

M1 junction 45 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 M1 junction 45 capacity enhancements project was officially opened during this period, in March 2018.

Before the M1 junction 45 improvements there was considerable congestion, and concerns were raised locally that this could restrict the opportunities for economic development in the area. Following the improvements, most road users have seen some improvement in journey times and reliability.

Department for Transport Road Safety Data shows a reduction in recorded incidents. However, a longer period will be required to determine if the initial positive findings are a real trend.

Scoping for the project did not anticipate any negative impacts on the environment and this has proved to be the case. However, a site visit flagged some concerns about new shrub, tree planting and grassland thriving less than hoped. We have looked at the after care and ongoing maintenance needed to improve this and we remain confident that these issues will be effectively resolved.

The project has also delivered benefits for walkers and cyclists with the introduction of a new cycleway footpath connecting to existing paths along Pontefract Lane offering a safer route up to the junction. We expect these measures to not only improve accessibility but also create a stronger bond between our network and the communities it serves.

Elliot Shaw

Chief Customer and Strategy Officer
December 2023

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1. Executive summary

The M1 junction 45 is located to the southeast of Leeds City Centre within the Aire Valley development area¹ of West Yorkshire. The junction itself is a four-arm roundabout and forms the interchange between the M1, the A63 Pontefract Lane to the north and Lakeside Way to the south.

The project opened in March 2018 and aimed to provide additional junction capacity to assist the development proposals in the Aire Valley area, whilst also improving journey times and journey time reliability through the junction, due to the provision of additional capacity.

Improvements included widening of the northbound on slip and upgrading the merge with the M1. Widening of the southbound off slip. The A63 Pontefract Lane approach and the circulatory carriageway were also widened. The signals at the junction were upgraded as part of the scheme.

In relation to non-motorised users, the upgraded traffic signals include toucan crossing facilities. The project provided a new footway/cycleway in addition to the replacement of the existing parapets on Pontefract Lane.

The evaluation observed traffic growth around the project, this is due to the developments in the Aire Valley area as well as the project potentially making the junction a more attractive route. Our analysis shows that the forecast traffic flows used in the appraisal were generally accurate.

There was little change in customer journey times and reliability. The M1 northbound off slip to A63 Pontefract Lane, and A63 Pontefract Lane to M1 northbound routes saw journey times improve by up to 11 seconds. For other movements journeys times become marginally longer by up to 24 seconds. This is likely due to the additional stop line on the circulatory at Lakeside Way (Skelton Lake service station), which was not part of this project. Without these extra signals it is believed that journey times and reliability would be similar or better than before project levels despite the traffic growth observed at the junction. Overall, the findings are that the net impact can be considered neutral over a year, though the throughput of traffic has increased.

Early indications show that only one personal injury collision occurred during the first year of opening. 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 project.

We found the project's environmental impacts at one-year after were neutral as expected by the assessment. Our site visit found some examples of new shrub and tree planting and amenity grassland in poor condition, but with appropriate maintenance during the aftercare period these should be resolved. The new cycleway footpath that links to the existing paths along Pontefract Lane now provide a safer route up to the junction. Combined with the new toucan crossings at the junction this should improve access to the countryside beyond. We considered that the measures would help encourage greater use.

A proportionate appraisal was completed for this project, in line with the approach to small scale enhancements at the time. This impacted on the scope of the

¹ Aire Valley Leeds Area Action Plan Adoption

evaluation. We restricted our analysis to data on personal injury collisions on the mainline, slip roads and gyratory roads and not the wider area. The environmental appraisal considered there would not be any environmental impacts applicable to the decision to invest in the project.

Since the appraisal was undertaken new guidance for small scheme appraisal was launched in 2019 and since updated in 2022².

² <https://www.gov.uk/government/publications/levelling-up-fund-round-2-small-scheme-appraisal-toolkit-user-guide/small-scheme-appraisal-toolkit-user-guide>

2. Introduction

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

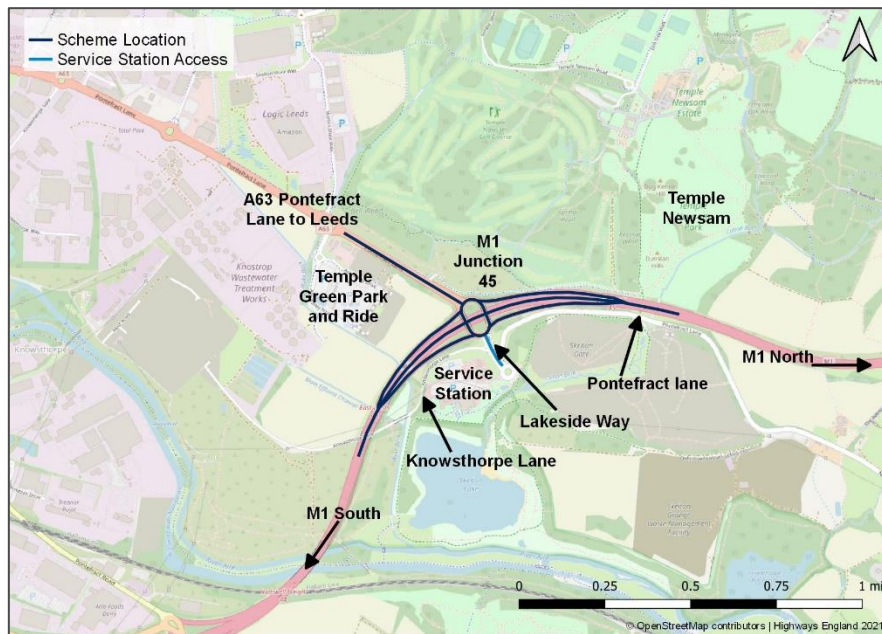
The M1 junction 45 is located to the south east of Leeds City Centre within the Aire Valley development area³ of West Yorkshire.

The junction itself forms the interchange between the M1, the A63 Pontefract Lane to the north and Lakeside Way (leading to Knowsthorpe Lane and Pontefract Lane) to the south. The A63 Pontefract Lane (which opened in February 2009) is a main route into and out of Leeds City Centre and provides access points to the Aire Valley development area.

The M1 junction 45 is situated in a semi-rural location with Temple Newsam Park to the north, and agricultural fields and a landfill site to the south. The recently constructed service station is also located to the south of the junction. The Temple Green Park and Ride side which opened in June 2017 is located to the north west of the junction.

The geographical context of the project is shown in Figure 1.

Figure 1: M1 junction 45 location



Source: National Highways and OpenStreetMap contributors

The project was designed to provide additional junction capacity to assist the development proposals in the Aire Valley area, and improvements to journey times and journey time reliability through provision of additional capacity.

We were aware that there were several proposed or recently constructed large developments in the vicinity of the junction. Skelton Lake service station to the south of the roundabout on Lakeside Way began construction after the junction 45 project was completed. It opened in March 2020 and a site visit in 2019 showed that the access roads into the service station were built but the development was still in construction. Temple Green Park and Ride (for trips to and from Leeds), located to the north-west of the junction, opened to traffic in June 2017 and is likely

³ Aire Valley Leeds Area Action Plan Adoption

to add further traffic demand to junction 45. It is noted that the improvements to the Lakeside Way arm of the roundabout leading to the service station were not part of this project⁴.

The M1 junction 45 project comprised of the following elements:

- The widening of the northbound on slip from one to two lanes and provision of a ghost island where it merges with the M1 motorway.
- The widening of the southbound off slip from two to three lanes at the roundabout junction with A63 Pontefract Lane
- The widening of the start of the southbound on slip from one to two lanes
- The widening of the A63 Pontefract Lane approach to junction 45 from two to three lanes
- The widening of the circulatory carriageway from two to three lanes
- The provision of a new footway/cycleway together with the replacement of the existing parapets on Pontefract Lane East and West Bridges
- Provision of new traffic signals with toucan pedestrian and cycle crossing facilities on the existing roundabout junction
- Construction of two new super-span sign gantries on the M1 motorway
- Removal of two existing single span gantries on the M1 motorway
- Works were also undertaken to strengthen the western end of the Temple Newsam underpass to support the widening of the northbound on slip.

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, provide opportunities to learn and improve future project appraisals and business cases. And are important for providing transparency and accountability for public expenditure, by assessing whether projects are on track to deliver value for money as part of the final evaluation.

A post-opening project evaluation compares changes in safety, journey times and journey reliability, and environmental impacts, 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 methodology note⁵.

⁴ There was a small element of developer funded work as part of the junction 45 improvement project to widen the circulatory for the motorway service area. As it wouldn't have been required without the service area, it was funded by the developer. This work was minimal, so we haven't attempted to isolate it from the rest of the junction improvements.

⁵ <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 additional junction capacity to assist in delivering the development proposals in the Aire Valley	Additional capacity provided through widening which is likely to support development. However, it is not possible to isolate the project impacts from other changes at the location.
Improve journey times and journey time reliability through the provision of additional traffic capacity	<p>There has been a slight benefit in journey times and reliability for customers travelling on the M1 northbound off slip to A63 Pontefract Lane, and A63 Pontefract Lane to M1 northbound. However, for other movements journeys times and reliability have marginally worsened.</p> <p>This disbenefit is most likely due to the additional signals that customers now need to pass through due to the new service station on Lakeside Way which was not part of the project. Without these extra signals it is realistic to believe that journey times and reliability would be similar or better than before project levels despite the traffic growth observed at the junction.</p>

4. Customer journeys

Summary

During the first year of project opening, we have seen an increase in traffic at M1 junction 45, as well as locally and regionally. The largest increase in traffic flows at the junction can be seen on the A63 Pontefract Lane approach, with an increase of 38% for traffic travelling to the M1 southbound, whilst other movements at the junction have grown in line with background traffic levels.

Traffic flows are tidal at the M1 junction 45, with the off slips experiencing the highest flow in the morning peak as traffic travels towards Leeds City Centre. The A63 Pontefract Lane approach then experiences high volumes of traffic in the evening peak as vehicles travel from Leeds City Centre to the M1. The overall profile across the day has remained the same between before the project was constructed and at one year after.

Our evaluation shows that the forecast traffic flows used in the appraisal were generally accurate. However, the forecast for the M1 northbound off slip to the A63 Pontefract Lane is 28% lower than expected in the morning peak.

Overall, the journey times for the left turn movements had improved slightly, by up to 11 seconds in the evening peak. Journey times for right turning traffic had increased, particularly in the morning peak from M1 southbound off slip to the A63 Pontefract which showed a worsening of 24 seconds.

The analysis of journey time reliability showed a slight benefit for customers turning left and a disbenefit for the customers turning right. This is most likely due to the additional signals that right turners now need to pass through due to the new service station on the Lakeside Way arm of the junction (this was not included in the forecasts used in this evaluation). Without these extra signals it is realistic to believe that journey times and reliability would be similar or better than before project levels despite the traffic growth observed at the junction.

How have traffic levels changed?

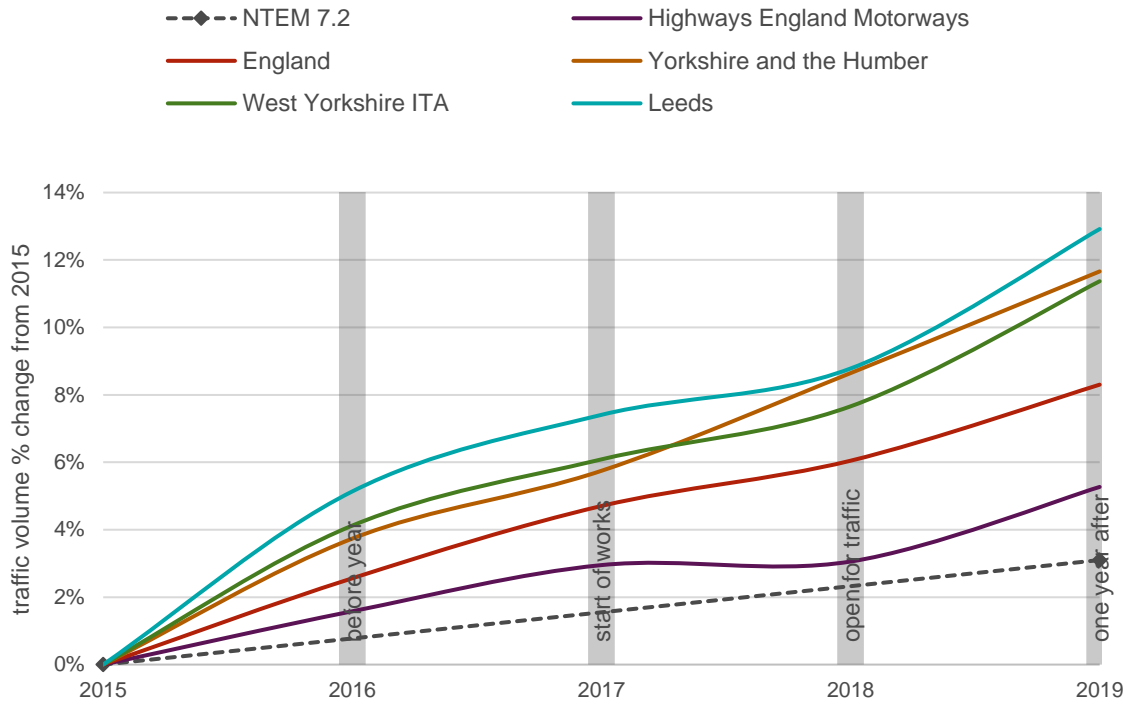
The following sections will examine if the traffic levels changed over the evaluation period and to what extent the forecast traffic levels were realised.

National and regional

To assess the impact of the project on traffic levels, it is useful to understand the changes within the context of national and regional traffic. 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 2015, which represents the project model base year, and 2018, which is one year after the project opened.

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 (Yorkshire and the Humber and West Yorkshire ITA), and locally (Leeds) between 2015 and 2019. Traffic levels has risen more quickly since the project opened in 2018, particularly in West Yorkshire and Leeds. Between 2016 (before project period) and 2019 (the one year after project period) we can see growth in the order of 7% for Leeds and West Yorkshire ITA, and 8% for Yorkshire and Humber. It is therefore likely that any increases observed on the project extent, up to this magnitude can be considered the result of background traffic growth rather than the project.

England and National Highways motorways traffic growth has been marginally lower at 6% and 4%. This shows that the increases locally and regionally are slightly higher than on a national level.

The appraisal of this project assumed that there would be some national growth and used NTEM⁶ to estimate this. The NTEM line as illustrated in Figure 2 represents the national growth forecast at the time of the model base year (in 2015), it gives a view of the anticipated growth on a national level from 2015 onwards. The model may have underestimated the growth.

Project locality

There has been an increase in traffic at the junction as shown in Figure 3. The M1 southbound off slip to the A63 Pontefract Lane has the highest flow using junction 45 following the project opening. This is the case both before the project and at one year after. This movement has increased by 8% (700 vehicles) which is slightly higher than the overall background traffic growth in Leeds. The additional traffic at

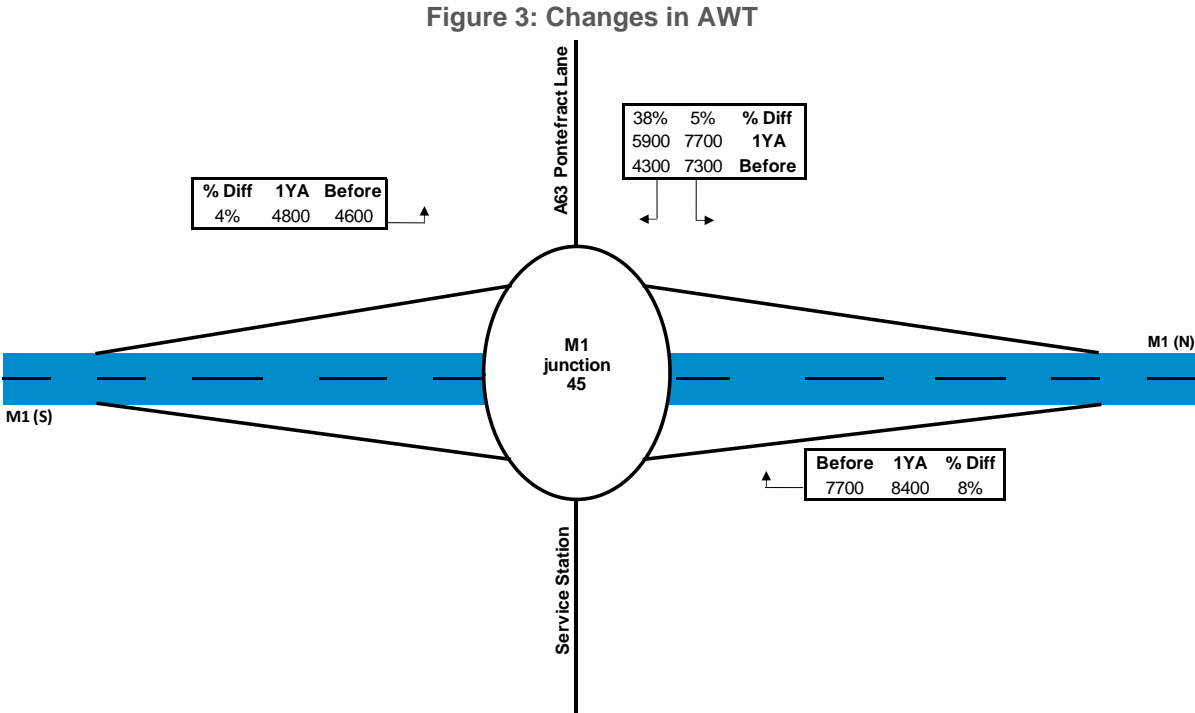
⁶ NTEM – National Trip End Model, owned by the Department for Transport and used to inform the traffic modelling that supports our project appraisal.

this location is to be expected given the developments in the Aire Valley along the A63, including Temple Green Park and Ride which opened in 2017.

The M1 northbound off slip experienced a slight increase of 4% (200 vehicles) which is less than background traffic growth. There were no improvements on the northbound off slip therefore we may not expect to see a significant increase at this location. Furthermore, online journey planning websites show that junction 43 is a quicker route into Leeds City Centre than junction 45 if travelling from the south.

From the A63 Pontefract Lane, 57% of traffic at one year after turns left onto the M1 heading northbound in comparison to 63% before the project. Despite the left turn being the dominant movement on this arm, the right turn to the M1 southbound shows the highest percentage increase between before and one year after across the whole junction. Right turning traffic from the A63 has increased by 38% from 4,300 to 5,900, which is higher than the local and regional trends.

Left turning traffic towards the M1 northbound has increased by 5% (400 vehicles). This approach to junction 45 has been widened from 2 lanes to 3 lanes and is now likely to be a more attractive route with less delays from Leeds City Centre, particularly in the evening peak. The increase in traffic on this arm is also likely to be a result of the additional developments in the Aire Valley along the A63 including the park and ride site, for which traffic would use junction 45 to access the M1.

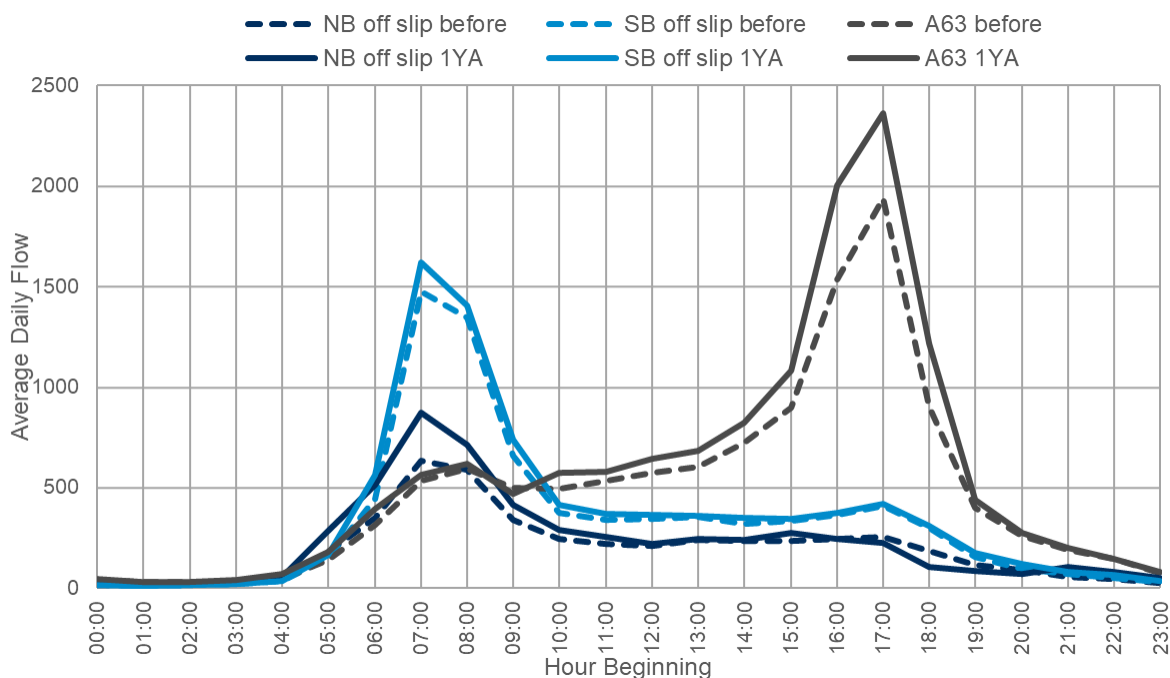


Source: WebTRIS and Leeds City Council, 2016 (before) and 2019 (one year after)

How are traffic flows distributed across the day?

We have analysed WebTRIS traffic flows across a typical weekday to determine whether traffic growth has occurred uniformly or at certain times of day. Figure 4 shows the daily profile of traffic flows on each approach to junction 45 both before the project and at one year after.

Figure 4: Daily flow profile comparison



Source: WebTRIS and Leeds City Council, 2016 (before) and 2019 (one year after)

We found that the overall profile across the day has remained the same, from before the project was constructed and at one year after. The peak periods for the northbound and southbound off slips are in the morning peak between with the highest traffic flow between 07:00 and 08:00. At one year after the morning peak flow reaches approximately 1,600 on the southbound off slip and 900 on the northbound off slip. The morning peak flows on the off slips decline sharply after around 09:00 with the traffic volumes remaining consistent until 18:00 with no real evening peak period.

On the A63 Pontefract Lane approach to junction 45, the highest flows are seen in the evening peak with 2,400 vehicles at one year after between 17:00 and 18:00. On this approach the traffic volumes increase steadily throughout the day before starting to rise rapidly at 15:00 before the evening peak period.

Overall, the traffic flows are tidal at the M1 junction 45, with the off slips experiencing the highest flow in the morning peak as traffic travels towards Leeds City Centre. The A63 Pontefract Lane approach then experiences high volumes of traffic in the evening peak as vehicles travel from Leeds City Centre to the M1.

Was traffic growth as expected?

We found that the observed flows are as or above that expected as shown in Figure 5 and Figure 6⁷.

⁷ The Traffic Economic Appraisal Report presents the forecast traffic flows in 2020 and 2036 for 08:00-09:00 and 17:00-18:00. We have compared the 2020 forecast traffic flows against the 2019 one year after flows. Although there is a slight discrepancy between the years being compared, the 2019 traffic flows are based on September data which is nearing 2020. Furthermore, due to the impacts of the COVID-19 pandemic on traffic flows, it would be inappropriate to use data from 2020. Although January and February 2020 were prior to the pandemic, these months are non-neutral and therefore have not been used.

It is noted that the forecast traffic flows associated with the service station on the Lakeside Way arm have not been included in the comparison. These were very low in the 2020 forecast, with 17 exiting and 10 entering the arm in the morning peak, and 17 exiting and 11 entering in the evening peak.

Figure 5: Traffic forecasting accuracy – morning peak (08:00 – 09:00 hours)

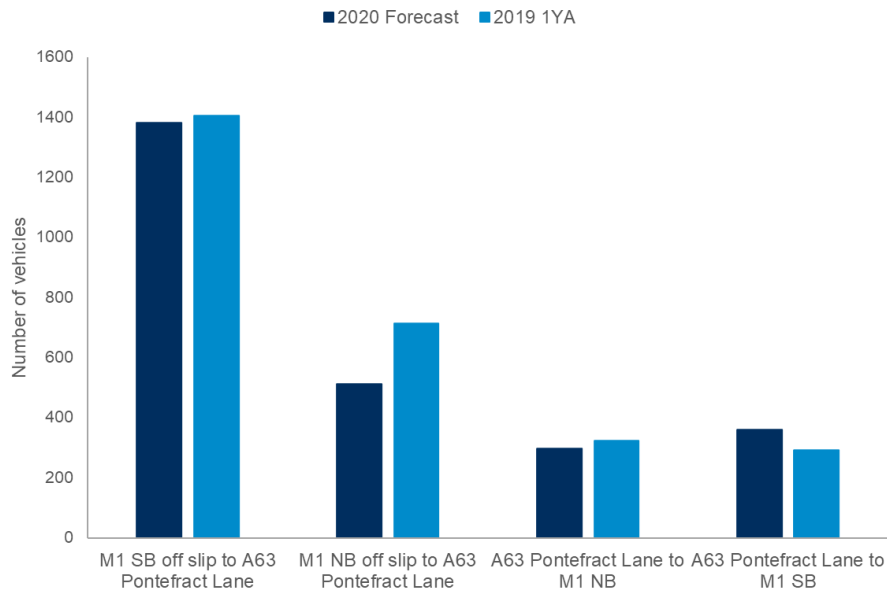
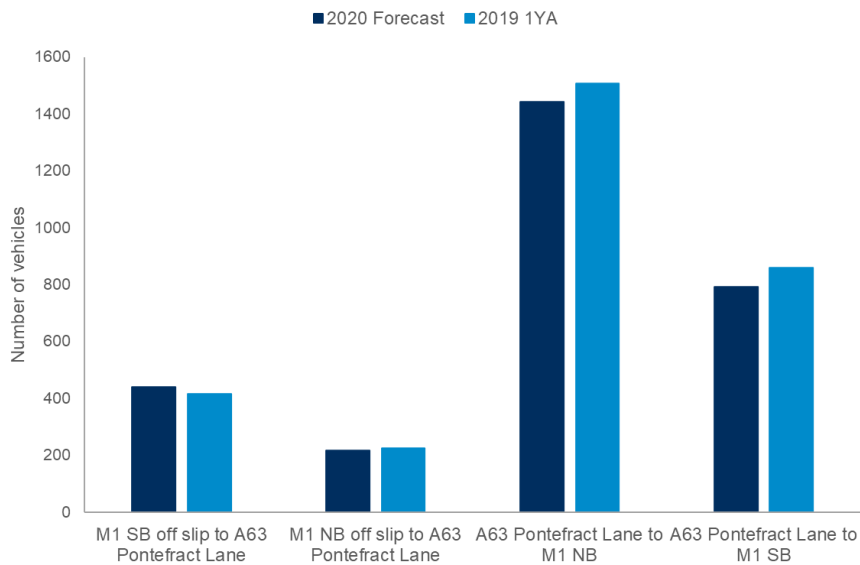


Figure 6: Traffic forecasting accuracy – evening peak (17:00 – 18:00 hours)



Relieving congestion and making journeys more reliable

In this section we consider the impact of the project on journey times, particularly as reducing congestion was a key aim of the project. The analysis compares the journey times before and after the project opened to understand whether the project has improved journey times and journey time reliability for vehicles.

Did the project deliver journey time savings?

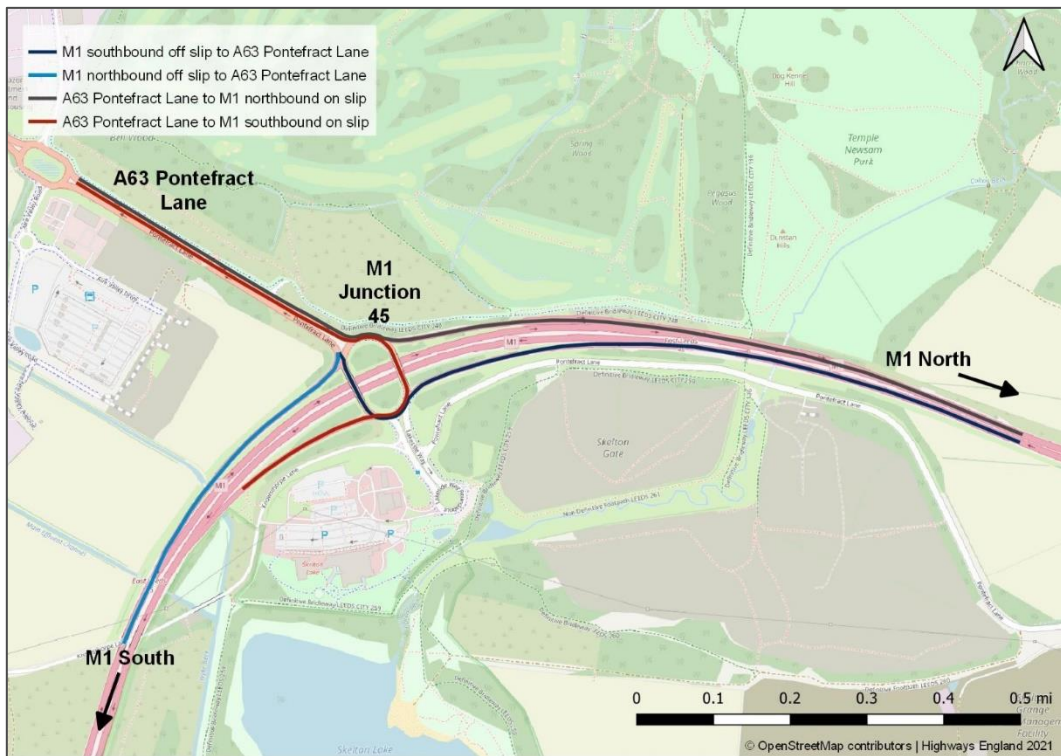
To understand whether the project has resulted in average journey time savings, we have used TomTom GPS data.

Routes have been selected to capture the key movements at the junction as follows:

- M1 southbound off slip to A63 Pontefract Lane
- M1 northbound off slip to A63 Pontefract Lane
- A63 Pontefract Lane to M1 northbound on slip
- A63 Pontefract Lane to M1 southbound on slip

The extents of these routes are shown in Figure 7 which we have designed to encompass all elements of the project. The routes going to the A63 Pontefract Lane exit have been chosen so that the journey times are less likely to be impacted by delays from the downstream roundabout. On the M1, the route has been extended to capture the impacts of the upgraded merge on at the northbound on slip as part of the project. The route from the M1 southbound off slip to A63 Pontefract Lane has also been extended to the mainline to capture any delays caused by potential blocking back from the off slip.

Figure 7: Journey time routes



Source: National Highways and OpenStreetMap contributors

Journey times for a neutral month, September 2016, have been compared to the same period in 2019 (one year after). We have used the same time periods that were used in the project appraisal, namely⁸:

- Morning peak (Weekday average hour, 07:00-10:00)
- Inter peak (Weekday average hour, 10:00-16:00)
- Evening peak (Weekday average hour, 16:00-19:00)

⁸ Note that this does not match the time periods used in the traffic flow analysis, however the time periods for the journey time analysis were chosen to be consistent with the economic calculations in the Project Appraisal Report (SAR)

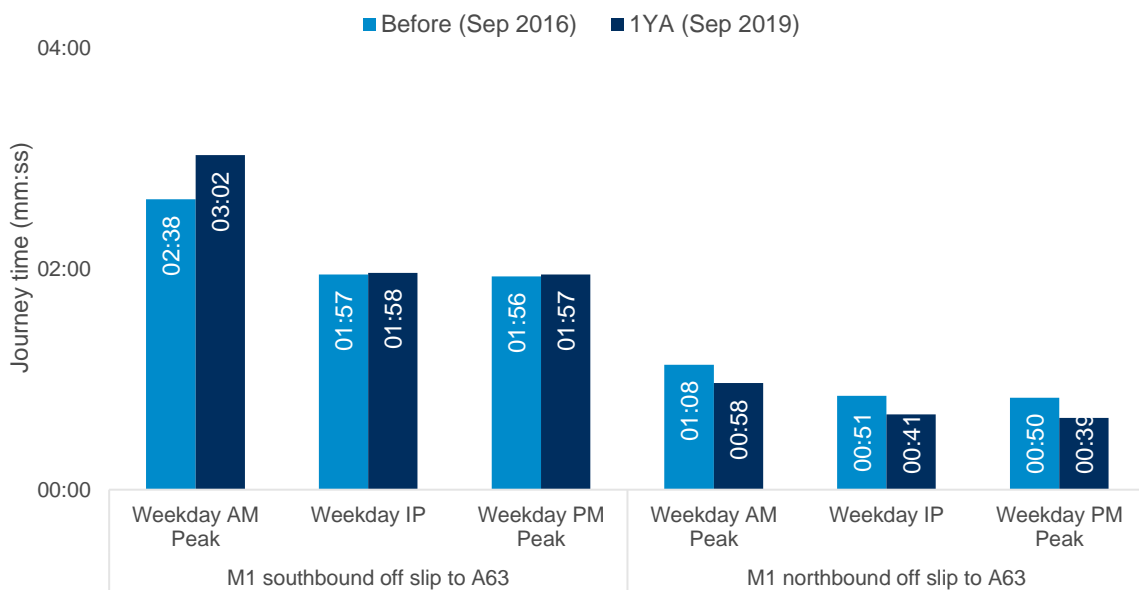
M1 to A63 Pontefract Lane

For customers travelling on from the M1 southbound off slip to the A63 Pontefract Lane in the inter peak and evening peak, the journey times remain similar between the before project period and at one year after.

For journeys made in the morning peak average journey times have increased by 24 seconds. This movement in the morning peak experiences high traffic flows as traffic travels towards Leeds City Centre. As part of the improvements to the Lakeside Way arm of the junction (which is not part of the junction 45 project), an additional stop line has been introduced on the circulatory. This would cause additional delays at the one year after stage compared to the before year, which is likely to be the reason for an increase in average journey times.

For customers travelling on from the M1 northbound off slip to the A63 Pontefract Lane journey times at one year after are 10 seconds quicker in the morning peak and inter peak and 11 seconds quicker in the evening peak. Although there have been no changes to the northbound off slip as part of the project, there may have been some changes to green times on the off slip as part of the signal upgrades which could have benefited the slip road.

Figure 8: M1 to A63 Pontefract Lane – average observed journey times



Source: TomTom (September 2016 and 2019)

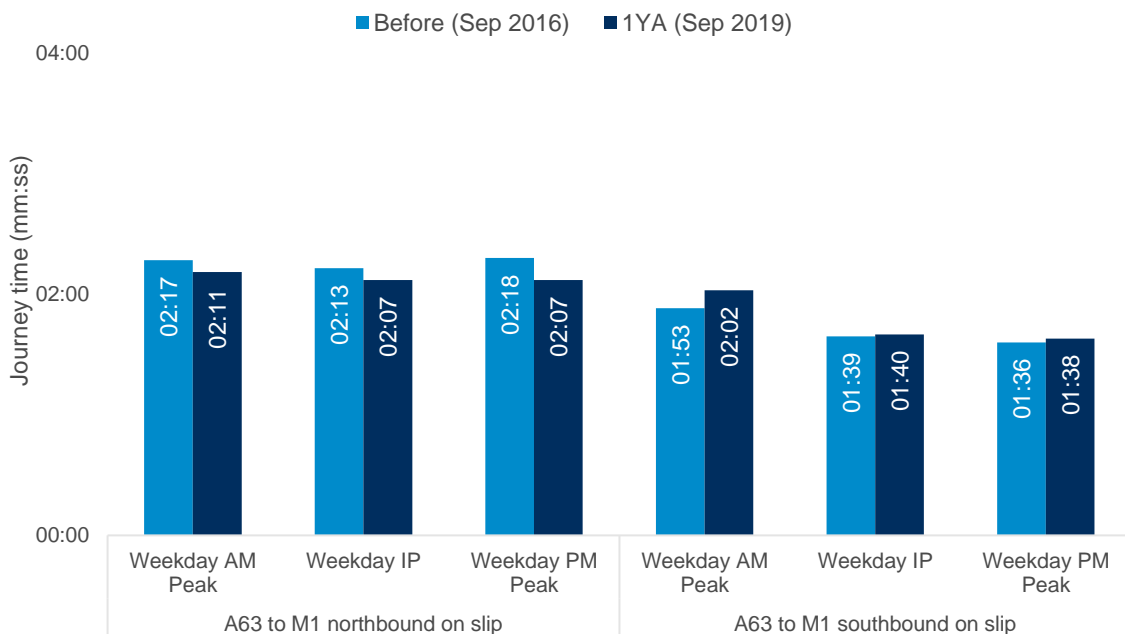
A63 Pontefract Lane to M1

For customers travelling on the A63 Pontefract Lane to the M1 northbound Average journey times are 6 seconds quicker in the morning peak and interpeak, and 11 seconds quicker in the evening peak. This is likely due to the implementation of the 3-lane approach as part of the project which allows for a double left turn onto the M1 northbound.

On the A63 Pontefract Lane to M1 southbound journey time route, morning peak journey times have increased by 9 seconds at one year after. In the inter peak and evening peak journey times are unchanged. The larger increase in the morning peak journey times is likely a result of the additional stop line on the circulatory at the Lakeside View approach, which was not part of this project.

Overall, the journey times for the left turn movements have improved slightly, whereas journey times for right turning traffic has increased slightly. This is most likely due to the additional signals that right turners now need to pass through due to the new service station on the Lakeside View arm of the junction. Without these extra signals it is realistic to believe that journey times would be similar or quicker than before project levels despite the traffic growth observed at the junction and as outlined previously.

Figure 9: A63 Pontefract Lane to M1 – average observed journey times



Source: TomTom (September 2016 and 2019)

Were journey time savings in line with forecast?

The Traffic Economic Appraisal Report does not provide details of the forecast impact of the project on journey times for specific routes, therefore direct comparisons cannot be made.

Liaison with the delivery team suggested that the main journey time benefits was expected to be from the M1 southbound off slip to the A63 Pontefract Lane in the morning peak and from the A63 Pontefract Lane to the M1 in the evening peak.

The observed average journey times from the TomTom data does show that there are benefits from the A63 Pontefract Lane to the M1 northbound in the evening

peak, however there are disbenefits going to the M1 southbound. It is likely that the project team did not account for the introduction of the additional stop line on the circulatory when making these predictions. Similarly, it was suggested there would be benefits from the M1 southbound off slip to the A63 Pontefract Lane in the morning peak however the TomTom data shows that there has been a disbenefit on this route. Again, this is likely due to the additional stop line on the circulatory causing delay.

As part of the appraisal of the project, a Project Appraisal Report (PAR) was produced which calculates the vehicle hours saved at the 2020 opening year. With the introduction of the M1 junction 45 project it was predicted that there would be a saving of 17,795 hours in the opening year. This is based on 3-hour morning and evening peak periods and a 6 hour inter peak.

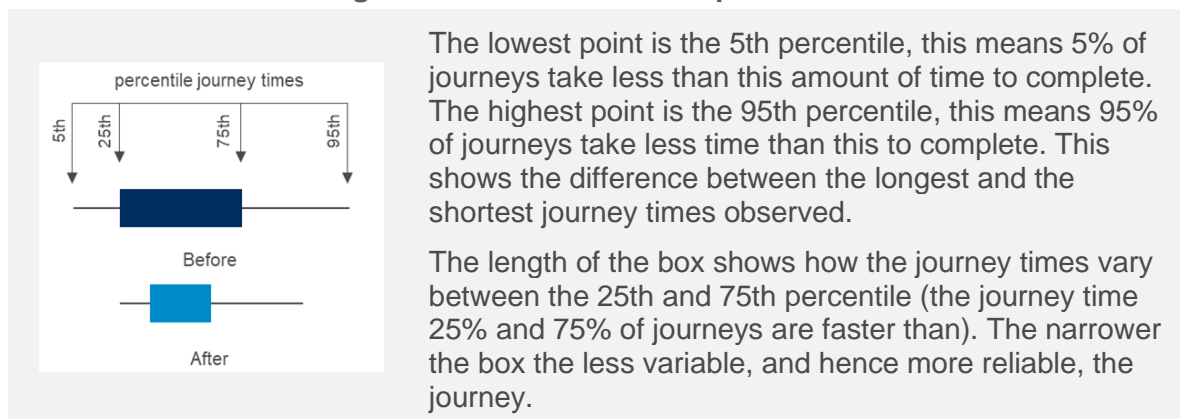
We have undertaken a calculation of the vehicle hours saved with the project for the same time periods using the observed traffic flows and journey times before the project and at one year after. This shows that the overall vehicle hours saved in the opening year is -558.7. While this is a slight worsening to vehicle hours, the effect over the year is so small it can be considered negligible. There are some vehicle hour savings for the left turn movements at the junction, whereas we see an increase in vehicle hours for the right turns. This is likely due to the additional signals at the new service station not being included in the appraisal. If these signals were not implemented, it is likely that the vehicle hour savings would be higher. Indeed, the Traffic Economic Appraisal Report does show that the Benefit Cost Ratio of the project combined with the new signals as part of the service station is lower than the BCR of our project alone.

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 have looked at the percentiles of journey times to establish whether they have become 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.

Figure 10: What does a box plot show?



M1 to A63 Pontefract Lane

On the route from the M1 northbound off slip to the A63 Pontefract Lane, the journey time reliability has improved. In all time periods, the 5th percentile and 95th percentile is lower than before the project. There is minor difference in the interquartile range between before and after the project. This shows that the project has made journeys on this route both more reliable and quicker.

From the M1 southbound off slip to the A63 Pontefract Lane, the journey time reliability in the inter peak and evening peak has remained similar to before the project. However, in the morning peak reliability has worsened.

Figure 11: M1 southbound off slip to A63 Pontefract Lane journey time reliability

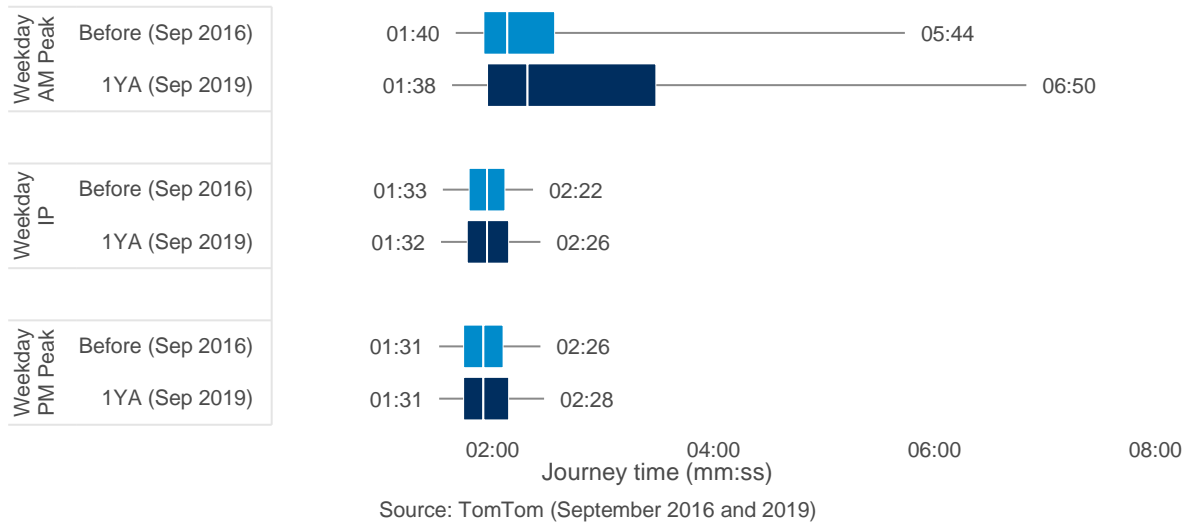
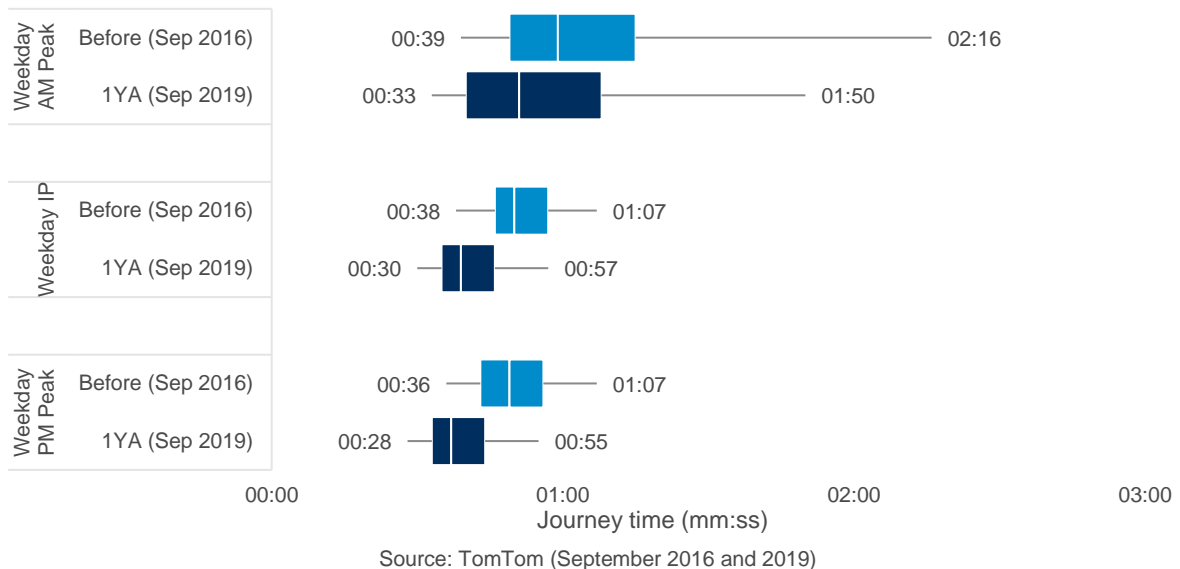


Figure 12: M1 northbound off slip to A63 Pontefract Lane journey time reliability

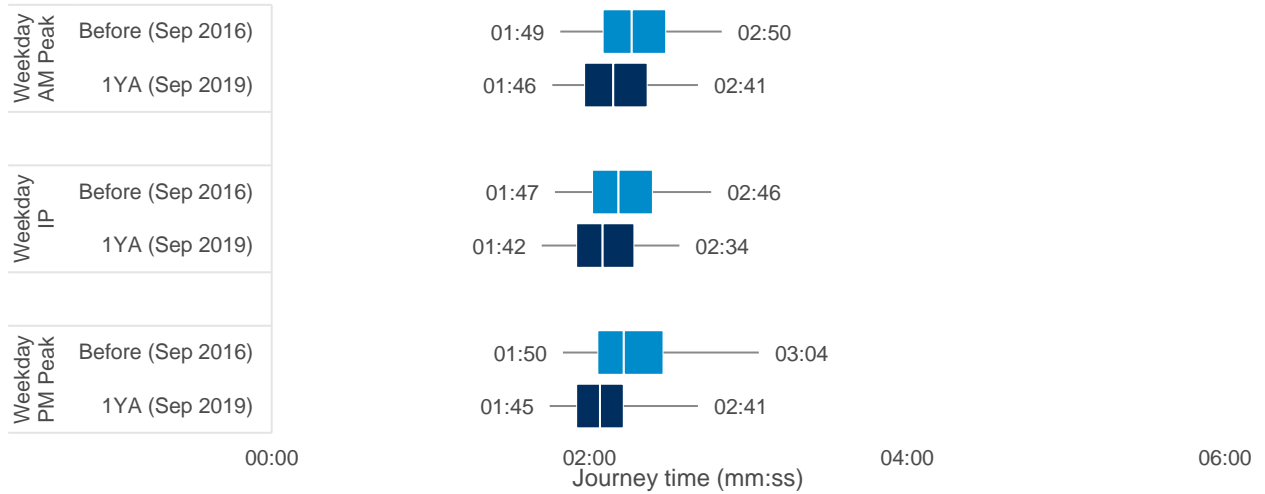


A63 Pontefract Lane to M1

From the A63 Pontefract Lane to the M1 north the journey time reliability has improved at one year after in all time periods. In each time period the 5th and 95th percentiles are lower than before the project, and the interquartile range is smaller. This suggests that journeys along this route are quicker and more reliable at one year after.

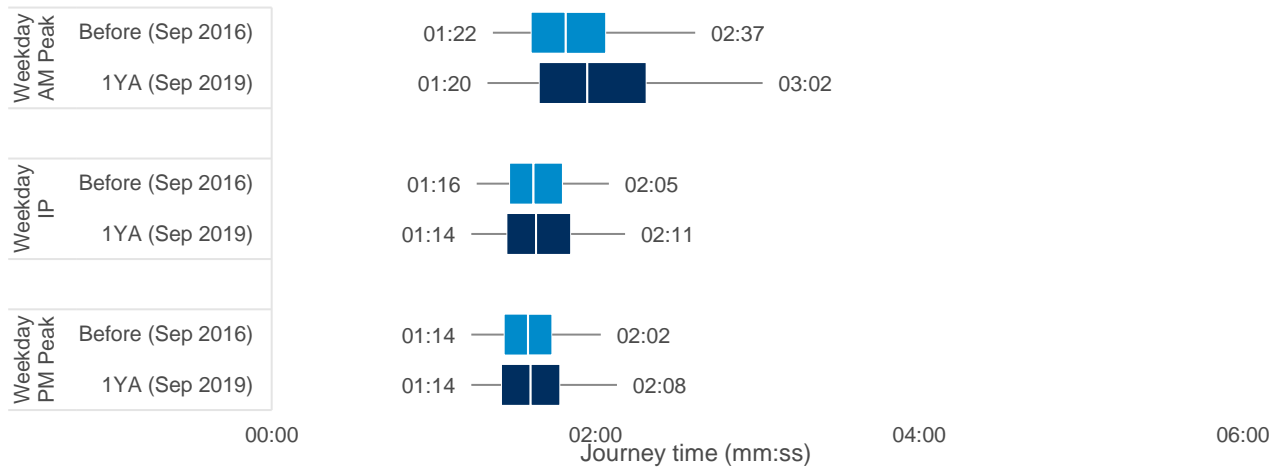
The A63 Pontefract Lane to M1 south results show that overall journey time reliability has worsened slightly at one year after. Although the 5th percentile has decreased in the morning peak and inter peak, the interquartile range and 95th percentile have increased in all time periods, particularly in the morning peak.

Figure 13: A63 Pontefract Lane to M1 northbound journey time reliability



Source: TomTom (September 2016 and 2019)

Figure 14: A63 Pontefract Lane to M1 southbound journey time reliability



Source: TomTom (September 2016 and 2019)

In summary, we see an improvement for left turning traffic and a worsening for the right turners. The impacts are minor, and the worsening is most likely due to the additional signal heads at the new Skelton Lake service station which right turners must navigate. The results should also be taken in the context of the additional traffic volume going through the junction after the project. The new arrangement is facilitating more traffic, with neutral impacts on performance.

5. Safety evaluation

There was no appraisal of safety benefits for the project which means there was no study area specified. For the purpose of the evaluation, we observed personal injury collisions that occurred on M1 mainline, slip roads and gyratory roads, using the safety study area shown in Figure 15.

Figure 15: 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 12 months after the junction was operational and open for road users.

The analysis draws on the following data collection periods:

- Pre-construction: 31st January 2012 to 30th January 2017
- Construction: 31st January 2017 to 28th March 2018
- Post-opening: 29th March 2018 to 28th March 2019

In total, there have been ten personal injury collisions during the observation period: 8 before the project was constructed, 1 during construction and 1 after the project was completed. This provided an early indication of the safety trends but will be monitored over a longer period before conclusions can be drawn about the safety impact of the project.

Due to the small number of collisions observed, the sample size is too small for robust evaluation of most safety metrics, therefore these have been descoped from this one-year evaluation and we will look to assess in the follow up evaluation which evaluates the five-year opening period.

6. Environmental evaluation

Summary

The evaluation of environmental impacts used information on the predicted impacts gathered from the environmental appraisal and the environmental assessment report. Information from the Traffic and Economic Appraisal Report and the project team was also used. This information was then compared with findings observed after the project opened for traffic. Observed impacts were determined during a site visit in August 2019, supported by desktop research. The results of the evaluation are recorded against each of the TAG (Transport Analysis Guidance)⁹ environmental sub-objectives and the three society sub-objectives of physical activity, severance, and journey quality. These are presented in Table 2.

The appraisal considered that there would not be any environmental impacts applicable to the decision to invest in the project and reported them and the three society sub objectives as not applicable. An environmental scoping exercise was undertaken which identified that the project would cause very few environmental impacts and those that might arise would be limited to within the highway boundary. A further assessment was done to understand the nature of those impacts that might arise and determined that none would be significant. The outcome of this work was considered in this evaluation.

Our one-year after evaluation found that most of the impacts on the sub objectives were restricted to within the highway boundary and were neutral as expected by the assessment. Our site visit found some examples of new shrub and tree planting and amenity grassland in poor condition but with appropriate maintenance during the aftercare period these should be resolved. The new cycleway footpath that links to the existing paths along Pontefract Lane now provides a safer route to the junction. Combined with the new toucan crossings at the junction, this should improve access to the countryside beyond. We considered that the measures would help encourage greater use but the beneficial effects to physical activity were unlikely to be significant.

The project was designed to provide additional capacity on and around the junction within the existing highway boundary to address existing congestion and to meet future demands.

The Environmental Assessment Report July 2015 (EAR) expected there to be no change to traffic volumes because of the project, stating that the junction improvement itself would not attract or generate traffic. There was anticipated traffic growth due to proposed nearby developments, but this was expected to occur regardless of the project.

The EAR did not include the opening year forecast flows meaning it was not possible to follow the POPE methodology¹⁰ to compare forecast against observed traffic data. Evaluation of observed after opening traffic data did show that traffic growth had occurred, but it was not possible to confirm whether this was due to the nearby developments or the project itself.

⁹ TAG provides guidance on appraising transport options against the Government's objective for transport.

¹⁰ <https://nationalhighways.co.uk/media/exypgk11/pope-methodology-note-jan-2022.pdf>

Noise

The environmental assessment undertook a scoping exercise to identify the potential for noise impacts from the project. It concluded that as the project would have negligible effects on traffic flows and speeds and would not bring traffic closer to the small number of nearby properties, there would be no significant noise impacts. No mitigation was considered necessary. The appraisal scoped out noise impacts and recorded them as not applicable.

The EAR noise assessment identified three residential / farm properties within the 1km study area (all located approximately 900 metres from Junction 45) and limited use of the Public Rights of Way / Non-motorised User facilities near the project. It concluded that the project would not lead to significant noise effects on these properties or users of the public rights of way.

As there were no opening year forecast flows or speeds to compare with observed traffic data, it was not possible to comment further on changes to the local noise climate or draw any firm conclusion as to whether the assumption that there would be no change in traffic growth as a direct result of the project was valid or not.

Air quality

The environmental assessment undertook a scoping exercise to identify the potential for air quality impacts from the project. It concluded that as the project would have negligible effects on traffic flows and speeds and would not bring traffic closer to the small number of nearby properties, there would be no significant air quality impacts. The appraisal scoped out air quality impacts and recorded them as not applicable.

The EAR local air quality assessment noted that there were no residential receptors and no sensitive ecological receptors identified within 200 metres of the project. It concluded that the project would not lead to significant effects.

As there were no opening year forecast flows to compare with observed traffic data, it was not possible to comment further on any changes to local air quality or draw any firm conclusion as to whether the assumption that there would be no change in traffic growth as a direct result of the project was valid. Our evaluation however did confirm that the project was not within an air quality management area (AQMA¹¹) either before or after the project was constructed. This confirmed that the project was not within an area where UK air quality objectives were not likely to be met.

Greenhouse gases

The environmental appraisal reported that the project would cause an increase in greenhouse gas emissions because the project would increase the total distance travelled by road users. Overall, it reported that the impacts would be slight adverse.

To evaluate the greenhouse gas emissions of the appraised project, forecast and observed traffic data is required for the appraised study area. The full extent of forecast traffic data required to evaluate greenhouse gas emissions including

¹¹ <https://uk-air.defra.gov.uk/aqma/>

heavy vehicle proportions and speeds were not available for this project. As such, greenhouse gas emissions were not evaluated.

Landscape and townscape

The environmental scoping exercise reported that the project lay within a semi-rural location. No townscape was present and therefore it was scoped out of further assessment and appraisal. The scoping exercise identified that there were no designated landscapes within the project study area and as the impacts would be limited to some small-scale localised vegetation clearance within the highway boundary no significant landscape impacts were predicted. The closest residential property was reported to be 1km away and screened from the project by intervening woodland. No visual impacts were expected. Landscape and visual impacts were scoped out of further assessment and considered to be neutral. The appraisal recorded impacts to landscape as not applicable.

Our evaluation confirmed that the impacts of the project were confined to within the highway boundary and no impacts to townscape had occurred. A new motorway service area had been built at the junction and a new business park was under construction on land to the west. The impacts of the project were negligible in comparison to these more recent developments. New tree, shrub and grassland planting had been provided to mitigate the impacts of the project. Some of the plots were overgrown and some of the grassland was patchy but with appropriate maintenance these should establish effectively. The evaluation site visit noted that remedial works were being undertaken to the motorway embankment opposite Temple Newsam Park. The embankment was programmed to be reseeded which should restore the embankment to its pre project condition. Overall, we considered the impacts were as expected.

Heritage of historic resources

The environmental assessment identified that the only cultural heritage site near to the project was the Temple Newsam grade II registered park and gardens and the grade 1 listed Temple Newsam House. The house is outside the study area and screened from the motorway by intervening woodland and the parklands closest to the motorway was a golf course. The visual impact of the new gantries proposed by the project were predicted to increase the presence of the motorway, but the effects were expected to be limited to users of the golf course. The assessment considered that buried archaeology was unlikely to be present as much of the ground surrounding the project had been disturbed by previous industrial and agricultural activities. Overall, the assessment predicted the effects would be neutral and the appraisal reported impacts to be not applicable.

Our evaluation confirmed that no known cultural heritages resources were affected by the project and no evidence provided to suggest any buried archaeology was encountered. Our site visit confirmed that the new gantries were new features on the M1 but unlikely to be visible from Temple Newsam house. As the M1 is already a prominent feature the new gantries were unlikely to cause more than a negligible effect to the setting of the registered park and garden and users of the golf course. Overall, the impacts were determined to be as expected.

Biodiversity

The environmental assessment reported that the works were limited to within the highway boundary and so the only impacts would be the loss of low-value semi-improved grassland habitats. No protected habitats or species would be affected. Standard mitigation measures would be adopted during construction and disturbed verges would be restored. Overall, the assessment predicted the impacts would be neutral. The appraisal reported impacts to be not applicable.

Our evaluation has confirmed that the impacts are confined to within the highway boundary and involved the loss of semi-improved grasslands and some highway scrub and trees. Our site visit confirmed that maintenance activities were being undertaken although examples of dead planting and bare earth within amenity grassland plots were found. These issues should be rectified during the aftercare maintenance period. Overall, we considered that the outcome at one-year after was broadly neutral as expected.

Water environment

The environmental assessment identified that the increase in impermeable area due to the extra lanes would not cause any significant increase in the volume of routine run off. The existing drainage system was considered suitable to manage any changes. Any pipework damaged during construction would be replaced and no further assessment or mitigation was considered necessary. Overall, the assessment predicted that the impacts would be neutral. The appraisal considered the impacts would be not applicable.

A visual inspection of surface drainage features was done during the evaluation site visit. It indicated that the drainage network was in place as expected. As the works were of such small scale no formal drainage survey was undertaken. We considered that the impacts at one-year after were as expected.

Severance, Physical fitness, and Journey quality

The environmental appraisal did not consider that there would be any impacts to physical activity, journey quality or severance and reported that they were not applicable to the investment decision. The environmental assessment noted that the project design included a new pedestrian cycle path along the eastbound approach to the junction. This would connect into existing provision to the east up to the M1. The project also included new Toucan¹² crossing points on the west and east side of the junction to allow walkers and cyclists to safely cross the junction. Overall, the environmental assessment predicted that the new facilities would provide beneficial impacts to pedestrians and cyclists although the benefits were not quantified.

We considered the impacts of the project as part of our evaluation site visit. We did not identify any impacts to severance and did not consider that the small junction improvement would have had any significant improvement on journey quality. The new combined footpath cycleway now connects the existing cycleway on Pontefract Lane up and across junction 45 using the new toucan crossing. This should help journeys to the new motorway service area and the countryside beyond. A formal survey was not undertaken but it was considered likely that there

¹² A type of signalised pedestrian crossing that includes provision for cyclists.

would be some beneficial effect on physical activity although unlikely to be significant. Overall, we the considered the outcome on severance and journey quality to be neutral as expected with some minor beneficial impacts for physical activity.

Figure 16: New footpath cycleway on eastbound approach to junction 41



Overview

The results of the evaluation are summarised against each of the TAG environmental sub-objectives and presented in Table 2. In the table, a one-year after evaluation is defined as ‘as expected’ if we believe that the observed impacts at one-year after were as predicted in the appraisal. We report them as ‘better than expected’ 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.

The appraisal did not consider that there would be any environmental impacts applicable to the decision to invest in the project and reported them and the three society sub objectives as not applicable. For the purposes of the evaluation, we assumed that the impacts were neutral. The exception was greenhouse gases where slight adverse impacts were reported.

Table 2: Environmental Impacts – M1 Junction 45

Sub Objective	Appraisal Score	One-year Evaluation	Summary
Noise	Not applicable. Assumed not significant		Unable to evaluate due to unavailability of comparable traffic data
Air Quality	Not applicable. Assumed not significant		Unable to evaluate due to unavailability of comparable traffic data

Sub Objective	Appraisal Score	One-year Evaluation	Summary
Greenhouse Gases	Slight adverse		Unable to evaluate due to unavailability of forecast traffic data
Landscape	Not applicable. Assumed neutral	As expected	All impacts were negligible and confined to within the highway boundary. Although there were some maintenance issues, none were likely to result in any significant effects
Townscape	Not applicable. Assumed neutral	As expected	All impacts were negligible and confined to within the highway boundary. No impacts on townscape
Heritage of historic resource	Not applicable. Assumed neutral	As expected	The project was unlikely to have affected Temple Newsam house due to intervening woodland. All works were within the highway boundary so impacts to the setting of the registered park and garden were likely to be negligible as expected
Biodiversity	Not applicable assumed neutral	As expected	Adverse effects were limited to the small-scale loss of low value verge side habitats. Verges were restored and new planting was in place. Provided maintenance works continue the expected outcome should be met.
Water Environment	Not applicable. Assumed neutral	As expected	Minor changes to existing road layout. No significant impacts observed.
Physical activity, severance, and journey quality	Not applicable. Assumed neutral	As expected.	No significant changes to existing severance and journey quality. New footpath cycleway and toucan crossing should provide some benefits to users but unlikely to generate a significant increase in physical activity.

Source: adapted from one year evaluation visit and appraisals

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