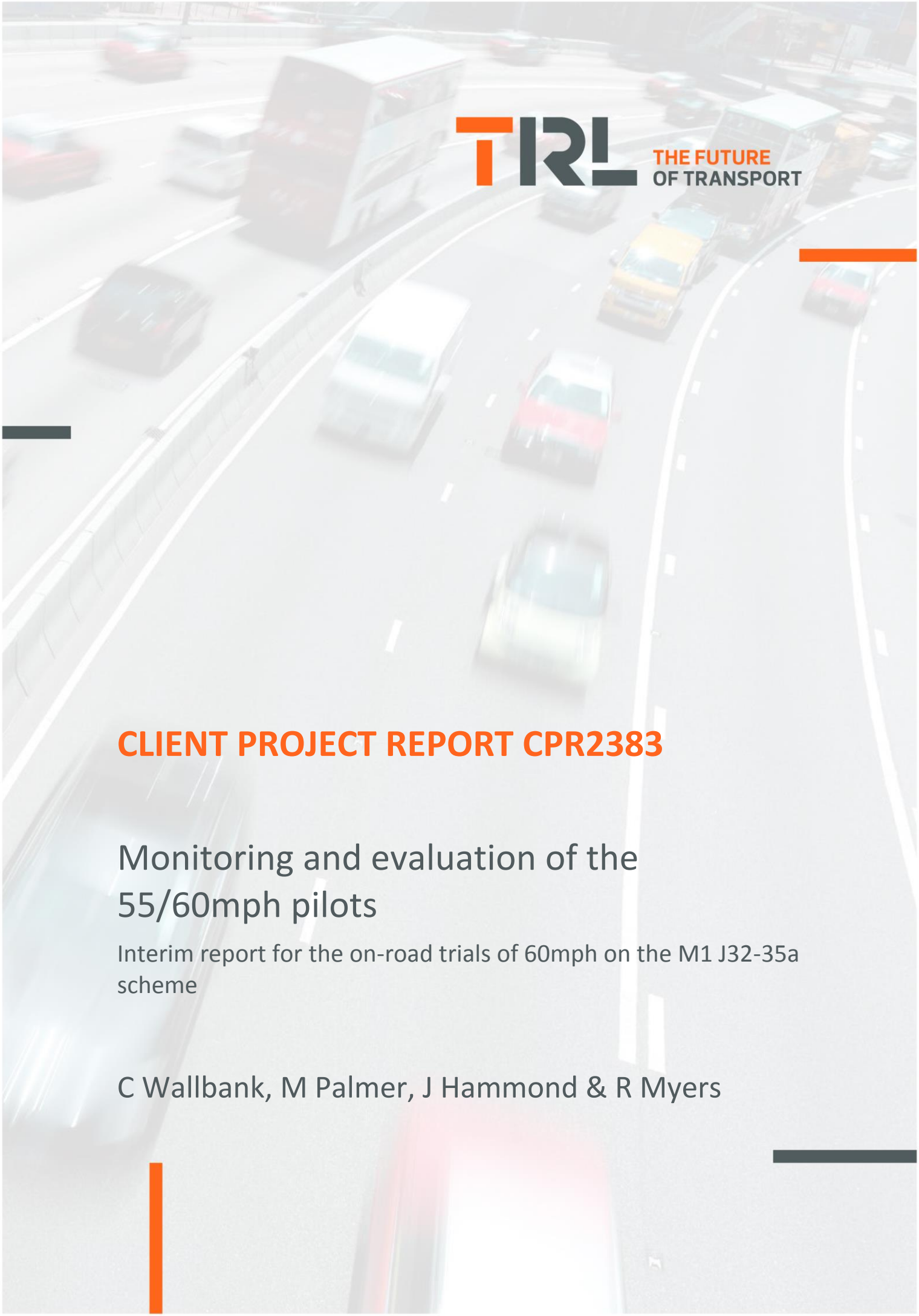

TRL THE FUTURE OF TRANSPORT

CLIENT PROJECT REPORT CPR2383

Monitoring and evaluation of the 55/60mph pilots

Interim report for the on-road trials of 60mph on the M1 J32-35a 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 the benefits of 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 60mph at the M1 J32-35a scheme during November and December 2016. Driver behaviour was measured throughout the on-road trial to understand whether the change in speed limit to 60mph impacted upon the safety of road users and workers. In addition, surveys were carried out at the nearest service station with drivers who had driven through the scheme, in order to understand their perceptions of increased speed limits through roadworks.

The results show that there is no indication that the 60mph speed limit had a negative impact on road user safety. Free-flow average speeds did increase, but only by around 3.5mph. Average headway was unaffected by the change in speed limit and, in general, safe stopping distances were maintained between vehicles.

Four road traffic collisions occurred within the 60mph speed limit. CCTV footage was reviewed for three of these four and there was no indication that the RTCs were due to the increased speed limit.

There is limited evidence to suggest that the TM maintenance requirements have changed, indicating a change in risk for the road workers carrying out this activity, but it is unclear whether the trend observed is a product of the data collection methodology. This finding will be investigated further in order to draw firm conclusions.

The survey results suggest that drivers are more satisfied with 60mph speed limits through roadworks than 50mph. Feedback from operatives who experienced working within the 60mph speed limit will be gathered in the New Year.

Based on the results presented in this report, it is recommended that the pilots continue, with the next trial planned for the A1 Leeming to Barton scheme over the Christmas period.

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 measure to achieve improvements in customer satisfaction at roadworks is challenging the "blanket 50mph" approach that is usually taken for major schemes. As a result, and following consultation with stakeholders across Highways England and the Supply Chain, this project will support monitoring and evaluation to understand the impact of raising the speed limit through roadworks 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 increased risk from the increased speed limit.

Three specific scenarios have been defined and will be trialled on-road:

> **Scenario 1:** Implementation of a 60mph speed limit on lead-in and exits to/from the works
>
> **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) during a low activity 'holiday period'.

1.2 Contents of this report

This report summarises the findings from the on-road pilot of 60mph at the M1 Junction 32-35a scheme during late 2016. This is the first pilot in a series of on-road trials aiming to understand the impact of increasing the speed limit to 55mph or 60mph at roadworks. Further interim reports will be available in due course summarising the findings from the other pilot schemes.

This scheme represents Scenario 2 where the speed limit is only increased during the operational testing phase when a motorway is converted to a SMART motorway. During this stage, the former hard shoulder (LBS1) remains closed until all the Motorway Incident Detection and Signalling (MIDAS) system detectors are commissioned. Once all is well, LBS1 is opened to traffic and queue protection (HIOCC) is tested.

From the customers' perspective, during the first part of this stage the former hard shoulder (LBS1) is coned off and no work is taking place; 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. This will be increased to 60mph for the trial.

TRL were commissioned by Highways England to monitor driver behaviour (and customer satisfaction), to ensure that safety of road users and workers is not compromised by the increase in speed limit during this period. This report outlines the scheme and data

collection methodology (Section 2), presents the results from the monitoring (Section 3), summarises these findings (Section 4) and makes recommendations for the next steps (Section 5).

The core research question for this pilot is:

What is the impact of increasing the speed limit on the M1 Smart Motorway scheme from 50mph to 60mph on:

a) **Average vehicle speed?**

b) **Average vehicle headway?**

c) **The number of incidents?**

d) **Journey times?**

e) **Customer satisfaction?**

2 Method

2.1 Overview of the scheme

The M1 J32-35a Smart Motorway scheme commenced in January 2015 and is due to finish in March 2017. The first links (junction 34-35 and junction 35-35a northbound) were completed and converted to All Lanes Running (ALR) in December 2016.

The pilot evaluates the impact of increasing the speed limit from 50mph to 60mph during the operational testing phase of the conversion to SMART motorway. This phase took place from 8th November 2016 to 12th December; during the last week in this period (6th-12th December) the cones in Lane 1 were removed in order to test the queue protection. Driver behaviour on these links was monitored throughout this five week period. In addition, in order to understand the impact of the speed limit increase, baseline data were also collected in the two weeks prior to this point (25th October to 7th November) when the speed limit was still 50mph.

To account for variations in behaviour over time, a control site which is not subject to a change in speed limit must also be monitored. For the purposes of the pilot, junction 35-35a northbound was selected as the 'experimental location' where the speed limit changed on 8th November. The link immediately upstream of the experimental location (junction 34-35 northbound) was used as a 'control location'. An overview of the scheme and the monitoring locations is provided in Figure 1.

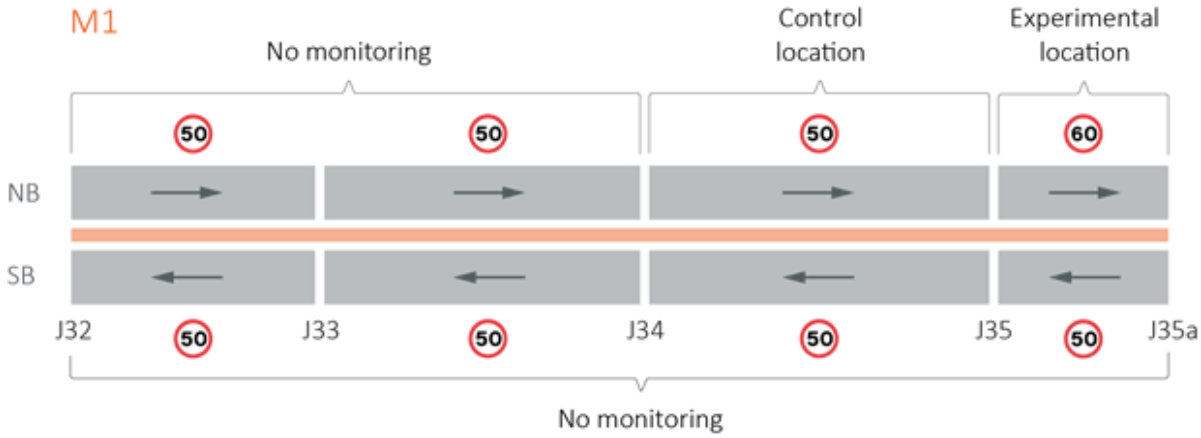


Figure 1: M1 J32-35a scheme monitoring locations (up to 22nd November 2016)

At the scheme's request, junction 34-35 northbound was also converted to 60mph on 23rd November. For the purposes of the monitoring, this report focuses on the first two periods highlighted in bold in Table 1 where the control location was running at 50mph.

The results of the monitoring during the period from 23rd November to 12th December when both links are running at 60mph will be presented, but no suitable control data are available so these data will be compared to the trend seen in the previous weeks.

Table 1: Timelines and locations for monitoring

Dates	Description of activity	Control location: J34-35	Experimental location: J35-35a
25th October – 7th November 2016	**Baseline monitoring period (Lane 1 coned off, remaining three lanes open and full width)**	**50mph**	**50mph**
8th November – 22nd November 2016	**Trial monitoring period with TM still in place (Lane 1 coned off, remaining three lanes open and full width)**	**50mph**	**60mph**
23rd November – 5th December 2016	Trial monitoring period with TM still in place (Lane 1 coned off, remaining three lanes open and full width)	60mph	60mph
6th December – 12th December 2016	Trial monitoring period with no TM (i.e. ALR running at reduced speed)	60mph	60mph
12th December 2016	Link opens - ALR running at national speed limit	No monitoring	No monitoring

2.2 Risk assessment

Prior to commencing the trial, Costain (as the Principal Contractor responsible for the scheme) 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, detailed the mitigation measures required to address these risks and assessed the tolerability of any risk change.

The details of this risk assessment are not included in this report, but on the basis of this evidence the project board agreed the trial could commence with on-going monitoring, provided all activities that significantly deviate from commissioning-type activities could be completed before the 60mph trial began.

2.3 Safety review and abort process

In addition to the findings presented in this report, for all pilots and trials taking place on the Highways England network which are monitored by TRL, procedures are put in place to monitor and review safety critical incidents to ensure that the risks posed to road workers and road users have not been increased to an intolerable level as a result of the trials. For this trial, periodic safety reviews were performed and reported to Highways England on a weekly basis.

If, at any point, concerns had been raised about the trial then the abort process would have been initiated. Costain had overall responsibility for risk and retained the right to initiate the abort process at any stage. Other parties to the trial (TRL and Highways England) could also request Costain to initiate the abort process, should evidence indicate that immediate termination of the trial was necessary. The abort process outlined before the trial commenced was as follows:

1. Costain to return the signing to 50mph at the earliest opportunity, provided this can be done with tolerable risk to road users and workers.
2. Notify Highways England, TRL, CCTV, police and recovery operators that the abort process has been implemented and the timescales for implementing the 50mph limit.
3. Review the decision to implement the abort process with Highways England, TRL and Project Board members.

The abort process was not initiated during the pilot and the monitoring continued throughout the baseline and trial periods. The weekly safety reports included a summary of the following data:

- Incidents involving road users, including injury and non-injury RTCs. CCTV footage of the incident was sought (where possible) and reviewed by a team of experts at TRL to assess whether the increased speed limit may have contributed to the incident occurring or may have increased the severity of the incident outcome.
- The incursions log and traffic management (TM) maintenance log for the scheme. These were reviewed to determine whether there had been an increase in incursions/collisions with the TM as a result of the increase in speed limit.
- Average speed data from the Motorway Incident Detection and Signalling (MIDAS) radars. Speeds during 'free-flow' conditions were compared to the enforcement threshold (10%+2mph).

The weekly reports made a recommendation whether or not to continue with the pilot. During the trial period no safety critical incidents attributed to the increased speed limit were identified, and no concerns were raised about the number of incidents or the average speeds experienced within the experimental area.

2.4 Data collection and statistical comparisons

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

- Motorway Incident Detection and Signalling (MIDAS) data.
- Incident data including CCTV logs, the Costain's incursions log and the TM maintenance log for the scheme.
- Data collected from a survey carried out at the nearest motorway service area with road users who had driven through the scheme.

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

Throughout the analysis the data are presented by week as labelled in Table 2. The ones in bold are the key analysis periods.

Table 2: Monitoring periods by speed limit

Dates	Label in the analysis	Control location: J34-35	Experimental location: J35-35a
25th October – 31st October 2016	**Baseline 1**	**50mph**	**50mph**
1st November – 7th November 2016	**Baseline 2**	**50mph**	**50mph**
8th November – 14th November 2016	**Week 1**	**50mph**	**60mph**
15th November – 21st November 2016	**Week 2**	**50mph**	**60mph**
22nd November – 28th November 2016[1]	Week 3	60mph	60mph
29th November – 5th December 2016	Week 4	60mph	60mph
6th December – 12th December 2016	Week 5	60mph ALR	60mph ALR

2.4.1 MIDAS data

2.4.1.1 Location of MIDAS radars

Two MIDAS radars within the control link and two radars within the experimental link were used to monitor speed, flow and headway during the baseline and trial periods.

For the purposes of monitoring, MIDAS detectors should ideally be located at least 1km from entry or exit slip roads and critical points in the TM (such as the location of the narrowing of lanes or the start of contraflow lanes). This ensures that drivers' speed choice is not greatly influenced by these features, allowing study of the behaviour of drivers in response to the changes in speed limit.

However, the experimental location between junction 35-35a is a short link (only 1.5km in total between the entry slip at J35 and the exit slip at J35a). As a result, it was not possible to identify any monitoring sites within this link which comply with the recommended criteria of being 1km away from slip roads. Instead, a 'matched locations' approach was taken where the selection of monitoring positions was matched (as closely as possible) between the experimental and control locations in term of distance from the entry and exit slips. The MIDAS detectors utilised for the monitoring are outlined in Table 3.

[1] Note that the speed limit change for junction 34-35 actually took place overnight on 22nd November, thus the first full day of 60mph running on this link was 23rd November. However, for the purposes of the analysis and to ensure that each period is seven days in total, week three commences on 22nd November.

Table 3: Location of MIDAS detectors in the control and experimental locations, and relative distances from entry and exit slips

MIDAS Radar Detector Reference	Link	Carriageway monitored[2]	Closest on slip (km)	Closest off slip (km)
MIDAS Radar Mast MP 262/4B (referred to as 'Junction 34-35 – MIDAS 1' throughout the report)	Control	Both	0.5	2.6
MIDAS Radar Mast MP 264/5A (referred to as 'Junction 34-35 – MIDAS 2' throughout the report)	Control	NB	2.7	0.4
MIDAS Radar Mast MP 266/9A	Experimental	Both	0.5	1.0
MIDAS Radar Mast MP 267/5A	Experimental	NB	1.1	0.4

2.4.1.2 Data processing

In order to understand the impact of the speed limit change on average vehicle speeds, behaviour must be investigated under conditions of free-flowing traffic when drivers are free to choose their speed. Therefore, periods of congestion were removed from the dataset; congestion was defined as periods in which the average speed of vehicles is lower than 40mph.

In addition, many of the statistical tests require the assumption of independence to hold. However, consecutive data points from MIDAS are not necessarily independent since the average speed or flow during one minute is likely to be related to the average speed or flow of the previous minute. To avoid this problem the data from each MIDAS radar were randomly sampled: with one minute selected from each 10 minute interval. This process produced a dataset containing six randomly sampled minutes from each hour for each MIDAS radar.

It was assumed that data from the different MIDAS locations were independent as there is a sufficient time delay between a car crossing MIDAS 1 and crossing MIDAS 2 within a link to assume that the speeds are unrelated.

2.4.1.3 Flow comparisons

Vehicle flow by-lane was collected every minute by the four MIDAS detectors. The overall vehicle flow (across all lanes) was also split into four vehicle classifications (based on the vehicle's length).

Changes in vehicle flow could impact the results for average speed or headway. As a result, it is 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:

[2] Two of the MIDAS radar units are capable of monitoring vehicles on both carriageways; only data from the NB carriageway (i.e. where the control and experimental locations are situated) was analysed in this trial.

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.

2.4.1.4 Average speed comparisons

Average speed data were collected every minute at each of the four MIDAS detectors; these data were available split by lane. The following comparisons were made:

1. Comparison of average speed between the baseline and trial periods at the control location (i.e. when the speed limit remained at 50mph)
2. Comparison of average speed between the baseline and trial periods at the experimental location (i.e. when the speed limit changed from 50mph to 60mph)
3. Comparison of average speed between the two MIDAS detectors at the experimental location (i.e. to determine whether drivers adjusted their speed through the link)

The results of these comparisons are presented in Section 3.1.

2.4.1.5 Average headway comparisons

Average vehicle headway (i.e. the average distance between vehicles in the same lane) was also collected using the MIDAS detectors. 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 (i.e. when the speed limit changed from 50mph to 60mph)

The results of these comparisons are presented in Section 3.2.

2.4.2 Incident data

Three sources of incident data were identified which could be used for monitoring:

- CCTV incidents log (results presented in Section 3.3.1)
- Incursions log (results presented in Section 3.3.2)
- TM maintenance log (results presented in Section 3.3.3)

2.4.2.1 CCTV incidents log

An incident log for the scheme containing information on all incidents recorded by CCTV staff was provided by Costain. Incidents recorded include road traffic collisions (RTCs), breakdowns, fires and abandoned vehicles. Data were analysed to understand the number and type of incidents that occurred at the control and experimental locations during the baseline and trial monitoring periods.

The analysis focused on road traffic collisions as the primary measure of safety, although due to the short-term nature of the trial, it is not possible to identify a statistically significant change in this measure. Other incidents (breakdowns, fires etc.) were also considered, although it is not thought that the speed limit should influence the number of these incident types.

2.4.2.2 Incursions log

Costain's incursion log is filled in by workers who observe incursions into the closure (either intentional or unintentional) whilst they are working in the vicinity. Due to the nature of the operational testing phase of the works (and the recommendation from the GD04 that the trial did not commence until all non-commissioning tasks were complete), there were relatively few workers operating within the control and experimental links during the monitoring periods, and subsequently relatively few incursions were actually identified. As a result, caution should be applied when interpreting the results from this dataset as the incursion numbers are likely to be influenced by the level of exposure of the workers.

In addition, there is likely to be some overlap in these observations with those recorded by the CCTV operators. Simple comparison of times and dates however, show that these two databases do not always identify the same incident. As a result, these data may still provide some indication as to whether there is a change in the number or type of incursions as a result of the change in speed limit – these data are presented in Section 3.3.2.

2.4.2.3 TM maintenance log

Finally, Costain also provided a copy of the TM maintenance logs for the scheme. These data outline how many times the cones have to be moved or replaced as a result of disturbances to the longitudinal cone line.

There are challenges with the free-text nature of these data, as different crews fill in differing levels of detail in terms of the location and number of incidences of maintenance activity. However, the number of maintenance activities has been classified as consistently as possible by link and date, in order to monitor whether the increase in speed limit has resulted in an increase in maintenance requirements, and therefore an increase in risk to road workers carrying out this task. A summary of these data are presented in Section 3.3.3.

2.4.3 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 (junction 35-35a) and the average speed of vehicles observed in the baseline and trial 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 JTR, these estimates will provide a proxy for customer journey times (and therefore, customer satisfaction) through the roadworks scheme. The findings from these calculations are presented in Section 3.4.

2.4.4 Customer satisfaction survey data

During the trial monitoring period, 100 drivers who had experienced driving through the roadworks were asked to complete a short survey whilst stopped at the M1 Woolley Edge northbound Motorway Service Area (MSA) located between junctions 38-39.

The survey asked questions about their experience of the journey, what they thought the posted speed limit on each link was and the speed that they travelled. Participants were also asked how they felt two different scenarios (Scenario A where the speed limit is 50mph throughout the works and Scenario B where part of the works is 60mph) would affect their journey time, satisfaction and feelings of safety. A number of questions on the participant's perception of speed enforcement were also included. Full details of the questions included in the MSA survey can be found 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 34 and 35a?
2. How fast did drivers think they travelled through each link?
3. How satisfied or dissatisfied would drivers feel travelling through a) Scenario A? b) Scenario B?

The results from this survey are presented in Section 3.5.

2.4.5 Statistical comparisons

Where possible, statistical tests[3] are carried out to test for a significant differences between the baseline and trial periods i.e. to determine whether driver behaviour has changed following implementation of the increased speed limit.

Three types of statistical test are used in this report, the choice is dependent on the type of data. Chi-squared tests are 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) has been 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.

Paired samples t-tests are used for the questionnaire data where respondents are asked to answer two questions and the mean response for these questions is then compared.

Results are classified as 'statistically significant' if the p-value is less than 0.05, a common standard in the behavioural sciences. A p-value less than 0.05 indicates that there is a 95% chance that the comparison being made has arisen due to the variable under investigation, and not simply random fluctuations ('noise') in the data.

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

3 Results

As discussed in Section 2.4.1.3, changes in vehicle flow could impact the results for average speed or headway. As a result, it is important to understand whether or not there were significant changes in vehicle flow between the baseline and trial periods before commencing the analysis.

Figure 2 shows the average daily vehicle flow recorded in each week by the four MIDAS radars.

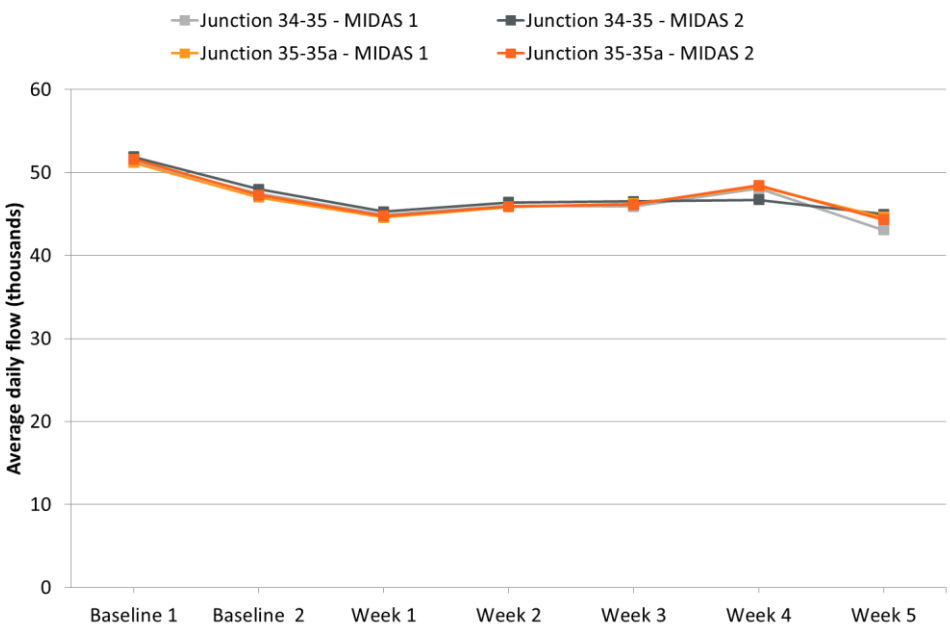


Figure 2: Average daily flow by week, link and MIDAS radar[4]

As expected, radars in the same link record similar total flows as there is no way for a vehicle to leave the link between successive radar. The average daily flow is also similar within junction 34-35 (control location) and junction 35-35a (experimental location).

A chi-squared test indicates that there is no significant difference (p = 0.156) in the distribution of vehicle flow across the baseline and trial periods between junction 34-35 and junction 35-35a. This suggests that flow is comparable and therefore any differences in speed or headway are likely to be due to the change in the speed limit, and not due to differences in the number of vehicles.

In addition to total flow, MIDAS radar also record the number of vehicles by vehicle class. This is based on the length of the vehicles and uses the following four classes: up to 17ft, 17-22ft, 22-38ft and greater than 38ft. HGVs have been defined as all the vehicles in category

[4] There is a slight difference between the flow recorded by the radars in week 4 due to a fault with MIDAS 2 between junction 34-35. On 30th November between 09:30 and 15:00 no data were recorded for this radar. This is not considered to have a large influence on the results presented in this report.

four (greater than 38ft) and half the vehicles in category 3 (22-38ft). Figure 3 shows how the percentage of HGVs changes by week and MIDAS radar.

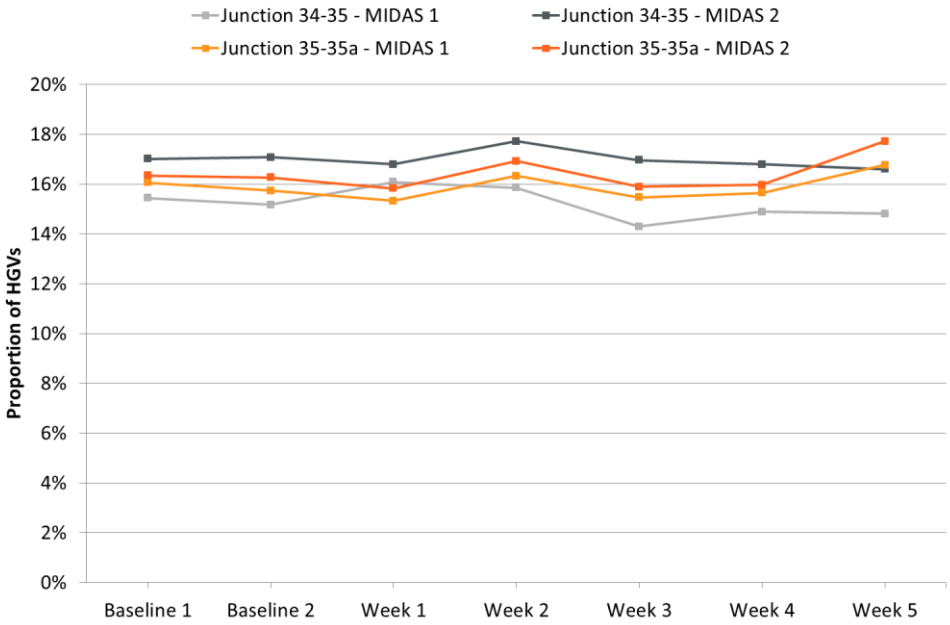


Figure 3: Proportion of HGVs by week, link and MIDAS radar[5]

The proportion of vehicles which are HGVs remains fairly stable throughout the monitoring period at around 16%.

A chi-squared test indicates that there is no significant difference (p = 0.052) in the distribution of daily HGV flow across the baseline and trial periods between junction 34-35 and junction 35-35a. This suggests that the composition of the traffic is comparable and therefore any differences in speed or headway are likely to be due to the change in the speed limit, and not due to differences in the vehicles travelling on each link.

It is worth noting that the speed and headway data are not available by vehicle class. Therefore, this analysis cannot be used to understand how average speeds (or headway) vary between HGVs and light vehicles.

As discussed in Section 2.4.1.2, the data were processed before carrying out analysis of average speed and headway. This processing involved removing periods where additional TTM closures were in place (lane 1 is closed throughout the duration of the analysis but there were a small number of overnight closures of lanes 2 and/or 3 which have been excluded) and removing periods of congestion (defined as average speeds less than 40mph). The resulting speeds and headway represent 'free-flow' conditions when drivers are free to choose their speed. The data were then sampled to allow statistical comparisons to be made.

The results presented in the following sections are flow-weighted average speed and headway. By weighting the results based on the vehicle flow, times of the day in which the

[5] Note that the vehicle class data was missing for the 19th-22nd November so the data for these days was calculated by taking the average vehicle flow in each class for that day and MIDAS radar from the other weeks.

flow is highest are given more weight in the calculation of average speed than times (e.g. overnight) when there are fewer vehicles but during which speeds might be higher. This ensures that the speeds and headway presented are representative of the traffic and are not unduly inflated by a small number of vehicles travelling at faster speeds.

3.1 Average vehicle speed

There may be 'background' factors, other than the change in speed limit, which could have resulted in a change to the average speed of vehicles. To control for these factors, data from the control location (junction 34-35) was used to understand whether there were any changes in speed between the baseline and trial periods which could be explained by the 'background trend'.

Throughout this section please note the compressed vertical axis on the charts: these typically display data from 45mph to 55mph.

Restricting the analysis to the first four weeks (baseline 1 & 2, weeks 1 & 2) enables comparison between the free-flow average speed at junction 34-35 (which remains at 50mph throughout) and junction 35-35a (where the speed limit increases from 50mph to 60mph). Figure 4 displays these results.

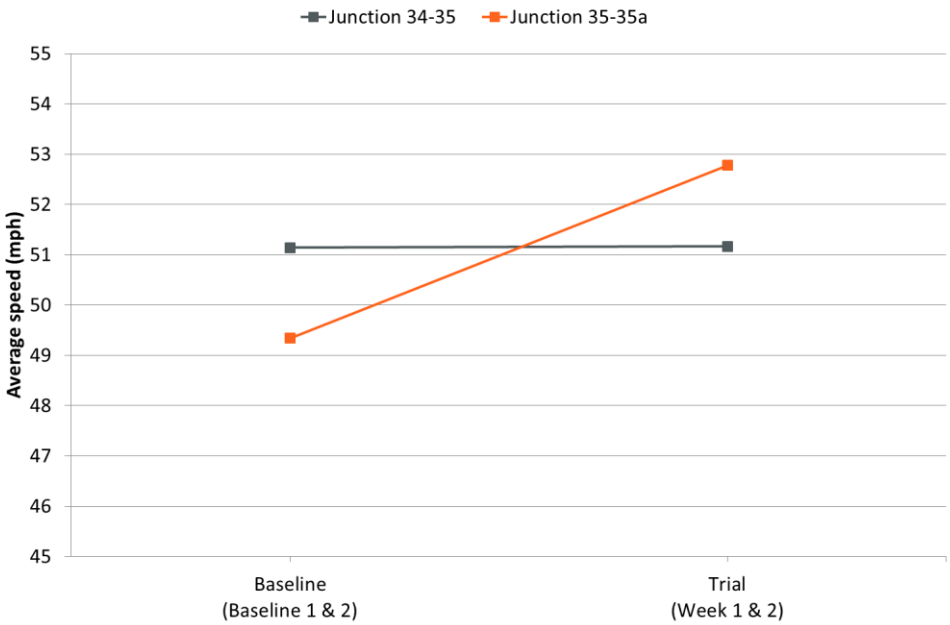


Figure 4: Free-flow average speed during the baseline and trial periods by location

The average speed remained similar at junction 34-35, but increased at junction 35-35a with the increase in speed limit. Although the speed limit increased by 10mph (from 50mph to 60mph), the increase in average speed was only around 3.5mph. This suggests that at least some drivers noticed the change in speed limit; however, it is likely that other drivers may have missed the change and continued to drive around 50mph, meaning that the overall average speed was substantially lower than the speed limit.

A statistical test (ANOVA) shows that the interaction between location and monitoring period is significant ($p < 0.01$), which suggests that the change in speed between the

baseline and trial periods differs significantly between the two links. Since no significant differences in vehicle flow or composition were identified, it is likely that this difference in average speed can be attributed to the change in speed limit.

During the monitoring the free-flow speed for junction 34-35 was slightly above the speed limit (50mph), whilst the speed across junction 35-35a remained below both speed limits (50mph in the baseline, 60mph in the trial). However, both were well below the enforcement limit (guidelines suggest that speeds should be enforced at the speed limit + 10% + 2mph[6]) suggesting that, on average, speed compliance was good.

Since there are two MIDAS radars being used for monitoring per link, these data can also be used to monitor speeds across the link. Figure 5 shows how the free-flow average speed changed across the link between junctions 35 and 35a for the baseline and trial periods.

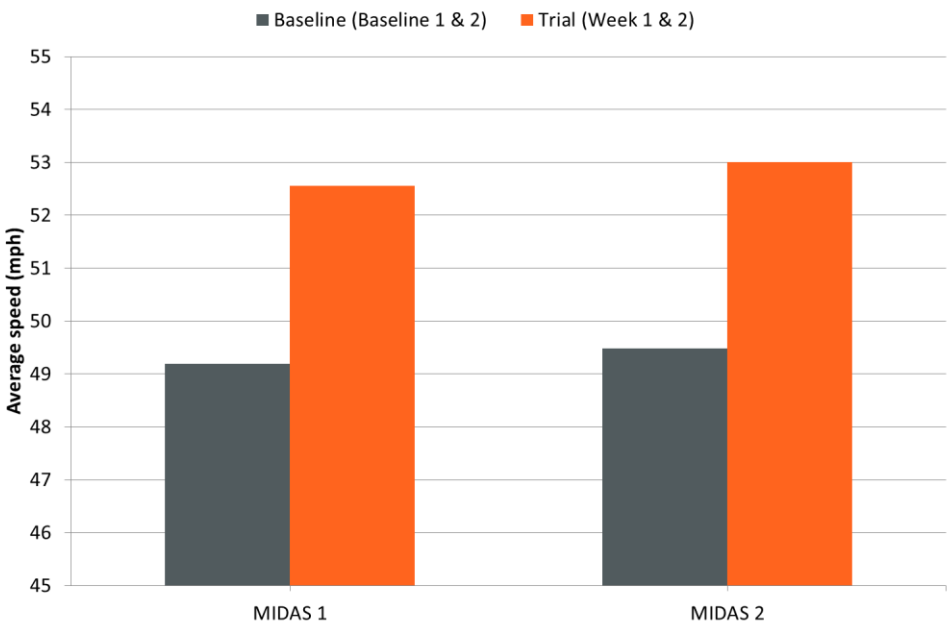


Figure 5: Free-flow average speed at MIDAS radar 1 and 2 by monitoring period, junction 35-35a only

Average speed increased slightly across the link, with slightly faster speeds closer to the end of the link (MIDAS 2) than at the beginning (MIDAS 1). This increase was only small (less than 0.5mph) and statistical tests show that the size of this increase was not statistically different (p = 0.14) between the baseline and trial periods.

This suggests that, on average, drivers do tend to increase their speed as they travel through the link, although this is only marginal and the amount that speeds increased did not differ depending on the speed limit. It is possible that at the location of MIDAS 1 (0.5km from the

[6] This is based on the 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).

on-slip), drivers may still be being influenced by the movement of other vehicles as they move around following the entry slip; this could be influencing the average speed measurement at this point.

Up until this point, data from the MIDAS radars have been presented at a weekly level for the whole carriageway; however, the MIDAS data provides detailed minute by minute average speeds which allow other trends to be examined. For example, trends in free-flow average speed by hour are shown in Figure 6, by day of the week in Figure 7 and by lane in Figure 8.

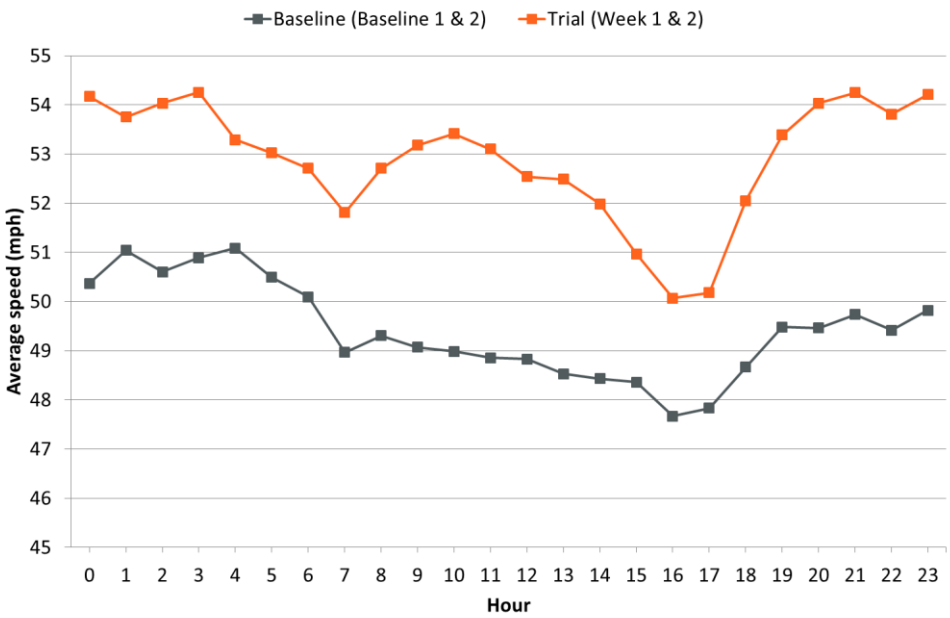


Figure 6: Free-flow average speed by hour and monitoring period, junction 35-35a only

Perhaps unsurprisingly, free-flow average speeds were lower during the peak traffic periods (6-10am and 3-8pm) and higher overnight. During the early hours of the morning in the baseline period, the average speed exceeded the speed limit (50mph); when the speed limit increased to 60mph this was not the case. This might suggest that drivers were more frustrated by the 50mph speed limit, particularly when the vehicle flow was low and they were capable of travelling much faster.

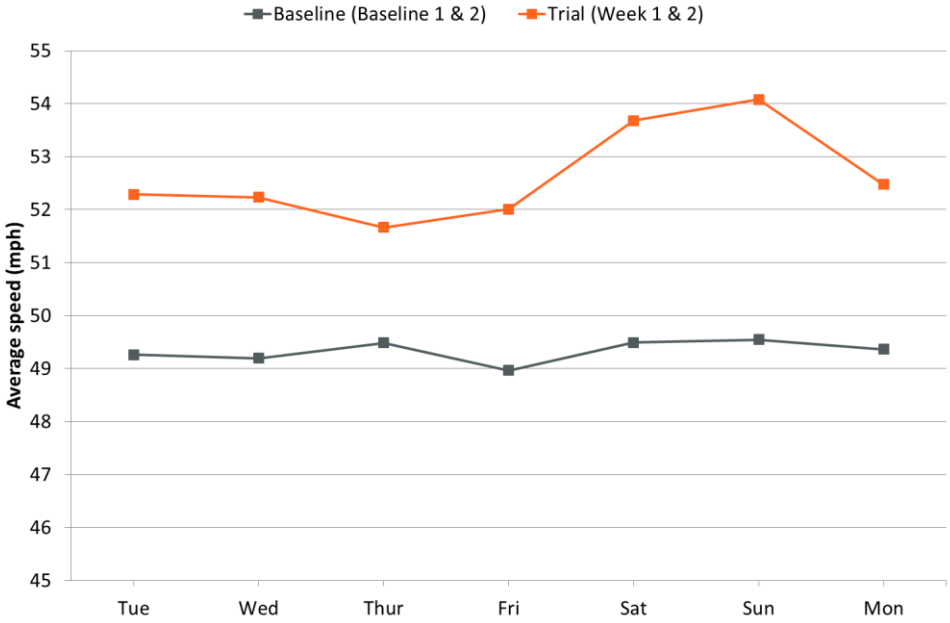


Figure 7: Free-flow average speed by day of the week and monitoring period, junction 35-35a only

Average speeds in the trial period (60mph) peaked at the weekend (when flows are generally lower); however the same trend was not observed in the baseline 50mph speed limit. The speeds in the baseline period remain just below the speed limit, whereas in the trial period average speeds are generally 6-8mph below the speed limit of 60mph. This suggests that when flows are lower, drivers are able to take more advantage of the increased speed limit and this results in a bigger speed differential between the weekdays and weekends.

Figure 8: Free-flow average speed (in mph) during the baseline and trial periods by lane, junction 35-35a only

Comparison of the free-flow average speeds by lane shows that average speeds have increased across all three lanes between the baseline (50mph speed limit) and trial (60mph speed limit) periods. This increase was largest in Lane 4 (3.1mph) and lowest in Lane 2 (1.4mph). Flows are typically higher in Lane 2 compared to Lane 4 and thus faster speeds may be more difficult to maintain. There is also a different mix of vehicle types (with a higher proportion of HGVs travelling in Lane 2), which could also influence the traffic speeds.

Figure 9 extends the analysis above and presents the free-flow average speed on each link during each of the seven weeks of the trial.

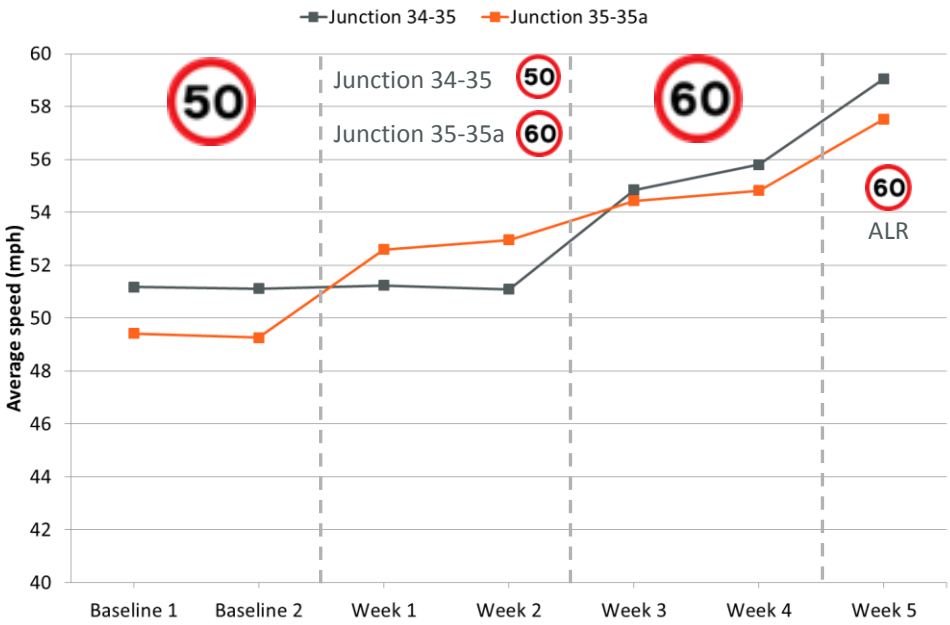


Figure 9: Free-flow average speed by week and location

The increases in free-flow average speed seen in the chart correspond to the increases in speed limit, suggesting that at least some of the drivers noticed the change in speed limit relatively soon after its implementation. Within junction 34-35 the speed limit remained at 50mph until week 3 and then increased to 60mph; correspondingly, the free-flow average speed for this link remained at about 51mph during the first four weeks and then increased to 55-56mph when the speed limit changed. For junction 35-35a the change in average speed occurred in week 1 of the trial period (which aligns with the speed limit change to 60mph). Following this, the average speed steadily increased each week, perhaps as more and more drivers noticed the change in speed limit and began to adjust their behaviour accordingly.

The free-flow average speed was slightly higher (by about 3mph) during all lane running 60mph (week 5), compared to the week previously in which Lane 1 remained closed. This increase in average speed is likely to be related to the increased capacity of the carriageway, as three running lanes became four and drivers experienced larger gaps between vehicles.

3.2 Average vehicle headway

Average headway measures the distance between successive vehicles travelling in the same lane. Similar to the average speed data, the analysis is initially restricted to the first four weeks (baseline 1 & 2, weeks 1 & 2) enabling comparison between the free-flow average headway at junction 34-35 (which remains at 50mph throughout) and junction 35-35a (where the speed limit increases from 50mph to 60mph) – see Figure 10.

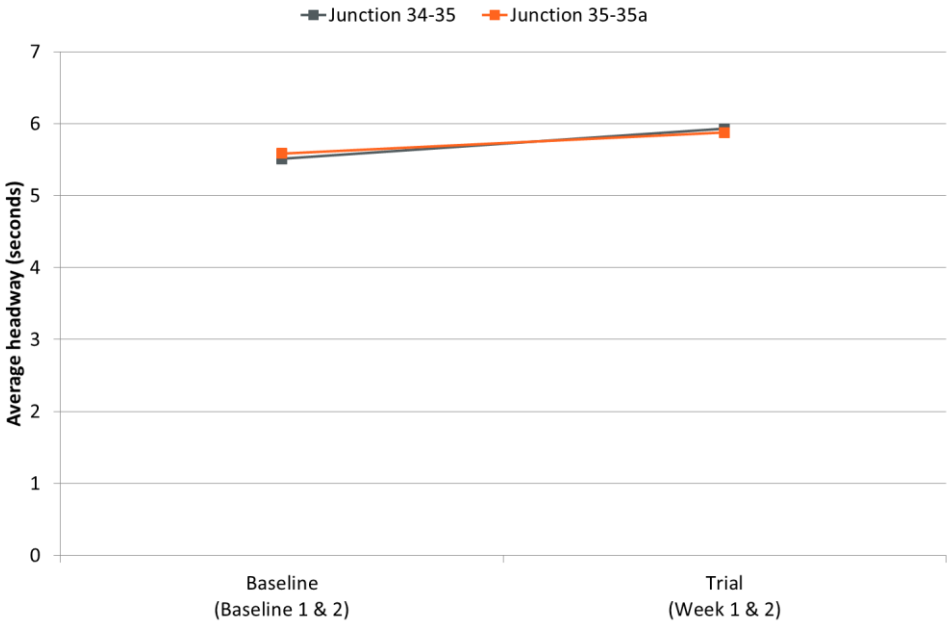


Figure 10: Free-flow average headway during the baseline and trial periods by location[7]

The average headway on both links increased between the baseline and trial periods from approximately 5.5 seconds to 5.9 seconds. Statistical tests show this change was not significantly different across the two links (p = 0.19), suggesting that it was not a result of the increase in speed limit.

The Highway Code suggests that drivers should allow at least 2 seconds gap between themselves and the vehicle in front on roads carrying faster moving traffic, with this distance doubled on wet or icy roads. The average headway was typically much larger than this (although there was some variation in this figure with lower headways associated with times of day during which there was more traffic). As a result, there is no evidence to suggest that safety was compromised by either the 50mph or 60mph speed limits.

Figure 11 presents the free-flow average headway on each link during each of the seven weeks of the trial.

[7] Note that the headway data was missing for the 19th-22nd November so the data for these days was calculated by taking the average headway for that minute, day and MIDAS radar from the other weeks.

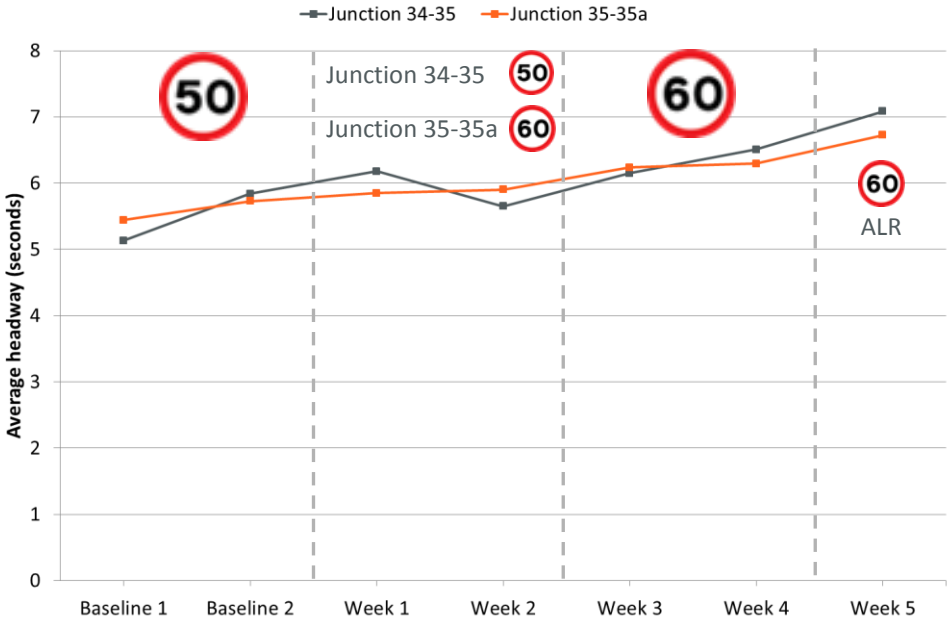


Figure 11: Free-flow average headway by week and location[7]

There was a slight upwards trend in average headway throughout the monitoring on both links, although there was no clear correlation with the changes in speed limit further confirming that this trend is unlikely to be related.

3.3 Incident data

3.3.1 CCTV incidents log

Over the seven week monitoring period, CCTV operators reported a total of 75 incidents between junctions 34-35a (as identified from the marker post locations of the incidents). The majority of incidents (59) were broken down vehicles; the number of these incidents by week is shown in Figure 12.

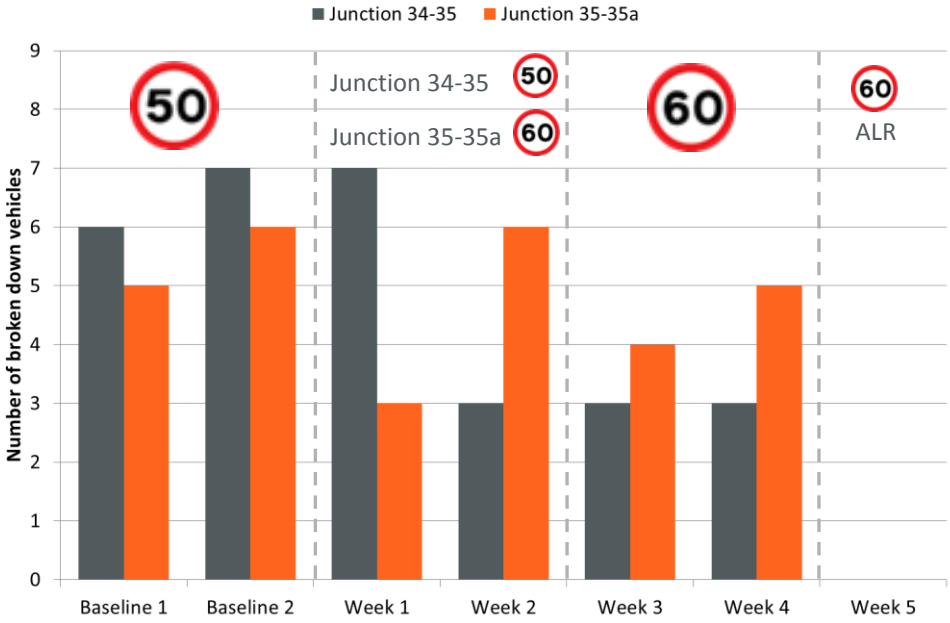


Figure 12: Broken down vehicles by location

The number of broken down vehicles reported each week varies between three and seven. There is no clear trend for increasing (or decreasing) broken down vehicles as the speed limit increased, suggesting that the number of broken down vehicles is not influenced by the speed limit. There were no incidents reported in week 5 where both links were running at 60mph with ALR.

In addition to the broken down vehicles, seven collisions occurred during the monitoring; these are shown in Figure 13.

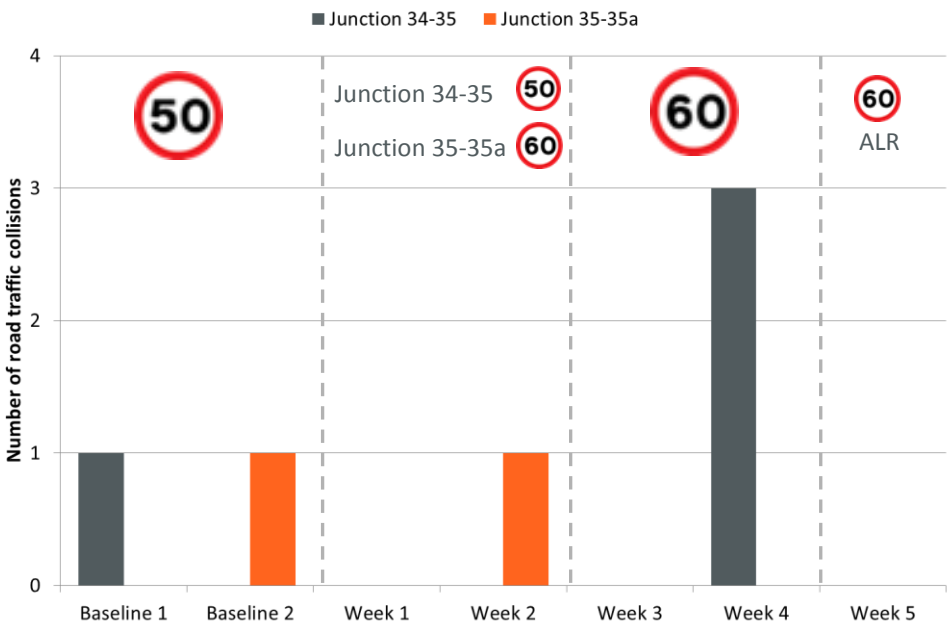


Figure 13: Road traffic collisions (RTCs) by location

Two collisions happened when the speed limit was 50mph (one in baseline week 1 and one in baseline week 2) and four occurred when the speed limit was 60mph (one in week 2 and

three in week 4). None of the four collisions within the 60mph speed limit triggered the abort process and the trial continued for the full five week period.

All four of the collisions in the 60mph limit involved a HGV and a car. Within the 50mph limit there was a single car collision with a works access sign, and the other collision involved a car and HGV. Due to small numbers, no robust conclusions can be drawn about increased collision risk due to the increased speed limit.

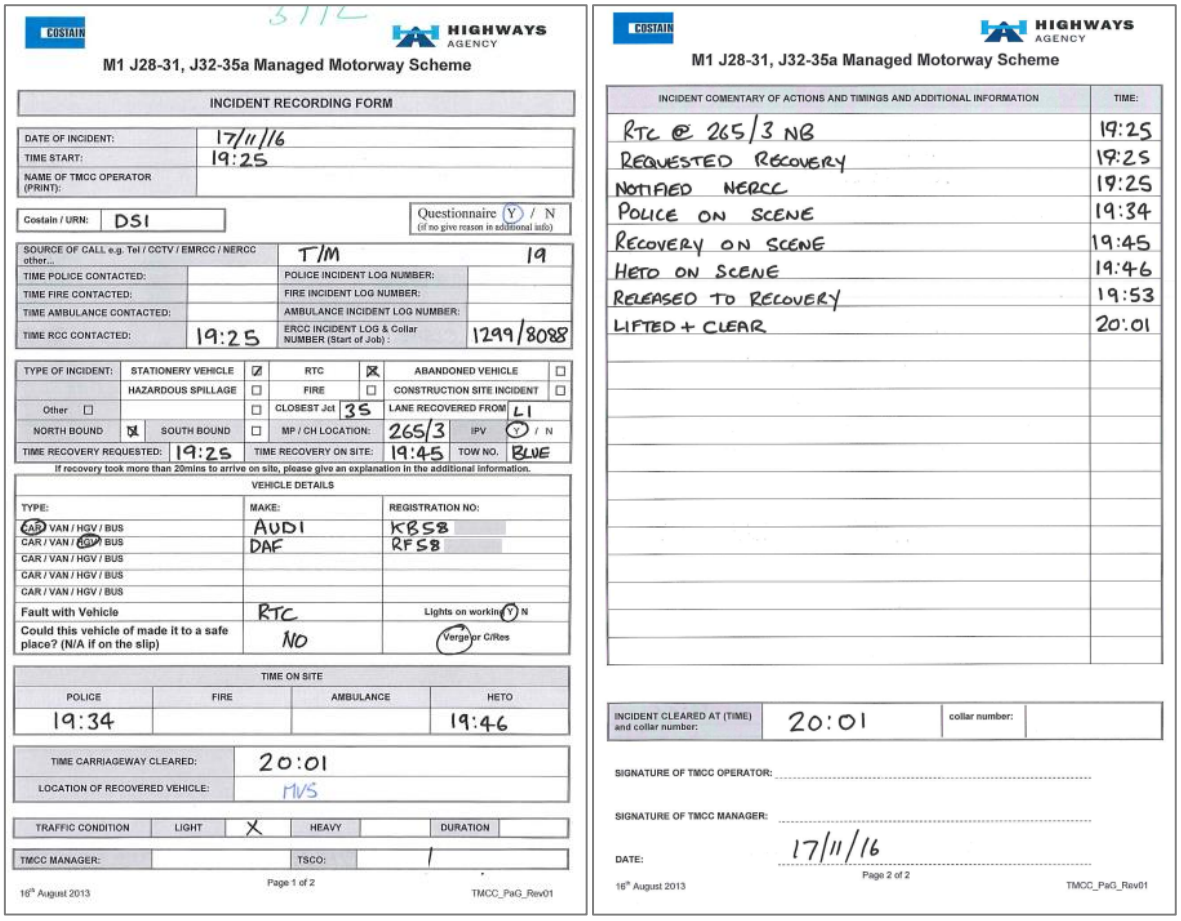
Of the four RTCs within the 60mph speed limit, operators were able to provide CCTV recordings for three (see Table 4 for more details of these incidents).

Table 4: RTCs reported by CCTV operators (60mph speed limit)

	Date	Time	Location	Vehicle 1	Vehicle 2	CCTV available?	Notes
1	17/11/2016	19:25	MP 265/3 (junction 35-35a)	Car	HGV	IM	
2	1/12/2016	22:50	MP 262/2 (junction 34-35)	Car	HGV	RTC	Vehicles left scene
3	2/12/2016	13:31	MP 264/1 (junction 34-35)	Car	HGV	RTC	HGV failed to stop
4	2/12/2016	16:20	MP 264/1 (junction 34-35)	Car	HGV	-	

For RTC 1, the CCTV recorded the incident management (IM) operation, but not the collision itself; CCTV for RTC 2 shows the collision and subsequent incident management and CCTV for RTC 3 partially shows the collision and all incident management. None of the four collisions required attendance by the ambulance service and it understood there were no serious injuries.

In addition to the CCTV log, individual RTCs were reported manually, in a handwritten log. An example of an individual RTC log is given in Figure 14.



COSTAIN — HIGHWAYS AGENCY

M1 J28-31, J32-35a Managed Motorway Scheme

INCIDENT RECORDING FORM

DATE OF INCIDENT:	17/11/16
TIME START:	19:25
NAME OF TMCC OPERATOR (PRINT):	

Costain / URN: DS1 — Questionnaire (Y) / N (if no give reason in additional info)

SOURCE OF CALL e.g. Tel / CCTV / EMRCC / NERCC other...	T/M		19
TIME POLICE CONTACTED:		POLICE INCIDENT LOG NUMBER:	
TIME FIRE CONTACTED:		FIRE INCIDENT LOG NUMBER:	
TIME AMBULANCE CONTACTED:		AMBULANCE INCIDENT LOG NUMBER:	
TIME RCC CONTACTED:	19:25	ERCC INCIDENT LOG & Collar NUMBER (Start of Job) :	1299/8088

TYPE OF INCIDENT:	STATIONERY VEHICLE ☑	RTC ☒		ABANDONED VEHICLE ☐	
	HAZARDOUS SPILLAGE ☐	FIRE ☐		CONSTRUCTION SITE INCIDENT ☐	
Other ☐		CLOSEST Jct	35	LANE RECOVERED FROM	L1
NORTH BOUND ☒	SOUTH BOUND ☐	MP / CH LOCATION:	265/3	IPV	(Y) / N
TIME RECOVERY REQUESTED:	19:25	TIME RECOVERY ON SITE:	19:45	TOW NO.	BLUE

If recovery took more than 20mins to arrive on site, please give an explanation in the additional information.

VEHICLE DETAILS

TYPE:	MAKE:	REGISTRATION NO:
(CAR) / VAN / HGV / BUS	AUDI	KB58
CAR / VAN / (HGV) / BUS	DAF	RF58
CAR / VAN / HGV / BUS		
CAR / VAN / HGV / BUS		
CAR / VAN / HGV / BUS		
Fault with Vehicle	RTC	Lights on working (Y) N
Could this vehicle of made it to a safe place? (N/A if on the slip)	NO	(Verge) or C/Res

TIME ON SITE

POLICE	FIRE	AMBULANCE	HETO
19:34			19:46

TIME CARRIAGEWAY CLEARED:	20:01
LOCATION OF RECOVERED VEHICLE:	M/S

TRAFFIC CONDITION	LIGHT	X	HEAVY		DURATION	

TMCC MANAGER:		TSCO:	/

16th August 2013 — Page 1 of 2 — TMCC_PaG_Rev01

COSTAIN — HIGHWAYS AGENCY

M1 J28-31, J32-35a Managed Motorway Scheme

INCIDENT COMENTARY OF ACTIONS AND TIMINGS AND ADDITIONAL INFORMATION	TIME:
RTC @ 265/3 NB	19:25
REQUESTED RECOVERY	19:25
NOTIFIED NERCC	19:25
POLICE ON SCENE	19:34
RECOVERY ON SCENE	19:45
HETO ON SCENE	19:46
RELEASED TO RECOVERY	19:53
LIFTED + CLEAR	20:01

INCIDENT CLEARED AT (TIME) and collar number:	20:01	collar number:	

SIGNATURE OF TMCC OPERATOR: .....

SIGNATURE OF TMCC MANAGER: .....

DATE: 17/11/16

16th August 2013 — Page 2 of 2 — TMCC_PaG_Rev01

Figure 14: Example incident recording sheet, for RTC 1 on 17th November 2016

The information recorded in the incident log includes:

- Date and time of the incident
- Location, by marker post and nearest junction and northbound / southbound
- Vehicle(s) involved
- Services attending (fire / police / ambulance / Traffic Officers / impact protection vehicle / recovery) and their arrival times
- Notifications made
- 'Commentary' of event timings within incident management (e.g. when cleared)

The following sections give an overview of the CCTV footage from the three incidents for which it was available.

3.3.1.1 RTC 1; Thursday 17th November 2016, 265/3 NB

RTC 1 occurred on the northbound carriageway immediately upstream of the CCTV camera, so the collision itself was not recorded. However, CCTV operators identified that traffic flow had stopped, reoriented the camera towards the collision scene and recorded the incident management activity until the site was cleared. Figure 15 shows the view of this collision immediately after the collision had occurred.

Figure 15: Immediately after the collision

All vehicles on the northbound carriageway are stationary. The car downstream of the HGV (circled, on the left of the image) is facing upstream, i.e. towards the HGV. A second car (circled, towards the centre of the image) is just visible adjacent to the central reservation. It is not known whether this vehicle was involved in the collision, but as just two vehicles were identified on the incident reporting form it suggests that this vehicle was driven by a witness to the collision.

In Figure 16, one of the pedestrians at the scene can be seen examining the front nearside of the HGV involved in the RTC.

Figure 16: Person (circled) examining the front of the HGV

Although the car involved did not appear to have suffered extensive damage (all direction indicators were illuminated as hazard lights, both external mirrors were still attached), the

incident recording sheet notes that the car was 'lifted' by the recovery operator, so was not in a safe condition to be driven.

3.3.1.2 RTC 2; Thursday 1st December 2016, 262/2 NB

RTC 2 occurred on the approach to a temporary lane closure within the existing road works. Lanes 1, 2 and 3 were closed, resulted in all traffic being directed into Lane 4. Leading up to the collision, traffic was moving slowly, with the majority of vehicles having already moved into Lane 4 (Figure 17).

Figure 17: Prior to the collision

The collision involved a car and HGV. It appears, from their relative positions post-collision, that the HGV impacted the rear of the car. The images below show how the incident developed following the collision (Figure 18 to Figure 21).

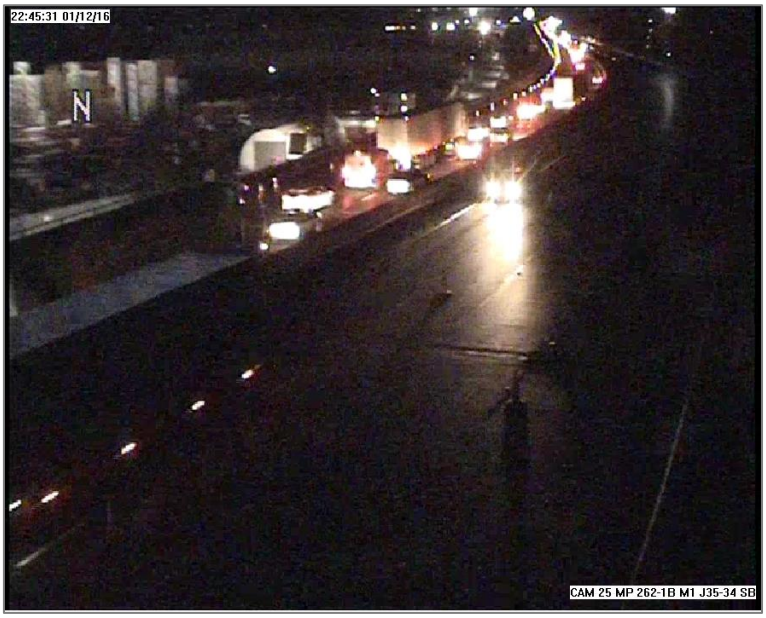


Figure 18: Vehicles leaving the stationary queue in lane 4 to pass the collision

The driver of the HGV remained at the scene for some time after the car had left and can be seen walking around his vehicle (Figure 19 and Figure 20). He did not use the offside door when entering or leaving the cab which suggests that the HGV is left hand drive i.e. a non UK-registered vehicle.

Figure 19: HGV driver (red oval) and car driver (blue oval)

Figure 20: HGV driver (circled) walking around vehicle. Car has left the scene

The first responder to attend was an IPV. Police then arrived on-scene (Figure 21) and the HGV left shortly after.

Figure 21: IPV and police vehicle at the collision scene

3.3.1.3 RTC 3; Friday 2nd December 2016, 264/1 NB

RTC 3 occurred adjacent to the CCTV camera location and the video shows the two vehicles involved immediately after the contact. At the point at which the vehicles are first visible on the CCTV recording (Figure 22), the HGV can be seen to be straddling the lane line markings separating Lanes 2 and 3 (Lane 1 is coned off to traffic).

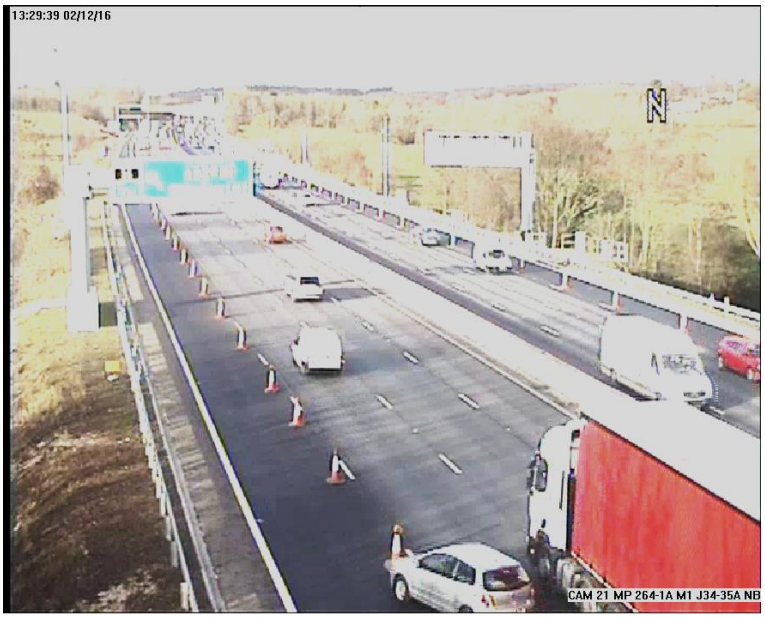


Figure 22: First view of involved vehicles

After the collision, the car enters the coned works area and is brought to a halt. The HGV does not appear to slow and continues along the main carriageway, leaving the scene.

As seen in Figure 23 and Figure 24, after the collision the HGV continues to straddle both lanes, only gradually moving left (as the carriageway curves to the right) and is not fully in Lane 2 as it disappears from view.

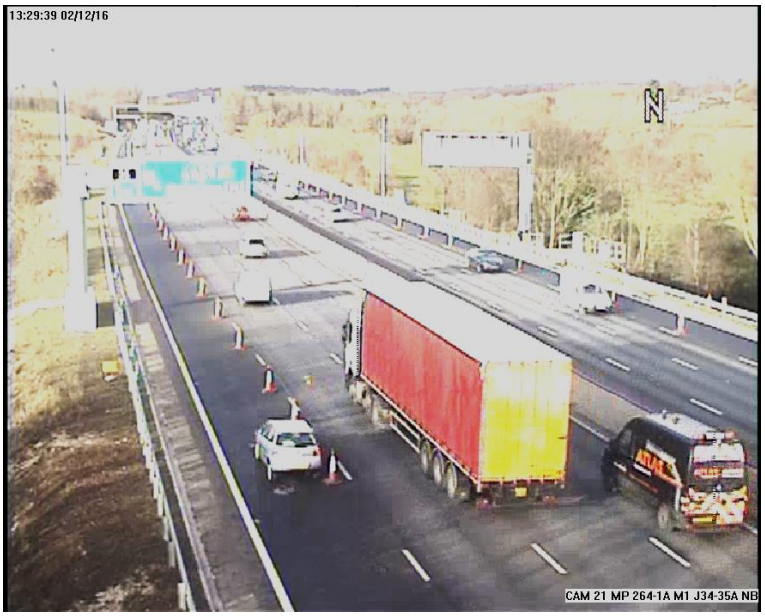


Figure 23: Car slowing within roadworks coned-off lane, HGV continuing

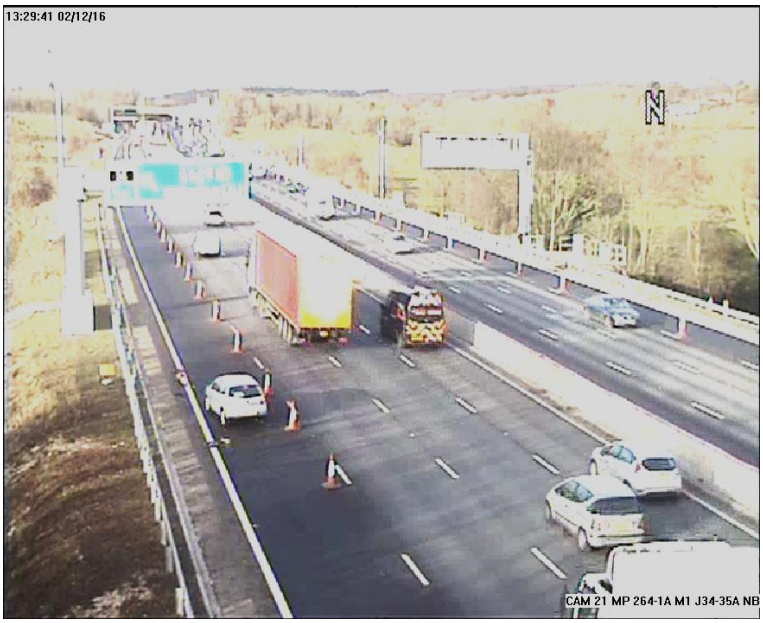


Figure 24: Car stationary, HGV continuing

After the car has stopped, the driver emerges and briefly examines the offside rear of the vehicle (Figure 25).

Figure 25: Driver examining vehicle

Subsequently two works vehicles arrive, travelling within the coned works area, then an IPV arrives and stops in Lane 2. A recovery vehicle arrives and enters the works area (Figure 26). As all vehicles are off the live carriageway, the IPV leaves the scene.

Figure 26: IPV in lane 2, recovery vehicle arriving. Two works vehicles within the coned area are not part of the incident management process

The incident recording sheet notes that the car was 'escorted off network' (Figure 27), suggesting that there was a low level of damage which did not affect the safety of the vehicle.

Figure 27: Car leaving the scene, following the recovery vehicle.

3.3.1.4 Conclusions from review of CCTV footage

Using the time and location of each incident, MIDAS data were reviewed immediately prior to the RTCs. For each incident, the average traffic speeds were similar to those identified for free flowing traffic within the two links. This suggests that excessive speed is unlikely to have been a contributory factor to the collisions.

From review of the CCTV recordings for three of the four RTCs, and from the analysis of average traffic speeds close to the collisions, there is no indication that the RTCs were due to the increased speed limit.

3.3.2 Incursions log

Operatives working on-road within the scheme are required to fill in a report form if they witness an incursion into the TM. A total of 49 incursions were reported to TRL over the six week period (no TTM was present in week 5 so incursions cannot be recorded), of which six were excluded due to insufficient information (e.g. no information about the location of the incursion). A count of incursions by week is shown in Figure 28.

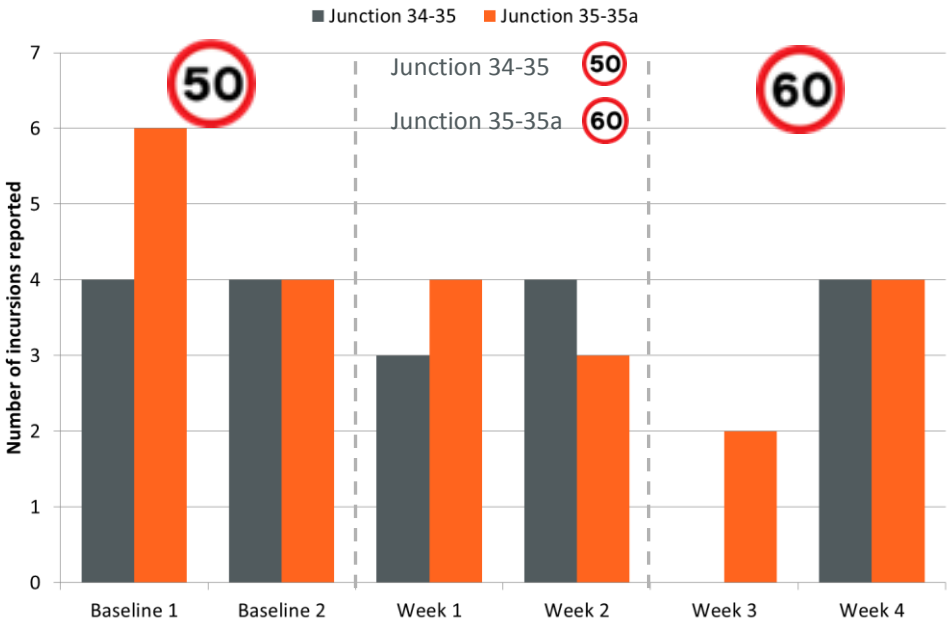


Figure 28: Number of incursions recorded by week and location

The number of incursions remains fairly stable over the period which indicates that the increase in speed limit did not have an adverse effect on this measure of safety.

The vast majority (over 70%) of incursions were classified as 'intentional incursions because of a breakdown', which are unlikely to be related to the speed limit. The remainder were classified as 'unintentional – driver confused' (2), 'unintentional – result of an accident' (7) or 'unknown' (3).

As discussed in Section 2.4.2.2, it should be noted that due to the low level of work activity taking place during the trial, it is likely that some incursions were not recorded and hence some caution should be applied when interpreting these results.

3.3.3 TM maintenance log

In addition to the CCTV and incursions logs, Costain also provided copies of the TM maintenance logs for the scheme for the first four weeks. Due to the time taken to collate these data and the resulting delay in TRL receiving this data, it has not been possible to consider data for the period during which both links were 60mph with TM in place (weeks 3-

4 of the trial). Since these data are not the only source of information regarding incidents within the works, the absence of this information is unlikely to greatly influence the results. In any case, as described in Section 2.4.2.3, some caution should be applied when interpreting these data which come from free-text sources. Free-text responses can be challenging to code and analyse; for example, different people recorded the maintenance activities in different ways. Some recorded an instance of maintenance at every location at which they had to straighten the cones, whilst others recorded maintenance along the entire length of a link, without specifying how many different cone misalignments this actually represented. Efforts were made to ensure the data were classified as consistently as possible by link and date; but the data should be treated as qualitative and so caution should be taken when drawing conclusions.

The number of TM maintenance activities per week is shown in Figure 29. TM maintenance activities which were recorded as being unrelated to the actions of road users (such as picking up signs blown down in high winds) have been removed from the analysis.

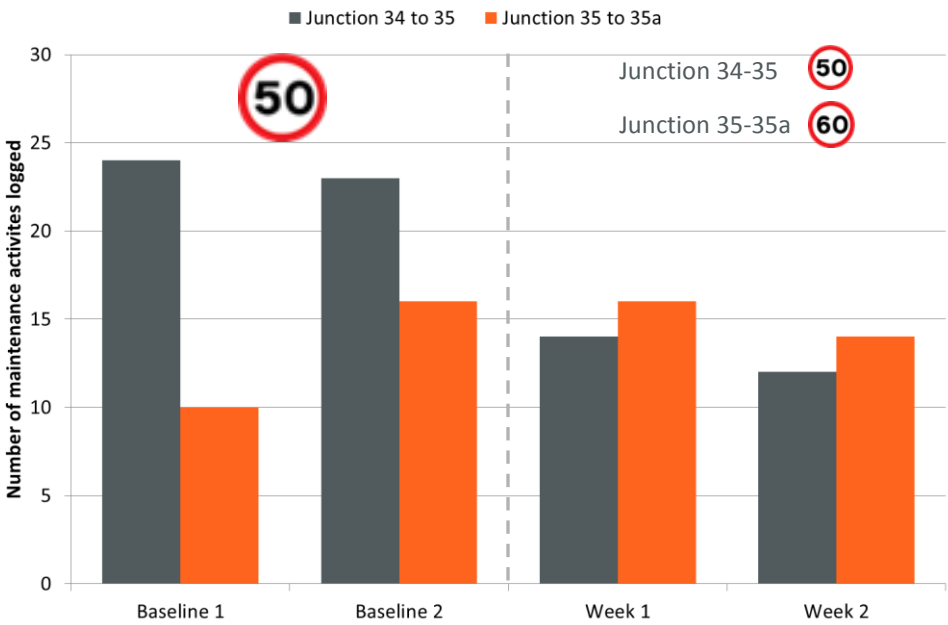


Figure 29: Number of road user induced traffic maintenance activities

For junction 35 to 35a there is no clear trend in the number of maintenance activities as the speed limit increased from 50mph to 60mph; however, over the same period the number of maintenance activities between junctions 34 and 35 (which remained at 50mph throughout) appears to decrease. This may suggest that the 60mph speed limit may have resulted in a larger TM maintenance requirement than expected (given the background trend).

A chi-squared test suggested there is a significant difference ($p < 0.05$) in the distribution of incidents across the two monitoring periods for the two links, however, the qualitative nature of these data (as described above) limits the ability to draw conclusions about the impact of speed limit on the occurrence of TM maintenance.

3.4 Journey time

Estimates of the average journey time were calculated based on the length of the link[8] and the average speed of vehicles from the MIDAS data. These estimates were calculated for the baseline period and the first two weeks of the trial period. The difference between journey times on the experimental link (junction 35-35a) gives an estimate of the journey time savings as a result of the increase in speed limit.

Table 5 shows the average journey time in both the baseline and trial periods. Both the control (junction 34-35) and experimental links (junction 35-35a) are included for the purposes of comparison.

Table 5: Journey time estimates by location

		Journey time (minutes)		
	Length of link (miles)	Baseline (Baseline 1 & 2)	Trial (Week 1 & 2)	Difference (seconds)
Junction 34-35	2.61	3.06	3.06	-0.1
Junction 35-35a	2.67	3.25	3.04	-12.7

The results suggest that changing the speed limit from 50mph to 60mph decreased the average journey time on the junction 35-35a link by just over 12 seconds. No noticeable change in journey time was observed for junction 34-35 as the speed limit remained at 50mph throughout both periods.

In order to understand whether a longer 60mph speed limit had a greater effect on journey time, the combined journey time over both links (i.e. junctions 34-35a) was estimated. The average journey time during the two baseline weeks (50mph speed limit on both links) was compared to the journey time during weeks 3 and 4 (60mph speed limit on both links). These results are shown in Table 6.

Table 6: Journey time estimates for junction 34-35a

		Journey time (minutes)		
	Length of link (miles)	Baseline (Baseline 1 & 2)	Trial (Week 3 & 4)	Difference (seconds)
Junction 34-35a	5.28	6.35	5.78	-34.5

It is estimated that introduction of the 60mph speed limit on the two links saved customers, on average, 34 seconds in journey time. Whilst not a substantial amount for each driver, particularly for those travelling long journeys, the journey time savings could be much greater if the speed limit was implemented over the entire scheme length. In addition, when

[8] The length of each link was calculated using the location of the gateway signs for 60mph (just before the on-slip) and the end of the speed limit (in the case of the junction 35-35a link, this was the end of the works just after junction 35a).

multiplied by the thousands of drivers who travel through the scheme each day, the time savings are much larger.

3.5 Customer satisfaction

A sample of one hundred drivers who had driven through the roadworks were invited to complete a survey carried out at the Woolley Edge Service Station upstream of the trial area. A number of the questions were focused on the specific sections of interest: the control link between junction 34 and 35 which still had a speed limit of 50mph on the days on which the surveys were carried out, and the experimental link between junction 35 and 35a where the speed limit was 60mph.

3.5.1 Participant sample

Over three quarters of the sample (76) were male and 24 were female. The distribution of ages is presented in Figure 30. In order to assess how representative the sample was of the general driving population, this is compared with the population of full car (Category B) driving licence holders in Great Britain in March 2016 (data.gov.uk, 2016).

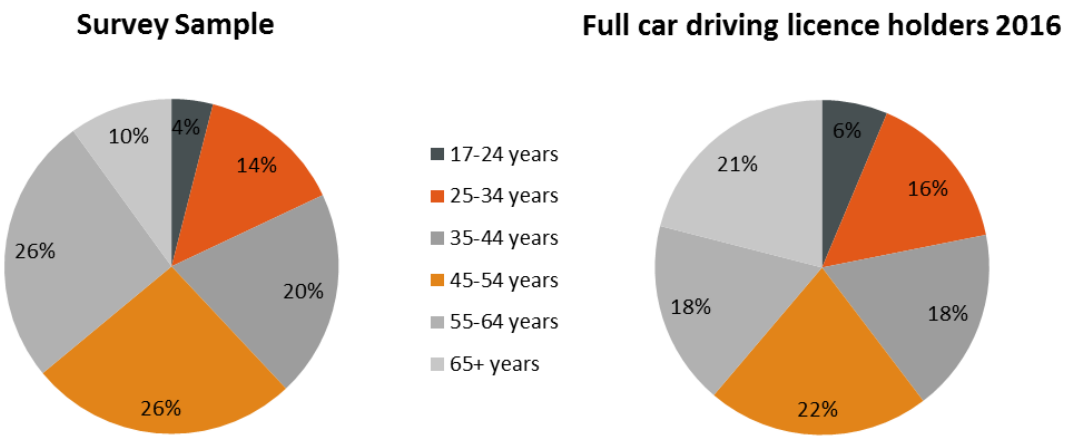


Figure 30: Age range of participants

The percentages of each of the four groups under 54 years are comparable between the survey sample and the population of licence holders. Licence holders aged from 55 to 64 appear to be overrepresented in the sample, with licence holders aged 65 years or older underrepresented. However, older drivers tend not to drive as often (GB licence data is not necessarily the most representative source of data relating to drivers on the Strategic Road Network) and therefore we can be relatively confident that our sample is a reasonable reflection of the general driving population.

The vast majority of drivers travelled by car (91%), 6% by HGV and 3% by LCV. Over half of the drivers were travelling more than 50 miles during their journey and over two-thirds travelled northbound on the M1 between junctions 34 and 35a a few times a month or less, suggesting that many of the respondents were not local to the area. However, 76% of the sample was aware of road works in advance of their trip.

Figure 31 shows the main purpose of participants' journeys.

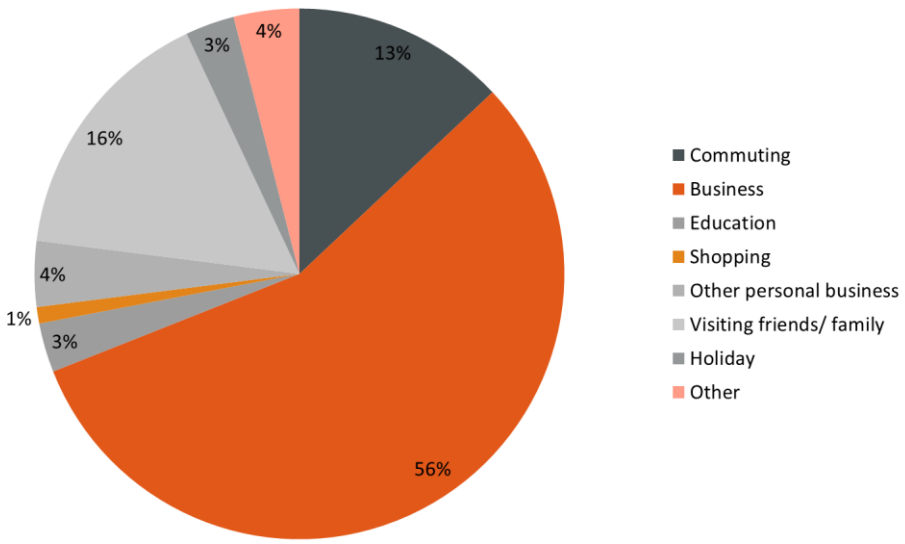


Figure 31: Main purpose of participants' journeys

The majority of drivers were travelling for business (56%), followed by visiting friends/family (16%) and commuting (13%).

During the survey participants were asked a number of attitudinal questions relating to their feelings about the M1 J32 to 35a scheme. They were first asked whether they agreed or disagreed with three statements about the long-term benefits of the roadworks (Figure 32).

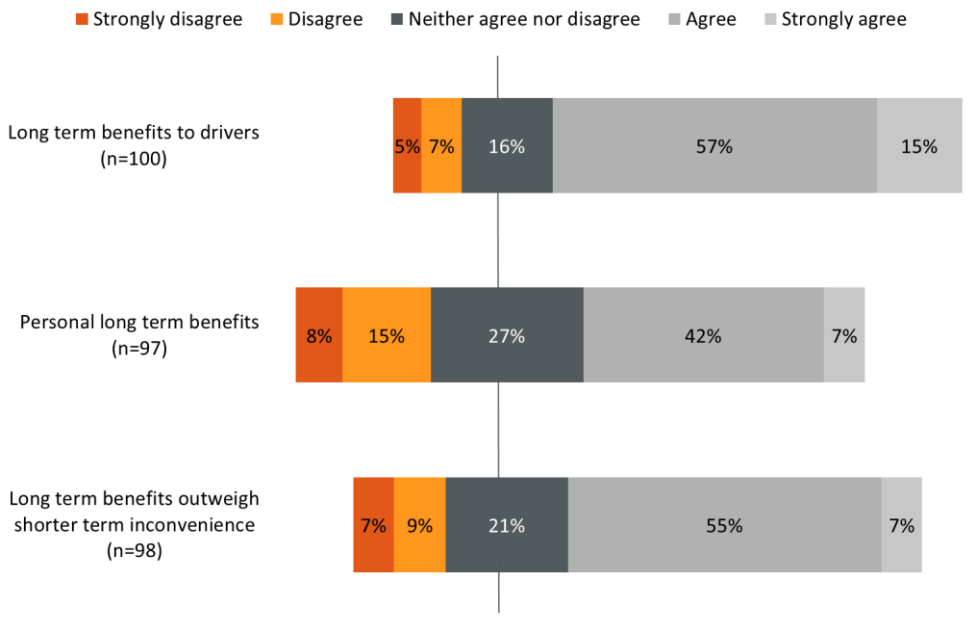


Figure 32: Responses to questions about the long-term benefits of roadworks

The vast majority of participants were neutral or agreed with the statement that the roadworks would provide long term benefits to drivers; however, a small proportion (12%) disagreed or strongly disagreed with this statement. In comparison, a slightly larger proportion disagreed that the roadworks would provide long term benefits to them personally (23%), and that the long term benefits of the roadworks outweigh the shorter

term inconvenience (16%). It is possible that these findings are related to the survey sample however, as the sample contained mainly people who are not local to the area and therefore do not travel on the road very often, they may be more inclined to disagree with the latter two statements.

In addition, participants were asked about how the presence of the roadworks between junctions 32 and 35a affected their overall satisfaction with their journey (Figure 33).

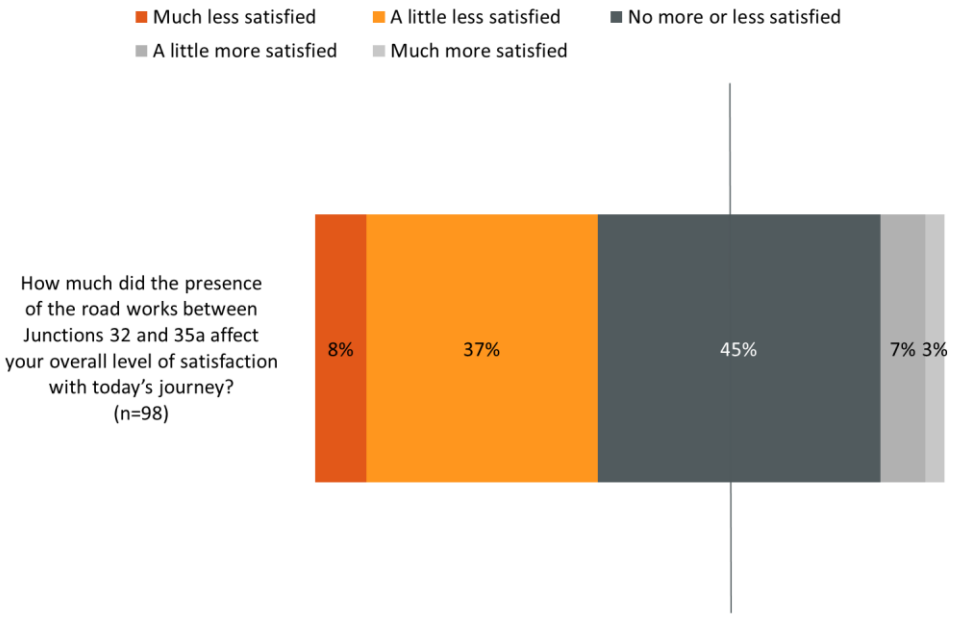


Figure 33: Participants overall satisfaction with their journey

The majority of participants (45%) reported that the presence of roadworks did not significantly affect their overall level of satisfaction with the journey. However, 37% described themselves as being a little less satisfied with their journey and 8% reported being much less satisfied. This highlights the need for Highways England to improve their customer satisfaction scores through roadworks such as the M1, in order to improve their overall satisfaction score.

3.5.2 Understanding of the speed limit

In order to determine whether participants noticed the change of the speed limit through the roadworks, participants were asked to recall the speed limit on each of the two links (Table 7).

Table 7: Participants recall of the speed limit

		Junction 35 to 35a 60				
		<50mph	50mph	60mph	70mph	Don't know/no answer
Junction 34 to 35 50	<50mph	2	3	0	0	0
	50mph	0	51	23	1	3
	60mph	0	5	8	0	2
	70mph	0	0	0	0	0
	Don't know/no answer	0	0	0	0	2

Only 23 people out of 100 correctly recalled that the speed limit was 50mph between junction 34 and 35 and 60mph between junction 35 and 35a. Over half (51) of participants thought the speed was 50mph throughout the two links and eight thought that the speed limit was 60mph throughout.

This suggests that a large proportion of drivers may have missed the change in speed limit, which may explain why free-flow average speeds were substantially below the 60mph speed limit during the trial period (see Figure 4 and Figure 9).

Participants were also asked what speed they thought they were travelling on the two links. For the 23 people who correctly answered the two speed limit questions, the reported speeds travelled are shown in Table 8.

Table 8: Reported speed travelled for each link (n=23)[9]

	Average speed reported	Minimum speed reported	Maximum speed reported
Junction 34 to 35 50	49.9mph	40mph	60mph
Junction 35 to 35a 60	58.5mph	50mph	62mph

On average, participants reported they were travelling below the speed limit on both links. Most commonly people reported travelling at exactly the speed limit (68% and 65% respectively for the two links).

Comparing the reported speeds to the average speeds observed, the average speed reported through junction 34 to 35 was slightly lower than the actual speed (49.9mph compared to 51.2mph), but the reported speeds between junction 35 and 35a were much

[9] One participant reported that they didn't know/couldn't remember what speed they travelled between junction 34 and 35 so have been excluded from the analysis for this link. Where a range of speeds were given (e.g. 50-60mph) the mid-point (55mph) was used.

higher (58.5mph compared to the observed speed of 52.8mph). This difference could also support the theory that a large proportion of drivers missed the change in speed limit and remained travelling at around 50mph through the 60mph section.

When asked to consider the conditions when driving each link and evaluate whether they thought the speed limit was about right, too high or too low, these 23 respondents gave the responses shown in Figure 34.

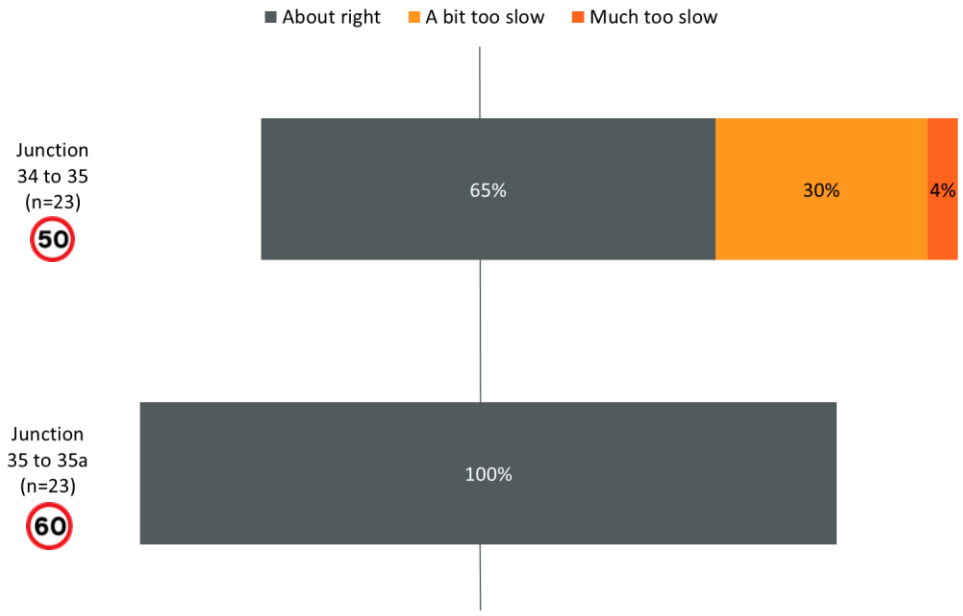


Figure 34: Participants feeling on the appropriateness of the speed limit

All 23 participants thought the 60mph speed limit was appropriate but eight (34%) thought the 50mph speed limit was a bit too slow or much too slow suggesting that they preferred the 60mph limit.

A proportion of all participants stated that they drove more slowly than they would have liked (44% of participants between junction 34 and 35, and 34% of participants between junction 35 and 35a) which may be linked to levels of congestion (Figure 35).

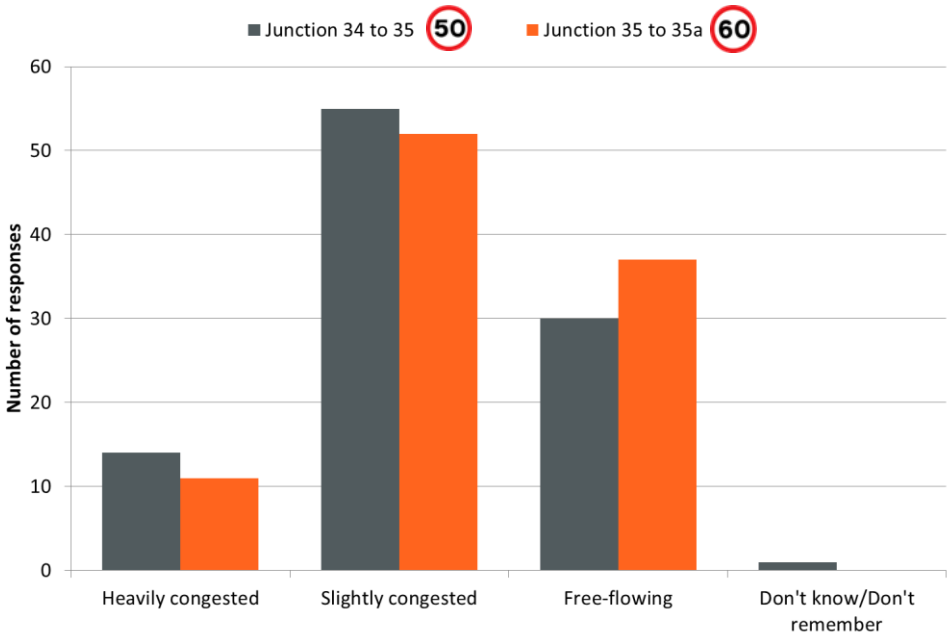


Figure 35: Reported traffic conditions

Between junction 34 and 35, 69% participants described traffic conditions as being slightly or heavily congested; between junction 35 and 35a the equivalent figure was 63%. The proportion of time classified as 'congested' on the two links (i.e. where average speeds were less than 40mph) was relatively small from the MIDAS data (typically around 1-2%). This indicates the definition of 'slightly congested' is likely to represent times during which the average speed was between 40mph and the speed limit (and thus would have been included in the analysis of 'free-flow' speeds in Section 3.1).

Conversely, 5% of people drove faster than they would have liked between junction 34 and 35, compared to 3% between junction 35 and 35a.

However, it is important to note that a quarter of participants did not remember their journey between junctions 34 and 35a very clearly. This raises some uncertainty of the extent to which participants could accurately recall aspects of their journey (for example, the speed at which they drove or the traffic conditions).

3.5.3 Driver behaviour

In addition to questions about the speed limit and speed at which they drove through the roadworks, participants were also asked about whether there were any times where the behaviour of other drivers made them feel less safe. Driver behaviours asked about 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.

Figure 36 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 is only counted once in this chart. For example, if participant 1 recorded that car drivers made them feel less safe because of close following and overtaking then this is only recorded as one record in Figure 36 (but twice in Figure 37).

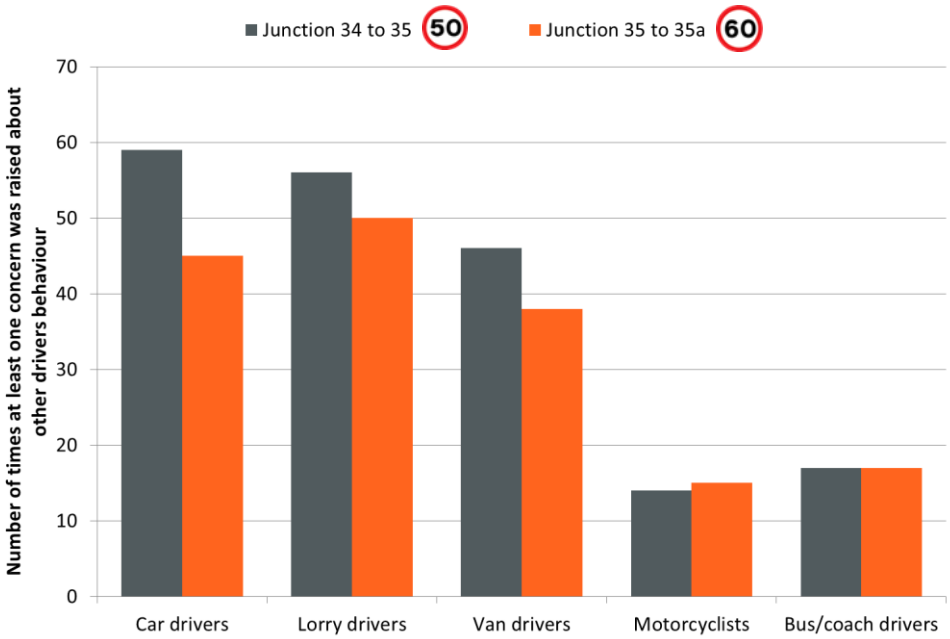


Figure 36: Count of times each driver type was recorded as having made the participant feel less safe

A larger number of concerns were raised about driver behaviour between junction 34-35 (50mph) compared to junction 35-35a (60mph), suggesting that people perceived a difference in behaviour between the two links.

Comparing car and lorry drivers shows that a similar number of concerns were raised about the behaviour of both drivers, despite HGVs only making up 15% of the total traffic. Van drivers were also identified as making drivers feel less safe, although to a slightly lesser extent. The specific behaviours identified for three driver types are examined in Figure 37.

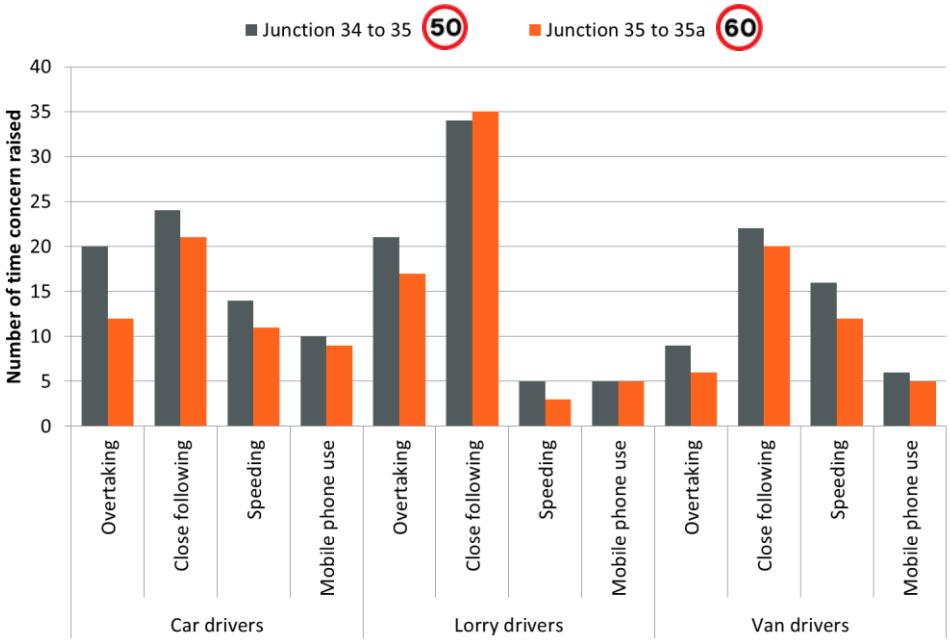


Figure 37: Unsafe behaviours of car, lorry and van drivers

Comparing the results across vehicle types, close following by lorry drivers was highlighted as the most frequent concern, and was less commonly reported as an issue for car or van drivers. Overtaking by lorry drivers was also a more common concern than for the other vehicle types, but speeding was reported less frequently for this group.

When comparing between the two links, participants reported fewer concerns with overtaking, speeding and mobile phone use by all three user groups where the 60mph speed limit was in place, perhaps suggesting that the increased speed limit has helped to reduce these behaviours. However, although close following by car and van drivers fell slightly at the higher speed limit, similar levels of close following by lorry drivers was reported in the two speed limits.

Other behaviours reported which made people feel less safe included:

- A lack of signalling when overtaking: *"A lady driver pulled over to another lane with no signalling"*
- Undertaking, specifically by lorries
- Incorrect use of the middle lane: *"Road users hogging the middle lane"*

3.5.5. Speed enforcement

Based on the ACPO enforcement guidelines which allow some tolerance for speeds slightly above the speed limit, enforcement is usually only carried out when speed is more than 10% + 2mph over the speed limit. Participants understanding of these guidelines were tested by asking what speed they thought drivers were currently detected and penalised when the speed limit was 50mph, 60mph or 70mph on motorways. Participants were also asked what speed they believe drivers should be detected and penalised.

The majority (79%) of participants believed that drivers who exceed the speed limit through roadworks on motorways should be detected and penalised. Eight people stated they did not know.

Of those who answered believed drivers should be penalised, when asked at what speed drivers are currently detected and penalised through roadworks on motorways with a 50mph speed limit, a variety of responses were given (Table 9). The equivalent results for a 60mph limit through roadworks are shown in Table 10.

Table 9: Speed at which participants believe enforcement is currently carried out (50mph speed limit through roadworks)

Perceived enforcement threshold	Number of participants
50mph (speed limit)	15
51-56mph	38
57mph (current enforcement threshold)	5
58mph +	15
Did not answer	6

Only five of the 79 participants correctly stated that the actual speed at which drivers are currently detected and penalised at a 50mph speed limit is 57mph. The majority of participants (38) believed this was between 51 and 56mph, of which 30 stated this was 55mph. The maximum speed suggested was 65mph.

Participants were also asked at what speed roadworks with a 50mph speed limit should be detected and penalised. On average, participants gave a figure 1.1mph lower than the speed at which they thought it was detected. A paired samples t-test showed that this difference was significant (at the 5% level).

The majority of participants who answered this question (n=71) thought that speeds should be detected and penalised at 55mph (30 people), whilst 17 thought this should happen at the speed limit (50mph).

Table 10: Speed at which participants believe enforcement is currently carried out (60mph speed limit through roadworks)

Perceived enforcement threshold	Number of participants
60mph (speed limit)	10
61-67mph	43
68mph (current enforcement threshold)	2
69mph +	13
Did not answer	11

Only two participants correctly stated the actual speed at which drivers are currently detected and penalised in a 60mph speed limit is 68mph. As with the 50mph limit, the majority of participants (20) thought the enforcement threshold was 5mph higher than the speed limit at 65mph. The maximum speed suggested was 80mph.

On average, participants thought the enforcement threshold for roadworks with a 60mph speed limit should be 1.2mph less than they thought it was currently. This difference was significant.

For a 60mph speed limit within roadworks, 65mph was commonly suggested as an appropriate enforcement limit (22 out of 62 participants) and 60mph was the second most common choice (10).

In addition to enforcement limits through roadworks, participants were also asked whether drivers should be detected and penalised for speeding through a national speed limit on a motorway with no roadworks. Just over half (56%) of participants thought that drivers should be penalised which is substantially smaller than the 79% which agreed with the same statement about speeding drivers through roadworks. Nine people did not know or did not answer the question.

Table 11 shows the speeds at which participants believe enforcement takes place.

Table 11: Speed at which participants believe enforcement is currently carried out (national speed limit on motorways)

Perceived enforcement threshold	Number of participants
70mph (speed limit)	9
71-78mph	22
79mph (current enforcement threshold)	2
80mph +	22
Did not answer	1

Only two participants correctly believed that the actual speed at which drivers are currently detected and penalised on motorways with the NSL (National Speed Limit) is 79mph. The majority of participants (18) believed this was 10 miles above the speed limit (i.e. 80mph) and ten suggested 75mph. The highest speed suggested was 90 mph.

On average, participants thought the enforcement threshold for a national speed limit on motorways should be 0.8mph less than they thought it was currently. This difference was not significant.

For a national speed limit motorway, 75mph was commonly suggested as an appropriate enforcement limit (19 out of 53 participants), closely followed by 80mph (17).

3.5.6 Stepped speeds through roadworks

Participants were provided with information on two scenarios. Section A was a section of roadworks with a 50mph speed limit throughout. Scenario B was a section of roadworks with an initial 50mph speed limit, followed by a 60mph speed limit (as shown in Figure 38).

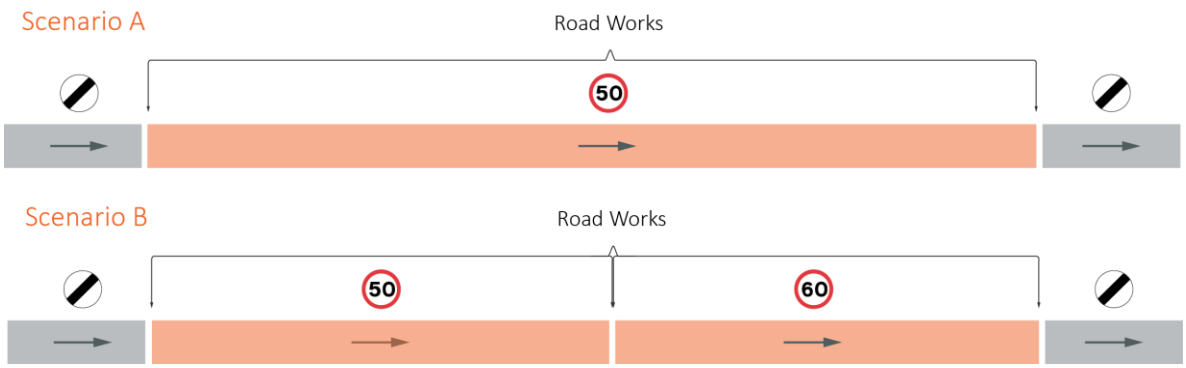


Figure 38: Scenario A and B presented in the survey

Participants were asked how scenario A and B would affect their journey satisfaction, journey time (compared to if there were no road works in place), and feelings of safety.

Figure 39 shows participants' levels of journey satisfaction in scenarios A and B.

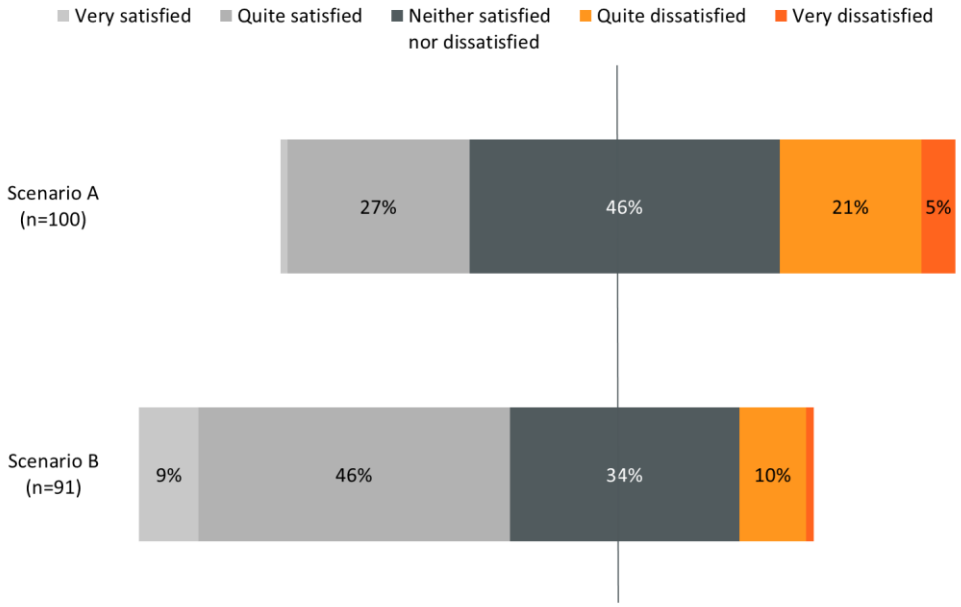


Figure 39: Drivers' journey satisfaction when travelling through scenarios A and B

Overall, participants described having higher levels of journey satisfaction in scenario B (9% described themselves as very satisfied and 46% as being quite satisfied, compared to 1% and 27% respectively in scenario A). Some people were dissatisfied with both options, suggesting that changes to the speed limit may not be the only solution to improving customer satisfaction through roadworks.

Figure 40 shows how participants' rated the impact of Scenario A and B on their journey time.

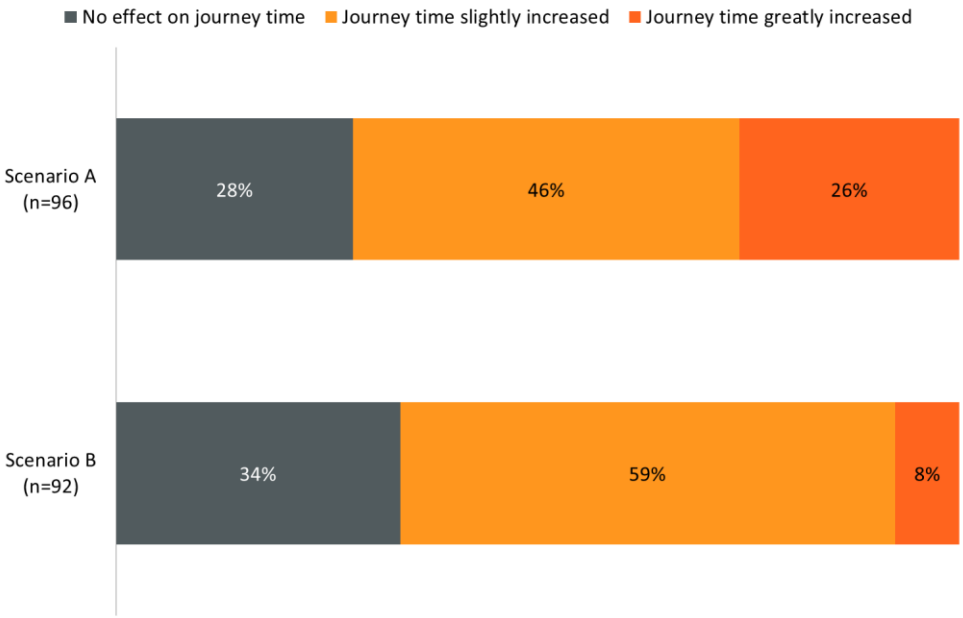


Figure 40: Participants' perception of journey times in scenarios A and B

The majority of participants described their journey time as being slightly or greatly increased (72% in Scenario A and 66% in Scenario B). The comparison for this question is relative to a journey with no roadworks, so it is not surprising that a large number reported that a reduction in the speed limit due to the roadworks would influence journey times. However, the reduction in the proportion stating that the journey time was greatly increased in Scenario B (26% compared to 8%) suggests that implementation of a 60mph limit, even for part of a scheme, is perceived positively by the customer.

Figure 41 shows descriptions of participants' feelings of safety in scenarios A and B.

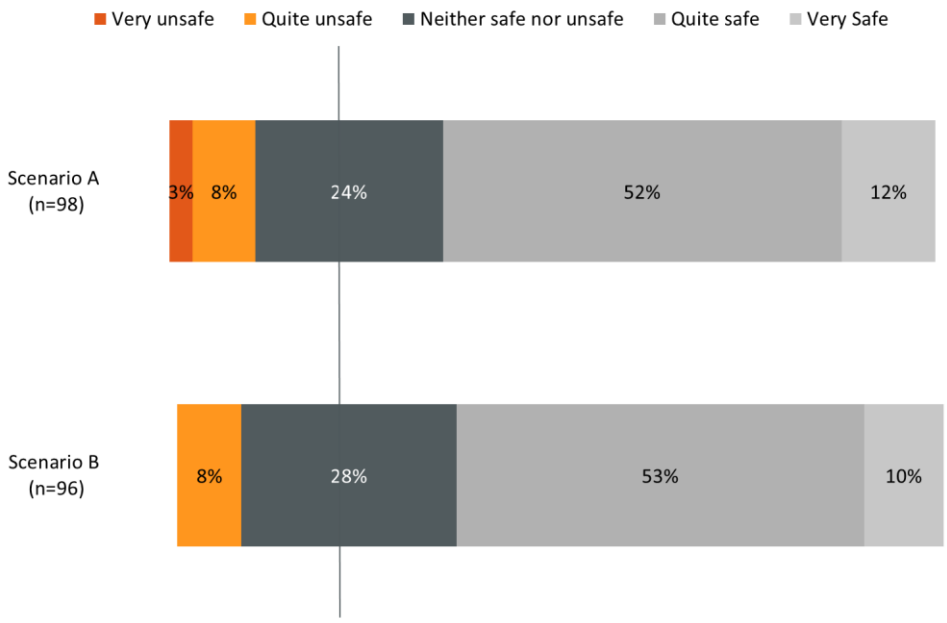


Figure 41: Participants' feelings of safety in scenarios A and B

Only a small proportion of people described the two scenarios as being unsafe (11% in Scenario A and 8% in Scenario B) with a slightly higher proportion (3%) reporting that the 50mph through the roadworks (Scenario A) was very unsafe. This suggests that, in general, an increase in the speed limit to 60mph would have little influence on customers perception of safety when travelling through roadworks.

3.5.7 General comments

Participants were given the opportunity to provide general comments about the survey. Some key themes could be drawn from the comments provided. These included:

Participants questioning why there seemed to be no road workers:

> *"Why are there no workers for endless miles of cones?"*
>
> *"No works being carried out on Sunday 6th Nov, but restrictions still in place. This is extremely annoying, allowable speed should be increased at weekends from 50mph to 60mph."*

Recommendations for the implementation of increased visibility of signs:

"Flashing signs needed because when concentrating on traffic you don't always see signs."

Recommendations for displaying the completion times for roadworks, and communication regarding future closures:

"It would be good to display the completion times for these roadworks, if possible, because they seem to take ages and they are found almost in every motorway these days."

"Pro-active communication for future closures would be helpful!"

Comments on the length of the roadworks:

"Length of roadworks, should finish what they're doing before starting more. Like 60mph, think it works."

"Why do both sets of carriageways (north and south bound) have to be closed at the same time? Why not finish the work on one side, and then do the other? (I accept this is not possible on central reservation work)."

Comments on other road users, in particular HGV drivers:

"When road works and a speed limit, HGVs should be made to stop in lane one, while in road works. I find these bullies on road drive way too close, pushing cars to get out of way even though we have a speed limit to stick to."

4 Summary

The on-road trial of 60mph at the M1 J32-35a scheme represents the first trial of increased speed limits at roadworks planned as part of this study. The scheme trialled a 60mph speed limit during the operational testing phase of the Smart motorway development.

As this study was the first of its kind, careful planning was required to ensure the risk to road users and workers was managed to an acceptable level, and to ensure that periodic safety monitoring was carried out during the trial. At all times Costain, as the Principal Contractor responsible for the scheme, had overall responsibility for risk and retained the right to initiate an abort process. The abort process was not initiated and the trial successfully completed data collection on 12th December 2016.

The 60mph speed limit was first implemented northbound on the M1 between junctions 35 and 35a on 8th November, and then extended to also include junction 34-35 two weeks later. In the final week of the trial, the TM in Lane 1 was removed and vehicles were allowed to travel at 60mph through all lane running (ALR).

Data from MIDAS radars were used to monitor average speed and headway during the trial. The results show that free-flow average speeds increased significantly (by around 3.5mph) as the speed limit increased from 50mph to 60mph, suggesting that that at least some drivers noticed the change in speed limit.

Following the implementation of the 60mph speed limit, free-flow average speeds increased slightly week by week as drivers got used to the new limit. However, throughout the monitoring period, the average speed remained below the 60mph speed limit indicating that there was, in general, good compliance. In comparison, average speeds in the baseline period (50mph) were sometimes slightly higher than the 50mph limit, suggesting that drivers might have been more frustrated by this limit and were keen to travel faster.

The biggest increase in average speed was observed when 60mph ALR was introduced: on average, drivers travelled around 58-59mph during this week. Since there are four running lanes instead of three in this scenario, these faster speeds are likely to be related to the increased capacity of the carriageway.

Headway (the distance between successive vehicles) increased slightly as the speed limit increased from 50mph to 60mph; however, this change was replicated at the control location suggesting that it was not a result of the increase in speed limit. Average headway was typically much larger than the 2 second rule, suggesting that, in general, safe stopping distances were maintained between vehicles.

Costain provided incident data from their CCTV, incursions and TM maintenance logs. The CCTV log identified four collisions within the 60mph speed limit. CCTV footage was reviewed for three of these four and there was no indication that the RTCs were due to the increased speed limit.

Any increase in incursions into the TM is likely to increase the risk not just to road users, but also to road workers who are required to attend the scene and maintain the TM. The number of reported incursions into the TM remained fairly stable across the monitoring period. In addition, the number of reported TM maintenance activities within the

experimental site was similar before and after the change in speed limit; however, this was relative to a decreasing background trend at the control site. It is possible that the increased speed limit led to more incursions with the TM (although this in not supported by the incursions or CCTV logs); however, the significant difference in TM maintenance activities between the control and experimental sites, could also be due to inconsistencies in the recording of these free-text data.

Based on the average speed and length of the links, it is estimated that introduction of the 60mph speed limit across the two links saved each customer, on average, 34 seconds in journey time. When multiplied by the thousands of drivers who travel through the scheme each day, this equates to substantial time savings.

In addition to the data on driver behaviour, a survey was carried out at the motorway service area at Woolley Edge with drivers who had driven through the scheme. The aim of this survey was to understand whether drivers noticed the change in speed limit and to find out how satisfied or dissatisfied they were with increases in speed through roadworks.

Only 23 of the 100 drivers who completed the survey correctly recalled that the speed limit was 50mph between junction 34-35 and 60mph between junction 35-35a. Of these individuals, 34% considered the 50mph limit to be too slow, whilst all of them considered the 60mph limit to be about right.

Overtaking and close following by lorry drivers through the roadworks was reported as making survey participants feel unsafe. Overtaking was reported less in the 60mph section than in the 50mph section of the roadworks, whilst close following was reported with a similar frequency.

Participants reported being more satisfied when roadworks had a 60mph limit for at least part of the work zone. Feelings of safety remained relatively unchanged compared to roadworks with a 50mph limit throughout.

In summary, there is no indication that the 60mph speed limit had a negative impact on road user safety. There is limited evidence to suggest that the TM maintenance requirements have changed, but it is unclear whether this is a product of the data collection methodology. This will be investigated further in the focus groups which will be hosted in late January (see Section 5.1). The survey results suggest that drivers are more satisfied with 60mph speed limits through roadworks than 50mph.

5 Next steps

5.1 Focus groups

In addition to engaging with customers on the Strategic Road Network through the MSA survey, it is important that the views of other stakeholders are collated and understood. The next step is to engage with individuals who have experience of working during the 60mph pilot, to understand any challenges faced during the trial and any concerns or risks that would need further management in order for increased speed limits at roadworks to be used across the network.

TRL will host a focus group in late January with representatives from Costain (a Traffic Safety Control Officer (TSCO), site operatives from Civils and Comms), the TM maintenance crew, the Traffic Officer Service, police and recovery operations. Results from the on-road trials will be included in the focus group agenda to aid discussions on the potential implications for safety. The topic guide will be developed and agreed with Highways England to ensure all relevant subject areas are covered.

5.2 Implementation of 55/60mph at other schemes

TRL is working closely with Highways England to implement increased speed limits at other schemes. At the time of writing, at least two additional schemes are in planning:

- A1 Leeming to Barton – increasing the speed limit to 60mph through part of the scheme during the Christmas embargo period.
- M5 J4a-6 – increasing the speed limit to 55mph during the operational testing phase of this scheme. This is currently expected to take place in February/March 2017.

In addition, discussions are on-going with one other Scheme (M1 Catterick) to determine the feasibility of a pilot of 55mph.

The results from each of the pilot schemes will be reported once monitoring is complete. A final report, collating all the findings from each scheme, will be provided at the end of the project.

Appendix A Motorway Service Area 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 5-10 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 do not ask for any personal details, so all of your answers will be anonymous.
- 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.

IF YOU COMPLETE THE SURVEY AND RETURN IT TO US TODAY, YOU WILL RECEIVE £5 IN CASH

Please confirm – have you just driven (as a driver, not a passenger) through the roadworks between Junctions 34 and 35a of the M1 (northbound)?

- ☐ Yes
- ☐ No – sorry, we are looking for responses from drivers who have just driven between Junctions 34 and 35a
- ☐ Don't know – please speak to a researcher

1. Where did you join the M1 today?

- ☐ Before Junction 26 *(Nottingham, A610 Ilkeston/Nottingham, Ripley, Eastwood, Nuthall, B600 Alfreton)*
  (Please specify junction number/location: _____)
- ☐ At Junction 26 *(Nottingham, A610 Ilkeston/Nottingham, Ripley, Eastwood, Nuthall, Alfreton B600)*
- ☐ At Junction 27 *(Heanor, A608 Hucknall/Mansfield)*
- ☐ At Junction 28 *(Mansfield, A38 Derby/Matlock (A615))*
- ☐ At Junction 29 *(Mansfield, A617 Matlock/Chesterfield)*
- ☐ At Junction 29a *(A6192 Markham Vale, Bolsover (A632))*
- ☐ At Junction 30 *(Chesterfield, A616 Newark, Sheffield(S), A6135 Worksop)*
- ☐ At Junction 31 *(A57 Worksop/Sheffield (SE), Rotherham (S), Clowne (A618))*
- ☐ At Junction 32, *M18 interchange (The North, Doncaster, Hull, Rotherham(E), Scunthorpe, M18)*
- ☐ At Junction 33 *(Sheffield (centre), Rotherham, A630)*
- ☐ At Junction 34 *(Meadowhall Centre, A6109/A6178 Rotherham)*
- ☐ Don't know

2. Approximately how many miles are you going to travel on your current journey?

- ☐ 1-50
- ☐ 51-100
- ☐ 101-150
- ☐ 151-200
- ☐ 201-250
- ☐ 251+
- ☐ Don't know

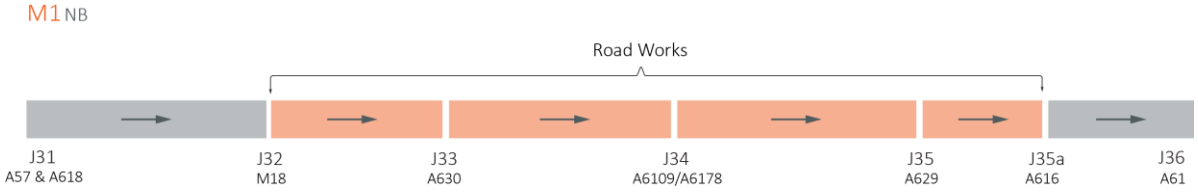
3. What type of vehicle are you driving today?

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

4. What is the main purpose of your current journey?

- ☐ Commuting
- ☐ Business
- ☐ Education (incl. escorting others)
- ☐ Shopping
- ☐ Other personal business
- ☐ Visiting friends/family
- ☐ Holiday
- ☐ Other (please specify)_____

The diagram below illustrates where road works are located on the M1:



5. Did you know about these road works in advance of your trip?

- ☐ Yes
- ☐ No

6. When you drove between Junctions 34 and 35a today was it…

- ☐ Daylight
- ☐ Dark

7. What was the weather like when driving between Junctions 34 and 35a today? *(Please tick all that apply)*

- ☐ Dry
- ☐ Light rain
- ☐ Heavy rain
- ☐ Foggy
- ☐ Other *(please specify)*_____

8. Typically, how often have you driven between Junctions 34 and 35a of the M1 (northbound only) over the last year?

- ☐ Every day/every weekday
- ☐ A few times a week
- ☐ A few times a month
- ☐ Once a month or less
- ☐ This is the first time in the last year I have driven between these junctions
- ☐ Don't know

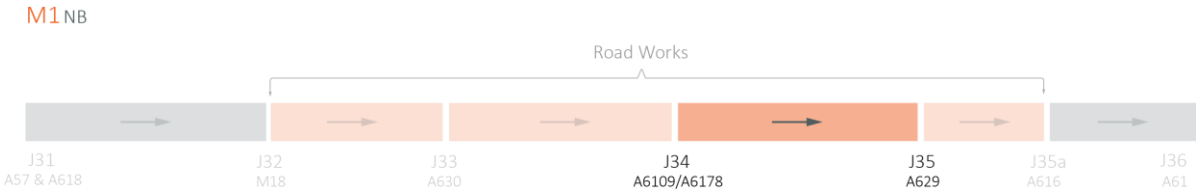
9. Did you notice any of the following when driving between Junctions 34 and 35a today?

	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	☐	☐	☐

10. 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 roadworks outweigh the shorter term inconvenience	☐	☐	☐	☐	☐

Questions 11 to 17 relate to the road works <u>only between Junctions 34 and 35</u> (as shown in the diagram below). Please try to think back to when you drove this section of road when answering these questions.



11. How would you describe the traffic conditions between Junctions 34 and 35 today?

- ☐ Heavily congested
- ☐ Slightly congested
- ☐ Free-flowing
- ☐ Don't know/don't remember

12. What do you think the speed limit between Junctions 34 and 35 was?

[ ] mph

13. Thinking about the conditions when you drove between Junctions 34 and 35 just now, do you think the speed limit was…

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

14. What speed do you think you drove between Junctions 34 and 35?

[ ] mph OR ☐ Don't know/don't remember

15. Did the presence or speed of other vehicles affect the speed at which you drove between Junctions 34 and 35?

- ☐ 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

16. When you drove between Junctions 34 and 35, were there any times where the behaviour of other drivers made you feel less safe? *(Please tick all that apply)*

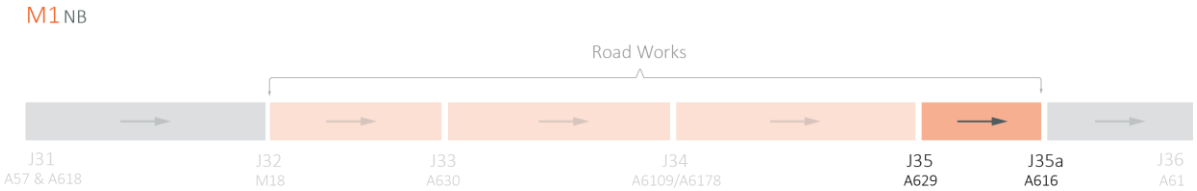
	Overtaking	Close following	Speeding	Using a mobile phone or other device	Other (please specify below)
Car drivers	☐	☐	☐	☐	☐
Lorry drivers	☐	☐	☐	☐	☐
Van drivers	☐	☐	☐	☐	☐
Motorcyclists	☐	☐	☐	☐	☐
Bus/coach drivers	☐	☐	☐	☐	☐

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

17. Did you notice any speed cameras between Junctions 34 and 35?

- ☐ Yes
- ☐ No
- ☐ Don't know

Questions 18 to 24 relate to the section of road works <u>only between Junctions 35 and 35a</u> (as shown in the diagram below). Please try to think back to when you drove this section of road when answering these questions.



18. How would you describe the traffic conditions between Junctions 35 and 35a today?

- ☐ Heavily congested
- ☐ Slightly congested
- ☐ Free-flowing
- ☐ Don't know/don't remember

19. What do you think the speed limit between Junctions 35 and 35a was?

[ ] mph

20. Thinking about the conditions when you drove between Junctions 35 and 35a just now, do you think the speed limit was…

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

21. What speed do you think you drove between Junctions 35 and 35a?

[ ] mph OR ☐ Don't know/don't remember

22. Did the presence or speed of other vehicles affect the speed at which you drove between Junctions 35 and 35a?

- ☐ 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

23. When you drove between Junctions 35 and 35a, were there any times where the behaviour of other drivers made you feel less safe? *(Please tick all that apply)*

	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:

24. Did you notice any speed cameras between Junctions 35 and 35a?

- ☐ Yes
- ☐ No
- ☐ Don't know

25. Please indicate how clearly you remember the part of your journey between Junctions 34 and 35a (the two sections which you have just been asked about)

Not at all clearly	Not very clearly	Quite clearly	Very clearly
I had to guess most of my answers	*I had to guess some of my answers*	*I am confident in most of my answers*	*I am confident in all of my answers*
☐	☐	☐	☐

The next set of questions is concerned with your general perceptions and experiences of motorway driving:

26. Do you think that drivers who exceed the speed limit through road works on motorways should be detected and penalised?

- ☐ Yes
- ☐ No
- ☐ Don't know

26a. IF YES to Q26, what do you think is the actual speed at which drivers are currently detected and penalised through road works on motorways with…

…a **50mph** speed limit? [ ] mph …a **60mph** speed limit? [ ] mph

26b. IF YES to Q26, what do you think is the actual speed at which drivers should be detected and penalised through road works on motorways with…

…a **50mph** speed limit? [ ] mph …a **60mph** speed limit? [ ] mph

27. Do you think that drivers who exceed the National Speed Limit (70mph) on motorways should be detected and penalised?

- ☐ Yes
- ☐ No
- ☐ Don't know

27a. IF YES to Q27, what do you think is the actual speed at which drivers are currently detected and penalised on motorways with the National Speed Limit?

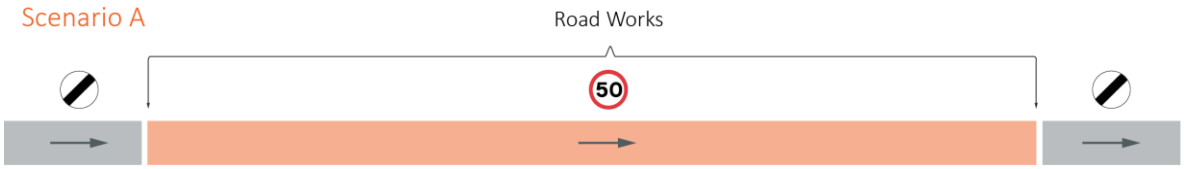
[ ] mph

27b. IF YES to Q27, what do you think is the actual speed at which drivers should be detected and penalised on motorways with the National Speed Limit?

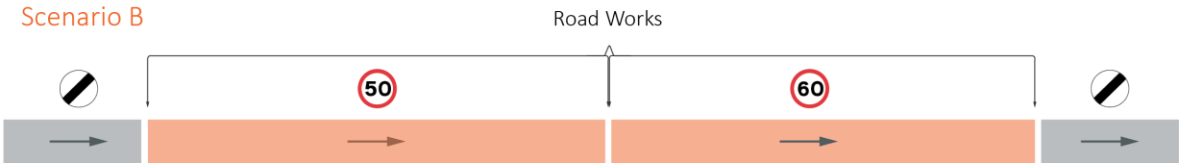
[ ] mph

The final set of questions is related to two alternative scenarios:

Scenario A involves a section of road works with a 50mph speed limit throughout:



Scenario B involves a section of road works with an initial 50mph speed limit, followed by a 60mph speed limit in the second part of the road works:



28. Assuming traffic conditions are normal, please indicate how you expect Scenario A and Scenario B would affect your:

a) Journey satisfaction

	Very dissatisfied	Quite dissatisfied	Neither satisfied nor dissatisfied	Quite satisfied	Very satisfied	Don't know
Scenario A	☐	☐	☐	☐	☐	☐
Scenario B	☐	☐	☐	☐	☐	☐

b) Journey time (compared to if there were no road works in place)

	Journey time **greatly increased**	Journey time **slightly increased**	**No effect** on journey time	Don't know
Scenario A	☐	☐	☐	☐
Scenario B	☐	☐	☐	☐

c) Feelings of safety

	Very unsafe	Quite unsafe	Neither safe nor unsafe	Quite safe	Very safe	Don't know
Scenario A	☐	☐	☐	☐	☐	☐
Scenario B	☐	☐	☐	☐	☐	☐

29. How much did the presence of the road works between Junctions 32 and 35a affect your overall level of satisfaction with today's journey so far?

☐	☐	☐	☐	☐
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:

30. And finally, what is your…

a) Gender

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

b) Age

- ☐ 17-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65-74
- ☐ 75-84
- ☐ 85+
- ☐ Prefer not to say

c) Ethnic group

- ☐ White (includes English, Welsh, Scottish, Northern Irish, British, Irish, Gypsy, Irish Traveller, any other white background)
- ☐ Asian / Asian British (includes Indian, Pakistani, Bangladeshi, Chinese, other Asian)
- ☐ Black / African / Caribbean / Black British
- ☐ Any other ethnic group (includes Arab and any other ethnic group)
- ☐ 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.

Please return it to one of the researchers, who will give you £5 (provided you have responded to all questions).

Monitoring and evaluation of the 55/60mph pilots

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