Economic Performance Impacts of Road Enhancements

Scheme Case Studies Report

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2 Executive summary

Aims and objectives of the study[1]

The specific objectives of the scheme case studies are to:

- Assess whether schemes have resulted in any changes to local economic performance, whether anticipated or not;
- Understand and demonstrate the mechanisms by which economic performance changes occur;
- Assess the effectiveness and efficiency of processes deployed by scheme promotors to maximise the economic impacts of schemes, and;
- Facilitate the demonstration and communication of the emerging evaluation results to a range of audiences, including policy makers and analysts.

In effect, the scheme case studies seek to unpack and understand the average effects identified in the econometric work. In so doing, developing additional evidence and insights of use to the Department for Transport (DfT) and National Highways (NH) for explaining how economic impacts are achieved as well as informing the design and practical delivery of future business cases. The findings are also of interest and use at a local level in informing understanding of the complexity of the opportunities associated with obtaining economic impacts from road enhancements and the challenges faced in achieving this. The findings obtained are summarised below.

A broad range of sources of evidence were used to develop the case studies: a process of extensive document reviews, a CATI telephone business survey for a sub-set of three case studies, group workshops and bilateral discussion/interviews with Local Enterprise Partnerships (LEPs) when they existed and with Local Authorities more generally, together with a set of interviews with business stakeholders. We also consulted internally within DfT on technical aspects of current traffic modelling methods relevant to business cases and the conduct of economic impact evaluations and the evolving thinking within DfT on Benefits Management at the local authority level (i.e., those post-opening monitoring activities that address economic impacts). This aspect of the study included collaboration with the contractors carrying out a one-year post-opening assessment for one of the case studies that pioneered an examination of noteworthy initial economic impacts.

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[1] Ipsos would like to acknowledge the advice and useful suggestions provided by the expert advisors to this study, Goerge Barrett and Tom Worsley, together with invaluable inputs from the project Steering Group. A special thanks to Matthew Clark at DfT for advice and ideas throughout this project that were critically important to its success in generating useful finding and insights.

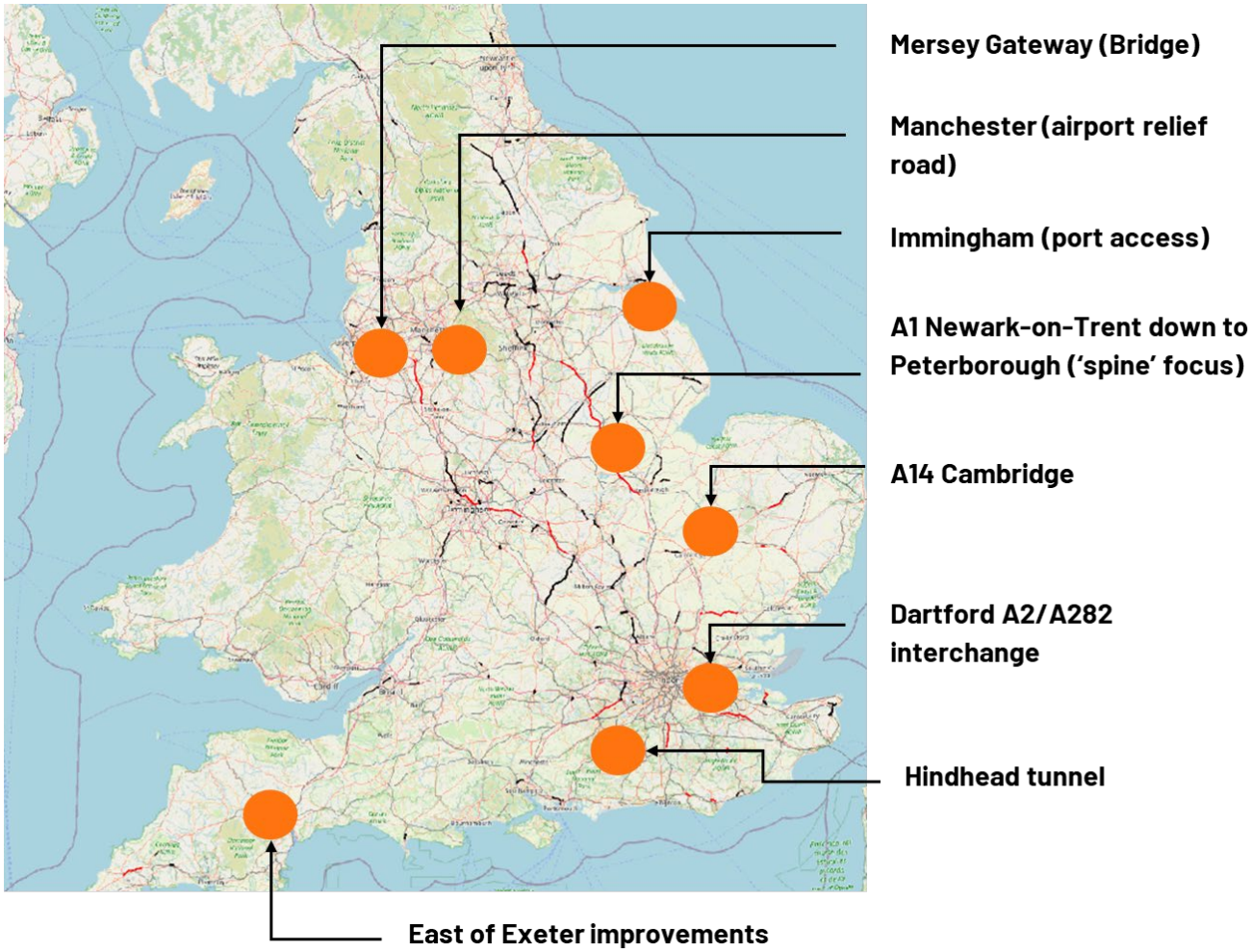
As a result, we have been able to create a ’rounded’ assessment of the contexts, opportunities to be exploited and challenges faced for each case study. The work sought to maximise the comparative analytical dimension via a comparative tabular framing of shared and distinct case study aspects, and perhaps most importantly by developing and using a generic case-study focussed logic model to both capture and record insights from the local level consultations and to provide an analytical framework for future use in case study work. The proposed generic logic model will allow the findings from future scheme case study analyses to be fed-back into a useful high-level framework that will maximise the information gain from future work.

This synthesis of a range of evidence sources and stakeholder insights was useful in allowing this study to recommend some potentially important foci for future work, specifically in regard to: (a) the spatial scope of relevant drivers of place-based economic impacts (extending beyond local aspects per se to consider regional and network-level aspects); (b) the optimal geographical scope of future econometric analyses of economic impacts (ideally conducted at a regional level in order to capture regional economic inter-dependencies); and (c) using the proposed case study logic model to capture the key ‘non-road’ factors that determine whether or not intended economic impacts actually occur (particularly in regard to how local economic development strategies, development planning consent and inward investment attraction function in practice).

The schemes considered

The following map overlays the set of road enhancement schemes contained in the EPIRE database with the overall road network. Local Major road schemes are identified in black and National Highways schemes in red. This map helps to highlight the general north-south travel emphasis of these road enhancements augmented by a set of more specific schemes addressing congestion problems. The scheme case studies are identified in this broader context.

Figure 2.1: The coverage of the EPIRE scheme portfolio in geographical context



Source: Ipsos

Summary of key findings for each case study

The following table summarises the conclusions reached from the case studies analysis as regards findings on economic impacts and the implications for future logic model design and use. The full table can be found in main body of this report.

Stepping back from these details on a scheme-by-scheme basis (and considering the detailed findings across all the case studies and also insights from the more general discussions at the local level), the overall conclusion is local-level confirmation that road enhancements play a key enabling role in delivering local economic growth and prosperity ambitions – but as a necessary not often a sufficient condition for achieving economic performance impacts. The complexities of local-level interactions between causes and effects that determine how road enhancements generate economic performance impacts, and why this sometimes does not happen. Planning consent concerns, and particularly the potential for traffic congestion driven by success in attracting new investments enabled by road enhancements are front of mind issues for local authorities in particular. This issue lies at the heart of the nexus between the evident entrepreneurial interest in developing land for business and new residential uses and the potential traffic congestion constraints that such investments are likely to lead to. Road enhancements in themselves, with their associated value of trave time savings, rely on these

entrepreneurial investments to drive the substantive land use changes that are associated with significant economic performance impacts. This can usefully be thought of as a ‘co-evolution’ relationship: road connectivity both current and planned attracts investor interest in specific places (including overall road network access for extended freight supply chains) but, in turn, increases the likelihood that the resulting economic activity increases will create congestion unrelated in causal terms to the ‘induced traffic’ aspects that are currently modelled by DfT. This suggests that the economic performance increases enabled by road enhancements will need to be given a stronger emphasis in future *ex ante* economic appraisals. The work on developing a detailed logic model for use at the local level carried out in this study can contribute to such an effort to broaden the scope of the impact pathways (and barriers) that need to be considered.

Also, for future work, the importance of applying a broad and comprehensive perspective on how road enhancements drive economic impacts via the combined consequences of close-proximity (up to 30km), extended proximity (2-hour travel radius) and overall network-level effects is crucial. As immediately above, planning consent concerns arise from the interactions between these three geographical domains.

In recognition of the two points above, on the basis of the views captured in consultations, there is currently a disjuncture between local-level strategic thinking on delivering economic growth enabled by road enhancements and current practices in *ex ante* appraisal. Network-level effects, extended-proximity effects and close-proximity effects are all modelled (with great sophistication) by DfT *ex ante*. This modelling examines how a specific road scheme, or bundle of schemes, will not only impact on local journey time savings but also via far more general extended proximity and network-level journey time savings.

However, some local authority officers working on economic development contend that they would prefer broader regional and national level to be considered in scheme specific businesses cases (even though they currently are). Given such statements, there is clearly an information asymmetry both within Local Authorities, and, possibly, between Local Authorities and DfT. An additional consideration in regard to central-local government relationships and assumptions is that there may be different assumptions made about future local economic performance improvements, and displacement. Assumptions asymmetries may lead to coordination challenges in optimising how local and central government approach investment appraisals.

Business stakeholder views were collected in a cross-cutting manner in order to avoid identifying specific firms. These views usefully emphasised the business reality that road enhancements make very important contributions to competitiveness in ways that do not necessarily get reflected in productivity data. The key insight provided by these consultations was that more reliable freight transport logistics help to maintain business-to-business customer satisfaction and generally assists supply chain logistics efficiencies. There are also benefits from being able to free up factory floorspace used for inventories for more profitable uses (and indeed output increases not requiring new floorspace additions). The CATI business telephone survey of three case study areas (Cambridge, Exeter and Manchester) also provided useful

information on business stakeholder views, but did not allow for such nuanced issues to be addressed (details can be found in the relevant case study chapters).

Table 2.1: Summary of main case study findings

Case study and type	Findings on economic impacts	Logic model design implications
A2/A282 Dartford improvement: opened in 2009 Detailed	Attributable economic impacts can be identified directly via industrial employment data. Local views were positive on economic impacts. A major Amazon facility was established facilitated by the scheme. This investment attraction was achieved as a result of a collaborative approach with a site developer to achieve planning consent. This involved a developer road funding contribution to address congestion concerns.	Highlights the importance of including site developer funding contributions to address concerns over increased traffic congestion via the interactions between network-level effects and close proximity effects
Manchester Airport Relief Road (A555): opened in 2018 Detailed + business CATI survey	It was not possible to identify attributable economic impacts as too many other factors are at work in this major urban area. Local views were positive on economic impacts, and reflected the importance of this scheme to helping the airport to benefit from its 2-hour travel time radius catchment area. Manchester was one of the three case studies benefiting from a CATI business survey The results obtained from the experimental geographical tracing of direct upstream (source) and downstream (destination) supply chain links demonstrated, as expected, the prominence of London in both providing and receiving inputs. The businesses surveyed viewed the local road network as important to their performance, however the impact on staff commuting times was mixed, with some firms dis-agreeing that the scheme had reduced commuting times. This may be because (as discussed above) congestion is still created by the interactions between local traffic and longer-distance airport traffic, or because the specific location of the businesses has not reduced commuting times (this is an airport relief road).	Highlights the importance of including extended proximity effects in logic models.

	Although the scheme is viewed to have reduced the time take to transport goods and to have improved connectivity to the local area, impacts on productivity were more mixed with no clear overall benefit being reported. The greatest perceived risk of not investing in road enhancements are congestion and consequent delays in transporting goods. These aspects are viewed as greater risks than limited access to staff and skills (so this view is consistent with the responses above on investment priorities).	
East of Exeter Access Improvements Phase 2 (2013 Detailed + business CATI survey)	Attributable economic impacts were identified in the 5-year POPE assessment. This identified business floorspace and associated employment increases. New housing developments (also an intended scheme impact) are also evident, though attribution to the road scheme less clear. Local views were positive on economic impacts. Exeter was one of the three case studies benefiting from a CATI business survey. However, in this case the response rate (n=53) was too small to provide robust evidence or supply chain mapping. As half of the respondents were not familiar with the scheme a detailed analysis of those results is not appropriate. The general views expressed on the importance of road connectivity to businesses and the local economy, and the related importance of reducing traffic congestion aligned with the findings from the other two CATI business surveys.	Highlights the importance of strategic planning and collaboration an the local authority level in identifying how road enhancements can help to deliver new industrial floorspace and associated employment at specific locations.
Port of Immingham (A18/A180 + A160/A180): opened in 2016 Detailed	It was not possible to identify attributable economic impacts as too many other factors are at work in this area. Local views were positive on economic impacts however, and stressed ‘strategic fit’ aspects (how these two schemes contributed to general economic development ambitions and efforts.	Highlights the importance of network-level effects in logic models, supports the consideration of impact links to innovation and clustering/agglomeration effects. Also supports the consideration of local

		authority ambitions and strategic fit in generating local benefits.
Mersey Gateway (Bridge) opened in 2017 Light touch – situational assessment & analytical implications	It was not possible to identify attributable economic impacts as too many other factors are at work in this major urban area – complicated by the COVID-19 episode (which impacted on toll revenue and required use of the DfT grant to cover anticipated gaps between income and expenditure). No evidence at present to indicate an attributable local impact beyond anecdotal evidence of attracting some named firms and investments.	None identified. However, given the current policy emphasis on public-private partnership funding for future major schemes it would be useful to include return on investment risk exposure in the generic logic model.
A14 Huntingdon to Cambridge Detailed + business CATI survey	As anticipated, too early to determine attributable economic impacts (the scheme was selected to provide a recently opened example and benefit from the 1 year POPE + assessment). Local views were positive on economic impacts, including benefits for businesses. Cambridge was one of the three case studies benefiting from a CATI business survey. The results suggest upstream (source) input dependencies concentrated in London (as expected) but also in East Anglia, the Midlands and Scotland. Downstream (destination) supply chain links are more diffuse but broadly similar. These findings confirm the importance of network-level connectivity and the SRN for businesses nearby to this scheme. The business survey confirmed the local firms' view that the local road network is of primary importance to them. Most were aware of, and had used the scheme, and viewed local roads as the most important priority for the local economy. 64 percent of the respondents viewed the scheme as having had a positive effect of how quickly or efficiently they were able transport goods to their site.	Given that future POPE+ studies will, ideally, use baseline consultations before a scheme opens in order to capture customer experience benefits it would be useful to use the detailed case study version of the EPIRE logic model to inform the design of these new baseline consultation studies. This will facilitate the identification of scheme impacts and also allow cross-scheme comparisons using a shared analytical framework.
A3 Hindhead improvement (2011) Light touch - situational assessment & analytical implications	National Highways requested this as a scheme case study, but it is not of a type likely to generate easily identified economic impacts. This is because the relevant aspects of the investment case pivoted on de-congesting connectivity between London and Portsmouth, (the A3 is now a high standard dual carriageway road for its entire length from the M25 to the A3(M) in Portsmouth). This case study	Highlights the importance of extended proximity and network-level effects in logic models.

	proved to be very useful in highlighting the importance, for future economic impact evaluations, of conducting broader scope regional econometric studies.	
A1 Spine: Peterborough, Newark & Sherwood and South Kesteven (2009) Light touch – experimental consideration of a 40-mile segment on the A1	This case study explored a different focus: on how SRN links can themselves act as growth drivers. It confirmed this aspect by highlighting how SRN segments attract industrial and retail businesses who locate alongside the route in order to benefit from direct accessibility. Labour supply is local and clustered along the road allowing easy commute, provided that congestion at junctions is not severe (as issue considered for granting planning permission) whilst customer and freight access is unproblematic due to direct access to the SRN. As significant new retail outlet investments are now taking place it will be useful to track these economic impacts over future years.	Moving forward, it will be necessary to consider this 'linear' economic development mode as a special type of logic model.

Source: Ipsos analysis of case studies

Have these schemes resulted in any changes to local economic performance, whether anticipated or not?

- Changes in local economic performance are observed across these schemes, but not uniformly and not in a manner that can be related to anticipated local economic impacts (where these are specified). In general, it is clear from examining data on local economic impacts that for these discrete schemes it is rare to be able to easily identify attributable local economic impacts. Within this sample of schemes, and despite the fact that the EPIRE study did not cover schemes with an over-arching regeneration aim, identifiable scheme-level economic impacts were clearest when a regeneration aspect was present (as this makes it easier to identify attributable economic impacts).
- Time series data for discrete schemes rarely exhibits shifts that could be attributed to the period after a scheme is opened. In general, local factors, particularly of a 'strategic fit' nature (how one public investment may rely on other factors and interventions to deliver benefits) affect whether or not anticipated benefits are achieved in practice. The impact of other shared, economy-wide, factors also determines whether or not anticipated benefits are achieved in practice (notably the global financial crisis, Brexit and the COVID-19 pandemic).
- This contrasts with portfolio-level econometric analysis, which is able to identify statistically significant economic impacts once what are in effect local stochastic aspects have been screened out by pooling data and a large number of schemes.
- The Dartford scheme is an example of positive impacts (the scheme helped to attract a major Amazon facility creating 2,500 new jobs and increased industrial floorspace by around 8 per cent). Significantly, planning consent for that development was only granted when the developer agreed to fund an extra lane on a scheme bridge to alleviate congestion risks

created by the interaction of local and long-distance HGV traffic at peak times. It is noteworthy that the Amazon facility opened in 2021, 12 years after the 2009 completion of the final phase of this scheme. This time-lag highlights the importance of avoiding examining economic impacts in too myopic a manner (an issue to consider for future econometric studies). The Dartford scheme is also an example, of negative unintended effects: the intended economic stimulus associated with growth around the Ebbsfleet rail terminal did not eventuate because Eurostar trains ceased stopping there in March 2020. Post-Brexit financial, border control factors and COVID-19 have all been referred to as causing the cessation of that service.

- Other schemes, such as the more recently opened Huntingdon to Cambridge A14 improvements, the A1 improvements and the Manchester Airport relief road also highlight the ways in which local and longer distance traffic can interact and cause problematic congestion. This suggests that traffic modelling (which does consider the interactions between various types of traffic that aligns with the emphasis on close proximity, extended proximity and network-level aspects) may still benefit from continued advances.
- The assessment of documentation for the case studies highlighted some examples where benefits have been lower than forecast at appraisal stage, or as anticipated in the strategic case. Scheme promoters and appraisers should consider uncertainty in an evidence-based proportionate way, as well as guidance covering optimism bias.
- Evidence for displacement effects (for business location and re-location) were found in this evaluation. General local government consultations highlighted that displacement effects are likely to be seen in some cases.

How do these schemes help us to understand and demonstrate the mechanisms by which economic performance changes occur?

- The schemes do help us to understand and demonstrate the mechanisms via which economic performance take place. This is reflected in the scheme-specific logic models that draw upon, and suggest improvements to, the generic logic model architecture developed for the case studies. The key impact pathways highlighted relate to housing and labour supply (new developments and improved commuting potential) and to extended proximity and network-level effects. Extended proximity effects, for the schemes we examined, related to customer catchment areas, usually treated as around 2 hours of travel time. Examples are Manchester Airports ‘hinterland’ (the population, wealth and business composition of which determined airline’s interest in using the airport for long-distance routes), and the current major retail outlet developments along the 43 mile section of the A1 that we examined.

How effective and efficient were the processes deployed by scheme promotors to maximise the economic impacts of schemes?

- It is easier to judge the effectiveness of efforts to maximise the economic impact of schemes than to draw conclusions on the efficiency of those efforts (which would require access to data on resources and costs not available). As regards maximising effectiveness, these case studies highlight the importance of a strategic intent to actively exploit opportunities to attract

investment linked to pragmatic decisions over planning consent. As the attainment of planning consent via a congestion risk reducing co-investment element for the Amazon facility in Dartford highlights, a partnership ethos between local government and business can be key to resolving impediments to benefits realisation. The importance of these local partnerships is an important aspect of Benefits Management to consider in the future (as aspect discussed in the sub-section immediately below).

- Scheme promoters should consider which components of TAG, and which appraisal impacts, are most relevant to their scheme They should also ensure to do evidence-based and proportionate analysis of the factors that may reduce level of benefit achieved by the scheme in practice. Furthermore, where possible evaluation findings should be fed back into the approach to appraisal, to aid ‘learning-by-doing’
- As DfT explores creating closer links between ex ante appraisal and ex post evaluation, it will be useful to understand further the processes followed at a local level (e.g. Benefits Management, the use of logic models). There could be a more explicit focus in using logic models in business cases that explicitly cover the ‘drag factors’ that may limit benefits realisation in practice.

What do these schemes tell us about how to facilitate the demonstration and communication of emerging evaluation results to a range of audiences, including policy makers and analysts?

- It would be useful for DfT to consider the technical feasibility of carrying out portfolio-based econometric analyses at a regional level. The Hindhead scheme, which addressed traffic congestion on the London to Portsmouth route, is an example of a scheme that aims to generate broad economic benefits in a geographically dispersed manner. Whilst technical challenges exist in how/where to define regional boundaries for regional econometric studies, such work would align with the government's interest in establishing broader regional 'compacts' or local authorities in the post-LEP era. Given that any increase in the geographical scope of an economic impact evaluation increases the likelihood of capturing any within region displacement effects this would be an additional benefit.
- This type of broader regional analysis would avoid the limitations of discrete scheme level evaluations, and be more likely to reveal and demonstrate economic performance impacts via considering the full range of impact domains emphasised by these case studies: close proximity effects, extended proximity effects and network-level effects. These three distinctions are useful for communicating evaluation results to a diverse audience because they can be grasped conceptually, communicated visually (for close and extended proximity effects in particular), and can capture the full range of impact pathways – both analytically (although new econometric methods would need to be developed as noted in the Lessons Learned report) and in terms of explanatory narratives ('stories') that communicate the findings.
- It could be useful for the presentation of data in POPE assessments, to include graphs of how effects evolve over time, alongside presenting data in tables. Drawing attention to this aspect of timelines is useful because it helps show how long-lived the economic impacts are, and also helps with comparisons to the econometric analysis. For stakeholders with less technical familiarity with statistical methods and significance, viewing timeline-based data may help to better communicate findings, and draw attention to important of benefits realisation.
- As DfT is refining updated guidance on benefits management and M&E methods it is useful to draw-out the implications for benefits management as well (that is to say for the non-counterfactual based monitoring methods that can be used more frequently and inform decision-making over benefits maximisation).
- Finally, maps of an analytical nature provide an effective means of communicating evaluation results to stakeholders – at both central and local government levels.

General conclusions

The following conclusions emerge from this consideration of scheme case studies.

- At an individual case study level there are multiple reasons why the intended economic benefits that are specified by Local Authorities do not eventuate, and this is mainly due to limitations to 'strategic fit' aspects of pathways to impact (anticipated houses not built, new business floorspace not created). Indeed, housing and business floorspace additions

dominate Local Authority perspectives, and for good reasons as these are key tangible impact pathways. Consequently, local standardised M&E arrangements regarding economic impacts could make effective use of such metrics. [2]

- As a result, when informed by insights from a broad range of evidence sources (business CATI surveys, LA/LEP interviews, ONS data, logic model depictions) individual scheme case studies are able to provide very useful insights into the practical realities of achieving any intended local economic performance impacts.
- It would be useful for DfT to consider the technical feasibility of carrying out portfolio-based econometric analyses at a regional level. The Hindhead case, which addressed traffic congestion on the London to Portsmouth route, is an example of a scheme that aims to generate broad economic benefits in a geographically dispersed manner. Whilst technical challenges exist in how/where to define regional boundaries for regional econometric studies, such work would align with the government's interest in establishing broader regional 'compacts' or local authorities in the post-LEP era.[3]
- As the case studies have highlighted, the combined importance of close proximity, extended proximity and network-level effects future work will need to develop new methods for addressing network-level effects that distance-decay and similarly framed more regionalised accessibility methods cannot address.

It will therefore be useful, in future work (both econometric and scheme case study-based) to:

- Use the following three-element distinction for understanding the economic performance of impacts of road enhancements: close proximity effects up to 30km from the scheme(s), extended proximity effects up to a two-hour road travel radius, and network-level effects that apply in particular to business supply chain connectivity.
- Adopt this three-part framing in any future use of Synthetic Control Group (SCG) methods via characterising groups of schemes on this basis.
- Translate the complex and sophisticated traffic modelling that is carried out at the *ex ante* appraisal/business case stage into an *ex post* economic impact evaluation tool able to pick-up how the schemes have changed overall accessibility for all three traffic impact domains (close proximity effects, extended proximity effects and network-level effects). This three-domain aspect is important because there is the potential for traffic flows to interact in unwanted ways (e.g. by success in extended proximity effects to increase congestion in the

[2] New DfT guidance on M&E for Local Authority Major Schemes is due to be published, the older 2012 guidance does not specify use of these spatial measures however (only stipulating rental values in addition to travel times and employment as key metrics, see: Major Scheme Business Cases: Evaluation Guidance for Local Authority Major Schemes

[3] The rationale for broader representative bodies is to reflect business and economic concerns, including transport related concerns, at a broad enough level to avoid overly 'parochial' perspectives and to allow more integrated and collaborative consultations and planning.

close proximity domain). Existing traffic modelling carried out for investment appraisal addresses these aspects, however these 'interference' effects will also need to be analysed in ex post evaluations in order to provide a complete picture of the overall balance of economic performance impacts.

- Recognise that positive impacts on businesses may not necessarily be captured fully in conventional labour and/or Total Factor Productivity (TFP) estimates. This is because faster and more reliable road freight can generate a type of benefit associated with the ability to increase output per square meter of business floorspace via more efficient logistical processes, thus allowing output to be increased without the need to increase business floorspace (and, potentially, re-located the facility if the additional floorspace cannot be added at the current location).
- A representative businesses comment on these competitive benefits was that: "Our industry is highly competitive, and we face challenges like fluctuating material prices, skilled labour availability, and the need to maintain high quality standards while controlling costs. Efficient logistics are crucial for managing these challenges and ensuring timely deliveries to our customers. Any delays in transportation can significantly impact our productivity and competitiveness …(the road enhancement) has had a noticeably positive impact on our business. The most significant benefit has been the improved reliability and speed of transportation for both our incoming materials and outgoing products. This has reduced lead times, improved our delivery schedules, and enhanced our overall efficiency."
- It is useful, in future DfT work, to explicitly consider the historical background of business floorspace structure and use in order to understand the potential future economic impact of a road enhancement scheme or bundle of schemes. GVA and employment can be increased via a combination of expanding business floorspace (facilitated by road enhancements), an extensive margin effect, and/or using existing floorspace more productively (an intensive margin effect). This distinction being captured by considering the past behaviour and future potential of GVA per square meter and square meters per FTE employee. It is therefore useful to use diagnostic tools that track the behaviour of GVA relative to the volume of business floorspace (which is able to pick-up the mix of intensive and extensive margin effects) in conjunction with the more familiar use of square meters per employee metric used in Local Authority planning. Combining the GVA and employment spatial densities into new metrics for use in business cases and evaluations may be a promising aspect to explore in future work.
- This floorspace-oriented approach (using business floorspace as an 'anchor variable') has the major advantage of providing a tangible and easily grasped link between Local Authority perspectives and their planning for economic development and DfT and National Highways concerns. Local Authorities consider the potential for a road enhancements to facilitate investment in adding to the stock of business floorspace and also pay considerable attention to new housing developments in the same manner. In so doing, addressing the key issues of the local demand for labour and the local supply of labour. When close proximity effects, extended proximity effects and network-level effects are considered systematically this provides a basis for a comprehensive assessment of future potential – and for evaluating

actual outcomes and economic impacts. Whether or not the intended business floorspace, and housing was added is easily measured (as tangible 'anchor variables') and can then be related to the more contingent impacts of the GVA and employment effects that actually resulted.

Given these conclusions, it could be useful if a portfolio-level evaluation solution that would allow Local Authorities to discharge their road investment Benefits Management and M&E reporting obligations were to be developed, This collective approach could:

- Exploit the economies of scale that can be achieved from pooled funding (in so doing providing Local Authorities with a more cost-effective means of discharge their reporting obligations than 'go it alone' approaches;
- Allow a consistent generic method to be deployed (using a consistent generic logic model to facilitate comparative analysis and information sharing);
- Exploit the methodological advantages of drawing on portfolio-level analysis to complement the individual scheme aspects;
- Benefit from a standard, collectively developed and maintained 'data quarry' optimised for this type of evaluation work (to include business floorspace and its GVA and employment density as an 'anchor' metrics set).

The value-for-money of DfT's investment in case studies

From a value-for-money perspective, this type of case study analysis generates benefits via providing evidence that helps more effective investment and benefits realisation decisions to be made in the future. Specifically: by avoiding unrealistically optimistic assumptions about future returns on investment in road enhancements; dealing realistically with displacement effects, and; being more effective in Benefits Management via using better monitoring methods and by actively troubleshooting the broader 'strategic fit' aspects of successful impact delivery. Take together, these aspects can generate a substantial return-on-investment for DfT in obtaining, assessing and using evidence. The value of the benefits (given the national value of the economic performance increments) vastly outweighs the cost of such research.

3 Introduction

3.1 Aims and objectives of the study

The key questions that the EPIRE project as a whole aims to address are:

- What has been the impact of road enhancements on local economic performance?
- How do impacts differ in different contexts?
- How do different features of a scheme affect its impact?

The specific objectives of the scheme case studies within this remit are to:

- Assess whether schemes have resulted in any changes to local economic performance, whether anticipated or not;
- Understand and demonstrate the mechanisms by which economic performance changes occur;
- Assess the effectiveness and efficiency of processes deployed by scheme promotors to maximise the economic impacts of schemes, and;
- Facilitate the demonstration and communication of the emerging evaluation results to a range of audiences, including policy makers and analysts.

In effect, the scheme case studies seek to unpack and understand the average effects identified in the econometric work. In so doing, developing additional evidence and insights of use to the Department for Transport (DfT) and National Highways (NH) for explaining how economic impacts are achieved as well as informing the design and practical delivery of future business cases. The findings are also of interest and use at a local level in informing understanding of the complexity of the opportunities associated with obtaining economic impacts from road enhancements and the challenges faced in achieving this.

3.2 Issues for consideration

As such, this strand of the EPIRE study required a range of analytical challenges to be addressed that stem from the ways in which econometric analysis screens out a myriad of complex and often idiosyncratic and in effect 'stochastic' effects that take place at the local level. Whilst these 'average' effects tell us what the broad patterns are these are what is referred to in signal detection and intelligence assessments work as 'weak signals'. This means that identifying signals in the background noise using the available data is hard – the background noise is created by the highly diverse contexts and experiences found at the granular local level. This makes it hard to infer implications from a historical portfolio-level analysis for *future* individual schemes. As a result, it is a non-trivial analytic challenge to unpack and understand the average effects revealed by the econometric work.

Given this challenge, the scheme case studies workstream has sought to develop a comparative analytical framework to aid understanding of why, and how, schemes' economic

impacts differ. This framework should also be useful in helping to identify the key structural considerations that need to be considered in efforts to improve how future business cases deal with potential future economic performance impacts.

This framework uses a sophisticated 'systems-based' Theory of Change to unpack and elaborate on the various pathways via which road enhancements can generate economic performance impacts. Notably by considering the:

- Labour and housing supply sub-system (how road enhancements help to facilitate local workforce and skills availability and associated housing affordability aspects), an aspect associated with close proximity effects via commuting etc.
- A supply chain and innovation capability sub-system that recognises the importance of attracting and retaining R&D and innovation-intensive businesses - an aspect more associated with entire road network-level effects than close proximity effects.
- A core journey time sub-system that reflects the importance of reduced journey time and congestion and in being able to travel further for a given journey time. This aspects can combine close proximity effects (travel to and from work) but can also relate to the extended proximity effects associated with travel within a two-hour journey time radius. These extended proximity effects can be especially important for retail businesses (especially major shopping centres) and other activities for which a 'hinterland' is important (e.g., a regional airport).

Understanding past economic performance impacts (and future potential) requires that consideration be given to all three sub-systems, and to how the associated close proximity, extended proximity and network-level effects can interact via journey times and congestion.

This aspect of the case studies work also proposes that this Theory of Change be complemented in future work by a focus on business floorspace (unpacking the 'economic density' element in the EPIRE logic model, found in both the econometric and more complex case studies versions). Increases in local economic performance (as reflected in GVA and employment) are achieved through a combination of adding more business floorspace (e.g. developing land for business use) facilitated by road enhancements or via increasing GVA and employment with unchanged business floorspace (also potentially facilitated by road enhancements albeit in a more indirect manner. Put succinctly: **local economic performance is driven by a combination of adding more (used) business floorspace within the area being considered (at the extensive margin), and by generating more GVA and employment for an unchanged volume of floorspace (at the intensive margin).** Local Authorities place considerable attention on business floorspace additions in their strategic planning and justifications for investing in road enhancements. They also consider (albeit more indirectly via changes in the uses of floorspace) how GVA and employment may be boosted for existing floorspace.

Consequently, a focus on floorspace provides a useful link between individual scheme characteristics and economic growth potential and the portfolio-level concerns that econometric work addresses.

Road freight has causal effects on productivity via production logistics efficiencies that can be very important to business performance, and can go beyond the demand for labour per se. Indeed, supply chain inputs that require road transport shape overall productivity performance and may come from remote destinations requiring the Strategic Road Network. Consequently, adopting a broader perspective on productivity beyond labour productivity per se in future work will help to focus attention on the key success factors at the local level that explains the average effects.[4]

Consequently, one useful legacy of the EPIRE study as regards individual scheme business cases would be the initiation of work developing a floorspace-based growth accounting approach, and supporting analyses. This involves using floorspace as an anchor metric to which other measures can be linked. Follow-up large-scale econometric studies could make use of the same anchor metric in order to provide a shared analytical measurement space (have GVA and employment increased at the extensive or intensive margin?). This ambition also has the advantage of aligning with the growing interest amongst academic economists in using satellite data to identify changes in buildings (their size and configuration) in order to have access to more timely and detailed data on the spatial characteristics of business activity (and of housing).[5] Such research would provide a consistent, up to date, cross-England baseline for future use in business case development.

3.3 Methodology

Overall, the case study methodology involved standard mixed methods research: combining quantitative evidence from consultations with any available quantitative data. It involved some telephone survey work for businesses in three of the scheme case study areas together with significant deskwork to review a wide range of literature relevant (in particular) to developing a sophisticated Theory of Change and logic model plus additional perspectives obtained from consultations with LEPs, Local Authorities and businesses intended to inform how the findings from this study are used in the future. The consultations with LEPs and Local Authorities were not restricted to the specific cases studies in order to capture more general perspectives (a process facilitated by the LEP Network and subsequently by its replacement, the Business Board Network).

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[4] This is a complex aspect to consider because these broader productivity effects do not necessarily mean that Total Factor Productivity (TFP) or Mult-factor Productivity (MFP) estimates capture the full competitive impacts of more reliable road freight transport (this report contains some insights into this issue from interviews with businesses).

[5] Professor Stephen Roper, Director of the Enterprise Research Centre at the University of Warwick Business School, is exploring this type of use of satellite data in economic evaluation studies (identified by personal communication).

3.4 Challenges faced

A major analytical challenge faced in this type of study is that:

- Proximity effects are easier to detect than network-level effects but both in combination are in principle important impact pathways – and impact pathways that will inter-relate to each other in ways relevant to the wider evidence base and also to future business cases and TAG methodology design.
- As chieving statistical significance using complex and noisy data requires diverse scheme contexts and extended timelines to be considered in order to identify economic impacts. The regression results considered both distance-decay effects up to 30km and also used accessibility modelling out to a two-hour travel time distance. The econometric analysis also included an events timeline analysis that examined effects over a post-opening timeline.[6] Overall, those analyses demonstrated that statistical significance is limited by a range of factors, including restrictions to the number of schemes with long-enough post-opening timelines to help to increase statistical significance. However, extending the econometric analysis further back in time exacerbates data availability challenges and also creates problems for using the results of such a historical analysis to inform future decisions given changing socio-economic circumstances (the economy in the 1980s was different than that in the 2024).

These challenges have important implications for scheme case studies because, at the local level, it can be difficult to attribute economic impacts to the road enhancement schemes as so many other factors come into play. This means that capturing 'on the ground' perceptions of cause-effect relationships does not have the benefit, in particular, of access to the analytically sophisticated econometric work that identifies events timeline aspects (until that work is published). Case studies tend to identify 'stochastic' serendipitous aspects of economic impacts, notably any major lumpy investments in, or the re-location of, new facilities (e.g., the location of the Met Office Supercomputer in Exeter). Such effects, whilst noteworthy, do little to inform our understanding of general patterns in impacts and the causal relationships being examined in this study.

We refer to this challenge, for convenience, as the 'weak signals problem' in identifying the economic impacts of road enhancements. We use this term because the more granular the scope of the analysis then the weaker the signals of interest in the data - to the extent that it is extremely hard to use specific case studies to identify general patterns. Where specific schemes (or more often bundles of local schemes) do identify economic impacts these can be of be of an unpredictable stochastic nature and hence less useful analytically. The combination of the weak signals problem and the stochastic impacts problem can be referred to as the

[6] See, Economic Performance Impacts of Road Enhancements: Econometrics Findings, October 2024.

granularity paradox: the more granular the analysis frame, the less likely it is to be able to provide generalisable findings and conclusions from scheme case studies.

This process of understanding local contexts is assisted by using the more complex case study version of the EPIRE logic model to inform thinking about the complex causal relationships involved. For example, local actors in business and local government are able to comment on the balance between proximity and network-level effects, and to an extent, the relationship between them.

3.5 Emerging opportunities: strengthening learning from multiple projects

Every scheme case study conducted by researchers and contractors to DfT (and more generally) provides an opportunity not just to improve understanding of specific contexts, challenges and outcomes but also to add-to a generally accessible evidence-base for future use by all analysts.

However, at present there is a risk that some useful information is being generated but under-used because it is not being fed-into an over-arching general analytical framework able to identify patterns (and, perhaps most importantly) any historical changes in these patterns). The potential for future structural changes in the relationship between road enhancements and economic performance impacts (addressed in this report) highlights the importance of being able to identify changing patterns in this context – not least because case studies and similar place-specific information is more likely to become available more quickly than the results of major econometric studies like EPIRE.

DfT's long-term aim of using logic models to more closely link *ex post* evaluation and *ex ante* appraisal highlights a major advantage of using logic models in case study work: providing a mechanism for collating and understanding what multiple case studies tell us about key issues of interest.

4 Broader context to the case studies

4.1 The role of the scheme case studies in the overall project: average effects and individual schemes

As noted in the introduction, the main role of the scheme case studies in the project has been to unpack and understand the average effects identified in the econometric work and, in so doing, develop additional evidence and insights of use to the Department for Transport (DfT) and National Highways (NH) when considering the design and practical delivery of future business cases.

Given the major analytical advantage of econometric analysis in identifying statistically significant relationships in complex and diverse situations, the case study workstream in this study faced methodological challenges. The essence of this challenge is that every case study exhibits unique characteristics and is subject to what are from a statistical perspective, stochastic events. Consequently, econometric analysis can screen-out these stochastic aspects and identify general patterns, whilst any case study will tend to emphasise such aspects – and thus limit the analytical gain achieved.

This is a particularly important aspect to bear in mind in relation to the implications of the EPIRE study for the future economic appraisal of individual schemes. The econometric evidence lends itself to future use at the portfolio-level, provided that the historical evidence maintains its relevance in the case of current and future changes in the relationships between road enhancements and economic performance improvements (as aspect addressed in this report). The average effects identified by the econometric work rely on screening-out stochastic aspects. Hence, unpacking these average effects is best achieved by using a comparative analytical framework able to identify the key causal relationships (as stressed in the EPIRE methodological scoping report).

For the evaluation of individual schemes, the evidence and insights tend to be more qualitative in nature. Whilst the comparative analysis of different schemes can be useful, it is hard to generate robust technical advice and methods given the combination of the diversity in scheme contexts and (as this report sets-out) the ways in which achieving economic performance improvements from road enhancements tends to rely on broader ‘strategic fit’ considerations. That is to say, how details of how local economic development plans, decision-making and investment attraction (in housing, general infrastructure and inward business re-location) all come together to generate economic impacts. For this reason, the case study work has developed a fairly complex Theory of Change and logic model to inform future thinking on both portfolio-level and individual scheme appraisal work.

4.2 Balancing overall impacts on economic performance against the more specific issue of labour productivity

A key finding from the econometrics workstream was provided by the events timeline analysis, which indicated that GVA, employment and GVA per worker impacts (in particular) tend to dissipate in the post-opening phase (most strongly for GVA per worker). That said, the econometrics analysis identifies a clear impact on *overall* economic performance. In approaching the scheme case studies it is therefore important to keep this distinction between impacts on overall economic performance and the more specific issue of labour productivity growth (which is more suspectable to subsequent market adjustments). At a local level, what matters most to Local Authorities is boosting employment and general economic dynamism, including investment attraction (re-developing under-used land), arguably productivity growth is a means to such ends not an end in itself (as increasing workforce participation is),

Consequently, it is useful for the case studies to focus primarily on the overall economic performance aspects, and in particular the nature and extent of land use changes related to the road enhancement(s) – captured in data on business floorspace. It is worth noting that confidentiality restrictions prevented us from presenting the econometric findings on these dissipation effects (especially the GVA per worker dissipation aspect). Consequently, liaison at the local level will be easier once the EPIRE reports are published by DfT.

Indeed, it is noteworthy that local authority officers do not currently regularly make use of the sort of analytically sophisticated tools able to generate an events timeline analysis using staggered Difference-in-Difference (even though this is possible to do). This means that, at the local level, it is hard to obtain insights into the economic performance improvements of road enhancements against counter-factual scenarios. In this latter respect, access to a standardised M&E framework for use by all local authorities in England, possibly using Synthetic Control Groups for comparative analysis may improve evaluation capabilities at the local level. The case studies work carried out in this study has prioritised this comparative analysis aspect in order to contribute to any future work in this area.

As a result, attention at the local level tends to focus in tangible aspects, notably attracting a new business facility (retail, office, industrial) that may increase the local floorspace used to employ people and generate GVA. Awareness of any subsequent dissipation of key economic impacts is limited or non-existent as this requires sophisticated econometric analysis over a long timeline.

However, local consultations were able to reveal concerns over unhelpful ‘clashes’ between the (what this report terms) ‘close proximity’ effects considered by the distance-decay based econometrics and other drivers of economic performance (the far more spatially extended effects associated with travel within the region (e.g. to a regional airport of major shopping centre) and of course the general network-level effects associated with use of the Strategic Road Network (SRN). Traffic congestion, and its costs, can be a product of how these three domains interact with each other (e.g. success in boosting travel at a regional ‘hinterland’ level

can create unexpected local congestion. These are, in effect, benefits dissipation effects caused by factors broader than those considered by traffic modelling per se.

One key caveat to this finding is of course that the econometric analysis was only able to consider impacts on labour productivity (and in the specific form of GVA per worker) rather than the broader Total Factor Productivity (TFP) aspects of economic performance. This is due to the data limitations faced in estimating TFP at the granular level required for spatial (distance-decay and accessibility based) econometric analysis. For highly capital-intensive industries (e.g. a major chemicals processing plant) employment levels may be modest, GVA per worker very high (but not particularly relevant to overall business productivity), whilst inward road (and rail) freight reliability may be very important given the costs of disruption to capital-intensive continuous flow production processes (especially if a temporary plant shutdown is required).

For reasons outlined in this report, there are plausible casual links between the ways in which road enhancements improve freight travel times and, most importantly, arrival predictability, and facility-level productivity performance. Consequently, efforts were made during the later phases of the case study consultations to capture some insights into this aspect of economic performance impacts. These consultations were informed by considering how road enhancements can improve industrial floorspace utilisation, for example by releasing factory floorspace from storing inventories for use in value-adding activities, in so doing increasing GVA (and potentially employment) per unit of factory floorspace.

4.3 Improving the analytical links between individual and portfolio-level assessments

One potentially useful aspect of this study relevant to both portfolio-level and individual appraisal work is that Local Authorities' scheme business cases emphasise how improved road connectivity, reduced travel times and congestion can help to facilitate land use changes via new investments) and associated increases in employment and, hence increases in Gross Value Added (GVA). The anticipated new business floorspace is stated as intended outputs from the road enhancement(s). Local planners also use national data on anticipated FTE employment relative to business floorspace to forecast employment impacts. These estimates differ widely by type of business floorspace and are periodically reviewed via government-funded survey work.[7]

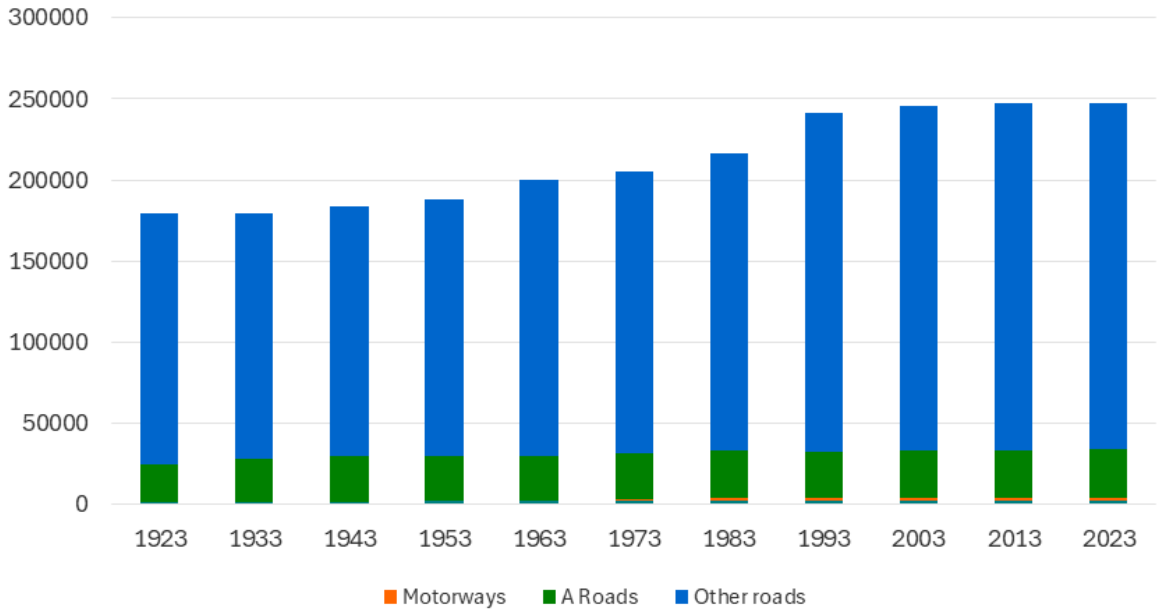
Given that many economic activities require business floorspace to generate GVA, and employment this provides a potentially useful 'anchor metric' to use in both portfolio-based econometric work and for analysing and predicting individual scheme performance. Consequently, business floorspace provides an analytical link between local-level individual schemes and portfolio-level analyses (including econometric work).

4.4 A network economics perspective on proximity to scheme-based economic impacts

[7] See for example: Employment Density Guide 3rd Edition

Road networks in advanced industrial economies develop broadly along familiar 'S-curve' pathways – an initial relatively slow growth, a major growth phase during which the bulk of the network is built and then a slow or stable 'asymptote' phase with little or no expansion in the road network. The following chart summarises the development of the UK road network since 1923 in ten-year segments. This chart shows how the road network has essentially remained at the same size since the mid-1990s. The 'other roads' component summarises all minor roads (classes B, C and U).

Figure 4.1: General development of the UK road network in miles (1923 to 2023)



Source: DfT dataset: RDL0103: Road length (miles) by road type in Great Britain, 1914 to 2023

In this developmental 'S curve' context it is also relevant to note that the technologies used to build and maintain roads themselves (rather than the electronic systems used to monitor and control traffic on roads) may also have reached an asymptote in the sense that there has been relatively little change over the post-war period. We return to this technological change aspect below.

One thing that stands out is the dominance of the complex network of 'other roads', which can be thought of in 'fractal' mathematical terms as the plethora of small connections via which road traffic starts and ends journeys. Rather like the fractal structure of mammal lungs, the functionality is split between movement via the major high-capacity conduits handling longer-distance traffic (A roads and motorways) and the part of the network that interfaces with where people live and businesses operate (the equivalent of capillaries). Hence, the part of the road network that interfaces with where people live and businesses operate must account for a large share of the overall size of the road network.

This interface component comprises 87 per cent (by miles of road infrastructure) of the UK road network and the remaining 13 per cent is made of motorways and A roads. This balance raises some interesting and important issues regarding road infrastructure maintenance and

replacement costs. If maintenance spending is insufficient then over three-quarters of the road network risks deteriorating (the often flagged ‘pot holes’ problem), in turn speeding-up decay and pushing-up major replacement and repair costs. Reflecting the ‘fractal’ aspect, the road quality challenge must deal with a vast number of small-scale maintenance challenges dispersed across the nation.

From an economic impact perspective both functional groups are of course very important, in systems performance terms road traffic requires both the ability to travel from the key nodes that link motorways and A roads (the longer distance journeys) and also the interfaces with where people live and businesses operate – a highly complex set of shorter and narrower roads without which the road network would be less useful.

4.5 Implications for understanding economic benefits

This functional distinction in conjunction with the long-term developmental pattern of the road network as a whole (currently in asymptote status) as implications for how we understand and measure economic impacts.

Firstly, distance-decay/proximity driven economic impacts will tend to rely on the existence of the complex interfaces with where people live and businesses operate, a bypass, tunnel or junction improvement creates benefits because it improves the links between these interfaces and the rest of the road network (less congestion, faster overall journey times, better predictability of journey time etc). This means that the new investments in road enhancements leverage both the existing accumulated investments in the interface component of the road network and the longer-distance transit component (essentially the strategic road network).

In a nutshell, these network level effects mean that adding more nodes and links to a network at the margin can have a dis-proportionately large effect on the accessibility functions and benefits across the whole network. Studies of economic benefits assessments demonstrate that cutting off benefits via using arbitrary spatial boundaries (scheme proximity) can severely limit the value of the benefits that result -network-level benefits arise at the overall system level.

Current traffic modelling methods consider, in some detail, the relationships between each scheme(s) traffic flow characteristics not just in relation to local and more spatially extended geographies but also in terms of network-level effects, treated as the complex set of traffic flows between the location being considered and all UK regions (treated as zones) at a less granular level. Hence, modern traffic flow analysis and modelling provides a useful balanced assessment that considers all relevant spatial connectivity aspects. [8]

Secondly, perhaps less at front of mind for analysts and policymakers, is the implications of where we sit on the developmental S curve. In a developing economy, there is likely to be a

[8] See for example the assessment of the Lower Thames Crossing: TR010032-001345-7.7 Combined Modelling and Appraisal Report - Appendix B - Transport Model Package.pdf

significant return on investment in better transport infrastructure simply because an asset is being created that did not previously exist – with consequent benefits for travel time, reliability and onward extended connectivity. As the development process enters the steeply rising phase of the S-curve this return on investment will strengthen through network connectivity effects – as the network gets larger all those with access to it (a growing number each year) will benefit in a collective manner. Importantly, these are not just proximity to scheme/distance-decay effects, they are generalised across the network. Once the asymptote phase has been reached in the status of the road network, all users stand to benefit from the existence of the road network (and its inter-model connections) on a collective basis. A key policy challenge becomes the effective maintenance, repair and marginal connectivity improvements of this large road network, and if such investments are not adequate relative to needs, the road network's ability to support and catalyse economic activities will decline.

If this is an accurate summary of the situation, the relative ease of conducting distance-decay econometric analysis based on an assumed localised impact should be complemented by a greater emphasis on entire road network-level analysis of system accessibility. This would be more technically (and computationally) demanding and may require advanced AI and machine learning tools to be used.

4.6 General public policy implications

A modern economy relies on an affective (fast, cheap and reliable) transport system whose use-value stems from the scope/depth (minimal non-connected places) and the efficacy of its core high-throughput major arteries. This means that every investment in road enhancements makes a marginal contribution to the economic utility of the entire network and that the economic benefits tend to be collective (via network economies) as well as localised.

From this perspective, the dissipation of any initial economic performance benefits (GVA, employment, GVA per worker) revealed in the EPIRE econometric results does not imply that the returns on investment are limited and lower than expected, only that we have been taking too narrow a view on where to look for this the returns on investment. As a complex system, the road network benefits from investments that increase its complexity via improving its scope scope/depth (minimal non-connected places) and the efficacy of the core high-throughput major arteries that link there interfaces together.

Once (largely) built, this network economics aspect also highlights the importance of adequate maintenance and repair spending, and investments in network-level system optimisation as this limits the functional decay and extends the life of the network as a national asset. From a 'whole system' perspective the benefits and costs of asset value maintenance points to increasing the emphasis on asset life cycle cost considerations. Notably, spending more on higher quality and longer-lasting/more resilient road surfaces that reduce the general costs of future road traffic disruptions,

Indeed, any future mission-driven policy stance on transport infrastructure could highlight the potential of future innovations in materials and construction methods, digital systems, electricity

transmission etc to maximise road network asset value in an overall life-cycle sense. This would involve considering how future technological advances could provide a more resilient and more network flow optimised asset that we currently possess.

Unless optimal investment and an associated network-level innovation emphasis takes place, aggregate economic performance will be negatively impacted. Hence, there is a logical symmetry between avoiding being overly focussed on the localised positive economic impacts of road enhancements (and under-playing the whole-of-network driven benefits),the negative consequences of insufficient spending on maintenance and renewals and how capital spending caps may result in higher traffic disruption costs over the long-term that could be avoided if we spent more on well-targeted road construction and on innovation-driven maintenance and renewals,

For an established road network, the marginal benefits (in the avoidance of the economic damage created by a decaying road network) may exceed those generated by road enhancements. Adequate spending on maintenance and repairs, innovation enabled where possible, becomes an economic security issue. There is a risk that any over-emphasis on localised economic benefits in investment appraisal methods relative to network-driven benefits will contribute to amplifying this risk to economic security. It directs attention away from the important network effects (which can be both positive and negative).

4.7 Specific implications for the EPIRE study

Recognition of the network-level effects highlighted in this contextual section led to the decision to carry out an experimental effort as part of the business survey to determine whether data on freight supply chain connectivity can, in principle, be collected. The aim being to highlight the potential to improve understanding of these more geographically-dispersed aspects of road enhancements.

5 The Theory of Change/logic model developed for case study level analysis

5.1 The purpose of this section of the report

As stressed in the introduction, a suitably detailed logic model can provide a useful means of collating and making sense of the findings from scheme case studies conducted by different researchers and contractors. At present there is a risk that some useful information is being generated but under-used because it is not being fed-into an over-arching general analytical framework able to identify patterns (and, perhaps most importantly) any historical changes in these patterns). Given the potential advantages of possessing an over-arching general analytical framework of this type, the EPIRE case study workstream made an effort to progress the development of such a framework.

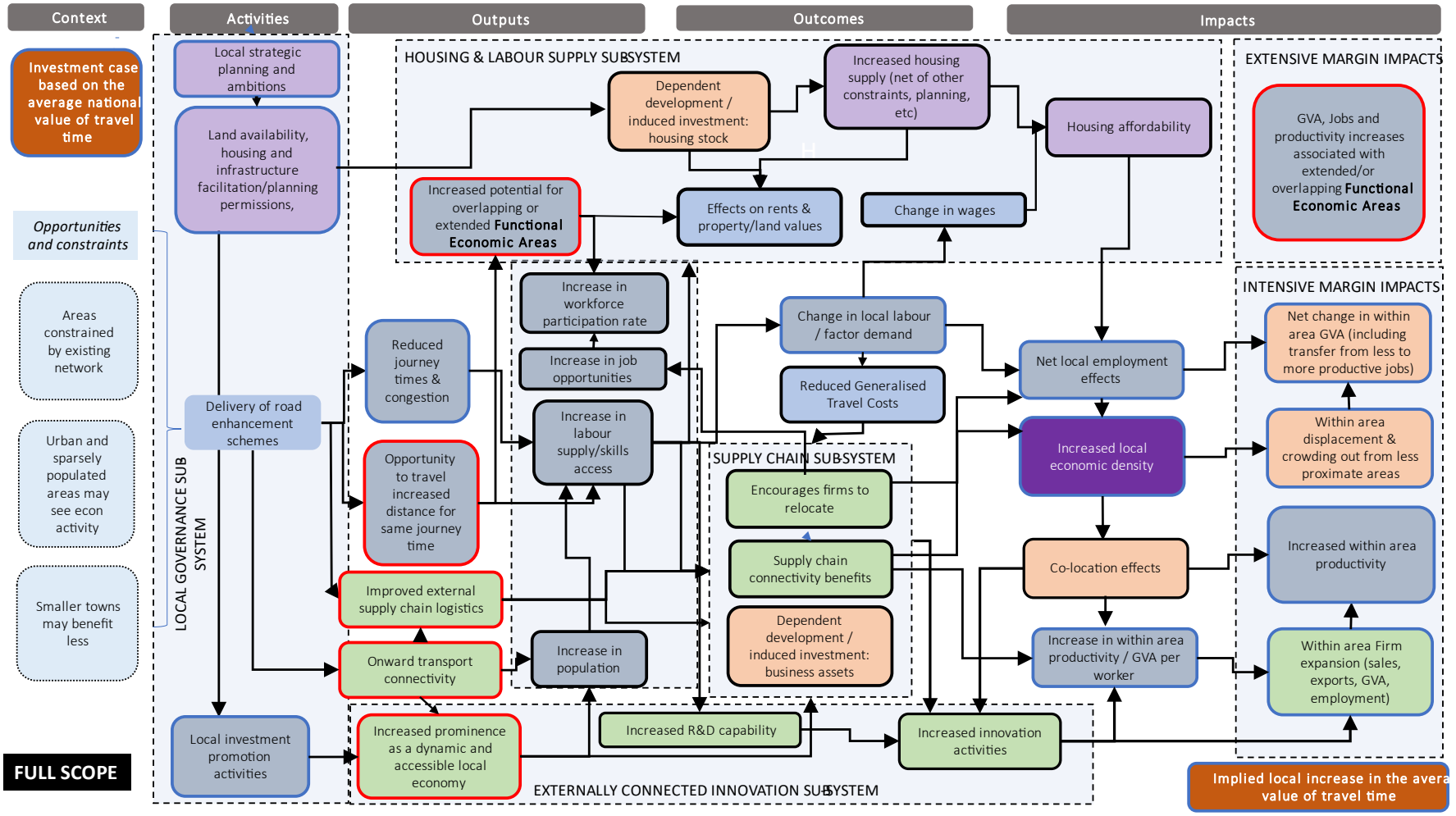
Whilst the original EPIRE scoping report emphasised developing a discreet logic model for each case study, recognition of the importance of using this study to provide a general comparative analytical framework for case studies in the future led to an emphasis being placed on using a generic logic model to compare and contrast discrete schemes. In other words, expressing the distinctive features of schemes via differing emphases on the causal links using a generic logic model. This approach should help future case study analyses to contribute to a single shared comparative understanding.

The starting point was the original logic model developed in the EPIRE methodology scoping study and then used to organise the econometric analysis in this project This was then organised slightly in order to draw attention to the key findings from the econometrics that, if economic performance impacts are to be observed (see figure 4.1):

- An area's economic performance must be constrained by the existing road network;
- Urban and sparsely populated areas stand to gain the most, and;
- other types of 'in between' areas such as smaller towns less so.

The logic model distinguishes between intensive margin (red border items) and intensive margin effects (blue border items), and combined effects (in a black border). These distinctions highlight the ways in which road enhancements can increase the spatial size of a functional economic area/geography by allowing for a greater distance of travel for a given journey time. Consequently, any extensive margin effects can strengthen agglomeration-driven benefits by increasing their geographical scope.

Figure 5.1: The detailed generic logic model developed for the case studies



Source: Ipsos

The logic model highlights the following considerations:

- The importance of local strategic planning and ambitions and how this then determines land availability and infrastructure (including via planning permissions).
- Important effects via which increases in the housing stock/supply impact on rents and property/land values, and when combined with changes in wages impact on housing affordability.
- The potential for road enhancements to result in overlapping Functional Economic Areas if journey times result in overlapping commuting radii, thus boosting agglomeration effects.
- Supply chain and innovation related aspects are addressed. These two important aspects inter-relate because the businesses in a given local economy will span those whose competitiveness rests on their ability to participate in more geographically extended supply chain systems (both nationally and internationally) and those that either rely on the local economy who rely largely on customers travelling to their location from further afield. For those businesses that rely on extended supply chain participation R&D and innovation performance can be key to winning and retaining business in the supply chains they trade in. This is why innovation and supply chains are linked in this part of the logic model. Network-level effects are of course extremely important in this regard.
- A more traditional travel time-based component in the central region of the model. This is driven by the combined ability to benefit from reduced travel time and congestion disruption within a given geographic area and an ability to travel further for a similar journey time. This contributes to the population, labour supply and workforce participation rate aspects and consequent net employment effects, economic density and co-location benefits.

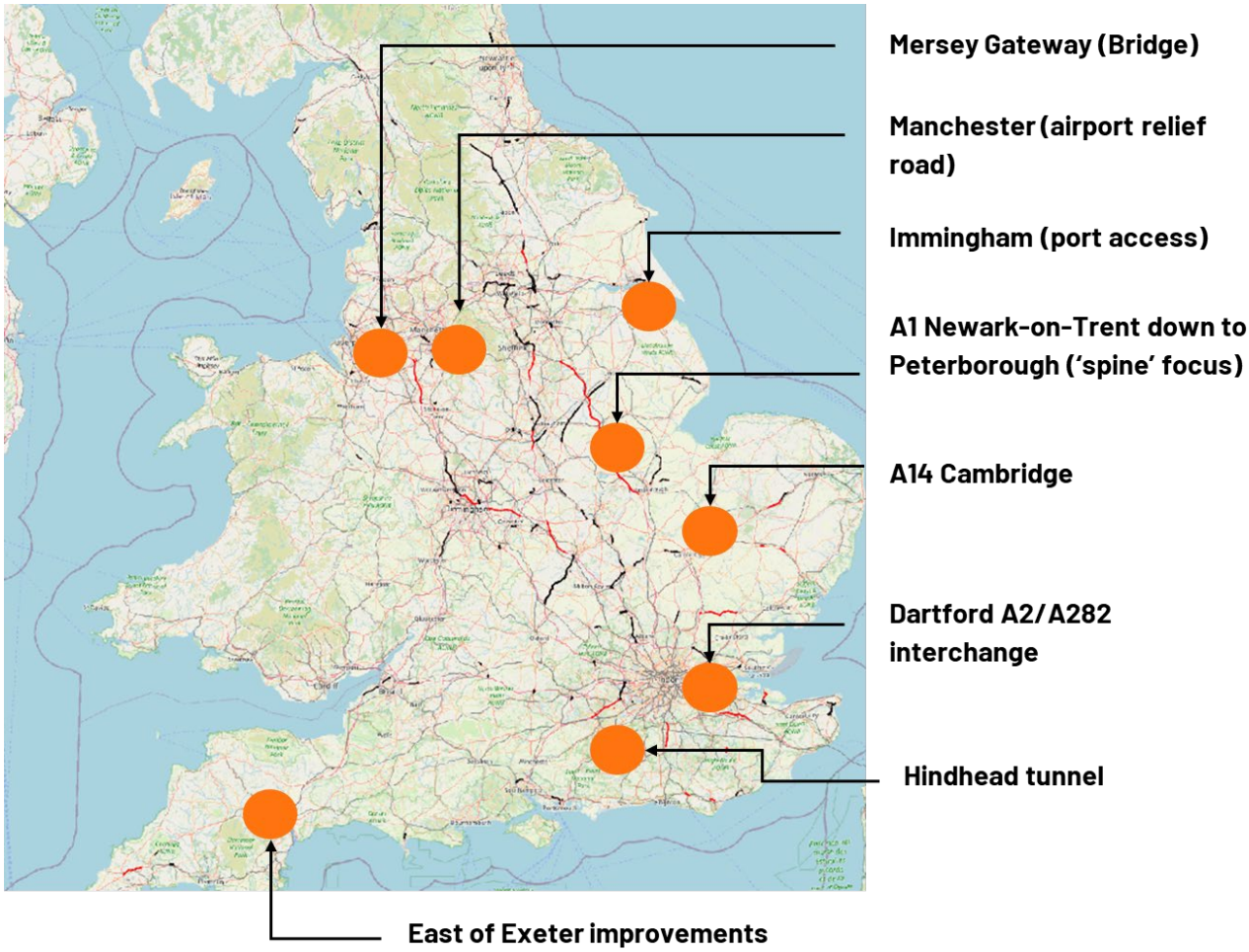
These more complex logic models include some elements that are hard to measure (and that may not even be possible to measure quantitatively) in an evaluation context, but that are important *ex ante* when developing business cases that require aspects such as strategic fit to be considered.

6 Introduction to the scheme case studies

6.1 Overview of the schemes

Figure 5.1 below, contains a map that overlays the set of road enhancement schemes contained in the EPIRE database with the overall road network. Local Major road schemes are identified in black and National Highways schemes in red. This map helps to highlight the general north-south travel emphasis of these road enhancements augmented by a set of more specific schemes addressing congestion problems.

Figure 6.1: The coverage of the EPIRE scheme portfolio in geographical context



Source: Ipsos using DfT data

6.2 Scheme selection

The first step taken was to draw-up a long list of scheme case studies using the EPIRE Scheme documentation summary spreadsheet to identify the most promising schemes based on their characterisations.

This yielded the following subset counts:

- Schemes opened between 2007 & 2017 (n=136)
- Schemes opened between 2007 & 2017 AND with Business Activity objectives (n=62)
- Schemes opened between 2007 & 2017 AND with Job Creation objectives (n=53)
- Schemes opened between 2007 & 2017 AND with Productivity Gains objectives (n=32)
- Opened between 2007 and 2017 AND Job Creation AND Business Activity AND Productivity Grains (n=23)

Given that twenty-three schemes opened over this time period that are marked as addressing Job Creation, Business Activity and Productivity Gains this provided a reasonable basis for a scheme long-list. Annex A on scheme selection contains a table summarising the characteristics of this long list of schemes.

6.3 Key features and comparisons

The following set of ‘fiches’ provide an easily digested summary of each of these schemes, and include a summary on the findings on economic impacts. These are discussed in greater detail from section 7 through to 13.

Figure 6.2: Mersey Gateway

Mersey Gateway (2017)

The Mersey Gateway Project involved the construction of a new 2.5km bridge across the Mersey, regeneration of the local area of Halton, refurbishments o f the nearby Silver Jubilee Bridge and improvements to the existing A533 and junctions linking to the M56 in the south.

Key objectives of the scheme

• Relieve congestion (specifically on the nearby Silver Jubilee Bridge)

• Improved accessibility to local development sites and regional growth opportunities

• Improvements to public transport links across the river and improve incentives for alternative transport opportunities (walking, cycling)

• Improved air quality and enhance the local urban environment

• Improved transit reliability + improved access both locally and wider region + Long term regional regeneration

Pre-construction estimates of benefits

• 4,640 jobs created through regeneration, inward investment and result of operation of the Mersey Gateway

• £61.9 million a year in GVA due to job creation by 2030

• Improved transport reliability

• £39 million in accident costs prevented (estimate)

• 80% reduction in traffic on Silver jubilee

• A Major new transport network linking Liverpool city region with the rest of the North-West and the rest of the country

Attributable economic impacts

Unclear at present due to complications created by COVID-19 over the impact timeline + other contextual aspects. Some positive anecdotal evidence on business & investment attraction.



Figure 6.3: A6 Manchester Airport Relief Road (now usually referred to as the A555 addition)

A6 to Manchester Airport Relief Road (2018)

The A6 to Manchester Airport relief road scheme is situated south of Manchester between the M56 and the A6 and below the M60. The scheme involved the improvement/construction of 11 junctions and 4 railway crossings, in addition to a segregated cyclist and pedestrian access system. £290m.

Key Objectives

- Increase employment and generate economic growth due to better connectivity
- Boost business integration and productivity by improving the reliability of the road network
- Reduce the impact of traffic congestion for local communities
- Promote fairness through job creation and the regeneration of local communities
- Support lower carbon travel through improved availability and safety of lower carbon mobility
- Improve the safety of road users, pedestrians and cyclists

Estimated benefits

- Efficiency: £858 million in total economic efficiency improvements (majority arising through traffic congestion relief)
- Output: £2,492 million output increase over 60 year appraisal period
- Employment: creation of 5,450 new local jobs
- Value for Money: high benefit-cost ratio of 5.06

Local economy – North West

- Manchester Airport is the largest outside of the South-East and is a key travel hub and international Gateway.
- The scheme was seen as a key part of the South-East Manchester Multi-Modal (SEMMM) Strategy Refresh.

Attributable economic impacts

It was not possible to identify robust attributable economic impacts as too many other factors are at work in this major urban area. Local views were positive on economic impacts, and reflected the importance of this scheme to helping the airport to benefit from its 2-hour travel time radius catchment area.

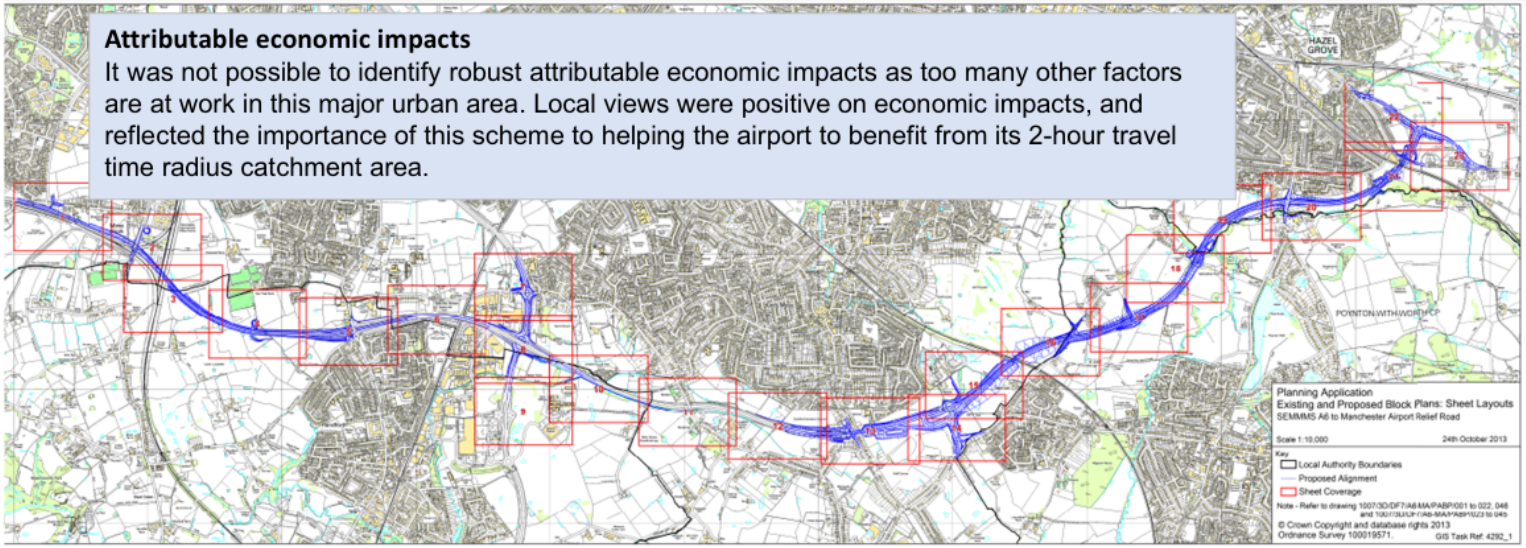


Figure 6.4: Immingham port link roads

A18-A180 Link (Immingham) and A160/A180 Port of Immingham Improvement (2016)

Two complementary schemes opened in 2016, aimed at supporting the growth of the Immingham freight port and the surrounding industrial area of the South Humber.

Key Objectives A18/ A180

- To provide better port access from Rural Lincolnshire
- Improved journey times for commercial transit
- Removing HGV travel from Immingham town centre
- Reduce "rat-running" through Stallingborough
- Air Quality Improvements

Key Objectives A160/A180

- Reduced congestion to and from the port
- Improve journey time reliability
- Improved safety for road users and local residents
- Increased Port access/usage
- Improved reliability of travel
- Improvements to local economy

Local economy

Immingham is the largest freight ports in the UK (by tonnage), with 56 million tonnes of goods travelling through the port in 2019. The port contributes roughly £460 million a year to the local area.

Estimated benefits

- The key economic benefit of these schemes is to improve access to the port of Immingham, in turn increasing demand for the port and greater usage. It was estimated that this would have multiplier effects throughout the local economy.
- Improved reliability of travel is also likely to be beneficial for residents and businesses and increase incentives for investment in the area.
- Improvements to air quality, safety, and congestion in Immingham and nearby towns of Stallingborough are likely to improve the lives of local residents



Attributable economic impacts

It was not possible to identify robust attributable economic impacts as too many other factors are at work in this area. Local views were positive on economic impacts however, and stressed 'strategic fit' aspects (how these two schemes contributed to general economic development ambitions and efforts).

Figure 6.5: Hindhead improvement

A3 Hindhead improvement (2011)

The scheme provided 6.5km of dual carriageway including a 1.9km twin-bored tunnel, under the Devil's Punch Bowl and 8 new bridges of different types along the A3.

Key objectives

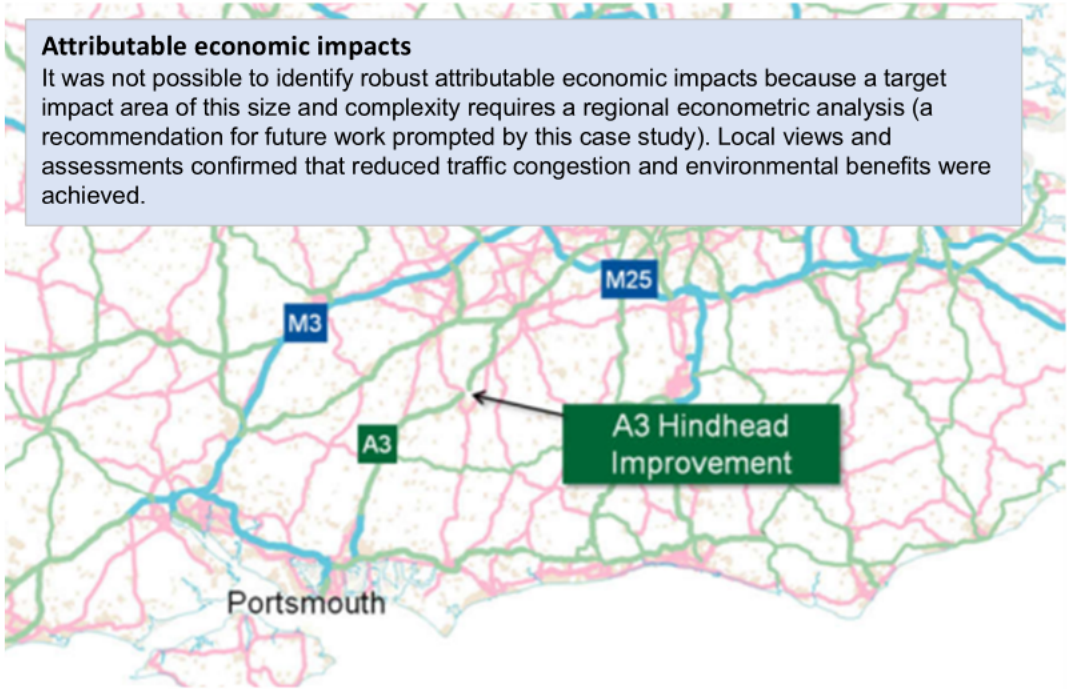
- Improve journey time reliability for users of the A3 and other surrounding roads.
- Improve Hindhead village by substantially reducing through traffic and rat running on minor roads leading to improved local air quality, less noise, reduced severance of communities.
- Reduce the numbers of collisions.
- Provide substantial environmental benefits by changing the route of the A3.

Economic performance

- Benefit Cost Ratio of (2.2, 2.4) (depending on whether indirect tax revenue is treated as cost or benefit)
- Journey time benefits: £808.8m
- Safety: £5.2m
- This benefits estimate involves large scale decreases in traffic flows through the de-trunked road (important for congestion through Hindhead and rat running). There were also increases in vehicles flows on the A3, by around 59%, with around 50,000 vehicles observed on the A3 north of the A3 tunnel and 42,000 to the south of the A3 scheme.

Attributable economic impacts

It was not possible to identify robust attributable economic impacts because a target impact area of this size and complexity requires a regional econometric analysis (a recommendation for future work prompted by this case study). Local views and assessments confirmed that reduced traffic congestion and environmental benefits were achieved.



Local economy

The A3 is the main strategic connection between greater London and Portsmouth, passing through some significant environmentally sensitive areas including the Surrey Hills area of Outstanding Natural beauty.

Figure 6.6: Cambridge A14

A14 Huntingdon to Cambridge (2020)

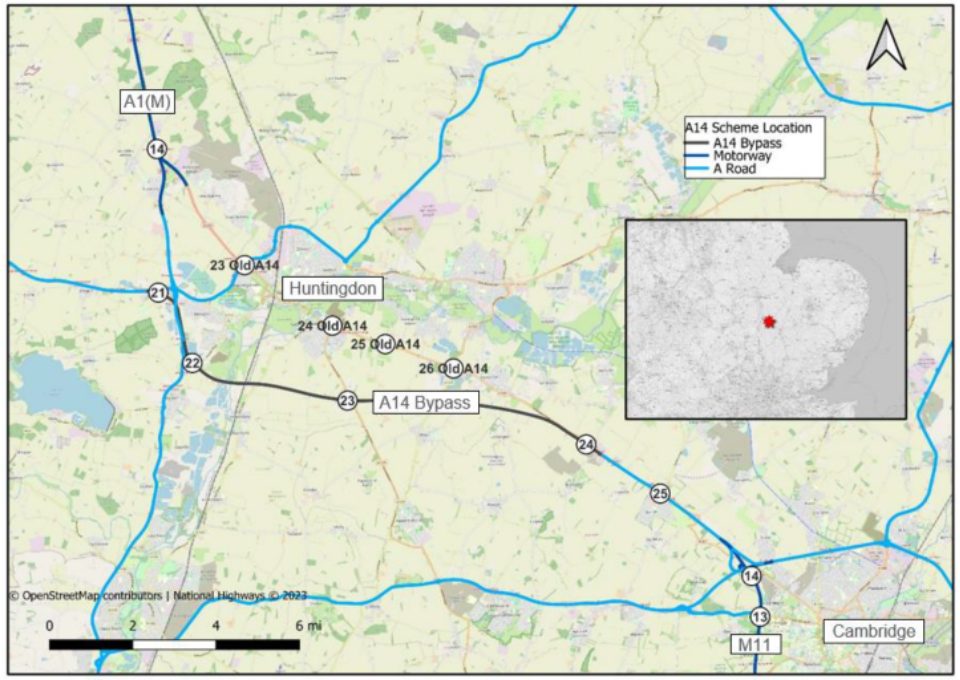
The A14 is a key transportation link connecting major cities, towns, and regions in the UK. It plays a crucial role in facilitating trade and logistics, particularly as it connects the Port of Felixstowe, one of the country's busiest ports, to the Midlands and other inland areas.

Key objectives

This section of the A14 suffered from congestion and unpredictable journey times, which led to delays for both local and long-distance travellers, with traffic merging/diverging with the A14 carriageway from important routes including the A1(M) and M11. By improving this section of the A14, the scheme aimed to improve journey time reliability and contribute towards the region's local economy.

Key benefits

		Monetised Value, m	
		Initial BCR	Adjusted BCR
Total Present Value of Benefits		**£1,792.0**	**£2,730.0**
Costs	Operating Costs (Capital Costs of Maintenance)	-£139.5	-£139.5
	Investment Costs	£1,169.3	£1,169.3
Total Present Value of Costs		**£1,029.7**	**£1,029.7**
Benefit Cost Ratio		**1.7**	**2.7**
Value for money category		Medium	High



Local economy

- Combat congestion, making the A14 more reliable and providing capacity for future growth
- Unlock economic growth, both regionally and nationally
- Improve local connectivity and improve the local network for all types of road-user.

Attributable economic impacts

Too early to determine robust attributable economic impacts (the scheme was selected to provide a recently opened example and benefit from the 1 year POPE + assessment). Local views were positive on economic impacts, including benefits for businesses.

Figure 6.7: Dartford M25 access improvements

A2/A282 Dartford Improvement (2007) & M25 Junction 1b to 3 Widening scheme (2008)

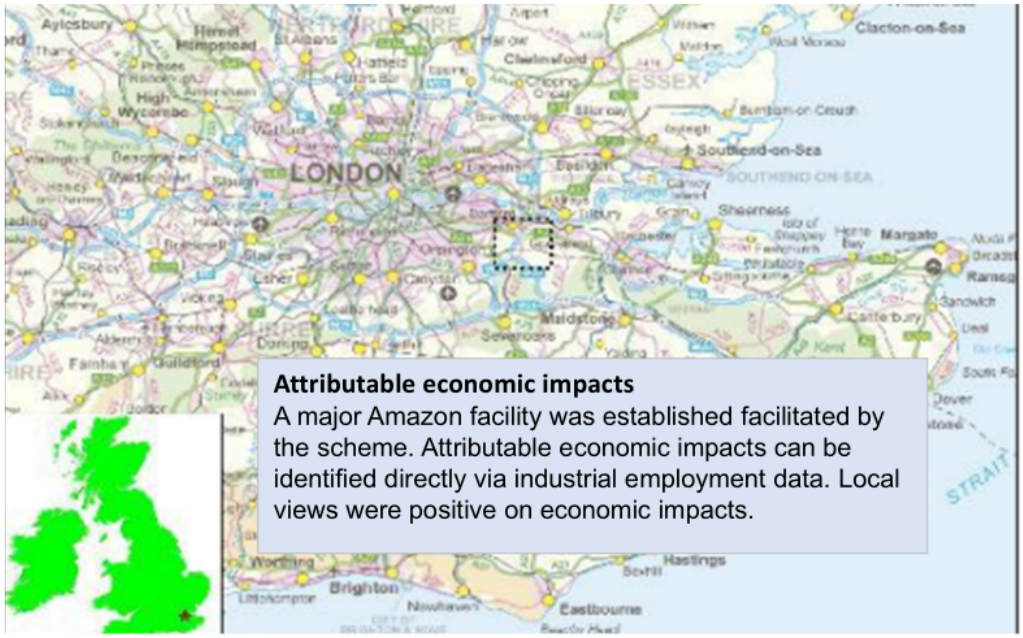
The A2/A282 Dartford improvement scheme includes the construction of two new viaducts, linking the M25/A282 to the A2 both westbound and eastbound, a new free flow slip road for travel from the A2 westbound and a widening of the A2 from three to four lanes in each direction between the M25/A282 and the Bean junction. The M25 widening involved widening to four lanes in each carriageway, from junction 3 to 2, and a widening to three lanes in each carriageway from junctions 2 to 1b.

Key objectives

- Improved travel reliability
- Significant regeneration of the Kent Thames-side area
- Facilitate access to Ebbsfleet International
- Limit environmental impact of scheme

Economic performance

- Cost benefit ratio of 1.2 [1.6 (A2), 0.5 (M25)]
- Journey time benefits of (£149.6m, £56.7m) for (A2, M25)
- Safety Benefits of (£10m, £27.8m)
- Both schemes were intended to have had a beneficial impact on access to employment opportunities in regeneration areas, Ebbsfleet International Railway Station and retail facilities at Bluewater shopping centre.



Local economy

- The M25 is a key artery in the UK and London, and is the busiest orbital motorway in Europe.
- The position of the scheme is strategically important as it is a gateway to other road networks across the south-east, such as the M20, M26 and A2.
- In addition to this just north-east of the scheme is the Bluewater shopping centre, which caters to over 27 million customers a year and employs over 7,000 people.
- East of the scheme lies Ebbsfleet International Railway station, with domestic and European rail links (currently suspended but may be re-instated)

Figure 6.8: East of Exeter Access Improvements Phase 2 (2012)

East of Exeter Access Improvements Phase 2 (2012)

The M5 Junction 29 (J29) improvement scheme is one of the many projects that have been delivered as a result of the public and private sector investment in the Exeter and East Devon Growth Point.

Key objectives

The improvements to junction 29 were expected to unlock 20,000 new homes and over 25,000 jobs in the East of Exeter Growth Point area by 2026

No GVA impact estimates were provided

Attributable economic impacts

Attributable economic impacts were identified in the 5-year POPE assessment. This identified business floorspace and associated employment increases. New housing developments (also an intended scheme impact) are also evident, though attribution to the road scheme less clear. Local views were positive on economic impacts



Local economy

- The was scheme intended to provide direct access to the Science Park adjacent to the M5 which is expected to attract new businesses into the area as well as encouraging growth of existing businesses.
- The road improvements were also intended to facilitate Exeter airport-driven local economic growth and the building of an inter-modal freight terminal

Figure 6.9: A1(M) Spine (Peterborough, Newark & Sherwood and South Kresteven)

A1 Spine: Peterborough, Newark & Sherwood and South Kresteven (2009)

Improvements to a 73 mile length the A1 trunk road in the East Midlands (the case study focussed on a 43 mile segment of this scheme and explored the use of satellite images to inform the analysis)

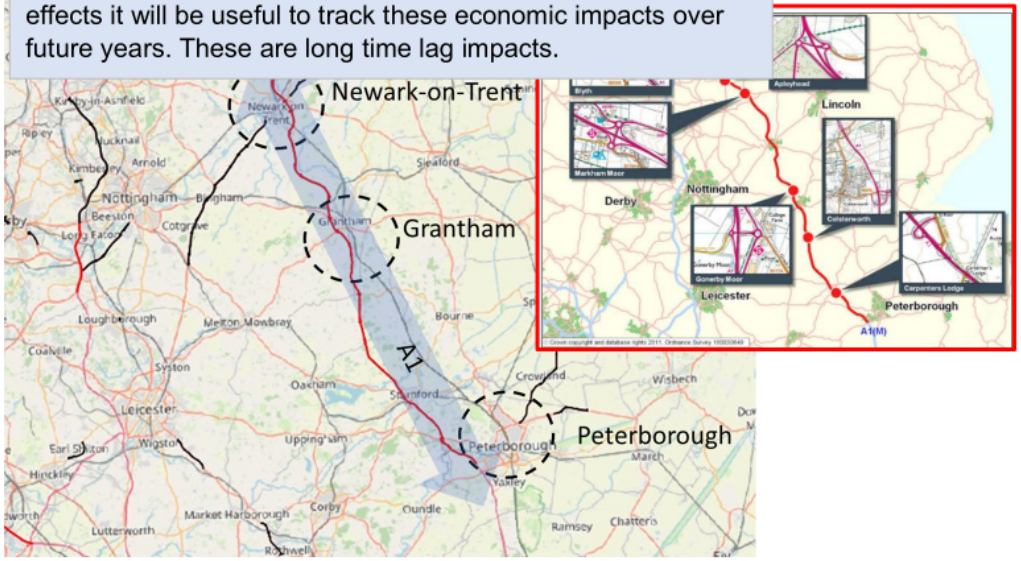
Key objectives

The A1 Peterborough – Blyth Grade Separated Junctions scheme is a major Highways England scheme to improve a 73 mile length the A1 trunk road in the East Midlands at Blyth, Apleyhead, Markham Moor, Gonerby Moor, Colsterworth and Carpenters Lodge. The scheme involved the construction of six new two level junctions, resulting in the removal of all the at-grade roundabouts on this section of the A1. The A1 improvements were carried out by Highways England to reduce congestion and accidents at these junctions. The schemes were appraised separately and have separate Appraisal Summary Tables (ASTs).

All monetary values in £m 2002 market prices, discounted		Forecast	Outturn re-forecast
Present Value Benefits	Journey Times	£1023.8 m	£397.1 m
	Vehicle Operating Costs (VOC)	-£6.7 m	-£8.2 m
	Safety	£42.6 m	£17.4 m
	Indirect Tax	£1.3 m	£1.6 m
	Total	£1061.0 m	£407.8 m
Present Value Costs		£66.4 m	£86.8 m
Benefit Cost Ratio (BCR)		16.0	4.7

Attributable economic impacts

As significant new retail outlet investments are now taking place that exploit SRN connectivity and extended proximity effects it will be useful to track these economic impacts over future years. These are long time lag impacts.



Local economy

- The focus of this case study is on how improvements to a major stretch of the SRN can facilitate an emerging 'linear economy' model in which employment and GVA are generated by the extended proximity and network-level effects associated with attracting major retail and logistics investment along such roads rather than close-proximity effects (aside from workforce access).

6.4 Case study analysis

The following chapters detail each scheme case study's findings. Each scheme-specific chapter contains an analytical summary of the scheme and its impacts and is followed by additional details. This template has three versions of differing detail:

- Detailed case studies with the additional benefit of the business CATI survey (three of these surveys were carried out);
- Detailed case studies without the business CATI survey
- Light touch case studies

This proportionality in reporting is useful because the case studies differ in regard to how much information is available, and what they are able to contribute to the study in terms of generalisable findings and implications for future work. All case study profiles provide a scheme-specific logic model based on the generic model developed above, but adjusting and adding new elements where this is required.

6.5 Summary of cross-case study findings

To re-cap, the specific objectives of the scheme case studies within this remit are to:

- Assess whether schemes have resulted in any changes to local economic performance, whether anticipated or not;
- Understand and demonstrate the mechanisms by which economic performance changes occur;
- Assess the effectiveness and efficiency of processes deployed by scheme promotors to maximise the economic impacts of schemes, and;
- Facilitate the demonstration and communication of the emerging evaluation results to a range of audiences, including policy makers and analysts.

Each of these objectives, slightly re-framed as research questions is addressed in the following four sub-sections. In addition to general conclusions, each response refers to specific schemes were possible. This provides an overview of the key findings prior to engaging with the case studies in greater detail.

6.5.1 Have these schemes resulted in any changes to local economic performance, whether anticipated or not?

Changes in local economic performance are observed across these schemes, but not uniformly and not in a manner that can be related to anticipated local economic impacts (where these are specified). In general, it is clear from examining data on local economic that for these discrete schemes it is rare to be able to easily identify attributable local economic impacts. Within this sample of schemes, and despite the fact that the EPIRE study did not cover schemes with an over-arching regeneration aim, identifiable scheme-level economic impacts were clearest when a regeneration aspect was present (e.g. for Dartford).

Time series data for discrete schemes rarely exhibits shifts that could be attributed to the period after a scheme is opened. In general, and as anticipated in the preceding discussion of methodological challenges, local factors, particularly of a 'strategic fit' nature affect whether or not anticipated benefits are achieved in practice. The impact of other shared, economy-wide, factors also determines whether or not anticipated benefits are achieved in practice (notably the global financial crisis, Brexit and the COVID-19 pandemic).

This challenge contrasts with portfolio-level econometric analysis, which is able to identify statistically significant economic impacts once what are in effect local stochastic aspects have been screened out by pooling data and a large number of schemes.

The Dartford scheme is an example of positive impacts (the scheme helped to attract a major Amazon facility creating 2,500 new jobs and increased industrial floorspace by around 8 per cent). Significantly, planning consent for that development was only granted when the developer agreed to fund an extra lane on a scheme bridge to alleviate congestion risks created by the interaction of local and long-distance HGV traffic at peak times. It is noteworthy that the Amazon facility opened in 2021, 12 years after the 2009 completion of the final phase of this scheme. This time-lag highlights the importance of avoiding examining economic impacts in too myopic a manner (an issue to consider for future econometric studies).

The Dartford scheme is also an example, of negative unintended effects: the intended economic stimulus associated with growth around the Ebbsfleet rail terminal did not eventuate because Eurostar trains ceased stopping there in March 2020. Post-Brexit financial, border control factors and COVID-19 have all been referred to as causing the cessation of that service.

Other schemes, such as the more recently opened Huntingdon to Cambridge A14 improvements, the A1 improvements and the Manchester Airport relief road also highlight the ways in which local and longer distance traffic can interact and cause problematic congestion. This suggests that traffic modelling (which does consider the interactions between various types of traffic that aligns with the emphasis on close proximity, extended proximity and network-level aspects) may still benefit from continued advances.

The assessment of documentation for the case studies highlighted some examples where benefits have been lower than forecast at appraisal stage, or as anticipated in the strategic case. Scheme promoters and appraisers should consider uncertainty in an evidence-based proportionate way, as well as guidance covering optimism bias.

Evidence for displacement effects (for business location and re-location) were found in this evaluation. General local government consultations highlighted that displacement effects are likely to be seen in some cases.

6.5.2 How do these schemes help us to understand and demonstrate the mechanisms by which economic performance changes occur?

The schemes do help us to understand and demonstrate the mechanisms via which economic performance take place. This is reflected in the scheme-specific logic models that draw upon,

and suggest improvements to, the generic logic model architecture discussed earlier. The key impact pathways highlighted relate to housing and labour supply (new developments and improved commuting potential) and to extended proximity and network-level effects. Extended proximity effects, for the schemes we examined, related to customer catchment areas, usually treated as around 2 hours of travel time. Examples are Manchester Airports 'hinterland' (the population, wealth and business composition of which determined airline's interest in using the airport for long-distance routes), and the current major retail outlet developments along the 43 mile section of the A1 that we examined.

6.5.3 How effective and efficient were the processes deployed by scheme promotors to maximise the economic impacts of schemes?

It is easier to judge the effectiveness of efforts to maximise the economic impact of schemes than to draw conclusions on the efficiency of those efforts (which would require access to data on resources and costs not available). As regards maximising effectiveness, these case studies highlight the importance of a strategic intent to actively exploit opportunities to attract investment linked to pragmatic decisions over planning consent. As the attainment of planning consent via a congestion risk reducing co-investment element for the Amazon facility in Dartford highlights, a partnership ethos between local government and business can be key to resolving impediments to benefits realisation. The importance of these local partnerships is an important aspect of Benefits Management to consider in the future (as aspect discussed in the sub-section immediately below).

Scheme promoters should consider which components of TAG, and which appraisal impacts, are most relevant to their scheme They should also ensure to do evidence-based and proportionate analysis of the factors that may reduce level of benefit achieved by the scheme in practice. Furthermore, where possible evaluation findings should be fed back into the approach to appraisal, to aid 'learning-by-doing.'

As DfT explores creating closer links between ex ante appraisal and ex post evaluation, it will be useful to understand further the processes followed at a local level (e.g. Benefits Management, the use of logic models). There could be a more explicit focus in using logic models in business cases that explicitly cover the 'drag factors' that may limit benefits realisation in practice.

6.5.4 What do these schemes tell us about how to facilitate the demonstration and communication of emerging evaluation results to a range of audiences, including policy makers and analysts?

As the discussion of the Hindhead scheme study notes, it would be useful for DfT to consider the technical feasibility of carrying out portfolio-based econometric analyses at a regional level. The Hindhead scheme, which addressed traffic congestion on the London to Portsmouth route, is an example of a scheme that aims to generate broad economic benefits in a geographically dispersed manner. Whilst technical challenges exist in how/where to define regional boundaries for regional econometric studies, such work would align with the government's interest in establishing broader regional 'compacts' or local authorities in the post-LEP era. Given that any

increase in the geographical scope of an economic impact evaluation increases the likelihood of capturing any within region displacement effects this would be an additional benefit.

This type of broader regional analysis would avoid the limitations of discrete scheme level evaluations, and be more likely to reveal and demonstrate economic performance impacts via considering the full range of impact domains emphasised by these case studies: close proximity effects, extended proximity effects and network-level effects. These three distinctions are useful for communicating evaluation results to a diverse audience because they can be grasped conceptually, communicated visually (for close and extended proximity effects), and can capture the full range of impact pathways – both analytically (although new econometric methods would need to be developed as noted in the Lessons Learned report) and in terms of explanatory narratives ('stories') that communicate the findings.

It could be useful for the presentation of data in POPE assessments, to include graphs of how effects evolve over time, alongside presenting data in tables. Drawing attention to this aspect of timelines is useful because it helps show how long-lived the economic impacts are and helps with comparisons to the econometric analysis. For stakeholders with less technical familiarity with statistical methods and significance, viewing timeline-based data may help to better communicate findings, and draw attention to important of benefits realisation.

As DfT is refining updated guidance on benefits management and M&E methods it is useful to draw-out the implications for benefits management as well (that is to say for the non-counterfactually based monitoring methods that can be used more frequently and inform decision-making over benefits maximisation).

Finally, as the following discussion of a map of house price changes and (all assessed) scheme locations makes clear (see figure 5.10, below), maps of an analytical nature provide an effective means of communicating evaluation results to stakeholders – at both central and local government levels.

6.6 The case studies and general patterns in house price changes

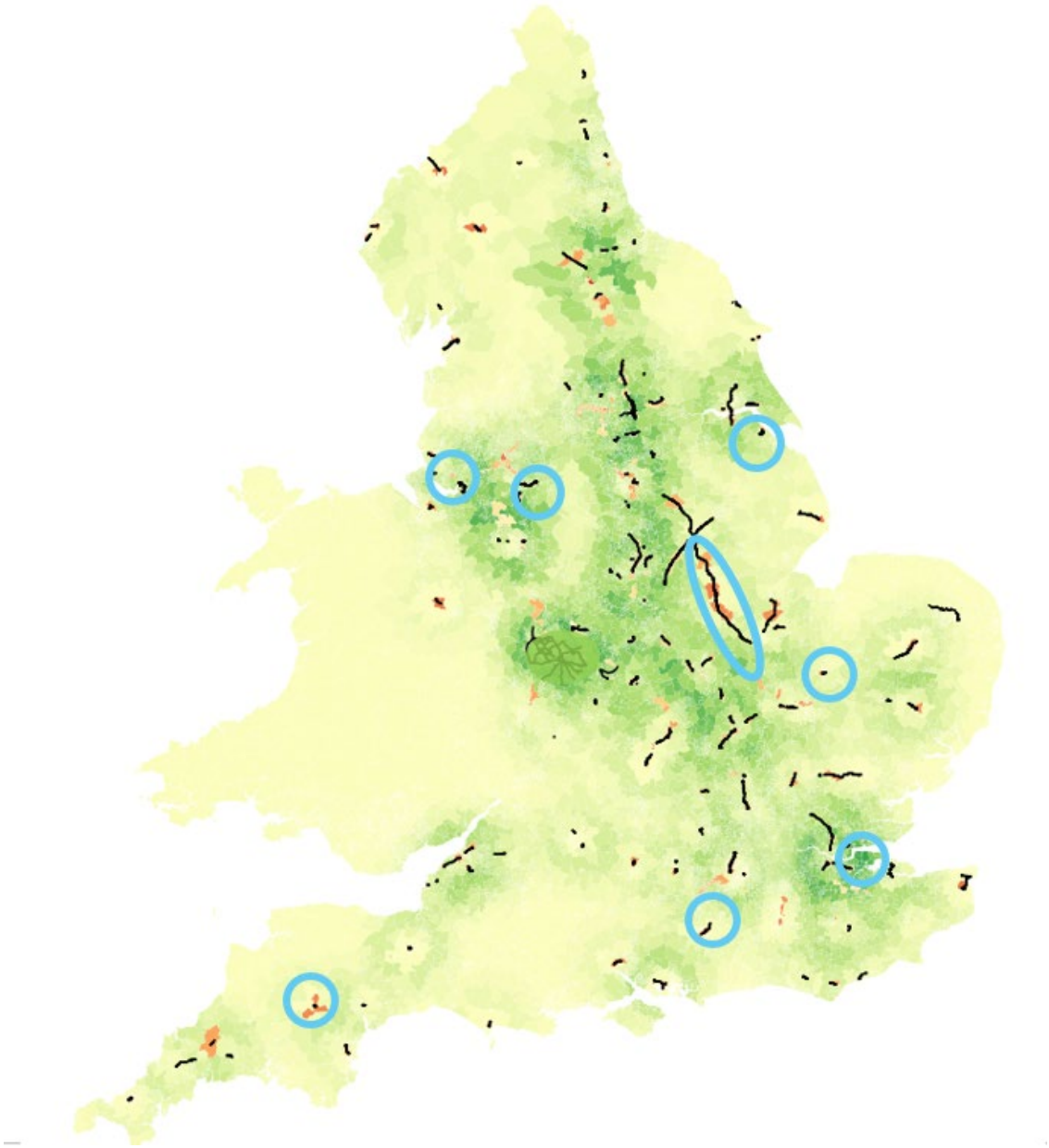
Given the recognised relationship between transport infrastructure improvements and property prices (which reflect the combined impact of a range of factors, direct and indirect in causal terms) it is useful to consider the scheme case studies from this perspective.

Figure 5.10, overleaf, contains a map of the changes in house prices over the period 2001 to 2023 related to all the road enhancement schemes examined in the econometric analysis, with the scheme case study areas highlighted. Grean areas have experienced house price increases and red areas house price decreases. The map was generated using Land Registry Price Paid Data as part of the econometrics workstream using estimates of the percentage change in the average sale price of houses in LSOAs within the specified distance bands of schemes used in the econometrics.

The map is useful context for any case studies because it highlights the general pattern of house price decreases immediately adjacent to schemes and house price increases in areas

that stand to benefit from improved road networks. Indeed, the pattern is striking and powerful as regards communicating this aspect of economic impacts.

Figure 6.10: House price changes and scheme location



Source; Ipsos using Land Registry Price Paid Data

The most note-worthy aspects are the clear reduction in house prices along the A1 ‘spine’ case study and the general North to South pattern in central England and the Midlands. Of course, other factors are also responsible for house price changes, but the overlaps with road enhancements over this time period do provide useful general context.

In the context of a suggestion made elsewhere in this report regarding exploring the possible use of regional versions of econometric analyses to address local interests (at the level of several adjacent local authorities with transport and economic inter-dependencies). Mapped

results of this type could provide an easily grasped and communicated basis for presenting some of these results. This suggestion reflects the point that it can be hard to identify the economic impacts of discrete schemes because so many other factors are in-play. The portfolio-level econometric analyses that can identify impacts across a number of schemes may be of more interest to local authorities (and any future post-LEP regional economic growth 'compacts' involving several local authorities) if there is greater 'local depth' to the analysis. This could usefully include looking at how a number of schemes complement each other (currently addressed *ex ante* in traffic modelling but less so *ex post* in the evaluation-based analysis of complex traffics flow patterns). These regional econometric evaluations would be able to examine extended proximity effects in particular, and ideally also network-level effects (the latter using different econometric model structure).

6.7 Comparative summary

The following table provides a comparative analysis of the case studies that highlights the key findings and implications for future work. Whilst the original intention was to use a method known as Qualitative Comparative Analysis (QCA) for this comparative assessment we decided that a more detailed qualitative and nuanced summary was more appropriate as a means of communicating the results.

One of the aspects highlighted is whether a case study-specific framing allows measured economic impacts to be identified directly. This addresses the point stressed in the introduction that portfolio-level evaluation methods may be much better suited to assessing economic performance impacts than discrete case studies conducted in analytical 'silos'. The overall conclusion from this set of case studies is that measured economic performance impacts are only evident in special cases, specifically for places able to leverage a road enhancement to attract a major investment that adds to the stock of business floorspace (and in this case there was no displacement aspect). For other cases and examples, road enhancements play a contributing role but so many other factors come into play that a robust attribution of economic benefits to specific road enhancement schemes would not be robust. Only portfolio-level econometric analysis can provide the necessary robustness via identifying signals in 'noisy' data. Consequently, whilst data dashboards can be developed for individual these datasets are unlikely to be fit for purpose for economic impact evaluations unless complemented by portfolio-level analyses.

Another important aspect relates to displacement. One displacement consideration is whether large logistics facilities are treated as displacement or not. This is not a straightforward matter because major fulfilment centres concentrate what may have been more spatially dispersed activities, in so doing benefitting from economies of scale and automation (e.g., robotic package handling). It is likely that there is a major productivity gain compared to more dispersed activities of that type. The previously more dispersed activities may have been carried out within a large number of manufacturing firms, so potentially displacing those jobs and GVA. However, the complication to the displacement case is that when imports and exports are involved the new facility will mix a displacement effect with a net GVA and employment benefit linked to that additional component of the business driven my international trade.

More generally, when scheme case studies are considered, it is useful to distinguish between what could be termed ‘pure’ displacement (in an HMT Green Book sense) and ‘pragmatic’ displacement. Pure displacement is when a business facility locates at place A rather than place B (and focuses attention on the productivity advantages of being located at place A over other potential locations). Pragmatic displacement is when a business facility re-locates from place A to place B to take advantage of place-specific advantages.

The A1 ‘Spine’: Peterborough, Newark & Sherwood and South Kresteven (part of a longer 73 mile scheme that opened in 2009) was included in order to explore how SRN links can themselves act as growth drivers by attracting investment along these roads (a noticeable feature of motorways such as the M40 with numerous large logistics facilities alongside at various points). This case study also started to explore using satellite imagery as a data source to track land use changes and development activity (noted as a future approach in the econometrics and Lessons Learned reports).

Table 6.1: Scheme case study characterisation

	A2/A282 Dartford improvement: opened in 2009	**Manchester Airport Relief Road (A555): opened in 2018**	**East of Exeter Access Improvements Phase 2 (2013)**	**Port of Immingham (A18/A180 + A160/A180): opened in 2016**	**Mersey Gateway (Bridge) opened in 2017**	**A14 Huntingdon to Cambridge**	**A3 Hindhead improvement (2011)**	**A1 Spine: Peterborough, Newark & Sherwood and South Kesteven (2009)**
Case study type	Detailed	Detailed + business CATI survey	Detailed + business CATI survey	Detailed	Light touch – situational assessment & analytical implications	Detailed + business CATI survey	Light touch - situational assessment & analytical implications	Light touch – experimental consideration of a 40 mile segment on the A1
Findings on the identification of economic impacts	Attributable economic impacts can be identified directly via industrial employment data. Local views were positive on economic impacts. A major Amazon facility was established facilitated by the scheme. This investment attraction was achieved as a result of a collaborative	It was not possible to identify attributable economic impacts as too many other factors are at work in this major urban area. Local views were positive on economic impacts, and reflected the importance of this scheme to helping the airport to benefit	Attributable economic impacts were identified in the 5-year POPE assessment. This identified business floorspace and associated employment increases. New housing developments (also an intended scheme impact) are also evident, though attribution to the road scheme	It was not possible to identify attributable economic impacts as too many other factors are at work in this area. Local views were positive on economic impacts however, and stressed 'strategic fit' aspects (how these two schemes contributed to	It was not possible to identify attributable economic impacts as too many other factors are at work in this major urban area – complicated by the COVID-19 episode (which impacted on toll revenue and required use of the DfT grant to cover anticipated gaps between income and	As anticipated, too early to determine attributable economic impacts (the scheme was selected to provide a recently opened example and benefit from the 1 year POPE + assessment). Local views were positive on economic impacts, including	National Highways requested this as a scheme case study, but it is not of a type likely to generate easily identified economic impacts. This is because the relevant aspects of the investment case pivoted on de-congesting connectivity between London and Portsmouth, (the A3 is now a high standard	This case study explored a different focus: on how SRN links can themselves act as growth drivers. It confirmed this aspect by highlighting how SRN segments attract industrial and retail businesses who locate alongside the route in order to benefit from direct accessibility.

	A2/A282 Dartford improvement: opened in 2009	Manchester Airport Relief Road (A555): opened in 2018	East of Exeter Access Improvements Phase 2 (2013)	Port of Immingham (A18/A180 + A160/A180): opened in 2016	Mersey Gateway (Bridge) opened in 2017	A14 Huntingdon to Cambridge	A3 Hindhead improvement (2011)	A1 Spine: Peterborough, Newark & Sherwood and South Kesteven (2009)
	approach with a site developer to achieve planning consent. This involved a developer road funding contribution to address congestion concerns.	from its 2-hour travel time radius catchment area.	less clear. Local views were positive on economic impacts.	general economic development ambitions and efforts.	expenditure). No evidence at present to indicate an attributable local impact beyond anecdotal evidence of attracting some named firms and investments.	benefits for businesses.	dual carriageway road for its entire length from the M25 to the A3(M) in Portsmouth). This case study proved to be very useful in highlighting the importance, for future economic impact evaluations, of conducting broader scope regional econometric studies.	Labour supply is local and clustered along the road allowing easy commute, provided that congestion at junctions is not severe (as issue considered for granting planning permission) whilst customer and freight access is unproblematic due to direct access to the SRN. As significant new retail outlet investments are now taking place it will be useful to track these economic impacts over future years.

	A2/A282 Dartford improvement: opened in 2009	**Manchester Airport Relief Road (A555): opened in 2018**	**East of Exeter Access Improvements Phase 2 (2013)**	**Port of Immingham (A18/A180 + A160/A180): opened in 2016**	**Mersey Gateway (Bridge) opened in 2017**	**A14 Huntingdon to Cambridge**	**A3 Hindhead improvement (2011)**	**A1 Spine: Peterborough, Newark & Sherwood and South Kesteven (2009)**
Area assessed & rationale	Relatively constrained geographical scope (Dartford) to reflect intended benefits.	Broad scope to reflect a major regional airport: Manchester, Oldham, Stockport, Tameside	Exeter specific with identified science park, business park and other targeted locations.	North Lincolnshire UA – relatively tight spatial focus given the major scheme investment rationale is major port access (hence network-level effects)	Liverpool and Knowsley	Cambridge, East Cambridgeshire, Huntingdonshire, South, Cambridgeshire. Adopted a broad geographical scope to reflect the long-commutes created by high house prices and limited housing in Cambridge and the axis of the road scheme (to Huntingdon).	East Hampshire. Although the business case stressed South Hampshire this is a larger domain (comprising the cities of Portsmouth, Southampton plus Gosport, Fareham, Havant and Eastleigh) with many other causal factors in-play.	South Kesteven, Newark and Sherwood, Peterborough UA – the three administrative areas through with this segment of the A1 sits. This is a segment of the longer A1 Peterborough – Blyth Grade Separated Junctions scheme that opened in 2009. This was a major Highways England scheme to improve a 73 mile length the A1 trunk road in the East Midlands at Blyth, Apleyhead, Markham Moor,

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								Gonerby Moor, Colsterworth and Carpenters Lodge.
Observations on displacement aspects	The displacement aspect pivots on whether large logistics facilities (in this case the Amazon investment) are treated as displacement or not, and specifically the issue of non-displacement factors driven by international trade (see preceding discussion). Most likely, this is a mix of displacement from multiple places and net benefits from	Displacement not considered in the business case.	Displacement effects are a possibility for the science park. As the business park ended up not meeting new retail and office space ambitions and essentially became a logistics hub there are also likely displacement effects specific to logistics facilities.	Displacement a possibility for some firms that have located to benefit from the schemes. Displacement effects also a factor for the offshore wind system fabrication facilities and via the competitively awarded Freeport status – but these are not direct or planned for scheme impacts (but were facilitated by the schemes).	Displacement not an issue given no evidence of economic impacts	Displacement not considered in the business case. Too early to determine displacement effects, but given the prominence of Cambridge as a high-tech hub the improved SRN connectivity and local accessibility is likely to result in displacement driven by significant agglomeration advantages.	Displacement not considered in the business case or (as usual given this) in the five year POPE assessment.. The investment rationale (de-congesting connectivity between London and Portsmouth) may in principle result in displacement as is usually the case.	Displacement likely to take place, especially because the new major designer outlet developments/re-developments are likely to reduce retail sales elsewhere in the broader region.

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	trade-related logistics.							
Business floorspace structure	Dominated by industrial floorspace (twice that of retail), flat trends for both.	Retail dominated due to major urban location, some adjacent industrial part businesses that require air connectivity	Industrial floorspace 1.4 times greater than retail floorspace, both relatively stable with no identifiable scheme impact at the broader Exeter level.	Dominated by industrial floorspace (nearly 6 x retail floorspace)	Dominated by industrial floorspace (2.7 x retail floorspace)	Dominated by industrial floorspace (4.2 x retail floorspace), stable trends in both.	Dominated by industrial floorspace (3.7 x retail floorspace).	Dominated by industrial floorspace (4 x retail floorspace).
Housing	Expected housing developments assisted by the scheme (among other factors) did not materialise Planning was for 15,000 new houses to be built by 2035, however to date, build-in only sits at 3,500 houses (Ebbsfleet Garden City	Stimulated some modest and spatially concentrated housing development	Viewed as facilitating new housing (hence local labour supply) – an intended scheme benefit due to prior access constraints.	No significant new housing impacts noted by the local authority. Some negative impacts on existing households noted due to HGVs parking in residential streets	No evidence of attributable new housing impacts	Though yet to be realised, part of the rationale for this scheme was to support regional and national housebuilding objectives in the broader area (A14 and A1 corridors).	No evidence of attributable new housing impacts	Although new housing development is taking place alongside other segments on the A1, this is not currently a feature of the stretch of the road examined here. Local labour supply for the new major retail sites is likely to be

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	proposal/plan) due in part to the cessation of Eurostar stops at Ebbsfleet.							sufficient – and the A1 adjacent locations of existing housing makes access to labour unproblematic.
GVA and employment	The long-term trend has been for GVA associated with retail floorspace use to remain fairly stable but for the GVA associated with industrial floorspace use to decline, with an indication of an uplift since 2015-16 (pre-dating a major Amazon investment).	No noticeable impact on local aggregate GVA and employment data due to the large scale of the urban conurbation in which the airport is located.	The long-term gradual decline in industrial GVA has not been reversed by the specific scheme-linked impacts. The latest employment data show volatile industrial employment around a downward trend and more stable retail employment also around a slight downward trend.	Modest growth in employment to 2021, followed by slight decline in data up to 2023. Industrial GVA rises from 2008-09 until 2016-17 then declines. Retail GVA lower and unchanged.	No evidence available on any attributable GVA impacts (partly due to data availability time lags).	No evidence available on any attributable GVA impacts (partly due to data availability time lags).	Industrial GVA in East Hampshire dopped significantly after 2011-12, retail GVA was unaffected. Likely to be due to unrelated factors.	Industrial and retail GVA picking up since 2017-18. Retail employment declining and industrial employment more stable.
Close proximity aspects	Concerns over traffic congestion created by the	Concerns over traffic congestion created by the	The main emphasis on the scheme has	Not significant for generalised conclusions.	Not significant for generalised conclusions.	Early evidence from the 1 year POPE+	Not significant for generalised conclusion given	Only relevant to labour supply given the

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	interactions between long-distance freight in and out of a new major Amazon facility (network-level effect) and commuting traffic.	interactions between Extended proximity traffic and local traffic at peak hours (especially early morning), mainly people not freight	been on easing motorway access and related local connectivity.			assessment indicates positive close proximity effects: (a) commuters travelling further for similar journey times, (b) improved journey time predictability, (c) local business productivity benefits associated with improved freight reliability (especially for time critical deliveries).	the nature of the scheme.	aspects examined in this case study.
Extended proximity aspects	Dominated by traffic associated with a major shopping centre.	2-hour travel hinterland of key importance to the airport in attracting and retaining direct international flights, the A555 has assisted this	Not a significant aspect in outcome terms to date because the regional airport has not flourished due to other broader negative factors.	Not significant for generalised conclusions.	Not significant for generalised conclusions.	Cambridge's extensive commuting patterns lie at the interface between close and extended proximity effects.	A key aspect of the investment rationale for this scheme (the London the Portsmouth axis), in turn pointing to the importance of	Of key importance to attracting new investment in major retail sites located along the A1 - large customer

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		but a minor factor	The unintended outcome of the business park becoming a logistics hub sits as the interface between network level and extended proximity effects.				deploying regional econometric analysis in the future in order to address such complex contexts.	catchment area(s).
Network-level aspects	SRN connectivity facilitated by the scheme helped to secure investment in a major new Amazon facility which is reflected in a local area employment uplift (2,500 new jobs).	Not especially important for this scheme due to good existing motorway connections to the airport. Air freight road traffic has a more direct motorway link to the airport	As the intermodal rail freight terminal was not built this aspect of network-level effects is not relevant. The unintended outcome of the business park becoming a logistics hub sits as the interface between network level and extended proximity effects.	As a major port supporting supply chains across the UK this is an example of network-level effects dominating impacts (but hard to identify in economic terms).	Not significant for generalised conclusions.	Business supply chain dependencies using the SRN confirm the importance of network-level effects as a general principle.	As above.	Important for overall freight access (mainly logistics facilities and large new retail sites).

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Key finding(s) relevant to future work	An example of planning consent requiring these congestion-causing interactions between close-proximity, extended proximity and network-level effects to be mitigated via site developer funding contributions.	An example of the importance of extended proximity effects for regional airports, and of the potential negative impacts of peak time congestion caused by the interaction of extended and close proximity effects.	An example of how a road scheme addressing housing and industrial development ambitions that explicitly require improved road access can deliver on expectations. Also an example of how a mix of external problems can limit realised benefits (for the airport) and of how shortcomings in planning can limit other aspects (the rail gradient problem with intermodal rail freight terminal).	An example of how an investment case based on network-level aspects can generate positive unintended impacts on a local economy provided that strategic fit aspects take place.	None identified.	This was the first use of a 1 year POPE+ assessment approach including 'customer experience' surveys and interviews (carried out be AECOM I loose collaboration with Ipsos). It is useful to note that: (a) the use of a generic logic model for case studies was confirmed as useful by AECOM, and that (b) they reported that businesses mentioned (unquantified) productivity benefits from	Due to the nature of this scheme (a case study requested by National Highways) it is not possible to identify any attributed economic performance improvements without making use of econometric analysis at a more regional level.	Long stretches of the SRN may increasingly become themselves drivers of local economic activity for logistics and retail activities in particular, and potentially the location for new housing developments also benefitting from direct SRN connectivity. These linear configurations suggest that, in the future, the links between the (urban) nodes in the SRN will increase in their importance as drivers of economic

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						more reliable freight logistics.		growth, requiring some re-thinking of standard accepted agglomeration-based explanations.
Logic model design implications	Highlights the importance of including site developer funding contributions to address concerns over increased traffic congestion via the interactions between network-level effects and close proximity effects	Highlights the importance of including extended proximity effects in logic models.	Highlights the importance of strategic planning and collaboration an the local authority level in identifying how road enhancements can help to deliver new industrial floorspace and associated employment at specific locations.	Highlights the importance of network-level effects in logic models, supports the consideration of impact links to innovation and clustering/agglomeration effects. Also supports the consideration of local authority ambitions and strategic fit in generating local benefits.	None identified. However, given the current policy emphasis on public-private partnership funding for future major schemes it would be useful to include return on investment risk exposure in the generic logic model.	Given that future POPE+ studies will, ideally, use baseline consultations before a scheme opens in order to capture customer experience benefits it would be useful to use the detailed case study version of the EPIRE logic model to inform the design of these new baseline consultation studies. This will facilitate the	Highlights the importance of extended proximity and network-level effects in logic models.	Moving forward, it will be necessary to consider this 'linear' economic development mode as a special type of logic model.

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						identification of scheme impacts and also allow cross-scheme comparisons using a shared analytical framework.		

7 A2/A282 Dartford Improvement (2007) & M25 Junction 1b to 3 Widening scheme (2008)

This chapter sets out the results from the A2/A282 Dartford Improvement (2007) & M25 Junction 1b to 3 Widening scheme (2008) case study. This was a detailed case study combining findings from interviews with the Local Authority, local businesses, documents review and secondary data analysis.

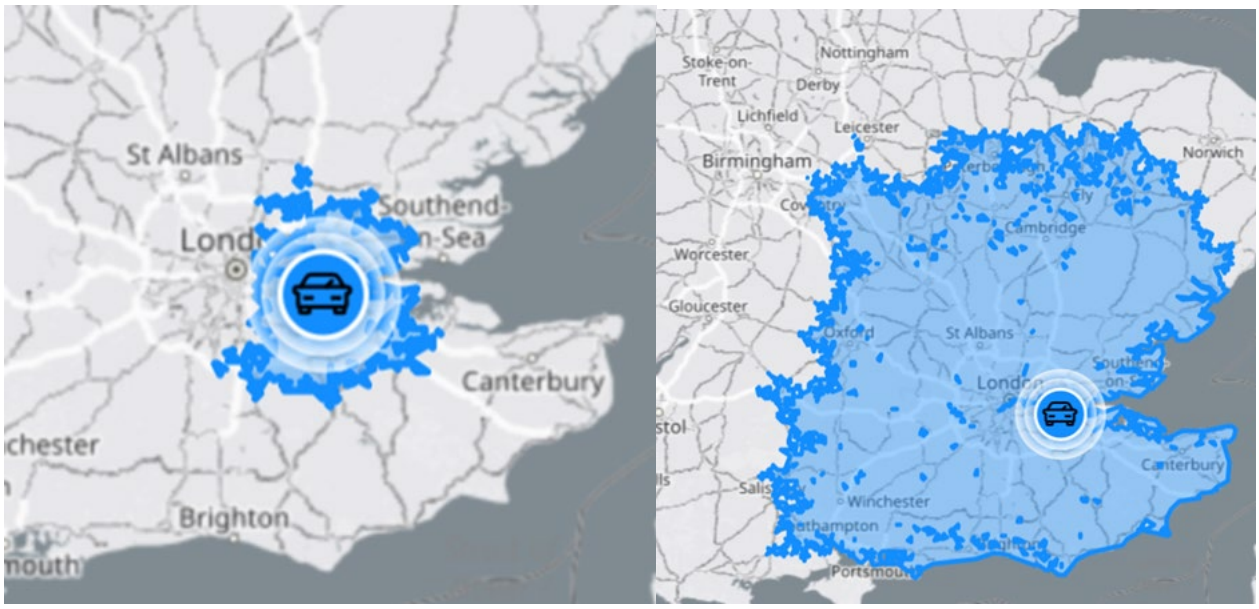
7.1 Overview

7.1.1 Scheme characteristics summary

A bundle of two schemes centred around junction 2 of the M25 in Kent. The A2/A282 Dartford improvement scheme includes the construction of two new viaducts, linking the M25/A282 to the A2 both westbound and eastbound, a new free flow slip road for travel from the A2 westbound and a widening of the A2 from three to four lanes in each direction between the M25/A282 and the Bean junction. The M25 widening involved widening to four lanes in each carriageway, from junction 3 to 2, and a widening to three lanes in each carriageway from junctions 2 to 1b.

The M25 is a key artery in the UK and London, and is the busiest orbital motorway in Europe. The position of the scheme is strategically important as it is a gateway to other road networks across the south-east, such as the M20, M26 and A2. In addition to this just north-east of the scheme is the Bluewater shopping centre, which caters to over 27 million customers a year and employs over 7,000 people. East of the scheme lies Ebbsfleet International Railway station, with domestic and European rail links.

Figure 7.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

7.1.2 Key outcomes to date

The main economic impact of this scheme (as stressed by the Local Authority) was to facilitate the re-development of the old Littlebrook Power Station as a major Amazon logistics facility. This facility opened in 2021 and has a stated employment of around 2500 and a floorspace of 50,817.96 m2. The scale and local significance of this new investment is sufficient to be picked up in time series data on local employment and is likely to have increased industrial floorspace by approximately 8 per cent (no hard data is available as yet on this due to time lags in the VOA floorspace data).

Significantly, there was a planning consent impediment to proceeding with the Amazon facility due to concerns over increased freight traffic at peak times causing congestion for local traffic. Planning consent was secured after the site developer agreed to fund an additional lane on the A282 Junction 1A bridge to ease the anticipated congestion (plus limits on HGV traffic in and out of the facility at peak times). This is a good example of the congestion-causing interactions between network-level and close-proximity aspects of road use.

The large Bluewater shopping centre (the fifth largest in the UK), which employs around 7,000 people and comprises 154,000 m2 of retail floorspace was opened in 1999 and therefore pre-dates these road enhancements – though benefitting from them.

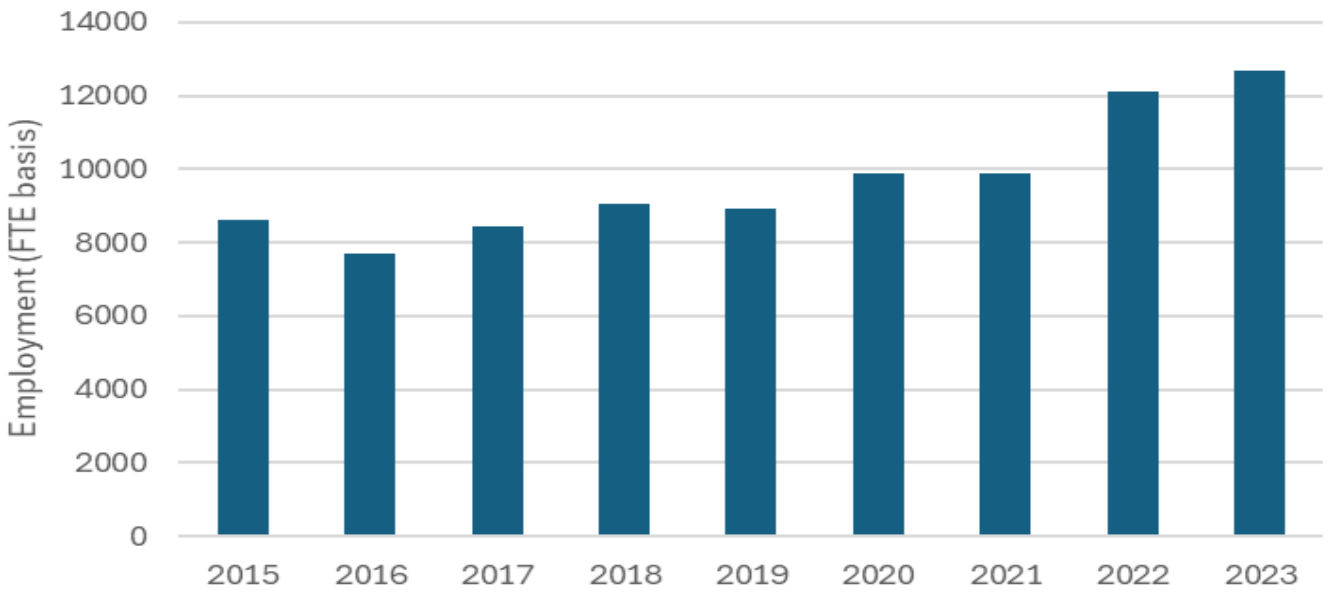
The displacement aspect pivots on whether large logistics facilities (in this case the Amazon investment) are treated as displacement or not. This is not a straightforward matter because these major fulfilment centres concentrate what may have been more spatially dispersed activities, in so doing benefitting from economies of scale and automation (robotic package handling). It is likely that there is a major productivity gain compared to more dispersed activities of that type. The previously more dispersed activities may have been carried out within a large

number of manufacturing firms, so potentially displacing those jobs and GVA. However, the complication to the displacement case is that when imports and exports are involved the new facility will mix a displacement effect with a net GVA and employment benefit linked to that additional component of the business driven my international trade. In this case, access to Folkstone for cross-channel freight via the SRN was a specific part of the location decision, hence supporting the conclusion that this is a mix of displacement and non-displacement effects.

7.1.3 Key evidence on outcomes to date

For this case study, the key evidence on economic impacts is provided by industrial employment data. This is able to pick-up the impact of the new Amazon logistics facility (stated publicly as 2,500 jobs and appearing as 2225 on an FTE basis in the jump between 2021 and 2022. As stressed above, this employment impact is driven by network-level and extended proximity effects rather than more localised distance-decay aspects per se. On the other hand, retail employment exhibits a downward trend. It is not possible to provide data on business floorspace and related economic density metrics (GVA per square meter and square meters per FTE employee) due to the unavailability of more recent data after the Amazon facility opened.

Figure 7.2: Employment changes in the Dartford area between 2015 and 2023



Source: Ipsos analysis, BRES data

7.1.4 Lessons for the EPIRE study and future work

This scheme provides a good example of the importance of network-level effects to local economic performance. The Amazon logistics facility is located here in order to benefit from SRN connectivity, particularly in regard to Folkstone port and channel tunnel access. The scheme's impacts also provide an example of long gestation periods, The Amazon facility opened in 2021 but the road enhancements were completed in 2008 (i.e., a 13 year time-lag). It is also worth noting that whilst regeneration focussed schemes were not included in the EPIRE dataset these two schemes did have a significant regeneration aspect. Anticipated Ebbsfleet rail

hub related economic development (the Ebbsfleet Garden City proposal/plan) did not eventuate at scale. Planning was for 15,000 new houses to be built by 2035, however to date, build-in only sits at 3,500 houses. This situation is attributed in part to Eurostar ceasing to use Ebbsfleet during the COVID-19 pandemic (although the Ebbsfleet Garden City concept is not rail connectivity-dependent overall). If cross channel trains do re-commence stopping at Ebbsfleet (as access the line by new train operators is being negotiated as there is currently excess capacity to do this) then there is a possibility that the housing developments and related local economic benefits may be enhanced.

7.1.5 Summary of key findings

- Beneficial economic benefits via an unexpected major investment that exploited the improved SRN connectivity and significantly boosted local employment.
- Support for the importance of future studies covering network-level effects, and the interactions between close-proximity, extended proximity and network-level effects) – in this case a major employment boost based on SRN connectivity (so independent of distance-decay effects per se), though with significant local second-order effects via increased employment.
- An example of planning consent requiring these congestion-causing interactions between close-proximity, extended proximity and network-level effects to be mitigated via site developer funding contributions.
- Broader, economic benefits via the Ebbsfleet Garden City concept yet to materialise but facilitated as a development option by these road enhancements.

7.2 Additional details[9]

7.2.1 Scheme characteristics summary

A bundle of two schemes centred around junction 2 of the M25 in Kent. The A2/A282 Dartford improvement scheme includes the construction of two new viaducts, linking the M25/A282 to the A2 both westbound and eastbound, a new free flow slip road for travel from the A2 westbound and a widening of the A2 from three to four lanes in each direction between the M25/A282 and the Bean junction. The M25 widening involved widening to four lanes in each carriageway, from junction 3 to 2, and a widening to three lanes in each carriageway from junctions 2 to 1b.

The M25 is a key artery in the UK and London, and is the busiest orbital motorway in Europe. The position of the scheme is strategically important as it is a gateway to other road networks across the south-east, such as the M20, M26 and A2. In addition to this just north-east of the

[9] Note: preparation of the additional details for this case study was assisted by using Ipsos Facto, a proprietary company AI tool that provides an extremely rapid solution to the challenge of collating and presenting information from a wide range of sources in an integrated manner.

scheme is the Bluewater shopping centre, which caters to over 27 million customers a year and employs over 7,000 people. East of the scheme lies Ebbsfleet International Railway station, with domestic and European rail links (although Eurostar trains ceased to stop at Ebbsfleet 2020 and are not expected to re-commence until 2026.

7.2.2 Aims

The M25 and A2/A282 Road Schemes were designed to address both immediate transportation needs and long-term regional development goals. Specifically:

- **Reduce congestion and improve traffic flow:** The M25 is one of Europe's busiest motorways, serving as a critical artery for both local and national traffic. The widening of the M25 and A2/A282 roads was a strategic move to alleviate chronic congestion issues. This involved expanding the road capacity by adding new lanes, which was expected to streamline the flow of traffic, reduce bottlenecks, and improve travel times for commuters and freight transport.
- **Enhance road safety**: Particularly at critical junctions such as those around the Dartford Crossing. The introduction of new free-flow links and additional lanes was aimed at minimizing collision risks by reducing traffic congestion and eliminating complex merging manoeuvres.
- **Support economic growth and regeneration:** The road schemes were seen as integral to unlocking economic potential in the surrounding regions. By improving connectivity, particularly to key economic hubs like the Kent Thames-side regeneration area and the Ebbsfleet International Railway Station. As such, the improvements were designed to attract investment and stimulate job creation.
- **Improve accessibility:** Enhancing access to significant commercial and transport nodes was a core objective. The improvements were focused on facilitating easier and faster access to destinations such as the Bluewater shopping centre, which attracts millions of visitors annually, and (once trains re-commence stop-ping there) Ebbsfleet International, an important rail link for both domestic and European travel. By improving road accessibility, the schemes supported local businesses and enhanced regional economic activities.
- **Environmental considerations:** While the primary focus was on improving transportation efficiency and safety, the schemes also incorporated environmental mitigation strategies. This included measures to reduce noise pollution and improve drainage systems, thereby minimizing the environmental impact of the expanded road network. These considerations were crucial in ensuring that the infrastructure development was sustainable and sensitive to the surrounding environment.

7.2.3 Outcomes

- **Reduced congestion and improve traffic flow:** The widening of the M25 and A2/A282 roads successfully reduced congestion. By adding new lanes and improving junctions, these schemes facilitated smoother traffic flow and increased road capacity. This was evidenced by significant reductions in journey times and improved travel reliability.

- **Enhance road safety:** The new free-flow links and additional lanes reduced collision risks and improved safety. Document reviews indicate a decrease in the average number of accidents per annum at the junction, partially fulfilling the safety objectives by providing a safer driving environment and more predictable travel conditions.
- **Support economic growth and regeneration:** The improved road infrastructure played a pivotal role in facilitating substantial economic investments, such as the development of Amazon's logistics facility at the former Littlebrook Power Station site. This facility not only leveraged the enhanced connectivity for logistics operations but also significantly boosted local employment. Business interviews highlighted the improvements in logistics, reduced lead times, and enhanced operational efficiency, contributing to the region's economic vitality.
- **Improve accessibility:** The schemes enhanced access to key commercial and transport hubs, such as the Bluewater shopping centre and (before trains ceases to stope there in March 2020) the Ebbsfleet International Railway Station. These enhancements supported local businesses by facilitating increased customer visits and regional economic activities. The infrastructure improvements ensured smoother and faster travel, thus supporting both the local economy and the broader regional development goals.
- **Environmental considerations:** The schemes incorporated various measures to mitigate environmental impacts, including noise reduction and improved drainage systems, demonstrating a commitment to sustainable development. Document reviews suggest that these environmental objectives were largely achieved, balancing infrastructural development with ecological sensitivity.

7.2.4 Impacts on local areas and businesses

- **Local economy:** The enhanced road network attracted significant investments, such as the Amazon facility, which has positively impacted local employment and economic activity. The Bluewater shopping centre also benefitted from the improved accessibility, resulting in higher visitor numbers and increased commercial activity.
- **Local businesses:** Interviews with local businesses revealed that the improved road reliability and reduced travel times have significantly enhanced logistics operations. This resulted in increased productivity, cost savings, and the ability to optimise supply chains, ultimately enabling businesses to expand their operations and improve service delivery. For example, Amazon chose to locate its fulfilment centre in Dartford, located at the site of the former Littlebrook Power Station. This is a significant logistics facility that opened in August 2021 which spans approximately 547,000 square feet (50,817.96 square meters) and is one of the largest of its kind in the UK. It features multiple floors, with operations spread across these levels to maximize efficiency. The centre employs over 2,500 permanent staff. This provides a substantial boost to local employment, contributing to the economic development of the Dartford area. The fulfilment centre is equipped with advanced technology, including more than eight miles of conveyor belts and thousands of robots that assist in the picking, packing, and shipping of items. These robots can lift heavy loads and are designed to operate efficiently alongside human workers. The facility

benefits from Dartford's strategic location near the M25 and other key transport links, allowing Amazon to efficiently manage its logistics and distribution across the UK and Europe. The decision to locate here was driven by several strategic advantages:

- **Proximity to major transportation networks:** Dartford is located near key transport routes, including the M25, A2, and A282, which are critical for distribution logistics. This location provides easy access to the rest of the UK and Europe, facilitating efficient shipping and delivery operations.
- **Access to a large customer base:** The location in Dartford places Amazon in close proximity to London and the densely populated areas of the South East, allowing for rapid delivery times and access to a large customer base.
- **Availability of industrial space:** The redevelopment of the former Littlebrook Power Station site provided Amazon with the opportunity to establish a large logistics facility with ample space for operations.
- **Support from Local Authorities:** The Amazon site developer received support from the local council and community, which was crucial in facilitating the planning and development process, including agreements to address potential congestion issues.
- **Economic incentives and workforce availability**: Dartford offers a conducive business environment, including potential economic incentives and a local workforce, which are attractive to large employers like Amazon.

Overall, the M25 and A2/A282 Road Schemes have successfully met their aims and objectives, delivering substantial positive impacts on local businesses and the regional economy. This underscores the value of strategic road investments in driving economic and infrastructural development, demonstrating how well-planned projects can transform regional connectivity and economic prospects over time.

7.2.5 Success factors

The M25 and A2/A282 Road Schemes were able to achieve their aims through a combination of strategic planning, robust infrastructure improvements, and effective collaboration with stakeholders. Here is a more detailed examination of the key success factors:

- **Strategic location:** Positioned at a crucial juncture of the M25, the busiest orbital motorway in Europe, these schemes enhanced connectivity across significant transport routes. This strategic location not only served local traffic needs but also facilitated access to broader national and international networks. The strategic importance of this positioning is underscored by data analysis, which shows a marked improvement in journey times and reduction in congestion as a direct consequence of the enhancements.
- **Infrastructure improvements**: The schemes involved substantial infrastructure upgrades, including the addition of new lanes and improved junctions. These enhancements directly addressed congestion issues and significantly boosted road safety. Detailed document reviews and traffic data analysis provide strong evidence of reduced accident rates,

improved journey reliability, and smoother traffic flow, highlighting the efficacy of these infrastructure improvements.

- **Economic development:** By improving road connectivity, the schemes attracted major economic investments, notably the establishment of the Amazon logistics facility. This development has significantly boosted local employment and economic activities, demonstrating the schemes' role in facilitating economic growth. Business interviews reveal how the improved logistics infrastructure and reduced lead times have enhanced business operations, aligning with the economic objectives of the schemes.
- **Collaboration and planning:** The success of the schemes was heavily reliant on effective collaboration between local authorities and various stakeholders. This collaboration facilitated the planning consents and the execution of necessary infrastructure changes, such as the additional lane on the A282 Junction 1A bridge. Document reviews highlight that these collaborative efforts were pivotal in overcoming planning challenges and realizing the intended benefits of the schemes.
- **Environmental mitigation measures:** The schemes were designed with a strong emphasis on sustainability, incorporating environmental measures like noise reduction and improved drainage systems. These measures aimed to minimize ecological impacts and ensure that the infrastructure development was environmentally sound. Document reviews suggest that these objectives were largely achieved, demonstrating a successful balance between infrastructural advancement and environmental stewardship.

The supporting evidence for these success factors is derived from a comprehensive approach that includes data analysis, document reviews, and business interviews. These sources collectively provide an extensive overview of the schemes' impacts and achievements, validating the strategic decisions made during the planning and implementation phases.

7.2.6 Unintended impacts

The documents, and transcripts provided do not explicitly suggest any unintended impacts from the road schemes. The focus is primarily on the intended outcomes: connectivity, economic growth, and enhanced road safety. Whilst it is common for large infrastructure projects to potentially have some unintended impacts, such as increased traffic volumes over time, temporary disruptions during construction, or ecological changes, though these are not specifically mentioned in the provided materials.

7.3 Scheme logic model variant

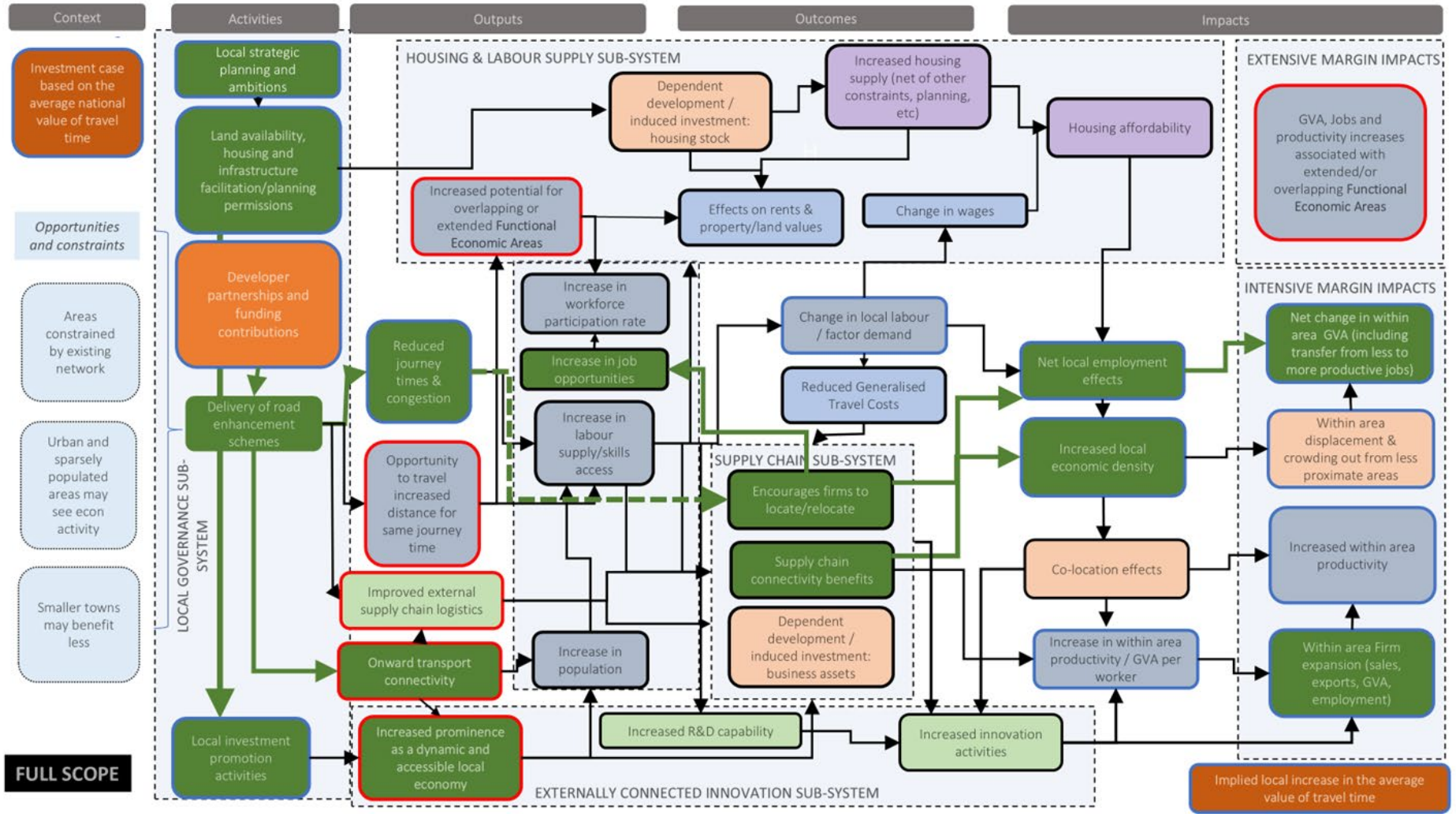
The scheme specific version of the logic model depiction is provided overleaf. This highlights the most relevant elements and causal links in green. Additional elements and links prompted by the case study are identified in amber (and provide a basis for augmenting the generic logic model on the basis of all these case studies).

As can be seen, the main impact pathway for this scheme case study is a basic combination of local strategic planning and inward investment promotion via which the particular road enhancements to M25 access enabled the major Amazon facility to be established. The critical

success factor here was the relationship with the developer (added in Amber) that resulted in a funding injection (adding an extra lane to a bridge) to address concerns over traffic congestion caused by the interaction between local traffic and the freight associated with the new Amazon facility. This negotiated involvement of developers/investment promotors should be considered for inclusion in the generic logic model as it is likely to be frequently encountered.

Note: the housing and labour supply elements have not been highlighted in this case because attention was drawn to the under performance of the Ebbsfleet Garden City ambition relative to expectations (far less housing completed to date than anticipated). I the event that the new housing does develop in line with ambitions then these elements should also be highlighted as key impact pathways.

Figure 7.3: Dartford logic model variant



Source: Ipsos

8 Manchester Airport Relief Road (A6/A555 extension)

This chapter sets out the results from the Manchester Airport relief road case study, combining findings from interviews with the Local Authority, airport, local businesses, document review, a business views and supply chain survey and secondary data analysis. This was a detailed case study supported by a CATI survey with local businesses.

8.1 Overview

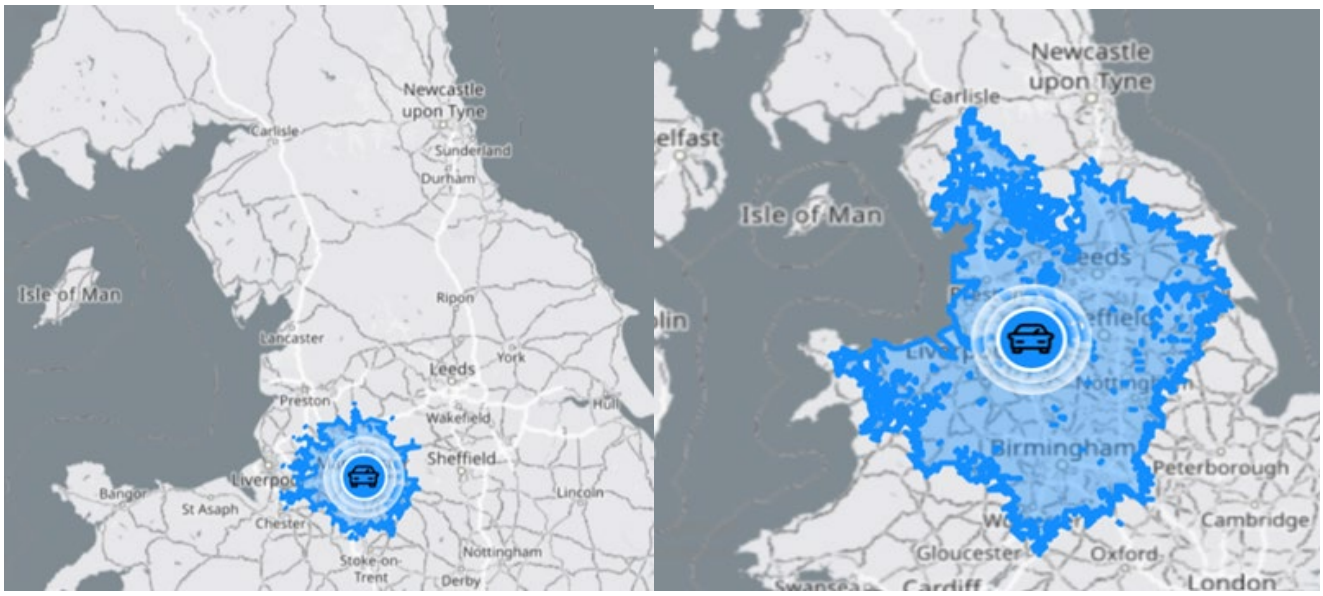
8.1.1 Scheme characteristics summary

The A6 to Manchester Airport relief road scheme is situated south of Manchester between the M56 and the A6 and below the M60. At its western end, the scheme begins at the intersection of the Ring Road and Ring Road West, adjacent to Manchester Airport. The scheme travels eastward along what was the B5358, then along what was the existing A555 past the area of Handforth. The scheme then continues on what was the A523 until reaching it's end with two junctions on the A6, near Hazel Grove. The Scheme Involved the improvement/construction of 11 junctions, 4 railway crossing, in addition to a segregated cyclist and pedestrian access system. The final section opened for use in October 2018 following delays caused in part by the collapse of the construction firm Carillion. Overall the project cost £290m.

Manchester Airport is the largest outside of the South-East, and is a key travel hub and international Gateway. Improved Access via the Relief road is not only seen as beneficial due to improved airport access but also through providing better accessibility and connectivity to South Manchester and the East Cheshire. The scheme was seen as a key part of the South-East Manchester Multi-Modal (SEMMM) Strategy Refresh.

The new road has faced major flooding problems since opening that have led to closures and associated traffic disruption, raising questions over the adequacy of road design from a flood risk angle.

Figure 8.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

8.1.2 Key outcomes to date

As the opening is fairly recent it is too early to start to pick up robust evidence of significant economic impacts in statistical data. Local consultations noted some limited house-building activity facilitated by the road enhancements likely to have improved local labour supply.

The main economic impacts highlighted relate to the core justification for the relief road – supporting Manchester Airport's role as a major regional hub. The airport has 2,000 direct employees and a total airport related head count of 20,000 (people employed in businesses and activities that depend on the airport. For the airport, the major benefit of road enhancements relates to two factors:

Firstly, its 'economic hinterland', the population, GVA and industrial mix across a geography within a two-hour travel time radius (the extended proximity effects dimension using the term adopted in the EPIRE study). Note: the two-hour travel time radius includes rail travel, and intermodal connectivity. A 1.5 hour travel time radius assessment is also used. This is a key 'impact pathway' because any regional airport's ability to attract and retain direct international flights pivots on an airlines' assessment of the economic strength and future growth potential of this hinterland/catchment area. The airport provides airlines with data on the economic characteristics of its hinterland, including travel times, congestion risks and aspects such as R&D and innovation activities. The data was requested but was deemed to be too commercially sensitive to share. Many airlines also carry out their own regional economic assessments too, in order to calibrate the airports' submissions to them. The airlines are understood to take a particular interest in road congestion across the extended proximity domain.

The second aspect of interest to airport (and any airport) is the potential for road traffic congestion to be created by the interactions between local (mainly commuter) traffic and traffic

in and out of the airport. In other words, congestion-generated by the interaction between close proximity and extended proximity effects. In this case, road freight (inward and outward) is viewed as not being affected by this problem (aside from any motorway entry and exit roadworks) because the airport has direct motorway access. However, problems are caused by congestion at peak times (mainly in the morning) when local commuter traffic interacts with cars arriving to catch early flights (from 5am onwards). This is viewed as a persisting challenge and the relief road has not reduced this aspect of congestion. The issues creates problems of concerns to airlines via the risk of people arriving late for, and potentially missing their flights.

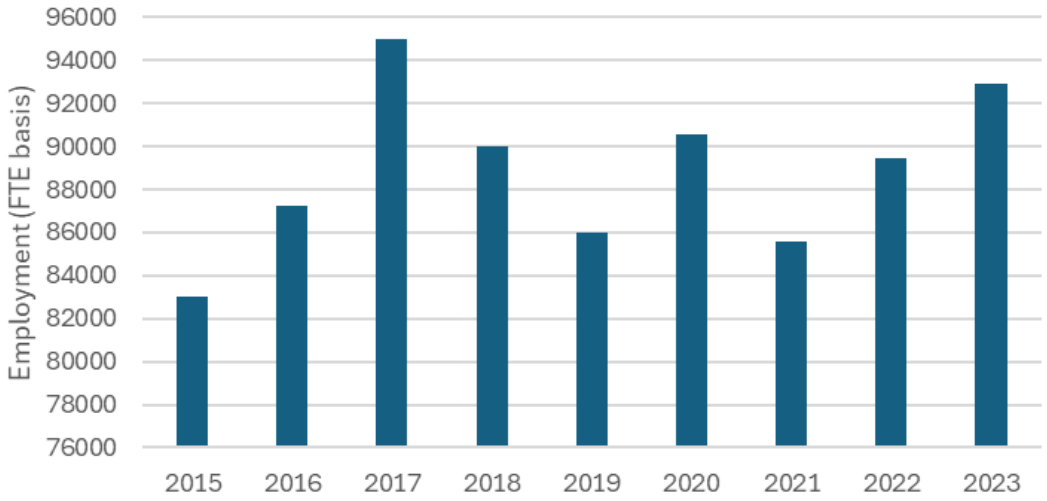
Another problem noted was a concern that occasional (short duration) maintenance road works are carried out in the early hours of the morning (when traffic is lightest), but this can be the favoured time for road freight accessing the airport, and can therefore cause problematic delays.

From this perspective, the relief road has contributed to the future potential of the airport.

8.1.3 Key evidence on outcomes to date

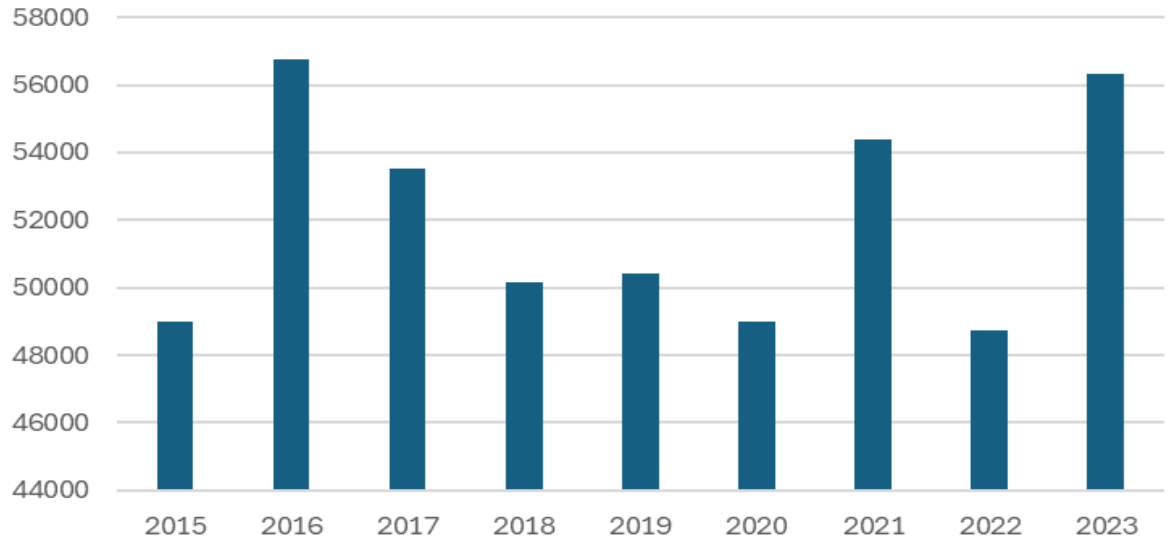
Both industrial and retail employment have been volatile and do not suggest attributable impacts.

Figure 8.2: Industrial employment changes in the Manchester Airport area between 2015 and 2023



Source: Ipsos analysis, BRES data

Figure 8.3: Retail employment changes in the Manchester Airport area between 2015 and 2023

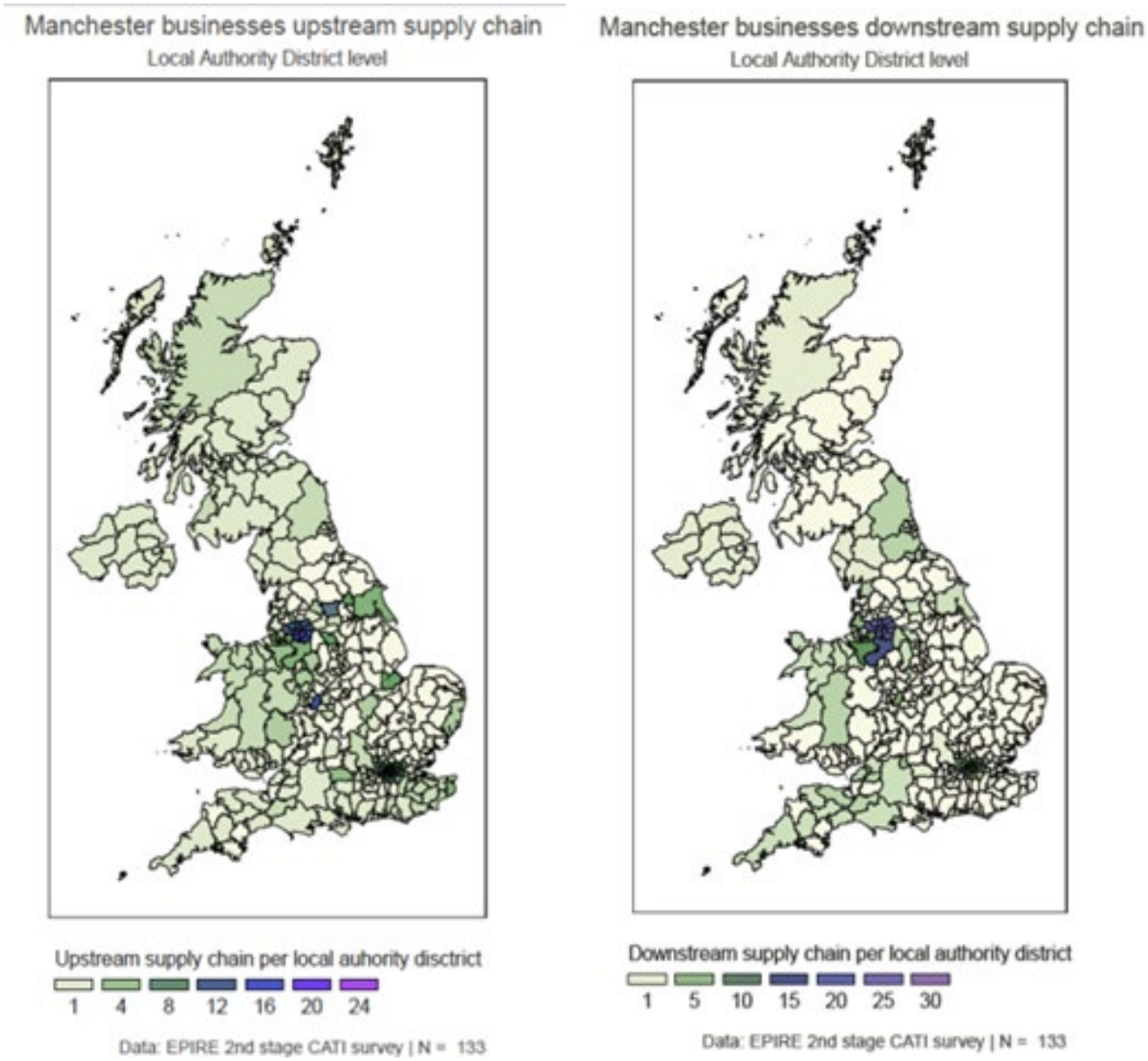


Source: Ipsos analysis, BRES data

8.1.4 Supply chain aspects

This case study benefited from a CATI business survey of firms located within 30kn of the airport relief road. The most useful aspect to discuss is this summary are the experimental results for direct upstream and downstream supply chain dependencies. Firms interviewed were asked to state the geographical sources and destinations of their supply chain links. Whilst only very indicative, the results for Manchester confirm the importance of network-level effects and the SRN (the sources and destinations are very geographically dispersed). The results also (as expected) confirm the prominence of London in those supply chain linkages.

Figure 8.4: Upstream and downstream supply chain destinations



Source: Ipsos survey analysis

8.1.5 Additional CATI survey findings

As this is one of three case studies that benefitted from the business CATI survey the key results are provided below. All three business surveys sampled businesses randomly on the basis of postcodes identified that contained at least one business.

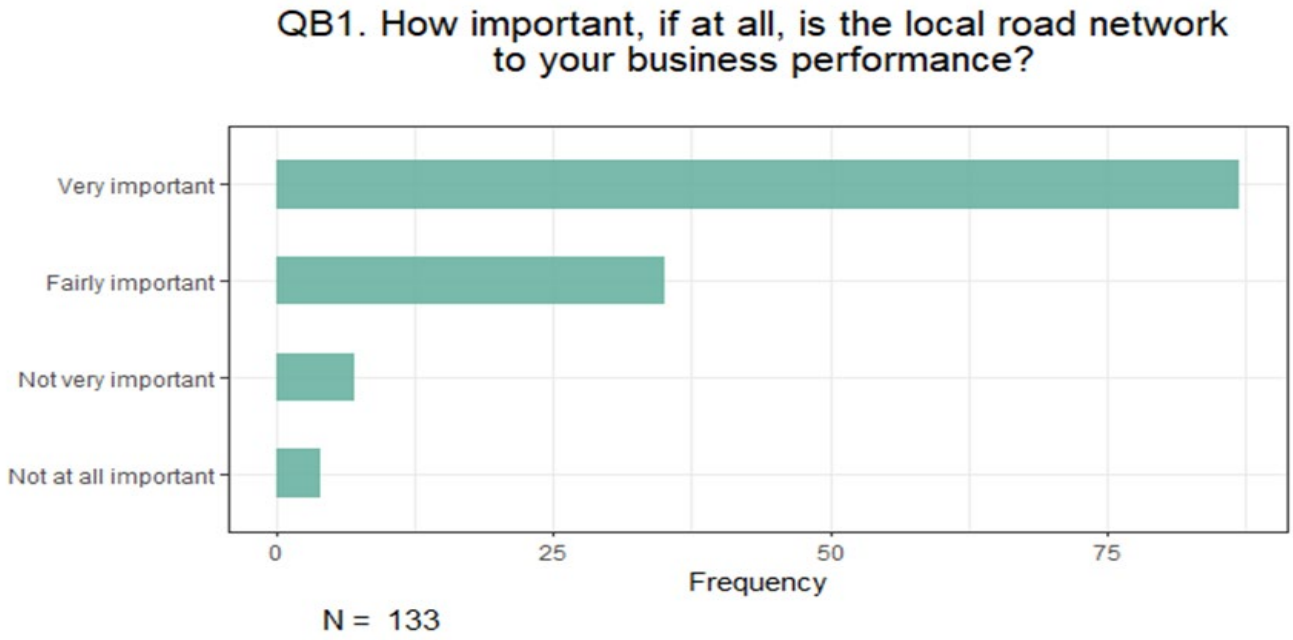
The sampling for this case study covered manufacturing and retail businesses (as did the other two surveys) but also added warehousing and logistics businesses (in recognition of the airport focus). 750 of the 1653 contactable manufacturing businesses (45 percent) identified were selected for randomised CATI calls, and 650 out of 1439 (45 per cent) contactable retail businesses (‘contactable’ means that a phone number was available in the sampling dataset). All 289 identified contactable warehousing and logistics businesses were sampled. 133 usable responses were obtained (7.9%). The following analysis merges all three sectors in recognition of the limited number of responses.

Screening questions ensured that the respondent was aware of the road scheme, and was involved in supply chains handling physical goods (a key issue for industrial firms as some younger firms may potentially be classified as such but be involved in pre-market R&D etc).

Views on the road scheme and its impacts on the business

The responses indicated that the businesses who responded did view the local road network as important to their performance.

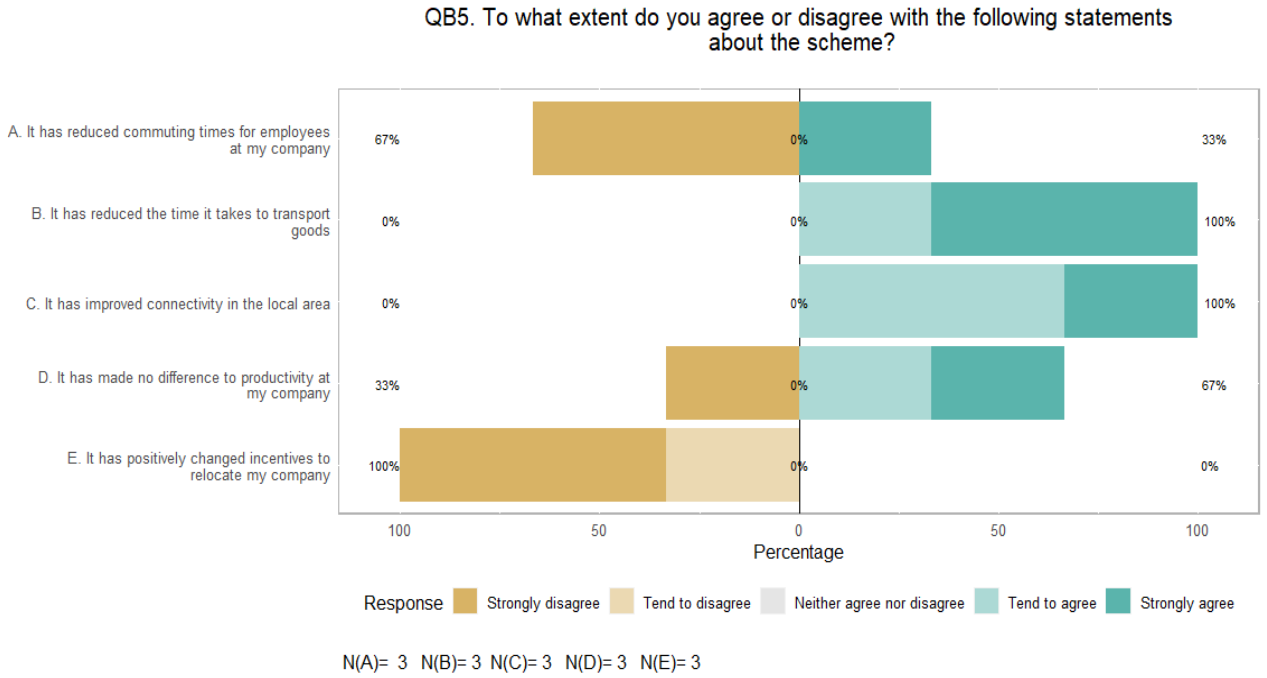
Figure 8.5: Views on importance of local road network to business performance



Source: Ipsos survey analysis

The impact on staff commuting times was mixed, with dis-agreeing that the scheme had reduced commuting times. This may be because (as discussed above) congestion is still created by the interactions between local traffic and longer-distance airport traffic, or because the specific location of the businesses has not reduced commuting times (this is an airport relief road). Although the scheme is viewed to have reduced the time take to transport goods and to have improved connectivity to the local area, impacts on productivity were more mixed with no clear overall benefit.

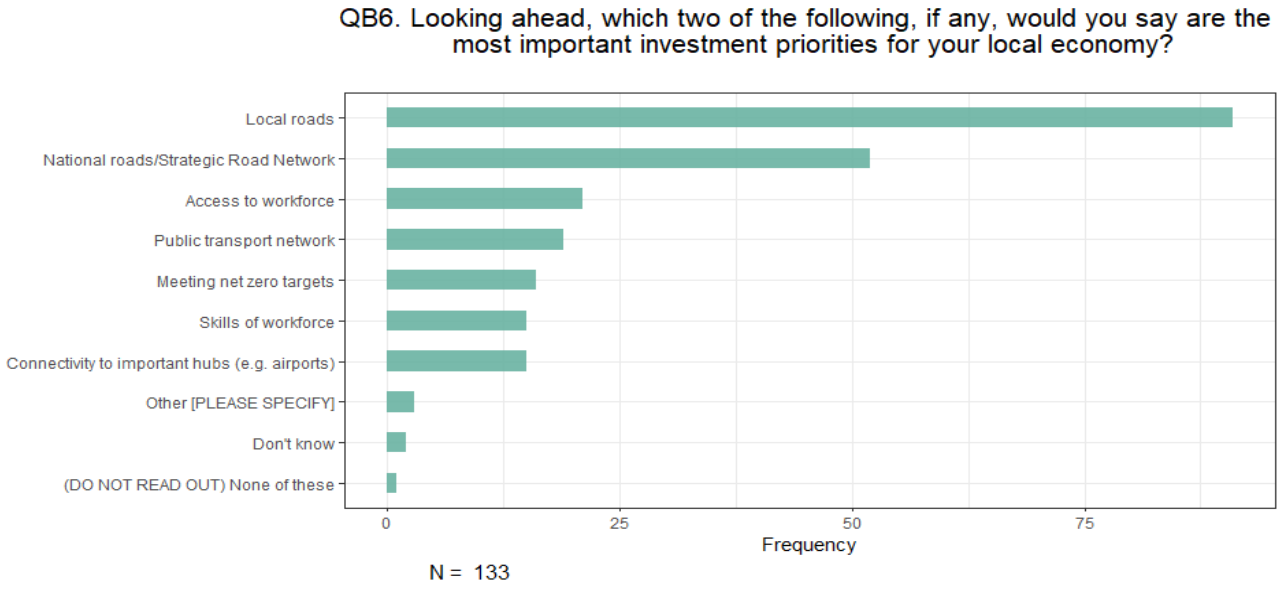
Figure 8.6: Views on impacts



Source: Ipsos survey analysis

Local roads are viewed as the most important investment priorities for this local economy, followed by the strategic road network. This dominates access to workforce, possibly indicating that supply chain connectivity is more important to competitiveness than access to labour (which is logical as this is a major urban area with a high population to draw on).

Figure 8.7: Views on most important investment priorities for local economy

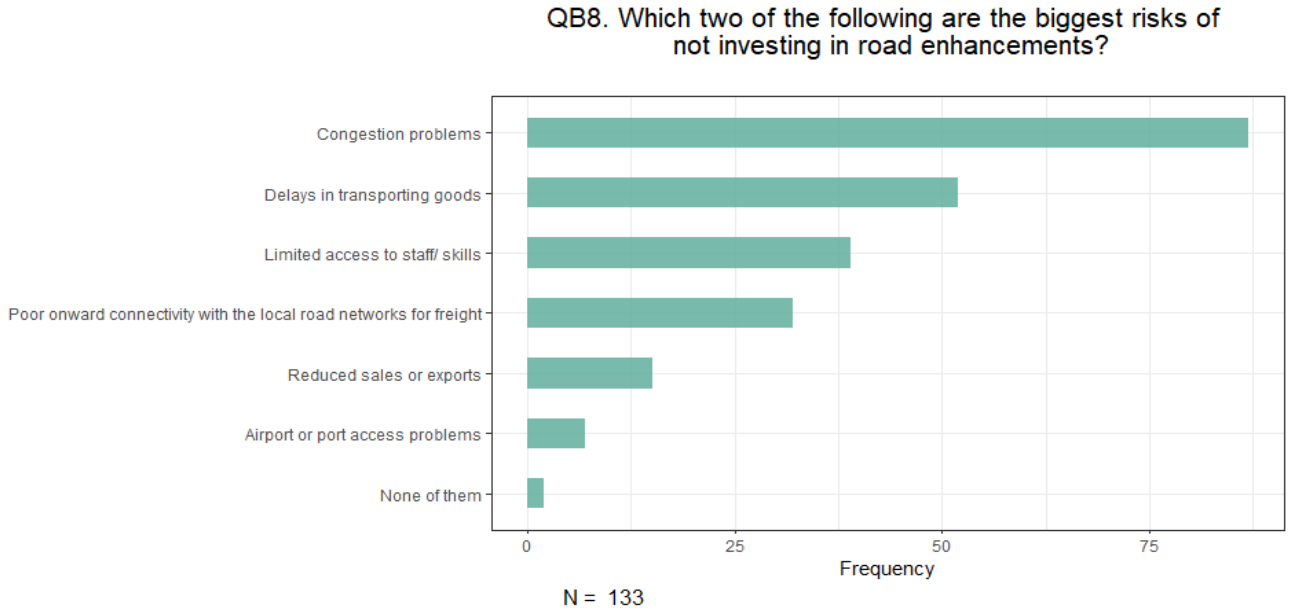


Source: Ipsos survey analysis

The greatest perceived risk of not investing in road enhancements are congestion and consequent delays in transporting goods. These aspects are viewed as greater risks than

limited access to staff and skills (so this view is consistent with the responses above on investment priorities).

Figure 8.8: Views on biggest risks from not investing in road enhancements



Source: Ipsos survey analysis

8.1.6 Lessons for the EPIRE study and future work

The main lesson for the EPIRE study and future work from this case study is the importance of extended proximity effects, and of interactions between close-proximity and extended proximity effects that can cause congestion. Recognition of the importance of extended proximity effects is important because these are different from the close-proximity distance-decay aspects examined in the econometric analysis. Whilst they relate to the accessibility analysis (which used a two-hour travel radius) the implication is that future work should focus on capturing the nature and extent of extended proximity effects.

8.1.7 Summary of key findings

- Road enhancements aimed at supporting regional airports will need to emphasise extended proximity aspects in order to reflect the underpinning investment rationale,
- Consideration must also be given to the potential for congestion-generating interactions between these extended proximity and close proximity dimensions. Although this aspect is addressed in ex ante traffic modelling it needs to be considered in ex post evaluations, including the potential contribution to dissipating any initial labour productivity gains.

8.2 Additional details

8.2.1 Scheme characteristics summary

The A6 to Manchester Airport relief road scheme is situated south of Manchester between the M56 and the A6 and below the M60. At its western end, the scheme begins at the intersection of the Ring Road and Ring Road West, adjacent to Manchester Airport. The scheme travels eastward along what was the B5358, then along what was the existing A555 past the area of Handforth. The scheme then continues on what was the A523 until reaching it's end with two junctions on the A6, near Hazel Grove. The Scheme Involved the improvement/construction of 11 junctions, 4 railway crossing, in addition to a segregated cyclist and pedestrian access system. The final section opened for use in October 2018 following delays caused in part by the collapse of the construction firm Carillion.

Manchester Airport is the largest outside of the South-East, and is a key travel hub and international Gateway. Improved Access via the Relief road is not only seen as beneficial due to improved airport access but also through providing better accessibility and connectivity to South Manchester and the East Cheshire. The scheme was seen as a key part of the South-East Manchester Multi-Modal (SEMMM) Strategy Refresh.

8.2.2 Aims

The Manchester Airport Relief Road scheme was a pivotal infrastructure project aimed at addressing several key issues related to traffic congestion, economic growth, and connectivity within the South Manchester region. This ambitious project was structured around a comprehensive set of objectives designed to enhance the region's transportation network and stimulate economic and social development.

- **Alleviating traffic congestion:** One of the primary goals of the scheme was to significantly reduce congestion across the existing road networks in South Manchester. This was particularly critical for routes leading to Manchester Airport, a major regional hub. By providing an alternative route, the scheme aimed to alleviate pressure on heavily trafficked roads, thereby improving travel efficiency and reducing delays for commuters and travellers.
- **Enhancing connectivity:** The scheme sought to improve strategic connectivity along the South Manchester corridor. This involved creating better access to Manchester Airport and its surrounding areas, which are vital for both local residents and businesses. The introduction of enhanced public transport facilities, coupled with new cyclist and pedestrian pathways, was intended to optimize the use of road space and offer sustainable travel alternatives.
- **Boosting economic growth:** By improving access and connectivity, the scheme aimed to make South Manchester more appealing for inward investment. This was expected to catalyse local economic development, as enhanced transport links could attract businesses and promote job creation. Additionally, by reducing congestion, the scheme was designed to improve the quality of the physical environment, thus increasing the area's desirability as a place to live and work.

- **Improving journey times and reliability**: The scheme was engineered to reduce journey times and enhance the reliability of the local and strategic road network. By facilitating smoother traffic flow and mitigating bottlenecks, it was anticipated that business operating costs could be reduced, thereby fostering a more productive economic environment. Furthermore, by offering more predictable journey times, the scheme was expected to enhance employment opportunities by expanding the catchment area for potential employees.
- **Environmental and social benefits:** The scheme was designed with a focus on sustainability, aiming to reduce vehicle emissions through decreased congestion and more efficient traffic management. By promoting alternative modes of transport and creating a more streamlined road network, the scheme sought to minimize the environmental footprint of road transportation. Additionally, by mitigating traffic impact on local communities, the project aimed to improve the overall quality of life for residents, contributing to a more harmonious urban environment.

As such, the scheme was part of a strategic initiative to propel South Manchester towards a more connected, economically vibrant, and environmentally sustainable future. By addressing these multifaceted objectives, the scheme aimed to play a crucial role in supporting the broader regional development strategy, ensuring that South Manchester could continue to thrive as a dynamic and attractive area for both business and leisure.

8.2.3 Outcomes

The Manchester Airport Relief Road scheme has achieved a variety of outcomes since its implementation, successfully addressing many of its initial aims and objectives. Below is a comprehensive summary of these outcomes, including their impacts on local areas and businesses, and the processes through which these outcomes were realized:

8.2.4 Meeting aims and objectives:

- **Traffic congestion alleviation:** The scheme effectively reduced congestion on the existing road networks in South Manchester, most notably on routes to and from Manchester Airport. This success is supported by data analysis presented in post project monitoring, demonstrating reduced traffic volumes on major roads such as the A6 and the A555, which indicates that the scheme has effectively redistributed traffic away from congested areas.
- **Enhanced connectivity:** The scheme has significantly enhanced strategic connectivity, facilitating better access to Manchester Airport and surrounding regions. This objective was achieved through the construction of new road links and the enhancement of public transport facilities, as corroborated by document reviews and comprehensive traffic data analyses. These improvements have made travel easier and more efficient, benefiting both local residents and businesses.
- **Economic growth stimulation:** While it is still early to measure the full economic impact, initial reports suggest that the improved connectivity has made the region more attractive for investment, hinting at potential long-term economic growth. Stakeholder interviews have

noted an increase in interest from businesses in areas such as Handforth and Poynton, demonstrating the scheme's potential to stimulate economic activity and development.

- **Journey time and reliability improvements:** The implementation of the relief road has resulted in significant reductions in journey times, with drivers experiencing savings of 15-35 minutes during peak hours. This finding is supported by journey time data analysis. However, while average journey times have improved, journey time reliability has shown mixed results, with some routes experiencing increased variability, as documented in the journey time reliability analysis.
- **Environmental and social benefits:** The scheme was designed to cut vehicle emissions by alleviating congestion, thus offering environmental benefits. Although empirical environmental data is still forthcoming, initial traffic flow improvements suggest a positive environmental impact. Social benefits have also been reported, with stakeholder feedback indicating an enhanced quality of life due to decreased traffic congestion in residential areas.

8.2.5 Impacts on local areas and businesses:

- **Local areas:** The relief road has increased traffic flow efficiency and reduced congestion in local centres such as Bramhall and Heald Green, thereby improving the living environment for residents. These improvements are supported by traffic data and insights gathered from local interviews.

  Local businesses: Enhanced access and connectivity have benefited local businesses by facilitating smoother logistics operations and attracting more customers. Evidence of these benefits comes from business surveys and stakeholder interviews, illustrating the scheme's positive impact on the local economy. The Manchester Airport Relief Road scheme was of paramount importance to Manchester Airport, serving as a cornerstone for its strategic development and operational efficiency:

  - **Enhanced connectivity:** The scheme significantly improved direct access to Manchester Airport's 'hinterland'. This enhancement in connectivity is crucial not only for passengers but also for freight operations, enabling smoother and more efficient travel to and from the airport. By providing a more direct route, the scheme has reduced travel times and simplified logistics, which are essential for maintaining a seamless flow of passengers and goods.
  - **Operational efficiency:** By alleviating congestion on existing routes, the road scheme has streamlined traffic flow around the airport, thereby minimizing delays for passengers, airport staff, and freight services. This improvement is particularly vital during peak travel times when the volume of traffic is at its highest. Enhanced operational efficiency ensures that the airport can maintain punctuality in its services, which is a critical factor in customer satisfaction and overall airport performance.
  - **Economic impact:** The upgraded road infrastructure bolsters Manchester Airport's role as a major economic hub within the region. By enhancing accessibility, the scheme makes the airport more attractive to both businesses and travellers, potentially increasing passenger numbers and freight volumes. This increased

accessibility can lead to greater economic activity, attracting investment to the surrounding area and fostering regional development. The airport's enhanced connectivity and capacity can also stimulate local economies by facilitating business operations and tourism.

- **Strategic advantage:** The road scheme provides Manchester Airport with a strategic advantage by offering a reliable and efficient transport link. This reliability is crucial in attracting new airlines and expanding existing routes, thereby increasing the airport's catchment area. With improved access, the airport can better compete with other major airports in the UK and Europe, positioning itself as a preferred gateway for international travel and commerce.

8.2.6 Success factors

The key success factors for the Manchester Airport Relief Road scheme in achieving its aims were multifaceted, involving a blend of comprehensive planning, strategic execution, and stakeholder collaboration, all of which contributed significantly to its overall success. Specifically:

- **Stakeholder engagement:** Active engagement with a wide range of stakeholders, including local businesses, residents, and community groups, was crucial for aligning the scheme with local needs and expectations. This engagement ensured community support, facilitating smoother implementation and fostering a sense of ownership and cooperation among stakeholders. Insights from stakeholder interviews highlighted the importance of inclusive stakeholder involvement.
- **Environmental considerations:** The integration of sustainable transport options, including dedicated facilities for cyclists and pedestrians, was a key element of the scheme. These features contributed to environmental benefits by promoting alternative modes of transport and reducing vehicle emissions, thereby improving the quality of life for local residents. Although comprehensive environmental data is still forthcoming, initial traffic flow improvements and positive stakeholder feedback suggest that the scheme has yielded beneficial environmental and social outcomes.
- **Strategic location:** The strategic placement of the road was a significant success factor, as it improved access to Manchester Airport and surrounding areas. This enhancement in connectivity supported economic growth by making the region more appealing to investors and businesses. Initial reports and stakeholder interviews underscored increased business interest and potential economic benefits in strategically located areas like Handforth and Poynton, showcasing the road's positive influence on regional development.

Overall, the combination of strategic planning, proactive stakeholder engagement, and a strong focus on environmental sustainability were pivotal in the scheme achieving its aims. These conclusions are supported by a diverse mix of data analysis, document reviews, and qualitative insights from stakeholder interactions, providing a holistic understanding of the scheme's success.

8.2.7 Unintended impacts

The documents and transcripts suggest several unintended impacts from the Manchester Airport Relief Road scheme:

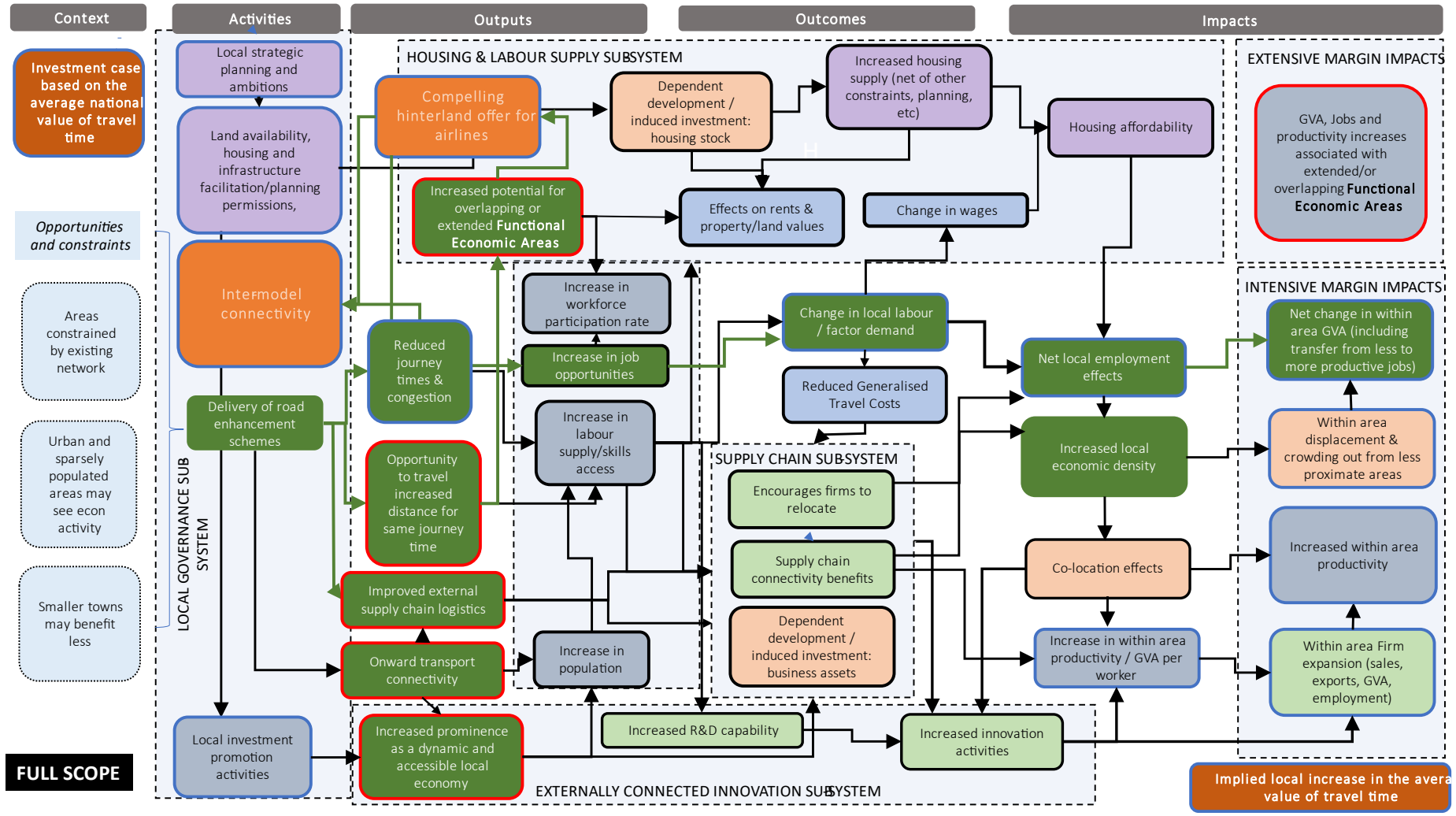
- Increased 'Rat-Running': The scheme has unintentionally led to increased 'rat-running' behaviour, where drivers use residential streets as shortcuts to avoid congestion on main roads. This has been particularly evident in areas like High Lane, where local residents have raised concerns about increased traffic on smaller streets. This issue was highlighted in the transcripts and supported by observations of traffic patterns that suggest a diversion of traffic onto smaller, less suitable roads.
- Journey time variability: While the scheme aimed to improve journey time reliability, some routes have experienced increased variability in travel times. This has resulted in unpredictable travel experiences for some users, contrary to the scheme's objectives. The journey time analysis and reliability data presented in post opening monitoring indicated higher variability in certain areas, suggesting that not all objectives related to journey times have been fully realised.

Overall, while the scheme has achieved many of its intended objectives, these unintended impacts suggest areas where further monitoring and mitigation efforts may be needed to optimize the road's benefits and address any negative outcomes.

8.3 Scheme logic model variant

Figure 7.9, overleaf, contains the logic model variant for the Manchester Airport relief road. This adds the inter-modal connectivity aspect (in orange) and highlights the key impact pathways in green.

Figure 8.9: Manchester Airport Relief Road logic model variant



9 East of Exeter Access Improvements Phase 2 (2013)

This chapter sets out the results from the East of Exeter Access Improvements detailed case study, combining findings from interviews with the Local Authority, local businesses, document review, supply chain survey and secondary data analysis.

9.1 Overview

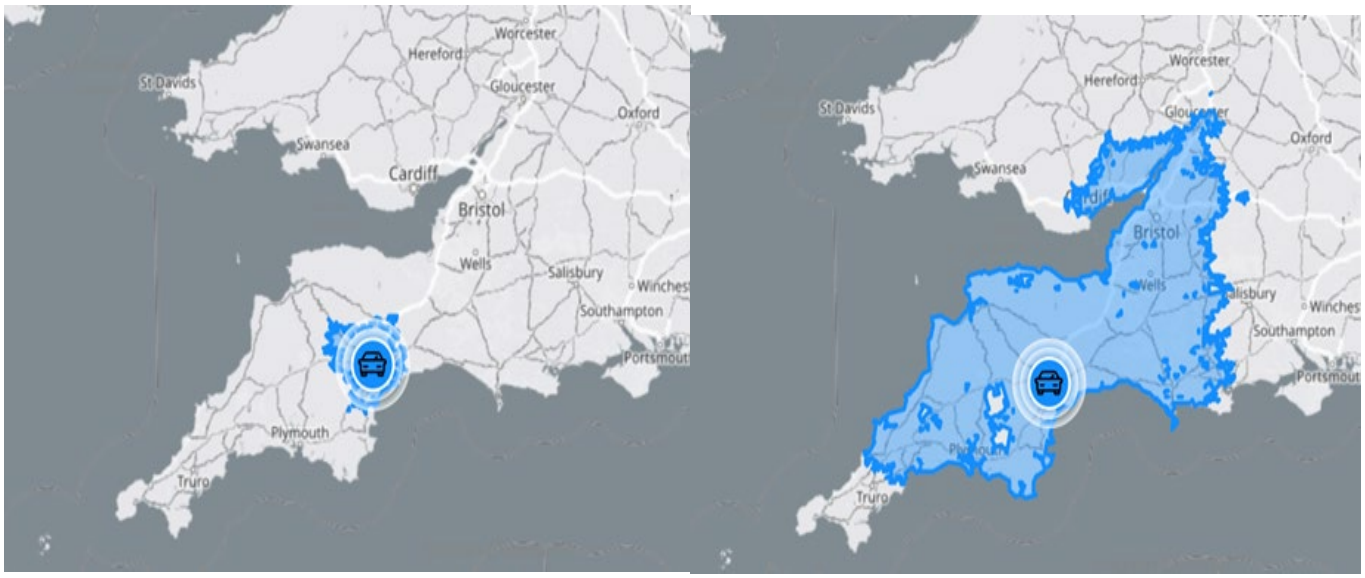
9.1.1 Scheme characteristics summary

The M5 Junction 29 (J29) improvement scheme, officially opened in January 2013, is one of many projects that have been delivered as a result of the public and private sector investment in the Exeter and East Devon Growth Point. The scheme is viewed as helping to unlock constraints to planned developments in this regional growth area, which consists of approximately 14,000 new dwellings, 10,000 new jobs, an Intermodal Freight Terminal and the expansion of Exeter Airport. The improved junction was intended to ensure that the transport system supports strategic development able to drive economic growth and prosperity in Devon.

The scheme has delivered a new all movements junction off the A30 at M5 J29 and a new link road providing access to the Science Park and old A30. The new link road connects to the A30 trunk road via a new signalised junction adjacent to J29, replacing the old Blackhorse interchange. This is the direct high-quality access the development needs to be a catalyst to enable the employment site to flourish. The scheme provides J29 with greater capacity for traffic leaving the motorway and removes the potentially hazardous situation of a ‘race start’. The M5 southbound off-slip has been widened to 4 lanes to provide additional capacity and a direct access to the Science Park whilst the northbound off slip has also been widened considerably and links to a new signalised junction on the A30.

The scheme cost a total of £16.2m, of which £10.4m was funded by the Department for Transport (DfT).

Figure 9.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

9.1.2 Key outcomes to date

The 2021 5-year POPE assessment noted that 2,350 jobs have been created within the Growth Point area since the opening of the scheme, with 1,600 of these jobs located at the Science and Skypark Business Park.

The science park developments are viewed as being successful, including attracting the Met Office supercomputer facility. This had local stimulus effects during its construction but once build only has an insignificant employment impact given the nature of the facility.

The business park aimed to develop a 'high end' mixed use profile (shops and offices), however it is now largely a logistics hub.

Whilst new housing completions exhibit a cyclical pattern the additions to business floorspace and associated employment echo aspects of the events analysis in the econometric work by peaking 5 years after scheme opening. In this case however, the peak is later than the two-year profile identified in the portfolio-level analysis (which encompasses multiple scheme types and contexts).

It is not possible to attribute the dissipation of these economic impacts to observed traffic congestion after the five-year peak. The most plausible explanation is that the road enhancement had the anticipated effect of helping to release pent up demand for investing in new business facilities thus generating new employment. Once achieved, a new equilibrium state was achieved.

The Intermodal Freight Terminal and the expansion of Exeter Airport did not meet expectations, and the science park related developments occurred later than expected. The Intermodal Freight Terminal plan did not come to fruition due to technical issues with the high rail gradient.

Exeter Airport has been affected negatively by regional airline business viability challenges associated with the COVID-19 pandemic. More generally, Exeter Airport has struggled since the global financial crisis in 2008 and has not developed as a regional hub outside of charter and budget airline activities.

Over recent years, additional airport road access improvements have been taking place with the aim of creating a major new East Devon business park that will create1,000 jobs. This is part of an Exeter and East Devon Enterprise Zone covering four sites that includes the Science Park, Business Park, Cranbrook town developments and Power Park (another business park) – all of which are intended to benefit from easy and fast-tracked planning consent via Local Development Orders.

If the intended Intermodal Freight Terminal and airport developments had taken place, then the potential for most sustained local economic growth beyond the initial

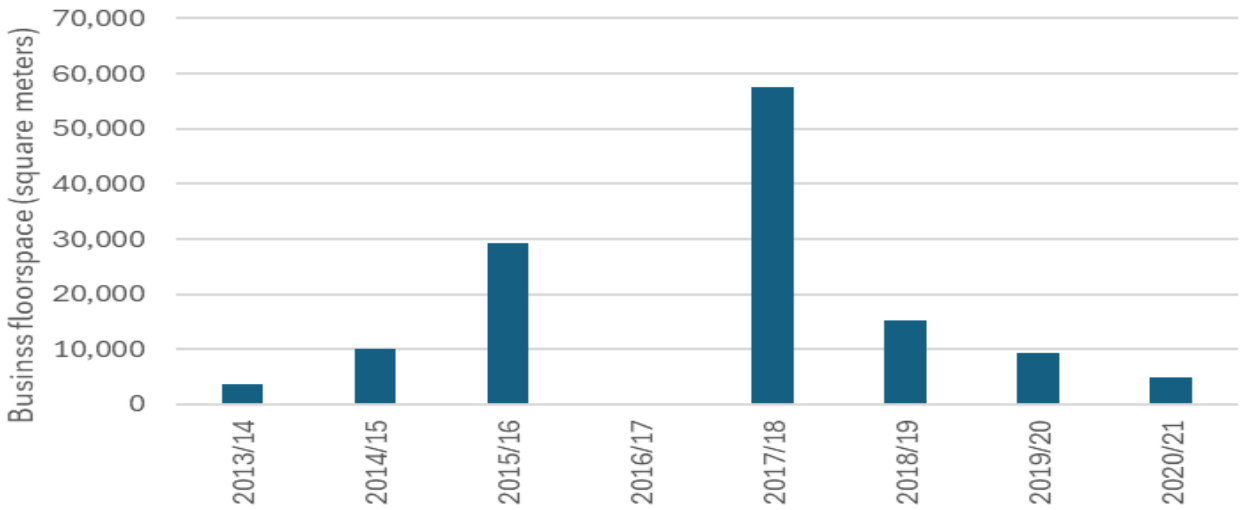
9.1.3 Key evidence on outcomes to date

The 5-year POPE assessment published in 2021 and containing data up to that year was able to highlight the following business floorspace, housing and employment impacts associated with this scheme based on targeted locations. Whilst the new housing completions exhibit a cyclical profile, the floorspace additions and associated new employment, which both peak 5 years after scheme opening. This finding broadly echo’s aspects of the events analysis in the econometric work.

Note: data for 2016-17 is missing from the tables provided without explanation. The traffic flow data provided only extended to 2018 in line with the 5-year assessment timeline for that aspect.

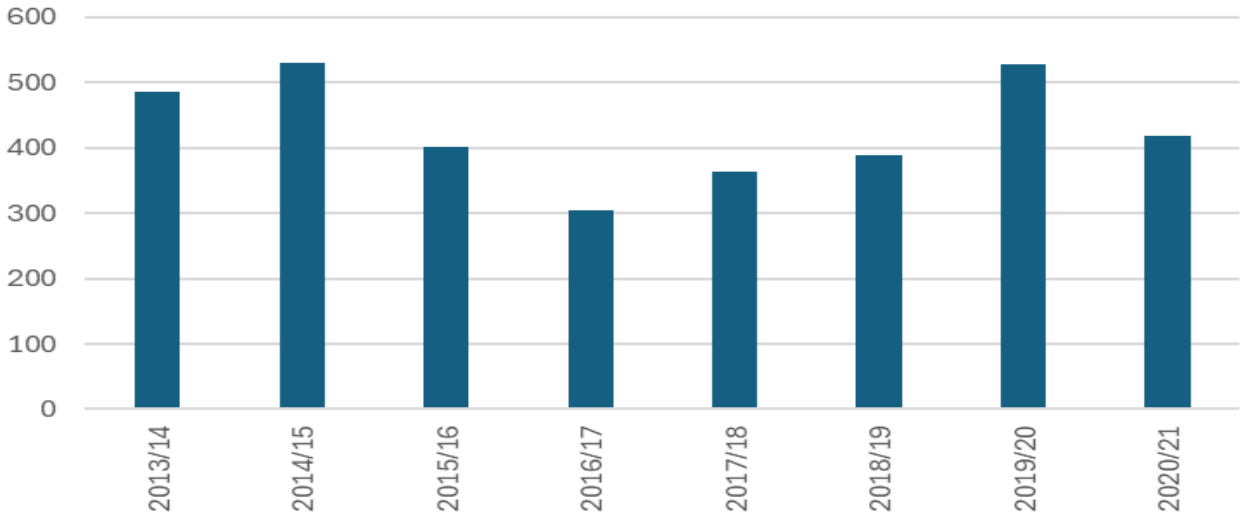
More general employment data for Exeter as a whole places the more specific impacts in context, and show volatile industrial employment around a downward trend and more stable retail employment also around a slight downward trend. This indicates that the specific impacts have not produced more generally noticeable local effects (to date).

Figure 9.2: Annual additions of floorspace (square miles)



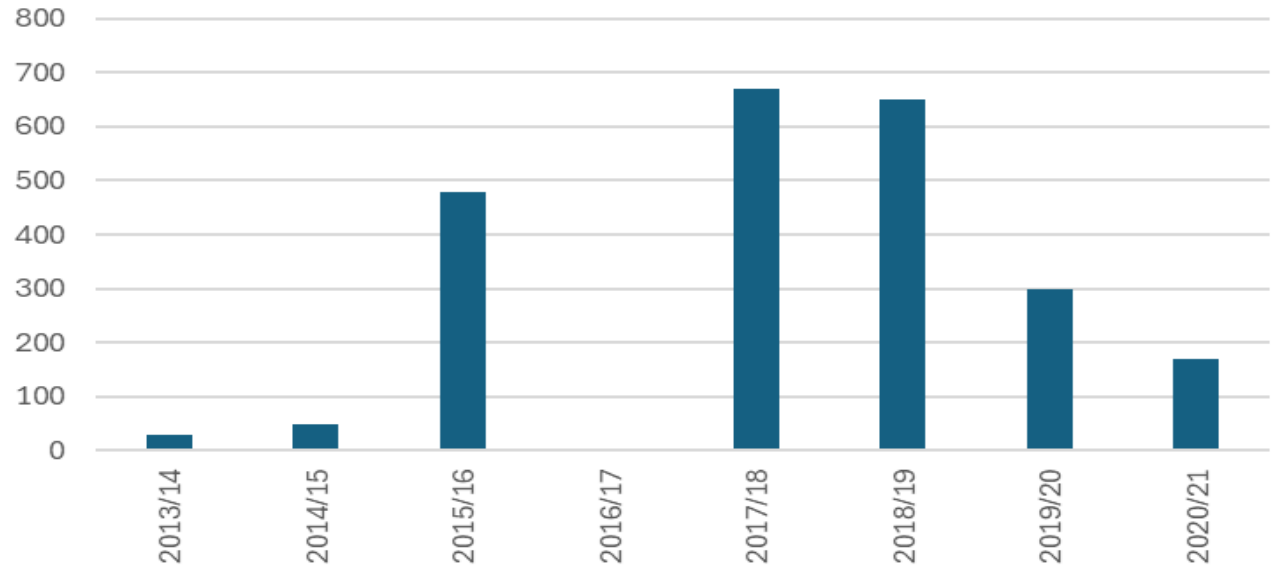
Source: Ipsos plots using 5 year POPE data provided by East Devon District Council.

Figure 9.3: New houses completed



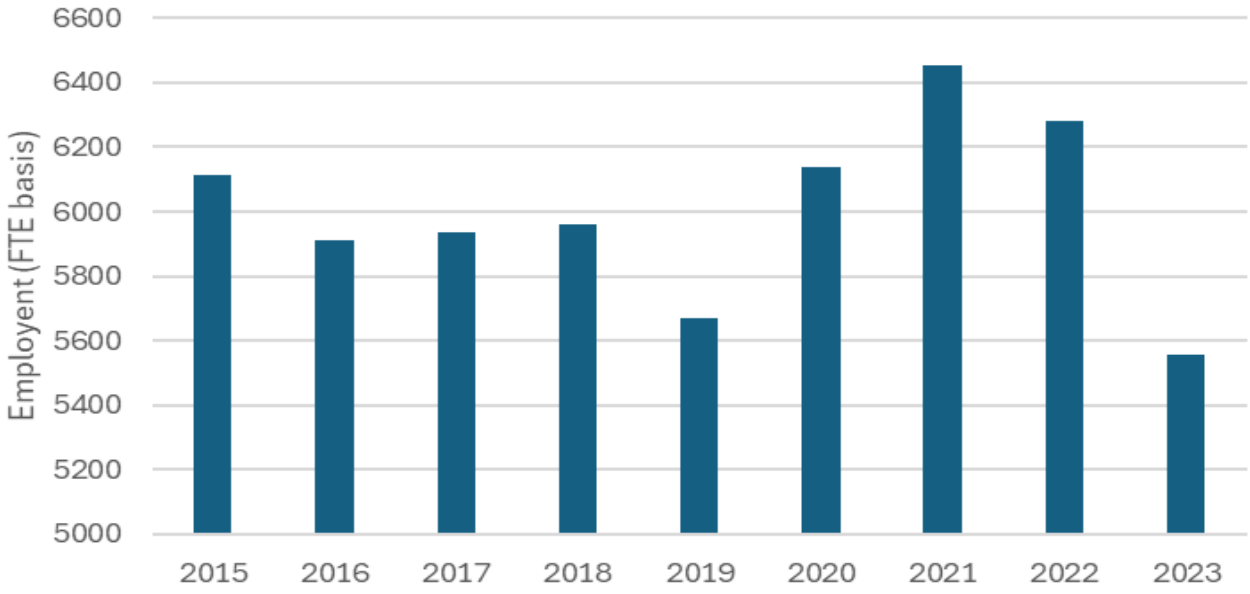
Source; Ipsos plots using 5 year POPE data provided by East Devon District Council.

Figure 9.4: Net additional employment



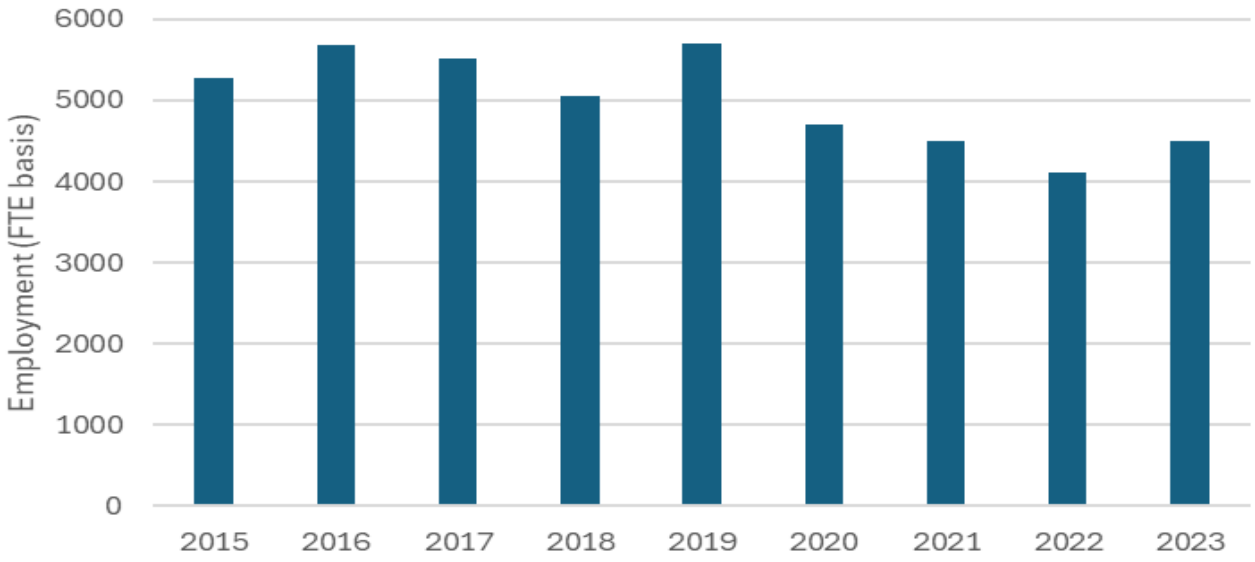
Source; Ipsos plots using 5 year POPE data provided by East Devon District Council.

Figure 9.5: Industrial employment



Source; Ipsos using NOMIS data

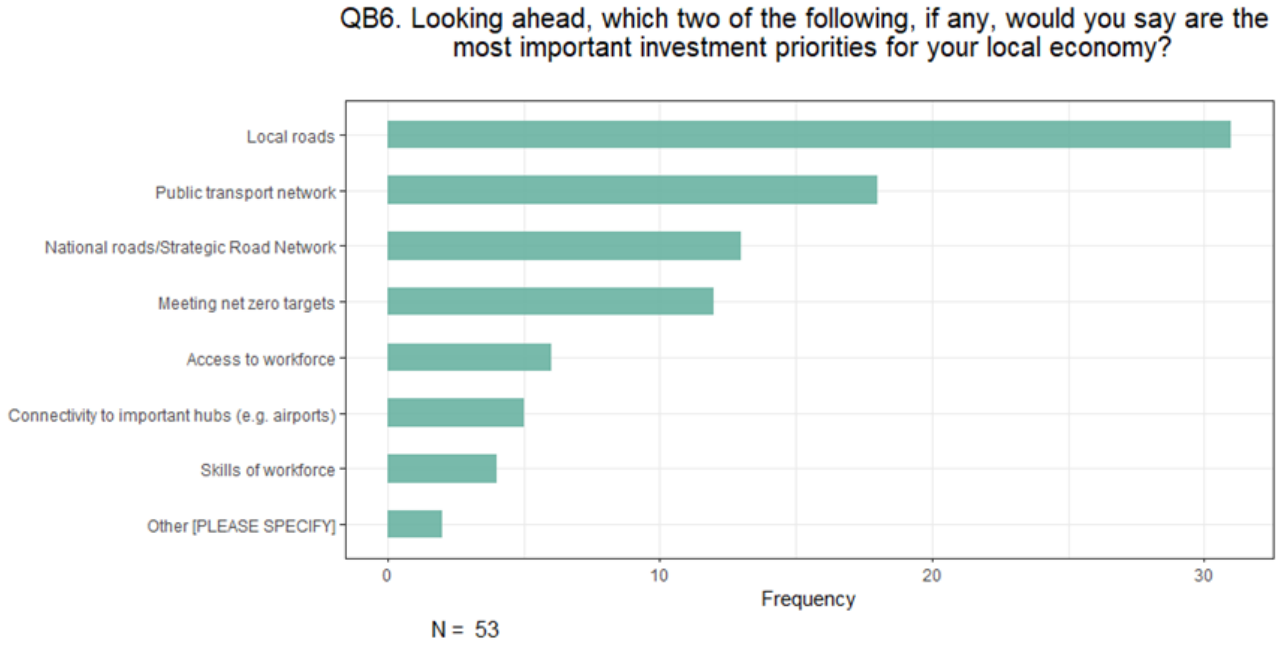
Figure 9.6: Retail employment



Source; Ipsos using NOMIS data

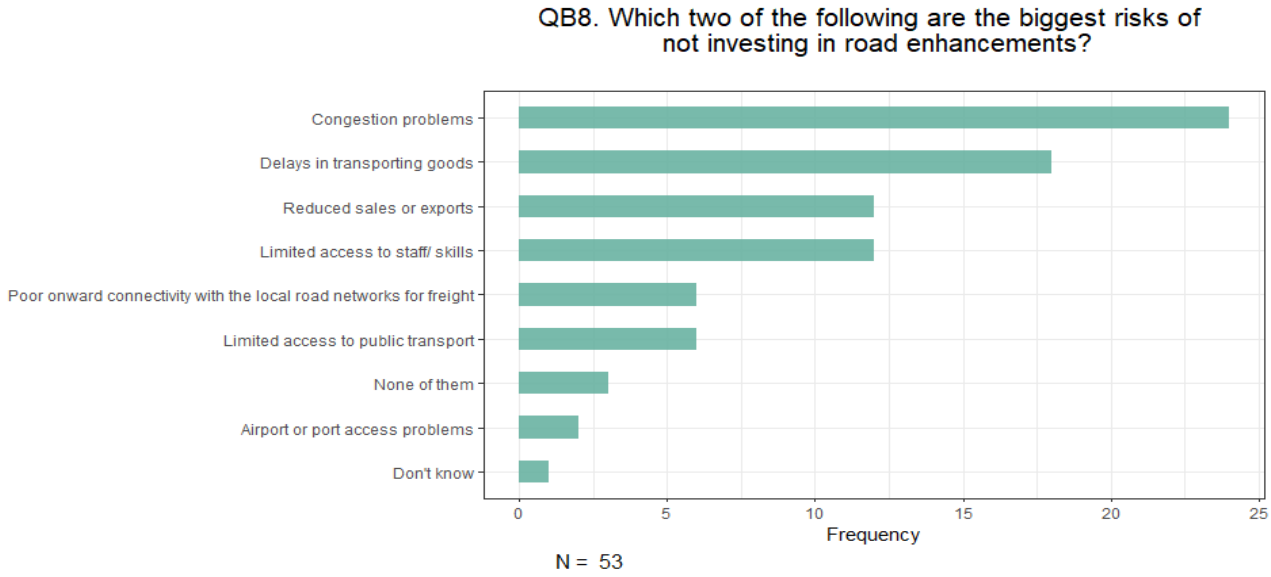
Exeter was one of the three case studies benefiting from a CATI business survey. However, in this case the response rate (n=53) was too small to provide robust evidence or supply chain mapping. As half of the respondents were not familiar with the scheme a detailed analysis of those results is not appropriate. The general views expressed on the importance of road connectivity to businesses and the local economy, and the related importance of reducing traffic congestion aligned with the findings from the other two CATI business surveys (see below).

Figure 9.7: Views on most important investment priorities for the local economy



Source: Ipsos survey analysis

Figure 9.8: Views on biggest risks from not investing in road enhancements



Source: Ipsos survey analysis

9.1.4 Lessons for the EPIRE study and future work

At a local government level, the successes achieved, principally reflected in housing development and (labour supply) and employment gains (demand for labour) are viewed as being facilitated by a legacy of productive collaboration between adjacent local authorities with a shared strategic vision going back to the 1990s. Planning consent has been assisted by a positive public attitude to facilitating local economic development. In combination, these aspects point to the importance of strategic ambitions, backed up by planning and local government collaboration is exploiting the potential for economic impacts provided by road enhancements.

The five-year POPE report provided tabular data on the main economic impacts (as summarised here) without graphical plots that highlight time paths. Given the policy significance of how economic benefits can peak and then dissipate (as highlighted the econometric analysis), it would be useful for future Benefits Management and M&E guidance to encourage the presentation of data in a manner that highlights the timeline aspect more clearly.

9.1.5 Summary of key findings

- Effective local government collaboration over a shared strategic vision and approaches to planning consent to achieve that vision, supported by local sentiment, are viewed as key success factors for this case.
- There were identifiable anticipated increases in business floorspace and associated employment associated with the scheme, together with positive new housing developments. The growth then dissipation impact timeline (peaking at five years after scheme opening) broadly aligns with the results from the econometric analysis, albeit with a later peak than identified in the average effects at that portfolio-level analysis. This points to the (expected) fact that schemes will exhibit a range of peak impacts before dissipation effects manifest

themselves. In this case, it is not possible to attribute the dissipation of these economic impacts to observed traffic congestion after the five year peak.

- Anticipated benefits in the form of a new inter-model (rail freight) terminal and Exeter airport expansion did not eventuate as intended. This was due to a mix of planning shortcomings for the rail terminal (a steep rail gradient) and more exogenous hard to predict problems for the airport (the global financial crisis and the negative impact of COVID-19) on regional airlines (including Flybe's insolvency).
- The anticipated business park developments did not meet expectations as regards new shopping and office investments and is now largely used as a logistics hub. This latter aspect highlights the importance of logistics facilities in providing employment (and therefore GVA) in response to reduced local congestion and SRN connectivity.

9.2 Additional details

9.2.1 Scheme characteristics summary

The M5 Junction 29 (J29) improvement scheme, officially opened in January 2013, is one of many projects that have been delivered as a result of the public and private sector investment in the Exeter and East Devon Growth Point. The scheme is viewed as helping to unlock constraints to planned developments in this regional growth area, which consists of approximately 14,000 new dwellings, 10,000 new jobs, an Intermodal Freight Terminal and the expansion of Exeter Airport. The improved junction was intended to ensure that the transport system supports strategic development able to drive economic growth and prosperity in Devon.

The scheme has delivered a new all movements junction off the A30 at M5 J29 and a new link road providing access to the Science Park and old A30. The new link road connects to the A30 trunk road via a new signalised junction adjacent to J29, replacing the old Blackhorse interchange. This is the direct high-quality access the development needs to be a catalyst to enable the employment site to flourish. The scheme provides J29 with greater capacity for traffic leaving the motorway and removes the potentially hazardous situation of a 'race start'. The M5 southbound off-slip has been widened to 4 lanes to provide additional capacity and a direct access to the Science Park whilst the northbound off slip has also been widened considerably and links to a new signalised junction on the A30.

The scheme cost a total of £16.2m, of which £10.4m was funded by the Department for Transport (DfT).

9.2.2 Aims

The East of Exeter Access Improvements scheme was designed with several comprehensive aims and objectives to support regional growth and development:

- **Unlock constraints for development:** The primary aim was to remove barriers hindering the development of new housing and employment sites, thereby fostering economic growth and prosperity in the region. By improving infrastructure, the scheme aimed to support the construction of approximately 14,000 new dwellings and the creation of 10,000 new jobs,

effectively catering to the growing demand for residential and commercial spaces in the East Devon Growth Point area. This objective was integral to stimulating long-term economic benefits by providing the necessary infrastructure to accommodate and attract businesses and residents. It also included plans for an Intermodal Freight Terminal and the expansion of Exeter Airport, although these specific projects faced challenges that prevented their full realization.

- **Increase junction capacity:** Enhancing the capacity of M5 Junction 29 was crucial to improving the overall traffic flow in the area. The scheme involved significant infrastructure upgrades, such as widening lanes and constructing new link roads. These developments were intended to provide additional movements at the junction, reduce congestion, and improve road safety for motorists. By addressing traffic bottlenecks and hazardous conditions, the scheme aimed to create a more efficient and safer transport network that supports strategic regional development.
- **Promote sustainable travel:** Another key objective was to encourage the use of sustainable modes of transport. The scheme incorporated infrastructure improvements like pedestrian and cycle paths, as well as bus priority lanes. These enhancements were designed to reduce reliance on motor vehicles by making alternative, environmentally friendly modes of travel more accessible and attractive. Promoting sustainable travel not only aligns with contemporary environmental goals but also helps to ease congestion and reduce pollution, contributing to the overall quality of life in the region.

9.2.3 Extent to which the scheme met its aims and objectives

- **Unlock constraints for development:** The scheme was partially successful in achieving this aim. Document review and data analysis from the 5-year post-opening evaluation reports, provided insights into housing and employment statistics relative to the project's goals. The scheme facilitated the construction of new housing and employment sites, contributing to the delivery of approximately 14,000 new dwellings and 10,000 new jobs. However, some planned developments, such as the Intermodal Freight Terminal and the expansion of Exeter Airport, faced challenges and did not materialize as expected. The constraints unlocked by the road improvements have paved the way for significant residential and commercial development, though some anticipated projects encountered unforeseen technical and economic barriers.
- **Increase junction capacity:** This objective was largely met as observed in traffic flow data and analysis from monitoring reports. The improvements at M5 Junction 29 significantly increased capacity, reduced congestion, and improved road safety. This was achieved through the widening of lanes and the construction of new link roads, facilitating new traffic movements and reducing journey times. The improved infrastructure has enabled smoother traffic flow and reduced bottlenecks, contributing to enhanced safety and efficiency for commuters and local businesses.
- **Promote sustainable travel:** The scheme successfully promoted sustainable travel by implementing pedestrian and cycle paths, as well as bus priority lanes. These developments aligned with consumer preferences for environmentally friendly transport options and helped

reduce reliance on motor vehicles. The enhancements made it easier for residents to opt for biking or public transport, supporting broader environmental and health goals. Observations from infrastructure enhancements and usage data indicated increased use of sustainable transport modes post-implementation in the documentation.

Anticipated benefits in the form of a new inter-model (rail freight) terminal and Exeter airport expansion did not eventuate as intended. This was due to a mix of planning shortcomings for the rail terminal (a steep rail gradient) and more exogenous hard to predict problems for the airport (the global financial crisis and the negative impact of COVID-19) on regional airlines (including Flybe's insolvency).

The anticipated business park developments did not meet expectations as regards new shopping and office investments and is now largely used as a logistics hub. This latter aspect highlights the importance of logistics facilities in providing employment (and therefore GVA) in response to reduced local congestion and SRN connectivity.

9.2.4 Impacts on local areas and local businesses:

- **Local areas:** Document review and stakeholder interviews with local authorities and businesses underscored the transformative impact on local development patterns. The scheme brought several infrastructural improvements, enhancing connectivity and accessibility in the region. This has made the area more attractive for residential and business investments, with positive implications for local economic growth and community development. The improved road network has been a catalyst for regional development, encouraging further investment and growth.
- **Local businesses:** Feedback from business surveys and interviews conducted as part of the scheme evaluation provided qualitative insights into business sentiments and economic activities Businesses benefited from improved transport links, which facilitated easier access to markets and resources. The creation of new business parks and the expansion of existing ones provided opportunities for business growth and job creation. Enhanced connectivity has allowed businesses to optimize supply chains and attract a broader customer base.

9.2.5 Realisation of outcomes:

Evaluation reports, stakeholder interviews, and data analysis, including traffic flow and economic impact assessments, offered a comprehensive view of how outcomes were achieved. The outcomes were realised through a combination of infrastructure enhancements, strategic planning, and collaboration between public and private stakeholders. The scheme's success was supported by a legacy of productive collaboration between adjacent local authorities. This collaborative approach ensured that the infrastructure developments were well-integrated into broader regional plans.

9.2.6 Success factors

The key success factors for the East of Exeter Access Improvements scheme in achieving its aims were:

- **Effective collaboration and planning:** Document review and stakeholder interviews highlighted the importance of inter-agency cooperation and shared strategic objectives. The successful collaboration between local authorities and stakeholders was described as a crucial factor. This partnership ensured that the strategic vision for the region's development was cohesive and well-executed, aligning infrastructure enhancements with economic and residential growth goals. By fostering a unified approach, stakeholders were able to streamline decision-making processes and address challenges collectively, which enhanced project efficiency and effectiveness.
- **Infrastructure investment:** Significant investment from both the public and private sectors, including substantial funding from the Department for Transport, provided the necessary resources to implement the infrastructure improvements. This financial backing was essential for the construction and enhancement of key transport links, which in turn facilitated regional growth by improving accessibility and connectivity. Investments were strategically allocated to maximize impact and ensure that infrastructure developments met the long-term needs of the community.
- **Integrated development goals:** The alignment of transportation improvements with broader economic and residential development goals facilitated a seamless integration of new infrastructure into the region's growth plans. This strategic alignment ensured that the infrastructure supported the anticipated increase in housing and business activities, thus driving sustainable development. By integrating these goals, the project not only addressed immediate transportation needs but also laid the groundwork for future economic expansion and community well-being.
- **Flexible policy frameworks:** Policy documents and planning records that outlined the application and impact of LDOs on the project's progress. These records demonstrate how LDOs were effectively leveraged to accelerate development timelines and accommodate evolving project requirements. The use of Local Development Orders (LDOs) allowed for a more flexible and expedited development approval process, which was crucial in keeping up with the rapid pace of regional development. This flexibility helped to mitigate potential delays and streamline the execution of development projects, ensuring that infrastructure enhancements could proceed without undue bureaucratic hindrances. LDOs provided a mechanism for adapting to changing needs and priorities, which was vital in a dynamic development landscape.

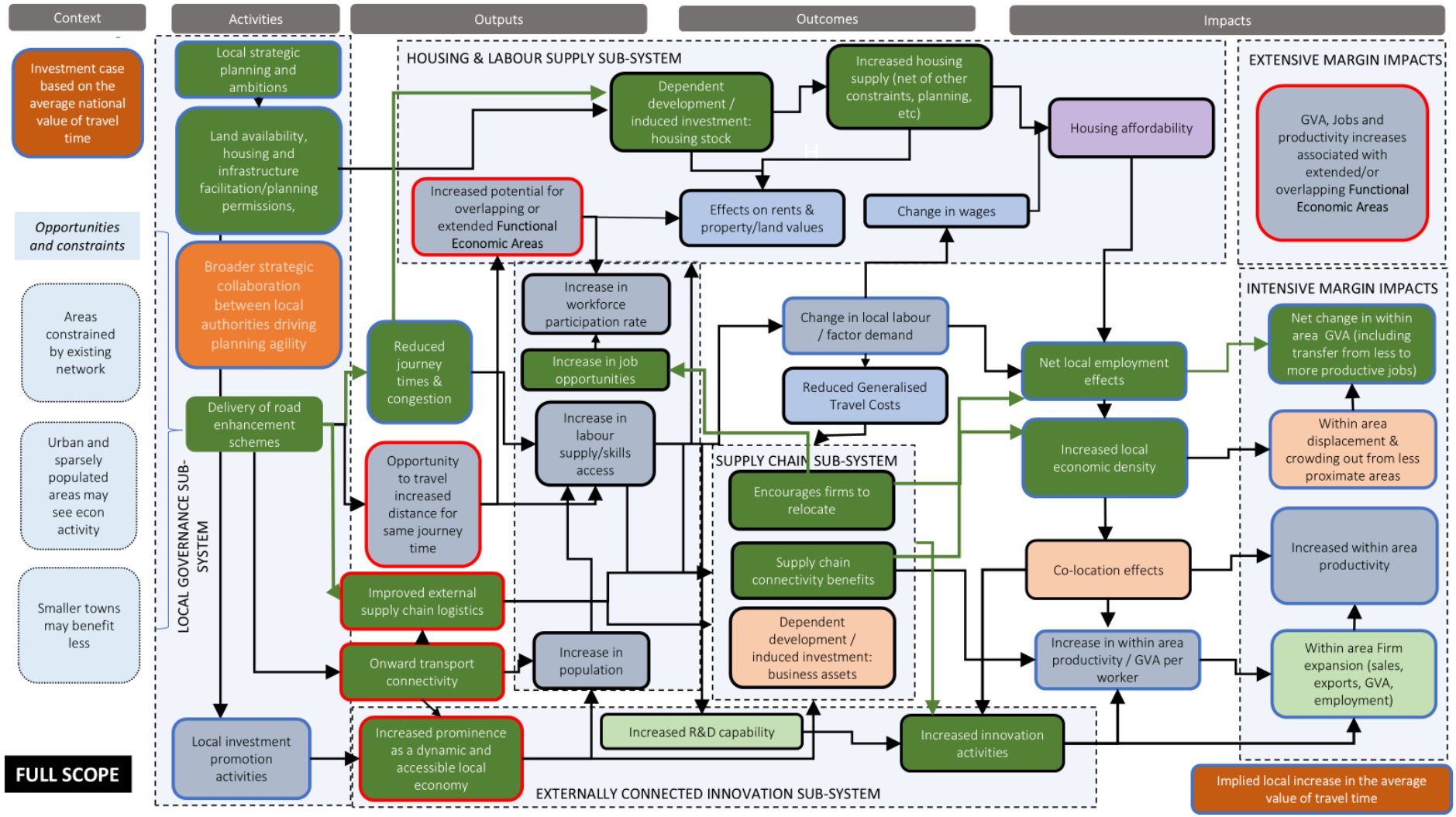
9.2.7 Unintended impacts

The documents revealed an unintended impact on road accidents. Following the scheme's implementation, there was a noticeable increase in the frequency of slight accidents within the vicinity of the new junction. This rise in minor accidents may be attributed to drivers needing time to adjust to the new road layout and traffic patterns, which initially presented unfamiliar navigation challenges. This phenomenon underscores the importance of considering driver behaviour and adaptation periods in infrastructure projects, especially when significant changes are made to existing roadways.

9.3 Scheme logic model variant

The logic model variant for this scheme is provided overleaf. In this case the key additional element (in orange) is the strategic collaboration between local authorities and the streamlining and flexibility of planning procedures (as highlighted above).

Figure 9.9: East of Exeter logic model variant



10 Port of Immingham (A18/A180 + A160/A180)

This chapter sets out the results from the detailed Port of Immingham case study, combining findings from interviews with the Local Authority, local businesses, document review, and secondary data analysis.

10.1 Overview

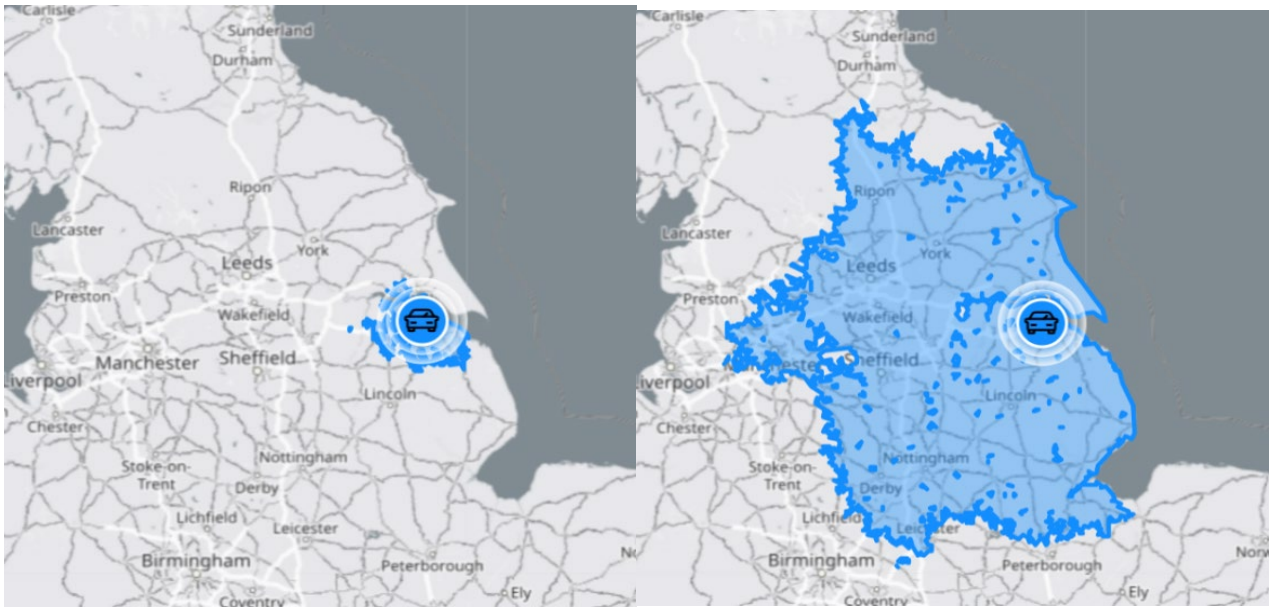
10.1.1 Scheme characteristics summary

This is a combination of two complementary schemes both opening in 2016, aimed at supporting the growth of the Immingham freight port and the surrounding industrial area of the South Humber. The improvements to the A18/A180 was a North-East and Local Major scheme, aimed at reducing congestion through residential Immingham and improving access to the port via the A18. The A160/A180 scheme was a Highways England scheme, which focused on improving the junction of the A160 with the A180, in addition to dualling of the previously single carriageway A160 leading to the Port.

Immingham is the largest freight port in the UK (by tonnage), with 56 million tonnes of goods travelling through the port in 2019. The port contributes roughly £460 million a year to the local area, so improvements are seen as likely to have significant positive impacts on the local economy. The surrounding regions are also strategically important, with many industrial plants, oil refineries and power stations. The Southern Bank of the Humber estuary are also seen as a key future investment prospect for renewable energy plants, and the production of offshore wind turbine equipment.

The wider area subsequently benefitted from attaining Freeport status.

Figure 10.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

10.1.2 Key outcomes to date

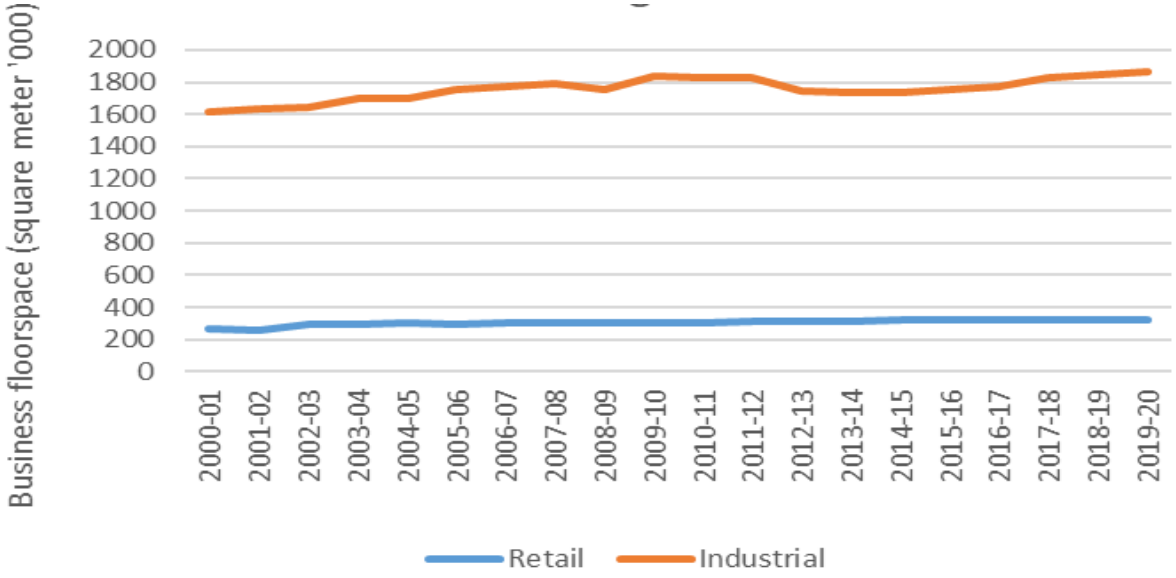
These road enhancements achieved their objectives of supporting Immingham as a freight port. Subsequent developments in offshore wind systems development and the growth of businesses exploiting the port location (including food/seafood) based businesses have all contributed to a beneficial clustering/agglomeration effect (which Freeport status adds to). Given the large size of some offshore wind system fabrication components (delivered by flat-bed HGV) road access is an important enabler of that industrial activity. The UK's first HGV EV charging facility has now been established (2024) as a joint venture between Volvo, Daimler and Traton.

Some negative unintended outcomes have been encountered however, due to HGV drivers opting to save on overnight parking fees by parking on residential streets. This has caused community dis-satisfaction.

10.1.3 Key evidence on outcomes to date

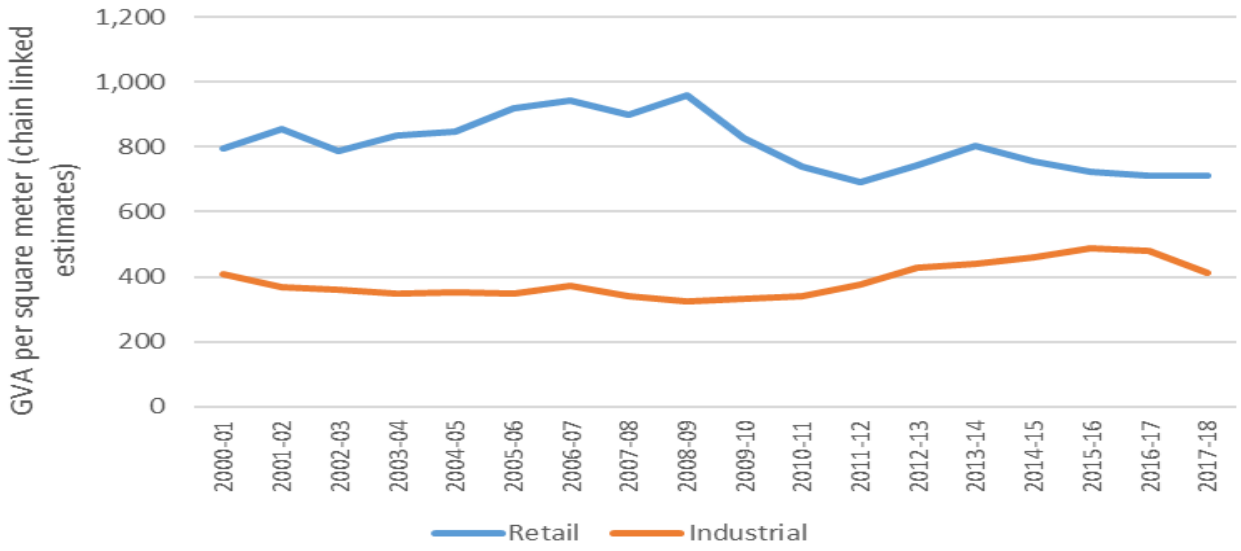
Although the VOA business floorspace data is insufficiently up to date at this point to reveal any major upward trends, there is an indication of increasing industrial floorspace since the schemes were completed in 2016. However, GVA per square meter for industrial floorspace declines over this post-opening phase – though may have picked up more recently than these data are able to show.

Figure 10.2: Retail and industrial business floorspace



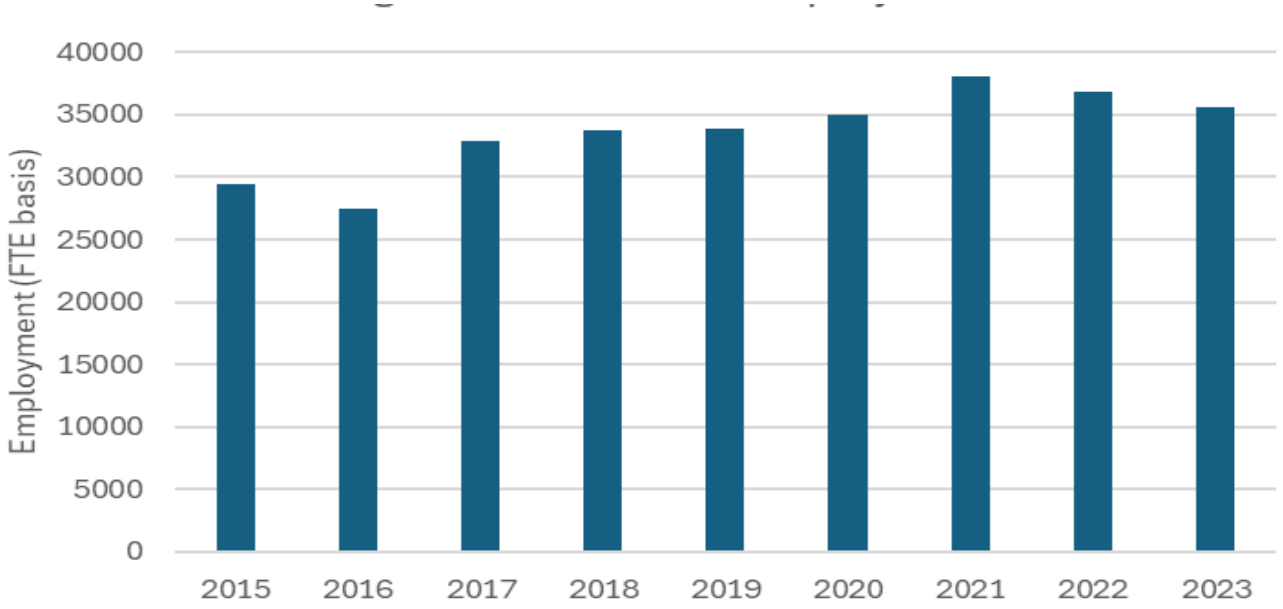
Source: Calculated by Ipsos using VOA data

Figure 10.3: GVA per square metre



Source: Calculated by Ipsos using VOA and ONS data

Figure 10.4: Industrial employment



Source: NOMIS

10.1.4 Lessons for the EPIRE study and future work

The main lesson from this case study is that investments in reducing HGV traffic congestion for a major port (as part of a consideration of network-level national benefits rather than local benefits) can help to catalyse local industrial development – and especially if these clustering/agglomeration effects also benefit from 'strategic fit' (in this case investments in offshore wind fabrication facilities and Freeport status). There is strong local authority interest in positioning as a net zero hub and these two road schemes have contributed indirectly to this strategic ambition.

10.1.5 Summary of key findings

Port congestion-related road enhancements can help to enable broader industrial benefits (including innovative activities) when there is a local strategic ambition to exploit emerging opportunities and the necessary strategic fit with other complementary activities and government interventions.

10.2 Additional details

10.2.1 Scheme characteristics summary

This is a combination of two complementary schemes both opening in 2016, aimed at supporting the growth of the Immingham freight port and the surrounding industrial area of the South Humber. The improvements to the A18/A180 was a North-East and Local Major scheme, aimed at reducing congestion through residential Immingham and improving access to the port via the A18. The A160/A180 scheme was a Highways England scheme, which focused on improving the junction of the A160 with the A180, in addition to dualling of the previously single carriageway A160 leading to the Port.

Immingham is the largest freight port in the UK (by tonnage), with 56 million tonnes of goods travelling through the port in 2019. The port contributes roughly £460 million a year to the local area, so improvements are seen as likely to have significant positive impacts on the local economy. The surrounding regions are also strategically important, with many industrial plants, oil refineries and power stations. The Southern Bank of the Humber estuary are also seen as a key future investment prospect for renewable energy plants, and the production of offshore wind turbine equipment. The wider area subsequently benefitted from attaining Freeport status.

10.2.2 Aims

The Port of Immingham Road Schemes were crafted with a multifaceted approach to meet several critical objectives aimed at enhancing the overall efficiency and capacity of the port and its surrounding infrastructure. Specifically:

- **Reduce traffic congestion:** The primary objective of the road schemes was to alleviate traffic congestion, particularly during peak hours and at times when freight ferries were actively unloading and loading at the port. Such congestion was a significant bottleneck for the flow of goods and people, impacting the port's operational efficiency. By implementing these road improvements, the schemes sought to streamline traffic flow, thereby minimizing delays and improving the overall throughput of vehicles accessing the port facilities.
- **Improve journey time reliability:** A crucial aspect of the road schemes was to enhance journey time reliability. This was achieved by upgrading the road infrastructure to ensure that travel times became more predictable, reducing the variability that congestion often causes. Reliable journey times are essential for logistics and supply chain operations, as they allow for better planning and scheduling of shipments and deliveries.
- **Enhance access to the Port of Immingham:** The improvements were designed to significantly enhance access to the Port of Immingham and the surrounding industrial areas. By facilitating smoother and more efficient transport routes, the schemes aimed to optimize the movement of goods to and from the port, thereby supporting its role as a critical node in the UK's logistics network.
- **Accommodate future traffic growth**: The road schemes were not just reactive but proactive in their design, anticipating future growth in port activity. With the expected increase in port operations, particularly in Heavy Goods Vehicle (HGV) traffic, the infrastructure was developed to accommodate this growth seamlessly. This forward-looking approach was essential to ensure that increased traffic volumes did not lead to renewed congestion or inefficiencies.
- **Reduce collision rates and improve road safety:** A key safety objective was to reduce the number and severity of road collisions. By upgrading road layouts, improving junction designs, and implementing better traffic management strategies, the schemes aimed to enhance the safety of road users and the local community, thereby reducing personal injury collisions and improving overall safety standards.
- **Improve facilities for non-motorised users:** Recognizing the needs of pedestrians, cyclists, and other non-motorised users, the projects included enhancements to non-

motorised user facilities. This encompassed the addition of wider footpaths, cycle lanes, and safer crossing points, ensuring that all users of the transport network could navigate the area safely and conveniently.

- **Support economic growth and regional development:** By improving transport links to the port, the schemes were instrumental in supporting regional economic growth. They aimed to strengthen the port's role in the UK's supply chain network, facilitating trade and commerce while contributing significantly to the regional economy. This proved to be particularly important in the context of Brexit (a decision post-dating scheme planning), which introduced new challenges and uncertainties in trade logistics.

These objectives reflect a comprehensive strategy to bolster the Port of Immingham's operational capabilities, ensuring it remains a pivotal element of the UK's transport infrastructure. The road schemes were essential in preparing the region for future demands and opportunities, cementing the port's role in facilitating economic activities across the UK.

10.2.3 Outcomes

Comprehensive statistical analysis of traffic flows, journey times, and collision rates in monitoring reports robust provided quantitative evidence of the project's impact, demonstrating improvements in congestion management, safety, and reliability. Qualitative insights from interviews with local businesses highlighted the economic benefits of the road schemes, including enhanced operational efficiency and improved access to the port, which are critical for business growth and sustainability and evaluation reports and environmental assessments offered a detailed review of the project's performance, outlining both the successes achieved and areas where improvements are necessary, particularly in environmental mitigation and management.

10.2.4 Extent to which the schemes met their aims and objectives:

- **Reduction in traffic congestion:** The road schemes effectively addressed the issue of congestion, which was a significant concern due to the high volume of traffic during peak hours and the arrival and departure of freight ferries at the port. Document review showed that the project successfully improved journey times, particularly in the outbound direction from the port, which was a critical indicator of reduced congestion. The improvements in the road network allowed for smoother traffic flow, even with the substantial increase in traffic volumes, especially from Heavy Goods Vehicles (HGVs).
- **Improvement in journey time reliability:** Journey time reliability saw notable enhancements, particularly for outbound traffic in post monitoring reviews. This improvement was crucial for businesses relying on timely logistics operations. However, there was a slight increase in inbound journey times due to adjustments in traffic arrangements, such as the new roundabout configurations. This indicates that while the objective was largely met, there is room for further optimization.
- **Enhanced access to the port:** The enhancements in road infrastructure significantly improved access to the Port of Immingham, a vital hub in the UK's logistics and supply chain

network. The upgrades to junctions and dual carriageways were instrumental in facilitating the efficient movement of goods, reducing bottlenecks, and decreasing travel times.

- **Reduction in collision rates and improved road safety:** Post-project evaluations indicated a reduction in the number and severity of collisions, underscoring the project's success in enhancing road safety for users and the local community. The improved road designs and traffic management strategies contributed to these positive safety outcomes (source: Evaluation Report).
- **Improvements for non-motorised users: The** project included significant improvements for non-motorised users, such as pedestrians and cyclists. As outlined in scheme documentation and post opening reviews, enhancements included wider footpaths, cycling lanes, and safer crossing points, which have made the area more accessible and safer for all users.

Impacts on local areas and businesses

- **Local economic growth:** Stakeholder interviews highlighted that the road improvements facilitated the growth of local businesses by attracting investment and supporting regional economic development. This was particularly evident in sectors like offshore wind energy and food processing, where improved logistics capabilities contributed to increased business activity and economic performance.
- **Increased business efficiency:** Local businesses reported significant efficiency gains due to reduced travel times and improved access to the port. These improvements translated into increased productivity and competitiveness, as businesses were able to optimize their logistics and operations.
- **Mixed environmental outcomes:** While some environmental outcomes such as air quality and noise levels were in line with expectations, others, like landscape and biodiversity impacts, fell short due to insufficient establishment of mitigation measures. This highlights the need for continued attention to environmental management and mitigation.

These findings collectively illustrate that the Port of Immingham Road Schemes largely achieved their aims and objectives, delivering substantial benefits to local areas and businesses. Nevertheless, they also underscore the importance of addressing certain challenges, particularly in environmental sustainability, to enhance the project's long-term success.

10.2.5 Success factors

The key success factors for the Port of Immingham schemes in achieving their aims were:

- **Strategic infrastructure improvements:** The One-Year Post Opening Evaluation Report provided robust data analysis demonstrating substantial reductions in congestion and notable improvements in journey times, particularly in the outbound direction from the port. This evidence underscores the effectiveness of the infrastructure improvements. The design and execution of infrastructure enhancements, such as the upgrading of junctions and conversion of single carriageways to dual carriageways, were pivotal. These developments

were essential in alleviating congestion and enhancing journey time reliability, which are core objectives of the scheme. The improvements facilitated a smoother flow of traffic and significantly improved access to the port, thereby boosting its operational efficiency and capacity.

- **Forward-thinking planning**: The schemes were described in the documentation as having been designed with a proactive, future-oriented approach, anticipating growth in traffic volumes, especially from increased HGV traffic due to the anticipated expansion of port activities. This foresight ensured that the infrastructure was resilient and capable of accommodating future demands without jeopardizing efficiency.
- **Focus on safety enhancements**: Enhancing road safety was a major priority, achieved through refined road layouts and advanced traffic management strategies. These measures were instrumental in reducing collision rates and improving overall safety for road users and the local community. A notable reduction in personal injury collisions was detailed in the post opening report.
- **Stakeholder engagement and feedback:** Qualitative evidence from business interviews and stakeholder feedback, as documented in the Stakeholder Interviews and Business Interviews, showcased the positive impacts on local businesses and the broader economic landscape. Active engagement with local businesses and communities was integral to the schemes' success. This engagement provided essential insights that informed the design and implementation processes, ensuring the schemes were aligned with the needs and expectations of those most impacted by the changes.
- **Economic and regional development focus**: The road improvements were strategically aligned with regional economic development goals, supporting broader economic growth and reinforcing the port's critical role in the UK's supply chain network. This alignment was crucial for maximising the economic benefits of the schemes.

10.2.6 Unintended impacts

The document review and transcripts reveal a number of unintended impacts stemming from the road schemes, which were not originally anticipated in the planning stages. A significant issue that emerged was the behaviour of HGV drivers who, seeking to cut costs on overnight parking fees, resorted to parking on residential streets. This practice led to considerable dissatisfaction and disturbance among local communities, highlighting a gap in the planning process regarding logistics and parking provisions. The influx of HGVs into residential areas underscored the necessity for designated parking facilities that are both accessible and affordable for freight operators.

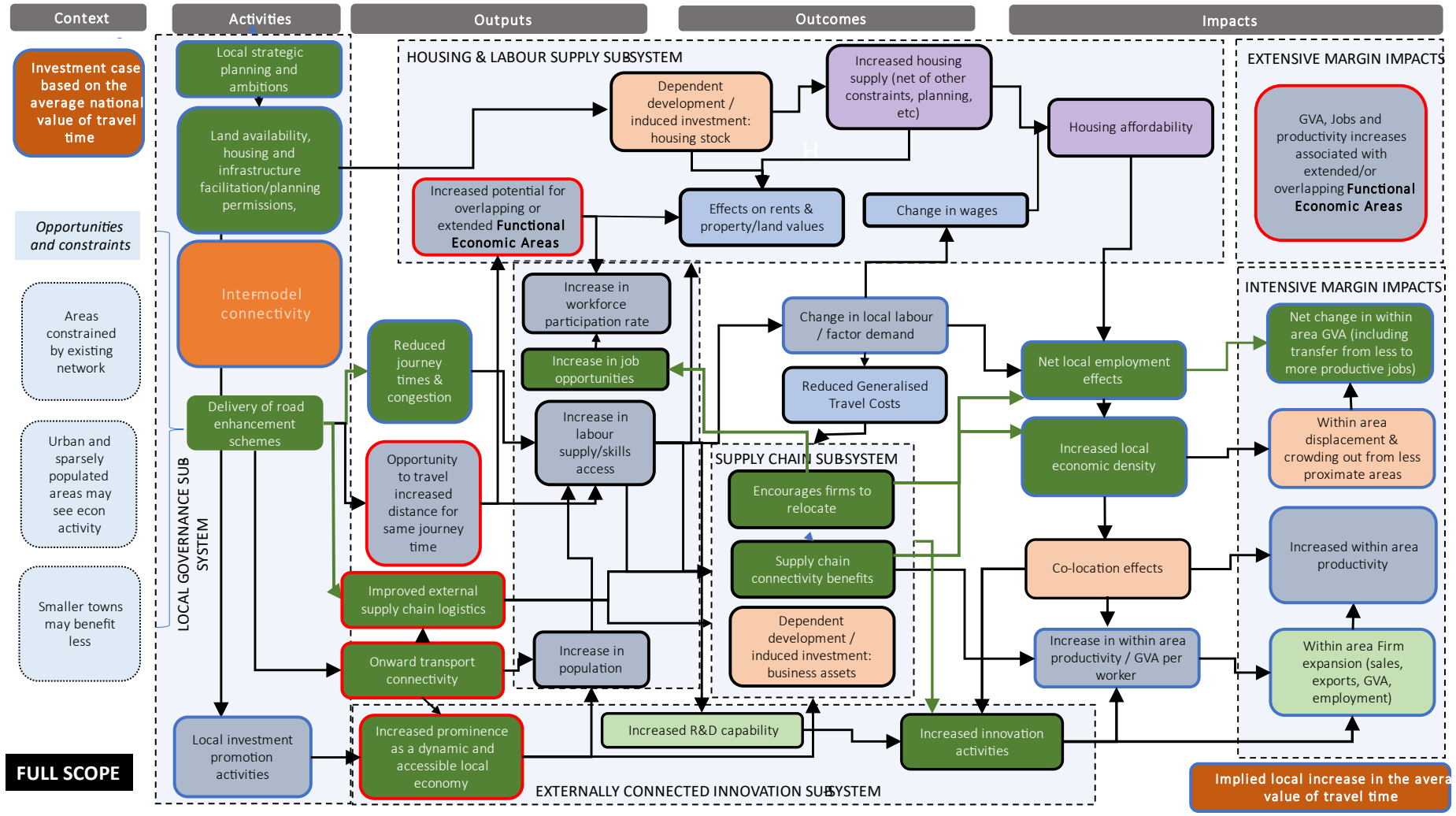
Additionally, the environmental evaluation conducted post-project revealed that certain mitigation measures did not perform as expected, particularly those related to landscape and biodiversity conservation. The poor establishment of mitigation planting resulted in landscape and biodiversity impacts that were more adverse than initially projected. This shortfall points to the need for more robust environmental planning and monitoring to ensure that such measures are effectively implemented and maintained.

These unintended impacts, while not overshadowing the overall success of the road schemes in meeting their primary objectives, underscore the critical importance of comprehensive planning that accounts for potential indirect effects. They also highlight the value of continuous stakeholder engagement to identify and address emerging challenges effectively. Such insights are crucial for informing future infrastructure projects, ensuring that they not only achieve their intended goals but also minimize negative repercussions for local communities and environments.

10.3 Scheme logic model variant

The logic model variant for the Immingham scheme is provided overleaf. Similarly to Manchester, inter-modal connectivity (in orange) needed adding. However, key impact pathways are similar to other schemes that did not involve a major housing emphasis.

Figure 10.5: Immingham logic model variant



11 Mersey Gateway (Bridge)

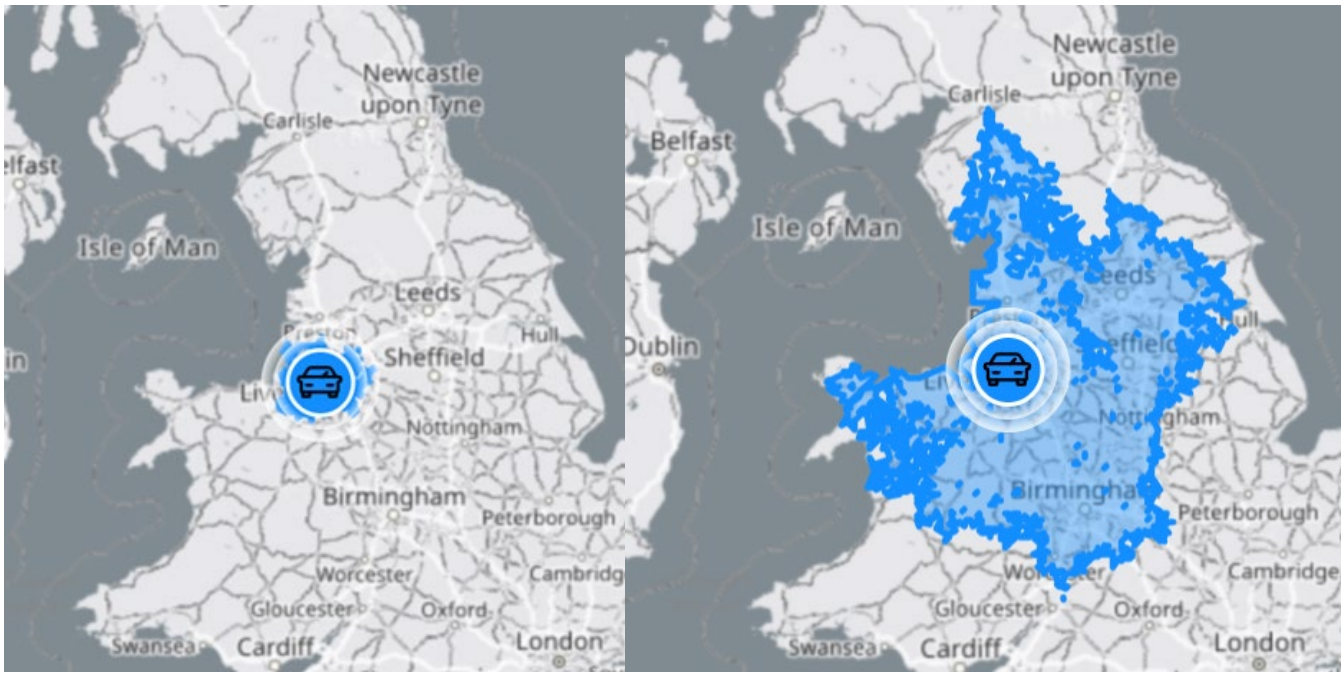
This chapter sets out the results from the light touch Mersey Gateway case study, combining findings from interviews with the Local Authority, local businesses, document review, and secondary data analysis.

11.1 Overview

11.1.1 Scheme characteristics summary

The Mersey Gateway Project involved the construction of a new 2.5km bridge across the Mersey, regeneration of the local area of Halton, refurbishments of the nearby Silver Jubilee Bridge (SJB) and improvements to the existing A533 and junctions linking to the M56 in the south. Given the strategic importance of the area, with links to the wider Merseyside region and North Cheshire. The proximity to the M56 and other major Motorway systems is also indicative of the wider economic benefits and largescale widespread regeneration that the scheme could contribute to. Although there is a significant regeneration aspect to this project (which was not a primary focus of the EPIRE study) it is useful to examine a bridge example and the emphasis on improving access to local developments.

Figure 11.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

A special purpose vehicle for this privately financed project was established by Halton Borough Council (HBC) with the delegated authority to deliver the Mersey Gateway Project and to administer and oversee the construction and maintenance of the new tolled crossings including the tolling of the existing SJB. This project agreement extends to 2044. Under the funding

agreement DfT provides an annual grant, paid in advance, to cover any anticipated gap between income and expenditure.

In the pre-construction project overview, some estimates were given on the expected economic benefits arising from construction: 4,640 jobs created through regeneration, inward investment and result of operation of the Mersey Gateway; £61.9 million a year in GVA due to job creation by 2030.

Transport benefits were also included which will likely have knock on wider economic benefits for the region: improved transport reliability; £39 million in accident costs prevented (estimate); 80% reduction in traffic on Silver jubilee, facilitating the development of a Major new transport network linking Liverpool city region with the rest of the North-West and the rest of the country.

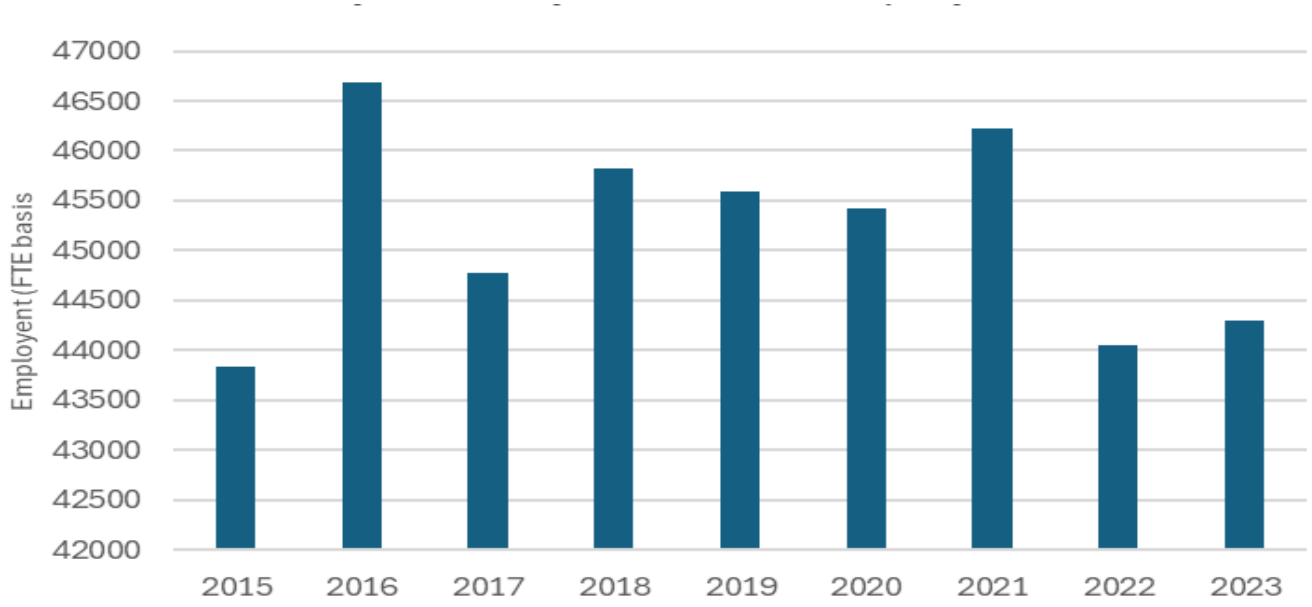
Cost: £600 million (construction) ,£1.86 billion (estimated over lifetime until 2044). Opened in 2017.

11.1.2 Key outcomes to date

Although this a major project with significant investments made no published economic impact studies are available. Assessing economic impacts is difficult due to the COVID-19 episode (which impacted on toll revenue and required use of the DfT grant to cover anticipated gaps between income and expenditure. Consideration of the data dashboard does not indicate a clear local impact beyond anecdotal evidence of attracting some named firms and investments. This evidence gap is evident in the key data on employment and business floorspace for the Liverpool and Knowsley administrative areas provided below.

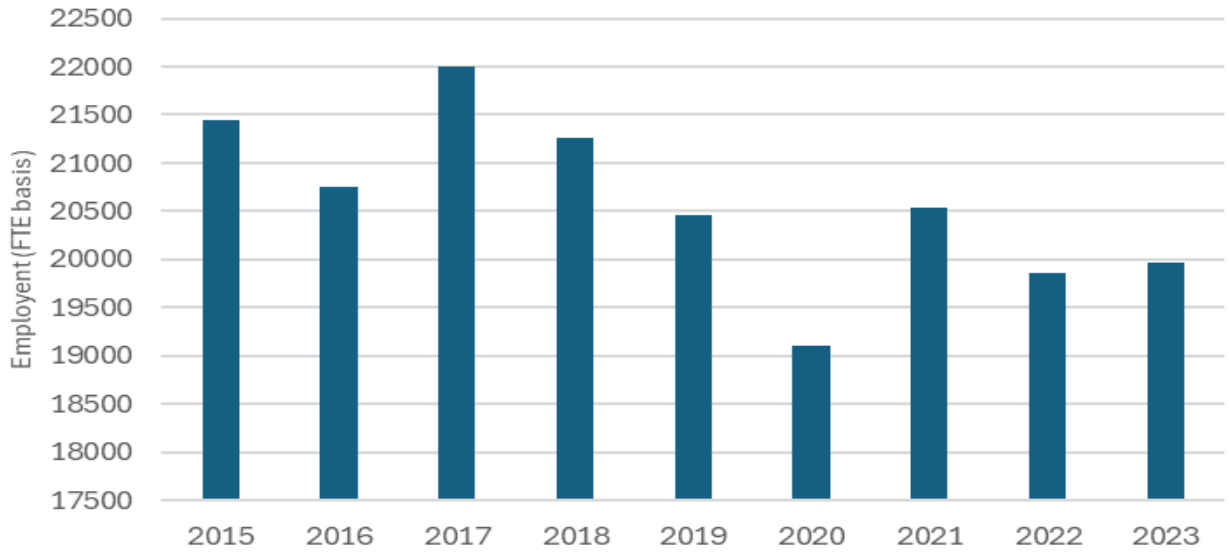
11.1.3 Key evidence on outcomes to date

Figure 11.2: Industrial employment



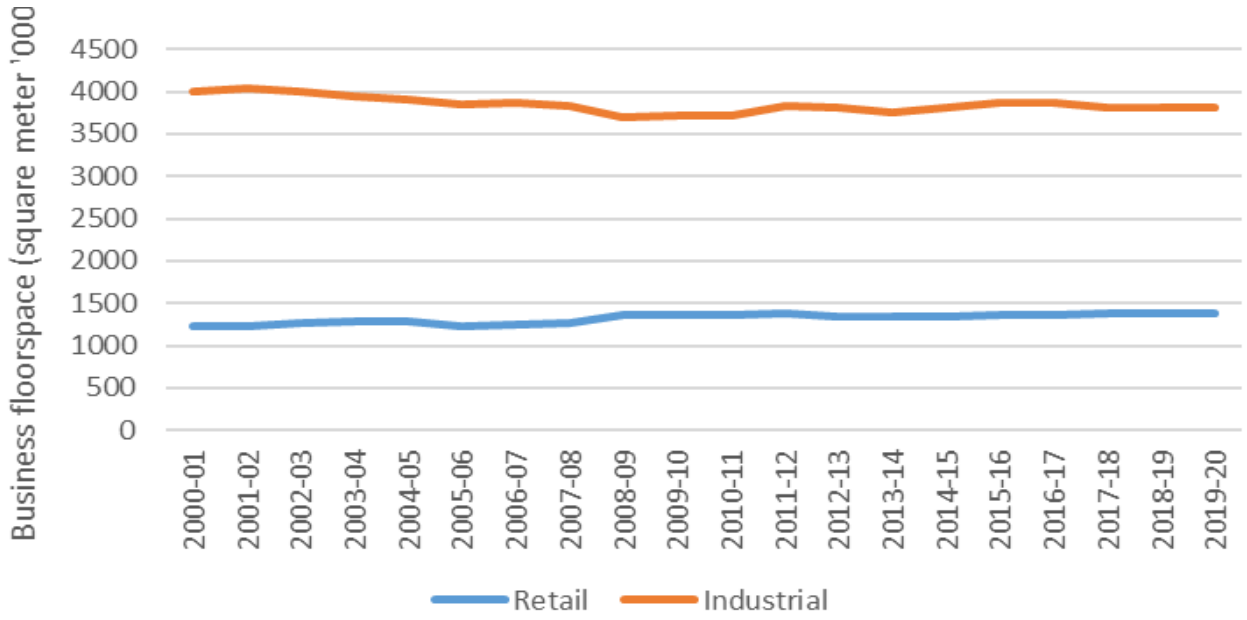
Source: NOMIS

Figure 11.3: Retail employment



Source: NOMIS

Figure 11.4: Retail and industrial business floorspace (square metres)



Source: Ipsos analysis of NOMIS and ONS data

11.1.4 Lessons for the EPIRE study and future work

The main lesson from consideration of this scheme is that it highlights the importance of using portfolio level econometric analysis to identify economic impacts, and also confirms that examining trends in business floorspace can provide a simple 'acid test' of one key aspect of economic impacts (whether business floorspace has increased or not).

11.1.5 Summary of key findings

No robust evidence of expected economic impacts at this point

11.2 Additional details

11.2.1 Scheme characteristics summary

The Mersey Gateway Project involved the construction of a new 2.5km bridge across the Mersey, regeneration of the local area of Halton, refurbishments of the nearby Silver Jubilee Bridge (SJB) and improvements to the existing A533 and junctions linking to the M56 in the south. Given the strategic importance of the area, with links to the wider Merseyside region and North Cheshire. The proximity to the M56 and other major Motorway systems is also indicative of the wider economic benefits and largescale widespread regeneration that the scheme could contribute to. Although there is a significant regeneration aspect to this project (which was not a primary focus of the EPIRE study) it is useful to examine a bridge example and the emphasis on improving access to local development.

11.2.2 Aims

The Mersey Gateway scheme was designed with several strategic aims and objectives, which can be categorized into economic, environmental, and transportation goals:

Transportation objectives:

- **Relieve congestion:** A primary focus was to alleviate the significant congestion on the Silver Jubilee Bridge (SJB). This congestion was a bottleneck, limiting local and regional development, and creating inefficiencies in meeting local transport needs. By reducing traffic on the SJB, the project aimed to open up new avenues for growth and development.
- **Improve accessibility:** The project sought to enhance accessibility, which is crucial for maximizing local development and fostering regional economic growth. This involved the development of improved links with the existing highway networks, thus facilitating efficient cross-river travel and better integration with the North West's transport infrastructure.
- **Restore network resilience:** The new six-lane crossing was introduced to restore effective network resilience for road transport across the River Mersey. This enhancement was designed to provide reliable journey times and increased capacity, thereby supporting economic activities and daily commutes.

Economic objectives:

- **Support economic growth:** By enhancing transport links, the project aimed to stimulate local and regional economic growth. Improved connectivity was anticipated to attract inward investment and create thousands of new jobs, thus revitalizing the local economy.
- **Generate economic benefits:** The project targeted substantial economic benefits, with a focus on increasing Gross Value Added (GVA) through job creation and business activities stimulated by improved transport infrastructure. These benefits were expected to ripple through the local economy, enhancing prosperity and development.

Environmental objectives:

- **Enhance air quality and urban environment:** An important aim was to improve local air quality and enhance the urban environment. This was to be achieved by reducing traffic congestion and the associated emissions, thus contributing to better public health and a more pleasant living environment.
- **Encourage sustainable travel:** The scheme included objectives to promote sustainable travel options. This involved encouraging the increased use of cycling and walking, as well as improving public transport links across the river. These initiatives were aimed at reducing car dependency and fostering a more sustainable transportation culture.

11.2.3 Outcomes

The Mersey Gateway Project has largely fulfilled its strategic aims and objectives, as substantiated by comprehensive analyses presented in post opening monitoring. A deeper exploration reveals the following outcomes and impacts:

- **Transportation goals**: As outlined in the documentation and post opening reviews, the primary objective of alleviating congestion on the Silver Jubilee Bridge (SJB) was achieved by diverting traffic to the new Mersey Gateway Bridge. This strategic shift has removed a significant barrier to local and regional development, enhancing transport efficiency and connectivity.

- **Economic objectives:** The project is detailed in documentation as potentially being a catalyst for stimulating local economic growth. By improving transport infrastructures, it is expected that the scheme will attract substantial inward investment and facilitated job creation. The long-term economic benefits projected include an annual increase of £61.9 million in Gross Value Added (GVA) by 2030. However, to stress these are still expected future benefits. No robust comprehensive economic impact assessment is currently available.

  Documentation and literature available on the scheme form National Highways and from the internet suggested that the Mersey Gateway Project had made significant strides towards achieving its economic objectives:

  - Stimulating local and regional economic growth: The Mersey Gateway was described as having played a pivotal role in attracting inward investment to the Halton region and its surroundings. This is largely attributed to the enhanced connectivity provided by the bridge, which has improved access to key transport networks. The project has been instrumental in creating a more attractive environment for businesses, leading to the establishment and expansion of numerous companies in the region.
  - Job creation: The project has been a significant driver of job creation, both during the construction phase and through the ongoing economic activities it has stimulated. The construction phase alone employed up to 1,250 workers at peak times, and the project is projected to create 4,640 permanent new jobs as part of the regeneration strategy (although verifiable data on this is not yet available).
  - Business investments and developments: Several high-profile companies, such as Hitachi, ConvaTec, and Hosokawa Micron, have made significant investments in the area, citing improved transport connectivity as a crucial factor in their decision-making processes. The bridge has facilitated developments at key sites like Widnes Waterfront, 3MG, and Manor Park, contributing to economic revitalisation and increased business opportunities.
  - Wider economic impact: The Mersey Gateway has had a broader economic impact by enhancing the attractiveness of the region for commercial activities and boosting property values. This has led to an uptick in the housing market, with a reported 7.5% growth in house prices in June 2018.

- **Environmental objectives:** As evidence in the monitoring data available, the initiative has led to a marked improvement in air quality and a reduction in noise pollution, thereby enhancing the urban environment. Additionally, it has promoted sustainable travel patterns through the enhancement of public transport links and the development of cycling and walking facilities.

Impacts on local areas and businesses:

As described above, the improved connectivity afforded by the new bridge has been pivotal in attracting businesses to the region. Notable investments have been made by companies such as Hitachi, ConvaTec, and Hosokawa Micron, underscoring the bridge's role in fostering economic vitality.

11.2.4 Success factors

The key success factors in the Mersey Gateway scheme achieving its aims are multifaceted, contributing significantly to the project's overall success. A detailed exploration of these factors reveals the following:

- **Strategic planning and design:** The detailed planning and design phase was described as crucial in the document review, ensuring the seamless integration of the Mersey Gateway Bridge into the existing transport network. This integration effectively addressed congestion issues on the Silver Jubilee Bridge (SJB) and enhanced regional connectivity. The project's alignment with regional development plans was a strategic move that facilitated its acceptance and integration into broader economic growth strategies. This alignment ensured that the project was not only a standalone success but also contributed to overarching regional development goals.
- **Robust financial and management structures:** The establishment of a special purpose vehicle (SPV) by Halton Borough Council was provided focused oversight and management of the project's finances. This structure ensured that the project met its budgetary and economic targets, which was crucial for its long-term viability. The involvement of private partners through the SPV allowed for efficient management and operational oversight. This partnership ensured financial sustainability and the effective delivery of services, leveraging private sector expertise and resources. That said, DfT’s contribution in covering financial shortfalls between income and expenditure (noted in the summary) proved to be important during the COVID’19 pandemic.
- **Focus on environmental and social benefits:** The project's commitment to improving environmental quality and promoting sustainable travel options was a significant factor in its success. This focus aligned with broader public policy goals and garnered public support, which was crucial for the project's acceptance and sustainability. Specific efforts to reduce air pollution and noise, alongside enhancements to public transport and active travel infrastructure, contributed to wider acceptance and support. These efforts demonstrated the project's commitment to social and environmental responsibility.

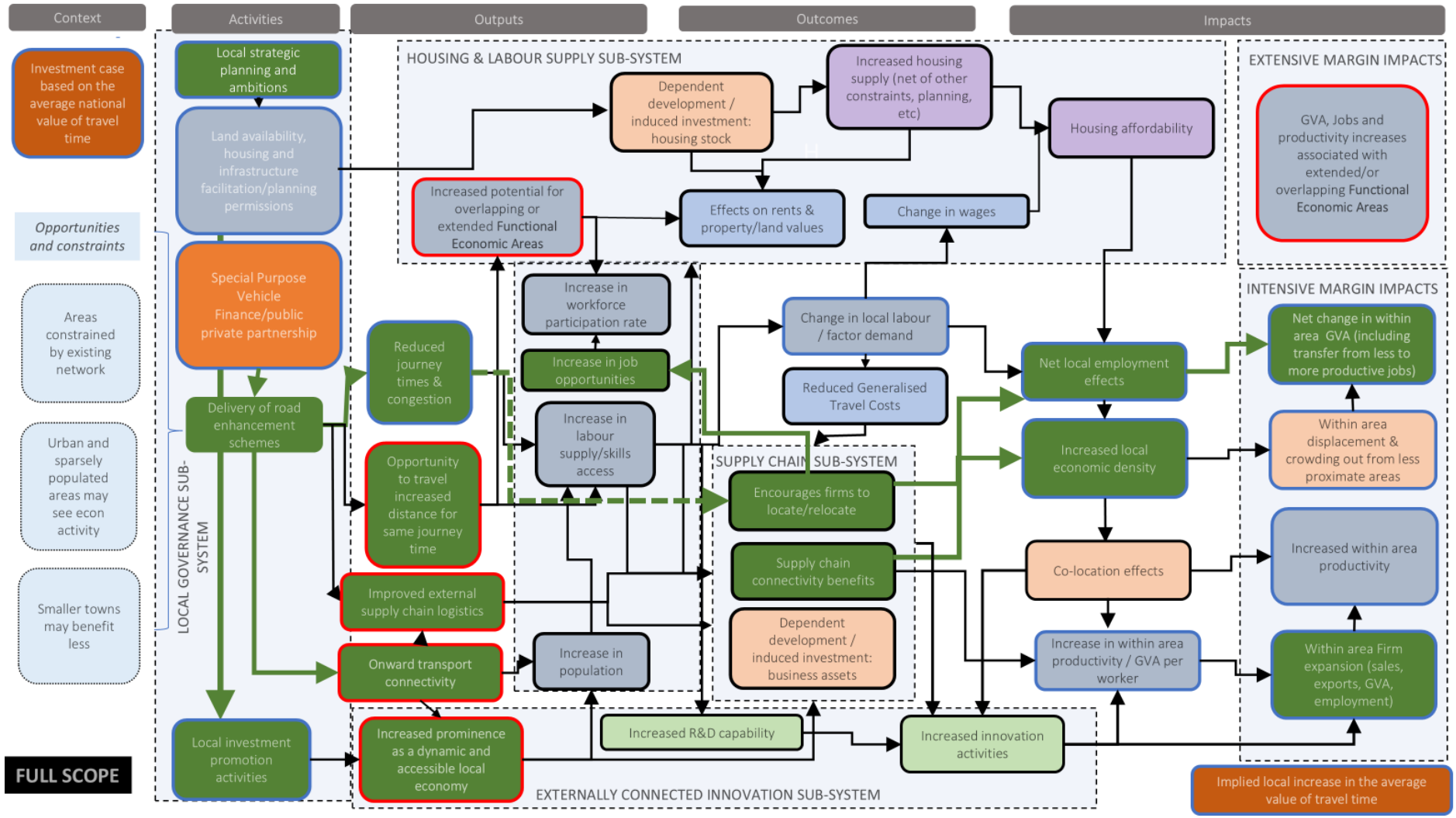
11.2.5 Unintended impacts

The case study analysis related to the Mersey Gateway scheme did not highlight unintended impacts.

11.3 Scheme logic model variant

The scheme logic model is provided overleaf.

Figure 11.5: Mersey Gateway logic model variant



12 A14 Huntingdon to Cambridge

This chapter sets out the results from the detailedA14 case study, combining findings from interviews with the Local Authority, local businesses, document review, supply chain survey and secondary data analysis. Preparation of this case study was also informed by collaboration with the consultants (AECOM) carrying out the 1-year POPE+ assessment.

12.1 Overview

12.1.1 Scheme characteristics summary

The A14 is a key transportation link connecting major cities, towns, and regions in the UK. It plays a crucial role in facilitating trade and logistics, particularly as it connects the Port of Felixstowe, one of the country's busiest ports, to the Midlands and other inland areas. The section of the route between Huntingdon and Cambridge carries a high level of commuter as well as long-distance (especially HGV) traffic and, in addition, provides a strategic link between the A1 and the M11 motorway. One noteworthy feature of this route is its use by traffic travelling to and from Dover and other destinations avoiding the M1 and A1 to M25 links (which created congestion not anticipated in earlier traffic modelling).

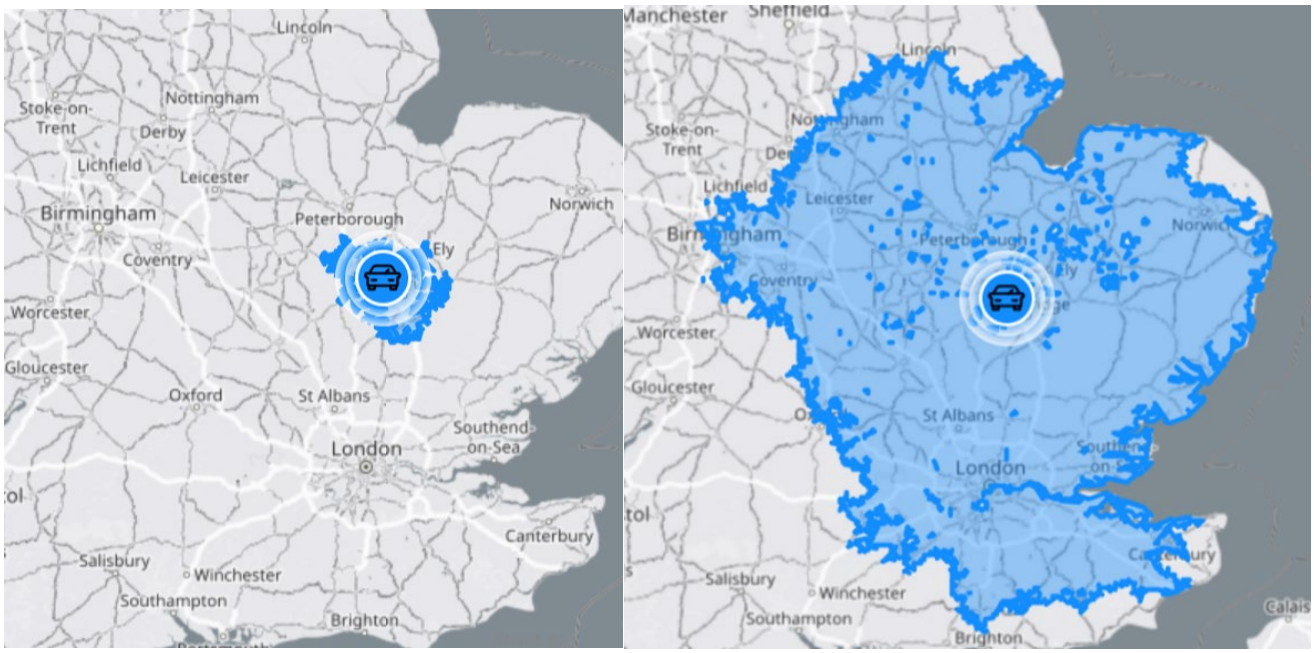
Before the improvements, congestion on the A14 through Huntingdon resulted in delays and poor journey time reliability. Two of our main objectives were to ease congestion by providing an alternative dual carriageway bypassing Huntingdon and to improve safety by separating strategic road traffic from local traffic. The new A14 provides 21 miles of best-in-class A-road. A new local road, the A1307, was built alongside the new A14 to allow local journeys. We have added 126 new lane miles to the network and improved several junctions, including Bar Hill and Swavesey, to provide better capacity at these locations. Improvements at Girton and Brampton Hut have also helped to improve capacity by allowing free-flow movements to existing roads.

The A14 also includes the latest safety features, such as: incident management equipment including electronic messaging signs and CCTV; emergency refuge areas for those with urgent vehicle problems; variable speed limits to steady the flow of traffic and reduce ‘stop-start’ traffic jams; and red X signs to manage traffic during vehicle incidents and roadworks.

The economic aspects of the investment case stressed the importance of supporting Cambridge’s high-tech business base and the general access requirements for large-scale housing developments are planned in the A14 and A1 corridors to alleviate acute housing shortages at local and regional levels. Although an ‘unlock’ growth framing was used the basis of the case was more focused on supporting continued growth via access to labour (commuting de-congestion) and the new housing developments

Cost £1.5 billion. Opened in May 2020, 6 weeks after the first Covid-19 lockdown. This is the first scheme of its size to be delivered since National Highways was created in 2015 (formerly Highways England).

Figure 12.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

12.1.2 Key outcomes to date

The one year Post Opening Project Evaluation (POPE) for this scheme was published in September 2024. The study was delayed due to the need to avoid assessing impacts over the COVID-19 period. It is referred to as a POPE + assessment because it sought to understand local views via surveys of through traffic users (using the new A14) and residents (likely to be impacted by the scheme). Interviews with businesses, community organisations and stakeholders were also carried out. At DfT's request, Ipsos collaborated with AECOM who were conducting the POPE+ study. As the POPE+ report notes, in the future this 'customer experience' survey work will be able to establish a baseline dataset against which subsequent impacts can be judged (but this was not possible for this first POPE+ study as it was a new approach).

The key outcomes to date are:

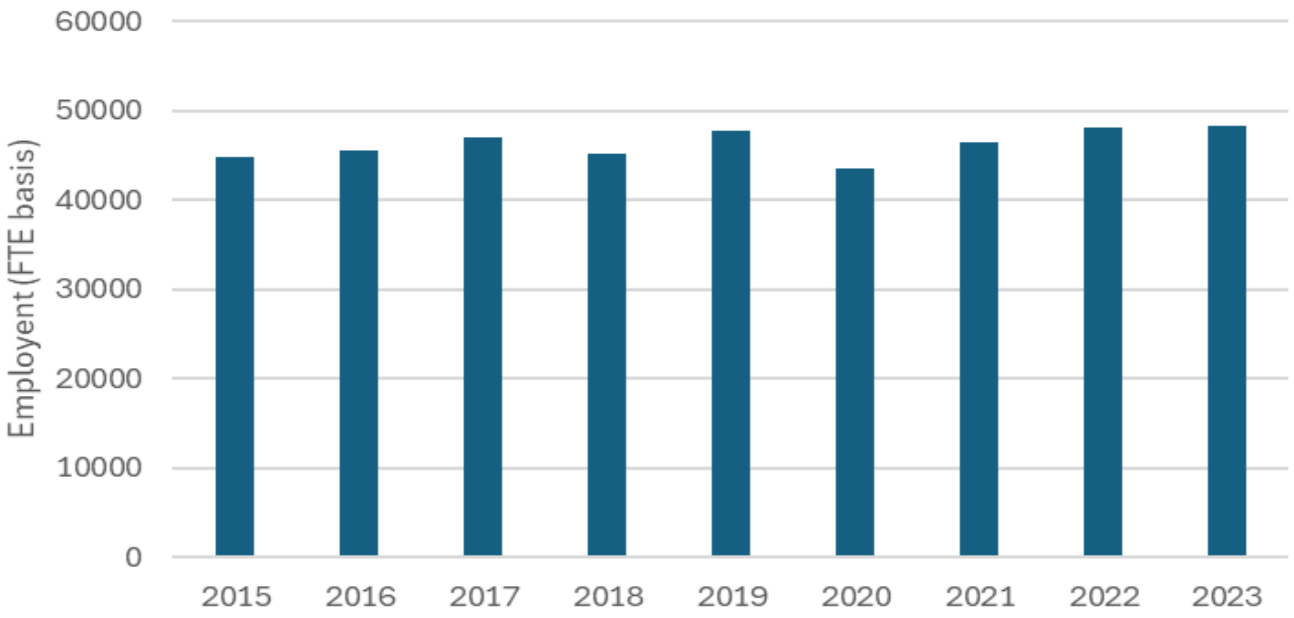
- Evidence of commuters travelling further for similar journey times
- Improved journey time predictability
- Local business customer catchment area benefits (shorter and more predictable customer journeys)
- Local business productivity benefits associated with improved freight reliability (especially for time critical deliveries)

Also, evidence of some unexpected congestion in roads linking to the A14 associated with economic vibrancy – highlights the importance of considering economic performance impacts

12.1.3 Key evidence on outcomes to date

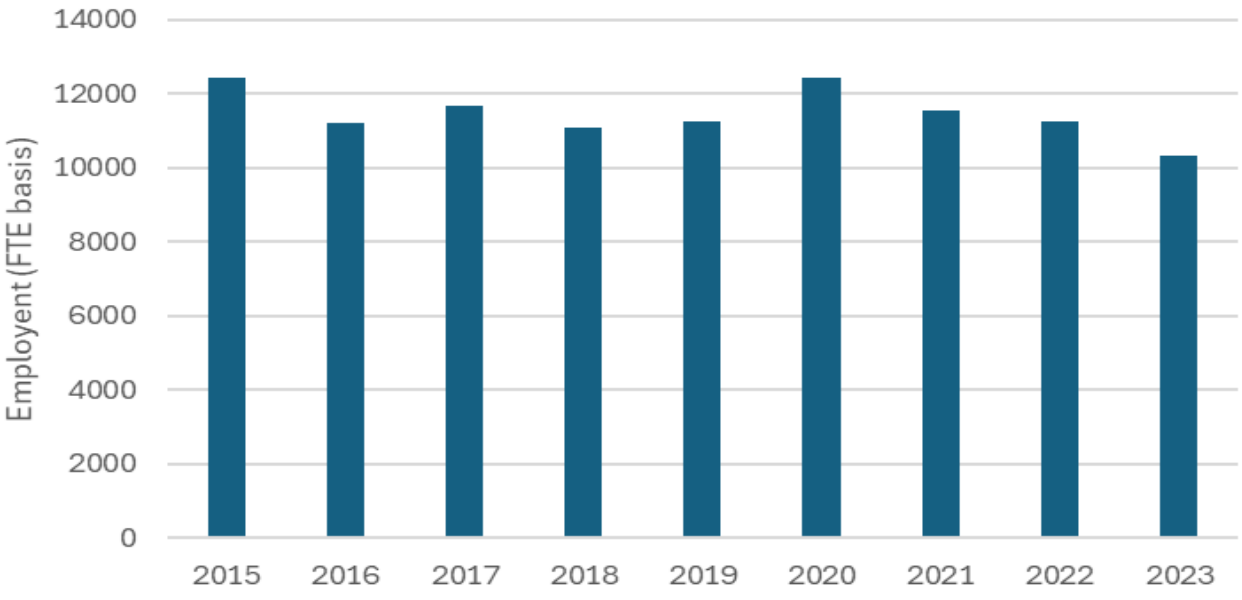
It is too early given time lags in key data availability, to examine economic data for any impacts. However, employment data up to 2023 are available and are presented below. These data confirm post-pandemic recovery for industrial employment (when recorded employment dropped), and a downwards trend for retail employment. Business floorspace data are provided for context prior to scheme opening and highlight the dominance of industrial floorspace (at 4.2 x retail).

Figure 12.2: Industrial employment



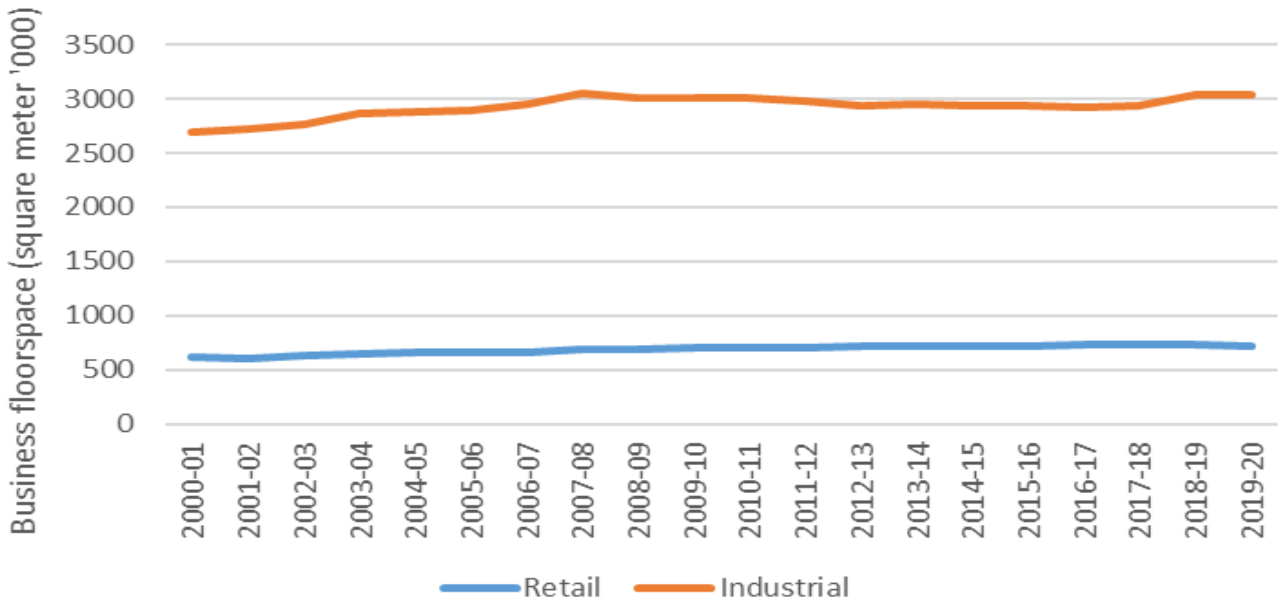
Source: NOMIS

Figure 12.3: Retail employment



Source: NOMIS

Figure 12.4: Retail and industrial floorspace (square metre)

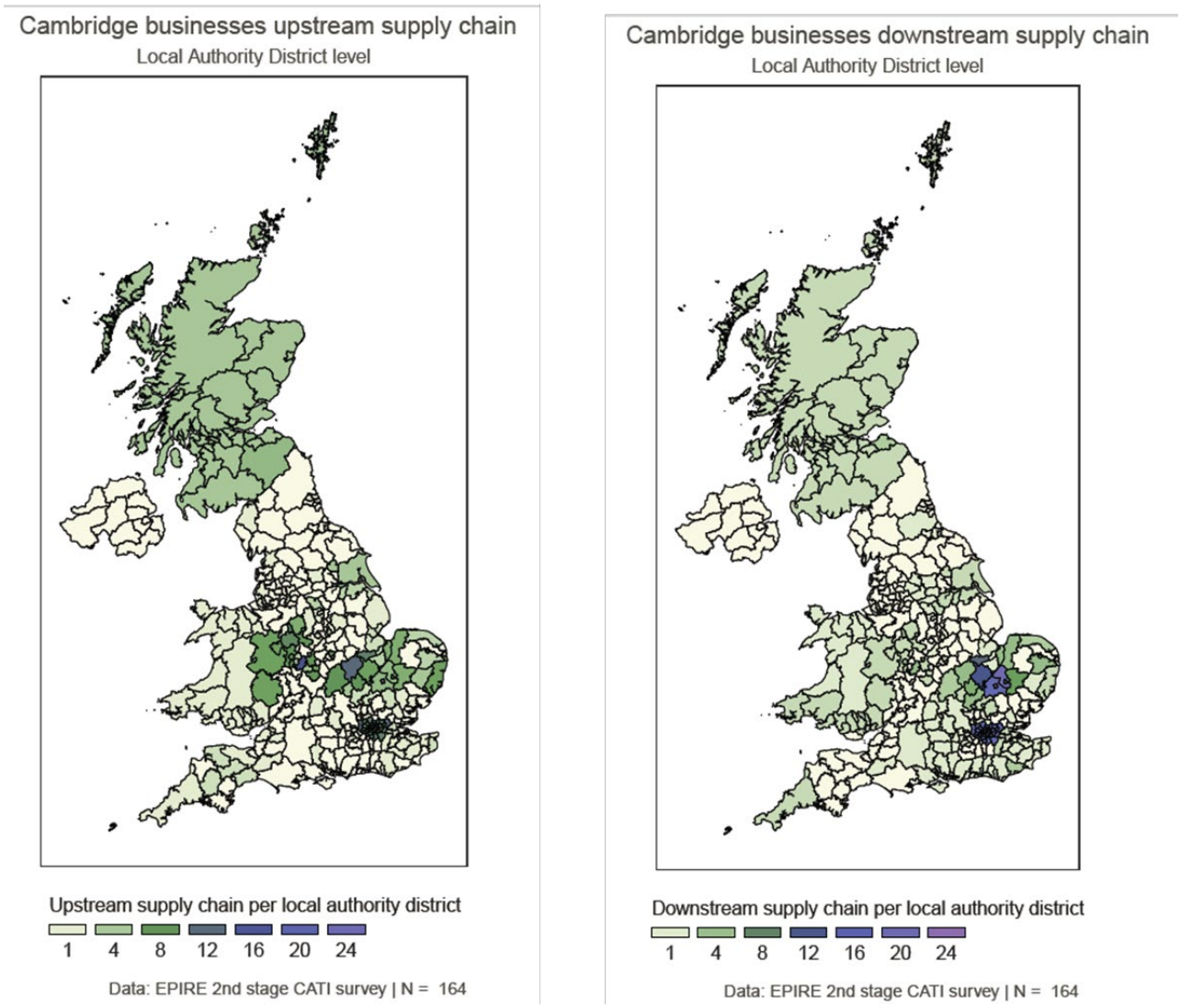


Source: Ipsos analysis of NOMIS and ONS data

Supply chain aspects

This case study benefited from a CATI business survey of firms located within 30kn of the A14 scheme. We start by considering the experimental results for direct upstream and downstream supply chain dependencies. Firms interviewed were asked to state the geographical sources and destinations of their supply chain links. Whilst only very indicative, the results for Cambridge suggest upstream input dependencies concentrated in London (as expected) but also in East Anglia, the Midlands and Scotland. Downstream supply chain links are more diffuse but broadly similar. These findings confirm the importance of network-level connectivity and the SRN for businesses nearby to this scheme.

Figure 12.5: Upstream and downstream supply chain locations

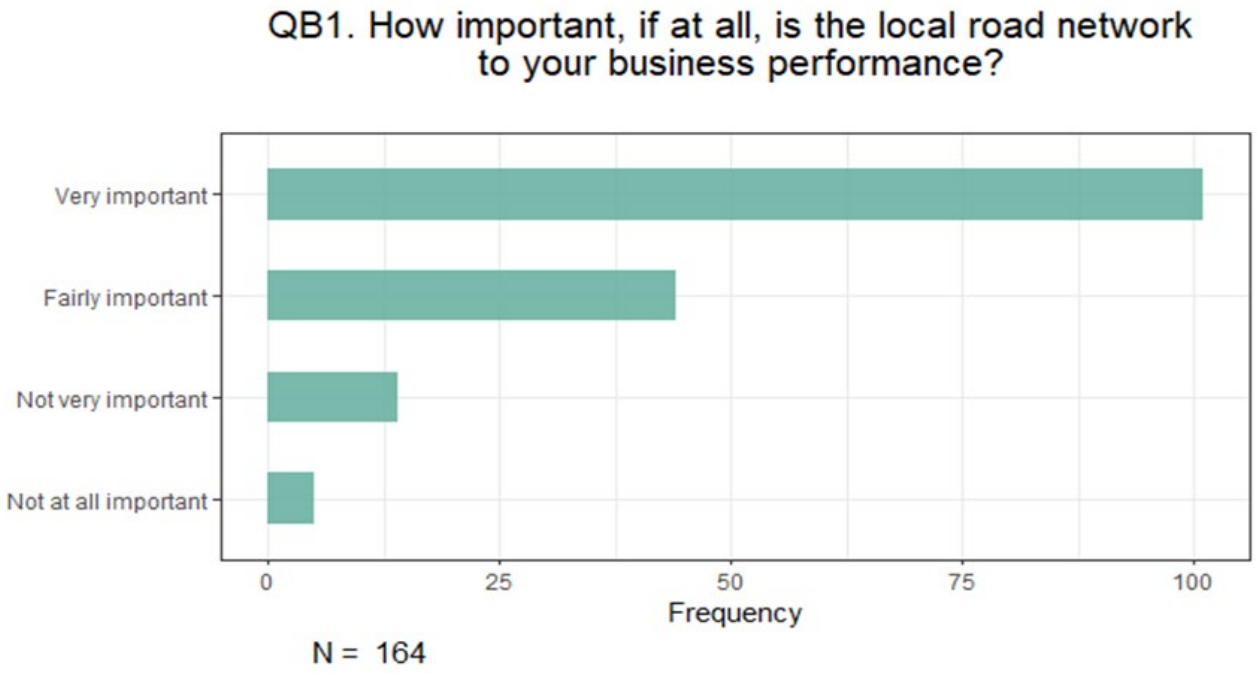


Source: Ipsos survey analysis

Other business survey findings

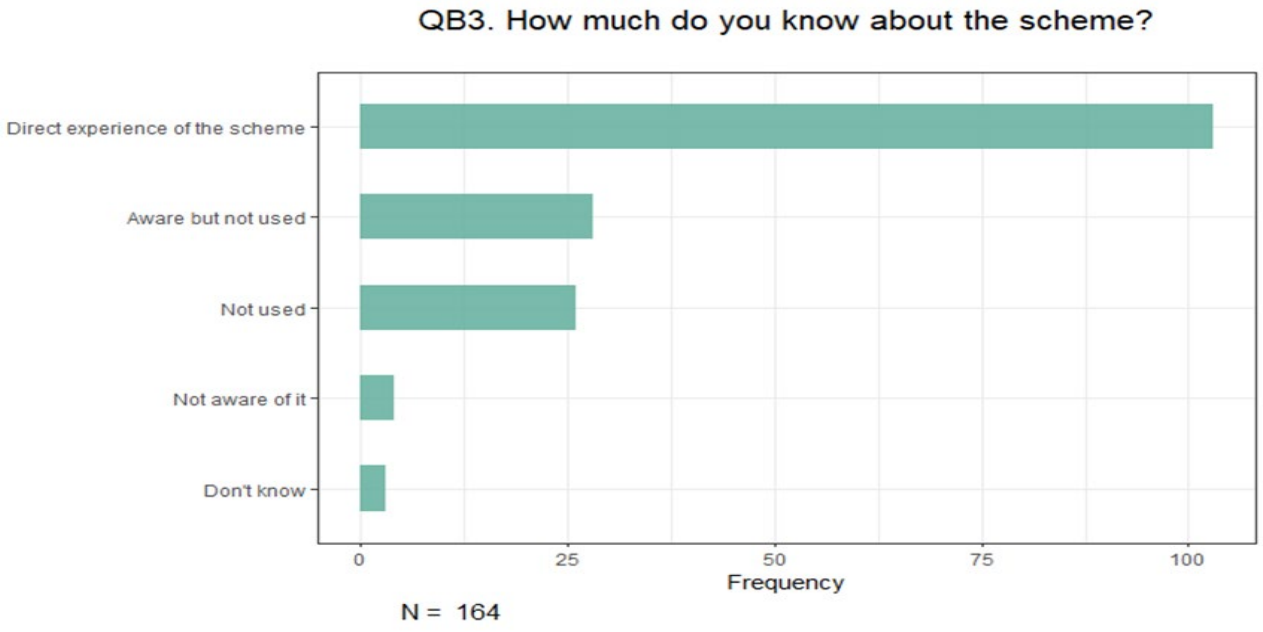
The business survey confirmed the local firms view the local road network as of primary importance to them. Most were aware of, and had used the scheme, and viewed local roads as the most important priority for the local economy. 64 percent of the respondents viewed the scheme as having had a positive effect of how quickly or efficiently they were able transport goods to their site.

Figure 12.6: Views on importance of local road network to business performance



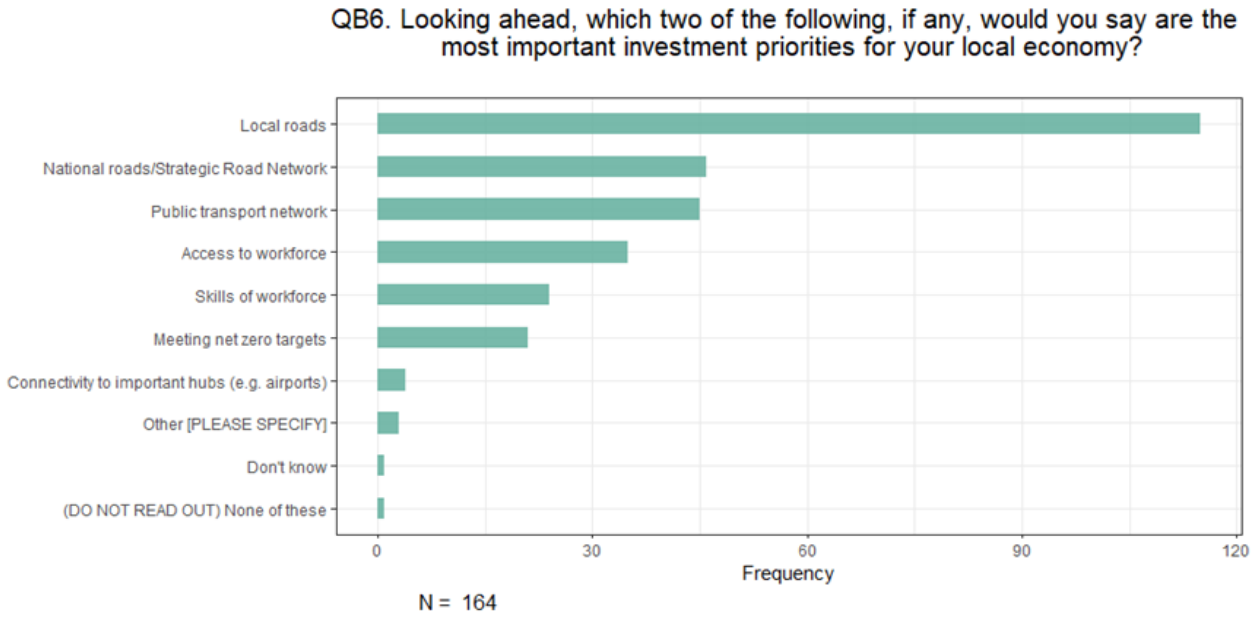
Source: Ipsos survey analysis

Figure 12.7: Awareness of the scheme



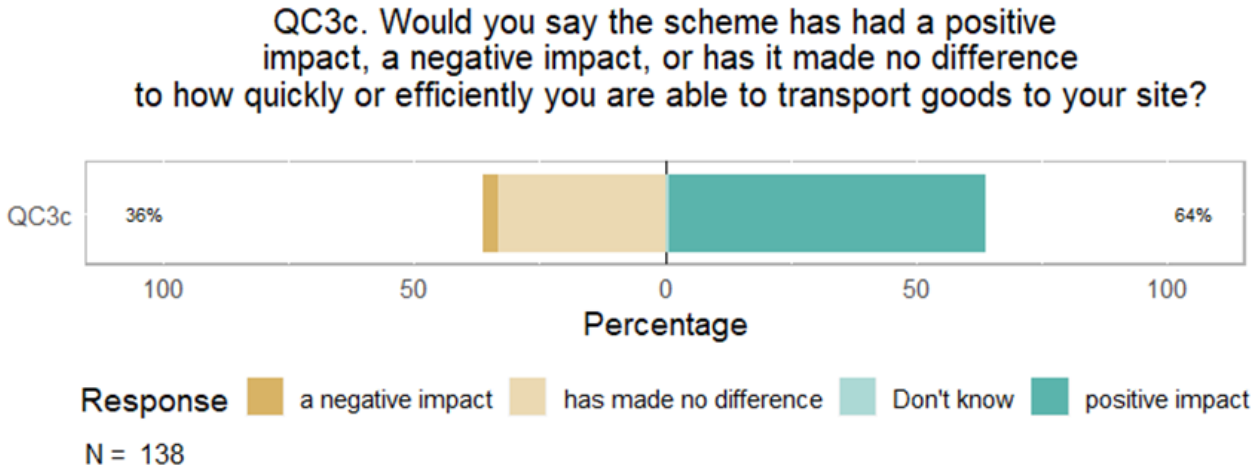
Source: Ipsos survey analysis

Figure 12.8: Views on most important investment priorities for the local economy



Source: Ipsos survey analysis

Figure 12.9: Impact on ability to quickly and efficiently transport goods



Source: Ipsos survey analysis

12.1.4 Lessons for the EPIRE study and future work

Given that future POPE+ studies will, ideally, use baseline consultations before a scheme opens in order to capture customer experience benefits it would be useful to use the detailed case study version of the EPIRE logic model to inform the design of these new baseline consultation studies. This will facilitate the identification of scheme impacts and also allow cross-scheme comparisons using a shared analytical framework.

12.1.5 Summary of key findings

Although too early to determine aside from the POPE+ survey findings, the indications are that this scheme has been successful in de-congesting this vibrant local economy and will also facilitate broader network-level effects given the SRN related uses of this part of the A14.

12.2 Additional details

12.2.1 Scheme characteristics summary

The A14 is a key transportation link connecting major cities, towns, and regions in the UK. It plays a crucial role in facilitating trade and logistics, particularly as it connects the Port of Felixstowe, one of the country's busiest ports, to the Midlands and other inland areas. The section of the route between Huntingdon and Cambridge carries a high level of commuter as well as long-distance (especially HGV) traffic and, in addition, provides a strategic link between the A1 and the M11 motorway. One noteworthy feature of this route is its use by traffic travelling to and from Dover and other destinations avoiding the M1 and A1 to M25 links (which created congestion not anticipated in earlier traffic modelling).

The economic aspects of the investment case stressed the importance of supporting Cambridge's high-tech business base and the general access requirements for large-scale housing developments are planned in the A14 and A1 corridors to alleviate acute housing shortages at local and regional levels. Although an 'unlock' growth framing was used the basis of the case was more focused on supporting continued growth via access to labour (commuting de-congestion) and the new housing developments.

12.2.2 Aims

The A14 Cambridge to Huntingdon Improvement Scheme was implemented to achieve several strategic transportation and economic objectives essential for the region's advancement:

- **Combating congestion**: A primary objective was to alleviate traffic congestion along a critical corridor that connects the Midlands and North East with East Anglia and South East England. This route is vital for both local and long-distance travel, including a high volume of heavy goods vehicles (HGVs). The project involved constructing a new A14 Huntingdon bypass to redirect traffic, thereby easing congestion in urban areas like Huntingdon. By facilitating smoother traffic flow, the scheme aimed to enhance journey predictability and reduce travel times, directly benefiting commuters and freight carriers.
- **Improving safety:** A cornerstone objective was to enhance road safety by reducing the frequency and severity of road collisions. This was accomplished through a modernized infrastructure featuring advanced safety elements such as incident management equipment, electronic messaging signs, CCTV, and emergency refuge areas. The project sought to create a safer driving environment, thereby reducing stress and increasing the reliability of travel for all road users.
- **Unlocking economic growth:** The scheme acted as a catalyst for local and national economic growth. By improving access to labour markets and reducing traffic delays, it broadened the geographical scope of job opportunities and business operations. The project

bolstered the region's economic vitality by facilitating the efficient movement of goods and people, enhancing the area's attractiveness for potential business investments and housing developments.

- **Connecting people:** A significant focus was placed on improving local connectivity. The scheme aimed to direct appropriate traffic onto suitable roads, which was crucial for supporting major new residential developments. This not only improved local traffic flow but also fostered community growth and integration. Enhancements to local roads, such as the development of the A1307 alongside the new A14, helped separate strategic and local traffic, ensuring smoother and safer travel for both local residents and through traffic.
- **Building a legacy:** Beyond immediate transportation improvements, the scheme sought to leave a lasting socio-economic and environmental legacy. This included creating new natural habitats and supporting biodiversity, thus contributing to environmental sustainability. Additionally, the project supported local businesses during construction and beyond and invested in community initiatives, promoting overall community well-being and resilience.

12.2.3 Outcomes

The A14 Cambridge to Huntingdon Improvement Scheme was conceived with strategic goals aimed at reducing congestion, enhancing safety, stimulating economic growth, improving connectivity, and leaving a lasting legacy. The outcomes achieved in relation to these objectives are detailed below:

Meeting aims and objectives:

- **Combating congestion:** The construction of the new A14 Huntingdon bypass was pivotal in alleviating traffic congestion along this crucial corridor, most notably in urban areas such as Huntingdon. This strategic redirection of traffic facilitated smoother traffic flow, significantly reducing travel times and enhancing journey time reliability. Decreased congestion levels underscore the successful fulfilment of this primary objective. Daily vehicle movements through Huntingdon dropped by 55,000, and journey times improved by approximately 9-10 minutes during peak hours, as noted in the traffic data analysis.
- **Improving safety**: The scheme introduced state-of-the-art safety features, including incident management systems, electronic messaging signs, CCTV surveillance, and emergency refuge areas. These measures collectively bolstered road safety, leading to a measurable reduction in the frequency and severity of road collisions. Despite the positive initial data, ongoing long-term analysis remains vital to validate these encouraging trends. The implementation of advanced safety features led to a decrease in the average annual number of collisions involving injury from 86 to 42. Residents and through traffic reported feeling safer on the new A14, with 79% of residents and 85% of through traffic stating that safety had improved.
- **Unlocking economic growth**: By improving access to labour markets and reducing traffic delays, the scheme has substantially contributed to both local and national economic vitality. This enhancement expanded business and employment catchment areas, as evidenced by

business interviews indicating an increased customer base and improved productivity. The scheme has provided a platform for economic expansion and resilience.

- **Connecting people:** The project successfully enhanced local connectivity by guiding suitable traffic onto appropriate roads, thus facilitating major new residential developments and fostering community integration. Infrastructure enhancements, particularly the development of the A1307, were crucial in achieving these connectivity objectives, promoting smoother and safer local travel.
- **Building a legacy:** Beyond immediate improvements, the scheme aimed to establish a sustainable socio-economic and environmental legacy. This involved creating new natural habitats and supporting biodiversity, which contributed to environmental sustainability. Additionally, investments in community initiatives furthered overall community well-being and resilience, ensuring long-term benefits.

Impacts on local areas and businesses:

- **Local areas:** The improvements in journey times and reliability have positively impacted local communities by making access to education, leisure, and employment opportunities more convenient. Environmental benefits such as reduced noise levels and improved air quality have also been noted, enhancing the quality of life for residents.
- **Local businesses:** Interviews with local businesses revealed numerous advantages, including expanded customer catchment areas, improved supply and delivery chains, and enhanced employee recruitment and retention. However, some businesses cited increased congestion on local roads connecting to the A14, highlighting areas for potential improvement.

12.2.4 Success factors

The key success factors in the A14 Cambridge to Huntingdon Improvement Scheme achieving its aims are as follows:

- **Strategic planning and design:** The successful redirection of traffic to the new A14 Huntingdon bypass was a result of detailed planning and design. This strategic approach effectively alleviated congestion and improved journey time reliability. Traffic data analysis and evaluation reports highlight the significant reduction in congestion and improved traffic flow.

  The A14 Huntingdon bypass was strategically designed to redirect through traffic away from congested urban areas, such as Huntingdon, effectively alleviating traffic pressure on local roads. The bypass includes several key features:

  - Multiple Lanes: The design incorporated additional lanes to accommodate high volumes of traffic, including heavy goods vehicles, thus improving traffic flow.
  - Improved Junctions: Key junctions along the route were redesigned to enhance capacity and reduce bottlenecks, facilitating smoother transitions between different traffic flows.

  - Integration with Local Infrastructure: The bypass was integrated with existing road networks, such as the A1 and M11 motorways, providing seamless connections and improving overall regional connectivity. These design decisions were informed by extensive traffic modelling and stakeholder consultations, ensuring that the bypass effectively addressed the specific congestion issues identified in the planning stages. The result was a substantial reduction in congestion levels, improved journey times, and enhanced reliability for both local and long-distance travellers.

- **Implementation of advanced safety features:** The incorporation of modern safety features such as incident management systems, electronic messaging signs, CCTV, and emergency refuge areas enhanced road safety and reduced collision rates. Post opening review data analysis and resident surveys indicated a reduction in the frequency and severity of road collisions.
- **Stakeholder engagement and communication:** Active engagement with local businesses and communities contributed to the scheme's success by addressing concerns and incorporating feedback into the project. An example of stakeholder engagement in the A14 Cambridge to Huntingdon Improvement Scheme was the active involvement of local businesses and community members during the planning and implementation phases. Engagement activities included regular meetings, consultations, and feedback sessions where stakeholders could express their concerns and suggestions regarding the project.

  One specific instance of stakeholder engagement was the inclusion of feedback from local businesses about potential disruptions during construction. Businesses expressed concerns about access to their premises and potential impacts on customer traffic. In response, the project team adjusted construction schedules and implemented measures such as clear signage and temporary access routes to minimize disruptions. The effect of this stakeholder engagement was significant. By addressing the concerns of local businesses, the project maintained positive relations with the community, reduced potential economic impacts on local enterprises, and ensured continued support for the project. This engagement also contributed to the project's overall success by fostering a sense of collaboration and trust between the project team and the local community, ultimately facilitating smoother project execution and enhancing the project's acceptance and effectiveness.

12.2.5 Unintended impacts

The documents review and transcripts from the evaluation of the A14 scheme indicated some unintended impacts that arose from the road scheme, extending beyond the initial objectives:

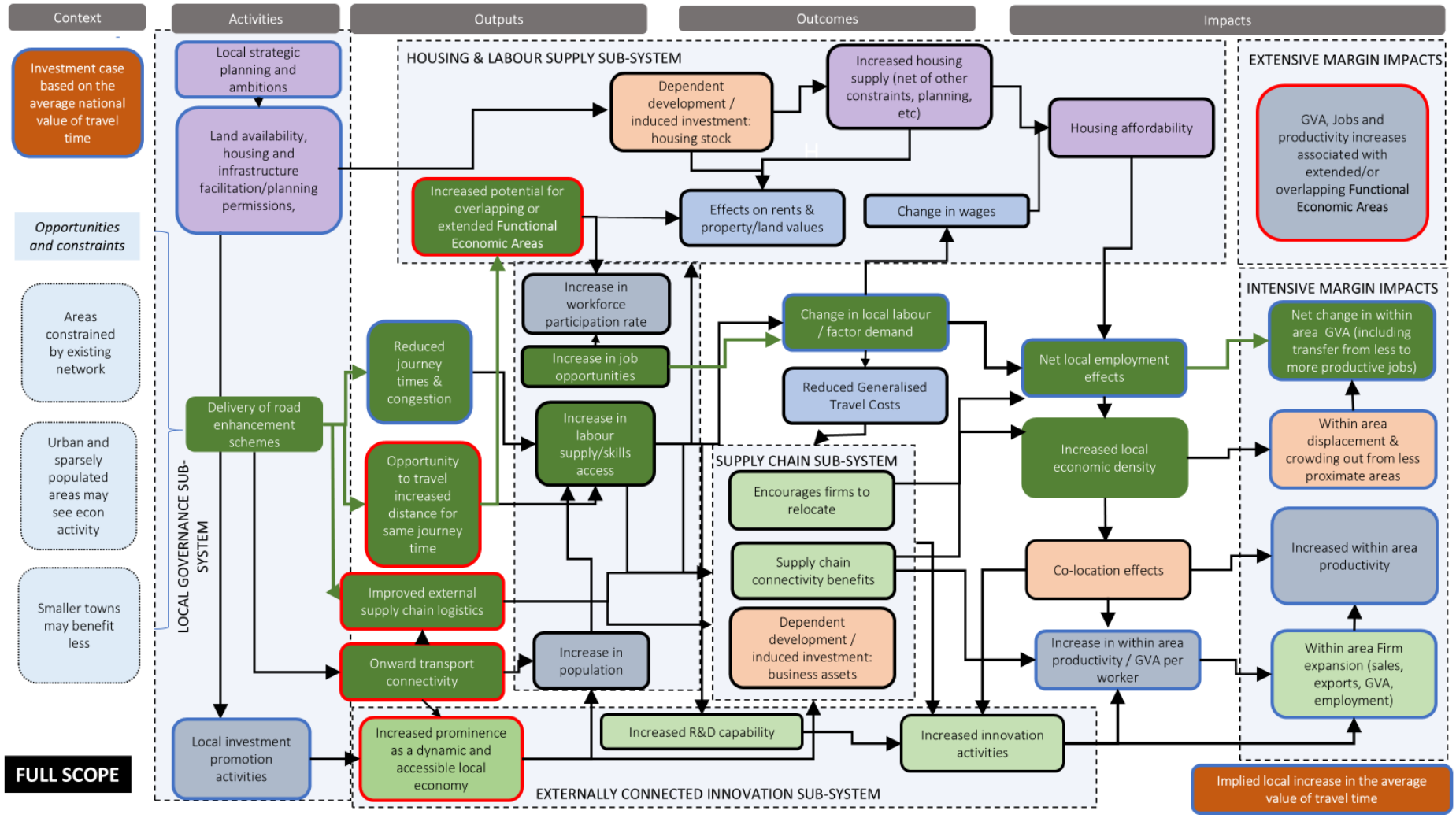
- **Increased congestion on local roads**: While the scheme effectively reduced congestion on the A14 corridor, this success led to unintended increases in congestion on some local roads according to traffic data analysis presented in POPE reporting. As traffic was redirected, certain areas experienced higher traffic volumes than anticipated, causing congestion issues. This was also highlighted in interviews with local businesses, which reported that the increased traffic on local roads sometimes undermined the benefits gained from the improved A14 corridor.

- **Environmental concerns:** Despite the scheme's goal to enhance environmental outcomes, there were unforeseen negative impacts on the landscape, biodiversity, and water environments. For instance, the initial planting efforts did not establish as expected, leading to challenges in achieving the desired environmental integration. Additionally, some watercourses required more maintenance than initially planned to manage vegetation overgrowth and ensure proper functionality.
- **Social perceptions and community feedback**: There were mixed perceptions among residents regarding environmental improvements. While the scheme aimed to enhance air quality and reduce noise pollution, some community members reported perceiving little to no improvement, and in some cases, even a decline in these areas. This discrepancy between expected and perceived outcomes highlights the importance of managing community expectations and maintaining ongoing communication.
- **Mixed business impacts**: Although many businesses benefited from improved travel conditions and expanded catchment areas, others faced challenges. Increased congestion on connecting local roads and disruptions due to construction activities were cited as concerns. These unintended impacts underscore the complexity of infrastructure projects and the need for comprehensive impact assessments that consider potential ripple effects on local communities and businesses.

12.3 Scheme logic model variant

This scheme logic model variant (overleaf) reflects the fact that Cambridge and its surrounding areas is a well-established and prominent dynamic local economy with a range of high-tech firms already in position It was not necessary to add any new logic model elements and the key impact pathways (in green) are similar to the other scheme case studies described above. AECOM noted, when relating their findings to the generic logic model, that the ability to travel further for a similar journey time was a noteworthy scheme impact pathway.

Figure 12.10: Scheme logic model variant



13 A3 Hindhead improvement

This chapter sets out the results from the light touch A3 Hindhead Improvement scheme case study, combining findings from interviews with the Local Authority, local businesses, document review and secondary data analysis.

13.1 Overview

13.1.1 Scheme characteristics summary

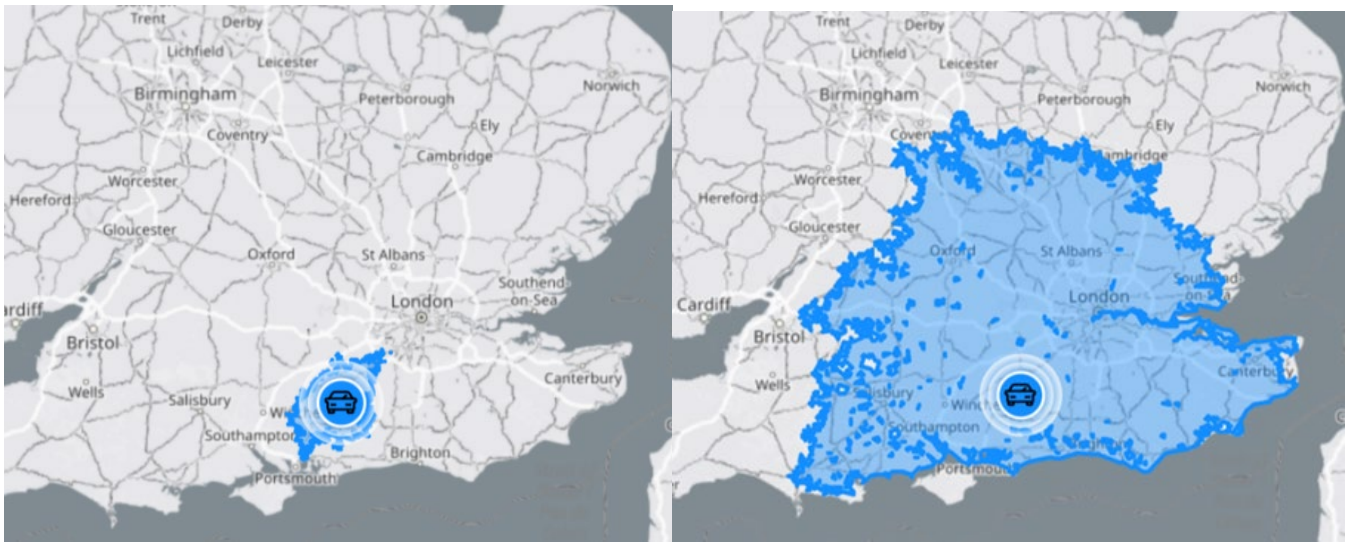
The A3 is the main strategic connection between greater London and Portsmouth, passing through some significant environmentally sensitive areas including the Surrey Hills area of Outstanding Natural beauty. The scheme provided 6.5km of dual carriageway including a 1.9km twin-bored tunnel, under the Devil's Punch Bowl and 8 new bridges of different types along the A3. The objectives of this scheme were to:

- Improve journey time reliability for users of the A3 and other surrounding roads.
- Improve Hindhead village by substantially reducing through traffic and rat running on minor roads leading to improved local air quality, less noise, reduced severance of communities.
- Reduce the numbers of collisions.
- Provide substantial environmental benefits by changing the route of the A3

The consideration of potential wider economic impacts assumed that South Hampshire is likely to benefits from the improved journey times and reliability on the A3, the key strategic link between South Hampshire and Portsmouth and the M25. The impact of the scheme on wider economic impacts is therefore assumed to be "moderate beneficial", which is as expected in the appraisal, and this assumption was confirmed in the five year POPE assessment published in 2017.

Cost £370.9m. Opened in 2011.

Figure 13.1: Potential destinations within 35 minutes (left pane) and 2 hours travel time (right pane)



Source: Ipsos analysis

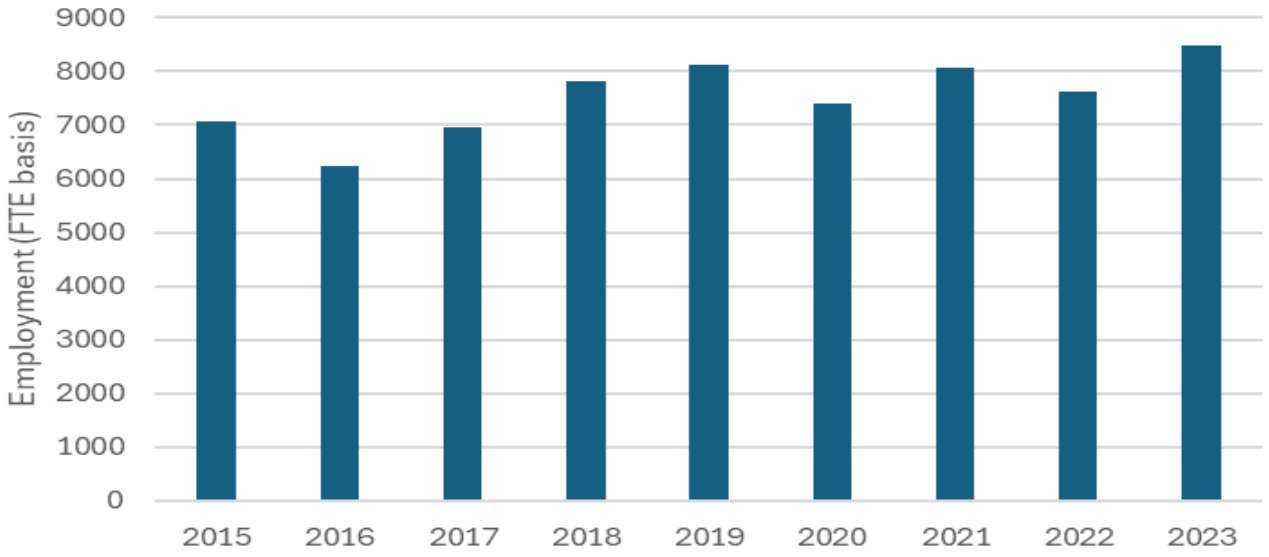
13.1.2 Key outcomes to date

The five-year POPE assessment concluded that largescale decreases in traffic flows through the de-trunked road (important for congestion through Hindhead and rat running) have taken place. There were also increases in vehicles flows on the A3, by around 59%, with around 50,000 vehicles observed on the A3 north of the A3 tunnel and 42,000 to the south of the A3 scheme.

The data dashboard does not indicate any more recent identifiable economic impacts given the complexity and range of other causal factors that are present. This highlights the importance of some potential future methodological advances noted below. The 2-hour travel time radius around Hindhead (above) highlights the broad geography to this scheme (the context within which the London to Portsmouth axis operates).

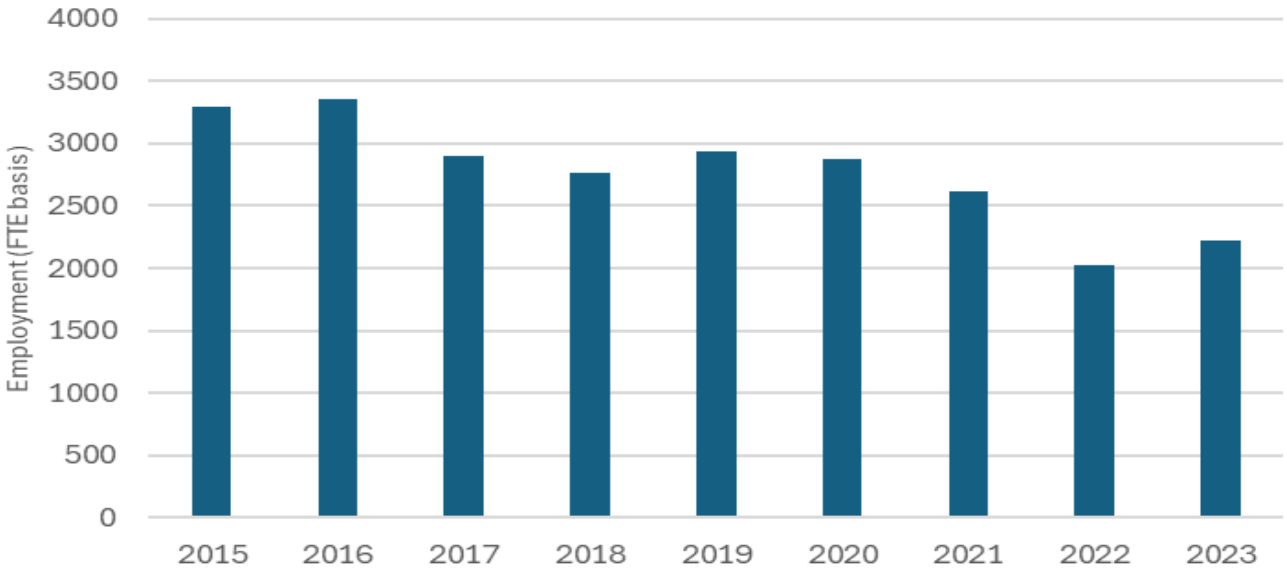
13.1.3 Key evidence on outcomes to date

Figure 13.2: Industrial employment



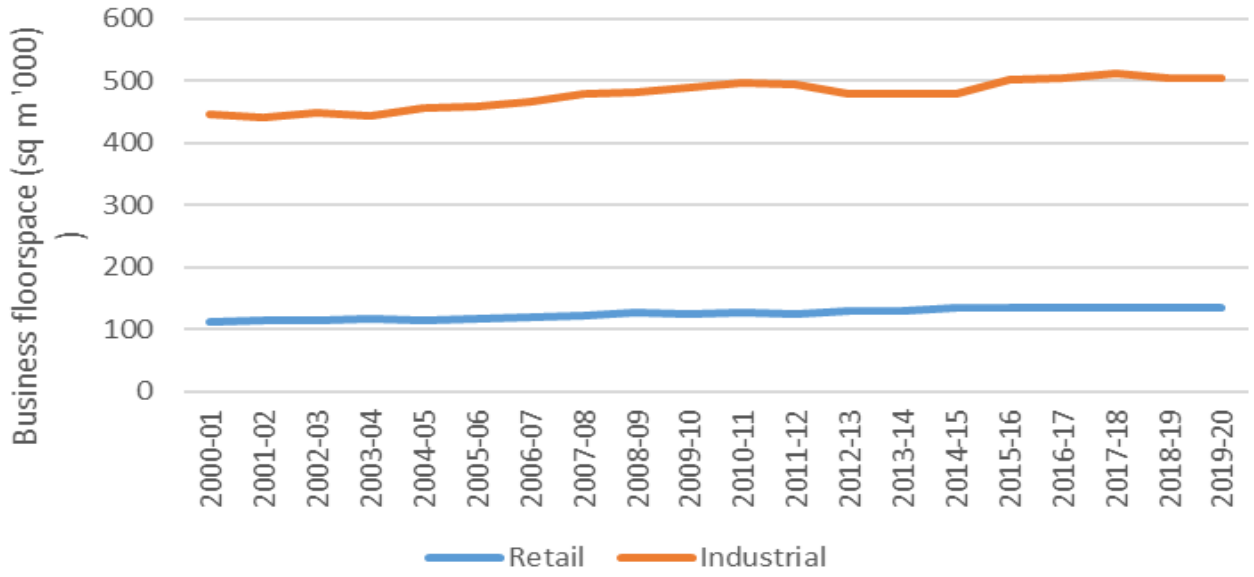
Source: NOMIS

Figure 13.3: Retail employment



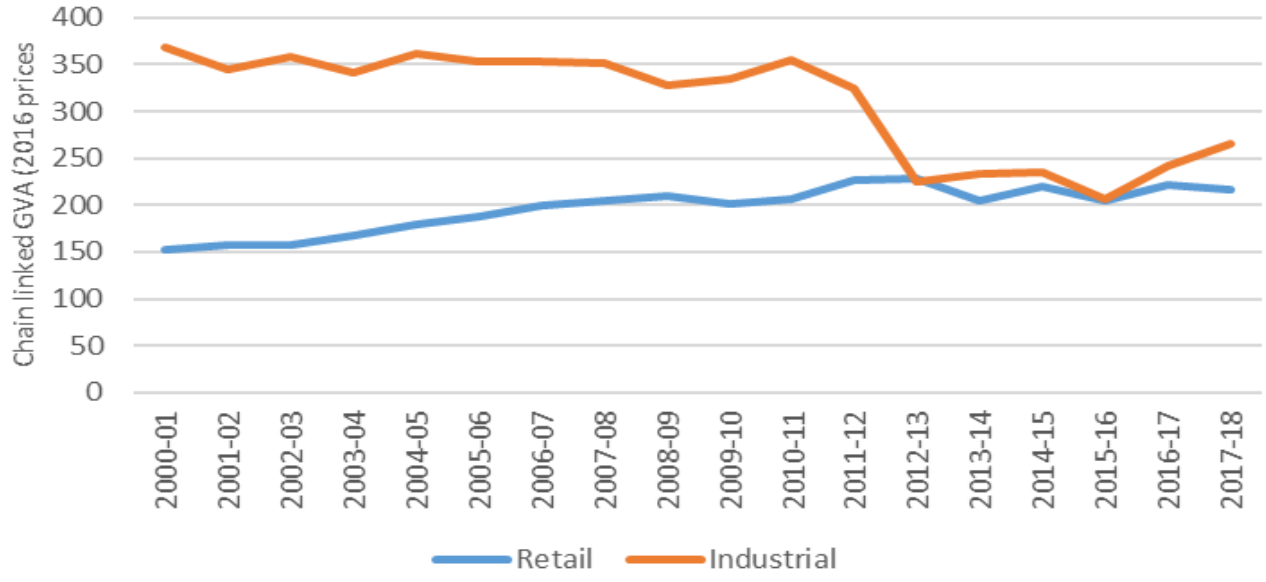
Source: NOMIS

Figure 13.4: Industrial and retail floorspace



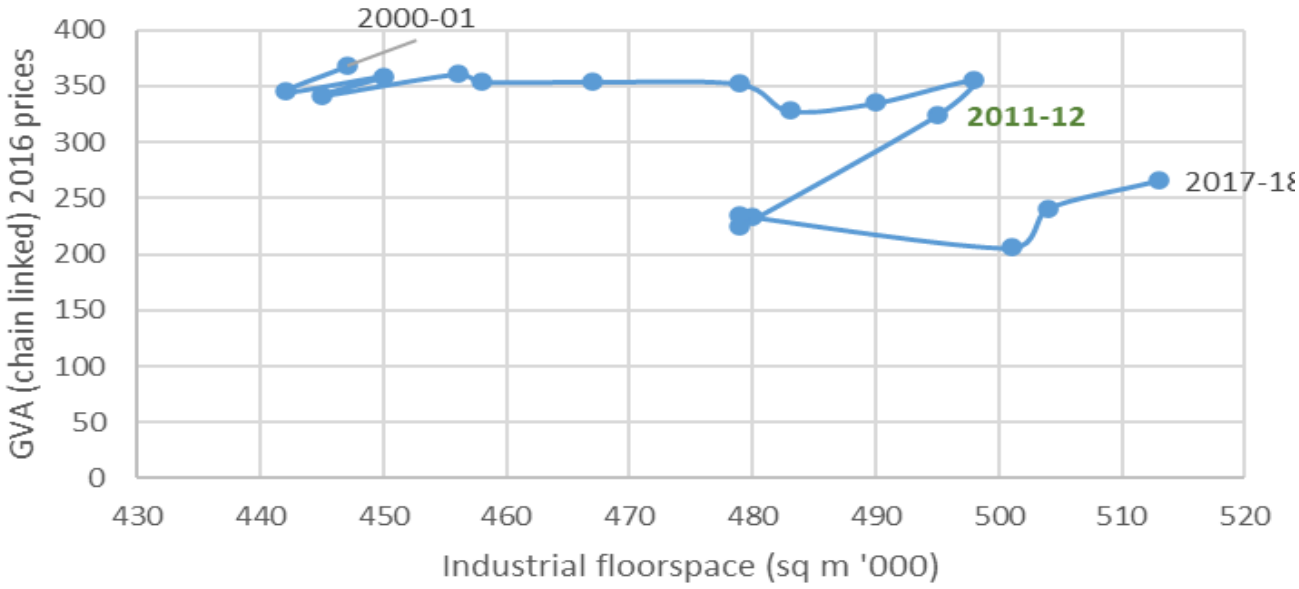
Source: VOA

Figure 13.5: Chain linked GVA



Source: ONS

Figure 13.6: GVA versus industrial floorspace (square metre)



Source: Ipsos analysis of VOA and ONS data

13.1.4 Lessons for the EPIRE study and future work

In situations such as this, in which potential economic performance improvements may relate to long-distance traffic flows (the A3 is the main strategic connection between greater London and Portsmouth) impact pathways pivot on extended proximity and network-level effects. This therefore raises the question of whether it is technically feasible to carry out econometric analysis at a more regional level in order to capture these types of impact. As noted elsewhere in this report (and also in the Lessons Learned report), this would require the development and use of the different method or methods than used in the EPIRE econometrics.

13.1.5 Summary of key findings

Due to the nature of this scheme (a case study requested by National Highways) it is not possible to identify any attributed economic performance improvements without making use of econometric analysis at a more regional level.

It would therefore be useful for future studies to consider carrying out more regionalised ‘light touch’ econometric analyses that consider functional economic areas based on extended proximity effects and selected aspects of network-level effects. This would be different in nature than standard functional economic areas based mainly on commuting radii, but could potentially be useful given the abandonment of LEPs and the move to consider larger scale groupings of adjacent local authorities that share transport and economic characteristics.

13.2 Additional details

13.2.1 Scheme characteristics summary

The A3 is the main strategic connection between greater London and Portsmouth, passing through some significant environmentally sensitive areas including the Surrey Hills area of Outstanding Natural beauty. The scheme provided 6.5km of dual carriageway including a 1.9km twin-bored tunnel, under the Devil's Punch Bowl and 8 new bridges of different types along the A3. The scheme cost £370.9m and opened in 2011.

13.2.2 Aims

The A3 Hindhead Improvement Scheme was an infrastructure initiative with a well-defined set of aims and objectives, crafted to address both transportation and environmental challenges in a highly sensitive area. The scheme sought to balance the enhancement of road transport efficiency with the preservation of the region's natural beauty and ecological integrity. The objectives were to:

- **Improve journey time reliability:** As a crucial route linking London with Portsmouth, the A3's transformation into a continuous dual carriageway aimed to significantly enhance journey time reliability. The scheme focused on alleviating congestion, particularly around the Hindhead bottleneck, to ensure smoother and more predictable travel for both commuters and freight vehicles. This objective was centred on improving the overall user experience and reducing travel-related stress.
- **Reduce traffic through Hindhead:** Prior to the scheme, Hindhead village suffered from substantial through traffic and rat running, adversely affecting local air quality, noise levels, and leading to community severance. The project aimed to redirect this traffic away from the village, thus restoring tranquillity and cohesion within the community. By decreasing traffic volumes on minor roads, the scheme sought to create a safer and more pleasant environment for residents and visitors alike.
- **Enhance safety:** Safety improvements were a core objective of the scheme. The project aimed to reduce the frequency and severity of road traffic collisions by upgrading road standards, implementing improved traffic flow management, and eliminating dangerous intersections. These measures were intended to foster a safer driving environment, protecting both motorists and non-motorized road users.
- **Environmental benefits:** Driven by a strong environmental agenda, one of the scheme's critical aims was to divert the A3's route through the environmentally sensitive area of Hindhead Common and the Devil's Punch Bowl, a designated Site of Special Scientific Interest (SSSI). By diverting traffic through a tunnel beneath this landscape, the project aimed to deliver substantial environmental benefits, including enhanced biodiversity and visitor experiences. This objective highlighted the importance of protecting and enhancing natural habitats while accommodating modern infrastructure needs.
- **Minimise adverse environmental impacts:** Complementing the environmental benefits, the scheme was designed to minimize adverse impacts on surrounding protected areas, particularly the Wealden Heaths Phase 2 Special Protection Area. Through careful planning

and design, the project aimed to ensure that the Surrey Hills Area of Outstanding Natural Beauty (AONB) experienced an overall slight beneficial impact, safeguarding the region's scenic and ecological values.

13.2.3 Outcomes

The A3 Hindhead Improvement Scheme was a comprehensive infrastructure initiative aimed at addressing key transportation and environmental challenges in the Hindhead area. The scheme's primary objectives included enhancing journey time reliability, reducing traffic through Hindhead, improving safety, providing environmental benefits, and minimizing adverse environmental impacts. The outcomes of the scheme largely met these objectives, contributing to significant improvements in various aspects.

Extent of objective achievement:

- **Improved journey time reliability:** The transformation of the A3 into a continuous dual carriageway was found to be a major success in POPE reporting in terms of reducing congestion around Hindhead. The improvement ensured smoother and more predictable travel for both commuters and freight vehicles, fulfilling the scheme's objective to enhance journey time reliability. The project's success in this area is evidenced by reduced travel times and increased road capacity, making it a more efficient transport corridor.
- **Reduced traffic through Hindhead:** By redirecting substantial through traffic away from Hindhead village, the scheme effectively alleviated issues related to poor air quality, noise pollution, and community severance. The construction of a tunnel to bypass the village was instrumental in achieving this objective, leading to enhanced local air quality and fostering a more cohesive community environment. This redirection of traffic has been supported by data showing decreased traffic volumes in the village centre.
- **Enhanced safety**: Safety improvements were a core component of the scheme, achieved through upgraded road standards and enhanced traffic flow management. These measures contributed to a notable reduction in the frequency and severity of road traffic collisions. The implementation of modern infrastructure, which eliminated dangerous intersections and improved overall traffic safety, was central to meeting this objective. Safety statistics post-implementation show a decline in collision rates, underscoring the scheme's effectiveness.
- **Environmental benefits:** A key environmental aim was to remove the A3's route through Hindhead Common and the Devil's Punch Bowl, areas of significant ecological importance. By diverting traffic through a tunnel, the project provided substantial environmental benefits, including improved biodiversity and enhanced visitor experiences. This objective highlights the scheme's commitment to preserving and enhancing natural habitats while meeting transportation needs.
- **Minimized adverse environmental impacts:** The scheme successfully minimized adverse impacts on surrounding protected areas, such as the Wealden Heaths Phase 2 Special Protection Area. Through careful planning and design, the project ensured that the Surrey Hills Area of Outstanding Natural Beauty benefited slightly from the scheme, safeguarding

the region's scenic and ecological values. The project's environmental management strategies were key in achieving these outcomes.

Impacts on local areas and businesses:

Document review indicated that the scheme's positive impact on local areas was primarily through reduced traffic congestion and improved air quality, significantly enhancing residents' living conditions. Local businesses experienced benefits from improved accessibility and reliability of transport links, which facilitated smoother logistics and transportation of goods. Additionally, the environmental improvements enhanced the area's attractiveness for tourism, potentially boosting local business revenues.

13.2.4 Success factors

The A3 Hindhead Improvement Scheme's success in achieving its objectives can be attributed to several critical factors:

- **Strategic infrastructure design:** A primary success factor evident in the document review was the strategic decision to construct a tunnel to reroute traffic away from Hindhead Common and the Devil's Punch Bowl. This engineering solution preserved these environmentally sensitive areas while enhancing traffic flow along the A3 corridor. The decision to use a tunnel had to address complex geological and environmental challenges, which were managed through planning and execution:
  - Geological stability: The tunnel had to be constructed through complex geological formations, requiring careful assessment and management of ground conditions to ensure stability. This included dealing with varying rock types and ensuring the tunnel's structural integrity.
  - Water table management: The tunnel's alignment needed to consider the local water table to prevent issues such as flooding or groundwater contamination. Comprehensive hydrological studies were required to design effective drainage and waterproofing systems.
  - Environmental protection: The construction process needed to minimize disruption to the surrounding landscape and ecosystems, particularly in the sensitive areas of Hindhead Common and the Devil's Punch Bowl. This involved implementing measures to protect native flora and fauna and managing construction waste and emissions.
  - Noise and dust control: Mitigating the noise and dust generated during construction was necessary to protect local wildlife and maintain the quality of life for nearby residents. This required the use of noise barriers, dust suppression techniques, and careful scheduling of construction activities.
  - Preservation of natural features: The project had to ensure that significant natural features, such as the Devil's Punch Bowl, were preserved and enhanced where possible. This included plans for landscape restoration and habitat connectivity post-construction.

- **Environmental management:** Environmental assessments and monitoring reports confirmed positive outcomes on biodiversity and landscape conservation. These reports documented the success of various environmental mitigation strategies employed during the project. The project prioritized environmental management by implementing careful planning and design measures to minimize adverse impacts on nearby protected areas. This approach ensured a balance between infrastructure development and environmental preservation, maintaining the ecological integrity of the region. Steps taken included:
  - Habitat restoration: Post-construction efforts focused on restoring habitats that were affected by the construction activities. This included replanting native vegetation and restoring the natural landscape above the tunnel.
  - Biodiversity protection: Measures were implemented to protect local wildlife and biodiversity during construction. This included creating wildlife corridors and installing crossings for animals to ensure safe passage.

13.2.5 Unintended impacts

The document review indicates that there were some unintended impacts associated with the A3 Hindhead Improvement Scheme. While the scheme achieved its primary objectives, there were challenges with the establishment of vegetation and biodiversity along the former A3 alignment, leading to concerns about invasive species such as gorse. These issues require ongoing maintenance and management efforts to realize the full environmental benefits anticipated by the project. Additionally, while the project successfully reduced traffic congestion and improved air quality, the increased traffic volumes on the new A3 alignment resulted in higher-than-expected carbon emissions, highlighting the need for continued environmental monitoring and mitigation strategies.

13.3 Scheme logic model variant

A logic model variant for this scheme has not been provided because the emphasis on easing traffic congestion on the London to Portsmouth route, and on protecting natural capital result in a very different impact framing. The main lesson from this scheme for future work is to raise the importance of developing regional econometric impact models (as noted above).

14 A1 Spine (Peterborough, Newark & Sherwood and South Kesteven)

This chapter sets out the results from the light touch A1 spine case study, combining findings from interviews with the local businesses, document review and secondary data analysis.

14.1 Overview

14.1.1 Scheme characteristics summary

This case study explored a new approach by examining a 40 mile section of the A1 opened in 2009. The aim was to focus on how a major route itself can act as an economic development catalyst via labour supply and demand for labour along that route. As such, this case study is less concerned with the impacts of specific schemes, and whether these scheme impacts can be identified, and more concerned with broader structural aspects associated with extended proximity and network-level effects. The 40 mile stretch of the A1 considered spans the A1-A47 junction outside Peterborough up to the A1-A46 junction outside Newark-on-Trent. The Curry's (white goods and electrical) national distribution centre is located alongside the Newark-on-Trent junction. In local governance terms this stretch of the A1 South Kesteven, Newark and Sherwood and Peterborough UA.

One aspect of this case study, with an eye on future potential, was the use of satellite images to examine industrial and housing developments. This is now easy to achieve because Google Earth provides a timeline facility (allowing easy visual inspection) and Google Earth Engine (though not used in this case study) provides AI and machine learning tools that can automate the identification of changes in landscape use.

This stretch of the A1 (in line with other SRN segments, notably the M40) attracts industrial and retail businesses who locate alongside the route in order to benefit from direct accessibility. Labour supply is local and clustered along the road allowing easy commute, provided that congestion at junctions is not severe (as issue considered for granting planning permission) whilst customer and freight access is unproblematic due to direct access to the SRN.

14.1.2 Key outcomes to date

The Downtown retail park at Gonerby Moor north of the A1-A52 junction (north west of Granthem) is an existing site undergoing re-development This site is a significant employer and attracts 2 million shoppers per year. A further 220,435 sq ft. (20,479 square meters) of designer outlet floorspace will be added to extend this footprint.

South of Granthem, 273,022 square feet (25,364 square meters) of land.is due to be developed as another major designer outlet explicitly exploiting SRN connectivity via the A1. The investment case for this new development emphasises a population of 3.75 million within a 1 hour drive time radius and 4.5 million within 1.5 hour dive time radius, and 28 million cars passing that location annually. The new Grantham Southern Relief Road junction provides (expected) congestion limiting local access (and hence facilitated the proposed investment).

Delayed due to Brexit, COVID19 and the war in Ukraine, construction is now planned to commence in late 2025.

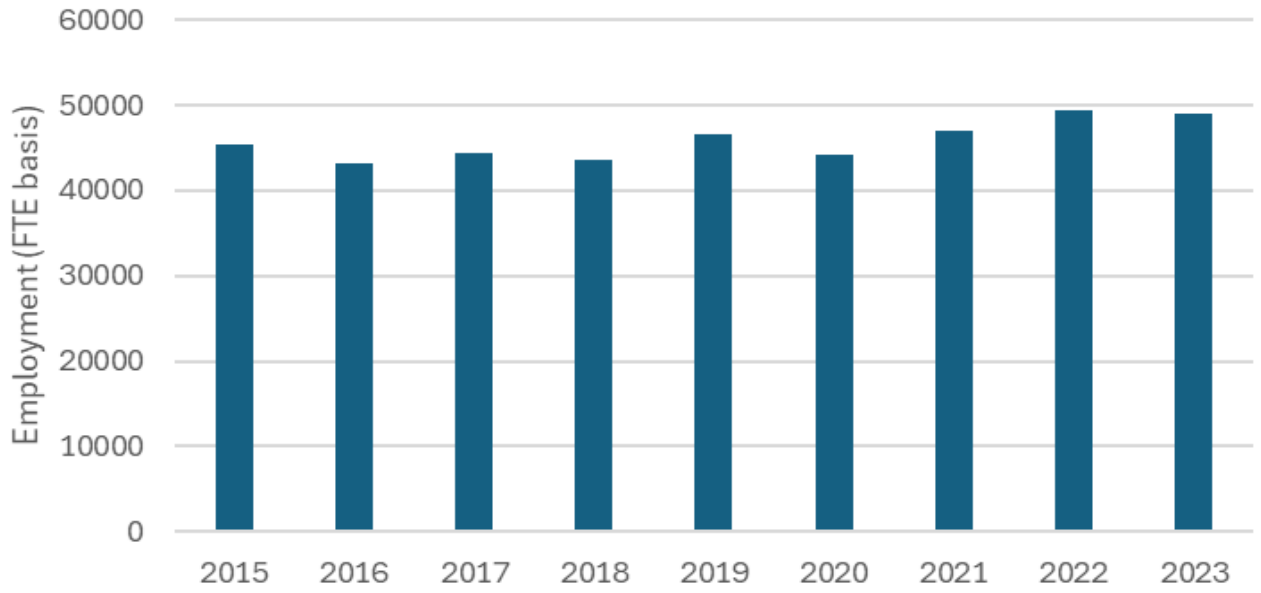
These two developments provide a useful example of how SRN accessibility drives investment opportunities, and supports local GVA and employment. These are extended proximity effects and network-level effects-based developments, with close proximity effects limited to local labour supply.

Although new housing development is taking place alongside other segments on the A1, this is not currently a feature of the stretch of the road examined here. Local labour supply for the new major retail sites is likely to be sufficient – and the A1 adjacent locations of existing housing makes access to labour unproblematic.

14.1.3 Key evidence on outcomes to date

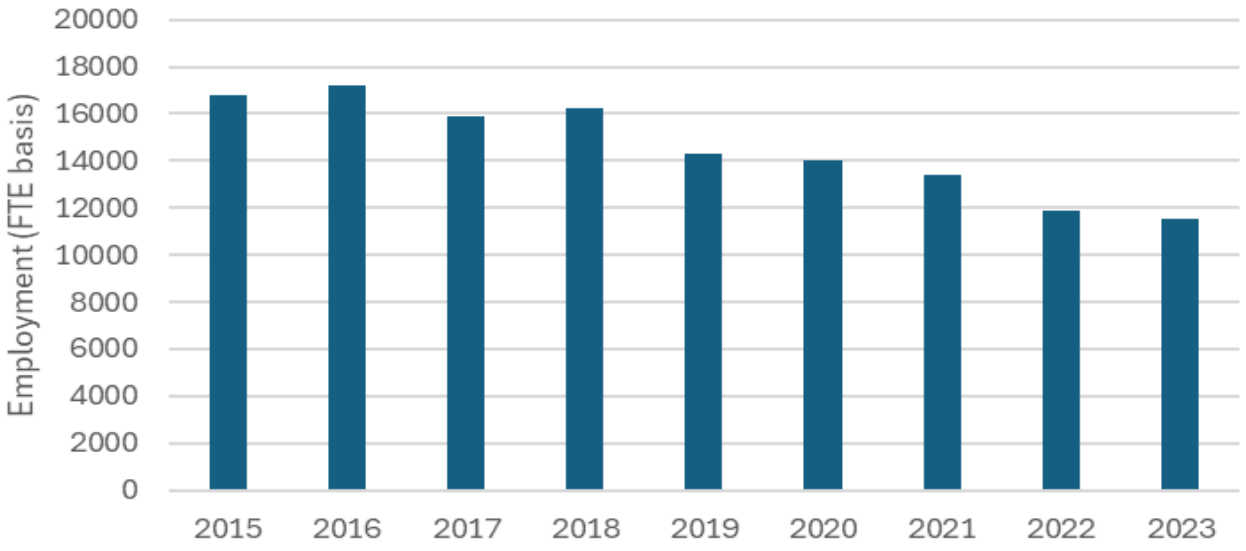
For local context, retail employment in the three relevant administrative areas has been declining whilst industrial employment has been more stable. Real GVA per square meter has been declining but with indications of an uptick from 2015-16 onwards (though of course not up to date data on that aspect).

Figure 14.1: Industrial employment



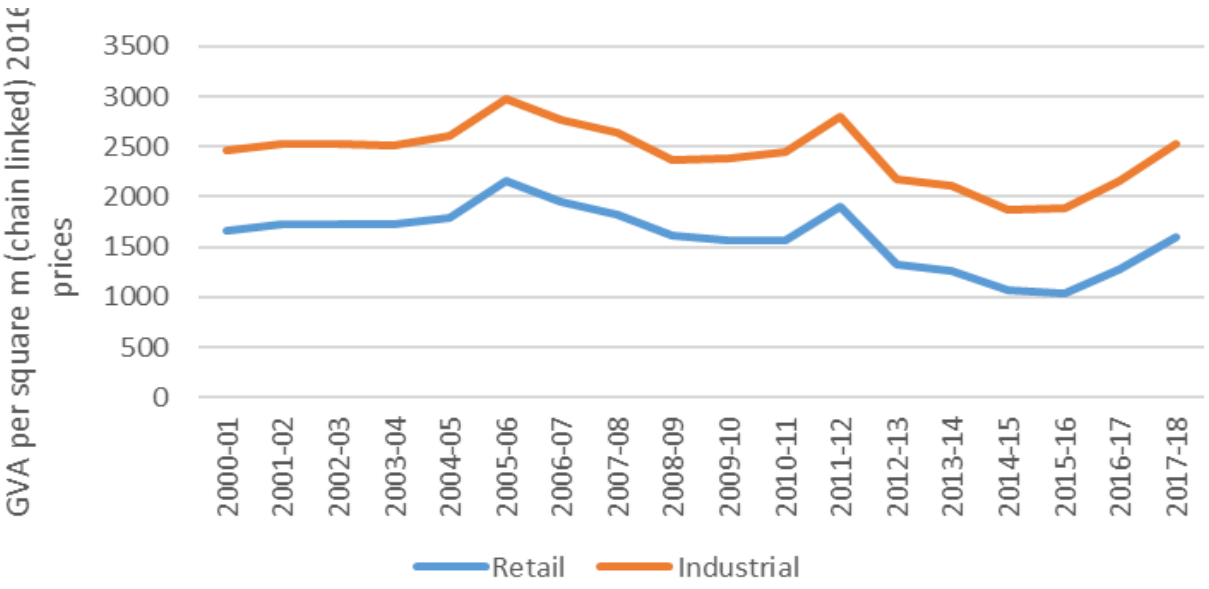
Source: NOMIS

Figure 14.2: Retail employment



Source: NOMIS

Figure 14.3: Retail and industrial GVA per square metre



Source: Ipsos analysis of VOA and ONS data

14.1.4 Lessons for the EPIRE study and future work

Supports adding a new focus on how the SRN is now driving economic developments directly exploiting network-level and extended proximity effects with access to local labour facilitated by adjacent housing – creating a 'linear' economic systems that can span a number of local authorities rather than conventional FEAs.

14.1.5 Summary of key findings

Long stretches of the SRN may increasingly become themselves drivers of local economic activity for logistics and retail activities in particular, and potentially the location for new housing developments also benefitting from direct SRN connectivity.

These linear configurations suggest that, in the future, the links between the (urban) nodes in the SRN will increase in their importance as drivers of economic growth, requiring some re-thinking of standard accepted agglomeration-based explanations.

14.2 Additional details

14.2.1 Scheme characteristics summary

This case study explored a new approach by examining a 40 mile section of the A1. The aim was to focus on how a major route itself can act as an economic development catalyst via labour supply and demand for labour along that route. This is a segment of the longer A1 Peterborough – Blyth Grade Separated Junctions scheme that opened in 2009. This was a major Highways England scheme to improve a 73 mile length the A1 trunk road in the East Midlands at Blyth, Apleyhead, Markham Moor, Gonerby Moor, Colsterworth and Carpenters Lodge. The scheme involved the construction of six new two-level junctions, resulting in the removal of all the at-grade roundabouts on this section of the A1 in order to reduce congestion at those junctions.

This stretch of the A1 (in line with other SRN segments, notably the M40) attracts industrial and retail businesses who locate alongside the route in order to benefit from direct accessibility. Labour supply is local and clustered along the road allowing easy commute, provided that congestion at junctions is not severe (as issue considered for granting planning permission) whilst customer and freight access is unproblematic due to direct access to the SRN.

14.2.2 Aims

The scheme was designed with a comprehensive set of objectives aimed at enhancing the efficiency and safety of the A1 trunk road corridor between Peterborough and Blyth. This major infrastructure initiative was necessitated by the need to address critical issues related to traffic flow, road safety, and environmental sustainability.

- **Reduce delays:** A primary goal of the scheme was to mitigate traffic congestion by effectively segregating A1 through traffic from local traffic at strategic junctions. This separation was intended to streamline traffic flow, minimize bottlenecks, and enhance journey times for both commuters and freight carriers. The implementation of grade-separated junctions was projected to facilitate seamless transitions and uninterrupted travel, thereby significantly reducing delays.
- **Reduce accidents**: Safety was a central focus of this A1 scheme. By replacing at-grade junctions with grade-separated alternatives, the project aimed to significantly reduce the likelihood of collisions caused by conflicting traffic movements. The design strategy sought to decrease traffic volumes at critical points and eliminate hazardous crossing paths, thereby

improving road safety for all users. This objective was particularly crucial given the historical accident rates at the junctions prior to the improvements.

- **Improve non-motorised user safety**: The scheme incorporated facilities designed to better accommodate non-motorised users, including pedestrians, cyclists, and equestrians. By providing designated pathways and safer crossing points, the project aimed to reduce severance and enhance accessibility for these groups. Improving the safety and convenience of non-motorised transport was a key aspect of promoting sustainable travel modes and enhancing regional connectivity.

In addition to these primary objectives, the scheme was anticipated to deliver substantial economic benefits by improving the efficiency of transportation networks. By facilitating the more effective movement of goods and services, the project aimed to strengthen regional economic development and competitiveness. Furthermore, environmental considerations were integral to the scheme's design, with measures to mitigate negative impacts on noise levels, air quality, and biodiversity. Efforts were also made to enhance the landscape and townscape, ensuring that the infrastructure improvements complemented the surrounding environment and contributed to the overall visual and ecological quality of the area.

14.2.3 Outcomes

The scheme accomplished a comprehensive set of outcomes that aligned with its initial aims and objectives, demonstrating notable successes across several key areas. Detailed examples from the interview transcripts and documentation illustrate these achievements:

Achievement of aims and objectives:

- **Reduction of delays:** The implementation of grade-separated junctions was crucial in alleviating traffic congestion and enhancing traffic flow. This infrastructural enhancement led to improved journey times along the A1 corridor, fulfilling the objective of reducing delays for both through and local traffic. For instance, interviewees from multiple businesses highlighted the improved reliability and speed of transportation, which reduced lead times and enhanced delivery schedules, thereby increasing overall efficiency.
- **Reduction of accidents:** A primary objective of the scheme was to enhance road safety, effectively achieved by eliminating at-grade crossings at critical junctions. The redesign reduced conflict points and minimized hazardous traffic interactions, particularly at the three northern junctions where accident rates saw a marked decline. Collision data analysis provided quantitative evidence of this improvement, highlighting the effectiveness of the implemented safety measures.
- **Improvement in non-motorised user safety:** Enhancements to facilities for non-motorised users significantly improved safety for pedestrians, cyclists, and equestrians. The creation of dedicated pathways and safer crossing points facilitated more secure and accessible travel for these users. This achievement was, as described in post opening review, realised through targeted infrastructure improvements designed to reduce severance and promote sustainable travel modes.

Impacts on local areas and businesses:

The scheme positively impacted local economies by enhancing connectivity and reducing travel times. Local businesses reported benefits stemming from improved logistics and transportation efficiencies, as captured through structured business interviews. For example, Stainless Metalcraft noted that the improved road network allowed them to optimise logistics and expand capacity, leading to increased revenue and profitability.

Environmental measures implemented as part of the scheme, including noise and air quality management, were also largely effective as evidence in the POPE report. However, some localised challenges persisted, particularly in landscaping and biodiversity, where plant growth and establishment faced difficulties. Document reviews provided insights into these environmental outcomes, indicating areas for ongoing attention and improvement.

Overall, the scheme successfully met its aims and objectives, delivering substantial improvements in traffic efficiency, safety, and regional economic benefits. As noted in the summary, the economic benefits are in part due to attracting major designer outlet facilities that explicitly exploit extended proximity effects (large customer catchment areas) in so doing generating local employment opportunities. While some environmental challenges remain to be fully addressed, the positive outcomes of the scheme are evident in the enhanced transportation network and its contribution to local economic vitality.

14.2.4 Success factors

The key success factors evident in the documents and transcripts analysed include:

- **Strategic infrastructure design:** The emphasis on grade-separated junctions is frequently mentioned in the documentation as a crucial element in reducing congestion and improving traffic flow. This design approach is highlighted in the evaluation reports and interview transcripts as a primary contributor to achieving reduced delays.
- **Safety enhancements:** The reduction in accident rates, noted particularly at the northern junctions, is supported by collision data analysis and discussed in the monitoring and evaluation reports. The interviews with businesses also reflect a shared perception of improved safety due to infrastructural changes.
- **Improved facilities for non-motorised users**: The transcripts from business interviews and the evaluation reports both mention the enhanced safety and accessibility for pedestrians and cyclists, underscoring the importance of these improvements in meeting the scheme's objectives.

14.2.5 Unintended impacts

The case study analysis related to the scheme did not highlight any unintended impacts.

14.3 Scheme logic model variant

Similarly to the preceding Hindhead scheme, a logic model variant has not been provided because this scheme also targets extended proximity effects – and also network-level effects associated with national SRN performance. It will therefore be useful to for future work to

develop a different type of logic model, ideally in association with exploring new econometric methods able to evaluate the economic impacts of network-level effects.

15 Implications for future logic model specifications

The scheme-specific logic model variants presented above suggest that a generic logic model for future use by DfT in more closely linking *ex ante* appraisal and *ex post* evaluation incorporate the following aspects:

- Developer partnerships and co-funding (which can be pivotal to achieving planning consent when there are concerns over traffic congestion caused by the interactions between close proximity, extended proximity and network-level effects.
- Inter-modal connectivity (rail, air and sea ports), especially relevant to network-level effects.
- Broader strategic collaboration between adjacent local authorities with shared ambitions and economic inter-dependencies to exploit, and in particular approaches that deliver more agile (faster and more flexible planning consent).
- The use of Special Purpose Vehicles (SPVs) and public-private partnerships to fund and maintain road enhancements – requiring as in the case of the Mersey Gateway the possible use of public funds to de-risk the consequences of low-probability high-consequence events that would otherwise limit the 'bankable feasibility' of such investments.

The final point on SPVs is relevant to an emerging policy narrative that emphasises a stronger future role for public-private partnerships in transport infrastructure provision. The finding from this study's econometric analysis - that productivity gains dissipate over time but that growth impacts are retained - has significant implications for future business case specifications. Specifically,

Overall, the nexus between planning consent agility (lead times and flexibility) and traffic congestion caused by the interactions between close proximity, extended proximity and network-level effects stand-out as key messages from this study. The greater the agility in planning consent the greater the potential to more widely distribute the gains from economic performance impacts beyond the people and firms that own property assets (both housing and business assets).

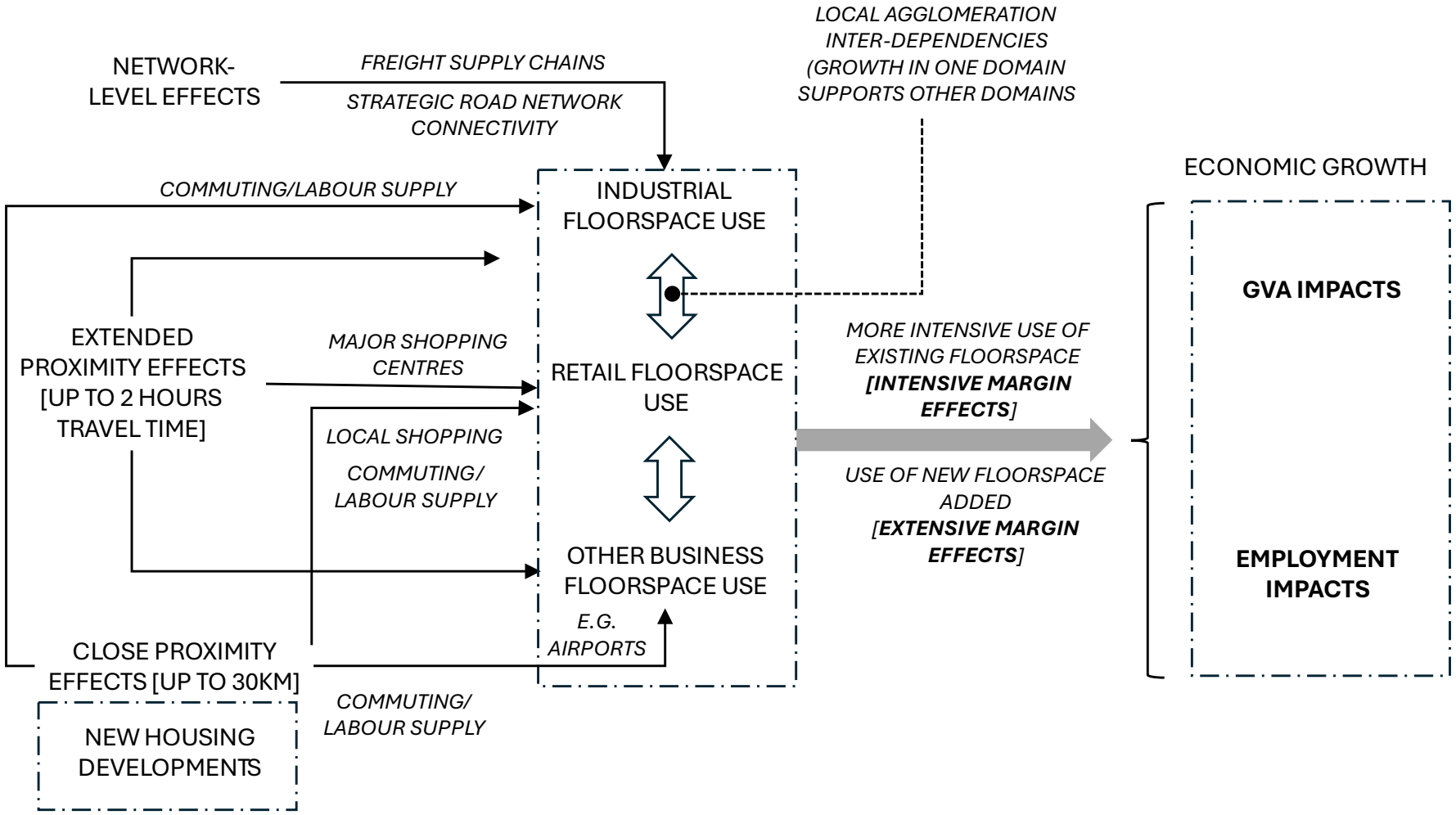
16 Additional observations on these findings

16.1 Productivity impacts

The following diagram summarises a main message from the case studies, which is that there are three important economic impact pathways for road enhancements: network-level effects, extended proximity effects (up to a two-hour travel time radius) and close proximity effects (up to 30km).

Agglomeration effects are therefore driven by the ways in which inter-dependencies are generated between different aspects, each of which is in turn driven by a mix of these network-level effects, extended proximity effects and close-proximity effects.

Figure 16.1: Summary depiction of key case study conclusions



16.2 Insights on road freight and competitiveness from the business interviews

The business interviews carried out for the scheme case studies asked for views on the competitive and productivity benefits associated with the road enhancement schemes. In order to protect anonymity these quotes have been obtained from across the set of interviews carried out.

A firm specialising in the design and manufacture of high-integrity precision metal fabrications, primarily for demanding industries like nuclear, oil and gas, and medical stressed that:

“Our industry is highly competitive, and we face challenges like fluctuating material prices, skilled labour availability, and the need to maintain high quality standards while controlling costs. Efficient logistics are crucial for managing these challenges and ensuring timely deliveries to our customers. Any delays in transportation can significantly impact our productivity and competitiveness …(the road enhancement) has had a noticeably positive impact on our business. The most significant benefit has been the improved reliability and speed of transportation for both our incoming materials and outgoing products. This has reduced lead times, improved our delivery schedules, and enhanced our overall efficiency. We haven't experienced any direct negative impacts.”

“…we have observed improvements in our productivity and overall business performance. The reduced travel times have allowed us to optimize our logistics, streamline our operations, and improve our responsiveness to customer demands. This has contributed to increased efficiency and cost savings.”

Another manufacturing firm commented that:

“Our industry is highly competitive, with global players vying for market share. We face challenges such as fluctuating material prices, exchange rate volatility, global competition, and the ever-present need to maintain high quality standards while controlling costs. Skilled labour shortages are also a concern, as our work requires highly specialised expertise. Efficient logistics are crucial for managing these challenges and ensuring timely deliveries to our customers. Any delays or disruptions in transportation can significantly impact our productivity, profitability, and competitiveness. We also invest heavily in research and development to stay at the forefront of technological advancements in our field.”

“The most noticeable benefit has been the improved reliability and speed of transportation for both our incoming materials and outgoing products. That has reduced lead times, improved our delivery schedules, and enhanced our overall efficiency. For example, we've seen a reduction in delivery times to certain key customers, which has strengthened our relationships and enhanced our reputation for reliability. We haven't experienced any direct negative impacts from the scheme, however the initial disruption during the construction phase was substantial … the reduced travel times have allowed us to optimise our logistics, streamline our operations, and improve our responsiveness to customer demands. This has contributed to increased efficiency and cost savings. For instance, the quicker turnaround times for deliveries have enabled us to take on additional projects and expand our capacity, leading to increased revenue

and profitability. The improved road network has also made it easier to attract and retain skilled employees, as commuting times have been reduced."

"The reduced journey times and increased reliability of the road network have played a key role in enhancing our logistics and overall operational efficiency. The … is a critical artery for our business, connecting us with key suppliers, customers, and transportation hubs. The improved road infrastructure has also reduced the wear and tear on our vehicles, resulting in lower maintenance costs."

A logistics company stressed that:

"We've observed measurable improvements, such as a 15% decrease in delivery times, 10% increase in daily shipments, improved fuel efficiency. These gains have positively impacted revenue and profitability, strengthening our market position….We directly attribute these improvements to the road scheme. The enhanced traffic flow and reduced travel times have significantly streamlined our operations, allowing us to optimise our logistics and reduce costs….The positive impacts have been consistent since the project's completion and remain noticeable today. We expect these benefits to continue, further enhancing our long-term growth prospects."

Evidence from the business interviews suggested that manufacturing and logistics firms gain several benefits from road improvements in their local area, which ultimately contribute to a more reliable supply chain:

- **Reduced transit times:** Improvements in roads led to faster delivery times, which translates to quicker movement of goods throughout the supply chain. This reduces lead times, allowing manufacturers to respond to customer demands more rapidly and was particularly important for time-sensitive goods.
- **Improved consistency:** Road improvements were said to have led to fewer delays caused by poor road conditions, traffic congestion, or need to use longer routes. This consistency in transportation allows for better planning and adherence to delivery schedules, improving overall reliability. However, gains were not expected to be directly visible in a GVA per worker uplift.
- **Lower transportation costs:** Small gains in fuel savings were highlighted as being likely as were gains in maintenance and repair costs driven by more efficient routing and reduced wear and tear on vehicles respectively. However, these were not quantifiable by firms included in the research.
- **Decreased inventory holding costs:** Faster and more reliable routing allowed manufacturers to optimize their inventory levels. In a handful of cases, road improvements had led to a reduction in safety stocks, freeing up capital and reducing storage costs.
- **Reduced spoilage and waste:** For manufacturers dealing with perishable goods, improved roads and faster transit times reduced the risk of spoilage and waste, leading to cost savings. However, these were again not measured by firms directly.

- **Improved customer satisfaction:** Road improvements enabled faster deliveries and more reliable order fulfilment which led to improved customer satisfaction.

The message conveyed by these businesses is that, in their experience, the improved reliability and speed of road freight transport made possible by road enhancements boosts productivity in a general sense. However, linking such benefits to businesses to formal productivity measures is more complex due to the technical details of how changes in productivity are calculated. Specifically, it is not necessarily the case that optimising logistics (more frequent and/or reliable shipments) and releasing more facility floorspace for productive uses will be reflected in either labour productivity or TFP. This is because the additional productive capacity (allowing output to increase without needing to increase factory floorspace) may be a pure scale effect that does not affect how efficiently capital and labour are combined in use. This implies that road enhancements can generate important competitive advantages for businesses that may not be captured in standard measures of labour productivity and TFP. This is a significant issue in policy terms because it draws attention to the fact that there are competitive benefits for businesses from road enhancements that are not reflected in productivity data.

One way of thinking about such benefits is that they help to safeguard future employment and GVA because improved reliability and shipment times of freight help firms to maintain their supply chain participation by keeping their customers happy.

17 Summary and conclusions

The following conclusions emerge from this consideration of scheme case studies.

At an individual case study level there are multiple reasons why the intended economic benefits that are specified by Local Authorities do not eventuate, and this is mainly due to limitations to 'strategic fit' aspects of pathways to impact (anticipated houses not built, new business floorspace not created). Indeed, housing and business floorspace additions dominate Local Authority perspectives, and for good reasons as these are key tangible impact pathways. Consequently, local standardised M&E arrangements regarding economic impacts could make effective use of such metrics.[10]

As a result, when informed by insights from a broad range of evidence sources (business CATI surveys, LA/LEP interviews, ONS data, logic model depictions) individual scheme case studies are able to provide very useful insights into the practical realities of achieving any intended local economic performance impacts.

As the Hindhead scheme study notes, it would be useful for DfT to consider the technical feasibility of carrying out portfolio-based econometric analyses at a regional level. Hindhead, which addressed traffic congestion on the London to Portsmouth route, is an example of a scheme that aims to generate broad economic benefits in a geographically dispersed manner. Whilst technical challenges exist in how/where to define regional boundaries for regional econometric studies, such work would align with the government's interest in establishing broader regional 'compacts' or local authorities in the post-LEP era.[11]

- As the case studies have highlighted, the combined importance of close proximity, extended proximity and network-level effects future work will need to develop new methods for addressing network-level effects that distance-decay and similarly framed more regionalised accessibility methods cannot address.

It will therefore be useful, in future work (both econometric and scheme case study-based) to:

- Use the following three-element distinction for understanding the economic performance of impacts of road enhancements: close proximity effects up to 30km from the scheme(s),

[10] New DfT guidance on M&E for Local Authority Major Schemes is due to be published, the older 2012 guidance does not specify use of these spatial measures however (only stipulating rental values in addition to travel times ad employment as key metrics, see: Major Scheme Business Cases: Evaluation Guidance for Local Authority Major Schemes

[11] The rationale for broader representative bodies is to reflect business and economic concerns, including transport related concerns, at a broad enough level to avoid overly 'parochial' perspectives and to allow more integrated and collaborative consultations and planning.

extended proximity effects up to a two-hour road travel radius, and network-level effects that apply in particular to business supply chain connectivity.

- Adopt this three-part framing in any future use of Synthetic Control Group (SCG) methods via characterising groups of schemes on this basis.
- Translate the complex and sophisticated traffic modelling that is carried out at the *ex ante* appraisal/business case stage into an *ex post* economic impact evaluation tool able to pick-up how the schemes have changed overall accessibility for all three traffic impact domains (close proximity effects, extended proximity effects and network-level effects).
- This three-domain aspect is important because there is the potential for traffic flows to interact in unwanted ways (e.g. by success in extended proximity effects to increase congestion in the close proximity domain). Existing traffic modelling carried out for investment appraisal addresses these aspects, however these 'interference' effects will also need to be analysed in ex post evaluations in order to provide a complete picture of the overall balance of economic performance impacts.
- Positive impacts on businesses may not necessarily be captured fully in conventional labour and/or Total Factor Productivity (TFP) estimates. This is because faster and more reliable road freight can generate a type of benefit associated with the ability to increase output per square meter of business floorspace via more efficient logistical processes, thus allowing output to be increased without the need to increase business floorspace (and, potentially, re-located the facility if the additional floorspace cannot be added at the current location).
- It is useful, in future DfT work, to explicitly consider the historical background of business floorspace structure and use in order to understand the potential future economic impact of a road enhancement scheme or bundle of schemes. GVA and employment can be increased via a combination of expanding business floorspace (facilitated by road enhancements), an extensive margin effect, and/or using existing floorspace more productively (an intensive margin effect). This distinction being captured by considering the past behaviour and future potential of GVA per square meter and square meters per FTE employee.
- It is therefore useful to use diagnostic tools that track the behaviour of GVA relative to the volume of business floorspace (which is able to pick-up the mix of intensive and extensive margin effects) in conjunction with the more familiar use of square meters per employee metric used in Local Authority planning. Combining the GVA and employment spatial densities into new metrics for use in business cases and evaluations may be a promising aspect to explore in future work.
- This floorspace-oriented approach (using business floorspace as an 'anchor variable') has the major advantage of providing a tangible and easily grasped link between Local Authority perspectives and their planning for economic development and DfT and National Highways concerns. Local Authorities consider the potential for a road enhancements to facilitate investment in adding to the stock of business floorspace and also pay considerable attention to new housing developments in the same manner. In so doing, addressing the key issues of the local demand for labour and the local supply of labour. When close proximity effects, extended proximity effects and network-level effects are considered systematically this

provides a basis for a comprehensive assessment of future potential – and for evaluating actual outcomes and economic impacts. Whether or not the intended business floorspace, and housing was added is easily measured (as tangible 'anchor variables') and can then be related to the more contingent impacts of the GVA and employment effects that actually resulted.

- There are many reasons why anticipated and actual business floorspace and housing stock additions may not eventuate, and these tend to be of a 'strategic fit' nature (other things need to happen in order for the potential economic performance benefits to be achieved). It is therefore useful to use a Theory of Change and associated logic model depiction (of the type experimentally developed by the EPIRE study) to ensure that investment planning and subsequent monitoring and evaluation give due consideration to these 'strategic fit' aspects.
- Use of these spatial anchor variables (housing and business floorspace) combined with an assessment of GVA and employment performance could be particularly useful for the future uses of Synthetic Control Group (SCG) methods than compare a discrete scheme to a synthetic comparator derived from the best batch with a combination of attributes of other real schemes. However, the Valuation Office Agency (VOA) would need to provide DfT and National Highways with a more detailed SIC breakdown of business floorspace use in order to facilitate such SCG work. This is because it will be necessary to consider the combination of industry composition differences and the differences in the 'economic density' (GVA per square meter and square meters per FTE employee) of business activities.
- As flagged in the Econometrics report, the improved access to AI and machine learning tools that can be used to automate the analysis of satellite data (identifying new housing and industrial land uses) has opened up a potentially useful new data source. Google Earth Engine, in particular, now provides an accessible dataset (from multiple sources) and the AI and machine learning tools able to provide fast and cost-effective analysis of satellite data. One conclusion from this study is that this automated analysis of satellite data can be used as part of both future econometrics and case study work. Such data would be particularly useful if integrated with traffic flow data – especially in regard to the extended proximity and network-level effects highlighted in the case studies workstream.
- Finally, an explicit consideration of this spatial dimension for both business floorspace and the availability of vacant and under-developed land, in combination and when informed by the mix of close proximity, extended proximity and network-level effects, will provide a robust basis for tracking how well government policies to increase the supply of land for housing and industrial development are bearing fruit. As the supply of (scarce) land for development becomes more elastic than it currently is then the economic benefits generated are more likely to diffuse beyond the property capitalisation effect (which risks benefitting asset holders dis-proportionately).

Given these conclusions, it could be useful if a portfolio-level evaluation solution that would allow Local Authorities to discharge their road investment Benefits Management and M&E reporting obligations were to be developed, This collective approach could:

- Exploit the economies of scale that can be achieved from pooled funding (in so doing providing Local Authorities with a more cost-effective means of discharge their reporting obligations than ‘go it alone’ approaches.
- Allow a consistent generic method to be deployed (using a consistent generic logic model to facilitate comparative analysis and information sharing).
- Exploit the methodological advantages of drawing on portfolio-level analysis to complement the individual scheme aspects.
- Benefit from a standard, collectively developed and maintained ‘data quarry’ optimised for this type of evaluation work (to include business floorspace and its GVA and employment density as an ‘anchor’ metrics set).

ANNEX A: Long and shortlist scheme case studies selection

The first step in drawing up a long list of scheme case studies was to use the EPIRE Scheme Documentation/characterisation spreadsheet to identify the most promising schemes based on existing characterisations.

This characterised dataset yields the following subset counts:

- Schemes opened between 2007 & 2017 (n=136)
- Schemes opened between 2007 & 2017 AND with Business Activity objectives (n=62)
- Schemes opened between 2007 & 2017 AND with Job Creation objectives (n=53)
- Schemes opened between 2007 & 2017 AND with Productivity Gains objectives (n=32)
- Opened between 2007 and 2017 AND Job Creation AND Business Activity AND Productivity Grains (n=23)

Given that there are twenty-three schemes that opened over this time period that are marked as addressing Job Creation, Business Activity and Productivity Gains this provides a reasonable basis for a scheme long-list. These schemes are listed in the following table.

Table 17.1: Long list of schemes

Scheme	Scheme category	Region	Cost band (£m)	Scheme opening year	Scheme selection comments
Bexhill-Hastings Link Road	Local Major	South East	<100	2015	
Darlaston Access Improvement	Local Major	West Midlands	<30	2016	
Bristol BRT North Fringe to Hengrove	Local Major	South West	<150	2017	
White Rose Way Imp Scheme	Local Major	Yorkshire & the Humber	<20	2013	Already being covered (indirectly) by CEPA as a nearby case study within the same local economy
Bedale/Aiskew/Leeming Bar Bypass	Local Major	Yorkshire & the Humber	<30	2016	
A6 to Manchester Airport Relief Road	Local Major	North West	>200	2017	Airport growth hub aspect
Elmbridge Transport (Phase 1)	Local Major	South West	<20	2016	
East of Exeter Access Improvements Phase 2	Local Major	South West	<20	2013	Science park, local airport and inter-modal freight aspects
Todwick Crossroads Improvement	Local Major	Yorkshire & the Humber	<20	2013	
Heysham-M6 Link Road	Local Major	North West	<150	2013	
Portsmouth Tipner Interchange	Local Major	South East	<30	2014	
Reading Station Highway Imps	Local Major	South East	<20	2014	
Stockport Town Centre Major Scheme	Local Major	North West	<100	2017	
North Middlesbrough Accessibility	Local Major	North East	<20	2010	
Cudworth and West Green Bypass	Local Major	Yorkshire & the Humber	<30	2010	
A1073 Spalding to Eye Improvement	Local Major	East Midlands	<100	2011	
Taunton Third Way	Local Major	South West	<10	2011	
Sittingbourne Northern Relief Road	Local Major	South East	<40	2011	
Hall Lane	Local Major	North West	<20	2012	

Scheme	Scheme category	Region	Cost band (£m)	Scheme opening year	Scheme selection comments
A130/A13 Sadlers Farm	Local Major	East of England	<100	2013	
A2/A282 Dartford Improvement (information dated 10/8/12)	HE Major Road	South East	<200	2007	
A46 Newark to Widmerpool Improvement (information dated 10/8/12)	HE Major Road	East Midlands	>200	2013	Already being covered by CEPA as a case study
A595 Parton - Lillyhall Improvement (information dated 10/8/12)	HE Major Road	North West	<30	2008	

A short list selection could then be made by considering the primary and secondary selection criteria set out in this paper, including the option to add schemes that addressed the primary selection criteria but that were not identified in this characterisation-based long list. These additional schemes were also identified using the EPIRE dataset but by taking a broader look at their characteristics without applying the filters used to generate the long list (which may overlook aspects of interest).

Table 17.2: Short list of schemes

Database Ref	Scheme description	Comments on selection rationale
L104	A6 to Manchester Airport Relief Road (2017)	Long listed scheme able to address airport link growth hub effects). Major expected economic benefits. North West & Local Major example.
L96 H89	A18-A180 Link (Immingham) (2016) A160/A180 Port of Immingham Improvement (2016)	Two complementary 'bundled' schemes opening in the same year aimed at supporting the growth of the Immingham freight port. Not in the long list but able to address DfT interest in ports, freight and strategic road network connectivity. Also of interest given the new Humber Region Freeport status. North East & Local Major + HE Major Road combination example
L21	A1073 Spalding to Eye Improvement (2011)	Long listed scheme with anticipated local economic benefits. East Midlands & Local Major example
L19	Poole Bridge Regeneration Initiative-	Long listed scheme. Regeneration emphasis. South West & Local Major example

Database Ref	Scheme description	Comments on selection rationale
	Core Scheme Element (2012)	
L42	East Kent Access Phase 2 (2012)	Long listed scheme. New road with a port access dimension. with anticipated local economic benefits South East and Local Major example.
L99	Mersey Gateway (PFI) (2015)	Private Finance Initiative (PFI) bridge scheme intended to boost the regional economy, potential relevance to the subsequent Liverpool Freeport (which on the basis of an exploratory consultation views the road network as a growth constraint given strategic intentions). North West & Local Major example
H15	A2/A282 Dartford Improvement (2007) M25 Junction 1b to 3 Widening scheme (2008)	Long listed scheme with anticipated local economic benefits bundled with complementary M25 junction widening. South East and HE Major Road example.
L79	East of Exeter Access Improvements Phase 2 (2012)	Long listed scheme. Science park, local airport and inter-modal freight aspects. South West and Local Major example
H20	A3 Hindhead improvement (2011)	Not on the long list due to characterisation but of interest to Highways England so included in the selection. An opportunity to test for *ex ante* unspecified local economic benefits. South East & HE Major Road example.
	A1 Peterborough – Blyth Grade Separated Junctions	Added to explore how long SRN segments can themselves attract investment via expended proximity and network-level effects.

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