national highways

A1 Coal House to Metro Centre improvements

One-year post-opening project evaluation

Foreword

National Highways – previously known as Highways England when the A1 Coal House to Metro Centre scheme was delivered – is the government-owned company that operates, maintains and improves England's motorway and long-distance trunk road network. 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. This project was delivered under Highways England's remit to make our roads safer and more reliable for the millions who depend on them daily.

We carried out the A1 Coal House to Metro Centre improvements project on the A1 Gateshead Western Bypass as part the first roads investment strategy. The dual carriageway bypass carries a mixture of local, regional and strategic traffic which impacts on the strategic links into and out of Gateshead and Newcastle. Efficient operation of the route is deemed a key priority for the region's economic prosperity. Before the project, the interactions of very high daily traffic volumes on an out-dated road design produced congestion, long delays and slower journey times on both the strategic and local road network. The project aimed to implement measures to increase capacity, reduce congestion and improve safety.

Our post-opening project evaluations provide us with opportunities to understand how effective we are in delivering improvements in our portfolio of major projects. This report gives an initial indication of the project's performance in the first year of its operation after opening to traffic in August 2016. The report forms part of a long-term evaluation study, and we will review the project's performance again at five-years after opening.

We found that most road users' journey times on the project extent were faster and more reliable at key times of the day. Their southbound journeys in the morning were over a minute faster. In the evening however, their southbound journeys were slower as traffic merged back to two lanes beyond the project extent.

We found positive signs that the project's safety objective to reduce the severity of casualties per year compared to the before project baseline, was on track to be achieved. We will however need more information to be sure.[1] We will review the project's performance again at five-years after opening as part of the long-term evaluation study.

Our evaluations of noise, air quality and greenhouse gases were impacted by the limited traffic information. Published monitoring data suggested the project, as expected, had had no significant effects on local air quality. The on-site inspection recommended landscape maintenance be improved. We have put plans in place to address these concerns to ensure the new planting will provide the desired mitigation.

Elliot Shaw

Executive Director, Strategy and Planning
January 2022

[1] Personal injury collisions on the strategic road network are very rare and can be caused by many factors. Due to their unpredictable nature, we must monitor trends over several years before we can have confidence that real change has occurred.

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1. Executive summary

1.1. Background

The A1 Coal House to Metro Centre improvements on the A1 Gateshead to Newcastle Western Bypass were completed in August 2016. The project replaced the earlier A1 Lobley Hill to Dunston project which was smaller in scope. Before construction, two-way average weekly flows on the Lobley Hill to Dunston section of the bypass exceeded 100,000 vehicles – over double its theoretical design capacity.[2] This caused stationary or slow-moving traffic in and out of Gateshead and Newcastle at both peak and off-peak times. The congestion was compounded by the road layout, the close spacing of the interchanges and the interaction between strategic, regional and local traffic. The levels of congestion led to a high number of personal injury collisions, primarily caused by shunts due to slow-moving traffic or by traffic making late changes when entering and exiting junctions. In 2014, the personal injury collision rate on the route was double the national average.

In 2010, a 50mph speed limit was imposed on the A1 between Birtley interchange and Blaydon viaduct due to the out of date standard of the road. It was imposed to improve safety and to reduce CO_2 emissions and noise pollution.[3] The limit remains in place at the time of this report.

The enhancement project brought a range of measures to increase capacity, reduce congestion and improve safety. A key objective was to make best use of existing infrastructure and aim to provide additional capacity within the existing highway boundary. This would allow construction to proceed without the need for statutory processes. As such, the carriageway was widened in both directions from two to three narrow lanes to fit within the existing highway boundary. New parallel link roads for local traffic were created between the Lobley Hill and Gateshead Quays interchanges (A184) with reconfigured merge and diverge arrangements provided.

This report documents the findings of the evaluation of the project after the first year of its operation (2018). This initial assessment forms part of a longer-term evaluation to review performance over time as the benefits mature. One-year after evaluations are not intended to provide conclusive evidence about a project's benefits, but to give an early indication about whether it is heading in the right direction. This helps to identify areas to focus efforts to optimise the benefits of the project.

1.2. Customer journeys

The project was designed principally to increase capacity within the highway boundary to reduce congestion and improve journey times. Most benefits were expected to be derived from the journey time savings made by existing road users.

We found that most road users' journey times on the project extent were faster and more reliable at peak times of the day. Their southbound journeys in the morning

[2] A1 Lobley Hill to Dunston Improvement (incorporating Metro Centre to Coal House extensions) Stage 5 Business Case (Highways England, March 2014).
[3] The A1 Trunk Road (Gateshead/Newcastle Western Bypass) (Birtley Interchange to Blaydon Viaduct) (50 miles per hour speed restriction) Order. https://www.thegazette.co.uk/notice/L-59313-1022585

were over a minute faster. However, in the evening they were nearly a minute slower (Figure 8). This was likely due to the merger of peak time traffic back to two lanes beyond the project extent.

The small number of active traffic counters across the project extent limited what links could be made between changes in traffic volumes and journey times.[4] Traffic volumes increased by around five per cent between 2013 and 2018 on the northbound carriageway between Coal House to Lobley Hill interchanges, below national and regional trends for the same period (Figure 2). The appraisal expected mostly small changes in traffic volumes on the project extent in the opening year, below or in line with expected traffic growth.[5]

Local distributor roads were constructed between Lobley Hill and Gateshead Quays interchanges to accommodate local traffic. Their impact could not be determined. Local traffic volumes fell substantially near Lobley Hill interchange. Further away, on local roads near Dunston interchange, volumes changed variably, while on the roads near Metro Centre and to the west of the project extent volumes increased in line with or above regional background trends (Figure 5).

1.3. Safety

We found early positive evidence to suggest the project's safety objective to reduce the severity of casualties per year compared to the before project baseline was on track to be achieved. The numbers and rates of personal injury collisions[6] per million vehicle kilometres at one year after opening (the 'after period') were both lower than the annual averages for the five-year period before the project's construction (the 'before period').

18 personal injury collisions occurred on the project extent in the after period, a reduction in comparison to the average of 25 for the five-year before period. Furthermore, we estimated the counterfactual range for personal injury collisions on the project extent would likely have been 13 to 42 (Figure 14).

The decline in personal injury collisions seen on the project extent in the after period, compared to average of the before period, was greater than the decline expected in the appraisal. A fall of around two was expected; a fall of seven was observed.[7]

The decline in collision numbers on the project extent had occurred while road users' speeds had increased in many key parts of the day. However, the impact of changes in traffic volumes was difficult to assess. It will be important to check how the positive trends develop in the follow-up evaluation, as traffic growth in future years is likely.

1.4. Environment

Our evaluations of noise, air quality and greenhouse gases were affected by the absence traffic data of sufficient quality and scope. For noise we were unable to

[4] The traffic counters on the project extent are located within the interchanges and on the on- or off-slips. Combinations of information from both types were required to obtain traffic flows for upstream or downstream mainline carriageways. Different counters were inactive at different periods in time, limiting what comparisons could be made. Our analysis of traffic volumes covered around 25% of the total route impacted by the project.

[5] The route was bounded by two-lane dual carriageways which was expected to constrain traffic growth.

[6] A collision that involves at least one vehicle and results in an injury to at least one person.

[7] Average of 2.38 per year based on a reduction of 143 collisions on the project extent over the 60-year appraisal period.

draw firm conclusions and will reconsider these impacts during our five years after evaluation if more data is available. For air quality, our analysis of both modelled and monitoring data confirmed that, as expected within the business case, no significant effects occurred. For greenhouse gases, our analysis suggested that emissions increased, as expected within the business case, however, we were unable to quantify the extent of change.

The evaluation assessed impacts to landscape and the visual amenity. New woodland and hedgerow planting was in place as expected, although we recommend that maintenance be improved to ensure the impacts are mitigated over the long-term. We found shotcrete had been used at Gateshead Quays. This was a design change implemented to manage the ground conditions encountered during construction. We deemed the large expanse of concrete had increased the sense of urbanisation and had a detrimental effect on the views and journey ambience for road users. Also, we considered the impacts on both townscape and journey quality were worse than expected.

We considered impacts on heritage of historic resources and found they were limited to the setting of a small number of listed buildings. It is likely that the impacts will be reduced as replacement screen planting establishes, as expected. Impacts on biodiversity were observed to have been limited to within the highway boundary. Mitigation planting was in place, but we had concerns over the establishment of some habitats especially some species-rich grasslands. Maintenance will need to be improved and so, at one-year after, it is too early to say that the long-term outcome will be met. The impacts to the water environment appear to be as expected and at one-year after we have seen no evidence to suggest the new drainage system and balancing pond are not functioning as expected. Impacts on physical activity and severance remained neutral as expected.

2. Introduction

2.1. What was the project and what was it designed to achieve?

The A1 Coal House to Metro Centre improvements were completed in August 2016. The project replaced the earlier A1 Lobley Hill to Dunston project which was smaller in scope. It implemented a range of measures to increase capacity, reduce congestion and improve safety along a 3.9-mile long stretch of the A1 Gateshead to Newcastle Western Bypass.

In the years before the project's implementation congestion had increased on the bypass due to economic regeneration. Very high volumes of traffic and a mixture of local, regional and strategic movements were observed. In 2011, average weekly traffic flows on the Lobley Hills to Dunston section exceeded 100,000 vehicles – over double its theoretical design capacity. This resulted in stationary or slow-moving traffic in and out of Gateshead and Newcastle daily, at both peak and off-peak times. This section was the third most congested link on the national trunk road network and the most congested regional trunk road link in terms of delay. It resulted in long delays and slower journey times. In 2014, the collision rate on the route was double the national average. Efficient operation of the A1 was deemed a key priority for the future prosperity of the region.[8]

In 2009, the Chancellor of the Exchequer announced a commitment to improve the Lobley Hill to Dunston section of the A1. However, in 2010 the project was deferred pending the results of the Tyne & Wear Delivering a Sustainable Transport System (DaSTS) study. Also, in 2010, a Local Network Management Scheme to ease congestion was implemented on the northbound carriageway between the Dunston and Metro Centre interchanges. It converted around a third of a mile of carriageway from two lanes to three narrow lanes.

In 2012, project development was reactivated as a 'single option scheme' with a fixed route within the highway boundary to allow an accelerated delivery programme. It was not expected to require an Environmental Statement. During the development phase, opportunities were identified to extend the project further, to Metro Centre interchange in the north and to Coal House interchange in the south. The extensions were made possible by savings from the reduced provision necessary for the lower 50mph speed limit introduced in late 2010, and from the accommodation of other changes and improvements to the network in the period after deferral, for example, the LNMS.[9]

The project's key measures were:

- widening of the northbound carriageway within the highway boundary from two to three lanes between the Coal House and Gateshead Quays interchanges with no hard shoulder provision;
- widening of the southbound carriageway within the highway boundary from two to three lanes between the Metro Centre and Coal House interchanges with no hard shoulder provision;

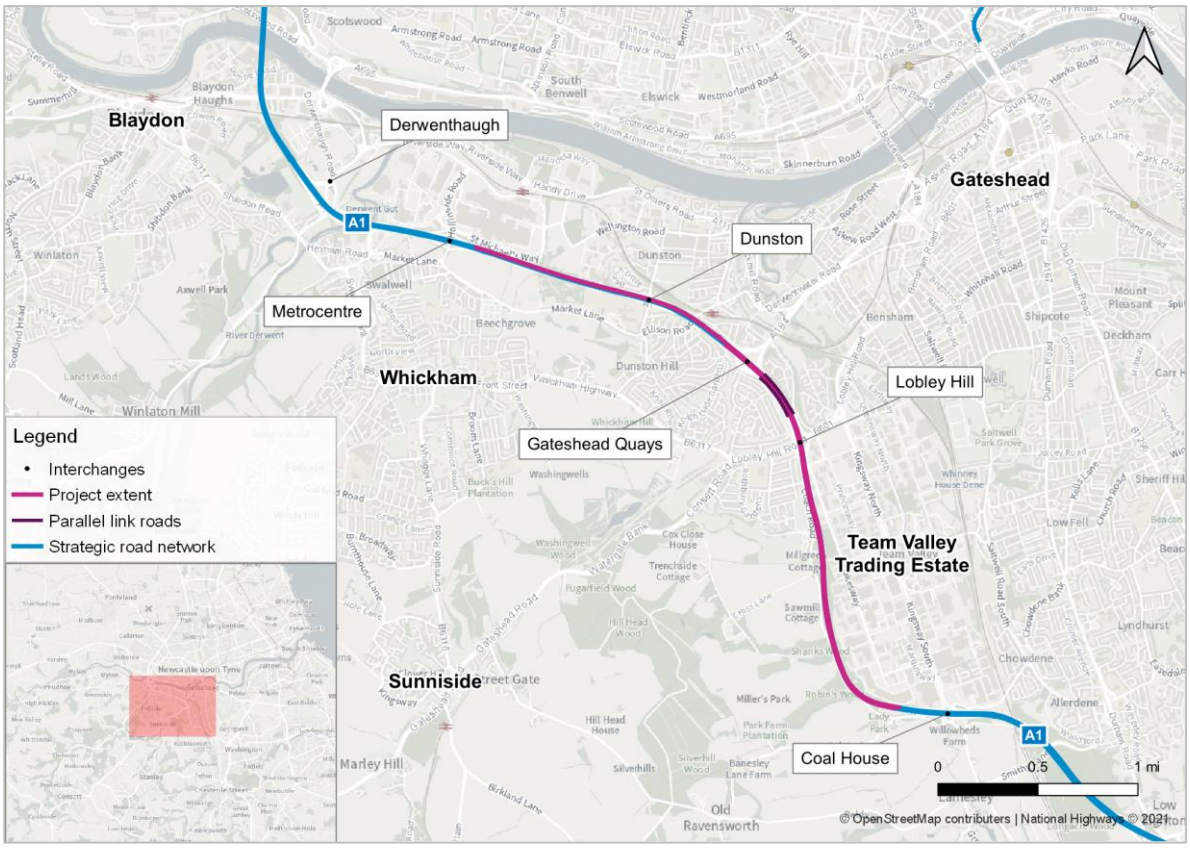
[8] The detail in the section has been taken from the 'A1 Lobley Hill to Dunston Improvement (incorporating Metro Centre to Coal House extensions) Stage 5 Business Case' (Highways England, March 2014).
[9] Local Network Management Schemes.

- creation of new parallel link roads for local traffic between the Lobley Hill and Gateshead Quays interchanges (A184) with provision of hard shoulder and reconfigured merge and diverge arrangements;
- provision of a 0.9 m high concrete barrier on the central reserve; and
- replacement and movement of the street lighting from the central reserve to mainly on the verges (apart from between A184 Gateshead Quays and Lobley Hill interchanges, where lighting columns were placed on the concrete stepped barrier that lay between the link roads and the A1).

2.2. Where is the project located?

The A1 forms the main north-south road link within Tyne and Wear. It is part of the strategically important road link between London, Tyne and Wear and Scotland, and is also important for local journeys. Figure 1 shows the project's location.

Figure 1 Location of project and interchanges



Source: National Highways and OpenStreetMap contributors.

2.3. 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 also seek to determine whether the expected project benefits are likely to be realised. They provide opportunities to learn and improve future project appraisals and business cases too. They are also important for providing transparency on and accountability for public expenditure, by assessing whether projects are on track to deliver value for money.

A post-opening project evaluation compares changes in key impact areas[10] 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.[11]

The scope of this project's evaluation had to be revised after a survey of traffic flow information on the project extent found it was only available for one section of carriageway in one direction in both the pre-construction and post-opening periods. This also impacted the traffic analysis and the safety and environmental analyses, which are both in part reliant on aspects of traffic data.

3. Delivering against objectives

3.1. How has the project delivered against its objectives?

All National Highways major projects have specific objectives which were defined early in the business case when project options were being identified. These benefits were appraised to be realised over 60 years, so the first-year evaluation provided an early indication of progress. The objectives for the A1 Coal House to Metro Centre are shown below in Table 1.

Table 1 Project objectives and one-year evaluation summary

Objectives	One-year evaluation
Reduce congestion and thereby improve traffic flows.	Early signs of improvement of congestion in most time periods.
Improve journey time reliability on the A1.	Indications that improvements were achieved in most time periods.
To maintain and, where possible, reduce current collision rates.	Positive early signs of safety improvements. More time and information required for greater confident in results.
Accommodate urban local journeys away from the A1 mainline.	Achieved – the local distributor roads now provide alternate routes.
Increase capacity within highway boundary.	Achieved.

[10] Key impact areas include safety, journey reliability and environmental impacts.
[11] https://nationalhighways.co.uk/publications/

4. Traffic evaluation

4.1. Summary

The project was principally designed to increase capacity within the highway boundary to reduce congestion and improve journey times. Most benefits were expected to be derived from the journey time savings made by existing road users.

We found that most road users' journey times on the project extent were faster and more reliable at peak times of the day. Their southbound journeys in the morning were over a minute faster. However, in the evening they were nearly a minute slower (Figure 8). This was likely due to the merger of peak time traffic back to two lanes beyond the project extent.

The small number of active traffic counters across the project extent limited what links could be made between changes in traffic volumes and journey times. Traffic volumes increased by around five per cent between 2013 and 2018 on the northbound carriageway between Coal House to Lobley Hill interchanges, below national and regional trends for the same period (Figure 2). The appraisal expected mostly small changes in traffic volumes on the project extent in the opening year, below or in line with expected traffic growth.

Local distributor roads were constructed between Lobley Hill and Gateshead Quays interchanges to accommodate local traffic. Their impact could not be determined. Local traffic volumes fell substantially near Lobley Hill interchange. Further away, on local roads near Dunston interchange, volumes changed variably, while on the roads near Metro Centre and to the west of the project, extent volumes increased in line with or above regional background trends (Figure 5).

4.2. How have traffic levels changes?

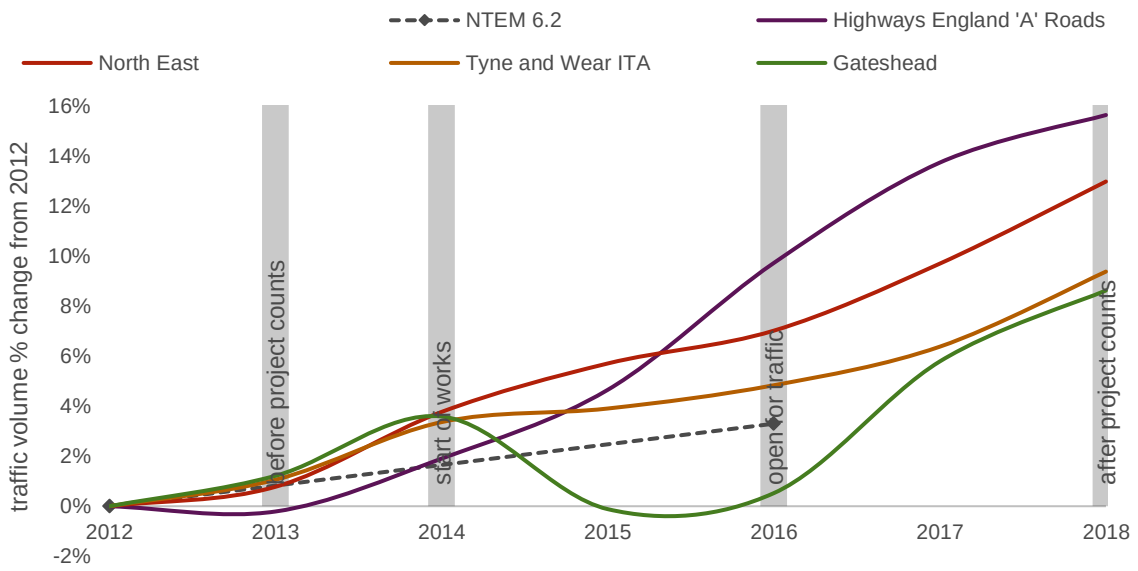
4.2.1. National and regional context

To assess the impact of a project on traffic levels, it is useful to understand any change observed within the context of national and regional trends. The relevant background trends for the project are illustrated in Figure 2.

Over the six-year period assessed, between 2012 and 2018, traffic on national A roads increased by about 16%. At the regional level, traffic on all road types in the North East grew by 13%, while in Gateshead it grew by eight per cent following a dip during project construction. The appraisal expected more modest growth in national trip numbers, as shown by the NTEM line.[12] These numbers indicated the route carried higher volumes of traffic than expected in the appraisal (see Section 4.2.2). The traffic information used in subsequent analysis was not adjusted to account for the background traffic trends.

[12] The National Trip End Model (NTEM) model forecasts the growth in trip origin-destinations (or productions-attractions) up to 2051 for use in transport modelling. The forecasts take into account national projections of: population, employment, housing, car ownership, trip rates. Source: DFT https://data.gov.uk/dataset/11bc7aaf-ddf6-4133-a91d-84e6f20a663e/national-trip-end-model-ntem

Figure 2 National and regional traffic volume changes since 2012



Source: Department for Transport road traffic statistics; NTEM 6.2.

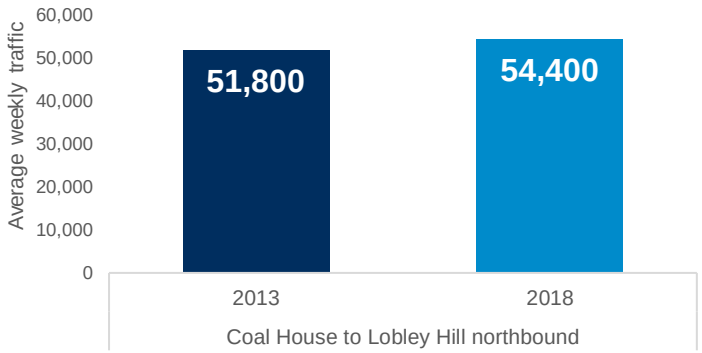
4.2.2. How did traffic volumes change on the project?

The project was principally designed to increase capacity within the highway boundary to reduce congestion and improve journey times. At the time of the appraisal, the carriageways of the A1 north of Metro Centre interchange, south of Coal House interchange, and of the A184 northeast of the Gateshead Quays interchange, were constrained to two lanes (see Figure 1). The project's appraisal therefore generally expected only small increases in numbers of road users on the project extent after it opened to traffic, below two per cent on average.

The largest increases were expected at peak times on the southbound carriageway between the Coal House and Lobley Hill interchanges. Increases of around five per cent in the morning and six per cent in the evening were anticipated due to a redistribution of traffic from Lobley Hill Road to the A1. It was suggested that increased numbers of road users would use Coal House interchange to access the Team Valley trading estate. Traffic volumes on the northbound carriageway were expected to increase by around two per cent in the morning and evening peaks.

The scope of the traffic evaluation was limited by the small number of active counters across the project's extent and relevant periods. We could only obtain information for the northbound carriageway between Coal House and Lobley Hill interchanges. On this carriageway, we found that average weekday traffic (AWT) volumes increased by around five per cent, from 51,800 vehicles per day in 2013 to 54,400 vehicles per day in 2018 (see Figure 3). This increase was lower than both regional background trends and trends for A roads across the country over a similar period.

Figure 3 Changes in traffic between 2013 and 2018

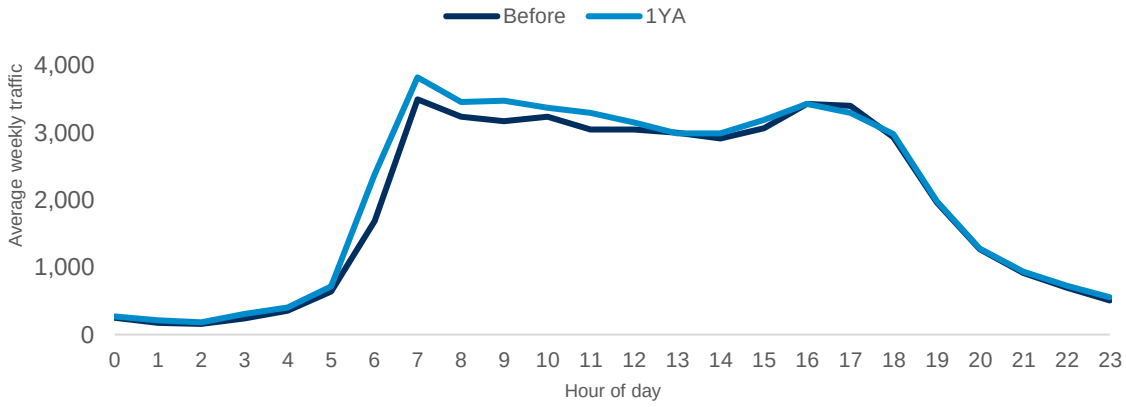


Note: Figures rounded to the nearest 100.
Source: National Highways WebTRIS.

4.2.3. How did daily patterns of journeys change?

We analysed the daily profiles of AWT in 2013 and 2018 on the northbound carriageway between Coal House and Lobley Hill interchanges to understand the project's impact on daily traffic patterns and whether the project's enhancements had permitted more people to travel at their chosen times. We found the bulk of the observed growth in AWT (Section 4.2.2) occurred in the morning and inter-peak periods. The appraisal expected less growth on the carriageway, with increases of around two per cent in each key time period (morning peak, interpeak, evening peak). We found the overall shape of the profile remained unchanged in 2018, with high traffic volumes across the day. Figure 4 shows the results. The findings may not be representative of changes across the whole project extent.

Figure 4 Comparison of average daily pattern of traffic volumes

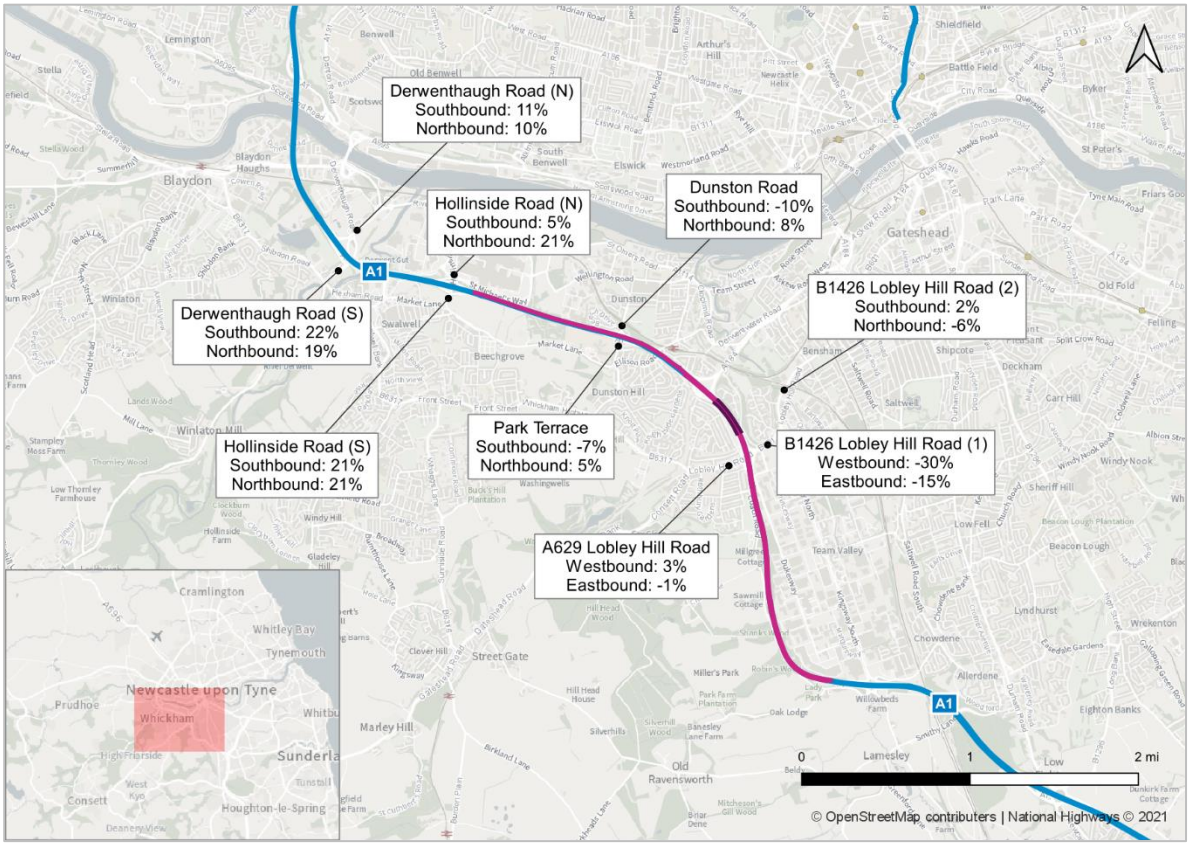


Note: Changes shown for the northbound carriageway between Coal House and Lobley Hill interchanges.
Source: National Highways WebTRIS.

4.2.4. How did traffic volumes change on local roads?

The limited traffic information for the A1 and for the parallel roads constructed between the Lobley Hill and Gateshead Quays interchanges made it difficult to draw firm conclusions on the project's impact on traffic volumes on the A1. To understand its impact on the wider road network, observations were undertaken on local roads adjoining the relevant A1 interchanges in the pre-construction (May 2013) and post-opening (June 2018) periods. The traffic counts were not factored for the analysis. Figure 5 shows the percentage changes.

Figure 5 Changes in average weekly traffic on local roads



Note: Changes are between 2013 and 2018.
Source: Atkins, Tracsis.

We found that traffic around Lobley Hill interchange fell substantially, by 15% and 30%. This evidence could support the appraisal's expectation that traffic would shift to the A1 southbound carriageway from Lobley Hill interchange to access the Team Valley Trading Estate from the Coal House interchange. At other points on Lobley Hill Road, traffic fell by lesser amounts or grew only marginally.

On the roads adjoining Dunston interchange, we found that traffic headed north increased in line with regional trends, while traffic heading south fell. On roads adjoining the Metro Centre and Derwenthaugh interchanges, beyond the project's extent, higher levels of traffic growth were observed. Traffic growth of between 19% to 22% was seen south of the A1.

We were unable to determine the impact of the local distributor roads constructed adjacent and parallel to the A1 to accommodate local traffic. No pre-construction traffic count data existed for comparison.

4.2.5. Was traffic growth as expected?

Where possible, we compared the project's observed traffic impacts to those expected in its appraisal to understand how accurate the forecasts were.[13] Forecasts were produced for key time periods on the A1 project extent and adjacent sections of the A1. These are detailed in Table 2 with an indication of whether evaluation was possible.

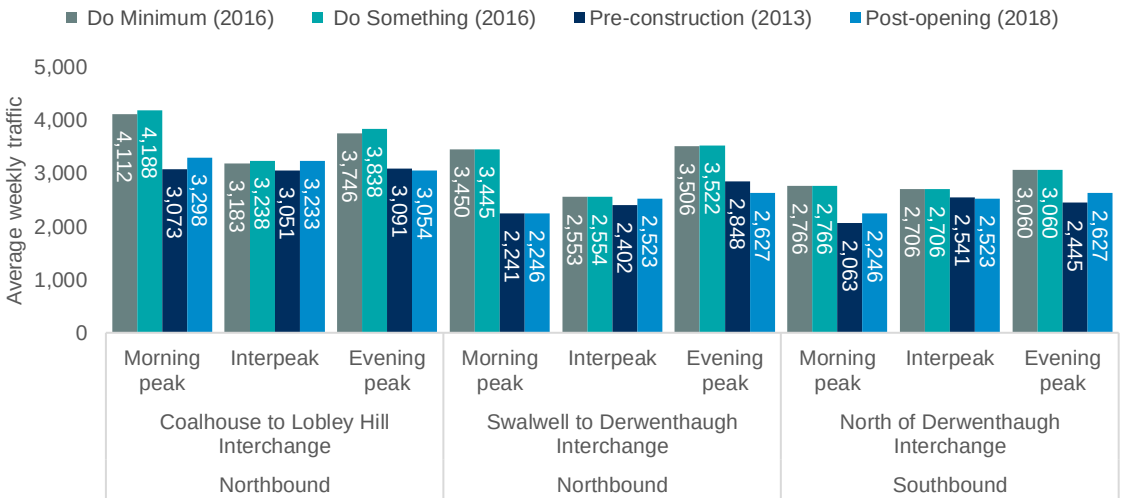
[13] The Do Minimum (without scheme) forecasts (May 2016) were deemed the best comparators for the pre-construction observed flows (May 2013). Correspondingly, the Do Something (with scheme) forecasts (May 2016) were deemed the best comparators for the post-opening observed flows (May 2018).

Table 2 Carriageways within project extent where changes were expected

Direction	Carriageway description	Within project extent	Assessed in evaluation
Northbound	Coal House to Lobley Hill	Yes	Yes
	Lobley Hill to Gateshead Quays	Yes	Not possible
	Swallwell to Derwenthaugh	No	Yes
Southbound	Metro Centre to Dunston	Yes	Not possible
	Dunston to Gateshead Quays	Yes	Not possible
	Gateshead Quays to Lobley Hill	Yes	Not possible
	Lobley Hill to Coal House	Yes	Not possible
	North of Derwentaugh	No	Yes

At the locations where evaluation was possible, we found the project was not expected to substantially increase traffic at the locations assessed. The appraisal expected larger traffic volumes in both the Do Minimum and Do Something forecasts than were observed, either before or after the project opened to traffic. The disparities were more evident in peak periods. However, the proportions and directions of change expected were relatively similar to those observed. The results are shown in Figure 6.

Figure 6 Comparison of forecast and observed changes in traffic on sections of the A1

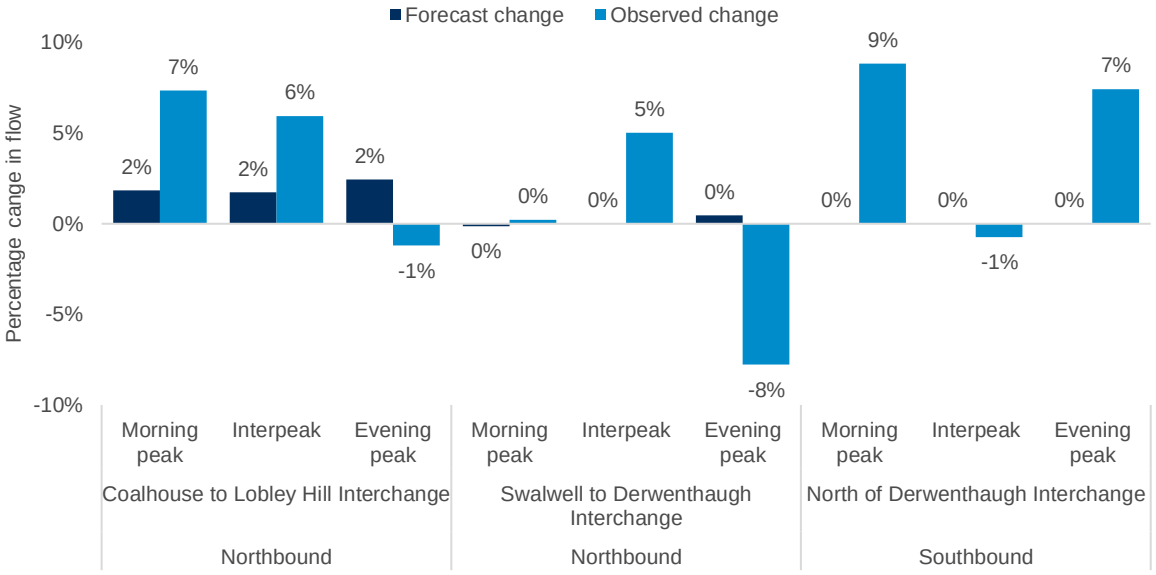


Source: A1 Traffic Forecasting Report and National Highways WebTRIS.

4.2.6. How accurate were the forecast flows for the project section?

To understand more about the accuracy of the traffic model and its forecasts for the locations evaluated, we compared the amounts of change expected with the amounts observed (Figure 7). The results indicated that the model generally expected more traffic in both scenarios, but the differences of the changes were within accepted ranges.[14]

Figure 7 Percentage changes in forecast and observed flows



Note: Changes displayed are between Do Minimum (without project) and Do Something (with project) forecasts versus change between pre-construction and post-opening observed.
Source: Forecasts: A1 Lobley Hill to Dunston Improvement (incorporating Coal House and Metro Centre extensions) Traffic Forecast Report v3 6th June 2014 (Atkins); Observed data: National Highways traffic count data WebTRIS.

4.3. Relieving congestion and making journeys more reliable

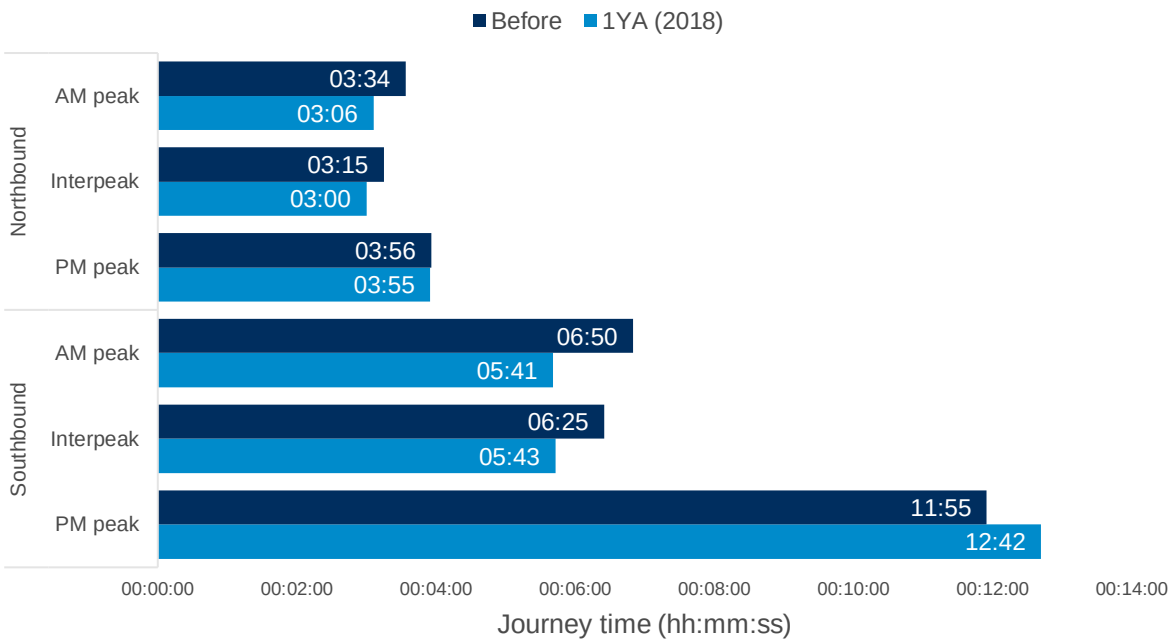
This section evaluates the project's impacts on journey times and the reliability of journeys.[15] We used satnav traffic information to assess the extent to which the journey times observed on the route varied from the average expected journey time. Comparisons of how this variability has changed over time can give an indication of the project's impact on the reliability of road users journeys. In turn, we can use this information to infer a project's impact on congestion. For this project however, the limited amount of traffic volume information available impacted our ability to draw firm conclusions.

4.3.1. Did the project deliver journey time savings?

First, we assessed the changes to average journey times on the A1 within the project extent. The results are shown in Figure 8.

[14] Traffic models are usually deemed acceptably accurate if the forecast flows are within 85% of the observed flows used to validate the model.
[15] To understand a scheme's impact on reliability, we compare the changes in the percentile ranges of a large sample of journey times, relative to the median journey time. A percentile represents the value below which a given percentage of data points in a sample lie. For example, the 20th percentile is the value below which 20% of the data points lie. It follows that 80% of the data points lie above the 20th percentile value.

Figure 8 Changes in average journey times at peak hours



Note: The project widened around three miles of the northbound carriageway between Coal House and the Gateshead Quays A184 interchanges, and around four miles of the southbound carriageway between Metro Centre and Coal House interchanges.
Source: TomTom satnav data, Before: 2013; After: 2018.

Road users' average journey times had improved in most of the key times of the day on the project extent. In the morning peak on the southbound carriageway, their journey times were improved by over a minute. In contrast, road users' journeys on the same carriageway in the evening peak had deteriorated by nearly a minute. The appraisal had expected speeds on the widened sections to increase.

To learn more, we compared average speeds over the project extent before construction and after opening.[16] The evidence pointed to a shift in congestion patterns on the southbound carriageway in the evening peak at one-year after (see Annex 1 Figure 23). Before the project, congestion was apparent between Metro Centre and Gateshead Quays A184 interchanges, where average speeds of 15 miles per hour were seen. Speeds improved further south between the Gateshead Quays A184 and Coal House interchanges.

At one-year after, speeds had improved between the Metro Centre and Gateshead Quays A184 interchanges, but congestion was apparent between the Gateshead Quays A184 and Coal House interchanges. The small number of active traffic counters limited the scope of our analysis, but it seemed likely the change in the pattern of congestion was due to capacity constraints beyond the improved section where the A1 remained a two-lane dual carriageway. So, the merger of three lanes of evening peak traffic to two lanes beyond Coal House interchange likely impacted traffic flows and speeds to produce the congestion observed.

We were able to obtain information on traffic volumes for a part of the northbound carriageway. This suggested the project's capacity improvements had had a positive impact in improving road users' northbound journey times. The

[16] It should be recalled that speeds on the A1 were already limited to 50mph by Statutory Order in 2010 as a measure to manage congestion.

improvements in the morning and interpeak were achieved against a backdrop of increased traffic volumes on the section (see Figure 7).

4.3.2. Were journey time savings in line with forecast?

For the appraisal, journey time saving forecasts were produced for two sub-routes rather one continuous route. Together these two sub-routes covered a stretch of the A1 greater than that of the project.[17] It was assumed this approach was adopted due to changes in the project's extent during the development process.

Route 1: Coal House interchange to Dunston interchange

The appraisal anticipated the project would produce journey time savings in all time periods on both the northbound and southbound carriageways of Route 1 (Figure 9). The largest savings, of more than a minute and a half, were expected in the morning. Savings of less than a minute were expected in other time periods.

We found savings in the morning peak and interpeak on both carriageways were achieved, but not to the extent expected. In the evening journey time, disbenefits of over two and a half minutes were observed southbound between Dunston and Coal House interchanges.

Route 2: Dunston interchange to Derwenthaugh interchange

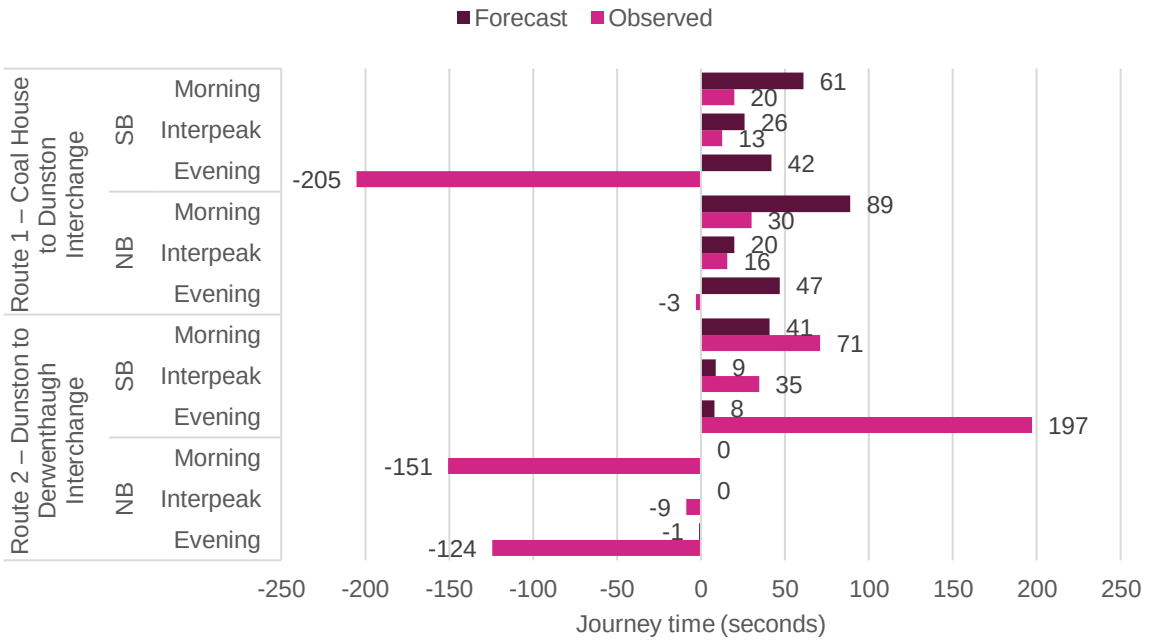
The appraisal anticipated the project would produce journey time savings on the southbound carriageway of Route 2, and few or no savings on the northbound carriageway. On the southbound carriageway between Derwenthaugh and Dunston interchanges, we found savings of more than three minutes were achieved in the evening peak, substantially more than the eight seconds expected. And in the morning, we found savings of around 70 seconds were achieved, more than the anticipated 40 seconds. Journey time disbenefits were observed in the morning and evening peaks on the northbound carriageway between Dunston and Derwenthaugh interchanges. These were not expected.

The impact of changes in traffic volumes could not be assessed.[18] The comparison of cumulative average speeds before and after the project provided some qualitative insight (see Appendix A). The disbenefits observed on the northbound carriageway between Dunston and Derwenthaugh interchanges indicated that the disbenefits were initiated 'upstream'; that road user's average speeds were more consistent before the project's implementation. At one-year after, road users' average speeds in the morning began to progressively decline after the Gateshead Quays A184 interchange in the morning (Figure 18), and from before Lobley Hill interchange in the evening (Figure 22).

[17] 'Route 1' extended from Coal House interchange to Dunston interchange, 'Route 2' extended from Dunston interchange to Derwenthaugh interchange. Each sub-route incorporated the respective northbound and southbound carriageways. See Figure 1 for more information.

[18] It should be recalled that within the project's extent, traffic volume information could only be obtained for the northbound carriageway between Coal House and Lobley Hill interchanges (see Section 4.2.2).

Figure 9 Forecast and observed changes in journey times

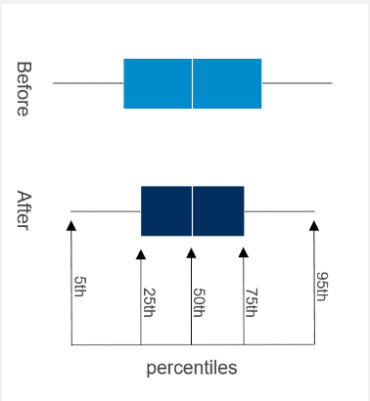


Source: A1 Lobley Hill to Dunston Improvement (incorporating Coal House and Metro Centre extensions) Traffic Forecasting Report version 3 (6th June 2014) (Halcrow Hyder) and TomTom satnav data.

4.3.3. Did the project make journeys more reliable?

One of the project's objectives was to improve the reliability of road users' journeys by making them more predictable. If the time taken to travel the same journey each day varies, we are less confident in planning how long our journey will take. If journey times do not vary, we can be more confident and allow a smaller window of time to make that journey. In contrast to the appraisal of journey time savings, the appraisal of journey time reliability focused solely on the project extent. As a result, we focused our analysis to the changes within the project's extent.

Figure 10 What does a box plot show?



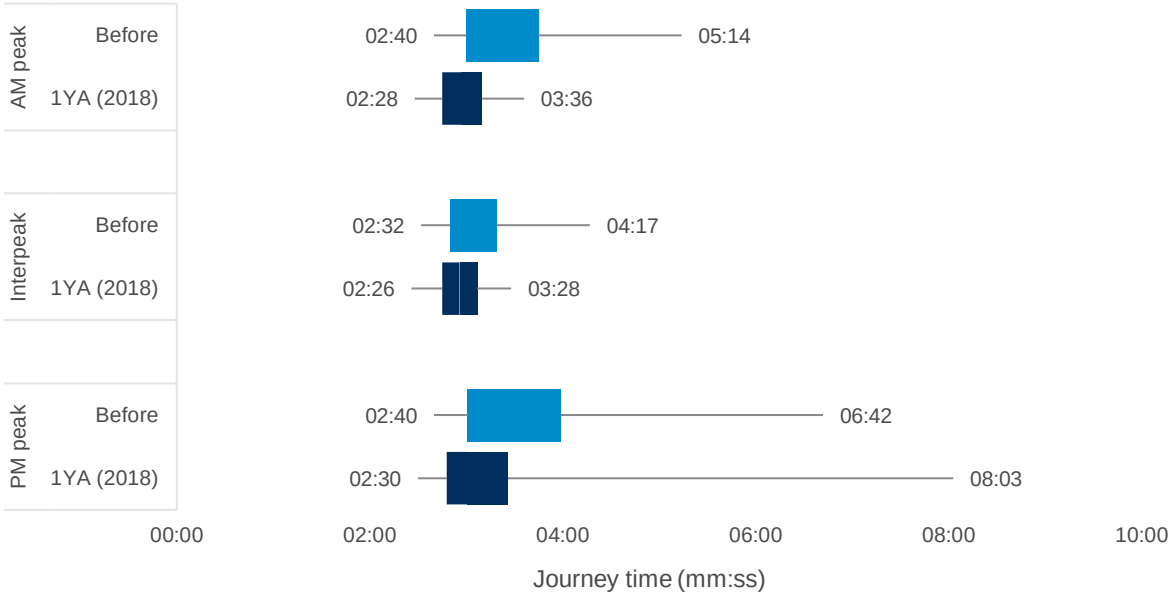
The leftmost point is the fifth percentile of journey times, the point below which just five per cent of journeys in the sample are faster. The rightmost point is the 95th percentile, the point below which 95% of journeys are faster. Together the two points show the difference between the shortest and longest journey times, disregarding outliers.

The width of the block in the middle marks the bulk of journeys, the 50% of journeys lying between the 25th and 75th percentiles. The smaller the block, the less variable average journey times are, and so the more reliable they are.

Reliability and journey times are closely related and the results mirror those for journey times discussed earlier (section 4.3.1). At one year after, journeys for the bulk of road users had become more reliable in most time periods within the project extent. The exception was southbound carriageway in the evening peak where

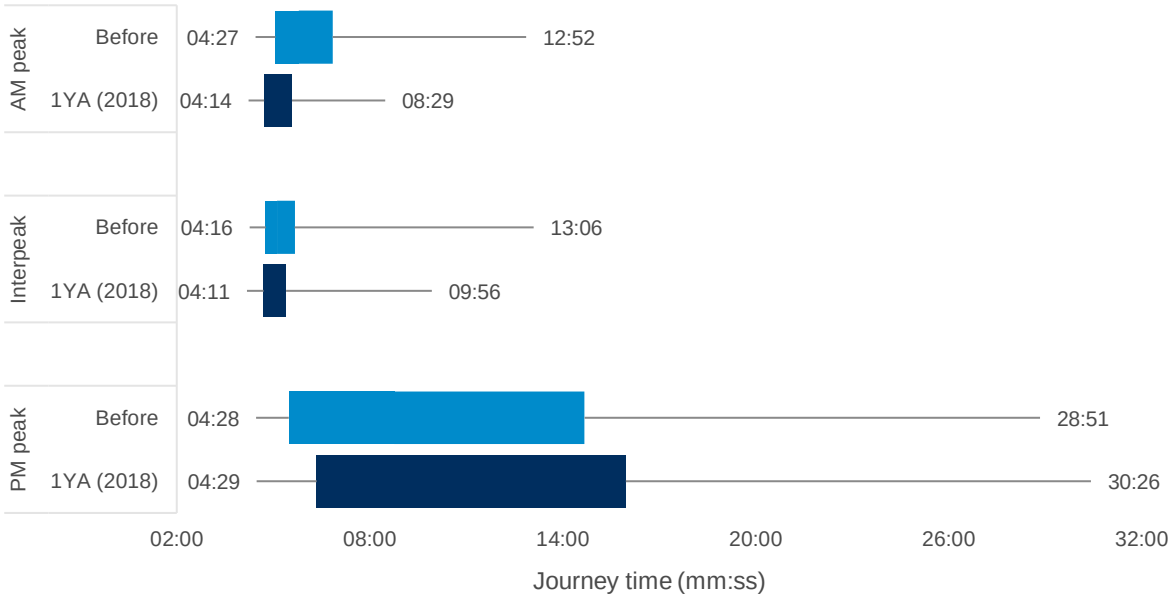
reliability had deteriorated. The reasons were unclear, though analysis of average speeds over distance suggested a shift in congestion in the evening had occurred. Figure 11 shows the results for the northbound section and Figure 12 shows the results for the southbound section.

Figure 11 Journey time reliability for northbound journeys



Source: TomTom satnav data. Before: 2013; After: 2018.

Figure 12 Journey time reliability for southbound journeys



Source: TomTom satnav data. Before: 2013; After: 2018.

5. Safety evaluation

5.1. Summary

We found early positive evidence to suggest the project's safety objective to reduce the severity of casualties per year compared to the before project baseline was on track to be achieved. The numbers and rates of personal injury collisions[19] per million vehicle kilometres at one year after opening (the 'after period') were both lower than the annual averages for the five-year period before the project's construction (the 'before period').

18 personal injury collisions occurred on the project extent in the after period, a reduction in comparison to the average of 25 for the five-year before period. Furthermore, we estimated the counterfactual range for personal injury collisions on the project extent would likely have been 13 to 42 (Figure 14).

The decline in personal injury collisions seen on the project extent in the after period, compared to average of the before period, was greater than the decline expected in the appraisal. A fall of around two was expected;[20] a fall of seven was observed.

The decline in collision numbers on the project extent had occurred while road users' speeds had increased in many key parts of the day. However, the impact of changes in traffic volumes was difficult to assess. It will be important to check how the positive trends develop in the follow-up evaluation, as traffic growth in future years is likely.

5.2. What safety improvements were forecast?

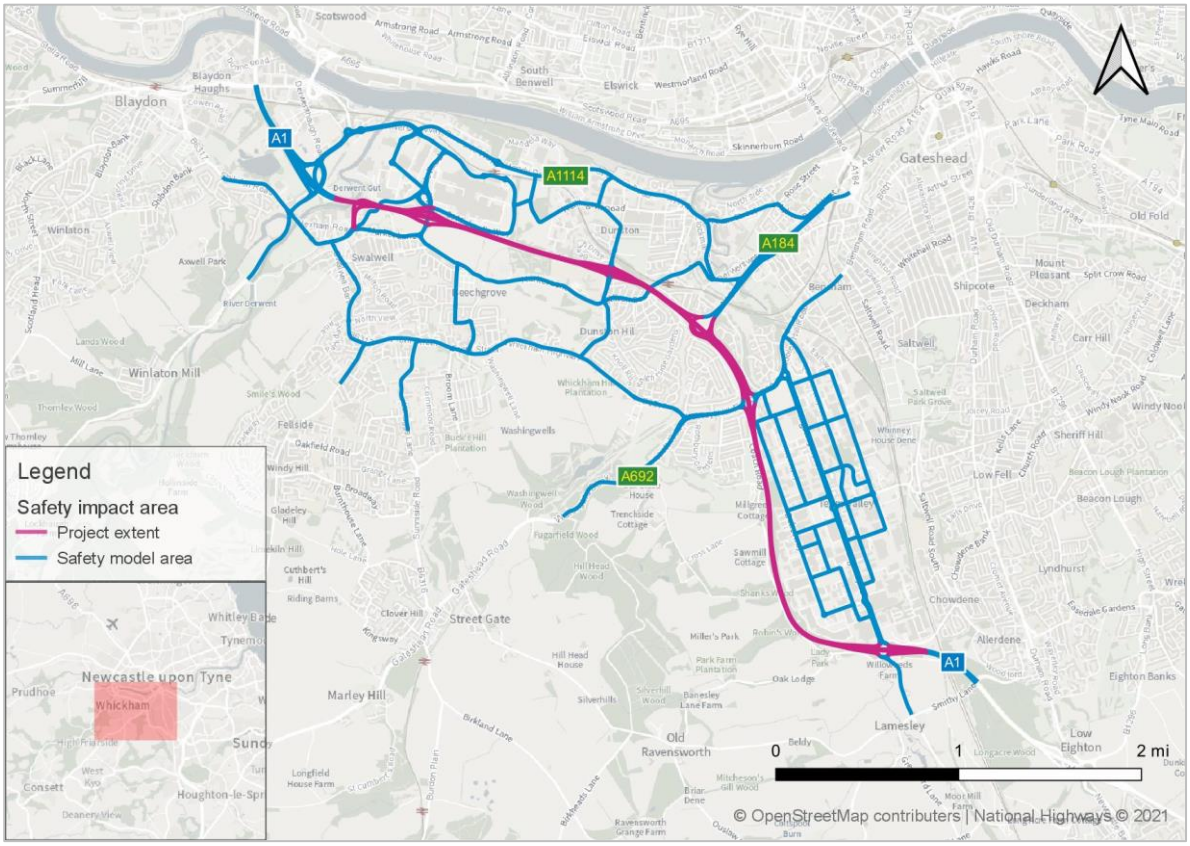
The project's appraisal predicted that the overall number of personal injury collisions in the safety impact area would fall by an average of four per year after it opened to traffic.[21] It was forecast that, over the 60-year appraisal period, the number of collisions on the project extent would be reduced by 143, while the number of collisions on roads in the wider area would be reduced by 109.

5.2.1. Safety study area

The safety study area incorporated the project extent and a 'wider area' of strategic and local roads surrounding the project (see Figure 13). It was used in the project's appraisal to determine the likely safety impacts, in combination with other predictions such as those for traffic growth. We replicated the appraisal's study area to understand whether safety trends had changed over the evaluation period.

[19] A collision that involves at least one vehicle and results in an injury to at least one person.
[20] Average of 2.38 per year based on a reduction of 143 collisions on the project extent over the 60-year appraisal period.
[21] Average of 4.2 per year based on a reduction of 252 personal injury collisions over the whole safety study area over a 60-year appraisal period.

Figure 13 Safety study area



Source: National Highways and OpenStreetMap contributors.

5.3. What are the emerging safety trends?

We assessed changes in safety over time by looking at the trends in relevant safety data in the five years before the project was constructed up to and including the first 12 months after the project opened to traffic.[22] We considered only those collisions that resulted in personal injury and produced an average number per year for each of the following periods:

- Pre-construction: 1 September 2009 to 31 August 2014;
- Construction: 1 September 2014 to 31 August 2016; and
- Post-opening: 1 September 2016 to 31 August 2017.

The results provided an early indication of safety trends.[23] We found that the number of personal injury collisions for the one-year after period were lower than average for the before period. 18 personal injury collisions occurred in the one-year after period compared to an average of 25 per year in the before period.

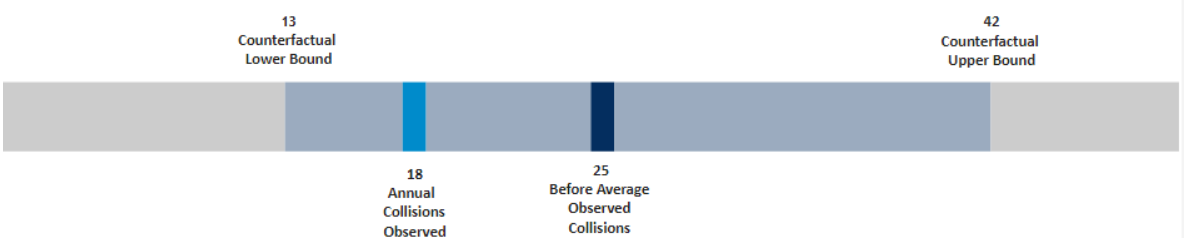
As well as comparing what occurred, we also estimated what the trend in personal injury collisions might have been had the project not been implemented. This is referred to as counterfactual analysis (see Annex 2: Safety counterfactual

[22] We obtained safety data from Department for Transport Road Safety Data. These data consist of records of incidents on public roads reported to the police.
[23] The results were deemed indicative due to the relatively small amount of data available for the after period. A longer timeframe over which more data can be gathered will be required before firmer conclusions can be drawn. We will carry out a further evaluation to assess long-term impacts.

Methodology) and was based on changes in regional safety trends for dual carriageways with high volumes of roads users.

In the counterfactual, we estimated that had the improvements not been implemented the number of personal injury collisions would likely have increased, while collision rates would have remained stable. Personal injury collisions would likely have ranged between 13 and 42 per year. Recall that 18 personal injury collisions were observed during the first year of the post-opening period (see Figure 14). These results were encouraging. The project's appraisal predicted that the number of personal injury collisions would fall by an average of four per year after its implementation.[24] Given the above results, this outcome will likely be achieved.

Figure 14 Annual average number of personal injury collisions on the project extent



Source: STATS19: 1 September 2009 to 31 August 2017.

5.4. How have traffic volumes impacted collision rates?

Our projects are often implemented on some of the country's busiest routes. It is important to contextualise the incidents that occur on our routes against the volumes of traffic they occur in. We therefore calculate collision rates for our routes: the number of collisions per annual million vehicle kilometres (mvkm) travelled.

On the project extent, the collision rate for the before period was 0.07 collisions per million vehicle kilometres. We found the collision rate for the one year after period to have fallen to 0.02 collisions per million vehicle kilometres. This equated to road users travelling almost 28 million vehicle kilometres on the project extent before an incident occurred. In the counterfactual, we estimated the collision rate would have remained the same as that of the before period. This suggested that the project had had a positive impact on collision rates on the A1.

5.5. Why is analysis of collision severity not feasible?

The way the police record the severity of road safety collisions changed over the time course of the evaluation. There was a shift to a standardised reporting tool known as CRASH (Collision Recording and Sharing). CRASH is an injury-based reporting system, and severity is categorised automatically by the most severe injury. Previous reporting methods relied on the attending police officer to categorise severity.[25] This has led to some disparity between the datasets.

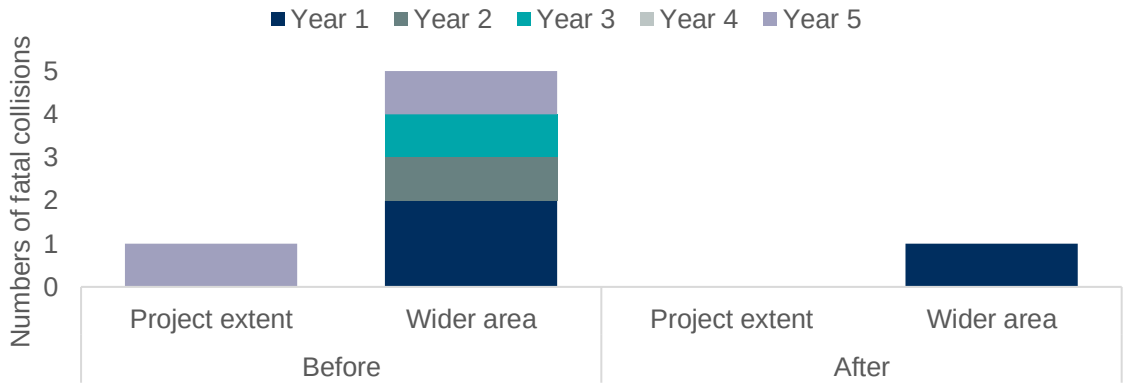
For this evaluation, one reporting mechanism was mainly used before the project's implementation and another one afterwards. This impacted the severity

[24] Based on a reduction of 634 personal injury collisions over the 60-year appraisal period.
[25] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820588/severity-reporting-methodology-final-report.odt

categorisation for serious and slight collisions and means results would be unreliable. We have not reported on these. For more detail see Annex 2. Categorisation of fatal collisions were not affected by the changes, so we are able to report these.

One fatal collision was reported on the project extent in the 5-year before period and none were reported in the first year after opening. Five fatal collisions were reported in the wider study area in the 5-year before period and one fatal collision was reported in the wider in the first year after the project opened (see Figure 15).

Figure 15 Number of fatal collisions over evaluation period



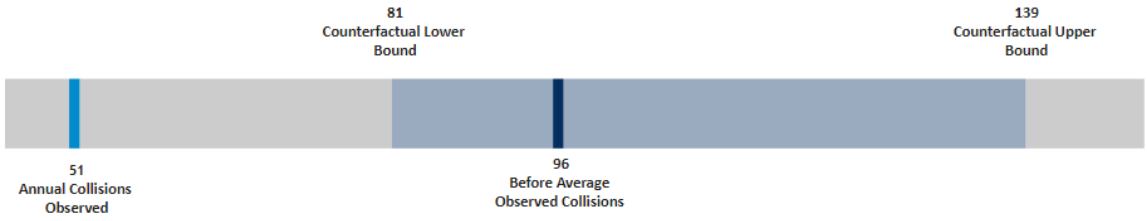
Note: The before period covers 5 years, the after period covers one year.
Source: STATS19: 1 September 2009 to 31 August 2017.

5.6. Changes in safety trends on other parts of the strategic and local road network

We assessed whether there had been any changes in personal injury collisions in the wider impact area over the evaluation period. This wider impact area was defined in the project's appraisal (refer to section 5.2.1 for more detail).

We found evidence to suggest the project had positively impacted on the safety of the surrounding road network, as anticipated in the appraisal (see Figure 16). In the wider safety area, the average number of personal injury collisions per year had reduced, from an average of 96 per year in the five-year before period to 51 in the first year after opening. There were on average 45 fewer personal injury collisions per year in the wider safety area. In the counterfactual scenario, we estimated that the safety trends across the wider area would be within a range of 81 to 139 personal injury collisions per year. This was above the 51 observed in the first year after opening.

Figure 16 Annual average number of personal injury collisions on the project and wider study area



Source: STATS19: 1 September 2009 to 31 August 2017.

6. Environmental evaluation

6.1. Summary

The evaluation of environmental impacts uses information on the predicted impacts gathered from the environmental appraisal and the environmental assessment report (EAR). This information is then compared with findings obtained after the projects have opened for traffic. The observed impacts have been determined during a site visit in July 2018, supported by desktop research. The results of the evaluation are recorded against each of the environmental and society sub-objectives and presented in Table 3.

Our evaluation of noise, air quality and greenhouse gases has been affected by the absence of traffic data of sufficient quality and coverage across the route. For noise, it has not been possible to draw firm conclusions and these impacts will be reviewed during our five-year after evaluation when more data may be available. For air quality, we were able to review both predicted air quality concentrations from the air quality assessment and actual monitoring data from Gateshead MBC and this confirmed that, as expected, no significant effects have occurred. For greenhouse gases, we were unable to quantify the change, but data does suggest emissions have increased in line with forecasts although changes in regional traffic growth may also be contributing.

Our site visit has observed impacts to landscape and the visual amenity. New woodland and hedgerow planting is in place as expected although maintenance will need to be improved if the impacts are to be mitigated in the long-term. The use of shotcrete at Gateshead Quays was a design change that was implemented to manage the ground conditions encountered during construction. However, the large expanse of concrete has increased the sense of urbanisation and had a detrimental effect on the views and journey ambience for road users. We consider the impacts on both townscape and journey quality are worse than expected.

We have considered impacts on heritage of historic resources. These have been limited to the setting of a small number of listed building and, as replacement screen planting establishes, the impacts will be reduced as expected. The impacts on biodiversity have also been confirmed to be limited to within the highway's boundary. Mitigation planting is in place, but we have concerns over the establishment of some habitats especially some species-rich grasslands. Maintenance will need to be improved and so at one-year after, it is too early to say that the long-term outcome will be met. The impacts to the water environment appear to be as expected and at one-year after we have seen no evidence to suggest the new drainage system and balancing pond are not functioning as expected.

The existing A1 already impacted on the movement of people between their homes and community facilities and business. The project has not changed that. The existing footpath cycleway overbridge at Chiltern Gardens has been replaced and there have been some improvements to existing footpaths, but these are unlikely to have any significant impact on severance or levels of physical activity. Impacts on physical activity and severance remain unchanged as expected.

6.2. Noise

The environmental appraisal predicted that the opening of the project would cause adverse noise impacts. However, a low noise surface would be laid along the project and an existing noise barrier at Lady Park would be realigned. These mitigation measures would reduce the impacts and, overall, the adverse impacts were predicted to be negligible.

Our evaluation has shown that a low noise road surface has been laid along the route and a new noise barrier at Lady Park has been provided. However, there is insufficient traffic data available to allow us to compare the observed traffic flows against the forecasts used in the noise assessment. This means we have been unable to determine the implications of any differences. Although the mitigation has been provided, we are unable to evaluate the noise impacts at one-year after and we will reconsider them again at five-years after when more data may be available.

6.3. Air quality

The environmental appraisal identified that there were existing locations within the study area where the annual average (mean) concentration of nitrogen dioxide exceeded the UK air quality objectives. However, the appraisal predicted that changes in traffic flows and speeds due to the project would lead to imperceptible changes in air quality and no significant effects would occur.

This evaluation has been unable to consider the impact of differences in observed and forecast traffic flows and speeds on the predicted air quality impacts. This is because there is insufficient observed traffic data available for the opening year to allow suitable comparisons to be made. We have reviewed air quality monitoring data published by Gateshead Metropolitan Borough Council for 2017 and compared this against the predicted opening year air quality concentrations for similar locations from our environmental assessment. Our predicted concentrations of nitrogen dioxide and the monitored concentrations are broadly similar, with no locations showing monitored results exceeding the UK air quality objectives. This evidence suggests that changes in air quality due to the project are not significant as expected within the appraisal.

6.4. Greenhouse gases

The environmental appraisal predicted that the introduction of the project would increase greenhouse gas emissions leading to a slight negative impact. Over 60 years, it was forecast that the total emissions across the entire modelled area would increase by 41,449 tCO_2e.[26]

We have insufficient traffic data to allow a meaningful comparison of predicted and observed carbon emissions along the project extent to be made. The traffic data we have suggests that traffic flows have increased and changes in HGVs are broadly in line with forecasts, but this is not representative of the entire route. Based on these broad conclusions, it is likely that greenhouse gas emissions will have increased as predicted in the appraisal, but it is not possible at this stage to quantify the change or to distinguish between emissions that may be as a result of

[26] tCO_2e stands for tonnes (t) of carbon dioxide (CO_2) equivalent (e). A 'tonne' is a metric ton or 2,200 pounds. 'Carbon dioxide equivalent' is a standard unit for counting greenhouse gas (GHG) emissions regardless of whether they're from carbon dioxide or another gas, such as methane. Source: https://www.climateneutral.org/faq (accessed 28/01/2021).

regional traffic growth. We will re-examine this during the five-years after evaluation to see if further data allows firmer conclusions to be made.

6.5. Landscape

The environmental appraisal predicted that the loss of vegetation within the highway estate caused by the road widening would lead to local changes to landscape character areas and views from local residential areas immediately adjacent to the A1. However, it predicted that in the medium- to long-term (over a 15-year period) the effects would reduce to neutral as new mitigation planting established.

The site visit has confirmed that the observed impacts are largely as predicted. Vegetation has been lost from within the highway's boundary however the effects of these impacts are localised. The gantry at Lady Park wasn't built, but lighting and the relocated noise barrier mean that the A1 is still a prominent feature. Mitigation is largely in place as expected. Maintenance reports for 2017 suggest that mitigation planting was doing well but in 2018, when the site visit was carried out, the situation had changed. Many of the planting plots were overgrown and weeds were commonplace. At one-year after, the impacts are broadly as expected but maintenance regimes will need to be improved if the desired long-term outcomes are to be met.

6.6. Townscape

The environmental appraisal predicted that the loss of vegetation within the highway estate caused by the widening would lead to local change to adjacent townscape character areas and the streetscape of residential areas immediately adjacent to the A1. The most notable changes were predicted to be experienced by residential properties within the vicinity of West Way and Chiltern Gardens and around the A184 Gateshead Quays junction. In these areas, vegetation clearance would be extensive. In most locations it was predicted that it would be possible to mitigate the most significant effects through hydroseeding of steepened slopes, replacement planting and the installation of timber visual barriers. Overtime it was predicted that the new planting would have established and created a linear landscape feature and visual barrier similar to the pre-project situation. It was recognised that not all impacts would be fully mitigated but overall the impact of the changes would in the medium- to long-term reduce to slight adverse.

The evidence gathered as part of the site visit has confirmed that the observed impacts at many locations are largely as predicted. The extent of vegetation clearance varies along the route but mitigation planting, hydroseeding and timber visual screens have been provided to minimise the visual and townscape impacts. Some off-site planting has also been done near Chiltern Gardens. At Gateshead Quays junction the expected vegetation clearance has taken place, but geotechnical issues were encountered that meant that the slopes had to be cut steeper to remain within the highway boundary. This has meant that the expected replanting using hydroseeding techniques did not take place. Instead, shotcrete was used to stabilise the slopes which has increased the sense of urbanisation, impacted the retained trees at the top of the embankment and increased the adverse effects.

Figure 17 View of shotcrete at Gateshead Quays and replacement Chiltern Gardens footbridge cycleway

Note: A pre-construction image can be viewed at Google Maps Street View for comparison.
Source: site visit July 2018.

We consider that, provided the new planting is maintained, most impacts will be minimised as expected. However, the use of shotcrete at Gateshead Quays has adversely affected the mitigation of the townscape impacts of the project here, and so overall the impacts will be worse than expected.

6.7. Heritage of historic resources

The environmental appraisal predicted that the construction of the project would impact the setting of a small number of sites of cultural heritage value along the boundary of the project. These impacts would be caused by vegetation clearance opening up new views of the road including the listed buildings near Ravensworth Castle conservation area. New planting would be provided to place the vegetation lost and to minimise impacts of the setting of the heritage resources. Once the replacement planting matures, it was predicted that the impacts would be nearly completely reversed. Overall impact was predicted to be slight adverse.

The evidence gathered as part of the site visit has confirmed that vegetation had been lost to accommodate the extra north bound lane and this has opened up views to the A1 which previously hadn't existed. This was particularly the case at Ravensworth. New planting was in place and, whilst the plot was overgrown, the trees and shrubs appeared to be establishing. Provided the plots are managed and they establish it should achieve its intended mitigation function. Overall, the impacts are as expected.

6.8. Biodiversity

The environmental appraisal predicted that the widening of the A1 would cause the loss of habitats within highway soft estate. This would include impacts on plantation woodland, scrub and semi-improved grassland. Habitats beyond the highway boundary would not be directly affected. Mitigation measures would be implemented during construction to avoid impacts to nesting birds, badgers, great crested newts and other species. Following completion, verges would be

reinstated, and new planting would be provided to minimise habitat loss. Overall, the effects of the minor loss of habitat would be slight adverse.

The evidence gathered during the site visit has confirmed that impacts to habitats were confined to within the highway boundary. New replacement planting including species-rich grasslands, hedgerows and trees have been provided and measures to eradicate Japanese knotweed found on site have been taken. However, gaps in the asset data provided have limited what assets could be identified. The species-rich grasslands created will take time to establish, but poor soil conditions, especially within the A184 junction, will affect their success. Stone picking and appropriate maintenance will be required if the predicted long-term outcomes are to be achieved. Overall, we consider that it is too early to be confident that the predicted long-term outcomes will be met. This should be reviewed again during the five-years after evaluation when more should be known about the success of the maintenance and establishment works.

6.9. Water environment

The environmental appraisal predicted that the key impacts of the project would be increases in routine road runoff caused by road widening. There would also be changes to the risk of spillages from road accidents and changes to flood risk. These impacts would be managed through the road design and additional capacity within the drainage system. A new underground storage tank at Gateshead Quays and new pollution control devices would also be provided. These measures would mitigate the project impacts and, overall, the impacts were predicted to be neutral.

A formal audit of the whole drainage system is not part of the evaluation methodology, but new drainage measures were observed during the site visit. These appeared to be functioning correctly. The drainage design was changed during construction and the underground tanks at Gateshead Quays have been replaced with a balancing pond within the junction slip roads. The pond was empty during the site visit, but inlets and outlets appeared unobstructed and in order. The use of shotcrete on the embankments at Gateshead Quays may change drainage flows but no evidence has been seen to suggest that the drainage system is not coping. This should be reviewed during the five-years after evaluation. Overall, we consider that the impacts at one-year after are as expected.

6.10. Physical activity

The environmental appraisal predicted that the impacts would be neutral. This was because there would be no permanent changes to the location or length of existing footpaths and cycleways. Diversions would be in place during construction, but these would be temporary, and no lasting effects were expected.

Our evaluation site visit has confirmed that the project has not made any changes to the existing footpaths and cycleways likely to change physical activity significantly. A new footbridge cycleway has been constructed at Chiltern Gardens to replace an existing crossing. The path on the east of the replacement footbridge connecting to Norwood Road has been widened and resurfaced. Whilst these are additional improvements, they are unlikely to encourage significant increases in physical activity. Overall, we consider that the impacts are as expected.

6.11. Severance

The environmental appraisal predicted that all existing crossing facilities for drivers and non-motorised users such as pedestrians and cyclists would be retained as part of the proposed project. The project was not expected to change access to and from local community services so, overall, the impacts were predicted to be neutral.

Our evaluation has confirmed that all the impacts on severance were limited to within the project boundary and were temporary during construction. All existing access routes connecting the community with local facilities have been reinstated. Improvements have been made to some footpaths and cycleways, but these are minor, and we don't consider these will have reduced severance to any significant degree. Overall, we consider the impacts are as expected.

6.12. Journey quality

The appraisal predicted that the project would affect driver views by removing woodland planting from along the boundary and by adding new signs and gantries. However, the route is mostly urban, and the enclosed views would gradually return as new planting matures creating views similar to those before the project. The additional lane would add capacity, improve congestion and provide some benefits that should reducing driver frustration. Overall, it was predicted that the impacts on journey quality would be neutral.

Our evaluation site visit considered the impact of the project on driver views. The new woodland planting should recreate the pre-construction views along much of the corridor and, over time, drivers will become accustomed to the new signage and gantries. However, the loss of woodland and use of shotcrete has significantly increased the sense of urbanisation at Gateshead Quays. This has adversely affected driver views. The new lane has added capacity and so likely to have reduced driver stress, but limitations with the traffic data has meant that it is difficult to measure these improvements. We consider that the use of shotcrete will have a lasting effect on journey quality along the route and so the impacts are likely to be worse than expected. We will review this during our five-years after evaluation to see if the effects of time reduce the impacts.

6.13. Overview

Table 3 Summary of environment evaluation against objectives

Sub-objective	Appraisal Summary Table Score	One-year Evaluation	Summary
Noise	-	Too early to say	Due to the unavailability of traffic data of suitable quality and issues with the quality of asset data, it is not possible to comment on the observed impacts of the project. This should be reviewed at five-years after.

Sub-objective	Appraisal Summary Table Score	One-year Evaluation	Summary
Air quality	Not significant	As expected	Suitable traffic data is unavailable and could not be used to support the evaluation. A comparison of monitoring data from Gateshead MBC against modelled results in the environmental assessment report shows that the results are broadly consistent and supports the predictions in the environmental assessment.
Greenhouses gases	-	As expected	Insufficient traffic data is available to undertake an outturn calculation. Based on qualitative information available on traffic changes, it's likely emissions have increased but it is not possible at this stage to quantify the change or to distinguish between emissions that may be as a result of normal background trends.
Landscape	Neutral	As expected	The observed impacts on the landscape are limited to within the highway's boundary. The effects are localised to areas immediately adjacent to the A1. The mitigation appears broadly as expected. However, if current poor maintenance isn't improved there is a risk that the long-term design outcome will not be achieved.
Townscape	Slight adverse	Worse than expected	The loss of vegetation is limited to the highway's boundary and the effects are limited to character areas immediately adjacent to the A1. However, the use of shotcrete has caused a greater sense of urbanisation and it is difficult to see how this can be mitigated to achieve the original design outcome.

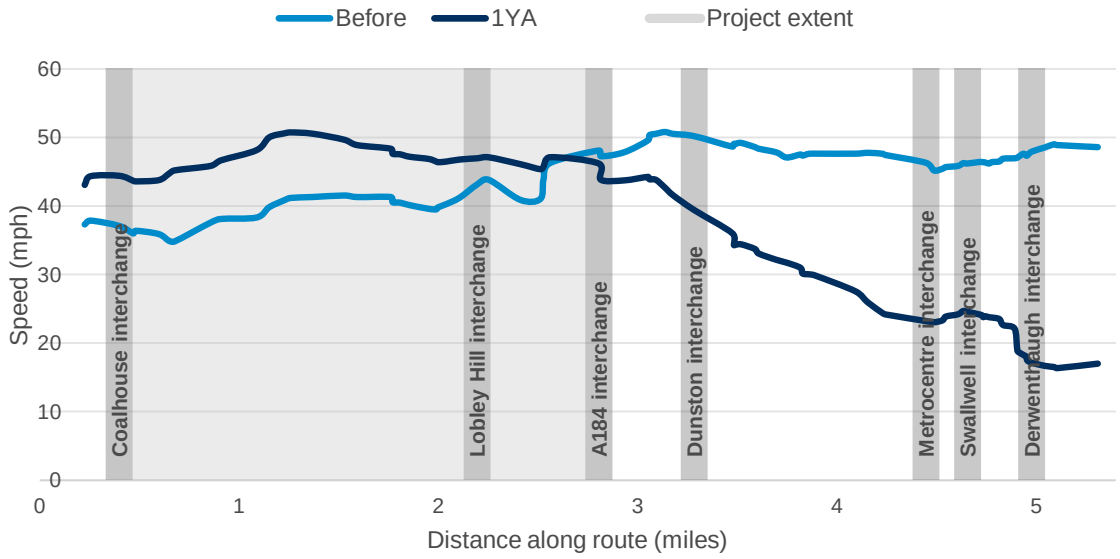
Sub-objective	Appraisal Summary Table Score	One-year Evaluation	Summary
Heritage of historic resource	Slight adverse	As expected	Impacts have been limited to the setting of two listed buildings immediately adjacent to the project. Screen planting has been introduced and, provided maintenance improves and it establishes, it should deliver the intended level of mitigation.
Biodiversity	Slight adverse	Too early to say	Impacts to habitats are as expected but it is unclear if all the mitigation and off-site planting proposed has been undertaken. There are maintenance issues and the species-rich grassland at Gateshead Quays requires attention if it is to deliver its desired outcome.
Water environment	Neutral	As expected	The drainage network appears to be installed as expected and no evidence has been presented to suggest that it isn't functioning correctly. This should be confirmed at five-years after.
Physical activity	Neutral	As expected	There have been no changes to the location or the length of existing NMU routes although the existing footpath linking Chiltern gardens to Norwood Road has been upgraded to facilitate cyclists. As there is no pre-construction survey data, it is not possible to evaluate whether the upgrade to the path has had any impact on the nature and number of users. The impact on physical activity is therefore considered to be as expected.
Severance	Neutral	As expected	The site visit has confirmed that the impacts are as expected. Whilst one footway has been improved, no evidence has been provided to suggest that this has had any significant effect on the level of existing severance caused by the A1.

Sub-objective	Appraisal Summary Table Score	One-year Evaluation	Summary
Journey quality	Neutral	Worse than expected	The use of shotcrete at the A184 Gateshead Quays junction has increased the sense of urbanisation leading to a worsening in the predicted views of vehicle travellers.

Annex 1: Average speeds over distance plots

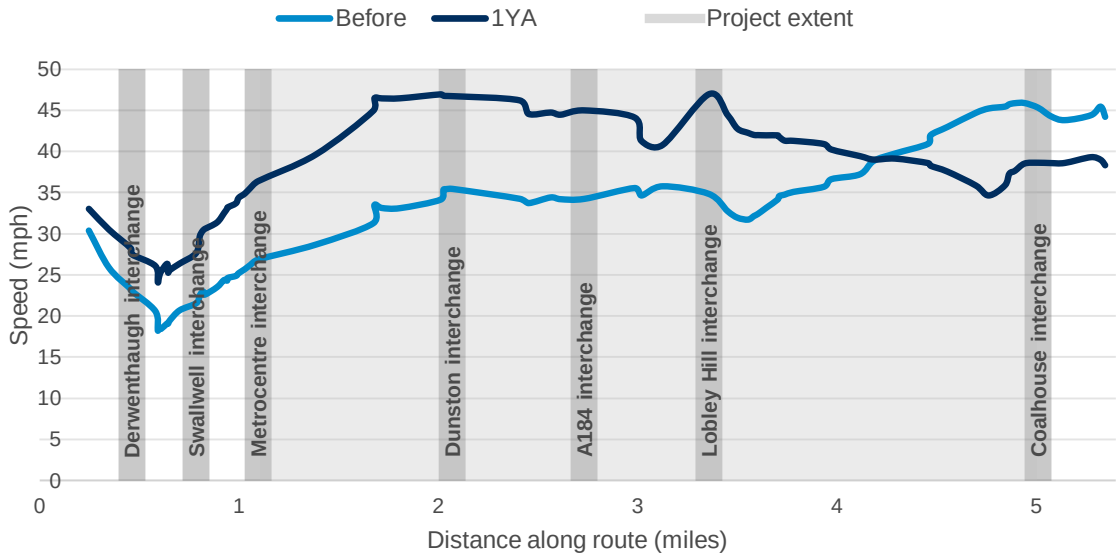
Presented below are plots of harmonic average speeds over distances for each key time period per direction.[27]

Figure 18 Comparison of northbound harmonic average speeds – morning



Source: TomTom satnav data. Before: 2013; 1YA: 2018.

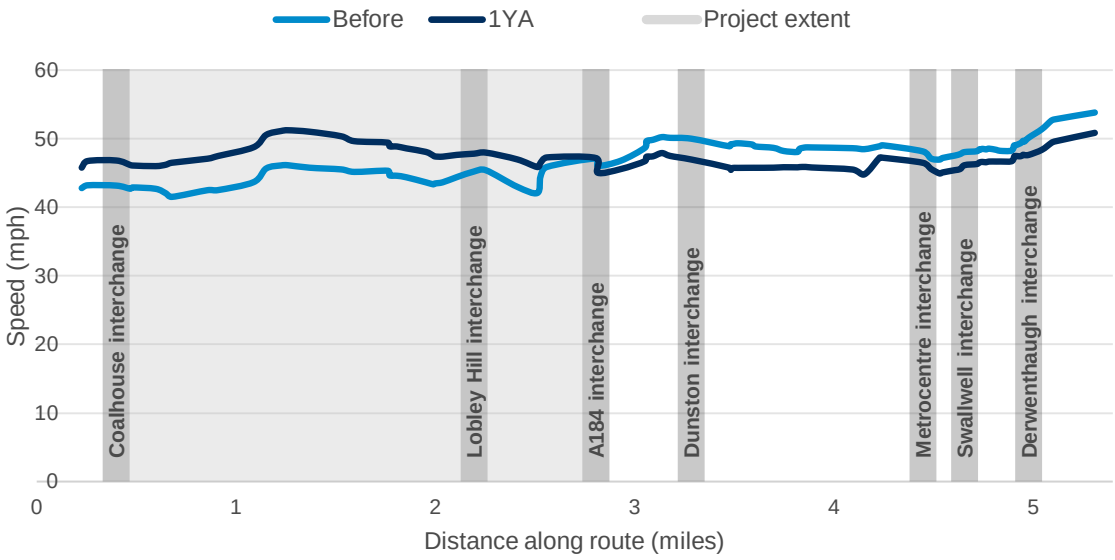
Figure 19 Comparison of southbound harmonic average speeds – morning



Source: TomTom satnav data. Before: 2013; 1YA: 2018.

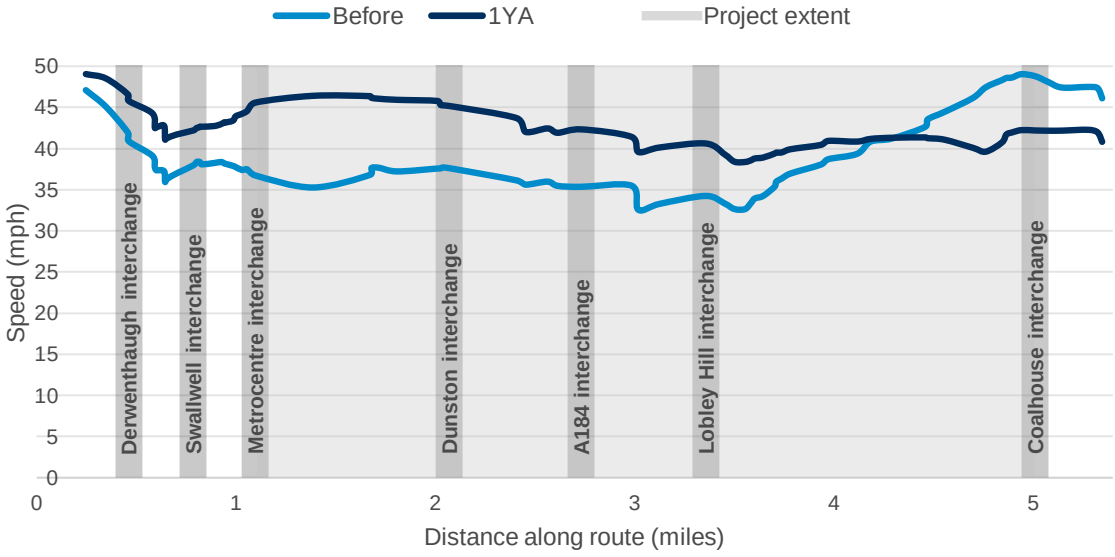
[27] A harmonic mean is one of several kinds of average. It is expressed as the reciprocal of the arithmetic mean of the reciprocals of a given set of observations. A reciprocal is denoted as 1/value.

Figure 20 Comparison of northbound harmonic average speeds – interpeak



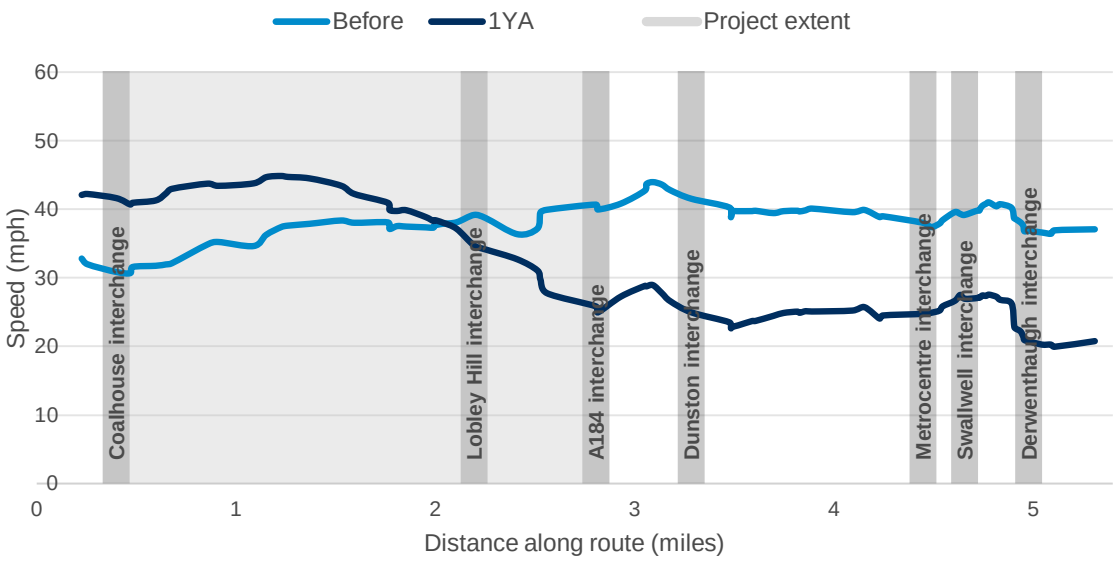
Source: TomTom satnav data. Before: 2013; 1YA: 2018.

Figure 21 Comparison of southbound harmonic average speeds – interpeak



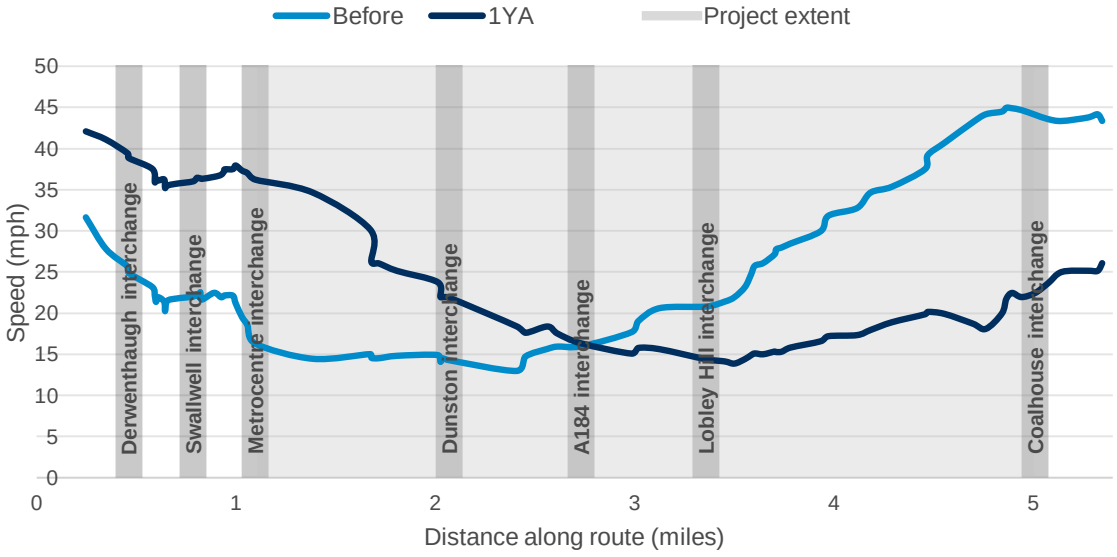
Source: TomTom satnav data. Before: 2013; 1YA: 2018.

Figure 22 Comparison of northbound harmonic average speeds – evening



Source: TomTom satnav data. Before: 2013; 1YA: 2018.

Figure 23 Comparison of southbound harmonic average speeds – evening



Source: TomTom satnav data. Before: 2013; 1YA: 2018.

Annex 2: Safety counterfactual methodology

Personal injury collisions (hereafter referred to as collisions) on the strategic road network are rare and can be caused by many factors. Due to their unpredictable nature, we monitor trends over many years before we can be confident that a real change has occurred as result of the project.

To establish whether any change in collision numbers is due to the project or part of wider regional trends we have established a test we call the 'counterfactual'. The 'counterfactual' asks the question: What would likely have occurred had the project not been implemented? To answer this question, we estimate the range of collisions that could have occurred without the project in place. Previous post-opening project evaluations answered this question by looking at national trends in collisions. Adjustments have been made to the methodology for estimating the counterfactual. These have been made to address the following areas:

Amended Data Collection Method:

- Revised method for identifying collisions that occurred on the network.
- Only validated STATS19 information is used for reporting purposes.

Adjusting for Traffic Flows:

- Baseline traffic flows are an important factor when determining the counterfactual. We now assume that without the changes made to the network, the trends would follow regional background traffic growth patterns.
- We can now calculate the collision rate for the busiest stretches of conventional motorways and dual carriageways.

Better Differentiation between different types of Motorway:

- The existing methodology only had one definition of motorway.
- The new method allows us to differentiate between conventional motorways, conventional motorways with high traffic flows and projects.

Assessing Regional Trends:

- The new method uses regional rather than national trends for collision rates and background traffic growth, which provides greater granularity and makes the hypotheses more realistic.

We have found that the adjustments have resulted in a slight change from the previous methodology. We still have confidence in the accuracy of the previous methodology but believe we have made suitable changes that will ensure a methodology fit for purpose for the future.

Annex 3: Incident reporting mechanisms

Police forces choose how they collect STATS19 data. Some police forces do this electronically, for example, using mobile devices, while others complete paper forms which are later digitised. In addition, some collisions are reported by members of the public after the event. Since 2016, new data collection systems (called CRaSH and COPA) have been introduced by some police forces.

Before these new systems, reporting police officers categorised the severity of non-killed casualties as either serious or slight according to their own judgment of the injuries sustained. This was based on information available within a short time of the collision, and often did not reflect the results of medical examination. This sometimes led to casualties being incorrectly classified as slight injuries when they were serious, or vice versa.

In April 2016 Northumberland police constabulary transferred from STATS19 to CRaSH (Collision Recording and Sharing) system for reporting personal injury collisions. In CRaSH reporting, police officers record the types of injuries suffered by the casualty rather than the severity. In previous systems the determination of severity was at the discretion of the reporting police officer. CRaSH automatically converted the injury type to a severity classification. This led to implications for reporting on collision severity as there had been an increase in the number of serious collisions recorded.

These changes make it difficult to monitor trends in the number of killed or seriously injured (KSI) casualties over time or between different police forces. To help with this, the Office for National Statistics (ONS) has undertaken research to identify methods of estimating and adjusting for the increased recording of serious injuries in the new systems. Based on this work, DfT have published an adjusted time series of KSIs at the national level and statistical adjustments at the record level. These adjustments are based on estimates of how casualty severity may have been recorded had injury-based severity reporting systems always been used.

The adjustments will be reviewed by the ONS and DfT as more data becomes available, and it is possible that further refinements will be made to the adjustment methodology in the future. Currently it is not possible to reliably adjust collision severity information at the granular level required for this project.

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