THE FUTURE OF TRANSPORT

CLIENT PROJECT REPORT CPR2485

Monitoring and evaluation of the 55/60mph pilots

Interim report for the on-road trials of 55mph on the M3 Junction 2 to 4a scheme

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Executive Summary

Improving customer satisfaction, particularly through roadworks, is a priority for Highways England. One potential measure to achieve this is raising the speed limit through roadworks from the current 50mph limit to 55mph or 60mph. This approach aligns with recommendation 6 from the 'Incidents and roadworks – A road user perspective' report which suggests that "Highways England should set speed limits in roadworks no lower than is required to maintain safety" (Transport Focus, November 2016). This project supports the monitoring and evaluation of trials which involve raising the speed limit through roadworks, where the scheme is designed in a way that makes it safe to do so, and when road workers will not be exposed to increased risk from the increased speed limit.

This report presents the findings from the on-road pilot of an increased speed limit at the M3 Junction 2 to 4a scheme, during the operational testing phase of Smart Motorway development. The trial involved implementation of a 55mph speed limit on part of the scheme on the southbound carriageway; drivers travelling on this part of the scheme experienced a 'step up' in speed limit from 50mph to 55mph. Driver behaviour was measured here and on an equivalent stretch of the northbound carriageway where the speed limit did not change (serving as a control site). The aim was to understand whether the change in speed limit on the northbound carriageway (to 55mph) impacted on the safety of road users. In addition to the behavioural measures, surveys were carried out with drivers through the scheme in order to understand perceptions of the 55mph speed limit.

The key findings from this trial can be summarised as follows:

- The 55mph speed limit resulted in a 2mph increase in free-flow average speed to around 52-53mph (i.e. below the speed limit)
- The increased speed limit saved each road user approximately 20s in journey time
- Speed compliance was better with the 55mph speed limit than the 50mph speed limit, but the occurrence of close following was not impacted. A previous trial of 60mph trial on the M5 found a substantial reduction in close following by HGVs compared with a 50mph speed limit; this suggests that a 60mph speed limit may be more effective than 55mph for reducing HGV close following
- Since there were very few breakdowns or collisions during the trial period, no robust conclusions can be drawn about the impact of the increased speed limit on incidents. Incidents in the roadworks will be examined further through a survey of road workers; this will be presented in a separate report in Autumn 2017
- Customers who drove regularly through the scheme were less likely to notice the change in speed limit than 'occasional' drivers
- Survey responses suggested the impact of the speed limit change on satisfaction was mostly positive (in 46% of cases) or neutral (also in 46% of cases); only 8% reported being 'much' or 'a little' less satisfied compared with before the speed limit change
- Despite this, detailed customer feedback indicated 'mixed' feelings about use of 55mph; some drivers felt further change was needed to improve satisfaction

1 Introduction

1.1 Background

Customer satisfaction and safety are critical components of Highways England's vision for the future; as part of this vision, Highways England is committed to improving the customer experience through roadworks by maximising safety (for both road users and road workers) and minimising disruption caused by roadworks schemes.

One potential way of improving customer satisfaction at roadworks is to challenge the approach to speed management that is usually taken at Major Schemes. Typically, a 'blanket' speed reduction of 20mph is imposed throughout the scheme, resulting in a 50mph enforced speed limit in place for the entire length and duration of the roadworks.

Following consultation with stakeholders across Highways England and the Supply Chain, this project was set-up to support the monitoring and evaluation of the potential benefits of raising the speed limit through roadworks from 50mph to 55mph or 60mph where the scheme is designed in a way that makes it safe to do so, and when road workers will not be exposed to unacceptable risk from the increased speed limit.

Three specific scenarios were defined for on-road trials:

> **Scenario 1:** Implementation of a 60mph speed limit on lead-in and exits to/from the works, with a 50mph speed limit through the works area
>
> **Scenario 2:** Changing the speed limit (to either 55mph or 60mph) during the operational testing (or 'pre-commissioning') phase of Smart Motorway schemes
>
> **Scenario 3:** Changing the speed limit (either to 55mph or 60mph) throughout the works during a 'holiday period' when there are no road workers present

A speed limit of 55mph is not currently used on the Strategic Road Network (SRN) and so there is limited evidence regarding how this speed limit might affect driver behaviour, perceptions or performance in the vicinity of roadworks. As a result, prior to trials of 55mph on-road, two trials of 55mph were carried out using TRL's driving simulator (Wallbank *et al*., 2017a; 2017b). These studies provided clear evidence in support of trialling 55mph speed limits on the SRN. Specifically, the results showed:

- The 55mph speed limit was no more distracting than the 50mph speed limit currently used in roadworks.
- From the qualitative feedback, some drivers perceived that driving in the 55mph speed limit was more difficult than the 50mph or 60mph limit, but there was no empirical evidence to suggest that this speed limit affected their ability to drive.
- There was no evidence that the 55mph speed limit resulted in reduced headway and thus increased collision risk compared to 50 or 60mph.
- When changing lanes there was no difference in behaviour between the 50 and 55mph speed limits, suggesting that drivers tended to accept similar gap sizes at these two speed limits.

Based on these results, it was recommended that 55mph is progressed to an on-road trial with a view to validating the findings from the simulator in the real world.

1.2 Study objectives

This report summarises the findings from an on-road pilot of 55mph on the M3 Junction 2 to 4a scheme during Summer 2017. This is the fourth pilot which has been completed with the aim of understanding the impact of increasing the speed limit at roadworks.

This pilot implemented a 55mph speed limit under the conditions of Scenario 2, that is, where the speed limit was only increased during the operational testing phase of Smart Motorway development. During this phase, the former hard shoulder (Lane 1) remains closed until all detectors in the Motorway Incident Detection and Signalling (MIDAS) system are commissioned. Following this, Lane 1 is opened to traffic, and queue protection (HIOCC) is tested.

From the customers' (road users') perspective, during the first part of this stage the former hard shoulder (Lane 1) is coned off and no visible work is taking place in the closure; during the second part, the whole carriageway is open and the Smart Motorway will appear "complete". During both of these periods a 50mph speed restriction is in place, for no apparent reason from the customers' point of view. For the purposes of the pilot, the M3 Junction 2 to 4a scheme agreed to increase the 50mph speed limit to 55mph when Lane 1 was coned off in order to examine the impact of the change on driver behaviour and customer satisfaction. Following this, the scheme reverted the speed limit back to 50mph during the testing of HIOCC.

TRL was commissioned by Highways England to monitor driver behaviour (and customer satisfaction), to ensure that safety of road users and workers was not compromised by the increase in speed limit during the trial period, and to understand how customer satisfaction was impacted by the increased speed limit.

The key objectives of the research were to gather evidence of the impact of increasing the speed limit on the M3 Junction 2 to 4a scheme from 50mph to 55mph on:

a) Lane distribution
b) Average vehicle speed
c) The number of vehicles non-compliant with the speed limit
d) Average vehicle headway
e) The proportion of vehicles close following
f) The number of incidents
g) Journey times
h) Customer satisfaction

This report provides an overview of the scheme and the data collection methodology (Section 2), presents the results from the monitoring of driver behaviour (Section 3), summarises the conclusions from the pilot (Section 4) and makes recommendations for the next steps (Section 5).

2 Method

2.1 Overview of the scheme

The M3 Junction 2 to 4a Smart Motorway scheme commenced in February 2015 and was completed in July 2017. This scheme replaced the existing three lane motorway with a four lane (All Lane Running, ALR) Smart Motorway.

The roadworks between Junctions 3 and 4a were identified as a suitable location for trialling an increased speed limit during the commissioning phase of the Smart Motorway ALR scheme (i.e. 'Scenario 2' – see Section 1.1). On these two links, the northbound carriageway was used as the 'control location' and retained the current 50mph speed limit throughout the monitoring period, whilst the southbound carriageway was used as the 'experimental location' and had a 55mph speed limit implemented through part of the works. During the pilot, drivers travelling southbound through the scheme experienced a step up in the speed limit from 50mph to 55mph, exiting the works into national speed limit beyond Junction 4a. The works between Junction 2 and 3 were unaffected by the pilot and retained the 50mph speed limit.

An overview of the scheme and the monitoring locations is provided in Figure 1. The location of the monitoring equipment is outlined in Section 2.2.

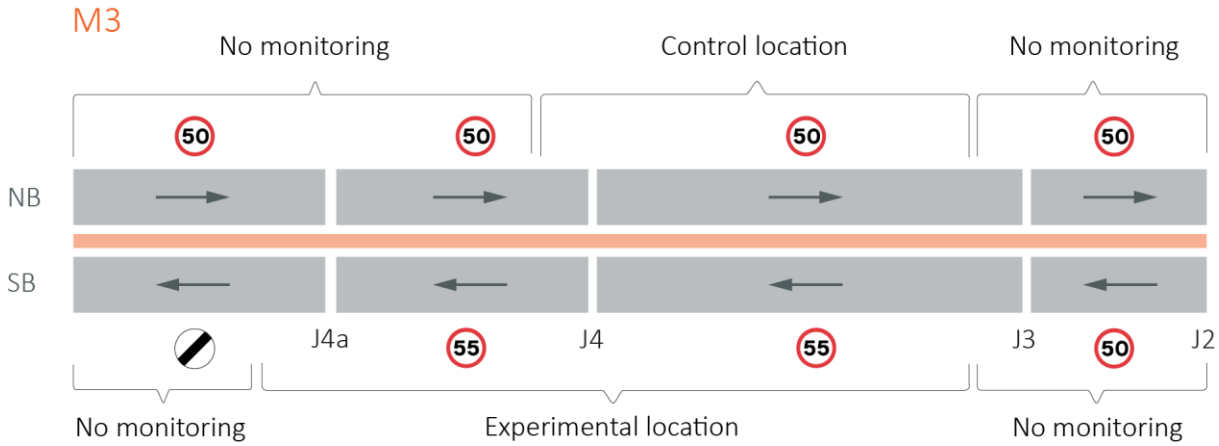
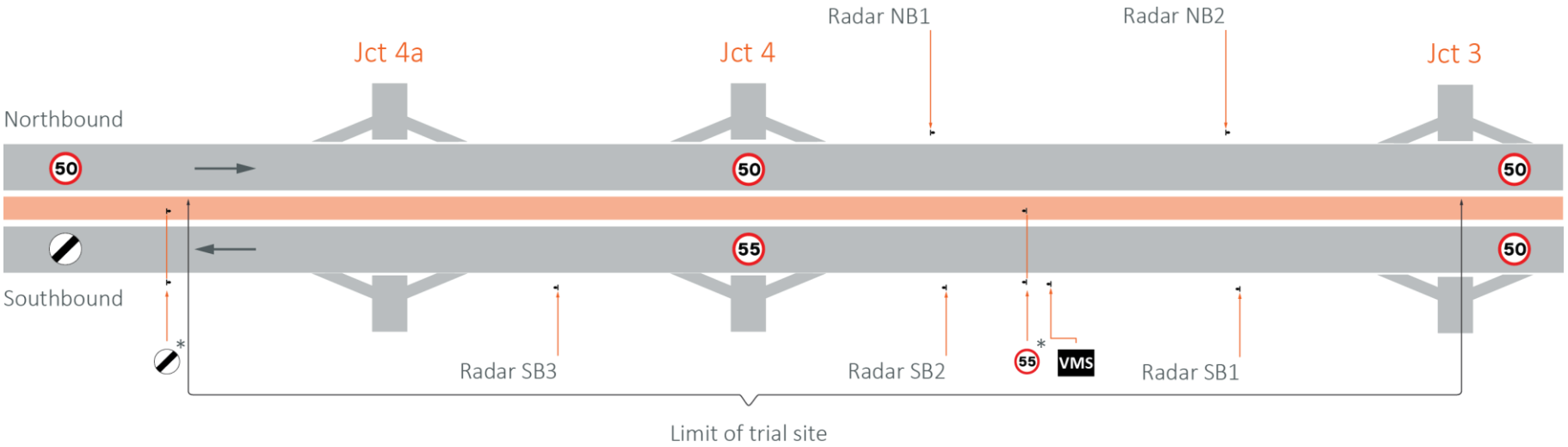


Figure 1: M3 Junction 2 to 4a scheme monitoring locations

2.2 Monitoring locations and signage

The monitoring covered two periods: the 'baseline' monitoring period during which both carriageways retained the current 50mph speed limit and the 'trial' monitoring period during which the 55mph speed limit was implemented southbound while the northbound carriageway speed limit remained at 50mph.

An overview of the scheme during the trial period, along with the monitoring locations used is provided in Figure 2.



* Terminal pair speed limit signs 1500mm in diameter, all other speed/repeater sign sizes and spacing as per TSM Chapter 8.

Figure 2: Overview of pilot site with monitoring locations

During the trial period, drivers travelling southbound entering the pilot area from Junction 3 travelled at 50mph and then transitioned to 55mph 3.6km downstream of the junction. They travelled for approximately 8.4km in the 55mph speed limit (through Junction 4) before exiting the works after Junction 4a into a National Speed Limit. Driver behaviour was monitored from shortly after Junction 3, prior to the step up, to just before Junction 4a.

Figure 2 shows how the step up in speed limit was communicated to drivers. A Variable Message Sign (VMS) displaying "new speed limit ahead" preceded the pair of 55mph 1500mm diameter terminal signs marking the change in speed limit[1]. Repeater signs were displayed after the terminal signs at 350m intervals on alternate sides of the carriageway as specified in TSM Chapter 8.

Five mobile radar units were used to monitor vehicle speeds, headways and flow, both upstream and downstream of the step up, to establish whether the combination of VMS and terminal signs was effective at notifying drivers of the change in speed limit. In addition to one-minute average data, the radar units were configured to collect data on individual vehicles.

Two of the radar (NB1 and NB2) were used to monitor driver behaviour on the northbound carriageway which served as a control location where no changes in speed limit were implemented. This enabled the analysis to account for any extraneous influences on behaviour between the baseline and trial periods (such as weather or local traffic conditions).

Speed cameras and warning signs were in place throughout the scheme to provide drivers with the perception of enforcement.

2.3 Timelines

The monitoring took place between 15th June and 29th June 2017. On 30th June, the scheme removed the traffic management (TM) from Lane 1 and commenced ALR as part of the final stage of commissioning required for the Smart Motorway. Table 1 outlines the monitoring timeline.

[1] This sign was installed overnight on 22nd June, one day after implementation of the 55mph speed limit.

Table 1: Timeline for monitoring

Dates	Description of activity	Experimental location (southbound carriageway)		Control location (northbound carriageway)
		Upstream of step (SB1)	Downstream of step (SB2 & SB3)	
15th June – 21st June 2017	Baseline monitoring period	50	50	50
22nd June – 28th June 2017	Trial monitoring period	50	55	50

All radar units were removed prior to the speed limit being returned to 50mph (29th June 2017) and the TM from Lane 1 being removed (30th June 2017). This ensured that all Emergency Refuge Areas (ERAs) were available for use by road users during the final commissioning period and that the risk to road workers was minimised. As a result, monitoring ceased on 28th June, in order to allow decommissioning of the radar units.

2.4 Lane use and widths

The lanes open for traffic, and the widths of the lanes, varied during the pilot:

- During the baseline monitoring, when both carriageways were 50mph, Lanes 1, 2 and 3 were open to traffic and narrow lanes were in place: Lane 1 at 3.25m, Lane 2 at 3m and Lane 3 at 2.85m.
- During the trial monitoring, when the 55mph speed limit was implemented southbound, Lanes 2, 3 and 4 were open to traffic at full width.

Speed cameras and warning signs were in place throughout both periods to ensure that drivers perceived the limits to be enforced.

The difference in the lane widths means that any differences in driver behaviour between the baseline and trial period cannot be attributed solely to differences in the speed limit. As such, the impact measured by this pilot is the combined impact of a speed limit change (from 50 to 55mph) and a lane width change (from narrow to full width). This is a limitation of the results presented in this report.

2.5 Risk assessment

Prior to commencing the pilot, the M3 Junction 2 to 4a Scheme team (Balfour Beatty) carried out a scheme-specific GD04 risk assessment. This assessment examined the risks to road workers and road users from the increase in speed limit, detailing the mitigation measures required to address these risks and an assessment of the tolerability of any risk change. On the basis of this risk assessment the 55/60 project board agreed the pilot could commence, provided on-going monitoring and safety reviews were carried out and that a suitable abort process was in place (this is detailed in Section 2.6).

2.6 Safety reviews and abort process

Throughout the pilot, the scheme had overall responsibility for risk and retained the right to initiate the abort process (i.e. reverting the scheme back to 50mph) at any stage. However, TRL provided on-going monitoring during the pilot and other parties (TRL and Highways England) could also request that the scheme initiate the abort process should evidence be obtained that immediate termination of the pilot was necessary.

The abort process was formally documented by the scheme team as part of the GD04 risk assessment. The abort process was never used and the pilot was completed successfully without any concern for safety.

2.7 Data collection

In order to achieve the objectives of this research (see Section 1.2), a number of different data sources were used:

- Radar data;
- Incident data;
- Survey data (administered online with road users who had driven through the scheme and face-to-face through surveys at the local Motorway Service Area).

These data sources, and the statistical comparisons made during the analysis, are outlined in more detail in the sections below.

2.7.1 Radar data

During the monitoring period the permanent MIDAS radar units were not yet operational. Therefore, in order to monitor vehicle flows, speeds and headway, five portable radars were deployed. Three were deployed to monitor the southbound carriageway and two on the northbound carriageway. The locations of the portable radar are shown in Figure 2 and further described in Table 2.

Table 2: Locations of the portable radar systems

Radar ID	Location	Description of location	Individual vehicle logger installed?
SB1	SB J3-4 ERA5A	1.9km upstream of speed limit changeover, within the experimental location, 50mph	Y
SB2	SB J3-4 ERA6A	0.8km downstream of speed limit changeover, within experimental location, 55mph	Y
SB3	SB J4-4a MP54/2	Within experimental location, 55mph	Y
NB1	NB J4-3 ERA7B	Within control location, 50mph	Y
NB2	NB J4-3 ERA8B	Within control location, 50mph	N

The locations of the radar were chosen to enable monitoring of driver behaviour at key points in the roadworks, at sufficient distances from the carriageway in areas which did not result in increased risk to either road users or road workers. Each radar was located at least 1km from entry and exit slip roads. This ensured that drivers' speed choice was not greatly influenced by the presence of junctions, allowing unbiased study of the behaviour of drivers in response to the changes in speed limit rather than in response to changes in the road environment.

Average vehicle data from the radar were downloaded by MVIS (the radar supplier) via a 3G mobile connection, and then passed to TRL on a daily basis to be analysed as part of the on-going monitoring (see Section 2.6). Individual vehicle data (IVD) were also recorded by the radar (where applicable) and stored locally on a hard-drive. The IVD were retrieved for analysis once the pilot was complete and the signs had been removed from site.

2.7.1.1 Data collected

The radar provided average speed and average headway (defined as the average time separation between vehicles, measured from the front bumper of the lead vehicle to the front bumper of the following vehicle) which was recorded at one minute intervals. Vehicle flow was recorded by lane and separately by vehicle class (class 1 - up to 17ft, class 2 - 17-22ft, class 3 - 22-38ft and class 4 - 38-120ft)[2]. For this analysis, HGVs were defined as all vehicles in the '38-120ft' category plus half those in the '22-38ft' category.

In addition to average speed, a count of vehicles in speed bins was provided. Speed data were split into the following bins: 0-40mph, 40-50mph, 50-55mph, 55-58mph, 58-62mph, 62-70mph and 70+mph. These bins were selected to allow analysis of the number of drivers who were non-compliant with enforcement guidelines (i.e. 10% + 2mph above the speed limit[3]). For example, this enabled analysis of the number of vehicles travelling more than 62mph in the 55mph limit.

The IVD loggers provided information on the length of each vehicle, which was used to classify three vehicle classes: 0-17ft as cars, 17-24ft as vans/LGVs, 24-61ft as HGVs[4]. IVD

[2] These classes align with those used by the permanent MIDAS radars installed on the scheme, which when commissioned are used to monitor traffic flow and sense incidents or congestion.

[3] This is based on the National Police Chiefs Council/Association of Chief Police Officers (ACPO) Speed Enforcement Policy Guidelines 2011-2015 (ACPO, 2013) which suggest that a Fixed Penalty or speed awareness education may be appropriate when the speed is 10% +2mph above the speed limit (see paragraph 9.6). These are only guidelines and a police officer/ force can decide to enforce at a speed lower than this limit assuming they have considered the tolerance of the measurement equipment (paragraph 9.7).

[4] These lengths were informed by vehicle safety experts and broadly align with the lengths used for the one minute radar data. The main difference between the two classifications was that of HGVs: for the IVD each vehicle's length is recorded and HGVs were defined as between 24-61ft in length, whereas for the one minute average data the vehicle length classifications were grouped. For the latter, HGVs included all vehicles in the '38-120ft' category plus half those in the '22-38ft' category. This resulted in a very minor difference in the total number of HGVs in each dataset.

were used to understand how average speed and close following differed between vehicle classes within the 55mph speed limit.

2.7.1.2 Data processing

In order to understand the potential impact of the speed limit change on vehicle speeds, driver behaviour was investigated when drivers were free to choose their speed. This required conditions with free-flowing traffic; congested traffic was defined as periods when the average speed of vehicles was lower than 40mph. In addition, since overnight lane closures were in place on the M3 between 21:00 and 5:00 on most nights during the pilot, data from these periods were also excluded from the analysis.

Many statistical tests assume that data are independent, that is that individual data points are not related to or influenced by each other. However, consecutive data points from radar data may not necessarily be truly independent since the average speed or flow during one minute is likely to be closely related to the average speed or flow of the previous minute. This problem of dependence was managed by random sampling: one minute of data was selected at random from within each 10-minute interval, resulting in a dataset containing six randomly sampled minutes from each hour of data for each radar location.

It was assumed that data from the different locations were independent as there was a sufficient time delay between a car passing the first radar location and the same car passing the second radar location within a link.

2.7.1.3 Flow comparisons

During the baseline and trial periods, vehicle flow data were collected every minute by the radar. The data were split by lane and by vehicle classification (based on the vehicle's length).

Changes in vehicle flow could have an impact on average speed or headway. As a result, it was important to understand whether or not there were significant changes in vehicle flow between the baseline and trial periods. Specifically, the following comparisons were made:

1) Comparison of average vehicle flow between the baseline and trial periods
2) Comparison of average vehicle composition between the baseline and trial periods

The results of these comparisons are presented in Section 3.1.

2.7.1.4 Lane distribution comparisons

Vehicle counts by vehicle type and lane allowed the following comparisons to be made:

1) Comparison of the proportion of vehicles using each lane between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 55mph)
2) Comparison of the distribution of vehicle types by lane between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 55mph)

The results of these comparisons are presented in Section 3.2.

2.7.1.5 Average speed and speed non-compliance comparisons

Average speed data, split by-lane were collected every minute at each of the radar. In addition, speed bin data were provided to enable analysis of speed limit non-compliance.

The following comparisons were made:

1) Comparison of average speed (and speed limit non-compliance) between the baseline and trial periods at the control location (i.e. when the speed limit remained at 50mph)
2) Comparison of average speed (and speed limit non-compliance) between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 55mph)
3) Comparison of average speed (and speed limit non-compliance) between the radar at the experimental location (i.e. to determine whether drivers adjusted their speed following the step up in speed limit)
4) Comparison of average speed (and speed limit non-compliance) between cars and HGVs at the experimental location (i.e. when the speed limit was 55mph)

The results of these comparisons are presented in Sections 3.3 and 3.4.

2.7.1.6 Average headway comparison

Average vehicle headway (i.e. the average time between vehicles in the same lane) was also collected for each lane using the radar.

The following comparisons were made:

1) Comparison of average headway between the baseline and trial periods at the control location (i.e. when the speed limit remained at 50mph)
2) Comparison of average headway between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 55mph)

The IVD were also used:

3) Comparison of average gap by vehicle class between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 55mph)

The results of these comparisons are presented in Section 3.5.

2.7.1.7 Close following

IVD were processed to calculate the proportion of vehicles with a gap between vehicles of less than two seconds (the minimum following distance recommended by the Highway Code). These data were split by vehicle class to investigate differences between the close following behaviours of HGV and car drivers.

The data from the IVD loggers allowed the following comparisons to be made:

1. Comparison of close following by vehicle class between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 55mph)

The results of these comparisons are presented in Section 3.6.

2.7.2 Incidents and incursions data

Records containing information on all incidents recorded by the CCTV team were provided by the scheme. The scheme provided data for road traffic collisions (RTCs) and breakdowns occurring in the works. These data were analysed to understand the number and type of incidents that occurred at the experimental location during the baseline and trial monitoring periods.

The following comparisons were made:

1) Comparison of the number of RTCs between the baseline and trial periods
2) Comparison of the number of other incidents (e.g. breakdowns) between the baseline and trial periods

In addition, CCTV footage of the RTCs was provided to TRL. This was reviewed to determine if the speed limit might have contributed to the collision.

A summary of these data is presented in Section 3.7.

2.7.3 Journey time

Data on Journey Time Reliability (JTR) were not available for this scheme. Instead, estimates of the average journey time were calculated based on the length of the experimental link and the average speed of vehicles observed in the baseline and experimental monitoring periods. These estimates were compared between baseline and trial periods to ascertain whether the change in speed limit resulted in a change in average journey time. Whilst not as informative as a direct measure of JTR, these estimates will provide an indication for customer journey times (and therefore a potential indicator for customer satisfaction) through the roadworks scheme. The findings from these calculations are presented in Sections 3.8.

2.7.4 Customer satisfaction survey data

This project used a combination of survey methodologies applied during the previous on-road trials. The M1 J32-35a and A1 Leeming to Barton schemes involved surveys with road users carried out at local Motorway Service Areas (MSAs) close to the scheme, and the M5

J4a to 6 involved a survey carried out at a local business park to target regular commuters through the scheme; this pilot involved both.

The nearest MSA was Fleet Services, located at Junction 4a. Researchers carried out the survey with drivers who reported having driven through the scheme on a single day during the trial period. Each person was offered a £5 incentive for completing the paper survey.

Flyers were used to advertise the survey at businesses local to the scheme. This provided input from road users who use the M3 as part of their daily commute. The survey was hosted online and was incentivised by entry into a prize draw.

Both surveys contained the same questions which asked about respondents' experience of the journey, whether they noticed the speed limit change, the suitability of the 55mph speed limit and whether the behaviour of other drivers made them feel less safe. Participants were also asked which route they would choose when given a choice of two routes with roadworks, each with different attributes. The aim of this short 'stated preference' survey is to inform the relative importance of a number of different features of roadworks, or 'attributes' (speed limit, length, enforcement and lane width). The questionnaire is included in Appendix A.

Responses from the MSA surveys were used to answer the following questions:

1) Did drivers notice the change in speed limit between Junction 3 and Junction 4a?
2) What features of the roadworks are likely to have the biggest impact on driver satisfaction?

The results from this survey are presented in Section 3.9.

2.8 Statistical testing

Appropriate statistical tests[5] were used to test for significant differences between data recorded during the baseline and trial periods (i.e. to determine whether driver behaviour changed following implementation of the increased speed limit). Two types of statistical test were used, the choice of which was dependent on the type of data:

- **Chi-squared tests** were used to test for a difference in the distribution of categorical data, for example to test for a difference in the distribution of incidents between the baseline and trial periods.
- **Analysis of variance (ANOVA)** were used to test for a difference in the mean response between groups, for example to test for a difference in the average speed between the baseline and trial periods.

Results were classified as 'statistically significant' if the *p*-value was less than 0.05 (a common standard in the behavioural sciences). The *p*-value is a measure of probability and, in the context of the tests carried out in this report, a value of less than 0.05 can be interpreted as meaning that there is a statistically significant difference between the groups being tested with a less than 5% chance that the difference occurred at random.

[5] Where required, data were transformed to meet the assumptions required by the statistical test.

3 Results

3.1 Vehicle flow

Figure 3 shows the average daily vehicle flow for the control (NB) and experimental (SB) locations, during the baseline and trial monitoring periods.

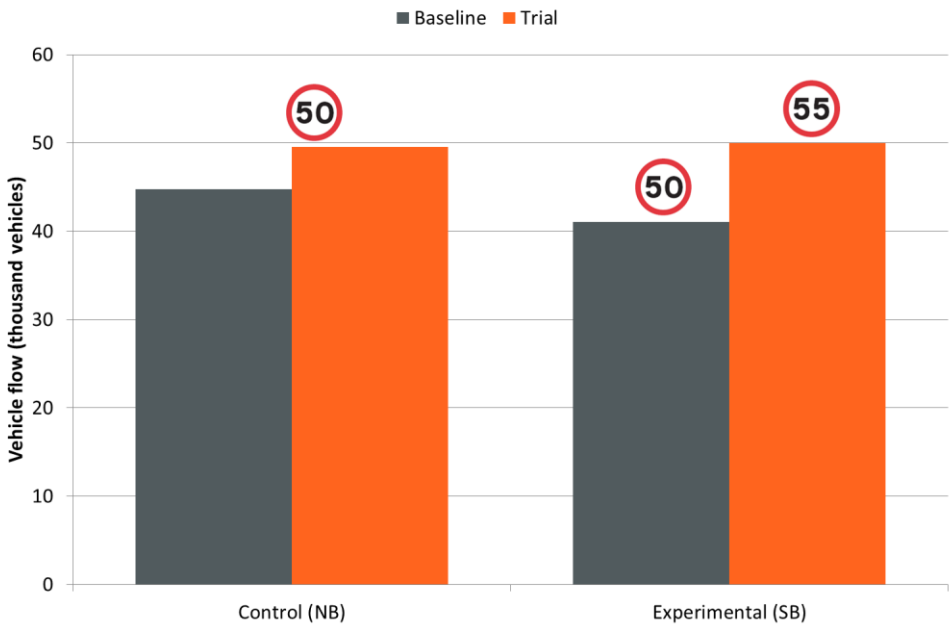


Figure 3: Average daily vehicle flow by location and monitoring period

The figure shows that, on average, there were more vehicles on the road during the trial period than during the baseline. Chi-squared tests showed that the changes in flow between the baseline and trial periods were not significantly different between the control and experimental locations ($p = 0.749$), suggesting that any impacts of the change in flow on driver behaviour are likely to be similar between the experimental and control locations.

Figure 4 shows how the flow changes by day.

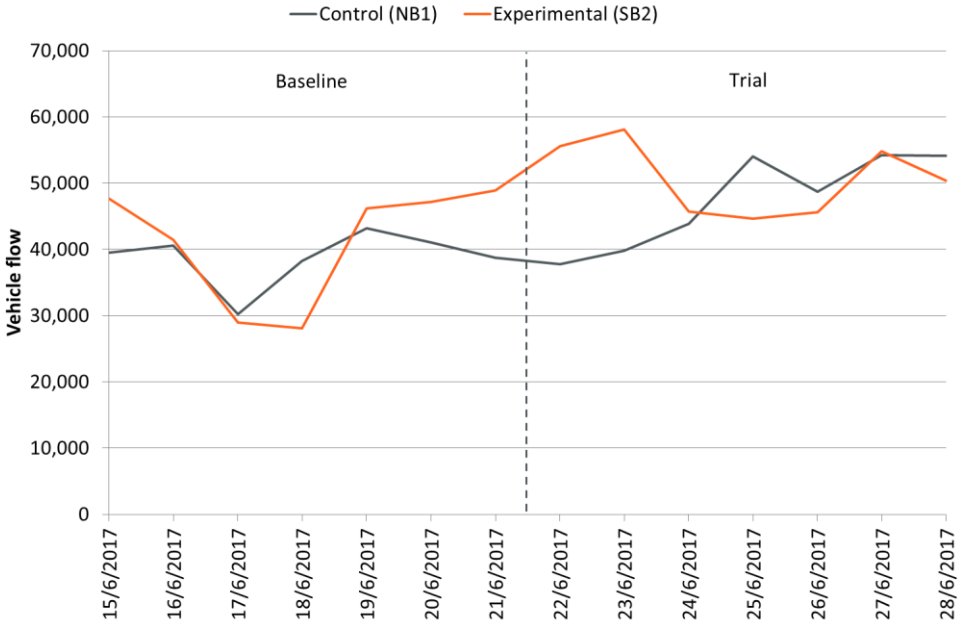


Figure 4: Average daily vehicle flow by date (NB1 and SB2)

There is no clear trend in the daily flows; however there is some suggestion that the flows appear to be lower at the weekends (17th/18th and 24th 25th) than during the week.

In addition to overall vehicle flow, differences in the distribution of vehicles by vehicle class could also influence average speed and headway. Figure 4 shows how the proportion of HGVs changed over the monitoring period.

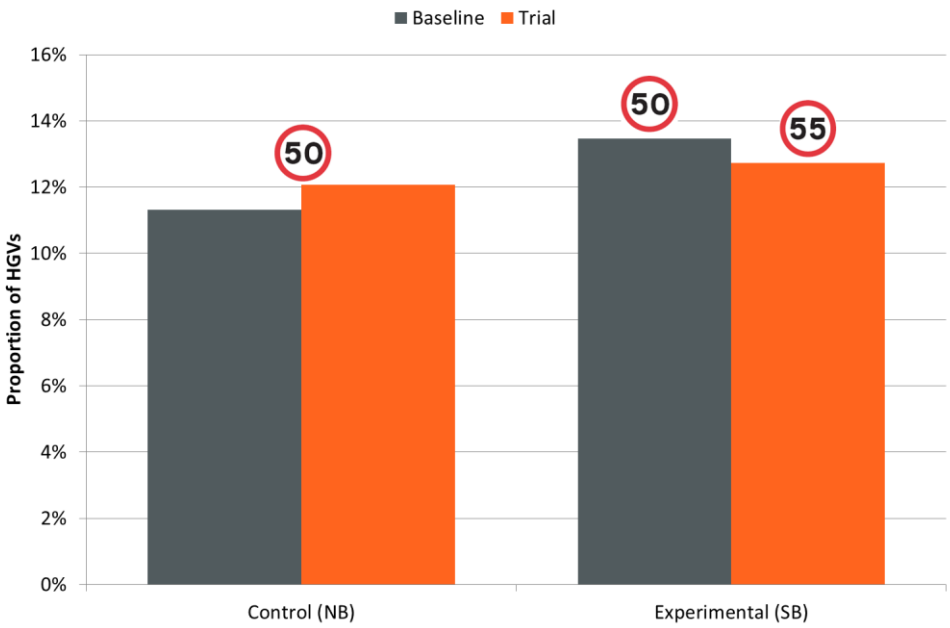


Figure 5: Proportion of HGVs by carriageway and monitoring period

Interestingly, the change in the proportion of HGVs was in the opposite direction for the two carriageways: on the control carriageway the proportion of HGVs increased slightly and on the experimental carriageway the proportion decreased. These differences were small (typically around 1%) but statistically significant ($p < 0.05$).

Figure 6 shows how the HGV proportion varies by day.

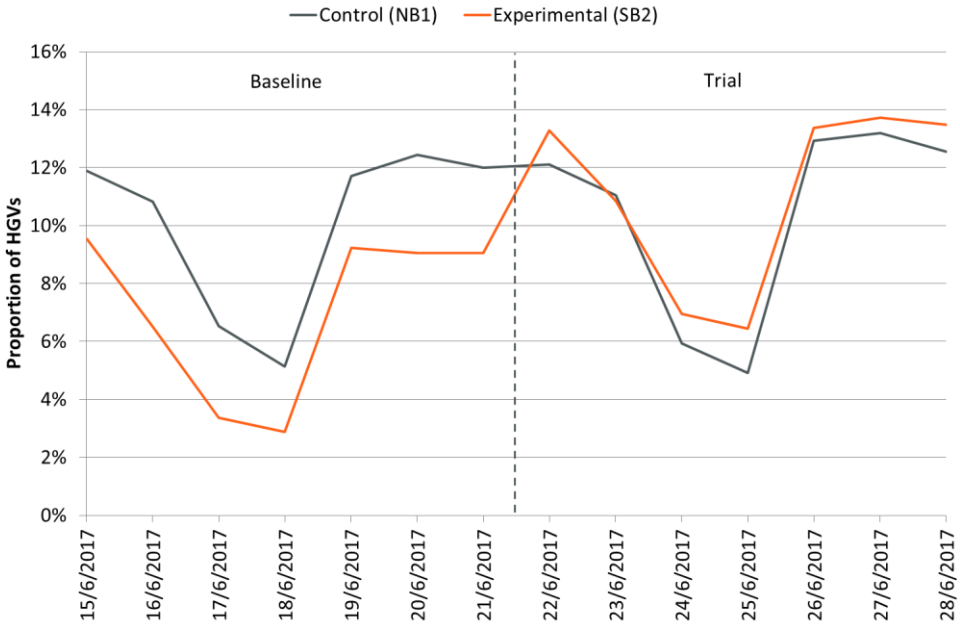


Figure 6: Proportion of HGVs by date and radar location (NB1 and SB2)

The chart shows that the proportion of HGVs is substantially lower at the weekends (17th/18th and 24th/25th) than during the week. This change may influence how drivers behave and so it will be important to monitor changes in average speeds and headway at this more granular daily level to ensure the effects of the speed limit increase are fully understood.

Key findings

- The vehicle flow increased following the change of speed limit. As a result, in order to understand the impact of the increased speed limit on driver behaviour, it is important to also consider changes to speed or headway on the control carriageway.
- The vehicle flow and distribution of vehicles by class varies by day with fewer HGVs at the weekend than during the week.

3.2 Lane distribution

Figure 7 shows the proportion of vehicles in each lane during the different monitoring periods. Note that due to the layout change between the baseline and trial periods, vehicles in the baseline period were travelling in Lanes 1, 2 and 3 and in the trial period were travelling in Lanes 2, 3 and 4.

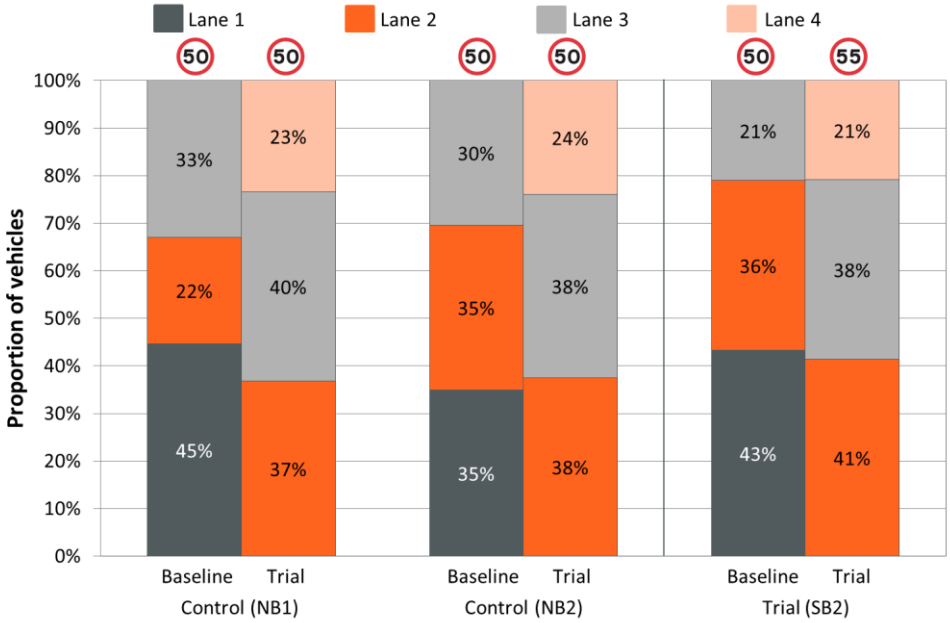


Figure 7: Proportion of vehicles by lane and radar location (NB1, NB2 and SB2)

Instead of considering the exact lane in which the drivers choose to travel (due to the differences in the lanes which are open to traffic) the lanes are hereafter labelled as the 'left lane' (Lane 1 during the baseline and Lane 2 during the trial), 'middle lane' (Lane 2 during the baseline and Lane 3 during the trial) and 'right lane' (Lane 3 during the baseline and Lane 4 during the trial).

Using this system to compare between the periods, there was very little difference in the distribution of vehicles by lane at the experimental location (SB2) and at one of the control locations (NB2), as can be seen in Figure 7. However, a different pattern was observed at NB1. Here the distribution of vehicles by lane was substantially different between the baseline and trial periods; more vehicles were counted in the middle lane and fewer vehicles were counted in the left and right hand lanes during the trial period compared with the baseline period.

The lane distribution at NB1 during the trial period was very similar to that observed at NB2 and SB2; possibly, the baseline period at NB1 might be an anomalous result. The results presented for SB2 suggest the increase in speed limit had little impact on the lanes drivers choose to drive in; however caution should be applied to this finding due to the unusual NB1 data, which cannot act as an adequate control to confirm these findings.

Using data from the IVD loggers, Figure 8 shows the distribution of vehicle types by lane at the experimental location (SB2) during the baseline and trial periods.

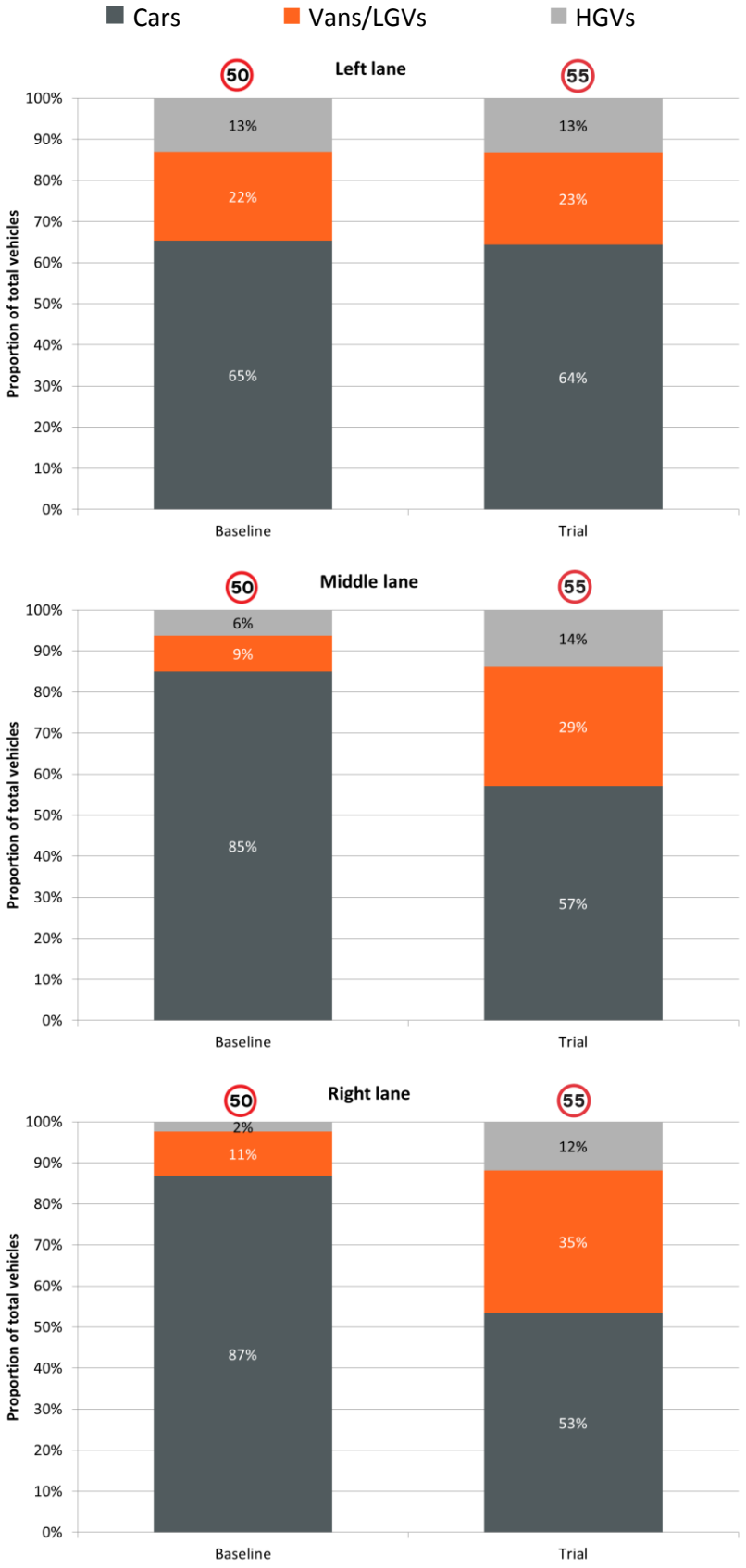


Figure 8: Distribution of vehicle types by lane and monitoring period (experimental location, SB2)

During the baseline and trial periods the distribution of vehicles in the left lane was similar with the vast majority of vehicles in this lane being cars (65%), followed by vans (22%) and HGVs (13%). However, there was a substantially larger proportion of vans and HGVs in the middle and right hand lanes during the trial compared to the baseline period. IVD loggers were only installed at NB1 and thus, due to the uncertainties in the data from this radar (which is needed as a comparator to the results at SB2), we cannot draw any firm conclusions about whether this difference was a result of the speed limit change or due to the change in lane widths.

Despite the challenges with the lane data, the radar supplier has indicated that due to the way the sensors operate, it is unlikely that inaccuracies in lane distribution have affected the key speed and headway results presented in the following sections.

Key findings

- Due to potential inaccuracies with the lane distribution recorded by the radar, no conclusions can robustly be drawn about the impact of the speed limit change on lane choice or the distribution of vehicles types within each lane.

3.3 Average vehicle speed

Figure 9 shows the free-flow average speeds on the control and experimental links at each radar across the two monitoring periods. To improve visibility, the vertical (y) axis has been compressed to display a range between 45mph to 55mph.

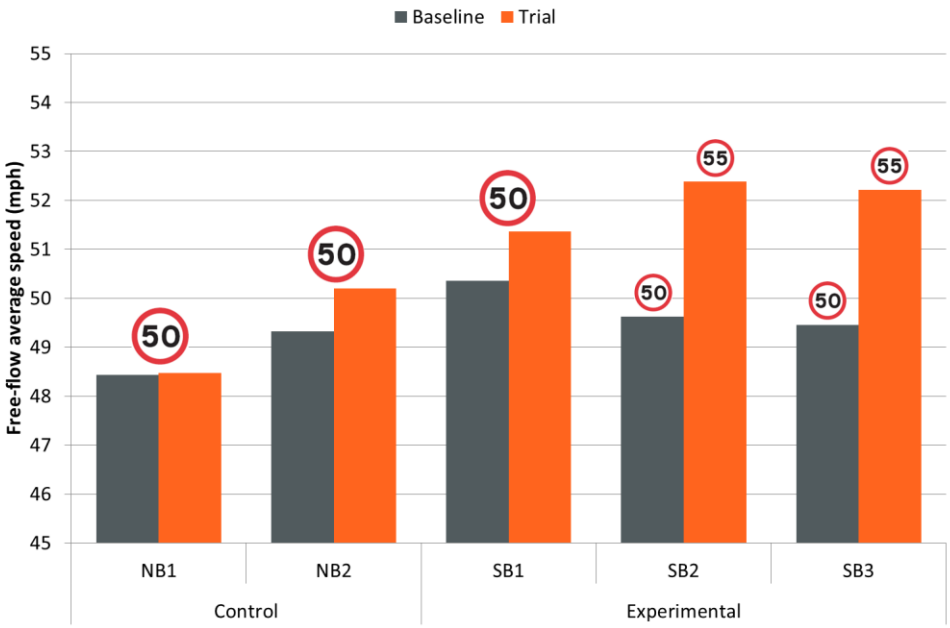


Figure 9: Free-flow average speed by radar location and monitoring period

At the two radar located after the step up to 55mph (SB2 and SB3), the average speed increased in the trial period by around 2.8mph. Some of this difference is likely to be related to the change in lane widths. However, since this increase was bigger than at the other

radar locations where the speed limit did not change (NB1, NB2 and SB1) where the average increase was 0.6mph, this does suggest that at least some drivers noticed the speed limit change and increased their speed accordingly.

A statistical test (ANOVA) showed that the interaction between location (control vs. experimental) and monitoring periods (baseline vs. trial) was significant ($p < 0.01$). This indicates that the change in free-flow average speed between the two monitoring periods was significantly different between the control and experimental locations. The slight differences in the vehicle flow and composition between carriageways could explain some of the differences in speed, however the results provide strong evidence that most of the differences observed can be attributed to the change in speed limit.

The free-flow average speeds observed during the trial at the two radar within the 55mph limit were just over 52mph (52.4 and 52.2mph respectively) and thus were well below the 55mph speed limit, suggesting that not all drivers noticed the change in speed limit.

Figure 10 shows how the free-flow average speed varied by date.

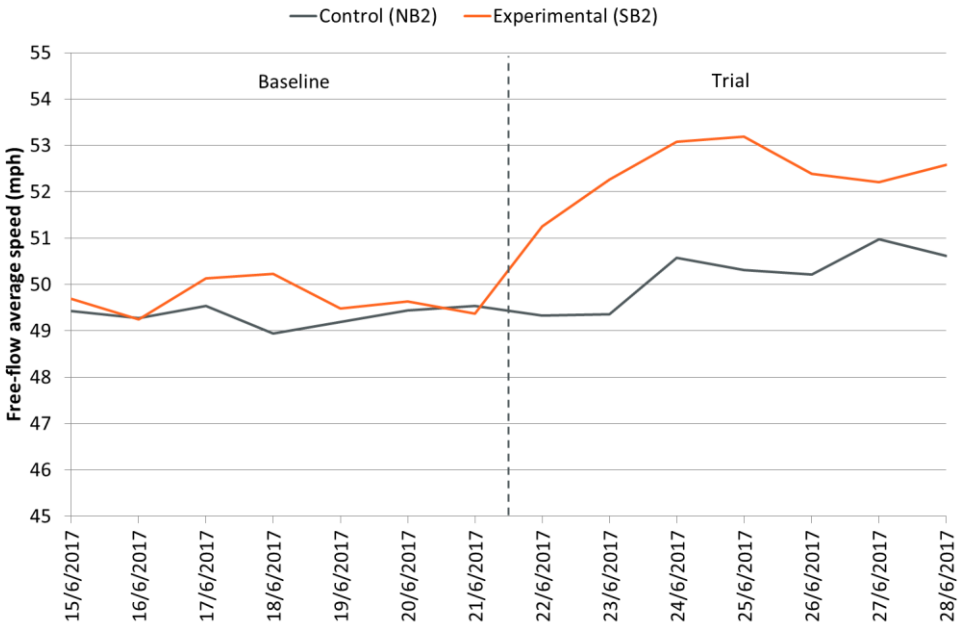


Figure 10: Free-flow average speed by date and radar location (NB2 and SB2)

The average speed gradually increased following the change in speed limit, suggesting that the number of drivers who noticed the speed limit change and adapted their speed was relatively low in the first few days. The average speeds peaked around 53mph, three days after the speed limit change.

As outlined above, following the change in lane widths on 22nd July, a small increase in speed occurred at the control site. This suggests that some of the increase in speeds (around 1mph) at the experimental site might also have been driven by the change in lane widths from narrow to full width lanes.

Differences in the average speed by lane are shown in Figure 11.

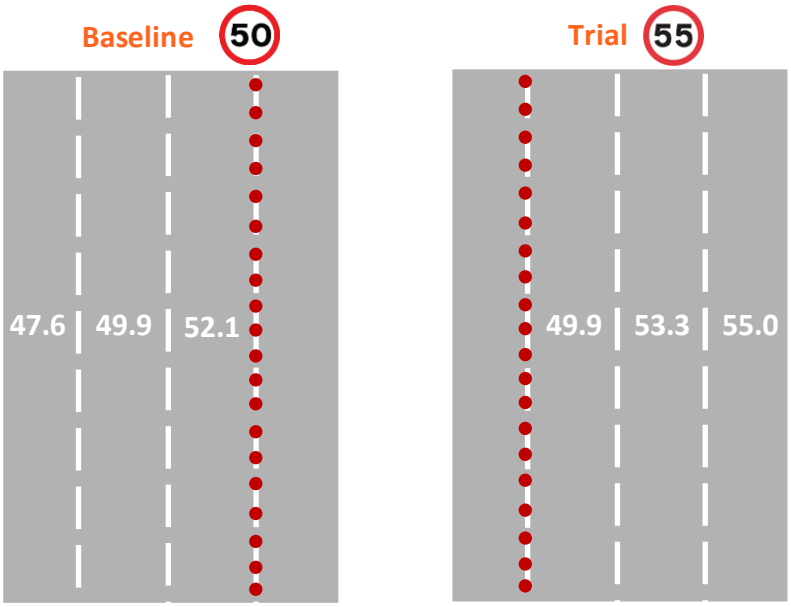


Figure 11: Free-flow average speed (in mph) by monitoring period and lane at the experimental location (SB2)

In the baseline period when the speed limit was 50mph, average speeds were below the limit in Lanes 1 and 2 and slightly higher (52.1mph) in Lane 3. In contrast, during the trial period average speeds were below or at the limit in all three lanes. This suggests that compliance was better during the trial; this is investigated further in Section 3.4.

The IVD provides information on the speed and type of each vehicle that travels past the radar. Figure 12 shows the free-flow average speed of cars, vans/LGVs and HGVs during the trial period at the control location (NB1) and the experimental location (SB2).

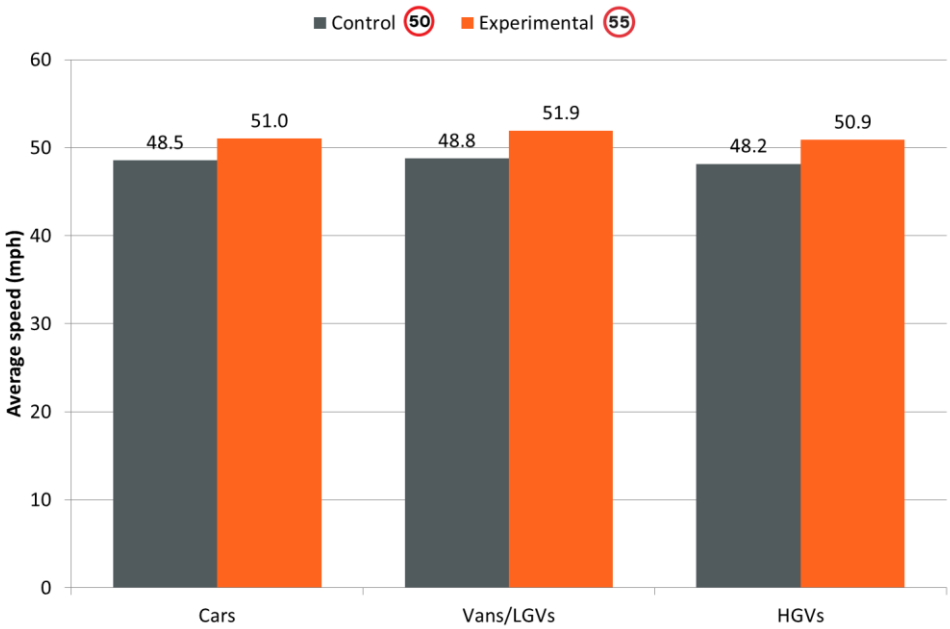


Figure 12: Free-flow average speed (in mph) by vehicle type and location (trial period)

The results shows that all vehicle types had a higher average speed in the 55mph speed limit than at 50mph. However the speed differentials are all small, ranging from 2.5mph for cars to 3.1mph for vans/LGVS. This suggests that, although vehicles were typically travelling faster at the experimental location, speeds did not increase by large amounts and there is very little difference between vehicle types.

Key findings

- Free-flow average speeds increased significantly (by around 3mph) following implementation of the 55mph speed limit, suggesting that some drivers noticed and responded to the change in speed limit.
- However, there is evidence (from the control location) that some of the increase in speeds was driven by the change in lane widths from narrow to full width lanes, which happened at the same time as the speed limit change. This is estimated to account for up to 1mph of the increase in free-flow average speeds.
- Throughout the trial, the average speed remained around 52-53mph, below the speed limit of 55mph.
- There was very little difference in the speed increase between vehicle types.

3.4 Speed limit compliance

Figure 13 shows the proportion of vehicles recorded in each speed bin across the two monitoring periods at SB2 (located within the 55mph speed limit). The grey bars show the proportion of vehicles travelling below the speed limit in each period; the dark orange bars show vehicles travelling above the speed limit but below the enforcement threshold and the lighter orange bars indicate the proportion of vehicles travelling above the enforcement threshold.

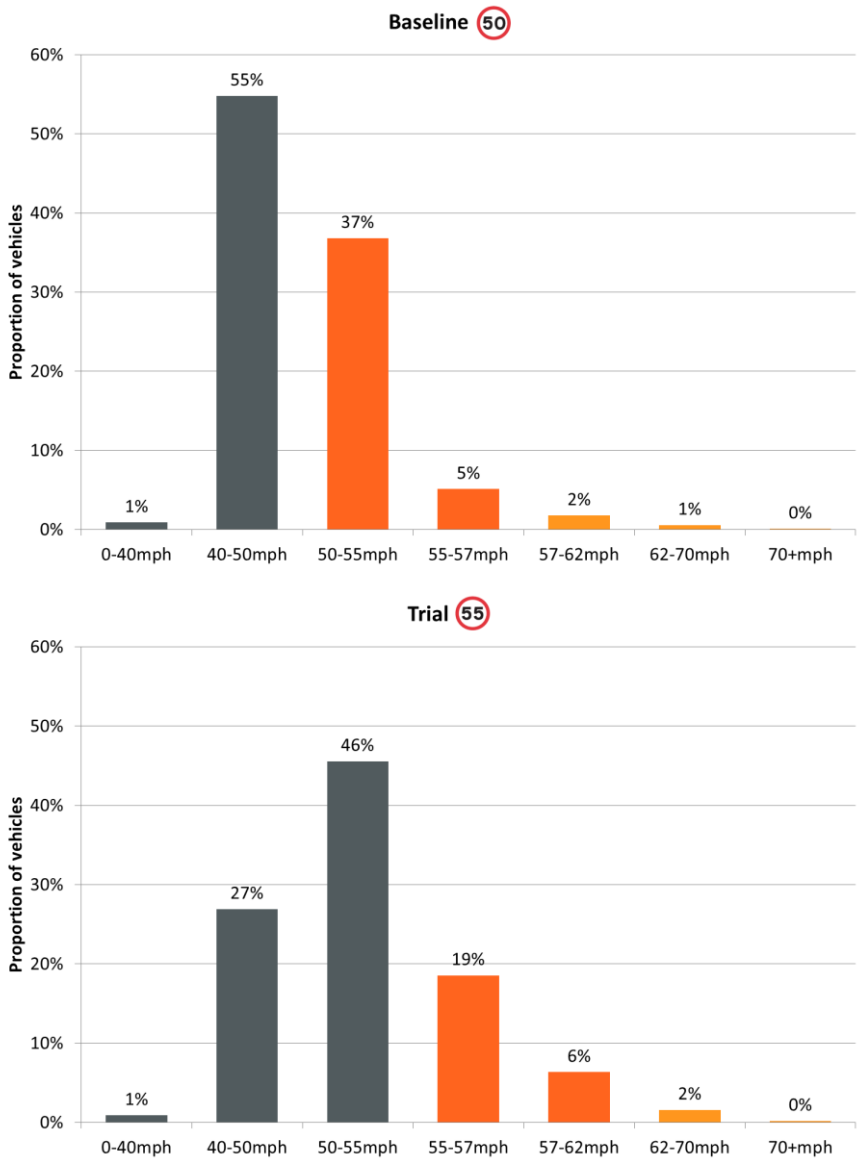


Figure 13: Proportion of vehicles in each speed bin by monitoring period at the experimental location (SB2) – orange bars indicate non-compliance with speed limit

The proportion of vehicles complying with the speed limit was 56% in the baseline period (50mph speed limit) and 73% in the trial period (55mph speed limit), suggesting that overall compliance with the 55mph speed limit was better than compliance with the 50mph speed limit.

The lightest orange bars represent the drivers who travelled above the enforcement threshold in each speed limit (57mph in the 50mph limit and 62mph in the 55mph limit). The proportion of vehicles above the enforcement threshold was 2.4% in the baseline period, 1.8% in the trial period, suggesting that the number of vehicles who would have been prosecuted for speeding would have slightly decreased during the trial (from an average of 97 per day during the baseline period to 80 per day during the trial).

The IVD was also used to investigate the difference in compliance between vehicle types. Figure 14 shows the distribution across speed categories for cars, vans/LGVs and HGVs at the experimental location (SB2) during the trial period.

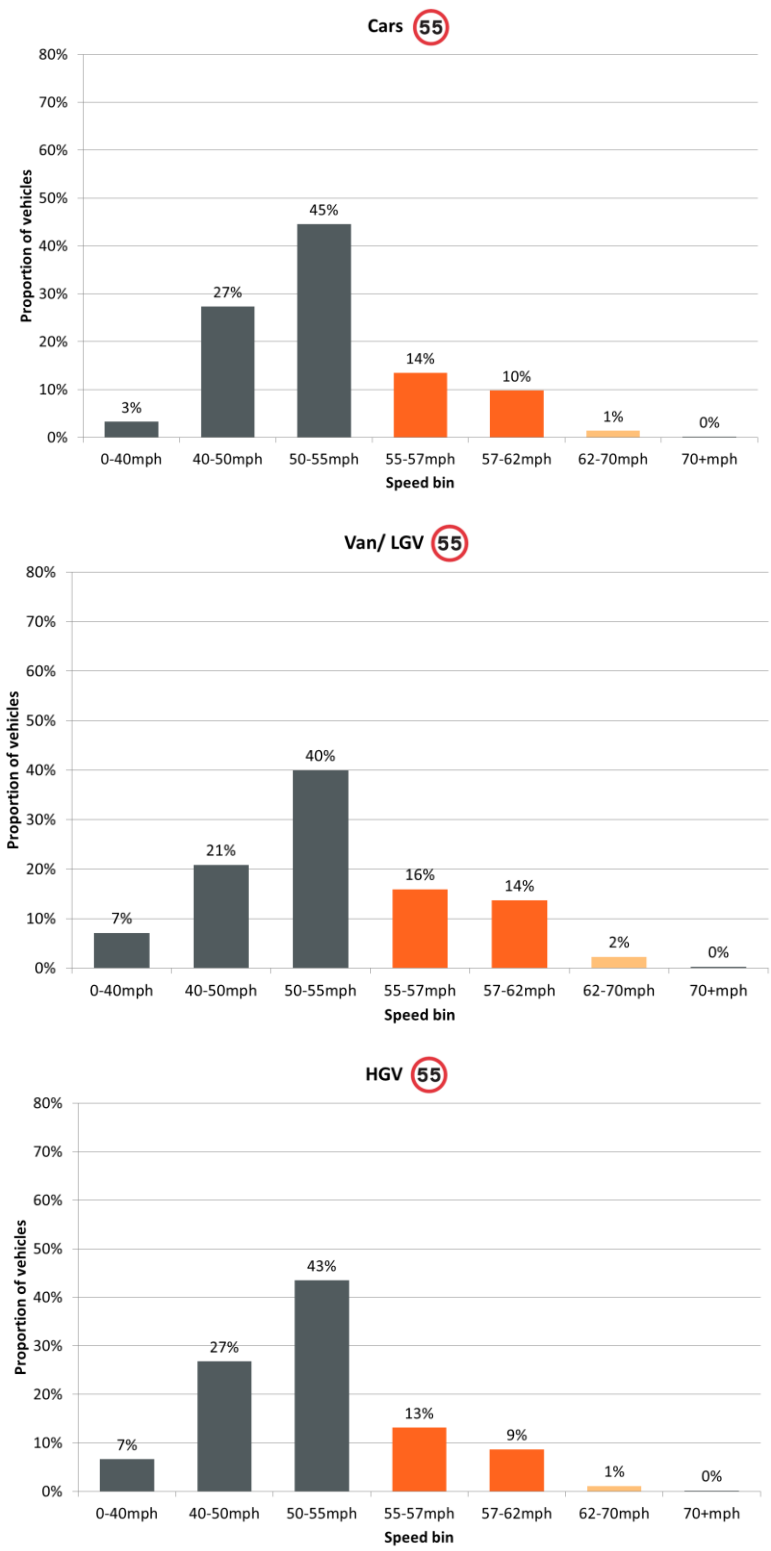


Figure 14: Proportion of vehicles in each speed category by vehicle type at the experimental location (SB2)

Overall, the distribution across speed categories was similar between vehicle types. The proportion of vehicles over the enforcement threshold was small for all vehicle types. However, there was a slightly higher proportion of vans/LGVs over the threshold (2.5%)

than cars and HGVs (1.5% and 1.3% respectively). In addition, 30% of vans/LGVs were travelling over the speed limit but below the enforcement threshold (between 55 and 62mph) compared with 24% of cars and 22% of HGVs.

Key findings

- The proportion of drivers who complied with the speed limit was higher during the trial period, suggesting that overall compliance with the 55mph speed limit was better than compliance with the 50mph speed limit.
- The number of vehicles over the enforcement threshold (speed limit + 10% + 2mph) was lower during the trial, suggesting that the number of speeding prosecutions would have decreased during the trial compared with the baseline period.
- In general, vans/LGV drivers were less compliant with the speed limit than either car or HGV drivers.

3.5 Average vehicle headway

Average vehicle headway can be expected to be linked with flow since headway will naturally increase when flow is lower. Figure 15 compares the average vehicle headway at each radar between the two monitoring periods.

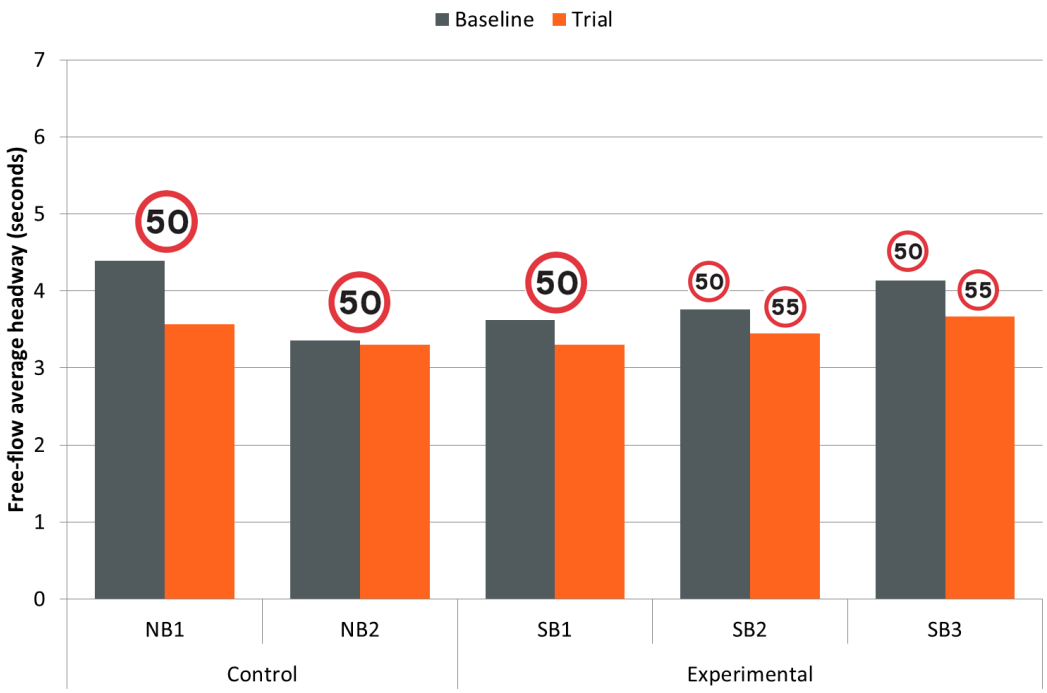


Figure 15: Free-flow average headway by radar location and monitoring period

The average vehicle headway was lower in the trial period at all five radar locations. Since this finding was not restricted to the radar with the 55mph speed limit (SB2 and SB3), there were no patterns to suggest that the change in headway was related to the change in speed

limit. As shown in Figure 3, vehicle flows were higher in the trial period, and thus it is logical that vehicles were generally closer together (shorter headway). A statistical test (ANOVA) showed that the interaction between location (control vs. experimental) and monitoring periods (baseline vs. trial) was not significant (p = 0.93), confirming these conclusions.

The Highway Code (DfT, 2015) suggests that drivers should allow at least 2 seconds gap between themselves and the vehicle in front on roads carrying fast moving traffic, with this distance at least doubled on wet roads and increased still further on icy roads. The average free-flow headway was very similar in both speed limits, which suggests that 55mph did not impact on the occurrence of unsafe headways between vehicles.

Headway takes no account of the length of the vehicle (since it is measured from the front bumper of one vehicle to the front bumper of the next vehicle). As such, the average gap (which measures from the front bumper of the vehicle behind to the rear bumper of the vehicle ahead) is a better measure of close following. The IVD were used to estimate the average gap by vehicle class. The results of this analysis are shown in Figure 16.

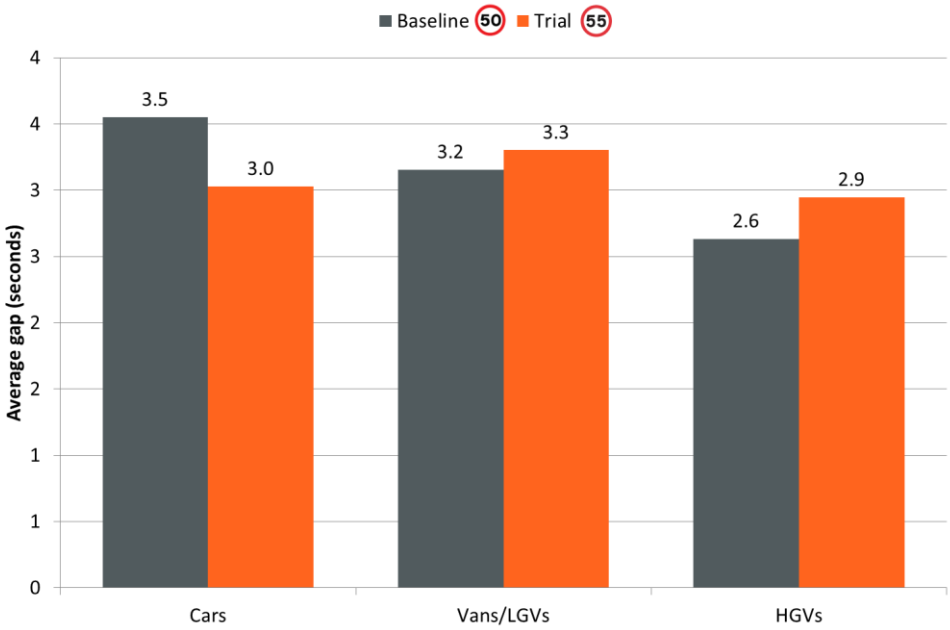


Figure 16: Average gap by monitoring period and vehicle type at the experimental location (SB2)

Figure 16 shows that, overall, the difference in average gap between baseline and trial periods was small for all vehicle types. This was also the case at the control location (NB1). The average gap for cars was smaller in the trial period than the baseline period, suggesting that cars got closer to the vehicle in front in 55mph. For vans/LGVs and HGVs the gap to the vehicle in front increased slightly during the trial period.

More detailed examination of close following is provided in Section 3.6.

Key findings

- Average headway was higher than the minimum two second headway recommended by the Highway Code throughout the monitoring.
- There is little evidence to suggest that the change in speed limit impacted on the average headway.
- There was little difference in average gap between the two periods; cars travelled slightly closer to the vehicle in front and vans/LGVs and HGVs travelled slightly further away, but these differences were marginal.

3.6 Close following

The IVD were used to investigate the amount of close following by different vehicle types during the baseline and trial periods. 'Close following' was defined as any incident in which vehicles had a gap of less than 2 seconds. Figure 17 shows the proportion of vehicles close following at the experimental location.

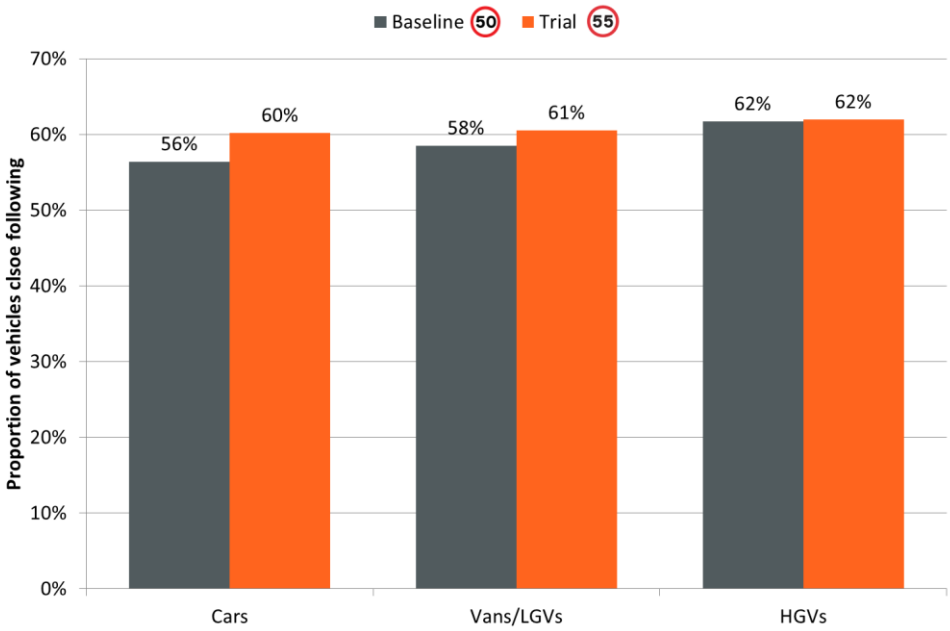


Figure 17: Proportion of vehicles travelling less than two seconds from the rear of the vehicle in front by monitoring period and vehicle type at the experimental location (SB2)

There was very little difference in the proportion of vehicles close following between the two periods. This suggests that the change in speed limit to 55mph had no noticeable difference on close following for any of the vehicle types. The results at the control location (NB1) were broadly similar.

During the trial of 60mph on the M5 (Wallbank, Chowdhury, Fleetwood, & Myers, 2017c), the proportion of HGVs close following dropped substantially from 65% in the baseline (50mph) to 50% in the trial (60mph). This was likely related to the difference in speed during the trial between HGVs on the limiter (56mph) and the speed limit (60mph). In the case of

55mph on the M3 (the current trial), HGVs travelling on the limiter will be travelling at a very similar speed to other vehicles complying with the 55mph speed limit. This may explain why no difference in close following was observed in this trial.

Key findings

- The proportion of vehicles close following was similar between the baseline and trial periods for all vehicle types, suggesting that increasing the speed limit to 55mph had very little effect on close following behaviour.

3.7 Incidents and incursions

3.7.1 Recovery log

The following summarises the information, provided to TRL by the scheme, relating to broken down vehicles (BDVs) within the southbound experimental location:

- There were eight BDVs in the baseline period and seven during the trial period.
- The majority of the vehicles were cars (11: six in baseline, five in trial). There were also a number of vans (two, both during the trial), one motorhome and one unknown (both during the baseline).
- The majority were in a live lane (four in Lane 1 during the baseline and two in Lane 2 in the trial) or within the cones (two in the baseline and four in the trial), but the location of two were unknown (two in the baseline and one in the trial).

Due to the limited number of reported breakdowns, no statistical analysis could be undertaken.

3.7.2 Road traffic collisions (RTCs)

There were two road traffic collisions (RTCs) within the experimental location, one in the baseline period and one in the trial. Incident logs from the CCTV control room and CCTV footage were provided to TRL for further examination.

3.7.2.1 RTC 1: Baseline period

RTC 1 occurred at 08:37 on Thursday 15th June near marker post 52/1. Four vehicles were involved: one motorcycle, two cars and a van. The speed limit was 50mph and narrow lanes were in place.

Marker post 52/1 is located slightly upstream of the start of the Junction 4 exit slip. Immediately before the collision, traffic was queuing in Lane 1 and flowing freely in Lanes 2 and 3 (Figure 18).

Figure 18: Frame from CCTV footage taken immediately before the collision. The motorcycle and car circled were both stationary at this time.

The collision was a rear end shunt involving the queuing vehicles. The rear car shunted into the other three vehicles from behind, while the front two (and possibly third) were stationary in a queue (Figure 19 and Figure 20).

Police, ambulance and recovery services attended but no one was injured.

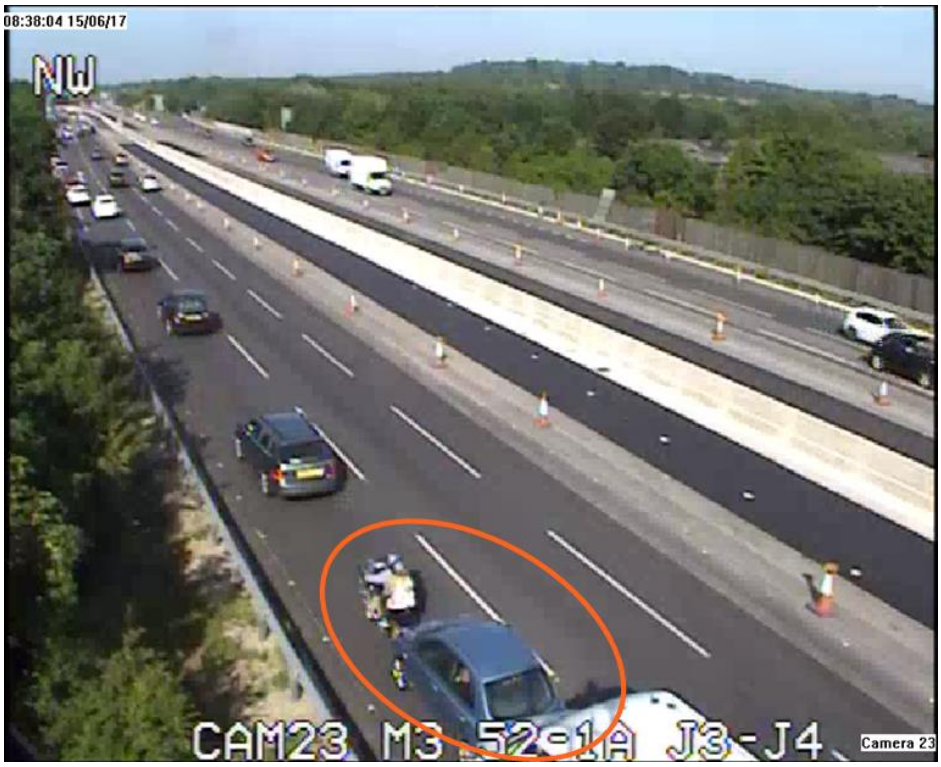


Figure 19: Frame from CCTV footage taken immediately after the collision

Figure 20: Final positions of vehicles after the collision

Given the stationary nature of the majority of the vehicles involved in this collision, it is unlikely that the speed limit (50mph) contributed to the collision.

3.7.2.2 RTC 2: Trial period

RTC 2 occurred at 09:18 on Wednesday 28th June near marker post 53/7. Five vehicles were involved, all of which were cars. The speed limit was 55mph and lanes were at their full width; Lane 1 was closed using cones. Traffic was flowing freely before the collision.

The first collision visible in the CCTV footage occurs at the 09:18 (Figure 21). A car travelling in Lane 2 of the opposite carriageway to the camera hits at least one of the cones used to delineate the traffic away from Lane 1, eventually coming to a stop in the closed lane. Flying debris from the cone is visible in the footage.

Figure 21: Car colliding with cone

Other vehicles in the lane are seen to slow substantially in response to this incident. These drivers gradually sped up, but the final vehicle in the line was slower to accelerate. An approaching vehicle slowed in response to this, but was then hit from behind. Three other nearby cars were also involved in the incident (Figure 22).

Figure 22: View from CCTV camera immediately after the slow moving car was struck from behind

The vehicle which was involved in the initial collision with the cone left the scene a few minutes later. Traffic officer, police, ambulance and recovery services attended (Figure 23). There were no recorded injuries.

Figure 23: Final positions of the vehicles after the collision

It is impossible to determine from the CCTV footage whether the initial collision with the cone was linked to the speed limit (55mph). Since this driver did not remain on the scene, no further evidence could be obtained to determine why this collision occurred.

The latter collisions were queue-tail collisions as a result of the reduced speeds following the first incident. Based on the footage observed, it appears that the primary reason for these collisions was due to the stationary/slow moving traffic and not linked to the increased speed limit, although it is possible that the collision might have been avoided if the approaching vehicles were travelling slower, giving them more time to observe the queueing traffic ahead and come to a stop safely.

The small number of reported RTCs is not sufficient to provide evidence on whether the changes to the speed limit resulted in a change to the rate of collisions.

Key findings

- Due to the limited number of reported breakdowns (eight in the baseline period and seven in the trial), no robust conclusions can be drawn about the impact of the increased speed limit on BDVs.
- Two RTCs were reported (one in the baseline and one in the trial). These numbers are too small for robust statistical analysis.
- No conclusions can be drawn as to whether the increased speed limit contributed to the collision during the 55mph speed limit. This was instigated by a car colliding with the cones in Lane 1 for an unknown reason. Subsequent queue-tail collisions occurred with the traffic which slowed to avoid the cones.

3.8 Journey time

Estimates of the average journey time were calculated based on the length of the link and the average speed of vehicles from the radar data. Table 3 shows the average journey time in the baseline and trial periods. Both the control (northbound carriageway) and experimental locations (southbound carriageway) are included for the purposes of comparison.

Table 3: Journey time estimates by location (baseline compared to trial)

		Journey time (minutes)		
	Length of 55mph speed limit (miles)	Baseline	Trial	Difference (seconds)
Control (N/B)	5.2	6.47	6.46	0.3 (0%)
Experimental (S/B)	5.2	6.31	5.98	19.9 (-5%)

The results suggest that changing the speed limit from 50mph to 55mph decreased the average journey time southbound by just under 20 seconds. Whilst not a substantial saving for an individual driver, when considering the many thousands of drivers who travel through the scheme each day, the time savings are notable. No noticeable change in journey time was observed northbound as the speed limit remained at 50mph throughout both periods.

Key findings

- It is estimated that the introduction of the 55mph speed limit saved each driver, on average, 20 seconds in journey time.

3.9 Customer satisfaction

3.9.1 Participant sample

In total, 221 people completed the survey (101 at the MSA and 120 online). The sample consisted of 74 (34%) females and 142 (66%) males.

Figure 24 compares the distribution of the survey sample by age to the distribution of full car (Category B) driving licence holders in Great Britain in 2016 (data.gov.uk, 2016).

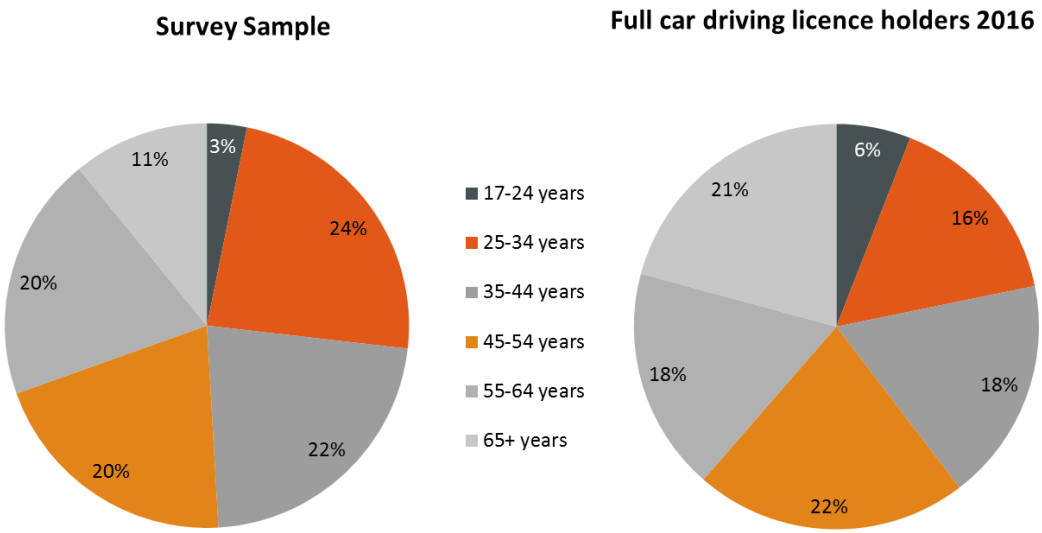


Figure 24: Distribution of age of the sample compared with car driving licence holders in GB

Licence holders from 25 to 34 years are slightly overrepresented and those aged 65+ years are underrepresented in the sample. However, while GB licence holder data is a good indication of the distribution of age of all drivers, it may not be exactly representative of drivers using the Strategic Road Network (SRN). In particular, older drivers (65 years or over)

tend not to drive as often as younger drivers, hence the under-representation of older drivers is not a cause for concern. It is therefore possible to be relatively confident that the sample of drivers surveyed is a reasonable reflection of the general driving population.

Almost all of those who participated in the survey were car drivers (93%), while a small proportion reported driving a light commercial vehicle (3%), coach (1%), or other category of vehicle (less than 1% each).

Figure 25 shows the journey purposes reported by the sample as a whole.

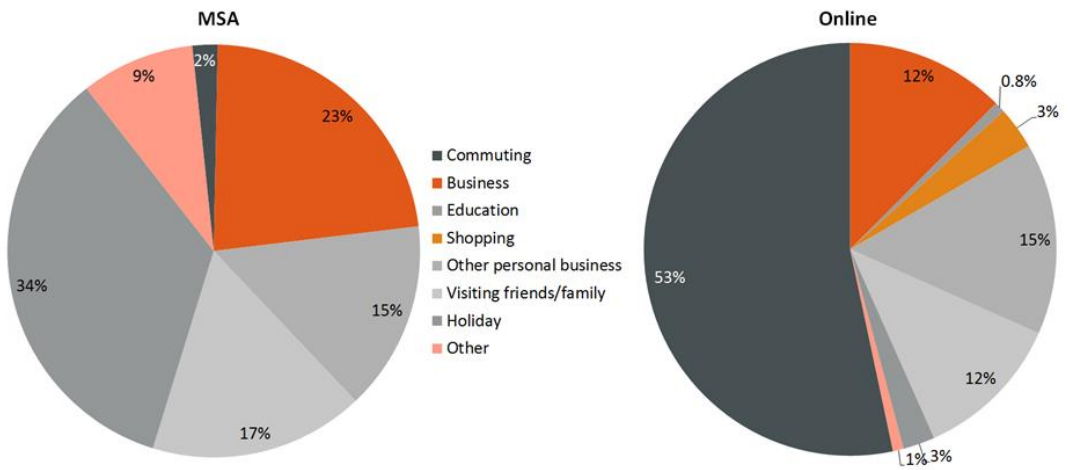


Figure 25: Reported journey purpose

For those who completed the survey at the MSA, the purpose of their journey was most commonly holiday (34%), followed by business (23%) and visiting friends or family (17%). For those who completed the survey online, it was most commonly commuting to work (53%), followed by other personal business (15%) and business (12%).

3.9.2 Experience of the roadworks

Participants were asked three questions about their opinions of the long terms benefits of the roadworks. In general, the responses to these questions were largely positive. The results are shown below in Figure 26 broken down by how frequently the respondent uses the road section between J3 and J4 on the M3. Regular drivers are those who reported driving on this section of road at least 1-2 times a week; drivers who travel on this road section less frequently have been categorised as occasional drivers.

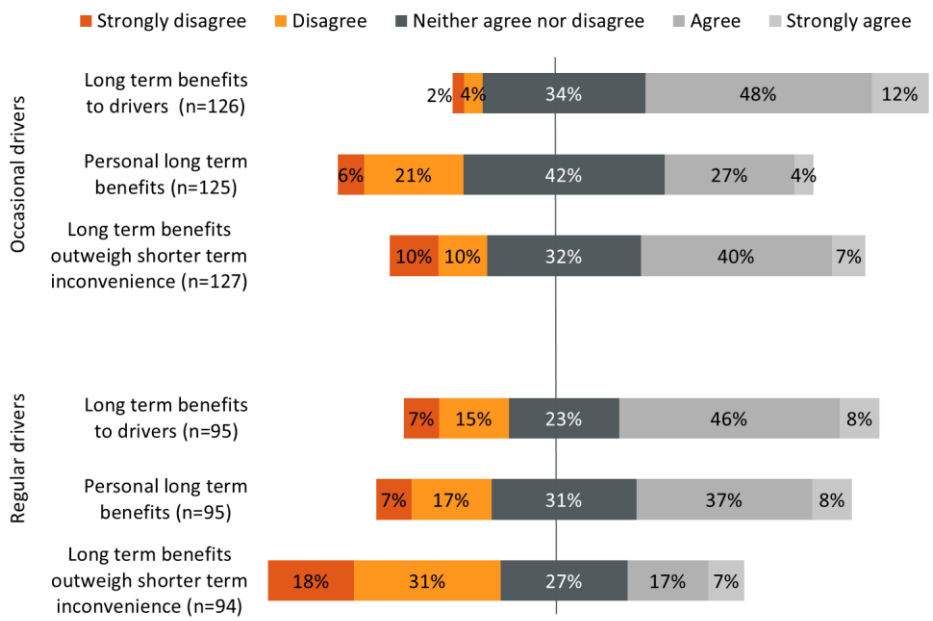


Figure 26: Responses to questions about long-term benefits of roadworks according to regular and occasional drivers

In total, over half of participants agreed that roadworks will bring long term benefits to drivers; in particular, 60% of occasional drivers and 54% of regular drivers were of this opinion. Only 6% of occasional drivers disagreed with this statement, compared to 22% of the regular drivers.

Customers were less inclined to think that the roadworks would generate long term benefits for them personally than to drivers in general, especially occasional drivers; 31% of occasional drivers expect personal long term benefits compared with 43% of regular drivers.

The most substantial divergence between the two groups emerged when asked whether the long term benefits of the roadworks outweigh the shorter term inconvenience. A chi-squared test showed that there was a significant difference ($p < 0.01$) between regular and occasional drivers' responses to this question. Around twice as many occasional drivers agreed with this statement compared with regular drivers (47% and 24% respectively). Similarly, while only 20% of occasional drivers expressed disagreement, this was almost half for the regular drivers (49%). These findings suggest that those who use this stretch of road regularly have the lowest customer satisfaction levels and hence initiatives to target these individuals might show the greatest gains in customer satisfaction.

3.9.3 Understanding of the speed limit

As part of the survey, participants were asked whether they noticed the speed limit signs through the roadworks; almost all the drivers confirmed they had seen the speed limit signs (98%).

Participants were also asked whether they noticed the change in speed limit through the roadworks (Figure 27).

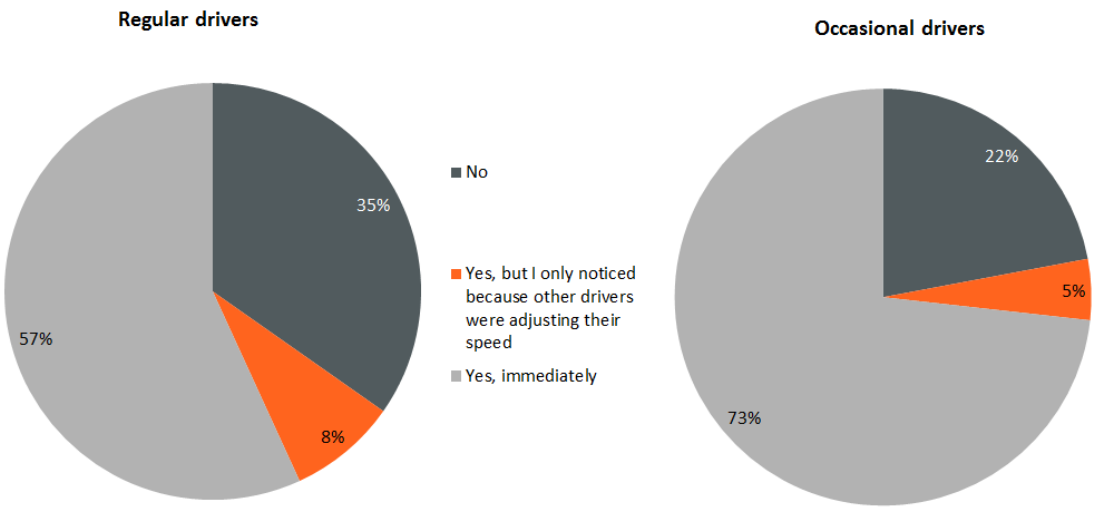


Figure 27: Drivers' awareness of the speed limit change through the roadworks

The percentage of occasional drivers who immediately noticed the change in speed limit was higher compared with regular drivers (73% and 57%, respectively). A chi-squared test showed that this difference between regular and occasional drivers was significant ($p = 0.038$) which might suggest that occasional drivers were paying more attention to the works than those that driver through this scheme often. More than one-third of the regular drivers (35%) did not notice that there was a different speed limit in place, but only one-fifth of the occasional drivers did not noticed the change (22%). The proportion of drivers who noticed the speed limit change because of other drivers' changes in speed was relatively similar across the two groups (8% and 5% for the regular and occasional drivers, respectively).

Many of the drivers who thought the speed limit affected the way they drove noted that they felt safer and more relaxed.

> *"I think car drivers were driving more naturally so less braking and bunching of cars in lanes. Safer than a very slow limit and people driving unnaturally to avoid speeding tickets."*
>
> *"Traffic was more free-flowing so less stop-start - more relaxed as well."*

However, some comments indicated higher concentration was needed in order to drive below the 55mph speed limit.

> *"More difficult to stick to speed limit as my speedometer in the car is clear for 50/60/70mph but not midpoints in between."*

Participants were asked to rate the appropriateness of the speed limits experienced through the roadworks (Figure 28).

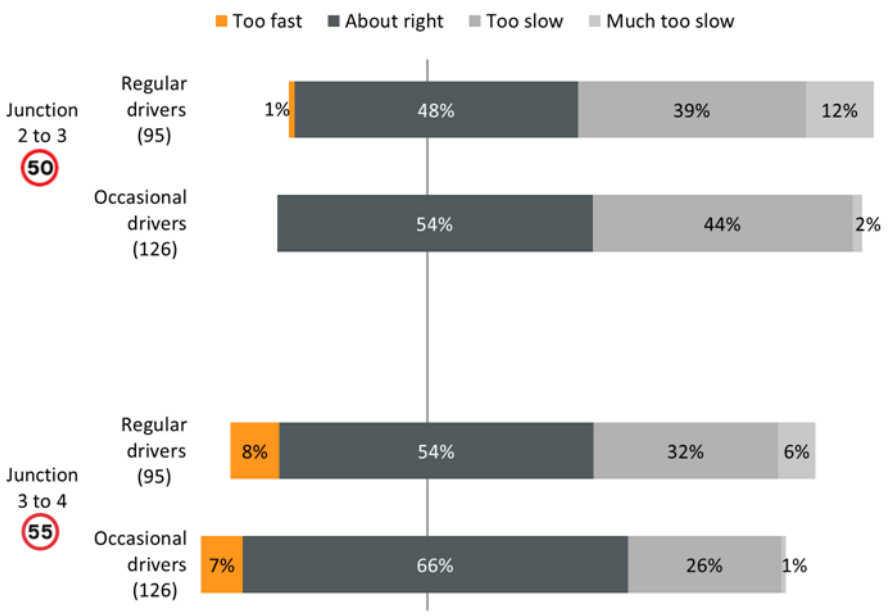


Figure 28: Reported 'appropriateness' of the speed limits

In general, around half of the drivers thought that 50mph was an appropriate speed limit for the roadworks (a slightly higher proportion of occasional drivers than regular drivers – 54% compared to 48%). However, very few customers thought that 50mph was too fast with the remaining half of the sample thinking that 50mph is too slow.

The majority of participants (54% and 66% regular and occasional drivers, respectively) perceived that a 55mph speed limit was about right and compared with the 50mph speed limit, a smaller proportion felt that it was too slow or much too slow (38% and 27% regular and occasional drivers, respectively). However, 8% of regular drivers and 7% of occasional drivers rated the 55mph speed limit as too fast.

3.9.4 Opinions on the speed limit

Participants were asked what they thought about the use of 55mph speed limits at road works on motorways. Key themes emerging from the comments are presented below.

Many participants perceived the 55mph speed limit positively, with several commenting that it was better than 50mph. A few participants cited potential benefits such as improved traffic flow and fuel economy:

> *"A distinct improvement on 50mph!"*
>
> *"I think it is noticeable and although only a small increase does make the journey through the roadworks feel a lot quicker."*
>
> *"Personally no great difference but good for fuel economy."*

However, others indicated that an increase of 5mph was not sufficient to benefit them or to make a noticeable difference:

> *"Not necessary, 50mph works fine and no benefit to additional 5mph."*
>
> *"I am not sure if this makes much difference to safety or travel times but I don't mind."*

"Not a great deal of difference in my total commuting time."

Similarly, many participants said that 55mph was not high enough, suggesting that the speed limit should be 60mph or higher. In some cases, this was because the roadworks were perceived to be near completion or because no works activity was observed. In other cases, it was because of perceived improvements to vehicle safety and highways infrastructure:

"Given that the road appears to be almost complete, I feel the speed limit is too low. Although National Speed limit may be too high whilst works continue, it would be beneficial for it to increase to 60."

"Fine, although size of lanes would allow 60mph limits."

"Most people drive to the 50-55mph so I don't believe 60mph would be too fast and most vehicles are ABS and all other modern systems of braking quicker etc."

"The problem is that there's a limit but often there doesn't seem to be much work going on."

Some participants indicated that their opinion of the 55mph speed limit depended on its impact on safety. Factors such as lane width and road worker activity were taken into account when commenting on the appropriateness of the speed limit.

"Sounds better, so long as it protects the workers."

"A welcome change, where it is safe to use."

"50 is better for narrow lanes, 55 when road is wider."

"55mph is a good speed whilst work is being carried out based on the safety of the workers."

A small minority of participants perceived that a 50mph speed limit was high enough, and indicated that it was safer than a 55mph speed limit.

"I think it should be 50mph - it makes drivers drive more safely and concentrate on their driving more."

"If you put it at 55 people will drive at 60+. Stick to 50 with narrow lanes."

Participants also commented on compliance. Some felt that the 55mph speed limit was better aligned with how drivers are already driving. However, others felt that compliance would be difficult because drivers are used to 50mph speed limits in roadworks and because speedometers are typically labelled in 10mph increments:

"Works well on open roads, as many drivers do about that anyway on a 50."

"Probably ok, novelty of 55 signs probably made people think about their speed, but this would wear off if encountered frequently."

"We are used to 50mph limits, do not confuse us."

"Annoying as difficult to gauge correct speed using speedometer dial."

"It's an odd speed. Since most cars speedometers read in units of 10mph it is difficult to judge."

3.9.5 Driver behaviour

Participants were asked whether there were any times where the behaviour of other drivers made them feel less safe. Driver behaviours included overtaking, close following, speeding and mobile phone use. Participants were also given the opportunity to comment on other behaviours which made them feel less safe. The unsafe behaviour most frequently reported was 'close following' (57%), followed by overtaking and speeding (45% and 35%, respectively) (Figure 29).

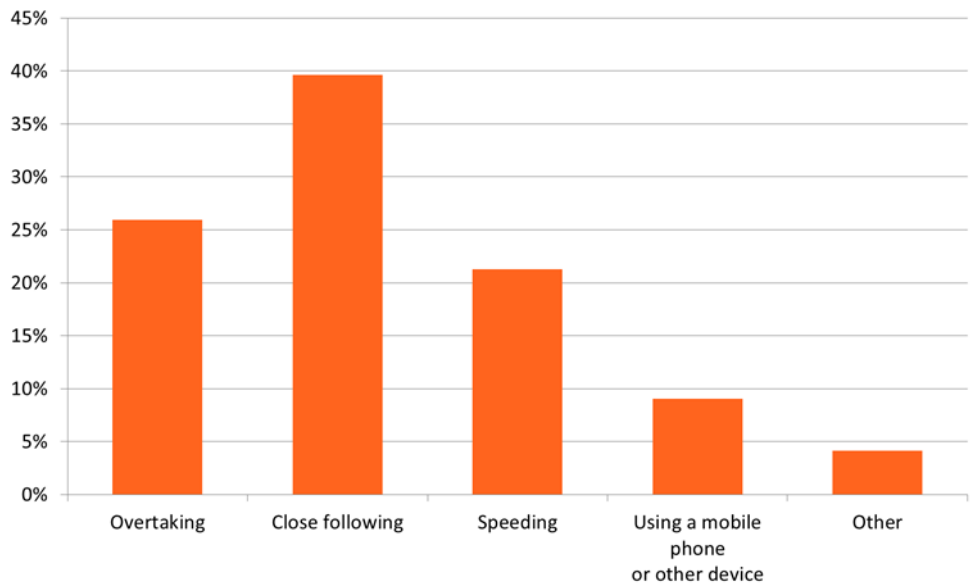


Figure 29: Proportion of participants by observed unsafe behaviours

Figure 30 shows the number of times each driver type was recorded as making the participant feel less safe. If multiple reasons were given for a particular driver type by a participant then this was only counted once in this chart. For example, if a participant stated that car drivers made them feel less safe because of close following and overtaking then this was only recorded once.

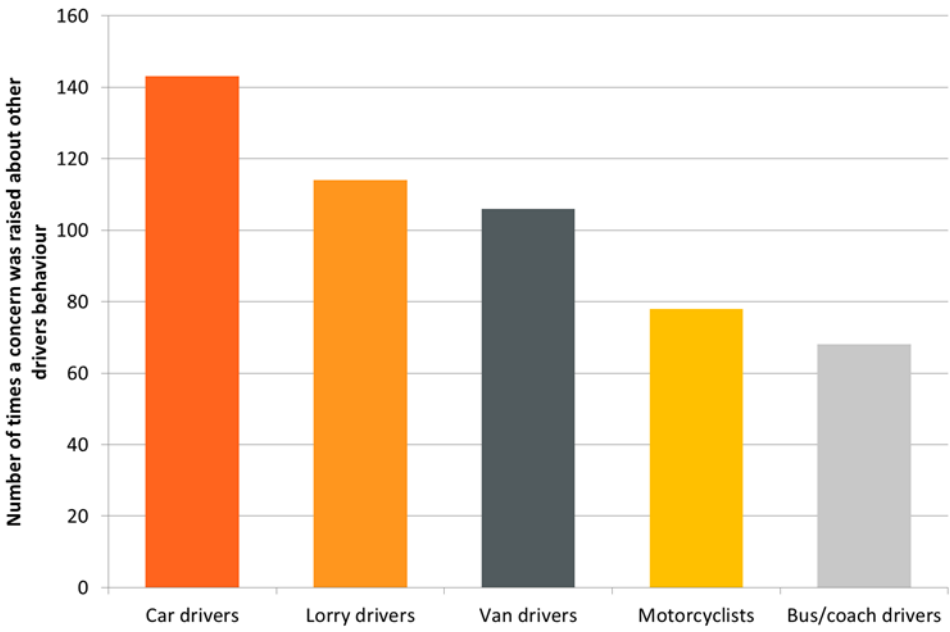


Figure 30: Count of times each driver type was recorded as having made the participant feel less safe

The largest number of concerns related to car drivers, followed by lorry and van drivers. The specific behaviours identified for three driver types are examined in Figure 31.

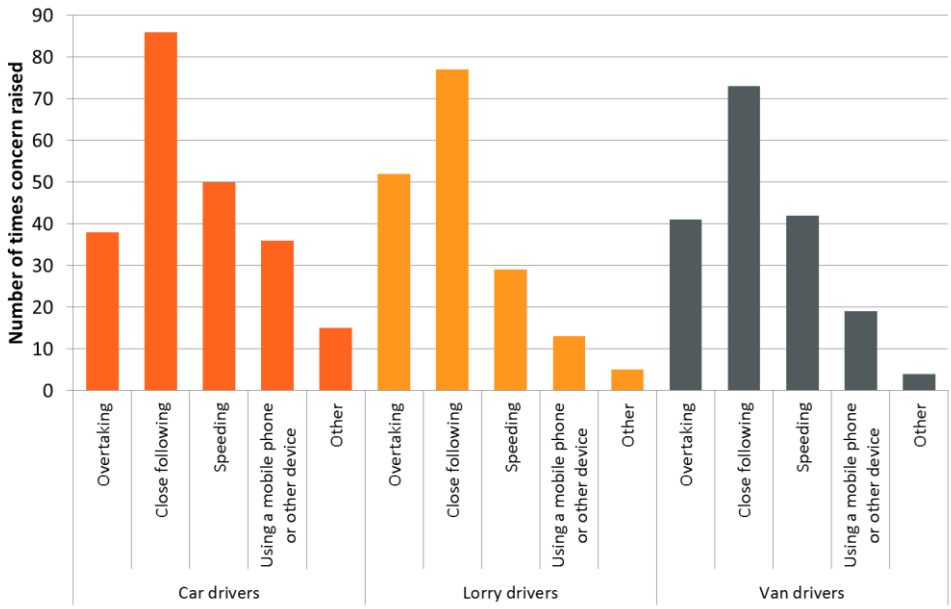


Figure 31: Unsafe behaviour of car, lorry and van drivers

Close following was the most common unsafe behaviour reported across all the three categories This aligns with the results from the radar analysis (Section 3.6) which suggests this behaviour is common among all vehicle types.

The second most frequently cited unsafe behaviours were speeding in the car driver category and overtaking in the lorry driver category; in the van driver category, speeding and overtaking were jointly the second most common unsafe behaviour reported.

Other behaviours which reportedly made people feel less safe included:

- Lane hogging: *"Lane hogging and changing lanes without indication."*
- Undertaking: *"Undertaking and drifting across more than one lane."*
- Cutting in: *"People cutting in at the last opportunity to leave the motorway."*
- Motorcycles weaving: *"Motorcyclists weaving in and out of the slow traffic suddenly appearing from what seems like nowhere and undertaking".*

3.9.6 Satisfaction

Participants were asked to rate how much the change in speed limit between Junction 2 and 4a affected their overall satisfaction with their journey. Responses are shown in Figure 32.

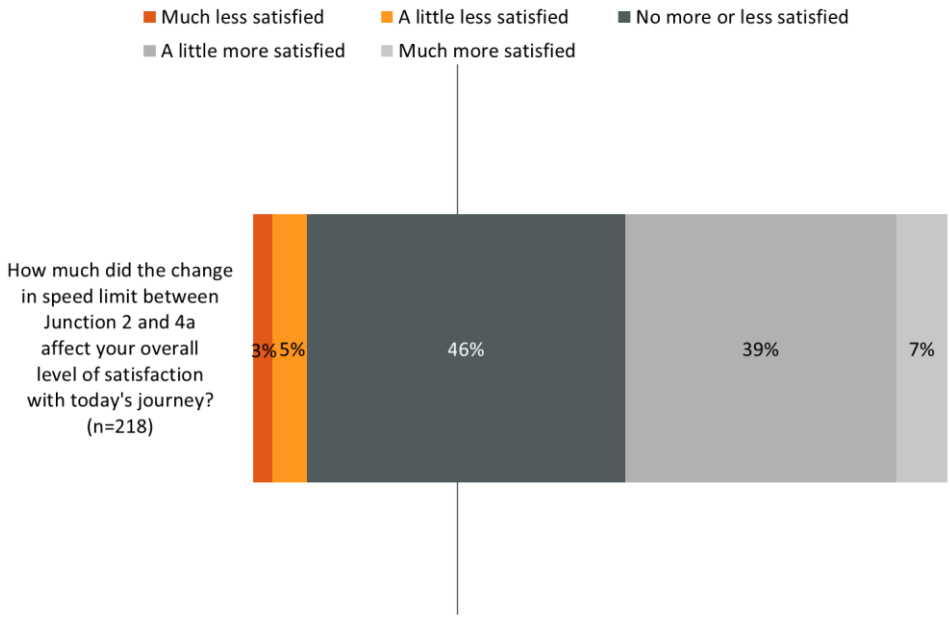


Figure 32: Change in participants' overall level of satisfaction with their journey as a result of the speed limit change

The reported effect of the speed limit change on satisfaction was positive (46%) or neutral (46%) for most of the sample. Only 8% reported being 'much' or 'a little' less satisfied compared with before the speed limit change.

Many of the respondents who expressed a neutral opinion reported that no difference was perceived between the 55mph and 50mph speed limit. A selection of comments is presented below:

> *"It didn't seem to change other drivers' attitude in speeding."*
>
> *"Other road users were still driving slower, or as badly as usual."*

"Just as slow as before, negligible difference."

"Tiny difference in speed from 50[mph], so didn't feel faster plus […] most drivers were still doing 50mph."

As found in previous surveys during the trial of 60mph through roadworks, some participants reported frustration at a lack of activity in the works area:

"The main frustration with the road works is that every time I go along there nothing seems to be happening - no people or machinery working as far as I can see."

"The length of road that waged road works on was ridiculous; most of it wasn't worked on. There was no need to restrict such a long stretch."

"Works have been intermittent - the last two times I travelled this way I have seen no sign of men working!"

As shown in Figure 33, the proportion of drivers who approve of the use of 55mph as a speed limit in roadworks is considerably higher than the percentage of drivers who disapprove (43% and 14%, respectively); about 23% of the respondents expressed a neutral opinion.

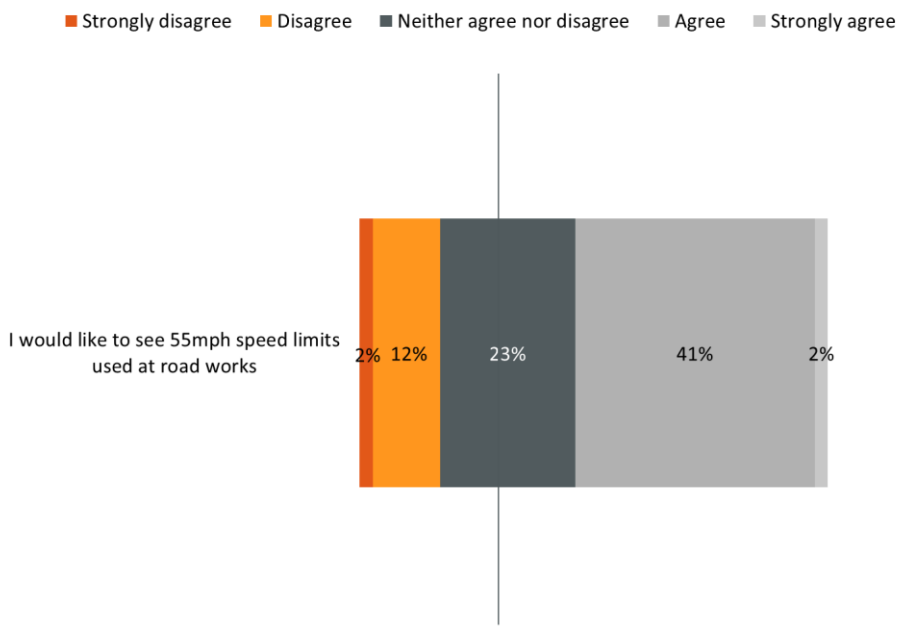


Figure 33 Participants' opinion about having 55mph speed limit at roadworks

A large number of the drivers surveyed expressed annoyance at not seeing the roadworks progress faster or not seeing workers on site. Suggestions provided by participants to improve their experience included the following:

"Limiting the extent of them i.e. working on a portion of the road of say no more than 5/10miles, then finishing before starting on another section."

"Work on smaller stretches at a time or work on a really long stretch but have hundreds of men working at the same time to get it done quickly."

"There should be no need for a speed restriction when there is no work being undertaken, i.e. if the works do not continue overnight then the speed restriction should be lifted."

"Variable speed limits so that the limit is faster when there is no work force actually there."

Some respondents suggested that receiving information about the roadworks could ease the feeling of frustration:

"Repeater signs advising of length of road works remaining may be useful."

"I wonder whether clear websites explaining the rationale can be created."

"Date for completion could be put on a notice."

In order to prevent dangerous braking of the vehicles, it was also suggested by participants that gradual speed reductions could be used to ease the transition into the roadworks (e.g. 70-60-50mph).

3.9.7 Route preferences

In addition to specific questions about the M3 scheme, the survey also included a short choice experiment[6] to investigate the relative importance of different attributes of the roadworks on a driver's route choice. Survey participants were asked to imagine they were driving from A to B with two possible motorway routes to choose from. Both routes had roadworks but the roadworks had different characteristics.

Each driver was presented with six different questions, each with two choices (Route 1 or Route 2) where the two routes had different attributes (related to the speed limit through the works, length of the roadworks, lane widths and use of speed enforcement). Drivers were asked "which route would you choose?". Each attribute had a number of levels, representing typical scenarios a driver might experience in the real world:

- Speed limit: 50mph, 60mph or 70mph
- Roadworks length: 5 miles, 10 miles or 15 miles
- Lane width: standard width lanes or narrow lanes
- Speed enforcement: none or average speed cameras

Figure 34 gives an example question from the choice experiment.

[6] The purpose of a choice experiment is to simulate the decision-making process made by drivers in the real world. When choosing between various alternatives, drivers are assumed to trade-off between the attributes of each in order to come to a decision. The analysis is used to quantify the different weighting consumers apply to each attribute.

	Route 1	Route 2
Speed limit	70mph	50mph
Roadworks length	10 miles	5 miles
Lane width	Narrow lanes	Standard width lanes
Speed enforcement	Average speed cameras	None
Choice	☐	☐

Figure 34: Example question included in the choice experiment: Which route would you choose?

This set of questions was also included in the road user survey for the M5 pilot (Wallbank, Chowdhury, Fleetwood, & Myers, 2017c). As the questions are not related to specific roadworks schemes, the data for the M5 survey were combined with the M3 data. This helped to the increase the sample size for this analysis (N = 280), providing more robust results.

The analysis of these data utilised a statistical technique known as multinomial logit (MNL) modelling[7] to estimate the relative weightings (importance) of each of the four attributes. Table 4 presents the results from this model. The table presents the coefficient (estimate) for each attribute, along with a significance value showing whether the coefficient is significantly different from zero (i.e. whether it is an important factor when customers choose between routes).

Table 4: MNL model results

Attribute	Coefficient	t value	Significance
Length	- 0.12	- 11.70	Significant ($p < 0.05$)
Lane width	- 0.85	- 13.08	Significant ($p < 0.05$)
Enforcement	- 0.27	- 4.25	Significant ($p < 0.05$)
Speed limit	0.04	8.34	Significant ($p < 0.05$)

The results showed that all four variables were significant and thus important in the choice task, but the magnitude of the coefficient varied suggesting some attributes were more important than others. Three of the attributes had a negative coefficient, and one had a positive coefficient. The sign of each factor signifies the direction of the relationship with drivers' choices. For example, length has a negative coefficient which indicates that as

[7] This is a relatively simple technique which involves estimating one coefficient for each attribute; these coefficients can then be interpreted to determine which factors are more important in the decision making process than others. Whilst more complex modelling techniques exist, which involve fewer assumptions and allow the weighting of the different attributes to vary between respondents, due to the small sample size (N = 280) and for ease of interpretation, the MNL model has been applied in this case. Further work involving a larger, stratified sample of SRN users could investigate these relationships further, including consideration of further attributes, understanding whether the decision making process differs between different users (e.g. between different driver segments, ages or genders) and investigating non-linearity in the attributes.

length of the roadworks increases this reduces the likelihood of drivers choosing the route. The presence of narrow lanes and enforcement also had a negative impact on likelihood to choose the route. Alternatively, the coefficient for speed limit was positive, suggesting that drivers preferred roadworks where the speed limit was faster.

Comparison of the absolute magnitude of the coefficients for lane width and enforcement (where the choice for both is a binary option) suggests that lane width is over three times more important for route choice than the presence or absence of enforcement (-0.85 is around 3 times bigger than -0.27).

The interpretation of the length and speed limit variables is slightly different since these are included in the model as linear predictors; here the coefficients represent the effect of a one mile increase in length, or a 1mph increase in speed limit, respectively. The magnitude of the coefficients demonstrates that a one mile increase in length is 3 times more important than a 1mph increase in speed limit.

The results from this choice experiment suggest that when asked to choose between routes with roadworks, drivers felt that the speed limit of the roadworks was the *least* important aspect of the four variables tested. The length of the roadworks, the presence of narrow lanes and average speed cameras all had a greater contribution to driver decisions. This might suggest that, in order to improve customer satisfaction, Highways England should also take steps to improve other aspects of the roadworks, including making the length of roadworks shorter. Whilst standard width lanes and no speed enforcement are seemingly preferred by most drivers, it is recognised that roadworks design decisions regarding lane width and enforcement are often made for practical and safety reasons and it may not be possible to remove these at some schemes.

3.9.8 Improving driver experience through roadworks

Participants were asked for their opinions on changes that should be made to the design or management of roadworks to improve their experience of driving though them. Some key themes emerged from the responses, which are presented below.

Many participants commented on a perceived lack of activity in the works. Some felt that the inconvenience of the roadworks would seem more worthwhile if they could see road workers working, particularly if working in larger numbers. Others said that carrying out work 'around the clock' would speed up the completion of the works:

> *"I need to see work going on which then feels that a reduction in speed is warranted."*
>
> *"To actually see more activity so that the road works will be completed earlier and not delayed."*
>
> *"Work nights like other countries, this should have been finished by now."*

Similarly, many participants felt that the traffic management was too long when considering the size of the section being worked on at the time. Participants suggested that the roadworks should have been carried out in smaller sections:

> *"Make the length of road works smaller, 16 miles was far too long with work seemingly only carried out on small parts at a time."*

"For them not to last as long - for the amount of cones that are a lot further back then where the roadworks start - why do the roadworks start at just after Fleet services when the majority of the roadworks do not start until after junction 4A?"

Some participants expressed frustration at the time taken to complete the works and wanted to see them completed as quickly as possible to end the disruption:

"Please finish the road works ASAP. I have been commuting to work since 2014 and it has been nearly 3 years that this road works have continued. It sometimes affects my work."

"Get them completed as fast as possible. Make sure that there is always someone actively working on them so that when we are all sitting in a queue we at least get the impression that the management are trying to minimise the length of time the roadworks take."

Many participants commented on changing the speed limit. Some suggested that the speed limit in roadworks should be increased or varied according to the conditions, while others felt that transitioning from the national speed limit to 50mph could help drivers to avoid reducing their speed harshly.

"Go to 60 miles outside rush hour."

"If nobody is actually working in a section of roadworks then an increase in speed "limit in suitable."

"Perhaps a transitioning from 70-60-50mph prior to the works could prevent people from slowing down too quickly."

Some participants made suggestions relating to signage. Some requests were for larger signs and more signs, while others were for accurate information on the works completion date:

"More, possibly earlier signage."

"Repeater signs advising of length of roadworks remaining may be useful. The existing signage advising of the length at the entry to them coincides with concentrating on adjusting speed, the narrowing of lanes, merging if necessary, and evaluating the position of other vehicles whilst doing this."

"Date for completion could be put on a notice."

A few participants perceived a need for better enforcement and suggested strategies for doing this:

"The lanes are quite narrow in places and when being passed by a large lorry it feels unsafe. Drivers will always exceed the speed limit no matter what it is but adding cameras that actually work might be a deterrent."

"Displays showing the number plates (and promising a fine) for speeding drivers. Name and shame and make them pay!"

"Do more to ensure drivers don't undertake, especially on approaching junctions as this exacerbates the concertina effect."

These findings align with those from the choice experiment (Section 3.9.7) and suggest that in addition to increasing the speed limit, there are many other changes to the way roadworks are managed that would help improve customer satisfaction.

3.9.9 General comments

At the end of the survey, participants were asked if they had any further comments. Some key themes could be drawn from the comments provided. These included:

Comments on an increased speed limit through roadworks:

> *"60 [mph] would be fine I believe."*
>
> *"Raising the speed limit can be dangerous with narrow lanes especially with old people/nervous drivers and lorries. A lorry lane would be good in roadworks."*

Comments on traffic flow during the roadworks:

> *"The M3 traffic flow during rush hours, morning and evening, has been better than pre-roadworks over the last 3 years due to the enforced speed limit. It has changed driver behaviour in a positive way as they accept the limit. This means they do not rush up behind slower traffic, pushing in aggressive manner, they do not lane-hop to the same degree to gain a few metres."*
>
> *"I generally think that the 50 mile an hour limit has helped the traffic to keep moving but with narrow lanes and limited exit places and no hard shoulder when there was an accident it was chaos."*

Comments on the length and duration of the roadworks:

> *"Please reduce the length of the road works where completed."*
>
> *"Can't see the M3 roadworks being finished this summer like advertised..."*
>
> *"Finish the roadworks ASAP."*

Recommendations for better planning to minimise disruption:

> *"Since the M3 roadworks, of course the back roads got busy as well. And it doesn't help that some of the back roads are having roadworks as well, like the one in Lightwater where there is a Virgin Media works. It takes me an hour and a half to get to work, when it's usually just 35 minutes if I just use M3."*
>
> *"During the M3 night closures I used the M4 to get the Heathrow quicker. Highways Agency also closed the M4 planned closure at the same time as the M3. 2 major trunk routes into the U.K.'s Capital City that run almost parallel together and just a few miles apart. Why on earth are the HA planning in 2 closures close together on 2 major routes into London, it should not be allowed, better planning needed".*

Key findings

- When asked about whether the long term benefits of the roadworks outweigh the shorter term inconvenience, there were significantdifferences between the opinions of regular drivers and those who only drive through occasionally. Regular drivers were more likely to disagree with the statement, which might suggest that initiatives to target individuals who drive through roadworks regularly might show the greatest gains in customer satisfaction.
- Nearly three-quarters of drivers who drive through the scheme only occasionally immediately noticed the change in speed limit compared to only 57% of regular drivers.This change was shown to be significant which suggests that regular drivers were paying less attention when driving through the scheme.
- Most of the drivers stated that the 55mph speed limit did not affect the way they drove and over half thought this speed limit was 'about right'.
- Many participants perceived the 55mph speed limit positively, with several commenting that it was better than 50mph. However, some people thought that an increase of 5mph was not sufficient to benefit them or to make a noticeable difference, suggesting that the speed limit should be 60mph or higher. Comments were also received around safety (both positive and negative for 55mph) and compliance.
- The 55mph speed limit improved some drivers satisfaction (46%) but others remained neutral (46%), stating that many drivers were still doing 50mph.
- The choice experiment suggests that when asked to choose between routes with roadworks, drivers felt that the speed limit of the roadworks was the least important aspect. The length of the roadworks, the presence of narrow lanes and average speed cameras were more important.
- Participants suggested a number of ways to improve driver experience through roadworks: increasing the activity of road workers, reducing the length of the roadworks, completing the roadworks as quickly as possible, varying the speed limit depending on the conditions, changes to signage and better enforcement.

4 Summary

The aim of the monitoring carried out as part of this on-road pilot was to determine the impact of increasing the speed limit on the M3 J2-4a scheme from 50 to 55mph during the commissioning phase of the Smart Motorway development. The monitoring measured both driver behaviour and perceptions through the roadworks with a 55mph speed limit.

Monitoring took place on both the northbound and southbound carriageways between Junctions 3 and 4a over a two week period. The northbound carriageway was the control location and retained a 50mph speed limit throughout and the southbound carriageway was the experimental location, which had a 50mph speed limit for the first week (the baseline period) and a 55mph speed limit for the second (the trial period).

Although the speed limit did not change at the control location, it was important to also monitor this carriageway to ensure that any extraneous influences on behaviour between the baseline and trial periods (such as weather or local traffic conditions) could be accounted for in the analysis. During the monitoring, there was a change in the roadworks layout from narrow lanes with Lanes 1, 2 and 3 open, to full width lanes with Lanes 2, 3 and 4 open; this change occurred on both carriageways, at the same time as the change in speed limit from 50 to 55mph at the experimental location. As a result, any differences in driver behaviour between the baseline and trial period cannot be attributed solely to differences in the speed limit.

Comparison of the vehicle flows between the baseline and trial periods showed that flow increased following the change of speed limit/lane widths. Hence, in order to understand the impact of the increased speed limit on driver behaviour, it is important to also consider changes to speed or headway on the control carriageway.

Free-flow average speeds increased significantly (by around 3mph) following implementation of the 55mph speed limit at the experimental location, suggesting that some drivers noticed and responded to the change in speed limit. However, speeds also increased slightly on the control carriageway, which suggests that some of the increase in speeds was driven by the change in lane widths from narrow to full width lanes. The change in lane widths is estimated to account for up to 1mph of the increase in free-flow average speeds, suggesting that the 55mph speed limit only resulted in a 2mph increase in average speed.

The analysis shows that the average speed at the experimental location remained around 52-53mph throughout the trial, below the speed limit of 55mph. In particular, the proportion of drivers who complied with the speed limit was higher during the trial period, suggesting that overall compliance with the 55mph speed limit was better than compliance with the 50mph speed limit. Van/LGV drivers were slightly less compliant with the 55mph speed limit than either car or HGV drivers.

Using the average speeds and the length of the link, it is estimated that the 55mph speed limit saved each road user around 20 seconds in journey time.

Headway measures the distance between successive vehicles. There was no evidence to suggest that the change in speed limit impacted on the average headway and this remained higher than the minimum two second headway recommended by the Highway Code. In

addition, the proportion of vehicles close following was similar between the baseline and trial periods for all vehicle types, suggesting that increasing the speed limit to 55mph had very little effect on close following behaviour. During the 60mph trial on the M5 (Wallbank, Chowdhury, Fleetwood, & Myers, 2017c), the increase in speed limit resulted in a subtaintial reduction in close following by HGVs, suggesting that a 60mph speed limit is more effective than 55mph for reducing this undesirable behaviour.

There were relatively few incidents (breakdowns or collisions) during the trial and thus no robust conclusions can be drawn about the impact of the increased speed limit on this measure of safety. The CCTV footage for the two incidents (one during the baseline period and one during the trial) were reviewed. However, no conclusions can be drawn as to whether the increased speed limit contributed to the second of these, as it is not clear whether the reason for the collision between the car and the cones in Lane 1 was related to the 55mph speed limit or not.

Customer satisfaction with the 55mph speed limit was measured using two surveys: one of regular commuters through the scheme using a targeted survey aimed at local businesses and one of road users who stopped at Fleet services (located at the end of the scheme). Nearly three-quarters of drivers who drive through the scheme only occasionally noticed the change in speed limit immediately. This is compared to 57% of regular drivers, which suggests that these drivers were paying less attention when driving through the scheme.

Many participants perceived the 55mph speed limit positively, with several commenting that it was better than 50mph. However, some people thought that an increase of 5mph was not sufficient to benefit them or to make a noticeable difference, suggesting that the speed limit should be 60mph or higher. Comments were also received around safety (both positive and negative for 55mph) and compliance.

The 55mph speed limit improved some drivers satisfaction (46%) but others remained neutral (46%), stating that many drivers were still doing 50mph.

In addition to questions around the M3 scheme and 55mph specifically, respondents were also asked to complete a short choice experiment. When choosing between routes with roadworks, drivers felt that the speed limit of the roadworks was the least important aspect. The length of the roadworks, the presence of narrow lanes and average speed cameras were more important. Participants also suggested a number of ways to improve driver experience through roadworks: increasing the activity of road workers, reducing the length of the roadworks, completing the roadworks as quickly as possible, varying the speed limit depending on the conditions, changes to signage and better enforcement.

In summary, there is no indication that the 55mph speed limit had a negative impact on road user safety. The survey results suggest there were mixed feelings around the use of 55mph with some drivers feeling that it didn’t go far enough to improve satisfaction.

5 Next steps

5.1 Road worker feedback

In addition to engaging with customers on the SRN through the two surveys, it is important to understand the first-hand views of people who were involved with the pilot. This is crucial for informing the design of further pilots or future roll-out of increased speed limits at roadworks. The next step for this project is therefore to engage with individuals who have experience of working during the 55mph pilot, to understand any challenges faced during the trial and any concerns or risks that need further management in order for increased speed limits at roadworks to be used across the network. These results will be presented in a separate report in Autumn 2017.

5.2 Implementation of 55mph at other schemes

This is the first on-road pilot of 55mph as part of this project. TRL is working closely with Highways England to implement increased speed limits at other schemes. At the time of writing, the M1 J45 scheme is in planning to implement 55mph on the main carriageway during this junction improvement scheme. This is currently expected to take place in late in 2017.

Following the completion of the pilot schemes, a final report will be collated, assessing the findings from all the 55 and 60mph pilots carried out as part of this project.

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Appendix A Motorway User Survey

MOTORWAY USER SURVEY

- This research is being carried out by TRL (the Transport Research Laboratory) on behalf of Highways England.
- We would be very grateful for your help with the survey *(it should only take around 10-15 minutes)* but you are under no obligation to do so and you may stop at any time.
- The research aims to improve understanding of driver perceptions of road works.
- There are no 'right' or 'wrong' answers – we are interested in what you think.
- We may wish to use anonymised quotes from your responses.
- If you have any questions about the survey, please ask one of the researchers.
- This survey is conducted in accordance with the Market Research Society Code of Conduct.

For the paper survey: IF YOU COMPLETE THE SURVEY AND RETURN IT TO US TODAY, YOU WILL RECEIVE £5 IN CASH

For the online survey: IF YOU COMPLETE THE SURVEY YOU WILL BE ENTERED INTO A PRIZE DRAW WITH A CHANCE TO WIN A £50 AMAZON VOUCHER OR ONE OF TWO £25 VOUCHERS

Please confirm – have you driven (**as a driver, not a passenger**) westbound through the road works between Junctions 3 and 4 of the M3 today?

- ☐ Yes
- ☐ No - sorry, we are looking for responses from drivers who have driven between Junctions 3 and 4
- ☐ Don't know – please speak to a researcher

1. Approximately how many miles was your journey in total?

- ☐ 1-20
- ☐ 21-40
- ☐ 41-60
- ☐ 61-80
- ☐ 81-100
- ☐ More than 100
- ☐ Don't know

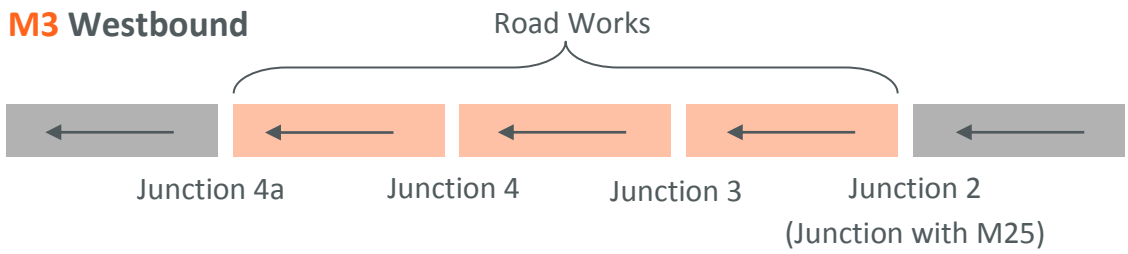
2. What type of vehicle did you drive?

- ☐ Motorcycle
- ☐ Car (includes car-derived vans)
- ☐ Light commercial vehicle (up to and including 7.5 tonnes)
- ☐ Heavy goods vehicle (over 7.5 tonnes)
- ☐ Other (please specify)_____

3. What was the main purpose of your journey?

- ☐ Commuting
- ☐ Business
- ☐ Education (including giving others a lift)
- ☐ Shopping
- ☐ Other personal business
- ☐ Visiting friends/family
- ☐ Holiday
- ☐ Other (please specify)_____

The diagram below illustrates where the road works are located on the M3:



4. Did you know about these road works in advance of your journey?

- ☐ Yes
- ☐ No

5. Typically, how often do you drive through this part of the M3?

- ☐ 5 or more times a week
- ☐ 3-4 times a week
- ☐ 1-2 times a week
- ☐ Once every 2-3 weeks
- ☐ Once every month
- ☐ Once every 2-6 months
- ☐ Once every 7-12 months
- ☐ Less than once a year

6. Did you notice any of the following when driving through the road works today?

	Yes	No	Don't know / don't remember
a) Work being carried out by road workers	☐	☐	☐
b) Closed lanes	☐	☐	☐
c) Narrowed lanes	☐	☐	☐
d) Speed limit signs	☐	☐	☐

7. To what extent do you agree or disagree with the following statements?

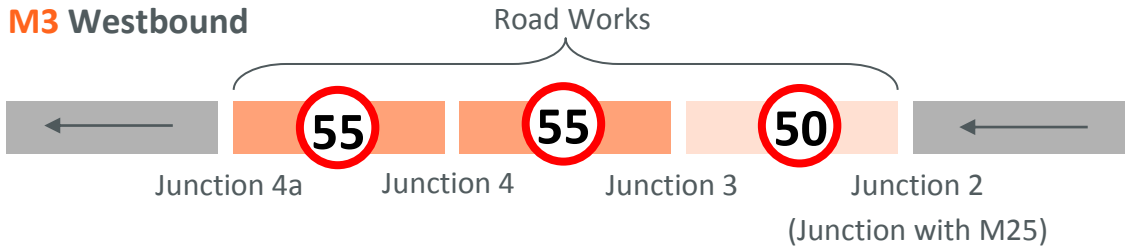
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a) The road works will provide long term benefits to drivers	☐	☐	☐	☐	☐
b) The road works will provide long-term benefits to me personally	☐	☐	☐	☐	☐
c) The long term benefits of the road works outweigh the shorter term inconvenience	☐	☐	☐	☐	☐

8. Typically, the speed limit through long-term road works on motorways is 50mph. Do you think the speed limit is:

☐	☐	☐	☐	☐
Much too slow	A little bit too slow	About right	A little bit too fast	Much too fast

After Junction 3 (for Woking, Bracknell, Lightwater, A322) the speed limit changes from 50mph to 55mph.

The diagram below illustrates the different speed limits in use at the road works between J2 and J4a.



9. Did you notice the speed limit change?

- ☐ Yes, I noticed the change in speed limit signs immediately
- ☐ Yes, but I only noticed because other drivers were adjusting their speed
- ☐ No, I did not notice the speed limit change

10. What do you think about the use of 55mph speed limits at road works on Motorways?

11. Thinking about the conditions when you drove between Junctions 3 and 4, do you think the **55mph speed limit** was:

☐	☐	☐	☐	☐
Much too slow	A little bit too slow	About right	A little bit too fast	Much too fast

12. Did the presence or speed of other vehicles affect the speed at which you drove between Junctions 3 and 4?

- ☐ Yes – I drove **more slowly** than I would have liked
- ☐ Yes – I drove **faster** than I would have liked
- ☐ No – I was able to drive at the speed that I wanted to drive at

13. Do you think the 55mph speed limit affected the way you drove?

- ☐ Yes
- ☐ No

If yes, please explain how you feel the 55mph affected the way you drove:

14. When you drove between Junctions 3 and 4, were there any times where the behaviour of other drivers made you feel less safe?

(Please tick all that apply to indicate which behaviours made you feel less safe and who performed those behaviours)

	Overtaking	Close following	Speeding	Using a mobile phone or other device	Other (please specify below)
Car drivers	☐	☐	☐	☐	☐
Lorry drivers	☐	☐	☐	☐	☐
Van drivers	☐	☐	☐	☐	☐
Motorcyclists	☐	☐	☐	☐	☐
Bus/coach drivers	☐	☐	☐	☐	☐

Other behaviours/road users that made you feel less safe:

15. Did you notice any speed cameras between Junctions 3 and 4?

- ☐ Yes
- ☐ No
- ☐ Don't know

16. How much do you agree with the statement below?

"I would like to see 55mph speed limits used at road works"

☐	☐	☐	☐	☐
Strongly agree	Agree	Neither Agree nor disagree	Disagree	Strongly disagree

Please give a reason for your answer to the above question:

17. How much did the change in speed limit affect your overall level of satisfaction with today's journey though the M3 road works between Junction 2 and 4a? Please complete the statement below:

"Compared with before the speed limit change, I felt…

☐	☐	☐	☐	☐
…much less satisfied"	…a little less satisfied"	…no more or less satisfied"	…a little more satisfied"	…much more satisfied"

Please give a reason for your answer to the above question:

18. In general, how satisfied or unsatisfied were you with your journey?

☐	☐	☐	☐	☐
Very unsatisfied	Quite unsatisfied	Neither satisfied or unsatisfied	Quite satisfied	Very satisfied

19. In your opinion, what changes should be made to the design or management of road works to improve your experience of driving though them?

This next set of questions is about your preferences for different types of motorway routes. For each question, please imagine you are driving from A to B and there are two possible motorway routes for you to choose. Both routes have road works on them but the road works have different characteristics. Which route you would choose?

20. Which route would you choose?

	Route 1	Route 2
Speed limit	70mph	50mph
Roadworks length	10 miles	5 miles
Lane width	Narrow lanes	Standard width lanes
Speed enforcement	Average speed cameras	None
Choice	☐	☐

21. Which route would you choose?

	Route 1	Route 2
Speed limit	50mph	60mph
Roadworks length	5 miles	15 miles
Lane width	Narrow lanes	Standard width lanes
Speed enforcement	None	Average speed cameras
Choice	☐	☐

22. Which route would you choose?

	Route 1	Route 2
Speed limit	60mph	70mph
Roadworks length	15 miles	5 miles
Lane width	Narrow lanes	Standard width lanes
Speed enforcement	None	Average speed cameras
Choice	☐	☐

23. Which route would you choose?

	Route 1	Route 2
Speed limit	60mph	60mph
Roadworks length	5 miles	15 miles
Lane width	Standard width lanes	Narrow lanes
Speed enforcement	Average speed cameras	None
Choice	☐	☐

24. Which route would you choose?

	Route 1	Route 2
Speed limit	50mph	70mph
Roadworks length	10 miles	10 miles
Lane width	Standard width lanes	Narrow lanes
Speed enforcement	Average speed cameras	None
Choice	☐	☐

25. Which route would you choose?

	Route 1	Route 2
Speed limit	70mph	50mph
Roadworks length	15 miles	10 miles
Lane width	Standard width lanes	Narrow lanes
Speed enforcement	None	Average speed cameras
Choice	☐	☐

26. What is your…

a) Gender

- ☐ Male
- ☐ Female
- ☐ Prefer not to say

b) Age

- ☐ 17-24
- ☐ 25-29
- ☐ 30-34
- ☐ 35-39
- ☐ 40-44
- ☐ 45-49
- ☐ 50-54
- ☐ 55-59
- ☐ 60-64
- ☐ 65-85
- ☐ 85+
- ☐ Prefer not to say

If you have any other comments relating to this survey, please write them here:

Thank you for taking the time to complete this survey.

Monitoring and evaluation of the 55/60mph pilots

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