ARUP AECOM

Department for Transport

Wider economic impacts of road freight improvements

Stage 2 Final Report

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Executive Summary

Background to the research

The Department for Transport (DfT) commissioned this research to improve understanding of the wider economic impacts (WEIs) of road freight investments, with the ultimate aim of strengthening the evidence base underpinning Transport Analysis Guidance (TAG) and supporting the appraisal of future transport interventions. While TAG provides established methods for valuing direct freight user benefits, and general wider economic impacts across sectors, there has been long-standing uncertainty about whether wider impacts specific to freight and logistics are being fully captured, and if not, how they could be incorporated in a proportionate and robust way.

Freight plays a critical role in the UK economy, underpinning production, distribution and consumption across virtually all sectors. Road freight in particular relies heavily on the Strategic Road Network (SRN), which carries a disproportionate share of freight traffic relative to its size. Improvements to the SRN can therefore have implications that extend beyond direct travel time savings, potentially influencing how firms organise supply chains, locate activities, manage inventories and access markets. However, the mechanisms through which such impacts arise, their magnitude, and their additionality relative to existing appraisal measures remain poorly understood.

This research was designed to address these gaps through a two-stage programme of work. Stage 1 focused on reviewing existing evidence and identifying priorities for further investigation. Stage 2, reported here, focused on gathering new empirical evidence to test key hypotheses emerging from Stage 1 and to inform future development of appraisal practice and economic narratives.

Stage 1 – purpose

Stage 1 of the research sought to establish a clear conceptual and evidential foundation for examining freight wider economic impacts. It comprised a review of the academic and other literature, engagement with DfT and expert stakeholders, and the development of an initial theory of change for how road freight investments may generate wider impacts.

The Stage 1 review highlighted several important findings. First, while some wider economic impacts of transport investment are well-established in the literature—particularly those related to agglomeration—evidence specific to freight and logistics is comparatively sparse and the mechanisms whereby freight businesses are affected are not clear. This includes mechanisms such as supply chain reorganisation, inventory management, as well as longer term impacts on employment or land use change.

Second, Stage 1 identified uncertainty around the extent to which these mechanisms are already captured within existing appraisal components, particularly values of freight travel time and reliability and the imperfect competition uplift applied in TAG. This raised questions about additionality and the risk of double counting.

Finally, Stage 1 concluded that not all potential freight impacts were equally amenable to further empirical investigation within the scope of this research. Two priority impact categories were therefore identified for deeper analysis in Stage 2: **Supply Chain Efficiencies (SCE)** and **Land-Use Change (LUC)**. These were selected on the basis that they are plausibly linked to road improvements, frequently cited by practitioners, and potentially under-represented or poorly evidenced in current appraisal practice. It was also considered that other benefits where gaps were identified were already being investigated through parallel research activities by DfT.

Stage 2 – purpose

The purpose of Stage 2 was to generate new empirical evidence on how, when and under what conditions road freight investments give rise to supply chain efficiencies and land-use change impacts, and to assess the implications of these findings for future appraisal and economic narratives.

Stage 2 was designed to move beyond abstract theorising by examining real-world responses to completed road schemes. The research sought to understand the mechanisms underpinning observed impacts, the role of contextual and market factors, and the extent to which freight businesses attribute observed changes to transport interventions as opposed to wider economic trends.

In doing so, Stage 2 aimed to answer a set of defined research questions covering:

- threshold effects and step changes in direct impacts;
- the influence of firm size, market structure and competition on the transmission of impacts; and
- the role of wider contextual factors such as customer behaviour, land availability and investment inertia.

The ultimate objective was not only to assess whether freight wider economic impacts exist, but to inform how appraisal practice and guidance could better reflect them in a proportionate, evidence led manner.

This report

This report presents the findings from Stage 2 of the research. It sets out the methodology adopted, summarises evidence collected across multiple data sources, and synthesises findings against the research questions defined at the outset of the study. The report also revisits the theory of change developed in Stage 1 in light of the new evidence, assesses implications for TAG, and proposes future research pathways and practical next steps.

The analysis draws on three main evidence sources: qualitative interviews with freight and logistics stakeholders, a targeted survey of businesses affected by selected road schemes, and secondary data analysis of logistics property markets and floorspace trends. These sources are triangulated to provide a balanced assessment of both perceived and observable impacts.

Summary of research and analysis undertaken

Stage 2 combined qualitative and quantitative approaches to capture both the mechanisms and the context through which freight wider economic impacts may arise.

Three case study corridors were selected in consultation with DfT and expert stakeholders: the A14 (Cambridge–Huntingdon), the A13/M25 Junction 30 corridor, and the M62 Trans-Pennine corridor. These schemes were chosen to reflect variation in scale, geography, time since completion, and freight intensity, while ensuring that sufficient post-opening evidence was available.

Primary qualitative evidence was gathered through 14 semi structured interviews with freight operators, manufacturers, ports, trade bodies and other freight stakeholders. These interviews explored how firms perceive and respond to changes in travel time and reliability, the nature of any operational or locational changes, and the constraints shaping decision making.

A complementary survey was used to test whether themes emerging from interviews were observed more broadly across firms, and to explore perceived thresholds for behavioural change. While response numbers were not statistically representative (27 responses), the survey provided useful indicative evidence on direction and plausibility of impacts.

Secondary data analysis examined changes in logistics floorspace and property market indicators using Valuation Office Agency (VOA) and CoStar data through descriptive statistics. This analysis sought to identify whether road improvements were associated with observable changes in logistics land-use patterns relative to wider regional trends.

Findings against research questions

Based on the information gathered through our research, we have set out responses to the overarching research questions for this study including Stages 1 and 2 in Table 1-1.

Table 1-1 Summary table of research questions findings

Questions	Findings
Does TAG adequately capture freight-related FWEIs (Units A2.2–A2.4), including firm relocation, production or logistics reorganisation? What is the role of journey time reliability, and are these effects additional to user benefits?	TAG captures some freight FWEIs through agglomeration, employment impacts and imperfect competition. Evidence from interviews and surveys suggests additional impacts—specifically Supply Chain Efficiencies and Land-Use Change—driven by large journey time or reliability improvements along corridors. These effects may be additional to user benefits, where market failures exist. The existence of market failures in the context of Supply Chain Efficiencies is complex to understand. Supply chain efficiency impacts will be captured partially through the upcoming TAG update on freight values of time, however some longer-term operational benefits may not be fully captured.
Can land-use change impacts (e.g. freight firm reorganisation) be isolated without complex models such as GE?	Evidence suggests LUC impacts are harder to detect and slower to materialise than Supply Chain Efficiencies. Interview findings in particular highlighted how road improvements are not the primary driver of LUC related to freight businesses. Instead, LUC are the result of a combination of factors and local conditions, which suggests that modelling these impacts through a simple model focusing on transport improvements may not be possible. Case-study secondary data analysis found no clear local LUC effects relative to regional benchmarks. This aligns with recent findings from DfT through their EPIRE[1] work, which show weak, short-lived and largely redistributive land-use effects at the scheme level.
In industries with economies of scale, is there any additional "level 3" impact from road schemes, and if so, why and how could it be measured?	Only sufficiently large travel time savings can reduce transport costs enough to trigger changes in business operations; marginal savings are unlikely to generate transformational impacts and leave firms in the baseline equilibrium.
Is there double counting between the FWEIs raised through freight system and the rest of WEIs estimations? If double counting is present, can this be adjusted for in some way?	SCE and LUC can be considered as separate from current wider economic impacts. However, SCE will be captured to a great extent through the upcoming update to TAG on freight values of time, and only where SCE appear in the context of market failures, these may be additional and considered FWEIs. Through review of the latest value of freight time research, we identified that some long term SCE may not be captured in the direct user benefits after the TAG update.
Beyond FWEIs in TAG, how does improved road freight	The analysis of findings has not allowed us to gain insights into job transition dynamics. From a productivity perspective, Stage 1 identified a possible

[1] DfT research undertaken in 2025, Economic Performance Impacts of Road Enhancements

infrastructure influence job transition and productivity across different sectors?	gap in agglomeration benefits related to the mining and agricultural sectors, currently not captured in TAG, which are important freight sectors.

Future pathways

The findings from Stage 2 suggest that further development of freight appraisal should focus less on new monetisation and more on improving how freight impacts are identified, evidenced and explained within business cases. This is partly because the research suggests that FWEIs are captured to a great extent within current TAG guidance.

Rather than seeking complex new models, there is clear value in providing practitioners with clearer guidance on:

- the conditions under which freight wider economic impacts are likely to materialise;
- how these conditions can be validated using proportionate, scheme specific evidence; and
- how freight impacts relate to existing TAG components, including risks of overlap or double counting.

Several potential future research pathways were considered, including further econometric analysis and corridor level modelling. However, the evidence indicates that the most immediate and practical benefit would come from distilling existing findings into a concise, practitioner focused guide to support strategic and economic narratives. A short methodology for how to do this is provided with a recommendation that this could become part of an updated TAG Chapter on Capturing Local Context in Transport Appraisal or TAG Units A2.1 and 2.2 on wider impacts, providing more information on freight related market failures and distortions.

Conclusion and next steps

This Stage 2 research provides new, policy relevant insight into how road freight investments can generate wider economic impacts and, critically, under what conditions those impacts are likely to materialise. The evidence shows that Supply Chain Efficiencies are the primary and most immediate mechanism, while land use change impacts are slower, less frequent and more strongly shaped by wider market and planning constraints.

The findings reinforce the importance of context, proportionality and additionality in freight appraisal. Many freight responses to improved travel time and reliability are already captured within existing or forthcoming appraisal components. Additional wider economic impacts are most plausible where transport investments help overcome identifiable market failures.

The recommended next step is therefore to focus on strengthening strategic and economic narratives for freight, rather than expanding monetisation. Developing a short, practical guide for case-makers—supported by real-world examples—would help ensure that freight impacts are treated consistently, transparently and robustly in future business cases, in line with TAG principles and the Green Book.

1. Introduction

1.1 Background to this research

The Department for Transport (DfT) has commissioned the consortium made of Arup, AECOM, Imperial College London, Oxera, and Grant Thornton to deliver research on road Freight Wider Economic Impacts (FWEIs) with the aim of improving the DfT Transport Analysis Guidance (TAG) and support the appraisal of future transport interventions.

The work was conducted in two stages. During Stage 1 of the research, the consortium carried out a review of the literature on the subject, identified evidence gaps, and, with the DfT and selected stakeholders, determined the key priorities to be investigated for further improvement of the evidence base that will be required to enhance TAG. Stage 2 of the research focused on gathering new evidence primarily through qualitative analysis focusing on two priority impacts identified as research priorities in Stage 1: supply chain efficiencies and land use changes in relation to the freight sector resulting from road improvements.

The research aims to answer a set of defined research questions, including to what extent wider economic impacts of freight are being missed from current TAG analysis and how best to incorporate these impacts into future guidance. These are discussed in section 3.3.

1.2 Findings from Stage 1

Stage 1 of this project included a literature review, developing a logic map for wider economic impacts of freight, assessment of gaps in TAG, and initial suggestions for further research. In particular, the following suggestions were identified:

- While some impacts may be captured in TAG to a great extent, the underlying mechanisms of how these impacts materialise are very poorly understood. The evidence for these intermediate impacts is also limited. This is particularly the case of supply chain efficiency impacts including optimised fleet and inventory strategies.
- Additional impacts could be captured in TAG such as agglomeration impacts for additional sectors (agriculture and mining), land use changes, trade impacts and resilience impacts.

Stage 1 concluded with a prioritisation of impacts to be researched during Stage 2, which consisted of supply chain efficiencies and land use changes. This was partly because the other two sets of impacts were already subject to ongoing research activities commissioned by DfT.

1.3 Purpose of Stage 2

The purpose of Stage 2 of this research is to shed light on the mechanisms underpinning the materialisation of FWEIs, with regards to the 'Supply Chain Efficiencies' (SCE) and 'Land-Use Change' (LUC) impacts, two key priority impacts identified in Stage 1. The outcomes of Stage 2 research will contribute to the development of more robust and evidence-based economic narratives supporting the case for intervention in transport infrastructure projects related to freight.

Stage 2 of the project included the following activities:

1. **Development of a methodology**: Development a methodology that could estimate FWEIs based on the findings from Stage 1, aiming to fill in gaps in TAG. This should be aligned with the TAG framework. Double counting risks should be clearly highlighted.
2. **Case studies**: Application of methodology to real life case studies, testing that the methodology can be implemented in practice and generating useful evidence in the form of quantitative and qualitative analysis that can help strengthen future business case and provide a pathway for capturing FWEIs in TAG.
3. **Development of future research pathways**: prioritisation of future research activities building on the findings from the case study analysis with recommendations on next steps.

This focused on how TAG guidance could be improved to better account for wider economic impacts of freight.

1.4 Purpose of this document

This document provides the detailed methodology and findings from Stage 2. The report was produced by consolidating the content of various technical notes produced during this stage, helping to inform discussions during workshops with DfT. The report is structured as follows:

- Section 2 provides a summary of the approach to stage 2 analysis. This includes a reference to the appendix with the original methodology developed and the actual research undertaken.
- Section 3 presents the Stage 2 findings, initially by data source and then consolidated across the research questions to provide a clear summary of findings.
- Section 4 revisits the Theory of Change presented during Stage 1 based on the findings from Stage 2.
- Section 5 discusses future research pathways based on a list of options considered and provides a detailed approach recommended for the preferred research pathway option.
- Section 6 concludes with a summary and next steps.

2. Approach to Stage 2 analysis

2.1 Introduction

The Stage 2 research aims to enhance our understanding of two key categories of benefits shortlisted as potential gaps and research priorities during Stage 1: supply chain efficiencies (SCE) and land use changes (LUC). The findings provide early evidence for how these impacts take place in practice, enabling more robust economic narratives to be developed but also allowing us to define future research pathways to assess these impacts more robustly and generate evidence that eventually can be included into TAG.

2.2 Research questions

The consortium defined prioritised Research Questions (RQs) to be addressed in the Stage 2 of the project taking into account the Stage 1 findings and the expected feasibility of analytical approaches which are proportionate to the scope of work. RQs have been grouped into three sets. The first two sets seek to investigate specific hypotheses of wider economic impacts resulting from market failures. The remaining set aims to understand other influencing factors which need to be taken into account when answering the other RQs. The research questions are addressed mostly through qualitative and high-level quantitative analysis.

2.2.1 RQs set 1: step-changes in direct impacts

The first set of RQs relates to whether threshold effects exist in direct impacts when it comes to whether wider impacts materialise.

An important factor shaping the RQs below is how agglomeration elasticities for transport interventions have been derived so far. Existing agglomeration models (e.g. Graham, 2018) estimate productivity effects from the proximity of people and as such, they treat accessibility mainly in terms of labour market density and productivity gains. While these approaches capture benefits linked to human capital, they do not fully account for how improved accessibility of goods (rather than people) transforms freight and logistics operations.

Some of these commodity-based benefits are represented in Value of Time (VoT) estimates, but VoT captures only marginal savings, not the wider organisational or locational adjustments that may follow sustained reductions in transport costs.

Importantly, in the present study, VoT gains are viewed as supportive indicators, not the causal driver of wider impacts. VoT estimates measure marginal gains, not the wider reorganisation of logistics and land use that can follow sustained reductions in transport costs.

In the present study, what matters most is the point at which improvements in accessibility and reliability enable clustering and economies of density. These effects arise once accessibility thresholds are reached, that is when transport improvements lead to a sufficient thickening of trunk routes, consolidating activity, and improves freight efficiency substantially and reaches a point that makes co-location and network reorganisation viable.

Clustering and density should be understood as mechanisms, that is second-round effects of transport improvements. They occur when time and reliability gains reduce costs and enable businesses to relocate or reorganise operations. These mechanisms, rather than being monetised impacts in their own right, are the focus of this RQ set, which explores how they arise, what triggers them, and under what conditions they lead to supply-chain efficiencies (SCE) and land-use change (LUC).

Hypothesis 1: If a transport intervention delivers accessibility and reliability improvements beyond a critical threshold (to be determined), freight and logistics businesses can reorganise operations in ways that generate Supply Chain Efficiencies (SCE) and Land-Use Change (LUC) impacts. These effects

depend on the improved proximity of goods within supply networks rather than the proximity of people.

Market failures: **Coordination failure** to internalise the spill-over benefits of faster travel routes among businesses. Private decisions could undervalue total social benefits.

RQs:

1.1 What impacts beyond those captured by the value of time are there according to freight and logistics firms?

1.2 Can such impacts materialise because goods are located closer to where they need to be (storage, dispatch, delivery) rather than because they are closer to where people work and live?

1.3 If these benefits take the form of SCE and LUC, are they aligned with the sub-types identified in the literature (e.g., changes to fleet, warehouse size and number, warehouse location, etc.) or are there additional sub-types of impact recognised by firms?

1.4 Do businesses expect some sub-types of SCE and LUC impacts to occur earlier, to be more likely, or be more valuable than others? What are the most prominent / important impacts? Do these vary by sector / types of goods transported?

1.5 Are there minimum thresholds of travel time savings from transport interventions that your firm expects to be met for businesses to experience SCE and/or LUC impacts?

1.6 To what extent do firms attribute organisational or location changes to the transport intervention itself instead of other factors (such as market demand/growth, regulation, land cost or availability, labour supply, or competition)?

2.2.2 RQ set 2: Market structure, competition, firm size, and the transmission of wider economic impacts

The second set of RQs examines how competition and market structure affect the extent to which freight and logistics firms can retain or pass on the benefits of transport improvements. The TAG framework applies a 13.6% uplift to qualifying business user benefits to account for welfare gains under imperfect competition in **downstream product markets**. This uplift should not be conflated with competition effects within freight and logistics markets, where benefits are usually passed through to customers rather than retained as additional profit.

Most freight markets are highly competitive, so cost savings from transport improvements are usually passed on to customers rather than retained by firms: in such cases, we expect a substantial pass-through of transport cost savings. In more concentrated or capital-intensive segments of freight and logistics (e.g., intermodal or specialist freight), some qualitative effects may arise through reduced barriers to entry, greater capacity for investment, or improved market access. Note that these effects will be recognised descriptively and not monetised separately from the TAG framework.

Firm characteristics also influence how such effects unfold. Larger or better-resourced operators are generally more able to reorganise or expand when accessibility improves, while smaller firms may lack the capital, systems, or scale to do so. Understanding how competition conditions interact with firm capacity is therefore central to identifying where and how wider economic impacts can realistically materialise. This leads to another set of RQs.

Hypothesis 2: The extent to which Supply Chain Efficiencies (SCE) and Land-Use Change (LUC) impacts occur depends on firm capacity and market structure, which in turn

influence the constraints faced by firms (e.g., lack of IT infrastructure to optimise routes, limited warehouse/ loading capacity, limited capital, constraints on loading bays/fleet, regulatory/ planning constraints.). Larger or better-resourced firms are more able to reorganise or invest when accessibility improves, while smaller firms may be constrained by limited capital, infrastructure, or regulatory flexibility.

Market failures: The market is stuck **in a sub-optimal equilibrium** that does not allow for the level of capital investment required to realise full productivity gains following travel time savings

RQs:

2.1 To what extent are SCE and LUC impacts conditional on firm size (e.g. fleet size, turnover, number of depots/warehouses, number of employees)?

2.2 What operational, financial and/or institutional factors enable or limit firms from capitalising on travel time savings and deliver SCE/LUC impacts?

Hypothesis 3: Firms operating in highly competitive segments of freight and logistics (especially smaller ones) will not experience additional benefits other than those captured by the freight VoT, implying there are only limited additional restructuring or wider economic impacts.

Market failures: **imperfect competition**, barriers to entry / capital constraints

RQs:

3.1 Which segments in the freight and logistics supply chain are perceived to be more competitive than others (e.g. parcel delivery, last-mile, general distribution, specialist freight, intermodal freight)?

3.2 Is applying a uniform uplift across freight time savings appropriate for imperfectly competitive markets? If not, should the uplift vary by segment, firm size (or other characteristics)?

3.3 How far can a transport improvement materialise from any given business for them to consider competition to become tighter? What is the effective spatial/time/proximity threshold?

3.4 How distant can businesses be from a transport intervention for them to experience SCE or LUC impacts? Is a single improvement sufficient to cause LUC? Or does it take a major reorganisation? Or else, is a combination of improvements (network effects, reliability, frequency, etc.) necessary for substantial impacts to materialise?

2.2.3 RQ set 3: contextual factors

The third set of RQs relates to contextual factors. Even where transport improvements improve accessibility, firms' propensity to (re)organise operations, change warehouse and fleet capacity, or relocate operations may be shaped by broader socio-economic trends and pre-existing investments.

Several frictions can slow or dampen the transmission of wider economic impacts, including capital inertia (sunk investments and long asset cycles), planning and land-supply constraints, labour availability and skills shortages, and wider trade or macroeconomic shocks. These external factors can confound the effects of transport interventions by influencing the timing, scale, and nature of firms' responses.

Hypothesis 4: Wider socio-economic trends and investment inertia need to be accounted for when assessing changes over time in the freight and logistics industry, as they can mask or delay the observable impacts of transport improvements.

RQs: 4.1 How have changes in customer behaviour (e.g., increased online shopping) influenced firms' decisions?

4.2 Has the change in the international trade environment affected your Land-Use in the case study area (e.g., tariffs, outsourcing of production with greater reliance on ports, global supply chain disruptions)?

4.3 How do investment decisions affect businesses' ability to make decisions affecting their location and floorspace (for example, time to recover from an early investment into a previous location)?

4.4 What proportion of observed changes in operations / land-use do firms attribute to transport improvements versus other socio-economic or investment inertia factors?

2.3 Case study selection

2.3.1 Information considered

Through consultation with the expert Advisory Board and DfT, the consortium **shortlisted three case studies** deemed to maximise the chances of addressing the priority RQs specified above.

A first long list of potential case studies was generated in Stage 1 workshops based on the proposition of experts and DfT stakeholders. Further potential studies were then added to the list considering prior project / research knowledge of consortium members during the completion of this note.

The interventions were then filtered based on the availability of business case estimates or post-opening evaluation estimates of travel impacts, especially considering travel time and travel demand. For the remaining interventions, impact data has been extracted and reported at a high level together with the type of intervention and year of completion.

The consortium later reviewed the research data supporting "Logistics sites in England and Wales: Location, size, type and loading bays" (published in Oct 2023 using VOA data)[2] to get the number of logistics businesses within 12.5km Euclidean distance from the middle point of the intervention. Alongside their floorspace area by type of business involved in logistics (manufacturer / retailer / warehouse).

High-level insights about the type of freight/logistics industries affected by each intervention were included based on knowledge from the consortium freight experts, while the presence of previous research from the consortium on the area of the intervention has also been recorded.

The table below summarises key information collected for the case study short-listing.

Table 2-1 Case study data sources

Data set	Source
Journey time information	National Highways Post-Opening Evaluation Reports. See Appendix 7.1 for detailed sources.
Logistics sites within 25km	NOMIS and Apollo - University of Cambridge Repository[3]

[2] Available at: https://www.repository.cam.ac.uk/items/3d0eb1ad-d077-4e4e-84cb-79af35f0b163

[3] De Saxe, C., Ainalis, D., & Cebon, D. (2023). Research data supporting "Logistics sites in England and Wales: Location, size, type and loading bays";. Apollo - University of Cambridge Repository. https://doi.org/10.17863/CAM.102176

SQM surface	Apollo - University of Cambridge Repository
Industry characteristics	Arup-AECOM expertise and previous published and confidential research

2.3.2 Criteria assessed and rationale

To identify the preferred interventions for the research, the above information was assessed against the following criteria jointly:

1. **Diversification of average travel time impacts**
   The interventions have been selected to display minor, intermediate, and large travel time savings on a relative scale within the long list. This is in order to capture the potential 'step-changes' in travel time savings which may or may not result in SCE and LUC impacts.

2. **Diversification of business types impacted**
   The selection has attempted to capture areas known to differ by type of freight and logistics business making use of the routes affected by the intervention, such as Ro-Ro or Lo-Lo freight moved, or aviation/maritime means of transportation to/from the UK. This is in order to assess whether different types of businesses experience SCE and LUC differently.

3. **Diversification of business densities**
   The selection has then sought to cover interventions whose surroundings (12.5km radius buffer) included different numbers of freight and logistics operators on the basis of business counts and total floorspace area (Cambridge analysis). This is in order to capture different potential business sizes and competitiveness conditions.

4. **Diversification in time elapsed since intervention**
   The longlist included intervention completed in over two decades prior to this research. The selection has attempted to look into case studies with different years of completion. This is to consider the potential delay that LUC impacts require to happen since end of infrastructure construction. This criterion has however been balanced considering the trade-off with the following one below.

5. **Likelihood of meaningful engagement**
   The criteria above are only helpful to the selection as far as businesses involved with the selected case studies can be successfully engaged for qualitative analysis. The earlier an intervention has been completed, the greater the likelihood that business personnel with historical understanding of the changes caused by the intervention have left.

Some of these criteria present risks and challenges which were discussed in a dedicated section below. The resulting favourite case studies are discussed next, while a table with the longlist of interventions (filtered after considering impact data availability) is provided at the end of the section.

2.3.3 Preferred case studies

The shortlisted case studies for the Stage 2 research are:

- **A14 – Felixstowe** (bypass completed in May 2020)
  This is a major port gateway route connecting the Midlands and North to the largest container port in the UK. The infrastructure led to clear journey-time savings (up to 10 minutes); it is straightforward to identify/locate the defined cluster of port-related operators accessible via specialist trade bodies. The port itself has a vehicle booking system that hauliers need to use on a daily basis. This helps smooth out the arrival and departure times throughout the 24 hour operational window although there are still known peaks in demand. Despite the presence of port-centric logistics, data shows less than 200 logistics businesses located in the buffer area and an estimated surface of less than 0.8 million sqm. Part of the reason for this is that many of the containers are taken straight from the port to more strategically central distribution centres for unloading often in the Golden Triangle in the Midlands.

- **A13/M25 – London Gateway** (junction completed in March 2017)
  This is a large logistics and regeneration corridor with one of the focal points being the new London Gateway container port which opened in late 2013. Its first scheduled container ship, arrived on November 7, 2013, marking the official start of operations for the new deep-sea port. The port's opening was the culmination of more than a decade of planning and construction. The new facility was built on the site of a former petrochemical plant and terminal and included improvement to some internal and local access roads. The road improvement in discussion for this study displayed mixed journey-time effects (2.5 minute savings to half a minute time increases), but most affected businesses are easy to locate. Data shows over 800 logistics businesses located in the buffer area and an estimated surface of over 4 million sqm.

- **M62 - Transpennine corridor** (smart motorway completed in October 2013)
  This is a substantial and strategic freight route linking ports and industrial centres to major population centres such as Greater Manchester and Leeds. Impact is intermediate (1-5 minute travel time savings). The case study can be backed by existing AECOM freight data. Data shows nearly 1,500 logistics businesses located in the buffer area and an estimated surface of over 6.6 million sqm.

For all three areas, a National Highways POPE report is available to build upon. The links of these POPE reports are attached in Appendix A.1

2.4 Approach to analysis

A methodology note was developed at the start of Stage 2, provided in Appendix A.4.

The case study research was delivered consistently with the approaches set out in this Methodology Note, focusing on **three data sources: interviews, surveys and secondary data**. This has yielded relevant insights to address the established Research Questions to different extents, noting however that the outturn number of completed interviews has been lower than the desired target (14 out of a target of 45, 15 per case study area) and the survey responses have been relatively low (27). Despite this, most interviews conducted (10) included organisations that were able to comment across all study areas due to either their larger remit of operations or due to being a trade body representative of the industry, partially compensating for lower number of interviews. As such, findings were aggregated across case studies rather than reported separately for each area.

Survey responses reached the aims set out in the Methodology Note in terms of respondents reporting on operations and land-use impacts of road schemes for each case study area (10-11 out of a target of 10-20 responses) although again the same respondent could report against multiple case study areas. While the overall number of survey responses (27) should not be considered statistically representative of the sample of freight and logistics operators in each area, the qualitative information emerging from the survey remains relevant to address key Research Questions.

The secondary data analysis included real estate market data from CoStar, floorspace and hereditament numbers from the Valuation Office Agency (in both cases local to the case study areas), and additional Office of National Statistics (ONS) data for contextualisation of wider trends affecting the industry.

Overall, the delivered methodology has resulted in the collection of important findings from field and existing secondary data to address research objectives, although these should not be considered as necessarily representative of the entire sector.

2.5 Interviews

The purpose of the interviews was to gather in-depth insights into the mechanisms driving wider economic impacts which are not possible to obtain through quantitative analysis of secondary or survey data. These were conducted to complement quantitative data and provide insights into the wider economic impacts of road improvements, following the sampling approach outlined in

Section A.4.1.1 of the Methodology Note. The interviews were structured to capture the influence of the wider socio-economic context faced by the freight and logistics industry, elaborate on the respondents' perception of Wider Economic Impacts of road interventions on their organisations, and discuss market dynamics and constraints to capitalise on road improvements. The topic guide used for the interviews is added in Appendix A.2 for reference.

2.5.1 Completed interviews and their characteristics

The evaluation included a total of 14 interviews with stakeholders across the freight and logistics sector. This was a disappointing result despite significant efforts in engaging and contacting over 250 organisations. The engagement plan was to create an initial database of contacts known to team members that operate in at least one of the case study areas, and then supplement this with approaches to four trade associations and three major port groups to assist in widening the contact list. Three of the four trade associations sent out mailings to members and two of the ports groups agreed to assist in finding contacts, but these approaches had limited success. In addition, team members attended Logistics UK regional Members Meetings in the area of the case studies, and this had success in awareness building and helping the survey response but not with companies agreeing to do an interview. Multiple follow-up emails were sent out to an enlarged database asking for an interview.

There were several factors affecting the response rate. The first of these related to the timing of the project, in that the initial wave of interview requests went out in the November/December period which is traditionally the busiest time of the year for many in logistics with the Christmas rush. The second wave in January had a higher response rate. The other notable factor was that the target individual(s) in the company were either a Transport planner who might have information on vehicle schedules or a business development/senior manager who would be knowledgeable about planning site locations. There were a number of declines to take part, based on not holding vehicle scheduling information very long so could not do any before and after timing comparisons, and/or depot location data being commercially sensitive.

Interview respondents were drawn from a range of organisations to capture diverse perspectives on freight operations and wider economic impacts. Large companies are defined as those with over 250 UK employees.

Table 2-2 Completed interviews by respondents group and organisation size

Organisational Group	Smaller Companies	Large Companies	Total
Logistics, Haulage & Freight	2	1	3
Ports & Port Operators		2	2
Construction, Engineering & Infrastructure	2	2	4
Food & Agriculture		3	3
Energy	1		1
Trade Associations		1	1
Total	**5**	**9**	**14**

Table 2-3 below also breaks down the number of interviews by size of the respondent's organisations' fleet. The sample captures different fleet sizes. Notably, some interviewees came from organisations with no fleet to transport goods themselves, but which nonetheless held a deep understanding of the sector due to their role as anchor organisations or customers of the industry.

Table 2-3 Breakdown of interviews by size of respondents' organisations' fleet

Fleet Size	0	1-50	51-100	100+
Number of Companies Interviewed	6	2	2	4

2.5.2 Sampling by freight operating model

The interviews covered the whole range of freight operating models to establish if there are any differences in attitudes across two types of organisations:

- **Manufacturers or retailers that operate a fleet of vehicles themselves** within the organisation are called Own Account operators. They represent about 40% of the road freight market. For example, a bakery company with a logistics and haulage operation it self-provides is 'own account'. In this case the core activity is manufacture and sale of bread products and the transport function is just one part of the whole supply chain.
- The second type of organisations consist of **haulage contractors** operating for hire and reward ranging from owner drivers with one or two vehicles up to well-known hauliers with over 1,000 HGVs. Some of these run as contractors to a larger organisation often operating vehicles in the livery of the organisation that allocates them work. For example, several DIY retailers have hauliers known as third party contractors operating the transport and warehousing function on behalf of the retailer. The vehicles frequently operate in the livery of the retailer.

Three own account operators have been interviewed along with another that has contracted out haulage in recent years. The rest are hauliers ranging from an owner driver with two vehicles to a company with over 1,000. This distribution ensured that insights were obtained from both service providers and users, capturing operational practices, market dynamics, and strategic decision-making in response to improved road infrastructure.

2.5.3 Sampling by case study area

As anticipated above, interviewees responses varied by case study area. In total, 5 responses came from interviewees providing cross-cutting insights either because of their position as anchor institutions (e.g., Associated British Ports, or RHA) or for activities directly involving all case study areas (such as a fleet operator). On top of those, 7 responses were relevant for the A14 case study. For 3 of them, the M62 intervention was also relevant. To conclude, 2 interviewees had experience of other road interventions.

2.6 Survey

2.6.1 Characteristics and distribution

The aim of the survey was to complement the primary evidence source of interviews. In total, it was composed of 21 questions and required an average time for completion of just under 8 minutes.

The survey included questions to understand the characteristics of the responding organisations (type of organisation, dimension, sectors served) and their relationship to each case study area (presence on corridors involved by each case study intervention, daily usage of the corridor). The survey also collected qualitative data around the perception of operational or land-use change impacts of the interventions, the type of changes experienced since completion of the schemes as well as contextual market conditions driving the respondent's decisions and ability to capitalise on the schemes.

The survey has been distributed directly to existing contacts of the consortium delivering this research as well as through Logistics UK to their several thousand members, collecting responses

between January and early February 2026. The survey was also promoted in person by the consortium attending three Logistics UK members quarterly meetings in the North and East of England.

2.6.2 Target and outturn responses

As discussed above, the aim for survey was to collect data from 10 to 20 respondents reporting on operational and land-use impacts of road interventions for each case study area. This target was based on the expected number of outturn responses.

The Methodology Note also outlined how higher response levels would have yielded different levels of representativeness of the local freight industry and confidence levels in the results. For example, a response level of 150 responses was associated to an 80% confidence level.

Despite efforts in engaging with businesses in the industry, the number of survey responses has not achieved a level that can be considered highly representative of the local industry composition. Overall, 27 companies completed the survey. Nonetheless, the ability of some respondents to report on operational and land-use changes across multiple case studies means that the target of 10-20 responses per case study has been achieved.

Out of the 27 respondents, 11 organisations provided a response to the question 7 '*Please select how each transport intervention has impacted your business operations or location of activities/warehouses (please mark an answer for each)'*. The additional 16 responses which did not report any awareness of SCE or LUC Freight WEIs among their organisations still provided helpful insights to understand market dynamics and industry drivers o constraints.

2.6.3 Sample characteristics

Despite the small sample size, the sample covered multiple types of organisations and industries served (including a mix of less and more time-sensitive goods transported), strengthening the diversity and quality of insights for the analysis. Responses by organisation types were grouped as follows:

- 4-5 distinct local authorities (one remained anonymous); one of these also reported on the freight WEIs from the case studies;
- 9 distinct businesses with freight, haulage, and logistics representing a key component of their activities (e.g., major online retailers) when not the main component (e.g., postage operators, deliverers, haulier of animal feed for the food industry); 4 of these reported on the freight WEIs from the case studies; 6 of these reported on the freight WEIs from the case studies.
- 10 distinct businesses active in the sectors of energy, construction, manufacturing, and waste; 6 of these reported on the freight WEIs from the case studies.

Moreover, the survey findings are likely to represent decisions made by organisations overseeing wider transport network changes as opposed to only local ones, considering their bigger focus on national rather than local markets. Considering the original target for interviews that aimed at covering 6-8 organisations servicing a local market, 3-5 a regional one, and 1-3 a national/international market (see Table 2 of Stage 2 Methodology Report), the survey responses from question 7 indicated higher coverage for national markets and less for local ones. In particular, for each case study, one respondent covered local markets, 3 sub-regional to regional markets, and 4 national to international markets.

It is worth noting that the sample does not allow a drawing of conclusions on the different experiences of organisations conditional on their size. This is because of all 27 responses, 22 were from respondents from reportedly organisations of over 250 employees; and 9 out of the 11 respondents reporting on freight WEIs from case studies belonged to this group, with only one having less than 10 employees, and one between 10 to 49.

2.7 Secondary data analysis

To complement the interview and survey evidence, secondary data analysis was undertaken to examine (1) changes in logistics property market activity and (2) changes in logistics-related floorspace in the vicinity of the three case study corridors. The purpose of this analysis was to provide contextual evidence on whether road improvements were associated with observable changes in logistics land use and commercial property market activity.

Two datasets were used:

- **CoStar commercial property market data** to examine trends in logistics property market indicators such as sale prices, asking rents, availability rates, vacancy rates, transaction activity, and development activity; and
- **Valuation Office Agency (VOA),** a non-domestic rating dataset used to analyse changes in logistics-related floorspace and property counts.

2.7.1 VOA

VOA data was used to analyse changes in logistics-related floorspace around the case study corridors. Four publicly available datasets were used (2010, 2017, 2023, and 2026), each providing a snapshot of active hereditaments in the respective year. VOA rating data provide a consistent administrative record of commercial property floorspace over time and allow changes in logistics-related land use to be tracked at a local level. For each case study, a central reference point was defined and all hereditaments within a 15 km radius were captured for analysis. The dataset was filtered using Special Category (SCAT) codes to retain logistics-related property types only.[4] SCAT codes are three-digit classifications used by the Valuation Office Agency to group non-domestic properties by functional use.

Observations were aggregated to calculate total logistics floorspace; counts of properties ('hereditaments'); and average floorspace per hereditament. To provide context, these metrics were compared with observations from a 50 km radius and the relevant regional averages, using the following ONS regional lookup codes: Southeast England (E12000008) for the A13; East of England (E12000006) for the A14; and Yorkshire and the Humber (E12000003) for the M62.

It should be noted that VOA property counts differ from those published in ONS statistics. This is due to differences in data sources and coverage, although both datasets show similar trends over time. Some hereditaments are recorded more than once in a given year due to revaluation updates; in these cases, the most recent record was retained.

Importantly, VOA data are based on business-rates records rather than planning or construction data. As such, they capture changes in occupied logistics floorspace rather than newly built or planned developments, meaning very recent development activity may not yet be fully visible.

2.7.2 CoStar

CoStar commercial property data[5] was used to provide contextual evidence on logistics property market conditions in the vicinity of the case study corridors. These data include indicators such as rental values, transaction activity, and vacancy rates for logistics and warehouse properties.[6]

For each case study corridor, logistics and warehouse properties within a 15 km study area were identified to represent the local logistics property market. Indicators were analysed over defined

[4] In particular, data was aggregated within and across four groups of SCAT codes as follows. Group 1: 096: Factories, Workshops and Warehouses (including Bakeries & Dairies); Group 2 (Warehouse group): 129: High Tech Warehouses; 151: Distribution Warehouses; 301: Wholesale Warehouse; 511: Warehouses Within/ Part of Specialist Property; 235: Retail Warehouses and Food stores; Group 3 (Depots): 267: Storage Depots; 712: Rail Freight Depots; 033: Bulk Cement Storage Depots; and Group 4: 161: Lorry Parks.

[5] Accessed at https://www.costar.co.uk/products/property-records.

[6] The dataset includes quarterly information on industrial and logistics property market indicators such as market sale prices (£ per m²), asking rents (£ per m²), sales transaction volumes, availability rates, vacancy rates, and floorspace under construction.

pre- and post-scheme periods based on scheme completion dates, with local trends compared against regional averages to provide context on wider commercial property market dynamics. The CoStar analysis complements the VOA floorspace analysis by providing insight into market conditions affecting logistics development and investment decisions, including price signals, supply availability, and development activity

Further details on the steps of the CoStar data analysis are shown in Appendix A.3.

3. Stage 2 findings

3.1 Introduction to case study interventions

The case studies were selected based on a mix of factors, such as the availability of POPE data; heterogeneity of travel time impacts and the heterogeneity of completion times. Information about the case studies was collected from POPE reports as well as via desk research and engagement of freight experts from the consortium. More information on case study selection is available in the Methodology Note.

The three case study areas selected all belong to nationally significant strategic corridors within the Strategic Road Network, serving both long-distance and regional movements:

- The A13/M25 (Thames Gateway) is a key London orbital corridor, also connecting traffic across the Thames;
- The A14 (Huntingdon–Cambridge) is a primary route connecting the Port of Felixstowe with the Midlands;
- The M62 J25–30 is a major Trans-Pennine route linking major northern cities.

Each corridor is characterised by high traffic volumes, a strong freight presence, and critical economic functions, as evidenced in their respective POPE reports. All schemes aimed at facilitating labour market access and regional connectivity, while the A14 and A13 schemes also aimed at enabling housing and business development.

The main objectives were to relieve severe congestion via road widening for the A13, improve reliability and divert traffic from an urban centre and some poorly configured junction via an upgraded expressway for the A14, and improve travel conditions via smart infrastructure for the M62. The cost of schemes ranged between £0.08-1.5bn.

Details about each case study area and the impact of the related interventions is provided below. It should be noted that in most cases, demand or travel time savings specific for the freight and logistics sector (e.g., for HGV) were not available. HGVs may travel at different times of the day compared to the 'average' road user and as such, the reported average road user impacts may not be representative of those experienced by the freight and logistics users.

A13 Corridor Relieving Congestion Scheme

The intervention was completed in March 2017, delivering:

- widening on the A13 in both directions between junction 30 and the A126;
- improvements to the junction 30 slip roads;
- additional lane capacity and traffic signals upgrade, and
- an introduction of dedicated left-turn lanes.

The M25 and the A13 are important routes within the SRN and junction 30 forms a key intersection between these routes. The new junction work is shown in the figure below, drawn from the Post-Opening Project Evaluation (POPE) report[7].

The scheme had a total cost of £83 million. The aim of the scheme was to tackle longstanding congestion and unreliable journey times at one of the key intersections in the Thames Gateway – a major regeneration area. Its overall purpose was to increase capacity, improve journey time

[7] The full report is available here: https://nationalhighways.co.uk/media/j0fn5wle/m25-j30_a13-corridor-enhancement-five-year-post-opening-evaluation.pdf

reliability, and support future economic and housing growth by removing a major transport constraint.

The M25 and A13 are key transport corridors that play a crucial role in supporting economic activity at regional, subregional, and local levels. The M25, functioning as London's strategic orbital route, is especially significant – carrying freight, commuter, and tourist traffic and forming part of the international E30 European route. The A13, on the other hand, linking Central London with the Thames Gateway and South Essex, serves as a critical east–west arterial corridor – carrying substantial freight, commuter, and local traffic while supporting major industrial hubs such as Tilbury and London Gateway Port. Together, they serve a wide range of commercial operations and communities across Thurrock, South Essex, and neighbouring areas, including major destinations such as the Port of Tilbury and Lakeside Shopping Centre, carrying flows from the UK's biggest container port to the Midlands and North. Logistics companies such as DP World, Thames Group, Warton Freight Services and XPO logistics operate in this area, which is geographically important for logistics and freight services.

Junction 30 of the M25 – known as the Mar Dyke Interchange – lies less than a mile east of the town of Aveley in the Unitary Authority of Thurrock. Positioned on the eastern side of the M25 near the boundary with east London and just over two miles north of the River Thames, it operates as a three-level stacked roundabout. Historically, it has been a busy and strategically important intersection, linking the M25 motorway with the A13, a major trunk road and key route into London. It is one of the UK's most logistics-intensive regions, dominated by warehouse and distribution centre handling containerised freight, agricultural produce, and international import/export flows.

According to the scheme's POPE, the scheme has largely achieved its objectives, access to the ports of Tilbury and London Gateway has improved, reducing journey time and increasing reliability. The scheme has also supported traffic growth above national/regional trends and delivered noticeable efficiency gains. On safety, the scheme has successfully reduced the number, rate and severity of personal injury collisions on the project extent and wider safety area.

The main impacts identified in the evaluation are shown in the table overleaf.

Figure 3-1 M25 junction 30

Source: National Highways and Open Streetmap.

Table 3-1: POPE Report impacts identified for the M25 junction 30/A13 Corridor Relieving Congestion Scheme

Impacts	Commentary
Travel time	• The journey times on the movements provided with a new dedicated left turn were around 28 to 51 seconds faster. On the M25 mainline through junction 30, journey time savings of over 2 and a half minutes were observed in the morning and evening peak periods.
General travel demand	• Traffic growth of 10% on the slip road to the north of the junction, slightly higher than the average growth around the east of England region. • Traffic growth of -10% on this road to south of the junction
HGV flows	• N/A. The report does not mention any impact on HGV
Reliability	• Journey time reliability had improved in all time periods on the A13 west to M25 north in comparison to the before and the one year after period. • There were only slight changes in the journey time variability on the M25 north to A13 east in the morning and interpeak periods • The five years after journey times were only slightly variable in comparison to the one year after period but were better than those observed during the before period.

A14 Huntingdon and Cambridge Bypass

This large intervention was completed in 2020 and allowed re-routing of through traffic from the A1307 and the old A14 around Huntingdon. This affected a major strategic road link connecting to Felixstowe, the largest container port by volume in the UK and represents a major international gateway. The new bypass is shown in the figure below, drawn from the Post-Opening Project Evaluation (POPE) report[8].

The scheme had a total cost of £1.5 billion. The aim of the scheme was to improve journey time reliability and contribute towards the region's local economy, addressing issues related to congestion, safety and capacity and reducing through traffic in Huntingdon. The scheme has largely achieved its objectives. It significantly reduced congestion and improved journey reliability by diverting traffic onto a new bypass, enhanced road safety with a marked drop in personal injury collision rates and supported local economic growth by unlocking new housing and business opportunities. The project also improved local connectivity and delivered social and environmental benefits.

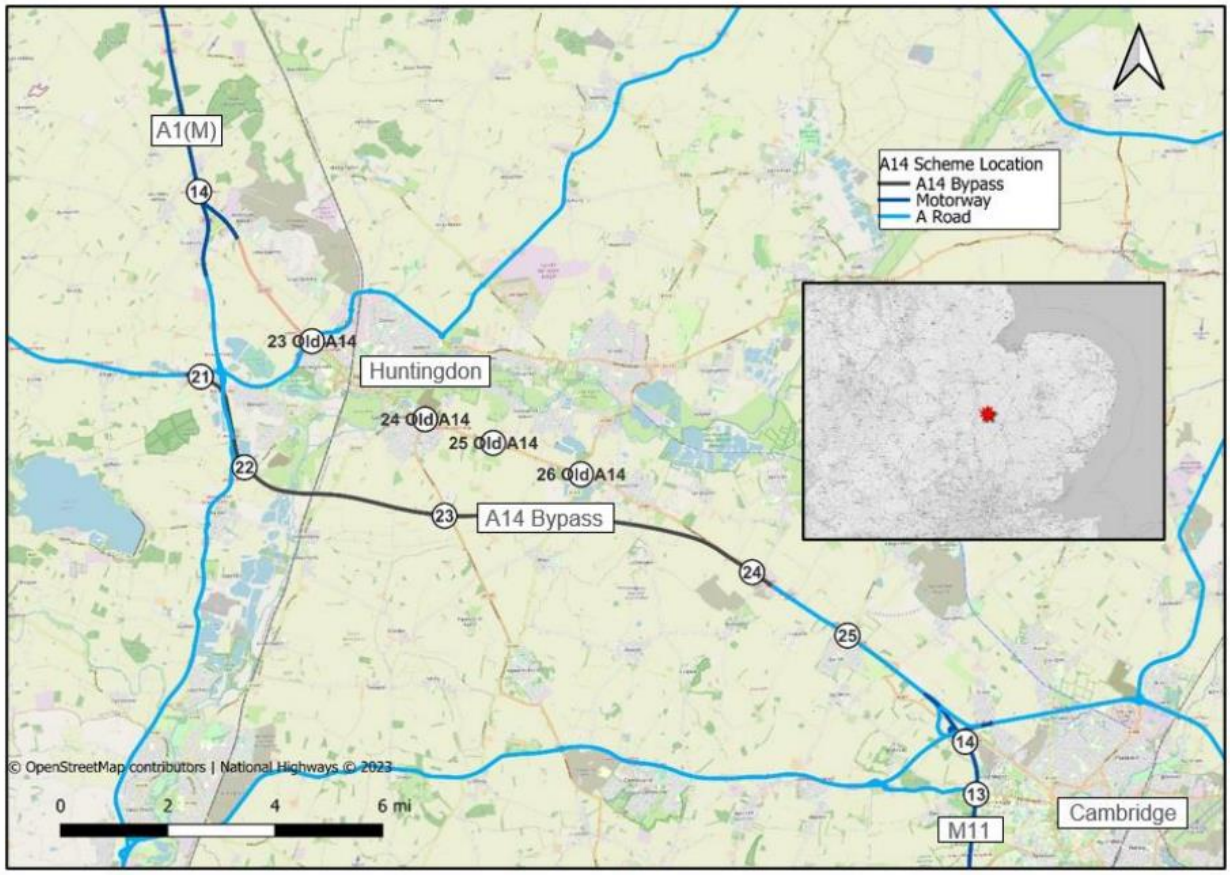
The A14 is a key transportation link connecting major cities, towns, and regions in the UK, crucial in facilitating trade and logistics, connecting the Port of Felixstowe, the largest container port by volume in the UK and represents a major international gateway. A14 handles around 5,000 HGV movements per day from Felixstowe alone, hosting a mix of agriculture and food-processing industries (including British Sugar, Hovis, Heygates and ForFarmers), a large logistics and haulage ecosystem (such as Maritime Transport, Goldstar, Stennetts, Bacton Logistics and Port Express). Together, these sectors move a wide range of goods along the A14 – containerised imports/exports, agricultural products, animal feed, sugar, flour, FMCG/retail goods, and construction materials. This bypass serves as a vital link between Huntingdon and Cambridge, carrying a substantial volume of both commuter and long-distance traffic, and a high proportion of

[8] Full report is available here: https://nationalhighways.co.uk/media/1tyov5fw/a14-cambridge-to-huntingdon-1-year-post-opening-project-evaluation.pdf

heavy goods vehicles (HGVs). It also provides a crucial strategic connection between the A1 and M11 motorways

The main impacts identified in the evaluation are shown in the table overleaf.

Figure 3-2 A14 bypass



Source: © OpenStreetMap contributors | National Highways © 2023

Table 3-2: POPE Report impacts identified for the A14 Huntingdon and Cambridge bypass scheme

Impacts	Commentary
Travel time	• 9-10 minutes decrease in journey time in the peaks using the new A14 bypass
General travel demand	• 68% reduction in traffic flow on the A1307 east of Alconbury and 76% reduction on A1307 Huntingdon due to rerouting • 109% increase in traffic flow on the A1 South of Alconbury and 21% increase on the A14 at Ellington (net increase in traffic)
HGV flows	• 84% reduction of A1307 volumes east of Alconbury and a 98% reduction through Huntingdon. • HGV flows at about only 300 vehicles a day on the A1307 through Huntingdon, compared to 18,200 in 2016, and 21,300 (between Junctions 22 and 25) on the A14 bypass in 2022. • HGVs decreased from 25% of traffic on the A14 in 2016 to 2% in 2016 (on the A1307) and constituted 29% of traffic on the new A14 (Junctions 22-23) in 2022
Reliability	• 90% of residents rated the reliability of their journey times as good, with three quarters stating that reliability had improved with the scheme in place;

	• 87% of through-traffic rated reliability as good, with the same proportion stating that reliability had improved with the scheme in place

Beyond the POPE findings, it should be noted that case-study findings were also provided as part of wider research from DfT[9], involving several interventions, with the A14 being one of them. The research included interviews with local businesses that reported improved supply and delivery chains among other impacts. However, some businesses cited increased congestion on local roads connecting to the A14.

3.1.1 M62 J25 – 30 Smart Motorway

The intervention was completed in 2013 and provided additional capacity through introducing controlled motorway elements including, the use of dynamic hard shoulder running (DHSR), permanent hard shoulder running and ramp metering. The upgrading of 15.3 miles (24.5km) of motorway to provide up to 4 lanes in each direction required a number of different features This affected a major strategic road providing the Trans Pennine east-west route across the north of England, connecting Merseyside, Lancashire and Manchester to Yorkshire and the Humber. It also provides a more local role, connecting the conurbations of Bradford and Leeds. The new smart motorway scheme is shown in the figure below, drawn from the Post-Opening Project Evaluation (POPE) report[10].

The scheme had a total cost of £95.9 million. The objectives of the scheme were to increase motorway capacity by making the best possible use of existing infrastructure, while also improving safety by reducing both the number and severity of accidents per vehicle-kilometre. The scheme also aimed to minimise any negative effects on surrounding roads, enhance journey time reliability – particularly by reducing delays in the worst 10% of journeys – and improve overall journey times. In addition, it sought to mitigate environmental impacts where feasible through appropriate measures, and to provide drivers with better, more accurate information about traffic conditions on the motorway.

The scheme has largely achieved its objectives. Traffic on the busiest section has grown but remains slightly below forecast, helping keep congestion lower than expected. Smart Motorway features have improved peak-period journey times and reliability. Safety has improved significantly, with large reductions in collisions and collision rates, while environmental impacts are broadly as expected, with smaller-than-forecast increases in noise and carbon.

The M62 is a vital east–west transport artery linking major northern cities such as Liverpool, Manchester, Leeds, Bradford and Hull, serving simultaneously as a heavily used commuter route and one of the UK's most important freight corridors. It carries consistently high daily traffic volumes, with an average of 140,000 vehicles carried per day across the scheme section, reflecting intense demand and persistent congestion, especially between Manchester and West Yorkshire.

The motorway supports a diverse industrial mix including retail, e-commerce, food distribution, manufacturing, parcel logistics and construction materials, with freight studies identifying major operators such as Eddie Stobart, DSV/DFDS, Yodel, Morrisons, Marks & Spencer, Surefreight, DHL, Ewals, Hanson, Maritime and Muller as frequent users. Combined, these patterns confirm the M62's central economic role, facilitating efficient movement of consumer goods, perishables, retail stock, parcels, aggregates, and industrial freight across the North. Ongoing roadworks such as the westbound resurfacing, the Lofthouse interchange bridge works and lighting upgrade along the junctions of the case study area demonstrate the government's ongoing commitment to enhancing the travel experience for those who rely on the M62.

[9] DfT EPIRE study

[10] The full report is available here: https://assets.publishing.service.gov.uk/media/5a74dbf140f0b65c0e8450dc/POPE___M62_J25-30_SM_OYA_Final_Report.pdf

The main impacts identified in the evaluation are shown in the table overleaf.

Figure 3-3 M62 bypass

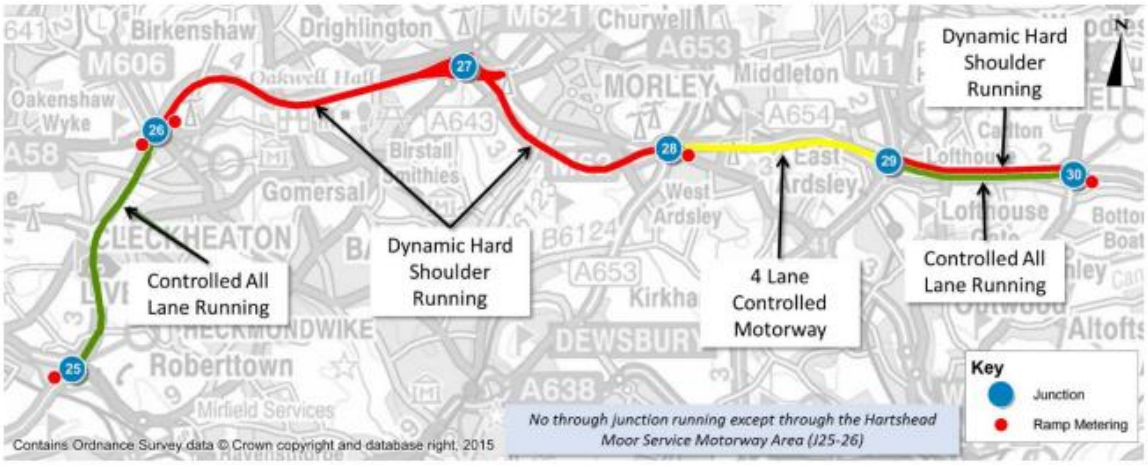


Table 3-3: POPE Report impacts identified for the M62 J25-30 Smart Motorway scheme

Impacts	Commentary
Travel time	• Most of the differences to the journey times are relatively small, but over the full length of the scheme can total changes of over a minute. • Journey time down by almost 5 minutes in the PM Peak for westbound journey • Eastbound journey times shows over a minute's time saving in the AM Peak
General travel demand	• Post opening, the weekday flows are between 0% and 7% higher compared with that observed before construction (2011) which is in line with the background level of traffic growth. • J26 – 27 remains the busiest section of the M62 in this region, with a two-way AWT of nearly 155,000 vehicles per day
HGV flows	• HGV traffic on the M62 (J25–30) increased across all sections after opening, with heavy good vehicles rising by up to 5.5 percentage points (e.g., from 14.8% to 20.3% at J26–27) and generally growing faster than overall traffic. • The proportion of HGVs has increased on the M62 throughout the scheme. As total traffic flows have increased on this section, showing that the growth in HGV numbers has been greater than for light vehicles.
Reliability	• AM Peak eastbound and PM Peak westbound show large reduction in mean journey times and improvements in reliability • The inter-quartile range has reduced on weekdays in all time periods and both directions indicating an improvement to reliability for journeys during these periods. • Delays are reduced for the worst 10% of journeys in both of the peak periods in both directions. • The greatest net improvement is over 7 minutes observed in the PM peak westbound.

3.2 Key findings by data source

This section covers the key findings by theme separately emerging from each data source. The findings from each source have been triangulated in the following section to derive responses to the Research Questions.

3.2.1 Interviews

Analysis of the interviews revealed several recurring themes relating to the wider economic impacts of road investments on the freight sector, as discussed below. Although this analysis is based on a small sample it does include the range of small to large companies. Note the section also touches on direct economic impacts such as travel time benefits but focusing on how these then lead to wider operational or land use benefits.

3.2.1.1 Operational efficiency and cost reduction

Some respondents highlighted improvements in operational efficiency resulting from better road connectivity. By reducing travel times and time variability, road upgrades enabled firms to optimise delivery schedules and improve vehicle utilisation. Some logistics operators and an engineering company noted that improved reliability allowed them **to reduce safety stock, lowering warehousing costs and freeing capital for other investments**. For example, the engineering company was able to reduce the inventory of various product lines in its regional distribution centre due to having a more reliable overnight replenishment service. A bakery reduced its product wastage by having a more reliable overnight trunking operation. Bread that missed the connection into the local delivery network at Regional Distribution Centres would miss its sales window and end up being downgraded to pig food. These operational benefits were generally observed in areas with direct access to upgraded routes, suggesting that proximity to interventions is a key factor in realising efficiency gains.

3.2.1.2 Business location and land-use decisions

Overall, there is evidence from the interviews to suggest that land use and business location decisions are driven to some extent by road improvements. However, the importance of road improvements compared to other factors varies by firm and is sector specific.

Several respondents discussed how improved transport links influenced decisions on warehouse and depot locations. While some firms reported historic consolidation of sites, contractual constraints and long-term leases limited the pace of change. Nonetheless, improved accessibility supported gradual relocation or expansion in strategic areas. However, **smaller companies reported that road infrastructure changes are unlikely to prompt a change in depot location**. Proximity to raw materials for example a food producer based near the agricultural growing area of the crop mentioned that was more important than road infrastructure itself. Similarly, a construction company supplying cement products said finding a suitable location in close proximity to its customer base was a more important factor than road improvements. However, three companies said how vital the road network is to their whole operation and these comments were from very road reliant sectors, agriculture, food and construction. Two of these companies have gone through a rationalisation process in the last 15 years to reduce the number of factory sites. In both cases the remaining manufacturing units are well located on the Strategic Road Network including the A14.

Trade bodies emphasised that land-use impacts tend to be sector-specific, with high-volume distribution and perishable goods more likely to benefit from consolidation and proximity to key routes. It should be noted that some parts of the freight sector, those that perhaps only need an operating yard with a small office, find it easier and less expensive to relocate than a different part of the business that is associated with a manufacturing site or intensive warehouse operation. In the latter cases relocation is expensive and can take years going through the process from business case to planning, design, build and eventually opening the new facility. Examples of organisations that tend to choose sites near major intersections of

the Strategic Road Network are in the pallet and parcel networks. They use a “hub and spoke” pattern to their supply chain with the central hub often located in the West Midlands. The pallet network interviewed has gone through a process of selecting its new West Midlands location to maximise national distribution efficiency and connectivity. As an example, some companies do not change their locations because of long-term lease commitments. This national hub is scheduled to open in 2027, and this long-term investment reflects confidence in the current strategic location rather than flexibility to relocate in response to incremental infrastructure changes. The quantity of warehousing for these companies is relatively small as the regional operation is one of transit sheds where goods come in and go out in just a small number of hours. Time is of the essence to these companies and hence road improvements matter a lot.

Firms located within case study areas generally observed faster and more pronounced impacts, while those in cross-cutting or peripheral areas experienced more modest or delayed effects. An example of that, in the A14 area, there was a local council that started to look to rationalise its depot structure and maintenance facilities partly prompted by improvements in journey times. Trade bodies emphasised that **regional infrastructure connectivity**, rather than local improvements alone, shapes the extent of wider economic impacts across supply chains. This might suggest that the scale of the road improvement and the package of wider road investments in an area might play a more important role in driving land use decisions than localised road improvements. This does not preclude local interventions from having a regional reach – in the sense that they can affect the freight and logistics operations beyond a local surrounding. The A13, A14 and M62 serve multiple roles starting from being key national freight arteries but also are important regional connector roads with local importance too.

Road improvements have benefitted all three levels of traffic. The maximum benefit of a specific road improvement is likely to be to freight operators near or on the improved section of route where a large proportion of the fleet use the road daily. The general haulier based in the Cambridge area said, the extent to which the logistics industry is affected by road changes depends on the structure and timing of routes. Where a company uses a particular road corridor, such as the A14, repeatedly and intensively, time savings or delays can have a much more pronounced operational impact. Hence the improvement of the A14 has been welcome to us.

An example of the influence of concurring interventions on the lack of land-use change was provided by an interviewee benefiting from upgrades near Thetford A11 – which shared some of the same route in the Newmarket area with the A14 scheme. One of the interviewee companies was originally looking to relocate their East Anglia distribution centre from Thetford to Bury St Edmunds due to the latter being on the better A14 dual carriageway whereas parts of the A11 to Thetford were still unreliable single carriageway. However, in 2014, improvements including a full dualling scheme of the A11 in the Thetford area removed previous constraints and supported continuing delivery operations out of Thetford.

“The road improvement was a significant factor in the company decision not to relocate.” – Anonymous

3.2.1.3 Market competitiveness and firm strategy

Interviews indicated that enhanced connectivity allowed some firms to access new markets and expand service catchment areas. **Smaller operators highlighted that entry into longer-distance routes became viable where travel time and reliability improved such as improvements on the A14**. For example, a small general haulier based in East Anglia that wants to complete a round trip in a driver’s daily duty cycle said:

”The A14 is now a pleasure to drive as the improvement scheme has taken out a lot of the complicated junctions and areas where delays happened in the past. It is now a smooth transition from Cambridge to the Midlands.” They agreed to take on work to destinations further north, including the Manchester area, due to this better reliability on the A14. This is evidence of market expansion.

Respondents also noted that competitive pressures influence the extent to which firms capitalise on road improvements. Specifically, firms with flexible operational models and investment capacity were better positioned to exploit the benefits, whereas others faced structural or financial constraints:

"Using a computer-based system gave greater visibility and we were able to reduce empty running and improve efficiency. In some depots the fleet size was reduced slightly due to the use of technology in vehicle scheduling. The increasing sophistication in scheduling and routing packages along with live tracking of vehicles with the option to reroute gives operational savings." – Agriculture Company

"Relocating to areas with better road access is often prohibitively expensive for smaller businesses. While larger companies may choose locations with stronger access to the strategic road network, they do not represent the majority of the industry.' – Manufacturer with an Own Account Operation

It should be noted however that companies interviewed highlighted the tight margins they operate with. Specifically, a trade body representing hauliers quoted a 1.7% average margin.

The implication of the above is that locations with better road accessibility are in higher demand and have high value for businesses. If more of that land could be made available, this would help lower transport costs for those businesses. It could be argued that there is market imperfection in the land market that transport infrastructure can help address by making more land accessible. An example of land values is the relative comparison of the cost per square feet of warehousing in Liverpool versus the Warrington area. The latter is typically 50 pence per square feet more expensive due to its better location on the Strategic Road Network.

"only have one small operating centre near where we live so no road improvements will change our depot location." – Small Operator

The reason for this comment is that the yard where the two vehicles are kept is close to the location where the drivers live and is visible from the main owner's house. This helps with security and avoids a formal journey to work as it is just a walk across the site, thus avoiding need for a car. This is typical of many small operators.

3.2.1.4 Perceived timeline of benefits

Respondents consistently observed that direct operational benefits, such as reduced travel time and improved reliability, were realised first, and **only sometimes this was followed by more strategic changes, including fleet rationalisation and/or market expansion**.

The general haulier based near Cambridge said,

"*Once the improved section of the A14 was open, the transport operation benefitted from week one and the most noticeable effect was that drivers arrived back into the yard slightly earlier in the day with fewer evening peak delays."*

Longer-term wider economic effects, including employment shifts or productivity gains, were viewed as emerging over time, reflecting the lag between operational adaptation and measurable sector-level impacts.

The same haulier as above said that once the enhanced reliability became a regular occurrence:

"This has enabled us to plan additional drops on certain runs meaning additional productivity. Overall it has helped improve efficiency but not to the extent of changing the fleet size."

There is a difference in timelines depending on whether transport is the core business or whether it is a service function to another part of the company. For example, a manufacturer where the vehicles are based at the production unit and may form part of the short-term stock holding process, i.e. part of the wider business, is less likely to relocate for just transport reasons. An animal feed producer and a food processor both manufacture on a 24-hour basis. In order to have

enough silo and warehousing capacity they load part of the night shift production on to vehicles that are parked overnight in the yard. This frees up space for additional production. If the vehicles were not based there, they would need extra silo space and apart from the cost of this, there is not physical space to accommodate this extra capacity. Hence the transport fleet is being used as part of the production process.

Large operators with established networks tend to experience broader operational benefits but face longer timelines for strategic adaptation. Margins in transport tend to be low, circa 5% but according to the RHA,
"*average profit margins are down to 1.7%. Low margins leave operators vulnerable to external pressures. This means making a business case to directors and shareholders and attracting funding from banks or other lenders has been very difficult recently. The number of transport companies entering administration is currently running at 400–500 haulage businesses each year, driven largely by rising operating costs and persistent congestion on the road network."*

This shows that for many just staying in business is a priority. Smaller firms could benefit from new market access but often require additional investment or logistical support to capitalise fully. The type of goods transported influenced the magnitude and timing of benefits, with perishable or time-sensitive products benefiting more quickly from improvements in reliability. The parcel and pallet networks are very competitive with around ten major players in each sector. Poor customer service with missed deliveries results in losing business to the competition.

1. Immediate operational impacts

Direct benefits, such as reduced travel times, improved journey reliability, and lower transport costs, were observed shortly after interventions were completed. A construction company benefitted from the enhanced reliability on the M62 particularly in the peaks and this increased productivity of the vehicles using that route. This resulted in vehicles doing more loads per week and hence earning more revenue (20% on one vehicle). As already mentioned, the haulier based near Cambridge was able to increase the number of drops on certain loads, thus improving productivity. He noted that,

"firms can adjust routing, schedules, and delivery frequencies almost immediately. These short-term operational improvements are most apparent for firms located close to the upgraded routes or hubs, while those further away experience more limited effects.".

2. Medium-term operational and strategic impacts

Respondents in the engineering and food sectors indicated that medium-term benefits emerge as firms adapt their internal processes. Examples included rationalisation of vehicle fleets, optimisation of load factors, and reductions in safety stock. These changes were typically realised over months to a few years, reflecting the time needed for operational adjustments and capital investment cycles. Firms with flexible supply chain structures were able to implement these changes more quickly. So, companies that have their own transport are potentially able to make strategic changes quicker as they are not tied into contractual arrangements with third party contractors. On the other hand, third party contractors that work for many customers may find it easier to redeploy resources across other work if one customer experiences a downturn. One of the food producers moved from having its own vehicles to sub-contracting it out due to the contractor offering enhanced flexibility and resource at different times of the year. This resulted in lower costs overall.

3. Long-term land-use and sectoral impacts

Longer-term impacts related to land-use and industry sector changes were reported to unfold over several years. An agricultural company and a food company provided examples of depot rationalisation. These firms gradually consolidated manufacturing and warehouse operations into a much smaller number of larger premises in order to benefit from economies of scale. This has allowed them to expand into new markets, such as pet food and energy production leading to shifts in the spatial distribution of freight activity. The delivery catchment area out of the smaller number of sites has grown. Improvements to the strategic road network over the years and improvements

to the vehicles themselves has helped facilitate this. The following is a quote from a food company that moved from being a regional company in the north of England to now being a national brand,

"*Land use and site location decisions are determined by the following four factors: Cost; Availability of suitable land; Transport connectivity; and Proximity to customers.*"

Respondents also suggested that employment and productivity effects are slower to materialise, influenced by both operational efficiency gains and wider market responses. High-volume sectors and perishable goods operations were cited as more sensitive to these long-term changes. Quote from a food company

"*Road transport is essential due to the short product lifecycle of bakery products. Supply chain speed is a critical determinant of operational performance, deliveries tend to go directly to customer sites due to short shelf life."*

Another example of perishable goods is in the fresh cut flower market which has a lot of suppliers based in the Netherlands. Many of the flower companies send directly on Dutch registered vehicles to UK high street flower shops to ensure the freshness of product.

3.2.1.5 Cross-cutting sectoral impacts

Interviews highlighted themes that extended across case study areas. Improved resilience of freight operations was cited, particularly in regions prone to congestion or disruption. The M62 East-West corridor had a poor reputation for journey time reliability but various schemes including the one in the case study have helped improve the situation. **Trade bodies noted that better connectivity indirectly supported efficiency in supply chains for perishable goods, reducing spoilage costs**. Several respondents emphasised that these benefits are not uniformly distributed and **depend on firm size, sector, and existing infrastructure networks**.

3.2.1.6 Sector-specific sensitivities

Certain sectors, such as food distribution, high-value manufacturing and construction, reported specific advantages of better reliability. For example, food hauliers indicated that reduced spoilage and wastage were tangible outcomes of improved journey reliability. An example was given of a load of freshly baked bread missing the connection to customer delivery vehicles at the regional distribution centre meaning the whole load missed its sales window and had to be downgraded to waste:

"The really big issue is that if a primary distribution lorry is delayed in arriving at one of the regional distribution sites, the speciality types of bread made in other parts of the country will miss the local delivery rounds that start to go out from 4am. Just one load missing its connection could result in £10,000–£20,000 in consequential losses as due to the need for freshness of the product and daily deliveries, if the bread is not delivered it has to be downgraded and go as "pig food." Prior to the A14 improvements near Cambridge this did happen on occasions. The delivery round vehicles based at Thetford, Norfolk, cannot wait long for a trunking vehicle to arrive as the locally made bread will also miss the critical sales window at customer stores. The A14 is used by the primary distribution vehicles from bakeries in the Midlands to the regional distribution centre in Norfolk. All the shops and restaurants that receive the fresh bread products across East Anglia are dependent on trunking vehicles meeting the delivery round vehicles early in the morning."

Similarly, manufacturers **transporting high-value components reported greater confidence in meeting just-in-time production schedules and customer fulfilment**. Respondents in the aerospace sector and the fire extinguisher market mentioned the importance of receiving parts for their production sites. Failure to receive parts may result in downtime in manufacturer. Also, a construction company gave an example of better reliability on the M62 leading to three extra loads in a week for a vehicle and this equated to 20% more earnings. The lorry in question operated from Monday to Saturday morning doing multiple local loads along the improved section of the M62. The savings in time made during the morning and evening peaks were enough cumulatively to do an extra half load a day which equates to 3 loads a week.

3.2.1.7 Lessons and considerations from the interviews

While the interviews reinforced many anticipated benefits, respondents also highlighted constraints and context-specific factors. Contractual limitations, land availability, and local planning policies were commonly cited as barriers to fully realising operational and land-use changes. An example was given by a food company that previously did not deliver south of London but used a gravity model to select their theoretical preferred location of Crawley for a depot to serve Sussex and Hampshire, but decisions were overridden by practical considerations such as land availability and network impacts and they relocated to Bognor Regis, 40 miles away from the original choice. It turned out that has Bognor Regis has proved to be a good location for reliability and it was considerably cheaper to locate there than Crawley which is near the expensive Gatwick Airport catchment area. This type of insight emphasises the importance of considering both physical infrastructure improvements and the organisational context when assessing wider economic impacts.

Two examples of land-use changes and depot rationalisation were given during the interviews, one in agriculture going from 18 to 12 factories. The factories are now located on the SRN in each English region and one in Scotland and one in Wales. The other example was in the food sector going from 12 to four production sites which are located on the SRN, two on the A1, one on the A14 and one on the A47. Although a road improvement was not the most important factor in either decision, the fact that both companies now have all their remaining sites with good access on to the strategic road network is no coincidence. Interestingly, both companies have production facilities on the A14 but of course this was partly why they were chosen as interviewees.

3.2.2 Surveys

The characteristics of the sample responding to the survey have been discussed in section 2.6 Additional information from responses covered the following themes:

1. Market dynamics and competitiveness;
2. Respondents' perception of WEIs from road schemes and their characteristics;
3. Reported operational and land-use changes, market outcomes, and enablers.

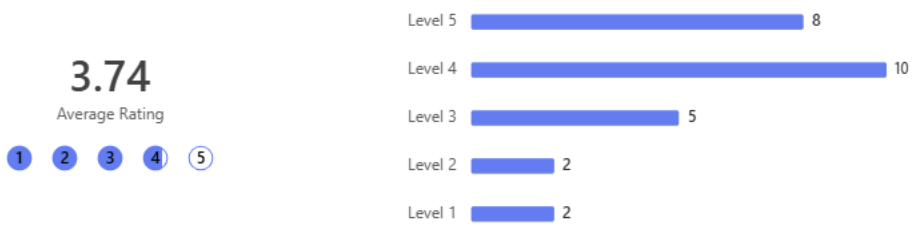
As mentioned above, the representativeness of findings should be interpreted carefully considering the small number of responses.

3.2.2.1 Market dynamics and competitiveness

Respondents faced different levels of competitiveness, yet responses were skewed towards higher rather than lower competitiveness.

Respondents were asked to rate their perceived level of competitiveness in their main market segment, as shown in Figure 3-4. Across 27 responses, the average rating (with a rating of one being the lowest and 5 the highest level of competitiveness) was 3.74. A total of 18 out of 27 responses provided a rating above 3, 5 responses a rating of 3, and 4 responses a rating below 3.

Figure 3-4 Survey responses to Q.16 'In your view, how competitive is your main market segment?' (n=27)

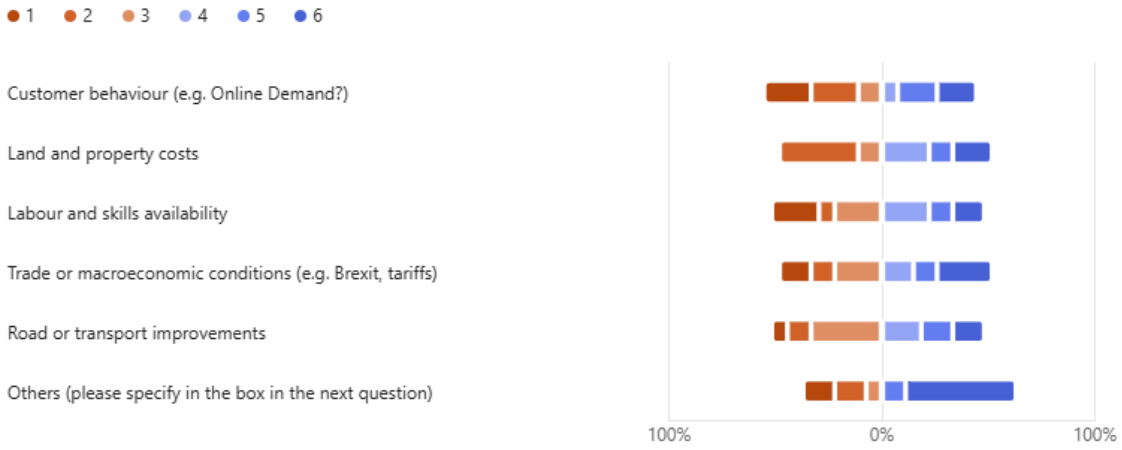


Moreover, **road improvements are relevant in the decision-making process of responding organisations, however they can hold intermediate to low relevance to that process compared to other factors.**

Respondents were asked to **rank 5 factors** (plus one 'other' category) **by order of influence on their past operational or location decisions**, with 1st position representing the most important factor and 6th the least – as shown in Figure 3-5. The results showed that:

- Across all responses, **customer behaviour was cited the most as 1st or 2nd factor**, with (12 responses, 6 for each rank position).
- Land and property costs were most consistently cited as 2nd most important factor (10 responses).
- Labour and skills availability was cited as 1st or 3rd most important factor by 6 respondents in each case.
- Road and transport improvements most frequently figured as 3rd most important factors (9 responses).
- Trade or macroeconomic conditions also received 6 responses for 3rd most important factor but figured as the least important of the factors in 7 cases, the highest number of responses for this rank position across all but 'other factors'.

Figure 3-5 Survey responses to Q.19 'Over the past five years, which of the following factors have influenced your operational or location decisions the most. Please rank them accordingly (1 = Most Important; 6 = Least Important)' (n=27); share of responses per rank position of each factor.



Among the specified 'other factors' that influenced respondents' past operational or location decisions, it was hard to detect recurring patterns, with 2 responses reporting the location of raw materials as relevant; 2 reported 'Customer base' or 'Location to costumers' as relevant.

One respondent provided a detailed answer:

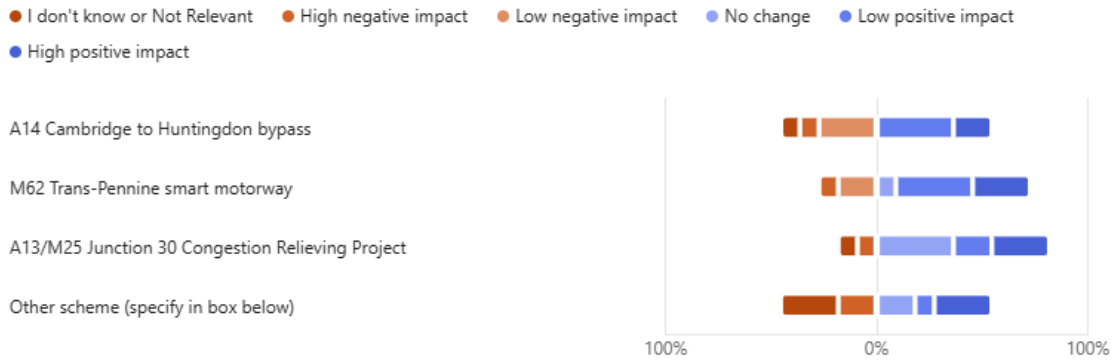
'*Our operational and location decisions have been influenced by a combination of commercial, market, and regulatory factors. Key considerations include customer proximity and service requirements, availability and cost of suitable warehouse and industrial land, labour availability, and overall operating costs. In addition, contractual obligations, long-term strategic planning, fuel and energy costs, and supply chain reliability have played an important role. Regulatory requirements, planning permissions, and local zoning policies have also affected location-related decisions. Overall, these factors have had a greater influence on our operational and location choices than transport infrastructure improvements alone.*'

3.2.2.2 Respondents' perception of WEIs from road schemes and their characteristics

Evidence from the survey suggests that the extent of operational or land-use change WEIs resulting from a road intervention might increase with the frequency of usage of the corridor. It also suggests that freight and logistics operators might be more likely to experience positive benefits from the interventions compared with manufacturers. However, this is based on a small sample, as discussed in more detail below.

Eleven respondents were able to report on the impact of the case study interventions (or other interventions) on their business operations or location of activities/warehouses, as shown in Figure 3-6.

Figure 3-6 Survey responses to Q.7 ' Please select how each transport intervention has impacted your business operations or location of activities/warehouses (please mark an answer for each)' (n=11 for each study area); share of responses per magnitude of impact of each scheme.



'Low positive' or 'High positive' impacts were reported respectively by 6, 7, and 5 respondents for the A14, M62, and A13 interventions, out of 11 responses for each.

On the other hand, '**Low negative' or 'High negative' impacts were reported respectively by 4, 2, and one respondent** for the A14, M62, and A13.

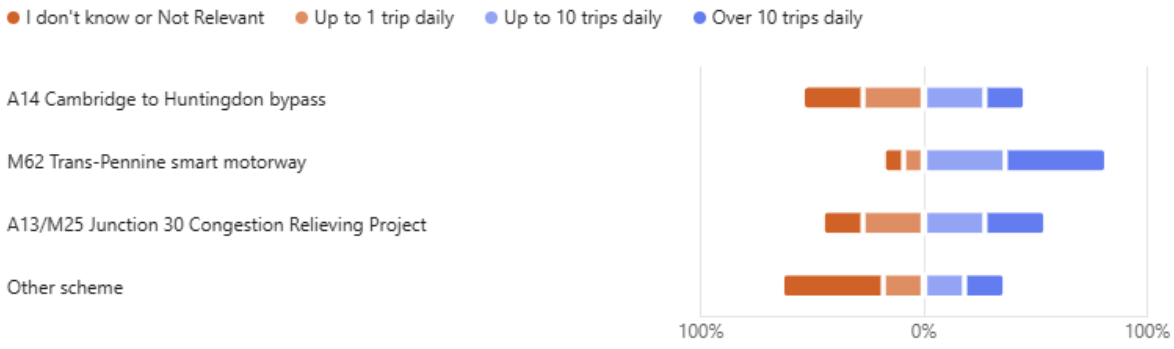
'No change' was selected by one respondent for the M62 and 4 respondents for the A13.

Regarding the other schemes, two respondents reported 'High negative' impacts for A66 road improvements and M74 Glasgow southern extension, and 'High positive' for the A19 improvements and the lifting of the road bridge toll. Moreover, one respondent provided a more elaborated answer:

'*We have also been affected by other road infrastructure improvements beyond the three schemes listed above. These interventions mainly involved upgrades to key freight corridors, including road widening, junction improvements, and traffic management enhancements. As a result, we have observed moderate operational impacts, particularly in terms of improved journey time reliability, reduced congestion during peak hours, and better predictability of delivery schedules.* ***These changes have supported more efficient route planning and have had a positive influence on fleet utilisation****. While these interventions* ***did not lead to a full relocation of our facilities, they contributed to adjustments in operational planning and distribution patterns, helping us optimise existing warehouse locations and service areas****.'*

Notably, the daily road schemes usage varies by intervention, as shown in Figure 3-7.

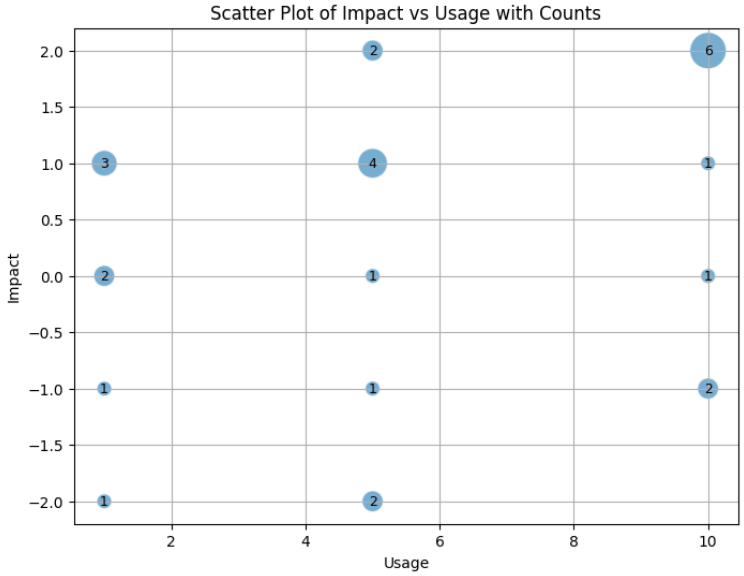
Figure 3-7 Survey responses to Q.9 'Please select how often your business has been using each of the case study corridors in the 2-3 years following the interventions (please mark an answer for each)' (n=11 for each study area); share of responses per band of usage of each scheme.



When excluding 'don't know/not relevant' responses, it is possible to **derive 27 observations from the 11 respondents across the 3 case study areas which contain both information on daily usage of the affected roads and perceived level of impact**.

Assigning a value of -2, -1, 0, 1, and 2 to impact categories of 'High negative', 'Low negative', 'No change', 'Low positive', 'High positive' impacts, and a value of 1 for usage of roads up to 1 trip daily, 5 for up to 10 trips daily, and 10 for over 10 trips daily, it is possible to visualise the relationship between scheme usage and perceived impact – as shown in Figure 3-8.

Figure 3-8 Scatter plot of usage and impact observations (27 datapoints across 11 responses for 3 case studies, NA removed)



Note: the size of the dots in the scatter plot are proportional to the number of observations with a given impact and usage combination.

While acknowledging that this analysis does not represent a robust quantitative examination of the relationship between usage of a scheme and perceived impacts from its improvement, it still provides an interesting insight: **the number of responses reporting 'High positive' impacts grows with the reported usage of the schemes.** Moreover, **six out of the 8 'High positive' impact responses were provided by freight and logistics organisations rather than manufacturing or other organisations.** There is no clear pattern emerging from the analysis of impacts conditional on the type of transported goods.

3.2.2.3 Reported operational and land-use changes, market outcomes, and enablers

In terms of the hypothetical market outcomes resulting from falling transport costs, across all 27 respondents, 16 indicated they would use the resulting benefits to invest or expand further, 9 that they would retain the benefits as margins, and 4 would pass the benefits on to customers – as shown in Figure 3-9.

This is counterintuitive compared to economic theory, which predicts greater pass-on to consumers in sectors of higher competition. This is especially true considering a logistics' trade body association indicating margin to be at 1.7% across the industry. An interpretation of the finding is that respondents are considering only short-term effects of transport interventions rather than long-term effects and competitive responses.

Figure 3-9 Survey responses to Q.17 'When transport costs fall, how is the benefit mainly realised in your firm/in your industry? (Select all that apply)' (n=27)

However, **the actual transmission mechanism between the perceived impact and the actual supply-chain efficiencies or land-use changes remains unclear,** with no distinct pattern of changes in fleet or inventory size, warehouse or depot space size, location, or consolidation, and delivery or shipment sizes/frequencies irrespectively of whether this is controlled for among the sub-sample of 11 respondents able to report on perceived operational and land-use changes of the impacts or the whole sample – as per survey question 12
'Since the transport intervention, has your business made any of the following changes? *(Select all that apply)*'.

The 11 respondents to survey question 7 (on perceived WEIs impact) indeed also indicated what can be considered only **an intermediate extent of influence between the schemes and reported changes**. Responses to question 13 '*To what extent were these changes influenced by transport improvements (e.g. Better travel times, Reliability, or Connectivity etc.)?*' (with a minimum rating of 1 and maximum of 5) yielded an average rating of 2.73, as shown in Figure 3-10.

Figure 3-10 Survey responses to Q.13 'To what extent were these changes influenced by transport improvements (e.g. Better travel times, Reliability, or Connectivity etc.)?' (n=11)

Importantly, the same 11 respondents reported they would **need relatively large travel time savings per trip before their organisation would reorganise operations**, compared to the magnitude of average travel time impacts recorded for the three case studies – as shown in Figure 3-11.

Figure 3-11 Survey responses to Q.14 'Roughly speaking, how large would travel-time savings per trip need to be before your business would reorganise operations (e.g. Expand fleet, Relocate, Consolidate Depots etc.)' (n=11)

An additional respondent from the rest of the sample also reported in Q.21('If a major transport improvement was to occur near your site, what single change (e.g., in travel time, reliability, or market access) would most encourage your firm to reorganise operations and why?' that they '*Would need a 20 minute journey time saving on each trip to prompt possible change*'. A response mentioned:

'*The single most influential change would be a significant improvement in journey time reliability. Greater reliability would allow us to plan deliveries more accurately, reduce buffer times, optimise fleet utilisation, and better meet customer service requirements. Consistent and predictable travel times would also reduce operational risk and costs, enabling more efficient scheduling and potentially supporting consolidation of routes or adjustments to operating hours. This level of reliability would provide sufficient confidence to justify reorganising operational processes*.'

3.2.3 Secondary data analysis

Secondary data analysis provided contextual evidence on logistics land-use and property market activity around the three case study corridors. The analysis examined 1) CoStar commercial property market indicators and 2) Valuation Office Agency (VOA) floorspace data to identify observable changes in logistics property markets over time following the road improvements.

This secondary data analysis was unable to provide evidence of logistics property market or land-use responses associated with the road improvements across the three case study corridors. VOA data show gradual increases in logistics property counts and floorspace over time, while CoStar indicators for prices, rents, availability, and vacancy rates broadly followed regional market trends. Observational evidence on lorry parking activity also suggested continued use of established logistics locations rather than the emergence of new logistics sites.

These findings are consistent with business survey and interview evidence, which indicated limited relocation of logistics activity and highlighted investment cycles, land availability, and market demand as key drivers of logistics location decisions. Overall, the secondary data suggest that changes in logistics activity around the case study corridors may occur gradually over time and were more strongly influenced by wider market conditions than by corridor-specific effects associated with the road improvements. Overall, results suggest that any freight wider economic impacts associated with the road improvements were more likely to occur through operational efficiency and utilisation of existing logistics assets rather than through observable changes in logistics property markets within the time frame of the evaluation.

However, the type of quantitative analysis carried out so far did not allow to control for concurring interventions and influencing factors, which may play an important role in the ability to measure different trends in the case study areas compared to benchmark areas.

3.2.3.1 *Logistics floorspace evidence (VOA)*

VOA non-domestic rating data were analysed to examine changes in logistics-related property counts and floorspace within 15 km of the case study corridors between 2010 and 2023. The analysis focuses on logistics-related hereditaments identified using relevant SCAT codes.

Overall, VOA floorspace data show gradual increases in logistics property counts and floorspace across all three case study corridors between 2010 and 2023. These changes occurred progressively over time rather than immediately following scheme completion. This suggests that observed growth in logistics land use reflects longer-term logistics market expansion rather than corridor-specific land-use responses to the road improvements:

- In the A13 corridor, logistics property counts increased from approximately 5,759 in 2010 to 6,576 in 2023 (around 14%). Total logistics floorspace also increased over the study period. Changes were gradual across the snapshot years, with no clear step change following scheme completion in 2017.
- In the A14 corridor, logistics property counts increased from approximately 1,226 in 2010 to 1,433 in 2023 (around 17%). Total logistics floorspace showed modest growth over the study period. Changes occurred progressively rather than immediately following scheme completion in 2020.
- In the M62 corridor, logistics property counts increased from approximately 10,006 in 2010 to 13,587 in 2023 (around 36%). Total logistics floorspace also increased over the study period. Growth was gradual across snapshot years. Again, there is no clear step change following the scheme completion in 2013.

3.2.3.2 *Logistics property market evidence (CoStar)*

The following subsections summarise CoStar logistics property market indicators for each case study corridor, highlighting differences in price, supply, and utilisation trends. For each corridor, “before” and “after” periods are defined relative to scheme completion dates reported in the Post-Opening Project Evaluation (POPE), with indicators calculated as averages over these periods and compared with regional trends. As schemes were completed at different times (M62: 2013; A13: 2017; A14: 2020), treatment periods vary across case studies, and regional averages are calculated over the same periods to ensure comparability.

Across all three corridors—the **M62**, **A13**, and **A14**—the **logistics property market evolved broadly in line with regional trends**, showing **no clear shift in activity or market conditions immediately following scheme completion**. Table 3-4 below summarises changes in key logistics property market indicators within each case study area compared with regional averages over the defined pre- and post-intervention periods.

Table 3-4 Change in logistics property market indicators relative to regional trends (CoStar)

Area of interest (time-period)	Metric	% change (Area of interest)	% change (regional average)	Local–regional difference (pp)
A13 (pre-scheme: 2009q1-2016q4; post-scheme: 2017 q1-2024q4)	Market sale price (£ per m²)	47%	103%	−56
	Market asking rent (£ per m²)	31%	57%	−26
	Sales volume (£)	81%	146%	−65
	Availability rate	−39%	−50%	+11
	Vacancy rate	−34%	−52%	+17
	Under construction	90%	93%	−4

A14 (pre-scheme: 2014q3-2020q1; post-scheme: 2020 q2-2025q4)	Market sale price (£ per m²)	28%	68%	−41
	Market asking rent (£ per m²)	26%	45%	−18
	Sales volume (£)	47%	125%	−77
	Availability rate	−18%	−10%	−8
	Vacancy rate	30%	61%	−32
	Under construction	−16%	207%	−223
M62 (pre-scheme: 2009q2-2013q3; post-scheme: 2013 q4-2018q2)	Market sale price (£ per m²)	10%	30%	−20
	Market asking rent (£ per m²)	3%	7%	−4
	Sales volume (£)	93%	173%	−80
	Availability rate	−43%	−50%	+6
	Vacancy rate	−51%	−61%	+10
	Under construction	17%	115%	−98

Note: Area of interest defined as logistics and warehouse properties within 15 km of each case study corridor. Regional averages correspond to the relevant ONS region for each corridor (A13: South East England; A14: East of England; M62: Yorkshire and the Humber). Percentage changes are calculated using average indicator values over defined pre- and post-intervention periods based on scheme completion dates (A13: 2017; A14: 2020; M62: 2013). Availability and vacancy rates are expressed as percentage-point changes. CoStar data are used to provide contextual evidence on logistics property market conditions rather than to attribute causality to the road improvements.

A13 corridor (East London – Essex)

In the A13 corridor, logistics property market indicators showed growth over the study period but generally remained below regional trends. Market sale prices increased by 47% compared with 103% regionally, while asking rents increased by 31% compared with 57% regionally. Sales transaction volumes also grew more slowly than the regional average.

Availability and vacancy rates declined over the study period in both the corridor and the regional market, indicating tightening utilisation of logistics space. Development activity, measured by floorspace under construction, increased at a similar rate to the regional average.

Taken together, these indicators suggest that logistics property market conditions in the A13 corridor evolved broadly in line with regional trends, with no clear change in market activity immediately following scheme completion.

Finally, observational evidence on lorry parking activity at selected industrial sites in the corridor also indicated continued use of established logistics locations over the study period.

A14 corridor (Cambridgeshire)

In the A14 corridor, logistics property market indicators showed modest growth over the study period and generally followed regional trends. Market sale prices increased by 28% compared with 68% regionally, while asking rents increased by 26% compared with 45% regionally. Sales transaction volumes also grew more slowly than the regional average.

Interestingly, availability declined slightly in the corridor over the study period, while vacancy rates increased, reflecting changes in supply and demand conditions similar to those observed

regionally. Development activity, measured by floorspace under construction, remained below regional growth levels.

Overall, these indicators suggest that logistics property market activity in the A14 corridor evolved in line with wider regional market conditions, with no clear change in property market trends immediately following scheme completion.

Lorry-parking observations at selected industrial estates suggested freight activity remained concentrated at existing logistics locations.

M62 corridor (West Yorkshire)

In the M62 corridor, logistics property market indicators showed relatively modest growth over the study period and generally followed regional trends. Market sale prices increased by 10% compared with 30% regionally, while asking rents increased by 3% compared with 7% regionally. Sales transaction volumes also grew more slowly than the regional average.

Availability and vacancy rates declined in both the corridor and the regional market, with slightly larger reductions observed locally. This indicates a tightening of the utilisation of existing logistics space rather than expansion of new supply. Development activity, measured by floorspace under construction, increased more slowly than regional levels.

Additional analysis of lorry parking and freight activity at selected industrial sites along the M62 suggested increased utilisation of established logistics locations between 2017 and 2022. HGV activity remained concentrated at existing industrial estates, indicating increased use of existing logistics capacity.

Overall, these indicators suggest that logistics property market activity in the M62 corridor evolved broadly in line with regional market conditions, with no clear change in property market trends immediately following scheme completion.

3.3 Findings against Research Questions

The Methodology Note defined three sets of Research Questions (RQs) to be addressed. These are discussed separately below based on all evidence gathered across data sources. These Research Questions should be distinguished from the wider Research Objectives that the DfT is aiming to achieve as part of this project. Those objectives build on the RQs here and are discussed in the following section.

3.3.1 Research Question Set 1: step-changes in direct impacts

This set of RQ addressed the following hypothesis (H1): if a transport intervention delivers accessibility and reliability improvements beyond a critical threshold, freight and logistics businesses can reorganise operations in ways that generate Supply Chain Efficiencies (SCE) and Land-Use Change (LUC) impacts. These effects depend on the improved proximity of goods within supply networks rather than the proximity of people. The individual RQs for this set are addressed below.

1.1 What impacts beyond those captured by the value of time are there according to freight and logistics firms?

Interviews and survey findings confirm that firms do not only experience the direct savings from travel time reductions on their routes. When travel time savings are ‘large enough’, firms can respond by altering their usage of fleet and existing spaces, that is, Supply Chain Efficiencies materialise. An example is a lorry being able to add an additional delivery round to its schedule on a given day. The organisation could then optimise deliveries across the fleet moving content from other lorries to that lorry, freeing up fleet capacity on multiple routes beyond the initial individual lorry benefiting from the travel time savings. Land-use change in the sense of relocation or consolidation of activities has been more difficult to observe, including based on quantitative data.

An open element of discussion is the extent to which such SCEs are already captured in the newly introduced Value of Travel Time for the freight industry[11]. In principle, operators may be able to assess the long-term opportunity-cost of travel time including any adjustment to operations, therefore embedding SCEs. However, the review provided in the abovementioned publication showed that *'These long-run effects might not be included in the trade-offs that respondents make when comparing within or between-mode alternatives in SP [Stated Preference] experiments'.*

The publication also reported that '*Producers/traders with their own transport and hauliers/forwarders were asked in the interview to provide estimates of their lost revenue, including missed opportunities, due to the forced inactivity of vehicles and transport staff.* ***Over half of the respondents interviewed could not provide estimates of these losses****. Most of the data on revenue losses was collected from the UK respondents. This analysis indicated that the* ***users evaluated the losses to be about 2.2 times higher than the estimates provided by the VTT statistics****. This multiplier provides an estimate of the additional costs of missed business opportunities and estimates of additional scheduling costs, which are not considered explicitly in the value of time figures'*.

The two statements indicate that the respondents consulted to derive the Value of Time for the industry might frame their responses from a short-term opportunity cost perspective (i.e., including wage and value of cargo costs) rather than long-term opportunity costs reflecting SCEs.

The additivity of SCEs is also consistent with findings from the EPIRE research (Economic Performance Impacts of Road Enhancements) due to be published by DfT, that reported '*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.'*

Interviewees also consistently reported that reliability can be valued more than travel time savings, allowing better planning of their operations and reduction of drivers' buffer times. Taking the RHA's comment that congestion makes up 16% of the cost of operation this needs to be factored into vehicle planning. So, on a route that is known to be unreliable a safety buffer of up to 20% may be built into vehicle schedules whereas on a reliable route this factor may only be 10%. This is a big difference in vehicle utilisation and earning potential.

1.2 Can such impacts materialise because goods are located closer to where they need to be (storage, dispatch, delivery) rather than because they are closer to where people work and live?

While some respondents commented on schemes impacting on their ability to reach talent for their operations or customers, they also confirmed that the reduced costs to move *goods* can have a distinct impact on firms' performance. However, the way such impacts materialise will depend on different conditions explored in the next RQs set.

1.3 If these benefits take the form of SCE and LUC, are they aligned with the sub-types identified in the literature (e.g., changes to fleet, warehouse size and number, warehouse location, etc.) or are there additional sub-types of impact recognised by firms?

Responses did not provide additional break-downs for SCE and LUC compared to those identified in the literature during Stage 1 of this research. Better reliability on the A14 has resulted in less food wastage as noted by one interviewee as £10k-£20k per load that missed onward local deliveries. Another example was the three extra loads per week done by a construction tipper using the M62 multiple times a day. The cumulative effect resulted in 20% extra revenue a week.

[11] https://assets.publishing.service.gov.uk/media/68f21191f5d433238a14c70f/freight-value-time-value-reliability.pdf.

Please note this was mainly due to less congestion at peak periods. It was not all due to the M62 case study scheme alone but other improvements in the area.

1.4 Do businesses expect some sub-types of SCE and LUC impacts to occur earlier, to be more likely, or be more valuable than others? What are the most prominent / important impacts? Do these vary by sector / types of goods transported?

A recurring theme across all data gathered is that LUC is observed less frequently as a type of impact and can take longer to materialise compared to SCE. Moreover, LUC is not necessarily perceived as a benefit, depending on the type of firm involved by the intervention. Freight and logistics operators closer to the primary sector indicated a preference to be located near producers, rather than move primarily accordingly to the changes on the road network. The main reason for this is that there can be synergies available with working actively with producers to minimise loading and queuing time at their premises. On the other hand, SCE effects can materialise in the short- to medium-term, depending on conditions discussed in the next RQs set.

1.5 Are there minimum thresholds of travel time savings from transport interventions that your firm expects to be met for businesses to experience SCE and/or LUC impacts?

Both interviewees and survey respondents highlighted that the industry is more likely to experience WEIs out of interventions delivering higher travel time savings. Savings above 20 or 30 minutes were cited as necessary to deliver SCEs. Notably, these do not need to arise from a single scheme, but can build up over a whole corridor. However, responses varied based on different factors discussed in the next RQs set.

Additionally, the existence of buffer times should be considered when valuing direct travel time savings for freight market players (and potentially for all road users in general). Indeed, smaller travel time savings resulting from an intervention may be absorbed into users' buffer times rather than actually 'freeing up' users time. For example, a manufacturer with own logistics operations using the A13 scheme commented that '*The A13 is one of the worst road networks in the country, no improvement is evident. We operate two London depots that rely heavily on the A13, and performance on this corridor remains a major concern'.* This clashes with the POPE report findings, which estimated average travel time savings of up to 51 seconds, assumed to be aligned with forecasted benefits, representing the backbone (£210m, or 84%) of the scheme's appraised benefits.

1.6 To what extent do firms attribute organisational or location changes to the transport intervention itself instead of other factors (such as market demand/growth, regulation, land cost or availability, labour supply, or competition)?

A consistent finding across interviews and the survey is that road infrastructure improvements only play a secondary role in organisations' decisions related to land use or operational changes. Customer behaviour and demand were identified as the principal drivers behind these decisions. Land and policy constraints as well as labour retention also play a more important role than transport improvements.

Survey respondents did not classify the direct link between reported operational or land-use changes and infrastructure improvements has strong (on a scale from 1 to 5, no response included the maximum value for the link).

3.3.2 Research Question Set 2: Market structure, competition, firm size, and the transmission of wider economic impacts

This set of RQ addressed the two distinct hypotheses:

- H2: The extent to which Supply Chain Efficiencies (SCE) and Land-Use Change (LUC) impacts occur depends on firm capacity and market structure, which in turn influence the constraints faced by firms (e.g., lack of IT infrastructure to optimise routes, limited warehouse/ loading capacity, limited capital, constraints on loading bays/fleet, regulatory/ planning constraints.). Larger or better-resourced firms are more able to reorganise or

invest when accessibility improves, while smaller firms may be constrained by limited capital, infrastructure, or regulatory flexibility.

- H3: Firms operating in highly competitive segments of freight and logistics (especially smaller ones) will not experience additional benefits other than those captured by the freight VoT, implying there are only limited additional restructuring or wider economic impacts.

The associated RQs are addressed jointly below.

2.1 To what extent are SCE and LUC impacts conditional on firm size (e.g. fleet size, turnover, number of depots/warehouses, number of employees)?

Respondents' ability to capitalise on interventions can vary with size. For example, larger freight and logistics operators with over 250 employees can hold IT systems allowing to identify operations and land-use location optimisation options. Smaller firms might struggle to deliver operational changes purely based on travel time savings.

2.2 What operational, financial and/or institutional factors enable or limit firms from capitalising on travel time savings and deliver SCE/LUC impacts?

Several factors can influence organisations' ability to capitalise on travel time savings from interventions, including:

- Market conditions that do not facilitate changes (e.g., presence of long-term leases affecting land-use);
- Delayed decision-making cycles compared to the time of infrastructure changes (e.g., business location decisions are only reviewed every 5 years);

- Conditions on the wider network: responses highlighted that additive travel conditions across multiple locations are greater determinants of firms' locations than individual conditions around a road segment.
    - Constrained margins: market players can face thin margins from logistics operations. In this case, the surplus unlocked via travel time savings could be maintained as headroom profit rather than converted into capital investment, lower prices, or increased outputs.
    - Segment usage: respondents making a higher daily usage of a segment had a greater propensity to report high positive impacts from the schemes.
    - Industry served and type of organisation: respondents serving more time-sensitive industries can have greater incentives to optimise operations based on smaller time savings. Moreover, manufacturers are less likely to experience SCE compared with freight and logistics operators. The two types of respondents face different incentives and making the improvement of operations more relevant to operators than producers.

3.1 Which segments in the freight and logistics supply chain are perceived to be more competitive than others (e.g. parcel delivery, last-mile, general distribution, specialist freight, intermodal freight)?

General haulage, pallet networks and parcel distributors were repeatedly identified as highly competitive, operating on tight margins. Materials logistics and last-mile Fast Moving Consumer Goods (FMCG) are also competitive due to utilisation pressures and tight delivery windows.

3.2 Is applying a uniform uplift across freight time savings appropriate for imperfectly competitive markets? If not, should the uplift vary by segment, firm size (or other characteristics)?

The analysis of findings has not allowed us to provide a consensus about this question.

Nonetheless, it is worth considering the following. Across the 27 survey respondents, the perceived level of competitiveness in the industry was moderate (a rating of 3.74 out of 5), but only 4 respondents indicated they would pass down the benefits from falling travel costs to consumers. This may appear as a counterintuitive result for economic industrial organisation theory. Indeed, higher level of competitions should be associated with a higher degree of pass-on of suppliers' cost efficiencies to consumers. However, as a temporary condition in the market, very low margins might explain respondents' current attitude towards maintaining prices/outputs unaltered while continuing to satisfy pre-existing customer expectations.

Across interviews, responses suggested that the examined case study improvements stabilise existing markets rather than radically reshape competitive geography. The RHA interview described the road haulage industry as highly competitive, with very low margins that nonetheless benefit the wider supply chain. Average profit margins are around 1.7%, which helps keep logistics costs down across the economy. However, these low margins, which are less than the cost of borrowing from a bank, leave operators vulnerable to external pressures. As a result, approximately 400–500 haulage businesses enter administration each year, driven largely by rising operating costs and persistent congestion on the road network. Logistics Uk produce a guide to transport costs and in the period Q1 2020 to Q3 2025 the cost of running an articulated vehicle has gone up 22.6%.

The road haulage market is not a uniform one as there are various sub-sectors with specialist vehicles moving various types of goods including hazardous goods and abnormal loads. Operations, margins and haulage rates can be significantly different in these sectors. There is a greater degree of competition in some markets than others and hence it is difficult to generalise on the overall market. As such, it is unclear whether an uplift over freight time savings for competitive effects should be considered appropriate altogether.

3.3 ***How far can a transport improvement materialise from any given business for them to consider competition to become tighter? What is the effective spatial/time/proximity threshold?*** *And* ***3.4 How distant can businesses be from a transport intervention for them to experience SCE or LUC impacts? Is a single improvement sufficient to cause LUC? Or does it take a major reorganisation? Or else, is a combination of improvements (network effects, reliability, frequency, etc.) necessary for substantial impacts to materialise?***
Respondents appear to take decisions on the basis of whole corridors rather than interventions on individual road segments. This result might be skewed on the basis of the geographic market served by respondents in the sample, which was more frequently national in scale. As such, direct proximity to a localised area might only represent a small factor affecting competition among freight and logistics operators.

It should be noted that respondents indicated rail-road integration schemes as more transformative types of projects that may more considerably shift their market geography.

3.3.3 Research Question Set 3: contextual factors

This set of RQ addressed the following hypothesis (H4): Wider socio-economic trends and investment inertia need to be accounted for when assessing changes over time in the freight and logistics industry, as they can mask or delay the observable impacts of transport improvements. The individual RQs for this set are addressed below.

4.1 ***How have changes in customer behaviour (e.g., increased online shopping) influenced firms' decisions?***
The analysis of findings consistently highlighted that customer behaviour is the main driver of firms' decisions, however no recurring example has been made to elaborate on specific changes over time. It should be noted that online shoppers are even more demanding on lead times wanting same or next day deliveries and this has caused some suppliers to establish fulfilment centres nearer to their customer bases.

4.2 Has the change in the international trade environment affected your Land-Use in the case study area (e.g., tariffs, outsourcing of production with greater reliance on ports, global supply chain disruptions)?
Manufacturers cited influencing factors such as Brexit, US tariffs as causing temporary effects on production. However, no specific mentioning of land-use change was made.

4.3 How do investment decisions affect businesses' ability to make decisions affecting their location and floorspace (for example, time to recover from an early investment into a previous location)?
This question has been addressed as part of the answer to RQ 2.2.

4.4 What proportion of observed changes in operations / land-use do firms attribute to transport improvements versus other socio-economic or investment inertia factors?
Respondents did not provide a specific proportion as an answer, although noting the answer to RQ 1.6.

3.4 Findings against broader Research Questions

Beyond the RQs outlined in the Methodology Note of Stage 2, Stage1 also outlined wider research priorities to be addressed as part of this study. Findings against these research questions are set out below.

3.4.1 Does TAG sufficiently capture the FWEIs raised through freight system (under the Units A2.2, A2.3 or A2.4) following a transport investment, such as firms relocating, reorganising production, logistics, etc.? What role does journey time reliability play in the FWEIs? What are the economic theories and evidence supporting the answer? If not, what further research would need to be done to capture this in TAG? And can these benefits be shown to be additional to user benefits?

TAG currently captures agglomeration effects based on access to economic mass (from the perspective of people/employment). TAG also captures effects on imperfect competition via an uplift to direct freight time savings.

The interview and survey data suggest that the freight and logistics industry can benefit from specific forms of WEIs related to the improved distribution of *goods* separately from effects on the connectivity of people and markets. That is, Supply Chain Efficiencies (SCE) and Land-Use Change (LUC) improvements. Both can be enabled by large travel time savings or reliability improvements accruing along a corridor rather than at a single location. These can be considered as additional to user benefits, assuming **market failures** influencing firm behaviour exist. See section 4 for more information on this.

The options for capturing such impacts in TAG will be scoped as part of the Final Report for this research. An initial assessment of this is presented in section 4.

3.4.2 Can the impacts of land use change (e.g. reorganisation of freight firms) be isolated without the need for complex models (e.g. GE models)? If so, how could this be done?

LUC appear to be harder and take longer to materialise than SCE. Floorspace and real estate market performance indicators analysis around the case studies did not detect local case-study effects compared to regional benchmarks. This suggests that appraisal resources for Freight WEIs might be better focussed on quantifying the impacts from SCE instead. It should be nonetheless acknowledged that additional quantitative analysis aligned with the EPIRE work could be delivered to control for the impact of simultaneous or partly overlapping interventions and other confounding impacts that could not be assessed as part of the scope of this research.

This is aligned with the EPIRE research. This collected data from 43 road schemes and analysed econometrically their impact on employment, wages, business counts, and commercial floorspace. While some effects of the intervention could be detected for these indicators specifically related to the manufacture and transport sectors, impacts were deemed difficult to attribute locally, were not sustained over time, and appeared driven by spatial reallocation rather than net additional activity.

Evidence of land-use change was deemed particularly weak at the scheme level, with observed patterns more consistent with displacement than with new development.

3.4.3 In industries where the production function (to be identified) has economies of scale/increasing returns to scale, is there any further 'level 3' extra impact from road schemes and why? If so, how best to measure it?

The discussed SCE do not seem to relate to economies of scale. Rather, they appear to materialise because of inefficient market equilibria. A transport intervention (or package of interventions) enabling sufficiently large travel time savings might reduce transport costs enough to push organisations to alter their business operations. Marginal travel time savings would not support this kind of transformational impacts instead and would leave the industry in the baseline equilibrium.

3.4.4 Is there double counting between the FWEIs raised through freight system and the rest of WEIs estimations? If double counting is present, can this be adjusted for in some way?

As mentioned, SCE and LUC can be considered as separate from current agglomeration impacts. There may be a degree of overlap with competitiveness impacts, although the qualitative evidence from this research suggests that currently there may be little pass-through of travel time savings to customers in the freight and logistics industry.

3.4.5 Beyond FWEIs in TAG, how does improved road freight infrastructure influence job transition and productivity across different sectors?

The analysis of findings has not allowed to gain insights into job transition dynamics.

4. Revisiting the theory of change

4.1 Introduction

Phase 1 of this research included developing a logic map for the impacts of road improvements on the freight sector. The purpose of this logic map was to set out clearly the impacts and mechanisms behind these based on a literature review and industry knowledge. The aim of the logic map was also to clearly identify level 1, level 2 and level 3 impacts and establish which wider economic impacts were already accounted for TAG.

Based on the findings from Phase 2 of this research, we have updated the logic map to confirm that the impacts previously identified are real based on evidence collected as well as to include wider factors driving these impacts that need to be considered.

We have also further revisited the analysis of which impacts are considered in TAG through a more detailed review of the latest Value of Time research for freight, which is now due to be incorporated soon into TAG.

4.2 Updated Theory of Change

4.2.1 Clarifying what is included in the Value of Time of freight based on latest research

On 18th December 2025, DfT announced a forthcoming change to update the road freight values of travel time, expected in May 2026. With the confirmation of this update, we have revisited the paper that provides the research findings underpinning this update[12] as well as the notice of forthcoming changes[13].

Based on the upcoming changes, the value of freight travel time will be updated to more comprehensively cover the costs of freight time. Specifically, it will be updated to not only cover driver cost (a strong limitation of current values of freight travel time, noting that vehicle costs are captured separately under vehicle operating costs), to also cover a wider range of factors including wider business costs (related to inventory, scheduling, penalties, and other logistics impacts) and willingness-to-pay for faster deliveries. The unit also proposes an updated approach to better account for reliability impacts. To the extent that improved reliability reduces scheduling risk, missed delivery penalties, or inventory restrictions, these effects will also be reflected within the updated valuation framework.

This implies that many observed supply chain adjustments (e.g. routing, scheduling, delivery frequency changes, inventory management, and fleet reorganisation) represent mechanisms through which time savings are realised, rather than separate additional benefits. Once TAG is updated, a significant proportion of these effects will be captured within Level 1 benefits. However, a key question remains of whether additional supply chain efficiencies could exist if market failures are present, thus justifying the estimation additional wider economic impacts. This is discussed further below in subsection 4.2.3.1.

4.2.2 Changes introduced in the updated logic map

The following changes are included:

- Impacts highlighted in green are those that are confirmed based on evidence from this research

[12] AECOM, Arup, Significance, ITS (2023), Freight value of time and value of reliability. Available at https://assets.publishing.service.gov.uk/media/68f21191f5d433238a14c70f/freight-value-time-value-reliability.pdf

[13] DfT (2025), The value of road freight travel time – updated evidence for Transport Analysis Guidance. Available at https://assets.publishing.service.gov.uk/media/68f8aa2180cf98c6e8ed8f5f/value-road-freight-travel-time.pdf

- Impacts highlighted in orange are those that were not researched in this study
- The colouring of which impacts are included in TAG has also been slightly updated
- Market failures are highlighted – these are important as they determine which impacts are additional to Level 1 impacts
- Key contextual factors are included

4.2.3 TAG assessment – which impacts are already included in TAG?

Based on the findings in this note, we have revisited to what extent the two impacts of interest researched are additional compared to benefits already included in the current TAG framework.

4.2.3.1 Supply chain efficiencies

The evidence collected shows that there is a transmission mechanism in which firms adjust logistics operations in response to changes in travel time and reliability when these changes are sufficiently large. In most cases, these responses represent private optimisation and are assumed to be captured within updated freight VoTs. The surveys have indicated there is only an intermediate extent of influence between transport schemes and reported changes in operations - which may indicate that the transmission in imperfect and the values of freight VoTs are not fully realised. Additional welfare gains would only arise where such adjustments alleviate a pre-existing distortion, or generate spillovers not reflected in private decision-making.

This research has provided evidence for these impacts:

- Supply chain efficiencies resulting from operational decisions on fleet reorganisation or inventory management
- Decisions related to travel behaviour – firms interviewed noted that firms could adjust routing, schedules, and delivery frequencies almost immediately.

As mentioned previously, the forthcoming update on values of freight travel time will account for a comprehensive set of business costs that are reduced when freight related businesses save time as a result of a road improvement. Our research has found evidence for these supporting the findings in this previous research providing richer information through interviews of how these impacts materialise in practice.

A key focus of this phase of work has then been to understand whether market failures or distortions exist that would justify the estimation of additional supply chain efficiency impacts. In consultation with the expert panel advising on this project, the following market failures and relationship to these impacts were identified:

Table 4-1 Supply chain efficiency market failures

Market failure	Business impact	Included in TAG?
Coordination failures	Businesses with suboptimal logistics reorganise their operations in a way that affects other businesses in the supply chain positively, resulting in sector-wide efficiencies	Partially through agglomeration benefits and employment impacts (mentioned in TAG Unit A2.1)
Externalities		Partially through agglomeration benefits (focusing on learning, matching and sharing) (mentioned in TAG Unit A2.4)
Labour market frictions (e.g. truck driver shortage)	Businesses change their fleet strategy to become more efficient (which they were not	No, although this could be solved through increased access to employment and be partially captured through

	able to do due to labour shortages)	employment effects (Unit A2.3
Economies of scale	Imperfect competition means businesses there are increasing returns to changes in logistics operations such as consolidating depots	Yes – through increased output in imperfectly competitive markets (mentioned in TAG Unit 2.2)

4.2.3.2 Land use changes

Findings from this research suggest that any land use modelling needs to consider land use constraints and wider market dynamics. These changes can be justified by market failures as follows in line with TAG states.

Table 4-2 Land use changes market failures

Market failure	Business impact	Included in TAG?
Land use availability constraints	Existing businesses are able to relocate to new places with improved land availability as a result of road improvements. New businesses are able to enter the market with improved land availability, including new firms.	Yes – through dynamic agglomeration benefits and move to more productive jobs (TAG Unit 2.2)
Coordination failures	Existing businesses are able to relocate to areas where multiple firms relocate. New businesses are able to locate with other firms,	Yes – through dynamic agglomeration benefits and move to more productive jobs (TAG Unit 2.2)

While these impacts are already considered within the TAG framework, a key question remains on how best to estimate them. Noting that DfT were interested on whether there were potential simple ways of estimating these impacts, the findings from the research presented in this report show that transport is a secondary consideration driving land use decisions for freight businesses. For example, land-use decisions are shaped by long-term decision-making cycles, existing lease agreements, and high costs of relocating activities.

Therefore, modelling should take account of important local contextual factors such as market dynamics and land use constraints when estimating these impacts, suggesting that simple analysis may not be possible. Current DfT guidance on wider economic impacts recognises that realising the impacts of schemes depends on attributes such as the availability of land for development.

A separate option would be to better capture the costs of land use constraints under consumer surplus or take other approaches such as applying quantitative spatial models.

4.2.4 Updated logic map

In stage 1 of this work, we highlighted that TAG recommends that given the importance of context specificity for transport investments, all assessments of economic impacts should be informed by a context specific Economic Narrative that will inform the analytical approach and appraisal specifications; and therefore that much of value in stage 2 of this work was in providing the additional evidence that can help future business cases strengthen the development of Economic Narratives around the impacts of freight and therefore on FWEIs.

The case study findings have helped provide a much better understanding of the story of freight i.e. the decisions made by businesses in logistics and manufacturing around supply chains and locations and if and how these are shaped by transport needs and costs. With this improved understanding, we have looked to update the logic map on road schemes and the potential impacts on freight.

The updated logic map is presented below. As explained below, it should be noted that:

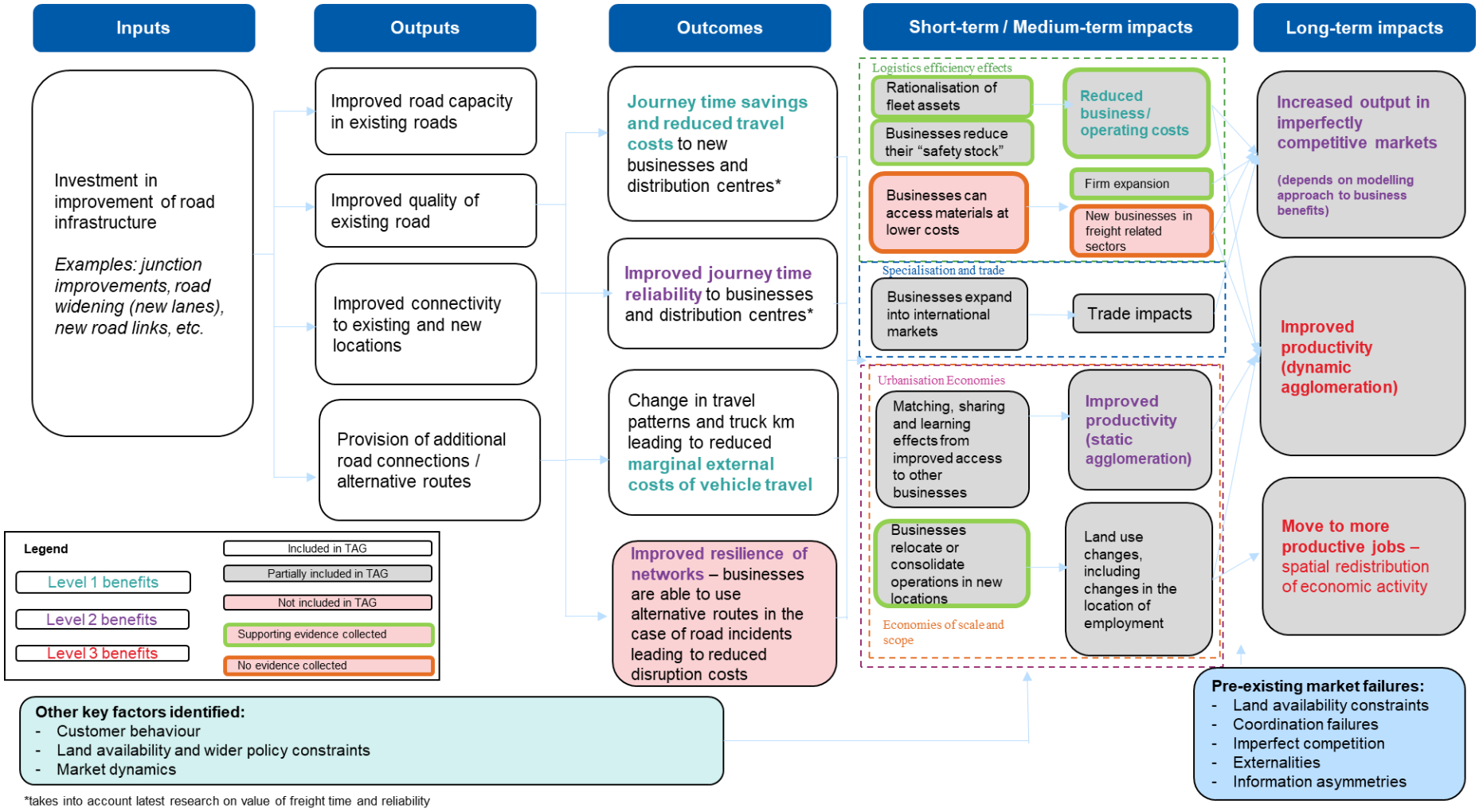
- Under conventional appraisal, reductions in freight travel time and costs are already captured through changes in consumer and producer surplus. These reflect real resource savings and efficiency gains to the economy – assuming that the transmission mechanisms from reduced travel times/costs are realised through efficiencies that benefit firms and consumers.
- While some of these benefits may subsequently be capitalised into higher wages, rents, or logistics land values, such capitalisation represents a redistribution of surplus rather than an additional welfare gain.
- Spatial reorganisation of activity (e.g. hub consolidation, depot relocation, or clustering of firms) therefore only constitutes a WEI where it operates through a pre-existing market failure - such as labour market frictions, coordination failures in logistics networks, scale economies, or planning constraints.

The updated logic map distinguishes between (i) capitalisation of accessibility benefits into wages, rents, or land values (representing the redistribution of surplus), and (ii) productivity gains arising where transport improvements alleviate pre-existing market failures. Only the latter constitute additional Wider Economic Impacts.

4.2.5 Note on modelling

It should be noted that the extent to which some benefits already in TAG are fully captured or not depends to a great extent on how demand modelling is undertaken. Through the discussions held as part of Stage 1 of this project, we identified that important modelling shortcomings exist when it comes to freight demand modelling. This is currently being addressed by some ongoing work by National Highways and also being looked at by DfT. For the estimation of FWEIs in TAG, it is particularly important to revisit how business journeys are modelled, as these are a key input into the calculation of agglomeration benefits and increased output from imperfect competition.

Figure 4-1 Logic Map - Road investment impacts on freight



*takes into account latest research on value of freight time and reliability

5. Forward look – developing future research pathways

5.1 Introduction

The third part of this research focused on developing a pathway for further research based on the findings from research obtained so far. This refers specifically to the research question: "*If not [TAG does not include all impacts identified], what further research would need to be done to capture this in TAG? And can these benefits be shown to be additional to user benefits?* "

5.2 Outstanding evidence gaps

Based on the research undertaken, the following evidence gaps were identified:

- Pass-on dynamics and value to the economy: While the research helped validating the presence of SCEs, it remains unclear the extent to which these are valued by the industry, as well as how much of the impact is passed on to the rest of the supply chain to cause ripple-effects (e.g., increased outputs of freight clients)[14].
- Extent of overlap with competition uplift: Where the pass-on effect of SCEs is to drop prices or increase outputs (rather than investment), it is possible that some of these impacts would be double-counted by the uplift applied in TAG to direct user benefits to derive imperfect competition impacts.
- Employment effects (even negative effects from SCE): The research highlighted that there may be workforce implications of SCE. However, it is unclear whether the implications are positive or negative, depending on whether SCEs result in consolidated fleets/operations or expanded ones. Moreover, land-use changes may also result in changes to the distribution of the workforce. Considerations from the Stage 1 concerning the possibility of a reduction in GVA in rural areas based on the attraction of under-skilled employment has not been further investigated.

5.3 Research opportunities

Table 5-1 Future FWEI research opportunities identified

Key finding	Implication for future developments
No clear evidence that wider economic impacts for freight are a major gap in current appraisal when compared to passenger travel	Future development to be focused on better understanding of impacts and capturing of transmission mechanisms in the business case narrative

[14] Note that it is not entirely clear to what extent increased outputs from imperfect competition includes increased output from freight-related businesses. As this is an uplift that is usually applied to business benefits, this would depend on whether travel for business purposes includes trips that are not freight related but affect businesses with a strong freight component.

Indication that supply chain efficiencies are only partially captured by the updated Value of Time, with possible gaps in relation to long-term changes in behaviour and impacts related to market failures	Additional research into supply chain efficiencies and market failures (Access to Goods) Additional research into behavioural responses to stated preference surveys and "what's in the VOT"
Direct and indirect impacts in the freight sector require multiple conditions to materialise	Clarify sets of conditions to support case-makers in preparing their strategic/econ cases
Road improvements are a secondary driver of land use change decisions. Land use changes take time to materialise. Some areas or interventions may make interventions more likely (e.g., combined road & rail); areas with lower taxes.	Follow-on deep-dives on specific types of interventions/areas
There is an outstanding evidence gap to understand employment effects arising via the freight & logistics sector	Consider application of IO tables Deliver additional research to measure changes to fleet sizes and intensity of usage via Logistics UK or other data
Isolated road improvements may be less important than corridor wide improvements, although this may be quite context specific.	Repeat EPIRE-like study at corridor level

5.4 Potential research opportunities

Notwithstanding the gaps above, the research has also highlighted a few potential low-hanging fruits in terms of possible future research steps:

- EPIRE-based research using corridors as unit of analysis
  The research indicated how freight operators' decision-making is more centred around corridors than individual case-study locations. The research could be repeated changing the unit of analysis.

- Alternative ATEM-like research
  It might be worth considering repeating the research which derived agglomeration elasticities but using VOA data for 'access to logistics facilities' rather than ATEM-based regressions. This would capture the proximity of goods rather than people (as ATEM is based on employment areas coming closer together).

- Follow-up with existing contacts
  Warm contacts from Stage 2 could be engaged again to deepen certain areas of the research, especially around evidence gaps. It should also be noted that a Trade Body, Logistics UK, presented to the consortium interesting survey data gathered across their members providing detailed breakdowns of wage, warehouse, fleet, and other costs which could be used as part of future SCEs research.

5.5 Long list of possible research pathways

Considering the research opportunities highlighted in the previous section as well as the findings from Stage 2, a long list of possible research pathways was developed. Three different purposes were considered for future research:

- **Immediate improvement of the strategic case**: how best to use the findings from this research complemented by available literature to provide stronger narratives on how to unlock benefits for the freight sector through the implementation of road improvements
- **Long-term improvement of the strategic case:** how to increase the evidence base for specific types of intervention (road-rail projects) or geographies with reduced market frictions or greater incentives (e.g., freeports/ports) for land-use change to enable more context-specific evidence to be available to support a stronger strategic case narrative
- **Strategic and economic case improvement**: how to develop more evidence to support the definition of criteria for when certain benefits apply and how new benefits could be estimated.

Based on this, the following long list of possible pathways was developed:

Table 5-2 Long list of proposed research pathways

Research pathway	Objective
• Creation of a short guide based on the existing findings from Stage 2 research and / or additional evidence to help appraisers sift the conditions required for freight impacts to materialise and include them in the strategic case or economic narrative	**Immediate improvement of the strategic case**
1. Follow-on deep dives on certain types of impacts or areas of intervention which interviews cited as being potentially more transformative, in order to capture additional insights on which kind of projects might be more impactful on freight (e.g., combined rail and road interventions)	**Long-term improvement of the strategic case**
2. Behavioural research on what VoT Stated Preference responses are likely to capture (acknowledging the theory is 'anything that happens with no market failures' – but also previous research showed respondents are potentially irrational agents with imperfect foresight and inability to fully capture long-term operational value of travel time changes in their SP responses, meaning TAG might be undervaluing impacts), further exploring long-term behaviour changes	**Strategic and economic case improvement**
3. Repeating existing DfT 'EPIRE' research to study corridor-level effects rather than scheme-level effects focusing on freight-related sectors	
4. Refining agglomeration benefits by attempting to work on the same line as Dan Graham's agglomeration work replacing the 'Access To Economic Mass' (i.e., proximity of employment areas) with 'Access To Goods' (i.e., proximity of where manufacturing or storing facilities are, controlling for their capacity) to measure supply-chain efficiencies and land-use change productivity or output levels impacts for the freight & logistics sectors. Potentially consider access to	

supplies / markets. This may be already partly (or fully) captured in the existing agglomeration effects though.	
5. Dependent on getting output levels effects on point 5 above, further research into the Industrial Organisation dynamics to understand how far down the supply chain value of time savings result in operational efficiencies and the role of market failures	
6. Further deep dives to study employment effects of SCEs – note we are still exploring Logistics UK data accessibility from their members including driver, vehicle, and warehousing costs.	

Note that these options listed above do not contain options related to further research of land use changes. This is because the findings from this work demonstrate that land use change decisions are very long-term and not primarily driven by road investments, instead they are the result of a wide range of factors. As a result, no quick or easy methodology different to models recommended in TAG's supplementary guidance is considered to be feasible for freight-only land use change impacts.

5.6 Shortlisted research pathways

A workshop was held with the panel of experts on the project and DfT to discuss the prioritisation of the long list. Option 1 with some elements from option 2 were selected as the high priority options as next steps to improve TAG. This is because:

- There is a clear need to improve the strategic and economic narratives with respect to freight in road improvement business cases
- It was discussed with the panel of experts that the updated value of time in the forthcoming TAG guidance (May 2026) is likely to capture a significant extent of SCE impacts. Despite the fact that the research that produced that value states that some long-term impacts may not be captured, it was agreed that it is probably best to assume for now that the updated value of time captures all impacts assuming no market failures.
- The EPIRE work already undertook significant work in estimating econometrically the impacts of road schemes, therefore there is no strong rationale for further econometric work at this stage.
- There is separate ongoing work on agglomeration benefits being undertaken by DfT. It was suggested during Stage 1 of this research that agglomeration benefits are currently missing two important freight-related sectors: agriculture and mining, with the recommendation that this is further explored as part of ongoing research undertaken by DfT. Although potentially exploring access to goods or markets measures is considered an interesting research avenue, it is likely to result in some double counting with current agglomeration benefits.
- While it would be helpful to dig further into the Industrial Organisation Dynamics to capture the conditions, under which direct benefits are passed on through the supply chain, the point at which pass-on is restricted – creating scope for wider impacts - may be location- and time-dependent. Therefore, while this research would enable us to better understand when wider impacts are more likely, generalisable conclusions may be difficult to draw. In addition, these wider impacts might be captured *de jure* by

the OCICM measure in appraisal, although *de facto* they may be missed due to how that measure is applied.

5.7 Proposed methodology to develop a short guide for an FWEIs strategic and economic narrative

This section provides a proposed methodology for the shortlisted option of developing a short guide with evidence to help appraisers sift the conditions required for freight impacts to materialise and include them in the strategic case or economic narrative.

5.7.1 Research purpose

The purpose of the short guide is to provide clear guidance to business case practitioners on how to demonstrate that freight related businesses will benefit from a specific road investment through a clear, evidence-based and coherent narrative. This guide would be used in the Strategic Case but would also support the Economic Narrative that underpins the Economic Case.

5.7.2 Overview of research

To produce a short guide, the following steps are suggested:

- Collating / summarising evidence on the conditions that drive wider economic impacts of freight.
- Setting out a method on how to validate whether these conditions exist locally
- Pilot criteria and methodology on different schemes with approval / failed approval to provide a case study to be included in the guidance
- [optional] further deep dives into topics
- TAG unit drafting on freight wider economic impacts

More detail on these steps is provided below.

5.7.2.1 Step 1: Identifying conditions that drive wider economic impacts of freight

Evidence from Stage 2 indicates that freight wider economic impacts do not arise automatically from road investments, but depend on a specific combination of conditions. In particular, impacts are more likely where interventions deliver sustained, corridor level improvements in journey time reliability and/or travel times that are sufficiently large to enable firms to reorganise operations, rather than marginal savings on isolated links. The research suggests that proximity to the Strategic Road Network, frequency of corridor use, and the time-sensitivity of goods transported are key enabling factors.

Firm characteristics also play an important role. Larger and better resourced freight and logistics operators are more likely to adjust routing, fleet utilisation, and inventory management in response to improved network performance, while smaller firms often face capital, contractual, or organisational constraints that limit their ability to respond. Market context further conditions outcomes: highly competitive segments with thin margins may realise operational efficiencies without translating these into observable changes in output, employment, or land use.

A key implication is that future appraisal and business cases should move away from generic assumptions about freight benefits, and instead focus on demonstrating whether these enabling conditions are present in the local and corridor context. This provides a more robust basis for identifying when freight wider economic impacts are plausible and when they are unlikely to materialise.

To define these conditions, we suggest:

- Producing a short summary of the conditions identified in this study which can serve as an annex to the TAG unit. These conditions are likely to include:
  - Size of road investment and time savings resulting from it
  - Presence of different freight-related sectors
  - Share of firms by size
  - Presence of anchor institutions such as ports, airports, industrial clusters
  - Quantity and density of freight-related businesses that will benefit from the improvement

  For each of the conditions above, the summary should set out how these conditions drive wider economic impacts of freight, for example:

  Size of road investment and time savings → Time savings greater than ~15 min are required for wider economic impacts on freight to materialise

We suggest that in addition to using evidence from this study, which has important limitations related to the number of interviews and surveys collected, additional evidence from other studies including the EPIRE work is considered.

5.7.2.2 Setting out method for how to validate whether these conditions exist locally

Building on the above, the proposed approach emphasises the need for proportionate, descriptive data analysis to validate that the conditions exist in the context of a particular scheme. Practitioners should be encouraged to assess whether the necessary conditions for freight wider economic impacts exist using readily available evidence, including scheme objectives, appraisal findings, freight flow data, and qualitative intelligence from industry stakeholders.

Validation should focus on questions such as: whether the scheme delivers material improvements in reliability or corridor-level travel times; whether the corridor serves a high concentration of freight and logistics activity; and whether the types of businesses using the corridor are operationally positioned to respond. Engagement with freight operators, ports, and trade bodies can provide valuable insight into how improvements are perceived and whether they are likely to influence operational decisions, although this may not be feasible in each business case.

To do this, the following evidence could be considered:

- Economic modelling evidence on expected journey time savings per trip and the extent of the spatial area benefitting from journey time savings
- Publicly available statistics from ONS (e.g. Business Employment and Register Survey) on business and employment by sector
- Desktop research on proximity of key institutions / anchor organisations in the catchment area
- Evidence from stakeholder engagement

This data will provide evidence to determine which conditions apply to justify claiming wider economic impacts for the freight sector in a business case. This is particularly important where these benefits form part of the strategic narrative of a business case.

5.7.2.3 *Pilot criteria and methodology on different schemes with approval / failed approval to provide a case study to be included in the guidance*

The following step in the methodology consists of testing the criteria and evidence gathering approach developed on real projects. This would ensure that we have a tried and tested approach and confidence in the methodology provided to obtain an output that is fit for purpose, i.e. that are really helping improve the narrative in the business case. Case studies also help provide clarity on what the expected output should look like.

We suggest that real life projects could include both projects that were implemented and projects that did not obtain funding approval. As a priority, projects that mention freight in their existing business cases should be chosen as case studies.

Examples of unsuccessful business cases where freight wider impacts were a key part of the Strategic Narrative include the cancelled A5036 Port of Liverpool Access scheme in which a dual carriageway was intended to support increased freight traffic through the on-going development of Liverpool2. In contrast the A160/A180 Port of Immingham Improvement scheme did proceed and had objectives around reducing traffic congestion related to freight ferries. There are a number of major schemes in the current programme for National Highways, such as the A66 Trans-Pennine and the A46 Newark Bypass in which understanding the freight impacts are likely to be key to the business case. Logistics UK, a stakeholder consulted during this research, also mentioned the A303 scheme and the A1 dualling in Northumberland, also it is noted that significant supplementary modelling was conducted for the A303 project.

For each case study, the following steps are recommended:

- Review references to freight sector included in the existing business case
- Undertake data collection and analysis to establish which conditions and criteria are present that would provide evidence for the existence of freight wider economic impacts
- Based on data analysed, develop a narrative that explains how the freight sector is likely to benefit from the scheme considering both direct and wider economic impacts, including reference to potential market failures.

The case study output should be a 3-5 page narrative including evidence collected.

5.7.2.4 *[optional] further deep dives into topics*

To provide further evidence on how freight wider economic impacts may materialise, the DfT may also choose to commission further research into particular types of road investments. Through this study, we found the following potential topics of interest:

- Combined rail-road schemes, as these are more likely than road only schemes to lead to transformative impacts
- Corridors with a high density of freight related businesses
- Definition of accessibility and questions about differentiating impacts around land use and productivity

5.7.2.5 *TAG unit drafting on freight wider economic impacts*

The final step in the approach would include bringing it all together in a new TAG unit that is clear, user-friendly to deliver tangible improvements to business cases. An alternative approach would be to update existing TAG units, including units A2.1 and 2.2 on wider economic impacts, setting out more clearly the conditions where market failure or distortions are more likely to justify the appraisal of wider economic impacts.

A key point to note is that an existing TAG unit exists on capturing local context in transport appraisal, including three case studies, published in 2021[15]. This guidance focuses on demonstrating how scheme promoters and business case practitioners can provide insight into the local context to help them make the case for a particular investment. At the time, the main purpose of this guidance was to address concerns captured in the Green Book Review conducted in 2020 relating to insufficient engagement with the strategic context in the economic appraisal. This guidance including case studies makes no explicit reference to freight, highlighting a notable gap, although these are indirectly referenced (e.g. there is a reference in one case study to "just in time" supply chains as well as manufacturing businesses). This is particularly striking given that the first two case studies included are road improvements located near a port.

In this context, a possibility would be to update this guidance in the context of the latest Green Book review (2025) and new Green Book (2026) including a freight specific chapter and a case study, setting out the key conditions to analyse, how to do it and a specific example. This could be included under the section on wider economic impacts. Existing case studies could also be enhanced to explicitly mention how passenger and freight travel impacts could affect wider economic impacts. Alternatively, a standalone TAG chapter could be produced focusing on freight narrative only.

Regardless of whether this guide becomes a standalone TAG chapter or part of a revised TAG chapter on local context, it is recommended that it is kept live and revisited periodically as more evidence is gathered in the future.

[15] DfT (2021), Capturing local context in transport appraisal case studies. Available at: https://assets.publishing.service.gov.uk/media/6098ef45e90e0735799d7ebc/capturing-local-context-in-transport-appraisal-case-studies.pdf

6. Conclusions and next steps

This Stage 2 research provides new insight into how road freight investments can generate wider economic impacts, including evidence under what conditions those impacts are likely to materialise. Building on the evidence gaps identified in Stage 1, the analysis has focused on two priority mechanisms: supply chain efficiencies and land-use change. Across interviews, survey responses and secondary data, the findings consistently suggest that supply chain efficiencies are the primary and most immediate channel through which freight wider economic impacts arise, while land-use change is less frequent, slower to materialise, and more strongly shaped by wider market and planning constraints.

The evidence shows that improvements in journey time reliability and sustained, corridor level travel time savings can enable freight and logistics operators—particularly larger firms and those serving time sensitive sectors—to reorganise operations. These responses include changes to routing and scheduling, improved vehicle utilisation, reductions in safety stock, and, in some cases, expansion into new markets. However, the research also demonstrates that these effects are highly context dependent. Road improvements are typically a secondary driver of organisational or locational decisions, with customer demand, land availability, labour constraints and investment cycles playing a more dominant role.

Importantly, the findings suggest that many observed supply chain responses may already be captured within Level 1 benefits, particularly in light of the forthcoming update to freight values of travel time and reliability. Additional wider economic impacts are most likely to arise where transport improvements help overcome identifiable market failures, such as coordination failures across supply chains, labour market frictions, or capital constraints that prevent firms from fully realising productivity gains. This reinforces the need for careful consideration of additionality and the avoidance of double counting when developing appraisal approaches.

Looking ahead, the results point towards a proportionate and evidence led pathway for future TAG development. Rather than seeking to monetise freight wider economic impacts through complex modelling, there is clear value in strengthening strategic and economic narratives by setting out the conditions under which freight impacts are likely to occur, and by providing practical guidance to casemakers on how to evidence these conditions locally.

The next stage of work should therefore focus on distilling the findings of this research into a concise, usable guide for practitioners, supported by case study examples and clear links to existing TAG units. Specifically, a recommendation is provided to update the TAG chapter on capturing the local context. This approach would allow freight impacts to be reflected more consistently and transparently in business cases, while remaining aligned with the principles of proportionality, robustness and additionality that underpin transport appraisal.

A.1 References

DfT, 2025. Evaluating economic performance impacts of road enhancements.

National Highways (2024). A14 Cambridge to Huntingdon Improvement Scheme – One-year Post-Opening Evaluation, available at https://nationalhighways.co.uk/media/1tyov5fw/a14-cambridge-to-huntingdon-1-year-post-opening-project-evaluation.pdf.

National Highways (2024). M25 Junction 30/A13 Corridor Enhancement – Five-year Post-Opening Evaluation. National Highways, available at https://nationalhighways.co.uk/media/j0fn5wle/m25-j30_a13-corridor-enhancement-five-year-post-opening-evaluation.pdf.

National Highways (2023). M62 Junctions 25–30 Smart Motorway – Five-year Post-Opening Evaluation., available at https://nationalhighways.co.uk/media/2lwdsh14/m62-junctions-25-to-30-five-year-post-opening-project-evaluation.pdf.

A.2 Interviews Topic Guide

Contextual factors around broader trends in freight and logistics
• How have changes in the wider economy affected freight and logistics? E.g. – the rise in online shopping and changes in customer behaviour? – international trade changes—like tariffs, outsourcing, or supply chain disruptions • When you make decisions about things like warehouse size or location, how much do past investments or existing infrastructure influence your choices? • When you notice/implement changes in your operations including location of business activity, how much of that is directly because of better transport infrastructure versus external factors like market trends or regulations?
The organisation (size of firm and market conditions)
• Do you think the size of your company—like the number of trucks, warehouses, or employees—affects how much you benefit from better roads? • What factors, like finances, technology, or regulations, make it easier or harder for your company to take advantage of improved transport infrastructure? • In your experience, which parts of the freight and logistics industry—like parcel delivery, last-mile delivery, or general distribution—are the most competitive? Why? • Do you think all companies in freight and logistics benefit equally from transport improvements, or does it depend on the type of business or market conditions? • At what point do you think better transport infrastructure starts to increase competition in your industry? Is it about the location, the scale of improvement, or something else?

- How far away from a transport improvement—like a new highway or upgraded road—do you think businesses start to see real benefits? Do these benefits depend on other factors, like reliability or network connections?

Impacts of the road improvement

- What benefits to your business have you noticed from the road improvement (details of specific road improvement)?
- Have you made changes to your operations—like fleet size, warehouse location, or delivery processes—because of better transport infrastructure and connectivity? If so, what kind of changes?
- What SCE and LUC impacts are likely to occur first based on your business decisions? Please describe the most prominent / important impacts within these impact categories. Do these vary by sector / types of goods transported? Are SCE and LUC impacts variable depending on firm size (e.g. fleet size, turnover, number of depots/warehouses, number of employees)?
- How significant do time savings from improved road infrastructure need to be for you to start implementing changes in your operations or business decisions? What is the minimum travel time saving before your business implements any Supply Chain Efficiency (SCE) and/or land use change impacts such as relocating to a different place or investing in expanded warehouse facilities? Suggest 5 aspect tick box <5 minutes/5-10 minutes/10-20 minutes/ 20-30 minutes/ >30 minutes
- When you make changes, like relocating warehouses or adjusting operations, how much of that is directly due to transport improvements versus other factors like market demand or regulations?
- How near would a TI improvement need to be to one of your sites for you to note SCE changes or consider LUC?
- What operational, financial and/or institutional factors limit firms from capitalising on travel time savings and delivering SCE/LUC impacts?
- Can you rank the following factors in order, reflecting the one that has had the most effect on your business decisions including those related to SUC and LUC over the past 5 years, at the top and the one with least effect at the bottom?
  - 1. Changes in customer behaviour have affected the supply chain e.g. internet shopping
  - 2. Change in the international trade from Brexit
  - 3. Change in the international trade from imposition of additional tariffs
  - 4. Increases in land prices
  - 5. Increases in operational costs
  - 6. Shortages of skilled labour / HGV drivers
  - 7. Road improvements
  - 8. Other factors – please specify

- Do you have any examples where transport interventions elsewhere have led to organisational or locational changes? If so, please describe the location and the outcome.

A.3 CoStar data analysis details

All CoStar data are recorded in quarterly basis, and the analysis periods are split into three periods: Before, Under Construction and After. The Under Construction period is determined by the corresponding quarter of the start and finish date reported in the POPE. To ensure a symmetric comparison, the number of periods in the pre- and post-intervention windows is kept the same. For example, if eight periods are available after the completion date, only the eight periods immediately preceding the start date are retained for analysis.

A centre point is chosen for each case study site and all the properties within the 15km radius of the centre points are captured for analysis. The dataset is filtered by construction status and property type. Only industrial and light industrial properties that are either existing or under construction are included in the analysis. Average values of these metrics are calculated for the Before and After periods.

They are then compared against the regional average, which are selected in CoStar by manually choosing a broader area. A screenshot of the regional area boundaries chosen for each case study is shown below:

Figure 6-1: A13 Regional average boundary

Figure 6-2: A14 Regional average boundary

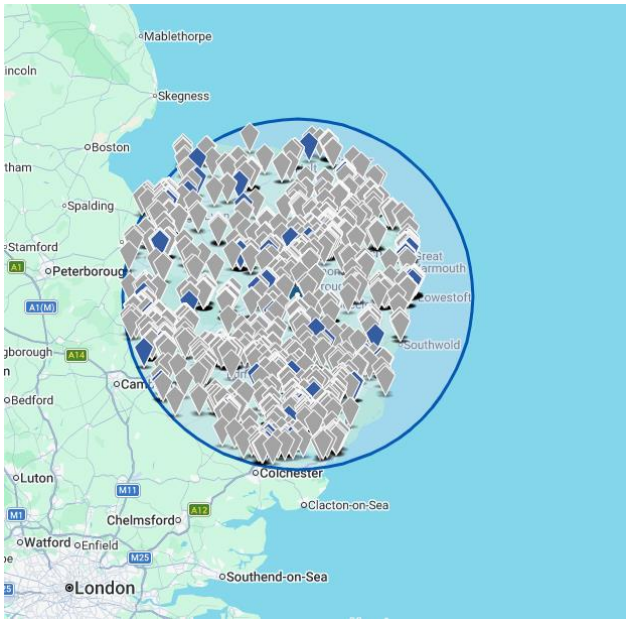
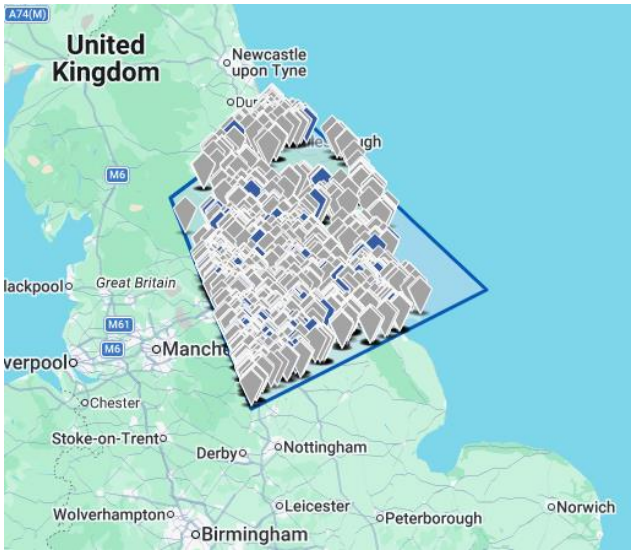


Figure 6-3: M62 Regional average boundary



One limitation for this method is that the regional average is determined without going through any official classification, which might risk violating the parallel trend assumption.

A.4 Original Stage 2 methodology note

Data Gathering and analysis approaches

A.4.1 Lead approach: interviewing

As agreed at end of Stage 1, the current evidence gaps on the WEIs of freight require further understanding of how those impacts materialise in practice to fill in current gaps in both theory and evidence. The qualitative analysis of interviews with relevant organisations such as freight and logistics firms is considered to be the most relevant activity to fill in those gaps.

Proportionally to the budget agreed for Stage 2, the consortium aims to complete up to 45 interviews equally distributed across the 3 case study areas. The approach to sampling, recruitment, and designing of topic guides for this workstream, alongside a brief discussion of the expected outputs, is outlined below.

A.4.1.1 Criteria for selection of the interviewee organisations (sampling)

The consortium experience with DfT road freight statistics shows that there are important variations within the freight and logistics industry which need to be reflected in the sampling of interviewees and captured in the analysis. For example, some commodities have a much higher value than others such as automotive parts compared to domestic waste. Urgency of delivery and whether a movement is part of a 'just-in-time' supply chain has a bearing on optimising journey time.

Although the SRN is only around 4% of our national road network National Highways estimate it carries over 60% of the total freight traffic. Part of the reasons for this is that motorways in particular allow the fastest driving speed for Heavy Goods Vehicles (56mph) and in normal conditions the quickest journey time. Some commodities that travel the furthest and most time dependent are more reliant on the SRN than others. So for example HGVs carrying food, post/parcels, palletised goods and engineering parts are more SRN reliant sectors.

Operators serving a local market may make use of a road segment multiple times per day with the same vehicle, while those service international markets might only make use of it once per day. All of the above may result in different approaches to responding to changes in transport infrastructure.

Considering the above, sampling design needs to account for the variation of interviewees across both across and within case studies.

Across the case studies, the consortium expects to engage with organisations involved with different types of freight moved (for example, whether goods are moved through Ro-Ro (Roll on/off) or Lo-Lo (Lift On/Off) procedures[16]), the way they travel to/from the UK (e.g., port, aviation), and the sectors served (some case study areas may see more food and agriculture products being moved than others).

The advisory board expertise with the case study areas will help guiding the identification of representing characteristics for each area which will shape the sampling. Sectors will also be prioritised based on past DfT and consortium research on the reliance of industries on the Strategic Road Network (SRN). Indeed, some commodities that travel the furthest and most time dependent are more reliant on the SRN than others. For example, HGVs carrying food, post/parcels, palletised goods and engineering parts are more SRN reliant sectors. BRES data analysis has also been completed to identify the largest sectors by employment in the LSOAs within a 25km diameter of each intervention to sense-check, which the consortium expects to need a higher proportion of freight & logistics services to operate.

[16] See Port freight statistics: notes and definitions - GOV.UK.

Our proposed approach to sampling organisations within each case study includes:

- **Trade organisations** (1 interview): these are going to be helpful to understand the commercial context of each area and identify key freight and logistics firms affected by the intervention. These interviews are also going to help understanding the relevance of interviewing businesses which do not have warehouses in the surroundings of the intervention but may still make use of it for long hauls.
- **Anchor organisations** (1 interview): these are organisations and institutions which make clear usage of an improved piece of transport infrastructure, such as ports or airports near an intervention area and would be easy to sample.
- **Freight and logistics clients** (1-2 interviews): manufactures and retailers may both be directly involved with freights and logistics of goods they produce or sell, but they may also be mostly reliant on external organisations. For this group of interviewees, we would target organisations falling in the latter case to understand from a client perspective whether infrastructure changes resulted in different commercial outcomes or relationships with freight and logistics organisations.
- **Freight and logistics businesses** (11-12): these organisations would provide the core of the evidence to understand SCE and LUC impacts. As shown in the annexed longlist of potential case studies, however, the number of target interviews would only represent a tiny fraction of the overall number of businesses in the surroundings of an intervention. The sampling of organisations for each break down would therefore be guided as much as possible (beyond contact availability) by information such as:
    - Data on most frequent segment users (most likely relevant for larger businesses) – from existing research such as a previous M62 analysis by AECOM.
    - The location of providers of the goods moved (for example, there is a limited number of known mills businesses in the UK which are going to be involved with significant movements of wheat; mills nearby an intervention of interest could be engaged with).
    - Examination of prior research for the area (DfT, National Highways, Arup, AECOM).

As far as possible based on the resulting shortlisting of organisations, sampling will also target a balance of the following characteristics (ideally respected in each case study, or distributed across case studies if it is not possible):

Table 6-1 Summary businesses interview sampling approach

Market served / Size (e.g., turnover, employment, or warehouse surface)	Local: 6-8	Regional: 3-5	National/International: 1-3
Large: 6-9	3-4	2-3	1-2
Medium: 1-3	1-2	0-1	0-1
Small: 1-3	1-2	0-1	0-1

Within the categories above, the consortium would also seek to sample businesses in different parts of the supply chain (manufacturers, storer, retailers – delivering freight & logistics in-house) and facing different time-sensitivities (e.g., organisations in the General Haulage Pallet Network, which need speedy deliveries, versus else).

A.4.1.2 Approach to the engagement and management of interviewee organisations (recruitment)

The plan is to use the experience of project team members who have engaged with the freight sector over many years. Indeed AECOM's Freight Team has several former hands-on transport practitioners who are familiar with freight transport operations and decision making. AECOM will therefore work as engagement lead for the Stage 2 research, recording progress over contacting and interviewing shortlisted organisations in an engagement tracker.

The first step will see AECOM reaching out to existing Trade Organisation contacts for early interviews. The consortium expects these organisations to be in the position to share further details from member organisations and other stakeholders like anchor institutions for the follow-up interviews.

It should be noted that the target number of interviews does not place a limit on the number of attendees per interview. For larger organisations, there may be a need to approach two different departments, for example, staff from Operations with a knowledge of vehicle planning and routing plus staff from a Strategic planning / business development background.

Upon finalisation of the case studies, the following text will be circulated to key contacts:

> *We hope you are well. We are reaching out on behalf of our consortium of Arup, AECOM, Grant Thornton, and Imperial College London as part of a confidential study for the Department for Transport.*
>
> *Our project will support decision-making for infrastructure projects which might have an impact on the freight and logistics industry and we hope to engage with relevant trade organisations and businesses on the field to gather first-hand insights and shape our research.*
>
> *We are aiming to interview key trade organisations and businesses in the freight and logistics sector as part of our research. In this context, we would like to ask if your organisation would be interested in taking part in interviews, and / or whether you could share any contacts beyond your organisation to identify other suitable interviewees, particularly across key businesses. Interviews would take place over the next month. We will share further details once you confirm your interest.*
>
> *We hope to hear soon from you and thank you in advance for your support.*

A.4.1.3 Criteria for the composition and tailoring of interview questions (topic guides analysis plan)

Our approach recognises that a flexible approach will be required across the 45 target interviews that reflect the characteristics and knowledge of different interviewees and variation across the three case study areas. This approach is grounded in:

- Asking broadly the same questions in each case study area (though tailoring this by trade association and freight/logistics organisation etc and with specific tailoring for 'anchor institutions'; manufacturers vs retailers vs warehouses; and for size/market served (international vs domestic) or by industry.
- Exploring how the differences among case studies can explain the different answers such as smaller time savings, density of businesses, etc.)

Our questions will be shaped by the hypotheses and research questions set out in section 2. However, we will tailor these to be accessible to the interviewees. Translating technical research questions into user-friendly ones will be essential for engaging conversations with the interviewees working in freight and logistics operations. This will encourage interviewees to share their practical experiences and observations and focus on relatable aspects of day-to-day operations and decision-making in freight and logistics.

We anticipate that each interview will begin by exploring the contextual factors around broader trends in freight and logistics, before moving onto understanding the organisation (such as the size

of the firm and the market conditions it operates it in before focusing on the specific case study / road improvement and understanding its potential impact on commercial decision making).

The proposed list of questions is presented below. These questions will be incorporated into a topic guide with an introduction to the project and the interview instructions for use during the interviews. **Contextual factors around broader trends in freight and logistics**
• How have changes in the wider economy affected freight and logistics? E.g. – the rise in online shopping and changes in customer behaviour? – international trade changes—like tariffs, outsourcing, or supply chain disruptions • When you make decisions about things like warehouse size or location, how much do past investments or existing infrastructure influence your choices? • When you notice/implement changes in your operations including location of business activity, how much of that is directly because of better transport infrastructure versus external factors like market trends or regulations?
The organisation (size of firm and market conditions)
• Do you think the size of your company—like the number of trucks, warehouses, or employees—affects how much you benefit from better roads? • What factors, like finances, technology, or regulations, make it easier or harder for your company to take advantage of improved transport infrastructure? • In your experience, which parts of the freight and logistics industry—like parcel delivery, last-mile delivery, or general distribution—are the most competitive? Why? • Do you think all companies in freight and logistics benefit equally from transport improvements, or does it depend on the type of business or market conditions? • At what point do you think better transport infrastructure starts to increase competition in your industry? Is it about the location, the scale of improvement, or something else? • How far away from a transport improvement—like a new highway or upgraded road—do you think businesses start to see real benefits? Do these benefits depend on other factors, like reliability or network connections?
Impacts of the road improvement
• What benefits to your business have you noticed from the road improvement (details of specific road improvement)? • Have you made changes to your operations—like fleet size, warehouse location, or delivery processes—because of better transport infrastructure and connectivity? If so, what kind of changes? • What SCE and LUC impacts are likely to occur first based on your business decisions? Please describe the most prominent / important impacts within these impact categories. Do these vary by sector / types of goods transported? Are SCE and LUC impacts variable depending on firm size (e.g. fleet size, turnover, number of depots/warehouses, number of employees)? • How significant do time savings from improved road infrastructure need to be for you to start implementing changes in your operations or business decisions? What is the minimum travel time saving before your business implements any Supply Chain Efficiency (SCE) and/or land use change impacts such as relocating to a different

place or investing in expanded warehouse facilities? Suggest 5 aspect tick box <5 minutes/5-10 minutes/10-20 minutes/ 20-30 minutes/ >30 minutes

- When you make changes, like relocating warehouses or adjusting operations, how much of that is directly due to transport improvements versus other factors like market demand or regulations?
- How near would a TI improvement need to be to one of your sites for you to note SCE changes or consider LUC?
- What operational, financial and/or institutional factors limit firms from capitalising on travel time savings and delivering SCE/LUC impacts?
- Can you rank the following factors in order, reflecting the one that has had the most effect on your business decisions including those related to SUC and LUC over the past 5 years, at the top and the one with least effect at the bottom?
  - 1. Changes in customer behaviour have affected the supply chain e.g. internet shopping?
  - 2. Change in the international trade from Brexit?
  - 3. Change in the international trade from imposition of additional tariffs?
  - 4. Increases in land prices
  - 5. Increases in operational costs
  - 6. Shortages of skilled labour / HGV drivers
  - 7. Road improvements
  - 8. Other factor please specify
- Do you have any examples where transport interventions elsewhere have led to organisational or locational changes? If so please describe, state location and the outcome.

A.4.1.4 Application to a preferred case study

As already mentioned, the A14 is the main SRN route from the Port of Felixstowe to the Midlands and North. The CEO of the Port of Felixstowe has recently stated that nearly 1.5 million TEUs (twenty feet equivalent units) travel from the port to the Northern Powerhouse region. This all has to travel though East Anglia and the Midlands. Some of this moves by rail but there are still many HGVs using the SRN to do this. As there is a booking system at the port with hourly slots and fines, if a slot is missed, this tends to focus the mind of vehicle schedulers and their computerised vehicle routing systems. Similarly, some customers including some supermarkets and manufacturers also allocate time slots and issue penalties if they are missed.

The A14 is a recommended example for to high volume of freight, through a full 24 hours, The road scheme reduced the amount of delay incidents in some of the old intersections some of which dated back to before the A14 extended out to the coast

A.4.1.5 Expected outputs

- Infographic / updated logic map of SCE and LUC sub-impacts (by size of impact, likelihood of materialisation, or sequence of prioritisation)
- Diagram showing factors/barriers facilitating/blocking the materialisation or size of the SCE and LUC impacts
- Comparison across case study findings

- Strength of evidence assessment and commentary of findings against hypotheses/RQs

Complementary approaches: surveying and secondary data analysis

A.4.2 Surveying

A.4.2.1 Differences from interviewing

The interviews (detailed in section 4.1) and the survey make up the two stages of our proposed primary research approach. Both aim to explore how freight-related transport interventions generate Supply Chain Efficiency (SCE) and Land-Use Change (LUC) impacts.

However, the survey serves a different (yet complementary) purpose to the interviews. Interviews constitute the primary tool to uncover how firms perceive and respond to changes in reliability, connectivity, and travel times. The survey provides a means to assess the magnitude and significance of those responses at a high level.

It is unrealistic to expect statistically representative results from the survey, and its aim is essentially to test and validate the main themes that emerged from interviews. The purpose of this survey is to determine which mechanisms are the most recognised across sectors, and across locations.

Key characteristics and differences between interviews and the survey are summarised below.

	Interviews	**Survey**
Purpose	Explore how firms respond to better connectivity and reliability.	Assess how common those responses are across firms.
Depth	Detailed insights, small number of firms.	Broader coverage.
Outputs	Qualitative evidence on how/why change happens.	Indicative data on how often and where change occurs.
Main contribution to our study	Develop ideas and examples of SCE and LUC impacts.	Check how commonly observed these impacts, support hypotheses tested in quantitative analysis.

A.4.2.2 Criteria to assess the feasibility of 'meaningful' surveying and targets

A brief feasibility check will test if the survey can provide meaningful insights for each case study.

	Targets / Benchmark (evidence-based)	**How it will be checked**
Reachable population of respondents	Use trade-body and consortium members' networks to reach firms impacted by transport project under study. Aim: 10-20 responses per case study.	Use the Cambridge logistics-site dataset and ONS BRES to estimate corridor business counts and confirm contact routes.
Relevance to study area	Ensure that most respondents are operationally reliant on the improved corridor.	Include a short screening question and check firm locations within the corridor area.

Profile of firms	Achieve diversity by supply-chain role, firm size, and other key characteristics.	Target outreach using BRES data and expert input.
Engagement feasibility	Secure at least one local/sector partner willing to share the survey quickly.	Coordinate through consortium and stakeholder networks.
Operational delivery	Keep the survey short and open for 4 weeks, with reminders if needed.	Track responses and send reminders if required.

A.4.2.3 Considerations for the design of the survey and analysis plan

This section outlines how the short survey will be structured and analysed to complement the interviews and provide indicative evidence on Freight Wider Economic Impacts (FWEIs).

Survey design

The questionnaire will be short (around 10-12 core questions) and use mainly closed and scaled items, supported by a few short open comments. It will focus on the main impact pathways identified through interviews: *Supply Chain Efficiency (SCE)*, *Land Use Change (LUC)*, and broader contextual factors such as market demand, labour availability, costs, and regulation. Wording will be clear and neutral so firms of different sizes and sectors can respond easily.

Example topics will include recent operational changes (fleet size, warehouse space), the importance of transport improvements relative to other factors, and the conditions under which firms might expand, relocate, or reorganise.

Analysis plan

Survey responses will be analysed descriptively to identify key patterns rather than to produce statistical estimates. Findings will be compared across case studies (and firm types) to assess for consistency with interview, as well as to identify the mechanisms that are most often reported. Open-text responses will add qualitative depth, while cross-checks with secondary data (e.g. land-use or VOA data) will be used to assess the plausibility of emerging patterns.

(Specific survey questions will be finalised after the methodology workshop, based on the themes set out in Section C. Provisional questions are laid out below).

Avoiding double counting and overlaps

To avoid any overlap or double counting of freight benefits, the survey results will be interpreted only as evidence of mechanisms, and not as additional monetised impacts. In practice: 1) time and reliability effects will be treated as part of existing user benefits; 2) we are not adding any new monetised terms (e.g., clustering, density, reorganisation) beyond what TAG already includes through the imperfect competition uplift; 3) clustering and density will be viewed as explanatory mechanisms rather than additive effects; and 4) reported improvements in reliability or accessibility will be counted only once, even where they influence multiple outcomes.

Dealing with potential divergences between survey and interview results

Any discrepancies between survey and interview findings will be interpreted as evidence of heterogeneity or conditional mechanisms, not as validation failures. Where differences are significant, follow-up discussions with selected respondents could be put in place to clarify obtain more details on the context and underlying reasons.

A.4.2.4 Draft survey questionnaire

Note: Headers were intentionally left in this version of the questionnaire to provide a clear audit trail showing how each survey section maps onto research questions and hypotheses described in previous sections. Each question notes which RQ it is aligned with.

The Department for Transport and Arup invite you to complete this short questionnaire on the economic impacts of road infrastructure on the freight and logistics sector. Your input is highly appreciated and will provide significant value to ongoing research.

This survey relates specifically to three separate transport improvement delivered in the last 12 years, however other minor improvements may also have taken place on the corridor. We are interested in understanding the supply chain impacts and land use impacts (such as relocation of warehouse activity) associated with these improvements. These three schemes are:

- **A14 – Cambridge to Huntingdon bypass** (completed in May 2020)
- **A13/M25 Junction 30/ Congestion Relieving Project** (completed in March 2017)
- **M62 – TransPennine smart motorway** (completed in October 2013)

A. About your business / organisation (Background information)

1. Which of the following best describes your business?

- Freight transport
- Warehousing
- Logistics services
- Manufacturing / retail with logistics operations
- Other (please specify)

2. What is the approximate size of your firm?

- Micro (1-9 employees)
- Small (10-49)
- Medium (50-249)
- Large (250+)

Note: Q2 feeds into RQ2 as it enables an analysis of firm heterogeneity

3. Are your operations directly linked to one of the three main roads and location of selected transport improvements (A14, M62 or A13/M25)?

- Yes: the firm's main site(s) is located on one of these corridors
- Partly: some of the firm's activity cover this corridor but its main base is elsewhere
- No, but the firm is affected through supply chain via partners

B. Supply Chain Efficiency and Land-Use Change Impacts

4. Please select the transport improvement that has affected your business operations directly:

- A14 Cambridge to Huntingdon bypass
- M62 TransPennine smart motorway
- A13/M25 Junction 30/ Congestion Relieving Project

5. How much have you benefited from this transport improvement?

- Not at all
- Very little
- To some extent

- To great extent

5. Since the [transport improvement/intervention], has your business made any of the following changes? (Tick all that apply)

- Increased/Expanded fleet size
- Reduced/optimised fleet size
- Invested in increased warehouse and/or depot space
- Consolidated and/or relocated depots to different locations
- Changed delivery patterns and/or schedules
- No significant changes recorded

Note: Q4 provides a direct measure of SCE/LUC presence.

6. To what extent were these changes influenced by transport improvements (e.g., better travel times, reliability, or connectivity)?
Scale: 1 = Not at all, 5 = Major influence. *Evaluated on a Likert scale.*

7. Roughly how large would travel-time savings per trip need to be before your business would reorganise operations (e.g., expand fleet, relocate, consolidate depots)?

- <5 min
- 5-10 min
- 10-20 min
- 20-30 min
- >30 min

Note: Q6 aims to identify the threshold that is met to trigger SCE/LUC (see RQ1).

C. Competition, Firm Size, and Market Conditions (RQ2)

8. In your view, how competitive is your main market segment?
Scale: 1 = Not competitive, 5 = Very competitive*. Evaluated on a Likert scale.*

9. When transport costs fall, how is the benefit mainly realised in your firm/in your industry?

- Passed through to customers (lower prices)
- Retained as profit margin
- Used to invest or expand further
- Other (please specify)

Note: Q8 tests pass-through channel laid out in Hypothesis 3.

10. What are the main factors limiting your ability to respond to improved connectivity (e.g., to expand or reorganise)? *(Rank top 3)*

- Capital availability/ability to invest
- Planning or land constraints
- Labour/skills availability
- IT/infrastructure limitations
- Market demand
- Regulatory constraints
- None of the above

Note: Identifies enabling vs constraining conditions (link between RQ2 and RQ3).

D. Contextual and External Factors (RQ3)

11. Over the past five years, which of the following factors have influenced your operational or location decisions the most? *(Rank 1 (most important) to 5 (least)):*

- Customer behaviour (e.g., online demand)

- Land and property costs
- Labour and skills availability
- Trade or macroeconomic conditions (e.g., Brexit, tariffs)
- Road or transport improvements

Note: tests the relative weight of contextual frictions.

12. If your firm has not changed operations following the transport improvement, what are the main reasons that can explain it? *(Tick all that apply)*

- Transport improvements were too small / insignificant
- Market demand remained stable
- My firm was subject to land and/or planning constraints
- Long investment recovery periods
- Labour shortages
- Other (please specify)

E. Final Open Reflection

13. If a major transport improvement was to occur near your site, what single change (e.g., in travel time, reliability, or market access) would most encourage your firm to reorganise operations?

A.4.2.5 Considerations for the administration of the survey

The following practical considerations will guide the administration of the survey to ensure it is robust, proportionate, and aligned with DfT standards.

- **Target Respondents and Coverage:** Ensure inclusion of a representative mix of freight operators, logistics firms, and relevant local stakeholders across regions to capture diverse economic linkages.
- **Survey Mode and Practicality:** Use online surveys to maximise participation while limiting respondent burden.
- **Questionnaire Testing:** The questionnaire will be reviewed internally within the consortium, and the wording will be refined wording based on feedback. questions to confirm clarity on freight behaviour, cost impacts, and wider economic outcomes;
- **Data Quality and Confidentiality:** Apply consistent validation and quality-control checks, ensuring respondent data are anonymised and handled in line with DfT standards.
- **Fieldwork Management:** Coordinate timelines with the wider workstreams, monitoring response rates and ensuring sufficient coverage for robust quantification of impacts.

Survey plan

An indicative survey plan has been developed based on the number of logistics businesses identified within a 12.5km radius from the approximate location of each road improvement. The survey plan below sets out the target number of business responses assuming this total number of businesses represent the total business population of interest for each case study. The plan the identifies what response rate this implies. Based on the analysis presented in the table and our expectations around survey numbers, it is clear that we will be unlikely to reach the number of responses needed across each case study to draw significant findings at a case study level. Our focus will therefore be on getting sufficient responses to be able to draw findings across all case studies aiming for at least 150 responses to get to a 80% confidence level, ideally close to 250 to get to a 90% confidence level. This is likely to be challenging and we will be aiming to distribute the survey as wide as possible to get responses.

Table 6-2 Indicative survey plan

Case study	N. of logistics sites	Survey requirements	80% Confidence	90% Confidence	95% Confidence	99% Confidence
A14	181	N. of responses	87	109	124	143
A14	181	Response rate	48%	60%	69%	79%
A13/M25	807	N. of responses	137	204	261	366
A13/M25	807	Response rate	17%	25%	32%	45%
M62 (J25-30)	1,489	N. of responses	148	231	306	461
M62 (J25-30)	1,489	Response rate	10%	16%	21%	31%
All case studies	2,477	N. of responses	154	246	333	525
All case studies	2,477	Response rate	6%	10%	13%	21%

A.4.3 Secondary data analysis

A.4.3.1 Scope of analysis (complementarity/triangulation of qual evidence)

The secondary quantitative analysis will be used to test the linkages identified through interviews and survey work, providing a cross-check against the patterns observed qualitatively. This will help ensure consistency between reported behaviours and measurable trends in freight and logistics data. The analysis will also produce stylised facts (data-based observations on freight activity, floorspace, and travel-time patterns) that can inform hypothesis development and later modelling within the wider FWEI framework.

A.4.3.2 Method of analysis and outputs

The quantitative analysis will aim to present **before/after evidence** of how freight activity and property outcomes have evolved, rather than to produce detailed econometric modelling.

The analysis will follow the steps listed below:

- Using VOA floorspace data (2010, 2017, 2023) to summarise growth in warehouse and logistics capacity, supported by CoStar data to illustrate spatial and ownership patterns at regional or local-authority level (e.g., property size, average rent, vacancy rate).
- Analyse freight flow and network performance data (Freight Data Sources, Strategic Freight Network, *if possible* DABS) to capture changes in HGV intensity and travel-time reliability.
- Producing before/after tables for selected case-study areas compared with suitable regional or national comparators, showing changes in key metrics (floorspace, freight intensity, reliability).
- Using simple descriptive statistics and indexed time-series to show direction and scale of change.

- Benchmarking results against national trends to account for macro-economic and COVID-related effects, so that case-specific differences can be interpreted meaningfully.

Outputs:

- Concise tables and charts showing before/after changes in key indicators for each case-study area.
- A short analytical note summarising methods, results, and data limitations.
- A set of stylised findings linking travel time, freight activity, and property change, feeding into the wider FWEI analysis and modelling.

A.4.3.3 Data sources

An initial list of proposed data sources is presented below. We will also look at previous Arup and Aecom work and relevant data sources from those studies. Note we are still investigating potential additional sources and some of these sources like DABS are not confirmed.

Table 6-3 Proposed secondary data analysis data sources

Data source	Description
CoStar Property Database	Used to extract property-level data within a defined geographic radius. We plan to use this for trend analysis of key property indicators and potentially match ownership data with company databases to support sectoral insights.
Valuation Office Agency (VOA) Floorspace Data	Provides floorspace data by building type (e.g., warehouses) for 2023, 2017, and 2010. This will support time-series analysis around case study areas and help triangulate qualitative findings.
DABS Tool (Delivering a Better Service to the Road Freight Sector) (if available)	Developed by AECOM and Arup, this interactive mapping tool visualises freight flows, accident hotspots, logistics centre locations, and infrastructure gaps. It will be used to illustrate freight sector dynamics and inform recommendations.
Strategic Freight Network (HGV Flows on SRN)	Based on HGV traffic data where freight accounts for over 20% of inter-peak traffic. This will help define strategic freight corridors, with a focus on the M62 as a core EU-identified route. Insights will support infrastructure prioritisation and investment planning.

A.4.4 Risk register

An initial risk register has been produced to set out the risks of our proposed approach and how we plan on mitigating them. The highest risks are identified in relation to the proposed survey. The successful delivery of the quantitative analysis will depend on careful management of data, timings, methodological and stakeholder risks.

Table 6-4 Methodology risk register

Risk	Description	Severity RAG rating	Likelihood RAG rating	Mitigation	Post-mitigation RAG rating
Availability of organisations for interviews	Difficulty in securing interviews due to limited availability or	High	Medium	We have identified a number of contacts who we know well. We will reach out as soon as the case	Medium

Risk	Description	Severity RAG rating	Likelihood RAG rating	Mitigation	Post-mitigation RAG rating
	scheduling conflicts.			studies are confirmed and make the most of existing contacts.	
Presence of someone with historic memory	Risk that key individuals with institutional knowledge are unavailable or have left the organisation.	Medium	Medium	We will check in advance if individuals were around at the time of the scheme implementation	Low
Selection of industries within radius rather than usage	Risk that industry selection is based on proximity rather than relevance or actual engagement with the programme.	Medium	Medium	We will engage a balanced mix of industries based on ONS data analysis of existing sectors and other information on key sectors.	Low
Low participation from freight operators or regional stakeholders	Insufficient data for robust analysis	High	Medium	Targeted engagement through industry networks and follow-ups	Medium
Over-representation of certain freight modes or regions	Reduced representativeness and analytical validity	Medium	Medium	Apply stratified sampling and weighting adjustments; monitor response composition in real time	Low
Incomplete or inconsistent survey responses	Limited data leading to reduced reliability of results	High	High	Implement validation checks, pilot testing, and provide clear guidance to respondents	Medium
Limited engagement or fatigue among industry participants	Low response rates leading to weaker insights	High	High	Use concise survey design, communicate value and relevance, and leverage established stakeholder networks	Medium
Concerns about confidentiality or data protection	This may result in reluctance to participate or incomplete responses	Medium	Low	Guarantee anonymity and compliance with DfT data standards; be transparent about data use	Low

Risk	Description	Severity RAG rating	Likelihood RAG rating	Mitigation	Post-mitigation RAG rating
Limited data granularity or extraction limits (e.g., CoStar cap, VOA data being too aggregated)	Restricts sectoral analysis or elasticity estimation	Medium	High	Focus on trend-level insights and triangulate with qualitative evidence	Medium
Variability across datasets (e.g., differing years, units, definitions)	Reduces comparability and integration across data sources	Medium	Medium	Apply consistent classification mapping and document assumptions clearly	Low
Data access or licensing constraints	Delayed or limited analysis	Medium	Low	Coordinate within consortium early; confirm usage rights	Low
Unclear linkage between travel-time changes and economic outcomes	Limits robustness of quantitative conclusions	Medium	Low	Use indicative elasticity or correlation analysis supported by qualitative validation	Low
Interview and survey findings consistency	Risk that survey and interviews provide conflicting findings	Medium	Low	Use a couple of open questions in the survey to gain more insights on responses. Ask in the survey if people are happy to be contacted again to explore some of their responses further.	Low

A.4.6 Case Study Analysis

This appendix provides more detail on the data gathered on a long list of case studies to enable us to assess those against defined criteria and suggest an initial shortlist to DfT.

A.4.6.1 National Highways Post-Opening Evaluation Reports

Case Study	Source
A13 – London Gateway	M25 junction 30/A13 Congestion Relieving Project: Five-year post-opening project evaluation
A14 Improvements – Felixstowe	A14 Cambridge to Huntingdon improvement: One-year post-opening project evaluation
M27 – Portsmouth/ Southampton	**No post-opening evaluation found**
M20 Junction 10a	**No post-opening evaluation found**

A19 upgrades	A19 / A1058 Coast Road junction improvement: Three-year post-opening project evaluation
A453 – East Midlands Airport Area	• A453 Widening M1 Junction 24 to A52: One Year After • A453 Widening (M1 junction 24 to A52): Five-year post-opening project evaluation
M62 – Main East	M62 J25-30 Smart Motorway - One Year After
M6 – Main North	• M6 Junction 5 – 8 Smart Motorway: One Year After • M6 Junction 8-10a Smart (Managed) Motorway Scheme: Five Years After • M6 Junction 10a – 13 Smart Motorway: One Year After
A66 – Scotch Corner to Penrith route	A66 Long Newton Grade Separated Junction: Five Years After Study
A55 – North Wales Dual Carriage	**No post-opening evaluation found**
A160	A160 / A180 Port of Immingham Improvement - Five-year post-opening project evaluation
A120	A120 Stansted to Braintree: Five Year After Study

A.4.6.2 Case Study Summary

Case Study	Transport intervention	Evaluation: Journey Time Saved (POPE)	Completed Date	N. of Logistics Sites in 25km diameter (Cambridge Data)	Sqm surface area (Cambridge data)	Industry characteristics
A13 – London Gateway	**Congestion Relieving Project (Junction)**	**2.5 minutes journey time saved** on the M25 mainline **16 to 35 seconds increase** in journey time on the A13 between junction 30 and the A126	March 2017	807	4,124,740	International access Carries flows from the UK's biggest container port to the Midlands and North Also carries agricultural produce Experienced significant regeneration over the last decade
A14 Improvement – Felixstowe	**Huntingdon and Cambridge bypass**	**9-10 minutes decrease** in journey time in the peaks using the new A14 bypass	May 2020	181	775,717	Largest container port by volume in the UK Representing a major international gateway

Case Study	Transport intervention	Evaluation: Journey Time Saved (POPE)	Completed Date	N. of Logistics Sites in 25km diameter (Cambridge Data)	Sqm surface area (Cambridge data)	Industry characteristics
						Major strategic road link improvements connecting to Felixstowe
M27	M27 junction 4 to 11: Smart motorway	(Unclear; the Junction 3-4 Widening led to 8-10 seconds travel time increases)	2022	378	1,449,688	Southampton is the second biggest container port in the UK Portsmouth is a major international RoRo port serving Europe to UK traffic
M20 Junction 10a	New Interchange Junction 700M east of junction 10 over the M20	N/A	November 2022	112	370,488	Main route for RoRo business in the UK with between 7,000 and 10,000 HGV movements a day. Highest % of foreign registered HGVs in the UK
A19	Junction Work	Northern direction: **Over 7 minutes journey time saved** in the morning peak Southbound direction: **Over 4 minutes saved** in the evening	March 2019	836	3,962,933	Good location to capture industrial traffic, automotive traffic and some port traffic to the Port of Tyne or to Teesport.
A453	Widening from one to two lanes of a seven-mile section of the route between the M1 junction and the A52 in Nottingham	Journey times have fallen by a minimum of 18% The greatest saving seen in **Westbound journey times are during PM peak hour with a saving of over 8 minutes (41%)** Smaller savings are seen in the inter-peak	July 2015	608	3,318,150	Designated as an Inland “freeport” The UK aviation hub for several large parcel carriers that have dedicated freight aircraft. Likely that some HGVs serving the cargo hub at the airport will be carrying high value goods.

Case Study	Transport intervention	Evaluation: Journey Time Saved (POPE)	Completed Date	N. of Logistics Sites in 25km diameter (Cambridge Data)	Sqm surface area (Cambridge data)	Industry characteristics
		periods of 3.5 - 4.5 minutes				
M62	Smart Motorway	Eastbound journey times shows **over a minute's time saving** in the AM Peak Westbound journey times shows the highest level of savings in the PM Peak (21%), **5 minutes in the PM peak**	October 2013	1,489	6,625,786	West Transpennine freight artery (107 miles long) joining Yorkshire to Lancashire. Located on the TEN-T route from Eastern Europe to Ireland as it links the Port of Hull to the Port of Liverpool.
A66	Substandard junction replacement; Improving access to Durham Tees Valley airport	North-Eastern Direction: **55 seconds to 1 minutes 45 seconds journey time saved** North-Western Direction: **33-45 seconds saved.** South-Western Direction**: 30 seconds to 1.5 minutes increase** in journey time South-Eastern journey time**: 1 minutes 16 seconds to 4 minutes 31 seconds' increase.**	June 2008	382	2,369,114	Scheduled for upgrade to dual carriageway carries a lot of long distance freight as well as agricultural, quarry, construction material and food.
M6	Total (Junction 5-13) Smart Motorway	In AM Peak Hour, Northbound **journey time increases by 43** seconds while **Southbound journey time decreases by 393 seconds (6 minutes 33 seconds)**	February 2016	1,541	6,766,352	South freight artery from the Midlands to Scotland. A TEN-T route which is still relevant for European lorry drivers Longest

Case Study	Transport intervention	Evaluation: Journey Time Saved (POPE)	Completed Date	N. of Logistics Sites in 25km diameter (Cambridge Data)	Sqm surface area (Cambridge data)	Industry characteristics
		In Inter Peak Hours, Northbound journey time **increases by 135.2 seconds (2 minutes 15 seconds) while Southbound journey decreases by 7.6 seconds** In PM Peak Hour, Northbound journey **time increases by 272 seconds (4 minutes 30 seconds) and Southbound journey time increases by 44 seconds**				motorway in England
A160	Brocklesby Interchange - Dualling of final 3 kms into the Port of Immingham, Lincolnshire	Inbound direction (IB), journey times have remained longer than before construction in the inter-peak and evening peak. Outbound (OB), average journey time savings saw improvements of between 25-45 seconds in the morning and evening peaks respectively	March 2017	154	915,018	NA
A120	Dualling of route from Stansted to Braintree, Essex and towards the Port of Harwich	The scheme has reduced journey times over all times periods and both direction, equating to an **average improvement of around 11 - 12 minutes**	July 2004	113	360,139	NA

Case Study	Transport intervention	Evaluation: Journey Time Saved (POPE)	Completed Date	N. of Logistics Sites in 25km diameter (Cambridge Data)	Sqm surface area (Cambridge data)	Industry characteristics
		A saving of 17 minutes is observed for westbound traffic during the AM Peak and a saving of nearly **14 minutes in the opposite direction during the PM Peak, experiencing a total of time savings of up to 30 minutes per day**.				