steer davies gleave

A14 Study Output 1

Department for Transport

Report

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Prepared by:
Steer Davies Gleave
28-32 Upper Ground
London, SE1 9PD
+44 (0)20 7910 5000
www.steerdaviesgleave.com

CONTENTS

FIGURES

TABLES

APPENDICES

Executive Summary

Context & Background

1. The A14 is part of the Strategic Road Network. It is a strategic east-west corridor of national importance and provides access to the Haven Ports. The road is also a designated Trans-European Network (TEN) route. The A14 between Huntingdon and Cambridge is also an important north-south route linking the Channel Tunnel and Dover, Kent, Essex and east London to the East Midland, Yorkshire and the North East. This section is also of importance for more local journeys between Cambridge and its wider catchment area towards Huntingdon and beyond. The road is characterised by significant including congestion and delays, which brings associated economic, environmental and social costs. Proposed housing and employment growth in the A14 corridor would increase traffic on the A14 and growth in strategic traffic is forecast. As a consequence, without intervention the economic, environmental and social costs associated with the route are anticipated to worsen.

2. To address these anticipated problems, the Highways Agency promoted the £1.2bn Ellington to Fen Ditton capacity improvement scheme. As part of the 2010 Comprehensive Spending Review the Government announced that the scheme was unaffordable in its current form.

3. When the Ellington to Fen Ditton scheme was withdrawn, the Department for Transport (DfT) undertook to identify 'cost effective and practical proposals which bring benefits and relieve congestion'. Option generation would not be constrained to highway schemes and would look at the potential role of all modes. The opportunity for private sector involvement in developing and implementing schemes would be explored.

4. This study forms the first phase (Output 1) of a three-stage study to develop proposals to resolve the prioritised challenges on the Cambridge and Huntingdon section (the Greater Cambridge areas) of the A14, whilst considering the performance of the transport corridor (Strategic National Corridor 11) as a whole.

5. This report is Output 1 of the A14 Study. It comprehensively reviews existing evidence to identify the key transport issues and wider challenges that should form the basis for the subsequent option development and assessment that will be undertaken to support Outputs 2 and 3.

Summary of Current and Future Transport Issues and Challenges

Capacity

6. Having reviewed the evidence, we have found that at peak times the A14 currently operates above its notional capacity of 3,600 (on two-lane sections) and 5,400 (three-lane) vehicles per direction. The effective capacity of the A14 is limited by a number of factors, including:

- the high percentage of HGVs, which take up more road-space than other vehicles;
- the tendency for HGVs to drive on the near-side carriageway, and for cars to primarily use the outer lane;
- the number of local access roads along the route, which results in conflicts as predominantly local traffic enters and leaves the main carriageway;
- major junctions along the route with significant volumes of joining and exiting traffic which result in weaving between lanes, reducing effective capacity and causing knock-on delays; and
- the absence of a hard shoulder or verge along much of the route makes the A14 more susceptible to delay than other trunk roads, owing due to incidents and road traffic accidents.

7. The Cambridge to Huntingdon section of A14 is below the standards to which a modern two-lane dual carriageway would now be built.

Asset Condition

8. In general, the A14 is in good operational condition and the level of routine maintenance required and undertaken is typical for a road of this type. There is a specific issue with the Huntingdon viaduct, which is structurally flawed. The previous A14 Ellington to Fen Ditton scheme would have seen the viaduct replaced, offering Huntingdon the benefits of reduced impacts of strategic traffic and potential environmental and economic benefits which would facilitate efforts to regenerate Huntingdon Town Centre. Our current understanding is that there are options that would retain it in-situ and lengthen the life of the viaduct. However, the viaduct means that it would not be possible to deliver on-line widening around Huntingdon and Godmanchester.

9. Issues associated with the Huntingdon viaduct will need to be considered further as part of Outputs 2 and 3, although the working assumption should be that the state of the viaduct itself does not preclude the development of on-line options for the wider A14, although there are other constraints which will effect on-line options and need to be considered.

Current Issues and Priorities

10. From a detailed review of the evidence available to us, we have identified three priority transport issues and priorities.

- The key transport problems identified are the prevalence of peak congestion and delay on much of the A14 under 'normal' conditions.
- The knock-on and associated peak delay congestion on the A14 has on local and adjacent roads, including parallel alternative routes and routes that interact with the A14 such as the A1096, A1198, A1123, A141, and B1050.
- Lack of resilience: while the frequency of accidents and incidents is arguably in-line with comparable sections of road elsewhere, the impacts of these on the A14, national and local transport network are very costly; this is largely because of the A14 characteristics, such as the absence of a hard shoulder, and lack of re-routeing alternatives.

11. These transport problems result in a number of wider economic, social and environmental consequences.

The Impact of Growth

12. There are three key drivers of growth that will service to increase demand on the A14 in the future. These are:

- Background growth: this is related to general increases in traffic due to social-demographic and economic factors.
- Freight related growth: freight growth on the A14 is forecast to increase by around 1% per annum on the A14.
- Local housing and employment growth: there are several major proposed housing developments close to the A14, including at Northstowe and Alconbury, and on the fringes of Cambridge itself. The evidence is that the impact of growth will have a higher absolute and proportionate impact on traffic levels on the A14 sections towards Cambridge. The Greater Cambridge and Peterborough LEP has a key role in encouraging and guiding development, linked to the wider objective of supporting the economic and employment growth of Greater Cambridge as a whole.

13. Taken together, overall traffic growth on the A14 is forecast to increase by around 15% by 2021.

14. Our assessment is that this growth, under a 'business as usual' scenario would exacerbate current transport issues and worsen the associated economic, environmental and social impacts.

Impact of Transport Issues on the Wider Economic, Social and Environmental Challenges

15. The transport challenges identified above and their relationship with the wider economic, social and environmental challenges are represented in Figure 1.

16. These broad priorities have been established with regard to the Department for Transport's current transport appraisal guidance (webTAG), which assess transport impacts under the headings:

- Economy – the impact of transport on encouraging economic growth
- Social & Environmental – this covers measures of 'well-being', including accidents, air quality and health impacts, and access to services and economic 'welfare' benefits.

17. The challenges that sit under the headings of economy, environment and social are strategic in nature. These establish the core objectives and strategic rationale for the subsequent option development stage of the Department's A14 study.

FIGURE 1 CHALLENGE MATRIX

TRANSPORT PROBLEMS	WIDER CHALLENGES					
	Supporting Economic Growth			Impact on Quality of Life (Social & Environmental impacts)		
	Lost productive time	Supporting the economic growth of Greater Cambridge	Access to labour markets	Quality of life / welfare	Accidents	Air Quality (Health) & Noise
Peak congestion and delay on A14						
Peak congestion and delay on key local roads						
Lack of resilience						
Safety						

18. We have identified three core economic challenges. These are:

- **Lost Productive Time**
  - This relates to congestion and associated delay caused to business and freight traffic, where under normal conditions the economic costs of delay have a direct impact on business productivity. This 'routine' delay occurs in both peak and inter-peak periods, but is worse and more significant in the peaks.
  - The impact of delays associated with lack of resilience is two-fold. First, there is the direct productivity cost of unreliable journey times – delay due to incidents (additional time). Second, there can be additional costs of disruption and day to day variability in journey times when this affects the planned timing of deliveries, meetings etc. which in turn can place significant additional costs on businesses.
  - The lost productive time and lost productivity will, in the absence of interventions, increase over time as traffic growth exacerbates current transport problems.
- **Supporting growth of the Greater Cambridge Area**
  - Enabling additional housing and employment would, other things being equal, contribute positively to the local, regional and national economy due to the high-value work and growth potential that underpin the economy of Greater Cambridge.
  - However, transport constraints mean there is a trade-off between the economic growth from additional housing and jobs, and the economic costs that the greater congestion which would come from associated traffic growth would impose upon all businesses.
  - The nature of this trade-off and challenge, and the potential options that could be considered, will be different in the short-and long-term. In the short-term the key issue is the potential for identified housing development in the vicinity of the A14 to come forward given current transport constraints.

- In the longer-term the issue revolves around the further development of the existing transport and land use strategy with the aim of efficiently delivering the level of housing that would support the growth of the Greater Cambridge economy. The challenge is the extent to which affordable and cost effective interventions can be developed that mitigate the associated economic costs on the transport network while supporting growth. This implies consideration of land use *and* transport issues and options along the A14 corridor, and also across a wider area.

Access to Labour Markets

- The success of the Greater Cambridge economy relies on having access to a sufficiently large labour market catchment. In choosing where to work, employees trade-off factors such as job income, house prices, commuting time and quality of life factors. High house prices within Cambridge means that a number of workers have to live some distance away and commute.
- Less attractive commuting (delay and unreliability, increasing cost, plus the adverse impact on quality of life) would, other things being equal, serve to limit Cambridge and Huntingdon's effective labour market catchment and make it a less attractive place for people to work.
- There is a link between labour market access and future housing growth, as the accommodation of additional housing closer to jobs can help increase the labour market catchment while mitigating impacts on the transport network. The significant additional housing planned within Cambridge creates the potential to support a more sustainable pattern of commuting, and also cater for the high demand, particularly among the young, for housing in Cambridge. However, many workers will want and choose to live in more rural locations and disparate commuting patterns (including within households) means that the merely locating new housing near jobs will not necessarily have a marked effect in encouraging more sustainable commuting.

Quality of Life (Social and Environmental) Challenges

Welfare Impacts

- Welfare impacts reflect the measure of dis-benefit associated with travel time congestion and delay, and the leisure time foregone because of this.
- In addition to the direct time costs, there is strong evidence of the additional welfare disbenefit (frustration and annoyance) that people feel when driving in congested conditions.
- Welfare impacts can, in the medium term, have economic consequences if the impact of the quality of life from congested commuting conditions discourages people from working in the area (and is related to the labour market issue above).

Accidents

- Accidents have an economic cost (lost productivity, direct costs to NHS. Police) and a social cost (pain and suffering of individuals and families etc.).
- Although the accident rate per vehicle mile on much of the route is not significantly above the average for roads built to a similar design standard,

this needs to be seen in the context that the road is below the standard to which a modern road would be designed. There are sections where accident rates are much higher than would be expected for roads of a similar standard. However, because traffic flows on the route are high there are a large number of accidents and disruptive incidents that cause delay on the A14 and have knock-on effects on the surrounding network. There is therefore considerable scope to reduce accident rates and the impact of incidents through improving the standard of the road.
  - As the social costs of accidents are significant, we suggest options should consider whether there is the potential to reduce accident risk and accidents in order to minimise accidents to levels below 'average' rates.

- **Air Quality / Health (and Noise)**
  - There are four AQMAs along the A14 corridor within the core study area, where the level of emissions represent a health risk for the surrounding community. The level of emissions (and noise) is related to the volume of traffic, but is also exacerbated when congestion and delay is more acute.
  - An additional issue is the localised air quality and noise impacts that can occur when there is significant disruption on the A14, and traffic (including HGV) re-routes to the local network.

Key Questions

19. Some key questions were set out in the study brief and in the course of Output 1.

What is the potential for expansion of rail freight to reduce HGV trips on the A14 between Huntingdon and Cambridge?

20. There is a significant increase in freight capacity committed and planned for the Felixstowe – Nuneaton (F2N) route, which links the Haven Ports with rail routes to the Midlands and the North. The F2N corridor provide a rail alternative to the A14 route.

21. Our assessment is that this increase in rail capacity would have only a small impact on HGV volumes on the A14 between Huntingdon and Cambridge. This is for several reasons:

- Only around 15% of HGV vehicles on the A14 (in the study area) comes from Haven Ports.
- Rail capacity from the Haven Ports via London (the current preferred freight routeing) is at or near capacity. Any future rail freight growth is likely to have to be accommodated via F2N, limiting the potential for modal shift of existing traffic from road. In addition a further pressure on capacity is the stated policy position is to re-route non-London Haven Ports freight traffic via F2N.
- Even if a substantial mode shift of 5% of HGV traffic from the Haven Ports transferred to rail, this would result in a less that 1% reduction in volumes on the A14. This is equivalent to about a year of forecast HGV growth.

22. There may be a strong case for further increasing rail capacity on F2N beyond the committed scheme, including the positive impacts of modal shift of Haven Ports

from road to rail. However, such options are likely to have only a limited impact on the identified problems and challenges in the A14 study area.

What is the impact of improving capacity on the A14 on the local and wider strategic network?

23. There is little direct evidence available to address this question. Depending on the nature of the option proposed, improving capacity on the A14 could well improve access to/from local roads onto the A14 (e.g. from Huntingdon, St. Ives, Fen Drayton). This would have been the case with the former A14 Ellington to Fen Ditton scheme.

24. However, it is also likely that the increased traffic generated by any capacity enhancements, combined with traffic associated with specific developments enabled by the enhancements, would increase the volume of traffic on the key radials between the A14 and central Cambridge.

25. The impact of capacity improvements on the wider strategic highway network is also, based on the evidence reviewed for this study, uncertain. While capacity improvements on the A14 in the core study area would address immediate problems, it could make north-south routeing via the M11-A14-A1(M) more attractive and amplify forecast stress and delay on these links. For east-west movements capacity improvements on the A14 in the study area would be likely to relieve routes such as the A428.

26. We suggest that an interrogation of existing highway model outputs (i.e. those undertaken for the Inquiry) should be undertaken in the early stage of Output 2 to help inform understanding of this issue.

How could local growth aspirations affect the A14, and how dependent are they upon additional road or public transport capacity being provided?

27. Currently travel conditions in the peaks on the A14 specifically, and for commuting movements using the north-west corridor between Huntingdon and Cambridge generally, are poor at present. It is evident that, even in the absence of development-specific growth the expectation is that traffic conditions would deteriorate further over time, and the related problems and challenges would be exacerbated. In this scenario, and in the absence of further intervention, it is unlikely that the full 'build-out' of current proposed development could be delivered without adversely impacting upon the A14, and contravening the Highways Agency's current 'nil-detriment' conditions.

28. This suggests that significant additional development could not be accommodated without further affecting the performance of the A14, without some form of intervention. There is potential for some additional capacity for demand growth to take place on the Cambridgeshire Guided Busway. The scheme is forecast to carry of 3.5 million users per annum (opening year), which is around 11,500 trips each week-day. The Busway could play a worthwhile role relieving some pressure on the A14, especially given its serves developments such as Northstowe. The nature of the scheme means that additional buses could be provided to cater for additional demand over time.

29. There are a range of non-capacity interventions that should also be considered as part of Output 2, including demand management options. An initial view is that, if the potential full scale of planned development were to be delivered along the A14 this would be likely to require some form of capacity improvement alongside other measures.

1 Introduction

1.1 This report represents Output 1 of the A14 Study, which comprehensively reviews existing evidence to identify the key transport issues and wider challenges that should form the basis for subsequent option development and assessment.

Background to Study

1.2 As part of the 2010 Comprehensive Spending Review the proposed £1.1 billion A14 Ellington to Fen Ditton scheme was deemed to be unaffordable in its current form. The Department for Transport (DfT) undertook to identify 'cost effective and practical proposals to which bring benefits and relieve congestion'. Potential options would look across modes and also explore the opportunity for private sector involvement in developing schemes.

1.3 In October 2011 the DfT issued briefs for a three-stage study to do this. The three stages, in broad terms, cover:

- **Output 1** – To review the evidence base to identify key transport problems and to prioritise the key challenges that result from this.
- **Output 2** – To develop options and shortlist the best performing options that should be considered for detailed assessment.
- **Output 3** – To develop and appraisal the preferred shortlist of options.

1.4 It is intended that Output 1 should for the starting point for the development of options as part of Output 2.

Key Questions for Output 1

1.5 We have also, in developing this report, sought to address each of the questions addressed by the Study Brief. These questions are listed below, along with the section(s) of the report that address them. We have re-ordered the questions to categorise them under current problems and issues, growth related issues and problems, challenges and priorities. This is presented in Table 1.1

Report structure

1.6 The report is structures as follows:

- Chapter 2 sets out the study scope and assumptions that form the basis for our review and interpretation of the evidence.
- Chapter 3 provides an overview of the study area and of the travel market, and also examines issues around future forecast growth.
- Chapter 4 considers the evidence on traffic, network performance and key transport issues, while Chapter 5 reviews evidence from previous strategic studies.
- Chapter 6 discusses issues where we believe further analysis mat be necessary to better understand the issues and challenges to inform Output 2.
- Chapter 7 distils the evidence from previous Chapters and sets out the key transport issues the priority challenges for Output 2.

TABLE 1.1 KEY QUESTIONS FROM STUDY BRIEF

QUESTION	CHAPTER
Current Problems & Issues	
Overall, what do we know about current and forecast delay on the core study area (see below), including who experiences it?	Chapter 4
What do we know about the condition of the existing A14, including the Huntingdon Railway Viaduct?	Chapter 4
What are the most significant environmental problems associated with the A14 in the core study area, and how significant are they?	Chapter 4
What do we know about the safety of the A14? Are there more accidents on the A14 than other comparable roads? What are the impacts of incidents on the road?	Chapter 4
What do we know about the traffic which uses the relevant section of the A14 (O-Ds, journey purpose, by time of day).	Chapter 4
Growth related issues	
How could local growth aspirations impact on the A14, and how dependent are they on additional capacity being available on road or public transport?	Chapter 2 sets out local growth proposals and status. Chapters 3 and 7 look at the implications of growth on the A14.
What are the impacts of forecast freight growth on the A14 and on rail freight capacity for the wider study area (see below)?	Chapter 3 (detail). Chapter 7 (summarised).
What are the consequences of routing most Haven Ports rail traffic via London?	Chapter 3 (detail). Chapter 6 (summarised).
Problems, Challenges and Priorities	
Overall, drawing on existing evidence and disaggregating as much as possible, what are the most significant transport-related problems affecting the A14 between Ellington, Alconbury and Fen Ditton, and how do these problems interact within the study area?	Chapter 6.
Taking account of impact of these problems on the wider economy and on the UK's climate change obligations, as well as direct transport impacts, what are the priority challenges (transport-related problems, and their consequences on the wider economy and environment)?	Chapter 6.

2 Study Scope and Key Assumptions

The Study Area

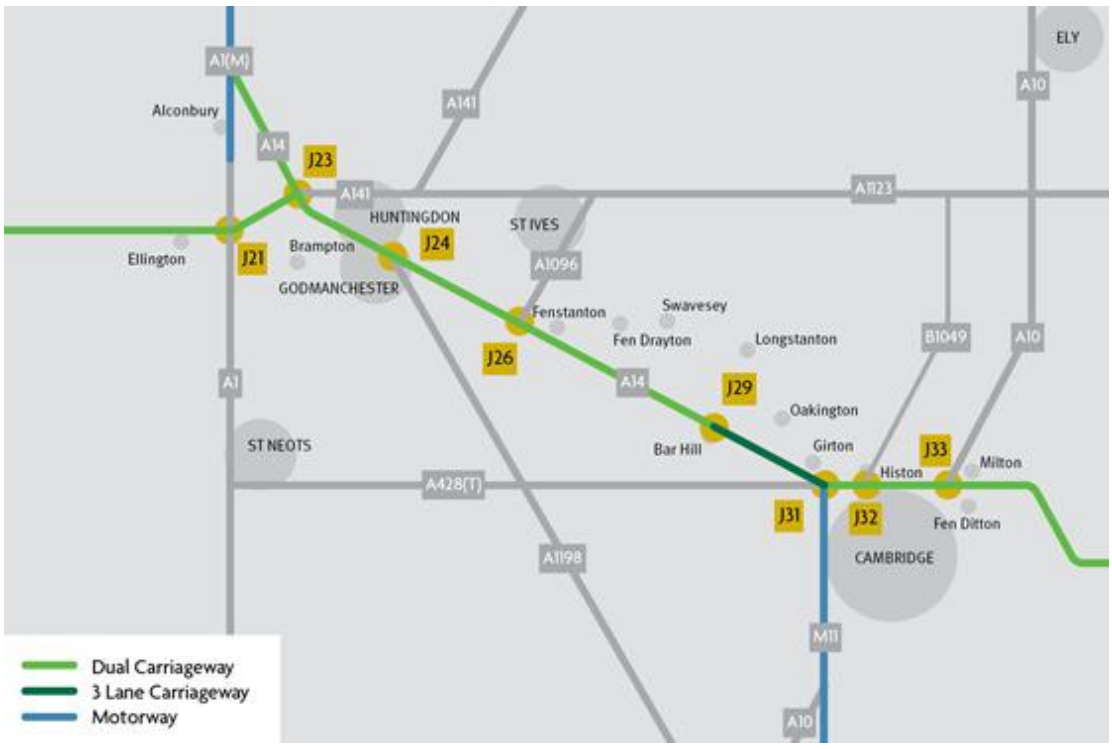
Core Study Area

2.1 The core study area covers the A14 between Ellington / Alconbury and Fen Ditton, which will be the focus of the problem identification exercise. It is bounded by Ellington/Alconbury in the west and Fen Ditton in the east. This includes a stretch of the A14 which is approximately 24 miles long (18% of the total length). There are three key interchanges with other strategic roads along this stretch of the road, at Girton (J31), Spittals (J23) and Brampton Hut (J21). There are also frequent junctions where local road traffic interacts with strategic traffic.

2.2 The A14 corridor passes through and serves the Greater Cambridge area, which covers the city of Cambridge, the districts of East Cambridgeshire, South Cambridgeshire and Huntingdonshire. Several urban settlements are located along the A14. Cambridge, located south of the A14/M11 junction, is the main town in the core study area. Given the dynamism and attractiveness of Cambridge's local economy, housing development is taking place around the A14 between Cambridge and Huntingdon, and the area functions increasingly like a conurbation. For many people living and working around Cambridge, the A14 is the main route across the Greater Cambridge area given the lack of alternative suitable roads.

2.3 The A14 section that lies within the core study area is shown in Figure 2.1.

FIGURE 2.1 THE A14 – CORE STUDY AERA



Wider Study Area

2.4 The wider study area will reflect where these problems in the core study area (A14 Ellington to Fen Ditton) have wider impacts (e.g. Haven Ports and East Midlands, Greater Cambridge) and also where potential opportunities (e.g. rerouting rail freight on the A14 corridor) could have wider benefits for other Strategic National Corridors.

The A14

2.5 The A14 Trunk Road is a 2-lane dual carriageway (except for a short stretch between Bar Hill and Girton interchanges) which connects Felixstowe Docks to the M1/M6 motorway junction near Rugby. It is 130 miles (210 kilometres) long. Given its strategic role in connecting the East Coast ports to the Midlands, it has a Trans-European Network (TEN) status. The A14 also serves north–south strategic movements using the M11 in the south and the A1 in the north, which connect via the A14 between Cambridge and Alconbury.

Network Assumptions

2.6 As a starting point for our analysis of key challenges, it is necessary to establish and agree key network assumptions to reflect those interventions that are assumed to be committed and in place and, equally, those that are not.

2.7 The key network assumptions set out below are consistent with the 2010 Spending Review, and reflect the status of schemes in the current Highways Agency, Network Rail and Local Authority programmes.

Strategic Road - A14

2.8 The Highways Agency (HA) scheme for the A14 between Ellington and Fen Ditton has been withdrawn by the Government on affordability grounds, and is therefore assumed not to be in place in our 'Do Minimum' scenario.

2.9 The proposed £1.1bn scheme would have upgraded the A14 between Ellington to Fen Ditton to a modern 3-lane dual carriageway. This would have involved online improvements between Fen Drayton and Fen Ditton and a new section of A14 bypassing Huntingdon between Ellington and Fen Drayton. A map of the previously proposed A14 scheme is provided in Appendix A.

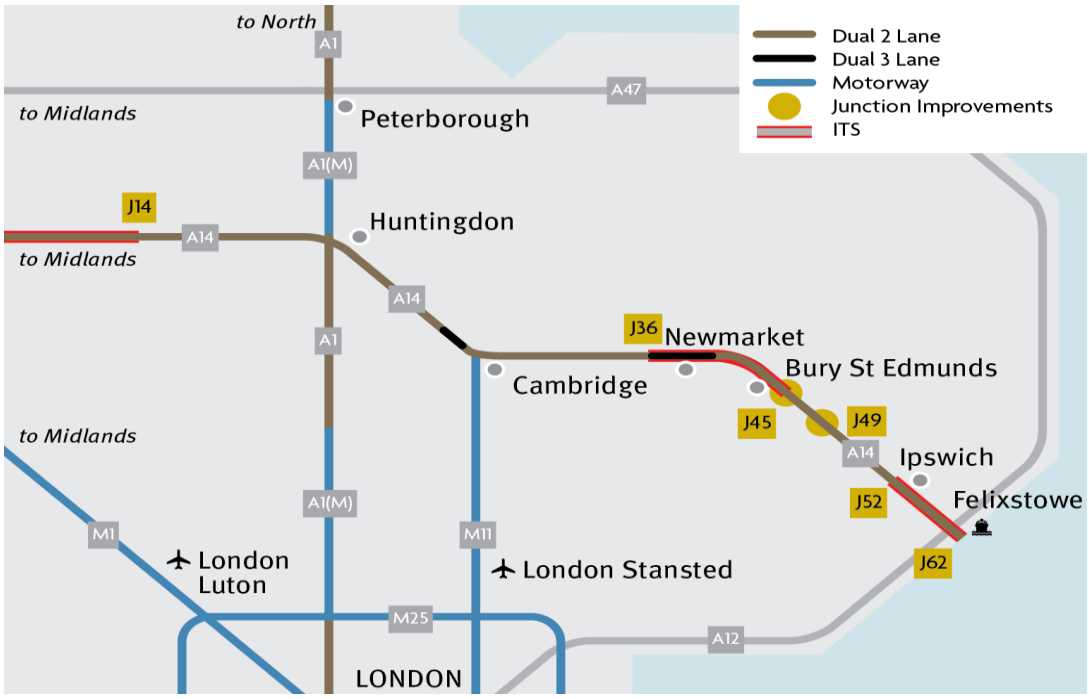
2.10 There have been some recent improvements on sections of the A14, including:

- Junction improvements on the section between Bury St. Edmonds and Newmarket
- Intelligent Transport Systems (ITS) initiatives including an automatic queue warning and signing system has been installed or plans to be installed on sections of the A14. The scheme includes Variable Message Signs (VMS) and CCTV to view traffic conditions from the control room. According to the HA:
  - Section 1 - A14 between the M1 J19 and A14 J14: Complete Autumn 2010
  - Section 2 - A14 J36 (Junction with A11) and A14 J45 (east of Bury)-: Complete Spring 2011
  - Section 3 - A14 J52 (Claydon) and J14 J62 (Port of Felixstowe): Complete Autumn 2011

2.11 However, given the assumption (up to last year) that the A14 Ellington to Fen Ditton scheme would progress, there has been little development of schemes in the study area route section to address key short-term issues, such as safety, delay at key junctions and emissions as it was assumed that these would be dealt with by the HA scheme.

2.12 A map of the wider A14 corridor, showing the recent improvements outlined above, is presented in Figure 2.2.

FIGURE 2.2 A14 STRATEGIC CONTEXT



Lorry Road User Charging

2.13 Lorry Road User charging is coalition policy as part of the coalition agreement. The broad proposal is that foreign registered HGVs would be charged for use of UK roads depending upon distance and the time at which the journey took place. For UK logistics operations the idea is that the proposal would be broadly cost neutral, as through the balancing of any charges with a reduction in vehicle excise duty. The primary aim is to "ensure a fairer arrangement for UK hauliers" to address the problem of foreign hauliers paying low amounts of fuel tax abroad and so enjoying a competitive advantage over domestic hauliers while not contributing to the costs of UK infrastructure.

2.14 The impact of LRUC on HGV travel volumes and distribution is expected to be negligible, and therefore for the purposes of this study not material to the interpretation of the evidence base, development of challenges or (in Output 2) for generation of options.

Rail Proposals - Felixstowe to Nuneaton Freight Route

2.15 There are a number of recently completed and committed enhancements on the Felixstowe to Nuneaton (F2N) route that will provide significant additional capacity for freight, through both the gauge clearance to allow for high cube containers, and re-signalling and infrastructure works (e.g. new curve at

Nuneaton, the Soham-Doubling) with allow for up to 24 trains per day by 2014, and for reduced conflict with passenger services. Currently there are around 10 trains per day on the route, which represents about a third of all rail freight trains from the Haven Ports, with the remainder routeing to or via London on GEML.

2.16 There is more discussion on the F2N route, in the broader context of the Haven Ports and national freight network Chapter 3.

Local Schemes- Cambridgeshire Guided Busway

2.17 The main local scheme of potential significance in the study area is the Cambridgeshire Guided Busway.

2.18 The Cambridgeshire Guided Busway was opened to the public in August 2011. The route is 25 miles long in total with guided sections of just over 16 miles, making it the longest in the world. The nine miles of on-street section between Huntingdon and St. Ives can suffer congestion related to A14 incidents. There are proposals for further bus priority measures on this section as part of Cambridgeshire's LTP3. It connects Huntingdon to Trumpington (south of Cambridge) and goes through key residential and employment areas such as St Ives, Addenbrooke's Hospital and the Science Park.

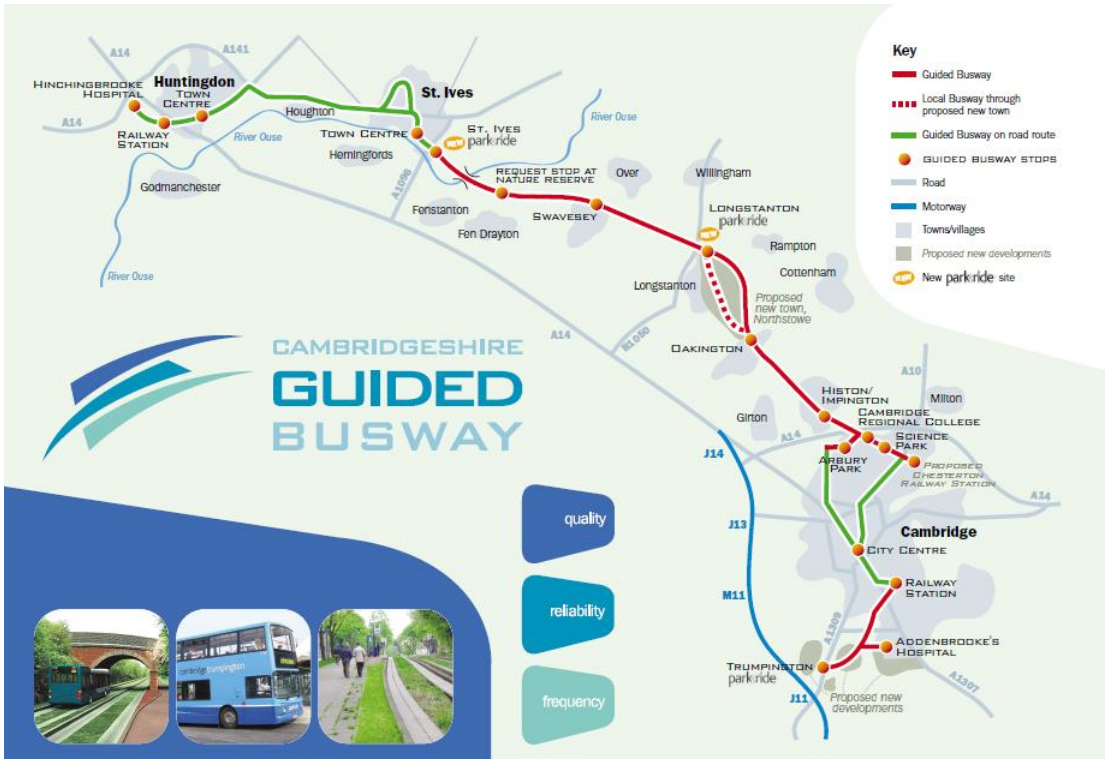
2.19 The Busway is expected to contribute to decongestion of the A14 by reducing car journeys. Cycling facilities are provided at several points along the Busway to enhance public transport options for passengers.

2.20 In the first three months of opening the system has carried over 600,000 trips, with a month-on-month increase in demand suggesting a strong build-up[1]. In the first year of operation it was forecast that 3.5 million trips will be made on the Busway.

2.21 There are two operators on the Busway, and it is intended and expected that service levels would increase in response the increased demand both in the short-term as demand builds-up, and on the longer terms as and when new housing developments come on-stream. The Busway route is shown in Figure 2.3.

[1] The busway carried 220,000 passengers in November 2011 – the latest month for which data is available .

FIGURE 2.3 CAMBRIDGESHIRE GUIDED BUSWAY



Other Local Schemes

2.22 Proposals to reactivate the disused station of Chesterton Sidings in north Cambridge have been circulating for many years, and there is strong local political support for the scheme. Its realisation also depends on the availability of funding, both public and private, as well as the need to meet DfT funding criteria (business case). In this respect, the recent allocation of £10.7m to the Cambridge LEP from the Growing Places Fund[2] represents a potential step forward for Chesterton. The scheme does not, however, have committed status at this point and is therefore not in a Do Minimum.

2.23 The new station would be expected to relieve congestion in the city centre, as commuters living in north Cambridge would be able to avoid crossing the centre to reach the train station, currently located in the south. The impact on the A14 is less predictable, as traffic to the station may worsen congestion along Cambridge's northern fringe.

Local Development & Growth Assumptions

Previous Growth Assumptions

2.24 The greater Cambridge area has long been identified as an area for significant planned growth.

2.25 As part of the Regional Spatial Strategy (RSS) targets were set for 2011-2031. These targets are set out in Table 2.1. This shows an allocation of 14,000 new dwellings for Cambridge City and 96,600 across the wider area that could broadly be defined by Cambridge's travel to work area.

[2] What it's about

TABLE 2.1 HOUSING PROVISION AND DISTRIBUTION IN THE CAMBRIDGE SUB-REGION (DRAFT EAST OF ENGLAND PLAN 2010)

AREA	DWELLING PROVISION 2011-2031
Cambridge city	14,000
East Cambridgeshire	11,000
Fenland	11,000
Huntingdonshire	11,000
South Cambridgeshire	21,000
Peterborough UA	28,600
Cambridgeshire and Peterborough	**96,600**

Growth in the Core Study Area

2.26 To meet this target for growth a number of specific sites and area have been designated for housing. There are a number of significant sites for which development is proposed that are closely linked to the A14 corridor and which could potentially impact upon it. Proposed development included several sites within the city boundaries as well as new developments along the main transport corridors.

2.27 Along the A14 around Cambridge and Huntingdon, the following sites are considered:

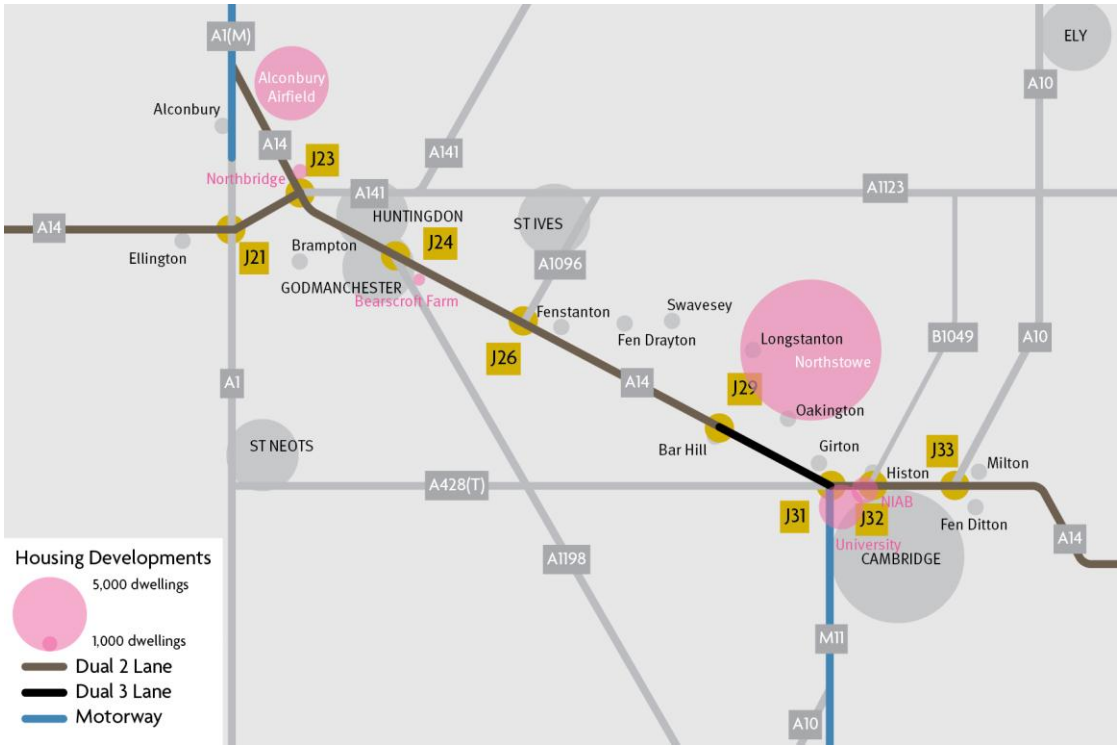
- Northstowe (in South Cambridgeshire District) is a planned new town north-west of Cambridge. There are plans to build around 10,000 dwellings hosting up to 24,000 people. A planning application for Phase 1 has been submitted: this first stage of development includes 1,600 dwellings which would access the A14 at the Bar Hill junction. Therefore, progress on this site is dependent on resolving the congestion problem issues on the A14. Although the HA have not formally imposed any thresholds on acceptable levels of development that could be achieved in the absence of the now-cancelled A14 improvement, WSP is preparing updated transport assessments. The development is located in close proximity to the Guided Busway, which could be integrated in Northstowe's transport plans as a potential alternative mitigation measure. However, should the full development be built without A14 improvements, congestion in this section would worsen.
- Residential development is also expected to take place in Alconbury, north-west of Huntingdon. Significant levels of employment and possibly related residential development are also planned to take place at the former RAF Alconbury, two miles north-west of Huntingdon. This site is served directly by the A14 and the site has already been partly designated with 'Enterprise Zone' status. Although initial negotiations are underway, no formal applications or submissions have yet been received, there is an aspiration to create around 8,000 new jobs and it is possible the additional development proposals could also include around 5,000 homes. Development negotiations will need to

consider and address the overall transport impact on the A14 and the local road network including the Spittals Interchange.

- The Bearscroft Farm site - The Bearscroft Farm site at Godmanchester, south of the A14 and east of the A1198 includes proposals for around 800 homes and associated community facilities, the level of which is still under discussion. A range of accompanying transport proposals are currently being discussed with the Local Planning Authority at the District Council and the County Council and Highways Agency as highway authorities. Such measures may include the provision of enhanced public transport services and the potential introduction of ramp-metering at the A14 Godmanchester interchange and the potential realignment of part of the A1198.
- RAF Brampton - The existing RAF Brampton facility two miles west of Huntingdon, and in close proximity to the A14, will shortly become surplus to MoD requirements and the site is designated for redevelopment. Initial discussions with the Local Planning Authority are focussing on the provision of a mixed use development of around 400 homes, employment opportunities and a range of community facilities.
- The Northbridge site located on land immediately north of Huntingdon and north east of the A14 Spittals Interchange includes development for 1,000 homes and associated community facilities. Development negotiations have focussed on the overall transport impact on the A14 and the need to achieve 'nil detriment' transport impact on the trunk road. This has resulted in a range of accompanying transport improvements being negotiated, alongside a developer Travel Plan.
- The Ministry of Defence has recently announced that the Waterbeach Barracks, a MoD site located north of Cambridge, will be progressively vacated and will close down in the coming months. The area, located near the A10, is being considered for brownfield development. Although no application has been submitted yet[3], there is potential land for housing growth (approximately 15,000 dwellings) in the longer term. No transport assessment has been prepared, but we understand that CCC's view is that the development would exacerbate existing congestion on the A10, and` probably require significant improvements to the A10 / A14 junction.
- Huntingdon Town Centre - The Core Strategy for Huntingdonshire includes proposals for the regeneration of Huntingdon Town Centre as a high quality retail destination to serve the needs of the local population and as part of local economic enhancement of the retail offer and to claw back outflow of retail spend and journeys. The strategy includes development proposals as part of the 'Huntingdon West Area Action Plan' to identify the best use of land to the west of Huntingdon town centre for a significant mixed use development. This plan is based upon the removal of the Huntingdon Viaduct, and the opportunity this would provide to create of a new road network (of which the current route of the A14 would be a key element). At the time of writing, development proposals within both the Town Centre and as part of Huntingdon West, including the provision of a new West of Town Centre Link Road, have either already received consent or support from the Local Planning Authority.

[3] Conversation with Keith Miles, Planning Policy Manager at SCDC, 24th November 2011

FIGURE 2.4 GROWTH AREAS ALONG THE A14



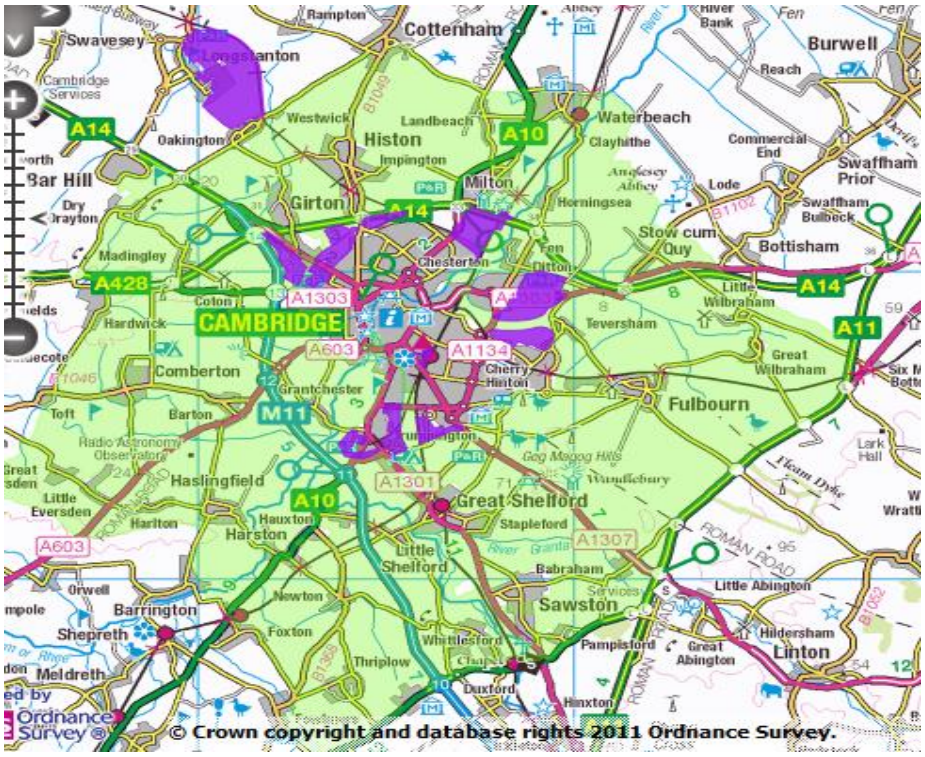
Note: Waterbeach is not a designated growth area, so is not shown on the map. It's location is north of Milton on the A10.

2.28 Within Cambridge City, the following sites are considered:

- The NIAB site - located between Histon Road and Huntingdon Road in Cambridge's north-west fringe. Plans for the site include 1,780 dwellings and local services. The Highways Agency (HA) has previously imposed a ceiling on development of the site of 350 units which would only be lifted when potential impacts on the A14 were addressed. This ceiling has now been lifted following assessment of outputs from the Cambridge Sub-Regional model, which indicate that workers would pre-dominantly work in Cambridge or out-commute, limiting the impact on the A14 at peak times.
- The University site - located between Madingley Road and Huntingdon Road in north-west Cambridge. The North West Cambridge Area Action Plan, which covers the University site, sets out a vision for a high-quality development with around 3,000 new homes (50% being 'key worker' housing for University staff), accommodation for 2,000 students, community and academic facilities. A planning application was submitted in September 2011. The potential impacts of the development on the A14, and any mitigation measures, will be a key consideration in determining the application.
- The Northern Fringe (East), located between the A14 and Chesterton, included proposals for new residential units (2,000-3,000 new homes) connected to new transport links: Chesterton rail station, cycling routes and P&R/guided bus.

However, the development was dependent on the relocation of Waste Water Treatment facilities which was not approved[4].

FIGURE 2.5 GROWTH AREAS AROUND CAMBRIDGE (PURPLE)



Current Position

2.29 Following recent changes in the planning system and the abolition of regional housing targets, local authorities in Cambridgeshire and Huntingdonshire have been working to update local development frameworks. We understand that the core aspiration to support significant increases in housing and employment, to enable the economic growth and success of the city and area as a whole, remains.

2.30 However, the changes to the planning system allied to the impact of the recent recession (which has affected the short term rate of development) bring a degree of uncertainty about the scale and rate of future development.

2.31 It is also the case that much of the growth allocated along the A14 (e.g. Northstowe) was based on the assumption that the A14 Ellington to Fen Ditton would proceed. In the absence of the A14 scheme, it is likely that the development of these growth areas would impact on congestion on the A14 and local roads. Furthermore, the implementation of some of the development could be dependent on improved conditions on the A14 (not necessarily the previous Ellington to Fen Ditton scheme), due the Highways Agency's 'nil detriment' conditions.

[4] http://www.cambridgeshire.gov.uk/NR/rdonlyres/15581DC5-F859-4D2E-A065-E2A5F199A24F/0/CNFEFAQv2.pdf

3 Study Area & Travel Market Overview

3.1 This section provides an overview of the core and wider study area and discusses the key underlying drivers of transport in current demand on the A14. At the end of the Chapter we examine forecast growth on the corridor, and the effects the recent recession has on the anticipated rate and timing of future growth.

Greater Cambridge - Area Overview

3.2 The Greater Cambridge area covers the city of Cambridge, the districts of East Cambridgeshire, South Cambridgeshire and Huntingdonshire.

3.3 The 2011 census showed that 312,000 people lived within Cambridge, South Cambridgeshire, East Cambridgeshire and Huntingdonshire. Economic activity rates in the area are considerably higher than the regional and national averages, though the economic activity rate in Cambridge is lower than the national average, due mainly to its high student population. Unemployment was, and remains, significantly lower than the regional and national averages.

3.4 Cambridge has higher population density than East or South Cambridgeshire, with the population density in these areas being significantly lower than the East of England or English averages (see Table 3.1).

TABLE 3.1 KEY STATISTICS FOR CAMBRIDGESHIRE (2001 CENSUS)

INDICATOR	CAMBRIDGE	EAST CAMBRIDGE-SHIRE	SOUTH CAMBRIDGE-SHIRE	HUNTINGDON-SHIRE	EAST OF ENGLAND	ENGLAND
Population	108,863	73,214	130,108	156,594	3,884,104	35,532,091
Population density (persons per hectare)	26.75	1.12	1.44	1.73	2.82	3.77
Number of people employed	47,505	35,915	36,675	80,000	2,588,733	22,567,852
Economic Activity Rate	65.2%	82.9%%	83.7%%	75.7%	76.0%	72.1%
Unemployment Rate	3.0%	2.8%	2%	2.5%	3.3%	4.3%
Retired (% of total population)	9%	14%	12%	12%	14%	14%

Economic Overview

3.5 The greater Cambridge economy is strong and dynamic, and has exhibited significant growth over the last decade. The Cambridge sub-region occupies a unique position in the regional and national economy, with three high value

sectors identified as being international significance - Information Communications and Technology (ICT), Biotechnology and Research and Development[5].

3.6 GVA per capita on average was much higher in Cambridge than the UK in 2008 (£30,807 in Cambridge compared to a UK average of £17,451). Growth in the number of jobs in Greater Cambridge has increased at a much faster rate than UK jobs growth and at one of the fastest rates of any area within the East of England. Increase in jobs in Cambridgeshire from 249,600 to 278,800 between 2000 and 2007[6], an increase of 10%.

3.7 The city of Cambridge and its wider hinterland have also proven to be resilient to the recent economic downturn, especially during the first months of the recession. Employment figures provide a useful indicator of such resilience. Cambridge was the city in the UK with the lowest rise in job-seekers allowance (JSA) claimants between February 2008 and November 2009 (0.8% increase in the number of claimants). Similarly, employment in the period April/March 2008-2009 only fell by 0.15%.

3.8 Latest figures for March 2011 show that employment has grown since then. Around 140,000 people are employed in Cambridge and South Cambridgeshire, a figure higher than the pre-recession total. This figure is back in line with the most recent trend forecast produced in March 2010 by SQW for the EEDA (with employment growth forecast at 0.9% p.a. for 2008-2030).

3.9 Several reasons for Cambridge's resilience are identified by the Centre for Cities[7]. The majority of the success factors identified relate to the composition of the local economy pre-recession. Around 35% of the local population was employed in knowledge intensive businesses in 2008 – these were less affected by the recession and more jobs were preserved. Moreover, around 50% of Cambridge's workforce is highly skilled thanks to the presence of research centres and university activities. As a result, the Greater Cambridge area has been identified as having the highest innovation rate of any City in the UK.

Retail

3.10 Cambridge is a regionally significant retail destination. Figure 3.1 shows the comparison shopping catchment for Cambridge which shows that the City has a large catchment extending to Ely in the north, Newmarket and Haverhill in the east and St Neots in the west. The Figure also shows that both Huntingdon and St. Ives serve a localised retail catchment, and that Cambridge or Peterborough would be the likely retail location for comparison shopping.

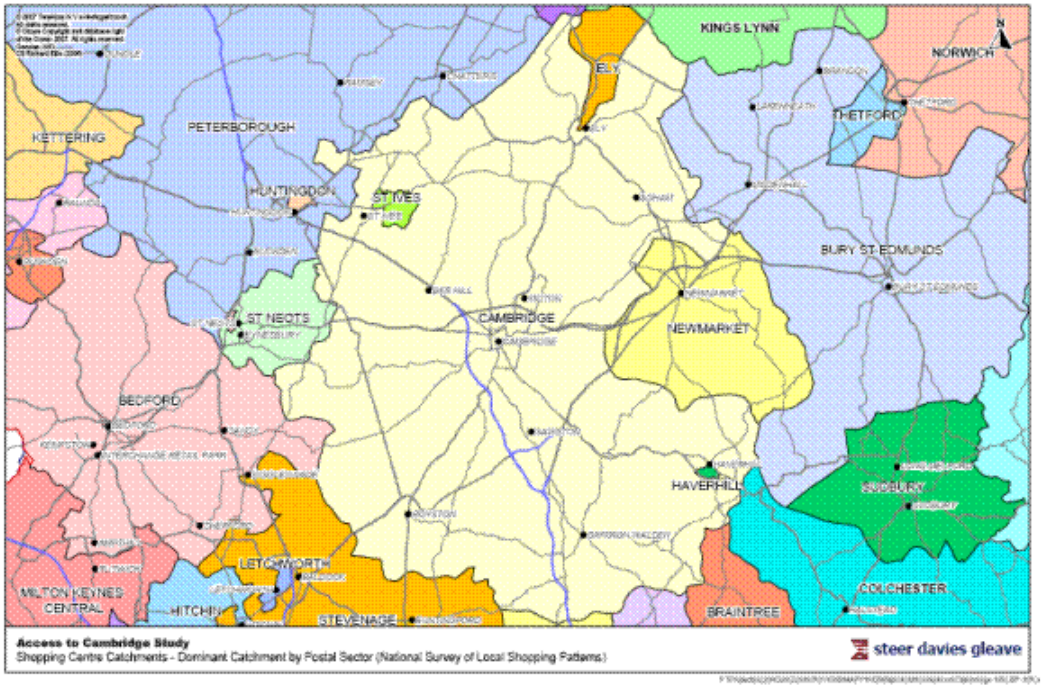
3.11 The main impact of retail based traffic will be in the off-peak periods.

[5] Regional Economic Strategy – Inventing our Future, EEDA 2009.

[6] East of England Plan – Annual Monitoring Report 2007-8, Background paper monitoring employment in the East of England, EERA

[7] http://www.centreforcities.org/assets/files/10-01-15%20Cities%20Outlook%202010.pdf

FIGURE 3.1 CAMBRIDGE RETAIL CATCHMENT (COMPARISON SHOPPING)

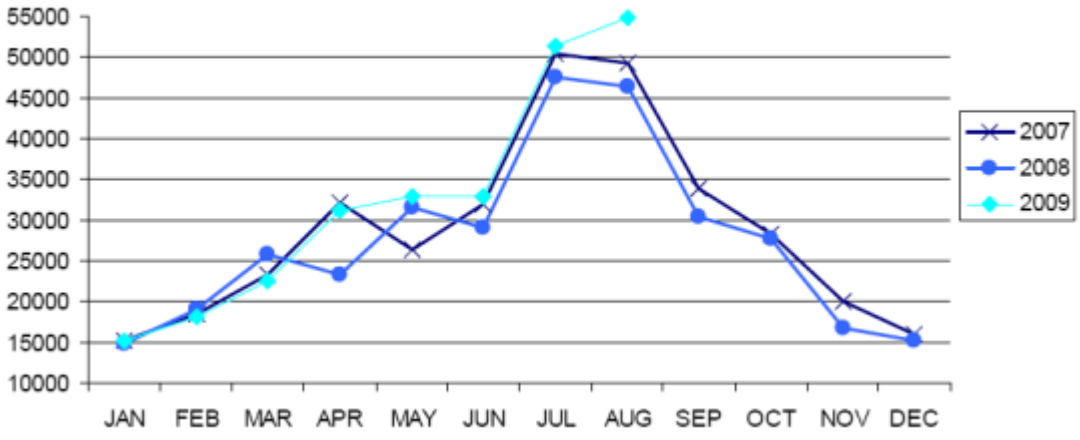


Tourism

3.12 Cambridge is also one of the UK's primary tourist destinations, and the number of tourists visiting Cambridge has also increased over the past two years, due to the favourable exchange rate and the trend of more British people holidaying in the UK.

3.13 Figure 3.2 shows that tourist numbers peak in the summer months, which may tend to be counterbalanced by the removal of school related trips over the same period. The focus of tourism trips in central Cambridge and the likelihood that London is the prime immediate origin of such trips means that managing tourism demand, while a significant issue for the City, will not be of key importance in the context of the A14.

FIGURE 3.2 NUMBER OF VISITORS TO THE TOURIST INFORMATION CENTRE

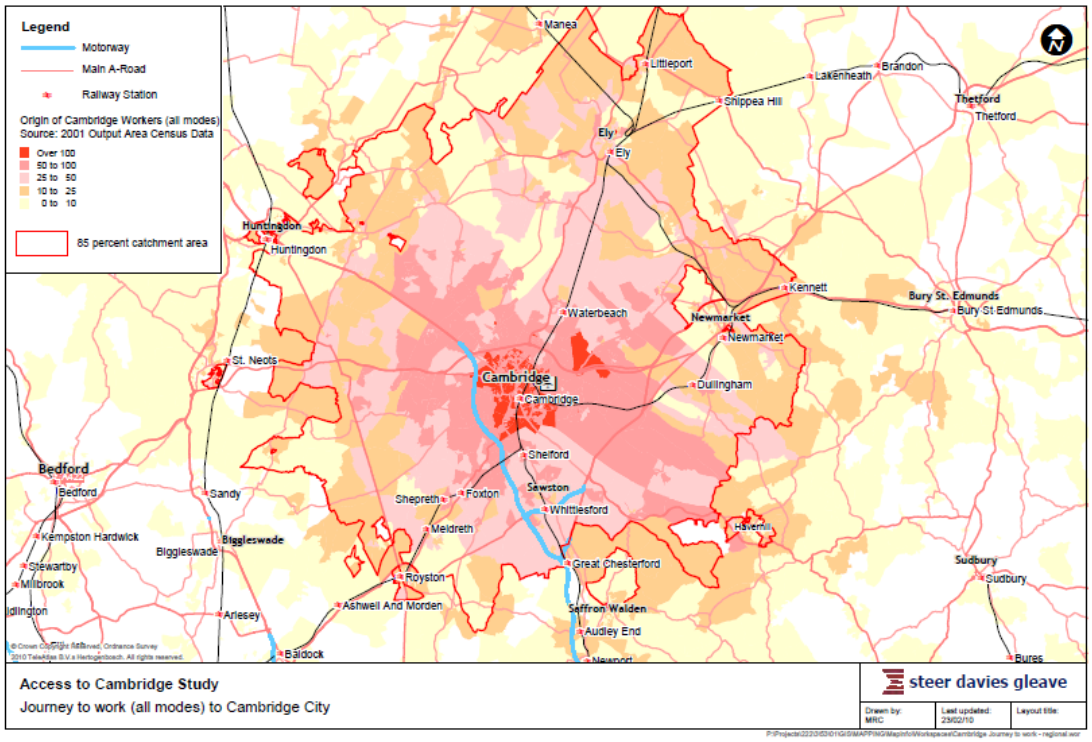


Greater Cambridge – Travel Patterns

Journey to Work Catchment

3.14 The journey to work catchment of Cambridge is shown in Figure 3.3. The red line denotes the boundary from within which 85% of travel to work journeys are made, and therefore represented a measure of the effective labour market catchment. It should be noted that the analysis is based on 2001 census and the boundaries are likely to have extended since as a result of the growth in employment in Cambridge in particular.

FIGURE 3.3 JOURNEY TO WORK TRIPS TO CAMBRIDGE – ALL MODES (2001)



3.15 The Figure shows that catchment of Cambridge extends to around 10 miles outside the City for work journeys. In 2001 Huntingdon itself was just outside the catchment defined by 85% of journeys to work, probably in part because Huntingdon itself is a major attractor of work trips to those that live in and around Huntingdon. The A14 corridor east of Huntingdon, however, is clearly a core part of Cambridge's travel to work catchment.

3.16 The catchment to the north, east and west are larger than to the south, which will reflect a combination of the 'London effect', as well as the good transport connections, such as the A14, that serve locations such as Swavesey, Oakington and Fenstanton and also and the A10 from Waterbeach into Cambridge.

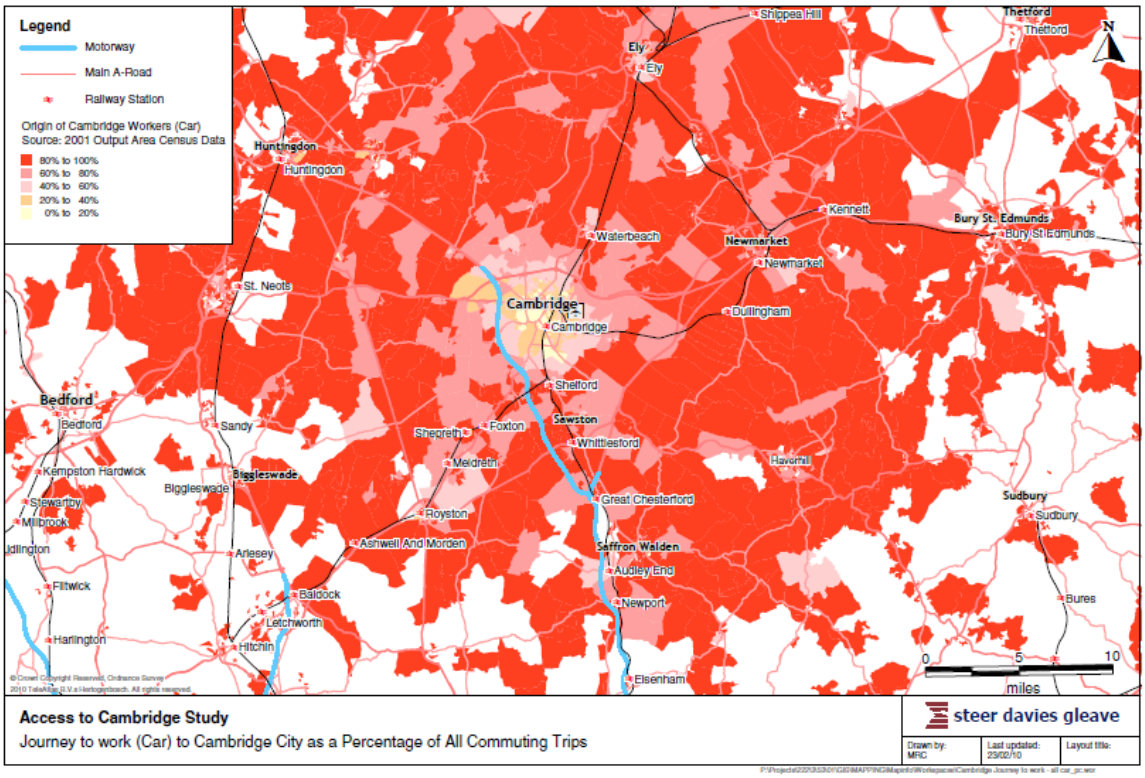
Mode Share Analysis

Journey to Work – Destination Cambridge

3.17 The majority of journeys to work in Cambridge are made by car, as shown in Figure 3.4. It is evident that there is a clear relationship between trip length and mode, which longer distance trips showing a higher propensity for travel by car. For most

origins along the A14 and beyond (that would use the A14) the car mode share is above 80%. Another feature is that locations with good public transport access, such as Ely, Audley End and Royston have a lower car share than other locations a similar distance out.

FIGURE 3.4 JOURNEYS TO WORK BY CAR TO CAMBRIDGE CITY (PERCENTAGE)



A14 Strategic Corridor (Road & Rail)

3.18 The A14 serves two national strategic corridors. It serves as a key east-west connection between the Haven Ports and Midlands/North. The also road serves as a key strategic north-south route for many movements from London and the South East to the North, via the M11 – A14 – A1 (M) axis. This is a key route for both long distance business and personal travel, as well as for freight. The A14 as a whole is a designated Trans European Network (TEN) route. The strategic functions of the A14 as part of the national strategic road network have implications for the composition of traffic that uses the A14 within the core study area.

Freight Market Analysis

3.19 The A14 strategic corridor covers the route from the Haven Posts through to the national strategic road and rail network (M1, A1, WCML), which has clear implication for the volume of traffic on the A14. An understanding of current and future freight movements are therefore critical to understanding the nature of future challenges and potential solutions.

3.20 Freight movements on the F2N rail corridor can be understood in the context of overall freight volumes at the Haven Ports, and the proportion of this demand that

is likely to use the F2N route given the relative attractiveness of rail, and consideration of capacity issues on freight routes via London and F2N.

3.21 The composition of freight on the A14 within the study area will, however, reflect a more disparate pattern of movements which can be broadly categorised as:

- Strategic 'east-west' movements from the Haven Ports (roll on roll off trucks heading to the midlands and north).
- Other strategic movements - this would include international 'north-south' movements to / from the Channel Tunnel via the M25 - M11 – A14 then northward, as well as long-distance domestic travel (freight, other business, and leisure).
- Local movements – trips either entirely within Cambridgeshire (e.g. local delivery) or with an origin – destination in the county (e.g. stocking of local supermarkets from central warehouses).

3.22 The strategic road and rail freight markets are discussed in more detail below.

Growth in International Freight Volumes

Haven Ports

3.23 The freight corridors of most relevance to the A14 study are those used to transport goods to/from the port of Felixstowe and, in the future, the potential new port at Bathside Bay (Harwich). These are collectively known as the "Haven Ports".

3.24 As the A14 is the primary link from Haven Ports to Midlands and the Northern parts of U.K., majority of container traffic from Haven Ports uses the sections of A14 in the study area. Recent (November 2011) figures indicate that nearly 3,000 lorries a day either coming from or going to the Haven Ports are currently using A14. This closely matches the 15% share of LoLo traffic of the total road freight movements on A14 discussed later in this section.

3.25 As per the National Policy Statement for Ports, the demand for port capacity is anticipated to continue to grow at a rapid pace. The impacts of the recent recession has slowed the growth in recent years however the eventual demand is expected to reach the forecast levels, albeit with a delay of few years. Table 3.2 presents the latest view of growth expected in Great Britain port demand.

TABLE 3.2 GB PORT FREIGHT DEMAND FORECASTS[8]

	2005	2030	GROWTH
Container TEU[9] (millions)	7	20	182%
Container Tonnage (millions of tonnes)	40	94	136%
RoRo Tonnage (millions of tonnes)	85	170	101%

[8] National Policy Statement for Ports, Presented to Parliament by the Secretary of State for Transport by Command of Her Majesty, October 2011

[9] TEU: twenty-foot equivalent unit, the standard measure of container capacity. Around two-thirds of containers are 40 feet long, and are classed as 2 teu each.

3.26 The Haven ports are expected to play an important role in catering for this growth in port demand with plans for expanding its capacity from three million TEU (Port of Felixstowe) to six million TEUs by 2020 and to eight million TEUs by 2030[10]. Some of the expansion is already underway (Berths 8 & 9) and others (Felixstowe South Phase 2) are in planning phases.

Road Freight

Analysis of Current Freight on A14

3.27 Freight traffic currently comprises 16%-22% of total traffic in sections of A14 between Ellington to Fen Ditton[11]. On 1st November 2011 the Bar Hill to Girton interchange section of A14 carried around 20,000 lorries (2-way total) across the whole day[12].

3.28 Freight characteristics of the wider A14 (Corridor 11) are described below[13]:

- ***Domestic/international split**: Corridor 11 is dominated by domestic traffic (around 75% to the east of Cambridge and 80% between the A1 and M1), There are also significant flows of LoLo (maritime containers) and RoRo[14] traffic. The 25% of international traffic comprises* 15% LoLo (container traffic from Haven Ports) and 10% RoRo (primarily HGVs via Channel Tunnel, routing via the M25 - M11 – A14).
- ***Commodities**: Food (both temperature controlled and ambient) and manufactured goods dominate the commodity groupings. This is to be expected given the freight generators/attractors located along the corridor. There are also significant flows of construction materials and metals along the corridor.*
- ***Length of haul**: The data also suggests that the average length of haul is 200-250 km with 20% of HGVs travelling less than 100 km, 35% travelling more than 300 km and 45% travelling 100-300 kms. Freight flows around the urban areas are dominated by medium distance movements (average length of haul circa 150-200km). It would therefore appear that much of the freight traffic around urban centres is likely to be final 'leg' in the supply chain type flows. Longer distance flows are evident on the more rural section of the A14 between Stowmarket and Newmarket, where average length of haul is around 250-300km.*
- ***Freight During Peak Hours**: Between 10-15% of freight traffic is on the A14 in either the AM and PM peak hours, implying that some freight traffic cannot avoid the peak hours.*

[10] http://www.portoffelixstowe.co.uk/PUBLICATIONS/JOURNAL/frmfuturedevelopment.aspx

[11] A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 2 – Appendices, Inquiry Commencing 20th July 2010, Table B.3

[12] SDG Analysis based on TRADS Data

[13] Network Analysis of Freight Traffic, Prepared for Department for Transport by MDS Transmodal Ltd to support DaSTS - 14 Strategic National Corridors Problem Identification and Option Generation process, Date: September 2009, Section 4.137

[14] RoRo: Roll-on roll-off – road goods vehicles (either driver accompanied or unaccompanied trailers) which are driven onto or from ferries

LoLo: Lift on lift off – maritime containers which are lifted to/from ships by means of gantry cranes

3.29 The network flow analysis of road freight movements therefore shows that 75% freight traffic on A14 section between Huntington and Cambridge is domestic traffic, with remaining 25% being international traffic which is split as 15% LoLo (container traffic from Haven Ports) and 10% RoRo (e.g. Channel Tunnel via M25 – M11 – A14).

3.30 There is little direct evidence in published sources[15] on the split of domestic traffic between that that is local (i.e. with an origin and / or destination in or around the study area) and 'through movements'. Information on freight tonnes lifted in Cambridgeshire and at Haven Ports by road transport for year 2003 available from Great Britain National Freight Model (GBFM)[16] suggests that the tonnage lifted in Cambridgeshire (i.e. originates or has at least an intermediate destination within Cambridgeshire) is over four times than that lifted at Haven Ports. Although not all of Cambridgeshire road freight tonnes would appear as freight traffic on A14, however this provides further evidence that local freight forms a significant, if not majority, component of the freight traffic on A14.

Growth in Road Freight Tonnage

3.31 In terms of freight tonnage, the increase in international freight is forecast to be significantly higher for international rather than domestic freight.

3.32 Analysis of freight movements originating in and destined for East Cambridgeshire carried out by MDS Transmodal as part of the DaSTS study[17] using the Great Britain National Freight Model (GBFM) suggests growth in road freight traffic would be driven by significant growth in international road freight tonnes lifted with modest growth in domestic road freight tonnes lifted. Table 3.3 below gives a summary of the growth projections. Note that although the analysis is available for East Cambridgeshire, it is still valid for A14 within the study area as it forms the key part of the key freight route linking East Cambridgeshire to rest of the country.

3.33 The forecast growth in international freight tonnage in Table 3.3 shows that international freight growth will be around 61% between 2007 and 2030, while the equivalent forecast increase in domestic freight tonnage is 18%.

TABLE 3.3 ROAD FREIGHT TONNES LIFTED GROWTH FORECASTS

Period	Category	Growth Forecasts
2007-2020	Domestic	6%
	International	37%
	Total	**10%**
2007-2030	Domestic	11%
	International	61%
	Total	**18%**

[15] More detailed analysis of freight modelling would need to be undertaken to gain a further understanding of this.

[16] East of England Freight Scoping Study, Stage 1 Report, November 2005

[17] East Cambridgeshire, Summary of Freight Outputs, MDS Transmodal Limited, July 2010

3.34 It should be noted that, particularly in respect of international freight the increase in in terms of tonnage is not expected to imply the corresponding increase in HGV numbers, due to trends towards larger vehicles and greater efficiency[18].

Growth in Road Freight Traffic

3.35 The growth in freight movements on this section of A14 will be linked to growth in domestic economic activities as well demand for international freight. The trend of freight vehicle kilometres growth being slower than growth in tonnes lifted is expected to continue.

3.36 Analysis of forecasts available from the National Transport Model[19] for this section of A14 suggest that growth in HGV flows between 2003 and 2035 will be approximately 35%-36%. Table 3.4 presents the growth forecast for freight traffic at three key locations on the A14.

TABLE 3.4 FREIGHT TRAFFIC GROWTH FORECASTS ON A14

Section	2003-2025	2003-2035
Brampton Hut (J21)	23%	36%
Spittals Interchange (J23-J24)	23%	36%
Bar Hill to Girton Interchange (J29-J31)	23%	35%

3.37 The growth figures imply an annual forecast increase in HGV growth of just under 1% per annum over the 2003-2035 period.

Light Goods Vehicles (LGVs)

3.38 The evidence available on Light Goods Vehicles (LGVs, Vans) for this section of A14 is relatively sparse. The Public Inquiry documentation for Ellington to Fen Ditton scheme has information about traffic growth categorised by Light Vehicles (car and LGVs) and Heavy Goods Vehicles (HGVs). Traffic monitoring information from Cambridgeshire County Council only identifies HGVs separately from all traffic information.

3.39 Traffic data for year 2003 available from the DfT count data base (provided as part of the National Transport Model dataset) shows that LGVs make 9-12% of the total traffic on of A14 between Ellington and Fen Ditton as per the 2003 AADT.

3.40 LGV traffic volumes have been growing at a much higher rate nationally than rest of the vehicles categories as per the latest transport statistics[20] (see Figure 3.5 below). There has been a decline in the volumes during the recent recession

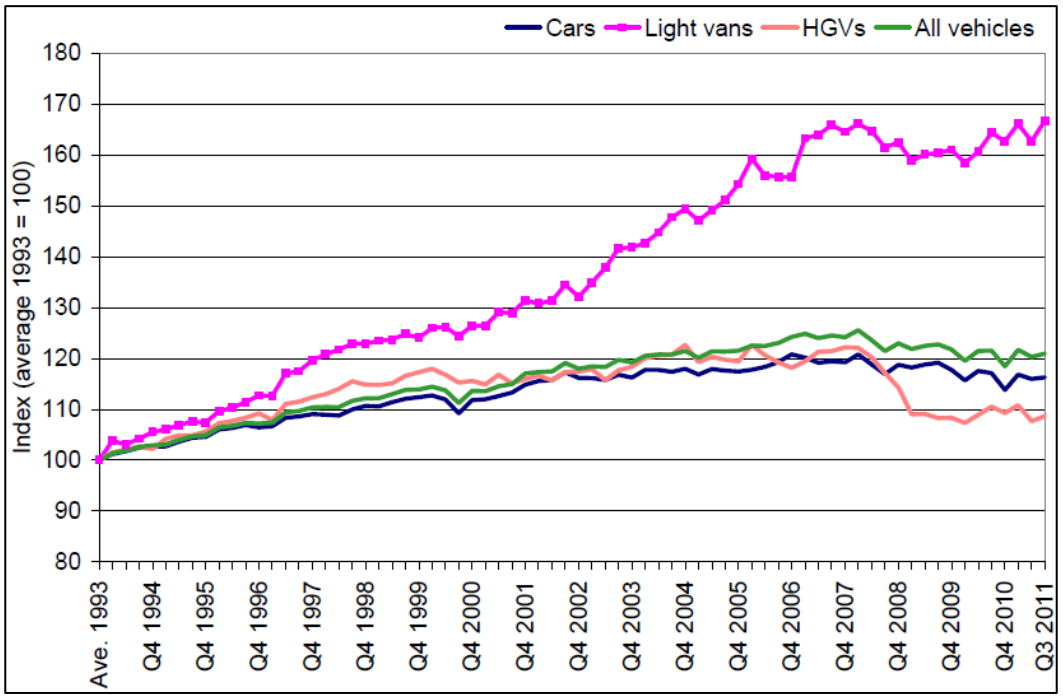
[18] Prior to the recent recession there was an emerging trend in the U.K. between 2000-2007 of total tonnes lifted increasing while the total road freight vehicle kilometres staying constant or declining. This effect has been attributed to shifts to use of bigger trucks, higher loading levels and better planning amongst other things. It is anticipated that this trend will continue in the future which will result in the overall road freight traffic (vehicle-kms) growth to be lower than the growth in tonnes lifted. (GB Road freight statistics, Statistical Release, 27 October 2011)

[19] National Transport Model (NTM), AF09 forecasts from DfT

[20] Quarterly Road Traffic Estimates: Quarter 3 2011, November 2011, Department for Transport

followed by a flat lining, a trend similar to that observed in car traffic. More recent periods have witnessed a slight increase in LGV traffic.

FIGURE 3.5 ROAD TRAFFIC GROWTH IN GREAT BRITAIN



3.41 The most relevant growth forecasts available for LGV's are from the Regional Traffic Forecasts as part of the National Transport Model 2009 forecasts21. These forecasts provide growth estimates of vehicle kilometres by vehicle type at Government Office Region (GoR) level.

3.42 Table 3.5 below presents the growth forecasts for vehicle kilometres growth on trunk roads in East of England region by vehicle type.

TABLE 3.5 TRAFFIC (VEH-KM) GROWTH FORECASTS FOR TRUNK ROADS IN EAST OF ENGLAND

VEHICLE TYPE	2003-2015	2003-2025	2003-2035
Car	5%	27%	43%
LGV	31%	63%	103%
HGV - Rigid	19%	26%	32%
HGV - Arctic	3%	18%	34%

3.43 It is evident from the table above that LGVs are expected to continue to grow at a significant rate. Although they make a relatively small proportion of overall traffic, their rapid increase is expected to put increasing pressure on the sections of A14 in the study area.

[21] Road Transport Forecasts 2009 Results from the Department for Transport's National Transport Model, March 2010

Rail Freight

Haven Ports Traffic

3.44 The primary use of rail from the Haven Ports is for the movement of intermodal containers; the port of Felixstowe currently handles over 40% of the UK's containerised trade. In early November 2011 a record 11,000 containers were transported to/from the port by rail in a single week, which equated to about one third of the total containerised traffic handled by the port in that week.

3.45 The rail corridors of most relevance to the A14 study are those used to transport goods to/from the port of Felixstowe and, in the future, the potential new port at Bathside Bay (Harwich). These are collectively known as the "Haven Ports".

3.46 Two principal rail corridors are involved:

- The Great Eastern Main Line (GEML) running south from Ipswich via Colchester to Stratford and London.
- The cross country route from Felixstowe to the West Midlands via Ipswich, Ely, Peterborough, Leicester and Nuneaton (often referred to as F2N - "Felixstowe to Nuneaton").

3.47 Each of these routes links to the principal main lines from London to the West Midlands, the North and Scotland. The GEML provides these links via rail connections around North London whilst the F2N route connects primarily at Peterborough (for Yorkshire and the North East) and at Nuneaton (for the North West and Scotland). These routes are shown in Figure 3.6.

FIGURE 3.6 KEY RAIL FREIGHT ROUTES

Current and Future Rail Freight Usage and Capacity

3.48 The key features of the current rail freight demand are that:

- There are around 29 trains per day that serve the port in each direction[22].
- Of these, around 20 use the GEML via London. This is primarily because, despite being a longer route to most destinations, it is electrified and has been cleared to convey high cube containers for a number of years. The route has therefore become established as the primary intermodal corridor to/from Felixstowe.
- However, capacity on the route is now almost completely used up, and there is a need to find alternative ways of handling further growth and, possibly, of removing some trains from the GEML to provide for alternative uses (e.g. additional services from the proposed Thames Gateway Port).

Future Rail Freight Usage and Capacity

3.49 There are significant committed capacity enhancements that on the F2N route, and a need for further longer-term enhancements also identified. However, the expectation is that future rail capacity enhancements on F2N will serve to primarily to accommodate forecast rail freight growth that cannot be routed via London because of capacity constraints, rather than attract modal shift of road freight from the A14. The key points are:

- Planned capacity improvements on F2N route and at the Port will provide for 24 trains per day between Felixstowe and Peterborough by 2014.
- Although the commercial attractiveness of the F2N route has challenges (in part due to it not being electrified), capacity constraints on the GEML route mean that the F2N route will be the primary means of accommodating future rail freight demand via the Haven Ports.
- In the longer-term, it is forecast that 58 trains per say will be required to serve Felixstowe and Bathside bay by 2030[23]. The preferred routings are shown in Figure 3.7, which clearly indicates that F2N would become the primary routing for Haven Port rail freight. Network Rail have identified a number of improvements proposed for Control Period 5 (2014 to 19) in the Rail 'Industry Initial Plan', published in September 2011. At this stage, none of these are committed schemes.

Freight Strategy

3.50 The London and South East Route Utilisation Strategy Draft for Consultation supported the notion that the F2N route should accommodate future growth in rail freight:

- "Wherever acceptable, freight traffic not serving London should be routed to avoid the capital."
- "Growth for Haven Ports traffic should be encouraged to use the cross-country route via Bury St Edmunds. However additional infrastructure enhancements beyond current commitments would be needed to allow all such freight to run this way."

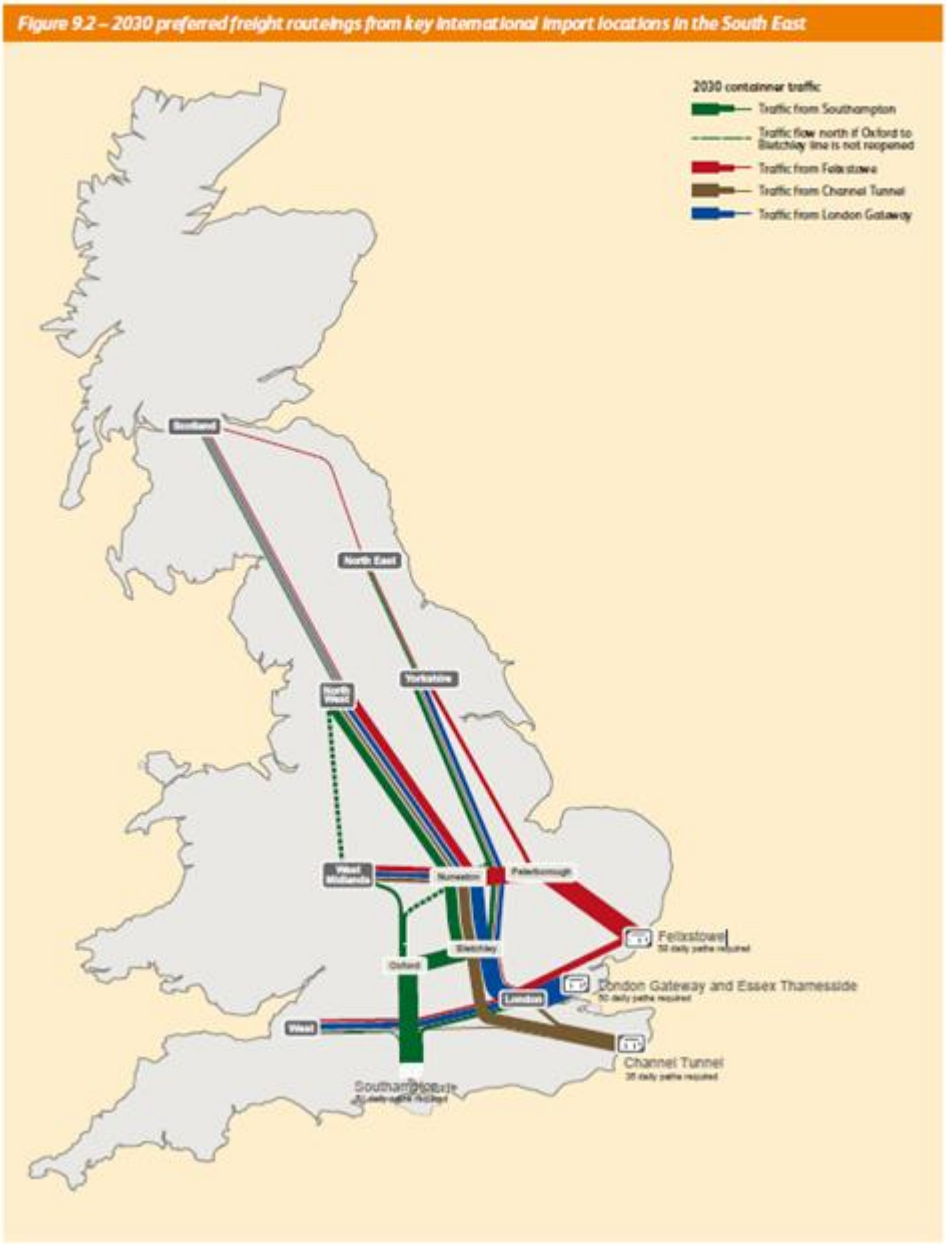
[22] There are services to/from Glasgow, Manchester, Liverpool, Leeds, Cleveland, Birmingham, Doncaster, Tilbury, Selby, Hams Hall (Coleshill), Wakefield, Ditton (Widnes), Birch Coppice (Warwickshire), Scunthorpe and Bristol.

[23] Network Rail London and South East RUS, July 2011.

North-South Freight Movements

3.51 There are also long-term plans to improve rail freight capacity for north-south movements. Planned upgrades on Stansted – Cambridge – Ely route will allow greater speed and capacity. These include gauge enhancements, raising the speed limits, capacity fir more trains per hour between Cambridge and Norwich, Ipswich and Kings Lynn, power extensions and electrification as part of the CP4 and CP5 programmes (i.e. to 2024). This would increase the capacity for number of freight trains per day, currently 3 between Stansted and Cambridge, and 8 between Cambridge and Ely.

FIGURE 3.7 2030 PREFERRED FREIGHT ROUTINGS FROM SOUTH EAST PORTS



Implications for A14

3.52 While there will be a significant increase in freight capacity on the F2N route over the next few years, the primary effect of this will be to accommodate future forecast increase in rail freight demand (in large part stemming from the capacity constraints on the GEML route via London), and will have a comparatively minor impact on the overall volume for road freight on the A14 via the Haven Ports.

3.53 Furthermore, a market-led analysis[24] suggested that only 5% of HGV traffic from the Haven Ports could potentially shift to rail, given the nature and destination of the load carried.

3.54 Taken together a 'best case' that a 5% transfer was achievable (i.e. the capacity was there to accommodate it), applied to the existing 15% of HGV traffic on the Huntingdon – Cambridge section of the A14 to / from the Haven Ports traffic, would result in a reduction in HGV traffic on the A14 of less that 1%. This is not to say that such an option would not be attractive in wider terms (it would reduce traffic by a larger proportion on the eastern section of the A14, and result in reduced congestion etc.) or that is could play a part in an overall package of measures to address the A14, but that its likely direct impact on congestion in the A14 core study area would be comparatively marginal – equivalent to less than a year's worth of HGV growth.

3.55 It is more difficult to gauge the potential impact on rail-freight capacity upgrades on the potential for north-south movement currently on the A14 to transfer to rail, although it is likely that the combination of origin, destination and load type will limit the potential market that could potentially transfer.

3.56 While there is therefore some potential for modal shift of freight from road to rail, our judgment is that any such impact will be comparatively small in the context of the increase in overall freight demand that will underpin future growth in road freight on the A14.

Review of Historic and Forecast Traffic Growth

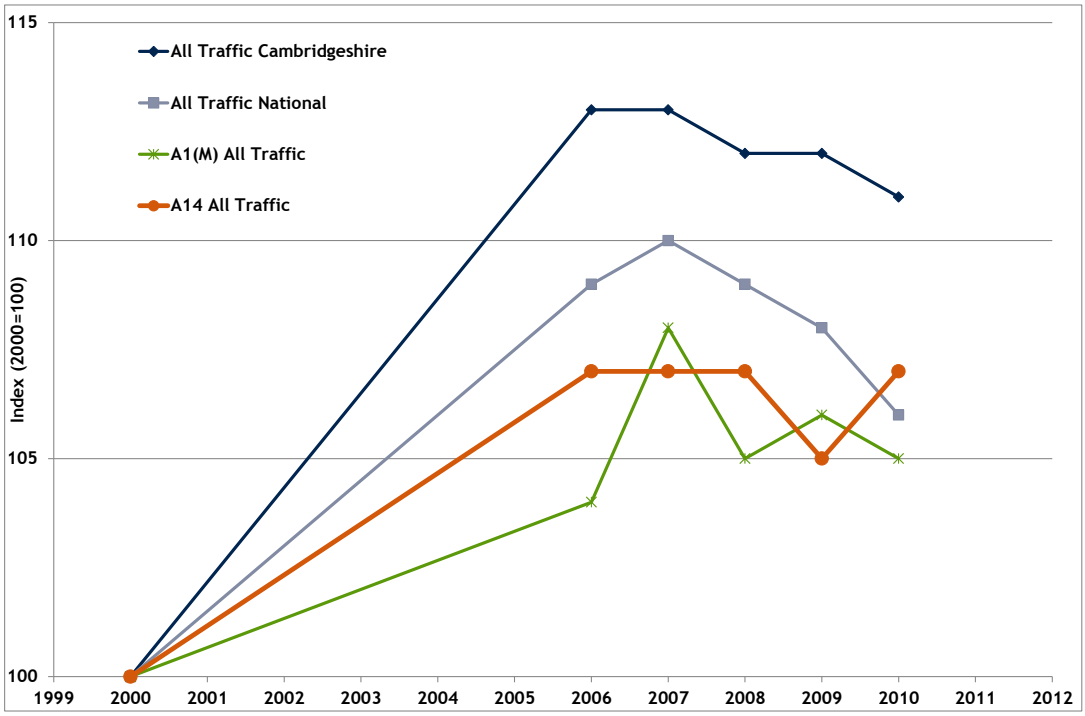
Historic Growth - General

3.57 As per the traffic monitoring carried out by Cambridge County Council[25], traffic growth has been higher in Cambridgeshire compared to growth in traffic nationally. Even during the recent recession the reductions in traffic observed in Cambridgeshire have been lower as compared to the average traffic reduction nationally. Traffic on A14 (J28) and A1 (J15) in Cambridgeshire has grown slower than rest of the roads included in the monitoring exercise. Figure 3.8 shows the growth profile comparisons over 2000-2010 period.

[24] CHUMMS Study

[25] 2010 Traffic Monitoring Report, Cambridgeshire County Council: 12-Hour manual classified count based data analysis across 2 screenlines in Cambridgeshire

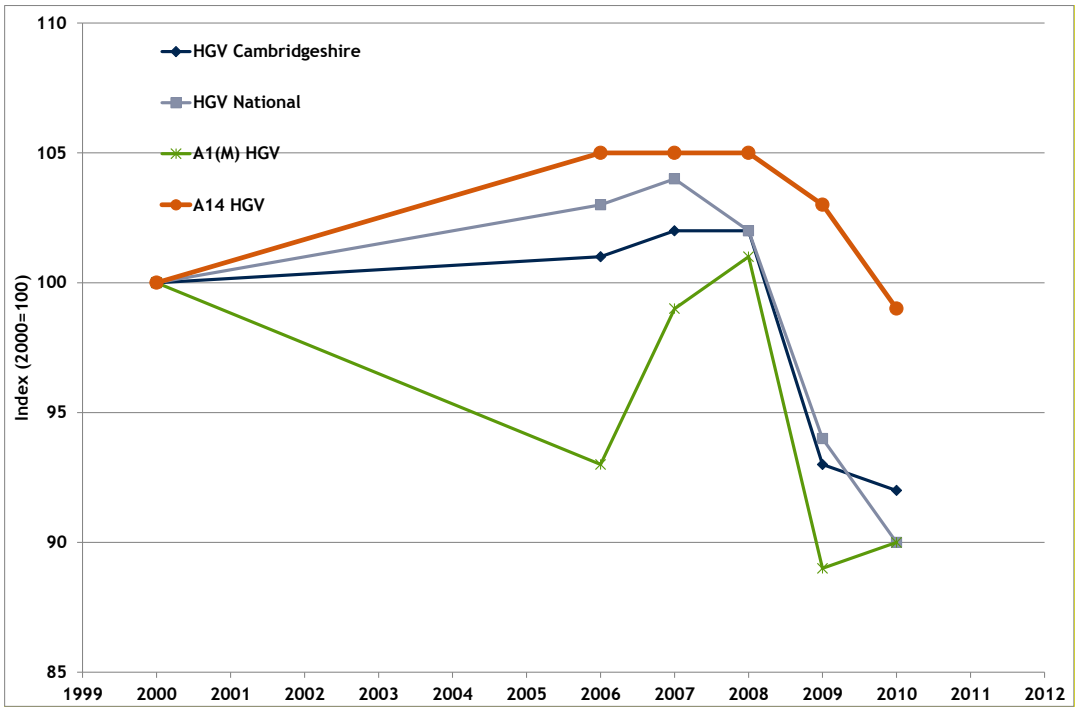
FIGURE 3.8 HISTORIC ALL TRAFFIC GROWTH



Historic Growth - HGVs

3.58 The traffic monitoring also shows that HGV growth has reversed in the last 4 years both nationally and in Cambridgeshire. The reduction of HGV traffic on A14 has been observed to be significantly lower than in other Cambridgeshire roads. Figure 3.9 shows the HGV traffic growth patterns over 200-2010 period.

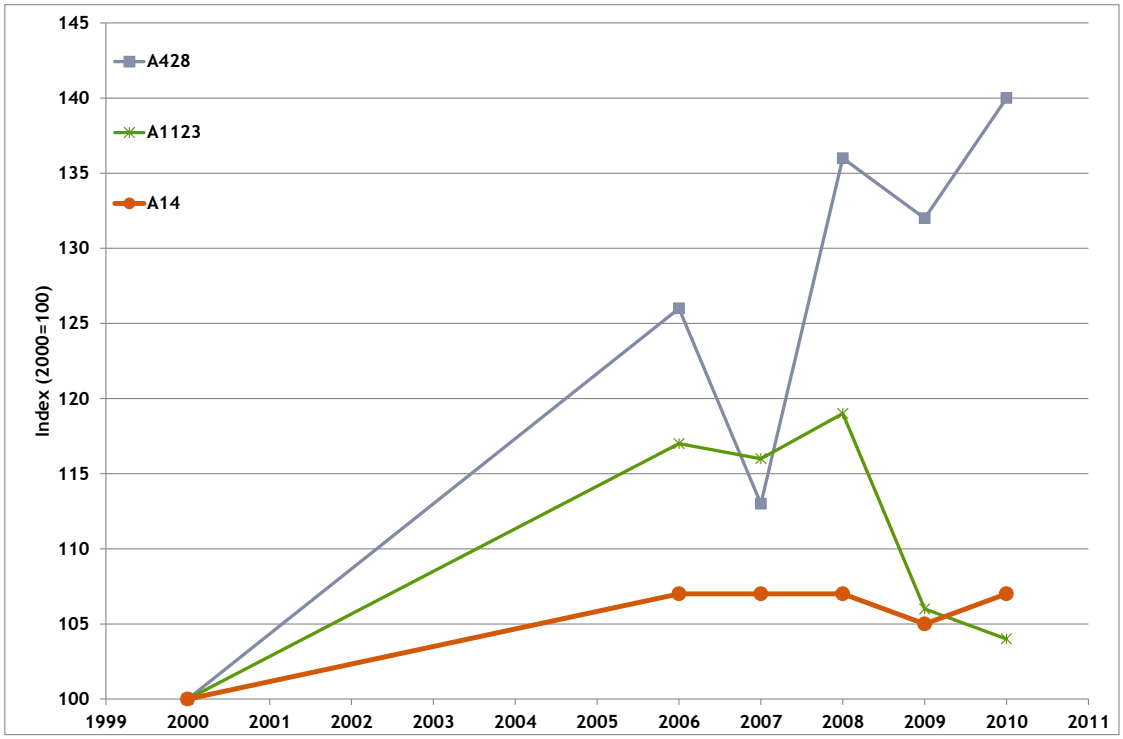
FIGURE 3.9 HISTORIC HGV TRAFFIC GROWTH



3.59 Comparing the historic traffic flows on A14 against the flows on the local roads (A428 and A1123) it is evident that the local roads have seen significantly higher growth over the last 10 years. Figure 3.10 illustrates the growth on these three parallel routes in Cambridgeshire. Note that the drop in A428 in 2007 was due to the roadworks related to the road capacity being increased.

3.60 It can be inferred from the figure below that prior to the recent recession local traffic was growing at a significantly higher rate and was choosing to use the local roads as compared to A14.

FIGURE 3.10 A14 VS. LOCAL ROADS HISTORIC TRAFFIC GROWTH



Long-Term Traffic Forecasts

3.61 The forecasting work underpinning the A14 Inquiry submission assumed long-term growth in line with standard DfT Tempro assumptions, with some specific representation of local developments on the A14. In broad terms, this forecast an increase in overall average traffic levels of 11% between 2006 (the model base year) and 2015, and 28% between 2006 and 2031.

Analysis of Recent Growth - Impact of Recession

3.62 Total traffic on sections of A14 has been broadly flat over the period between 2006 and 2011.

3.63 Causes of the year to year traffic growth pattern (a drop followed by flat lining) on A14 over the past few years can be primarily attributed to the wider economic downturn along with more local effects including:

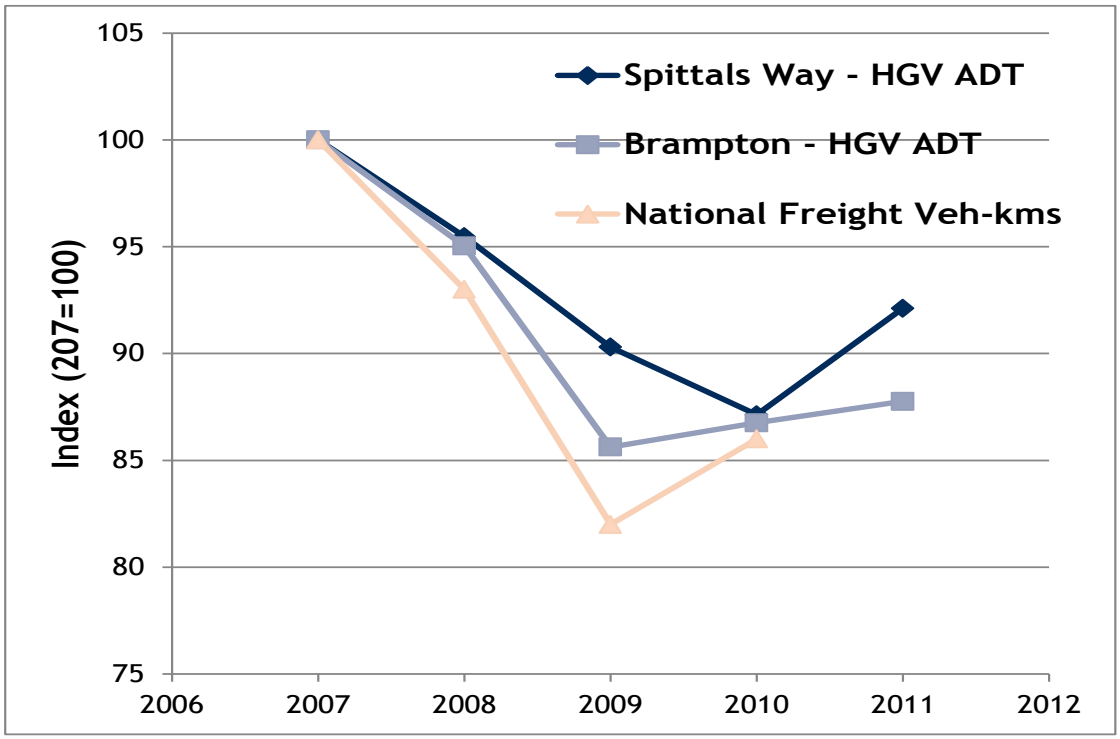
- Postponement/slowdown of local housing developments
- Significant freight traffic reduction across the country

- Significant increases in fuel costs and slowdown in average income increases
- Relatively robust performance of Cambridge as an economic centre
- More recent impact of the Cambridgeshire Busway

Freight Growth

3.64 There has, in particular, been a significant reduction in freight volumes on the A14. Nationally[26] freight traffic has declined significantly since the start of the recession in 2007-08 but there has been a recovery in growth over the past two years. Analysis of recent traffic data[27] has shown freight movements on this section of A14 have shown similar trends as the national freight movements. Figure 3.11 shows this comparison. However the freight traffic flows have seen an upturn in the last year.

FIGURE 3.11 FREIGHT TRAFFIC TRENDS SINCE 2007



Potential Future Traffic Scenario

3.65 Depending upon the rate and form of general economic growth and more specifically how Cambridgeshire grows, this section of A14 is expected to experience increase in traffic flows.

3.66 Taking account of the recent recession and assuming that the fundamental long-term drivers of traffic growth (e.g. GDP) and rate of growth remain the same, and therefore that the impact of the recession has been to affect short-term traffic growth the levels of traffic on these sections of A14 previously expected by 2015 could now reasonably be expected to occur around 2019-2020.

[26] GB Road freight statistics, Statistical Release, 27 October 2011

[27] SDG Analysis of TRADS data

Summary of Forecast Growth

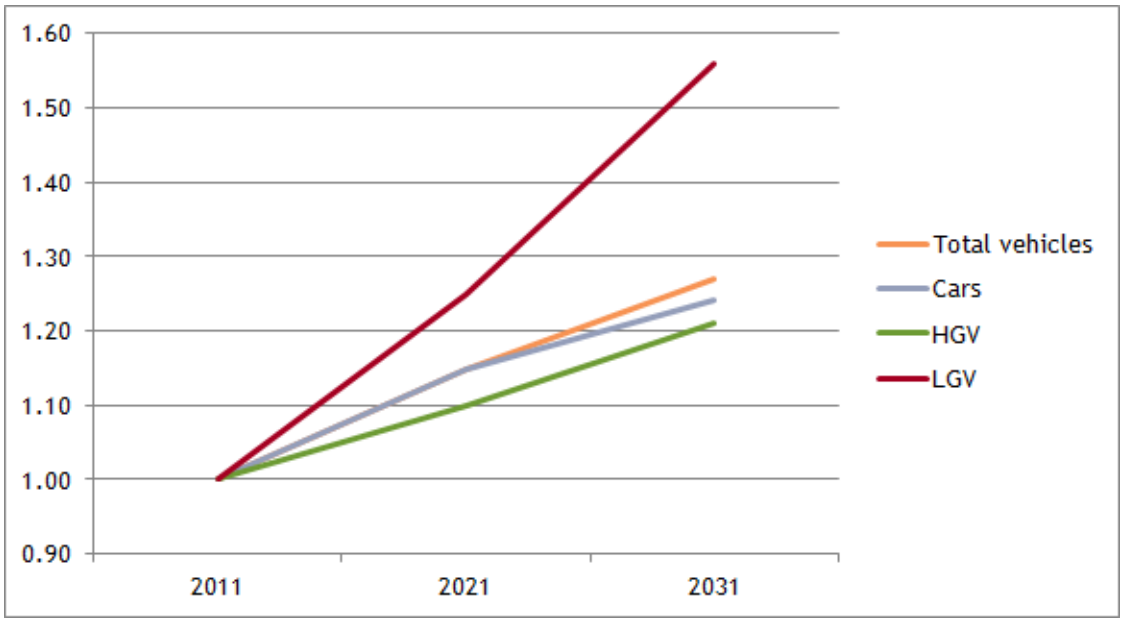
3.67 Using central (TEMPRO) consistent forecasts underpinning a representative 'average' section of A14 (i.e. the average vehicle split and average future growth) we have made a broad assessment of what might reasonably be an expected growth scenario, by vehicle type and for all traffic, between now and 2021 and 2031 respectively. The data and annual growth by vehicle type is presented in Table 3.6.

TABLE 3.6 CURRENT VEHICLE SPLIT AND GROWTH TO 2021

	2011 SPLIT	ANNUAL GROWTH TO 2021
HGV	19.5%	0.95%
LGV	10.5%	2.25%
Cars	70%	1.39%
Total vehicles	100%	1.40%

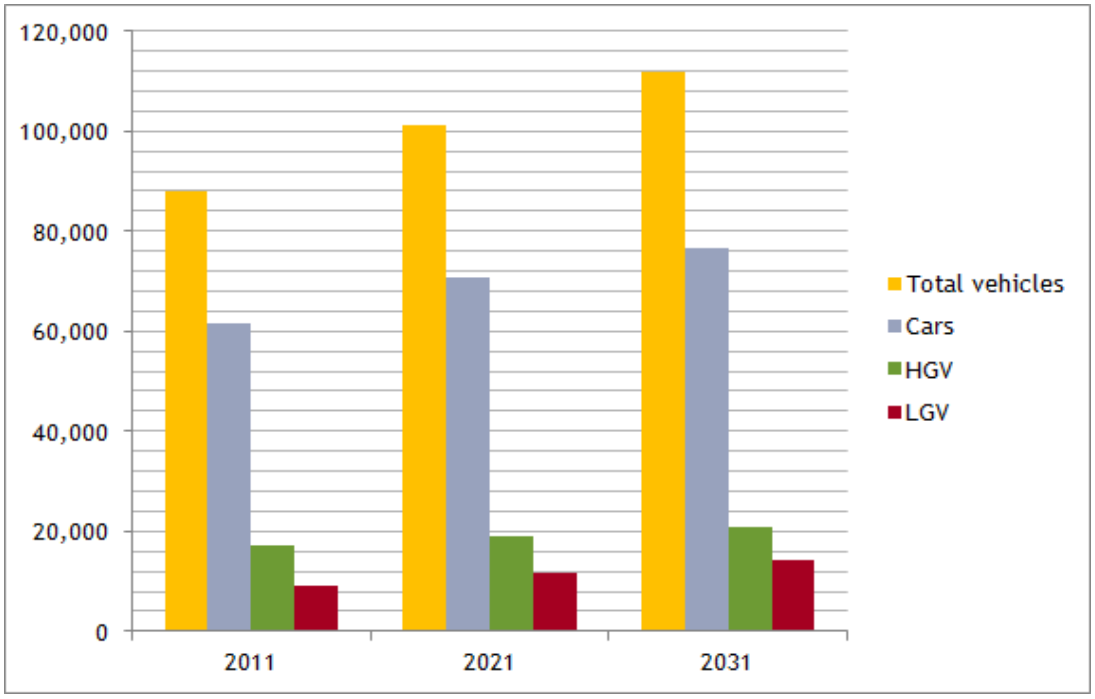
3.68 The figure shows that overall traffic will increase by approximately 15% to 2021, and at a similar rate to 2031.

FIGURE 3.12 'MID-RANGE' FORECAST GROWTH BY VEHICLE TYPE



3.69 The forecast vehicle split based on the above, in each of 2011, 2021 and 2031 is presented in Figure 3.13.

FIGURE 3.13 FORECAST VEHICLE COMPOSITION



4 Evidence Review – Transport Issues

4.1 In this section we consider how transport demand & supply interacts now and in the future, and the transport issues this gives rise to.

The A14 Capacity Characteristics

4.2 The A14 between Cambridge and Huntingdon is a primarily an older dual two-lane road, except for the section between Bar Hill and Girton where the road is a rural dual three-lane all-purpose road. This type of road provides a notional capacity of 3,600 vehicles per hour per direction (two-lane section) and 5,400 vehicles per hour per direction (three-lane). The analysis presented later in this section shows that volume exceeds this capacity under baseline conditions.

4.3 However, as well as the number of lanes being a defining factor for the A14's capacity, its effective capacity is further constrained by:

- The higher than typical proportion of traffic accounted for by heavy goods vehicles (HGVs), which take up more road space per vehicle than cars (around 2.5 times) are speed limited and have lower rates of acceleration. HGVs represent around 20% of traffic on the route.
- The tendency for HGVs to drive on the near-side carriageway, and for cars to primarily use the outer lane.
- Access roads along the route, which results in conflicts related to the mix of local and strategic traffic, and the complex local movements that take place. This issue is a particular problem in the peaks due to the higher volume of main carriageway traffic and a greater incidence of joining/leaving traffic at minor junctions, many of which are of sub-standard design. Up and downstream to major junctions along the route which result there is significant weaving between lanes which in turn reduces effective capacity and causes knock-on delays. The configuration of some junctions also prioritises lower volume non-A14 movements over those on the road (e.g. A428, A14 spur from A1)
- The absence of a hard shoulder or verge along much of the route gives the A14 a perception of narrowness with the effect that vehicles travel slower and further apart.

Road Condition

The A14

4.4 Based on discussions with HA, it is evident that the road section itself is in good operating condition. The overall standards of the road section are below the standards to which a modern 2-lane dual carriageways are now built. Hence the prevalence several at-grade local access roads, short merge sections and lack of 1-1.5m wide verges make this section unique.

4.5 HA's Managing Agent Contractor has the responsibility of maintaining this corridor to the required standards. There are emergency roadwork being carried out as and when the need arises alongside the regular maintenance (drainage, utilities etc.) to keep the road in suitable and appropriate condition. These are either carried

out through overnight closures of single lanes or where necessary closure of lanes during the day time.

4.6 According to the HA, the frequency of emergency roadwork required on this section of A14 is considered to be normal for road of similar category carrying the traffic levels as this section does.

4.7 There hasn't been a major maintenance of the road in the recent past partly because it will be difficult to maintain the necessary traffic management impacts and partly due to a 'sweat the asset' approach taken in expectation of the Ellington to Fen Ditton scheme being delivered.

4.8 There are plans to carry out major maintenance including repaving of the entire section between Spittals and Godmanchester (J23-24) in late 2012 to early 2013. This is within HA's plans to maintain the road condition to the required standards. It is anticipated that this maintenance would be carried out in a 6-7 week period.

4.9 In a recently completed project modern monitoring and information systems comprising of MIDAS loops, VMS signs and CCTV systems were implemented on sections of A14 both to the east and west or the study area section. This was again in the anticipation that the study area section was to be upgraded as part of the Ellington to Fen Ditton scheme.

Huntingdon Viaduct

4.10 The Spittals Interchange (J23) to Godmanchester (J24) section of A14 goes over the East Coast Mainline rail tracks using a viaduct structure. The key issues with the viaduct are[28]:

- *the existing structure is believed to have a limited life, has three major structural flaws, and has been subject to a number of remedial repairs including steel support beams;*
- *it is built on a technically challenging skew across the East Coast Mainline, and is located above an important station; and*
- *it is located above an important link in the local highway network.*

4.11 The HA is carrying out its own internal evaluation of the remaining lifespan viaduct and requirements for repairing it. The current view of the HA is that it is probable that it would not need complete replacement, on structural grounds, and an in-situ repair is possible. One of the key constraints in this task is being able to access the railway property and tracks which run underneath the viaduct. Therefore it is seen as a more longer term task (2-3 months) to implement and will require longer planning. The budget for this maintenance task will also have to be established by HA. The capacity of Brampton Road (A1514) is also constrained by the supporting steel work as part of the on-going maintenance and monitoring work.

4.12 While there remains some uncertainty about whether there is a long term need to remove the viaduct on structural grounds, Huntingdon's town centre regeneration proposals are predicated on the removal of the viaduct, and is also an integral part

[28] A14 Study, Preliminary Evidence Review, Prepared by Mike Salter, East of England Development Agency, For Cambridgeshire County Council, July 2011

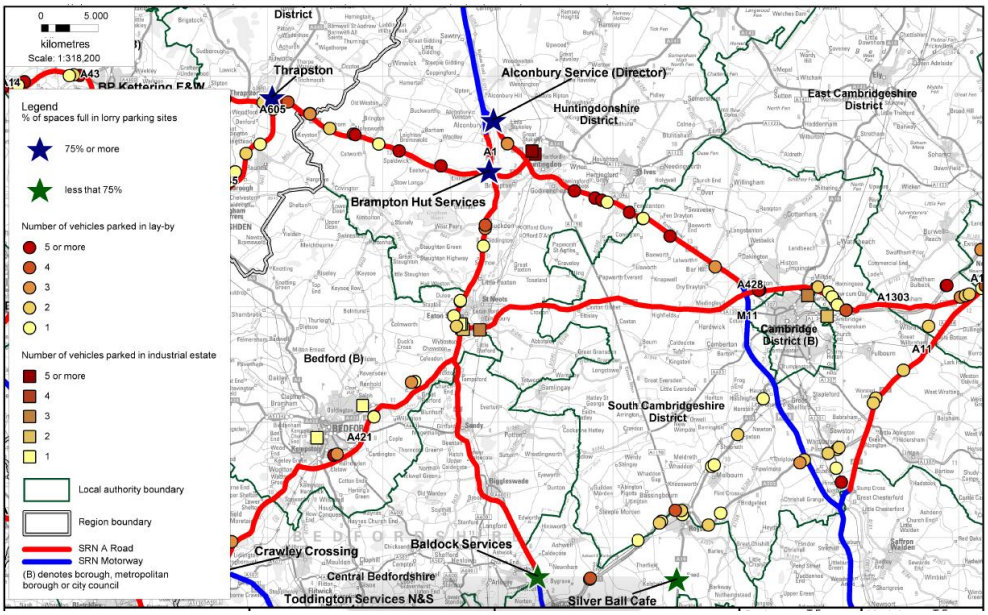
of the local authority's plans for addressing environmental issues in Huntingdon centre, which is a designated Air Quality Management Area (AQMA).

Lorry Parking

4.13 The availability of parking for lorries in the study area is an additional matter for consideration. Recent findings are presented in a study by the Department for Transport[29] . This shows that lorry parking areas are under severe pressure along the A14.

4.14 The most recent data available suggests that both Alconbury[30] and Brampton Hut services are over 75% capacity and there is not enough available capacity to accommodate extra vehicles. As a result, vehicles tend to park either in lay-bys or in industrial estates in South Cambridgeshire and Huntingdonshire. Figure 4.1 shows congestion levels on the area's parking sites.

FIGURE 4.1 LORRY PARKING ALONG THE A14



4.15 The lack of parking spaces acts as a constraint on lorry drivers' decisions, especially at peak times. If they were able to leave the A14 when the road is most congested, then congestion levels could be mitigated. However, HGVs have no incentive to wait for traffic levels to decrease in a parking area at present, given the issues of overcrowding described above.

Baseline Traffic Analysis

Flows on the A14

4.16 Figure 4.2 illustrates the traffic flow levels (AADT) on this section of A14 and the HGV share of the total traffic. Note that the average share of motorway traffic that HGVs make up nationally is in the range of 10-15%.

[29] Lorry Parking Study – AECOM and DfT, November 2011

[30] The Alconbury facility has recently closed and re-opened, and HDCs view it that the facility may now operate below the 75% capacity level and that the data underpinning the analysis above may pre-date this.

FIGURE 4.2 A14 TRAFFIC FLOWS AND HGV SHARE (AADT)

4.17 Traffic flow levels on the A14 increase going from Ellington through Huntington towards Cambridge. The volumes tend to increase gradually from around 65,000 – 70,000 AADT to around 85,000-95,000 AADT from Spittals Junction (J23) to Girton Interchange (J31). Around 40% of traffic on A14 is from/to M11 whereas the rest continues on A14 between Girton and Milton, north of Cambridge.

4.18 The capacity of A14 increases between Bar Hill and Girton as it becomes a three-lane section. However in peak conditions the volumes tend to exceed capacity in this section as well as in the section between Fenstanton and Bar Hill. Junction capacities are also exceeded at Histon (J32) Spittals Junction (J23) and at Brampton Hut (J21) which leads to long queues on to the A14[31].

Composition of Traffic Flow – HGV Proportion

4.19 Typically, 17-22% of traffic on the route comprises heavy goods vehicles. This is a higher proportion of road freight movements than the national average and it presents several issues described below.

Flow Profile Over the Day

4.20 Commuter trips constitute the highest proportion of total trips in the area, particularly as a result of the housing-job imbalance in Cambridge[32], whereby approximately 40,000 workers in Cambridge do not reside in the city. The analysis of traffic flows on the A14 highlights a clear pattern with most trips west-bound towards Cambridge in the AM peak, while most trips east-bound away from Cambridge in the PM peak.

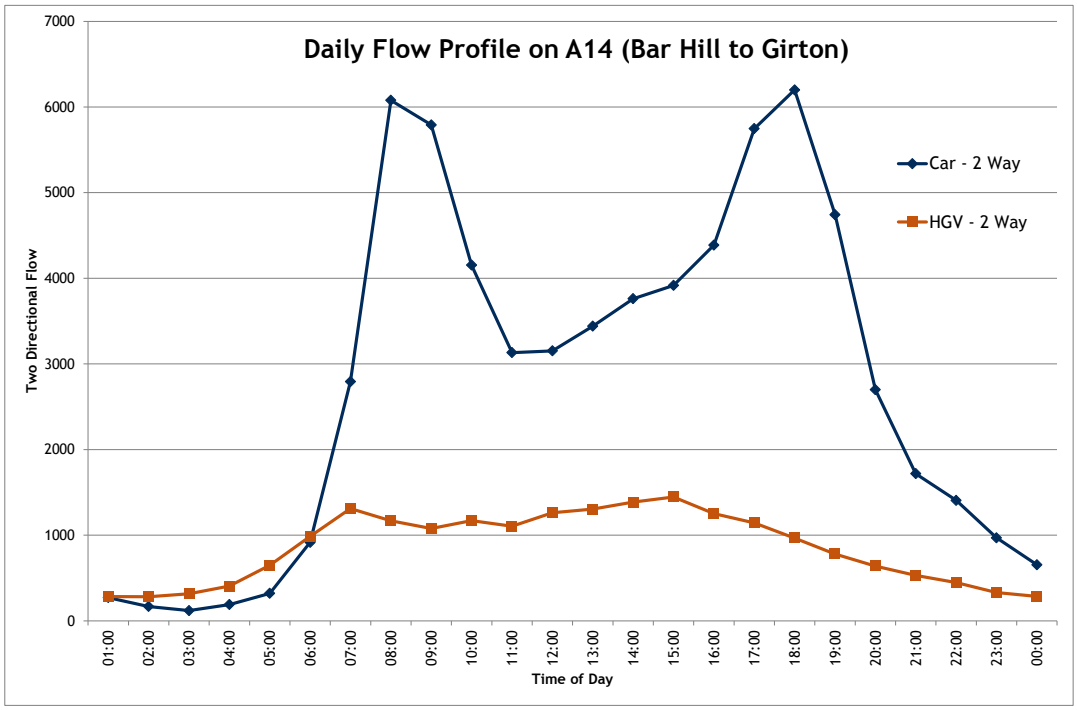
[31] A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 1 – Text, Inquiry Commencing 20th July 2010, Section 2.5.13-2.5.23

[32] TIF Package and Funding proposition, October 2009,

4.21 The typical distribution of trips (daily flow profile) can be seen in Figure 4.3, which shows the daily flow profile on the Bar Hill to Girton section. While the flow of heavy goods vehicles tends to be stable throughout the day, car flows clearly peak between 7-9am and between 4-7pm.

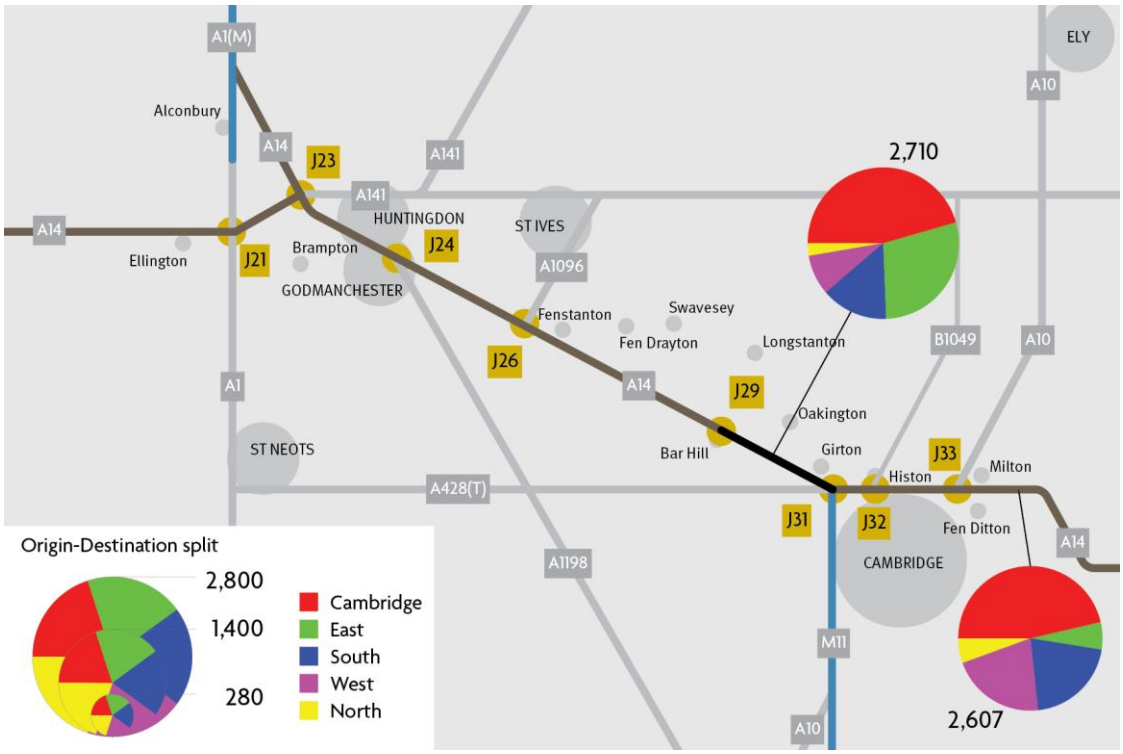
4.22 While car volumes in the morning and evening peaks are broadly similar, the volume of HGV trips is higher in the morning peak, suggesting that overall capacity is more constrained in the morning than the evening (especially given the larger amount of road space used per vehicle by HGVs).

FIGURE 4.3 DAILY FLOW PROFILE ON A14



4.23 Assessment carried out for the Cambridge DaSTS study examined the composition of the total traffic travelling in eastbound direction A14 between Bar Hill and Girton and in westbound direction on A14 from Newmarket. This was based upon a select link analysis of highway model data for a base year of 2006. Figure 4.4 shows the breakdown of traffic on A14 in the AM peak. The analysis shows that roughly half of all traffic is destined for Cambridge City in the morning peak. This share drops to around a third of total traffic in the inter-peak as commuting trips (largely destined for Cambridge) reduce while the volume freight and other trips (a higher proportion of which will be 'through' trips) is more constant over the day.

FIGURE 4.4 AM PEAK DESTINATIONS OF TRAFFIC ON A14 – INBOUND TOWARDS CAMBRIDGE



Baseline Transport Issues

4.24 The physical characteristics of the road and the traffic flows described above give rise to several transport issues along this stretch of the A14, and the local and wider road network.

Network Performance - Congestion and Delay

Congestion and Delay on the A14

4.25 Congestion is severe at several sections and junctions of the A14. The Girton Interchange, the Brampton Hut and Spitalls junctions are congestion hotspots, especially at peak times. The whole section between Fenstanton and Bar Hill is also highly congested, where volume over capacity is close to 100% and traffic flows often breakdown in peak periods.

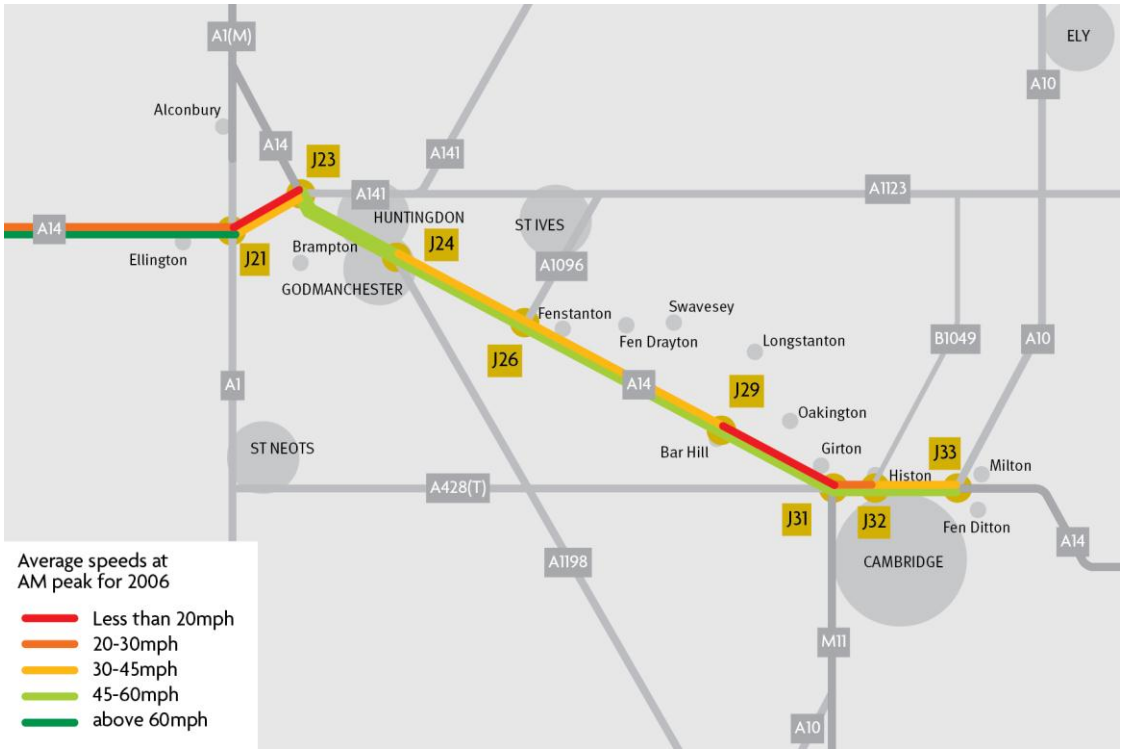
4.26 The main cause of congestion is the limited effective capacity on this route, which cannot cope with the high traffic flows. Capacity is structurally limited because the road is a 2-lane dual carriageway. However, effective capacity is further reduced by the high proportion of HGVs. Lorries, in fact, take up around 2.5 times more road space per vehicle than cars, are speed limited and have lower rates of acceleration. At peak times, lorries tend to occupy the outer lane and cars are segregated along one lane only.

4.27 Access to the road is also problematic. Conflicts between traffic leaving and traffic entering the carriageways causes severe congestion at the main junctions. The design of some junctions (e.g. Spittals) appears to exacerbate access problems. Congestion at the junctions has knock on effects along the whole route and along local roads feeding into the A14.

4.28 These high levels of congestion cause significant delays both on the A14 and on local roads. The reduction in average speed at peak times is a powerful indicator for traffic delays. Indeed average speed falls dramatically along certain sections of the A14: east-bound traffic towards the Girton interchange and west-bound traffic towards Brampton Hut are two hotspots at which average observed[33] speed falls below 20mph in the morning peak times, as shown in Figure 4.5. The equivalent plot for the evening peak is shown in Figure 4.6.

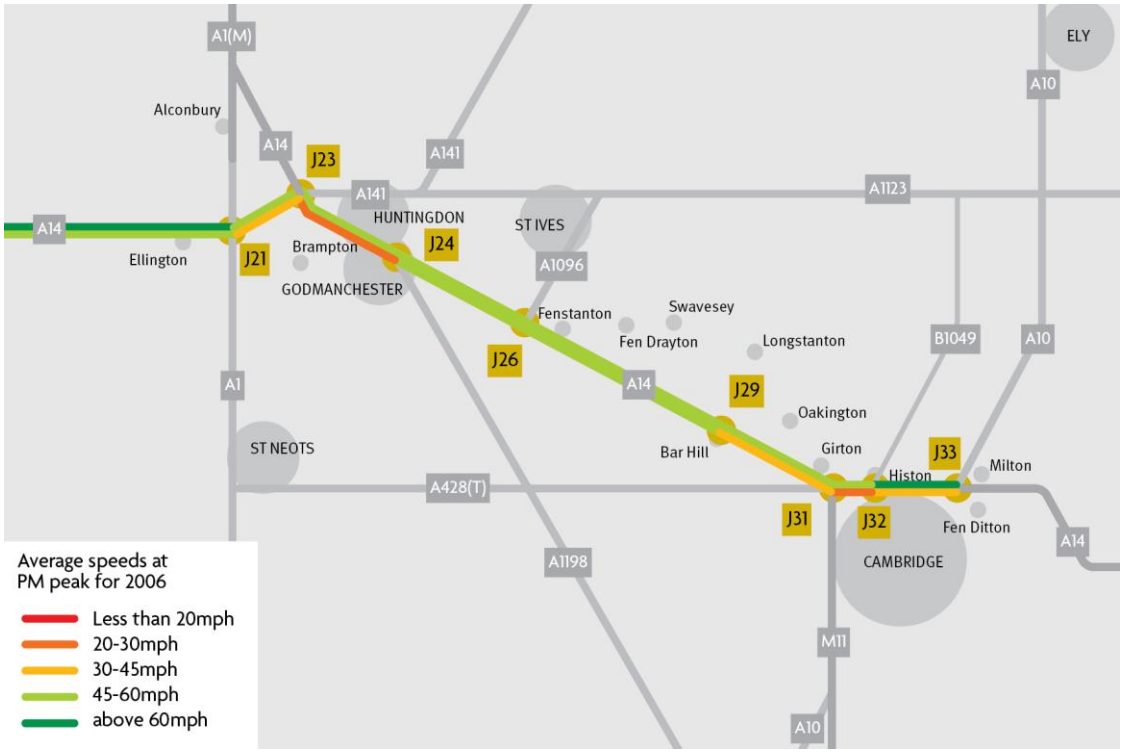
4.29 In the peak hour a typical end-to-end journey time on the section from Ellington to Fen Ditton would be 30 minutes, compared to 25 in the inter-peak and 20 under free-flow conditions.

FIGURE 4.5 AM PEAK SPEEDS ON A14



[33] TrafficMaster September 2008-July2009 data provided by Cambridgeshire City Council, AM: 8-9 am, PM: 5.30-6.30pm

FIGURE 4.6 PM PEAK SPEEDS ON A14



4.30 Overall, the A14 in the study area faces high levels of congestion and severe journey times delays as a result of the volume of movements, the interaction between movements (lorries and cars, access to the junctions) and the traffic flows at peak times.

Congestion and Delay on Local Roads

4.31 The impacts of congestion and delay extend beyond the A14 and affect the whole network of local roads between Huntingdon and Cambridge. The next paragraphs examine the extent to which local roads are affected, using TrafficMaster data for AM/PM peaks, as processed and mapped by Cambridgeshire County Council.

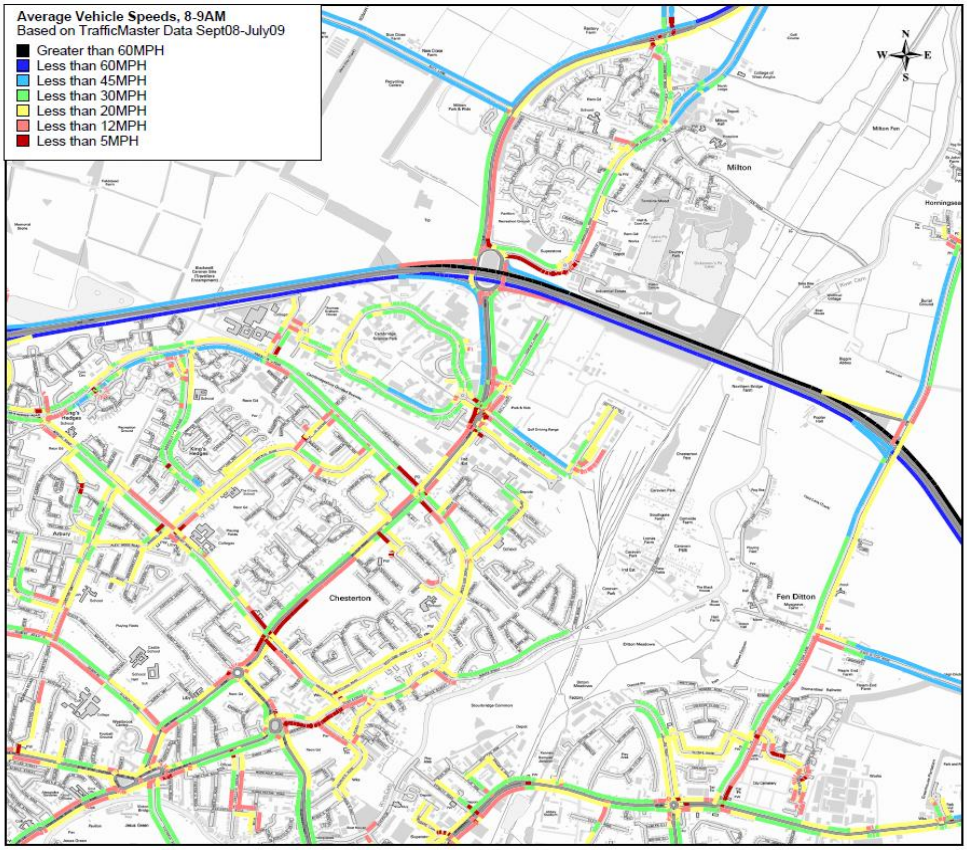
4.32 Certain local roads around Huntingdon and St. Ives are severely congested due to traffic spillovers from the A14, due to local traffic choosing to completely avoid the A14 as the route of choice as well as traffic detouring or rat-running as a result of A14 incidents.. This is particularly evident at the Spittals Junction in the morning peak, where queues are formed along the A141 southbound and average speed falls below 12mph.

4.33 The B1514 route through Godmanchester to Huntingdon Ring Road is also highly congested at peak times at the junction with the A14. This has knock-on effects in Huntingdon's town centre around the B1514 ring, where average speed is lower than 5mph at several sections.

4.34 Traffic spillovers take place on the Cambridge local network too. The city centre faces severe congestion at peak times as a result of intense commuting flows. The north-west part of the city witnesses average speeds below 12mph as vehicles exit the A14 at AM peak and enter the A14 at PM peak from the Girton Interchange (A428 junction). Traffic to/from Impington in the north is also subject to delays.

4.35 Cambridge city centre bears the additional burden of traffic flows from the north-east. Average speed on the A1309, connecting Milton to the city centre, is for long sections lower than 5mph in the morning peak. Severe congestion occurs between the Science Park and the Park and Ride in the PM peak, as shown in Figure 4.7

FIGURE 4.7 AVERAGE SPEED IN CAMBRIDGE CITY CENTRE (AM PEAK)



4.36 Other local roads are affected by traffic migrating away from the A14 when disruptions take place (e.g. accidents, road works). These include the A1123, which runs broadly parallel to the A14 for the stretch between Huntingdon and Newmarket, and is part of the route to alternative A14 access points, and the A428, which links the A1 and the M11 south of the A14. On the A428, traffic volumes have risen by 40% between 2000-2010[34].

4.37 The knock-on effects of A14 traffic diversion on this road are felt in smaller towns and villages (St Ives, Cambourne) as well as rural areas. The latest national statistics show that average traffic flow on the rural 'A' roads in Cambridgeshire is higher than in Great Britain by around 40%[35]. This trend is likely to worsen the quality of life in rural areas through increased levels of noise and air pollution.

4.38 Critically, the existing issues of congestion on local roads would be exacerbated if planned housing development took place. If the area were to become more urbanised, local roads would be under additional pressure.

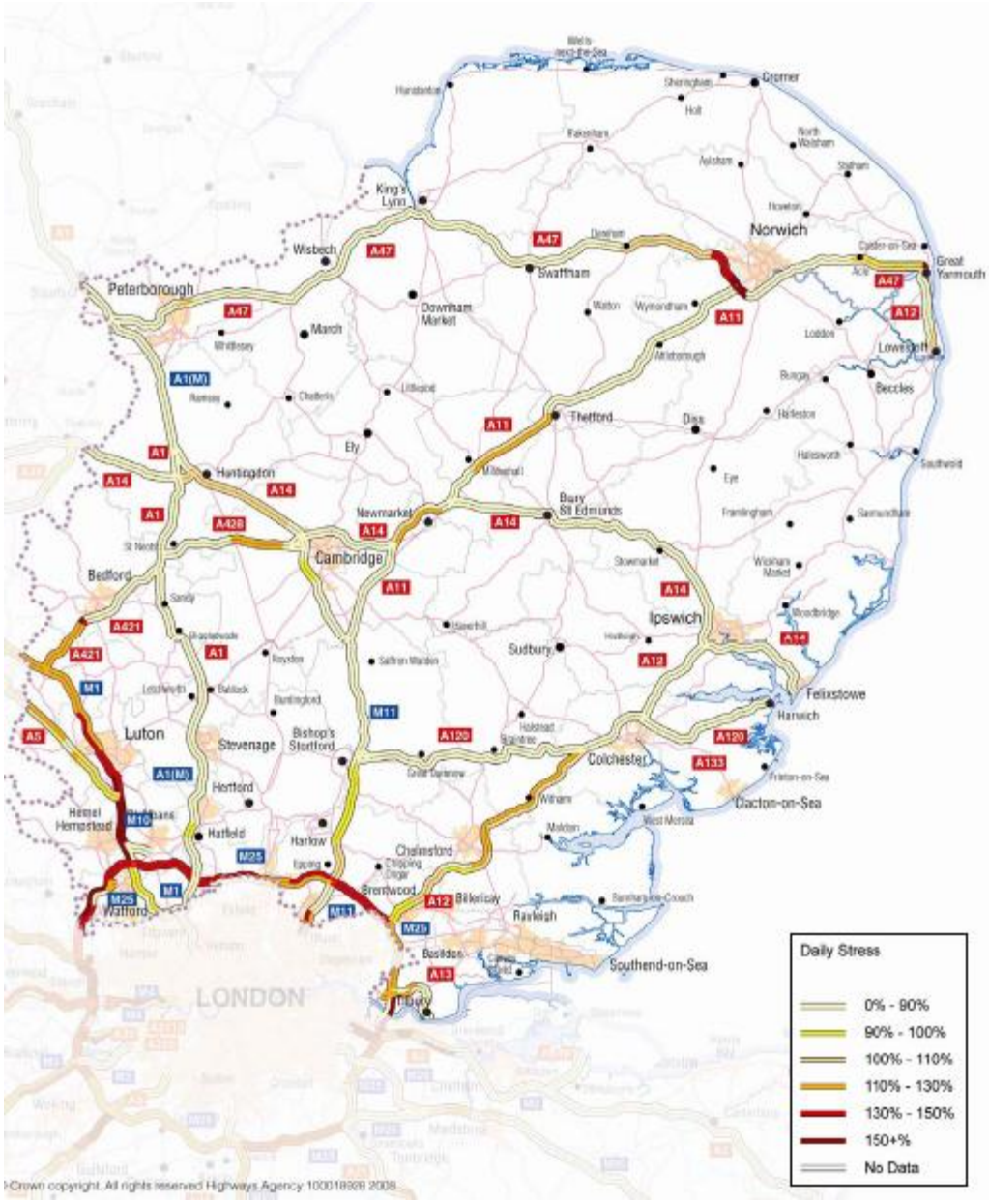
[34] Traffic Monitoring Report 2010 – Rural Traffic, p.2

[35] Traffic Monitoring Report 2010 – Rural Traffic, p.4

Congestion and Delay on the wider Strategic Road Network

4.39 Congestion and delay mapping prepared by the Highways Agency based on observed data[36] shows that levels of congestion on the network are greatest on strategic links around London (M25) and on the strategic network around the London Arc and Thames Gateway / South Essex. Other key 'hot-spots' are on much of the M1, the M11 and A1 (M), and on key strategic routes around Cambridge including A14, A428 and A11. Figure 4.8 presents the 'stress' map of the strategic road network. 'Daily Stress' in this case is defined as daily flow (AADT) over the maximum sustainable traffic flow in the peak hour. It is possible for 'Daily Stress' levels to exceed 100% where the roads are busy for substantial proportions of the day.

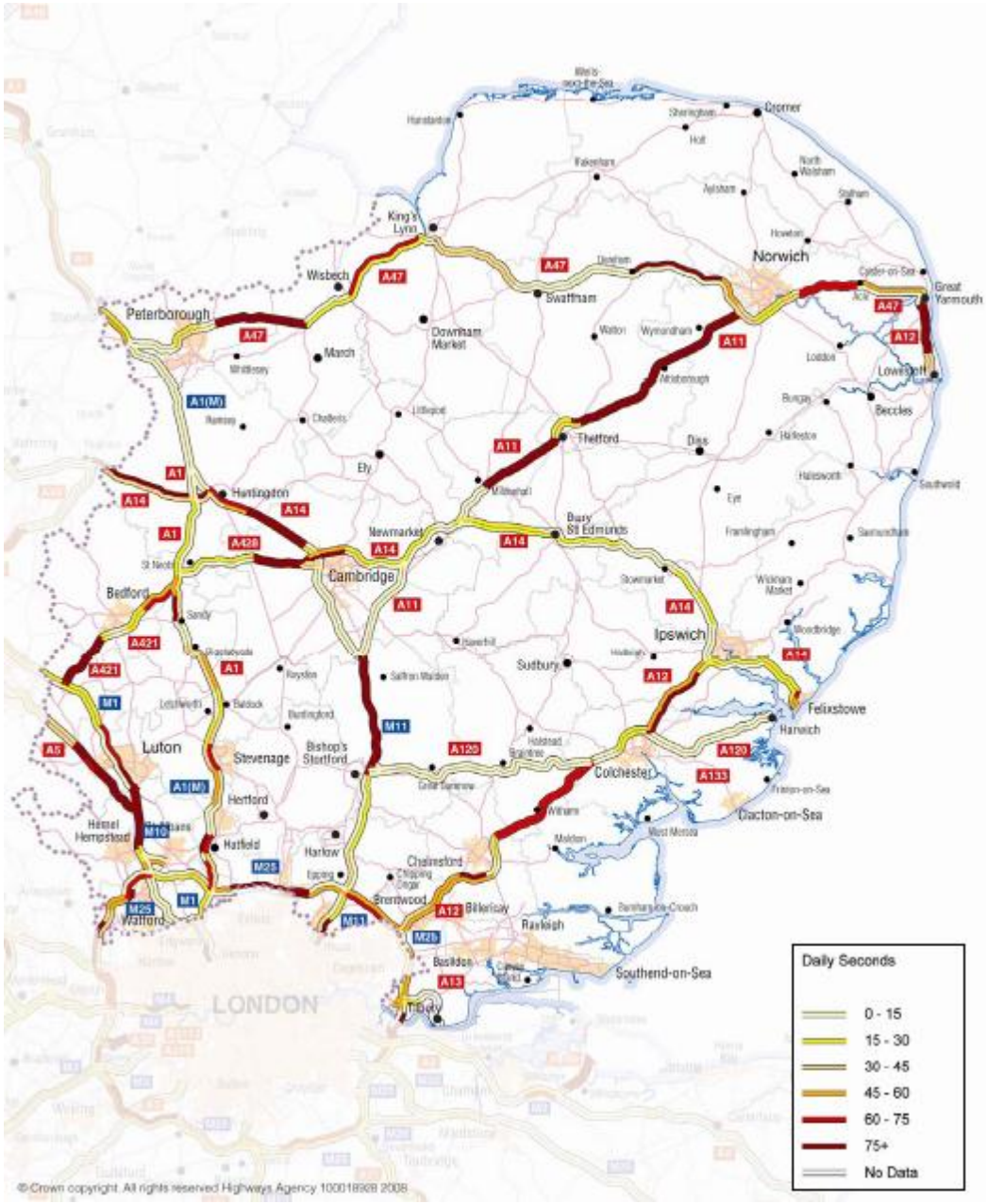
FIGURE 4.8 STRATEGIC ROAD NETWORK STRESS 2006



[36] Regional Network Report for East of England, 2008, HA

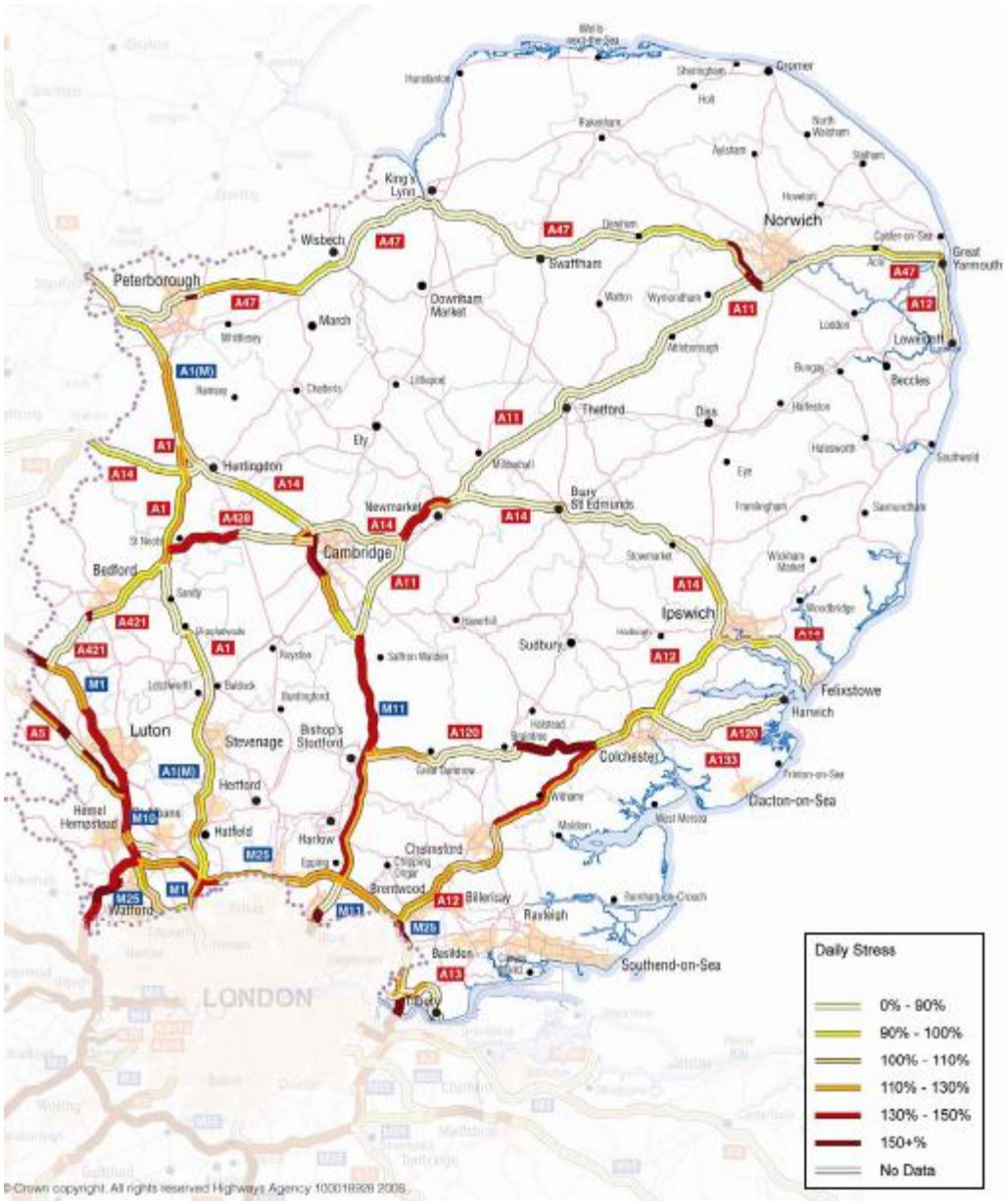
4.40 The average delays per vehicle experienced on different sections of the strategic road network is presented in Figure 4.9.

FIGURE 4.9 STRATEGIC ROAD NETWORK DELAY PER VEHICLE 2006



4.41 Similar analysis of delay and stress has been carried out for future years using the East of England Regional Model (EERM) by the HA. In these forecasts a number of road schemes, including A14 Ellington to Fen Ditton, which formed part of the Major Schemes Programme of the HA were assumed to be implemented. Figure 4.10 below shows the forecast stress levels in year 2016 on the strategic road network in East of England.

FIGURE 4.10 STRATEGIC ROAD NETWORKS STRESS 2016



4.42 It is evident that the implementation of the A14 Ellington to Fen Ditton scheme was forecast reduced the stress levels on A14 between Huntingdon and Cambridgeshire. The implementation of the A428 dual lane between Cambourne and M11 is also seen to reduce stress levels on this section. However there are other sections adjacent to these scheme locations which are forecast to get worse, especially M11 J8 to A14 J31, A14 J36 to J38 (near Newmarket) and A428 St. Neots to Cambourne.

4.43 For strategic north-south movements Figure 4.10 shows a high level of network stress on both the M11 to the south and the A1(M) to the north that has implications for the attractiveness of strategic routeing from parts of London and the south-east to the Midlands / North. Under a baseline case (in which no improvements were made on the A14) stress and delay on the Ellington to Fen

Ditton would mean the route broadly from the M25 through to Peterborough would be experience delay and poor resilience.

Safety and Accidents

Accidents

4.44 The safety record of the Ellington to Fen Ditton section of A14 in the study area is relatively poor. There are about 150 personal injury accidents per annum on this section[37]. The perception of this section of A14 as being an unsafe corridor is amplified by the long delays caused to drivers. Large number of HGVs using this corridor and occupying the nearside lane is often cited as the cause of regular accidents on this section of A14. The local news coverage (see Figure 4.11) also highlights the poor perception of this corridor.

FIGURE 4.11 ACCIDENTS ON A14 RESULTING IN SIGNIFICANT CASUALTIES[38]

4.45 A simple accident rates analysis indicates whether, considering the amount of traffic carried by the A14 and the design standard of the road, this particular road is unusually dangerous. The straightforward analysis of accident rates[39] for this section of A14 suggests that most sections have similar accident rates (0.149-0.154 PIA per million vehicle kilometres) to the relatively small number of comparable roads with similar traffic levels[40].

4.46 However there are couple of hotspots:

- Brampton Hut to Spittals (J22-23) where the accident rate is double the expected accident rate for an equivalent road, and

[37] A14 Study, Preliminary Evidence Review, Prepared by Mike Salter, East of England Development Agency, For Cambridgeshire County Council, July 2011

[38] Source: http://www.cambridge-news.co.uk/Home/More-than-50-people-killed-on-A14.htm

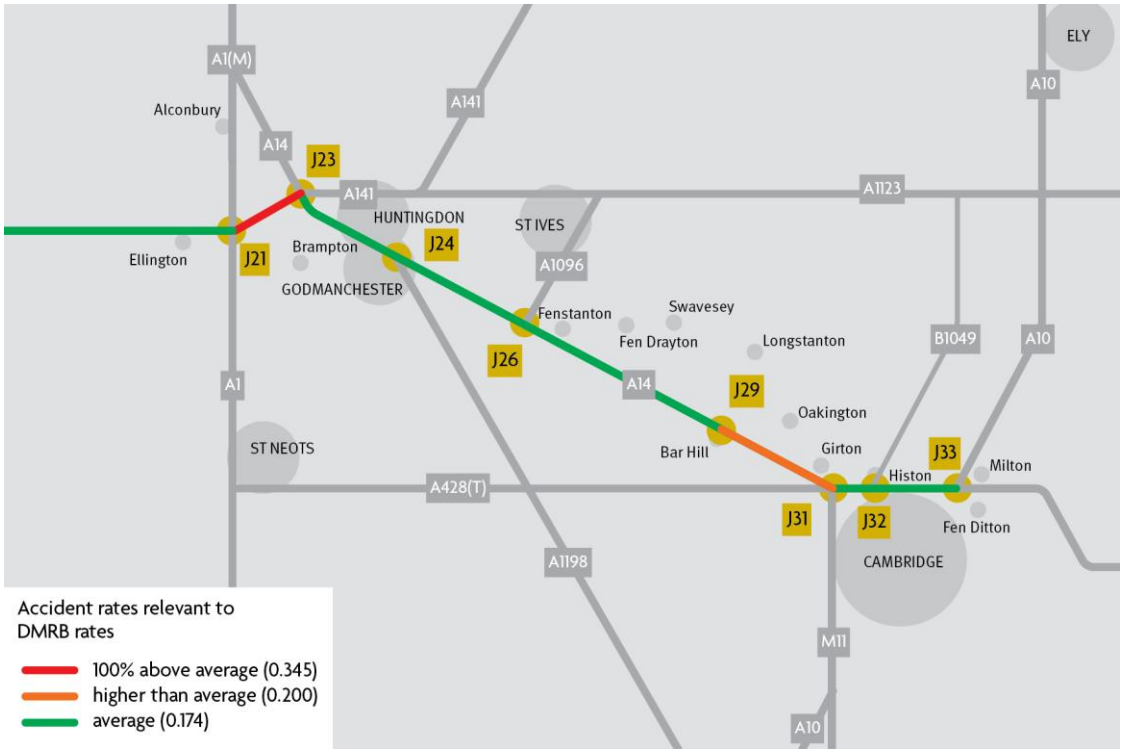
[39]A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 2 – Appendices, Inquiry Commencing 20th July 2010, Table C.1

[40]A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 2 – Appendices, Inquiry Commencing 20th July 2010, Table B.3

- Bar Hill to Girton Interchange (J29-31) where the accident rate is 30% higher than expected accident rate for an equivalent road.

4.47 Figure 4.12 presents the accident rates on the sections on A14 relative to the default accident rates. The high accident rates on the two 'hotspots' is not, in the HA's view, attributable to the intrinsic design or condition of these sections. However, both sections near Spittals and Girton involve weaving sections with traffic merging and diverging to get in the right lane and high proportion of freight traffic.

FIGURE 4.12 ACCIDENT RATES ON A14



4.48 Accidents rates have been declining over the past 5 years on the A14, but this is in line with wider reduction in accidents across the motorway and trunk road network. Average speed cameras were installed on the A14 section between Huntington and Cambridge in 2007. Analysis[41] of the accident rates after has shown that 20% reduction of accidents can be attributed to the implementation of these cameras.

Reliability and Resilience

Incidents

4.49 In addition to accidents, the occurrence of incidents also impacts upon the performance of this section of A14. Incidents include road traffic accidents formally reported (via STATS19), minor damage only accidents, clearance of debris, emergency roadwork, as well as vehicle breakdowns. Around 200 incidents in 2008 which required closure of one lane for an average of 2 hours. Table 4.1

[41] A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 1 – Text, Inquiry Commencing 20th July 2010, Section 2.6.25

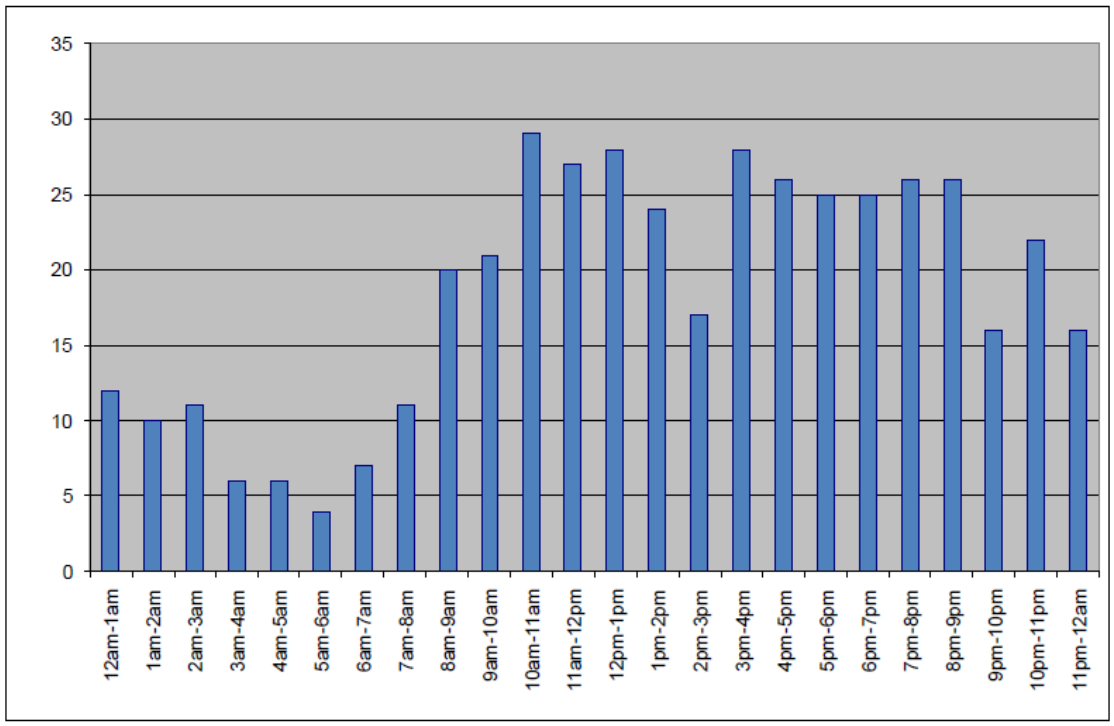
presents a summary of lane closures in 2008 on the sections of A14 in the study area.

TABLE 4.1 INCIDENT RELATED LANE CLOSURES IN THE STUDY AREA ON A14[42]

	NUMBER OF INCIDENTS	AVERAGE DURATION OF CLOSURE (HOURS)
Single Lane Closure	188	2.1
Double Lane Closure (Full Road)	9	1.4
Total	**197**	**2.1**

4.50 Figure 4.13 shows the distribution of lane closures during the day. This shows that incidents occur throughout the day.

FIGURE 4.13 DAILY DISTRIBUTION OF LANE CLOSURES IN THE STUDY AREA ON A14[43]



4.51 Lack of viable alternative routes, results in significant delays on incident days, in some cases one to two hour delays to what otherwise would be a 15 minute journey.

4.52 Due to the 'peakiness' of traffic flow profile the impact of incidents in peak hour through reduced capacity on A14 resulting in blocking-back of traffic results in

[42] A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 1 – Text, Inquiry Commencing 20th July 2010, Section 2.7

[43] A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 1 – Text, Inquiry Commencing 20th July 2010, Section 2.7

significant amplification of congestion of delays. Traffic also diverts on to local roads which have limited capacity and in many cases are not suitable for the volume or type of traffic resulting in a network breakdown in the entire vicinity of A14.

4.53 Accident management system (VMS, MIDAS loops) is in place on either side of this section of A14 as well as on A1 and M11. However, there are limited options available for strategic traffic to re-route, as the only other strategic route option for east-west movement is M25. The official diversion option provided to strategic traffic in case of an incident on this section of A14 is A1-A428, which the only possible alternative. A428 is a one lane each way single carriageway between A1 and Cambourne, with limited capacity.

4.54 Local traffic diverts on several secondary roads depending upon their location in relation to the incident location. Long queues on local roads running through various towns and villages between Huntington and Cambridge is common occurrence on days of incidents on A14.

Overall Reliability and Resilience

4.55 Combined impact of daily peak congestion and incidents related variability in journey time results in this section of A14 being perceived as highly unreliable with high levels of congestion being considered as a chronic problem.

4.56 Trafficmaster 'hotspot' analysis for the year 2008 identified A14 between Cambridge and Huntington as the fourth busiest 'hotspot' on the trunk road network in England[44]. A 'hotspot' is defined when a congestion alert is issued when the speeds breakdown below 30 mph. In the case of this section of A14, these alerts would be made up of days with extreme traffic congestion and days with incidents.

4.57 A report on behalf of the Highway's Agency[45] identified the A14 Cambridge to Huntingdon as being the joint least resilient stretch of strategic road in the region, alongside the M25 (junction 17 – 21). The M25 (17 – 21) represents the other key east-west axis for strategic movements, suggesting that the resilience issue on the A14 is part of a wider resilience issue for strategic east-west movements.

4.58 The key causes of the lack of resilience are:

- Lack of viable alternative routes to the section of A14 between Huntington and Cambridge;
- Poor mobility caused by frequent congestion and delay on the route, which results in longer response times;
- The absence of a hard shoulder or verge on the route, which means that any incident will necessarily impact on traffic.

4.59 The consequence of poor resilience is that the economic, social and environmental impacts that are experienced under 'normal' conditions are severely exacerbated under conditions where the network can be deemed to have 'broken down' in the area.

[44] A14 Ellington to Fen Ditton, Proof of Evidence, Traffic and Economics, Volume 1 – Text, Inquiry Commencing 20th July 2010, Section 2.5.26

[45] Highways Agency, Network Resilience and Adaptation, Phase 1 Final Report, May 2010

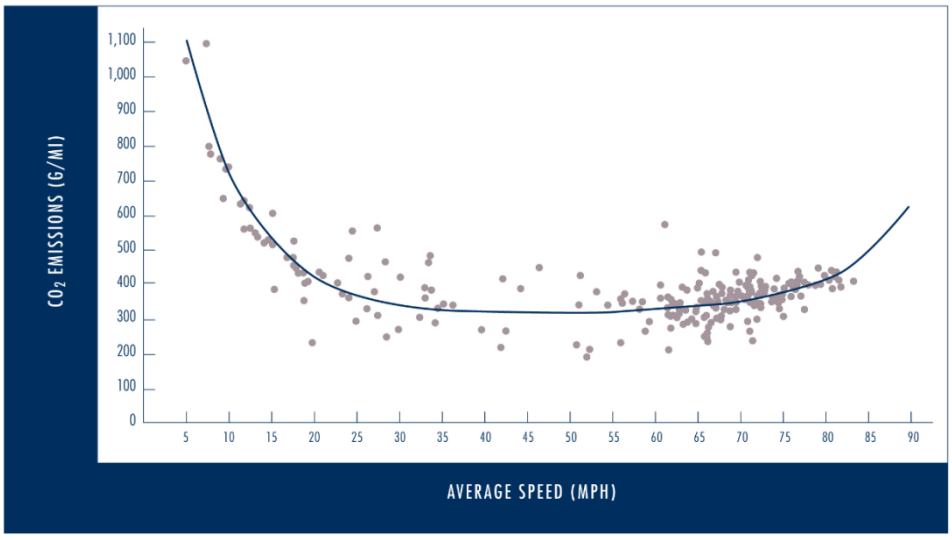
Carbon emissions and Climate Change

4.60 The East of England Transport and Carbon Study (TRACS 2009) reported that road transport emissions account for 32.7% of total CO2 emissions in the East of England and presented a forecast of 20% increase in CO2 emissions from road traffic by 2031. The increase in carbon from road transport suggested that increased emissions from traffic growth (of around 45%) would only be partially offset by improvements in vehicle and fuel efficiency.

4.61 Carbon reduction commitments are set both at the national, regional and local level. For example, Cambridge County Council has pledged to reduce its carbon emissions by 89% in 2050 compared to 2006[46]. This will require a mix of policies ranging from land-use change to waste management, to travel behaviour and road transport (East of England DaSTS 2010).

4.62 As far as the A14 is concerned, CO2 emissions can be reduced alongside congestion on this road. Empirical evidence suggests that emissions are not simply related to vehicle kilometres travelled; CO2 emissions are higher both in stop-and-go, slow speed conditions and in high speed conditions, while they are lower at moderate speeds, as shown in the figure below.

FIGURE 4.14 EMISSIONS AND AVERAGE SPEED[47]



4.63 In addition, Heavy Goods Vehicles emit a higher proportion of greenhouse gases per mile, when compared to cars and lighter vehicles. Therefore, the scope for CO2 emission reduction in the study area will depend on congestion levels as well as flow speeds and traffic composition. Fuel efficiency improvements will also play an important role.

46 http://www.cambridge.gov.uk/public/pdfs/Cambridge-Climate-Change-Strategy.pdf

47 UC Transportation Centre, Traffic Congestion and Greenhouse Gases, by Matthew Barth and Kanok Boriboonsomsin

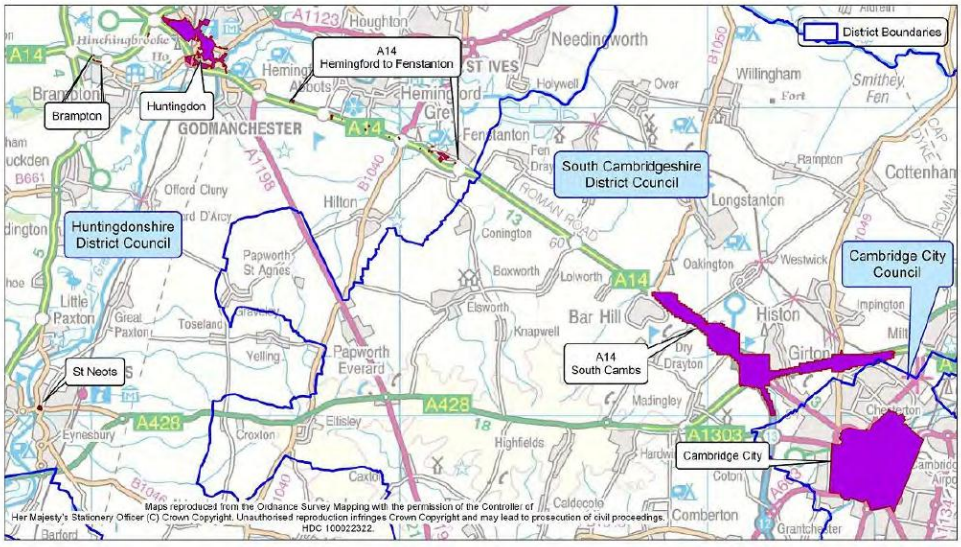
Local Air Quality

4.64 Motor vehicle emissions constitute a major source of air pollution in the study area. In places where the national objectives on air quality are not likely to be achieved, the HA and local authorities have declared six Air Quality Management Areas (AQMA) to focus measures

4.65 Four of the six AQMAs of the study area are located in close proximity of the A14. These are:

- Huntingdon AQMA
- Brampton AQMA
- A14 Hemingford to Fenstanton AQMA
- Bar Hill to Milton AQMA

FIGURE 4.15 AQMAS IN CORE STUDY AREA



4.66 Air quality management involves two twin activities: monitoring emission levels and designing action plans to reduce emissions. The main transport-related emissions monitored in the study area are nitrous dioxide and PM10 particles. In the period 2004-2009, pollution levels have remained high, with negative effects on health conditions.

4.67 A less explored issue is the mismatch between the static nature of AQMAs and the dynamic nature of traffic flows. Congestion on the A14 often leads to traffic being diverted onto local roads, which do not fall under management areas. This poses additional challenges to ensure that air quality standards are safeguarded in the local area against traffic spill-overs.

4.68 The growth in traffic volumes along the A14 is likely to result in higher emissions over the next decade. However, tighter vehicle emissions and fuel standards are likely to lead to further decoupling of air pollution and traffic volumes, as witnessed in recent decades.

4.69 The impact on air quality of proposed local developments is an additional matter of concern[48] for the County Council as highlighted in LTP3. Growth areas such as Northstowe and the NIAB site pose additional challenges to air quality management, being located within the boundaries of or in close proximity to AQMAs. In these areas, any increase in traffic flows is also expected to cause an increase in emissions. Developers have been submitting transport plans as part of their applications to present their mitigation strategies.

4.70 The Ellington to Fen Ditton scheme included the removal of the viaduct, which would have delivered significant environmental improvements in Huntingdon town centre. HDC's view is that online widening of the A14 through Huntingdon would fundamentally affect their ability to address AQMA issues.

Other Environmental Designations

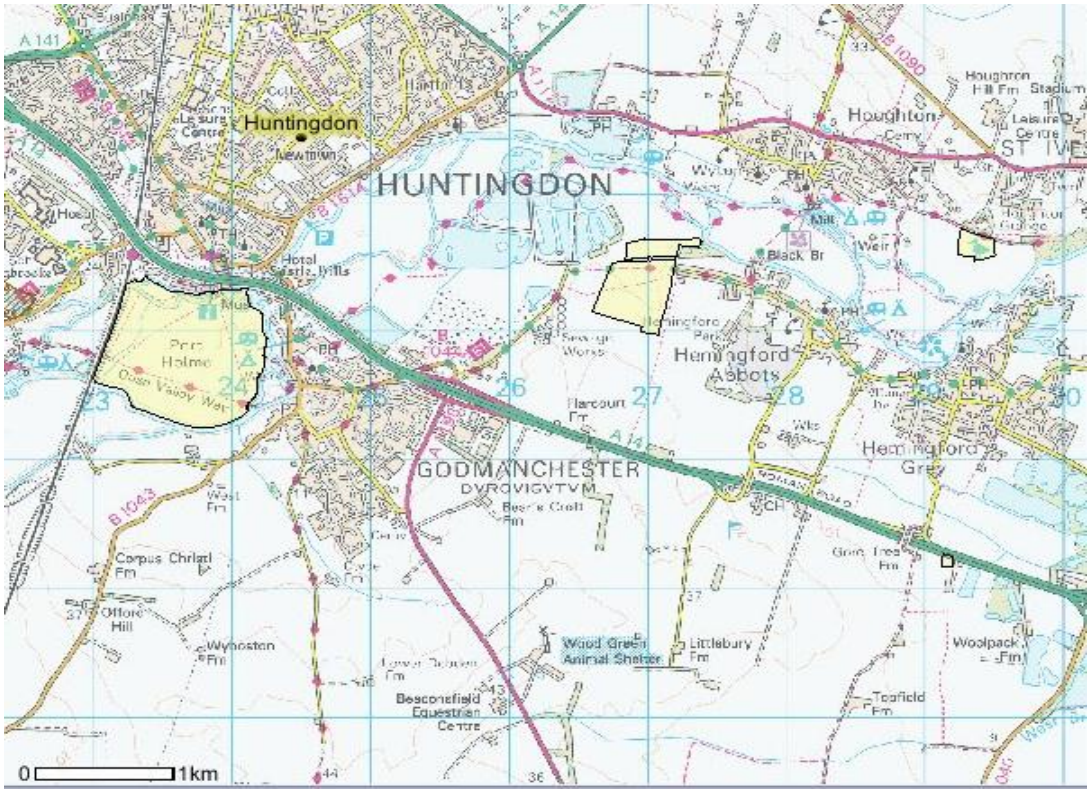
4.71 There are several other environmental designations within the study area, including:

- Sites of Special Scientific Interest (SSSIs)
  - Brampton Wood, second largest woodland area in Cambridgeshire (132ha), managed by the Wildlife Trust. Located off the A14, 4 miles from Huntingdon.
  - Portholme, meadows where traditional farming methods are used on the large area of grazing land, which provides a source of hay for the farming community. Situated south of the A14 between Junction 25 and 26.
- Biodiversity Action Plans
  - A large land of the Priority Habitats that are listed in the UK Biodiversity Action Plan is concentrated around the Godmanchester junction. These rare or threatened semi-natural habitats are the subject of concerted action by many different organisations involved in wildlife conservation (lowland meadows and grazing marsh).

4.72 These are presented in Figure 4.16.

[48] http://www.cambridge.gov.uk/public/docs/Joint_Air_Quality_Action_Plan_CCityC_FINAL.pdf

FIGURE 4.16 ENVIRONMENTAL DESIGNATIONS (SSSI)



Noise

4.73 Dominant noise sources are identified as the A14 between Ellington and Fen Ditton and the A1 between Alconbury and Brampton. Around 4,000 people are estimated to be annoyed by noise[49], especially those living in properties adjacent to the motorways and the local roads.

4.74 Planned housing developments around the road network are likely to suffer from noise pollution, unless mitigation measures are devised. Similarly, the spill-over of traffic to local roads may raise noise levels to nearby properties.

Evidence on Future Transport Issues

4.75 There is relatively little direct existing evidence on the impact of traffic growth on the A14 under a future year scenario[50].

4.76 The A14 Inquiry presented some metrics on future year performance of the A14 in the absence of the Ellington to Fen Ditton Scheme (the Do Minimum), for 2015 and 2026. This key features presented in the Inquiry Evidence show that:

- The forecasting assumed changes in general traffic growth in line with DfT Guidance at the time. This included specific representation of key developments within the A14 corridor, including Northstowe.

[49] Ellington to Fen Ditton, Summary Proof of Evidence

[50] In most recent studies the A14 Ellington to Fen Ditton scheme was assumed to be 'committed'. The A14 Inquiry Documentation contains some detail on current problems, but little on how these will develop in the future.

- Changes in overall traffic flows at daily AADT levels were reported for the 'Do Minimum' for the A14, but no accompanying evidence on network performance was provided.

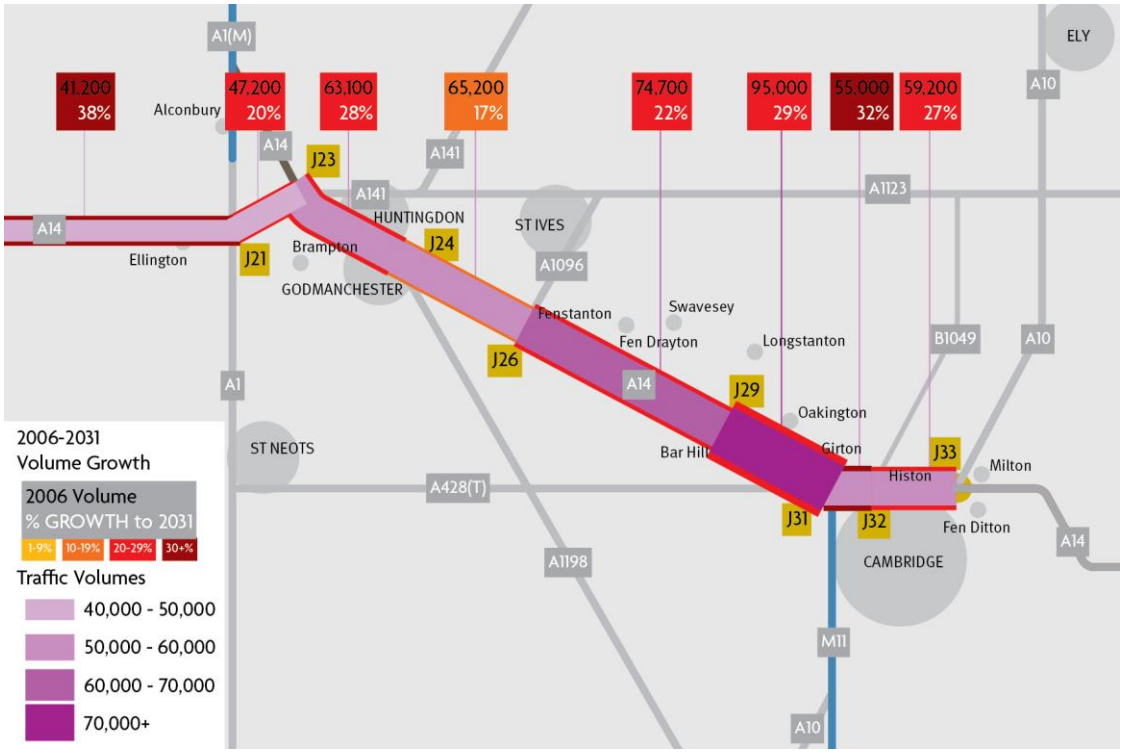
4.77 However, there was no detail provided on the impact on either the local or wider strategic transport network within the Inquiry submission.

4.78 Based on the analysis presented towards the end of Chapter 3, our assessment is that, given the impact of the recession, and on the assumption that post-recession growth returns to the forecast traffic volumes underpinning the Inquiry submission, the volume of traffic presented for 2015 in the Inquiry, is likely to materialise around 2019/2020.

4.79 Figure 4.17 and Figure 4.18 below show the forecasts for traffic flow increases on different sections of A14 as per the Do Minimum forecasts as presented in the Public Inquiry of the Ellington to Fen Ditton scheme.

FIGURE 4.17 2006-2015 TRAFFIC FLOW GROWTH FORECASTS

FIGURE 4.18 2006-2031 TRAFFIC FLOW GROWTH FORECASTS



4.80 Our assessment based on the current speeds and the forecast increase in traffic flows is that if these growth levels were to materialise the impact on average traffic speeds will be detrimental. The performance of key junctions (Girton, Spittals, Histon, Brampton) which already operating under overcapacity conditions will worsen. In addition the increased congestion levels will lead to breakdown in traffic flows in other busy sections of A14.

4.81 In the absence of network performance statistics for a future year without the A14, we have made an assessment of the impact that forecast increase in traffic is likely to have on speeds on the A14. These are presented in figures Figure 4.19 to

4.82 Figure 4.22, for the AM and PM periods in each of 2015 and 2031.

Implications of Future Growth

4.83 There is little direct evidence on the impact of future growth on either the transport network, or its knock-on implications for housing growth. We therefore explore this issue further in Chapter 6, where we interpret the evidence we have looked at and draw inferences where direct evidence is not available.

FIGURE 4.19 2015 AM PEAK TRAFFIC SPEEDS FORECAST

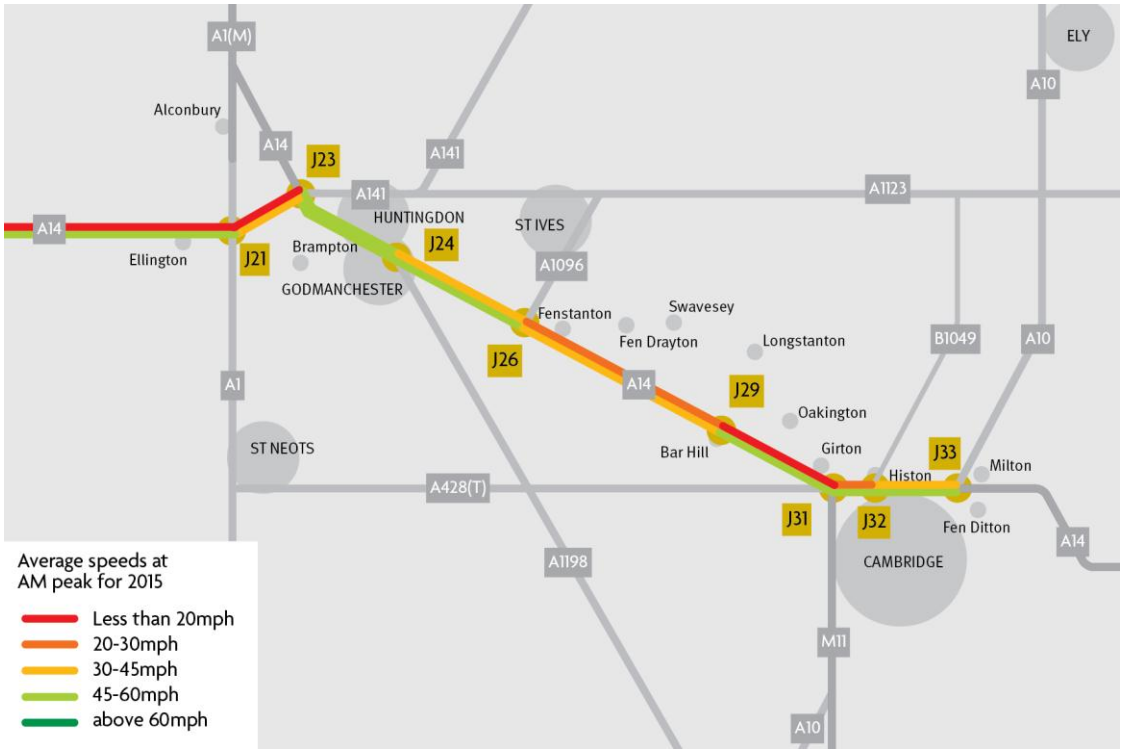


FIGURE 4.20 2015 PM PEAK TRAFFIC SPEEDS FORECAST

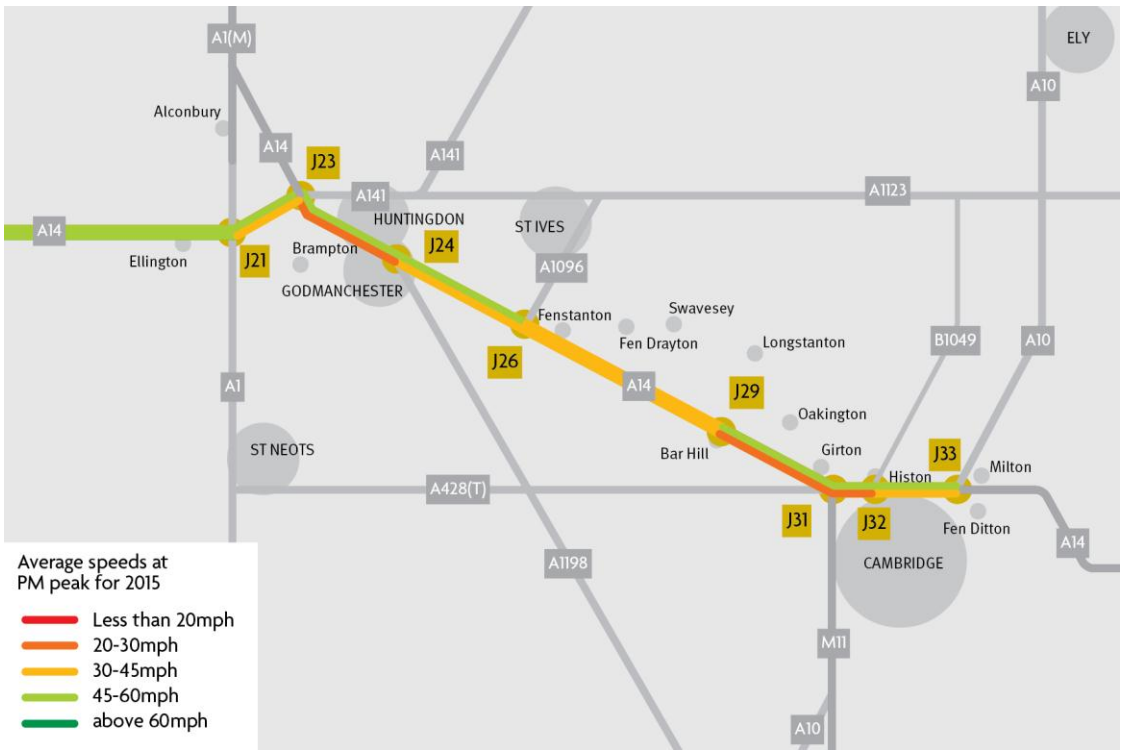


FIGURE 4.21 2031 AM PEAK TRAFFIC SPEEDS FORECAST

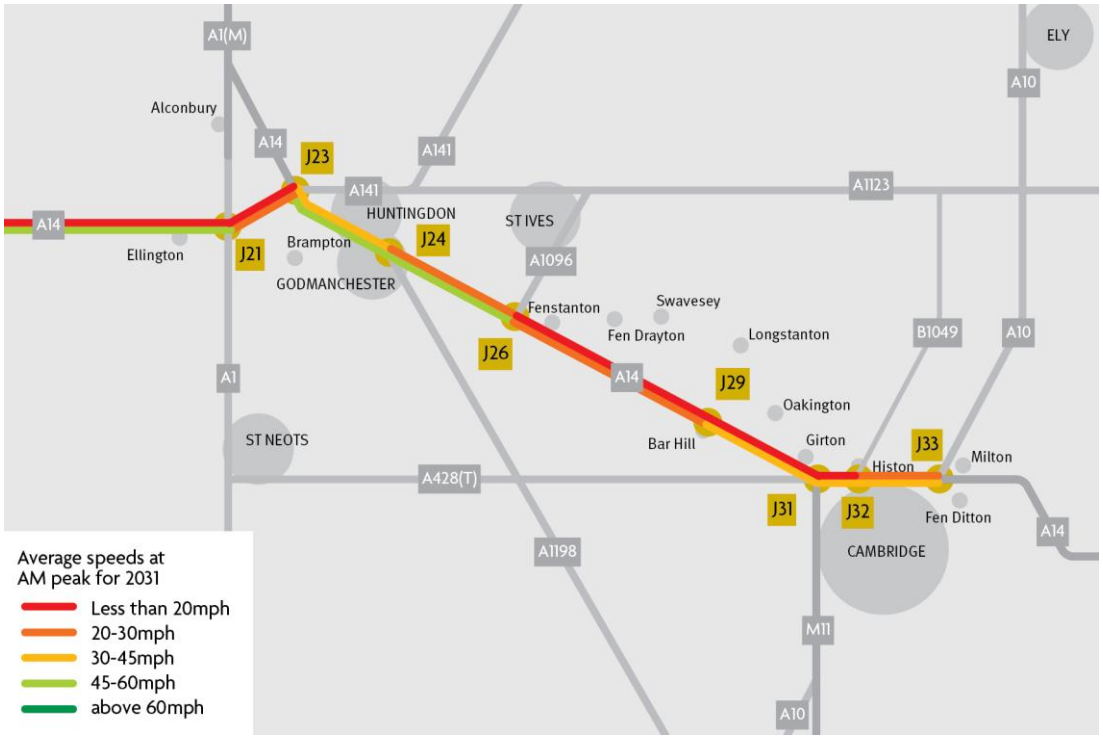
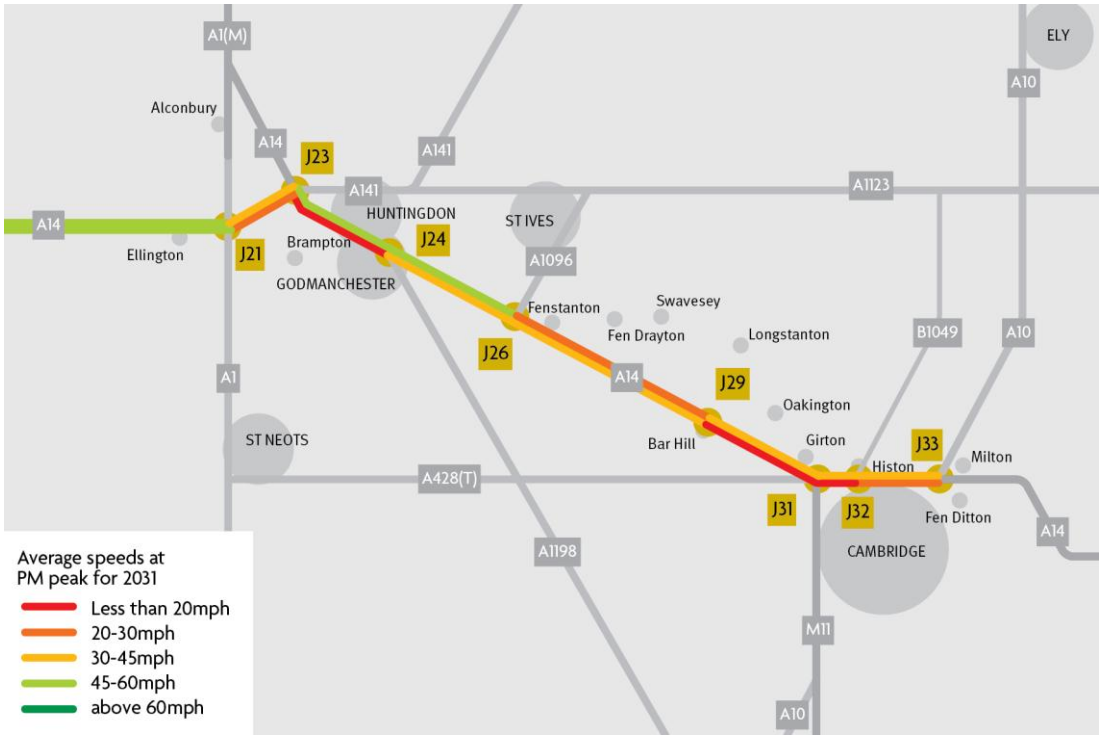


FIGURE 4.22 2031 PM PEAK TRAFFIC SPEEDS FORECAST



4.84

5 Evidence Review – Review of Strategic Studies

5.1 In addition to reviewing the transport problems and evidence, as outlined in the previous Chapter, we have also reviewed the large body of evidence that exists from previous strategic studies, which have sought to identified current and future challenges that stem from transport problems.

5.2 We have reviewed a range of documents and the key findings are summarised in Table 5.1.

5.3 A key issue is that many of the studies (and all the more recent studies) assume that the A14 scheme (Ellington to Fen Ditton) will be in place in the respective future year scenarios.

5.4 This means that, in general, the baseline analysis provides a better assessment of specific transport issues and challenges in the A14 study area. Whereas the future analysis shows that, with the A14 Ellington to Fen Ditton scheme in place many identified transport issues are largely addressed, we can infer that, in the absence of the A14 scheme, baseline transport issues would tend to become more pressing as a result of future traffic growth.

5.5 The strategic studies are of more direct relevance where they set out the key challenges for the study area, which relate to the broader strategic context and wider challenges that are germane to this study.

5.6 The core strategic challenges identified that are of relevance to the A14 are:

- The economic importance of the A14 as a strategic corridor and of Cambridge as a key driver of the regional and national economy were highlighted. Cambridge is home to knowledge-based industries, supported by linkages with the University, that complete internationally for investment and jobs, and are therefore of national as well as regional economic significance.
- The baseline transport constraints on and around the A14 identified elsewhere in this report were highlighted in several studies.
- There is a clear trade-off between the strategic movements on the A14, and the largely commuting trips to / from Cambridge. Current transport constraints on the A14 imposes economic costs on both of these key economic drivers, which would, in the absence of further intervention, be expected to worsen into the future.
- There are long-standing aspirations to accommodate market-led demand for significant growth in employment and housing in and around Cambridge, which in turn can support the continued growth of the local and national economy. The role of transport is enabling and supporting this growth is key, and analysis suggested that, even taking account of (previously) committed schemes, transport constraints would worsen (including increased congestion) and could threaten the achievement of this growth.
    - Housing growth in the A14 corridor assumed and was, to a degree, predicated on the assumptions that the A14 Ellington to Fen Ditton scheme would proceed. With the cancellation of the A14 scheme, the general issue

regarding balancing the desire to accommodate growth with a transport network that can support this will be a key challenge.

- Reliability and Resilience is a key issue on the A14. The HA DaSTS (and other) studies highlight the lack of resilience, and the business stakeholder consultation undertaken as part of the TEES study emphasised the economic costs and disruption that poor resilience on the A14 (and more generality for east-west movements) place on business.
- Carbon – Road based transport is a major contributor to carbon emissions. Cambridgeshire has a higher per capita rate of emissions (compared to the regional and national average), related to the high levels of economic activity and trip rate, high car commuting mode share and wide commuter catchment. As a strategic route the A14 is also key source of road-based emissions, and the levels of congestion and delay that characterise the road result in higher carbon emissions that would be the case under more freely flowing conditions.

TABLE 5.1 REVIEW OF EVIDENCE FROM STRATEGIC STUDIES

STUDY	REMIT	KEY FINDINGS (TRANSPORT PROBLEMS)	KEY FINDINGS (WIDER CHALLENGES)	ISSUES / APPLICABILITY.
Transport and the Economy in the East of England (TEES), 2008, EEDA (SDG)	To identify transport constraints, where these constraints has the greatest economic impact, and to assess strategic 'package' solutions.	**Strategic movements** -Significant base (2008) congestion on A14 -Future year assessments assumed A14 'committed' so FY findings not applicable. **Local / Cambridge movements** -Existing constraints identified on key strategic routes to other key centres, including to London (via London Arc), west to Milton-Keynes / South Midlands -Transport network performance in / around Cambridge forecast to worsen i.e. committed schemes do not offset impact of future demand growth.	**Economic Issues and Challenges** -A14 is a corridor of primary economic importance, connecting the 'engines of growth' around Haven Ports & Greater Cambridge. -Significant congestion / delay for strategic trips on A14. -Business stakeholder identified unreliability and lack of resilience for E-W movements (i.e. A14) as key issue, due to lack of alternative route / mode (rail) options. -Cambridge identified as key drive of regional (and national – in key areas of bio-science and research) economy, and transport constraints forecast to impact on economic growth at greater level into future. Issue that additional housing and employment will place economic costs on 'existing' businesses in absence of transport interventions.	Study highlighted the economic importance of the A14 as a strategic corridor, and also the role of Cambridge as a key driver of the economy. There is a clear trade-off between these two economic drivers, in terms transport issues on the A14 (though this was not explicitly addressed in the study. The A14 Scheme was included in BAU scenario for all future tests, so results are not of direct relevance. It can be inferred that the constraints in the baseline (including on the A14) would worsen into the future given high levels of traffic growth for strategic movements (freight, long-distance car), and planned/ forecast employment and housing growth in and around Cambridge.
Access to and around Greater	To identify key challenges based on	**Strategic movements** -Significant base (2008)	Three core challenged identified: **Challenge 1 - Reduce lost productive time**	The study highlighted the network performance issues on the A14 caused by the interaction of commuting trips

Cambridge, Phase 1 DsSTS Study, 2010, EEDA. (SDG)	existing evidence.	congestion on A14 -Future year assessments assumed A14 'committed' so FY findings not applicable. -Select link analysis on A14 (east and west of Cambridge) showed almost half of all traffic going to / from Cambridge in the AM peak, compared to around 1/3 in the inter-peak. **Local / Cambridge movements** -Peak delay movements into Cambridge (from Huntingdon) on the A14 corridor in 2006 base accounted for 38% of overall journey time. The A14 scheme was forecast to reduce delay to <10% total. -From Ely corridor (crossing the A14) delay was 45% in 2006 rising to 55% in 2021. -Delay on A14 (from Newmarket) 14% in 2006 and 25% in 2021. -Connectivity for public transport and future rail capacity identified as issues.	by maintaining or improving the reliability and predictability of journey times along the A14 corridor, particularly in and around Cambridge but without compromising Carbon Emission targets. Related issue – congestion & delay on A14 places direct economic cost of freight & business users. **Challenge 2 -Improve the connectivity and access to labour markets** of the region's Engines of Growth particularly on the radial routes from London, the east-west corridors in and between the London Arc communities and in and around Norwich and Peterborough, without compromising Carbon Emission targets. Related issue – Worsening congestion and public transport capacity & connectivity issues forecast to place significantly increase economic costs on travel in the greater Cambridge area over time, affecting both business productivity and constraining effective labour markets. **Challenge 3 -Deliver the transport improvements required to support the sustainable provision of housing** and in particular the region's PSA targets. Related issue – The need to accommodate planned growth of 71,000 jobs and 68,000 homes (between 2011 & 2031) in a sustainable manner, limiting the economic	into Cambridge and strategic movements on the A14 (e.g. freight). The conflict reflects both capacity issues and the patterns of movement (i.e. north-south commuting trips conflicting with east-west strategic movements). There is a core challenge and trade-off for Cambridge / Cambridgeshire in the desire to accommodate population and employment growth, which will support the expansion of the high-value Greater Cambridge economic, with the economic and environmental costs imposed by growth. This trade-off will result in specific development / growth / capacity issues in the A14 corridors (towards Huntingdon, Newmarket and north-south crossing movements e.g. Ely)

			and carbon impacts of growth.	
East of England Transport and Carbon Study (TRACS), 2009, EEDA (Atkins)	To examine role of transport and its impact on carbon emissions, in context of UK (80% cut by 2050, vs. 1990) and regional carbon targets.	Road transport emissions account for 32.7% of total CO2 emissions in the East of England. The other major contributors are aviation and shipping. Overall regional traffic km forecast to increase by 40% between 2006 and 2031.	Overall CO2 from road traffic forecast to increase by 20% by 2031, despite improvements in vehicle and fuel efficiency. The forecast increases for rail and shipping are 46% and 59% respectively. Emissions in Cambridgeshire by district and per capita are among highest in region. (District level stats potentially misleading as affected by presence / absence strategic roads.	Establishes scale and nature of carbon challenge at a regional level. Further understanding of implications and trade-offs in A14 corridor will need to be understood e.g. emissions impact from road vs. rail freight, housing and land-use impacts, impact of congestion / delay on emissions.
Network Resilience and Adaptation, Highways Agency, 2010 (Hyder)	The study sought to: 1. investigate short to medium term operational vulnerability and resilience; and 2. Identify longer term network adaptation issues raised by climate	10 key resilience measures identified and used to prioritise 'hotspots' using a 'vulnerability index'. A14 identified as joint top (worst) 'hot-spot' in region in 2008, along with M25 (jcn 17-21). Resilience issues for rail also identified, bit overall 'vulnerability' scores lower than for road.	Study related each resilience indicator to the (then) DaSTS challenges. These suggested that the primary impact of poor resilience was on 'economic growth' (5 of the 10 resilience indicators had a 'primary' impact on growth), followed by carbon (2 out of ten).	Identified A14 as the joint worst 'hotspot' in terms of vulnerability in the baseline analysis. Forecasting of future year assumed A14 scheme in place, therefore not applicable. The primary 'challenge' related to poor resilience is on economic growth. It can be inferred that, given increasing pressures on demand and the currents state of the asset, resilience on the A14 would worsen under a future 'Business As Usual' scenario.

	change.			
Sustainable Transport Options to Support and Deliver Housing and Economic Growth, Government Office for the East of England, 2010 (Halcrow)	To consider the transport challenges in delivering housing and economic growth in (KCDCs) across the East of England.	Neither Cambridge nor Huntingdon are identified KCDCs, so findings are not of direct relevance. General transport –related issues were: Journey time reliability Congestion and air quality Connectivity within town centres Over-reliance on car travel	Existing transport problems likely to be exacerbated by future development and growth. 'Containment' of journeys to work a key challenge. Conflict between Impact of local growth and increasing traffic on strategic highway network identified as general issue. Land use options identified as a key lever, alongside sustainable transport solutions.	Specific evidence not applicable, but some of the general challenges are relevant to the A14 study: -containment of journey to work trips -managing conflict between local and strategic network -role of land use (both as a potential cause of and solution to transport issues and wider challenges)

6 Developing Key Challenges

6.1 The identification of key challenges is concerned with understanding the impact transport problems and issues (from the previous section) have on wider policy priorities and challenges, for example the impact on economic growth and carbon.

6.2 Understanding the challenges, present and future and then prioritising them is central to developing this output.

6.3 This Chapter summarises the key evidence from previous Chapters and sets out the key transport problems and wider challenges that we recommend should form the starting point for Outputs 2 and 3.

Summary of Current and Future Transport Issues and Challenges

Design and Capacity

6.4 The A14 between Cambridge and Huntingdon is a primarily an older rural dual two-lane all-purpose carriageway road which carries around 75,000 vehicles per day on the section between Spittals Junction (Junction 23) and Bar Hill (Junction 29). Between Bar Hill and Girton the road is a rural dual three-lane all-purpose carriageway road, which carries 99,000 vehicles per day (AADT). In each case the flow is amongst the highest in the UK for these types of road.

6.5 As well as the number of lanes being a defining factor for the A14's capacity, its effective capacity is further limited by:

- Local access roads along the route, which results in conflicts as predominantly local traffic enters and leaves the main carriageway. This issue is a particular problem in the peaks due to the higher volume of main carriageway traffic and a greater incidence of joining/leaving traffic at minor junctions.
- Major junctions along the route with significant volumes of joining and exiting traffic which result in weaving between lanes. This reduces effective capacity and causes knock-on delays. The configuration of some junctions also prioritises lower volume non-A14 movements over those on the road (e.g. A428, A14 spur from A1).
- The high percentage of HGVs, which take up more road space per vehicle than cars (around 2.5 times), are speed limited and have lower rates of acceleration than private cars. The proportion of HGVs on the route is around 20%.
- The tendency for HGVs to drive on the near-side carriageway, and for cars to primarily use the outer lane.

6.6 The combination of the A14 design (supply-side) and the travel demand results in a range of network performance problems and associated externalities of economic costs, safety, emissions and noise.

Transport Issues under 'normal' conditions

6.7 In typical conditions (i.e. 'average' conditions, with no incidents), the key transport issues are:

- Traffic volumes on the A14 lead to excess journey times. In the peak hour, once a user is on the A14, a typical junction-to-junction journey time on the

section Ellington to Fen Ditton would be 30 minutes, compared to 25 in the inter-peak and 20 under free-flow conditions. There are additional delays accessing the route via the local road network.

- Congestion and delay on local roads. These include key roads with access onto the A14, crossing the A14 (e.g. A1M, A10 etc.) and routes from the A14 into Cambridge, many of which exhibit significant delay particularly during the peaks.
- Delays are particularly prevalent at four sections. These are:
  - Brampton Hut (A14 – A1);
  - Spittals Interchange (A14 – A141);
  - Girton Interchange; and
  - Fenstanton to Bar Hill.

6.8 These transport issues have direct economic, social and environmental consequences, including:

- **Economic impacts** on the form of lost productive time and the impact on the Greater Cambridge economy, as well as **welfare disbenefit**.
  Local environmental impacts in the form of air quality and noise issues at key points. There are four AQMAs along the A14 at Huntingdon, Brampton, between Hemingford and Fenstanton and between Bar Hill and Milton. The removal of the Huntingdon viaduct (as part of the A14 Ellington to Fen Ditton scheme) was central to the environmental improvements planned for the town centre to address the AQMA. CO_2 emissions would be lower under notional free flow conditions than under the 'stop-start' conditions that prevail much of the time.
- Impact on **safety**. While for sections of road the accident rate is typical of the average for this kind of road, it is higher than the average experienced on the trunk road network as a whole. There are two specific areas where accident rates are substantially higher than average. Contributory factors include weaving between lanes at key 'decision points', combined with a high proportion of HGVs, approaching key junctions. The proliferation of junctions and mix of local and strategic traffic is another key contributory factor. While the accident rate is typical of this kind of road, combined with the high volume of traffic this means there is a high incidence of road traffic accidents and the disruption that they create.

Lack of Resilience

6.9 While the above issues pertain to 'normal' conditions, a fundamental issue for this section of the A14 is lack of resilience when there are incidents that disrupt normal conditions. Incidents include road traffic accidents formally reported (via STATS19), minor damage only accidents as well as breakdowns.

6.10 The Highways Agency Network Resilience and Adaptation study identified the A14 Cambridge to Huntingdon as being the least resilient stretch of strategic road in the East of England, alongside the M25 (junction 17 – 21). The M25 (17 – 21) represents the other key east-west link for strategic movements between London and the south-east and the midlands/ north. This suggests that the resilience issue on the A14 is part of a wider resilience issue for many strategic north-south movements, as well as those that travelling along the A14 corridor (east-west).

6.11 The evidence we have examined suggests that while the overall number and type of incidents is not atypical given the nature of the A14, the impact of incidents can be highly disruptive across a wide area.

6.12 The key causes of the lack of resilience are:

- The absence of a hard shoulder or verge along much of the route gives the A14 makes the road more susceptible to delay due to incidents and road traffic accidents when compared with other trunk roads.
- Lack of viable alternative routes to the A14 when disruption does occur, which tend also to 'break-down' as traffic re-routes form the A14.
- Longer incident response times due to the prevalent congestion and delay on the route.

6.13 Evidence of the effect of poor resilience includes:

- **Economic impacts** through unpredictable additional travel time incurred by commuter, business and freight trips, plus the additional impact that disruption can have on business operations and deliveries. Where commuting trips are affected this can result in a direct loss to employers.
- **Welfare disbenefits.** The same delay and disruption that affects business trips also affects other users, and can have a serious impact on quality of life. It is also the case that quality of life issues can become economic issues where, for example, increasingly unpleasant commuting conditions affect people's choice of whether to live and work in the area.
- Widespread **local environmental impacts** affecting not just the A14, but also causing emissions, noise across a range of alternative routes where traffic diverts in the case of incidents on the A14, many of which will be local roads that are unsuitable for the volume and mix of traffic that will re-route to them.
- There are likely to be knock-on s**afety** impacts, as drivers re-route to unsuitable roads (e.g. HGVs to secondary roads), roads that they are not familiar with and through the general uncertainty that disruption can bring.

6.14 The consequence of poor resilience is that the negative economic, social and environmental impacts that are experienced under 'normal' conditions are severely exacerbated under conditions where the network can be deemed to have 'broken down'.

6.15 The economic costs are directly borne by business travellers and freight, and also by businesses in the Greater Cambridge area where disruption to commuters reduces the effective working day. Addressing unreliability and uncertainty is particularly important for businesses.

6.16 The impact on quality of life stems from the frustration and annoyance that disrupted journeys results in in itself, plus the additional impact upon any plans and arrangements made that reflects the purpose of the journey.

6.17 The impact on noise and emissions is likely to be worsened within the designated AQMAs, but the displacement of traffic to largely unsuitable local roads will affect the quality of life of residents and communities across a wider area.

Future Drivers of Demand

6.18 There are three primary drivers of demand that, under a 'business as usual' scenario would exacerbate the problems and challenges outlined above. These are the background growth in private car demand that will arise as the national economy grows; future localised growth of employment in Cambridge and Cambridgeshire which in turn will support population growth; and, forecast growth in freight and strategic traffic.

Background Growth

6.19 Background traffic growth reflects changes in socio-economic and demographic factors such as increasing incomes over time, changes in household size etc., which in turn affect the propensity to travel.

Growth of Cambridgeshire

6.20 There is a strong market-led demand for future housing and jobs growth in Cambridgeshire. The demand for this growth is driven by the economic vitality of the Cambridge sub-region and in particular its status as an internationally renowned location for high-tech industries, in turn supported by close links between local firms and the University.. The strategy is to accommodate this growth through sustainable development, which has informed the long-standing proposals and substantial targeted population and employment growth in Cambridgeshire. The Greater Cambridge and Greater Peterborough LEP is playing a key role in encouraging and guiding development. Much of the housing growth is proposed or planned to take place on the A14 corridor, including at Northstowe and on the Enterprise Zone at Alconbury

6.21 This scale of growth, if it could be accommodated without causing unacceptable impacts and costs on the transport network, would deliver housing, jobs and economic growth which reflect the stated priorities of both national Government as well as CCC.

6.22 The potential benefit of accommodating additional housing and employment growth is therefore significant. However, our analysis of the evidence also suggests that accommodating this growth is the greatest longer-term challenge facing the A14. This is due to:

- Peak time congestion delay is already significantly worse than at other times, and that this is largely related to the volume and pattern of commuting trips. Additional housing would inevitably, in the absence of transport-related interventions, place additional demand on the road network and increase congestion associated delay.
- The majority of HGV movements (75%) are domestic, of which we think at least half are not long distance nature, and most of those are likely to have either an origin and / or destination in the Greater Cambridge area. The future growth in local freight movements will be highly correlated with the future population and economic activity.

Growth of Freight

6.23 Domestic freight accounts for about 75% of HGVs on the A14, while international freight accounts for most of the remainder (of which about 15% comes from the

Haven Ports and 10% from other locations such as via the Channel Tunnel). We estimate that over 50% of domestic freight can be considered local (i.e. with an origin and / or destination within the Greater Cambridge area).

6.24 The demand drivers of international freight growth are largely exogenous to this study, and the implication is that there could be options to manage international HGV traffic (re-timing, re-routeing etc.) but there is little scope with an A14-driven intervention to affect the overall volume of international HGV traffic. HGV traffic growth is forecast to increase by approximately 1% per annum.

6.25 We have also considered the future potential of rail freight to reduce HGV traffic on the A14 in the core study area. A significant increase in national rail freight capacity and capability is currently being delivered and will be in place by 2015. There is the potential for further capacity increases beyond 2015. However, the potential for this to address HGV issues on the Huntingdon – Cambridge section of the A14 is very limited for the following reasons.

- The Great Eastern Main Line (GEML) route via London (where most current Haven Ports rail freight route via) is almost at capacity, and this capacity will be further limited should, as is likely, the development of London Gateway results in additional rail freight via London.
- This means that the forecast increase in rail freight capacity on the Felixstowe to Nuneaton route (F2N) will be taken up by rail freight growth that cannot be on the GEML route via London. The residual potential for modal shift over and above this is small.
- A market-led analysis[51] suggested that only 5% of HGV traffic from the Haven Ports could potentially shift to rail, given the nature and destination of the load carried.
- Taken together a 'best case' that a 5% transfer was achievable (i.e. the capacity was there to accommodate it), applied to the existing 15% of traffic on the Huntingdon – Cambridge section of the A14, would result in a change in HGV traffic on the A14 of less that 1%. This is not to say that such an option would not be attractive in wider terms (it would reduce traffic by a much larger proportion on the eastern section of the A14, and result in reduced congestion etc.), but that as a potential option to address the A14 core study area it is of marginal significance.

Medium to Long-Term Transport Issues

6.26 The combined impact of the above growth is that total traffic on the A14 is forecast to grow by around 15% over current levels by 2021, to a level even further above the capacity of the existing road, with growth in car trips around this level, LGV growth of around 25% and HGV growth of around 10%. Under a 'business as usual' scenario (i.e. in the absence of further interventions), this growth would result in a significant worsening on network performance, and hence the economic, social and environmental challenges that results. Similar rates of growth are expected from 2021 to 2031.

[51] CHUMMS Study

6.27 The key challenges are common to both the baseline and future scenarios, although the potential options and means of addressing these challenges in the short and longer-terms are likely to differ. We discuss this later in this section.

Summary of Short-Term Transport Issues

6.28 The current transport issues identified above lead us to recommend that Output 2 will need to consider short-term options to meet some key challenges (the Challenges posed by growth plans are addressed elsewhere in this chapter under Future Drivers of Demand, Medium to Long Term Transport Issues, and Impact of transport challenges on the wider economic, social and environmental challenges).

- **Reducing the impact of peak congestion and delay on the A14 & Local Roads**. This should look at both the A14 and local roads, and the interaction between the two. The overall volume of traffic and complexity of conflicting movements make this issue primary a peak issue. This suggests the need to consider options focused on specific types of movement, purposes, the management of demand as well as localised supply-side measures.
- **Improving Resilience**. This should look at measures to:
  - Reduce the number of accidents and incidents and, in particular
  - To reduce the impact of these accidents / incidents upon A14 and the wider network.
- **Improving safety**. In addition to contributing the lack of resilience, reducing the number of incidents should be a challenge in its own right due to the economic and social costs they create.

Impact of Transport Issues on the Wider Economic, Social and Environmental Challenges

6.29 The challenges and key relationships identified above are represented in Figure 6.1.

6.30 The transport issues are considered in the context of the broader economic, social and environmental challenges:

- Economy – the impact of transport on encouraging economic growth
- Social and Environmental Impacts – this covers measures of 'well-being', including accidents, air quality and health impacts, and access to services and economic 'welfare' benefits.

6.31 The identification of challenges that sit under the headings of economy, environment and social are those that are strategic in nature, and that essentially establish the core objectives and strategic rationale for the option development stage (which would then be assessed through the strategic case).

FIGURE 6.1 CHALLENGE MATRIX

TRANSPORT PROBLEMS	WIDER CHALLENGES					
	Supporting Economic Growth			Impact on Quality of Life (Social & Environmental impacts)		
	Lost productive time	Supporting the economic growth of Greater Cambridge	Access to labour markets	Quality of life / welfare	Accidents	Air Quality (Health) & Noise
Peak congestion and delay on A14						
Peak congestion and delay on key local roads						
Lack of resilience						
Safety						

Lost Productive Time

- This relates to congestion and associated delay caused to business and freight traffic, where under normal conditions the economic costs of delay have a direct impact on business productivity. This 'routine' delay occurs in both peak and inter-peak periods, but is worse and more significant in the peaks.
- The impact of delays associated with lack of resilience is two-fold. First, there is the direct productivity cost of unreliable journey times – delay due to incidents (additional time). Second, there can be additional costs of disruption and day to day variability in journey times when this affects the planned timing of deliveries, meetings etc. which in turn can place significant additional costs on businesses.
- The lost productive time and lost productivity will, in the absence of interventions, increase over time as traffic growth exacerbates current transport problems.

Supporting growth of the Greater Cambridge Area

- Enabling additional housing and employment would, other things being equal, contribute positively to the local, regional and national economy due to the high-value work and growth potential that underpin the economy of Greater Cambridge.
- However, transport constraints mean there is a trade-off between the economic growth from additional housing and jobs, and the economic costs that the greater congestion which would come from associated traffic growth would impose upon all businesses.
- The nature of this trade-off and challenge, and the potential options that could be considered, will be different in the short-and long-term. In the short-term the key issue is the potential for identified housing development in the vicinity of the A14 to come forward given current transport constraints.
- In the longer-term the issue revolves around the further development of the existing transport and land use strategy with the aim of efficiently delivering

the level of housing that would support the growth of the Greater Cambridge economy. The challenge is the extent to which affordable and cost effective interventions can be developed that mitigate the associated economic costs on the transport network while supporting growth. This implies consideration of land use *and* transport issues and options along the A14 corridor, and also across a wider area.

- **Access to Labour Markets**
  - The success of the Greater Cambridge economy relies on having access to a sufficiently large labour market catchment. In choosing where to work, employees trade-off factors such as job income, house prices, commuting time and quality of life factors. High house prices within Cambridge means that a number of workers have to live some distance away and commute.
  - Less attractive commuting (delay and unreliability, increasing cost, plus the adverse impact on quality of life) would, other things being equal, serve to limit Cambridge and Huntingdon's effective labour market catchment and make it a less attractive place for people to work.
  - There is a link between labour market access and future housing growth, as the accommodation of additional housing closer to jobs can help increase the labour market catchment while mitigating impacts on the transport network. The significant additional housing planned within Cambridge creates the potential to support a more sustainable pattern of commuting, and also cater for the high demand , particularly among the young, for housing in Cambridge. However, many workers will want and choose to live in more rural locations and disparate commuting patterns (including within households) means that the merely locating new housing near jobs will not necessarily have a marked effect in encouraging more sustainable commuting.

Quality of Life (Social and Environmental) Challenges

- **Welfare Impacts**
  - Welfare impacts reflect the measure of dis-benefit associated with travel time congestion and delay, and the leisure time foregone because of this.
  - In addition to the direct time costs, there is strong evidence of the additional welfare disbenefit (frustration and annoyance) that people feel when driving in congested conditions.
  - Welfare impacts can, in the medium term, have economic consequences if the impact of the quality of life from congested commuting conditions discourages people from working in the area (and is related to the labour market issue above).

- **Accidents**
  - Accidents have an economic cost (lost productivity, direct costs to NHS. Police) and a social cost (pain and suffering of individuals and families etc.).
  - Although the accident rate per vehicle mile on much of the route is not significantly above the average for roads built to a similar design standard, this needs to be seen in the context that the road is below the standard to which a modern road would be designed. There are sections where accident rates are much higher than would be expected for roads of a similar

standard. However, because traffic flows on the route are high there are a large number of accidents and disruptive incidents that cause delay on the A14 and have knock-on effects on the surrounding network. There is therefore considerable scope to reduce accident rates and the impact of incidents through improving the standard of the road.

- As the social costs of accidents are significant, we suggest options should consider whether there is the potential to reduce accident risk and accidents in order to minimise accidents to levels below 'average' rates.

Air Quality / Health (and Noise)

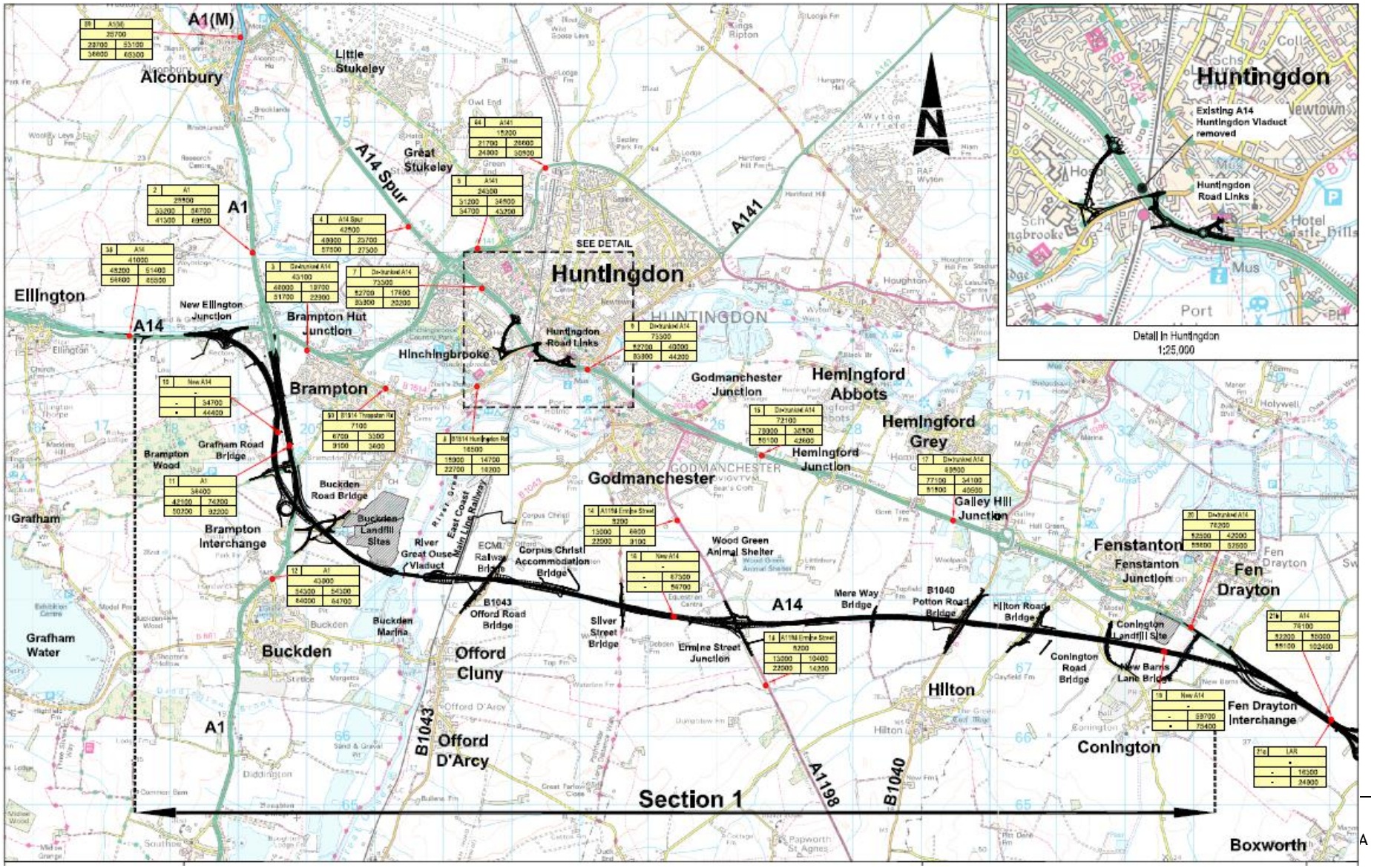
- There are four AQMAs along the A14 corridor within the core study area, where the level of emissions represent a health risk for the surrounding community. The level of emissions (and noise) is related to the volume of traffic, but is also exacerbated when congestion and delay is more acute.
- An additional issue is the localised air quality and noise impacts that can occur when there is significant disruption on the A14, and traffic (including HGV) re-routes to the local network.

APPENDIX

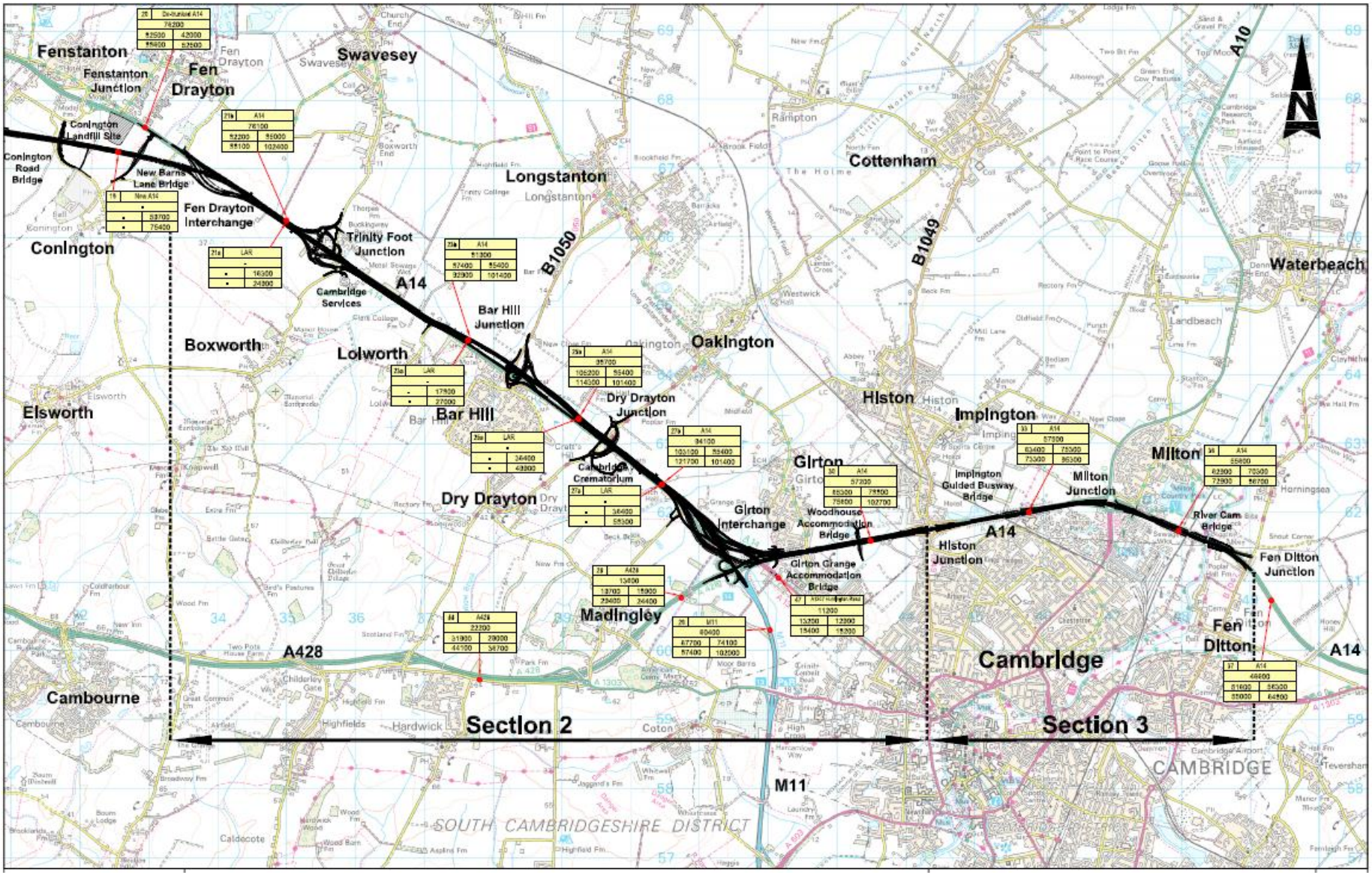
A

ELLINGTON TO FEN DITTON SCHEME PLOTS

APPENDIX FIGURE A.1 ELLINGTON TO FEN DRAYTON



Output 1



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