

M1 junctions 28 to 31 and junctions 32 to 35a all lane running

Five-year post-opening project evaluation



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Foreword

As Chief Customer and Strategy Officer, I want to know whether developments on our network are meeting their objectives and making a difference for our customers – the four million people that use the Strategic Road Network (SRN) every day.

Evaluation is a key function in the safe running of the SRN and we carry out POPE¹ evaluations at set points during a major enhancement scheme's lifetime to enable us to take stock and make any necessary interventions. POPEs provide an early indication if the scheme is on track to deliver the benefits over 60 years as set out in the business case appraisal.

This report evaluates the M1 junctions 28 to 31 and junctions 32 to 35a all lane running smart motorways within five years of operation following their conversion from conventional three lane motorways.

An initial study was conducted one year after the projects opened in 2017, followed by this report after five years which provides more robust data and analysis. The report includes an understanding of the safety and environmental impacts of a scheme, as well as how traffic has changed due to a scheme being in place and how the scheme supports the economy.

There are three types of smart motorway, all lane running (ALR), dynamic hard shoulder (DHS) and controlled motorway. ALR and DHS motorways create more space on some of the most congested sections of the SRN by using hard shoulder as a running lane either permanently or only at busy times. They create extra capacity with less disruption to road users and fewer environmental impacts than physically widening the road, along with reduced carbon emissions associated with construction.

Although the performance of individual scheme is important at a local level, drawing together findings at a programme level helps us to understand patterns and trends across our network.

Safety remains our number one priority and the five-year POPEs published to date (representing approximately a quarter of those in operation) demonstrate that smart motorways are delivering safety benefits in line with or above those originally forecast, with most schemes evaluated having lower collision rates than would have been expected on the conventional motorways they replaced. Where it has been possible to assess changes to the severity of such collisions, the evidence shows those collisions have been less severe.

The published five-year POPEs show that smart motorways are broadly on track to realise their envisaged environmental objectives. With further planned mitigation these will be fully met.

The five-year ALR and DHS POPEs published to date for smart motorways also show that the schemes are delivering much needed capacity with schemes accommodating up to almost a quarter (22%) more traffic than before they were converted into smart motorways. The reports indicate that many of the motorway sections would have been unable to cater for today's traffic (at the busiest times) if they had not been converted into smart motorways.

¹ Post-opening project evaluation (POPE)

According to the reports, the schemes are currently on course to deliver benefits, but will not deliver all the originally expected benefits within the 60-year appraisal period. There has been lower traffic growth than was expected when these schemes were appraised, due to the 2008 financial crisis and lower population growth than originally forecast (this will impact all transport schemes, built around this time). This means fewer drivers are benefiting today from smart motorway schemes than originally anticipated. Five-year POPEs also show that traffic on some smart motorway sections is not travelling as quickly as was forecast at the appraisal stage. Together these factors have resulted in the value for money for all schemes with five-year appraisals, over the 60-year appraisal period, currently being lower than anticipated at this stage when compared with the original appraisal. This is, however, a forecast and there is the opportunity to take further action to improve benefits.

We have therefore examined these results in detail and have identified specific actions to further improve the performance of schemes, including:

- Standardised operating procedures for DHS schemes
- Technology improvements
- Optimisation of the algorithms that set speed limits
- Investigating physical constraints off the network that impact performance

We will continue to monitor schemes in operation, enabling us to track their benefits and take further action if required to ensure these schemes deliver an improved experience for our customers.

Elliot Shaw

Chief Customer and Strategy Officer

September 2025

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1. Executive summary

The M1 junctions 28 to 31 and junctions 32 to 35a all lane running² projects, combined with a separate project between junctions 31 and 32 from our 'Pinch Point' investment stream³, mean that the whole section on the M1 from junction 28 to junction 35a now has variable mandatory speed limits. The projects were constructed in phases with the whole section opening for traffic in March 2017.

Our smart motorway sections have provided additional road capacity, creating more road space on congested sections of motorway. This has particularly provided more reliable journeys for road users at the busiest periods of the day. This has allowed people to travel as conveniently, reliably, and safely as possible, and means more traffic can use the strategic road network rather than divert on to the local road network causing further congestion.

Before construction of the projects, congestion on this section of motorway was a problem and the extent and severity of congestion was expected to increase over time. The implementation of the projects focussed on the objectives to reduce congestion, make journeys more reliable and improve driver information, all whilst maintaining road safety and minimising impacts on the local road network.

The evaluation indicates that there are generally small changes in journey times. However, noticeable savings in journey times have been observed during periods of the heaviest congestion, namely during the AM peak in a southbound direction between junctions 28 and 32, and during the PM peak in a northbound direction between junctions 32 and 35a. Journey time reliability has also improved with the slowest journey times showing particular improvement in the AM and PM peaks across the project extent.

Safety data has shown that the observed rate of collisions has reduced with observations from the wider safety area supporting safety improvements. The business case forecast a reduction in personal injury collisions as a result of this project, with a saving of 140 collisions over the 60-year appraisal period. Findings at the five-year after stage suggest the project is likely to outperform the appraisal scenario.

The available traffic data suggested that air quality and noise impacts along the project were likely to be as expected. Mitigation of the scheme through the implementation of a 60mph speed limit during weekday AM and PM peak, with 70mph at all other times helped manage environmental impacts. Other environmental impacts such as landscape, townscape, heritage of historic resource, biodiversity and journey quality were all as expected.

² All lane running (ALR) motorways apply technology to control speeds, and permanently convert the hard shoulder to a running lane. Emergency areas are available at regular intervals providing places to stop in an emergency.

³ The Pinch Point Programme was a collection of small-scale schemes (generally costing up to £10m) delivered on the strategic road network, specifically aimed at stimulating growth in the local economy, relieving congestion and/or improving safety.

Value for money was forecasted over a range of possible traffic growth scenarios⁴. These scenarios forecast value for money to range from 'high' to 'very high'. The appraisal forecast significant traffic growth and improving journey times; the observed data suggested more modest traffic growth and journey time savings in most time periods, which has impacted the project's value for money. If the journey time and traffic growth trends observed within the first five years continue, the M1 junctions 28 to 31 project is expected to deliver 'low' value for money, while the M1 junctions 32 to 35a project is expected to deliver 'medium' value for money.

It is noted that for this five-year study, we have considered the effects of the COVID-19 pandemic and national lockdowns on traffic volumes and travel patterns in the project area.

⁴ See section 7 – *Forecast value for money*.

2. Introduction

What is the project and what was it designed to achieve?

This report relates to two improvements, namely:

- M1 junctions 28 to 31 all lane running
- M1 junctions 32 to 35a all lane running

The smart motorway projects are approximately 18 and 13 miles long respectively. They were constructed in phases starting in October 2013 with the whole section opening in March 2017. For the M1 junctions 28 to 31 section, works started in October 2013 opening in March 2016, whilst for the M1 junctions 32 to 35a section, works began in June 2015 with this section opening in March 2017.

As part of wider works to provide a consistent journey experience for users, a controlled motorway pinch point scheme in between the two proposed smart motorway schemes, from junctions 31 to 32, opened in 2014. This project, covering just over a mile, had already been widened and retains a hard shoulder.

The smart motorways added capacity by adapting the existing hard shoulder to a running lane, providing four lanes permanently open for use by road users, with provision of emergency areas along the route. Junctions 32 to 35 include lane gain/drop layouts with four running lanes between the junctions and three running lanes through each junction.

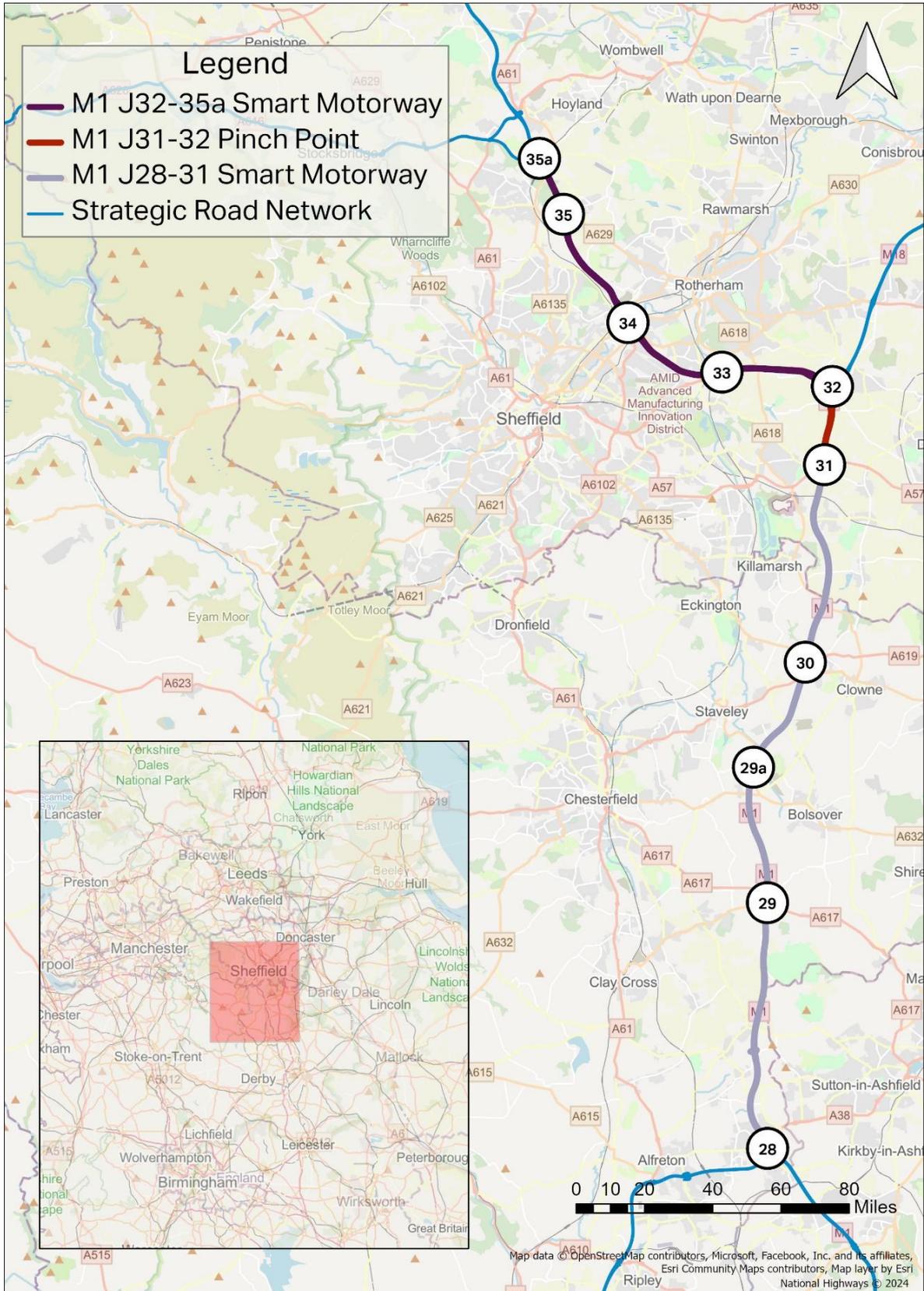
The whole section, junctions 28 to 35a, had variable mandatory speed limits with a 60mph speed limit enforced between 7am to 9am and 3pm to 6pm upon scheme implementation to help manage air quality impacts caused by the project. These speed limit restrictions have since been removed after it was determined they were no longer required, and the section now operates with a standard motorway 70mph speed limit.

The project sought to address a number of issues on this stretch of the M1 including reducing traffic congestion, improving journey time reliability, minimising detrimental effects in the surrounding network, improving driver information and not worsening the accident rate.

Project location

The M1 motorway is a strategic route in England, linking London with the Midlands and the North. The project sections are located in the counties of Derbyshire and South Yorkshire, and form part of the primary strategic link between Nottingham and Sheffield. The route is important for freight with freight traffic accounting for a high proportion (up to 22%) of total traffic flows.

Figure 1 M1 J28 to J35a project location



Source: National Highways and OpenStreetMap contributors

How has the project been evaluated?

Post-opening project evaluations (POPE) are carried out for major projects to validate the accuracy of expected project impacts which were agreed as part of the business case for investment. They seek to determine whether the expected project benefits are likely to be realised and are important for providing transparency and accountability for public expenditure, by assessing whether projects are on track to deliver value for money. They also provide opportunities to learn and improve future project appraisals and business cases.

A POPE compares changes in key impact areas⁵ by observing trends on a route before a project is constructed (baseline) and tracking these after it has opened to traffic. The outturn impacts are evaluated against the expected impacts (presented in the forecasts made during the appraisal) to review the project's performance. For more details of the evaluation methods used by National Highways, please refer to the POPE methodology manual on our website.⁶

⁵ Key impact areas include safety, journey reliability and environmental impacts.

⁶ <https://nationalhighways.co.uk/publications/>

3. Delivering against objectives

How has the project performed against objectives?

All our major projects have specific objectives which are defined early in the business case when project options are being identified. The project has five objectives, primarily related to improving journey time reliability, reducing congestion, minimising traffic impacts on the local roads, improving driver information and maintaining safety for road users.

The benefits are appraised to be realised over 60 years. The one-year after evaluation provides early indication of progress, followed by the five-years after evaluation which gives a more detailed insight.

Table 1 summarises the project’s performance against each of the objectives, using evidence gathered for this study. Further detail is provided in the following sections.

Table 1 Objectives and evaluation summary

Smart motorway RIS2 ⁷ Objective	Project Objective	Five-year evaluation
Providing Fast and Reliable Journeys We want to help people and businesses have safe, reliable and efficient journeys with decreased journey times between the start and end points of the scheme.	Reduce congestion	Average journey times have generally reduced in both AM and PM peak periods on both schemes.
Providing Fast and Reliable Journeys We want to help people and businesses have safe, reliable and efficient journeys with increased journey time reliability between the start and end points of the scheme.	Improve journey time reliability (particularly delay to worst 10% of journeys)	Journey time reliability has been shown to improve in both directions across all time periods. The 90 th percentile journey times have also generally reduced.
A Well Maintained and Resilient Network Our network is complex and varied and requires careful stewardship to keep it in good condition.	Improve driver information	Variable Messaging Signs (VMS) on gantries above the M1 provide improved driver information regarding road conditions, journey time certainty and reliability.
	Minimise detrimental traffic effects on the surrounding network	Due to both schemes having limited locations for traffic forecasts as well as limited available traffic data, there is insufficient evidence to conclude if there has been an impact on the surrounding network.
Improving Safety for All	No worsening of accident rate	There is an observed reduction in the rate and number of collisions

⁷ During the first Road Investment Strategy (RIS) from 2015 to 2020, and subsequent RIS2 (2020-2025), universal objectives were created to ensure consistency across the smart motorway programme.

Smart motorway RIS2 ⁷ Objective	Project Objective	Five-year evaluation
<p>We need to keep our customers, people and suppliers safe, above all else. At a minimum, there will be no increase in the average number of Fatal and Weighted Injuries (FWI) per year or an increase in FWI per hundred million vehicle miles per year compared to baseline.</p>		<p>and improvement to the impact on casualties.</p>
<p>Delivering Better Environmental Outcomes We want our roads to work more harmoniously with the communities that live alongside them, and the environment that surrounds them.</p>	-	<p>The evaluation has demonstrated that outcomes were as expected for all of the environmental impacts assessed across the project's extent.</p>
<p>Delivering Even More Value for Our Customers We are setting out to deliver £2.23bn of efficiencies, which will mean that taxpayers will see even more investment for their money than in the past.</p>	-	<p>The evaluation indicated that in the first five years this investment is not on track to deliver the value for money anticipated over the 60-year life of the project. The M1 junctions 28 to 31 project is expected to deliver 'low' value for money, while the M1 junctions 32 to 35a project is expected to deliver 'medium' value for money.</p>

4. Customer journeys

Summary

For this five-year after study, we have had to consider the effects of the COVID-19 pandemic and national lockdowns on traffic volumes.

Our analysis has shown that the National and Regional traffic volumes were impacted by COVID-19 with traffic flow levels falling below the 2010 baseline. However, traffic flows began to rise as COVID-19 related restrictions / guidance affecting travel patterns started to ease throughout 2021 and this trend continued in 2022. Traffic flows across the project area have been shown to rise with higher flows at five-years after compared to before.

One of the project's objectives was to improve journey time reliability. Five years after opening, journey time reliability is shown to improve in all peak periods across the extent of the project area.

A further objective of the project was to reduce congestion. Journey times have decreased in the majority of time periods between M1 junctions 28 to 32. Journey time benefits between M1 junctions 32 to 35a are more variable with a decrease in journey times in both directions during the PM peak and some increases shown in the AM peak and inter-peak (daytime).

How have traffic levels changed?

Prior to a pause on implementation in January 2022, smart motorways were built on stretches of motorway which experience high levels of congestion and/or are expected to see traffic levels increase in future years. The following sections examine how the traffic levels changed over the evaluation period and to what extent the forecast traffic levels were realised.

National and regional

To assess the impact of the project on traffic levels, it is useful to understand the changes within the context of national and regional traffic. To do this, we use the Department for Transport (DfT) annual statistics. The data is reported by local authority and road type, recording the total number of million vehicle kilometres travelled.⁸ This data is used as a baseline, and we attribute any growth observed on roads in the project area which is above national and regional trends to the project.⁹

Figure 2 presents regional and national background traffic trends in the study area between 2013 and 2022. Five years after the project opened, traffic volumes on National Highways motorways were 7% higher than in 2013 when works commenced. A similar growth rate has been experienced in the Yorkshire and Humber region and throughout England, which are both 6% higher than 2013 traffic volumes. The East Midlands region has experienced a slightly higher growth rate with a 10% increase in traffic volumes between 2013 and 2022.

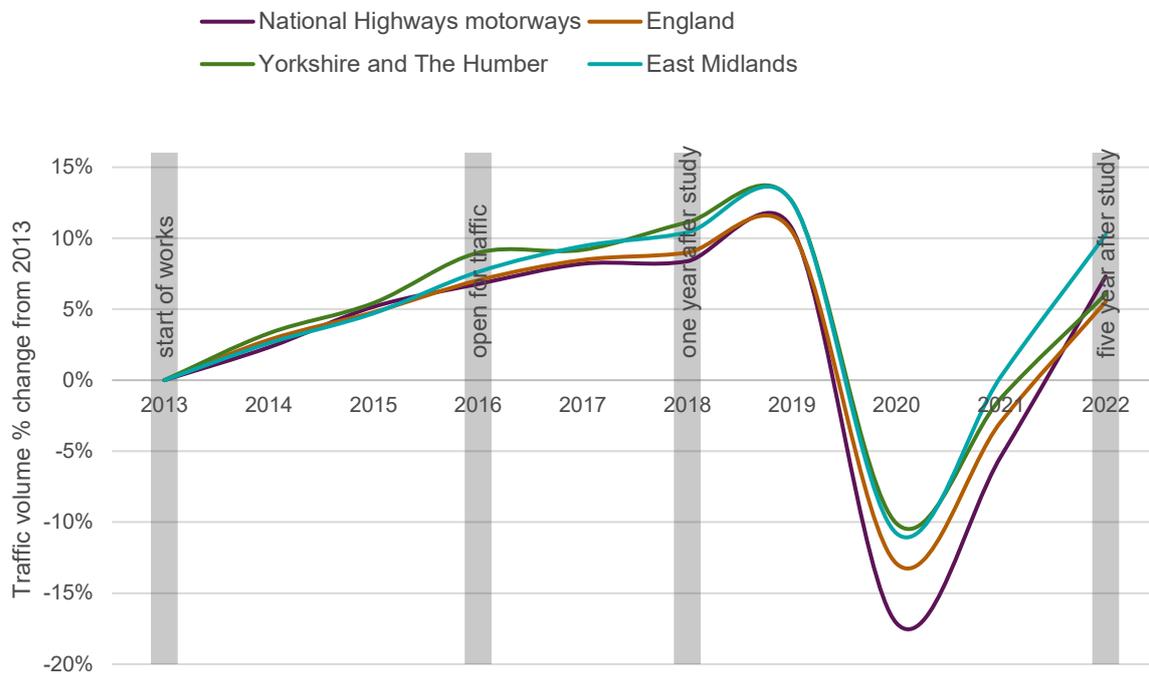
The impacts of the COVID-19 pandemic in 2020 were significant with traffic levels falling below the 2013 baseline. In 2021, traffic volumes began to rise as COVID-

⁸ Motor vehicle traffic (vehicle miles) by local authority in Great Britain, annual from 1993 to 2022, Table TRA 8901, DfT

⁹ Given the uncertainties in the figures, we view the measure as qualitative.

19 related restrictions/guidance affecting travel patterns started to ease at times throughout the year. This trend continued in 2022, however traffic did not reach the pre-pandemic levels.

Figure 2 National and regional traffic variation (2013 – 2022)



How did traffic volumes change?

Since the opening of the smart motorway, there has been some variability in traffic volume at different locations across the project extent and the surrounding road network.

To analyse how the traffic volumes have changed on the project extent and in the wider area, Average Daily Traffic (ADT) and Average Weekday Traffic (AWT) data have been extracted from WebTRIS.¹⁰ The ADT and AWT volumes have been derived from traffic data covering the periods June 2012-June 2013 (Before), September 2017-August 2018 (on-year after), and March 2022 (five-years after).

In general, the comparison shows that the ADT between before construction and five years after has increased at most locations in both directions.

The average traffic flows for the before and five-years after scenarios are shown in Figure 3 and Figure 4 for the junctions 28 to 32 northbound and southbound directions respectively. Generally, traffic volumes in 2022 have increased by between 4% and 11% since 2013, with an exception between junction 28 and the Motorway Service Area (MSA) southbound, where traffic volumes have decreased by approximately 4%. It should be noted that there was insufficient before construction data from junction 30 onwards.

¹⁰ [National Highways - WebTRIS - Map View \(highwaysengland.co.uk\)](https://www.highwaysengland.co.uk/webtris)

Figure 3 ADT traffic volumes (Northbound) – M1 junctions 28 to 32

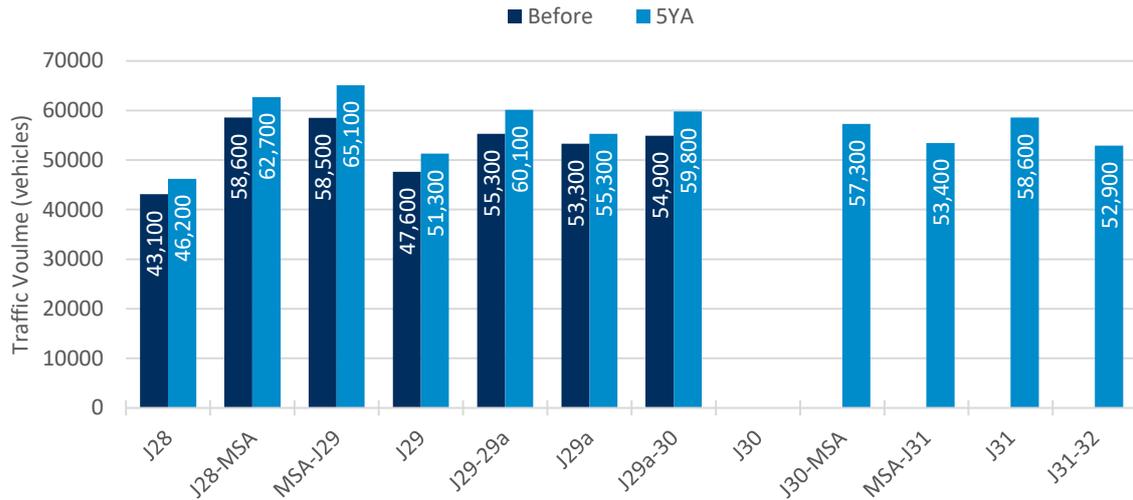
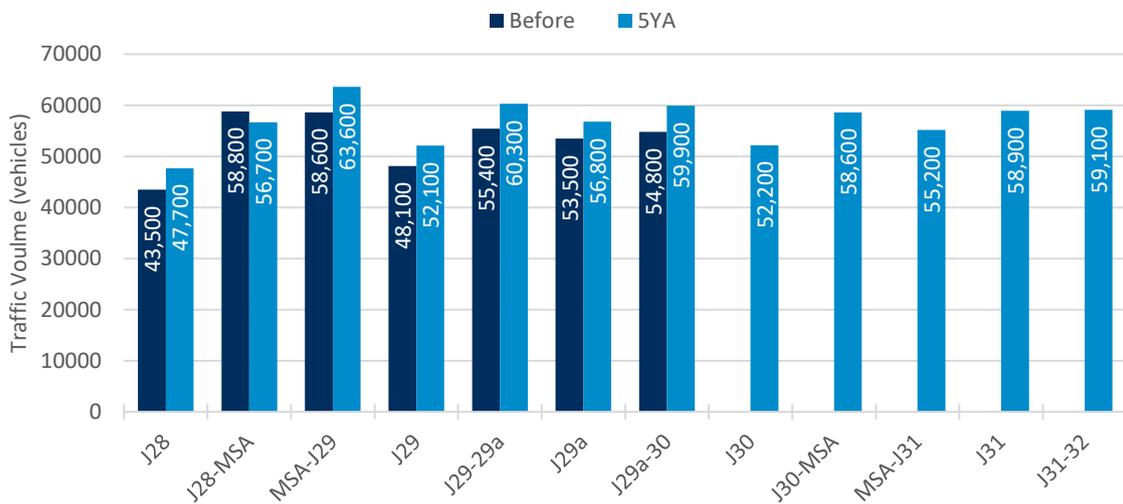


Figure 4 ADT traffic volumes (Southbound) – M1 junctions 28 to 32



The average traffic flows for the before and five-years after scenarios are shown in Figure 5 and Figure 6 for the J32-35a northbound and southbound directions respectively. Generally, traffic volumes in 2022 have increased by between 7% and 9% since 2013, with exceptions in a southbound direction between J32 and J33, and J33 and J34 where traffic volumes have seen a smaller increase of 2% and 3% respectively.

Figure 5 ADT traffic volumes (Northbound) – M1 junctions 32 to 35a

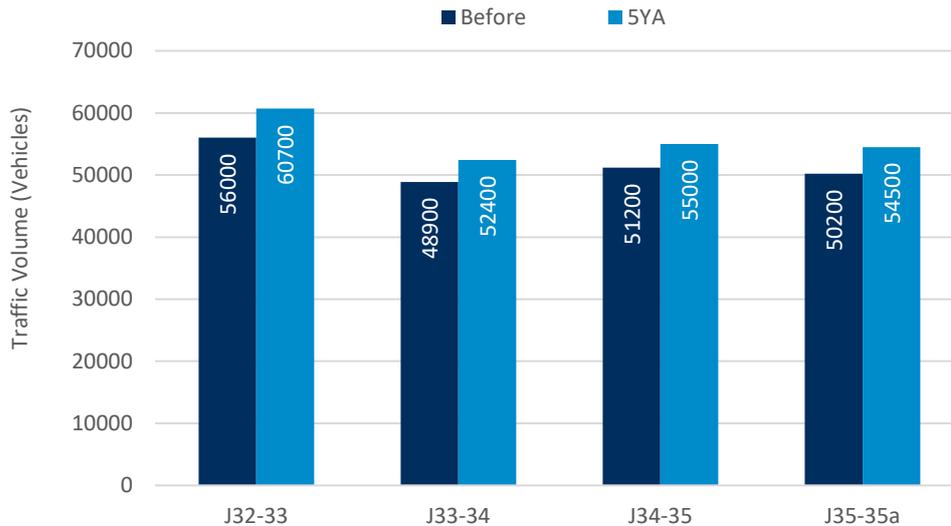
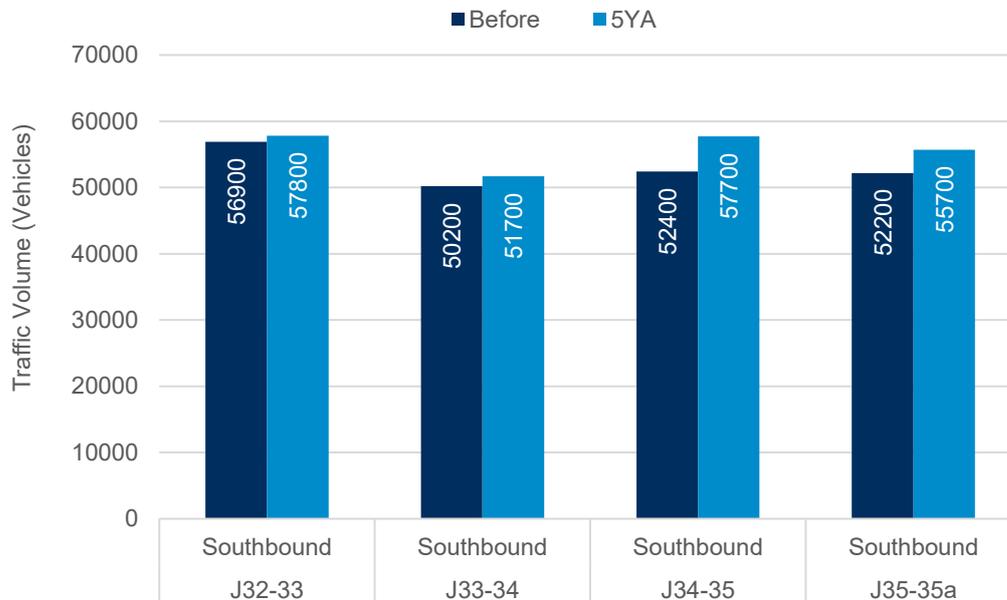


Figure 6 ADT traffic volumes (Southbound) – M1 junctions 32 to 35a



The hourly traffic flow profiles for before construction, at one-year after and at five-years after have been plotted and presented separately for each section of the scheme in Appendix A1.

Both ALR schemes have an objective to minimise detrimental effects on the surrounding road network. However, due to both schemes having limited locations with forecasts and also before and after traffic data, there is insufficient evidence to conclude whether or not there has been an impact on the surrounding network.

Was traffic growth as expected?

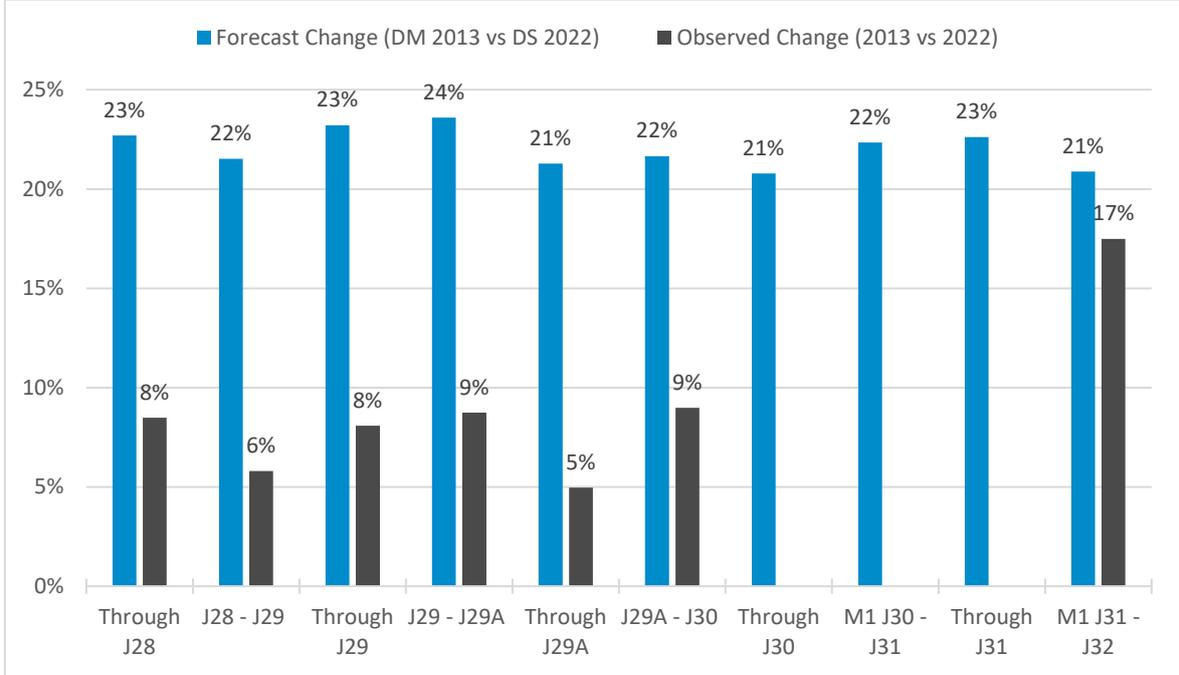
To understand more about the accuracy of the traffic model and its forecasts, we compared the amounts of change the appraisal expected with the amounts observed at several locations. This section compares the expected and observed changes in traffic flow by examining the forecast change Do-Minimum (DM) 2013

vs Do-Something (DS) 2022 and the observed change (2013 vs 2022) in traffic flows.

M1 junctions 28 to 32

Figure 7 shows the comparison between the two-way forecast AADT flows for the DM (2013) versus DS (2022) and the observed before (2013) versus observed at five-years after (2022).

Figure 7 Comparison of forecast and observed traffic flows (% difference) – M1 J28 to J32



Source: Traffic Forecasting Report and National Highways (WebTRIS)

Traffic forecasts indicated there was expected to be a 21-24% increase in traffic flows between 2013 and 2022 on the M1 between junctions 28 and 32. The observed traffic flows between junction 28 and junction 30 have increased by 5-8% between 2013 and 2022, notably lower than the forecast growth. Observed traffic between junction 31 and 32 increased by 17% between 2013 and 2022, which is closer to the 21% forecast growth. It was not possible to establish the observed traffic growth between junction 30 and junction 31 due to a lack of available 2013 data.

Figure 8 demonstrates the accuracy of the forecast DM 2013 traffic flows versus the observed 2013 traffic flows between junctions 28 and 32. As shown below, the observed two-way traffic flows are lower than the forecast DM flows by between 2% and 6%.

Figure 8 Observed 2013 vs forecast DM 2013 – M1 J28 to J32

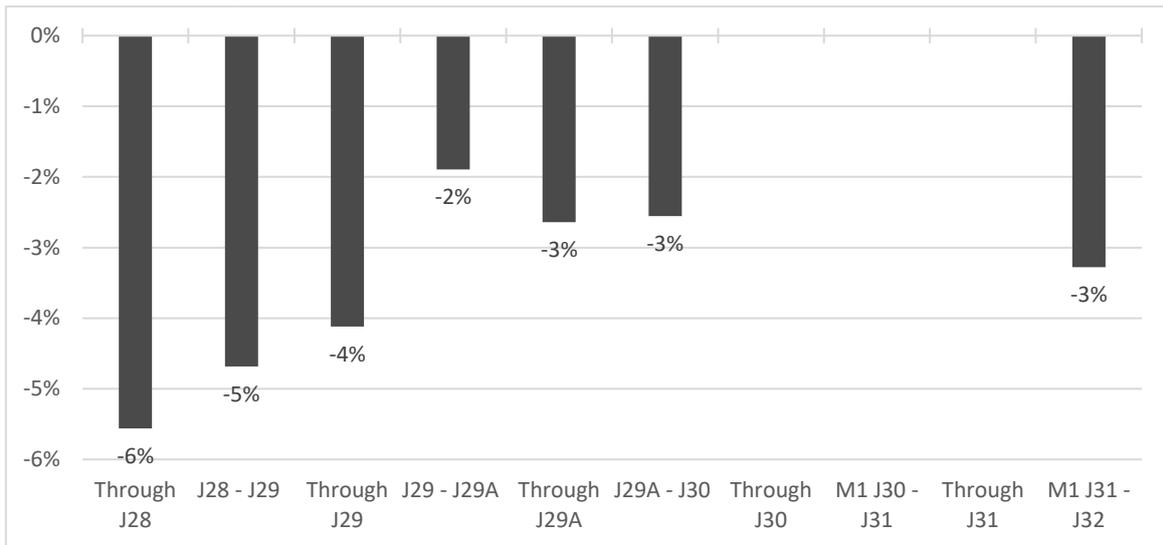
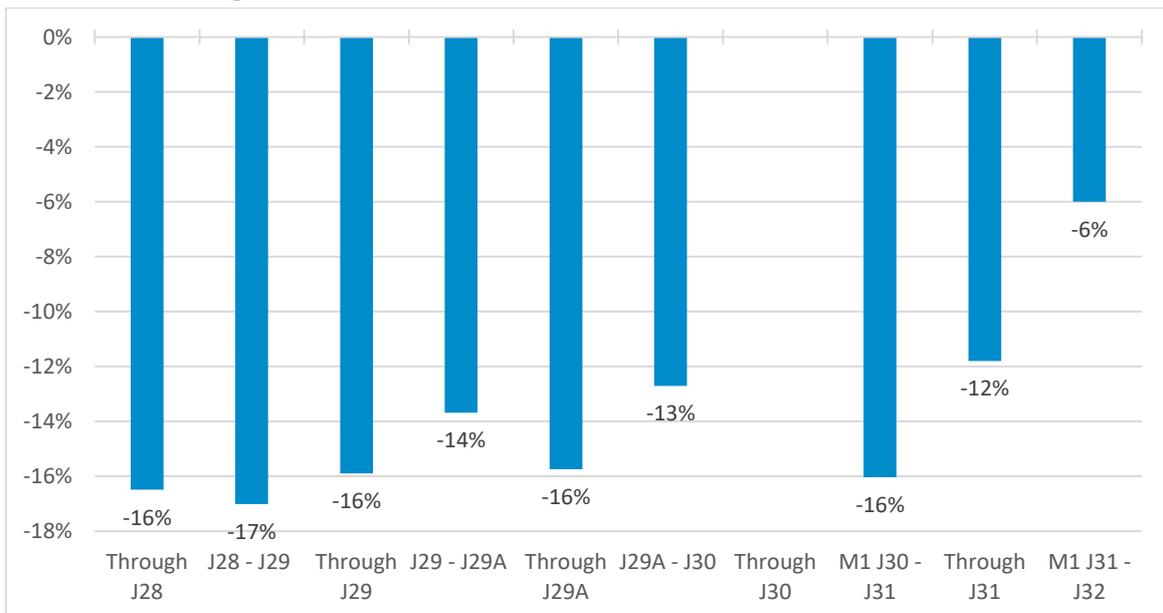


Figure 9 demonstrates the accuracy of the forecast DS 2022 traffic flows versus the observed 2022 traffic flows. As shown below, the observed two-way traffic flows are lower than the forecast DS flows by between 6% and 17%.

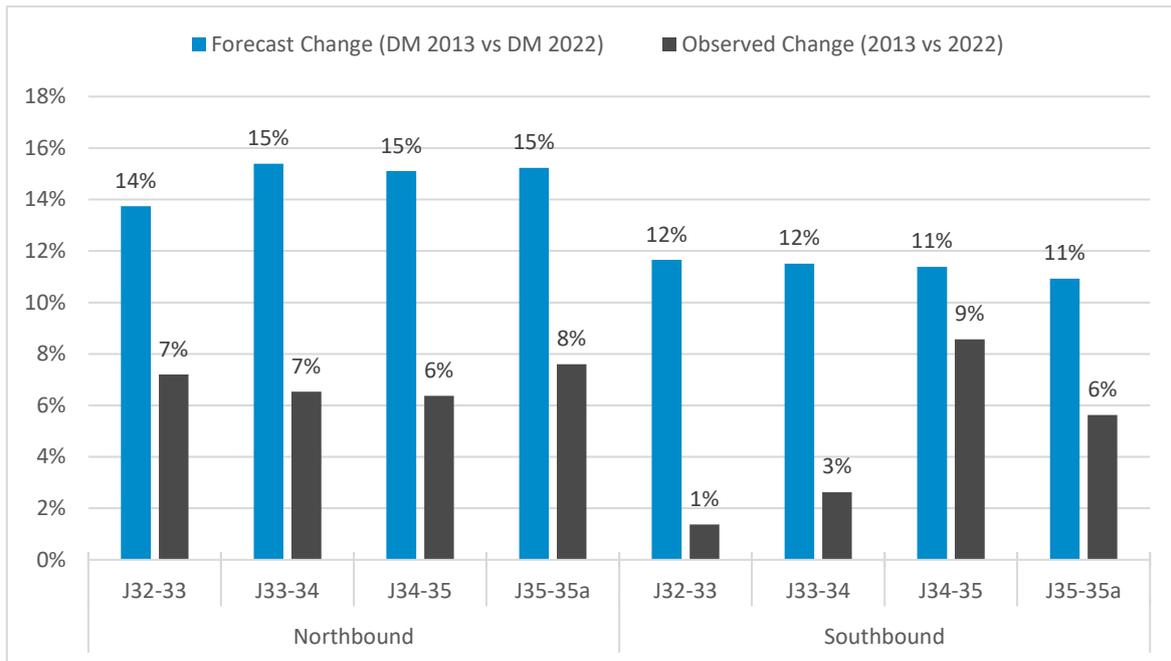
Figure 9 Observed 2022 vs forecast DS 2022 – M1 J28 to J32



M1 junctions 32 to 35a

Figure 10 shows the comparison between the directional forecast AADT flows for the DM 2013 versus DS 2022 and the observed 2013 (before) versus observed 2022 (five-years after).

Figure 10 Comparison of forecast and observed traffic flows (% difference) – M1 J32 to J35a



Traffic forecasts indicated there was expected to be a 14-15% increase in northbound traffic flows, and a 11-12% increase in southbound traffic flows between 2013 and 2022 on the M1 between junctions 32 and 35a.

The observed traffic flows have increased by 6-8% in the northbound direction between 2013 and 2022, notably lower than the 14-15% forecast growth.

Similarly, observed southbound traffic between junctions 32 and 34 has increased by 1-3%, which is notably lower than the 12% forecast growth, while between junction 34 and 35a, traffic has increased by 6-9% between 2013 and 2022 which is closer to the 11% forecast growth.

Figure 11 demonstrates the accuracy of the forecast DM 2013 traffic flows versus the observed 2013 traffic flows between junctions 32 and 35a. As shown below, the observed two-way traffic flows are lower than the forecast DM flows by between 11% and 15%.

Figure 11 Observed 2013 vs forecast DM 2013 - M1 J32 to J35a traffic flows

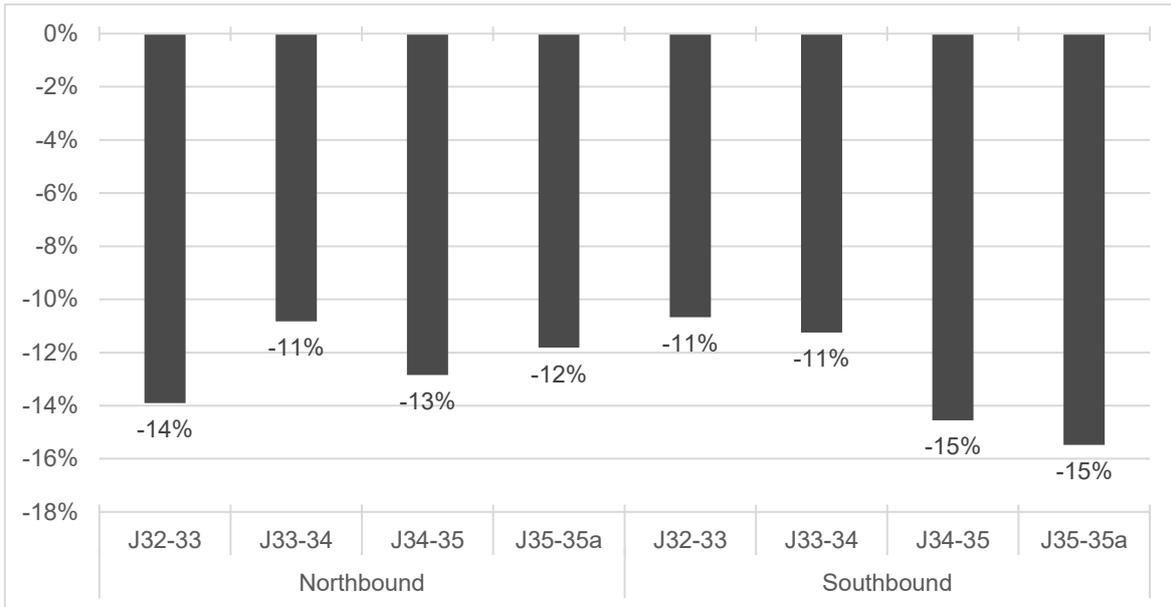
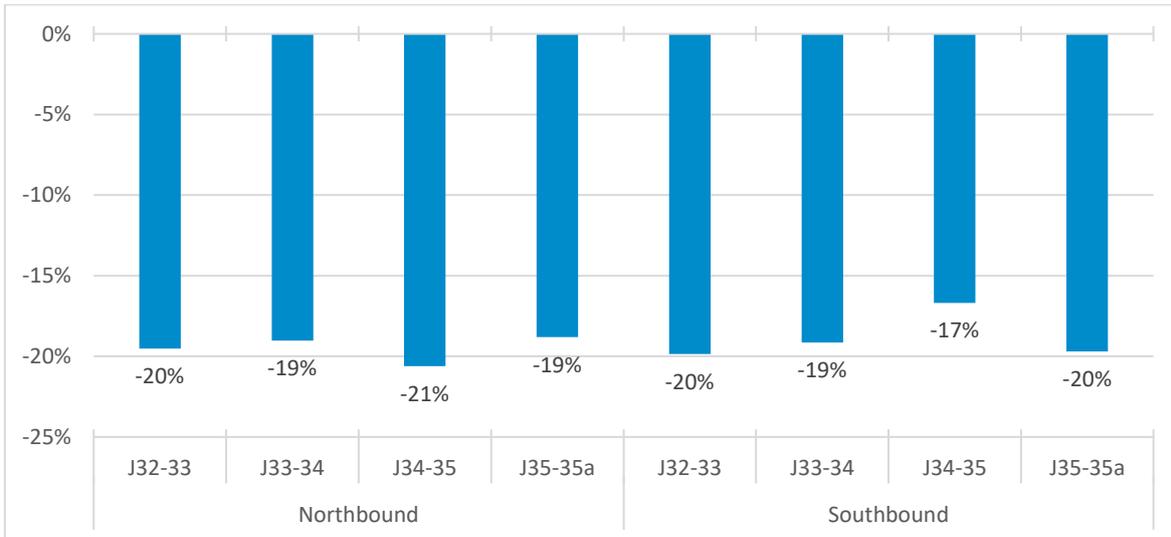


Figure 12 demonstrates the accuracy of the forecast DS 2022 traffic flows versus the observed 2022 traffic flows. As shown below, the observed two-way traffic flows are lower than the forecast DS flows by between 17% and 21%.

Figure 12: Observed 2022 vs forecast DS 2022 - M1 J32 to J35a traffic flows



The variation between the expected and observed growth in traffic flows across the project extent could be explained due to the significant reduction in traffic in 2020 and 2021 as a result of restrictions during the COVID-19 pandemic, and the subsequent gradual recovery of traffic which has not yet reached the pre-pandemic levels (see Figure 2).

Relieving congestion and making journeys more reliable

Smart motorways are applied to the busiest routes to ease congestion and ensure journey times are more predictable. Often these routes are where we anticipate congestion will increase in the future and our actions seek to limit this.

Analysis of journey times and speeds can indicate the impact of the smart motorway on congestion. The extent to which journey times vary from the expected average journey time indicates how reliable a journey is.

Did the project deliver journey time savings?

To understand the scheme’s impact on journey times, analysis has been undertaken using satellite navigation data (TomTom).

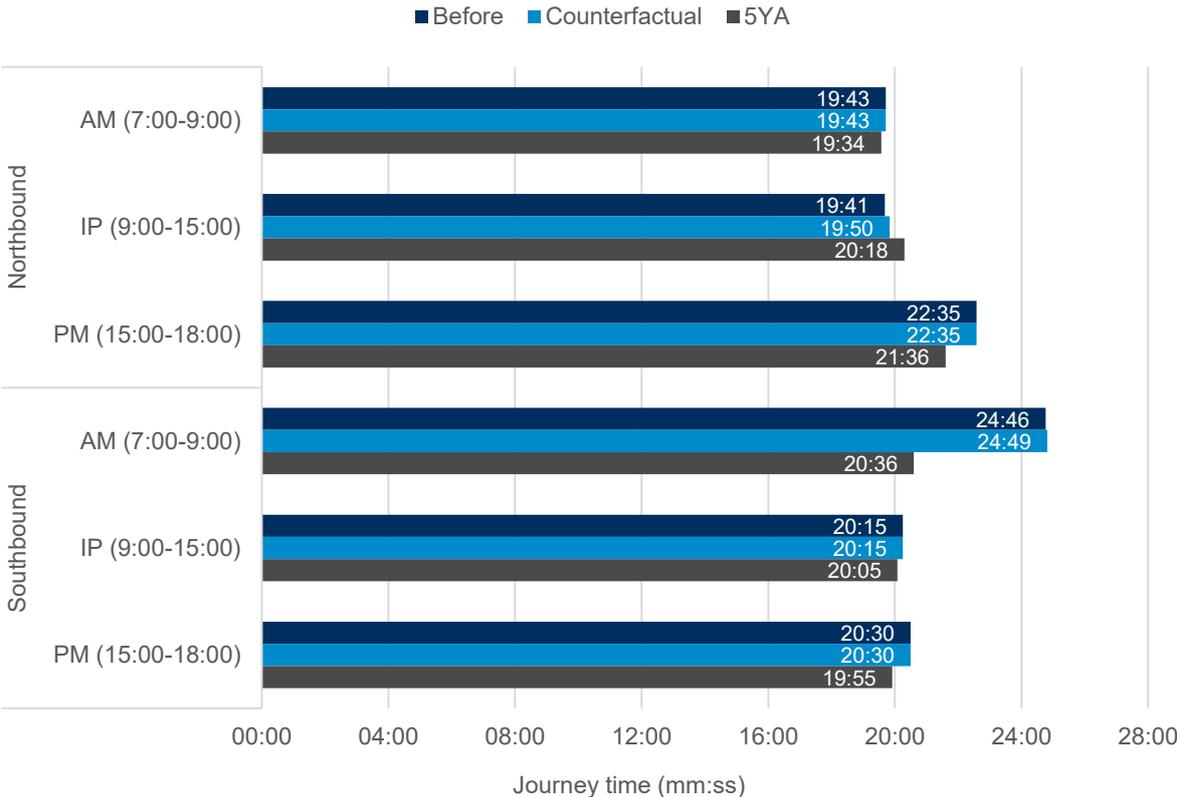
M1 junctions 28 to 32

Figure 13 shows the comparison between the junctions 28 to 32 average journey times for 2013 (before), 2022 counterfactual, and observed 2022 (five-years after).

The counterfactual journey times represent an estimation of the journey times assuming the project had not been implemented and are derived from journey times observed in 2013 (before construction of the scheme began), which are then factored with consideration to observed traffic growth relative to regional traffic trends.

In this case, because observed traffic growth on the project route has been similar or lower than regional traffic trends, the counterfactual journey times are very close to the observed 2013 before journey times.

Figure 13 Average journey times comparison (mm:ss) – M1 J28 to J32



Source: Satellite navigation (TomTom) Traffic Analytics. Before: 2013, 1YA: 2018, 5YA: 2022

The northbound direction shows observed 2022 average journey times are slightly shorter than the equivalent 2022 counterfactual journey times during the AM and PM periods, by 9 seconds and 59 seconds respectively. The average inter-peak journey time has been observed to be 28 seconds longer than the counterfactual journey time.

The southbound direction shows a similarly small difference in observed and counterfactual journey times during the inter-peak and PM periods, with the observed 2022 journey times 10 seconds and 35 seconds shorter than counterfactual journey times respectively. There is a more noticeable journey time saving during the AM period, with the observed 2022 average journey time 4 minutes 13 seconds shorter than the counterfactual journey time.

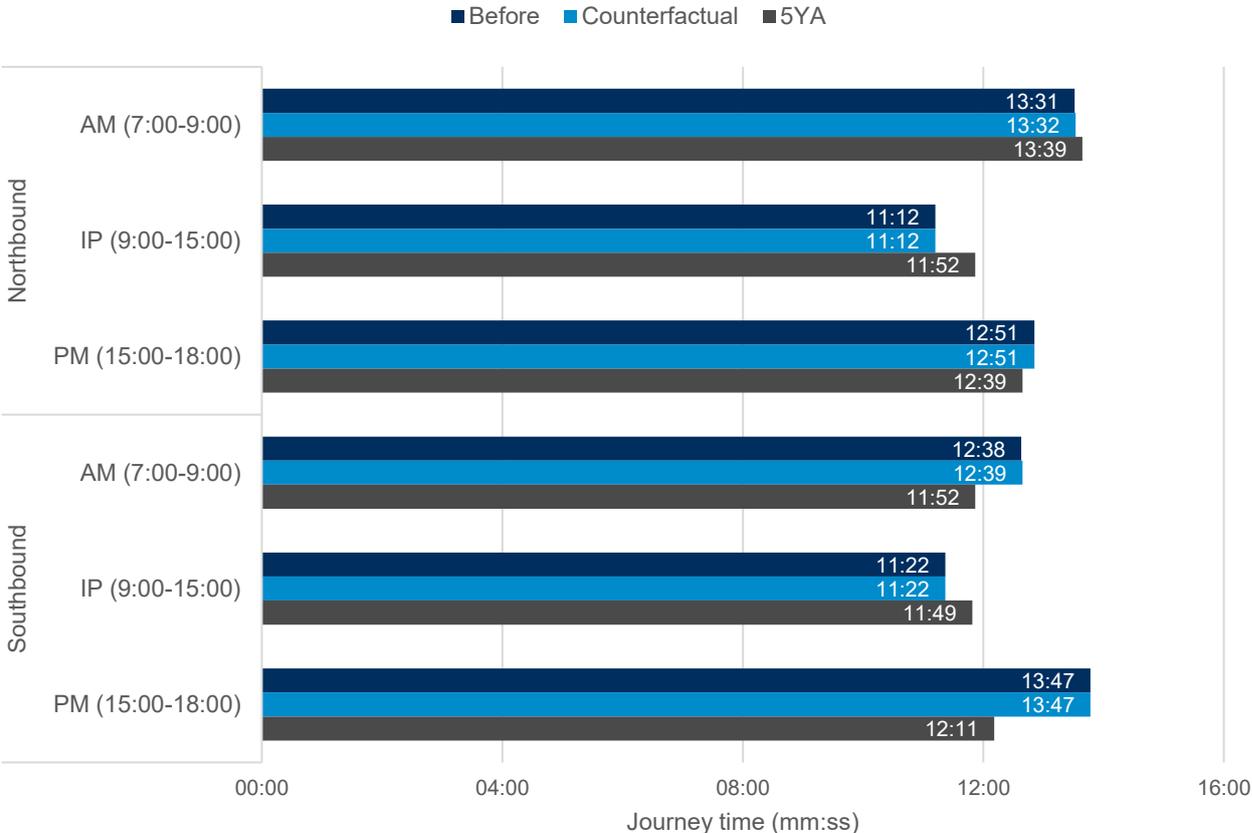
Overall, the average journey times do not appear to have been substantially affected by the scheme in most time periods and directions. However, the average journey time following implementation of the junctions 28 to 31 smart motorway did decrease by just over four minutes in the southbound direction during the AM peak period.

It should be noted that this analysis does not include potential relief provided for traffic approaching junction 28 in a northbound direction, where any reduction of queueing is likely to have had a positive impact on journey times for vehicles before they reach junction 28, both for northbound journeys continuing along the M1 and those leaving the M1 at junction 28. It is therefore possible that there are some additional benefits of the scheme at this location which have not been accounted for.

M1 junctions 32 to 35a

Figure 14 shows the comparison between the junctions 32 to 35a average journey times for 2013 (before), 2022 counterfactual, and observed 2022 (five-years after).

Figure 14 Average journey times comparison (mm:ss) – M1 J32 to J35a



Counterfactual journey times are shown to be consistent with the before data. The northbound direction shows that, compared to the counterfactual, observed 2022

average journey times are similar in the AM and PM peak periods (8 seconds slower and 12 seconds faster respectively) and slightly slower (by 40 seconds) in the inter-peak period.

The southbound direction shows similarly small differences in observed and counterfactual journey times during the AM and inter-peak periods, with the observed 2022 journey times 47 seconds faster during the AM period and 27 seconds slower during the inter-peak period than the equivalent counterfactual journey times. There is a more noticeable journey time saving during the PM peak period, with the observed 2022 average journey time 1 minute 36 seconds faster than the counterfactual journey time.

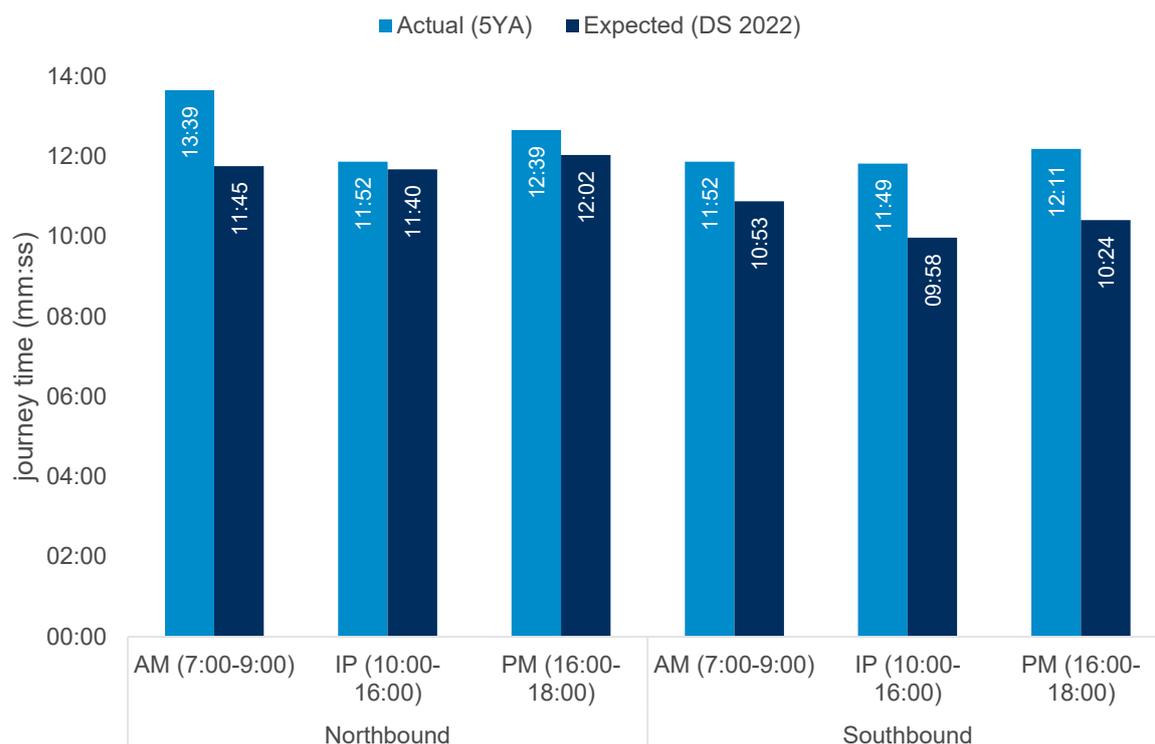
Overall, the average journey times do not appear to have been substantially affected by the scheme in most time periods and directions. However, the largest difference in journey times as a result of the implementation of the J32 to 35a smart motorway is a reduction in journey times by approximately 1 minute 36 seconds in a southbound direction during the PM peak period.

Were journey time savings in line with forecast?

For the project section between junctions 28 and 32, no new comparison of expected and observed journey times can be undertaken for 2022 because no forecast journey time data beyond 2015 is available. The junctions 28 to 35a one-year after POPE Report analysed the accuracy of the 2015 forecast journey time savings against the outturn 2018 journey time savings. The report found that in some time periods, the forecasts were inaccurate, with the largest discrepancy being in the order of two minutes (southbound during the AM peak period).

A comparison between the expected (DS forecast) and actual (five-year after) journey times on the junctions 32 to 35a section is shown in Figure 15. The forecast journey times in the Traffic Forecasting Report (TFR) were interpolated to identify an expected journey time in 2022, which was then compared with the observed journey times. Overall, the observed journey times in all time periods and both directions were slower in the five-year after period compared to the expected (forecast 2022 with project) journey times.

Figure 15 Actual vs expected journey times – M1 J32 to 35a



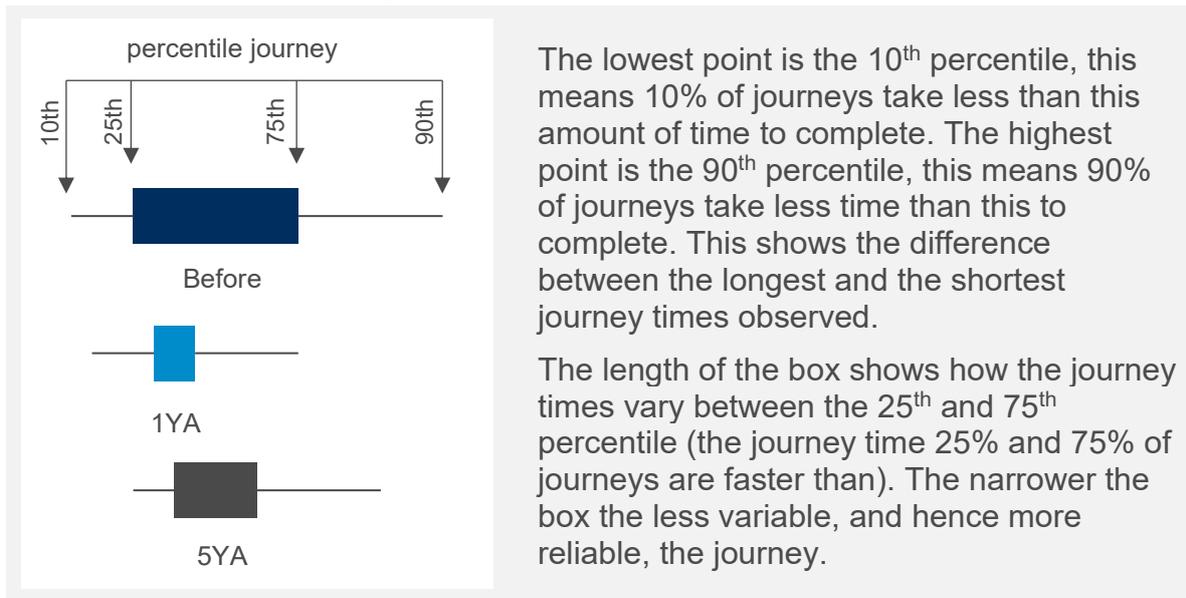
Source: Interpolated forecast based on expected values in TFR and actual 5YA (2022) Satellite navigation (TomTom) Traffic Analytics

Did the project make journeys more reliable?

Congestion can make journey times unreliable. If the time taken to travel the same journey each day varies, journey times are unreliable, and the road user is less confident in planning how long their journey will take them. If journey times do not vary, the road user can be more confident in the time their journey will take and allow a smaller window of time to make that journey.

To measure journey time reliability, we examine how much journey times vary from the average journey time, on any day or time-period. The distribution of journey times is a good indication of how much journey times vary. Four metrics of the distribution of journey times for the M1 junctions 28 to 32 and junctions 32 to 35a route have been used and presented as box-and-whiskers diagrams for northbound and southbound journeys. An explanation of the metrics shown in the box-and-whiskers diagrams is provided in Figure 16.

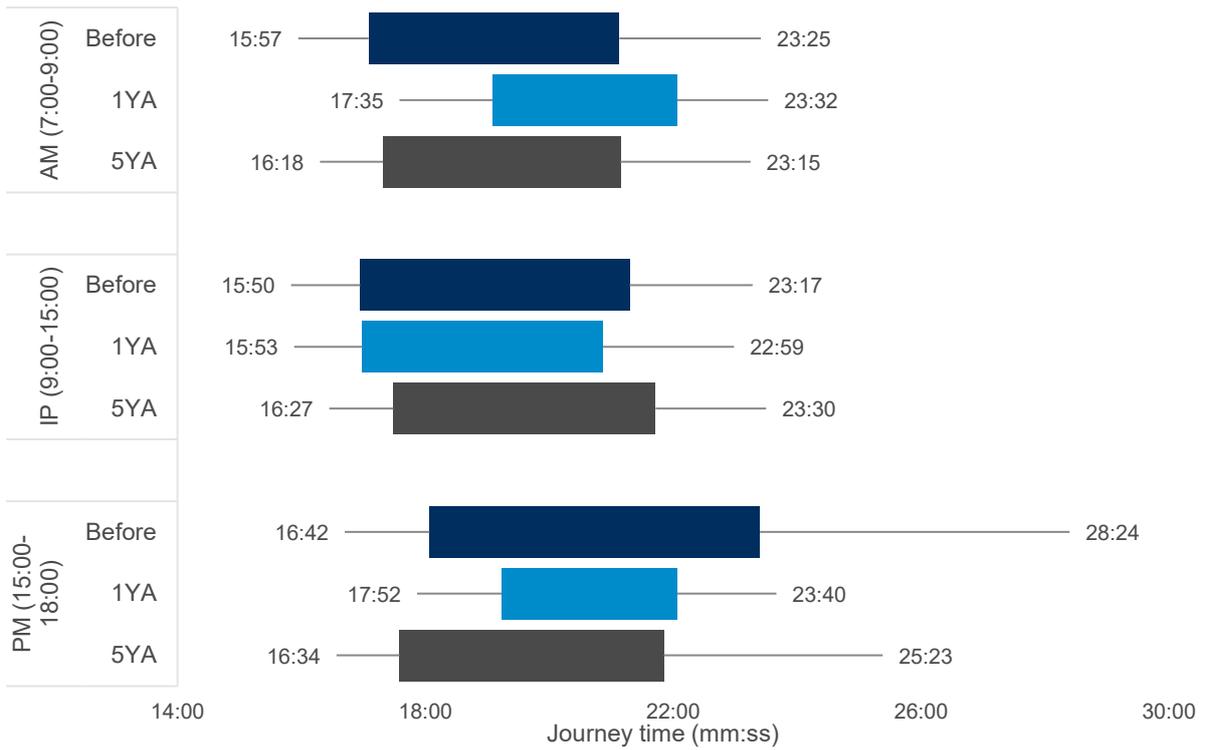
Figure 16 What does a box plot show?



M1 junctions 28 to 32

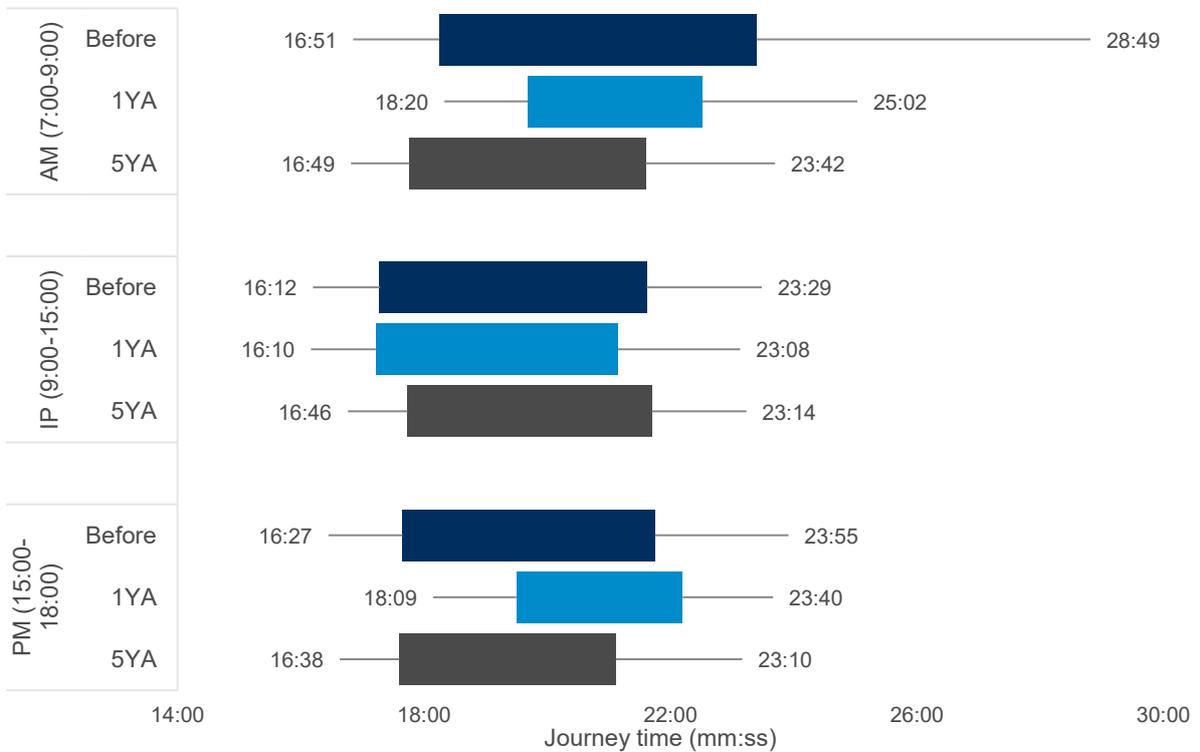
The northbound and southbound journey time reliability plots for this section can be viewed in Figure 17 and Figure 18. If the boxes get narrower, this indicates journeys become less variable and users can be more confident of the time it takes to travel through the route.

Figure 17 Journey time reliability (northbound) – M1 J28 to J32



Source: Satellite navigation (TomTom) Traffic Analytics. Before: 2013, 1YA: 2018, 5YA: 2022

Figure 18 Journey time reliability (southbound) – M1 J28 to J32



Source: Satellite navigation (TomTom) Traffic Analytics. Before: 2013, 1YA: 2018, 5YA: 2022

The five-years after data shows that the inter-quartile range (middle 50%) of journey times is narrower than the corresponding before journey time reliability data to a very small degree during the AM and inter-peak periods in the northbound direction and during the inter-peak period in the southbound direction, indicating a negligible change in reliability during these times. The improvement in journey time reliability is more noticeable during the PM period in the northbound direction and in both AM and PM periods in the southbound direction.

It is noted that during the AM and PM peak periods in both directions, journey time reliability has worsened when compared with one-year after data, despite faster average journey times.

Longest Journey Times

The scheme had an objective to: *'improve journey time reliability (particularly delay to worst 10% journeys)*'. In each of the three time periods in both directions, the 90th percentile journey time decreased from before to five-years after, with the exception of the northbound inter-peak journey times, which saw a small increase (13 seconds). It is therefore reasonable to conclude that the scheme has been successful at improving the worst 10% of journeys, in particular in the northbound PM peak period (by about three minutes) and in the southbound AM peak period (by about five minutes) between junctions 28 to 32.

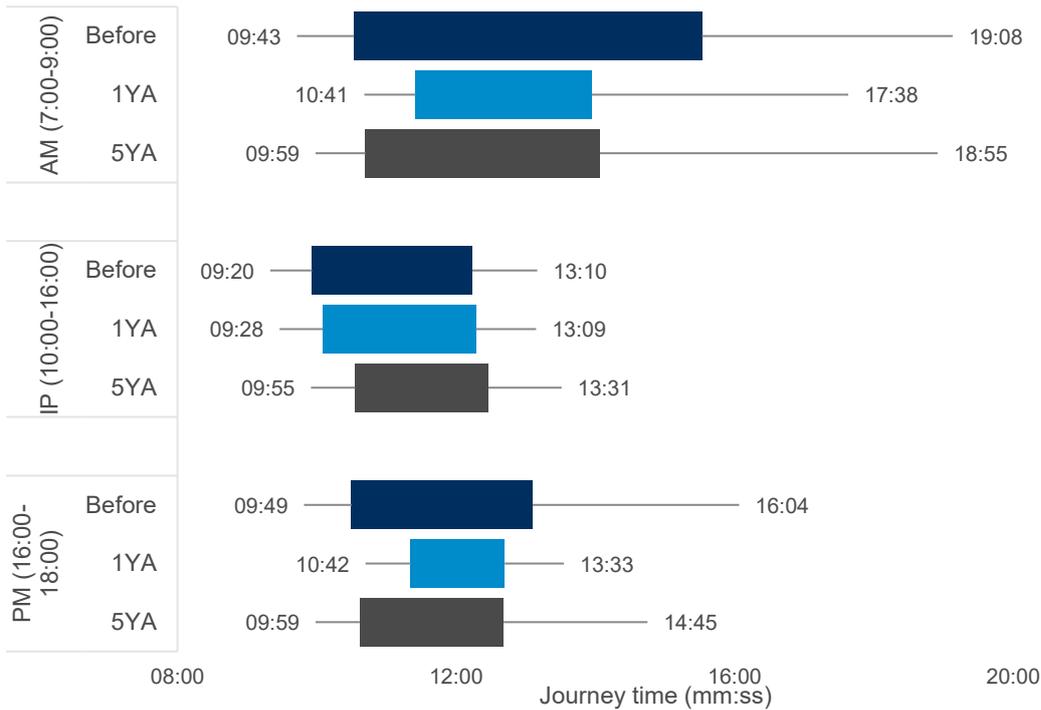
Shortest Journey Times

Five-years after data shows that the shortest journey times, shown as the 10th percentile, have experienced a small increase by between 21 seconds and 37 seconds during the inter-peak period in both directions and the AM peak northbound, with an even smaller change (less than 10 seconds) in all other time periods in both directions.

M1 junctions 32 to 35a

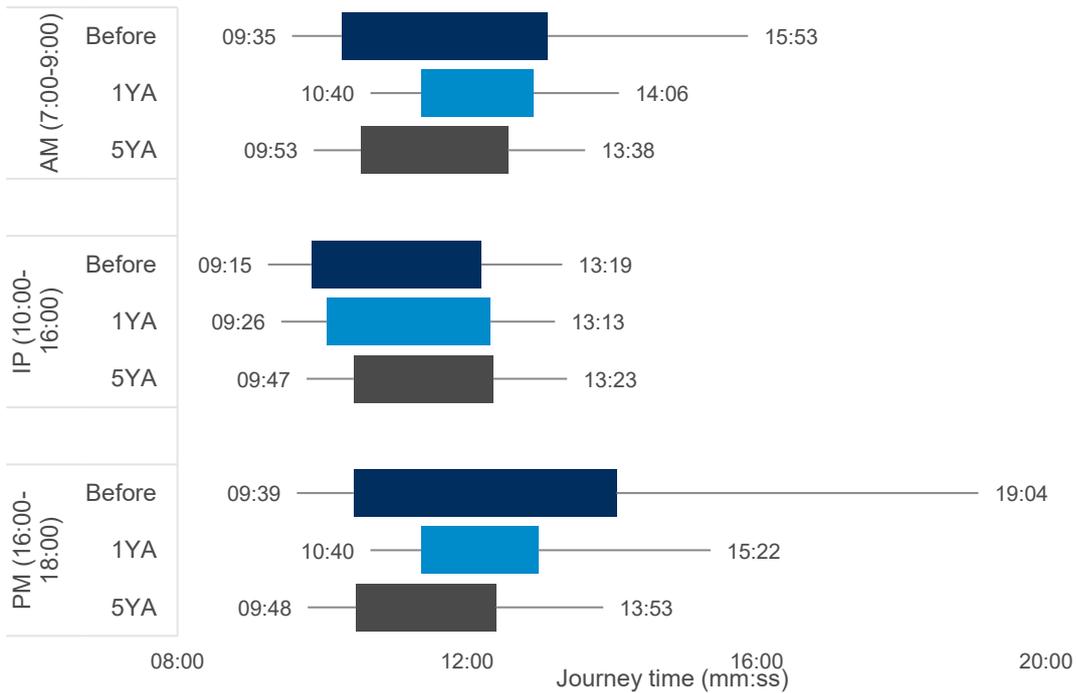
The journey time reliability plots for this section can be viewed in Figure 19 and Figure 20. Overall journey time reliability has improved in both directions with notable changes in the PM peak.

Figure 19 Journey time reliability (northbound) – M1 J32 to J35a



Source: Satellite navigation (TomTom) Traffic Analytics. Before: 2015, 1YA: 2018, 5YA: 2022

Figure 20 Journey time reliability (southbound) – M1 J32 to J35a



Source: Satellite navigation (TomTom) Traffic Analytics. Before: 2015, 1YA: 2018, 5YA: 2022

The five-years after data shows that the inter-quartile range (middle 50%) of journey times is narrower than the corresponding Before journey time reliability data in all time periods in both directions. The most notable improvement to journey time reliability has occurred during the AM peak period in the northbound direction, and during the PM period in the southbound direction.

It is noted that during the AM and PM peak periods in both directions, journey time reliability has worsened when compared with one-year after data, despite faster average journey times.

Longest Journey Times

In each of the three time periods in both directions, the 90th percentile journey time decreased from before to five-years after, with the exception of the inter-peak journey times in both directions which saw a small increase (21 seconds northbound and 4 seconds southbound). It is therefore reasonable to conclude that the scheme has been successful at improving the worst 10% of journeys, in particular in the southbound PM peak period (by about 5 minutes) between J32 and J35a.

Shortest Journey Times

Five years after data shows that the shortest journey times, shown as the 10th percentile, have increased in all time periods in both directions, although by no more than 18 seconds in the AM and PM peak periods and 35 seconds in the inter-peak.

5. Safety evaluation

Summary

The safety objective for both M1 junctions 28 to 31 and M1 junctions 32 to 35a was to ensure no worsening of the collision rate.

Junctions 28 to 31

The business case forecast a saving of 688 collisions over the 60-year appraisal period which accounts for a benefit of £56 million. The predicted casualty reduction for the wider area was 13 fatal, ten serious and 868 slight over the 60-year appraisal period.¹¹

The average collision rate on the project extent has reduced by nine personal injury collisions (PIC) per hundred million vehicle miles (hvm) since the project has been open to traffic. The average PIC has reduced by 66 (annual average of 92 to 26 PICs after) in the same period. The number of fatal collisions has reduced by two (seven in the five years before the project was constructed and five in the five years after), and there has been a reduction across serious and slight collision severities, Fatal and Weighted Injuries (FWI) and Killed or Seriously Injured (KSI) measures.

The average collision rate in the wider area has reduced by 22 PICs per hvm since the project has been open to traffic. The average PIC has reduced by 189 (annual average of 441 to 252 PICs after) in the same period. The number of fatal collisions remains stable between before and after (21). There has been a positive reduction across serious and slight collision severities, FWI and KSI measures.

Junctions 32 to 35a

The business case forecast a saving of 115 collisions over the 60-year appraisal period which corresponds to a benefit of £5.6 million. The predicted casualty reduction for the wider area was one fatal, ten serious and 102 slight over the 60-year appraisal period.

The average collision rate on the project extent has reduced by seven PICs per hvm since the project was opened to traffic. The average PIC has reduced by 21 (annual average of 38 to 17 PICs after) in the same period. The number of fatal collisions has reduced by one (three in the five years before the project was constructed and two in the five years after), and there has been a reduction across serious and slight collision severities, FWI and KSI measures.

The average collision rate in the wider area has reduced by 23 PICs per hvm since the project was opened to traffic. The average PIC has reduced by 99 (annual average of 212 to 113 PICs after) in the same period. There has been a positive reduction across serious and slight collision severities, FWI and KSI measures. There has been an increase in two fatal collision severity (ten before to 12 fatal collisions after).

If the wider area surrounding both M1 junctions 28 to 31 and M1 junctions 32 to 35a continues to perform at the current level, it will exceed the predicted reduction

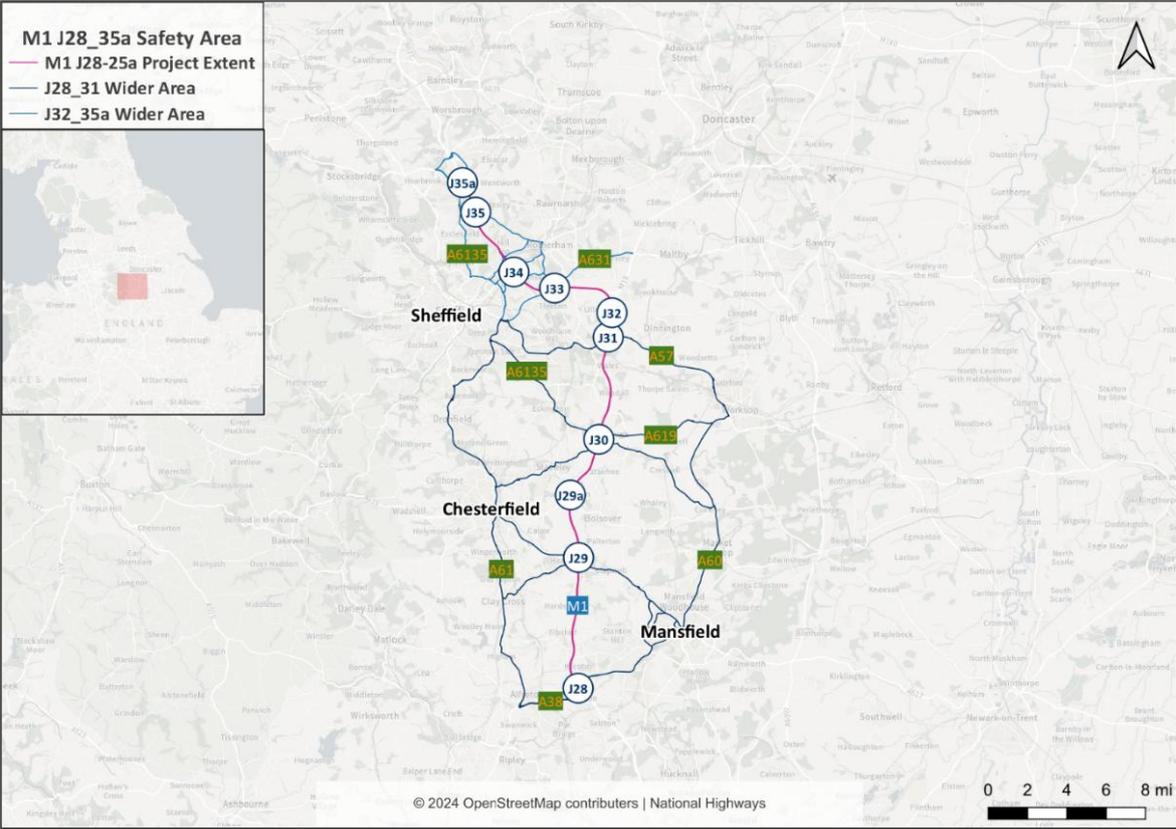
¹¹ The safety benefit was expected to be observed in the wider area. The appraisal forecast an increase of 7 PICs on the project extent, mainly because of higher traffic flows.

in all measures. At this five-year evaluation point, the project is on track to meet its objective to ensure no worsening of the collision rate.¹²

Safety study area

The safety study area is shown in Figure 21. This area was assessed in the appraisal supporting the business case for the project. We have therefore replicated the appraisal study area to understand the emerging safety trends.

Figure 21 Safety study area



Source: National Highways and OpenStreetMap contributors

Road user safety on the project extent

What impact did the project have on road user safety?

DfT releases road safety data¹³ that records incidents on public roads that are reported to the police. This evaluation considers only collisions that resulted in personal injury.

The safety analysis has been undertaken to assess changes over time looking at the trends in the five years before the project was constructed to provide an annual average. We have then assessed the trends from the first five years after the scheme was operational and open for road users. This provides an indication of safety trends, to allow conclusions to be drawn about the safety impact of the project across the following time periods.

Junctions 28 to 31

¹² Projects are appraised over a 60-year period. This conclusion is based on the findings at five years after the project opened for traffic.

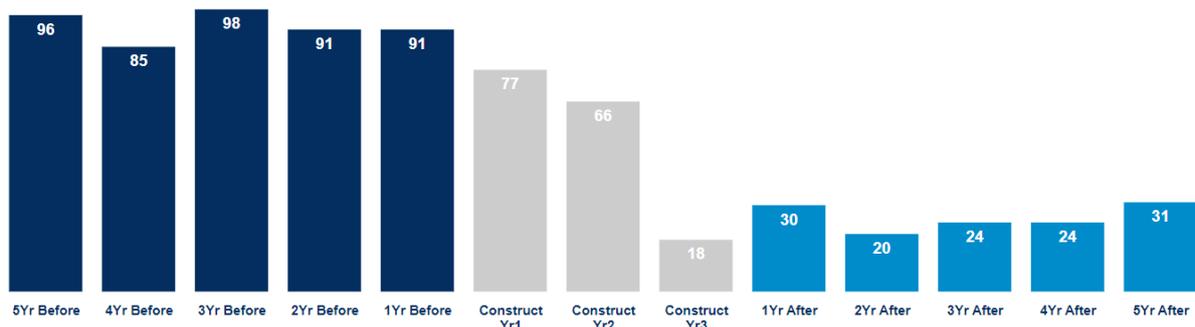
¹³ <https://data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data>

- Pre-construction: 6 September 2008 – 5 September 2013
- Construction: 6 September 2013 – 30 March 2016
- Post-opening: 31 March 2016 – 30 March 2021.

It should be noted that COVID-19 restrictions were in place during the fifth year post-opening, affecting traffic volumes and patterns during this time.

The evaluation found the number of PICs on the project extent had decreased. During the first five years, the project was operational, there were on average 26 PICs per year, 66 fewer than the average 92 per year over the five years before the project was constructed (Figure 22).

Figure 22 Annual PICs – M1 J28 to J31



Source: STATS19 6 September 2008 – 30 March 2021

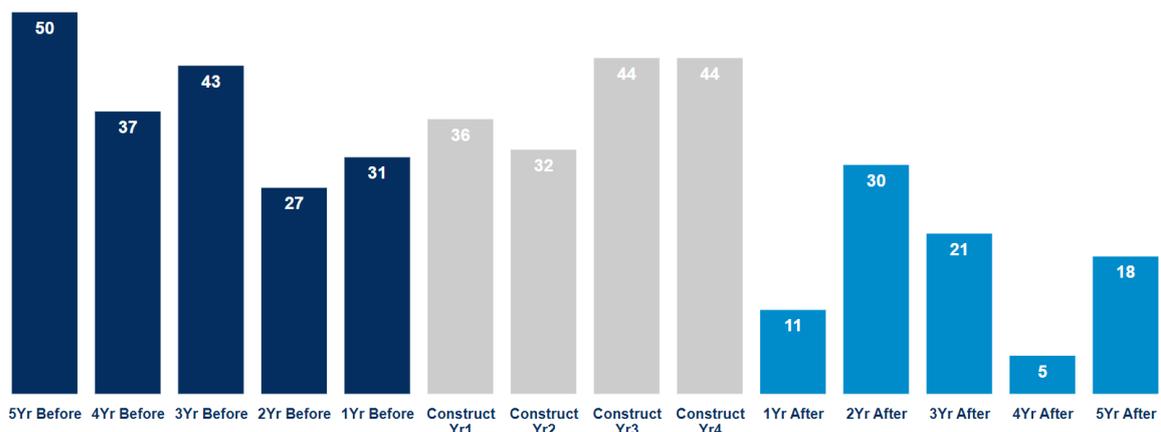
Junctions 32 to 35a

- Pre-construction: 30 June 2008 - 29 June 2013
- Construction: 30 June 2013 – 29 March 2017
- Post-opening: 29 March 2017 – 28 March 2022.

It should be noted that COVID-19 restrictions were in place during the fourth- and fifth-year post-opening, affecting traffic volumes and patterns during this time.

The evaluation found the number of PICs on the project extent had decreased. During the first five years, the project was operational, there were on average 17 PICs per year, 20 fewer than the average 38 per year over the five years before the project was constructed (Figure 23).

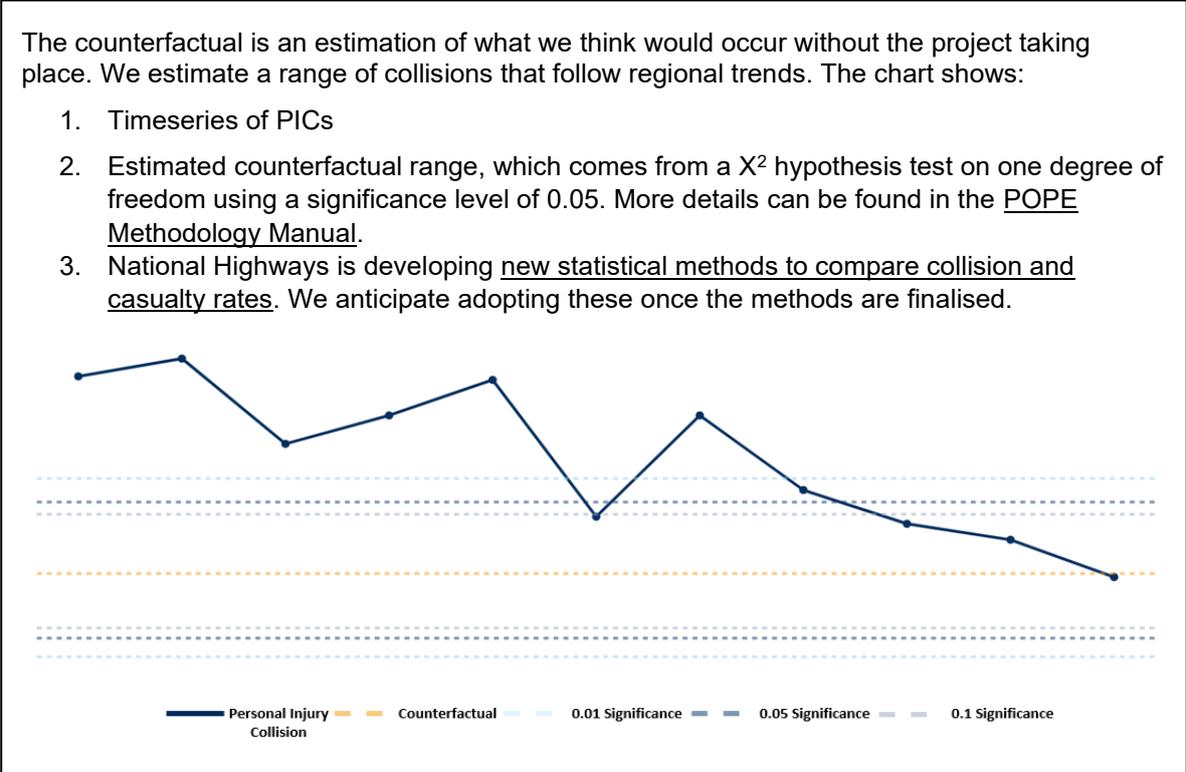
Figure 23 Annual PICs – M1 J32 to J35a



Source: STATS19 30 June 2008 – 28 March 2022

As part of the safety evaluation, we look to assess what changes in collision rates might have occurred due to factors external to the project over this timeframe. To do this, we estimated the trend in PICs which might have occurred if the road had remained in its previous configuration (this is referred to as a counterfactual – see Figure 24 and the POPE methodology manual¹⁴). This is based on changes in regional safety trends for conventional motorways with a high volume of road users.

Figure 24 What does the counterfactual show?

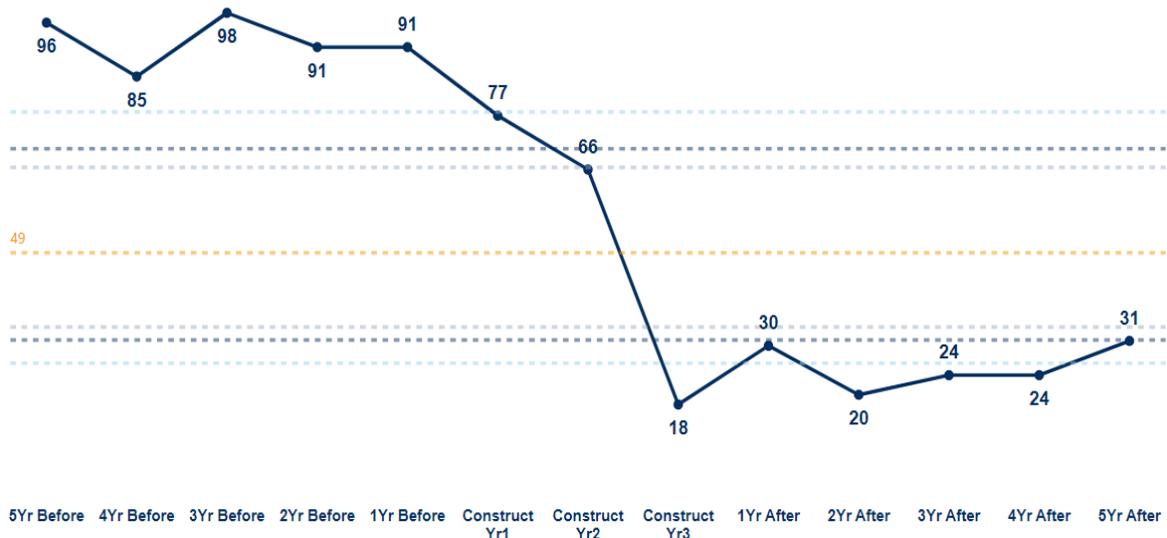


This helped us to estimate how the pre-construction safety levels would have changed over the evaluation period without the scheme. Based on this assessment, we estimate that if the conversion to ALR had not occurred, the trend in the number of PICs and collision rates would likely have reduced, but not to the extent to that has been observed.

A counterfactual test has been performed which estimates a range of between 31-70 PICs would be expected as shown in Figure 25 between M1 junctions 28 and 31.

¹⁴ <https://nationalhighways.co.uk/media/exypgk11/pope-methodology-note-2024-v2.pdf>

Figure 25 Annual average number of PICs with counterfactual scenario ranges – M1 J28 to J31

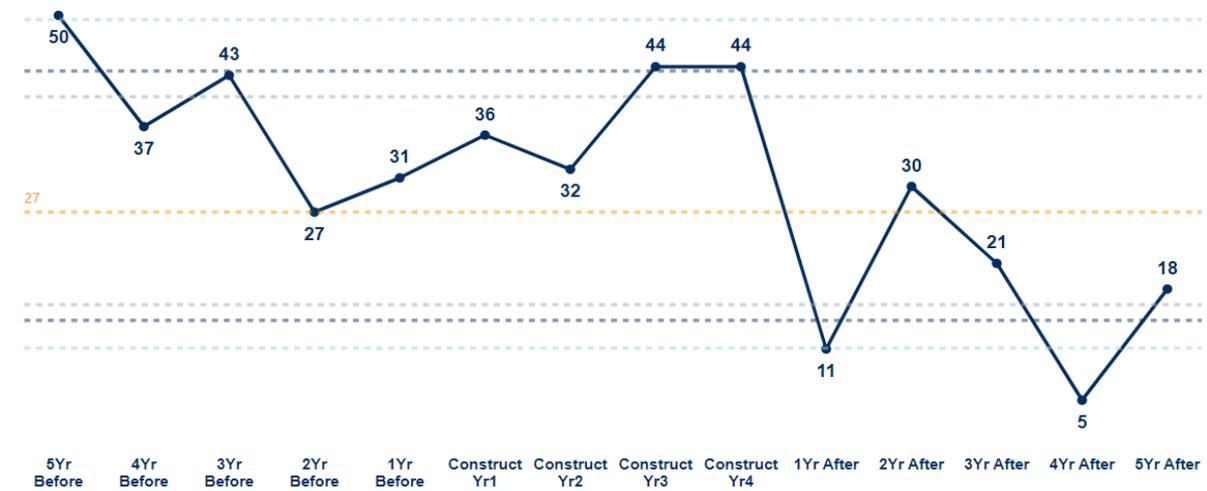


Source: STATS19 6 September 2008 – 30 March 2021 Note: Refer to Figure 24 for chart legend

The observed average of 26 collisions per year is lower than what we would have expected without the project. This is an indication that the project has had a positive impact on safety.

A counterfactual test has also been performed for M1 junctions 32 to 35a, which estimates a range of between 14 to 44 PICs would be expected as shown in Figure 26.

Figure 26 Annual average number of personal injury collisions with counterfactual scenario ranges – M1 J32 to J35a



Source: STATS19 30 June 2008 – 28 March 2022

The observed average of 17 collisions per year is within the counterfactual range, but towards the lower end. This is an indication that the project appears to have had a positive impact on safety, although it is possible that the reduction in collisions per year could have occurred without the scheme in place.

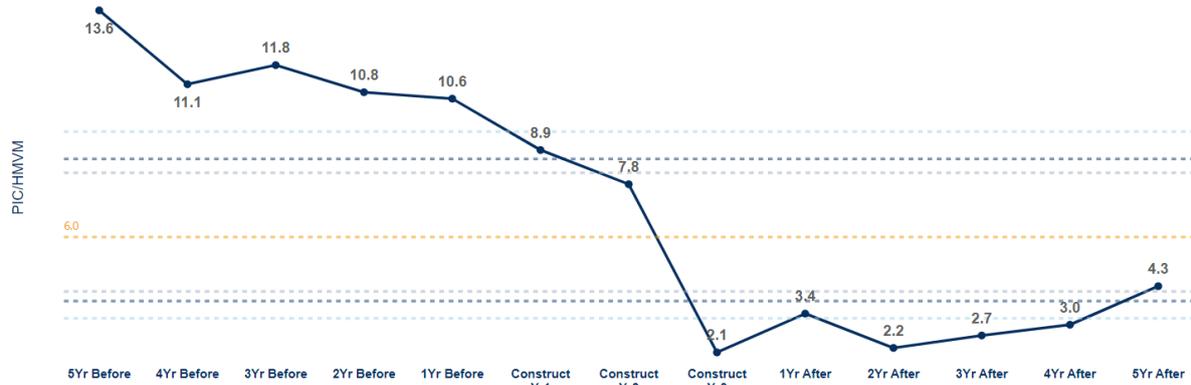
How had traffic flows impacted collision rates?

To understand potential safety benefits, we consider changes in the volume of traffic and the number of collisions observed. A rate is calculated using the number

of PICs and the total miles travelled on a road section or type. The rate is presented as the number of collisions per hmvm.

Between M1 junctions 28 and 31, the average collision rate had decreased to 3.1 PICs per hmvm in the five years after construction, which equates to travelling 34 million vehicle miles before a collision occurs. During the five years before the scheme, the average collision rate was 11.6 PICs per hmvm. This equates to traveling nine million vehicle miles before a collision occurs (Figure 27).

Figure 27 Annual average collision rate with counterfactual scenario ranges – M1 J28 to J31

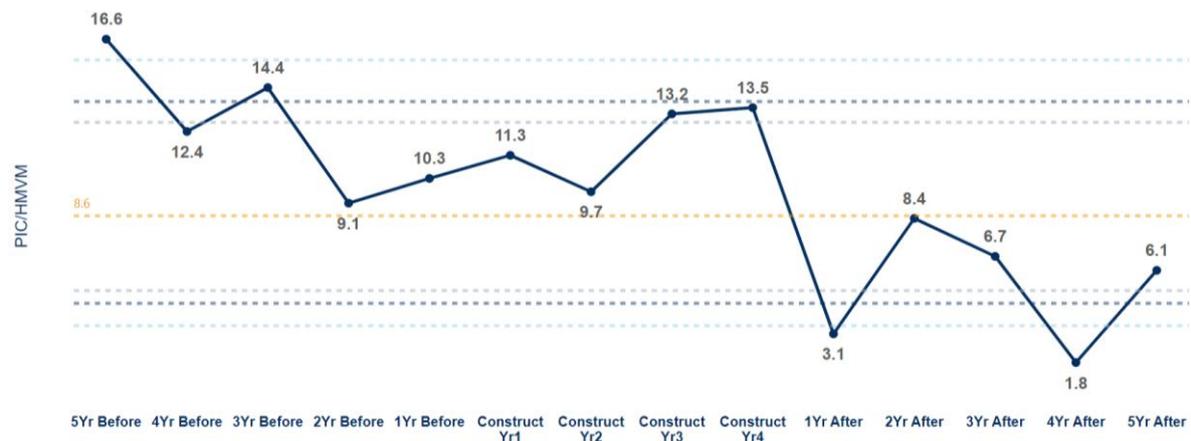


Source: STATS19 6 September 2008 – 30 March 2021. Note: Refer to Figure 24 for chart legend

As with the number of PICs, a counterfactual test has also been performed on personal injury collision rates. This estimated the collision rate would likely have reduced to between 3.8 and 8.6 PICs per hmvm. This is lower than the 11.6 PICs per hmvm in the five years before scheme construction commenced, but higher than the 3.1 PICs per hmvm with the scheme in place i.e. the actual annual average collision rate in 2021 is lower than what would have been expected had it not gone ahead.

The average collision rate for M1 junctions 32 to 35a had decreased to 5.2 PICs per hmvm in the five years after construction, equating to travelling 26 million vehicle miles before a collision occurs. In the five years before the scheme, the average collision rate was 12.6 PICs per hmvm, which equates to traveling eight million vehicle miles before a collision occurs (Figure 28).

Figure 28: Annual average collision rate with counterfactual scenario ranges – M1 J32 to J35a



Source: STATS19 30 June 2008 – 28 March 2022. Note: Refer to Figure 24 for chart legend

The counterfactual test estimated the collision rate would likely have reduced to between 4.5 and 13.8 PICs per hmvm. This is lower than the 12.6 PICs per hmvm in the five years before scheme construction commenced, and the 5.2 PICs per hmvm with the scheme in place is within the range, but towards the lower end. It appears that the actual annual average collision rate in 2022 is lower than what would have been expected had it not gone ahead, although it is possible that the reduction in collision rate could have occurred without the scheme in place.

Based on this assessment, we estimate that if the conversion to ALR had not occurred, the trend in the number of PICs and collision rates would likely have reduced, but not to the extent to what has been observed.

What changes in the severity of collisions did we see?

Collisions which result in injury are recorded by severity as either fatal, serious, or slight. The way the police record the severity of road safety collisions changed within the timeframes of the evaluation, following the introduction of a standardised reporting tool – Collision Recording and SHaring (CRASH). This is an injury-based reporting system, and as such severity is categorised automatically by the most severe injury. This has led to some disparity when comparing trends with the previous reporting method, where severity was categorised by the attending police officer.¹⁵ As a consequence, DfT has developed a severity adjustment methodology¹⁶ to enable robust comparisons to be made.

The pre-conversion collision severity has been adjusted, using DfT’s severity adjustment factors, to enable comparability with the post-conversion safety trends.¹⁷

Junctions 28 to 31

Five years after the project opened to traffic, there has been a decrease in the number of fatal, serious and slight collisions when compared to five years before (Table 2). Figure 29 shows the full breakdown of severity of PICs by project year.

Table 2 Number of PICs by severity - M1 J28 to J31

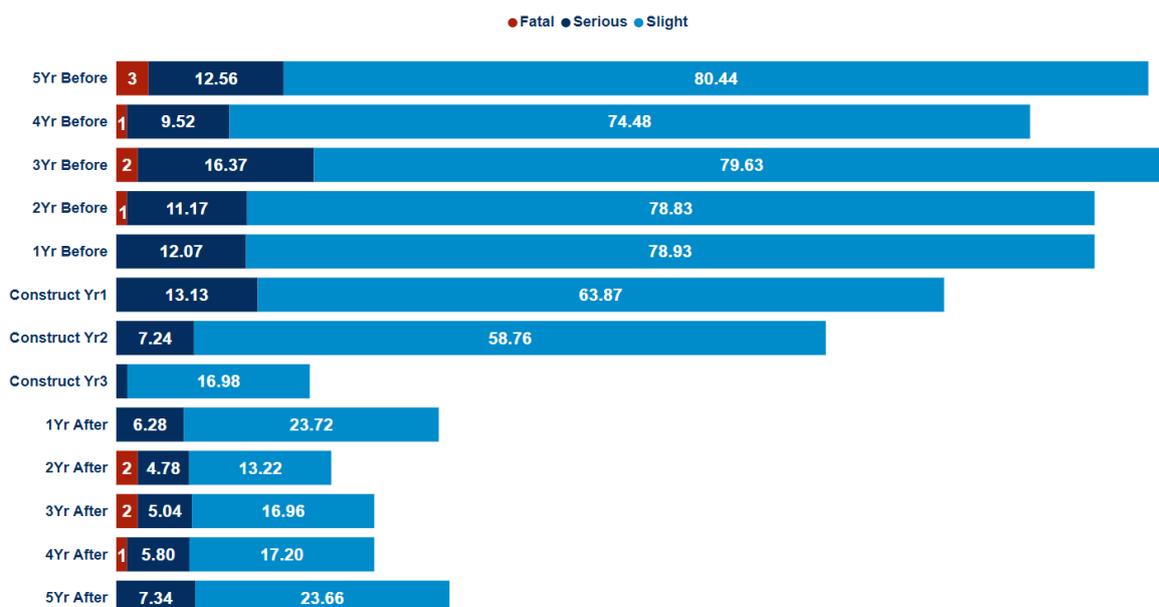
	5Y Before	5Y After	Change	Change direction
Fatal (total)	7	5	-2	
Serious (annual average)	12.34	5.85	-6.49	
Slight (annual average)	79.46	18.95	-59.51	

¹⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820588/severity-reporting-methodology-final-report.odt

¹⁶ <https://www.gov.uk/government/publications/guide-to-severity-adjustments-for-reported-road-casualty-statistics/guide-to-severity-adjustments-for-reported-road-casualties-great-britain#guidance-on-severity-adjustment-use>

¹⁷ Collision Severities within this report use the 2022 adjustment factor.

Figure 29 Severity of PICs within the project extent - M1 J28 to J31



Source: STATS19 6 September 2008 – 30 March 2021

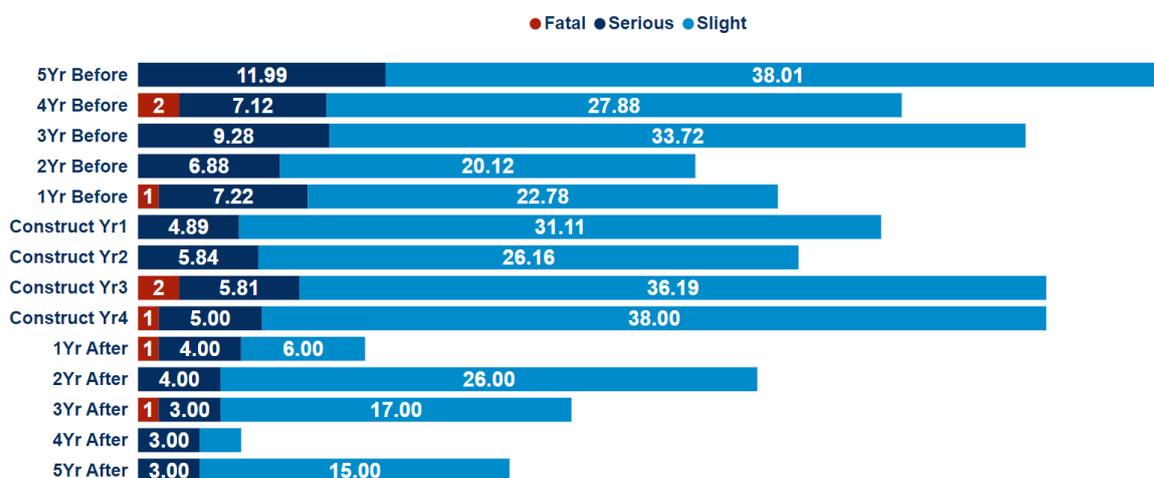
Junctions 32 to 35a

Five years after the project's construction, there has been a decrease in the number of fatal, serious and slight collisions when compared to five years before (Table 3). Figure 30 shows the full breakdown of severity of PICs by project year.

Table 3 Number of PICs by severity – M1 J32 to J35a

	5Y Before	5Y After	Change	Change direction
Fatal (total)	3	2	-1	↓
Serious (annual average)	8.50	3.40	-5.1	↓
Slight (annual average)	28.50	13.20	-15.3	↓

Figure 30 Severity of PICs within the project extent – M1 J32 to J35a



Source: STATS19 30 June 2008 – 28 March 2022

How had traffic flows impacted collision severity?

Like other transport authorities across the UK, the key measure we use to assess the safety of roads is FWI. This gives a fatality ten times the weight of a serious casualty, and a serious casualty ten times the weight of a slight casualty¹⁸. In effect, it takes all non-fatal injuries and adds them up using a weighting factor to give a total number of fatality equivalents.¹⁹ This is represented by an annual average and a rate that standardise casualty severities against flow to show the likelihood of a fatality equivalent occurring per distance travelled.

Junctions 28 to 31

There has been a decrease in the FWI observed annually from 4.2 to 2.1 FWI.

The combined measure showed an increased number of million vehicle miles was travelled before a FWI²⁰. The rate of FWI per hmvm has reduced. This suggests that taking into account changes in traffic, the project is having a positive safety impact on the severity of casualties within the project extent.

We also assess the impact the project had on casualties using the KSI measure²¹, and consider changes in traffic by calculating an average rate for every hmvm travelled.

There has been a reduction in the KSI observed annually. The average has decreased to an average of 8.2 KSI during the first 60 months of operation. The average KSI was 15.5 during the five years before. The rate of KSI per hmvm has reduced from an average of two to one for every hmvm travelled.

Junctions 32 to 35a

There has been a slight decrease in the FWI observed annually from 2.1 to 1.2 FWI.

The combined measure showed an increased number of million vehicle miles was travelled before a FWI²². The rate of FWI per hmvm has reduced. This indicates that the project is having a positive safety impact on the severity of casualties within the project extent.

There has been a reduction in the KSI observed annually. The average has decreased to an average of 4.4 KSI during the first 60 months of operation. The average KSI was 10.3 during the five years before. The rate of KSI per hmvm has reduced from an average of 3.4 to 1.4 for every hmvm travelled.

In both project areas, the observations for FWI and KSI suggest that the projects are having a positive safety impact on the severity of casualties within the project extent.

¹⁸ The FWI weights collisions based on their severity. A fatal collision is 1, a serious collision is 0.1 and a slight collision is 0.01. So ten serious collisions, or 100 slight collisions are taken as being statistically equivalent to one fatality.

¹⁹ Casualty severities within this report use the 2022 adjustment factor.

²⁰ Before the project, 165 million vehicle miles needed to be travelled before a FWI (0.61FWI per hmvm). After the project, this increased to 354 million vehicle miles (0.28 FWI equivalents per hmvm).

²¹ The number of people killed or seriously injured in road traffic collisions. This metric is non-weighted but does not pick up all injuries (slight casualties). KSI rate per hmvm is the rate calculated using the number of people who are killed or seriously injured, and the total miles travelled on a road section or type.

²² Before the project, 141 million vehicle miles needed to be travelled before a FWI (0.7 FWI per hmvm). After the project, this increased to 261 million vehicle miles (0.4 FWI equivalents per hmvm).

Road user safety in the wider area

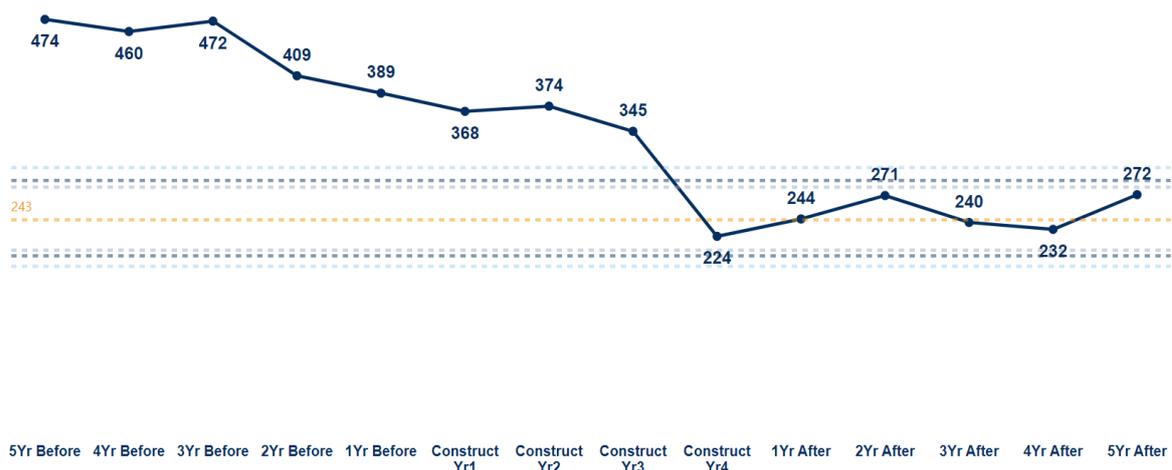
The wider safety area for the M1 junctions 28 to 31 and M1 junctions 32 to 35a projects overlap. Due to the close dates of development, we have decided to use selected links within the respective safety areas and allocate them to a project. This has enabled us to analyse the potential safety benefits that the projects have had on surrounding roads. To collect information, we have used the following dates:

- Pre-construction: 30 June 2008 - 29 June 2013
- Construction: 30 June 2013 – 29 March 2017
- Post-opening: 29 March 2017 – 28 March 2022.

What changes in safety numbers did we see in the wider area?

Before the M1 junctions 28 to 31 project, an annual average of 441 collisions were observed. After the projects, this had fallen to 252, a decrease of 189. The after annual average falls within the counterfactual range of between 202-288 PICs per year (Figure 31).²³

Figure 31: Observed and expected range of PICs in the wider area (annual average) - M1 J28 to J31



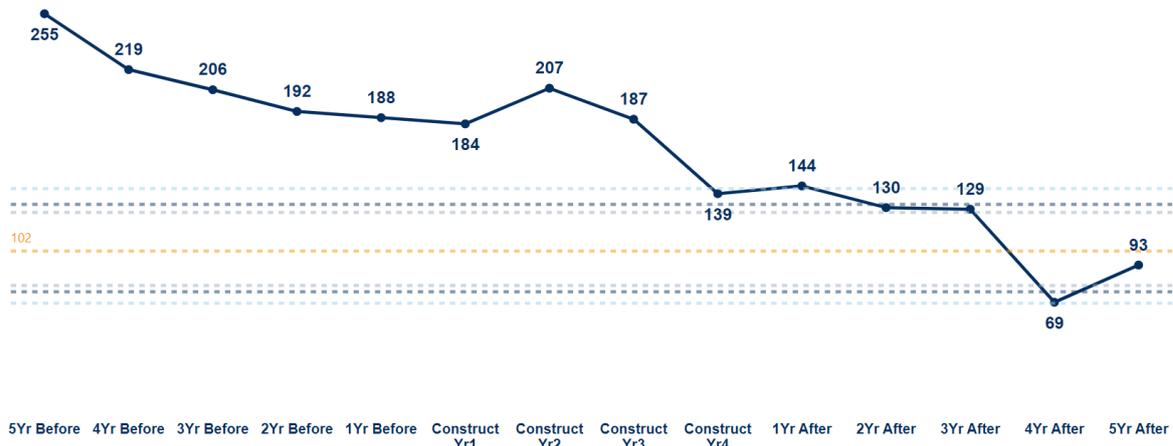
Source: STATS19 30 June 2008 – 28 March 2021. Note: Refer to Figure 24 for chart legend

Before the M1 junctions 32 to 35a project, an annual average of 212 collisions were observed. After the project, this had fallen to 113, a decrease of 99. The after annual average falls within the counterfactual range of between 76-132 PICs per year (Figure 32).²⁴

²³ We have tested the results at 95% confidence interval.

²⁴ We have tested the results at 95% confidence interval.

Figure 32: Observed and expected range of PICs in the wider area (annual average) - M1 J32 to J35a



Source: STATS19 30 June 2008 – 28 March 2022. Note: Refer to Figure 24 for chart legend

What impact did traffic flows have on collision rates in the wider area?

Junctions 28 to 31

The evaluation has identified a decrease in the rate of collisions per hundred million vehicle miles (hmvm). During the five years before, there was an annual average of 51.1 PICs per hmvm. During the five years after, there was a decrease to 29.1 PICs per hmvm. The counterfactual test undertaken found that the collision rate would likely have been between 27-39 PICs per hmvm. The after annual average collision rate falls just within the counterfactual range of 27-39 collisions per hmvm.

This indicates we have observed a reduction in the rate that PICs occur as predicted.

Junctions 32 to 35a

The evaluation has identified a decrease in the rate of collisions per hmvm. During the five years before there was an annual average of 53.5 PICs per hmvm. During the five years after, there was a decrease to 31.1 PICs per hmvm. The counterfactual test undertaken found that the collision rate would likely have been between 25-43 PICs per hmvm. The after annual average collision rate falls just within the counterfactual range of 25-43 collisions per hmvm.

This indicates we have observed a reduction in the rate that PICs occur as predicted, but within regional trends to be confident that the project is having a positive impact on surrounding roads.

What changes did we see in the severity of collisions in the wider area?

After the M1 junctions 28 to 31 project there has been a reduction in severity for serious and slight categories with fatal remaining stable with no change (Table 4).

Table 4 Number of PICs by severity – M1 J28 to J31

	Before	After	Change	Change direction
Fatal (total)	21	21	0	↔
Serious (annual average)	89.11	64.07	-25.04	↓
Slight (annual average)	347.49	183.53	-163.96	↓

After the M1 junctions 32 to 35a project there has been a reduction in severity across serious and slight categories, but an increase in fatal casualties (Table 5).

Table 5 Number of PICs by severity – M1 J32 to J35a

	Before	After	Change	Change direction
Fatal (total)	10	12	2	↑
Serious (annual average)	44.17	27	-17.17	↓
Slight (annual average)	165.83	83.6	-82.23	↓

How had traffic flows impacted collision severity in the wider area?

Junctions 28 to 31

There has been a reduction in the FWI observed annually. An annual average of 13.2 FWI was observed after the project became operational. This is a reduction compared to the average 18.6 FWI observed before.

The combined measure showed an extra 12.9 million vehicle miles was travelled before an FWI²⁵.

A reduction of 28.2 KSI has been observed annually. Reducing from an average of 96.7 KSI before to 68.5 KSI after the project became operational. The rate of KSI per hmvm has reduced from an average of 13.3 to 9.6 for every hmvm travelled.

Junctions 32 to 35a

There has been a reduction in the FWI observed annually. An annual average of 6.2 FWI was observed after the project became operational were observed. This is a reduction compared to the average 7.5 FWI observed before.

The combined measure showed an extra 10 million vehicle miles was travelled before an FWI²⁶.

A reduction of 12 KSI has been observed annually. Reducing from an average of 42.6 KSI before to 30.2 KSI after the project became operational. The rate of KSI per hmvm has reduced from an average of 14 to 10.2 for every hmvm travelled.

²⁵ Before the project, 36 million vehicle miles needed to be travelled before a FWI (2.8 FWI per hmvm). After the project, this increased to 49 million vehicle miles (2.0 FWI per hmvm).

²⁶ Before the project, 31 million vehicle miles needed to be travelled before a FWI (3.3 FWI per hmvm). After the project, this increased to 41 million vehicle miles (2.5 FWI per hmvm).

The observations for FWI and KSI in both projects suggest that they are having a positive safety impact on the severity of casualties within the project extent.

Has the project achieved its safety objective?

The project safety objective was to ensure that there was no worsening of the collision rate. Despite the small sample size for the scheme extent, we have observed a reduction in the rate and number of collisions and improvement to the impact on casualties. Observations from the wider safety area (see Appendix B) also support these reductions. We believe that the project has met its safety objective.

The business case forecast was a reduction in PICs as a result of this project, with a saving of 140 collisions over the 60-year appraisal period. Findings at the five-year after stage suggest the project is likely to outperform the appraisal scenario.

6. Environmental evaluation

Summary

The project did not have specific environmental objectives. A one-year after evaluation was completed for the greenhouse gas and noise topics as no site visits are conducted for the one-year after report. At one-year after, noise effects were 'broadly as expected and greenhouse gas impacts were assessed as 'too early to say'. Overall, the five-years after evaluation shows that:

- in most cases, noise levels changed as expected (between -1.0 dB and +1.0 dB)
- it is not anticipated that the results of this POPE review of the project would lead to a change in the overall evaluation of significance for air quality
- it was considered that the predicted landscape impacts of the project had occurred due to the new infrastructure and the proposed mitigation had been provided, which included a brown paint finish being applied to the steelwork of the gantries
- the impacts on heritage of historic resources and biodiversity were broadly as expected
- the impacts of the project on journey quality were predicted to be neutral, and were broadly as predicted.

The evaluation of environmental impacts uses information on the predicted impacts gathered from the TAG environmental appraisal (AST – Appraisal Summary Table) and the Environmental Assessment Reports (EARs) and compares them with findings obtained five years after the project opened for traffic. Several EARs were completed, one for each scheme and a later one which assessed the operating regime for the combined scheme.

Noise

The 2015 EAR reported that the study area included both the M1 junctions 28 to 31 and the M1 junctions 32 to 35a schemes. The assessment also reported that there were 34 noise important areas (NIA) within the study area. The noise assessment was conducted on the original operating regime for the project (70mph, seven days a week) as this was considered to be a worst-case scenario and any operating regimes running at lower speeds would have lower noise impacts.

The assessment reported that in the short-term comparison for the opening year Do-something (2017 DS) scenario there would be negligible to moderate decreases in traffic noise impacts at the majority of receptors. Although traffic would be brought closer to properties, these beneficial decreases in traffic noise levels are attributable to the application of a low noise surface in the opening year of the scheme. The long-term assessment showed that the majority of receptors would experience negligible decreases with the implementation of the proposed project, including proposed mitigation measures and resulting traffic growth over a 15-year period.

The mitigation proposed within the updated EAR included a low-noise surface, and extension of the existing noise barrier at NIA²⁷ 2181, located in Blackburn. The one-year after environmental analysis²⁸ confirmed that low-noise surfacing had been laid and the barrier at NIA 2181 had been extended by 70m. The extended barrier is visually in good condition. The five-years after evaluation follows the noise impact methodology set out in the National Highways POPE Methodology Manual, March 2024. This comprises a quantitative review based on changes in forecast and outturn traffic data, where available. Data has been analysed for 13 road links along the M1 junctions 28 to 35A to identify changes in road traffic noise level per link of greater than 1dB²⁹. The links comprise two-way flows for junctions 28 to 29, junctions 29 to 29a, junctions 29a to 30, junctions 30 to 31 and junctions 31 to 32 (Links 1-5) and one-way flows both northbound and southbound for junctions 32 to 33, junctions 33 to 34, junctions 34 to 35 and junctions 35 to 35a (Links 6-13). However, all three screening criteria could not be tested due to the lack of valid Heavy Duty Vehicle (HDV) data in the outturn traffic data, and lack of speed data for the two-way traffic flows (links 1-5) in the forecast and out-turn traffic data.

The evaluation has considered whether the project outcome per road link is worse than, better than or as expected based on the Average Annual Daily Traffic (AADT) flow for each of the 13 road links, together with the speed data for eight of the 13 road links where the data was available.

Of these 13 road traffic links:

- Five two-way road links (Links 1-5) had no change in flow between the forecast and outturn AADT exceeding '25% more or 20% less', The change in noise levels for these road links would therefore be between -1.0dB and +1.0dB, resulting in an 'as expected' outcome.
- Seven one-way road links (Links 6-13) had no change in flow between the forecast and outturn AADT exceeding '25% more or 20% less'. The change in noise levels for these road links would therefore be between -1.0dB and +1.0 dB, resulting in an 'as expected' outcome.
- One road link (junctions 35 to 34 SB) had a 20% decrease in flow between the forecast and outturn AADT. The change in noise levels for this road link would therefore be at least -1.0dB, resulting in a 'better than expected' outcome. There are noise sensitive receptors close to the southbound carriageway, including isolated properties at Rainstorth and the following residential streets in south-west Rotherham (Kirkstead Road, Barberwood Road, Thundercliffe Road, Baring Road, Droppingwell Road, Blackburn Lane, Whitley View Road, Concord View Road and Park View Road), which may experience an overall 'better than expected' slight decrease in road traffic noise levels. This is also the area where the existing noise barrier was extended, which would have beneficial impact on the properties directly behind the barrier (Kirkstead Road and Barberwood Road). However, there would be minimal benefit to residential properties further back from the road as the residential properties become increasingly elevated above the M1.

²⁷ The government has given National Highways funding for noise reduction to protect the health of our neighbourhoods. Department for Environment Food and Rural Affairs (Defra) has identified locations experiencing the highest noise levels as part of its *Noise Action Plan: Roads*. These areas have been designated as NIAs. See <https://nationalhighways.co.uk/our-work/environment/air-quality-and-noise/noise/>

²⁸ M1 J28-35a Environmental Analysis - Technical Note – One-year after Evaluation (August 2019)

²⁹ dB - decibels

- For links 6-13, forecast traffic speed data have also been available for this five-years after evaluation, although it is noted that this forecast traffic speed assumed a 60mph speed limit restriction between 7am and 7pm, while the noise assessment in the EAR was based on a 70mph speed limit. The out-turn data provided for this five-years after evaluation have also been based on a 70mph limit, seven days a week operating regime. All eight links show an increase in speed, with six of the eight links showing a greater than 10km/h increase, and the remaining two links showing a less than 10km/h increase between the out-turn and forecast speeds. However, given that the EAR was based on a 70mph speed limit, the increase in speeds between the out-turn and forecast traffic data is likely to result in an ‘as expected’ outcome on all eight links.

Based on the available road links evaluated, the overall outcome of the five-years after evaluation for Noise is ‘as expected’.

Air quality

As set out in the 2015 EAR, a version of the project with an opening year of 2015 was originally assessed assuming no mitigation in place, and a conclusion of significant adverse effects for air quality was found. Following a process of identifying mitigation solutions and further refinement of the assessment, the EAR was updated to assess the impacts of a mitigated solution consisting of a 60mph speed limit during the weekday AM and PM peaks, with 70mph at all other times, which was the implemented solution when the schemes opened (although this speed mitigation regime has since been discontinued, after it was determined that it was no longer required).

The 2015 EAR identified nine Air Quality Management Areas (AQMAs)³⁰ adjacent to the project, and five others in the wider study area. Nitrogen dioxide (NO₂) monitoring identified that baseline air quality was poor (above the Air Quality Strategy (AQS)³¹ annual mean NO₂ objective of 40 µg/m³) in some areas adjacent to the project. It also stated that in some locations where air quality was already poor, the project would make this worse (even with the mitigation). There were 51 locations where ‘small’ worsening was predicted, and one where a ‘medium’ worsening was predicted. The locations where these worsenings were predicted were geographically spread over a wide area including adjacent to the M1 between junctions 24 and 29, and junctions 30 and 31, junctions 33 and 35, and on the A628 adjacent to junction 37 of the M1. The highest annual mean concentrations were recorded on Dodworth Road in Barnsley (60.3 µg/m³ and 59.4 µg/m³) and in Tinsley (59.3 µg/m³).

The assessment concluded that, with the speed limit mitigation in place, the effects of the project on local air quality would be not significant.

Environmental appraisals were carried out for the junctions 28 to 31 section and the junctions 31 to 35a section of the project. These both identified that a net deterioration in air quality was anticipated due to the project at local receptors. The detriment was costed at +£0.466 million and £0.535 million respectively.

It has not been possible to follow the methodology set out in the National Highways POPE Methodology Manual, March 2024. This is because the speed limit regime is

³⁰ <https://uk-air.defra.gov.uk/aqma/>

³¹ <https://www.gov.uk/government/consultations/revised-national-air-quality-strategy>

of critical importance for air quality, and, due to the number of different operating speeds that have been applied over time, appropriate traffic data was not available to compare back to the forecast traffic data. In the absence of this data, to enable an alternate evaluation to be completed, we have considered previous work undertaken to assess the need for continuing mitigation. This has been supplemented by a review of up-to-date air quality monitoring data.

The 2015 EAR suggested that the mitigation would be required for a 3-to-5-year period. In 2020 (three years after opening), we conducted an assessment to review whether air quality had improved sufficiently along the M1, such that the 60mph speed limit could be removed. This incorporated the results of post-opening monitoring that we conducted in the area. This assessment concluded with the recommendation that the 60mph speed limit was no longer required.

Recent air quality monitoring data has also been considered for the five-years after evaluation including:

- Annual Status Reports (ASRs) for local authorities that the project passes through (Sheffield³², Rotherham³³, Bolsover³⁴, Chesterfield³⁵ and North East Derbyshire³⁶)
- National Highways Air Quality Monitoring Network (NHAQM) Reports³⁷.

In many locations where exceedances of the objective value were predicted by the EAR in 2017, local authority monitoring and monitoring conducted by us reports annual mean NO₂ concentrations under the objective value in 2022. However, in one location, the Tinsley Roundabout, monitored concentrations remain above the annual mean NO₂ objective, and are comparable to the opening year predicted concentrations. These monitors are likely to represent less than ten sensitive receptors, and are affected not just by emissions from the project, but also from other roads including the A631 and A6178 and overall would not constitute a significant effect.

Overall, it is not anticipated that the results of this assessment would lead to a change in the overall evaluation of significance for air quality. Concentrations are considered to be 'as expected.'

Greenhouse gases

Government guidance³⁸ notes that CO₂ is considered the most important greenhouse gas and therefore it is used as the key indicator for the purposes of assessing the impacts of transport options on climate change. The EAR did not contain a Climate or Greenhouse Gases chapter. A regional assessment of CO₂ was undertaken as part of the Air Quality chapter. The increase in CO₂ emissions was predicted to be 2.5% in the opening year (2017) and 7.4% in the design year (2032) due to traffic growth.

Environmental appraisals were carried out for the junctions 28 to 31 section and the junctions 31 to 35a section of the project. These both identified that increases

³² Sheffield City Council (2023) [Air Quality Annual Status Report 2023 \(sheffield.gov.uk\)](https://www.sheffield.gov.uk/air-quality/annual-status-reports/2023)

³³ Rotherham Metropolitan Borough Council (2023) [2023-air-quality-annual-status-report \(rotherham.gov.uk\)](https://www.rotherham.gov.uk/air-quality/annual-status-reports/2023)

³⁴ Bolsover District Council (2023) [Annual Status Report 2023.pdf](https://www.bolsover.gov.uk/air-quality/annual-status-reports/2023)

³⁵ Chesterfield Borough Council (2023) [Microsoft Word - Chesterfield Borough Council ASR 2020](https://www.chesterfield.gov.uk/air-quality/annual-status-reports/2020)

³⁶ North East Derbyshire District Council (2023) [North East Derbyshire District Council 2023 Final Issued V1.1.pdf](https://www.north-east-derbyshire.gov.uk/air-quality/annual-status-reports/2023)

³⁷ National Highways (2023) [National+Highways+NAQMN+Annual+2022+Report_FINAL_v1.3+\(003\).pdf](https://www.nationalhighways.gov.uk/air-quality/annual-status-reports/2022)

³⁸ DfT appraisal guidance: <https://www.gov.uk/government/publications/tag-unit-a3-environmental-impact-appraisal>.

in greenhouse gases were anticipated due to the project. An increase in carbon emissions over 60 years of 2.39 million tonnes, costed at £111.063million was predicted for the junctions 28 to 31 section. An increase in carbon emissions over 60 years of 1.03 million tonnes, costed at £52.278million was predicted for the junctions 31 to 35a section.

The Greenhouse Gases methodology set out in the National Highways POPE Methodology Manual, March 2024 describes a quantitative review process based on comparisons between forecast and observed traffic data where available.

This has not been possible in this case because % Heavy Duty Vehicles (%HDV) and speed data was missing from the forecast traffic data, so a comparison of 'actual' to 'predicted' data could not be made. Further, the speed limit regime in operation is of critical importance for greenhouse gases and, due to the variation of operating speeds that have been applied over time, directly comparable traffic data is not available to compare back to the forecast traffic data.

Therefore, with the absence of appropriate forecast and observed data it has not been possible to evaluate greenhouse gases for the project.

Landscape and Townscape

M1 junctions 28 to 31

The existing M1 was already a dominant feature in the landscape. Around junction 28 the landscape was mainly urban, but existing mature vegetation screened most views into the M1. The project was within the existing highway boundary and so no significant impacts were predicted on the local townscape. North of junction 28 the landscape becomes more rural and is characterised by both rolling hills and open countryside. In places, the M1 is enclosed within cuttings which restricts views of the M1, but towards junction 31, more open long-distance views of the M1 are possible.

The environmental assessment predicted that the construction of the project had the potential to cause adverse impacts on the local landscape and on the views of the communities that lived nearby. The impacts would be caused by the installation of the new technology needed to operate the smart motorway. This included the construction of new gantries, CCTV masts and emergency refuge areas which would increase the visual dominance of the M1. The works would also involve the clearance of some existing mature vegetation to accommodate the works which would, at some locations potentially open up new views into the M1, its traffic and new infrastructure.

A range of measures were incorporated into the project design to reduce its impacts. Wherever possible, the new technology was co-located with existing infrastructure or reused existing locations. Vegetation clearance was minimised and where possible new infrastructure was located within cuttings or other locations where existing landform or woodlands helped to hide them. Discussions were also held with the National Trust and English Heritage to develop additional mitigation to help further reduce the impacts on the sensitive properties and landscapes near Hardwick Hall³⁹, Bolsover Castle⁴⁰ and Sutton Scarsdale Hall⁴¹.

³⁹ Grade 1 listed hall and registered park and garden. <https://www.nationaltrust.org.uk/hardwick-hall>

⁴⁰ Scheduled Ancient Monument and Grade 1 listed building and registered park and garden <https://www.english-heritage.org.uk/visit/places/bolsover-castle/>

⁴¹ Scheduled monument and grade 1 listed building <https://www.english-heritage.org.uk/visit/places/sutton-scarsdale-hall/>

This included the application of a brown finish to the new infrastructure to help it blend in more sympathetically. Overall, with the incorporation of the mitigation measures there were predicted to be no significant impacts on townscape and only 'slight adverse' impacts on the landscape.

We evaluated the impacts of the project by reviewing the as built design drawings and by observing the impacts during a site visit. It was not possible to visit all the locations considered by the environmental assessment because of the number of locations involved and because many were private properties. Instead, a sample of locations were chosen that were considered representative of the project as a whole and of the impacts predicted.

Our site visit confirmed that new infrastructure had added to the dominance of the M1, but steps had been taken to minimise the impacts. New gantries and CCTV masts had, in many locations, been co-located or reused existing foundations. Vegetation clearance had been minimised and the benefits of cuttings and other landscape features had been utilised where possible. Around the urban areas near junction 28, views of the M1 were broadly unchanged. In the more rural areas, new views of traffic and the new infrastructure had been created but most of these were long distant and when seen in the context of the existing M1, were not significant. The brown paint finish had been applied to the steelwork of the gantries within the visual envelop of the sensitive properties and appeared to be helping to soften their outline especially when seen at a distance.

New mitigation planting had been provided. However, at those locations visited, there was little evidence seen of recent maintenance. Some of the planting was establishing, but examples of dead trees and shrubs and overgrown planting plots beside new gantries were encountered.

Overall, it was considered that the predicted impacts of the project had occurred and the proposed mitigated had been provided. Whilst the outcome was broadly 'as expected', there was a risk that if maintenance regimes were not revised, not all the benefits of the mitigation would be achieved.

M1 junctions 32 to 35a

The existing M1 was a dominant feature within much of the landscape along the project. However, the landscape between junctions 32 and 33 was already affected by rows of overhead electricity pylons and between junction 33 and 34 north, the urbanised commercial and industrial fringe of Sheffield and Rotherham. In these locations, the significance of the changes caused by the project were influenced by these existing visual effects. Beyond junction 34 north, the landscape becomes more rural and although the M1 is visible in places, much of it is screened by trees along the highway boundary. Overall, the impacts were predicted to be 'slight adverse'.

The environmental assessment predicted that the construction of the project had the potential to cause adverse impacts on the local landscape and on the views of the communities that lived nearby. The impacts would be caused by the installation of the new technology needed to operate the smart motorway. This included the construction of new gantries, CCTV masts and emergency refuge areas which would increase the visual dominance of the M1. The works would also involve the clearance of some existing mature vegetation to accommodate the works which would, at some locations potentially open up new views into the M1, its traffic and new infrastructure.

We evaluated the impacts of the project by reviewing the as built design drawings and by observing the impacts during an evaluation site visit. It was not possible to visit all the locations considered by the environmental assessment because of the number of locations involved and because many were private properties. Instead, a sample of locations were chosen that were considered representative of the project as a whole and of the impacts predicted.

Our site visit confirmed that new infrastructure had added to the dominance of the M1, but steps had been taken to minimise the impacts. New gantries and CCTV masts had, in many locations, been co-located or reused existing foundations. Vegetation clearance had been minimised and the benefits of cuttings and other landscape features had been utilised where possible. On the whole, the impacts of the project had been confined to within the highway boundary and had not impacted on the local townscape. However, residential properties, especially in Brinsworth and Blackburn were very close to the M1 and new gantries had caused new adverse visual impacts. In Blackburn near Kirkstead Road, vegetation clearance associated with the construction of a new replacement environmental barrier had opened up new views of the new gantry and moving traffic.

The new replacement planting was being shaded by the barrier and nearby trees and was in poor condition as shown in Figure 33. At five-years after, there was little evidence of recent maintenance works and therefore a risk that without further remedial work, the impacts here may be worse than expected.

Figure 33 View of new gantry and sign from properties on Kirkstead Road. New planting partially in shade (Evaluation site visit, June 2022)



Overall, it was considered that the predicted impacts of the project had occurred and the proposed mitigated had been provided. Whilst the outcome was broadly as expected, there was a risk that if maintenance regimes were not revised and remedial works in Blackburn not undertaken, not all the benefits of the mitigation would be achieved.

Heritage of historic resources

M1 junctions 28 to 31

The environmental assessment considered the potential effects of the project on buried archaeology, historic landscapes and the setting of historic buildings. It was predicted that as the works were all within the highway boundary, any impacts would be localised and so were not predicted to have any effects historic

landscapes. There was also a very low risk that buried archaeology would be impacted as the ground had already been disturbed during the construction of the original M1. The project would involve the construction of new signs, gantries and emergency refuge areas, and therefore, it was predicted that there was the potential for indirect impacts on the setting of nearby historic sites. This included scheduled monuments, listed buildings and registered parks and gardens associated with Hardwick Hall⁴², Bolsover Castle⁴³ and Sutton Scarsdale Hall⁴⁴. Mitigation strategies were developed for these three properties in conjunction with their custodians, National Trust and English Heritage. These strategies included the use of a brown finish to elevated structures such as gantries and CCTV masts and localised new planting. It was predicted that with the implementation of these additional strategies, the impact of the project would be no more than slight adverse.

Our evaluation reviewed the available desktop information and undertook a site visit to observe the impacts of the project and the effectiveness of the mitigation.

Our evaluation confirmed that a construction environmental management plan was implemented that included measures to ensure any buried archaeology encountered was reported and appropriate measures undertaken. No archaeology was encountered.

Our site visit confirmed that the new gantries and CCTV masts had added new vertical elements to the landscape. The environmental assessment included images of the effect of the paint finish on the visual impact of the gantries that had been requested by the National Trust and English Heritage as shown in Figure 34.

Figure 34 Original gantry colour (EAR Fig 7.3 Nov 2013)



⁴² Grade 1 listed hall and registered park and garden. <https://www.nationaltrust.org.uk/hardwick-hall>

⁴³ Scheduled Ancient Monument and Grade 1 listed building and registered park and garden <https://www.english-heritage.org.uk/visit/places/bolsover-castle/>

⁴⁴ Scheduled monument and grade 1 listed building <https://www.english-heritage.org.uk/visit/places/sutton-scarsdale-hall/>

**Figure 35 Brown finish on steel work of gantry and CCTV mast at Deep Lane overbridge
(Evaluation site visit, June 2022)**



The brown finished had been applied to gantries and masts although not to the back of the sign, but it would appear it had had the desired effect as shown on Figure 35. At Sutton Scarsdale, the new infrastructure was barely visible in the distance between the trees that were retained along the M1. Although neither Bolsover Castle nor Hardwick Hall were visited, imagery from Google for Bolsover⁴⁵ and Hardwick Hall⁴⁶ suggested that the new gantries had not had a significant effect on their setting. At Bolsover, the gantries were too far away to be perceptible and at Hardwick Hall those gantries that were visible above the trees were seen in the context of the existing moving traffic which was already visible through the gaps in the trees.

Overall, our evaluation confirmed that the impacts were broadly ‘as expected’.

M1 junctions 32 to 35a

The environmental assessment considered the potential effects of the project on buried archaeology, historic landscapes and the setting of historic buildings. It was predicted that as the works were all within the highway boundary, any impacts would be localised and so were not predicted to have any effects historic landscapes. There was also a very low risk that buried archaeology would be impacted as the ground had already been disturbed during the construction of the original M1. The project would involve the construction of new signs, gantries and emergency refuge areas. Therefore, it was predicted that there was the potential for indirect impacts on the setting of the small number of nearby historic sites within the visual context of the project. This included the Upper Whiston Conservation Area. Overall, the impacts were predicted to be ‘slight adverse’.

Our evaluation reviewed the available desktop information and undertook a site visit to observe the impacts of the project and the effectiveness of the mitigation.

Our evaluation confirmed that a construction environmental management plan was implemented that included measures to ensure any buried archaeology encountered was reported and appropriate measures undertaken. There were no

⁴⁵ Imagery on Google Streetview Feb 2021 <https://goo.gl/maps/9HWK46zRXwyw84JG6>

⁴⁶ Imagery on Google Streetview September 2020 <https://goo.gl/maps/ojbtXx6C8ucV2KF6A>

reports of any archaeology being encountered and so no impacts were understood to have occurred.

Our site visit confirmed that the new gantries and CCTV masts had added new vertical elements to the landscape. However, as expected, there were no perceptible changes to the setting of Morthen Conservation Area, nor on the setting of the scheduled monument at Blue Man's Bower. This was because the new gantries could not be seen from Morthen Conservation Area and whilst there were glimpsed views of new gantries and CCTV masts from Blue Man's Bower scheduled monument, the changes were negligible when seen in the context of the existing M1 and the rows of overhead electricity pylons. New infrastructure could be seen above the M1 embankment and between trees along the highway boundary from the edge of Upper Whiston Conservation Area. However, as predicted, this was limited to views from beside The Heights listed building on the edge of the conservation area. This building already had some views towards the M1, and its setting was already affected by the presence of an overhead electricity pylon immediately adjacent. Overall, our evaluation confirmed that the impacts were broadly as expected.

Biodiversity

M1 junctions 28 to 31

The environmental appraisal predicted that the construction of the project would cause temporary negative impacts on habitats within the motorway boundary. There were no national or international sites biodiversity importance within the study area that could be affected. The construction of new gantries, CCTV masts and emergency refuge areas would cause the permanent loss of small areas of low value verge habitats and temporary disturbance during vegetation clearance. However, in conjunction with adjacent habitats, they had the potential to provide foraging habitats for species in the area including protected species such as bats, great crested newts and badgers. After the completion of construction works, disturbed areas of habitats would be reinstated or replanted. It was predicted that mitigation measures would be required to avoid impacts on protected species during construction but following construction and restoration, impacts were predicted to be neutral.

Our site visit confirmed that the construction of new gantries, CCTV masts and emergency refuge areas had caused localised temporary clearance of vegetation from within the highway boundary. The works had also caused the permanent loss of small areas highway verge to accommodate the emergency refuge areas and the foundations of the new gantries. The verges had been replanted and whilst there was little evidence of on-going maintenance, the verges had re-established as expected.

The Handover Environmental Management Plan (HEMP)⁴⁷ set out details of the control measures implemented to manage the impacts of the construction works on biodiversity. These measures included steps to minimise vegetation clearance and ecological inspections to ensure that, prior to construction starting, works areas were clear of protected species including reptiles, birds, bats badgers and great crested newts. Great crested newts were identified along the M1 north of junction 30 and newts were translocated under licence from the works area and a

⁴⁷ A project document that sets out how the environmental impacts were managed and controlled.

temporary amphibian fence installed. After the completion of the works, the fence was removed, and records submitted to Natural England as required by the licence.

Overall, the outcome was broadly as expected.

M1 junctions 32 to 35a

The assessment predicted that the construction of the project would cause temporary negative impacts on habitats within the motorway boundary. There were no national or international sites biodiversity importance within the study area that could be affected. The construction of new gantries, CCTV masts and emergency refuge areas was expected to cause the permanent loss of small areas of low value verge habitats and temporary disturbance during vegetation clearance. However, in conjunction with adjacent habitats, they had the potential to provide foraging habitats for species in the area including protected species such as bats, reptiles and badgers. After the completion of construction works, disturbed areas of habitats would be reinstated or replanted. It was predicted that mitigation measures would be required to avoid impacts on protected species during construction, but following construction and restoration, impacts were predicted to be neutral.

Our site visit confirmed that the construction of new gantries, CCTV masts and emergency refuge areas had caused localised temporary clearance of vegetation from within the highway boundary. The works had also caused the permanent loss of small areas highway verge to accommodate the emergency refuge areas and the foundations of the new gantries. The verges had been replanted and whilst there was little evidence of on-going maintenance, the verges had re-established as expected.

The HEMP set out details of the control measures implemented to manage the impacts of the construction works on biodiversity. These measures included steps to minimise vegetation clearance and ecological inspections to ensure that, prior to construction starting, works areas were clear of protected species including reptiles, birds, bats and badgers. The HEMP indicated that no protected species were encountered during the works other than nesting birds and works were programmed to avoid impacts to them.

Overall, the outcome was broadly 'as expected'.

Journey quality

The journey quality sub objective considers traveller care (facilities and information), traveller views and traveller stress (frustration, fear of accidents and route uncertainty). The environmental assessment did not predict any significant effects on journey quality.

The environmental appraisal predicted that the construction of new gantries, CCTV masts and signs would change the perception for road users of the motorway. However, although the frequency of signs and gantries would increase, this would be within the context of the existing motorway and so the impact was predicted to be neutral. The new VMS would provide clear information to drivers regarding road conditions, journey times and reliability which would all contribute beneficially to the journey ambience and journey experience. Overall, the impacts of the project on journey quality were predicted to be 'neutral'.

The site visit confirmed that the project had installed more infrastructure along the route. Although some gantries had been removed or replaced, overall, there were more gantries, CCTV masts and signs than before. This had added to the urbanisation of the route, but these impacts were set within the context of the existing M1 and overall were likely to be as expected.

As detailed in the Customer Journeys section, there has been a notable improvement in journey time reliability on the M1 junctions 28 to 31 section during the PM period in the northbound direction and in both AM and PM periods in the southbound direction, and on the junctions 32 to 35a section during the AM peak period in the northbound direction and during the PM period in the southbound direction.

As detailed in the Safety evaluation section, we have observed a reduction in the rate and number of collisions on both the scheme extent and in the wider area.

The new signage including MS4 has improved the quality of information available to drivers including on journey times and delays.

Overall, journey quality is 'as expected'.

Overview

The results of the evaluation are summarised against each of the Transport Appraisal Guidance (TAG)⁴⁸ environmental sub-objectives and presented in Table 6 and Table 7. In the tables, we report the evaluation as expected if we believe that the observed impacts at five-years after are as predicted in the appraisal. We report them as better or worse than expected if we feel the observed impacts are better or worse than expected. Finally, we report impacts as too soon to say if we feel that at five-years after, there is insufficient evidence to draw firm conclusions.

Table 6 Summary of Environmental Impacts M1 junctions 28 to 31

Sub Objective	AST Score	Five-years after Evaluation Outcome	Evaluation Summary
Noise	<p>M1 Junctions 28-31: Population annoyed in DM/DS: 2,143/2,232</p> <p>Net noise annoyance change (15th year): 89</p> <p>The Net Present Value (NPV) (Residential) reported in the AST for Noise is - £2,082,271.</p>	As expected	<p>Of the 13 road links assessed across the project based on traffic flows only:</p> <ul style="list-style-type: none"> one road traffic link is performing 'better than expected' 12 road traffic links are performing 'as expected'. <p>When traffic flow and speed data is considered for eight of the 13 links, it is likely to result in an 'as expected' outcome on all eight links. Based on the available road links evaluated, the overall outcome of the five-years after</p>

⁴⁸ TAG provides guidance on appraising transport options against the Government's objective for transport

Sub Objective	AST Score	Five-years after Evaluation Outcome	Evaluation Summary
			evaluation for Noise is 'as expected'.
Air Quality	-	As expected	An exit assessment conducted by National Highways concluded that speed limit mitigation identified by the EAR was no longer required. Concentrations of air pollutants were better than expected in several locations where monitoring was available. However, at Tinsley Roundabout, monitored concentrations were still above the relevant objective, and comparable to the concentrations predicted by the EAR, leading to a conclusion of 'as expected' in this location.
Greenhouse Gases	-	-	Greenhouse gases have not been evaluated due to limitations in traffic data availability and the speed limit regime in place at five-years after is not the same as the forecast scenario.
Landscape	Slight adverse	As expected	The predicted impacts of the project had occurred, and the proposed mitigation had been provided. Although the outcome was as expected, poor maintenance was creating a risk that not all of the benefits of the mitigation would be achieved.
Townscape	Neutral	As expected	The project was contained with the highway boundary and no significant impacts were observed.
Heritage of historic resource	Slight adverse	As expected	The predicted impacts had arisen. The mitigation including the brown finish to gantries and CCTV masts had helped these new features blend into the background minimising the impact on the setting of nearby historic buildings.

Sub Objective	AST Score	Five-years after Evaluation Outcome	Evaluation Summary
Biodiversity	Neutral	As expected	Localised disturbance and loss of small areas of verge habitats had occurred. Mitigation had been implemented to minimise construction effects and verge habitats had been restored.
Journey quality	Neutral	As expected	The site visit confirmed that the project had installed more infrastructure along the route. This had added to the urbanisation of the route, but these impacts were set within the context of the existing M1 and overall were likely to be as expected. Journey time reliability and road user safety have improved.

Table 7: Summary of Environmental Effects M1 J32-35a

Sub Objective	AST Score	Five-Years Evaluation Outcome	Evaluation Summary
Noise	<p>M1 junctions 32 to 35a: Population annoyed in DM/DS: 2,342/2,255</p> <p>Net noise annoyance change (15th year): -87</p> <p>The NPV (Residential) reported in the AST for Noise was £6,302,000.</p>	As expected	<p>Of the 13 road links assessed across the Project based on traffic flows only:</p> <ul style="list-style-type: none"> • one road traffic link is performing 'better than expected' • 12 road traffic links are performing 'as expected'. <p>When traffic flow and speed data is considered for eight of the 13 links, it is likely to result in an 'as expected' outcome on all eight links. Based on the available road links evaluated, the overall outcome of the five-years after evaluation for Noise is 'as expected'.</p>
Air Quality	-	As expected	An exit assessment conducted by National Highways concluded that speed limit mitigation identified by the EAR was no longer required. Concentrations of air pollutants

Sub Objective	AST Score	Five-Years Evaluation Outcome	Evaluation Summary
			<p>were better than expected in several locations where monitoring was available. However, at Tinsley Roundabout, monitored concentrations were still above the relevant objective, and comparable to the concentrations predicted by the EAR, leading to a conclusion of 'as expected' in this location.</p>
Greenhouse Gases	-	-	<p>Greenhouse gases have not been evaluated due to limitations in traffic data availability and the speed limit regime in place at five-years after is not the same as the forecast scenario.</p>
Landscape	Slight adverse	As expected	<p>The project had added new vertical elements into the landscape and caused new visual impacts. Impacts had been mitigated broadly as expected but there was a risk that the poor condition of the mitigation planting in front of residential properties in Blackburn would affect the outcome there.</p>
Townscape	Neutral	As expected	<p>The impacts of the project were confined to within the highway boundary and did not significantly alter local townscape character or perception of the motorway.</p>
Heritage of historic resource	Neutral	As expected	<p>The project had added new vertical elements to the landscape, but the impacts were localised. Impacts on the setting of Upper Whiston Conservation Area had occurred, but these were limited and experienced within the context of the existing impacts of the M1 and from nearby overhead electricity pylons.</p>
Biodiversity	Neutral	As expected	<p>Localised disturbance and loss of small areas of verge habitats had occurred. Mitigation had been implemented to minimise</p>

Sub Objective	AST Score	Five-Years Evaluation Outcome	Evaluation Summary
			construction effects and verge habitats had been restored.
Journey quality	Large beneficial	As expected	The site visit confirmed that the project had installed more infrastructure along the route. This had added to the urbanisation of the route, but these impacts were set within the context of the existing M1 and overall were likely to be as expected. Journey time reliability and road user safety have improved.

7. Value for money

Summary

As part of the business case, an economic appraisal was conducted to determine the project's value for money. This assessment was based on an estimation of costs and benefits over a 60-year period.

The M1 junctions 28 to 31 project was delivered at a construction cost of £194.1million, about 7% over the forecast cost of £181.2million⁴⁹. The M1 junctions 32 to 35a project was delivered at a construction cost of £103.5million, about 3% over the forecast cost of £100.3million⁵⁰. Both projects demonstrated improved journey times particularly between M1 junctions 28 to 31 and additionally, a reduction in collisions was also observed demonstrating a positive safety impact.

It is noted that outturn traffic flows were lower than expected, due to the wider growth impacts resulting from the COVID-19 restrictions, which will have had an impact on the re-forecast benefits of these projects.

Overall, the evaluation indicated that in the first five years, this investment is not on track to deliver the value for money anticipated over the 60-year life of the project. If the journey time trends observed within the first five years continue, the M1 junctions 28 to 31 project is expected to deliver 'low' value for money⁵¹, while the M1 junctions 32 to 35a project is expected to deliver 'medium' value for money.

Forecast value for money

An economic appraisal is undertaken prior to construction to determine a project's value for money and inform the business case. The appraisal is based on an estimation of costs and benefits. The impacts of a project, such as journey time savings, changes to user costs, safety impacts and some environmental impacts can be monetised. This is undertaken using standard values which are consistent across government. The positive and negative impacts over the life of the project⁵² are summed together and compared against the investment cost to produce a benefit cost ratio (BCR). The monetised impacts are considered alongside additional impacts which are not able to be monetised, to allocate the project a 'value for money' category.

Since 2011, we have routinely forecasted benefits over a range of possible traffic growth scenarios in response to the economic downturn.⁵³

The monetised benefits forecast by the appraisal which supported the M1 junctions 28 to 31 business case are set out in Table 8. These benefits relate to the core traffic growth scenario which we use to re-forecast and provide an estimate for outturn value for money based on data from the first five years after opening.

⁴⁹ Present value of costs in 2010 prices and values.

⁵⁰ Present value of costs in 2010 prices and values.

⁵¹ The value for money categories referenced are defined by the Department for Transport <https://www.gov.uk/government/publications/dft-value-for-money-framework>

⁵² Typically scheme life is taken to be 60 years.

⁵³ We undertake a core scenario, which is intended to provide a sensible, consistent basis for decision-making given current evidence, and which provides a 'common comparator' to assess all projects and options against. However, there are significant and often unquantifiable uncertainties associated with forecasting travel demand, such that it is not possible to robustly identify a 'most likely' or expected outcome with any certainty. Key questions include: Under high demand assumptions, is the intervention still effective in reducing congestion, or are there any adverse effects, e.g. on safety or the environment? Under low demand assumptions, is the intervention still economically viable? Under a wide range of possible futures does the intervention still provide value for money?

During this evaluation, we have considered the high and low growth scenarios in response to the lower than forecast traffic levels we have observed. We have also included an indication of what proportion of the monetised benefits each impact accounted for and a summary of how we have treated the monetisation of each impact in this evaluation.

Table 8 Monetised benefits of the project (£million) – M1 junctions 28 to 31

	Forecast (£m)	% forecast monetised benefits⁵⁴	Evaluation approach
Journey times	910	95%	Re-forecast using observed and counterfactual traffic flow and journey time data for the project area only and not those in the wider area
Vehicle operating costs (VOC)	20	2%	Monetised benefits assumed as forecast
Journey time & VOC during construction and maintenance	-121	-13%	Not evaluated (assumed as forecast)
Journey time reliability	208	22%	Monetised benefits assumed as forecast
Safety	49	5%	Re-forecast using observed and counterfactual safety data
Carbon	-111	-12%	Not evaluated (assumed as forecast)
Air quality	0	0%	Not evaluated (assumed as forecast)
Noise	-2	0%	Not evaluated (assumed as forecast)
Indirect tax revenues	6	1%	Re-forecast using observed and forecast traffic flow and journey time data
Total present value benefits (PVB)	958		

Note: 2010 prices discounted to 2010. Due to rounding the numbers and percentages may not always add up exactly to the presented totals.

The monetised benefits forecast for M1 junctions 32 to 35a is set out in Table 9.

⁵⁴ Disbenefits are presented as negative numbers and percentages. The total of the positive and negative contributions total to 100%

Table 9: Monetised benefits of the project (£million) – M1 J32 to 35a

	Forecast (£m)	% forecast monetised benefits⁵⁵	Evaluation approach
Journey times	426	68%	Re-forecast using observed and counterfactual traffic flow and journey time data for the project area only and not those in the wider area
VOC	13	2%	Monetised benefits assumed as forecast
Journey time & VOC during construction and maintenance	-45	-7%	Not evaluated (assumed as forecast)
Journey time reliability	274	43%	Monetised benefits assumed as forecast
Safety	6	1%	Re-forecast using observed and counterfactual safety data
Carbon	-53	-8%	Not evaluated (assumed as forecast)
Air quality	-1	0%	Not evaluated (assumed as forecast)
Noise	6	1%	Not evaluated (assumed as forecast)
Indirect tax revenues	5	1%	Re-forecast using observed and forecast traffic flow and journey time data
Total PVB	632		

Note: 2010 prices discounted to 2010. Due to rounding the numbers and percentages may not always add up exactly to the presented totals.

Evaluation of costs

The M1 junctions 28 to 31 project was delivered at a cost of £194.1million⁵⁶, approximately 7% higher than the anticipated cost of £181.2million.

The appraisal expected that the project would result in minimal changes in maintenance costs over the life of the project. As most of this maintenance is still in the future, the evaluation uses the maintenance costs forecast within the business case.

The costs anticipated in the appraisal are set out in Table 10 for M1 junctions 28 to 31. Based on this information, the scheme was anticipated to give 'high' value for money over the 60-year appraisal period.

⁵⁵ Disbenefits are presented as negative numbers and percentages. The total of the positive and negative contributions total to 100%

⁵⁶ This is the PVC (present value cost) of the project. This means it is presented in 2010 prices, discounted to 2010 to be comparable with the other monetary values presented.

Table 10 Forecast cost of the M1 J28 to J31 project (£million) in the business case

	Forecast (£m)	% of forecast costs	Evaluation approach
Construction costs	181	69%	Current estimate of project cost
Maintenance costs	83	31%	Not evaluated (assumed as forecast)
Total PVC	264		

Note: 2010 prices discounted to 2010. Due to rounding the numbers and percentages may not always add up exactly to the presented totals.

The M1 junctions 32 to 35a project was delivered at a cost of £103.5million⁵⁷, approximately 3% higher than the anticipated cost of £100.3million.

The appraisal expected that the project would result in minimal changes in maintenance costs over the life of the project. As most of this maintenance is still in the future, the evaluation uses the maintenance costs forecast within the business case.

The costs anticipated in the appraisal are set out in Table 11 for M1 J32 to J35a. Based on this information, the scheme was anticipated to give 'high' value for money over the 60-year appraisal period.

Table 11: Forecast cost of the M1 junctions 32 to 35a project (£million) in the business case

	Forecast (£m)	% of forecast costs	Evaluation approach
Construction costs	100	63%	Current estimate of project cost
Maintenance costs	59	37%	Not evaluated (assumed as forecast)
Total PVC	159		

Note: 2010 prices discounted to 2010. Due to rounding the numbers and percentages may not always add up exactly to the presented totals.

Evaluation of monetised benefits

Once a project has been operating for five years, the evaluation monitors the construction costs and the trajectory of benefits to reforecast these for the 60-year scheme life. Appraisal of these major investments takes many years of complex and expensive analysis. Our evaluation methods are much simpler, so consequently, there is a degree of uncertainty around these numbers.

Monetised journey time benefits

As can be seen in Table 8 and Table 9, monetised benefits were primarily driven by forecasted reductions in journey times over the modelled period compared to a 'do-minimum' scenario, what would be expected to happen if the smart motorway were not built. Therefore, in this section of our study, we have compared the 'after'

⁵⁷ This is the PVC (present value cost) of the project. This means it is presented in 2010 prices, discounted to 2010 to be comparable with the other monetary values presented.

journey times to an estimate of the 'counterfactual' - what journey times are likely to have been without the project. This allows for the deterioration in journey times that we would have expected to have happened due to growth in background traffic levels causing additional congestion.

The forecasts generally overstated traffic increases.⁵⁸ Forecast growth assumptions were not able to consider the impact of the COVID-19 pandemic, which slowed the rate of traffic growth.

The overall vehicle hour savings on the project section in the fifth year is estimated to have been positive⁵⁹. Without the detail of the original forecasts to compare to, it is difficult to draw conclusions, but given the magnitude of journey time savings presented in the pre-construction appraisal, estimated vehicle hour savings are likely to be much lower than what was anticipated. Without further intervention, journey time benefits are unlikely to be on track to be realised.

This is likely to be due to lower than forecast levels of traffic due to the impact of COVID-19 restrictions, resulting in the additional lane being required less frequently than may have been expected. This means that the additional capacity provided by the smart motorway is not yet being fully optimised to realise the benefits to customer journeys. However, the capacity is available to support an increase in road users in the future.

The appraisal assumed the project would deliver journey time savings for both those using the smart motorway and those using the surrounding road network, where congestion would be eased by the additional capacity. The evaluation has not monitored the journey time impact on the surrounding roads and can only directly quantify a proportion of the journey times. Our findings relating to the project area are very different from those forecast for that area. We therefore did not feel we had sufficient confidence in the forecasts to use them as the basis of an estimate of the outturn impact in the wider area.

The re-forecast user time 60-year benefit from observed vehicle hour savings is £128million for the M1 junctions 28 to 31 section and £17million for the M1 junctions 32 to 35a section, compared to £909.8million and £426.4million respectively forecast at the appraisal stage. The re-forecast figures only reflect journey time trends observed on the project area, not the surrounding road network which would have been considered in the appraisal. The lower than forecast journey time benefit is consistent with information presented in Figure 15, with longer outturn journey times compared to the forecast 'do something' journey times.

Our observations of flows in the wider area showed mixed evidence for decongestion effects on the wider network. As noted in the Customer journeys section, there is insufficient evidence to conclude whether or not there has been an impact on the surrounding network. We acknowledge that the monetised value presented above does not represent the full impact of the project and does not reflect any potential impact on the wider road network.

Monetised journey reliability benefits

Improvement of journey time reliability was a main objective of this project. Our evaluation showed an improvement in reliability between the before and five-years after for the M1 junctions 28 to 31 project, most notably during the PM period in the

⁵⁸ Refer to Section 4 for further details.

⁵⁹ A benefit of 307,882 (M1 J28 to 31) and 41,639 (M1 J32 to 35a) vehicle hours in the fifth year.

northbound direction and in both AM and PM periods in the southbound direction. Between M1 junctions 32 to 35a, there were shown to be improvements to journey time reliability with the most notable improvement occurring during the AM peak period in the northbound direction, and during the PM period in the southbound direction.

The slowest 10% journeys are now generally quicker, with the slowest journeys taking about five minutes less than before in a southbound direction during the AM peak between M1 junctions 28 and 31, and during the PM peak between M1 junctions 32 and 35a. The slowest journey times during other periods of the day have remained stable (see Figures 17 to 20).

The monetised journey time reliability benefits shown in Table 8 and Table 9 demonstrate positive forecast benefits of £207.6million for M1 junctions 28 to 31 and £274.3million for M1 junctions 32 to 35a.

Other reforecast impacts

We reforecast total safety benefits to be £206.7million for M1 junctions 28 to 31 and £71.5million for M1 junctions 32 to 35a, compared to £48.5million and £5.6million respectively forecast at the appraisal stage. This figure relates to the benefit on the strategic road network including the wider area over 60-years. The reforecast is higher than the appraisal forecast. Further detail of this can be viewed in the Safety evaluation section.

There are two further impacts associated with the changes in numbers and speeds of vehicles – indirect tax revenues (ITR) and vehicle operating costs (VOC).

ITR are the benefit to the government (and therefore society) of the additional tax income from the additional fuel consumed due to increased speeds and distances travelled. This was forecast to be positive because more vehicles were forecast and they were forecast to be travelling at higher speeds, and therefore using more fuel and paying more tax. We have reforecast that the impact would be smaller than expected, an increase in tax revenues of £2.3million for M1 junctions 28 to 31 and £2.1million for M1 junctions 32 to 35a compared to £6.3million and £5million respectively forecast at the appraisal stage. The impact is smaller because our evaluation has shown that there was not as much traffic growth as forecast.

VOC refer to the fuel and other costs borne by the user (such as the wear and tear on vehicles). This generally increases with increased distance travelled. The relationship between ITR and VOC is typically such that when one provides a positive benefit, the other will provide a negative benefit (or cost). However, in the appraisal it was forecast that both ITR and VOC would provide a positive benefit, so when the ITR was reduced upon reforecast, the reforecast VOC was also reduced. This pattern is counterintuitive, and the VOC was therefore assumed as forecast. The forecast VOC benefit for M1 junctions 28 to 31 was £19.9million and for M1 junctions 32 to 35a was £12.8million.

Impacts assumed as forecast

The evaluation has not been able to reforecast the monetary value of air quality, noise and carbon benefits⁶⁰, and instead these were reported as forecast. For noise and carbon impacts, this assumption is conservative because lower than

⁶⁰ We do not have a method for reforecasting the monetised impact of noise or carbon impacts. These generally have a small contribution to the monetised benefits of schemes and therefore the impact of assuming as forecast is unlikely to impact on the value for money rating of the project.

forecast traffic flows are likely to mean that these impacts are better than forecast.⁶¹ However, the environmental assessment indicates that the environmental impacts at five-years after are 'as expected', suggesting that the impacts would be close to what was originally forecast.

Journey times and VOCs during construction and maintenance are not evaluated and therefore assumed as forecast. As the vast majority of this maintenance is still in the future, we did not have any information with which to update the estimate for this and therefore the forecast from the appraisal remains our best estimate.

Overall value for money

The forecast value for money for M1 junctions 28 to 31 was 'high', with a low growth to high growth scenario range of 'high' to 'very high' value for money. The project has been re-forecast to be 'low' value for money.

The forecast value for money for M1 junctions 32 to 35a was 'high', with a low growth to high growth scenario range of 'high' to 'very high' value for money. The project has been re-forecast to be 'medium' value for money.

The main reason for the overall reduced level of benefits from this project is the lack of journey time savings. The appraisal forecast significant traffic growth, but with better journey times with the implementation of the scheme compared to the counterfactual (i.e. if the scheme was not delivered). The observed data suggested more modest traffic growth likely as a result of the COVID-19 pandemic and associated lockdowns. This has affected the project's value for money.

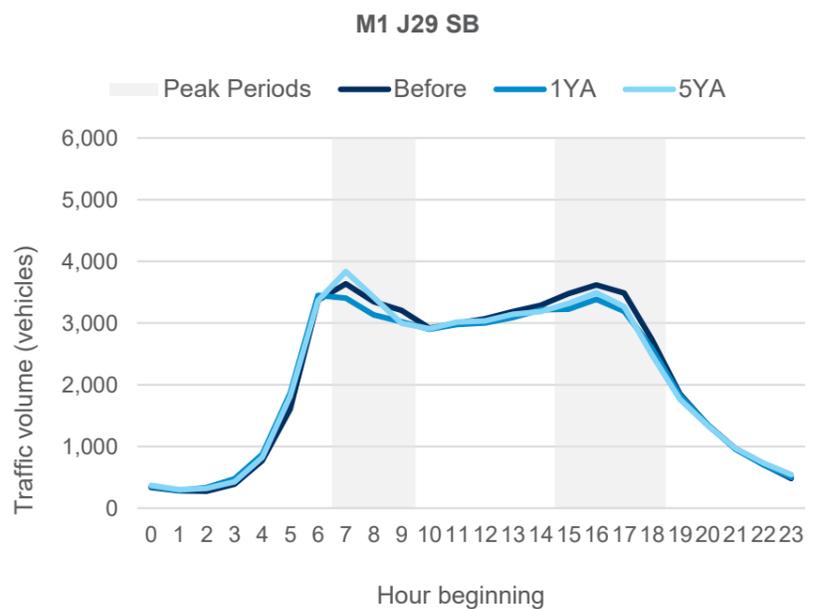
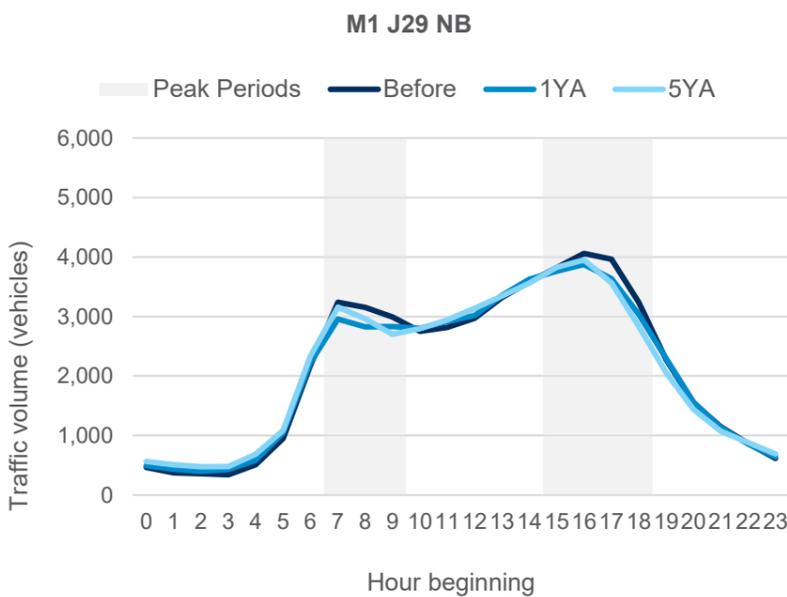
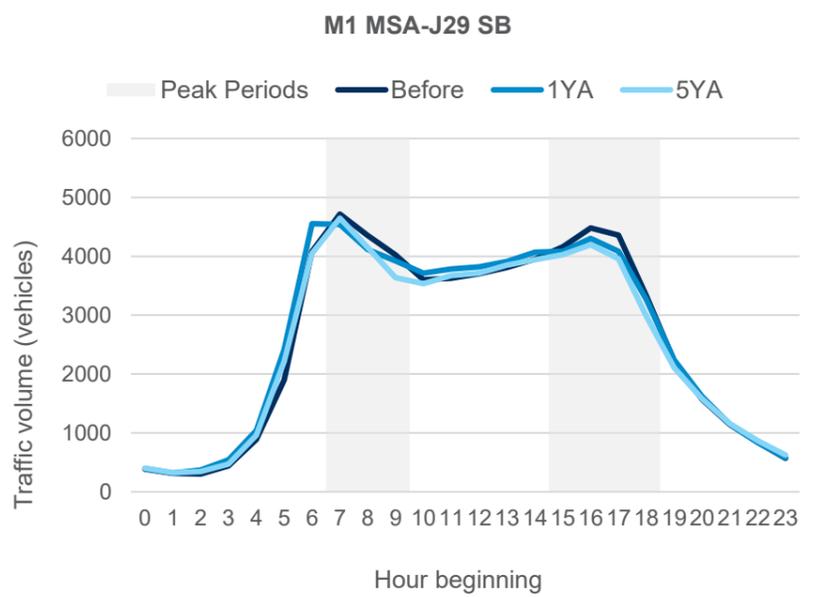
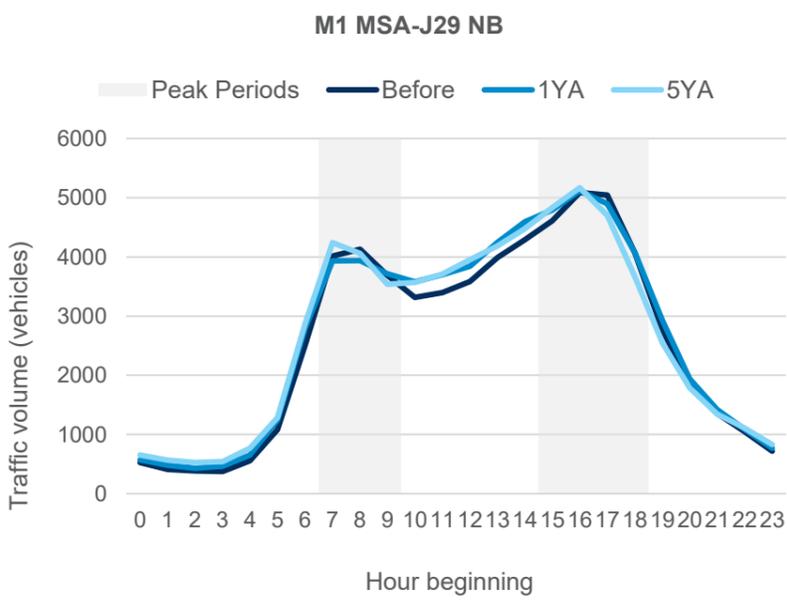
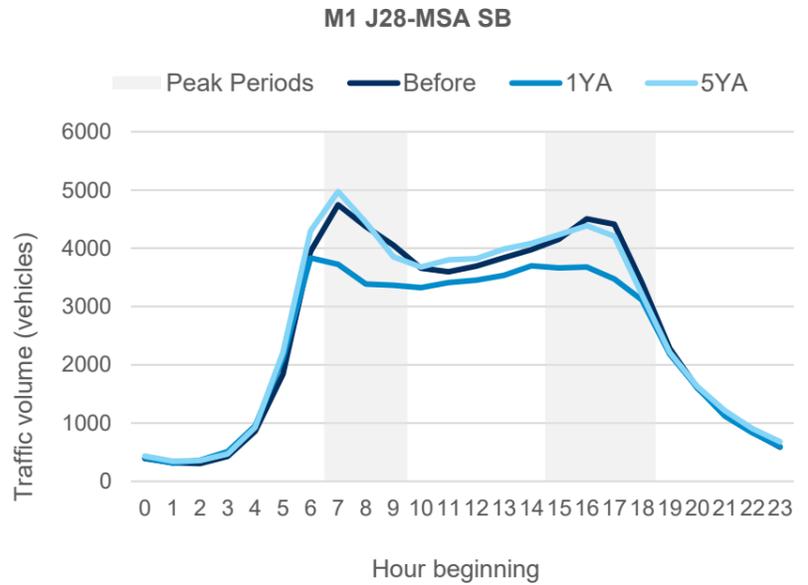
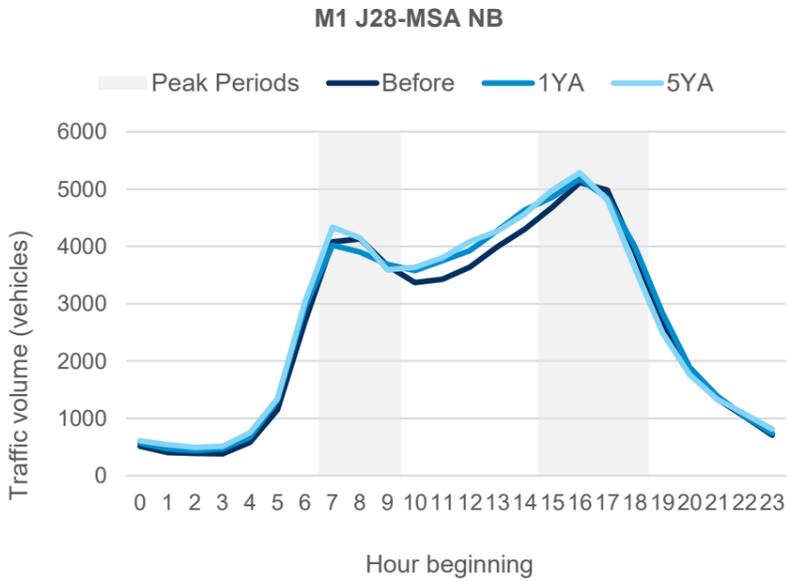
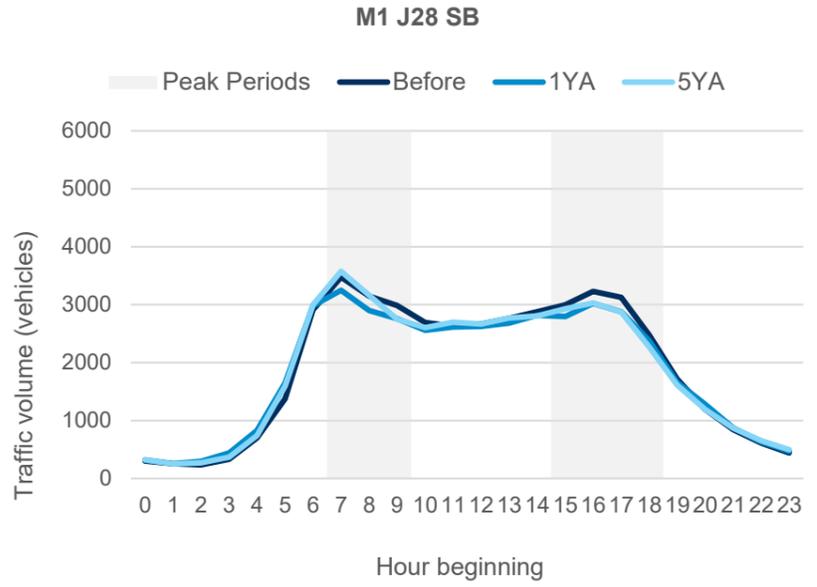
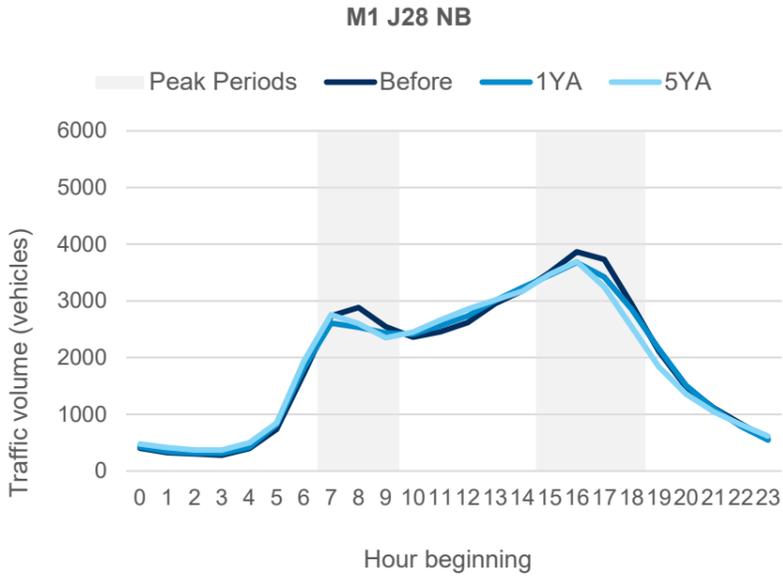
Journey time benefits represented a large proportion of the total benefit reported in the appraisal. The five-year analysis has shown that both projects deliver journey time savings, although in both cases journey time improvements are less than originally forecast.

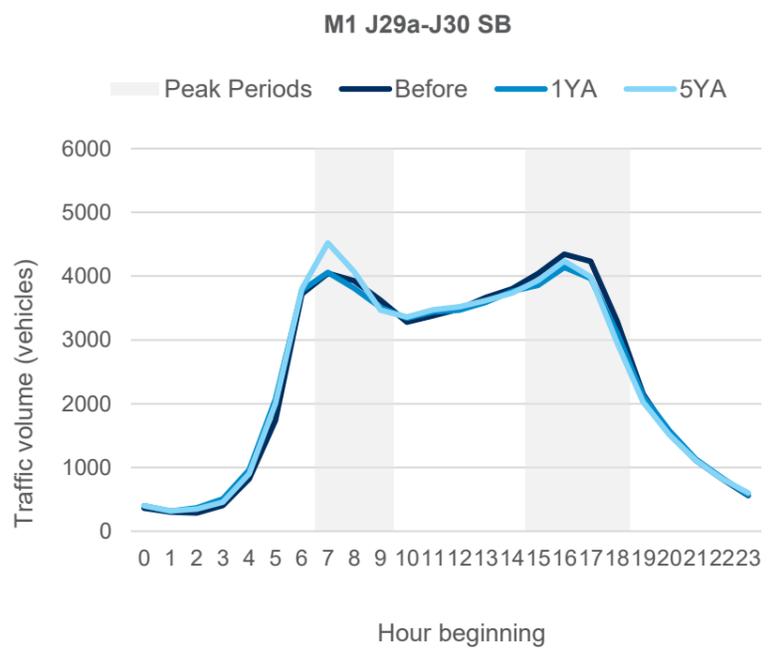
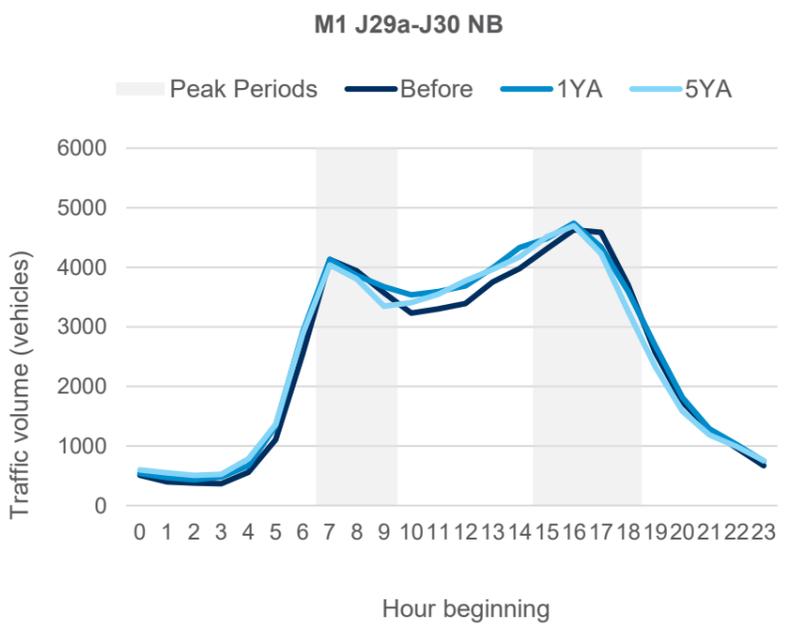
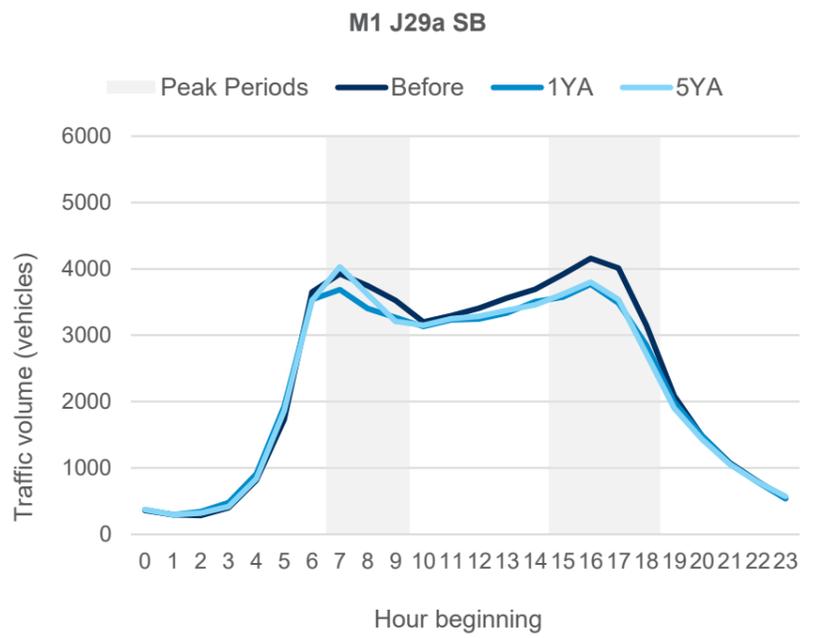
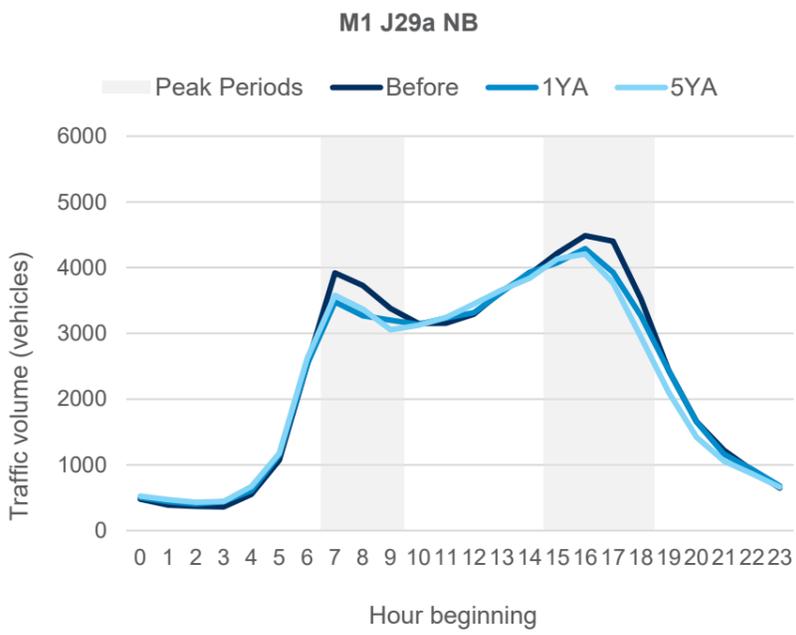
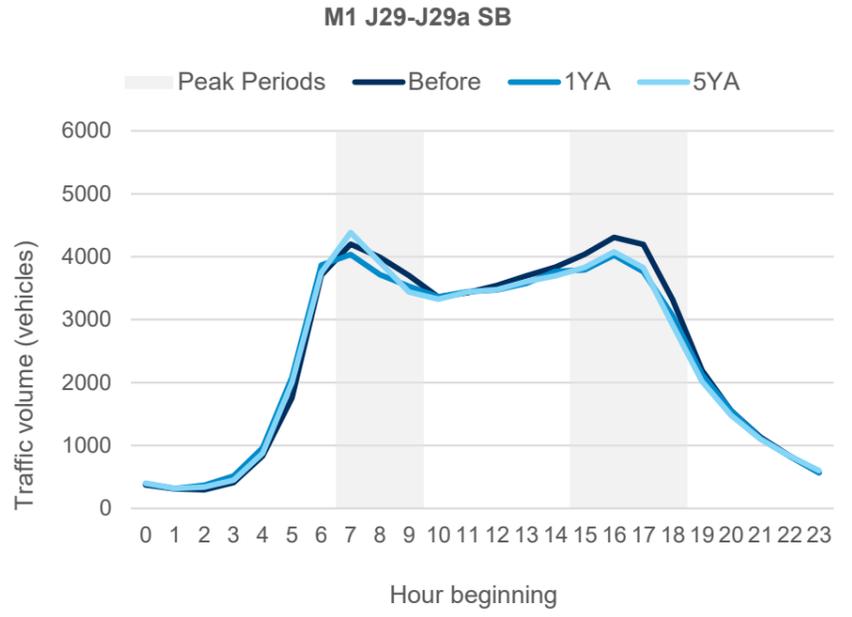
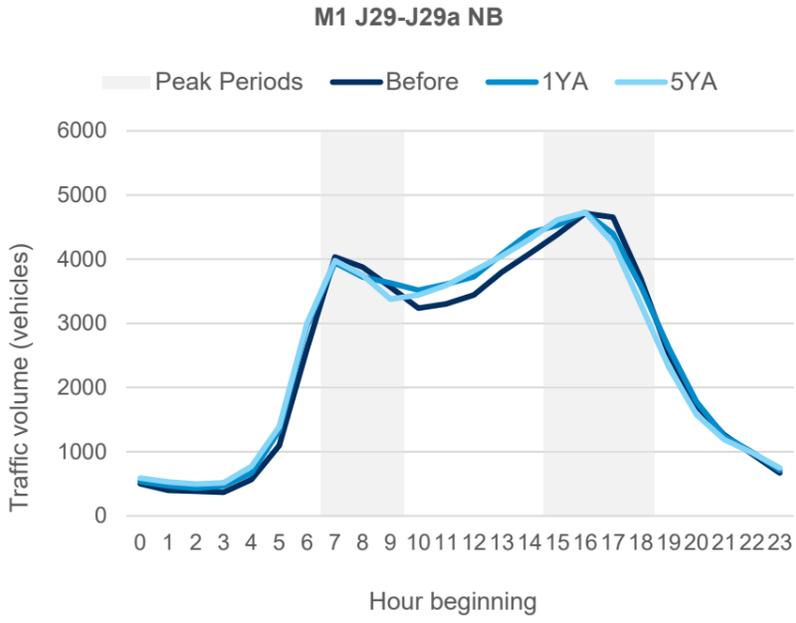
Overall, the evaluation indicated that in the first five years, this investment is not on track to deliver the value for money anticipated over the 60 year life of the project, however if traffic growth returns to what was forecast when this project was appraised, it is likely that the project will gain back some of those lost benefits.

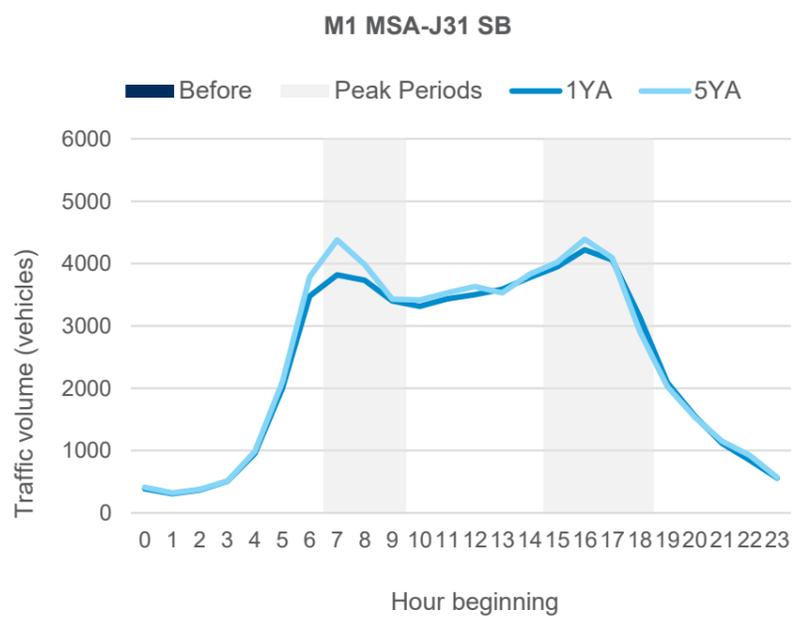
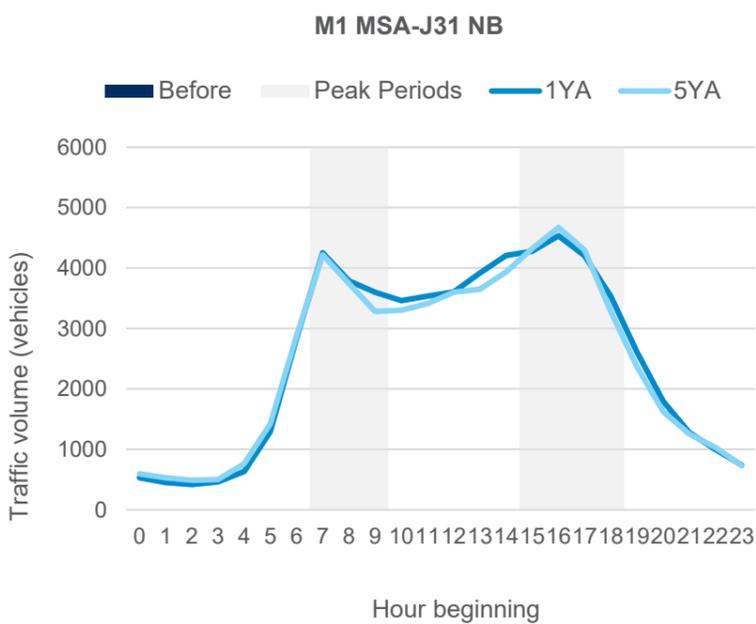
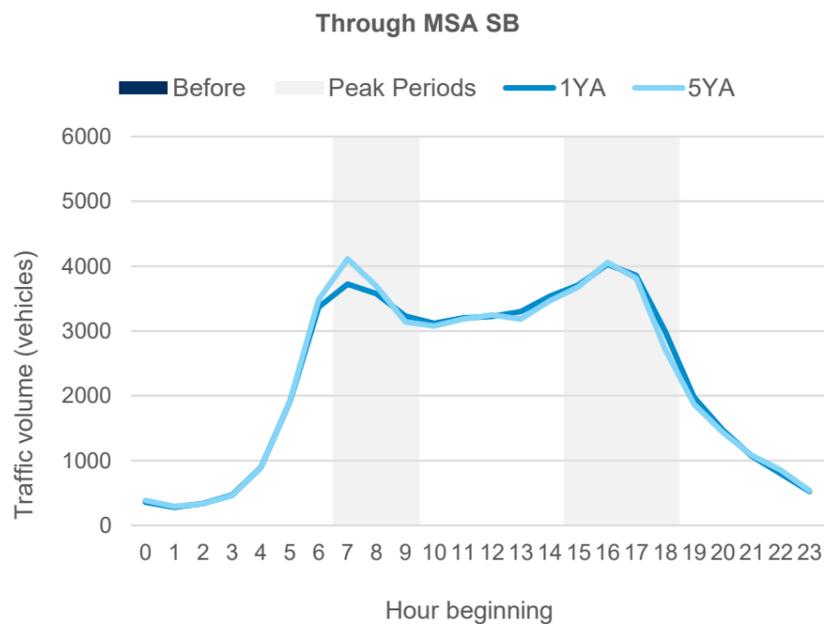
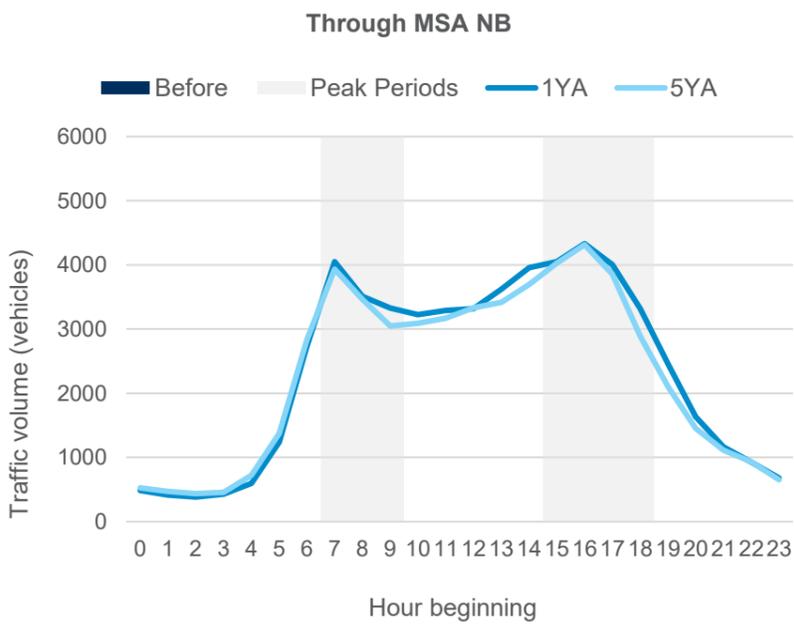
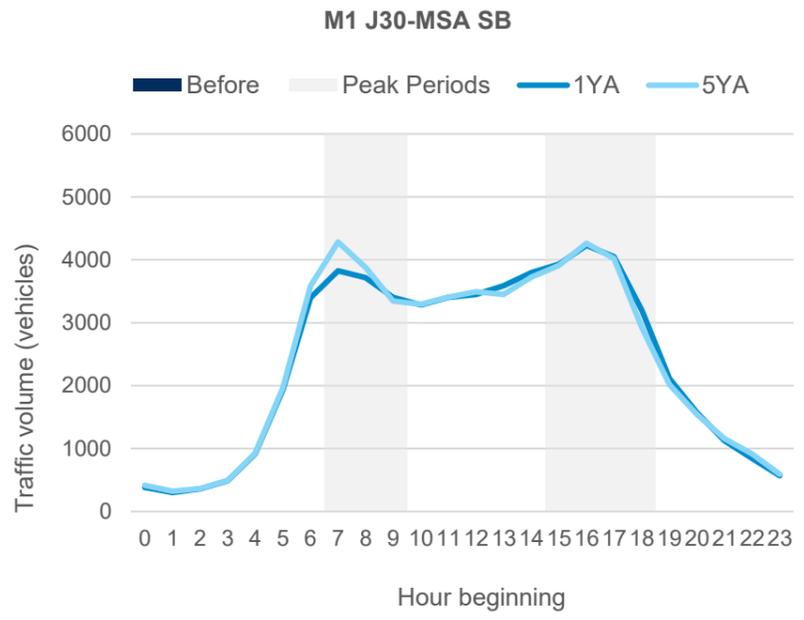
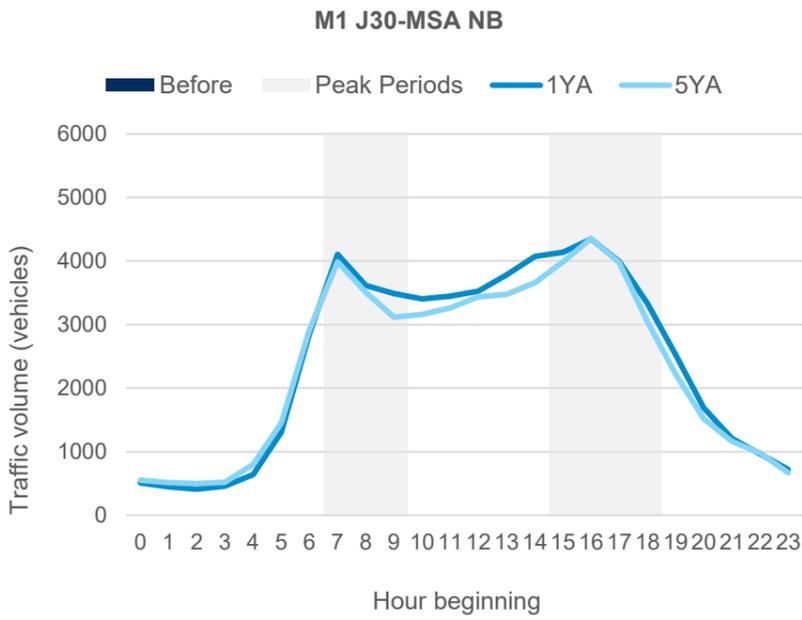
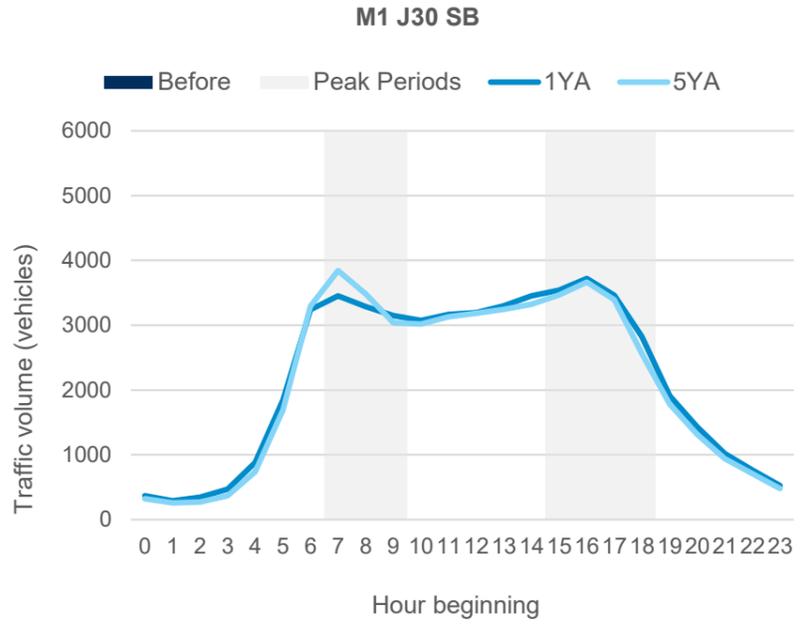
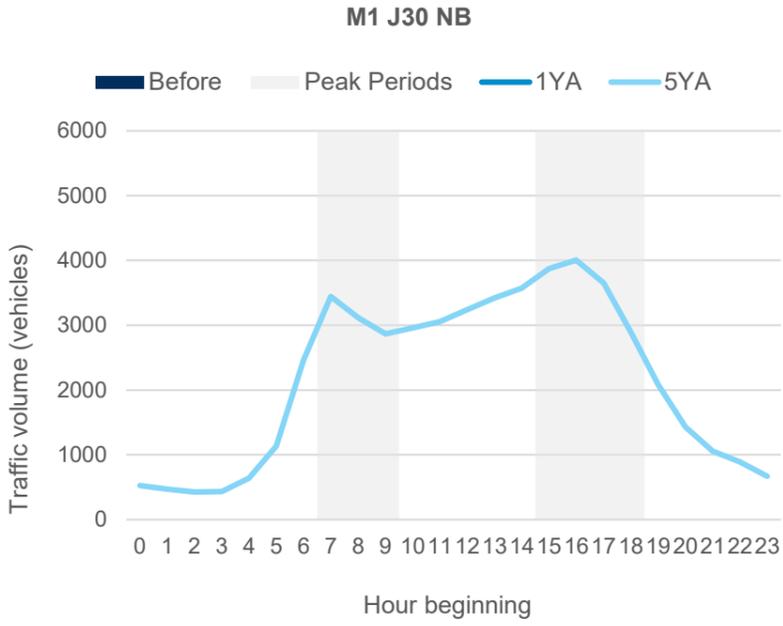
⁶¹ Refer to section 6 for further detail on noise and greenhouse gas impacts.

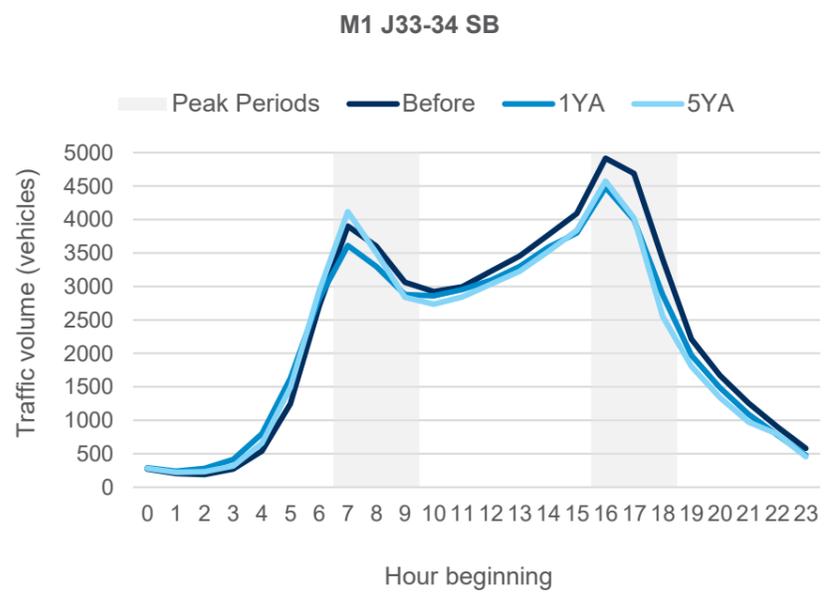
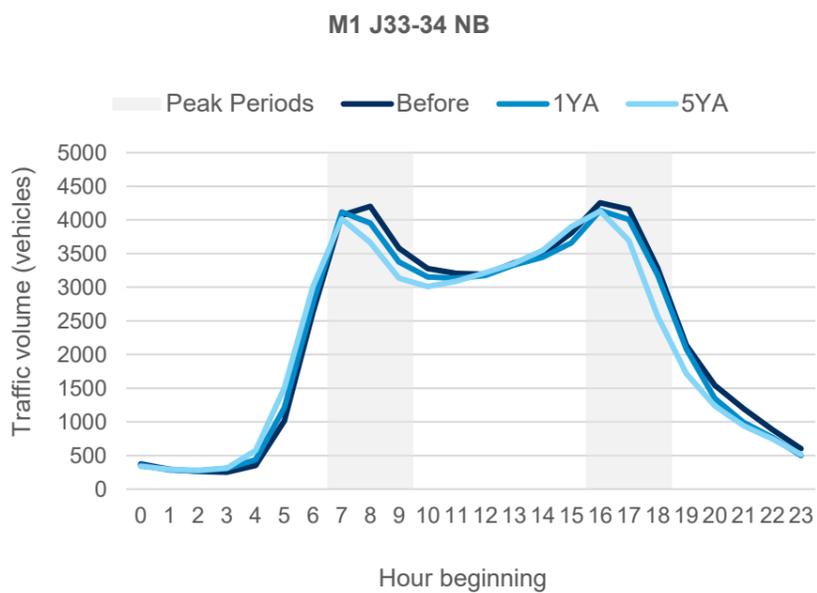
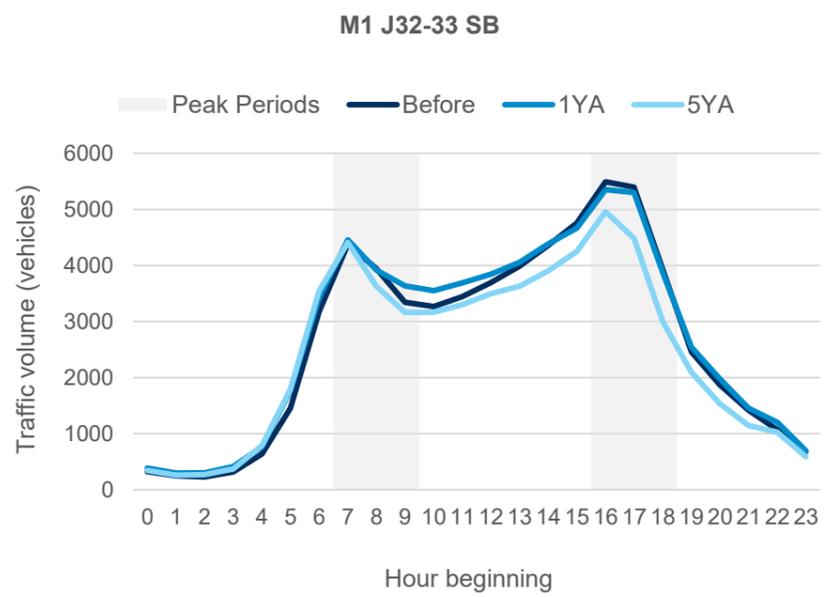
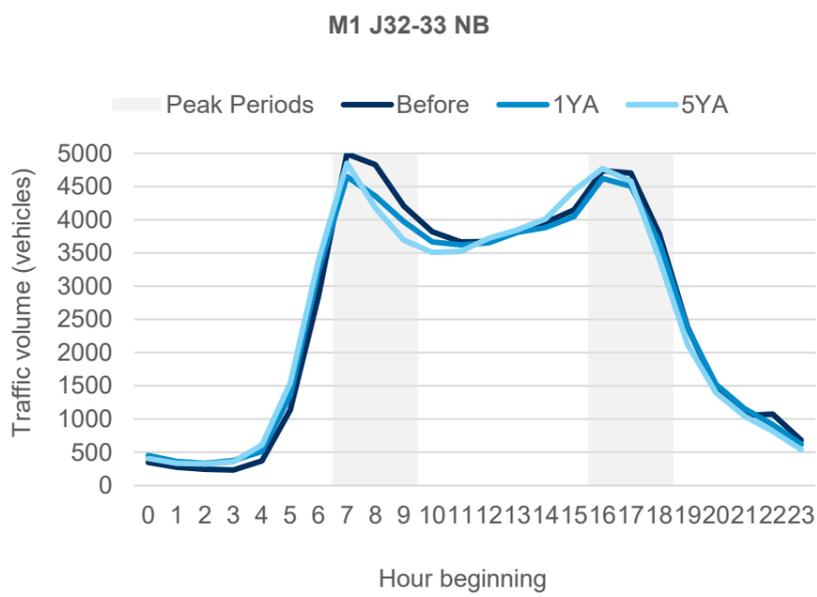
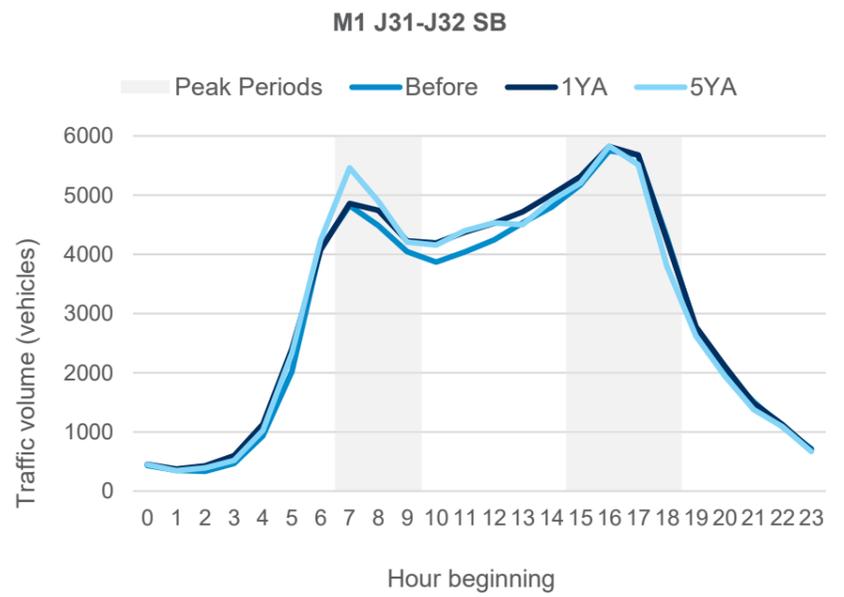
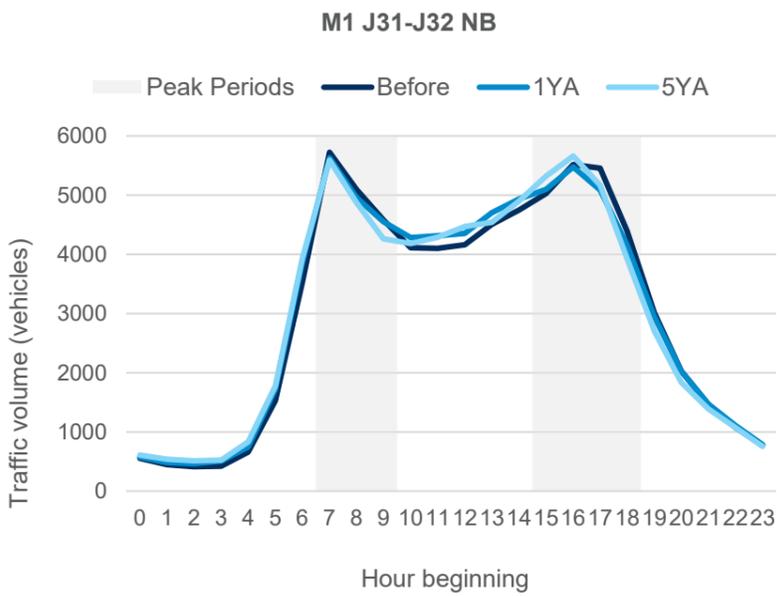
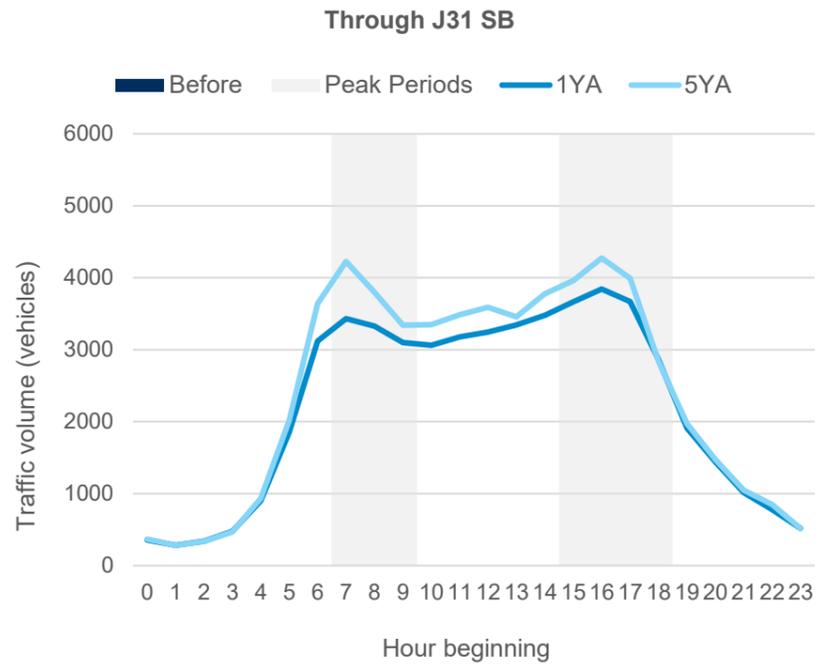
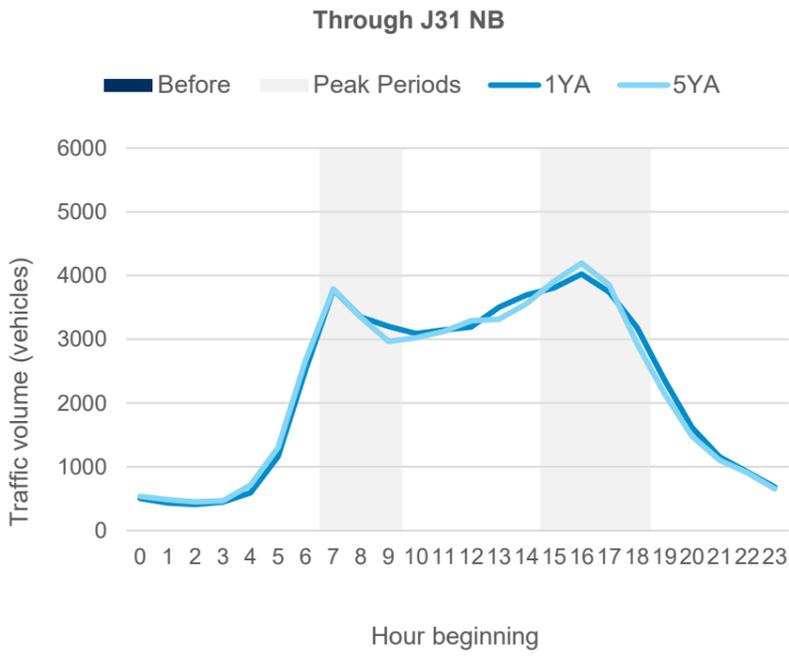
Appendix A

A.1 Hourly Distribution of Flows on Scheme Sections

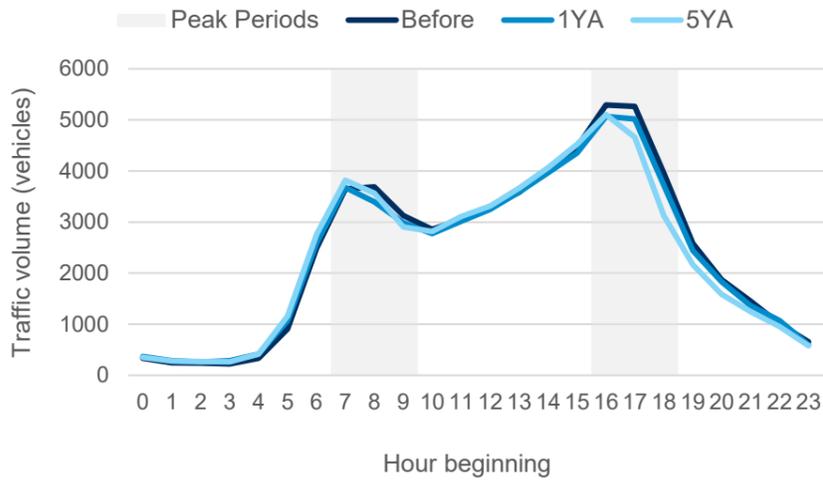




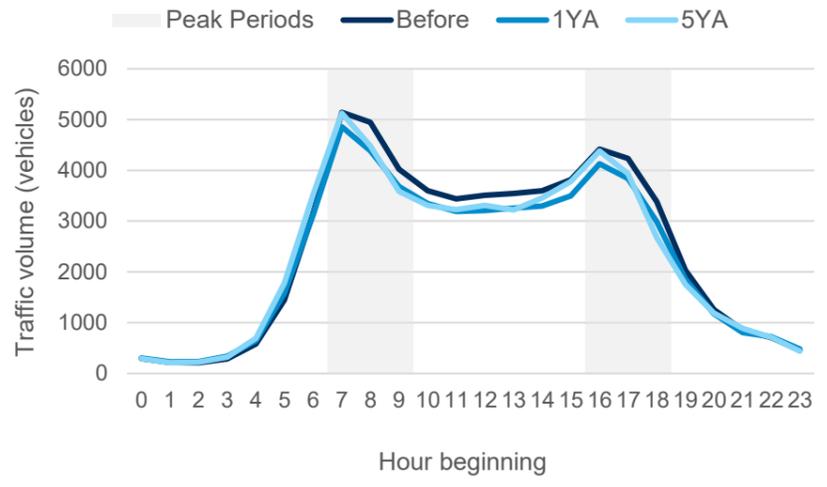




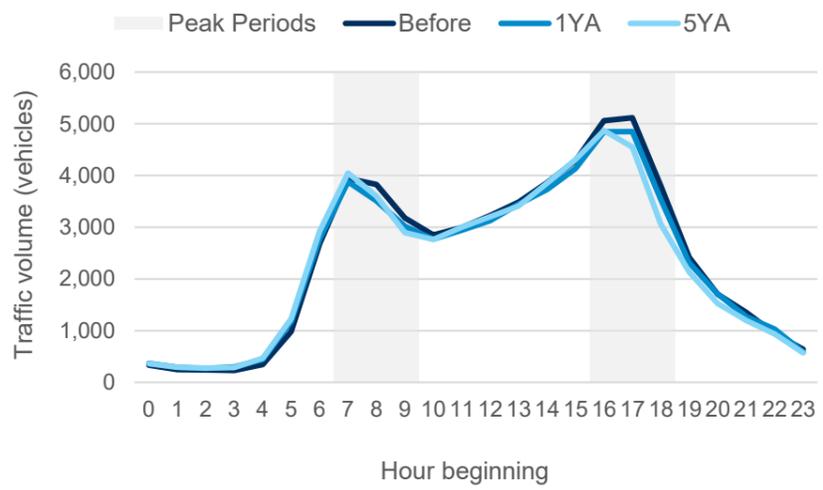
M1 J34-35 NB



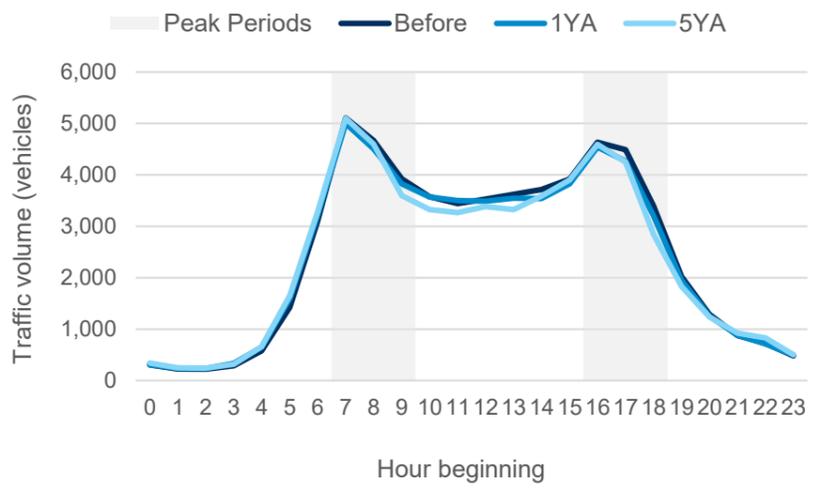
M1 J34-35 SB



M1 J35-35a NB



M1 J35-35a SB



Appendix B

B.1 Incident reporting mechanisms

Since 2012, many police forces have changed the way they collect STATS19 data (for more information see the DfT *Guide to severity adjustments for reported road casualties Great Britain*⁶²). These changes mean casualty severity is now categorised automatically based on the most severe injury, rather than the judgement of an attending police officer.

Police forces using the new systems, called injury-based severity reporting systems, (also known as CRaSH and COPA) report more seriously injured casualties than those which don't. These changes make it particularly difficult to monitor trends in the number of killed and seriously injured casualties over time, or between different police forces. In response to these challenges, DfT and the Office for National Statistics (ONS) have developed an approach to adjust the data collected from those police forces not currently using injury-based reporting systems.

These adjustments are estimates for how casualty severity may have been recorded had the new injury-based reporting system been used. These adjusted estimates apply retrospectively from 2004 and adjust historical data to show casualty severity 'as if' this was recorded under the new injury-based system. Until all police forces have started using the new systems, these historical adjustments will continue to be updated every year. Using these adjusted totals allows for more consistent and comparable reporting when tracking casualty severity over time, across a region, or nationally. While there is no impact on total casualties or collisions, and no impact on total fatalities, these adjustments do impact serious and slight casualties and collisions.

⁶² <https://www.gov.uk/government/publications/guide-to-severity-adjustments-for-reported-road-casualty-statistics/guide-to-severity-adjustments-for-reported-road-casualties-great-britain>

Appendix C

C.1 Unadjusted collision severity for M1 junctions 28 to 31

The project extent is covered by Nottinghamshire Police constabulary which transferred from Stats19 to CRaSH in February 2021.

Table 12 shows the unadjusted collision severities on the project extent.

Table 12 Unadjusted collisions by severity for project extent

Year Type	Fatal	Serious	Slight
5Yr Before	3	6	98
4Yr Before	1	3	93
3Yr Before	2	9	98
2Yr Before	1	5	96
1Yr Before	0	4	93
Construct Yr1	0	8	75
Construct Yr2	0	4	72
Construct Yr3	0	1	20
1Yr After	0	6	27
2Yr After	2	4	15
3Yr After	2	6	21
4Yr After	1	4	23
5Yr After	0	7	33

Source: STATS19 6 September 2008 – 30 March 2021

The wider safety area of the M1 junctions 28 to 31 project is covered by Nottinghamshire and South Yorkshire police constabularies who transferred from Stats19 to CRaSH in February 2021 and January 2016 respectively.

Table 13 shows the unadjusted collision severities on the wider safety area.

Table 13 Unadjusted collisions by severity for wider area

Year Type	Fatal	Serious	Slight
5Yr Before	5	62	407
4Yr Before	5	52	403
3Yr Before	5	65	402
2Yr Before	1	58	350
1Yr Before	5	47	337
Construct Yr1	3	58	307
Construct Yr2	6	42	326
Construct Yr3	9	37	299
Construct Yr4	2	36	186
1Yr After	8	47	189
2Yr After	4	53	214
3Yr After	0	56	184
4Yr After	5	49	178
5Yr After	4	56	212

Source: STATS19 30 June 2008 – 28 March 2022

C.2 Unadjusted collision severity for M1 junctions 31 to 32

The project extent is covered by South Yorkshire Police constabulary, which transferred from Stats19 to CRaSH in January 2016.

Table 14 shows the unadjusted collision severities on the project extent.

Table 14 Unadjusted collisions by severity for project extent

Year Type	Fatal	Serious	Slight
5Yr Before	1	0	9
4Yr Before	0	1	18
3Yr Before	0	0	10
2Yr Before	0	1	10
1Yr Before	0	3	10
Construct Yr1	0	0	16
1Yr After	0	2	12
2Yr After	0	0	10
3Yr After	0	1	9
4Yr After	0	1	11
5Yr After	0	3	5
6Yr After	1	0	3
7Yr After	0	1	8
8Yr After	0	2	5

Source: STATS19 1 February 2009 – 31 October 2022

C.3 Unadjusted collision severity for M1 junctions 32 to 35a

The project extent and wider area is covered by South Yorkshire Police constabulary which transferred from Stats19 to CRaSH in January 2016.

Table 15 shows the unadjusted collision severities on the project extent, and Table 16 shows the unadjusted collision severities on the wider safety area.

Table 15 Unadjusted collisions by severity for project extent

Year Type	Fatal	Serious	Slight
5Yr Before	0	5	45
4Yr Before	2	3	32
3Yr Before	0	3	40
2Yr Before	0	4	23
1Yr Before	1	2	28
Construct Yr1	0	1	35
Construct Yr2	0	2	30
Construct Yr3	2	2	40
Construct Yr4	1	5	38
1Yr After	1	4	6
2Yr After	0	4	26
3Yr After	1	3	17
4Yr After	0	3	2
5Yr After	0	3	15

Source: STATS19 30 June 2008 – 28 March 2022

Table 16 Unadjusted collisions by severity for wider area

Year Type	Fatal	Serious	Slight
5Yr Before	5	22	228
4Yr Before	2	17	200
3Yr Before	0	22	184
2Yr Before	1	19	172
1Yr Before	2	19	167
Construct Yr1	0	22	162
Construct Yr2	3	16	188
Construct Yr3	3	20	164
Construct Yr4	0	14	125
1Yr After	2	30	112
2Yr After	2	37	91
3Yr After	4	32	93
4Yr After	2	16	51
5Yr After	2	20	71

Source: STATS19 30 June 2008 – 28 March 2022

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