CSRM Modelling Summary Report for Cambridge and South Cambridgeshire Local Plans – March 2015

Prepared by WSP ~~Group~~ | Parsons Brinckerhoff and Atkins

EXECUTIVE SUMMARY

This Summary Report outlines the work undertaken by WSP Group and Atkins to investigate the transport implications of a range of development options, as well as the preferred development strategy for Cambridge City and South Cambridgeshire Local Plans to 2031. These strategies have been tested in the Cambridge Sub Regional Model (CSRM).

The modelling work has been carried out in three phases as described below. Model tests were carried out initially assuming only committed transport investment is undertaken (including upgrading the A14 and Cambridge Science Park station). Further tests investigated the improvements which could be made by using a focused series of transport improvements. The measures tested included improvements to the A428, access controls on the Cambridge Ring Road, a major increase in cycle provision, bus priority measures and busways, additional Park & Ride sites, and improvements to rail services.

Forecast Traffic Growth

Published National Forecasts for the East of England predict 2010 to 2030 traffic growth of 37%-39% (dependent on urban or rural definitions). In the model, there is overall headline traffic growth of 40% across the wider Cambridge sub-region reflecting the higher than average growth of Cambridgeshire compared to the rest of the East of England.

Without any transport mitigation, Cambridge City is forecast to have lower than average traffic growth which accords well with both sustainable planning and transport policies but demonstrates the challenge of levels of existing traffic congestion, which will be difficult to reverse. Cambridge will have a ~~32~~33% growth in the AM peak hour (8am-9am) rising to 41% in the inter-peak (2pm-3pm). South Cambridgeshire is likely to experience higher average traffic growth than Cambridge City but still lower than the wider Cambridge sub region with figures of ~~38~~40% in the AM peak and ~~46~~47% in the inter-peak periods as people either move around within South Cambridgeshire for employment and services or use Cambridge as their main destination for these trips.

Phase 1: Seven different scenarios were tested based on the sites in the Issues and Options consultation**,** including the current committed level of development (planning permissions and sites allocated in current local plans). These scenarios sequentially increased the total development, allowing the impact of varying levels of future housing at different stage of the development sequence to be tested.

The results showed that increasing traffic levels occur in the Cambridge area in all available strategies. The projected employment growth in Cambridge and South Cambridgeshire will lead to a demand for workers. Without further housing this causes a large rise in inbound commuting trips, which are mainly by car. Therefore higher housing levels within Cambridge and South Cambridgeshire have the potential to minimise total future AM peak traffic in the area.

Development in and around Cambridge generates fewer car trips than that in rural areas and new settlements (approximately 6% less per new household). However, the majority of trips are pre-determined by the distribution of existing and currently planned development. This means that the TOTAL car mode share varies much less: only by approx. 1% between options.

Phase 2: Detailed tests were carried out on **short-listed strategic options**: village focused development in South Cambridgeshire, development at Bourn Airfield and a new town at Waterbeach. These tests allowed the different development focuses to be compared, including the potential for mitigation of transport impacts.

The Phase 2 results demonstrated that the dispersed village development option is less preferable than new settlements in terms of car mode share of new trips generated. This reflects the improved access to public transport and greater internalisation that can be achieved in larger developments. The concentrated impacts of car trips on specific corridors can be more easily addressed through focused mitigation measures.

As in Phase 1, it was observed that the differences in car trip generation for specific sites could be significant: 66% of new AM trips in village-based developments could be by car, compared with only 59% for a Waterbeach development. However, the overall traffic growth for the two districts varies much less.

Phase 3: In the final phase, the Proposed Submission Local Plan scenarios for South Cambridgeshire and Cambridge were tested together with an enhanced package of transport mitigations.

The Transport Strategy measures proposed have a beneficial impact on travel behaviour in the two districts. These measures directly cause non-car trips into Cambridge to grow at double the rate they would otherwise be expected to (26% compared with 13%). The growth in car trips into Cambridge is reduced by 10%. The measures increase the total trips into Cambridge during the peak by 2.5%, as the rise in non-car trips exceeds the fall in car trips (i.e. the City becomes slightly more accessible overall).

Demand Management: It was recognised that in order to prevent car entries to Cambridge rising unsustainably, a balanced approach may be needed to discourage car use. Therefore a sensitivity test was undertaken with stricter controls of parking, making no firm assumptions on the delivery method but aiming to discourage car use for trips to the City in the AM and interpeak periods. The results showed that there is potential to limit car entries to the City at approximately 2011 levels. Park & Ride was the most popular alternative method of accessing the City, reflecting the continued need for those living in rural areas to drive in order to access the public transport network.

CONCLUSIONS

- The Local Plan Strategies should pursue focused rather than dispersed development;
- Development locations should maximise sustainable travel alternatives to the car, particularly by providing high quality public transport. New Settlement locations are best suited to delivering the necessary infrastructure to encourage travel by non-car modes;
- Such public transport routes need to be able to bypass queues and congestion to offer reliable and swift journey times both to the identified growth areas to improve options for residents in existing villages and settlements as well as for the new developments.
- The Transport Strategy will help to make the City and key destinations more accessible;
- The Preferred Local Plan Strategies and transport measures should reduce the amount of car growth to and from the City; and
- With a growth in travel demand generally stricter controls on car access and parking in Cambridge City will need to play an increasing role in managing car travel demand. Initial testing suggests that demand measures such as parking restraint appear to offer a realistic and cost effective mechanism of reducing car growth where strong alternative modes exist.

This work has therefore demonstrated that the proposed Local Plan and Transport Strategy should have a beneficial effect overall. The development strategy chosen by providing further housing will assist in minimising in-commuting, which is a major driver of future traffic growth. The focus on new settlements will provide opportunities to further minimise traffic growth through use of sustainable travel modes and internalisation of trips.

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1 Introduction

1.1 Background to tests

This Summary Report outlines the work undertaken by WSP Group and Atkins to investigate the transport implications of a range of development options, as well as the preferred development strategy for Cambridge City and South Cambridgeshire Local Plans to 2031. These Local Plan development strategies and the Transport Strategy measures have been tested in the Cambridge Sub Regional Model (CSRM) through to 2031.

CSRM is an established dynamic land use and transportation model, which incorporates housing, employment, transport demand and transport infrastructure. Testing with the model allows the outcomes of differing strategies to be independently assessed, to identify which perform best across a range of criteria, including changes in travel behaviour, and patterns of job growth and employed residents.

Through their respective Local Plans Cambridge City Council and South Cambridgeshire District Council are planning to meet the objectively assessed needs for housing and jobs 2011 to 2031 (Cambridge 14,000 homes and 22,000 jobs; South Cambridgeshire 19,000 homes and 22,000 jobs)

CSRM has been used to model different development assumptions for strategy options and then how these perform with proposed Transport Strategy measures in place. The testing has informed decisions on the preferred Local Plan Strategies and demonstrated the positive impact of the Transport Strategy measures proposed.

1.2 Forecast Traffic Growth

The location of the majority of traffic and non-car trips on the network is pre-determined by the distribution of existing and currently planned development in Cambridge, South Cambridgeshire and beyond. In addition, published National Forecasts for the East of England predict 2010 to 2030 road traffic growth in the range 37% to 39% (dependent on urban or rural definitions). In the model, there is overall headline traffic growth of 40% across the wider Cambridge sub-region reflecting the higher than average growth of Cambridgeshire compared to the rest of the East of England.

Without any transport mitigation, Cambridge City is forecast to have lower than average traffic growth which accords well with both sustainable planning and transport policies but demonstrates the challenge of levels of existing traffic congestion, which will be difficult to reverse. Cambridge will have a ~~32~~33% growth in the AM peak hour (8am-9am) rising to 41% in the inter-peak (2pm-3pm). South Cambridgeshire is likely to experience higher average traffic growth than Cambridge City but still lower than the wider Cambridge sub region with figures of ~~38~~40% in the AM peak and ~~46~~47% in the inter-peak periods as people either move around within South Cambridgeshire for employment and services or use Cambridge as their main destination for these trips.

Whilst a shift in distribution of development and associated journeys will occur over the longer term to 2031, with the preferred Local Plan strategies and Transport Strategy measures in place a positive impact can be achieved. With this in mind the planning strategy in the two local plans aims to build on the existing City and South Cambridgeshire local plans which focus development in and on the edge of Cambridge and at the new town of Northstowe, and locate development where it will reduce the need to

travel and where it will have the greatest opportunity to facilitate trips by sustainable non-car modes compatible with other sustainability considerations.

1.3 Phases of Modelling Tests

The modelling work has been carried out in three phases. The testing of options has examined the individual elements of the strategy options in isolation before being tested in combination up to a forecast year of 2031. The preferred strategy was then tested. In all options, the committed level of development in planning permissions and current plans remained constant and accounts for a significant proportion of the development required over the period to 2031. The three phases of testing are described below.

Phase 1: In Autumn 2012 seven different scenarios were tested based on the sites in the Issues and Options consultation**, including the current committed level of development (planning permissions and sites allocated in current local plans), and the 7 scenarios that test the effects of the site options which were consulted on between June and September 2012**. The additional growth scenarios separately tested locations as follows:

- Cambridge urban sites;
- New settlement development split between Bourn Airfield and Waterbeach;
- A single, larger, new settlement at Waterbeach
- Village extensions;
- The Cambridge Fringe, tested at two levels of development; and
- A combined option covering all of these together.

These scenarios sequentially increased the total development, allowing the impact of varying levels of future housing at different stage of the development sequence to be tested. They assume no mitigation measures, which were considered at phases 2 and 3 below.

Phase 2: Detailed tests were carried out on **short-listed strategic options** with a focused set of potential transport mitigations also considered and the effects of the different options compared. The options tested at this stage were village focused development in South Cambridgeshire, development at Bourn Airfield and a new town at Waterbeach. It was assumed that the whole of the new settlements would be built by 2031 in order to explore the impacts of the whole developments, even though this is not likely to be the case and only approximately 3,100 homes are anticipated to be built by then across both new settlements.

This approach does not give a true representation of the impacts of the new settlements because phasing and impacts of housing and employment development elsewhere beyond 2031 will also play a part in longer term travel patterns. This issue is particularly relevant to the Waterbeach results, which can only be seen as broadly indicative of the trip generation for such a complex site. More detailed work would include consideration of on-site design and master planning, facilities and potential for trip internalisation, as well as additional employment on and off-site.

Phase 3: In the final phase, the **Proposed Submission Local Plan scenarios for South Cambridgeshire and Cambridge** were tested together with an enhanced package of transport mitigations. A parallel test of the potential for demand management to reduce the number of car entries into Cambridge was also carried out.

2 Results of Development Strategy Tests

2.1 Phase 1 Tests

The initial **Phase 1** results illustrated that increasing traffic levels occur in the Cambridge area in all available strategies, particularly for traffic in rural areas and on routes into Cambridge. These results are well aligned with Government regional forecasts, and have been confirmed in later tests as options were refined. The following factors were found to contribute to the increasing demand for car travel:

- Increases in availability of cars, particularly in rural areas with greatest reliance on car travel;
- A growth in traffic to fill available road capacity (e.g. in off-peak periods or as a result of modal switch); and
- Most importantly, the economic growth of the sub-region requiring increasing numbers of workers to fill jobs – where housing for workers is not available locally, the model assumes that the difference is met by increased levels of in-commuting.

As might be expected, new households in or near Cambridge use cars less than those in villages or new settlements further from Cambridge : typically there are 6% more extra car trips per household further from Cambridge. However, this does not translate into such significant differences in traffic growth for the Districts as a whole, for two reasons:

- The new development being re-located between these areas is relatively small, when considering the total dwellings in the two districts, and hence the change in car trips has only a small proportional impact;
- Given the level of congestion on key routes into Cambridge, there is predicted to be suppressed demand for car travel by 2031. When road space is freed up by developing in more sustainable locations, some of the benefit is eroded as this suppressed demand returns, a process known as back-filling. Hence the net benefit is less than would be expected based on local trip generation.

The net effect was that comparing the most dispersed development strategy (village extensions) with the densest (city and fringe locations only), the total car mode share altered by just over 1%. The impact of this was explored further in the Phase 2 tests.

These results also indicated that the major influence on traffic growth in Cambridge and South Cambridgeshire is the quantum of employment and housing growth. Low housing growth options require more in-commuting trips to support employment, which is largely car-based. Though high housing growth options generate more trips locally, the total vehicle kilometres are lower due to shortening of car trips.

2.2 Transport Strategy Measures

The Phase 2 and Phase 3 model tests were carried out initially assuming **only committed transport investment is undertaken** (including upgrading the A14 and Cambridge Science Park station).

A further series of tests investigated **the improvements which could be made to the network by using a focused set of transport improvements**. The package of measures tested included:

- Strategic corridor improvements - A428 Black Cat - Caxton Gibbet, A14 upgrade Ellington to Milton;
- Access controls close to Cambridge Ring Road to enhance public transport operations and discourage cross city movements in the built up area;

- A major increase in dedicated cycle provision in Cambridge and South Cambridgeshire;
- A wide range of bus priority measures in Cambridge and on major routes to/from Cambridge, including busways and High Quality Public Transport (HQPT) on routes from Royston, Haverhill and St Neots;
- Additional Park and Ride sites on the A428, the A1307 and at Hauxton on the A10, and the re-location of Newmarket Road P&R to Airport Way;
- Improvements in rail services, speed and capacity, including the Thameslink upgrade and improved rolling stock; and
- A segregated busway from Waterbeach to Cambridge and dualling of the A10, implemented ahead of development of Waterbeach New Town.

The focused package of measures listed above was applied to each of the Phase 2 options, with the Waterbeach busway and A10 dualling implemented only in the Waterbeach New Town option. More information is included in the technical appendix.

A full package of enhanced transport measures was applied in Phase 3, that comprised all the focused package and included some additional improvements to the HQPT services in terms of priority and improved journey times.

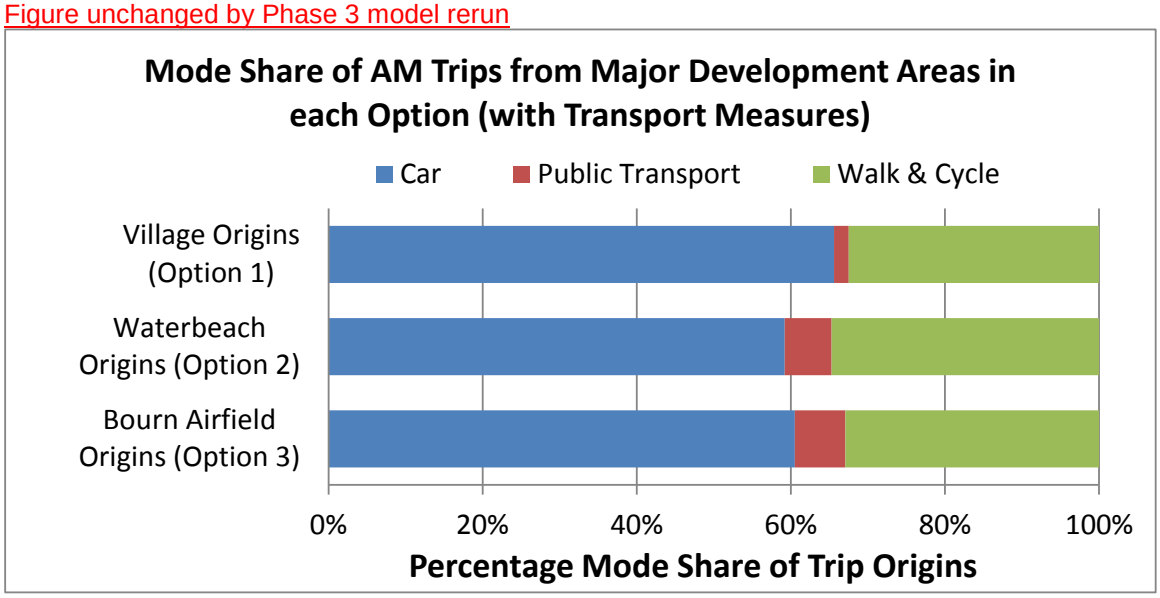
Further details of the transport measures are provided in Appendix B.

2.3 Phase 2 Tests

Following the phase 1 testing and considering alongside other planning considerations, the District and City Councils concluded that sites on the edge of Cambridge were not reasonable options for further testing. The **Phase 2** tests therefore focused on new settlements and village alternative options for the 5000 homes required. The testing confirmed the general trends identified at phase 1, and investigated **whether any major differences between strategy options** would be seen once the focused transport mitigation measures described above were considered.

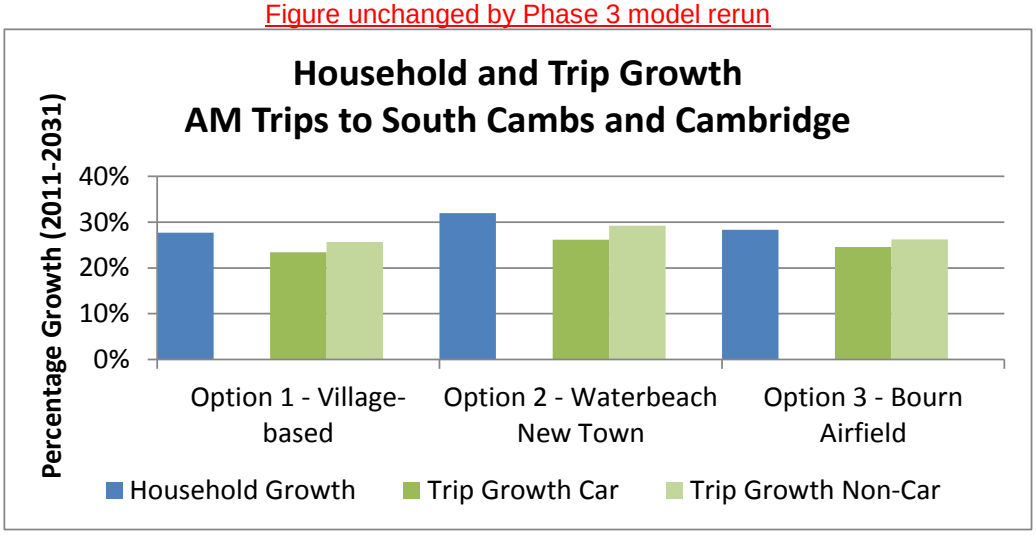
The chart below compares trips generated by the new developments in each of the options tested, when focused transport measures were in place. This shows that 66% of the additional village-based trips would be made by car, compared with only 2% by public transport. By comparison, the additional Waterbeach based trips are 59% car and 6% public transport, and the Bourn Airfield trips 61% car and 7% public transport. This indicates that the new settlement options have advantages in terms of sustainable mode share. The lower car mode share for Waterbeach and Bourn relates to both the greater accessibility by public transport, and the higher level of internal trips. Waterbeach additionally has a larger number of walk and cycle trips to Cambridge.

Figure unchanged by Phase 3 model rerun



However, overall traffic growth across the sub-region is more similar in each option, as shown below. This reflects the relatively small amount of additional development compared with the total amount of development in the area. The total trip growth naturally varies according to the number of households delivered (blue bars), which varied across the options tested as the strategy was being refined. The relative growth of car and non-car trips however shows less different between the options.

Figure unchanged by Phase 3 model rerun



When comparing the village-based (dispersed) development option with the new settlements (Waterbeach and Bourn Airfield), there are two competing factors:

- As shown above, for new settlements, a lower car mode share is possible, as the greater size brings opportunities for internalised trips and site-specific public transport measures to reduce car mode share. By comparison, for village-based developments mitigation is more difficult;
- The larger developments produce more concentrated traffic increases, which would need to be mitigated with sustainable transport schemes and specific highway measures, particularly on routes around Waterbeach.

The modelling results suggested these factors are reasonably balanced. The village-based developments generate a higher proportion of car trips overall, but some increase in localised traffic problems was observed in the new settlement options.

In addition, the *overall* levels of traffic increase, and the benefits of the focused package Transport Strategy measures, are similar whether additional development being identified in the new Local Plans is focused in the villages, Bourn Airfield or Waterbeach. As has been noted for Phase 1, this is both because of 'back-filling' when suppressed demand rises to take advantage of road space freed, and also because much of the traffic on the network is generated by existing or committed houses and businesses.

The differences between development options are relatively small in terms of the number of additional dwellings (<5,000 dwellings). For example, the Bourn Airfield development tested at 3,500 dwellings represents only 2.5% of the total existing and committed dwellings in 2031. A similar proportion of the overall trip origins will be affected by the strategy. Given many of the destinations will remain the same, the scope to radically alter the traffic through development location is clearly more limited.

The Phase 2 results have demonstrated that the dispersed village development option is less preferable than new settlements in terms of car mode share of new trips generated. This reflects the improved access to public transport and greater internalisation that can be achieved in larger developments with more concentrated locations of housing and ability to generate more local employment.

Furthermore, whilst the concentrated impacts of the car trips on specific corridors creates more congestion on those routes than a rural dispersed strategy this can be more easily addressed through delivery of new settlements. They have the advantage of being able to provide for coordinated infrastructure on key routes in the form of public transport and highway measures. In addition, having Bourn Airfield and Cambourne West on the same corridor helps to support the public transport improvements that would help mitigate the transport impacts and congestion on Madingley Road between the A428 and the M11 junction and onward into the City.

2.4 Phase 3 - Preferred Local Plan Strategies

The phased testing described above has informed the preferred Local Plan Strategies. Phase 3 of the testing was carried out as follows:

- For Cambridge this includes a number of urban allocations, edge of Cambridge allocations at Worts' Causeway and a windfall allowance.
- Strategic development at Waterbeach new town and Bourn Airfield new village, though only circa 3,100 dwellings are expected to be delivered in the timeframe modelled (2011 to 2031) and also a Cambourne West village expansion of circa 1,2~~5~~00 dwellings;
- Development of ~~895~~ 860 additional dwellings in six villages in South Cambridgeshire and
- The total employment in Cambridge reflects the up to date technical work including the Strategic Housing Market Assessment identification of 22,100 additional jobs by 2031 (increased from phases 1 and 2).

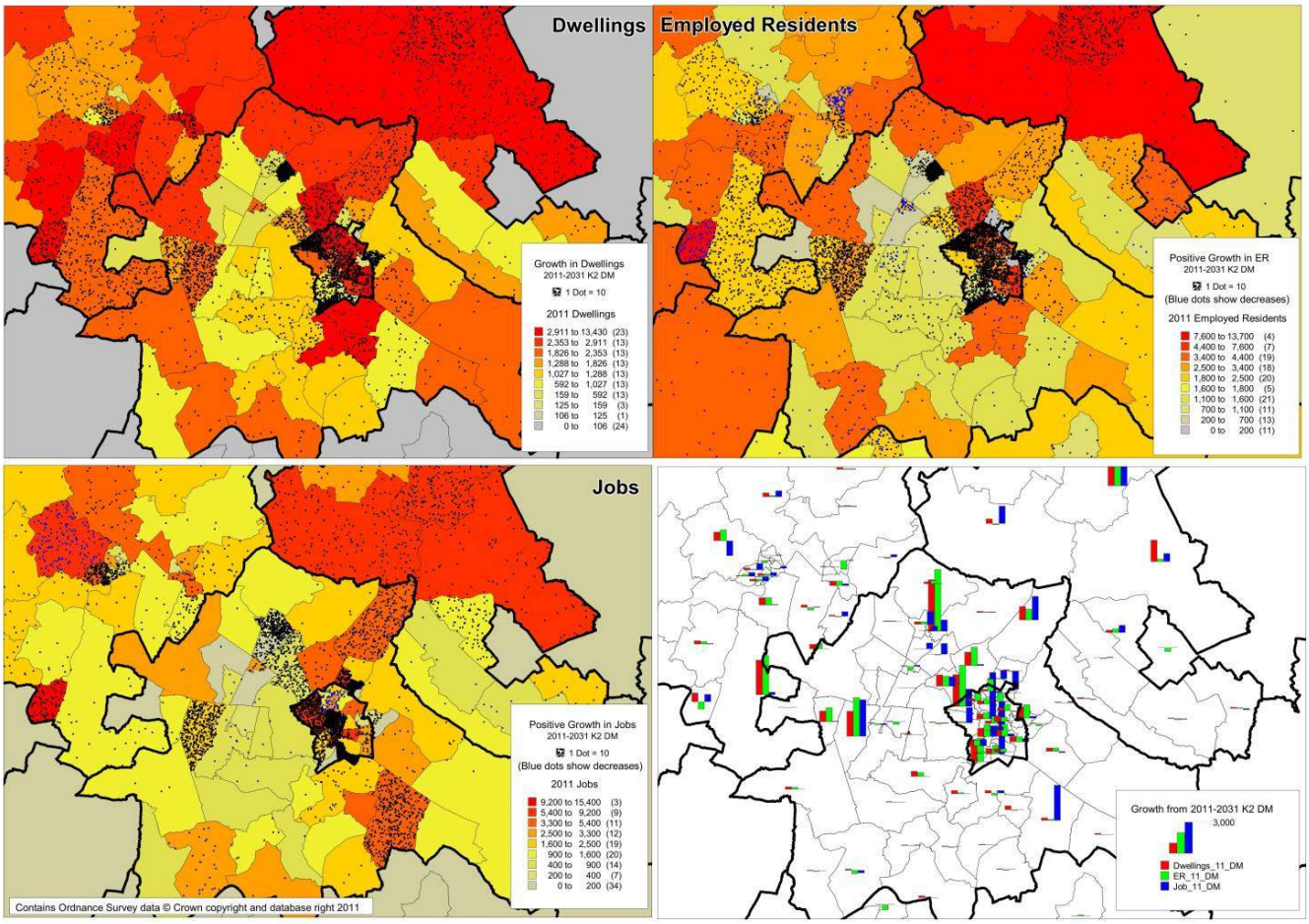
As part of the phase 3 testing, the model assumptions that were used in the phase 1 and 2 testing regarding the number of workers in the Sub Region were reviewed, based on information in the recently published Strategic Housing Market Assessment chapter on forecasts for all homes (May 2013) that identified objectively assessed needs for jobs and homes having looked at a range of available forecasts and the 2011 Census. This review showed that the higher employment levels in Cambridge would be associated with an increase in the number of employed residents in the City and South Cambridgeshire. This increase is in line with trends observed in the 2011 Census, that the number of workers per dwelling (especially in Cambridge City) has been increasing, as has the proportion of dwellings with employed residents.

The assumed growth in employment and population means that a similar proportion of the population is forecast to be in employment in 2031 as in 2011 (around 50%) with the remaining 50% being children, the retired as well as those of working age not in employment. The overall balance of jobs to workers is forecast to improve over time. For Cambridge City, the model is indicating that there will be an increasing proportion of the resident population in employment, resulting in a better balance between jobs and the resident workforce and the potential to reduce the amount of commuting into and out of the City. This assumes some continuing increase in household size in the City, as indicated in the 2011 Census.

Car ownership levels are rising through time and this is reflected in the assumptions input to the model for growth from 2011 to 2031. The percentage of households without a car will fall overall, though in the City the proportion of households without a car rises from 28% in 2011 to 30% by 2031. This is due to improved accessibility by non-car modes than in other parts of the sub region as well as the number of opportunities for work and leisure in the immediate vicinity.

The change in distribution of population and employment is shown below in the locations of dwellings, employed residents and jobs growth.

Change in Dwellings, Employed Residents and Jobs, 2011-2031
(see large scale version at Appendix A)
(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



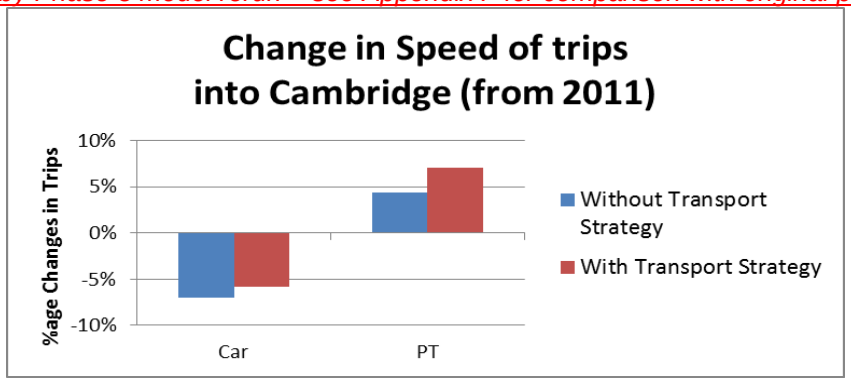
This section shows the impact of the preferred strategy on different aspects of transport demand and the transport network. Results are shown for the Preferred Local Plan strategy. Responses of a similar scale were seen for the Phase 2 options tested.

Journey Times

The tests demonstrated that **investment in high quality public transport corridors** significantly increases patronage and helps improve the accessibility of Cambridge in particular. This is shown

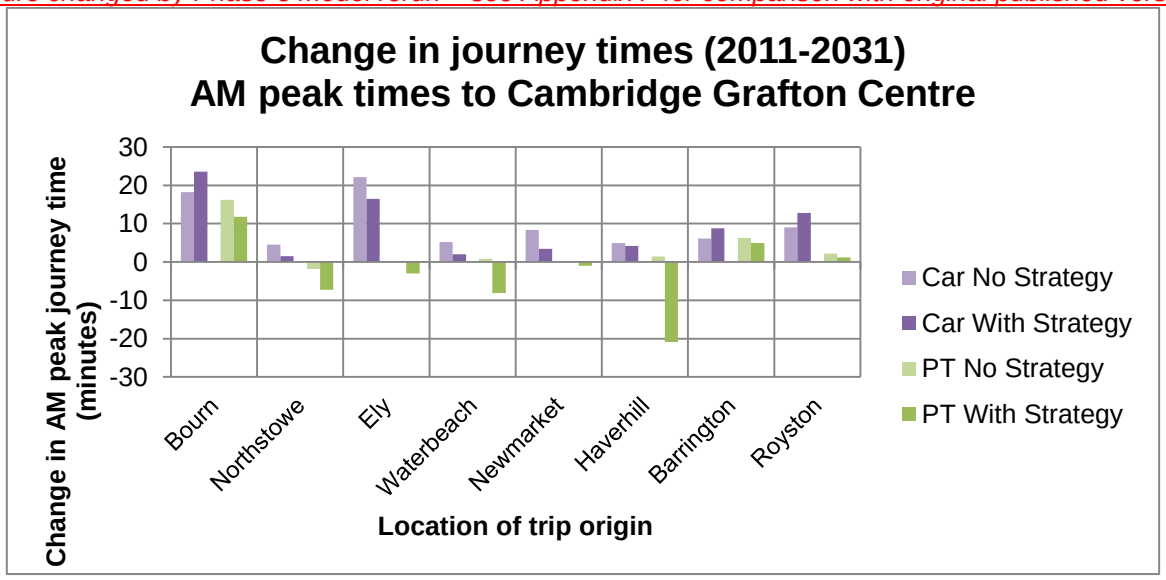
below in terms of the improvement of public transport journey times with the Transport Strategy in place.

Percentage change in speed of trips into Cambridge (from outside) with and without Transport Measures (2011 to 2031)
(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



While it is clear that on average, travel conditions by car deteriorate over time while those for public transport improve, there will be spatial variations based on the availability of high quality public transport facilities between key locations.

Change in AM peak journey time from selected locations to central Cambridge zone with and without Transport Measures (2011 to 2031)
(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



The transport strategy changes to travel times are shown above. Car travel times are forecast to increase over the 20 year period in all cases, with the strategy alleviating congestion in some corridors. Note that journey times from the south and west increase slightly with the strategy in place, which reflects re-routing to cross the City once the expanded core scheme is in place. Travel times by public transport increase over time less than those by car and in some cases are forecast to reduce with the strategy amplifying this effect.

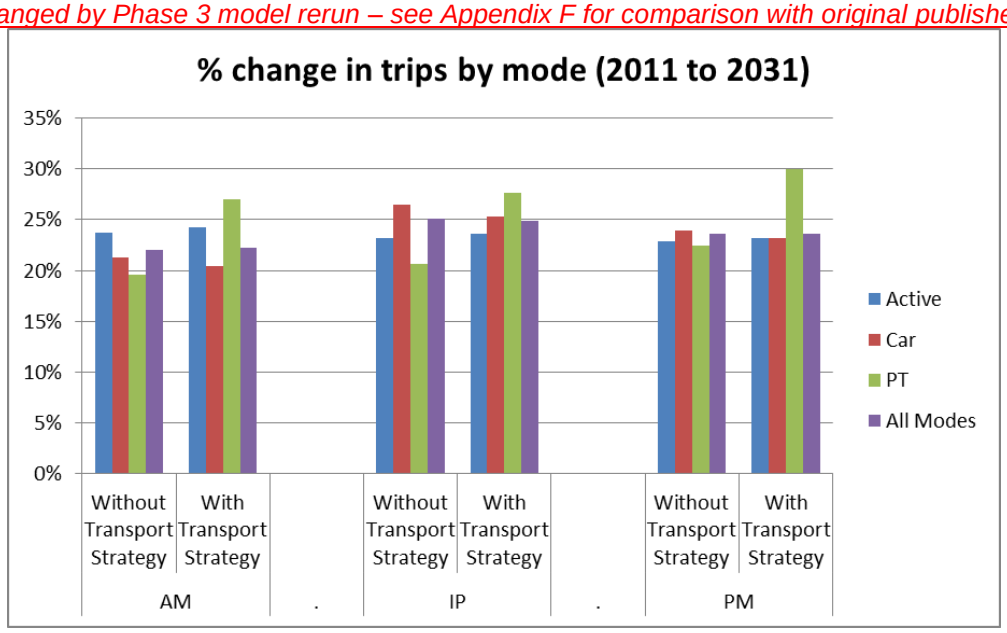
The chart also highlights congestion effects which remain on some corridors, and affect both car and bus journey times from on the A428 (Bourn) and A10 south (Barrington and Royston) although some of this is down to this analysis using the Grafton Centre as the main destination whereas for many from the south and west the destination is more likely to be the historic city centre which can be accessed more quickly from these directions than the Grafton Centre. In particular, on the A428 corridor, additional bus priority improvements on the edge of Cambridge will be essential to improve the journey times above for Bourn to ensure non-car trips are made to facilitate sustainable growth.

Further details of travel times by corridor are included in Appendix C (High Quality PT Corridors) and D (variations in journey time).

Change in Trips

The growth in population and employment will result in an increased demand for travel across the sub region.

Increase in travel demand (2011 to 2031) by mode across Sub Region
(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



The chart shows how this increased demand varies by time of day and mode and that the **total demand across all modes increases between 20% and 25% in all time periods**. The growth in public transport trips improves significantly with the transport strategy, in particular public transport trips growing ~~26~~27% in the AM with transport measures, compared with ~~17~~19% without. However, public transport remains a minority mode for medium and particularly longer distance travel. Improvements to cycling facilities within and around Cambridge also have potential to reduce car trips.

The growth in travel demand forecast as a result of the planning assumptions tested is most pronounced for travel to and from Cambridge City.

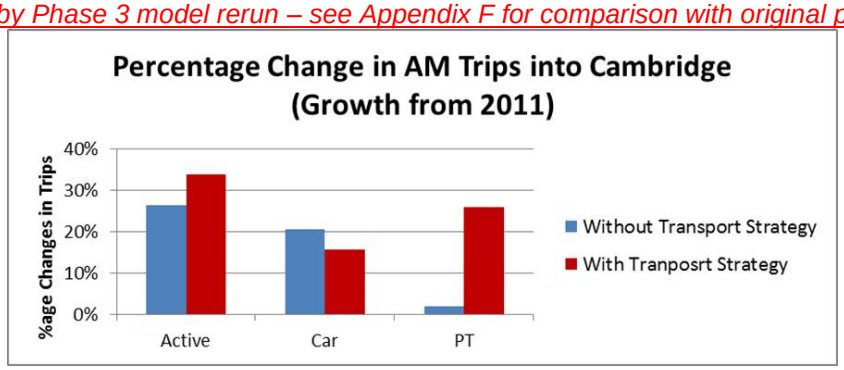
(Table changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

	To destinations in:			
From origins in:	Cambridge City	South Cambs	Elsewhere	All Areas
Cambridge City	30%	32%	21%	29%
South Cambridgeshire	32%	34%	23%	31%
Elsewhere	24%	26%	16%	17%
All areas	30%	32%	17%	24%

This shows that travel to, from and within the City is expected to grow by around 30% while average growth in the sub region is ~~23~~21%. It can be seen below that with the transport strategy in place it helps significantly increase trips by non-car modes and improves overall accessibility to and from the City, with cycling and walking growing from ~~24~~26% to ~~32~~34% and public transport growing from ~~4~~2% to ~~29~~26% between the without strategy and with strategy situation.

Change in trips into Cambridge (from outside)
with and without Transport Measures (2011 to 2031)

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



Traffic Growth and Congestion

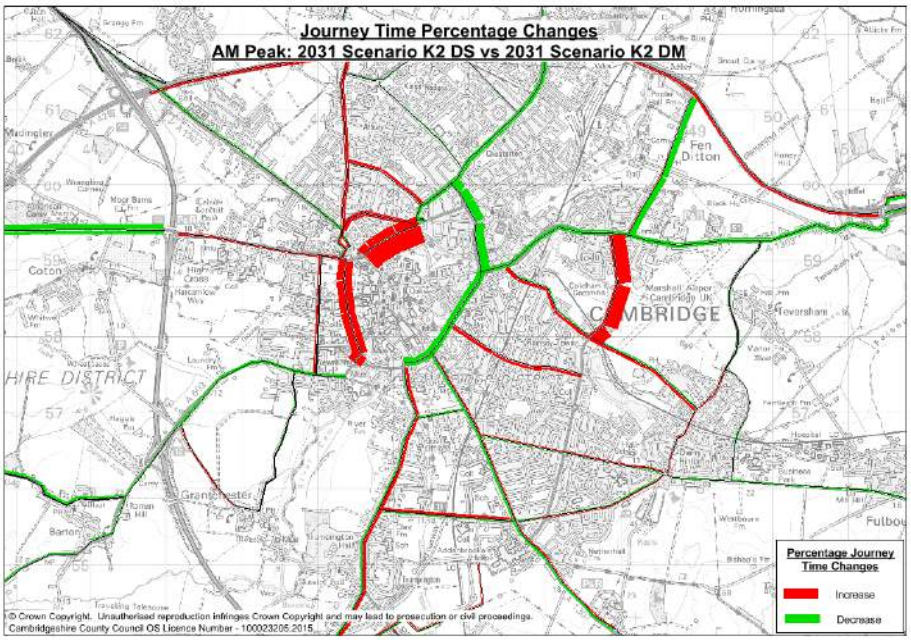
With **continued growth in AM peak trips into Cambridge predicted by all modes, there is likely to be peak hour congestion**. Without strategy interventions, the increase in vehicle miles travelled in Cambridge will translate into a ~~61~~63% rise in peak hour travel times with time spent in congested conditions more than doubling (~~113~~118%). In South Cambridgeshire, similarly projected levels of growth could result in peak travel times increasing by ~~62~~65% and time spent in congestion rising by ~~125~~134% particularly on the approaches to Cambridge.

The modelling shows that unless further medium and long-term measures are put in place over time, the location and severity of congestion hotspots could radiate out from Cambridge over an ever widening area. This emphasises the importance of the Transport Strategy in providing alternative modes of travel to the car.

The diagram below shows the impact of further Core Scheme type interventions, potential road closures of Hills Road, East Road and Mill Road alongside comprehensive parking restrictions in residential areas, as an expansion to the existing core scheme, can reduce journey times for certain segments of movements within Cambridge City but increase journey time pressures on other key routes. These measures will assist in improving travel by non-car modes, reducing journey times and increasing non-car modes shares.

Change in selected 2031 highway journey times as a result of Transport Strategy

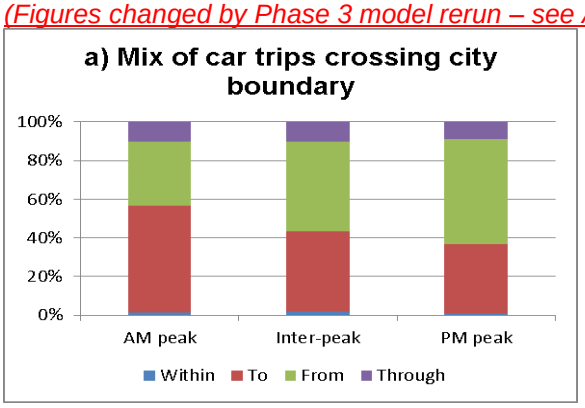
(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

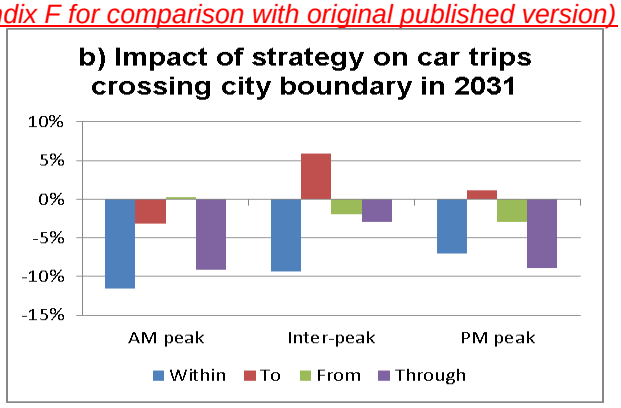


Trips to / from Cambridge

Analysis shows that a majority of the car trips using the radial routes to cross into or out from the city have one end of their journey in the City and the other outside. In each time period modelled approximately 10% of the trips are however passing through the city, with a very small number (between 1% and 2%) travelling out and then back in again with both ends of their journey within the city. The strategy reduces travel to, from and through the city as a result of the extension of the core scheme making it more difficult to cross the city by car.

(Figures changed by Phase 3 model rerun – see Appendix F for comparison with original published version)





Trips crossing city boundary in 2031 without Strategy *Impact of strategy on each category of trip*

Types of trip: To trips with an origin outside the city and a destination within the city

From trips with an origin in the city and a destination outside

Through trips which start and end outside the city, but pass through

Within trips which start and end inside the city, but travel out then back in again

The Transport Strategy measures proposed have a beneficial impact on travel behaviour in the two districts. The Transport Strategy measures directly cause non-car trips into Cambridge to grow at double the rate they would otherwise be expected to (26% compared with 13%). The growth in car trips into Cambridge is reduced by 10%. The measures have the added impact of increasing the total trips into Cambridge during the peak by 2.5%, as the rise in non-car trips exceeds the fall in car trips (i.e. the City becomes slightly more accessible overall). This clearly shows that the Transport Strategy improves trips by public transport, cycling and walking.

2.5 Managing Growing Travel Demands

There is likely to be significant growth in demand for car travel across the sub-region as outlined above both as a result of general trends in car use and ownership as well as from development. The Transport Strategy measures have been shown to improve non-car travel significantly and reduce congestion in the context of the level of planned growth and increasing travel demand. However, as Cambridge is such a magnet, particularly in terms of jobs, the modelling shows that in-commuting from further afield will continue to grow, unless there are restrictions as well as improvements to the transport network people will continue to drive and road space will fill up. Therefore a balanced approach is proposed in the Transport Strategy, and this aligns with evidence of how the current core scheme has helped to reduce traffic through the centre.

In addition to the main transport measures tested, a sensitivity test was undertaken with stricter controls of parking, which might be delivered through more extensive residential parking permits or limited supply of employers parking. Due to the way in which the model works, the test was carried out by adding an additional time penalty for all cars ending their journey in the City. This was an additional 20 minutes to all journey time at the end of car trips into Cambridge City, and additionally to the Science

Park and Addenbrookes. Additionally, a 10 minute penalty was applied for Northstowe and Cambourne, to reflect the lower parking provision anticipated for employment sites in those developments.

This has a significant impact on AM Peak car trips into Cambridge City. These were reduced to slightly below the 2011 base level, a reduction of approximately 5,000 trips. Of these, 50% appear to enter Cambridge in the AM Peak by another mode, with the largest rise being for Park & Ride (a growth in excess of 60%) and a circa 8% rise in cycle, walk and rail trips to the City. There are reductions of a similar scale in car trips within the City, with 4,000 fewer trips, of which approximately half make trips by cycling and walking instead.

As a consequence of the additional road space freed up, there is an increase in car trips entirely outside the City Centre, with these increasing by around 2,000 (<1%), this will be due both to a decrease in congestion inducing car traffic, and a switching of destination for some trips. These results are consistent with the observed impact of the previous core scheme.

The modelled responses also included a decrease in leisure, retail and personal business trips to Cambridge. In modelling terms a proportion of these re-located to destinations outside Cambridge. This is a potential response should people who normally arrive by car find parking not available, and alternative means of travel are not sufficiently accessible. However, the model cannot fully account for the strong attraction of Cambridge for these types of trips, so the extent of the response needs careful consideration.

It was concluded that if such measures could be introduced, then they would decrease peak hour car entries to the City considerably. Such a potential demand management measure therefore has a positive impact in encouraging people to travel by Park and Ride and other non-car alternative modes of travel. For discretionary inter peak trips, there may be some reduction in trips, however this could be addressed by only enforcing restrictions at peak times.

3 Conclusions

Economic growth in the sub region brings opportunities and challenges in terms of increased population and a greater demand for travel. Increases in availability of cars are projected through time, particularly in the rural areas with greatest reliance on car travel. Without adapting the way people live and work, this will almost certainly lead to increased demand for travel resulting in more congestion and increased air pollution at peak times. Where spare road capacity is available, travel patterns and mode share will normally shift to take advantage of this and fill available road capacity. This may take the form of changes in the locations of development in the economic growth of the sub-region and requires increasing numbers of workers to fill jobs. Where housing for workers is not available locally, this tends to increase levels of in-commuting.

Whilst much of the trip patterns are generated by the historic distribution of development, the transport strategy will be critical to continuing the strategy of shifting from a reliance on car based travel to sustainable modes permitting viable and self-supporting public transport alternatives to be created to the new development areas delivered by the Local Plan Strategies.

The key findings of the detailed transport modelling undertaken to inform the two Councils' Local Plans and the Cambridge and South Cambridgeshire Transport Strategy are as follows:

- The Preferred Local Plan Strategies should focus development in key locations rather than dispersed in villages;
- These locations should maximise sustainable travel alternatives to the car, particularly by providing high quality public transport for those expanded and new settlements, and these locations are best suited to delivering the necessary infrastructure to encourage travel by non-car modes;
- Such public transport routes need to be able to bypass queues and congestion to offer reliable and swift journey times both to the identified growth areas to improve options for residents in existing villages and settlements as well as for the new developments.
- The Transport Strategy will help to make the City and key destinations such as employment centres more accessible;
- The Preferred Local Plan Strategies and transport measures should reduce the amount of car growth to and from the City; and
- With a growth in travel demand generally stricter controls on car access and parking in Cambridge City will need to play an increasing role in managing car travel demand. Initial testing suggests that demand measures such as parking restraint appear to offer a realistic and cost effective mechanism of reducing car growth where strong alternative modes exist.

This work has therefore demonstrated that the proposed Local Plan and Transport Strategy should have a beneficial effect overall. The development strategy chosen by providing further housing will assist in minimising in-commuting, which is a major driver of future traffic growth. The focus on new settlements will provide opportunities to further minimise traffic growth through use of sustainable travel modes and internalisation of trips.

The Transport Strategy, and the inclusion of identified transport requirements in Local Plan policies for the major developments will help in mitigating some of the implications of future growth through providing high quality alternatives to the car that can bypass congestion and provide an attractive alternative that results in an increase in the modal shift and number of non-car trips within Cambridge and South Cambridgeshire. The Transport strategy should help to reduce congestion, help mitigate the impacts of growth, enhance travel by sustainable alternatives and help make the City and South Cambridgeshire more accessible overall, for existing and planned communities. It will ensure priority for sustainable modes can be promoted through appropriate planning allocations and tailoring high quality public transport services to provide reliable and attractive routes to areas of greatest demands.

Appendix A – Distribution of Dwellings, Workers and Jobs in Preferred Development Option

Figure A.1 is an enlarged version of the map in section 2.4 of the main report, showing the distribution of dwellings, employed residents (or workers) and jobs as produced by the model based on proposed development patterns.

In each case, the dwellings totals are directly entered into the model based on planning policy. Floorspace for commercial developments is similarly entered as a model input. The location of the employed residents and jobs is determined by the model within the dwelling and employment space made available.

The shading shows the 2011 locations, coloured from grey through to red as the absolute numbers increase. The change from 2011 to 2031 is shown by dots, with each black dot representing 10 additional dwellings, workers or jobs. The blue dots show decreases. Decreases occur particularly for employed residents where there are few additional dwellings. This is because falling household size and the increase in the retired population will lead to fewer employed residents per household. Hence without increases in dwellings the number of workers in the area will fall.

The maps shows that the changes in employed residents correspond well with the dwellings, as would be expected. The jobs patterns match reasonably well, though there are increases to the south-east of Cambridge which do not have matching rises in employed residents. This means that the average distance between workers and jobs is increased in this area, leading to longer commuting trips.

Appendix B – Transport Strategy Measures used in Local Plan tests

Transport measures were developed by Cambridgeshire County Council to indicate a likely package of improvements which could be brought forward in phases to 2031. The measures were designed by CCC to address significant known transport issues, and anticipate measures which would be needed to support future growth. The main transport measures tested at Phases 2 and 3 were:

- Strategic corridor improvements - A428 Black Cat - Caxton Gibbet, A14 upgrade Ellington to Milton;
- Access controls close to Cambridge Ring Road to enhance public transport operations and discourage cross city movements in the built up area;
- A major increase in dedicated cycle provision in Cambridge and South Cambridgeshire;
- A wide range of bus priority measures in Cambridge and on major routes to/from Cambridge, including busways;
- Additional Park and Ride sites on the A428, the A1307 and at Hauxton on the A10, and the re-location of Newmarket Road P&R to Airport Way;
- Improvements in rail services, speed and capacity, including the Thameslink upgrade and improved rolling stock;
- A busway from Waterbeach to Cambridge, implemented ahead of development of Waterbeach New Town.

Note that some of the proposed enhancements in these tests are linked with specific development sites.

Table B.1 and Figure B.1 give further detail of the highway schemes which were included in the SATURN highway model.

Table B.1 – Highway Schemes included as part of Transport Measures

Highway Scheme	Description
Core Scheme Extension demand management package	Closure of East Road and Mill Road to through traffic (additionally Hills Road closure for bus priority – see below).
Inner Park and Ride site expansion of capacity	Segregated access at Babraham Rd P&R segregated access, Milton P&R bus priority at Milton Interchange (TIF 28) and Hauxton M11 P&R access improvements (TIF 36) coded for 2016 onwards. Relocation of Newmarket Rd P&R site to east of Airport Way (as TIF) coded for 2021 onwards.
Corridor: Alconbury, Huntingdon, St Ives and Northstowe to Cambridge.	A14 Ellington to Milton improvement scheme: Option 7 with D3AP main carriageway and £1/£2 toll. Most recent version of Northstowe coding as agreed with Bob Tuckwell.
Corridor: St Neots to Cambridge	In 2016, dedicated left turn from A1198 north to A428 east with full length slip road onto A428 (rather than single lane for each flow). From 2021 onwards, A428 Caxton Gibbet to Black Cat improvement (single carriageway on an off line route between the two junctions with no intermediate junctions; grade separated junction at Black Cat; enlarged four arm roundabout at Caxton

	Gibbet with a dedicated A1198 north to A428 east slip lane; old A428 diverted to a separate roundabout just to the north on A1198).
For any large new settlement at Waterbeach	2021 onwards: A10 dualled between Cambridge Research Park and A14 Milton Interchange, with dedicated access from Waterbeach new town. Assumed existing priority junctions on A10 remain as priority junctions with at-grade facilities to cross dual carriageway. No expansion of Milton Interchange incorporated at this stage.
New / enhanced bus priority through junctions and pinch points on key radial routes into Cambridge	Newmarket Road segregated busway crossings between football stadium and Elizabeth Way (TIF 25) and Hills Road closure and bus priority between Station Road and Lensfield Road (TIF 33) coded for 2021 onwards.

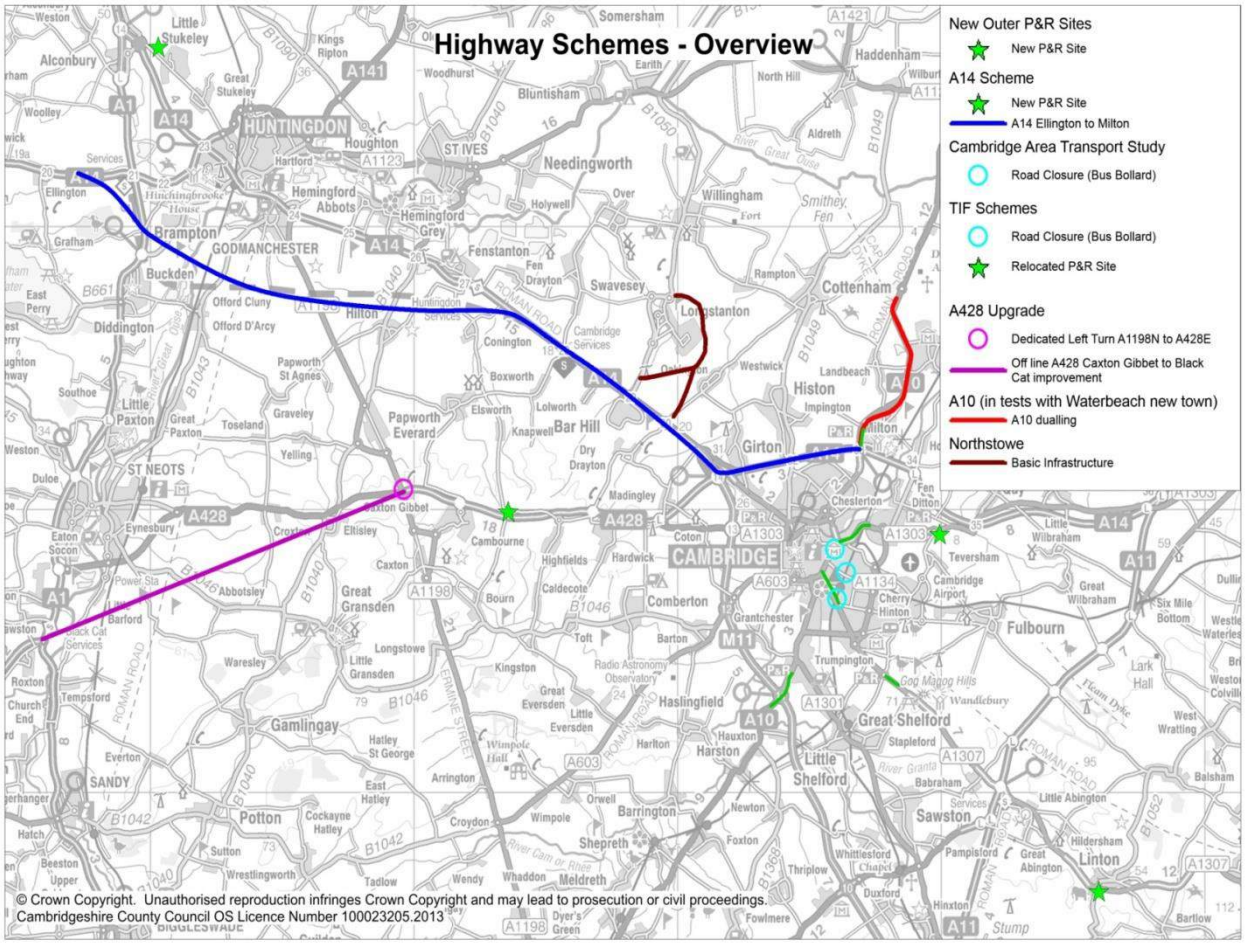


Figure B.1 - Overview of Highway Schemes included as part of Transport Measures

Table B.2 – Public Transport and Cycle Schemes included as part of Transport Measures

Type	Description
Bus Priority/ Busway	Priority measures to increase bus speeds including: ■ Segregated bus lanes for major routes into Cambridge as shown in Figure

	B.2 below. These were modelled as increasing bus speeds and removing congestion impacts for buses on these routes. ■ High Quality Public Transport services on the St Neots (A428), Haverhill (A1307) and Royston (A10) corridors with high frequencies and guideway quality segregated routes. ■ An orbital bus service from Cambridge Science Park Station to Addenbrookes, via North West Cambridge.
New Park and Ride	Additional outer Park & Ride sites on the A1307 and A428 and relocation of Newmarket Road P&R site to Airport Way.
Rail	Improved journey times and capacity to London, and onward accessibility to south London as part of the Thames link upgrade.
Cycle Networks	A major network of cycling improvements in and around Cambridge, including segregated routes along major roads and elimination of gaps in the network, see Figure B.3 below.

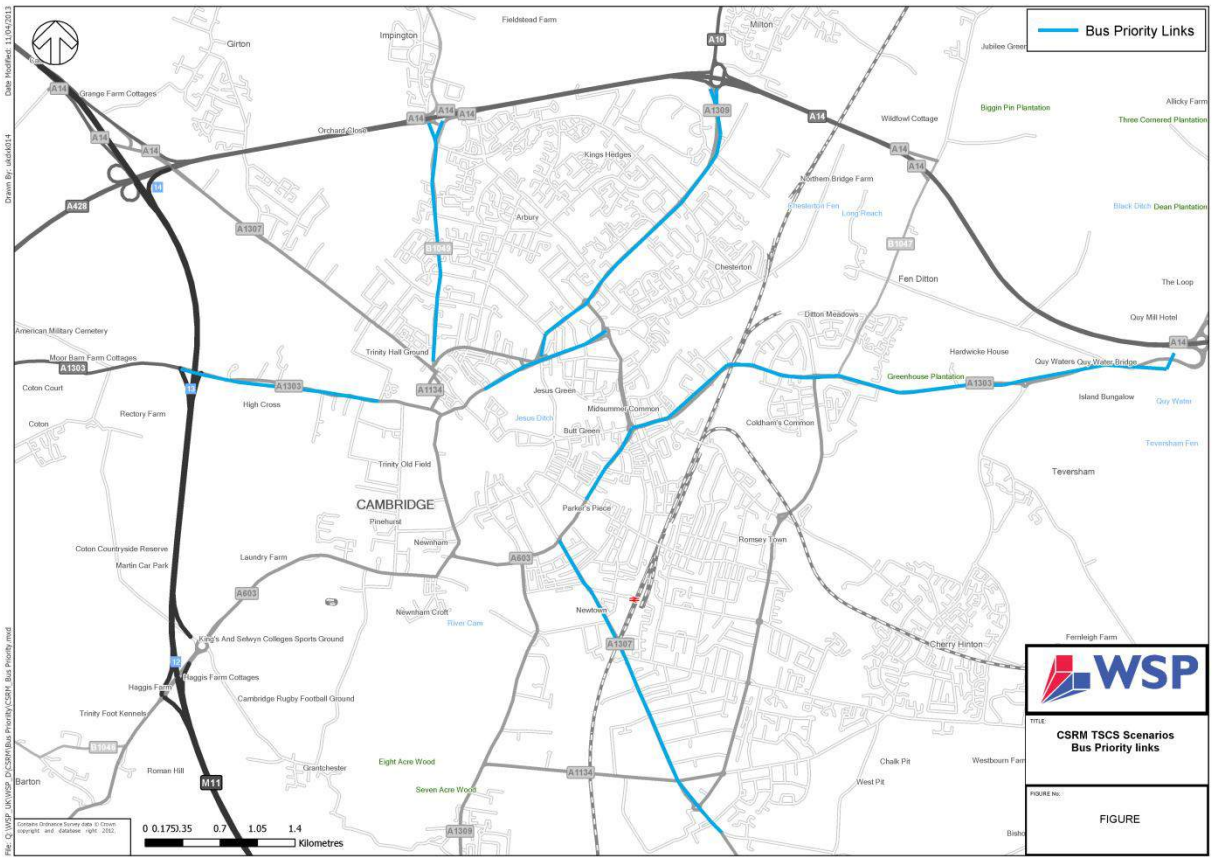


Figure B.2 – Segregated Bus Routes introduced within Cambridge as part of Transport Measures

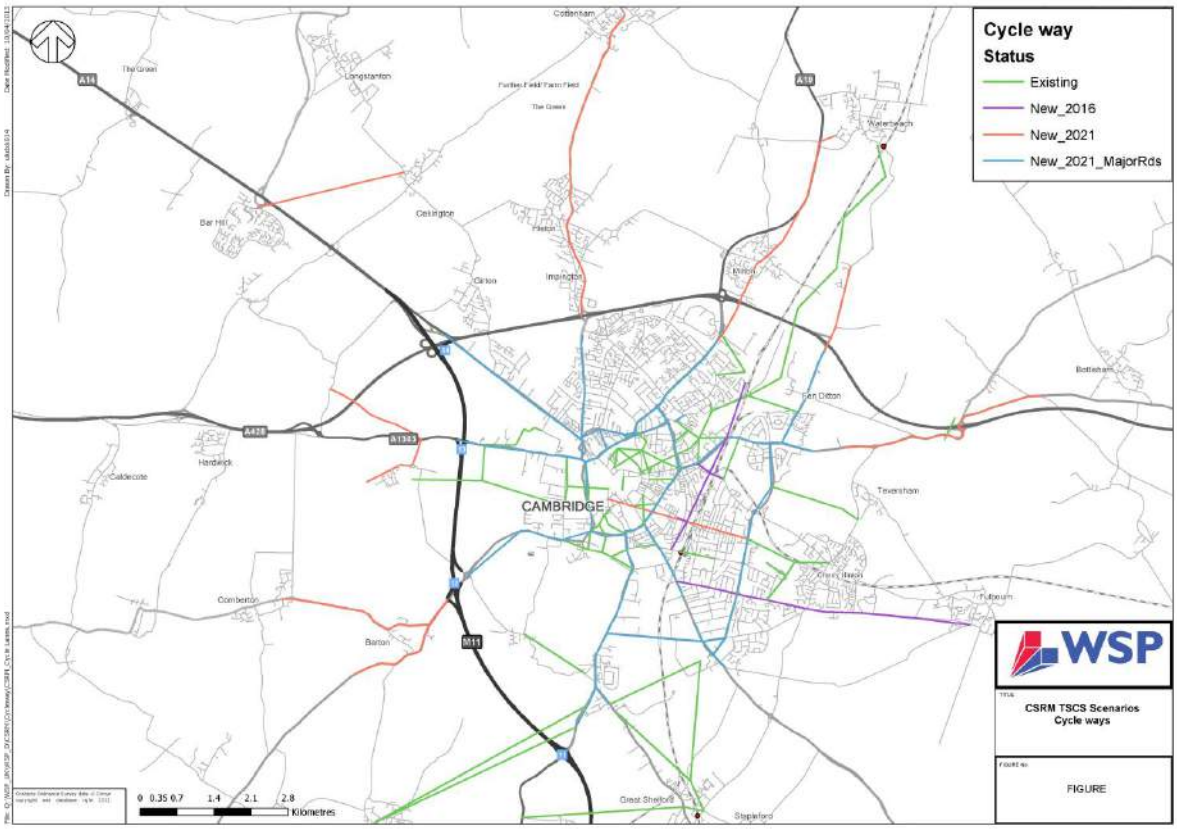


Figure B.3 – Enhancements to Cambridge Cycle Network

Appendix C – Transport Impacts on High Quality Public Transport Corridors

High Quality Bus Services

Figure C.1 below shows the proposed High Quality Bus services on the A428, A1307 and A10 (South) corridors, along with the change in frequency, journey time, speed, and the peak ridership. For these services, it has been assumed that greater speed increases can be achieved outside Cambridge City, on a par with those for the existing Cambridgeshire Guided Busway (CGB) services. Where specified by CCC, the services have been assumed to run segregated from other highway traffic, to eliminate delays caused by traffic queues. As with the CGB, these services also benefit from an additional 'attraction' factor which represents the improved quality of the bus service and stock, plus the improved frequency and reliability.

The results show that the total journey times (including decreases in waiting time due to frequency increase) improve by 24% on the Haverhill and North Bedfordshire routes. The St Neots/Cambourne route has a smaller improvement due to additional congestion delays on some remaining 'on road' sections. It is possible that further design work on the bus segregation measures or the highways in this corridor may eliminate this delay and provide journey times similar to CGB. For example, the minimum time from Cambourne and Northstowe to city centre are 40 mins(25 stops) and 22 mins (7 stops) respectively. The congested times are 57 mins and 24 mins respectively. The speed of the Cambourne service is 16 kph in the City and 37 kph in South Cambs, with CGB speed of 17 and 67 kph.

The improvements in bus ridership on each route are significant. The figures show the increase in maximum loading on each route section, which range from ~180 to ~~1,100~~1,110.

Note that journey times for a wider range of rural services have also been improved by this strategy, as the bus infrastructure introduced is expected to benefit all services using these routes.

Figure C.1 : High Quality Bus Services in the AM Peak, impact of Transport Measures.

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

		Headway (min)			Difference (without / with Transport Measures)				
Origin	Destination	w/o Transport Measures	with Transport Measures	Route Section	Timetable Time (min)	Journey Time (min)	%age Time	avg speed (kph)	Max. Load
Haverhill	City Centre	15	10	City	-3	-3	-18%	3	232
				S Cambs	-2	-2	-25%	11	179
				Other	-10	-10	-26%	11	196
				All	-15	-15	-24%	8	187
St Neots	City Centre	60	10	City	0	0	1%	0	190
				S Cambs	-1	1	2%	-1	198
				Other	-4	-6	-40%	26	196
				All	-5	-5	-6%	2	198
North Beds.	City Centre	30	10	City	-3	-6	-32%	7	1,105
				S Cambs	-2	-7	-32%	14	462
				Other	-5	-8	-18%	9	482
				All	-10	-20	-24%	11	1,093

Notes:

1. Where bus services run unsegregated from other highway traffic, the Journey Time includes any extra delay caused by traffic congestion. This congestion is taken from the County's SATURN Highway model.

2. Timetable Times and Speed includes any dwelll times at stops on these services

Appendix D – Change in Journey Time to Cambridge City

Figures D.1 and D.2 show the change in journey times to Cambridge City from origins in the City, South Cambridgeshire and surrounding areas. These figures are taken from the final test of the Preferred Local Plan Option.

Figure D.1 compares 2031 **without Transport Measures** (the Do Minimum or 'DM' scenario) to 2011 (modelled times), and Figure D.2 compares the situation with and without Transport Measures in 2031 (Do Something or 'DS' minus DM). The maps show the percentage change in the average journey time to all City destinations from each model zone: Red represents an INCREASE in travel time, Blue a decrease (the change in time in minutes is shown in brackets on each zone).

The maps illustrate the worsening of journey times for all modes between 2011 and 2031, other than some specific public transport corridors with improvements (e.g. Northstowe for CGB and Royston for rail services)[1].

Comparing times with/without the Transport Measures (DS-DM) shows that car journey times within and close to Cambridge stay the same or increase slightly. Journey times from more distant locations decrease, which is likely to be due to congestion relief on the edge of Cambridge.. Park and Ride journey times generally decrease, though the A1307 (Babraham Road) corridor worsens and may require some further investigation to determine whether this is associated with the bus or car leg. The other PT (comprising bus, guided bus and rail) improves more significantly in journey time, particularly on the A1307 and A428 corridors showing the success of the HQPT.

The three maps below have been changed by Phase 3 model Rerun – see Appendix F for comparison with original published version.

[1] Note that because the maps represent average time to all of Cambridge City, some changes may represent journeys lengthening by reaching further INTO the City. This is likely to be the case for 'Active' modes, where times would not otherwise increase. However, as cycling mode shares increase through time, cyclists are travelling further across the city and hence increasing journey time.

Dwellings

Growth in Dwellings
2011-2031 K2 DM

1 Dot = 10

2011 Dwellings

2,911	to	13,430	(23)
2,353	to	2,911	(13)
1,826	to	2,353	(13)
1,288	to	1,826	(13)
1,027	to	1,288	(13)
592	to	1,027	(13)
159	to	592	(13)
125	to	159	(3)
106	to	125	(1)
0	to	106	(24)

Employed Residents

Positive Growth in ER
2011-2031 K2 DM

1 Dot = 10

(Blue dots show decreases)

2011 Employed Residents

7,600	to	13,700	(4)
4,400	to	7,600	(7)
3,400	to	4,400	(19)
2,500	to	3,400	(18)
1,800	to	2,500	(20)
1,600	to	1,800	(5)
1,100	to	1,600	(21)
700	to	1,100	(11)
200	to	700	(13)
0	to	200	(11)

Jobs

Positive Growth in Jobs
2011-2031 K2 DM

1 Dot = 10

(Blue dots show decreases)

2011 Jobs

9,200	to	15,400	(3)
5,400	to	9,200	(9)
3,300	to	5,400	(11)
2,500	to	3,400	(12)
1,600	to	2,500	(19)
900	to	1,600	(20)
400	to	900	(14)
200	to	400	(7)
0	to	200	(34)

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Growth from 2011-2031 K2 DM

3,000

Dwellings_11_DM
ER_11_DM
Job_11_DM

Scenario K2 Travel Times Differences (DM - 2011) to City

Car

Active

P&R

OtherPT

Difference of Travel Time to Cambridge City
DM vs 2011

>50%	
30%	to 50%
10%	to 30%
5%	to 10%
2%	to 5%
-2%	to 2%
-5%	to -2%
-10%	to -5%
-30%	to -10%
<-30%	

Travel Time shows in %age change (min change in brackets)

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Scenario K2 Travel Times Differences (DS - DM) to City

Car

Active

P&R

OtherPT

Difference of Travel Time to Cambridge City
DS vs DM

>50%	
30%	to 50%
10%	to 30%
5%	to 10%
2%	to 5%
-2%	to 2%
-5%	to -2%
-10%	to -5%
-30%	to -10%
<-30%	

Travel Time shows in %age change (min change in brackets)

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Appendix E – Highway Network Performance

Three highway performance analyses are presented in this appendix. These are:

- overall highway network performance;
- identification of location and severity of forecast year junction hotspots; and
- changes in journey times for key routes and corridors.

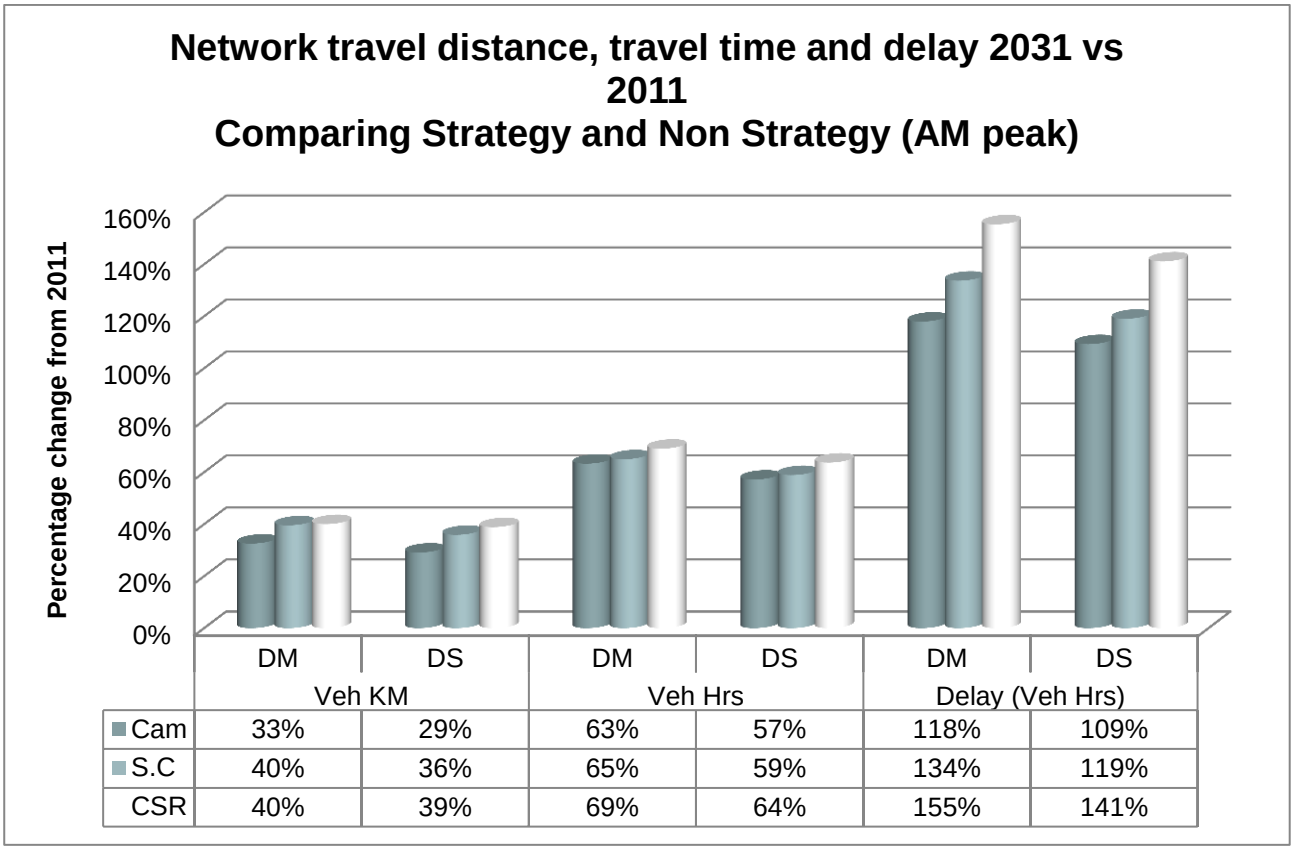
The graphics relate to outputs taken from Cambridgeshire County Council's highway assignment model for a 2031 forecast year that forms part of the Cambridge Sub Regional Modelling system.

Measure of overall highway network performance

Figure E1 shows the overall network vehicle distance covered, vehicle time travelled and vehicle delay incurred for 2031 AM peak compared to 2011 (the measure of "current day" conditions). This is separated geographically into Cambridge City (Cam), South Cambridgeshire (S.C) district and the coverage of the whole of the Cambridge sub region (CSR) as represented in the transport model (which is the four districts of Cambridge, South Cambridgeshire, Huntingdonshire and East Cambridgeshire but excluding Fenland). The analysis compares the existing 2011 base situation to the 2031 proposed South Cambs and Cambridge City Local Plan land use disposition. Tests were conducted "with" and "without" the proposed Transport Strategy measures. These scenarios are referred to as Do Minimum and Do Something scenarios, denoted DM and DS in the Figure E1.

Figure E1: Overall Network Statistics for 2031 compared to 2011

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



	Veh KM DM	Veh KM DS	Veh Hrs DM	Veh Hrs DS	Delay (Veh Hrs) DM	Delay (Veh Hrs) DS
Cam	33%	29%	63%	57%	118%	109%
S.C	40%	36%	65%	59%	134%	119%
CSR	40%	39%	69%	64%	155%	141%

These forecast results indicate that the development impacts felt would be less severe in Cambridge and South Cambs than the rest of the sub region. The growth in delays, however, is symptomatic of a highway network operating at capacity on many links. The effect of the traffic growth is partly mitigated by the transport strategy which shows reduction in the level of delay experienced across all reported districts of around ~~10~~14 - ~~12~~17% in the most extreme case.

Junction Hotspots

Figure E2: AM DM 2031

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

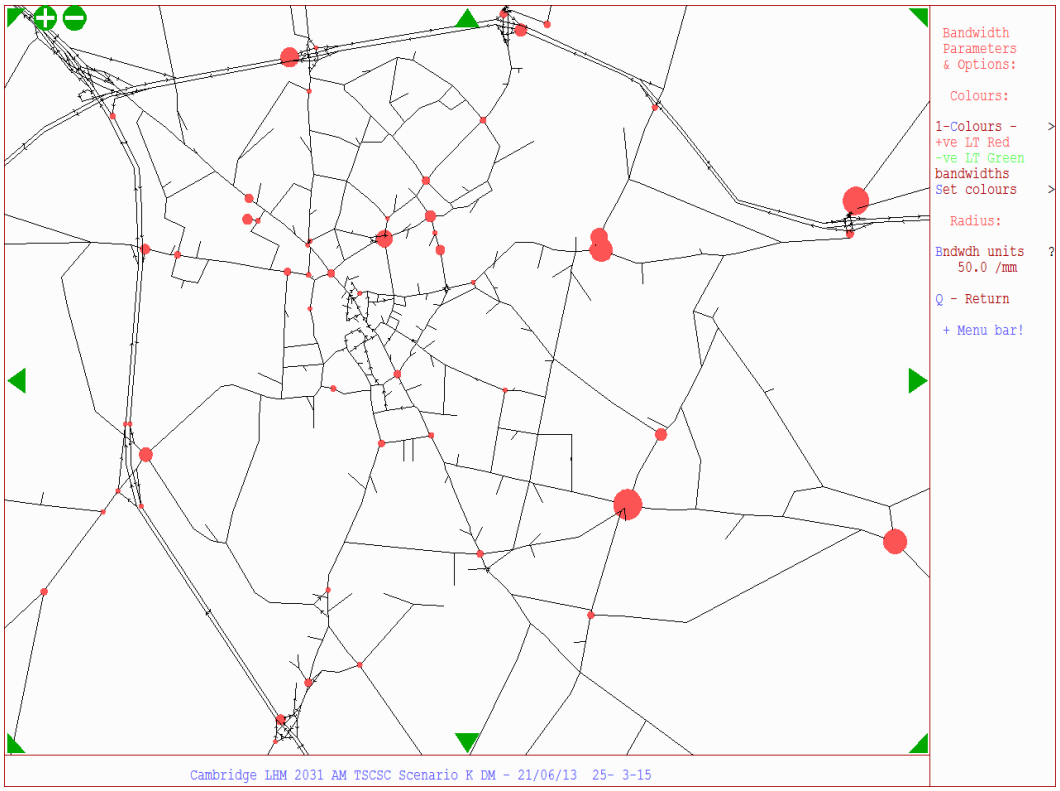


Figure E3: AM DS 2031

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

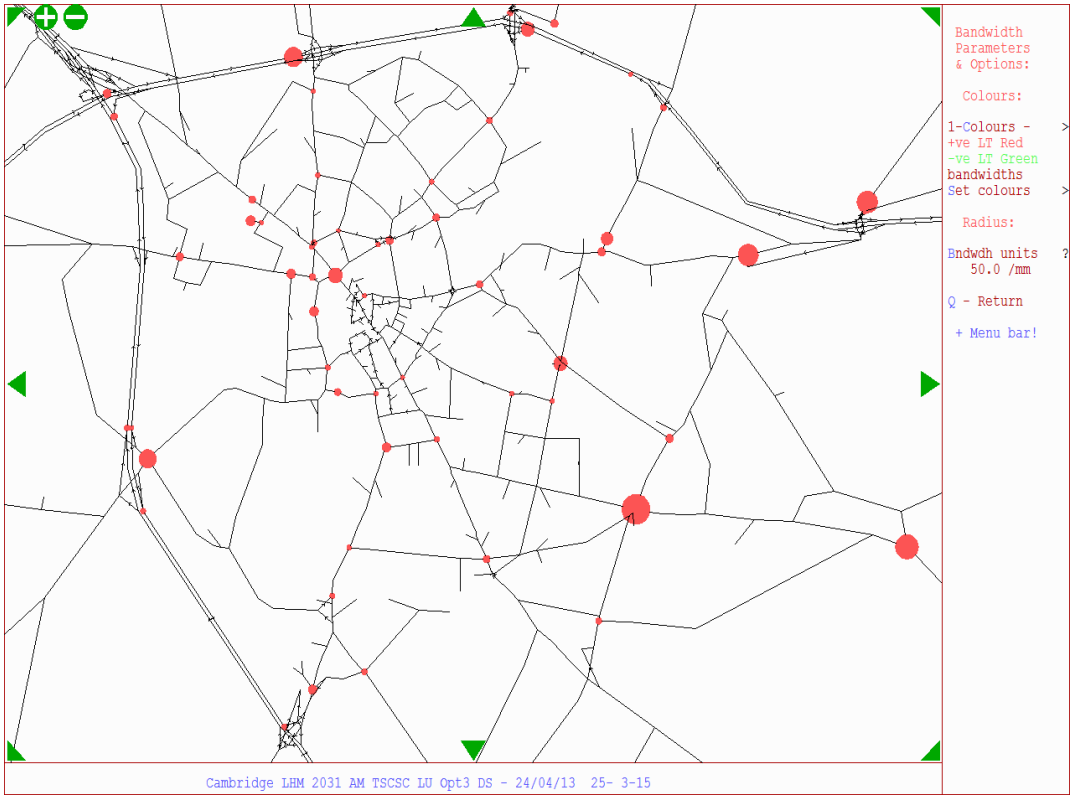


Figure E4: PM DM 2031

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

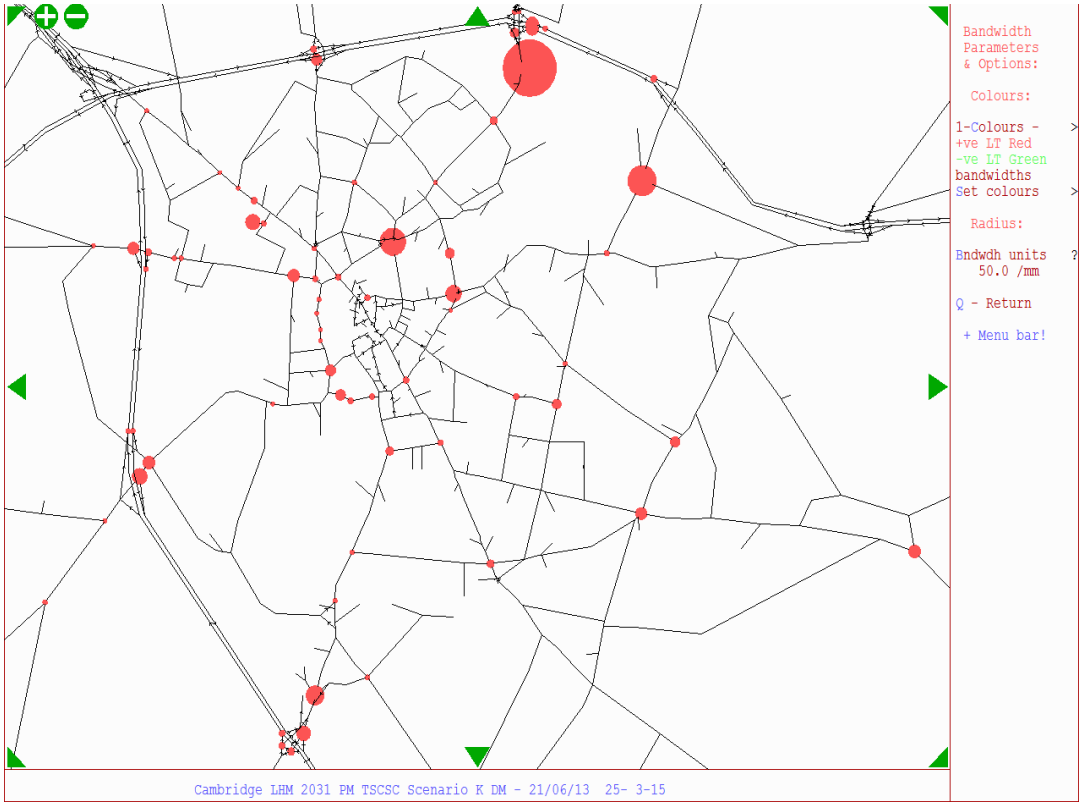
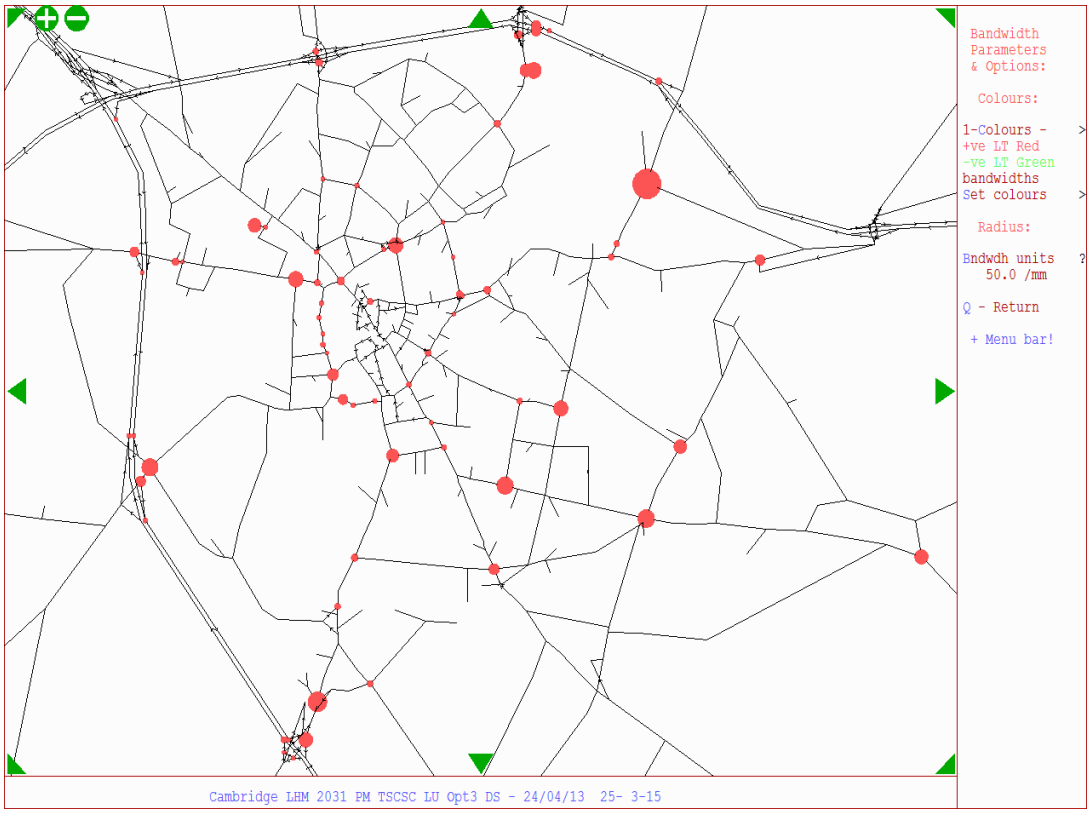


Figure E5: PM DS 2031

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



Figures E2-E5 are indicative maps of the scale and intensity of junction delay across Cambridge City in the 2031 forecast year at key junctions. The circles are representative of average delay per vehicle, where junctions are only annotated if the average delay is greater than 30 seconds per vehicle. Within Cambridge city, the severity of congestion is more acute in the PM peak than the AM peak, with a number of junctions showing considerable overload, particularly in the scenario without transport mitigation measures.

Selected Journey Time routes: Percentage change in travel time along highlighted route length

Figure E6: Wide view AM peak 2011 vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

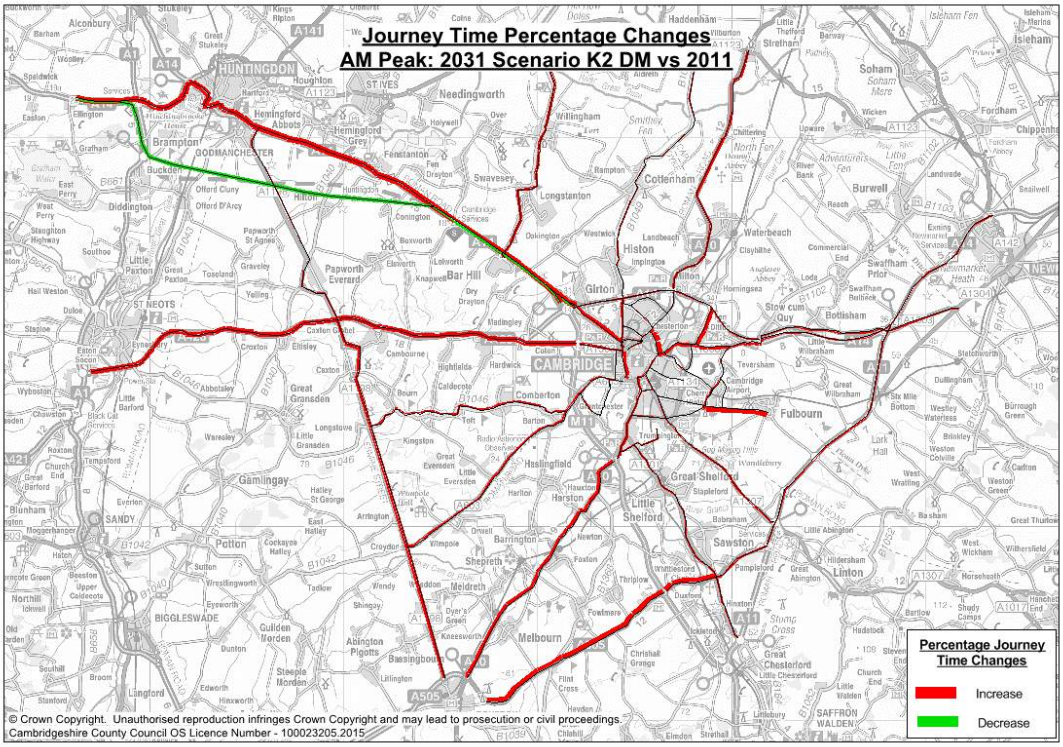


Figure E7: Cambridge centred view AM peak 2011 vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

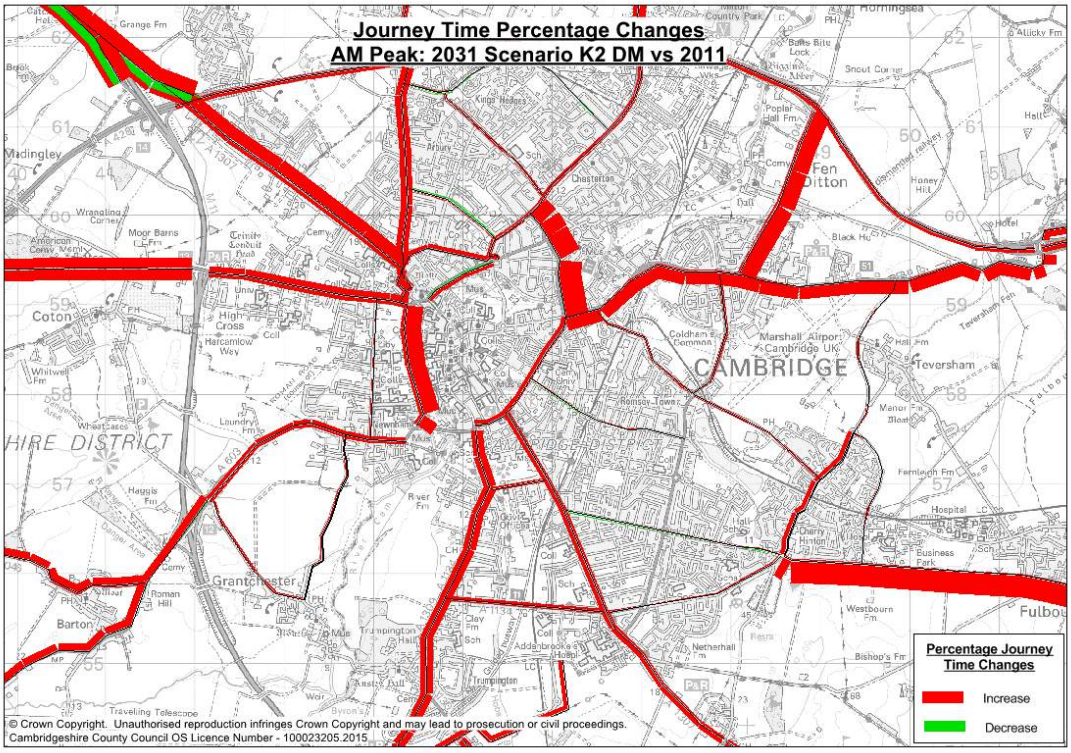


Figure E8: Wide view PM peak 2011 vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

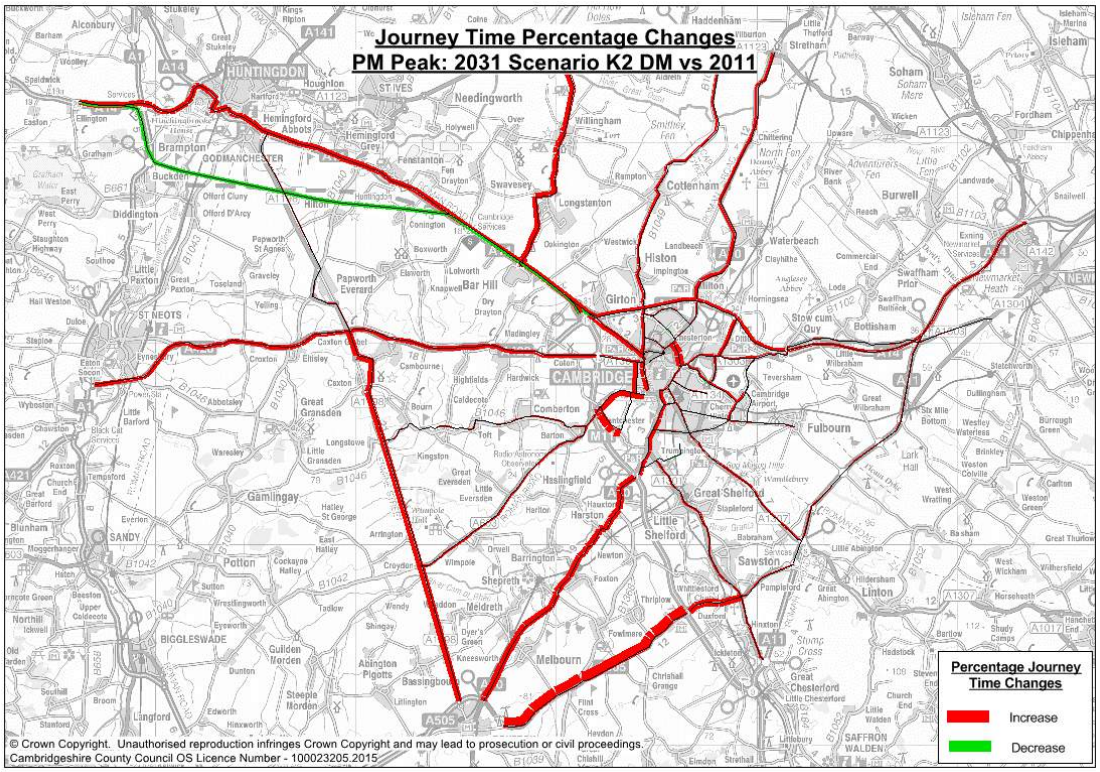


Figure E9: Cambridge centred view PM peak 2011 vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

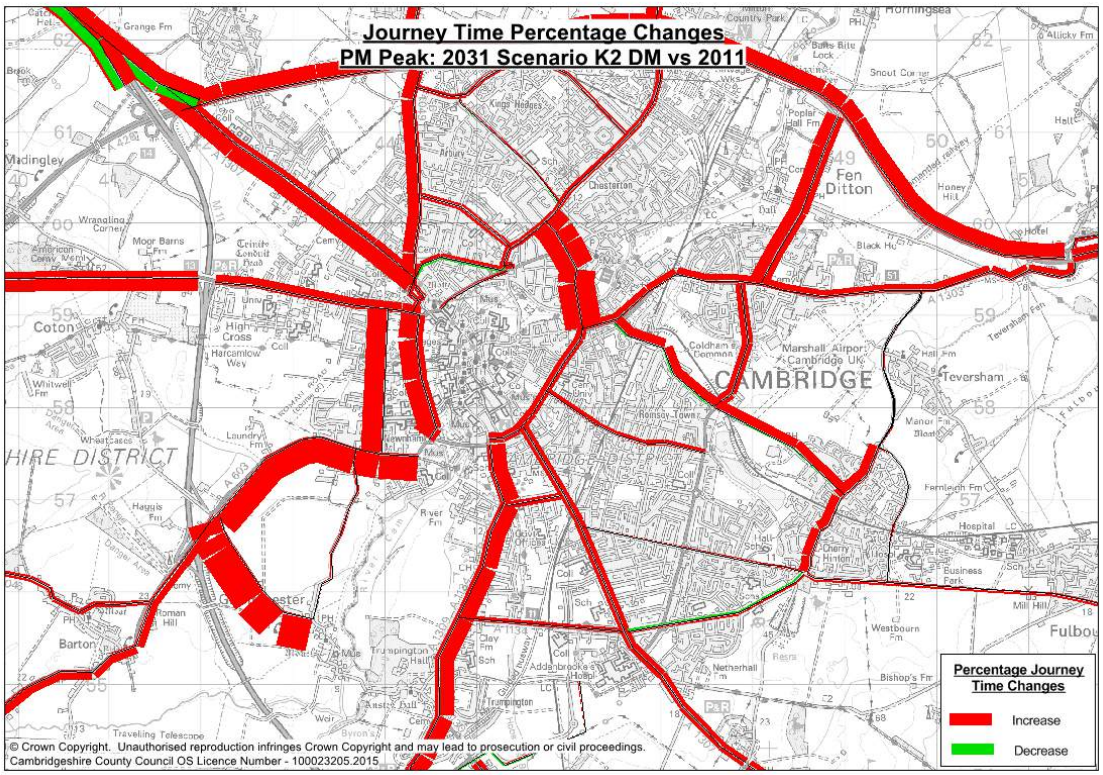


Figure E10: Wide view AM peak 2031 with Transport Strategy vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

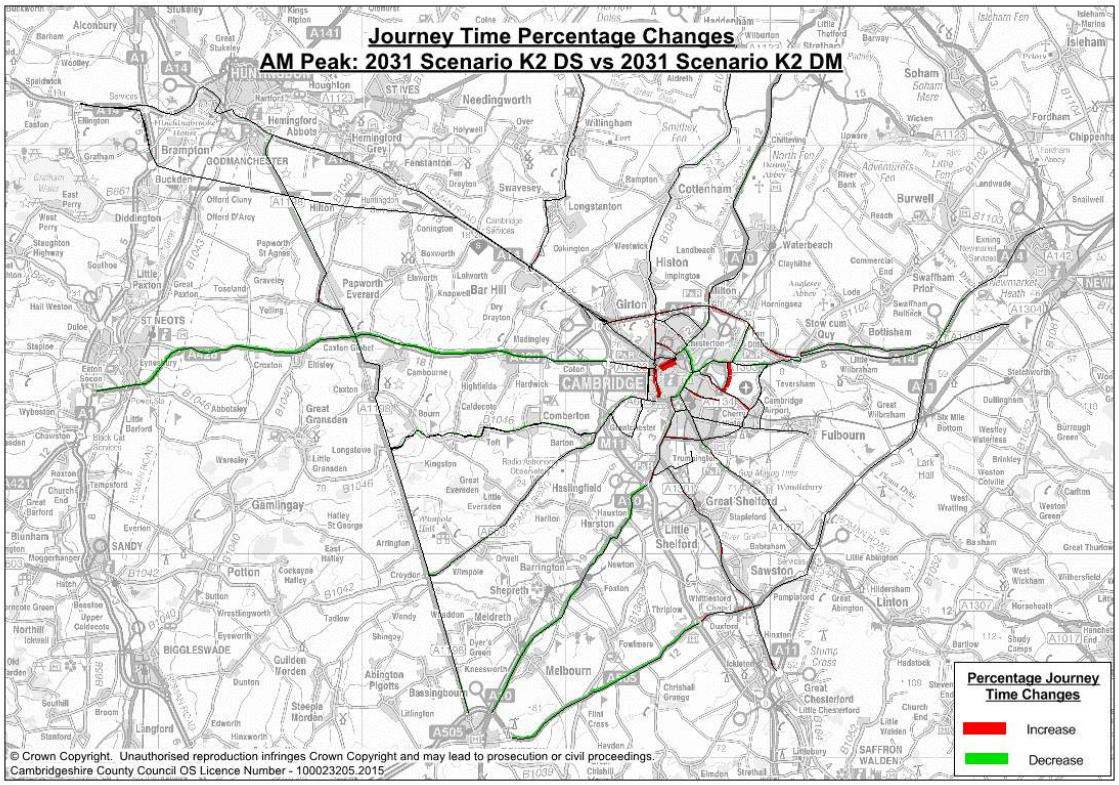


Figure E11: Cambridge centred view AM peak 2031 with Transport Strategy vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

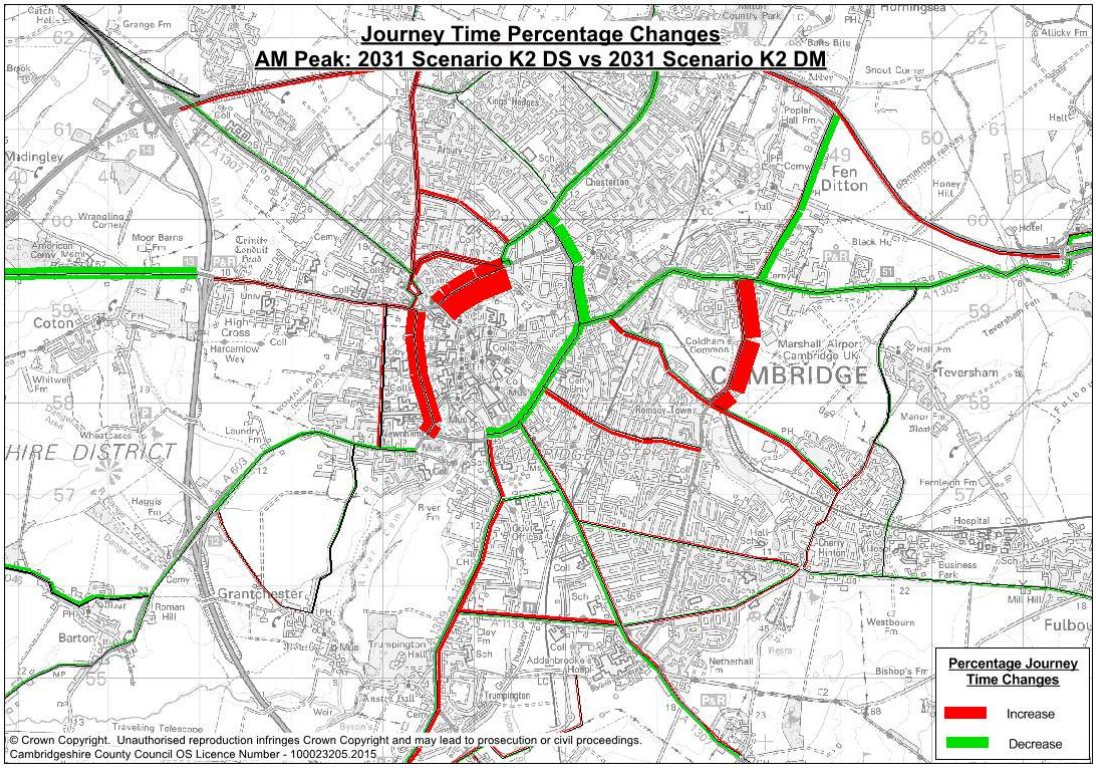


Figure E12: Wide view PM peak 2031 with Transport Strategy vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)

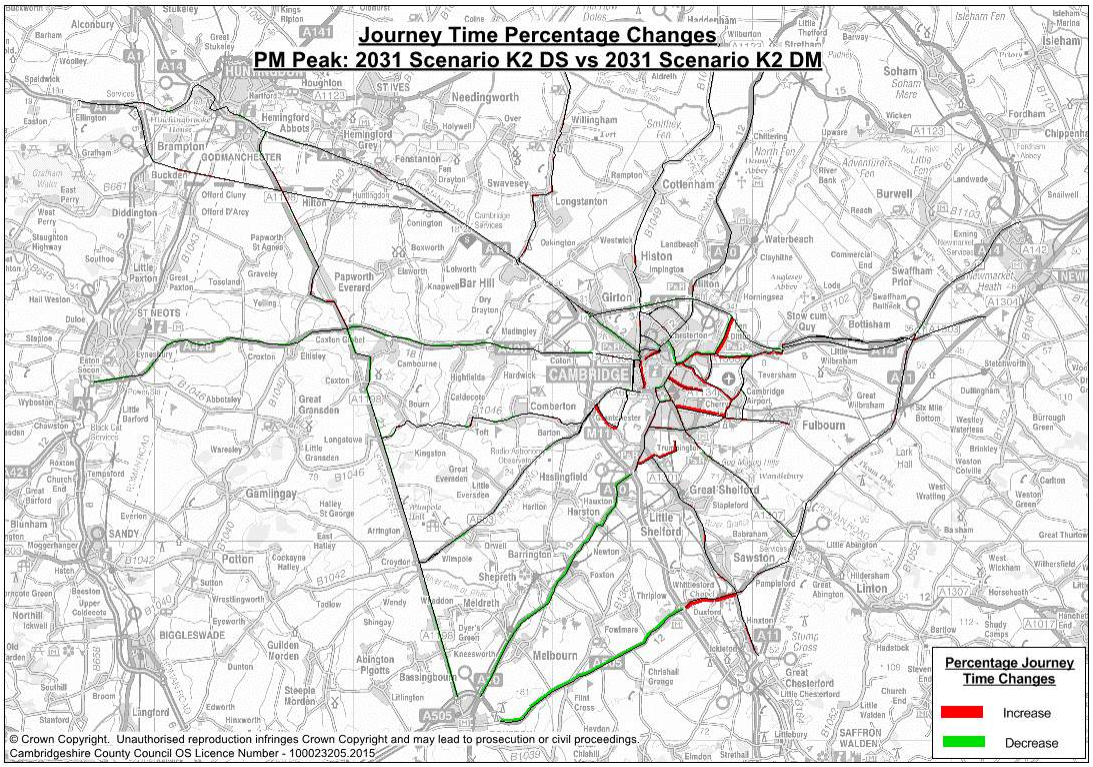
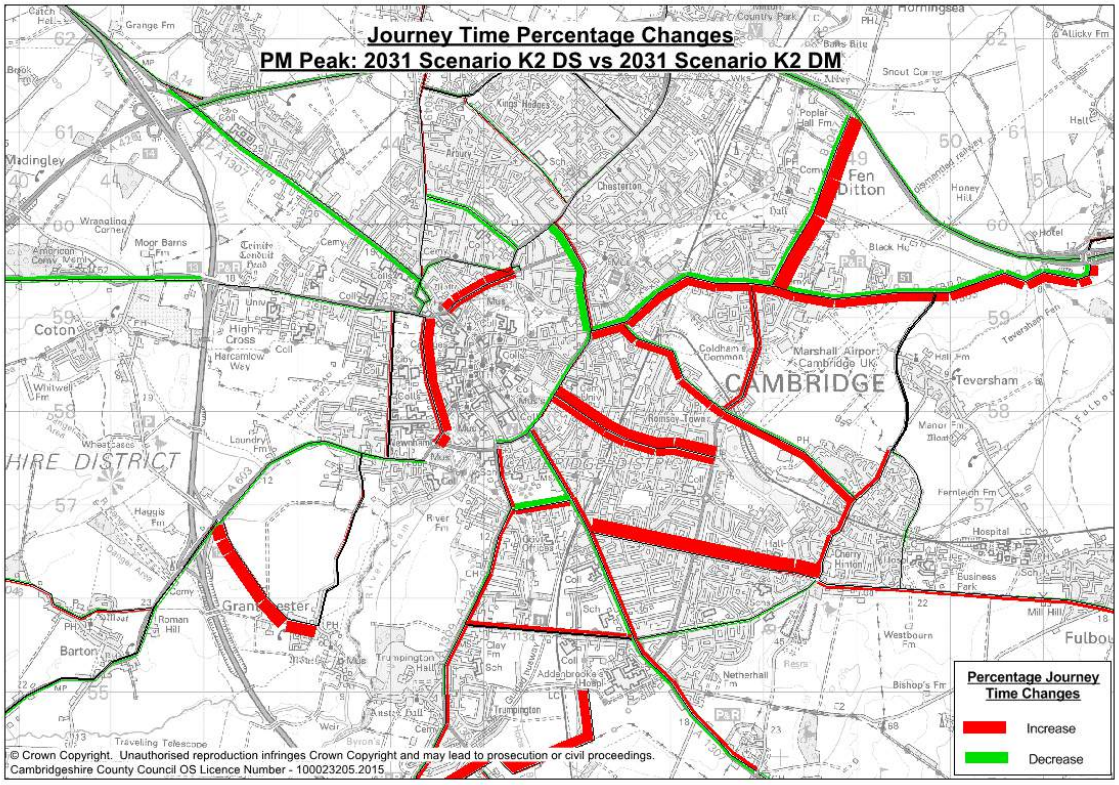


Figure E13: Cambridge centred view PM peak 2031 with Transport Strategy vs 2031 DM

(Figure changed by Phase 3 model rerun – see Appendix F for comparison with original published version)



Figures E6 to E13 show the percentage journey time changes along the entire length of selected routes with red showing a worsening of conditions and green an improvement.

It should be noted that where a link is not annotated that is not indicative that no change will occur, the figures have been created to show the effects on selected major routes and corridors only.

Appendix F – Figure comparisons

Appendix F provides plots in the main report for both July 2013 and March 2015 versions. The plots are put next to each other for ease of visualisation. Scenario K2 (Phase 3 Re-run) is the top figure, the bottom figure is the original Scenario K. Contents from Appendix B were kept unchanged.

Figure F.1 – Page 5 [No change]

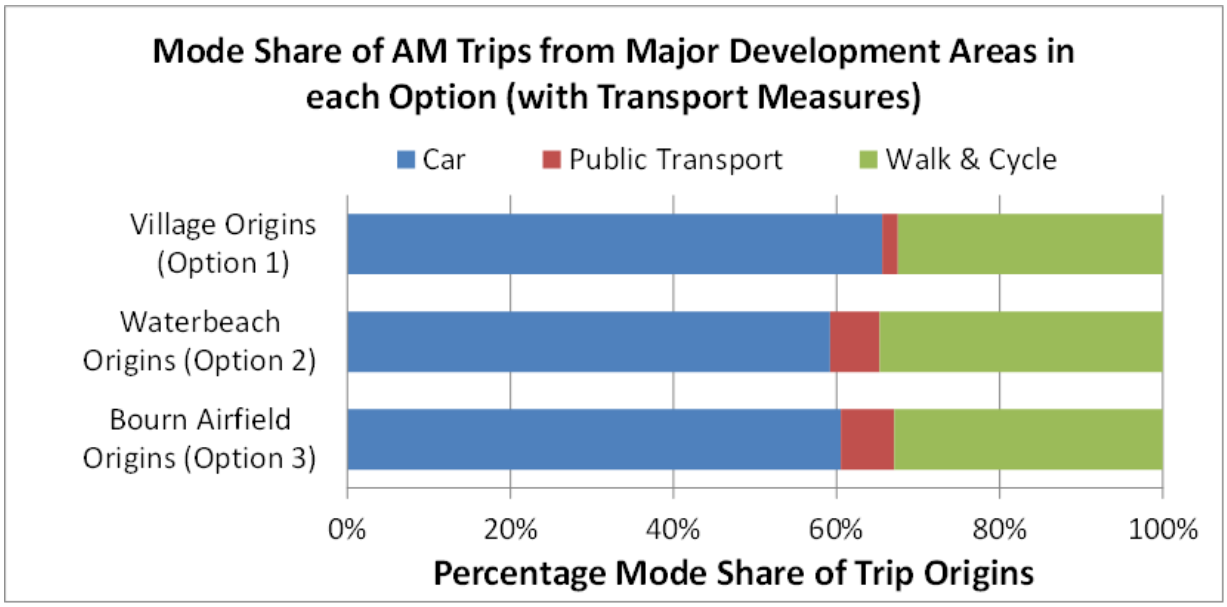


Figure F.2 – Page 5 [No change]

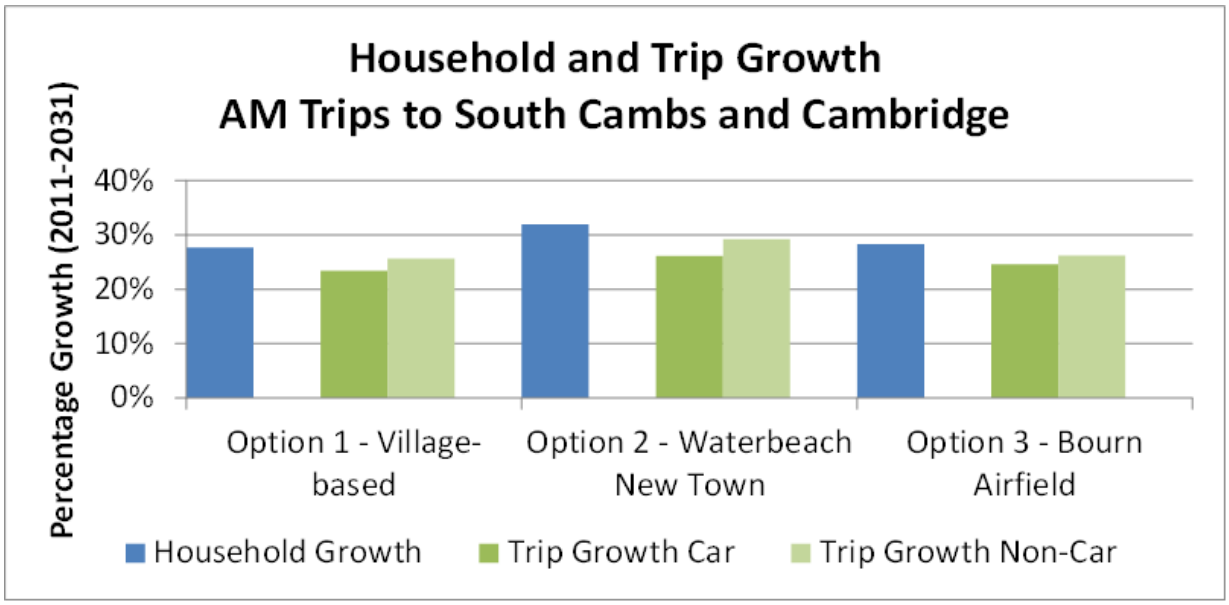
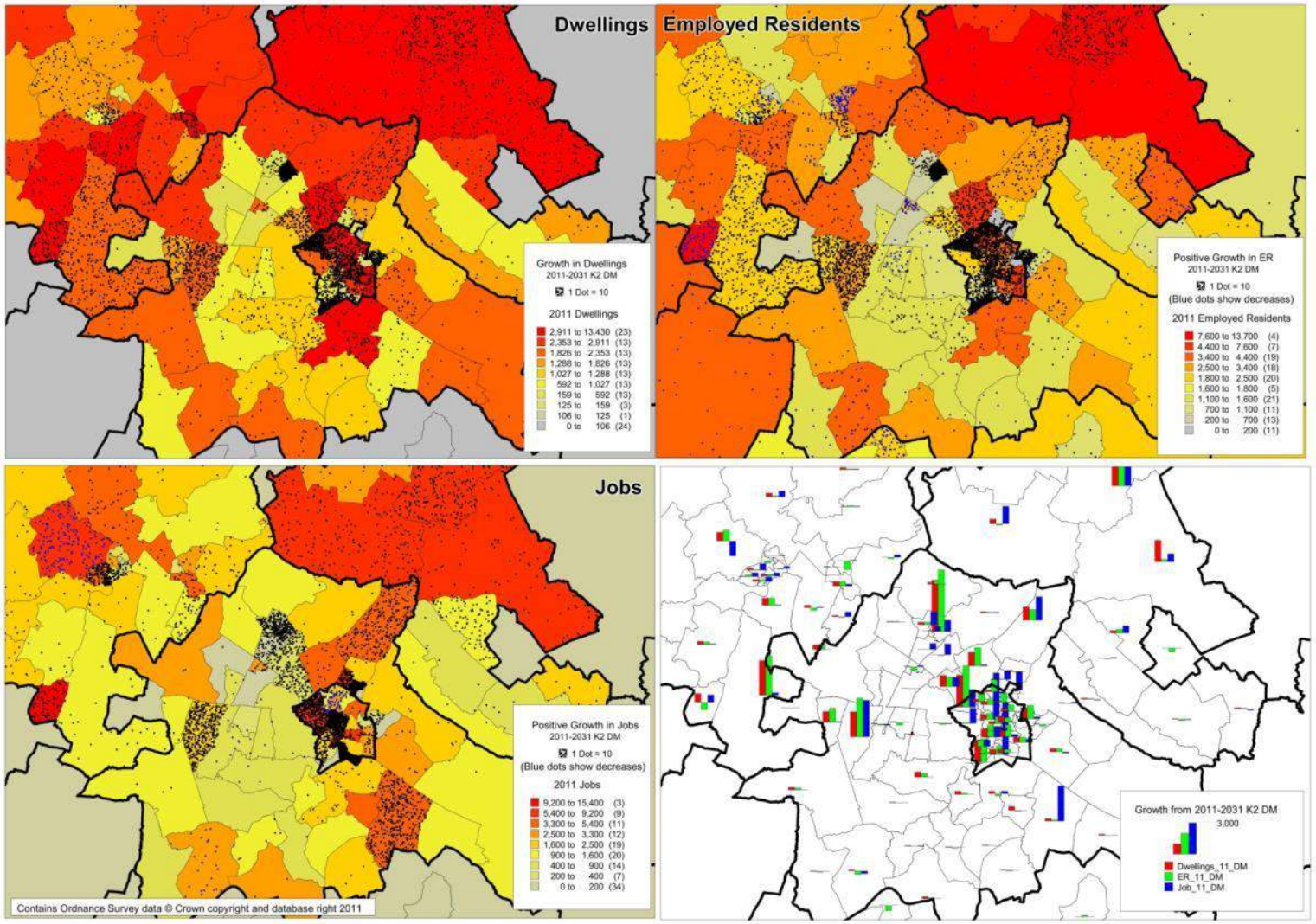
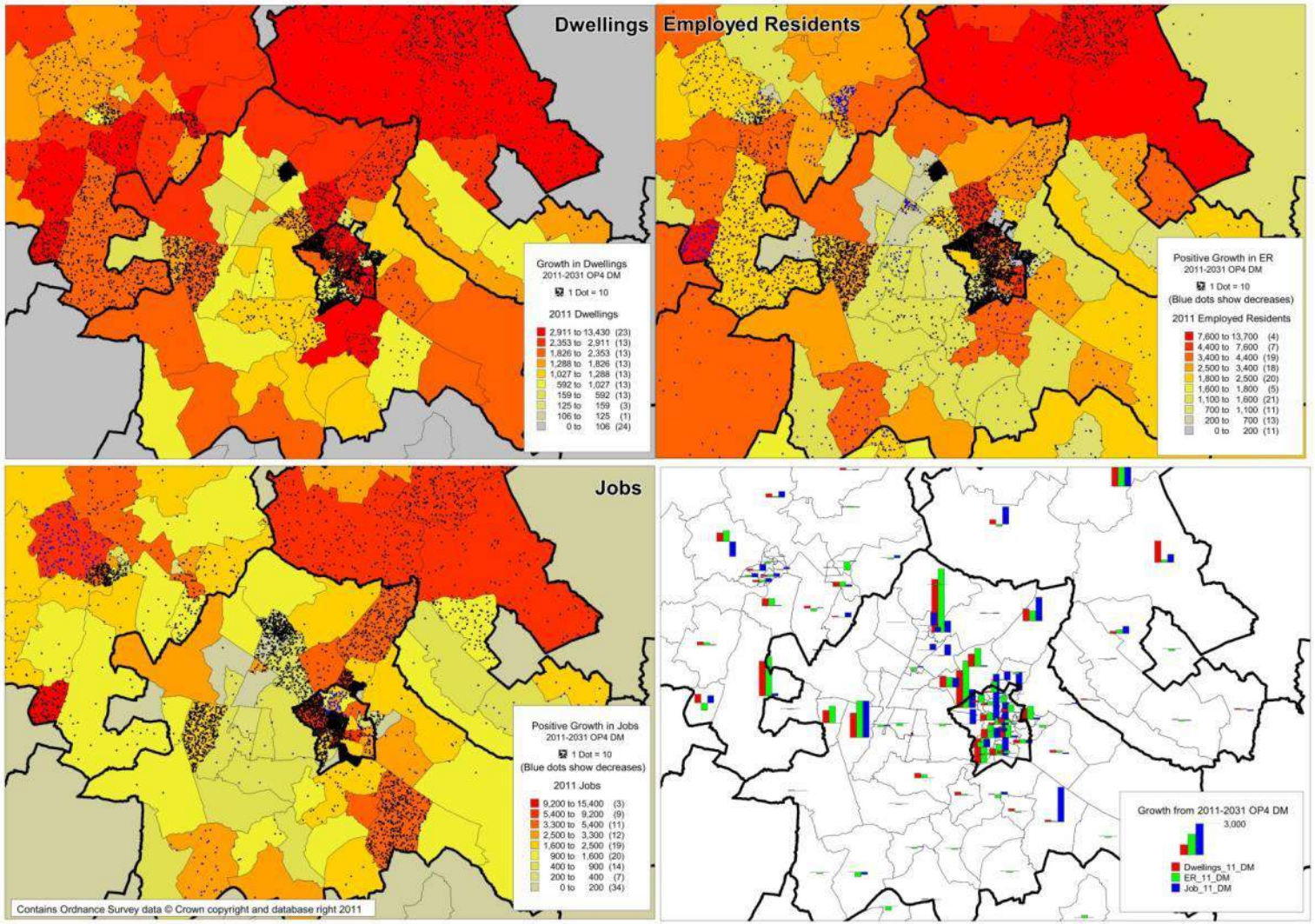


Figure F.3 – Page 7, same as Appendix A

2015 Updated chart



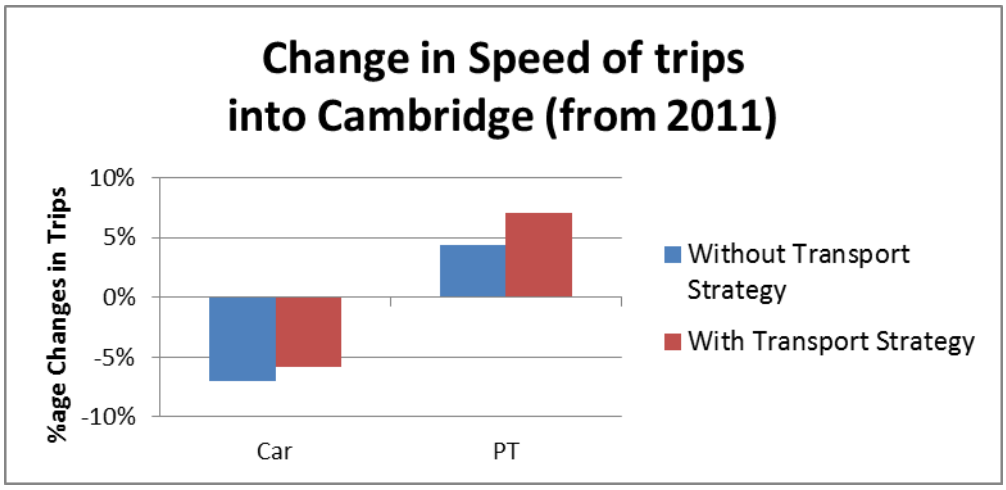
2013 Original chart



Appendix F – Figure comparisons

Figure F.4 – Page 8

2015 Updated chart



2013 Original chart

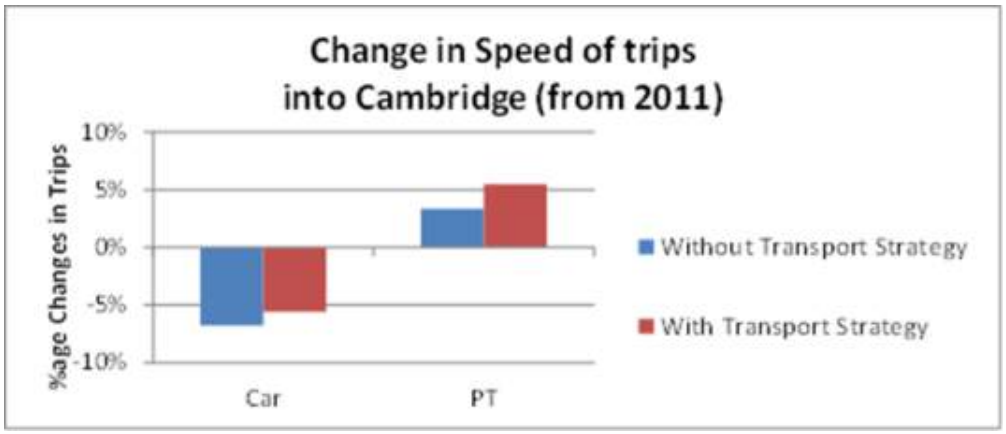
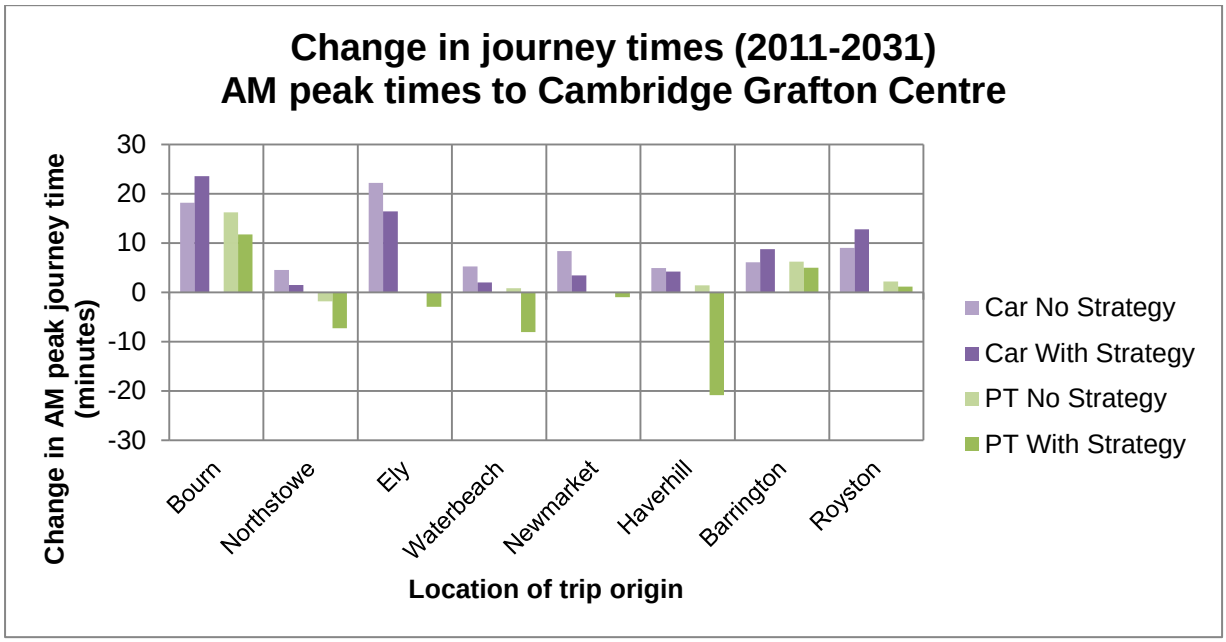


Figure F.5 – Page 8

2015 Updated chart



2013 Original chart

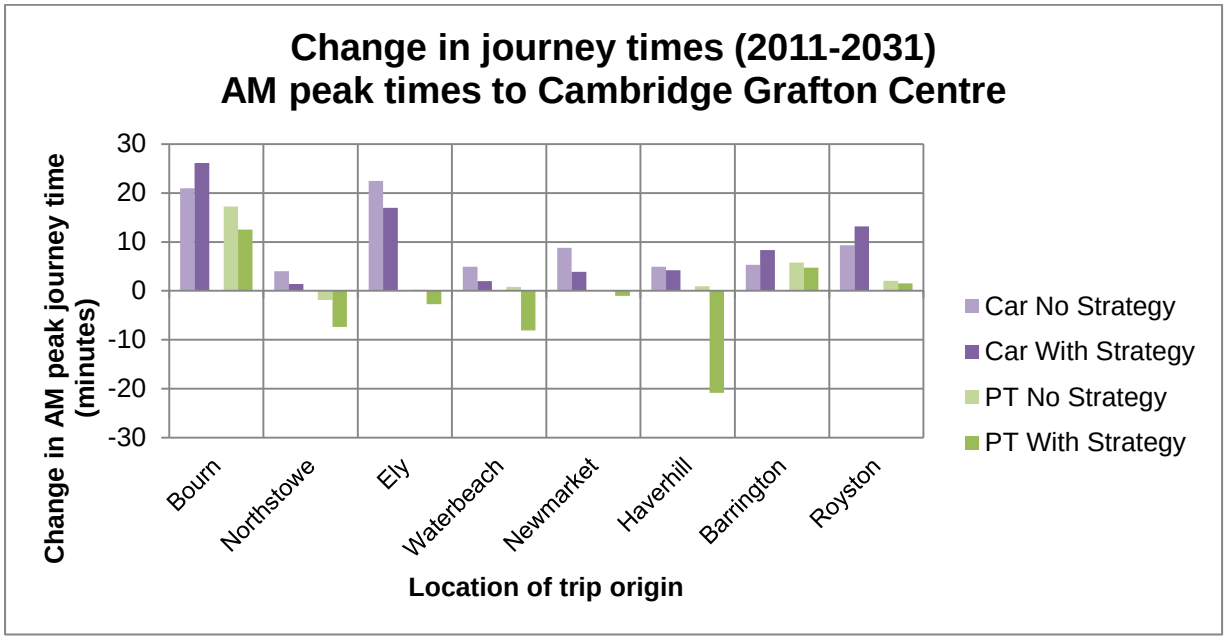
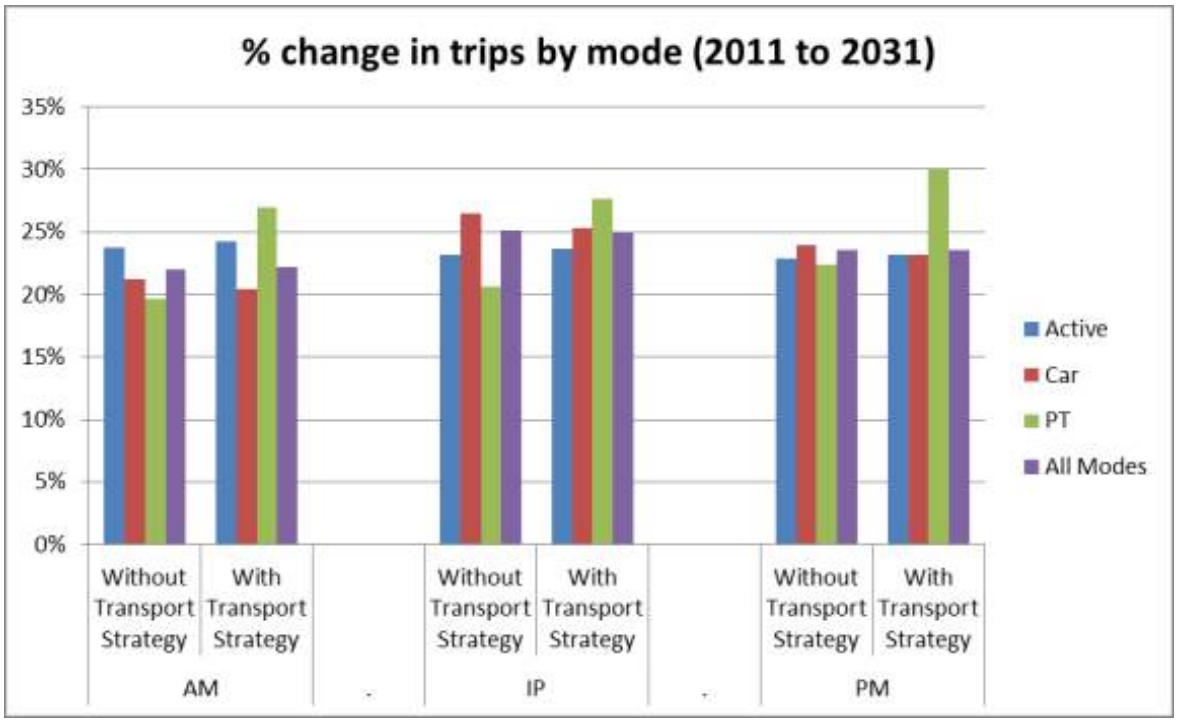


Figure F.6 – Page 9

2015 Updated chart



2013 Original chart

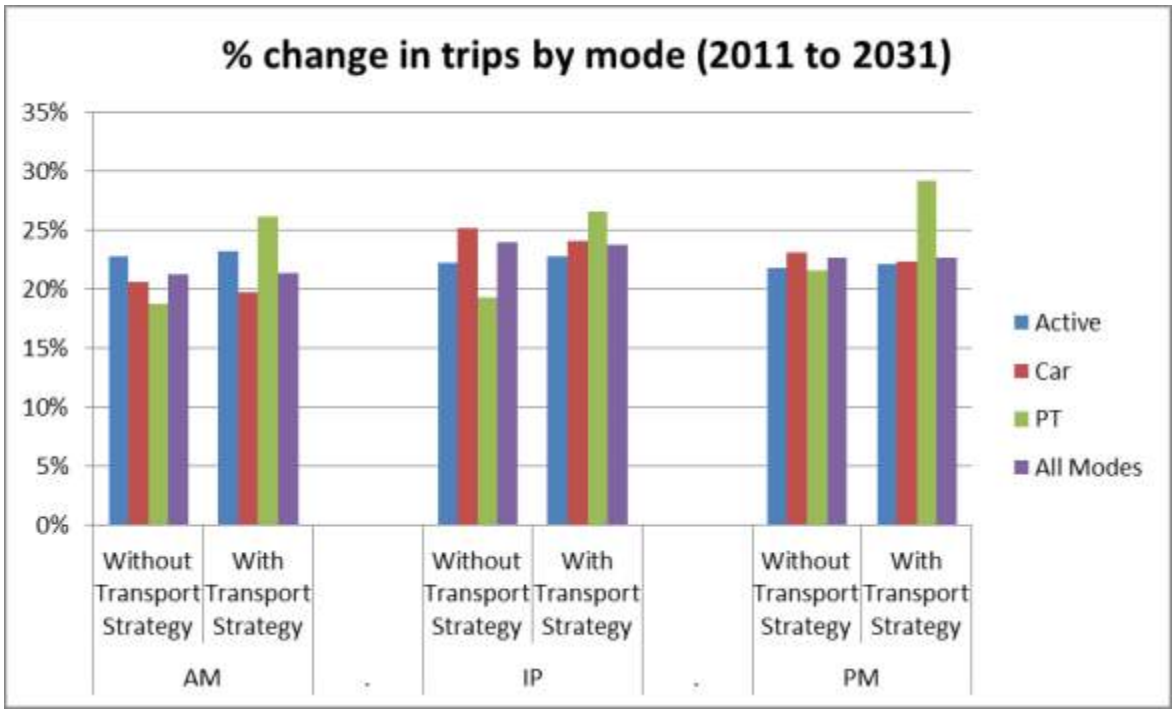


Figure F.7 – Page 9

2015 Updated table

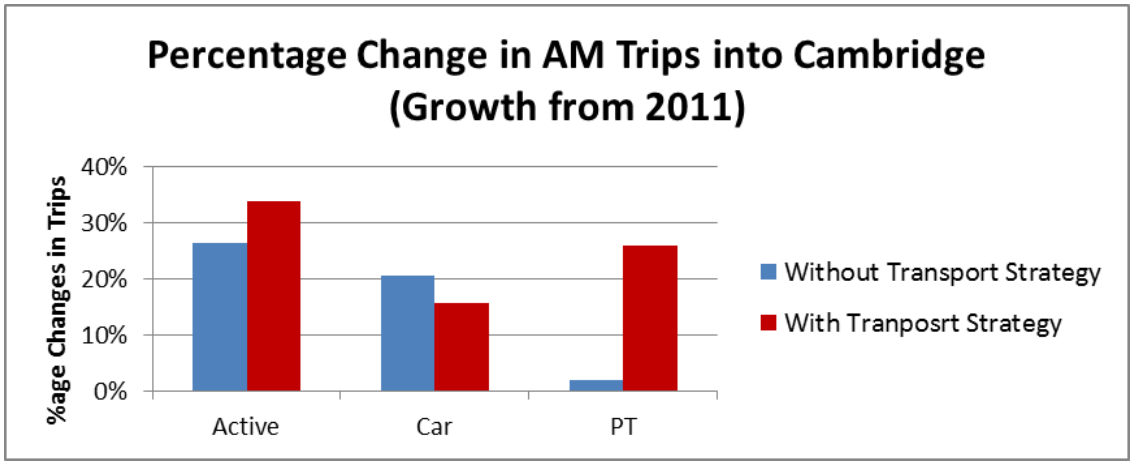
	To destinations in:			
From origins in:	Cambridge City	South Cambs	Elsewhere	All Areas
Cambridge City	30%	32%	21%	29%
South Cambridgeshire	32%	34%	23%	31%
Elsewhere	24%	26%	16%	17%
All areas	30%	32%	17%	24%

2013 Original table

	To destinations in:			
From origins in:	Cambridge City	South Cambs	Elsewhere	All Areas
Cambridge City	31%	30%	23%	30%
South Cambridgeshire	31%	29%	21%	27%
Elsewhere	26%	24%	15%	17%
All areas	30%	28%	17%	23%

Figure F.8 – Page 10

2015 Updated chart



2013 Original chart

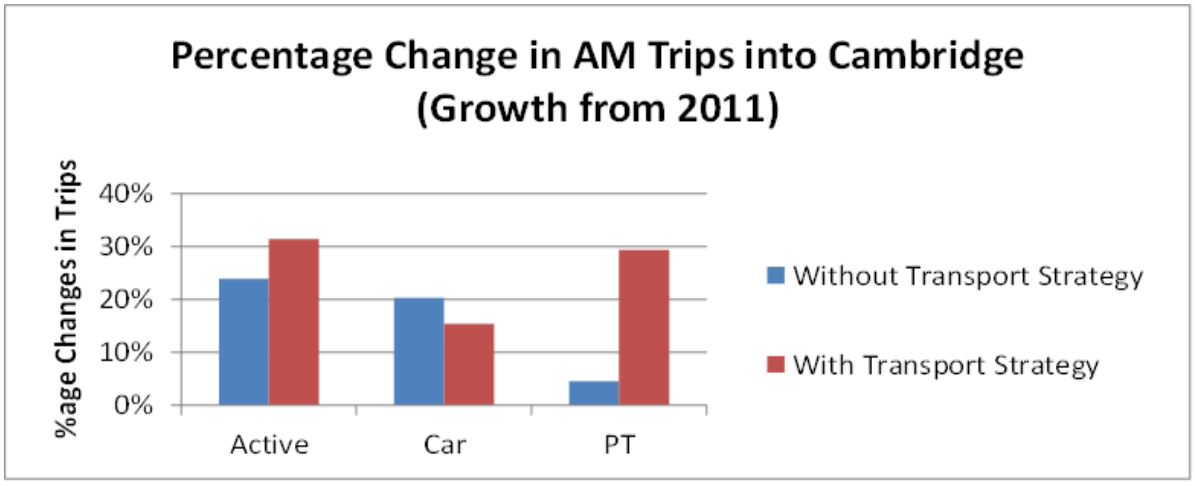
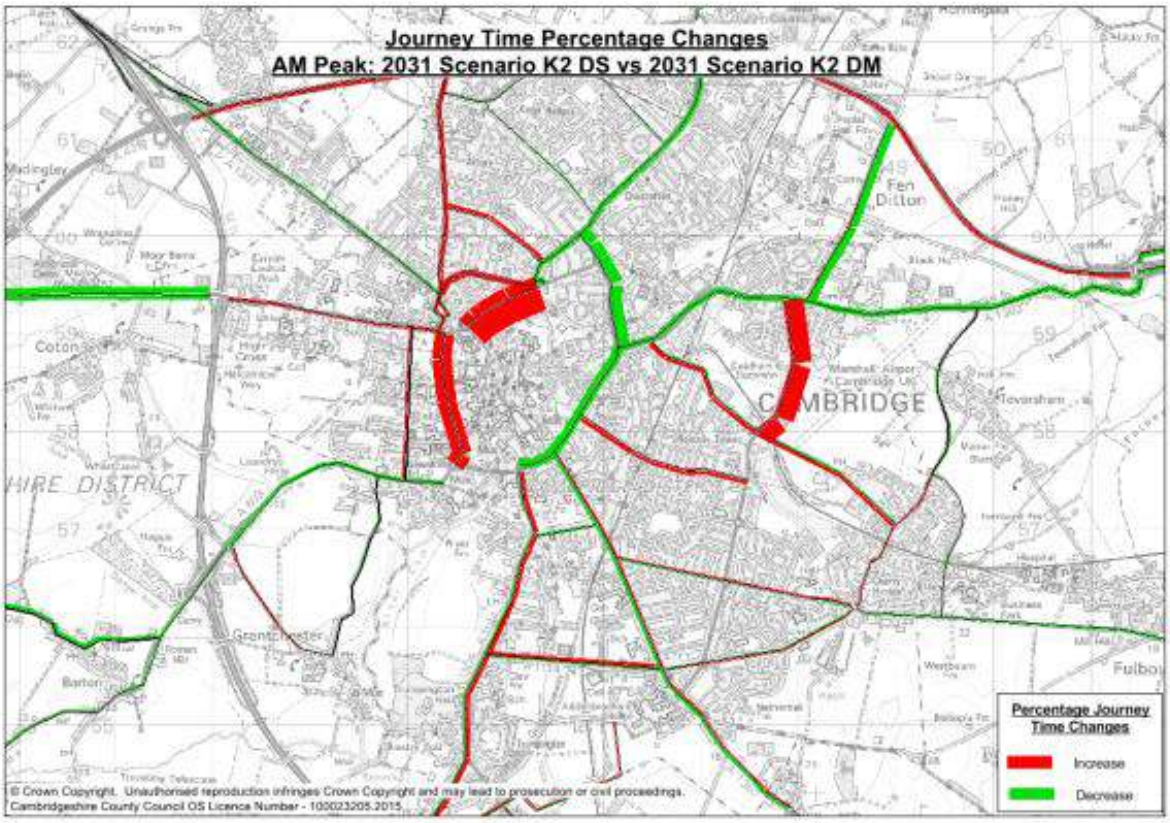


Figure F.9 – Page 10

2015 Updated chart



2013 Original chart

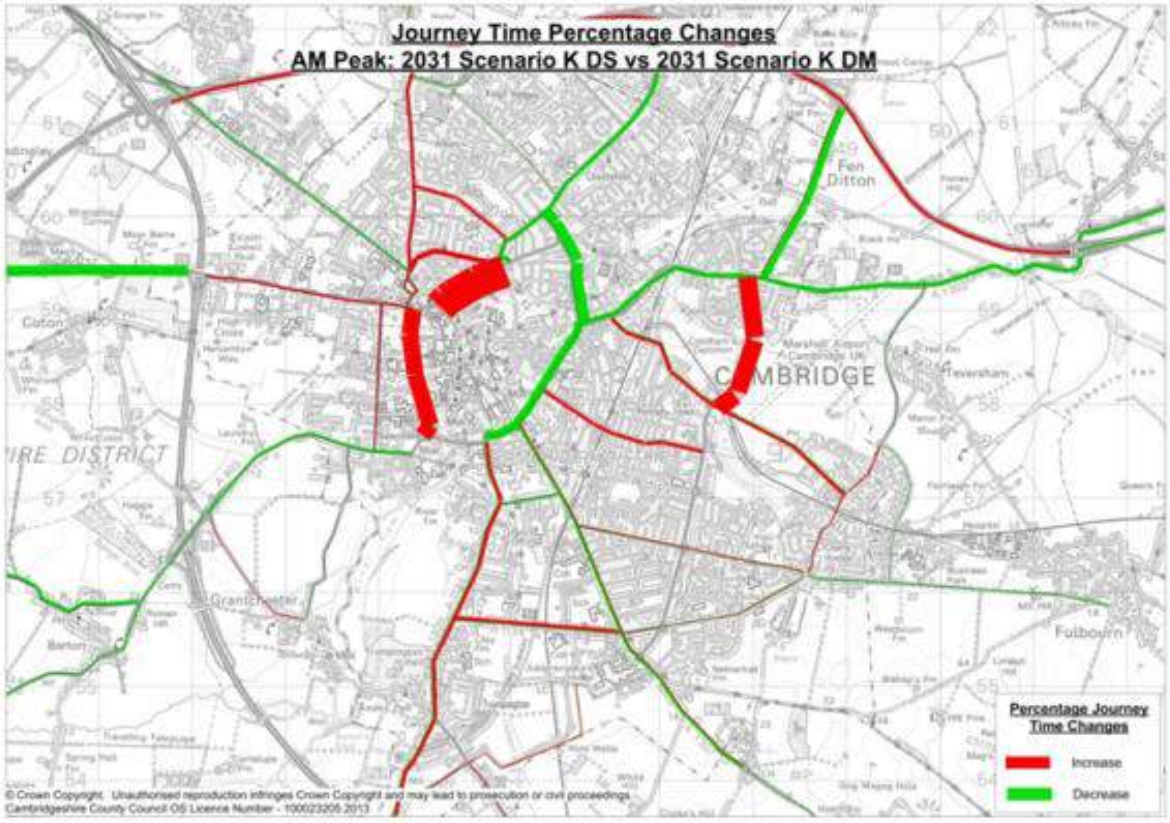
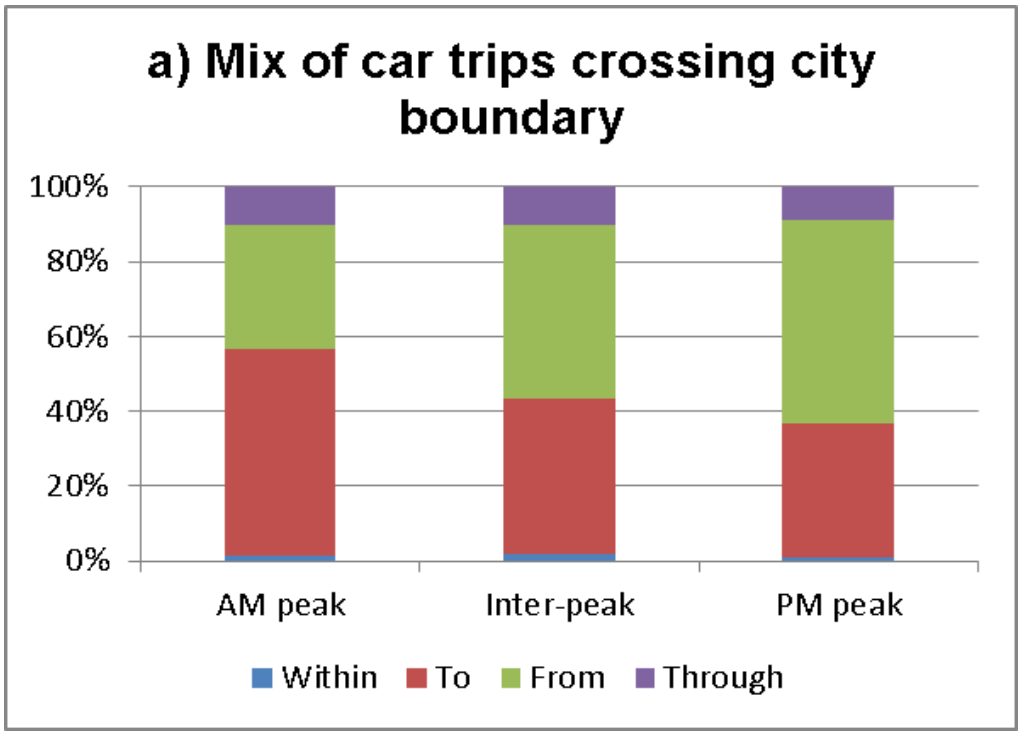


Figure F.10a – Page 11

2015 Updated chart



2013 Original chart

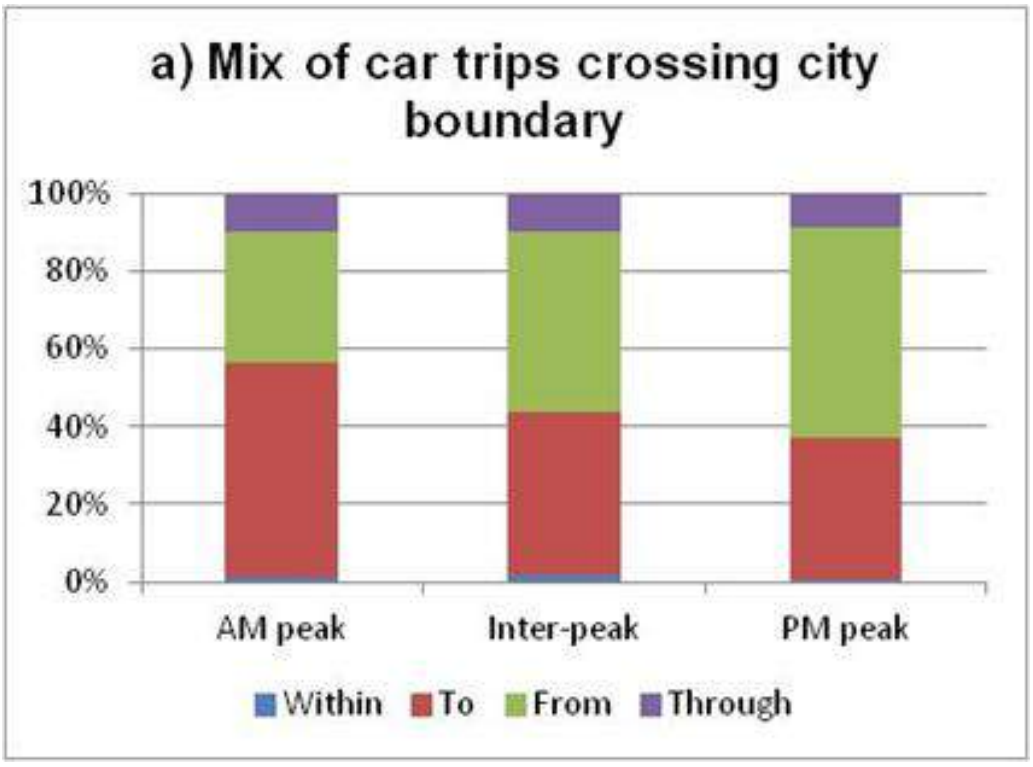
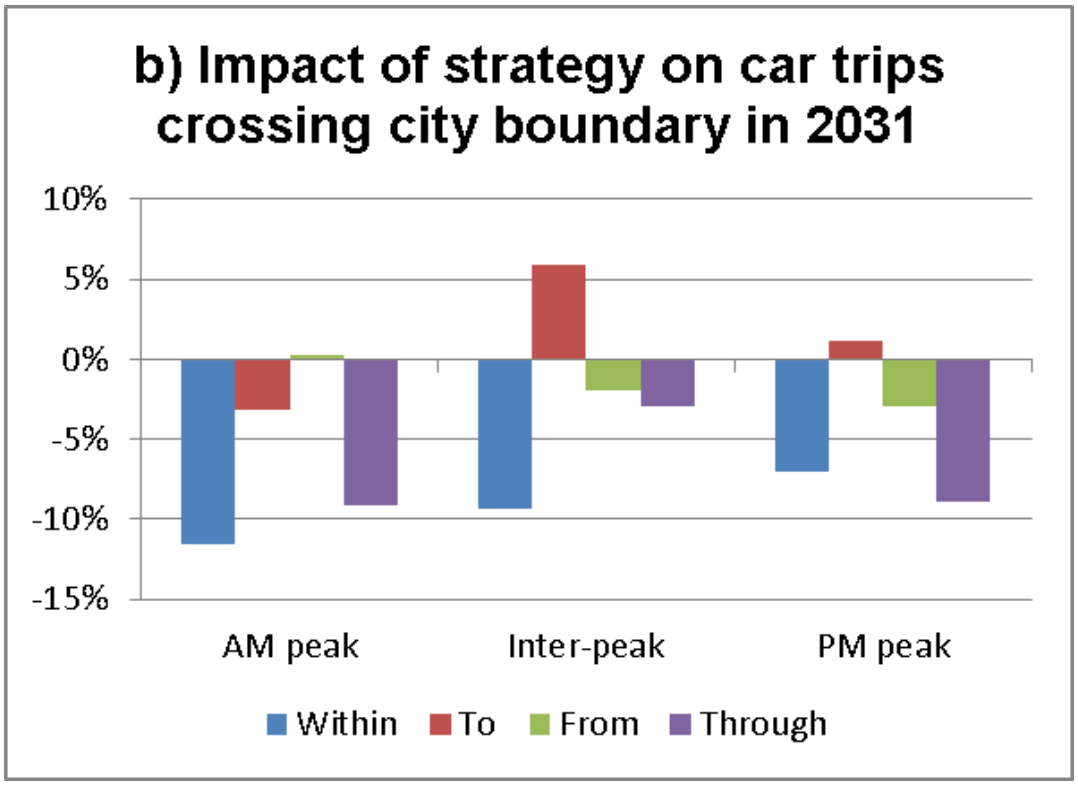


Figure F.10b – Page 11

2015 Updated chart



2013 Original chart

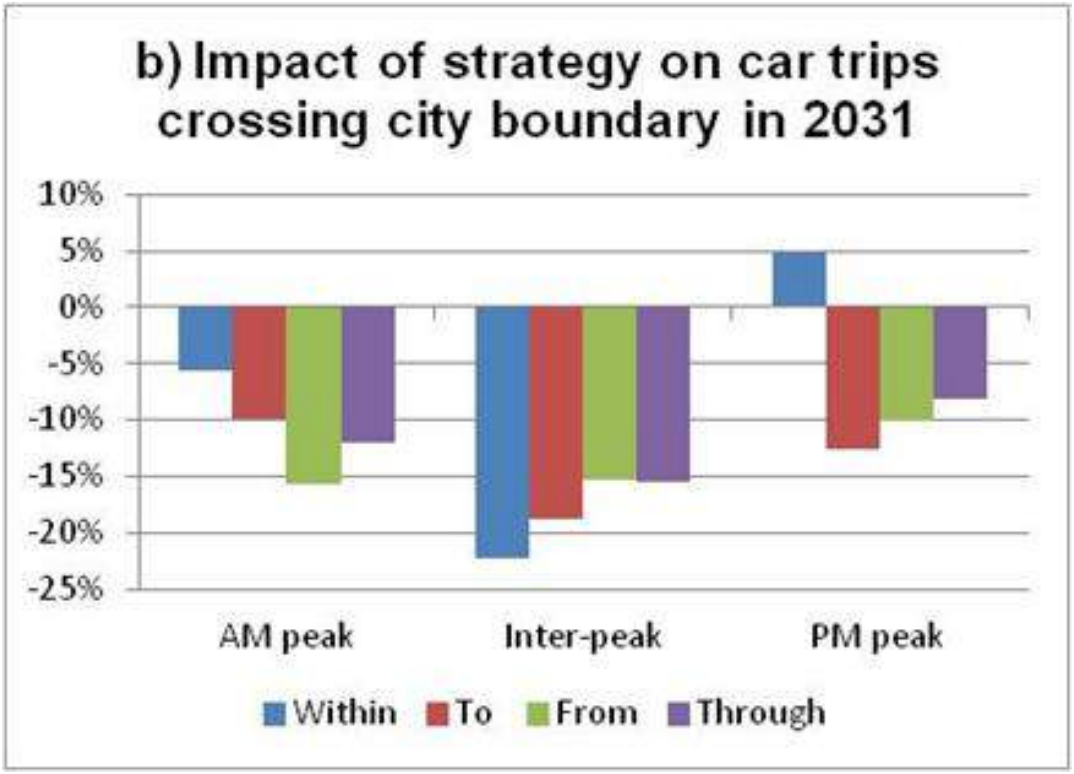


Figure F.11 – Appendix C

2015 Updated table

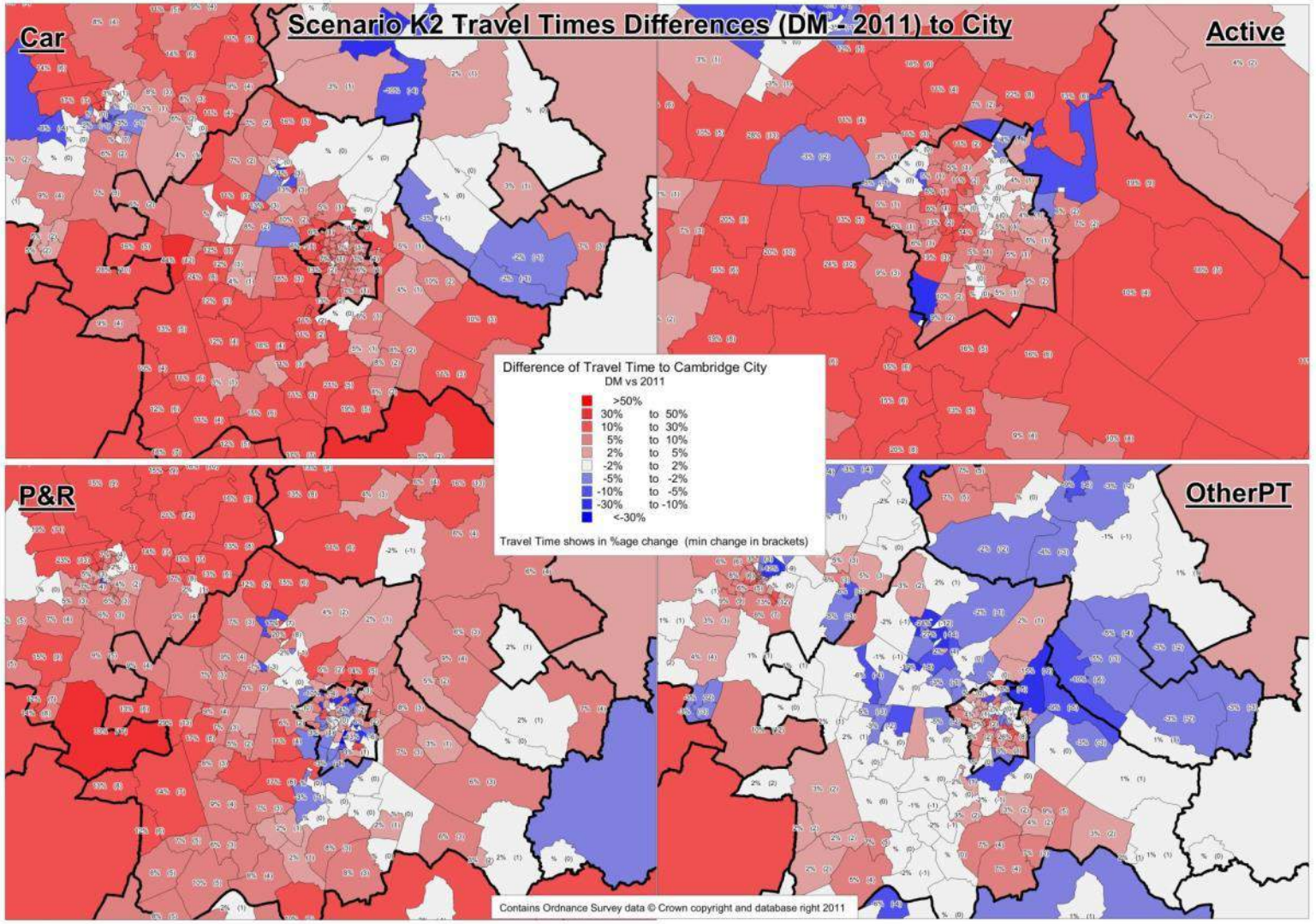
		Headway (min)			Difference (without / with Transport Measures)				
Origin	Destination	w/o Transport Measures	with Transport Measures	Route Section	Timetable Time (min)	Journey Time (min)	%age Time	avg speed (kph)	Max. Load
Haverhill	City Centre	15	10	City	-3	-3	-18%	3	232
				S Cambs	-2	-2	-25%	11	179
				Other	-10	-10	-26%	11	196
				All	-15	-15	-24%	8	187
St Neots	City Centre	60	10	City	0	0	1%	0	190
				S Cambs	-1	1	2%	-1	198
				Other	-4	-6	-40%	26	196
				All	-5	-5	-6%	2	198
North Beds.	City Centre	30	10	City	-3	-6	-32%	7	1,105
				S Cambs	-2	-7	-32%	14	462
				Other	-5	-8	-18%	9	482
				All	-10	-20	-24%	11	1,093

2013 Original table

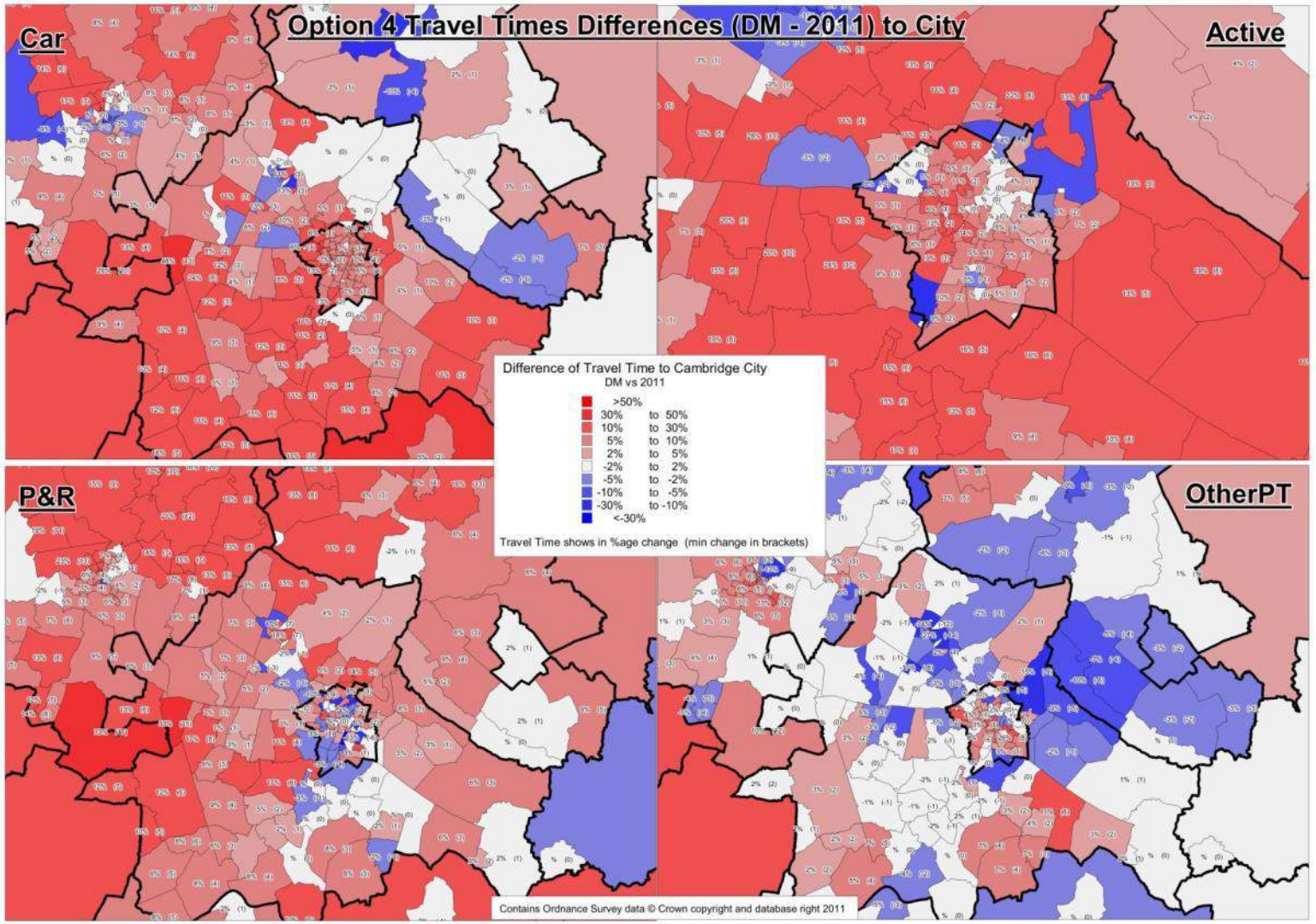
		Headway (min)			Difference (without / with Transport Measures)				
Origin	Destination	w/o Transport Measures	with Transport Measures	Route Section	Timetable Time (min)	Journey Time (min)	%age Time	avg speed (kph)	Max. Load
Haverhill	City Centre	15	10	City	-3	-3	-18%	3	232
				S Cambs	-2	-2	-25%	11	179
				Other	-10	-10	-26%	11	196
				All	-15	-15	-24%	8	187
St Neots	City Centre	60	10	City	0	0	2%	0	188
				S Cambs	-1	1	2%	-1	195
				Other	-4	-7	-41%	26	194
				All	-5	-5	-6%	2	195
North Beds.	City Centre	30	10	City	-3	-6	-31%	7	1,086
				S Cambs	-2	-7	-32%	14	454
				Other	-5	-7	-16%	9	472
				All	-10	-20	-24%	11	1,077

Figure F.12 – Appendix D

2015 Updated chart



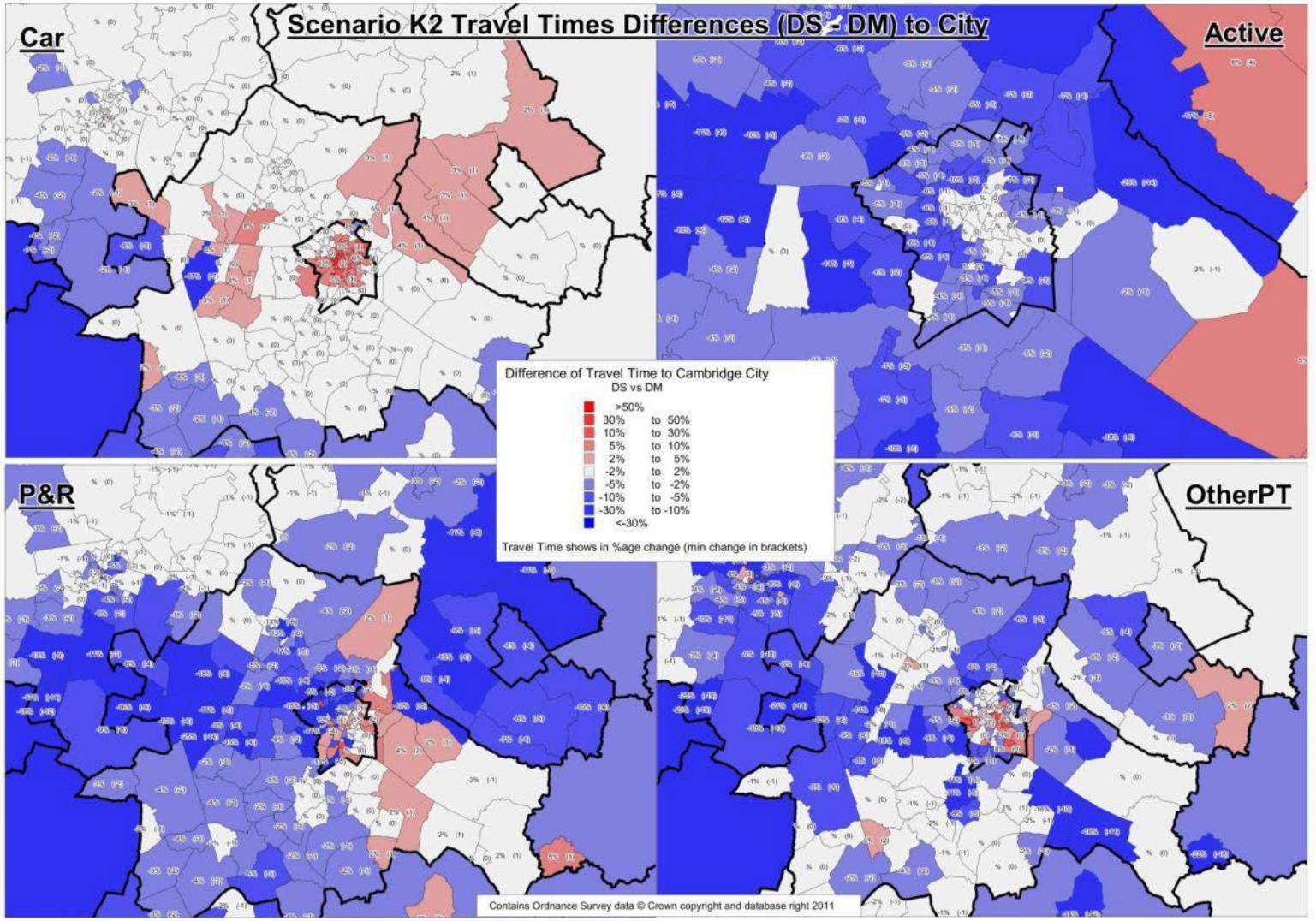
2013 Original chart



Appendix F – Figure comparisons

Figure F.13 – Appendix D

2015 Updated chart



2013 Original chart

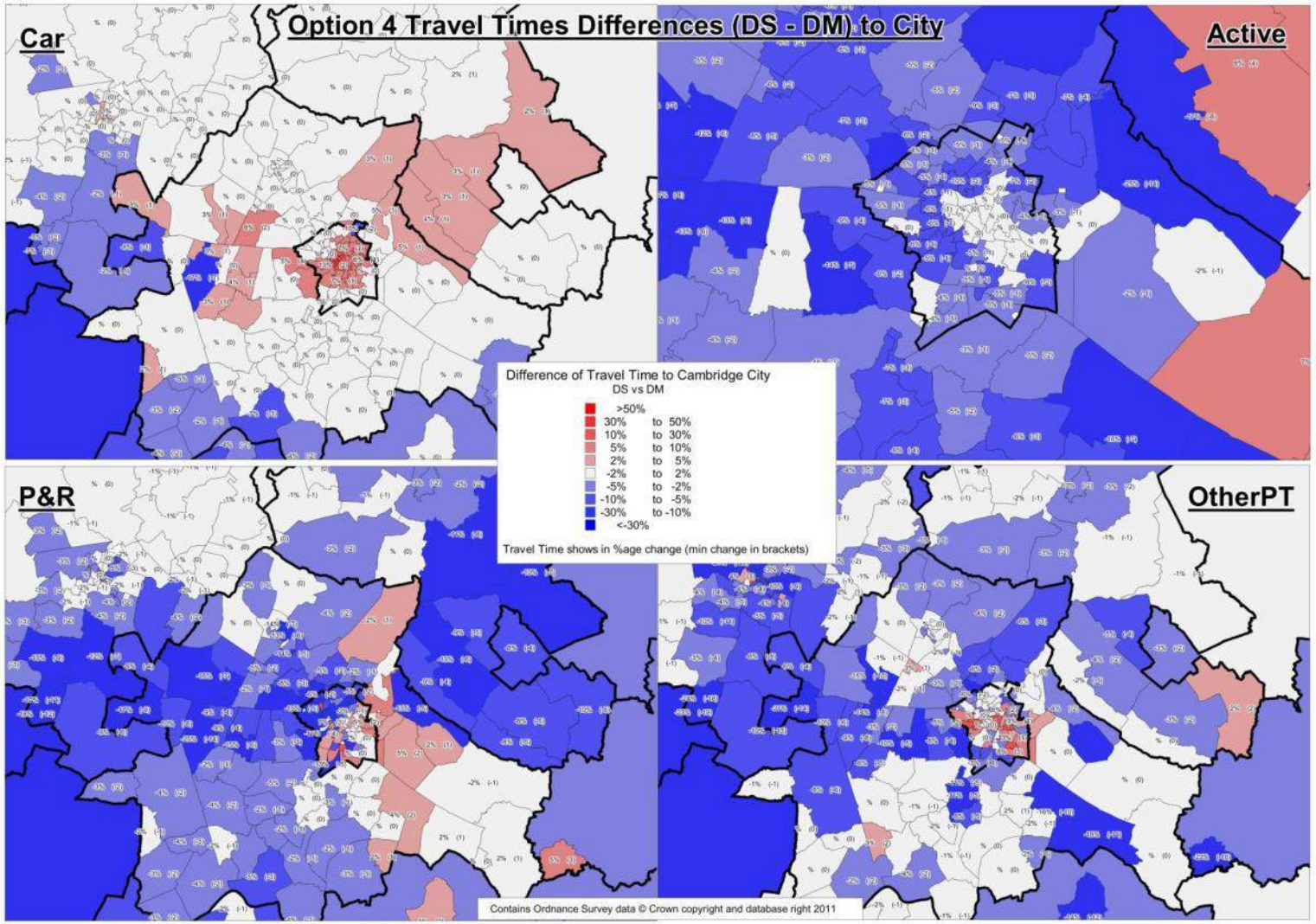
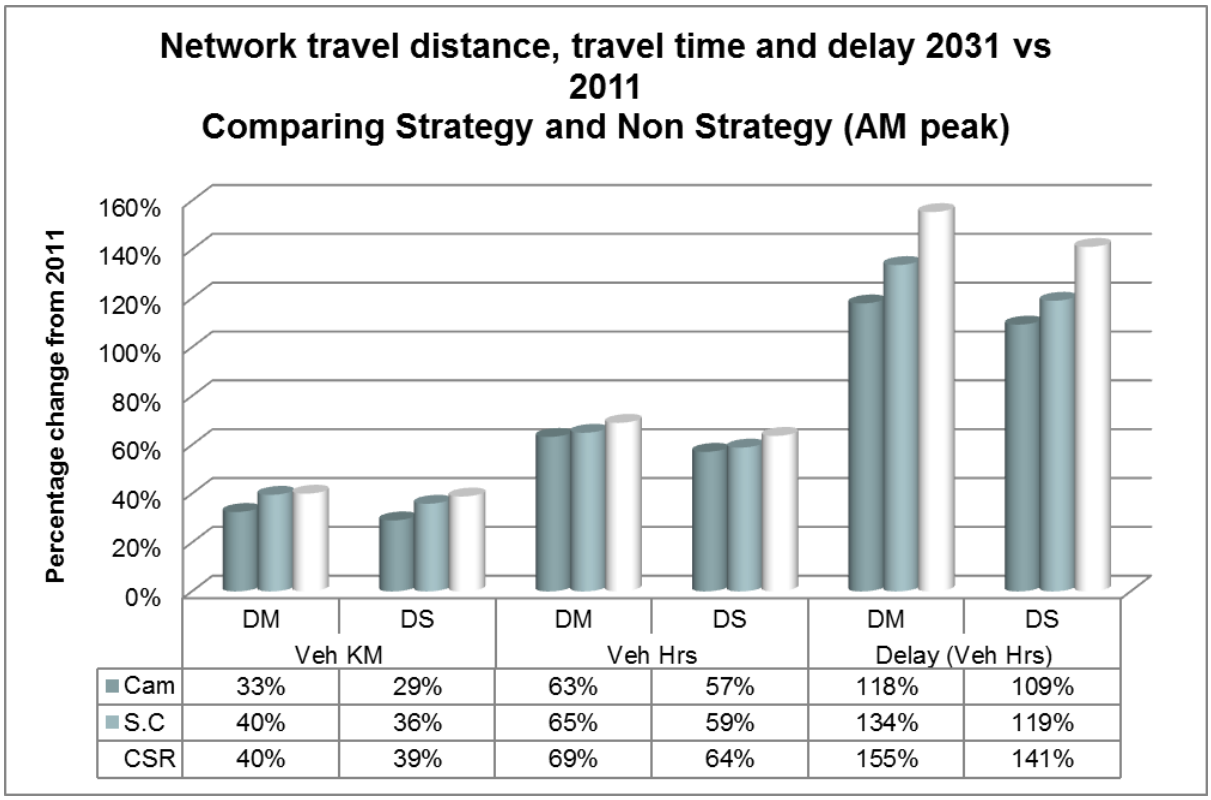


Figure F.14 – Appendix E (E1)

2015 Updated chart



2013 Original chart

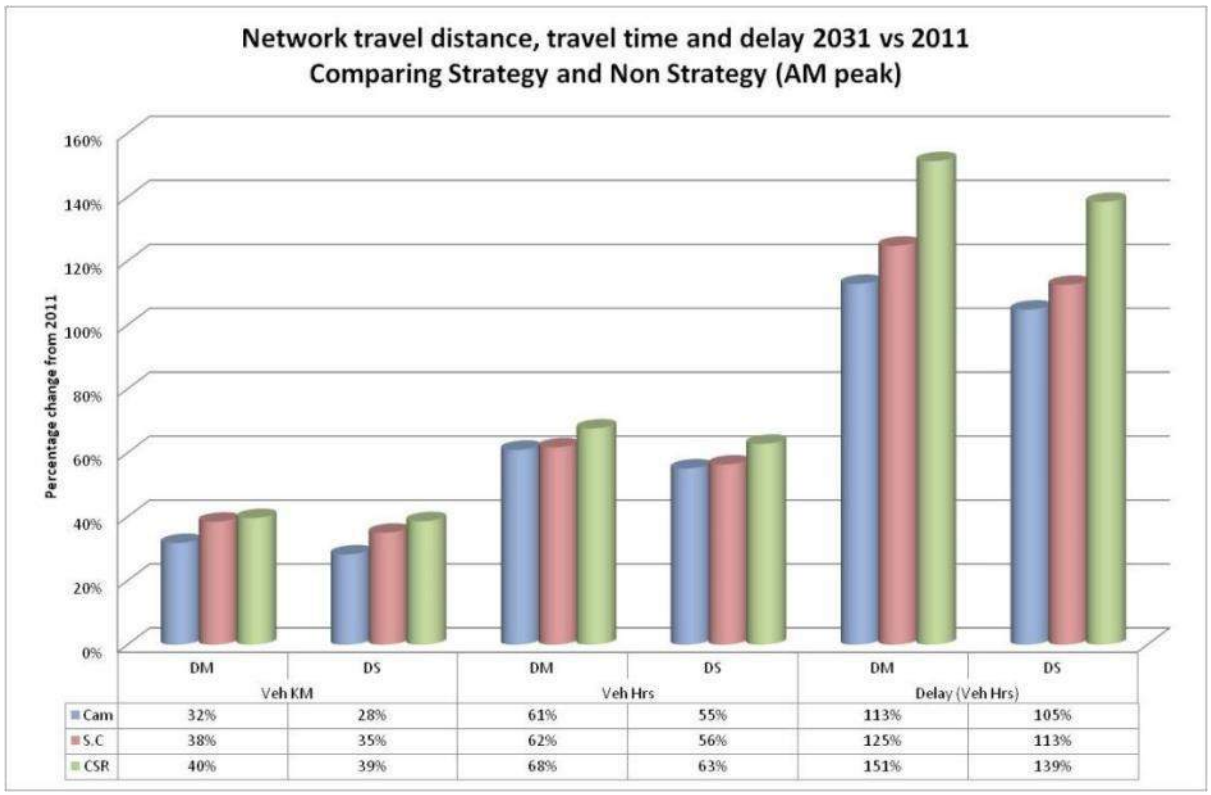
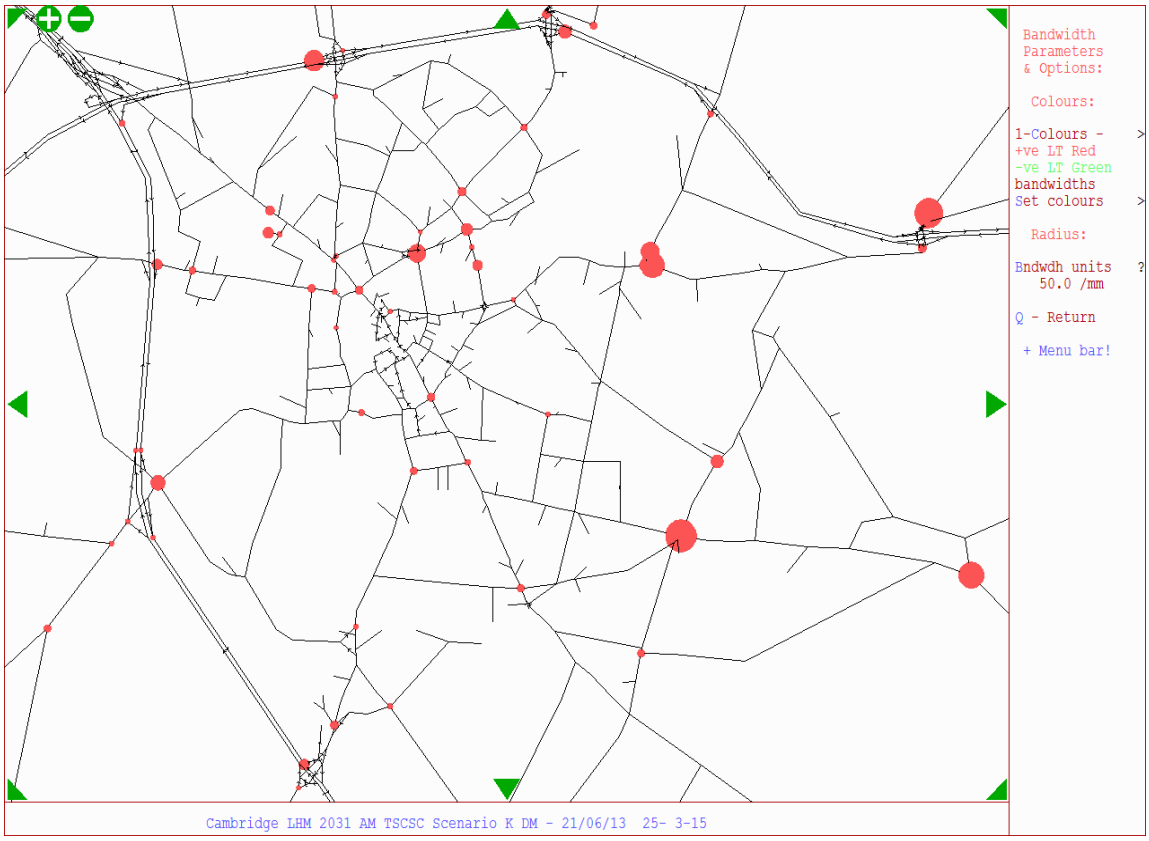


Figure F.14 – Appendix E (E2)

2015 Updated chart



2013 Original chart

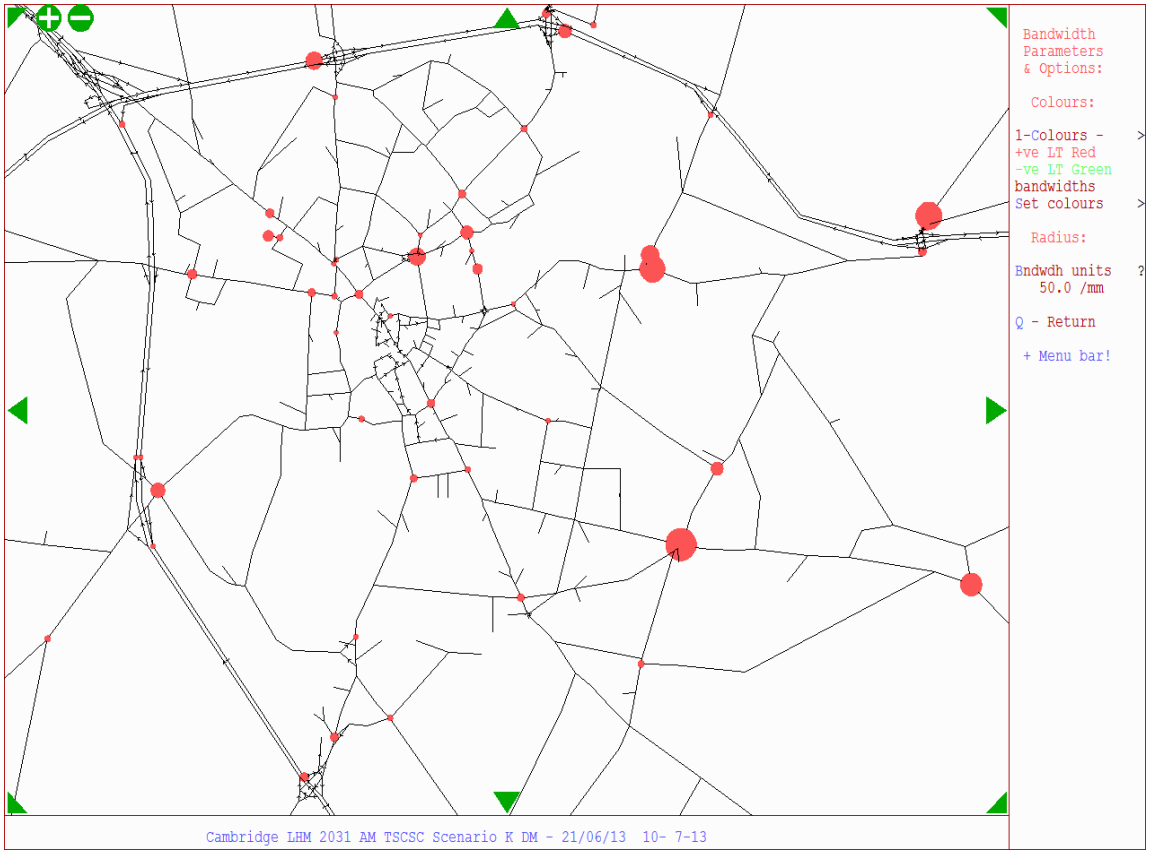
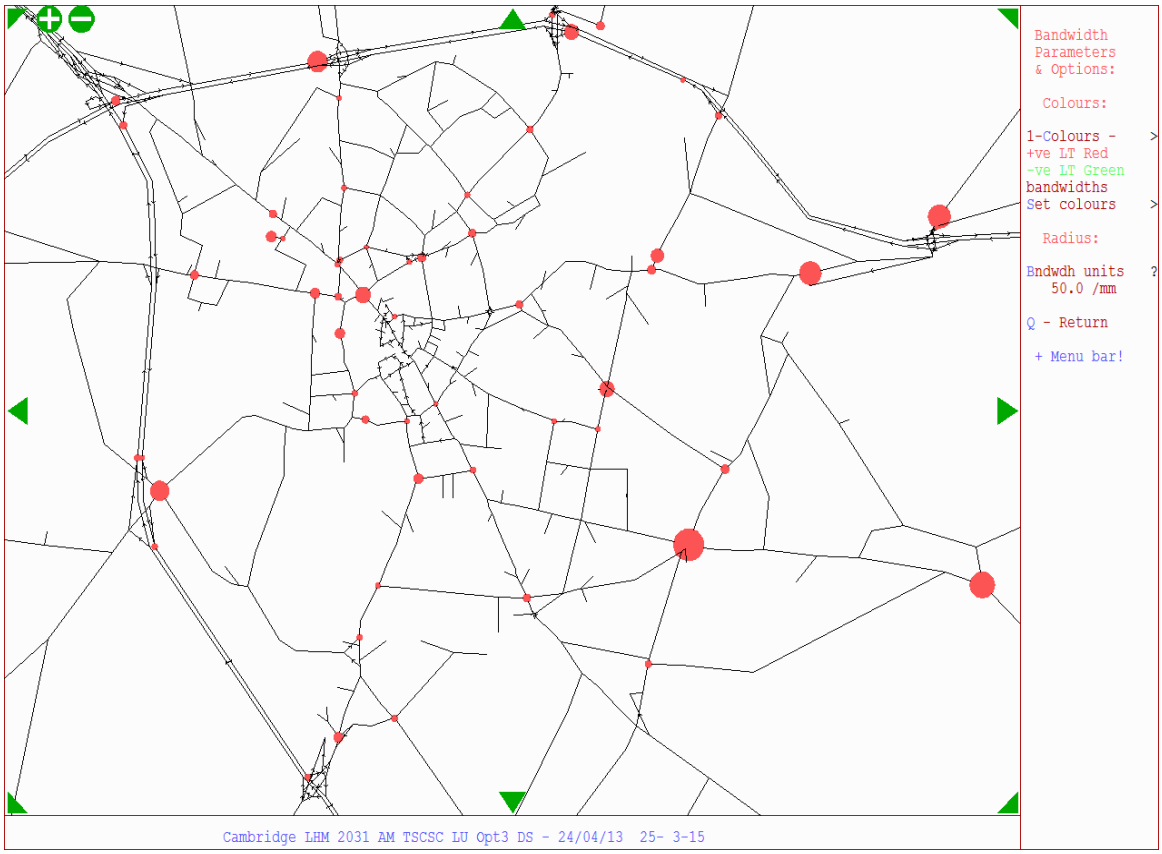


Figure F.14 – Appendix E (E3)

2015 Updated chart



2013 Original chart

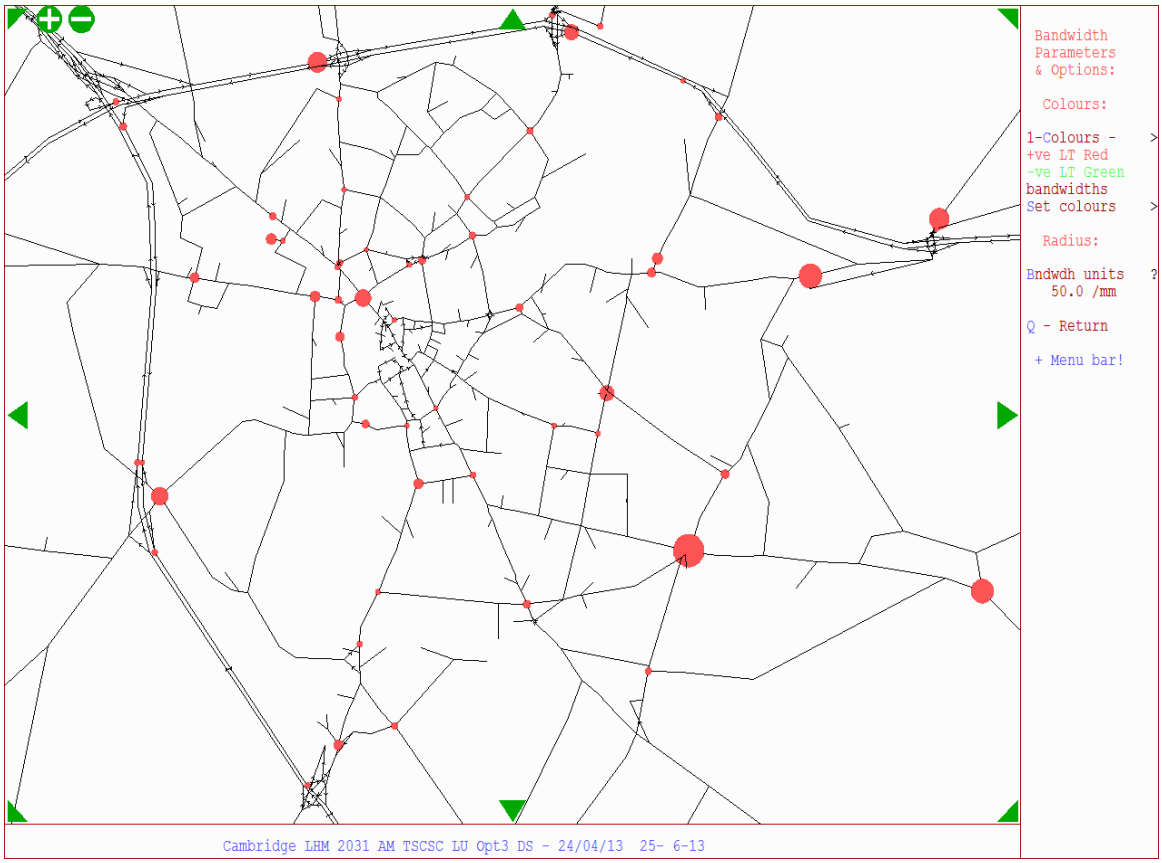
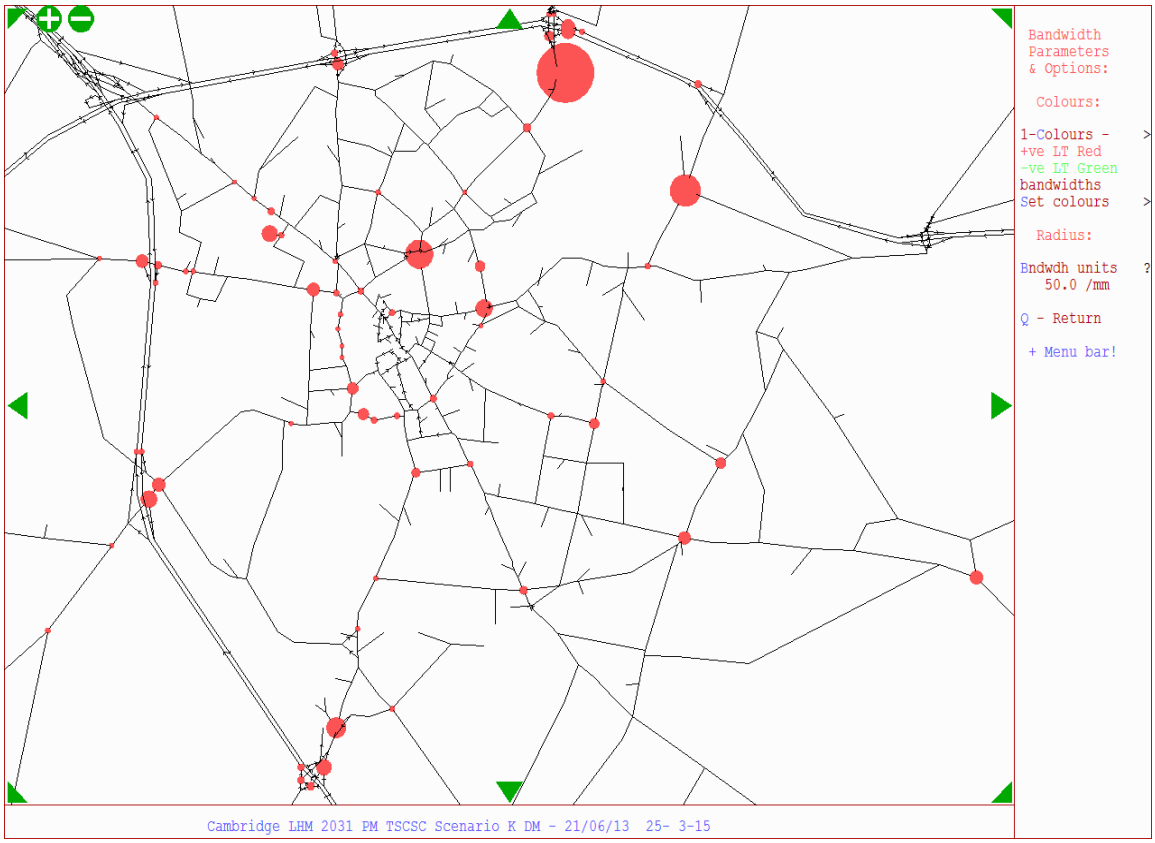


Figure F.14 – Appendix E (E4)

2015 Updated chart



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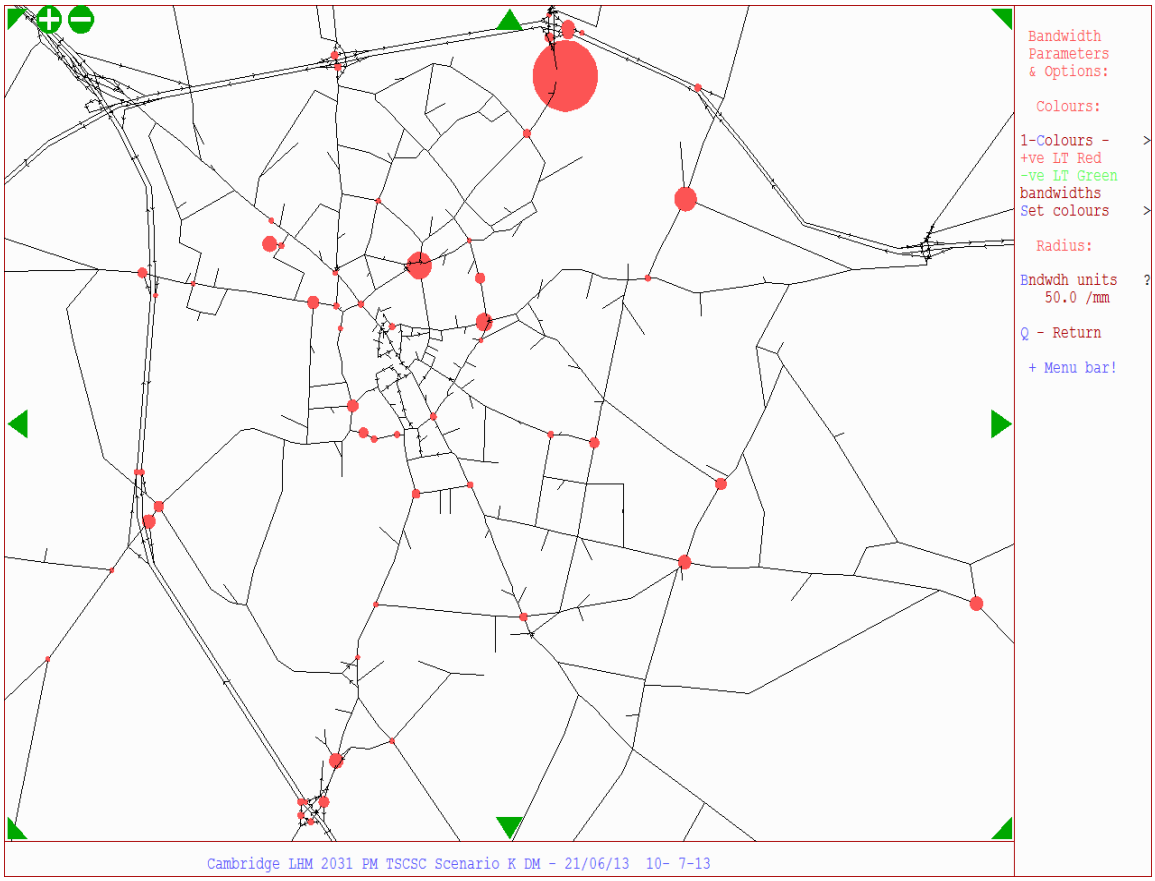
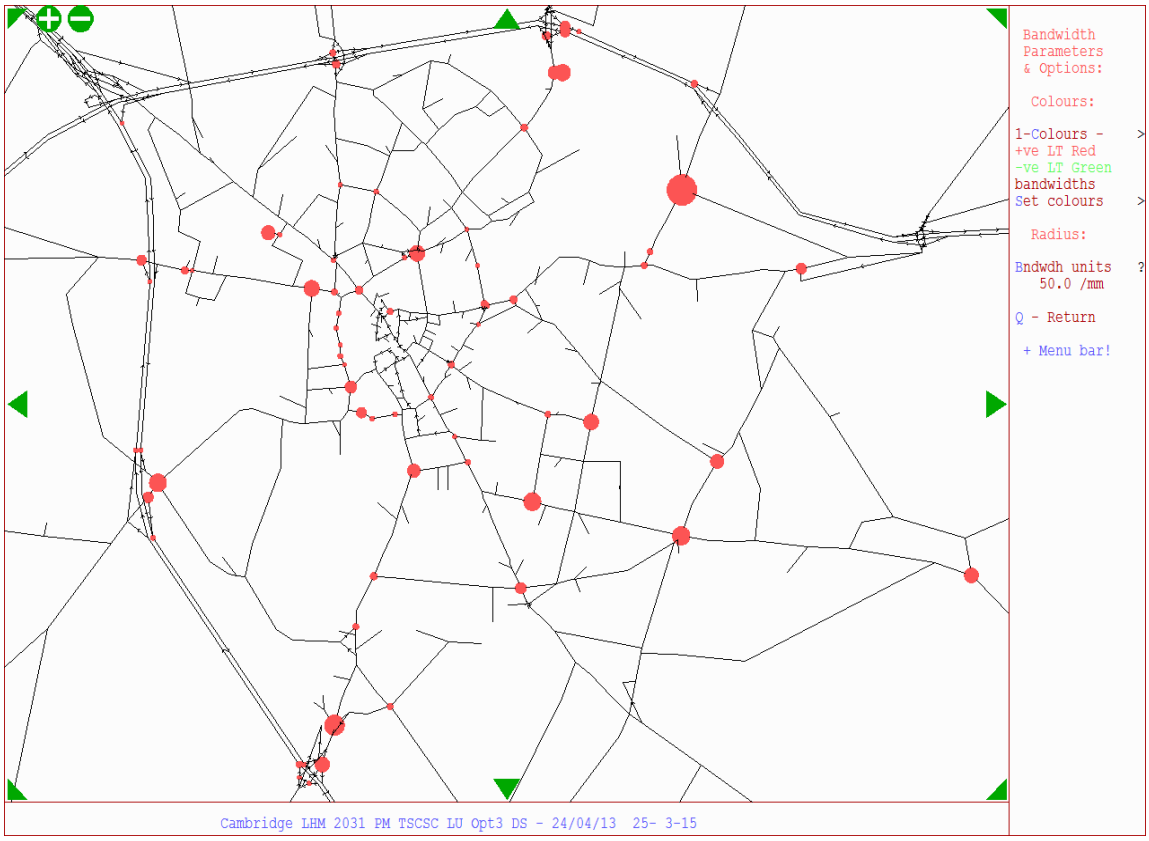


Figure F.14 – Appendix E (E5)

2015 Updated chart



2013 Original chart

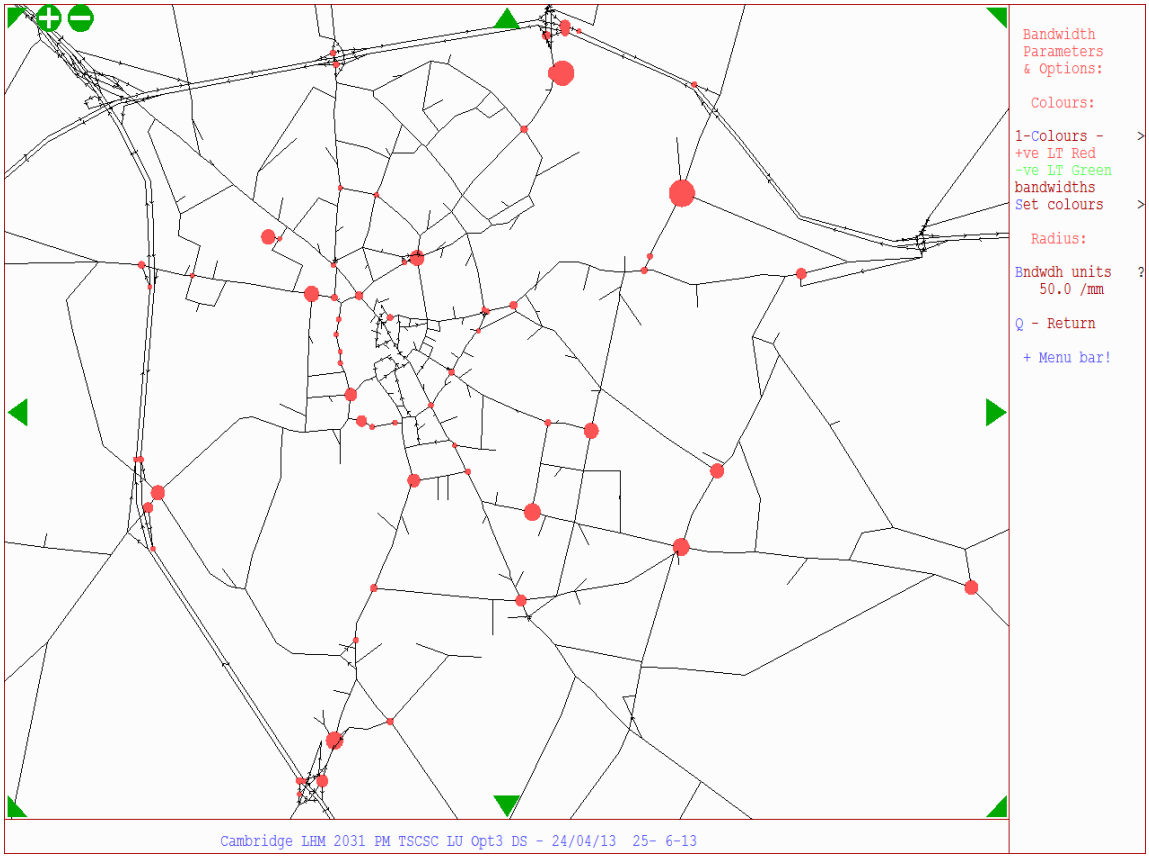
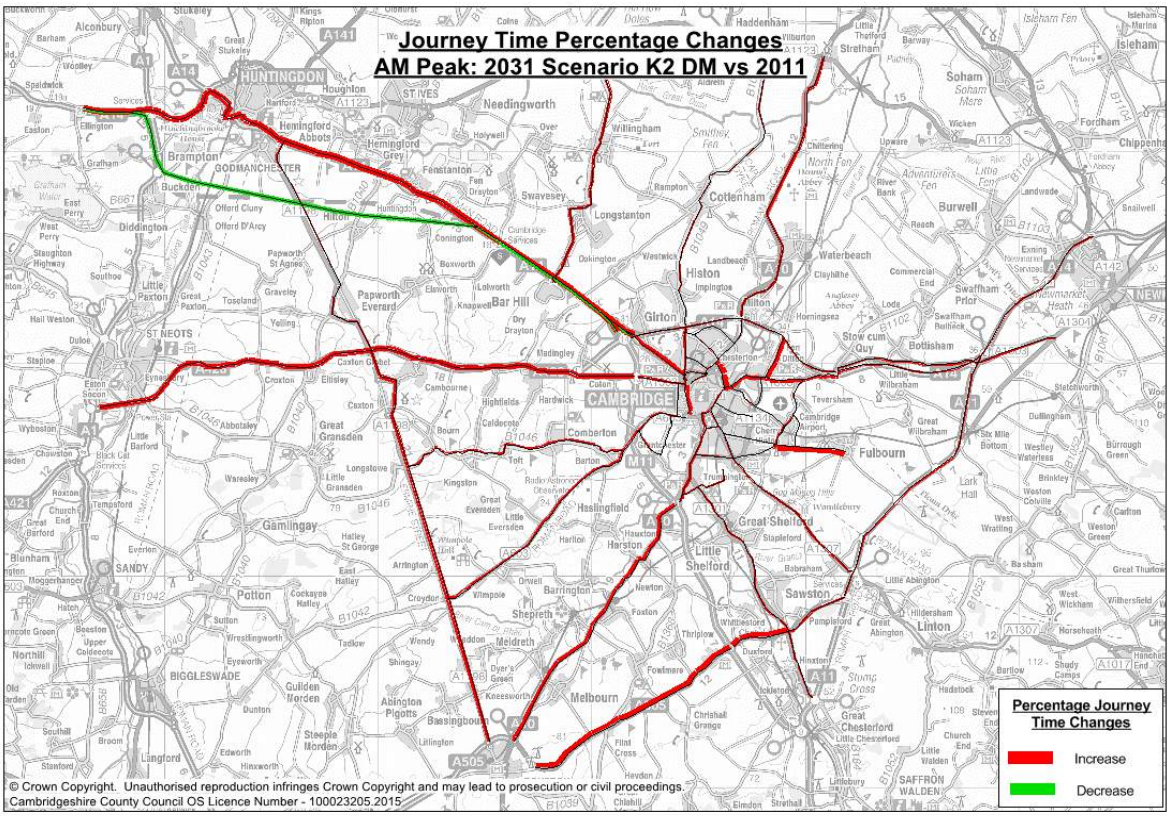


Figure F.14 – Appendix E (E6)

2015 Updated chart



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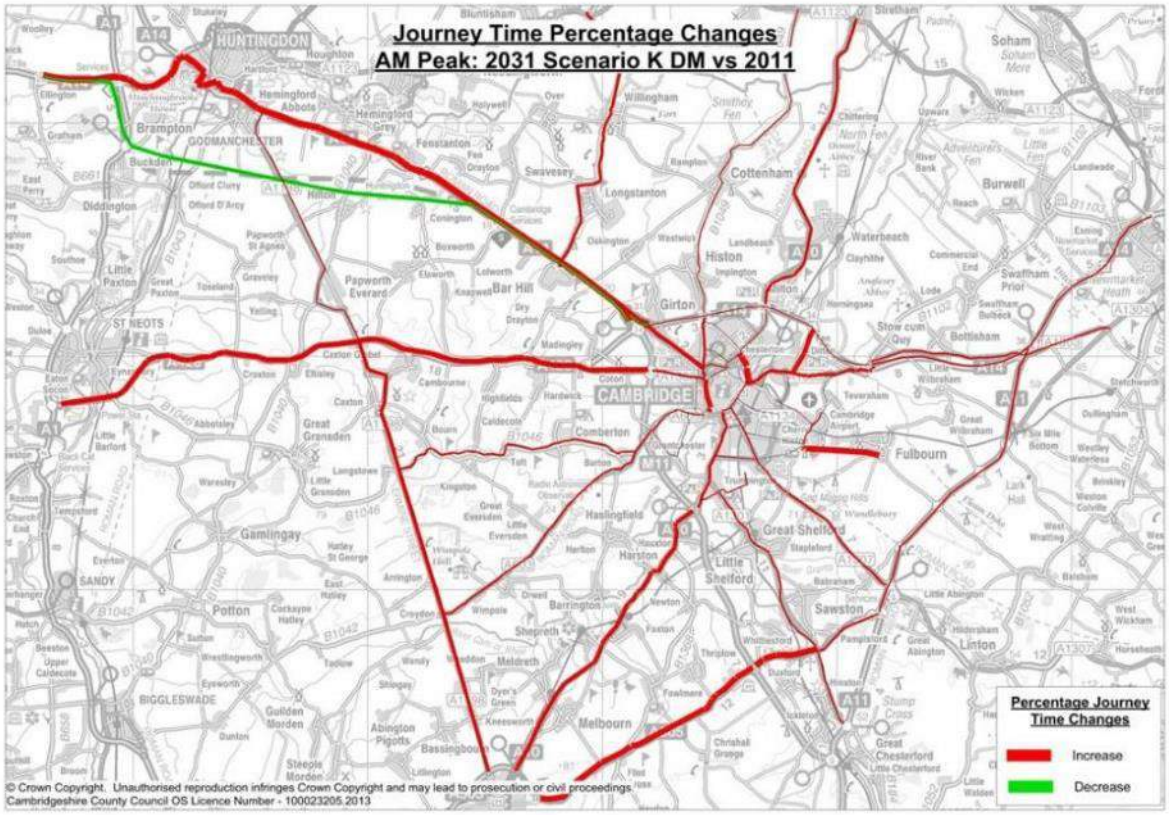
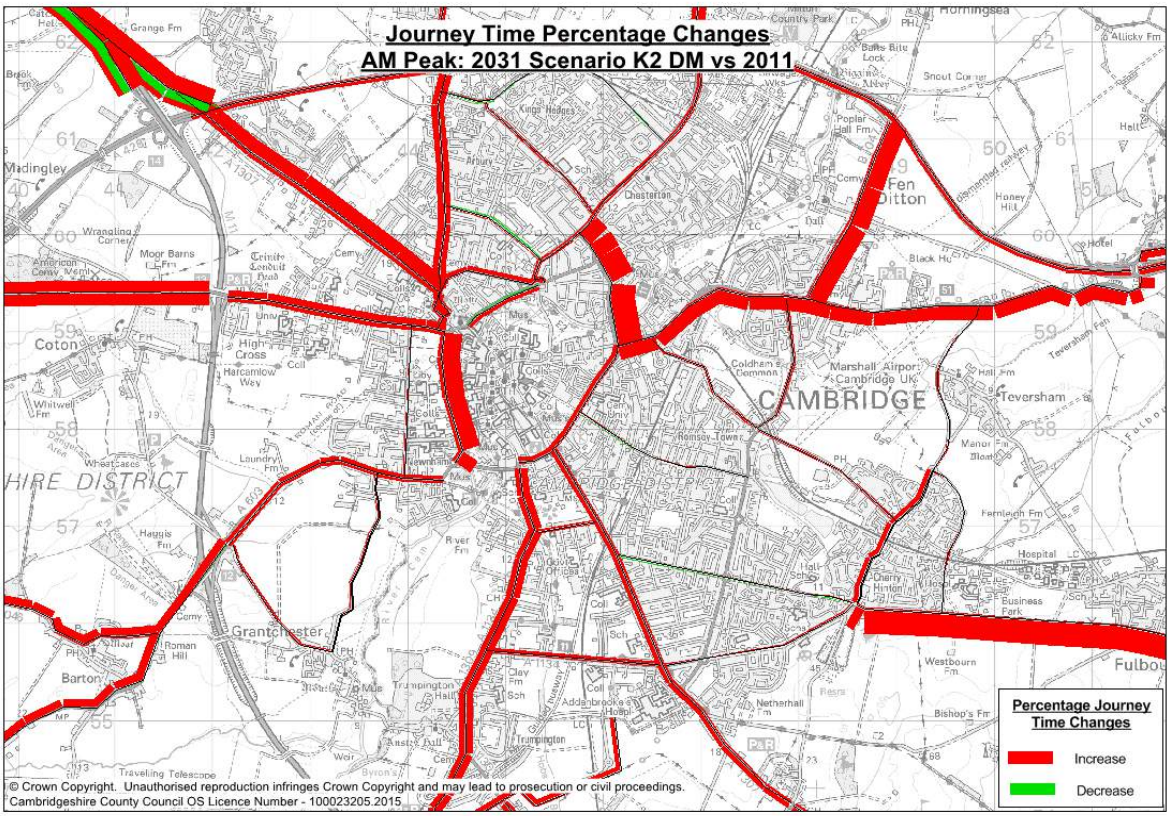


Figure F.14 – Appendix E (E7)

2015 Updated chart



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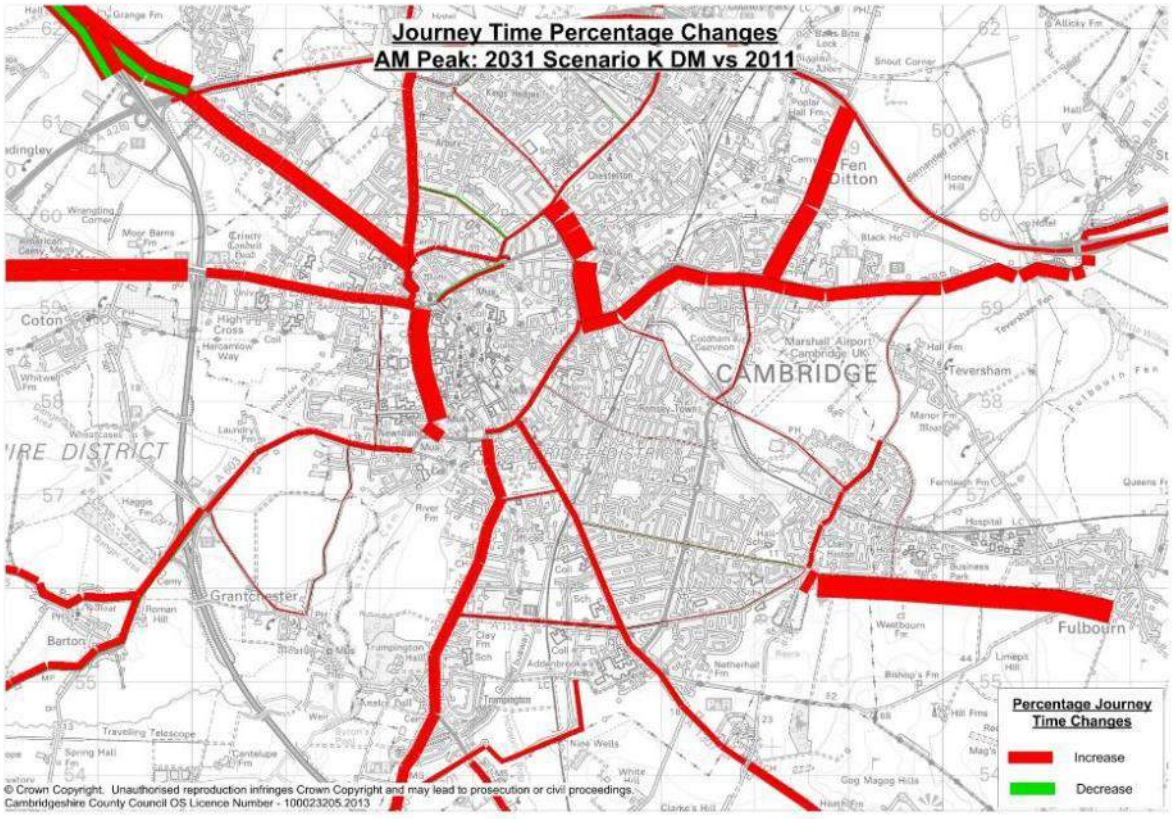
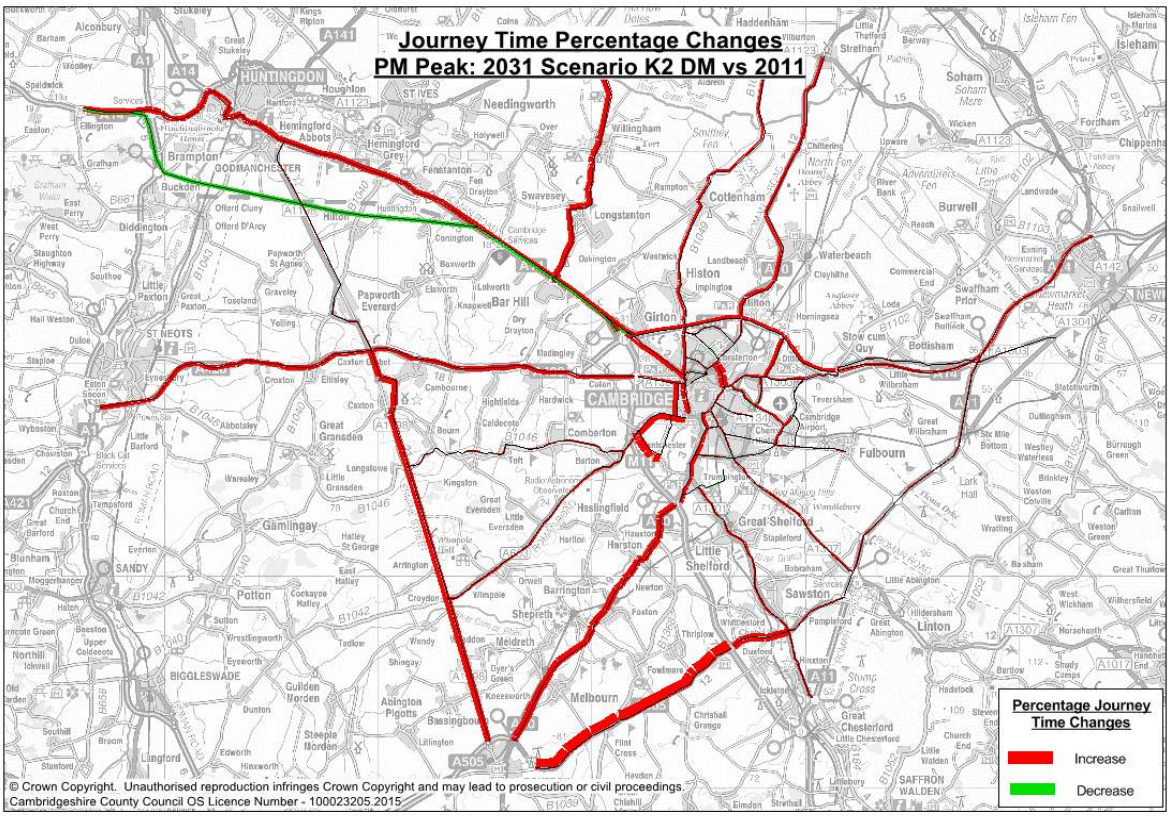


Figure F.14 – Appendix E (E8)

2015 Updated chart



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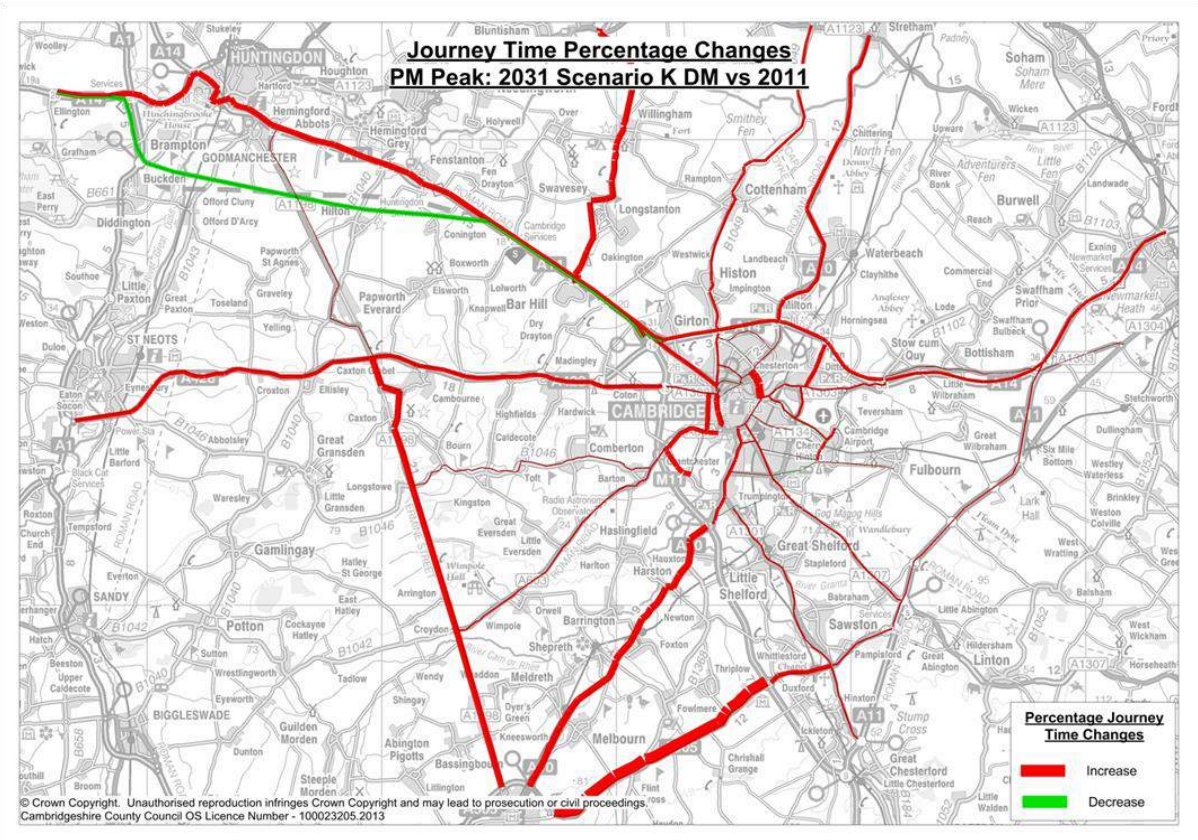
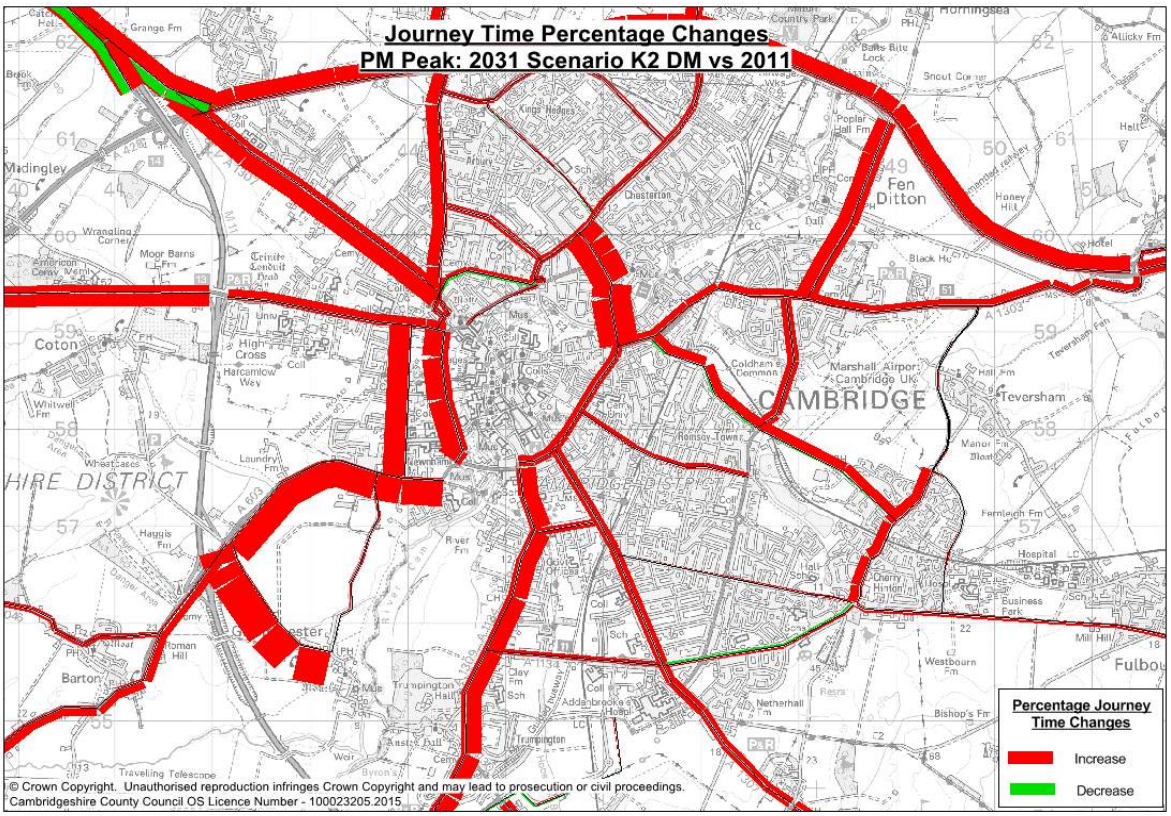


Figure F.14 – Appendix E (E9)

2015 Updated chart



2013 Original chart

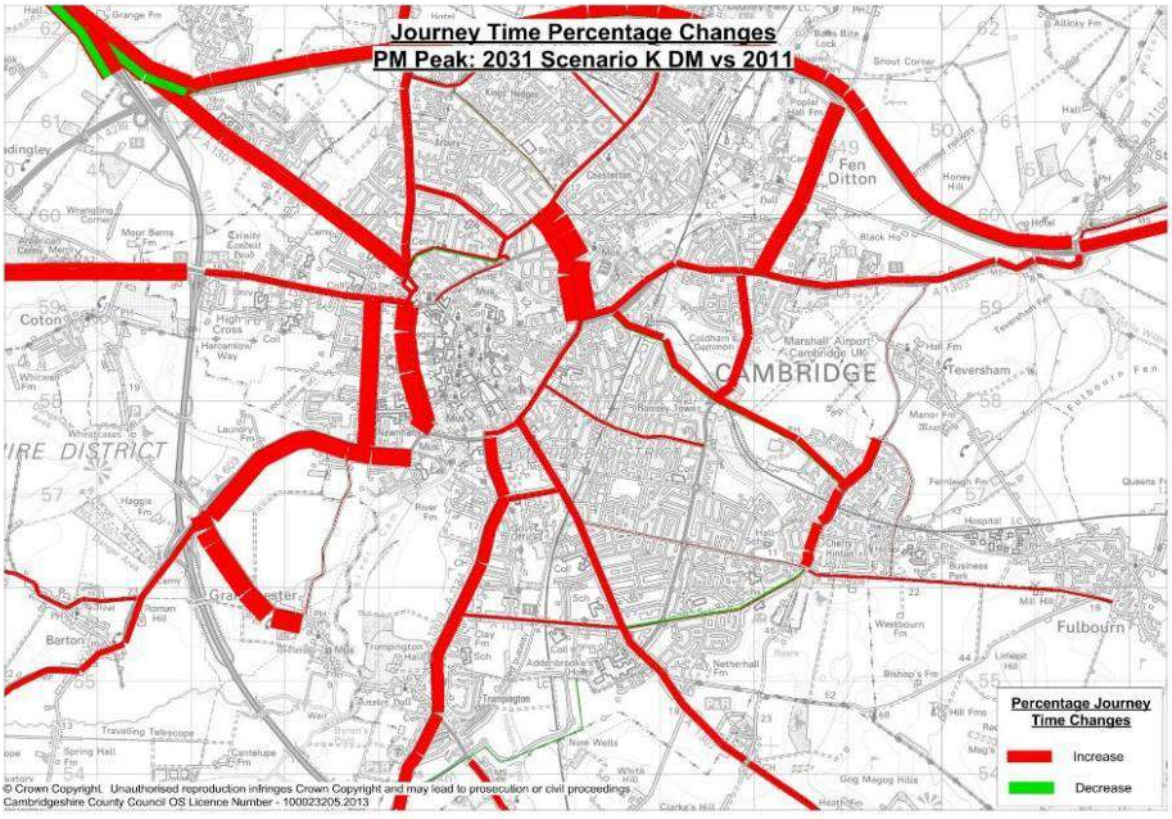
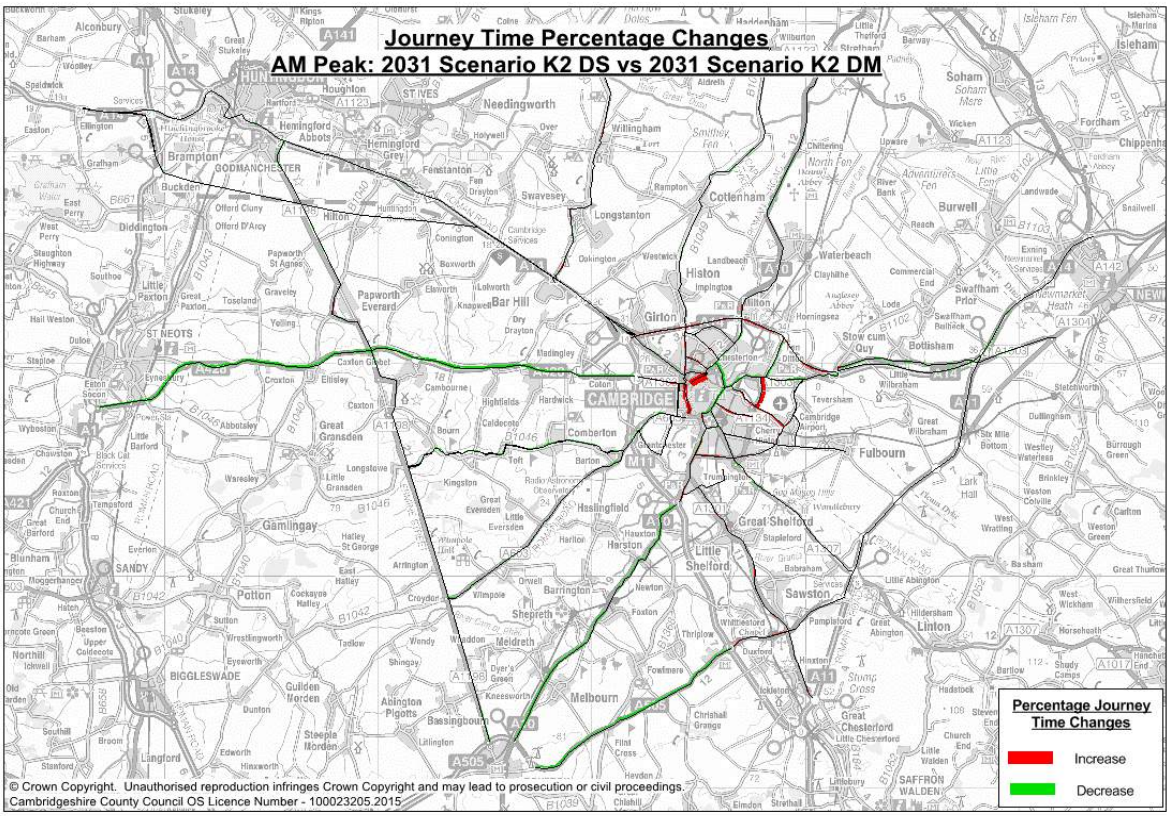


Figure F.14 – Appendix E (E10)

2015 Updated chart



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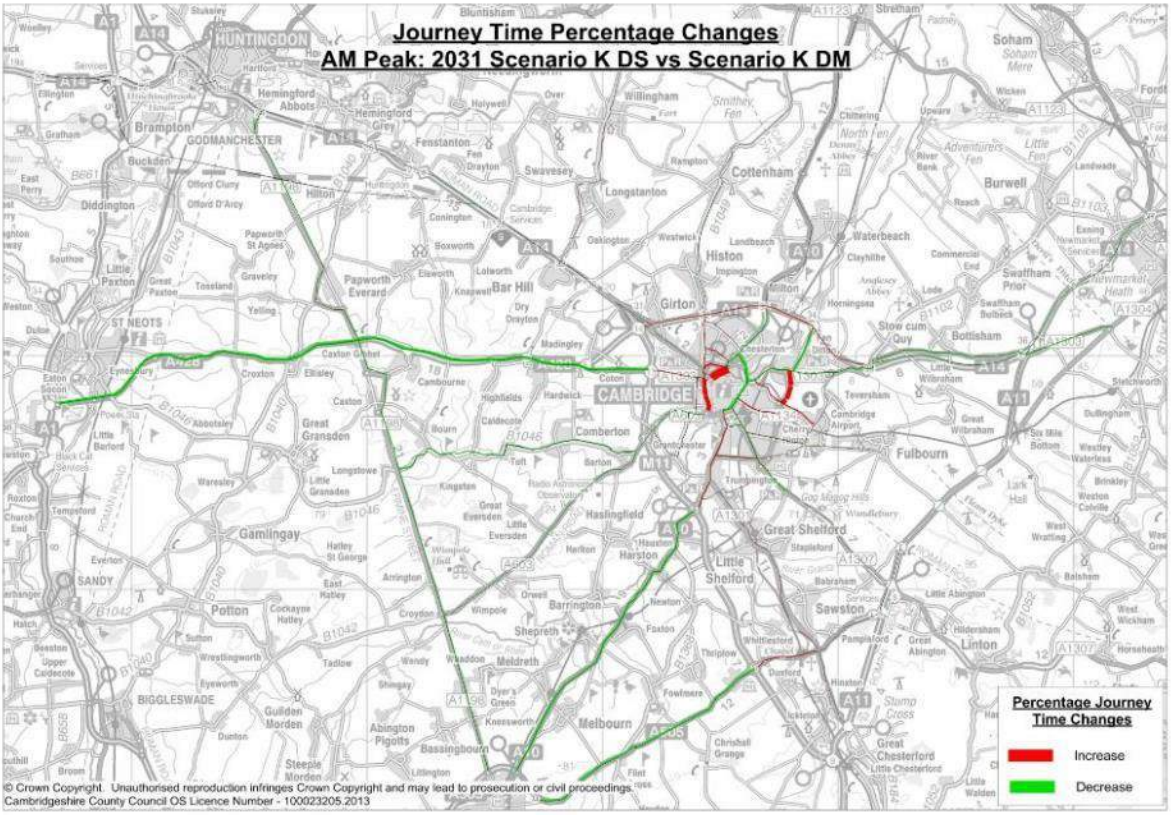
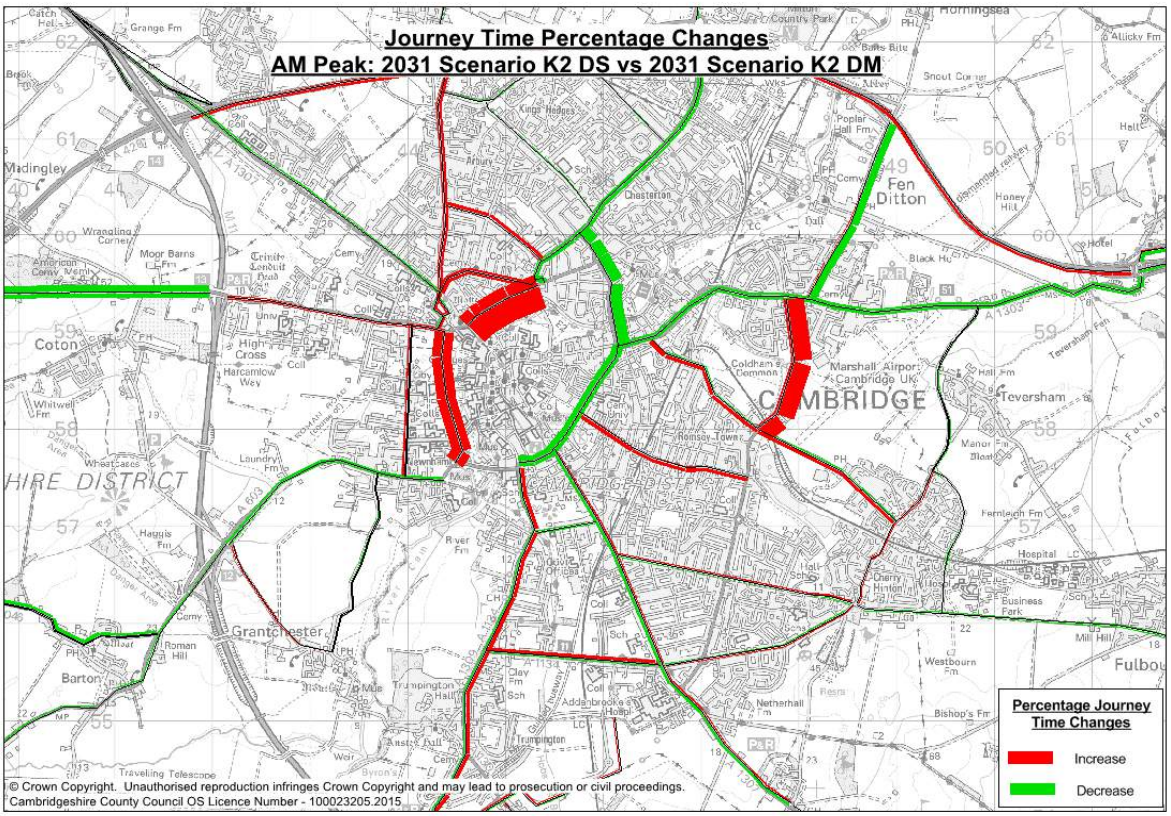


Figure F.14 – Appendix E (E11)

2015 Updated chart



2013 Original chart

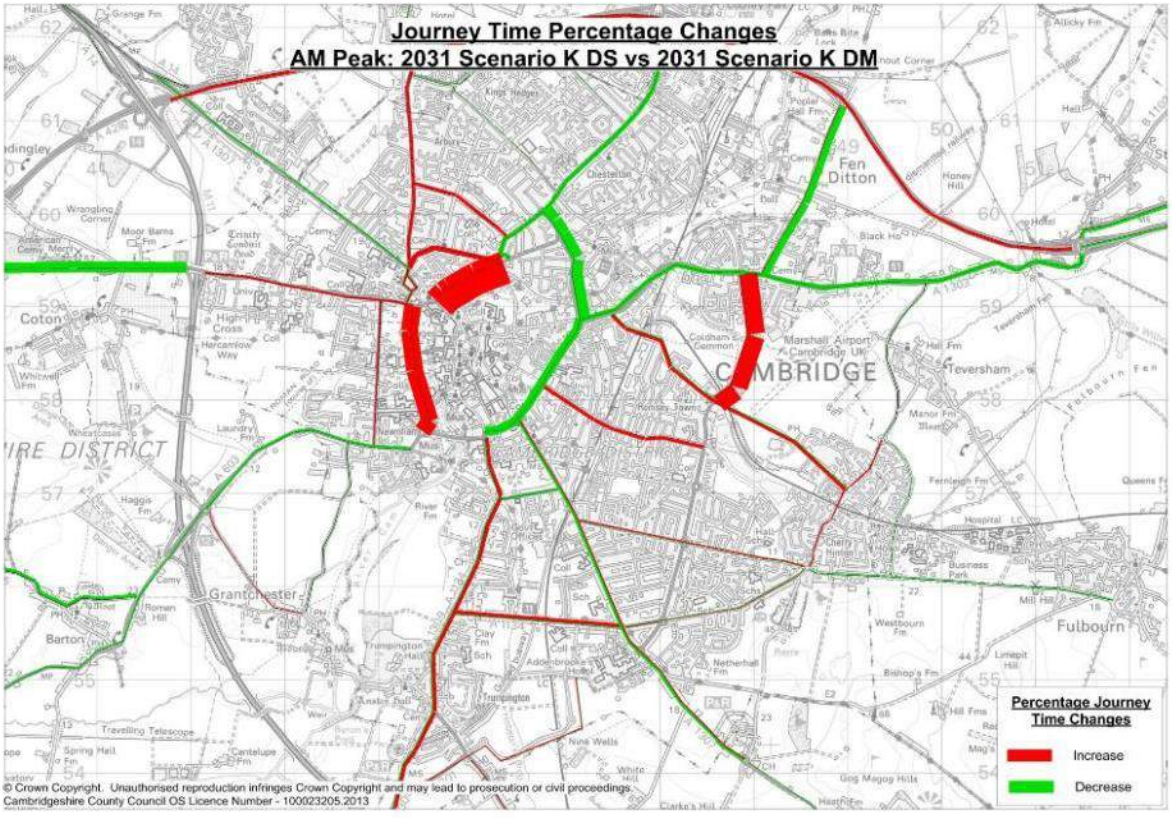
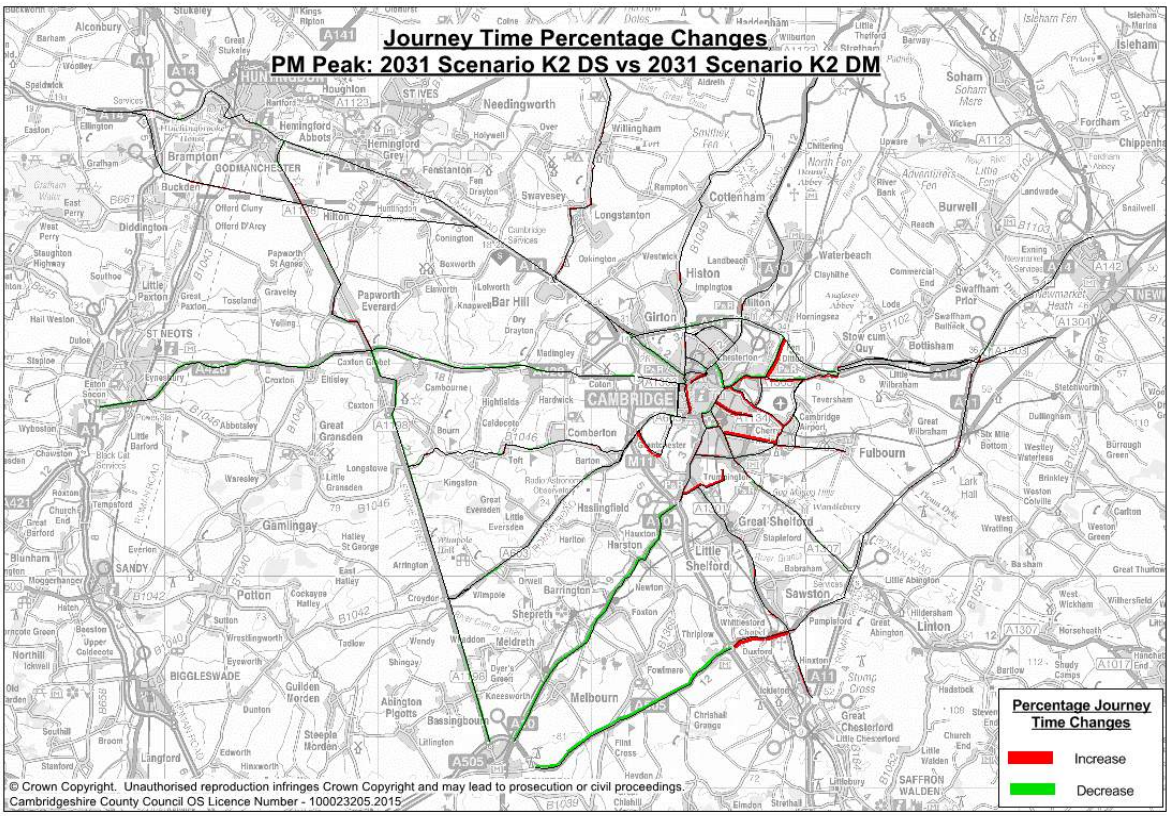


Figure F.14 – Appendix E (E12)

2015 Updated chart



2013 Original chart

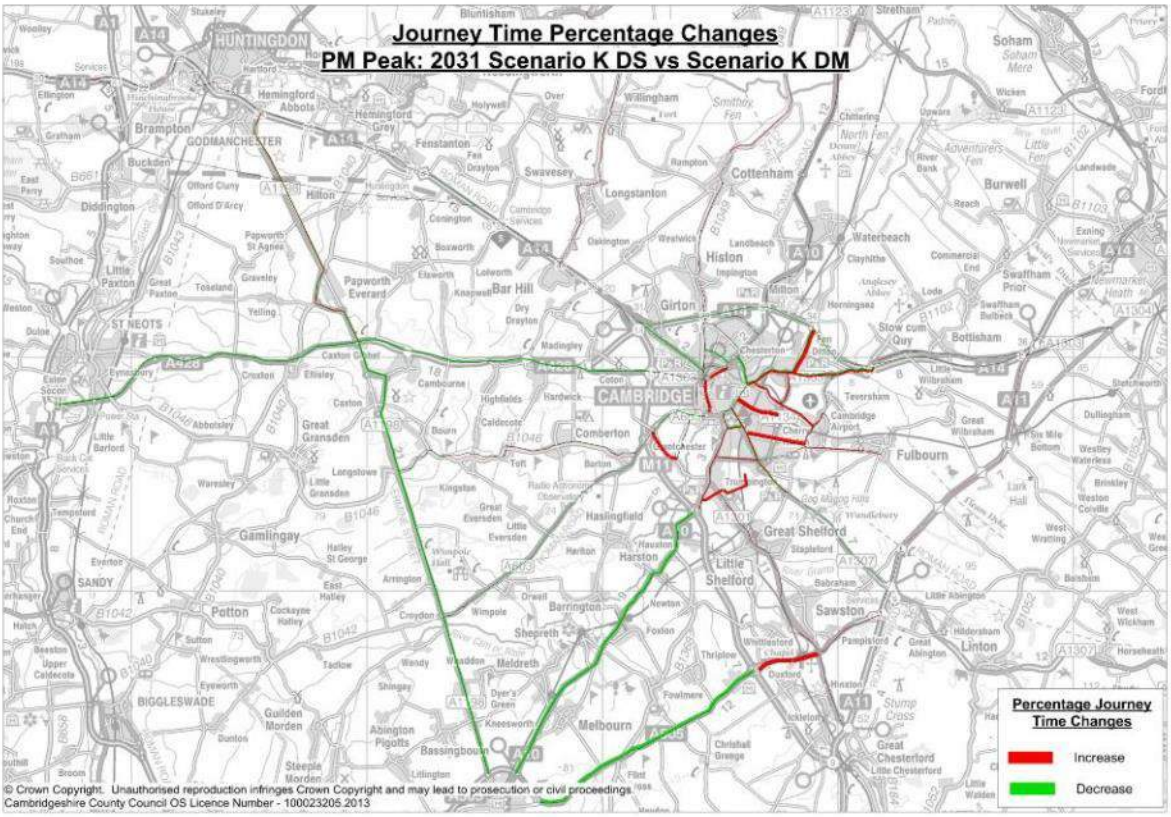
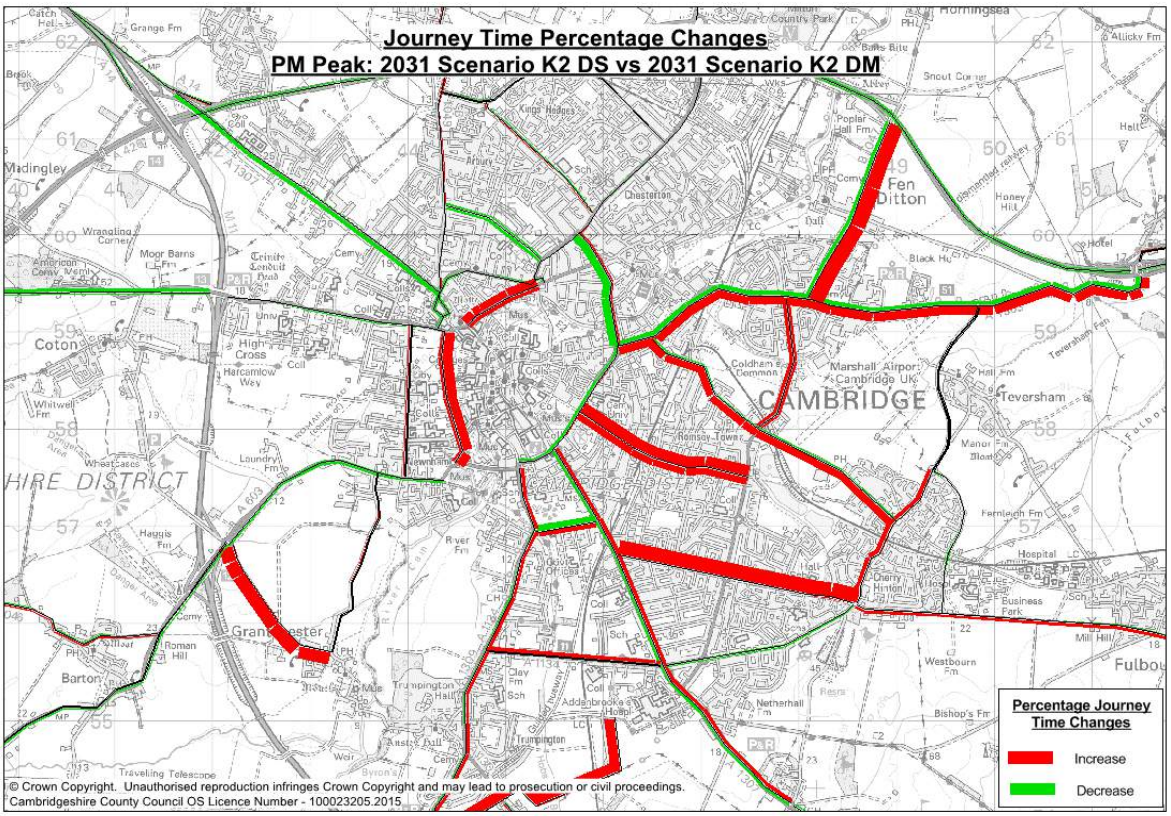
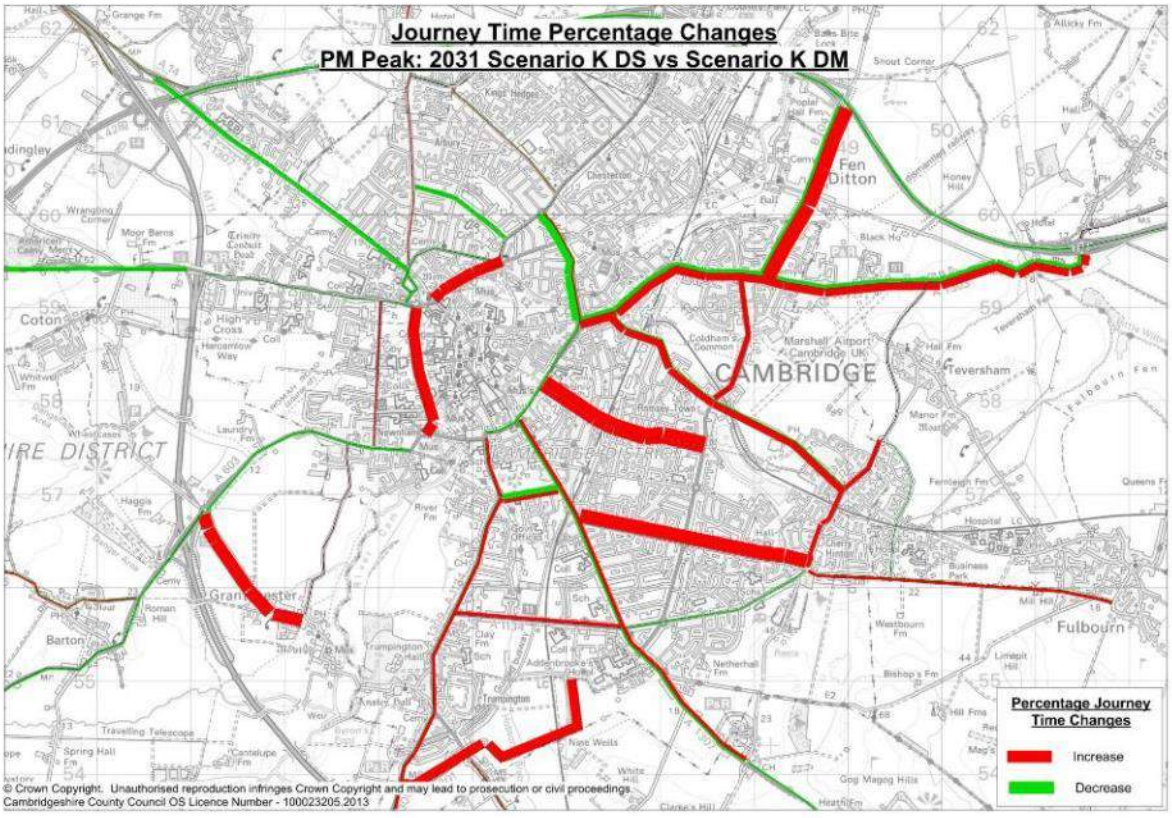


Figure F.14 – Appendix E (E13)

2015 Updated chart



2013 Original chart