national highways

A45/A46 Tollbar End improvement

One-year post-opening project evaluation

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Foreword

National Highways is the government-owned company that operates, maintains, and improves England's motorways and major A roads. Our roads help our customers get to their destination safely – and in the time they expect to. Safety is our top priority, and we are committed to reducing the number of road users killed or seriously injured on the strategic road network by 50% (from the 2005-2009 baseline) by the end of 2025, with a vision of zero harm by 2040.

As Chief Customer and Strategy Officer, I want to know that developments on our network are meeting their objectives and are putting the needs of drivers first. Post-Opening Project Evaluations (POPEs) are a vital part of that assessment. POPEs are undertaken for all our major projects to understand how traffic changes, due to a project being in place, the environmental and safety impacts and how a project supports the economy.

We work to a five-year funding cycle, a radical new approach to road investment first introduced in 2015 which saw the government committing £15.2 billion in the period from 2015 to 2021. The A45/A46 Tollbar End improvement project opened during this period, in March 2017.

Before the A45/A46 Tollbar End improvements, congestion at A45/A46 Tollbar End resulted in queues and delays. One of our main objectives was to ease traffic build-up by providing a two-lane dual-carriageway underpass link between A45 Stonebridge Highway and A46 Coventry Eastern Bypass at Tollbar End junction and widen the existing A45 Stonebridge Highway to a three-lane dual-carriageway. While average journey times in some areas of the scheme have increased, overall, the project has delivered a net benefit on journeys.

We also achieved our goal to improve pedestrian access around Tollbar End roundabout by creating a new shared footpath/cycleway and signal-controlled crossing points.

In terms of safety, we aimed to maintain and, where possible, improve current safety. Safety trends can vary each year and we will continue to monitor this trend over a longer period before drawing conclusions. Early indications show however that the safety objective is on track to be achieved, with a reduction in the rate and number of personal injury collisions in the first two years of the project being operational.

Elliot Shaw

Chief Customer and Strategy Officer

December 2023

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1. Executive summary

The A45-A46 Tollbar End improvement is situated to the south of Coventry. The project encompassed the A45 Stonebridge Highway, extending to the A46 south of Stivichall Interchange and the A46 east of Tollbar End junction. The improvement was officially opened in March 2017.

The project created a two-lane dual-carriageway underpass link between A45 Stonebridge Highway and A46 Coventry Eastern Bypass at Tollbar End junction. The new underpass link enables customers on this route to avoid using Tollbar End roundabout circulatory. The project also widened the existing A45 Stonebridge Highway from a two-lane dual-carriageway to a three-lane dual-carriageway between the improved Tollbar End junction and Stivichall Interchange. The approach arms to Tollbar End junction and two of the approaches to Stivichall Interchange were improved as part of the project to allow traffic to manoeuvre safely into the required lane on approach to the junctions and to aid traffic flow.

Before the project, this part of the road network had been operating above its design capacity for many years, causing queues and delays especially during peak hours. The project was designed to relieve traffic congestion and improve access to local businesses and Coventry Airport. It was also our objective to improve safety and to improve pedestrian access around Tollbar End roundabout.

The evaluation has found that the new underpass link at Tollbar End junction has reduced the overall volume of traffic using the Tollbar End roundabout and the widening of the A45 Stonebridge Highway has provided additional capacity. Journey times improved for customers using the new underpass at Tollbar End.

Access to local businesses at Coventry Airport and Middlemarch Industrial Estate improved by changing the junction of Siskin Drive and Rowley Road from a roundabout to a signal-controlled junction. However, average journey times increased for some routes around Tollbar circulatory.

The safety objective for this project was to maintain and, where possible, improve current safety. Early indications show that the safety objective is on track to be achieved with a reduction in the rate and number of personal injury collisions on both the project extent and wider area.

Pedestrian access has been improved by provision of a new shared footpath/ cycleway along the southern side of the A45 Stonebridge Highway linking together Tollbar End and Stivichall Interchange. Pedestrian access has also been improved at Tollbar End roundabout with signal-controlled crossing points provided between the outer edge and central island of the roundabout.

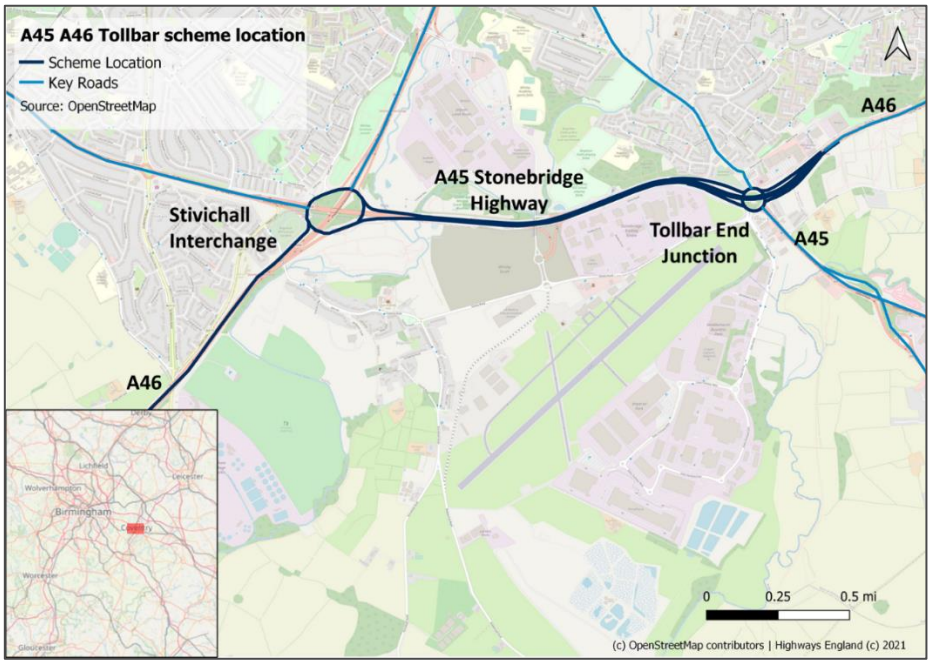
The environmental impacts on physical activity, severance, and journey quality were as expected. For impacts on landscape, heritage, biodiversity, and drainage objectives, although the impacts were broadly as expected and mitigation was in place, it was too early to say whether the design year outcomes will be met. We will review the success of mitigation planting and any additional asset data and maintenance information at the next evaluation stage.

2. Introduction

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

The A45-A46 Tollbar End improvement is situated to the south of Coventry. The project encompassed the A45 Stonebridge Highway, extending to the A46 south of Stivichall Interchange and the A46 east of Tollbar End junction. The improvement was officially opened in March 2017. The geographical context of the project is shown in Figure 1.

Figure 1: A45 A46 Tollbar End project location



Source: National Highways and OpenStreetMap contributors

Before the project, this part of the road network had been operating above its design capacity for many years, causing queues and delays especially during peak hours.

The project was designed to provide relief from traffic congestion and improve access to local businesses and Coventry Airport. The project design set out to achieve these objectives by improving the capacity around the Tollbar End junction and A45 Stonebridge Highway.

It was also an objective to improve safety and to improve pedestrian access around Tollbar End roundabout.

The project comprised of the following elements:

- two-lane dual-carriageway underpass link between A45 Stonebridge Highway and A46 Coventry Eastern Bypass at Tollbar End
- A45 Stonebridge Highway widened to a three-lane dual carriageway, between Tollbar End junction and Stivichall junction.
- improvements to approach arms and circulatory carriageway at Tollbar End roundabout

- Siskin Drive and Rowley Road junction upgraded from a roundabout to a traffic signal-controlled junction.
- traffic signals introduced on all approaches to the improved Tollbar End roundabout[1]
- new sign gantries and re-painted lane markings at A46 northbound approach to Stivichall Interchange and A45 westbound approach to Stivichall Interchange
- junction of Stonehouse Lane and Stonebridge Highway closed.
- improved pedestrian access around Tollbar End roundabout
- new shared footpath cycleway along the southern side of the A45 Stonebridge Highway linking together Tollbar End and Stivichall junctions.

The project was designed reduce the volume of traffic using Tollbar End roundabout (by providing the underpass link). Widening the A45 Stonebridge Highway was to enable traffic to safely manoeuvre into the required lane on the approach to Tollbar End junction and Stivichall Interchange, as well as increasing capacity.

Signalising the junction of Siskin Drive and Rowley Road was designed to improve access to local businesses and Coventry Airport. Signalising all approaches to Tollbar End roundabout was to maximise the efficiency of traffic movement through the area.

The creation of new shared-use paths was to improve access for pedestrians and cyclists around Tollbar End roundabout and between Tollbar End and Stivichall Interchange.

How has the project been evaluated?

Post-opening project evaluations 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 post-opening project evaluation compares changes in key impact areas[2] 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 in this study please refer to the post-opening project evaluation (POPE) methodology manual on our website.[3]

[1] Prior to the improvement only some approaches to Tollbar End roundabout were signalised: A45 Stonebridge Highway, A46 Coventry Eastern Bypass and A45 London Road.
[2] Key impact areas include safety, journey reliability and environmental impacts.
[3] https://nationalhighways.co.uk/media/exypgk11/pope-methodology-note-jan-2022.pdf

3. Delivering against objectives

How has the project performed against objectives?

Our Major Projects have specific objectives which were defined early in the business case when project options were being identified. These benefits are appraised to be realised over 60 years; a one-year evaluation provides early indication if the project is on track to deliver the benefits.

Table 1 summarises the project's performance against each of the objectives, using evidence gathered for this study.

Table 1: Project Objectives and Evaluation Summary

Objective	One year evaluation
Provide relief from traffic congestion	The new underpass at Tollbar End junction was expected to provide the greatest benefits. We found that the underpass has reduced the overall volume of traffic using the Tollbar End roundabout and improved the journey time for customers using the underpass. Despite the Tollbar junction improvements and the removal of some traffic from the junction, average journey times for customers travelling on the junction increased in some of the assessed time periods. The new road markings and signage improved traffic flow on the approach to the Stivichall Interchange. Overall, the project has had a net benefit on journeys
Maintain and, where possible, improve current safety standards.	Early indications are that the safety objective is on track to be achieved. A longer period will be required to determine if these initial positive findings are a real trend or natural fluctuation.
Improve pedestrian access around Tollbar End roundabout	Pedestrian access improved by provision of a new shared footpath/cycleway along the southern side of the A45 Stonebridge Highway linking together Tollbar End and Stivichall Interchange. Pedestrian access also improved at Tollbar End roundabout with signal-controlled crossing points provided between the outer edge and central island of the roundabout.
Improve access to local businesses and Coventry Airport	Access to local businesses at Coventry Airport and Middlemarch Industrial Estate improved by changing the junction of Siskin Drive and Rowley Road from a roundabout to a signal-controlled junction. However, average journey times appear to have increased on several approaches to Tollbar End roundabout.

Objective	One year evaluation
Ensure there is no significant worsening of the Appraisal Summary Table sub-criteria and to improve them over the existing conditions where possible	The environmental impacts on physical activity, severance, and journey quality were as expected. For impacts on landscape, heritage, biodiversity, and drainage, although the impacts were broadly as expected and mitigation was in place, it was too early to say whether the design year outcomes will be met.

4. Customer journeys

Summary

During the first year of the project opening, traffic increased on the roads in the vicinity of the project. This increase is above background growth in traffic, but lower than forecast traffic levels.

For customers using the new underpass link at Tollbar End, journey times and reliability improved. Average journey times improved by 50 seconds or greater.

For customers travelling through Tollbar End junction, journey times and reliability deteriorated in some movements. It is likely that the increased journey times are a result of traffic flow increases for certain movements at Tollbar End (A45 west to A45 south traffic increased by 45%, 4,000 vehicles), despite observed flows around the project being below forecast flows.

We have calculated vehicle hour savings to demonstrate there is an overall net benefit on congestion in the study area. This is driven by the vehicle hour savings from the new underpass link at Tollbar End.

On the two routes where comparisons could be made (A45 Stonebridge Highway – A46 Coventry Eastern Bypass and A46 Kenilworth Bypass – A46 Coventry Eastern Bypass), the observed percentage change in journey time was greater than the forecast percentage change in journey time in all time periods.

How have traffic levels changed?

The following sections will examine if the traffic levels changed over the evaluation period and to what extent the forecast traffic levels were realised.

National and regional

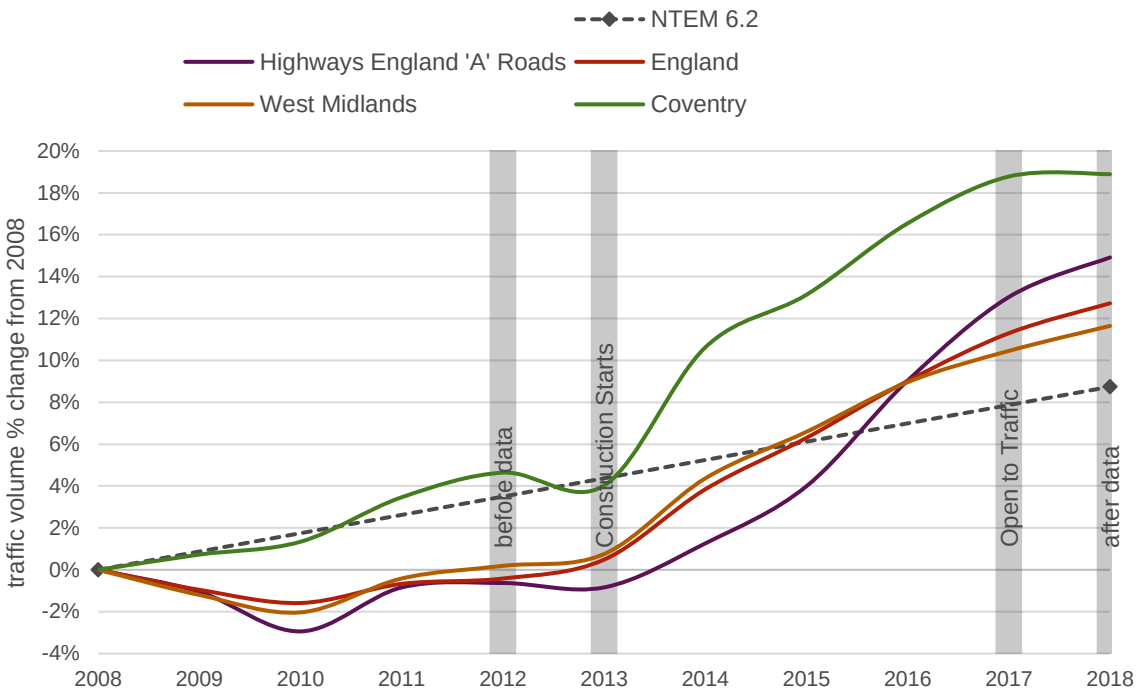
To assess the impact of the project on traffic growth, it is useful to understand the changes within the context of national and regional traffic. To do this, we use the Department for Transport annual statistics. The data is reported by local authority and road type, recording the total number of million vehicle kilometres travelled[4]. 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.

We use this information as a relative baseline from which to measure a project's impact on traffic growth. We attribute to the project any growth observed on roads in the study area which is above the baseline trends.

Figure 2, below, shows how traffic has grown between 2008, which represents the project model base year, and 2018 which is one year after the project opened.

[4] Motor vehicle traffic (vehicle kilometres) by region in Great Britain, Table TRA 8904, Department for Transport

Figure 2: National, regional, and local traffic trends



Source: Department for Transport road traffic statistics
https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra

Overall, traffic levels increased nationally, regionally (West Midlands), and locally (Coventry), with the increase being more rapid after 2013. Between 2012 (which is our baseline in this study) and 2018 (the one year after project period) we can see growth in the range of 11% (for West Midlands) and 16% for National Highways 'A' Roads. Only growth beyond this level should be attributed to the project.

The appraisal of this project (in 2008) assumed that there would be some background growth and used National Trip End Model (NTEM)[5] to estimate this. The NTEM growth rate for Coventry is included on Figure 2 for comparison and shows the model may have underestimated the growth seen in the Coventry area.

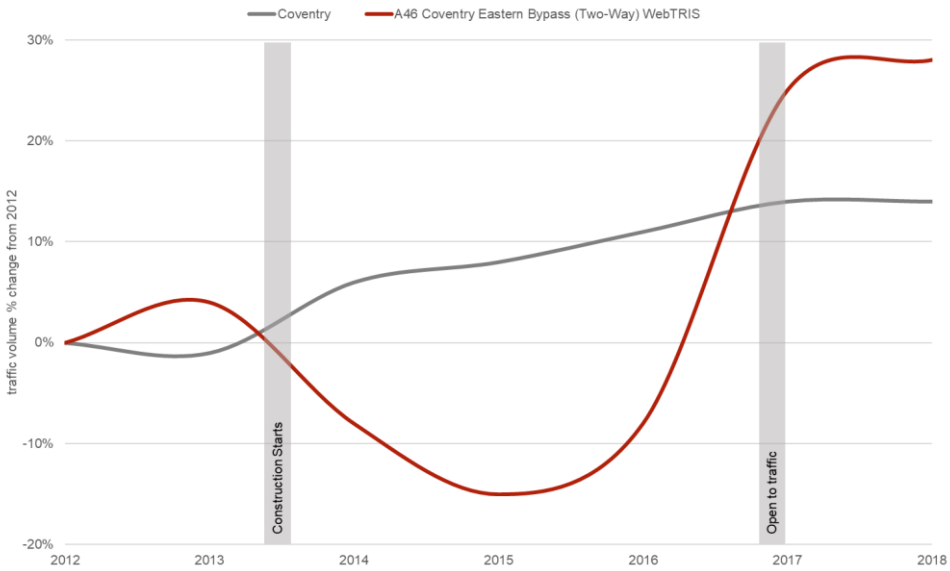
Project locality

Our analysis of traffic growth was limited by a lack of one year after traffic data on the A45 Stonebridge Highway (between the Stivichall Interchange and Tollbar End junction)[6]. Data for locations adjacent to the project section was used to support this evaluation.

Following the project completion, traffic growth on the A46 Coventry Eastern Bypass was greater than for Coventry (14% higher in 2018). and higher than the observed local, regional, and national traffic growth.

[5] NTEM – National Trip End Model, owned by the Department for Transport and used to inform the traffic modelling that supports our project appraisal. Dataset version 6.2 was used.
[6] The traffic counters at this location were removed as part of the project construction.

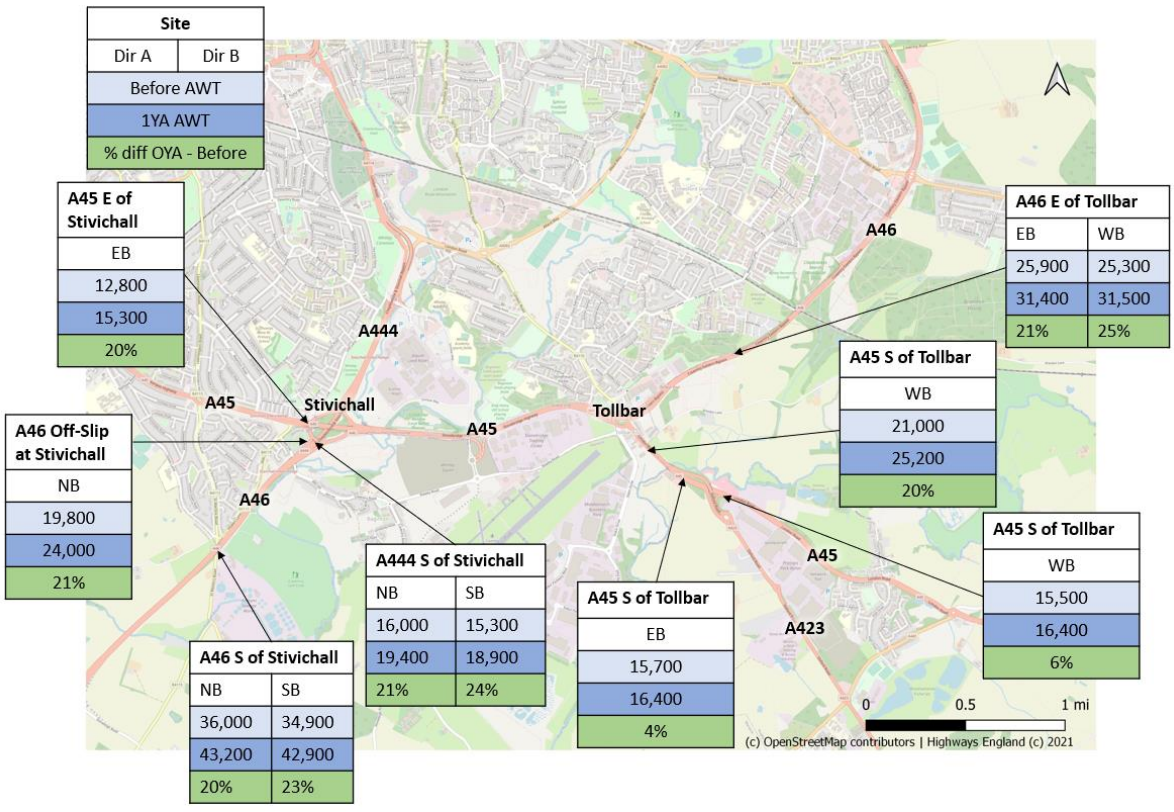
Figure 3: Coventry local vs A46 Coventry Eastern Bypass long-term trends



Source: Department for Transport road traffic statistics & WebTRIS

Figure 4 illustrates the traffic growth adjacent to the project section and its vicinity before the project (2012) and one year after (2018).

Figure 4: Comparison of before and after average weekly traffic



Source: WebTRIS traffic counts – November 2012 (before) and November 2018 (after). All figures are to the nearest 100.

One year after opening, traffic volumes increased at all assessed locations on the network in the project vicinity. Sites to both the east and west of the project show increases in traffic growth within the immediate project vicinity, this is between 20% and 25%. This level of growth is slightly higher than the trends we are seeing across England, locally and regionally. This could be attributed to an increase in

economic activity in the area, such as the expansion in operations at Jaguar Land Rover's Whitley site located to the northeast of Stivichall Interchange.

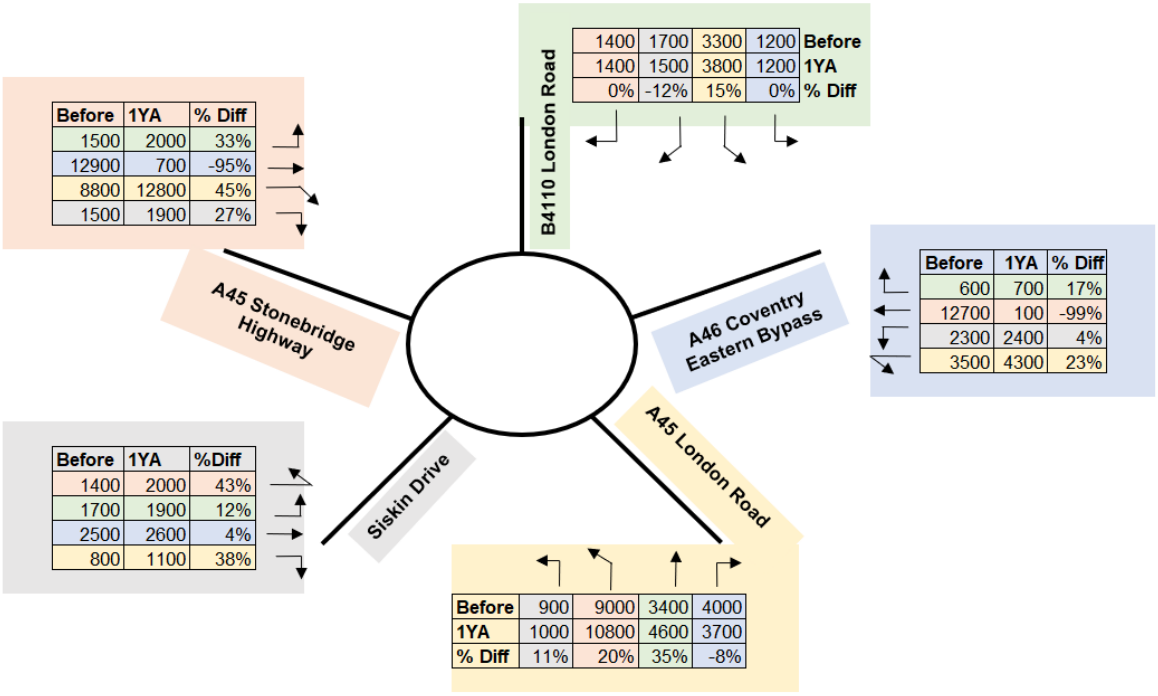
An outlier to this pattern is the A45 London Road south of Tollbar End junction where traffic has only increased between 4% to 6% one year after. This is lower than background traffic growth, and much lower than traffic growth seen at all other count sites in the project vicinity.

Tollbar End junction

To understand the changes in the volume of traffic using the Tollbar End junction. and to demonstrate the impact of the new underpass link, turning count observations[7] were undertaken.

A comparison between before project (October 2013) and one year after (using March 2019 data) turning movements for the Tollbar End junction is presented in Figure 5.

Figure 5: Comparison of 12-Hour turning movements for Tollbar End junction.



Source: Turning Count Traffic Survey – October 2013 (before) and March 2019 (1YA). 1YA (one year after opening period). All figures are to the nearest 100.

Figure 5 shows that according to the turning count observations:

- Total traffic flow arriving and exiting the junction one year after decreased by approximately 19% from around 75,100 vehicles to 60,500 vehicles.
- Before the project, Tollbar End junction had two major movements in both directions: A45 Stonebridge Highway to A46 Coventry Eastern Bypass and A45 Stonebridge Highway to A45 London Road.
- Traffic travelling between the A45 Stonebridge Highway and A46 Coventry Eastern Bypass in both directions used to account for 34% of all traffic

[7] The turning movements presented in this section represent 12-hour flows over the course of one weekday for both the before project and one year after periods.

which used Tollbar End junction before project. The introduction of the new underpass link reduced traffic making this movement to only 1.3% of total traffic which uses Tollbar End. This illustrates that the new underpass link has successfully diverted the majority of through traffic, although a small proportion of customers still use the junction circulatory route.

- Traffic travelling between the A45 Stonebridge Highway and A45 London Road now represents the dominant movement at the junction. This movement was the second dominant movement before project. The turning count shows a post-opening increase of 4,000 vehicles (45%) from the west to the south and 1,800 vehicles (20%) in the reverse direction.

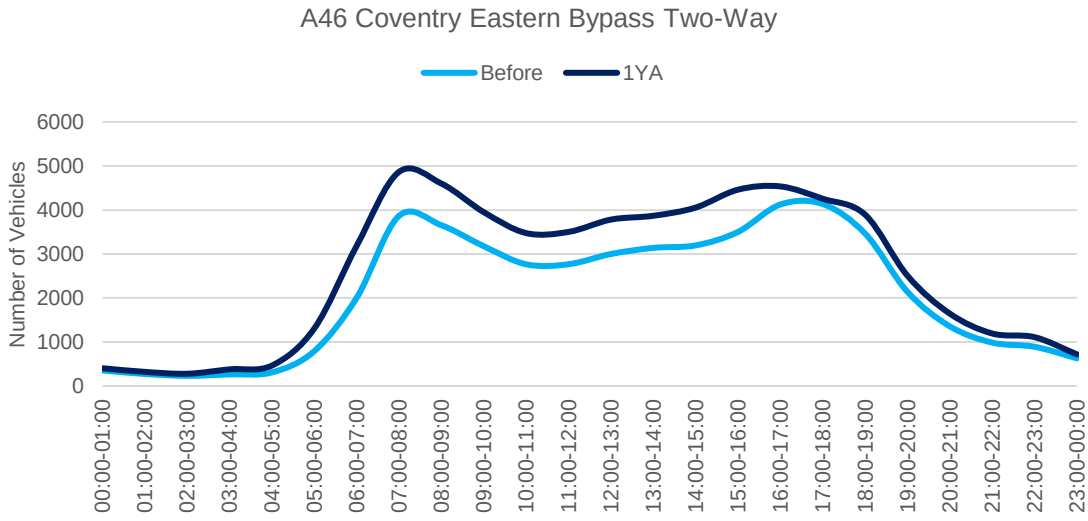
Most other movements which still use Tollbar End junction one year after show an increase in traffic volumes compared to before project. Excluding the two dominant junction movements discussed above one year after, the remaining movements at Tollbar End traffic volume increased by 14% or 4,440 vehicles. This is to be expected given the increase in traffic growth around the project area as shown in Figure 5.

How are traffic flows distributed across the day?

We analysed traffic flows across a typical weekday to determine whether traffic growth has occurred uniformly or at certain times of day, as shown in **Error! R eference source not found.**.

We found that the busiest times on the road network at this location are 7am to 9am and 4pm to 6pm before the project, and 7am to 9am and 3pm to 6pm one year after opening. This spreading of the evening peak is potentially because of the increase in operations at the Jaguar Land Rover Whitley site which is known to have earlier working hour patterns.

Figure 6: Comparison of average weekday hourly flows before and one year after opening.

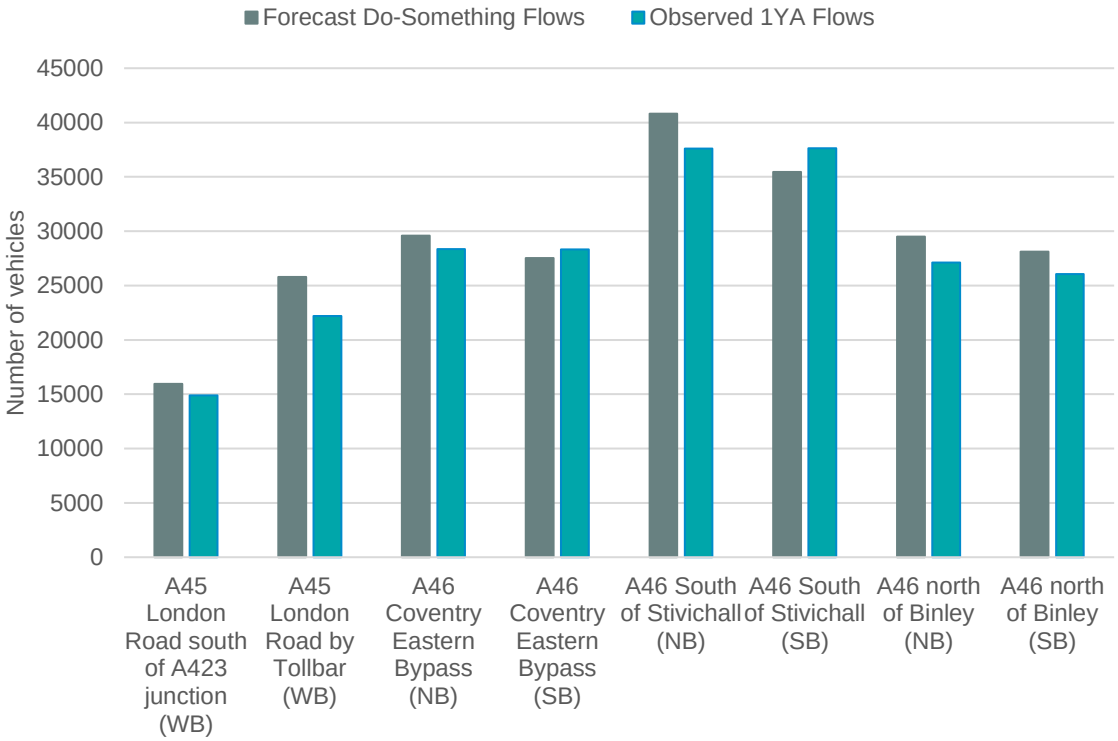


Source: WebTRIS traffic counts – November 2012 (before) and November 2018 (after)

Was traffic growth as expected within the business case?

We found that traffic growth in the vicinity[8] of the project was slightly over-estimated. However, the differences between observed and forecast flows are less than 10%[9]. for six out of the eight locations.

Figure 7: Before and after average daily traffic



Source: Traffic Forecasting Report & WebTRIS (November 2018 factored to 2016). The data presented in Figure 7 corresponds to some of the sites shown in Figure 4, but uses ADT rather than AWT to match with the available model forecast data.

Relieving congestion and making journeys more reliable

One of the objectives of this project was to provide relief from traffic congestion.

We analysed journey times as a way of identifying the impact of the project on congestion. We also considered the extent to which journey times vary from the expected average journey time which indicates how reliable a journey is.

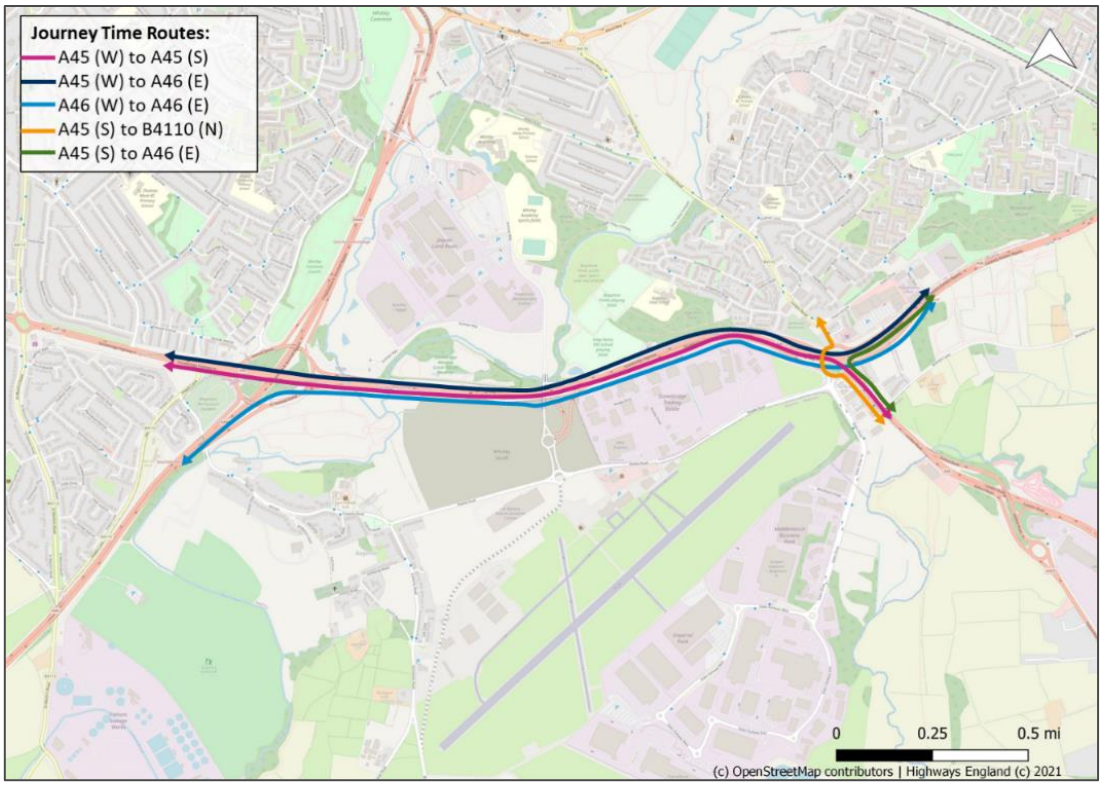
Did the project deliver journey time savings?

To understand whether the project has resulted in journey time savings, we used TomTom GPS data. Routes were selected to capture both local movements around Tollbar End junction and routes which travel along the wider project extent, including the A45 Stonebridge Highway and Stivichall Interchange. Figure 8**Error! Reference source not found.** presents the journey time routes assessed. All routes were assessed in both directions.

[8] We have not been able to compare the forecast flows along the A45 Stonebridge Highway as there is no one year after observed traffic data available between the Stivichall Interchange and Tollbar End junction.

[9] Guidance suggests up to a 15% threshold is acceptable. Refer to Transport Analysis Guidance (TAG) unit M3.1

Figure 8: Journey time routes



Source: National Highways and OpenStreetMap contributors

Data from October 2012 to September 2013 was used for the before scenario, and from April 2018 to March 2019 for one year after. We used the same time periods used in the project appraisal, plus some additional time periods, namely:

- Weekday morning peak 7am to 8am, 8am to 9am
- Weekday interpeak, average hour 10am to 4pm
- Weekday evening peak 4pm to 5pm, 5pm to 6pm

An assessment of other hourly time periods was carried out to check for relevant or unexpected observed changes, but the above time periods remain the key focus of analysis in this section.

A45 Stonebridge Highway (A45 W) - A46 Coventry Eastern Bypass (A46 E)

Customers using the new underpass were expected to experience the greatest benefits as they are no longer required to travel through Tollbar End junction.

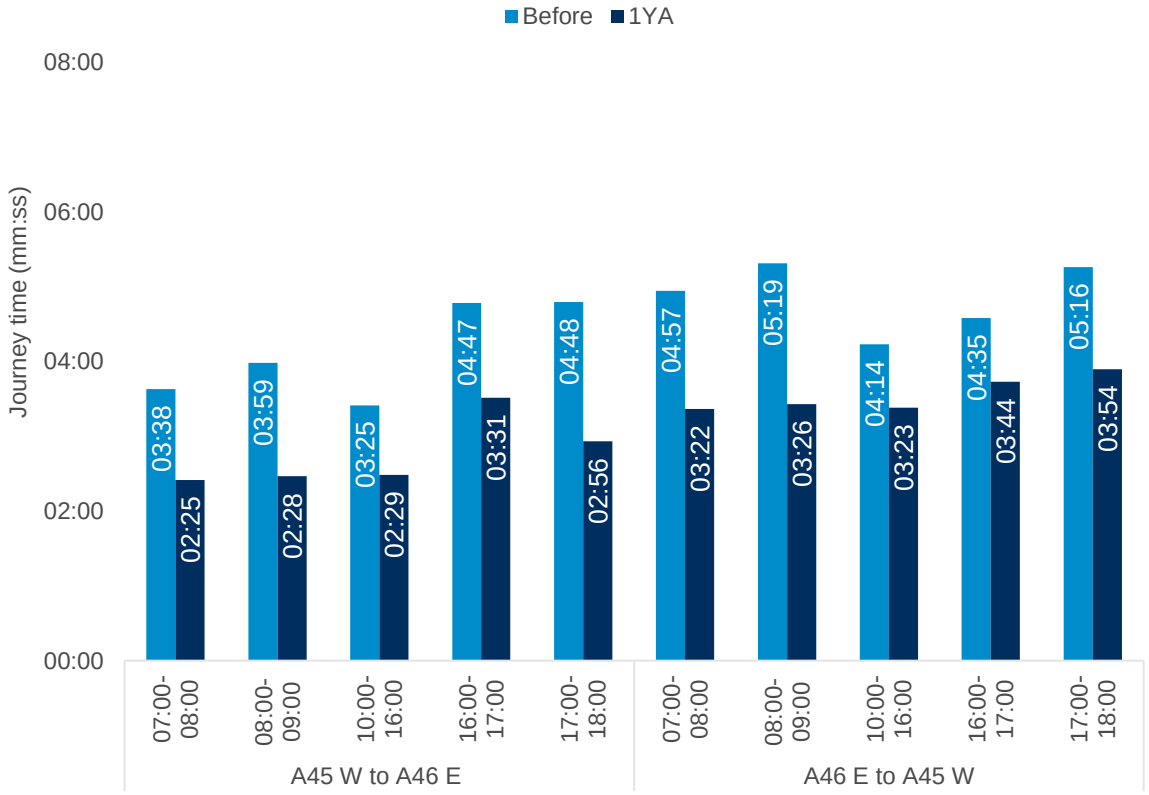
Following the project's implementation, all time periods demonstrate an improvement in average journey times (50 seconds or greater) in both directions as customers can now use the free-flow underpass route instead of Tollbar End junction circulatory.

On the eastbound route (A45 W to A46 E), the greatest journey time savings were in the evening peak. On the westbound route (A46 E to A45 W), the greatest journey time savings are in the morning peak. There is also a noticeable improvement in the consistency of journey times across the day in both directions.

Figure 9 shows the average observed journey times for the A45(W) to A46(E) and A46(E) to A45(W), before and one year after project opening. The project components picked up on this route include:

- the widening of the A45 Stonebridge Highway from two-lanes to three-lanes in both directions
- the new two-lane dual carriageway underpass link between the A45 Stonebridge Highway and the A46 Coventry Eastern Bypass at Tollbar End junction, which was expected to be one of the major beneficiaries of the project.

Figure 9: average observed journey times before and one year after A46 Coventry Eastern Bypass (A46 E) - A45 Stonebridge Highway (A45 W)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

A45 London Road (A45 S) – A46 Coventry Eastern Bypass (A46 E)

Despite the junction improvements and the removal of some traffic from the junction, average journey times increased in some of the assessed time periods for the A45(S) to A46(E) and A46(E) to A45(S) route in both directions. This could be due to the overall increase in traffic demand for these movements, as seen in Figure 5 most movements which still use Tollbar End junction at one year after having increased. Traffic signal timing might also have an influence. The northbound route (A45 S to A46 E) average journey times appear to have increased more than the southbound route.

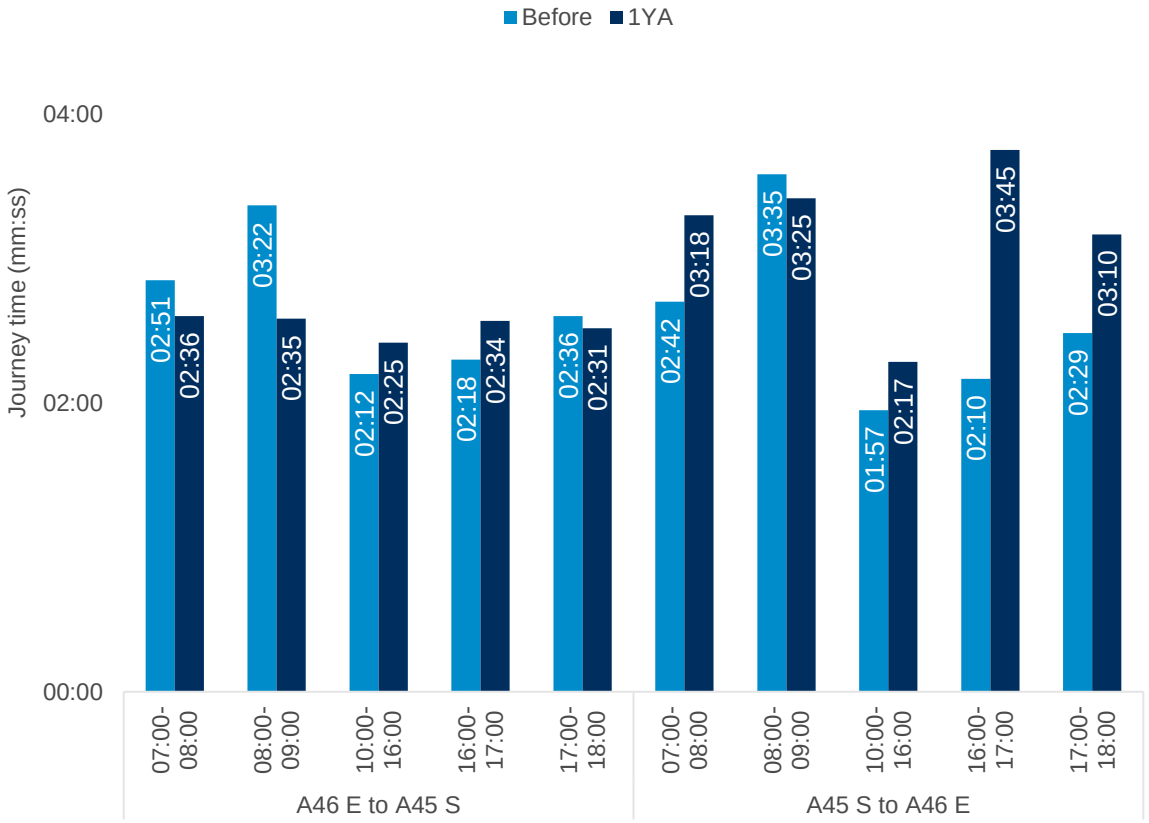
One year after, northbound average journey times still varied throughout the day, the same pattern as seen in the before project data. Southbound journey times are more consistent across the day compared to before project.

Figure 10 shows the average observed journey times for the A45(S) to A46(E) and A46(E) to A45(S) before and one year after project opening.

The project components picked up on this route include the improved Tollbar End roundabout. This route expected to benefit from the project due to the reduced

volumes of traffic around the Tollbar End circulatory from the creation of the new underpass link, and improvements at Tollbar End junction.

Figure 10: average observed journey times before and one year after (mm:ss) A46 Coventry Eastern Bypass (A46 E) - A45 London Road (A45 S)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

Average journey time graphs for the remaining journey time routes shown in Figure 10are presented in Annex 1.

From the assessed routes within this one year after evaluation, we can conclude that those customers who can use the new underpass link at Tollbar End experienced journey time improvements in both directions across all time periods. The routes which use Tollbar End roundabout circulatory show journey time improvements in some periods. It is likely that the increases in journey times seen on some of these routes is due to the increased traffic volumes for various movements at Tollbar End shown and not a direct result of the improvement project. To a lesser extent, the traffic signals at Tollbar End roundabout might have contributed to the increases in journey times on some routes. Before the project, only some of the approach arms to Tollbar End roundabout were signalised. The project added traffic signals to all approach arms of Tollbar End roundabout. It is likely that the signal staging and timings have been amended compared to the before project traffic signal timings.

Were journey time savings in line with forecast?

Forecast journey times were provided in the Traffic Forecasting Report (TFR) prepared as part of the pre-construction project appraisal. Two of the evaluated routes align with those included in the TFR; the A45 Stonebridge Highway – A46 Coventry Eastern Bypass and the A46 Kenilworth Bypass – A46 Coventry Eastern

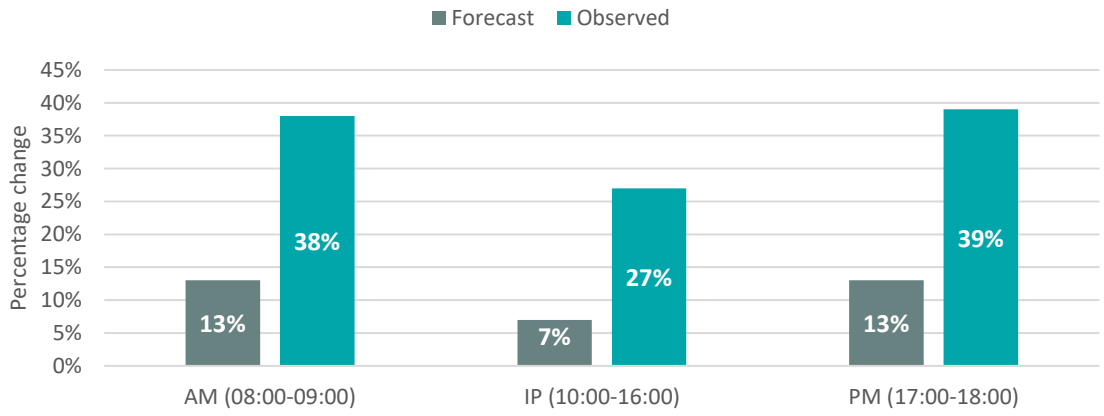
Bypass. The TFR did not define the precise start and end points of routes therefore we compared the forecast percentage change in journey times against observed percentage change, rather than presenting the absolute journey times.

A45 Stonebridge Highway (A45 W) – A46 Coventry Eastern Bypass (A46 E)

Figure 11 and Figure 12 present the forecast and observed percentage change in journey times for the A45(W) to A46(E) and A46(E) to A45(W), Journey times were expected to improve because of the project.

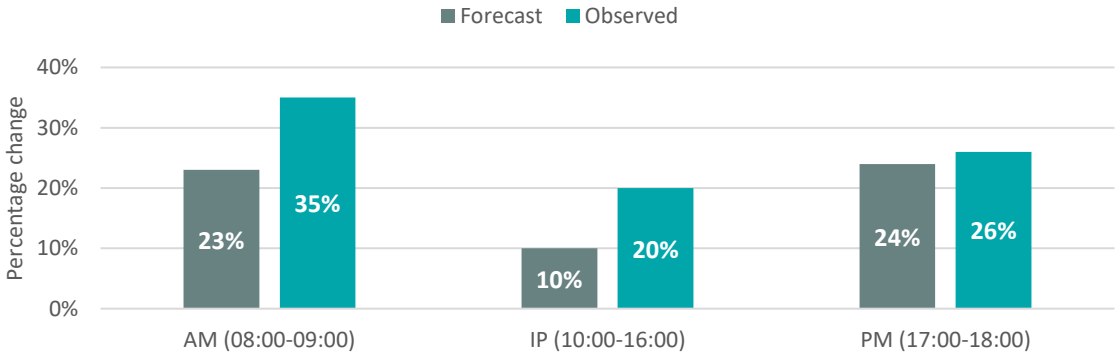
The observed percentage change in journey time on the eastbound route (A45 W to A46 E) is much greater than the forecast in all time periods. On the westbound route (A46 E to A45 W), our observations are consistent with the forecast journey time percentage change in the evening peak (PM), within 2%. In the morning (AM) and interpeak (IP) the observed journey time percentage change is greater than the forecast percentage change in journey time.

Figure 11: Forecast and observed journey time percentage change (A45 W to A46 E)



Source: Traffic Forecasting Report & TomTom (October 2012 – November 2013, April 2018- March 2019)

Figure 12: Forecast and observed journey time percentage change (A46 E to A45 W)



Source: Traffic Forecasting Report & TomTom (October 2012 – November 2013, April 2018- March 2019)

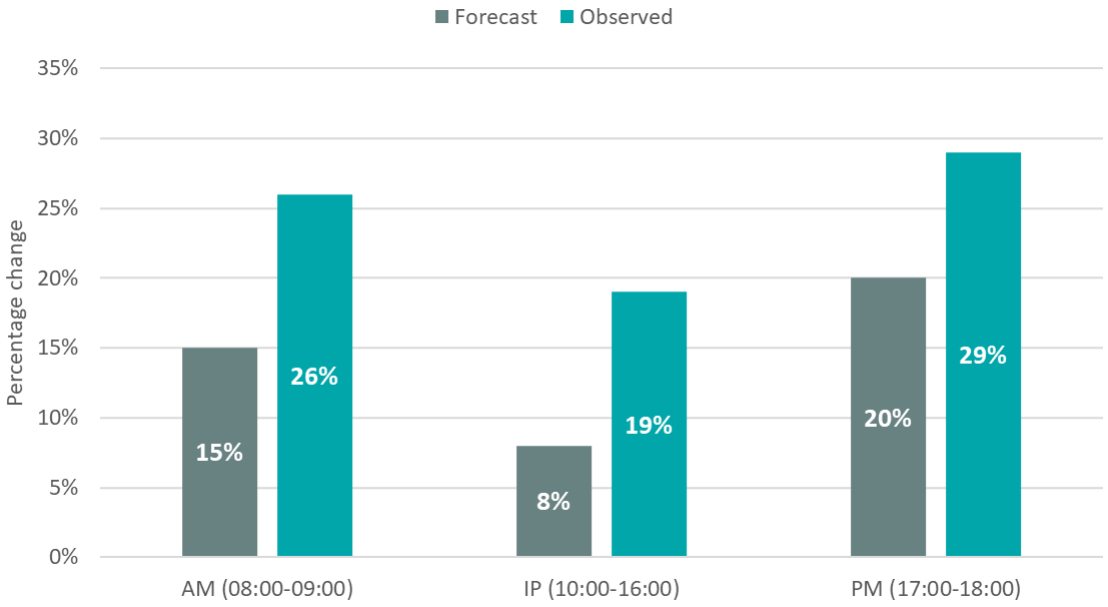
A46 Kenilworth Bypass (A46 W) – A46 Coventry Eastern Bypass (A46 E)

Figure 13 and Figure 14 present the forecast and observed percentage change in journey times for the A46(W) to A46(E) and A46(E) to A46(W), the light blue route on Figure 8.. Journey times were forecast to improve because of the scheme.

The observed percentage change in journey time on the eastbound route (A46 W to A46 E) is greater than the forecast in all time periods. On the westbound route (A46 E to A46 W), our observations are consistent with the forecast journey time

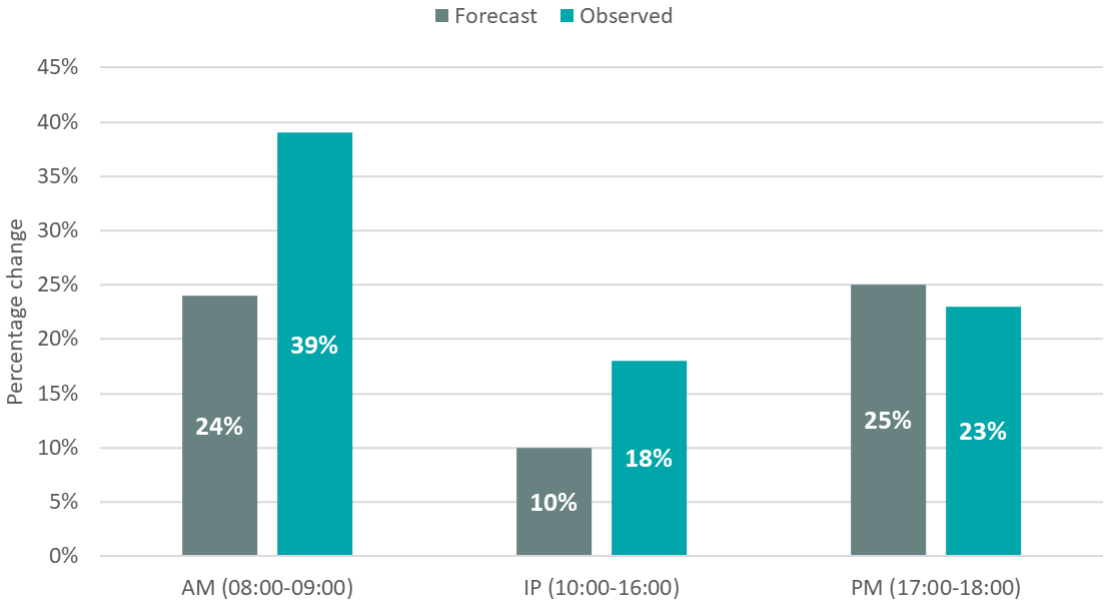
percentage change in the PM peak, within 2%. In the AM and IP, the observed journey time percentage change is greater than the forecast.

Figure 13: Forecast and observed journey time percentage change (A46 W to A46 E)



Source: Traffic Forecasting Report & TomTom (October 2012 – November 2013, April 2018- March 2019)

Figure 14: Forecast and observed journey time percentage change (A46 E to A46 W)



Source: Traffic Forecasting Report & TomTom (October 2012 – November 2013, April 2018- March 2019)

Overall impact on journeys

We observed large journey time savings associated with routes using the new underpass link at Tollbar End one year after. We have also seen some increases in average journey times for routes which use Tollbar End junction. To determine whether the project has had a net benefit in reducing vehicle hours around the scheme section we calculated vehicle hour savings for journey time routes which equated for over 80% of movements through Tollbar End junction.

The vehicle hours analysis in Table 2 shows that when considering all movements at Tollbar End there is a large net vehicle hour saving across all time periods totalling at 244,900 hours. This is despite vehicle hours increasing in all but one period for movements which still use the Tollbar End junction. This shows that the new underpass link at Tollbar End is the main driver behind vehicle hour savings for the project. Vehicle hour savings for this route are such that it outweighs the increase in vehicle hours on other routes which use Tollbar End circulatory.

It is important to note that the increase in vehicle hours on routes which use Tollbar End circulatory isn't necessarily a direct result of the project but instead the increase in traffic volumes across the study area as shown in Figure 4.

Overall, the scheme has a net benefit at reducing vehicle hours, and it is likely that the scheme also has additional vehicle hour savings which aren't captured in Table 2 from the scheme improvements on the approach to Stivichall Interchange.

Table 2: Vehicle hour savings – flow weighted

Time Period (Weekday)	**All Movements** Vehicle Hours Saved in Opening Year	**Tollbar End Only Movements** Vehicle Hours Saved in Opening Year
07:00-08:00	9,000	-7,100
08:00-09:00	21,800	2,700
Inter Peak	191,100	-51,700
16:00-17:00	4,700	-6,700
17:00-18:00	18,300	-1,900
Overall Result (Total)	**244,900**	**-64,600**

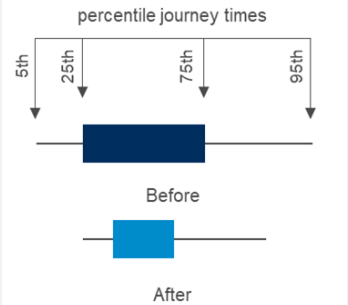
Source: WebTRIS traffic counts – November 2012 (before) and November 2018 (after) and TomTom (October 2012 – November 2013, April 2018- March 2019). All figures rounded to the nearest hundred.

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 customers are less confident in planning how long their journey will take them. If journey times do not vary, our customers can be more confident in the time their journey will take and allow a smaller window of time to make that journey.

We calculated this using the same GPS data from TomTom that was used in the average journey time analysis. We looked at the percentiles of journey times to establish whether they have become more reliable since before the project was implemented. In this section, we present the journey time reliability on the same routes presented in the average journey time analysis section. The remaining journey time route reliability graphs are presented in Annex A.

Figure 13: What does a box plot show?



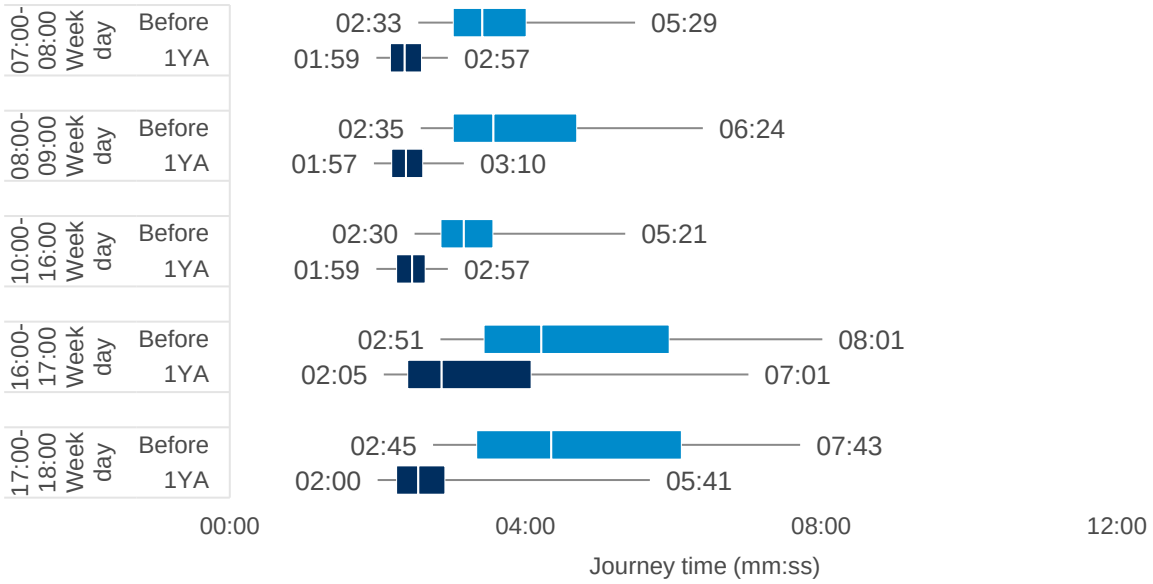
The lowest point is the 5th percentile, this means 5% of journeys take less than this amount of time to complete. The highest point is the 95th percentile, this means 95% of journeys take less time than this to complete. This shows the difference between the longest and the shortest journey times observed.

The length of the box shows how the journey times vary between the 25th and 75th percentile (the journey time 25% and 75% of journeys are faster than). The narrower the box the less variable, and hence more reliable, the journey.

A45 Stonebridge Highway (A45 W) – A46 Coventry Eastern Bypass (A46 E)

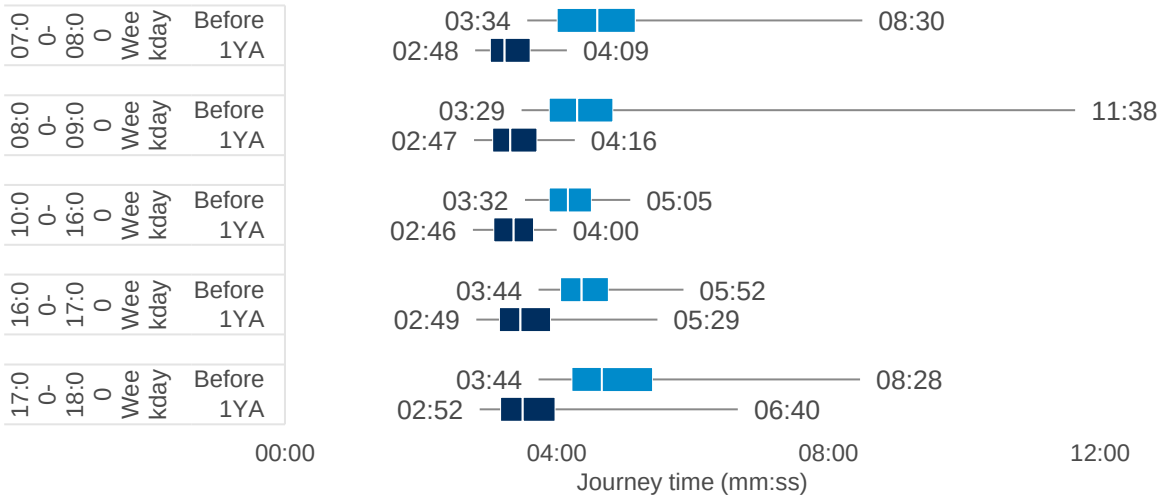
Reliability has improved in all time periods and in both directions. Journeys are both quicker and more consistent one year after compared to before project. This is illustrated in Figure 14 and
Figure 15 where the one year after interquartile range is smaller than before project in all time periods. This shows that the project has made journeys on this route both more reliable and quicker. The 95th percentile journey times also improved one year after compared to before project in all time periods.

Figure 14: Journey time reliability A45 W to A46 E (Eastbound)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

Figure 15: Journey time reliability A46 E to A45 W (Westbound)

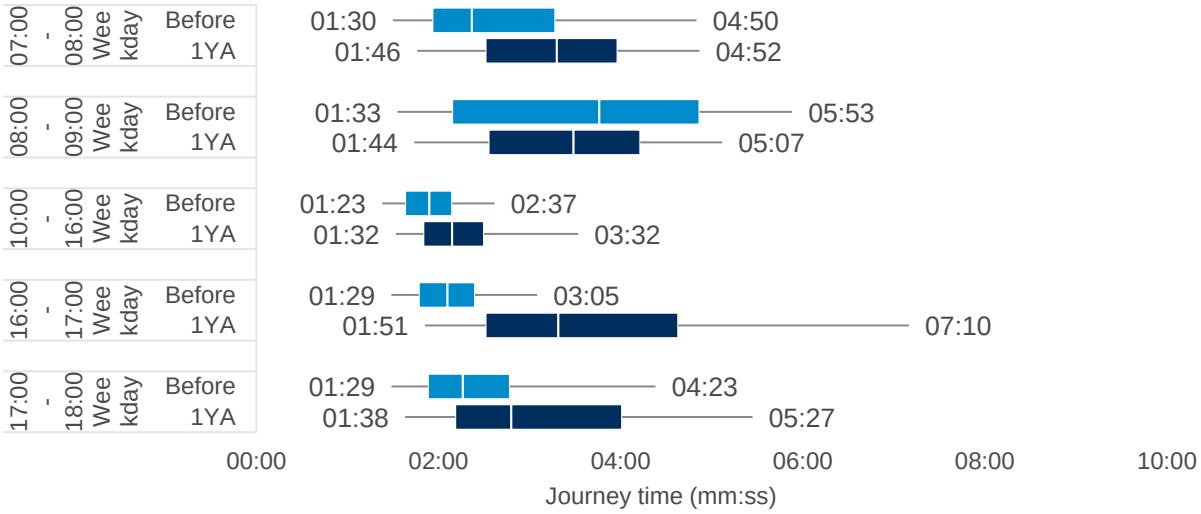


Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

A45 London Road (A45 S) to A46 Coventry Eastern Bypass (A46 E)

In the northbound direction, journey time reliability appears to have worsened one year after in all time periods except in the morning peak 8am to 9am, where reliability has improved. The 95th percentile journey times increased in all assessed time periods except in 8am to 9am, where the 95th percentile journey time has improved.

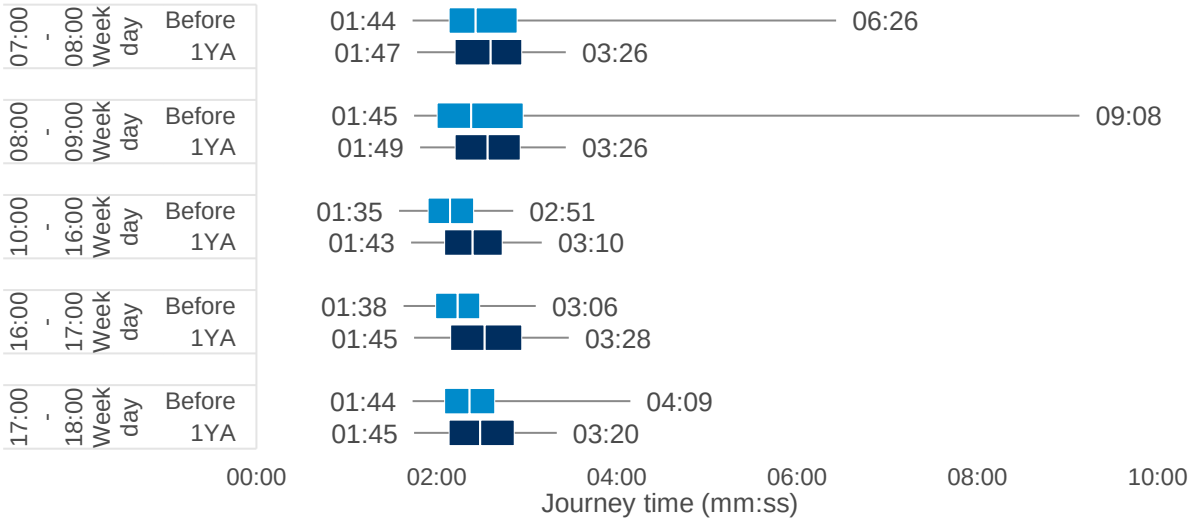
Figure 16: Journey time reliability A45 S to A46 E (Northbound)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

In the southbound direction, journey time reliability has remained similar for 7am to 8am and 10am to 4pm and reliability has improved in morning peak 8am to 9am. Journey time reliability has worsened in the evening peak periods, 4pm to 6pm. The 95th percentile journey times improved in the morning peak one year after compared to before project. The changes in reliability for this route could be due to increased traffic volumes around the junction and traffic signal timings.

Figure 17: Journey time reliability A46 E to A45 S (Southbound)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

5. Safety evaluation

Summary

The safety objective for this project was to maintain and, where possible, improve current safety standards.

Most of the expected benefits were related to improvements in journey time and reliability. The improvements made to this section of road was expected to slightly reduce the number of personal injury collisions for the project extent and wider area.

The early indications are that the safety objective is on track to be achieved. The number and rate of personal injury collisions per hundred million vehicle miles were analysed to track a change over time. In the first two years of the project being operational, there has been a reduction in the rate and number of personal injury collisions compared with the annual average for the five years before the project was built.

Initial investigation suggests that there has been a reduction in the number of serious and slight collisions during the first 24 months of operation, compared with the annual average for the five years before the project was built.

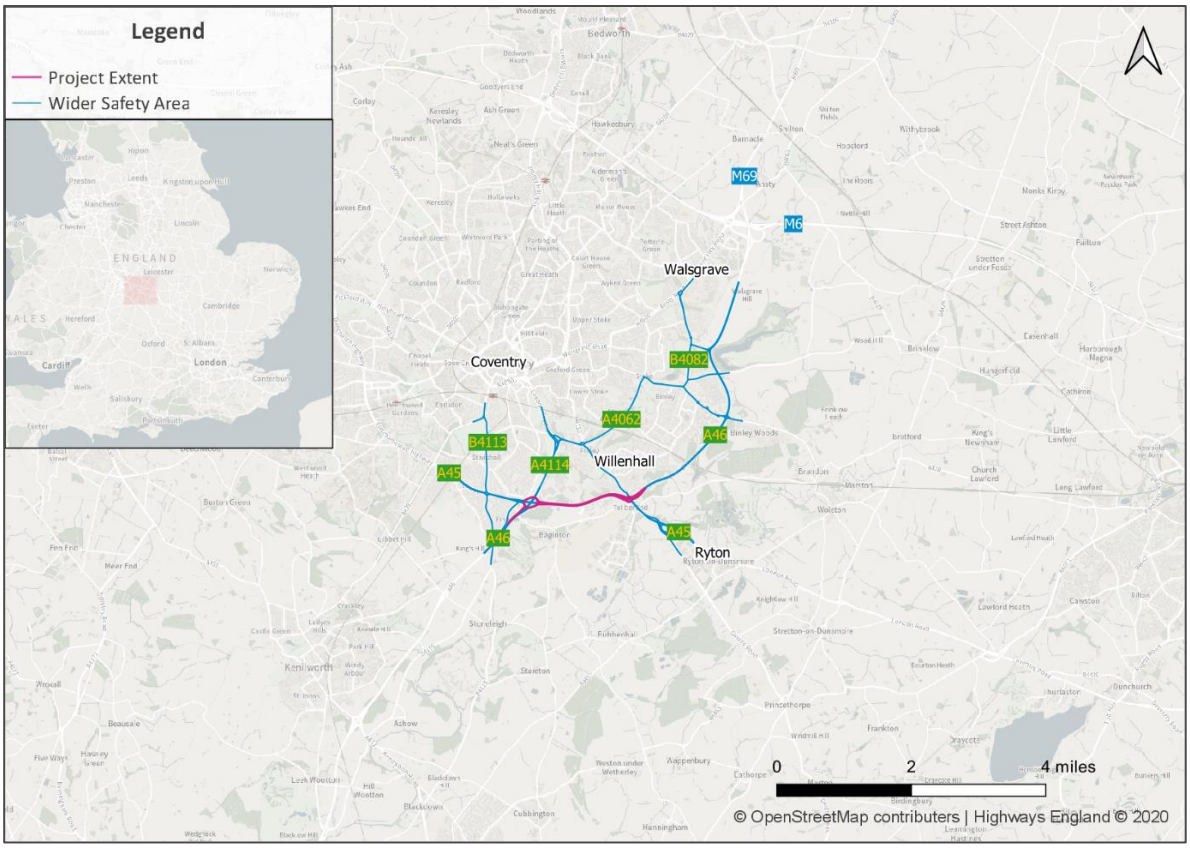
The dualling appears to be having a positive impact on safety in the wider area, there has been a reduction in the rate and number of personal injury collisions compared with the annual average for the five years before the project was built.

The analysis will need to be revisited in later years before we are sure that the change is significant. It will require a longer period to determine if these initial positive findings are a real trend or natural fluctuation.

Safety study area

The safety study area is shown in Figure 18Figure 18: Safety study area**Error! Reference source not found.**. This is a wider area encapsulating both strategic and local roads surrounding the project. This area was assessed in the appraisal supporting the business case for the project. It checks any potential wider implications for the intervention. This information was then used with other predictions around the potential impact of the project, such as by how much traffic may grow. We therefore replicated the appraisal study area to understand the emerging safety trends.

Figure 18: Safety study area



Source: National Highways and OpenStreetMap contributors

What are the emerging safety trends?

Safety data for this evaluation was obtained from Department for Transport Road Safety Data. This records incidents on public roads that were reported to the police. This evaluation considered only collisions that resulted in personal injury.

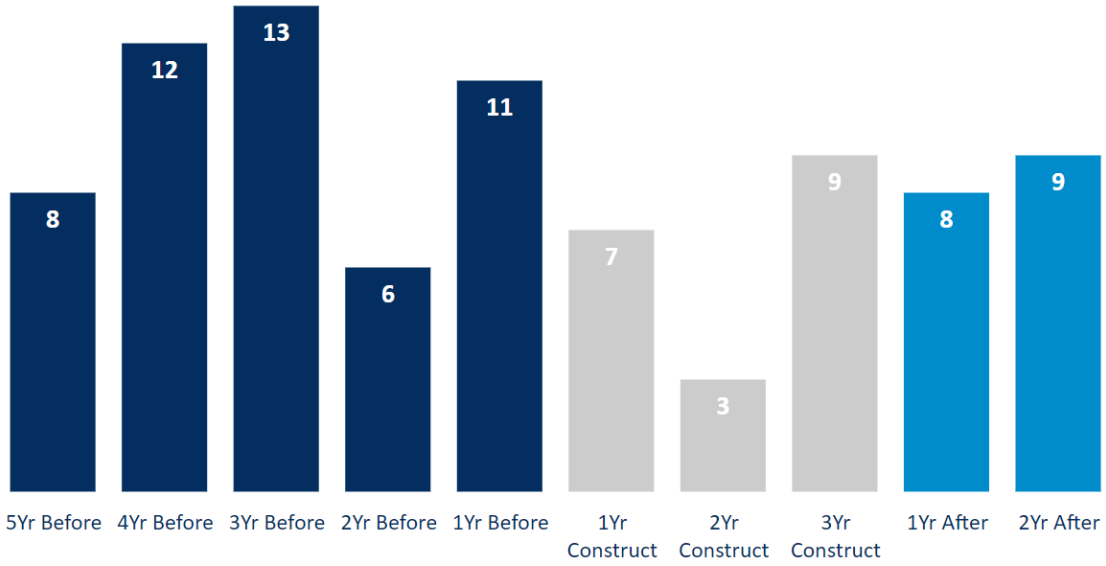
The safety analysis was undertaken to assess changes over time looking at the trends in the five years before the project was constructed to provide an annual average. We then assessed the trends from the first 24 months after the dual carriageway was operational and open for road users. This provided an early indication of the safety trends but will be monitored over a longer period before conclusions about the safety impact of the project are drawn.

The analysis drew on the following data collection periods:

- Pre-construction: 1 October 2008 to 30 September 2013
- Construction: 1 October 2013 to 14 December July 2016
- Post-opening: 15 December 2016 to 14 December 2018

The early indications were that the number of personal injury collisions for the first two years of the project were lower than the period before construction began. The number of personal injury collisions had reduced from an annual average of ten to nine personal injury collisions during the first 24 months of the project being open for road users. Safety trends can vary each year and we will monitor this trend over a longer period before drawing conclusions about the safety impact of the dual carriageway.

Figure 19: Annual average number of personal injury collisions on the project



Source: STATS19: 1st October 2008 to 14th December 2018

As part of the safety evaluation, we look to assess what changes in personal injury collisions might have occurred due to factors external to the project over this period. To do this we estimated the trend in personal injury collisions which might have occurred if the road had not been dualled (this is referred to as a counterfactual). This was based on changes in regional safety trends for conventional roads with a high volume of roads users. This helped us to estimate how the pre-construction safety levels would have changed over the evaluation period if the road had remained a conventional single carriageway.

Previously the counterfactual for projects was based on the national trends averaged across all types of A road. The new method provides information for average conventional A roads and those with higher-than-average traffic levels. It also allows for differentiation between distinct types of projects.

In this case, it was not possible to produce a counterfactual for the project extent as to do so requires a count of at least 15 incidents per year. This was achieved in the wider area but not within the project extent.

How has traffic flow impacted on collision rates?

It is important to contextualise any incidents with the volume of traffic seen on this stretch. To do so a collision rate is calculated: the number of collisions per annual hundred million vehicle miles (hmvm).

Before the project was constructed (based on the five-year pre-construction period), the average collision rate was 33 personal injury collisions per hundred million vehicle miles (an average of one personal injury collision for every 3 million miles travelled). Since the project there has been an average collision rate of 28 personal injury collisions per hundred million vehicle miles (an average of one personal injury collision for every 4 million miles travelled).

If the route had remained a single carriageway, we estimate that the collision rate would be 32 personal injury collisions per hundred million vehicle miles. The initial indications are positive, but safety trends can vary each year and we will monitor

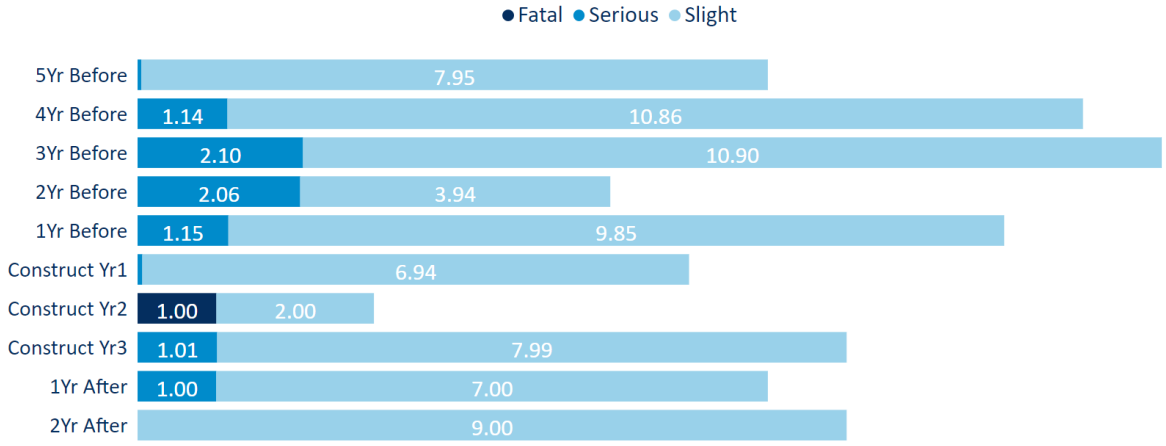
this trend over a longer period before drawing conclusions about the safety impact of the dual carriageway.

What impact did the project have on the severity of collisions?

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. 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[10]. Therefore, the Department for Transport have developed a severity adjustment methodology[11] to enable robust comparisons to be made.

For this evaluation, one reporting mechanism was used prior to conversion and another afterwards. The pre-conversion collision severity has been adjusted, using the Department for Transport's severity adjustment factors, to enable comparability with the post-conversion safety trends.[12]

Figure 20: Personal injury collisions by severity



Source: STATS19: 1st October 2008 to 14th December 2018

Before the project became operational, we observed an annual average of 1.3 serious collisions and 8.69 slight collisions. During the first 24 months of operation, we observed an average of 0.5 serious collisions and 8 slight collisions.

How have safety trends changed across the wider study area?

Changes in personal injury collisions in the wider impact area were analysed. The area was defined in the project's appraisal – where the evidence for the benefits of a project is assessed ahead of a decision to deliver an intervention.

There was a reduction in the average number of personal injury collisions per year in the wider safety area, from 66 per year in the five years before the project to 50

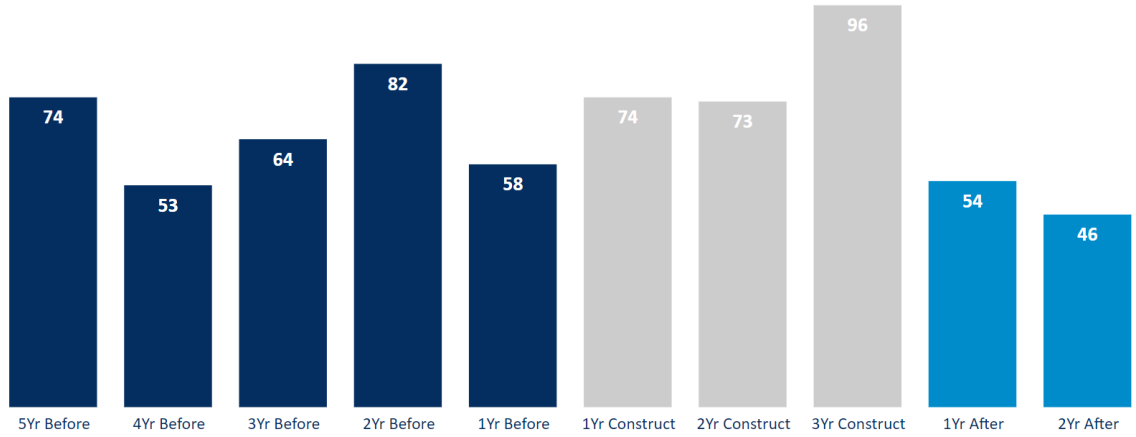
[10] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820588/severity-reporting-methodology-final-report.odt

[11] 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

[12] Collision Severities within this report use the 2020 adjustment factor.

in the first two years after. There were on average 16 fewer personal injury collisions per year in the wider safety area. It was estimated that if the route had remained in its previous configuration the safety trends across the wider area would have remained in the range of 41 to 78 personal injury collisions per year.

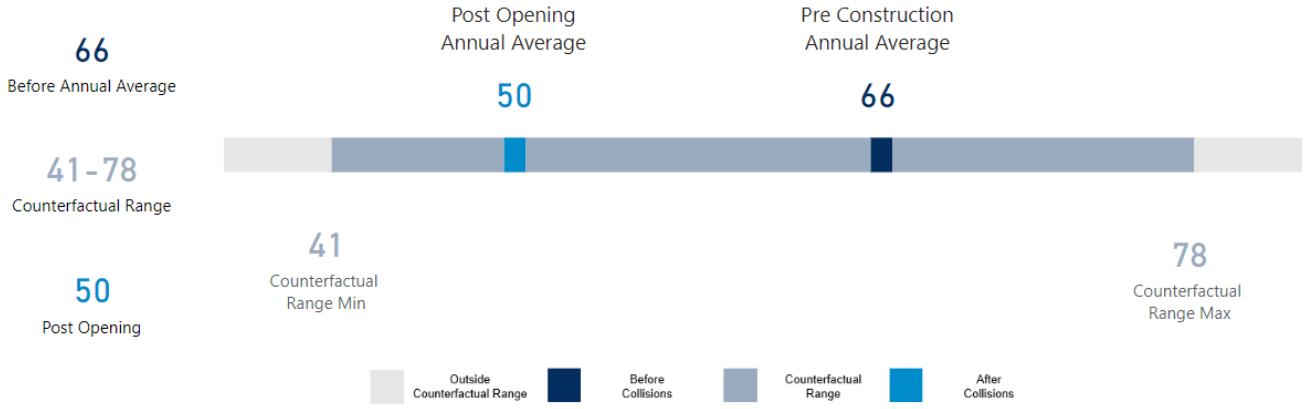
Figure 21: Annual average number of personal injury collisions in the wider study area



Source: STATS19: 1st October 2008 to 14th December 2018

It was estimated that if the route had remained in its previous configuration the safety trends across the wider area would have remained in the range of 41 to 78 personal injury collisions per year.

Figure 22: Counterfactual in wider area



Source: STATS19: 1st October 2008 to 14th December 2018

How had traffic flow impacted collision rates in the wider area?

The average collision rate had decreased to 23 per hundred million vehicle miles – this equates to travelling almost nine million vehicle miles before seeing an incident. Before the project, this figure stood as 32 per hundred million vehicle miles. The decrease was nine personal injury collisions per hundred million vehicle miles.

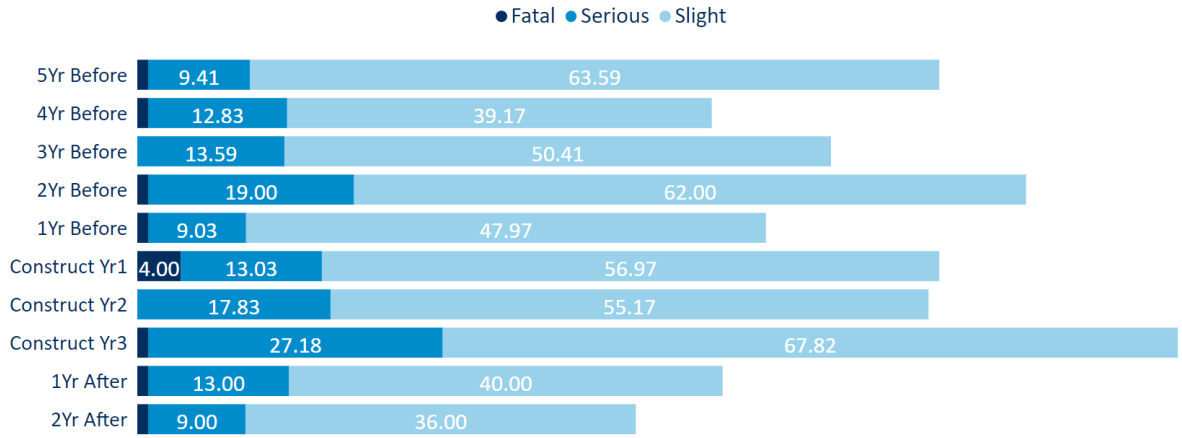
A counterfactual test was undertaken. It found that the collision rate would likely have been 25 collisions per hundred million vehicle miles in the counterfactual period: above that of the first two years after opening the project.

What impact did the project have on the severity of collisions across the wider area?

Before the project became operational, we observed a total of 4 fatal collisions. During the first 24 months of operation, 2 fatal collisions have been observed.

There was an annual average of 12.77 personal injury collisions with a serious casualty before the project during the first 24 months of operation, this has decreased to 11. We observed a reduction in the number of personal injury collisions with slight casualties, before the project there was an average of 52.63, after this had reduced to 38.

Figure 23: Personal injury collisions by severity for the wider area



Source: STATS19: 1st October 2008 to 14th December 2018

How has the project performed compared to expectations?

The project was expected to reduce the number of collisions for the project and wider safety area by 12 collisions, over the projects 60-year lifespan. Initial indications are that the project will outperform these expectations.

Has the project's safety objective been met?

The analysis undertaken indicated that the project is on track to achieve its objective to improve road safety. However, safety trends vary year on year, and we will evaluate again at five-years after once more data is available.

6. Environmental evaluation

The evaluation of environmental impacts of this project used information on the predicted impacts gathered from the environmental appraisal and the environmental assessment report (November 2009). This information was compared with findings observed one-year after the project opened for traffic. Observed impacts were determined during a site visit in October 2018, supported by desktop research. The results of the evaluation were recorded against each of the Transport Analysis Guidance (TAG) environmental sub-objectives (noise, air quality, greenhouse gas emissions, landscape and visual impacts, townscape, biodiversity, water environment: drainage and water quality). In addition to these, TAG social impacts such as physical fitness, journey ambience (quality) and severance were evaluated. These are presented in Table 3 (page 37). The social impacts were evaluated using information contained in both the environmental appraisal and the environmental assessment. The appraisal did not record a predicted outcome and so the environmental assessment outcome of neutral was applied.

Based on the one-year after site visit and information available at the time of writing, the one year after evaluation confirmed that the predicted impacts on physical activity, severance, journey quality were as expected. For impacts on landscape, heritage, biodiversity, and drainage objectives, we considered that, although the impacts were broadly as expected and mitigation was in place, it was too early to say whether the design year outcomes will be met. This is because the evaluation found that there was insufficient evidence available on maintenance and aftercare to be confident that the predicted design year outcomes will be met. We will review the success of mitigation planting and any additional asset data and maintenance information at the next evaluation stage.

For this one-year after evaluation, there was no observed post-opening traffic flow data available for the project extent between the Stivichall Junction and Tollbar End Roundabout, therefore, it was not possible to compare the environmental statement (ES) traffic forecast with observed flows to evaluate any effects the project may have had on local noise, air quality or greenhouse gases.

Noise

The environmental appraisal predicted an overall slight beneficial impact on noise. This was because the project was predicted to lead to major decreases in noise level for properties near to the Tollbar End roundabout due to the new underpass. There would be an increase in noise level at the Stivichall roundabout, but this would be imperceptible. There were no other properties or locations sensitive to noise changes around the project area that were predicted to experience a change of greater than 1dB(A) and no significant impact upon night-time noise levels were expected.

Based on the one-year after site visit, Low Noise Surfacing (LNS) and noise barriers were in place. However, around London Road, what was planned as one noise barrier had a gap which may limit the effectiveness of noise screening for properties at the location.

Figure 24: Noise barriers at London Road showing noise barrier with gap.

Source: Evaluation visit, 4 October 2018

Air quality

The environmental appraisal predicted that in both the with and without project scenarios, there would be exceedances of the EU Limit Value for Nitrogen dioxide[13]. However, it predicted a reduction in the total number of properties likely to exceed the threshold, leading to an overall benefit. An overall net improvement in Nitrogen dioxide and Particulate Matter concentrations was expected with the project in terms of local air quality, while regional emissions for both Nitrogen dioxide and Particulate Matter were expected to be negatively affected.

The Air Quality Annual Status Report[14] published by Coventry City Council states that a city-wide Air Quality Management Area had been in place since 2009. The report indicated that there was a general improvement in nitrogen dioxide levels. However, there were areas of poor air quality near the city centre. Air quality monitoring results for 2019 were available for two locations adjacent to the A45 Tollbar junction. The results showed that nitrogen dioxide levels were well below the EU limit value, which suggested that there were no significant air quality concerns in the vicinity of the project.

Greenhouse gases

To evaluate the greenhouse gas emissions forecast and observed traffic data is required for the appraised study area. At this one-year after stage there was no observed post-opening traffic flow data available within the project extent between Stivichall Interchange and Tollbar junction. As such it was not possible to follow the evaluation methodology and conduct a reliable evaluation of the project's impact on greenhouse gas emissions.

[13] UK air quality standards: https://uk-air.defra.gov.uk/air-pollution/uk-eu-limits
[14] 2018 & 2019 Air Quality Annual Status Report (ASR), November 2019 - https://www.coventry.gov.uk/downloads/file/31847/2018-and-2019-air-quality-annual-status-report-asr-

Landscape

The environmental appraisal reported that the loss of vegetation within the highways estate because of construction would result in local change to adjacent landscape character immediately adjacent to the A45, although within the medium to long term the effects would reduce to neutral. The environmental assessment anticipated adverse visual impacts on residential properties located near the existing highway, including London Road (north and south of the Tollbar End roundabout), Selsey Close and Montgomery Close.

Based on the one year after site visit and information available at the time of the evaluation, landscape impacts were as expected. The proposed mitigations were in place and implemented as expected. The site visit identified some concerns with the establishment of some planting plots with tree plots doing better than the hedgerows. A further examination of the tree plots and hedgerows is needed at five years after to ascertain whether visual impacts on nearby properties and the cumulative effect of third part development will be as expected by the design year. At one year after it was considered too early to say whether the design year outcome will be met.

Townscape

The environmental appraisal reported that the adjacent townscape is ordinary in value and typical of the urban fringe. Despite the increase in scale of the project, the design of the new structures and the new landscaping would help minimise any impacts. The resulting significance of the impact of the project was expected to be neutral.

Our site visit has confirmed that the new grade separated junction and road widening has slightly increased the sense of urbanisation. New mitigation planting was provided which was yet to establish, but it is expected to minimise the impacts of the changes. We considered that, providing maintenance continues the intended outcome will be met by the design year.

Figure 27: The new grade-separated Tollbar End junction at five years after[15]

Source: Evaluation visit 3 October 2018

[15] Web link of Google photo of Tollbar before the project: https://www.google.com/maps/@52.3781511,-

Heritage of historic resources

The environmental appraisal anticipated that historic landscapes would be unaffected, but that there would be slight adverse impacts to the settings of nearby listed buildings. A low value Locally Listed boundary post was expected to be relocated. The appraisal also anticipated a low potential for unrecorded remains to be present. The significance of the impact of the project on historic resources was predicted to be slight adverse.

Based on desktop research and evidence gathered during the evaluation site visit, the evaluation confirmed that, as expected, historic landscapes were unaffected. However, the impact of the project on archaeological resources could not be confirmed at one year after because no information (such as the post-construction report) was available on the outcome of the archaeological watching briefs that were planned to be applied as mitigation during the construction phase. Visual impacts on the settings of one scheduled monument (the Lunt Roman Fort) and one historic building (the Code Green cottage at 665 London Road) were as expected at one year after. The inclusion of a low noise surfaces was likely to have provided some noise mitigation, as predicted. However, there was no observed post-opening traffic flow data available for the project between the Stivichall Junction and Tollbar End Roundabout. Thus, it was not possible at one year after to determine whether the noise mitigation had been realised.

Biodiversity

The appraisal reported that there would be slight adverse impacts on statutory nature conservation sites in and around the Tollbar End junction project (for example Stonebridge Meadows, a Local Nature Reserve, and an ancient dry pond near Tollbar junction) due to widening of the Stonebridge Highway and change at Tollbar. It predicted a neutral effect on amphibians and a slight beneficial effect on hedgerows, watercourses, and semi-improved grassland. All other habitat and species impacts were expected to be neutral or insignificant. The significance of the impact of the project on biodiversity, overall, was expected to be slight adverse in the short-term reducing to neutral by the design year after ecological mitigation.

The evidence gathered as part of the site visit confirmed that the observed impacts were partly as predicted. Species rich grasslands were provided as expected, but they had yet to establish at the time of the one year after evaluation visit. Biodiversity should be re-considered in the future when confirmation of the ongoing habitat management and maintenance commitments, for example for hedges and species-rich grasslands, would be available to inform the evaluation.

The water environment

The environmental appraisal and assessments reported that the existing Tollbar junction did not have adequate drainage facilities to manage routine road runoff. The project design included the provision of new storm water attenuation and treatment facilities and so it was predicted that the project would confer a benefit for future water quality and flood protection. The significance of the impact of the project on the water environment was expected to be slight beneficial.

1.4652569,3a,75y,283.78h,99.29t/data=!3m6!1e1!3m4!1sfx6SKVu9jNmCYn5miUh3vw!2e0!7i13312!8i6656

The evaluation confirmed that the proposed improvements to the drainage system had been implemented broadly as expected, with the new pumping station at Tollbar and pollution control devices observed during the site visit. There were design changes including the replacement of one balancing pond east of Tollbar with a covered water storage tank (bio-retention pond). This change was implemented in response to a request from Coventry airport to reduce the risk of bird strikes. The proposed stormwater wetland near the River Sherbourne, however, was not provided due to asbestos. Although the drainage network is broadly as expected, drainage issues have been reported with the kerb drains on London Road, and these were being investigated. Based on the design changes and the outstanding issues with the kerb drainage we considered that it was too early to say whether the drainage system will deliver the desired design year outcome. This will be reconsidered at five years after.

Figure 28: The pumping station on the south side of Tollbar End junction

Source: Evaluation visit, 4 October 2018

Physical activity

The environmental appraisal predicted that the project would lead to the closure of one footpath across the A45 along with minor changes to the existing footpaths around the Tollbar junction. The changes would cause slightly longer journey times and distances, but none would be longer than 30 minutes. The significance of the impact of the project on physical activity was expected to be insignificant and recorded as not applicable in the AST.

The evaluation confirmed that the impacts of the improvements at Tollbar End roundabout are as anticipated in the environmental assessment. Footpath 443 was closed and there were minor amendments to the length of the footpaths around Tollbar junction. A new footpath was also provided across the River Sowe. The new footpaths were an improvement. Overall, we considered that the changes were unlikely to have had any significant impact on physical activity. The impacts were as expected.

Severance

The environmental appraisal reported that there would be no severance[16] issues resulting from the project. This was because alternative accesses are provided in all cases.

The evaluation site visit confirmed that the proposed improvements to the footpaths and cycleways were implemented broadly as expected. New improved signage was provided along the footpaths, footbridge, and crossings and no significant changes to existing severance were identified. The impact of the project on severance was as expected.

Journey quality[17]

The environmental appraisal predicted that improvements to the road design, signage and reduced congestion would help reduce driver frustration and the fear of accidents. Improvements in the design of the roads at Tollbar End roundabout and associated landscaping would also enhance the immediate environment for all road users. Despite the improvements, the appraisal considered journey quality as not applicable. Thus, no overall appraisal outcome was given, and the predicted outcome was assumed to be neutral.

Based on the one-year after site visit, the road layout was modernised, and signage was improved. Based on this, although there was no traffic and safety data to allow comment on driver stress, the impact of the project on journey quality was likely to be as expected.

Overview

The results of the evaluation are summarised against each of the Transport Appraisal Guidance (TAG)[18] environmental sub-objectives and presented in Table 3.

We report the evaluation as expected if we believe that the observed impacts at one year after were as predicted in the appraisal. We report them as better or worse than expected if we feel the observed impacts were better or worse than expected. Finally, we report impacts as too soon to say if we feel that at one year after there was insufficient evidence to draw firm conclusions.

[16] Severance means where the project causes additional separation of residents from facilities and services they use within their community (TAG A4.1)
[17] Journey ambience is a measure of the experience of travelling. This includes traveller care (for example information and facilities), travellers' views; and traveller stress factors (such as perceptions of safety, congestion, and reliability). Refer to TAG unit A4.1
[18] TAG provides guidance on appraising transport options against the Government's objective for transport.

Table 3: Summary of environmental findings A45 Tollbar

Sub objective	AST score	One year valuation outcome	One year evaluation summary
Noise	Net benefit	Cannot be confirmed	Low Noise Surfacing (LNS) and noise barriers are in place. Around London Road, what was planned as one noise barrier has a gap which may limit the effectives of noise screening. There was no observed post opening traffic flow data available within the project extent for use to conduct a reliable evaluation of the project's impact on noise.
Air Quality	Slight benefit	Cannot be confirmed	Air quality monitoring data for 2019 suggested that there were no air quality issues in the vicinity of the project. There was no observed post opening traffic flow data available within the project extent for us to conduct a reliable evaluation of the project's impact on local air quality.
Greenhouse Gases	Overall reduction in GHGs	Cannot be confirmed	There was no observed post opening traffic flow data available within the project extent for use to conduct a reliable evaluation of the project's impact on greenhouse gas emissions.
Landscape	Neutral	Too early to say	The impacts were as expected. Mitigation was in place. However, it had yet to mature. A further examination of the cumulative visual impact of new third- party development and tree plots and hedges will be needed to ascertain whether visual impacts will be as expected by the design year.
Townscape	Neutral	As expected	The project slightly increased urbanisation, with more cluttering due to the expansion of the Tollbar End junction. Mitigation planting was still to establish but was expected to meet the intended outcome by the design year.
Heritage of historic resource	Slight Adverse	Too early to say	Historic landscapes were unaffected, as expected. However, the impact on archaeological resources could not be confirmed at one-year after because the outcome of construction phase surveys was not available. Visual impacts on the Lunt Roman Fort and on historic buildings were as expected at one-year after.

Sub objective	AST score	One year valuation outcome	One year evaluation summary
Biodiversity	Neutral	Too early to say	The evidence gathered as part of the site visit confirmed that the observed impacts were partly as predicted. Species-rich grasslands had yet to establish. Asset data was incomplete. Biodiversity should be re-considered when biodiversity data on habitat management and maintenance commitments should be available to inform the evaluation.
Water Environment	Slight beneficial	Too early to say	Drainage measures were implemented broadly as expected. But there was an outstanding flooding issue with kerb drains on London Road. Service and monitoring information is needed to confirm the evaluation findings.
Physical activity	Neutral	As expected	The impacts of the improvements at Tollbar Roundabout were as anticipated in the environmental assessment. The closure of footpath 443 had an insignificant increase on physical activity as expected and this was balanced by new footpath over River Sowe.
Severance	Neutral	As expected	The proposed improvements to the footpaths and cycleways were implemented broadly as expected. New improved signage was provided and no significant changes to existing severance was identified.
Journey quality	Neutral	As expected	The project modernised the road layout and improved signage.

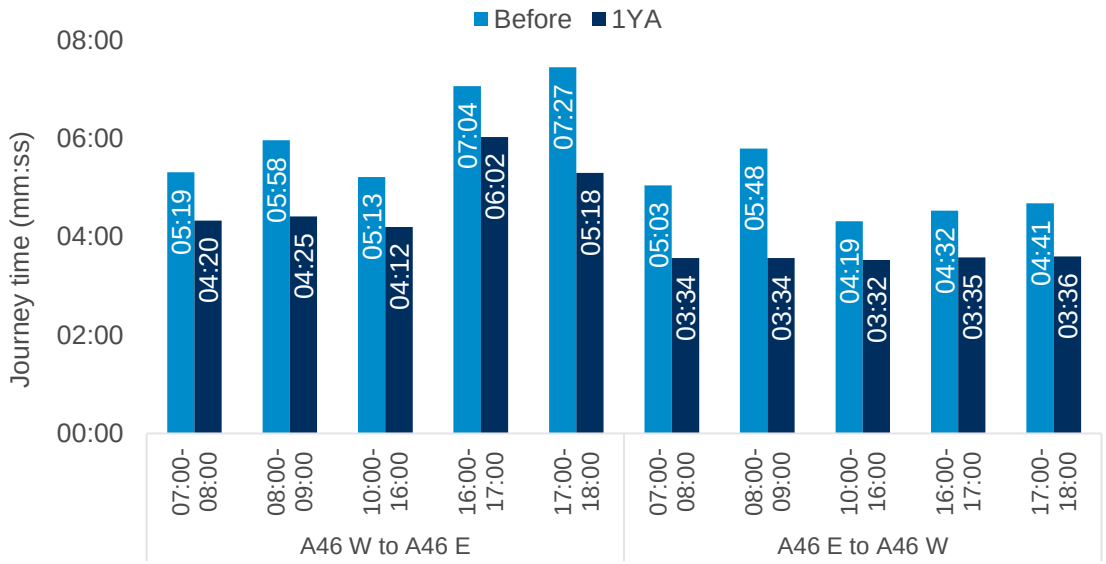
Source: adapted from one year evaluation visit and appraisals

Annex A1: Average journey time analysis (additional routes)

The average journey time analysis of those additional journey time routes is shown in Figures 29 to 31

Figure 259: Average observed journey times before and one year after project opening (mm:ss)

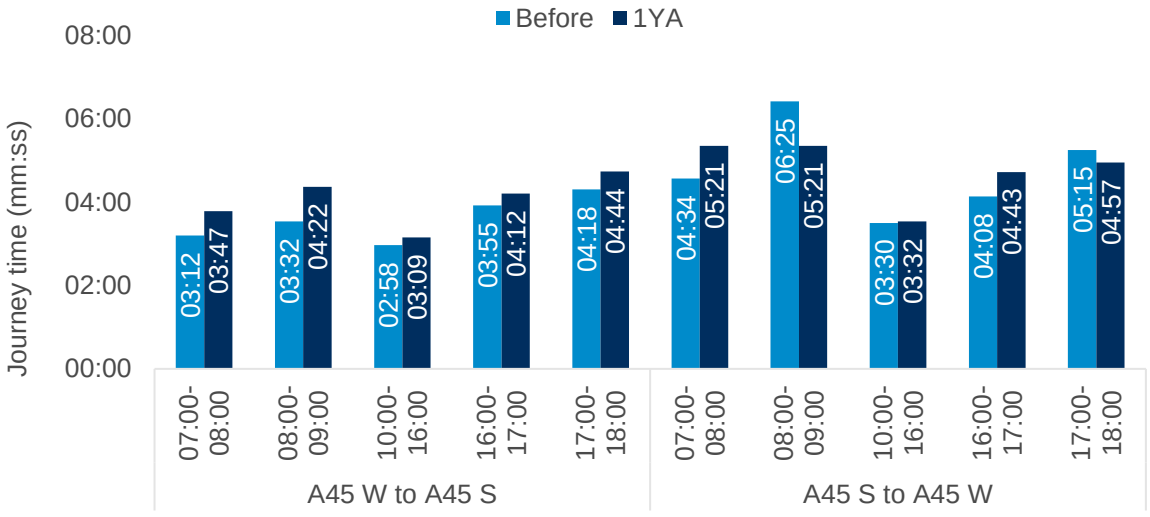
A46 Coventry Eastern Bypass (A46 E) – A46 Kenilworth Bypass (A46 W)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

Figure 26: Average observed journey times before and one year after project opening (mm:ss)

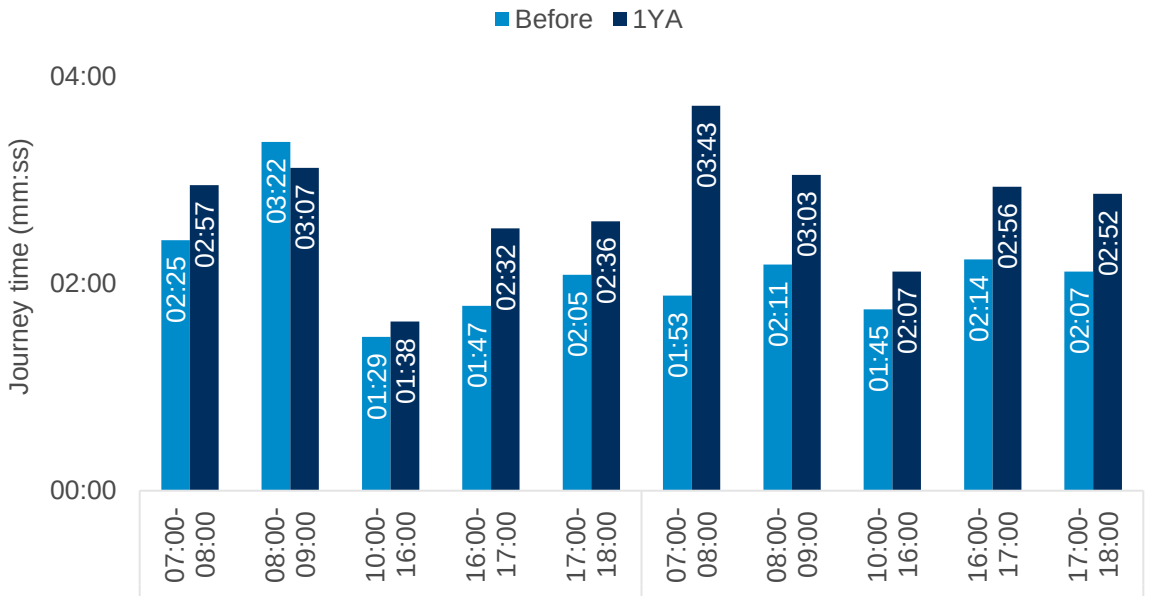
A45 Stonebridge Highway (A45 W) - A45 London Road (A45 S)



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

Figure 27: Average observed journey times before and one year after project opening (mm:ss)

B4110 London Road (B4110 N) - A45 London Road (A45 S)



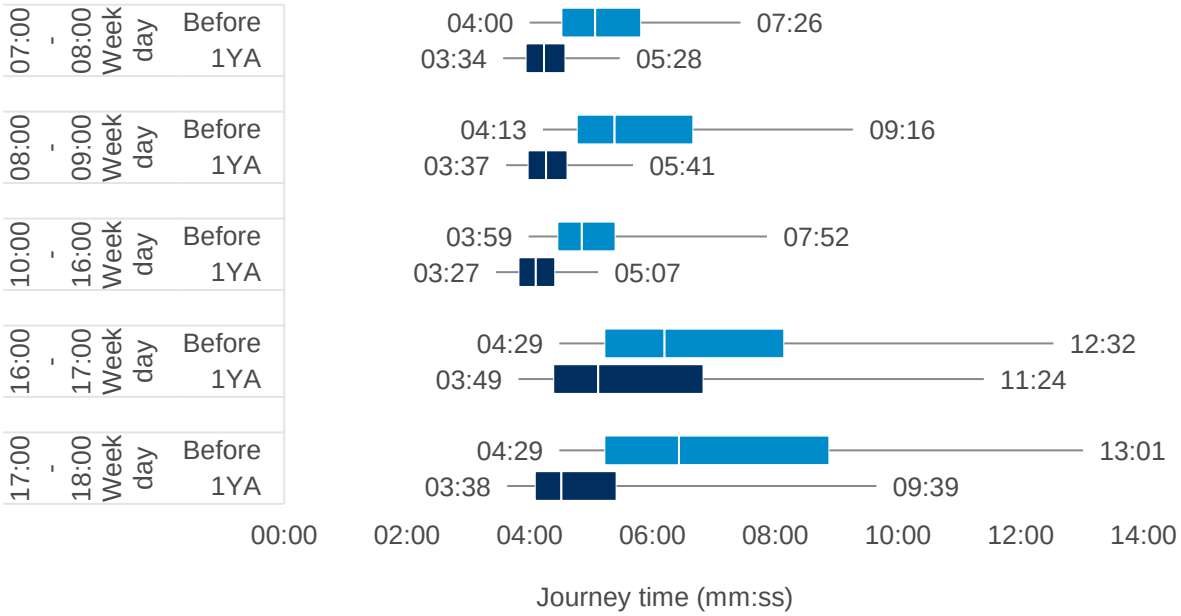
ource: TomTom (October 2012 – November 2013, April 2018- March 2019)

Annex A2: Journey time reliability analysis (additional routes)

The journey time reliability analysis of those additional journey time routes presented in Figure 8 but not covered in the main report are shown in Figure 28 to Figure 32Figure

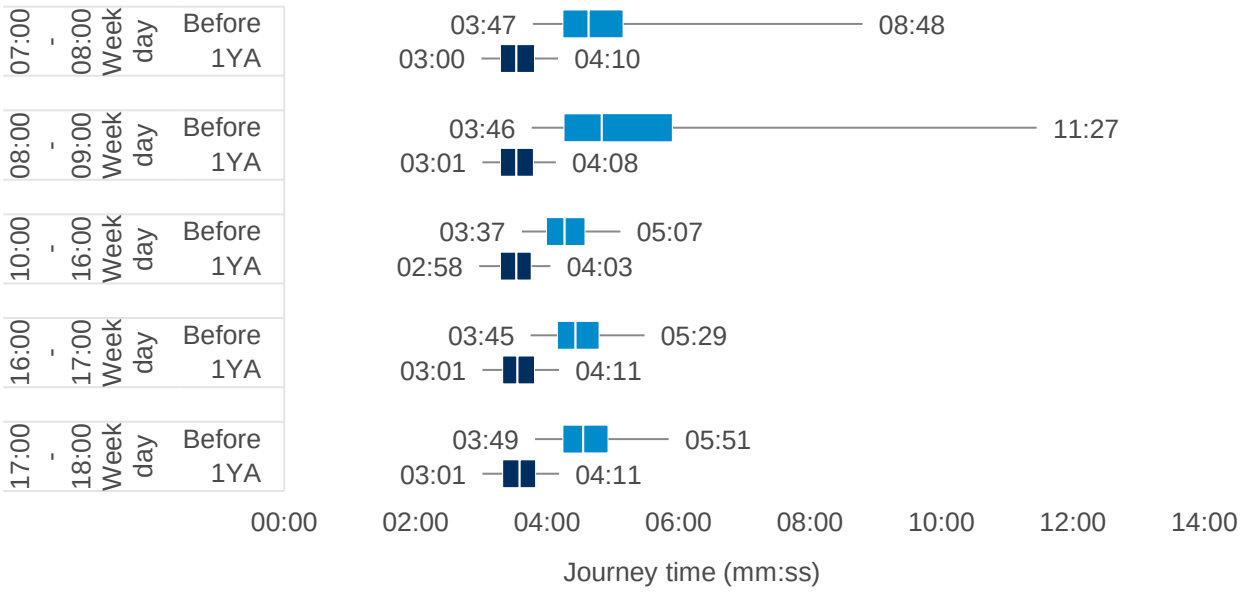
A46 Kenilworth Bypass (A46 W) - A46 Coventry Eastern Bypass (A46 E)

Figure 28: A46 W to A46 E journey time reliability



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

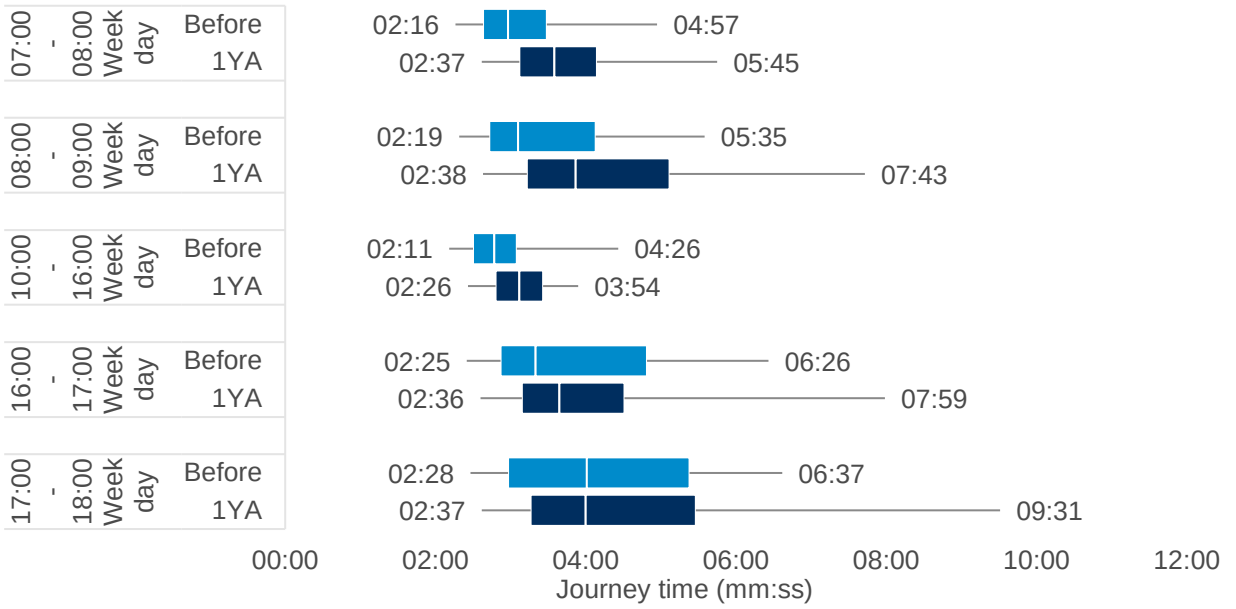
Figure 293: A46 E to A46 W journey time reliability



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

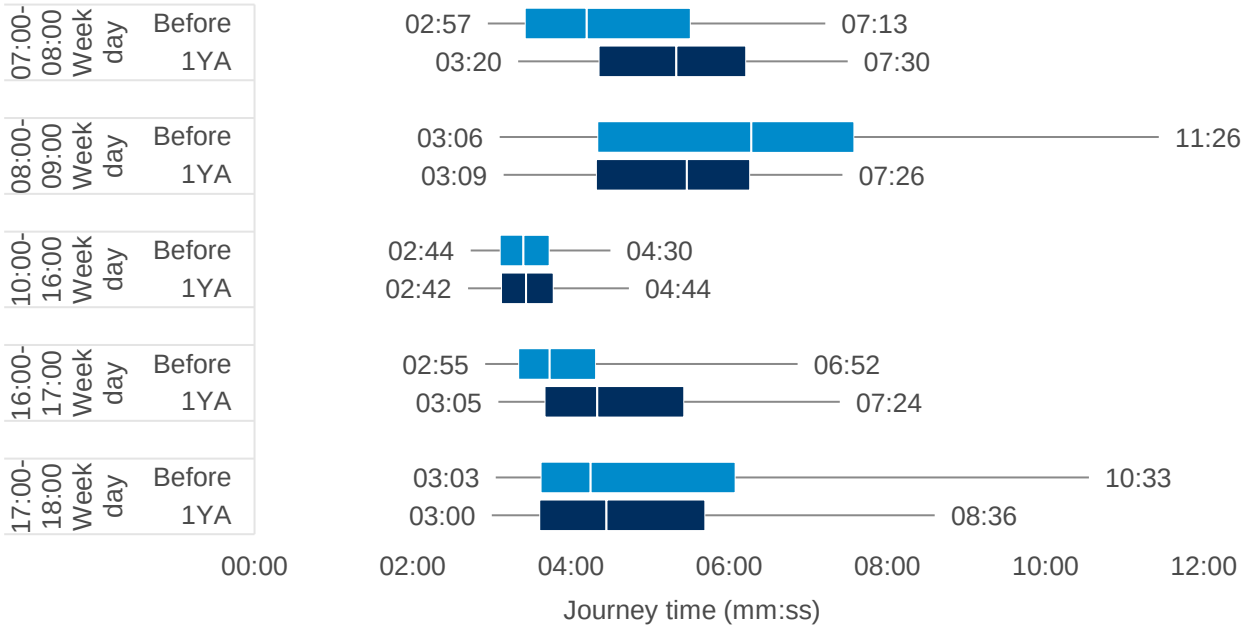
A45 Stonebridge Highway (A45 W) – to A45 London Road (A45 S)

Figure 30: A45 W to A45 S journey time reliability



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

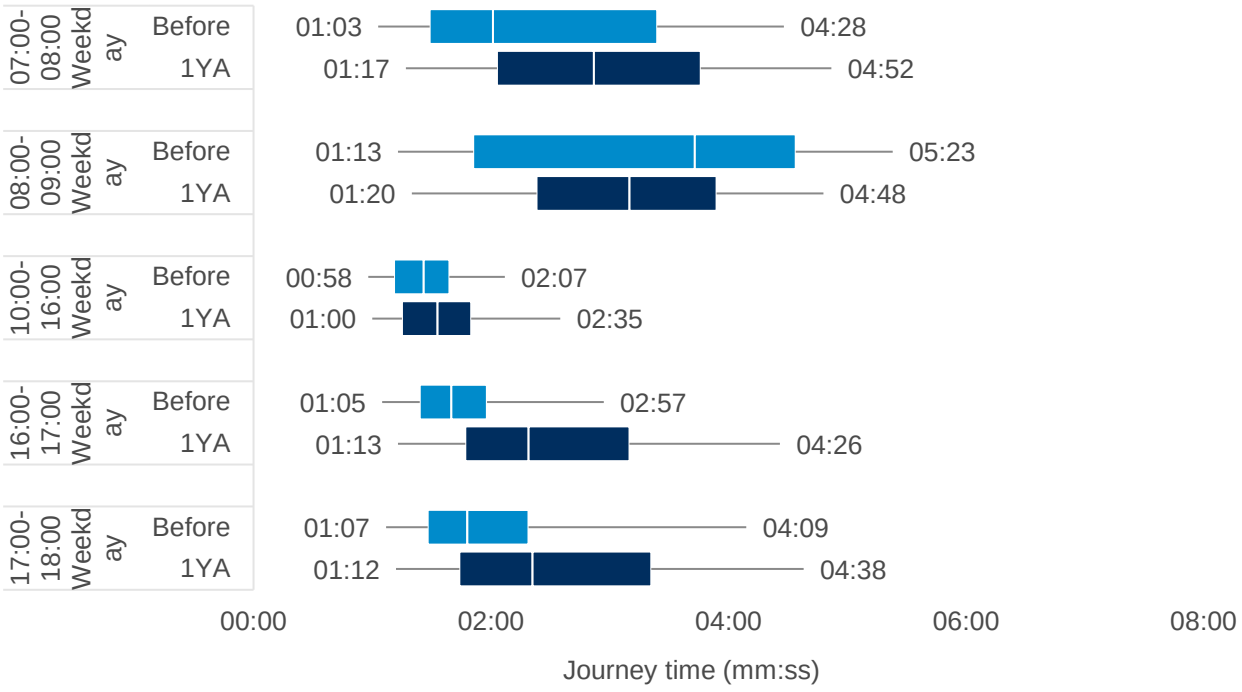
Figure 31: A45 S to A45 W journey time reliability



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

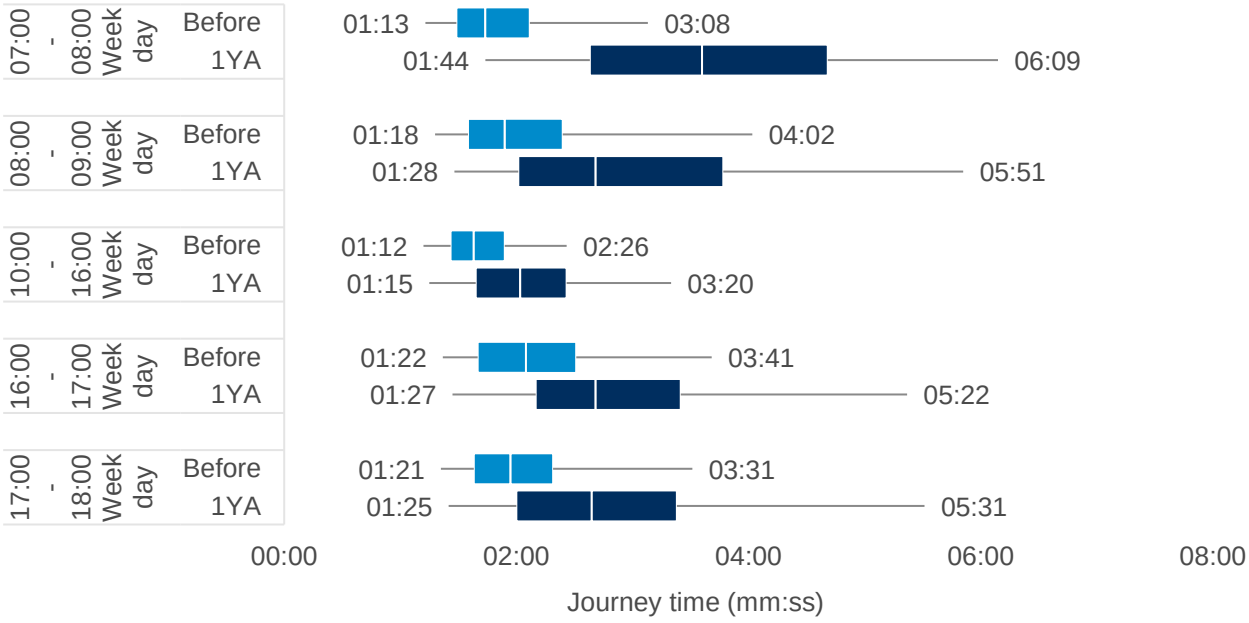
A45 London Road (A45 S) – B4110 London Road (B4110 N)

Figure 32: A45 S to B4110 N journey time reliability



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

Figure 33: B4110 N to A45 S journey time reliability



Source: TomTom (October 2012 – November 2013, April 2018- March 2019)

Annex B: Safety methodology

Since 2012, many police forces have changed the way they collect STATS19 data (for more information see here). 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 do not. 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, Department for Transport (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.

Unadjusted collision severities

The project extent is covered by West Midlands Police constabulary who transferred from Stats19 to CRASH in November 2015.

Figure 34 and Figure 39**Error! Reference source not found.** shows the unadjusted collision severities on the project extent and the wider safety area:

Figure 34: Project extent

Observation Year	Fatal	Serious	Slight
3Yr Before		2	11
2Yr Before		2	4
1Yr Before		1	10
1Yr Construct			7
2Yr Construct	1		2
3Yr Construct		1	8
1Yr After		1	7
2Yr After			9

Figure 39: Wider Safety Area

Observation Year	Fatal	Serious	Slight
5Yr Before	1	8	65
4Yr Before	1	12	40
3Yr Before		13	51
2Yr Before	1	17	64
1Yr Before	1	8	49
1Yr Construct	4	12	58
2Yr Construct		17	56
3Yr Construct	1	27	68
1Yr After	1	13	40
2Yr After	1	9	36

Source: STATS19: 1st October 2008 to 14th December 2018

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