

Evaluation of Longer Semi-Trailers: 2014 Interim Results Report

A report for Department for Transport
March 2015
Issue 3



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Executive summary

The Department for Transport (DfT) wants to evaluate a trial of the operation of longer semi-trailers (LSTs) on roads in Great Britain (GB). These trailers are permitted to be up to 2.05m longer than the standard 13.6m units commonly seen on the roads in this country. The trial is designed to test the impact of LST operations on efficiency, emissions and safety. A reduction in emissions may be expected from the increased trailer capacity which should allow the same quantity of goods to be transported in fewer journeys. The evaluation of the trial will ascertain whether this potential reduction in emissions is realised. The trial is proposed to last for 10 years from the launch in 2012 and will permit up to 1,800 trailers in two length categories (up to 14.6m and up to 15.65m) to operate under Vehicle Special Orders (VSOs) granted by the Vehicle Certification Agency (VCA). DfT appointed Risk Solutions as the independent evaluation consultant for the trial and have recently confirmed them in this role until March 2017.

The first LSTs started to operate in March 2012 and formal data collection began from 1 May 2012, with operators recording details of every individual journey leg covered by LST as well as any incidents that took place. Data is submitted in periods covering four months of operations after which a period report is submitted to DfT.

The first annual report of the trial was published in May 2013, covering data from the start of the trial to December 2012. The second annual report¹ updated the results and included an initial analysis of reported injury and non-injury incidents involving LSTs, compared to non-LSTs, as well as estimates of the journeys saved by the LSTs.

2014 Interim results report

This document reports 2014 interim results as a purely factual update to the figures presented last year, so that they can be available for briefings within the Department and at an industry LST forum scheduled for 21 April 2015. Full commentary and discussion of the results will follow in the full annual report, scheduled for publication in summer 2015.

Key facts and figures

At the end of 2014, there were almost **1,200 of the planned 1,800 LSTs on the road**, with **over 1,400 VSOs granted** as of February 2015. At the time of writing, **data from 101 of the 114 operators** on the trial had been received, containing results from **929,000 journey legs** covering a distance of **108 million vehicle km**.

During 2014 there were an additional two serious and two slight injury incidents involving LSTs. Only one of these new incidents, a slight injury incident, has been judged to be potentially LST-related by the operators concerned.

Trial outcomes analysis:

The 2013 Annual Report analysis has been updated to incorporate the 2014 data.

- **LST incident and casualty rates (per billion vehicle km) are only 20-30% of those for non-LST articulated HGVs (>7.5T).**
- The 2013 conservative estimate of 'journeys saved' (used as a proxy for carbon savings) has been updated. The new estimate of **savings (in vehicle km) to the end of 2013 is in the range of 1.2 to 1.4 million vehicle km, which is** double that previously reported.
- The total estimated savings in distance travelled by articulated HGVs, arising from LST operations **to the end of 2014, is now 3.6 to 4.5 million vehicle km.**

¹ Evaluation of the longer semi-trailer trial: annual report 2013. Published 19 June 2014 and available at <https://www.gov.uk/government/publications/evaluation-of-the-longer-semi-trailer-trial-annual-report-2013>

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Note on Issue 3

Following publication of Issue 2 of this report by DfT on 24 March 2015, two small errors were identified. In Figure 1, the 'Tonnes Lifted' total figure to the end of 2013 was incorrectly stated, the figure being given was that to the end of period 2014-P2. In Figure 5, the values shown were also those for a previous period.

Issue 3 corrects these errors.

In all other respects, the report is unchanged from Issue 2.

1 INTRODUCTION

Background

- 1.1 The Department for Transport (DfT) wants to evaluate a trial of the operation of longer semi-trailers (LSTs) on roads in Great Britain (GB). These trailers are permitted to be up to 2.05m longer than the standard 13.6m units commonly seen on the roads in this country. The trial is designed to test the impact of LST operations on efficiency, emissions and safety. A reduction in emissions may be expected from the increased trailer capacity which should allow the same quantity of goods to be transported in fewer journeys. The evaluation of the trial will ascertain whether this potential reduction in emissions is realised.
- 1.2 The trial is proposed to last for 10 years from the launch in 2012. The trial will permit up to 1,800 trailers in two length categories (up to 14.6m and up to 15.65m) to operate under Vehicle Special Orders (VSOs) granted by the Vehicle Certification Agency (VCA). The first semi-trailers were granted VSOs early in 2012 and data collection began on 1 May 2012. In December 2011, DfT appointed Risk Solutions as the independent evaluation consultant for the trial and have recently confirmed them in this role until March 2017.

Trial data collection and reporting

- 1.3 The first LSTs started to operate in March 2012, but they did not appear in service in significant numbers until April/May of that year. Formal data collection began from 1 May 2012, with operators recording details of every individual journey leg covered by LSTs, some basic trailer design details and also information on any incidents that took place. The process also gathers basic counterfactual² information about the non-LST operations of the participants for a period prior to the trial. Data is submitted in periods covering four months of operations and a summary 'Period report' is sent to DfT after each data collection.
- 1.4 The first annual report of the trial was published in May 2013³, covering data from the start of the trial to December 2012. The second annual report⁴ updated the results to December 2013 and included an initial analysis (a) reported **injury and non-injury incidents involving LSTs**, compared to non-LSTs and (b) estimates of the **journeys saved by the LSTs**.

2014 results

- 1.5 With the general election in May 2015, we decided to split the publication of results into a set of '2014 Interim Results' – for publication before the election, followed by a full 2014 Annual Report, including new analysis – to be published after the election.
- 1.6 The intention is that the interim results can be used within the Department for briefings and also for communication at an industry LST forum (21 April 2015) which would otherwise have to be done using the year old 2013 results.
- 1.7 This 2014 Interim Results report provides a summary of the data for the trial to the end of 2014, as well as updated versions of the two evaluation analyses first presented in the 2013 Annual Report. The report is design purely as a factual update. Commentary and discussion of the results will follow in the full annual report.

² HM Treasury. The Magenta Book, Guidance for Evaluation, April 2011: "The key characteristic of a good impact evaluation is that it recognises that most outcomes are affected by a range of factors, not just the policy. To test the extent to which the policy was responsible for the change, it is necessary to estimate – usually on the basis of (often quite technical) statistical analysis of quantitative data – what would have happened in the absence of the policy. This is known as the counterfactual."

³ Evaluation of longer semi-trailer trial: annual report 2012: Published 31 May 2013 and available at <https://www.gov.uk/government/publications/evaluation-of-the-high-volume-semi-trailer-trial-annual-report-2012>

⁴ Evaluation of the longer semi-trailer trial: annual report 2013. Published 19 June 2014 and available at <https://www.gov.uk/government/publications/evaluation-of-the-longer-semi-trailer-trial-annual-report-2013>

2 TRIAL DATA OVERVIEW

Summary statistics

- 2.1 The trial has now been running since March 2012. Figure 1 shows the scale of LST operations on the trial up to the end of December 2014, with a comparison to the position one year earlier.

	Trial to end 2014	Trial to end 2013
Operator Submissions		
Due:	114	76
Finalised at report date:	101	66
Trailers (Inc. where data is missing/late)		
In operation (data submitted)	1,194	548
On VSO	1,439	approx. 550
Legs	928,134	345,560
Distance [Million vehicle km]	108	41
Load Lifted ['000 T]	8,400	3,068
Single Leg Averages: (Rounded)		
Average Distance [km]	117	117
Average Load [T] (when loaded)	13	13
Average Load [T] (all journeys)	9	9

Figure 1 Trial data overview (to end 2014)

LST take-up

- 2.2 The take up of LSTs can be measured in two ways. Figure 2 shows the growth in the number of LSTs actually on the road, counted by the date on which each trailer appears in the submitted data. Figure 3 shows the number of trailers for which VCA have granted a Vehicle Special Order (VSO). The numbers on the second chart are always higher as they include trailers which have not yet entered service or are still under construction. In comparing the charts, note that the 'on the road' data stops at the end of 2014, whereas the VSO data continues to the point at which the data for the report was processed. The latter therefore includes about 100 LSTs granted VSOs in early 2015.

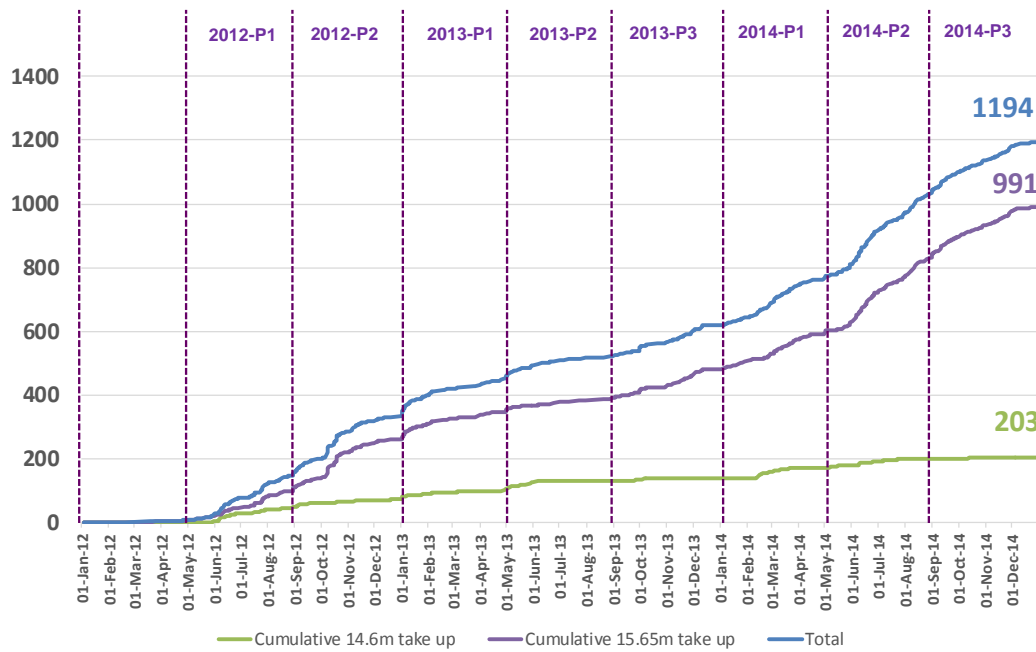


Figure 2 Cumulative count of LSTs entering operation by length (from journey leg data)

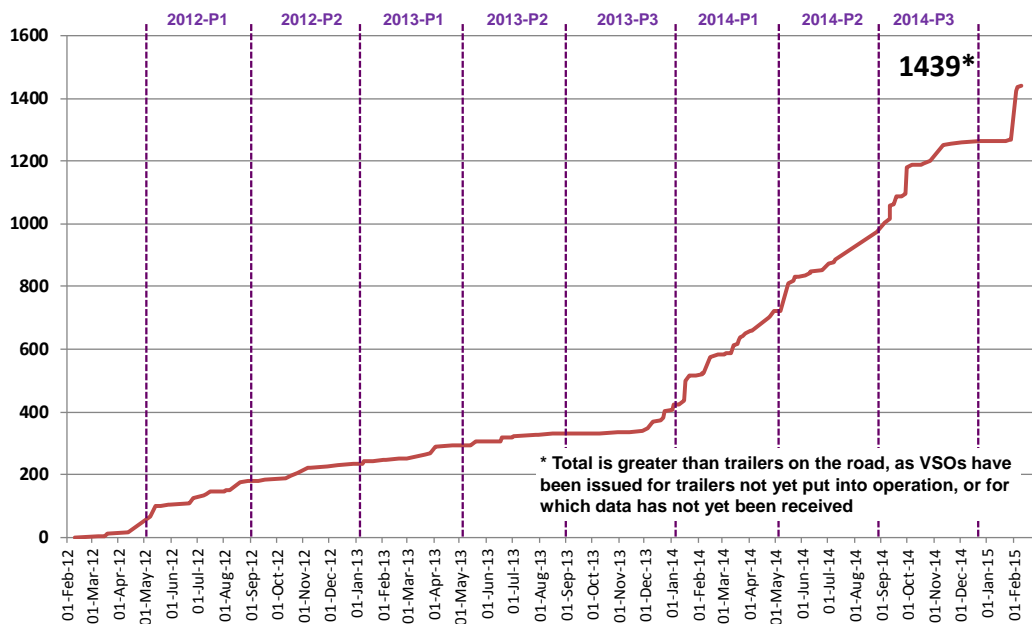


Figure 3 Cumulative count of number of LSTs on Vehicle Special Orders (VSOs) to February 2015

The participating companies

- 2.3 The size of the companies involved in the trial (by number of drivers) is given in Figure 4⁵ with the split by primary business type shown in Figure 5. The companies on the trial impose special operational constraints on the LSTs while they explore the use of these new designs, as shown in Figure 6.

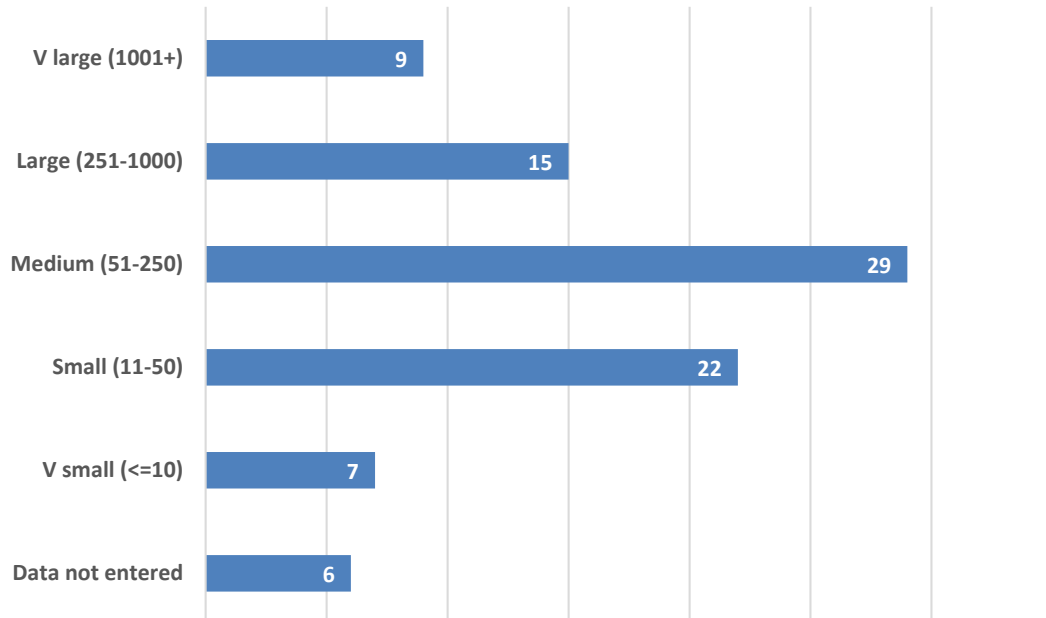


Figure 4 Trial participants by company size (number of drivers employed)

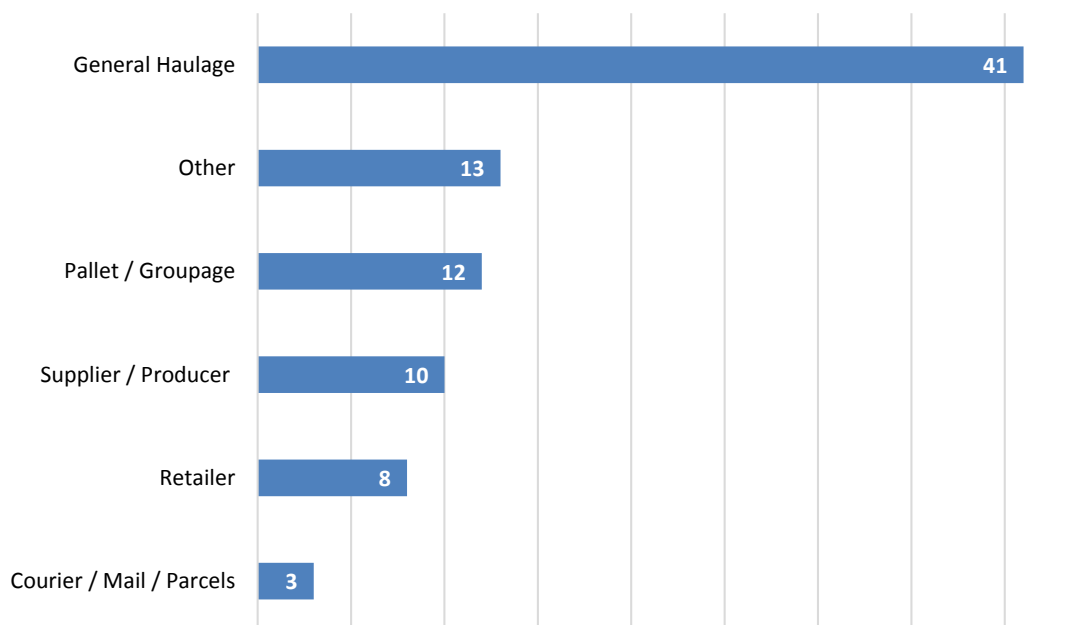


Figure 5 Types of operators by primary / largest part of operation

⁵ Note that the total number of participating companies in some charts may differ from the total cited in Figure 1, because we are still awaiting company information from some participants.

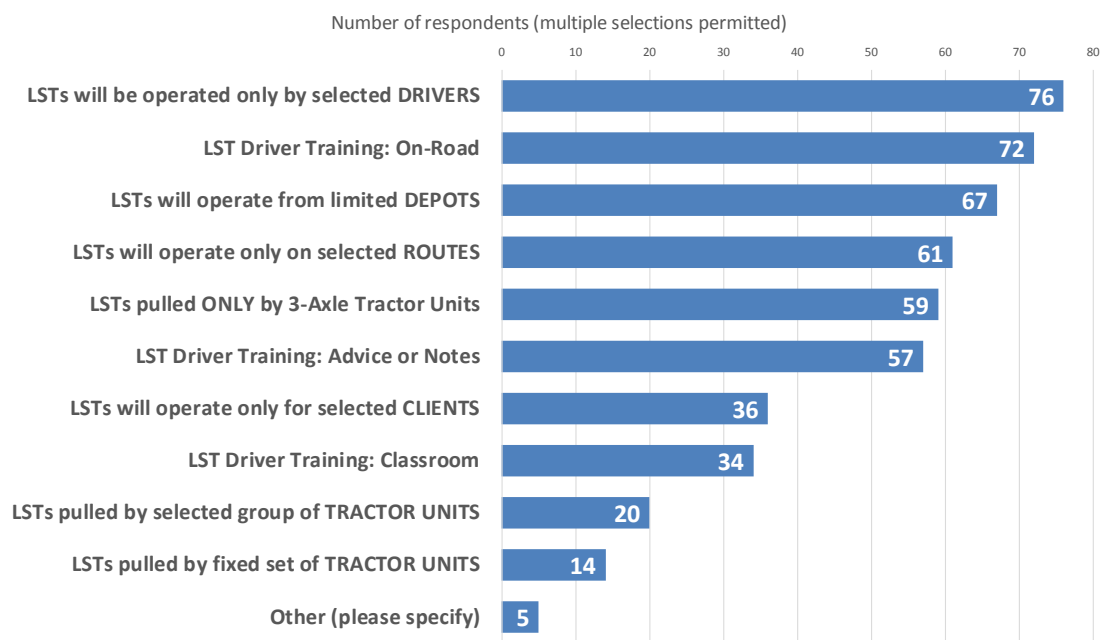


Figure 6 Special arrangements applied to LST operations

- 2.4 A wider range of data relating to the operation of the trial, the companies involved and the trailer designs, as has been presented in previous years, will be included in the 2014 Annual Report.

3 INCIDENTS INVOLVING LSTS

- 3.1 Trial participants are required to report all incidents on the public highway or involving injury on private land, directly to DfT at the time of the event. A full description of the incident reporting process can be found in the 2013 Annual report or in the trial data requirements guide on the DfT website. Figure 7 shows the incidents by location category from the start of the trial to the end of 2014.

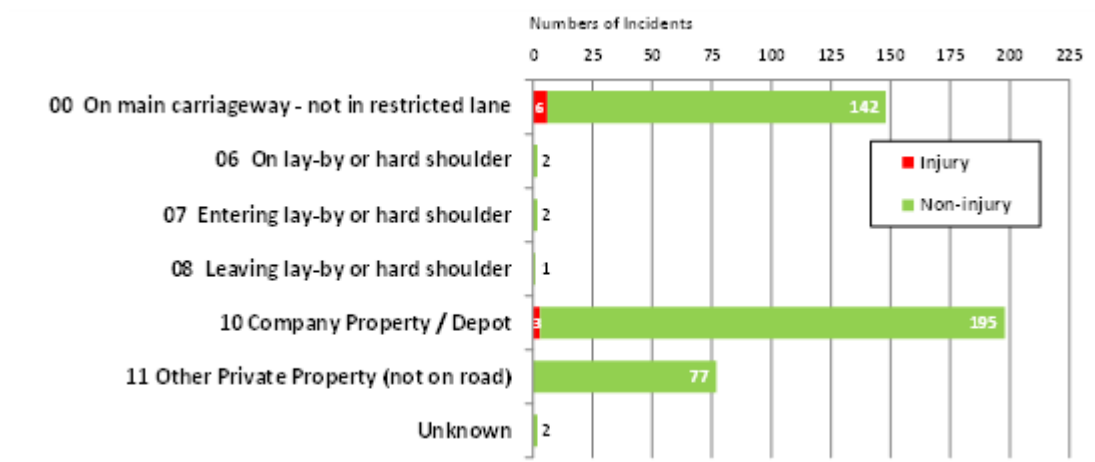


Figure 7 Incidents involving LSTs by location

As indicated in the 2013 report, the number of incidents resulting in injury is very small. The 2013 report also indicated that almost half of the non-injury incidents were very minor events that did not result in any property damage. * For one injury incident it is unclear how the incident occurred and whether this was related to the length of the trailer – the incident is being investigated to clarify the cause.

- 3.2 Figure 8 shows the updated breakdown of the injury incidents by location and injury severity, with the same totals to the end of 2013 shown for comparison in parentheses.

Injury Collisions from Trial Logs	Total Casualties	Fatal	Serious	Slight
All Injuries	9 (5)	0	3 (1)	6 (4)
All Injuries in Public Road/Place	6 (2)	0	3 (1)	3 (1)
All Injuries judged LST related *	2-3 (2)	0	0	2-3 (2)

* For one injury incident it is unclear how the incident occurred and whether this was related to the length of the trailer – the incident is being investigated to clarify the cause.

Figure 8 Injury incidents / casualties by location and severity

- 3.3 Each incident resulted in a single casualty.
- 3.4 The chart shows that there have been two additional **serious** injuries in incidents involving an LST during 2014, both of which took place on the public highway. However, the fact that the trailer was an LST was not judged to be a causal factor in either incident. In the first, the driver of the tractor unit pulling the LST was injured when he collided with a previously jack-knifed vehicle that was partly blocking lane one of the motorway. The third party vehicle did not have any lights operating and the section of motorway was unlit. The driver was unable to see the incident early enough to avoid it completely. In the second incident, the person injured

was in a vehicle that collided with the rear of an LST as it travelled in lane one of the motorway.

3.5 There were also two additional **slight** injury incidents in 2014. In one of these, the driver of another vehicle ran into the back of the LST on a motorway and so the event is not considered to be LST related. The second is less clear as it involved the driver of the LST losing control and the vehicle overturning. The root causes of this incident have not been reported and we plan to investigate this further, in time for the 2014 Annual Report.

3.6 The two figures below give a breakdown of the circumstances of all the incidents. Further analysis of the non-injury incidents will be provided in the 2014 Annual Report.

Manoeuvre before incident	Injury	Non-injury	Grand Total
01 Reversing	1	81	82
02 Parked		19	19
03 Waiting to go ahead but held up		2	2
04 Slowing or stopping	2	4	6
05 Moving off	1	68	69
06 U turn		22	22
07 Turning left	2	100	102
08 Waiting to turn left		3	3
09 Turning right		86	86
10 Waiting to turn right		4	4
11 Changing lane to left		6	6
12 Changing lane to right		1	1
15 Overtaking on nearside		1	1
16 Going ahead left hand bend		4	4
17 Going ahead right hand bend		1	1
18 Going ahead other	3	16	19
Unknown		2	2
Grand Total	9	420	429

Figure 9 LST Incidents: Manoeuvre before incident

Incident proximity to junction	Injury	Non-injury	Grand Total
00 Not at, or within 20 metres of junction	4	75	79
01 Approaching junction or waiting parked at junction approach	1	31	32
02 Cleared junction or wait/park at exits		8	8
03 Leaving roundabout	1	5	6
04 Entering roundabout		7	7
05 Leaving main road		40	40
06 Entering main road		17	17
07 Entering from slip road		2	2
08 Mid junction - on roundabout or road		18	18
09 Not on public highway	3	215	218
Unknown		2	2
Grand Total	9	420	429

Figure 10 LST Incidents: Proximity to junction

4 TRIAL OUTCOME ANALYSIS 1: INJURY INCIDENTS

- 4.1 The 2013 Annual Report included two preliminary analyses of trial outcomes in terms of:
1. Reported injury and non-injury incidents involving LSTs, compared to non-LSTs.
 2. Reported utilisation of the trailer load area and resulting journeys saved.
- 4.2 These analyses have been updated to incorporate the 2014 trial data and some process changes made during the year. They are presented in the following sections.

Incident and distance data source updates

- 4.3 The LST incident data and the distance travelled by LSTs is available from the trial data and has been updated to incorporate the 2014 figures. The data for non-LST articulated vehicles comes from three data sources, all of which are publically available, as shown in Figure 11.

Data & Source	2013 Annual Report	2014 Interim Results
LST Incidents & Casualties	Trial data to end 2013	Trial data to end 2014
LST Distance travelled (Billion Vehicle km)		
Incidents involving UK Artics > 7.5T and resulting casualties	STATS19 5 Years 2008-12	STATS19 5 Years 2009-13
Distance travelled by UK Artics > 7.5T	DfT Table TRA 3105 5 years 2008-12	DfT TRA 3105 4 years 2009-2012 (2013 not yet published)

Figure 11 Incident analysis data source updates

- 4.4 For these interim results we applied the 2012 national figure for the distance travelled by articulated vehicles > 7.5T, as the DfT source table for this has not yet been updated to include the 2013 figures. We hope to include the updated figures in the 2014 Annual Report.

Analysis and statistical significance testing

- 4.5 As reported in the 2013 Annual Report we have again conducted an analysis to demonstrate that we have sufficient data to report a statistically significant difference between the incident rates being observed for the LSTs compared to the background rates for non-LSTs. This analysis will be fully reported in the 2014 Annual Report, due to be published later this year.
- 4.6 The results are summarised in Figure 12, showing that the LST fleet continues to have an incident rate that is only 20-30% of that seen in the general UK articulated HGV fleet. The figures in parenthesis show the figures from the 2013 Annual Report.

Injury incidents Public access locations	LST Rate per billion vkm	GB Artic HGV Rate per billion vkm	Ratio LST/GB-HGV
Collisions	55.6 (48.8)	176.9 (187.4)	31% (26%)
Casualties	55.6 (48.8)	251.6 (262.5)	22% (19%)

Figure 12 LST vs non-LST incident and casualty rate comparison

5 TRIAL OUTCOME ANALYSIS 2: UTILISATION

- 5.1 This analysis was first presented in the 2013 Annual Report, and led to some recommendations for refinements to the data reporting structure. These changes were applied by operators in the latter half of 2014. Here, we explain the changes and how they have been incorporated into the analysis. The analysis method is fully described in the 2013 Annual Report. The results here include a re-statement of the end of 2013 position, as it would have appeared if the new calculation features had been used.

Calculation assumption changes

- 5.2 The definition of **Fully Loaded Logs**, where the load could not have been carried on a 13.6m, trailer, has been adjusted to reflect the difference between 14.6m and 15.65 trailers.
- 5.3 Where **deck utilisation** has been expressed using the bands rather than actual percentages, an analysis of the use of the new bands by operators has been used to determine how their historic 'old band' data is converted to the new values.
- 5.4 In this analysis, the **summation of savings** has been done on an individual leg basis, rather than the simpler aggregated calculation used for the 2013 Annual Report.
- 5.5 As in the 2013 Annual Report, an upper and lower bounding estimate has been produced. In the lower bound all operation 'leg types' are treated as discrete journeys. For the upper bound, an assumption is made for legs noted as being 'To/from Retail site', that where a loaded leg has been saved going from the distribution centre to a retail site, an empty return leg back to the depot is also saved, doubling the distance travelled/saved.
- 5.6 Appendix 1 sets out these calculation assumptions in detail.

Vehicle kilometre savings (lower bound)

- 5.7 The changes in the data bands and the calculation process remove conservatism that was present in the 2013 analysis. Figure 13 shows the results to the end of 2013, recalculated using the new assumptions and process. Figure 14 provides the comparable figures with the 2014 data included.⁶

Vehicle kilometre savings (upper bound)

- 5.8 As in the 2013 Annual Report, an upper bound calculation is generated by changing the assumption for the specific case of legs to retail sites. The calculation assumptions are:
1. The retail sector is assumed to operate many legs as full from a distribution centre to a retail site, then empty from the retail site back.
 2. For each round trip made, we could assume a percentage saving of the total round trip, as 13.6m trailers would also make outward loaded and return empty trips, but would make more overall round trips than fully loaded longer trailers.
 3. This assumption represents the 'higher bound' of saved vehicle kilometres – for this calculation we double the saved vehicle kilometres associated with fully loaded legs with the leg type 'to/from retail site' only.
- 5.9 Figure 15 shows the results to the end of 2013, recalculated using the new assumptions and process. Figure 16 provides the comparable figures with the 2014 data included.⁶

⁶ Note that in these calculations, the data from the very first trial period – 2012-P1 has been excluded, because in that first period there was no distinction between volume and deck space utilisation in the data framework. The results are not affected significantly because of the very small numbers of trailers in operation in that period.

Trailer Length:	14.6m	15.65m	Total
Vkm for legs where LSTs are reported to be full (Full=91-100%)	4,192,105	18,518,410	22,710,515
All vkm operated by LSTs	7,077,452	33,636,520	40,713,972
Percentage of vkm operated by full LSTs	59%	55%	56%
Assumed saving for vkm operated by full LSTs (additional load carried)	0-7%	0-15%	
Vkm saved (lower bound)	231,870	1,661,239	1,893,109
Vkm 'increase' on all LST vkm as a proxy for emissions increase of 1.8%	127,394	605,457	732,851
Estimated net vkm saved	104,476	1,055,782	1,160,258

Figure 13 Distance savings to end 2013 – recalculated (lower bound)

Trailer Length:	14.6m	15.65m	Total
Vkm for legs where LSTs are reported to be full (Full=91-100%)	9,932,287	49,708,990	59,641,277
All vkm operated by LSTs	18,096,310	87,125,648	105,221,958
Percentage of vkm operated by full LSTs	55%	57%	57%
Assumed saving for vkm operated by full LSTs (additional load carried)	0-7%	0-15%	
Vkm saved (lower bound)	647,246	4,831,677	5,478,923
Vkm 'increase' on all LST vkm as a proxy for emissions increase of 1.8%	325,734	1,568,262	1,893,995
Estimated net vkm saved	321,512	3,263,415	3,584,928

Figure 14 Distance savings to end 2014 (lower bound)

Trailer Length:	14.6m	15.65m	Total
Vkm for legs where LSTs are reported to be full	4,192,105	18,518,410	22,710,515
Vkm for legs where LSTs are reported to be full and to/from retail site	743,190	3,358,845	4,102,035
Percentage of full vkm operated to/ from retail sites	18%	18%	18%
Vkm saved in non-retail operations	201,246	1,422,558	1,623,804
Vkm savings for outward full retail journeys	30,624	238,681	269,305
Total Vkm saved in retail operations	61,248	477,362	538,610
Vkm saved (upper bound)	262,494	1,899,920	2,162,414
Vkm 'increase' on all LST vkm as a proxy for emissions increase of 1.8%	127,394	605,457	732,851
Estimated net vkm saved	135,100	1,294,463	1,429,563

Figure 15 Distance savings to end 2013 – recalculated (upper bound)

Trailer Length:	14.6m	15.65m	Total
Vkm for legs where LSTs are reported to be full	9,932,287	49,708,990	59,641,277
Vkm for legs where LSTs are reported to be full and to/from retail site	1,305,509	9,864,424	11,169,933
Percentage of full vkm operated to/ from retail sites	13%	20%	19%
Vkm saved in non-retail operations	583,337	4,012,075	4,595,412
Vkm savings for outward full retail journeys	63,909	819,602	883,511
Total Vkm saved in retail operations	127,818	1,639,204	1,767,022
Vkm saved (upper bound)	711,155	5,651,279	6,362,434
Vkm 'increase' on all LST vkm as a proxy for emissions increase of 1.8%	325,734	1,568,262	1,893,995
Estimated net vkm saved	385,421	4,083,017	4,468,439

Figure 16 Distance savings to end 2014 (upper bound)

Vehicle kilometre savings - summary

5.10 The data from the figures above is summarised in Figure 17.

Distance saved (million vehicle km)	2014	2013 New Calculation	2013 Annual Report
Lower bound	3.58	1.16	0.61
Upper bound	4.47	1.43	0.90

Figure 17 Vehicle km saved by using LSTs

- 5.11 The removal of the conservatism that was present in the 2013 Annual report, as well as the addition of some journey leg data from 2013 that was submitted late by operators and has now been incorporated into the database, has broadly doubled the estimate of the distances saved. A more detailed explanation of these changes will be given in the 2014 Annual Report.
- 5.12 The majority of the additional saving in 2014 compared with 2013 arises from the much greater distances being covered as the number of LSTs on the trial has risen during the year. The 2014 Annual Report is expected to include further analysis of the relative savings in distances travelled by different types of operator.

APPENDIX 1 UTILISATION ANALYSIS CALCULATION ASSUMPTIONS

‘Loaded legs’

1. Longer trailers are fully loaded where the deck load is more than could be accommodated by a 13.6m trailer so:
 - 14.6m trailers are fully loaded if deck is more than 91% covered⁷
 - 15.65m trailers are fully loaded if deck is more than 87% covered⁵.
2. 14.6m trailers are assumed to be able to carry a maximum of 7% more goods than a 13.6m trailer if they are 100% loaded. Between 91-100% loading of the LST, the ‘extra’ goods assumed to be carried over and above a 13.6m trailer has been linearly interpolated.
3. 15.65m trailers are assumed to be able to carry a maximum of 15% more goods than a 13.6m if they are 100% loaded. Between 87-100% loading of the LST, the extra goods assumed to be carried over and above a 13.6m trailer has been linearly interpolated.

Utilisation by percentage / by band

4. The data framework allows operators to submit their utilisation (deck space covered, volume filled) either as estimates of the percentage of the available space or by selecting a band from a given range:

OLD BAND	100 = 91-100%	
NEW BANDS	95=91-99%	New mid-2014
	100=100% FULL	New mid-2014

5. The key change since 2013 is the division of the top band into separate ‘nearly full’ (91-99% range) and ‘full’ bands.
6. The analysis is performed using percentage values, so where operators have provided percentage loadings these have been used for all calculations.
7. Where operators have used utilisation bands, the data is converted into percentages using set rules. The rules now need to address historic data using the old bands as well as 2014 data created using the new bands.

Old /New band data – conversion to utilisation percentages

8. Older data (before 2014-P2) has a single band of 91-100% full. Newer data (2014-P2 onwards) this band was split into two parts, 91-99% and 100%.
9. Where operators using the new bands (in 2014-P2, P3) have more than 96% of their full data in the 100% full band, we have converted all their historic 91-100% data into 100% full data.
10. For other operators, 91-100% full data has been converted to 91-99% full data.
11. Band conversion to percentages for calculation
 - a. For the 2013 Annual Report, the single band of 91-100% full, which was converted to its mid-point of 95.5%, which was stated as being conservative
 - b. For the 2014 results, the new bands have allowed some of the conservatism to be removed, with band-based utilisation data being converted as follows:
 - 91-99% full band = 95%
 - 100% full band = 100%

⁷ Measurement based on the number of standard pallets that cover the deck space

Summation of savings

12. In the 2013 analysis, the calculations involved a single 'top band' of utilisation. In this category we conservatively assumed that the trailer was 95% full. The previous analysis also assumed a single, gross saving for the two trailer lengths.
13. For the updated analysis we have used the new bands to remove much of the previous conservatism, and journey savings have been calculated on a 'per leg' basis. In addition, since everything is now expressed as percentages, we have been able to define more accurately the percentage fill as that which exceeds a 13.6m trailer, for each of the two trailer lengths.
14. The calculation assumptions are:
 - a. For each leg, the total distance in km is multiplied by the assumed saving percentage, based on the additional percentage loading achieved on that leg over and above what a 13.6m trailer would have carried.
 - b. It is assumed that the journeys/ vehicle km saved can be summed over the total volume of data, on the basis that:
 - Operators will aim to operate efficiently, so will aim to consolidate loads as far as possible.
 - Legs not run fully loaded have been excluded from the calculations, so any 'leftover' loads that would not fill a longer trailer to greater than the capacity of a 13.6m trailer have not been counted as part of the potential journey savings.
 - The dataset is large, and the assumptions made do not introduce a bias to the calculation in favour of the journey savings.

Additional savings for retail site deliveries

15. As in the 2013 Annual Report, an upper bound calculation is generated by changing the assumption for the specific case of legs to retail sites.
16. The retail sector is assumed to operate many legs as full from a distribution centre to a retail site, then empty from the retail site back.
17. For each round trip made, we could assume a percentage saving of the total round trip, as 13.6m trailers would also make outward loaded and return empty trips, but would make more overall round trips than fully loaded longer trailers.
18. This assumption represents the 'higher bound' of saved vehicle kilometres – for this calculation we double the saved vehicle kilometres associated with fully loaded legs with the leg type 'to/from retail site' only.