PROJECT REPORT MIS7

Monitoring and evaluation of the 60mph trials

Report for the on-road trials of 60mph on the M20 junction 10a

S Glaze, R Ramnath, J Hammond and R Sharp
Report details

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Executive Summary

Temporary mandatory speed restrictions are considered for road works on high-speed roads in order to limit the risks posed to road users from specific traffic management features. Current guidance recommends a speed reduction of 20mph for many traffic management features. Where safe to do so, a change in the recommended speed reduction could bring about potential benefits to road users in the form of improved journey times and increased satisfaction.

This report presents the findings from the on-road investigation of a 60mph speed restriction on the M20 junction 10a scheme. A 60mph speed restriction was implemented across a single carriageway in the coast bound direction within the road works. The impact of this change on driver behaviour, customer satisfaction and scheme costs and delivery was monitored over an 8 week monitoring period.

Analysis of the data collected during this monitoring period suggested that the change from a 50mph to a 60mph speed restriction had the following impacts:

- Road users responded to the change in speed restriction by increasing their speed; average speeds at the trial location increased from about 51mph before the speed limit change, to 57mph after the speed limit change. This resulted in an estimated journey time reduction of approximately 17 seconds per road user.
- This increase in average vehicle speed had a positive effect on the levels of speed compliance shown by road users, compliance observed with the 60mph speed restriction was higher than with the 50mph speed restriction.
- The distribution of vehicles across the two running lanes was not greatly affected by the change in speed restriction; whilst overall numbers were small, the proportion of HGVs travelling in the offside lane remained similar in 50mph and 60mph conditions.
- The overall amount of close following observed was not greatly affected by the change in speed restriction. The proportion of HGVs engaged in close following marginally decreased as a result of the change in speed restriction, reducing from around 8% to 6%.
- A sample of road users surveyed during the monitoring period suggested that the increased speed restriction had little impact on their feelings of safety, or their levels of satisfaction when travelling through the scheme. However, participants did indicate overall that they thought both the 50mph and 60mph speed restrictions were ‘too slow’.

Based on these findings, the scheme subsequently looked to change the remaining 50mph speed restriction on the London bound carriageway of the M20 junction 10a scheme to a 60mph speed restriction.

Results from other investigations undertaken by Highways England at the scheme were as follows:

- Customer audits concluded that all the speed restriction signage was easily viewable and all auditors were aware of the speed restrictions in place.
These same audits also suggested that the traffic conditions through the M20 junction 10a scheme (which has relatively little congestion and low traffic volumes) greatly affected customers’ perception of the speed limits. Auditors noted that in the 50mph conditions other drivers were going well beyond the speed limit due to traffic being clear.

A review of social media ‘conversations’, concluded that road users felt intimidated by HGVs that appeared to be disobeying speed restrictions. These conclusions could not be solely attributed to customer experiences on the M20 junction 10a scheme due to the presence of adjacent road works and the method used for reporting.

At the time of writing, further investigations into the use of 60mph speed restrictions are underway. Findings from these additional investigations will be collated with the current findings in a final project report.
1 Introduction

1.1 Background

Safety and customer satisfaction are critical components of Highways England’s vision for the future. As part of this vision, Highways England is committed to improving road user experience through road works by ensuring that road works are implemented with appropriate speed restrictions to minimise disruption for customers, whilst also ensuring risk to road users and road workers is as low as reasonably practicable.

Following on from previous investigations into varying speed restrictions within road works, consultation with stakeholders from across Highways England and the Supply Chain, this project was established to support the safe implementation and monitoring of three new trial scenarios. A key defining feature of many of these scenarios is the trial implementation of a 60mph speed restriction in road works with narrowed lane width restrictions.

1.2 Contents of this report

This report summarises the findings from the on-road trial of a 60mph speed restriction on the M20 junction 10a scheme during mid-2019.

The investigation took place across the entire length of the scheme’s traffic management on its coast bound carriageway where the use of a 60mph speed restriction was trialled. TRL was commissioned by Highways England to monitor driver behaviour (along with customer satisfaction and scheme cost/delivery) to ensure that the safety of road users and road workers was not compromised by the increase in speed restriction during the investigation.

This report outlines the scheme and data collection methodology, presents the results from the monitoring, summarises these findings and outlines the next steps required.

1.3 Study objectives

The key objectives of the research were to gather evidence of the impact of changing the speed restriction on the M20 junction 10a scheme from 50mph to 60mph on:

- a) Lane distribution
- b) Vehicle speeds
- c) The number of non-compliant vehicles
- d) The number of incidents
- e) The levels of close following (vehicle headway)
- f) Customer satisfaction
- g) Scheme delivery and cost
2 Method

2.1 Overview of the scheme

Notice to proceed was issued to the principal contractor to begin the main construction of the scheme in March 2018. The package of work is planned for four distinct phases, with the timeline for the work on-site currently running until May 2020. The works incorporate the creation of a new junction with over bridge and slip roads, with the majority of the works’ activities taking place off the side of the main carriageway.

Due to the design of the scheme - a single phase of traffic management situated off the nearside of the carriageway – there was an opportunity to change the existing speed restriction in place at the scheme from 50mph to 60mph for the purposes of the investigation. The speed restriction on the coast bound carriageway was changed to 60mph, while the speed restriction on the London bound carriageway remained at 50mph.

An overview of the scheme can be seen in Figure 1 below.

Figure 1: Overview of M20 junction 10a scheme (CB = Coast bound; LB = London bound)
2.2 Monitoring approach

The on-road investigation sought to monitor the effect of the change in speed restriction on driver behaviour and customer satisfaction. Monitoring took place between 1st April 2019 and 27th May 2019, with speed restrictions in place as shown in Table 1.

Table 1: Timelines for monitoring

<table>
<thead>
<tr>
<th>Dates</th>
<th>Description of activity</th>
<th>Control location (LB carriageway)</th>
<th>Experimental location (CB carriageway)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Apr 2019</td>
<td>Baseline monitoring period</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>29th Apr 2019</td>
<td></td>
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<tr>
<td>30th Apr 2019</td>
<td>Trial monitoring period</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>27th May 2019</td>
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Throughout the baseline and experimental monitoring periods the traffic management at the scheme remained the same. The number of lanes open to traffic and the width of those lanes remained constant. The traffic management was comprised of two ‘full width’ running lanes, 3.6m each, on both carriageways. Delineation between the work zone and the carriageway was provided by a mixture of cones and temporary vehicle restraint systems (VRS). The set-back between the VRS and the nearside traffic lanes was 375mm, requiring a departure from standard.

The approach and lane change zones on the coast bound carriageway incorporated a lane drop and dedicated off slip for junction 10. This differed to the London carriageway, which featured a Lane 3 closure followed by a chicane in its lane change zone.

Due to the short length of the scheme, access and egress to the work zone was limited to a single access point on each carriageway. Egress for the work zone was provided by a single end or works merge.

2.3 Risk assessment

As part of the proposed risk management approach and safety governance for the trialling of 60mph speed restrictions within road works, a programme level safety risk assessment was produced by TRL. This assessment was informed by previous relevant on-road trials, simulator trials, and associated GG 104 risk assessment and was used to feed into the scheme-specific risk assessments carried out by participating schemes (Fordham & Glaze, 2019).

Prior to implementing the change in speed restriction, WSP carried out a scheme-specific safety risk assessment in line with GG104 standards. This assessment examined the risks posed to all affected parties from the change in speed restriction, detailing required mitigation measures to address the potential increase in risks posed from the anticipated increase in vehicle speed as part of the investigation on the M20 junction 10a scheme.

This assessment concluded that if the change in speed restriction was adopted, it must be accompanied by the introduction of several additional mitigations. Details of these additional mitigations are outlined within the following section (2.3.2).
In accordance with the safety governance requirements outlined within GG104, a project safety control review group (PSCRG) was established to review the scheme-specific assessment. This led to a decision to trial a 60mph speed limit on the coast bound carriageway from 30th April 2019 for four weeks (WSP, 2019).

The PSCRG is a cross-functional group that reviews ‘safety work’ to agree that the safety risks are correctly identified, reviewed and managed appropriately (Highways England, 2015). The group is required to comprise of principal and specialist members. Principal members collectively determine decisions taken and endorse evidence presented to the group. Specialist members provide additional subject matter specialism experience to the group. A list of required roles for each member type can be seen in Appendix A.

2.3.1 Departures from standard

As this investigation would be looking to utilise the existing traffic management design in place on the carriageway, a single design feature (the set-back distance of the temporary VRS to the nearside running lane) would be considered unsuitable in terms of risk if no additional mitigations were implemented. Current standards cover both desirable and relaxed distances for VRS set-backs for both 70mph and 50mph speed restrictions. As currently no standard exists for 60mph speed restrictions, the programme level risk assessment outlined that a set-back suitable for 70mph was also seen as suitable for 60mph.

In order to undertake the safe implementation of a 60mph speed restriction with a set-back reduced from this suitable distance, as the scheme looked to utilise its existing barrier placement with a 375mm set-back, a departure to TD 19/06 would be required along with additional mitigations to reduce the risks posed to road users from the reduced set-back.

A departure from TD19/06 was sought and agreed for the duration of the investigation, on the condition that proposed mitigations would be in place and suitable monitoring take place.

In order to mitigate the risks posed to road users from the reduced VRS set-back the continued use of full width carriageway running lanes had to be maintained across the length of the scheme. It was anticipated that the additional space within the running lanes would accommodate any lateral shift of vehicles caused by the reduced set-back, reducing the risk of vehicle collisions.

2.3.2 Scheme-specific mitigations

Several additional mitigations, above those already outlined within the programme level risk assessment, were identified as being required to manage risks as part of the scheme-specific risk assessment. These additional mitigations were implemented on the scheme prior to the start of the on-road investigations; they are outlined below.

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1 Desirable set-back at 70mph - 1000mm. Desirable set-back at 50mph - 600mm.
2 Relaxed set-back at 70mph - 600mm. Relaxed set-back at 50mph - 375mm.
2.3.2.1  Speed enforcement

Prior to the trial, average speed camera enforcement was in place at the scheme and set with an appropriate enforcement threshold for 50mph. This would be changed to an appropriate enforcement threshold for 60mph (when 60mph is implemented on both carriageways). Cameras and signage remained in place (changed to 60mph for both carriageways) (WSP, 2019).

2.3.2.2  Variable message signs

Message sign, mark 3s (MS3) on the coast bound carriageway were used to warn approaching drivers when road workers are at risk setting out temporary traffic management – set by the regional control centre (RCC) upon request for planned works (WSP, 2019).

Appropriate variable message signs (VMS) – using MS3s on coast bound carriageway and portable VMS on London bound carriageway – showing either text, pictograms or a combination of both, were provided on both carriageways to warn oncoming drivers of broken down or stopped vehicles in live lanes (including road traffic collisions) (WSP, 2019).

It was anticipated that by providing advanced warning of incidents and temporary traffic management to approaching drivers a reduction would be seen in the risks posed to road users and road workers from collisions between stopped and moving vehicles.

2.3.2.3  Recovery

On-site light vehicle recovery was provided. This service attended breakdowns with an impact protection vehicle (rated to 60mph). When HGVs broke down, the impact protection vehicle was sent to protect the HGV until heavy vehicle recovery arrived from off-site, rather than awaiting attendance of vehicle recovery operators. Traffic Safety and Control Officers (TSCOs) were required to attend all live lane incidents throughout the worksite to offer safety advice to occupants of broken down vehicles (WSP, 2019).

These changes to existing recovery operations sought to reduce the time road users spent unprotected in the carriageway, reducing their exposure to risks posed from collisions involving other road users.

2.4  Safety reviews and abort process

During the trial monitoring period, weekly safety reports were provided outlining changes in the average speed of vehicles during free-flow\(^3\) periods, the proportion of vehicles over the posted speed limit during free-flow periods and the proportion of vehicles over the enforcement threshold during free-flow periods. These weekly reports fed into an agreed abort process. The details of this process are outlined in the scheme-specific safety risk assessment; Figure 2 below provides a summary.

\(^3\) ‘Free-flow’ was defined as any period where the one-minute averaged speed of all vehicles across the carriageway was greater or equal to 40mph.
Figure 2: Abort process summary

One-minute averaged data from the radar units (outlined later in Section 2.5.1) were issued weekly to TRL (Tuesday mornings) and the Safety Reports were created and issued by TRL before the end of the working day. A scheduled review call was carried out the following day (Wednesdays) and during this call the review group discussed the reported safety proxies and any weekly incidents. These review calls acted as the abort decision points outlined within Figure 2 above. An emphasis was placed on any feedback from the Traffic Management Supplier and work crews.

During the four-week trial monitoring period, the abort process was not implemented at any point.

2.5 Data collection and statistical comparisons

In order to achieve the objectives of this research (see Section 1.3), a number of different data sources were used:

- Radar data
- Incident data
- Survey data
- Workshop data

These data sources, and any statistical comparisons which were made, are outlined in more detail in the following sections. Suitable statistical comparisons were undertaken only when sufficient samples of data were available.

2.5.1 Radar data

In order to monitor speed, flow, headway and lane choice during the baseline and trial phases, two temporary radar installations were installed at the scheme. Each radar installation was
capable of monitoring traffic on a single carriageway, down to the level of individual vehicles. For this investigation two separate installations were used to monitor the control and experimental locations.

2.5.1.1 Location of radar installations

Both radar installations were situated on the side of their respective carriageways within the work zone. These positions are depicted in Figure 3 below.

![Location of radar installations](image)

Figure 3: Location of radar installations

Placement of the radar installations was limited due to the short nature of the scheme. Sites were chosen to be at least 2km from the start of the speed restrictions on both carriageways. This ensured that driver speeds and following distances were not greatly influenced by the start of the traffic management, allowing the study of the behaviour of drivers in response to the changes in speed limit.

2.5.1.2 Data collected

The radar installations provided data on vehicle flow, average speed and average headway\(^4\) for each carriageway and lane. These metrics were recorded and averaged across one-minute intervals.

Vehicle flow data were split by vehicle class:

- Class 1 (≤18ft)
- Class 2 (>18 - 22ft)
- Class 3 (>22 - 38ft)
- Class 4 (>38 - 120ft)

HGVs were defined as all vehicles in class 4 plus half of those in class 3.

In addition to one-minute average speed, the radars provided a count of vehicles in each of the following speed bins:

---

\(^4\) Average headway was defined as the time separation between vehicles, measured from the front bumper of the first vehicle to the front bumper of the following vehicle, averaged over one-minute intervals.
These bins were used to identify the number of drivers who were driving over the speed limit and those who were non-compliant with enforcement guidelines (i.e. 10% + 2mph above the speed limit\(^5\)). The enforcement thresholds were above 57mph in the 50mph speed limit and 68mph in the 60mph speed limit.

2.5.1.3 Data processing

In order to understand the potential impact of the speed restriction change on vehicle speeds, data on driver behaviour were required for periods when drivers were free to choose their own speed. This required conditions with free-flowing traffic. Periods with congested traffic were therefore removed; defined as periods when the average speed of vehicles was lower than 40mph. This resulted in the removal of less than 1% of the available data.

Many of the statistical tests used require the assumption of independence to hold, meaning the value of one observation must not influence or affect the value of other observations. However, data collected from the radar are not necessarily independent; average flow or speed data during one-minute intervals are likely to be correlated from one minute to the next. As such, to avoid the problem of dependence between measurements, data from each radar unit were randomly sampled by selecting one minute from each ten minute period. This process produced a dataset consisting of six randomly sampled one-minute periods within each hour, per radar unit. The duration of the monitoring periods used allowed for an appropriate amount of data to remain after this sampling was undertaken. In total, around 113 hours of data were used from each of the monitoring locations.

2.5.1.4 Issues with data collection

Due to technical issues with the supplied radar installations, a limited amount of Individual Vehicle Data (IVD) could be extracted and used in this investigation. Table 2 shows the proportion of days in each period where IVD was available, split by location.

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\(^5\) This is based on the National Police Chiefs Council/Association of Chief Police Officers (ACPO) *Speed Enforcement Policy Guidelines 2011-2015* (ACPO, 2013) which suggest that a Fixed Penalty or speed awareness education may be appropriate when the speed is 10% +2mph above the speed limit (see paragraph 9.6). These are only guidelines and a police officer/force can decide to enforce at a speed lower than this limit assuming they have considered the tolerance of the measurement equipment (paragraph 9.7).
Table 2: Proportion of days for which IVD was available

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<th>Description of activity</th>
<th>Control location (LB carriageway)</th>
<th>Experimental location (CB carriageway)</th>
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<td>Baseline monitoring period</td>
<td>3%</td>
<td>31%</td>
</tr>
<tr>
<td>29th Apr 2019</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30th Apr 2019</td>
<td>Trial monitoring period</td>
<td>93%</td>
<td>25%</td>
</tr>
<tr>
<td>27th May 2019</td>
<td></td>
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</table>

As a result of these issues, minute averaged data would be used for comparisons of flow, speed and congestion. The limited sample of IVD data would be used for the comparison of close following.

2.5.1.5 Comparison of flow

It was essential to understand how vehicle flow changed between the baseline and trial periods, since any changes in vehicle flow can affect the behaviour of road users and impact their speed. The following comparisons were made:

1. A comparison of overall and daily average vehicle flows between the baseline and trial periods at both experimental and control locations.
2. A comparison of average vehicle flow split by vehicle class between the baseline and trial periods.
3. A comparison of average vehicle flow composition by lane at the experimental location.

The results of these comparisons are presented in Section 3.1.1.

2.5.1.6 Comparison of speed

The following comparisons were made using the one-minute average speed data collected from the radars:

1. A comparison of average speed between the baseline and trial periods by monitoring location.
2. Comparison of average speed by lane between the baseline and trial periods at the experimental location.
3. A comparison of compliance with the posted speed limit between the baseline and trial periods by monitoring location.

The results of these comparisons are presented in Section 3.1.2.

2.5.1.7 Comparison of congestion

Data collected during periods of congestion were removed from the comparisons of flow and vehicle speed. This allowed for the impact of the speed restriction change to be explored, since comparisons were focused on free-flow conditions where drivers had free choice of
speed. It was however also important to understand the impact of the speed restriction change on the levels of congestion seen at the scheme. A comparison of average daily periods of congestion between the baseline and trial periods by monitoring location was made. The results of this comparison are presented in Section 3.1.3.

2.5.1.8 Comparison of close following

The following comparisons were made using the IVD collected from the radars:

1. A comparison of close following between the baseline and trial periods by monitoring location.
2. Comparison of close following by vehicle type between the baseline and trial periods at the experimental location.

The results of these comparisons are presented in Section 3.1.4.

2.5.1.9 Statistical comparisons

Appropriate statistical tests were used to test for significant differences between data recorded during the baseline and trial periods (i.e. to determine if driver behaviour changed following the implementation of the increased speed limit). Three types of statistical tests were used, depending on the type of data available:

- **Chi-squared tests** were used to test for a difference in the distribution of categorical data, for example to test for a difference in the distribution of vehicle flows between the baseline and trial periods.

- **Analysis of Variance (ANOVA)** was 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.

- **Two-proportion z-tests** were used to test for a difference in proportions, for example to test for a difference in percentage of vehicles close following.

Results were classified as ‘statistically significant’ if the p-value was less than 0.05 (a common standard in behavioural sciences). The p-value is a measure of probability, and a value of less than 0.05 implies that any differences between the groups being tested has a less than 5% chance that the difference occurred at random.

2.5.2 Incident data

Throughout both the baseline and trial phases of the investigation, incidents which occurred within the confines of the scheme traffic management were documented and collated by the scheme’s traffic management contractor. These logs identified the type of reported incidents

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6 A vehicle was defined as engaging in ‘close following’ if there was a gap of less than two seconds to the vehicle in front.
(breakdowns and road traffic collisions) along with the location of the incident (carriageway) and the date it took place.

Comparisons of the number of incidents between the baseline and trial phase were made; a summary of these data is presented in Section 3.2.

2.5.3 Workforce survey data

In an attempt to provide further insight into the potential impact of changing the speed limit at the scheme from 50mph to 60mph, a workforce survey was conducted during the trial monitoring period. The survey aimed to capture insight from project managers, site workers and members of the workforce who operate within the carriageway environment. Unfortunately no survey responses were received from the scheme and as such these data could not be included in the analysis summarised in this report.

2.5.4 Customer satisfaction survey data

2.5.4.1 Online survey

Throughout the on-road investigation, surveys were used to collect information on the impact of increasing the speed limit on the satisfaction levels of road users travelling through the scheme. These surveys were administered to individuals who had identified themselves as having travelled through the scheme during either the baseline and trial periods.

Targeting of these individuals was achieved through the use of a social media advertising campaign, with individuals within a 50km radius of both Ashford and Sandling targeted to take part in the study. The adverts were also shared with multiple special interest groups on social media platforms. This approach ensured the recruitment of individuals who regularly drove the route over the duration of the investigation.

The surveys collected data on customers’ feelings of safety affected by both the posted speed restriction and the width of the scheme’s lanes. Levels of journey satisfaction and how they were affected by the posted speed restriction and the width of the lanes were also captured.

Comparisons of the survey responses between the baseline and trial periods are presented in Section 3.4.

2.5.4.2 Statistical comparisons

A Chi-squared statistical test was used to test for significant differences between survey data recorded during the baseline and trial periods (i.e. to determine if customer satisfaction changed following the implementation of the increased speed limit).

Results were classified as ‘statistically significant’ if the p-value was less than 0.05 (a common standard in the behavioural sciences). The p-value is a measure of probability, and a value of less than 0.05 implies that any difference between the groups being tested has a less than 5% chance that it occurred at random.
2.5.5  Delivery and cost impacts

In order to understand the impact of the change in speed restriction on the scheme’s delivery and costs, a lessons-learned workshop was held after the monitoring periods had ended. The session sought to capture details on any impacts to the scheme associated with implementing the change in speed restriction. Attendees included the scheme’s Highways England Project Manager, Principal Contractor, Traffic Management Supplier and Risk Contractor.

A summary of the findings of this workshop is presented in Section 3.5.

3  Results

3.1  Driver behaviour

3.1.1  Vehicle flow

Figure 4 shows the average daily vehicle flow for the baseline and trial monitoring periods between the control and experimental monitoring locations.

![Average daily vehicle flow by location and monitoring period](image)

**Figure 4: Average daily vehicle flow by location and monitoring period**

The average daily vehicle flow varied over the course of the study at both the control and experimental locations. The control location had an average daily flow of 17,651 during the baseline period and 16,470 during the trial period. The experimental location had slightly higher average daily flows of 19,208 during the baseline period and 18,926 during the trial period.

A chi square test was conducted to test for statistically significant differences between the average daily vehicle flow by monitoring period and location. The test found that there was a statistically significant difference in flow between the control and experimental locations and between the baseline and trial periods ($p < 0.01$). This suggests that changes in average speed
or compliance with the speed limit may have been influenced by differences in vehicle flow, for this reason later comparisons have been weighted by flow.

A comparison of the proportion of HGVs by monitoring location and period is presented in Figure 5. This shows that the proportion of HGVs remained fairly constant at both locations throughout the trial. The average proportion of HGVs at the experimental location was 15% during the baseline period and 16% during the trial period. The proportion of HGVs at the control period was higher throughout the trial with an average of 22% during the baseline period and 24% during the trial period.

![Figure 5: Proportion of HGVs by week and location](image)

A two-proportion z-test indicated that the difference in the HGV proportions at the experimental location between the baseline and trial periods was statistically significant ($p < 0.01$). Tests also showed that there were significant differences ($p < 0.01$) in HGV proportion between the control and experimental locations during both periods. However as the proportion difference was minimal, on average 1% of total vehicles, this difference is unlikely to have had a significant impacted on driver behaviour.

The distribution of vehicles between Lane 1 and Lane 2 within the experimental location is shown in Figure 6.
The vehicle composition of Lane 1 at the experimental location remained similar between the baseline and trial periods. The proportion of HGVs was around 15% and the proportion of cars and LGVs was around 85% during the baseline period. The proportions changed marginally during the trial period to around 17% for HGVs and 83% for cars and LGVs. A chi square test showed that the small variation in vehicle composition between the baseline and trial periods at the experimental location was statistically significant ($p < 0.01$).

Likewise, the composition of vehicles in Lane 2 remained fairly constant between the baseline and trial periods. During the baseline period proportions were around 14% HGVs and 86% cars and LGVs. The trial period experienced proportions of 11% HGVs and 89% cars and LGVs. Similarly to Lane 1, a chi-square test showed that there was a significant difference between the baseline and trial periods ($p < 0.01$).

The small variations in vehicle composition by lane at the experimental location, even though statistically significant, are unlikely to have impacted on driver behaviour and as such any changes identified in vehicles speeds and speed compliance can be associated with both the change in speed restriction and changes in vehicle flow.

### 3.1.2 Vehicle speed

To ensure that comparisons of vehicle speed were not conflated by the presence of small numbers of high speed vehicles, the one-minute average speed data were weighted by vehicle flow. This ensured that more weight was given to data from periods when the flow was higher, compared to times when there were fewer vehicles (low flow), since averages calculated from small numbers of vehicles may be more greatly biased by high speed outliers.

Comparisons were made between control and experimental locations to account for background factors (aside from the speed restriction change) which may have influenced driver behaviour between the two monitoring periods.
Figure 7 shows the free-flow average speeds on the control and experimental locations across the two monitoring periods.

![Graph showing free-flow average speeds](image)

**Figure 7: Free-flow average speed during the monitoring period by location**

Free-flow average speed at the control location remained fairly constant throughout the investigation, at around 50mph. At the experimental location, there was an increase in free-flow average speed from around 51mph in the baseline period to around 57mph in the trial period.

A statistical test (ANOVA) confirmed that there was a significant difference in free-flow average speed (p < 0.01) between the baseline and trial periods at the experimental location. There was also shown to be a significant difference in average speeds between baseline and trial periods at the control location (p = 0.003), however the difference in average speeds was small at around 0.2mph.

Since the difference in flow between monitoring periods and monitoring locations has been shown to be significant, changes in speed may not be wholly attributed to the change in the speed restriction.

Free-flow average speeds by lane are shown in Table 3.

**Table 3: Free-flow average speed (mph) by monitoring period and lane at the experimental location**

<table>
<thead>
<tr>
<th>Monitoring period</th>
<th>Lane 1</th>
<th>Lane 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline period</td>
<td>50.6</td>
<td>53.7</td>
</tr>
<tr>
<td>Trial period</td>
<td>56.8</td>
<td>58.8</td>
</tr>
</tbody>
</table>

In both periods, speeds were slightly higher in Lane 2 than in Lane 1. Table 3 shows that the free-flow average speed in Lane 1 at the experimental location increased by 6.2mph between
the baseline and trial periods and in Lane 2 there was an increase of 5.1mph. Although not shown here, there was little change in the average speeds by lane at the control location.

In order to understand the compliance of road users with the posted speed, data were separated into speed bins. These speed bins (0-40, 40-50, 50-57, 57-60, 60-68, 68+mph) allow for vehicles to be identified as travelling: below the speed limit, above the speed limit but below the enforcement limit, and above the enforcement limit (10% of speed limit +2mph).

Figure 8 and Figure 9 show the proportion of vehicles recorded in each speed bin across the two monitoring periods at the experimental location.

The grey bars show the proportion of vehicles travelling below the speed limit; the orange bars show the proportion of vehicles travelling above the speed limit but below the enforcement threshold (10% of speed limit +2 mph); and the red bars show vehicles travelling above the enforcement threshold.

![Figure 8: Proportion of vehicles in each speed bin during the baseline period at the experimental location](image-url)
The proportion of vehicles travelling above the posted speed limit at the experimental location changed considerably between the baseline and trial periods, dropping from 57% to 27%. Similarly, the proportion of vehicles travelling above the enforcement limit decreased from 13% to 2% between the two periods.

When looking at the differences in the proportion of vehicles in each category (below speed limit, above speed limit but below enforcement threshold and above enforcement threshold), two-proportion z-tests showed that, for all three categories, the proportion of vehicles in the category was significantly different ($p < 0.01$) between the baseline and trial periods at the experimental location.

Figure 10 and Figure 11 show the proportion of vehicles recorded in each speed bin across the two monitoring periods at the control location.
The proportion of vehicles in each speed bin at the control location remained fairly consistent between the baseline and trial periods. This is expected as the posted speed limit remained the same during both periods at the control location, and further demonstrates that the changes observed at the experimental location were due to the change in speed restriction.
3.1.3 Congestion

A check was conducted on the total duration of congestion observed during the investigation. In total, less than 0.1% of the total time monitored was classified as congested; defined as any period where the one-minute averaged speed of all vehicles across the carriageway was less than 40mph. Figure 12 outlines the average speeds per hour of the day, by monitoring period and location.

Figure 12 shows that, generally, average speed was higher during the night (between 22:00 and 06:00) and lower during the day. This pattern appears consistent across the baseline period at both locations and during the trial period at the control location. During the trial period at the experimental location, however, the average speed was higher overall, and there were smaller differences between day and night speeds.

As on average the hourly average speed did not fall below 40mph it can be concluded that there was minimal routine congestion at the scheme. As such the introduction of a 60mph speed restriction did not appear to have an impact on the amount of congestion seen through the scheme.

![Figure 12: Average hourly vehicle speed by location and monitoring period](image)

3.1.4 Close following

A vehicle was defined as engaging in ‘close following’ if there was a gap of less than two seconds to the vehicle in front. This section presents comparisons of close following between monitoring period and location; both for all vehicles and split by vehicle class.

Figure 13 shows the proportion of total vehicles close following across the course of the trial at both the control and experimental locations. Note that IVD was not available for all weeks of the trial at both locations and therefore the chart does not show bars for all locations and all weeks.
During the baseline period the proportion of vehicles close following was 13% at the control location but slightly higher (15%) at the experimental location. During the trial period, the proportion was 14% at both locations.

A two-proportion z-test indicated that the small difference in the proportion of vehicles close following at both the control and experimental locations between the baseline and trial periods was statistically significant (p < 0.01).

Figure 14 shows the proportion of vehicles close following at the experimental location. The results are split by monitoring period and vehicle type. Note that there was no IVD available for trial weeks one and four. HGVs are defined as any vehicle over 30ft long.
The proportion of vehicles close following at the experimental location was higher for cars/LGVs than HGVs throughout the investigation. During the baseline period 18% of cars/LGVs were considered to be close following, this reduced to 16% during the trial period.

During the baseline period, the proportion of HGVs close following was 8% and this decreased to 6% during the trial period. However, Figure 14 shows that the proportion of HGVs close following also decreased each week during the baseline period.

A two-proportion z-test indicated that the difference in the proportion of both HGVs and cars/LGVs close following at the experimental location between the baseline and trial periods was statistically significant ($p < 0.01$).

### 3.2 Reported Incidents

In total 24 incidents were reported: 13 of which were in the baseline phase, and 11 in the trial phase. A summary of these reported incidents are presented in Figure 15.
The number of breakdowns and road traffic collisions (RTC) across both monitoring locations varied through the investigation, however the number of incidents of any given type were similar across the monitoring periods and locations. Due to the limited number of reported instances, no statistical analysis could be undertaken. The short length of the scheme (around 3.8km of speed restriction) and the limited duration of the monitoring period (8 weeks) may have contributed to the low number of reported incidents.

The experimental location experienced more reported incidents (21) than the control location (3) during the monitoring periods. During the trial no safety concerns were raised (by the contractor, the scheme and any adjacent schemes) around the number of reported incidents. As no further detail was provided concerning contributory factors it was therefore not possible to determine whether the change in speed limit may have been a contributory factor in any of the incidents reported by the scheme.

3.3 Journey time

Estimates of the average journey time were calculated based on the length of the road works and a single aggregated free-flow average speed of vehicles, for each four week monitoring period, from the radar data. Table 4 shows the estimated average journey time during the baseline and trial periods. Both monitoring locations have been included for the purposes of comparison.
Table 4: Journey time estimates by monitoring location

<table>
<thead>
<tr>
<th>Monitoring location</th>
<th>Length (km)</th>
<th>Average vehicle speed (mph)</th>
<th>Journey time (seconds)</th>
<th>Difference (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td>Trial</td>
<td>Baseline</td>
</tr>
<tr>
<td>Control</td>
<td>3.7</td>
<td>50.0</td>
<td>50.1</td>
<td>165.7</td>
</tr>
<tr>
<td>Experimental</td>
<td>3.8</td>
<td>51.4</td>
<td>57.3</td>
<td>165.4</td>
</tr>
</tbody>
</table>

The results suggest that changing the speed restriction from 50mph to 60mph decreased the average journey time by around 17 seconds. When considering the many thousands of drivers who travel through the scheme each day, the time savings are notable. No real change in journey time was observed at the control location, the speed restriction remained consistent throughout both monitoring periods.

3.4 Customer satisfaction

In total, 92 participants were identified from the customer satisfaction survey as eligible for inclusion in the investigation; 64 whose last journey through the scheme was in the baseline period (12 at the control location and 52 at the experimental), and 28 who reported that their last journey was during the trial period (8 at the control location and 20 at the experimental). A summary of their responses is presented below.

Due to the smaller number of responses from people who drove through the scheme during the trial period (28), statistical analyses were only performed when sufficient responses were received for each question.

Responses were excluded for two reasons:

- Participants reported that they did not clearly remember the journey (based on their responses to question 25 of the survey).
- Participants reported that they did not drive through the control or experimental location, or it was not possible to determine whether they had driven through either location (based on their responses to questions 7 and 8 of the survey, which ask where they joined and exited the motorway).

3.4.1 Feelings of safety

Participants were asked to rate how they thought the speed restriction affected their safety. Responses are shown in Figure 16.
**Figure 16: Responses to question: “How do you think the speed restriction affected your safety? Did it make you feel...” (split by monitoring period and location)**

The 60mph speed restriction was generally considered to have no impact on drivers’ feelings of safety. At the experimental location:

- During the baseline period (50mph), 37 out of 52 individuals (71%) reported the speed restriction did not affect how safe they felt. During the trial period (60mph), 15 out of 20 individuals (75%) reported the speed restriction did not affect how safe they felt.

- During the baseline period (50mph), 10 out of 52 individuals (19%) reported the speed restriction made them feel either very or slightly unsafe. During the trial period (60mph), 4 out of 20 individuals (20%) reported the speed restriction made them feel either very or slightly unsafe.

- During the baseline period (50mph), 5 out of 52 individuals (10%) reported the speed restriction made them feel either slightly or very safe. Only one individual reported the speed restriction made them feel either slightly or very safe during the trial period (60mph).

Due to the limited range of responses during the trial period at the experimental location no statistical tests could be undertaken to determine whether there were any statistically significant differences between the responses reported above. The range of responses did not provide sufficient numbers to satisfy the assumptions of the tests statistical tests used.

Participants were also asked to rate how appropriate they thought the speed restriction was, in terms of their own safety. Responses are shown in Figure 17.
Overall both speed restrictions were considered either ‘too slow’ or ‘about right’, in terms of safety. No individuals reported either speed restriction as being either slightly or much too high. At the experimental location:

- During the baseline period (50mph), 26 out of 52 individuals (50%) reported the speed restriction was either much or slightly too slow.
- During the trial period (60mph), 12 out of 20 individuals (60%) reported the speed restriction was either much or slightly too slow.

There were no statistically significant differences in responses between the baseline and trial monitoring periods at the experimental location.

As well as the effect of the speed restriction on perceived safety, participants were asked to comment on how the width of the running lanes within the scheme’s road works affected their feelings of safety. Responses are shown in Figure 18 and Figure 19.
The most common response from participants was that the lane widths were ‘about right’ and had no effect on their feelings of safety. Some participants indicated that they felt the lanes were ‘too narrow’ – no-one indicated that they were ‘too wide’. Statistical tests indicated that there was no significant difference in the perceptions of lane widths between the baseline or trial period at the experimental location. There was also no significant difference identified in the perceived safety associated with the lane widths between baseline
and trial periods at the experimental location. In summary of the data at the experimental location:

- During the baseline period (50mph), 29 out of 52 individuals (56%) reported the width of the lanes was about right, and 28 out of 52 individuals (54%) reported the width of the lanes did not affect how safe they felt.

- During the trial period (60mph), 9 out of 20 individuals (45%) reported the width of the lanes was about right, and 11 out of 20 individuals (55%) reported the width of the lanes did not affect how safe they felt.

- No significant differences in responses were identified.

Finally, in an open question, participants were asked to provide any further comments on their feelings of safety when they last drove between Junctions 10 and 11 of the M20. Table 5 shows themes that emerged from participants’ comments in relation to their feelings of safety, the road works speed limits or width of the lanes. No positive comments were provided by any participants.
<table>
<thead>
<tr>
<th></th>
<th>Control location</th>
<th></th>
<th>Experimental location</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline period</td>
<td>Trial period</td>
<td>Baseline period</td>
<td>Trial period</td>
</tr>
<tr>
<td><strong>Negative comments</strong></td>
<td>Other drivers exceeded the speed limit. Other drivers drove well below the speed limit, causing HGV drivers to overtake in the offside lane.</td>
<td></td>
<td>Other drivers exceeded the speed limit.</td>
<td>Speed limit was too low. Other drivers drove well below the speed limit. The speed limit caused other drivers to tailgate.</td>
</tr>
<tr>
<td><strong>Speed limits</strong></td>
<td>Increase speed limit to 60mph.</td>
<td>Increase speed limit to at least 56mph to match the speed restriction on HGVs. Increase speed limit when there are no road workers present. Deter tailgating through police presence.</td>
<td></td>
<td>Speed limit was unnecessary.</td>
</tr>
<tr>
<td><strong>Suggestions to improve safety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Width of lanes</strong></td>
<td>Lanes were too narrow.</td>
<td></td>
<td>Lanes were too narrow.</td>
<td>Other drivers had poor lane discipline in narrowed lanes. Overtaking was difficult due to narrowed lanes. HGV drivers overtook other HGV drivers, limiting space for other vehicles.</td>
</tr>
<tr>
<td><strong>Negative comments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Suggestions to improve safety</strong></td>
<td>HGV drivers should be permitted to use only the inside lane.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additionally, participants made other general comments about road works and safety. One participant who drove through the control location during the baseline period felt that the
offer of free recovery increased safety. Two negative comments were made by participants who drove through the experimental location during the baseline period: one participant mentioned the lack of police presence to discourage dangerous driving behaviours and another participant mentioned the lack of information on signs through the road works (e.g. about debris on the road).

3.4.2 Journey satisfaction

Participants were asked to rate how they thought the speed restriction affected their journey satisfaction. Responses are shown in Figure 20.

![Figure 20: Responses to question: “How satisfied or dissatisfied were you with the speed restriction?” (Split by monitoring period and location)](image)

The 60mph speed restriction did not appear to have an impact on drivers’ levels of satisfaction. Statistical tests indicated that there were no significant differences between baseline and trial period responses at the experimental location:

- During the baseline period (50mph), 32 out of 52 individuals (62%) reported the speed restriction did not affect their satisfaction. During the trial period (60mph), 10 out of 20 individuals (50%) reported the speed restriction did not affect their satisfaction.
- During the baseline period (50mph), 16 out of 52 individuals (31%) reported the speed restriction made them feel either very or somewhat dissatisfied, and 4 out of 52 (8%) reported the speed restriction made them feel either very satisfied.
- During the trial period (60mph), 8 out of 20 individuals (40%) reported the speed restriction made them feel either very or somewhat dissatisfied. 2 out of 20 (10%) reported the speed restriction made them feel either very satisfied.

Participants were also asked to rate how appropriate they thought the speed restriction was, in terms of their own journey satisfaction. Responses are shown in Figure 21.
Figure 21: Responses to question: “In terms of journey satisfaction, do you think the speed restriction was...” (split by monitoring period and location)

Overall both speed restrictions were generally considered ‘too slow’, in terms of journey satisfaction, or ‘about right’. Statistical tests indicated that there were no significant differences in responses between the baseline and trial phases at the experimental location:

- During the baseline period (50mph), 28 out of 52 individuals (54%) reported the speed restriction was either much or slightly too slow.
- During the trial period (60mph), 11 out of 20 individuals (55%) reported the speed restriction was either much or slightly too slow.

Participants were also asked to rate how appropriate they thought the lane widths were, in terms of their own journey satisfaction. Responses are shown in Figure 22.
Figure 22: In terms of journey satisfaction, do you think the lane widths were... (split by monitoring period and location)

Statistical tests indicated that there were no significant differences in responses between the baseline and trial periods at the experimental location:

- During the baseline period (50mph), 29 out of 52 individuals (56%) reported the width of the lanes was about right. During the trial period (60mph), 9 out of 20 individuals (45%) reported the width of the lanes was about right.

- During the baseline period (50mph), 23 out of 52 individuals (44%) reported the width of the lanes were either much or slightly too narrow. During the trial period (60mph), 11 out of 20 individuals (55%) reported the width of the lanes were either much or slightly too narrow.

Participants were asked to rate how they thought the lane widths affected their satisfaction. Responses are shown in Figure 23.
Figure 23: Responses to question: “How satisfied or dissatisfied were you with the lane widths?” (Split by monitoring period and location)

Statistical tests indicated that there were no significant differences in responses at the experimental location between the baseline and trial periods:

- During the baseline period (50mph), 27 out of 52 individuals (52%) reported the width of the lanes did not affect their satisfaction. During the trial period (60mph), 8 out of 20 individuals (40%) reported the width of the lanes did not affect their satisfaction.

- During the baseline period (50mph), 19 out of 52 individuals (37%) reported they were either very or somewhat dissatisfied with the width of the lanes. 6 out of 52 individuals (11%) reported they were either very or somewhat satisfied with the width of the lanes.

- During the trial period (60mph), 10 out of 20 individuals (50%) reported they were either very or somewhat dissatisfied with the width of the lanes. 2 out of 20 individuals (10%) reported they were either very or somewhat satisfied with the width of the lanes.

Finally, participants were asked to comment on their journey satisfaction when they last drove between Junctions 10 and 11 of the M20.

Table 6 shows themes that emerged from participants’ comments in relation to their journey satisfaction, the road works speed limits or width of the lanes. No positive comments were provided by any participants.

**Table 6: Themes from participants’ comments in relation to their journey satisfaction**

<table>
<thead>
<tr>
<th>Control location</th>
<th>Experimental location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline period</td>
<td>Trial period</td>
</tr>
<tr>
<td>Baseline period</td>
<td>Trial period</td>
</tr>
</tbody>
</table>
### Speed limits

<table>
<thead>
<tr>
<th>Negative comments</th>
<th>Other drivers exceeded the speed limit.</th>
<th>Other drivers exceeded the speed limit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suggestions to improve journey satisfaction</td>
<td></td>
<td>Deter tailgating through police presence.</td>
</tr>
</tbody>
</table>

### Width of lanes

<table>
<thead>
<tr>
<th>Negative comments</th>
<th>Other drivers had poor lane discipline in narrowed lanes.</th>
</tr>
</thead>
</table>

Additionally, three participants who drove in the experimental location during the baseline period made general comments about road works and journey satisfaction: one participant commented that they thought the road works would improve the motorway, whereas the other participants reported that road works cause congestion and delays. Two participants who drove in the experimental location during the trial period also made general comments: one participant commented that road works are necessary to improve the motorway and the other reported that the presence of the road works increases the time taken to complete journeys.

### 3.5 Scheme delivery and cost

#### 3.5.1 Delivery

Overall the scheme indicated that delivery of the works activities were not impacted by the 60mph speed restriction. Discussions recorded as part of the lessons learned workshop concluded that the trial and implementation of a 60mph speed restriction had not impacted on the delivery schedule of the scheme.

#### 3.5.2 Cost

In order to safely implement the 60mph speed restriction, on the coast bound carriageway of the scheme’s traffic management, several additional key mitigations and activities were required. These included:

- Higher containment vehicle restraint systems and end terminals.
- Mobile variable message signs, used for incident management.
- Additional static signing (speed limit signs).
- On-site presence of an impact protection vehicle used for incident management and recovery.

Along with the costs of these additional mitigations, two other additional costs were incurred by the scheme in order to implement the trial of a 60mph speed restriction. These were:

- The consultancy of technical experts to undertake the scheme-specific safety risk assessment.
- Temporary radar installations used for monitoring traffic during the investigation.
4 Conclusions

This section summarises the conclusions from the investigation. As previously mentioned in section 2.5.1.4, there were some limitations with the data collected on-road, in particular the loss of individual vehicle data meant that assessment of the impact of the change in speed restriction on levels of close following was limited.

These conclusions are based on the findings from a single investigation undertaken at a specific scheme. Both the design and implementation of the scheme’s traffic management and trial mitigations impact greatly on the behaviours identified. As such, caution should be taken when using these conclusions to inform decisions about implementing future 60mph speed restrictions on schemes with different designs.

As part of the final project report, the conclusion from this report will be brought together with those from other participating schemes. This final report has been outlined later in section 6.2.

4.1 Impact of change in speed restriction on driver behaviour

Analysis of driver behaviour during periods of free-flowing traffic showed that, on average, drivers appeared to respond to the increase in speed restriction from 50mph to 60mph by increasing their travelling speed (from about 50mph in the baseline period to 57mph in the trial period, on average). The increase in average vehicle speed was consistent across both carriageway lanes. This increase in average vehicle speed resulted in an estimated average journey time reduction of around 17 seconds per driver.

Whilst average speeds increased, overall compliance with the posted speed limit was higher in the 60mph condition than the 50mph condition. A proportion of drivers were travelling above 50mph in the baseline period, but a lower proportion chose to travel above 60mph in the trial period.

Unfortunately due to issues with the radar installations it was not possible to assess compliance or changes in speeding behaviour between vehicle types.

The distribution of cars and HGVs across the two running lanes was not greatly affected by the change in speed restriction. This suggests that the change in speed restriction did not alter the number of HGVs travelling in the offside lanes (albeit only a small number were observed in the data).

The scheme in general experienced relatively consistent levels of close following between vehicles but there was a small change as a result of the change in speed restriction. The experimental location experienced proportions of around 15% in the baseline period and then 14% during the trial period. The proportion of HGVs close following dropped marginally from 8% in the baseline period to 6% in the trial period. This small change was likely related to the difference in average vehicle speeds and compliance with posted speed limits after the change of speed restriction, with speed differentials between vehicles classes reducing resulting in less close following.

Due to a small sample size, the impact of the speed restriction change on the number of incidents and breakdowns could not be determined.
4.2 Impact of change in speed restriction on customer satisfaction

Analysis of customer survey responses during the investigation identified no statistically significant differences in the patterns of responses between baseline (50mph) and trial (60mph) periods at the experimental location. This suggests that the 60mph speed restriction did not have a large impact on drivers’ feelings of safety or satisfaction when travelling through the scheme.

4.3 Impact of change in speed restriction on scheme cost and delivery

Feedback from the scheme suggested that the introduction and application of a 60mph speed restriction had no negative impact on the schedule and delivery of the works. However, it was reported that substantial additional resource was required to implement the investigation as part of this trial.

Several large fixed costs were also incurred in order to implement additional risk mitigations, such as higher containment vehicle restraint systems.

This information will be used to inform future use of 60mph speed restrictions within road works and will be presented alongside future guidance material.

5 Other investigations

5.1 Highways England customer audits

Separate to this investigation, Highways England’s insight team investigated the impact of the change in speed restriction on customer satisfaction by undertaking customer audits of the scheme. For ease of reference, and with permission from Highways England, a copy of the report can be seen in Appendix D.

These customer audits, undertaken by Ipsos and Pell Frischmann, utilised briefed ‘Auditors’ (i.e. members of the public) who lived in the vicinity of the scheme. These Auditors were given a full written brief detailing where they needed to go, what they needed to look out for, and a preview of the survey questionnaire. Auditors were instructed to drive through the scheme and undertake a survey within 24 hours. These surveys sought to identify the impact of the speed restriction change on both customer safety and customer satisfaction. In total 56 surveys were completed, 29 whilst the scheme was in the baseline trial phase and 27 during the trial phase.

Survey responses were then reviewed via a quality control process by a validation team. This team looked for contradictions and irregularities within the responses of each survey. If completed surveys were deemed to be of poor quality, they would not be included in the top line results. No surveys were reported to have failed this quality control process for the investigations on the M20.

The headline findings from these customer audits are summarised below. Some caution is advised in the extrapolation of these results since a small sample of Auditors was used (29 in the control phase and 27 in the trial phase). In addition, no details are provided in the “Top Line Results” report with regard to whether statistically significant differences were identified.
between the 50mph and 60mph phases; therefore it is not possible to draw robust conclusions from these data regarding the impact of the increase speed restriction.

Key points noted in the “Top Line Results” report (Appendix D) are as follows:

- 24/29 Auditors (83%) felt 50mph was appropriate for the conditions, and 26/27 Auditors (96%) felt 60mph was appropriate.
- 29/29 Auditors (100%) reported that the signage was easy to see in the control (50mph) phase, and 27/27 (100%) reported it was easy to see in the trial (60mph) phase.
- 29/29 Auditors (100%) indicated that they felt safe in 50mph, and 27/27 (100%) said they felt safe in 60mph.
- 8/29 Auditors (28%) were very satisfied with the 50mph speed limit, and 17/27 (63%) were very satisfied with 60mph.
- 23/29 Auditors (79%) felt 50mph was about right, and 6 Auditors (21%) felt it was too slow. 25/27 Auditors (93%) felt 60mph was about right.

The report concluded that the results collected from the surveys suggest that the traffic conditions on the M20 junction 10a (which has relatively little congestion and low traffic volumes) greatly affected customers’ perceptions of the speed limits. Auditors noted that in the 50mph conditions other drivers were going “well beyond” the speed limit due to traffic being clear. The report also concludes that a customer would be more satisfied with the higher speed limit.

5.2 Highways England social media listening

Separate to this investigation Highways England’s insight team investigated the impact of the change in speed restriction on customer satisfaction by monitoring social media postings using a TalkWalker, a specialist social listening tool. The tool utilised a search query, containing the following key words:

- M20 J10
- M20 J10a
- Increased speed from 50mph to 60mph
- Road works near Ashford
- Road works near A2070

Feedback collected in this investigation using this query concluded:

- Road users feel incredibly intimidated and angered by HGV vehicles that disobeyed speed restrictions. Road users suggest there is a lack of policing and punishment in place. Many comments suggested HGV vehicles are ignoring speed limits, regardless of what they state.
- Road users were concerned with HGV vehicles and one road user felt that 50mph was dangerously slow.
- Road users were confused as to why the speed restriction was different than other parts of the motorway. Many road users demanded an explanation. One road user suggested the need for an increased 60mph speed limit to overtake HGV vehicles.

Due to the presence of adjacent road works, these findings cannot be solely attributed to thoughts on the M20 junction 10a scheme. Instead they must be considered to reflect the thoughts of individuals commenting on either the M20 junction 10a scheme or the traffic management in place between junction 8 and junction 10 for Operation Brock.

6  Next steps

6.1  Continued use of 60mph at the M20 junction 10a scheme

Upon completion of the trial of 60mph on the coast bound carriageway, a review and validation exercise was undertaken by the scheme in order to determine if the 60mph speed restriction could be implemented on the London bound carriageway of the scheme.

In line with the agreed monitoring process, detailed in the scheme-specific risk assessment, available data were reviewed in order to determine if the safety objectives had been met during the trial. Based on this review:

- The continued use of the 60mph speed restriction on the coast bound carriageway was approved.
- The change of speed restriction on the London bound carriageway, from 50mph to 60mph, was also approved.

6.2  Implementation of 60mph at other schemes

This is the third investigation of a 60mph speed restriction within road works as part of this project. TRL is working closely with Highways England to implement 60mph speed restrictions at other schemes on the Strategic Road Network. Several additional lessons learned were captured as part of this investigation; these have been outlined in Appendix C and should be considered when implementing the 60mph speed restriction on other schemes in the future.

The results from future investigations (each to be presented in their own report) will be collated together (in a final report) once the monitoring programme is complete.

The final report will enable robust recommendations to be made on the basis of a large and substantial evidence base, with findings being used to inform guidance material into the use of appropriate speed restrictions within road works.
Acknowledgements

The following individuals (or organisations) contributed directly to the investigation of a 60mph speed restriction with the M20 junction 10a road works:

- Paul Osborne and Peter Thickbroom – Taylor Woodrow
- Ryan Bridger, Asha Bogle and Simon Wickenden – WSP
- Thomas Selby and Amy Hulley – Highways England

References


Appendix A  PSCRG Members

Principal members:

- A senior Highways England Project Manager and/or Senior Responsible Owner
- Lead consultancy support, with relevant risk assessment knowledge, competence, design understanding and experience with Highways England safety governance procedures
- Network Delivery and Development Senior User
- Customer Operations Senior User
- Competent Designer Safety / Operations Expert
- Project Construction, Design and Management Coordinator
- Contractor representative (when appointed)
- Professional and Technical Solutions Safety Risk and Governance representative

Specialist members:

- Additional technical support (Professional and Technical Solutions specialists or external subject matter experts, as required)
- The Design Team Project Manager
- Asset Support Contract representative
- Maintenance representative, including technology
- Stakeholder representative (e.g. other RCC/Traffic Officer Service representatives)
Appendix B  Additional monitoring

As part of the risk management process, a period of additional monitoring was undertaken after the 4-week initial trial period. This additional monitoring was required whilst updates to departures were submitted and approved ahead of the continued use of the 60mph speed restriction within the scheme’s traffic management; monitoring took place over a further 8 weeks, resulting in 12 weeks of ‘trial’ data).

Radar data from these additional 8 weeks were reviewed weekly as part of the scheme’s abort process (described in Section 2.4 of this report). Figure 24 shows the free-flow average speeds at the control and experimental locations across both the original monitoring periods (4 baseline weeks and 4 trial weeks) and for the extended trial monitoring period (an additional 8 weeks).

![Figure 24: Free-flow average speed during the extended monitoring period by location](image)

To ensure that comparisons of vehicle speed were not conflated by the presence of small numbers of high speed vehicles, the one-minute average speed data were weighted by vehicle flow. This ensured that more weight was given to data from periods when the flow was higher, compared to times when there were fewer vehicles (low flow), since averages calculated from small numbers of vehicles may be more greatly biased by high speed outliers.

Average speed across the additional 8 weeks remained consistent at the experimental location, at around 58mph compared to the 57mph observed during the first four weeks of the trial monitoring period, and compared to just over 50mph in the four baseline weeks.
Appendix C  Lessons learned

In order to understand the impact of the change in speed restriction on the scheme’s delivery and costs, a lessons-learned webinar was held after the trial had ended. This session sought to capture details on any impacts to the scheme associated with implementing the change in speed restriction. Attendees included: the scheme’s Highways England Project Manager; Principal Contractor; Traffic Management Supplier; and Risk Contractor.

The following questions were posed to attendees.

**Question: How do you feel that the investigation went on a general level? What worked well? What didn’t? Why?**

Summary of key points made:

- The risk assessment process worked well, although initial risk discussions were long and took time. Face-to-face meetings were important initially to build relationships.
- The overall process for the trial was intensive; at times there were many hoops to jump through. This wasn't helped by the changing environment of adjacent schemes/projects.
- The scheme had to implement many of the required actions and changes initially at risk, these costs were due to implementing the investigation rather than just the 60mph speed restriction. In future trials a funding mechanism for schemes should be established to mitigate this requirement.

**Question: Early on some potential concerns in relation to changing the speed restriction for this scheme were raised. Were any of them realised? If so, how?**

Summary of key points made:

- Compliance with the two speed restrictions was good.
- Undertaking light removals (as part of the free recovery) was considered ‘business as usual’.

**Question: Was any additional traffic management equipment required to make the scheme suitable for 60mph speed restriction? If so, what?**

Summary of key points made:

- Additional variable message signs, mainly for the London bound carriageway were required. Existing MS3s on the coast bound carriageway were used. For continued use of the 60mph speed restriction on both carriageways, additional portable variable message signs would be required on the coast bound carriageway.

**Question: Did you have to make any modifications to risk assessments or method statements?**

Summary of key points made:

- Recovery risk assessments were updated; this required some effort but did not result in substantial changes.
- Toolbox talks for site workers were undertaken.
Question: Were additional staff required to implement the use of a 60mph speed restriction? If so, what was the impact of this on budget compared to if the scheme has not been running at 60mph?

Summary of key points made:

- For the scheme, trials such as these are considered ‘add-ons’ to the ‘day job’. They are a good advert for the scheme and participating contractors. Including a 60mph speed restriction trial from project inception would require minimal staff effort.
- The scheme appreciated the good support from the internal dedicated team from Highways England.

Question: Summary, what were your feelings on the impact of using a speed restriction of 60mph, rather than 50mph, within the scheme on: the safety of both road users and road workers? The satisfaction of customers? The delivery schedule of the scheme?

Summary of key points made:

- The trial and implementation of a 60mph speed restriction did not impact on the delivery schedule of the scheme.
- No issues were raised in terms of road user safety.
- Anecdotally, customer response has been good to the change in speed restriction.
- For a short scheme, the costs were high for implementing the trial.
Appendix D  Ipsos Customer Audits

Highways England
Customer Audits – Speed Trials – M20 J10
Top Line Results
June 2019
Contents

• Introduction & Methodology
• Results
• Conclusions & Recommendations
Report for the on-road trials of 60mph on the M20 junction 10a

Research Methodology

Schemes

Customer Audits conducted across the following schemes:

- M20 J10 over the March/May Period
- Highways England have been trialling a new 60mph speed limits whilst going through the M20 J10 scheme. Auditors were specifically briefed to undertake the usual customer audit but also look out for/observe the speed limit and provide their perception on the limits.

Measurement

Scheme audits assessing:

- The auditors perception of the 50mph/60mph speed limit that was in place.
- The audits were split evenly to gain an understanding of a customers perception of both speed limits

Sample Base

M20 J10 n=56

50mph Tests n=29
60mph Tests n=27

This work was carried out in accordance with the requirements of the international quality standard for market research, ISO 20252 and with the Ipsos MORI Terms and Conditions.
Results
The 60mph tests were seen as more appropriate for the conditions

Did you feel the speed limit in place was appropriate for the conditions?

50 MPH
% Yes
83%

60 MPH
% Yes
96%

“It’s not a pleasure to drive at only 50 speed when the road is fluid. The speed limit at 50 is appropriate if there is big traffic but if there is no traffic and the road is clear the speed limit 50 is too slow and it is annoying to drive at a slow speed on a clear road.”

Base: n=29

“It seems to have increased from 50 so this was quite pleasing as it helps the traffic move through quicker.”

Base: n=27
In addition, the signage was easy to see

Was the signage displaying the speed limit easy to see?

50 MPH
% Yes

100%

"Different signage was evident displaying the speed limit and easy to see on M20."

60 MPH
% Yes

100%

"It was well angled and clearly visible in advance."

Base: n=29

Base: n=27
The higher speed limit felt as safe as the lower limit

Did you feel safe travelling at the speed limit through the scheme?

50 MPH

% Yes

100%

Average speed recorded by the auditor = 49 mph

60 MPH

% Yes

100%

Average speed recorded by the auditor = 58 mph

The average speed was provided by the auditors verbatim based on what they recorded during the journey.

Base: n=29

Base: n=27
The auditors felt that the 50mph limits was at times too slow

Did you think the speed limit was too high / too low / about right?

**50 MPH**
- 79% stated the speed limit was too slow
- "I think everyone drives in excess of 50 when the road is clear."
  
  *Base: n=29*

**60 MPH**
- 93% stated the speed limit was about right
- "The speed limit at 60 mph is just right for the roadworks zone."
  
  *Base: n=27*
The audits noted that the road was mostly clear leading to auditors noting that other road users were going above the 50mph limit.

**How satisfied were they with the speed limit?**

**50 MPH**

- Very Satisfied: 28%
- Satisfied: 48%
- Neither Satisfied: 17%
- Dissatisfied: 7%
- Very Dissatisfied: 0%

*“Difficult to drive at 50 if there is no traffic.”*

*“When the lorries have a speed above 50 it is impossible for a small car to roll at 50.”*

**60 MPH**

- Very Satisfied: 63%
- Satisfied: 30%
- Neither Satisfied: 4%
- Dissatisfied: 4%
- Very Dissatisfied: 0%

*“60 mph is better than 50 mph.”*

*“Hardly affects progress but feels safe.”*

Base: n=29

Base: n=27
Recommendations & Conclusions
Recommendations & Conclusions

The traffic conditions on the M20 J10 greatly affected the customers' perception of the speed limits

Several auditors have noted that in 50mph conditions other drivers were going well beyond this limit due to the traffic being clear. That made them feel uneasy when HGV vehicles were travelling past them at higher speeds. Although this didn’t affect the perception of safety towards the speed limits, it could be leading to dangerous situations through the scheme.

The audit results suggest that a customer would be more satisfied at the higher speed limit.

Signage was clear and well positioned in all cases

All signage was viewed easily and all auditors were aware of the speed limits in place. The lighter levels of traffic will have also contributed to being able to see all the signage.
Monitoring and evaluation of the 60mph trials

The purpose of this trial was to understand the impact of changing the speed restriction within the M20 J10a scheme from 50mph to 60mph on driver behaviour, customer satisfaction and the scheme’s cost and delivery. The findings from this investigation will be used, along with other investigations, to inform the development of guidance material for future road works design.

The investigation involved monitoring of data from ‘control’ and ‘experimental’ locations positioned within the road works scheme. A number of different data sources were used for both locations across a ‘baseline period’ (when both locations were subject to a 50mph speed restriction) and a ‘trial period’ (when the control location was subject to a 50mph speed restriction and the experimental location was subject to a 60mph speed restriction). These data sources included road side radar data, scheme incident logs, and online surveys from both customers and the scheme workforce. Feedback from the workforce was also gathered during workshops with scheme representatives.

The change in speed restriction resulted in increased average speeds, reduced average journey times, and reductions in the proportion of drivers travelling over the speed limit. Little impact on drivers’ self-reported levels of satisfaction was identified. Further findings are detailed within the report.