# Direct Vision Standard

## Phase 2a Policy Consultation document

One of the Mayor of London's top priorities is the safety of Londoners. In September 2016 he launched the world's first Direct Vision Standard (DVS) for Heavy Goods Vehicles (HGVs) to reduce the number of collisions involving Vulnerable Road Users (VRUs).

The first phase of the DVS consultation was held earlier this year. Since then we have conducted further research on HGV safety and listened carefully to stakeholder views.

This policy consultation document outlines how we set the proposed DVS star rating boundaries and the process by which we have arrived at the HGV safety standard permit scheme ('the scheme proposal'). It demonstrates how the proposal was developed with consideration of the Phase 1 consultation feedback, and how different options for implementation were assessed and used to develop the preferred scheme. In this consultation we are seeking feedback on the HGV safety standard permit scheme proposal.

The proposed scheme outlined in this document is applicable to all large HGVs over 12 tonnes (N3 Class) working in or entering Greater London from 2020.

## Have your say

We want you to continue to help shape our proposals for making HGVs safer in London by expressing your views in this consultation. Please take the time to consider the information in this document and answer the questions provided.

## Definition of terms

Throughout this document, a number of terms are used to distinguish between the technical DVS and the proposals for implementing the HGV safety standard permit scheme:

**Direct Vision Standard (DVS)** or **'the Standard'** – The technical standard that has been developed and refined in order to rate HGVs based on the amount of visibility a driver has directly with his or her own eyes through the windows of a HGV cab. The output of the Standard is a zero to five star DVS rating which reflects the risk of collision with VRUs.

**HGV** covered by the Scheme means a Heavy Goods Vehicle of 12 tonnes or more (N3 Class).

**HGV safety standard permit scheme** or **'the Scheme'** – The way in which the Mayor proposes to ban or place restrictions on HGVs with poor direct vision entering or operating in Greater London from 2020. The proposed HGV safety standard permit scheme considers other safety components in addition to the DVS and is therefore wider in scope than DVS alone.

**Scheme options** – The range of ways of meeting the Mayor's objective to ban or place restrictions on the most unsafe HGVs with poor direct vision that have been considered. Scheme options are outlined in full in the Integrated Impact Assessment (IIA). This document focusses on the HGV safety standard permit scheme proposal.

**direct vision** – Where we refer to 'direct vision' in lower case and without reference to the DVS, this relates only to the amount of visibility that a driver has directly through the windows of a HGV cab.

**Safe system approach –** the concept that the sources of road danger should be considered as part of a system and not addressed in isolation. By considering all parts of the system in combination, road users are still protected if one part fails.

**Integrated Impact Assessment (IIA) –** The comprehensive investigation and consideration of the likely significant economic, environmental, health and community safety impacts. The IIA was used to appraise the scheme options and to develop the HGV safety standard permit scheme as the Mayor's preferred proposal.

**Vulnerable Road User (VRU) -** Any road user vulnerable to the risk posed by a HGV, particularly pedestrians, cyclists and motorcyclists.

## The consultation process

We are undertaking a phased consultation approach at key stages of the development of the consultation proposals to implement the DVS:

**Phase 1 (January to April 2017) –** we set out the case for HGV driver direct vision and consulted on the Mayor of London's outline proposals to introduce a DVS for HGVs in London and the principles of the Standard itself. We have considered all of the responses and a full analysis can be found in the Consultation Report[1] and the Responses to Issues Raised[2]. The responses showed that, in general, there is support for the principle of a DVS.

**Phase 2a – policy consultation (16 November 2017 to 24 January 2018) –** the current phase of consultation seeks views and feedback on the scheme proposals as outlined within this document and supporting technical reports including the full IIA[3] and the responses to the Phase 1 consultation. Feedback from this phase of consultation will be used to develop a second IIA and finalise the scheme proposals to be included in the next phase of consultation.

**Phase 2b – Final scheme proposals and statutory consultation (Spring/Summer 2018) –** this final phase will consult on the final proposals for the

[1] Appendix 6 - TfL (2017) Phase 1 Consultation results
[2] Appendix 7 - TfL (2017) Phase 1 Response to issues raised
[3] Appendix 1 - Jacobs (2017) Integrated Impact Assessment of the Direct Vision Standard

HGV safety standard permit scheme including statutory consultation on the appropriate regulatory measure to ban or restrict HGVs in London under the scheme, subject to Government and European Commission support and notification.

## Executive summary

In September 2016 the Mayor of London launched the world's first DVS. The Mayor announced his intention to use the DVS to ban or restrict zero star rated HGVs from London's roads in 2020 and those that score less than three stars from 2024. We sought your views on the Standard itself and outline proposals on how it could be used to reduce road danger earlier this year.

One of the Mayor's top priorities is the safety of Londoners and he has committed to a Vision Zero approach to road danger reduction. This means completely eliminating all deaths and serious injuries from road collisions in London. In his draft Transport Strategy[4], the Mayor sets the ambitious target of achieving this by 2041.

Road casualties occur when several things go wrong at once. To achieve this target all sources of road danger must be considered as part of a wider system and all aspects of risk reduced. All parts of this system must be strengthened in combination to multiply their effects and road users should still be protected if one part of the system fails.

The issue in London is more pressing where VRU casualty rates show a much higher risk than in the country as a whole[5], calling for more immediate action. In London, HGVs are overrepresented in collisions with VRUs. In the last three years HGVs have been involved in 20 per cent of pedestrian fatalities and over 70 per cent of cyclist fatalities, despite only making up four per cent of road miles in London[6]. Restrictions in the HGV driver's field of vision, or 'blind spots' have been identified as a significant contributory factor in collisions, although other factors play their part.

Whilst construction type vehicles such as tippers and skip-loaders are over-represented to an even greater extent in these statistics[7] they are not involved in *all* collisions with VRUs and we must therefore look across all HGV types. In addition, some construction type vehicles have a good DVS star rating.

The freight industry has already made significant progress in recent years to improve the safety of HGVs to help protect VRUs. This progress has generally been through the retrofitting of safety equipment to existing HGV designs.

Despite this progress, research shows that HGV drivers react quicker and are less likely to be involved in a collision when they can see VRUs directly through the cab window. Increased direct vision from HGV cabs therefore has the potential to save lives. However, we want to recognise the important role that other safety measures, including retrofit equipment, can play as part of a wider 'systems' solution to reduce

[4] The consultation on the Mayor's draft MTS closed on 2 October 2017

[5] Based on analysis of cyclist collision data – Appendix 3 - TRL (2017) Casualty Impact Analysis for Proposed Implementation in London

[6] The average and median proportion of all VRU fatalities in London caused by goods vehicles are 19% and 15% respectively. This is an over-representation relative to the volume of traffic (4% of London traffic involves goods vehicles in excess of 3.5 tonnes) (TRL,p6)

[7] "Tippers" were most commonly involved in collisions where pedal cycles were killed during left turns (45%) (TRL p12)

road danger and increase the number of vehicles fitted with a comprehensive safety package[8]. We propose doing so via a HGV safety standard permit scheme.

As we look to implement the Mayor's proposals, we are following a phased consultation approach to ensure feedback from all stakeholders is considered at each stage of development.

[8] Of the 225,000 estimated unique HGVs (over 12T) entering London each year, it is estimated that 100 per cent of vehicles will have sideguards and Class V and VI mirrors; 8 per cent will have camera, sensor and audible warning systems; 20 per cent of drivers will have undertaken VRU theory training; and 8 per cent will have undertaken on-cycle practical VRU training

## Section 1 Scope of the consultation

### Phase 1

The first phase of the DVS consultation was held earlier this year to seek views on the principles of the Standard and the Mayor's outline proposals on how it could be used to reduce road danger. The results of this consultation show that there is support for a DVS for HGVs. Since then we have:

- Set the boundaries between the DVS star ratings[9] and subsequently calculated interim or provisional DVS star ratings for Euro VI HGVs for consultation with manufacturers[10].
- Completed a full Cost and Business Impact Assessment[11]
- Completed a full Collision Impact Analysis[12]
- Analysed DVS ratings in relation to the current HGV fleet population[13]
- Completed a full Integrated Impact Analysis (IIA) report[14]
- Analysed the Phase 1 consultation responses[15]

Our research into the impact of the Phase 1 consultation proposals has shown that direct vision for current HGV fleets is very poor and it will be some years before manufacturers can produce enough vehicles with sufficient direct vision. It also showed that an opportunity for greater safety benefit exists if we set the ambition for HGV safety wider than looking at direct vision alone. It is therefore necessary to take a more holistic approach and review additional safety measures that may assist in reducing road danger before improved designed cabs become widely available.

In line with the Mayor's Vision Zero principles we are proposing to take a 'safe system' approach, as we do for bus safety risk. We intend to develop and deliver this safe system through our preferred scheme option of a **HGV safety standard permit scheme.**

Under this proposal, in 2020, all larger HGVs (Class N3 over 12 tonnes) working in or entering Greater London would require a safety permit to operate, regardless of how good their DVS rating is. HGVs rated one star and above would automatically be granted a permit. HGVs rated zero star will be granted a permit in 2020 only if they meet specific measures in a defined safe system. In 2024, HGVs rated below three stars would need to prove they meet the standards of an updated 'progressive'

[9] Appendix 5 - Loughborough Design School (2017) The definition, production and validation of the DVS for HGVs

[10] Interim or provisional DVS star ratings were provided in September 2017 in order to allow review and comment on individual results of vehicles by manufacturers. These are no longer available publically to enable variations in data which could affect individual ratings to be resolved ahead of final rating publication

[11] Appendix 2 - Jacobs (2017) Cost and Business Impact Assessment

[12] Appendix 3 - TRL (2017) Casualty Impact Analysis for Proposed Implementation in London

[13] Appendix 3 - TRL (2017) Methods - Casualty Impact Analysis for Proposed Implementation in London

[14] Appendix 1 - Jacobs (2017) Integrated Impact Assessment of the Direct Vision Standard

[15] Appendix 6 - TfL (2017) Phase 1 Consultation results

safe system. The DVS concept also presents a longer-term opportunity to work with the Department for Transport (DfT) and European Commission (EC) to influence and transform HGV cab design.

Further information on these proposals is summarised in this document and the referenced supporting technical reports.

**Phase 2a – the current consultation**

During this phase of the consultation, we are seeking your views on:

- How the Standard has developed since the Phase 1 consultation
- The Scheme proposal:
    - in 2020 all HGVs entering or operating in London to be required to have a HGV safety standard permit
    - in 2024 to ban those that are zero, one and two star unless they can demonstrate operation of a safe system
- The process to establish what components should make up this safe system
- Our assessment of the impact of the scheme options considered, the proposed Scheme as identified in the IIA and your comments on them
- The HGV safety standard permit scheme proposal itself
- The options to operate and enforce the Scheme

**Phase 2b**

The next phase of the consultation (Phase 2b) will focus on the 'final package' for the proposed Scheme, including:

- The agreed HGV safe system
- How HGVs demonstrate compliance
- How HGVs apply for a permit, including the appeals process
- Other administrative arrangements for the Scheme
- Statutory notice of the Traffic Regulation Order (TRO) and proposed permit conditions that will implement the HGV safety standard permit scheme under the London Lorry Control Scheme

The information from this phase (Phase 2a) of the consultation and feasibility work that we will be carrying out in the coming months will be used to finalise these matters.

## Section 2 – A growing city must be a safe city

One of the Mayor's top priorities is the safety of Londoners and he has committed to a Vision Zero approach to road danger reduction. This means no loss of life should be considered acceptable or inevitable and all deaths and serious injuries from road collisions in London should be eliminated. The Mayor's aim is that no deaths or serious injuries from road collisions occur on London's streets by 2041. Vision Zero forms part of the Mayor's ambition to create 'Healthy Streets' – safer, more attractive, accessible and people-friendly streets where everybody can enjoy spending time and being physically active.

London is a growing city. Today's population of 8.8 million people is predicted to grow to 10 million by 2030. If this growth is to continue in a way that works for everyone and enhances Londoners' lives, then it must do so safely. Safety concerns are the main reason people give for not cycling more, and for being unwilling to let their children walk unaccompanied[16]. Growth in London means an increase in freight activity. It is crucial that those HGVs are as safe and environmentally clean as possible.

London has a particular problem with VRU and HGV collisions, compared with the UK and other cities. In 2015, HGVs were involved in around 78 per cent of cyclist fatalities and 20 per cent of pedestrian fatalities in London, despite only making up four per cent of the miles driven in London. Between 2013 and 2015, 116 pedestrians and cyclists were killed or seriously injured in collisions with goods vehicles over 3.5 tonnes. Analysis shows that 45 per cent of collisions involving a left turn manoeuvre involved tipper HGVs[17]. Whilst this proportion is high for a single body type, there is a further 55 per cent that is attributed to other HGV types. If we are to tackle all sources of road danger we must look at all vehicle body types involved in these collisions.

There is no single cause of the high fatality rates involving HGVs. Analysis of the UK accident database (STATS19)[18] shows that poor vision (cited as 'vehicle blind spot' or 'failed to look properly') is a commonly cited cause of HGV incidents. Between 2010 and 2015, 882 cyclist and 399 pedestrian collisions with HGVs (over 7.5t) were attributed to 'failed to look properly' or 'vehicle blind spot'.

The DVS was specifically developed to help improve the design of large HGVs (N3 over 12 tonnes) involved in collisions where a contributory factor was the blind spot. That is why the Scheme is only being applied to larger vehicles over 12 tonnes.

### A comprehensive approach

Achieving Vision Zero requires all sources of road danger to be considered as part of a wider system. All parts of the system must be strengthened in combination to

[16] Future Thinking (2016) Attitudes towards cycling
[17] Appendix 4 -TRL (2017) Casualty Impact Analysis for Proposed Implementation in London
[18] STATS 19 - https://data.gov.uk/dataset/road-accidents-safety-data

multiply their effects and road users should still be protected if one part of the system fails.

We know that whilst blind spots are a commonly cited cause of HGV incidents, they are not the only cause. We know that whilst construction-type HGVs are over-represented in VRU deaths and serious injuries, they are not the only vehicles involved and that direct vision is not the determining factor in every accident. We therefore need to look wider than just direct vision and the construction sector to reduce road danger.

We have a comprehensive road danger reduction programme designed to look at all sources of road danger and VRU safety including road conditions, infrastructure design and behaviour change. This programme is based around the principles of Vision Zero[19] and adopting a safe system approach to eliminate all deaths and serious injuries.

A specific programme of dedicated HGV safety measures already exists in London based around the following core pillars:

- **Safer operations** - encouraging, supporting, recognising and enforcing safe and compliant fleets
- **Safer people** - improving driver and manager knowledge, skills and performance
- **Safer vehicles** - stimulating innovative HGV design and purchase
- **Safer supply chains** - using buying power and planning to manage road risk in supply chains

Reducing road danger requires action in all of these areas. A number of HGV related organisations are actively addressing these pillars through existing recognised safety standards, embedded within their procurement practices and through schemes such as the Fleet Operator Recognition Scheme (FORS), the Construction Logistics and Community Safety programme (CLOCS) and Truck Excellence. The London Freight Enforcement Partnership (LFEP) also tackles unsafe HGVs and takes any non-compliant and unsafe commercial vehicles, drivers and operators off London's streets.

We understand that ensuring the safest possible vehicles are on the road can mean increased costs to businesses. Recognising this position, we have carried out a full Cost and Business Impact Assessment. A careful balance between meeting the goals of Vision Zero, ensuring ‘good growth’ in London and ensuring sustainable operations for industry is required.

[19] Vision Zero means that road danger will be targeted at its source by ensuring the street environment incorporates safe speeds, safe people, safe street design and safe vehicles (Draft Mayor’s Transport Strategy, page 62).

## Section 3 – Strengthening the system - why is direct vision important?

Research shows HGV drivers react quicker and are less likely to be involved in a collision when they can see VRUs directly through the cab window. It also shows that pedestrians and cyclists feel safer in the knowledge that they have made eye contact with a HGV driver[20]. Therefore, increased direct vision from HGV cabs has the potential to save lives as part of a safe system approach to reducing road danger.

To understand the benefits of direct vision, over the last two years, we have been working with the freight industry and stakeholder groups to develop the DVS for HGVs. The DVS provides a means of objectively measuring and rating the direct view available to a driver from a particular make and model of HGV.

There are a number of design features that influence direct vision, such as the size and shape of the windows as well as the height of the HGV cab. For any given HGV model, the higher the cab, the worse the level of direct vision will be.

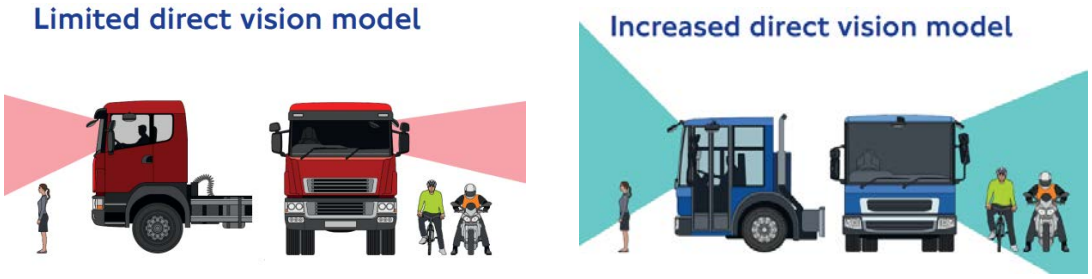


**Figure 1:** Example of limited direct vision (zero star) and increased direct vision (five star) rated vehicles

Direct vision from the majority of the currently available HGV models is poor. However, the DVS star rating concept presents opportunities in the short, medium and long term to improve the situation.

In the **short to medium term**, the DVS can be used to measure and improve the direct vision capabilities of HGVs entering London by:

- Objectively categorising HGVs by direct vision for the first time
- informing operator purchasing and leasing decisions so they can buy the 'best in class' vehicle model fit for use in an urban environment
- Encouraging manufacturers to promote higher star rated vehicles to their customers and to guide their future HGV designs
- Enabling client organisations and projects that employ HGV operators to specify the use of vehicles with improved direct vision in procurement contracts
- Implementing and enforcing a scheme to remove HGVs, which is the focus of this consultation

[20] Arup (2016), Exploring the road safety benefits of Direct vs Indirect vision in HGV cabs

There is also the potential for more radical **long term** change by influencing the next generation of HGV cab design. The European Commission is currently reviewing the General Safety Regulation which governs the design of vehicles sold in Europe. We are continuing to lobby for direct vision to be included in future regulations.

The Mayor proposes to use the DVS to ban or place restrictions on the most dangerous (zero star) HGVs from entering London in 2020 and those that score less than three stars in 2024. Section 4 explains how these DVS rating boundaries have been set.

## Section 4 - Defining the Direct Vision Standard ratings

Since Phase 1 of the DVS consultation, we have worked with manufacturers, academia, vehicle testing houses and regulators from the UK and EC to finalise the DVS concept and set the rating boundaries. The DVS measures the 3D volume of space that can be seen directly by the driver from the cab. The greater the volume of that direct visibility, the closer the person can be seen to the vehicle and the more of them that can be seen. The assessment volume zone created concentrates on the area of greatest risk to a VRU. Measurement of this zone must be made consistently by all vehicle manufacturers to ensure it remains objective and repeatable.

The volume of space has been linked to ‘real world’ performance. VRUs are placed around the vehicle and the distance that the head and shoulders can be seen is calculated. This was correlated with the direct visibility volume results and shows that the larger the volume the closer VRUs can be seen to the vehicle.

To meet ‘one star’, at least the head and shoulders of 99 per cent of the European adult population must be seen within an ‘acceptable’ distance at the front and side. The ‘acceptable’ distance is 4.5m to the nearside, 2m to the front and 0.6m on the offside of the HGV cab.  This distance is linked to where people become directly visible within the area covered by the existing close proximity mirrors and indirect vision becomes complemented by direct vision.

The two, three, four and five star rating boundaries are set by equally dividing the volume of space over and above the one star measurement to show relative direct vision performance (see figure 3).

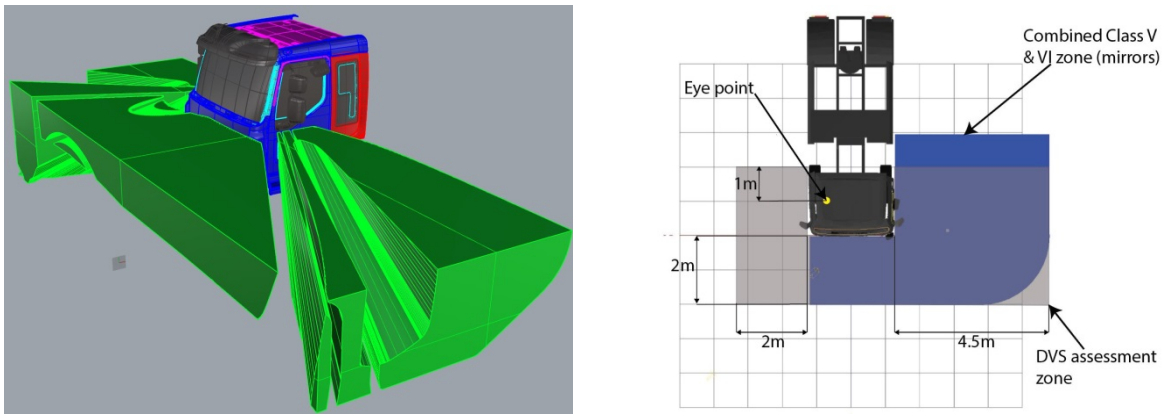


**Figure 2** The DVS assessment zones and volumes

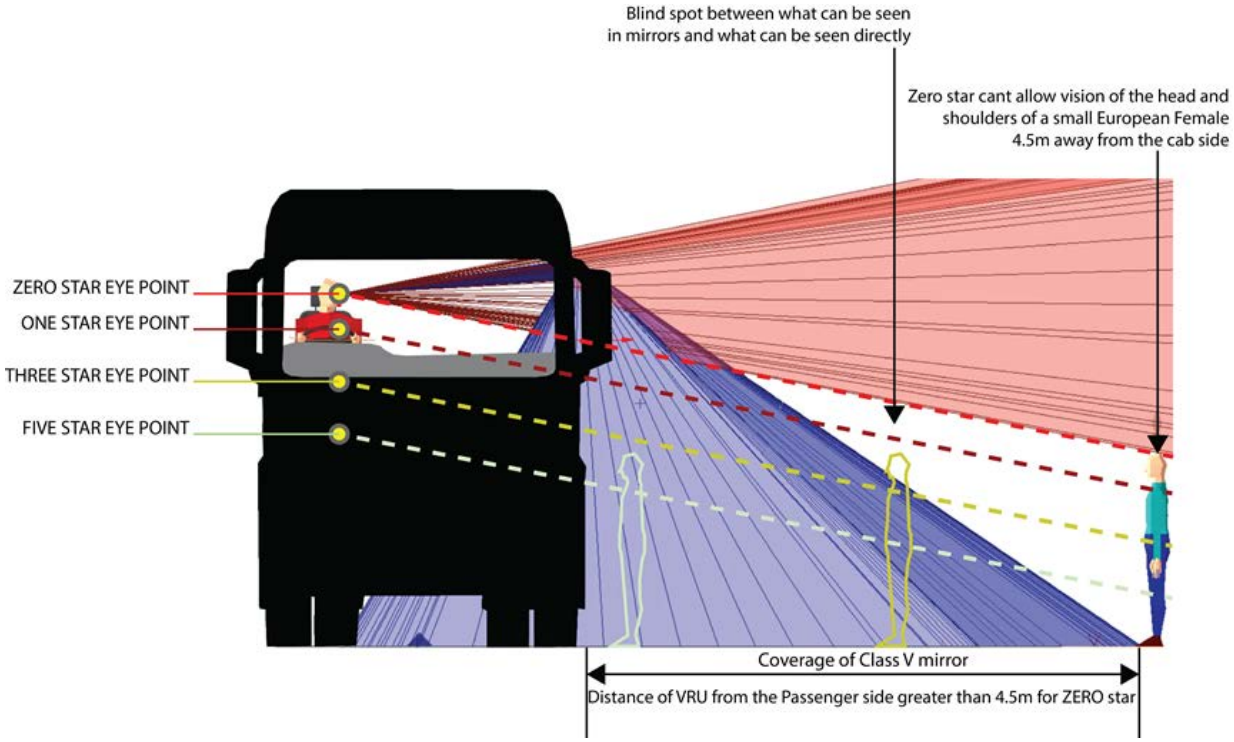


**Figure 3** The 'acceptable' distance at the front and side of a HGV by star rating

The rating boundaries have been set based on the appropriate desired level of direct vision, rather than the current performance of the HGV fleet which is poor. This means a much larger number of HGV makes and models are rated zero star than we originally anticipated. Approximately 50 to 60 per cent of vehicles could be considered non-compliant with the original proposal to ban or restrict all zero star vehicles in 2020[21]. The height that a HGV cab is mounted at is used to obtain a star rating. This data is not readily available for the current HGV population so a number of informed assumptions were made to reach this figure[22]. Section 4 outlines our preferred approach of a HGV safety standard permit scheme which has been developed using the DVS concept and rating system.

We are still working to finalise important points of technical measurement for the DVS and ensure that the process is objective and repeatable by all manufacturers. Once this is complete, individual star ratings will be available via manufacturers and an online 'look-up' tool.

**Expert engagement**

Using best practice of European regulation and policy development, we have developed the DVS in full consultation with an Expert Panel group. This group is made up of experts representing the freight industry, vehicle manufacturers,

[21] Jacobs applied a range of between 58% and 63% for vehicles expected to be zero star and likely to be subject to financial cost to business (Appendix 2 - Jacobs CBIA p19)

[22] Percentages are based on a number of vehicle population assumptions as outlined in the Methods - Casualty Impact Analysis for Proposed Implementation in London supporting document (Appendix 4 - TRL, 2017)

regulatory bodies, test houses, researchers, academics and specialist consultants. The panel provide specialist advice to:

- Ensure the DVS is developed in the right way and aligned to existing industry practice
- Ensure the technical measurements required and used are objective and repeatable
- Inform how the star rating boundaries could be set
- Input to ongoing lobbying for regulatory change

The panel last met in October 2017 to discuss the technical measurements essential to finalising the rating process. We will continue to work with the Expert Panel and individual vehicle manufacturers as part of the ongoing consultation process and the design of the final scheme proposal.

We are seeking feedback from all stakeholders on the way in which we propose to set the DVS star ratings. This feedback will be used to calculate confirmed star ratings for individual makes and models after this Phase of consultation or sooner, following further engagement with the Expert Panel group and individual manufacturers concerned.

Whilst direct vision alone has clear benefits and blind spots are a commonly cited cause in UK STATS 19 data, not all collision scenarios can be avoided through improved direct vision. Based on data analysis[23], a number of incidents, particularly those involving cyclists would not be affected by improved direct vision because they are positioned too far to the rear of the cab at the critical moment when the driver would need to react to allow the collision to be avoided. Therefore it is clear there is still a need for other safety measures and a place for technology in HGV safety to achieve the optimum safety solution.

**Consultation questions**

Please refer to **Questions 6 to 9** at tfl.gov.uk/direct-vision-standard to submit your consultation responses on the Direct Vision Standard and rating boundaries as outlined in this section.

[23] TRL (2016) Assessing the direct vision performance of Heavy Goods Vehicles – p5

## Section 5 – Development of DVS based restriction scheme

We are recommending a HGV safety standard permit scheme and safe system rather than an outright vehicle ban.

In this section, we set out the reasons why we are proposing a HGV safety standard permit scheme. A permit would be required by all large HGVs entering or operating in London. In 2020, zero star HGVs would need to demonstrate they have a safe system, which includes additional safety measures to reduce overall risk when direct vision is poor. In 2024, HGVs below three star, would need to demonstrate a more progressive safe system.

The details of the safe system proposal – how it could be made up and how it could operate – are in section 6.

### The case for a HGV safety standard permit scheme

*Towards a fair comparison with other professional modes of transport*

We want road danger to be treated as seriously as safety risk in other industries and modes of transport, such as rail and aviation.

For example, in the rail industry, there is an expectation on "duty holders to reduce the risk of their activities to as low as reasonably practicable (ALARP) taking into account levels of risk, costs of mitigation and good practice"[24]. We believe the proposal for a HGV safety permit and safe system adopts the principles already applied to other transport sectors: there is a clear risk from poor direct vision; the costs of mitigation on a per vehicle basis are not excessive; and the scheme encourages adoption of what is existing good practice.

*A reasonable cost to comply*

This proposal does not require HGVs with poor direct vision to adopt practices or equipment that are not already approved and commonplace in the industry. We used an estimated maximum cost of around £2,000 per vehicle to fit equipment to comply. In practice, many operators will already be at or near this level and the cost to them will be considerably less. The costs of an operator's HGV colliding with a VRU are likely to be far higher in terms of disruption to the business, including police investigations and coroners court attendance, loss of use of the vehicle and driver, and potential reputational damage etc. Most importantly of all is the very real pain and anguish for all affected by the accident that might have been avoided: the victim, the driver, their families, friends and colleagues.

[24] Rail Accident Investigation Board (2014) -https://www.gov.uk/guidance/raibs-response-to-accident-and-incident-notification#how-raib-selects-accidents-to-investigate

*An opportunity for a greater safety benefit*

Widening our approach beyond direct vision to tackle road danger through a safe system approach allows us to address a broader range of risks. While poor direct vision poses a particular danger to VRUs, it is not the only threat – specific manoeuvres by cyclists and drivers, the physical impact of a collision, unsafe behaviours or a lack of awareness are all additional risks that should be considered. Addressing these issues alongside our work to greatly improve direct vision will ensure that London's HGVs are as safe as they can be. By going further than direct vision, and by ensuring the safe system is continually updated to account for advances in technology, the scheme will provide the widest range of benefits well into the future.

*An independent Integrated Impact Assessment*

As part of a suite of technical reports (the details of which are set out later in this section), we commissioned an independent Integrated Impact Assessment (IIA)[25] to consider the wider impacts of the proposed safe system approach, as well as an outright ban of zero star rated HGVs.

The IIA considered the significant likely economic, social and environmental impacts, and impacts on equalities, traffic movement and traffic management. It drew its conclusions from the other technical research, stakeholder surveys and interviews, Phase 1 consultation response, and the on-going feedback from stakeholders.

The IIA recommends only developing the permit scheme and safe system proposals and we agree with that conclusion.

The remainder of this consultation document sets out how that scheme might operate in more detail, and seeks your views on how to shape it.

## Approach to choosing a HGV safety standard permit scheme, and alternatives considered

*Shortlisting*

In January 2017, as part of Phase 1 of our consultation, we set out our intention to start the consultation process on the Mayor's outline proposals to "ban zero star rated vehicles in 2020, and only allow vehicles with a three star or 'good' rating in 2024".

To build on the responses we received to our Phase 1 consultation, we commissioned a series of technical reports to better understand what the impacts – both costs and benefits – of such a ban might be. We also used this process to consider and assess alternative options for using the DVS to improve road safety. All of the supporting technical reports are set out in figure 3 and are published as part of this consultation.

[25] Appendix 1 - Jacobs (2017) Integrated Impact Assessment of the Direct Vision Standard

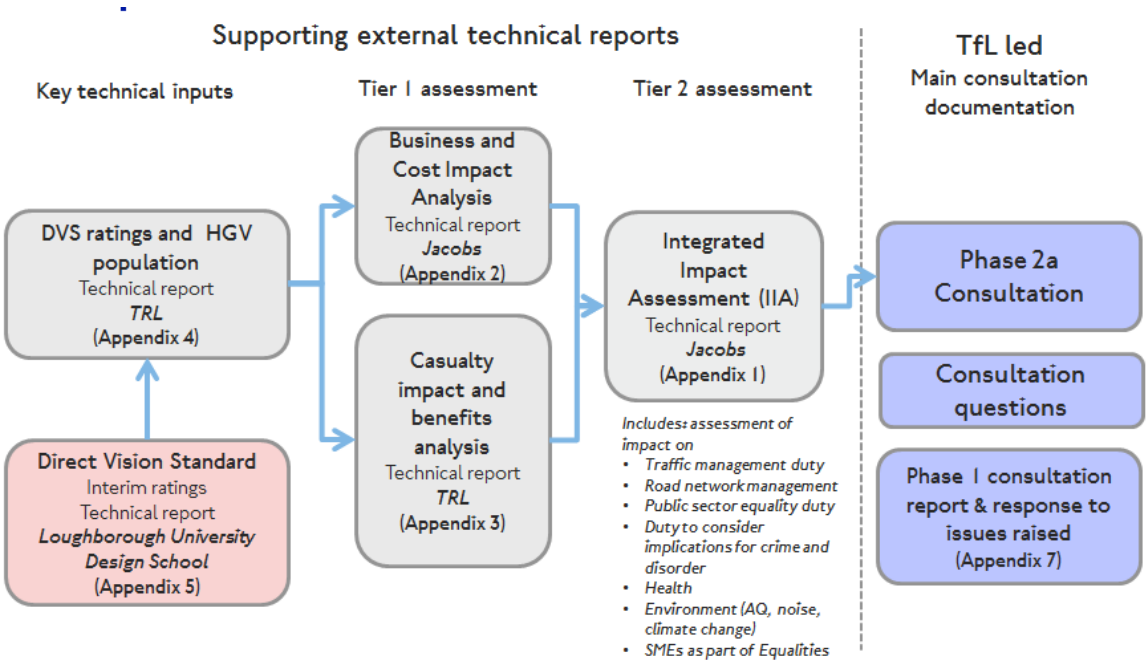


**Figure 3** Phase 2a consultation and supporting documents

The proposal is for the Scheme to operate across Greater London and to be in force 24 hours a day, seven days a week. We explored the possibility of having smaller areas or different time zones to make compliance easier, but the feedback from industry was that this was of little practical help and that on balance consistency with other schemes (such as the Safer Lorry Scheme or Low Emission Zone) would be preferred.

We therefore concentrated on five options for using the DVS to reduce road risk. Options 1-4 are variations on a ban based solely on DVS rating; Option 5 considers a wider range of factors that could contribute to a collision:

- **Option 1 – *Outright restriction*:** ban N3 class (over 12 tonnes) vehicles rated zero stars by 2020 and those rated below three stars by 2024
- **Option 2 – *Phased outright restriction*:** only newly registered N3 vehicles must comply with at least three stars by 2020 and all N3 class vehicles must comply with three stars by 2024
- **Option 3 – *Outright restriction with transitional mitigation*:** allow zero star rated vehicles to demonstrate mitigating safety features in 2020 temporarily. N3 class vehicles rated below three stars are prohibited from entering Greater London by 2024
- **Option 4 – *N3G ban*:** an outright ban on the sub-class of HGVs that are configured to operate off-road (N3G class) from 2020
- **Option 5 – *HGV safety standard permit scheme*:** from 2020, zero star rated HGVs only allowed access if they can demonstrate they are operating a safe system. From 2024 HGVs rated one or two star also required to have a safe system

*A permit based scheme*

A scheme has to be enforceable. The DVS is a new standard, which means it cannot be enforced via existing techniques. Specifically, the DVS rating of a vehicle cannot be identified visually at the roadside and cannot be derived solely from information captured at the point of DVLA registration.

Therefore, we believe the only practical way of operating a DVS restriction scheme is through a permit system for all large HGVs (those over 12 tonnes, i.e. N3 class). This will require certification to establish the DVS rating of the HGV before it applies for a permit to enter London. We will then be able to enforce using number plate recognition to cross-reference whether that HGV has a permit or not.

For more details on how the scheme could operate and be enforced, see section 6.

*DVS ratings and the HGV population*

The work done to rate the current fleet of Euro VI vehicles[26] has confirmed that direct vision from the current fleet of HGVs is poor. It also confirmed that at the usual rate of vehicle renewal, it will be some years before manufacturers can produce enough vehicles with the highest levels of direct vision to replace vehicles with poor direct vision in the existing fleet.

The exact number of vehicles on the road in each DVS star category has been estimated[27]. However, because the DVS is new, the 'as sold' data is not readily available, nor have older vehicles all been rated. There remains a degree of uncertainty as to how many vehicles fall into each class. Costs and benefits are therefore calculated using ranges based on informed assumptions.

*Costs and benefits of the scheme options*

The main costs of the scheme are the costs to public sector to set up and operate the scheme (estimated at around £10m – see section 6), plus the direct costs to HGV owners and operators to comply and the indirect costs to the wider economy (e.g. the knock on effects to business from more expensive deliveries)[28].

The main benefits of the scheme come from reduced road fatalities and serious injuries, plus increased levels of cycling as a result of people feeling safer on the roads.

The four variations of implementing an outright ban and the costs to the economy of those schemes range from £5.1bn up to £30.6bn (over ten years). None of the variations to an outright ban reduced the cost of the scheme materially. The costs of

[26] Appendix 5 - Loughborough Design School (2017) The definition, production and validation of the DVS for HGVs
[27] Appendix 4 - TRL (2017) Methods - Casualty Impact Analysis for Proposed Implementation in London
[28] Appendix 2 - Jacobs (2017) Cost and Business Impact Assessment

the safe system scheme is significantly lower than for the ban options, estimated at between £0.6 – 0.7bn.

There is much less difference in the benefits of the schemes. An outright ban (Option 1) would likely prevent a total of 4-18 fatalities and 2-15 serious injuries by 2030, at a value of £18m to £43m. The safe system was estimated to prevent 2-15 fatalities and 2-15 serious injuries by 2030 at a value of £7m to £40m[29].

Although the benefits of the outright ban are greater up to 2030, a safe system could take advantage of technology improvements and would deliver a greater reduction in serious and fatal collisions in the longer term.

The Casualty Impact Assessment[30] also found that, while it is the single biggest contributor to VRU/ HGV fatalities, not all fatalities occur as a result of the blind spot. In other words, more needs to done with other aspects of road danger as well as improving direct vision. This is consistent with both our experience and Phase 1 consultation feedback, which suggests many HGV operators are already adopting best practice safety equipment separately from direct vision.

Our research shows that an outright ban (Option 1) offers the greatest safety benefits to 2030 and the HGV safety standard permit scheme (Option 5) presents the lowest cost option.

The costs of a HGV safety standard permit scheme (Option 5) are considerably less than for the outright ban, whereas the benefits are only marginally lower. If we look at the period beyond 2030, the benefit of the Scheme are greater than for the outright ban.

To 2030, the benefit/cost ratio for the Scheme (Option 5) ranges from 0.140 to 0.168. This is considerably better than for an outright ban, which ranges from 0.004 to 0.012.

Achieving Vision Zero requires a step change in the way we manage and take responsibility for risk on the road. No loss of life is acceptable and all parts of the system need to be strengthened in combination if we are to achieve this goal.

**ULEZ proposal**

In parallel to the DVS, the Mayor is proposing changes to the Ultra Low Emission Zone (ULEZ). The Mayor has confirmed the early introduction of ULEZ in Central London from 8 April 2019. He is also looking at expanding the ULEZ for HGV, buses and coaches London-wide from 2020.

[29] These benefits are incremental to the "do minimum" benefits assumed to occur from the DVS being published, informing vehicle design and being embedded in purchasing decisions but without any restriction scheme. The additional benefits to London of developing the DVS but not using it to restrict access are estimated as preventing 2-9 fatalities, 1-9 serious injuries at a value of £6m-£26m. (Appendix 3 – TRL, CIA p73)

[30] Appendix 3 - TRL (2017) Casualty Impact Analysis for Proposed Implementation in London

By publishing this consultation now we hope to give clarity to those looking to purchase or lease ULEZ and DVS compliant vehicles. Under our proposals, any HGVs bought to comply with ULEZ would have the opportunity to be compliant under DVS through the use of additional safety components.

**Consultation questions**

Please refer to **Questions 10 to 13** at tfl.gov.uk/direct-vision-standard to submit your consultation responses on the development of a DVS restriction scheme as outlined in this section.

## Section 6 The HGV safety standard permit scheme

Below is an outline of the proposals we are consulting on during this Phase of the consultation.

**How the Scheme will operate and which vehicles are in scope**
Our proposal is to implement a HGV safety standard permit scheme based on a safe system approach to reducing road risk. All HGVs over 12 tonnes (N3 class) would require a permit to enter or operate in Greater London. HGVs without a permit would be in breach of the Scheme. A permit would only be issued to vehicles that meet the minimum star rating threshold. Those that don't meet the threshold will need to demonstrate that they meet the requirements of a safe system. A 'safe system' describes an approach to reducing overall road risk to a level appropriate for a large urban environment.

**2020:** The first stage of the permit scheme in 2020 would automatically issue permits to vehicles rated one star and above. **Zero star** HGVs (approximately 50-60 per cent of the current fleet)[31] would be banned unless they can demonstrate they operate in compliance with other measures in a defined safe system to minimise their risk to VRUs. If the HGV meets the defined safe system a safety permit would be issued. Only those zero star vehicles unable or unwilling to comply with the safe system would be banned.

**2024:** The second stage of the permit scheme in 2024 would ban **zero, one and two star** HGVs (approximately 90 percent of the current fleet) unless they can demonstrate they operate in compliance with an updated progressive safe system. Permits would be issued automatically to vehicles rated three star or above. The permit scheme remains the same but brings more vehicles into scope by restricting vehicles below a three star rating.

An opportunity exists in 2024 to consider technology and equipment not yet available on the market today. We could then reassess the specific measures in a progressive safe system. The progressive system will be subject to further consultation in advance of 2024.

There may also be an opportunity in the future to develop a rating scheme which looks at all safety aspects, including direct vision.

[31] Jacobs estimated the number of vehicles subject to financial cost for each option based on behavioural responses from industry and standard vehicle replacement rates. For the Safety System option this could be up to 44,916 HGVs (Appendix 2 - Jacobs CBIA p23)

Support from both the DfT and EC will be required for the Scheme proposals which will require notification to the Commission as a technical standard[32]

**Components of a safe system**

At the core of the proposed Scheme is the idea of a safe system to minimise the dangers posed by the most unsafe HGVs. The safe system requirement will apply to zero star rated HGVs in 2020 and those rated two stars or below from 2024. To obtain a permit, operators will be required to prove they meet the safe system requirements and operate to that standard.

The proposed safe system has three components: (i) areas of risk to address, (ii) specific measures and (iii) a process for setting, testing and maintaining the system.

**(i) Areas of risk to address.** Recognising casualties occur when several things go wrong at once and following the principles of Vison Zero, we want to reduce risk across all parts of a HGV's operation. This will help ensure road users are still protected if one part of the system fails. We propose the following five areas should be considered when assessing if a HGV's risk is reduced sufficiently and suitably for a large urban environment.

- **Direct vision –** poor vision is the single biggest contributory factor to urban HGV fatalities. This would be based on the Direct Vision Standard star rating assigned to an individual HGV and would form the primary component of the HGV safety standard permit scheme. The star rating would determine the level of 'input' from all other components i.e. a zero star rated HGV would not be granted a permit unless other components of the safe system are met
- **Indirect vision –** still focussed on minimising the vehicle blind spot, this component would focus on aids that increase the driver's field of view indirectly
- **Warning of intended manoeuvres** –Warning or alerting VRUs and drivers to each others presence and intended manoeuvres
- **Physical impact of a hazard** – Physical 'hardware' fitted or retrofitted to the exterior of the HGV to reduce the risk or impact of a hazard
- **Urban driving skills** – Training and education in VRU safety should be undertaken to ensure that drivers have the knowledge, skills and attitude to recognise, assess, manage and reduce road danger. All drivers should also be appropriately trained and educated in the use and relevance of safety equipment

**(ii) Specific Measures.** Table 1 describes what a vehicle may need to have in place to demonstrate it has a safe system and address the areas of risk outlined above. Adoption of these specific measures would result in permit eligibility.

[32] Notification to the European Commission is required for as long as the UK is subject to European Directive 2007/46/EC and its procedures

| Area to address | Desired outcome | Example measures |
|---|---|---|
| Direct vision | To improve visibility for drivers and reduce the risk of close proximity blind-spot collisions | • DVS star rating |
| Indirect vision | To improve visibility for drivers and reduce the risk of close proximity blind-spot collisions | • Class V and VI mirrors<br>• Acceptable approved blind spot camera systems |
| Warning of intended manoeuvres | To reduce the risk of close proximity collisions by audibly alerting vulnerable road users to vehicle hazards | • Vehicle manoeuvring warnings such as left-turn audible alarms<br>• Sensors that audibly warn drivers of a VRU's presence<br>• Non-prescriptive warning signage |
| Physical impact of a hazard | To minimise the probability and severity of collisions with vulnerable road users | • Side under-run protection<br>• Front under-run protection where ground clearance presents a hazard |
| Urban driving skills | To ensure that all drivers have the knowledge, skills and attitude required to recognise, assess, manage and reduce the risks that their vehicle poses to vulnerable road users | • Theoretical and practical VRU training such as the Safe Urban Driving CPC course<br>• Appropriate training in use of VRU equipment and technology |

**Table 1** Example measures for mitigating areas of risk

We are seeking your views on what specific measures would be acceptable and how we should develop them.

**(iii) Setting, testing and maintaining the safe system.** In deciding which specific measures a vehicle should have we propose being guided by the following design principles:

- **Easily identifiable** – it must be easy to show measures applied are in place to allow compliance with the Scheme
- **Evidence based –** the effectiveness of each measure must be proven and accepted as industry good practice as defined by existing safety standards and schemes
- **Consistent with existing good practice scheme** – measures and standards must work with existing industry recognition schemes, such as FORS, CLOCS or Truck Excellence
- **Retrofit capability –** in order that the existing fleet of vehicles can adopt the specific measures, each should have the capability to be fitted or adopted retrospectively

- **Market availability** – the supply of each component should be able to meet market demand. There should be a range of ways to meet the requirement
- **Proportionate costs** – the cost of fitment or adoption should be proportionate the risk
- **Fit for purpose –** any specific measures should be quality assured, robust and easily maintained
- **Progressive** – in order to remain appropriate for future use, each component should allow for progression and advances in technology

The process for defining the specific measures for each component will be developed through ongoing consultation with industry, and establishment of a dedicated independent group with defined terms of reference, including representatives from VRU groups. This will be a transparent process and would need to be in place at least a year in advance of any Scheme being enforced.

We welcome your views on:

- The risk sources a safe system should seek to reduce (as outlined above)
- The principles behind selecting specific measures to be added to a vehicle to show compliance
- The process for establishing the acceptable specific measures of the system (the specific design features, equipment, technology, training etc that would be required for am HGV safety standard permit to be granted)

Feedback will be used to develop the safe system to be implemented from 2020 and proposal for the detailed system will be included in the next phase of consultation (Phase 2b).

**Implementation of the proposed HGV safety standard permit scheme**

For the Scheme to be effective, it must be as simple as possible to comply with, have a practical means of enforcement, and there must be a credible deterrent. It must consider all existing and potential operators in Greater London, regardless of where there are domiciled. This is true for enforcement as well as allowing for vehicles to comply with the Scheme before arriving in London.

Our biggest challenge to doing so is that the DVS concept itself does not exist in law. We cannot identify a vehicle's DVS star rating visually, and there are no means of determining DVS rating from other sources of vehicle registration data, such as the DVLA. Therefore a permit scheme to which all N3 class HGVs are subject is the most practical means of identifying the DVS star rating of any particular vehicle or model. Permits will be automatically issued to HGVs meeting the minimum required DVS star rating – one star in 2020 and three stars in 2024. Those not meeting those minimum ratings will only be issued a permit if they prove they meet and operate a safe system via a new application and certification process.

In broad terms we propose making it an offence in 2020 for any HGV (N3 class) to enter or operate in Greater London without a permit. It would also be an offence for

those HGVs subject to the permit requirements to operate in contravention of the defined safety system. The exact detail of the proposed offences will be covered in the Phase 2b consultation.

**Legal implementation**

The proposed method of statutory implementation is through a Traffic Regulation Order (TRO), the legal mechanism that allows traffic authorities to control or regulate vehicular traffic on road safety grounds[33]. A TRO can be decriminalised allowing us to enforce the HGV safety standard permit scheme by issuing civil enforcement Penalty Charge Notices (PCNs) without the need for police intervention.

The London Council's London Lorry Control Scheme (LLCS)[34] is an existing TRO which we propose should be amended to incorporate the HGV safety standard permit scheme alongside the current LLCS restrictions on the movement of HGVs over 18 tonnes during unsocial hours[35]. This will require the agreement of London Council's Transport and Environment Committee (TEC). Incorporating the HGV safety standard permit scheme into the LLCS would have the following advantages:

- A single amendment by the TEC to one existing TRO already covering all roads in Greater London
- An easily enforceable permit scheme that is already de-criminalised with no requirement for police or DVSA resource
- The potential opportunity for a 'one-stop' scheme for HGVs entering London that covers both HGV safety and environmental issues in terms of unsocial hours traffic movements
- Two levels of penalty for non-compliance at £550 for operators/ hauliers and £130 for drivers – a significantly more effective deterrent than a £50 Fixed Penalty Notice (FPN)[36]

**Operation and enforcement of the proposed Scheme**

During phase 2b of the DVS consultation, we will consult on how HGVs should demonstrate they comply with a safe system before applying for a permit. This will be supported by feasibility work.

A HGV safety standard permit scheme allows for a fully enforceable scheme whereby the absence of a permit becomes an offence. The process of gaining the permit relies on an effective certification process to demonstrate compliance.

Feedback from this phase of consultation will be used to develop these proposals, which will be consulted on during Phase 2b of the consultation.

[33] Sections 1 and 6 of the Road Traffic Regulation Act 1984
[34] The Greater London (Restriction of Goods Vehicles) Traffic Order 1985 (as amended)
[35] Any future changes to the LLCS as a result of the recent London Councils' review of the Scheme, could be promoted separately from the HGV safety standard permit changes
[36] A criminal FPN at the single level of £50 is the normal way TROs are enforced unless referred to the magistrate's court where a maximum £1000 fine can be imposed

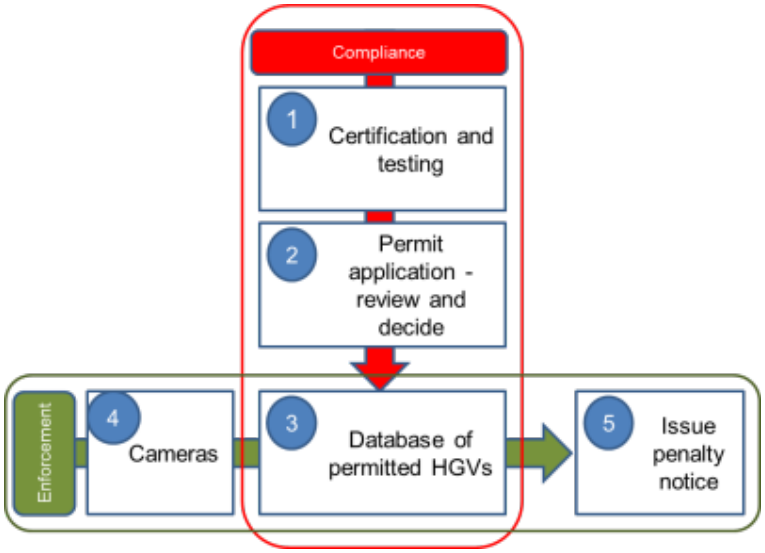


**Figure 4:** High level certification and enforcement process

At a high level, the process would first require verified testing of the wide range of HGV makes and models in the fleet to determine their DVS star rating (as the primary component of the safe system). The process must account for new vehicles and the existing fleet.

Once testing is complete the application and decision process for a HGV safety standard permit would commence. For zero star rated HGVs in 2020, and those rated two star or below in 2024, the additional safe system measures discussed above will be required in order for a permit to be granted.

If HGVs are zero star rated, compliance with the safe system would have to be demonstrated. Once a HGV has demonstrated compliance with the safe system, a safety permit can be applied for.

We are investigating options for a database of HGV makes and models which will form the interface with the permit enforcement process. The existing networks of ANPR (Automatic Number Plate Recognition) cameras around the Greater London boundary for the London Low Emission Zone and around the central London Congestion Charging Zone can be used to check all vehicles over 12 tonnes to ensure they have a permit. A mechanism for ensuring this includes foreign registered vehicles will need to be investigated. Enforcement will simply be based on whether a permit exists or not, as roadside checks are unlikely to be practicable. If a HGV is found to be in breach of the permit scheme a Penalty Charge Notice (PCN) will be issued at £550 for operators/ hauliers and £130 for drivers.

It is assumed that existing Safer Lorry Scheme (SLS) signage can be used to indicate both the existing SLS and the proposed HGV safety standard permit restrictions.

We welcome your views as we continue to develop the enforcement process. The next phase of statutory consultation (Phase 2b) will focus on the refined scheme proposal ("final package"), including the agreed HGV safe system, how HGVs demonstrate compliance, how HGVs apply for a permit and an appeals process.

**Consultation questions**

Please refer to **Questions 14 to 27** at tfl.gov.uk/direct-vision-standard to submit your consultation responses on the HGV safety standard permit scheme as outlined in this section.

## Section 7 – Next Steps

Below is a timescale of the next key milestones towards implementation of the proposed scheme.

**Now - Consultation Phase 2a:** This current phase of the consultation process will run from 16 November 2017 until 24 January 2018. This is the policy consultation phase where we have presented our proposals for the HGV safety standard permit scheme supported by an Integrated Impact Assessment (IIA).

**Ongoing**: Develop and update online look up tool with DVS star ratings for individual Euro VI HGV makes/models and then for Euro V and below

**Feb – March 2018**: Analyse responses to the policy consultation, refine scheme proposals and update the appropriate impact assessments and analysis. Adjust and finalise the current provisional DVS star ratings.

**Spring/Summer 2018 – Final Consultation Phase 2b**: The final consultation phase will present the "final package" of proposals for feedback including statutory consultation on the TRO that will implement the HGV safety standard permit scheme, currently proposed to be under the LLCS. Start of this consultation phase is subject to Government and European Commission support and the outcome of notification.

**Pre-2019**: Engage with manufacturers, industry and other stakeholders on the components of the safe system for 2020.

**Pre-compliance period:** lead-in period to allow necessary adjustments and preparation for compliance with the HGV safety standard permit scheme.

**2020**: Enforcement of the HGV safety standard permit scheme will go live: zero star HGVs will be banned unless they operate to the defined safe system.

**Pre-2024**: Engage with manufacturers, industry and other stakeholders on the components of the progressive safe system for 2024.

**2024**: HGVs that are two stars or below will be banned unless they operate to the progressive safe system.

## Section 8 – List of supporting documents

**Appendix 1**- Integrated Impact Assessment of the Direct Vision Standard, Jacobs, 2017

**Appendix 2** - Cost and Business Impact Assessment, Jacobs, 2017

**Appendix 3** - Casualty Impact Analysis for Proposed Implementation in London, TRL, 2017

**Appendix 4** - Methods - Casualty Impact Analysis for Proposed Implementation in London, TRL, 2017

**Appendix 5** - The definition, production and validation of the Direct Vision Standard (DVS) for HGVs, Loughborough Design School, 2017

**Appendix 6** - Direct Vision Standards – Phase 1 Consultation results, Transport for London, 2017

**Appendix 7** - Direct Vision Standards – Phase 1 Response to issues raised, Transport for London, 2017