

GB Longer Semi-Trailer Trial: 2021 Annual Report

This report has been produced by Risk Solutions, the independent evaluation consultants for the LST trial. Statements in the first person (We, Our) refer to Risk Solutions, not to the Department for Transport, unless explicitly stated otherwise.



“Making substantial inroads to the decarbonisation of road freight requires innovation in both vehicle performance and logistics...the single most effective change in the short term is use of higher capacity vehicles.”

Professor David Cebon, University of Cambridge, Director for Sustainable Road Freight in Logistics Report 2017, Freight Transport Association:

ABOUT AR2021

In our reports on the trial to the end of 2019 and again in [AR2020](#), we concluded that we had sufficient quantitative data and other evidence to provide a robust evaluation response to all seven key evaluation questions set out early in the trial.

In this report to the end of 2021, we provide updated quantitative results, further supporting the trial conclusions in AR2019 and AR2020 and confirming that there were no new developments or indications in the data that change our previous conclusions.

Unlike past years, there are insufficient new results to warrant production of a long-form 2021 annual report, so this update is the primary publication from the trial for this year. This is supported by a data update document containing all the main charts and figures published in AR2020, updated with the data to the end of 2021 but without explanation or commentary (which can be found in AR2020).

As in earlier years, this report is a cumulative document, reporting on the main evaluation results from the whole trial to date rather than only the results from the most recent trial year. It can be read as a stand-alone summary of the trial evaluation outcomes to date.

HEADLINES

Trial take up **Trial maximum: 2,800 LSTs**

2,595 (93%)	LSTs registered on current or past Vehicle Special Orders and not registered as scrapped as at May 2022 (VSOs ⁽¹⁾) (93% of trial target of 2,800 trailers)
2,703 (96.5%)	LSTs on the road and submitted trial data up to end 2021 (% of trial target of 2,800 trailers)
2,60	Number of operators with trailers on the road and due to submit data in final period of 2021

Note: (1) A VSO grants permission for a specific operator to operate specific special trailer(s) on GB roads for the duration of the VSO. All operators require a VSO from the Vehicle Certification Authority (VCA) before their LSTs go on the road.

Utilisation and km saved	Utilisation and km saved (to end 2021)	
8.4 million	Journey legs travelled by LSTs during the trial	
1044 million	km travelled by LSTs during the trial Analysis in 2017 showed LST usage to be 85% Trunk, 13% Principal & 2% Minor Roads	
78 - 86 million	Vehicle km saved by LST operations Lower – upper estimates (upper includes empty return legs that would also be saved)	
Journeys saved	Estimates of equivalent standard (13.6m) trailer journeys saved across whole trial period and all operators (to end 2021)	
621 - 688,000	Journeys by 13.6m trailers saved by using LSTs based on 125km average journey Upper estimate (including some return legs) is used in the saving and emissions figures that follow	
1 in 12 (8.2%)	Average saving across all operators - 1 in 'n' journeys	
1 in 7.5 (13.5%)	Highest saving achieved by individual operators - 1 in 'n' journeys	
Emissions saved by LSTs on trial to date 2012-2021	Emissions saved by LSTs on trial – projection to 15 years	Estimates compared with the emissions from delivering an equivalent quantity of cargo on standard trailers – savings of carbon monoxide (CO), particulate matter (PM) (exhaust) and volatile organic compounds (VOC) also calculated
70,000	124,000	CO2(e) (1) Tonnes of CO2(e) ⁽¹⁾
97 ⁽²⁾	112 ⁽²⁾	NOx Tonnes of NOx of which 6.2% saved within 200m of 'Designated Areas' (2017 modelling estimates)

Notes:

- (1) Carbon dioxide equivalent or CO2(e) is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO2(e) signifies the amount of CO2 with an equivalent global warming impact.
- (2) NOx savings are lower than projected in AR2019 as Euro VI engine impact is now being modelled.

Injury incidents – national comparison

Collisions Casualties Collisions / casualties where LST involved on public highways or public access areas (2012-2021) resulting in injury

48 (4)	60 (4)	All personal injury incidents involving an LST (Brackets show collisions / casualties judged to be 'LST related', meaning the incident might not have happened with a standard trailer)
33	37	Three-year average safety incident rate (ALL collisions or casualties per billion vehicle km, 2018-2021)
85	116	Equivalent three-year rate for all GB articulated HGVs, (per billion vehicle km 2017-2020 – 2021 not yet published at the time the analysis was carried out)
0.39	0.32	Collision / Casualty rate ratio (LST vs All GB Artic. HGVs)

On a per kilometre basis, nationally, we estimate LSTs have been involved in around 61% fewer personal injury collisions than GB articulated HGV average. This is against a background collision rate for GB articulated HGVs that has been falling for several years.

Injury incidents – urban only/minor road comparison

Collisions and casualties where LST on public highways or public access areas (2012-2021) resulting in injury

Urban ⁽¹⁾	Minor ⁽²⁾	Collisions/casualties where LST on public highways or public access areas (2012–2021) resulted in injury
6	5	Personal injury incidents involving an LST (All – regardless of any 'LST related' judgement)
44 (per billion km)	238 (per billion km)	Safety incident rate (collisions per billion vehicle km)
486 (per billion km)	815 (per billion km)	Equivalent rate for all GB articulated HGVs over whole trial period for which data available, 2012-2020 (per billion vehicle km - 2021 not yet published at the time the analysis was carried out)
0.09	0.29	Collision rate ratio (LST vs All GB Artics)

Notes:

(1) Urban areas as defined by the Office for National Statistics (ONS) – excluding motorways

(2) Operations off motorway, trunk or principal roads

On a per kilometre basis, compared with the average for all GB articulated HGVs, LSTs on the trial have been involved in 91% fewer personal injury collisions per km when operating on roads in urban areas and 71% fewer when on minor roads.

Injury Incidents – vulnerable road users

Collisions	Casualties	LST collisions on public highways or public access areas (2012-2021) that resulted in one or more injury to a pedestrian or cyclist, whether or not judged to be “LST related”
4	4	All LST personal injury incidents and casualties where a pedestrian or cyclist was involved
3.83	3.83	LST collision and casualty rates (per billion vehicle km) over whole trial period, 2012-2021
9.79	10.16	Equivalent rates for all GB articulated HGVs over whole trial period, 2012-2020 per billion vehicle km 2021 not yet published at the time the analysis was carried out)
0.39	0.38	Collision and casualty rate ratios (LST vs All GB Artic. HGVs)

The LST injury incident rate for vulnerable road users in all locations, appears to be lower than that for the GB HGV fleet, but there are too few incidents for the difference in rates to pass a classical statistical significance test.

Damage incidents – comparison within sample of operator fleets

LST Non-LST Based on a special, in depth study of 2018 data from 92 operators for incidents involving both LSTs and Non-LSTs in the same operator fleet, on roads, resulting in damage

0.87 (incidents)	6.7 (incidents)	Mean number of incidents expected for an LST fleet and a non-LST fleet after 1 million vehicle km exposure, that is, after completing a million vehicle km as a fleet.
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On a per kilometre basis, the average number of damage incidents for non-LSTs is greater than that for LSTs by a factor of about eight.

Progress against key evaluation questions

In our report to end 2019, we concluded that we had sufficient quantitative data and other evidence to provide a robust evaluation response to all the key evaluation questions. This conclusion was confirmed in our report to end 2020. This update to the end of 2021 adds a further year of data to the analysis and has not revealed any results that are contrary to those seen in previous years of the trial.

GB Longer Semi-Trailer trial: 2021 Annual Report summary

What is a longer semi-trailer?

Longer Semi-Trailers, or LSTs, are a type of heavy goods vehicle (HGV) trailer that have been on trial since 2012. The LSTs are up to 2.05 metres longer than the current standard semi-trailers on our roads (15.65 metres instead of 13.6 metres). These are not the mega trailers or road-trains permitted in some other countries.

While the trailers are longer than existing HGV trailers, they cannot be heavier. The total weight of the trailer, the goods and the tractor unit must still be within the UK domestic weight limit of 44 tonnes. They must also

pass the turning circle test applied to the existing 13.6 metre trailers. To achieve this, LSTs usually have a steering rear axle.

This document summarises the latest findings from the trial of this new type of heavy goods vehicle trailer.

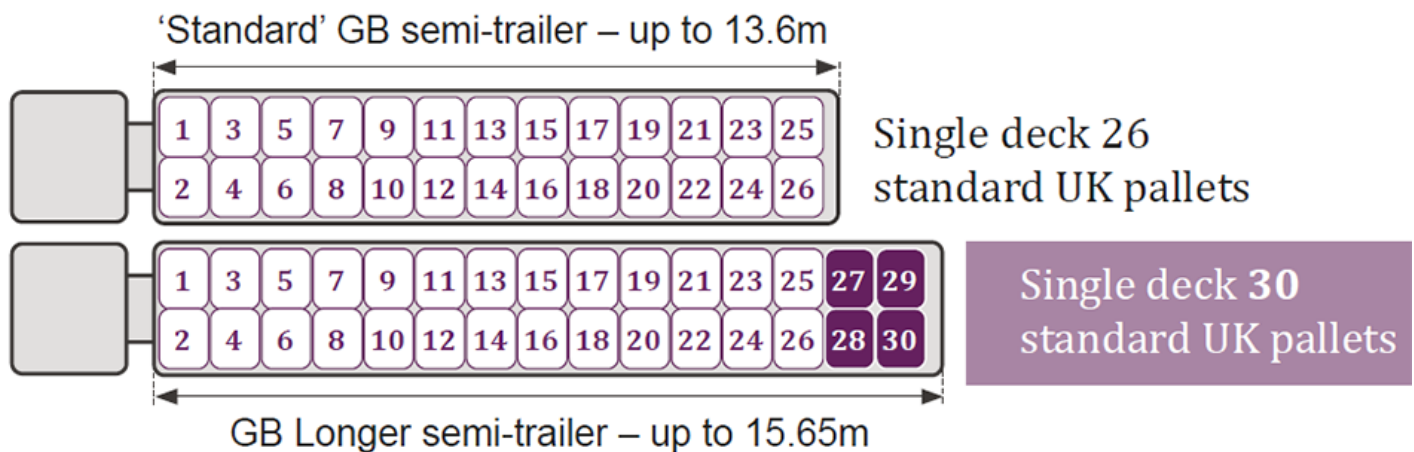


Why use LSTs?

By making the trailer 2 metres longer, you can carry two more rows of pallets or three more rows of goods cages on each journey compared with existing trailers.

Fully loaded LSTs can move goods using fewer journeys than current trailers, reducing overall emissions, congestion and collision risk.

This differs from other approaches to freight carbon reduction, such as increasing engine efficiency or electric vehicles, in being available without the need for further significant technological and infrastructure development.



Why is there a trial? Why not just allow the trailers now?

The trial is seeking answers to seven evaluation questions:

1. [What do operators use LSTs for, and where?](#)
2. [What are the savings realised in HGV journeys?](#)
3. [What are the resulting reductions in emissions?](#)
4. [What about safety - will LSTs cause more injuries?](#)
5. [What about damage and the associated costs - will LSTs cause more damage to the roads?](#)
6. [Might any special operational requirements be appropriate for LSTs?](#)
7. [What proportion of the existing GB fleet of semi-trailers might be replaced by LSTs, were numbers not restricted?](#)

DfT needs to take all these factors into account in deciding whether to allow LSTs for general use on GB roads when the trial ends.

When we published our report, presenting results to end 2019, we noted that we had sufficient quantitative data and other evidence to provide a robust evaluation response to these key evaluation questions. This conclusion was confirmed in our report to end 2020 and again in this update to the end of 2021.

The response to each of these questions is covered later in this report.

About the GB LST Trial

What does the trial involve?

DfT began the trial in January 2012, when it established an initial allocation of 1,800 trailers for operators wishing to take part, with an initial trial period of 10 years.

In April 2017, the government increased the number of LSTs by an additional 1,000 and decided to extend the trial by 5 years.

All participants must submit detailed data about the journeys their LSTs make and on all incidents (not just those resulting in injury) on the public road or in public areas (such as services).

Operators participate voluntarily, at their own cost and risk. As this is a trial, there is no guarantee that LSTs will be permitted on the road beyond the end of the trial period. The trial was set to run for a long period to ensure it generated enough data to answer the [seven evaluation questions](#) above and to allow participants to recover the costs of investing in LSTs.

Who can participate in the trial?

Any licensed GB haulier is eligible to apply to join the trial and DfT's aim has been to include a mix of large and small operators.

Companies sign an operator undertaking which sets out the terms of the trial, including the requirement to provide data to the evaluation. They also need a Vehicle Special Order (VSO) granted by the Vehicle Certification Authority (VCA).

VSOs can be revoked or suspended by VCA for any serious failure to comply with the operator undertaking. Operating an LST without a valid VSO is illegal.

Who is evaluating the information from the trial?

The trial evidence could not be evaluated by DfT or by the industry – there needed to be an independent party to both hold the commercially sensitive data and conduct a fair evaluation of the evidence.

The same core team here at Risk Solutions has fulfilled this role for the trial since it began in 2012 and we now hold data on over one million LST journeys to the end of 2021.

Although commissioned by DfT, our role is to provide independent scrutiny of the evidence. We also, on occasion, provide comment on DfT's public statements regarding the trial, to ensure they are accurate and are supported by the evidence.

In addition, we have been consulted by the DfT policy team developing the department's future options for LSTs and the related impact assessment, to ensure they are making valid use of the trial evidence in support of their thinking and decisions.

We produce a report of the [latest observations and results for each calendar year](#) of the trial.



How is the data gathered?

Detailed information on trailers operated, journeys and incidents is submitted for every trailer in Excel templates every four months. (Note – from January 2022, this changed to an online web portal). This has been a comprehensive and long running data collection process, as it has been important for DfT to ensure that any new equipment introduced has demonstrable and evidence-based benefits.

As the trial has progressed and key quantitative questions have been answered, we have gradually reduced the level of detail required for the journey data. This has allowed time for a greater focus on other areas of evidence gathering and had reduced the data collection burden on operators.

Is self-reporting by the operators reliable?

Yes, with active engagement with operators, and expert support, self-reporting works extremely well and is producing good quality data.

Self-reporting is sensible here because of the duration of the trial, the number of operators involved and the complex mix of data types we need. This would make independent data collection prohibitively expensive. In any case, operators must be closely involved to ensure that the data is of the high quality we need to answer the [seven evaluation questions](#) listed earlier.

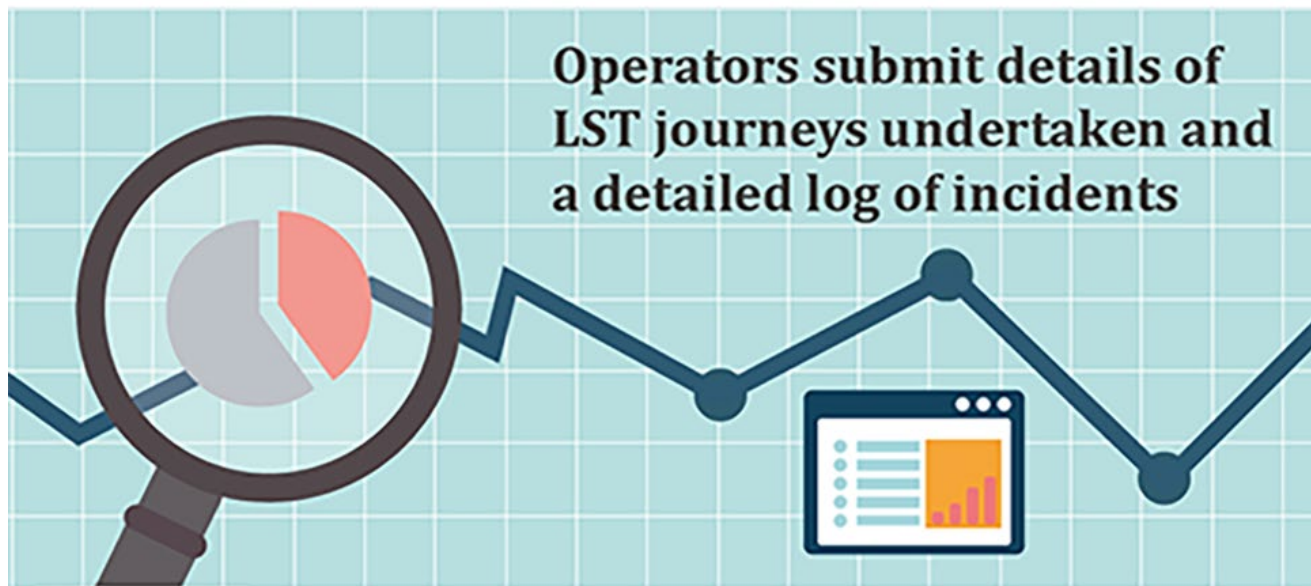
A robust approach to collecting self-reported data

We do everything practicable to maximise complete reporting by operators. Our processes seek to create a sense of personal responsibility with each company contact collecting data and an informal community between the company data contacts.

We provide telephone and email support, share ideas and experiences in making data collection efficient, and facilitate contact between companies with similar operational challenges.

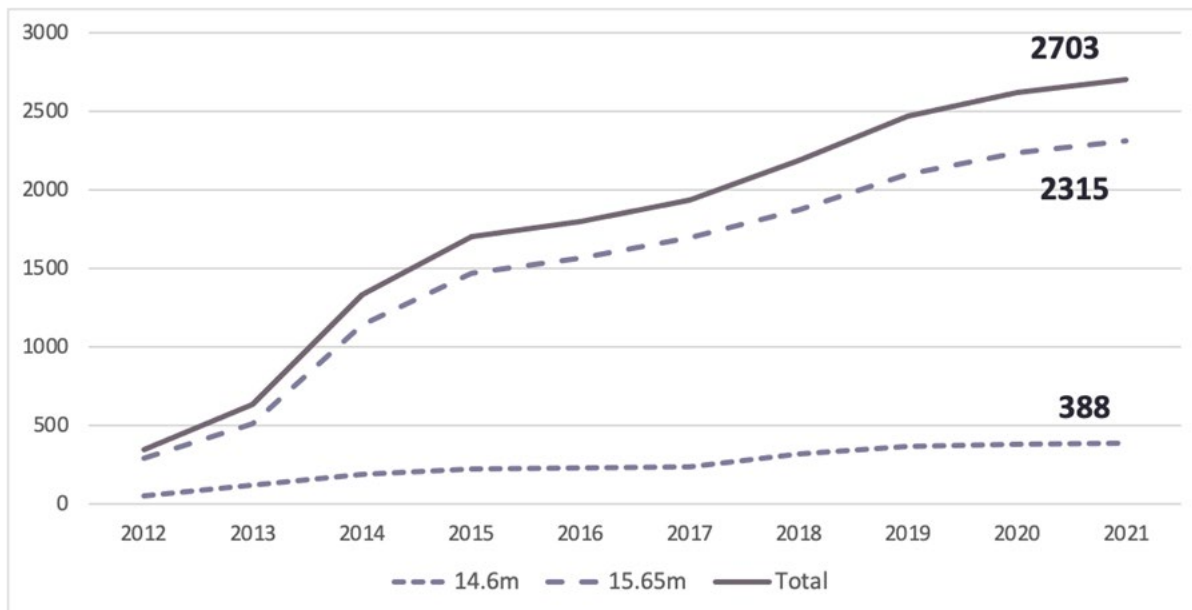
We carry out rigorous data checking and reflect any issues back to operators for resolution. Continuing concerns can be escalated to DfT with the most severe sanction available being removal from the trial.

Our direct contact with operators tells us that, in the vast majority of cases, those collating the data are very conscientious, even where it costs them some significant time and effort. In exceptional cases, the chance of losing their VSO has been used by DfT to prompt improvement.



How many LSTs are there on the road now?

The trial started in 2012 to 2013 with just a few hundred trailers in the national fleet. At the time of writing, the majority of the LST allocations had been granted, and at the end of 2021, 2,703 LSTs were on the road and submitting data. The following chart shows how the fleet has grown over time.



The dotted lines show the fleet split between the two length categories set by DfT at the start of the trial – trailers up to 14.6m and 15.65m respectively. From early in the trial, the longer category clearly became the industry favoured design, although some operators with the need to access locations with space constraints, still use the shorter models.

In the later part of 2019 and throughout 2020 we saw the emergence of both fleet renewal and a second-hand market in LSTs. This is partly being driven by trailers reaching the end of their standard seven-year leasing deals and the rental companies or, for wholly owned trailers, the end of their standard asset lifecycle.

In some cases, the operators involved have replaced the trailers with new units, while others have either ceased LST operations or stated that they have deferred that decision pending an indication of the future policy framework for operating these trailers.

A total of 2,703 LSTs have appeared on the trial and submitted data at some point up to the end of 2021 (identified by their vehicle identification numbers - VINs). The current (May 2022) number of LSTs on live VSOs is lower, at 2,595. Some trailers will have been scrapped and, at any point in time, some LSTs are in the emerging second-hand market or otherwise not in service. These may not appear on a live VSO or be submitting data, so their actual status is unclear, until they emerge in use as part of a new operator's fleet.

LST trial results

This is the 10th GB LST Trial Annual Report (AR2021).

More details of how we carry out the calculations and research can be found in the earlier annual reports as each part of the methodology was developed. There is an up to date index to each element of the work in Annex 1 of AR2020.

1 What do operators use LSTs for?

Nature of journeys

Our trial data provides us with a lot of information about LST journeys: where they start and end, distances covered, what they are carrying and how full the trailers are.

By the end of 2021, LSTs had travelled 1,044 million km:

- Goods carried are dominated by fast-moving consumer goods (low cost products, sold quickly) and other cage or pallet loads
- At least 71% of the distance travelled was between industrial locations (depots, distribution centres, supplier sites etc.); around 9% of loaded legs are to or from retail sites – although a large proportion of these trips have a matching empty return leg, which would also be saved, so the actual total use for retail sites could be up to double this figure
- Trailers ran empty around 18% of the total distance travelled, much lower than the figure of around 30% for all articulated trailers (source: [Road Freight Statistics Table RFS0117](#) percentage empty running and loading factors by type and weight of vehicle up to 2020.)

Many operators restrict LSTs to operations where they can run heavily loaded on both outbound and return legs to make the most of what is a significant investment. In many cases, this is between major distribution centres, which will mainly be on trunk roads, but also includes repetitive

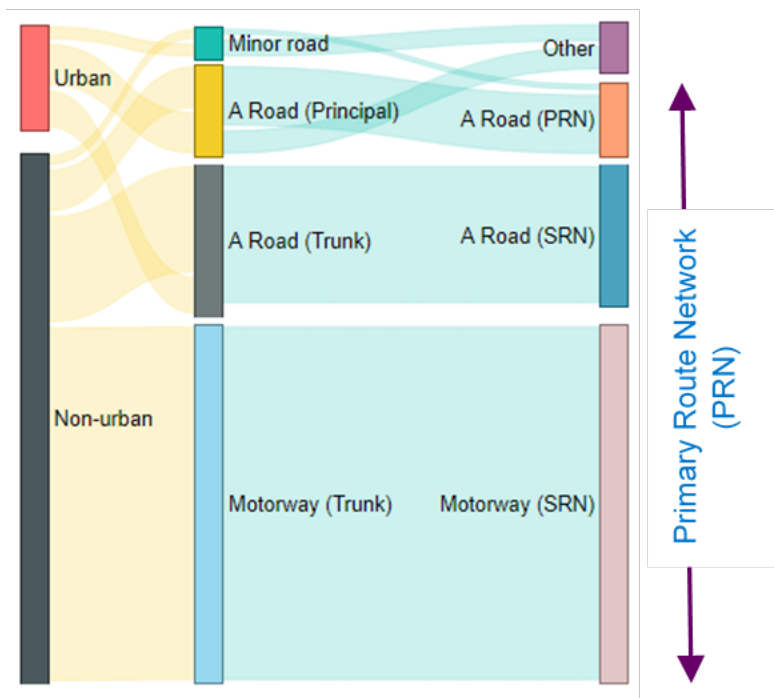
operations from distribution centres to larger retail stores, where the access permits LST use.

Nature of routes

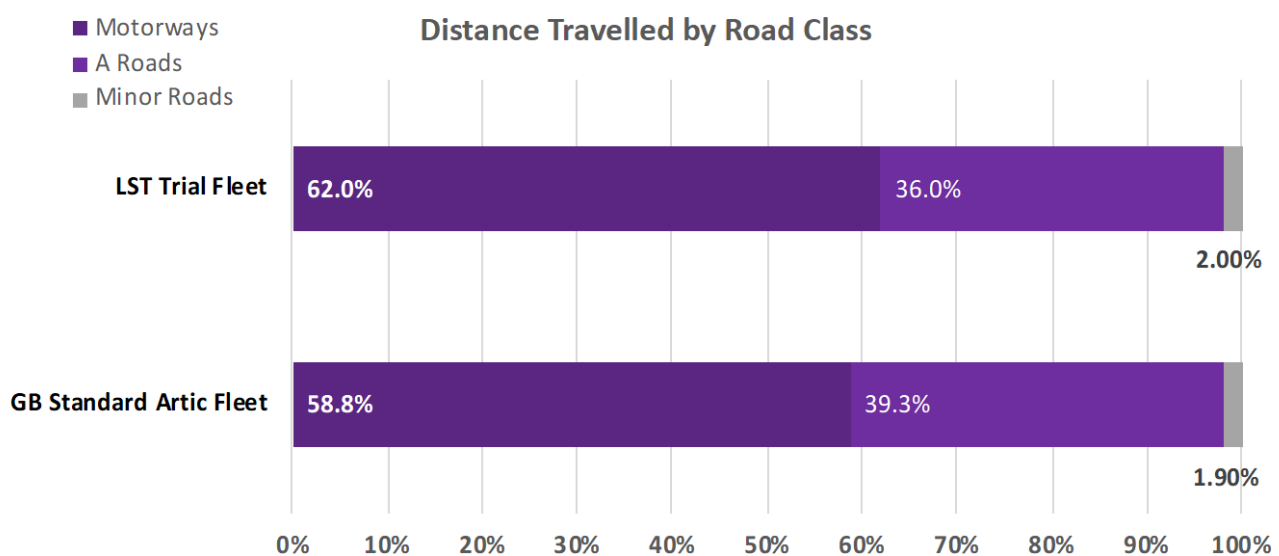
The trial data up to the end of 2017 included the start and end of each journey, but not the route travelled. Routing information was not available for all the LSTs. At the start of the trial, tracking semi-trailers separately from the tractor units that pull them was not standard industry practice and so to have demanded it for the trial was judged to be a barrier to smaller company's participation. (While GPS use is now more common in tractor units, our last research in this area suggested that fewer than 50% of the trailers themselves were fitted with GPS tracking.)

During 2015 through to 2017 we therefore developed a method of modelling routes, using the start and end postcodes provided by operators for all legs in 2017. This was a significant exercise both for the operators and the evaluation team - generating detailed data for almost 1 million LST legs, and therefore was not repeatable in other years. We validated the model route selection using a large sample of GPS data for a mix of LST and non-LST operations by trial participants.

From this work we were able to generate estimated patterns of LST movement by each of the major GB road classification systems, as show in the chart below.



A key result of this 2017 work was the comparison of the LST use of different road types to that published for the GB Articulated HGV fleet as a whole. As the chart below shows, the split of road types used by the LSTs was very similar to that of the standard length trailers in the same year



GB Fleet 2017 data vs LST Fleet Modelled 2017 data based on routing from start to end postcodes.

This is an important conclusion of the trial since it shows that contrary, to some pre-trial assumptions, the LSTs operations are not any more weighted towards Motorways and SRN A Roads than the standard GB articulated fleet. This aligns with the major use of LSTs by the retail sector

to deliver to large stores, rather than solely for trunking between national distribution centres.

Information about geographical patterns of movement by region and Local Authority (LA) can be found in the full [2018 trial annual report](#).

2 What are the savings realised in HGV journeys?

We estimate that the average percentage distance saving to the end of December 2020 is around 8.2%, which equates to 1 in every 12 journeys. The most efficient LST operations are saving up to 1 in every 7.5 journeys.

Beneath this average figure there are considerable differences in efficiency of operation across the range of operators taking part in the trial. We can identify 3 broad groupings in the data as shown in the table.

LST savings⁽¹⁾ performance summary by operator (2018)	Lowest savings group (0-5% saving)	Average savings group (>5-10% saving)	Highest savings group (>10-14% saving)
% of operators	11%	28%	60%
% of trailers ⁽²⁾	23%	38%	39%

Notes:

- (1) Based on the savings % for each operator including an estimate for empty return legs saved.*
- (2) Based on the number of trailers registered to the operators falling into each savings group.*

Sixty percent of the operators are running their trailers at or near their maximum efficiency. These goods are often shipped goods in full loads on all trips or, commonly as a simple 'Full-Out – Empty-Back' loop (where the empty return leg is also saved)

Around a thirty percent of operators are in the average savings group, where a mixture of factors are driving the savings and variable trailer fill levels. An example is some retail sector deliveries to stores, where the

cargo sizes can be driven by just in time delivery to the store of exactly what is demanded – there being little or no stock held at stores.

The lowest performing group – eleven percent of operators – contains some cases where the fill level of trailers is determined by timetabled trailer departures; or, cargos such as waste packaging, which may be simply back-haul legs as a by-product of the main purpose of the trip.

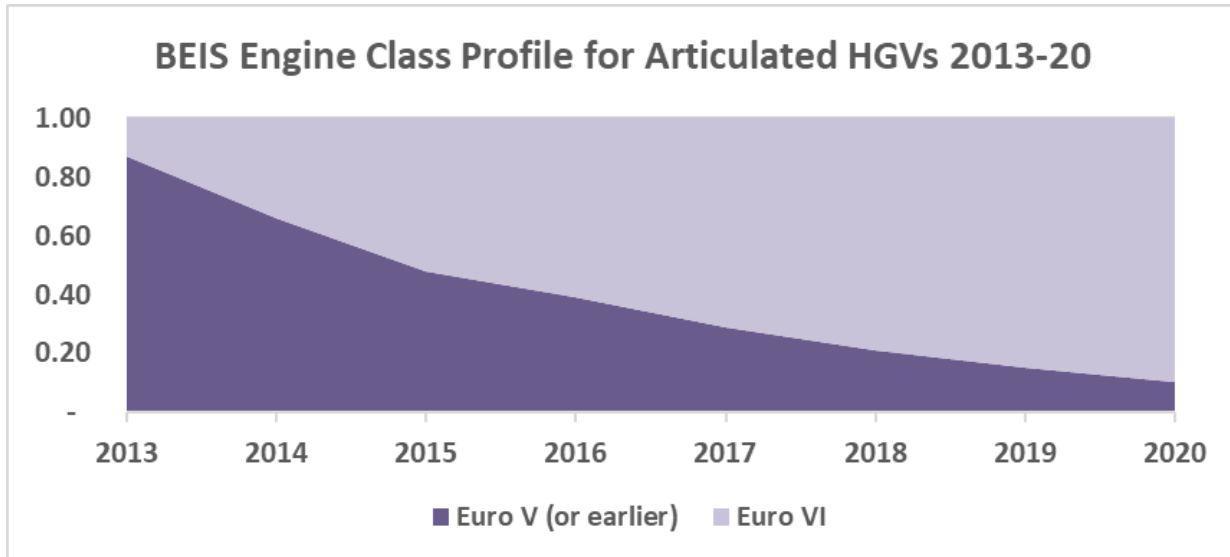
Some of the lower performing operators are cases where the trailer has been purchased for use on a specific contract, which has then ended and new work has not been found. In other cases, the trailer has simply not been usable on as wide a range of work, or at the loading levels, the operator hoped. Outside of trial conditions and with a more active open market for LSTs, these operators may not have held on to their trailers.

3 What are the resulting reductions in emissions?

In 2017 we developed an [emissions model](#) which, integrated with the [route modelling system described above](#), allowed us to estimate savings in emissions taking account of route information, estimated vehicle weights and actual load weights.

The emissions model provides estimates for carbon dioxide, and five additional emissions relevant to air quality, both for the trial to date and projected forward to the nominal trial end point(s).

In 2020 we upgraded this model to incorporate a profiled migration of tractor units from Euro V to Euro VI engines. DfT chose the engine class profile used by BEIS (Department for Business, Energy & Industrial Strategy) Euro V/VI mix for articulated HGVs outside London.



The results presented here reflect this new engine profiling. This refinement in the underlying calculations reduces the air quality related emissions (such as NOx) from HGV operation, and hence savings from the use of LSTs, with a very marginal effect on the CO2e results.

The table here shows results for two key indicators – CO2e (carbon dioxide equivalent or CO2(e) is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO2(e) signifies the amount of CO2 with an equivalent global warming impact) and NOx.

LST Trial Emissions Savings Summary

(All figures in tonnes, rounded)	Trial to 2021	Extended 15 year trial
Savings:	2012-21	2012-2026
Carbon dioxide (equivalent) CO2(e)	69,598	123,855
Oxides of Nitrogen (NOx)	97	112

The key results for CO2(e) (as an emission that disperses widely) and NOx (as a localised emission) are:

The net emissions reduction from the trial to 2021 is around 70,000 tonnes of CO2(e) and 97 tonnes NOx, as well as other emissions.

The projected net reduction if the trial were to run to the extended end date, (15 years) is around 123,855 tonnes of CO₂(e) and 112 tonnes NO_x, as well as other emissions.

(Note that backdating the engine profiling to reflect a gradual change from Euro V to Euro VI engines means that the headline figures for emissions saved on the trial cited in AR2019 (to the end of that year) are reduced slightly for CO₂e and significantly for NO_x.)

4 What about safety – will LSTs cause more injuries?

The trial results are showing that LSTs can be operated safely, even when used on routes involving some minor roads.

Numbers of safety incidents – collisions and casualties

During the nine years from 2012 to the end of 2021 there have been 48 road traffic collisions in public locations that involved HGVs pulling an LST and have resulted in an injury. These have resulted in three fatal, 11 serious and 46 slight injuries. (A further one serious and five slight injuries occurred in depots or on other private land not accessible to the public.)

There were two personal injury incidents involving LSTs in public locations during 2021, resulting in two casualties. One of the 2021 casualties was a fatality, and one was a slight injury. Neither of the 2021 incidents were judged to have been LST related (meaning the incident might not have happened or the injury might have been less serious, with a standard trailer).

Fatal incidents on the trial

There had been no fatal incidents involving LSTs up to the end of 2018. In 2019 there were two and in 2021 there was one additional fatality.

In 2019, there was a fatal accident involving a longer semi-trailer resulting in the death of the lorry driver. Investigation by the DVSA found that this incident was unrelated to the condition or extra length of the longer semi-trailer.

A second incident in 2019 resulted in the death of a cyclist. With the evidence the Department currently possesses, it is not believed that this was related to the longer length of the trailer.

In 2021, a motor vehicle collided with the rear of an LST trailer where the traffic had come to a standstill resulting in the death of the motor vehicle driver. There was no indication that the design of the trailer had any bearing on the incident.

While there is no evidence at this stage that any of these incidents were caused or affected by the trailer being an LST, the DfT will continue to check (for example when the incident inquests are completed) if there are issues related to either incident which require further consideration in the context of the trial.

Collision and casualty rates (to end 2021)

A key question for the trial is whether LSTs cause more injury collisions than the standard 13.6 metre semi-trailers. There are two parts to this question.

Q1. How many extra injury collisions would have occurred if the same goods had been moved using standard trailers, requiring more journeys?

There will have been a direct safety benefit of around 8% reduction in collisions, equivalent to around 10 to 11 collisions and 14 to 15 casualties, saved during the period of the trial due to the reduction in the number of journeys.

Q2. Do LSTs have a higher incident rate than the trailers they replace?

This question is about whether the LSTs are having more incidents per kilometre that they DO travel. It is independent of Q1.

At the end of 2021, we find that the trial LSTs continue to be operated in a way that results in a significantly lower rate of injury incidents per vehicle km (in public locations) than the average for GB articulated HGVs (based on the latest 3-year rolling averages).

This remains the case, despite the average collision rate for GB articulated HGVs falling consistently since 2016.

Vulnerable road users

In terms of risk to vulnerable road users, analysis first presented in the [2019 Annual Report](#) and updated for the 2020 and 2021 reports, does not indicate that the national results are masking a problem, and the vulnerable road user incident rates for LSTs are lower than that for the GB articulated fleet as a whole. However, there are too few incidents for the difference in rates to pass a classical statistical significance test.

So LSTs are safe?

There is no reason why LSTs should be inherently safer than standard trailers, but on the trial, their incident rate per kilometre is lower than for other trailers. Operators attribute this to a number of causes in our consultations with them:

- the conditions of participating in the trial require that operators provide special driver training for any staff using LSTs
- operators often report paying additional attention to route selection, route assessment, driver selection and driver familiarity with both the LST and the routes
- the LSTs represent a significant investment that operators do not want to see damaged
- the focus brought by having to submit data on LST operations and incidents probably also reinforces their special nature, even when, for some operators, they have now been in service for many years.

Separately to the statistical analysis, we study each injury event in detail to look for any lessons that can be learnt regarding safe operation of LSTs. This has identified important principles in driver training and route planning and some more technical points about good maintenance.

Further work to gather industry insights into [good practice in adopting and operating LSTs](#) was published alongside the 2019 annual report – see the discussion of [evaluation question 6](#), below.

The statistical analysis presented on the trial treats all events in which an LST was involved as relevant. This is intentionally conservative, since for the great majority of the incidents, analysis of the events suggests that the type of trailer being pulled was not a factor.

Of the 48 injury events on the road or in another public place, over the ten years of the trial to date, there are only four where the incident details suggest the length or steering behaviour of the trailer was or might have been a factor in either the event occurring or the severity of the injury. In all four cases the resulting injury was slight.

Summary of injury incidents involving LSTs in all public locations⁽¹⁾, after 1044 million km travelled, compared with those for all GB articulated HGVs (>7.5T)

Collisions in all public locations and resulting casualties	GB artic HGVs 1 in every... ⁽⁴⁾	LST involved 1 in every... ⁽⁵⁾	Judged LST related 1 in every... ⁽⁶⁾
All roads	7.8 million km	22 million km	261 million km
Urban ⁽²⁾ only	2.0 million km	23 million km	137 million km
Minor ⁽³⁾ roads only	1.2 million km	4.2 million km	21 million km
All locations - where a pedestrian or cyclist was involved	102 million km	261 million km	n/a

Notes:

- (1) 'All public locations' covers all public roads and also private land where there is public access.
- (2) 'Urban' here defined as all roads, excluding motorways, in ONS defined urban areas.
- (3) 'Minor' roads are all roads that are classified below the level of A-Road.
- (4) GB Articulated HGVs: Based on DfT National data for all articulated HGVs > 7.5T 2012-2020 ([TRA3105](#)) = 129.9bn km of which 7.3bn urban non-motorway and 2.6bn minor roads. Injury incidents from [STATS19](#) 2012-20: Total collisions = 16,579 (3,550 urban and 2,120 minor roads).
- (5) LST Involved: 48 collisions (of which 6 occurred on urban and 5 on minor roads). Any injury event in which an LST was involved, even if the trailer being an LST was not relevant – data internal update provided to DfT. Non-injury, damage incidents are covered separately.

- (6) *LST Related: 4 collisions. Events involving an LST where the fact that the trailer was an LST rather than a standard length was considered to be at least part of the cause or severity. Note that the headline figures for trial injury rates use all collision and causality data.*
- (7) *These figures are mean values. The latest annual report includes analysis that concludes that the comparisons between LST incident rates shown here are statistically robust at a 95% confidence level, with the exception of the rate comparison for vulnerable road users.*

5 What about damage and the associated costs – will LSTs cause more damage on the roads?

Damage to property or other vehicles

Since there is no national dataset for the damage events for non-LSTs, we needed to obtain data for non-LSTs within the fleets where the LSTs are operating, to inform a comparison. The revised data collection framework launched from 2018 crucially included a requirement to report summary figures for incidents and total distance travelled for the non-LST trailers operating in the same fleets as the LSTs, where it could be gathered.

Results from this data were available to inform a special study of damage incidents carried out in 2018 using data from 92 operators who were able to provide both LST and non-LST damage event figures for their fleets on a comparable basis. We collated the data across these 92 operators to examine any difference between the LST and non-LST fleets.

We found that for the operators in this sample, LST fleets have a much lower incident rate than non-LST fleets of the same group of operators. The results were found to pass tests for statistical significance.

We therefore saw no indication that the LSTs on the trial are causing more damage than other semi-trailers in the same fleets.

As with the injury incident results, this is not attributed to any inherent characteristic of LSTs, but is taken to indicate that the LSTs are being operated in a manner that reduces the likelihood of damage events.

We also looked at the specific issue of whether the owners of assets damaged by LSTs were commonly aware of who was responsible for the damage. This was prompted by a concern expressed by stakeholders that, in their view, large HGVs cause asset damage without the asset owner being aware of which haulier was responsible.

We found that in 90% of cases, where a third party's property was damaged, the owner was either present or was made aware of the incident by the operator.

In only 10% of events was the owner marked as "unknown", and will not have been aware of how the damage occurred, or it was unclear from the data submitted whether the owner was aware or not.

Damage to the road surface

The analysis has focused on the damage to roadside assets and other vehicles as we have not been asked to study wear and tear impact on the road surface itself.

Pre-trial work suggested that this would not be an issue since the overall weight limit and number of axles/tyres for an LST is no different from standard trailers. Indeed, the argument was made that the reduction in tyre scrub by the use of a rear steering axle would mean reduced road surface damage.

6 Might any special operational requirements be appropriate for LSTs?

From our periodic surveys of operators, we know that:

- many operators restrict LST operations to set routes, where:
 - they can maximise utilisation of the extra length
 - they have assessed the route to be suitable for LSTs
 - the delivery points have been assessed as suitable for LSTs
- operators have adopted a range of different approaches to drivers' LST training
- many operators seek to ensure that LSTs are operated by drivers who do so regularly, and in some cases, on repeated routes.

During 2018 and 2019 we carried out one-to-one conversations and a workshop to further explore the special provisions operators have adopted to ensure safe, efficient and economic use of their LSTs.

This led to a document summarising the main issues that operators have actually implemented, or, from their trial experience, they believe will be important in future, presented in full in the [2019 Annual Report](#) (Annex 6) and as a standalone [industry-led summary of good practice](#), available on the DfT website. It covers a full range of investment, training operations and infrastructure issues that operators saw as important, including:

- A) Business Decisions
- B1) Training and Awareness – Drivers
- B2) Training and Awareness – Other Roles
- C1) Operational Processes – Routing
- C2) Operational Processes – Depot Assessment
- C3) Operational Processes – Warehousing / Supply Chain
- D) Equipment and Maintenance
- E) Depot Infrastructure

F) Specifying LSTs – Design Choices

Issues are marked with the primary area of benefit or risk they influence.

 **Safety / Damage**

 **Efficiency (journey savings) / Emissions**

 **ROI (Return on Investment)**

Using these insights from operators

The industry insights document provides insights from operators with hands-on experience of adopting and operating LSTs and was designed to serve a number of possible aims, such as:

- A starting point for policy makers, industry or government stakeholders charged with the regulation of LST operations,
and then, if the government decides there is a future for LSTs,
- A foundation for good practice guidance for potential LST operators
- A core of training content for drivers and other staff in relation to LSTs
- A source of key points company owners, directors and fleet managers should consider in adopting LSTs
- A source for freight sector analysts and researchers interested in the issues and parameters affecting the operation of LSTs, or indeed other special vehicle designs

In terms of any future operation of LSTs, we believe that this document, based on real world operational experience of the trailers, forms one of the most important tangible outputs from the trial as a whole.

In our [2019 Annual Report](#), we recommended that,

“this good practice document be used as the foundation for further DfT and industry led discussion with the aim of:

(a) refining the content based on input from a wider selection of relevant stakeholders

(b) adding prioritisation of measures, where possible, based on industry experience and consensus

(c) agreeing the most appropriate format(s) for publication (where and by which body)

While policy decisions lie outside the scope of our evaluation, we recommend that any policy or regulatory system should include some reference to this new document containing good operational practice to be used by operators and any other relevant industry representatives or regulatory bodies.”

We continue to recommend that regardless of which, if any, policy option is taken forward by the department, they should work with the industry to look for ways in which the insights from industry can be disseminated and embedded in the approach companies take to considering, adopting and operating LSTs in the future.



7 What proportion of the existing GB fleet of semi-trailers might be replaced by LSTs, were numbers not restricted?

In 2016, we carried out a survey of operators to explore the numbers of LSTs that may be taken up by the trial operators, were LSTs to become widely available at some point in the future.

Operators were asked to make two take-up estimates:

- the first assuming today's infrastructure (mainly depot and yard designs, but also manufacturing bases)
- the second, assuming some future date when some newer depots etc would have been designed or modified to better accommodate the longer trailers

The data gathered showed some logical patterns, with higher take-up estimates made by those with the most control over their load sizes and those involved in longer distance movements between large distribution sites, where the benefits of additional capacity are greatest.

During 2018 we continued to gather information on potential take-up as part of our conversations with selected operators. The table below shows our latest estimate of take-up (for the operators on the trial). This is based on our 2016 data, with some small adjustments resulting from conversations in 2018.

This gives a broad indication of the potential take-up in different sectors of the freight industry – where the specific goods involved are sufficiently light (low density) that a full LST load can be carried within the national 44t weight limit.

LST take up projections by goods type: Percentage of current fleet that trial participants might replace, over time, with LSTs – by goods type carried

Goods type	With current infrastructure	With future infrastructure
1) Empties/waste packing	26%	31%
2) Fast-moving consumer goods FMCG (mixed products)	23%	33%
3) FMCG (single product)	14%	20%
4) Raw material/supplies	28%	35%
5) Industrial products	21%	28%
6) Biomass/fuel	10%	22%
7) Mail/parcels	14%	22%
8) Other – retail	39%	63%
9) Other – non-retail	3%	7%
10) Pallets – mixed/unknown	21%	35%

Note: The take-up figures are from AR2019 and are distance-weighted averages for each operator based on the total km travelled carrying each good type. FMCG = Fast moving consumer goods.

Scaling up

During 2019 and the first half of 2020, we completed a scaling model designed to enable the DFT to apply the trial results appropriately to the national freight statistics to estimate the potential impact of LSTs if they were made available in larger numbers.

The scaling process takes a reference year of data from the Continuing Survey of Road Goods Transport (CSRGT) and models what that same year of freight movements might have looked like, if relevant segments of the work had been carried out using LSTs in place of standard 13.6m trailers, reducing the distance travelled for the same outcome.

Savings in vehicle km, emissions and safety are estimated using scaling factors derived from a statistical analysis of the trial data.

The model generates future projections of distance, emissions and injury savings that might be made in future years, taking into account estimates of future LST take up and overall freight demand growth. The model provides for sensitivity analysis based on variation of the savings and take up assumptions, and exploration of different future scenarios.

The results of the modelling do not form part of this evaluation, but rather the model was designed for use by the DfT in their policy explorations and impact analysis when they reached that point in the trial process.

During 2020 and into early 2021, we have worked in conjunction with the DfT freight policy team to extend the model to provide the results sets they require, our role being to ensure the use of the trial data continued to reflect, and not go beyond, the evidence base of the trial.

Important extensions to the model during 2021 included the engine class profiling mentioned earlier for the emissions modelling, and factoring to allow exploration of options with different limits on the supply chain capacity to build new LSTs in any single year.

A full description of the model is presented in the [2019 Annual Report](#) for readers who are interested in studying it further, with technical details of steps such as the statistical data analysis being given in report annexes.

What next for the trial?

Evaluation work led to address the seven key evaluation questions is now complete, to the extent possible under trial conditions.

While DfT carry out their policy consultation and discussions, Risk Solutions continue to monitor the operation of LSTs, with the focus now on:

- 1 Data collection to support safety performance monitoring.**
For operations from January 2022 onwards, the data submission framework has been rationalised and no longer monitors the operations of individual trailers, but simply the number of LSTs in use by an operator, the count of trips and the total distance. All

injury incidents are still reported in detail and this, with the distance total, provides the data for continued monitoring of the injury incident rate.

Data submissions have moved from an excel file system to an online portal.

2 LSTs in operation.

We continue to track, with the VCA, which operators have which specific LSTs (by VIN number) in operation and are also performing data cross-checks to identify all of the existing LSTs in the DVSA vehicle database where they will be assigned an 'LST' tag.

Department for Transport

The Department for Transport (DfT) is the government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved. DfT began the GB trial of longer semi-trailers for articulated goods vehicles in January 2012 and is responsible for the trial as a whole, including the allocation of trial places to companies applying to participate. The evaluation of the trial is funded by DfT under the Specialist Professional and Technical Services (SPaTS) framework, but is carried out by independent consultants.

For further details on the trial see the [DfT website](#) contact the DfT trial project manager:

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Risk Solutions

Risk Solutions is a specialist management consultancy working in the areas of risk, evaluation and decision support, with specialist expertise in industry engagement and working with complexity and high degrees of uncertainty. Risk Solutions has been involved in policy evidence development, preparation of impact assessments and evaluations for DfT, Defra, BEIS and other government departments and private companies. Risk Solutions was commissioned by DfT in 2012 to help design and implement the LST Trial evaluation process and has since been reappointed twice in the role of independent evaluator.

For further details of Risk Solutions' services, including the evaluation of the trial, follow the link below or contact:

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WSP

WSP is one of the world's leading engineering and professional services consulting firms. With over 43,000 talented people in more than 500 offices across 40 countries, 7,800 of which are based in the UK. WSP supplies services to DfT and Highways England under the SPaTS Framework Contract, using a consortium of in-house skills and carefully selected partners, including Risk Solutions. WSP has a dedicated logistics team that combines technical skills in modelling and analysis with a depth of knowledge based on real life operational experience in the logistics and supply chain sector.

For further details of WSP's services in the Freight and Logistics Sector, follow the link below or contact:

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Please note

Communication from trial participants regarding data collection issues should be directed to the trial email address: LSTTrial@risksol.co.uk. Any questions relating to the conduct of the trial should be directed to the DfT contact above.