AECOM

HGV Incident Prevention Project

Interim Tyres Report (Final Version)

Highways England

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Quality information

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Glossary of Terms

Term(s)	Definition
Axle Weight	The recommended weight to be placed upon on an individual axle.
Driver Walk Around Checks	Mandatory daily checks, forming part of a wider maintenance programme, which must be completed by drivers before using a vehicle.
Graduated Fixed Penalties	A financial penalty of varying magnitude, which may be issued by the DVSA or Police for vehicle defects or driving offences.
Gross Vehicle Weight (GVW)	The maximum weight of a vehicle inclusive of the vehicle, load, fuel, driver and accessories.
Hardshoulder Debris	Material from accidents, collisions or other incidents that accumulates on the hardshoulder.
Heavy Goods Vehicle (HGV)	Goods vehicles over 3.5 tonnes GVW.
Incorrect Loading	Where the vehicle load is unevenly distributed, placing uneven pressure on a particular axle or axle group.
Motorway Service Area (MSA)	A dedicated area on the motorway network allowing drivers to take rest, refreshments or use services during the course of their journey.
Overloading	Where the gross weight of the vehicle exceeds that which it has been designed or is legally permitted to operate at.
Traffic Commissioner	The persons responsible for the licencing and regulation of Heavy Goods and Public Service Vehicle operators.
Tread	The patterned rubber around the circumference of a tyre, which are a vehicles only points of contact with the road surface.
Tread Depth	The amount of tread remaining on a tyre.
Tyre Pressure Monitoring System (TPMS)	A vehicle system, which provides the driver with information relating to tyre pressure. Such systems may be manufacturer or retrospectively fitted.
Tyre Specialist	A third party organisation often contracted to supply, monitor, fit and manage HGV tyres.
Weighbridge	A type of equipment used for weighing vehicles.
Weight in Motion (WiM)	A type of drive-over equipment, which can measure GVW and/or axle weight of vehicles while moving at low speed.

1. Introduction

1.1 Background

AECOM and our project partners PA Consulting and Road Safety Support (RSS) have been commissioned by Highways England (HE) to explore a number of options for reducing the frequency and severity of incidents involving Heavy Goods Vehicles (HGV) on the Strategic Road Network (SRN) which HE are responsible for. There are three areas, which the project team will focus on:

- Tyres
- Diesel Spills
- Drivers Hours Regulations

This report is one of three interim reports produced in line with the three areas of focus above. This report details the initial findings and makes informed recommendations relating to the tyre aspects of the wider Heavy Goods Vehicle Incident Prevention Project. Figure 1.1 shows the methodology for the interim stage of the tyres element of the project.

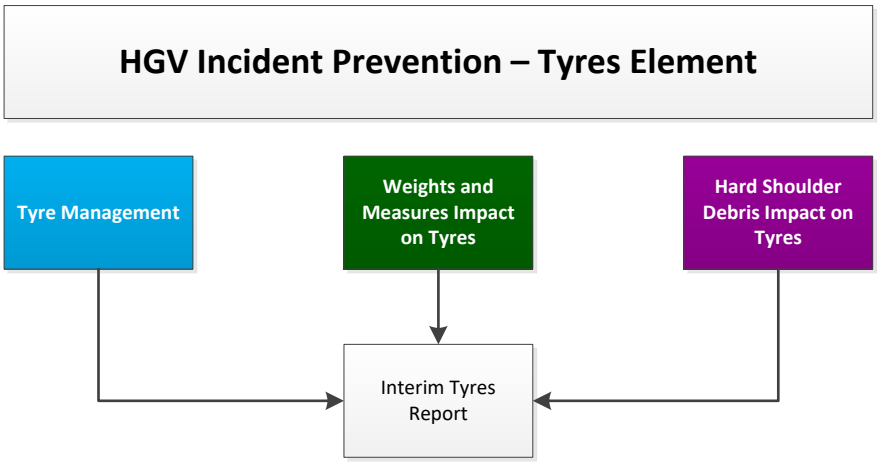


Figure 1.1 – Tyres Methodology (HGV Incident Prevention)

1.2 SRN Tyre Incidents

This section provides some information to outline the magnitude of SRN tyre incidents and the huge economic costs, which such incidents may have.

Approximately 20% of all breakdowns are tyre related and there were over 60,000 tyre related breakdowns in the 18-month period from April 2013 and September 2014. According to Highways England data, the number of HGV tyre incidents are 'relatively small' compared to cars however; the impacts of such incidents are far greater. Using 40,000 annual incidents as a base, approximately 13% of tyre incidents relate to a HGV.

In 2014, the gross economic impact of accidents was estimated at £16.3 billion. As such, reducing accidents can have significant benefit to the economy. The average economic benefit of preventing an accident on the motorways in the UK is £2.2 million for a 'fatal accident', £270,000 for 'serious incidents' and £34,000 for 'slight incidents'. These costs are attributed to lost output, medical costs, human costs, Police costs, insurance and damages[1].

Table 1.1 shows the number of tyre change, tyre blowout and tyre debris incidents recorded by Highways England on SRN motorways between 2013 and 2015.

[1] Highways England Tyre Management Strategy

Table 1.1 – Tyre Incidents on SRN Motorways (2013-15) (Source: HE Command and Control Data)

Year	Tyre Changes	Tyre Blowouts / Punctures	Tyre Debris	All HGV Tyre Incidents
2013	196	3,191	1,790	5,177
2014	-*	3,478	1,840	5,318
2015	-*	3,798	1,574	5,372

**Tyre changes not recorded separately from 2014 onwards*

As can be seen there were over 5,000 HGV tyre incidents per year between 2013 and 2015, which equates to over 14 incidents per day on average. The total costs of tyre incidents can be extremely large and are affected by the time of day, duration of the closure and number of lanes closed.

Tables 1.2 and 1.3 provides estimated costs relating to SRN incidents as extracted from the Highways England Commercial Vehicle Incident Prevention (CVIP) Outline Business Case (2015). These costs can be used to develop the business case(s) for particular HGV tyre interventions, which are identified in the course of this project.

Table 1.2 – Delay values by busyness (Source: Highways England CVIP Outline Business Case)

Incident duration time (mins)		Route busyness			Weighted incident costs
Range	Average	Busy	Moderate	Quiet	
0-10	5	£ 705	£ 118	£ -	£ 320
10-20	15	£ 2,115	£ 353	£ -	£ 960
20-30	25	£ 6,345	£ 1,058	£ -	£ 2,879
30-40	35	£ 12,690	£ 2,115	£ -	£ 5,757
40-50	45	£ 21,150	£ 3,525	£ -	£ 9,595
50-60	55	£ 29,610	£ 4,935	£ -	£ 13,433
60-120	90	£ 84,600	£16,920	£ -	£ 39,339
120+	240	£541,440	£90,240	£ -	£ 245,633

Table 1.3 – Delay values by capacity and duration (Source: Highways England CVIP Outline Business Case)

Flow (% of capacity)	Duration of incident closure (minutes)						
	Lanes Closed (of 4)	15	30	60	120	180	240
80	1	£176	£705	£2,820	£11,280	£25,380	£45,120
	2	£2,115	£8,460	£33,840	£135,360	£304,560	£541,440
	3	£5,816	£23,265	£93,060	£372,240	£837,540	£1,488,960
	4	£11,280	£45,120	£180,480	£721,920	£1,624,320	£2,887,680
60	1	-	-	-	-	-	-
	2	£353	£1,410	£5,640	£22,560	£50,760	£90,240
	3	£1,851	£7,403	£29,610	£118,440	£266,490	£473,760
	4	£4,230	£16,920	£67,680	£270,720	£609,120	£1,082,880
40	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	3	£529	£2,115	£8,460	£33,840	£76,140	£135,360
	4	£1,880	£7,520	£30,080	£120,320	£270,720	£481,280

Highways England Command and Control Centre data for 2013 and 2014 provides the incident impact duration of the following incidents:

- Offside tyre changes (2013 only) – 19 minutes. Of the 196 incidents, 108 had 'Null' recorded duration. Excluding these results, the average increases to 42 minutes.
- Blowouts, punctures and flat tyres (2013 & 2014) – 20 minutes. Of the 6669 results, 4054 had 'Null' recorded duration. Excluding these results, the average increases to 51 minutes.

- Tyre debris incidents (2013 & 2014) – 22 minutes. Of the 3630 incidents, 994 have 'Null' recorded impact duration. Excluding these figures, the average increases to 30 minutes.

1.3 Report Structure

This interim report has been structured as follows:

- Chapter 2 – Literature Review Findings (CAB Report)
- Chapter 3 – Stakeholder Consultation
- Chapter 4 – Tyre Management
- Chapter 5 – Effects of Overloading and Incorrect Weight Distribution
- Chapter 6 – Hardshoulder Debris

Chapters 4-6 include a number of potential interventions for consideration by Highways England to take forward in the next stage of the project and business case development.

1.4 Stakeholders

In the development of this report and research undertaken as part of the HGV Incident Prevention Project, we have engaged with the following stakeholders via telephone consultation, online survey and meetings:

- Highways England Traffic Officers (At North West Regional Control Centre)
- Highways England Regional Control Centre Staff
- Goods Vehicle Operators
- DVSA
- Tyre Checking Technology Providers
- Traffic Commissioner (London and South East)
- Cheshire Police Commercial Vehicle Unit (CVU)

Additionally, we will consult with leading tyre manufacturer(s) and tyre service provider(s) to test interventions.

2. Literature Review Findings

2.1 Introduction

In this section or the report, we have outlined findings and case studies from the literature review exercise, which details the trends and different approaches to tyre management taken by a number of transport operators. Table 2.1 provides a summary of the documents, which were reviewed as part the literature review exercise.

Table 2.1 – Literature Review Documents

Document Name	Source
Tyre Management Strategy	Highways England
Keep your tyres in good condition to cut crashes	SAE International
Insight: Future tyre technologies	Fleetnews
New CEMEX Tyre Strategy Gives Economic and Sustainability Savings	Cemex
New tyre strategy pays off for Scottish Fire and Rescue Service	Michelin
Truck and Bus FAQs	Bridgestone
Technical information – Michelin: Truck and bus tyres	Michelin
Domestic road freight statistics	DfT
Road freight economic, environmental and safety statistics	DfT
Tread Carefully	Transport Engineer
Heavy Goods Vehicle Inspection Manual (Section 8 Condition of Tyres)	DVSA
Heavy Goods Vehicle Inspection Manual (Section 7 Size and Type of Tyres)	DVSA
Relationship between overloaded lorries and pavement maintenance costs	Highways England
Disproportionate Incident impacts supporting information & summary results	AECOM
New tyre strategy pays off for Scottish Fire and Rescue Service	Commercial Fleet
Bridgestone extends tyre contract with Arla Foods	Transport Operator
The new winter specialist for trailer tyres	Tyre Trade News
The law about car tyres	AA
Driver walk around checks and defect reporting – sharing good practice	FTA
Tyre Pressure Monitoring System (TPMS)	Bridgestone
The Tyre Pressure Monitoring System	Continental
Why operators should embrace smart tyre monitoring	SMMT
New legislation causing uninformed motorists to fail MOT	Tyre Safe
Roadside vehicle checks for commercial drivers	Gov.UK Website
Roadway (November 2016) – Michelin Telematics Upgrade	RHA

Findings from the literature review have been grouped into the following themes:

- Legal
- Fines and penalties
- Tyre manufacturer developments
- Tyre failure – causes
- Tyre failure – impact
- Tyre checks
- Tyre Pressure Monitoring Systems (TPMS)
- Operator case studies

2.2 Findings

Legal

Under EU law, any new goods vehicle built or registered from 1st January 2014 must have a Euro 6 engine. As a result, the UK truck market is starting to move towards 315/70 R22.5 and away from 295/80 R22.5 tyres due to the former's greater capacity to cope with the extra weight that Euro 6 vehicles impose on steered axles.

Since 2012, tyres must be labelled with ratings for rolling resistance, external noise and wet braking performance. This has helped fleet operators and drivers to select the right tyres for their particular vehicle or operation.

The UK Government provides that, the aim of the regulation is to increase safety, promote fuel-efficient and safe tyres, decrease noise levels and allow consumers to make informed purchasing decisions. The label classifies tyres from A (the highest performing) to G (the lowest performing).[2]

Fines and Penalties

According to the AA, the maximum fine that a court can impose for using a vehicle with a defective tyre is £5,000 in the case of a goods vehicle. The penalties for vehicle overloading are shown in Table 2.2.

Table 2.2 – Vehicle Overloading Fines

Vehicle Overweight by	Penalty
5% to 10%	£100
10% to 15%	£200
15% to 30%	£300
More than 30%	Court summons

If a vehicle is overloaded or has defects rendering it "*immediately dangerous*" the DVSA or Police can immobilise it.

Tyre Manufacturer Developments

In this section, we have reviewed recent tyre and tyre monitoring developments from a number of tyre manufacturers.

Michelin

Michelin has recently unveiled a long- distance super-single steer tyre, claimed to offer lower rolling resistance than its predecessor, plus an increase in mileage of up to 15%.

Michelin have found that many operators working in the construction and waste sectors believe that fitting a budget tyre as a premium unit is cost effective, since both are equally vulnerable to damage off-road. Their answer is to offer a refund based on the remaining tread if a problem occurs before the tyre is 50% worn, assuming the original purchase price is £400. Michelin have been openly critical about the tyre manufacturers that produce tyres that meet the mandatory requirements only when new, disregarding what happens later.

Goodyear

Goodyear does not have tyre-mounted Tyre Pressure Monitoring System (TPMS) sensors in the market yet, but has the technology in development, as well as a new system that automatically maintains the correct tyre pressure. Like TPMS, this Air Maintenance Technology (AMT) is also set to benefit the

[2] https://www.gov.uk/guidance/eu-tyre-labeling-regulation-guidance-for-business-and-industry

commercial sector before it reaches passenger cars. This technology will allow use of a pump to constantly maintain optimum tyre pressure.

One drawback of employing retreads is that they may not offer the same wet grip or rolling resistance as the tyres on which they are based. Goodyear is attempting to address this by offering products which use similar materials and identical tread designs to the new tyres they replicate. Once again, however, performance depends on pressures.

Goodyear has launched a mobile app that allows information on (and photographs of) inspected tyres to be sent directly to its online solutions tyre system.

Continental

The majority of UK hauliers do not tackle long- distance European runs, so are likely to be more interested in tyres such as Continental's recently introduced Hybrid tyres (steer, drive and trailer), aimed at regional applications. The nature of the work – running up and down A roads and motorways – means tyres have to be durable. New block design and rubber compounds have resulted in a 20% increase in service life and a 6% fuel improvement in new Continental tyres.

The ContiPressureCheck system constantly measures the pressure and temperature of all tyres on HGVs. Continental report that this helps to save fuel, increase tyre life and significantly reduce the risk of tyre failure, whilst maintaining the value of the casing, and thus the retreadability.

Continental suggest that operators can reduce operating costs by up to 1,500 € per vehicle a year while improving driver and vehicle safety. (Savings based on 4 x 2 tractor with three-axle semi-trailer driving 150,000 km per year with the assumed price of diesel: 1 €/l).

Another area of development concerns tread-wear monitoring, which is calculated using TMS and wheel-speed sensor data, and is said to be accurate to within 1mm. Loaded into the sensor is information on the tyre such as the production date, fitment date, mileage and speed limit. This information can be stored in multiple places including the cloud and if the wear rate on the tyre is known, operators can predict when it will run out and at a minimum, tell the driver when the right time will be to have a new tyre installed.

Hankook

Many Hankook tyres have the "Three Peak Mountain Snowflake" (3PMSF) symbol, showing it is well suited to use in extreme winder conditions. The specialist winter tyres have Multi-3D sipes (tread patterns) to improve braking on wet, snow and ice covered roads. An added feature is the high degree of stability in the tread blocks which results in uniform tread wear and increased mileage and fuel efficiency. Aquaplaning on wet or slushy roads is reduced by the water displacement caused by the zigzag tread groves. Solid, sipeless shoulder blocks on both outer tread ribs of Hankooks new tyres provide stability and better grip on both wet and dry roads as well as high mileage performance.

Tyre Failure – Causes

Continental suggests that approximately 30% of tractor units and 40% of trailers are running on tyres that are incorrectly inflated. For example, the pressure is up to 10% above or below the recommended level[3].

A survey conducted in 2014 by Texaco looked at 500 truck fleets and discovered that only 42% even carried out regular tyre pressure checks. That is despite the fact that tyres up to 20% under-inflated could cost up to £555 extra in fuel per truck per year.

Highways England's Tyre Management Strategy 2016 provides that approximately 20% of all breakdowns are tyre related, 61,405 tyre related breakdowns occurred incidents between 1st April 2013 and the 31st Sept 2014 (Inc.). The number of tyre related incidents for Commercial Vehicles is relatively small compared with cars but the impact of "live lane" tyre failure is far greater.

[3] http://www.transportengineer.org.uk/transport-engineer-features/tread-carefully/83795

A trial by British Rubber Manufacturers Association found that a car travelling at 50mph with tread depth 4.1mm stopped in 24.3m whereas with 1.6mm (the legal minimum limit for cars) the breaking distance was 32.7m (A 34% increase).

Defective tyres dramatically reduce the effectiveness of a vehicles steering and braking systems and can potentially suffer catastrophic deflations and add to numbers of road casualties (KSIs).

Tyre Failure – Impact

The Highways England Tyre Management Strategy 2016 outlines that 'commercial vehicle' tyre failures that impact on the "live lane" are potentially more serious in terms of KSIs and delays. There are approximately 12,000 commercial vehicle tyre failures on the SRN each year recorded in Command & Control and over 5,500 of these impact the live lanes as shown in Table 1.1.

KSI impacts include:

- In 2014, the number of reported accidents in which police attended where tyre condition was a contributing factor was 714, of which 22 were fatal. An EU study indicates that correct tyre inflation reduces the probability of an accident by about 35%. It notes that voluntary monitoring of tyre pressures and the availability of air pressure equipment would have resulted in a reduction of between 28 and 109 fatalities per year across the EU.

- DfT figures show that of the 48 people killed in road accidents attributable to vehicle defects in 2015, 58% (28) were due to tyres defects. Further to this, of the 2,855 casualties caused by defective vehicles, dangerous tyres were a contributory factor in 968 cases (34%).

- The average economic benefit of preventing an accident on the motorways in the UK is £2.2m for a fatal accident, £270,000 for serious incidents and £34,000 for slight incidents. The costs are attributed to lost output, medical costs, human costs, police costs, insurance and damages. In 2014, accident costs were estimated to have an impact of £16,300m across the UK.

Journey time impacts include:

- Command & Control figures have shown 3,600 incidents each month on the motorway are tyre related. From April 2011 to April 2014 an average of 123 days equivalent of lane closures occurred each month across the network, with a normal closure period lasting about 19 minutes. Of these HGVs represent a disproportionate amount and the average delay is significantly longer at 1.75 hours.

Cost of closure:

- The cost of lane closures depends on the number of closed lanes and the duration of the closure. A four lane motorway at 80% capacity, when closed for two hours costs an estimated £730,000, however if it is running at 40% capacity this closure costs £120,000. For a three lane motorway such as the M6, the cost of lane closures range from £0 to £23,265 for a half hour closure (depending on capacity and the number of closed lanes) and from £0 to £372,240 for a two hour closure. For a 30 minute delay the average cost is £4,820 – this cost will be used for car related incidents and tyre debris on the motorway. For a two hour delay the average cost is £77,080 – this cost will be used for HGV incidents.

Impact is not just equivalent to the magnitude of the delay experienced, because delays to some journeys can have more consequence than others, for example where an objective to reach a destination by a specific time is missed, the journey is much reduced in value or even becomes redundant. The impact of an incident therefore relates to the effect it can have on the customer's perception of delay.

Disproportionate incidents are those where the impact on their journey is perceived by the customer to be larger than is justified by the event. Some incidents may take longer to resolve than others, but in many cases the incident duration cannot be considered disproportionate. For example, following a

fatality, there is little that Highways England can currently do to reduce the time required to gather evidence.

Tyre Checks

Tread Carefully, provides advice on drivers daily walk around checks, suggesting that operators should ensure drivers carry out a visual inspection of tyres as part of their daily walk-around checks. This should include looking for foreign objects in the tread, suspicious bulges in the sidewalls and uneven wear patterns. Operators should also ensure that pressures are regularly checked, either by their own technicians or others employed by a third party, with the findings recorded.

Michelin provide the following recommendations, with regard to checking tyres. Start with the drivers' door corner and work clockwise checking tread, inflation and valves. Regular checks should also look for bulges and cuts to the tyre wall. Tyre checks should be done especially before long journeys.

In terms of frequency, Tyresafe recommend checking tyre pressure every two weeks and that this should only be done when the tyre is cold as pressure increases after use.

Michelin suggest that tyres on a vehicle must be checked regularly, taking particular care to check:

- the tread, for signs of abnormal wear, cuts, load deformations and embedded foreign objects (stones, bolts, nails etc.)
- the sidewalls for cuts, impact damage (caused by pot-holes, riding kerbs, etc.),
- rasping due to kerbing, and abnormal deformations.
- Causes of vehicle handling problems such as, steering wheel vibrations, pulling to left or right, etc. should also be investigated.
- If loss of pressure occurs, it is imperative to stop as quickly as possible, as running underinflated causes thermal degradation of the tyre components.
- The tyre should be removed from the rim, and the reason for the loss of pressure determined.
- Any damage must be examined by a tyre professional who is capable of determining if a repair is necessary or possible.
- Repairs must be undertaken by a tyre specialist, who will accept responsibility for the repair.
- Before any repair, the interior of the tyre must be examined to ensure that no degradation has occurred.
- The difference in tread depth between tyres on the same axle should not exceed 5mm.

The truck and bus FAQ section on the Bridgestone website provides a range of useful information for vehicle operators relating to tyre fitment, maintenance and regulations[4].

Why is it important to maintain the correct tyre pressure?

- Underinflated tyres have a higher rolling resistance and therefore cause increased fuel consumption. A 10% drop in pressure can cause a 1.7% increase in fuel use.
- Underinflated tyres cause accelerated shoulder wear. When 20% underinflated, tyres may only last 75% of their full service life.

Where can an operator find the correct inflation pressure for their tyres?

- Vehicle manufacturer instructions
- Technical tyre features, loads carried and surface conditions will affect the required pressure

When should operators replace their tyres?

- Bridgestone recommend replacing tyres before reaching the legal limit to avoid damaging the tyre casing

[4] http://www.bridgestone.co.uk/truck-and-bus/faq/

How can operators make tyres last longer?

- Turn tyres on the rim
- Swap tyres on an axle
- Swap inside and outside dual tyres
- Swap trailer tyres between 1st, 2nd and 3rd axles

In terms of tread depth, the FAQ section also highlights that the minimum legal tread depth in the UK is the joint lowest in Europe and there are no variations between summer and winter as there are in other European countries.

Tyre Pressure Monitoring Systems

From 1st January 2012, all cars must be fitted with TPMS. As such, a car displaying a TPMS fault when submitted for its MOT will result in a test failure. Although mandated for cars, TPMS is not required for HGVs.

According to the Society of Motor Manufacturers and Traders (SMMT) there is growing pressure for TPMS to be made mandatory for commercial vehicles. SMMT suggest that commercial fleets, are some of the most enthusiastic advocates of the benefits it provides.

Correctly inflated tyres result in fuel savings, reduce tread wear and minimise the risk of blowouts or breakdowns from punctures. TPMS sensors may also monitor tyre temperature, which can reduce the fire risk from binding bearings or brakes.

The SMMT reference a number of leading tyre manufacturers of TPMS solutions for HGVs:

- Pirelli- Cyber Fleet
- Continental – ContiPressureCheck

Michelin Solutions is launching a suite of upgrades to its dedicated trailer telematics programme. The system was designed to be upgradeable and the latest enhancements introduce three new capabilities: cold chain management, asset ID and a door-opening sensor. These new capabilities will be added to the systems existing capabilities, which includes TPMS.

Bridgestone offer a TPMS solution whereby sensors are fitted to existing valves and receivers are fitted to the entrance/exit to an operator's depot. The transmitter within each valve sends pressure temperature and a unique identification number every 6 seconds. Further to this, when a TPMS equipped vehicle passes the receivers, tyre information is sent to Bridgestone's fleet data server and then analysed against recommended tyre pressures. If there is an issue, an email is generated for the fleet and/or service provider.

Tyre Service Provision

Desktop research shows that there a number of organisations and tyre manufacturers offering tyre management support solutions for operators. For example, Bridgestone offer a range of services called Total Tyre Care, which aim to reduce operator's tyre related costs. Total Tyre Care offers three levels of management and maintenance service packages for operators:

1. Monitoring
2. Maintenance
3. Management

The following case studies provide a number of examples of the tyre management arrangements between operators and tyre manufacturers or service providers.

Case Studies

Case Study: Pets at Home/ ATS Euromaster

Pets at Home are a pet food and product retailer with major distribution centres in Stoke-on-Trent and Northampton. In 2015, Pets at Home contracted ATS Euromaster , the UKs largest tyre distributor, to handle all aspects of tyre management, following an audit of truck and trailer assets, which revealed potential for reducing operating costs, improving safety, tyre life and vehicle uptime.

ATS Euromaster performs regular inspections of Pets at Home's fleet to ensure tyres are in a safe and legal condition, with replacements fitted before they reach the legal limit for truck tyres. To ensure Pets at Home only source replacement tyres when genuinely required, ATS Euromaster also turn tyres on the rim and twin them to ensure even wear is maintained, allowing Pets at Home to get the most out of their rubber. ATS Euromaster also proactively regrooves tyres to extend the life of the Pirelli fitments by a further 25 per cent.

Due to outsourcing tyre management, Pets at Home report that they have experienced a reduction in fleet costs and are confident that this trend will continue[5].

Case Study – Cemex

Cemex are a leading supplier of construction materials with a large HGV fleet. The CEMEX fleet tyre policy uses a tailored range of Continental HGV tyres, which are managed and reworked to give maximum life span, optimum performance and fuel economy.

Environmental benefits have resulted through extending the life of the tyre by reworking and effectively giving it four lives. CEMEX estimate that each retreaded tyre can save up to 68 litres of oil, 44 grams of rubber and the equivalent of 182 kg of CO_2 compared to a new tyre.

New tyres are designed to be re-cut once the tread has worn down to approximately 4mm tread depth. When this has worn down to its limit, it can be returned to Continental and retreaded, for a third life. Finally, the retreaded tyre can also be re-cut to extend it into its fourth life.

Case Study - Scottish Fire and Rescue Service

Scottish Fire and Rescue Service is benefiting from improved tyre life, durability and traction for its frontline assets after changing its tyre strategy. The Service operates a fleet of over 1,900 vehicles including 830, which are over 7.5 tonnes.

In 2011, the service moved from 275/70 R 22.5 to 315/70 R22.5 Michelin X MultiWay 3D XZE all-position tyres and has benefited from a 94% increase in mileage performance. Feedback from drivers and driver trainers were of significantly less understeer when making progress under blue light conditions.

This case study shows the importance of choosing the correct tyre for a particular vehicle tyre and operation.

Case Study - ARLA Foods / Bridgestone

Bridgestone reports that its tyre pressure monitoring system, used by Arla Foods as part of a tyre contract, has contributed to a 30% cut in call-out times. The system is designed to save fuel and reduce the risk of a flat tyre.

Bridgestone says it supplies Arla with the most cost-efficient tyres, supported by real-time monitoring and analysis of fleet performance. The products, services and systems are delivered by Bridgestone's Truck Point service network, combined with the specialist Bandag retread network. To maximise efficiencies and fleet uptime for customers, Arla and Bridgestone deploy methods such as on-site coaching and monthly performance reviews, to identify and implement service improvements.

This case study shows some of the benefits transport operators receive by outsourcing tyre management and the expertise of tyre manufacturers.

[5] http://www.atseuromaster.co.uk/information/about-us/press-releases/ats-euromaster-makes-tyre-management-easy-for-pets-at-home

2.3 Summary of Findings

- In terms of the recommended tyre inspection frequency, there are a range of views. The literature review shows that recommendations are inconsistent e.g. every 2 weeks, before long journeys and monthly.
- It is very common for vehicle operators to have arrangements with third party tyre specialists or manufacturers for example Pets at Home and ATS Euromaster or Arla Foods and Bridgestone.
- In the UK, EU Euro Engine ratings have led to a shift in the type of tyres used on certain vehicles due to the additional weight, which is imposed on steer axles.
- A previous survey of goods vehicle operators suggested that less than half actually carried out regular tyre pressure checks.
- Since 2012, tyres must be labelled with ratings for rolling resistance, external noise and wet braking performance.
- In the case of a HGV a court can impose a maximum £5,000 fine for a defective tyre.
- The maximum fixed penalty for overloading is £300 or a court hearing
- There are over 5,000 HGV tyre incidents on the motorways each year.
- TPMS is has been mandated for cars since 2012 but not commercial vehicles
- Many tyre manufacturers offer TPMS solutions for commercial vehicles

3. Stakeholder Consultation

3.1 Introduction

In total, 62 different operators completed the tyre management element of the stakeholder consultation survey. Operators were asked a variety of questions relating to their tyre management strategy, use of tyre specialists, tyre procurement, tyre incidents and causes, tyre pressure monitoring, driver walk around checks, overloading and tyre checking technologies. Where open questions were asked, we have provided a selection of the responses rather than the complete list.

We have also engaged with a Traffic Commissioner, the DVSA, Cheshire Police, Highways England (North West Regional Control Centre) as part of the consultation element of the project. The results of consultation with these stakeholders are included in this section.

3.2 Operator Survey Results

Do you have a tyre management strategy?

There were 62 responses to this question, with the following result:

- Yes (100%)

The fact that 100% of operators have a tyre management strategy shows that vehicle operators recognise the range of benefits of having a tyre management strategy in place.

What key elements are included in this strategy?

Figure 3.1 shows the percentage of respondents who selected particular tyre management strategy elements. Respondents were able to select multiple answers.

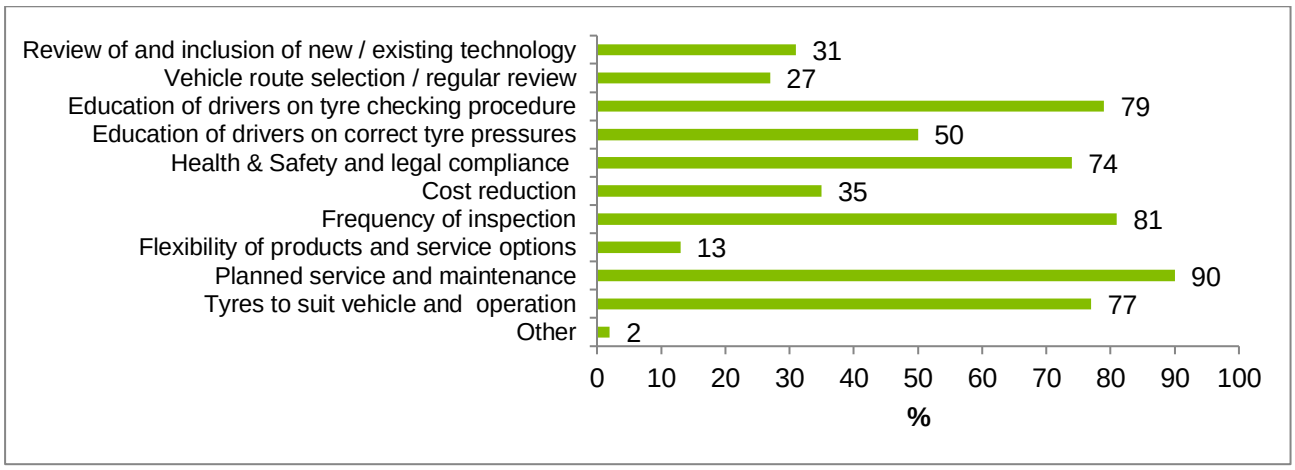


Figure 3.1 – Elements included in operator's tyre management strategies.

This result shows that the elements and considerations included in operator tyre management strategies are wide ranging. The five most frequently selected options were as follows:

- Planned service and maintenance
- Frequency of inspection
- Education of drivers on tyre checking procedure
- Tyres to suit vehicle and operation
- Health & Safety and legal compliance

If you selected 'other' please specify

There were no further comments provided by the operators who selected 'other' in response to the previous question.

How often do you review your tyre management strategy?

There were 56 responses to this question. Figure 3.2 shows how frequently operators tend to update their tyre management strategy.

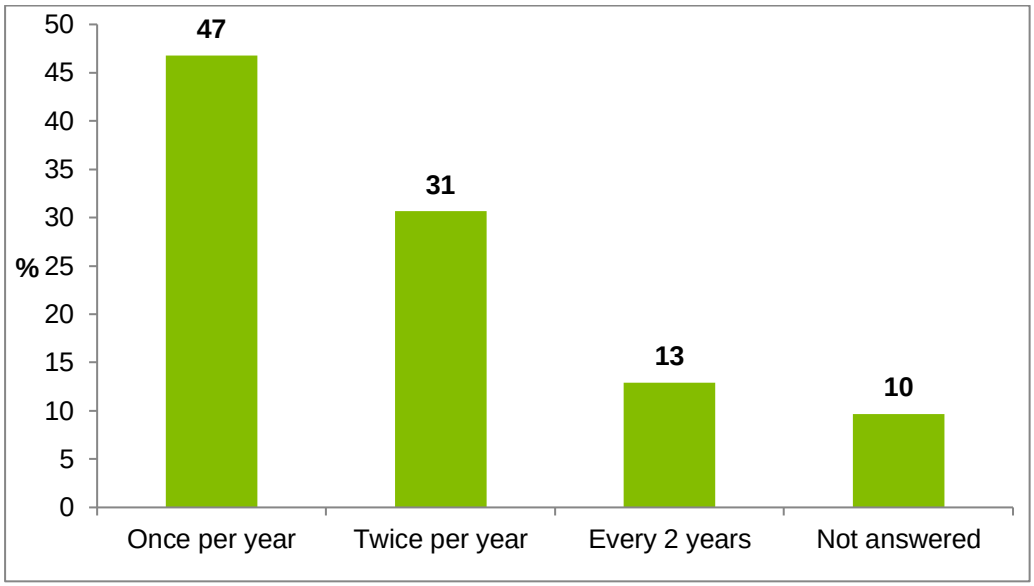


Figure 3.2 – Tyre management strategy update frequency

As shown in Figure 3.2, the majority of operators update their tyre management strategy on an annual (47%) or twice annually (31%) basis.

If longer than 2 years, please specify

Operators provided the following comments to this question:

- "*As necessary dependent on new risks, new products and new work environments emerging.*"
- *"Our strategy has been proven over a huge number of years to be satisfactory, so we do not feel we need to review it annually or at any fixed periods. Unless something goes wrong or changes, we will keep it as it is."*
- *"Only have one vehicle so tyre management strategy could change at any time."*

Do you have a tyre management arrangement with a tyre specialist or do you manage tyres in-house?

There were 62 responses to this question, with the following result:

- Tyre Specialist (65%)
- In-house (35%)

This result shows that there is a trend for vehicle operators to use third party tyre specialists to provide tyre management services. However, a significant proportion of operators still manage this aspect 'in-house'.

Please specify which tyre specialist you use:

The following range of tyre specialists are used by survey respondents. ATS Euromaster were the most frequently used tyre specialist, with 11 out of 29 respondents using their service.

- APT
- Vaculug
- DTM Tyres Ltd
- Hi Q Belvedere Kent
- Universal Tyres
- GW Tyres

- ATS Euromaster
- Bridgestone
- Freelance Tyres Ltd
- Humber Tyres
- Kingsway Tyres
- Tyre Man Ltd.
- Red dragon Lodge Tyre
- GB Tyres
- Goodsall Tyres
- Link Tyres
- Watlings Tyre Services
- Tructyre
- G and S Tyre Service

What influences the type of tyre, which you buy?

The considerations which influence operators choice of tyres are shown in Figure 3.3.

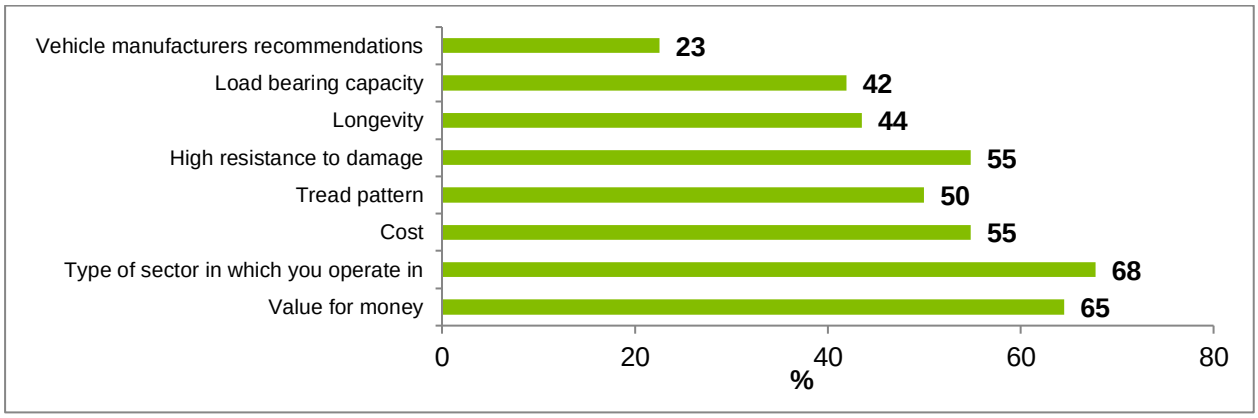


Figure 3.3 – Influences on tyre choice

This result shows the range of considerations by operators when selecting tyres. Approximately two thirds of operators stated that they consider the sector, which they operate in (68%) and value for money (65%) when selecting tyres. Operators did not provide any 'other' considerations to this question.

How many tyre related incidents have you experienced in the past year?

There were 62 responses to this question that are shown in Figure 3.4.

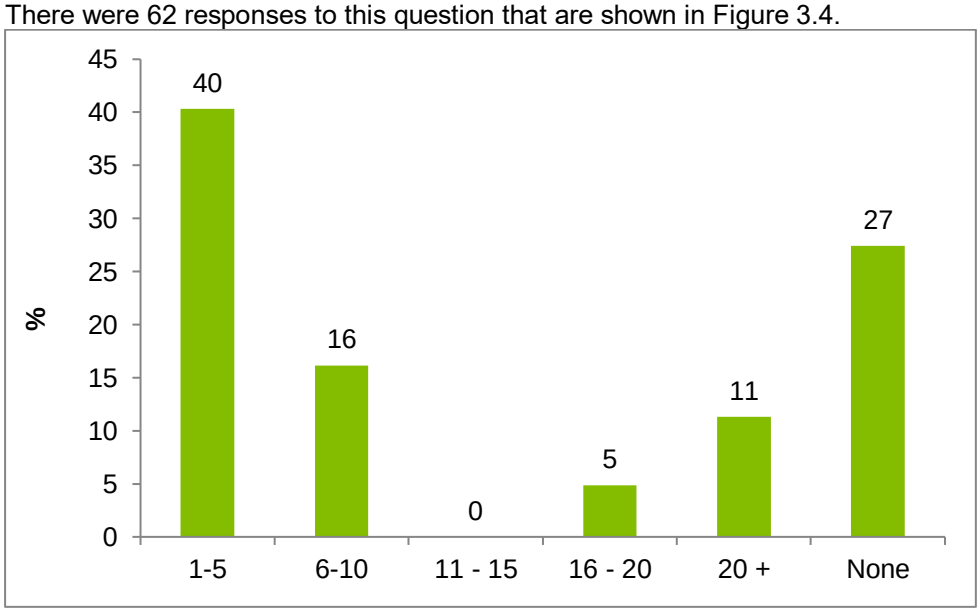


Figure 3.4 – Frequency of tyre incidents

This result shows that HGV tyre incidents are commonplace, with the majority (40%) of operators indicating that they have experienced between '1 and 5' tyre incidents in the past year. An interesting finding in response to this question is that over one quarter of operators have had no tyre incidents in the past year.

Of the operators who experienced '16-20' or '20+' tyre incidents, 20% have an arrangement with a tyre specialist compared to 65% of all respondents. This finding may suggest a trend however, other important factors such as the size of fleet in question are not known. A larger fleet is likely to have more tyre incidents than a smaller one.

Were there any trends/common factors in the incidents you experienced?

There were 44 responses to this question with the following result:

- Yes (34%)
- No (66%)

This result shows that in one third of cases, operators have noticed trends in any tyre incidents that they have experienced.

Please explain the nature of the trends/common factors:

Operators provided the following comments in relation to this question:

- Tyre damage caused by objects on the road.
- Early warnings not noted and drivers failing to report damage to tyres.
- We have been supplied with a rogue batch of re-manufactured trailer tyres, we believe we have identified all the rogue tyres however; a couple were missed and resulted in blow outs on the road.
- Off road vehicle punctures.
- Cuts on construction sites.
- Punctures due to damage or road debris.
- We have avoided using retreaded tyres however their use is unavoidable particularly in breakdown situations where a third party is used. We have a policy of using a premium brand first life tyre only.

These comments suggest that there is a trend for tyre incidents to be linked to construction /off-road operation, damage due to road debris and tyre issues (re-treads and a 'rogue batch').

In your opinion, what are the main causes of tyre incidents / failures?

Responses to this question are shown in Figure 3.5.

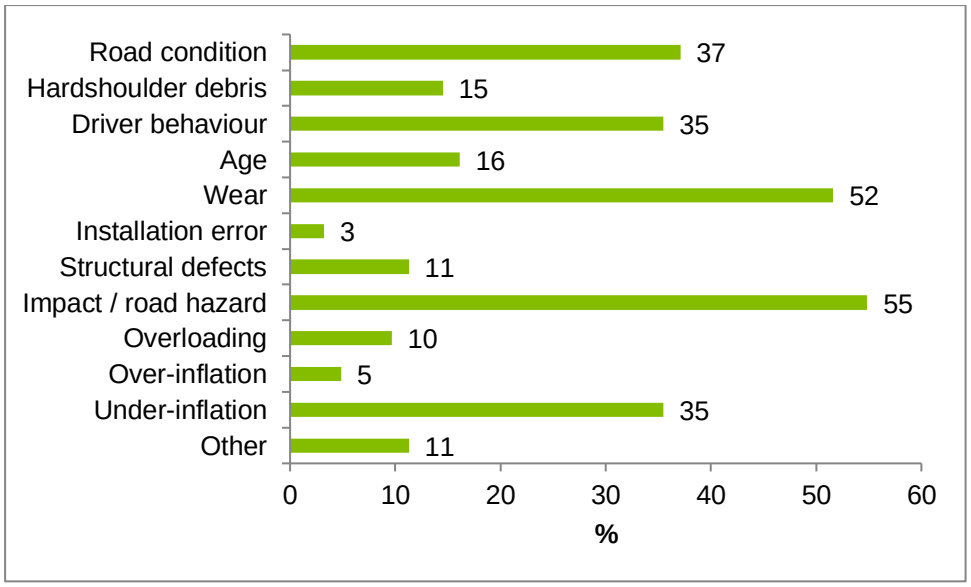


Figure 3.5 – Reasons for tyre incidents

This result shows that operators perceive the following factors to be the main causes of tyre incidents:

- Impact/road hazard (55%)
- Wear (52%)

- Road condition (37%)
- Driver behaviour (35%)
- Under-inflation (35%)

If other, please specify:

In relation to the previous question, operators provided the following 'other' causes of tyre incidents:

- Damage on construction sites.
- Off-road - I run tippers.
- Off-road driving on a tip.
- Landfill and Recycling yards are full of puncture hazards.
- Site work with hidden sharps.

These comments suggest that in addition to the points raised in the previous question. Off-road and on-site driving is also seen as a contributory factor in goods vehicle tyre incidents.

Do you allow drivers to inflate HGV tyres themselves?

There were 62 responses to this question with the following result:

- Yes (42%)
- No (58%)

This is an interesting finding and shows that over half of operators do not allow drivers to inflate tyres on HGVs.

Please explain why:

Operators provided the following comments with regard to why they do or do not allow drivers to inflate their own tyres:

Allow driver to inflate HGV tyres:

- Drivers have been shown how to inflate a tyre and to what pressure.
- For emergency situations only
- If a tyre is low in the yard it makes sense to inflate them
- Our drivers are long distance drivers and do not return to base everyday - therefore we expect them to keep tyre pressures monitored and tyres inflated correctly.
- When a driver checks the tyres during his daily walk around check he may find an under inflated tyre, if the driver is close to a garage he is authorised to inflate the tyre to the correct pressure.
- My drivers check tyre pressures daily. If required, they use an airline to inflate tyres to correct pressure.

Do not allow drivers to inflate HGV tyres:

- We feel that the high pressures of HGV tyres represent a risk to untrained personnel.
- They are not trained or expected to do so for Health & Safety reasons. Our service provider or our own maintenance engineers carry out this.
- All vehicles are in full contract hire and the supplier local to the branch network is easily accessible as our branches do not hold the correct equipment or trained in its use.
- Health & safety reasons. I do not believe drivers have necessary skills. Definitely not allowed in our organisation.
- Drivers do not always check for air leaking from valve after checking.
- Checked monthly by our service provider, no need for additional checks, it risks incorrect pressures being applied.

These comments show that many operators have health and safety concerns with allowing drivers to inflate HGV tyres themselves due to the high pressures involved and a perceived lack of training or

expertise. On the other hand, there are a considerable number of operators who suggest that drivers are able and authorized by the company, to inflate tyres themselves.

Do you ask your drivers to check their tyres more frequently if they have been to a 'high risk' site such as a tip or steel merchants?

There were 62 responses to this question with the following result:

- Yes (74%)
- No (26%)

This finding suggests that most operators are aware of the increased risk of tyre damage at certain collection or delivery locations and encourage drivers to check tyres after visiting certain sites.

Please explain why:

Operators provided the following comments with regard to why they ask drivers to check their tyres more frequently if they have been to a 'high risk' site:

Ask drivers to check tyres after visiting a high-risk site:

- We ask the drivers to check between the wheels after driving off a waste tip site looking for bricks and any other objects that can stick in between the tyres and then come loose when travelling on the highway.
- Obvious hazards! Better dealt with off road and away from moving traffic and pedestrians.
- High-risk sites produce more material that can cause punctures, these may not become apparent until the vehicle is on the motorway network where a combination of high speed & temperature build up will cause a blow-out situation to develop.
- Our tyres get destroyed driving over tips.
- Deliveries are often to building sites where debris and uneven surfaces can damage tyres.
- We go onto sites and even though there are sometimes hardcore roads into sites they can inevitably pick up debris and that can be deposited on the road

Do not ask driver to check tyres after visiting a high-risk site:

- Tyres are checked every day.
- Drivers check tyres before each shift. Then should be vigilant whilst loading / tipping.
- Tyres checked by driver daily, and by tyre fitters weekly.

This result shows that many operators believe that there is an enhanced risk of damage to tyres from visiting particular types of sites. On the other hand, some operators suggested that these extra checks are not relevant to their particular operations.

It is concerning that some operator's comments suggest that drivers daily checks negate the need to check tyres after visiting a high-risk site. A visual inspection at the beginning and end of a drivers shift would not pick up a foreign object lodged between twin tyres during the course of the day for example.

Do your vehicles have tyre pressure monitoring systems (TPMS)?

There were 62 responses to this question with the following result:

- Yes (16%)
- No (84%)

This result shows that the majority of HGVs do not have TPMS. This is an interesting finding considering TPMS has been available for HGVs for some time. Unlike passenger vehicles, onboard TPMS is not mandatory and generally presents an additional cost to operators when specifying new vehicles or through retrofitting.

Has the use of TPMS helped to reduce tyre related incidents?

Of the ten operators who have TPMS, eight suggested that TPMS had helped to reduce tyre incidents.

- Yes (80%)
- No (20%)

The majority of operators are not using TPMS however; this result suggests that the majority of operators who are using TPMS have found that it has helped to reduce tyre incidents.

How do you monitor tyre pressure?

Operators provided that they use the following methods of monitoring tyre pressure:

- Preventative maintenance inspections
- Visual inspection
- Fleet checks by tyre supplier and at PMI by service agents
- Checked weekly by in house fitters and daily visual checks by drivers
- Never consider necessary
- Manually via dedicated on-site tyre technician

Please explain what other technology you use to monitor your tyres?

Operators provided the following comments with regards to other tyre pressure monitoring technology, which they use:

- All new technology is evaluated to see if it can reduce costs.
- Torque wrench for tightness. Otherwise visual, audible and touch.
- Watlings tyre track site.
- Tread depth gauge.
- Gauges and tyre inflators on all vehicles.
- TPMS is being trialled.

There were also 13 operators who stated that they do not use any other technology to monitor their tyre pressure. This suggests that the use of technology for tyre pressure monitoring is not common among HGV operators.

Do you think that driver walk around checks are an effective way of identifying tyre defects?

There were 62 responses to this question, with the following result:

- Yes (84%)
- No (16%)

This finding suggests that the majority of operators believe that driver walk around checks are an effective way of identifying HGV tyre defects.

Please explain:

Operators provided the following comments with regard to the suitability of driver walk around checks for identifying tyre defects.

Comments from those who believe that driver walk around checks are effective for identifying tyre defects:

- Only the basic defects on the outer tyres, and the driver must have an interest otherwise it is a tick box exercise.
- A visual inspection is essential. A TPMS system would not see a tyre with a foreign body in it. This can happen and the tyre still stays inflated.
- The walk around checks require that the vehicle is moved in order check the whole circumference of each tyre.

- Providing drivers are trained correctly in what to look for.
- Yes but they have to be monitored to ensure effective checks are undertaken.
- Best practice applied in daily check process should identify any tyre issues before work commences
- The mainstay of a maintenance system relies on daily checks.

Comments from operators who do not feel the driver walk around checks are suitable for identifying tyre defects:

- Drivers cannot see everything, like damage to 'inside' wall, damage to tread either on tarmac or under mudguard.
- Drivers give tyres a cursory look rather than a full and thorough inspection.
- A driver cannot thoroughly see if a tyre is under inflated.
- The entire tyre is not visible.

This result shows that there is a difference of opinion as to the effectiveness of drivers walk around checks for identifying tyre defects. Operators who answered both ‘yes’ and ‘no’ have acknowledged the limitations of the walk around check in that generally, it requires the vehicle to be moved and the entire tyre is not visible.

How do you ensure that drivers are completing their daily checks?

Operators provided the following comments with regards to how they ensure that drivers are completing their daily checks:

- Random visual checks by supervisors and managers and defect reporting system in place
- They have to fill in a defect book daily, whether any defects found or not. Also, tachograph shows movement of vehicle for tyre check
- The daily check is an electronic based service allowing instant upload to the company servers. Audits of the vehicle and trailer condition are carried out to ensure the correct checks are being undertaken
- CCTV monitoring.
- Random gates checks, managers out in the yard at the commencement of shifts.
- The drivers are not released from the depot without submitting a daily walkaround check and a defect sheet which is checked before release
- They each have a check pad. We also have cctv cameras that record drivers activity & management staff can periodically go into recording equipment in order to cross check.

How does your organisation ensure that vehicles are not overloaded?

The response to this question is outlined in Figure 3.6.

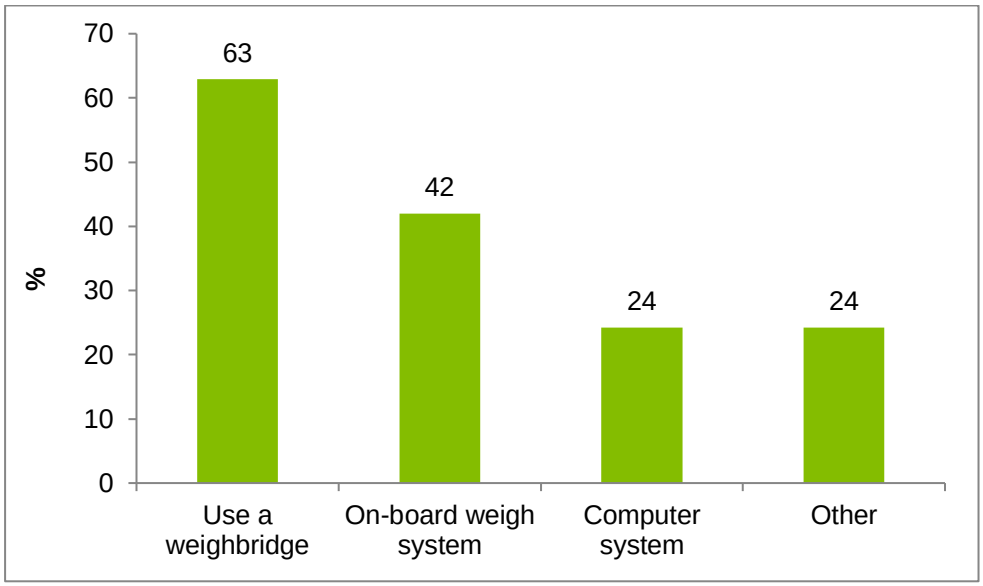


Figure 3.6 – Methods of ensuring vehicles are not overloaded

If other, please specify:

Operators provided the following 'other' methods of ensuring vehicles are not overloaded:

- Vehicle scales on-site
- Driver training
- Use the drivers professional judgement if no weighbridge is available
- Manifests record total weight
- Use of a body size suitable for the job in hand, test weighing and loading bucket counts during loading

Would you consider including a requirement for drivers to use roadside tread depth, axle weighing and pressure equipment as part of your tyre management strategy?

There were 62 responses to this question with the following result:

- Yes (32%)
- No (68%)

This result shows that roughly one third of respondents would consider including a requirement for drivers to use roadside tyre equipment as part of their tyre management strategy.

Please give details of how frequently these facilities should be used?

Operators provided the following response to this question:

- Daily (five operators)
- Weekly (two operators)
- Depends on cost
- The equipment makes it very easy for drivers to pressure and tread depth check their vehicle but the cost of the equipment is prohibitive

Of those who provided a response, the use of such equipment on a daily or weekly basis was the most popular option.

Where do you feel would be the best place for such technology to be located?

Operators provided that the following locations would be suitable for tyre inspection equipment:

- Transport depots
- Motorway services
- Approved weigh bridge (WiM)
- Ports
- Lorry Parks
- Delivery and / or Collection Points
- Logistic parks
- Servicing garages

Some other comments provided by operators have been provided below:

- *"For safety reasons we do not believe it would be safe for drivers to carry out such checks on motorway service areas or other locations without a risk assessment being undertaken."*
- *"We wouldn't consider including a requirement for drivers to use roadside tread depth, axle weighing and pressure equipment as part of our tyre management strategy."*
- *"Cannot comment as would be dependent on each business profile."*
- *"Wouldn't want our drivers to use this."*

Would you consider running a pilot, supported by Highways England, using drive-over TPMS, axle weighing and tread depth measuring equipment at one of your transport depots?

There were 62 responses to this question with the following response:

- Yes (63%)
- No (37%)

Although the majority of operators indicated that they would not include a requirement for drivers to use roadside tyre checking equipment, the response to this question suggests that many would be open to a pilot at their depots.

There were 39 operators who indicated that they would be interested in such a trial and this includes a wide range of operators from a variety of sectors. Some examples of those interested are provided in Table 3.1.

Table 3.1 – Example of Operators

Operators	Sector	Depot(s)
Middlebrook Transport	General Haulage and Abnormal Loads	Alfreton, Derbyshire
Alliance Healthcare	Healthcare	UK Wide
Hanson UK	Construction (Cement)	UK Wide
Alfred Hymas	Bulk Haulage	Harrogate, Yorkshire
TNT UK Ltd	Post/Parcel	UK Wide

Does the type and condition of the road surface have an impact on which routes you send your vehicles on?

There were 62 responses to this question, with the following result:

- Yes (8%)
- No (92%)

The type and condition of the road surface does not affect the routes which vehicles are routed on for the vast majority of operators. This is an interesting finding considering that 37% of respondents suggested that 'road condition' was responsible for tyre incidents in a previous question (see Figure 3.6).

Please give details of reason and roads:

Operators provided the following comments to the previous question:

- Too many to list.
- We do not go off highway / paved road.
- We would avoid where possible poor road surfaces.

Any additional comments:

Operators were invited to provide any further comments relating to tyre management and equipment. The following comments were provided:

- *"We have had quotations for a site based TPMS but under the current financial climate it is too expensive for us to consider."*
- *"Tyre management is a very time consuming and complicated job. We strive weekly to improve. The numbers are enormous though and are stacked against us. As an example we run 40 vehicles and over 130 trailers which equates to over 1000 tyres."*
- *"As a tipper operator, all our vehicles are back to base every night, which gives us the opportunity to monitor and correct any deficiencies with tyres on a daily basis. However, I could see the benefit of roadside facilities for those operators whose vehicles are based away from the depot."*
- *"Proactive tyre management is fundamental to the legal, safe and economical control of a modern logistics business. Tyres are a fundamental consideration and affect most aspects of the costs of running a HGV fleet."*
- *"Tyre management is an essential part of the maintenance strategy of a fleet, cutting corners on tyres is not an option in terms of safety and long term costs."*

3.3 Engagement with Other Stakeholders

3.3.1 Tyre Manufacturers and Service Providers

Engagement with Tyre Manufacturers and Service Providers to be completed following the selection and development of preferred interventions by Highways England.

3.3.2 Traffic Commissioner Consultation

The project team engaged with the Traffic Commissioner for London and the South East in relation to HGV Drivers' Hours and tyres issues. In terms of tyres, the Traffic Commissioner provided the following key points:

- Some tyre defects require the use of a probe, to see exposed cords and drivers could not necessarily do these checks daily.

- Logs of public enquiries are not detailed and fall under the umbrella term *"failure to fulfil undertakings."* As such, it would be difficult to provide a number of public enquiries relating to a specific type of issue.
- DVSA have a detailed log of vehicle prohibitions. This information is not publically available but this data could be requested. Generally, repeat prohibitions would result in a public enquiry.
- Traffic Commissioners have no jurisdiction over foreign vehicles unless they are impounded.
- Traffic Commissioners do deal with foreign drivers working for UK operators and there is a feeling that some rules are taken less seriously in some countries. On the other hand, fines in France and Germany are much greater than in the UK for the same offence.
- If an operator has tyre issues, the Traffic Commissioner would expect to see other compliance issues.
- The majority of public enquiries are with operators with 2-3 vehicles on their O-Licence. Following public enquiries, operators may be sent on an o-licence management course. In many cases, they comment that they wish they had done one in the first instance.

3.3.3 DVSA

The findings outlined in this section have been gained from stakeholder engagement with the DVSA Enforcement Policy Manager.

Enforcement

The DVSA focus their enforcement on non-compliant operators and drivers. They do this by using tools such as Operator Compliance Risk Score (OCRS), which is an intelligence-based approach to rating the risk of operators. This is a well-developed system, which considers a variety of inputs such as annual test results and other encounters. OCRS rates operators according to their O Licence number so large operators with multiple licences would not be targeted nationwide if issues were limited to a particular operating depot.

One limitation of OCRS is that it does not consider data from other enforcement agencies such as the Police. DVSA suggested that increased transparency would be beneficial but they were not sure if this would be feasible as Police data is managed at a regional rather than national level.

There are a number of designated DVSA check sites throughout the UK that have ANPR and WIM technology and Sandbach is an example of one such site. The DVSA have approximately 500 roadside examiners. There are two types of examiner, with slightly different responsibilities:

4. **Traffic examiners –** drivers hours, licencing and vehicle weights
5. **Vehicle examiners –** vehicle roadworthiness and condition

In terms of penalties, the DVSA can issue graduated fixed penalties and deposits. These penalties vary depending on the severity of the offence. In terms of tyres, vehicles will be immobilised if considered "*immediately dangerous."*

A number of DVSA sites have been closed in recent times. One case is the Site at Perry Bar which closed due to the development of managed motorways. In terms of Smart Motorways there is a more general issue relating to variable speed limits. DVSA staff cannot legally catch up with vehicles to inspect them if speeds limits are set to less than the limit for HGVs. The speed limit for HGVs is 60[6] mph on motorways.

Reporting

Under EU Law, the DVSA are required to report the most serious infringements to the Traffic Commissioners of Great Britain and other EU Member States. From January 2017, there will be a

[6] https://www.gov.uk/speed-limits

regulatory change meaning that other levels of defect, *"serious"* and *"very serious"* must also be reported.

GB vs Foreign Operators
There are some differences in the treatment of foreign and GB operators when defects are found and penalties are issued. Part of the issue is that traffic commissioners do not have jurisdiction over foreign operators as they do with UK ones so cases cannot be escalated.

Foreign drivers are treated as a vehicle operator's agent. Any graduated fixed penalties issued to foreign operators must be paid on the same day as they are issued, as it is difficult to enforce them if drivers leave the country. Drivers and operators can then appeal retrospectively. This contrasts with the case of GB operators who have 28 days to pay or appeal the fixed penalty.

In some cases, drivers may be arrested for a very serious offence. In order for DVSA to do this, the Police must be present to make an immediate arrest and drivers are usually in court the next day. Although this approach is less common, it does happen and is seen as a good deterrent to the most serious offenders and more effective than fixed penalties. One major issue is that the Police do not have the resource that the DVSA have available in terms of commercial vehicle enforcement.

There are a number of other joint operations between the DVSA and Police, specifically the London Task Force and operations in the West Midlands. There was suggestion that defining what the different agencies (Police, DVSA and Highways England) should focus on or support would be beneficial.

3.3.4 Cheshire Police

The project team visited Cheshire Commercial Vehicle Unit (CVU) at their check site near Sandbach. The purpose of this visit was to gain a better understanding of the enforcement efforts by the police in relation to HGV tyres and drivers hours.

HGV Inspection
When the Police check a HGV, a walk around check is conducted. Generally, issues found with tyres are nearly always to do with the trailers on the middle axles. The Police suggested that generally, tyre issues are more prevalent with cars and vans than HGVs.

Foreign Operators
The Police suggested that they experience particular problems with foreign operators. If they have a tyre in poor condition, they will try and make it back to their home country. The reason for this is that tyres are much cheaper than in the UK.

In one such instance, a foreign driver would not allow a UK sourced tyre to be fitted to their vehicle. Instead, they contacted their colleagues who delivered a non-branded tyre from their home country, which took a day because it was cheaper to do this. There was a suggestion that cheap tyres may be a problem and that it would be interesting to investigate tyre carcasses for further details.

For UK operators the traffic offence is sent through the post and they are given 28 days to pay. However, this is not done for foreign operators who must pay on the spot.

Tyre Checking Technologies
The Police approved the tyre checking system used at Keele Service during the HE pilot. It allowed drivers to check their tyres, refuel, take breaks and get tyres changed if necessary. There was a suggestion that the system could be a good way of mitigating against corporate manslaughter.

There was a suggestion that many incidents on the SRN are the result of vehicle proximity. There was a suggestion that chevron marking on the road to give an indication of distance were a good mitigation. This would be unlikely to specifically reduce tyre incidents however, it could reduce the impact by encouraging vehicles to keep a safe distance. In the case of a HGV blowout, other vehicles would be less likely to collide with the HGV.

Location of Tyre Checking Technology
The Police suggested that in Cheshire, Lymm MSA would be an excellent location for the tyre technology to be located. There are multiple bays at the exit, which would capture a large amount of traffic. The Lymm MSA is also at the intersection of the M56 and M6, which are both major routes for freight traffic.

Overloading
The Police do not weigh all vehicles as a course of procedure. They suggested that the biggest issues are with 3.5 tonne vans and in one instance they stopped a vehicle with a 7.1 tonne GVW. HGVs overloading is seen as less of an issue. In the case of HGVs, the majority of problems are with 2 axle tractor units that are loaded as if they have 3 axles. There was a suggestion that the public and HGV drivers do not know where weighbridges are located and that more could be done to promote locations.

Hardshoulder Debris
There was a suggestion that maintenance of motorways has reduced and the frequency of hardshoulder punctures had increased. In relation to Area 10, the Police suggested that Barrier damage could take weeks to be repaired.

3.3.5 Visit to the North West Regional Control Centre

In order to better understand how Highway England and its agents respond to incidents on the SRN, the project team visited the North West Regional Control Centre (RCC) in Newton-Le-Willows, Merseyside in August 2016. This visit included an overview of the operation at this site and discussions with staff there including the RCC Manager and Traffic Officers based at the site.

Incident Response
RCC operators are made aware of SRN incidents via calls from roadside SOS telephones, the Police, CCTV observations and traffic officer observations. There is a team of North West Motorways Police based onsite at the Highways England RCC.

When reported, HE will alert the nearest traffic officer to dispatch to the incident. If there is any damage to infrastructure the service providers for that traffic area will be alerted. Service providers vary for different traffic areas. For area 10 (Greater Manchester, Cheshire & Merseyside) Balfour Beatty Mott Macdonald are the current provider whereas for area 13 (Lancashire and Cumbria) the provider is Kier.

Highways England have a 20 minutes response time target and 1 hour to clear live lane obstructions with an 80% KPI target. When a live lane is closed, staff provided that tailbacks of 1 mile per minute are caused during peak hours, which can have huge economic effects.

Data
When alerted to an incident, RCC operators generate an incident on the computer and once dealt with, they assign closure codes to it. Once an incident is closed, it it is transferred to the RCC supervisor for checking and approval.

Data collected by RCC staff does not record HGV specific details e.g. the operator, vehicle type or cargo carried.

Traffic Officers
When traffic officers arrive at the scene, their priority is to ensure that vehicle occupants and the person(s) servicing (e.g. tyre contractors) are safe. Following this they will arrange lane closure if required. For HGV tyre incidents on the hard shoulder, the live lane must be closed if the offside is affected.

If an offside HGV tyre incident occurs on the hardshoulder during peak hours, the North West RCC provided that they would not close a live lane until traffic flow declines, unless on a particularly quiet stretch.

The North West has six outstations and four patrol cars are dispatched from each station. There are set strategic park up points across the area where traffic officers observe and respond. Traffic officers no longer patrol the network due to the resultant vehicle depreciation and fuel costs.

Following an incident, traffic officers can move debris from the carriageway or hard shoulder but cannot remove it as they do not have a waste disposal licence. Often they will leave the debris at the roadside for the service provider to remove.

Police Involvement
The Police are only called to an incident if there has been an injury. If there has been a fatal incident or serious injury, traffic officers would contact the police. In general, Highways England deal with all non-injury incidents on the SRN independently.

RCC staff said that police do not have sufficient resource to attend all incidents e.g. if a HGV driver is using the hard shoulder to take a rest break. Police and traffic officers use the same tetra radios so are able to communicate in this means directly.

HGV Incidents
RCC staff commented that HGVs are not more problematic than other vehicles although due to the scale of the vehicles, they can have greater impact and cause longer delays. The majority of HGV operators have tyre provision arrangements in place and arrange this themselves. If they have no provision then traffic officers will arrange this. In some cases drivers choose to change tyres themselves.

3.4 Summary of Findings

Key findings from consultation with industry stakeholders are summarised below.

Vehicle Operators

- All operators have a tyre management strategy and the majority update once a year or more. The priority was to have planned service and maintenance. Over half of operators outsourced management of tyre services with a third of these using ATS Euromaster.
- The largest influencing factors when purchasing tyres was the sector in which they operated in and the value for money.
- Slightly under half of operators reported experiencing between 1and 5 tyre related incidents a year but over a quarter experienced no incidents. The main perceived cause of these incidents was punctures, followed closely by wear of the tyre.
- Just over half of operators do not allow drivers to inflate tyres themselves, mostly due to health and safety reasons. Drivers of the vast majority of operators are required to check tyres after they have been somewhere dangerous but a quarter of operators do not require this since tyres are checked every day.
- Only 16% of operators used TPMS but 80% of users reported it has helped to reduce tyre incidents.
- Driver walk around checks were seen to be an effective way of detecting tyre defects, if carried out correctly; although operators noted that there are limitations. The whole tyre not being visible is a commonly expressed limitation. Driver checks are ensured using written documentation and inspections of drivers carrying out checks.
- Most organisations use a weighbridge to check for overloading with an on-board weigh system being the second most common method.
- A third of respondents would consider including a requirement for drivers to use roadside tyre equipment, with the majority stating that it should be used daily. A variety of locations were suggested as appropriate areas, such as transport depots, motorway services and WiMs.

- Despite most operators being reluctant for drivers to use roadside tyre equipment, over half would consider running a pilot. Operators that would not consider a pilot stated that daily checks were adequate.

Enforcement Bodies

- Identification of some tyre defects require the use of a probe and drivers couldn't be expected to do this.
- Logs of public enquiries are not detailed and fall under the umbrella term "*failure to fulfil undertakings*."
- Traffic Commissioners have no jurisdiction over foreign vehicles unless they are impounded.
- Following public enquiries, operators may be sent on an o-licence management course. In many cases, they comment that they wish they had done one in the first instance.
- OCRS does not consider data from other enforcement agencies such as the Police and there are opportunities for increased transparency and data sharing.
- There are difficulties in enforcing against foreign operators and drivers and different approaches to GB and Non GB cases are taken.
- The DVSA have approximately 500 roadside examiners, which includes traffic and vehicle examiners.
- Some DVSA check sites are not operational.
- There are issues with DVSA stopping vehicle on Managed Motorways
- Under EU Law, the DVSA are required to report the most serious infringements to the Traffic Commissioners of Great Britain and other EU Member States.
- Police at Cheshire CVU thought that the tyre checking system used at Keele Service during the HE pilot was a good system and well located. They suggested that in Cheshire, Lymm MSA would be an excellent location for the tyre technology to be located.
- It was suggested that HGV drivers do not know where weighbridges are located and that more could be done to promote locations.
- Cheshire CVU has experienced an increase in hard shoulder debris causing punctures.

Infrastructure Operator

- Highways England has a 20 minutes response time target and 1-hour period to clear live lane obstructions with an 80% KPI target.
- The Police are only called to an incident if there has been an injury.
- When a live lane is closed, staff said that tailbacks of 1 mile per minute are caused during peak hours.
- If a vehicle on the hardshoulder requires an offside tyre change, Highways England close the live lane. If this happens during peak hours, staff provided that they would not close a live lane until traffic flow declines, unless on a particularly quiet stretch.

4. Tyre Management

4.1 Introduction

This chapter considers existing tyre management strategies of HGV operators, the use of equipment, availability of equipment, tyre management best practice and potential application of tyre checking

equipment. As identified by the literature review case studies and operator survey results, tyre management strategies are common within the HGV industry.

Despite the suggestion that tyre management strategies apparently being commonplace, the condition of tyres has been the second most common reason for DVSA prohibitions between 2011 and 2014. Table 4.1 shows the Top Ten prohibition defects as a percentage of all HGV motor vehicles inspected at roadside and operators' premises.

Table 4.1 – Top ten prohibition defects as a percentage of vehicles examined at the roadside and operator depots

Defect Type	2013/14	2012/13	2011/12
Brake Systems and Components	8.0%	8.9%	10.0%
Condition of Tyres	5.2%	5.2%	5.6%
Direction Indicators and Hazard Warning lamps	5.0%	2.6%	1.8%
Service Brake Operation	4.2%	4.7%	4.8%
Lamps	4.1%	3.9%	3.6%
Spray Suppression & Wings & Wheel Arches	3.2%	3.6%	3.0%
Steering Mechanism	2.7%	2.7%	2.8%
Suspension	2.4%	2.5%	2.5%
Security of Body	2.1%	0.8%	0.2%
Road Wheels and Hubs	1.8%	2.1%	2.0%

4.2 Current Tyre Management Strategies

4.2.1 Findings

The literature review and operator survey have shown that the vast majority of operators have some form of tyre management strategy. It is also common for transport operators to contract third party tyre specialists to support tyre management. From the operator survey, 100% of operators had a tyre management strategy in place and 65% use a third party tyre specialist.

Given that individual HGV tyres can range in price from £125.00 to £500+ and the largest standard HGVs (6 axle articulated) can have up to 22 tyres, tyres are a major operational cost for operators. Along with premises, fuel, vehicle costs and driver costs, tyres are a major contributor to a vehicle operator's overheads.

As such, there have been many developments in tyre technology such as the introduction of retreading and regrooving and emergence of best practice such as turning tyres on the rim, which extend tyre life and provided cost savings to operators.

Operators provided that the following areas are included in their company tyre management strategy:

- Planned service and maintenance
- Frequency of inspections
- Education of drivers on tyre checking procedure
- Tyres to suit the vehicle and operation
- Legal Compliance
- Education of drivers on correct tyre pressures
- Cost reduction
- Review of and inclusion of technologies
- Vehicle route

The literature review and survey findings suggest that operators are generally aware of the operational, environmental and safety benefits of proper tyre management strategy. This notion is supported by the fact that the majority of operators use dedicated tyre specialists and also the comments made by operators such as:

> ***"Proactive tyre management is fundamental to the legal, safe and economical control of a modern logistics business. Tyres are a fundamental consideration and affect most aspects of the costs of running a HGV fleet."***

Although a broad selection of tyre management areas are considered by operators, feedback shows that there is inconsistency between different operators and there are additional areas, which could be considered as part of their tyre management strategy, for example:

- Periodic use of tyre checking equipment (e.g. pressure gauges and tread depth indicators)
- Provision of supporting material for drivers
- Tyre load capacity and speed ratings
- Retreading, regrooving and turning on the rim
- Tyre end of life management

The survey conducted by Texaco across 500 truck fleets showed that only 42% carried out regular tyre pressure checks. This suggests there is considerable room for improvement and, according to Texaco, potential for operational savings for fleet operators.

As such, it is suggested that the development of a Tyre Management Best Practice Guide, which could be used as a template for operators when developing and reviewing their strategy would be beneficial.

4.2.2 Foreign Operators

In order to determine if there are any significant differences in the tyre management strategies of UK and European operators entering the UK, the project team has attempted to engage with a number of foreign operators. The operator survey has been translated into Polish and Spanish sent to 320 operators across 19 EU Member States with links to the different translations.

The electronic survey e-mail has also been followed up with calls by Polish, Spanish and Italian speaking staff. To date the project team has found it difficult to engage with foreign operators and have had three responses to the operator survey.

4.2.3 Industry Sectors

Although there are a number of factors, which should be considered by all operators in relation to their tyre management strategies, there are also operational differences between operators in different sectors, which should be considered.

For example, a waste management company operating goods vehicles on landfill sites and the SRN will have some different operational risks and tyre requirements to a parcel company operating trunk routes between depots, which are strategically located close to the SRN. As such, it will be important to consider these differences when developing the Tyre Management Best Practice Guide if this potential intervention is agreed by Highways England.

4.2.4 Tyre Management Best Practice Examples

Fleet Operator Recognition Scheme (FORS)

FORS is a three-stage – Bronze to Silver to Gold – European fleet accreditation programme. FORS aims to drive best practice across the European fleet industry in terms of safety, efficiency and environmental protection. There are now over 4,000 members of the scheme and over 167,000 accredited vehicles.

In order to gain accreditation, transport operators must pass an audit, which considers management, vehicles, drivers and operations elements. As per the FORS Standards, operators are required to show that they have certain policies and procedures in place regarding tyres, daily vehicle defect checks, vehicle inspection and maintenance and safe vehicle loading. The FORS Standards for these areas are shown in Figure 4.1.

Figure 4.1 –FORS Standards (tyre management, vehicle maintenance, loading and defect checks)

M11 Tyre and fuel management

Requirement

Fleet operators shall record and manage tyre wear, condition and disposal, and monitor and manage fuel consumption.

Purpose

To ensure that there is a high level of safety, efficiency and environmental performance relating to the management and use of tyres and fuels.

V5 Safe loading and load restraints

Requirement

Fleet operators shall ensure that vehicles are safely loaded, that appropriate load restraints are used and that vehicles are not overloaded.

Purpose

To ensure that vehicle and trailer loads do not present a risk due to poor load security or a lack of suitable restraint in both normal and emergency situations, and that vehicles do not exceed the permitted gross vehicle weight.

V1 Inspection and maintenance plan

Requirement

Fleet operators shall have a vehicles and equipment inspection and maintenance plan which maintains the record for servicing and repairs of vehicles and specialist equipment.

Purpose

To ensure that vehicles, trailers, equipment and related machinery have planned and proactive maintenance systems in place so they operate safely, legally and efficiently.

V2 Defect checks

Requirement

Fleet operators shall ensure that vehicles are checked before the first use of that vehicle in a driver's shift.

Purpose

To ensure that vehicles are inspected for safety-related issues by drivers who have been trained in defect reporting, and that defects are rectified (where necessary) by competent persons prior to use to ensure the continuing safety of the operation of that vehicle.

When auditing companies, FORS auditors ask a number of questions and look for evidence to satisfy a number of standards relating to tyres, loading, defects and inspections.

As can be seen in Figure 4.1, the FORS Standards provide that "operators shall record and manage tyre wear, condition and disposal." The auditor looks for a robust tyre policy that records condition and use. The auditor will ask operators who supplies their tyres and has found that generally operators fit into one of three categories:

- Those who have an arrangement with a third party supplier who also does regular fleet checks e.g. ATS Euromaster.
- Those who only use a particular brand of tyres (e.g. premium brands), the cheapest they can source or whatever tyres they can get hold of at the time.
- Those with a specific policy e.g. no use of remoulded tyres or tyres must be changed when tread reaches 5mm.

In relation to loading, the auditor looks for evidence that operators have conducted a comprehensive vehicle loading risk assessment to ensure that vehicles are safely and securely loaded and not overweight.

In relation to servicing and maintenance, operators must provide evidence that they have a vehicle and equipment service and maintenance plan.

4.3 Tyre Checking Technology

4.3.1 Review of Keele Services Tyre Checking Pilot (2015)

Between March and December 2015, Highways England supported a pilot in conjunction with Welcome Break and WheelRight at Keele Motorway Service Area (MSA) using innovative drive-over tyre pressure, heat and axle weighing technology. Keele Services are located on the M6 close to Stoke-on-Trent which is a significant UK freight route.

The drive-over technology for the pilot was supplied and part-funded by WheelRight and two tyre checking facilities for passenger vehicles and HGVs were installed at the MSA. Tyre measurement feedback was provided to drivers through use of a touch-screen kiosk and a printout of the result was also available.

During the pilot, 2,334 HGVs were voluntarily checked along with 28,670 tyres. The findings of the pilot study have been summarised below according to tyre pressure, overloading, tread depth and driver feedback[7].

Tyre Pressure

- HGVs are typically operating with one under-inflated tyre at any one time
- 8% of HGV tyres were significantly under-inflated
- There were 370 grossly underinflated HGV tyres with less than 60 psi measured
- There were 2,170 HGV tyres that were more than 20% from nominal pressure measured

Overloading

- Between 1.7-15.4% of HGVs were overloaded
- Between 1.1-1.3% of HGV axles were overloaded

*The GVW limits for HGVs vary between 3.5 and 44 tonnes for standard vehicle types. From the information provided in the Keele Pilot report, it is not clear what method and metrics were used to determine if vehicles or axles were overloaded.

Tread Depth

- 1% of tyres had tread depth below 1.5mm and 10% were below 3mm (measured manually)

*Tread depth measurements were taken manually as this technology is still under development

Driver Feedback

- Two thirds of HGV drivers have experienced a tyre related safety issue on the motorway
- 95% of HGV drivers gave the equipment a 9 out of 10 rating for accuracy and ease of use
- 90% of HGV drivers called for improved tyre pressure checking solutions
- Over 90% of drivers said they would use the system once a month to supplement their daily checks

[7] Highways England Six Month Report – Keele Services Installations

- HGV tyres are visually inspected on a daily basis but pressure is generally measured every 6 weeks

Construction Costs

- £24,000 for both the car and HGV systems
- £5,200 HGV System surface preparation
- £7,700 installation of the tread depth checking system

WheelRight suggest that the usual cost of installation is around £5,000 however, this was greater at Keele due to the requirement for safety barriers, bollards and long trenches for the touch screen kiosks. If tread depth had been installed at the same time as the other equipment, the costs would likely be less.

Lead Time

For the Keele Pilot, WheelRight were able to install the equipment in approximately 6 weeks. During consultation, they have advised that usually, the lead time would be slightly greater for example 2-3 months.

Cost Benefits

Following the trial, the equipment provider WheelRight calculated the potential cost benefits using Highways England cost estimates. Using these figures, WheelRight calculated the following:

- Annual benefits or preventing HGV and car incidents range from £356,778 to £6.5m depending on the assumptions used.
- Using the most conservative estimate, there was an 800% return on investment.
- The cost of a WheelRight installation is covered if only a single accident or major incident is prevented.
- HGV incident costs were taken as £77,080.

4.3.2 Highways England Plans

The Tyre Management Strategy 2016 outlines Highways England's plans for the period 2016-2020 and also details the results of the tyre monitoring pilot conducted at Keele MSA. This strategy document was reviewed as part of the literature review process and the plan for the next four years with regard to tyre checking technology has been summarised in this section. Some of the plans for the next four years will be considered as part of this project.

Year 1 (2016-2017)

1. Engage with TfL to add enhanced tyre management requirements to the Fleet Operator Recognition Scheme (FORS) Standards.
2. Install tyre technology at a major operator depot, DVSA check site, Port of Dover or Truck Stop.
3. Initiate the following research initiatives:
   - Develop best practice tyre management procedures for commercial vehicles and trailers
   - Testing of 'on-board' commercial vehicle diagnostic technology
   - Consider how Highways England can support improved tyre management procedures by improving facilities at motorway service areas.
   - Review the impact of hard shoulder debris on tyre failures

Year 2 (2017-2018)

1. Optimise technology for types of site.
2. Develop technical specification and installation instructions for handover to National Delivery and Development Directorate (NDD)
3. Identify with NDD initial locations where technology will be installed, based on Route Strategies.
4. Initial Route Strategy installation focused on traffic from ports

Years 3 & 4 (2018-2020)

1. NDD to extend installation of technology to remaining strategic routes
2. Benefit realisation continued

4.3.3 Tyre Checking and Vehicle Weighing Technology

In this section of the report, we have reviewed a range of tyre checking technologies, including that used in the Highways England pilot at Keele MSA. We have reviewed a range of technologies with the following tyre checking capabilities:

- Tyre pressure
- Tread depth
- Axle weight/gross vehicle weight
- Temperature
- Tyre daily checks

Product:	Provider:	Capabilities:
WheelRight	WheelRight	• Tyre Pressure • GVW and Axle Weight

Information:

WheelRight is a drive over tyre pressure and vehicle weighing equipment, which was used during a pilot study at Keele MSA for HGVs and passenger vehicles. As drivers approach the sensors, an ANPR camera reads and records the vehicle registration and a second camera photographs the vehicle.

Tyre pressure and vehicle weight are measured using a number of sensors, which are embedded in a strip that is flush with the road surface and a number of other sensors depending on the size of the vehicles to be measured (pictured).

Once drivers drive over the equipment, results can be displayed using a traffic light system (green, amber and red warnings) or at a touch-screen monitor, which can provide a print out of the result.

If known, results can also be sent via text message or email to a mobile phone number or email address linked to the vehicle registration. All data is also stored in a cloud database. WheelRight claim that the texting of results takes up to 20 seconds depending on considerations such as mobile phone signal.

The purpose of the equipment is to provide information to the driver or fleet/transport manager and not to say whether the vehicle is or is not roadworthy[8].

Applications:

WheelRight currently consider the application of this equipment in two ways:

1) Open Environment
2) Closed Environment

In an open environment, such as a motorway service area, where specific vehicle details are not known a print-out is provided and readings are stored in the cloud database against the vehicle registration.

In a closed environment such as a transport depot measurements can be taken against those on record for the specific vehicle. These can then be text or emailed to the driver or transport manager.

It was also suggested than in an open environment situation, an operator could provide vehicle details to WheelRight who could then measure and report against the recommendations.

In terms of articulated trailers, WheelRight said that it would be possible to identify trailers and measure them against recommended pressure and weight values. This could be done using RFID as an example.

Costs:

A user typically pays for equipment installation and ongoing information. There is not a capital expenditure cost on the equipment. This is owned, managed and maintained by WheelRight as part of the fees.

Summary:

WheelRight is a drive-over tyre pressure and vehicle weighing technology, which following successful pilots and application in vehicle operating depots has shown to provide road safety and operational cost benefits.

[8] Visit to WheelRight in Oxfordshire

The WIM capabilities are accredited by National Measurements Office to Class 10. The equipment has capacity to accurately measure vehicle tyre pressures and weight at up to 5mph meaning that queuing could be minimal particularly in a closed environment where drivers do not need to get a printout.

The use of ANPR cameras to record vehicle registration and a digital photograph to check and consider weight limits for specific vehicle axle configurations is useful as a 8 wheel rigid and 4 axle artic may have similar GVW limits but different axle configurations.

Potential to measure tyre tread depth would enhance the benefits of the system from a tyre management perspective.

Product(s):	Provider:	Capabilities:
Pneuscan	Ventech	• Tyre pressure • Tread depth • GVW and Axle Weight

Information:
The Pneuscan system is a drive over tyre pressure, tread depth and vehicle weighing (axle weight and gross vehicle weight) system. The maximum drive over speed is 11mph[9].

As the vehicle passes over the equipment, it is 'photographed' by eight cameras, which record the licence plates and unit number. The sensors, which are embedded in the floor check the tyres for air pressure and tread depth as the vehicle passes over them. Once captured, the data can then be forwarded in real time to fleet management. The data can be sent to any computer workstation, other data processing systems, a display for the driver and mobile devices.

Applications:
There are systems are used at yards, truck service stations, toll stations, ports and harbours across Europe, for example:

- Pepsi Co (UK)
- Dublin Airport
- Port of Rotterdam
- Port of Hamburg
- Duisberg Multimodal Terminal (SamSkip)

The system has been used at some passenger vehicle maintenance facilities, to record tyre information as a vehicle arrives at a dealership for a service or repair.

Pepsi Co reported a 70% reduction in vehicle breakdowns following the installation of Pneuscan at their site in Leicester, which is the headquarters for Walkers Crisps. Pepsi Co's UK fleet consists of 212 tractor units and 517 trailers[10]. SamSkip who also use the equipment state that they expect to achieve a 80% reduction of tyre failures.

Costs:
For a truck system the cost is €90,000

Summary:
Pneuscan is a drive-over TPMS, temperature, tread depth measuring, axle weight and GVW measuring equipment which has been installed at a number of large transport terminals and distribution centres across Europe. Case Studies suggest that the equipment has helped users to significantly reduce tyre incidents and breakdowns.

[9] Telephone Consultation with Ventech
[10] Commercial Tyre Business (Issue No. 12)

Product(s):	Provider:	Capabilities:
Tyre Pilot TPMS	Snooper	• Tyre pressure • Tyre temperature

Information:[11]

Snooper is a well-known technology provider within the road haulage industry, manufacturing a range of products such as: satellite navigation, dash cams, reversing cameras and accessories. They also provide retrofit TPMS systems, which consist of an in-cab monitor and sensors that are embedded in wheel valve caps.

When a vehicle is in motion, the sensors send and receive tyre pressure data every 5 minutes. Tyre Pilot can also display the temperature, alerting drivers quickly to any rises that can indicate potential tyre failure. The sensors and in-cab monitor are connected via Bluetooth and TPMS information can also be displayed on some Snooper HGV satellite navigation devices and on smartphones via the Tyre Pilot App.

The equipment is capable of measuring pressures up to PSI 188, which Snooper recommends for HGV application. Other versions are available for passenger cars and light goods vehicles.

Applications:

The product is designed to monitor the following configurations:

- Single vehicle up to 4 wheels
- Single vehicle up to 4 wheels + spare wheel
- Single vehicle up to 4 wheels + trailer up to 12 wheels
- Single vehicle up to 10 wheels
- Single vehicle up to 10 wheels + spare tyre
- Single vehicle up to 10 wheels + trailer up to 12 wheels
- Trailers up to 12 wheels

Costs:

Monitor - £220.99

Sensors – ranges from £203.99 for 6 sensors to £663.98 for 26 sensors

Summary:

Tyre Pilot is a retro-fittable technology, which can help drivers and operators to monitor tyre pressure and temperature. This allows them to manage pressure and take action as tyre temperature becomes excessive and there is an increased blowout risk.

[11] http://www.snooper.co.uk/tyre-pilot-stp1800-bluetooth-tpms.html

Product:	Provider:	Capabilities:
Axscend trailer telematics	**Axscend**	• **Tyre Pressure** • **GVW and Axle Weight** • **Temperature**

Information:

Axscend provides a trailer telematics system which provides the following functions:

- Electronic Braking Performance Monitoring (EBPM) – developed in response to new guidelines introduced by DVSA in 2014. EBPMS reduces the need for frequent roller brake testing. EBPMSmeasures brakingperformance during everyday operational use of a vehicle and provides alerts and reports via the web highlighting trailers with underperforming brakes.. Braking performance evidence produced by EBPMS is now accepted by DVSA as an alternative to roller brake testing
- Tyre Pressure Monitoring - Temperature compensated monitoring system providing real-time accurate readings. Temperature is crucial in order to accurately monitor tyre inflation, as temperature rises so does pressure, the Axscend system compensates the measured pressure to a common Cold Inflation Pressure (CIP). The sensors are mounted to the wheel rim (inside the tyre) and measures tyre pressure and temperature. This information is transmitted to the cloud and held on Axscend servers, proving reports and real-time alerts when underinflated tyres are detected
- EBS Fault Monitoring (DTC) – provides visibility of DTC error codes directly from the trailers Electronic Braking System (EBS)
- Load monitoring - calculates the axle load of a trailer. This data is recorded and ensures trailers don't sit empty and that operators to not exceed legal axle weight limits.
- Location management – Trailer tracking devices. The latest GNSS receiver technology, concurrent GPS and GLONASS positioning offers reliable geo-location of trailers even when they're not connected
- Trailer Light monitoring – Flags up any trailer light faults and reports these to the operator

Applications:

Axscend work with the operator to determine exactly what they require and design a tailored fit to suit. The system covers almost all combinations of fitment, from single axle trailer to six axle vehicle configurations.

Information is gathered even when the trailer is not connected to the tractor units. Axscend's system is constantly monitoring the trailer. This has the benefit of highlighting any issues before the trailers are loaded allowing fitters to rectify the problems before the trailers are taking on the SRN.

Costs:

The system costs less than £200 per year per trailer – this could be easily offset against 4 or 5 roller brake tests. This cost is for the full telematics package.

Summary:

Axscend provides a trailer telematics system which is capable of measuring tyre pressure and temperature along with axle weight/gross vehicle weight. Whilst the system can provide the

operator with reports and real-time alerts when underinflated tyres are detected, an operator must put resources in place to act upon the information provided by the system.

Axscend is compatible with any trailer and is easily transferred to different trailers, without the need for additional system configuration.

Product(s):	Provider:	Capabilities:
Pressure Check	Continental	• Tyre pressure • Tyre temperature

Information:
Continental is one of the market leading HGV tyre manufacturers. Pressure Check is an on-board TPMS System, which also has the capacity to send tyre information to operators fleet telematics software, allowing for tyre monitoring at the vehicle depot as well as on board.

Tyre sensors fitted inside each tyre are linked to an in-cab display and provide drivers with real time information on the tyres status in terms of pressure and temperature. As such, defects noticed by the driver or fleet manager can be checked and rectified promptly.

Applications:
The system covers almost all combinations of fitment, from single axle trailer to six axle vehicle configurations with a maximum of 24 tyres. It is suitable for tractors, trailers, tractor/ trailer combinations, as well as buses and coaches.

Pressure Check can communicate with operator's existing vehicle telematics systems to allow fleet and transport managers to monitor tyres from a transport depot.

The system includes 'Automatic Trailer Leaning', which means that it is simple to exchange trailers without the need for additional system configuration. This means the system is suitable for operators who frequently use different tractor units and trailers in combination.

Costs:
Unknown

Summary:
Pressure Check is an on-board TPMS System, which is suitable for a wide variety of HGVs. It can send tyre information (pressure and temperature) to managers remotely and the driver. The system is easily transferred to different tractor unit and trailers, without the need for additional system configuration.

Product(s):	Provider:	Capabilities:
Pressure Gauge	Multiple	• Tyre pressure

Information:
A variety of manual (pictured) and digital tyre pressure gauges are available. This portable equipment allows the user to measure the pressure of their tyres at any location. Devices, which are capable of measuring up to 160 psi (e.g. commercial tyre pressures), are available.

Applications:
There may be potential for such equipment to be used by vehicle drivers to check tyre pressures; although some training may be required. If a driver suspects that a tyre is underinflated, use of such a tool could confirm this and allow him to call a specialist. On the other hand, the tool could help to prevent unnecessary call outs.

Such equipment could be used to support drivers daily checks or operators may choose to have a digital device at their transport depot, which could be used by drivers or another person to check pressures regularly.

Most HGV tyre compressors also have a digital pressure monitor however feedback has suggested that many operators do not allow their drivers to inflate tyres themselves due to the high pressures involved and a perceived safety risk.

Costs:
- Manual - £20.00 – £70.00
- Digital – approx. £600.00

Summary:
Although relatively simple compared to other equipment reviewed, such tools have a place as part of HGV tyre management, as they are reasonably inexpensive and could be utilised by operators and drivers to support their existing tyre management strategy and vehicle checks.

Product(s):	Provider:	Capabilities:
Tyre Compressor and Gauge	Multiple	• Tyre pressure • Tyre inflation

Information:
The compressor has an electronically controlled, automatic tyre pressure control. The incorporated micro-computer determines the nominal value and automatic ending of the inflation process occurs when a pre-determined pressure value is reached. Leakages are indicated via an error message.

Features:
- Pressure can be preset
- Accurate and repeatable inflation
- Can be easily serviced
- Machines can contain a coin or token mechanism

Applications:
System can be used on all tyres up to a pressure of 232 psi and has a maximum inflation flow of 400 l/min. The compressor can be driver operated. The compressor could be provided at MSAs, operator depots, DVSA WiM sites or lorry parks.

Costs:

• Tower Compressor – £2434 (£2726 with GBP coin mechanism)[12]
Summary: The system could be installed at a variety of locations and operated easily by drivers or vehicle technicians. The preset pressure provides a health and safety benefit, as the driver does not need to be in close proximity to the tyre whilst it is being inflated.

Product(s):	Provider:	Capabilities:
Vehicle Compliance App.	**CheckedSafe**	• **Walk around check support**
Information: Checkedsafe DVSA Vehicle compliance App digitises the vehicle defect card by allowing drivers to complete a driver daily walk around check/ first user check from their smart phone. The app is simple to use and allows the driver to take photographs and add detailed notes of any faults found / actions taken to correct them before submitting the results in real time from the App. All failed vehicle compliance checks will automatically generate a report which will be sent to the line manager. The system uses the mobile device's motion sensors to track the driver's movements as they undertake the check, this allows the operator to see the driver moving around the vehicle. Features: • Geo Tag - uses GPS to pin point exact location of where the daily walk around check took place • There are several DVSA recommended checklist's to choose from however, all checks can be made bespoke. • Checks can be conducted regardless of Wi-Fi connection or phone signal as checks are stored on the device and uploaded automatically when the driver is in signal area. • Can be used on either android or apple devices • Uses motion sensors to track the driver's movements as they undertake the check • Once data is recorded, it cannot be altered in any way as it is a fully secured service • Allows the driver to take photographs as they conduct the check		
Applications: This app or one similar could be used as part of the drivers daily walk around check and could be tailored to incorporate a more stringent tyre check.		
Costs: • £1 per week per user • Also offer a 30 day free no obligation trial		
Summary: Although this system is not capable of measuring tyre pressure, tread depth, axle weight/gross vehicle weight or temperature it could provide an extra level of assurance to the operator that their drivers are undertaking their daily walk around checks. This is due to it using the mobile device's motion sensors to track the driver's movements as they walk around the vehicle.		

[12] Quotation from commercial tyre compressor manufacturer (PCL)

Table 4.2, provides a summary of the capabilities and costs of the tyre checking and vehicle weighing technologies, which have been reviewed.

Table 4.2 – Summary of Tyre Checking and Vehicle Weighing Equipment Capabilities

Type	Cost	Equipment Capabilities								
		Tyre pressure	Tread depth	Axle weight	Tyre temperature	GVW	Tyre Inflation	Provision of data	Manual	Automatic
WheelRight	Monthly data charge	✓		✓		✓		✓		✓
Ventech - Pneuscan	€90,000	✓	✓	✓		✓		✓		✓
Snooper -Tyre Pilot	Monitor - £220.99. Sensors –£203.99 for 6. £663.98 for 26 sensors.	✓			✓			✓		✓
Continental - Pressure check	Unknown	✓			✓			✓		✓
Axscend trailer telematics	Less than £200 per trailer	✓		✓	✓	✓	✓	✓		✓
Tyre Pressure Gauge	Manual Gauge- £20.00 - £70.00 Digital Gauge– approx. £600.00	✓							✓	
HGV Tyre Compressor and Gauge	£2434	✓					✓		✓	
Checkedsafe – Compliance App	£1 per week per user							✓	✓	

4.3.4 Tyre Checking and Vehicle Weighing Equipment Potential Locations

Stakeholders recommended a number of potential locations for the installation of drive-over tyre checking and vehicle-weighing equipment during consultation, these included:

- Operator depots
- MSAs
- Existing WiM Sites
- Ports/Transport Terminals
- Dedicated Lorry Parks
- Collection or delivery points
- Logistics Parks
- Servicing garages

The project team have drafted some potential locations for tyre checking and vehicle weighing equipment. Table 4.3 outlines a number of city locations and nearby MSAs for consideration by Highways England along with the relevant HE Route Strategy.

Table 4.3 – Potential City/MSA Locations

Region	City/ Route Locations		MSA Locations	Relevant HE Route Strategy
South West	Exeter	**M5**	Taunton	Birmingham to Exeter
South East	Heston/Heathrow	**M20**	Ashford	Kent Corridor
London	A406 North Circular	**M25**	Thurrock	Kent Corridor
East of England	Norwich	**A14**	Cambridge	London to Leeds
West Midlands	Coventry	**M6**	Hilton Park	London to Scotland (West)
East Midlands	Nottingham	**A1**	Grantham	N/A
Yorkshire	Leeds	**M1**	Wooley Edge, Barnsley	London to Scotland
Manchester	Trafford Park	**M62**	Birch Services, Oldham	South Pennines (West)
Merseyside/ North West	Preston	**M6/M56**	Lymm	London to Scotland (West) / South Pennines (West)
North East	Newcastle	**A19**	Sunderland	London to Scotland (East)

In relation to the locations above, Police at Cheshire Commercial Vehicle Unit specifically identified Lymm MSA as a good location for such equipment to be installed.

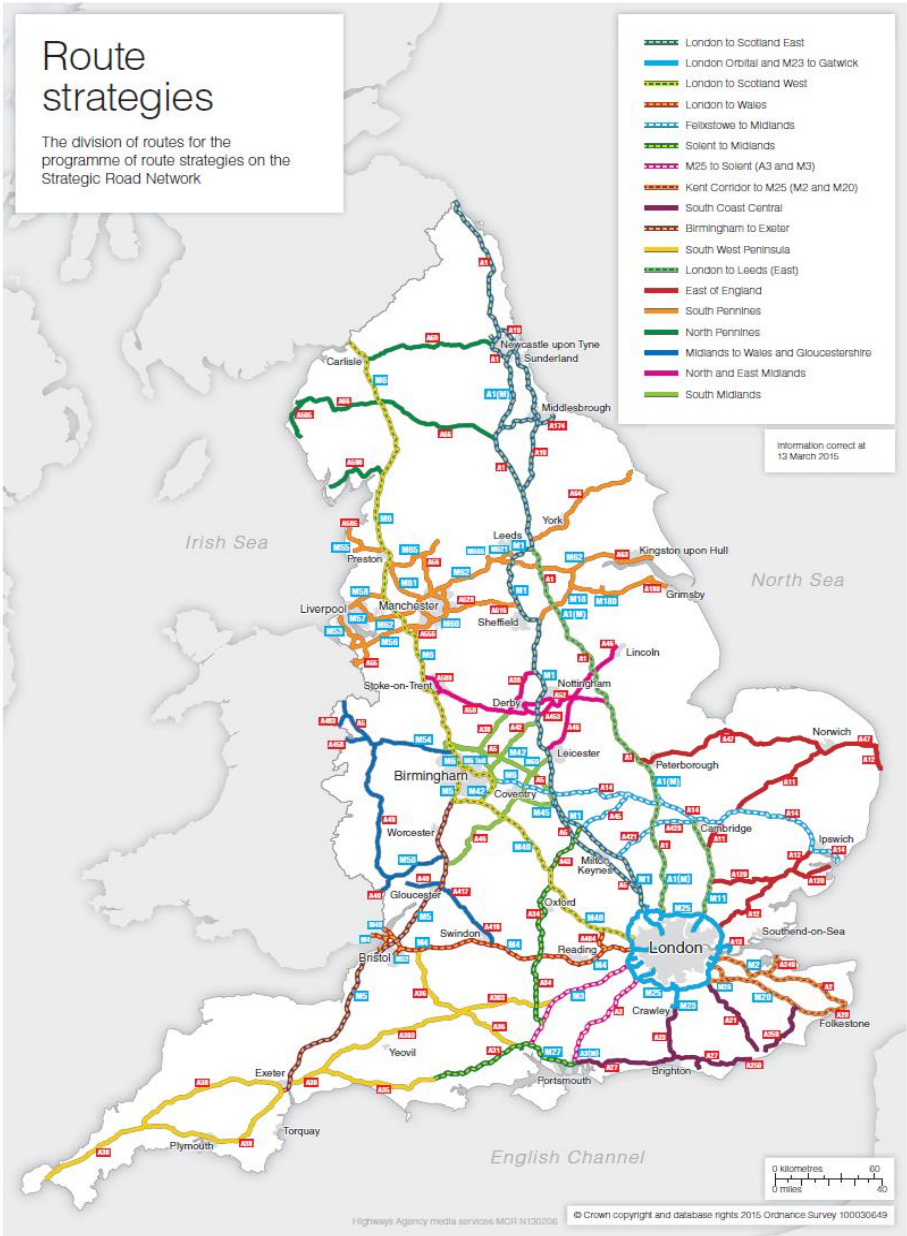
Table 4.4 outlines a number of other locations and specific industry sectors for Highways England to consider in relation to the same regions.

Table 4.4 – Potential Port or Sector Specific Locations

Region	Large Ports	Sector Specific
South West	Bristol	Automotive
South East	Dover	International General Haulage
London	Tilbury	Aggregates
East of England	Felixstowe	Containers
West Midlands	Southampton	Parcels
East Midlands	Grimsby/Immingham	Temperature Controlled Food & Drink
Yorkshire	Hull	Steel/metals
Manchester	Salford	Manufactured Goods
Merseyside/ North West	Liverpool	Waste
North East	Teesport	Bulk

Figure 4.2 shows the 18 Highways England route strategies for the SRN. These strategies outline Highways England's priorities for the five year 'Road Period' and beyond.

Figure 4.2 – Highways England Route Strategies[13]



[13] Highways England – Birmingham to Exeter Route Safety Profile

5. Effects of Incorrect Loading and Overloading on Tyres

5.1 Introduction

This section of the report considers the effects that the overloading and uneven distribution of loads can have on the tyres, vehicle controls, highways infrastructure and the environment. Broadly speaking, overloading and uneven loading can have a wide range of environmental, economic and social impacts.

Reports to Highways England from the DVSA and tyre manufacturers suggest that a significant proportion of commercial vehicles and vans are overloaded. At present, an overload up to 5% will be treated as a minor overload. In this case, the driver will be cautioned and allowed to proceed or they may be requested to remove the excess load.

Table 5.1 shows the penalties for overloading[14]. Vehicle examiners will allow a 5% tolerance before a fixed penalty or prohibition is issued unless the weight has been exceeded by 1 tonne or more.

Table 5.1 – Vehicle Overloading Penalties

Vehicle overweight by	Fixed penalty amount
5 - 9.99%	£100
10 - 14.99%	£200
15 - 29.99%	£300
Over 30%	Court summons

If the overload is serious, the vehicle must have the excess load removed and action will be taken against the driver and operator. Overloading can void vehicle insurance so in the event of an incident involving an overloaded vehicle an operator could be held liable for damages.

In some cases, the overload may only be on an individual axle or axle grouping but the GVW is not exceeded. In such cases, the driver would be expected to redistribute the load to comply with the maximum axle weights of the vehicle.

Review of the DVSA Annual Effectiveness report shows the number of HGV overloading convictions between 2011 and 2014, as well as the average fines issued following prosecution. As shown in Table 5.1, a court summons is usually issued for vehicles that are more than 30% overloaded. During this period, overloading has been the fifth most common prosecuted offence. This information is shown in Figure 5.2.

Table 5.2 – HGV Overloading Prosecutions (2011-2014)

Offence	2013/14		2012/13		2011/12	
	Number of convictions	Average fine	Number of convictions	Average fine	Number of convictions	Average fine
Overloading	147	£654.03	231	£780.93	166	£651.93
All HGV Offences	**4,941**	**£215.69**	**4,873**	**£212.21**	**5,063**	**£208.45**

Table 5.2 shows that overloading offences account for approximately 3-5% of HGV prosecutions. However, the fines for overloading are more than three times greater than the average fines for all HGV prosecutions.

The operator survey showed that at present, operators use a range of methods of ensuring that their vehicles are not overloaded. The most common survey response was the use of a weighbridge (63%)

14 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226566/Guide_to_Graduated_Fixed_Penalties__Financial_Deposits.pdf

and on-board weighing systems (42%). Other methods included vehicle scales, driver judgement, including weight on load manifests 'bucket counts' and test weighing.

It is quite concerning that some operators suggested that they count the number of buckets loaded and rely on the drivers professional judgement to ensure that their vehicles are overloaded. For a number of reasons, these methods are not an accurate way of ensuring a HGV is within vehicle manufacturer or legal weight limits.

Feedback from the Police suggests that the locations of weighbridges could be better publicised and this was seen as a potential intervention that Highways England could support. A Freedom of information request online provides the locations of UK weighbridges. These locations are provided in Appendix A. However, the list appears to be out of date as there are some weighbridges listed which no longer exist or are not operational e.g. Perry Bar and Rostherne.

5.2 Why does incorrect weight distribution and overloading occur?

According to the DVSA,[15] overloading of HGVs was the fifth most common motoring offence for prosecution during 2015. The same report stated that in 2013/14 out of the 2,712 HGVs from the UK stopped, 58.2% of them were issued with a fine for being over their weight threshold.

This is compared with 59.7% in 2012/13 and 60.6% in 2011/12. The data shows that vehicles from non-UK countries are around 2% more likely to be overloaded than UK vehicles in 2013/14 but the decline between 11/12 and 13/14 followed the same trend as UK vehicles.

The figure cannot be said to be representative of all HGVs since the DVSA follow the policy of targeting based on Operator Compliance Risk Score (OCRS). This method results in operators that have previously offended, and therefore have a high OCRS, being more likely to be stopped.

Table 5.3 shows the overloading prohibition rate of vehicles stopped by DVSA between 2011 and 2014. There appears to be a gradual decline in the number of vehicles being overloaded, with Non GB vehicles declining at the same rate but consistently being a few percentage points higher.

Table 5.3 – Percentage of GB and Non GB HGV stopped by DVSA that were overloaded

Financial Year	GB/Non GB	Prohibition Rate
2013/14	GB	58.2%
	Non GB	60.3%
2012/13	GB	59.7%
	Non GB	62.7%
2011/12	GB	60.6%
	Non GB	62.3%

Heavy vehicle operators that comply with vehicle weight limits are placed at a disadvantage, as they struggle to compete with operators that follow a policy of deliberate overloading.

Although high, the percentage of HGVs overloaded is much less than that of light goods vehicles (LGVs). For example, 84% of stopped GB LGVs were overweight in 2013/14, compared to 58.2% for GB HGVs. This is recognised by Highways England under the scope of this project however the effects of HGV incidents are of a greater magnitude.

Reasons for overloading:

- Driver unaware of weight of vehicle and load (negligence)
- Vehicle deliberately overloaded to increase competitive advantage
- Weight declared by customer is incorrect

[15] DVSA Annual Effectiveness Report (2015)

Reasons for incorrect load distribution:

- Weight not redistributed after delivery(s)
- Unable to redistribute load after delivery(s)
- Order of deliveries not considered during vehicle loading
- Deviation from the planned route

In many instances, overloading is not an issue as operators are constrained by volume rather than weight capacity. Examples of this might include transportation of certain goods for example breakfast cereals, which are voluminous but not dense.

5.3 Effects of Incorrect Weight Distribution and Overloading

5.3.1 Effect on Tyres

According to TyreSafe, the effects of overloading and underinflation are very similar[16]. The pneumatic tyre is, in effect a form of shock absorber. The tyre is designed to deflect, and the more effectively the tyre deflects, the better it will be able to protect the vehicle and load from road shocks. Increasing this deflection by overload or under inflation rather than by design reduces tyre performance.

Each tyre will have information on the sidewall, which will state the maximum load and speed within which the tyre is designed to operate. The tyre must be able to carry the weight of the vehicle and load at the maximum speed, and also be able to withstand the stresses of load transfer on braking, steering, acceleration and cornering.

If the tyre is overloaded or the rated speed is exceeded the tyre could become dangerously overheated, and abnormal wear patterns develop which reduce tyre life and grip. When overloaded contact with the road surface is concentrated on the outer edges of the tyres, which leads to accelerated shoulder wear.

The load carrying capacity of a tyre is directly related to the pressure in it. Incorrect inflation pressures could increase the abnormal wear of the tyre, and could potentially cause a serious failure with obvious consequences.

Due to the additional strain placed upon the tyre, which causes it to flex, overloading causes similar effects to those experienced where a tyre is under inflated. Figure 5.1 shows how the area of contact with the road surface is affected, with contact focused on the outer edges on the tyre.

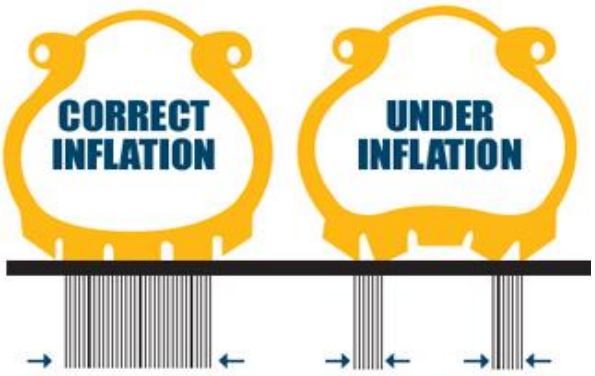


Figure 5.1 – Effect of overloading/underinflation on tyres

Massive strain is placed on vehicle tyres and can cause the tyres to overheat and wear rapidly which increases the chance of premature, dangerous and expensive failure (such as blow outs). The larger footprint of the tyre caused by the overloading also causes uneven and fast shoulder wear, which can affect vehicle handling.

[16] http://www.tyresafe.org/media-centre/latest-news/183-increased-overloading-adding-costs-to-van-users/

Overloading can also reduce the ability to retread or repair damaged and unevenly worn tyres meaning that operators may have to replace them sooner than planned.

A vehicle may not be above its gross vehicle weight capacity but due to incorrect weight distribution, individual tyres may be overloaded, causing the above issues on the overloaded tyre or axle.

5.3.2 Effect on Vehicle Controls

HGVs are designed to operate safely within their maximum gross and axle design weight. The manufacturer will state what the maximum axle and gross weights are for the vehicle on the vehicle plate.

These parameters will ensure that the vehicle can brake, steer and carry the load of the vehicle safely. The braking system, suspension, tyres and chassis will be designed to perform up to the maximum design weight of the vehicle.

If the load on the vehicle is greater than the design weight allowed on the vehicle, extra load is placed on the vehicle components. This extra weight could cause premature failure of components and the consequences could be very serious.

For a vehicle operator, this is more likely to become an increased financial burden, as the components will wear quicker, require earlier replacement and the vehicle is likely to be off the road longer that would normally be expected. There is also the possibility that the Operator Licence of the owner could be affected.

Incorrect loading of a vehicle can cause the vehicle to be unstable whilst moving. If the load is incorrectly distributed or in excess of the vehicle design weight this could exceed the performance of the vehicle components and affect the vehicles stability along with its ability to brake and steer, with potentially serious results.

Overloading makes the vehicle less stable, more difficult to steer and increases stopping distance. Vehicles react differently when the maximum weights, which they are designed to carry, are exceeded. As uneven loads make the vehicle or trailer unstable, navigating corners and roundabouts is especially dangerous and the likelihood of a vehicle rollover incident is increased.

The DVSA said that drivers are not only putting themselves at risk when they carry too much cargo, but other motorists as well. Due to the adverse effect on brakes, overloading further increases the risk of fatal accidents, which is already high.

5.3.3 Effect on Infrastructure

Overloading causes excessive wear and damage to roads, bridges and pavements, which accelerates required maintenance and can reduce asset life at the expense of the taxpayer. The damage is exponential, in that the greater the added weight over the maximum, the greater the damage. Damage also depends on the construction standards of the pavement or structure in question so would vary for different stretches of the SRN unless construction standards are uniform.

The damage caused by the passage of any particular heavy vehicle is determined by the magnitude of each of its axle loads, the spacing between the axles, the number of wheels, the contact pressures of the tyres and the travelling speed.

For existing pavements, when compared to a road network without the overloaded vehicles, the presence of the overloading will either:

- Reduce the likelihood of the pavement achieving the intended service life at the desired serviceability (i.e. reduced reliability) without prior rehabilitation; and/or
- Increase the rate of surface deterioration and thus increase the required maintenance.

From a design perspective, whilst the high degree of built in design reliability could be considered to provide some “spare” capacity for some overloaded vehicles to be accommodated, the overloaded

vehicles consume some or all of that capacity, the balance of which will vary from site to site. It follows that irrespective of design reliability level, increasing magnitude and frequency of overloaded vehicles will inherently reduce the overall reliability of the pavement from the original design value.

5.3.4 Environmental Impact

An overloaded vehicle emits exponentially more pollution than one that is not overloaded, since fuel consumption increases. When on steep gradients slow moving heavy vehicles cause traffic disruption, causing congestion and a further increase in emissions.

5.4 Vehicle Data

5.4.1 Weight in Motion (WIM) Data

Highways England said that a number of DVSA WiM sites are no longer operational. This was confirmed during consultation with DVSA on 1st November 2016. The reason for site closures in some cases is due to the development of Managed Motorways. Perry Bar, which was described as an effective enforcement site by DVSA is no longer used for this reason.

Following a Freedom of Information Request by a member of the public, the DVSA provided a list of WiM sites. This list is provided in Appendix A.

DVSA WiM data for specific vehicles is not publically available however, the DVSA Annual Effectiveness Report includes figures for overweight prohibitions, fines and convictions.

5.4.2 DVSA Overweight Prohibition Data

The DVSA Annual Effectiveness Report provides information on the number of weight checks carried out on various vehicle types. Table 5.4 shows the number of HGVs weighed, the number and rate of prohibitions.

Table 5.4 – DVSA HGV Weight Checks and Overweight Prohibitions Issued (2011-14)

Year	Type	GB/Non GB	Weight Checks	Prohibitions Issued	Prohibition Rate
2014-15	HGV	GB	2,191	1,304	59.5%
	HGV	Non GB	2,385	1,482	62.1%
2013-14	HGV	GB	2,712	1,578	58.2%
	HGV	Non GB	2,435	1,469	60.3%
2012-13	HGV	GB	2,759	1,648	59.7%
	HGV	Non GB	2,651	1,663	62.7%
2011-12	HGV	GB	3,239	1,963	60.6%
	HGV	Non GB	2,909	1,813	62.3%

As shown in Table 5.3, a significant number of HGV weight checks are performed by DVSA each year and roughly, 60% of those weighed are overweight and issued with a prohibition. The data shows that there has been a downward trend in the number of vehicles weighed by DVSA between 2011 and 2015 with 6,148 in 2011/12 compared to 4,576 in 2014/15. This is equivalent to a 26% reduction and although the number of vehicles checked has fallen over this period, the proportion which are overweight has remained at around 60%.

Although roughly 60% of vehicles weighed by DVSA are overweight, this sample is not representative of the wider industry as DVSA have an intelligence-based approach to pulling over and inspecting vehicles at the roadside or at operator's depots.

6. Hardshoulder Debris

6.1 Service Provision

6.1.1 Maintenance and Operational Requirements

Highways England has recognised the issue of debris on the hard shoulder and maintenance requirements are undertaken by the Service Providers under both the Managing Agent Contract (MAC) and Asset Support Contract (ASC) delivery models. The requirements are defined in contract include sweeping and cleaning of the hard shoulder and the spot removal of debris in response to incidents.

Two forms of maintenance and operational requirement are relevant to this report:

- Routine and Severe Weather Code (RSWC) and Network Management Manual (NMM). The RSWC is prescriptive detailing the maintenance requirements and was applicable to the MAC delivery model, whilst the NMM brings together extant policy from those two volumes together with current Area Management Memos and Network Security Notes. It provides advice, some mandatory instruction and guidance on good practice for the management and provision of the routine and winter service on the trunk road network.
- Asset Maintenance and Operational Requirements (AMOR). AMOR is an outcome-based requirement for maintenance and operational activities and is applicable to the ASC delivery model. The outcome-based approach provides for the Service Provider to determine his method to achieve the requirements through a risk based approach.

Figure 6.1 shows the risk based methodology approach to maintenance employed by the service provider for Area 9. As can be seen, a scoring system is used to prooritise the approach to maintenance. (Commercial sensitivities?)

Catastrophic - potential loss of life	Consequence of Event	5	5	10	15	20	25	Safety Critical - Make Safe & mitigate within 24 hrs
Major		4	4	8	12	16	20	Safety Critical - permanent repair within 7 days
Moderate		3	3	6	9	12	15	Safety Critical - permanent repair within 28 days
Minor		2	2	4	6	8	10	Other defect - repair within 6 months
Insignificant		1	1	2	3	4	5	Other defect - include in renewal scheme
			1	2	3	4	5	
			Likelihood of Hazardous Event					
			Unlikely	Possible	Probable	Likely	Very Likely	

Figure 6.1 – Area 9 Approach to Maintenance

The project team visited the Perry Bar site during the course of the project to observe a diesel spillage treatment and discuss hardshoulder maintenance. During this visit, the service provider for that area provided that debris on the road and verges is not picked up unless there has been a closure on that particular stretch. In most cases, debris is placed on the hardshoulder for collection during routine maintenance by the service provider.

6.1.2 Review of Changes to the Maintenance and Operational Requirements

A comparison of the changes in the maintenance and operational requirements for the activities relating to debris on the hard shoulder are shown in Table 6.1.

Table 6.1 - Changes to requirements relating to hard shoulder debris

Maintenance Activity	RSWC / NMM	AMOR	Notes:
Safety Inspections and Safety Patrols	Prescribed frequency of occurrence dependent on the classification of the network.	Frequency determined by the Service provider based on a risk assessment.	Safety Inspections and Safety Patrols are conducted from a moving vehicle for both maintenance and operational requirements. NMM recognised the issue of debris on the hard shoulder in section 3.14: "*On occasions it will be necessary for emergency vehicles to drive along the hard shoulder, often at speed. It has been noted that debris on the hard shoulder, particularly metal objects can cause punctures to emergency vehicles. Therefore the use of magnetic cleaning is encouraged*."
Sweeping and Cleaning	Grade A standard in accordance with the Code of Practice for Litter and Refuse.	Grade A standard in accordance with the Code of Practice for Litter and Refuse.	Condition assessed by visual inspection. Under AMOR the Service Provider is required to prepare a Maintenance Requirements Plan for the approval of the HE Service Manager. This is intended to give the HE assurance that the required level of service will be delivered.
Incident Clearance	Specified attendance and clearance times. Provision of Incident Support Unit specified.	Specified attendance and clearance times. No requirement for Incident Support Unit.	Greater emphasis under AMOR for the Service Provider to respond to instructions from the Police or the Traffic Officer Service. Police and Traffic Officers can collect debris and put in safe place for later collection by the Service Provider.

6.1.3 Impact of Contract Changes

The requirement for the Service Provider to sweep, clean and maintain safety on the hard shoulder remains unchanged. The service level requirement, of Grade A in accordance with the Code of Practice for Litter and Refuse, is unchanged. Theoretically, there should be no impact on the service delivery because of the changes.

6.1.4 Highways England Data Analysis

Table 6.2 outlines the 'Top Ten' highways for tyre debris incidents in 2014, as extracted from Highways England's Command and Control data for tyre debris incidents.

Table 6.2- Top Ten Highways for HGV Tyre Debris Incidents (2014)

Highway	Number of Incidents	Share of All Incidents	Average Lane Impact Duration (mins)
M6	369	20.1%	27
M5	238	12.9%	35
M25	169	9.2%	36
M1	162	8.8%	33
M62	161	8.8%	25
A1M	128	7.0%	24
M4	115	6.3%	37
M42	74	4.0%	42
M40	69	3.8%	26
M20	61	3.3%	26
All HGV Incidents	**1,840**	**84.0%**	**33**

As shown in Table 6.1, there were 1,790 HGV tyre debris incidents recorded on motorways by Highways England in 2013. Of the highways with the most incidents recorded, the M6 and M5 account for almost one third of all recorded incidents. By comparison, the Top Ten sites for tyre incidents were the same in 2014 as they were in 2013.

In terms of duration, the average lane impact duration was 33 minutes in 2014.

6.1.5 Relationship between Hardshoulder Debris and Tyre Failures

The incident report provided by Highway England for the years 2013 and 2014 relating to tyre debris, contained in the spreadsheet titled "CV IP Programme - CC Baseline Data for tyre debris incidents 2013 14" does not indicate whether the tyre debris is the cause of or resultant to the incident. As such, no relationship between hard shoulder debris and tyre failure can be made.

The team intends to engage with a major tyre manufacturer, which has been investigating tyre carcasses found on the hardshoulder to identify patterns in the debris.

6.2 On-Road Traffic Officers

6.2.1 Role and Interaction of Traffic Officers

Traffic Officers help to manage incidents by:

- coordinating the resources of the emergency services
- managing traffic to reduce incident related congestion
- clearing debris from the carriageways
- re-opening routes as soon as it is safe to do so
- support the police

Traffic Officers wider role[17]:

- keep SRN users informed through electronic message signs and by supplying information for local travel reports
- help SRN users if they breakdown or are involved in a collision or incident
- remove damaged and abandoned vehicles

[17] https://www.gov.uk/government/organisations/highways-england/about/about-our-services

- provide mobile and temporary road closures

The Traffic Officer Work Instructions provides guidance on dealing with debris. This is as follows:

General

a) Off-carriageway debris is the responsibility of the MSP. Request immediate MSP attendance if off-carriageway debris could impact the carriageway eg be blown there by high winds

b) When informing the MSP of off-carriageway debris give precise location details – they may collect the debris at night

c) If the debris may be linked to an incident or a crime inform the Police and request the MSP to retain the debris

d) If large debris is traceable, pass details of the apparent owner to the MSP for cost recovery purposes. Also inform the Police for their consideration of possible proceedings

Small debris that is on the carriageway and is removable by TO resources:

a) Remove the debris to the verge (or rear boundary of a nearby refuge area or lay-by) noting the exact location

b) Request the RCC to inform the MSP of the location of the debris and to request them to arrange disposal

Large debris that is on the carriageway and is not removable to the verge by TO resources:

a) Request the RCC to inform the MSP

b) Supervise removal of the debris by the MSP

c) Consider the need for specialist cleansing or road surface testing following clearance

Debris in Smart Motorway (SM) sections:

a) Alternative methods for dealing with small debris in these locations include taking the debris to an emergency refuge area (ERA) on a non-elevated section or to a suitable off-carriageway or depot location in order that the MSP can deal with it

b) Where small debris has been taken to an ERA, unless it can be placed so as not to impact on the use of the ERA, remain at the ERA pending collection by the MSP (unless not feasible to do so or attendance at another incident takes precedence)

c) Placing small debris in an ERA located on an elevated section may be inappropriate due to the risk of debris being blown or thrown onto infrastructure below – consult local instructions before placing debris there

Under the Traffic Management Act 2004, Traffic Officers have the following powers:

- stop and direct traffic
- close lanes and carriageways
- manage traffic

Failing to obey directions from a Traffic Officer is an offence and carries a fine of up to £1,000 along with possible driving licence endorsement or disqualification.

Under AMOR the Traffic Officer Service (TOS) take a more significant role in managing incidents and requesting the service of the Service Provider to assist. This is defined in Appendix 3.2 of AMOR, Traffic Officer Service and Service Provider Joint Operating Principles. Responsibility for the condition and maintenance of the asset remains with the Service Provider.

The project team visited the Highways England North West Regional Control Centre. A summary of the findings and process taken by Traffic Officers is provided below.

- When traffic officers arrive at the scene, their priority is to ensure that vehicle occupants and the person(s) servicing (e.g. tyre contractors) are safe. Following this they will arrange lane closure if required. For HGV tyre incidents on the hard shoulder, the live lane must be closed if an offside tyre is affected.
- If an offside HGV tyre incident occurs on the hardshoulder during peak hours, the North West RCC said that they would not close a live lane until traffic flow declines, unless on a particularly quiet stretch.
- The North West has six outstations and four patrol cars are dispatched from each station. There are set strategic park up points across the area where traffic officers observe and respond. Traffic officers no longer patrol the network due to the resultant vehicle depreciation and fuel costs.
- Following an incident, traffic officers can move debris from the carriageway or hard shoulder but cannot remove it as they do not have a waste disposal licence. Often they will leave the debris at the roadside for the service provider to remove later.

6.3 Hardshoulder maintenance regimes

Each Highways England Service Provider should have a maintenance programme or plan that is Area specific, dependent on the road hierarchy, traffic flows and asset condition. This plan should detail their hard shoulder maintenance regime. These documents are not readily available, and may be considered by the Service Providers to be commercially sensitive. It is not, therefore, possible to comment within this report on the maintenance regimes of the service providers.

6.3.1 Area 9 - Kier Feedback

The project team were invited to attend a diesel spillage demonstration at Kier's depot in Perry Barr. During the visit, the team were presented with various contract service information and provided with the answers to the following questions:

What services do you need to provide as part of your contract with Highways England?

There are six key services that are required to be provided as part of the contract. These are:

- Incident Attendance & DCP identification
- Asset Inspection – Safety and Detailed – Identify Defects
- Minor Asset Repairs/Make Safe e.g. Pothole repair, barrier coning etc.
- Emergency Traffic Management (ETM) (where safe to do so)
- Winter Maintenance duties (decision making, reserve gritter drivers)
- Asset Watchman role

Who is responsible for delivering the six key services?

Asset Incident Wardens (AIWs) are the primary resource employed for delivering the six key services. There are 16 AIW Teams of 2 on the Area 9 Network, which are the on-road eyes and ears of the organisation.

Each AIW Team will be responsible for approximately 100 miles of carriageway and will undertake all safety patrols and the majority of detailed inspections required under the contract within that route (with the exception of specialist inspections such as Structures and Geotech).

AIW Teams will operate from depots across the network, working a rota system incorporating early, late and night shift Monday to Friday and Stand-by at weekends means a 24/7 coverage of the network.

On a daily basis the AIW duties are prioritised as follows:

- Priority 1 – Incident Response to Asset Damage– Advise, monitor, make safe and collect DCP
- Priority 2 – Severe Weather – Advise and support Duty Manager/Supervisors
- Priority 3 – Safety Patrols and Inspections
- Priority 4 – Watchman Investigation
- Priority 5 - Targeted Longstop inspection

Who is responsible for maintaining the grass verges, cleaning up debris on the hardshoulder and repair works?

Debris on the road and verges is not picked up unless there has been a closure on that particular road. Usually traffic officers will put debris on the hard shoulder for the service providers to collect during routine maintenance.

If debris is not considered to be causing a danger to traffic then the service provider is under no obligation to collect it. Kier mentioned that they are not allowed to cross the carriageway to collect debris due to health and safety reasons

7. Interventions

7.1 Introduction

This section sets out how the interventions as proposed in the Interim Tyres Report and selected by Highways England for detailed examination, can be taken forward. Following feedback from the client, a number of interventions have been deferred or dismissed due to a range of factors including the perceived effectiveness or timescales involved. Further to this, a number of interventions have been merged to provide more comprehensive options.

For each of the selected options, the following information is provided in this document:

- Issue
- Evidence
- Potential Solution
- Staged approach to delivery

7.2 TM1 – Develop guidance for operators

1. Create best practice tyre management guide

Issue

- There is a lack of consistency between different operator's tyre management strategies
- 100% of operators responding to our on-line survey said they have a strategy however, some operators did not respond to our survey and there are still over 5,000 tyre incidents recorded by HE annually
- Offside tyre changes put the tyre fitter's safety at risk and therefore require live lane closures.

Evidence

- There is a lack of consistency between different operator's tyre management strategies
- The Texaco survey looked at 500 truck fleets and discovered that only 42% carry out regular tyre pressure checks
- In most cases, tyre pressure is checked every 6 weeks as part of routine vehicle servicing
- HE records 5,000 tyre incidents involving HGVs annually.

Potential solution

Develop a best practice tyre management guide for commercial vehicles and trailers, which operators can tailor to their specific needs and use as a benchmark to review their existing procedure against.

Highways England might consider charging operators who are involved in a tyre incident on the SRN for not complying with this best practice guide. This guidance should be linked to the vehicle breakdown costs document below as this could encourage operators to adopt best practice guidelines when they realise how much it could cost them if they do not.

The procedure may include the following elements:

Tyre Procurement

- Consideration of the operation, load/weight and speed
- Consideration of third-party support

Tyre Checking/Inspection Frequency

- Legal requirements (e.g. PMIs, Annual Test and Daily Checks)
- Best practice
- Trailer collection

What to look for

- Tread wear
- Damage
- Visual inspection weaknesses

Equipment

- Range of equipment available (e.g. from tyre gauges to drive-over equipment)
- Support daily checks
- Periodic use

Driver Responsibilities / Training

- Responsibility for driving with legal tyres
- Training available

Trailer collection and change over

- Responsibility for checking each trailer as well as the tractor unit
- Recommended procedure for correct trailer swap-over

Other:

- Handouts/guidance documents
- HGV Tyre Awareness Campaign (industry and enforcement bodies)
- Tyre end of life/ retreading / regrooving

This guidance should be produced in consultation with relevant stakeholders including operators, tyre manufacturers, tyre specialists, DVSA, Police and Traffic Commissioners and be translated into multiple languages.

There is existing material, which should be used to develop the contents of the guidance.

Staged approach to delivering intervention

a) Consult relevant stakeholders such as fleet operators, tyre manufacturers, tyre fitters, DVSA, Police and Traffic Commissioners and gather existing material
b) Develop preliminary best practice guide and obtain feedback from stakeholders
c) Translate into multiple languages
d) Raise awareness of best practice procedure via FTA, RHA, FORS, trade fairs etc.
e) Enforce on network and potentially charge operators who are involved in incidents that cause costs to HE and delays to other road users that have chosen not to follow best practice

2. Create vehicle breakdown costs document / case study and highlight that these may be passed on to non-compliant operators

This document will outline the costs associated with vehicle breakdowns and will mention that if operators choose not to follow best practice then these costs could be passed onto them. This guidance should be linked to the best practice tyre management procedure detailed above.

A case study should be produced alongside this guidance that will highlight the pros and cons of premium / mid-range and budget tyres. This should include a basic cost / benefit analysis of fitting premium tyres as opposed to budget ones and provide an example of how an operator has chosen to do this and saved money in the process.

This document should be translated into multiple languages.

Staged approach to delivering intervention

a) Use cost of vehicle breakdown information contained in Atkins report[18] and create guidance document for operators
b) Consult with relevant stakeholders such as 'friendly' fleet operator, tyre manufacturers
c) Develop case study highlighting pros and cons of premium / mid-range and budget tyres
d) Translate into multiple languages
e) Raise awareness of vehicle breakdown costs document / case study via FTA, RHA, FORS, trade fairs etc.
f) Enforce on network and charge operators who are involved in incidents that have chosen not to follow best practice

3. Compile database of locations of weighbridges in England

Issue

- Overloading tyres increases the risk of a blow out and affects the drivers' ability to control the vehicle. It is unfair to compliant operators who comply with vehicle weight regulations
- Some operators and drivers knowingly overload vehicles for competitive advantage
- Finding the location of the nearest calibrated and operational weighbridge is not always as easy as it should be
- Methods of weighing vehicles are not always sufficiently accurate

Evidence

- The UK government website provides a weighbridge finder tool[19] however, this directs the user to the relevant local authority website for the postcode entered and does not always provide the optimal locations. The list of weighbridges found following a FOI request is outdated
- Some operators rely on counting digger buckets and driver judgement to determine whether a vehicle is correctly loaded
- Some drivers rely on load cell based weighing systems on-board vehicles. Whilst these are useful come are not calibrated sufficiently or regularly checked for accuracy

Potential solution

Develop a publically available database outlining the location, opening times/availability and costs of weighbridges within 5 miles from junctions situated on the SRN. This should be a comprehensive list including privately and publically owned weighbridges and also those located at DVSA, HE and police check sites.

This database could be made publically available on Highways England's website, other relevant stakeholder's websites or via other forms of media such as Motorway Buddy for instance. Further to this, a GiS map layer could be created and possibly added to existing mapping tools and linked devices such as satellite navigation systems.

Staged approach to delivering intervention

a) Consult with DVSA, DfT, Police, HE, local authorities, and various internet resources
b) Compile list of public and private weighbridge locations, usage costsavailability etc.
c) Make information publically available on Highways England's, DfT's website and Motorway Buddy

[18] Commercial Vehicle Incident Prevention Strategy Outline Business Case, Atkins
[19] https://www.gov.uk/find-weighbridge

4. Create advice for drivers on the dangers of vehicle overloading, the impact this might have on operating costs and what to do if they suspect their vehicles are overloaded

Issue

- Drivers may be unaware of the seriousness of overloading
- Both the driver of the vehicle and the operator are legally responsible for avoiding overloading and both can be prosecuted for breach of the regulations
- Overloading tyres increases the risk of a blow out and negatively affects the driver's ability to control the vehicle. It is also unfair to compliant operators who comply with vehicle weight regulations
- Some operators may deliberately overload vehicles or rely on manifest weights to calculate the payloads
- Certain industry sectors such as loose bulk loads are more likely to be overloaded due to the nature of cargo, but operators should have systems in place to avoid this

Evidence

- Approximately 60% of vehicles stopped by the DVSA are overweight each year
- 3-5% of all HGV prosecutions are for serious overloading e.g. >30% above the vehicles Maximum Gross Weight (MGW). This is the fifth most commonly prosecuted offence
- Some operators rely on counting digger buckets and driver judgement to determine overloading
- Overloading reduces infrastructure life and accelerates the need for maintenance
- Overloading vehicles makes the engine operate less efficiently and increases the levels of pollution emitted
- The average fine for serious overloading in 2014 was £654.03 which is triple the average for all HGV prosecutions
- Overloading can invalidate an operator's insurance policy and mean that an operator is in practice uninsured

Potential solution

Highways England might consider developing a guidance document providing advice to drivers on the dangers of vehicle overloading and what to do if they suspect their vehicle is overloaded. This should be translated into multiple languages and could be handed out to both UK and foreign operators when they are stopped by Traffic Officers, DVSA, police etc.

This guidance could include:

- The responsibilities of the operator / driver
- Methods of preventing vehicle overloading
- Negative impacts and costs of vehicle overloading
- Legislation surrounding overloading
- Potential penalties for overloading
- Information on how to find the nearest weighbridge
- Promotion of on-board weighing systems
- Useful contact information

<u>Staged approach to delivering intervention</u>

a) Consult relevant stakeholders such as FTA, RHA, FORS, DVSA and Traffic Commissioners
b) Develop preliminary advice on the dangers and impacts of overloading
c) Translate into multiple languages

d) Raise awareness of guidance via FTA, RHA, FORS, trade fairs etc.

5. Map trends in incidents and tyre failure hotspots

Highways England's Command and Control Centre has already provided our team with two years' worth of data (2013 – 2014) on the locations and frequencies of tyre blowouts, punctures and flat tyre incidents. The table below shows the worst 20 highways for tyre incidents (blowouts, punctures and flat tyres) 2013 and 2014.

Highway Name	Number of incidents (2013 and 2014 combined)	Highway Name	Number of incidents (2013 and 2014 combined)
M6	1137	M1	1002
M25	740	M5	661
M62	538	A1M	452
M4	266	M42	238
M20	210	M40	200
M3	169	M18	154
M11	110	M60	103
M27	88	M56	77
M2	58	M50	58
M180	56	M23	49

Although preliminary work has already been conducted to map tyre failure hotspots across the SRN, this could be expanded upon in greater detail.

In order to pinpoint particular 'hotspots' on the SRN, Highways England should consider developing heat maps that show which sections (e.g. M6 between Junctions 14 and 15) of the SRN are particularly susceptible to HGV tyre incidents. This could be achieved by using the GIS Shape Map (of the SRN) and link file(s) and using these files together with the Command and Control Centre data to develop a GiS map of incidents.

It addition Highways England might consider developing its understanding of the external factors that contribute to tyre failures and highlight any trends. Once the heat maps have been created further research could be conducted on what might be causing these incidents to occur in these areas. Contributing external factors could include:

- Impact with litter / debris
- Excessive gradients on the road
- Conditions encountered by vehicles at delivery / collection points
- Driving unintentionally or quickly over obstacles in the road

Staged approach to delivering intervention

a) Obtain GIS shape map data and relevant link files from Highways England
b) Use in conjunction with Command and Control Centre data to develop GIS heat map
c) Consult with area service providers to determine levels of litter / debris in a given area and see if they are aware of any issues that may be influencing the number of tyre related incidents

d) Conduct research on the impacts that gradients can have on tyre wear
e) Conduct research on the topography of area hotspots
f) Collect data on the vehicle type and industry sector of vehicles involved in tyre incidents in area hotspots and identify any trends
g) Gather information on the local businesses in the area hotspots that relate to these industry sectors
h) Contact these businesses and convince them to adopt best practice tyre management procedures

7.3 TM2 – Consult with industry

1. Set up national challenge group consisting of relevant stakeholders such as DVSA, Police, Fleet operators, Traffic Commissioners, FTA, RHA, FORS and any other specifiers etc. and build buy-in

Issue

- Lack of strategic direction for commercial vehicle enforcement across the different enforcement agencies
- Levels of enforcement activity within the Police vary considerably dependant on the level of interest and training and officers
- Infrastructure investment on the network (i.e. SMART motorways) are having detrimental effects on the level of enforcement that can be conducted
- Tachograph fraud (i.e. magnets, switches etc.) is becoming very complex and is therefore difficult to identify and enforce against

Evidence

- Discussions with DVSA, Police, former Police Traffic Officers have highlighted that DVSA cannot legally stop vehicles on Smart Motorways when a variable speed limit is applied
- Police resourcing issues have been identified for vehicle enforcement along with Police training issues and approval to issue PG9 vehicle prohibitions
- Closure and disuse of former DVSA check sites have occurred due to managed motorways and infrastructure projects
- Different enforcement agencies are using different methods and software for analysis drivers hours'
- The way DVSA and the Police interpret the Graduated Fixed Penalty legislation is different

Potential solution

The national challenge group would encourage its members to take ownership of its agreed priorities and could follow a similar format to the load-security forum that HE was previously involved in. This challenge group could be used to:

- Review / develop guidance documents
- Develop direct relationships with Traffic Commissioners, DVSA, Police, TfL, TfGM, FORS, FTA and RHA etc.
- Promote joined up thinking between all the organisations involved
- Develop best practice
- Promote the collection and sharing of operator and vehicle data
- Keep the partnership board up to date with the latest events
- Explore collaborative funding / resourcing

Staged Approach

a. Agree chairperson for the National Challenge Group
b. Agree which stakeholders are to be involved - i.e. Traffic Commissioners, DVSA, Police, TfL, TfGM, FORS, FTA and RHA etc
c. Agree location and regularity of National Challenge Group meeting (i.e. monthly, quarterly)
d. Contact each stakeholder to request them to nominate a representative to attend the meetings
e. Hold a launch meeting to introduce the National Challenge Group and define its scope

2. Consult with foreign enforcement agencies DfT and Northgate Public Services to improve foreign operator compliance

Issue

- There is a perception, supported by data and comments of the enforcement agencies that overseas drivers and vehicles are less compliant than GB ones
- Traffic Commissioners cannot take action against foreign operators o-licence
- Highways England has a facility to inform foreign enforcement bodies of any issues found with foreign vehicles but the extent to which this is being done is unknown

Evidence

- Police, DVSA and Traffic Commissioner outlined specific issues with foreign operators
- Consultation with Traffic Commissioner, DVSA and Police
- Foreign operators must pay graduated fixed penalties on the day unlike UK operators who have 28 days or they are not likely to be paid

Potential solution

Highways England should consult with the foreign equivalents of the DVSA, Police and HE and collaborate with them to drive change amongst foreign operators and create joined up thinking and action between themselves and other countries.

Traffic Commissioners can take action against UK operator's O-Licences but not against foreign operators. It is therefore recommended that Highways England should explore what more can be done to deter foreign operators from breaking 'O' licence rules.

All foreign operators wishing to use the UK road network must purchase a HGV road user levy before entering the UK. This applies to all vehicles weighing 12 tonnes or more and is payable on a daily, weekly, monthly or annual basis.

There are a number of ways that non-UK HGVs can pay for the levy including via a payment system developed and operated by Northgate Public Services. Non-payment of the charge is a criminal offence and can result in a fine of £300.

Highways England might consider exploring what information can be attached to the road user levy receipts through consultation with Northgate. Useful information on UK road laws could be incorporated into the terms and conditions or provided separately. As every foreign operator is required to have a road user levy this would be an excellent way of ensuring all foreign operators are reached, with UK specific information.

Staged approach to delivering intervention

a) Compile top 10 list of foreign countries with highest numbers of offending operators
b) Consult with DVSA / Highways Agencies in these countries and create list of interventions for consideration
c) Consult with Traffic Commissioners / Police to gain their insight into how to deter foreign operators from breaking 'O' licence rules

d) Consult with DfT and Northgate Public Services and determine whether 'O' licensing rules can be included into the terms and conditions of the road user levy or provided separately with the receipt
e) Increase road user levy for vehicles registered in the most offending countries and make them accountable
f) Consider the ramifications of not issuing a road user levy permit for repeat offending operators

7.4 TM3 – Conduct pilot studies

1. Install HGV tyre checking facilities at key locations on the SRN and at selected operator's depots

Issue

- Overweight, unevenly loaded HGVs and vehicles with defective tyres are operating on the SRN
- The propensity for an incident is more likely when tyres are operating at or beyond their design limits
- Incidents can be catastrophic and have huge economic and social impacts.

Evidence

- A successful pilot at Keele Services in 2015 has already been undertaken
- In 2014, there were 147 seriously overloaded HGV prosecutions (>30% overloaded)
- Approximately 60% of HGVs checked by DVSA were found to be overloaded (2011-2014)

The economic benefits of preventing accidents are as follows:

- Fatal - £2.2m
- Serious incident - £270k
- Slight incident - £24k

Potential solution

Highways England should continue its plans to install HGV tyre checking facilities at key locations on the SRN and at selected operator's depots in line with its Tyre Management Strategy. This rollout will build on the successful pilot conducted at Keele Services and take place over the period 2017-2020.

The most effective locations for tyre checking facilities should be identified on each of Highways England's route strategies. Highways England's Command and Control Centre data (HGV tyre incident data: 2013-2015) should be reviewed before making a decision on where these locations should be. Consideration should also be given to the proximity of major cities, existing motorway service areas, ports and lorry parks.

The roll-out of the tyre checking facilities should be limited to a small number of locations to begin with and feedback should be obtained to ascertain how successful these installations are at reducing the number of incidents. If deemed successful the number of installations should be gradually increased until two tyre checking facilities are installed on each of Highways England's 18 strategic route corridors by 2020.

Highways England might consider making the operators aware of the results of any tyre checks as well as the drivers as this would limit the potential for the results to be forgotten / not acted upon.

In addition to the above, Highways England could utilise technology and help fund resources at entry points to the UK, so that defective HGVs entering the country can be dealt with before the vehicles reach the SRN. Foreign operators have been highlighted as a specific problem due to disproportionality. This would be a good solution as there are difficulties enforcing the law against foreign drivers and operators as Traffic Commissioners have no jurisdiction.

Staged approach to delivering intervention

a) Develop most effective locations for tyre checking facilities using Command and Control Centre data, police enforcement data
b) Consult with suitable MSA's, ports etc. and gain buy-in
c) Procure tyre checking facility supplier(s)
d) Roll out facilities at a small number of locations
e) Obtain feedback from selected locations and determine levels of success
f) If successful, roll out facilities to more locations

2. Investigate the use of DVSA ANPR/WIMS sites and potentially open additional weighbridges (both private and HE owned) at key locations on the SRN

Issue

- Police issues with resourcing and providing trained staff relating to HGV enforcement efforts have been highlighted
- A number of DVSA sites have been closed or are no longer used

Evidence

- The Operator Compliance Risk Score (OCRS) system employed by DVSA for targeting vehicle operators is well developed but could benefit from transparency and data sharing
- Provision of equipment or data could reduce resource requirements on enforcement bodies

Potential solution

Highways England could potentially contribute to developing reasonable geographical coverage with regards to available weighbridges open to operators across the SRN. This could be achieved by negotiating access to the currently open DVSA WiM sites, funding the reopening of the sites that DVSA have closed, opening up additional weighbridges to the public and possibly subsidising the use of privately owned weighbridges.

Firstly approach DVSA to find out if they would be willing to allow HE to provide funding to reopen the closed weighbridge sites in exchange for HE being allowed to use the sites as they wish and gaining access to any data collected. HE could also negotiate access to the DVSA WiM sites that are still currently open.

It is believed that TDC Systems manage a number of DfT WIMS sites on the SRN so HE could explore the possibility of working with this company for the DVSA sites.

Secondly, it is understood that Highways England also have their own weighbridges which are used when loading gritters. The exact location of these sites should be determined and potentially opened up for use by the public who suspect their vehicles are overloaded.

Lastly, HE could consider subsidising the use of a number of private weighbridges in close proximity to the SRN in key areas of England to make up the shortfall of coverage.

Another option for Highways England would be to open up their own weighbridges to the general public and charge for their use which could possibly be done using a franchise arrangement. This could generate a source of income which could be used in other areas of the business.

The outcome from this intervention would be in the form of a populated spreadsheet/database and the capability for HE to issue warning letters to operators running overweight vehicles on the SRN. HE would agree the weight tolerance for the letters.

Staged approach to delivering intervention

a) Consult DVSA, DfT and TDC systems and negotiate / fund DVSA WiM sites
b) Compile list of HE weighbridge locations and open for public use
c) Conduct gap analysis of areas not covered by DVSA / HE weighbridge sites
d) Consult private weighbridge owners in areas where there is no weighbridge coverage and consider subsidised use
e) Create and populate a database of WIM data
f) Introduce warning letter protocol for operators running overweight vehicles on the SRN

3. Specify that in-house HE construction sites (e.g. smart motorway build) at key locations on the SRN are serviced by accredited fleet operators

Issue

- HGVs delivering to off road sites are at greater risk of picking up debris between tyres and suffering tyre damage

Evidence

- Feedback has been provided by construction sector operators
- Fleet accreditation scheme audits ensure that operators have certain processes and procedures in place relating to tyre management, vehicle servicing, vehicle loading and defect checks
- Operators that have already signed up to an accreditation scheme have a tyre management plan in place
- It is believed that companies with a tyre plan in place are less likely to be involved in incidents on the road
- A number of large construction companies and local authorities recognise the benefits of fleet accreditation

Potential solution

Highways England could examine the merits of specifying that deliveries and collections to their major project sites are made by accredited fleets, which have been audited for management, vehicle and operational best practice, including tyre management and safe loading. In doing this HE would force operators wishing to work on Highways England's contracts to take responsibility for their fleets and meet a required standard as stipulated by FORS, FTA etc.

Staged approach to delivering intervention

a) Consult FORS, FTA, RHA etc. informing them of plans for enforcement and join scheme(s) as a Champion
b) Consult Area Service Providers and inform them of plans for enforcement
c) Select a small number of sites to roll out intervention
d) Specify in sub-contracts with operators the requirement to operate accredited fleets
e) Ask operators to provide evidence of compliance with best practice procedure
f) Conduct vehicle spot-checks at site(s) if necessary
g) Issue warning letters to those found not to be compliant and cancel contract if problem persists

4. Trial alternative debris removal procedure in a particular area (e.g. Area 7)

Issue

- Increased incident of punctures caused by hard shoulder debris reported by Police

Evidence

- Consultation with various police forces suggests there is a variable level of debris removal and carriageway maintenance around the network
- Existing service providers are "encouraged" to use magnetic cleaning to remove metal shards which could cause punctures, but it is not sure how widespread this is
- Operator survey feedback regarding causes of tyre damage
- A recent study conducted by Bridgestone of tyre carcasses highlighted that 67% of all tyre failures were attributable to impact with debris on the network

Potential solution

The evidence provided by Bridgestone supports the feedback provided by operators and the police during the consultation phase of this study. This suggests that debris on the network is an issue that causes a large number of tyre related incidents and that the ways in which this debris is removed needs to be improved.

Staged approach to delivering intervention

a) Use evidence obtained from this study and Bridgestone to highlight blackspots and influence change
b) Stipulate that area maintenance providers use vehicles or equipment with suction or magnetic technology for carriageway and hard shoulder clearance. This potentially could be designed to be done at speed by vehicles working under 'orange lights' as is the case with road gritters.
c) Revising Service Level Agreements relating to the removal of hard shoulder debris from the SRN e.g. establish improved agreed tyre incident response/debris removal KPIs
d) Acquire a waste disposal licence or an exemption so that traffic officers can remove debris likely to puncture tyres

7.5 TM4 – Roll out to industry

1. Raise awareness of best practice tyre management guide and costs attached to breakdowns by distributing via FTA, FORS, RHA, Trade Fairs etc.

Highways England could formulate a communications plan that sets out a strategy for reaching HGV operators and encourage them to use and adopt the best practice measures identified above.

The communications strategy should include:

- Raise awareness of and celebrate achievements of the Incident Prevention project
- Launch and raise awareness of all guidance documents that Highways England choose to move forward
- Change the behaviour of HGV operators and drivers by encouraging safer driving and promoting good practice
- Encourage organisations to take responsibility for road safety and manage road risk created by van driving activities

The communications objectives should be to:

- Distribute best practice tyre management guides / breakdown of costs documents

- Develop a set of case studies
- Communicate that non-compliant operators could be charged if involved in an incident
- Distribute vehicle overloading advice documents
- Negotiate use of DVSA WIM sites
- Develop relationships / build buy-in with relevant stakeholders such as DVSA, Police, operators, Traffic Commissioners, FORS, FTA, RHA and create national challenge group
- In-house HE construction sites to specify fleet accreditation in their contracts
- Introduce alternative debris removal procedure in a particular area

The tactical communications plan should consist of:

- Segment HGV driving market and prioritise target audiences
- Identify best communication channels to reach target audiences
- Define key messages for target audiences
- Set key timescales and communications milestones linked to key project milestones and specific audiences
- Position the various guidance documents as a 'must read' for operators and drivers
- Remind HGV drivers and operators of the importance of road safety and consequences of non-compliant vehicles/driving
- Reassure operators/drivers that good practice is easily achieved and HE products can help you get there
- Report back on the progress of the Incident Prevention Project – guidance distributed, case studies showing behaviour change, reduction in number of incidents

2. Enforce across entire network

Once Highways England has raised awareness of the Incident Prevention project and conducted pilot studies in a selected number of locations it should commence enforcement across the entire network.

Appendix A – Location of Weighbridges

The tables provided below outline the addresses of weighbridges following a FOI request.

Site Name	Site Type	Address 1	Address 2	Address 3	Town	County	Post Code
Abingdon	Weighbridge	A34/41 Marcham Interchange	Abingdon	South of Oxford	Oxford	Oxfordshire	OX14 1TZ
Ainley Top	Weighbridge	M62 (J24) Ainley Top	N.W. of Huddersfield		Huddersfield	West Yorkshire	HX5 0TD
Ashford	Weighbridge	Joshna House	Crowbridge Road	Orbital Park	Ashford	-	TN24 0GR
Ashley Heath	Weighbridge	A31 Ashley Heath			Ringwood	Dorset	BH24 2NW
Badbury	Weighbridge	M4/A419, Adjacent to J15			Swindon	Wiltshire	
Beattock Summit	Weighbridge	A74 Southbound	Trunkroad @ Beattock Summit		Crawford	-	DG10 6
Beddingham	Weighbridge	A27, East of Lewes			Lewes	East Sussex	BN8 6JR
Boston Spa	Weighbridge	A1 / A659 N.W. of Leeds	Boston Spa		Wetherby	West Yorkshire	LS22 0AA
Boughton	Weighbridge	A2 Eastbound	Canterbury Road	Boughton Street	Faversham	Kent	ME13 9SR
Castle Kennedy	Weighbridge	A75 Castle Kennedy	Just E. of Stranraer		Stranraer	-	DG9 8SQ
Coldra	Weighbridge	M4 (J24) / A48 / A449	Coldra N.E. of Newport		Newport	Gwent	NP18 2LA
Coquelles	Weighbridge					-	
Craigforth	Weighbridge	M9, Craigforth, N.W. of Stirling			Stirling	-	FK9 4UA
Cramond	Weighbridge	A90 W/B Site	Cramond, W. of Edinburgh		Edinburgh	West Lothian	EH4 6DT
Crick	Weighbridge	M1 (J18) / A428	Rugby Road	Crick	Rugby	Northamptonshire	NN6 7SL
Cuerden	Weighbridge	M65 (J1a), Cuerden	S.E. of Preston		Preston	Lancashire	PR5 6OX
Dagenham	Weighbridge	A13, Morrison Road	Dagenham	E. of Barking	Dagenham	-	RM9 6UQ
Dalar Hir	Weighbridge	A55, Llandegai to Holyhead Rd	Dalar Hir		Dalar Hir	-	LL65 3YD
Dartford	Weighbridge	South Orbital Road			Dartford	-	DA1 5PR
Denham	Weighbridge	M40 (J1) / A412, Denham	N.W. of London		Denham	-	UB9 4HA
Dover East Docks	Weighbridge	Waterloo Crescent	Dover		Dover	-	CT17 9BU
Doxey	Weighbridge	M6 (J14)	Corner of Aston Bank,Seighford Rd	Doxey	Doxey	Staffordshire	ST16 1DQ
Dunkirk	Weighbridge	M56 (J16) / A5117	N.W. of Chester	Dunkirk W/B	Ellesmere Port	Cheshire	CH2 4RJ
Ewloe	Weighbridge	A55 / A494, Ewloe Roundabout	Nr Queensferry, N.W. of Chester		Wrexham	-	CH5 3AU
Felixstowe Docks	Weighbridge	Felixstowe Docks			Felixstowe	-	IP11 3SU
Handcross	Weighbridge	A23, Handcross	S. of Crawley		Crawley	West Sussex	RH17 6BA
Harlow	Weighbridge	M11 (J7) / A414 Roundabout	Hasting Wood	North Weald, S. of Harlow	Harlow	Essex	CM17 9LH
Harwich	Weighbridge				Harwich	-	CO12 4SR
Hatfield	Weighbridge				Hatfield	-	
Holdingham	Weighbridge	A17 / A15, Holdingham			Sleaford	Lincolnshire	NG34 8NR
Immingham	Weighbridge	Manby Way	South Killingholme		Immingham	-	DN40 3DX
John's Cross	Weighbridge	Junction of A2100 & A21	Just S. of Robertsbridge		Robertsbridge	-	
King George Dock	Weighbridge	King George Dock	Hull		Hull	-	HU9 5PR

Site Name	Site Type	Address 1	Address 2	Address 3	Town	County	Post Code
Leatherhead	Weighbridge	M25 (J9) / A243, N. of Leatherhead			Leatherhead	-	KT22 7JW
Narberth	Weighbridge	A40 / A478	Nr Haverfordwest		Narberth	-	SA67 7NZ
Newhaven	Weighbridge	Newhaven Harbour			Newhaven	-	BN9 0BN
Newport Pagnell	Weighbridge	M1 (J14) / A5130	Newport Pagnell	S.E. of Northampton	Milton Keynes	-	MK10 9AA
Perry Bar	Weighbridge	M6 (J6/7), Perry Bar			Birmingham	-	B42 2LR
Poole Docks	Weighbridge	Poole Docks			Poole	Dorset	BH15 4AJ
Portsmouth Docks	Weighbridge	Portsmouth Docks			Portsmouth	Hampshire	PO12 8SP
Puddletown	Weighbridge	A35 / A354	S.E. of Dorchester		Dorchester	Dorset	DT2 8RX
Quinton	Weighbridge	M5 (J3) / A458	E. of Halesowen		Halesowen	-	B62 0HJ
Ramsgate Docks	Weighbridge	Ramsgate Docks			Ramsgate	-	CT11 9LQ
Risby	Weighbridge	A45(E) / A142	W. of Bury St Edmunds	Nr Newmarket	Bury St Edmunds	-	IP28 6RN
Ross-on-Wye	Weighbridge	M50 (J4) / A40, Ross on Wye			Ross On Wye	-	HR9 7HB
Rostherne	Weighbridge	A556 near M6 (J19)	S.W. of Altrincham		Altrincham	-	WA16 6RR
Rosyth	Weighbridge	Rosyth Ferry Terminal			Rosyth	Fife	KY11 2XH
Sampford Peverell	Weighbridge	M5 (J27) / A373	Sampford Peverell	E. of Tiverton	Tiverton	Devon	EX16 7HL
Sandy	Weighbridge	A1 (N), Nr Bedford	N.W. of Biggleswade		Biggleswade	-	SG19 1NU
Sawtry	Weighbridge	A1 (S), S. of Peterborough	N.W. of Huntingdon		Huntingdon	-	PE28 5GN
Saxondale	Weighbridge	A46 / A52, E. of Nottingham			Nottingham	-	NG13 8AW
Scotch Corner	Weighbridge	A1 / A66, S.W. of Darlington	Scotch Corner		Darlington	-	DL10 6NS
South Cave	Weighbridge	A63, W. of Hull	South Cave		Hull	East Riding of Yorkshire	HU15 2ER
Switch Island	Weighbridge	M57 / M58 & A59 Junction	Switch Island		Liverpool	-	L30 6TQ
Tankersley	Weighbridge	M1 / A61, N. of Sheffield	Nr Rotherham		Sheffield	-	S75 3DA
Thornham	Weighbridge	M62 (J20) / A622, Nr Rochdale N.	Nr Oldham		Oldham	-	OL2 5UX
Todhills	Weighbridge	M6 (J44), Northbound	Guards Mill	Todhills	Carlisle	Cumbria	CA6 4HA
Tormarton	Weighbridge	M4 (J18) / A46	S.E. of Chipping Sodbury	Tormarton	Chipping Sodbury	-	BS37 6EJ
Towcester	Weighbridge				Towcester	-	NN12 6JW
Wall	Weighbridge	A5 / A5127, Nr Lichfield	N. of Birmingham		Lichfield	-	WS14 0JS
Wellfield	Weighbridge	A19, Nr. Stockton-on-Tees			Stockton-On-Tees	-	TS27 4TE
Withy Patch	Weighbridge	A27, Nr. Lancing			Worthing	-	BN15 0RT
Wylye	Weighbridge	A303 / A36, W. of Salisbury			Salisbury	Wiltshire	BA12 0RY