Assessment of growth impacts

This report was commissioned by Highways England to inform the emerging Strategic Economic Growth Plan (SEGP) and better understand the relationship between economic growth and the strategic road network. This report does not inform or relate to planning matters or investment decisions.

Queries relating to this report should be sent to growthandplanning@highwaysengland.co.uk

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This document has 96 pages including the cover.

Document history

Job number: 5146133			**Document ref:**			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Final Report	ES	NA	TM	RC	29/11/16

Client signoff

Client	Highways England
Project	HE Strategic Economic Growth Plan
Document title	Assessment of Growth Impacts
Job no.	5146133
Copy no.	
Document reference	

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Introduction

Atkins is working in partnership with Highways England (HE) to develop the first Strategic Economic Growth Plan (SEGP) which will build upon the current 5 Year Strategic Business Plan 2015-2020. The SEGP will guide Highways England to actively support economic growth with its investments.

It focuses on the local growth impacts of eight major SRN schemes which have been completed prior to the commencing of the Phase One of the Road Investment Strategy (RIS1).

This document forms part of a suite of six evidence reports produced to support the production of the SEGP. These are:

1. Economic growth and the SRN
2. Commercial development and the SRN
3. International gateways and the SRN
4. Socio-economic analysis, future forecasts and the SRN
5. Assessment of growth impacts
6. Economic value of the SRN

This report focuses on the local growth impacts of eight major SRN schemes which have been completed prior to the commencing of the Phase One of the Road Investment Strategy (RIS1). It assesses the local economic impacts of the chosen schemes, using a qualitative methodology. This provides examples of the ways in which, how and to what extent SRN investment can contribute to local economic growth.

Robust evaluation of the local economic impacts of schemes is highly challenging. As such, this study does not claim that the economic impacts discussed represent a direct causal effect of the schemes. The analysis is based on interviews with local authorities in areas affected by SRN schemes. The purpose of the case studies is to understand the economic impacts to which the schemes may have contributed in the view of local stakeholders, how the schemes contributed to these impacts and the perceived limitations of the schemes. Even where schemes have been said by stakeholders to have a direct impact, there are likely to be other relevant variables which influenced the outcome (for example, local housing demand).

The analysis will focus on direct and indirect impacts of the schemes in terms of local employment growth, housing development and inward investments.

Executive Summary

This document presents eight case studies of Strategic Road Network (SRN) schemes (some of which combine schemes). For each case study, the impacts of the scheme on local economic growth have been assessed, based on consultation with local authorities. The focus is on economic change in the area around the scheme rather than the net national effect usually considered in appraisal. The national effect would be considerably smaller or neutral after accounting for the fact that the local increase in economic activity is usually largely the result of displacement of activity from other areas of the country.

In order to ensure that the schemes are understood in context, each assessment includes discussion of the transport impact of the scheme and the local economic context. Economic information about the scheme considered in appraisal and evaluation, such as present value of cost, provide further context in regards to the scheme.

These assessments are primarily qualitative and cannot attribute direct causality of the impacts seen to the schemes assessed, given the wide range of other influences on economic activity over the time frames considered. Identifying the quantitative causal impact of SRN schemes is an empirically extremely challenging task and beyond the scope of this report. As such, interviewees from local authorities have been asked to qualitatively evaluate the role of the scheme in local economic development. Quantification of potential benefits, such as employment creation, has been provided where possible.

The case studies allow for the identification of key factors which appear to either increase or limit the impact of schemes on local economic development. Factors that improved the impact of SRN schemes include:

- Existing demand in the local economy creating growth pressure;
- Local importance of road intensive economic sectors;
- Improving specific junction/link roads which provide access to key sites;
- Contribution of schemes to inter-modal connectivity; and
- Schemes which significantly improve access to previously peripheral areas.

Factors that limited the impact of SRN schemes include:

- The broader economic climate;
- Ongoing congestion or other transport issues; and
- Junction-specific limitations.

The evidence presented in this document suggests several key messages for the Strategic Economic Growth Plan (SEGP).

Firstly, transport projects are unlikely to have a significant impact on local economic growth in a vacuum. Major research and policy papers have repeatedly warned against a ‘build it and they will come’ approach to transport investment and this is supported by the case studies. Where road schemes have successfully led to local economic growth, this is due to a wide range of supporting factors, including the demand for employment and housing sites, policy support such as Enterprise Zones and where SRN investment contributes to the broader economic growth strategy. This suggests that there should be a clear strategic case for investment and investment decisions should be aligned with local priorities, based on a robust assessment of evidence.

Secondly, SRN investment should contribute to an adaptable transport network. The impacts of SRN schemes were believed to be increased where these contributed to inter-modal connectivity. Additionally, multiple consultations highlighted the importance of specific junction improvements. Providing access to key employment or housing sites is critical for local economic growth. Junctions also act as nodal points which allow the SRN to facilitate further local development, for example further SRN investment, local roads schemes or major housing or employment land investment. Whilst this again emphasises the importance of aligning investment with local priorities, ensuring adaptability of the network allows for these to change over time.

Lastly, the methodology used for these assessments has certain limitations, despite being felt to be the best option for providing meaningful insight on the role of SRN schemes in supporting local economic growth. In particular, impacts included in assessments were limited to the local area, it is therefore not possible to establish additionality of investments and consequently potential net national impacts. The assessments were also dependent on the views of a particular category of consultees. This opens up a wider question about how the economic growth impacts of schemes should be assessed and evaluated.

1. Study Rationale and Methodology

1.1. Study rationale

The aim of this report is to analyse the economic impacts of major Strategic Road Network (SRN) schemes. As outlined in the accompanying report *Transport Investment and Economic Growth*, investment in the SRN can support economic growth through:

- **Improve productivity** through reduced business costs, agglomeration economies and increased competition.
- **Facilitate investment**, and therefore facilitate local economic growth through encouraging mobile activity to locate in a particular location and through unlocking land for housing and employment uses.
- **Increase trade** by reducing transport costs domestically and internationally, by improving access to international gateways.
- **Reduce unemployment and increase labour supply** by increasing the scale of labour markets and improving access to jobs. However, evidence from the UK suggests that given the already extensive network, the potential of achieving this through further investment may be limited.

This assessment specifically considers the local impacts of SRN schemes, as regional or national impacts are difficult to identify under either a quantitative or qualitative approach. Issues considered include how schemes have facilitated investment locally and what the impacts of this investment have been, in terms of housing and employment. The assessment also considers whether particular business sectors have experienced benefits, including productivity and trade benefits. The effect of schemes on labour market catchment areas has also been discussed where highlighted as relevant.

1.2. Methodology

Eleven SRN schemes were selected to be assessed. Due to difficulties in separating impacts, the effects of nearby schemes have been considered as one entity.

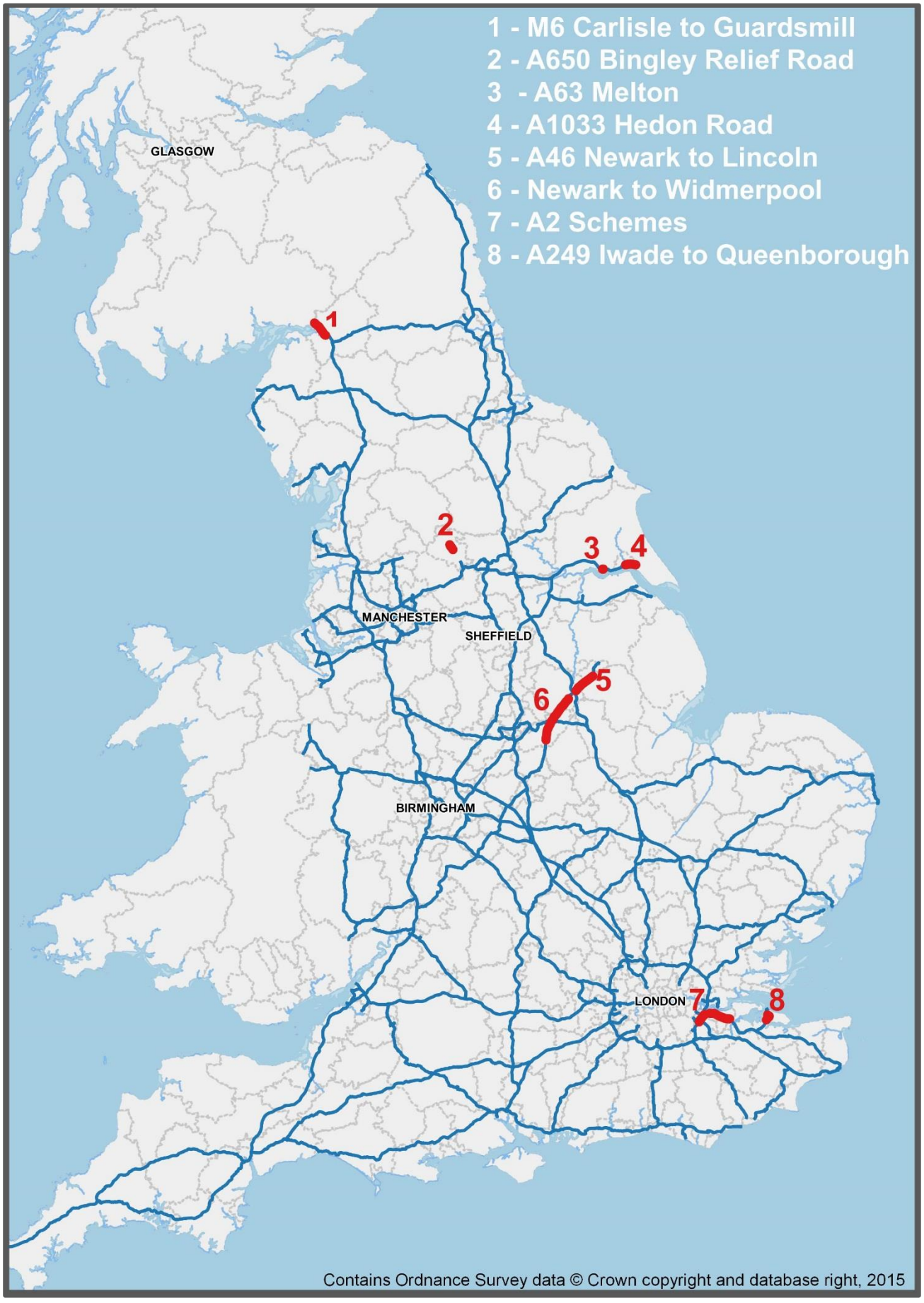
The schemes were selected from major Highways Agency schemes which opened between 2000 and 2015 for which Post Opening Project Evaluation (POPE) studies were completed. The schemes were selected based on their economic objectives and to ensure an even distribution across England. The selected schemes are listed in **Table 1-1** and the location of the schemes is shown in **Figure 1-1**.

Table 1-1 Major highways schemes selected as case studies

Region	Scheme Name	Date of opening
North West	M6 Carlisle to Guardsmill Extension	December 2008
Yorkshire & Humberside	A1033 Hedon Road Improvement	November 2003
Yorkshire & Humberside	A63 Melton Grade Separated Junction	April 2007
Yorkshire & Humberside	A650 Bingley Relief Road (not SRN)	December 2003
East Midlands	Newark to Lincoln Improvement	July 2003
East Midlands	Newark to Widmerpool Improvement	April 2012
South East	A2 Bean to Cobham (Phase 1)	December 2004
South East	A2 Bean to Cobham (Phase 2)	February 2009
South East	A2/A282 Improvement	December 2007
South East	M25 Junctions 1b to 3	July 2008
South East	A249 Iwade to Queenborough	July 2006

All four schemes have been analysed as one due to their close proximity

Figure 1-1 Location of selected schemes



1.2.1. Economic impacts of schemes

Consultation with local authorities provided the basis for assessing the impacts of the schemes. This was principally undertaken through telephone interviews, following a pro-forma included in Appendix A, and email correspondence. The record of consultation with local authorities is included in **Error! Reference source not ound.**.

Consultation was limited to local authorities to ensure consistency across schemes. Consultees were asked to discuss the impact of the relevant scheme in regards to:

- Key sites where development was facilitated by the scheme;
- Housing growth associated with the scheme;
- Employment growth associated with the scheme;
- Notable investments facilitated by the scheme;
- Specific industries which benefited from the scheme; and
- Limitations of the scheme for local growth.

The analysis also made use of the One Year Assessment (OYA) and Five Year Assessment (FYA) POPE reports for information on the local context, scheme objectives and non-economic impacts of schemes. Local Enterprise Partnership documentation, Local Plans and associated documents were used for understanding local objectives and the relevance of schemes.

ONS socio-economic datasets were used to provide information on the local economic context, including the Annual Business Inquiry, Business Register and Employment Survey and Annual Population Survey.

1.2.2. Travel impacts of schemes

Census Travel to Work data for 2001 and 2011 was also analysed for the areas around the schemes to provide context on trends in local commuting patterns. All but one of the schemes were opened between 2001 and 2011 (the exception being the A46 Newark to Widmerpool Improvement) and therefore would have contributed to the changes seen, along with other influences such as changes in population, changes in the scale and composition of local employment and other transport schemes. Further detail on the travel to work analysis is included in Appendix C.

Congestion data was also considered in order to understand the current efficiency of the strategic road network (SRN) maintained by Highways England. The SRN traffic data which represented a yearly average between April 2014 and March 2015 was sourced from Highways England during March 2016.

The data provided included link references, length of the link, as well as:

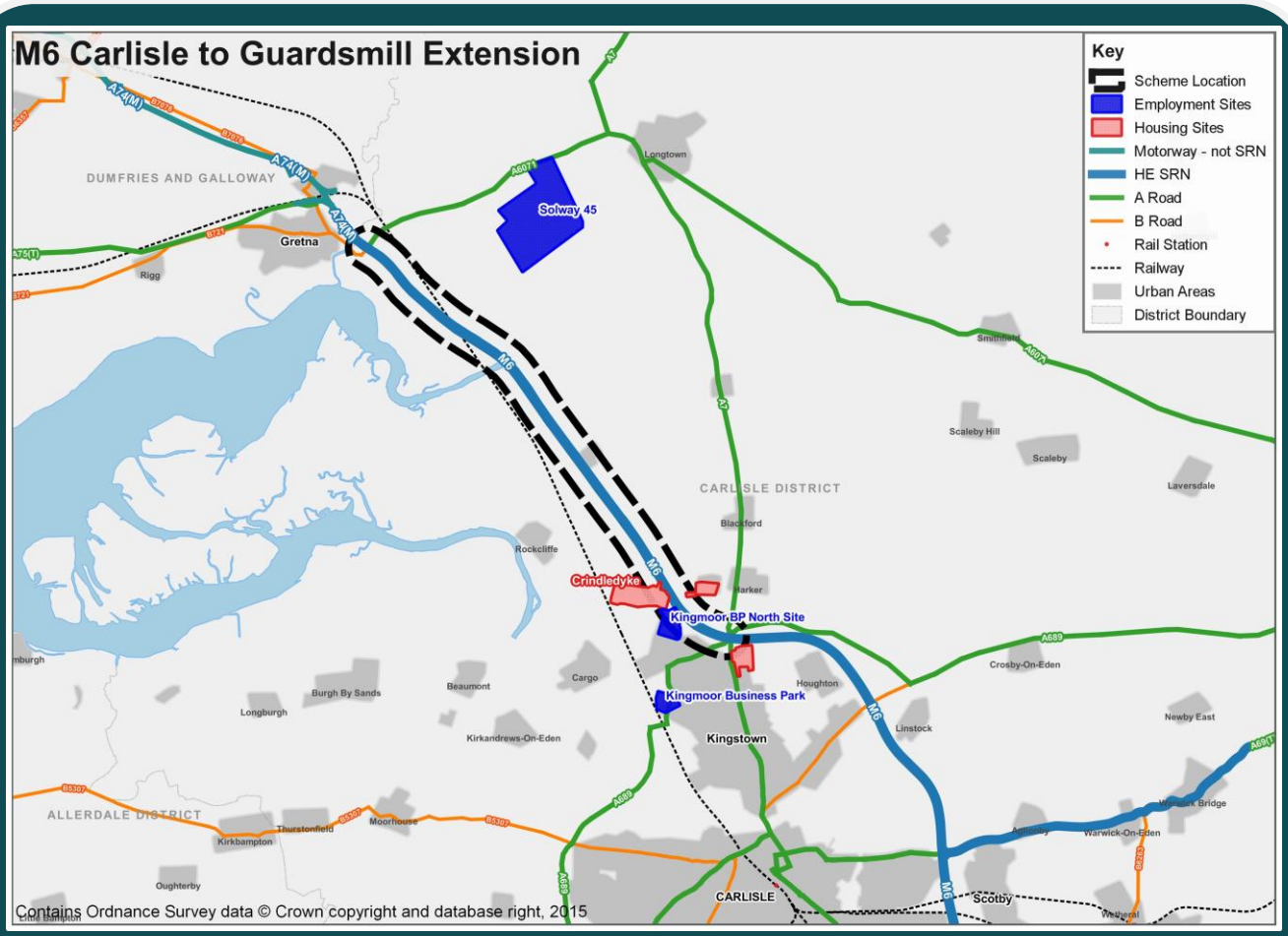
- **Traffic flow**: Traffic flow averages for yearly statistics, daytime weekday, AM and PM peak averages. This is also classified by vehicle type which allows for the calculation of the average HGV proportion of the total traffic flow for 2015;
- **Delay**: This is the key performance indicator in performance specification. It is calculated as the average delay per vehicle per mile;
- **Free Flow Speed:** This includes the speed limit for each road link;
- **Speed Limited Works**: Number and proportions of time periods where speed limited works were in place at any location within the road link;
- **Speed**: average speed in miles per hour for the four time periods mentioned above;
- **Acceptable Journeys**: This is calculated as the proportion of journeys (in vehicle kilometres) above the acceptable threshold which is 75% of the speed limit; and
- **Planning Time Index**: PTI is the 95th centile journey time (slowest journeys) divided by the free-flow journey time.

The travel impacts analysis for most of the schemes include maps of the average delay and the relative AM speed. The relative AM speed is a calculated average of the AM speed for each link as a percentage of the free flow speed.

This congestion data was also used to calculate the average travel time for each link affected by the chosen schemes. The calculations include journey time for different peak times of the day as well as AM and PM delay which is measured as seconds per vehicle mile. These calculations are provided in Appendix D.

2. Case Studies

2.1. M6 Carlisle to Guardsmill Extension



- The scheme opened to traffic in December 2008
- The scheme was implemented in order to connect the M6 to the A74(M) to improve accessibility across the Scottish border.
- The existing A74 was widened to create a 3 lane motorway, now part of the M6. An adjacent road was also constructed for local traffic.
- The total outturn cost of the scheme was £100.448m.

Scheme Objectives:

- Reduce accidents on the route;
- Improvement in accessibility for users;
- The provision of more predictable journey times; and
- Support the construction of the Carlisle Northern Development Route and development of Kingmoor Business Park.

2.1.1. Key impacts

Key impacts associated with the scheme are discussed below:

- Supported development and Enterprise Zone status of Kingmoor Park, a key employment site. Various logistics operations are based in Kingmoor Park and local businesses have used relocation to the site to expand. However, employment effects could not be quantified by consultees;
- Supported identification of Solway 45 site for development as an intermodal logistics hub;
- Improved access to proposed housing sites, which could provide a total of 1,250 homes; and
- Improved access to Carlisle for commuters and visitors, however the economic benefits of this cannot be easily quantified.

2.1.2. Local economic context

Carlisle has a high concentration of employment in the following sectors: transport and logistics, manufacturing, construction, storage, and wholesale and retail. At the opening of the scheme in 2008, these sectors accounted for 47% of employment in Carlisle compared to 39% in the North West and 38% for England.

In 2014, these sectors continued to contribute 41% of employment, compared to 36% in the North West and 33% in England. The wholesale and retail sector is particularly important for the district, contributing 19% of employment in 2014[1].

Cumbria is the 4th fastest growing sub-region in the UK from 2002-2012 in terms of gross value added (GVA) outside London[2]. The most recent available data indicate that the unemployment rate was 4.8% in 2014, below the UK rate of 6.4%. Effective transport infrastructure is therefore an important asset in supporting the continued growth of local businesses as well as the attraction of new businesses.

Local economic objectives, as stated in the Cumbria LEP's Strategic Economic Plan 2014 - 2024, include:

- Create 15,000 additional full-time equivalent jobs;
- Boost Cumbria's economy by £600m more than current predictions through targeted investment in key projects;
- Increase the county's GVA growth by 0.6 percentage points above current forecasts, yielding a GVA growth rate of 2.2% during the plan period;
- Support the local planning authorities to deliver 30,000 new homes through their Local Plans; and
- Increase visitor expenditure by over £500m.

Advanced manufacturing and tourism are considered as strategic growth sectors therefore accessible and efficient transport infrastructure is important supporting the achievement all of these objectives, particularly in an area with a relatively dispersed population. Strategic connectivity to the M6 corridor is a key aspect of business growth and development in Carlisle.

2.1.3. Travel impacts

The scheme extends from Junction 44 of the M6, north of Carlisle, to the A74(M), at the edge of England's border with Scotland. As traffic data is only available for the SRN in England and the Travel to Work Census data is also divided between England and Scotland, the travel impacts analysis accounts for England only.

2.1.3.1. HE road traffic data

Average delay and free flow variables have been mapped in relation to the scheme in order to identify congestion hotspots. Figure 2-1 shows that average network delay between junction 44 of the M6 and A74(M) is only 1.4 seconds per vehicle mile, which indicates low levels of congestion. Figure 2-2 also shows there are no congested links close to the scheme as the relative average speed is 100% of the free flow speed[3]. The most congested link nearby (shown on the map) is the A69 south of Brampton.

[1] ONS. Annual Business Inquiry/Business Register and Employment Survey. Made available through Nomis.
[2] Cumbria LEP. March 2014. The Four Pronged Attack: Cumbria Strategic Economic Growth Plan 2014-2024 and ONS Regional GVA data.
[3] Both maps use Highways England 2015 traffic flow data and are annual average values for each road link. Average delay is measured in seconds per vehicle mile. Traffic flowing less than 100% of the free flow speed is an indicator of congestion.

Figure 2-1 M6 Extension Scheme: Average SRN delay

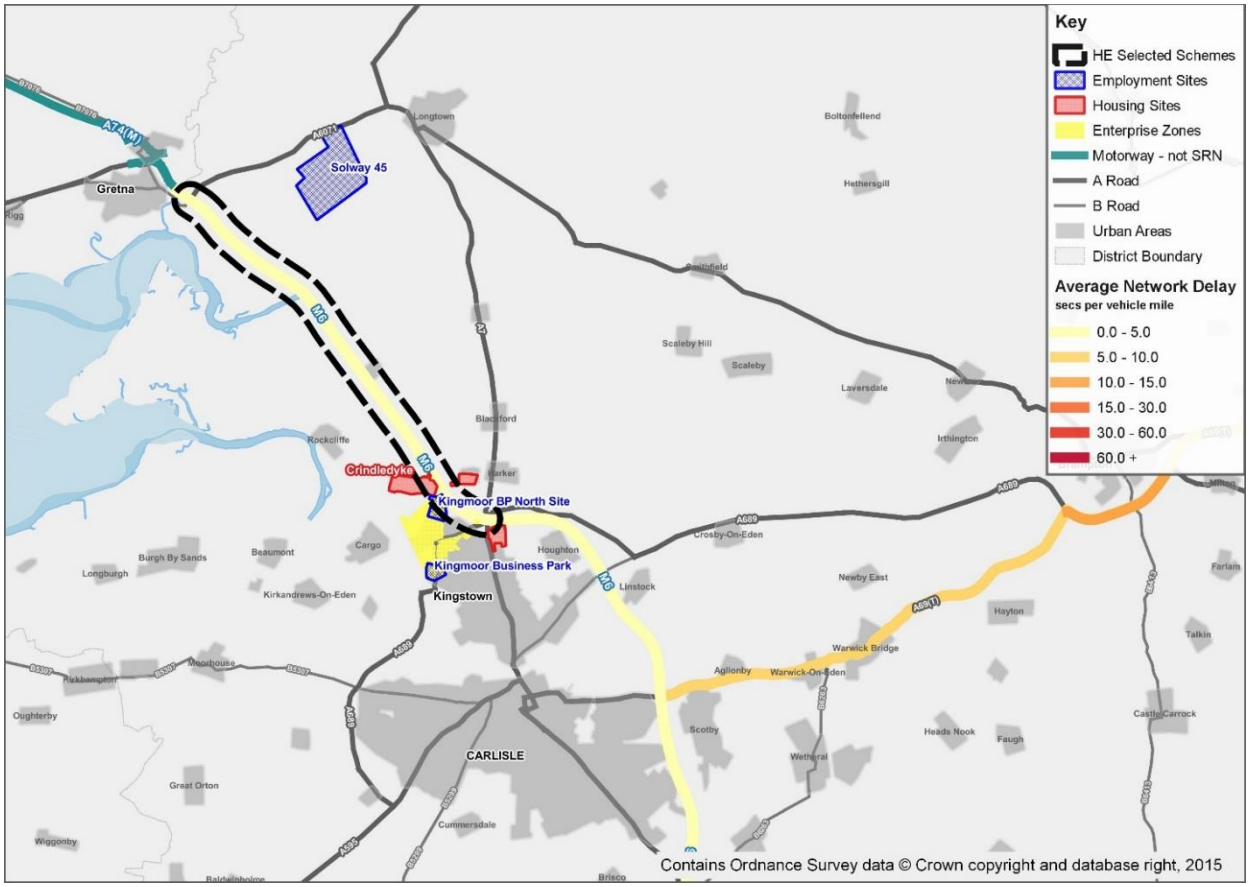
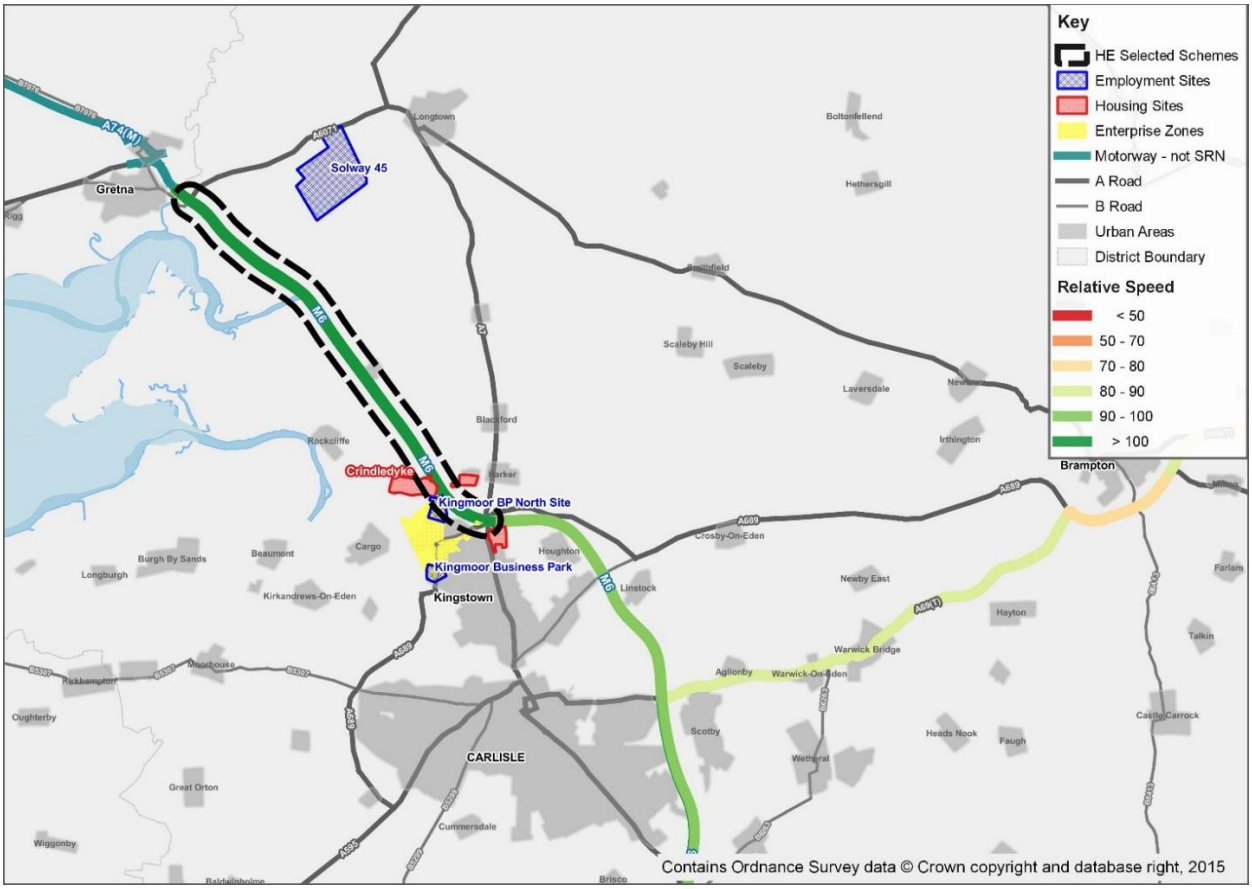


Figure 2-2 M6 Extension Scheme: Relative speed on SRN as a % of free flow speed



2.1.3.2. Census Travel to Work Data

The M6 Carlisle to Guardsmill Extension scheme was completed in 2008. The 2001 Travel to Work data showed that higher volume travel to work flows (20+ trips at a ward to ward level) occurred on distances of up to 35 km to and from the selected wards. This distance almost tripled in the 2011 statistics as the maximum length of trips from the area reached 91 km.

The total number of trips on flows with more than 20 trips per day has remained the same at around 8,000 trips however the car mode share has increased by over 10%. The greatest increase of workplace trips is within the 15 to 20 km distance band which only accounted for an average 2.75% share of all the trips in the 2001 Census and then increased to a 24.5% share in the 2011 Census.

Overall the number of trips on higher volume travel to work flows has increased between censuses, however the most significant change can be seen in the share of long distance trips.

2.1.4. Economic growth impacts

Consultation with officials in Carlisle City Council suggests that the scheme has been important for strengthening Carlisle as a regional economic centre. This has been achieved through faster and more reliable journey times for commuters and visitors, particularly those travelling from the north. This potentially contributes to the increased number and increased length of trips in the Travel to Work data.

In a 2013 study, 59% of local businesses cited proximity to good road/motorway links as being a benefit of being located in Carlisle (though local road traffic remains an issue, particularly within the city centre)[4].

The one-year POPE report noted that, beyond local benefits, the scheme is important to HGV traffic between Scotland and England and these users were expected to benefit from the scheme. Benefits to freight users and further indirect benefits for consumers and businesses nationwide are likely, but are not explored in this assessment.

The POPE report indicated that HGV traffic had fallen following the construction of the scheme, but the reduction was relatively small compared to the national decline associated with the economic recession. The average annual percentage of HGVs on the links affected by the scheme was almost 30% of the total traffic flow according to the HE traffic data. This is over 6% higher than the overall percentage of HGVs recorded on the SRN nationally between April 2014 and March 2015.

2.1.4.1. Employment sites

One of the objectives of the scheme was to support the development of Kingmoor Business Park, located north of Carlisle and adjacent to the M6. Kingmoor Park is an 88 ha site with 140,000 square metres of floor space and over 100 tenants in 2010, though this was considered a fairly low uptake by planning officials.

Businesses based at the park include distribution centres for Edinburgh Woollen Mill, Eddie Stobart, DPD and UPS. Road connectivity is therefore key for the Park's businesses. Local businesses have also used the availability of land in the Park to expand; examples include Story Homes, Thomas Graham's and Carlisle Brass.

Kingmoor Business Park was granted Enterprise Zone status in April 2016, to direct focus on advanced manufacturing. Connectivity, including access to regional airports such as Glasgow, Manchester and Newcastle aided by the scheme, was a key element of the application.

The other employment site highlighted in consultation is Solway 45. This is a 100 ha employment site situated a mile from Junction 45 of the M6 extension and with rail links to the West Coast Main Line. This is a key project for the Cumbria Local Enterprise Partnership. A £3m Public Works Loan was secured in 2014 to develop an intermodal transport and logistics hub and the site is currently being marketed to investors for industrial and distribution uses. SRN connectivity is therefore of significant importance for the site.

2.1.4.2. Housing sites

Crindledyke Farm is a housing development site to the north of Kingmoor Park, in close proximity to Junction 44 of the M6. The scheme has increased the attractiveness of development in this site due to increased

[4] Carlisle Economic Partnership. January 2013. Economic Review of Carlisle. Available from: http://www.carlisle.gov.uk/Portals/24/Documents/Evidence_Base/Employment/Economic%20Review%20of%20Carlisle%202013.pdf?timestamp=1459783442711

connectivity. Planning consent has been granted for 850 homes, of which around 100 have already been constructed.

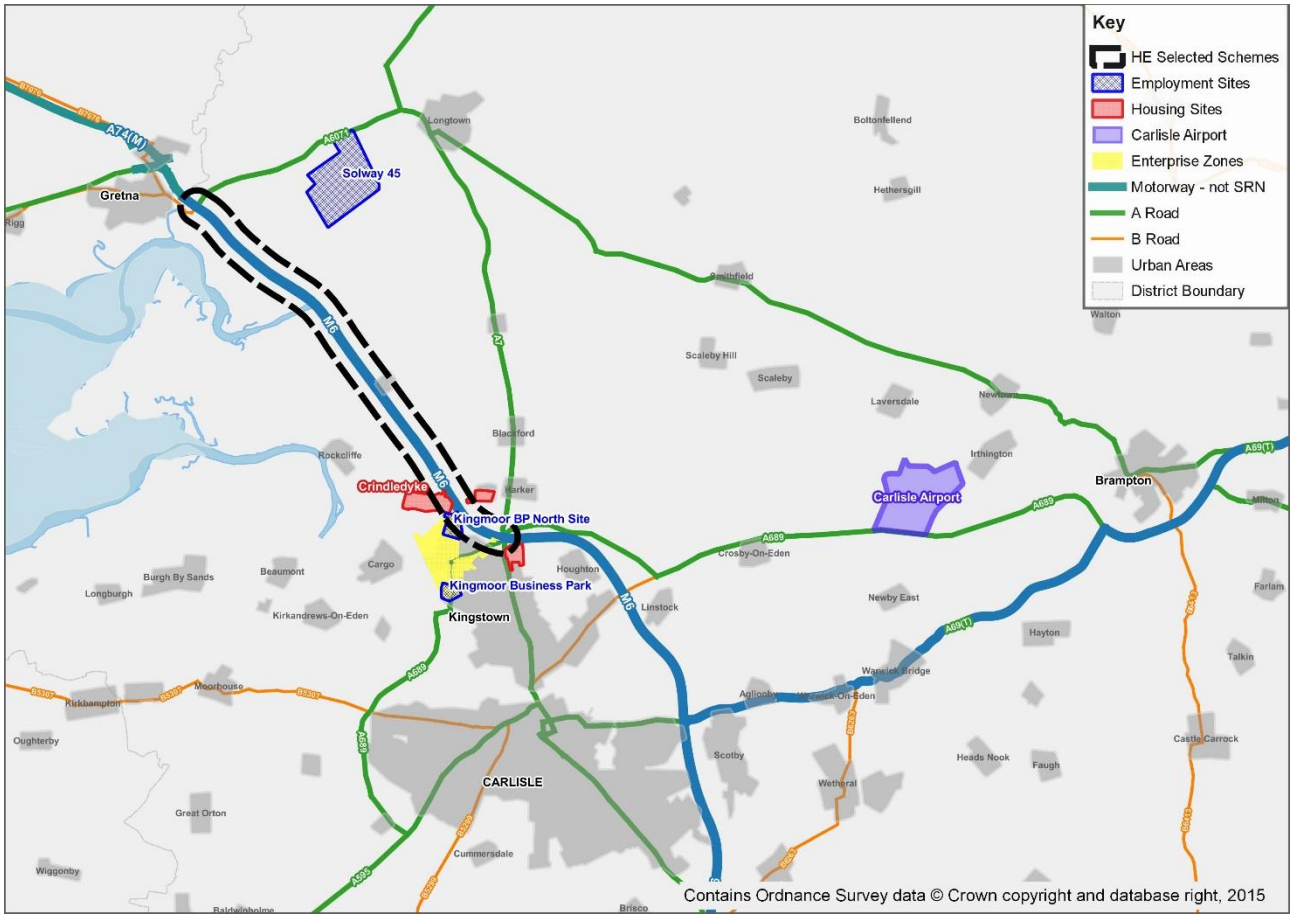
Three housing sites in close proximity to Junction 44 have been allocated as part of the emerging Local Plan. Local officials indicated that, though the motorway extension was not solely responsible for these sites, it increased the possibility of development expansion. Combined, these three sites take up over 25 ha and if approved could provide approximately 400 dwellings. Proximity to the M6 and employment areas such as Kingmoor Park were an important part of the justification for these sites.

2.1.4.3. Investment

No major inward investments were identified by local officials, other than those associated with Kingmoor Business Park, as discussed above.

Local officials did not feel that there was currently a clear link between the scheme and proposed development of Carlisle Airport, though the scheme may contribute to making the airport more attractive in the future, particularly if passenger air transport commences. The scheme would allow the airport to draw passengers from south west Scotland in particular. Figure 2-3 outlines the location of all the strategic sites close to the scheme including Carlisle Airport.

Figure 2-3 Strategic sites close to M6 Extension Scheme



2.1.4.4. Industries

The major sector identified as benefiting from the scheme and associated development was the logistics sector. Carlisle is home to a large number of logistics companies and distribution centres thus this sector is important for local employment, as noted in section 2.1.2.

2.1.4.5. Limitations

Local officials cited access to/from Junction 45 as a limitation of the scheme. A local Action Group has been formed around this issue, with involvement from local MP David Mundell. This relates to vehicles not being able to access the A74(M) to travel north at Junction 45 of the M6 from local A and B roads.

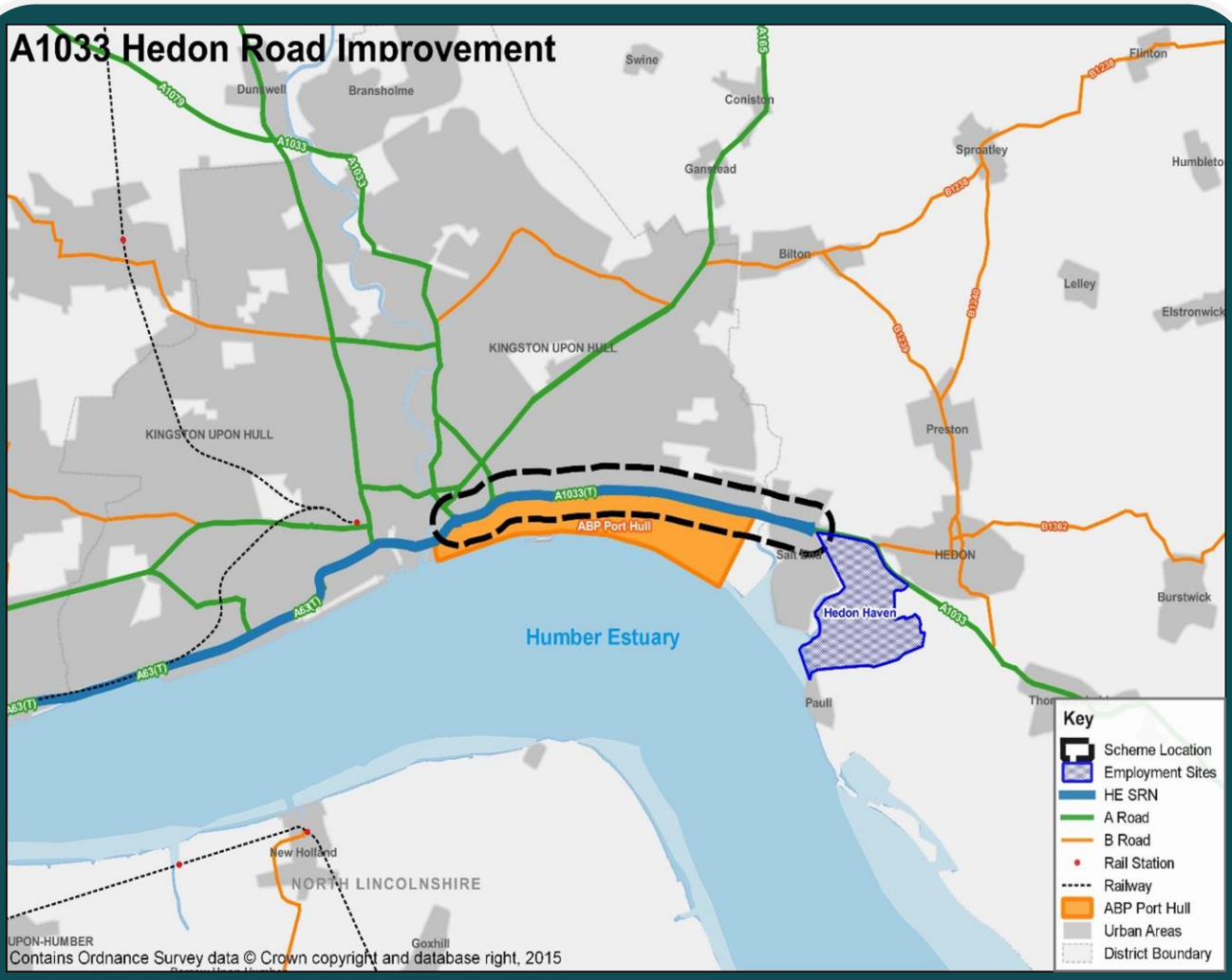
This forces traffic through the town of Gretna to connect to the A74(M) at Junction 22. This causes congestion in the town, which is believed to negatively affect the local tourism and retail industries. This also affects logistics companies accessing the SRN from local roads, such as those based at Longtown, and could limit the attractiveness of the Solway 45 site.

2.1.5. Conclusions

The M6 extension has overall promoted the local economy by supporting investment and Enterprise Zone status for key employment sites, as well as supporting new housing development. The scheme has principally benefited the logistics and distribution sector, though benefits for companies in certain sites may have been limited due to accessibility issues.

Less tangibly, the scheme has increased the attractiveness of the city as an accessible, regional centre for visitors and commuters from the wider region, including south west Scotland. The scheme is also expected to support future developments and economic growth in the local area, for example the development of Carlisle Airport.

2.2. A1033 Hedon Road improvement



- The scheme opened in November 2003.
- The scheme involved dualling the A1033 to the east of Hull city centre. Overpasses and roundabouts were constructed to improve access to docks and industrial works.
- Total outturn costs were £86.7m, 45% above forecasts.

Scheme Objectives:

- Reduce delays
- Enhance safety
- Enhance local environment
- Assist economic growth by providing additional capacity

2.2.1. Key impacts

The key impacts of the scheme concluded from the consultation with local authorities as well as supporting evidence are outlined below:

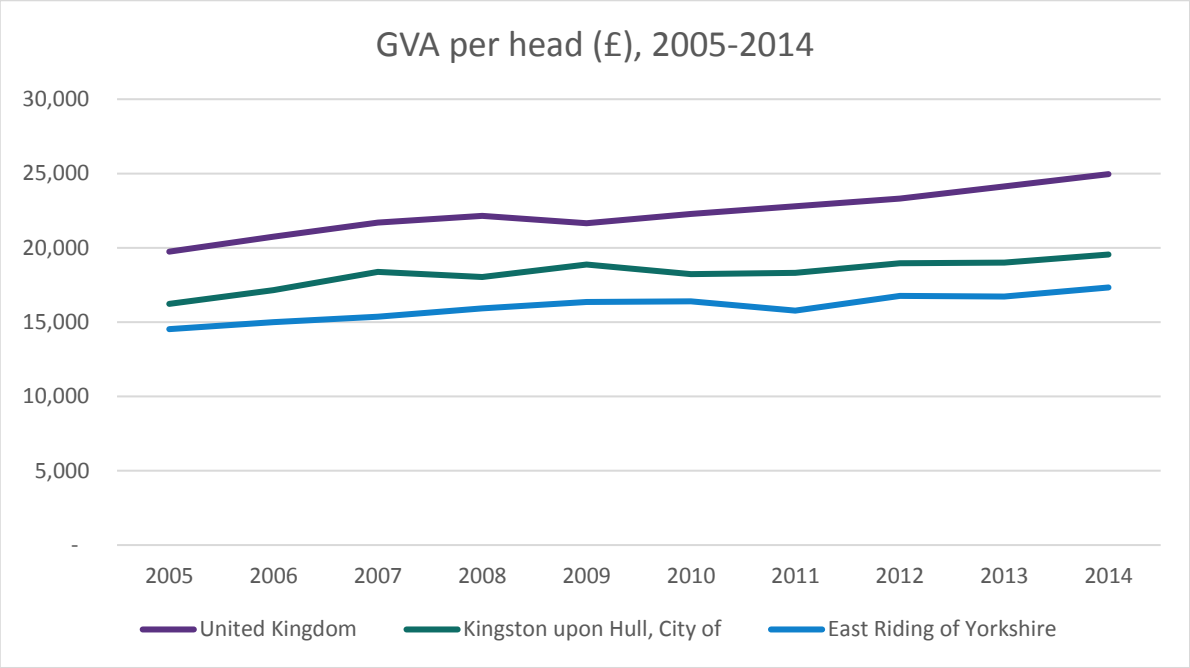
- The scheme proved important for facilitating the major Green Port Hull investment by Siemens at Alexandra Dock, particularly due to junction improvements and the construction of a link road. This investment is projected to create 1,000 jobs;
- Facilitated development of several smaller employment sites and continued development of housing at Victoria Dock;
- Facilitated Enterprise Zone designation for Hedon Haven, with a projected potential for 1,000 jobs at the site; and
- Supported Local Development Order designation for Hedon Haven and Queen Elizabeth Dock.

2.2.2. Local economic context

Model-based estimates of unemployment rates in the Hull City Council area indicate that over the last ten years the unemployment rate has been 1.4 to 2 times the national rate (with the disparity worsening during the recession)[5]. Unemployment has typically been lower than the national rate in the East Riding however.

Output has been weak in the area and in 2014, GVA per head was 69% of the UK level in East Riding of Yorkshire and 78% in Hull (see Figure 2-4). Average annual growth in total GVA from 2005-2014 has been lower than the national rate in both districts. This disparity is reduced when measured per head, indicating that population growth in the area has been slow relative to the rest of the country. This suggests that job creation, investment and business growth are imperative priorities in this area.

Figure 2-4 GVA per head (£) in Hull, East Riding of Yorkshire and the UK



Source: ONS Regional GVA

The districts of Hull and East Riding of Yorkshire have particularly high employment shares in manufacturing. A the time of scheme opening in 2003, the sector accounted for 18% of employees in 2003 in the two districts combined, compared to 16% in Yorkshire & Humber and 13% nationally. This has remained an important sector locally, representing 15% of employment in 2014 compared to only 12% in Yorkshire & Humber and 8% nationally[6]. The Humber LEP has identified the renewable energy sector as a potential opportunity for future economic growth and job creation. This is also reflected in the Hull City Plan's 'UK Energy City' ambition, which includes several projects aimed at developing the renewable energy sector in the city[7].

Access to efficient infrastructure is of significant importance for the manufacturing sector. Accordingly, accessibility along key growth corridors in the region has been recognised as a strategic enabler of growth[8]. Consultees from East Riding of Yorkshire indicated that the A63/A1033 had been identified as an East-West Multi-Modal Transport Corridor, which is fundamental for economic development in this area and has proved to be the most attractive location for inward investment.

2.2.3. Travel impacts

Both the A1033 Hedon Road Improvement and the A63 Melton Grade Separated Junction (the next case study) form part of the same east-west corridor along the north bank of the Humber. The travel impacts of the

[5] ONS. Annual Population Survey. Made available through Nomis.
[6] ONS. Annual Business Inquiry/Business Register and Employment Survey. Made available through Nomis.
[7] Hull City Plan [website]. 2016. Available from: http://cityplanhull.co.uk/
[8] Humber LEP. 2014. Strategic Economic Plan 2014-2020.

schemes have therefore been analysed together. For the economic assessment of the A63 scheme, please see Chapter 2.3.

2.2.3.1. HE road traffic data

Congestion currently experienced on Castle Street (A63) was highlighted by local authorities as a limitation of the network. The proposed RIS1 scheme at Castle Street aims to alleviate congestion issues on the A63 and improve traffic movement through Hull. Improvements in connectivity and reductions in congestion following the RIS1 scheme should benefit employment sites along the corridor.

Network delay and relative speed figures have been mapped in Figure 2-5 and

Figure 2-6 to identify congestion hotspots on the network. The links within the scope of the completed schemes have a relative speed between 80% and 100% of the speed limit, which suggests that there is a relatively small degree of congestion on these parts of the SRN. In contrast, the links close to the proposed RIS1 junction works on Castle Street suffer from congestion and have a relative speed of less than 50% (

Figure 2-6). The link between Castle Street and the start of the A1033 experiences heavy delays, with an annual average delay of 22.4 seconds per vehicle mile, rising to 40.5 seconds per vehicle mile during the evening peak.

Figure 2-5 Annual average network delay for A1033 and A63 schemes

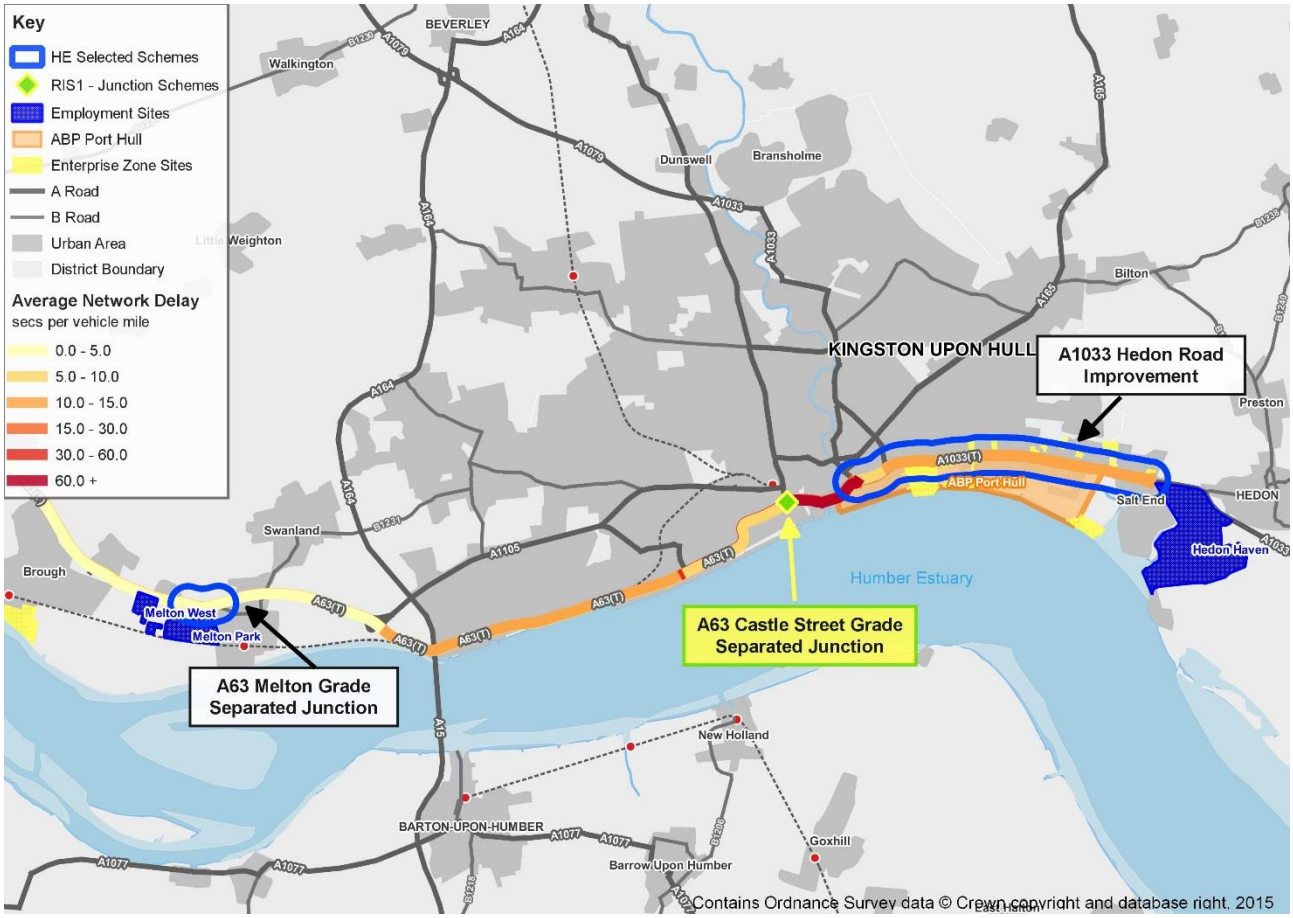
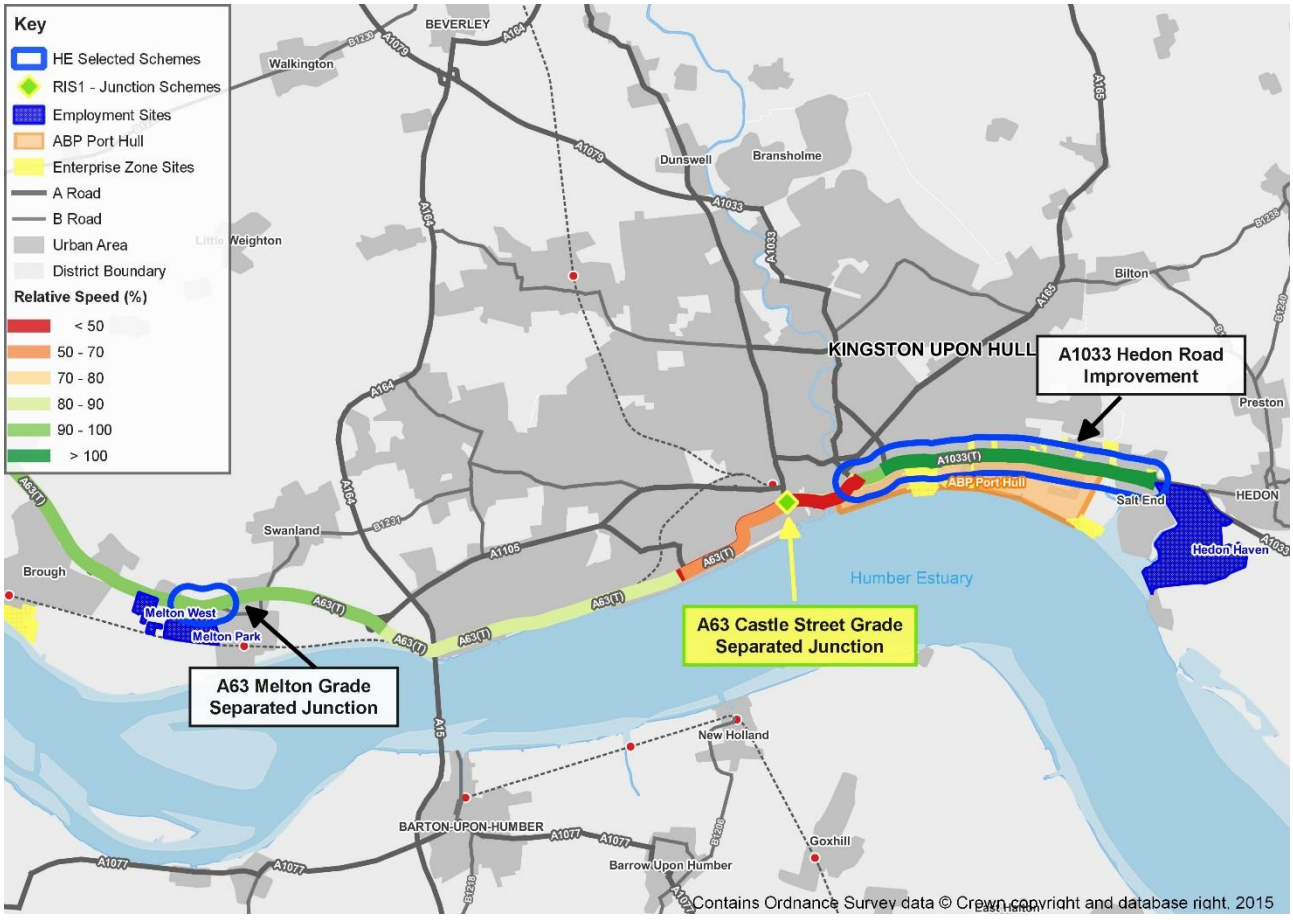


Figure 2-6 Annual average relative speed for A1033 and A63 schemes



2.2.3.2. Census Travel to Work Data

The total number of travel to work trips to and from the selected areas increased by 8% since the 2001 Census with 8,945 trips. Furthermore the total car trips made also increased by 9,256 which increased the average mode share for car by 4%.

The ward which saw the biggest change in travel to work trips is South Hunsley, within which the A63 Melton Grade Separated Junction scheme is located. The total number of trips in South Hunsley increased by 46.6% with 7,608 trips in 2011. Unemployment in the ward, as recorded in the 2011 Census, was low relative to Hull and the East Riding, at 4.1%.

The total number of car trips to South West Holderness, which lies at the western end of the A1033 scheme, increased by 1,257 trips.

2.2.4. Economic growth impacts

Consultation with local authorities indicated that the scheme has indirectly supported a range of developments. The scheme is not considered as the principal driver of development. This is partly evidenced by the long transition period between the scheme opening in 2003 and the inward investment which has been made recently. This also suggests that the outturn BCR produced as part of the POPE evaluation in 2009 will not reflect recent levels of activity. Efficient infrastructure is important in supporting nearby industries to attract further growth and this will also be supported by the RIS1 scheme on the A63 at Castle Street.

2.2.4.1. Employment sites

Two major employment sites, Green Port Hull and Hedon Haven, were highlighted by local authorities during consultation as relevant to the scheme.

The 58 ha Green Port Hull, previously known as Alexandra Dock, was subject to a major £310m investment from Siemens and ABP which was agreed in 2014. A wind turbine manufacturing facility will open in 2016 and is projected to create 1,000 jobs.

In selecting a site for the investment, local authority officials believed that access to the SRN was an important consideration. The development has created additional demand on the A1033. The link road to Alexandra

Dock constructed as part of the scheme was considered to be particularly important in facilitating development for the site as, without this road, significant mitigation works would have been required for planning permission which may have deterred developers.

SRN access was not however the only consideration. Hull had also previously been identified as a good location for renewable energy industries due to its proximity to offshore wind sites and this was a highly significant factor in the choice of location. The site also has Enterprise Zone status.

Hedon Haven is a 205 ha site in the East Riding of Yorkshire to the east of Hull, intended to provide for expansion of the Port of Hull. The site is a key employment site in the East Riding of Yorkshire Local Plan Strategy Document. The Hedon Road improvements have facilitated this designation, but improvements to the surrounding network are still required to facilitate development of the site. 80 ha of Hedon Haven has been designated as part of the Humber Green Port Enterprise Zone and is subject to a Local Development Order (LDO). Junction improvements at the Saltend roundabout undertaken as part of the scheme were important for LDO approval. The Enterprise Zone application for the site included a projection that 1,000 jobs could be based at the site.

Several sites identified in the five-year POPE report - Hull Maternity Hospital, Burma Drive (Marfleet) and Wyke Works - have come forward for development. The east-west road corridor, including the A1033, is also important for regeneration of the city centre, which could enable employment opportunities in the future.

Improved access as part of the Hedon Road scheme has contributed to the following sites coming forward:

- Tower House Lane: Redevelopment of a 3.24 ha site, with construction of additional units. Development likely would have required significant highway mitigation without Hedon Road.

- Vivergo Fuels at Saltend Chemicals Park: A £350m investment was made in the Saltend facility. Congestion along the A1033 prior to the scheme would have discouraged developers from investing in the site. The plant created 150 jobs on-site and supports over 2,000 jobs nationwide, and is also a project under the City Plan's 'Energy City' initiative[9].

- Marfleet Environmental Technology Park: A completed brownfield development, which was facilitated by improved access as part of the Hedon Road scheme. The project has created 200 jobs and is part of the 'Energy City' initiative under Hull's City Plan[10].

Additional sites currently awaiting or undergoing development are also believed to have benefited from the Hedon Road scheme and are listed below:

- Queen Elizabeth Dock and Queen Elizabeth Dock South: Both sites have Enterprise Zone status and are subject to a Local Development Order. The access provided by the Somerden Road roundabout as part of the scheme supported the LDO application.

- Eltherington Business Park: The site, currently under development, is projected to provide 200 jobs. Improved access as part of the scheme allowed development to come forward.

2.2.4.2. Housing sites

Victoria Dock is a housing site located to the south of the A1033 close to Hull city centre. The site already contained around 1000 dwellings at the time of the scheme, but there were significant issues with congestion in accessing the site. Additional access created by the south Mount Pleasant roundabout significantly benefited the scheme, which is currently a very popular housing development.

2.2.4.3. Investment

The Siemens and ABP investment in Alexandra Dock was the most significant investment related to the A1033 scheme, as highlighted by local authorities.

The Hedon Haven site is currently available for investment, following the decision of Siemens to base all their operations out of Alexandra Dock, rather than constructing a turbine blade factory at the site. The site is still being marketed to renewable and port-related uses as part of the Humber Green Port Enterprise Zone.

[9] City Plan Hull. Energy City: http://cityplanhull.co.uk/index.php/energy-city-2/
[10] ^ *ibid.*

2.2.4.4. Industries

The growth of Port of Hull is expected to be focused on the low carbon and renewable energy sectors. This is reflected in the Green Port Hull investment and in the Enterprise Zone designation of Hedon Haven. The Local Development Order (LDO) which applies to 80 ha of Hedon Haven is also focused on port-related renewable and low carbon industries. The wider site is expected to be the location for general industrial, storage and distribution developments. Local authorities also indicated that there were a large number of caravan manufacturers and storage facilities situated along the A1033 who had likely benefited.

2.2.4.5. Limitations

The A1033 in Hull city centre is still subject to significant congestion, particularly around Castle Street as indicated in Figure 2-5 and

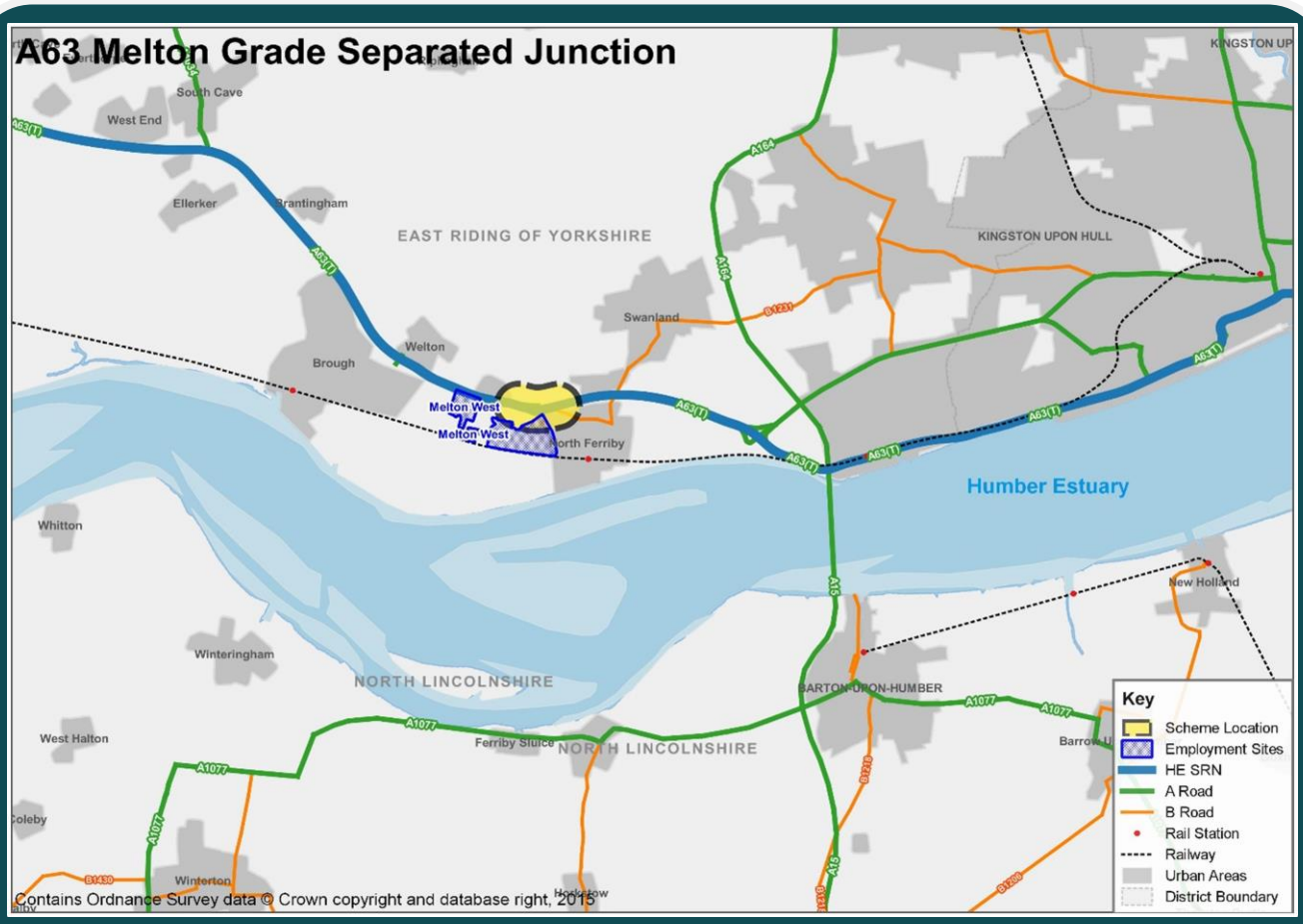
Figure 2-6. Another limitation raised regarding the scheme was the lack of hard shoulder for emergency services or recovery vehicle access, as this means that incidents are harder to clear which exacerbates congestion.

2.2.5. Conclusions

The A1033 Hedon Road improvement scheme was required to facilitate recent major investment, however the road investment alone was not sufficient to cause economic growth. Development stalled during the recession and further investment is still required to facilitate development of Hedon Haven.

The inclusion of the southern Mount Pleasant roundabout and Alexandra Dock link road were identified as having been particularly important in attracting new growth in areas surrounding the schemes. The congestion on Castle Street has been identified as a limitation to further growth. This is being addressed through the junction improvement as part of RIS1.

2.3. A63 Melton Grade Separated Junction



- The scheme opened in October 2006.
- The scheme consisted of a new grade-separated junction as well as non-motorised transport facilities.
- Total outturn costs were £39.2m, 2.8 times forecast costs.

Scheme Objectives:

- Reduce junction delays
- Eliminate accidents
- Facilitate new development and regeneration south of the A63 corridor.

2.3.1. Key impacts

Key impacts of the scheme are summarised below:

- The scheme has supported development of large scale industrial premises at Melton as well as Key Employment Site designation in the Local Plan. Access to the SRN supported the successful Enterprise Zone application for the site.

- To date, over 400 employees are employed in various investments in Melton undertaken since the scheme was completed. When fully developed, 5,600 jobs are projected for the Enterprise Zone sites within Melton.

2.3.2. Local economic context

As discussed in section 2.2.2, manufacturing is a key sector for the East Riding and Hull sub-region, for which access to the SRN is important.

The A63 forms part of the East-West Multi-Modal Transport Corridor which runs through the sub-region. The Leeds-Hull railway line, also part of the corridor, has sidings at Melton. Proximity to the Ports of Hull and Goole has been noted as a strength for the East Riding[11], which depends on access to the SRN via the A63.

[11] East Riding of Yorkshire. 2012. Economic Development Strategy 2012-2016.

2.3.3. Travel impacts

Please refer to section 2.2.3 as the analysis for this scheme has been merged with that of the A1033 Hedon Road improvement scheme due to their close proximity.

2.3.4. Economic growth impacts

The scheme has facilitated the development of employment land at Melton, an important strategic employment site for the region. The development of this site can provide benefits for both the East Riding and the city of Hull, particularly in terms of employment.

2.3.4.1. Employment sites

The investment in the A63 junction at Melton has been an important factor in identifying the area as a Key Employment Site in the East Riding Local Plan, which describes the grade separated junction as having "transformed Melton into a very attractive employment site"[12]. As well as being located on the East-West Multi-Modal Transport Corridor, the sites are suitable for development due to the availability of under-developed land in large plots. Melton has therefore been identified as being relevant for manufacturing, storage and distribution activities[13].

Of the available land in Melton, 67 ha is allocated for employment use and 22.2 ha of employment land has been developed since the scheme was opened. Melton also formed part of the extension to the Humber Green Port Enterprise Zone in November 2015 and 62.13 ha of land have been given Enterprise Zone status. The application for Enterprise Zone status included a projection of 5,600 jobs at Melton once the site is fully developed.

2.3.4.2. Housing sites

It does not appear that the scheme has had any effect on housing provision. The objectives of the scheme did not relate to any housing developments.

2.3.4.3. Investment

Major investments in the Melton area since the scheme opening have included:

- Heron Foods Ltd, which constructed a 24,642 distribution centre in 2009, employing 240 people.
- House of Townend wine merchants, who have built a 30,000 sq ft site which employs 30 people
- Allam Marine, who expanded their head office facility to include manufacturing, warehousing and distribution
- Paragon have constructed a 45,000 sq ft facility for the processing and distribution of bottles for the pharmaceutical industry
- Kohler Mira, a plumbing company, opened a manufacturing facility on the site, employing over 100 people
- East Riding of Yorkshire Supplies opened a 30,000 sq ft office and distribution unit in 2009
- Needlers Hygiene have a 53,000 sq ft facility, employing 55 people. Quick and reliable access to the SRN was a key influence to relocate from Hull city centre to Melton.

2.3.4.4. Industries

Local planning documents and the major investments listed above indicate the importance of manufacturing, storage and distribution activities for Melton. These sectors are particularly dependent on access to the strategic road network.

2.3.4.5. Limitations

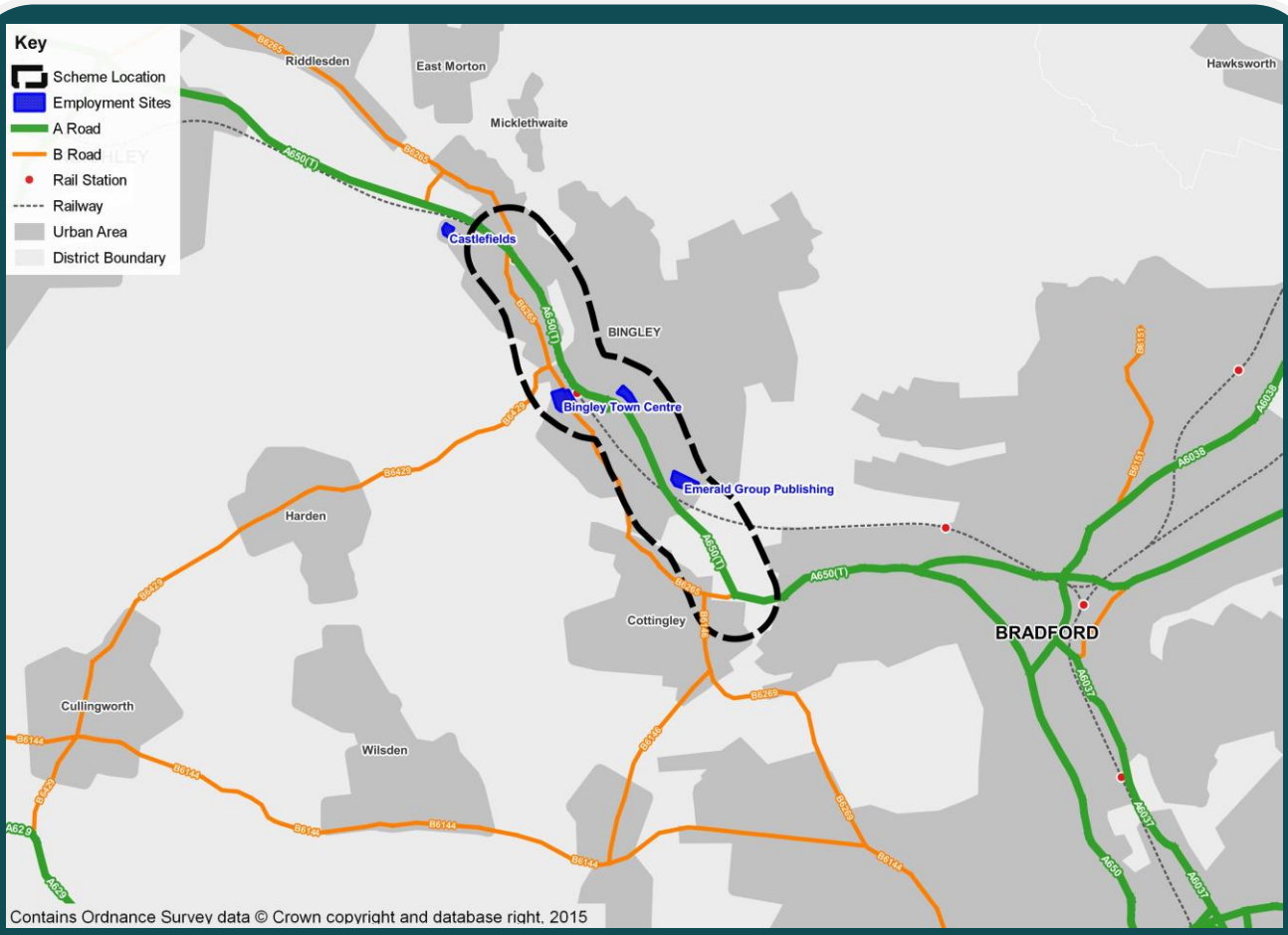
No specific limitations were identified in consultation with East Riding Council. Hull City Council officials noted that, from their perspective, the movement of some businesses from the city to the Melton site was seen as a negative impact.

[12] East Riding Local Plan: Proposed Submission Allocations Document. January 2014.
[13] East Riding Proposed Submission Local Plan Strategy Document. January 2014.

2.3.5. Conclusions

The scheme has been an important factor in facilitating the development of Melton, supporting the development of manufacturing, storage and distribution businesses and employment at the site. The site forms an important part of the economic development strategy for the East Riding of Yorkshire. Despite the low outturn BCR of 1.4, consultation indicated the scheme had been influential for development.

2.4. A650 Bingley Relief Road



- The scheme opened in December 2003.
- The scheme consisted of constructing 4.5km of dual carriageway through Bingley.
- Total outturn costs were £90.6m, compared to forecast costs of £69.3m.

Scheme Objectives:

- Reduce congestion in and improve Bingley town centre
- Improve safety
- Improve noise and air quality
- Improve public transport and non-motorised transport environment

2.4.1. Key impacts

Consultation with local authorities indicated that the scheme was not believed to have had any major direct impacts. Consultees did note that:

- Town centre redevelopment has occurred in line with the objectives of the scheme. However the scheme is not believed to have directly facilitated development.
- Successful industrial parks in the area benefit from the scheme, but the scheme has not directly facilitated development.
- The only specific investment local officials were able to confirm the scheme had a clear role in was the relocation and expansion of Emerald Publishing Group.
- The scheme has contributed to making the area more attractive for housing and business in general, but this cannot be quantified.

2.4.2. Local economic context

Bingley and the wider Bradford district have a relatively high proportion of employment in manufacturing, which constitutes 12% of employment in Bingley, 13% in Bradford and 8% nationally in 2014[14]. Wholesale and retail are also relatively important for employment in Bingley, providing 21% of employment compared to 14% nationally[15]. The strategic road network is important for all three sectors. By comparison, transport and storage employment is relatively low. Whilst unemployment in the wider Bradford district is relatively high, Census data indicates that unemployment in Bingley was 5% in 2011, compared to 7% nationally and 8% in Yorkshire & the Humber.

Bingley and the A650 form part of the Airedale area and transport corridor, which runs from Keighley through Bingley to Shipley, just outside of Bradford. Identified priority sectors for the broader Airedale corridor – manufacturing, retail and wholesale – are stated within the Bradford District Local Plan and reflect the distribution of employment in Bingley[16]. The Local Plan also identifies Airedale as the location for high value creative and service industries. Emerald Group Publishing is an example of activity in this sector in Bingley.

2.4.3. Travel impacts

There is no recent road traffic data available for A650 as this no longer under SRN status. The travel impacts analysis will therefore consider comments from the five year POPE report related to changes in traffic.

Notes from the five year POPE Report[17]:

- Traffic flows on the old A650 reduced significantly five years after the scheme, by 47%.
- Whilst there is still a proportion of traffic using the B6265 through Bingley rather than using the Relief Road, this proportion has reduced on almost all origin – destination routes since the One Year Assessment (OYA) surveys.
- Journey times on the new Relief Road have been roughly 7 – 12 minutes shorter northbound, and 3 - 9 minutes shorter southbound, than using the old A650 before the scheme opened. On the old A650, journey times are now 3 – 7 minutes shorter northbound and 1 – 5 minutes shorter southbound. Journey time savings have remained broadly the same since the OYA stage.

The length of higher volume commuting trips increased in the 2011 Census compared to the 2001 Census. The total number of trips on higher volume flows also increased by 5,568 but the car mode split decreased by almost 5%.

Keighley North Ward had the biggest increase in overall trips with 8,857 and an increase in car trips of 6,327. This ward is located at the northern end of the scheme and the significant increase in the number of trips therefore suggests that the scheme improved connectivity on the A650 corridor.

Analysis for the two years shows that frequent travel to work journeys made between selected Bingley areas and others have a high car mode share, even for trips under 5km. This could suggest congestion issues for nearby local roads as indicated by local authorities when consulted.

2.4.4. Economic growth impacts

Consultation with local authorities indicated that key development projects in Bingley, such as the redevelopment of the town centre, would have come forward without the scheme as a result of prevailing economic growth in the area. As such, no specific impact could be attributed to the scheme. However, it is likely the scheme has contributed to making the area more attractive for housing and business.

[14] For ONS statistics in this chapter, 'Bingley' refers to the administrative ward of Bingley.
[15] ONS. Annual Business Inquiry/Business Register and Employment Survey. Made available through Nomis.
[16] Bradford Metropolitan District Council. 2014. Local Plan for the Bradford District: Core Strategy.
[17] http://assets.highways.gov.uk/our-road-network/pope/major-schemes/A650%20Bingley%20Relief%20Road/POPE%20_%20A650%20Bingley%20FYA%20_%20website%20part%20A.pdf

2.4.4.1. Employment sites

Key development sites in Bingley identified in the 2005 Bradford Unitary Development Plan are Bingley Town Centre and the former industrial area on the east bank of the Leeds-Liverpool Canal, centred on Britannia Wharf and Whitley Street.

The area around Britannia Wharf has since been developed as a mixed-use development. This area has good access to the A650 though local authority officers believed that there was no particular impact of the scheme and development would have likely occurred without it.

The town centre has been redeveloped, including redevelopment of the town square and the area around the Myrtle Walk shopping centre. The town centre has increasingly become a destination for recreation, with a burgeoning food and drink industry. A major aim for development of the town centre was to provide a large supermarket. This has now occurred with Aldi investing in a newly constructed supermarket in the town. Lidl are also interested in investing in the town. The original aim of the scheme was to remove traffic from the town centre and POPE evaluations indicate that this did occur, though local officials reported that the town centre still suffers from congestion. Local officials indicated that though the scheme may have made these investments more attractive, it was not believed to be a critical consideration.

The Castlefields industrial park, located to the north of the town, has seen significant investment since the scheme. The site has been very popular with warehousing and manufacturing businesses, with very low levels of vacancy. Access to the relief road is believed to have been relevant to the site's attractiveness, but there is not a sufficiently clear link to draw conclusions about employment impacts.

A 2 ha site in the south of Bingley has been developed as an office park and is currently home to Emerald Group Publishing, who used relocation to the site from Bradford city centre to expand their operations. The relief road is believed to have been a significant consideration in the choice of location.

2.4.4.2. Housing sites

There has been significant housing development in the east of Bingley, at sites including the Oval, Agincourt Drive and Tulyar Court, as well as in Eldwick, over the last ten years. However, local officials were not aware of any clear link between development of these sites and the scheme.

2.4.4.3. Investment

Major recent investments highlighted in consultation were the construction of an Aldi supermarket in the town centre, investment in the existing Castlefields site and the relocation of Emerald Group Publishing.

2.4.4.4. Industries

Though direct economic benefits of the scheme, such as employment growth, could not be identified by local authority officials, sectors which may have benefited include:

- Retail (particularly supermarkets)
- Warehousing
- Manufacturing
- Professional services

2.4.4.5. Limitations

Though consultees did not indicate that the scheme had had a clear effect on economic growth locally, no specific limitations of the scheme were raised by local authority officials. This is partly because the natural geography of the area means options for scheme design are limited.

2.4.5. Conclusions

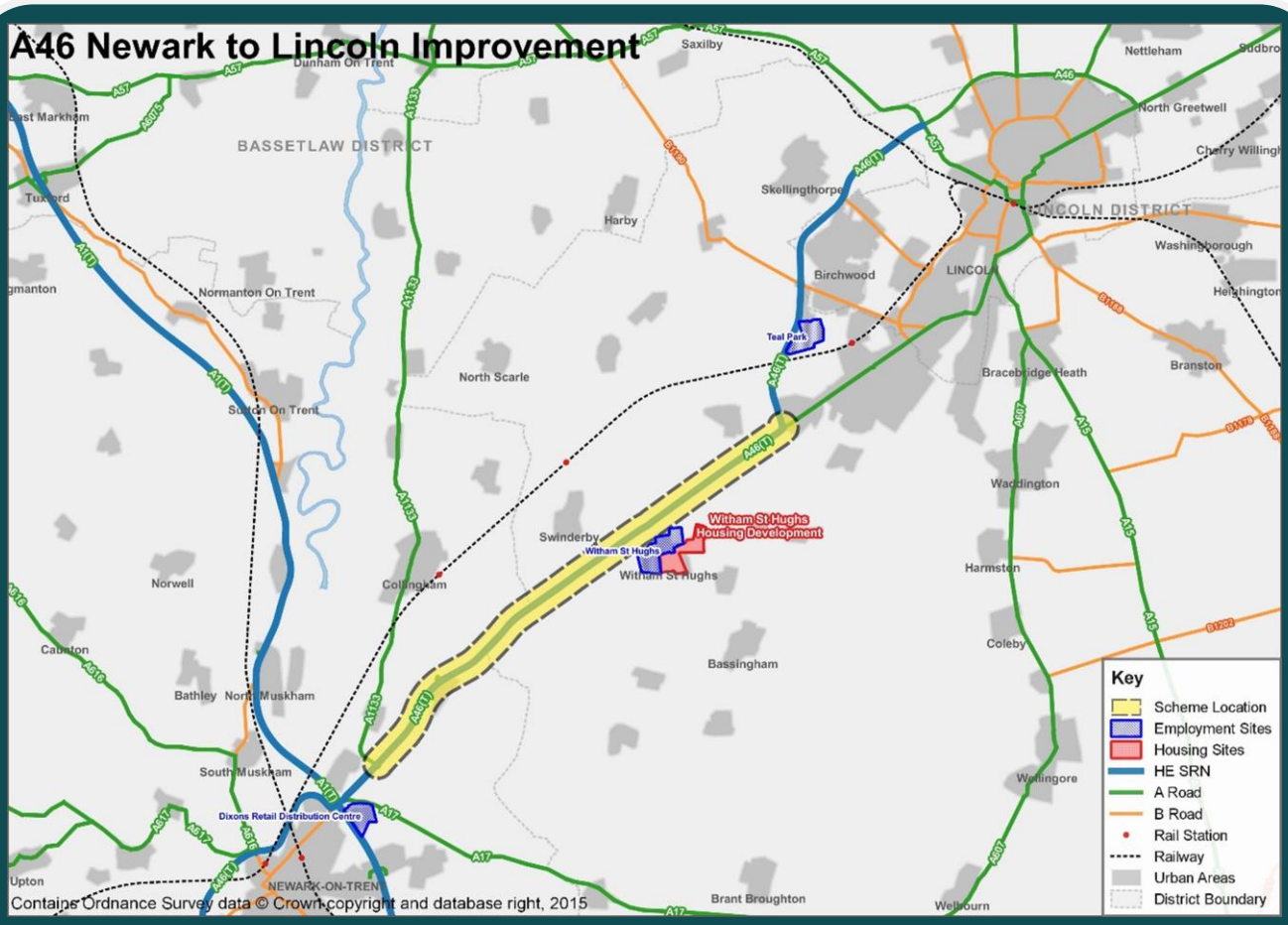
Consultation with local authorities did not indicate clear economic impacts of the scheme in Bingley. In particular, it was noted that the area was an increasingly attractive place to live and visit due to general economic trends rather than any specific infrastructure investment. Nonetheless, the scheme has likely made various investments, including both housing and employment sites, more attractive for businesses whose workforce need to commute from elsewhere in the area or rely on access to the road network for their operations.

2.5. A46 Newark to Lincoln and Newark to Widmerpool improvements

2.5.1. Scheme background

The two A46 schemes have been considered together due to the close proximity of the two schemes.

2.5.1.1. Newark to Lincoln

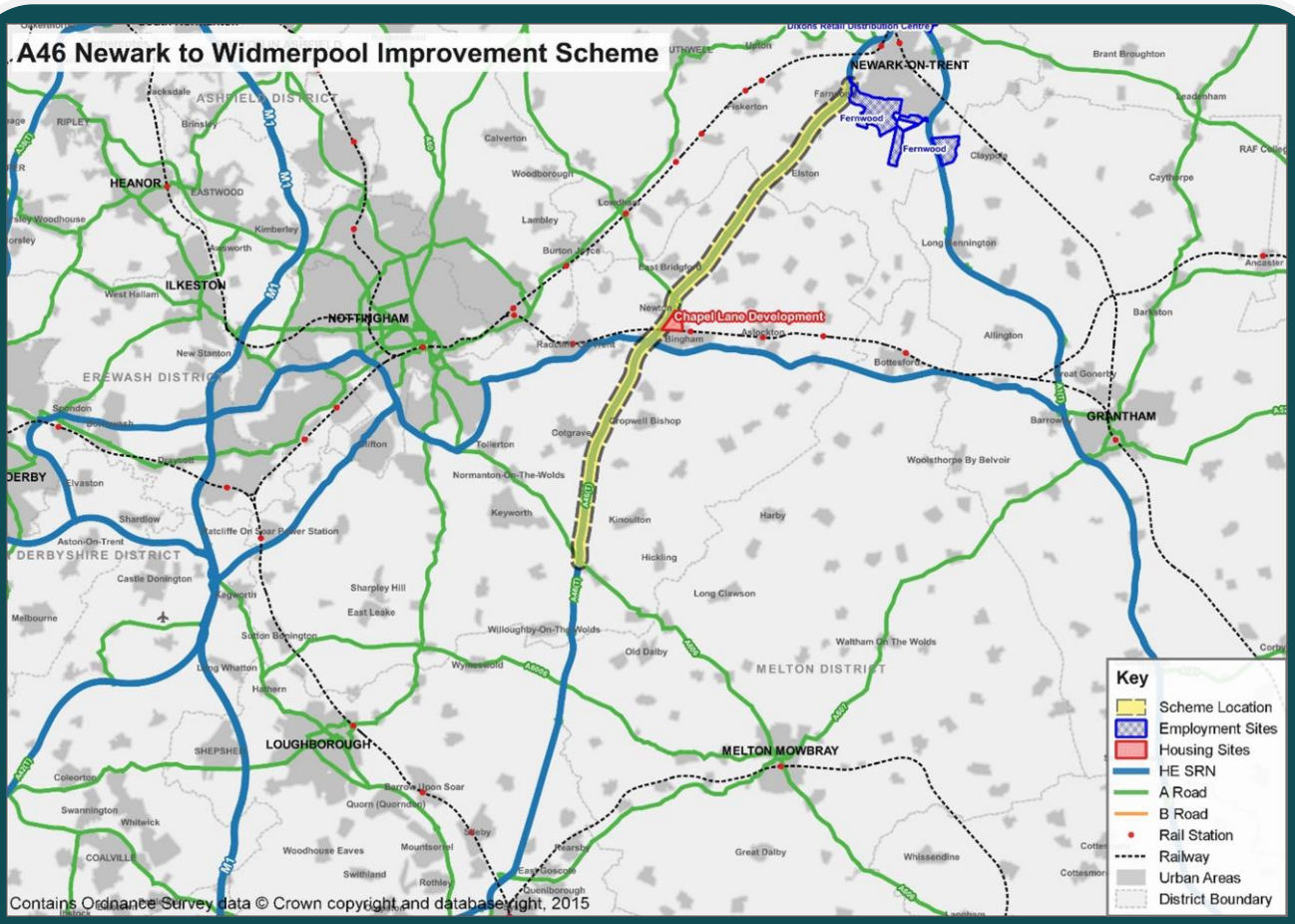


- The scheme opened in July 2003.
- The scheme consisted of dualling a section of the A46, as well as construction of several junctions and roundabouts.
- Total outturn costs were £40.6m, close to the forecast costs of £38.6m.

Scheme Objectives:

- Reduce congestion and improve journey times
- Improve safety
- Provide environmental benefits
- Contribute to the economic prosperity of the region

2.5.1.2. Newark to Widmerpool



- The scheme opened in April 2012.
- The scheme consisted of constructing 17.5 miles of dual carriageway as well as junctions, roundabouts and underpasses
- Total outturn investment costs were £265.3m, 3.3% below forecasts.

Scheme Objectives:

- Reduce congestion and number of accidents
- Improve links between local centres and the A1
- Improve the strategic link between the M1 and A1
- Relieve development pressure in Bingham

2.5.2. Key impacts

Key impacts of the schemes, discussed in more detail below, were:

- Directly facilitated development of industrial premises and housing at former RAF Swinderby, also known as Witham St Hughs. This has allowed the construction of 1,300 dwellings, with further housebuilding proposed, as well as providing employment.

- Made several employment sites more attractive. For example, the 30ha Teal Park site has since attracted investment by Siemens who have developed a facility providing 600 jobs.

- Improved connectivity as a result of the schemes has facilitated completed and proposed housing development in the south of Lincoln and Newark. Combined, these developments could provide 8,000 dwellings by 2036.

- Consultees noted that the schemes had made the urban centres of Newark and Lincoln more accessible for commuters and business travellers in particular. The schemes have also provided the basis for further proposed road infrastructure improvements.

2.5.3. Local economic context

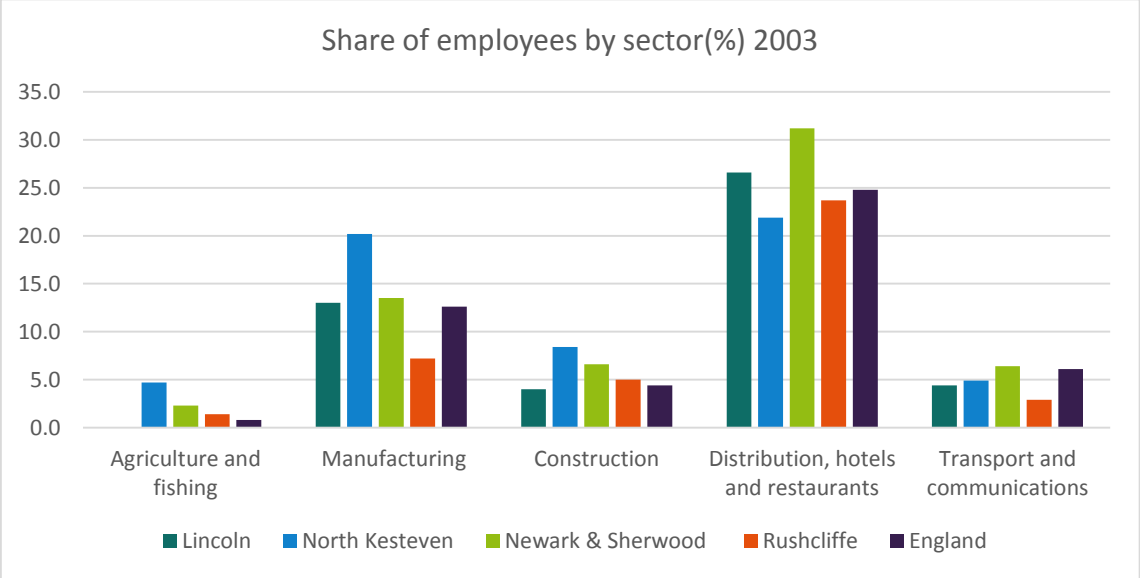
Priority sectors identified by the Greater Lincolnshire LEP include manufacturing and engineering, particularly in Lincoln and North Kesteven. Agri-food is also a key sector for the broader LEP area.

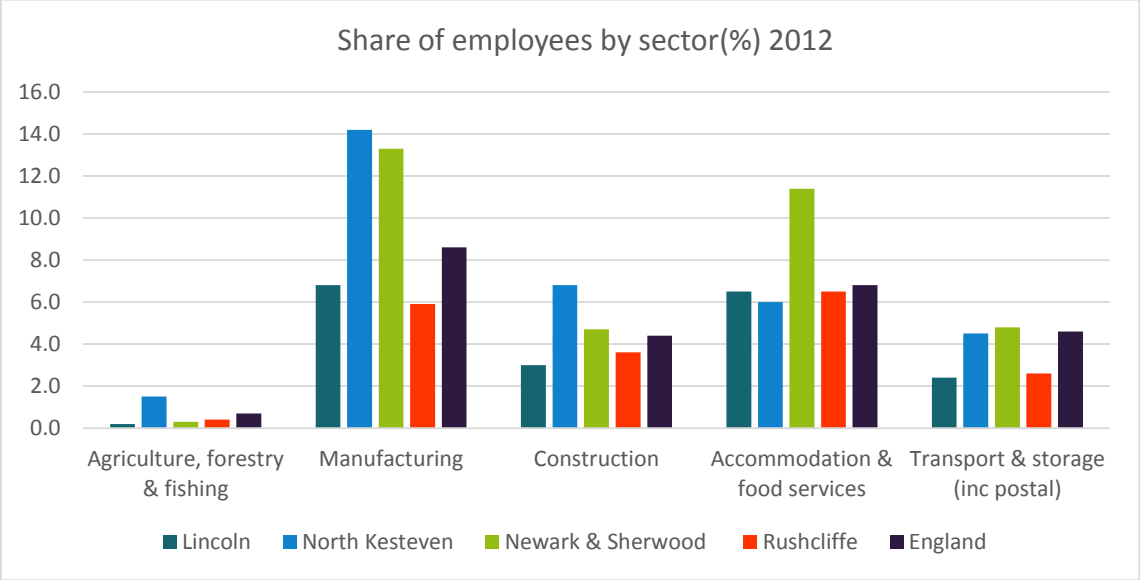
Priority sectors for the D2N2 LEP (Derby, Derbyshire, Nottingham and Nottinghamshire), which includes Newark & Sherwood and Rushcliffe, include the visitor economy, transport and logistics, food and drink and transport manufacturing. The SRN is likely to be important for businesses in all of these sectors.

These priorities are reflected in employment data. The figures below highlight the local importance of construction and manufacturing at the time of construction of the two schemes, particularly in Newark and Sherwood and North Kesteven.

In Newark and Sherwood in 2003 the following sectors generated high levels of employment of 60% compared to the national figure of 49%: agriculture, distribution, hotels and restaurants, manufacturing, transport and communications.

Figure 2-7 Share of employees by sector in A46 districts, 2003 and 2012





Source: ONS Annual Business Inquiry/Business Register and Employment Survey

The wider Lincolnshire and Nottinghamshire area also contains nationally significant infrastructure and international gateways for which SRN access is important. D2N2 is a well-connected area, including the M1, East Midlands Airport and the proposed HS2 route. The Strategic Economic Plan also outlines the ambition

for improving rail journey times between Nottingham, Newark and Lincoln, demonstrating the importance of the Newark-Lincoln corridor. Greater Lincolnshire also contains the largest UK port by tonnage (Grimsby and Immingham). As such, the A46 between Newark, Lincoln and Grimsby is identified as one of Greater Lincolnshire LEP's main growth corridors.

Economic performance in the area over the past ten years has been largely in line with national trends. Lincoln has tended to have above average rates of unemployment over the past ten years, which suggests job creation here is a priority, however the rest of the area has had low or average unemployment[18]. Average annual GVA growth in Nottinghamshire and Lincolnshire has been slightly above the UK from 2006-2015. However, these are quite large aggregated areas and may not be relevant for the specific districts considered in this assessment.

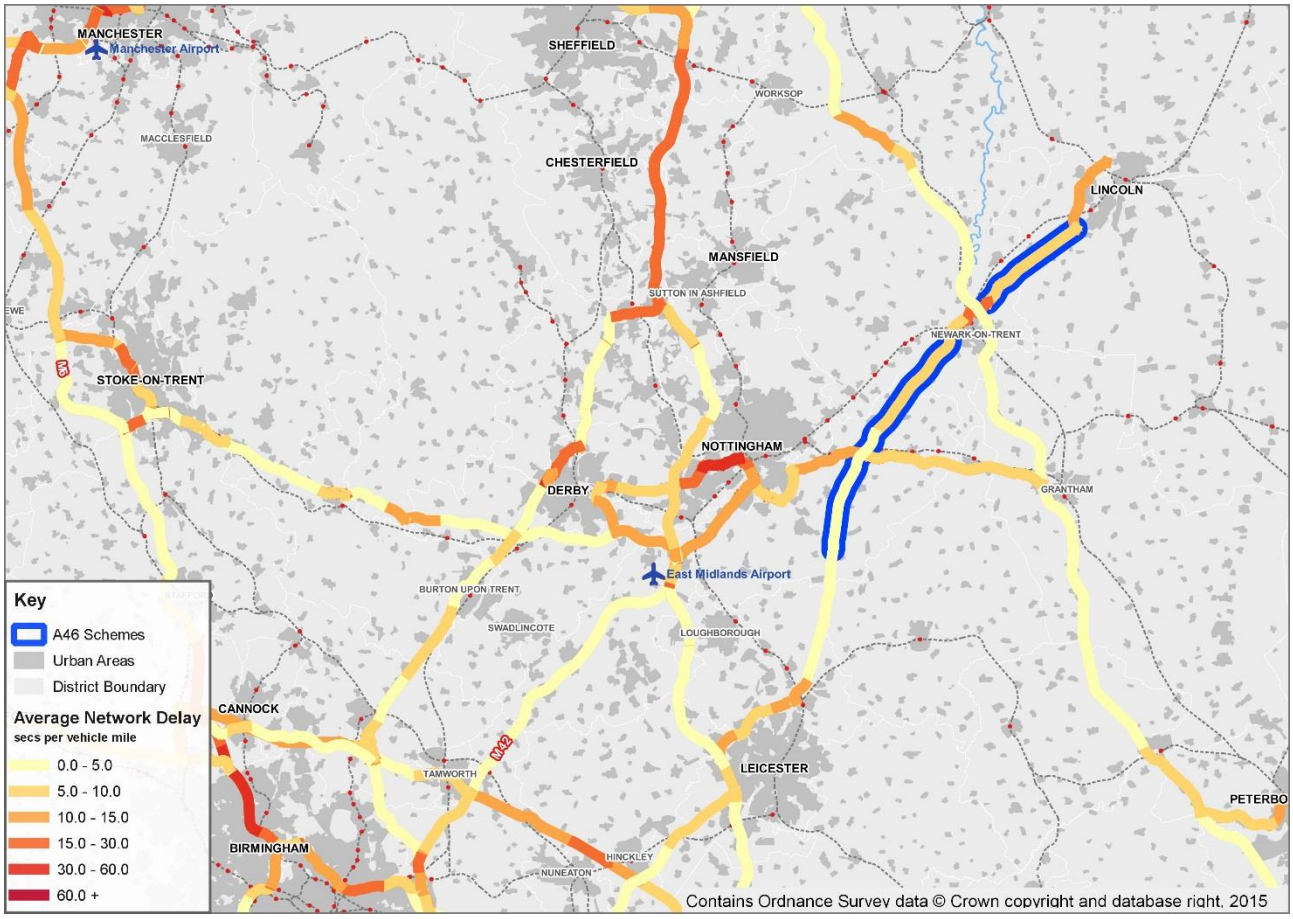
2.5.4. Travel impacts

The congestion analysis of the A46 schemes has been presented together due to their close proximity and also to show how congestion experienced on these links compares to nearby areas.

2.5.4.1. HE Road Traffic Data

The aims of both schemes were to relieve congestion on the A46 and improve accessibility between Lincoln, Newark, Nottingham and Leicester. The map below shows the average annual delay on the SRN.

Figure 2-8 Annual average network delay for A46 schemes



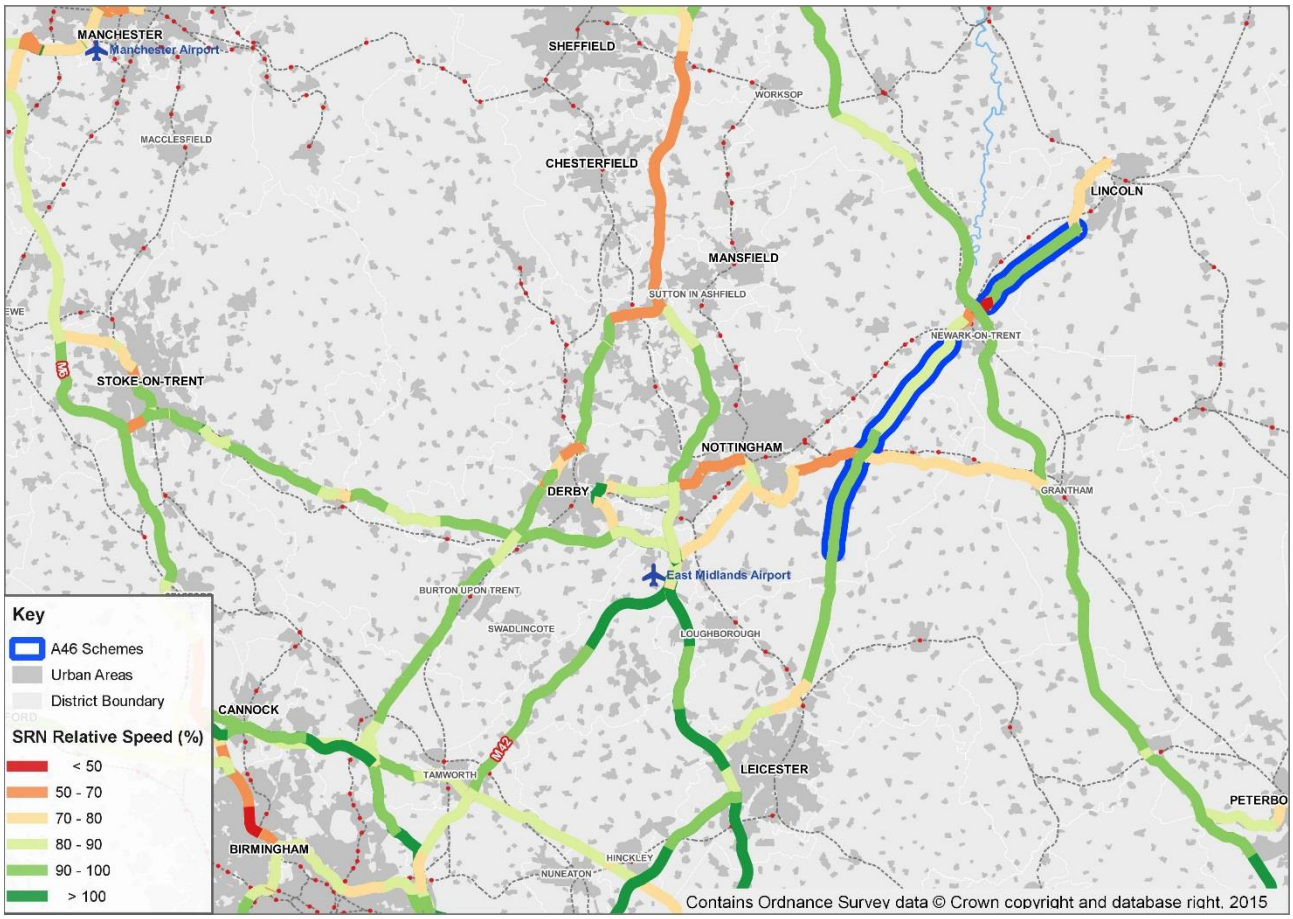
The A46 link that was part of the Lincoln to Newark scheme experiences a delay of 6.4 seconds per vehicle mile during the AM peak. The link at the western end of the scheme, between Newark and the A1, has an average annual delay of 27.5 seconds per vehicle mile, with an average PM peak delay of 42.7 seconds per vehicle mile. This indicates high levels of congestion in this area. The link between Newark and Bingham has an average delay of 8 to 10 seconds per vehicle mile depending on the time of day.

[18] ONS. Annual Population Survey. Made available through Nomis.

The A52 connects the A46 to Nottingham and this also experienced significant delays of up to 18.7 seconds per vehicle mile during the PM peak.

The relative speed on the SRN was also calculated and is presented in the map below as a percentage of the free flow speed for each link.

Figure 2-9 Annual average relative speed for A46 schemes

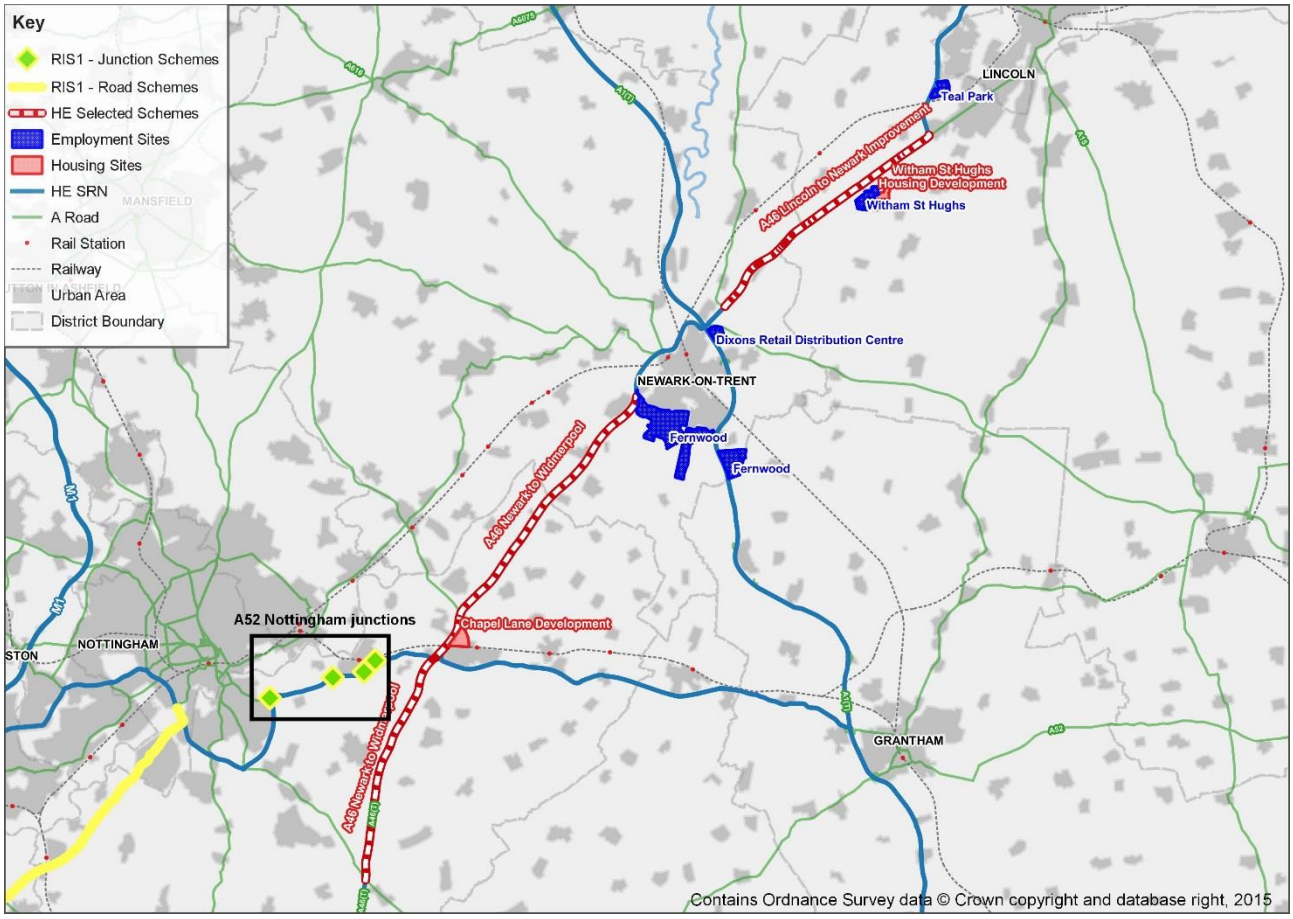


The average speed on the A46 between Lincoln and Newark is between 80%-100% of the speed limit, which suggests that traffic on the road flows smoothly. There are patches of congestion on the route. The most congested link is on the section of the A46 north-east of Newark, between the A1 and A1133 where traffic moves at under half of the speed limit during the AM peak. Other congested links include sections of the A46 between A616 and A1 (Newark bypass) and north-west of Lincoln between the A1434 and A57.

Traffic flows between Lincoln towards Nottingham are affected by long delays as the A52 from the A46 to Nottingham has an average relative AM speed less than 70% of the speed limit. This could be relevant for the Chapel Lane developments as these are adjacent to the A46/A52 junction.

There are several junction and road improvement schemes near the A46 schemes that will be implemented during RIS1 and these are mapped below.

Figure 2-10 RIS1 shemes adjacent to A46 improvement schemes



The delay and relative speed maps show that the A52 between Nottingham and the A46 experiences delays, which affect traffic towards Nottingham from Newark. The relative speed is 56% of the speed limit, which suggests that there is widespread congestion on this link. The junction improvements along the A52 during RIS1 are expected to improve network efficiency and reduce congestion between the A46 and Nottingham.

2.5.4.2. Census Travel to Work Data

The A46 Newark to Lincoln scheme was opened to traffic in 2003.

The second A46 scheme from Newark to Widmerpool opened in 2012 therefore only 2011 Census data will be considered to analyse the patterns before the opening of the scheme.

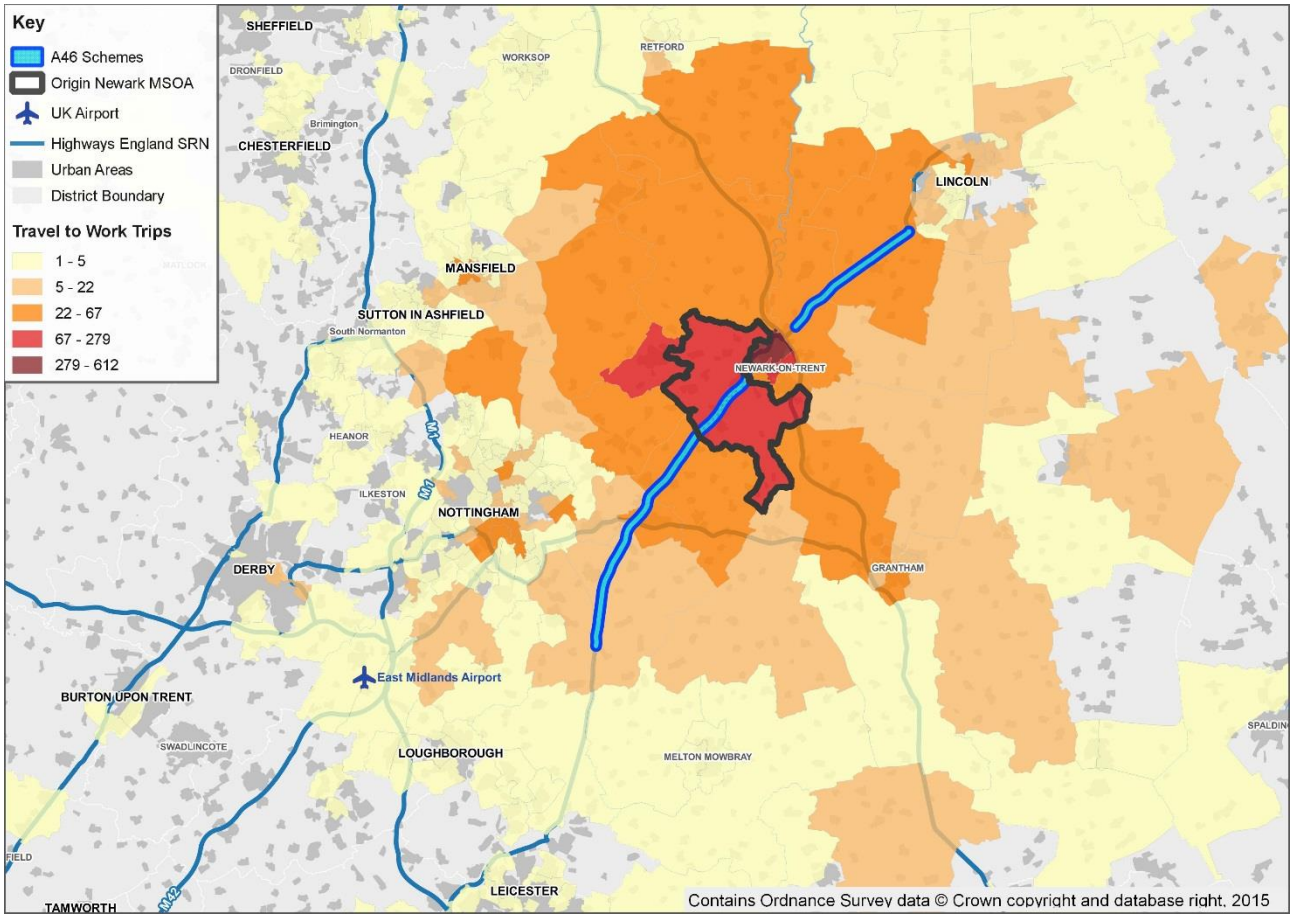
Four main districts surrounding the A46 schemes (Leicester, Lincoln, Newark and Sherwood and Nottingham) were analysed in order to identify any changes in travel patterns. The main findings are summarised below:

- Trips from Newark to Nottingham decreased by 691 whilst trips from Lincoln to Newark increased by 1,034;
- The difference in average car mode share was mostly negative with some increases from Newark to Leicester and Lincoln to Nottingham of 8% and 4% respectively; and
- The highest decrease in car mode share was from Lincoln to Leicester with 23% and Leicester to Newark with 24%.

The 2011 travel to work analysis from the Newark MSOA at the end of the scheme identified that frequent travel to work trips were within short distances from the scheme, mainly focused within the Newark District. Figure 2-11 below is a thematic map that highlights the workplace hotspots for residents of the highlighted MSOA.

The distance travelled to work from Newark and areas surrounding the second A46 scheme is likely to increase following the opening of this scheme in April 2012.

Figure 2-11 Travel to work thematic map from Newark representing census 2011 data



2.5.5. Economic growth impacts

Local authority officials considered that the schemes had been important in attracting businesses by improving the accessibility of the area. For the Newark to Lincoln improvements, this is reflected in the POPE report, which notes higher than forecast journey time savings. The A46 is also a key element for further proposed road infrastructure improvements around Newark and Lincoln. The schemes have contributed to industrial development and have made proposed developments more attractive, though these developments would likely have been brought forward without the scheme.

Documents produced by Rushcliffe Borough Council and the D2N2 LEP indicate that several developments are planned along the A46 from Newark to Widmerpool. The Rushcliffe Core Strategy, which includes plans for these developments, indicates that the A46 scheme was amongst transport schemes "essential" for the delivery of the Strategy[19]. However, efforts to consult with Rushcliffe Borough Council were unsuccessful and therefore it is difficult to provide a clear understanding of the impacts of the A46 scheme in Rushcliffe.

2.5.5.1. Employment sites

North Kesteven has been working to develop former RAF Swinderby, now Witham St Hughs, as employment land since its closure in 1993. Possibilities for development were limited due to poor road access to the site. The roundabout construction that took place as part of the scheme was therefore identified as critical for unlocking the site for development and the dualling has made the site more attractive. Various distribution and engineering businesses, such as Turbine Efficiency and UK Mail, are now located at the site.

Employment sites located in North Kesteven are important for both Lincoln and North Kesteven local authorities due to the shortage of available land within Lincoln itself. There has been major industrial development to the south west of Lincoln, including the 30 ha Teal Park site. This area is in close proximity to the A46 and is believed to have been made significantly more attractive by both dualling schemes. However, it is not believed that the A46 improvements directly unlocked these sites and development would have occurred regardless.

[19] Rushcliffe Borough Council. December 2014. Adopted Rushcliffe Core Strategy. p. 25.

Two sites to the south of Newark have been allocated for industrial and commercial development. This consists of 40 ha of employment land at Land South of Newark and a 15 ha high quality business park for company headquarters and high tech businesses at Fernwood. The dualling of the A46 from Newark to Widmerpool is expected to benefit both of these developments, though both would have occurred without it.

In Rushcliffe, a total of 26.5 ha of proposed mixed-use employment land is associated with three developments based around the A46 Newark to Widmerpool at Land North of Bingham, former RAF Newton and Cotgrave Colliery. D2N2 suggests 2,000 jobs are expected to result from these developments[20]. Additionally, planning permission has been granted for three supermarkets in the Bingham and Chapel Lane area. The transport assessment prepared to support planning permission for housing and residential land north of Bingham notes that the A46 dualling must be completed before construction work can commence and that the A46 scheme eliminates the need for road improvements[21].

The scheme has contributed to making Newark and Lincoln highly accessible centres. Lincoln in particular indicated the A46 improvements had improved access to the A1 and East Coast Main Line in Newark and therefore to London and other core cities. Many businesses, particularly head offices in Newark and those that require specialist labour such as tech firms, are expected to have benefited from easier commuting to the towns. Strong connectivity has been associated with expansion of various businesses, including food processing in Newark, though it is difficult to separate this from business growth following increased economic growth in recent years.

2.5.5.2. Housing sites

Development of former RAF Swinderby has now led to the construction of around 1,300 dwellings and further expansion has been proposed.

Housing development in the Lincoln area has focused around Newark Road in North Hykeham and in the west of the city. Both areas are linked to the A46, either the section dualled by the scheme or the existing western bypass. An urban extension proposed as part of the Central Lincolnshire Local Plan, which could contain more than 2,000 dwellings, would be located to the south of North Hykeham due to the accessibility from the Hykeham roundabout at the north end of the Newark to Lincoln scheme. This is also expected to form the entrance to a proposed Southern Bypass to link the A46 and A15 and to a proposed Eastern Bypass. The aim of these schemes is principally to reduce congestion and improve links to the SRN.

The two sites south of Newark discussed above are also allocated planning permission for a total of over 5,000 dwellings, to increase to over 6,000 by 2036. As with the industrial development, this is not believed to have been dependent on the A46 dualling but development of the sites will likely benefit from increased connectivity.

In Rushcliffe, Local Plan documents suggest a total of 2,020 homes are planned for the A46 associated developments[22]. The D2N2 LEP suggests that 3,500 homes will be provided[23]. As Rushcliffe Borough Council were not available for consultation, the exact scale of housing growth and the role of the A46 in supporting growth remains unclear.

2.5.5.3. Investment

The accessibility provided by the scheme is believed by local authorities to be a significant factor in the relocation of Siemens' gas turbine service facility to Teal Park in North Kesteven in order to facilitate expansion. The facility provides 600 jobs.

A major investment associated with the strong connectivity in Newark that the A46 schemes have contributed to is the development of KnowHow (after-sales support and distribution for Dixon Carphone) at a site on the A46/A17 roundabout. The businesses originally had 800 jobs based in Newark and has recently expanded, with an expected additional 700 jobs.

2.5.5.4. Industries

Within Lincoln and North Kesteven, sectors which were likely to have benefited from the schemes were identified as manufacturing (such as the Siemens investment), higher and further education, which is a growth sector for the city and smaller professional, often creative, businesses which particularly benefit from improved

[20] D2N2 LEP. 2014. Strategic Economic Plan. p. 18.
[21] Entec UK. 2010. Proposed Mixed Use Developments, Chapel Lane, Bingham: Transport Assessment.
[22] Rushcliffe Borough Council. December 2014. Adopted Rushcliffe Core Strategy
[23] D2N2 LEP. 2014. Strategic Economic Plan. p. 18.

access to London and other cities. Following the schemes there has also been interest from distribution companies in the area though this has historically been a very marginal sector due to poor connectivity.

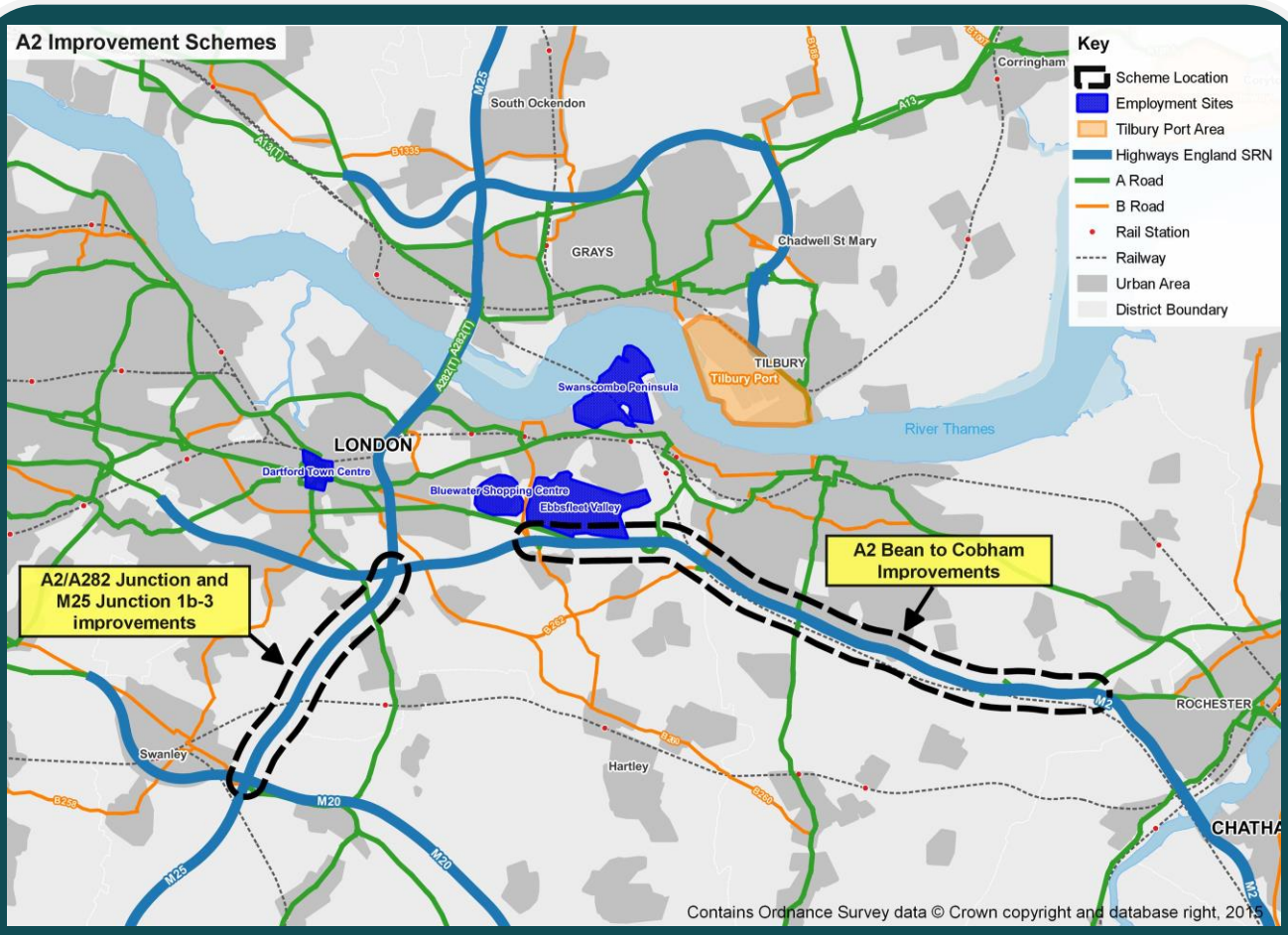
2.5.5.5. Limitations

A limitation raised relating to the Lincoln end of the scheme is that dualling only connects to one connection to the city, the A1434. This results in a bottleneck as traffic moves onto the single carriageway bypass, which connects the scheme to much of the employment and housing development in the area. Similar concerns were raised in Newark regarding the single carriageway Newark bypass. This creates bottlenecks and has been cited by local businesses as a concern. This is reflected in the congestion data in section 2.5.4.

2.5.6. Conclusions

The cumulative effect of the schemes has been significant for establishing the strong connectivity of Newark and improving the accessibility of Lincoln and areas of North Kesteven. This has proved important for helping to attract and retain businesses in these areas, particularly in engineering, distribution and professional services as demonstrated by the pattern of industrial growth. Proposed housing developments have also been influenced by the schemes. Development of Witham St Hughs was facilitated directly by the scheme, providing for housing and employment growth. Additionally, the schemes allow for further proposed road infrastructure improvements.

2.6. A2 Bean to Cobham improvements, A2/A282 junction improvements and M25 junction 1b-3 improvements



A2 Bean to Cobham Improvements

- The scheme consisted of widening the A2 between Bean and Cobham in two phases.
- Phase 1 of the scheme opened in December 2004; Phase 2 opened in February 2009.
- Total outturn present value costs were £144.4m, 1.5% higher than forecast.

Scheme Objectives:

- Reduce journey times and improve reliability
- Improve safety
- Provide enhanced access to regeneration areas in Kent Thameside and NE Kent
- Facilitate access to Ebbsfleet International Rail Station

A2/A282 and M25 Junctions 1b-3 Improvements

- These were treated as one scheme as impacts could not be distinguished. This follows the POPE reports.
- The schemes consisted of road widening and junction improvements.
- The schemes opened in December 2007 and July 2008.
- Total outturn present value costs were £170.5m.

Scheme Objectives:

- Reduce journey times and improve reliability
- Provide enhanced access from the M25 to the regeneration areas of Kent Thameside and north-east Kent
- Facilitate access to Ebbsfleet International Rail Station.

These three schemes were opened between 2004 and 2009 and have been considered cumulatively due to their close proximity and similar objectives.

2.6.1. Key impacts

Key considerations regarding the impacts of the scheme are:

- Local authorities were not able to clearly identify any impacts specific to the schemes.
- Highways infrastructure is seen as key for economic development of the area and the schemes may have contributed to this.
- Significant issues of congestion and accessibility remain, particularly around Dartford.
- The economic recession was cited as having held back development, suggesting a limited role for infrastructure investment.

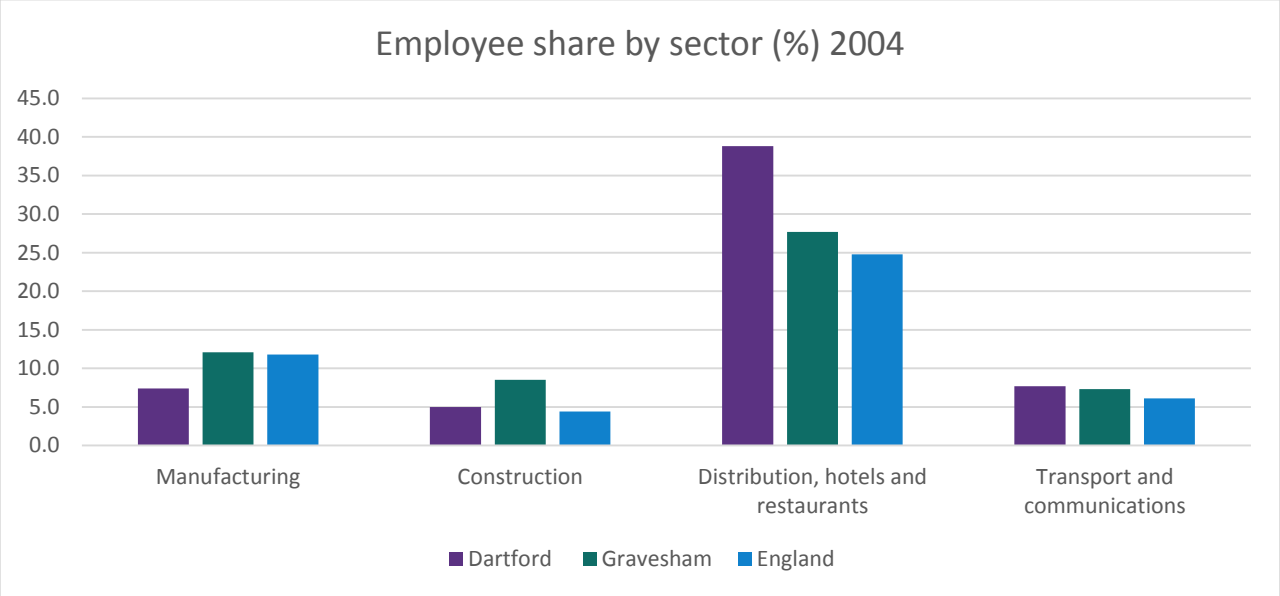
2.6.2. Local economic context

Dartford and Gravesham form part of the Thames Gateway regeneration area. Several major developments in the area are associated with the regeneration initiative, including a potential major leisure resort on Swanscombe Peninsula and Ebbsfleet Garden City (which also has Enterprise Zone status). These are expected to require significant transport infrastructure investment. These build on a number of ongoing or completed developments, including The Bridge and Dartford Northern Gateway. The Thames Gateway is a priority for the South East LEP[24].

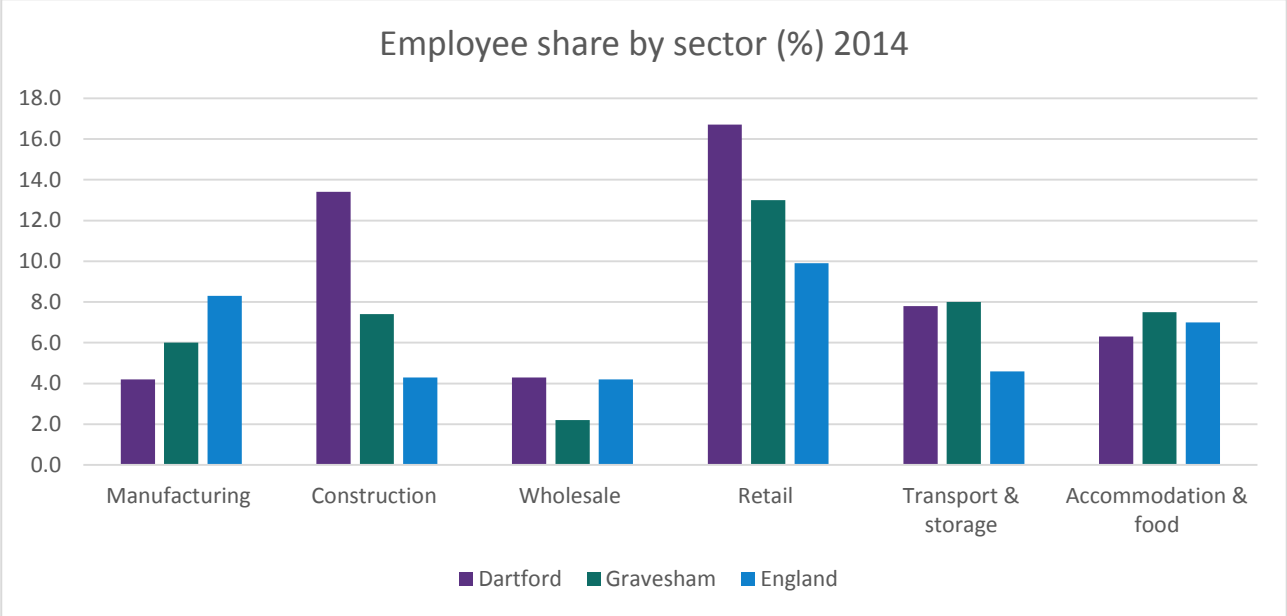
The regeneration effort builds on major infrastructure and international gateways in the area, including Ebbsfleet International Station and HS1, the Ports of London and Sheerness and the M25 and Dartford Crossing/QEII Bridge.

The South East LEP identifies priority sectors as advanced manufacturing, transport and logistics (particularly regarding the Port of Sheerness), life sciences, environmental technologies and energy (particularly in North Kent), creative and cultural media sectors and the visitor economy[25]. As demonstrated in Figure 2-12, the transport and logistics sectors are relatively important for local employment, as are other roads-intensive sectors including retail and construction.

Figure 2-12 Employee share by sector in Dartford and Gravesham, 2004 and 2014



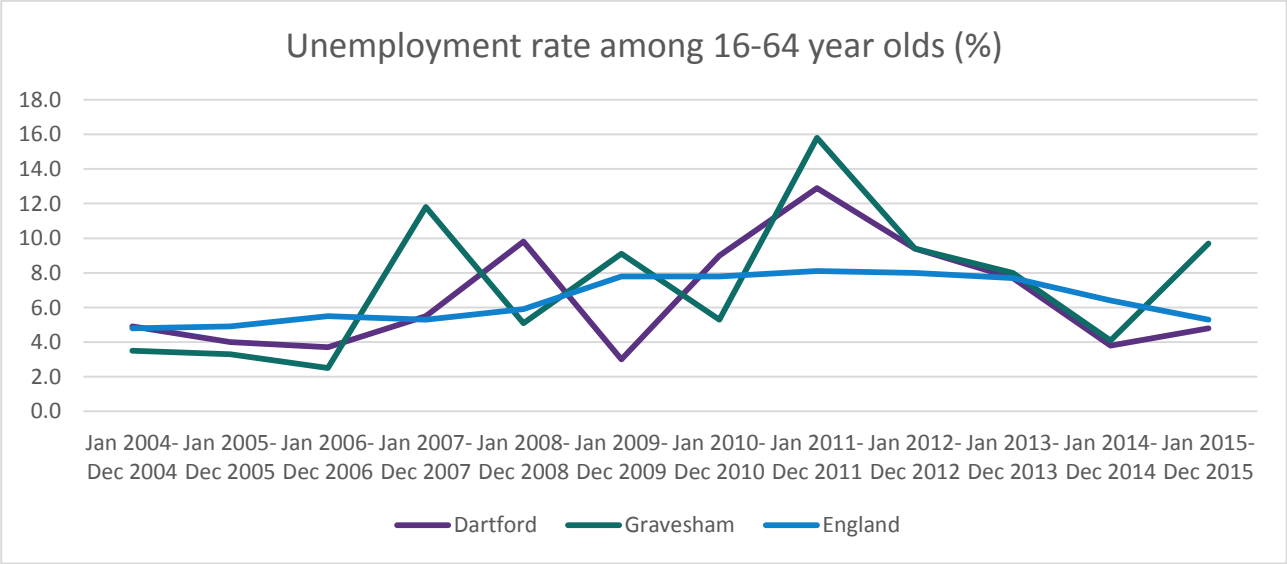
[24] South East LEP. 2014. Strategic Economic Plan.
[25] ^ *ibid*.



Source: ONS Annual Business Inquiry/Business Register and Employment Survey

Unemployment rates from the period 2004-2015 indicate quite volatile rates of unemployment in both Dartford and Gravesham, with Gravesham in particular often experiencing a greater rate of unemployment than the rate for England. GVA per head in 2014 in the Kent Thames Gateway area and across Kent area was 81% of the measure for the UK and 74% of the measure for the South East[26]. This suggests that there is a significant need to improve productivity and employment in the area.

Figure 2-13 Unemployment in Dartford and Gravesham, 2004-2014



Source: ONS Annual Population Survey

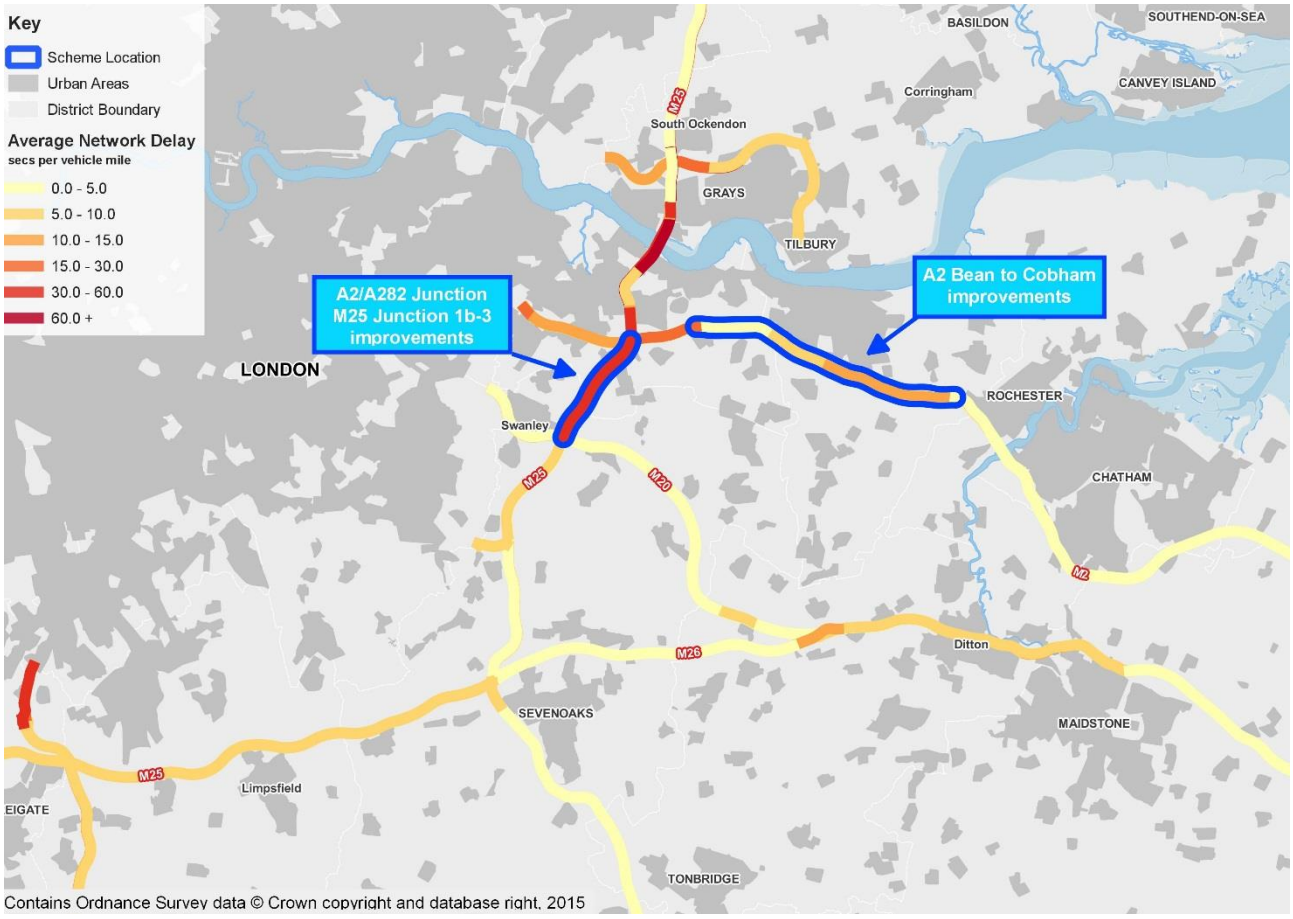
2.6.3. Travel impacts

2.6.3.1. HE Road Traffic Data

The SRN link on which the A2 Bean to Cobham scheme was implemented experienced an average annual delay of 15.6 seconds on the eastbound link and 8.4 seconds on the westbound link leading to the M25. The average annual delay for the northbound link of the M25 between junction 1 and junction 3 was 30 seconds per vehicle mile. Delays for the southbound link were significantly lower at only 6.4 seconds.

[26] ONS Regional GVA

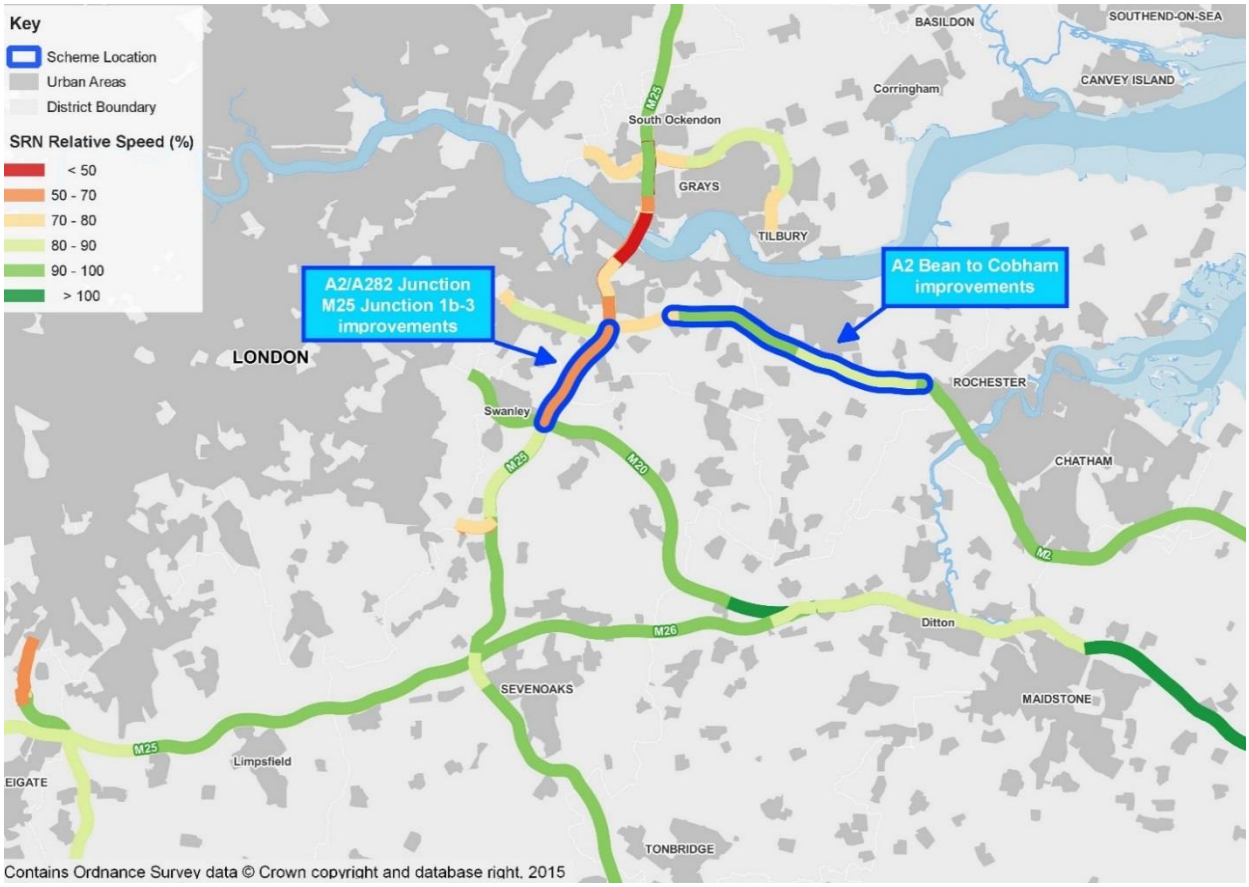
Figure 2-14 Average network delay surrouding the A2 and M25 schemes



The relative speed recorded on the SRN close to the two schemes is mapped in Figure 2-15. On the A2, the average speed is relatively close to the speed limit on links where these improvements were carried out. The average speed recorded from 2014 to 2015 around Dartford was almost half of the speed limit, which could affect movement from the Swanscombe Peninsula to the southern links of the M25.

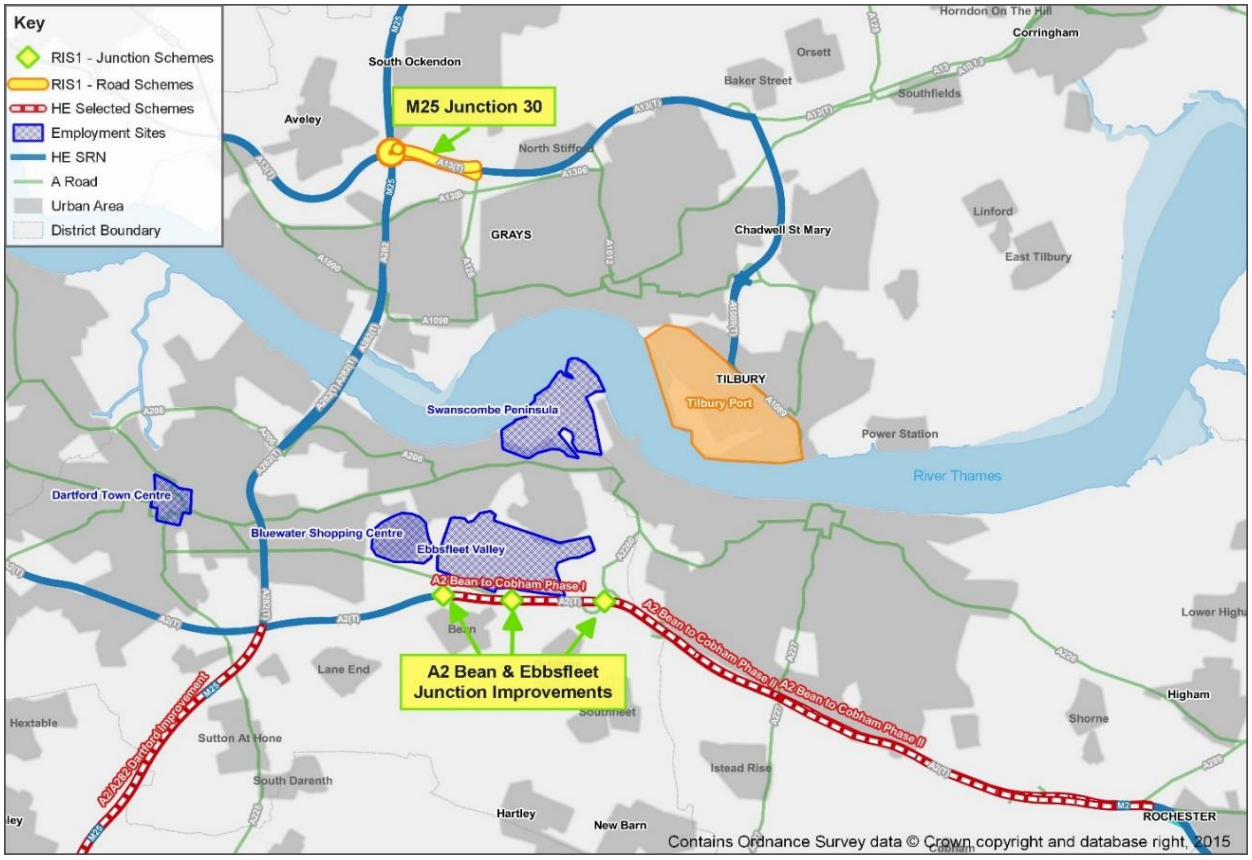
The section of the M25 close to the scheme suffers from delays and congestion. SRN traffic data indicates that the most congested link considered in the study area was on the M25 between Junctions 1b to 3. The average PM peak delay was 75 seconds per vehicle mile between April 2014 and March 2015. The current relative speed on the M25 between M25 J2 and M25 J3 is 41% during the PM peak and has an average annual delay of 8 seconds per vehicle mile. The A2 also experienced delays of 12 seconds per vehicle mile between the A2260 and A227.

Figure 2-15 Relative speed on the SRN close to the A2 schemes



The map below indicates the location of the RIS1 schemes close to the A2 schemes.

Figure 2-16 RIS1 schemes to be implemented on the A2 and M25



There are two RIS1 schemes near the A2 improvements as shown in the map above, including A2 Bean and Ebbsfleet junction improvements. These could improve traffic flow along the A2 and would therefore improve access to key employment sites in the area such as Bluewater Shopping Centre and Ebbsfleet Valley.

2.6.3.2. Census Travel to Work Data

The trips presented in the census analysis were filtered to only include those trips on travel to work flows with 20 trips or more per day to and from Dartford and Gravesham at district level. The exclusion of trips with frequency less than 20 aimed to identify common travel patterns of people travelling to and from the two districts.

There were 706 less trips made for work purposes recorded in the 2011 Census for Dartford district and 10,676 less trips for Gravesham district compared to the 2001 data. Despite the decrease in total trips for Dartford, the number of car trips increased by 1,969 and the mode share for car therefore increased to 70%. The mode share for car increased for both districts, and the commuting catchment areas also increased. For example, 25 travel to work trips were reported during the 2011 Census between Dartford and Manchester.

2.6.4. Economic growth impacts

Consultation with local authority officers in Dartford and Gravesham suggested that economic benefits from the schemes were hard to identify. This is due to conflation with the significant regeneration programme currently underway in North Kent and the negative effect of the recession on regeneration being realised. Improvements to highways infrastructure were seen as key for supporting development, and the schemes have likely contributed to this, but there are still significant issues of congestion and accessibility in the region.

2.6.4.1. Employment sites

Dartford Borough Council are aiming to bring forward 750,000 m^2 of additional employment floor space by 2026, to provide for 26,500 additional jobs. An increase in retail employment is also predicted due to proposed expansion of Bluewater Shopping Centre. Development of a commercial hub at Ebbsfleet as well as Dartford Town Centre and Thames Waterfront are strategic policies of the Council's 2011 Core Strategy[27]. Ebbsfleet Garden City, consisting of three sites in Ebbsfleet, was given Enterprise Zone status as part of the North Kent Enterprise Zone. The sites are expected to provide over 25 ha of employment land[28]. Proposals are also at a pre-planning stage for the London Paramount theme park, to be located on the Swanscombe Peninsula. If successful, this development could create 27,000 jobs[29].

The M25, A282 and A2 are key for access to the strategic road network from these areas. However, achieving this scale of development has been held back by the investment climate during the economic recession. The schemes were believed to form part of a programme of investment which would ultimately facilitate development of the area and had plausibly improved accessibility, but the programme of investment remained an ongoing process and issues associated with strategic road infrastructure persist in the area.

2.6.4.2. Housing sites

Similarly to the development of employment land, housing growth in Dartford is principally associated with Ebbsfleet, the Thames Waterfront and Dartford Town Centre. Combined, the Core Strategy aims for the provision of over 14,600 homes across these areas by 2026. The impact of the schemes on achieving proposed housing development was believed to be the same as the impact on employment sites.

2.6.4.3. Investment

No major investments are believed to have been directly facilitated or caused by the schemes. However, many major programmes of investment are proposed for the area, as discussed in Section 2.6.4.1.

2.6.4.4. Industries

Local authority officers were not able to identify clear impacts of the scheme on specific sectors. However, improved conditions of the strategic network are likely to support proposed retail expansion and leisure schemes and the logistics and manufacturing and engineering sectors (which are key growth sectors in the

[27] Dartford Borough Council. Core Strategy 2011. Available from: http://windmz.dartford.gov.uk/media/Inspector%20Approved%20Core%20Strategy.pdf

[28] Thames Gateway Kent Partnership. North Kent Innovation Zone presentation. Available from: http://www.tgkp.org/content/North%20Kent%20Innovation%20Zone%20%E2%80%93%20Web%20Version.pdf

[29] Thames Gateway Kent Partnership. Investment Opportunities webpage. Available from: http://www.tgkp.org/opportunities

Dartford Core Strategy). The Ebbsfleet Garden City Enterprise Zone site has a sectoral focus of professional services, creative industries, construction technologies and advanced manufacturing

2.6.4.5. Limitations

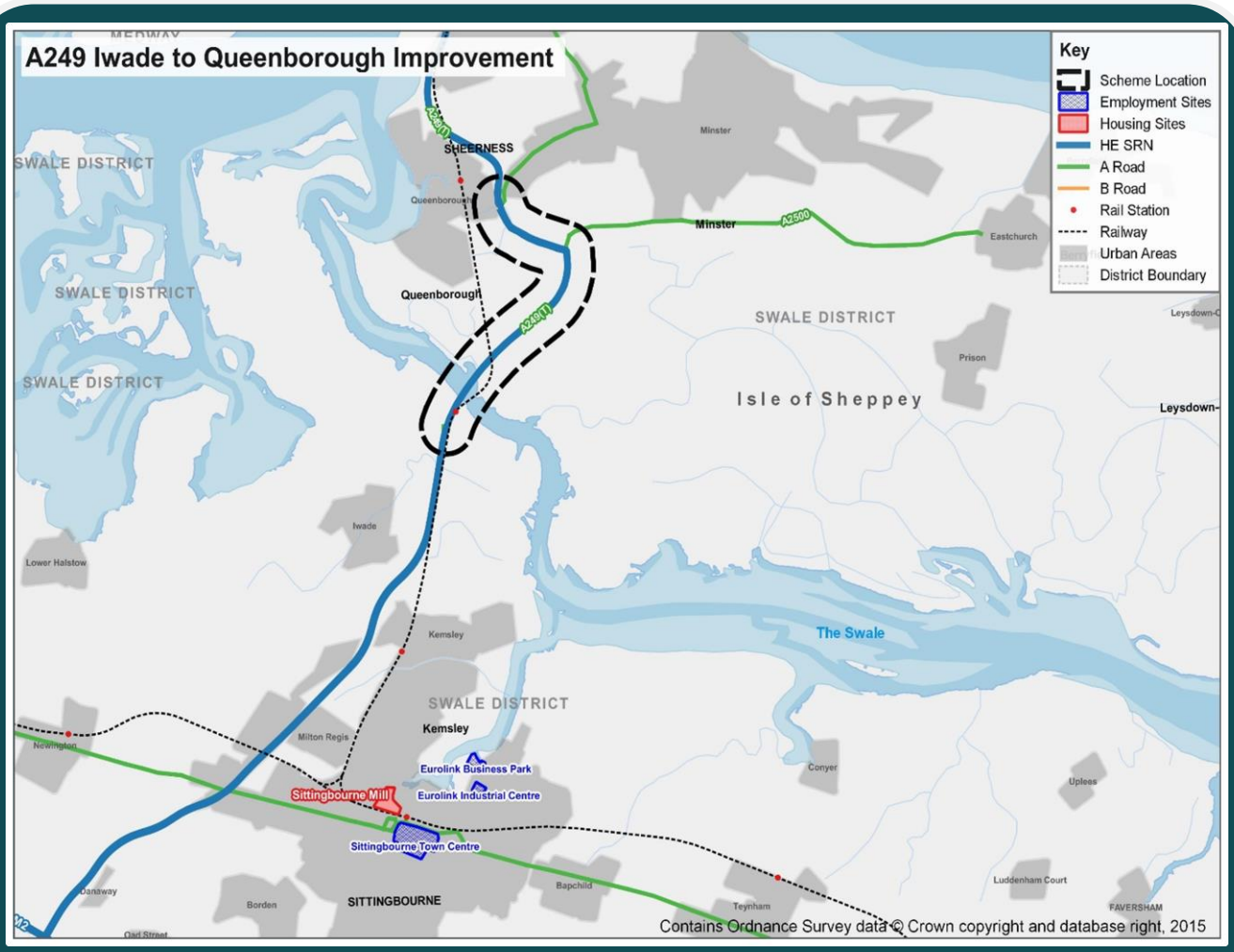
The POPE evaluation of the A2 Bean to Cobham improvements notes that the scheme did achieve objectives regarding journey time savings. Local authorities however raised issues around congestion on A2 junctions limiting development, particularly around development at Ebbsfleet and the Swanscombe Peninsula and the requirement for further improvements to the Ebbsfleet junction. Congestion issues associated with the Dartford River Crossing, though not directly related to either scheme, were also perceived as detrimental to development of Dartford Town Centre.

2.6.5. Conclusions

North Kent is subject to a substantial regeneration programme, making any impact specific to the schemes hard to identify. Additionally, this process is ongoing as investment has been dampened by the recession. Ongoing highways issues were highlighted by both Dartford and Gravesham local authorities as potentially constraining development and this is reflected in the congestion data. Therefore it appears that, though the schemes may have contributed to the provision of infrastructure to support large-scale development, this example demonstrates the limitations of highways investment for achieving economic development where other significant barriers exist.

2.7. A249 Iwade to Queenborough Improvement

2.7.1. Scheme background



- The scheme opened in July 2006.
- The scheme consisted of constructing a new bridge across the Swale and 3 miles of dual carriageway.
- Total outturn present value costs were £91.1m, compared to a forecast of £81.4m.

Scheme Objectives:

- Reduce journey times
- Improve accessibility to/from the Isle of Sheppey for economic regeneration and emergency services
- Improve public transport links

2.7.2. Key impacts

Key impacts of the scheme, discussed in more detail below, were:

- Directly facilitated development of Kemsley Fields employment site, which provides 10,000m^2 of employment land.

- Facilitated development of further road infrastructure, specifically the Sittingbourne Northern Relief Road and Rushenden Relief Road.

- These further developments have allowed expansion of existing employment and housing land and new developments. Together, these may provide for over 2,900 jobs and around 1,300 dwelling units.

2.7.3. Local economic context

The South East LEP has outlined plans for Swale and the Medway Estuary to form the Kent Centre for Offshore Renewable Engineering, due to the strong local manufacturing base and proposed Assisted Area designation for areas of Medway, Sittingbourne and Sheppey[30]. The A249 corridor between Sittingbourne and Sheerness is identified as a major sector of manufacturing employment. This is reflected in employment data from the time of the scheme and more recently, as shown in Figure 2-7. The Port of Sheerness, which forms part of the Port of Medway, is based on the Isle of Sheppey. The Port of Medway was the 16th largest port by freight traffic in the UK in 2014[31].

Figure 2-17 Employee share by sector in Swale, 2006 and 2014

Source: ONS Annual Business Inquiry/Business Register and Employment Survey

There is significant deprivation on the Isle of Sheppey based on 2015 data, with areas of Sheerness, Minster and Rushenden and the east of the island ranking in the most deprived 10% of neighbourhoods in England. This is based on a wide range of measures of deprivation, including health, employment, income, crime and education. Additionally, some areas of Sittingbourne are deprived[32]. Unemployment in Swale is relatively high

[30] South East LEP. 2014. Kent and Medway Growth Deal.
[31] Department for Transport. 2014. UK Ports and Traffic statistics.
[32] DCLG. 2015. Indices of Multiple Deprivation 2015 Explorer. Available from: http://dclgapps.communities.gov.uk/imd/idmap.html

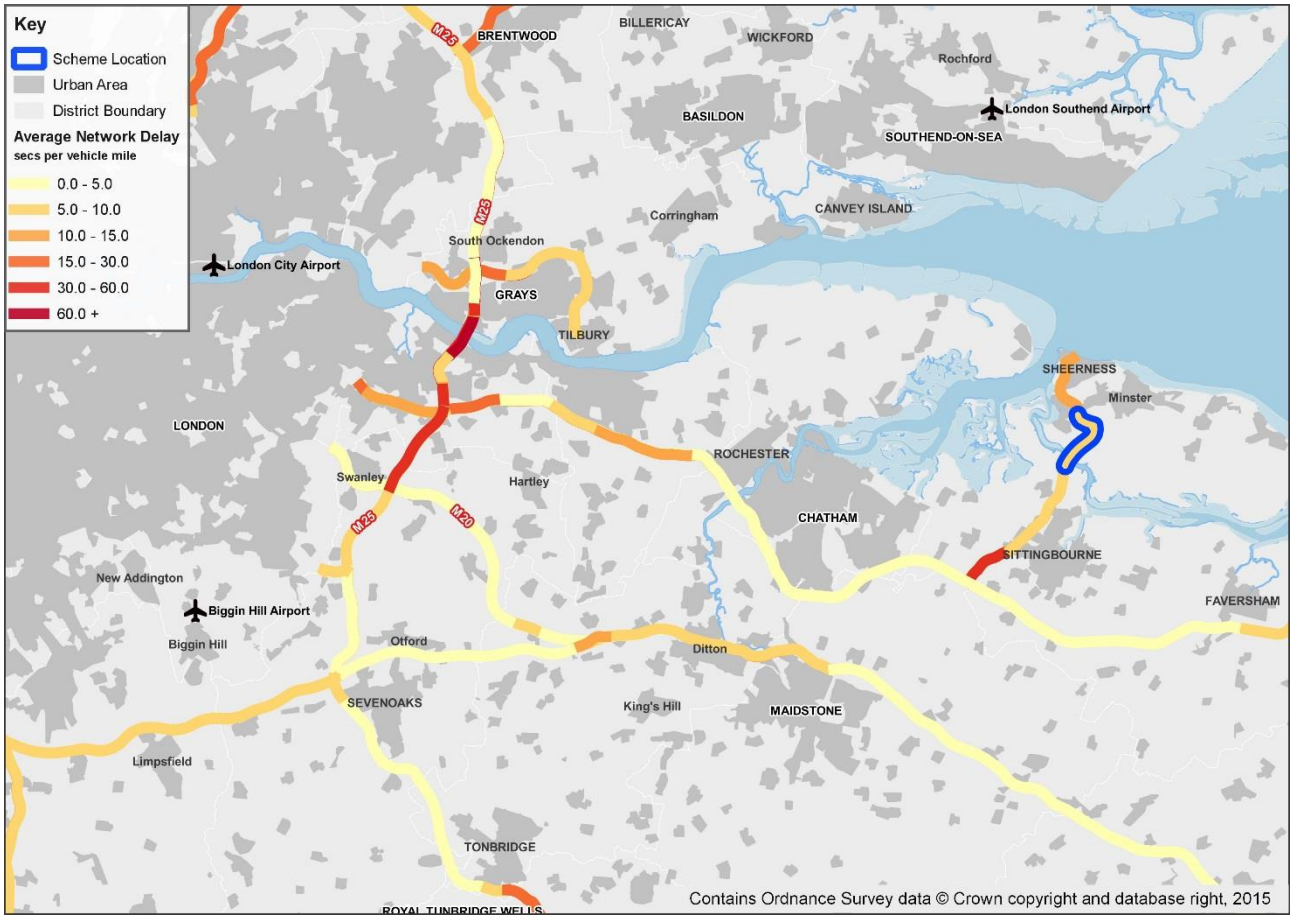
for the South East and has typically been above the rate for the UK from 2006-2013, though has reduced significantly in more recent years[33].

2.7.4. Travel impacts

2.7.4.1. HE road traffic data

The road link covered by the scheme has an average delay of 8 seconds per vehicle mile (Figure 2-18). This is relatively low compared to the average delay of 30 seconds per vehicle mile on the A249 southbound link to the M2.

Figure 2-18 Average network delay around the Isle of Sheppey



The A249 (from Iwade to Queenborough and then through to Sheerness) has a relative speed of 80%-90%, which suggests that traffic moves relatively smoothly on this road. The speed of traffic decreases to under 50% of the speed limit on the road link where the A249 joins the M2. The relative speed on the SRN connecting the scheme to the wider network is mapped in

Figure 2-19.

The M2 Junction 5 improvement scheme is predicted to be completed in January 2020 as part of RIS1. The location of this scheme is presented in Figure 2-20. The scheme will benefit traffic movements from the M2 onto the A249. The current level of congestion on this road link is high: the link between the A2 and Junction 5 has an average AM weekday delay of 93 seconds per vehicle mile and carries, on average, almost 24,000 vehicles per day.

[33] ONS. Annual Population Survey.

Figure 2-19 Relative speed on the SRN near the Isle of Sheppey

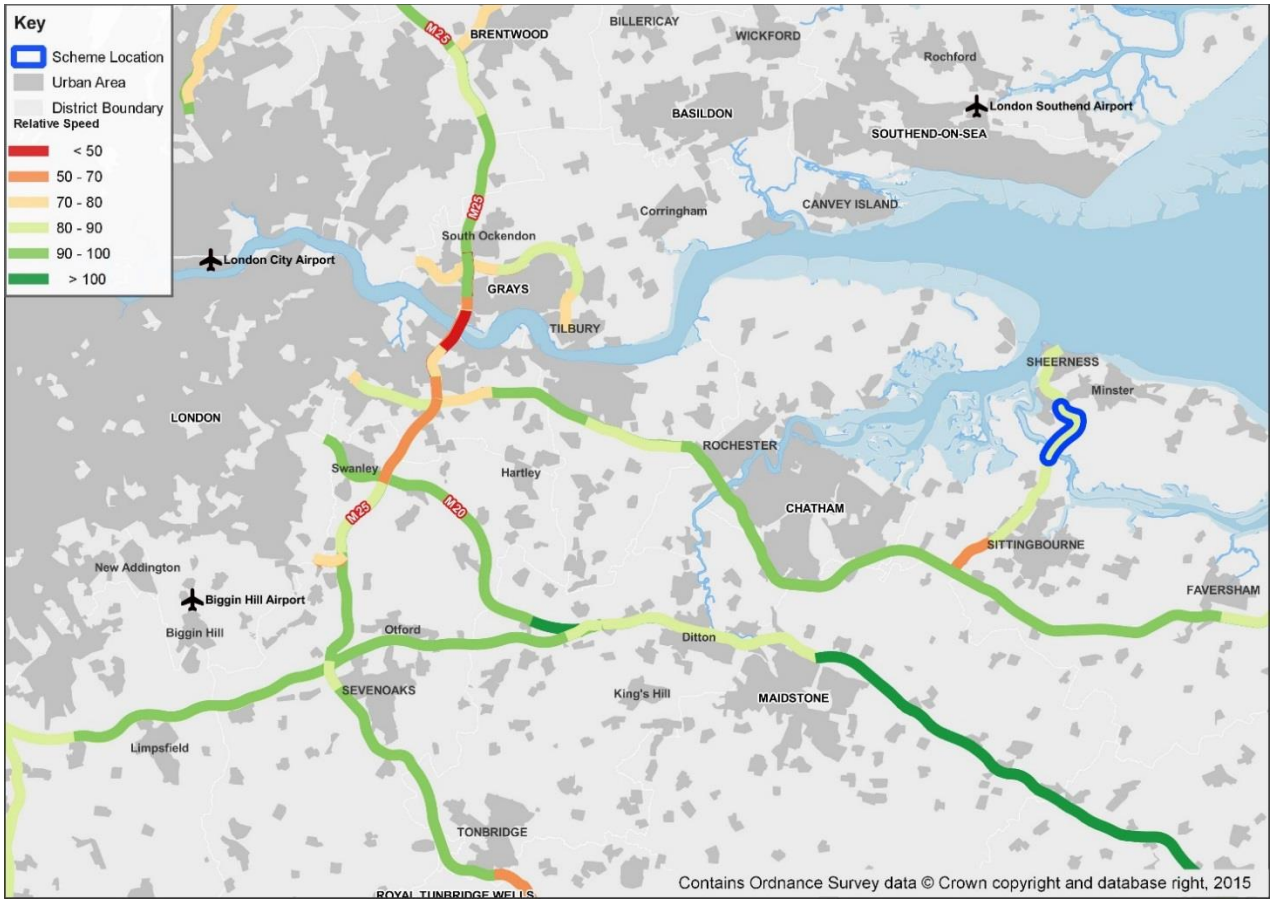
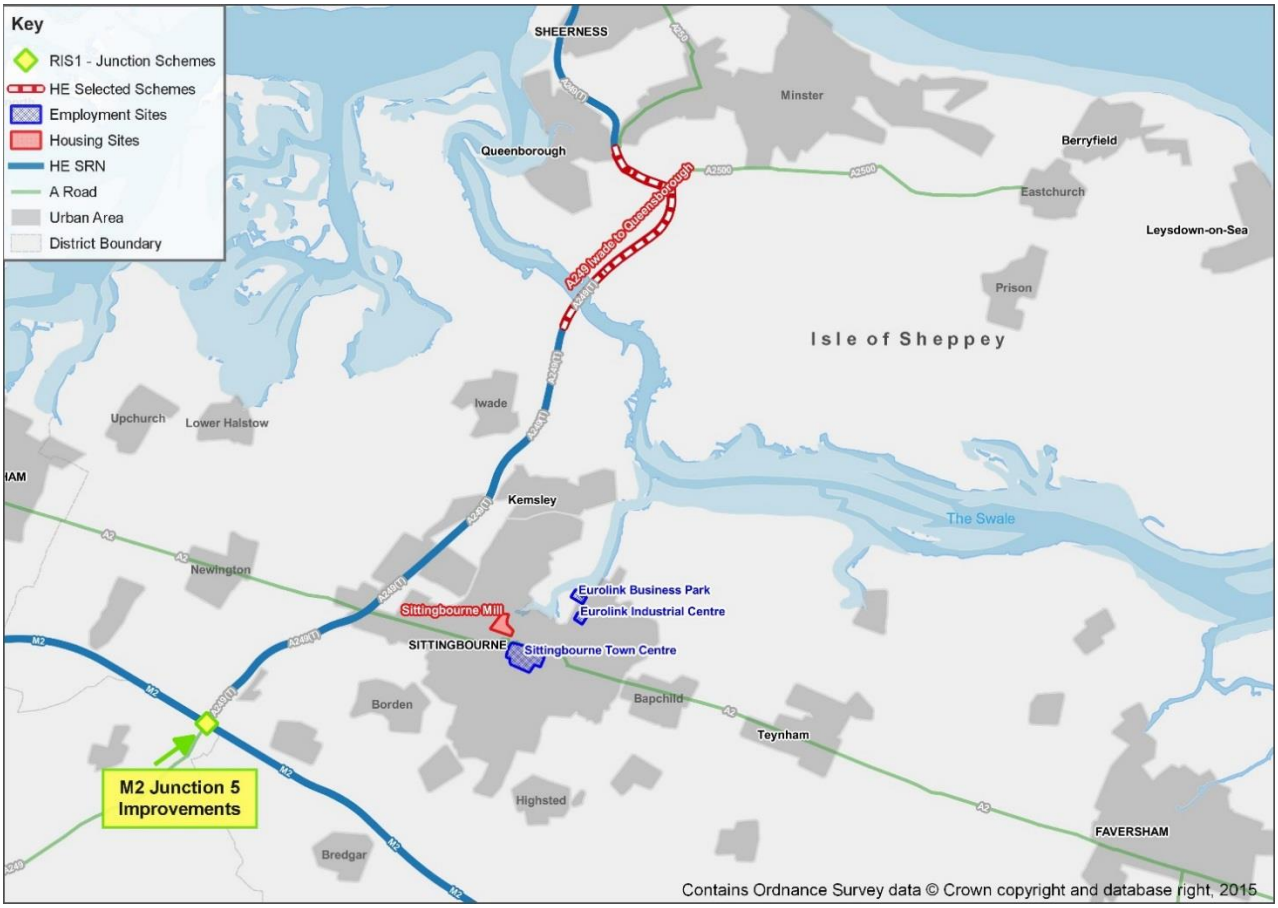


Figure 2-20 RIS1 scheme near the A249 scheme



2.7.4.2. Census Travel to Work Data

The A249 Iwade to Queenborough improvement scheme opened to traffic in July 2006 and is therefore likely to have contributed to a change in commuting patterns between 2001 and 2011.

The total number of trips to and from the Isle of Sheppey decreased by 3,823 trips since the 2001 Census. However, the number of car trips only decreased by 370 trips and car mode share therefore increased by 9%.

The 2011 selected MSOAs were matched as closely as possible to the six 2001 wards in order to identify which area saw the biggest change in commuter patterns. There was a decrease of 825 commuters in Sheerness and the remainder were mainly in the eastern part of the Isle (wards and MSOA boundaries are not comparable in the east of Sheppey, making identifying the change for specific locations difficult). The maximum distance travelled to work in the Isle of Sheppey has increased from 26km to 62km.

2.7.5. Economic growth impacts

This scheme allowed for the further development of road infrastructure and therefore had significant direct and indirect impacts on employment and housing in both the Isle of Sheppey and the mainland (particularly around Sittingbourne). The scheme was described as a centrepiece of regeneration planning in Swale Borough and is a useful example of how improved trunk infrastructure can result in further benefits.

2.7.5.1. Employment sites

Following the completion of the scheme, the Kemsley Fields employment site, which constitutes the main employment allocation of the Swale Local Plan, could be developed. This is allocated for 10,000 m^2 of employment land and consultees indicated that currently only one plot remains vacant.

The scheme facilitated development of the Sittingbourne Northern Relief Road, which then allowed for expansion of Eurolink Business Park. Before expansion, the 200,000 m^2 site was the base for 6,000 jobs and 275 firms. The site has since been approved to expand by another 43,000 m^2. If current intensities are maintained, this implies over 1,000 additional jobs and 50 firms.

The scheme also facilitated development of the Rushenden Relief Road, which provided access to the Queenborough and Rushenden regeneration area. This allowed development of the Neats Court employment

site, which currently is the location of around 550 employees. Local authority officials indicated that Aldi plan to develop a distribution centre at the site, which will provide another 400 jobs.

Construction of the Sittingbourne Northern Relief Road has reduced traffic in the town centre and facilitated the approval of plans for mixed-use redevelopment of the town centre, to include a cinema and big-box retail, though development has not yet begun. This is projected to create 950 jobs[34].

2.7.5.2. Housing sites

Similarly to employment sites, the scheme has had both direct and indirect effects on housing sites. Some small housing sites around Iwade were developed following the scheme. A housing site near Neats Court, facilitated by the Rushenden Relief Road, has been approved for 1,100 dwellings. Additionally, 200 residential units are included in the plans for Sittingbourne town centre redevelopment. In the future, the scheme may facilitate further housing development on the Isle of Sheppey around Minster-on-Sea.

2.7.5.3. Investment

A major investment that occurred following the scheme was the development of a regional distribution centre by Morrisons at Kemsley Fields, which was developed following the scheme. Proposed investments include the Aldi distribution centre at Neats Court and the town centre regeneration. The focus of investments on logistics centres reflect the connectivity benefits the area provides.

2.7.5.4. Industries

Industries which have benefited from the scheme, as indicated by local authority officers, include the Port of Sheerness, logistics and retail (as evidenced by the Morrisons investment). Manufacturing is also an important employment sector locally, concentrated in the Eurolink Business Park. Prior to the development of the Sittingbourne Northern Relief Road, the Eurolink site was single access and frequent congestion was having negative productivity effects on businesses at the park.

2.7.5.5. Limitations

No specific limitations of the scheme were raised by local authority officers, though there have been some concerns over the safety of the bridge between the Isle of Sheppey and the mainland. Local issues of congestion on the strategic network, for example on the M2, were perceived as more significant issues as discussed in section 2.7.4.

2.7.6. Conclusions

The scheme has had a significant impact on the local economy by providing for development and expansion of several key employment and housing sites. Much of this impact has been indirect, through allowing the development of further local road infrastructure which then facilitated the development of sites. This has particularly resulted in benefits for the distribution and manufacturing sectors.

[34] South East LEP. 2014. Kent and Medway Growth Deal Application.

3. Analysis

The case studies presented in the previous chapter are summarised in Table 3-1 below. The following section presents an analysis of the case studies, identifying factors which the case studies suggest either support or limit the impacts of schemes on local economic growth.

3.1. Factors supporting the economic impacts of SRN schemes

3.1.1. Local economic context

A major factor which improved the perceived impact of SRN schemes was where schemes were aligned with the local economic context. This might arise from responding to strong local growth by relieving demand pressure. For example, in regards to the A46 Newark to Lincoln improvements, consultees indicated how the schemes complemented their existing plans for housing growth to accommodate demand and the creation of employment land on the edge of urban centres due to inability to meet demand for employment land through currently accessible, town centre sites.

Impacts of the schemes were also seen to be particularly beneficial where development unlocked by schemes benefited local priority sectors. In Carlisle, the M6 scheme was seen as having principally benefited the logistics and distribution sector, which is an important sector for the local economy. Many of the schemes assessed for this study supported the development of key employment sites targeted at local priority sectors, such as manufacturing in Melton or renewable energy in Hull. Whilst this in part results from the methodology used for this study, as local authorities are likely to stress the impact of schemes on priority sectors, this demonstrates how SRN schemes can support strategic growth locally. This is particularly true where schemes can benefit roads-intensive sectors, such as distribution and logistics or manufacturing.

3.1.2. Transport networks

Specific junction or link road interventions were repeatedly highlighted by local authorities as being critical for the economic impacts of the scheme. Interventions were relevant for development at a local level but also in regard to regionally important developments such as Green Port Hull. Junctions provide access to specific sites for development. In the case of Green Port Hull, for example, the link road constructed as part of the A1033 scheme was seen as being particularly useful for the redevelopment of the site.

Junctions also act as nodal points for future development. This could relate to the provision of further roads such as the Relief Roads developed around the A249 in Swale or through providing focal points for future development of employment or housing sites, such as the potential urban extensions around Lincoln and North Kesteven. The importance of junctions emphasises the role the SRN plays in shaping future development, which may be unforeseen at the time of investment. Though this suggests that junction interventions could represent a high-impact intervention, the success of these in promoting local development is also dependent on increasing capacity on the surrounding network.

Most consultees did not raise the issue of inter-modal connectivity and this was not relevant in most of the schemes assessed as part of this study. Where improvements to inter-modal connectivity had occurred, these were felt to have realised significant economic benefits. In particular, where roads schemes improved multi-modal connectivity, as with the A46 Newark to Lincoln improvements improving access to the East Coast Main Line, a broader range of sectors were able to benefit.

The Eddington Review (2006) and several other documents related to highways investment in the UK emphasise the importance of improving the efficiency of roads infrastructure rather than expanding the road network, given the already sophisticated network in existence in the UK. However, consultees from areas which were either perceived as or were more peripheral noted the importance of schemes, particularly A road improvements, in reducing this barrier to growth. Examples include Lincoln and North Kesteven following the A46 improvements and in Swale following the A249 improvements (including construction of a new bridge).

3.2. Factors limiting the economic impacts of SRN schemes

3.2.1. Broader economic context

While strong local demand for housing and employment land supported the economic impacts of SRN schemes, the broader macroeconomic environment was often highlighted by consultees as limiting the impacts of schemes. This is in part due to real impacts being limited and partly due to how potential scheme impacts were perceived. In some cases, particularly in Hull and North Kent, the economic recession from 2008 onwards was seen as having dampened investment and therefore limited at least the short-term impact of schemes. However, in Bingley the scheme was not seen as having had significant impacts due to employment and housing growth taking place in the town regardless.

This issue emphasises the difficulty in establishing the economic impact of schemes in the absence of a clear counterfactual or 'do nothing' case for comparison. Identifying the specific impact of schemes is difficult in both strong and depressed economic climates, particularly in qualitative consultation, as the broader economic environment obscures the impact of the scheme.

3.2.2. Transport networks

The economic impacts of schemes of course depend primarily on the transport impact of schemes. In order for economic benefits of a particular scheme to be realised, schemes must sufficiently reduce transport costs. This is not always guaranteed, either due to issues with the scheme itself or with issues elsewhere on the network. This was particularly raised as an issue in Hull and North Kent, with ongoing congestion issues elsewhere on the A63 around Castle Street in Hull and on the A2 and M25 in North Kent. Whilst this is not the focus of this assessment, POPE reports on the schemes often demonstrated that forecast traffic time savings were not realised. For further information, please consult Atkins' 2013 meta-analysis of POPE studies[35].

A related point is the issue of junction-specific constraints creating limitations for economic development and adverse unforeseen economic impacts. This is clear in the example of the access issues highlighted by local groups in regards to Junction 45 of the M6 extension.

[35] Highways Agency. 2013. Post Opening Project Evaluation of Major Schemes: Meta-analysis 2013: Main Report.

Table 3-1 Summary of case study schemes

Scheme	Scheme type	Construction period	Date opened	PVC (£ millions)	Key impacts
M6 Carlisle to Guardsmill	Route widening	29 months	December 2008	100.45	• Important factor in releasing development capacity and improving viability of 100ha intermodal logistics hub (Solway 45) – potential for 3,000 jobs. • Enhancement of major trade corridor between England and Scotland linking major ports. • Improved viability of 88ha Kingmoor Park Enterprise Zone, a high local priority employment site (potential for 2,000 jobs). • Peripheral economic location – scheme generates selected sector benefits but these are limited by wider economic and local market conditions which have impacted on take-up rates. • Overall economic impact: Medium - focused on logistics and freight sector Overall housing impact: Low.
A1033 Hedon Road Improvement	Dualling; junction improvements and link road; non-motorised facilities	28 months	November 2003	86.7	• Scheme is an important factor in realising investment in renewables manufacturing facility by Siemens at Alexandra Dock (particularly due to junction improvements and new a link road). Green Port Hull will create 1,000 jobs and act as major catalyst for further growth in the Humber renewables sector and its supply chain. • Facilitated Enterprise Zone designation for Hedon Haven (80ha), with a projected potential for 1,000 jobs at the site. • Supported Local Development Order designation for Hedon Haven and Queen Elizabeth Dock. • Facilitated development of several smaller but significant employment sites including Eltherington Business Park, Saltend Chemicals Park & Marfleet Environmental Technology Park, together supporting 1,000+ jobs. • Improved viability of housing development at Victoria Dock (1,000+ units) • Cumulative effect of schemes and other road improvements in the area has been important in facilitating local economic growth. • Strategic growth location – scheme an important factor in realising sectoral growth opportunities and policy priorities. • Overall economic impact: High – focused on ports, logistics & freight, renewables and manufacturing. Strongly reinforcing established policy priorities. Overall housing impact: Medium – improving development value of sites in urban location.

A63 Melton Grade Separated Junction	Junction construction; non-motorised facilities	25 months	October 2006	39.2	• The scheme has been of fundamental importance to enabling development of major, high priority employment sites at Melton which is a multi-modal location. Consequently, the scheme has been central to the creation of the Key Employment Site designation. • The scheme was also an important factor in extending the designation of Humber Green Port Enterprise Zone to include 62ha of land at Melton. • Around 5,600 jobs are being created at Melton employment sites enabled by the scheme. • Many manufacturing investments have been stimulated and enabled by the scheme. • Overall economic impact: High – focused on manufacturing and logistics & freight. Scheme objectives align closely with local policy priorities for economic growth. Overall housing impact: Low.
A650 Bingley Relief Road	Dualling; junction and roundabout construction; pedestrian facilities.	17 months	December 2003	90.3	• Scheme reinforced local market forces to enable successful redevelopment of the town centre. It may have accelerated the regeneration process and had an upward effect on land and rental values. • Successful industrial parks in the area benefit from the scheme, but the scheme has not directly facilitated development. • The relief road has been an important factor in the investment decisions of Emerald Group Publishing (300 jobs). • The scheme has contributed to making the area more attractive for housing investment and development but the relationship is thin. • Overall economic impact: Medium. Focus is on transport user benefits rather than direct economic benefits which reflects wider market conditions and the local policy position.
A46 Newark to Lincoln Improvement	Dualling; junction and roundabout construction	21 months	July 2003	40.6	• Directly facilitating development of major development sites which previously were unviable because of accessibility constraints – in particular, land at former RAF Swinderby, also known as Witham St Hughs. • Development viability and deliverability also significantly enhanced at other key employment sites including Teal Park (30ha) which has since attracted investment by Siemens who have developed a facility providing 600 jobs. Other key sites include sites to the south of Newark (55ha) and 27ha in Rushcliffe. • Approximately 6,000 jobs likely to be enabled or supported by the schemes. • Improved connectivity as a result of the schemes has facilitated completed and proposed housing development to the south of Lincoln and Newark. Combined, these could provide 8,000 dwellings by 2036 and include 1,300+ dwellings at the
A46 Newark to Widmerpool improvement	Construction of dual carriageway; junction and roundabout construction	34 months	April 2012	265.3	

					former RAF Swinderby and sites focused on Newark Road in North Hykeham and to the west of the city. • Schemes aligned closely with Lincolnshire and D2N2 LEPs economic growth strategies as well as Local Plan / Core Strategy objectives of various local authorities. This includes improving connectivity with the A1, East Coast Main Line at Newark and the major urban centres of the East Midlands. • Overall economic impact: High – focused on logistics & freight, manufacturing and business & professional services. This reflects both development effects and labour market and business productivity improvements Overall housing impact: High – scheme considered fundamental in enabling development at key sites.
A2 Bean to Cobham Improvements (Phase 1 and 2)	Dualling of existing road; construction of dual carriageway.	Phase 1 took approximately 2 years; Phase 2 took approximately 3 years.	Phase 1: December 2004; Phase 2: February 2009.	144.4	• Highways infrastructure investment is seen by local stakeholders as key for the future economic development of the area and schemes in question have undoubtedly contributed to this. • Significant issues of congestion and accessibility remain, however, which limits the scope of the schemes in making a more pronounced economic impact. • The recession was cited as having held back development, therefore reducing the power of road schemes to enable a substantial uplift in business investment and economic growth. • Strong policy push to deliver substantial employment growth in the area through major developments such as the expansion of Bluewater Shopping Centre, Thames Waterfront, Ebbsfleet Garden City, Paramount theme park and major employment sties in Dartford. Collectively, these sites aim to deliver potentially 60,000 jobs. Similarly, the area includes plans and the identification of sites with scope to deliver 30,000 new homes. • Overall economic impact: Medium. The scale of the scheme is insufficient in itself to play a direct role in enabling the substantial amount of latent employment creation in North Kent. For this economic capacity to be released, there is a strong need for an integrated package of strategic and local road and connectivity investments. The impact of the schemes has also been dampened by the long lasting effects of the recession, the beginning of which coincided with the schemes being completed. • Overall housing impact: Low. The schemes are insufficient in themselves to directly enable housing development of the scale aspired for in the area. Mismatch between scheme(s) and scale of development potential which underpin local policy priorities. The roads investment response needs to be one of an integrated package of strategic and local road improvements forming part of an overarching connectivity and accessibility strategy.
A2/A282 and M25 Junctions 1b-3 Improvements	Road widening; junction improvements	A2/A282: 17 months; M25: 15 months	A2/A282: December 2007; M25: July 2008	170.5	

A249 Iwade to Queenborough Improvement	Bridge construction; dual carriageway construction	28 months	July 2006	91.1	• Directly enabled development of Kemsley Fields employment site, which provides 10,000m^2 of employment land. • Facilitated development of further road infrastructure, specifically the Sittingbourne Northern Relief Road and Rushenden Relief Road. These have enabled the expansion of Eurolink Business Park along with Queenborough and Rushenden regeneration areas. Overall the scheme is likely to enable directly and indirectly the creation of over 2,900 jobs. This figure does not include employment at Kemsley Fields. • Similar to the enabling of employment development, the scheme is having notable direct and indirect effects on stimulating housing development. Sites and localities impacted upon include Neats Court, Sittingbourne town centre, Isle of Sheppey and Minster-on-sea. The scheme is supporting the development of at least 1,300 additional homes. • Overall economic impact: High – focused on logistics & freight, retail and manufacturing sectors. Overall housing impact: High – effects include the enabling of other complementary road investments including the Sittingbourne Northern Relief Road and the Rushenden Relief Road. Overall impact is therefore high.

4. Conclusion

This report has presented case studies of eight SRN schemes and assessed their impact on local economies. Assessment has been principally informed by consultation with local authorities, as well drawing on supplementary evidence to consider the local economic and transport context of the schemes. From these assessments and the analysis in Chapter 3, several key messages for the SEGP can be identified.

4.1. Considering local context in project appraisal

Alignment with local priorities, based on robust assessment of evidence: The case studies have shown that the economic impact of SRN schemes is maximised when the scheme is aligned with local economic priorities. This might refer to strategic business sectors or relieving growth pressure in a particular location. However, local priorities need to be considered in investment decisions based on robust evidence of demand to avoid a 'build it and they will come' approach. This should be reflected in the business case and appraisal of potential projects.

Transport projects do not have an impact in a vacuum: Policy discussion of transport investment has repeatedly suggested that investment does not have an impact by itself and this is made clear by the assessments. Even in the case of Witham St. Hughs, where the A46 improvements directly facilitated development, development was also dependent on local planning policy objectives. Many of the sites brought forward in these assessments also have Enterprise Zone status and strategic advantages beyond SRN access. To ensure that SRN schemes result in economic growth, these complementary factors will need to be considered in the business case and appraisal of potential projects,

Develop clear strategic case for investment: This suggests that a clear strategic case needs to be made for SRN investment in terms of its relevance for economic growth in the business case and project appraisal stages. Engagement with local and national authorities is required to ensure that policies and investments are aligned in order to maximise scheme impacts.

Recent consultation guidance on consideration of wider economic impacts from DfT has emphasised the importance of ensuring that appraisal is context specific, including the development of a context specific economic narrative for schemes and understanding the importance of complementary investments[36]. This has clear overlap with the messages outlined above. Nonetheless, understanding the national effect of local impacts remains important, as discussed in further detail below.

4.2. An adaptable transport network

Importance of junctions and site-specific access: Junctions and specific access interventions provide connectivity to key sites for development, maximising the impact of schemes. Junctions can also act as nodal points for future development.

Align with major infrastructure and other travel modes: Where possible, alignment with other travel modes can increase the benefits of SRN schemes by further developing connectivity, particularly in regards to major infrastructure.

Maintaining an adaptable network: By aligning schemes with other transport infrastructure and ensuring that the network can support future, possibly unforeseen developments and spatial patterns of activity, the SRN can be a key element of an adaptable transport network.

4.3. Identifying and evaluating economic impacts

Local vs national: Only impacts in the local authority districts immediately around the scheme were considered in this study, meaning potential benefits of schemes for businesses which use the route in question but are not based locally were not captured. Similarly displacement impacts are not captured, i.e. the impacts on the locations where the increased development in the study area was previously or would have located. Therefore, little consideration could be given to additionality, which is a key consideration in determining the national and regional scale of scheme impacts. This issue may be relevant at a national or local level, for

[36] DfT. September 2016. Understanding and Valuing Impacts of Transport Investment: Updating Wider Economic Impacts Guidance.

example in the case of Melton and Hull, suggesting that evaluation should take place at a sufficient spatial scale to capture relocation of activity within local areas or regions.

Recent consultation guidance from DfT has addressed the issue of establishing the additionality of localised wider economic impacts, working from the default position that economic activity is 100% displaced. Additionality is also noted as an area for further research[37].

Quantifying impacts: This case study analysis raises the question of how economic growth impacts should be assessed. For this study, a qualitative methodology was chosen based on consultation with local officials. Whilst this was the most appropriate methodology given the objectives of this study, there are certain limitations with such an approach. In general, only limited quantification was possible, without the basis for attributing clear causality to the schemes, which makes comparison of schemes more difficult. Finally, the assessments are dependent on the views and information available to consultees who in turn represented a subset of stakeholders.

Alternative methodologies could include Land Use/Transport Interaction models, longitudinal data analysis and/or comparisons against comparator locations, combined with supporting interviews and research. However there are challenges with these approaches, particularly regarding data availability, identifying comparator locations, isolating potentially marginal impacts and identification of causality in the context of a wide range of other influences. It is possible therefore that an extended form of the qualitative methodology used in this study may be more appropriate for identifying local impacts, despite the limitations described above.

A comparison of scheme benefits raised by consultees with the outturn BCRs does not always result in a consistent picture of scheme benefits.

As it is difficult to identify wider economic benefits caused by a scheme, these are not typically quantitatively captured in project evaluation. In part, this reflects the difference between national and local impacts but may also be because development and associated activity often takes a significant amount of time to come forward following a scheme and therefore benefits are not captured in project evaluation. Even where information on economic impacts was quantified in project appraisal, as for example the job projections included in the M25 J1b-3 Widening Economic Impact Report, this information is not typically included in evaluation, though doing so may be relevant for communicating the performance of a scheme against objectives.

This highlights the issue that evaluating the economic growth impacts of a SRN scheme in a more quantifiable and robust manner is likely to require a sophisticated methodology, an extended timescale and potentially significant amounts of information and resources.

As discussed in section 4.1, there may be a benefit of establishing the strategic case for an intervention as part of the broader business case. This would take into account the local economic context and alignment with other local priorities. Where this includes clear and specific economic objectives or targets of a scheme, this can also support evaluation of whether a scheme has met economic objectives. This may be relevant for the economic narrative referred to in current DfT consultation guidance. Whilst the POPE reports used in this study have compared qualitatively described forecast and outturn wider economic benefits, there may be scope to do this in a more specific and systematic way.

[37] DfT. September 2016. Understanding and Valuing Impacts of Transport Investment: Updating Wider Economic Impacts Guidance.

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Appendix A. Local Authority Consultation Pro-forma

Local Authority:
Scheme 1: **Scheme 2 (if applicable):** **Key sites unlocked:** **Associated housing growth (or land value):** **Associated employment growth:** **Major investments facilitated by the scheme:** **Specific industries which benefited from the scheme (e.g. employment growth, major investments):** **Limitations of the scheme for local growth:**

Appendix B. Travel to Work Analysis

The following analysis is based on the 2001 and 2011 Census sourced from the NOMIS website. The statistical boundaries chosen vary with the magnitude of the scheme. Where possible the travel to work origin-destination data has been used at a middle super output layer (MSOA) in order to assess changes in travel pattern to and from the location of the scheme.

The travel to work census analysis for each scheme has been divided into sub-sections to represent the two census years, 2001 and 2011 followed by a conclusion section which reports the main findings for each scheme, providing context on the changes in commuting patterns occurring over the time period in which the schemes were implemented.

B.1. M6 Carlisle to Guardsmill Extension

The scheme was opened to traffic in December 2008.

The main limitation when analysing the travel impacts on areas surrounding the M6 Extension Scheme is that the 2011 MSOAs do not cover areas over the Scottish border thus there is no data available for areas at the end of the M6 across the Scottish border.

Another limitation when comparing the Travel to Work data for this scheme is the difference in the two statistical boundaries used. Ward boundaries were used to analyse the origin-destination Travel to Work data from the 2001 Census and MSOAs (middle super output areas) were used to analyse data from the 2011 Census.

Four MSOAs and Wards were chosen to analyse workplace trips to and from the area surrounding the scheme. The selected statistical areas have been mapped below to show the area that the chosen MSOAs and Wards covered.

Figure B-1 2001 Census selected wards for analysis

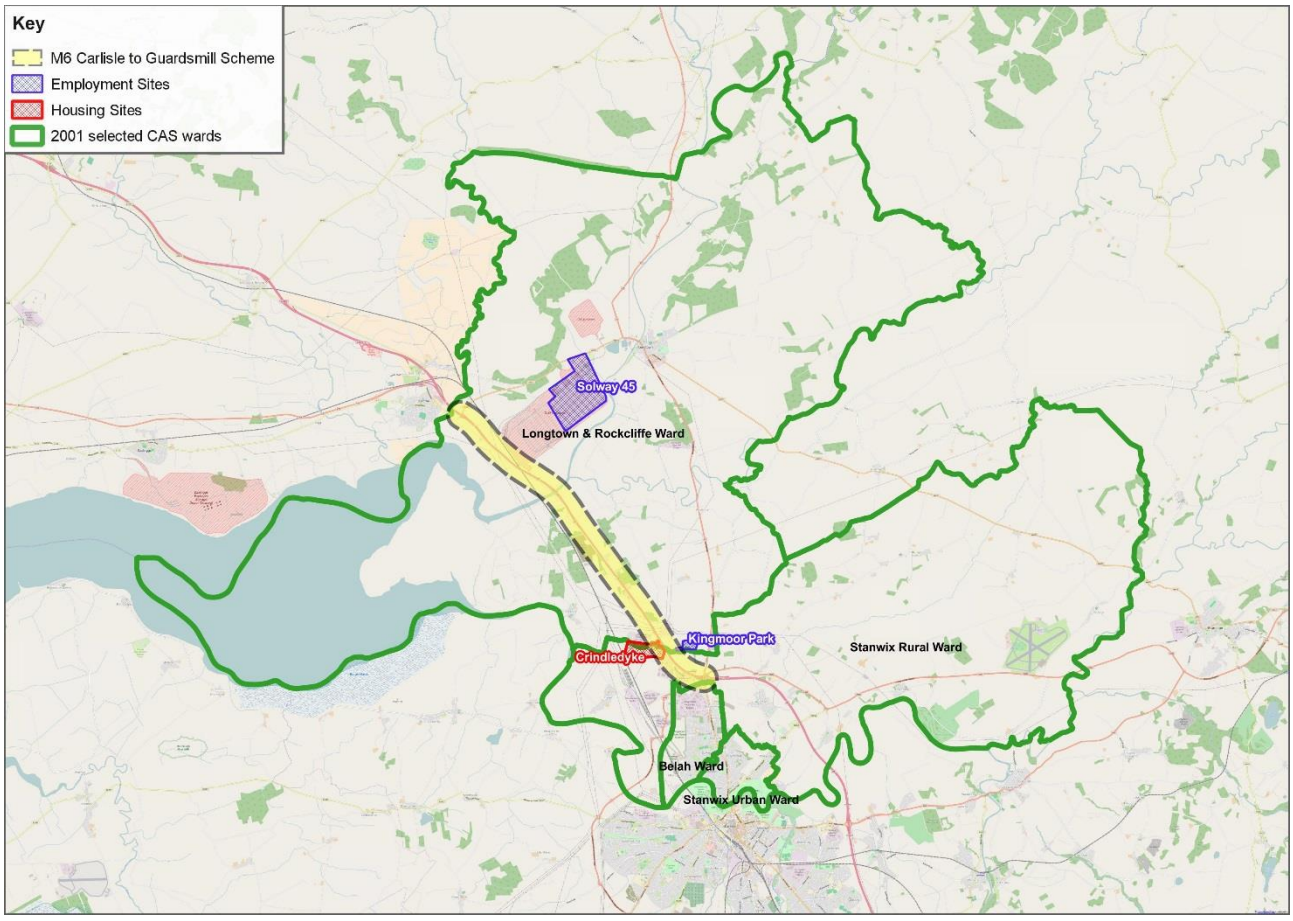
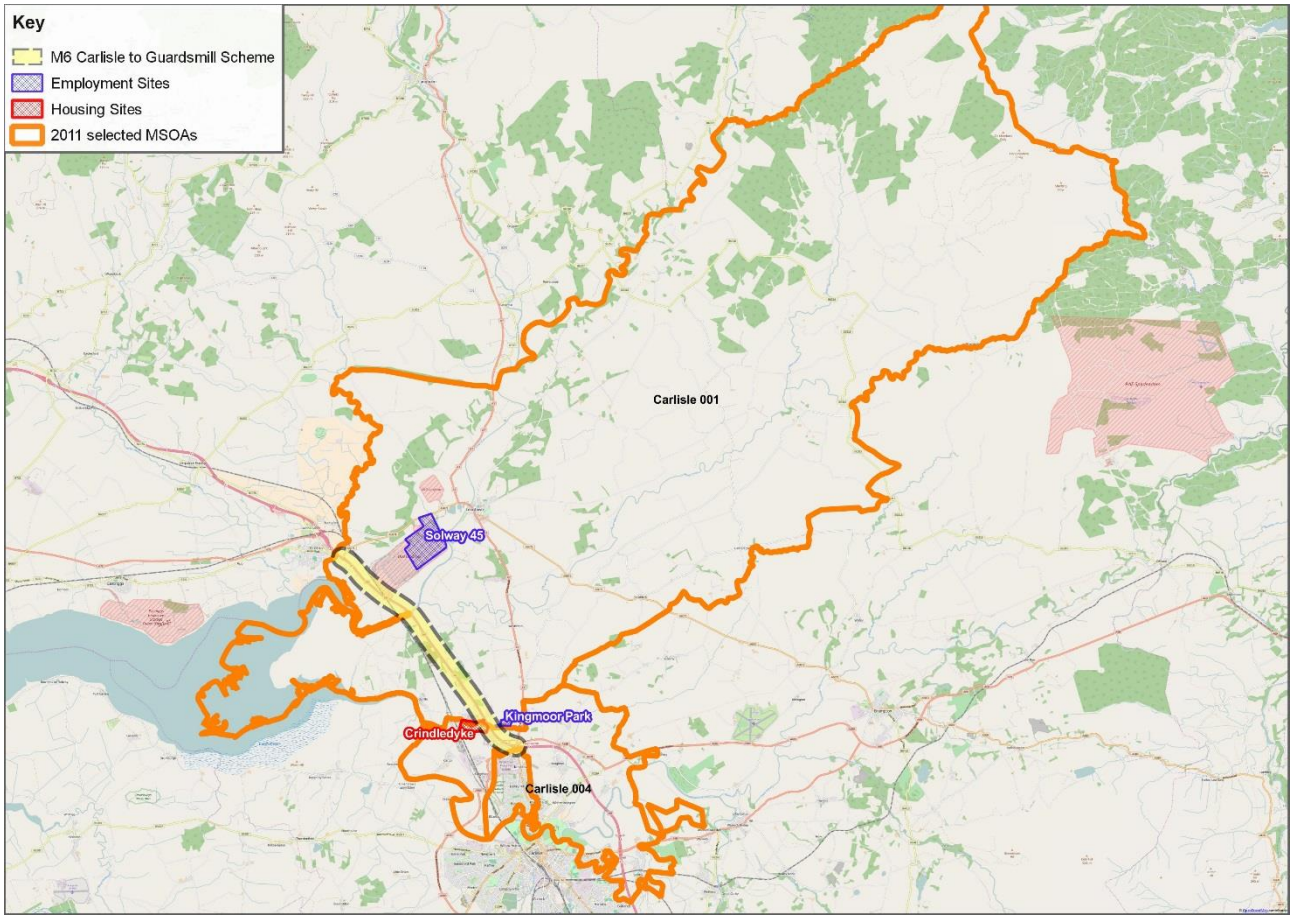


Figure B-2 2011 Census selected MSOAs for analysis

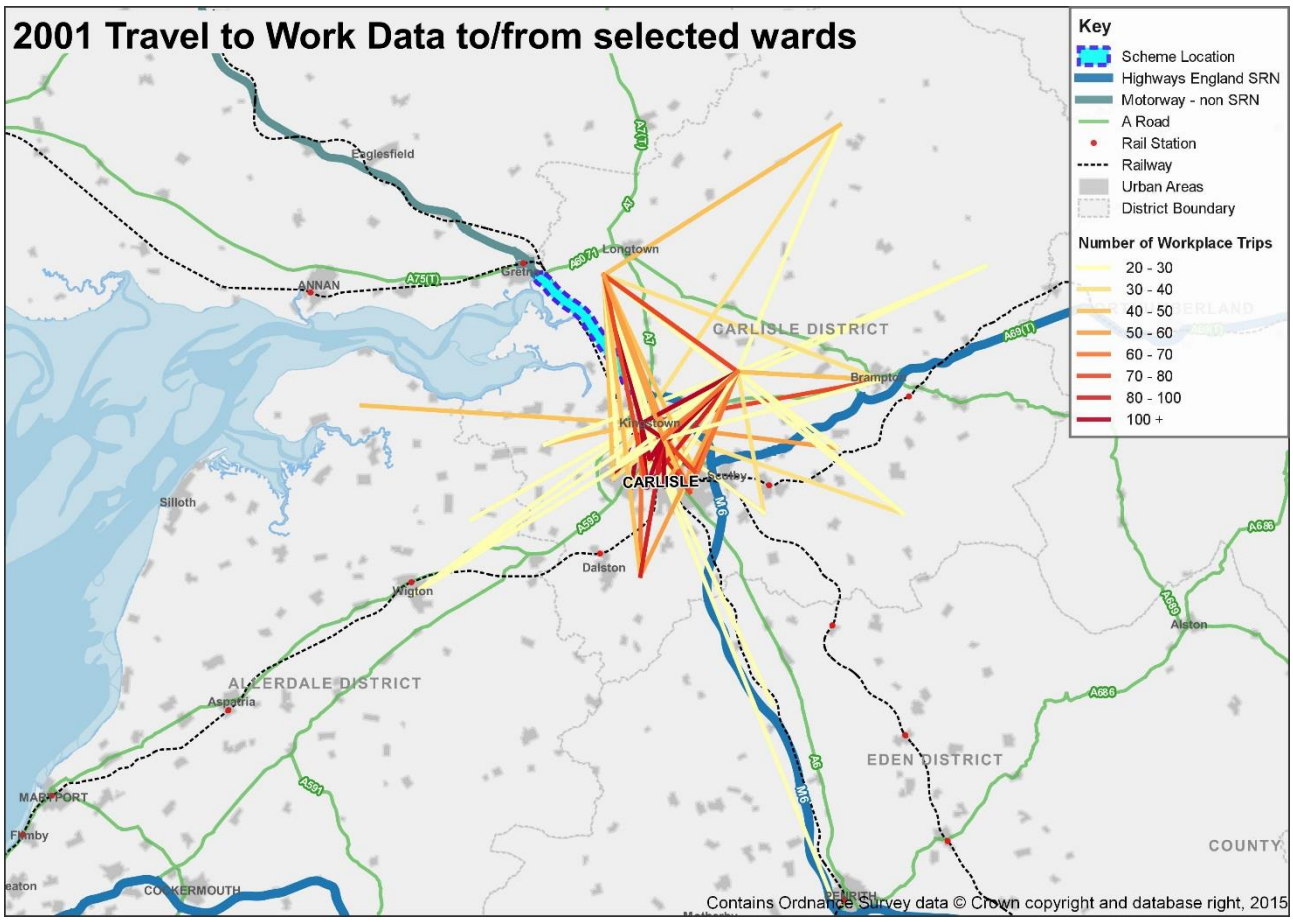


B.1.1. 2001 Census Ward Data

The travel to work trips to the four selected wards (Longtown and Rockcliffe, Stanwix Rural, Stanwix Urban and Bellah) were filtered by the total trips made and only those flows with 20 or more trips per day are displayed in the map below. The reason for this is so that the trips mapped represent the higher volume trips made by people to and from the selected wards.

The travel flows mapped in the map below are thematically coded by the total number of trips where flows with the highest number of trips have the darkest shade. Trips with origins and destinations in the selected wards were mapped together as volumes are comparable and, due to size of the scheme, there was no need to represent the 'to' and 'from' flows on separate maps.

Figure B-3 Carlisle Travel to Work patterns 2001



The longest travel to work flows with more than 20 daily trips were made to Penrith according to the 2001 Census whilst most of the trips were made within 5km of the selected areas.

The two tables below show the total number of trips, car trips and car mode share made to and from the selected 2001 wards.

Table B-1 2001 trips from selected wards

Distance (km)	All Trips	Car Trips	Car Share
0-5	5,694	2,982	52%
5-10	1,784	1,542	86%
10-15	654	575	88%
15-20	148	120	81%
30-35	23	20	87%
Total	**8,303**	**5,239**	**63%**

Table B-2 2001 trips to selected wards

Distance (km)	All Trips	Car Trips	Car Share
0-5	4,632	2,400	52%
5-10	1,745	1,507	86%
10-15	648	584	90%
15-20	282	264	94%
20-25	101	101	100%
Total	**7,408**	**4,856**	**66%**

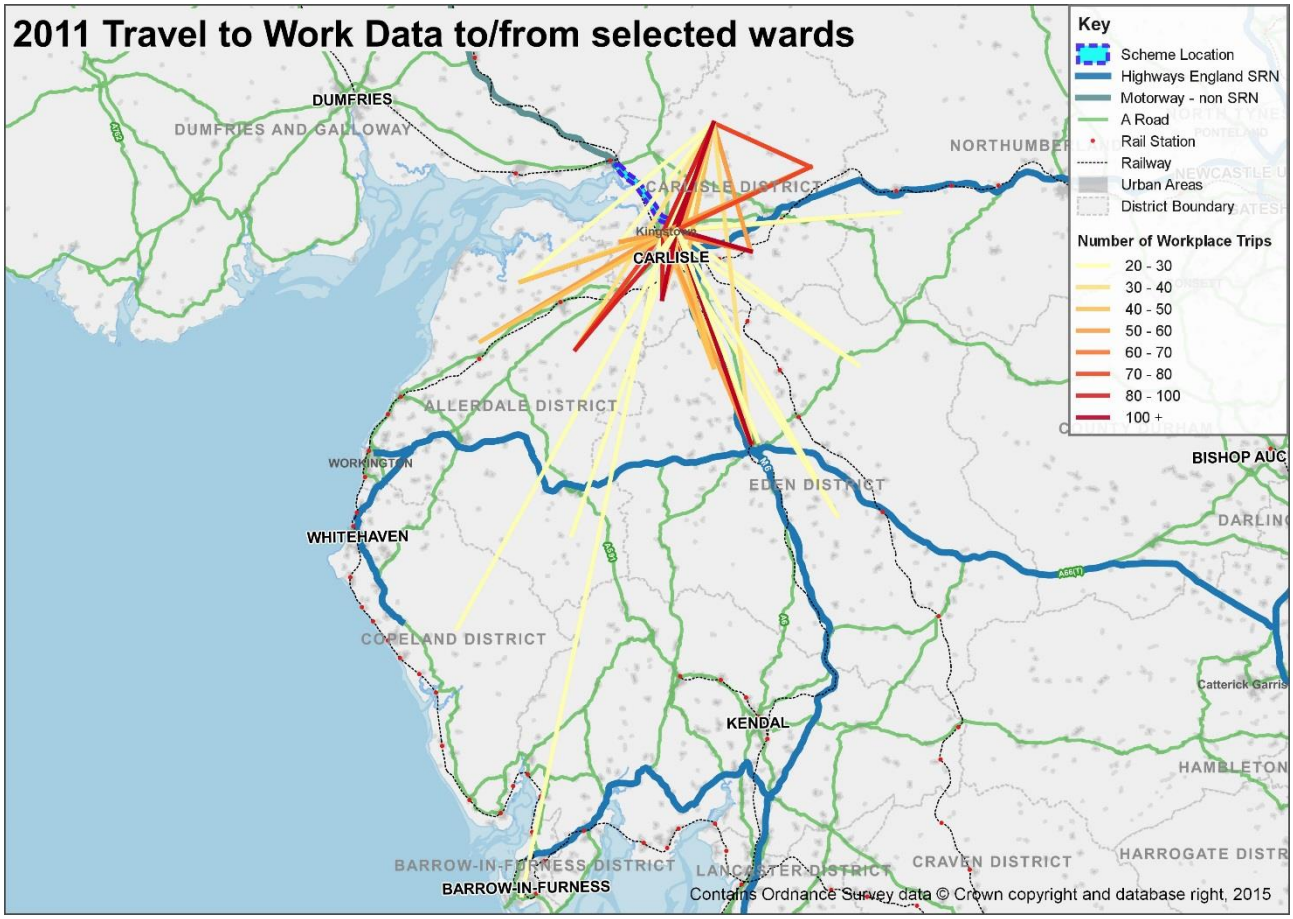
Trips from the wards to other workplace areas in England have a higher travel distance than trips going to the selected wards. The overall car mode share is above 60% for both datasets and reaches 100% for trips above 20km in Error! Reference source not found..

B.1.2. 2011 Census MSOA Data

Similar to the 2001 Census, the mapped travel to work flows were filtered by the total number of trips and those flows with less than 20 daily trips were excluded from the data. This methodology was used for all the datasets used within this document in order to focus on higher volume flows at a local level.

The map below shows the 2011 workplace trips to and from the selected MSOAs.

Figure B-4 Carlisle Travel to Work patterns 2011



The travel to work flows have been thematically coloured consistently with the 2001 map so that a fair comparison can be made. The map shows a wider area than that for the 2001 trips as the 2011 data indicates that flows with over 20 trips extend to greater distances than those recorded in the previous census.

The tables below show the total trips made by distance along with car mode share for each distance band.

Table B-3 2011 Travel to Work trips to selected MSOAs

Distance (km)	All Trips	Car Trips	Car Share
0-5	5,608	4,105	73%
5-10	1,017	923	91%
10-15	575	537	93%
15-20	1,458	1,322	91%
20-25	438	412	94%
25-30	55	50	91%
30-35	326	308	94%
35-40	33	32	97%
40-45	86	80	93%
Total	**9,596**	**7,769**	**81%**

Table B-4 2011 Travel to Work trips from selected MSOAs

Distance (km)	All Trips	Car Trips	Car Share
0-5	6,118	4,305	70%
5-10	356	324	91%
10-15	250	224	90%
15-20	1,489	1,323	89%
20-25	214	198	93%
30-35	199	186	93%
40-45	53	45	85%
60-65	26	25	96%
90-95	29	17	59%
Total	**8,734**	**6,647**	**76%**

The tables indicate that the greatest distance travelled by people working outside the selected MSOA is almost double that of people working within the selected MSOAs. The most trips are made within 5km of the selected MSOAs which suggests that most people are travelling into Carlisle town centre from each MSOA. On average car mode share is still relatively high, above 70%.

B.1.3. Conclusion

The M6 Carlisle to Guardsmill Extension scheme was completed in 2008 and is likely to have contributed to the change in commuting travel patterns between 2001 and 2011, alongside other influences such as population and employment changes and other transport changes

The 2001 Travel to Work data showed that higher volume travel to work flows (20+ daily trips) had a maximum distance of 35km to and from the selected wards. This distance almost tripled in the 2011 statistics as it reached 91km.

The total number of trips on flows with a higher volume than 20 trips has remained the same at around 8,000 trips however the car mode share has increased by over 10 percentage points as shown in the tables. The greatest increase of workplace trips is within the 15 to 20 km distance band which only accounted for an average 2.75% share of all the trips in the 2001 Census and then increased to a 24.5% share in the 2011 Census.

Overall the number of travel to work trips on higher volume flows have increased during the 2011 Census however the most significant change can be seen in the share of trips with higher distances from areas around the scheme to everywhere else.

B.2. A63 and A1033 Schemes

The A1033 Hedon Road improvement scheme was opened to traffic in November 2003 and the A63 Melton grade separated junction was completed in April 2007. Both opening dates fall between the census years and the schemes are therefore likely to have contributed to the change in commuting travel patterns between 2001 and 2011, alongside other influences such as population and employment changes and other transport changes.

The analysis of the travel impacts of the schemes has been amalgamated due to their close proximity.

Seven 2001 wards and eleven 2011 MSOAs were selected for the travel to work origin-destination analysis. The location of the selected statistical areas for analysis are outlined in **Error! Reference source not found.** nd **Error! Reference source not found.**.

Figure B-5 2001 Wards selected for the analysis of the schemes

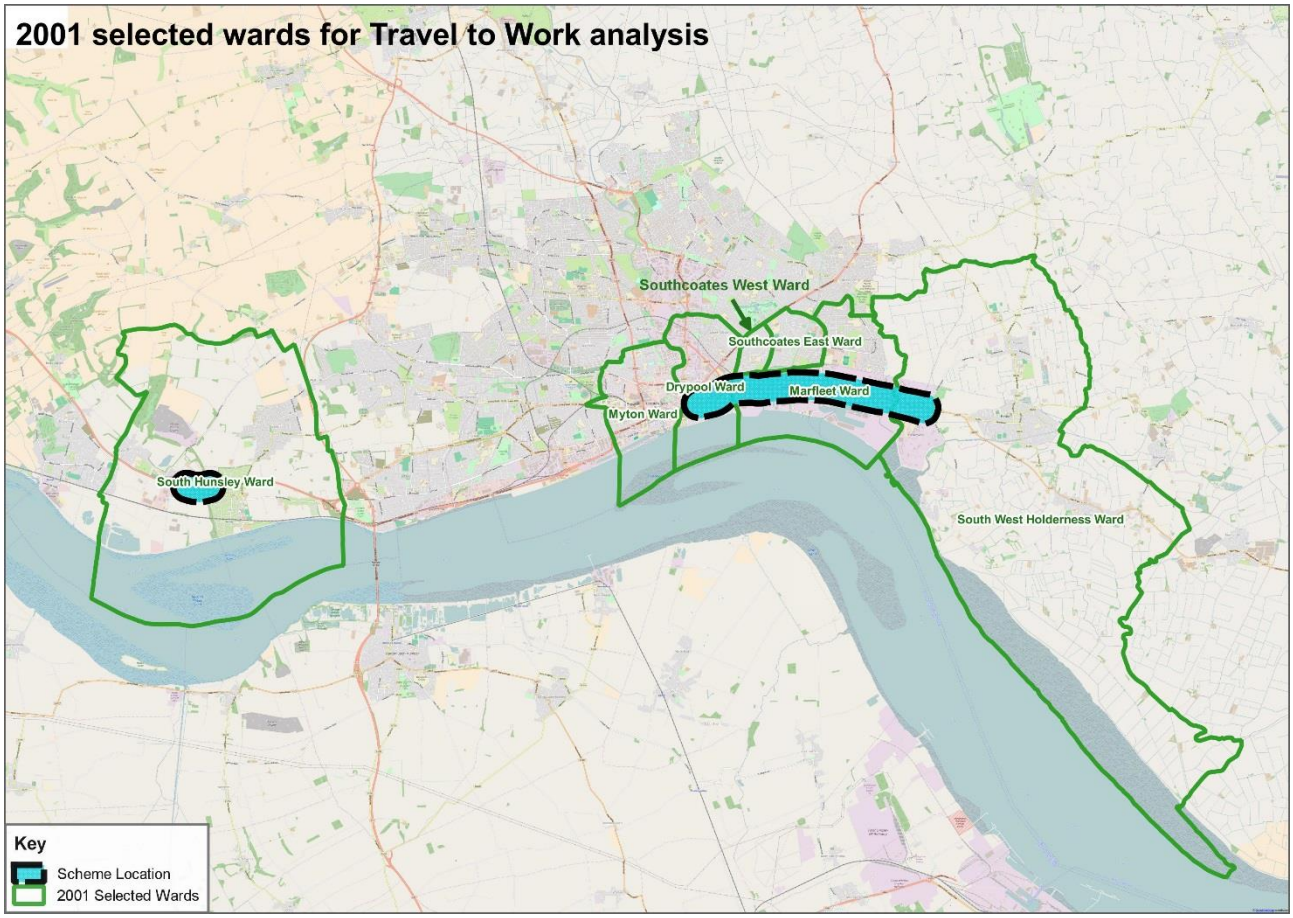
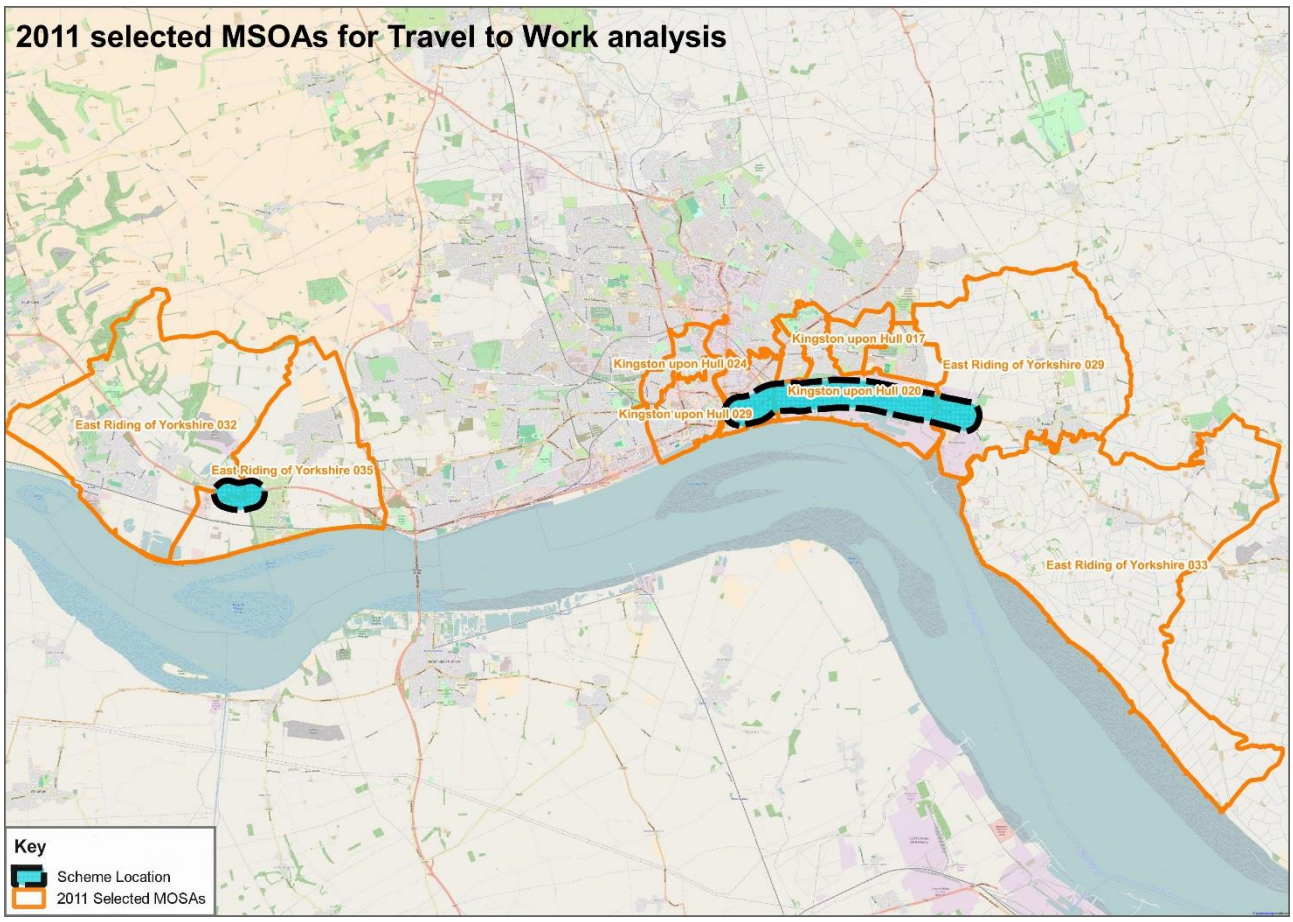


Figure B-6 2011 MSOAs selected for the analysis of the schemes



B.2.1. 2001 Census Ward Data

Two of the selected wards, South Hunsley and South West Holderness, fall within the East Riding of Yorkshire District and the rest are located within the Kingston upon Hull District. The wards located within the Kingston upon Hull district are also very close to Hull city centre therefore these are expected to generate the majority of inward travel to work flows.

63.8% of trips from the selected wards to the rest of the UK are within 5km of the centre point of each ward which means that most of the travel to work trips are made locally i.e. from South West Holderness to Drypool.

The travel flows map presented below shows that the longest trips are made to Leeds and Robin Hood Airport.

Figure B-7 Hull and East Riding Travel to Work patterns 2001

The map shows flows two-way flows between the seven wards surrounding the schemes and the rest of the UK in order to show the distance travelled on a regular basis.

The table below calculates the total number of trips made by distance as well as the total car mode share for each distance band. This table focuses on trips from the selected wards.

Table B-5 2001 Travel to Work trips from Hull selected areas to the rest of the UK (ward level)

Distance (km)	All Trips	Car Trips	% Car Share
0-5	17664	7841	44%
5-10	5175	3797	73%
10-15	3963	3375	85%
15-20	431	400	93%
20-25	240	191	80%
25-30	21	21	100%
30-35	48	36	75%
35-40	91	79	87%
65-70	33	26	79%
Total	**27666**	**15766**	**57%**

The car share for all trips on higher volume flows from the selected wards is 57% however this fluctuates between 44% and 100% depending on distance. Small distance trips, under 5km, have the lowest car share of 44% however this increases to 73% in the next distance band between 5 and 10km.

The table below summarises the travel to work trips made to the selected wards surrounding the A63 and A1033 schemes.

Table B-6 2001 Travel to Work trips to Hull selected areas to the rest of the UK (ward level)

Distance (km)	All Trips	Car Trips	% Car Share
0-5	32804	16136	49%
5-10	16603	11865	71%
10-15	8538	7184	84%
15-20	2213	2034	92%
20-25	1523	1314	86%
25-30	509	449	88%
30-35	931	784	84%
35-40	289	233	81%
40-45	204	174	85%
50-55	20	17	85%
Total	**63634**	**40190**	**63%**

There are 35,968 more trips being made into Hull compared to the 27,666 trips from Hull to surrounding areas. The car mode share is a lot more consistent across the distance bands for trips to other areas, with an average of 63%. The car share increases across the distance bands starting at 49% for trips under 5km and reaching 85% for trips between 50km and 55km.

B.2.2. 2011 Census MSOA Level Data

The travel to work flows for the 2011 data have a similar spread across the north east, with less trips being made to the south of Hull. The map below outlines the travel to work trips to and from the selected MSOAs close to the schemes.

Figure B-8 Hull and East Riding travel to work patterns 2011

There are a few differences between the travel to work flows mapped using the 2011 data compared to the 2001 data. The difference in the areas covered by the chosen wards and MSOAs must be taken into consideration. The data has therefore been amalgamated for all wards/MSOAs in order to analyse travel patterns on a larger scale.

The 2011 data highlights more trips between Melton and surrounding areas. There are also longer trips being made to the north of Hull compared to 2001 where trips to northern areas were more frequent but of shorter distances. There are also no workplace trips to Robin Hood airport.

The table below summarises the total workplace trips made from the chosen MSOAs to other areas.

Table B-7 Workplace trips from Hull chosen MSOAs to rest of UK

Distance (km)	All Trips	Car Trips	% Car Share
0-5	17251	8584	50%
5-10	6251	4934	79%
10-15	5071	4458	88%
15-20	910	844	93%
20-25	397	358	90%
25-30	63	53	84%
35-40	21	19	90%
50-55	35	33	94%
65-70	46	20	43%
Total	**30045**	**19303**	**64%**

The lowest car mode share is 43% for trips between 65km and 70km, which is only 7 percentage points lower than trips under 5km. This indicates that other modes of transport are used for trips in this distance band. This is also 36 percentage points less than trips recorded in the 2001 Census.

The table below summarises the workplace trips to Hull from other UK areas by distance and car share.

Table B-8 Workplace trips to Hull - Census 2011

Distance (km)	All Trips	Car Trips	% Car Share
0-5	31699	16493	52%
5-10	18267	12897	71%
10-15	8720	7380	85%
15-20	2423	2228	92%
20-25	1281	1163	91%
25-30	598	460	77%
30-35	372	308	83%
35-40	231	156	68%
40-45	135	110	81%
Total	**63726**	**41195**	**65%**

There were only 92 more travel to work trips on higher volume flows being made to MSOAs in 2011 than in 2001. These were however on average shorter distances as the highest distance band in 2011 is 10km higher in the 2001 Census. Despite the low increase in total trips from the MSOAs, total car trips increased by 1,005 which lead to a 2 percentage point increase in average mode share.

B.2.3. Conclusion

Overall the number of travel to work flows have increased by 15.5% since the 2001 Census. The average car mode share for trips from Hull has increased by 7 percentage points for higher volume workplace flows. The maps show that the travel to work flows have, on average, decreased in distances, but were being made to

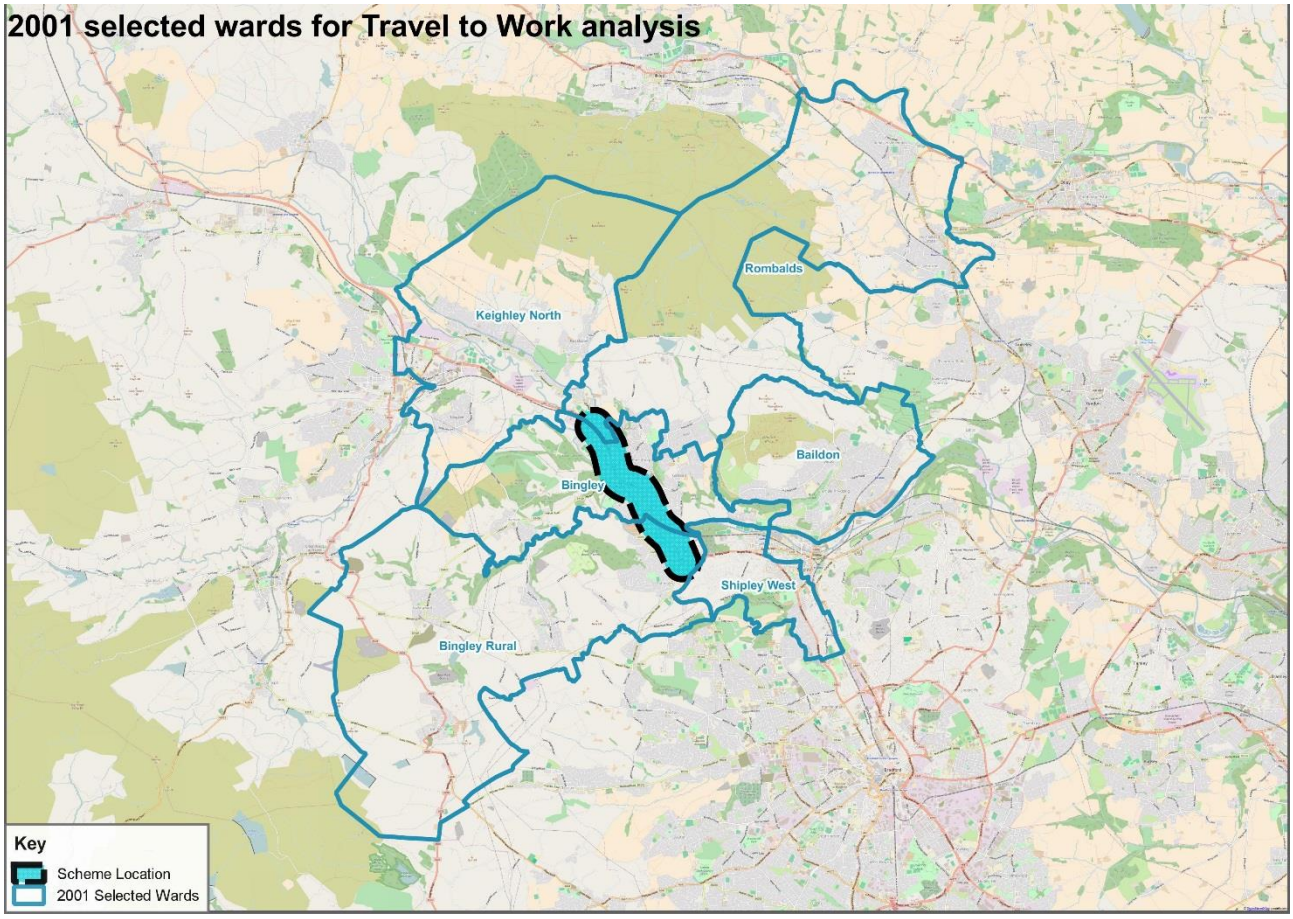
more areas in the 2011 census. There was also a significant increase in the higher volume workplace flows made between areas in the city of Hull and areas to the east in East Riding of Yorkshire.

B.3. A650 Bingley

The A650 Bingley relief road was opened to traffic in December 2003 therefore the two census years should provide a coherent analysis of travel patterns before and after the opening of the scheme.

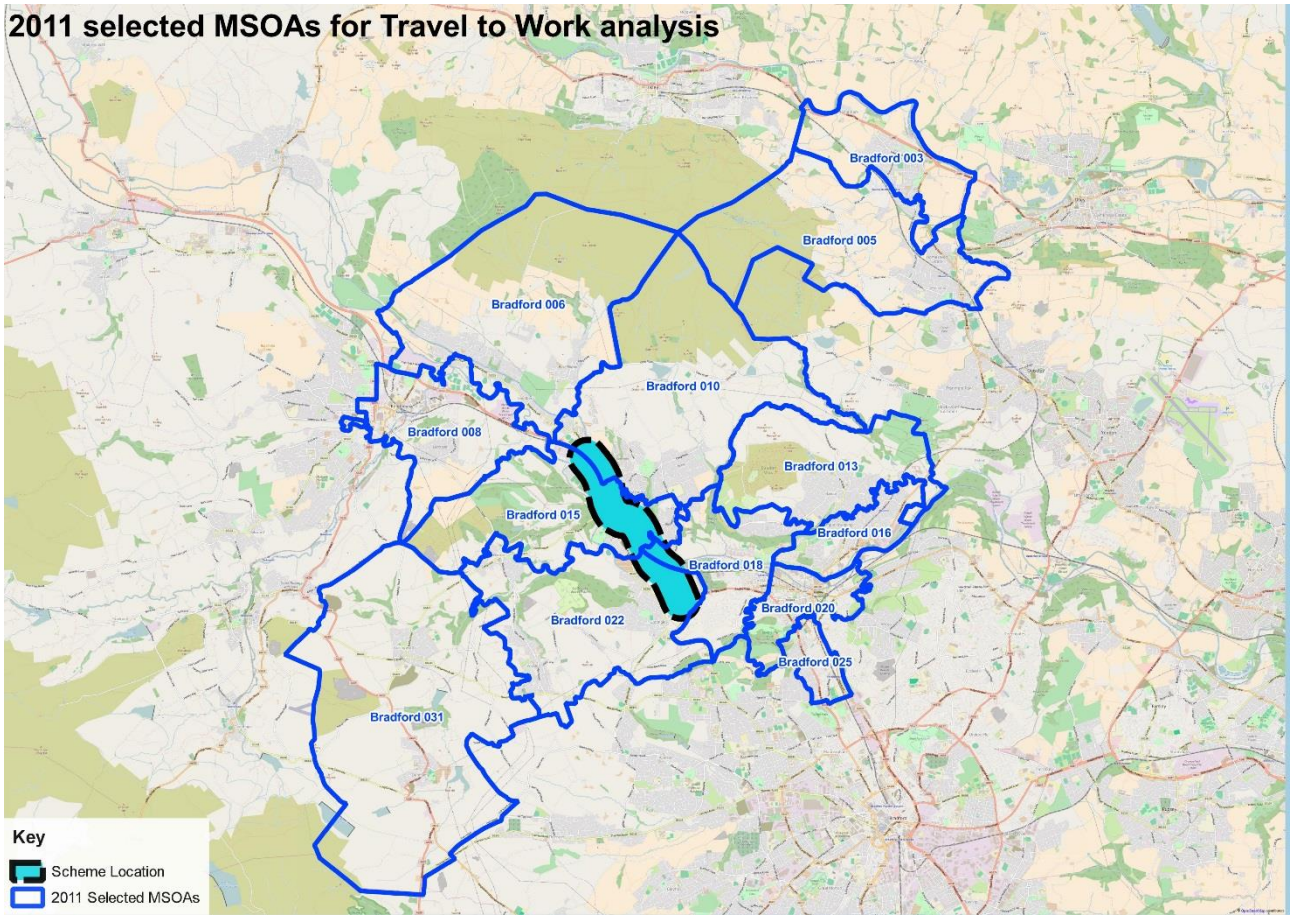
Six 2001 wards were chosen for the travel to work analysis and the extent of these is shown below.

Figure B-9 Bingley 2001 wards



Ten MSOAs were chosen to match the areas covered by the wards so that the analysis remains consistent across the two census years and these are shown in the map below.

Figure B-10 Bingley 2011 MSOAs

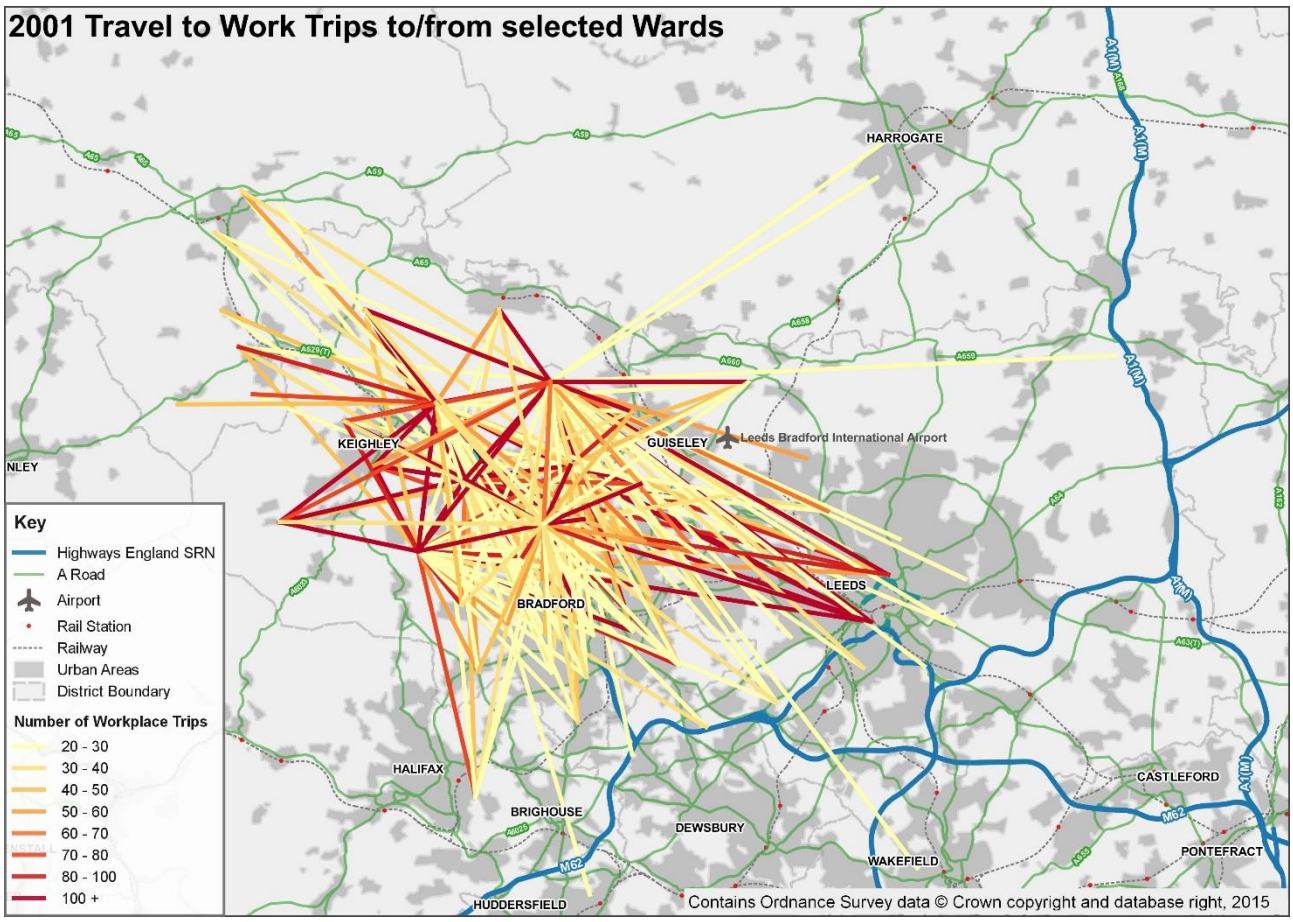


B.3.1. 2001 Census Ward Data

The Travel to Work data was filtered in order to only represent trips on higher volume flows to and from the selected statistical areas. For all the case studies, higher volume trips have been defined as above 20 daily trips, irrespective of distance or mode.

The map below shows the extent of the higher volume travel to work flows from selected wards and the rest of the UK.

Figure B-11 Bingley Travel to Work patterns 2001



The travel to work flows are mainly between Bingley areas and major surrounding urban areas such as Skipton, Harrogate, Halifax, Wakefield, Leeds and Bradford. The flows are spread mainly to the south of the scheme where major a roads join the SRN.

The table below summarises trips on higher volume workplace trips of residents living within the selected wards to surrounding areas.

Table B-9 2001 Workplace Trips from selected wards in Bingley

Distance (km)	All Trips	Car Trips	% Car Share
0-5	18,894	9,691	51%
5-10	11,779	9,372	80%
10-15	4,161	3,453	83%
15-20	2,598	1,574	61%
20-25	875	451	52%
25-30	47	41	87%
Total	**38,354**	**24,582**	**64%**

49% of workplace trips on higher volume flows fall within 5km of the chosen wards. A further 30% of all trips fall between 5km and 10km. The total number of car trips are similar for both distance bands, with more car trips being made on journeys under 5km. The mode share for short distance car trips is 51% which is similar to that of trips between 20km and 25km.

The following table presents the travel to work trips of people working within the selected wards.

Table B-10 2001 Workplace Trips to selected wards in Bingley

Distance (km)	All Trips	Car Trips	% Car Share
0-5	16,328	7,915	48%
5-10	6,847	5,284	77%
10-15	1,537	1,279	83%
15-20	69	54	78%
Total	**24,781**	**14,532**	**59%**

The table shows that people living outside the selected wards travel shorter distances to reach these for work purposes whilst people living within the selected wards travel up to 30km on a regular basis to reach their workplace. The car mode share for trips under 5km is lower yet still quite high at 48%. Over 65% of all trips fall within the lowest distance band.

There were 63,135 trips made between the selected wards and other UK wards for work purposes. Of these, 39,114 were car trips, with an average mode share of 61.9%.

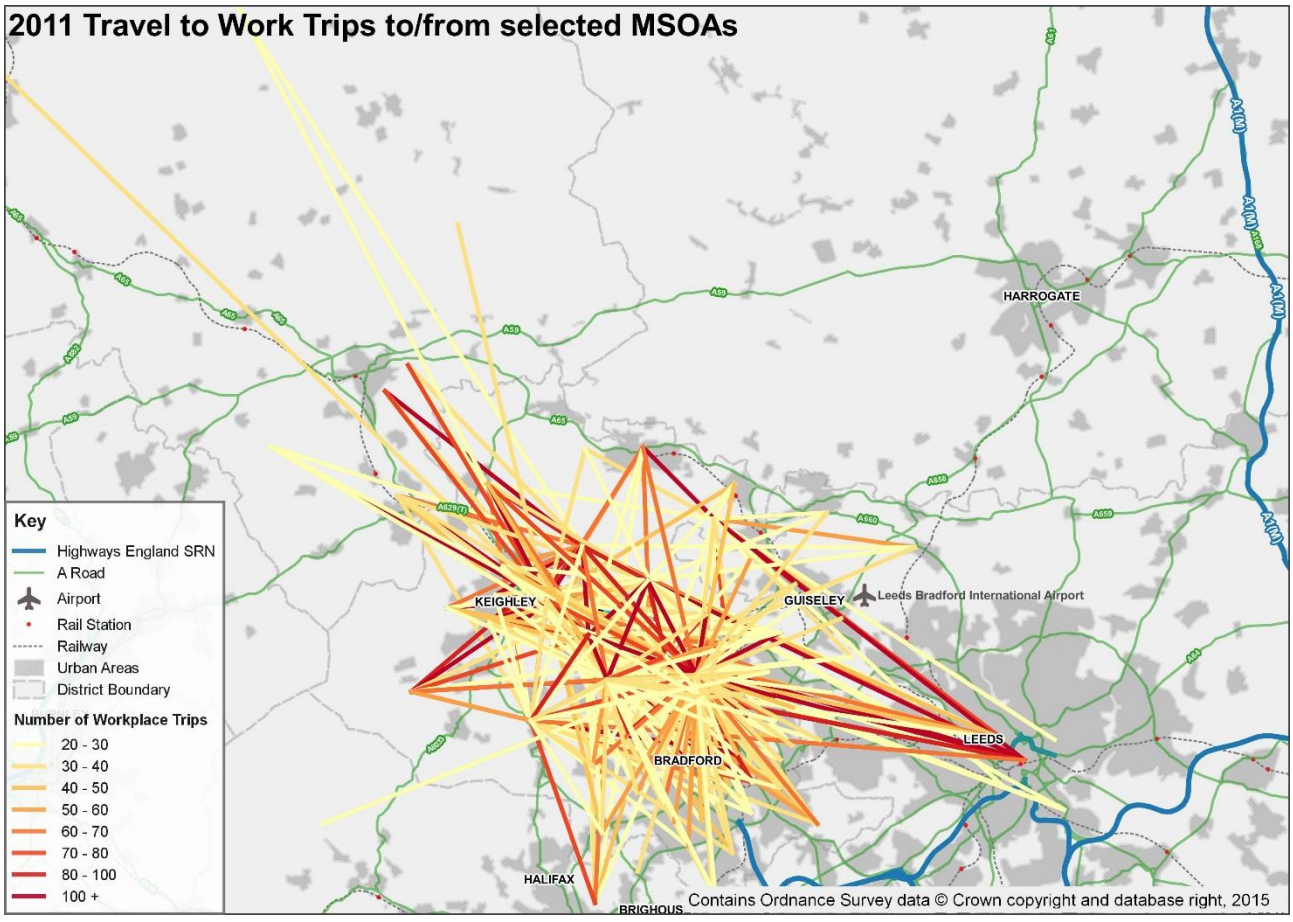
The data presented so far shows that even for short distances of under 5km, car journeys account for almost half of all journeys.

B.3.2. 2011 Census MSOA Data

The following sub-section focuses on travel to work flows between selected Bingley MSOAs and surrounding areas. The flows presented in this section are only for higher volume workplace flows with daily trips of 20 or more in order to keep consistent with previous sections.

The map below shows the flows between selected MSOAs and surrounding areas.

Figure B-12 Bingley Travel to Work patterns 2011



The 2011 travel to work flows are extended more to the north of Bingley when compared to those presented using the 2001 data at ward level. The flows are also more centred on Leeds city centre and Skipton.

The table below expands on the data presented in the map and summarises the trips on higher volume travel to work flows made by Bingley residents to other nearby areas. The distances have been calculated from the centroids of MSOAs.

Table B-11 2011 Workplace trips from Bingley MSOAs

Distance (km)	All Trips	Car Trips	% Car Share
0-5	16651	7662	46%
5-10	10205	5915	58%
10-15	3828	2308	60%
15-20	2745	483	18%
20-25	844	199	24%
25-30	21	13	62%
30-35	21	2	10%
Total	**34,315**	**16,582**	**48%**

Over 78% of trips on higher volume flows from the selected Bingley MSOAs are under 10km. The greatest distance for high volume flows for residents from the selected MSOAs to their place of work is just over 31km.

The car mode share fluctuates from 46% for the shortest trips to 10% for the longest trips. The overall car mode share is 48%.

The table below further expands on the data presented on the map above and summarised higher volume travel to work flows made by people working in the selected Bingley MSOAs.

Table B-12 2011 Workplace trips to Bingley MSOAs

Distance (km)	All Trips	Car Trips	% Car Share
0-5	22,536	13,572	60%
5-10	8,808	6,902	78%
10-15	2,655	2,018	76%
15-20	244	204	84%
20-25	25	21	84%
30-35	48	48	100%
35-40	72	54	75%
Total	**34,388**	**22,819**	**66%**

The car mode share is high across all distance bands with an average of 66%, especially for trips between 30km and 35km where this reaches 100%.

There are 73 more trips made by people working within the Bingley MSOAs compared to the number of people living there and working elsewhere. The biggest difference for car mode share was for trips between 30 and 35km with the mode share of trips made to Bingley MSOAs 90 percentage points higher than for those made to Bradley MSOA.

Overall 68,703 trips occur on higher volume travel to work flows between Bingley MSOAs and surrounding areas. Car mode share was consistently higher for trips to Bingley MSOAs where higher volume flows reached distances above 35km.

B.3.3. Conclusion

The distance travelled on high volume travel to work flows has increased in the 2011 Census compared to the 2001 Census. The total number of trips increased by 5,568 however, the car mode decreased by almost 5 percentage points.

The comparison of the two years has allowed for a thorough analysis of travel patterns at a strategic analysis. This analysis has concluded that higher volume travel to work journeys made between selected Bingley areas and others have a very high car mode share, even for trips under 5km. This could become a congestion issue for nearby local roads.

B.4. A46 Newark to Lincoln and Newark to Widmerpool Improvements

The following schemes will be analysed together due to their close proximity.

The Newark to Lincoln scheme was opened in July 2003 therefore may have contributed to the changes in commuting travel patterns between 2001 and 2011.

This section will therefore be divided into two sections:

- The first will focus on the Newark to Lincoln scheme and analyse higher volume flows and car mode share, similar to the previous analysis throughout the report as well as include a district level analysis;
- The second section will look at 2011 Census data to understand what the travel patterns were like close to the opening of the Newark to Widmerpool scheme.

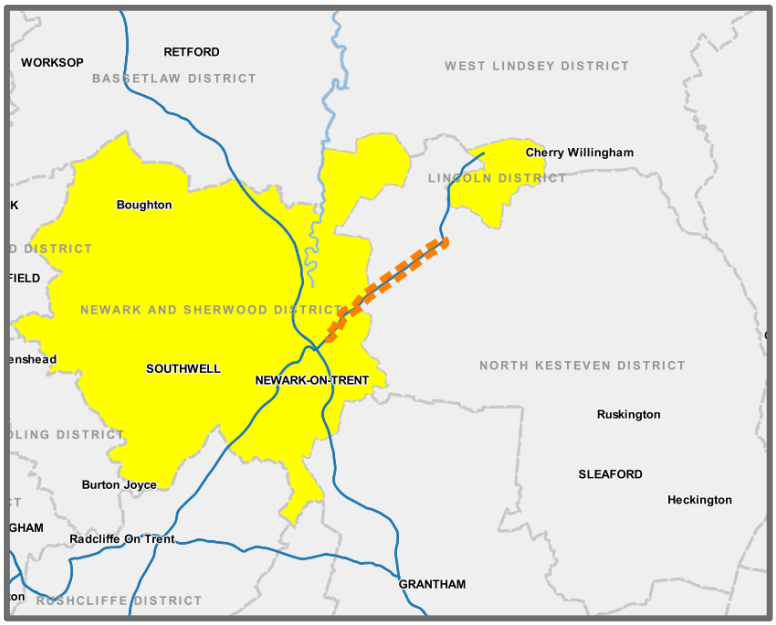
Both schemes aimed to improve connectivity between Newark, Lincoln, Nottingham and Leicester.

B.4.1. A46 Newark to Lincoln

The data was analysed at district level so that any changes in travel patterns on a larger scale could be identified. The two districts analysed are Newark and Sherwood and Lincoln.

The extent of these in relation to the scheme is presented in the figure below.

Figure B-13 Districts local to the A46 Newark to Lincoln scheme



The following sub-sections will provide a breakdown of the census data for 2001 and 2011 at a district level. This data has been analysed in order to uncover any significant change in travel to work patterns for both districts. The outward and inward flows have been considered together for both districts.

B.4.2. 2001 Census

The tables below summarise higher volume travel to work flows to and from Lincoln and Newark and Sherwood districts by distance and number of car trips as well as car mode share.

Table B-13 2001 Travel to Work Trips between Lincoln and surrounding districts

Distance (km)	All Trips	Car Trips	% Car Share
10-20	24,423	20,036	82%
20-30	1,536	1,406	92%
30-40	1,639	1,417	86%
40-50	2,398	2,098	87%
50-60	750	559	75%
60-70	229	192	84%
70-80	278	228	82%
90-100	68	62	91%
120-130	21	18	86%
190-200	48	14	29%
Total	**31,390**	**26,030**	**83%**

Table B-14 2001 Travel to work trips between Newark and Sherwood and surrounding districts

Distance (km)	All Trips	Car Trips	% Car Share
15-25	12,898	11,370	88%
25-35	10,197	9,060	89%
35-45	3,441	3,191	93%
45-55	697	658	94%
55-65	422	369	87%
65-75	196	153	78%
85-95	100	81	81%
95-105	97	88	91%
125-135	25	22	88%
175-185	58	22	38%
185-195	103	22	21%
Total	**28,234**	**25,036**	**89%**

Newark and Sherwood District has an area of 65,183 ha whilst the Lincoln District covers only 3,569 ha. However as Lincoln is a more densely populated area, it also has a higher number of travel to work trips with 3,156 trips made.

The car share is very high for trips under 20km for Lincoln with 82% and 88% for trips under 25km in Newark and Sherwood. For both districts, trips above 185km have a 21% car mode share, therefore these higher volume flows have a high proportion of trips made by other modes.

B.4.3. 2011 Census

The tables below summarise travel to work trips from the 2011 Census for Lincoln and Newark and Sherwood districts.

Table B-15 2011 Travel to Work Trips between Lincoln and surrounding districts

Distance (km)	All Trips	Car Trips	% Car Share
15-25	27,963	23,406	84%
25-35	3,180	2,864	90%
35-45	5,100	4,467	88%
45-55	962	767	80%
55-65	512	432	84%
65-75	625	441	71%
75-85	92	59	64%
85-95	103	73	71%
95-105	40	35	88%
105-115	22	19	86%
125-135	20	14	70%
155-165	23	22	96%
175-185	23	13	57%
185-195	56	12	21%
205-215	32	19	59%
Total	**38,753**	**32,643**	**84%**

Table B-16 2011 Travel to Work Trips between Newark and Sherwood and surrounding districts

Distance (km)	All Trips	Car Trips	% Car Share
15-25	15,617	14,087	90%
25-35	13,041	11,667	89%
35-45	4,738	4,511	95%
45-55	1,120	1,017	91%
55-65	680	639	94%
65-75	235	202	86%
75-85	53	51	96%
85-95	203	155	76%
95-105	144	107	74%
125-135	20	8	40%
135-145	37	34	92%
145-155	34	30	88%
175-185	74	38	51%
185-195	188	42	22%
205-215	20	16	80%
Total	**36,204**	**32,604**	**90%**

Lincoln district still had more trips than Newark and Sherwood during the 2011 Census with 2,549 more trips. The mode share for car trips is 6 percentage points higher for trips in Newark and Sherwood.

The total workplace flows for the Lincoln district have increased by 7,363 from the 2001 Census and the car share has seen a 1 percentage point increase. Travel to work flows have increased more for Newark and Sherwood with almost 8,000 trips whilst the car mode share has seen the same 1 percentage point increase as Lincoln.

The car mode share for trips under 25km has also seen a slight increase of 2 percentage points for both districts. The majority of trips for Lincoln are less than 25km whilst the majority of journeys from Newark are under 35km.

The table summarises travel to work trips between the four major districts surrounding the A46 schemes.

Table B-17 Travel to Work trips between A46 districts

	2001 to 2011 difference - All Trips				2001 to 2011 difference - Car Mode Share (%)			
From/To	**Leicester**	**Lincoln**	**Newark and Sherwood**	**Nottingham**	**Leicester**	**Lincoln**	**Newark and Sherwood**	**Nottingham**
Leicester	-	9	19	154	-	1	-24	-8
Lincoln	5	-	1034	80	-23	-	-1	4
Newark and Sherwood	-9	318	-	-691	8	-4	-	-1
Nottingham	113	55	573	-	-14	-6	-1	-

The table is colour coded therefore if the number of trips have increased during the 2011 Census then the figures are written in green and if they have decreased then they are red. The table also shows the difference in the total number of trips as well as the difference in car mode share.

As the Newark to Widmerpool scheme opened in April 2012 this data represents the circumstances before the opening of the scheme which show that trips from Newark to Nottingham decreased by 691 whilst trips from Lincoln to Newark increased by 1,034.

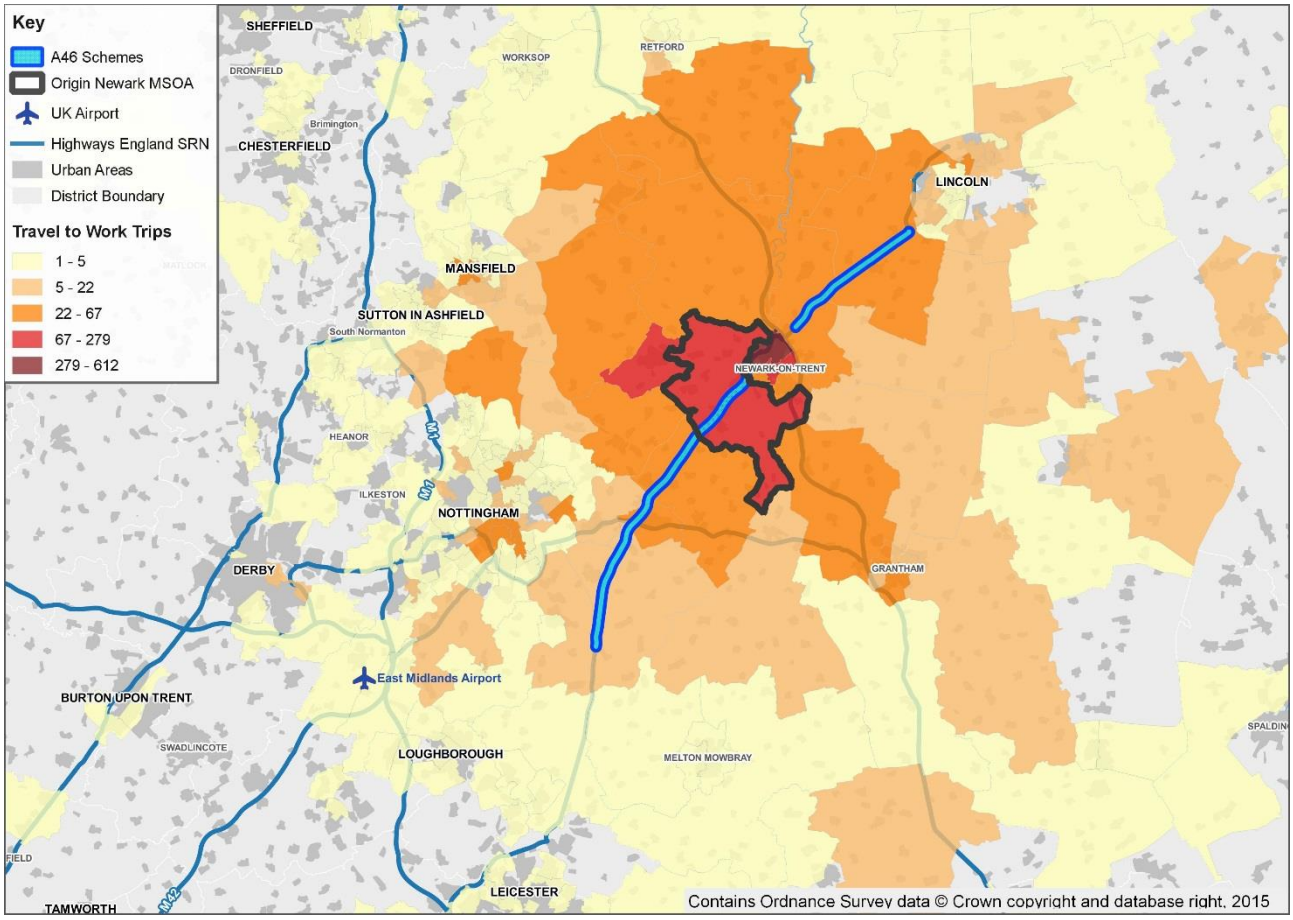
The difference in average car mode share between 2001 and 2011 is mostly negative across the table with some increases from Newark to Leicester and Lincoln to Nottingham of 8 percentage points and 4 percentage points respectively. The highest decrease in car mode share was from Lincoln to Leicester with 23 percentage points and Leicester to Newark with 24 percentage points.

B.4.4. Newark 2011 Travel Patterns

The 2011 Census data was used to understand the travel to work patterns of Newark residents living near the scheme.

The map below is thematic map of the travel to work trips from the origin MSOA which is highlighted using the thick black border.

Figure B-14 Newark Travel to Work patterns 2011



The map shows that people living within the selected MSOA do not travel very far to their place of work. The highest number of trips are in the centre of Newark and to the north-east of the selected MSOA. These figures are however likely to have changes now since the scheme opened in 2012.

B.4.5. Conclusion

Only data for the A46 Newark to Lincoln scheme has been analysed for both census years as the scheme was opened in 2003 and is likely to have contributed to the change in commuting patterns between 2001 and 2011. Therefore only 2011 Census data was analysed for the Newark to Widmerpool scheme as this was opened in 2012.

The four main districts surrounding both A46 schemes (Leicester, Lincoln, Newark and Sherwood and Nottingham) were analysed in order to identify any changes in travel patterns between 2001 and 2011. The main findings are summarised below:

- Trips from Newark to Nottingham decreased by 691 whilst trips from Lincoln to Newark increased by 1,034;
- The difference in average car mode share is mostly negative across the table with some increases from Newark to Leicester and Lincoln to Nottingham of 8 percentage points and 4 percentage points respectively; and
- The highest decrease in car mode share was from Lincoln to Leicester with 23 percentage points and Leicester to Newark with 24 percentage points.

The analysis concluded that the A46 Newark to Lincoln scheme might have had an impact on the number of travel to work trips as there were 1,352 more trips being made between the two districts in 2011 compared to 2001 Census figures.

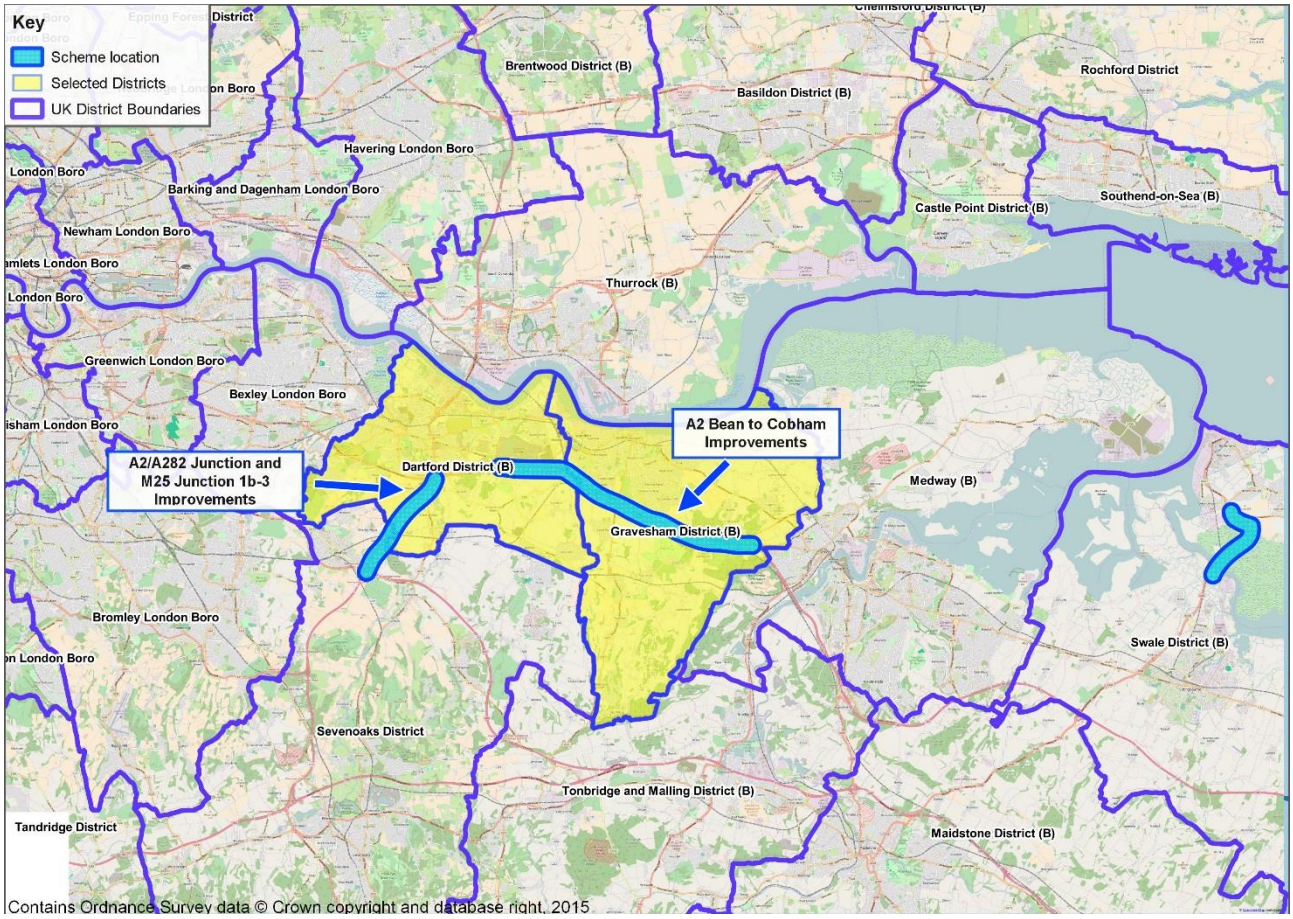
The 2011 travel to work analysis from the Newark MSOA at the end of the scheme identified that higher volume travel to work trips were within small distances of the scheme, mainly focused within the Newark District. The

distance travelled to work from Newark and areas surrounding the second A46 scheme is likely to increase following the opening of this scheme in April 2012.

B.5. A2 Bean to Cobham Improvements, A2/A282 Junction Improvements and M25 Junction 1b-3 Improvements

These three schemes were opened between 2004 and 2009 and have been considered together due to their close proximity and similar objectives. The travel impacts analysis has been considered at district level, specifically two districts which the schemes fall within have been considered and these are Dartford and Gravesham as shown in the figure below.

Figure B-15 Dartford and Gravesham Districts and SRN schemes



Whilst junction 3 of the M25 falls within the Sevenoaks district, this was not included as this district is very large.

The travel to work analysis will be divided into two sections, one for each census and the main findings will be reported in the conclusion section.

B.5.1. 2001 Census Analysis – District Level

The data for inflows and outflows for travel to work trips has been combined for each district so that any significant patterns can be identified on a larger scale.

The table below summarised the travel to work flows for Dartford using the 2001 Census data.

Table B-18 2001 Dartford Travel to Work Flows

Distance (km)	All Trips	Car Trips	% Car Share
0-10	48,543	29,908	62%
10-20	21,304	17,698	83%
20-30	9,676	5,951	62%
30-40	4,624	2,221	48%
40-50	816	737	90%
50-60	418	370	89%
60-70	383	347	91%
70-80	211	187	89%
Total	**85,975**	**57,419**	**67%**

There are 85,975 workplace trips made to and from Dartford with an average mode share for car of 67%. Over 56% of the total trips are under 10km and over 81% of all trips are under 20km.

The lowest car mode share was 48% and this was for trips between 30km and 40km. The average car mode share for short-distance trips was 62% which is relatively high.

The table below summarises the 2001 Travel to Work data for trips to and from Gravesham.

Table B-19 2001 Gravesham Travel to Work flows

Distance (km)	All Trips	Car Trips	% Car Share
0-10	40,971	22,465	55%
10-20	17,062	14,542	85%
20-30	6,246	5,629	90%
30-40	3,631	1,401	39%
40-50	2,511	752	30%
50-60	314	266	85%
60-70	154	136	88%
Total	**70,889**	**45,191**	**64%**

The highest distance travelled to and from Gravesham is 10km less than that for Dartford District. There were also 15,086 less travel to work trips for Gravesham with a car mode share of 3% less than that in Dartford.

In contrast with Dartford, trips under 10km have a 55% mode share for car, which is 7% less. The car share for journeys increases to 85% for trips under 20km and then reaches the highest reported share of 90% for trips under 30km.

The lowest mode share for car is for trips between 30 and 50km with 39% and 30% respectively.

B.5.2. 2011 Census Analysis – District Level

The 2011 analysis presents the data for Dartford and Gravesham at district level to keep consistent with the previous sub-section so that the figures can be compared easily.

The most noticeable difference between the two sets of tables presented for each census year is the increase in the distance travelled on higher volume journey to work flows.

The table below presents the 2011 travel to work flows for Dartford.

Table B-20 2011 Dartford Travel to Work Flows

Distance (km)	All Trips	Car Trips	% Car Share
0-10	38,815	26,445	68%
10-20	24,977	20,415	82%
20-30	10,089	6,584	65%
30-40	8,376	3,364	40%
40-50	1,251	1,040	83%
50-60	683	612	90%
60-70	714	611	86%
70-80	295	275	93%
180-190	24	22	92%
280-290	45	20	44%
Total	**85,269**	**59,388**	**70%**

There were 85,269 trips made to and from Dartford district for work purposes. The average car mode share for these trips was 70%, more specifically 59,338 trips. Over 74% of all trips were under 20km with an average mode share of 75%.

The lowest mode share for car was between 280 and 290km with 44% and between 30 and 40km with 40%.

The table below summarised the travel to work flows for Gravesham district by distance and including the mode share for car.

Table B-21 2011 Gravesham Travel to Work flows

Distance (km)	All Trips	Car Trips	% Car Share
0-10	25,980	16,454	63%
10-20	18,969	16,237	86%
20-30	7,420	6,515	88%
30-40	2,897	1,326	46%
40-50	3,900	875	22%
50-60	649	518	80%
60-70	351	290	83%
70-80	26	21	81%
90-100	21	14	67%
Total	**60,213**	**42,250**	**70%**

There were 60,213 trips made between Gravesham district and the rest of the UK with trips reaching distances between 90km and 100km.

The average car mode share of these trips was 70% which is equal to that of trips made to and from Dartford. Over 74% of all trips that were made were under 20km and had an average mode share for car of 74.5% which is close to the overall average.

The lowest mode share for car was between 40 and 50km with 22%.

B.5.3. Conclusion

The trips presented in the census analysis were filtered to only include 20 or more trips for travel to work purposes to and from Dartford and Gravesham at district level. The exclusion of trips with frequency less than 20 aimed to identify common travel patterns of people travelling to and from the two districts.

There were 706 less trips made for work purposes recorded in the 2011 Census for Dartford district and 10,676 less trips for Gravesham district. Despite the decrease in total trips for Dartford, the number of car trips increased by 1,969 therefore the mode share for car also increased to 70%.

The most positive change between the two census years is the great increase in distance travelled on higher volume journeys to work reaching 281km for trips between Dartford and Manchester with 25 people making this journey to work on a regular basis.

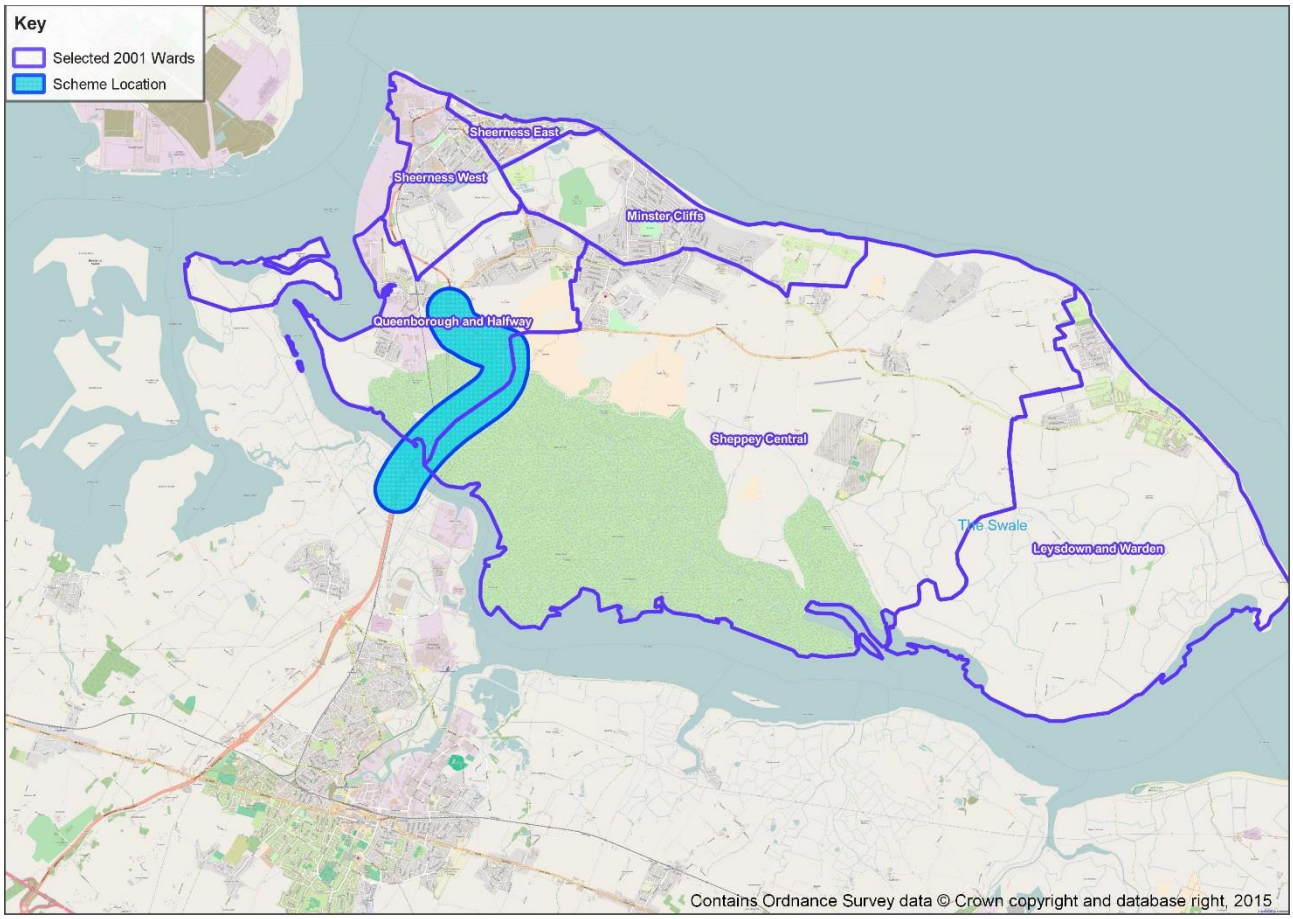
B.6. A249 Iwade to Queenborough Improvement

The scheme opened in July 2006 and aimed to improve accessibility to and from the Isle of Sheppey in order to drive new economic developments.

The travel to work analysis was analysed at ward level for the 2001 Census and at MSOA level for the 2011 census.

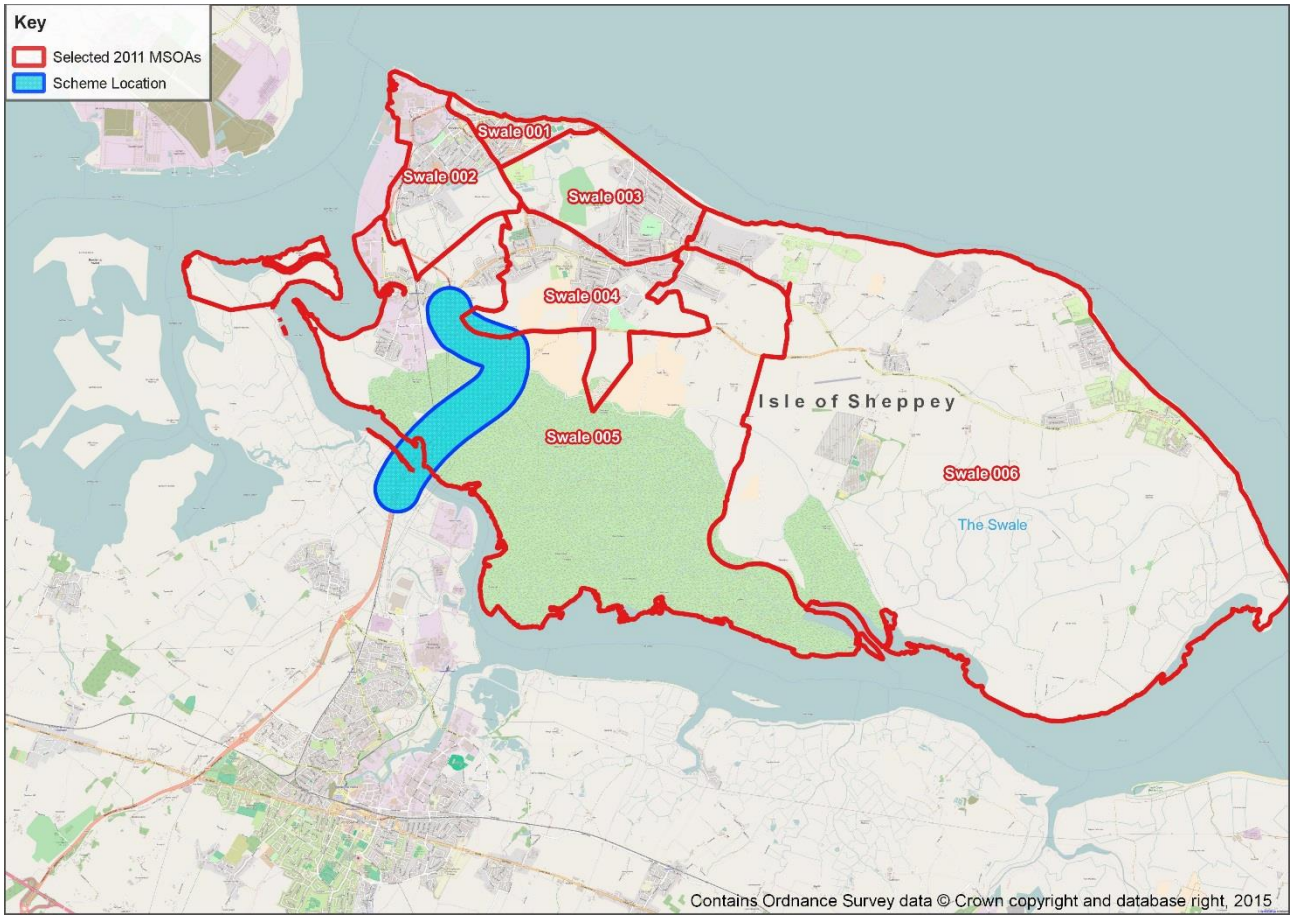
Six wards were chosen for analysis of the 2001 Travel to Work data. The extent of these in relation to the scheme is outlined in the figure below.

Figure B-16 Isle of Sheppey 2001 wards



There were also six middle level super output areas (MSOAs) chosen to analyse the travel to work patterns for the Isle of Sheppey using the 2011 Census and these are displayed below.

Figure B-17 Isle of Sheppey 2001 MSOAs



The areas covered by both statistical boundaries are very similar, which enables consistency in the analysis for the two census years. The Isle has been considered as one entity and all chosen wards and MSOAs have therefore been combined in the following analysis.

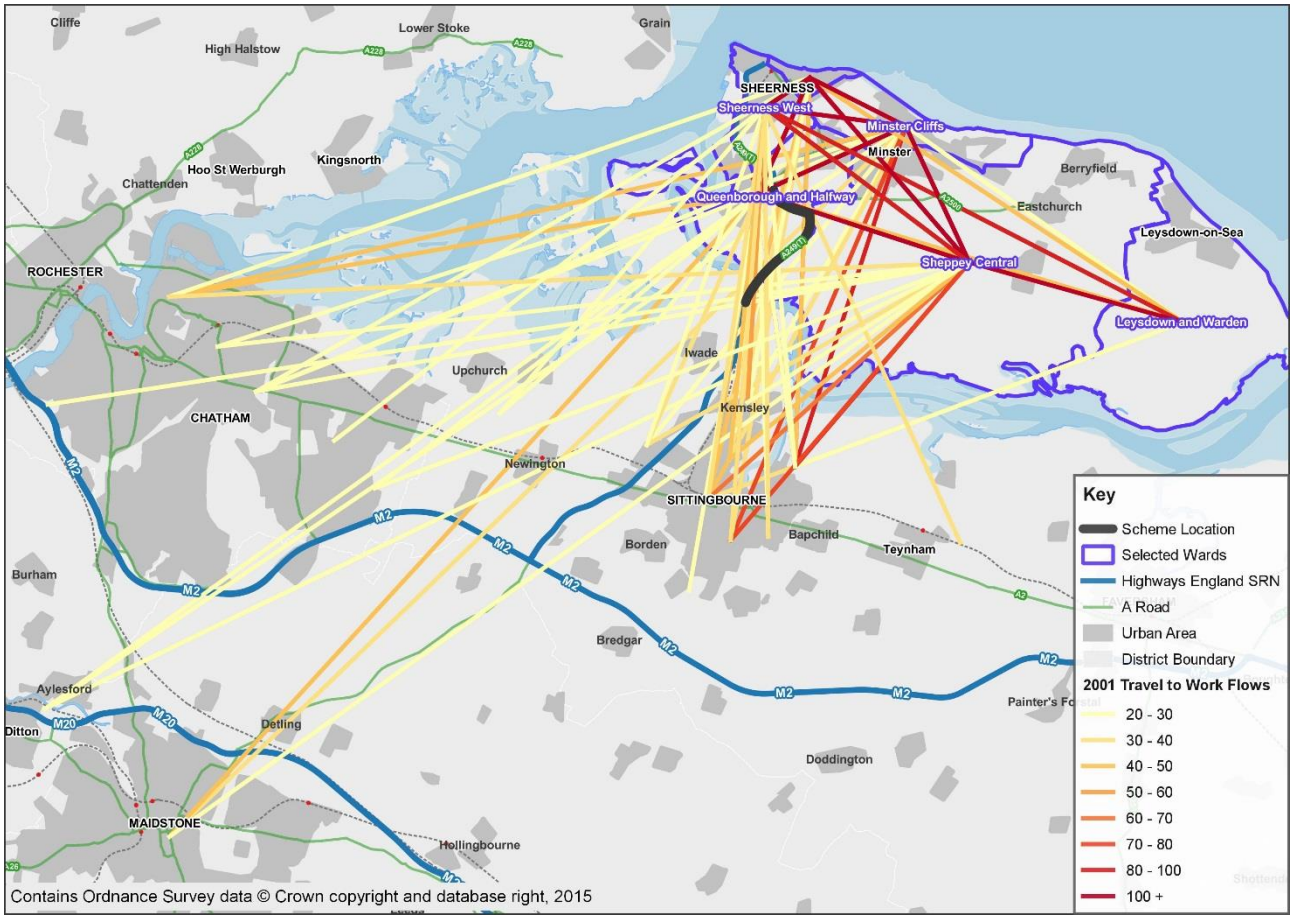
In order to identify any significant changes in the travel to work patterns to and from the Isle, flows with less than 20 trips per day were omitted from this analysis.

The following sub-sections analyse the census data separately for each census year, which will then be combined and summarised in the conclusion section.

B.6.1. 2001 Census Ward Data

The travel to work flows to and from the Isle of Sheppey have been mapped using the 2001 Census data at ward level.

Figure B-18 Isle of Sheppey Travel to Work patterns 2001



The flows represent all trips made between the areas shown in the map. The colours of the lines have been thematically coded where the darkest lines represents the highest number of trips. Most trips are between wards on the Isle, however there are also several trips made to Sittingbourne, approximately 8km away. The map indicates that the longest distance higher volume flows are between Isle of Sheppey and Maidstone and Chatham.

The tables below summarise the travel to work trips to and from the Isle of Sheppey separately using the 2001 ward level data.

Table B-22 2001 Travel to Work Trips to the Isle of Sheppey wards

Distance (km)	All Trips	Car Trips	% Car Share
0-5	8,368	4,635	55%
5-10	1,857	1,571	85%
10-15	416	344	83%
15-20	24	21	88%
Total	**10,665**	**6,571**	**62%**

Table B-23 2001 Travel to Work Trips from the Isle of Sheppey wards

Distance (km)	All Trips	Car Trips	% Car Share
0-5	8,397	4,661	56%
5-10	2,540	2,157	85%
10-15	616	492	80%
15-20	234	206	88%
20-25	124	112	90%
25-30	95	95	100%
Total	**12,006**	**7,723**	**64%**

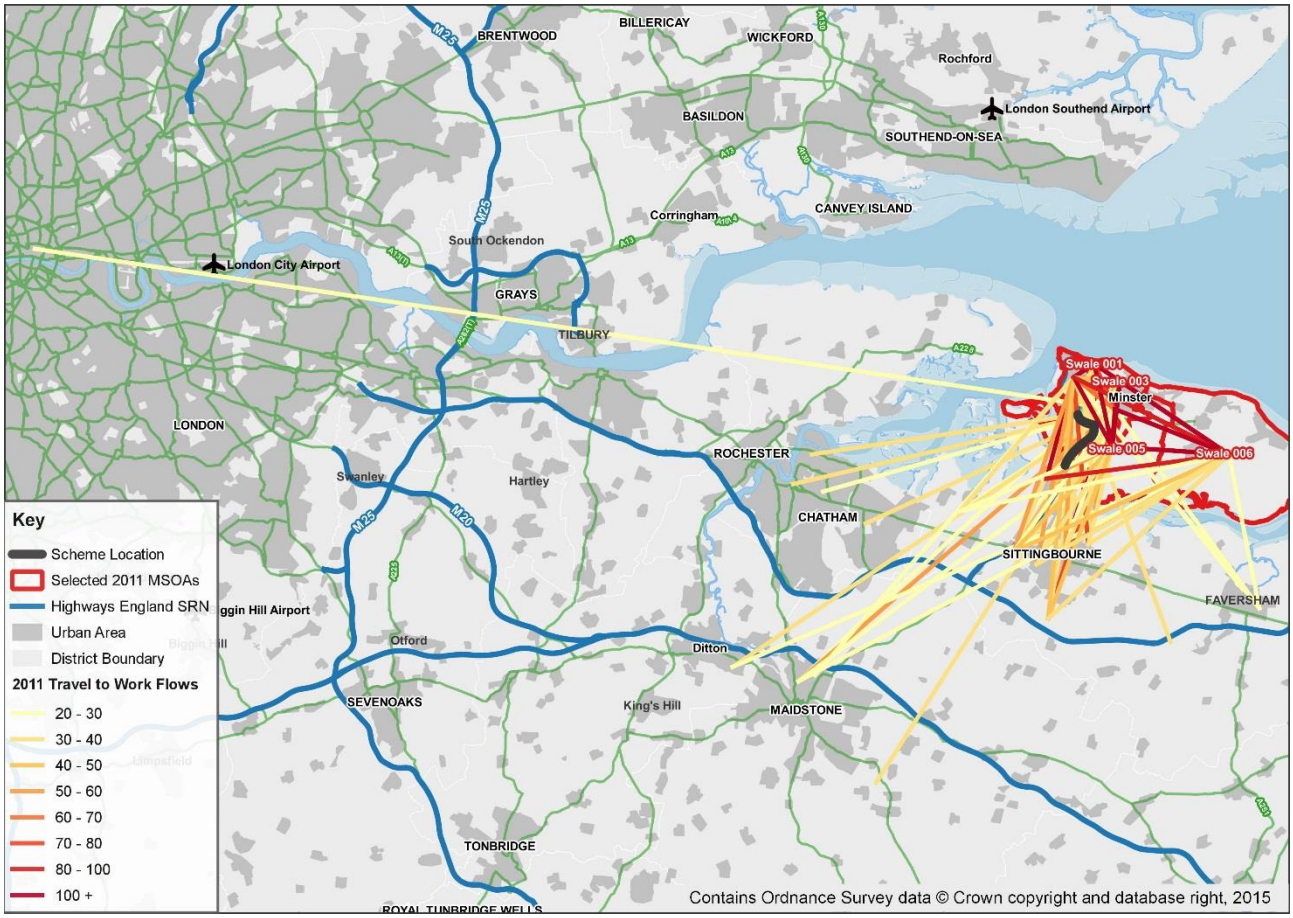
Overall there were 22,671 trips made between the Isle and other UK wards, of which 14,294 were car trips (car driver and passenger). The average mode share for the overall trips was therefore 63%, with a slightly

higher car mode share for trips made by Isle of Sheppey residents compared with those living elsewhere and working on the Isle. The furthest workplace destination for Isle residents living in the Minster Cliffs ward was Aylesford (26km away).

B.6.2. 2011 Census MSOA Data

The map below shows the travel to work patterns for higher volume flows between selected Isle of Sheppey MSOAs and surrounding areas.

Figure B-19 Isle of Sheppey Travel to Work patterns 2011



The data has been presented in the same format using thematically coloured lines to represent the travel to work flows. The map covers a larger area than that presented for the 2001 flows as the maximum distance travelled to the Isle increased to over 62km.

As for the 2001 data, most of the trips were made on the Isle. However there has been an increase in the distance travelled and the number of areas included. For example, the 2011 data now includes trips between the Isle and the City of London, although the numbers are very small.

The tables below summarise the 2011 travel to work flows to and from the Isle by distance.

Table B-24 2011 Travel to Work Trips to the Isle of Sheppey

Distance (km)	All Trips	Car Trips	% Car Share
0-5	5,816	3,739	64%
5-10	2,607	2,316	89%
10-15	901	764	85%
15-20	127	119	94%
20-25	76	68	89%
25-30	121	115	95%
30-35	21	21	100%
60-65	29	3	10%
Total	**9,698**	**7,145**	**74%**

Table B-25 2011 Travel to Work Trips from the Isle of Sheppey

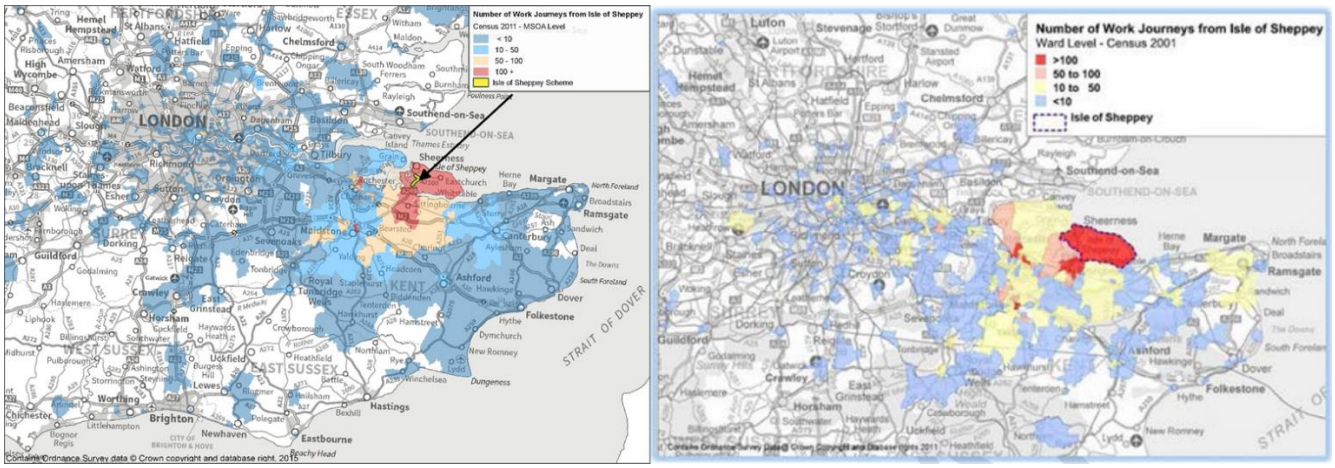
Distance (km)	All Trips	Car Trips	% Car Share
0-5	5,823	3,743	64%
5-10	2,024	1,813	90%
10-15	591	496	84%
15-20	114	103	90%
20-25	22	22	100%
Total	**8,574**	**6,177**	**72%**

Overall there were 18,272 travel to work trips made to and from the Isle of Sheppey in 2011. Of these 13,322 were car trips, with an average 73% car mode share for car. The maximum distance travelled to workplaces in the Isle increased to 62km and the main mode of travel for these longer-distance trips was a combination of bus and train, due to the origins of the trips being in London.

B.6.3. Change in Trips from the Isle of Sheppey

The map below includes Travel to Work data presented thematically from the Isle of Sheppey to surrounding areas. The 2001 map is sourced from the POPE report for this scheme.

Figure B-20 Travel to Work from the Isle of Sheppey 2001 and 2011



The 2011 Census data further supports the findings from the previous sections which concluded that more people are making longer-distance trips. The thematic maps include all trips from the Isle of Sheppey made for work purposes. The red areas indicate the locations of higher volume workplace destinations which are mainly located in the Isle itself and Sittingbourne.

The MSOA and ward boundaries were matched as closely as possible in order to allow for a more accurate analysis. The following matches were made:

- Leysdown and Warden – Swale 006
- Minster Cliffs – Swale 003
- Queenborough and Halfway – Swale 005
- Sheerness East – Swale 001
- Sheerness West – Swale 002

- Sheppey Central – Swale 004

Only two MSOAs match the exact boundary of their correspondent ward and these are Swale 001 and Swale 002 which allows for an accurate comparison between the two years, however this limits any comparison that can be made between the other areas.

The table below highlights the difference in total travel trips between the two census years.

Table B-26 Change in total travel trips in Swale 2001-2011

Wards (MSOA Code)	All	Car	% Car
Leysdown and Warden(006)	2,838	2,755	22
Minster Cliffs (003)	- 2,007	- 1,107	12
Queenborough and Halfway (005)	- 2,665	- 1,570	8
Sheerness East (001)	- 158	10	3
Sheerness West (002)	- 667	- 278	3
Sheppey Central (004)	- 1,164	- 180	13
Total Change 2011 – 2001	**- 3,823**	**- 370**	**10**

The main findings from the statistical area match show that the total number of travel to work trips between the Isle of Sheppey and the rest of the UK was 3,823 less in 2011 than in 2001. The total number of car trips decreased by 370, whilst other modes saw a decrease of 3,453 trips. The mode share by car therefore increased by 10% as there was a much larger decrease in overall trips than car trips.

B.6.4. Conclusion

The A249 Iwade to Queenborough Improvement opened to traffic in July 2006 and is therefore likely to have contributed to significant changes in travel to work trip patterns observed between 2001 and 2011. The average distances travelled to work increased and the car mode share increased by 10%, which indicates that the road scheme could have been a factor in increasing the depth of the labour market in this area.

The A249 which runs from Iwade to Queenborough and then on to Sheerness has a relative speed of 80-90%. This suggests that the traffic moves with relatively few delays along the road, however traffic slows to speeds under 50% of the speed limit on the A249, near Sittingbourne, between the A2 interchange and M2 Junction 5.

Appendix C. Traffic Data Calculations

Delay and traffic flow data for SRN links in proximity to the case study schemes is set out in the following table. It shows AM/PM average delays in seconds and AM/PM journey times compared to free flow journey times in minutes.

Table C-1 Traffic data calculations by scheme

Scheme	Direction	AM Delay (sec)*	PM Delay (sec)*	Length (km)	AM Journey Time (min)	PM Journey Time (min)	Free Flow Journey Time (min)
M6 Carlisle to Guardsmill	North West	4.6	5.33	10.15	5.29	5.28	3.36
	South East	2.94	3.18	10.01	5.26	5.24	3.31
A63 Melton	East	11.99	4.25	1.05	0.69	0.6	0.35
	West	5.62	5.77	1.05	0.62	0.62	0.35
A1033 Hedon Road	West	231.44	199.17	7.51	10.86	10.03	4.51
	East	36.53	69.4	7.61	7.68	8.74	4.53
A46 Newark to Lincoln	South	61.59	21.45	1.42	2.13	1.53	0.76
	West	6.16	4.69	1.31	0.78	0.76	0.43
A46 Newark to Widmerpool	North	13.18	14.9	5.56	3.2	3.23	1.86
	South	15.29	13.49	5.4	3.17	3.11	1.81
A2/A282 Junction Improvements and M25 Junction 1b-3 improvements	North	14.04	75.41	5.27	3.56	6.92	1.74
	South	15.69	5.38	5.28	3.67	3.1	1.75
A2 Bean to Cobham improvements	East	10.69	30.09	12.28	6.88	7.67	4.07
	West	92.33	22.26	12.28	10.37	7.41	4.06
A249 Iwade to Queenborough Improvement	North	8.82	8.68	9.86	6.35	6.33	3.28
	South	8.98	8.97	9.93	6.44	6.43	3.51

*Average annual delay measured in seconds per vehicle mile.

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