national highways

A160 / A180 Port of Immingham improvement

Five-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. Road safety is, and will always be, our number one priority. We are committed to reducing the number of people killed or seriously injured on our roads.

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 A160 Port of Immingham project was officially opened during this period, in March 2017.

The A160 / A180 Port of Immingham Improvement project was implemented to improve movements to and from the port and surrounding area by reducing congestion, particularly during peak hours and when freight ferries unload at the port. This report gives an initial indication of the project's performance in the fifth year of its operation.

At one year there were early indications that the safety objective was on track to be achieved with a reduction in the rate and number of personal injury collisions. The five-year evaluation continues to support this.

Given increases in traffic volumes since the project opened, the journey time savings at five-years after opening, indicates that the additional capacity created by the project was accommodating the increased demand. The results are the same as the one-year evaluation findings, in that the project has mitigated the worsening of journey times and reliability that could have resulted from increased port activity.

As with the one-year evaluation, we continue to see improved journey times in the outbound direction, but slightly increased inbound journey times. This is most likely due to the introduction of the new Habrough Roundabout which replaced the previous T-junction arrangement that allowed main line traffic priority.

This investment has delivered benefits to road users, but not the full value anticipated. The main reason for this is the reduced level of benefits associated with a journey time savings for inbound journeys. Despite this, significant improvements to outbound journey times have been achieved.

Elliot Shaw

Chief Customer and Strategy Officer

March 2025

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1. Executive summary

The A160 / A180 Port of Immingham Improvement project was implemented to improve movements to and from the port and surrounding area by reducing congestion, particularly during peak hours and when freight ferries unload at the port.

The scheme included several components, including the modification of the Brocklesby interchange (which connects the A180 to the A160) to a two-bridge grade separated roundabout. Widening of the A160 carriageway to a two-lane dual carriageway between Brocklesby interchange (A180) and Habrough roundabout was also implemented. Additionally, Habrough roundabout was moved westwards and upgraded to a five-arm higher capacity layout.

Given increases in traffic volumes since the project opened, the journey time savings at five-years after opening, indicates that the additional capacity has supported the traffic demand to and from the port and surrounding area and reduced congestion as a result.

Average journey times for heavy goods vehicles on the A160 in the outbound direction (away from the port) improved across all time periods, indicating that congestion had reduced. Conversely, journey times had increased slightly in the inbound direction in the inter-peak and evening periods, most likely due to the introduction of the new Habrough roundabout, replacing a previous T-junction arrangement which offered mainline traffic priority. Additionally, the journey time reliability also mirrored the trends observed with journey times, with improvements observed across all time periods outbound on the A160, compared to before the project was implemented, and only in the morning peak inbound to the Port of Immingham.

The project also improved facilities for walkers and cyclists in the area, including dropped kerbs, increased footway width and the provision of a shared footpath / cycleway alongside the new Town Street overbridge over the A160. These improvements have led to reduced severance for the local community and improved access to and from South Killingholme.

There has been a reduction in the rate and number of personal injury collisions (PICs) on both the project extent and the wider area. When accounting for the increased volume of road users over this period, the annual average rate of personal injury collisions per hundred million vehicle miles (hmvm) had also improved, reducing by nine PICs per hmvm. On the wider area[1] there was an annual average decrease of three PICs per hmvm.

The available traffic data suggested that air quality and noise impacts along the project were likely to be as expected. A site visit identified that the planting designed to mitigate impacts to landscape was becoming more established, however there are still issues with ornamental shrubs failing and a general issue with weeds not being maintained. Overall, on the assumption that remedial mitigation planting and weeding is implemented, the landscape planting is anticipated to deliver design year outcomes as expected. Attenuation and treatment ponds to improve the water environment had been incorporated, but at

[1] The road network is determined as part of the appraisal process to understand changes to road safety on the project extent and roads which the project may have an impact.

five-years after, many of the drainage ditches and culverts were overgrown with vegetation. One attenuation pond is covered in algae on the surface, which can adversely affect the water quality. In this regard, the maintenance regime needs to be reviewed to ensure the drainage network delivers the expected beneficial outcome for the water environment. All other environmental and society impacts were broadly as expected ranging from neutral to adverse.

Value for money was forecasted over a range of possible traffic growth scenarios.[2] Based on traffic growth assumptions and likelihood of development trips. These scenarios forecast value for money to range from 'poor' to 'very high' value for money.[3] Under a low growth scenario, the project was expected to achieve 'poor' value for money and based on this assessment, falls within the same category. Due to lower traffic growth (in part the result of less local development than forecasted) and reduced journey time saving benefits.

The project has successfully achieved its specific objectives. Road users are experiencing more reliable, safer and less congested journeys. Accessibility to both the port and the surrounding area has also improved. The project has accommodated for future traffic growth and in turn, supported future development in the local area.

[2] See section 7 – *Forecast value for money.*
[3] The value for money categories referenced are defined by Department for Transport (DfT) https://www.gov.uk/government/publications/dft-value-for-money-framework

2. Introduction

Project location

The A160 corridor connects the Port of Immingham to the wider strategic road network (SRN) and is in North Lincolnshire. The project improvement was situated to the west of Immingham, between the A180, which runs east to west and the Manby roundabout, a short distance from the Humber River. The project's location is shown in Figure 1.

Figure 1: A160 / A180 Port of Immingham improvement location

Source: National Highways and OpenStreetMap contributors.

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

The project opened to traffic in March 2017. It comprised of a series of upgrades along the A160 corridor to address delays along the A160, particularly heading in the outward direction during the PM peak.

Situated to the north-west of Grimsby and south of Hull, the Port of Immingham is the largest port by tonnage in the UK and forms a key element of a wider network of ports situated along the Humber. Prior to the project, there were concerns regarding the anticipated growth in traffic, particularly heavy goods vehicles (HGVs), driven by a predicted increase in port activity (growth in shipping volumes).

The nature of port activity means that when a freight ferry is unloaded, there is a significant increase in the number of container HGVs exiting a port. In such cases, average traffic is not the only concern, but also the reasonably frequent 'worst case' when such unloading occurs. If shipping volumes continued to increase at

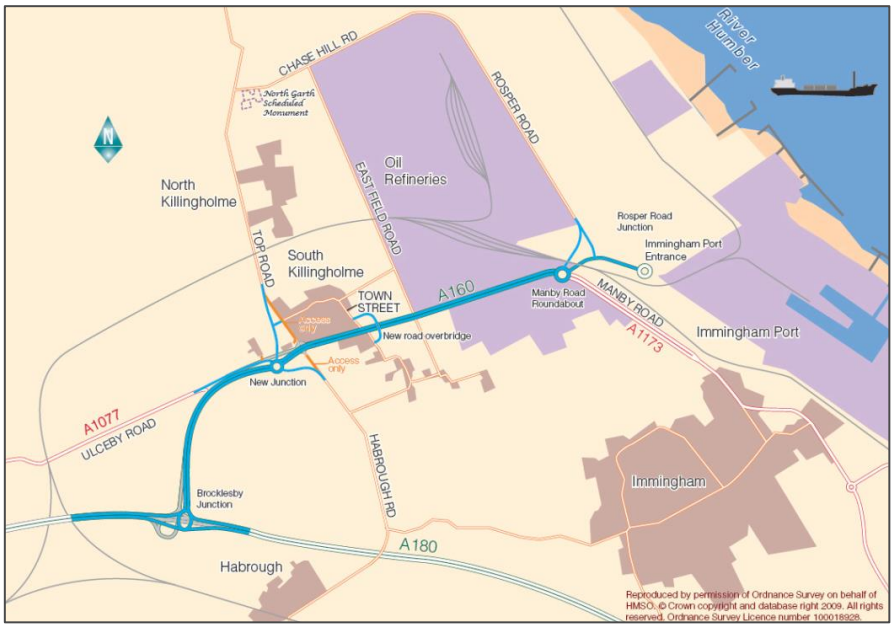
the Port of Immingham, these occurrences of higher demand will become more frequent and the volume of HGVs on the A160 during unloading potentially higher, leading to more congestion and delays.

To address the problems identified, the project comprised of different components, with several of these components also shown in Figure 2:

- Brocklesby interchange (which connects the A180 to the A160) was upgraded to a two-bridge grade separated roundabout. The unrestricted left turn between the A180 eastbound to the A160 remained in place.
- The A160 carriageway between Brocklesby interchange (A180) and Habrough roundabout was widened to a two-lane dual carriageway.
- Habrough roundabout was moved westwards and upgraded to a five-arm higher capacity layout.
- The A1077 Ulceby Road was re-aligned to join the A160 at Habrough roundabout.
- A new link road delivered between Habrough roundabout and Greengate Lane.
- A new overbridge over the A160 was built. Before the project, traffic requiring access to the village of South Killingholme via Town Street had to cross the A160, and the central reservation gap was closed.
- A new gyratory system between Manby Road roundabout, Rosper Road junction and the port.
- Non-motorised user (NMU) facilities including dropped kerbs, increased footway width and the provision of shared footpath / cycleway alongside the new Town Street overbridge.

The project was anticipated to provide improvements to journey times, relieve congestion, improve reliability along the A160 and, enhance access to the port itself and the surrounding area.

Figure 2: Layout of the A160 / A180 Port of Immingham improvement project



Source: Traffic Forecasting Report: A160/A18 Port of Immingham improvement.

How has the project been evaluated?

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

A POPE compares changes in key impact areas[4] 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 POPE methodology manual on our website.[5]

[4] Key impact areas include safety, journey reliability and environmental impacts.
[5] https://nationalhighways.co.uk/media/pq2jb142/pope-methodology-note-2024-v2.pdf

3. Delivering against objectives

How has the project performed against objectives?

All our major projects have specific objectives which are defined early in the business case when project options are being identified. These objectives are appraised to be realised over 60 years. Following the one-year after evaluation, this five-year evaluation provides a more detailed insight into the project results.

A summary of the evaluation conclusions aligned with the objectives for the A160 / A180 Port of Immingham Improvements is provided as follows (Table 1):

Table 1: Objectives and evaluation summary

Objective	Five-year evaluation
Reduce traffic congestion, especially that seen in peak hours and when freight ferries are arriving and leaving after unloading at the port	Journey times[6] in the outbound direction (away from the port) had improved from which we can reasonably infer that congestion had reduced. Journey times had increased slightly in the inbound direction, most likely due to the introduction of the new Habrough roundabout replacing a previous T-junction arrangement that allowed mainline traffic priority.
Improve journey time reliability and reduce journey times on the A160 between A180 Brocklesby interchange and the port entrance	Similar trends were observed at five years post opening as observed at one-year after, with journey times in the outbound direction (away from the port) improving in all peak periods, suggesting a reduction in congestion. This was anticipated as the A160 had been dualled between Habrough roundabout and Brocklesby interchange and there was no additional opposing traffic. In contrast, journey times had increased slightly in the inbound direction (towards the port) in the inter-peak and PM peaks, most likely due to the new layout at Habrough roundabout. Journey time reliability also mirrored the average journey times trends, with improvements in the outbound direction and a slight worsening in the inbound direction.
Improve access to the port of Immingham and the surrounding area	This objective has been achieved due to the project providing significant additional capacity via the upgraded dual carriageway between A180 Brocklesby interchange and the upgraded Habrough roundabout. The introduction of non-motorised user facilities and Town Street overbridge has also reduced severance and improved access for the local community.

[6] Journey time analysis for five-year after has used HGV satnav data. This approach was undertaken for the one-year after POPE analysis and has been replicated for the five-year after analysis.

Objective	Five-year evaluation
Meet the needs of future traffic growth resulting from existing and future developments	Capacity has been improved along the A160 through the introduction of the two-lane dual carriageway. The realignment of Habrough roundabout and the introduction of the Tower Street overbridge also supports existing traffic and future traffic growth. The project objectives to reduce traffic congestion, accommodate forecast local traffic growth, and improve access to the port have been met.
Reduce the number and rate of collisions on the A160 and their severity	The project has successfully reduced the rate, and number of collisions on the A160, compared to the trends observed five years before the improvement project was operational and open for road users. The severity of collisions observed (measured by the Fatal and Weighted Injuries (FWI) and the Killed or Seriously Injured (KSI) measures) after the project opened also improved compared to before. Observations from the wider safety area also saw reductions in the rate and number of collisions.
Improve safety for road users and the local community	
Improve facilities for non-motorised users (NMUs) where technically feasible and economic to do so	Improved NMU facilities have been provided for pedestrians, cyclists and horse riders including increased footway widths, dropped kerbs and improvement of cycling provision locally.
Improve journey ambience	The scheme has had a beneficial impact on journey ambience. The upgrades to the road layout and improvements to facilities for NMUs would have led to a reduction in route uncertainty, user frustration and likely improved perceptions of road safety.

4. Customer journeys

Summary

Five years after opening, we have seen traffic volumes to be lower compared to the one-year after study along the project extent and in the wider local area. One reason for this trend is the impact of the Covid-19 pandemic and national lockdowns on traffic volumes, where regional and local traffic levels were observed to be taking longer to recover. However, traffic volumes were higher than before the project, and the largest increase observed was along the A160 (13%).

Movements at the port entrance (Manby Road roundabout) show that there has been a slight increase in overall traffic volume (approximately 1%) at five-year after compared to one-year after, primarily owing to the additional HGVs accessing the port via the project (15% increase in HGVs). This analysis provided a strong indication that port activity had increased, especially the number of HGVs accessing and exiting the port. Meeting the additional demand for this activity was a key objective for the project and the improvements are shown to increase capacity along the route. Additionally, the observed traffic flows after the project opened were less than what was anticipated in the forecasts.

The project had an objective to improve journey time reliability and reduce journey times on the A160 between A180 Brocklesby interchange and the port entrance. Similar trends were observed at five-years after opening as observed at the one-year after stage, with journey times for HGVs in the outbound direction (away from the port) improving, suggesting a reduction in congestion. This was anticipated as the A160 had been dualled between Habrough roundabout and Brocklesby interchange and there was no additional opposing traffic.

In contrast, journey times for HGVs had increased slightly in the inbound direction (towards the port), most likely due to the new layout at Habrough roundabout. Before the project, there was a T-junction arrangement that allowed mainline traffic priority. The new road layout results in traffic heading inbound towards the port opposed by traffic heading to A1077 Ulceby Road. Journey time reliability also mirrored the average journey times trends, with improvements in the outbound direction and a slight worsening in the inbound direction.

The forecast journey times for the with-project scenario were notably quicker than observed, suggesting that the traffic model was optimistic in terms of expected journey time savings. Despite this, we can conclude the project achieved its objectives and was managing with the traffic growth in the area.

How have traffic levels changed?

This section examines how traffic levels have changed in the years since the project opened, and how it was expected to perform over the same timeframe.

National and regional

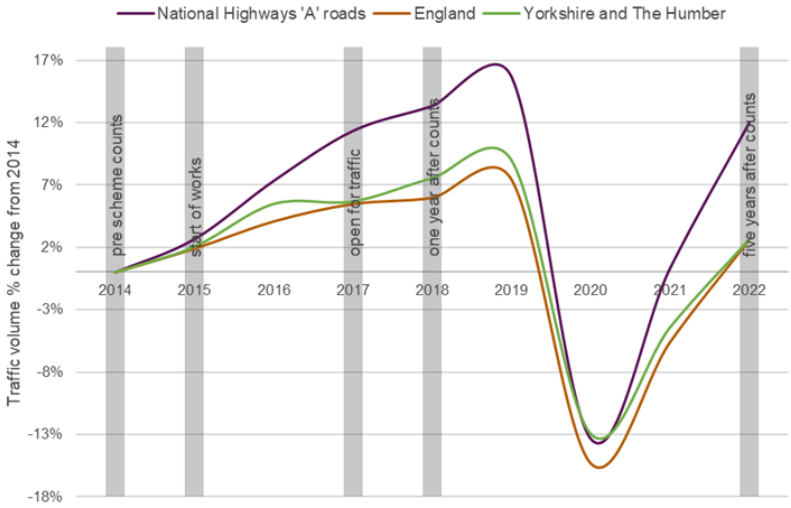
To assess the impact of the project on traffic levels, it is helpful to understand the changes within the context of national and regional traffic. To do this, we use Department for Transport (DfT) annual statistics, the data is reported by local authority and road type, recording the total number of million vehicle miles

travelled.[7] This data is used as a baseline, and we attribute any growth observed on roads in the project area, which is above national and regional trends to the project.

Figure 3 shows the traffic growth between 2014 and 2022. Five years after the project opened, traffic volumes on the strategic A roads increased by an average of 12%. At the regional level (Yorkshire and the Humber), traffic had increased by 3%, the same growth rate as the traffic on all road types in England. The analysis in the following sections should be considered in this context as no adjustments have been made to take account of background traffic growth.

The outbreak of the Covid-19 pandemic heavily impacted traffic levels, with all geographies experiencing a considerable fall in 2020 and flows 13-15% lower than that seen in 2014. The 2021 data shows traffic levels starting to increase as Covid-19 related restrictions / guidance affecting travel patterns started to ease at times throughout the year. By 2022, strategic A roads recovered to pre-Covid-19 levels, compared to regional and local traffic levels that are taking longer to recover.

Figure 3: Changes in national and regional background levels of traffic



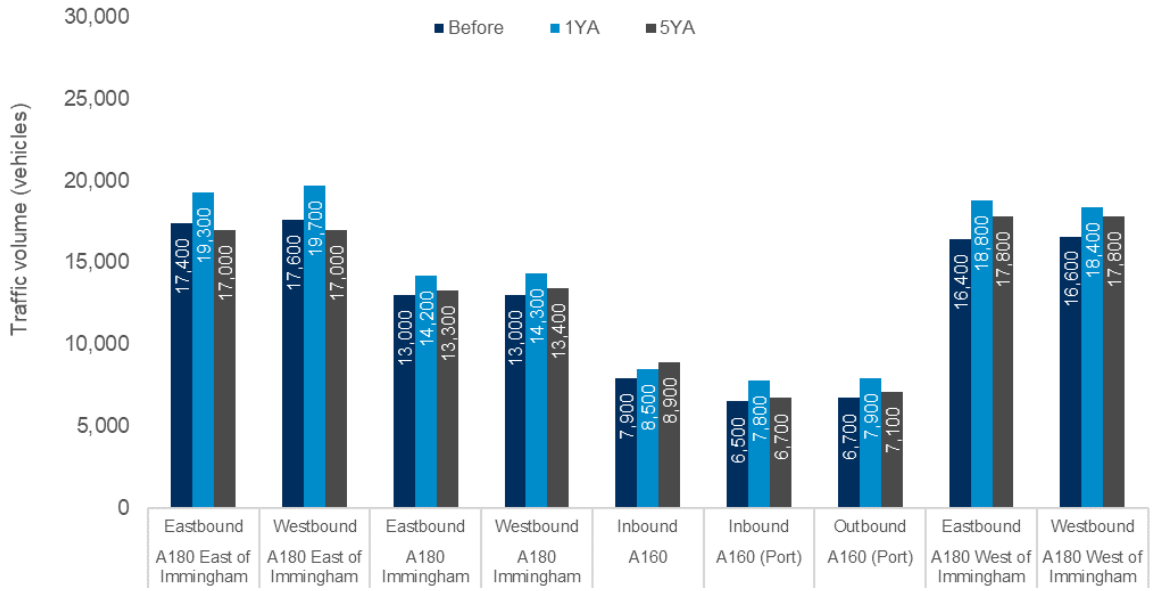
Source: DfT Road Traffic Statistics Table TRA8901.

How did traffic volumes change?

Figure 4 shows the change in average weekday traffic (AWT) volumes in the vicinity of the project. The evaluation found that at five-years after opening, all locations, except for the A180 East of Immingham, have seen traffic volumes higher than before construction. On average, traffic volume increased by 4% at five-years compared to before construction. The largest increase in traffic volume compared to before was observed on the A160 Inbound (between Brocklesby interchange and Habrough roundabout), where there was an increase of 13%. Moreover, five-year after flows were generally lower than those seen at one-year after the project improvement. The exception to this was the A160 Inbound, which had seen a modest increase between before construction and one-year after. The largest decreases in traffic volumes between five-years and one-year after the project improvement were observed on the A180 East of Immingham (about 2,500 vehicles) and A160 (Port) Inbound (about 1,000 vehicles).

[7] Motor vehicle traffic (vehicle miles) by region in Great Britain, annual from 1993 to 2021, Table TRA 8901, DfT

Figure 4: Average weekday traffic volume (24hr AWT, average day in month)



Source: National Highways (WebTRIS). Before: September 2014 for most sites except for A180 West of Immingham (September 2013) and A160 (Port) (March 2015), 1YA: September 2018 for most sites except for; A160 (Port) (March 2019) and 5YA: September 2022 for most sites except for; A180 East of Immingham Eastbound (September 2021) and A160 (Port) (May 2022). All figures are to the nearest 100.

Manby Road roundabout

To provide an insight into any changes in movements around the Manby roundabout and changes in the volumes of traffic using the junction since the project opened, we used turning count data[8] collected in November 2023, to provide a comparison to counts collected for before (November 2012) and one-year after (December 2018) the project improvement.

A comparison between the before construction, one-year after and five-years after turning movements for the Manby roundabout is presented in Figure 5 for all vehicles, with the values for HGVs in Figure 6. The percentage differences presented in the graphics relate to the movement changes seen from before to five-years after the project opened.

Overall, the turning counts showed a slight increase in traffic, primarily owing to the additional HGVs accessing the port via the project. This analysis provided a strong indication that port activity had increased, especially the number of HGVs accessing and exiting the port. Meeting the additional demand for this activity was a key objective for the project.

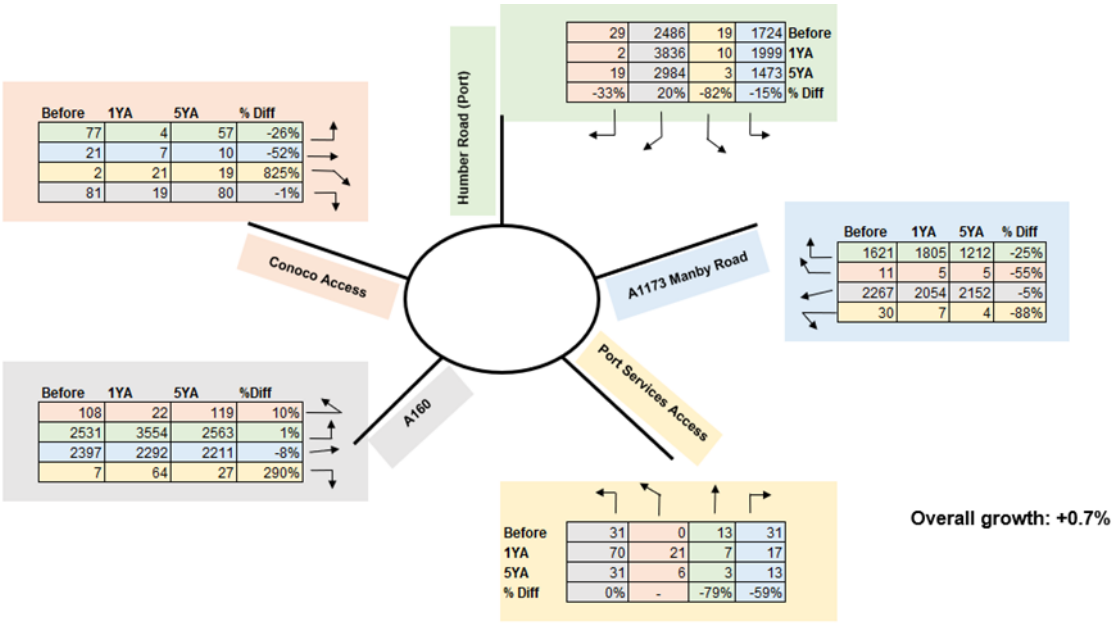
Focus should be placed on the larger movements at the roundabout due to the lower traffic volumes easily showing large percentage changes. The main findings of the traffic count surveys were:

- The overall growth in traffic was 0.7%, which was marginally below that of the local background trends (shown in Figure 3, following the trend of slow traffic volume recovery after the Covid-19 pandemic travel restrictions.
- The increase in the number of HGVs using the junction was higher, at 15%.

[8] The turning movements presented in this section represent 12-hour flows over the course of one weekday for the before project, two days for the one-year after evaluation and three days for five-year after evaluation. Therefore, we need to be mindful that using data with such a narrow timeframe could compromise the reliability of the data.

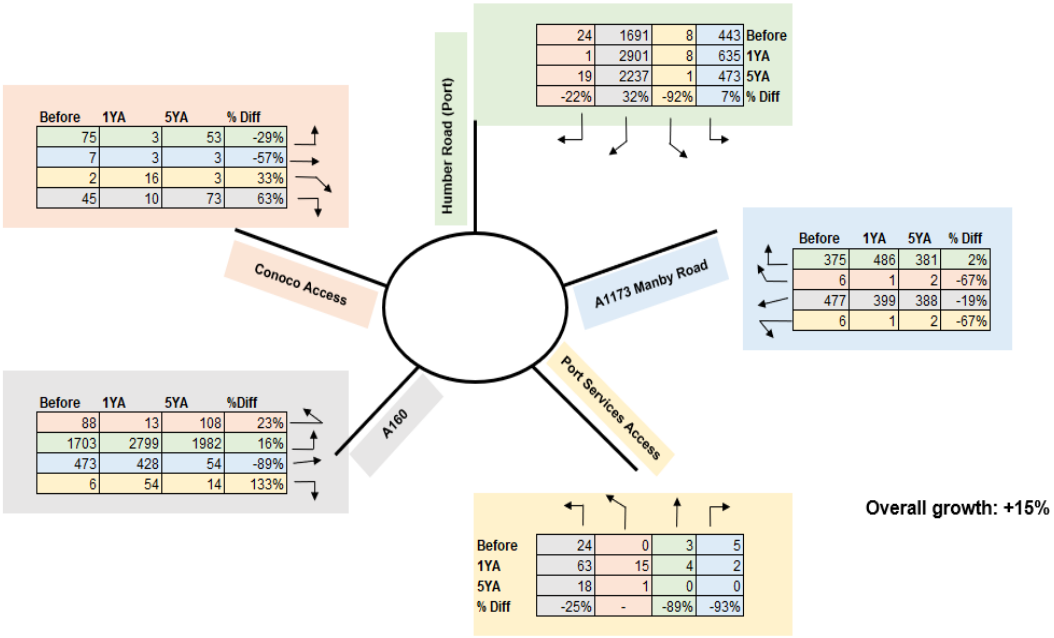
- The major movements for all vehicles at the junction were those relating to port access between the Humber Road, A160 Humber Road and A1173 Manby Road. Outbound movement, from Humber Road to A1173 Manby Road, experienced a 15% decline in traffic compared to a 20% increase to the A160. Inbound movements to the port saw a small increase (1%) from A160, whilst a decline of 25% was observed from A1173 Manby Road. Additionally, between the A160 Humber Road and A1173 Manby Road, a decline in movements were observed (8% and 5% respectively).
- The growth in HGV volumes for port access movements was higher than for the overall total indicating that this growth was primarily driven by the increase in HGV volumes. Inbound to the port from the A160, there was a 16% increase in HGV movements and 32% outbound, with access movements to and from the port via the A1173 Manby Road also seeing an increase at five-years after compared to before.

Figure 5: Comparison of 12-hour turning movements for Manby roundabout - all vehicles



Source: Manual traffic count surveys. Before: November 2012, 1YA: December 2018, 5YA: November 2023.

Figure 6: Comparison of 12-hour turning movements for Manby roundabout - HGVs



Source: Manual traffic count surveys. Before: November 2012, 1YA: December 2018, 5YA: November 2023.

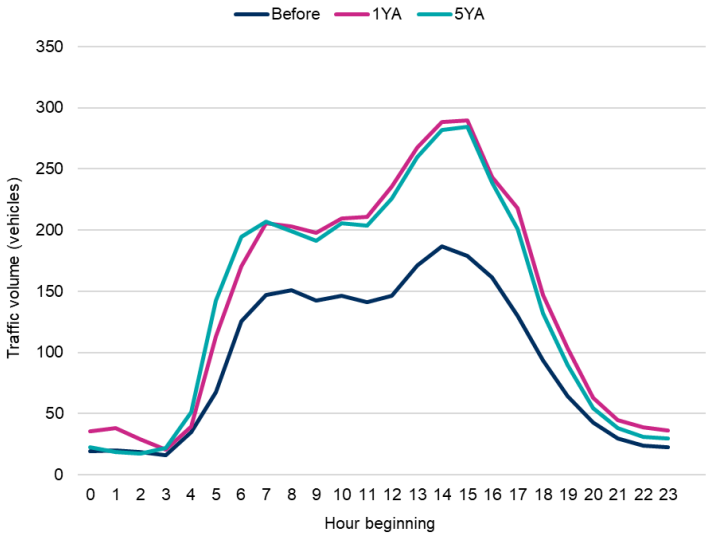
The number of HGVs accessing and exiting the port will depend on the number of cargo ships loading and unloading on a given day. The growth in HGV traffic, shown in Figure 6, will be subject to this daily variation. To confirm whether the volume of HGV traffic had significantly increased across a wider timeframe, we have further analysed traffic volumes across a typical weekday to determine whether traffic growth had occurred uniformly or at certain times of day.

For the inbound direction, the ‘all traffic’ profile (Figure 7) shows the before, one-year and five-years after periods had similar profiles between midnight and 9am, and then again between 4pm and midnight. The greatest hourly flow occurred 7-8am, while the evening peak hour occurring 4-5pm was evident in all evaluation periods. Compared with before construction, both the one-year after and five-years after profiles show a similar pattern of rising traffic volumes in the inter-peak after midday.

For HGVs (

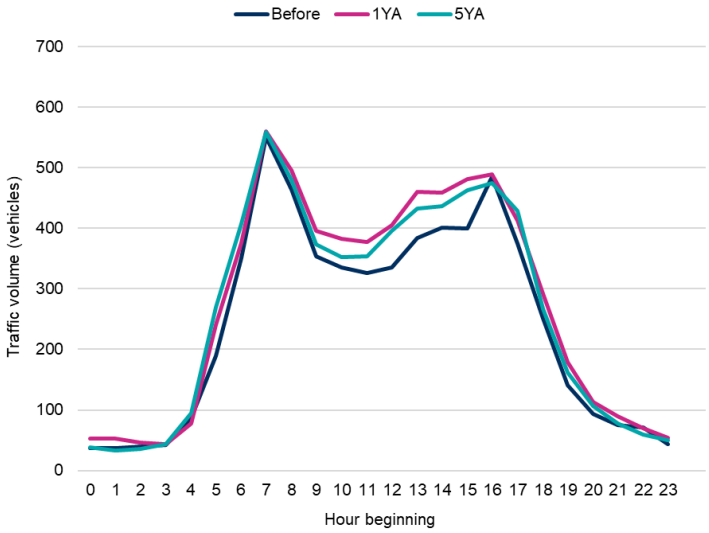
Figure 8), the inbound profile identifies that the traffic volumes seen at one-year after and five-years after opening were notably higher than the before volumes. The profiles for one-year after and five-years after show growth in traffic volumes occurring throughout the afternoon, with an earlier than typical PM peak, which likely explains the growing demand seen in the ‘all traffic’ profile in Figure 7. At five-years after, the AM peak also started slightly earlier than that seen before and at one-year after opening.

Figure 7: A160 port hourly weekday flow profile (inbound) AWT – all traffic



Source: National Highways (WebTRIS). Before: April 2015, 1YA: April 2019, 5YA: May 2022.

Figure 8: A160 port hourly weekday flow profile (inbound) AWT – HGVs



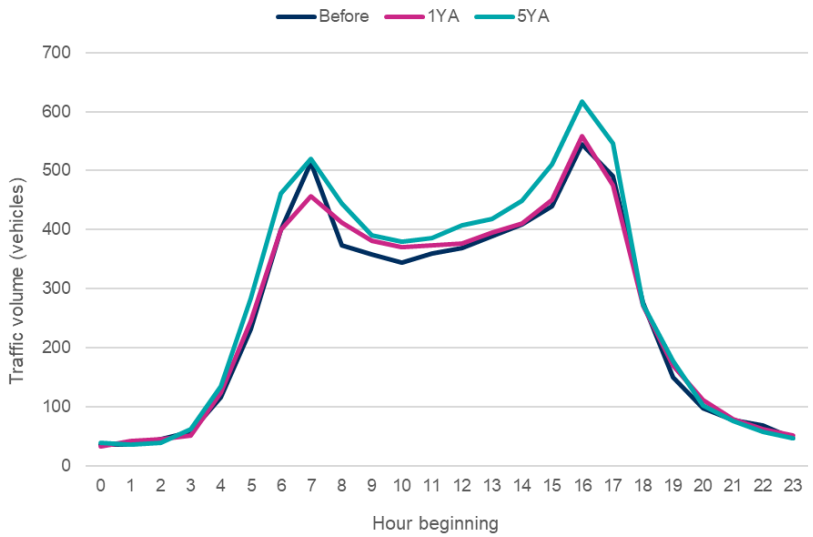
Source: National Highways (WebTRIS). Before: April 2015, 1YA: April 2019, 5YA: May 2022.

The hourly weekday outbound traffic flow profiles for all traffic (Figure 9) during the three evaluation periods followed a similar pattern of a pronounced peak during the morning and evening peaks with lower traffic volumes in the inter-peak and overnight. While the morning peak was less pronounced at one-year after, this was evident in the before and five-years after data. Throughout the rest of the day, the five-years after profile followed a similar profile to the other evaluation periods, albeit with greater demand.

For HGVs, at five-years after, the hourly profile shows traffic volumes were slightly higher than before the project at the start of the morning peak. Traffic volumes then dropped sharply by 10am, where the volumes remained at a lower level compared to before and one-year after implementation, before declining further overnight. One explanation for the decline in volumes observed is data limitations at the count

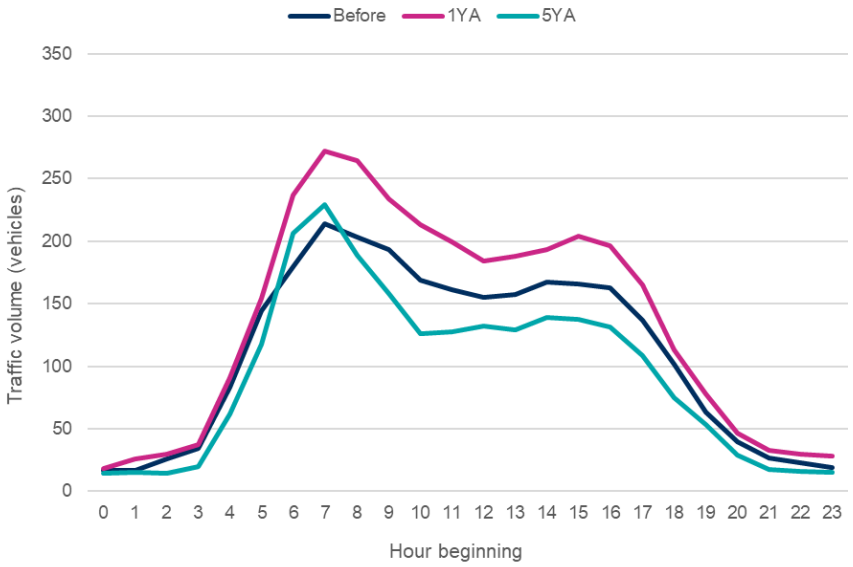
site and the roll-on, roll-off activity of the port means the unaccompanied trailer is likely to not have been registered as an HGV at the count site due to the length classification. Shipping timetables also show that there are arrivals from large continental ports (including Rotterdam) at times which align with the peaks in traffic volumes observed in the five-year evaluation.

Figure 9: A160 port hourly weekday flow profile (outbound) AWT – all traffic



Source: National Highways (WebTRIS). Before: April 2015, 1YA: April 2019, 5YA: May 2022.

Figure 10: A160 Port hourly weekday flow profile (outbound) AWT – HGVs



Source: National Highways (WebTRIS). Before: Apr 2015, 1YA: Apr 2019, 5YA: May 2022.

Was traffic growth as expected?

It is important to understand how levels of traffic on the project compare to the forecasts, and whether the level of growth projected was realised.

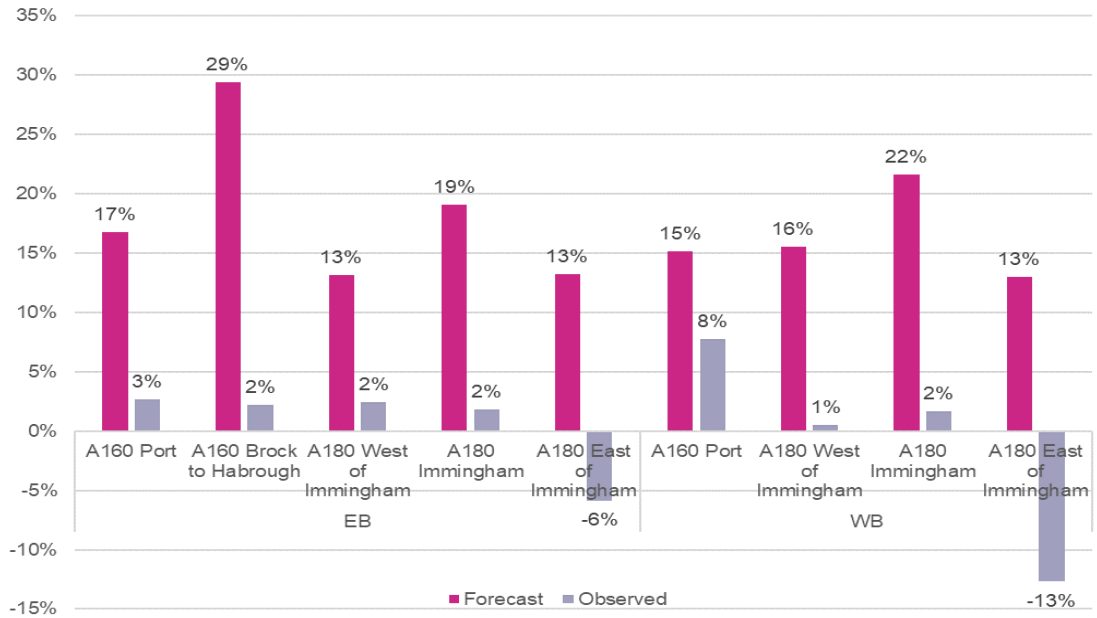
This section compares the annual average daily traffic flows (AADT) from the Traffic Forecasting Report (TFR) with equivalent observed data. The forecast 2014 without project and a 2022 modelled with-project were compared with the observed change in traffic volumes. As the modelled opening year does not match with either the before period (2014), or the two forecast years: 2016 and 2031, we made estimates for the years using the available data to enable us to compare between observed and forecast traffic volumes on a like-for-like basis.[9]

Three time periods were modelled:

- Morning peak hour (AM peak) 7-8am.
- Average inter-peak (IP) hour between 10am to 4pm.
- Evening peak hour (PM peak) 4-5pm.

Figure 11 shows expected forecast growth of 13-29% at the differing locations. It was anticipated that the highest growth would be around the Brocklesby interchange, with a forecast 22% increase of traffic approaching the interchange westbound on the A180 and 29% heading eastbound on the A160 towards Habrough roundabout. Figure 11 also shows the observed change in traffic volume before the project was constructed and five years after opening. The expected traffic growth was greater than that observed at all locations. Also, on the A180 East of Immingham, the observed data shows a reduction in traffic volumes in both directions rather than the forecast increase.

Figure 11: Forecast and observed change in traffic volume

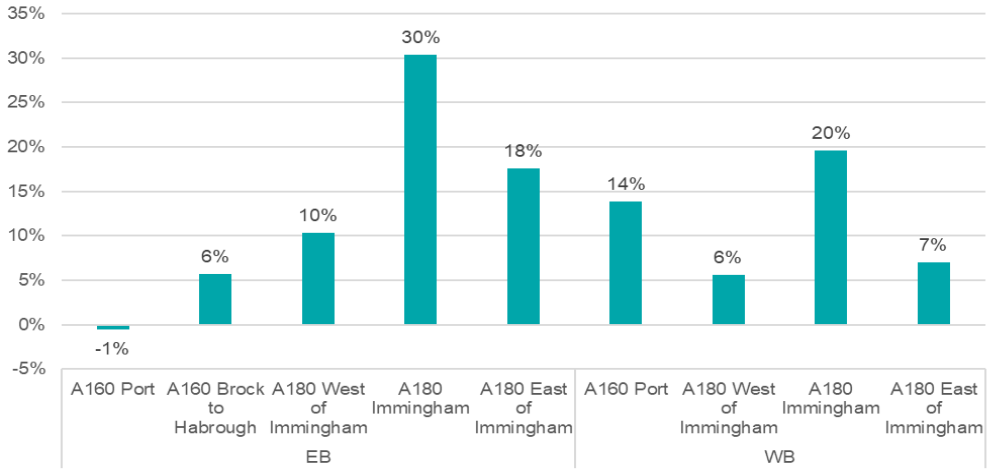


Source: Forecast – National Highways Economic Assessment Report (EAR); Observed – National Highways WebTRIS, Before: 2014 apart from A180 West of Immingham (2013), 5YA: 2022 apart from East of Immingham eastbound (2021).

[9] The with project forecasts were factored to 2021 using a linear interpolation between the 2016 and 2031 forecasts. The without project 2016 forecasts were extrapolated back to 2014 based on the relationship between the 2016 and 2031 forecasts.

As illustrated in Figure 12, the 2014 observed flows before the project implementation were generally higher than the 2014 without project forecast flows, particularly on the A180 East of Immingham (observed flows were in excess of 20% higher than the forecast).

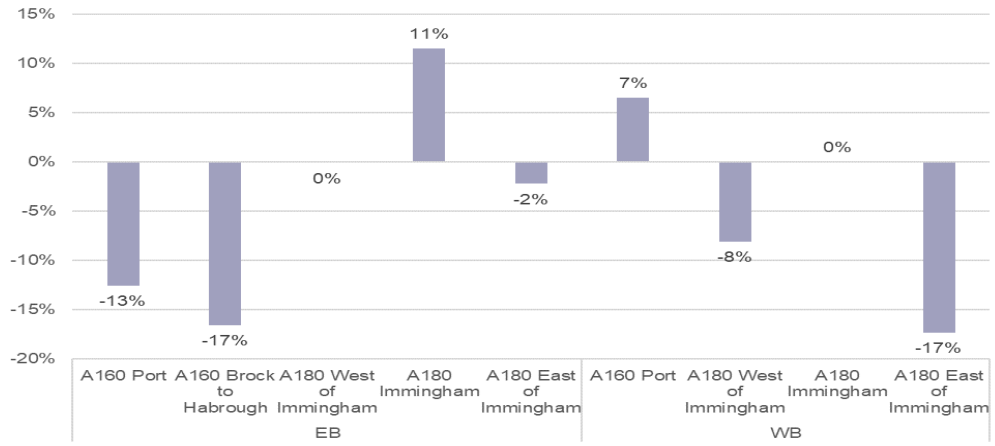
Figure 12: Difference between observed and forecast traffic volume (observed traffic flows in 2014 vs forecasted without project flows (2014))



Source: Forecast – National Highways EAR; Observed – National Highways WebTRIS, 2014 observed data apart from A180 West of Immingham (2013).

Figure 13 shows a comparison between the five-years after opening observed flows and the forecast with-project interpolated values, with a range of trends observed. In the eastbound direction, the A160 Port, A160 Brocklesby to Habrough roundabout and A180 East of Immingham locations saw less growth than was modelled, compared to the A180 Immingham location that experienced an 11% increase in observed traffic flows than forecast. In the westbound direction, the A180 West of Immingham and A180 East of Immingham both saw less traffic flows than forecast and on the A160 at the port, there was an increase of traffic compared to forecast (7%). Both the A180 West of Immingham eastbound and A180 Immingham westbound, saw an accurate forecast in traffic flows for five years after opening.

Figure 13: Difference between observed and forecast traffic volumes (observed traffic flows in 2022 vs forecasted with-project flows for 2022)



Source: Forecast – National Highways TEAR; Observed – National Highways WebTRIS, 2022 observed data apart from A180 East of Immingham (Eastbound) which is from 2021.

The trend of observing less traffic growth than predicted is potentially explained from the expectation of growth in shipping volumes not being realised, for example at the Port of Immingham, there was a significant decline (18%)[10] in the tonnage of goods handled between 2018 - 2020. There are several contributing factors to the decline in the goods, firstly, the end of the Brexit transition period was at the start of 2021, contributing to a reduction in the volume of accompanied roll-on, roll-off cargo due to driver shortage and new border controls. The Port of Immingham is the second largest port in the UK for roll-on, roll-off cargo, and a decline of 13% in units between 2018 and 2022 occurred. Secondly, the impact of lockdowns and disruptions to global supply chains following the outbreak of the Covid-19 pandemic, led to an immediate decline in the total tonnage handled by the port in 2020, with a secondary impact being a decline in oil production which accounts for around a third of port volumes.[11] The impact of these trends would result in there being less freight traffic in the study area.

Relieving congestion and making journeys more reliable

Analysis of journey times and speeds can indicate the impact of the project on congestion and customer journeys. The extent to which journey times vary from the expected average journey time indicates how reliable a journey is. Improving journey time reliability, reducing journey times, and reducing congestion were objectives for this project.

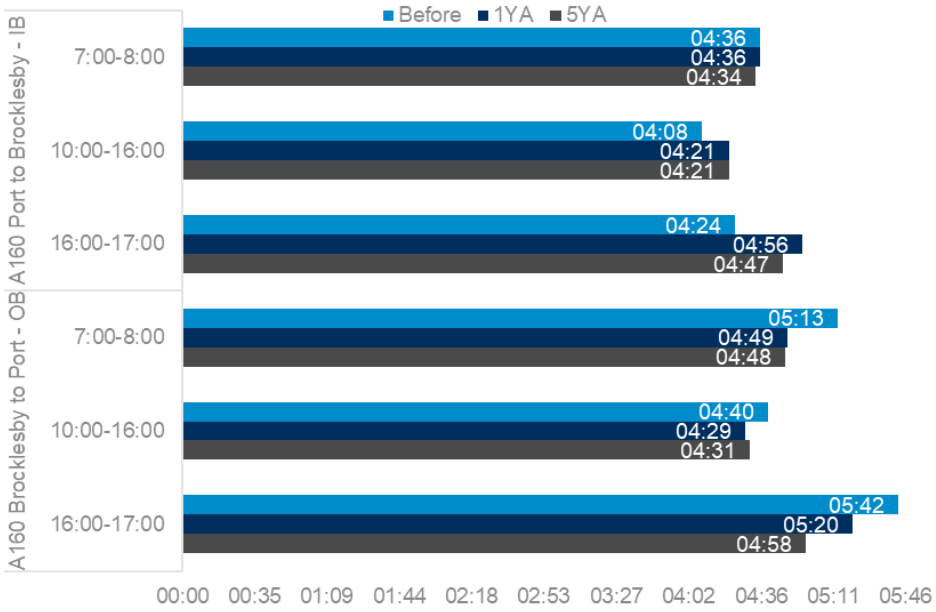
Did the project deliver journey time savings?

Improvements in journey times on the A160 between A180 Brocklesby interchange and the port entrance are an objective of this project, and at five-years after opening, the trends observed are similar to that observed at one-year after. As shown in Figure 14, in the inbound direction (IB), journey times have remained longer than before construction in the inter-peak and evening peak. This increase is potentially explained by considering that due to the upgrading of Habrough roundabout to five arms, inbound traffic on the A160 was opposed by traffic heading to the A1077 Ulceby Road. A minimal improvement was also observed in the morning peak at five-years after compared to before construction and one-year after opening.

Outbound (OB), average journey time savings saw improvements of between 25-45 seconds in the morning and evening peaks respectively compared to before the project implementation. Journey time savings had also improved compared to one-year after in the morning and evening peaks at five-years after. As observed at one-year after, with the increases in traffic volumes since the project opened, the journey time savings at five-years after opening indicated the additional capacity created by the project was accommodating the increased demand.

[10] Data from DFT (Table PORT0302: UK major port freight traffic by port and route (filter by direction, cargo group and year))
[11] Financial Times: *UK ports on course for worst year since 1983* https://www.ft.com/content/d174f95e-cd7d-4ca9-aa11-f61de7d0134b

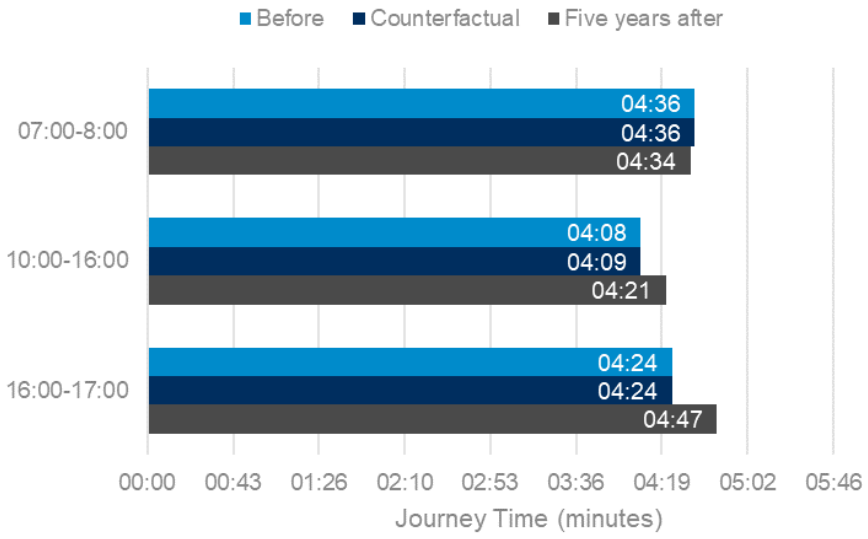
Figure 14: Change in average journey times – HGVs



Source: Satellite Navigation (TomTom). Before: 2014, 1YA: 2018, 5YA: 2022.

The counterfactual was calculated to give an estimate of what the journey time would likely have been, had the project not been implemented and journey times continued to deteriorate with increasing traffic levels. The counterfactual is based on journey times before the project was implemented and factored using regional traffic trends from 2022. For freight traffic travelling inbound on the A160 from Brocklesby interchange to the port (Figure 15), the journey times have slightly worsened in the inter-peak and evening peaks at five-years after compared to before and calculated for the counterfactual. In comparison, there was a minimal improvement observed in the morning peak at five-years after compared to before and the counterfactual.

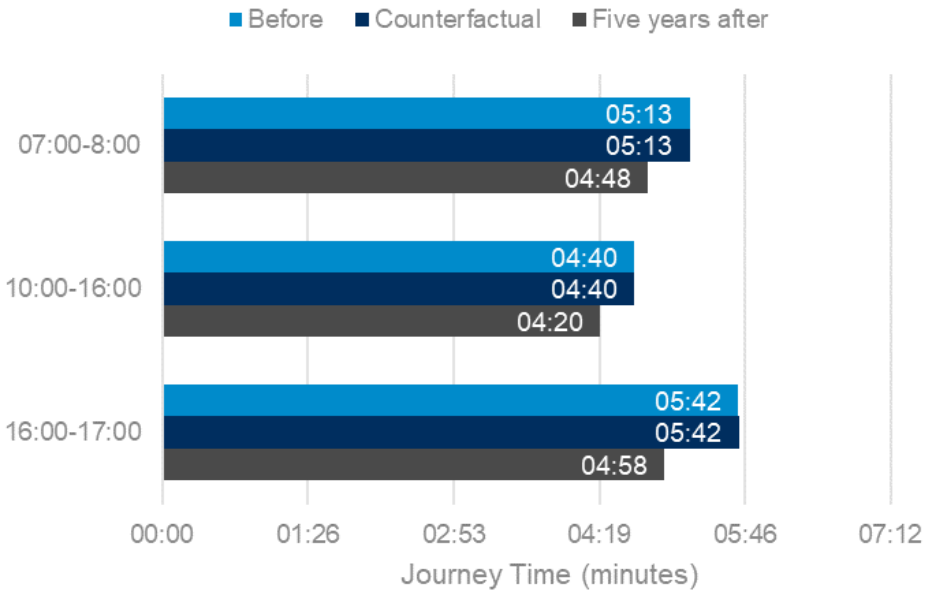
Figure 15: Counterfactual comparison for journey times – inbound



Source: Satellite Navigation (TomTom) and National Highways (WebTRIS). Before: 2015 and 5YA: 2022.

For road users travelling outbound from the port to Brocklesby interchange on the A160, there have been improvements in journey times across all time periods at five-years after compared to before and the counterfactual (Figure 16)**.** The largest improvements in journey times at five-years after compared to the counterfactual, was in the PM peak (4-7pm), the counterfactual predicted journey times would remain at nearly 6 minutes as seen before the project, and at five-years after they were close to a minute quicker.

Figure 16: Counterfactual comparison for journey times – outbound



Source: Satellite Navigation (TomTom) and National Highways (WebTRIS). Before: 2015 and 5YA: 2022.

Were journey time savings in line with forecast?

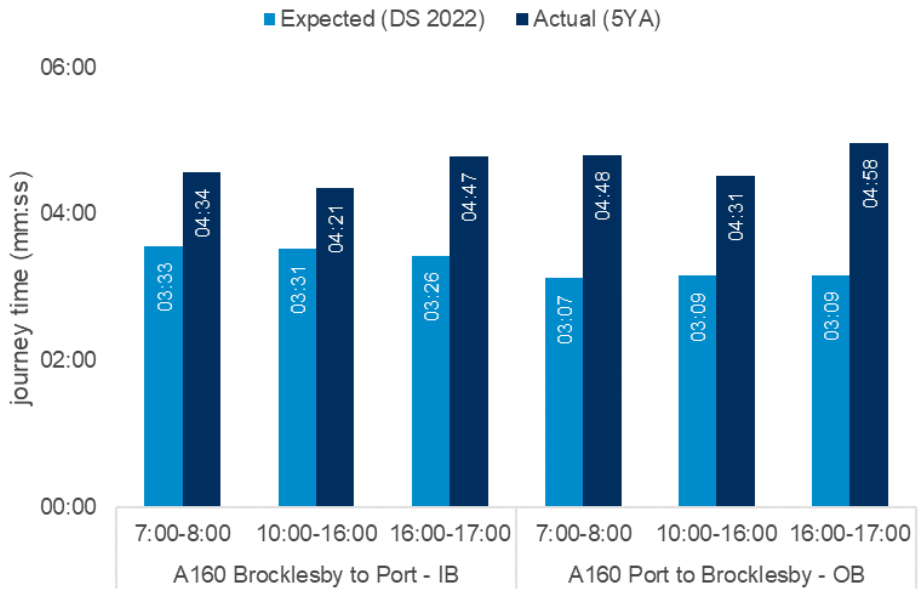
A comparison has been made between the observed journey times one-year after, and the forecast journey times, referenced as 'expected' in this section. The expected journey times have been calculated by interpolating the modelled journey times, to present the same year as the observed journey times, which for this project is 2022.[12]

As illustrated in Figure 17, the observed journey times inbound towards the port were expected to be around 3 minutes and 30 seconds with the quickest journey being during the evening peak. At five-years after opening, the observed journey times were over four minutes indicating that the traffic model was optimistic and the benefits have not been realised. For users outbound from the port, the expected journey times were also overly optimistic in terms of achievable speeds along the A160, as all three periods observed speeds that were over a minute longer than expected, and the evening peak observing nearly 2 minutes difference.

The traffic model was optimistic potentially as strategic transport models, such as the one used for the assessment of this project, do not fully capture differences in speeds between different vehicle types, and the observed journey times being for HGVs.

[12] As presented in the TFR - forecasted journey times have been interpolated using the 2016 and 2031 modelled journey time values.

Figure 17: Actual vs expected journey times



Source: Interpolated forecast based on expected values in TFR and Satellite Navigation (TomTom).

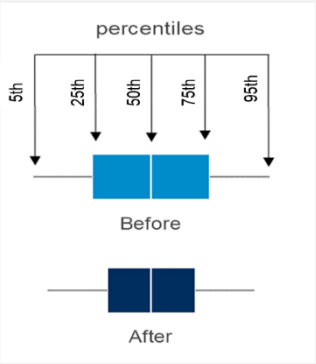
Did the project make journeys more reliable?

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

To measure journey time reliability, we examine how much journey times vary from the average journey time, on any day or time-period. The distribution of journey times is a good indication of how much journey times vary.

Several metrics of the distribution of journey times for the A160 route have been used and presented as box-and-whiskers diagrams for the inbound and outbound journeys. An explanation of the metrics shown in the box-and-whiskers diagrams is provided in Figure 18.

Figure 18: What does a box plot show?



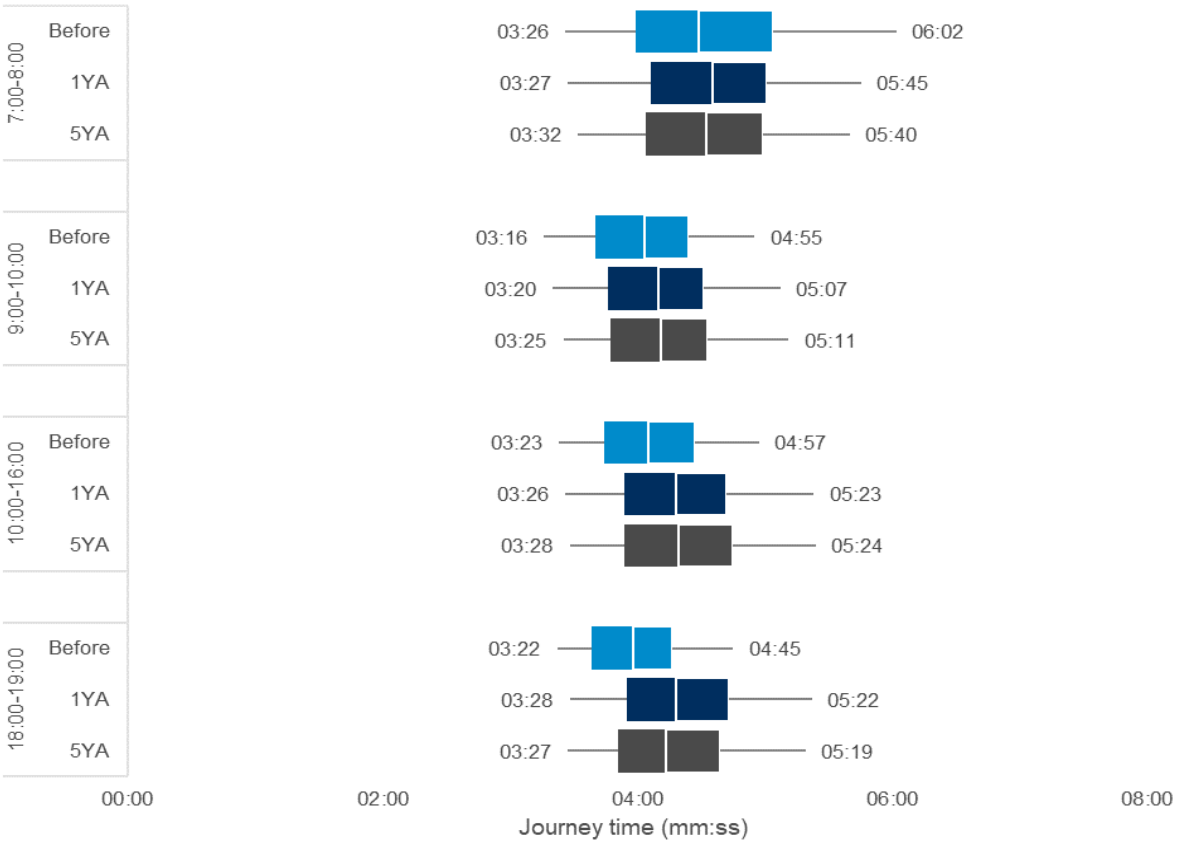
The lowest point is the 5th percentile, this means 5% of journeys take less than this amount of time to complete. The highest point is the 95th percentile, this means 95% of journeys take less time than this to complete. This shows the difference between the longest and the shortest journey times observed.

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

The journey time reliability, referenced as half of all journeys, is depicted by the 25th to 75th percentile boxes in Figure 19 and Figure 20; if the boxes get shorter, this indicates journeys become more reliable. For HGVs travelling inbound on the A160 Brocklesby to Manby roundabout route (Figure 19), the journey time reliability has generally worsened, except from 7-8am when reliability improved compared to before. In comparison, in the outbound direction (Figure 20) improvements were observed during all time periods at five-years after compared to before, with reliability marginally better relative to one-year after between 9-10am. As considered at one-year after opening, the minimal improvements observed inbound is possibly the result of the new arrangement at Habrough roundabout (whereby this traffic must give way to A160 outbound traffic travelling to A1077 Ulceby Road).

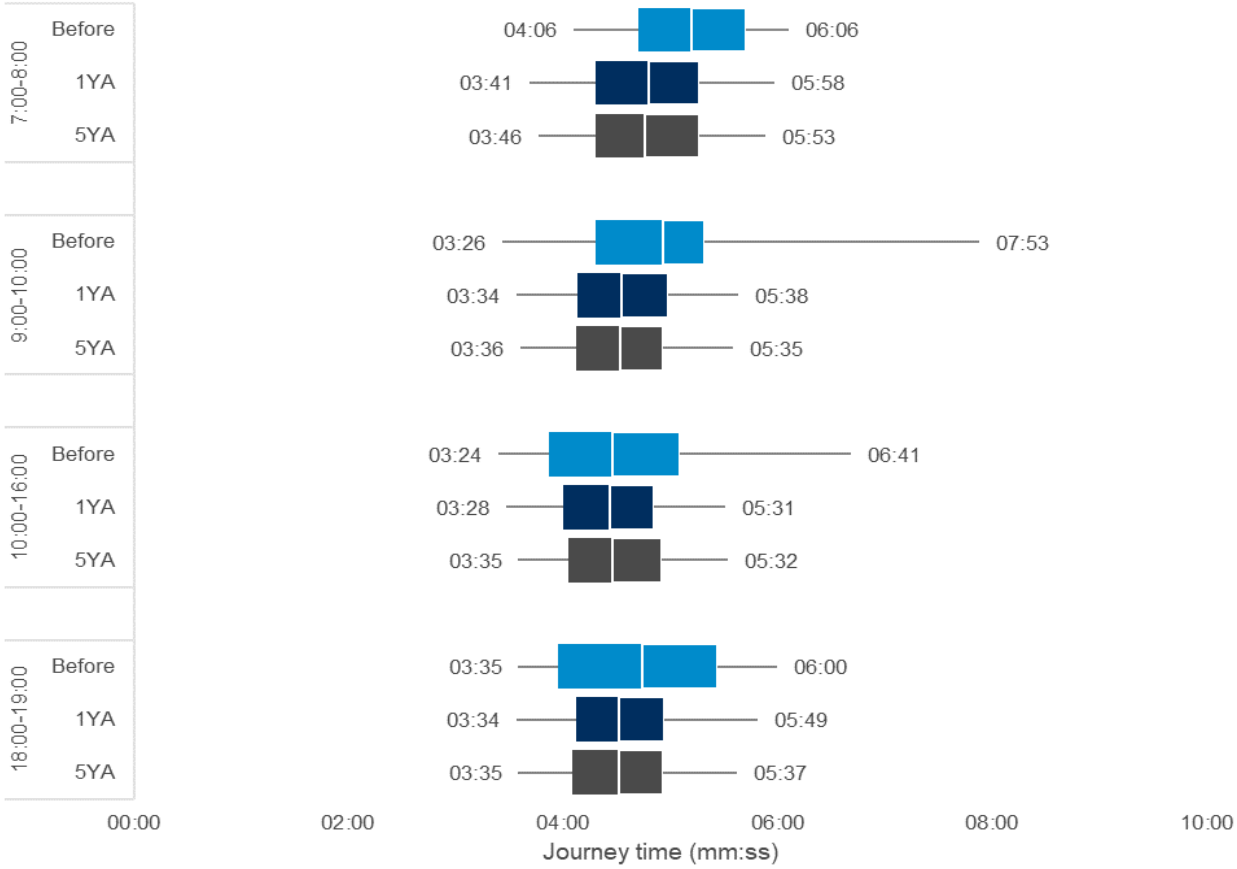
Analysis of the longest journeys times depicted as the 95th percentile (the line extending to the right of the boxes) found for HGVs travelling inbound, most journey times had increased. Meanwhile, outbound journey times at five-years after saw improvements compared to before and one-year after opening, for example, between 9-10am, a considerable improvement of over 2 minutes was observed compared to the project implementation. Also, the quickest journeys (5th percentile) in both directions saw a marginal deterioration in journey times for most time periods compared to before and one-year after the project opening.

Figure 19: Journey time reliability inbound (time taken to drive through the project mm:ss)



Source: Satellite Navigation (TomTom). Before: 2015, 1YA: 2018, 5YA: 2022.

Figure 20: Journey time reliability outbound (time taken to drive through the project mm:ss)



Source: Satellite Navigation (TomTom). Before: 2015, 1YA: 2018, 5YA: 2022.

5. Safety Evaluation

Summary

The safety objective for the A160/A180 Port Immingham improvements project was to improve road safety for all, by successfully achieving a reduction of the number of collisions by the end of the project lifespan.

The business case forecast a reduction of 194 collisions over the 60-year appraisal period. The monetary value of the overall change in collisions would be a benefit of £26.7 million. The predicted casualty reduction for the wider area was 14 fatal, 68 serious and 242 slight over the 60-year appraisal period.

Table 2 captures all the key measures for the project extent from before to after construction.[13] The five-year evaluation shows a reduction across all key safety measures.

Table 2: Summary of project extent key measures

Measure		Before[14]	After	Change
Personal Injury Collisions (PICs)		6	5	-1
Collision Rates - per hundred million vehicle miles (hmvm)		44	35	-9
Measure		**Before**	**After**	**Change**
Collision Severity	Fatal	0	0	0
	Serious	11.8	6	-6
	Slight	19.2	18	-1
Fatal Weighted Injury (FWI)[15]		0.3	0.1	-0.2
FWI/hmwm[16]		1.8	0.5	-1.3
Killed or Seriously Injured (KSI)[17]		2.9	1.4	-1.5
KSI/hmvm[18]		20.5	10.2	-10.3

Source: STATS19 30 May 2010 – 21 March 2022.

[13] Due to the limited sample size, we have been unable to calculate a counterfactual for the project extent.
[14] Values have been rounded to the nearest whole number. Therefore, the change values may be more / less than independent calculations.
[15] The FWI weights collisions based on their severity. A fatal collision is 1, a serious collision is 0.1 and a slight collision is 0.01. The combined measure is added up. A full number is the equivalent to a fatality.
[16] FWI/hmvm= Fatal Weighted Injury per Hundred Million Vehicle Miles.
[17] The number of people killed or seriously injured (KSI) in road traffic collisions. This metric is non-weighted but doesn't pick up all injuries (slight casualties). KSI rate per hmvm is the rate calculated using the number of people who are killed or seriously injured, and the total miles travelled on a road section or type.
[18] KSI/hmvm = Killed or Serious Injured per Hundred Million Vehicle Miles.

The average collision rate in the wider area has reduced by three PICs per hmvm since the project has been open to traffic. The average PIC has reduced by 16 (annual average of 67 to 51 PICs after) in the same period. There has been an increase of four fatal collisions within the wider area, from six before the project to ten after the project. Conversely, there has been a positive reduction across serious and slight collision severities and KSI measures. FWI has remained stable between before and after.

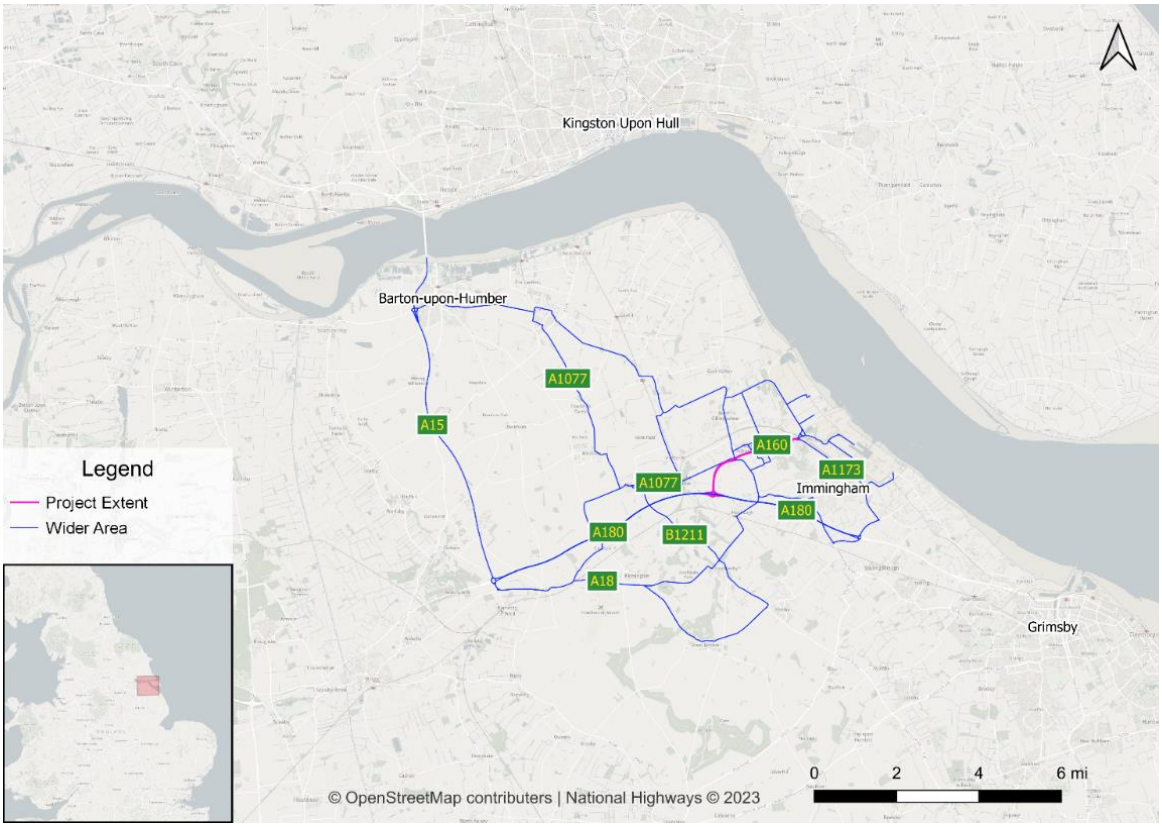
If the wider area continues to perform at the current level, it will meet the predicted reduction. A full summary of the wider area analysis can be found in Appendix A.

At this five-year evaluation point, the project is on track to meet its objective to reduce the number and rate of collisions.[19]

Safety study area

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

Figure 21: Safety study area



Source: National Highways and OpenStreetMap contributors.

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

Road user safety on the project extent

How has traffic flow impacted collision rates?

DfT releases road safety data[20] that records incidents on public roads that are reported to the police. This evaluation considers only collisions that resulted in personal injury.

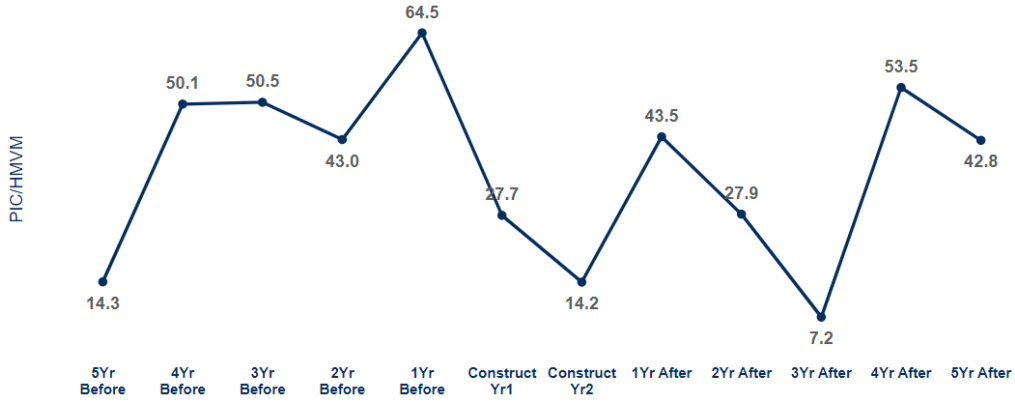
The safety analysis has been undertaken to assess changes over time looking at the trends in the five years before the project was constructed to provide an annual average. We have then assessed the trends from the five-years after the Immingham improvement project was operational and open for road users.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

- Pre-construction: 30 May 2010 – 29 May 2015
- Construction: 30 May 2015 – 21 March 2017
- Post-opening: 22 March 2017 – 21 March 2022

To understand potential safety benefits, we consider changes in the volume of traffic and the number of collisions observed. A rate is calculated using the number of PICs and the total miles travelled on a road section or type. The rate is presented as the number of collisions per hundred million vehicle miles (hmvm).

For the five-year period before the project, the average collision rate was 44 PICs per hmvm, this equates to traveling three million vehicle miles before a collision occurs (Figure 22). For the five-year after period, the average collision rate decreased to 35 PICs per hmvm, this equates to travelling five million vehicle miles before a collision occurs.

Figure 22: Annual average of collision rate



Source: STATS19 30 May 2010 – 21 March 2022.

Based on the five-years after evaluation point, an annual average reduction of nine PICs per hmvm is a positive result at this stage of the project.

As part of the safety evaluation, we usually assess what changes in collision rates might have occurred due to factors external to the project over this timeframe. To do this, we estimate the trend in PICs which might have occurred if the road had remained in its previous configuration (this is referred to as a counterfactual - see

[20] https://data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data

the POPE methodology manual[21]). However, due to the small sample size for the project extent, we have been unable to perform the normal counterfactual test and estimate the likely range of collisions rates. We have also been unable to perform statistical significance testing on these results.

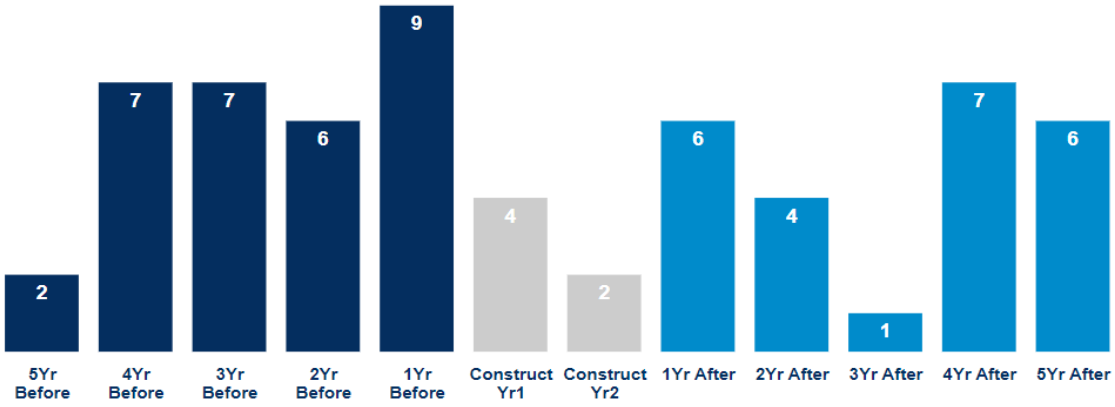
What impact did the scheme have on road user safety?

The evaluation found the number of PICs on the project extent had decreased. During the first five years, the project was operational, there were on average five PICs per year, one less than the average six per year over the five years before the project was constructed (Figure 23).[23]

Project extent average PICs[22]

6	5	1
Before	After	Fewer

Figure 23: Annual Personal Injury Collisions



Source: STATS19 30 May 2010 – 21 March 2022.

Similar to collision rates, collision numbers also reduced slightly. Due to the small sample size, it is difficult to interpret these results to understand the impact on safety without a counterfactual for comparison. However, comparing before and after values only, the project is successful and is on track within the 60-year appraisal.

What changes in the severity of collisions did we see?

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

[21] https://nationalhighways.co.uk/media/pq2jb142/pope-methodology-note-2024-v2.pdf
[22] Values are rounded and therefore may not add up exactly for independent calculations.
[23] Due to the small sample size, we have been unable to perform the normal counterfactual test and estimate the likely range of collisions. We have also been unable to perform statistical significance testing on these results.

officer.[24] As a consequence, DfT has developed a severity adjustment methodology[25] to enable robust comparisons to be made.

The pre-conversion collision severity has been adjusted, using DfT's severity adjustment factors, to enable comparability with the post-conversion safety trends.[26]

After the project, fatal collisions remained stable at zero, but there was a reduction across the serious and slight severity categories (Table 3).

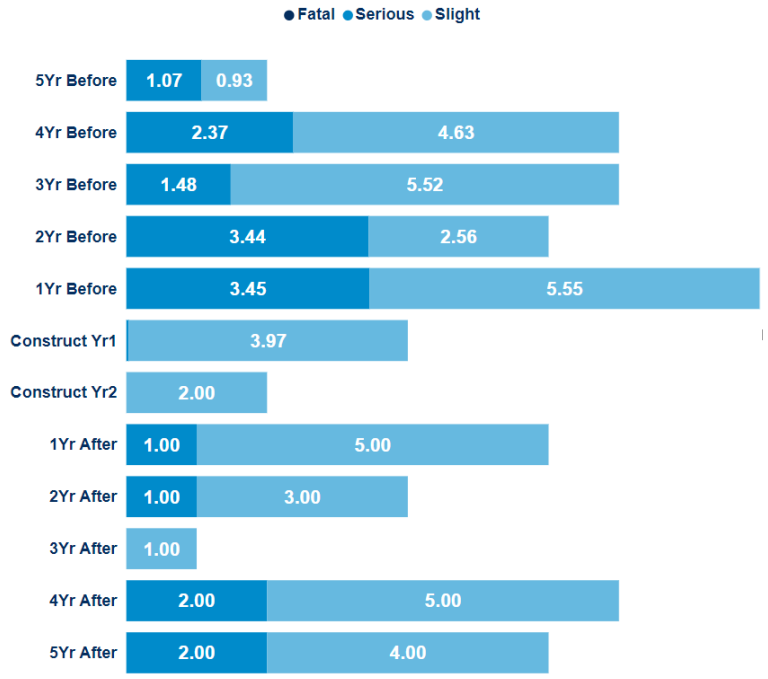
Figure 24 shows the full breakdown of severity of PICs by project year.

Table 3: Number of PICs by severity[27]

	Before	After	Change	Change direction
Fatal	0	0	0	↔
Serious	11.82	6.00	-5.82	↓
Slight	19.18	18.00	-1.80	↓

Source: STATS19 30 May 2010 – 21 March 2022.

Figure 24: Severity of PICs



Source: STATS19 30 May 2010 – 21 March 2022.

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

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

26 Collision severities within this report use the 2022 adjustment factor.

27 Due to the limited sample size, totals of collisions by severity have been presented.

What impact did the project have on casualty severity?

Like other transport authorities across the UK, the key measure we use to assess the safety of roads, is Fatal and Weighted Injuries (FWI). This gives a fatality 10 times the weight of a serious casualty, and a serious casualty 10 times the weight of a slight casualty.[28] In effect, it takes all non-fatal injuries and adds them up using a weighting factor to give a total number of fatality equivalents.[29] This is represented by an annual average and a rate that standardise casualty severities against flow to show the likelihood of a fatality equivalent occurring per distance travelled.

There was no change in the FWI observed annually. The severity of casualties occurring after the project became operational reduced slightly in the project extent. Before the project, an annual average of 0.3 FWI was observed. After the project, this reduced to 0.1 fatality equivalent, which is classified as stable. This is likely due to the small sample size of collisions collected.

The combined measure showed an extra 38 million vehicle miles was travelled before a FWI.[30] The rate of FWI per hmvm reduced. This suggests that considering changes in traffic, the project is having a positive safety impact on the severity of casualties within the project extent.

We also assess the impact the project had on casualties using the Killed or Seriously Injured (KSI) measure [31], and consider changes in traffic by calculating an average rate for every hmvm travelled.

A reduction of two KSI was observed annually. Reducing from an average of 2.9 KSI before to 1.4 KSI after. The rate of KSI per hmvm decreased from an average of 20.5 to 10.2 for every hmvm travelled.

The observations for KSI suggests that the project is having a positive safety impact on the severity of casualties within the project extent.

Road user safety in the wider area

Further detail on the safety analysis in the wider area is contained in Appendix A.

Is the project on track to achieve its safety objective?

The safety objective was to achieve improving road safety for all. Despite the small sample size for the project extent, we observed a reduction in the rate and number of collisions and improvement to the impact on casualties. Observations from the wider safety area support these reductions. We therefore believe that the project has met its safety objective.

The business case forecast was a reduction in PICs as a result of this project, with a saving of 194 collisions over the 60-year appraisal period. Findings at the five-year evaluation stage suggest the project is likely to meet the appraisal scenario.

[28] The FWI weights collisions based on their severity. A fatal collision is 1, a serious collision is 0.1 and a slight collision is 0.01. So 10 serious collisions, or 100 slight collisions are taken as being statistically equivalent to one fatality.
[29] Casualty severities within this report use the 2022 adjustment factor.
[30] Before the project, 38 million vehicle miles needed to be travelled before a FWI (0.4 FWI per hmvm). After the project this increased to 77 million vehicle miles (0.2 FWI equivalents per hmvm).
[31] The number of people killed or seriously injured in road traffic collisions. This metric is non-weighted but does not pick up all injuries (slight casualties). KSI rate per hmvm is the rate calculated using the number of people who are killed or seriously injured, and the total miles travelled on a road section or type.

6. Environmental Evaluation

Summary

The evaluation of environmental impacts uses information on the predicted impacts gathered from the appraisal and compares them with findings obtained during a site visit. POPEs provide an opportunity for such findings to be captured early and ensure improvements are made, so the design outcome can be achieved.

The evaluation of environmental impacts uses information gathered from the environmental appraisal within the business case (the Appraisal Summary Table (AST)), the Environmental Statement (ES) and considers findings of the one-year after opening evaluation, compares them with findings obtained five-years after the project opened for traffic.

Observed impacts have been determined during a site visit, supported by follow up desktop research. The site visit was undertaken in July 2022.

The results of the five-year evaluation are recorded against each of the Transport Appraisal Guidance (TAG) environmental sub-objectives[32] and the key outcomes have been summarised below and presented in Table 5:

- The available traffic data suggested that air quality and noise impacts along the project were likely to be as expected.
- The site visit identified that the planting designed to mitigate impacts to landscape was becoming more established, however, there are some issues with where ornamental shrubs were not present in planned planting locations and a general issue with weeds present in areas designated for ornamental shrubs. Overall, on the assumption that remedial mitigation planting and weeding is implemented, the landscape planting is anticipated to deliver design year outcomes as expected.
- Whilst key biodiversity mitigation had been implemented, monitoring reports confirming the effectiveness of the ecological mitigation was not available. Therefore, we don't have the evidence to confirm if the biodiversity impacts at five-years after were as expected.
- Attenuation and treatment ponds had been incorporated, but at five-years after many of the drainage ditches and culverts were overgrown with vegetation. The maintenance regime needs to be reviewed to ensure the drainage network delivers the expected beneficial outcome for the water environment.
- All other environmental and society impacts were broadly as expected.

[32] Environmental impacts on severance, physical activity and journey quality were scoped out for the five-year evaluation as there were no outstanding issues.

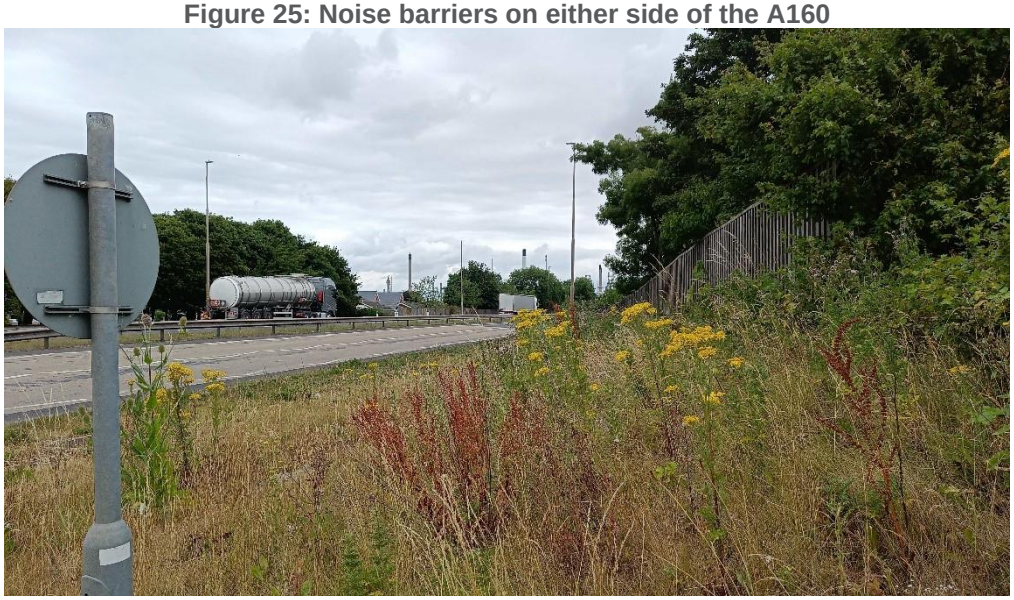
Noise

The ES predicted that the widening of the A160 and amendments to the existing 'on-line' sections, including the Top Road Link and the new Habrough roundabout would lead to both beneficial and adverse impacts to nearby residential properties. This was due to changes in traffic volumes, moving traffic closer and in some cases further away from properties and the creation of new road links. The project also considered whether noise insulation would be required for nearby properties[33], but instead identified that installing 1.8-metre-high timber noise barriers at the two locations would provide the required benefits. The use of a low noise surface along sections of the project would also bring benefits.

Overall, the assessment predicted that the impacts of the project would be beneficial.

Our five-year evaluation considered the available documentary evidence supported by observations made during the site visit. During the five-years after site visit, it was confirmed that two timber noise barriers have been installed at two locations (see Figure 25). The barriers performance can't be assessed in this study due to limited information being available, so are not considered in the five-year evaluation. It has also been confirmed low noise surfacing has been laid.

Figure 25: Noise barriers on either side of the A160



Source: 5YA Evaluation Site Visit (July 2022).

POPE methodology for evaluating local noise from traffic compares forecast traffic flows with observed post project traffic flows. Traffic flow data from the five-year analysis in Table 4 suggested that the impact of the project on noise was 'as expected'.

[33] These properties were numbers 35 to 51 School Road (odd numbers only) and Janika, off Habrough Road to the south of the A160.

Table 4: Two-way AADT flows on the A160 and A180 project extent

Site	Interpolated 5YA Forecast (2022) - AADT	Observed 5YA (2022) - AADT	Difference between Forecast and Observed (AADT, 2022)	
			Absolute Number	%
A160 Port	10,894	10,503	-391	-3.6%
A160 Brock to Habrough[34]	7,698	6,424	-1,274	-16.5%
A180 West of Immingham	30,563	29,265	-1,298	-4.2%
A180 Immingham	21,545	22,709	1,164	5.4%
A180 East of Immingham	30,652	27,526	-3,126	-10.2%

Source: Forecast traffic data interpolated from traffic forecast report and observed from five-year after counters.

Air quality

The ES noted that the A160 in the project area carried a substantial quantity of non-local traffic, particularly from the nearby docks. Local air quality was predicted to improve at receptors close to the Habrough roundabout as the scheme relocated the highway further away from properties. At receptors along the A160 adjacent roads in South Killingholme, increases were anticipated in concentrations of emissions associated with a rise in vehicles using the A160, but none of the increases in pollutant concentrations were predicted to be above the threshold for noticeable change.

The AST indicated that there would be an overall improvement of air quality with the project implemented for nitrogen oxides (NOx) and particulate matter (PM_{10}). There would also be a decrease in regional emissions of NOx and improvement in exposure to PM_{10} and nitrogen dioxide (NO_2) concentrations.

Overall, the ES assessment considered that the scheme would not have a significant impact on air quality.

For the five-years after evaluation, the focus was on annual mean NO_2 concentrations as this is the primary pollutant of concern in the study area. However, where the conclusion of the review is focus on NO_2, it can be expected that similar changes would be anticipated for PM_{10} and the overall conclusions apply to both pollutants.

In 2022, there were local authority NO_2 diffusion tubes located adjacent to road links with forecast and observed traffic flows.[35] At these sites, annual mean NO_2 concentrations range from 14.0 to 27.1µg/m³ in 2022. These concentrations are generally comparable to the predicted concentrations at receptors in the EAR assessment year of 2016.

Overall, based on a comparison of available observed data to forecast data, and recent local air quality monitoring, it is not anticipated that the differences between the observed and forecast traffic would lead to a significant change. The evaluation of air quality for the project concludes that it is likely to be as expected.

[34] Observed data was only available in one direction.
[35] North Lincolnshire Council Annual Status Report (June 2023).

Greenhouse gases

The environmental appraisal predicted that the project would increase carbon emissions due to the changes in traffic volumes and traffic speeds that it would cause.

To evaluate the greenhouse gas emissions of the appraised project, forecast and observed traffic data is required for the full appraised study area. However, the full extent of forecast traffic required to evaluate and quantify greenhouse gas emissions was not available for this project at the five-year evaluation stage. Instead, we looked at those areas where we had some data.

There were nine one-way road links where some observed and forecast traffic data were available. However, full data was only available for three one-way road links. For these locations, emissions calculations and comparisons were carried out using two approaches. Emissions from both the observed data and the forecast data for the three road links were calculated using Defra's Emission Factor Toolkit (EFT)[36] to enable a comparison between the two datasets.

Two road links were predicted to experience higher CO_2 emissions with the observed data compared to the forecast data, but overall lower CO_2 emissions were predicted compared to the observed data, due to the influence of the A160 Brocklesbury Interchange to Habrough Roundabout, which has lower flows, lower heavy goods vehicle, and less congested speeds than was forecast.

Overall, based on a comparison of available observed data to forecast data using the EFT, the observed data resulted in lower calculated greenhouse gas emissions than the forecast data. While the total change in emissions caused by the project cannot be evaluated with confidence from the limited data, the evaluation suggests that the project may have led to a smaller increase in CO_2 emissions than forecast.

Landscape

The appraisal found that the project would adversely affect the rural landscape, interrupt field patterns and cause loss of vegetation and important hedgerows. In terms of mitigating the impacts predicted to be produced, the ES outlined that the establishment of mitigation vegetation had the potential to blend the road and new landform features into the surrounding landscape, provide screening of moving traffic and reduce adverse visual effects. It was anticipated that a change in the A160 alignment, and screening of existing oil refinery views, would result in a beneficial effect for five receptors after 15 years of vegetation establishment.

At the one-year after evaluation, it was considered that although landscape mitigation planting had generally been implemented, it was not as well established as would be expected and several areas were not yet complete or appeared unfinished. The site visit noted significant numbers of failed plants and furthermore, ornamental planting did not appear to be thriving. It is understood that some reseeding of grassland had been required and species rich areas were noted to have weeds. Overall, the project was considered to be worse than expected at one-year after and furthermore, there was a risk that if performance of the landscape mitigation did not improve, the long-term visual impacts are likely to be worse than expected.

[36] Emission Factor Toolkit (EFT) version 12.01.

At the five-year evaluation site visit, it was found that the landscape mitigation was becoming more established, although it was noted that some areas needed immediate weed control and other areas will need replanting in the future. Areas needing replanting and weeding were part of the planted slope at the new Town Street bridge (Figure 26) and ornamental planting plot on Ulceby Road. Furthermore, a site wide observation in relation to the landscape mitigation planting was that the tree and shrub guards had not been removed (as seen in Figure 27), likely hindering the growth of the shrubs.

Several locations were replanted before the site visit and plants were smaller than expected at five-years after, but growing well. With the new vegetation in place, landscape impacts have been reduced to the levels predicted in the environmental appraisal and at the five-years after stage, the outcome was as expected.

Figure 26: Replanted trees and shrubs at Town Street bridge

Source: Five-year after evaluation site visit (July 2022).

Figure 27: Example of unmaintained planting

Example of unmaintained planting (*left*: one-year after; *right*: five-year after)

Source: One-year after evaluation site visit (September 2018); five-year after evaluation site visit (July 2022).

Townscape

The AST assessed the impacts of the scheme as ‘neutral’ stating that there would be minimal effects. The new road bridge at South Killingholme would slightly improve connectivity in the townscape, improving the overall layout and human interaction.

In the ES, townscape was assessed within the landscape chapter stating that "*within this assessment, no distinction is made between landscape and townscape, and the topic therefore covers potential changes in any of these components both in the countryside and in built-up areas.*" The landscape assessment noted that the new road bridge in South Killingholme and associated loss of residential land would lead to a loss of built form and structure within the village resulting in a 'Slight Adverse' effect.

At one-year after the project opening, it was found that the new road bridge provided a safer crossing of the A160 for all users. Due to opening of views to the oil refinery and the direct loss of infrastructure within the village, at one-year after, the ES assessment of 'slight adverse' effects from the project better reflected the changes to the local townscape character. This was reiterated in the five-year evaluation, with vegetation expected to filter the open views not introduced at the properties on School Road and other roads near Town Street Bridge (Figure 28). Overall, it was considered that the predicted impact of neutral was not consistent with the visual observations during the site visit, as the visual amenity was worse than pre-project views.

Figure 28: South Killingholme village view towards new link road to Town Street bridge after property demolition

Source: Five-year evaluation site visit (July 2022).

Heritage of historic resources

The environmental assessment and appraisal considered the potential impact of the project on heritage and historic resources within the study area. It predicted a potential impact of 'slight adverse' on the heritage assets Grade II Listed Building, three undesignated historic buildings, and 12 regionally important archaeological sites within the study area.

The environmental assessment identified several heritage assets impacted by the project including 36 archaeological assets ranging in heritage value, five historic landscape character units, and seven historic buildings. The ES stated that on completion of the archaeological investigations, a programme of post-excavation studies was to be agreed with English Heritage and the County Archaeologist. We

can confirm that post-excavation was completed, the archaeological finds / archive have been deposited with the local museum and the reports published.[37]

Four of the historic buildings were predicted to have direct impacts from the project including the setting of South Killingholme village, Cross Keys pub, Poplar Farm and the Grade II listed 'The Nook'. Similarly, the settings of the five historic landscape character units were predicted to be adversely impacted.

The environmental assessment set out that the mitigation strategy for archaeology would include strip, map and sample, earthworks and watching brief for archaeological remains pre-construction, the results of which were not made available as part of the POPE. The ES also set out a landscape mitigation planting scheme, which was predicted to be sufficient in minimising impacts to the identified historic buildings and historic landscapes. Overall, residual impacts with the mitigation in place were predicted by the environmental assessment to be 'slight adverse', except for one 'moderate adverse' impact at Poplar Farm.

At five-years after opening, the impacts for the heritage assets were generally as expected due to the establishment of the landscape planting. However, the Poplar Farm screening mitigation had established poorly with gapping present between the hedgerows. In addition, areas of planting in South Killingholme Village (which includes planting to screen The Nook and Cross Keys Pub) and on Town Street bridge had variable planting establishment and would need replanting and weed control in the future, to screen open visuals towards the oil refinery. With the new vegetation in place, impacts on most of the heritage assets were reduced to the levels predicted in the environmental appraisal. With the exception of Poplar Farm, which requires further remedial planting to achieve screening targets. The impacts on the setting of The Nook and The Cross Keys pub as result of opening views to the oil refinery were not assessed fully within the environmental appraisal or assessment and therefore are worse than expected five-years after opening.

Biodiversity

Key ecological features of the study area identified by the ES included protected nature conservation sites and other sensitive habitats including wetlands, scrub, semi-improved grassland, species poor hedgerows, watercourses, and ditches, as well as legally protected species. No significant impacts were predicted for the two internationally important nature conservation sites.[38]

The AST predicted short term impacts on various ecologically sensitive receptors including water vole, breeding / wintering birds, badgers, and ecologically important hedgerows. It noted that mitigation measures had been identified to ensure there would be no significant impacts and overall impacts were assessed as 'neutral'.

At one-year after, the key mitigation measures had generally been provided. However, the planting and seeding were not well enough established to give habitat connectivity, vegetation cover or discouragement to barn owls from hunting within the road corridor. Also, some of the enhancement measures proposed for other species had not been implemented. Based on the information available at the

[37] https://archaeologydataservice.ac.uk/library/browse/organisationDetails.xhtml?organisationId=820 and https://www.barpublishing.com/becoming-roman-in-north-east-lincolnshire.html

[38] **Humber Estuary** (Ramsar, Special Area of Conservation (SAC), Special Protection Area (SPA) and Site of Special Scientific interest (SSSI)) and **North Killingholme Haven Pits** SSSI (which is also part of the Humber Estuary Ramsar, SAC and SPA).

one-year after evaluation, it was deemed that the condition of planting and ecological mitigation measures was worse than expected.

At the five-years after stage, our evaluation confirmed that all key mitigation and the enhancement measures had been provided. Based on the monitoring reports available, the created water vole habitat and one mammal tunnel appeared to be operating as intended. Some monitoring reports including breeding and wintering birds, and barn owl and bat monitoring post 2019 were not available, along with information on animal mortality. The incomplete information available meant the evaluation was limited in being able to provide a full assessment on the mitigation measures. Therefore, due to the limited information available at the time of writing, it is concluded that it is not possible to confirm if the biodiversity impacts at five-years after were as expected.

Water environment

There are several local watercourses and field drains in the vicinity of the project and surface water from the existing A160 drains into Skitter Beck and the South Killingholme Drain eventually discharging into the Humber Estuary. It was expected that routine runoff from the project would also discharge into these watercourses via various drains. An existing Environment Agency control pond near where the railway and A180 intersect would not be affected by the project.

It was predicted in the ES that during the project operation the impacts would be associated with pollutants being washed from the road surface by rainwater, and spillages or fuel or other contaminants because of road traffic collisions. The appraisal highlighted that the project would introduce treatment and attenuation ponds for stretches of existing carriageway that had no treatment for runoff, the impacts of the project were assessed as ‘slight beneficial.’

The mitigation measures included dividing the project into ten catchment areas, with most of the road runoff passing through attenuation ponds prior to discharge. Sustainable drainage systems would be implemented to slow down / regulate the flow of runoff from the road prior to discharge to help manage flood risk, as well as providing water treatment to improve the quality of the runoff.

Based on the available information at the one-year after evaluation, attenuation and treatment ponds were incorporated into the project, but it was not possible to understand whether the drainage design was performing other than as designed.

During the five-year evaluation site visit, it was identified that most balancing ponds were performing as intended with some providing a secondary function as a wildlife habitat. However, a large algae bloom was recorded in Pond 6, which was not observed during the one-year after site visit (Figure 29) and was likely to be affecting the quality of the water in the pond and its biodiversity value. Subsequent site visits (Summer 2024) has revealed that the pond is looking to be in a better condition. Large weed populations were also observed within many of the drainage ditches and culverts (Figure 30). These weed populations were likely to be affecting the flow of water and impairing the performance of the drainage network. The maintenance regime will be reviewed to ensure the drainage network delivers the expected beneficial outcomes.

Figure 29: Pond 6 at (*top*) one-year after and (*bottom*) five-years after

Source: One-year after evaluation site visit (September 2018); Five-year evaluation site visit (July 2022).

Figure 30: Culvert at the truck stop

Source: Five-year evaluation site visit (July 2022).

Overall, as there was little evidence of recent maintenance at the time of the site visit, the effects on the water environment were worse than expected.

Overview

The results of the evaluation are summarised against each of the Transport Appraisal Guidance (TAG)[39] environmental sub-objectives and presented in Table 5. In the table, we report the evaluation as expected if we believe that the observed impacts at five-years after are as predicted in the appraisal. We report them as better or worse than expected if we feel the observed impacts are better or worse

[39] TAG provides guidance on appraising transport options against the Government's objective for transport

than expected. Finally, we report impacts as too soon to say if we feel that, at five-years after, there is insufficient evidence to draw firm conclusions.

Table 5: Summary of environmental findings – A160 / A180 Port of Immingham improvement

Sub Objective	AST Score	Five-Year Evaluation Outcome	Five-Year Evaluation Summary
Noise	Without project: Likely people annoyed 149. With project: Likely people annoyed 144. Net change in population annoyed: 4	As expected	Of the nine road links evaluated across the Project, eight of the road traffic links are identified as having a basic noise level change "as expected", with one road traffic link identified as having a basic noise level change of "worse than expected". Therefore, based on the available traffic data, the project is performing 'as expected' at five-years after.
Air Quality	Local Air Quality Assessment Score: PM_{10}: -11; NO_2: -95; Regional Emissions: (Opening Year): NOx: -1 tonnes/yr	As expected	Based on a comparison of available observed data to forecast data and the recent local air quality monitoring, it is not anticipated that the differences between the observed and forecast traffic would lead to a significant change. The evaluation of air quality for the project concludes that it as expected.
Greenhouse Gases	Adverse	As expected	Due to limited data, the total change in emissions caused by the project cannot be evaluated with confidence. However, the evaluation suggests that the project potentially led to a smaller increase in CO_2 emissions than forecast.
Landscape	Slight Adverse	As expected	Generally, vegetation was well established at this stage of the project. Predicted impacts had arisen and the expected mitigation was in place. Establishment had improved since one-year after, although some issues with weeds and establishment of the ornamental shrubs remained. Overall, on the assumption that remedial mitigation planting and weeding is implemented, the landscape planting is anticipated to deliver design year outcomes as expected.

Sub Objective	AST Score	Five-Year Evaluation Outcome	Five-Year Evaluation Summary
Townscape	Neutral	Worse than expected	The new road bridge had provided a safer crossing of the A160 for all users; however, the demolition of the vacant property had opened views from Town Street south to the oil refinery. As the impact to the townscape of South Killingholme was not addressed in the AST, at five-years after townscape views are worse than expected.
Heritage of historic resource	Slight Adverse	Worse than expected	Archaeology – The archaeological mitigation was provided in various reports and submitted to a local museum as expected. Historic Buildings - as expected for three locations, but worse than expected for three other locations at five-years after. Historic Landscapes - landscape mitigation has generally been provided, but in areas is less well established at five-years after than expected but can still achieve the desired year outcome.
Biodiversity	Neutral	Too early to say	The landscape planting regime overall is performing as expected. All other key mitigation and the enhancement measures including badger tunnels, bird and bat boxes, and barn owl nest boxes, and water vole habitat had been provided. As monitoring reports confirming the effectiveness of the ecological mitigation was not available, it is considered too early to confirm if the biodiversity impacts at five-years after were as expected.
Water Environment	Slight Beneficial	Worse than expected	Attenuation and treatment ponds had been incorporated, but at five-years after many of the drainage ditches and culverts were overgrown with vegetation. The maintenance regime needs to be reviewed to ensure the drainage network delivers the expected beneficial outcomes.

7. Value for money

Summary

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

The project was delivered at a cost of £78.1 million, about 10% over the forecast cost.[40] In the first five years, the road provided improved journey times for traffic leaving the port, however increased journey times are observed towards the port during some time periods. This is potentially an effect of the remodelling of the Habrough roundabout to include an additional arm.

Outturn traffic flows are significantly lower than forecast, due to the wider growth impacts resulting from the Covid-19 lockdowns.

Analysis of collision numbers indicates an improvement in safety resulting from the schemes.

Value for money was forecasted over a range of possible traffic growth scenarios.[41] These scenarios forecast value for money to range from 'poor' to 'very high'.[42] The appraisal forecast a significant traffic growth and improving journey times; the observed data suggested a more modest traffic growth accompanied by slower journey times towards the port. This has affected the project's value for money, which we have re-forecast to be 'poor' in line with the low growth scenario, falling within the lower end of the forecasted range.

Forecast value for money

An economic assessment is undertaken prior to construction to determine a project's value for money and inform the business case. The assessment is based on an estimation of costs and benefits. The impacts of a project such as journey time savings, changes to user costs, safety impacts and some environmental impacts are able to be monetised. This is undertaken using standard values, which are consistent across government. The positive and negative impacts over the life of the scheme[43] are summed together and compared against the investment cost to produce a benefit-cost ratio (BCR). The monetised impacts are considered alongside additional impacts, which are not able to be monetised, to allocate the project a value for money category.

The monetised benefits forecast by the appraisal, which supported the A160 Port of Immingham scheme business case, are set out in Table 6. We have also included an indication of what proportion of the monetised benefits each impact accounted for and a summary of how we have treated the monetisation of each impact in this evaluation.

[40] Present Value of Costs (PVC) in 2010 prices and values.
[41] See section 7 – *Forecast value for money.*
[42] The value for money categories referenced are defined by DfT https://www.gov.uk/government/publications/dft-value-for-money-framework
[43] Typically scheme life is taken to be 60 years.

Table 6: Monetised benefits of the project (£ million)

	Forecast (£m)	% Forecast monetised benefits[44]	Evaluation approach
Journey times	157.6	86%	Re-forecast for the project area only (not the wider area) using observed and counterfactual[45] traffic flow and journey time data.
Vehicle operating costs (VOC)	3.3	2%	Monetised benefits assumed as forecast.
Journey time & VOC during construction and maintenance	-2.0	-1%	Not evaluated (assumed as forecast).
Safety	26.7	14%	Monetised benefits assumed as forecast.
Carbon	-4.6	-2%	Not evaluated (assumed as forecast).
Noise	0.7	0%	Not evaluated (assumed as forecast).
Air quality	0	0%	Not evaluated (assumed as forecast).
Indirect tax revenues	2.5	1%	Re-forecast using observed and forecast traffic flow and journey time data.
Total Present Value of Benefits (PVB)	**184.2**		

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

The costs anticipated in the appraisal are set out in Table 7. Based on this information, the scheme was anticipated to give a 'high' value for money over the 60-year appraisal period.

Evaluation of costs

The project was delivered at a cost of £78.1 million[46], which was slightly higher than the anticipated cost of £71.0 million (see Table 7).

The appraisal expected that the project would result in lower maintenance costs than would be incurred without the scheme. The evaluation thus uses a negative value for maintenance costs within the business case. Maintenance costs are not re-evaluated as part of the evaluation.

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

[45] We calculated the vehicle hours saved by comparing outturn journey times with an estimate of how journey times would have continued to deteriorate had the project not been implemented (i.e. a 'counterfactual').

[46] This is the PVC of the project. This means it is presented in 2010 prices, discounted to 2010 to be comparable with the other monetary values presented.

Table 7: **Cost of the project (£ million)**

	Forecast (£m)	% of Forecast Costs	Evaluation Approach
Construction costs	71.0	103.8%	Current estimate of project cost
Maintenance costs	-2.7	-3.8%	Not evaluated (assumed as forecast)
Total PVC	**68.4**		

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

Evaluation of monetised benefits

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

Monetised journey time benefits

As can be seen in Table 6, journey time benefits made up the majority of the justification for investing in this infrastructure project. The outturn journey time benefits are significantly lower due partially to lower than forecast traffic growth[47], but primarily to lower-than-expected journey time savings. Journey time savings were calculated only for the A160 between the A180 and the port, rather than the wider network as used for the forecasts. This would tend to slightly underestimate scheme impacts, although the largest proportion of benefit would be expected on the scheme section.

The overall impact of the scheme on vehicle hours on the project section in the fifth year was estimated to be very small. While benefits were observed for outbound (westbound) traffic, the comparison between the observed and counterfactual times, showed a disbenefit for the inbound (eastbound) traffic as shown in Figure 15.

Combined with the outturn flows at five-years after being lower than forecast, as shown in Figure 13, the overall net benefit for journey times is very low.

If the trends observed at the fifth year continue over the 60-year period, without any further action to optimise benefits, the monetised impact on journey times, for those using the road, would be £2.2 million.[48]

Overall, this should be considered a lower bound estimate. This benefit value represents time savings only on the scheme section, based on journey time trends

[47] Forecast traffic growth for the core scenario included developments in the South Humber Area and growth at Immingham Port that exceeded NTEM forecasts and were not constrained to TEMPRO.

[48] This is against a counterfactual where we have estimated what the journey time is likely to have been if the road had remained unchanged.

observed on the project area, not the wider surrounding road network which was considered in the calculations for the original business case.

Other reforecast impacts

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

- Indirect tax revenues are the benefit to the government (and therefore society) of the additional tax income from the additional fuel consumed due to increased speeds and distances travelled. Within the business forecast, this was forecast to be a small positive value. We have reforecast that the impact would be slightly greater than expected, an increase in tax revenues (£4 million). The impact is larger because our evaluation has shown that the speed increase was lower than expected, suggesting vehicles are using more fuel per kilometre at the lower speed.
- VOCs refer to the fuel and other costs borne by the user (such as the wear and tear on vehicles). This generally changes in the opposite direction to indirect tax, since increasing tax revenues imply an increase in VOCs and consequently, a disbenefit to users in terms of operating costs.

In this case, the appraisal showed benefits for both VOCs (£3.3 million) and indirect tax revenues (£2.5 million). Under these counter-intuitive circumstances, the VOC benefits are reported as forecast.

Impacts assumed as forecast

The evaluation has not been able to reforecast the monetary value of noise and carbon benefits[49], these represent a very small element of the overall scheme benefits and are reported as forecast.

Although we have been unable to reforecast the monetised impacts of safety, the project has shown that collision numbers have reduced slightly within the project extent.[50] Given that the project covers a very small area, we have been unable to perform the normal counterfactual test and estimate the likely range of collisions rates. Over the wider area, the changes in collision numbers are shown to fall within the counterfactual range.

The safety analysis concludes that despite the small sample size for the project extent, a reduction in the rate and number of collisions and improvement to the impact on casualties. At this stage, the project is likely to meet the appraisal scenario and consequently, the value for reduction in collision costs is retained as forecast.

Journey times and VOCs during future construction and maintenance have been assumed as forecast. As the vast majority of this maintenance is still in the future, the evaluation uses the impacts forecast within the business case.

[49] We do not have a method for reforecasting the monetised impact of noise or carbon impacts. These generally have a small contribution to the monetised benefits of schemes and therefore the impact of assuming as forecast is unlikely to impact on the value for money rating of the project.
[50] See section 5 for more detailed findings on the evaluation of safety.

Overall value for money

The main reason for the overall reduced level of benefits from this project is the lack of journey time savings. The appraisal forecast a significant traffic growth and improving journey times.

Journey time benefits represented 86% of the total benefit reported in the EAR. The analysis of journey times shows that the differences between forecast and observed five-year journey times are large, and while in the westbound direction observed five-year after journey times are lower than observed before journey times, in the eastbound direction five-years after observed journey times are the same or higher than before the scheme. In all cases, journey time improvements are less than forecast.

High levels of traffic growth were forecast on the A160, and comparison of before and after counts show that observed growth was lower than expected.

Given that journey time benefits contributed a high proportion of forecast benefits and these appear not to have been realised by the scheme, it is likely that this project has provided a return on investment but falling within the lower end of the forecasted range.

The business case considers the impact on benefits of growth assumptions higher and lower than the core scenario. The range of journey time and travel cost benefits was forecast to fall within the range of £30.2m to £374.2m over the 60-year assessment period. The sum of the equivalent reforecast values reported above is £9.5m, which falls below the lower end of the forecast range. To this end, under a low growth scenario, the project was expected to deliver poor value for money and based on this assessment, falls within the same category.

Appendix A

A.1 Road user safety on the wider area

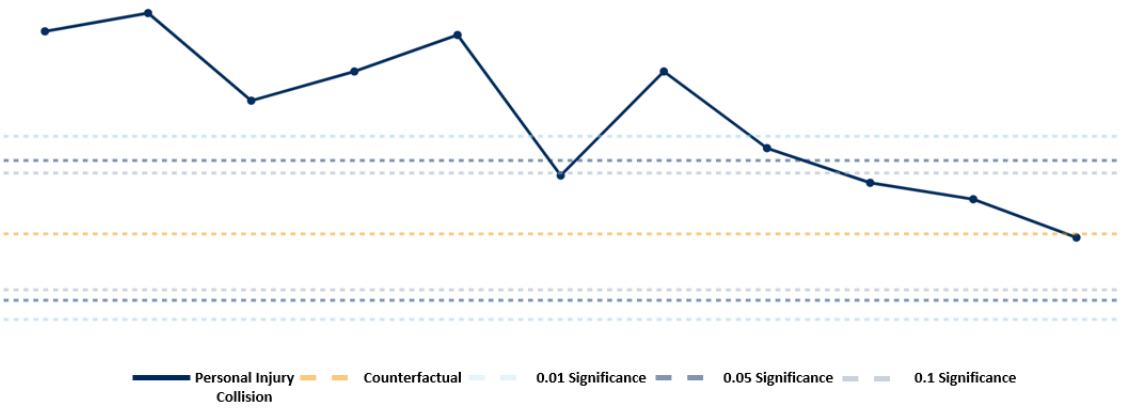
Overview

As part of the safety evaluation, we look to assess what changes in collision rates might have occurred due to factors external to the project over this timeframe. To do this, we estimate the trend in PICs which might have occurred if the road had remained in its previous configuration (this is referred to as a counterfactual – refer to Figure 31 and the POPE methodology manual[51]). This is based on changes in regional safety trends for dual carriageways on the SRN with a high volume of road users.

Figure 31: What does the counterfactual show?

The counterfactual is an estimation of what we think would occur without the project taking place. We estimate a range of collisions that follow regional trends. The chart shows:

1. Timeseries of personal injury collisions
2. Estimated counterfactual range, which comes from a X^2 hypothesis test on one degree of freedom using a significance level of 0.05. More details can be found in the POPE Methodology Manual.
3. National Highways is developing new statistical methods to compare collision and casualty rates. We anticipate adopting these once the methods are finalised.

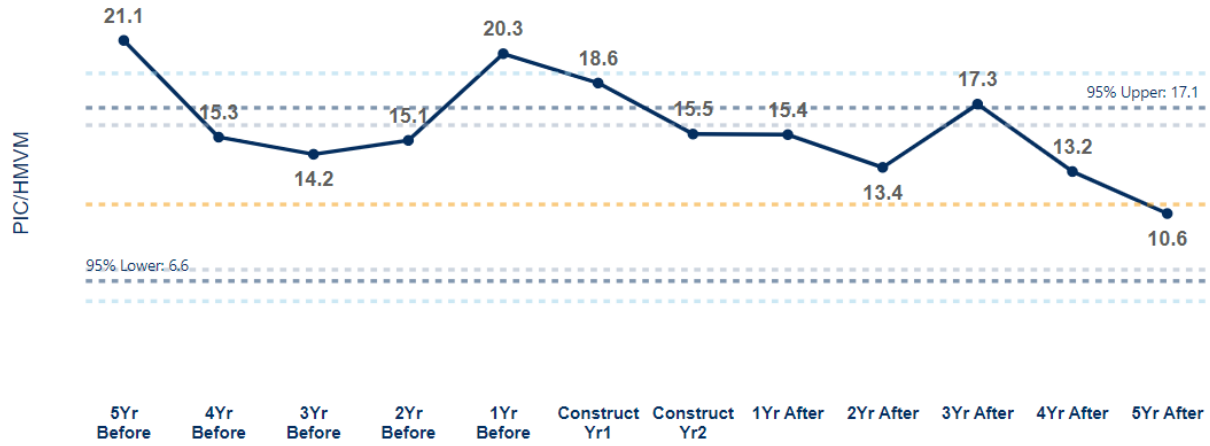


How had traffic flows impacted collision rates in the wider area?

The evaluation has identified a decrease in the rate of collisions per hmvm. Five years before, there was an annual average of 17 PICs per hmvm. Five years after, there was a decrease to 14 PICs per hmvm (Figure 32). The counterfactual test undertaken found that the collision rate would likely have been between 6 - 17 PICs per hmvm. The after annual average collision rate falls inside the counterfactual range of 6-17 collisions per hmvm.[52]

[51] https://nationalhighways.co.uk/media/pq2jb142/pope-methodology-note-2024-v2.pdf
[52] We have tested the results at 95% confidence interval. The critical value at 95% confidence interval is 11, the observed collision savings for the wider area are close to this value of 11. We

Figure 32: Annual average number of collision rate with counterfactual scenario ranges



Source: STATS19 30 May 2010 – 21 March 2022.

This indicates we have observed the reduction in the rate of PICs that was predicted.

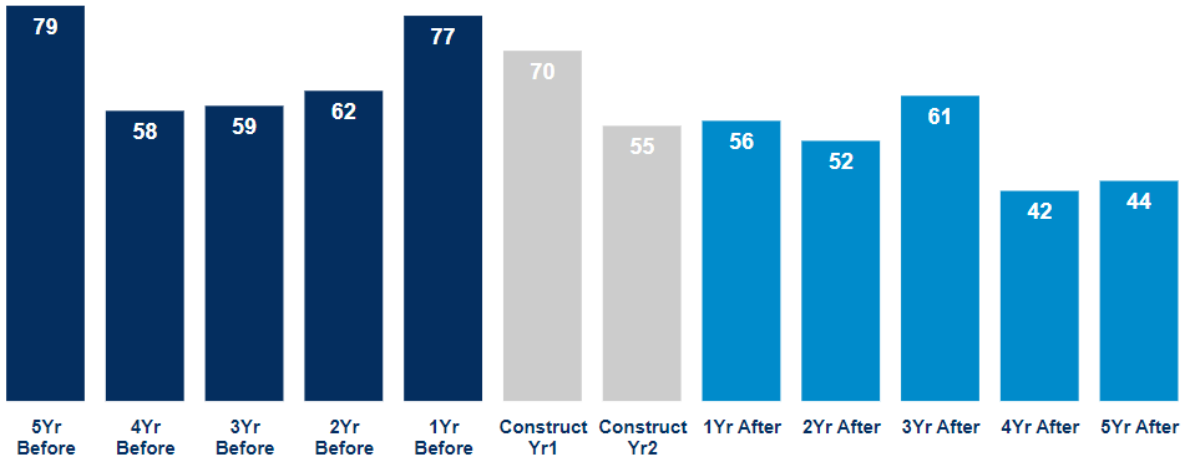
What impact did the project have on safety for the wider area?

Before the project, an annual average of 67 collisions were observed. After the project, this had fallen to 51, a decrease of 16 (Figure 33).

Personal injury collisions

67	51	16
Before	After	Fewer

Figure 33: Annual PICs in wider area

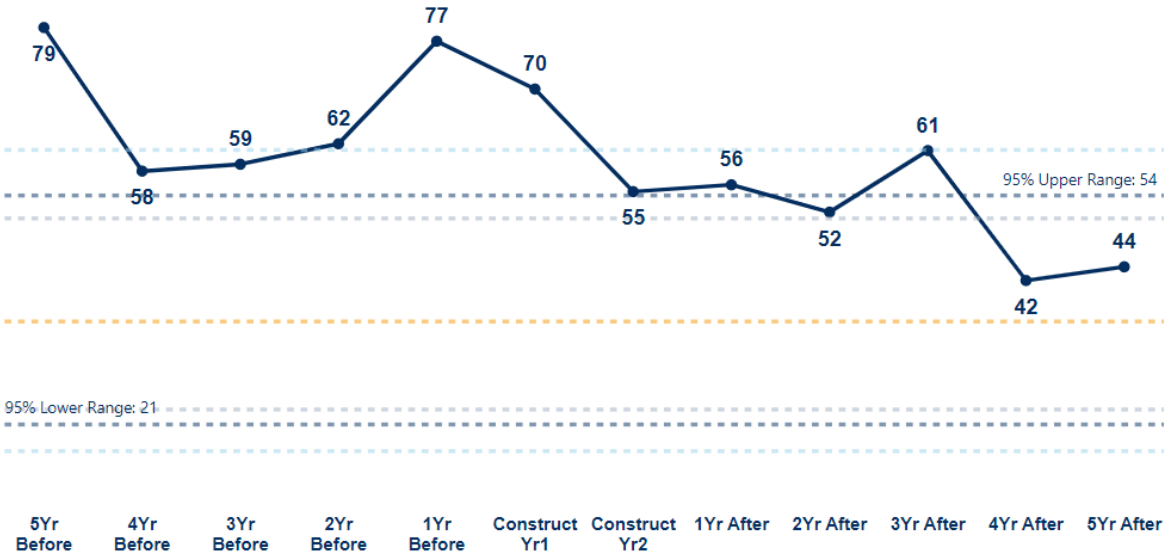


Source: STATS19 30 May 2010 – 21 March 2022.

believe that the collisions rates observed for the project extent ensure that the project has met its safety objective.

The after annual average falls within the counterfactual range of between 21-54 PICs per year (Figure 34).[53]

Figure 34: Observed and expected range of PICs in wider area (annual average)



Source: STATS19 30 May 2010 – 21 March 2022.

What changes in the severity of collisions did we see?

See Appendix B for information on when police forces transitioned to a new method in how severity of incidents is recorded.

After the project, in the wider area, there was an increase of four fatal collisions and a reduction in average severity across serious and slight categories (Table 8). The predicted collision reduction for the wider area was 14 fewer fatal collisions over the 60-year appraisal period. Figure 35 shows the full breakdown of severity of PICs by project year.

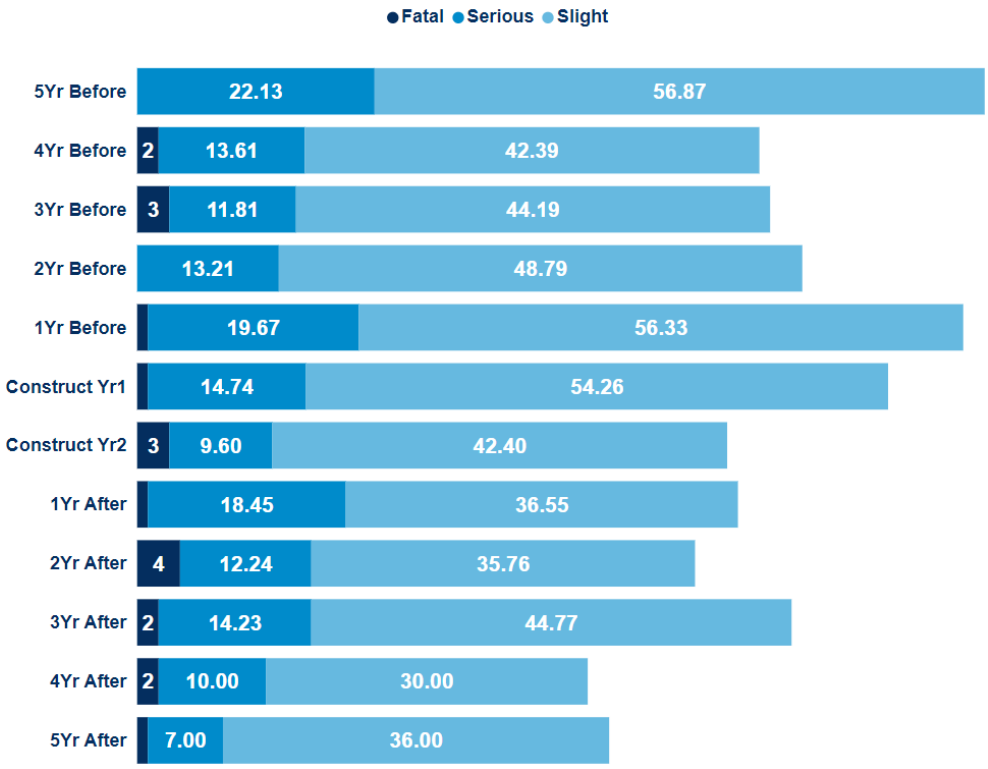
Table 8: Number of PICs by severity

	Before	After	Change	Change direction
Fatal	6	10	4	↑
Serious (average)	5.36	4.13	-1.23	↓
Slight (average)	16.57	12.21	-4.36	↓

Source: STATS19 30 May 2010 – 21 March 2022.

[53] We have tested the results at 95% confidence interval. The critical value at 95% confidence interval is 36, the observed collision savings for the wider area above this value of 36. We believe that the collisions savings observed for the wider safety area ensure that the project is on track to meet its safety objective.

Figure 35: Severity of PICs within the wider area



Source: STATS19 30 May 2010 – 21 March 2022.

What impact did the project have on casualties?

There was no reduction in the FWI observed annually. Before the project, an annual average of 3.9 FWI was observed annually. An annual average of 4.0 FWI was observed after the project became operational, which is classified as stable.

The combined measure showed no increase in million vehicle miles travelled before an FWI.[54]

A reduction of three KSI has been observed annually. Reducing from an average of 19.1 KSI before to 15.8 KSI after the project became operational. The rate of KSI per hmvm has reduced from an average of six to five for every hmvm travelled.

The observations of FWI suggest the project impact is neutral. The observation of KSI suggests that the project is having a positive safety impact on the severity of casualties within the wider area.

[54] Before the project, 74 million vehicle miles needed to be travelled before a FWI (4.4 FWI per hmvm). After the project, this remained stable at 74 million vehicle miles (4.3 FWI per hmvm).

Appendix B

B.1 Incident reporting mechanisms

Since 2012, many police forces have changed the way they collect STATS19 data (for more information see here). These changes mean casualty severity is now categorised automatically based on the most severe injury, rather than the judgement of an attending police officer.

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

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

Appendix C

C.1 Unadjusted collision severity

The project extent is covered by Humberside Police constabulary, which transferred from STATS19 to CRaSH in January 2016.

Table 9 shows the unadjusted collision severities on the project extent:

Table 9: Unadjusted collisions by severity for project extent

Year type	Fatal	Serious	Slight
5Yr Before	0	1	1
4Yr Before	0	2	5
3Yr Before	0	1	6
2Yr Before	0	3	3
1Yr Before	0	3	6
Construct Yr1	0	0	4
Construct Yr2	0	0	2
1Yr After	0	1	5
2Yr After	0	1	3
3Yr After	0	0	1
4Yr After	0	2	5
5Yr After	0	2	4

Source: STATS19 30 May 2010 – 21 March 2022.

The wider safety area of the A160 Immingham improvement project is covered by Humberside and Lincolnshire Police constabularies. Humberside transferred from STATS19 to CRaSH in January 2016. Lincolnshire has not transferred over yet.

Table 10 shows the unadjusted collision severities on the wider safety area:

Table 10: Unadjusted collisions by severity for wider area

Year type	Fatal	Serious	Slight
5Yr Before	0	16	63
4Yr Before	2	10	46
3Yr Before	3	8	48
2Yr Before	0	9	53
1Yr Before	1	15	61
Construct Yr1	1	12	57
Construct Yr2	3	9	43
1Yr After	1	18	37
2Yr After	4	12	36
3Yr After	2	14	45
4Yr After	2	10	30
5Yr After	1	7	36

Source: STATS19 30 May 2010 – 21 March 2022.

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