be ensured, for example by offering capability to monitor performance of critical systems and indicate whether the system is functioning correctly
- For LSAVs, definition by CAL of whether standees and side-facing seats are permitted and what crashworthiness requirements apply; virtual testing can be accepted by the approval authority in lieu of destructive tests

The steering equipment regulation's functional safety requirements for complex electronic systems were modified. These would nominally include assessment of the whole of the ADS (due to the ADS being captured by the definition of 'steering control'). The regulation was modified to cover functional safety assessment and demonstration of the safety concept only for the execution of control demands created by the ADS; the steps before, leading to generation of control demands, shall be included in the functional safety assessment of the ADS regulation. The steering control transmission was required to fail operational; the energy transmission to fail safe. Prescriptions for advanced driver assistance steering systems and automatically commanded steering functions were marked not applicable because their purpose is to assist the driver. Requirements to provide a steering characteristic which helps human drivers (self-centring steering geometry; prohibition of rear-wheels-only steering) were waived.

Braking system regulations for both heavy and light vehicles were modified to the same effect as the steering regulation with regard to functional safety requirements. Furthermore, it was required to ensure that all muscular generated performances are replaced by alternative energy sources, because there is no driver as a fallback in case of failures, and where more than one driver control is required (e.g. service and parking brake) this shall be replaced by independent power sources. For slow LSAVs, with a maximum speed of 25 km/h or less, the manufacturer can demonstrate compliance with Construction & Use requirements instead of the UN Regulations on braking; this does not include

requirements for anti-lock braking or electronic stability control. Faster LSAVs shall be fitted with anti-lock braking but electronic stability control is not required.

For electromagnetic compatibility, the technical service shall perform a worst-case assessment to identify vehicle-specific functions which are in or out of scope of testing with the ADS functions switched on; however, possibly with some limitations in use case.

External projections requirements for both heavy and light vehicles required changes to the specifications for which surfaces are included because conventional vehicle features such as a driver's cab may not be present. In the absence of detailed knowledge of future vehicle designs, the technical service is given discretion to judge what areas are relevant for the injury risk or seriousness of bodily injury to a person hit by the bodywork or brushing against it.

Lighting installation requirements were clarified for bi-directional vehicles: Requirements shall apply in both directions and an appropriate switching strategy when changing front and rear lighting depending on the direction of travel shall be implemented to the satisfaction of the technical service and type approval authority; retro-reflectors might be concealable to ensure that only the correct colours for the current driving direction are shown.

Safety glazing requirements and tests regarding optical qualities (visibility after shattering, light transmission, optical distortion and secondary image separation) were waived for SMVs and LSAVs. Other aspects continue to apply even for vehicles without occupants.

Installation requirements for tyres were adapted to allow LSAVs to be fitted with L-category tyres of appropriate speed and load capacity ratings.

Some general construction requirements for buses and coaches were waived, such as prescriptions relating to the driver's compartment, driver's seat and visual entertainment; but additional requirements were introduced for vehicles intended to carry passengers with reduced mobility, wheelchair users, prams and/or unfolded pushchairs. For LSAVs, some specific requirements were defined, such as a passenger emergency communication system or emergency stop controls.

Pedestrian protection and full-scale crash requirements and tests for SMVs remained unchanged in substance but modified to clarify application for bi-directional vehicles and vehicles without driver's seating position. For LSAVs, specific requirements were defined as outlined in Section 3.2.1.2.

3.2.1.2 Decisions on key safety aspects specific to LSAVs

Because there are no non-automated equivalents to LSAVs on the road today, in a number of topic areas, the requirements of the current regulation are not appropriate for application to LSAVs. To resolve this problem a previous project[5] developed new approaches and requirements for LSAVs for the following topic areas:

[5] Edwards M, Seidl M, Edwards A (2022): GB LSAV approval scheme: Non-ADS requirements D7.1. PPR2006 Available from: https://www.trl.co.uk/publications/gb-lsav-approval-scheme--non-ads-requirements-d7-1

- Occupant restraint and crashworthiness
- Vulnerable road user (VRU) protection
- Vehicle stability
- Protection against unauthorised use and security

These are summarised in the sections below:

Occupant restraint and crashworthiness

The level of occupant protection and crashworthiness required by an LSAV will change depending on its ODD. A main factor is the risk of injury from collisions which could cause large accelerations and/or compartment intrusion. Given that the ADS is responsible for primary safety for collision avoidance, the action of other road users may still result in collisions which require mitigation through secondary safety measures. Similarly, given that the ADS regulation should assure that the vehicle drives well (e.g. in a manner which adheres to the Highway Code), the main types of collisions are anticipated to be 'not at fault' ones, i.e. other vehicles colliding into the LSAV.

The injury risk will be low in ODDs where the collision risk and/or consequence is reduced. Examples include separated lanes, where the collision risk will be reduced compared to open roads because less traffic is encountered, and 20 mph zones or business/university campuses where the collision consequences will be reduced because of the low traffic speed. Conversely, in ODDs such as roads with 30 mph speed limits on which mixed traffic is present, the injury risk will be much higher because the presence of many other vehicles increases the collision risk and because they are likely to be travelling faster at 30 mph or potentially above, this also increases the collision consequence. Different levels of protection will be required for these different ODDs.

When considering whether or not standing or unrestrained passengers should be permitted in LSAVs, the presence of VRUs in the ODD should be taken into account because automatic emergency braking manoeuvres to avoid VRUs could cause occupants to fall and/or be thrown forward. Standing/unrestrained passengers could be permitted only in ODDs with low/no prevalence of VRUs or a very low speed restriction could be imposed on vehicles with standing or unrestrained passengers in areas with VRUs.

Within Road Vehicles (Approval) Regulations 2020 (S.I. 2020 No. 818) for approval of M- and N-category vehicles the level of occupant protection and crashworthiness varies depending on the vehicle category and its function. For Class A buses, to some extent because of a functional need and that there are relatively low consequences associated with collisions with other vehicles (in turn because acceleration levels are relatively low due to the large size and mass of a bus), standing passengers are permitted, occupant restraint requirements are minimal and there are no crashworthiness requirements. In contrast, for M_1 category vehicles (cars), which have a much higher risk of collision and higher consequences, protection requirements are much more stringent. Standing passengers are not permitted, occupant restraint such as three-point seat belts is required for all seating positions, and there are many crashworthiness requirements.

With this in mind and based on a principle of at least an 'equivalent level of safety' to current non-automated vehicles, it is proposed that there should be two CALs to cover potential ODDs with outline requirements as follows:

1. **Reduced:** based on Class A bus requirements for ODDs with a low risk of collision and/or low consequences.
    - Occupant restraint:
        - Standees: permitted, requirements include handrails/handholds
        - Seated: side-facing seats permitted, requirements include guard or at least 2-point safety belt for exposed seats only
    - Crashworthiness: No requirements.
2. **Standard:** based on car requirements for ODDs with a higher risk of collision and/or higher consequences.
    - Occupant restraint:
        - Standees: not permitted
        - Seated: side-facing seats not permitted, requirements include 3-point safety belts and head restraints for all seating positions (including rear-facing seats)
    - Crashworthiness: requirements include front, rear and side impact tests, which use the principles from UN Regulation No. 95 as a basis

It is envisaged that the manufacturer will be able to choose which CAL to approve the LSAV to, depending upon the intended use. An LSAV approved to CAL Reduced should be limited to ODDs where the risk of collision and/or consequences within the domain are appropriately low (considering the risk of impacting/being impacted by other vehicles and the risk of emergency braking manoeuvres endangering standing/unrestrained occupants).

In summary, the main reasons for this proposal are:

- It aligns with current regulatory requirements: CAL Reduced with city (Class A) buses, CAL Standard with cars.
- It provides approval levels for potential ODDs with low and higher injury risk from collisions respectively. It also permits standing passengers to enable frequent and fast passenger changes, at least in certain ODDs which are deemed low risk.
- It enables a safe approach for the deployment of LSAVs. For example, for ODDs where it is uncertain how high the collision risk may be, initially authorisation may be given to operate vehicles with a standard approval level only, until data can be collected to justify operation of vehicles with a reduced approval level.

With regard to passenger LSAVs which are similar to M_2 Class A buses, **the Department should consider whether CAL Reduced requirements could be acceptable without restricting the ODD**. This refinement is not currently reflected in the proposed text but would allow better alignment of the approval scheme with safety countermeasures for current vehicles (M_2 Class A buses do not have to fit seat belts or meet crashworthiness

requirements) and potentially other regulatory schemes. The reduced requirements could be applied to passenger LSAVs with a maximum mass > 3,500 kg and the R-point of lowest seat > [800] mm above ground level. The technical justification is that:

- Large mass should ensure lower collision acceleration levels and thus reduce the risk of injury.
- High R-point should ensure a lower risk of injury because the main impact point for cars is largely below the occupant position. Notes:
    - On this basis, UN Regulation No. 95 (03 series of amendments, 4th supplement) used to contain a derogation for vehicles with seating R-points > 700 mm above ground level.
    - Typical lowest seat R-point height above ground of city buses in the range of 800 mm to 850 mm.

Vulnerable Road User (VRU) protection

LSAVs are expected to predominantly operate in areas with a high density of VRUs (pedestrians and cyclists) which makes VRU protection a high priority. Given that it is unlikely to be possible for advanced emergency braking systems to avoid all VRU impacts, and ADSs are expected to have corresponding limitations, passive safety countermeasures are required.

The following approach is proposed for VRU protection requirements of LSAVs in the short term:

- External projections: To reduce the risk of injury to a person hit by sharp edges and protrusions on the vehicle body work, apply requirements of UN R26 with newly added requirements for ADS sensors, which are not currently covered within the regulation. If vehicle features are present that are regulated only in UN R61, the Technical Service may consider the relevant prescriptions of UN R61 in their assessment. An exemption for certain features can be given by the Approval Authority where the special purpose of a vehicle makes it impossible to fully comply. In general, the Technical Service should pay specific attention to features likely to cause leg injuries because pedestrian leg impact testing will not be performed (see further down).
- Head impact testing: For vehicles with a maximum speed > [16 km/h] to submit documentation to demonstrate that frontal areas of the vehicle that are likely to be hit by a VRU's head have safety levels in line with the principles of UN R127. The documentation will be assessed by the technical services. Notes:
    - Assessed areas should include windscreen / window areas if likely to be hit, i.e. wrap-around distance of 800 mm to 2500 mm or a height above ground of 2000 mm for vehicles with close to vertical front shapes. Test areas to be defined using UN R127 procedures or, if not appropriate, an equivalent type of method

- Safety levels may be demonstrated with headform tests or logical argumentation, e.g. toughened glass windscreen with sufficient distance to hard points assumed to comply on the basis that known to shatter on headform impact
- Headform test parameters may be adjusted where appropriate, e.g. impact angle for different vehicle front shapes, or impact speed to account for a vehicle's maximum speed being < 40 km/h, the nominal pedestrian impact speed used as the basis for the development of UN R127
- For child and adult headform tests the HIC recorded shall meet the requirement to not exceed [1000] over all of the test area. Note: this is different to UN R127 requirements which are < 1000 over 2/3 of test area and < 1700 over remaining area
- Frontal Protection Systems: It shall not be permitted to fit frontal protection systems to LSAVs. Frontal protection systems are defined as a separate structure or structures, such as a bull bar, or a supplementary bumper which, in addition to the original-equipment bumper, is intended to protect the external surface of the vehicle from damage in the event of a collision with an object, with the exception of structures having a mass of less than 0.5 kg, intended to protect only the vehicle's lights.

In the medium to longer term, it is proposed that an appropriate regulation for the assessment of VRU impact protection for LSAVs is developed based on lessons learnt from in-use safety monitoring. This regulation should be suitable for the assessment of vertical fronted vehicles and include requirements for both leg and head impact.

Vehicle stability

There are two main questions related to requirements for LSAV stability in cornering and other manoeuvres in which the vehicle may roll:

- Should electronic stability control (ESC) and/or anti-lock braking system (ABS) fitment be a mandatory requirement or not?
- Are static stability requirements such as a tilt test or a static stability factor (SSF) needed?

ESC is important to help vehicle control in swerving type manoeuvres. LSAVs will have a maximum speed of 32 km/h. In general, for collision avoidance at these low speeds it is preferrable to brake rather than swerve because braking distances are short at these low speeds and unlike for a swerving manoeuvre there is no risk of colliding with a vehicle which may be alongside. On this basis, it is proposed that fitment of ESC need not be a mandatory requirement, though it should be permitted if a manufacturer chooses to develop the capability and fit it.

ABS helps maintain tractive contact with the road surface and allows the ADS to maintain more control over the vehicle, both in terms of steering and maximising braking, on surfaces with varying and low friction. On this basis, it is proposed that fitment of ABS, or provision of equivalent functionality through other systems such as the ADS, should be a mandatory

requirement. This should apply to vehicles with a maximum speed >25 km/h (the current scope limitation of UN Regulation No 13-H).

With regard to static stability, it is expected that the stability of LSAVs in general should be good because heavy items such as batteries are likely to be located at low positions in the vehicle resulting in a low centre of gravity. However, some vehicles may be designed with batteries at high positions, e.g. on roof, to allow low entry heights, or with a narrow track width, both of which may lead to poor stability. It is therefore proposed that an SSF requirement of SSF > [1.0] is imposed for the vehicle in its worst-case loading condition.

SSF to be determined based on the following equations:

SSF = T/2H, where T = track width and H = centre of gravity height

or, when the centre of gravity is laterally offset, extended equation to capture the worst-case side:

SSF = (0.5*T – L)/H, where L = lateral offset of the centre of gravity

The proposed SSF performance limit of [1.0] was pragmatically decided on the following bases:

- This should practically allow cornering lateral *g* forces of the order of 0.75 *g* which should be far above those likely to be experienced by LSAVs.
- National Highway Traffic Safety Administration (2017) data[4] show that current light vehicles generally exceed this value with the exception of some full-size passenger vans which have SSF values circa 0.9.

Protection against unauthorised use and security

Under Regulation 2018/858 there are three interlinked UN regulations related to vehicle security and protection against unauthorised use which are referenced as part of vehicle approval. The applicability of these regulations is dependent on vehicle category, and approval can be obtained for either a vehicle or for specific components or separate technical units (STUs).

These regulations are:

- UN R18 Protection of motor vehicles against unauthorised use – $M_2/M_3/N_2/N_3$ & STU (Item 13A)
- UN R116 Protection of motor vehicles against unauthorised use – M_1/N_1 & STU (Item 13B)
- UN R97 vehicle alarm systems (VAS) – M_1/N_1 & STU (Item 68)

Compliance with UN R18 for a mechanical device to prevent unauthorised use is not mandatory for vehicles of category $M_2/M_3/N_2/N_3$, but if devices covered by its scope are optionally fitted, then they must meet the requirements of the regulation.

For vehicles of category M_1/N_1, then they must be fitted with a mechanical device to prevent unauthorised use as defined in UN R116 Part I. Such devices can be optionally fitted

to other categories of vehicles, in which case they must meet the requirements of the regulation.

A VAS must be fitted to M_1/N_1 vehicles with a maximum mass of not more than 2000 kg, in which case the VAS installation must be approved to either UN R116 Part III or UN R97 Part II. In these cases, the VAS may be approved as a component or STU to either UN R116 Part II or UN R97 Part I. An immobiliser can be optionally fitted to other categories of vehicles, in which case they must meet the requirements of the respective regulations.

An immobiliser must be fitted to M_1/N_1 vehicles with a maximum mass of not more than 2000 kg, in which case the immobiliser installation must be approved to either UN R116 Part IV or UN R97 Part III. In these cases, the VAS may be approved as a component STU to either UN R116 Part IV or UN R97 Part III. An immobiliser can be optionally fitted to other categories of vehicles, in which case they must meet the requirements of the respective regulations.

The regulations do assume that when the vehicle is unattended or not in use then an operator will remove from the vehicle the de-activation device for the alarm or immobiliser (key, remote control, RFID etc.) and that they will also take some action to activate the protective devices (engage a physical lock or set via a remote controller etc.). Further, a UN R116.01 series amendment allows the use of “digital keys” that can be transferred to authorised users by a primary user. This is intended to support “app” based vehicle sharing services.

Vehicles without a driver may not have an operator physically present who can make these actions, so this function must be performed by the ADS, a remote intervention operator or passenger access may be enabled using an unlocking app.

For DMVs and SMVs it is proposed that the requirements should apply unaltered. For LSAVs, however, recognising that these vehicles do not currently sit within the defined vehicle categories, their public service vehicle-like use cases will be very diverse, and they will be fleet owned, which may involve safe overnight storage in many cases, a large degree of flexibility in the application of the regulations should be afforded. It is therefore proposed to apply the regulations on an if-fitted basis, i.e. make fitment of the corresponding systems optional so as to allow the manufacturers to cater for the requirements of specific use cases but ensure that systems that are voluntarily fitted fulfil established safety standards and reduce nuisance (in the case of vehicle alarm systems).

It should be noted that the following three UN regulations entered into force on the 30/09/2021:

- UN R161 Protection against unauthorised use by mean of a locking device (M_1/N_1)
- UN R162 Approval of immobilisers (M_1/N_1)
- UN R163 Approval of VAS (M_1/N_1)

The content of these new regulations mirrors the respective sections of UN R18/97/116; however, they now split the content by subject. The digital key amendment also extends to the three new regulations (UN R161/162/163). Currently, these new regulations are not referenced by the GB whole vehicle approval framework, and it is proposed to accept approvals to these new regulations as alternatives for DMVs, SMVs and LSAVs.

3.2.1.3 *Application of regulations for national small series type-approval and individual vehicle approval*

NSSTA and IVA set out technical requirements for a subset of the items considered for unlimited series type-approval. The technical requirements and test procedures referenced in the current schemes are typically older EU or EEC directives. This project proposes that fully automated vehicles approved under these schemes would also comply with more recent technical standards. The analysis in this project found that the UN and EU regulations recommended for unlimited series type-approval are suitable to replace the current technical standards referenced in both schemes. Therefore, it is proposed to apply the same technical regulations as for unlimited series type approval for the existing technical items within NSSTA and IVA. Recommendations were provided regarding which of the existing exemptions and modifications in NSSTA and IVA are appropriate to be applied also to fully automated vehicles.

3.2.1.4 *Aspects requiring further consideration by the Department*

The analysis of existing technical regulations for unlimited series type-approval highlighted some aspects which are outside the scope of the current project but require further consideration by the Department:

- Driving speed signal for automated driving: The speedometer regulation (Item 17B, UN Regulation No. 39) covers the display of speed and mileage driven to the driver of the vehicle and is as such not required for fully automated vehicles. However, the regulation also sets requirements regarding the accuracy of the speed signal, with tolerances that are likely too wide to be suitable for automated driving applications. It should be considered whether regulation of the driving speed signal for the ADS is required to ensure safe operation of the vehicle or adherence to traffic rules.
- Additional risks/considerations: For LSAVs, a previous project performed a risk analysis to identify and mitigate risks specific to low-speed vehicles without a driver. New risk analysis for fully automated vehicles was not in scope of the current project, which is why the resulting additional requirements are currently only proposed to be applied to LSAVs. The Department could consider applying some of these additional requirements also to fully automated vehicles, e.g. those set out under Item 52A.
- Safety of bi-directional vehicles: Recent sled testing commissioned by the National Highway Traffic Safety Administration indicates that occupants experiencing a frontal collision in a rear-facing seat may face a substantially increased risk of sustaining serious injuries. The injuries found in this post-mortem human subject test programme would likely not become apparent in tests using a crash test dummy because the Hybrid-III dummy is not designed for rear-facing impacts. While this is an issue even for conventional vehicles with rear-facing seats, occupants of bi-directional vehicles may experience this type of impact more frequently – whenever the vehicle is travelling rearwards compared to their seat orientation. The worst injury consequences could arguably be expected in fast-moving vehicles (AVs) with a comparatively low weight (M_1, N_1). The Department should consider whether some (e.g. M_1/N_1) or all bi-directional vehicles should be prohibited until more evidence on

their safety is available and appropriate requirements and tests have been developed, or whether solutions should be enforced to ensure that occupants always travel facing forward.

With regard to the application of technical regulations for NSSTA and IVA, the Department should consider:

- The analysis was based on the list of technical items in the existing NSSTA and IVA schemes. The Department may consider whether additional items should be introduced and assess whether existing technical requirements for unlimited series type-approval would be appropriate for application for these. This could, for instance, be relevant for full-scale crash test requirements that are mostly absent from the schemes. Both schemes include requirements on protective steering only, and these will not apply to vehicles without a steering column, i.e. most SMVs, LSAVs. Demonstrations without destructive testing, e.g. based on simulations, could be a solution to make them more suitable for application. Furthermore, for electric vehicles it is relevant to consider that protection from electric shock post-crash would not be assessed for vehicles exempted from the protective steering requirements. Permission of alternative methods, e.g. static tests rather than dynamic tests, could be considered for electric safety.
- Existing exemptions and modifications in the NSSTA and IVA schemes were checked for their suitability for fully automated vehicles and modified to be fit for purpose in application with the new UN Regulation-based requirements. The Department may want to investigate, for instance through stakeholder consultation, whether additional exemptions are required for requirements or tests specified within the new regulation, which were not contained in the technical requirements so far.
- Wheelchair-accessible vehicles, while being an important consideration in the context of fully automated vehicles, were not considered in detail in this project. The Department could consider granting general permission to the technical service to apply any of the existing special purpose exemptions or special provisions as appropriate for fully automated vehicles.

3.2.2 L-category

3.2.2.1 Proposed modifications to technical regulations

Cross-cutting prescriptions, which should apply in the context of all technical regulations, contained the following key elements:

- Clarification that vehicles are not required to have driver / rider controls and associated requirements (e.g. their geometric positioning or control application forces) are not applicable, and references to activations by the driver / rider are to be interpreted as activations by the ADS
- Requirement for vehicles to be designed so as to allow performing the required tests, for example by allowing temporary manual control or by offering an

automated test mode performed by the ADS; test modes or functions must be protected against unauthorised use in production vehicles

- Clarification that information required to be presented to the driver or other vehicle occupants (e.g. tell-tales, indicator or warning lights or acoustic warnings) shall generally be sent to the ADS and / or remote assistant instead
- Definition of what constitutes a 'bi-directional' vehicle based on its maximum speed in either direction, and clarification that applicable requirements must generally be fulfilled in both directions unless it is deemed incompatible with the vehicle's use
- Requirement for vehicles to be purely electrically propelled
- Prohibition of vehicles designed to tow trailers
- Prohibition of vehicles designed to carry or haul dangerous goods

Regarding environmental and propulsion performance requirements it was clarified that the driver / rider mass shall be considered as zero. For electric energy consumption measurements, the technical service can agree to use other test cycles than specified in the regulation if these are deemed more appropriate for the specific vehicle use case, e.g. for low-speed vehicles.

For braking requirements various clarifications were made regarding the role of the ADS and it was proposed that it should not be permitted to disable the antilock brake system function.

The requirements relating to front and rear protective structures (external projections) were extended to include requirements for ADS sensors.

Lighting installation requirements were clarified for bi-directional vehicles: Requirements shall apply in both directions and an appropriate switching strategy when changing front and rear lighting depending on the direction of travel shall be implemented to the satisfaction of the technical service and type approval authority; retro-reflectors might be concealable to ensure that only the correct colours for the current driving direction are shown.

Steerability requirements were extended to require that vehicles shall be equipped with a device for reversing and the self-centring requirement for the steering system, intended to help human drivers control the vehicle, shall not apply.

Devices intended to prevent unauthorised use shall not be required, i.e. the requirements shall apply on an 'if fitted' basis and operating incompatibilities, for example if the device is part of or integrated with the ADS, the vehicle manufacturer may agree with and demonstrate to the technical service and the approval authority an equivalent level of protection to the regulation.

With regard to masses and dimensions it was clarified that the driver / rider mass shall be defined as 0 kg.

Requirements for access to repair and maintenance information were bound to not apply to the vehicle's ADS because these will be somewhat different to what is currently prescribed and would need to be considered when developing the ADS regulation.

3.2.2.2 Aspects requiring further consideration by the Department

The analysis of existing technical regulations highlighted some aspects which are outside the scope of the current project but require further consideration by the Department:

- On the basis that automated L-category vehicles will be used mainly in urban and suburban areas where many VRUs are present, it is recommended that further requirements for VRU impact protection are considered for application to automated L-category vehicles, for example requirements similar to those for M_1/N_1 category vehicles, and a requirement to fit AVAS should be considered.
    - Related to AVAS, Regulation (EU) 3/2014, Annex II, Part 2 para 1.5 states that:

      In the absence of specific requirements in UNECE regulation No 28 and as provided in point 1.3 of Part 1, audible warning or additional devices installed on vehicles which are propelled by means of one or more electric motors may incorporate a feature enabling the device to be intermittently activated in such a way that it operates at a significantly lower sound pressure level than required for audible warning devices, emitting a continuous, uniform sound with a sound spectrum that does not vary perceptibly during operation, with the aim to for instance alert pedestrians about the vehicle approaching.

      Consideration could be given to mandating the fitment of this type of feature for L-category fully automated vehicles to act as an AVAS.
- Comparison of the requirements for L- and M-/N-category vehicles for key vehicle systems, such as braking and steering, show substantial differences, both in terms of the range of requirements and performance limits which are more comprehensive and stringent for M-/N-category vehicles and possibly necessary for the approval of automated L-category vehicles.

  For example, UN Regulation No. 79 for the approval of steering systems for M-/N-category vehicles contains requirements to help reduce the likelihood of failure of steering mechanical components with requirements such as adequate dimensioning and accessibility for maintenance, whereas Regulation (EU) 3/2014 (Annex XIV) for L-category vehicles does not specify similar requirements. These requirements may be needed as part of a functional safety case for approval of the ADS. Therefore, as part of the ADS safety case, it may be necessary for the manufacturer to consider demonstrating compliance of the steering system of an L-category vehicle to the relevant parts of UN Regulation No. 79 (as detailed for M-/N-category vehicles) in addition to Annex XIV and indeed, ultimately, it may be better to require approval of steering systems for automated L category vehicles to UN Regulation No. 79.

  Another example is braking. UN Regulation No. 13H for approval of M_1/N_1 category vehicles which, compared to the L-category regulation, contains additional requirements for assessment of complex electronics and the fitment of ESC and more stringent braking performance limits for key parameters such as the mean fully developed deceleration. These additional requirements may be necessary to ensure the safety of L-category automated vehicles.

On this basis it is recommended that the application of selected regulatory requirements for M-/N-category vehicle approval are considered for approval of automated L-category vehicles. Indeed, application of whole regulations could be considered.

4 In-use requirements

4.1 Approach

After approval and registration, vehicles have to comply with a set of in-use requirements to be used legally on GB roads. These are set out in the following regulations:

- The Road Vehicles (Construction and Use) Regulations (S.I. 1986 No. 1078), as last amended by S.I. 2022 No. 470; these are referred to as 'C&U' in the following text
- The Road Vehicles Lighting Regulations (S.I. 1989 No. 1796), as last amended by S.I. 2020 No. 818; referred to as 'RVLR'

Some types of vehicles cannot, by the nature of their purpose, comply with all aspects of C&U and RVLR. These may rely on authorisation based on the provisions of the following order:

- Road Vehicles (Authorisation of Special Types) (General) Order 2003 (S.I. 2003 No. 1998), as last amended by S.I. 2023 No. 524; referred to as 'STGO'

This project developed modifications for these three pieces of legislation to:

- ensure that vehicles which were approved to the proposed pre-deployment requirements (see Section 3) and subsequently remained unaltered will continue to be compliant with in-use requirements; and
- remove other potential barriers to compliance with in-use requirements, for instance related to the lack of a driver's seat and controls in SMVs.

To identify necessary modifications, all items (articles, regulations and schedules) within C&U, RVLR and STGO were reviewed.

After review, some items were not further analysed: Some were identified as automatically not applicable for any vehicles in scope based on their shared characteristics (e.g. no two-wheeled vehicles), and therefore no modifications or further consideration was required for these. Other items would generally apply to vehicles in scope but are not required for automated vehicles because SMVs do not have a driver or because the corresponding pre-deployment requirements were waived; it was proposed to grant exemptions from these for SMVs and LSAVs. Certain other items related to the use of vehicles (rather than their construction) and were therefore out of scope of this non-ADS focussed project; these are listed in the subsequent sections and will require further consideration in the context of the development of an ADS regulation and may require adaptation/exemption in order to allow automated vehicles to operate on-road legally.

The remaining items were analysed in detail and the majority were found to be suitable for application to automated vehicles without modifications. For other items appropriate proposals for modifications were developed, as summarised in the subsequent sections.

4.2 Summary of results

The following sections summarise the proposed modifications and aspects which require further consideration by the Department (for non-ADS regulations and for development of

the ADS regulation). Full lists of C&U, RVLR and STGO items detailing their status based on the analysis undertaken are provided in Appendix D.

4.2.1 Road Vehicles (Construction and Use) Regulations 1986

4.2.1.1 Proposed modifications to technical regulations

Modifications were proposed for 19 C&U items; the main aspects are summarised below.

Definitions required to denote automated vehicle groups (e.g. SMV, DMV, LSAV) and to identify bi-directional vehicles were introduced into Regulation 3 and these were kept in alignment with those proposed for the regulatory frameworks (Section 2) and pre-deployment requirements (Section 3). Furthermore, various definitions of vehicle categories (e.g. bus, large bus, motor car) were amended to clarify passenger number boundaries in absence of a driver, and definitions of overall length and width were brought in alignment with pre-deployment regulation by clarifying that ADS sensors are not taken into account for these measurements. For bi-directional vehicles, terms referring to their front or rear were clarified to ensure that:

- vehicles comply with all design and construction requirements in both driving directions; and
- loads carried comply with forward or rearward projection requirements in both directions unless a journey is undertaken using only one driving direction except for manoeuvring purposes.

For the braking regulation (Regulation 15) it was proposed to refer to the same series of amendments of the relevant UN Regulations as required for approval for M- and N-category vehicles, rather than older series or EU directives. For L-category vehicles, reference to the appropriate UN regulation was included.

For tyre-related requirements various changes were made to align with pre-deployment requirements, such as reference to the L-category tyre regulation. Furthermore, a requirement was introduced to Regulation 26 for bi-directional vehicles which ensures that the tyres used are approved for rotation in both directions.

Seat belt and seat belt anchorage point requirements were brought in line with pre-deployment requirements, such as removal of requirements for vehicles without occupants and specification of LSAV requirements by CAL.

The plating requirements were modified to include additional information for LSAVs (maximum operating speed, crashworthiness approval level, and maximum number of seated and standing passengers)

4.2.1.2 Aspects requiring further consideration by the Department

For three regulations, **the Department should take a decision whether and what modification should be included**:

- Regulation 6 (Compliance with community directives and ECE regulations): References should encompass the new approval scheme and corresponding

amendments should be considered by the Department when the legal instrument for implementation of the scheme has been decided upon.

- Regulation 37 (Instruments and equipment – audible warning instruments): Pre-deployment proposals require LSAVs to be fitted with a horn. C&U, however, only maintains this requirement for vehicles with a maximum speed of more than 20 mph, which is not the case for LSAVs, i.e. without modification this will be a relaxation compared to type-approval requirements. The Department may want to consider whether the requirement to be fitted with a horn should be explicitly extended to include LSAVs.
- Regulation 60 (Control of emissions – Radio interference suppression): This regulation concerns radio interference suppression and the requirements currently only apply for vehicles propelled by spark-ignition engines. No technical reason is apparent why electric vehicles are not currently governed by radio interference requirements. The Department may want to consider whether the requirements should be extended to DMVs, SMVs and LSAVs by requiring continued compliance with type-approval requirements. The Department may want to also consider updating the required series of amendments for electrical/electronic sub-assemblies (ESAs). For ESAs it should be considered that, once approved, an approval is rarely updated which is why previous series of amendments than 06 of UN Regulation No 10 should be accepted. It is proposed to mirror what other UN Regulations currently require, such as UN R79 (steering systems), which requires the 03 series of amendments, unless related to the coupling system for charging a Rechargeable Electric Energy Storage System, in which case the 04 series of amendments is required. In general, for non-safety-related ESAs requirements for radiated emissions are sufficient because insufficient immunity would not have safety implications. For safety-related ESAs (such as external cameras, radar or sensor systems linked to the vehicle controller or complex electronic network) requirements for emissions and immunity should apply.

The project identified four additional aspects, which are not currently covered in C&U and for which **the Department should consider whether the introduction of new regulations to C&U may be appropriate**:

1) Speed limitation of LSAVs

As per the proposed type-approval requirements for LSAVs, these vehicles would be technically limited to a maximum speed of not more than 32 km/h and manual operation of the vehicles will be limited to not more than 6 km/h. The Department should consider whether and how this limitation should be reflected in C&U. Two principal options to achieve this were identified:

- Option 1: Include the permitted maximum speeds of 32 km/h and 6 km/h, respectively, explicitly in C&U. A new regulation applicable only to LSAVs could be added after R36C.

- Option 2: Prohibit tampering with the maximum vehicle speeds declared during type-approval of LSAVs. Again, a new regulation to be added after R36C could be a suitable place for such requirements.

2) Acoustic Vehicle Alerting System (AVAS)

Type-approval requirements ensure that vehicles without a combustion engine are fitted with AVAS, a system to alert other road users of a moving vehicle that might otherwise be too quiet to be noticed. AVAS is not covered by C&U so could be deactivated or left unrepaired after vehicle registration. While this is relevant for conventional vehicles too, it could be particularly important in the case of bi-directional vehicles where a vehicle that has gone past in one direction may remain unnoticed when returning. The Department could consider including requirements for AVAS for DMVs, SMVs and LSAVs in C&U.

3) Carriage of dangerous goods

Vehicles included in the scope of this project are not expected to carry dangerous goods. The Department should consider whether this should be prohibited formally. If so, a new regulation applicable only to DMVs operating in automated mode, SMVs and LSAVs could be added after R93A. When phrasing a prohibition, care should be taken to avoid unintended consequences, such as prohibiting the vehicles form transporting batteries. Alternatively, it could also be considered to extend R44, which requires safe containers for the carriage of highly inflammable or otherwise dangerous substances but currently only applies to minibuses.

4) Post-registration modifications

Requirements for type-approval are broader and, in some areas, more stringent than C&U requirements. This is the case for all vehicle categories because the type-approval framework has been further developed over time and not all updates are reflected in C&U, and also because C&U needs to accommodate all vehicles including individual, hand-built vehicles. In practice this could lead to type-approved vehicles being modified after registration in a way that maintains compliance with C&U (and is therefore legal) but reduces the vehicle's overall safety level. For aspects that are already contained within C&U and were identified as potentially safety critical, modifications are proposed. However, for DMVs, SMVs and LSAVs which are used as public service vehicles, the Department could additionally consider specifying notifiable modifications to maintain control over other important aspects.

The items discussed in Table 6 were out of scope of this project and **should be reviewed by the Department in the context of the ADS regulation**.

Table 6: C&U regulations and schedules requiring further consideration

Regulation/ Schedule	Subject	Notes
R10	Indication of overall travelling height	These regulations apply to vehicles of a height of over 3 metres and require a height notice for the driver displayed in the cab and a visible warning to the driver if equipment exceeds a certain threshold. This might be addressed by informing the operator and/or adaptations/exemptions and/or requirements for an ADS.
R10A	Warning devices where certain high level equipment is fitted to a vehicle	
R10B	Vehicles to which Regulation 10A applies	
R10C	Interpretation of Regulations 10A and 10B	
R19	Application of brakes of trailers	This regulation relates to the use of a vehicle rather than its construction and stipulates that the driver of a vehicle needs to be in a position to readily operate the brakes of the vehicle or a trailer drawn (with some exceptions). Exemptions for vehicles operating in automated mode should be considered.
R74	Testing and Inspection	This regulation is applicable for the vehicles in scope; however, it only sets out details of the empowerment to inspect vehicles, rather than specifying requirements relating to the construction of the vehicle. Visual inspection of brakes, steering gear and tyres will continue to be possible, but those empowered might not have the capability to test the vehicles without assistance from the operator or manufacturer because testing might require access to the ADS.
R97	Avoidance of excessive noise	These regulations relate to the use of vehicles rather than their
R98	Stopping of engine when stationary	

Regulation/ Schedule	Subject	Notes
R99	Use of audible warning instruments	construction, in particular to a person generating excessive noise for instance through the use of the horn or not stopping any attached machinery when the vehicle is stationary. These requirements may need to be reflected in the ADS regulation or exemptions for automated vehicles specified where this is not possible.
R101	Parking in darkness	These regulations relate to various aspects of the use of vehicles. Inclusion of requirements in the ADS regulation may be required to ensure that the relevant rules are obeyed, and/or exemptions from some may be considered for very low-speed manual operation.
R103	Obstruction	
R104	Driver's control	
R105	Opening of doors	
R106	Reversing	
R107	Leaving motor vehicles unattended	
R108	Securing of suspended implements	
R109	Television sets	
R110	Mobile telephones	

4.2.2 Road Vehicles Lighting Regulations 1989

4.2.2.1 Proposed modifications to technical regulations

Modifications were proposed for 8 RVLR items; the main aspects are summarised below.

For the required definitions to denote automated vehicle groups and to identify bi-directional vehicles, references to the corresponding C&U definitions were included in Regulation 3. For bi-directional vehicles, terms referring to their front or rear were clarified to ensure that vehicles comply with all requirements in both driving directions.

Any implicit requirements for tell-tales or switches for the driver within RVLR were waived for SMVs and LSAVs by an exemption included in Regulation 4. For Schedule 5, an explicit requirement for a driver switch for main-beam headlamps was waived.

Regulation 11 was found to restrict the fitment of lamps and reflectors which are capable of showing a red light to the front or light other than red to the rear, which would present an issue for bi-directional vehicles which will have lamps and reflectors capable of showing non-compliant colours fitted. Exemptions from the restrictions were therefore included that are based on the switching strategy required for type-approval.

Regulation 15 requires single-driver-switch operation for certain lamps, which was modified to require simultaneous switching by the ADS.

Schedules 4, 7 and 23 were found to include a mass representing a driver for measuring the alignment of dipped-beam headlamps and front fog lamps. It was proposed to remove this mass for SMVs and LSAVs, which do not have a driver's position.

4.2.2.2 Aspects requiring further consideration by the Department

For one item, **the Department should take a decision whether and what modification should be included**:

- Schedule 1 (Obligatory lamps, reflectors, rear markings and devices): Exemptions for low-speed vehicles are included for most lamps and retro reflectors. The Department may want to consider removing some of these low-speed exemptions in order to ensure continued compliance of LSAVs when in road-use.

The items discussed in Table 7 were out of scope of this project and **should be reviewed by the Department in the context of the ADS regulation**.

Table 7: RVLR regulations and schedules requiring further consideration

Regulation/ Schedule	Subject	Notes
R23	Maintenance of lamps, reflectors, rear markings and devices	This regulation requires lamps, reflectors, etc. to be in good working order and clean. These requirements may need to be reflected in the ADS regulation.
R24	Requirements about the use of front and rear position lamps, rear registration plate lamps, side marker lamps and end-outline marker lamps	These regulations define certain lamps that need to be kept lit in darkness and unobscured. These

Regulation/ Schedule	Subject	Notes
R25	Requirements about the use of headlamps and front fog lamps	requirements may need to be reflected in the ADS regulation. Additions for bi-directional vehicles should also be considered, which govern the use of lamps and potentially require covering of reflectors when changing driving direction. It should also consider whether an addition to RVLR and/or the ADS regulation is required to ensure that the intention of S5, Paragraph (10)(a) (for which an exemption is proposed) remains assured.
R26	Requirements about the use of warning beacons	This regulation requires warning beacons to be kept lit when operating on an unrestricted dual-carriageway road. This requirement may need to be reflected in the ADS regulation.
R27	Restrictions on the use of lamps other than those to which Regulation 24 refers	This regulation prohibits the use of certain lamps in a dangerous manner like, for example, to cause undue dazzle or discomfort to other persons using the road, or to be lit when the vehicle is parked. These requirements may need to be reflected in the ADS regulation.
R28	Testing and inspection of lighting equipment and reflectors	This regulation points to C&U, R74. The considerations outlined in Table 6 apply.
S22	Diagram showing where unlit parking is not permitted near a junction	This schedule relates to R24 (see corresponding row above).

4.2.3 Road Vehicles (Authorisation of Special Types) (General) Order 2003

4.2.3.1 Proposed modifications to technical regulations

Modifications were proposed for 5 STGO items; the main aspects are summarised below.

For the required definitions to denote automated vehicle groups and to identify bi-directional vehicles, references to the corresponding C&U definitions were included in Article 3. For bi-directional vehicles, terms referring to their front or rear were clarified in the same way proposed for C&U.

Braking requirements for abnormal indivisible load vehicles and mobile cranes contained in Schedules 1 and 2 refer to a Council Directive and set out modifications for these. As this Directive has not been modified to accommodate fully automated vehicles, it is proposed to accept either:

- compliance with the current type approval UN regulation as modified by the future LSAV/AV approval regulation, or
- compliance with the Council Directive as modified by STGO.

In each case, respecting the specific provisions on driver controls, alternative energy sources for muscular generated performances, and independent power sources when more than one control is required set out in the future LSAV/AV approval regulation.

Schedule 8 specifies that end markers must be fitted so that they impede the view of the driver as little as possible. It was proposed to widen this to also include the field of perception of ADS sensors.

Schedule 12 defines 'large bus' by a reference to the number of seated passengers in addition to the driver. For SMVs and LSAVs it was proposed to adapt this by referencing a total number of occupants.

4.2.3.2 Aspects requiring further consideration by the Department

For one item, **the Department should take a decision whether and what modification should be included**:

- Article 3 (Interpretation: general): The provisions of STGO often refer to vehicles of category N_3, which in turn is defined by reference to a Council Directive. The Department should consider adapting the definition to also capture DMVs, SMVs and LSAVs equivalent to category N_3. It is not possible to draft specific text before the final make-up and means of implementation of vehicle categories for fully automated vehicles is decided upon.

The items discussed in Table 8 were out of scope of this project and **should be reviewed by the Department in the context of the ADS regulation**.

Table 8: STGO articles and schedules requiring further consideration

Article/ Schedule	Subject	Notes
A3	Interpretation: general	The definition of 'operator' in some cases refers to the driver of a vehicle. This definition may need to be adapted to reference the person in charge of operating a fully automated vehicle.
A3	Interpretation: general	STGO in various places puts requirements on the 'user' of a vehicle or vehicle combination, such as notifying authorities, details of the user to be included in notices to police, or the use vehicles for tests and trials. This term is not defined in A3. It may be necessary to give consideration to developing a definition that clearly assigns responsibility in case of fully automated vehicles which may operate without a person accompanying them.
A18	Use on bridges	This article puts various requirements on the 'driver' of a vehicle or vehicle combination. These requirements may need to be reflected in the ADS regulation or the responsibility within STGO assigned to another person in charge of or accompanying the vehicle.
A21	General requirements as to construction and use	A21, Paragraph (6) imposes specific speed limits. These requirements may need to be reflected in the ADS regulation.
A27	Track-laying agricultural motor vehicles: use on bridges	See consideration on 'driver' under A18.
A30	Motor vehicles or trailers carrying loads of exceptional width: restrictions on width and speed	See considerations on 'speed' under A21.
A47	Straddle carriers: restrictions on use, speed and width	See considerations on 'speed' under A21.

Article/ Schedule	Subject	Notes
A52	Trailers used for cutting grass or trimming hedges	See considerations on 'speed' under A21.
S1	Abnormal indivisible load vehicles	See considerations on 'speed' under A21.
S2	Mobile cranes	S2, Part 1, Paragraph 2(5) sets out the condition that, in order to be considered a mobile crane, a motor vehicle needs to be 'operated by a driver or other person riding on it'. If completely automated mobile cranes, i.e. cranes that require no driver and no operator riding on it, shall be permitted in the future, this paragraph would need to be adapted.
S2	Mobile cranes	S2, Part 4, Paragraph 21 requires a beacon to be lit in certain conditions. These requirements may need to be reflected in the ADS regulation.
S2	Mobile cranes	See considerations on 'speed' under A21.
S3	Engineering plant	See considerations on 'driver or other person riding on it' under S2.
S3	Engineering plant	See considerations on 'speed' under A21.
S4	Road recovery vehicles	See considerations on 'speed' under A21.
S4	Road recovery vehicles	See considerations on 'beacon' under S2.
S5	Notices to police	S5, Paragraph 6(b) refers to directions given by a police constable to the 'driver'. It should be considered to extend this to directions given to the ADS in case of an DMV, SMV or LSAV.

Article/ Schedule	Subject	Notes
S6	Attendants	The concept of attendants is centred around persons accompanying vehicles or vehicle combinations and fulfilling a safety-critical role for instance by giving warnings to the driver. Two aspects should be considered when considering potential changes to STGO: 1) Can human attendants perform their role effectively when accompanying a fully automated vehicle where there is no driver to give warning to or should fully automated vehicles be prohibited in cases where attendants are required? 2) Could the role of an attendant in the future also be performed by an accompanying automated vehicle/machine with appropriate perception capabilities? 3) Could the requirement for an attendant be dispensed of if the automated vehicle or vehicle combination has sufficient sensor capability to replace the perception of both a driver and an attendant?
S8	Marking of projections	S8, Part 4, Paragraph 10 requires end markers and side markers to be illuminated between sunset and sunrise and at all times when visibility is seriously reduced. These requirements may need to be reflected in the ADS regulation.
S10	Local excavation vehicles	See considerations on 'speed' under A21.

Article/ Schedule	Subject	Notes
S12	Vehicles propelled by compressed natural gas systems	S12, Paragraph 10(7)(a) concerns fuel selection systems for vehicles designed to operate at any one time on one only of two or more alternative fuels. It expects the driver of a vehicle to make the fuel selection and therefore requires a switch to be readily accessible to the driver. If the ADS shall be allowed to perform the fuel selection, then this may need to be reflected in the ADS regulation and the requirement for a driver-accessible switch could be waived. Alternatively, if this task should remain under the exclusive control of humans, then this paragraph could be adapted to require a switch that is accessible by persons that are not drivers or not even occupants.

5 Stakeholder engagement

5.1 Approach

A two-stage stakeholder consultation was performed to solicit views and comments on TRL's proposals from relevant experts:

- Stage 1 was performed between late June and mid-July 2023 with a workshop on 3 July. Stage 1 consulted on the draft of the regulatory framework outline developed at that time. The main aspects consulted on included:
    - Overall approach:
        - E.g. proposal to adapt current regulatory frameworks (Regulation 2018/858 and Regulation 168/2013) to permit approval of automated vehicles
    - Scope of automated vehicles to include:
        - E.g. proposal to include only fully automated quadricycle and tricycle electric goods vehicles within the motorcycle framework regulation (Regulation 168/2013)
    - Automated vehicle categorisation:
        - For each of the regulatory frameworks, proposals for categorisation of the automated vehicles to be included were made
    - Implementation:
        - For each of the regulatory frameworks, outline proposals of how the articles and annexes could be changed to include approval of automated vehicles were made
- Stage 2 was performed between late October and mid-November 2023 with a workshop on 1 November. It mainly consulted on the pre-deployment requirements and test procedures developed for automated vehicles from analyses of current technical requirements (see Section 3). It also consulted on the regulatory framework because minor modifications were made to it in response to feedback received from Stage 1 of the consultation.

Each stage of the consultation consisted of two parts, namely:

- A workshop to present the relevant work and proposals to stakeholders, provide them an opportunity to ask questions, and to gather immediate feedback to the consultation questions.
- Written feedback: Following the workshop, the stakeholders were provided with the workshop slide decks which included specific consultation questions and other relevant materials and details, e.g. draft technical notes, and were requested to provide detailed written feedback. Any further stakeholder questions were dealt with by direct communication between the stakeholder and TRL.

This approach was chosen because it helped improve efficiency, both in terms of the time required for stakeholders to familiarise themselves with the relevant work and proposals and addressing stakeholder questions, as most were answered in the workshops.

Five stakeholders were consulted: two motor industry trade associations, one system / vehicle developer, one research organisation / test house, and one potential automated vehicle commercial end user. It should be noted that the motor industry trade associations gathered views from their members thus greatly increasing the scope of stakeholders consulted. All stakeholders attended the workshops and provided feedback for both stages of the consultation although the system / vehicle developer provided written feedback through their trade association (Table 9).

Table 9: Stakeholder participation in consultation

Stakeholder	Stage 1	Stage 2
Motor industry trade association 1	✓	✓
Motor industry trade association 2	✓	✓
System / vehicle developer	✓	✓
Research / test house	✓	✓
Potential vehicle end user	✓	✓

5.2 Summary of feedback

5.2.1 Stage 1: Regulatory framework outline

In general stakeholders were supportive of the regulatory framework and agreed with the overall approach, namely to adapt current regulatory frameworks (Regulation 2018/858 and Regulation 168/2013) to permit approval of automated vehicles, but the following comments were voiced:

<u>GB assimilated version of Regulation (EU) 2018/858</u>

- Categorisation of LSAVs
    - Comment: A stakeholder proposed that LSAVs be defined under two categories based on their maximum speed:
        - Max speed below 25km/h (~16mph)
        - Max speed between 25km/h (~16mph) and 50km/h (~31mph)

      Reasons given for this proposal were to separate out LSAVs that would not be within the scope of the current Regulation 2018/858 and include vehicles with a maximum speed of up to 30 mph (~ 48 km/h) into the LSAV category to allow them to operate safely on 30 mph roads which are generally

understood to be low speed roads according to the 1934 and 1960 Road Traffic Acts.

- Discussion / action: For various reasons, the main one being the introduction of 20 mph speed limits for many urban roads, it was decided to keep the one speed category proposed for LSAVs, between [6 km/h] and [32 km/h (~20 mph)].

- Implementation
  - Comment: As mentioned previously, stakeholders considered the inclusion of automated vehicles within Regulation 2018/858 as workable. However, they noted that careful consideration may need to be given to interactions with the other parts of both that regulation and the regulations that are referred to within it. UN WP.29 is currently doing work on the identification and amendment of non-automated driving regulations which need to be updated to take account of automated vehicles. This work should be closely followed and supported by UK in order to ensure that the outcomes of those activities are relevant to the development of the UK scheme.
  - Discussion / action: Agreed with stakeholder feedback, Department informed.

<u>GB assimilated version of Regulation (EU) No 168/2013</u>

- Scope: Inclusion of automated electric goods-carrying tricycles as well as quadricycles
  - Comment: At this stage, unless a particular safety issue is discovered with this type of vehicle, stakeholders supported the inclusion of tricycles within the L-category GB approval scheme on the basis that not including them could potentially limit innovative design in the future.
  - Discussion / action: Automated tricycles were included in the regulatory framework.
- Potential maximum speed requirement of 32 km/h, the limit currently proposed for LSAVs
  - Comment: Stakeholders mentioned that a potential use case for these L-category automated goods vehicles is to provide deliveries in urban and sub-urban areas in a quick timescale (within 1 hr from order), e.g. food or supermarket type deliveries. A speed limit of 32 km/h may restrict the vehicle to operate only on roads with speed limits of 20 mph, otherwise the vehicle could cause annoyance to other road users. The speed limit could also limit the ability to reach customers in a timely manner which is the core of this service offering. Therefore, this potential speed limit proposal is not supported.
  - Discussion / action: On the basis of this feedback and that the maximum power restriction for these vehicles will to some extent restrict their

maximum speed, it was decided that a maximum speed limit should not be imposed for electric goods carrying L category automated vehicles.

- Categorisation
    - Background: A category LA for single-mode automated lightweight vehicles was proposed, sub-categorised into:

      (i) LA-7e-CU fully automated lightweight vehicle (automated heavy quadri-mobile for utility purposes): automated utility vehicle exclusively designed for the carriage of goods

      (ii) LA-5e-B fully automated lightweight vehicle (automated commercial tricycle): automated utility tricycle exclusively designed for the carriage of goods

      on the basis that the LA-7e-CU sub-category was formed based on the non-automated L7e-CU sub-category and similarly the LA-5e-B sub-category was based on the non-automated L5e-B sub-category.
    - Comment: To avoid confusion in the nomenclature between automated and non-automated vehicle categories, stakeholders suggested that the name for the LA-7e-CU and LA-5e-B sub-categories should be changed to LA-U4 and LA-U3, respectively with U standing for utility and 4 and 3 the number of wheels.
    - Discussion / action: This suggestion was implemented.

5.2.2 Stage 2: Pre-deployment requirements and test procedures

A few specific in-depth comments were made by stakeholders on the proposed detailed technical proposals. To illustrate the nature of the comments given, some examples and resulting actions taken to respond are noted below; refer to the task report for more detail.

5.2.2.1 GB assimilated version of Regulation (EU) 2018/858

- Item 0: Cross-cutting prescriptions
    - Background: The initial proposal required for the ‘test mode’ (required to enable type approval testing of vehicles without driver controls) to not be available on production vehicles.
    - Comment: Clarification required how in-service conformity testing can be carried out in absence of test mode.
    - Discussion / action: Agree with stakeholder comment. Changed requirement so that test mode does not have to be removed from production vehicles but protected against unauthorised use which will allow its use for in-service conformity testing.
- Item 10A: Electromagnetic compatibility (EMC)
    - Comment: Further work is required in demonstrating that the operation of the vehicle is not adversely impacted by electromagnetic radiation. Operating

vehicle in autonomous mode in an EMC chamber is not practical and hence demonstrating that automated driving function is not impacted by external interference is difficult. Due to the complexity of the issue, industry-wide co-operation is necessary to agree a feasible test methodology and failure criteria.

  - Discussion / action: Agree with stakeholder comment. For the short term, the proposed text intends to give flexibility to the technical service to overcome any hurdles. In the medium to long term, more explicitly defined solutions are required, and it is understood that discussions at the UNECE informal working group on EMC have started.

- Item 45A: Safety glazing materials and their installation on vehicles
  - Comment: No benefit in mandating optical quality requirements for the windscreen of a fully automated vehicle where the occupants cannot take control of the vehicle at any time. Mandating compliance with the optical quality requirements could limit future vehicle designs that offer other benefits such as energy efficiency or pedestrian protection due to the installation angle required to meet the requirements.
  - Discussion / action: Agree with stakeholder comment. Added exemption from optical qualities requirements and tests for SMVs and LSAVs.
- Item 46A: Installation of tyres
  - Background: In order to allow emerging tyre technologies to be used on LSAVs, such as airless tyres, it was proposed to enable the technical service to also accept non-type-approved tyres for LSAVs.
  - Comment: Not in agreement with proposals of 'non-type-approved' tyres in the marketplace, as these could subsequently be installed on other vehicles and manufacturers are unable to control them when in second-hand use.
  - Discussion / action: Based on these reservations, the permission outlined above was removed from the proposals.
- Item 50A: Mechanical coupling components of combinations of vehicles
  - Comment: We understand that further considerations may be needed with coupling suppliers to ensure new developments don’t stifle innovation.
  - Discussion / action: Agree that in the longer term this regulation might be redrafted with coupling suppliers’ input to ensure it is open for new developments. Added comment into the report to ensure this aspect is not missed in future work.

5.2.2.2 GB assimilated version of Regulation (EU) No 168/2013

- Item A3: Test procedures related to sound

- Comment: Sound emissions for pure electric vehicles (battery electric) are not tested. UNECE R9 deals with sound emissions of ICE and hybrid electric vehicles Therefore applicability for LA-U3 and LA-U4 should be not applicable.
- Discussion / action: Double-checked UNECE R9 and also checked EU 134/2014, Annex IX, appendix 3, which is related to sound emissions. Noted that this only contained tests related to the engine and exhaust system, nothing for tyres, which also infers that pure electric vehicles are not tested. Therefore, as proposed in comment, updated to remove applicability of this item for LA vehicles because, by definition, they are pure electric only.

- Item B1: Audible warning devices
  - Comment: EU 3/2014, Annex II, Part2, para 1.5 states:

    In the absence of specific requirements in UNECE regulation No 28 and as provided in point 1.3 of Part 1, audible warning or additional devices installed on vehicles which are propelled by means of one or more electric motors may incorporate a feature enabling the device to be intermittently activated in such a way that it operates at a significantly lower sound pressure level than required for audible warning devices, emitting a continuous, uniform sound with a sound spectrum that does not vary perceptibly during operation, with the aim to for instance alert pedestrians about the vehicle approaching.

    This requirement could be mandated to effectively mandate an Acoustic Vehicle Alerting System (AVAS).
  - Discussion / action: Agree that this should be considered as part of future work because outside scope of current project. Paragraph added to task deliverable to ensure this idea is remembered and considered for future work.
- Item B8: installation of lighting and light signalling devices, including automatic switching-on of lighting
  - Comment: For non-automated L5e and L7e vehicles, approval to UN R48 is also permitted as an option.
  - Discussion / action: Updated reports to include specific provisions to enable approval of LA category vehicles to UN R48.
- Item 15B: vehicle maximum speed limitation plate and location on vehicle
  - Comment: Suggested change to specific provision to shorten it and improve its clarity, namely to add automated vehicle category by just adding LA category to current list (note bold added text): Para 1.2. Vehicles of categories L1e, L3e, L4e, L5e-A **and LA** may be fitted with a plate on which the maximum design vehicle speed is indicated, provided that the requirements of this Annex are met.
  - Discussion / action: Updated as suggested.
- Item C5: devices to prevent unauthorised use

- Comment: These devices are likely going to become an integrated function within the ADS and should be covered by whatever the ADS regulation itself provisions when it is finalised.
- Discussion / action: Agree with stakeholder comment. Updated specific provisions to take this point into account (Note bold added text).

  2. Where devices intended to prevent unauthorised use are fitted and in case of operating incompatibilities with the regulation, ***for example if the device is part of or integrated with the Automated Driving System (ADS)****, in lieu of compliance with UN Regulation 18 as published, the vehicle manufacturer shall agree with and demonstrate to the technical service and the approval authority an equivalent level of protection.*

- Item C7: external projections
  - Comment: Suggested minor change to text for specific provision:

    EU 44/2014, Annex VIII

    (Note suggested changes shown using strikethrough (deleted text) and bold (added text))

    1.2.2. For **LA category vehicles** ~~AVs~~ (without a seating position) the tests shall be conducted in normal running order, without a dummy or person in/on the vehicle.
  - Discussion / action: Agree with stakeholder comment. Updated as suggested.

6 Conclusions

The project developed proposals for vehicle categorisation of fully automated SMVs, DMVs and LSAVs, and for adaptations to the approval processes and associated administrative requirements of unlimited series type-approval, NSSTA and IVA.

Proposals were also made for suitable technical regulations and appropriate series of amendments for pre-deployment requirements and test procedures for all non-ADS aspects and modifications and additions to the language of these regulation were proposed to make them suitable for fully automated vehicles. The Department may consult on the proposals in order to implement them into a GB scheme or use them as a basis to contribute to work underway at the UNECE level to modify UN regulations.

The relevant GB in-use regulations were analysed, and proposals were developed to remove incompatibilities with proposals made for pre-deployment requirements and remove any barriers to the deployment of fully automated vehicles. It should be noted that this project did not consider development of additional in-use requirements for fully automated vehicles (e.g. keeping automated driving software up-to-date) and the Department may want to pursue a wider review with this purpose in the future.

Aspects identified during the course of the project which require further consideration by the Department, also in the context of developing the ADS regulation, were summarised in Sections 3.2.1.4, 3.2.2.2, 4.2.1.2, 4.2.2.2 and 4.2.3.2 of this report.

7 Glossary

Term	Definition
ABS	Anti-lock braking system
ADS	Automated driving system
ASDE	Authorised self-driving entity
AVAS	Acoustic vehicle alerting system
CAL	Crashworthiness approval level
CoP	Conformity of Production
CNG	Compressed natural gas
C&U	The Road Vehicles (Construction and Use) Regulations
DMV	Dual mode vehicle
EMC	Electromagnetic compatibility
ESA	Electrical/electronic sub-assembly
ESC	Electronic stability control
EU	European Union
GB	Great Britain
IVA	Individual vehicle approval
LPG	Liquified petroleum gas
LSAV	Low speed automated vehicle
NSSTA	National small series type-approval
NUIC	No user-in-charge
ODD	Operational design domain
RVLR	The Road Vehicles Lighting Regulations
S.I.	Statutory instrument
SMV	Single mode vehicle
SSF	Static stability factor
STGO	Road Vehicles (Authorisation of Special Types) (General) Order 2003
STU	Separate technical unit
VAS	Vehicle alarm system
VCA	Vehicle Certification Agency
VRU	Vulnerable road user

Appendix A Modifications to framework regulations

A.1 Introduction

Implementation of non-ADS requirements for automated vehicles requires a number of amendments and additions to the regulations governing the approval and market surveillance of vehicles:

- For M and N category automated vehicles and for the new low speed automated vehicle (LSAV) category, this is the GB assimilated version of Regulation (EU) 2018/858
- For the new LA category fully automated lightweight vehicles, this is the GB assimilated version of Regulation (EU) No 168/2013

The following sections detail the amendments and additions required, all of which have been validated via the stakeholder consultation in Task 5.

A.2 Regulation 2018/858 (M-, N-, O-, LSAV-M and LSAV-N category)

This section details the text to be added to or amended in the GB assimilated version of Regulation (EU) 2018/858.

TITLE

Amend the title of the regulation as follows to accommodate the introduction of Low Speed Automated Vehicles:

REGULATION (EU) 2018/858

OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of May 30, 2018

on the approval and market surveillance of motor vehicles **and of low speed automated vehicles** and their trailers, and of systems, components and separate technical units intended for such vehicles amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC

Amended by (EU) 2019/2144(‡), S.I. 2019 No. 648(*) and S.I. 2022 No. 1273

CHAPTER 1: SUBJECT MATTER, SCOPE AND DEFINITIONS

ARTICLE 2: SCOPE

Amend the following paragraph to include the LSAV category in addition to current M and N categories:

1. This Regulation applies to motor vehicles of Categories M and N and their trailers of Category O**, and low speed automated vehicles (LSAVs),** that are intended to be used on public roads …

ARTICLE 3: DEFINITIONS

Amend the following definition:

(15) 'Vehicle' means any motor vehicle**, LSAV,** or its trailer

Add the following definitions:

(63) **'Dynamic driving task'** (DDT) means the real time operational and tactical functions required to operate the vehicle.

(64) **'Automated driving system'** (ADS) means the hardware and software that are collectively capable of performing the entire dynamic driving task (DDT) on a sustained basis.

(65) **'Automated vehicle'** means a motor vehicle fitted with an ADS designed and constructed to drive itself without human monitoring for real-time safety critical intervention. An automated vehicle may be a [Conditionally] Automated Vehicle, a [Fully] Automated Vehicle or both.

(66) **'[Conditionally] automated vehicle'** means an automated vehicle with at least one ADS feature which may make requests for hand-over of control of the dynamic driving task to a human driver (i.e. the ADS feature issues transition demands).

(67) **'[Fully] automated vehicle'** means an automated vehicle with at least one ADS feature which does not make requests for hand-over of control of the dynamic driving task to a human driver (i.e. the ADS feature does not issue transition demands).

(68) **'Dual mode vehicle'** means a fully automated vehicle which has a manual driving mode

(69) **'Single mode vehicle'** means a fully automated vehicle which does not have a manual driving mode but which may have a recovery driving mode.

(70) **'Automated driving mode'** means a mode in which the automated driving system is performing the dynamic driving task.

(71) **'Manual driving mode'** means a mode in which the vehicle can be driven using manual control at more than 6 km/h.

(72) **'Recovery driving mode'** means a mode in which the vehicle can be driven using manual controls at no more than 6 km/h.

(73)[6] **'Low Speed Automated Vehicle'** (LSAV) means a power-driven vehicle[7] with a maximum design speed of at least [6 km/h] but not more than [32 km/h], which is fitted with an ADS designed and constructed to drive itself without human monitoring for real-time safety critical intervention, does not make requests for hand-over of control of the dynamic driving task to a human and which does not have a manual driving mode, but which may have a recovery driving mode.

ARTICLE 4: VEHICLE CATEGORIES

Amend the following paragraphs:

1. (a) (i) Category M_1: motor vehicles with not more than ~~eight~~**nine** seating positions ~~in addition to the driver's seating position~~ and without space for standing passengers, regardless of ~~whether~~ the number of seating positions ~~is restricted to the driver's seating position~~;

1. (a) (ii) Category M_2: motor vehicles with more than ~~eight~~**nine** seating positions ~~in addition to the driver's seating position~~ and having a maximum mass not exceeding 5t, regardless of whether those motor vehicles have space for standing passengers; and

1. (a) (iii) Category M_3: motor vehicles with more than ~~eight~~**nine** seating positions ~~in addition to the driver's seating position~~ and having a maximum mass exceeding 5t, regardless of whether those motor vehicles have space for standing passengers;

Add the following paragraphs:

1. (d) Category LSAV-M consists of low speed automated vehicles designed and constructed primarily for the carriage of passengers and their luggage, divided into;

1. (d) (i) Category LSAV-M_1-CS: low speed automated vehicles with not more than nine seating positions and without space for standing passengers;

1. (d) (ii) Category LSAV-M_1-CR: low speed automated vehicles with not more than nine seating positions excluding folding seats and a maximum passenger capacity of 15, with or without space for standing passengers, and intended for use only in low-risk operating domains;

1. (d) (iii) Category LSAV-M_2: low speed automated vehicles with more than nine seating positions excluding folding seats and more than 15 passengers, and having a

[6] Alternatively, this definition could be entered as (16A) to put it with the definition of a Motor Vehicle.

[7] NB: The definition of automated vehicle does not include LSAV because LSAV is not a motor vehicle (LSAV can have a maximum design speed less than 25 km/h, whereas a motor vehicle must have a maximum design speed exceeding 25 km/h. Either definition of motor vehicle could be updated (definition number 16) to add 'or an LSAV' or LSAV could be added to the title of the regulation (along with trailers, systems, components and STUs). The option to amend the title is shown above.

maximum mass not exceeding 5t, regardless of whether those motor vehicles have space for standing passengers; and

1. (d) (iv) Category LSAV-M_3: low speed automated vehicles with more than nine seating positions and having a maximum mass exceeding 5t, regardless of whether those motor vehicles have space for standing passengers;

1. (e) Category LSAV-N consists of low speed automated vehicles designed and constructed primarily for the carriage of goods, divided into;

1. (e) (i) Category LSAV-N_1: low speed automated vehicles with a maximum mass not exceeding 3.5t;

1. (e) (ii) Category LSAV-N_2: low speed automated vehicles with a maximum mass exceeding 3.5t but not exceeding 12t;

1. (e) (iii) Category LSAV-N_3: low speed automated vehicles with a maximum mass exceeding 12t.

CHAPTER V: AMENDMENTS TO AND VALIDITY OF GB TYPE-APPROVALS

ARTICLE 35: TERMINATION OF VALIDITY

Amend the following paragraph to incorporate LSAVs:

1. Seven years after the latest update of the information package in case of a GB whole-vehicle type-approval certificate for vehicles of Categories M_1**,** ~~and~~ N_1**, LSAV-M_1-CS, LSAV-M_1-CR and LSAV-N_1**, and 10 years for vehicles of Categories M_2, M_3, N_2, N_3**,** ~~and~~ O**, LSAV-M_2, LSAV-M_3, LSAV-N_2 and LSAV-N_3**, the approval authority shall verify that the type of vehicle complies with all the regulatory acts that are relevant to that type.

CHAPTER VIII: VEHICLES PRODUCED IN SMALL SERIES

ARTICLE 41: GB TYPE APPROVAL OF VEHICLES PRODUCED IN MEDIUM SERIES

Amend the following paragraph to incorporate LSAVs:

5. The Secretary of State may by regulations amend-

(a) Appendix I of Part I to Annex II to set out the technical requirements for vehicle Categories M, N, ~~and~~ O, **LSAV-M and LSAV-N,** and

ANNEX I: GENERAL DEFINITIONS, CRITERIA FOR VEHICLE CATEGORISATION, TYPE OF VEHICLE AND TYPES OF BODYWORK

PART A: CRITERIA FOR VEHICLE CATEGORISATION

Amend the following paragraphs:

3. CRITERIA FOR THE CATEGORISATION OF VEHICLES IN CATEGORY N

3.5. The number of seating positions ~~excluding the driver's seating position~~ shall not exceed:

(a) ~~6~~**7** in the case of N_1 vehicles;

(b) ~~8~~**9** in the case of N_2 or N_3 vehicles.

3.6.1. For such purposes, the following equations shall be satisfied in all configurations, in particular when all seating positions are occupied:

…

'N' is the number of seating positions ~~excluding the driver's seating position~~ **minus 1**.

3.8.2.2. (b) In the case of a rear door or a tailgate, the loading aperture shall meet the following requirements:

(i) In the case the vehicle is fitted with only one row of seats**,** ~~ or~~ with only the driver seat**, or with no seats**, the minimum height of the loading aperture shall be at least 600mm;

(c) **'Cargo area'** means the part of the vehicle located behind the row(s) of seats or behind the driver seat when the vehicle is fitted with only one driver seat**, or for carriage of goods if there are no seats**;

(ii) Where the vehicle is fitted with only one row of seats**,** ~~or~~ with one seat**, or no seats**, the minimum length of the cargo area shall be at least 40% of the wheelbase;

Add the following paragraphs:

7. CRITERIA FOR THE SUB-CATEGORISATION OF MOTOR VEHICLES AS SINGLE-MODE (-A) OR DUAL-MODE (-D) AUTOMATED VEHICLES

7.1. Category M or N shall be subcategorised as single-mode (-A) if they are a fully automated vehicle which does not have a manual driving mode, but which may have a recovery driving mode.

7.2. Category M or N shall be subcategorised as dual-mode (-D) if they are a fully automated vehicle which has a manual driving mode.

7. CRITERIA FOR THE SUB-CATEGORISATION OF LOW SPEED AUTOMATED VEHICLES AS CRASHWORTHINESS APPROVAL LEVEL STANDARD (-CS) OR CRASHWORTHINESS APPROVAL LEVEL REDUCED (-CR)

7.1 Category LSAV-M_1 shall be subcategorised as Crashworthiness Approval Level Reduced (-CR) if they are intended for use only in restricted operational design domains with reduced risk (i.e. operational design domains in which the risk of

injury is low because the collision risk is low or the severity of consequences is reduced[8].

7.2 All other LSAV-M_1 shall be subcategorised as Crashworthiness Approval Level Standard (-CS).

PART B: CRITERIA FOR TYPES OF VEHICLE, VARIANTS AND VERSIONS

Add the following paragraphs:

8. CATEGORY LSAV-M_1

Per Paragraph 1. CATEGORY M_1

9. CATEGORIES LSAV-M_2 and LSAV-M_3

Per Paragraph 2. CATEGORIES M_2 and M_3

10. CATEGORY LSAV-N_1

Per Paragraph 3. CATEGORY N_1

11. CATEGORY LSAV-N_2 and LSAV-N_3

Per Paragraph 4. CATEGORIES N_2 and N_3

ANNEX II: REQUIREMENTS FOR THE PURPOSE OF GB TYPE-APPROVAL OF VEHICLES, SYSTEMS, COMPONENTS OR SEPARATE TECHNICAL UNITS

Add **PART I – Appendix 3: Regulatory Acts for GB Type-approval of Low Speed Automated Vehicles**

Add an Appendix to include a table of applicability of regulatory acts for LSAVs by LSAV category, i.e. LSAV-M_1-CS, LSAV-M_1-CR, LSAV-M_2, etc. based on Deliverable D2-2 Regulatory items and proposed amendments spreadsheet.

Add **PART IV: Applicability and Specific Requirements for Regulatory Acts for GB Type-approval of Single Mode and Dual Mode [Fully] Automated Vehicles**

Add a PART IV to include a table for application of regulatory acts for M and N category fully automated vehicles (i.e. single mode vehicles with and without occupants, and dual mode vehicles) within the scope of the base regulation that includes specific provisions (modifications) for application where needed (based on Deliverable D2-2 Regulatory items and proposed amendments spreadsheet).

[8] For example, separated lanes, where the collision risk will be reduced compared to open roads because less traffic is encountered, and 20 mph zones or business/university campuses where the collision consequences will be reduced because of the low traffic speed).

Add **PART V: Applicability and Specific Requirements for Regulatory Acts for GB Type Approval of Low Speed Automated Vehicles**

Add a PART V to include a table for application of regulatory acts for LSAV category vehicles, within the scope of the base regulation (i.e. Part 1B applicability table) which includes specific provisions (modifications) for application where needed (based on Deliverable D2-2 Regulatory items and proposed amendments spreadsheet).

A.3 Regulation 168/2013 (L-category)

This section details the text to be added to or amended in the GB assimilated version of Regulation (EU) No 168/2013.

CHAPTER 1: SUBJECT MATTER, SCOPE AND DEFINITIONS

ARTICLE 2: SCOPE

Amend the following paragraph to ensure Category LA vehicles are not excluded from the scope of the regulation due to their having no seating position:

2. (j) vehicles not equipped with at least one seating position **and which are not fully automated**;

ARTICLE 3: DEFINITIONS

Add the following definition:

(97) **'Dynamic driving task'** (DDT) means the real time operational and tactical functions required to operate the vehicle.

(98) **'Automated driving system'** (ADS) means the hardware and software that are collectively capable of performing the entire dynamic driving task (DDT) on a sustained basis.

(99) **'Fully automated vehicle'** means any power-driven vehicle designed and constructed to be driven, in normal operation, only by an automated driving system without any driver supervision

ARTICLE 3: VEHICLE CATEGORIES

Add the following items:

2. (a) Category LA vehicle (fully automated lightweight vehicle, sub-categorised into:

(i) LA-U3 fully automated lightweight vehicle (automated commercial tricycle): automated utility tricycle exclusively designed for the carriage of goods;

(ii) LA-U4 fully automated lightweight vehicle (automated heavy quadri-mobile for utility purposes): automated utility vehicle exclusively designed for the carriage of goods.

ANNEX I: VEHICLE CLASSIFICATION

PART A: CRITERIA FOR VEHICLE CATEGORISATION

Add table below to define LA Category and LA-U3 and LA-U4 sub-categories.

Category	Category name	Common classification criteria[1]
LA	Fully automated lightweight vehicle	(1) Fully automated vehicle (2) length ≤ 3,700 mm (3) width ≤ 1,500 mm (4) height ≤ 2,500 mm (5) Propelled with an electric engine
Sub-categories	Sub-category name	Common classification criteria
LA-U3	Automated commercial tricycle	(6) three wheels (7) exclusively designed for the carriage of goods with no seats for passengers/riders (8) maximum continuous rated power ≤ 15 kW[2] (9) maximum design vehicle speed ≤ 90 km/h[2] (10) mass in running order ≤ 600 kg[3]
LA-U4	Automated heavy quadri-mobile for utility purposes	(6) four wheels (7) exclusively designed for the carriage of goods with no seats for passengers/riders (8) maximum continuous rated power ≤ 15 kW (9) maximum design vehicle speed ≤ 90 km/h (10) mass in running order ≤ 600 kg

Notes:

[1] Propose to restrict dimension of all L cat automated vehicles, including commercial tricycles, to same value as for L7e-CU quadri-mobile

[2] Propose add requirements for max power and speed to align with automated quads

[3] Propose reduce mass req. from 1,000kg to 600 kg to align with automated quads

ANNEX I: EXHAUSTIVE LIST OF REQUIREMENTS FOR THE PURPOSES OF EU VEHICLE TYPE-APPROVAL

Add table for LA Category / LA-U3 and LA-U4 sub-category technical requirements which contains specific provisions for supplementing and individual regulations, based on Deliverable D2-2 Regulatory items and proposed amendments spreadsheet.

Appendix B Modifications to administrative documents

B.1 Regulation (EU) 2020/683

B.1.1 Introduction

This section details the text to be added to or amended in the GB assimilated version of Commission Implementing Regulation (EU) 2020/683.

The following shows the main content of Regulation 2020/683 (in Annexes), including which Annexes have recommended amendments in subsequent sections and which Annexes do not require amendment:

- **Annex I** defines the template for an information document for whole-vehicle single-step type-approval, whole-vehicle mixed type-approval, whole-vehicle multi-stage type-approval and the type-approval of systems, components or separate technical units
    - The necessary amendments to this annex are shown in Appendix B.1.2
- **Annex II** defines the template for an information document for whole-vehicle step-by-step type-approval
    - The necessary amendments to this annex are shown in Appendix B.1.3
- **Annex III** defines the templates for approval certificates
    - The necessary amendments to this annex are shown in Appendix B.1.4
- **Annex IV** defines the approval certificate numbering system
    - No amendments required
- **Annex V** defines the GB type-approval mark of components and separate technical units
    - No amendments required
- **Annex VI** defines the template for the test result sheet (for sound and exhaust emissions testing)
    - No amendments required
- **Annex VII** defines the format of test reports for the type-approval of a system, component or separate technical unit
    - No amendments required
- **Annex VIII** defines the certificate of conformity for all motor vehicles, broken down by complete, complete small series, completed and incomplete vehicles, each further broken down by category
    - The necessary amendments to this annex are shown in Appendix B.1.5

B.1.2 Template Information document (Regulation 2020/683 Annex I)

ANNEX I: TEMPLATE FOR AN INFORMATION DOCUMENT FOR THE GB TYPE-APPROVAL OF VEHICLE, SYSTEMS, COMPONENTS OR SEPARATE TECHNICAL UNITS

Add the following items:

4.7.1. Maximum vehicle design speed in automated driving mode (in km/h): …

6.6.1.1.1.7. etc. Tyre approved for rotation in both driving directions (yes/no): …

17. SPECIAL PROVISIONS FOR VEHICLES FITTED WITH AN AUTOMATED DRIVING SYSTEM (ADS)

17.1. Vehicles fitted with an ADS

17.1.1 Vehicle is fully automated single mode or fully automated dual mode …

17.1.2. Vehicle is designed to be bidirectional in operation (yes/no)[(xx)]: …

17.1.3. Description of the ODD[9]: …

17.2. Manual control of vehicle fitted with ADS

17.2.1. Description of manual controls including the vehicle parameters that may be controlled, and the limits of vehicle operation (maximum speed, turning rate, etc.) in this mode (if fitted): …

17.2.2. Method of communication between manual control system and vehicle (if fitted): …

17.2.3. Method control of access to controls or connection ports for plug-in controls or how their operation is restricted by means of mechanical or electronic systems: …

17.3. Vehicles intended for transporting passengers

17.3.1. Crashworthiness approval level (reduced/standard): …

17.3.1.1. For LSAV-M_1-CR, the number of standing passengers and the number of passenger seating positions

17.3.1.2. For LSAV-M_1-CS, the number of passenger seating positions

17.3.2. Technical description of the passenger emergency communication system: …

17.3.3. Drawing or description of emergency stop control and relevant markings: …

17.3.4. Technical description of roof structure

17.4. Vehicles intended for transporting goods

17.4.1. [Reserved for additional information supporting approval of the ADS]

17.5. Bidirectional vehicles

17.5.1. For bi-directional vehicles where front and rear axle is not clearly defined, provide information which allows identification of each axle: …

[9] Required to set scope of driving test for adaptive front lighting systems.

Add a footnote xx to Item No. 17.1.2. as follows:

> For bidirectional vehicles, fill in Items related to front and rear of vehicles for both travelling directions unless vehicle is symmetrical; in this case fill in information related to front and rear for one travel direction only.

Amend the following item:

13. SPECIAL PROVISIONS FOR BUSES**,** ~~AND~~ COACHES**, LSAV-M_2 AND LSAV-M_3**

B.1.3 Template information document (Regulation 2020/683 Annex II)

ANNEX II: TEMPLATE FOR AN INFORMATION DOCUMENT FOR THE PURPOSES OF GB WHOLE-VEHICLE STEP-BY-STEP TYPE-APPROVAL

PART 1

Amend title as follows:

A. CATEGORIES M, ~~AND~~ N, and LSAV

All changes in Appendix B.1.2 above must also be implemented in the template information document in Annex II.

B.1.4 Approval certificate (Regulation 2020/683 Annex III)

ANNEX III: TEMPLATES FOR APPROVAL CERTIFICATES

MODEL E (to be used for individual vehicle approval)

INDIVIDUAL VEHICLE APPROVAL CERTIFICATE

APPENDIX 1: PART 2 OF INDIVIDUAL APPROVAL CERTIFICATE

Note for Information: Annex III, Model E, Appendix 1, Part 2 requires the manufacturer to provide standardised information that is a sub-set of the Certificate of Conformity Part 2 information that is required to be attached to Section II of the approval certificate for series production vehicles, systems, and components and separate technical units in Model A, Model B and Model C respectively. The Appendix has separate requirements for each category of vehicle covered by Regulation 2020/683 (M_1 to O_3/O_4).

Apply the amendments and additions described in Appendix B.1.5 below.

Add the following sections for LSAV categories, with the amendments and additions described in Appendix B.1.5 below:

- LSAV-M_1-CR based on M_1
- LSAV-M_1-CS based on M_1
- LSAV-M_2 based on M_2
- LSAV-M_2 based on M_3

- LSAV-N_1 based on N_1
- LSAV-N_2 based on N_2
- LSAV-N_3 based on N_3

B.1.5 Certificate of conformity (Regulation 2020/683 Annex VIII)

ANNEX VIII: CERTIFICATE OF CONFORMITY IN PAPER FORMAT

APPENDIX: TEMPLATES FOR THE CERTIFICATE OF CONFORMITY IN PAPER FORMAT

PART I: COMPLETE AND COMPLETED VEHICLES

MODEL A1 – PART 1: *COMPLETE VEHICLES* **– CERTIFICATE OF CONFORMITY**

Note for information: if the forthcoming ADS regulation requires a vehicle to have an ADS family identifier (similar to the Interpolation, ATCT, PEMS, Roadload etc. family identifiers used to identify a vehicle for emissions conformity) it should be included here.

MODEL A2 – PART 1: *COMPLETE VEHICLES TYPE APPROVED IN SMALL SERIES* **– CERTIFICATE OF CONFORMITY**

As MODEL A1 above.

MODEL B – PART 1: *COMPLETED VEHICLES* **– CERTIFICATE OF CONFORMITY**

As MODEL A1 above.

PART II: INCOMPLETE VEHICLES

MODEL C1 AND MODEL C2

As MODEL A1 above.

PART 2 – *VEHICLE CATEGORY M_1* (complete and completed vehicles)

Amend the following paragraphs (also equivalents for M_2, M_3, N_1, N_2 and N_3 category vehicles):

3.1. Specify if the vehicle is non-automated/**[Conditionally]** automated/**single mode** fully automated**/dual mode fully automated**(8)

42. Number of seating positions (including the driver **if not a single mode fully automated vehicle**)(115)

Add the following paragraphs

3.2. Specify if the vehicle has a recovery driving mode

3.3. Specify if the vehicle is bidirectional

3.3.1. For bi-directional vehicles where front and rear axle is not clearly defined, provide information which allows identification of each axle

29.1. Maximum speed in automated driving system mode

Notes for information:

Paragraphs 16 to 19 cover the technically permissible maximum mass of the vehicle and towable trailers. An automated vehicle may or may not be allowed to tow, and may or may not have a different maximum mass or dimensions of towed vehicle if it is allowed to tow, depending on the requirements of the forthcoming ADS regulation. Modifications may be required here (and similar sections of PART 2 for M_2, M_3, N_1, N_2 and N_3 category vehicles) once the ADS regulation is published.

Paragraph 49 and subparagraphs: there is potential for different emissions and fuel/energy consumption in manual and ADS driving modes, especially if ADS mode is limited to a maximum speed that is lower than the maximum speed in the test cycle.

PART 2 – *VEHICLE CATEGORY M_2*, M_3, N_1, N_2 and N_3 (complete and completed vehicles)

Make the same amendments and additions as for N_1 vehicles.

Add the following to PART 2:

Add new templates for LSAV-category vehicles, each duplicating the Certificate of Conformity PART 2 items for M_1 to N_3 category vehicles with amendments as above.

For example:

PART 2 – *VEHICLE CATEGORY LSAV-M_1* (complete and completed vehicles)

For LSAV-M_1-CR, include the following item from PART 2 M_2:

43. Number of standing places

For LSAV-M_1-CS, add the following items:

B.2 Regulation (EU) No 901/2014

B.2.1 Introduction

This section details the text to be added to or amended in Commission Implementing Regulation (EU) No 901/2014.

The following shows the main content of Regulation 901/2014 (in Annexes), including which Annexes have recommended amendments in subsequent sections and which Annexes do not require amendment:

- **Annex I** defines the templates for the information document and information folder
    - The necessary amendments to this information document are shown in Appendix B.2.2
- **Annex II** defines the templates for the manufacturer's statements on endurance testing and vehicle structure integrity
    - No amendments required
- **Annex III** defines the templates for the manufacturer's certificates providing proof of compliance on access to vehicle on-board diagnostics and to vehicle repair and maintenance information
    - No amendments required
- **Annex IV** defines the templates for certificates of conformity
    - The necessary amendments to this annex are shown in Appendix B.2.3.
    - NB: the type declaration on the certificate of conformity fully defines whether the vehicle is non-automated or fully automated, so it is not necessary for this to be declared
- **Annex V** defines the models for statutory plates and type-approval mark
    - No amendments required
- **Annex VI** defines the templates for type-approval certificates
    - No amendments required
- **Annex VII** defines the numbering system for type-approval certificates
    - No amendments required
- **Annex VIII** defines the format of test reports and templates for test results sheets (for environmental and propulsion unit performance, functional safety and vehicle construction)
    - No amendments required
- **Annex IX** defines the templates for numbering and certificates for parts or equipment which may pose a serious risk to the correct functioning of essential systems
    - No amendments required

- **Annex X** defines the reporting format for the list of parts or equipment which may pose a serious risk to the correct functioning of essential systems
    - No amendments required

B.2.2 Information documents (Regulation 901/2014 Annex I)

ANNEX I – **Templates for the information document and information folder**

PART B – **INFORMATION DOCUMENT**

Section 2.8. **INFORMATION DOCUMENT DATA ENTRIES**

This is a large table defining all information document data entries required per (sub) category.

Add the following item:

Item No.	(Sub) categories	Detailed information
1.9.	LA	Vehicle is designed to be bidirectional in operation?

Add a footnote to Item No. 1.9. as follows:

For bidirectional vehicles, fill in Items related to front and rear of vehicles for both travelling directions unless vehicle is symmetrical; in this case fill in information related to front and rear for one travel direction only.

Amend the following items:

(Sub) categories column – add LA-U3 wherever L5e-B is included in the (sub) category range and add LA-U4 wherever L7e-CU is included in the (sub) category range. For example:

- Most of the items in the 'Range of vehicle mass (overall)' section (2.1) are currently defined as required for L1e–L7e – this should be amended to L1e–LA
    - NB: LA covers both LA-U3 and LA-U4
- Item 2.1.3.3. is for L4e only – do not amend
- Item 2.1.12. is for L2e-U, L5e-B, L6e-BU and L7e-CU – add LA-3U and LA-4U (or just LA)
- Item 1.8.1. is for L3e, L4e, L5e, L7e-A and L7e-B2 – add LA-3U
- Item 1.8.2 is for L1e, L2e, L6e, L7e-B1 and L7e-C – add LA-4U

Apply the above amendment to all item numbers **except** the following (not required because LA-category vehicles do not have an occupant compartment, do not have occupants and are not permitted to tow trailers):

- 3.8.x – Passenger-compartment heating system and air-conditioning
- 6.5.x – Glazing, windscreen wipers and washers, and defrosting and demisting systems
- 6.6.x – Windscreen wiper(s)

- 6.7.x – Windscreen washer
- 6.8.x – Defrosting and demisting
- 6.9.x – Driver-operated controls including identification of controls, tell-tales and indicators
- 6.10.1.x – Speedometer
- 6.12.x – Rearward visibility
- 6.14.x – Safety belts and/or other restraints
- 6.15.x – Safety belt anchorages
- 6.16.x – Seating positions (saddles and seats)
- 6.20.x – Vehicle occupant protection, including interior fittings and vehicle doors
- 7.1.x – Coupling devices and attachments
- 7.7.x – Passenger handholds and footrests

Amend item 7.8.1. as follows:

Location of ~~rear~~ registration plate (indicate variants where necessary; drawings may be used as appropriate):

Appendix 1 – **Model information document relating to EU type-approval of a type of a vehicle with regard to a tailpipe pollution-control system**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 2 – **Model information document relating to EU type-approval of a type of a vehicle with regard to a crankcase and evaporative emissions system**

Apply as amendments to Section 2.8 above to all item numbers.

Appendix 3 – **Model information document relating to EU type-approval of a type of a vehicle with regard to an on-board diagnostic (OBD) system**

Apply as amendments to Section 2.8 above to all item numbers.

Appendix 4 – **Model information document relating to EU type-approval of a type of a vehicle with regard to a sound level system**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 5 – **Model information document relating to EU type-approval of a type of a vehicle with regard to a propulsion unit performance system**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 6 – **Model information document relating to EU type-approval of a pollution-control device as a STU**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 7 – **Model information document relating to EU type-approval of a noise-abatement device as a STU**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 8 – **Model information document relating to EU type-approval of an exhaust (pollution-control device and noise-abatement device) as a STU**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 9 – **Model information document relating to EU type-approval of a type of a vehicle with regard to a braking system**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 10 – **Model information document relating to EU type-approval of a type of a vehicle with regard to an installation of lighting and light-signalling devices system**

Apply as above to all item numbers.

Appendix 11 – **Model information document relating to EU type-approval of a type of a vehicle with regard to a roll-over protective structure (ROPS) system**

Apply as amendments to Section 2.8 above to all item numbers.

Appendix 12 – **Model information document relating to EU type-approval of a type of a vehicle with regard to an installation of tyres system**

Apply as amendments to Section 2.8 above to all item numbers except 1.8.1. and 1.8.2. – for these, add LA to 1.8.2. only.

Appendix 13 – **Model information document relating to EU type-approval of an audible warning device as a component**

Apply as amendments to Section 2.8 above to all item numbers.

Appendix 14 – **Model information document relating to EU type-approval of a non-glazing front windscreen e as a component/STU**

Do not add LA-category to Appendix 14 – passengers/riders not permitted for LA-category vehicles.

Appendix 15 – **Model information document relating to EU type-approval of a windscreen washer device as a component/STU**

Do not add LA-category to Appendix 15 – passengers/riders not permitted for LA-category vehicles.

Appendix 16 – **Model information document relating to EU type-approval of a rearward visibility device as a component/STU**

Do not add LA-category to Appendix 16 – passengers/riders not permitted for LA-category vehicles.

Appendix 17 – **Model information document relating to EU type-approval of safety belts as a STU**

Do not add LA-category to Appendix 17 – passengers/riders not permitted for LA-category vehicles.

Appendix 18 – **Model information document relating to EU type-approval of a seating position (saddle/seat) as a component/STU**

Do not add LA-category to Appendix 18 – passengers/riders not permitted for LA-category vehicles.

Appendix 19 – **Model information document relating to EU type-approval of a trailer coupling device as a STU**

Do not add LA-category to Appendix 19 – trailers not permitted for LA-category vehicles.

Appendix 20 – **Model information document relating to EU type-approval of devices to prevent unauthorised use as a STU**

Apply as amendments to Section 2.8 above to all item numbers.

Appendix 21 – **Model information document relating to EU type-approval of passenger handholds as a STU**

Do not add LA-category to Appendix 21 – passengers/riders not permitted for LA-category vehicles.

Appendix 22 – **Model information document relating to EU type-approval of footrests as a STU**

Do not add LA-category to Appendix 22 – passengers/riders not permitted for LA-category vehicles.

Appendix 23 – **Model information document relating to EU type-approval of a side-car as a STU**

Do not add LA-category to Appendix 23 – sidecars not permitted for LA-category vehicles.

Appendix 24 – **Manufacturer's declaration for vehicles capable of converting their performance level from subcategory (L3e/L4e)-A2 to (L3e/L4e)-A3 and vice-versa**

Not relevant – relates to L3e and L4e only.

Appendix 25 – **Manufacturer's declaration on powertrain tampering prevention measures (anti-tampering)**

Amend paragraph 0.4.2 to add **/LA-U3[10]/LA-U4**.

Amend paragraph 0.3(f) to add **/LA-U3/LA-U4**.

B.2.3 Certificate of conformity (Regulation 901/2014 Annex IV)

ANNEX IV – **Templates for Certificates of Conformity**

Appendix I – **Models for the certificate of conformity**

Section 2 – VEHICLE CATEGORY L (COMPLETE, COMPLETED AND INCOMPLETE VEHICLES)

Add the following item:

Item No.	(Sub) categories	Detailed information
1.9.	LA	Vehicle is designed to be bidirectional in operation?

[10] NB: there is no power limit for L5e, but it is proposed to limit LA-U3 power to match LA-U4.

Appendix C Lists of pre-deployment regulations and proposed application

C.1 M-, N-, LSAV-M and LSAV-N category – Unlimited series

Table 10 provides an overview of the proposed regulatory regime for fully automated M- and N-category vehicles and LSAVs. Table 11 provides detail on the applicability of regulations for individual vehicle categories and the application by automated vehicle group.

Table 10: List of applicable items for M-, N-category unlimited series type-approval and regulations and series of amendments recommended for application

Item	Subject	Regulatory act	Series of amendments
Items from conventional GB type-approval			
0	Cross-cutting prescriptions	New regulatory text	n/a
1A	Sound level (not covering AVAS and replacement silencers)	UN Regulation No. 51	03
1A	Sound level (AVAS)	UN Regulation No. 138	01
1A	Sound level (Replacement silencers)	UN Regulation No. 59	03
2A	Emissions (Euro 5 and Euro 6) light duty vehicles/access to information	GB assimilated version of Regulation (EC) No 715/2007	n/a
2A	LD exhaust emissions (diesel smoke)	UN Regulation No. 24	03
2A	LD exhaust emissions (does not cover diesel smoke, engine power, WLTP, RDE)	UN Regulation No. 83	07
2A	LD exhaust emissions (engine power)	UN Regulation No. 85	00
2A	LD exhaust emissions (WLTP)	UN Regulation No. 154	02
2A	LD exhaust emissions (RDE)	UN Regulation No. 168	00
3A	Prevention of fire risks (liquid fuel tanks)	UN Regulation No. 34	03
3B	Rear underrun protective devices (RUPDs) and their installation; rear underrun protection (RUP)	UN Regulation No. 58	03
4A	Space for mounting and fixing rear registration plates	GB assimilated version of Commission Regulation (EU) 1003/2010	n/a
5A	Steering equipment	UN Regulation No. 79	04
6A	Vehicle access and manoeuvrability (steps, running boards and handholds)	GB assimilated version of Commission Regulation (EU) 130/2012, Annex II	n/a
6B	Door latches and door retention components	UN Regulation No. 11	04
7A	Audible warning devices and signals	UN Regulation No. 28	00
8A	Devices for indirect vision and their installation	UN Regulation No. 46	n/a
9A	Braking of vehicles and trailers	UN Regulation No. 13	12
9B	Braking of passenger cars	UN Regulation No. 13-H	01
9B	Braking of passenger cars (ESC part)	UN Regulation No. 140	00
10A	Electromagnetic compatibility	UN Regulation No. 10	06
12A	Interior fittings	UN Regulation No. 21	01

Item	Subject	Regulatory act	Series of amendments
13A	Protection of motor vehicles against unauthorised use	UN Regulation No. 18	03
13B	Protection of motor vehicles against unauthorised use	UN Regulation No. 116	01
14A	Protection of the driver against the steering mechanism in the event of impact	UN Regulation No. 12	05
15A	Seats, their anchorages and any head restraints	UN Regulation No. 17	10
15B	Seats of large passenger vehicles	UN Regulation No. 80	04
16A	External projections	UN Regulation No. 26	04
17A	Vehicle access and manoeuvrability (reverse gear)	GB assimilated version of Commission Regulation (EU) 130/2012, Annex III	n/a
17B	Speedometer equipment including its installation	UN Regulation No. 39	n/a
18A	Manufacturer's statutory plate and VIN	GB assimilated version of Regulation (EU) No 19/2011	n/a
19A	Safety-belt anchorages, ISOFIX anchorages systems and ISOFIX top tether anchorages (covering safety-belt anchorages)	UN Regulation No. 14	09
19A	Safety-belt anchorages, ISOFIX anchorages systems and ISOFIX top tether anchorages (covering ISOFIX anchorages)	UN Regulation No. 145	00
20A	Installation of lighting and light-signalling devices on vehicles	UN Regulation No. 48	07
21A	Retro-reflecting devices for power-driven vehicles and their trailers	UN Regulation No. 3	03
22A	Front and rear position lamps, stop-lamps and end outline marker lamps for motor vehicles and their trailers	UN Regulation No. 7	02
22B	Daytime running lamps for power-driven vehicles	UN Regulation No. 87	01
22C	Side-marker lamps for motor vehicles and their trailers	UN Regulation No. 91	01
23A	Direction indicators for power-driven vehicles and their trailers	UN Regulation No. 6	02
24A	Illumination of rear registration plates of power-driven vehicles and their trailers	UN Regulation No. 4	01
25A	Power-driven vehicle's sealed-beam headlamps (SB) emitting an European asymmetrical passing beam or a driving beam or both	UN Regulation No. 31	03
25B	Filament lamps for use in approved lamp units of power-driven vehicles and their trailers	UN Regulation No. 37	03
25C	Motor vehicle headlamps equipped with gas discharge light sources	UN Regulation No. 98	02
25D	Gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles	UN Regulation No. 99	00
25E	Motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with filament lamps and/or LED modules	UN Regulation No. 112	02
25F	Adaptive front-lighting systems (AFS) for motor vehicles	UN Regulation No. 123	02
26A	Power-driven vehicle front fog lamps	UN Regulation No. 19	05
27A	Towing device	GB assimilated version of Regulation (EU) No 1005/2010	n/a
28A	Rear fog lamps for power-driven vehicles and their trailers	UN Regulation No. 38	01
29A	Reversing lights for power-driven vehicles and their trailers	UN Regulation No. 23	01

Item	Subject	Regulatory act	Series of amendments
30A	Parking lamps for power-driven vehicles	UN Regulation No. 77	01
31A	Safety-belts, restraint systems, child restraint systems and ISOFIX child restraint systems	UN Regulation No. 16	08
32A	Forward field of vision	UN Regulation No. 125	n/a
33A	Location and identification of hand controls, tell-tales and indicators	UN Regulation No. 121	n/a
34A	Windscreen defrosting and demisting systems	GB assimilated version of Commission Regulation (EU) No 672/2010	n/a
35A	Windscreen wiper and washer systems	GB assimilated version of Commission Regulation (EU) No 1008/2010	n/a
36A	Heating systems	UN Regulation No. 122	00
37A	Wheel guards	GB assimilated version of Commission Regulation (EU) No 1009/2010	n/a
38A	Head restraints (headrests), whether or not incorporated in vehicle seats	UN Regulation No. 25	04
41A	Emissions (Euro VI) heavy duty vehicles (access to information)	GB assimilated version of Regulation (EC) No 595/2009	n/a
41A	HD exhaust emissions (diesel smoke)	UN Regulation No. 24	03
41A	HD exhaust emissions (does not cover determination of CO2 via VECTO)	UN Regulation No. 49	07
41A	HD exhaust emissions (engine power)	UN Regulation No. 85	00
42A	Lateral protection of goods vehicles	UN Regulation No. 73	01
43A	Spray suppression systems	GB assimilated version of Regulation (EU) No 109/2011	n/a
44A	Masses and dimensions	GB assimilated version of Regulation (EU) No 1230/2012	n/a
45A	Safety glazing materials and their installation on vehicles	UN Regulation No. 43	01
46A	Installation of tyres	UN Regulation No. 142	01
46B	Pneumatic tyres for motor vehicles and their trailers (Class C1)	UN Regulation No. 30	02
46C	Pneumatic tyres for commercial vehicles and their trailers (Classes C2 and C3)	UN Regulation No. 54	00
46D	Tyre rolling sound emissions, adhesion on wet surfaces and rolling resistance (Classes C1, C2 and C3)	UN Regulation No. 117	02
46E	Temporary-use spare unit, run-flat tyres/system and tyre pressure monitoring system	UN Regulation No. 64	03
47A	Speed limitation of vehicles	UN Regulation No. 89	n/a
48A	Masses and dimensions	GB assimilated version of Regulation (EU) No 1230/2012	n/a
49A	Commercial vehicles with regard to their external projections forward of the cab's rear panel	UN Regulation No. 61	00
50A	Mechanical coupling components of combinations of vehicles	UN Regulation No. 55	02
50B	Close-coupling device (CCD); fitting of an approved type of CCD	UN Regulation No. 102	00
51A	Burning behaviour of materials used in the interior construction of certain categories of motor vehicles	UN Regulation No. 118	04
52A	M_2 and M_3 vehicles	UN Regulation No. 107	10
52B	Strength of the superstructure of large passenger vehicles	UN Regulation No. 66	02

Item	Subject	Regulatory act	Series of amendments
53A	Protection of occupants in the event of a frontal collision	UN Regulation No. 94	04
54A	Protection of occupants in the event of lateral collision	UN Regulation No. 95	05
56A	Vehicles for the carriage of dangerous goods	UN Regulation No. 105	n/a
57A	Front underrun protective devices (FUPDs) and their installation; front underrun protection (FUP)	UN Regulation No. 93	00
58	Pedestrian protection (covering everything except brake assist)	UN Regulation No. 127	03
58	Pedestrian protection (covering brake assist)	UN Regulation No. 139	n/a
59	Recyclability	UN Regulation No. 133	00
61	Air-conditioning systems	GB assimilated version of Directive 2006/40/EC	n/a
62	Hydrogen system	UN Regulation No. 134	01
63	General Safety	GB assimilated version of Regulation (EC) No 661/2009	n/a
63	GS1 - Retro-reflective markings (heavy and long vehicles)	UN Regulation No. 104	01
63	GS1 - Cornering lamps	UN Regulation No. 119	02
63	GS1 - Light Emitting Diode (LED) light sources	UN Regulation No. 128	00
63	GS1 - Tyre Pressure Monitoring Systems (TPMS)	UN Regulation No. 141	01
64	Gear shift indicators	GB assimilated version of Regulation (EU) No 65/2012	n/a
65	Advanced emergency braking system	UN Regulation No. 131	01
66	Lane departure warning system	UN Regulation No. 130	n/a
67	Specific components for liquefied petroleum gases (LPG) and their installation on motor vehicles	UN Regulation No. 67	04
68	Vehicle alarm systems (VAS)	UN Regulation No. 97	01
69	Electric safety	UN Regulation No. 100	03
70	Specific components for CNG and their installation on motor vehicles	UN Regulation No. 110	05
71	Cab strength	UN Regulation No. 29	03
72	eCall system	GB assimilated version of Regulation (EU) 2015/758	n/a
Additional recommended items			
91	Protection of vehicle against cyberattacks	UN Regulation No. 155	00
114	Software update and software updates management system	UN Regulation No. 156	00
115	Maximum vehicle speed limitation	GB assimilated version of Commission Delegated Regulation (EU) No 3/2014, Annex XVIII	n/a
116	Manual operation at very low speeds	New regulatory text	n/a
117	Static vehicle stability	New regulatory text	n/a

Table 11: Applicability of M-, N-category items by vehicle category ('X' = applicable; 'X*' = applicable with footnotes; empty cell = not applicable) and application by automated vehicle group ('X' = applies unmodified; 'A' / 'B' / 'AB' = applies with modifications for fully automated vehicles / LSAVs / both; 'N/A' = not applicable)

Item	Fully automated vehicles												Low speed automated vehicles						
	M_1	M_2	M_3	N_1	N_2	N_3	DMV manual	DMV automated	SMV w/ occupants	SMV w/o occupants	M_1 CAL Standard	M_1 CAL Reduced	M_2	M_3	N_1	N_2	N_3	LSAV w/ occupants	LSAV w/o occupants
Items from conventional GB type-approval																			
0	X	X	X	X	X	X	N/A	A	A	A	X	X	X	X	X	X	X	AB	AB
1A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
1A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
1A	X			X			X	A	A	A	X	X			X			A	A
2A	X*	X*		X*	X*		X	X	X	X	X*	X*	X*		X*	X*		X	X
2A	X*	X*		X*	X*		X	X	X	X	X*	X*	X*		X*	X*		X	X
2A	X*	X*		X*	X*		X	A	A	A	X*	X*	X*		X*	X*		AB	AB
2A	X*	X*		X*	X*		X	X	X	X	X*	X*	X*		X*	X*		X	X
2A	X*	X*		X*	X*		X	X	X	X	X*	X*	X*		X*	X*		B	B
2A	X*	X*		X*	X*		X	X	X	X	X*	X*	X*		X*	X*		X	X
3A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
3B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A
4A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
5A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
6A	X			X	X	X	X	X	X	N/A	X	X			X	X	X	X	N/A
6B	X			X			X	A	A	N/A	X				X			AB	N/A
7A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
8A	X	X	X	X	X	X	X	N/A	N/A	N/A								N/A	N/A
9A		X*	X*	X*	X*	X*	X	A	A	A			X*	X*	X*	X*	X*	AB	AB
9B	X*			X*			X	A	A	A	X*	X*			X*			AB	AB
9B	X*			X*			X	X	X	X	X*	X*			X*			B	B
10A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
12A	X						X	A	A	N/A	X							AB	N/A
13A		IF*	IF*		IF*	IF*	X	A	A	A			IF*	IF*		IF*	IF*	AB	AB
13B	X			X			X	A	A	A	IF	IF			IF			AB	AB
14A	X			X			X	A	A	N/A								N/A	N/A
15A	X	X*	X*	X	X	X	X	A	A	N/A	X	X	X*	X*	X	X	X	AB	N/A

Item	Fully automated vehicles												Low speed automated vehicles						
	M_1	M_2	M_3	N_1	N_2	N_3	DMV manual	DMV automated	SMV w/ occupants	SMV w/o occupants	M_1 CAL Standard	M_1 CAL Reduced	M_2	M_3	N_1	N_2	N_3	LSAV w/ occupants	LSAV w/o occupants
15B		X	X				X	X	X	N/A			X	X				X	N/A
16A	X						X	A	A	A	X	X						AB	AB
17A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17B	X	X	X	X	X	X	X	N/A	N/A	N/A								N/A	N/A
18A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
19A	X	X	X	X	X	X	X	A	A	N/A	X	IF	X	X	X	X	X	AB	N/A
19A	X	IF	IF	IF	IF	IF	X	A	A	N/A	X	IF	IF	IF	IF	IF	IF	AB	N/A
20A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
21A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
22A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
22B	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
22C	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
23A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
24A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
25A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25C	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
25D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25E	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
25F	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
26A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
27A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
28A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
29A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
30A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
31A	X	X	X	X	X	X	X	A	A	N/A	X	X	X	X	X	X	X	AB	N/A
32A	X						X	N/A	N/A	N/A								N/A	N/A
33A	X	X	X	X	X	X	X	N/A	N/A	N/A								N/A	N/A
34A	X						X	N/A	N/A	N/A								N/A	N/A
35A	X						X	N/A	N/A	N/A								N/A	N/A

Item	Fully automated vehicles												Low speed automated vehicles						
	M_1	M_2	M_3	N_1	N_2	N_3	DMV manual	DMV automated	SMV w/ occupants	SMV w/o occupants	M_1 CAL Standard	M_1 CAL Reduced	M_2	M_3	N_1	N_2	N_3	LSAV w/ occupants	LSAV w/o occupants
36A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
37A	X						X	X	X	X	X	X						B	B
38A	X						X	A	A	N/A	X	X						A	N/A
41A	X*	X*	X	X*	X*	X	X	X	X	X	X*	X*	X*	X	X*	X*	X	X	X
41A	X*	X*	X	X*	X*	X	X	X	X	X	X*	X*	X*	X	X*	X*	X	X	X
41A	X*	X*	X	X*	X*	X	X	A	A	A	X*	X*	X*	X	X*	X*	X	AB	AB
41A	X*	X*	X	X*	X*	X	X	X	X	X	X*	X*	X*	X	X*	X*	X	X	X
42A					X	X	X	X	X	X						X	X	X	X
43A				X	X	X	X	X	X	X								N/A	N/A
44A	X						X	A	A	A	X	X						AB	AB
45A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
46A	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
46B	X			X			X	x	x	x	X	X			X			X	X
46C		X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X
46D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
46E	X*			X*			X	A	A	A	X*	X*			X*			AB	AB
47A		X	X		X	X	X	N/A	N/A	N/A								N/A	N/A
48A		X	X	X	X	X	X	A	A	A			X	X	X	X	X	AB	AB
49A				X	X	X	X	A	A	A					X	X	X	AB	AB
50A	X*	X*	X*	X*	X*	X*	X	A	A	A	X*	X*	X*	X*	X*	X*	X*	A	A
50B					X*	X*	X	A	A	A						X*	X*	AB	AB
51A			X				X	X	X	N/A				X				X	N/A
52A		X	X				X	A	A	N/A	X	X	X	X				AB	N/A
52B		X	X				X	X	A	N/A			X	X				A	N/A
53A	X						X	X	A	N/A								N/A	N/A
54A	X			X			X	X	A	A	X				X			AB	AB
56A				X	X	X	X	N/A	N/A	N/A								N/A	N/A
57A					X	X	X	X	A	A						X	X	A	A
58	X			X			X	A	A	A	X	X			X			AB	AB
58	X			X			X	N/A	N/A	N/A								N/A	N/A

Item	Fully automated vehicles												Low speed automated vehicles						
	M_1	M_2	M_3	N_1	N_2	N_3	DMV manual	DMV automated	SMV w/ occupants	SMV w/o occupants	M_1 CAL Standard	M_1 CAL Reduced	M_2	M_3	N_1	N_2	N_3	LSAV w/ occupants	LSAV w/o occupants
59	X			X			X	X	X	X	X	X			X			X	X
61	X			X*			X	X	X	X	X	X			X*			X	X
62	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
63	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
63		X	X	X	X	X	X	A	A	A			X	X	X	X	X	A	A
63	X*	X*	X*	X*	X*	X*	X	X	X	X	X*	X*	X*	X*	X*	X*	X*	X	X
63	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
63	X*	X*					X	A	A	A								N/A	N/A
64	X						X	N/A	N/A	N/A								N/A	N/A
65		X	X		X	X	X	N/A	N/A	N/A								N/A	N/A
66		X	X		X	X	X	N/A	N/A	N/A								N/A	N/A
67	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	A	A
68	X			X			X	A	A	A	IF	IF			IF			AB	AB
69	X	X	X	X	X	X	X	A	A	A	X	X	X	X	X	X	X	AB	AB
70	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
71				X	X	X	X	X	A	N/A					X	X	X	A	N/A
72	X			X			X	A	A	N/A	X	X			X			AB	N/A
Additional recommended items																			
91	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
114	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
115							N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	B	B
116							N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	B	B
117							N/A	N/A	N/A	N/A	X	X						B	N/A

C.2 L-category – Unlimited series

Table 12 provides an overview of the proposed regulatory regime for fully automated LA-category vehicles and detail on the application of the regulations.

Table 12: List of applicable items and regulations for L-category unlimited series type-approval, regulations selected for application ('Y' = yes; 'N' = no), and application for LA-category vehicles ('X' = applies unmodified; 'A' = applies with modifications for fully automated vehicles; 'N/A' = not applicable)

No.	Article	Subject	Regulations				Selected for application			Application
			Implementing regulation	Relevant annex	Compulsory UN Regulation	Optional UN Regulation	Relevant annex	Compulsory UN Regulation	Optional UN Regulation	LA
0	n/a	Cross-cutting prescriptions	n/a	n/a						X
A	**Environmental and propulsion performance requirements**									
1	23&24	environmental test procedures related to exhaust emissions, evaporative emissions, greenhouse gas emissions, fuel consumption and reference fuels	EU No. 134/2014	Annex VII			Y			A
2		Maximum design vehicle speed, maximum torque, maximum continuous total engine power of propulsion	EU No. 134/2014	Annex X	UN Regulation No. 85		Y	Y		A
3		Test procedures related to sound	EU No. 134/2014	Annex IX		UN Regulation No. 9	N	N		N/A
B	**Vehicle functional safety requirements**									
1	22	audible warning devices	EU No. 3/2014	Annex II	UN Regulation No. 28		Y	Y		A
2	22	braking, including anti-lock and combined brake systems	EU No. 3/2014	Annex III	UN Regulation No. 78		Y	Y		A
3	22	electrical safety	EU No. 3/2014	Annex IV			Y			A
4	22	manufacturer declaration requirements regarding endurance testing of functional safety systems, parts and equipment	EU No. 3/2014	Annex V			Y			X
5	22	front and rear protective structures	EU No. 3/2014	Annex VI		UN Regulation No. 26	Y		Y	A
6	22	glazing, windscreen wipers and washers, and defrosting and demisting systems	EU No. 3/2014	Annex VII	UN Regulation No.43		N	N		N/A
7	22	Driver-operated controls including identification of controls, tell-tales and indicators	EU No. 3/2014	Annex VIII		UN Regulation No. 121	N		N	N/A
8	22	installation of lighting and light signalling devices, including automatic switching-on of lighting	EU No. 3/2014	Annex IX		UN Regulation No. 48 UN Regulation No. 53	Y		Y	A
8	22	Headlamps emitting an asymmetrical passing beam and/or driving beam equipped with filament lamps R2 and/or HS1	EU No. 3/2014		UN Regulation No. 1, superseded by UN Regulation No. 112			Y		N/A

No.	Article	Subject	Regulations				Selected for application			Application
			Implementing regulation	Relevant annex	Compulsory UN Regulation	Optional UN Regulation	Relevant annex	Compulsory UN Regulation	Optional UN Regulation	LA
8	22	Retro-reflectors	EU No. 3/2014		UN Regulation No. 3			Y		X
8	22	Direction indicators for power-driven vehicles and their trailers	EU No. 3/2014		UN Regulation No. 6			Y		A
8	22	Front and rear position lamps and stop lamps	EU No. 3/2014		UN Regulation No. 7			Y		A
8	22	Motor vehicles headlamps (H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H11)	EU No. 3/2014		UN Regulation No. 8, superseded by UN Regulation No. 112			Y		N/A
8	22	Power-driven vehicle front fog lamps	EU No. 3/2014		UN Regulation No. 19			Y		A
8	22	Headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H4)	EU No. 3/2014		UN Regulation No. 20			Y		N/A
8	22	Filament bulbs	EU No. 3/2014		UN Regulation No. 37			Y		X
8	22	Rear fog lamps for power-driven vehicles and their trailers	EU No. 3/2014		UN Regulation No. 38			Y		X
8	22	Lighting components for vehicles of category L	EU No. 3/2014		UN Regulation No. 50			Y		X
8	22	Headlamps (motorcycles and vehicles treated as such)	EU No. 3/2014		UN Regulation No. 57, superseded by Regulation No. 113			Y		N/A
8	22	Headlamps (HS1)	EU No. 3/2014		UN Regulation No. 72, superseded by Regulation No. 112			Y		N/A
8	22	Daytime running lamps	EU No. 3/2014		UN Regulation No. 87			Y		X
8	22	Headlamps with asymmetrical beams	EU No. 3/2014		UN Regulation No. 112			Y		X
9	22	Rearward visibility	EU No. 3/2014	Annex X	UN Regulation No. 46		N	N		N/A
9	22	Rearward visibility	EU No. 3/2014	Annex X	UN Regulation No. 81		N	N		N/A
10	22	Roll-Over Protective Structures (ROPS)	EU No. 3/2014	Annex XI			N			N/A
11	22	Safety belt anchorages and safety belts	EU No. 3/2014	Annex XII	UN Regulation No. 16		N	N		N/A
12	22	Seating positions (saddles and seats)	EU No. 3/2014	Annex XIII			N			N/A
13	22	steer-ability, cornering properties and turn-ability	EU No. 3/2014	Annex XIV			Y			A
14	22	installation of tyres	EU No. 3/2014	Annex XV	UN Regulation No. 75		Y	Y		X

No.	Article	Subject	Regulations				Selected for application			Application
			Implementing regulation	Relevant annex	Compulsory UN Regulation	Optional UN Regulation	Relevant annex	Compulsory UN Regulation	Optional UN Regulation	LA
15	22	vehicle maximum speed limitation plate and location on vehicle	EU No. 3/2014	Annex XVI			Y			A
16	22	Vehicle occupant protection, including interior fittings, head restraint and vehicle doors	EU No. 3/2014	Annex XVII			N			N/A
17	22	maximum continuous rated or net power and/or vehicle speed limitation by design	EU No. 3/2014	Annex XVIII			Y			A
18	22	vehicle structure integrity	EU No. 3/2014	Annex XIX			Y			X
C	**Vehicle construction and general type-approval requirements**									
1	20	anti-tampering measures	EU No. 44/2014	Annex II			Y			A
2	25	arrangements for type-approval procedures	EU No. 44/2014	Annex III			Y			X
3	33	conformity of production requirements	EU No. 44/2014	Annex IV			Y			X
4	18	coupling devices and attachments	EU No. 44/2014	Annex V		UN Regulation No. 55	Y		Y	N/A
5	18	devices to prevent unauthorised use	EU No. 44/2014	Annex VI	UN Regulation No. 18					A
6	18	electromagnetic compatibility (EMC)	EU No. 44/2014	Annex VII	UN Regulation No. 10					X
7	18	external projections	EU No. 44/2014	Annex VIII	UN Regulation No. 26		Y		Y	A
8	18	fuel storage	EU No. 44/2014	Annex IX			N			N/A
9	18	load platforms	EU No. 44/2014	Annex X			Y			A
10	18	masses and dimensions	EU No. 44/2014	Annex XI			Y			A
11	21	on-board diagnostics	EU No. 44/2014	Annex XII			N			N/A
12	18	Passenger handholds and footrests	EU No. 44/2014	Annex XIII			N			N/A
13	18	registration plate space	EU No. 44/2014	Annex XIII			Y			X
14	18	repair and maintenance information	EU No. 44/2014	Annex XIV			Y			A
15	18	Stands	EU No. 44/2014	Annex XVI			N			N/A

Appendix D Lists of in-use regulations and applicability

D.1 Road Vehicles (Construction and Use) Regulations 1986

Table 13 provides a summary overview of the status of each C&U regulation and schedule based on the outcomes of the analysis performed. The status is recorded as:

- Applicable – items which can be applied to vehicles in scope without modifications
- Applicable with modifications – items which should be applied to vehicles in scope with proposed modifications
- Not applicable – items which are automatically not applicable based on shared characteristics of all vehicles in scope
- Exemption proposed – items for which an exemption is proposed to be implemented via R4 for SMVs and LSAVs
- Omitted – items which are no longer contained in C&U based on historic amendments
- For further consideration – items which may require adaptation or modification but are out of scope of this project (non-ADS aspects only)

Table 13: Summary overview of all C&U regulations and schedules and their status

Regulation/ Schedule	Subject	Status
R1	Commencement and citation	Applicable
R2	Revocation	Applicable
R3	Interpretation	Applicable with modifications
R3A	Modification of Regulations in relation to vehicles for which a Minister's approval certificate has been issued under the Motor Vehicles (Approval) Regulations 1996	Not applicable
R4	Application and Exemptions	Applicable with modifications
R5	Trade Descriptions Act 1968	Applicable
R6	Compliance with Community Directives and ECE Regulations	Applicable with modifications
R7	Length	Applicable
R8	Width	Applicable
R9	Height	Applicable
R10	Indication of overall travelling height	For further consideration

Regulation/ Schedule	Subject	Status
R10A	Warning devices where certain high level equipment is fitted to a vehicle	For further consideration
R10B	Vehicles to which Regulation 10A applies	For further consideration
R10C	Interpretation of Regulations 10A and 10B	For further consideration
R11	Overhang	Applicable
R12	Minimum ground clearance	Applicable
R13	Turning circle–buses	Applicable
R13A	Turning circle–articulated vehicles other than those incorporating a car transporter	Applicable with modifications
R13B	Turning circle–articulated vehicles incorporating a car transporter	Applicable with modifications
R13C	Turning circle–heavy motor car	Applicable with modifications
R14	Connecting sections and direction-holding of articulated buses	Applicable
R15	Braking systems of certain vehicles first used on or after April 1, 1983	Applicable with modifications
R16	Braking systems of vehicles to which Regulation 15 does not apply	Applicable
R17	Vacuum or pressure brake warning devices	Applicable with modifications
R17A	Couplings on trailer pneumatic braking systems	Applicable
R18	Maintenance and efficiency of brakes	Applicable
R18A	Review of Regulation 18	Omitted
R19	Application of brakes of trailers	For further consideration
R20	General requirement as to wheels and tracks	Applicable
R21	Diameter of wheels	Omitted
R22	Springs and resilient material	Applicable
R23	Wheel loads	Applicable
R24	Tyres	Applicable
R25	Tyre Loads and Speed Ratings	Applicable with modifications
R25A	Tyre noise	Applicable

Regulation/ Schedule	Subject	Status
R26	Mixing of tyres	Applicable with modifications
R27	Condition and maintenance of tyres	Applicable with modifications
R28	Tracks	Not applicable
R29	Maintenance of steering gear	Applicable
R30	View to the front	Exemption proposed
R31	Glass	Not applicable
R32	Glass	Applicable with modifications
R33	Mirrors and other Devices for Indirect Vision	Exemption proposed
R34	Windscreen wipers and washers	Exemption proposed
R35	Speedometers	Exemption proposed
R36	Maintenance of speedometers	Exemption proposed
R36A	Speed limiters for coaches	Applicable
R36B	Speed limiters for goods vehicles	Applicable
R36C	Speed limiters–authorised sealers	Applicable
R37	Audible warning instruments	Applicable with modifications
R38	Motorcycle sidestands	Not applicable
R39	Petrol tanks	Applicable
R39A	Unleaded Petrol	Applicable
R39B	Unleaded Petrol	Applicable
R40	Gas propulsion systems and gas-fired appliances	Applicable
R41	Minibuses–Construction	Applicable
R41A	Minibuses–Alternative means of compliance	Applicable with modifications
R42	Minibuses–Fire extinguishing apparatus	Applicable
R43	Minibuses–First aid equipment	Applicable
R44	Minibuses–Carriage or dangerous substances	Applicable
R45	Power to weight ratio	Omitted
R46	Seat belt anchorage points	Applicable with modifications

Regulation/ Schedule	Subject	Status
R47	Seat belts	Applicable with modifications
R48	Maintenance of seat belts and anchorage points	Applicable
R48A	Minibuses and coaches to be fitted with additional seat belts when used in certain circumstances	Applicable
R49	Rear under-run protection	Applicable with modifications
R50	Maintenance of rear under-run protective device	Applicable
R51	Sideguards	Applicable
R52	Maintenance of sideguards	Applicable
R53	Mascots	Applicable
R53A	Strength of superstructure	Applicable
R53B	Additional exits from double-decked coaches	Applicable
R53C	Alternative means of compliance for coaches	Applicable
R54	Silencers–general	Applicable
R55	Noise limits–certain vehicles with 3 or more wheels–general	Applicable
R55A	Noise limits–certain vehicles with 3 or more wheels–general	Applicable
R56	Noise limits–agricultural motor vehicles and industrial tractors	Not applicable
R57	Noise limits–construction requirements relating to motorcycles	Not applicable
R57A	Exhaust systems–motorcycles	Not applicable
R57B	Noise Limit–maintenance requirements relating to motorcycles	Not applicable
R58	Noise limits–vehicles not subject to Regulations 55 to 57, first used on or after April 1, 1970	Omitted
R59	Exceptions to certain regulations	Applicable
R60	Radio interference suppression	Applicable with modifications

Regulation/ Schedule	Subject	Status
R61	Emission of smoke, vapour, gases, oily substances etc	Applicable
R61A	Emission of smoke, vapour, gases, oily substances etc – further requirements for certain motor vehicles first used on or after January 1, 2001	Applicable
R61B	Retrofitting and refilling of certain air conditioning systems	Applicable
R61C	End-of-series exemption	Not applicable
R61D	Review of Regulations 61 to 61B	Applicable
R62	Closets etc	Applicable
R63	Wings	Applicable
R64	Spray suppression devices	Applicable
R65	Maintenance of spray suppression devices	Applicable
R66	Plates for goods vehicles and buses	Applicable
R67	Vehicle identification numbers	Applicable
R68	Plates–agricultural trailed appliances	Not applicable
R69	Plates–motorcycles	Applicable
R70	Ministry plates	Applicable
R70A	Speed limiter plates for coaches	Applicable with modifications
R70B	Plate relating to dimensions	Applicable
R71	Marking of weights on certain vehicles	Not applicable
R71A	Marking of date of manufacture of trailers	Not applicable
R72	Additional markings	Applicable
R73	Test date discs	Applicable
R74	Testing and Inspection	For further consideration
R75	Maximum permitted laden weight of a vehicle	Applicable
R76	Maximum permitted laden weight of a vehicle and trailer, other than an articulated vehicle	Applicable
R77	Maximum permitted laden weight of an articulated vehicle	Applicable

Regulation/ Schedule	Subject	Status
R78	Maximum permitted wheel and axle weights	Applicable
R79	Maximum permitted weights for certain closely-spaced axles etc.	Applicable
R79A	Saving for the Road Vehicles (Authorised Weight) Regulations 1998	Applicable
R80	Over-riding weight restrictions	Applicable
R81	Restrictions on use of vehicles carrying wide or long loads or having fixed appliances or apparatus	Applicable
R82	Restrictions on use of vehicles carrying wide or long loads or having fixed appliances or apparatus	Applicable
R83	Number of trailers	Applicable
R84	Trailers drawn by motorcycles	Applicable
R85	Trailers drawn by agricultural motor vehicles	Not applicable
R86	Distance between motor vehicles and trailers	Applicable
R86A	Use of secondary coupling on trailers	Applicable
R86B	Use of mechanical coupling devices	Applicable
R87	Unbraked trailers	Applicable
R88	Use of bridging plates between motor vehicle and trailer	Omitted
R89	Leaving trailers at rest	Applicable
R90	Passengers in trailers	Applicable
R91	Passengers in trailers	Omitted
R92	Attachment of sidecars	Not applicable
R93	Use of sidecars	Not applicable
R93A	Additional braking requirements for motor vehicles carrying or hauling dangerous goods	Not applicable
R94	Use of gas propulsion systems	Applicable
R95	Use of gas-fired appliances–general	Applicable

Regulation/ Schedule	Subject	Status
R96	Use of gas-fired appliances when a vehicle is in motion	Applicable
R97	Avoidance of excessive noise	For further consideration
R98	Stopping of engine when stationary	For further consideration
R99	Use of audible warning instruments	For further consideration
R100	Maintenance and use of vehicle so as not to be a danger, etc	Applicable
R100A	Speed of low platform trailers and restricted speed vehicles	Applicable
R101	Parking in darkness	For further consideration
R102	Passengers on motorcycles	Not applicable
R103	Obstruction	For further consideration
R104	Driver's control	For further consideration
R105	Opening of doors	For further consideration
R106	Reversing	For further consideration
R107	Leaving motor vehicles unattended	For further consideration
R108	Securing of suspended implements	For further consideration
R109	Television sets	For further consideration
R110	Mobile telephones	For further consideration
R111	Review	Applicable
S1	Regulations revoked by Regulation 2	Applicable
S2	Community Directives and ECE regulations	Applicable with modifications
S2A	Vehicles for which a Minister's Approval Certificate has been issued under the Motor Vehicles (Approval) Regulations 1996	Not applicable
S3	Braking requirements	Applicable with modifications
S3A	Exclusion of certain vehicles from the application of Regulation 39A	Applicable
S3B	Authorised sealers	Applicable
S4	Gas containers	Not applicable
S5	Gas systems	Applicable

Regulation/ Schedule	Subject	Status
S6	Construction of minibuses	Applicable
S7	Fire extinguishing apparatus and first aid equipment for minibuses	Applicable
S7XA	End of series exemptions	Applicable
S7A	Motorcycle noise and motorcycle silencers	Not applicable
S7B	Emissions from certain motor vehicles	Applicable
S8	Plates for certain vehicles	Applicable with modifications
S9	Plates for motorcycles	Applicable
S10	Ministry plate	Applicable
S10A	Ministry plate	Applicable
S10B	Ministry plate	Applicable
S10C	Ministry plate	Applicable
S11	Maximum permitted weights, etc.	Applicable
S11A	Exemptions relating to intermodal transport operations	Applicable
S12	Conditions to be complied with in relation to the use of vehicles carrying wide or long loads or vehicles carrying loads or having fixed appliances or apparatus which project	Applicable
S13	Plate for restricted speed vehicle	Not applicable

D.2 Road Vehicles Lighting Regulations 1989

Table 14 provides a summary overview of the status of each RVLR regulation and schedule based on the outcomes of the analysis performed. The status is recorded as:

- Applicable – items which can be applied to vehicles in scope without modifications
- Applicable with modifications – items which should be applied to vehicles in scope with proposed modifications
- Not applicable – items which are automatically not applicable based on shared characteristics of all vehicles in scope
- For further consideration – items which may require adaptation or modification but are out of scope

Table 14: Summary overview of all RVLR regulations and schedules and their status

Regulation/ Schedule	Subject	Status
R1	Commencement, citation and revocation	Applicable
R2	Statement under Section 43(3) of the Road Traffic Act 1988	Applicable
R3	Interpretation	Applicable with modifications
R3A	Equivalent standards	Applicable
R4	Exemptions – General	Applicable with modifications
R4A	Exemptions – Vehicle examiners	Applicable
R5	Exemptions – Temporarily imported vehicles and vehicles proceeding to a port for export	Applicable
R6	Exemptions – Vehicles towing or being towed	Applicable
R7	Exemptions – Military vehicles	Not applicable
R8	Exemptions – Invalid carriages	Not applicable
R9	Exemptions – Vehicles drawn or propelled by hand	Not applicable
R9A	Exemptions – Tramcars	Not applicable
R9B	Modifications in relation to vehicles approved under the Motor Vehicles (Approval) Regulations 1996	Not applicable
R10	Provision as respects the Trade Descriptions Act 1968	Applicable
R11	Colour of light shown by lamps and reflectors (including reflectors on rear markings and signs on buses carrying children	Applicable with modifications
R12	Movement of lamps and reflectors	Applicable
R13	Lamps to show a steady light	Applicable
R14	Filament lamps	Applicable
R15	General requirements for electrical connections	Applicable with modifications

Regulation/ Schedule	Subject	Status
R16	Restrictions on fitting blue warning beacons, special warning lamps and similar devices	Applicable
R17	Obligatory warning beacons	Applicable
R17A	Signs on buses carrying children	Applicable
R18	Obligatory lamps, reflectors, rear markings and devices	Applicable
R19	Restrictions on the obscuration of certain lamps and reflectors	Applicable
R20	Optional lamps, reflectors, rear markings and devices	Applicable
R20A	Application of the ECE conspicuity requirements	Applicable
R21	Projecting trailers and vehicles carrying overhanging or projecting loads or equipment	Applicable
R22	Additional side marker lamps	Applicable
R23	Maintenance of lamps, reflectors, rear markings and devices	For further consideration
R23A	Review	Applicable
R24	Requirements about the use of front and rear position lamps, rear registration plate lamps, side marker lamps and end-outline marker lamps	For further consideration
R25	Requirements about the use of headlamps and front fog lamps	For further consideration
R26	Requirements about the use of warning beacons	For further consideration
R27	Restrictions on the use of lamps other than those to which regulation 24 refers	For further consideration
R28	Testing and inspection of lighting equipment and reflectors	For further consideration
S1	Obligatory lamps, reflectors, rear markings and devices	Applicable with modifications
S2	Front position lamps	Applicable

Regulation/ Schedule	Subject	Status
S3	Dim-dip devices and running lamps	Applicable
S4	Dipped-beam headlamps	Applicable with modifications
S5	Main-beam headlamps	Applicable with modifications
S6	Front fog lamps	Applicable with modifications
S7	Direction indicators	Applicable with modifications
S8	Hazard warning signal devices	Applicable
S9	Side marker lamps	Applicable
S10	Rear position lamps	Applicable
S11	Rear fog lamps	Applicable
S12	Stop lamps	Applicable
S13	End-outline marker lamps	Applicable
S14	Reversing lamps	Applicable
S15	Rear registration plate lamps	Applicable
S16	Warning beacons	Applicable
S17	Side retro reflectors	Applicable
S18	Rear retro reflectors	Applicable
S19	Rear markings	Applicable
S20	Pedal retro reflectors	Not applicable
S21	Front retro reflectors	Applicable
S21A	Prescribed sign	Applicable
S22	Diagram showing where unlit parking is not permitted near a junction	For further consideration
S23	Example of marking showing the vertical downwards inclination of the dipped-beam headlamps	Applicable with modifications
S24	Requirements relating to daytime running lamps	Applicable

D.3 Road Vehicles (Authorisation of Special Types) (General) Order 2003

Table 15 provides a summary overview of the status of each STGO article and schedule based on the outcomes of the analysis performed. The status is recorded as:

- Applicable – items which can be applied to vehicles in scope without modifications
- Applicable with modifications – items which should be applied to vehicles in scope with proposed modifications
- For further consideration – items which may require adaptation or modification but are out of scope

Table 15: Summary overview of all STGO articles and schedules and their status

Article/ Schedule	Subject	Status
A1	Citation and commencement	Applicable
A2	Revocation	Applicable
A3	Interpretation: general	Applicable with modifications / for further consideration
A4	Interpretation: vehicles and their measurement	Applicable
A5	Interpretation: lateral projections of loads and their measurement	Applicable
A6	Interpretation: forward or rearward projections of loads and their measurement	Applicable
A7	Interpretation: axles, wheels, axle weights and wheel weights	Applicable
A8	Application of this Order	Applicable
A9	Authorisation of particular vehicles falling within recognised Category of special vehicles	Applicable
A10	Part 2 vehicles and Part 2 vehicle-combinations: recognised categories and defined terms	Applicable
A11	Part 2 vehicles and Part 2 vehicle-combinations: authorisation requirements	Applicable
A12	Length: police notification and attendants	Applicable
A13	Forward and rearward projections: police notification	Applicable
A14	Forward and rearward projections: attendants	Applicable

Article/ Schedule	Subject	Status
A15	Width and lateral projections: police notification, Secretary of State notification and attendants	Applicable
A16	Visibility and marking of forward, rearward and lateral projections of loads etc	Applicable
A17	Weight: police notification and road and bridge authority notification and indemnity	Applicable
A18	Use on bridges	For further consideration
A19	Agricultural vehicles: recognised categories and defined terms	Applicable
A20	Agricultural vehicles: authorisation requirements	Applicable
A21	General requirements as to construction and use	For further consideration
A22	Restrictions on towing of trailers	Applicable
A23	Forward and rearward projections; police notification, Secretary of State notification and attendants	Applicable
A24	Width: police notification and attendants	Applicable
A25	Visibility and marking of forward, rearward and lateral projections	Applicable
A26	Track-laying agricultural motor vehicles; road and bridge authority notification and indemnity	Applicable
A27	Track-laying agricultural motor vehicles; use on bridges	For further consideration
A28	Motor vehicles or trailers carrying loads of exceptional width; recognised Category	Applicable
A29	Motor vehicles or trailers carrying loads of exceptional width; authorisation requirements	Applicable
A30	Motor vehicles or trailers carrying loads of exceptional width; restrictions on width and speed	For further consideration
A31	Motor vehicles or trailers carrying loads of exceptional width; requirements as to width	Applicable
A32	Local excavation vehicles; recognised Category	Applicable
A33	Local excavation vehicles; authorisation requirements	Applicable

Article/ Schedule	Subject	Status
A34	Local excavation vehicles; requirements as to width	Applicable
A35	Local excavation vehicles; requirements as to weight	Applicable
A36	Vehicles for tests, trials or non-UK use etc; recognised Category	Applicable
A37	Vehicles for tests, trials or non-UK use etc; authorisation requirements	Applicable
A38	Vehicles for tests, trials or non-UK use etc; requirements as to length	Applicable
A39	Vehicles for tests, trials or non-UK use etc; requirements as to width	Applicable
A40	Vehicles for tests, trials or non-UK use etc; requirements as to weight	Applicable
A41	Track-laying vehicles; recognised Category	Applicable
A42	Track-laying vehicles; authorisation requirements	Applicable
A43	Track-laying vehicles; restrictions on use	Applicable
A44	Track-laying vehicles; consent of road authorities	Applicable
A45	Straddle carriers; recognised Category	Applicable
A46	Straddle carriers; authorisation requirements	Applicable
A47	Straddle carriers; restrictions on use, speed and width	For further consideration
A48	Straddle carriers; requirements as to length	Applicable
A49	Vehicles with moveable platforms	Applicable
A50	Pedestrian-controlled road maintenance vehicles	Applicable
A51	Motor vehicles used for cutting grass or trimming hedges	Applicable
A52	Trailers used for cutting grass or trimming hedges	For further consideration
A53	Operational military vehicles	Applicable
A54	Track-laying vehicles belonging to Royal National Lifeboat Institution	Applicable
A55	Highway testing vehicles	Applicable
A56	Vehicles propelled by natural gas	Applicable

Article/ Schedule	Subject	Status
A57	Longer semi-trailers	Applicable
A58	Longer semi-trailers - legislation which applies as authorisation requirements	Applicable
A59	Longer semi-trailers - length requirements	Applicable
A60	Longer semi-trailers - other construction requirements	Applicable
A61	Longer semi-trailers - requirements relating to route plans and risk assessments	Applicable
A62	Longer semi-trailers - notification of operation for monitoring and evaluation purposes	Applicable
A63	Longer semi-trailers - application of Section 53(1) and (2) of the 1988 Act	Applicable
S1	Abnormal Indivisible Load Vehicles	Applicable with modifications / for further consideration
S2	Mobile Cranes	Applicable with modifications / for further consideration
S3	Engineering Plant	For further consideration
S4	Road Recovery Vehicles	For further consideration
S5	Notices to Police	For further consideration
S6	Attendants	For further consideration
S7	Notices to Secretary of State	Applicable
S8	Marking of Projections	Applicable with modifications / for further consideration
S9	Road and Bridge Authorities	Applicable
S10	Local Excavation Vehicles	For further consideration
S11	Vehicles for Tests, Trials or Non-UK Use Etc	Applicable
S12	Vehicles Propelled by Compressed Natural Gas Systems	Applicable with modifications / for further consideration

GB Approval Standards for Automated Vehicles - Non-ADS Requirements

Other titles from this subject area

CPR3012 GB LSAV Approval Scheme: Work Package 4 – Non-ADS requirements – D7.1 Overview report. M Edwards, M Seidl, A Edwards. 2022

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ISSN: 2514-9652

DOI: 10.58446/qolv9243

PPR2033