

CLIENT PROJECT REPORT CPR2491

Monitoring and evaluation of the 55/60mph pilots

Final report for 60mph trials

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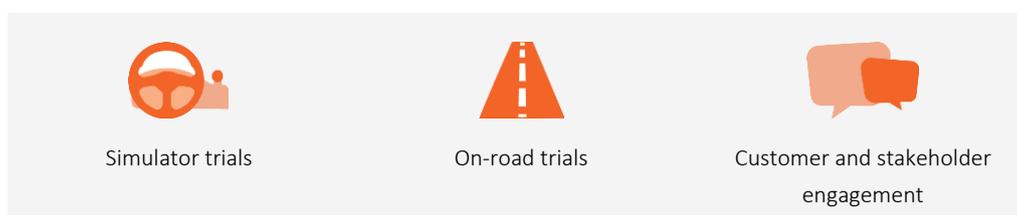
Executive Summary

Monitoring and evaluation of the 60mph pilots

As an organisation that is committed to improving the experience of its customers, Highways England commissioned this work to provide monitoring and evaluation of increased speed limits through roadworks. The safety of road users and road workers was monitored, along with surveys investigating customer satisfaction with the speed limit increase. This information will be used to challenge the 'blanket' approach to speed management undertaken at major motorway schemes.

Work undertaken

This report focuses on the findings and recommendations related to an increase in speed limit from 50mph to 60mph. During the course of the project, the following activities were undertaken:



Safety findings

- + There was no indication that a 60mph speed limit through roadworks had a negative impact on the safety of road users.
- + The increased speed limit was perceived as inherently less safe by some road workers, with concerns raised over the increased severity of incidents with vehicles travelling faster through the works.
- + Previous apprehensions by some road workers changed as the benefits of reduced close-following by HGVs were seen on-road.
- + Other road workers had fewer safety concerns and reported benefits such as improved response times to incidents and improved traffic flows.

Customer service findings

- i Road users perceived the 60mph speed limit positively, both in terms of journey time and overall satisfaction.
- i Results suggested that changes in speed limit are not the only factor which contributes towards satisfaction levels. Road users cited dissatisfaction with the length of the works, absence of road workers, journey times, road closures, narrow lanes and safety aspects associated with incidents.
- i Road users perceived a step up in speed limit more positively than a step down. However they would be more accepting of a step down if they were kept informed of the reasons.
- i Road workers suggested that more communication was needed with road users. Social media was suggested as the best platform for these communications.
- i Across participants from both the simulator and on-road trials, there was an appetite for more 'dynamic' speed limits within roadworks.

Recommendations

Safety

The signing configuration used around step downs in the speed limit should be investigated further, as there was evidence that not all road users noticed the step from 60mph to 50mph. Identifying a signing configuration that maximises road user compliance with minimal impact on road worker safety is imperative to the use of speed limit changes within roadworks.

Communication with road workers around the intended application of the increased speed limit and the importance of their safety is necessary if the implementation of 60mph at other schemes is to be successful.

Customer service

Schemes should do more at a local level to improve the perception of roadworks, perhaps providing more information to drivers about timescales, long term benefits and progress.

Safety needs to be central to all communications with road users. Key points around the importance of speed compliance, how speed restrictions have a positive impact on journey time and the role road workers play in making the roads a safer and better place for motorists should all be communicated.

Increased communication with drivers about changes within the works, especially providing reasons behind the changes, should be considered for all future Major Project Schemes.

In addition to speed limits, steps should be taken to improve other aspects of the works to improve customer satisfaction. Dynamic roadworks, which are shorter, minimise disruption and are delivered quicker, would help to achieve this.

Delivery

Planning for higher speed limits needs to be done at the design stage of a scheme as there are several specific considerations (outlined within the report) that make it difficult to retrospectively apply increased speed limits to existing Major Projects.

Roadworks standards and guidance needs to be updated to cover 60mph.

A 'Planning for 60mph' toolkit should be developed, in order to drive the expectation that speed limits other than the blanket 50mph are implemented where practicable.

The Temporary Traffic Regulation Order (TTRO) process needs to be overhauled to allow more flexibility in the enforceable speed limit.

Other opportunities for 60mph speed limits should be identified; the limited application of the increased speed limit during these trials (in specific scenarios where there was minimal on-road work) could be expanded to other phases of construction.

1 Introduction

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

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

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

1.1 Objectives of the project

Three specific scenarios were defined for the purposes of this project:

Scenario 1: Implementation of a 60mph speed limit on lead-in and exits to/from the works, with a 50mph speed limit through the works area

Scenario 2: Changing the speed limit (to either 55mph or 60mph) during the operational testing (or 'pre-commissioning') phase of Smart Motorway schemes

Scenario 3: Changing the speed limit (either to 55mph or 60mph) throughout the works during a 'holiday period' when there are no road workers present

To date, this project has trialled increases in the speed limit from 50mph to 55mph, and from 50mph to 60mph, within a digital car simulator and on-road at a number of locations. The aim of these trials was to determine if the increased speed limit had any negative impact on road user or road worker safety, and to understand what impact there was on customer satisfaction.

Scenarios 2 and 3 have both been trialled on-road and the results of these trials are reported on in a number of TRL reports. Although the specific circumstances for Scenario 1 were not trialled, evidence was obtained from the trials of Scenario 2 and 3 relating to the use of stepped speeds within roadworks.

1.2 Aim of this report

The aim of this report is to highlight the key findings from the simulator and on-road trials of 60mph, and to make recommendations for next steps. The trials of 55mph are still on-going and hence findings for these are not presented in this report.

The findings are presented in relation to Highways England's three imperatives: safety, customer service and delivery of the Road Investment Strategy.

2 Summary of work completed

2.1 Simulator trials

Two simulator trials were carried out as part of this project. The primary aim of these was to understand the likely impact of the alternative speed limits on safety and customer satisfaction. This was particularly important for 55mph since this speed limit is not currently used on the network and thus there is no evidence regarding how it might affect driver behaviour, perceptions or performance, in particular in the vicinity of roadworks.

The first trial (Wallbank, Robbins, Tailor, & Chowdhury, 2017) used TRL's advanced driving simulator (DigiCar) to compare driver behaviour and subjective impressions of safety and satisfaction between four different drives which displayed a single speed limit throughout the roadworks (50mph, 55mph, 60mph or 70mph), and an additional four drives with a single change of speed limit (step) within the works. In the 60mph speed limit, driver behaviour was similar to that in the 50mph speed limit. However, there was some evidence to suggest driver behaviour in roadworks differed when the speed limit was 55mph compared to 50mph.

The second trial (Wallbank, Balfe, & Chowdhury, 2017) explored possible reasons for these differences, in order to understand the relative safety implications of the 55 and 60mph speed limits. The primary aim of this follow-up study was to provide clear evidence as to the suitability of trialling 55mph speed limits on the Strategic Road Network (SRN). The results of this trial are not the focus for this report.

2.2 On-road trials

Three on-road trials of 60mph were carried out as part of this project:

1. Trial of Scenario 2 at the M1 junction 32-35a scheme in late 2016 (Wallbank, Palmer, Hammond, & Myers, 2017)
2. Trial of Scenario 3 at the A1 Leeming to Barton scheme during the Christmas embargo period in 2016/17 (Wallbank, Hammond, Myers, & Chowdhury, 2017)
3. Trial of Scenario 2 at the M5 junction 4a-6 scheme in Spring 2017 (Wallbank, Chowdhury, Fleetwood, & Myers, 2017)



These trials involved monitoring driver behaviour before and after the speed limit change. The aim was to understand what impact the 60mph speed limit had on driver speed choice, close following behaviour and the number of breakdowns and road traffic collisions. The data were used to understand the potential impact on road user and road worker safety as a result of the increase in speed limit.

Due to the nature of the roadworks and the timing of the trial within the scheme, each trial used a slightly different layout and monitoring specification (the details of which can be found in the reports for each trial). However, as a result, drivers experienced the 60mph section of the works at different points through the roadworks:

- On the M1 J32-35a scheme, drivers travelling northbound through the scheme experienced a step up in speed limit from 50mph to 60mph.
- At the A1 Leeming to Barton (L2B) scheme, drivers northbound experienced a step down from 60mph to 50mph, and those travelling southbound experienced a step up from 50mph to 60mph.
- On the M5 J4a-6 scheme, drivers travelling southbound experienced a step down from 60mph to 50mph within the works.

2.3 Customer and stakeholder engagement

In addition to monitoring safety, surveys were carried out with road users to understand the impact of the 60mph speed limit on customer satisfaction. These surveys were carried out at motorway service areas close to the trial and/or through surveys with local business parks to target commuters travelling through the scheme.

Finally, following the trials, engagement with key stakeholders (e.g. scheme representatives, police, traffic officers and free recovery) was carried out. The aim was to seek feedback on the trial findings, and to obtain views and perceptions on the 60mph speed limit in order to understand the ways in which it impacted on worker safety and operations. The results of this engagement are presented in three reports (Tailor, 2017a, 2017b and 2017c).

3 Safety

Safety was a key consideration for the trials and a full GD04 risk assessment was carried out for the programme of work, and individually for each of the schemes involved. Where necessary, mitigations were put in place to reduce risk to road users and road workers. This section summarises the results of the safety monitoring and perceptions of safety from both road users' and road workers' perspectives.

3.1 Road user safety

Table 1 summarises the results from the analysis of road user behaviour data collected from the three trials.

Table 1: Summary of results from the on-road trials of 60mph¹

Measure	M1 J34-35a	A1 L2B	M5 J4a-6
Average vehicle speed			
Step up	Increased (53mph)	Increased (56mph)	n/a
Step down	n/a	Increased (58mph), no change downstream	Increased (56-58mph), increased downstream (51-53mph)
Speed compliance (% compliant with speed limit)			
Step up	-	Improved relative to baseline ² (85% vs. 57%)	n/a
Step down	-	Improved (69% vs. 43%)	Improved in 60mph (75% vs. 46%) but worse downstream (40% vs. 55%)
Average vehicle headway	No significant change	No significant change	No significant change
Close following			
by cars	-	-	No change (55%)
by HGVs	-	-	Improved relative to baseline (65% vs. 50%)
Number of incidents			
Breakdowns	No noticeable change	No noticeable change	No noticeable change
Road traffic collisions in trial	Four (two in baseline)	None (none in baseline)	None (one in baseline)

¹ Note that not all measures were possible for each trial due to the equipment used; where data were not collected for a specific measure these are noted with a '-'

² Each trial used a before-after design; the trial site retained the current 50mph speed limit during the 'baseline' monitoring period and then increased to 60mph during the 'trial' monitoring period.

The results show that there were:

- Increases in average speed that were at or below the 60mph speed limit
- Improvements in the speed compliance of vehicles within the 60mph speed limit, but some concerns with speed limit compliance downstream of the step down (i.e. within the 50mph speed limit) at the M5 scheme. The signing configuration used at the step down for this scheme differed to that used at the A1 L2B scheme; there were fewer Vehicle Activated Signs (VAS) and speeds suggest this configuration was not as effective at notifying drivers of the change in speed limit.
- Little change in average headway (i.e. the average distance between successive vehicles), but evidence that the 60mph speed limit resulted in significantly less close following (defined as a gap of less than 2 seconds between vehicles) by HGVs
- A small number of collisions and breakdowns; however the numbers were too small for robust statistical comparisons.

When asked questions around safety as part of the road user surveys, a 60mph speed limit had little effect on road users reported level of safety, suggesting that the majority of survey participants perceived a 60mph speed limit to have a similar level of safety to a 50mph speed limit.

Based on these findings there is no indication that the 60mph speed limit had a negative impact on road user safety. However, it is recommended that the signing configuration around steps down in the speed limit is investigated further since there was some evidence at the M5 scheme that not all drivers noticed the step down to 50mph. This work should focus on identifying a signing configuration which maximises effectiveness whilst minimising the burden on traffic management resources, in order to reduce the risk to road workers who are required to install and remove the signs.

3.2 Road worker safety

The scenarios trialled were specifically selected in order to reduce risk to road workers, since there is minimal on-road work taking place during embargo and pre-commissioning phases. Road worker safety cannot be measured directly so proxy measures (incursions and TM maintenance data) were sought where possible. Results show that:

- There was some evidence to suggest that the TM maintenance requirements changed at the M1 J32-35a scheme following the implementation of 60mph, but these results should be treated with caution due to the qualitative nature of the data. In the focus groups which followed the trial, TM maintenance tasks were not specifically raised as a concern.
- There was no noticeable change in the number of incursions at either the A1 L2B or M1 J32-35a schemes due to the increase in speed limit. Two incursions were logged by the M5 J4-6a scheme; neither were identified as having resulted due to the change in speed limit.

In addition to the quantitative data, feedback from stakeholders was sought at a series of focus groups to determine whether there were any concerns for the future implementation of 60mph in these scenarios. Feedback was mixed across the different schemes.

Following the trial, M1 J32-35a representatives remained apprehensive about the 60mph speed limit despite results indicating there were no significant concerns with road user behaviour. The increase in speed limit was perceived as inherently less safe with participants feeling that the consequences of an incident involving a vehicle travelling at 60mph would be more severe than that involving a vehicle travelling at 50mph. There were also concerns around speed differentials between HGVs and cars, and a subsequent increase in lane changing; underpinning participants' concerns that the 60mph speed limit increased collision risk. They felt that a 60mph speed limit contradicted existing safety-related messages and initiatives, and that it represented a step backwards.

In contrast, stakeholder feedback on the A1 L2B trial was generally more positive; operatives had fewer concerns about safety and reported that there were some benefits of the increased speed limit. For example, Traffic Officers reported an improvement in responses to incidents and general traffic flow was also perceived to have improved.

The M5 J4a-6 scheme described concerns about the 60mph speed limit prior to the trial, but felt more positive about it during and after the trial. In particular, participants were apprehensive before the trial about an increase in risk resulting from the higher speeds and had concerns relating to the location of the trial. However, these perceptions changed and stakeholders agreed that the 60mph speed limit could assist with maintaining a constant traffic flow (due to less close following by HGVs), which in turn would help to minimise the number of collisions. While participants felt that topography and road layout remained a challenge for future trials, all said they would be comfortable with working in or around other roadworks with 60mph speed limits in the future.

These findings show that further work is needed to ensure that all road workers are on-board with the implementation of 60mph at other schemes. In particular, communication around the intended application of the increased speed limits (i.e. only during the pre-commissioning phase of Major Scheme roadworks) and messages around how a 60mph speed limit aligns with values such as 'Aiming for Zero' would be beneficial.

4 Customer service

The reason for increasing speed limits at roadworks was driven by an aim to improve customer service. Specifically, Highways England has a KPI to achieve a satisfaction score of 90%. This section summarises the results of the customer satisfaction surveys carried out as part of this project, and makes recommendations for other things Highways England could do to improve this.

4.1 Satisfaction with 60mph

In a survey carried out by Ipsos MORI in September 2016, two-thirds (64%) of panellists admitted that they get frustrated if there is congestion due to roadworks. As a result, increasing the speed limit and improving journey times could be one way of tackling customer dissatisfaction. Table 2 summarises the estimated journey time savings realised in each of the three trials.

Table 2: Summary of results from the on-road trials of 60mph

	M1 J34-35a	A1L2B	M5 J4a-6
Journey time reduction			
Step up	34 seconds per driver	30 seconds per driver	-
Step down	-	40 seconds per driver	30-40 seconds per driver

Whilst the average journey time saving for each driver was minimal, when summed over the many thousands of drivers who use the schemes each day (estimated to be between 20,000 and 50,000 per day at each scheme during the trial), the economic benefits (due to time saved) are considerable. Nevertheless, road workers involved in the focus groups post-trial at the M1 J32-35a scheme felt that the journey time reductions per driver were too small to rationalise the perceived increase in risk to those working on road.

The results from the surveys of drivers during each trial showed that drivers through the M1 scheme perceived the 60mph speed limit positively, both in terms of overall satisfaction and perceptions of journey time.

The findings at the A1 L2B replicated these and suggested that, in general, drivers were more satisfied with 60mph speed limits through roadworks than 50mph limits. However, the results also suggest that changes in speed limit are not likely to be the only factors which contribute towards journey satisfaction.

The responses at the M5 scheme were more negative than those seen for the previous two trials. This may be a reflection of the differences in the sample, which included more individuals from the local area who would be impacted most by any delays and diversions. At this scheme, the vast majority of drivers were 'much' or 'a little' less satisfied as a result of the roadworks and cited reasons for this dissatisfaction as the length of the works, the absence of road workers, journey times, road closures, narrow lanes and safety aspects associated with incidents. This suggests that more should be done locally at schemes to

improve the perception of roadworks; perhaps providing more information to drivers about the timescales, long term benefits and progress.

4.2 Satisfaction with steps in speed

Direct comparisons between customer satisfaction for steps up and down in speed limit were not possible from the on-road trials, since each driver only experienced one scenario. However, as part of the simulator trial, drivers drove eight conditions in total, four of which involved a stepped speed.

Satisfaction ratings for the stepped speed limit were similar to the single speed limit, except for the 60-50mph condition which was rated substantially lower on satisfaction than the condition with a continuous 60mph limit. Reasons cited included the fact that the speed limit dropped for no clear reason.

Generally a step up in speed was perceived more positively than a step down, particularly the 50 to 60mph step-up. This condition allowed drivers to feel like they were making more progress compared to the opposite 60 to 50mph step-down condition (despite the overall travel time being the same in these two conditions).

These findings suggest that drivers would be more accepting of a step down in speed limit if they were kept informed of the reasons for this. Increased communication with drivers about changes within the works should be considered for all future Major Project Schemes.

4.3 Communication

The need for increased communication was supported by the stakeholder feedback from the M1 and M5 schemes. Participants felt that safety needed to be central to communications with road users, and that an increase in the speed limit could send the wrong message. Key points which participants suggested should be communicated to road users included:

- Speed restrictions can have a positive impact on journey time
- Recovery workers help to clear incidents and reduce delays
- Road workers play a role in making roads better and safer for motorists
- Explanations when there are roadworks but no workers on road
- Why speed restrictions remain during phases when there is little visible work (e.g. the pre-commissioning phase)
- Informing drivers about incidents in roadworks, using portable Variable Message Signs (VMS) where the permanent VMS are not yet operational
- The importance of speed compliance and impact of speed enforcement, for example using signs to highlight the number of drivers who have been prosecuted for speeding within that section

Social media was suggested as the best platform for these communications but VMS, information leaflets at motorway service areas and Highways England information screens at motorway service areas were also suggested.

4.4 Alternative ways to improve customer satisfaction

In addition to specific questions about the M5 scheme, the survey for this scheme also included a short choice experiment to investigate the relative importance of different attributes of the roadworks (speed limit, roadworks length, lane width and speed enforcement) on a driver's route choice. The results from this experiment suggest that when asked to choose between two routes (both with roadworks), drivers felt that the speed limit of the roadworks was the least important aspect. The length of the roadworks, the presence of narrow lanes and average speed cameras contributed more to their decision. This might suggest that, in order to improve customer satisfaction, Highways England should also take steps to improve other aspects of the roadworks, including making the length of roadworks shorter.

4.5 Dynamic roadworks

During the first simulator trial participants were asked what speed they would prefer to see in roadworks; the most popular answer (given by over 30% of respondents) was 60mph. The current 50mph speed limit was also popular (22%) but some participants also suggested that the speed limit should change depending on the conditions. This suggestion was replicated in recent surveys from the on-road trials and suggests there would be an appetite for more 'dynamic' speed limits.

Highways England are already making progress on this and have drafted a dynamic roadworks vision. The vision contains a number of statements about how roadworks will be designed and managed by the end of the second Road Investment Strategy (RIS2), which sets out Highways England's post-2020 plans for improvements to the SRN. Specifically, this vision outlines plans to:

1. Vary speed limits so they are appropriate to the works taking place
2. Shorten the length of road works (delivering work in phases where possible)
3. Minimise the impact of diversions
4. Deliver roadworks quicker
5. Explain clearly to road users what activities are taking place

5 Delivering the Road Investment Strategy

Increasing speed limits through roadworks is one part of a series of initiatives Highways England are implementing to deliver the Road Investment Strategy, which aims for the network to be smoother, smarter and more sustainable by 2040. This section describes some of the challenges encountered during implementation of on-road trials of 60mph speed limits which need solving before 60mph is more widely used across Major Project Schemes. Opportunities for improvements to the implementation of 60mph speed limits are also discussed.

5.1 Planning for 60mph

The feedback from the schemes involved in the on-road trials was clear that planning for higher speed limits needs to be done at the design stage of the scheme, not retrospectively. In particular there are a number of specific considerations:

- The position of the change in speed limit needs to be considered to ensure that enforcement is cited in the correct place relative to any step changes in speed.
- The timing of the change is also important to ensure that the risk to road workers is not increased to intolerable levels.
- The need for additional material costs, such as additional Temporary Vehicle Restraint Systems (TVRS).
- Risk Assessments and Method Statements (RAMS) need to be reviewed to ensure that essential works, for example recovery operations, can still be carried out safely in a 60mph speed limit.

Guidance for scheme designers is needed to drive the expectation that speed limits other than 50mph are considered and implemented where practicable. It is recommended that a 'Planning for 60mph' toolkit is developed and embedded within the construction plan for each scheme.

5.2 Updates to standards and regulations

Current roadworks standards and guidance covers 50mph and 70mph. Consideration needs to be given as to whether standards for 60mph should be developed.

Following the successful on-road trials, Interim Advice Note 182/14 'Major Schemes: Enabling Handover into Operation and Maintenance' is being updated to allow schemes to run at 60mph during the pre-commissioning phase of Smart Motorway construction. However, other improvements may also be necessary; for example, schemes felt that the Temporary Traffic Regulation Order (TTRO) process needs to be overhauled to allow more flexibility in the enforceable speed limit.

5.3 Other opportunities

The scope of the on road trials was limited to two very specific scenarios (holiday periods and the pre-commissioning phase) since there is minimal on-road work taking place during

these times. Now that these trials have proved successful, Highways England should seek to understand what other opportunities there may be to run at 60mph. For example, can 60mph be safely used during other phases of construction, or can the speed limit be altered in line with the road conditions? This links to the idea of dynamic roadworks (outlined in Section 4.5), but further work may be required to understand how many changes and how frequently drivers can cope with changes to the speed limit. It is clear that industry views and consensus should be sought on this topic, to ensure road workers are on board with any proposed changes to working practices.

6 Conclusions and recommendations

The work carried out as part of this project has successfully demonstrated that the speed limit can be increased from 50mph to 60mph within 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 unacceptable risk from the increased speed limit.

The monitoring has shown that there were no road user safety concerns identified during trials, but more work is needed to ensure that road workers are on-board with the increased speed limit.

Road users perceived the 60mph speed limit positively, and satisfaction was improved, but there is more which can be done to improve satisfaction with roadworks and ensure Highways England meet their KPI to achieve a satisfaction score of 90%.

This project has also provided a number of practical recommendations for taking 60mph forwards and increasing its use in Major Project Schemes:

- The signing configuration used around step downs in the speed limit should be investigated further, as there was evidence that not all road users noticed the step from 60mph to 50mph. Identifying a signing configuration that maximises road user compliance with minimal impact on road worker safety is imperative to the use of speed limit changes within roadworks.
- Communication with road workers around the intended application of the increased speed limit and the importance of their safety is necessary if the implementation of 60mph at other schemes is to be successful.
- Schemes should do more at a local level to improve the perception of roadworks, perhaps providing more information to drivers about timescales, long term benefits and progress.
- Increased communication with drivers about changes within the works, especially providing reasons behind the changes, should be considered for all future Major Project Schemes.
- Safety needs to be central to all communications with road users. Key points around the importance of speed compliance, how speed restrictions have a positive impact on journey time and the role road workers play in making the roads a safer and better place for motorists should all be communicated.
- In addition to speed limits, steps should be taken to improve other aspects of the works to improve customer satisfaction. Dynamic roadworks, which are shorter, minimise disruption and are delivered quicker, would help to achieve this.
- Planning for higher speed limits needs to be done at the design stage of a scheme as there are several specific considerations (outlined in section 5.1) that make it difficult to retrospectively apply increased speed limits to existing Major Projects.
- A 'Planning for 60mph' toolkit should be developed, in order to drive the expectation that speed limits other than the blanket 50mph are implemented where practicable.
- Roadworks standards and guidance needs to be updated to cover 60mph.

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- The Temporary Traffic Regulation Order (TTRO) process needs to be overhauled to allow more flexibility in the enforceable speed limit.
 - Other opportunities for 60mph speed limits should be identified; the limited application of the increased speed limit during these trials (in specific scenarios where there was minimal on-road work) could be expanded to other phases of construction.

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