Greater Cambridge Local Plan

Transport Evidence Report

Preferred Option Update

Cambridgeshire County Council

October 2021

Cambridgeshire County Council

Revision	Date	Originator	Checker	Approver	Description
A	Aug 20	LMW	LMW	JS	Draft
B	Sept 20	LMW	LMW	JS	2nd Draft
C	Sept 20	LMW	LMW	JS	3rd Draft
D	Oct 20	LMW	LMW	JS	4th Draft
E	Oct 20	LMW	LMW	JS	5th Draft
F	Oct 20	LMW	LMW	JS	6th Draft
G	Nov 20	LMW	LMW	JS	7th Draft
H	Nov 20	LMW	LMW	JS	First publication as part of Interim Evidence
I	Aug 21	LMW, MB, NH, KK	LMW	JS	Draft Preferred Option Update
J	Sep 21	LMW, MB, NH, KK	LMW	JS	Second Draft Preferred Option Update
K	Oct 21	LMW, MB, NH, KK	LMW	JS	Preferred Option Update

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Glossary

2015 Base Year: The base year in CSRM2 E Series, from which the 2041 Baseline was derived. The base year model is validated using observed traffic counts.

2041 Baseline: The growth scenario in CSRM2 for 2041 that acts as a baseline against which the additional growth included in the Greater Cambridge Local Plan has been assessed against. It includes committed development in Greater Cambridge comprising allocations from the current 2018 Cambridge Local Plan and South Cambridgeshire Local Plan and development with planning permission. It also includes allocations from the Local Plans of surrounding districts.

CSRM2: Cambridge Sub-Region Model 2. The Cambridge Sub-Region Model 2 is a strategic transport model with a number of separate modules that together allow for the assessment of land use and transport proposals on the transport network of the Greater Cambridge area.

- **CSRM2 E Series:** the version of CSRM2 used to assess the Strategic Spatial Options in Part 1 of this report
- **CSRM2 F Series:** the version of CSRM2 used to assess the Preferred Option tests in Part 3 of this report
- **Model sectors / zones**: Subdivisions of the CSRM2's geographical coverage. Sectors cover broad areas, and zones are smaller areas within the sectors.

EEFM: The East of England Forecasting Model, which projects economic, demographic and housing trends in a consistent fashion, which has been used by widely by local authorities producing local plans within.

EWR: East West Rail. In this report, East West Rail refers to the Central Section of the overall proposals for a rail route between the East of England and Oxford and the west and south west of England. The Central Section proposals are for a railway on a new alignment between Bedford and Cambridge, with two intermediate stations, in the Tempsford / St Neots area and in the Cambourne area.

Free Flow Speed: Free Flow Speed is the time it would take to drive at the posted speed limit if there were no obstructions or congestion

Greater Cambridge: The administrative areas of the City of Cambridge and the District of South Cambridgeshire.

Green Belt: A statutory designation made for the purposes of:

- checking the unrestricted sprawl of large built-up areas
- preventing neighbouring towns from merging into each other
- assisting in safeguarding the countryside from encroachment
- preserving the setting and special character of historic towns and
- assisting in urban regeneration by encouraging the recycling of derelict and other urban land. (Source: NPPF, 2021).

HQPT: High Quality Public Transport. Used to refer to a bus service with a frequency of six or more buses per hour, or a rail route with four or more trains per hour

Mode Share / Modal Share: The proportion of trips, expressed as a percentage of the total number of trips on the local transport network, made by a particular method of transport. Broadly speaking, most local trips are made by walking, cycling, bus, rail, taxi, motorcycle or moped, or by a car, van or goods vehicle. In this report, transport modes are generally grouped as follows:

- **Active modes**: A trip undertaken by walking or cycling
- **Public Transport**: A bus or rail trip accessed by walking or cycling at both ends of the journey
- **Park & Ride (including Park & Rail)**: A single trip involving a car journey to a Park & Ride site or a railway station, and an onward bus or rail journey to the ultimate destination from that Park & Ride site or station
- **Park & Active**: A single trip involving a car trip to a transport interchange – typically a Park & Ride site – and an onward trip on foot or by bicycle to the ultimate destination from that site. The functionality to assess and report Park & Active was introduced in CSRM F Series.
- **Car**: A trip undertaken as the driver or passenger in a motor vehicle, including private cars, taxis, goods vehicles, mopeds and motorcycles.

PCU: Passenger Car Unit. A car with one occupant is equivalent to 1 PCU, and other vehicle types have factors applied to them so the capacity of a transport network in a transport model can be assessed consistently with different mixes of vehicles / travellers.

Peak hours / Inter-peak: The period for which the CSRM2 outputs results for. The AM and PM peaks are the busiest hours in the morning and evening peak periods respectively. In CSRM2 the peaks are:

- AM peak (08:00 – 09:00)

- Average inter-peak hour (average hourly flow between 10:00 – 16:00)
- PM peak (17:00 – 18:00)

Preferred Option: The development scenario selected by the Greater Cambridge Shared Planning Service to be taken forward for further consultation and development work through the statutory plan making processes, following the initial stages of public and stakeholder consultation and plan development which considered development strategy options.

Sensitivity tests: A series of additional model runs undertaken to test scenarios or assumptions not covered by the Strategic Spatial Options, or transport schemes not sufficiently advanced to be included in the 2041Baseline.

Strategic Spatial Options (SOs, SO1, SO2 etc): Development scenarios, eight of which – the core Strategic Spatial Options – were developed by Greater Cambridge Shared Planning informed by the 'First Conversation' consultation, and two of which followed later to inform the Preferred Option. The Strategic Spatial Options were tested by Cambridgeshire County Council using the CSRM2 to assess their transport impacts, as discussed in this report.

Trip Budget: A transport policy approach that sets a limit on the level of vehicular trips that can be generated from a particular development. The policy seeks to ensure through all stages of the planning process that there are tools and mechanisms in place to comply with those limits. This may include commitments to provision of forms and mixes of development that internalises many trips, to infrastructure provision for non-car modes, to transport service provision, and to levels of car and cycle parking, and the management of that parking.

Trip Internalisation: Trips generated by a development that do not leave the development site, and therefore minimise their impact on the local transport network beyond the site. These trips are often of shorter distance and made on foot or by bicycle.

Executive Summary

Cambridgeshire County Council are working with Greater Cambridge Shared Planning (GCSP) to provide a transport evidence base to support the preparation and examination of the Greater Cambridge Local Plan that will run to 2041. This report forms the Transport Evidence that supports the emerging Local Plan.

Part 1: Assessment of Strategic Spatial Options 1 to 8

The results reported in Part 1 of this report represent the initial phase of the testing (interim report published November 2020) which focused on eight (non site-specific) Strategic Spatial Options identified by GCSP. The levels of growth and the Strategic Spatial Options tested in this phase were informed by the initial spatial choices set out in the First Conversation consultation (Issues and Options, held in January / February 2020), and by subsequent evidence. The three growth level options considered were:

- Minimum – Standard Method homes-led
- Medium – Central scenario employment-led
- Maximum – Higher scenario employment-led

The Strategic Spatial Options each focused on a different form of development, and all were assessed against the Maximum growth level for consistency and to test maximum impacts on the transport network. They were analysed against a number of transport and highway metrics, and against their ability to minimise the need to travel by car, and to reduce the carbon emissions associated with the transport demands of growth (using levels of vehicular travel as a proxy for this). The relative performance of the eight options was as follows:

Best Performing Options

- Strategic Spatial Option 1: Densification

Medium Performing Options

- Strategic Spatial Option 2: Edge non-Green Belt
- Strategic Spatial Option 3: Edge Green Belt
- Strategic Spatial Option 7: Integrating Homes and Jobs
- Strategic Spatial Option 8: Expanded Growth Area
- Strategic Spatial Option 6: Public Transport Corridors

Poorly Performing Options

- Strategic Spatial Option 4: New Settlements

- Strategic Spatial Option 5: Villages

Performance of individual development locations

The relative performance of the Strategic Spatial Options does not always reflect the performance of the sites within them. The hierarchy of best performing sites that were tested in transport terms is as follows:

Best Performing Locations

- Densification of Cambridge – North East Cambridge
- Edge of Cambridge – non-Green Belt – Cambridge East
- Edge of Cambridge Green Belt – varies by location
- Densification of Cambridge – Small sites

Medium Performing Locations

- Accelerated growth at existing new towns
- New Settlement G: South of Cambourne
- New Settlement A: South East of Cambridge
- Better performing villages

Poorly Performing Locations

- New Settlement E: South West of Cambridge 1
- New Settlement B: South of Cambridge 1
- New Settlement C: South of Cambridge 2
- New Settlement D: South of Cambridge 3
- New Settlement F: South West of Cambridge 2
- Poorly performing villages

Locations within Cambridge generally performed very well in transport terms, as did sites on the edge of Cambridge. New settlements performed well if they were served by good Public Transport links, and generally, if they were of a larger size, with a greater range of employment opportunities, services and facilities available locally that meant that there was more opportunity for shorter distance local trips.

Part 2: Assessment of Strategic Spatial Options 9 and 10

To inform the development of a Preferred Option, two further options were developed:

- Strategic Spatial Option 9: Preferred Option growth level, Preferred Option spatial strategy
- Strategic Spatial Option 10: Blended Strategy including Edge of Cambridge: Green Belt

Both options included growth at North East Cambridge and at Cambridge East. The main difference between them was that SO9 includes additional growth at an expansion of Cambourne, while SO10 substitutes this for additional development on the edge of Cambridge in the Green Belt. These options were assessed using data from the testing of the original eight options.

It was concluded that both options could achieve low levels of car use and high levels of Active Travel and Public Transport use. Strategic Spatial Option 10 would likely require less site-specific mitigation, but conversely, development at Cambourne in Strategic Spatial Option 9 would benefit from the planned Cambourne to Cambridge Public Transport Scheme and the East West Rail Central Section.

Part 3: Assessment of the Preferred Option

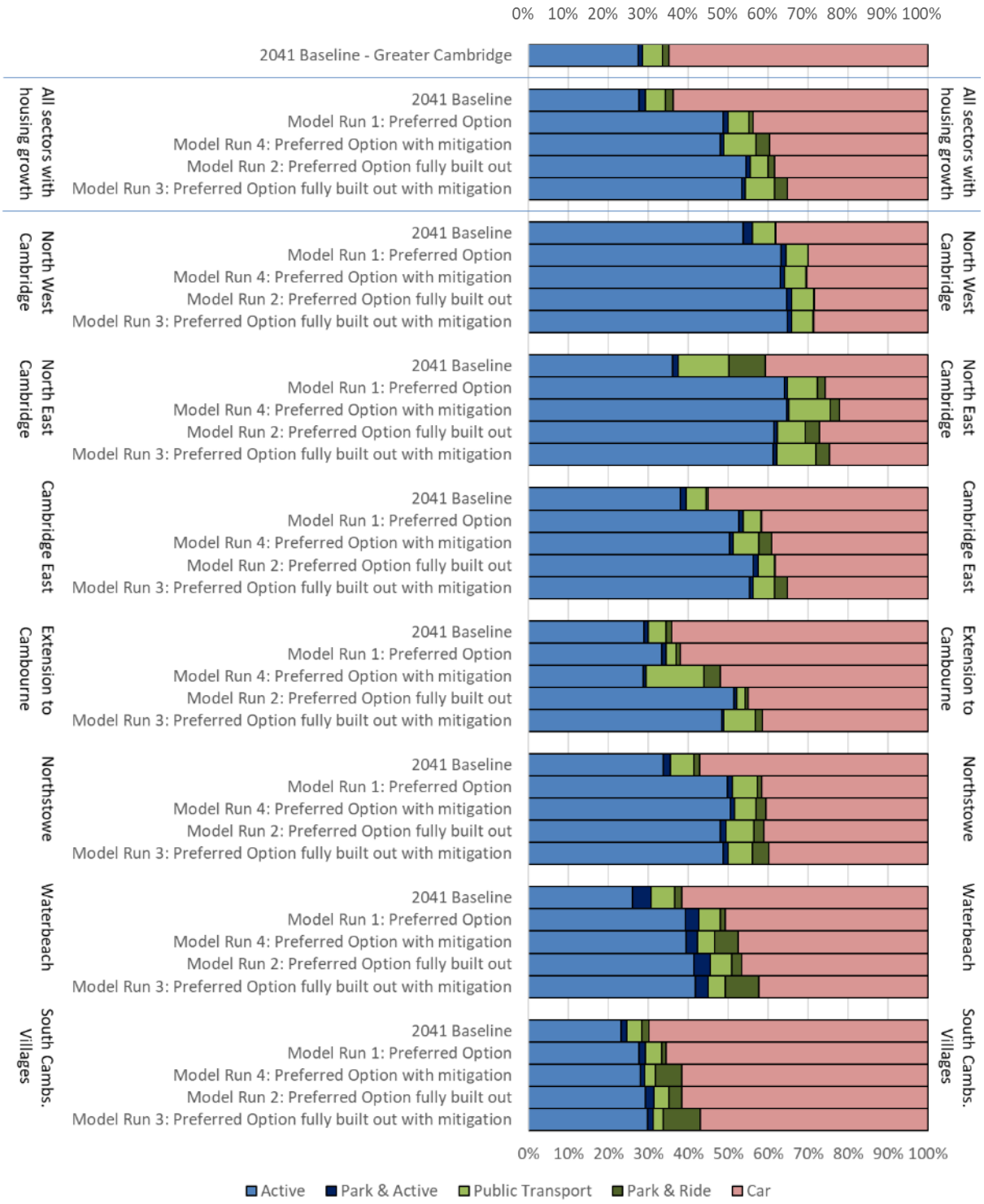
Once the working assumption Preferred Option was identified, four model runs were undertaken. The model runs were:

- 1: Preferred Option to 2041
- 2: Preferred Option (Full Build Out)
- 3: Mitigation run (Full Build Out)
- 4: Mitigation run (2041)

Model Runs 1 and 2 demonstrated the transport demand of the Preferred Option and showed that the development in it will inherently, before including any mitigation, achieve lower proportions of trips made by car than currently seen on the Greater Cambridge transport network. Model Runs 3 and 4 demonstrated that the mitigation planned will further increase the levels of Active Travel and Public Transport use from the new development.

Sector Analysis of the Preferred Option confirmed the relative performance of the locations for housing growth included in the Preferred Option that was seen in the Modelling of the Strategic Spatial Options in Part 1 of this report.

Mode shares, 2041 Baseline trips, and of new trips in Preferred Option Model Runs 1 to 4



Best Performing Housing Locations

- Densification of Cambridge – North East Cambridge
- Edge of Cambridge – non-Green Belt – North West Cambridge
- Edge of Cambridge – non-Green Belt – Cambridge East

Medium Performing Housing Locations

- Accelerated growth at Northstowe and Waterbeach to 2041

- Expansion of Cambourne
- Dispersal to Rural Centres, Minor Rural Centres and Group Villages with very good Public Transport

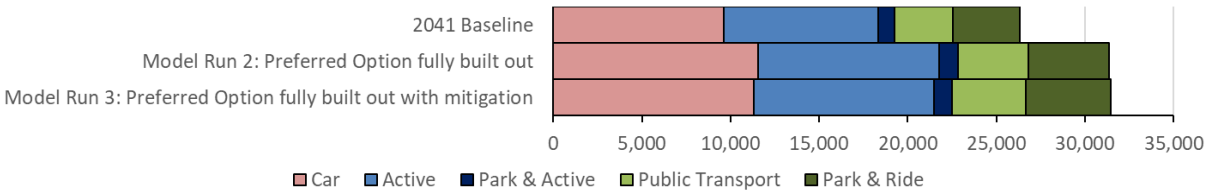
Mitigation measures

The mitigation measures tested did not include policy interventions such as vehicular trip budgets, that are already planned for a number of the strategic sites and will be considered at other sites. The performance of the Preferred Option in achieving low levels of car use would be enhanced further with these measures.

Additional employment growth at the Cambridge Biomedical Campus

For the Full Build Out Model Runs it was also assumed that there would be an additional 8,000 jobs situated at the Cambridge Biomedical Campus. These additional jobs would lead to increased trip making to and from the campus and to a small reduction from the already low mode share of car travel to the campus with the mitigation package.

All trips in the Cambridge Biomedical Campus model zone in the 2041 Baseline, and in the Preferred Option, fully built out, and fully built out with mitigation



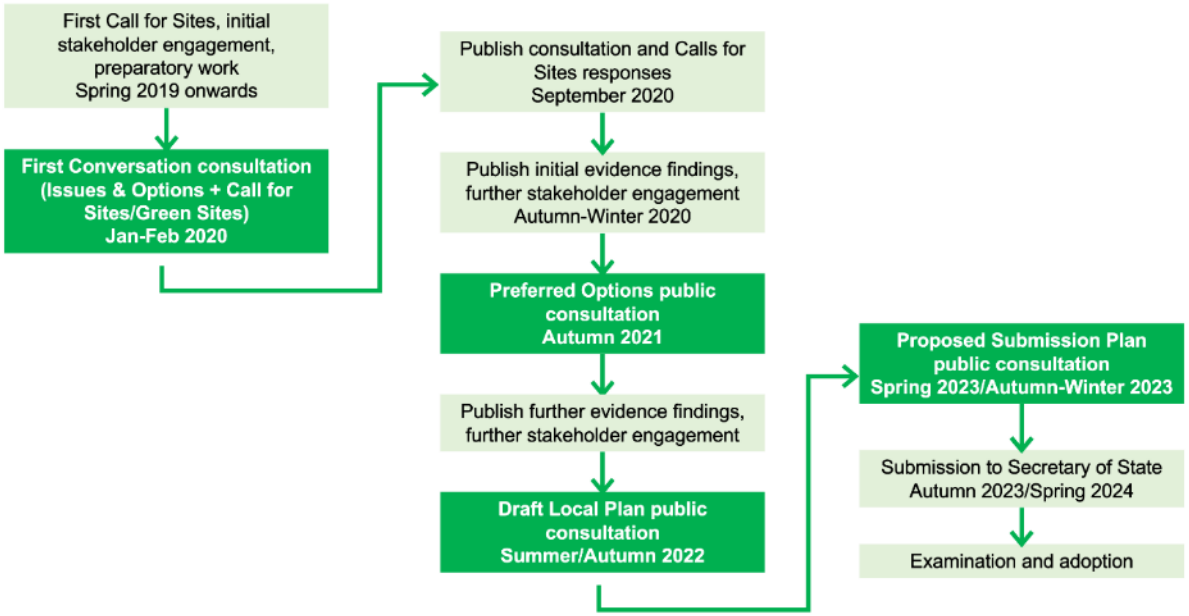
Part 3 conclusions

Overall, the analysis of the modelling of the Preferred Option demonstrated that sustainable transport patterns would be achieved with development at the proposed locations: the transport demand of the Preferred Option will achieve, even without mitigation, much lower proportions of trips by car than currently seen on the Greater Cambridge transport network. It confirmed that to provide the best opportunity to minimise car travel and achieve greater use of active modes and public transport, a scale of development that allows opportunity for employment and services needs to be met on site was necessary. This applies particularly to new settlements at locations that are remote from Cambridge, although the performance of Cambridge urban fringe sites also improves with higher levels of growth.

Introduction

Cambridgeshire County Council is working with Greater Cambridge Shared Planning to provide a transport evidence base to support the preparation and examination of the Greater Cambridge Local Plan that runs to 2041. The process of Local Plan preparation is set out below.

Process of Local Plan Preparation



This report forms the Transport Evidence that supports the emerging Local Plan. The information set out in this report will help inform the spatial distribution of development within the Local Plan. This Report should be read in conjunction with the 'Existing Conditions' Report that sets out the current situation for all transport modes in the Greater Cambridge Area.

Part One of this report describes the initial phase of the testing, which focuses on the impact of eight Strategic Spatial Options on the level of trip making and mode shares in the Greater Cambridge area. The Strategic Spatial Options assessed in Part One are:

- SO1: Densification of existing urban areas (Densification)
- SO2: Edge of Cambridge – outside the Green Belt (Edge – non-Green Belt)
- SO3: Edge of Cambridge – Green Belt (Edge – Green Belt)
- SO4: Dispersal – new settlements (New Settlements)
- SO5: Dispersal – villages (Villages)
- SO6: Public Transport Corridors (PT Corridors)

- SO7: Supporting a high-tech corridor by integrating homes and jobs (Integrating Homes and Jobs)
- SO8: Expanding a growth area around transport nodes (Expanding Growth Area)

Ahead of confirming the Preferred Option development strategy, Greater Cambridge Shared Planning identified working assumptions for two further Strategic Spatial Options to be assessed to inform the selection of the Preferred Option. These are:

- SO9: Preferred Option growth level, Preferred Option spatial strategy
- SO10: Blended Strategy including Edge of Cambridge: Green Belt

Part Two of this report assesses these two options, and considers their likely performance compared to core Strategic Spatial Options tested in Part One.

Part Three of this report details the assessment of the Preferred Option that emerged following the consideration of the initial evidence, including the Transport Evidence included in Parts One and Two.

The Greater Cambridge Local Plan – First Proposals public consultation is planned for the autumn 2021, including a preferred strategy and draft allocations, and this report forms part of the evidence base for that consultation.

Further assessment work as the Local Plan is developed

The assessment to date provides a robust evidence base for the Preferred Option stage of the Local Plan. There will be a need for further assessment as the Local Plan develops towards a draft plan, including additional work to refine the scope and detail of the package of mitigation measures.

Part 1: Assessment of Strategic Spatial Options 1 to 8

1 The Strategic Spatial Options (Non-Site Specific)

1.1 Introduction to Part 1

1.1.1 Cambridge City Council and South Cambridgeshire District Council completed public consultation on the Greater Cambridge Local Plan First Conversation (Issues and Options) in early 2020. Building on the initial options set out in the First Conversation, the Councils have identified three growth level options for homes and jobs and eight Strategic Spatial Options (non-site specific) for testing.

1.1.2 Descriptions of the options and explanations of how they were developed is set out in the "Greater Cambridge Local Plan: Strategic Spatial Options for testing – methodology" document

1.1.3 The Councils have asked consultants producing Local Plan evidence studies, including the Sustainability Appraisal, to assess the Strategic Spatial Options with regard to their initial evidence findings. This report forms one element of that assessment.

1.1.4 The initial evidence findings were reported to the Joint Local Planning Advisory Group in autumn 2020 and will help inform further engagement with stakeholders.

1.1.5 The purpose of Part One of this report is to:

- Set out the modelling methodology used in the assessment of the identified Strategic Spatial Options.
- Set out the details of the scale of development that forms the 2041 Baseline that has been used as the starting point for the assessment of the Strategic Spatial Options
- Set out the assumptions made for each of the Strategic Spatial Options, including the quantum and location of development
- Provide high level results setting out the impact of each Strategic Spatial Options on transport networks
- Provide a high-level indication of the deliverability of each Strategic Spatial Options in transport terms.

1.1.6 Part 1 of this report is structured as follows:

- Chapter 1: Chapter 1: The Strategic Spatial Options (Non-Site Specific)
- Chapter 2: Strategic Spatial Options 1 to 8 Modelling Methodology
- Chapter 3: Analysis of Strategic Spatial Options 1 to 8
- Chapter 4: Sensitivity Tests on Strategic Spatial Options 2 and 4
- Chapter 5: Strategic Spatial Options 1 to 8: Conclusions

1.2 The Strategic Spatial Options

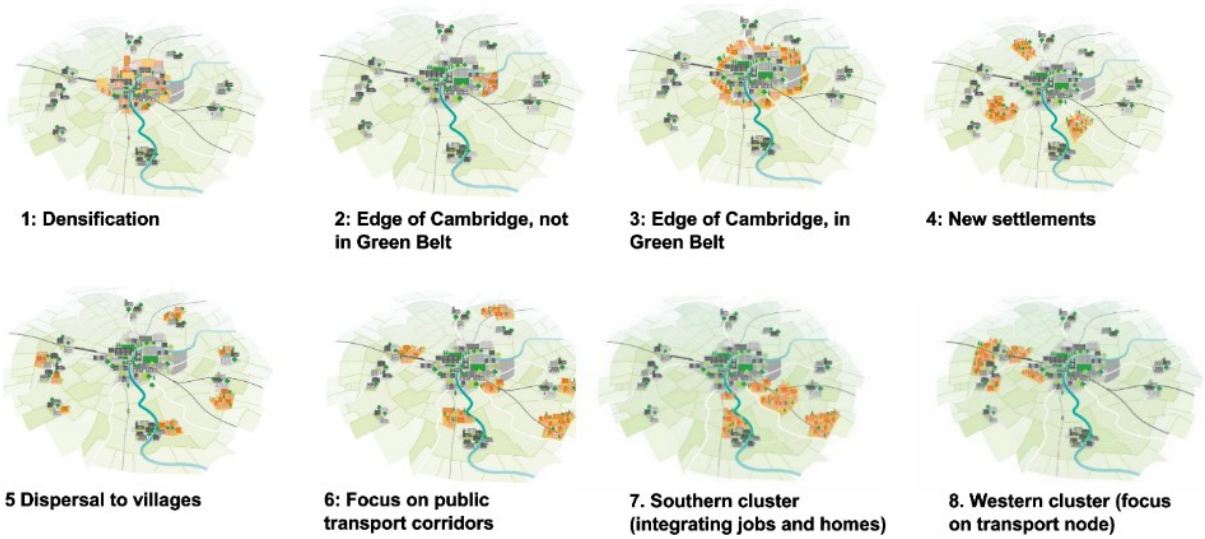
1.2.1 The three growth level options tested through the Local Plan are:

- Minimum: Standard Method homes-led
- Medium: central scenario employment-led
- Maximum: higher employment-led

1.2.2 The Strategic Spatial Options are shown illustratively in Figure 1 and listed below:

- SO1: Densification of existing urban areas (Densification)
- SO2: Edge of Cambridge – outside the Green Belt (Edge – non-Green Belt)
- SO3: Edge of Cambridge – Green Belt (Edge – Green Belt)
- SO4: Dispersal – new settlements (New Settlements)
- SO5: Dispersal – villages (Villages)
- SO6: Public Transport Corridors (Public Transport Corridors)
- SO7: Supporting a high-tech corridor by integrating homes and jobs (Integrating Homes and Jobs)
- SO8: Expanding a growth area around transport nodes (Expanded Growth Area)

Figure 1 Illustrative representation of Strategic Spatial Options being tested



1.2.3 Ahead of confirming the working assumption Preferred Option development strategy assessed in Part Three of this report, the Councils identified working assumptions for two further Strategic Spatial Options:

- SO9: Preferred Option growth level, Preferred Option's spatial strategy
- SO10: Blended Strategy including Edge of Cambridge: Green Belt

1.2.4 Part Two of this report analyses these options, drawing from the analysis of Spatial Options 1, 3, 4 and 8 in Chapter 3 and the Sensitivity Tests on Strategic Spatial Options 2 and 4 in Chapter 4. It considers the likely performance of Strategic Options 9 and 10 compared to Strategic Spatial Options 1 to 8 as summarised in Chapter 5.

2 Strategic Spatial Options 1 to 8 Modelling Methodology

2.1 Model Tools

2.1.1 This chapter sets out the methodology used to undertake testing of the Strategic Spatial Options to support the development of the Greater Cambridge Local Plan to 2041.

2.1.2 The modelling undertaken used the Cambridge Sub-Regional Model 2 (CSRM2) E-Series which is owned by Cambridgeshire County Council and operated on behalf of the County Council by Atkins.

2.1.3 The CSRM2 consists of a highway assessment model (in the SATURN software) that is based on observed traffic data with a 2015 Base Year. In addition to this there is a variable demand model that captures the trip making potential and mode share of the sites within the model. This allows the trip generation and mode choice of differing mixes of development to be compared as the model determines the trips based on not just the number of dwellings and jobs assumed but also takes into consideration such things as the size of dwellings, the levels of car ownership, the type and location of the jobs to generate the trips for each of the Strategic Spatial Options tested. The model is compliant with current Department for Transport (DfT) guidance as set out in the Transport Analysis Guidance (TAG)

2.1.4 CSRM2 covers the administrative districts of Cambridge City, South Cambridgeshire as well as Huntingdonshire and East Cambridgeshire.

2.1.5 The modelling undertaken to date does not take any account of the impact of COVID-19, as the CSRM2 base model is validated to 2015 observed data. This is considered to be compliant with current DfT guidance as there is no certainty what travel patterns will look like once the restrictions in place to limit the spread of the COVID-19 virus are lifted. Cambridgeshire County Council are actively monitoring the impact of COVID-19 on the level of trips and mode shares in the County and future phases of modelling will refer to this ongoing work to ensure that the most robust modelling possible supports the Local Plan Transport Evidence.

2.2 Model Assumptions

2.2.1 As stated above the model has a 2015 Base Year, as this is the latest set of observed traffic counts that have been validated. This base year takes into account any development in place at that time. The 2015 Base Year has been used as the starting point for the assessment in this study. In order to be able to test the impacts of the eight Strategic Spatial Options identified it was necessary to develop 2041 Baseline. This was undertaken by adding completed developments 2015-2020 and planned development 2020-2041 (including planning permissions and adopted 2018 Local Plan allocations) to the 2015 Base Year. The 2041 Baseline model also included transport schemes that are assumed to be in place by 2041, given the level of confidence in their delivery.

2.2.2 The 2015 Base Year is not consistent with the start of the plan period, which is 2020. However, the key outputs from the study relate to transport impacts in 2041 from all jobs and homes in Greater Cambridge, rather than just the transport impacts from the new homes and jobs delivered between 2020 and 2041. The difference between the model base year and the start of the plan period does not affect the validity of this report's findings.

2.2.3 This 2041 Baseline model includes the development that is assumed to be in place by 2041 and provides a consistent starting point for testing the eight Strategic Spatial Options identified at this stage of the Local Plan process. For clarity the analysis in this report compares the 2041 Baseline to the 2015 Base, whilst the eight Strategic Spatial Options are compared to the 2041 Baseline.

2041 Baseline Development Assumptions

2.2.4 CSRM2 explicitly includes growth in dwellings and jobs as agreed with Greater Cambridge Shared Planning and Cambridgeshire County Council, which are taken as direct inputs to the model. The level of growth assumed in the 2041 Baseline has been derived from housing trajectories produced by each of the local planning authorities covered by the model, in line with the adopted Local Plan for each District. Estimates of jobs associated with 'B' class development were used for developments in the 2041 Baseline. The number of non-B-class jobs has then been distributed to match the overall level of development. The number of school places required to cater for the 2041 Baseline has been estimated using the methodology

used in the recent testing of the Greater Cambridge Partnership and Combined Authority transport schemes. This methodology is based on the estimated number of children generated by the proposed level of housing included in the 2041 Baseline.

2.2.5 The growth assumed in the 2041 Baseline has been assigned to the relevant zones within the model which are in line with the output areas in the 2011 Census. The zones are then grouped into larger sectors and these sectors have been used to assess the impact of the eight Strategic Spatial Options. The sectors used in this report are set out in Figure 2 below.

2.2.6 The resulting quantum of development assumed in each sector for the 2041 Baseline is set out in Table 1.

2.2.7 Outside of the CSRM2 modelled area, the level of growth in jobs is assumed to be in line with the National Trip End Model (NTEM) produced by the Department for Transport, while the population growth is sourced from the Office for National Statistics.

2.2.8 In summary, the development quantum in the CSRM2 modelled area (which includes Cambridge City, South Cambridgeshire, Huntingdonshire, and East Cambridgeshire) assumed to be in the 2041 Baseline is as set out in Table 2.

Figure 2 Sectors within the Cambridge Sub-Region Model 2 (CSRM2)

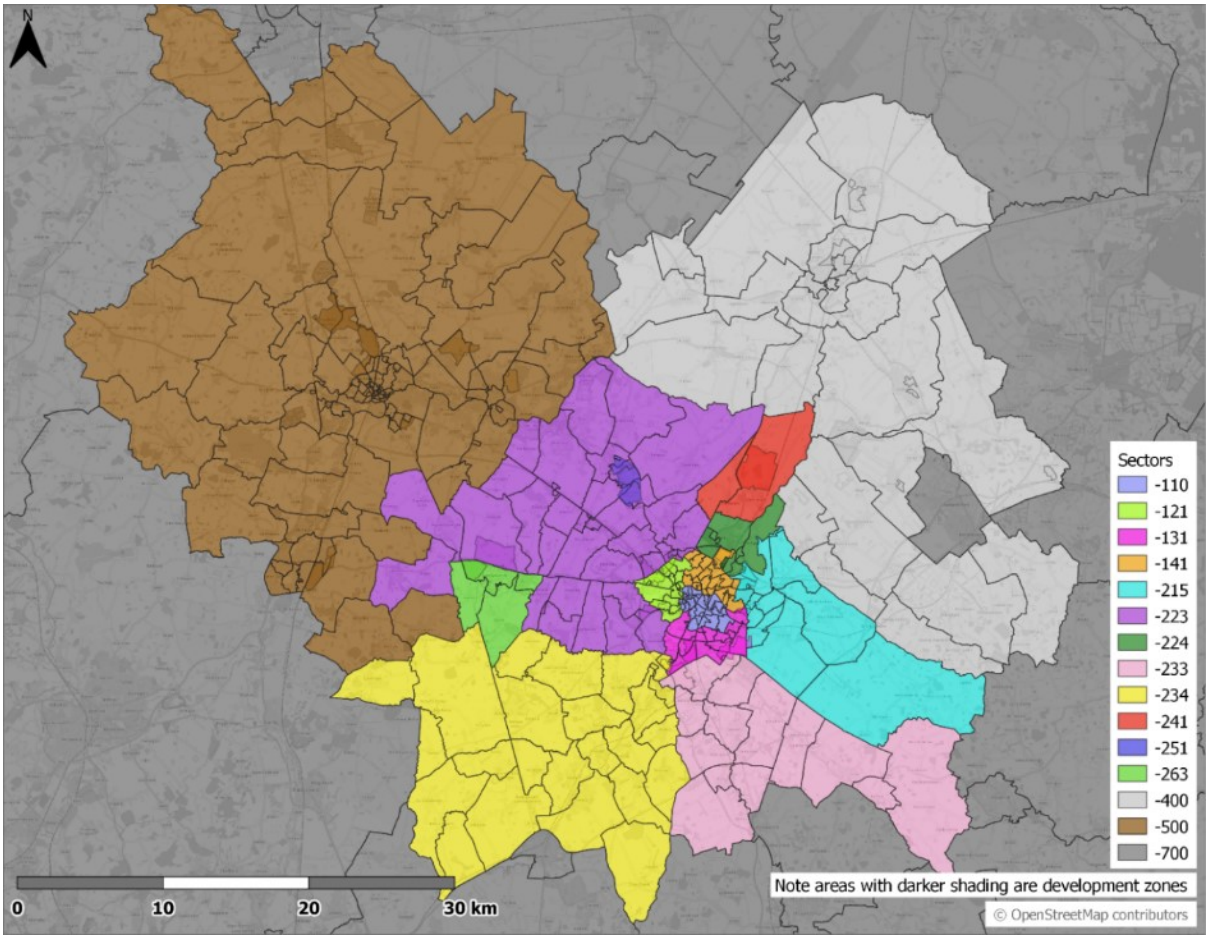


Table 1 2041 Baseline Development Distribution by Sector

Sector	Sector Description	Dwellings	Employment
-110	Cambridge Central	19,093	40,114
-121	Cambridge North West + West	12,287	21,881
-131	Cambridge South	15,202	31,974
-141	Cambridge North East	17,892	21,875
-215	S Cambs. East	7,829	10,906
-223	S Cambs. North West	30,161	29,044
-224	S Cambs. North	2,700	10,138
-233	S Cambs. South	13,620	23,776
-234	S Cambs. South West	16,500	12,962
-241	Waterbeach	7,894	7,067
-251	Northstowe	6,181	3,267
-263	Cambourne Bourn + Caxton	10,597	9,578
-400	East Cambridgeshire	48,149	43,179
-500	Huntingdonshire	97,568	91,566
Total	**All Sectors**	**305,673**	**357,326**

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Table 2 Total Dwellings and Jobs in 2041 Baseline

Development type	2041
Dwellings	305,673
Jobs	357,326

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

2041 Baseline In- and out-commuting

2.2.9 The level of in- and out-commuters are considered separately in the model. In-commuters are defined as people who live outside the CSRM2 modelled area but work inside it; out-commuters are those who live inside but work outside. The following are the key inputs to calculating in- and out-commuter volumes:

- The population per dwelling
- The total resident population
- The proportion of the population that work
- The numbers of workers per household
- In-commuters as a percentage of internal jobs (that is., jobs within the modelled area)
- Out-commuters as a percentage of internal workers

2.2.10 These figures are based on the East of England Forecasting Model (EEFM) which provides a set of baseline forecasts prepared by a leading independent forecasting house for the East of England region. The levels used in the 2041 Baseline are as set out in Table 3.

Table 3 2041 Baseline In- and Out-commuting

2041 Baseline	2041 (EEFM in-commuting)
Dwellings (input)	305,673
Jobs (input)	357,326
Population per Dwelling (input)	2.30
Population (calculated)	703,202
Working Population Rate (input)	47.9%
Workers (calculated)	336,717
In-commuters as % of internal total jobs (input)	22.8%
Out-commuters as % of internal total workers (calculated)	18.1%
In-commuters (absolute) (calculated)	81,429
Out-commuters (absolute) (calculated)	60,821

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

2.2.11 From Table 3, it can be seen that in the 2041 Baseline it is assumed that there are 81,429 in-commuters and 60,821 out-commuters.

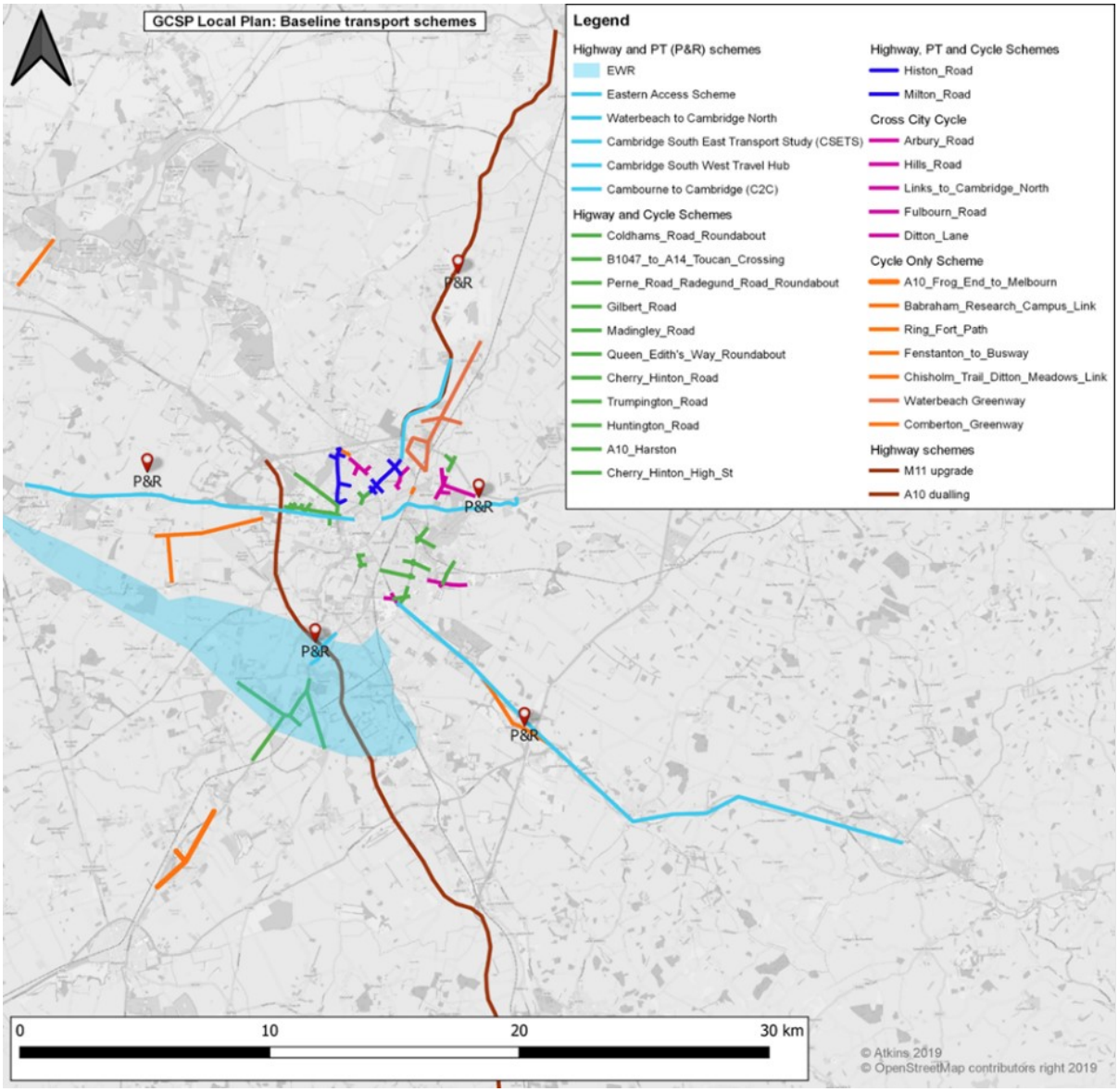
2041 Transport Schemes

2.2.12 In addition to the above levels of development there is a need to include the transport schemes that are considered likely to be in place by 2041 to mitigate the levels of development proposed. The transport schemes[1] included in the 2041 Baseline are as follows, and as shown in Figure 3.

- Greater Cambridge Partnership (GCP) schemes:
  - Cambourne to Cambridge
  - Cambridge South East Transport Study
  - Cambridge South West Travel Hub
  - Waterbeach to Cambridge
  - Cambridge Eastern Access
  - City Access
  - Foxton Rural Travel Hub
  - GCP Cycle Schemes
- The A428 Black Cat to Caxton Gibbet
- Cambridge South Station
- The A10 (Ely to Cambridge) highway improvements.

[1] Some of these schemes are at an early stage of development and therefore they are represented in the model by “proxies” to represent the impact of the proposed scheme on the wider transport networks. The coding for these schemes used in this assessment is that used in the recent modelling of the various GCP schemes and the Cambridge Autonomous Metro (CAM) Outline Business Case.

Figure 3 Transport Schemes included in the 2041 Baseline



2.2.13 In addition, it has been assumed that there will need to be an improvement to the M11 around Cambridge, relating to transport growth generated by through traffic arising from outside of the model area. This has been assumed to be in line with Highways England's previous scheme that was considered for inclusion in the national programme.

2.2.14 The Royston to Granta Park Strategic Growth and Transport Study, East West Rail (EWR) Central Section and the Cambridge Autonomous Metro (CAM) are not included within the core tests due to the uncertainty regarding the schemes and when they might be delivered, but given the significant potential implications of the EWR and CAM schemes, these have been included in Sensitivity Tests in Chapter 4 of this report.

2.3 Strategic Spatial Option Tests

2.3.1 This section sets out the details of the eight Strategic Spatial Options that are tested in this phase of the modelling. The level of development in each of the Strategic Spatial Options is the same with only the location of the development changing. The tests undertaken in this initial phase of the modelling assume that the level of additional development is the same across all the Strategic Spatial Options, so as to give a fair comparison of the impacts of each Strategic Spatial Option on the transport networks within the Greater Cambridge area.

Growth Scenarios

2.3.2 There are three growth level options tested through the Local Plan, these are:

- Minimum – Standard Method homes-led
- Medium – central scenario employment-led
- Maximum – higher employment-led

2.3.3 The testing of the eight Strategic Spatial Options reported below utilises the maximum growth option. This level of growth was chosen as it enables the maximum transport impacts of the eight Strategic Spatial Options to be assessed and therefore allowed an assessment to be made as to whether this level of development could be accommodated on the transport networks. The potential impact of the minimum and medium options will be tested via the Sensitivity Testing (see Chapter 4).

2.3.4 The maximum growth scenario tested in this first phase of transport modelling assumes a 1:1 relationship between additional jobs above those supported by the minimum Standard Method calculations and additional resident workforce (that is, each job over that indicated by the Standard Method will be filled by residents from within the Greater Cambridge Area). This is to test the maximum level of homes that might be delivered through the plan-making process. Variations to this assumption are included as Sensitivity Tests (see Chapter 4).

Strategic Spatial Options Assumptions

2.3.5 This section sets out the assumptions made for each of the Strategic Spatial Options.

In-Commuting Assumptions

2.3.6 Table 4 below shows the level of development included in each of the eight Strategic Spatial Options tested in Part One of this report. This level of development has been added to the 2041 Baseline figures set out in Table 2 above.

Table 4 Development Quantum (Maximum Method) for Strategic Spatial Options

Development type	Development quantum: 2041
Dwellings	26,389
Jobs	11,810

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

2.3.7 As stated above the level of in-commuting has been fixed for the tests undertaken at this stage. In-commuters are defined as people who live outside the CSRM2 model area but work inside it; out-commuters are those who live inside the model area but work outside. The CSRM2's study area covers the whole of Greater Cambridge, Huntingdonshire and East Cambridgeshire – so in and out-commuters are those with a home or job outside of the four districts (not just the Greater Cambridge area). However, the figures for Huntingdonshire and East Cambridgeshire are fixed in all scenarios; only the levels of in-commuting in Greater Cambridge vary.

2.3.8 The levels of in and out-commuting assumed in the 2041 Baseline were taken from the East of England Forecasting Model (EEFM) as were the figures for the 2041 Standard Method. The number of in-commuters generated for the Standard Method was then taken into the 2041 Maximum Method, the resulting levels of in and out-commuting are set out in 0.

Table 5 Level of In- and Out-Commuting

Metric	2041 Baseline	2041 "Standard Method"	2041 "Maximum Method"
Dwellings (input)	305,673	309,697	332,062
Jobs (input)	357,326	335,439	369,136
Population per Dwelling (input)	2.30	2.30	2.30
Population (calculated)	703,202	712,459	763,910
Working Population Rate (input)	47.9%	47.9%	47.9%
Workers (calculated)	336,717	341,150	365,787
In-commuters as % of internal total jobs (input/calculated)	22.8%	22.8%	20.7%
Out-commuters as % of internal total workers (calculated)	18.1%	24.1%	20.0%
In-commuters (absolute) (calculated/input)	81,429	76,442	76,442
Out-commuters (absolute) (calculated)	60,821	82,153	73,092

Note: The proportion of in-commuters is an input for the Baseline and Standard Method but is calculated for the Maximum Method to fix the absolute number of in-commuters at the Standard Method level ("consume your own smoke").
The number of in-commuters is calculated for the Baseline and Standard Method but is an input for the Maximum method (fixed at the Standard Method value).

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

2.3.9 From the information in 0 it is possible to see that the percentage of in-commuters remains the same in the 2041 Baseline and the 2041 Standard Method at 22.8%, but drops to 20.7% in the 2041 Maximum Method as the absolute number of in-commuters is fixed at 76,442 in line with the number indicated by the minimum Standard Method.

2.3.10 It is also possible to see that the absolute number of out-commuters drops in the Maximum Method from that indicated by the Standard Method, this similarly indicates that more Greater Cambridge residents are able to take internal jobs than under the minimum - Standard Method.

Development Assumptions

2.3.11 Table 6 and Table 7 set out the number of dwellings and jobs in the CSRM2 in each sector in each of the spatial options tested at this stage of the process. Note that in Table 6, the Strategic Spatial Options figures include 8,689 dwellings associated

with growth between 2015 (CSRM2 Base Year) and 2020 (Local Plan Base Year), on top of the 17,700 dwellings in the maximum growth scenario between 2020 and 2041.

Table 6 Sectored Dwelling Changes 2015-41

Sector	2041 Baseline	SO1: Densifi-cation	SO2: Edge - non-Green Belt	SO3: Edge – Green Belt	SO4: New Settlements	SO5: Villages	SO6: Public Transport Corridors	SO7: Integrating homes+ jobs	SO8: Expanded growth area
-110 Cambridge Central	3,182	1,599	-8	-	-	-	-5	-5	-5
-121 Cambridge NW+West	4,073	740	-5	1,239	-	-	-3	-3	-3
-131 Cambridge South	4,511	1,081	-6	4,248	-	-	-4	-4	-4
-141 Cambridge North East	1,571	8,192	7,170	-	-	-	5,239	5,114	5,114
-215 S Cambs East	2,550	1,785	1,931	7,080	4,550	912	253	1,932	1,932
-223 S Cambs North West	6,057	674	-13	2,301	-	7,116	1,269	-8	3,501
-224 S Cambs North	195	3,050	2,822	-	-	654	3,078	1,714	1,714
-233 S Cambs South	1,702	582	2,763	2,832	4,550	3,982	6,648	9,014	-4
-234 S Cambs South West	2,706	36	3,122	-	4,550	2,955	762	-4	-4
-241 Waterbeach	5,444	3,997	3,995	4,000	4,000	4,554	4,508	3,997	3,997
-251 Northstowe	6,181	3,817	3,815	3,819	3,819	3,819	3,816	3,816	3,816
-263 Cambourne Bourn + Caxton	6,177	868	865	870	4,920	2,396	867	867	6,375

Sector	2041 Baseline	SO1: Densifi-cation	SO2: Edge - non-Green Belt	SO3: Edge – Green Belt	SO4: New Settlements	SO5: Villages	SO6: Public Transport Corridors	SO7: Integrating homes+ jobs	SO8: Expanded growth area
-400 East Cambridgeshire	11,390	-10	-20	-	-	-	-13	-13	-13
-500 Huntingdonshire	23,693	-21	-41	-	-	-	-26	-26	-26
Total: 2015 to 2041	**79,432**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**

Note: The small negative values are due to some redistribution of the locations of forecast dwellings in 2041 that occurs when the Spatial Options are added. This is a redistribution of development in 2041 that is., dwellings that have not been built yet.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Table 7 Sectored Job Changes

Sector	2041 Baseline	SO1: Densifi-cation	SO2: Edge - non-Green Belt	SO3: Edge – Green Belt	SO4: New Settlements	SO5: Villages	SO6: Public Transport Corridors	SO7: Integrating homes+ jobs	SO8: Expanded growth area
-110 Cambridge Central	1,819	362	-3	-	-	-	-2	-2	-2
-121 Cambridge NW+West	8,256	167	-2	560	-	-	-1	-1	-1
-131 Cambridge South	8,892	245	-3	1,920	-	-	-2	-2	-2
-141 Cambridge North East	1,300	3,619	2,883	-	-	-	2,654	2,464	2,464

-215 S Cambs East	1,398	562	845	3,200	2,010	412	57	845	845
-223 S Cambs North West	5,204	153	-2	1,040	-	3,216	288	-2	794
-224 S Cambs North	3,322	2,759	1,861	-	-	296	2,342	1,663	1,663
-233 S Cambs South	6,901	132	1,226	1,280	2,010	1,800	2,383	3,044	-1
-234 S Cambs South West	647	8	1,209	-	2,010	1,336	173	-1	-1
-241 Waterbeach	3,602	1,907	1,906	1,907	1,907	2,158	2,023	1,907	1,907
-251 Northstowe	3,267	1,406	1,406	1,406	1,406	1,406	1,406	1,406	1,406
-263 Cambourne Bourn + Caxton	4,723	497	496	497	2,466	1,187	497	497	2,746
-400 East Cambridgeshire	8,155	-2	-4	-	-	-	-2	-2	-2
-500 Huntingdonshire	12,337	-4	-8	-	-	-	-5	-5	-5
Total: 2015 to 2041	**69,825**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**

Note: The values presented for the 2041 Baseline are additional to the 2015 Base Year; those presented for each of the Spatial Options are additional to the 2041 Baseline. The negative job numbers in this table represent a redistribution of jobs locations in 2041 when the spatial options are added compared to those in the 2041 Baseline.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

3 Analysis of Strategic Spatial Options 1 to 8

3.1 Model Outputs to be assessed

3.1.1 This chapter analyses the key transport data for each of the Strategic Spatial Options in 2041, compared to the data for the 2015 Base Year and the 2041 Baseline (which includes committed development in the 2018 Local Plans and planning permissions as well as committed transport schemes that are expected to be in place at that time). It therefore allows for an understanding of the effects of different Strategic Spatial Options for new development, compared to the situation without them, but with already committed development, in 2041.

3.1.2 This then allows for comparisons to be made between the performance of each Strategic Spatial Option against a number of key transport metrics. For each metric, the analysis will look at the data at a 'Greater Cambridge-wide' level, before moving into sector-to-sector analysis, which examines in more granular detail the performance of the Strategic Spatial Options in the model. The Strategic Spatial Options do not benefit from any transport mitigation to provide for their travel demand in the analysis in this chapter.

3.1.3 The Strategic Spatial Options (SO) tested are set out below:

- SO1: Densification of existing urban areas - (Densification)
- SO2: Edge of Cambridge – outside the Green Belt – (Edge - non-Green Belt)
- SO3: Edge of Cambridge – Green Belt – (Edge – Green Belt)
- SO4: Dispersal – new settlements – (New Settlements)
- SO5: Dispersal – villages – (Villages)
- SO6: Public Transport Corridors - (Public Transport Corridors)
- SO7: Supporting a high-tech corridor by integrating homes and jobs – (Integrating homes and jobs)
- SO8: Expanding a growth area around transport nodes – (Expanded growth area).

3.1.4 It is important to note that the analysis set out below does not include any additional site-specific mitigation, and therefore the transport network is assumed to be the same as in the 2041 Baseline; the details of which are set out in paragraphs 2.2.12 to 2.2.14 and Figure 3 above.

3.1.5 Various metrics will be used in this chapter to assess each Strategic Spatial Option, using outputs from the CSRM2's Transport Demand Model and Highway Model.

Transport Demand Model outputs

- Change in the Active Travel Mode Share
- Change in the Public Transport Mode Share
- Change in the Car Mode Share.

3.1.6 These three metrics enable the changes in mode shares across all modes and the total number of vehicles on the road network (trip volume) to be assessed for each Strategic Spatial Option. However, to understand this impact below at the 'Greater Cambridge-wide' level, and to attempt to gauge how and why each Strategic Spatial Option performs as it does, the data will be further interrogated at a sector / locational level to understand:

- Absolute change in car trips between each Strategic Spatial Option and the 2041 Baseline
- Additional car trips per dwelling and / or job.

Highway Model outputs

- Change in total vehicle kilometres
- Change in total vehicle hours
- Change in total Delay.

3.1.7 These metrics from the highway model allow the scale of impact on the highway network to be assessed as they record the changes to how far is being driven in total, the time spent driving and the changes in delay.

3.1.8 To further explore the reasons for the impact of the Strategic Spatial Options on the highway network, the following metrics were assessed at a sector / locational level:

- Actual outward trips resulting from each Strategic Spatial Option (relative to all trips in the model area); and
- Settlement zone and sector internalisation rates.

3.2 Core Analysis: Trip Volumes and Mode Share

3.2.1 This section of analysis looks at the overall trip volumes from the eight Strategic Spatial Options, as well as those in the 2015 Base Year and in the 2041 Baseline. This is broken down by mode, with the modal shares for each Strategic Spatial Option then assessed and compared at a Greater Cambridge-wide level, before the best, medium and worst performing options are outlined. The focus is to identify those options that rely least on the private car and that reduce the need to travel, and whose travel demand is most likely to be least damaging in terms of the environmental and social impacts of their travel demand.

3.2.2 Following this, in order to understand the reasoning behind the car modal trip volumes resulting from each Strategic Spatial Option, the data is analysed more granularly, by looking at how and why the level of car mode trips of each Strategic Spatial Options within each sector might happen. This is especially important as whilst most of the Strategic Spatial Options have a specific focus, they also incorporate a range of other development locations within them, in order to make up the requisite homes and jobs numbers.

3.2.3 The information in 0 below shows the total number of trips in the model, across the Greater Cambridge transport network, for the 2015 Base Year, the 2041 Baseline and each of the eight Strategic Spatial Options.

Assessment of mode share of total trips

3.2.4 Mode shares are presented for:

- Active modes (walk and cycle)
- Public Transport (Bus, Guided Bus and Rail)
- Park & Ride (including Park & Rail)
- Car.

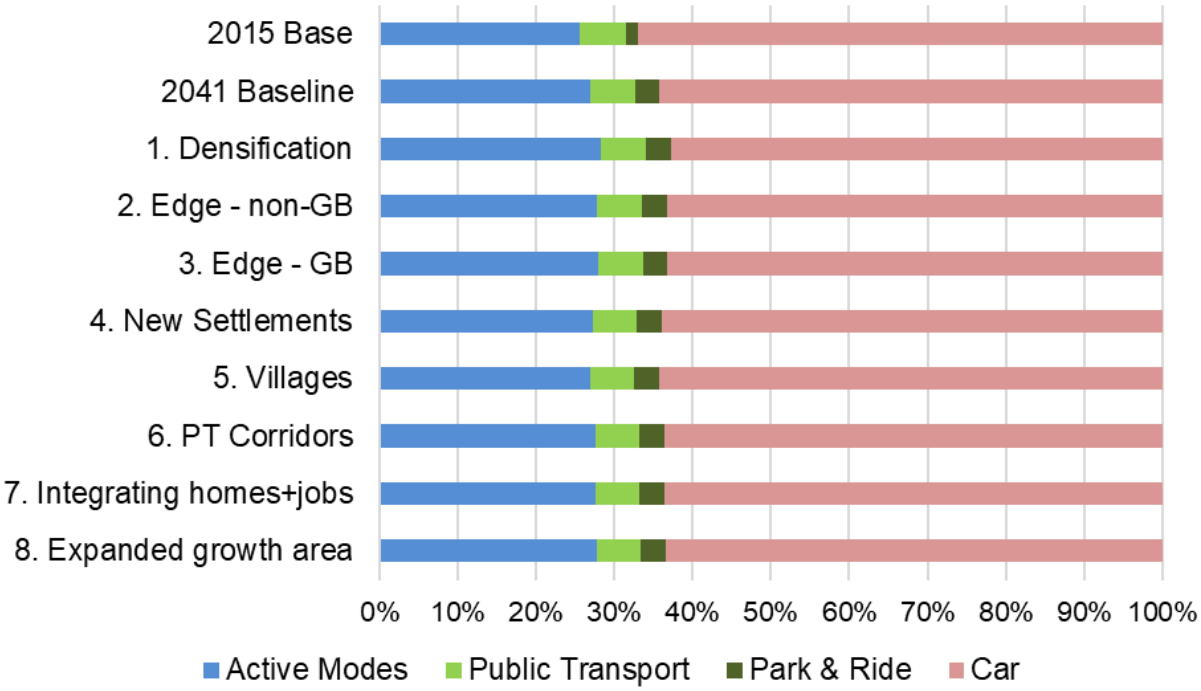
Table 8 Total Number of Trips by transport mode on the Greater Cambridge transport network for 2015 Base Year, 2041 Baseline and each Strategic Spatial Option

Baseline test / Strategic Spatial Option test	Active mode trips	Public Transport trips	Park & Ride trips	Car trips	Total trips
Base Year (2015)	400,924	93,649	23,756	1,050,496	1,568,824
2041 Baseline	541,823	113,035	63,399	1,288,332	2,006,589
SO1: Densification	609,469	123,129	69,081	1,349,738	2,151,418
SO2: Edge – non-Green Belt	600,276	121,864	69,465	1,361,583	2,153,188
SO3: Edge – Green Belt	603,557	121,439	65,724	1,362,228	2,152,949
SO4: New Settlements	589,543	118,476	68,503	1,377,456	2,153,978
SO5: Villages	582,656	119,567	68,030	1,386,035	2,156,287
SO6: PT Corridors	593,658	121,732	68,478	1,370,572	2,154,440
SO7: Integrating homes+jobs	594,532	121,608	69,613	1,368,004	2,153,756
SO8: Expanded growth area	599,396	120,733	69,619	1,364,055	2,153,802

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

3.2.5 In the analysis that follows the 2041 Baseline is compared against the 2015 Base Year, whilst each of the eight Strategic Spatial Options have been compared to the 2041 Baseline. Figure 4 below sets out the mode shares for the 2015 Base Year, the 2041 Baseline and each of the eight Strategic Spatial Options.

Figure 4 Percentage Transport Mode Share of Total Trips for 2015 Base Year, 2041 Baseline and each Strategic Spatial Option



Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

3.2.6 From Figure 4 we can see that the mode shares of total trips on the network are fairly consistent across all of the Strategic Spatial Options, with relatively small differences shown. Figure 4 includes:

- Trips in the 2015 Base Year (a total of 1,568,824 trips)
- The addition of the 2041 Baseline growth and currently planned transport infrastructure and services resulted in an additional 437,765 trips
- The eight Strategic Spatial Options add between 144,000 and 150,000 new trips to the network.

3.2.7 Table 9 and Table 10 below set out the change in mode shares for each Strategic Spatial Option. The information in Table 9 indicates that the non-car mode share for the 2041 Baseline is 2.8% higher than the 2015 Base Year, which is due to the inclusion of the transport schemes in the 2041 Baseline run (see paragraphs 2.2.12 to 2.2.14 and Figure 3 above). Table 10 shows that all Strategic Spatial Options except SO5: Villages show a further increase in the non-car mode share beyond that seen in the 2041 Baseline. Increases in the mode share of active modes of travel is seen in all Strategic Spatial Options except SO5: Villages.

Table 9 Change in mode share of total trips between 2015 Base Year and 2041 Baseline

Baseline test / Strategic Spatial Option test	Active modes	Public Transport	Park & Ride	Total non-car	Car
2015 Base Year mode share	**25.6%**	**6.0%**	**1.5%**	**33.0%**	**67.0%**
Modelled change between 2015 and 2041	1.4%	-0.3%	1.6%	+2.8%	-2.8%
2041 Baseline mode share	**27.0%**	**5.6%**	**3.2%**	**35.8%**	**64.2%**

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Table 10 Percentage mode share of non-car modes as a proportion of total trips for the 2041 Baseline, and percentage point change in mode share of total trips resulting from each Strategic Spatial Option

Baseline test / Strategic Spatial Option test	Total Number of trips	Active modes	Public Transport	Park & Ride	Total non-car
2041 Baseline mode share	**2,006,589**	**27.0%**	**5.6%**	**3.2%**	**35.8%**
SO1: Densification	2,151,418	+1.3%	+0.1%	+0.1%	+1.5%
SO2: Edge - non-Green Belt	2,153,188	+0.9%	-	+0.1%	+1.0%
SO3: Edge - Green Belt	2,152,949	+1.0%	-	-0.1%	+0.9%
SO4: New Settlements	2,153,978	+0.4%	-0.1%	-	+0.3%
SO5: Villages	2,156,287	-	-0.1%	-	-0.1%
SO6: PT Corridors	2,154,440	+0.6%	-	-	+0.6%
SO7: Integrating homes+jobs	2,153,756	+0.6%	-	+0.1%	+0.7%
SO8: Expanded growth area	2,153,802	+0.8%	-	+0.1%	+0.9%

Note: Green shading indicates positive change consistent with policy direction – increased non-car mode share.

Red shading indicates negative change compared to policy direction

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

3.2.8 The additional trips from each of the Strategic Spatial Options account for an increase of less than 8% over the overall number of trips in the 2041 Baseline. In this context, the characteristics of and impacts of the Strategic Spatial Options are somewhat masked by the 2015 Base Year and 2041 Baseline trips in Figure 4.

Assessment of mode share of trip growth

3.2.9 To gain a better understanding of the performance of each of the eight Strategic Spatial Options tested, Table 11 and Figure 5 below set out:

- The mode share for the 2041 Baseline without the 2015 Base Year trips
- The mode share of the additional trips generated by the Strategic Spatial Options (excluding the 2015 Base Year and 2041 Baseline trips).

3.2.10 They effectively show how the Strategic Spatial Options – without mitigation – perform in terms of increasing the mode share of non-car modes:

- Against the 2015 Base Year, and
- Against the growth in the current Local Plans and the associated infrastructure and services to provide for their transport demand.

3.2.11 From the information in Table 11 and Figure 5 we can see that the mode shares for the 2041 Baseline and the eight Strategic Spatial Options vary much more in isolation than when considered with the existing trip making in the 2015 Base Year and 2041 Baseline. It is possible to clearly see which of the Strategic Spatial Options perform best in terms of their potential to achieve higher volumes of non-car trips and lower volumes of car trips over the Greater Cambridge transport network as a whole, and those options that perform more poorly.

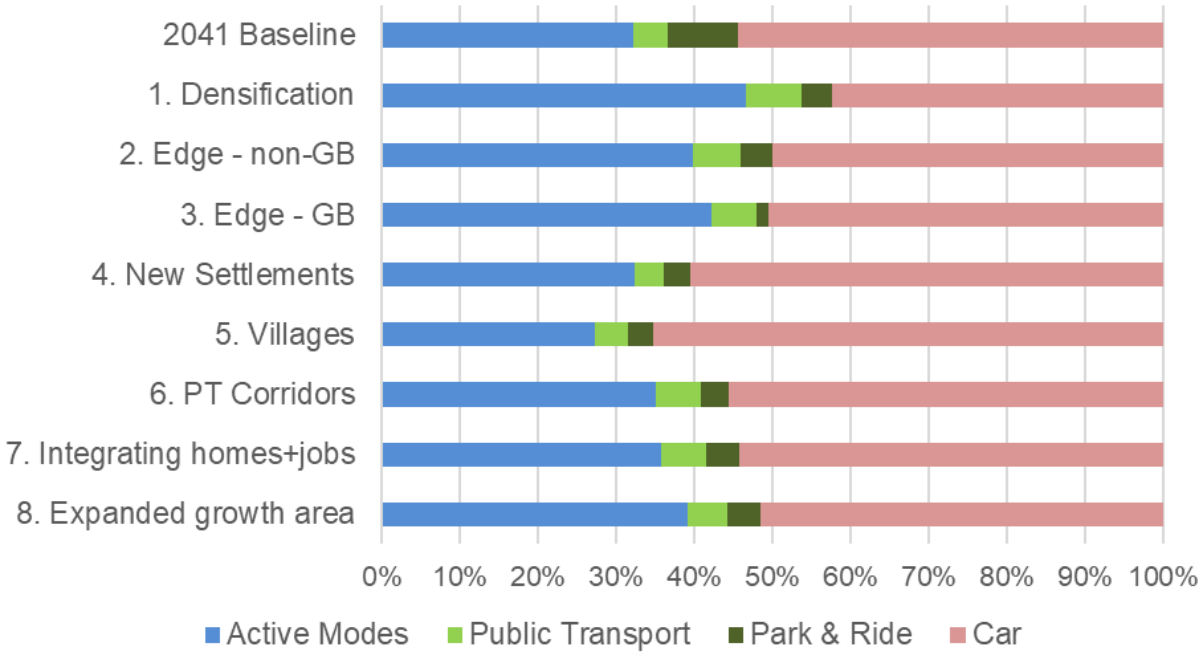
Table 11 Mode share of the additional trips generated by development in each Strategic Spatial Option, compared to the mode shares of the 2015 Base Year and the additional trips in the 2041 Baseline

Baseline test / Strategic Spatial Option test	Number of trips	Active modes	Public Transport	Park & Ride	Total non-car
2015 Base Year	**1,568,824**	**25.6%**	**6.0%**	**1.5%**	**33.0%**
2041 Baseline – new trips	**437,765**	**32.2%**	**4.4%**	**9.1%**	**45.7%**
SO1: Densification	144,829	46.7%	7.0%	3.9%	57.6%
SO2: Edge - non-Green Belt	146,599	39.9%	6.0%	4.1%	50.0%
SO3: Edge - Green Belt	146,360	42.2%	5.7%	1.6%	49.5%
SO4: New Settlements	147,389	32.4%	3.7%	3.5%	39.5%
SO5: Villages	149,698	27.3%	4.4%	3.1%	34.7%
SO6: PT Corridors	147,851	35.1%	5.9%	3.4%	44.4%
SO7: Integrating homes+jobs	147,167	35.8%	5.8%	4.2%	45.9%
SO8: Expanded growth area	147,213	39.1%	5.2%	4.2%	48.6%

Note: Green shading indicates positive change consistent with policy direction compared to 2041 Baseline – increased non-car mode share. Red shading indicates negative change compared to policy direction.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Figure 5 Mode share of the additional trips generated by development in each Strategic Spatial Option, compared to the additional trips in the 2041 Baseline



Note: For the 2041 Baseline, mode shares of the growth in trips over the 2015 Base Year.
For the Strategic Spatial Options, mode shares of the growth in trips over the 2041 Baseline.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

3.2.12 It is important to remember that there is no mitigation for the development in the Strategic Spatial Options included in these tests.

Summary of the performance of Strategic Spatial Options in reducing car-mode share

Best Performing Options

3.2.13 The following options perform best in terms of reducing reliance on the private car for travel:

- **SO1: Densification** performs particularly well in generating the highest percentage of active mode trips with 46.7% of trips. Public transport mode share

is 7.0% with a further 3.9% of trips using Park & Ride giving a total of 57.6% of trips by non-car modes.

- **SO2: Edge – non-Green Belt** has an active mode share of 39.9%, 6% Public Transport and 4.1% Park & Ride with a total of 50.0% of trips by non-car modes.
- **SO3: Edge – Green Belt** has an active mode share of 42.2%, 5.7% Public Transport and 1.6% Park & Ride with a total of 49.5% of trips by non-car modes.
- **SO8: Expanded Growth Area** has an active mode share of 39.1%, 5.2% Public Transport and 4.2% Park & Ride with a total of 48.6% of trips by non-car modes.

Medium Performing Options

3.2.14 The majority of the remaining options show lower proportions of total Active Travel and Public Transport mode shares than the options above:

- **SO7: Integrated homes and jobs** has an active mode share of 35.8%, 5.8% Public Transport and 4.2% Park & Ride with a total of 45.9% of trips by non-car modes.
- **SO6: Public Transport Corridors** has an active mode share of 35.1%, 5.9% Public Transport and 3.4% Park & Ride with a total of 44.4% of trips by non-car modes.
- **SO4: New Settlements** has an active mode share of 32.4%, 3.7% Public Transport and 3.5% Park & Ride with a total of 39.5% of trips by non-car modes.

Poorly Performing Options

3.2.15 **SO5: Villages** is the one option to see a decrease in active mode travel compared to the 2041 Baseline and shows an active mode share of 27.3%, 4.4% Public Transport and 3.1% Park & Ride giving a total of 34.7% of trips by non-car modes. Given the particularly poor performance of this option and the problems with mitigating that performance due to the dispersed nature of development within this option, SO5: Villages is unlikely to be viable.

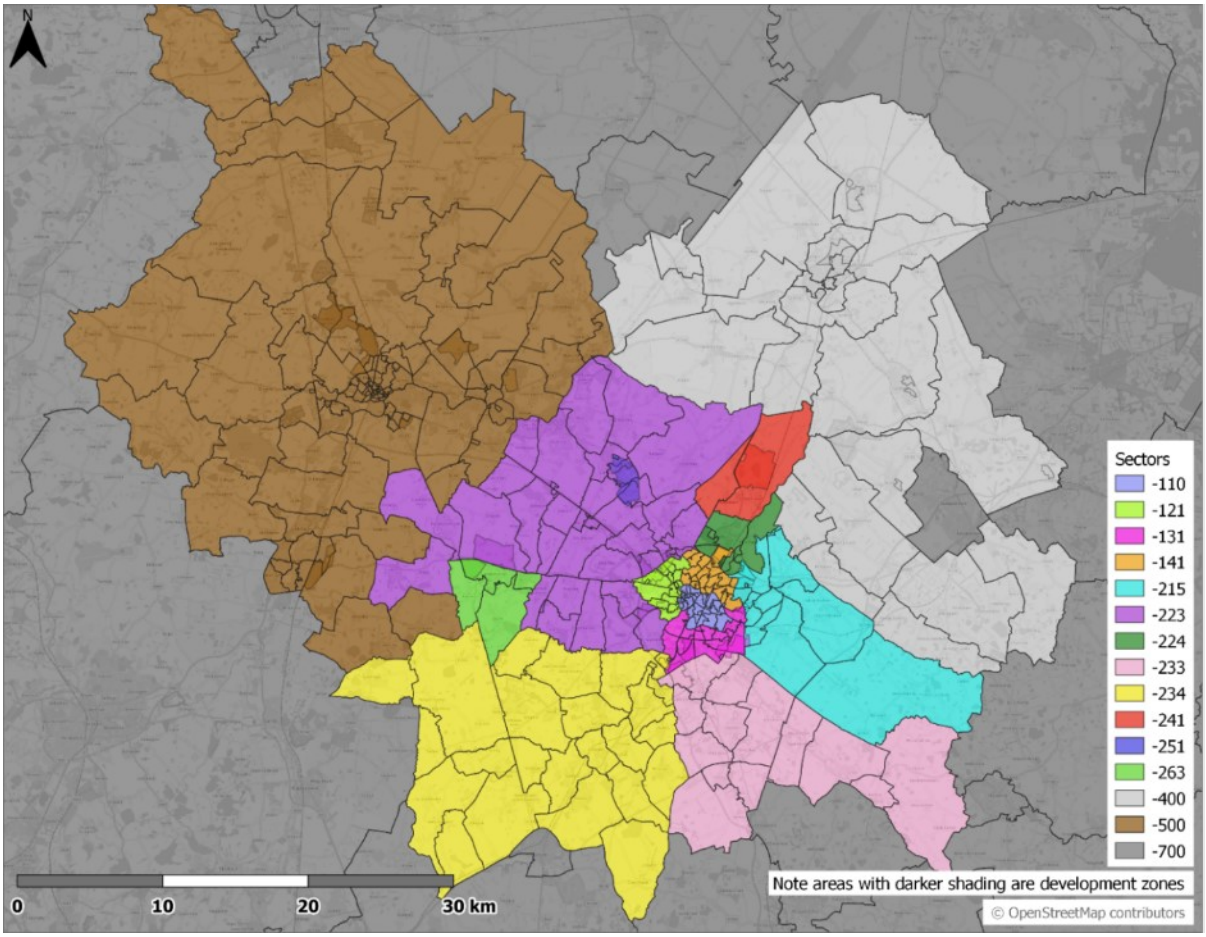
3.3 Additional Analysis: Change in Car Trips by Sector

3.3.1 To fully compare each Strategic Spatial Option, it is prudent to explore the data in more detail to understand why some options are performing as they are, in relation to Trip Volume and Mode Share. This is especially important when considering the make-up of each option, with many of these incorporating a range of broad locations for development within them. Indeed, many of these broad development locations appear in more than one Strategic Spatial Option, so the reason for how each may perform differently as part of the wider Strategic Spatial Option is worth exploring further.

3.3.2 SO5: Villages is not included in this analysis due to its poor performance in the analysis in Section 3.2 above and Section 3.5 below.

3.3.3 Figure 6 shows the sectors within CSRM2. The model also includes the districts of East Cambridgeshire (sector ('-400') and Huntingdonshire (sector '-500') which lie outside the area covered by the Greater Cambridge Local Plan. Outside of Greater Cambridge and these two districts, the area external to the model is covered by sector'-700'). All sectors within the model are referenced in the various tables and figures below.

Figure 6 Sectors within the Cambridge Sub-Region Model 2 (CSRM2)



3.3.4 Table 12 is a useful starting point in this further analysis of car mode share from each Option, as it highlights any change in car mode share for each of the sectors in the model where development could go, compared to what would happen in the 2041 Baseline.

3.3.5 As stated previously, each Strategic Spatial Option is made up of the same numbers of homes and jobs, but these are distributed in different ways and with different rates of delivery of some sites.

3.3.6 Table 12 shows that all but one of the sectors that have additional development included show a decrease in the car mode share across all Strategic Spatial Options. However, the increases shown in sector "-224_S_Cambs_North" are primarily due to a quirk of the modelling of the North East Cambridge site, which is discussed in paragraphs 3.3.10 to 3.3.14 below.

3.3.7 The sectors showing the largest decrease in car mode share are those where the highest levels of development are included in the Strategic Spatial Options. These include Cambridge East, North East Cambridge, Northstowe and Waterbeach. All

four of these areas show a fall in car mode share combined with an increase in the Active Travel mode share. This in turn suggests that the larger scale of the development and the additional facilities on offer that comes with these larger sites, reduce the need to travel to access daily requirements. Where there is a need to make these journeys, the data indicates that many of these do not need to be made by car.

3.3.8 When looking at the sectors that show the lowest car mode share in all of the Strategic Spatial Options, it is clear that these are either located close to Cambridge, close to larger existing urban settlements and/or they are located along one of the proposed High Quality Public Transport (HQPT) corridors that are included in the 2041 Baseline Transport Schemes. This is logical, as the sectors close to large urban areas such as Cambridge allow for shorter trips to reach key services and requirements, and those journeys that are required are more easily made by Active Travel.

3.3.9 Similarly, those sectors along HQPT routes, such as Northstowe and Waterbeach would offer users quick, direct Public Transport access into central Cambridge and other key employment sites / service areas, as well as corresponding Active Travel options, which are often located alongside HQPT infrastructure. In these options, non-car modes of transport are more attractive than they are in the 2041 Baseline, noting that this is based on an assessment without any mitigation.

Table 12 Change in car mode share of the Strategic Spatial Options vs 2041 Baseline by sector

Sector	2041 Baseline car mode share	SO1 Change	SO1 Car mode share	SO2 Change	SO2 Car mode share	SO3 Change	SO3 Car mode share	SO4 Change	SO4 Car mode share
-110_Cambridge_Central	24.1%	-0.2%	23.9%	0.1%	24.2%	-	24.1%	0.3%	24.4%
-121_Cambridge_NW+West	34.2%	-0.1%	34.1%	0.3%	34.5%	0.1%	34.3%	0.5%	34.7%
-131_Cambridge_South	31.2%	-0.4%	30.8%	-0.2%	31.0%	-0.8%	30.4%	0.2%	31.4%
-141_Cambridge_North_East	30.1%	-2.3%	27.8%	-2.2%	28.0%	0.0%	30.2%	0.2%	30.4%
-215_S_Cambs_East	70.2%	-3.4%	66.8%	-4.2%	66.0%	-6.7%	63.5%	-5.3%	64.8%
-223_S_Cambs_North_West	70.8%	-0.3%	70.6%	0.0%	70.9%	-0.8%	70.0%	0.2%	71.0%
-224_S_Cambs_North*	50.1%	6.0%	56.1%	6.3%	56.4%	-	50.1%	-	50.1%
-233_S_Cambs_South	75.3%	-0.3%	75.0%	-1.1%	74.2%	-2.0%	73.3%	-2.1%	73.2%
-234_S_Cambs_South_West	77.1%	0.1%	77.2%	-2.0%	75.0%	0.2%	77.3%	-1.1%	75.9%
-241_Waterbeach	67.2%	-4.4%	62.8%	-4.4%	62.7%	-4.0%	63.2%	-4.2%	63.0%
-251_Northstowe	58.2%	-2.5%	55.7%	-2.6%	55.6%	-2.3%	55.9%	-2.4%	55.8%
-263_Cambourne_Bourn_+_ Caxton	62.5%	-0.4%	62.0%	-0.4%	62.1%	-0.3%	62.2%	-3.4%	59.1%
-400_East_Cambridgeshire	74.2%	0.1%	74.3%	0.1%	74.3%	0.2%	74.4%	0.2%	74.4%

Sector	2041 Baseline car mode share	SO1 Change	SO1 Car mode share	SO2 Change	SO2 Car mode share	SO3 Change	SO3 Car mode share	SO4 Change	SO4 Car mode share
-500_Huntingdonshire	75.2%	0.1%	75.3%	0.1%	75.3%	0.1%	75.3%	0.1%	75.3%
-700_External	85.5%	-0.2%	85.3%	-0.1%	85.4%	-0.1%	85.4%	0.0%	85.5%
Total (all sectors)	**64.2%**	**-1.5%**	**62.7%**	**-1.0%**	**63.2%**	**-0.9%**	**63.3%**	**-0.3%**	**63.9%**

Sector	2041 Baseline car mode share	SO6 Change	SO6 Car mode share	SO7 Change	SO7 Car mode share	SO8 Change	SO8 Car mode share
-110_Cambridge_Central	24.1%	0.2%	24.3%	0.1%	24.2%	0.1%	24.2%
-121_Cambridge_NW+West	34.2%	0.3%	34.5%	0.4%	34.6%	0.3%	34.5%
-131_Cambridge_South	31.2%	0.2%	31.4%	0.0%	31.2%	-0.1%	31.1%
-141_Cambridge_North_East	30.1%	-1.9%	28.3%	-1.4%	28.7%	-1.5%	28.7%
-215_S_Cambs_East	70.2%	0.3%	70.5%	-4.0%	66.2%	-4.3%	65.9%
-223_S_Cambs_North_West	70.8%	0.1%	70.9%	0.1%	70.9%	0.5%	71.3%
-224_S_Cambs_North*	50.1%	6.4%	56.5%	4.8%	54.9%	4.8%	54.9%
-233_S_Cambs_South	75.3%	-2.7%	72.6%	-2.9%	72.4%	0.0%	75.3%

Sector	2041 Baseline car mode share	SO6 Change	SO6 Car mode share	SO7 Change	SO7 Car mode share	SO8 Change	SO8 Car mode share
-234_S_Cambs_South_West	77.1%	0.1%	77.1%	0.3%	77.4%	0.3%	77.3%
-241_Waterbeach	67.2%	-4.3%	62.9%	-4.4%	62.8%	-4.4%	62.8%
-251_Northstowe	58.2%	-2.5%	55.7%	-2.5%	55.7%	-2.4%	55.8%
-263_Cambourne_Bourn_+_ Caxton	62.5%	-0.4%	62.1%	-0.4%	62.1%	-3.6%	58.9%
-400_East_Cambridgeshire	74.2%	0.2%	74.3%	0.1%	74.3%	0.1%	74.3%
-500_Huntingdonshire	75.2%	0.1%	75.2%	0.1%	75.3%	0.1%	75.3%
-700_External	85.5%	0.0%	85.5%	0.0%	85.4%	-0.2%	85.3%
Total (all sectors)	**64.2%**	**-0.6%**	**63.6%**	**-0.7%**	**63.5%**	**-0.9%**	**63.3%**

Note: Green shading indicates positive change consistent with policy direction – that is., decreased car mode share and an equivalent increase non-car mode share. Red shading indicates negative change compared to policy direction. Changes of less than 0.5% are not highlighted.

The Total (all sectors) shows the change in car mode share across the Greater Cambridge area resulting from each Strategic Spatial Option.

* See paragraphs 3.3.10 to 3.3.14 for commentary on sector '-224_S_Cambs_North'.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

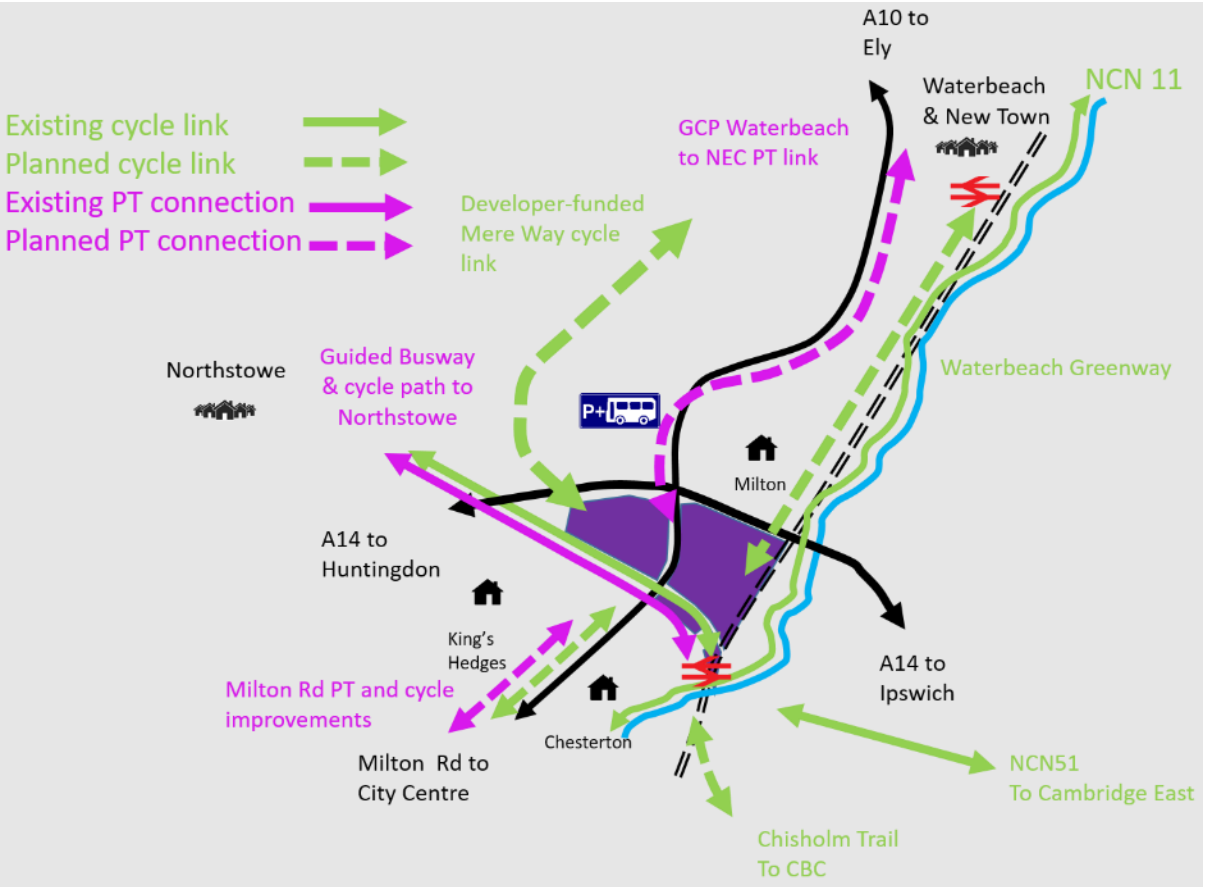
Assessment of sites that straddle the Cambridge / South Cambridgeshire boundary

3.3.10 Sector '*-224_S_Cambs_North*', in South Cambridgeshire shows an increase in the mode share of car trips with the introduction of new housing in Table 12. The North East Cambridge site on the edge of Cambridge straddles the Cambridge City / South Cambridgeshire boundary and in the Cambridge Sub-Region Model (CSRM2), is covered by two sectors:

- '-141_Cambridge_North_East', in Cambridge, and
- '*-224_S_Cambs_North*', in South Cambridgeshire.

3.3.11 The larger portion of the North East Cambridge site is within Cambridge City boundary, with only the railway sidings in South Cambridgeshire. The elements of the site in both sectors are accessed from the same point on Milton Road in Cambridge, and by the same busway, rail and active mode connections. Figure 7 shows the North East Cambridge site and the existing and planned (2041 Baseline) transport infrastructure that serves the site. The area of the site in South Cambridgeshire is on the eastern edge.

Figure 7 North East Cambridge site transport links



3.3.12 The South Cambridgeshire element of the CSRM2 sector covering North East Cambridge uses census data from output areas in what is a largely rural area of the district as the starting point for its assessment of development in the sector, rather than data from the immediately adjacent Cambridge City sector which most of the development in North East Cambridge development sits in.

3.3.13 For this reason, the assessment of '*-224_S_Cambs_North*' as detailed in Table 12 and Table 13 will misrepresent the performance of the South Cambridgeshire area of the North East Cambridge site, and its characteristics will be very similar to those seen in sector '*-141_Cambridge_North_East*'. This caveat applies to the consideration of Strategic Spatial Options, 1, 2, 6, 7 and 8 in the following paragraphs.

3.3.14 While it is the assessment of the North East Cambridge site that highlight this issue, it is also likely to impact on the assessment of a number of other development locations. This can be seen most clearly in Table 13 in Section 0 of this report below, which clearly highlights the difference in trip making by car between the zones in Cambridge and South Cambridgeshire. The development locations that are affected are:

- **Cambridge East** – Sectors '-141' (City) and '-215' (South Cambs.)
  - Seen in Strategic Spatial Options 1, 2, 7 and 8
- **South of Cambridge Southern Fringe** – Sectors '-131' (City) and '-233' (South Cambs.)
  - Seen in Strategic Spatial Option 3
- **North of Barton Road / Grange Farm** – Sectors '-121' (City) and '-223' (South Cambs.)
  - Seen in Strategic Spatial Option 3
- While they do not straddle the district boundary, it is also likely that **Cherry Hinton 3** (SO3, Sector '-215) and **Land at Fen Ditton** (SO3, Sector '-215') will see higher levels of car use than they would have had they been assessed using census data from the immediately adjacent Cambridge wards from their locations in South Cambridgeshire.

3.3.15 The following sections provide commentary on the performance of each sector relative to how they are included in each Strategic Spatial Option. This commentary is informed by the data in Table 12 above.

Strategic Spatial Option 1: Densification

3.3.16 This Strategic Spatial Option focuses new homes and jobs within Cambridge, as the main urban area and centre for services and facilities in Greater Cambridge. The primary location for development within the urban area is assumed in this option to be at North East Cambridge.

Focus of option:

3.3.17 The development of the North East Cambridge site as included in SO1 is assessed as performing very well against the level of trip making by non-car modes and shows the lowest level of car trips within sector '-141' of any of the Strategic Spatial Options. The areas of the site in Sector '-224' in South Cambridgeshire are expected to perform similarly to those in Sector '-141', as discussed in paragraphs 3.3.10 to 3.3.14 above.

3.3.18 The performance of this option is unsurprising, as locating the bulk of additional homes and jobs in established urban areas reduces the need to travel for work and services, as these exist close by, and shorter distance travel is less likely to be undertaken by car. This is especially true for densification in larger urban areas such as Cambridge, where established high levels of Active Travel mode shares already exist. North East Cambridge has direct rail and Busway access and good active mode links to the rest of the city and to Milton, which also contributes to the high non-car modal share seen.

Balance of option:

3.3.19 Development at Cambridge East forms the largest part of the balance of development in SO1. This site also performs well in terms of reducing the level of car use in its sector, and the site would achieve low mode shares of car use even without mitigation and is discussed in more detail in SO2 below.

Strategic Spatial Option 2: Edge non-Green Belt

3.3.20 This Strategic Spatial Option would create new homes and jobs in urban extensions on the edge of Cambridge, using land not in the Green Belt. The only large site on the edge of Cambridge not in the Green Belt is Cambridge Airport.

Focus of option:

3.3.21 This site performs very well in terms of reducing car mode share compared to the 2041 Baseline, indeed the higher level of growth on the site compared to SO1 leads to a larger reduction in car trips in its sector. We can again infer that this is down to the ability to access jobs and services on the site and nearby, by non-car modes.

Balance of option:

3.3.22 Development at North East Cambridge forms the bulk of the additional development to make up the balance of this option, and this reduces the mode share of car trips within its sector by a similar quantum to that seen in Strategic Spatial Option 1.

3.3.23 While not being the focus source of supply for this option, to make up the balance needing to be found, this option also includes additional homes and jobs in some new settlements located in other sectors. These developments reduce the car mode share in their sectors, but from a much higher mode share in the 2041 Baseline than the development in the 'Edge non-Green Belt' sites and North East Cambridge.

Strategic Spatial Option 3: Edge Green Belt

3.3.24 This approach would create new homes and jobs in extensions on the edge of Cambridge, involving release of land from the Green Belt.

Focus of option:

3.3.25 Assumptions have to be made for the purposes of testing impacts, and the two Cambridge sectors where the non-specific Green Belt locations for the modelling of this Strategic Option have been tested are:

- '-121_Cambridge_NW+West'
- '-131_Cambridge_South'

3.3.26 The proximity of these locations to the existing large urban area of Cambridge ensures that they perform well in reducing car mode share compared to the 2041 Baseline in these sectors and achieving high Active Travel mode share of trips from the new development.

Balance of option:

3.3.27 A small number of additional homes are accommodated within the urban area of Cambridge, and while they are expected to achieve low car mode shares, they do not have a material effect on the performance of this option.

Strategic Spatial Option 4: Dispersal New Settlements

3.3.28 New settlements would establish a whole new town or village, providing homes, jobs and supporting infrastructure in a new location, and would need to be supported by strategic transport infrastructure connecting to Cambridge.

Focus of option:

3.3.29 For modelling purposes, this Strategic Spatial Option placed all new homes and jobs in four new settlements in various sectors in the Greater Cambridge area. The analysis shows that the new settlements located on or close to HQPT corridors or those closer to existing urban settlements (such as Cambourne, Northstowe or close to Cambridge) perform better than those that are more remote from existing settlements or HQPT corridors.

3.3.30 Again, this is unsurprising as these tests do not include any site-specific mitigation, and where there are currently fewer options to travel by Active Travel or Public Transport, car remains the most viable option.

3.3.31 However, the car mode share of these settlements is somewhat greater than that seen by development in or on the edge of Cambridge, as is the focus of Strategic Spatial Options 1, 2, and 3, and as can be seen from the data in Table 12.

Balance of option:

3.3.32 No other locations were needed for this option.

Strategic Spatial Option 6: Public Transport Corridors

3.3.33 This approach would focus homes and jobs along key Public Transport corridors and around transport hubs, extending out from Cambridge. This could be by expanding or intensifying existing settlements, or with more new settlements. It also includes development at North East Cambridge. There is also development spread across eighteen villages sited along existing or proposed Public Transport corridors.

Focus of option:

3.3.34 The development in this Strategic Spatial Option shows good performance in terms of reducing car mode share in their sectors, particularly in locations / sectors close to:

- The Cambourne to Cambridge (C2C) scheme (for example, development in the sectors covering Cambourne / Bourn / Caxton)
- The existing Cambridgeshire Guided Busway (for example, development in sectors covering or close to Northstowe)
- The Waterbeach to Cambridge HQPT scheme (for development at Waterbeach).

3.3.35 This is unsurprising as these locations offer good non-car alternatives into key areas such as Cambridge, as well as accommodating existing established developments which helps reduce the need for longer trips.

3.3.36 The development at North East Cambridge leads to a smaller reduction in car mode share in sector '-141_Cambridge_North_East' than seen in Strategic Spatial Options 1 and 2. This is likely to be as a result of the other development in this option being further away from North East Cambridge than is the case for development in SO1 and SO2, and there being less opportunity for Public Transport or active mode trips between North East Cambridge and other sites in this option.

3.3.37 More detail on the performance of the villages in SO6 can be found in paragraph 3.4.37 below.

Balance of option:

3.3.38 No other locations were needed for this option.

Strategic Spatial Option 7: Integrating homes and jobs

3.3.39 This approach would focus new homes close to existing and committed jobs within the life sciences cluster area around the south of Cambridge, including homes at existing villages and at new settlements.

Focus of option:

3.3.40 This option places the bulk of new homes and jobs in locations close to the 'Southern Cluster' of business parks. This option performs reasonably well in reducing car mode share from the 2041 Baseline, as locating homes closer to

existing employment reduces the need for longer distance travel and therefore reduces the need to travel by car.

Balance of option:

3.3.41 The balance of development in this option is at Cambridge East and North East Cambridge.

- The development at Cambridge East sees a slightly lower reduction in car mode share than seen in Strategic Spatial Option 2.
- The development at North East Cambridge sees lower reductions in car mode share in sector '-141_Cambridge_North_East' than seen in Strategic Spatial Options 1, 2, and 6.
- The areas of the North East Cambridge site in Sector '-224' in South Cambridgeshire are expected to perform similarly to those in Sector '-141', as discussed in paragraphs 3.3.10 to 3.3.14 above.

Strategic Spatial Option 8: Expanded Growth Area

3.3.42 This approach would focus new homes at Cambourne and along the A428 Public Transport corridor, on the basis that Cambourne is due to be served by a new East West Rail station (EWR not included in this test), and that Cambourne and the villages along the corridor are due to be served by the Cambourne to Cambridge (C2C) Better Public Transport Project.

Focus of option:

3.3.43 For the purpose of testing this option, the predominant new development for homes and jobs was assumed to be located close to Cambourne in sector '-263_Cambourne_Bourn_+_ Caxton'.

3.3.44 This option performs well in reducing car mode share compared to the 2041 Baseline, and achieves a slightly greater reduction than that seen in Strategic Spatial Option 4. This is unsurprising when the main sector for development is an existing growth area and transport node with HQPT access close by, as this would facilitate some shorter trips which could be made by Active Travel and offers the opportunity of Public Transport for trips further afield.

Balance of option:

3.3.45 The balance of development in this option is accommodated at Cambridge East and North East Cambridge.

- The development at Cambridge East sees a slightly lower reduction in car mode share than seen in Strategic Spatial Option 2.
- The development at North East Cambridge sees lower reductions in car mode share in sector '-141_Cambridge_North_East' than seen in Strategic Spatial Options 1, 2, and 6, but shows a slightly higher reduction than that seen in Strategic Spatial Option 7.

3.4 Additional Analysis: Car Trips per Dwelling / Job by Sector

3.4.1 Although the analysis of the data in Table 12 is useful in understanding the mode share from each Strategic Spatial Option, and it allows us to begin to look at the reasons for this on a more sector by sector basis, it is helpful also to contextualise this further.

3.4.2 Therefore, it is prudent for us to understand the actual number of additional car trips generated by and within each Option, and to understand the reasons for the differences. The next stage of analysis considers the number of additional car trips per dwelling or job generated by each potential development location / sector. Table 13 sets out the level of additional car trips per dwelling or job generated by development in the Strategic Spatial Options, by sector and site.

3.4.3 The performance against this metric for car trips per dwelling in the development in the Strategic Spatial Options is assessed as follows:

- Performs well: 1.6 or fewer car trips per dwelling
- Performs moderately well: Between 1.7 and 3.2 car trips per dwelling
- Performs poorly: Between 3.3 and 4.8 car trips per dwelling
- Performs very poorly 4.9 or more car trips per dwelling

3.4.4 It should again be noted that the Strategic Spatial Options as tested and as assessed in this Chapter do not benefit from mitigation to provide for their transport demand. However, commentary on the assessment in this section of the report and in Chapter 4 may address the potential of mitigation measures to improve performance against this metric.

3.4.5 SO5: Villages is not included in this analysis due to its poor performance in the analysis in Section 3.2 above and Section 3.5 below.

Table 13 Additional car trips per additional dwelling or job

Location & Zone Name	Sector	Metric	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Cambridge Urban Area: North East Cambridge NEC Housing (Cambridge)	-141	Trips / dwelling	1.1	1.1	-	-	1.1	1.1	1.1
Cambridge Urban Area: North East Cambridge	-224	Trips / dwelling	4.4	4.4	-	-	4.4	4.4	4.4

Location & Zone Name	Sector	Metric	SO1	SO2	SO3	SO4	SO6	SO7	SO8
NEC Housing (South Cambs.) *									
Cambridge Urban Area: North East Cambridge NEC Employment (Cambridge)	-141	Trips / job	0.3	0.3	-	-	0.3	0.3	0.3
Cambridge Urban Area: North East Cambridge NEC Employment (South Cambs.)	-224	Trips / job	0.8	0.8	-	-	0.8	0.8	0.8
Cambridge Urban Area: North East Cambridge NEC Employment: Cambridge Science Park (South Cambs.)	-224	Trips / job	0.1	-	-	-	0.1	0.1	0.1
Smaller urban area sites Arbury 2 (Cambridge)	-121	Trips / dwelling	2.2	-	-	-	-	-	-
Smaller urban area sites Barnwell Road 2 (Cambridge)	-141	Trips / job	0.1	0.4	-	-	-	0.4	0.4
Smaller urban area sites Cowley Road (Cambridge)	-141	Trips / job	-	-0.1	-	-	-	-	-
Edge of Cambridge: Non-Green Belt Cambridge Airport 1 (Cambridge)	-141	Trips / dwelling	1.3	1.3	-	-	-	1.3	1.3
Edge of Cambridge: Non-Green Belt Cambridge Airport 2 (South Cambs.) *	-215	Trips / dwelling	2.6	2.6	-	-	-	2.6	2.6
Edge of Cambridge: Green Belt Cherry Hinton Road / Babraham Road (Cambridge)	-131	Trips / dwelling	-	-	1.5	-	-	-	-
Edge of Cambridge: Green Belt Cherry Hinton 3 (South Cambs.) *	-215	Trips / dwelling	-	-	2.8	-	-	-	-
Edge of Cambridge: Green Belt Land at Fen Ditton (South Cambs.) *	-215	Trips / dwelling	-	-	2.9	-	-	-	-
Edge of Cambridge: Green Belt South of Cambridge Southern Fringe (Cambridge)	-131	Trips / dwelling	-	-	1.6	-	-	-	-
Edge of Cambridge: Green Belt South of	-233	Trips / dwelling	-	-	2.5	-	-	-	-

Location & Zone Name	Sector	Metric	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Cambridge Southern Fringe (South Cambs.) *									
Edge of Cambridge: Green Belt North of Barton Road / Grange Farm (Cambridge)	-121	Trips / dwelling	-	-	1.4	-	-	-	-
Edge of Cambridge: Green Belt North of Barton Road / Grange Farm (South Cambs.) *	-223	Trips / dwelling	-	-	3.0	-	-	-	-
Hypothetical New Settlements (non-specific locations) New Settlement A: South East of Cambridge	-215	Trips / dwelling	-	-	-	3.1	-	-	-
Hypothetical New Settlements (non-specific locations) New Settlement B: South of Cambridge 1	-233	Trips / dwelling	-	-	-	-	-	3.7	-
Hypothetical New Settlements (non-specific locations) New Settlement C: South of Cambridge 2	-233	Trips / dwelling	-	3.8	-	-	3.7	-	-
Hypothetical New Settlements (non-specific locations) New Settlement D: South of Cambridge 3	-233	Trips / dwelling	-	-	-	3.7	-	-	-
Hypothetical New Settlements (non-specific locations) New Settlement E: South West of Cambridge 1	-234	Trips / dwelling	-	3.5	-	-	-	-	-
Hypothetical New Settlements (non-specific locations) New Settlement F: South West of Cambridge 2	-234	Trips / dwelling	-	-	-	4.0	-	-	-
Hypothetical New Settlements (non-specific locations) New Settlement G: South of Cambourne	-263	Trips / dwelling	-	-	-	3.1	-	-	3.0
Accelerated growth at committed New Settlements Waterbeach New Town	-241	Trips / dwelling	-	-	-	-	2.5	-	-

Location & Zone Name	Sector	Metric	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Villages The Abingtons	-233	Trips / dwelling	-	-	-	-	3.2	3.9	-
Villages Bourn	-263	Trips / dwelling	-	-	-	-	-	-	4.6
Villages Caldecote	-223	Trips / dwelling	-	-	-	-	5.2	-	5.1
Villages Coton	-223	Trips / dwelling	-	-	-	-	3.5	-	3.4
Villages Croxton and Eltisley	-223	Trips / dwelling	-	-	-	-	-	-	4.7
Villages Elsworth	-223	Trips / dwelling	-	-	-	-	-	-	4.6
Villages Foxton	-234	Trips / dwelling	-	-	-	-	3.8	-	-
Villages Fulbourn	-215	Trips / dwelling	-	-	-	-	4.2	-	-
Villages Great Shelford	-233	Trips / dwelling	-	-	-	-	3.4	2.7	-
Villages Hardwick	-223	Trips / dwelling	-	-	-	-	5.4	-	5.1
Villages Histon	-223	Trips / dwelling	-	-	-	-	3.0	-	-
Villages Linton	-233	Trips / dwelling	-	-	-	-	4.6	3.9	-
Villages Meldreth	-234	Trips / dwelling	-	-	-	-	3.9	-	-
Villages Milton	-224	Trips / dwelling	-	-	-	-	2.7	-	-
Villages Pampisford	-233	Trips / dwelling	-	-	-	-	3.5	-	-
Villages Papworths	-223	Trips / dwelling	-	-	-	-	-	-	4.5
Villages Sawston	-233	Trips / dwelling	-	-	-	-	4.7	4.2	-
Villages Shepreth	-234	Trips / dwelling	-	-	-	-	3.7	-	-
Villages Swavesey	-223	Trips / dwelling	-	-	-	-	4.8	-	-
Villages Waterbeach	-241	Trips / dwelling	-	-	-	-	3.8	-	-
Villages Whittlesford	-233	Trips / dwelling	-	-	-	-	4.3	4.0	-
Planned growth at committed new settlements (for comparative	-251	Trips / dwelling	2.2	2.2	2.2	2.2	2.2	2.2	2.2

Location & Zone Name	Sector	Metric	SO1	SO2	SO3	SO4	SO6	SO7	SO8
purpose only) Northstowe Phase 3									
Planned growth at committed new settlements (for comparative purpose only) Waterbeach New Town	-241	Trips / dwelling	2.5	2.5	2.6	2.6	2.5	2.6	2.5
Planned growth at committed new settlements (for comparative purpose only) Bourn Airfield	-263	Trips / dwelling	2.9	2.9	3.0	3.0	3.0	2.9	3.0

Note: * These sites are likely to be modelled as having a higher level of car use than would be expected, for the reasons set out in paragraphs 3.3.10 to 3.3.14.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Strategic Spatial Option 1: Densification

3.4.6 This Strategic Spatial Option focuses new homes and jobs within Cambridge, as the main urban area and centre for services and facilities in Greater Cambridge.

Focus of option:

3.4.7 The primary location for development within the urban area is assumed to be at North East Cambridge. The key focus of the results in Table 13 for Strategic Spatial Option 1 is therefore the additional car trips generated by North East Cambridge and by smaller sites within the Cambridge urban area.

3.4.8 Development at North East Cambridge performs well against this metric, with low levels of trip making by car. Development in sector '-141' (in Cambridge) generates low levels of car trips, with 0.1 to 0.3 trips per additional job and 1.1 trips per additional dwelling.

3.4.9 These low car trip numbers are not unexpected, as this site is located at the edge of the urban area of Cambridge, is close to HQPT infrastructure, including the Cambridgeshire Guided Busway, Cambridge North Station, and the proposed Waterbeach to Cambridge HQPT route and Greenways, and has good cycle links into and around the city.

3.4.10 The assessment of car trips from the part of North East Cambridge in Sector '-224' (in South Cambs.) suffers from the issue discussed in Paragraphs 3.3.10 to 3.3.14 above, and it is expected that:

- The performance of housing development in this sector would reflect the 1.1 car trips per dwelling seen in sector '-141' as opposed to the 4.4 trips per dwelling generated by the modelling, and
- The jobs figure would reflect the 0.1 to 0.3 car trips per job seen in sector '-141' as opposed to the 0.8 trips per job generated by the modelling.

3.4.11 Car trips from smaller developments within the Cambridge urban area generate low levels of car trips per dwelling, and as the level of development at these sites is low in comparison to the larger sites, these developments have a small but positive impact on the performance of Strategic Spatial Option 1.

Balance of option:

3.4.12 Cambridge East performs identically in terms of trips per dwelling as it does in Strategic Spatial Option 2 (where it is the focus of the option) as detailed in paragraphs 3.4.14 to 3.4.15 below.

Strategic Spatial Option 2: Edge non-Green Belt

3.4.13 This Strategic Spatial Option would create new homes and jobs in extensions on the edge of Cambridge, using land not in the Green Belt. The only large site on the edge of Cambridge not in the Green Belt is Cambridge Airport.

Focus of option:

3.4.14 The focus of this option is the provision of homes and jobs at Cambridge East, where low levels of car trips per dwelling are seen. The site's location on the edge of Cambridge would encourage active modes. Development at Cambridge East performs well against this metric, with 1.3 car trips per dwelling seen in sector '-141' (in Cambridge) before any mitigation has been provided. In sector '-215' in (South Cambs.), 2.6 car trips per dwelling are seen.

3.4.15 The difference in trips per dwelling between the two sectors covering Cambridge East is due to the issue discussed in Paragraphs 3.3.10 to 3.3.14 above. The higher car trips per dwelling from the part of Cambridge East in sector '-215' are primarily due to this sector being in South Cambridgeshire and using census data from output

areas in South Cambridgeshire (with higher rates of car use) as the starting point for its assessment of the development, rather than census data from Cambridge output areas. As the development would effectively be a new area of the city, it is considered that the characteristics of the site as a whole are likely to be closer to the trips per dwelling seen in sector '-141'. Further assessment of this site in detail would address this point at the draft plan stage.

Balance of option:

3.4.16 While not the focus of housing supply for Strategic Spatial Option 2, this option also includes additional homes and jobs at North East Cambridge and at two hypothetical new settlements on High Quality Public Transport corridors.

3.4.17 North East Cambridge as assessed in Strategic Option 2 has very similar levels of car trips per dwelling as seen in SO1, with the main difference being that development at the Cambridge Science Park is neutral (that is, no additional car trips per additional job).

3.4.18 For the two new settlements considered in SO2:

- New Settlement C: South of Cambridge 2, performs poorly against this metric in SO2, with 3.8 car trips per dwelling
- New Settlement E: South West of Cambridge 1, performs poorly against this metric in SO2, with 3.5 car trips per dwelling.

3.4.19 A small number of jobs in this option are located inside the city (sectors '-121' and '-141') which perform well by this metric but are not of huge consequence for the Strategic Spatial Option as a whole.

Strategic Spatial Option 3: Edge Green Belt

3.4.20 This Strategic Spatial Option would create new homes and jobs in extensions on the edge of Cambridge, involving release of land from the Green Belt.

Focus of option:

3.4.21 Assumptions have to be made for the purposes of testing impacts, and the two Cambridge sectors where the non-specific Green Belt locations for the modelling of this Strategic Option have been tested are:

- '-121_Cambridge_NW+West'

- '-131_Cambridge_South'
- '-215_S_Cambs_East'
- '-223_S_Cambs_North_West'
- '-233_S_Cambs_South'

3.4.22 The five assumed locations for development for testing within these sectors are:

- Land at Fen Ditton (sector '-215') 2.9 trips per dwelling
- Cherry Hinton 3 (sector '-215')2.8 trips per dwelling
- Cherry Hinton Road / Babraham Road (sector '-131')1.5 trips per dwelling
- South of Cambridge Southern Fringe
- Cambridge (sector '-131') 1.6 trips per dwelling
- South Cambs. (sector '-233') 2.5 trips per dwelling
- North of Barton Road / Grange Farm
- Cambridge (sector '-121') 1.4 trips per dwelling
- South Cambs. (sector '-223') 3.0 trips per dwelling

3.4.23 Development at all of the sites performs well or moderately well against the metric of car trips per dwelling. This is largely as would be expected, as the location on the edge of Cambridge ensures high Active Travel mode shares and low car use.

3.4.24 However, the South Cambridgeshire sites (in sectors '-215', '-223' and '-233') are likely to be seeing an overestimation of the level of car trips per dwelling for the reasons discussed in paragraphs 3.3.10 to 3.3.14 above.

Balance of option:

3.4.25 No other locations were needed for this option.

Strategic Spatial Option 4: New Settlements

3.4.26 New settlements would establish a whole new town or village, providing homes, jobs and supporting infrastructure in a new location, and would need to be supported by strategic transport infrastructure connecting to Cambridge.

Focus of option:

3.4.27 For transport modelling purposes, this Strategic Spatial Option places new homes and jobs in four new settlements, dispersed around Greater Cambridge for the purposes of testing:

- New Settlement A: South East of Cambridge, performs moderately well, achieving 3.1 trips per dwelling.
- New Settlement D: South of Cambridge 3, performs poorly, achieving 3.7 trips per dwelling.
- New Settlement F: South West of Cambridge 2 performs poorly, achieving 4.0 trips per dwelling.
- New Settlement G: South of Cambourne performs moderately well, achieving 3.1 trips per dwelling.

3.4.28 New Settlement A: South East of Cambridge, and Settlement G: South of Cambourne perform best of the four settlements tested, both seeing 3.1 car trips per dwelling or job, which is similar to the levels seen at the committed new settlement at Bourn Airfield (see Table 13). New settlements D and F perform less well. This is unsurprising given their locations are further from urban areas such as Cambridge and Cambourne. They are also located a distance away from existing and planned HQPT corridors.

3.4.29 The following points may also be factors in the performance of the New Settlements:

- The scale of development proposed; larger development generally means higher non-car mode shares and more internalisation of trip making.
- For the external trips, the settlements assumed locations relative to services / employment areas, existing urban areas, and to HQPT provision.

3.4.30 For the New Settlement G: South of Cambourne, the lower car trip making is likely due to the proximity of the assumed development to Cambourne, and to the Cambourne to Cambridge HQPT scheme which is included in the 2041 Baseline. For New Settlement A, the reasons for its lower level of car trips are slightly less obvious, though sector '-215' in which it sits does border the eastern side of Cambridge, as well as being close to the Science Parks and employment areas located close to the outer edge of the Cambridge Green Belt south east of Cambridge.

3.4.31 There may be potential for the performance of these developments to improve, as they are not fully built-out by 2041 in this test, lessening the opportunity for more local trip making, and there being no mitigation measures included.

Balance of option:

3.4.32 No other locations were needed for this option.

Strategic Spatial Option 6: Public Transport Corridors

3.4.33 This Strategic Spatial Option would focus homes and jobs along key Public Transport corridors and around transport hubs, extending out from Cambridge. This could be by expanding or intensifying existing settlements, or with new settlements. It also includes development at North East Cambridge.

Focus of option:

3.4.34 As modelled, Strategic Spatial Option 6 includes additional development at the existing new settlement of Waterbeach, an additional New Settlement C: South of Cambridge 2, and development at North East Cambridge. There is also some additional development in existing villages along existing and currently planned HQPT routes.

3.4.35 New Settlement C: South of Cambridge 2, performs poorly, although slightly better than it does in Strategic Spatial Option 2 (3.7 car trips per dwelling compared to 3.8 in SO2).

3.4.36 The additional development at Waterbeach new town above the 2041 Baseline will have a relocated railway station serving the new town, as well as the Waterbeach to Cambridge HQPT route and Park & Ride options. It performs moderately well against this metric, seeing 2.5 car trips per dwelling.

3.4.37 The relatively small numbers of dwellings at development at villages impacts the results for the villages included in this Strategic Spatial Option, which are located on or close to HQPT routes. The performance of the villages is in three bands:

- Villages that perform moderately well; car trips per dwelling of 3.2 or less:
  - The Abingtons, Histon and Milton.
- Villages that perform poorly; car trips per dwelling between 3.3 and 4.8:
  - Coton, Foxton, Fulbourn, Great Shelford, Linton, Meldreth, Pampisford, Sawston, Shepreth, Swavesey, Waterbeach and Whittlesford.
- Villages that perform very poorly; car trips per dwelling 4.9 or greater:
  - Caldecote and Hardwick.

Balance of option:

3.4.38 No other locations were needed for this option.

Strategic Spatial Option 7: Integrating homes and jobs

3.4.39 This approach would focus new homes close to existing and committed jobs within the life sciences cluster area around the south of Cambridge, including homes at existing villages and at new settlements.

Focus of option:

3.4.40 This option places the bulk of new homes and jobs where there are already clusters of employment development, including in sector '-233' which covers the 'Southern Cluster' of business parks. It includes New Settlement B: South of Cambridge 1, as well as development in five village to the south east of Cambridge.

3.4.41 New Settlement B: South of Cambridge 1, performs poorly in terms of trips per dwelling/job, with a car trip rate per dwelling of 3.7. The location of this development, which is in a sector that at its most southern tip is quite a distance from Cambridge or any other significantly large urban area, could be the reason it doesn't achieve lower levels of car use, but its proximity to existing jobs and business parks is likely to be a reason for it not seeing higher levels of vehicular trip making.

3.4.42 The performance of development in villages in Strategic Spatial Option 7 is in two bands:

- Villages that perform moderately well; car trips per dwelling of 3.2 or less:
  - Great Shelford.
- Villages that perform poorly; car trips per dwelling between 3.3 and 4.8:
  - The Abingtons, Linton, Sawston and Whittlesford.

3.4.43 All of the villages apart from the Abingtons see a lower level of car trip making than seen in Strategic Spatial Option 6. This is likely to be due to increased Active Travel from the villages to New Settlement B, and potentially Public Transport trips on CSETS to Settlement B: due to the CSETS (Cambridge South East Transport Study) HQPT scheme providing a link to jobs and services that were not previously there.

Balance of option:

3.4.44 The balance of development in this option is accommodated at Cambridge East and North East Cambridge. The car trips per dwelling / job are as seen in Strategic Spatial Options 1 and 2 for these sites.

Strategic Spatial Option 8: Expanded Growth Area

3.4.45 This approach would focus new homes at Cambourne and along the A428 Public Transport corridor, on the basis that Cambourne is due to be served by a new East West Rail station and that Cambourne and the villages along the corridor are due to be served by the Cambourne to Cambridge (C2C) Better Public Transport Project.

Focus of option:

3.4.46 New Settlement G: South of Cambourne is assumed in this option, and is shown to perform quite well, with 3.0 car trips per dwelling / job. At this stage of assessment, the new settlement does not have any mitigation. While the Cambourne to Cambridge HQPT scheme is included in the 2041 Baseline and passes close to this settlement, it does not directly link to it. East West Rail is not included in the 2041 Baseline or in any of the Strategic Spatial Option tests and would benefit this new settlement.

3.4.47 This performance is likely to be in part due to the scale of the new settlement proposed in this Strategic Spatial Option (in comparison to Bourn Airfield) and the proximity to Cambourne itself, which has an existing level of homes, jobs and services accessible by non-car modes. The Cambourne to Cambridge HQPT scheme would be relatively accessible from New Settlement G.

3.4.48 Settlement G's level of car trips/ dwelling is as low as is seen at Bourn Airfield, noting that Bourn Airfield is served directly by the Cambourne to Cambridge HQPT route in all Strategic Spatial Options, and that no transport mitigation has been assessed for any of the new development sites in any of the Strategic Spatial Options.

3.4.49 The performance of development in villages in Strategic Spatial Option 7 is in just one band:

- Villages that perform poorly; car trips per dwelling between 3.3 and 4.8:

- Bourn, Caldecote, Coton, Croxton and Eltisley, Elsworth, Hardwick and the Papworths.

3.4.50 None of these villages achieve levels of car trip making as low as would be seen at Bourn Airfield or New Settlement G, including those served directly by the Cambourne to Cambridge HQPT route.

Balance of option:

3.4.51 The balance of development in this option is accommodated at Cambridge East and North East Cambridge. The car trips per dwelling / job are as seen in Strategic Spatial Options 1 and 2 for these sites.

3.5 Core Analysis: Highway Impact

3.5.1 The previous sections of this chapter examined the trip volumes and travel patterns generated by the Strategic Spatial Options and considered whether they are likely to achieve high mode shares of trip making by non-car modes. The following section looks at the impact of the Strategic Spatial Options due to new vehicle trips on the local highway network, taking figures from the CSRM2 Highway Assignment Model (HAM) for this analysis. The statistics are reported separately for each of the HAM model periods, which are:

- AM peak (08:00 – 09:00)
- Average inter-peak hour (average hourly flow between 10:00 – 16:00)
- PM peak (17:00 – 18:00)

3.5.2 The reported statistics use the standard Passenger Car Unit (PCU) of measurement (see glossary). The following statistics are reported across the full modelled area:

- **Travel distance** – the total distance in PCU kilometres (PCU-km) travelled by all trips assigned to the network.
- **Travel time** – the total time in PCU hours (PCU-hrs) taken for all PCU trips assigned to the network.
- **Delay** – the total delay (which is total time minus free-flow time) in PCU hours experienced by all PCU trips assigned to the network.

3.5.3 These three metrics are discussed together in terms of their impacts across the Greater Cambridge area, as the relative performance of the Strategic Spatial Options against these metrics is largely consistent at this level. The Strategic Spatial Options which perform ‘best’, ‘medium’ and ‘poorly’ are highlighted.

3.5.4 Following this, we assess the performance of the Strategic Spatial Options in a more granular way, to understand why their modelled impact on the highway network is happening. To do this, the metric of internalisation of trips is analysed at a ‘sector to sector’ level to allow for better comparison of each Strategic Spatial Option. This is important, as each Strategic Spatial Option incorporates a range of development locations within it, in order to make up the requisite homes and jobs numbers. Therefore, looking at the level of internalisation, focusing on those sectors making up the focus of each Strategic Spatial Option gives a good basis for comparison of

Strategic Spatial Options, when considered alongside the analysis of trip volumes and mode shares above.

3.5.5 In addition, this section of the report will look at the actual number of trips generated by each Strategic Spatial Option, to provide some context about the relative scale of impact each Strategic Spatial Option would be likely to have on the highway network, when considered against the total trips across the entire Greater Cambridge-wide modelled area in the 2041 Baseline.

3.5.6 It is important to note that the model tests a neutral day and therefore, does not account for any unexpected events (such as accidents on the road or bad weather conditions) which may occur, and as with all tests in this chapter, does not include any additional site-specific mitigation for the Strategic Spatial Options.

3.5.7 As a core part of the analysis of the Strategic Spatial Options, this section of the report includes consideration of SO5: Villages.

Travel Distance, Travel Time and Delay

3.5.8 The following paragraphs discuss additional travel distance, additional travel time and additional delay metrics together, as the relative performance of the Strategic Spatial Options against these metrics is broadly consistent. The paragraphs below cover:

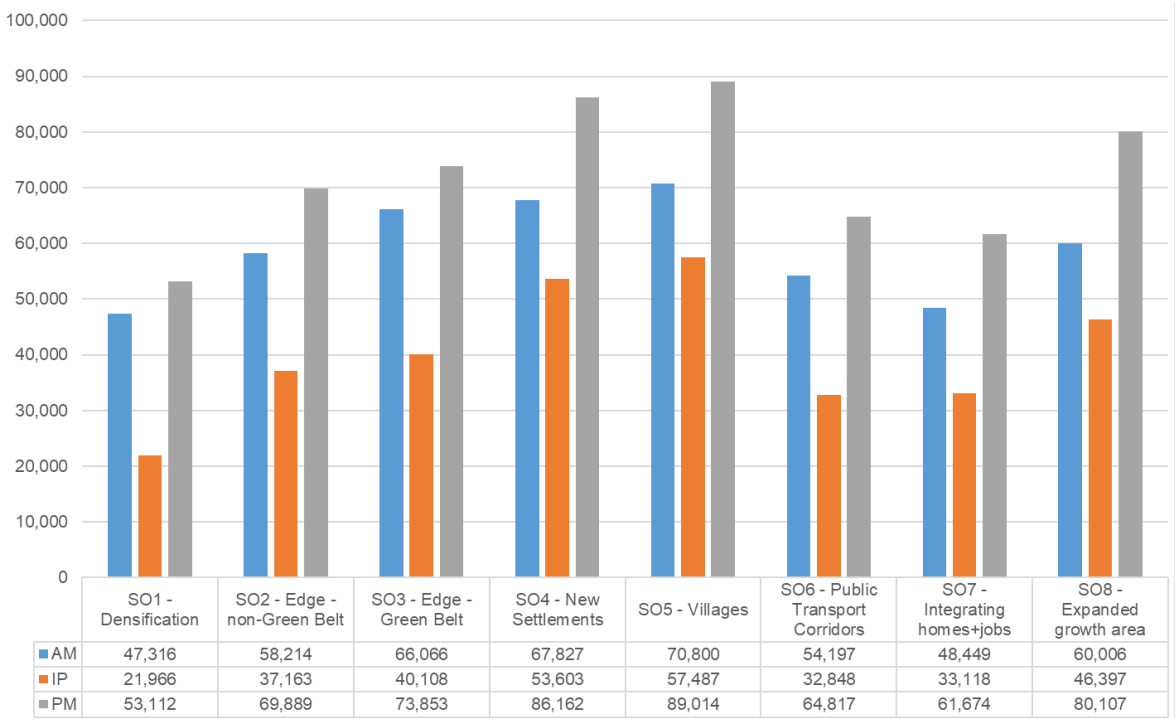
- **Additional travel distance (PCU-km)** – the change in the distance travelled by motor vehicle traffic across Greater Cambridge due to the distribution of growth in the eight Strategic Spatial Options. The total distance travelled is derived by multiplying the number of additional PCUs on the road network in the model area by the average length of their trips (in kilometres).
- **Additional travel time (PCU-hrs)** – the additional time spent travelling in motor vehicles due to the distribution of growth in each of the eight Strategic Spatial Options. Travel distance is divided by speed to give the travel time.
- **Additional delay (PCU-hrs)** – the change in delay to vehicular journeys due to each of the eight Strategic Spatial Options. This is calculated by comparing the PCU-hrs experienced in the model to the PCU-hrs that would be experienced if vehicular traffic were able to move at ‘free flow’ speed.

3.5.9 Figure 8, Figure 9 and Figure 10 show the increase in the total distance travelled (in PCU-km), the increase in total travel time (in PCU-hrs) travelled, and the increase in total delay (in PCU-hrs) respectively, compared to the 2041 Baseline for each of the Strategic Spatial Options.

3.5.10 Table 14 shows the total increase in PCU-km over all three time periods for each Strategic Spatial Option. The discussion below orders the Strategic Spatial Options by their increase in vehicular kilometres over all three time periods combined, compared to the 2041 Baseline. Table 15 shows the level of inter-peak PCU-km distance for each spatial option as a proportion of the average level seen in the AM and PM peak hours. This gives an indication of the availability and accessibility of services and facilities by non-car modes. If there are fewer services and facilities available locally, there will typically be more vehicular trips made / PCU-km travelled in the inter-peak period.

3.5.11 The shape of the profiles in Figure 8, Figure 9 and Figure 10 for each of the Strategic Spatial Options are similar, with the highest increases seen in the PM Peak, the lowest impact in the inter-peak, and with the AM peak higher than the inter-peak but lower that the PM peak. They reflect the profile for traffic currently seen across the road network in Greater Cambridge as a whole, where the peak in the evening is typically higher than in the morning.

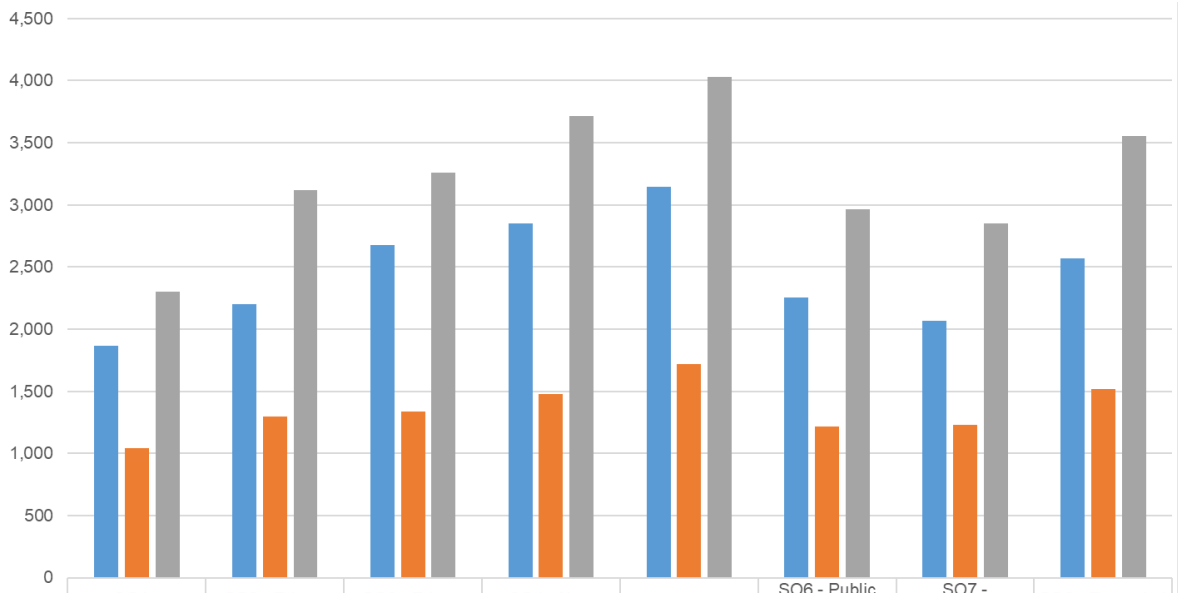
Figure 8 Additional travel distance by vehicular traffic in Greater Cambridge (PCU-kms), Strategic Spatial Option vs. 2041 Baseline



	SO1 - Densification	SO2 - Edge - non-Green Belt	SO3 - Edge - Green Belt	SO4 - New Settlements	SO5 - Villages	SO6 - Public Transport Corridors	SO7 - Integrating homes+jobs	SO8 - Expanded growth area
AM	47,316	58,214	66,066	67,827	70,800	54,197	48,449	60,006
IP	21,966	37,163	40,108	53,603	57,487	32,848	33,118	46,397
PM	53,112	69,889	73,853	86,162	89,014	64,817	61,674	80,107

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

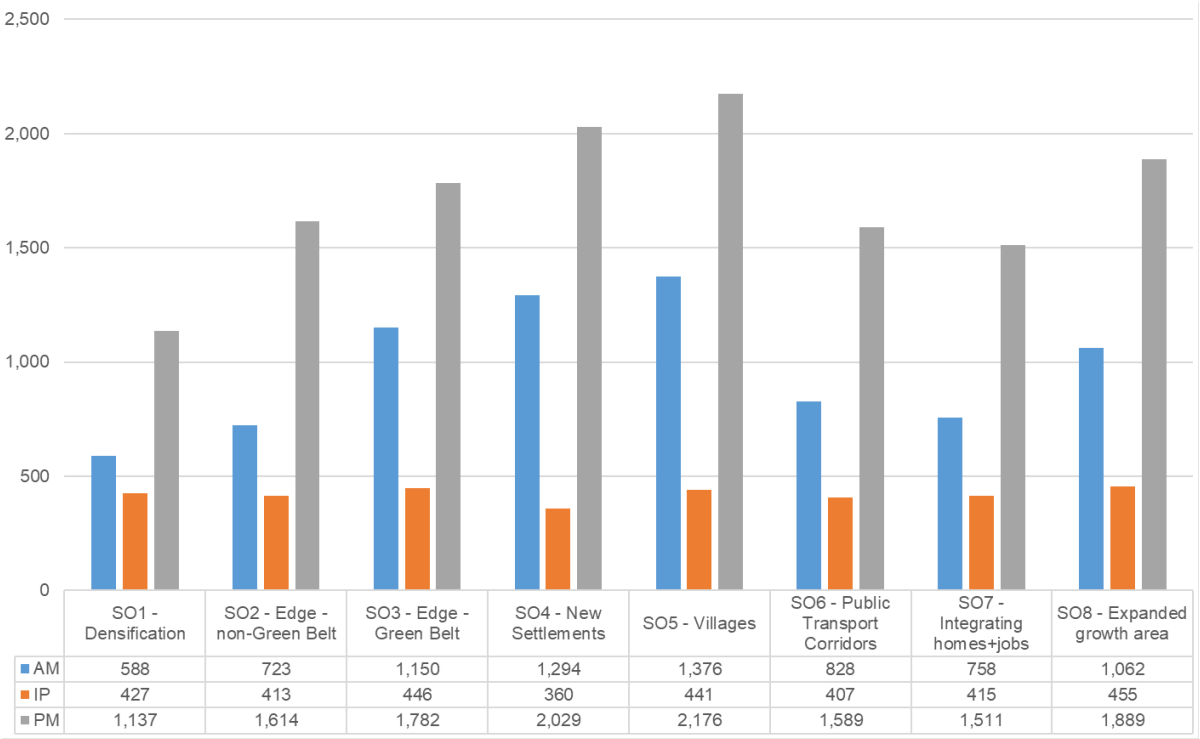
Figure 9 Additional total travel time for vehicular traffic in Greater Cambridge (PCU-hrs), Strategic Spatial Options vs 2041 Baseline



	SO1 - Densification	SO2 - Edge - non-Green Belt	SO3 - Edge - Green Belt	SO4 - New Settlements	SO5 - Villages	SO6 - Public Transport Corridors	SO7 - Integrating homes+jobs	SO8 - Expanded growth area
AM	1,864	2,205	2,675	2,849	3,146	2,258	2,071	2,572
IP	1,043	1,295	1,336	1,477	1,720	1,215	1,229	1,517
PM	2,304	3,122	3,261	3,713	4,030	2,966	2,850	3,558

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Figure 10 Additional total delay in Greater Cambridge (PCU-hrs), Strategic Spatial Options vs 2041 Baseline



Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Table 14 Total additional vehicular trip distance in PCU-kms, travel time in PCU-hrs and delay in PCU-hrs in the AM peak hour, PM peak hour and average inter-peak hour resulting from each Strategic Spatial Option, over 2041 Baseline

Metric	SO1	SO2	SO3	SO4	SO5	SO6	SO7	SO8
Total additional car PCU-km	122,394	165,266	180,027	207,592	217,301	151,862	143,241	186,510
Total additional car PCU-hrs	5,211	6,622	7,272	8,039	8,896	6,439	6,150	7,647
Total additional car PCU-hrs delay	2,152	2,750	3,378	3,683	3,993	2,824	2,684	3,406

Source: Data derived from Figure 8, Figure 9 and Figure 10 above

Table 15 Level of inter-peak additional trip making (average hour) as a proportion of the average seen in the AM and PM peak hours for the additional vehicular trips in each Strategic Spatial Option

Metric	SO1	SO2	SO3	SO4	SO5	SO6	SO7	SO8
Inter-peak PCU-km as proportion of average AM/PM peak PCU-km	44%	58%	57%	70%	72%	55%	60%	66%

Source: Data derived from Figure 8 above

3.5.12 When the detailed information on additional travel distance, travel time and delay for each Strategic Spatial Option – as shown in Figure 8, Figure 9, Figure 10, Table 14 and Table 15 – is assessed we can see the following:

Best Performing Options

3.5.13 SO1: Densification, SO7: Integrating homes and Jobs and SO6: Public Transport Corridors perform the best in terms of the lowest additional PCU-km travelled.

- **SO1: Densification** generates the lowest number of additional vehicular PCU-km, the lowest additional travel time, and the lowest level of additional delay across all three time periods, as shown in Figure 8, Figure 9 and Figure 10.
  - In the peaks, this is due to the location of the development in this option within the existing urban area of Cambridge, therefore placing residents of these dwellings close to centres of employment and to services.
  - The inter-peak level of additional trip making is low indicating that the development provides the required facilities close to dwellings thus reducing the need to use the car to access day to day requirements.
  - However, additional delay in the inter-peak is proportionally higher in SO1 than seen in the other spatial options, indicating that trips in the interpeak that are made by car are more likely to suffer from congestion in this option.
- **SO7: Integrating homes and jobs** generates the second lowest level of additional trips, travel time and delay.
  - SO7 generates around 21,000 more PCU-km in all three time periods compared to SO1. This is likely to be due to the greater distance from jobs and services in Cambridge of the development compared to SO1, notwithstanding the proximity of homes to jobs in the southern cluster.
  - The proportionally higher level of inter-peak trip making compared to SO1 (see Table 15) indicates that poorer accessibility to services and facilities locally is leading to more vehicular trip making.

  - The low level of increased vehicle kilometres over SO1 indicates that this Strategic Spatial Options offers a realistic prospect of reducing PCU-km with the right package of mitigation, especially as the AM peak figures are so close to that of SO1 as shown in Figure 8.
- SO6: Public Transport Corridors performs similarly to SO7.
  - SO6 generates around 29,500 more PCU-km across all time periods than SO1, and as is the case for SO7, this highlights the greater distance from jobs and services in Cambridge of the development in SO6.
  - The proportionally higher level of inter-peak trip making compared to SO1 (see Table 15) indicates that poorer access to services and facilities locally is leading to more vehicular trip making.
  - As with SO7, the level of increased PCU-km is relatively small and indicates that this scenario offers a realistic prospect to further reduce vehicle kilometres with the introduction of the right package of mitigation.

Medium Performing Options

3.5.14 The remaining options show larger increases in PCU-km than the options above:

- **SO2: Edge non-Green Belt** is shown to generate circa 11,000 more PCU-km in the AM peak and 16,000 more in the PM peak than SO1.
  - The figures for additional car use in this option are likely to be inflated by the issues noted in paragraphs 3.3.10 to 3.3.14, and paragraph 3.4.15 above in relation to North East Cambridge and Cambridge East. However:
  - Nonetheless, the data indicates that SO2 relies on car travel more than SO1 and therefore the level of mitigation required to reduce the need to travel by car for this option would be higher than for SO1, while noting that the 2041 Baseline does not include the Greater Cambridge Partnership's Cambridge Eastern Access Phase B scheme.
  - SO2 shows a similar level of inter-peak travel distances as a proportion of peak travel (see Table 15) compared to options SO3, SO6 and SO7, indicating poorer access to services and facilities compared to SO1 leading to more vehicular trip making.
  - SO2 generates slightly less delay overall than SO6.
- **SO3: Edge Green Belt** performs worse than SO2 in all metrics.

- Compared to SO2, this option generates around 8,000 more PCU-km in the AM peak, but the difference in the PM peak is less marked with around 4,000 additional PCU-km.
- As with SO2, the figures for additional car use in this option are likely to be inflated by the issues noted in paragraphs 3.4.15 and 3.4.24 above.
- Compared to SO1 and SO2, additional mitigation is likely to be needed for this option to ensure that the trips that need to be made have viable alternatives to the private car, if any selected sites did not have easy access to existing or planned HQPT routes.
- SO3 shows a similar level of inter-peak travel distances as a proportion of peak travel (see Table 15) compared to SO2, SO6 and SO7, indicating poorer access to services and facilities locally compared to SO1, leading to more vehicular trip making.

- **SO8: Expanded Growth Area** generates a lower level of vehicle kilometres than SO3 in the AM peak but notably higher levels in the PM peak and inter-peak.
  - Given the proximity of development in this option to the Cambourne to Cambridge HQPT scheme, it is considered that mitigation that provides direct links into that scheme is deliverable and could significantly reduce additional PCU-km generated by this option. This would be the case even in a scenario where East West Rail were not delivered.
  - SO8 has a high level of inter-peak trip making by car (see Table 15) compared to SO1, SO2, SO3, SO6 and SO7, indicating that the absence of services and facilities locally is likely to be leading to additional vehicular trip making. The full build-out of New Settlement G in this option beyond 2041 would be likely to give more options for local trips by active modes or by Public Transport as the development continues, as would additional mitigation.
  - SO8 has a higher level of delay than the other medium performing options, but this level of impact could be mitigated by East West Rail and by the additional development in this option beyond 2041.

Poorly Performing Options

- **SO4: New Settlements** is shown to have a similar level of vehicle kilometres in the AM peak period to SO3 but the inter and PM peaks both show significant increases in PCU-km over SO3.

  - This may indicate that there are trips accessing the new settlements by car that were going elsewhere in the 2041 Baseline due to the facilities or jobs on offer in the new settlements.
  - The level of mitigation needed is likely to be greater than for SO2 and SO3 and may be difficult to deliver if developments in this option require mitigation that is not currently planned.
  - SO4 shows a high level of inter-peak travel distances as a proportion of peak travel (see Table 15) compared to all other options apart from SO5: Villages. indicating poorer access to services and facilities locally is leading to more vehicular trip making.
- **SO5: Villages** generates the highest number of additional vehicular PCU-km, the highest additional travel time, and the highest level of additional delay across all three time periods, as shown in Figure 8, Figure 9 and Figure 10. This clearly indicates that the dispersal of development in this option leads to increased vehicle kilometres.
  - The dispersed nature of the development in this option would make it difficult to provide active and Public Transport links to cater for the trips that this option would generate, as the individual sites are relatively small and often a significant distance from locations that provide employment opportunities and key services.
  - SO8 has the highest levels of inter-peak travel distances as a proportion of peak travel (see Table 15) of all of the Strategic Spatial Options. indicating poorer access to services and facilities and leading to more vehicular trip making.
  - The level of mitigation required to provide Active Travel and Public Transport links to serve the sites in this option and the lower level of development at each site would render this option unviable.

3.6 Additional analysis: Total additional car trips

3.6.1 Although the above analysis of the various metrics of highway performance is useful, it is helpful to contextualise this further, by looking at the actual number of outward car trips that result from each Strategic Spatial Option. SO5: Villages, is not included in this analysis due to its poor performance in the analysis in Sections 3.2 and 3.5 above.

3.6.2 Table 16 sets out the total number of car trips generated from each of the Strategic Spatial Options across Greater Cambridge. This data is useful in underlining the relatively low level of car trips resulting from each of the Strategic Spatial Options when compared with the comparatively high level of overall trips in the entire model network in 2041, as discussed in the analysis above, and shown specifically in Table 10 and Table 11. This is not to say that these car trips would not negatively impact the local highway network, but it is helpful context when trying to analyse the figures below.

3.6.3 SO5: Villages, is not included in this analysis due to its poor performance in the analysis in Sections 3.2 and 3.5 above.

Table 16 Total Additional Car Trips from each Strategic Spatial Option

Metric	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Total Number of additional car trips	61,406	73,251	73,896	89,124	82,239	79,671	75,723

GCSP Local Plan_CSRM2 Additional Analysis_v0.1T

3.6.4 The data highlights:

- **SO1: Densification** performs best when it comes to the lowest number of additional car trips on the network.
- SO2: Edge of Cambridge non-Green Belt, SO3: Edge of Cambridge Green Belt and SO8: Expanded Growth Area, all perform moderately well against this metric.
- **SO6: Public Transport Corridors** and **SO7: Integrating homes and jobs** perform relatively poorly against this metric, but it should be noted that they also generate the lowest average journey lengths of the additional trips of any of the options (see Table 14), and therefore the second and third lowest overall additional PCU-km after SO1, as discussed in Section 3.5. This gives an

indication that there is likely to be potential to provide for some of the trips by active modes of transport.

- **SO4: New Settlements** performs poorly on this metric.

3.7 Additional Analysis: Trip Internalisation

3.7.1 This section of analysis looks the level of internalisation of trips (as a proportion of all trips generated by a development) achieved by each broad location included within the Strategic Spatial Options.

3.7.2 SO5: Villages, is not included in this analysis due to its poor performance in the analysis in Sections 3.2 and 3.5 above.

3.7.3 Internalisation refers to the number of trips (as a proportion of all trips generated, by all modes of transport) that are made within individual development sites, so that they don't impact on the operation of the surrounding transport network. For example, internalisation relates to such things as shopping or employment trips that are able to be made within some of the larger development sites due to the provision of a wide range of differing land uses and services on the site, including for example, grocery shops and offices.

3.7.4 Table 17 below considers the levels of internalisation of journeys anticipated at each development location, which is displayed as a percentage of the overall trips made. From this we can infer which development sites / locations have the highest level of internalisation (higher percentages mean better performing), and therefore further understand how each Strategic Spatial Option performs depending on the development included in them.

3.7.5 In general, internalisation levels are higher in larger developments, where there is a good mix of dwellings, services and jobs. Where services and jobs are located close to homes, the need to travel externally for work or shopping et cetera. is greatly reduced, whilst trips within the development can often be made by walking and cycling. However, this is not the only factor. The location of new development in relation to how close it is to other major urban areas (with the resultant jobs and services these urban areas provide) and its proximity to HQPT corridors that provide links to key urban areas, also influences internalisation rates. When the need to travel outside the development is high, the level of internalisation is likely to be reduced.

3.7.6 As noted above, internalisation rates are generally higher in larger developments. In this context, there are several developments where data is presented in Table 17

where the site straddles two model zones, one in Cambridge, and one in South Cambridgeshire. These are:

- North East Cambridge Housing
- Cambridge Airport
- South of Cambridge Southern Fringe
- North of Barton Road / Grange Farm

3.7.7 The two sectors covering each of these sites would ideally be considered together and would be expected to achieve internalisation rates overall that are equivalent or greater than the higher rates achieved for each site by sector demonstrated in Table 17. The issue derives from the same issues noted in paragraphs 3.3.10 to 3.3.14 above.

Table 17 Trip Internalisation Levels

Location & Model Zone Name	Sector	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Cambridge Urban Area: North East Cambridge: NEC Housing (Cambridge) *	-141	20%	21%	-	-	21%	16%	16%
Cambridge Urban Area: North East Cambridge: NEC Housing (South Cambs.) *	-224	13%	13%	-	-	13%	10%	10%
Smaller urban area sites: Arbury 2 (Cambridge)	-121	12%	-	-	-	-	-	-
Edge of Cambridge: Non-Green Belt: Cambridge Airport 1 (Cambridge) *	-141	9%	11%	-	-	-	11%	11%
Edge of Cambridge: Non-Green Belt: Cambridge Airport 2 (South Cambs.) *	-215	11%	13%	-	-	-	13%	13%
Edge of Cambridge: Green Belt: Cherry Hinton Road / Babraham Road (Cambridge)	-131	-	-	21%	-	-	-	-
Edge of Cambridge: Green Belt: Cherry Hinton 3 (South Cambs.)	-215	-	-	17%	-	-	-	-
Edge of Cambridge: Green Belt: Land at Fen Ditton (South Cambs.)	-215	-	-	20%	-	-	-	-
Edge of Cambridge: Green Belt: South of	-131	-	-	15%	-	-	-	-

Location & Model Zone Name	Sector	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Cambridge Southern Fringe (Cambridge) *								
Edge of Cambridge: Green Belt: South of Cambridge Southern Fringe (South Cambs.) *	-233	-	-	20%	-	-	-	-
Edge of Cambridge: Green Belt: North of Barton Road / Grange Farm (Cambridge) *	-121	-	-	7%	-	-	-	-
Edge of Cambridge: Green Belt: North of Barton Road / Grange Farm (South Cambs.) *	-223	-	-	15%	-	-	-	-
Hypothetical new settlements (non-specific locations): New Settlement A: South East of Cambridge	-215	-	-	-	26%	-	-	-
Hypothetical new settlements (non-specific locations): New Settlement B: South of Cambridge 1	-233	-	-	-	-	-	29%	-
Hypothetical new settlements (non-specific locations): New Settlement C: South of Cambridge 2	-233	-	22%	-	-	29%	-	-
Hypothetical new settlements (non-specific locations): New Settlement D: South of Cambridge 3	-233	-	-	-	28%	-	-	-
Hypothetical new settlements (non-specific locations): New Settlement E: South West of Cambridge 1	-234	-	26%	-	-	-	-	-
Hypothetical new settlements (non-specific locations): New Settlement F: South West of Cambridge 2	-234	-	-	-	30%	-	-	-
Hypothetical new settlements (non-specific locations): New Settlement G: South of Cambourne	-263	-	-	-	13%	-	-	15%
Accelerated growth at committed New Settlements: Waterbeach New Town	-241	-	-	-	-	17%	-	-

Location & Model Zone Name	Sector	SO1	SO2	SO3	SO4	SO6	SO7	SO8
Villages: The Abingtons	-233	-	-	-	-	7%	13%	-
Villages: Bourn	-263	-	-	-	-	-	-	13%
Villages: Caldecote	-223	-	-	-	-	11%	-	13%
Villages: Coton	-223	-	-	-	-	9%	-	12%
Villages: Croxton and Eltisley	-223	-	-	-	-	-	-	8%
Villages: Elsworth	-223	-	-	-	-	-	-	9%
Villages: Foxton	-234	-	-	-	-	12%	-	-
Villages: Fulbourn	-215	-	-	-	-	17%	-	-
Villages: Great Shelford	-233	-	-	-	-	17%	18%	-
Villages: Hardwick	-223	-	-	-	-	14%	-	15%
Villages: Histon	-223	-	-	-	-	13%	-	-
Villages: Linton	-233	-	-	-	-	29%	32%	-
Villages: Meldreth	-234	-	-	-	-	14%	-	-
Villages: Milton West	-224	-	-	-	-	11%	-	-
Villages: Pampisford	-233	-	-	-	-	8%	-	-
Villages: Papworths	-223	-	-	-	-	-	-	14%
Villages: Sawston	-233	-	-	-	-	26%	26%	-
Villages: Shepreth	-234	-	-	-	-	8%	-	-
Villages: Swavesey	-223	-	-	-	-	16%	-	-
Villages: Waterbeach	-241	-	-	-	-	17%	-	-
Villages: Whittlesford	-233	-	-	-	-	12%	16%	-
Planned growth at committed new settlements (for comparative purpose only): Northstowe Phase 3	-251	40%	40%	40%	40%	40%	40%	40%
Planned growth at committed new settlements (for comparative purpose only): Bourn Airfield	-263	35%	35%	35%	34%	35%	35%	34%

Note: Focus of option shown with yellow shading: that is, 20%

* The assessment of these sites is likely to be underestimating the potential for the internalisation of trips. The reasons for this are set out in paragraphs 3.7.6 and 3.7.7.

3.7.8 The analysis in the following paragraphs assesses the internalisation of the development sites included in the Strategic Spatial Options. It should be noted that internalised trips are more likely to be active mode trips rather than car or Public Transport trips. The value of this metric is that it gives an indication as to how well the location, scale and make-up of development is minimising the need for external trip making.

3.7.9 However, the relative locations of development must be considered in any assessment of internalisation. A site in or on the edge of Cambridge with low levels of internalisation is still likely to generate less vehicular traffic than a new settlement that is remote from Cambridge that has higher levels of internalisation. This can be seen by referencing the data in Table 17 with the consideration of Highway Impact in Section 3.5 above. Table 18 summarises the additional travel distance generated by each Strategic Spatial Option for reference in the following analysis.

Table 18 Total additional vehicular trip distance in PCU-kms, from each Strategic Spatial Option, over the 2041 Baseline

Metric	SO1	SO2	SO3	SO4	SO5	SO6	SO7	SO8
Total additional car PCU-km	122,394	165,266	180,027	207,592	217,301	151,862	143,241	186,510

Source: Data derived from Figure 8.

Strategic Spatial Option 1: Densification

Focus of option:

3.7.10 SO1 focusses on densifying existing urban areas. The main development assumed in this SO1 is at North East Cambridge.

3.7.11 The data in Table 17 shows that for the North East Cambridge site, internalisation rates are quite high in the sector in Cambridge (20%), but as detailed in paragraphs 3.7.6 and 3.7.7 above, the levels seen in the South Cambridgeshire sector of North East Cambridge are lower. The overall level of internalisation is likely to be an underestimate of the levels that would be seen across the whole site, due to the separate consideration of the two sectors covering the site.

3.7.12 However, it should also be noted that this site is in Cambridge, and as such benefits from the good accessibility to other locations where jobs and services are available, by active modes, Public Transport and car, which may reduce the level of internalisation.

3.7.13 This option includes a significant level of development assumed to be in smaller sites across Cambridge, which by their nature will not achieve any significant internalisation within the sites but are very likely to generate trips to local facilities and services within their locality / model sectors.

Balance of option:

3.7.14 Discussion of internalisation of trips within Cambridge East is discussed under SO2: Edge non-Green Belt below. The slightly lower rates of internalisation shown for Cambridge East in SO1 compared to SO2, SO7 and SO8 is due to the lower level of development on this site in SO1 compared to the other options.

Strategic Spatial Option 2: Edge non-Green Belt

Focus of option:

3.7.15 This Strategic Spatial Option focusses development on the edge of Cambridge outside the Green Belt. Cambridge East is the main area of development in this option.

3.7.16 The data in Table 17 shows Cambridge East achieving relatively low internalisation rates. As detailed in paragraphs 3.7.6 and 3.7.7 above, the levels seen at Cambridge East are likely to underestimate of the levels that would be achieved by the whole site due to the separate consideration of the two sectors that cover the site.

Balance of option:

3.7.17 Discussion of internalisation of trips within North East Cambridge is discussed under SO1: Densification above. The rates of internalisation shown for North East Cambridge in SO2 are very similar those seen in SO1.

Strategic Spatial Option 3: Edge Green Belt

Focus of option:

3.7.18 SO3 focusses development on the edge of Cambridge, within non-site-specific locations in the Green Belt. The development assumed in this option consists of:

- The sites ‘Land at Fen Ditton’ and ‘Cherry Hinton Road / Babraham Road’ see good levels of internalisation, at 21% and 20% respectively, similar to those seen at North East Cambridge in SO1, SO2 and SO6.
- ‘Cherry Hinton 3’ sees slightly lower levels of internalisation, at 17%.
- The ‘South of Cambridge Southern Fringe’ site sees good levels of internalisation (20% and 15%), but as the site straddles two model sectors, it is likely that the levels shown underestimate the levels that would be achieved by the whole site – see paragraphs 3.7.6 and 3.7.7 above.

- The 'North of Barton Road / Grange Farm' site sees lower levels of internalisation (15% and 7%), but as the site straddles two model sectors, it is likely that the levels shown underestimate the levels that would be achieved by the whole site – see paragraphs 3.7.6 and 3.7.7 above.

Balance of option:

3.7.19 No other locations were needed for this option.

Strategic Spatial Option 4: New Settlements

Focus of option:

3.7.20 This option places new homes and jobs predominantly in 4 new settlements, dispersed around the modelled area: These are New Settlement A: South East of Cambridge, New Settlement D: South of Cambridge 3, New Settlement F: South West of Cambridge 2 and New Settlement G: South of Cambourne.

3.7.21 New Settlements A (26%), D (28%) and F (30%) all achieve high rates of internalisation, at levels higher than seen at the edge of Cambridge sites and lower than the existing new settlements at Northstowe (40%) and Bourn Airfield (35%). We can infer that this is owing to the size of development assumed, and the fact that these settlements are proposed to be located in sectors further away from existing major urban centres such as Cambridge. This means that the right mix of development, with sufficient dwellings, jobs and services can contain at least a quarter of generated trips within the development.

3.7.22 New Settlement G: South of Cambourne achieves around 13% internalisation. The proximity of this settlement to Cambourne, Bourn Airfield, and to the Cambourne to Cambridge HQPT route may mean that the model sees trips being made to access services and facilities in Cambourne and Cambridge rather than staying in the new settlement.

Balance of option:

3.7.23 No other locations were needed for this option.

Strategic Spatial Option 6: Public Transport Corridors

Focus of option:

3.7.24 This option focuses new jobs and houses on or close to proposed and existing developments along existing and planned HQPT corridors. It includes New Settlement C: South of Cambridge 2, Accelerated development at Waterbeach New Town and additional development in existing villages along key HQPT.

3.7.25 New Settlement C: South of Cambridge 2 performs similarly to New Settlements A, D and F in SO5, with a high rate of internalisation at 29%.

3.7.26 The accelerated growth at Waterbeach achieves around 17% internalisation of trips. This could be due to the level of development proposed here in this Strategic Spatial Option being lower, but perhaps more pertinent is the closer proximity to Cambridge and specifically North East Cambridge, where high levels of jobs and services are already provided. North East Cambridge itself achieves modal shares at the same levels to those seen for it in SO1 and SO2.

3.7.27 SO6 also assumes development in a number of villages, and two of these, Linton and Sawston achieve internalisation levels of over 25%.

Balance of option:

3.7.28 No other locations were needed for this option.

Strategic Spatial Option 7: Integrating homes and jobs

Focus of option:

3.7.29 SO7 places the bulk of new homes and jobs where there are already clusters of (particularly) employment development, predominantly in the sector housing the 'Southern Cluster' of business parks. The key area for analysis is New Settlement B in the southern cluster.

3.7.30 The level of internalisation realised by New Settlement B is high, at 29%. This compares well with New Settlements A, D and F in SO4, and with development at Northstowe and Bourn Airfield. The settlement is far enough away from Cambridge to encourage internal trips where possible.

3.7.31 Table 17 also shows trips resulting from smaller levels of developments from the villages in this (and neighbouring) sectors. As with SO6, development at Linton and

Sawston achieves levels of internalisation over 25%. However, this is likely to have a minimal impact on the performance of this Strategic Spatial Option.

Balance of option:

3.7.32 North East Cambridge has a lower level of internalisation in SO7 than it does in SO1, SO2 and SO6.

3.7.33 Cambridge East has similar levels of internalisation in SO7 as it does in SO2.

Strategic Spatial Option 8: Expanded Growth Area

Focus of option:

3.7.34 This option places additional homes and jobs predominantly in an existing growth area located on an existing transport node. New Settlement G: South of Cambourne is the key settlement to assess in this Strategic Spatial Option, as this is where the bulk of homes and jobs are assumed.

3.7.35 The 'new settlement close to Cambourne' (New Settlement G) achieves a slightly higher level of internalisation in SO8 than in SO4. The commentary on New Settlement G in SO4, in paragraph 3.7.22 above, is also valid for this settlement in SO8.

3.7.36 Table 17 also shows some internalisation of trips resulting from development at a number of villages. The high proportion of car trips in the external trip making from these villages (see Table 13) means that the benefit of the levels of internalisation seen is likely to be minimal.

Balance of option:

3.7.37 North East Cambridge and Cambridge East see the same levels of internalisation as they did in SO7.

4 Sensitivity Tests on Strategic Spatial Options 2 and 4

4.1 The Sensitivity Tests

4.1.1 The core Strategic Spatial Option tests all include the maximum growth level, to test the worst-case scenario, but do not consider the performance of the minimum and medium growth levels. They also include baseline committed transport schemes and exclude some significant proposed new transport infrastructure. While this infrastructure is not sufficiently advanced at to include in the Baseline, it could have significant implications for how the options perform.

4.1.2 For these reasons, a range of sensitivity tests have been undertaken to understand these and other relevant different scenarios. These tests assist the understanding of which options perform better or worse in transport terms. The results of these tests are compared against the core tests which assumed the maximum level of growth and fixed levels of in-commuting. The list of Sensitivity Tests is set out in Table 19 below:

Table 19 List of Sensitivity Tests

Test	Description	Growth Scenario	Commuting assumption
1a	Full build out of SO2: Edge non-Green Belt	Max	Fixed In-commuting
1b	Full build out of SO4: New Settlements	Max	Fixed In-commuting
2a	SO2: Edge non-Green Belt + Cambridge Autonomous Metro (CAM)	Max	Fixed In-commuting
2b	SO2: Edge non-Green Belt + East West Rail Central Section (EWR)	Max	Fixed In-commuting
2c	SO2: Edge non-Green Belt + CAM & EWR	Max	Fixed In-commuting
3a	Medium Growth SO2: Edge non-Green Belt	Med	East of England Forecasting Model (EEFM)
3b	Medium Growth SO4. New Settlements	Med	EEFM
3c	Minimum Growth (not tested in CSRM2 as very similar to 2041 Baseline)	Min	EEFM
4a	In/out-commuting SO2: Edge non-Green Belt	Max	EEFM
4b	In/out-commuting SO4 New Settlements	Max	EEFM
5a	Strategic Spatial Option 2: Edge non-Green Belt, Housing Excluding 10% Buffer	Max	Fixed In-commuting

Test	Description	Growth Scenario	Commuting assumption
5b	Strategic Spatial Option 4: New Settlements, Housing Excluding 10% Buffer	Max	Fixed In-commuting

Source: GCSP Local Plan_CSRM Outputs_v2.0

4.1.3 The Councils took a pragmatic approach to the selection of Sensitivity Tests, considering time and costs, and selected two options (SO2 and SO4) as the basis for them, as likely impacts for other options could be inferred. SO2 and SO4 give coverage of the greatest range of sources of supply (densification, edge non-GB, new settlement, villages), allowing maximum inferences for the other options. Time and cost constraints limited the number of tests that could be undertaken. Ideally CAM and EWR would have been tested against SO4.

4.1.4 Sensitivity Test 3c: Minimum Growth has not been tested as the level of development is similar to that included in the 2041 Baseline and it was considered that any conclusions in relation to it could be drawn from the assessment of the 2041 Baseline.

4.1.5 The following sections of this Chapter describe the Sensitivity Tests and analyse their results. It is important to note that with the exception of Sensitivity Tests 2a, 2b and 2c, there are no mitigation measures included in this analysis.

4.2 Rationale behind the Sensitivity Tests

4.2.1 The purpose of these Sensitivity Tests is to give an understanding of the range of transport responses resulting from scenarios which are different to the core spatial option tests set out in Chapter 3 of this report. The core tests assumed the maximum growth level in 2041 with no additional site-specific mitigation. These additional Sensitivity Tests ensure that all reasonable options are considered, and their relative transport implications are understood. The Sensitivity Tests also consider a range of other factors as set out below. The results of the initial Strategic Spatial Option tests and the results of these Sensitivity Tests will be used to help inform the choice of the preferred spatial strategy that will be taken forward in the Local Plan.

4.2.2 There are two key assumptions that vary within the Sensitivity Tests; these are the level of growth, and the level of in and out-commuting. The growth scenarios tested in these Sensitivity Tests are:

- Medium – central scenario employment-led
- Maximum – higher employment-led
- Excluding 10% buffer of housing numbers included in the Strategic Spatial Options
- Full build out of strategic sites

4.2.3 The levels of in-commuting tested are as follows:

- Fixed in-commuting as in the tests of the core Strategic Spatial Options in Chapter 3, and,
- The level of in-commuting assumed in the East of England Forecasting Model.

4.2.4 To understand the impact of changes in the level of development and in/out-commuting on the major strategic sites, the following Strategic Spatial Options were chosen as the focus for the Sensitivity Tests set out in this chapter.

- Strategic Spatial Option 2: Edge non-Green Belt (SO2: Edge non-Green Belt) and
- Strategic Spatial Option 4: New Settlements (SO4: New Settlements)

4.2.5 These Strategic Spatial Options were chosen as they both include large strategic sites within their makeup, but these are located in very different geographical areas with SO2: Edge non-Green Belt including development on the edge of Cambridge

and SO4: New Settlements including free standing new settlements in more rural areas. The different spatial locations of the major strategic sites will enable the impact of the different growth and commuting assumptions to be assessed on both edge of Cambridge developments and more rural development. It is for this reason that the Sensitivity Tests set out below were undertaken using these two Strategic Spatial Options.

4.2.6 The detail of each Sensitivity Test is set out below.

Full Build Out: Sensitivity Tests 1a and 1b

4.2.7 The level of development involved in several of the Strategic Spatial Options is greater than would come forward in the lifetime of this Local Plan to 2041. This is particularly true for the larger strategic sites which will take longer to build out.

4.2.8 To enable the impact of these strategic sites to be assessed, Sensitivity Tests 1a and 1b assume that all development at strategic sites included in SO2: Edge non-Green Belt and SO4: New Settlements respectively will be built out by 2041, to understand how they perform with the benefit of the full amount of development. This is not a future year scenario but rather a proxy to understand the transport impacts of individual large developments. For this reason, other assumptions remain as in the tests in Chapter 3.

Cambridge Autonomous Metro (CAM) and East West Rail Central Section (EWR): Sensitivity Tests 2a, 2b and 2c

4.2.9 The list of transport schemes included in the 2041 Baseline did not include either the CAM or EWR as neither of these schemes were sufficiently well defined at the time the 2041 Baseline was defined in June 2020. To this end, Sensitivity Tests 2a, 2b and 2c were undertaken using the latest publicly available information on these schemes with a view to understanding the impact of CAM and EWR – singly and together – on the performance of the transport network for Strategic Spatial Option 2. To be consistent with the tests in Chapter 3 it will retain the Fixed In-commuting approach described in paragraphs 2.2.9 to 2.2.11.

4.2.10 In relation to the CAM, this Sensitivity Test was identified and assessed at a time when the Cambridgeshire and Peterborough Combined Authority (CPCA) was actively developing plans for the CAM, responding to their 2020 Local Transport

Plan (LTP). The LTP is due to be updated in late 2021 / early 2022 by the CPCA and any changes to the LTP will be reviewed and reflected as necessary in the draft Local Plan. The assumptions in this sensitivity test for the CAM include the core tunnels section; it does not include an assumption about the proposed regional routes beyond the Greater Cambridge Partnership radial route schemes which were included in the transport network baseline.

Growth levels: Sensitivity Tests 3a, 3b and 3c

4.2.11 As noted above, the Strategic Spatial Option tests described in Chapter 3 assume the maximum growth option. The next set of Sensitivity Tests look at the impact of the medium and minimum levels of development growth on trip making and mode share of the Strategic Spatial Options, so as to provide a comprehensive understanding of growth and spatial options. The in-commuting assumptions used in these Sensitivity Tests no longer follow the “consume your own smoke” assumption and instead revert to the level of in-commuting indicated by the EEFM (see Greater Cambridge Local Plan First Proposals Topic Paper 1: Strategy for more detail on commuting assumptions associated with the different levels of growth).

In and out-commuting: Sensitivity Tests 4a and 4b

4.2.12 As set out in paragraphs 2.2.9 to 2.2.11, the Strategic Spatial Option tests included in Chapter 3 assume a fixed in-commuting approach to ensure that all workers for the additional jobs above the minimum growth option travel from within the Greater Cambridge area. To understand the impact of this assumption on the maximum growth option, Sensitivity Tests 4a & 4b look at the impact of unconstrained in-commuting on Strategic Spatial Options 2 and 4 respectively.

10% Housing Buffer: Sensitivity Tests 5a and 5b

4.2.13 In order to give greater confidence in meeting housing needs, all the growth level options include a 10% housing buffer on top of the housing growth level identified in the Greater Cambridge Local Plan Housing & Employment Relationships Report. The final Sensitivity Tests look at the impact of excluding that 10% buffer from the housing numbers. To be consistent with the tests in Chapter 3 these will retain the Fixed In-commuting approach described in paragraphs 2.2.9 to 2.2.11.

4.3 Model Inputs

Development Assumptions

4.3.1 The quantum of dwellings and jobs for each Sensitivity Test were set out by the Greater Cambridge Shared Planning. The required level of growth was distributed across the Sector system within the model as per the core spatial options. Note that the spatial options included assumptions for the purposes of options testing to ensure consistent levels of development were tested for each option and were not intended to indicate any preferences for how the balance of development should be provided under the relevant option.

4.3.2 The jobs associated with the Sensitivity Tests were distributed in the same way as in the core Strategic Spatial Option tests, as described in paragraphs 2.2.4 to 2.2.8. Sensitivity Test 5 retains the same total number of jobs as the core Strategic Spatial Option tests but includes fewer dwellings. Similarly, Sensitivity Test 3 has fewer jobs overall. The resulting levels of development are set out in Table 20 below. It is important to note that the figures in this table include the dwellings and jobs in the 2041 Baseline.

Table 20 Dwelling and jobs (employment) totals

Strategic Spatial Option / Sensitivity Test	Dwellings	Jobs
Strategic Spatial Option 2	332,062	369,136
Strategic Spatial Option 4	332,062	369,136
1a Strategic Spatial Option 2: Edge non-Green Belt, Full Build Out	345,662	404,841
1b Strategic Spatial Option 4. New Settlements, Full Build Out	345,662	404,841
2a Strategic Spatial Option 2. Edge non-Green Belt + CAM	332,062	369,136
2b Strategic Spatial Option 2. Edge non-Green Belt + EWR	332,062	369,136
2c Strategic Spatial Option 2. Edge non-Green Belt + CAM & EWR	332,062	369,136
3a Strategic Spatial Option 2: Edge non-Green Belt, Medium Growth	315,473	357,401
3b Strategic Spatial Option 4, New Settlements, Medium Growth	315,473	357,401
4a Strategic Spatial Option 2: Edge non-Green Belt, In/Out-commuting	332,062	369,136
4b Strategic Spatial Option 4: New Settlements, In/Out-commuting	332,062	369,136

5a Strategic Spatial Option 2: Edge non-Green Belt, Housing Excluding 10% Buffer	326,362	369,136
5b Strategic Spatial Option 4: New Settlements, Housing Excluding 10% Buffer	326,362	369,136

Source: GCSP Local Plan_CSRM Outputs_v2.0

Transport Networks

4.3.3 The transport networks for all the Sensitivity Tests are the same as for the core Spatial Option tests except for the inclusion of the Cambridgeshire Autonomous Metro in Sensitivity Test 2a, of the East West Rail Central Section (EWR) in Sensitivity Test 2b, and of both in Sensitivity Test 2c.

In and out- commuting

4.3.4 The Strategic Spatial Options as tested included the same total dwellings and jobs in 2041 and had the same "consume your own smoke" approach to in and out-commuting. In the Sensitivity Tests, where commuting assumptions vary as follows:

- **Sensitivity Test 1:** The absolute number of in-commuters are fixed at the same value as in the core Spatial Option tests ("consume your own smoke"). As a result, the number of out-commuters has been recalculated to take account of the additional workers that result from the increased numbers of dwellings and jobs included in these Sensitivity Tests. These values vary for the individual Sensitivity Tests affected (1a/b and 5a/b).
- **Sensitivity Test 2:** No changes to Land Use, so these tests use the same values as the core Strategic Spatial Option tests.
- **Sensitivity Tests 3 and 4:** In these Sensitivity Tests the level of in-commuting is different from the level used in the Strategic Spatial Option tests and is derived from EEFM projections which do not fix the level of in-commuting. As a result of the different level of in-commuting, it has been necessary to recalculate the number of out-commuters. The level of out-commuting is calculated by accounting for the number of workers derived from the dwellings and jobs numbers associated with each of the Sensitivity Tests. The levels of in and out-commuting vary for Sensitivity Tests 3 and 4.

4.3.5 Table 21 below shows the in and out-commuting values for the Sensitivity Tests. The terms in brackets in the "Parameter" column are the sources of the parameters.

Table 21 In-/out-commuting balancing by Sensitivity Test

Parameter (Source in Brackets)	ST1a	ST1b	ST3 (a/b)	ST4 (a/b)	ST5 (a/b)
Dwellings (Greater Cambridge Shared Planning – GCSP)	345,662	345,862	315,473	328,562	326,362
Jobs (GCSP)	404,841	385,561	357,401	369,135	369,135
Population per Dwelling (EEFM)	2.30	2.30	2.30	2.30	2.30
Population (calculated)	795,197	795,657	725,747	755,858	750,797
Working Population Rate (EEFM)	47.9%	47.9%	47.9%	47.9%	47.9%
Workers (calculated)	380,768	380,988	347,513	361,931	359,508
In-commuters as % of internal total jobs (EEFM/calculated)	18.9%	19.8%	22.8%	22.8%	20.7%
Out-commuters as % of internal total workers (calculated)	13.8%	18.9%	20.6%	21.3%	18.6%
In-commuters (calculated/input)	76,442	76,442	81,446	84,120	76,442
Out-commuters (calculated)	52,369	71,869	71,558	76,916	66,814

Source: GCSP Local Plan_CSRM Outputs_v2.0

4.4 Sensitivity Test Analysis: Trip Volumes and Mode Share

4.4.1 The growth in trips by mode is presented below to illustrate the impact of the Sensitivity Tests. The growth in trips from Sensitivity tests is compared to the same data from the core Strategic Spatial Options 2 and 4 tests as applicable.

4.4.2 Mode shares are presented on the same basis as in Chapter 3, as detailed in paragraph 3.2.4.

4.4.3 Table 22 shows:

- The absolute trip volumes by mode for the 2041 Baseline
- The trip volumes generated by development in Spatial Option 2: Edge non-Green Belt, over and above trips in the 2041 Baseline
- The trip volumes generated by SO2 in Sensitivity Tests 1a, 3a, 4a and 5a, over and above trips in the 2041 Baseline

4.4.4 Table 23 shows the same data for Strategic Spatial Option 2: Edge non-Green Belt and Sensitivity Tests 2a, 2b and 2c, and Table 24 shows the same data for Spatial Option 4: New Settlements and SO4 Sensitivity Tests 1b, 3b, 4b and 5b. As noted above CAM and EWR were not tested against SO4.

Table 22 Additional trip volume by mode over the 2041 Baseline of Strategic Spatial Option 2: Edge non-Green Belt, and its four Sensitivity Tests (1a, 3a, 4a and 5a)

Scenario	Active mode trips	Public Transport trips	Park & Ride trips	Car trips	Total Trips
2041 Baseline	541,823	113,035	63,399	1,288,332	2,006,589
SO2: Edge non-Green Belt	58,453	8,829	6,065	73,251	146,599
1a: Full Build Out	100,185	13,934	9,655	107,486	231,260
3a: Medium Growth	17,131	3,722	3,361	32,319	56,533
4a: In/Out-commuting	50,299	9,220	6,486	72,864	138,870
5a: Housing Excluding 10% Buffer	45,282	6,646	4,371	57,822	114,121

Source: GCSP Local Plan_CSRM Outputs_v2.0

Table 23 Trip volume growth by mode of Spatial Option 2 and CAM / EWR Sensitivity Tests 2a, 2b, 2c from 2041 Baseline

Scenario	Active mode	Public Transport	Park & Ride	Car	Total Trips
2041 Baseline	541,823	113,035	63,399	1,288,332	2,006,589
SO2 - Edge - non-Green Belt	58,453	8,829	6,065	73,251	146,599
2a: CAM	53,848	16,395	13,306	63,573	147,122
2b: EWR	58,363	9,536	6,811	71,771	146,481
2c: CAM + EWR	53,609	16,941	14,077	62,428	147,055

Source: GCSP Local Plan_CSRM Outputs_v2.0

Table 24 Additional trip volume by mode over the 2041 Baseline of Strategic Spatial Option 4: New Settlements, and its four Sensitivity Tests (1b, 3b, 4b and 5b)

Scenario	Active mode trips	Public Transport trips	Park & Ride trips	Car trips	Total Trips
2041 Baseline	541,823	113,035	63,399	1,288,332	**2,006,589**
SO4 - New Settlements	47,720	5,441	5,104	89,124	**147,388**
1b: Full Build Out	78,728	8,363	6,016	137,262	**230,369**
3b: Medium Growth	14,380	2,338	3,026	36,895	**56,640**
4b: In/Out-commuting	41,414	6,308	5,430	86,440	**139,592**
5b: Housing Excluding 10% Buffer	37,507	4,078	3,225	69,895	**114,704**

Source: GCSP Local Plan_CSRM Outputs_v2.0

4.4.5 Figure 11 compares the mode shares achieved by the additional growth included in Strategic Spatial Option 2 with those achieved by Sensitivity Tests 1a, 3a, 4a and 5a. Figure 12 shows the same data for Strategic Spatial Option 2 compared to Sensitivity Tests 2a, 2b and 2c, and Figure 13 shows the same data for Strategic Spatial Option 4 compared to Sensitivity Tests 1b, 3b, 4b and 4d.

Figure 11 Percentage transport mode share of trip volume growth from 2041 Baseline of Spatial Option 2 and Sensitivity Tests 1a, 3a, 4a and 5a

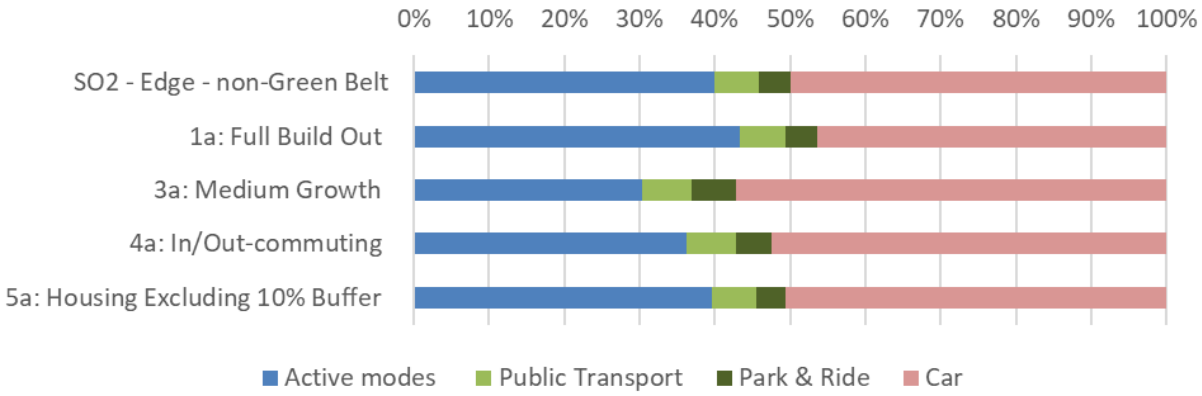


Figure 12 Percentage transport mode share of trip volume growth from 2041 Baseline of Spatial Option 2 and Sensitivity Tests 2a, 2b and 2c

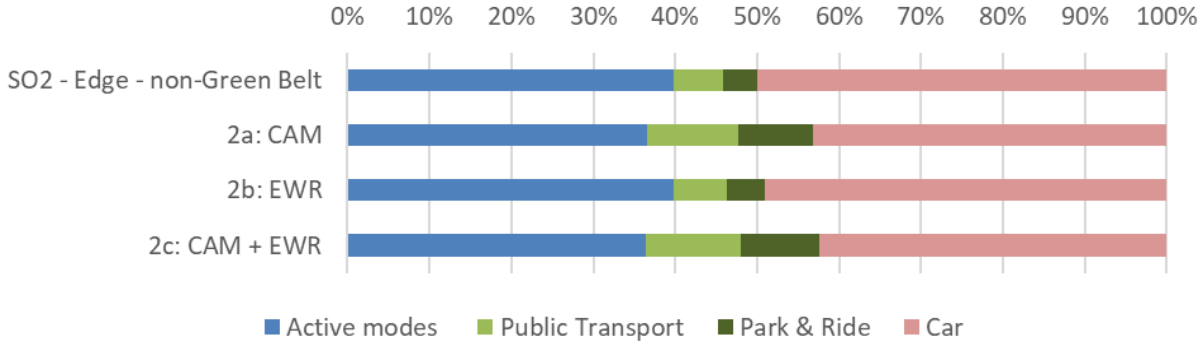
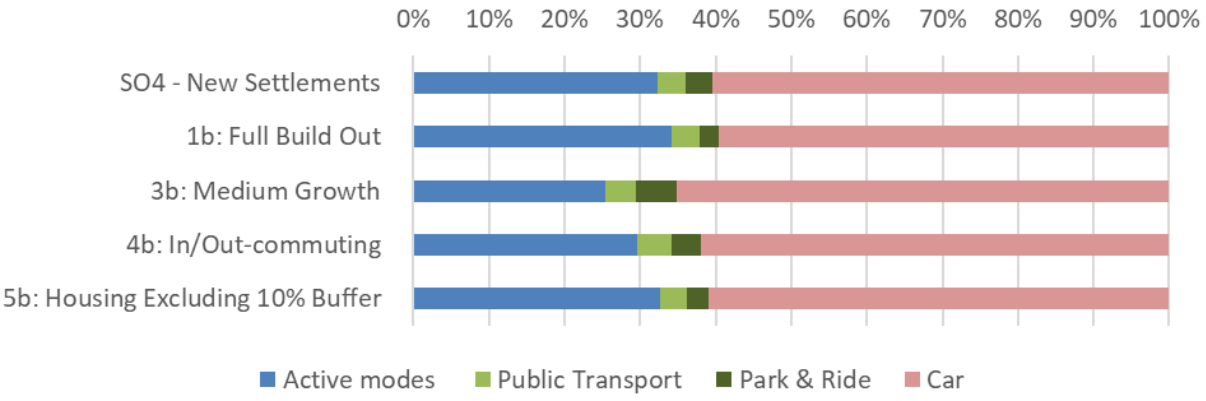


Figure 13 Percentage transport mode share of trip volume growth from 2041 Baseline of Spatial Option 4 and Sensitivity Tests 1b, 3b, 4b and 5b



4.4.6 The following paragraphs discuss the analysis of trip volumes and mode share results for each of the Sensitivity Tests. Note that Sensitivity Tests 4a and 4b are discussed before Sensitivity Tests 3a and 3b, as tests 3a and 3b layer a second changed assumption on top of the same single changed assumption seen in tests 4a and 4b.

Full Build Out of Strategic sites: Sensitivity Tests 1a and 1b:

4.4.7 The results of the full build out test looks at the impact of the full build-out of the strategic scale developments included in SO2: Edge non-Green Belt and SO4: New Settlements. Whilst full build-out in this timescale is not a realistic option under consideration, it is a proxy to understand the full impact of the completed developments on the transport network. This will help to identify whether there are differences in factors such as mode share with the full development that should be taken into consideration as part of the plan making process.

Sensitivity Test 1a: Full build out of Strategic Spatial Option 2: Edge non-Green Belt

4.4.8 Sensitivity Test 1a indicates that for SO2: Edge non-Green Belt:

- There would be an increase of approximately 231,000 trips compared to the 2041 Baseline, which is an increase of almost 85,000 trips compared to the original SO2: Edge non-Green Belt test set out in Chapter 3. This represents a 4% increase in total trips when compared to the original SO2: Edge non-Green Belt test.
- The mode share for non-car trips from the new developments would increase from 50% in the original SO2 test, to 53.5% at Full Build-out.
- While approximately 34,000 more car trips are generated, the number of non-car trips increases by over 50,000. The number of Public Transport / Park & Ride trips increases, but the mode share does not change.

Sensitivity Test 1b: Full build out of Strategic Spatial Option 4: New Settlements

4.4.9 Sensitivity Test 1b indicates that for SO4: New Settlements:

- There would be an increase of approximately 230,000 trips from the 2041 Baseline with Full Build-Out, which is an increase of almost 83,000 trips from the original SO4 test.
- The mode share of car use would fall slightly, from 60.5% to 59.6%.
- The mode share of Active Travel would increase by around 1.8%.
- The combined mode share of Public Transport / Park & Ride would decrease by around 1%, but the number of Public Transport / Park & Ride trips would increase.

Comparison between results of Sensitivity Tests 1a and 1b

4.4.10 There is a significant difference between the results of Sensitivity Tests 1a and 1b in terms of trip volumes and mode share. While both tests show that at a higher level of development, car use will decrease, the magnitude of the decrease in terms of the mode share of trips is almost four times higher, at 3.5% for SO2: Edge non-Green Belt, compared to 0.9% for SO4: New Settlements.

Cambridge Autonomous Metro and East West Rail: Sensitivity Tests 2a, 2b and 2c

4.4.11 Sensitivity Tests 2a, 2b and 2c show the impact of the introduction of major additional Public Transport options in the form of CAM and EWR. These tests were carried out on the SO2: Edge non-Green Belt. All other assumptions in these tests are the same as for the core SO2: Edge non-Green Belt test in Chapter 3.

4.4.12 It should be noted that the assessment of East West Rail against Strategic Spatial Option 2: Edge non-Green Belt will not be representative of its performance against all the other Strategic Spatial Options. It would be expected to achieve better results for Strategic Spatial Options 4 and 8, both of which include significant levels of development in the Cambourne area, where an East West Rail station is planned.

Sensitivity Test 2a: Introduction of the Cambridge Autonomous Metro

4.4.13 Sensitivity Test 2a was undertaken to assess the impact of the introduction of the CAM in providing for the transport demand of developments.

- With the introduction of CAM, overall levels of trip making rise very slightly, by 500 trips, suggesting that CAM would not itself generate many new trips but would provide a different option for existing trips on the local transport network in Strategic Spatial Option 2.
- The mode share of car trips drops from 50% in core Strategic Spatial Option 2 test to 43% (equating to a reduction of almost 10,000 trips) with the introduction of CAM but no other site-specific mitigation.
- This test also indicates that there would be around 4,500 fewer active mode trips with the introduction of CAM in SO2, dropping the proportion of trips by active mode from 40% to 37%. This change in the proportion of active mode trips indicates that the introduction of CAM not only encourages car drivers to switch mode but also replaces some active mode trips.

- The introduction of CAM leads to a doubling of trips by Public Transport (both bus and Park & Ride).

Sensitivity Test 2b: Introduction of the East West Rail Central Section

4.4.14 Sensitivity Test 2b was undertaken to assess the impact of the introduction of the East West Rail Central Section in providing for the transport demand of developments.

- The level of total trips generated by this option is very close to the core test indicating that the introduction of EWR does not generate significant additional trip making.
- The mode shares shown in this test are largely the same as for the core test which indicates that for this core spatial option EWR does not have a major impact on its own. This is due to the distance from the development in this spatial option to the proposed EWR route. As such, any opportunities to increase sustainable mode shares generated by EWR do not benefit a development strategy focused on the edge of Cambridge non-Green Belt.

4.4.15 The key finding from this test is that the introduction of EWR on its own does not have a significant impact on the level of trip generation or mode share for this Strategic Spatial Option 2: Edge non-Green Belt

Sensitivity Test 2c introduction of CAM and EWR

4.4.16 Sensitivity Test 2c was undertaken to assess the impact of the introduction of both the CAM and EWR in providing for the transport demand of developments.

- The total level of trips generated by this option is very close to the core test indicating that the introduction of CAM and EWR do not generate significant additional trips.
- The changes in mode shares seen in this test are slightly larger than those seen in Sensitivity Test 2a, with an:
  - 8% reduction in car mode share
  - 4% reduction in the active mode share
  - 6% increase in Public Transport mode share
  - 6% increase in Park & Ride mode share.

Comparison between results of Sensitivity Tests 2a, 2b and 2c

4.4.17 The key finding from this test is that even without detailed site-specific links into the CAM, the improved Public Transport connectivity encourages a significant shift away from the private car.

4.4.18 However, for Strategic Spatial Option 2, the introduction of EWR has a relatively small impact as it does not provide a viable alternative to the car for the new residents and workers in this option as tested to date.

4.4.19 It is recommended that if options that include development in the Cambourne area are taken forward, further assessment work is undertaken to assess the impact of East West Rail on those options.

East of England Forecasting Model In-commuting: Sensitivity Tests 4a and 4b

4.4.20 Sensitivity Tests 4a and 4b look at the impact of removing the “consume your own smoke” in-commuting assumption that was used in the core test and replacing it with the level of in-commuting indicated by EEFM, meaning that more workers will be drawn from outside of the Greater Cambridge area whilst retaining the same level of growth used in the core test. Unlike Sensitivity Tests 3a and 3b below, the levels of development are not changed from those included in the original SO2 and SO4 tests.

Sensitivity Tests 4a: SO2: Edge non-Green Belt with EEFM In-commuting

4.4.21 For SO2, the EEFM in-commuting assumption in Sensitivity Test 4a results in:

- Fewer additional trips on the transport network than are seen in the core Strategic Spatial Option 2: Edge non-Green Belt test.
  - The original SO2 test generated around 146,500 new trips.
  - SO2 Sensitivity Test 4a generates around 139,000 new trips.
- The mode share of car use rises by around 2.5%, to 52.5%.
- The combined Public Transport / Park & Ride mode share rises by around 1.2%.
- The mode share of the new trips made by Active Modes reduces by around 3.7% in Sensitivity Test 4a compared to the original SO2 test.

Sensitivity Tests 4b: SO4: New Settlements with EEFM In-commuting

4.4.22 For SO4, the EEFM in-commuting assumption in Sensitivity Test 4b results in:

- Fewer additional trips on the transport network than are seen in the core Strategic Spatial Option 4: New Settlements test.
  - The original SO4 test generated around 147,500 new trips.
  - SO4 Sensitivity Test 4b generates around 139,500 new trips.
- The mode share of car use rises by around 1.5%, to 59.6%.
- The combined Public Transport / Park & Ride mode share rises by around 1.3%.
- The mode share of the new trips made by Active Modes reduces by around 2.7% in Sensitivity Test 4a compared to the original SO2 test.

Comparison between results of Sensitivity Tests 4a and 4b

4.4.23 The key findings from these Sensitivity Tests compared to the core Strategic Spatial Option tests are intuitive, as they show that if levels of longer distance commuting can be minimised, and more jobs be provided for a local population, the more opportunity there will be for more sustainable travel patterns to be established and for lower levels of car use.

4.4.24 The results above indicate that the higher level of development in these Sensitivity Tests compared to Sensitivity Tests 3a and 3b below (which assume the same method of calculating in-and out-commuting but a lower level of development than the core Strategic Spatial Option tests) result in fewer longer distance commuter trips.

Medium Growth: Sensitivity Tests 3a and 3b

4.4.25 Sensitivity Tests 3a and 3b were undertaken to compare the maximum growth scenario against a medium growth scenario. These tests include less development than is included the in the core Strategic Spatial Option tests in Chapter 3.

4.4.26 As is the case with Sensitivity Tests 4a and 4b, they use the East of England Forecasting Model (EEFM) to calculate the level of in-commuting, rather than the fixed “consume your own smoke” assumption used for the core Strategic Spatial Option tests.

Sensitivity Tests 3a: SO2: Edge non-Green Belt Medium Growth

4.4.27 Sensitivity Test 3a looks at the impact of a lower level of development at the locations included in Strategic Spatial Option SO2: Edge non-Green Belt.

- Sensitivity Test 3a generates less additional trips on the transport network than are seen in the core Strategic Spatial Option 2: Edge non-Green Belt test.
  - The original SO2 test generated around 146,500 new trips
  - SO2 Sensitivity Test 3a generates around 56,500 new trips.
- The mode share of car use rises by around 7%, to 57%.
- The combined Public Transport / Park & Ride mode share rises by around 2.5%.
- The mode share of the new trips made by Active Modes reduces very significantly, by around 9.5% in Sensitivity Test 3a compared to the original SO2 test.

Sensitivity Tests 3b: SO4: New Settlements Medium Growth

4.4.28 Sensitivity Test 3b looks at the impact of a lower level of development at the locations included in Strategic Spatial Option SO4: New Settlements.

- Sensitivity Test 3b generates less additional trips on the transport network than are seen in the core Strategic Spatial Option 4: New Settlements test.
  - The original SO2 test generated around 147,500 new trips
  - SO2 Sensitivity Test 3a generates around 56,500 new trips.
- This mode share of car use rises by around 4.7%, to 65%.
- The combined Public Transport / Park & Ride mode share rises by around 2.3%.
- The mode share of the new trips made by Active Modes reduces very significantly, by around 7.3% in Sensitivity Test 3b compared to the original SO4 test.

Comparison between results of Sensitivity Tests 3a and 3b

4.4.29 In both sensitivity tests, the lower level of development in the plan period leads to less sustainable travel patterns, with significant increases in car use and reductions in Active Mode trips, however, in both cases, a proportion of the trips lost to Active Modes switch to Public Transport and Park & Ride.

4.4.30 There are likely to be two main factors behind these changes:

- Firstly, the lower level of development in these Sensitivity Tests in the plan period means that there is a smaller local pool of potential employees, and there is therefore more in-commuting, which is more likely to be car based.
- The lower levels of housing development mean that there is less scope for the internalisation of trips, as there are fewer local services and facilities available.

4.4.31 The first of these points is the more difficult to address in transport terms, as it might involve the provision of mitigation that would provide a viable alternative to the private car for longer distance in-commuting trips.

4.4.32 The second of these points could be mitigated by ensuring that development options with lower levels of growth in the plan period still included sufficient development at individual sites to maximise the opportunity for sustainable trip making and for viable local facilities and services to be established.

4.4.33 The key finding from this test is, as with Sensitivity Tests 4a and 4b, intuitive. If the level of housing development planned is not considered in the context of the local employment market and with the aim of minimising in-commuting, travel patterns will be likely to be less sustainable as a result.

Sensitivity Test 3c: Minimum Development levels

4.4.34 As noted in paragraph 4.1.4 above, Sensitivity Test 3c was not specifically tested and analysed. Testing to date has indicated that trip making and mode shares are sensitive to the level of development proposed, but are even more sensitive to the level of in-and out-commuting. Were the minimum level of development pursued there would be very little difference in performance to the 2041 Baseline, as the levels of development are very similar.

Excluding the 10% housing buffer: Sensitivity Tests 5a and 5b

Sensitivity Test 5a and 5b: excluding 10% housing buffer

4.4.35 These tests were run to understand the impact of this marginally lower housing level on trip generation and mode share.

4.4.36 The reduction in the number of dwellings proposed results in a reduction in the total number of trips made (approximately 33,000 for SO2: Edge non-Green Belt and

SO4: New Settlements) compared to the core spatial option tests. Mode share for car trips is 1% higher, which results in 15,000 fewer car trips whilst there are 13,000 fewer active mode trips.

4.4.37 This indicates that the key factor here is the level of in-commuting because the mode shares remain almost constant between this test and the core test which indicates that the change in trips is due solely to the change in the level of development.

4.5 Sensitivity Test Analysis: Highway Impact

This section of the report sets out the results of the Sensitivity Tests on the highway network. The key metrics are the same as for the Strategic Spatial Option tests assessed in Section 3.5 above:

- Travel Distance (PCU kilometres)
- Travel Time, (PCU Hours) and
- Delay (PCU Hours)

4.5.1 The figures overleaf show the changes in vehicular travel distance, travel time and delay resulting from the revised assumptions that were tested in the Sensitivity Tests and compared to the results for Strategic Spatial Options 2 and 4 as appropriate.

Travel distance

- Figure 14 shows the change in vehicular travel distance resulting from development in Strategic Spatial Option 2 and the SO2 Sensitivity Tests 1a, 2a, 2b, 2c, 3a, 4a, and 5a., compared to the 2041 Baseline.
- Figure 17 shows the change in vehicular travel distance resulting from development in Strategic Spatial Option 4: New Settlements and the SO4 Sensitivity Tests 1b, 3b, 4b, and 5b., compared to the 2041 Baseline.

Travel time

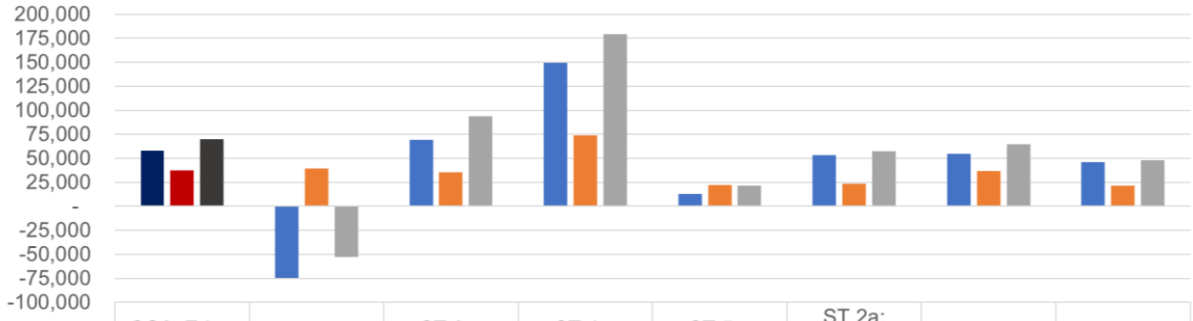
- Figure 15 shows the change in vehicular travel distance resulting from development in Strategic Spatial Option 2 and the SO2 Sensitivity Tests 1a, 2a, 2b, 2c, 3a, 4a, and 5a., compared to the 2041 Baseline.
- Figure 18 shows the change in vehicular travel distance resulting from development in Strategic Spatial Option 4: New Settlements and the SO4 Sensitivity Tests 1b, 3b, 4b, and 5b., compared to the 2041 Baseline.

Delay

- Figure 16 shows the change in vehicular travel distance resulting from development in Strategic Spatial Option 2 and the SO2 Sensitivity Tests 1a, 2a, 2b, 2c, 3a, 4a, and 5a., compared to the 2041 Baseline.
- Figure 19 shows the change in vehicular travel distance resulting from development in Strategic Spatial Option 4: New Settlements and the SO4 Sensitivity Tests 1b, 3b, 4b, and 5b., compared to the 2041 Baseline.

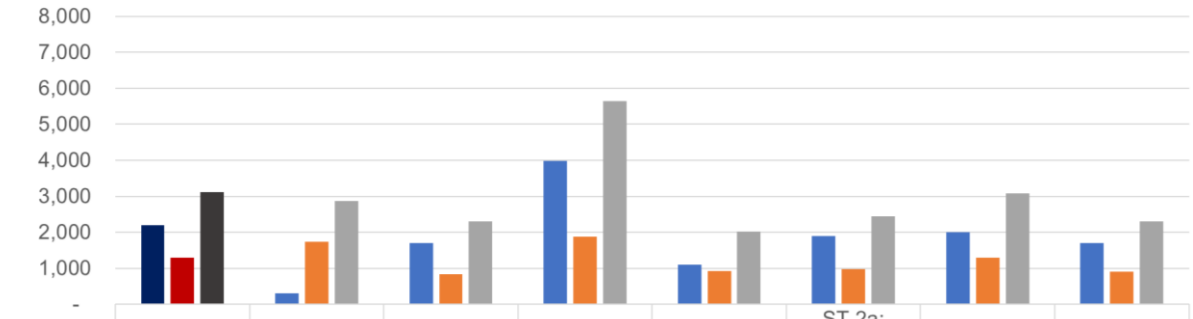
4.5.2 It is important to note that with the exception of the Cambridge Autonomous Metro and East West Rail tests (2a, 2b and 2c), none of the development in the Sensitivity Tests benefits from mitigation measures.

Figure 14 Change in travel distance (PCU-km) vs. 2041 Baseline, Strategic Spatial Option 2: Edge non-Green Belt and SO2 Sensitivity Tests 1a, 2a, 2b, 2c, 3a, 4a & 5a



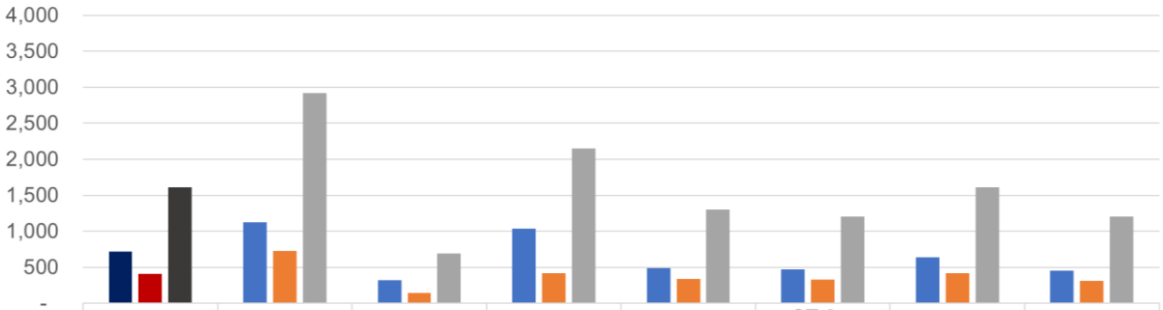
	SO2: Edge non-Green Belt	ST 1a: Full Build Out	ST 3a: Medium Growth	ST 4a: In/out-Commuting	ST 5a: Housing - no 10% buffer	ST 2a: Cambridge Autonmous Metro	ST 2b: East West Rail	ST 2c: CAM + EWR
AM peak	58,214	-74,531	69,237	149,156	12,678	53,571	54,633	45,805
Inter-peak	37,163	39,612	35,491	73,670	21,866	23,704	36,612	21,267
PM peak	69,889	-53,047	93,631	179,587	21,328	57,472	64,444	48,299

Figure 15 Change in travel time (PCU-hrs) vs. 2041 Baseline, Strategic Spatial Option 2: Edge non-Green Belt and SO2 Sensitivity Tests 1a, 2a, 2b, 2c, 3a, 4a & 5a



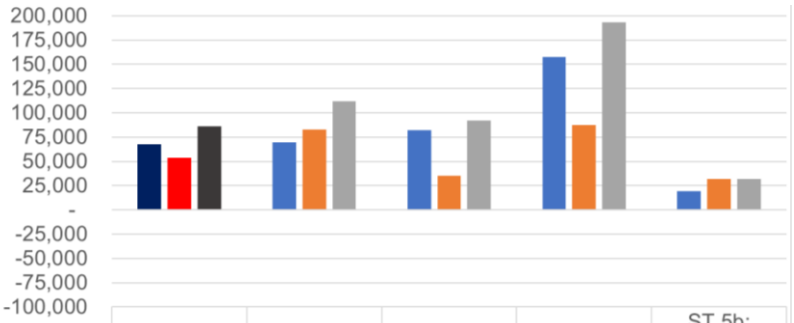
	SO2: Edge non-Green Belt	ST 1a: Full Build Out	ST 3a: Medium Growth	ST 4a: In/out-Commuting	ST 5a: Housing - no 10% buffer	ST 2a: Cambridge Autonmous Metro	ST 2b: East West Rail	ST 2c: CAM + EWR
AM peak	2,205	298	1,711	3,992	1,104	1,904	2,012	1,710
Inter-peak	1,295	1,736	841	1,884	923	976	1,298	911
PM peak	3,122	2,869	2,297	5,643	2,029	2,440	3,078	2,301

Figure 16 Change in delay (PCU-hrs) vs. 2041 Baseline, Strategic Spatial Option 2: Edge non-Green Belt and SO2 Sensitivity Tests 1a, 2a, 2b, 2c, 3a, 4a & 5a



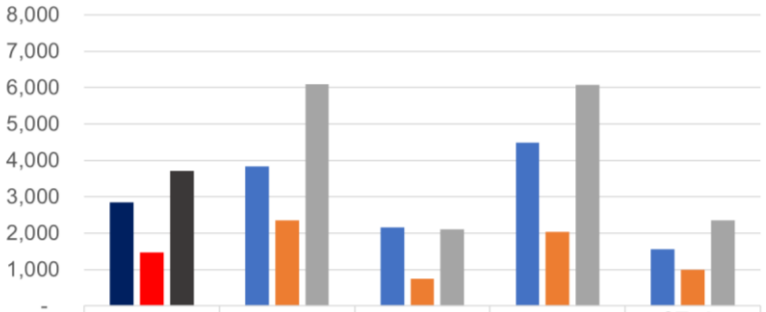
	SO2: Edge non-Green Belt	ST 1a: Full Build Out	ST 3a: Medium Growth	ST 4a: In/out-Commuting	ST 5a: Housing - no 10% buffer	ST 2a: Cambridge Autonmous Metro	ST 2b: East West Rail	ST 2c: CAM + EWR
AM peak	723	1,128	318	1,041	492	472	636	457
Inter-peak	413	727	145	418	335	333	421	316
PM peak	1,614	2,918	692	2,154	1,303	1,205	1,610	1,208

Figure 17 Change in travel distance (PCU-km) vs. 2041 Baseline, Strategic Spatial Option 4: New Settlements and SO4 Sensitivity Tests 1b, 3b, 4b & 5b



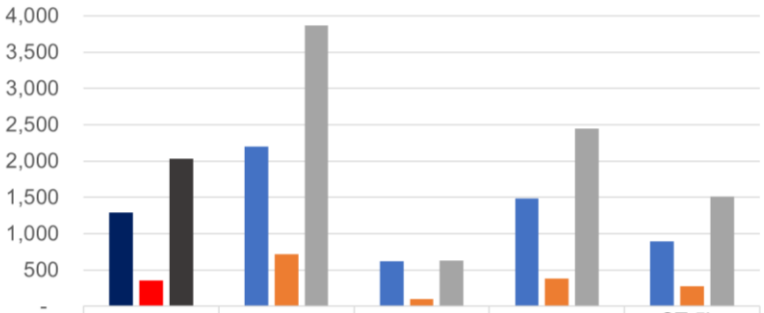
	SO4: New Settlements	ST 1b: Full Build Out	ST 3b: Medium Growth	ST 4b: In/out-Commuting	ST 5b: Housing - no 10% buffer
AM peak	67,827	69,838	82,254	157,267	19,620
Inter-peak	53,603	82,618	35,270	87,115	32,019
PM peak	86,162	111,960	91,967	193,248	31,931

Figure 18 Change in travel time (PCU-hrs) vs. 2041 Baseline, Strategic Spatial Option 4: New Settlements and SO4 Sensitivity Tests 1b, 3b, 4b & 5b



	SO4: New Settlements	ST 1b: Full Build Out	ST 3b: Medium Growth	ST 4b: In/out-Commuting	ST 5b: Housing - no 10% buffer
AM peak	2,849	3,841	2,163	4,491	1,564
Inter-peak	1,477	2,357	741	2,034	1,003
PM peak	3,713	6,098	2,112	6,083	2,345

Figure 19 Change in delay (PCU-hrs) vs. 2041 Baseline, Strategic Spatial Option 4: New Settlements and SO4 Sensitivity Tests 1b, 3b, 4b & 5b



	SO4: New Settlements	ST 1b: Full Build Out	ST 3b: Medium Growth	ST 4b: In/out-Commuting	ST 5b: Housing - no 10% buffer
AM peak	1,294	2,199	619	1,482	898
Inter-peak	360	714	98	380	280
PM peak	2,029	3,870	626	2,443	1,512

Full Build Out of Strategic sites: Sensitivity Tests 1a and 1b:

Sensitivity Test 1a: Full build out of Strategic Spatial Option 2: Edge non-Green Belt

4.5.3 This test results in a reduction in the distance travelled in the AM and PM peak periods compared to both the initial SO2 test and the 2041 Baseline. This indicates that development in Strategic Spatial Option 2 has the potential to be accommodated on the transport network while decreasing car travel in the longer term. It also confirms that the larger the site, the more opportunity there is for sustainable transport patterns to be established.

4.5.4 However, despite the reduction in travel time and distance this Sensitivity Test indicates that there is an increase in delay on the highway network. This leads us to determine that although people are travelling shorter distances by car in the fully built-out development, there is still an increase in delay as the network is more congested.

Sensitivity Test 1b: Full build out of Strategic Spatial Option 4: New Settlements

4.5.5 The results for this Sensitivity Test for SO4: New Settlements shows an increase in the distance travelled, travel time and delay in all time periods compared to the initial SO4 test. This indicates that the larger quantum of development within the lifetime of the Local Plan results in more trips on the highway network.

Comparison between results of Sensitivity Tests 1a and 1b

4.5.6 The increases in travel time and delay in these Sensitivity Tests are greater for SO4: New Settlements than for SO2: Edge non-Green Belt, and for SO2, there is actually a reduction in peak period traffic compared to the 2041 Baseline. This indicates that development on the edge of Cambridge at a scale that provides more local services and jobs reduces the need to travel by car, while new settlements, even at the larger scale envisaged in the full build-out scenario, are more likely to increase car travel.

4.5.7 For SO2, the car travel time and delay still increase. This may indicate that existing levels of congestion in the city are such that even small increases in short distance car trip making lead to significant additional congestion. However, for the edge of Cambridge site this is likely to be a factor in driving the overall car travel distance reduction, even without transport mitigation, as Active Travel and Public Transport alternatives are already available for many trips.

Cambridge Autonomous Metro and East West Rail: Sensitivity Tests 2a, 2b and 2c

4.5.8 Strategic Spatial Option 2 does not include growth in the Cambourne area, and in this context, Sensitivity Tests 2b and 2c are likely to show less benefit from EWR than tests against options that did include such development.

Sensitivity Test 2a introduction of Cambridge Autonomous Metro (CAM)

4.5.9 This Sensitivity Test results in a reduction in the distance travelled, travel time and delay in all time periods which indicates that the introduction of CAM would be of benefit to the delivery of this option. However, the reductions seen are relatively small, suggesting that further mitigation to improve links from development into the CAM network and improve connectivity by all modes would improve the performance of CAM in terms of its impact on the highway network.

Sensitivity Test 2b introduction of East West Rail Central Section (EWR)

4.5.10 The introduction of EWR reduces the total distance travelled by vehicles on the highway network in all periods tested. It slightly reduces travel time in the morning and evening peaks but is broadly neutral against this metric compared to the original SO2 in the inter-peak. Delay reduces in the morning peak but is broadly neutral compared to the original SO2 test in the inter-peak and evening peak.

Sensitivity Test 2c introduction of CAM and EWR

4.5.11 This Sensitivity Test indicates that the combined impact of CAM and EWR is greater than the sum of the individual tests on all three metrics. There are significant reductions in the distance travelled on the highway network in all time periods but the reduction in travel time delay is lower indicating that there are residual issues with congestion in this spatial option with the introduction of CAM and EWR that might need to be addressed by site specific mitigation.

East of England Forecasting Model In-commuting: Sensitivity Tests 4a and 4b

Sensitivity Test 4a and 4b: East of England Forecasting Model In-commuting

4.5.12 This Sensitivity Test indicates a significant increase in distance, time and delay for both SO2: Edge non-Green Belt and SO4: New Settlements, all of which is due to the longer distances travelled by workers as they come from outside of Greater Cambridge as a result of the change to the in-and out-commuting assumptions in this Sensitivity Test.

4.5.13 The results indicate that the higher level of in-and out-commuting leads to increases in all highway metrics compared to the core test. This means that should this spatial option be taken forward then the site choices and development mix need to encourage the maximisation of internalisation of trips and facilitate the use of active modes for those trips that need to be made.

Medium Growth: Sensitivity Tests 3a and 3b

Sensitivity Tests 3a: SO2: Edge non-Green Belt Medium Growth

4.5.14 This Sensitivity Test indicates that for SO2: Edge non-Green Belt, travel distance increases in both the AM and PM peak periods whilst the interpeak sees a very slight reduction. This test indicates that travel time and delay would reduce. This suggests that distances travelled by workers increases due to increased in-and out-commuting, but that the lower level of development leads to a reduction in congestion in the city which leads to the reduction in travel time and delay as the overall number of trips on the network reduces.

Sensitivity Tests 3b: SO4: New Settlements Medium Growth

4.5.15 This Sensitivity Test indicates that for SO4: New Settlements, travel distance increases in both the AM and PM peak periods whilst the interpeak sees a reduction. This test also indicates that travel time and delay would increase.

Sensitivity Test 3c: Minimum Development levels

4.5.16 For the reason set out in paragraph 4.4.34, Sensitivity Test 3c has not been undertaken or reported. The performance of the highway network would see little change in the minimum growth scenario, and the increases in use of non-car modes seen in the maximum growth scenario in most of the Strategic Spatial Options would not occur.

Excluding the 10% housing buffer: Sensitivity Tests 5a and 5b

Sensitivity Test 5a and 5b: excluding 10% housing buffer

4.5.17 This test indicates that the removal of the 10% housing buffer, whilst fixing the level of in-and out-commuting, results in reductions to the distances travelled and travel time on the highway network in all time periods, with slight reductions in delay. This indicates a reduction in the number of cars on the highway network compared to the core spatial test.

5 Strategic Spatial Options 1 to 8: Conclusions

5.1 General Conclusions from the analysis of the Strategic Spatial Options

5.1.1 This chapter draws conclusions on the relative performance of Strategic Spatial Options 1 to 8 in transport policy terms, and which individual sites or types of locations tested as part of the options perform best. These conclusions will aid the selection of a Preferred Option, which could be an amalgam of one or more options tested for the Greater Cambridge Local Plan.

5.1.2 It then looks at each of the eight Strategic Spatial Options in turn, summarising the analysis in Chapter 3, and using information from the Sensitivity Tests in Chapter 4.

5.1.3 From analysing the key metrics, as set out in Sections 3.2 to 0 of Chapter 3, and from the Sensitivity Tests, as set out in Chapter 4, some general conclusions can be drawn about the relative transport performance of the broad locations for development that are assessed in the Strategic Spatial Options. These are:

The role of scale of individual developments in achieving low car use

5.1.4 The size of a proposed development makes a significant difference to how well it performed against the transport metrics tested.

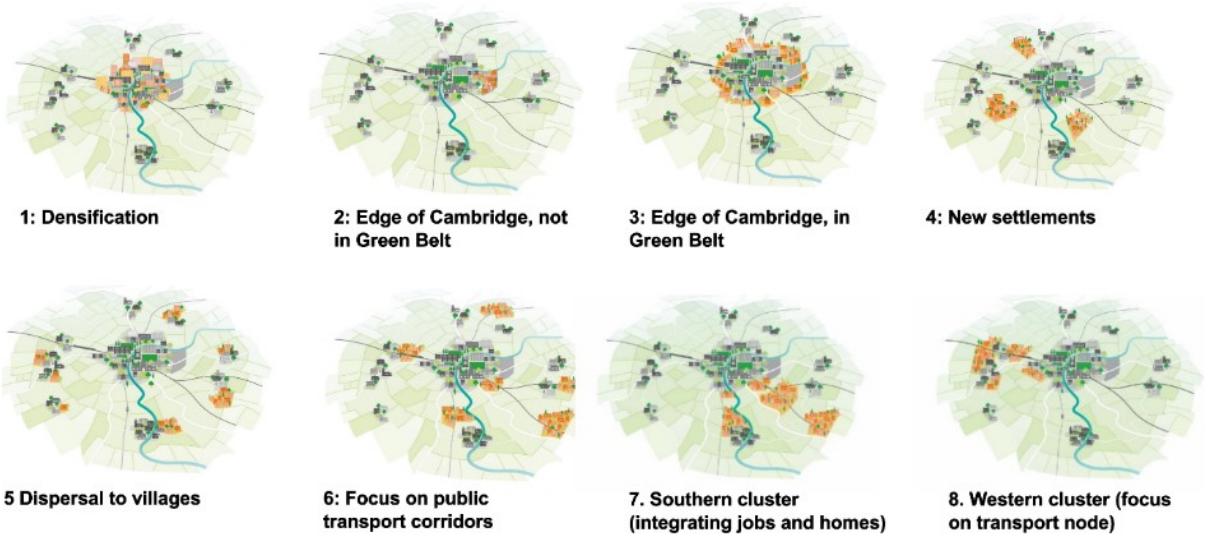
- Larger developments in the Strategic Spatial Options accommodated a wider mix of uses, with homes, jobs and key services being well balanced. This allows for more ‘internalisation’ of trips within the site, as people can access employment and key services such as shops, education and health facilities close to where they live.
- Conversely, smaller scale developments were generally shown to produce more car trips per dwelling or job and have a higher car mode share as the opportunity to make essential trips by non-car modes is lower due to the longer distances travelled to access services and employment.
- In addition, it is generally easier to provide viable mitigation for larger developments because with more people comes greater demand. For example, Public Transport provision requires a certain level of patronage to sustain viable operation, and for Active Travel, linking a large number of small sites sustainably

and safely would require a much greater level of investment, for a much lower return in terms of the likely use of the measures provided.

The role of location of individual developments in achieving low car use

5.1.5 The Strategic Spatial Options that have been assessed in this report are shown illustratively in Figure 20 below.

Figure 20 Illustrative representation of Strategic Spatial Options being tested



5.1.6 The testing of these options has again confirmed work carried out to inform previous development plans, that concluded the location of development plays an important role in how sustainable it is in transport terms.

- Locating development close to existing urban areas, particularly Cambridge, would ensure more trips are made by Active Travel modes (walking and cycling) due to the shorter length of trip required to access a wide range of accessible employment opportunities and local services. The proximity to an established, well-defined Public Transport network encourages the use of Public Transport modes, and the level of car trips in general is reduced compared to areas further from Cambridge and in more isolated or rural locations.
- The proximity of a development to High Quality Public Transport is also an important factor in encouraging non-car trips, especially for those areas not on the edge of Cambridge. Easy, quick access to Cambridge by non-car modes is vital to prevent car trips for medium and longer distance travel.
- More remote, rural locations have higher car mode shares and, in general, more trips as a result of the lack of viable alternative modes of travel to the car. This is

especially true of development within villages away from major urban centres and not close to existing, well established High Quality Public Transport networks.

The need to achieve a balance between jobs and housing growth, and minimise in-commuting in order to achieve lower low levels of car use

5.1.7 Sensitivity Tests 3a, 3b, 4a and 4b tested different assumptions on the level of housing development and the level of in-commuting. The results of these tests confirmed that if the number of jobs in an area increases faster than the development of homes for the population to service those jobs, then travel distances to access those jobs will increase, and these longer trips will most often be undertaken by car.

Transport mitigation measures

5.1.8 No site-specific mitigation was included in the Strategic Spatial Options as tested in Part One of this report, with only those schemes and transport interventions included within the 2041 Baseline, as detailed in paragraph 2.2.12 included in the modelling at this stage.

5.1.9 Inferences as to the ease and viability of providing mitigation has been made where this has been possible, but until further assessment is carried out at the next stage of the plan making process, the likely viability and true impact of site-specific mitigation will not be fully known.

5.1.10 Due to the poor performance against the metrics that have been assessed in the core Strategic Spatial Option tests set out in Sections 3.2 and 3.5 of Chapter 3, SO5: Villages was not carried forward for more detailed sector analysis as it was not considered viable for mitigation, and therefore an unsustainable option in transport terms.

The Cambridge Autonomous Metro and the East West Rail Central Section

5.1.11 Sensitivity Tests 2a, 2b and 2c tested the Cambridge Autonomous Metro and the East West Rail Central Section against Strategic Spatial Option 2. These tests showed that CAM would lead to a significant increase in Public Transport usage, including Park and Ride, but would also switch some trips away from Active Modes. The East West Rail test was of less value, as Strategic Option 2 does not include any development in the Cambourne area, which would most obviously benefit from this scheme.

5.1.12 However, it should be noted that since these Sensitivity Tests were carried out, the CAM project is no longer being progressed by the Cambridgeshire and Peterborough Combined Authority. The Combined Authority is however seeking to achieve similar benefits through a more traditional surface level Public Transport approach, and this will need to be reflected in further modelling to support Local Plan development.

Sensitivity Tests 1a and 1b: Full Build-out

5.1.13 Sensitivity Tests 1a and 1b are the most interesting when it comes to the assessment of the overall level of sustainability of Strategic Spatial Options 1 to 8 in transport terms. These tests assess the impact of the full build-out of the strategic sites included in Strategic Spatial Options 2 and 4 and so conclusions can be drawn on the likely impact of Full Build-out of the sites in the other options

5.2 Overall conclusions on the performance of Strategic Spatial Options 1 to 8, and of sites / broad locations tested

Performance of the Strategic Spatial Options

5.2.1 This section sets out the relative performance of Strategic Spatial Options 1 to 8, without mitigation, considering all of the metrics outlined in Chapter 3 and taking account of the results of the Sensitivity Tests in Chapter 4.

Best Performing Options

- **Strategic Spatial Option 1: Densification** performs best against all metrics analysed in Chapter 3 and is likely to perform better when fully built-out than any of the other options.

Medium Performing Options

- **Strategic Spatial Option 2: Edge non-Green Belt** performs well against all metrics but does generate more trips than SO1, which is largely due to the inclusion of New Settlements C and E in this option. It performs very well when fully built out.
- **Strategic Spatial Option 3: Edge Green Belt** performs well against most metrics but generates more car trips than Strategic Spatial Option 2.
- **Strategic Spatial Option 7: Integrating Homes and Jobs** performs well against the highway metrics compared to all other options apart from SO1. However, it does generate higher levels of car trips than most other options apart from SO5 and SO6, and relatively low mode shares of non-car use, indicating high levels of car use for shorter journeys.
- **Strategic Spatial Option 8: Expanded Growth Area** performs very well in terms of mode share of non-car modes of transport, and moderately well against most other metrics, but does perform relatively poorly in terms of the highway metrics assessed in Section 3.5.
- **Strategic Spatial Option 6: Public Transport Corridors** Performs third best against the highway metrics, but like SO7, generates high levels of car trips – more than all other options apart from SO5.

Poorly Performing Options

- **Strategic Spatial Option 4: New Settlements** performs poorly overall, but it is noted that two of the four settlements in this option perform better than the other two.
- **Strategic Spatial Option 5: Villages** performs worst against every metric analysed in Chapter 3. Some villages will be capable of accommodating growth with lower levels of reliance on car use, and if this is beneficial in supporting local services and facilities, this may be appropriate and better in transport terms than the loss of local services.

5.2.2 Resolution of the issues outlined in paragraphs 3.3.10 to 3.3.14 (with regard to some development sectors on the edge of Cambridge in South Cambridgeshire modelled as generating higher levels of car trips than would be expected) might improve the performance of Strategic Spatial Options 1, 2, 3, 6, 7 and 8. However, it is unlikely to alter the relative performance of these options to each other.

Performance of individual locations (specific and non-specific)

5.2.3 The relative performance of the Strategic Spatial Options does not necessarily reflect on the performance of the locations within the options. Whilst they are non-site specific options for testing the relative performance of different locational choices, assumptions had to be made in order to run the transport model. The following paragraphs comment on the best performing locations, and the best performing location types. It should of course be noted that the assessment of the performance of individual locations is without any mitigation. The hierarchy of best performing locations in Strategic Spatial Options 1 to 8 is as follows:

Best Performing Locations

- Densification of Cambridge – North East Cambridge
- Edge of Cambridge – non-Green Belt – Cambridge East
- Edge of Cambridge Green Belt – varies by location
- Densification of Cambridge – Small sites

Medium Performing Locations

- Accelerated growth at existing new towns
- New Settlement G: South of Cambourne
- New Settlement A: South East of Cambridge

- Better performing villages

Poorly Performing Locations

- New Settlement E: South West of Cambridge 1
- New Settlement B: South of Cambridge 1
- New Settlement C: South of Cambridge 2
- New Settlement D: South of Cambridge 3
- New Settlement F: South West of Cambridge 2
- Poorly performing villages

5.2.4 The following general conclusions on the performance of broad locations in transport terms can be drawn from the modelling of the Strategic Spatial Options.

- Sites within or on the edges of Cambridge performed well or very well in reducing the need to travel by car, and generally contributed less to congestion in the peak periods than sites in other broad locations.
- New settlements generated more car traffic, but a location on a Public Transport corridor does provide opportunity to reduce reliance on car use.
- The larger a new settlement is, the more likely it is to be able to achieve lower levels of reliance on the car, as more local opportunities for employment, and to access services and facilities will be present.
- Small scale development at villages will in most cases rely on car use more than the other broad locations tested, although villages on Public Transport corridors or very close to Cambridge may perform better.

5.2.5 The results noted above are in line with previous modelling and assessment of broad locations for development in Cambridgeshire over the past 20 years.

5.3 Strategic Spatial Option 1: Densification

Performance Rating

5.3.1 This Strategic Spatial Option is the most sustainable of the eight options assessed in Chapters 3 and 4 in transport terms, when considering the performance of the transport network, the aim to achieve low levels of car use, and in the context of achieving the climate change objectives of the wider Greater Cambridge Local Plan.

Analysis

5.3.2 The sustainable transport characteristics of the development in this Strategic Spatial Option is due to the very nature of a densified development strategy. Residents and employees of the new developments would not have to travel far to access other existing and established employment areas in Cambridge, and for those short journeys that are required, the use of Active Travel modes is shown to be prevalent.

5.3.3 The largest development location assumed in SO1: Densification is the North East Cambridge site. This site creates the lowest level of new car trips per dwelling of any of the other major new locations assessed in any of the Strategic Spatial Options. (see Table 13). The site also benefits from existing and planned High Quality Public Transport links, with the adjacent station at Cambridge North and the Cambridgeshire Guided Bus (CGB) route serving the site directly, and the Waterbeach to Cambridge route also providing for HQPT links into the site.

5.3.4 Cambridge East (Edge of Cambridge non-Green Belt) makes up much of the balance of this option, and performs well, with low levels of car use, as discussed in Section 5.4 below. The remainder of the development in SO1 is within the urban area of Cambridge, and also achieves low levels of car use.

5.3.5 Without mitigation, this Strategic Spatial Option is shown to be the most sustainable in transport terms and has the least negative impact on the local highway network.

Mitigation

5.3.6 It is possible to conclude that site specific mitigation will be generally easier and more financially viable for SO1: Densification than it would in other Strategic Spatial Options, particularly those with development focussed further from Cambridge. This is not to say site specific mitigation is always straightforward in urban and edge of

city locations, as the surrounding local highway network is usually under more sustained pressures in these locations than more rural road networks.

5.3.7 However, because the mitigation for development sites needs to focus on sustainability, it should first look at switching trips from cars to non-car modes. To this end densified urban areas have an advantage with their higher proportions of Active Travel mode trips, as the infrastructure required to encourage and facilitate Active Travel trips is generally cheaper and less difficult to deliver than large scale Public Transport or highway infrastructure.

5.3.8 The Cambridge urban area also benefits from established and planned Active Travel and Public Transport networks, meaning there is less of a requirement to create new links / corridors or sufficient patronage to justify investment as is the case with sites in a number of the other Strategic Spatial Options. North East Cambridge in particular is already well served by existing and currently planned HQPT and Active Travel routes.

5.3.9 Work on the Area Action Plan for North East Cambridge has led to proposals for a trip budget policy approach, which seeks to limit the vehicular trip generation of development in the area. The ability to take this type of approach depends on the availability of alternatives to car use.

Sensitivity Tests

5.3.10 Whilst the Sensitivity Tests didn't specifically compare impacts against SO1: Densification, it did look at SO2: Edge non-Green Belt, which is a Strategic Spatial Option where the development is in a reasonably similar location to SO1: Densification, and which was assumed at North East Cambridge.

5.3.11 Sensitivity Test 1a looks at the full build-out of the strategic sites in Strategic Spatial Option 2: Edge non-Green Belt, and Sensitivity Test 1b looks at the full build-out of the strategic sites in Strategic Spatial Option 4: New Settlements.

5.3.12 For the reasons set out in paragraph 4.5.6 and 4.5.7, it is considered that at full build-out, Strategic Spatial Option 1 will perform better than SO2 did in Sensitivity Test 1a, with potential for more significant switches to non-car modes of trip making than seen in SO2 in this test.

5.3.13 As with SO2: Edge non-Green Belt, we can infer that CAM would benefit SO1: Densification due to increased Public Transport accessibility.

5.3.14 The East West Rail Central Section is unlikely to have a major impact on the performance of SO1: Densification in transport terms, as without significant development in the Cambourne area in this option, the ability of the route to cater for trips from other new development into North East Cambridge via Cambridge North Station is more limited than would otherwise be the case.

5.4 Strategic Spatial Option 2: Edge non-Green Belt

Performance Rating

5.4.1 This Strategic Spatial Option is one of the most sustainable options presented when taking into account performance of the transport network and achieving the climate change objectives of the wider Greater Cambridge Local Plan. Only SO1: Densification performs better.

Analysis

5.4.2 By focussing a greater proportion of the proposed new homes and jobs at a large edge of city location, namely at Cambridge East which is the only large site on the edge of Cambridge not in the Green Belt, a very good Active Travel mode share is shown to be achieved (39.9% of all trips for the whole Strategic Spatial Option combined). This is due to the relatively short distances between this key development location and the various existing key urban areas, business parks and services that are clustered all over Cambridge. Shorter distances between homes and jobs/services encourages Active Travel modes, such as walking and cycling.

5.4.3 The good sustainability in transport terms and this edge of Cambridge location that makes up SO2: Edge non-Green Belt is highlighted further when compared to the Strategic Site Options which are largely made up of proposed development in new settlements in more rural locations. For example, SO4: New Settlements places the bulk of jobs and homes across four new settlements, all of which are more rural in nature and further afield from Cambridge than the key locations in SO2: Edge non-Green Belt. Unsurprisingly, and due to the rural locations of the four proposed new settlement locations, SO4: New Settlements is shown to have a lower Active Mode share than SO2: non-Green Belt (see Table 11). However, tellingly, SO4: New Settlements is also shown to have a lower Public Transport mode share than SO2: Edge non-Green Belt. As a result, car trips are significantly higher at three of the four new settlement locations, than they are at Cambridge East.

5.4.4 The one exception within SO4: New Settlements (and indeed in SO8: Expanded Growth Area) is the proposed new settlement location close to Cambourne, which benefits from being close to the HQPT infrastructure linking Cambourne to Cambridge. This results in a high Public Transport mode share for this specific

location, and although this is better in sustainability terms compared to making the same trip by car, is still not as sustainable as more trips by Active Travel modes.

5.4.5 The same logic can be applied when comparing the edge of Cambridge location for development that make up SO2: Edge non-Green Belt, with SO6: Public Transport Corridors and locating new homes and jobs on HQPT routes. The key development locations in SO6: Public Transport Corridors, which propose locating development on HQPT corridors, all have access to HQPT infrastructure for those making trips to key employment and services, most notably in Cambridge. As a result, these locations achieve a good Public Transport mode share. However, from a sustainability perspective, it would still be better if more of these trips were made by Active Travel modes and thus, the edge of Cambridge sites are more sustainable.

Mitigation

5.4.6 It is possible to conclude that site specific mitigation will be generally easier and more financially viable for the sites contained within SO2: Edge non-Green Belt than in other Strategic Spatial Options with development focussed further from Cambridge. This is not to say site specific mitigation is straightforward in urban and edge of city locations, as the surrounding local highway network is usually under more sustained pressures in these locations than more rural road networks.

5.4.7 However, because the mitigation for development sites need to focus on the provision of access via sustainable modes, it should first look at switching trips from cars to non-car modes. This gives edge of Cambridge and densified development sites the advantage with their higher proportions of Active Travel mode trips, as the infrastructure required to facilitate Active Travel trips is generally cheaper and less difficult to deliver than large scale Public Transport or highway infrastructure.

5.4.8 The edge of Cambridge sites also benefit from being in closer proximity to a well-established Active Travel and Public Transport networks, meaning there it will be a less onerous requirement to create new links / corridors, or achieve sufficient patronage to justify investment.

Sensitivity Tests

5.4.9 The Sensitivity Tests carried out highlight that when a higher level of development is applied (compared to the Core Tests) to SO2: Edge non-Green Belt, that the mode

share for Cars decreases, with Active Mode share increasing, and Public Transport remaining broadly the same, compared to the 2041 Baseline (this is also the same in SO4: New Settlements). This pattern ties in with the results in Chapter 3, which suggest larger developments encourage shorter trips, which are able to be made by Active Travel and that sites on the edge or within urban areas such as Cambridge also benefit from higher Active Travel mode share than those sites further adrift from Cambridge. This reaffirms the sustainability, in transport terms, of Edge of City or Densified development. However, it should be noted that delay on the highway network does increase with this Test, although to a lesser extent than in SO4: New Settlements, again suggesting an edge of city location is more beneficial than one more remote.

5.4.10 A lower level of growth than is assumed in the core tests has a different impact. More trips are made than in the 2041 Baseline (though still fewer than the Core Tests) but in this scenario, the Active Mode share reduces, with Car mode share increasing (in both SO2: Edge non-Green Belt and SO4: New Settlements). This correlates with the analysis to date, suggesting that smaller development causes less internalisation and more ‘in and out-commuting’ trips, which are less likely to be made by sustainable modes. This suggests that lower levels of growth than assumed in the Core Tests for SO2: Edge non-Green Belt and SO4: New Settlements is less sustainable in transport terms. However, delay and travel time do decrease in this scenario for SO2: Edge non-Green Belt, whereas there is again an increase in levels of delay on the network for SO4: New settlements

5.4.11 Indeed, the Sensitivity Tests indicate that the low level of commuting, particularly ‘in’ commuting is key to Active Travel Mode Share being high in both the Strategic Spatial Options tested.

5.4.12 The Sensitivity Tests indicate that SO2: Edge non-Green Belt benefits from the introduction of CAM, even without site specific mitigation, due to increased access to Public Transport provision meaning there are 10,000 fewer car trips. East West Rail has less of an impact, however, which is unsurprising as the proposed route (linking Cambourne with the Cambridge stations) has little impact on an edge of Cambridge location to the east of the city.

5.5 Strategic Spatial Option 3: Edge Green Belt

Performance Rating

5.5.1 This Strategic Spatial Option is also one of the most sustainable options presented when taking into account performance of the transport network and achieving the climate change objectives of the wider Greater Cambridge Local Plan. Only SO1: Densification and SO2: Edge non-Green Belt perform better.

Analysis

5.5.2 As is the case for SO2: Edge non-Green Belt above, placing a large bulk of the proposed new homes and jobs on the edge of the city, albeit in different locations spanning the Green Belt, ensures that a very good Active Travel mode share is achieved (42.2% of all trips for the whole Strategic Spatial Option). As with SO2, this is due to the relatively short distances between these edge of city Green Belt locations and the various existing key urban areas, business parks and services that are clustered all over Cambridge.

5.5.3 The Public Transport / Park & Ride combined mode share for SO3 is also shown to be good, with the wider Strategic Site Option again comparing very similarly to SO2: Edge non-Green Belt with 7.3% of trips made by this mode. The proximity to existing infrastructure and established patronage of Public Transport in Cambridge is one reason for this.

5.5.4 Four of the five locations in SO3 suffer in part or in whole from the issue outlined in paragraphs 3.3.10 to 3.3.14, which means that their mode share of car use is likely to be overestimated.

5.5.5 By comparison with other Strategic Site Options whose focus for development is away from the edge of Cambridge, SO3: Edge Green Belt continues to perform well by the metric of Public Transport trips, especially when compared to those Strategic Spatial Options with a focus of development in more rural areas. SO3 as a whole has similar Public Transport mode share to already planned new settlements on HQPT corridors at Northstowe and Bourn Airfield, or close to existing transport nodes such as Cambourne.

5.5.6 Densified development (SO1: Densification) or edge of city development (SO2: Edge non-Green Belt and SO3: Edge Green Belt) causes significantly fewer car trips

overall than all the other Strategic Site Options (see Table 16). The trips that do emanate from these development locations are shorter and more focussed on accessing nearby employment and services in existing urban areas and as explained, are generally made by more sustainable modes. As a result, the level of internalisation is of less relevance than in other more rural locations such as the 'new' new settlements proposed or those existing new settlements such as Bourn Airfield, Northstowe and Waterbeach.

Mitigation

5.5.7 It is possible to infer that site specific mitigation will be generally easier and more financially viable for the sites contained within SO3: Edge Green Belt than in other Strategic Spatial Options with development focussed further from Cambridge. However, the provision of mitigation may be more challenging than for SO2, as Cambridge North East already benefits from significant levels of existing and planned HQPT and Active Travel provision, and Cambridge East benefits from infrastructure planned by the Greater Cambridge Partnership. It should also be noted that the surrounding local highway network in Cambridge and edge of Cambridge locations is usually under more sustained pressure than it is in more rural locations.

5.5.8 Because the mitigation for development sites needs to focus on sustainable modes, it should first look at switching trips from cars to non-car modes. This gives edge of Cambridge and densified development sites the advantage with their higher proportions of Active Travel mode trips as a starting point, and also because the infrastructure required to facilitate Active Travel trips is generally cheaper and less difficult to deliver than large scale Public Transport or highway infrastructure. The edge of Cambridge sites also benefit from being in close proximity to a well-established Active Travel and Public Transport network, meaning there is less of a requirement to create new links / corridors or sufficient patronage to justify investment (as this largely exists already).

5.5.9 It is true to say that the ease and viability of providing mitigation does vary slightly between the sectors that could house development in SO3: Edge Green Belt. This is dependent on the proximity to the city centre or key employment hubs of each sector (that is, sector 121 is closer to Cambridge city centre than sector 215 so will likely achieve better Active mode shares). However, by comparison with the more rural locations for proposed development that are included in other Strategic Site Options,

the level of mitigation for the less well performing sectors in SO3: Edge Green Belt is still likely to be less expensive and of a smaller scale than the infrastructure required elsewhere. Furthermore, any Public Transport infrastructure in and around the proposed development locations in SO3: Edge Green Belt is less likely to require subsidisation in order to attract a Public Transport operator, compared with locations further from Cambridge or in more rural locations.

Sensitivity Tests

5.5.10 Sensitivity Test 1a indicated that SO2: Edge non-Green Belt would achieve significantly better performance when fully built out. While the sites in SO3 are in a broadly similar location / proximity to Cambridge, they will not benefit from the same improvement when fully built out, as the trajectory for the sites in this option shows them as already fully built out by 2041.

5.6 Strategic Spatial Option 4: New Settlements

Performance Rating

5.6.1 SO4: New Settlements performs significantly less well in sustainability terms than the three best performing Strategic Spatial Options (SO1, SO2, SO3) when taking into account performance of the transport network and achieving the climate change objectives of the wider GCSP Local Plan.

5.6.2 SO4 is considered as a poorly performing Strategic Spatial Option overall when its performance against the metrics in Chapter 3 is considered. However, consideration of the individual settlements included in this option allows a more nuanced conclusion on the merits of the individual sites in SO4 to be drawn.

Analysis

5.6.3 The analysis in Chapter 3 suggests that car mode share is significantly higher in SO4: New Settlements than it is in the better performing Strategic Spatial Options. This is likely due to the isolated and rural nature of two of the four main proposed development sites that make up SO4: New Settlements, New Settlement D – to the South of Cambridge and New Settlement F – to the South West of Cambridge. As explained above, the sectors further from existing urban areas, and particularly Cambridge, have fewer Active Mode trips as they are considered too far by most to consider walking or cycling trips to destinations external to the settlements.

5.6.4 The more isolated nature of these New Settlements also means that the existing Public Transport provision is often of a lesser quality than on higher density routes, meaning fewer of these longer trips can be made by this mode on existing routes. As a result, new car trips per dwelling / job are shown to be significantly higher at all three of these New Settlements than at the sectors / locations closer to the edge of the city.

5.6.5 The new settlements in SO4 that perform best are New Settlement A: South East of Cambridge and New Settlement G: South of Cambourne. New Settlement G shows good Public Transport mode shares in comparison to the other three locations.

5.6.6 The scale of development at the new settlements in SO4 means that they are large enough to contain a good mix of jobs, homes and services and thus the level of

internalisation is quite good (generally 26-30% other than in the New Settlement close to Cambourne which is much lower at 13%).

5.6.7 However, Table 14 shows that SO4: New Settlements still creates the second highest level of distance travelled by car of all the eight Strategic Site Options, around 70% higher than the best performing SO1.

5.6.8 In this context, we can conclude that in 2041 and without site specific mitigation, SO4 is far less sustainable than SO1: Densification, SO2: Edge non-Green Belt and SO3: Edge Green Belt, and is also less sustainable than SO6, SO7 and SO8.

Mitigation

5.6.9 The rural location of three of the four main new settlement locations in SO4: New Settlements means that site specific mitigation is likely to be quite large in scale and potentially costly.

5.6.10 The New Settlement close to Cambourne benefits from being located near to the Cambourne to Cambridge HQPT corridor, and the planned East West Rail Central Section. For the other settlements in SO4, it is considered that to attract sufficient Public Transport trips to make New Settlements A, D and F sustainable in transport terms, significant investment in infrastructure is likely to be required, but even with such investment, it is unlikely that the performance of these settlements could achieve the low levels of trip making by car seen in SO1, SO2 and SO3.

5.6.11 This is likely to be quite costly, and owing to the fact that these proposed settlements are not in close proximity to existing urban areas or HQPT routes where existing demand would be found, some level of subsidisation would probably be required to attract a Public Transport Operator. Active Travel mode shares would also be difficult to increase due to the distance from Cambridge (and its associated key employment and services), unless the scale of development was increased to deliver a mix of jobs and homes sufficient to create very high levels of internalisation.

Sensitivity Tests

5.6.12 Sensitivity Tests 1a and 1b highlighted that when a higher level of development is applied (compared to the original tests of SO2 and SO4), that the mode share for car use decreases, with Active Mode share increasing, and Public Transport usage remaining broadly the same. However, while Sensitivity Test 1b shows that SO4

would achieve increased levels of use of non-car modes when fully built out, the additional development would still increase the use of car from the new settlements. This is different to the result seen for SO2 when fully built out, when car use decreased significantly, to lower levels than seen in the 2041 Baseline without any development.

5.6.13 Figure 14 and Figure 17 show the changes in car trips at Full Build out as assessed in Sensitivity Tests 1a and 1b for SO2 and SO4 respectively. Delay on the highway network increase in SO4: New Settlements (1b) to a greater extent than in SO2: Edge non-Green Belt (1a), suggesting that more remote New Settlements are less sustainable than locations on the edge of Cambridge. It should be noted however, that as in the analysis of the Core Tests, each of the four New Settlements in SO4 do perform slightly differently, with New Settlement G (Close to Cambourne) having significantly better non-car mode share than New Settlement A, New Settlement D and New Settlement F.

5.6.14 As is the case with SO2: Edge non-Green belt, having a lower level of growth than is assumed in the core tests for SO4: New Settlements means more trips are made than in the 2041 Baseline (though still fewer than the Core Tests). Again, the result in this scenario is that the Active Mode Share reduces, with Car Mode Share increasing. This correlates with the analysis to date, suggesting that smaller development causes less internalisation and more ‘in and out-commuting’ trips, which are less likely to be made by sustainable modes and this is worse for more rural, isolated new developments than it is on edge of city sites due to the natural advantage in creating shorter, Active Travel mode trips that edge of city sites have. This suggests lower levels of growth than assumed as happening in the Core Tests for SO4: New Settlements is less sustainable in transport terms. A further impact of this lower level of development for SO4: New settlements is the resultant increase in network delay highlighted by the Sensitivity Test, something that doesn’t happen in the more sustainable edge of city/densified locations that make up SO2: Edge non-Green Belt.

5.7 Strategic Spatial Option 5: Villages

Performance Rating

5.7.1 Due to the poor performance against the metrics that were analysed in Sections 3.2 and 3.5 of Chapter 3, SO5: Villages was not carried forward for more detailed assessment, as it is not considered that there is a viable package of mitigation measures that would significantly improve the performance of this option. It is the worst performing of all eight Strategic Spatial Options assessed in Chapters 3 and 4.

Analysis

5.7.2 Strategic Option 5: Villages performed most poorly of all of the eight core Strategic Spatial Options against all of the metrics analysed in Sections 3.2 and 3.5 of this report.

Mitigation

5.7.3 Due to the small, dispersed scale of development proposed in SO5: Villages, it is considered that High Quality Public Transport provision could not be made at a reasonable cost to mitigate the high level of car trips, especially for those villages located further away from existing and proposed HQPT routes.

5.7.4 Additionally, the rural nature (as opposed to villages on the urban fringe of Cambridge or on Public Transport corridors) of many villages in the Greater-Cambridge area also makes Active Travel on a scale likely to make this Strategic Spatial Option feasibly sustainable, highly unlikely

Sensitivity Tests

5.7.5 None of the Sensitivity Tests lead to any change to the assessment of this option, and the conclusions drawn.

5.8 Strategic Spatial Option 6: Public Transport Corridors

Performance Rating

5.8.1 SO6: Public Transport Corridors is considered to be 'medium' performing when compared to the Strategic Spatial Options, when considering sustainability and performance in transport terms. It performs less well than the better performing Strategic Spatial Options (SO1, SO2, SO3).

Analysis

5.8.2 Placing new homes and jobs on existing HQPT corridors, either by assuming faster delivery of homes at existing new settlements that lie on such corridors (such as Northstowe, Waterbeach and Bourn Airfield) or with new settlements in similar locations, is shown to produce a reasonably good level of non-car mode trips. The proximity to the existing HQPT corridors, such as Cambourne to Cambridge and the Cambridgeshire Guided Busway explains this, and the associated Active Travel infrastructure that accompanies HQPT routes also allows for some reasonable levels of Active Mode trips. A location such as Waterbeach also benefits from a relocated rail station linking it to key employment and service areas in Cambridge.

5.8.3 Whilst the mode split from these proposed locations in SO6: Public Transport Corridors is comparably worse than edge of Cambridge sites, they are better than the more rural locations of development, such as those that largely make up SO4: New Settlements (the exception being the New Settlement close to Cambourne, which itself benefits from a nearby HQPT link to Cambridge).

5.8.4 The analysis in Chapter 3 also shows that the impact on the metrics that affect the local highway network from the proposed development locations in SO6: Public Transport Corridors, are reasonably well performing. Namely, the small increase in vehicle kilometres emanating from the various locations that make up development are lower than those in more rural locations, such as those proposed new settlements in SO4: New Settlements, making mitigation a viable possibility.

5.8.5 However, this Strategic Spatial Option also includes proposed development within existing villages (again by intensifying) and as well as the scale of development, the location of these villages has an impact on their sustainability. Clearly, smaller scale developments perform worse by most transport metrics tested in Chapter 3, for the

reasons already discussed. In addition, where a village site is located close enough to an urban area or existing established Public Transport or even HQPT corridor in order for it to be accessed, clearly these locations show a benefit in transport and sustainability terms over a village located away from these places as they are easier to mitigate, by creating short links into these corridors/urban areas.

Mitigation

5.8.6 Another significant benefit of locating development on existing HQPT routes is the requirement to provide new large scale site specific mitigation is vastly reduced, as this already exists. We can therefore deduce that mitigating the impact of development as proposed in SO6: Public Transport Corridors is largely more viable than it is at other more rural locations for development that make up non-edge of Cambridge focussed Strategic Site Options.

Sensitivity Tests

5.8.7 The Sensitivity Tests carried out did not directly consider SO6: Public Transport Corridors. However, SO4: New Settlements, which was analysed in the Sensitivity Tests, does have some reasonable parallels to SO6: Public Transport Corridors; notably the make-up of development away from the edge of Cambridge, and in the case of New Settlement G (close to Cambourne) which is the best performing of the four 'New Settlements' in SO4: New Settlements, it also lies on a HQPT. It should however be noted that SO6: Public Transport Corridors is, by most metrics analysed in Chapter 3, better performing as a Strategic Spatial Option than SO4, largely owing to the proposed location of new homes and jobs on or close to HQPT routes, which is not the case in SO4.

5.8.8 As with SO4: New Settlements, we can infer that larger scale development (higher growth than in Core Tests) would draw benefits in Non-Car mode shares and that a lower growth rate (medium growth rate compared to Core Tests) would mean fewer 'internalisation' trips and therefore more in and out-commuting. We can also judge that keeping the level of in and out-commuting lower for development locations with SO6: Public Transport Corridors would have transport and sustainability benefits, as is shown in SO2: Edge non-Green Belt and SO4: New Settlements.

5.8.9 However, the key difference for SO6: Public Transport Corridors compared to SO2: Edge non- Green Belt and SO4: New Settlements, Active Travel mode share is that

the tests undertaken to date have shown placement of development on HQPT routes reduces the number of trips on the highway network but also facilitates this by increased use of Public Transport, rather than by increasing Active Travel, as these locations tend not to be as attractive for Active Travel (especially compared to edge of city sites).

5.8.10 Locating the key development sites on the Cambourne to Cambridge corridor, as is proposed in SO6: Public Transport Corridors, would however likely benefit from key HQPT infrastructure, such as C2C and potentially EWR.

5.9 Strategic Spatial Option 7: Integrating Homes and Jobs

Performance Rating

5.9.1 SO7: Integrating Homes and Jobs is considered 'medium' performing when compared to the Strategic Spatial Options, when considering sustainability and performance in transport terms. It performs less well than the better performing Strategic Spatial Options (SO1, SO2, SO3).

Analysis

5.9.2 Placing new homes and jobs close to existing and committed jobs within the life sciences cluster area around the south of Cambridge, including homes at existing villages and at new settlements, is shown to have some benefits when it comes to key transport and sustainability metrics. By way of comparison, locating development close to existing homes and in particular the cluster of jobs in this area leads to a reasonable level of non-car mode shares, with similar levels of Public Transport and Active Travel being achieved as to those locations within SO6: Public Transport Corridors. The level of Active Travel mode share is lower than Edge of Cambridge or Densification of Urban areas, as would be expected, however the level of Public Transport mode share that can be expected does compare reasonably similarly to the two Edge of Cambridge sites.

5.9.3 One key area where locating development in these sectors to the south of Cambridge around the Science Cluster does not perform well is the level of new car trips associated with each new job / dwelling. Rates of car trips per dwelling for locations in SO7 are significantly higher than seen in edge of Cambridge or densified urban area locations. The performance of the New Settlement B in this test for this metric is similar to that of the New Settlement D in SO4 but is significantly worse than New Settlements A and G in that test. As a point of comparison, the existing new settlements at Northstowe and Waterbeach both perform rather better by this metric than any of the new settlements in SO4 or SO7, but it should be noted that these sites are larger and benefit from HQPT provision and other mitigation in the 2041 Baseline tests.

5.9.4 SO7: Integrating Homes and Jobs also includes proposed development at existing villages in the vicinity of the southern cluster, and as well as the scale of development, the location of these villages has an impact on their sustainability.

Clearly, smaller scale developments perform worse by most transport metrics tested in Chapter 3, for the reasons already discussed. In addition, where a village site is located close enough to an urban area or existing established Public Transport or even HQPT corridor in order for it to be accessed, clearly these locations show a benefit in transport and sustainability terms over a village located away from these places as they are easier to mitigate, by creating short links into these corridors/urban areas.

Mitigation

5.9.5 The key location/sector for a development in SO7: Integrating Homes and Jobs is shown to achieve fairly good rates of internalisation as you would expect for a location with a balance of homes and jobs, and as a result travel distances and travel times are also quite low. However, the overall level of car trips for the Strategic Spatial Option are still significantly higher than Densification or Edge of Cambridge options, and added to this the relatively rural nature of the ley locations that make up SO7: Integrating Homes and Jobs (especially the villages), it is possible to conclude that increasing the most sustainable mode of travel - Active Travel – by mitigation would be more difficult and less financially viable for the longer distance trips, so it cannot be considered as sustainable or well performing as SO1, SO2 or SO3. Mitigation for SO7: Integrating Homes and Jobs is, however, likely to be achievable.

Sensitivity Tests

5.9.6 The Sensitivity Tests carried out did not directly compare SO7: Integrating Homes and Jobs. However SO4: New Settlements, which was analysed in the Sensitivity Tests, does have some reasonable parallels to SO7: Integrating Homes and Jobs; notably the make-up of development away from the edge of Cambridge and in a more isolated location and therefore it has a similar level of new car trips per dwelling/job as two of the four assumed new settlements in SO4. It should however be noted that SO7: Integrating Homes and Jobs is, by most other metrics analysed in Chapter 3, better performing as a Strategic Spatial Option than SO4: New Settlements. This is largely owing to the proposed location of new homes and jobs at an existing cluster for employment, causing a high level of shorter ‘internalised’ trips and therefore doesn’t cause huge delay on the local highway network.

5.9.7 As with SO4: New Settlements, we can infer that larger scale development (higher growth than in Core Tests) would draw benefits in non-Car Mode shares and that a lower growth rate (medium growth rate compared to Core Tests) would mean fewer 'internalisation' trips and therefore more in and out-commuting. We can also judge that keeping the level of in and out-commuting lower for development locations with SO6 would have transport and sustainability benefits, as is shown in SO2: Edge non-Green Belt and SO4: New Settlements.

5.9.8 Indeed, the maximisation of internalisation as well as the distance travelled, the time taken and therefore the level of delay is key to reducing the number of trips in SO7: Integrating Homes and Jobs. It is important to note that the development options within this Strategic Spatial Option did not perform as well as those located in or close to the existing urban areas and that the proposed location of the bulk of homes and jobs in SO7: Integrating Homes and Jobs (in sector 233 to the South and South East of Cambridge), mean that benefits of CAM and particularly EWR are unlikely to be significant.

5.10 Strategic Spatial Option 8: Expanded Growth Area

Performance Rating

5.10.1 SO8: Expanded Growth Area is considered 'medium' performing when compared to the Strategic Spatial Options, when considering sustainability and performance in transport terms. It performs less well than the better performing Strategic Spatial Options (SO1, SO2, SO3).

Analysis

5.10.2 This approach would focus new homes in a development close to Cambourne and the A428 Public Transport corridor, on the basis that Cambourne is due to be served by a new East West Rail station and that Cambourne and the villages along the corridor are due to be served by the Greater Cambridge Partnership's Cambourne to Cambridge scheme. East West Rail is covered in the sensitivity test discussion below, but would also likely benefit New Settlement G. As a result of these existing and proposed HQPT routes being in close proximity to the key development areas in SO8: Expanded Growth Area, the level of Public Transport and in particular Park & Ride mode shares achieved is shown to be quite good and in fact comparable to SO2: Edge non-Green Belt and SO3: Edge Green Belt, for which the main proposed development locations are on sectors on the edge of Cambridge.

5.10.3 Active Travel mode share from these key locations in SO8: Expanded Growth Area is also substantially better than for other more rural proposed 'new' settlements. This is due to both the close proximity to Cambourne and its existing homes, jobs and key services (particularly of the larger 'new settlement' G that makes up SO8: Expanded Growth Area) but also because where HQPT infrastructure is provided, often good Active Travel infrastructure is located close by.

5.10.4 However, despite the relatively good levels of non-car mode shares in SO8: Expanded Growth Area, the data does indicate that this settlement has relatively high numbers of people travelling out of the new settlement to Cambridge on a regular basis for what are quite long trips (when compared to the trips made by people in SO1: Densification, SO2: Edge non-Green Belt and SO3: Edge Green Belt for example). This has some negative impacts on the highway network, such as increased delay, but moreover, means that these key locations within SO8 are generally less sustainable than Edge of City or Densification of urban areas as

shorter trips can be made by Active Travel more easily. New Settlement G does however perform better than the other proposed 'new' settlements that have been tested, such as those included within SO4: New Settlements, for example, and compares well with locations on other HQPT corridors, such as those tested in SO6: Public Transport Corridors.

5.10.5 It should also be noted that this Strategic Spatial Option also includes proposed development at existing villages on the A428 corridor from Cambourne to Cambridge. As before, the scale of development and the location of these villages has an impact on their sustainability. Clearly, smaller scale developments generally perform worse by most transport metrics tested in Chapter 3, for the reasons already discussed, than larger ones. In addition, where a village site is located closer to an urban area or existing established Public Transport or even HQPT corridor than another, it makes it easier to be accessed by non-car modes.

Mitigation

5.10.6 The proximity of Cambourne and the HQPT options already existing / proposed for the Cambourne to Cambridge corridor makes mitigation for main new settlement (New Settlement G) proposed for SO8: Expanded Growth Area viable. For those proposed village developments that help make up the balance of this option; those located closer to the HQPT corridors (or indeed Cambourne or Cambridge) are easier to mitigate than those slightly further away. In particular, it is considered that the larger site is viably mitigated.

Sensitivity Tests

5.10.7 The Sensitivity Tests carried out did not directly compare SO8: Expanded Growth Area. However, SO4: New Settlements, which was analysed in the Sensitivity Tests, does have some notable parallels to SO8; notably the make-up of development away from the edge of Cambridge, and in the case of New Settlement G (close to Cambourne) which is the best performing of the 4 'New Settlements' in SO4, it also the main proposed location for growth in SO8. It should however be noted that SO8 is, by most metrics analysed in Chapter 3, better performing as a Strategic Spatial Option than SO4, largely owing to the proposed location of New Settlement G (Close to Cambourne) making up the vast majority of the new homes and jobs in SO8, as opposed to being one of four new settlements in SO4.

5.10.8 As with SO4, we can infer that larger scale development (higher growth than in Core Tests) would draw benefits in non-Car mode shares and that a lower growth rate (medium growth rate compared to Core Tests) would mean fewer 'internalisation' trips and therefore more in and out-commuting in SO8. We can also judge that keeping the level of in and out-commuting lower for development within SO8 would have transport and sustainability benefits, as is shown in SO2 and SO4.

5.10.9 However, the key difference for SO8 compared to SO2: Edge non-Green Belt and SO4: New Settlements, is the relevance of EWR. The EWR test indicated that SO8 has the potential to result in a shift away not just from the car but also Active Travel, as people switch mode and make longer journeys by rail rather than by active modes. This is logical, as Chapter 3 shows that a comparatively very high Public Transport Mode Share is achieved in SO8, with it using the existing HQPT corridor to link to Cambridge from the Cambourne area. This would only improve further with EWR. Although the increased Public Transport Mode Share is a positive benefit for SO8, it still isn't as sustainable as Active Mode travel, which is shown to decrease, and therefore cannot be considered as sustainable as edge of city or densified sites.

Part 2: Assessment of Strategic Spatial Options 9 and 10

6 Analysis of Strategic Spatial Options 9 and 10

6.1 Introduction to Part 2

6.1.1 As referred to in paragraph 0, before confirming the working assumption Preferred Option development strategy assessed in Part Two of this report, the Councils identified working assumptions for two further spatial options:

- SO9: Preferred Option growth level: Preferred Option spatial strategy
- SO10: Preferred Option growth level: Blended Strategy including Edge of Cambridge: Green Belt

6.1.2 Alongside other evidence assessments and Sustainability Appraisal, consideration of the SO9 and SO10 Edge of Cambridge: Green Belt alternative alongside the Strategic Spatial Options assessments ensures consideration of a range of reasonable alternative strategies.

Context

6.1.3 Part 1 of this report includes assessments of the eight Strategic Spatial Options and three growth levels. Further to this, ahead of the Preferred Options Plan consultation taking place in autumn 2021, officers from Greater Cambridge Shared Planning on behalf of the two councils shared with us a working assumption Preferred Option development strategy, including preferred growth level and distribution assumptions for dwellings, jobs and associated population growth.

6.1.4 Please note that use of the working assumption Preferred Option development strategy to inform this evidence base does not confer formal support by either council for that strategy. No decisions will be taken on development strategy assumptions until relevant member committees meet and approve documents for the Local Plan Preferred Option consultation. Such decisions will be informed by appraisal of reasonable alternatives. Setting out working assumptions in this and other notes does not prejudice those decisions.

Growth level

6.1.5 Following consideration of the November 2020 Strategic Spatial Options evidence bases and Sustainability Appraisal, Greater Cambridge Shared Planning have determined that the medium level of homes associated with the central employment

scenario represents the objectively assessed need for homes in Greater Cambridge. Having determined this, the previously assessed alternative growth options of minimum and maximum are no longer considered to represent reasonable alternatives.

6.1.6 Further to the above, the Greater Cambridge Local Plan Preferred Option growth level is the medium homes level, including a 1:1 commuting ratio for housing growth generated by additional jobs above those supported by the Standard Method, in line with the Councils' aims of limiting longer distance commuting and thereby limiting carbon emissions (described as medium+). We, and other evidence base consultants, did not assess the medium+ level of growth for the Strategic Spatial Options, but we do not consider that rerunning the evidence testing of the Strategic Spatial Options against a new medium+ housing figure would result in materially different outcomes to our November 2020 conclusions.

6.1.7 Drawing on the above, we are testing the new spatial options of SO9: Preferred Option growth level: preferred options spatial strategy and SO10: Blended Strategy including Edge of Cambridge: Green Belt based on the medium+ growth level, and have not assessed the impacts of the previous alternative growth levels in relation to these new spatial options.

Spatial distribution

6.1.8 The Councils' working assumption Preferred Option is a blended strategy including a number of broad supply locations. To ensure that the Preferred Option is tested against reasonable alternatives, an assessment of the Preferred Option blended strategy has been completed, so that it can be compared against:

- The Strategic Spatial Options tested in 2020
- Other reasonable alternative blended strategies.

6.1.9 Some of the Strategic Spatial Options tested in 2020 were blended strategies and others not. The Councils reviewed the Strategic Spatial Options tested in November to see whether these included a range of reasonable alternative blended strategies, noting that they don't need to test every possible reasonable alternative. The conclusion to this assessment was that the only alternative blended strategy not yet tested was one including development at Edge of Cambridge: Green Belt. The Councils therefore identified a blended strategy development distribution for this

spatial option, which is directly comparable to the Preferred Option and broadly comparable to the Strategic Spatial Options from November 2020.

6.2 Analysis of transport impacts of Strategic Spatial Options 9 and 10

6.2.1 This Chapter reflects on the conclusions in Chapters 3, 4 and 5. In order to provide an assessment with SO1-SO8 on a comparable basis, it assesses the likely performance of options SO9 and SO10 based on data from:

- The modelling of Strategic Spatial Options 1, 2, 3, 4 and 8 (analysed in Chapter 3).
- The modelling of Sensitivity Tests 1a and 1b, considering the Full Build Out of Strategic Spatial Options 2 and 4 (analysed in Chapter 4).

6.2.2 The Strategic Spatial Option tests between them contain most of the development locations that are included in SO9 and SO10. In addition, the two Sensitivity Tests 1a and 1b include the Full Build Out of the North East Cambridge Site, Cambridge Airport site and the New Settlement G South of Cambourne, and can therefore be used to reflect on the likely performance of SO9 and SO10 when fully built out (noting that the Edge of Cambridge – Green Belt sites included in SO10 are already fully built out by 2041). Table 25 below shows the housing growth included in SO9 and SO10, compared to SO1, SO2, SO3, SO4, SO8, and Sensitivity Tests 1a and 1b. Considering the Strategic Spatial Options / Sensitivity Tests noted above:

- Strategic Spatial Option 2 is similar in concept to SO9, having development at North East Cambridge, Cambridge East and at new settlements on Public Transport corridors
- Strategic Spatial Option 8 allows for an assessment of the likely performance of the North East Cambridge site in both SO9 and SO10, as the quantum of development at North East Cambridge in SO8 is nearer to that in SO9 and SO10 than either SO1 or SO2.
- Strategic Spatial Option 1 allows for a direct comparison of the likely performance of the Cambridge East site in 2041 in both SO9 and SO10 (as the quantum of development at Cambridge East by 2041 is the same in SO1, SO9 and SO10)
- Strategic Spatial Option 3 allows for an assessment of the likely performance of the Edge of Cambridge – Green Belt sites in SO10

- Strategic Spatial Option 4 allows for an assessment of the likely performance of the Extension to Cambourne in SO9 (SO8 also includes a new settlement south of Cambourne, but at a much larger scale by 2041 than either SO9 or SO4
- SO2 Sensitivity Test 1a allows for a direct assessment of the likely performance of the fully built out North East Cambridge and Cambridge East sites in SO9 and SO10
- SO4 Sensitivity Test 1b allows for a direct assessment of the likely performance of the fully Built-out extension to Cambourne in SO9.

Table 25 Housing Development (dwellings) between 2020 and 2041, contained in Strategic Spatial Options 9 and 10, compared to SO1, SO2, SO3, SO4 and SO8 and Sensitivity tests 1a (Full Build Out of SO2) and 1b (Full Build Out of SO4)

Development area	SO9	SO9 full build out	SO10	SO10 full build out	SO1	SO2	SO3	SO4	SO8	SO2 ST 1a	SO4 ST 1b
North East Cambridge	3,900	8,350	3,900	8,350	8,000	8,000	-	-	4,900	8,300	-
North West Cambridge	1,000	1,500	1,000	1,500	-	-	-	-	-	-	-
Other Smaller urban sites	200	200	200	200	6,800	-	-	-	-	-	-
Cambridge Airport	2,900	7,000	2,900	7,000	2,900	3,800	-	-	3,800	9,500	-
Edge of Cambridge Green Belt - non site specific	-	-	2,000	2,000	-	-	17,700	-	-	-	-
Extension to Cambourne	2,000	7,000	-	-	-	-	-	4,550	9,000	-	9.000
Other New Settlements on Public Transport Corridors	-	-	-	-	-	5,900	-	8,600	-	13,500	13,500
Southern Cluster	~600	~600	~600	~600	-	-	-	-	-	-	-
Dispersal to Villages	~900	~900	~900	~900	-	-	-	-	-	-	-
Northstowe	750	750	750	750	-	-	-	-	-	-	-
Waterbeach	750	750	750	750	-	-	-	-	-	-	-
Other New Settlements	-	-	-	-	-	-	-	4,550	-	-	9,000
Total additional dwellings	**12,900**	**28,550**	**12,900**	**22,550**	**17,700**	**17,700**	**17,700**	**17,700**	**17,700**	**31,300**	**31,500**

Source: GCSP Local Plan_CSRM Outputs_v2.0.docx

6.3 Trip Volumes and Mode Share

Total trip volumes

6.3.1 The information in Table 26 below shows the additional trips generated across the Greater Cambridge transport network for Strategic Spatial Options 1, 2, 3, 4 and 8, and Sensitivity Tests 1a and 1b, which assess the Full Build-out of Strategic Spatial Options 2 and 4 respectively.

Table 26 Total number of trips by transport mode for additional trips from Strategic Spatial Options 1, 2. 3, 4 and 8, and Sensitivity Tests 1a and 1b

Baseline test / Strategic Spatial Option test	Non-car trips	Car trips	Total trips	Number of dwellings	Trips per Dwelling
SO1: Densification	83,422	61,406	144,828	17,700	8.2
SO2: Edge non-Green Belt	73,348	73,521	146,869	17,700	8.3
SO3: Edge – Green Belt	72,463	73,896	146,359	17,700	8.3
SO4: New Settlements	58,265	89,124	147,389	17,700	8.3
SO8: Expanded growth area	71,491	75,723	147,214	17,700	8.3
SO2: Edge non-Green Belt – Sensitivity Test 1a: Full Build Out	123,774	107,486	231,260	31,300	7.4
SO4: New Settlements – Sensitivity Test 1b: Full Build Out	93,107	137,262	230,369	31,500	7.3

Source: Data from or derived from 0, Table 22 and Table 24 in this report.

6.3.2 0 takes these trip rates and applies them to SO9 and SO10 to show the likely level of additional trip generation associated with these two options, in 2041, and when fully built out.

Table 27 Derivation of estimated total additional trips generated by Strategic Spatial Options 9 and 10, in 2041 and when fully built out

Baseline test / Strategic Spatial Option test	Number of dwellings	Trips per Dwelling	Total Trips
SO9: Preferred Option growth level: Preferred Option's spatial strategy	12,900	8.3	107,070
SO10: Blended Strategy including Edge of Cambridge: Green Belt	12,900	8.3	107,070
SO9: Preferred Option growth level: Preferred Option's spatial strategy – fully built out	28,550	7.4	211,270
SO10: Blended Strategy including Edge of Cambridge: Green Belt – fully built out	22,550	7.4	166,870

Source: Data derived from dwelling numbers for SO9 and SO10 in Table 25, and from assumptions set out in paragraph 6.2.2.

Mode share of car and non-car modes

6.3.3 Table 28 and Figure 21 show the mode share of the additional trips associated with Strategic Spatial Options 1, 2, 3, 4 and 8.

6.3.4 Table 29 shows the car trip rates per dwelling associated with the locations included in Strategic Spatial Options 9 and 10. This has been done by considering the trips per dwelling of these sites in the original tests of Strategic Spatial Options, 1, 2, 3, 4 and 8, on the basis referenced in paragraph 6.2.2 above.

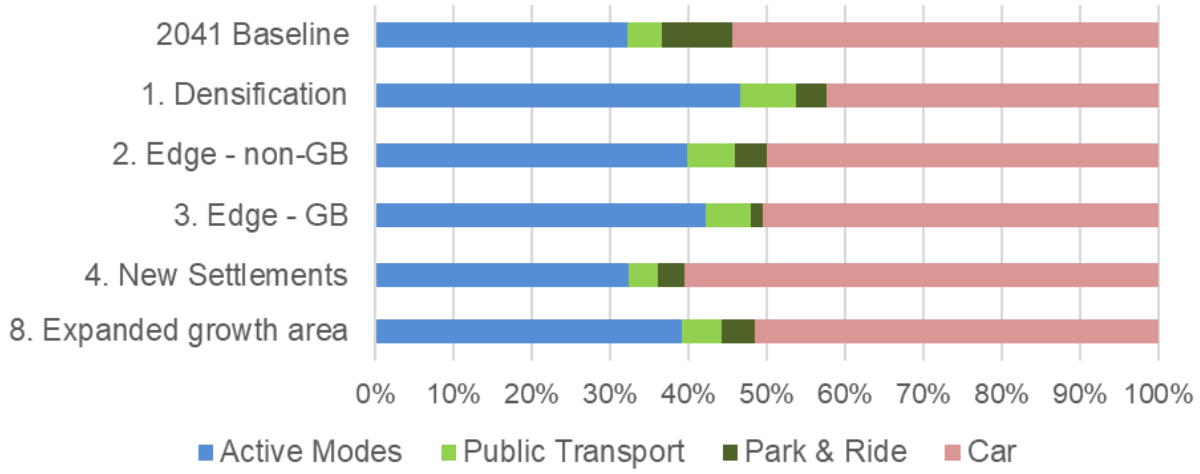
Table 28 Mode share of the additional trips generated by development in Strategic Spatial Options 1, 2, 3, 4 and 8, compared to the mode shares of the 2015 Base Year and the additional trips in the 2041 Baseline

Baseline test / Strategic Spatial Option test	Number of trips	Active modes	Public Transport	Park & Ride	Total non-car
SO1: Densification	144,829	46.7%	7.0%	3.9%	57.6%
SO2: Edge - Non-Green Belt	146,599	39.9%	6.0%	4.1%	50.0%
SO3: Edge - Green Belt	146,360	42.2%	5.7%	1.6%	49.5%
SO4: New Settlements	147,389	32.4%	3.7%	3.5%	39.5%
SO8: Expanded Growth Area	147,213	39.1%	5.2%	4.2%	48.6%

Note: Green shading indicates positive change consistent with policy direction compared to 2041 Baseline – increased non-car mode share. Red shading indicates negative change compared to policy direction.

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Figure 21 Mode share of the additional trips generated by development in each Strategic Spatial Option, compared to the additional trips in the 2041 Baseline



Note: For the 2041 Baseline, mode shares of the growth in trips over the 2015 Base Year.

For the Strategic Spatial Options, mode shares of the growth in trips over the 2041 Baseline.

Table 29 Derivation of estimated trips per dwelling by car and non-car transport modes for locations included in Strategic Spatial Options 9 and 10

Baseline test / Strategic Spatial Option test	Car trips / dwelling	Site in SO9?	Site in SO10?
North East Cambridge	1.1	✓	✓
North West Cambridge	1.1	✓	✓
Other Smaller urban sites	1.1	✓	✓
Cambridge Airport	2.0	✓	✓
Edge of Cambridge Green Belt – non site specific	1.5	-	✓
Extension to Cambourne	3.0-3.1	✓	-
Southern Cluster	4.6	✓	✓
Dispersal to Villages	4.6	✓	✓
Faster delivery at Northstowe	2.2	✓	✓
Faster delivery at Waterbeach	2.6	✓	✓

Source: Data derived from Table 13 above, with the methodology for deriving car trip rates for specific sites noted below.

1. North East Cambridge car trip rates taken from trip rates for elements of site in sector '-141' in SO8
2. North West Cambridge car trip rates assumed to be as North East Cambridge in SO8

3. Cambridge Airport car trip rates are an average of the trip rates for the site in sectors '-141' and '-215' in SO1
4. Edge of Cambridge Green Belt – non site-specific car trip rates are an average of the trip rates for the elements of the sites in sectors '-121' and '-131' in SO3
5. Southern Cluster Trip rates are assumed to be as trip rates for Dispersal to Villages, due to the low level of development
6. Dispersal to Villages trip rates taken from the average trip rate of villages included in SO8
7. Northstowe and Waterbeach car trip rates taken from the comparator data in Table 13.

Strategic Spatial Option 9: Preferred Option growth level: Preferred Options spatial strategy

6.3.5 Considering the likely car mode share of sites in SO9:

- Performance of North East Cambridge and Cambridge East
  - These two sites performed almost identically in terms of their low levels of car use in all the Strategic Spatial Options in which they were included, even when the level of development varied considerably between options.
- Performance of the extension to Cambourne
  - SO2 contains two new settlements, each of which includes more development than would be seen in the extension to Cambourne in SO9. However, both of these settlements have a higher level of car trip making than seen by the new settlement South of Cambourne in both SO4 and SO8 (3.5 and 3.8 car trips per dwelling for new settlements in SO2, 3.0-3.1 car trips per dwelling for the new settlement South of Cambourne in SO4 and SO8.
    - In this context, the smaller scale of development at Cambourne in SO9 compared to SO4 and SO8 may slightly increase the level of trip making by car.
    - The lower level of development in the new settlement South of Cambourne is likely to compensate for this in terms of its impact on the car mode share of SO9 as a whole.
- Other sites in SO9
  - The North West Cambridge densification and other smaller urban sites would be expected to have similar characteristics to Cambridge East / North East Cambridge.

- The dwellings at Northstowe and Waterbeach would achieve low levels of car use compared to those seen at the new settlement at Cambourne

6.3.6 Taking account of the above, it is likely that overall, the mode share performance of SO9, without mitigation, would be similar to that seen for SO2 in Table 28, if tested using CSRM2. Given the mix of development included within this spatial option it would be likely to have the potential for lower levels of car use if mitigation were introduced.

Strategic Spatial Option 10: Preferred Option growth level, Blended Strategy including Edge of Cambridge: Green Belt

6.3.7 Compared to SO9, the only difference in terms of the analysis in paragraphs 6.3.5 and 6.3.6 above, is the inclusion of development in non-site-specific Edge of Cambridge: Green Belt sites rather than the extension of Cambourne. In this context, considering the likely car mode share of sites in SO10:

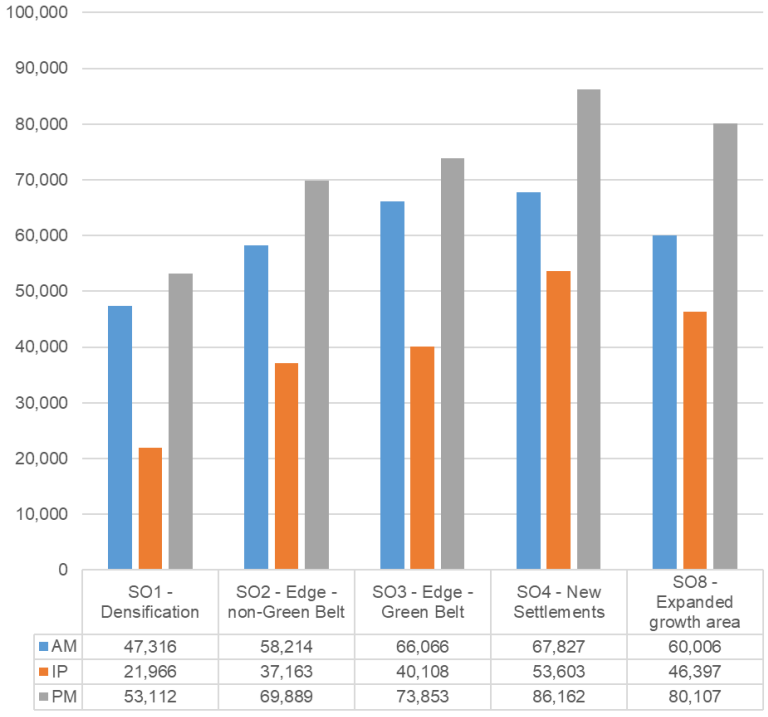
- Performance of the non-site-specific Edge Green Belt sites
  - The performance of these sites is expected to be similar to that seen for similar sites assumed in SO3.

6.3.8 In this context, the likely car mode share would be expected to be between that achieved by Strategic Spatial Options 1 and 2 in Table 28, and lower than SO9.

6.4 Highway Impact

6.4.1 Figure 22 and Figure 23 show the additional travel distance (PCU-km) and additional travel time (PCU-hrs) generated by Strategic Spatial Options 1, 2, 3, 4 and 8, and Table 30 summarises the metrics in these two figures.

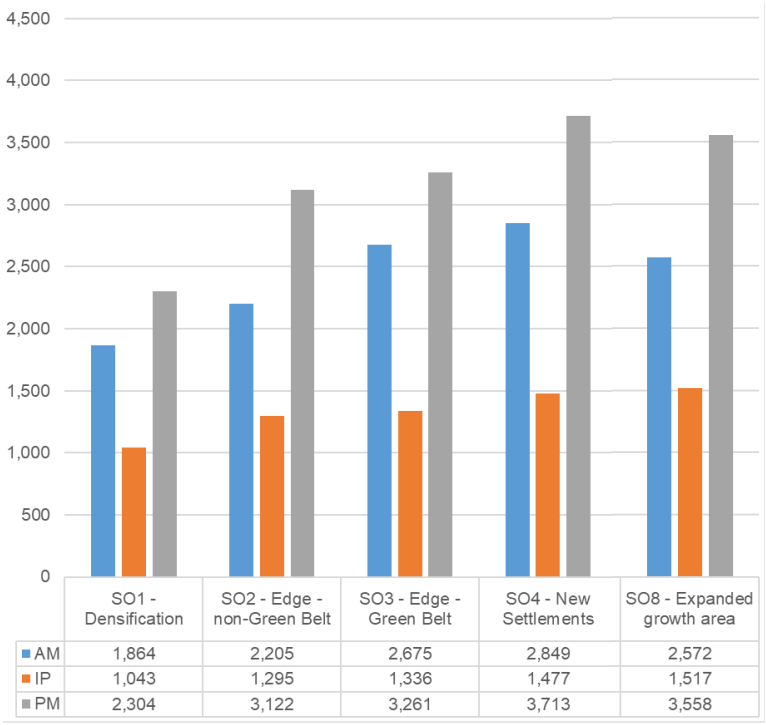
Figure 22 Additional travel distance by vehicular traffic in Greater Cambridge (PCU-kms), Strategic Spatial Option vs. 2041 Baseline



	SO1 - Densification	SO2 - Edge - non-Green Belt	SO3 - Edge - Green Belt	SO4 - New Settlements	SO8 - Expanded growth area
AM	47,316	58,214	66,066	67,827	60,006
IP	21,966	37,163	40,108	53,603	46,397
PM	53,112	69,889	73,853	86,162	80,107

Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Figure 23 Additional total travel time for vehicular traffic in Greater Cambridge (PCU-hrs), Strategic Spatial Options vs 2041 Baseline



Source: GCSP Local Plan_DRAFT CSRM2 Outputs_v0.4

Table 30 Total additional vehicular trip distance in PCU-kms and travel time in PCU-hrs in the AM peak hour, PM peak hour and average inter-peak hour resulting from each Strategic Spatial Option, over 2041 Baseline

Metric	SO1	SO2	SO3	SO4	SO8
Travel distance: Total additional car PCU-km (AM peak, interpeak, and PM peak)	122,394	165,266	180,027	207,592	186,510
Travel time: Total additional car PCU-hrs (AM peak, interpeak, and PM peak)	5,211	6,622	7,272	8,039	7,647

Source: Data derived from Figure 8 and Figure 9 above

6.4.2 It is important to note that Strategic Spatial Options 9 and 10 include 12,900 new dwellings, while Strategic Spatial Options 1 to 8 all include 17,700 dwellings reflecting that the first 8 options were tested against the maximum growth option whilst the additional two options are tested against the medium+ preferred growth level. In this context, it is not possible to draw definitive conclusions as to the highway impacts of Strategic Spatial Options 9 and 10 in comparison to the core options without undertaking modelling.

6.4.3 It can however be inferred that both SO9 and SO10 would generate less additional vehicular distance travelled (PCU-km) as a result of the additional development compared to any of the core Strategic Spatial Options.

7 Strategic Spatial Options 9 and 10: Conclusions

7.1 Performance of SO9 and SO10 compared to the core Strategic Spatial Options

7.1.1 Section 5.2 above sets out the relative performance of the eight core Strategic Spatial Options. Based on the analysis in this Chapter, the following bullets consider how Strategic Spatial Options 9 and 10 are likely to perform in relative terms compared to the core options.

Best Performing Options

- **Strategic Spatial Option 1: Densification** performs best against all metrics analysed in Chapter 3 and is likely to perform better when fully built-out than any of the other options.

Medium Performing Options

- **Strategic Spatial Option 10: Blended Strategy including Edge of Cambridge: Green Belt** would be likely to fall between SO1 and SO2 in terms of its relative performance overall.
- Strategic Spatial Option 9: Preferred Option growth level: Preferred Option spatial strategy would be likely to perform very similarly to Strategic Spatial Option 2.
- **Strategic Spatial Option 2: Edge non-Green Belt** performs well against all metrics but generates more trips than SO1, which is largely due to the inclusion of New Settlements C and E in this option. It performs very well when fully built out.
- **Strategic Spatial Option 3: Edge Green Belt** performs well against most metrics, but generates more car trips than Strategic Spatial Option 2.
- **Strategic Spatial Option 7: Integrating Homes and Jobs** performs well against the Highway Metrics compared to all other options apart from SO1. However, it does generate higher levels of car trips than all other options apart from SO5 and SO6, and relatively low mode shares of non-car use, indicating there are high levels of car use for shorter journeys.
- **Strategic Spatial Option 8: Expanded Growth Area** performs moderately well against most metrics, but relatively poorly in terms of the highway metrics assessed in Section 3.5.

- **Strategic Spatial Option 6: Public Transport Corridors** Performs third best against the highway metrics, but like SO7, generates high levels of car trips – more than all other options apart from SO5.

Poorly Performing Options

- **Strategic Spatial Option 4: New Settlements** performs poorly overall, but it is noted that two of the four settlements in this option perform better than the other two.
- **Strategic Spatial Option 5: Villages** performs worst against every metric analysed in Chapter 3. Some villages will be capable of accommodating growth with lower levels of reliance on car use, and if this is beneficial in supporting local services and facilities, this may be appropriate and better in transport terms than the loss of local services.

7.1.2 The issues outlined in paragraphs 3.3.10 to 3.3.14 with regard to the potential for some development sectors on the edge of Cambridge in South Cambridgeshire to be assessed as generating higher levels of car trips than would be expected might improve the performance of Strategic Spatial Options 1, 2, 3, 6, 7, 8, 9 and 10. However, it is unlikely to alter the relative performance of these options to each other.

Part 3: Assessment of the Preferred Option

8 The Preferred Option

8.1 Introduction to Part 3

8.1.1 Part One of this report examined the potential transport impacts of a range of Strategic Spatial Options and forms part of the evidence base that has informed the development of the Preferred Option for the Greater Cambridge Local Plan (GCLP).

8.1.2 Part Two of this report took the evidence from the assessment of the initial eight Strategic Spatial Options and used that to assess of a further two options – an emerging Preferred Option and a blended option as a comparator.

8.1.3 Part Three of this report examines the transport impacts of the Preferred Option for the emerging GCLP that covers the period to 2041.

8.1.4 The Cambridge Sub-Regional Model 2 (CSRM2) has been used to assess the potential mode share and highway impacts of the Preferred Option. Consideration is given to the potential transport mitigation measures for the Preferred Option to facilitate maximum use of sustainable modes of transport and promote opportunities to reduce the need for travel. This includes taking account of the implications of full build out of strategic scale sites where that would continue beyond 2041 to identify the full mitigation required.

8.1.5 The information in Part Three of this report may be used, alongside other information, to inform the refinement of the Preferred Option to ensure a sustainable, deliverable development strategy.

Report Structure

8.1.6 Part 3 of this report is structured as follows:

- Chapter 8: The Preferred Option
- Chapter 9: Preferred Option Modelling Methodology
- Chapter 10: Analysis of Model Run 1: Preferred Option to 2041
- Chapter 11: Analysis of Model Run 4: Preferred Option to 2041 with Mitigation
- Chapter 12: Analysis of Model Run 2: Preferred Option Fully Built Out
- Chapter 13: Analysis of Model Run 3: Preferred Option Fully Built Out with Mitigation
- Chapter 14: Preferred Option Sector Analysis

- Chapter 15: Preferred Option Tests: Summary and Conclusions

9 Preferred Option Modelling Methodology

9.1 Model Tools

9.1.1 This chapter sets out the methodology used to undertake testing of the Preferred Option, to support the development of the Greater Cambridge Local Plan to 2041.

9.1.2 The CSRM2 E Series, with a 2015 Base Year was used to assess the Strategic Spatial Options which are reported in Part One of this report.

9.1.3 The model was updated in the period between the Strategic Spatial Options tests and the Preferred Option tests, and the CSRM2 F Series, which has been revalidated against 2019 traffic flows, has been utilised to undertake the Preferred Option tests.

9.1.4 The update of the CSRM2 from Series E to Series F involved the following changes:

- Update the base year to use the latest version of TAG Databook parameters
- Corrected specific coding issues revealed during the recent Greater Cambridge Partnership / Cambridgeshire and Peterborough Combined Authority model runs which have been traced back to the base year network
- Update the SATURN software to version 11.5.05H
- Update the base year SATURN network with the changes implemented by Mott MacDonald to aid subsequent scheme representation
- Update the education attractors in the Trip End Spreadsheets from the 2015 DfE's school census database which was not available at the time the CSRM2 Base Year Land Use was defined
- Other small updates / refinements logged which are primarily tidying / streamlining and not expected to impact on model results
- Apply the zonal changes at Trumpington, Babraham and Granta Park areas to ensure that the future corridors would better capture movements and level of demand at key locations
- Split external zones to the east and west of the study area such that Mildenhall and Bedford are in separate external zones from the wider surrounding areas, to help with the modelling of Cambridge Autonomous Metro (CAM) and East-West-Rail Central Section (EWR) schemes respectively

- Make Whittlesford Parkway a main rail station and add some network detail to make sure it is accessed appropriately
- Review the zoning around Waterbeach / Landbeach / Milton to provide a more appropriate representation of connectivity to the GCP Waterbeach to North-East Cambridge scheme
- Changes to enable the benefits of wholly new cycle routes (such as parts of the Chisholm Trail, or cycle paths alongside new off-road busways) to be captured in the model
- The ability to capture “non-standard” usage of Park and Ride for example., Park and Active
- 2019 Present Year Validation to prolong the life of the CSRM2

9.2 Model Assumptions

Job types within CSRM2

9.2.1 Within CSRM2 there are two types of job that are included, these are:

- B-type jobs, and
- Service jobs

9.2.2 "B-Type" jobs are taken from the Town and Country Planning (Use Classes) Order 1987 and include use Classes B1, B2, et cetera. jobs. These can be generally described as covering such jobs as offices or industrial estates. Note that the model will be revised in due course to reflect new Use Class E. The distribution of "B-Type" jobs is explained further at 9.2.9.

9.2.3 Within CSRM jobs that are not considered to be "B-Type" are deemed to be "Service Jobs". These cover employment types such as education, health and retail but are not formally defined outside of CSRM.

9.2.4 Service jobs are themselves broken down into three allocations:

- A proportion that follows dwellings:

  The proportion of service jobs that follows new dwellings includes such things as employment at new or expanded local schools, new or expanded local shops and new or expanded local medical practices, as facilities like these must be built or expanded to cater for an increase in the local population. The level of jobs covered by this allocation is determined by a job per dwelling ratio derived from information within CSRM.

- A proportion that follows the 2020 jobs distribution:

  The Service jobs that follow the 2020 jobs distribution represent growth that is not directly related to the development of new dwellings which might also arise due to an increase in the population they serve. Examples of this growth include health jobs at large hospital sites like Addenbrooke's and retail jobs in Cambridge city centre.

- The remainder of service jobs used to balance overall totals:

  The final, much smaller, proportion of Service jobs are considered to represent intensification of existing Service jobs across the City of Cambridge and South Cambridgeshire. This allocation is relatively small as it is only required to balance the number of jobs assumed in the model with the number supplied by GCSP for inclusion in the Local Plan. These jobs can be thought of as representing employment such as that provided by (retail) catering services at existing employment sites.

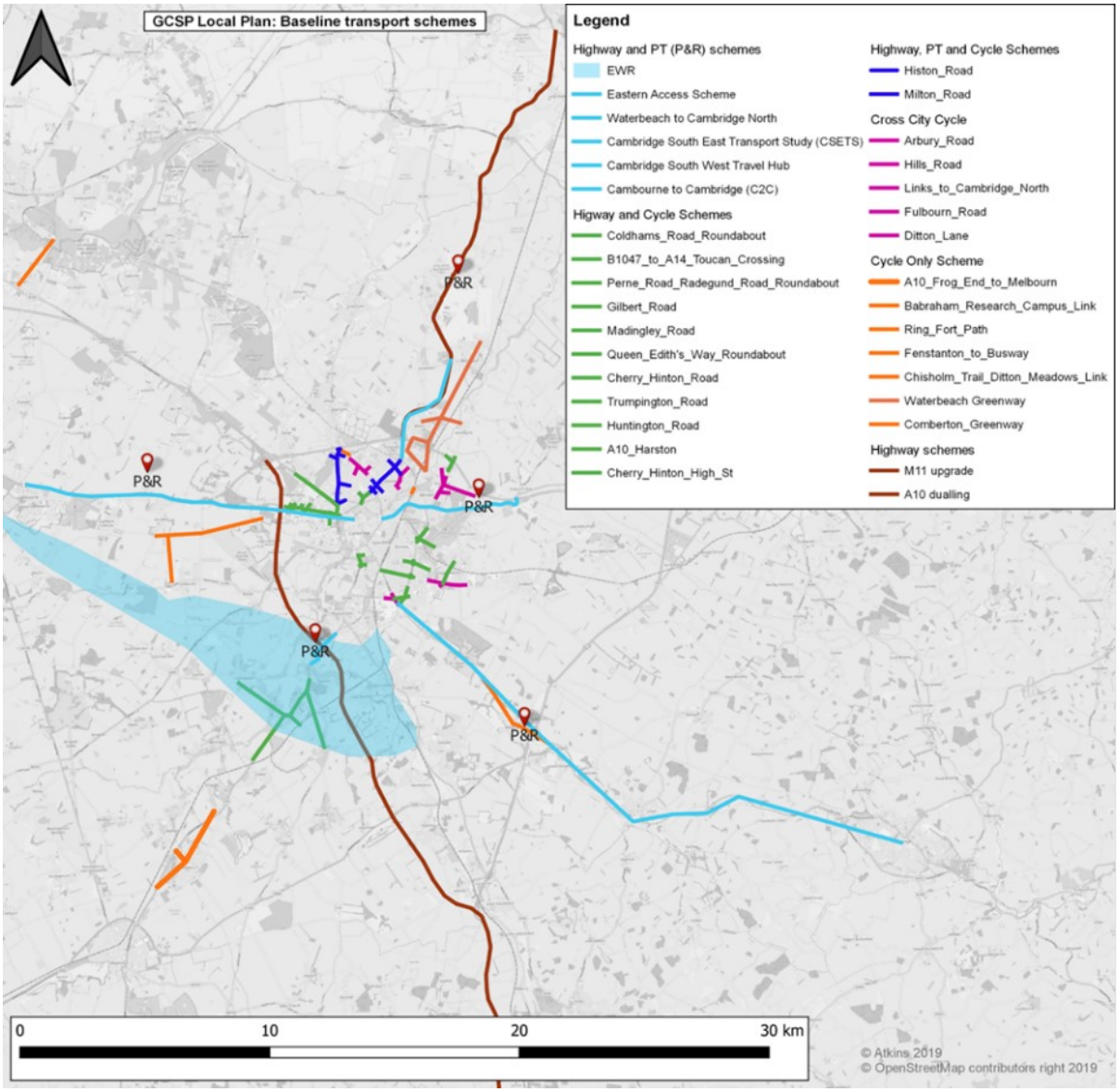
CSRM2 F Series 2041 Baseline

Baseline Transport Schemes

9.2.5 The transport schemes included in the 2041 Baseline used in assessing the Preferred Option are largely the same as used in the core Strategic Spatial Option tests set out in Part One of this report. The exception to this is the coding of the Cambridge Eastern Access scheme, where the coding has been altered to reflect the latest information relating to this scheme. The main change is that Phase A of the eastern access scheme has been included in the 2041 Baseline while Phase B has been assumed to be part of the mitigation for the Cambridge East scheme. The transport schemes included in the 2041 Baseline comprise:

- Greater Cambridge Partnership (GCP) schemes:
  - Cambourne to Cambridge
  - Cambridge South East Transport Study
  - Cambridge South West Travel Hub
  - Waterbeach to North East Cambridge
  - Cambridge Eastern Access Phase A
  - City Access
  - Foxton Rural Travel Hub
  - GCP Cycle Schemes
- The A428 Black Cat to Caxton Gibbet
- Cambridge South Station
- The A10 (Ely to Cambridge) highway improvements.
- Capacity improvements to the M11.

Figure 24 Transport Schemes included in the 2041 Baseline



Note that the East West Rail Central Section is shown in this figure but is not included in the 2041 Baseline.

Growth in dwellings

9.2.6 The growth in dwellings is based upon information supplied by Greater Cambridge Shared Planning. Windfall allocations in the 2041 Baseline are distributed based on the location of dwellings in a given district in the 2015 Base, as the 2041 Baseline is built on the 2015 Base Year.

9.2.7 The 2041 Baseline dwelling distribution used in this round of modelling is similar to that used in the testing of the Strategic Spatial Options set out in Part 1 of this report. The one difference is the inclusion of 1,500 dwellings on the Wellcome Genome Campus site. The inclusion of growth at the Wellcome Genome Campus site has

resulted in reductions in the level of growth assumed in other parts of the model in order to ensure that the level of growth in the model as a whole is correct.

9.2.8 Table 31 below shows the absolute dwellings by site or district in the 2041 Baseline.

Table 31 Dwellings by District in the 2041 Baseline

Location	2041 Baseline dwellings
Cambridge: North East Cambridge	0
Cambridge: Cambridge East	86
Cambridge: North West Cambridge	2,881
Cambridge: Remainder in Cambridge	62,612
Total: Cambridge	**65,579**
South Cambridgeshire: Cambourne Area additional development	0
South Cambridgeshire: Villages	36,806
South Cambridgeshire: Northstowe	4,681
South Cambridgeshire: Waterbeach New Town	4,580
Remainder in South Cambridgeshire	48,320
Total: South Cambridgeshire	94,387
East Cambridgeshire and Huntingdonshire	145,718
Total	**305,684**

Growth in Jobs

9.2.9 Table 32 shows growth in jobs between 2020 and 2041. Jobs from the 2015 and 2019 Base Years are derived from the East of England Forecasting Model (EEFM) for 2019 which was the most recent data available at the time of the modelling. To reach 2020 and the start of the GCSP input data, the district level jobs growth was extrapolated from the 2019 EEFM data and then applied at the zonal level based on the relative number of jobs in each zone in 2019.

Table 32 Jobs Growth between 2020 and 2041

Location	2041 Baseline jobs
Site-specific jobs B-Type (site specified)	18,470
Site-specific jobs Non-B-Type (site specified)	9,500
Total site-specific jobs	27,970
"Service" Jobs from Dwellings Growth following distribution of Dwellings	15,592
"Service" Jobs from Dwellings Growth following distribution of Jobs	3,925
Remaining Intensification	270

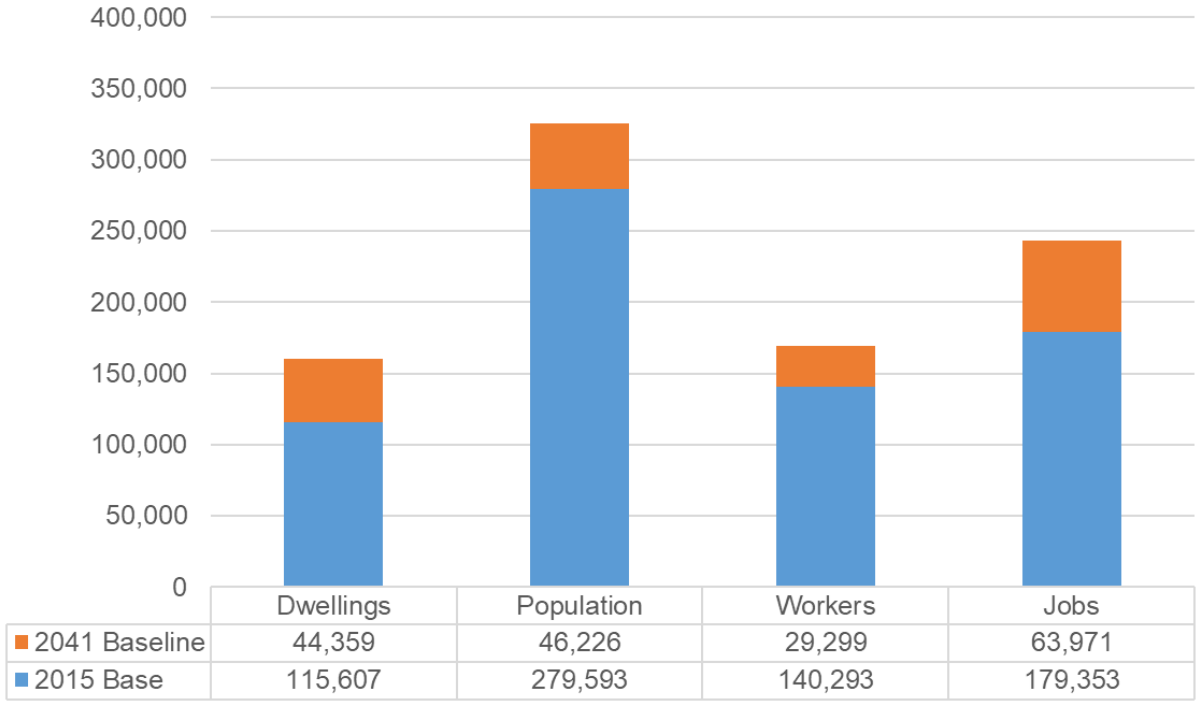
Total service jobs	19,786
Total jobs	**47,756**

9.2.10 Growth in jobs in East Cambridgeshire and Huntingdonshire (the non-GCSP internal model districts) was extrapolated from EEFM district level totals to obtain a job growth target for each Future Year in keeping with the scale of growth identified in the relevant adopted Local Plan. This shows growth at large sites accounting for 90% of growth, the remaining 10% of growth is treated as windfall and was allocated to sites in these districts with existing jobs based on the proportion of jobs at a given site in 2019.

Combined inputs

9.2.11 Figure 25 shows the numbers of dwellings, population, workers and jobs (the four key inputs to the model) in Greater Cambridge used in the modelling of the 2041 Baseline. It illustrates that most of the development and population were already present in 2015 when the base data used in the development of the model was collected. Note that the jobs total for the 2041 Baseline is made up of 16,214 jobs between 2015 and 2020 and the 47,756 jobs detailed in Table 32 between 2020 and 2041.

Figure 25 Dwellings, Population, Workers and Jobs in the 2015 Base Year, and in the 2041 Baseline



Source: Land Use and Settlement Metrics Summary_v0.1

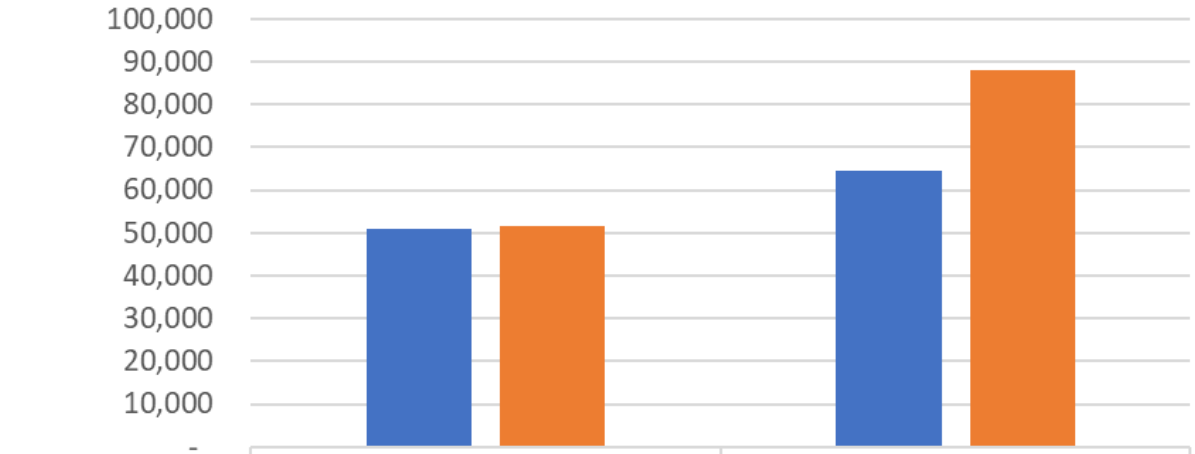
9.2.12 The following bullets detail how the dwelling figures were derived and how the total figure of 159,966 dwellings by 2041 was calculated. From the information in Figure 25 it can be seen that there were 115,607 dwellings present in the 2015 Base Year. The growth to 2041 was built up as follows:

- The 2020 growth was derived from the completion monitoring undertaken by the local authorities. This resulted in an additional 8,706 dwellings in addition to the 2015 figure which equates to 124,313 dwellings in 2020.
- Growth between 2020 and 2041 was derived from the Local Planning Authority housing trajectories which resulted in 35,653 dwellings between 2020 and 2041 so the total number of dwellings in the 2041 Baseline is 159,966.

2041 Baseline in- and out-Commuting

9.2.13 Figure 26 shows 2041 Baseline in- and out-commuting. Whilst the level of out-commuting only increases by 890 in the 2041 Baseline, the level of in-commuting increases by approximately 33% from 64,566 to 88,022. This indicates that in the 2041 Baseline there is an imbalance between the number of dwellings provided and the number of workers needed to fill the jobs expected to be in place by 2041. This issue predates the emerging Greater Cambridge Local Plan.

Figure 26 2015 Base Year and 2041 Baseline in- and out-Commuting



	Out-commuters	In-commuters
2015 Base Year	50,817	64,566
2041 Baseline	51,708	88,022

Source: Source: Land Use and Settlement Metrics Summary_v0.1

9.3 2041 Baseline Network Performance

Transport Demand Model Outputs

9.3.1 The following metrics, obtained from the CSRM2 Transport Demand Model, are used to assess the impact of the Preferred Option in the following chapters, and to analyse currently planned growth to 2041 in the following paragraphs. The metrics are:

- Change in Active Travel Mode Share
- Change in Public Transport Mode share
- Change in Car mode share

9.3.2 As discussed in Section 9.1 above, CSRM2 was updated from Series E to Series F between the testing of the Strategic Spatial Options and the testing of the Preferred Option. The 2015 Base Year and 2041 Baseline were therefore re-established for CSRM2 Series F.

9.3.3 Table 33 shows the number of person trips in the 2015 Base Year and the 2041 Baseline in CSRM2 Series F.

9.3.4 0 and Figure 27 show the Mode Shares of trips in the same years.

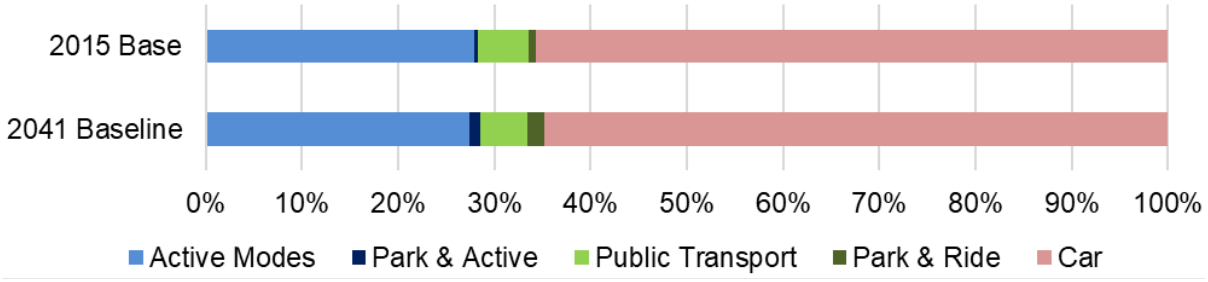
Table 33 Person trips in the 2015 Base Year and the 2041 Baseline for the purposes of modelling the Preferred Option

Base Year / Base Case	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2015 Base: Series F	438,052	5,433	82,908	12,205	1,029,274	1,567,871
2041 Baseline: Series F	508,083	19,929	90,031	31,889	1,199,292	1,849,223

Table 34 Mode share of total trips in the 2015 Base Year and in the 2041 Baseline for the purposes of modelling the Preferred Option

Base Year / Base Case	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2015 Base: Series F	27.9%	0.3%	5.3%	0.8%	34.4%	65.6%
2041 Baseline: Series F	27.5%	1.1%	4.9%	1.7%	35.1%	64.9%

Figure 27 Mode share of total trips in the 2015 Base Year and in the 2041 Baseline for the purposes of modelling the Preferred Option



9.3.5 It can be seen that the combined Active Mode / Public Transport share increases with the addition of the development to 2041 which shows that the transport schemes included in the 2041 Baseline have an impact on the level of non-car trips.

Trips and mode shares in the 2041 Baseline in CSRM2 sectors with housing growth in the Preferred Option

9.3.6 Table 35 shows existing trips and modes shares of those trips on the local transport network in the sectors that contain development locations in the Preferred Option, and for comparative purposes, the Greater Cambridge area, East Cambridgeshire, and Huntingdonshire.

Table 35 Existing trips on the local transport network and mode shares of those trips in the CSRM2 sectors that have residential development locations in the Preferred Option in the 2041 Baseline

Location	Active Modes	Park & Active	Public Transport	Park & Ride	Car
North West Cambridge (sector -199): Trips	6,669	271	728	16	4,726
North West Cambridge (sector -199): Mode shares	53.7%	2.2%	5.9%	0.1%	38.1%
North East Cambridge (sector -202): Trips	6,611	261	2,325	1,658	7,483
North East Cambridge (sector -202): Mode shares	36.0%	1.4%	12.7%	9.0%	40.8%
Edge of Cambridge: Non-Green Belt (sector -201): Trips	4,943	197	642	73	7,185
Edge of Cambridge: Non-Green Belt (sector -201): Mode shares	37.9%	1.5%	4.9%	0.6%	55.1%

Location	Active Modes	Park & Active	Public Transport	Park & Ride	Car
New Settlement around Cambourne (sector - 263): Trips	15,262	530	2,344	734	33,905
New Settlement around Cambourne (sector - 263): Mode shares	28.9%	1.0%	4.4%	1.4%	64.2%
Northstowe (sector - 251): Trips	8,575	481	1,469	371	14,576
Northstowe (sector - 251): Mode shares	33.7%	1.9%	5.8%	1.5%	57.2%
Waterbeach (sector - 241): Trips	9,770	1,760	2,247	676	23,224
Waterbeach (sector - 241): Mode shares	25.9%	4.7%	6.0%	1.8%	61.6%
South Cambs. Villages (various sectors)*: Trips	41,958	2,413	6,904	3,192	126,116
South Cambs. Villages (various sectors)*: Mode shares	23.2%	1.3%	3.8%	1.8%	69.8%
Greater Cambridge: Trips	508,083	19,929	90,031	31,889	1,199,292
Greater Cambridge: Mode shares	27.5%	1.1%	4.9%	1.7%	64.9%
East Cambridgeshire: Trips	58,420	1,260	7,643	3,219	187,138
East Cambridgeshire: Mode shares	22.7%	0.5%	3.0%	1.2%	72.6%
Huntingdonshire: Trips	111,141	2,440	14,225	3,828	389,177
Huntingdonshire: Mode shares	21.3%	0.5%	2.7%	0.7%	74.7%

Note: * The growth at villages in South Cambridgeshire is located in a number of model sectors. As the levels of growth in any individual sector are small, the growth is aggregated across sectors in this table and in other tables that refer to sectors containing growth in the villages at a sector level.

Highway Model Outputs

9.3.7 The following metrics, obtained from the CSRM2 Highway Model are used to assess the impact of the Preferred Option in the following chapters, and to analyse currently planned growth to 2041 in the following paragraphs. The reported statistics in this section and in the following chapters use the standard Passenger Car Unit (PCU) of measurement. 1 PCU = 1 Car. The metrics are:

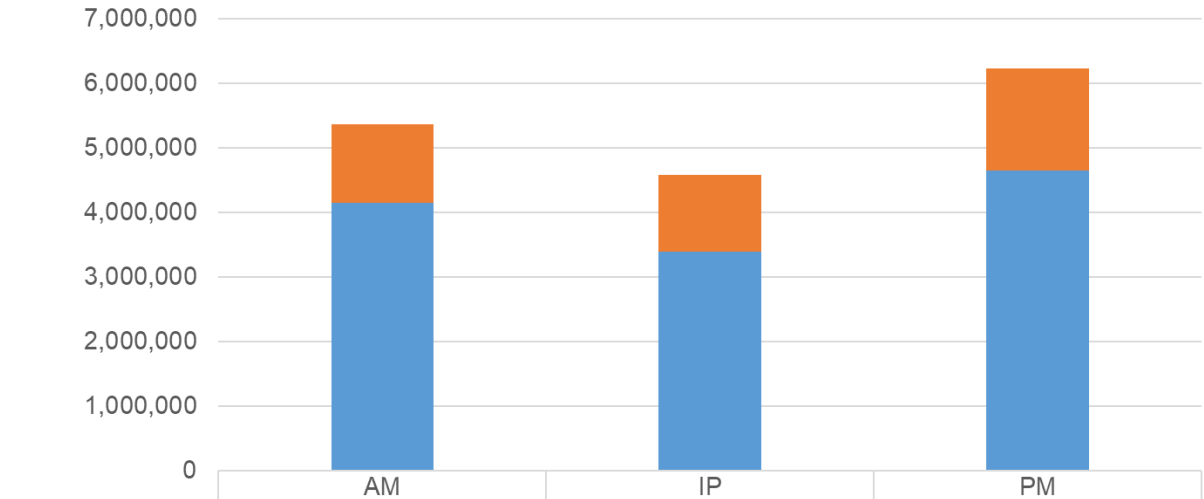
- **Travel distance** – the total distance (in PCU kilometres) travelled by all trips assigned to the network.
- **Travel time** – the total time (in PCU hours) taken for all trips assigned to the network.
- **Delay** – the total delay (which is total time minus free-flow[2] time) (in PCU hours) experienced by all trips assigned to the network.

9.3.8 These metrics allow the scale of impact on the road network to be assessed as they record the changes to how far is being driven in total, the time spent driving and the changes in delay. These metrics together help to indicate the impact of the Preferred Option on the Highway Network.

9.3.9 The transport measures included in the 2041 Baseline are as in the core Strategic Spatial Option tests with the exception of the GCP Eastern Access scheme where the coding has been updated to reflect the latest scheme design and specifically includes just Phase A of the scheme in the 2041 Baseline.

Travel distance

Figure 28 Additional Travel Distance by vehicular traffic (PCU-km) on the Transport Network in the 2041 Baseline over and above the 2015 Base Year



	AM	IP	PM
2041 Baseline	1,217,138	1,181,832	1,580,976
2015 Base Year	4,148,236	3,394,588	4,648,969

Source: GCSP_LP_SATSTAT_Baseline_PO_summary_charts_v1.1

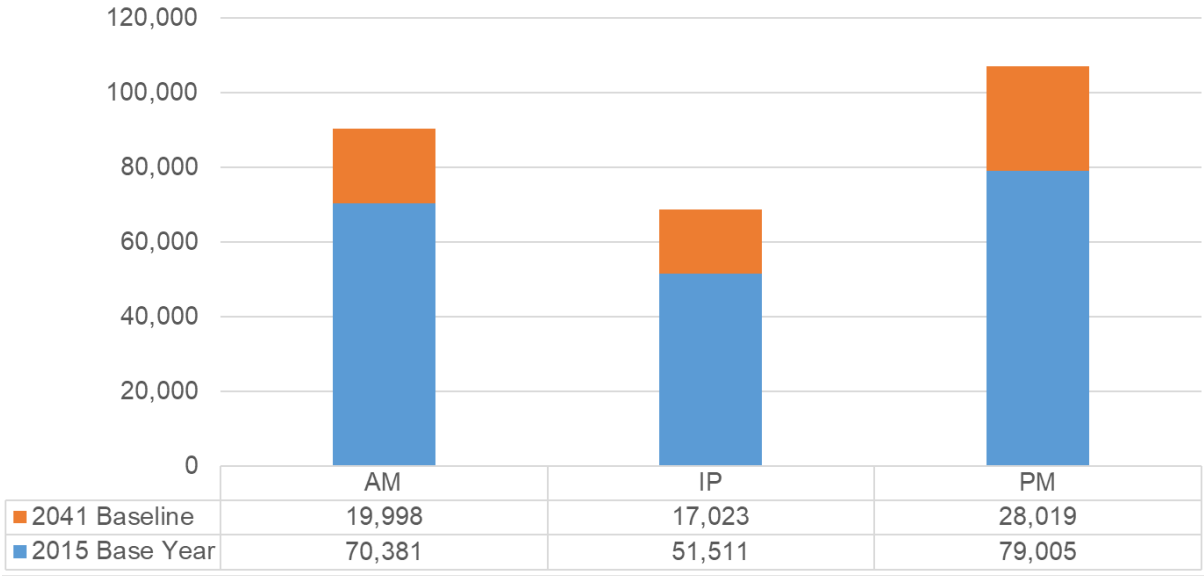
[2] Free Flow Speed is the time it would take to drive at the posted speed limit if there were no obstructions or congestion.

9.3.10 The addition of the development included in the 2041 Baseline results in a 28% increase in distance travelled in the AM peak, a 33% increase in the inter-peak and a 35% increase in the PM peak, as shown in Figure 28. This indicates that the imbalance in the number of dwelling vs jobs seen above which resulted in an increase in in-commuting leads to an increase in the distance travelled by workers accessing the jobs predicted to be provided by 2041.

Travel time

9.3.11 The addition of the growth to 2041 results in a 29%, 35% and 34% increase in the travel time for the AM, inter-peak (IP) and PM peaks respectively, as shown in Figure 29, which again shows that the increase in in-commuting associated with the 2041 Baseline results in longer trips that take more time.

Figure 29 Additional Travel Time by vehicular traffic (PCU-hrs) on the Transport Network in the 2041 Baseline over and above the 2015 Base Year



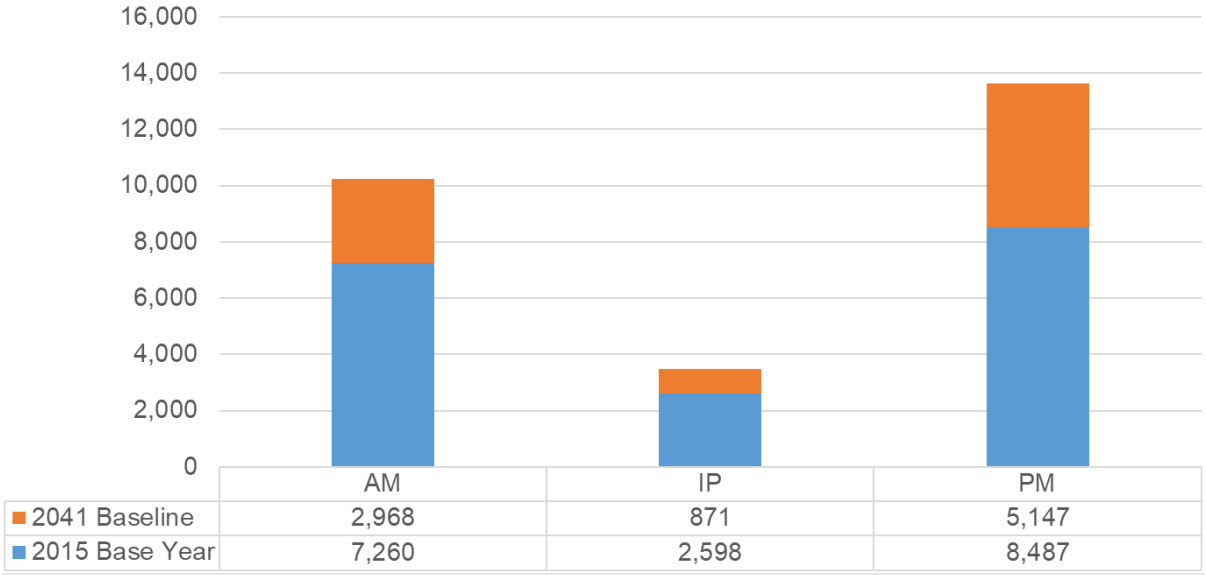
	AM	IP	PM
2041 Baseline	19,998	17,023	28,019
2015 Base Year	70,381	51,511	79,005

Source: GCSP_LP_SATSTAT_Baseline_PO_summary_charts_v1.1

Delay

9.3.12 The addition of growth to 2041 results in the following increases in Delay for the AM, inter-peak (IP) and PM peaks respectively of 41%, 34% and 61%, as shown in Figure 30. This indicates that the highway network is already congested, and the increased level of in-commuting significantly adds to the level of delay experienced.

Figure 30 Additional Delay for vehicular traffic (PCU-hrs) on the Transport Network in the 2041 Baseline over and above the 2015 Base Year



	AM	IP	PM
2041 Baseline	2,968	871	5,147
2015 Base Year	7,260	2,598	8,487

Source: GCSP_LP_SATSTAT_Baseline_PO_summary_charts_v1.1

Note on traffic levels in AM peak, PM peak and Inter-Peak periods

9.3.13 In the 2015 Baseline, 2041 Base Year, and in the Preferred Option model runs, there is more traffic in the evening peak period than in the morning peak period. This means that the road network is operating closer to its overall capacity in the PM peak than it is in the AM peak.

9.3.14 In the 2015 Base Year, this reflects traffic conditions observed on the transport network across the Greater Cambridge area. In the PM peak the same number of vehicles make the same trips as in the AM peak but do so within a shorter period of the day, such that they generate higher levels of congestion. In future years, the model assumes that travel demand by time of day will follow the same pattern where capacity on the transport network allows.

9.3.15 As a result, increases in traffic in the pm peak are more likely to lead to disproportionately greater increases in travel time and delay than would be seen for the same increase in traffic in the AM Peak and Inter-Peak periods. For the period between the 2015 Base Year and the 2041 Baseline, this can be seen in Figure 29 and Figure 30, and in the summary data shown in 0.

Table 36 Increase in dwellings, and of vehicular traffic's travel distance, travel time and delay between the 2015 Base Year and the 2041 Baseline

Metric	AM peak	Inter peak	PM peak
Increase in dwellings in Greater Cambridge in the Preferred Option to 2041	38.3%	38.3%	38.3%
Increase in travel distance	29.3%	34.8%	34.0%
Increase in travel time	28.4%	33.0%	35.5%
Increase in delay	40.8%	33.5%	60.6%

Source: Data from Figure 25, Figure 28, Figure 29 and Figure 30

9.4 Preferred Option assumptions

Location and quantum of dwellings and jobs in the Preferred Option

9.4.1 Table 37 shows the dwelling and job numbers included in the Preferred Option which are over and above those in the 2041 Baseline. Note that these are figures identified specifically for transport modelling purposes, and do not necessarily imply that the Councils intend to allocate these sites for the numbers specified in the table.

9.4.2 The dwelling numbers in Table 37 differ slightly from those used in the transport modelling that informed the development of the Preferred Option, and which is analysed in the following chapters. The variances generally occur due to the zoning in the model, where there may be small levels of background growth in addition to the Preferred Option growth. For a strategic model such as CSRM2, attempting to disaggregate the trips associated with the background growth would make no substantive difference to the model results.

Table 37 Preferred Option Housing and Job Numbers

Development location	2041 dwelling numbers	Full build out dwelling numbers	2041 job numbers	Full build out job numbers
Densification of Cambridge: North East Cambridge	3,900	8,350	1,260	15,000
Densification of Cambridge: North West Cambridge	1,000	1,500	-	-
Densification of Cambridge: Other Smaller urban sites	200	200	-	-
Edge of Cambridge – non-Green Belt: Cambridge Airport	2,850	7,000	75	8.325
Edge of Cambridge – Green Belt: Cambridge Biomedical Campus	-	-	-	8,000
Faster delivery at existing New Settlements: Northstowe	750	750	-	-
Faster delivery at existing New Settlements: Waterbeach	750	750	-	-
New settlements on Public Transport Corridors: Extension to Cambourne	1,950	10,000	300	10,000
Southern Cluster: Babraham Research Campus	-	-	270	560

Development location	2041 dwelling numbers	Full build out dwelling numbers	2041 job numbers	Full build out job numbers
Dispersal to Villages in Southern Cluster and Rest of Rural Area: Rural Centres, Minor Rural Centres and Group Villages with very good Public Transport (a proxy)	2,100	2,100	-	-
Rural Employment Locations: B2 / B8 on A14 corridor (in vicinity of Swavesey junction)	-	-	300	750
Total additional dwellings	**13,500**	**30,650**	**2,155**	**42,635**

9.4.3 Beyond the general points at 9.4.1 regarding the Preferred Option housing and job numbers, the following points are relevant to specific locations set out in the table above:

Cambridge Biomedical Campus

- The Preferred Option identifies the Cambridge Biomedical Campus as an Area of Major Change, including:
- the main campus and the area previously allocated for its extension through the South Cambridgeshire Local Plan 2018, and
- an additional area adjoining Babraham Road as a potential area to be released from the Green Belt specifically to meet the long-term needs of the Campus.
- If taken forward in later stages of plan-making, the preferred approach will be developed into a criteria-based policy, and the areas proposed for development will be identified on the draft Policies Map, following further work undertaken on site capacity and design issues. Given the uncertainty associated with the likely scale of development and phasing of delivery for this site, 8,000 jobs has been identified at full build out as a proxy for the purposes of testing at this stage, but no jobs figure has been identified to 2041.

Accelerated delivery at Northstowe and Waterbeach

- Development at the new settlements of Northstowe and Waterbeach is included in the South Cambridgeshire Local Plan 2018, with 10,000 dwellings expected at Northstowe once fully built out, and 11,000 dwellings at Waterbeach.

- In the Preferred Option, no additional development is assumed at these sites, but it is assumed that at both Northstowe and Waterbeach, 750 additional dwellings are built between 2020 and 2041, over and above the existing baseline trajectory, drawing on the evidence supporting higher housing delivery rates in the Councils' Housing Delivery Study, September 2021. The existing baseline for committed development (set out in the Greater Cambridge Housing Trajectory and Five Year Land Supply, April 2021) assumes:
- for Northstowe that 5,595 dwellings are built 2020-41 on top of the 677 dwellings built by March 2020 (for a total of 6,272 by 2041).
- for Waterbeach that 4,580 dwellings are built 2020-41, with no dwellings having been completed prior to March 2020.
- Table 38 sets out the change in dwelling numbers at Northstowe and Waterbeach assumed in the Preferred Option, and the additional dwellings beyond 2041.

Table 38 Dwelling numbers at Waterbeach an Northstowe by 2041 as a result of the accelerated delivery of dwellings assumed in the Preferred Option

Development location	Existing planned dwellings to 2041 (housing trajectory March 2021)	Accelerated delivery to 2041	Total dwellings by 2041 (including accelerated delivery)	Further planned dwellings post 2041
Northstowe	6,272	750	**7,022**	2,978
Waterbeach	4,580	750	**5,330**	5,670

- All of the modelling of the Preferred Option includes the additional 750 dwellings at Northstowe and Waterbeach.
- The model runs assessing the full build out of the Preferred Option do not include any further development at Northstowe and Waterbeach beyond the accelerated development to 2041.
- This approach has been taken because we are not testing the transport impacts of Northstowe and Waterbeach when fully built out as the Preferred Option does not propose a change to the full build out numbers, and the mitigation for these sites is already agreed. As such, maintaining a consistent additional 750 dwellings assumption for both the Preferred Option to 2041 and Preferred Option Full Build Out at these sites ensures that the impacts of differing levels of development at the new strategic scale sites included in the Preferred Option run may be understood more clearly.

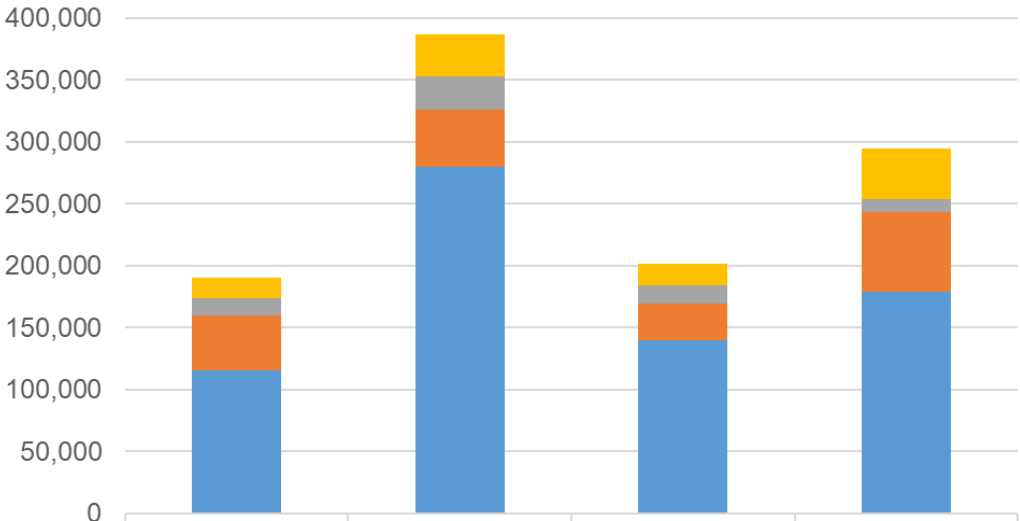
Extension to Cambourne

- The extension to Cambourne is included as a broad location for strategic growth with 10,000 dwellings included as a proxy for a full build out for the purposes of testing at this stage.
- For the Preferred Option modelling, the extension to Cambourne is assumed to be located to the north of the A428. This does not infer a preferred location for development around Cambourne by the Councils, but rather, in combination with the findings of the Strategic Spatial Options where development was tested to the south of the A428, this approach enables comparison of the performance of both broad locations.

Growth Assumptions

9.4.4 The 2041 Baseline set out in Section 9.3 above provides the starting point for the analysis of the Preferred Option. Figure 31 shows Preferred Option 2041 and Preferred Option Full Build Out Dwellings, Population, Workers and Jobs added to the 2041 Baseline.

Figure 31 Dwellings, Population, Workers and Jobs in the 2015 Base Year, in the 2041 Baseline, in the Preferred Option to 2041, and the Preferred Option fully built out



	Dwellings	Population	Workers	Jobs
2041 Full Build Out	17,150	34,022	18,131	40,796
2041 Preferred Option	13,500	26,837	14,203	10,685
2041 Baseline	44,359	46,226	29,299	63,971
2015 Base	115,607	279,593	140,293	179,353

Source: Land Use and Settlement Metrics Summary_v0.1

9.4.5 The growth expected within the lifetime of the emerging Local Plan (based on evidence based build out rates for development) results in an additional 13,500 dwellings on top of the 2041 Baseline for a total of 173,466 dwellings at the end of the Local Plan period. The full build out of the locations included in the Preferred Option tests adds a further 17,150 dwellings to this total.

9.5 Preferred Option Tests

Model Runs to assess the Preferred Option

9.5.1 The following model runs have been undertaken for this stage of the work. The numbering relates to order in which they were run:

- **Model Run 1: Preferred Option to 2041**
  - Development:
    - Preferred Option to 2041
  - Baseline transport schemes (including Cambridge Eastern Access Phase A)
  - Mitigation measures:
    - None
- **Model Run 4: Mitigation run (to 2041) (Preferred Option with mitigation)**
  - Development:
    - Preferred Option to 2041
    - Further employment growth at the Cambridge Biomedical Campus
  - Baseline transport schemes (including Cambridge Eastern Access Phase A)
  - Mitigation measures:
    - As Model Run 3
- **Model Run 2: Preferred Option (Full Build Out) (Preferred Option, fully built out)**
  - Development:
    - Preferred Option to 2041
    - Full build-out of the strategic sites
    - Further employment growth at the Cambridge Biomedical Campus
  - Baseline transport schemes (including Cambridge Eastern Access Phase A)
  - Mitigation measures:
    - None
- **Model Run 3: Mitigation run (Full Build Out) (Preferred Option, fully built out plus Mitigation)**
  - Development:
    - Preferred Option to 2041
    - Full build out of the strategic sites
    - Further employment growth at the Cambridge Biomedical Campus
  - Baseline transport schemes (including Cambridge Eastern Access Phase A)

- Mitigation measures:
  - Cambridge Eastern Access Phase B, including:
    - The relocation of the Newmarket Road Park & Ride site
    - High Quality Public Transport (HQPT) connection to Cambridge City Centre via the Cambridge East site
    - HQPT connection to Cambridge Railway Station via the Cambridge East site
    - HQPT connection to Addenbrooke's via the Cambridge East site
    - HQPT connection to Addenbrooke's via Cherry Hinton
  - A modal filter at the bridge over the railway on Coldhams Lane
  - A shuttle bus service between Cambridge North Station and Cambridge Regional College via North East Cambridge
  - Improved active mode connections around North East Cambridge
  - East-West Rail Central Section between Bedford and Cambridge via Cambourne.

9.5.2 Table 39 summarises the land use and strategic transport schemes that are included in each of the model runs noted above.

Table 39 Land Use and Transport Inputs to Preferred Option model runs

Model Inputs	**Model Run 1: Preferred Option to 2041**	**Model Run 2: Preferred Option (Full Build Out)**	**Model Run 3: Mitigation run (Full Build Out)**	**Model Run 4: Mitigation run (to 2041)**
Land Use input: Preferred Option to 2041	✓	✓	✓	✓
Land Use input: Full build-out of Strategic Sites in Preferred Option	-	✓	✓	-
Land Use input: Further employment growth at the Cambridge Biomedical Campus	-	✓	✓	-
Transport input: Baseline Transport Schemes	✓	✓	✓	✓
Transport input: Cambridge Eastern Access Phase A	✓	✓	✓	✓
Transport input: Cambridge Eastern Access Phase B	-	-	✓	✓

Model Inputs	Model Run 1: Preferred Option to 2041	Model Run 2: Preferred Option (Full Build Out)	Model Run 3: Mitigation run (Full Build Out)	Model Run 4: Mitigation run (to 2041)
Transport input: East West Rail Central Section	-	-	✓	✓
Transport input: Mitigation package	-	-	✓	✓

9.5.3 The emerging policy for the Preferred Option has been used to determine the content and sequence of the model runs. The following bullets set out the rationale for each of the Preferred Option model runs noted above:

- **Model Run 1: Preferred Option to 2041**

  This model run allows for a comparison of the Preferred Option with the 2015 Base Year and the 2041 Baseline to be made, without mitigation, on the same basis as the Strategic Spatial Options were considered in Part One of this report.

- **Model Run 2: Preferred Option (Full Build Out) (Preferred Option, fully built out)**

  As the Strategic Sites included in the Preferred Option will continue to build-out beyond 2041, it is important to understand that the impacts of the fully built out sites.

- **Model Run 3: Mitigation run (Full Build Out) (Preferred Option, fully built out plus Mitigation)**

  As with Model Run 2, it is important to understand that the full development of the sites included in the emerging Local Plan is capable of being mitigated, not just the build-out in the Plan Period.

- **Model Run 4: Mitigation run (to 2041) (Preferred Option with mitigation)**

  While it is important to understand that the full development of the sites included in the emerging Local Plan is capable of being mitigated, it is also important to confirm the level of mitigation for build out in the Plan Period.

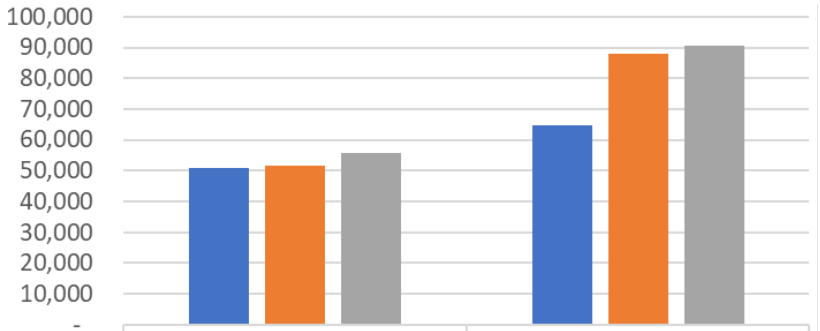
10 Analysis of Model Run 1: Preferred Option to 2041

10.1 In- and out-commuting

10.1.1 The levels of in- and out-commuting for the Preferred Option have not been fixed as they were in the tests of Strategic Spatial Options 1 to 8. Instead, the levels of in- and out-commuting were derived from the East of England Forecasting Model (EEFM) which was developed by Oxford Economics to project economic, demographic and housing trends in a consistent fashion and has been used to support plan-making by many Local Planning Authorities.

10.1.2 Figure 32 sets out the levels of in- and out-commuting in the Preferred Option tests in the CSRM2 model area. Table 40 takes this data and sets it against the numbers of workers and jobs in the CSRM2 model area.

Figure 32 In and out-commuting in the 2015 Base Year, 2041 Baseline and Preferred Option to 2041



	Out-commuters	In-commuters
2015 Base Year	50,817	64,566
2041 Baseline	51,708	88,022
2041 Preferred Option	55,567	90,516

Note: The data in this figure is for the in and out commuting to and from the area covered by CSRM2 – that is the districts of Cambridge, South Cambridgeshire, East Cambridgeshire, and Huntingdonshire

Source: Land Use and Settlement Metrics Summary_v0.1

Table 40 Workers, Jobs, In and out-commuting in the CSRM2 (all districts) in 2015 Base Year, 2041 Baseline, and in the Preferred Option in 2041

Scenario	Workers living in model area	Jobs in model area	Out Commuting from model	Out Commuting as percentage of Workers	In Commuting to model area	In Commuting as percentage of Jobs	Net level of in Commuting
2015 Base Year	282,319	296,068	50,817	18.0%	64,566	21.8%	13,749
2041 Baseline	344,001	377,104	51,708	15.0%	88,022	23.3%	36,314
2041 Preferred Option	358,204	387,788	58,567	16.4%	90,516	23.3%	31,948

Note: The data in this table is for the in and out commuting to and from the area covered by CSRM2 – that is the districts of Cambridge, South Cambridgeshire, East Cambridgeshire, and Huntingdonshire

Source: Data from Figure 31 and Figure 32

10.1.3 Figure 32 and Table 40 show:

- In comparison to the 2015 Base Year, the 2041 Baseline sees:
- the level of in-commuting rising significantly in the four districts covered by the CSRM2, with the proportion of jobs taken by people living outside the model area increasing from 21.8% to 23.3%.
- the proportion of workers out-commuting dropping from 18% to 15%, which still results in a slight increase in levels of out-commuting as a result of the growth in population.
- the net level of in-commuting increasing by a factor of 2.6.
- In comparison to the 2041 Baseline, the Preferred Option results in:
- an increase in the proportion of people out-commuting, while the proportion of people in commuting remains constant.
- a reduction of around 4,300 in the net level of in-commuting, but the net level of in commuting is still around 2.3 times the level seen in the 2015 Base Year.

10.1.4 This implies that the measures taken in the Preferred Option to provide additional homes in relation to jobs within the Greater Cambridge area have a slight positive impact on the level of in-commuting, as assessed using EEFM.

Impact of assumptions on in and out-commuting

10.1.5 The level of in-commuting across the model boundary is a modelling input rather than an output. The tests undertaken on the eight Strategic Spatial Options, as set out in Part 1 of this report, assumed that the additional workers needed to fill the additional jobs over the standard method would come from within the Greater Cambridge area, on the basis that all homes identified as necessary to support the additional jobs would be provided within Greater Cambridge. Conversely, the level of in-commuting in the Preferred Option test is based on EEFM data, which in turn is derived from observed data.

10.1.6 If the same assumption as used for the Strategic Spatial Option tests were to be applied to the Preferred Option, then the level of in-commuting trips would reduce by approximately 5,000. This would mean that the distances travelled would reduce and therefore – based on the evidence relating to the performance of the Strategic Spatial Options tested in Part 1 of this report and the sensitivity tests that looked at the impact of in-commuting on trip making patterns – more of these shorter distance trips would be made by Active Modes and Public Transport and fewer by private car.

10.2 Core Analysis: Trip Volumes and Mode Share

10.2.1 Table 41 and Table 42 show the change in person trips and change in mode shares due to the growth contained in the Preferred Option. Table 43 and Table 44 show the new person trips and the mode share of those trips generated by the Preferred Option. Figure 33 shows the changes in mode share that result.

Table 41 Trips in the Preferred Option to 2041, vs. 2041 Baseline

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. Preferred Option to 2041	539,575	20,687	95,005	32,239	1,234,619	1,922,125

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 42 Mode share of trips in the Preferred Option to 2041, vs. 2041 Baseline

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. Preferred Option to 2041	28.1%	1.1%	4.9%	1.7%	**35.8%**	64.2%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 43 New trips in the Preferred Option to 2041, vs. 2041 Baseline

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. New Trips: Preferred Option to 2041	31,492	758	4,974	350	35,327	72,901

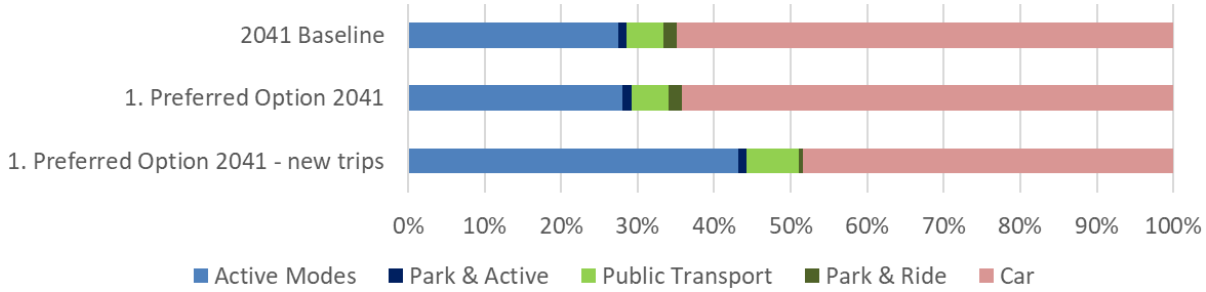
Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 44 Mode share of new trips in the Preferred Option to 2041, vs. 2041 Baseline

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. New Trips: Preferred Option to 2041	43.2%	1.0%	6.8%	0.5%	**51.5%**	48.5%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Figure 33 Mode share of trips / new trips in the Preferred Option in 2041 vs. 2041 Baseline



Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

10.2.2 As can be seen from Table 42 and Figure 33, the combined Active Mode / Public Transport mode share across Greater Cambridge increases by 0.7% in 2041 to 35.8% with the addition of the development in the Preferred Option. This shows that the Preferred Option would deliver more sustainable transport patterns than seen in the 2041 Baseline, without any mitigation measures provided.

10.2.3 However, the positive performance of the Preferred Option is somewhat masked by the large number of existing trips in the 2041 Baseline. When the new trips associated with the Preferred Option are considered in isolation, over half of these trips (51.5%) are catered for by non-car modes.

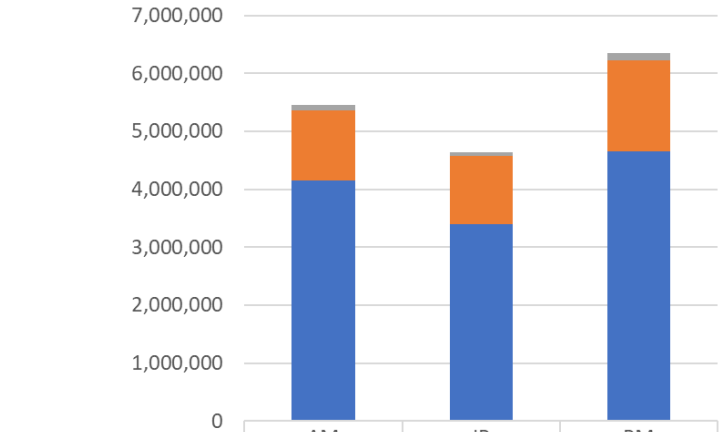
10.2.4 This performance is again in the context of no specific mitigation measures having been included in Model Run 1. This indicates that the sites in the preferred option are inherently more sustainable in transport terms than the overall performance of the existing and planned developments in Greater Cambridge that were included in the 2041 Base Year, as clearly shown in Table 44 and Figure 33.

10.3 Core Analysis: Highway Impact

Travel Distance

10.3.1 Figure 34 shows the change in travel distance on the highway network due to the travel demand for car trips generated by the Preferred Option without mitigation. Figure 35 shows the increase in travel distance due to the Preferred Option relative to the 2041 Baseline. The total distance travelled is derived by multiplying the number of vehicles on the road network in the model area by the average length of their trips (measured in kilometres). This metric enables the increase in vehicle trips generated to be quantified and assessed.

Figure 34 Increase in travel distance (PCU-km) over and above the 2015 Baseline in the 2041 Base Year, and due to the Preferred Option to 2041



	AM	IP	PM
2041 Preferred Option	88,666	63,706	119,134
2041 Baseline	1,217,138	1,181,832	1,580,976
2015 Base	4,148,236	3,394,588	4,648,969

Figure 35 Change in travel distance (PCU-km) vs. 2041 Baseline

	1: 2041 Preferred Option
AM	88,666
IP	63,706
PM	119,134

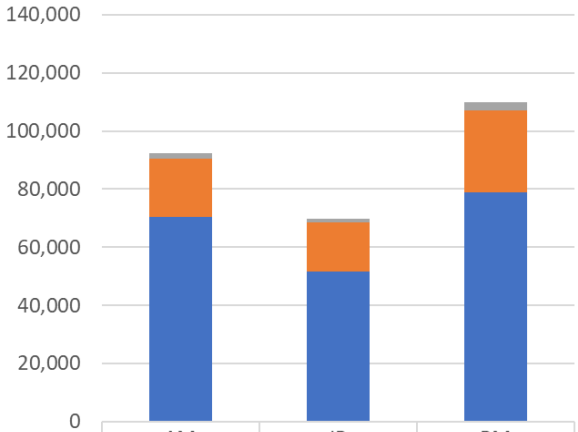
10.3.2 As a proportion of the distance already travelled by car on the Greater Cambridge transport network, the increases due to the Preferred Option without mitigation are small. In the AM peak, the distance travelled increases by 1.7% compared to the 2041 Baseline, and in the evening peak there is a 1.9% increase. Despite the increased level of development contained in the Preferred Option, the increase in travel distance is small. This is due to higher levels of internalisation and local trip making patterns experienced at the strategic sites such as Cambridge East, North East Cambridge and Cambourne extension, which help to limit the increase in distances travelled, and allows more trips to be made by non-car modes.

Travel Time

10.3.3 Figure 36 shows the change in travel time on the highway network due to the travel demand for car trips generated by the Preferred Option without mitigation. Figure 37 shows the increase in travel time due to the Preferred Option relative to the 2041 Baseline.

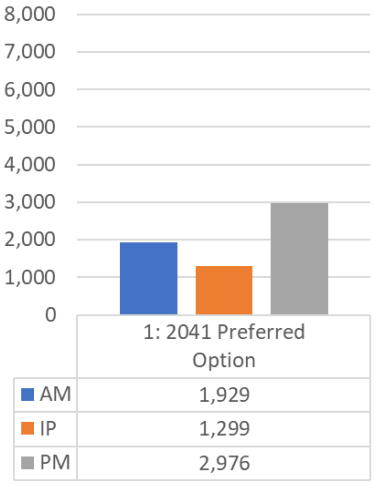
10.3.4 Figure 36 and Table 45 show that travel time increases at a higher rate than travel distance in all time periods. This indicates that the traffic speeds on the highway network are decreasing due to the additional traffic generated by the travel demand of the Preferred Option.

Figure 36 Increase in travel time (PCU-hrs) over and above the 2015 Baseline in the 2041 Base Year, and due to the Preferred Option to 2041



	AM	IP	PM
2041 Preferred Option	1,929	1,299	2,976
2041 Baseline	19,998	17,023	28,019
2015 Base	70,381	51,511	79,005

Figure 37 Change in travel time (PCU-hrs) vs. 2041 Baseline



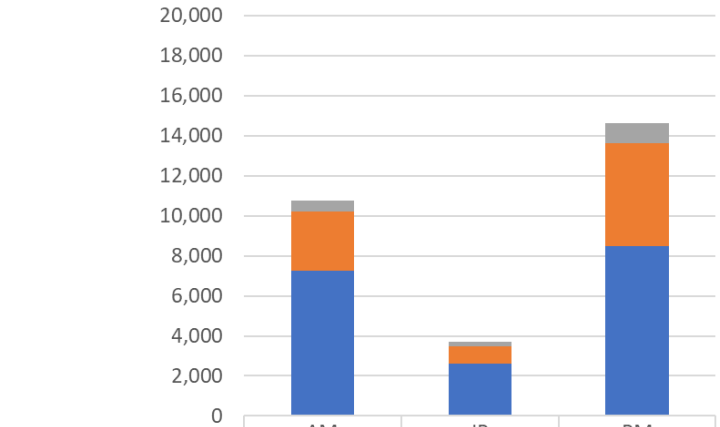
Delay

10.3.5 Figure 38 shows the change in delay on the highway network due to the travel demand for car trips generated by the Preferred Option without mitigation. Figure 39 shows the increase in delay due to the Preferred Option relative to the 2041 Baseline.

10.3.6 From this information we can see that the level of delay as a result of the introduction of the Preferred Option increases significantly, noting that this impact is prior to any site-specific mitigation, or other transport policies being introduced aimed at encouraging further modal shift away from private car, and the introduction of planning policies aimed at creating more self-contained communities.

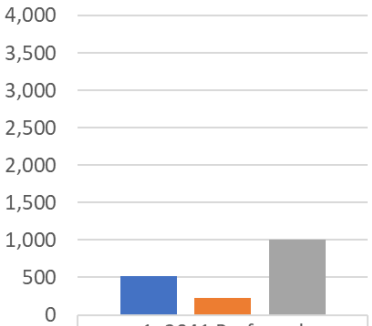
10.3.7 Figure 38 and Table 45 show that without mitigation, the Preferred Option would lead to an increase in delay that is disproportionate to the additional travel distance. In the morning peak, a 1.7% increase in travel distance would lead to a 5.1% increase in delay on the road network. The largest increase in delay is seen in the PM peak, where a 1.9% increase in travel distance would lead to a 7.4% increase in delay. This is characteristic of circumstances where even small amounts of additional vehicular traffic are added to a network that is operating at or near its capacity, as is the case in large parts of the Greater Cambridge area.

Figure 38 Increase in delay (PCU-hrs) over and above the 2015 Baseline in the 2041 Base Year, and due to the Preferred Option to 2041



	AM	IP	PM
2041 Preferred Option	521	223	1,006
2041 Baseline	2,968	871	5,147
2015 Base	7,260	2,598	8,487

Figure 39 Change in delay (PCU-hrs) vs. 2041 Baseline



	1: 2041 Preferred Option
AM	521
IP	223
PM	1,006

Consideration of overall highway impacts across Greater Cambridge

10.3.8 Table 45 shows the increases in travel distance, travel time and delay in percentage terms from the 2041 Baseline as a result of the Preferred Option without mitigation.

Table 45 Increase in dwellings, and of travel distance, travel time and delay on the highway network due to the Preferred Option to 2041

Metric	AM peak	Inter-peak	PM peak
Increase in dwellings from the 2041 Base Year in Greater Cambridge in the Preferred Option to 2041	8.4%	8.4%	8.4%
Increase in travel distance	1.7%	1.4%	1.9%
Increase in travel time	2.1%	1.9%	2.8%
Increase in delay	5.1%	6.4%	7.4%

10.3.9 As discussed above, this highlights that travel distance, travel time and delay all increase with the addition of the Preferred Option. This is particularly the case for delay. For all three metrics, the increase is higher in the PM peak than in the AM peak and Inter-Peak periods, the context for which is discussed in Paragraphs 9.1.3 and 9.1.4 above.

10.3.10 However, for all three metrics, the increases seen are proportionally less than the increases in dwellings included in the Preferred Option, and in terms of travel distance and travel time, they are considerably lower. This indicates that the following factors are in play to a greater or lesser extent across the locations in the Preferred Option and are contributing to the locations generating low levels of additional motor vehicular traffic:

- The new development is achieving lower mode shares of car use than seen from existing land use included in the 2041 Baseline, as discussed in Section 10.2.
- The new developments in the Preferred Option are in locations that minimise the need for travel by car for many trips, due to their relative proximity to other settlements.
- The scale of the development in the Preferred Option is such that internalisation of trips occurs, and even if undertaken by car these trips will be shorter than external trips to access jobs and services.

11 Analysis of Model Run 4: Preferred Option to 2041 with Mitigation

11.1 Mitigation measures

11.1.1 This model run analyses the Preferred Option and a package of mitigation measures against the 2041 Baseline. The mitigation measures for the Preferred Option are in addition to the baseline schemes set out in paragraph 2.2.12 in Part 1 of this report.

11.1.2 Mitigation measures were identified by Cambridgeshire County Council's Transport Strategy and Funding team in discussion with Greater Cambridge Shared Planning, drawing on adopted transport policies, awareness of emerging transport infrastructure schemes, and engagement with relevant partners such as the Greater Cambridge Partnership.

11.1.3 It is important to note that the mitigation tested at this time does not include a 'trip budget' policy approach, which is identified as required for North East Cambridge (see Paragraph 14.3.5), Cambridge East (see Paragraph 14.4.8), and the Cambridge Biomedical Campus (see Paragraph 14.8.10). Trip budgets will also be considered for other large sites as the draft Local Plan is prepared, including the expansion of Cambourne. The mode share of car use for the larger sites within the Preferred Option are therefore likely to be over-estimated at this point in the assessment process.

11.1.4 In addition, orbital Public Transport services between Cambridge East and North East Cambridge, and between Cambridge East and the Cambridge Biomedical Campus were considered for inclusion in Model Runs 3 and 4 but were not ultimately included at this stage of the assessment. As the Local Plan is developed further the merits of additional mitigation will be considered.

Measures included in the mitigation scenario for Model Runs 4 and 3

11.1.5 The mitigation scenario, in addition to the 2041 Baseline schemes set out in paragraph 2.2.12 of Part 1 of this report, includes the following interventions:

- Cambridge Eastern Access Phase B
  - Includes the relocation of the Newmarket Road Park & Ride site
- A modal filter at the bridge over the railway on Coldhams Lane

- A shuttle bus service between Cambridge North Station and Cambridge Regional College via North East Cambridge
- Improved active mode connections around North East Cambridge
- East-West Rail Central Section between Bedford and Cambridge via Cambourne.

11.1.6 Cambridge Eastern Access Phase B includes infrastructure improvements to improve accessibility to the relocated Park & Ride site, as well as additional services from Cambridge East to:

- Cambridge City Centre via the Cambridge East site
- Cambridge Railway Station via the Cambridge East site
- Addenbrooke's via the Cambridge East site
- Addenbrooke's via Cherry Hinton.

11.1.7 Considering these schemes:

- The modal filter on Coldhams Lane allows only pedestrians, cyclists, and buses to pass, preventing through traffic of any other type from using Coldhams Lane. Its location at the bridge over the railway does not necessarily represent the final location of such a filter but is the obvious point to test at this early stage of modelling, as there are no rat runs that can be used to avoid it.
- The shuttle bus at the North East Cambridge site is coded with a high frequency and no fare (that is, free to use) but can only be used to access zones that make up the North East Cambridge site.
- The active mode connection improvements around North East Cambridge are designed to better connect the various zones that make up the site, although they also provide some improved through routes across the site.
- East West Rail Central Section
    - The East West Rail Central Section is coded with a new local station internally in the Cambourne extension zone. For the purposes of this model run and Model Run 4, the station is assumed to be north of the A428. Note that in Sensitivity Tests 2b and 2c on Strategic Spatial Option 2, the station location was assumed in the model to be to the South of Cambourne and the A428.
    - Externally, a new local station is provided at Tempsford, where East West Rail crosses the East Coast Main Line (ECML). Additionally, stations are provided externally to connect to the zones representing the Bedford area and the

Oxfordshire / Northamptonshire area. East of Cambourne, East West Rail is connected to the existing railway network south of Cambridge South station.

- Services in both directions along East West Rail have a 15-minute headway (that is, four trains an hour) at all stations from Cambridge to Bletchley (Bletchley representing more distant locations including Oxford, Northampton, Et Cetera. in the model), except for Cambridge South, where the services have a 30-minute headway. As the East West Rail Company are yet to finalise how their services will interact with Cambridge South, this assumption is made so that only every other EWR service stops at Cambridge South.
- ECML services are also adjusted, with every service that stops at Stevenage and uses the ECML between Sandy and St Neots being stopped at Tempsford to allow for interchanges between EWR and the ECML. Stevenage is used as a proxy for the ECML stopping patterns at Tempsford as it is similarly a junction for Cambridge and some “Fast” services on the ECML call there. It is assumed that as Tempsford would also be a junction for Cambridge, it too would attract more than just the local trains that use this part of the ECML.

11.2 Core Analysis: Trip Volumes and Mode Share

11.2.1 Model Run 4 assumes that the strategic sites included in the preferred option are built out at the rates assumed in the Local Plan First Proposals, which mean they are only partly built out by 2041. The quantum of development assumed at the large strategic sites by 2041 is set out in Figure 57 above.

11.2.2 The conclusions set out in Section 5.2 of this report note that larger settlements often have more sustainable transport characteristics and less reliance on the private car due to the presence of a wider range of employment opportunities and local services. Model Runs 2 and 3 allow for this point to be assessed for the Preferred Option.

11.2.3 Table 46 and Table 47 show the change in trips and change in mode shares due to the growth contained in the Preferred Option to 2041 with mitigation. Table 48 and Table 49 show the new trips and the mode share of those trips generated by the Preferred Option when partially built out and mitigated. Figure 40 shows the changes in mode share that result.

Table 46 Trips in the Preferred Option to 2041 with mitigation, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. Preferred Option to 2041	539,575	20,687	95,005	32,239	1,234,619	1,922,125
4. Preferred Option to 2041 with mitigation	537,908	20,104	96,107	40,742	1,226,936	1,921,796

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 47 Mode share of trips in the Preferred Option to 2041 with mitigation, vs. the 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. Preferred Option to 2041	28.1%	1.1%	4.9%	1.7%	**35.8%**	64.2%
4. Preferred Option to 2041 with mitigation	28.0%	1.1%	5.0%	2.1%	**36.2%**	63.8%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.

Table 48 New trips in the Preferred Option to 2041 with mitigation, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. New trips: Preferred Option to 2041	31,492	758	4,974	350	35,327	72,901
4. New trips: Preferred Option to 2041 with mitigation	29,825	175	6,076	8,853	27,644	72,573

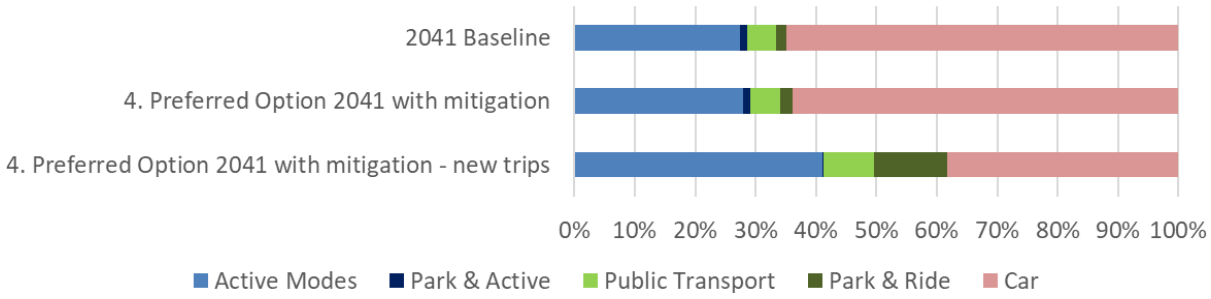
Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 49 Mode share of new trips in the Preferred Option to 2041 with mitigation, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. New trips: Preferred Option to 2041	43.2%	1.0%	6.8%	0.5%	**51.5%**	48.5%
4. New trips: Preferred Option to 2041 with mitigation	41.1%	0.2%	8.4%	12.2%	**61.9%**	38.1%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Figure 40 Mode shares of trips / new trips in the Preferred Option to 2041 with mitigation vs. 2041 Baseline



Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

11.2.4 Table 47, Table 49 and Figure 40 show the combined Active Mode / Public Transport mode share use increases again as a proportion of total trips, compared to both the 2041 Baseline and also the Preferred Option to 2041, when the development included in the Preferred Option to 2041 includes mitigation. This is a positive indication that the proposed mitigation package would increase opportunities

for travel by active modes and Public Transport and therefore significantly reduce the proportion of car trips.

11.2.5 Of the new trips over the 2041 Baseline, the Preferred Option to 2041 with mitigation leads to an increase of 10.3% of trips made by non-car modes compared to the Preferred Option in 2041, with almost 62% of new trips made by non-car modes, compared with 51.5% in the Preferred Option to 2041 without mitigation. Most of the shift away from car is to Public Transport and Park & Ride in the 'with mitigation' scenario. There is also a small shift away from Active Travel to Public Transport and Park & Ride.

11.2.6 The forecast non-car mode share of almost 62% is extremely high compared to the 2041 Baseline figure of 35.1%, and on the whole, can be attributed to the opportunities for Active Travel, the availability and viability of Public Transport, local trip making patterns and high rates of internalisation linked to the availability of local jobs and services found in the larger development sites that are close to existing settlements or urban areas, for example., Cambridge East, Cambourne and North East Cambridge.

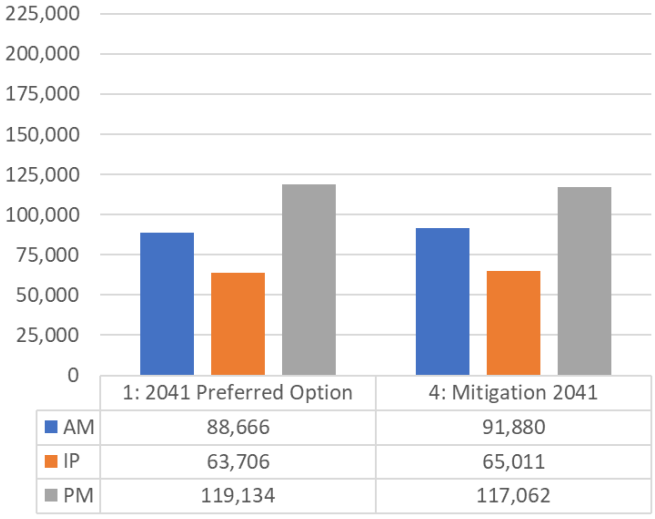
11.2.7 It should be noted that the mitigation scenario in Model Runs 3 and 4 do not include a vehicular trip budget for any of the large sites. As a trip budget policy approach is planned for North East Cambridge and other strategic sites, the role of active modes and Public Transport are likely to be underplayed in Model Runs 4 and 3 that test the 'with mitigation' scenarios. Therefore, the mode share for non-car modes has the potential to be even higher.

11.3 Core Analysis: Highway Impact

Travel Distance

11.3.1 Figure 41 shows the change in travel distance over the 2041 Baseline due to the Preferred Option with and without mitigation.

Figure 41 Change in travel distance (PCU-km) vs. 2041 Preferred Option



	1: 2041 Preferred Option	4: Mitigation 2041
AM	88,666	91,880
IP	63,706	65,011
PM	119,134	117,062

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

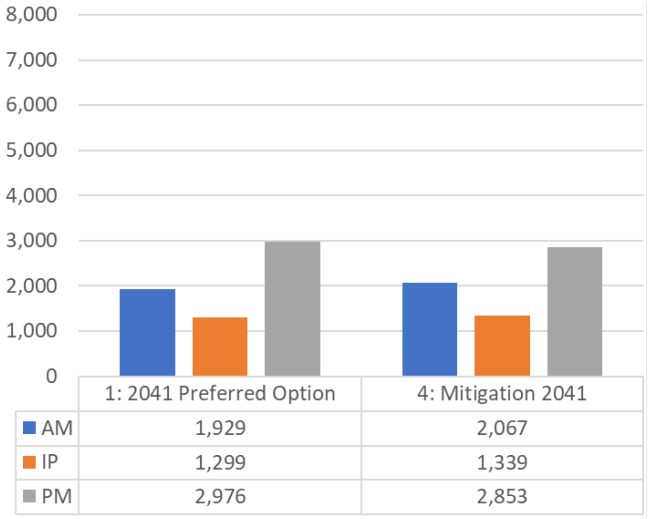
11.3.2 The distances travelled with the proposed mitigation are similar to those indicated by the Preferred Option to 2041, which did not include mitigation.

- In the AM Peak, travel distance is very slightly higher than seen in Model Run 1: Preferred Option to 2041. This is due to the improvements in the transport networks and the fact that less congestion on key links may encourage others to drive who would otherwise have been deterred. This will need to be investigated and local mitigation introduced to prevent this.
- In the Inter Peak, travel distances are slightly higher than in Model Run 1: Preferred Option to 2041. Again, this may be due to improvements to the transport network and lower levels of congestion which may encourage others to drive. This will need to be investigated and local mitigation measures may be required.
- In the PM Peak, travel distance is lower than for the Preferred Option to 2041.

Travel Time

11.3.3 Figure 42 shows the increase in travel time from the 2041 Baseline due to the Preferred Option with mitigation relative to the Preferred Option to 2041, which is without mitigation.

Figure 42 Change in travel time (PCU-hrs) vs. 2041 Preferred Option



	1: 2041 Preferred Option	4: Mitigation 2041
AM	1,929	2,067
IP	1,299	1,339
PM	2,976	2,853

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

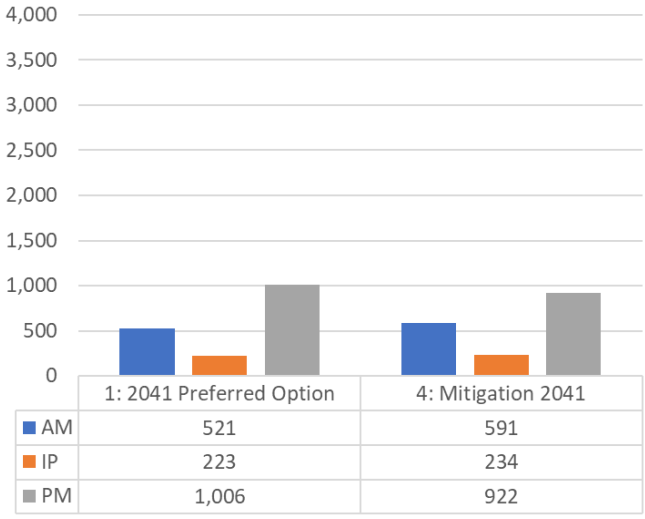
11.3.4 Travel times for the Preferred Option with mitigation are similar to those seen in Model Run 1 for the Preferred Option to 2041 without mitigation.

- In the AM Peak, travel time rises slightly when compared to Model Run 1: Preferred Option to 2041. This is due to the improvements in the transport networks and the fact that less congestion on key links may encourage others to drive. This will need to be investigated and local mitigation may need to be introduced to prevent this.
- Travel time in the Inter Peak period also rises from levels in Model Run 1: Preferred Option to 2041.
- In the PM Peak, levels of travel distance are lower than seen in Model Run 1: Preferred Option to 2041.

Delay

11.3.5 Figure 43 shows the change in delay as a result of the introduction of the mitigation measures to the Preferred Option to 2041, relative to the Preferred Option without mitigation.

Figure 43 Change in delay (PCU-hrs) vs. 2041 Preferred Option



	1: 2041 Preferred Option	4: Mitigation 2041
AM	521	591
IP	223	234
PM	1,006	922

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

11.3.6 The level of delay associated with the mitigation package is very similar to that seen in Model Run 1: Preferred Option to 2041 in all time periods – only minor variations are observed. This indicates that the proposed mitigation package has minimal impact on levels of delay. However, the Preferred Option plus mitigation has a very positive impact on non-car mode share, particularly for new trips, compared to the Preferred Option without mitigation, as detailed in Section 11.2.

Consideration of overall highway impacts across Greater Cambridge

11.3.7 The introduction of the proposed mitigation package shows that the car mode share reduces by over 10% compared to the 2041 Preferred Option. It should be noted that the mitigation scenario does not include a trip budget for any of the large sites, which is planned for North East Cambridge and other strategic sites. Therefore, the role of active modes may be underplayed in Model Run 4: Full Build Out with mitigation.

11.3.8 Table 50 shows the increases in travel distance, travel time and delay from the 2041 Baseline due to the Preferred Option in percentage terms.

Table 50 Increase in dwellings, travel distance, travel time and delay due to the Preferred Option with mitigation on the highway network from the 2041 Baseline

Metric	AM peak	Inter peak	PM peak
Growth in the number of dwellings in Greater Cambridge in the Preferred Option to 2041	8.4%	8.4%	8.4%
Increase in travel distance	1.7%	1.4%	1.9%
Increase in travel time	2.3%	2.0%	2.7%
Increase in delay	5.8%	6.7%	6.8%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

11.3.9 Traffic levels are similar to those seen in the Preferred Option to 2041 without mitigation, and slight increases in travel time and delay are seen in the AM peak and Inter-Peak periods. The mitigation package reduces delay in the PM peak period.

11.3.10 In the context of the decreased car mode shares seen as a result of the mitigation package (see Section 11.2), it is likely that the capacity released on the highway network as a result of this mode shift is being taken up by other traffic on the network in the AM peak and interpeak, and potentially by a reduction in peak spreading in the morning peak.

11.3.11 Conversely, the PM peak is busier than the AM Peak, with greater levels of travel distance (see Figure 34), travel time (see Figure 36) and delay (see Figure 38), the context for which is discussed in Paragraphs 9.1.3 and 9.1.4 above. Reductions against all three metrics are seen when mitigation is provided.

11.3.12 As was noted in Section 10.3, for all three metrics the levels of change seen are proportionally lower than the increases in dwellings included in the Preferred Option, and in terms of travel distance and travel time, they are considerably lower.

12 Analysis of Model Run 2: Preferred Option Fully Built Out

12.1 Note on the assessment of the fully built out Preferred Option in Chapters 12 and 13

12.1.1 Model Runs 2 and 3 assume that the strategic sites included in the Preferred Option are fully built out by 2041. The trajectory for the build out of these sites envisages that they will take longer than this to complete, and as such this model run is a proxy that allows the transport characteristics of the fully built out strategic sites to be assessed. The focus of this section is therefore on the performance of the strategic sites and care must be taken in inferring any wider transport implications in Greater Cambridge as a whole, where the eventual build out of the strategic sites beyond 2041 will be accompanied by other development elsewhere in the area.

12.1.2 In the context of the above, it is considered that the Transport Demand Model outputs are more informative than the Highway Model outputs for the two 'Full Build Out' model runs, as they provide an indication of how the locations within the preferred option will evolve in transport terms when they are fully built out, with and without mitigation.

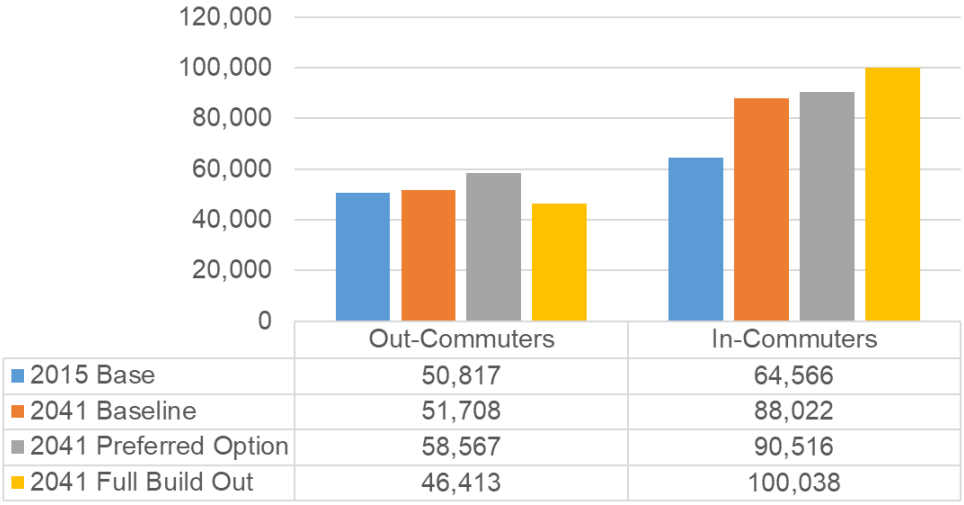
12.1.3 The Highway Model outputs in Section 12.3 (and Section 13.3 in Chapter 13) are nonetheless provided for completeness.

In- and Out-Commuting post 2041

12.1.4 As detailed in Section 10.1, the levels of in-commuting to the area covered by the CSRM2 associated with the Preferred Option rise significantly by 2041 in all four districts covered by the CSRM2.

12.1.5 Figure 44 and Table 51 show the level of in- and out-commuting associated with the Preferred Option to 2041, fully built out as tested in Model Runs 2 and 3. This is without any development elsewhere in the area beyond 2041 which would be expected to have an impact on these metrics. Whether that impact is positive, reducing in- and out-commuting, or negative would depend on the mix and locations of that development. This data should therefore be treated with caution.

Figure 44 In- and out-commuting in the 2015 Base Year, 2041 Baseline, Preferred Option to 2041 and Preferred Option Fully Built Out



Note: The data in this figure is for the in and out commuting to and from the area covered by CSRM2 – that is the districts of Cambridge, South Cambridgeshire, East Cambridgeshire and Huntingdonshire

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 51 Workers, Jobs and in and out-commuting in the CSRM2 2015 Base Year, 2041 Baseline, Preferred Option to 2041 and Preferred Option Fully Built Out

Scenario	Workers living in model area	Jobs in model area	Out Commuting from model	Out Commuting as percentage	In Commuting to model area	In Commuting as percentage of Jobs	Net level of in Commuting
2015 Base Year	282,319	296,068	50,817	18.0%	64,566	21.8%	13,749
2041 Baseline	344,001	377,104	51,708	15.0%	88,022	23.3%	36,314
2041 Preferred Option	358,204	387,788	58,567	16.4%	90,516	23.3%	31,948
Preferred Option Fully Built Out	376,335	428,584	46,413	12.3%	100,038	23.3%	53,624

Note: The data in this table is for the in and out commuting to and from the area covered by CSRM2 – that is the districts of Cambridge, South Cambridgeshire, East Cambridgeshire and Huntingdonshire

Source: Data from Figure 31, Figure 32 and Figure 44

12.1.6 Noting the caveats in Paragraphs 12.1.2 and 12.1.5 above, the level of out-commuters increases from the 2041 Baseline, but then drops below both the 2041 Baseline and 2015 Base Year once fully built out. Conversely, In-commuter levels increase from the 2041 Baseline and also from the Preferred Option, at Full Build Out.

12.1.7 Fully built out, and in the absence of other development post 2041, the Preferred Option reduces levels of out-commuting to levels lower than seen in the 2015 Base Year. The proportion of in-commuting remains constant, meaning that the number of in-commuters increases. Most notably, the total number of in and out-commuting trips slightly decreases compared to the Preferred Option in 2041.

12.2 Core Analysis: Trip Volumes and Mode Share

12.2.1 As noted above, Model Run 2 is a proxy that allows the transport characteristics of the fully built out strategic sites to be assessed. It also provides the basis for the assessment of whether the mitigation package is capable of catering for the transport demand of the completed developments, as tested in Model Run 3 and detailed in Chapter 13. This is important as it allows for a more robust understanding of the viability of the development in the Preferred Option beyond the plan period.

12.2.2 The conclusions set out in Section 5.2 of this report note that larger settlements often have more sustainable transport characteristics and less reliance on the private car due to the presence of a wider range of employment opportunities and local services, as well as a critical mass of population better able to support Public Transport services. Model Runs 2 and 3 allows for this point to be assessed for the Preferred Option.

12.2.3 Table 52 and 0 show the change in person trips and change in mode shares due to the growth contained in the Preferred Option when fully built out. Table 54 and Table 55 show the new person trips and the mode share of those trips generated by the Preferred Option when fully built out. Figure 45 shows the changes in mode share that result.

Table 52 Trips in the Preferred Option, fully built out, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. Preferred Option to 2041	539,575	20,687	95,005	32,239	1,234,619	1,922,125
2. Preferred Option, fully built out	595,391	22,161	100,032	36,365	1,274,118	2,028,067

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 53 Mode share of trips in the Preferred Option fully built out, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. Preferred Option to 2041	28.1%	1.1%	4.9%	1.7%	**35.8%**	64.2%
2. Preferred Option, fully built out	29.4%	1.1%	4.9%	1.8%	**37.2%**	62.8%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 54 New trips in the Preferred Option to 2041 fully built out, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. New trips: Preferred Option to 2041	31,492	758	4,974	350	35,327	72,901
2. New trips: Preferred Option, fully built out	87,308	2,232	10,001	4,476	74,826	178,844

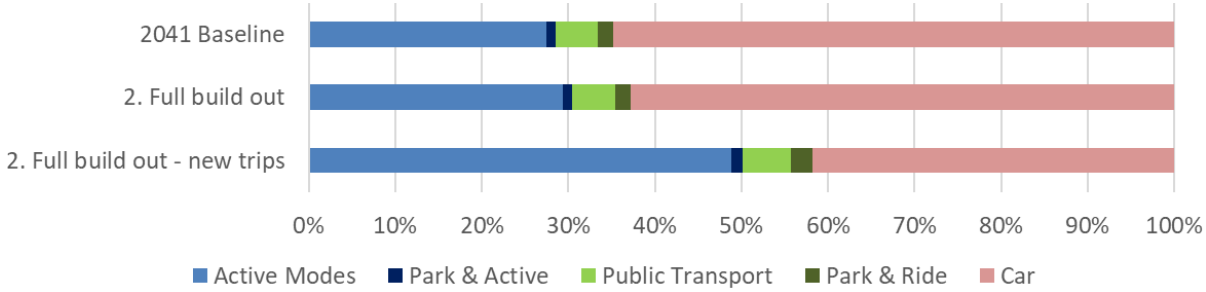
Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 55 Mode share of new trips in the Preferred Option to 2041 fully built out, vs. 2041 Baseline, and compared to Model Run 1

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. New trips: Preferred Option to 2041	43.2%	1.0%	6.8%	0.5%	**51.5%**	48.5%
2. New trips: Preferred Option, fully built out	48.8%	1.2%	5.6%	2.5%	**58.2%**	41.8%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Figure 45 Mode share of trips / new trips in the Preferred Option, fully built out, vs. 2041 Baseline



Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

12.2.4 0, Table 55 and Figure 45, show the combined Active Mode / Public Transport mode share use increases again as a proportion of total trips when the development included in the Preferred Option is fully built out. This indicates that the Preferred Option, which can already be considered sustainable given it achieves excellent non-car mode share increases above the 2041 Baseline, will become even more sustainable in terms of mode share once it is fully built out. This reflects the conclusion mentioned in Paragraph 12.2.2 and Figure 45 that increases in dwellings and jobs at a development generally leads to fewer out-commuters, which in turn lends itself to better non-car mode shares.

12.2.5 The point above is highlighted more clearly by the new trips over the 2041 Baseline, which shows that the full build out of the Preferred Option leads to an increase of 6.7% of trips made by non-car modes compared to the Preferred Option in 2041, with almost half of trips made by Active Travel. This can be considered a very good figure when compared to the 2041 Baseline, especially as this model run does not include any mitigation measures above those already included in the 2041 Baseline.

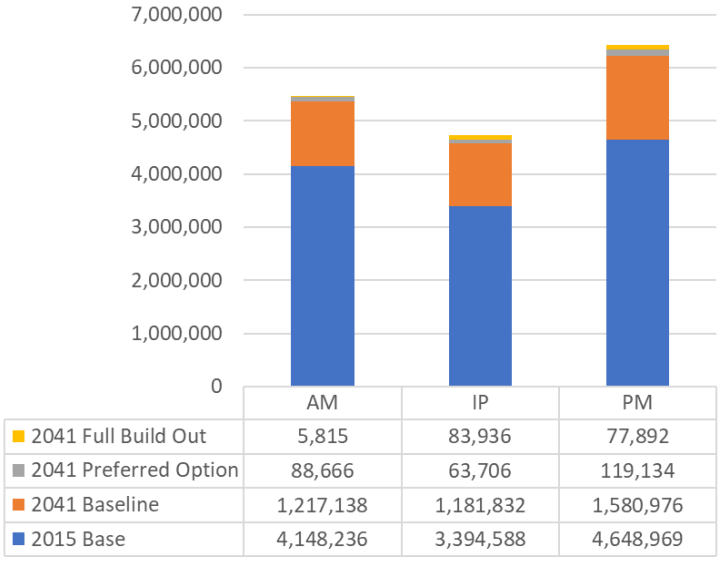
12.3 Analysis: Highway Impact

12.3.1 The consideration of the outputs presented in this section should be considered in the context of the caveats noted in Paragraphs 12.1.1 to 12.1.3 above. Any conclusions drawn from the data presented below will relate solely to the performance of the locations included in the Preferred Option.

Travel Distance

12.3.2 Figure 46 shows the change in travel distance on the highway network due to the travel demand for car trips generated by the Preferred Option, fully built out without mitigation.

Figure 46 Increase in travel distance (PCU-km) due to the Preferred Option, fully built out

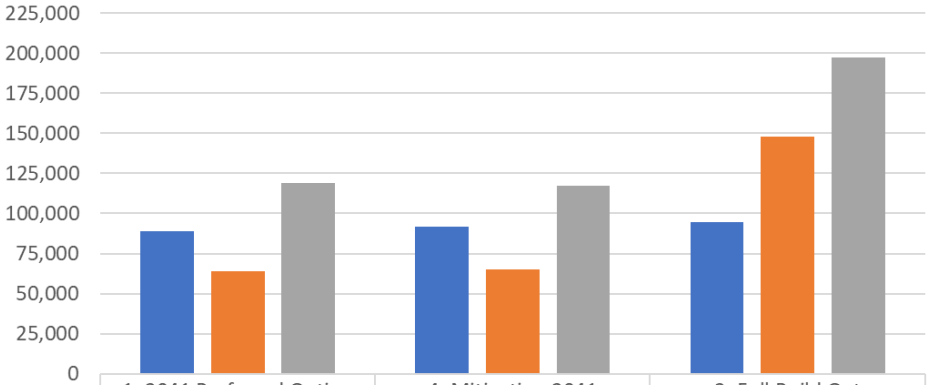


	AM	IP	PM
2041 Full Build Out	5,815	83,936	77,892
2041 Preferred Option	88,666	63,706	119,134
2041 Baseline	1,217,138	1,181,832	1,580,976
2015 Base	4,148,236	3,394,588	4,648,969

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

12.3.3 Figure 47 shows the increase in travel distance due to the Preferred Option, fully built out relative to the 2041 Baseline. It highlights that travel distances increase in the Preferred Option, fully built out scenario in every time period, but more so in the Inter peak and PM peak than in the AM peak.

Figure 47 Change in travel distance (PCU-km) vs. 2041 Baseline



	1: 2041 Preferred Option	4: Mitigation 2041	2: Full Build Out
AM	88,666	91,880	94,480
IP	63,706	65,011	147,642
PM	119,134	117,062	197,025

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

12.3.4 As a proportion of the distance already travelled by car on the Greater Cambridge Transport network, the increases due to the Preferred Option when fully built out are relatively small. Table 56 shows that the Preferred Option when fully built out increases the number of dwellings in Greater Cambridge by over 19%, but only increases the distance travelled by car by 1.8% in the AM peak and 3.2% in the PM peak. The reason the increase in Travel Distance is not larger, despite the increased level of development, is due to higher levels of internalisation and local trip making patterns experienced at the strategic sites such as Cambridge East, North East Cambridge and Cambourne extension.

Table 56 Increase in dwellings, and of travel distance due to the Preferred Option, fully built out on the highway network from the 2041 Baseline

Metric	AM peak	Inter peak	PM peak
Growth in the number of dwellings in Greater Cambridge in the Preferred Option, fully built out	19.2%	19.2%	19.2%
Increase in travel distance	1.8%	3.2%	3.2%

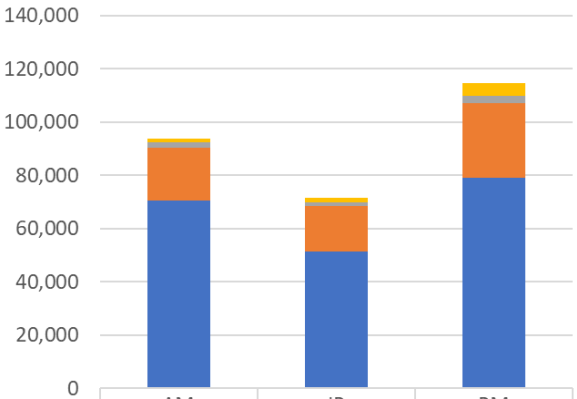
Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Travel time

12.3.5 Figure 48 shows the change in travel time on the highway network due to the travel demand for car trips generated by the Preferred Option, fully built out without mitigation. Figure 49 shows the increase in travel time due to the Preferred Option, fully built out relative to the 2041 Baseline. Again, the Preferred Option when fully

built out increases travel time in all three time periods, but more so in the PM peak than in the AM peak or Inter peak.

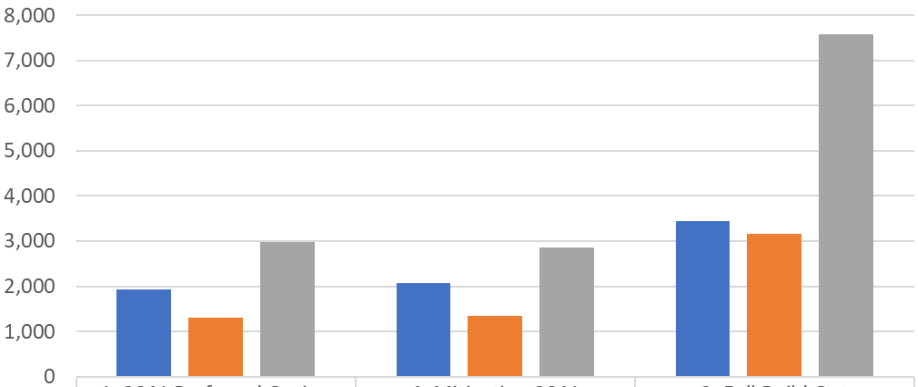
Figure 48 Increase in travel time (PCU-hrs) due to the Preferred Option, fully built out



	AM	IP	PM
2041 Full Build Out	1,522	1,855	4,608
2041 Preferred Option	1,929	1,299	2,976
2041 Baseline	19,998	17,023	28,019
2015 Base	70,381	51,511	79,005

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Figure 49 Change in travel time (PCU-hrs) vs. 2041 Baseline



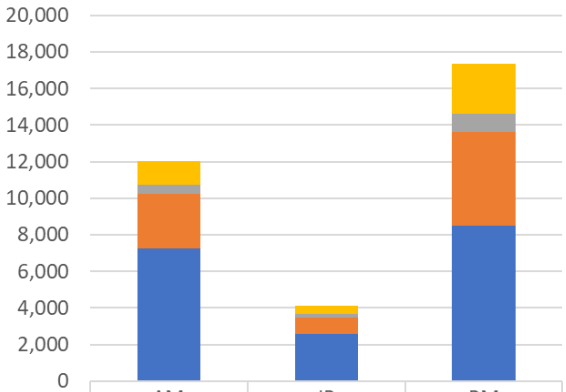
	1: 2041 Preferred Option	4: Mitigation 2041	2: Full Build Out
AM	1,929	2,067	3,450
IP	1,299	1,339	3,153
PM	2,976	2,853	7,583

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Delay

12.3.6 Figure 50 shows the change in delay on the highway network due to the travel demand for car trips generated by the Preferred Option, fully built out without mitigation. Figure 51 shows the increase in delay due to the Preferred Option, fully built out relative to the 2041 Baseline. Again, delay increases as a result of the Preferred Option when fully build out compared to the 2041 Baseline, particularly in the PM peak, due to the increase in vehicular traffic, notwithstanding the relatively low mode shares of car use of the additional trips.

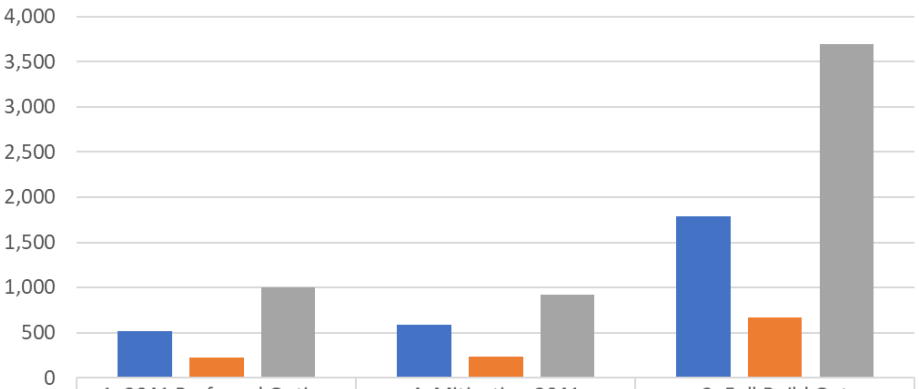
Figure 50 Increase in delay (PCU-hrs) due to the Preferred Option, fully built out



	AM	IP	PM
2041 Full Build Out	1,265	450	2,693
2041 Preferred Option	521	223	1,006
2041 Baseline	2,968	871	5,147
2015 Base	7,260	2,598	8,487

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Figure 51 Change in delay (PCU-hrs) vs. 2041 Baseline



	1: 2041 Preferred Option	4: Mitigation 2041	2: Full Build Out
AM	521	591	1,786
IP	223	234	672
PM	1,006	922	3,698

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Consideration of vehicular trip making characteristics of locations in the Preferred Option when fully built out

12.3.7 In the same context as was the case for the Preferred Option in 2041, the following factors are in play to a greater or lesser extent across the locations in the Preferred Option and are contributing to the locations generating low levels of additional motor vehicular traffic:

- The new development is achieving lower mode shares of car use than seen from existing land use included in the 2041 Baseline, as discussed in Section 12.2.
- The new developments in the Preferred Option are in locations that minimise the need for travel by car for many trips, due to their relative proximity to other settlements.
- The scale of the development in the Preferred Option is such that internalisation of trips occurs, and even if undertaken by car these trips will be shorter than external trips to access jobs and services.

13 Analysis of Model Run 3: Preferred Option, Fully Built Out with Mitigation

13.1 Mitigation measures

13.1.1 This model run analyses the Preferred Option, fully built out, and a package of mitigation measures against the 2041 Baseline. The mitigation measures for the Preferred Option fully built out are the same as those tested in Model Run 4, as detailed in Section 11.1 above, and are in addition to the baseline schemes set out in paragraph 2.2.12 in Part 1 of this report.

13.1.2 Mitigation measures were identified by Cambridgeshire County Council's Transport Strategy and Funding team in discussion with Greater Cambridge Shared Planning, drawing on adopted transport policies, awareness of emerging transport infrastructure schemes, and engagement with relevant partners such as the Greater Cambridge Partnership.

13.1.3 It is important to note that the mitigation tested at this time does not include a trip budget policy approach, which is identified as required for North East Cambridge, Cambridge East and the Cambridge Biomedical Campus. This will also be considered for other large sites as the draft Local Plan is prepared, including the expansion of Cambourne. The mode share of car use for the larger sites within the Preferred Option are therefore likely to be over-estimated at this point in the assessment process.

13.2 Core Analysis: Trip Volumes and Mode Share

13.2.1 Model Run 3 assumes that the strategic sites included in the preferred option are fully built out and mitigated by 2041. The trajectory for the build out of these sites envisages that they will take longer than this to complete, and as such this model run is a proxy that allows the transport characteristics of the fully built out and mitigated development to be assessed. It allows for the assessment of whether the identified mitigation package is capable of catering for the transport demand of the completed developments. This is important as it allows for a more robust understanding of the deliverability and viability of the development in the Preferred Option, including where it is expected to take place beyond the plan period.

13.2.2 The conclusions set out in Section 5.2 of this report note that larger settlements often have more sustainable transport characteristics and less reliance on the private car due to the presence of a wider range of employment opportunities and local services. Model Runs 2 and 3 allows for this point to be assessed for the Preferred Option.

13.2.3 0 and Table 58 show the change in trips and change in mode shares due to the growth contained in the Preferred Option when fully built out and mitigated. 0 and Table 60 show the new trips and the mode share of those trips generated by the Preferred Option when fully built out and mitigated. Figure 52 shows the changes in mode share that result.

Table 57 Trips in the Preferred Option to 2041, fully built out with mitigation, vs. 2041 Baseline, and compared to Model Runs 1,4, and 2

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. Preferred Option to 2041	539,575	20,687	95,005	32,239	1,234,619	1,922,125
4. Preferred Option with mitigation	538,000	20,107	96,124	40,749	1,227,146	1,922,125
2. Preferred Option, fully built out	595,391	22,161	100,032	36,365	1,274,118	2,028,067
3. Preferred Option, fully built out plus Mitigation	592,557	21,328	104,894	45,443	1,263,344	2,027,567

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 58 Mode share of trips in the Preferred Option to 2041, fully built out with mitigation, vs. 2041 Baseline, and compared to Model Runs 1,4, and 2

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. Preferred Option to 2041	28.1%	1.1%	4.9%	1.7%	**35.8%**	64.2%
4. Preferred Option with mitigation	28.0%	1.1%	5.0%	2.1%	**36.2%**	63.8%
2. Preferred Option, fully built out	29.4%	1.1%	4.9%	1.8%	**37.2%**	62.8%
3. Preferred Option, fully built out plus Mitigation	29.2%	1.1%	5.2%	2.2%	**37.7%**	62.3%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 59 New trips in the Preferred Option to 2041, fully built out with mitigation, vs. 2041 Baseline, and compared to Model Runs 1,4, and 2

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Car	Total
2041 Baseline	508,083	19,929	90,031	31,889	1,199,292	1,849,223
1. New trips: Preferred Option to 2041	31,492	758	4,974	350	35,327	72,901
4. New trips: Preferred Option with mitigation	29,917	178	6,093	8,860	27,854	72,902
2. New trips: Preferred Option, fully built out	87,308	2,232	10,001	4,476	74,826	178,843
3. New trips: Preferred Option, fully built out plus mitigation	84,474	1,399	14,863	13,555	64,052	178,343

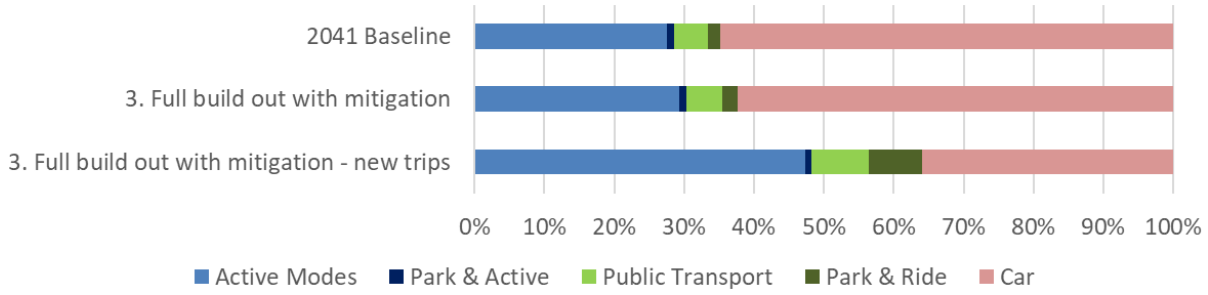
Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Table 60 Mode share of new trips in the Preferred Option to 2041, fully built out with mitigation, vs. 2041 Baseline, and compared to Model Runs 1,4, and 2

Scenario	Active Modes	Park & Active	Public Transport	Park & Ride	Total non-car	Car
2041 Baseline	27.5%	1.1%	4.9%	1.7%	**35.1%**	64.9%
1. New trips: Preferred Option to 2041	43.2%	1.0%	6.8%	0.5%	**51.5%**	48.5%
4. New trips: Preferred Option with mitigation	41.0%	0.2%	8.4%	12.2%	**61.8%**	38.2%
2. New trips: Preferred Option, fully built out	48.8%	1.2%	5.6%	2.5%	**58.2%**	41.8%
3. New trips: Preferred Option, fully built out plus mitigation	47.4%	0.8%	8.3%	7.6%	**64.1%**	35.9%

Source: GCSP Local Plan_CSRM2 Preferred Option_v1.0

Figure 52 Mode shares of trips / new trips in the Preferred Option, fully built out with mitigation, vs. 2041 Baseline



13.2.4 As can be seen from Table 58, Table 60 and Figure 45, the combined Active Mode / Public Transport mode share use increases again as a proportion of total trips when the development included in the Preferred Option is fully built out with mitigation. This is a positive indication that the proposed mitigation package would increase opportunities for travel by Active Modes and Public Transport and therefore significantly reduce the proportion of car trips.

13.2.5 Of the new trips over the 2041 Baseline, the full build out of the Preferred Option with mitigation leads to an increase of 12.6% of trips made by non-car modes compared to the Preferred Option in 2041, with almost two thirds of new trips made by non-car modes. Compared to the fully built out development without mitigation, an additional 5.9% of the new trips are made by non-car modes.

13.2.6 This is a significant and hugely positive figure, given that the Preferred Option already achieved very good non-car mode shares over and above the 2041 Baseline. As was the case with the Preferred Option to 2041 with mitigation, the high non-car mode shares can be attributed to the opportunities for Active Travel, the availability and viability of Public Transport, local trip making patterns and high rates of internalisation linked to the availability of local jobs and services found in the larger development sites that are close to existing settlements or urban areas. The full build out of the Preferred Option then increases this mode share benefit by locating yet more dwellings and jobs at these development locations, which the mitigation package then further improves by providing Active Travel and Public Transport opportunities.

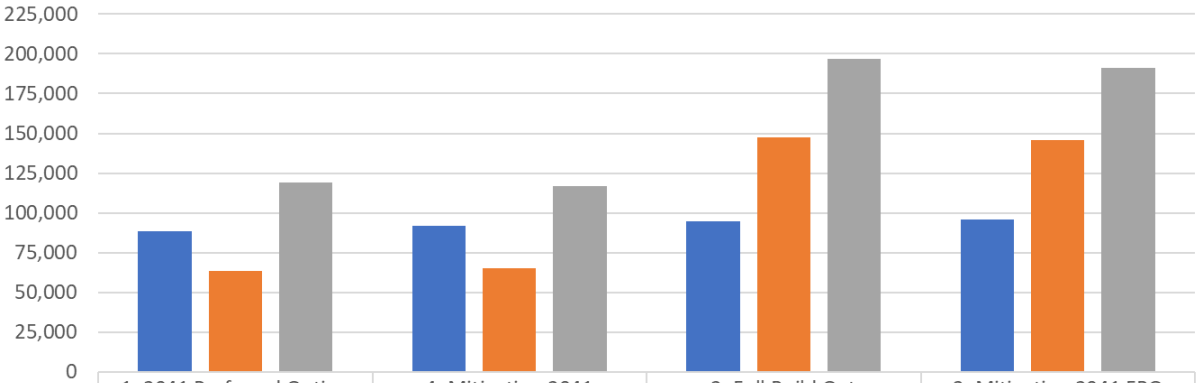
13.2.7 Most of the shift away from car is to Public Transport and Park & Ride in the ‘with mitigation’ scenario. There is also a small shift away from Active Travel to Public Transport and Park & Ride. It should be noted that the mitigation scenario in Model Runs 3 and 4 do not include a vehicular trip budget for any of the large sites. As a trip budget policy approach is planned for North East Cambridge and other strategic sites, the role of Active Modes and Public Transport are likely to be underplayed in Model Runs 4 and 3 that test the ‘with mitigation’ scenarios. In this context, the mode share for non-car modes has the potential to be even higher than demonstrated in Model Runs 4 and 3.

13.3 Core Analysis: Highway Impact

Travel Distance

13.3.1 Figure 53 shows the change in travel distance due to the Preferred Option Full Build Out with mitigation, relative to the Preferred Option to 2041 (1), the Preferred Option with mitigation (4) and the Preferred Option Fully Built Out (2).

Figure 53 Change in travel distance (PCU-km) vs. 2041 Baseline



	1: 2041 Preferred Option	4: Mitigation 2041	2: Full Build Out	3: Mitigation 2041 FBO
AM	88,666	91,880	94,480	95,579
IP	63,706	65,011	147,642	145,525
PM	119,134	117,062	197,025	190,879

13.3.2 The distances travelled with the full build out with mitigation are similar to those indicated by the full build out when compared to the 2041 Baseline.

- In the AM Peak, travel distance is very slightly higher than seen in Model Run 2: Preferred Option Fully Built Out. This is due to the improvements in the transport networks and the fact that less congestion on key links may encourage others to drive. This will need to be investigated and local mitigation introduced to prevent this.
- In the Inter Peak, travel distances are slightly lower than in Model Run 2: Preferred Option Fully Built Out.
- PM Peak the levels of travel distance are lower the for full build out, this is probably due to the longer PM peak period.

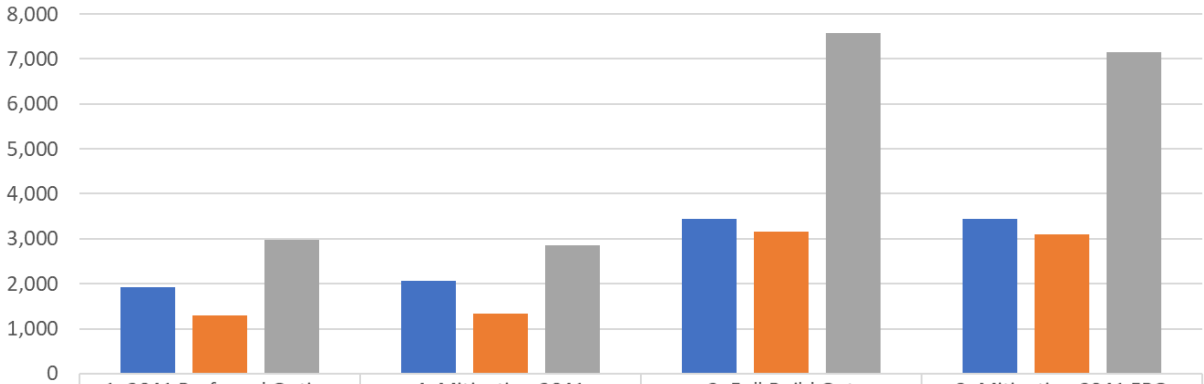
Travel Time

13.3.3 Figure 54 shows the increase in travel time due to the Preferred Option fully built out, with mitigation relative to the 2041 Baseline, as well as showing a comparison with the Preferred Option to 2041 (1), the Preferred Option with mitigation (4) and the Preferred Option fully built out without mitigation (2).

13.3.4 Travel time for the full build out of the Preferred Option with mitigation is similar to that seen in Model Run 2: Preferred Option Fully Built Out. This is due in part to the fact that the car leg of any Park & Ride or Park & Active trips are included in these figures.

- In the AM Peak, travel times are virtually the same as seen in Model Run 2: Preferred Option Fully Built Out. This may be due to capacity released by the mitigation package being taken up by other car trip making, as less congestion on key links may encourage others to drive further. This will need to be investigated and local mitigation may need to be introduced to mitigate this.
- Travel time in the Inter peak period sees a slight reduction from levels in Model Run 2: Preferred Option Fully Built Out.
- In the PM Peak, overall travel times are lower than seen in Model Run 2: Preferred Option Fully Built Out. This relative lack of backfilling of traffic on released highway capacity compared to the AM peak and Inter peak may be due to the greater levels of congestion seen in the PM peak.

Figure 54 Change in travel time (PCU-hrs) vs. 2041 Baseline

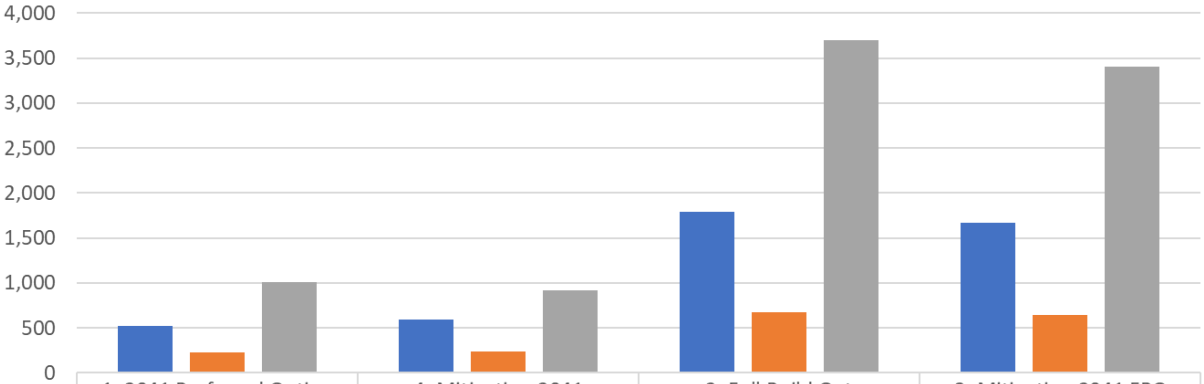


	1: 2041 Preferred Option	4: Mitigation 2041	2: Full Build Out	3: Mitigation 2041 FBO
AM	1,929	2,067	3,450	3,447
IP	1,299	1,339	3,153	3,106
PM	2,976	2,853	7,583	7,141

Delay

13.3.5 Figure 55 shows the change in delay as a result of the introduction of the mitigation measures to the Preferred Option, fully built out, relative to the 2041 Baseline, and the other three tests.

Figure 55 Change in delay (PCU-hrs) vs. 2041 Baseline



	1: 2041 Preferred Option	4: Mitigation 2041	2: Full Build Out	3: Mitigation 2041 FBO
AM	521	591	1,786	1,665
IP	223	234	672	647
PM	1,006	922	3,698	3,407

13.3.6 The level of delay associated with the mitigation package is lower than seen in Model Run 2: Preferred Option Fully Built Out in all time periods. This indicates that the proposed mitigation package reduces the level of delay by reducing congestion. This reduced congestion could result in additional trip making by car if measures to lock in reduced car use are not introduced at the same time as the mitigation measures, and this response may be reflected in the results for Model Run 3.

Consideration of overall highway impacts across Greater Cambridge

13.3.7 Table 61 shows the increases in travel distance, travel time and delay from the 2041 Baseline as a result of the Preferred Option fully built out with mitigation, in percentage terms.

Table 61 Increase in dwellings, travel distance, travel time and delay due to the Preferred Option, fully built out with mitigation on the highway network from the 2041 Baseline

Metric	AM peak	Inter peak	PM peak
Growth in the number of dwellings in Greater Cambridge in the Preferred Option fully built out	19.2%	19.2%	19.2%
Increase in travel distance	1.8%	3.2%	3.1%
Increase in travel time	3.8%	4.5%	6.7%
Increase in delay	16.3%	18.7%	25.0%

13.3.8 As was the case for the Preferred Option in 2041 (as discussed in Section 11.3) travel distances are similar in all time periods for the Preferred Option, fully built out, with or without mitigation. Slight increases in travel time and delay are seen in the

AM peak and Inter peak periods. The mitigation package reduces delay in all time periods.

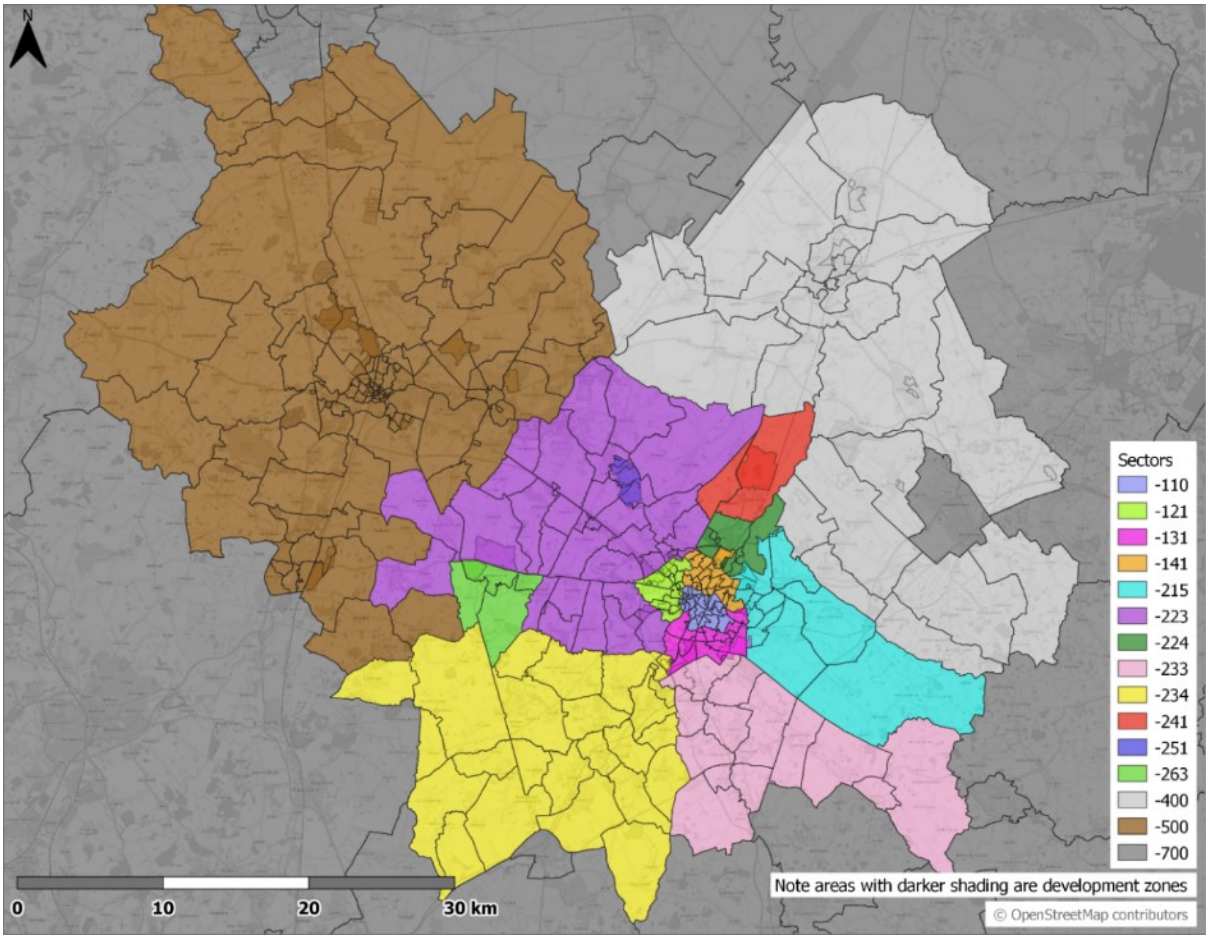
13.3.9 In the context of the decreased car mode shares seen as a result of the mitigation package (see Section 13.2), it is likely that some of the capacity released on the highway network as a result of this mode shift is being taken up by other traffic on the network.

14 Preferred Option Sector Analysis

14.1 Introduction

14.1.1 This Chapter considers the impact of the development in the Preferred Option in the different sectors within the CSRM2. Figure 56 shows the sectors within CSRM2.

Figure 56 Sectors within the Cambridge Sub-Region Model 2 (CSRM2)



2041 Baseline metrics for the assessment of development locations

Mode Share of all trips and trips per dwelling

14.1.2 Figure 57 and Table 62 show the 2041 Baseline mode share of all trips for the sectors in which the residential development locations contained in the Preferred Option are located, so it includes trips from other existing properties in the sector.

14.1.3 Figure 58 and Table 63 show the 2041 Baseline car trips per dwelling for the sectors in which the residential development locations contained in the Preferred Option are located. Note that trips per dwelling data for North East Cambridge is not presented

as there are very few dwellings in the Sector in the 2041 Baseline, and a large number of jobs.

14.1.4 These tables and figures provide the baseline data against which the changes in travel patterns as a result of the development locations in the Preferred Option can be assessed.

Figure 57 Mode share of all trips in 2041 Baseline in sectors containing locations for residential development in the Preferred Option

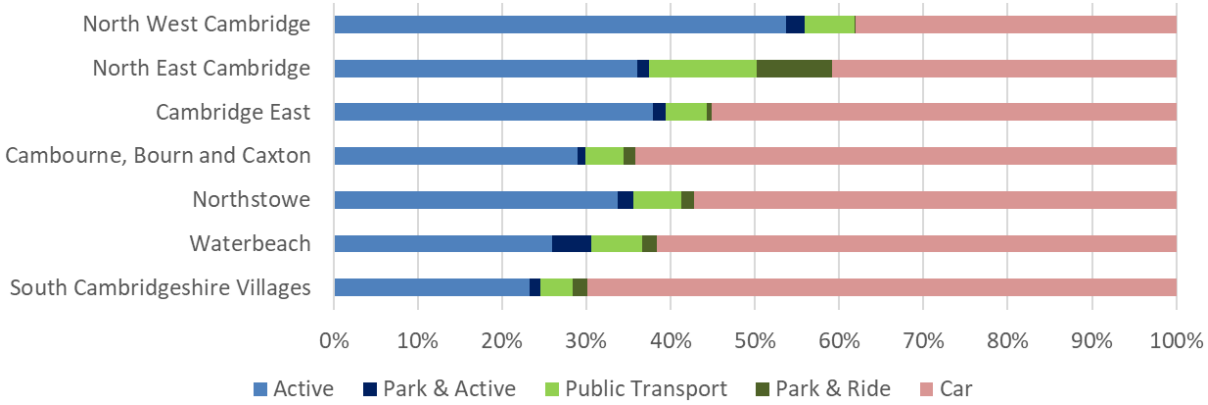
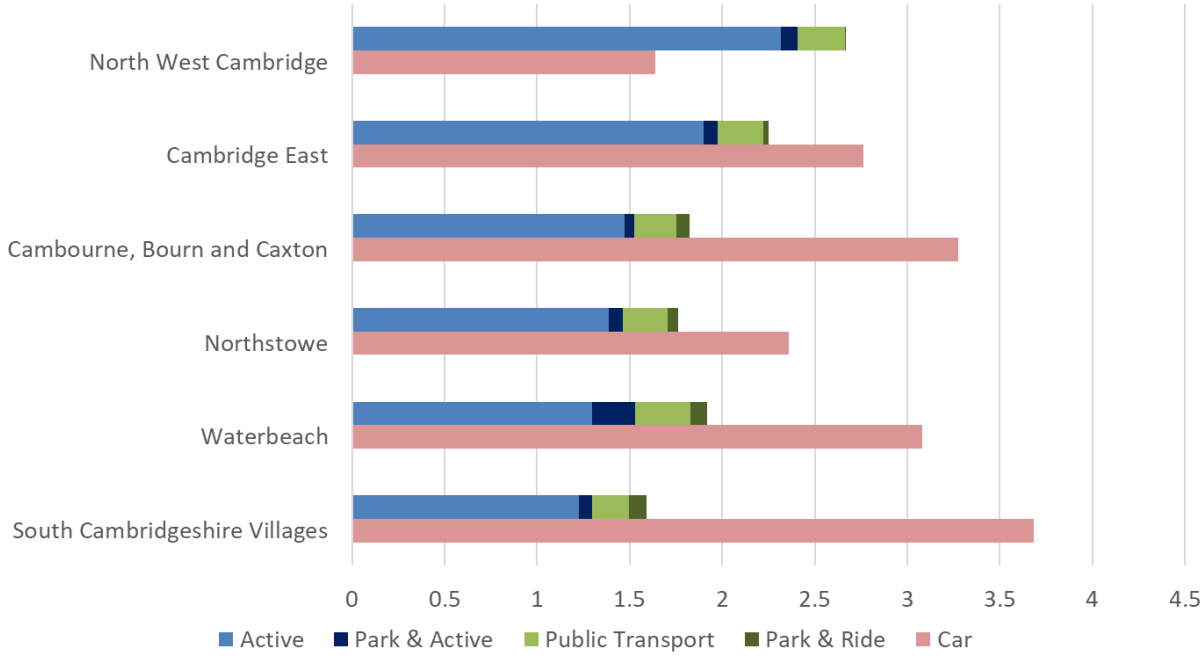


Table 62 Mode share of all trips in 2041 Baseline in sectors containing locations for residential development in the Preferred Option

Sector	Dwellings	Jobs	Active Modes mode share	Park & Active mode share	Public Transport mode share	Park & Ride mode share	Car mode share
Cambridge Urban Area: North West Cambridge	2,881	3,559	53.7%	2.2%	5.9%	0.1%	38.1%
Cambridge Urban Area: North East Cambridge	198	15,413	36.0%	1.4%	12.7%	9.0%	40.8%
Edge of Cambridge: Non-Green Belt: Cambridge East	2,601	3,685	37.9%	1.5%	4.9%	0.6%	55.1%
New Settlements: Cambourne, Bourn and Caxton	10,359	9,843	28.9%	1.0%	4.4%	1.4%	64.2%
Accelerated Growth at	6,181	3,838	33.7%	1.9%	5.8%	1.5%	57.2%

Sector	Dwellings	Jobs	Active Modes mode share	Park & Active mode share	Public Transport mode share	Park & Ride mode share	Car mode share
Committed New Settlements: Northstowe							
Accelerated Growth at Committed New Settlements: Waterbeach	7,536	9,270	25.9%	4.7%	6.0%	1.8%	61.6%
Villages: South Cambs. Villages	34,238	32,974	23.2%	1.3%	3.8%	1.8%	69.8%

Figure 58 Daily trips per dwelling in the 2041 Baseline in sectors containing locations for residential development in the Preferred Option



Note that data for North East Cambridge is not presented in this figure as there are very few
dwellings in the CSRM2 sector containing North East Cambridge in the 2041 Baseline.

Table 63 Daily trips per dwelling in the 2041 Baseline in sectors containing locations for residential development in the Preferred Option

Sector	Dwellings	Jobs	Active Modes trips per dwelling	Park & Active trips per dwelling	Public Transport trips per dwelling	Park & Ride trips per dwelling	Car trips per dwelling
Cambridge Urban Area: North West Cambridge	2,881	3,559	2.31	0.09	0.25	0.01	1.64
Edge of Cambridge: Non-Green Belt: Cambridge East	2,601	3,685	1.90	0.08	0.25	0.03	2.76
New Settlements: Cambourne, Bourn and Caxton	10,359	9,843	1.47	0.05	0.23	0.07	3.27
Accelerated Growth at Committed New Settlements: Northstowe	6,181	3,838	1.39	0.08	0.24	0.06	2.36
Accelerated Growth at Committed New Settlements: Waterbeach	7,536	9,270	1.30	0.23	0.30	0.09	3.08
Villages: South Cambs. Villages	34,238	32,974	1.23	0.07	0.20	0.09	3.68

Note that data for North East Cambridge is not presented as there are very few dwellings in the Sector in the 2041 Baseline.

14.1.5 Performance against the trips per dwelling in the following sections – in the context of new development being able or likely to achieve low levels of car use – is assessed on the same basis as the Strategic Spatial Options were assessed in Part 1 of this report as detailed in Section 0 above:

- Performs well: 1.6 or fewer car trips per dwelling
- Performs moderately well: Between 1.7 and 3.2 car trips per dwelling
- Performs poorly: Between 3.3 and 4.8 car trips per dwelling
- Performs very poorly 4.9 or more car trips per dwelling

14.1.6 The ‘Performs well’ rating is at or below the level seen across central Cambridge and other parts of the city with high levels of accessibility to jobs, services, and to Public Transport / Active Travel networks. The ‘Performs very poorly’ rating reflects levels of car use seen in the most rural areas in Greater Cambridge with few local options for many trip purposes and a reliance on the private car.

14.1.7 Note that the changes in dwellings and jobs shown in sections 14.3-14.8 do not exactly match the figures set out in Table 37. See Section 9.4 for the explanation of why this is so.

14.2 North West Cambridge

14.2.1 Table 64 and Figure 59 show trips per dwelling generated by the additional dwellings in the Preferred Option at North West Cambridge, and Figure 60 shows the total daily trip generation. 0 and 0 show the mode shares of the additional trips generated by the development in the Preferred Option.

Table 64 Daily trips per additional dwelling at North West Cambridge in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	2,881	3,559	2.31	0.09	0.25	0.01	1.64
1: Preferred Option to 2041	1,006	440	2.47	0.05	0.22	0.01	1.17
4: Preferred Option with mitigation	1,006	440	2.46	0.05	0.21	0.01	1.19
2: Preferred Option Fully Built Out	1,506	659	2.64	0.05	0.22	0.01	1.16
3: Preferred Option Fully Built out with mitigation	1,506	659	2.63	0.05	0.22	0.01	1.16

Figure 59 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at North West Cambridge in the Preferred Option

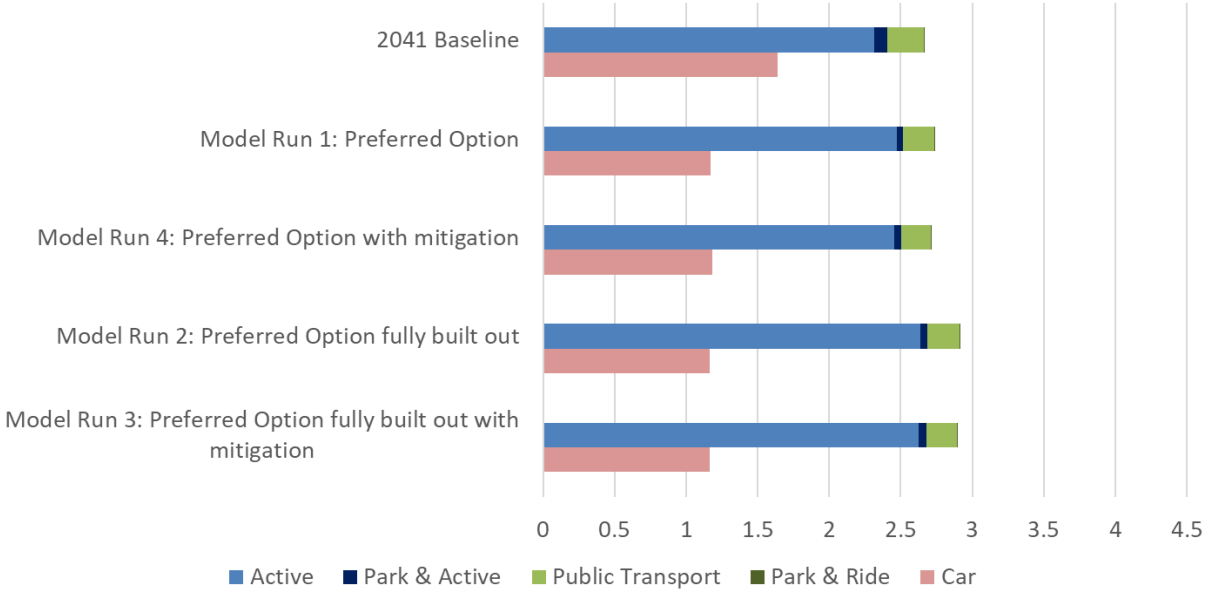


Figure 60 Daily trip generation of North West Cambridge in the Preferred Option

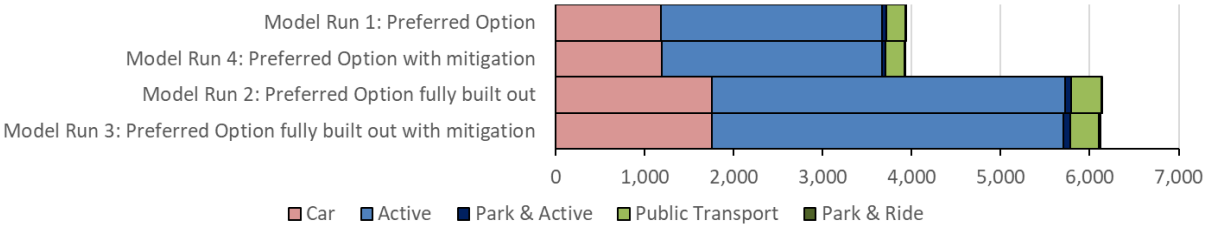
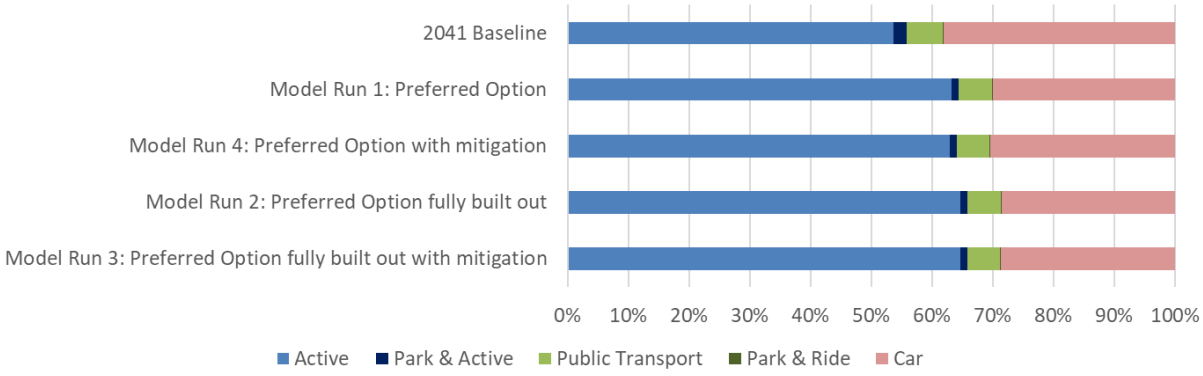


Table 65 Mode shares of trips from North West Cambridge in the 2041 Baseline, and of additional trips from North West Cambridge generated by development in the Preferred Option

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	2,881	3,559	53.7%	2.2%	5.9%	0.1%	38.1%
1: Preferred Option to 2041	1,006	440	63.2%	1.2%	5.5%	0.1%	30.0%
4: Preferred Option with mitigation	1,006	440	62.9%	1.2%	5.3%	0.2%	30.4%
2: Preferred Option Fully Built Out	1,506	659	64.6%	1.2%	5.5%	0.1%	28.5%
3: Preferred Option Fully built out with mitigation	1,506	659	64.7%	1.2%	5.3%	0.2%	28.6%

Figure 61 Mode shares of trips from North West Cambridge in the 2041 Baseline, and of additional trips from North West Cambridge generated by development in the Preferred Option



Model Run 1: Preferred Option

14.2.2 The additional development at North West Cambridge performs very well in transport terms, and second best of all the locations included in the Preferred Option in terms of achieving low car use, with 1.2 car trips per dwelling, only slightly higher than the level seen at North East Cambridge. It achieves levels of Active mode / Public Transport use at similar levels to Cambridge East. This is to be expected given its location, local facilities, and existing connections to the sustainable transport network.

Model Run 4: Preferred Option with mitigation

14.2.3 Model Run 4 shows very little change in trips per dwelling or mode share for any mode of transport as none of the proposed mitigation measures directly serve North West Cambridge. This location continues to perform well in sustainable transport terms, supporting a high level of trips by Active Modes and a low level of car trips.

Model Run 2: Preferred Option, fully built out

14.2.4 Model Run 2 shows a small increase in trips per dwelling (from 2.47 to 2.64 trips per dwelling) by Active Modes at the additional development at North West Cambridge when fully built out. This indicates that there are more opportunities for local trip making due to the increase in jobs and services as the development builds out. Public Transport and Car trips per dwelling remain broadly as they were in 2041 as assessed in Model Run 1.

Model Run 3: Preferred Option, fully built out with mitigation

14.2.5 Table 61 unsurprisingly shows little change in trips per dwelling by any mode of transport, given that none of the mitigation measures assessed in Model Run 3 directly serve North West Cambridge. Given the already excellent performance of this location in terms of the low level of car trips per dwelling and high level of Active Mode trips seen, this is not considered problematic.

14.3 North East Cambridge

14.3.1 0 and Figure 62 show trips per dwelling generated by the additional dwellings in the Preferred Option at North East Cambridge, and Figure 63 shows the total daily trip generation. Table 67 and Figure 64 show the mode shares of the additional trips generated by the development in the Preferred Option.

14.3.2 It should be noted that:

- trips per dwelling is not shown for the 2041 Baseline for North East Cambridge in 0 and Figure 62 as the existing land uses in the CSRM2 model sectors that include North East Cambridge are primarily for employment purposes.
- the additional jobs in 0 include 15,000 jobs as part of the Preferred Option (as detailed in Table 37), with the remainder being made up of service jobs associated with the residential development on the site and elsewhere in the CSRM2 model zone which includes North East Cambridge.

Table 66 Daily trips per additional dwelling at North East Cambridge in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	198	15,413	-	-	-	-	-
1: Preferred Option to 2041	3,901	2,966	2.72	0.03	0.32	0.08	1.10
4: Preferred Option with mitigation	3,901	2,966	2.82	0.03	0.46	0.10	0.97
2: Preferred Option Fully Built Out	8,351	18,652	3.31	0.05	0.38	0.19	1.46
3: Preferred Option Fully built out with mitigation	8,351	18,652	3.37	0.04	0.54	0.19	1.36

Figure 62 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at North East Cambridge in the Preferred Option

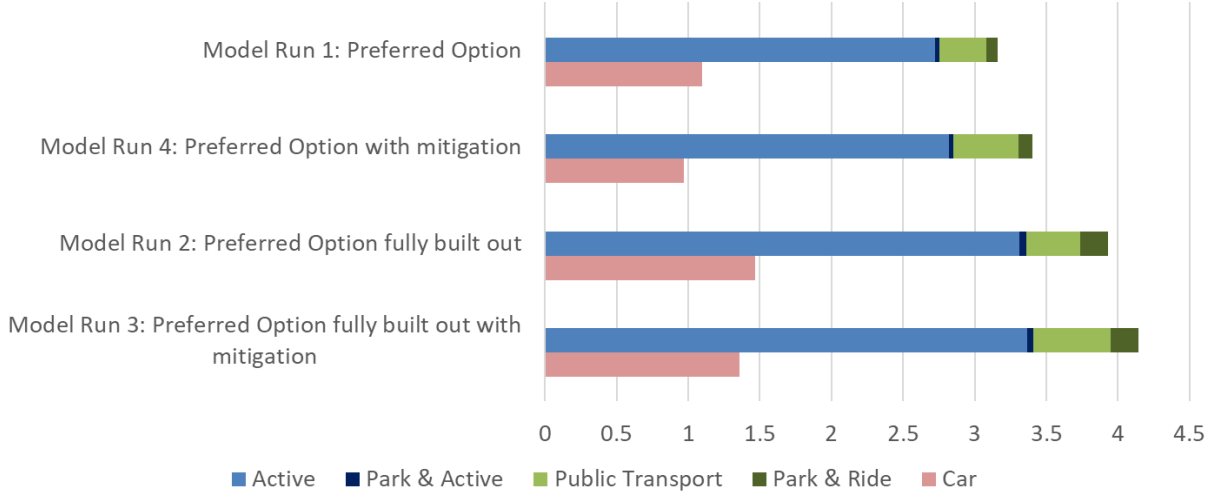


Figure 63 Daily trip generation of North East Cambridge in the Preferred Option

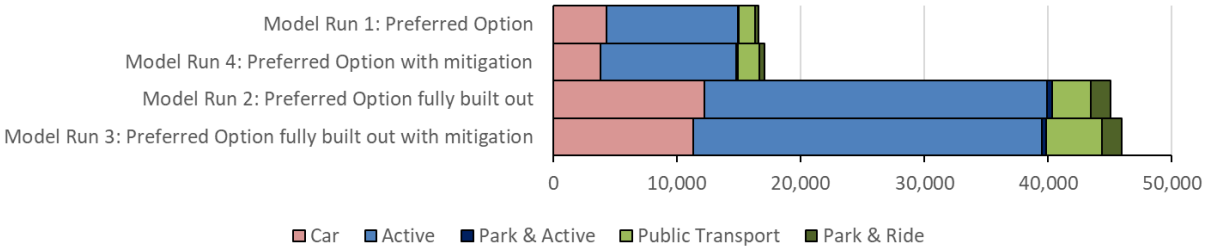
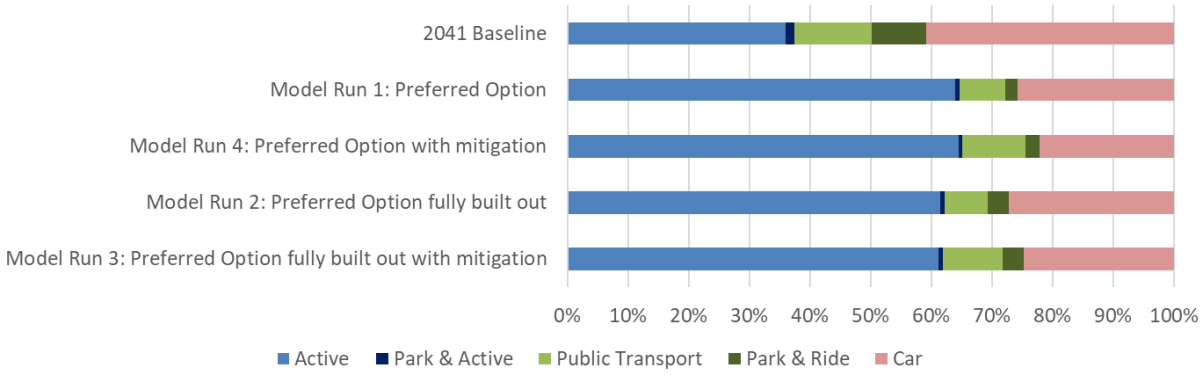


Table 67 Mode shares of trips from North East Cambridge in the 2041 Baseline, and of additional trips from North West Cambridge generated by development in the Preferred Option

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	198	15,413	36.0%	1.4%	12.7%	9.0%	40.8 %
1: Preferred Option to 2041	3,901	2,966	64.0%	0.7%	7.6%	1.9%	25.8 %
4: Preferred Option with mitigation	3,901	2,966	64.5%	0.6%	10.4%	2.3%	22.2 %
2: Preferred Option Fully Built Out	8,351	18,652	61.4%	0.9%	7.0%	3.6%	27.1 %
3: Preferred Option Fully built out with mitigation	8,351	18,652	61.3%	0.8%	9.8%	3.5%	24.7 %

Figure 64 Mode shares of trips from North East Cambridge in the 2041 Baseline, and of additional trips from North East Cambridge generated by development in the Preferred Option



Model Run 1: Preferred Option

14.3.3 In terms of car trips per additional dwelling, North East Cambridge performs well, and very similarly to how it performs in the Strategic Spatial Options in which it was included (see Table 13 in Section 0), with 1.10 car trips per dwelling. North East Cambridge achieves a high level of travel by Active Modes with 2.72 trips per dwelling and a good level of Public Transport / Park and Ride usage, at a combined 0.40 trips per dwelling. This indicates that the location on the edge of Cambridge and access to local jobs and services enables a high proportion of trips to be made by Active Modes.

Model Run 4: Preferred Option with mitigation

14.3.4 Active mode trips per dwelling at North East Cambridge increase from 2.72 in the Preferred Option without mitigation to 2.82 with mitigation, while car trips per dwelling fall from 1.10 to 0.97, the lowest levels seen in all the major development sites in Model Run 4. Public Transport and Park & Ride trips per dwelling both increase. This indicates that the proposed mitigation package enables even more trips to be made by sustainable modes, with around 78% of the additional trips made by non-car modes.

14.3.5 It is noted that:

- The vehicular trip budget policy approach that has been identified as required for this site, via the Area Action Plan process and is confirmed here, was not included in the modelled package of mitigation measures.

- The mitigation in Model Runs 4 and 3 included only limited measures that directly provide for the transport demand of the North East Cambridge site over and above that included in the 2041 Baseline. In this context, some of the improvements in non-car trip making are likely to be down to the improvements to wider accessibility from North East Cambridge to other locations as a result of measures such as City Access, Cambridge Eastern Access and East West Rail.

Model Run 2: Preferred Option, fully built out

14.3.6 0 and Figure 62 show that when fully built out without mitigation, trip rates per dwelling by all modes of transport increase at North East Cambridge compared to Model Run 1, which tested the Preferred Option in 2041. This increase in trip making includes trips by car, which account for approximately one third of the overall increase. This results in an increase in the mode share of car use in Model Run 2 of 1.3% compared to Model Run 1, as shown in Table 67 and Figure 64.

14.3.7 This increase in car mode share is due in large part to the significant increase in the ratio of jobs to dwellings at North East Cambridge when the site is fully built out, from 0.76 jobs per dwelling in Model Runs 1 and 4, to 2.23 in Model Runs 2 and 3. This leads to more in-commuting, including by car.

Model Run 3: Preferred Option, fully built out with mitigation

14.3.8 As was the case with Model Run 4, the mitigation in Model Run 3 includes only limited measures that directly provide for the transport demand of the North East Cambridge site over and above that included in the 2041 Baseline.

14.3.9 0 and Figure 62 show that when fully built out, with mitigation, the absolute level of trip making and mode share of trips by Active Modes, Public Transport and Park & Ride all rise, whereas the mode share of car usage falls, although not back to the levels seen in Model Runs 1 and 4. As noted in relation to Model Run 2, the reason for the higher level of car trips is due in large part to the higher ratio of jobs to homes at North East Cambridge when fully built out.

14.3.10 However, the mode share of Public Transport increases significantly with the mitigation package in the full build out scenario, as clearly shown in Figure 62, Figure 63 and Figure 64, and the mode share of Active Modes sees a very small reduction – from 61.4% to 61.3%. The combined non-car mode share of 75.3%

remains very high for an edge of city site and indicates that the site is very well placed in terms of its ability to achieve sustainable transport patterns.

14.3.11 There would also be opportunity to further increase levels of trip making by Active Modes and Public Transport through the refinement of the package of mitigation measures, and by consideration of the proposed trip budget policy approach.

14.4 Cambridge East

14.4.1 Table 68 and Figure 65 show trips per dwelling generated by the additional dwellings in the Preferred Option at Cambridge East, and Figure 66 shows the total daily trip generation. 0 and Figure 67 show the mode shares of the additional trips generated by the development in the Preferred Option.

Table 68 Daily trips per additional dwelling at Cambridge East in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	2,601	3,685	1.90	0.08	0.25	0.03	2.76
1: Preferred Option to 2041	2,853	1,291	2.40	0.05	0.20	0.01	1.90
4: Preferred Option with mitigation	2,853	1,291	2.39	0.04	0.30	0.15	1.86
2: Preferred Option Fully Built Out	7,003	8,295	2.89	0.06	0.21	0.01	1.96
3: Preferred Option Fully built out with mitigation	7,003	8,295	3.01	0.05	0.29	0.18	1.91

Figure 65 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at Cambridge East in the Preferred Option

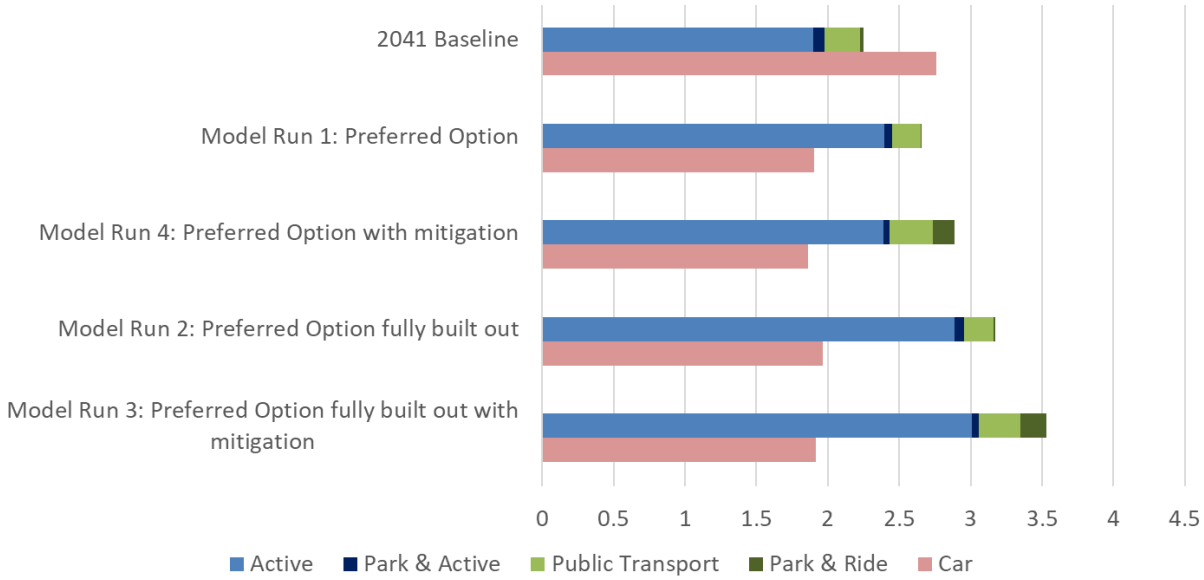


Figure 66 Daily trip generation of Cambridge East in the Preferred Option

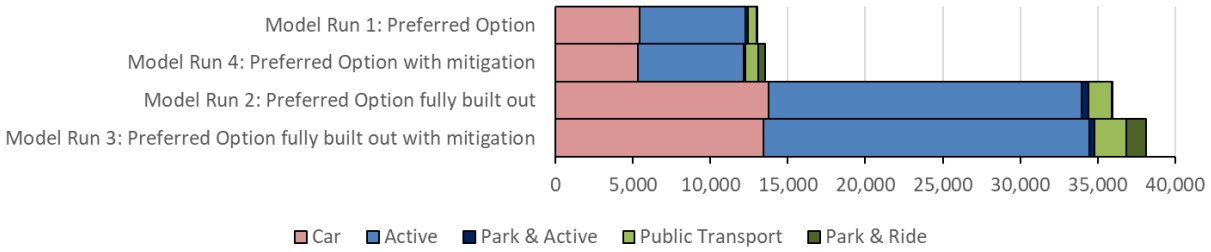
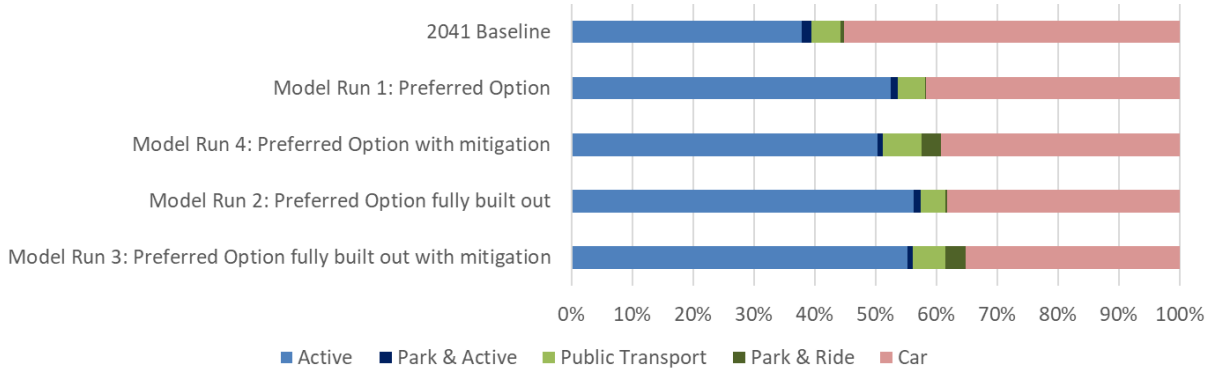


Table 69 Mode shares of trips from Cambridge East in the 2041 Baseline, and of additional trips from Cambridge East generated by development in the Preferred Option

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	2,601	3,685	37.9%	1.5%	4.9%	0.6%	55.1%
1: Preferred Option to 2041	2,853	1,291	52.6%	1.1%	4.4%	0.2%	41.7%
4: Preferred Option with mitigation	2,853	1,291	50.4%	0.9%	6.3%	3.2%	39.2%
2: Preferred Option Fully Built Out	7,003	8,295	56.3%	1.2%	4.0%	0.2%	38.2%
3: Preferred Option Fully built out with mitigation	7,003	8,295	55.3%	0.9%	5.4%	3.3%	35.2%

Figure 67 Mode shares of trips from Cambridge East in the 2041 Baseline, and of additional trips from Cambridge East generated by development in the Preferred Option



Model Run 1: Preferred Option

14.4.2 Cambridge East performs moderately well, achieving 1.9 car trips per dwelling, which is approximately the average of the 1.3 and 2.6 trips per dwelling achieved in the two sectors this location was covered by in the assessment of the Strategic Spatial Options and reported in Table 13. Without mitigation, use of Active Modes and Public Transport combined is high, and similar to levels seen at North West Cambridge but is slightly lower than the levels seen at North East Cambridge.

Model Run 4: Preferred Option with mitigation

14.4.3 Table 68 and Figure 65 show that Public Transport and Park & Ride trips per dwelling both increase with the addition of the proposed mitigation package. This indicates that the proposed mitigation package, and particularly the Cambridge Eastern Access Phase B scheme, is performing well in terms of making the sustainable transport network an attractive option for many trips. The mode share of the additional non-car trips at Cambridge East rises to over 60% in Model Run 4.

Model Run 2: Preferred Option, fully built out

14.4.4 Cambridge East sees a slight increase in car trips per dwelling when fully built out without mitigation, but it also shows a correspondingly larger increase in Active Travel trips per dwelling. The level of Public Transport trips per dwelling does not increase. This indicates increasing opportunities for travel by Actives Modes due to the additional jobs and services provided on site. Nevertheless, this also provides a strong indication of the need for mitigation at Cambridge East to reduce the level of car trips on the network.

Model Run 3: Preferred Option, fully built out with mitigation

14.4.5 Table 68 and Figure 65 show Cambridge East achieving a reduction in car trip making back to the levels seen in Model Run 1, with an additional slight increase in Active Travel Trips per dwelling, as well as an increase in Public Transport and Park & Ride trips per dwelling.

14.4.6 This indicates that the package of mitigation measures, and in particular the Cambridge Eastern Access scheme, are having a very positive impact on the sustainable transport patterns associated with Cambridge East.

14.4.7 The increased level of Park & Ride trips as a result of the mitigation package is not unexpected or unwanted, but further analysis of the Cambridge Eastern Access scheme to understand whether any of these trips are generated by development at Cambridge East directly may be of value. Higher proportions of trips using direct Public Transport services, as opposed to driving to a Park & Ride site are more sustainable in transport / carbon terms.

14.4.8 As noted elsewhere in this report, the mitigation measures tested did not include policy interventions such as vehicular trip budgets. To further improve non-car mode shares and minimise highway impacts on the surrounding network, a trip budget will be required for this site as part of the package of mitigation measures.

Potential change to phasing of Cambridge Eastern Access proposals

14.4.9 In July 2021 the Executive Board of the Greater Cambridge Partnership considered Cambridge Eastern Access. They agreed that the development of an Outline Business Case for the Park & Ride provision would be brought forward ahead of Phase B.

14.4.10 The inclusion of the Park & Ride site in the 2041 Baseline rather than the mitigation package would have resulted in changes to the performance of the Preferred Option in Model Runs 1 and 4, with the likelihood of higher Park & Ride numbers at Cambridge East (and potentially at Waterbeach – see Section 14.10 below) in those tests. However, it would not change the conclusions drawn in this report, as it is a phasing issue, rather than a substantive change to the transport mitigation package.

14.5 Extension to Cambourne

14.5.1 Table 70 and Figure 68 show trips per dwelling generated by the additional dwellings in the Preferred Option at the Extension to Cambourne, and Figure 69 shows the total daily trip generation. 0 and Figure 70 show the mode shares of the additional trips generated by the development in the Preferred Option. As explained at Paragraph 9.4.1, the extension of Cambourne is included as a broad location for strategic growth in the Preferred Options, with 10,000 dwellings included as a proxy for a full build out for the purposes of testing at this stage.

Table 70 Daily trips per additional dwelling at the Extension to Cambourne in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	10,359	9,843	1.47	0.05	0.23	0.07	3.27
1: Preferred Option to 2041	1,950	1,162	1.50	0.04	0.12	0.05	2.79
4: Preferred Option with mitigation	1,950	1,162	1.29	0.03	0.65	0.19	2.34
2: Preferred Option Fully Built Out	10,000	10,009	2.45	0.03	0.10	0.04	2.15
3: Preferred Option Fully built out with mitigation	10,000	10,009	2.30	0.03	0.38	0.08	1.97

Figure 68 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at the Extension to Cambourne in the Preferred Option

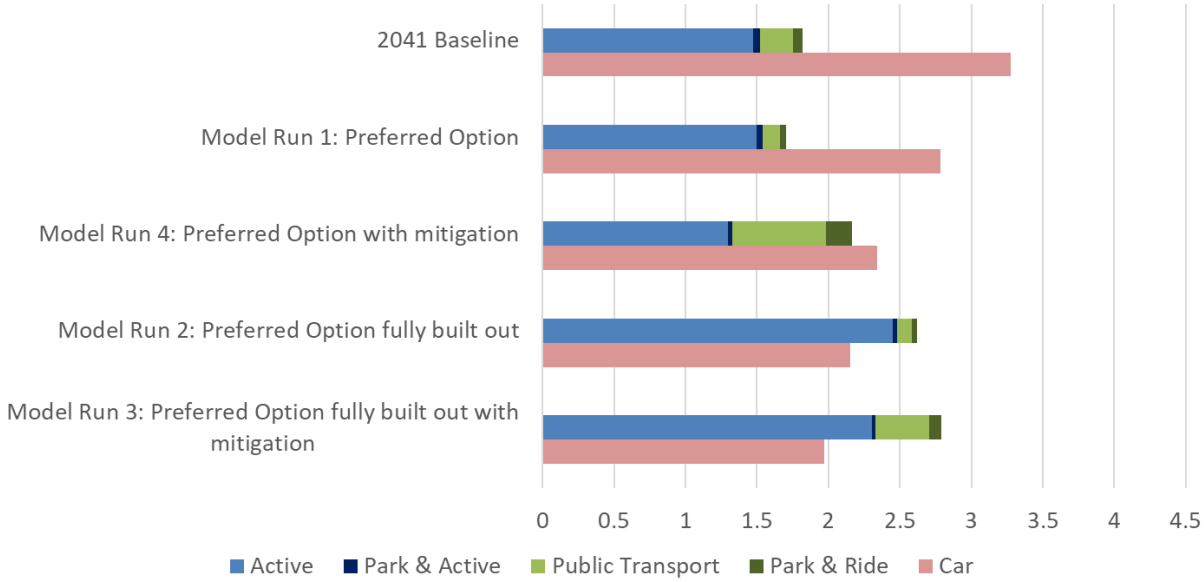


Figure 69 Daily trip generation of the Extension to Cambourne in the Preferred Option

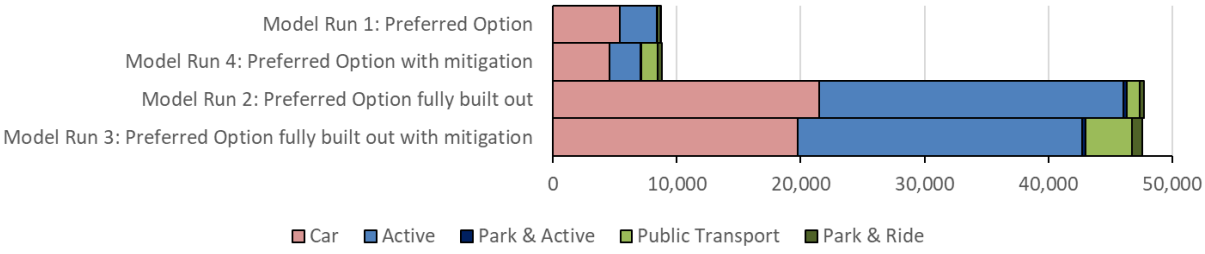
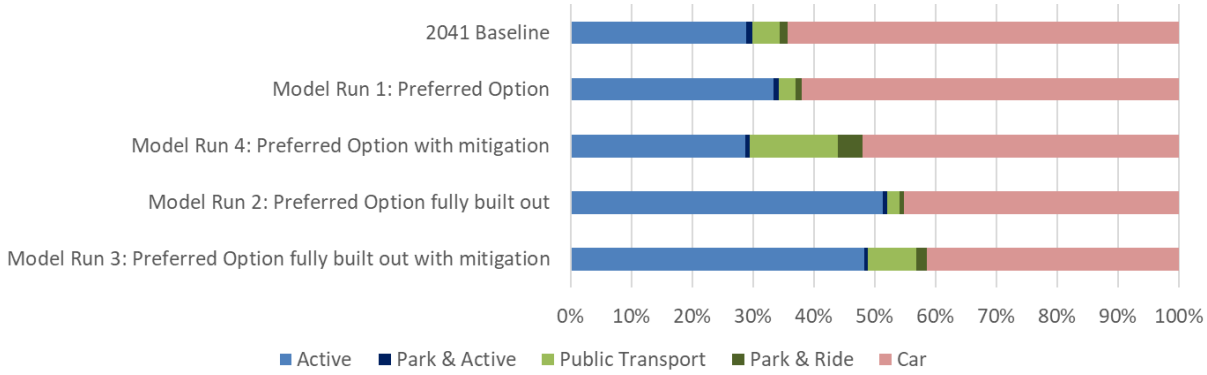


Table 71 Mode shares of trips from Cambourne / Bourn / Caxton in the 2041 Baseline, and of additional trips from the Extension of Cambourne in the Preferred Option

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	10,359	9,843	28.9%	1.0%	4.4%	1.4%	64.2%
1: Preferred Option to 2041	1,950	1,162	33.4%	1.0%	2.6%	1.0%	62.0%
4: Preferred Option with mitigation	1,950	1,162	28.7%	0.7%	14.5%	4.1%	52.0%
2: Preferred Option Fully Built Out	10,000	10,009	51.4%	0.6%	2.1%	0.7%	45.1%
3: Preferred Option Fully built out with mitigation	10,000	10,009	48.4%	0.5%	7.9%	1.7%	41.5%

Figure 70 Mode shares of trips from Cambourne / Bourn / Caxton in the 2041 Baseline, and of additional trips from the Extension of Cambourne in the Preferred Option



Model Run 1: Preferred Option

14.5.2 Table 70 and Figure 68 show that the extension to Cambourne performs moderately well in terms of levels of car use. As set out in Paragraph 2.2.12 and confirmed in Section 9.2, the 2041 Baseline assumes the Greater Cambridge Partnership's Cambourne to Cambridge scheme is provided but is not directly linked into the site with dedicated infrastructure. It does not include East West Rail, which is included as mitigation in Model Run 4 for the Preferred Option in 2041, and Model Run 3 (Preferred Option fully built out).

14.5.3 Without mitigation, the extension of Cambourne achieves 2.8 car trips per dwelling / job, compared to 1.9 at Cambridge East. This outcome is unsurprising, as the analysis of Sensitivity Tests 2a and, 2b and 2c reported in Paragraphs 4.4.11 to 4.4.19 of this report underlined the importance of mitigation measures (absent in this test) to the performance of sites further away from Cambridge in achieving high non-car mode shares. In this context, the additional accelerated development at the existing new settlements at Northstowe and Waterbeach, both of which benefit from mitigation measures, achieve higher Active Mode and Public Transport usage, and lower car use than the extension to Cambourne without mitigation.

14.5.4 Without mitigation measures, the extension to Cambourne achieves low levels of Public Transport usage compared to North East Cambridge and Cambridge East in Model Run 1. New Active Travel mode trips per dwelling / job for the extension of Cambourne are shown to be 1.5 trips per dwelling, compared to 2.4 at Cambridge East and 2.7 at North East Cambridge. This is again unsurprising when considered alongside earlier analysis in Part 1 of this report, which demonstrated that locations closer to Cambridge achieved higher Active Travel Mode shares than those further away from the urban edge.

Model Run 4: Preferred Option with mitigation

14.5.5 As shown in Table 70 and Figure 68, the level of trips per dwelling in Model Run 4 for Active Modes goes down to 1.29 from 1.50 in Model Run 1. However, trips per dwelling for Public Transport rise considerably from 0.12 to 0.65, and Park & Ride trips per dwelling go up from 0.05 to 0.19 when compared to Model Run 1, and the combined trips per dwelling by non-car modes rises from 1.71 to 2.16.

14.5.6 In terms of car trips, the site still performs moderately well, with the level of car trips per dwelling reducing from 2.79 to 2.34, indicating a shift away from private car towards Public Transport. The GCP Cambourne to Cambridge scheme and East West Rail are catering for a significant increase in Public Transport trips. 0 and Figure 70 show that mode share of non-car modes of additional trips from the extension to Cambourne is almost 50%. This figure is not as high as that seen for the additional trips generated by the accelerated delivery of dwellings at Northstowe and Waterbeach. This reflects the relative level of development at these three settlements in Model Runs 1 and 4, with significantly less development at the extension to Cambourne (1,950 dwellings) than at Northstowe (around 7,000 dwellings) and Waterbeach (around 5,300 dwellings). The assessment of Model Runs 2 and 3 below provides further opportunity for a comparison of the performance of these three sites.

Model Run 2: Preferred Option, fully built out

14.5.7 Table 70 and Figure 68 show that the extension to Cambourne if built out fully to 10,000 dwellings (the proxy being used for testing) would see a significant improvement in its transport performance, due to a significant decrease in the number of car trips per dwelling. At 2.15 car trips per dwelling, the performance of the extension to Cambourne is almost identical to that shown for the additional development at Waterbeach in Model Run 2. The use of Active Modes sees a large increase, from 1.5 to 2.45 trips per dwelling, reflecting the greater opportunity for these modes with the provision of more local services and facilities.

14.5.8 The 2.15 car trips per dwelling seen at the extension of Cambourne, fully built out is only around 10% higher than the 1.96 car trips per dwelling seen at Cambridge East in Table 68 and Figure 65. This again reinforces the point that new settlements at the scale seen at Northstowe and Waterbeach, and as being tested as a proxy for the full built out of an extension of Cambourne, can achieve high levels of non-car travel and levels of car trip making that are near to those seen at edge of Cambridge sites. In this context, the improvement seen is largely due to the settlement being of a scale that means that many local jobs and services can be provided and accessed within the settlement by Active Modes.

14.5.9 This site-specific analysis has not assessed additional trip distance by car from new settlements compared to edge of Cambridge sites. However, the analysis of travel

distance by car of the Strategic Spatial Options in Section 3.5 of this report, and in particular the comparison between Strategic Spatial Option 2 with Strategic Spatial Option 8 in Figure 8, indicates travel distances by car from the new settlements are likely to be greater than those associated with edge of Cambridge sites.

14.5.10 Public transport mode share remains relatively low, reflecting that in Model Run 2 there is no mitigation applied.

Model Run 3: Preferred Option, fully built out with mitigation

14.5.11 Table 70 and Figure 68 show that the introduction of the package of mitigation measures in Model Run 3 leads to a further reduction in car trips per dwelling from the level seen in Model Run 2. East West Rail has a significant beneficial impact on the travel patterns seen from this location, with a large increase in Public Transport use. It is noted that the assessment of the benefits of East West Rail on this location can be considered conservative as:

- The East West Rail Central Section was modelled with only two of the four services an hour on the route stopping at Cambridge South.
- East West Rail services were modelled as terminating at Cambridge, meaning that there would be an interchange penalty for onward trips to Cambridge North, Waterbeach, Ely, Newmarket, Bury St Edmunds, Ipswich, and Norwich. However, it is likely that some services on the East West Rail Central Section would travel onwards to these destinations.

14.5.12 As was the case with Model Run 2, the performance of the extension of Cambourne for this metric mirrors that of Waterbeach, with both locations just under 2.0 car trips per dwelling. Notably, this level of car use is only slightly higher than seen at Cambridge East in Model Run 4. 0 shows the trip rates per dwelling of the additional trips from these sites in Model Run 3.

Figure 71 Daily trips per additional dwelling in Model Run 3 at Cambridge East, Extension to Cambourne, Accelerated Delivery at Northstowe and Waterbeach

Scenario	Change in dwellings	Change in Jobs	Active Modes	Park & Active	Public Transport	Park & Ride	Car
Cambridge East	7,003	8,295	3.01	0.05	0.29	0.18	1.91
Extension to Cambourne	10,000	10,009	2.30	0.03	0.38	0.08	1.97
Northstowe	750	328	1.97	0.06	0.29	0.10	1.69
Waterbeach	850	470	1.92	0.15	0.20	0.38	1.95

14.5.13 Once again, this demonstrates that new settlements at the scale seen at Northstowe and Waterbeach, and as included in the Preferred Option as an extension of Cambourne can achieve low levels of car use when there are significant associated public and active transport improvements provided.

14.5.14 As noted elsewhere in this report, a trip budget policy approach was not included in the modelled package of mitigation measures for any site, even where one is being required through the planning process. For Cambourne, a trip budget policy approach is not identified as required at this stage, but as noted in Paragraph **Error! R eference source not found.**, a trip budget will be considered for the expansion of Cambourne as the draft Local Plan is prepared. This would improve non-car mode shares yet further.

14.6 Accelerated delivery of dwellings at Northstowe and Waterbeach

Note on the assessment of accelerated development at Northstowe and Waterbeach

14.6.1 The development at Northstowe and Waterbeach in the Preferred Option takes the form of accelerated delivery of development at the two new settlements that is already committed in the South Cambridgeshire Local Plan 2018. As is set out in Section 9.4, in each case it is planned to deliver an additional 750 dwellings by 2041 over and above the trajectory set out in the Local Plan 2018.

14.6.2 The overall level of development at the two new settlements when fully built out is not changed by the accelerated development in the Preferred Option, as set out in Section 9.4 above. It should be remembered that as detailed in Paragraph 9.4.3, there is no additional development at Northstowe or Waterbeach in Model Runs 2 and 3 over and above that included in Model Runs 1 and 4.

14.6.3 The purpose of the transport evidence in this document is to assess the impact of the Preferred Option on the transport network – with and without mitigation – and the assessment of development at Waterbeach and Northstowe is therefore limited to the consideration of the impact of the acceleration of development to 2041, as detailed in Model Runs 1 and 4. While the data for Model Runs 2 and 3 covering Northstowe and Waterbeach is presented in this section of the report for completeness, it is not analysed here.

14.6.4 However, there is some value in the assessment of Model Runs 2 and 3 to see the impact of the new sites in the Preferred Option, fully built out on Waterbeach and Northstowe. The consistent level of development at both locations in all four model runs allows the impact of the Preferred Option on both settlements to be considered. This analysis is undertaken as an addendum to the Sector Analysis in Section 14.10 below, as the conclusions drawn do not relate to development at Northstowe or Waterbeach.

Accelerated delivery of dwellings at Northstowe

14.6.5 Table 72 and Figure 72 show trips per dwelling generated by the additional dwellings in the Preferred Option at Northstowe, and Figure 73 shows the total daily trip

generation. 0 and Figure 74 show the mode shares of the additional trips generated by the development in the Preferred Option.

Table 72 Daily trips per additional dwelling at Northstowe in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	6,181	3,838	1.39	0.08	0.24	0.06	2.36
1: Preferred Option to 2041	750	328	1.98	0.05	0.25	0.04	1.66
4: Preferred Option with mitigation	750	328	1.99	0.04	0.22	0.10	1.60
2: Preferred Option Fully Built Out	750	328	1.97	0.06	0.29	0.10	1.69
3: Preferred Option Fully built out with mitigation	750	328	1.97	0.05	0.25	0.17	1.61

Figure 72 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at Northstowe in the Preferred Option

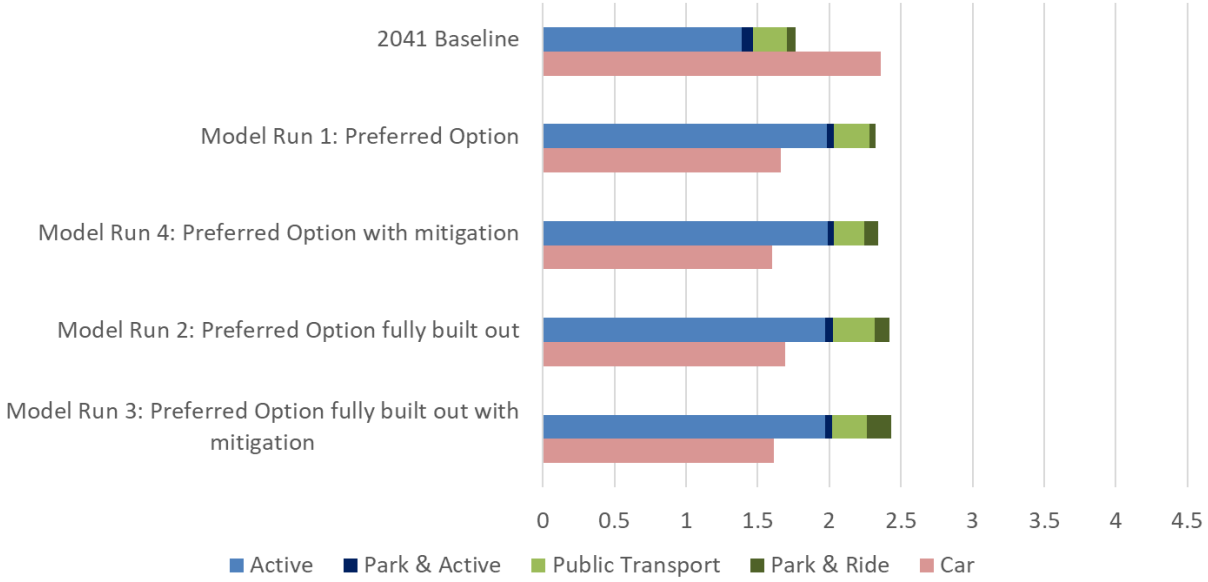


Figure 73 Daily trip generation of the accelerated delivery of dwellings at Northstowe in the Preferred Option

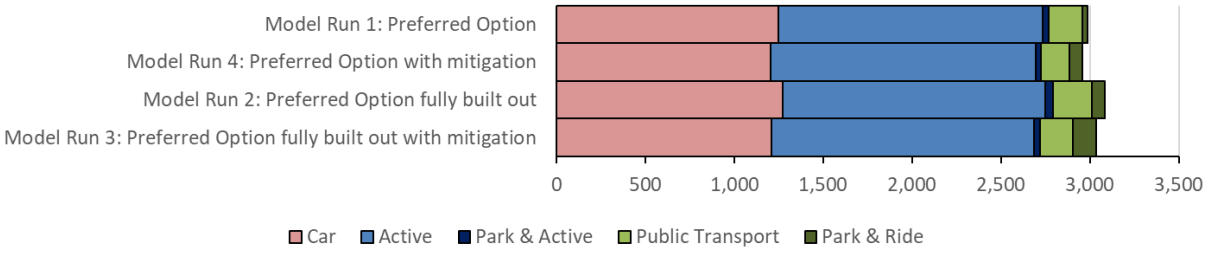
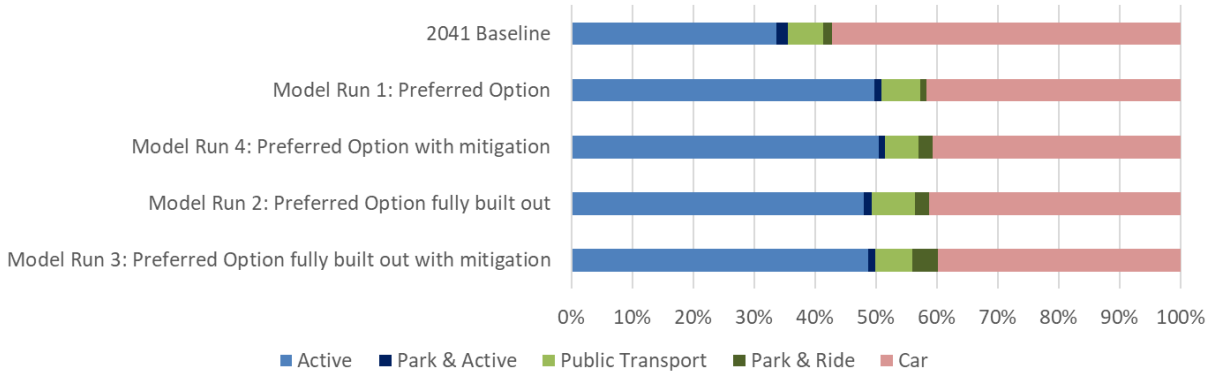


Table 73 Mode shares of trips from Northstowe in the 2041 Baseline, and of additional trips from Northstowe generated by development in the Preferred Option

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	6,181	3,838	33.7%	1.9%	5.8%	1.5%	57.2%
1: Preferred Option to 2041	750	328	49.8%	1.2%	6.3%	1.1%	41.7%
4: Preferred Option with mitigation	750	328	50.4%	1.0%	5.5%	2.4%	40.6%
2: Preferred Option Fully Built Out	750	328	48.0%	1.4%	7.1%	2.4%	41.2%
3: Preferred Option Fully built out with mitigation	750	328	48.7%	1.1%	6.1%	4.2%	39.8%

Figure 74 Mode shares of trips from Northstowe in the 2041 Baseline, and of additional trips from Northstowe generated by development in the Preferred Option



Accelerated delivery of dwellings at Waterbeach

14.6.6 Table 74 and Figure 75 show trips per dwelling generated by the additional dwellings in the Preferred Option at Waterbeach, and Figure 76 shows the total daily trip generation. Table 75 and Figure 77 show the mode shares of the additional trips generated by the development in the Preferred Option.

Table 74 Daily trips per additional dwelling at Waterbeach in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	7,536	9,270	1.30	0.23	0.30	0.09	3.08
1: Preferred Option to 2041	850	470	1.88	0.17	0.25	0.06	2.44
4: Preferred Option with mitigation	850	470	1.84	0.13	0.20	0.27	2.23
2: Preferred Option Fully Built Out	850	470	1.98	0.19	0.26	0.12	2.24
3: Preferred Option Fully built out with mitigation	850	470	1.92	0.15	0.20	0.38	1.95

Figure 75 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at Waterbeach in the Preferred Option

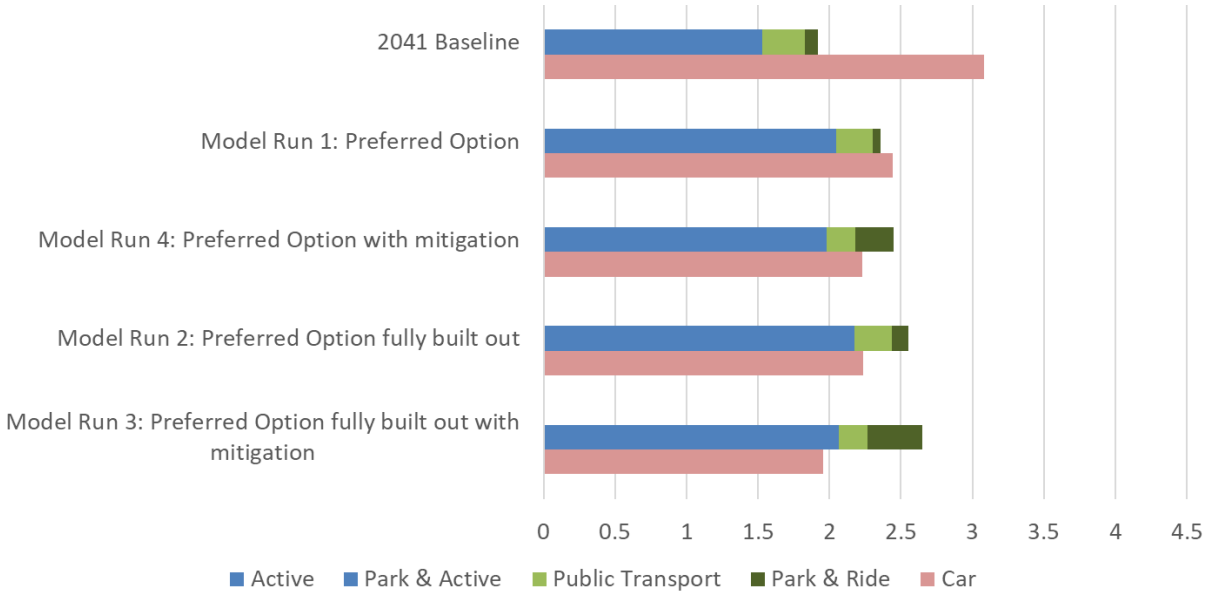


Figure 76 Daily trip generation of the accelerated delivery of dwellings at Waterbeach in the Preferred Option

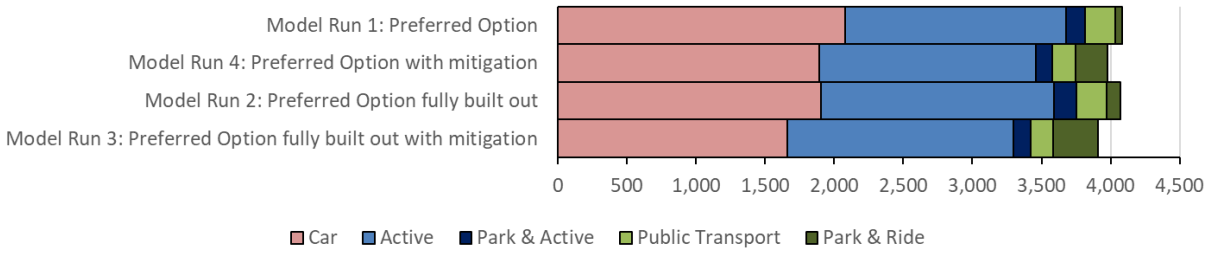
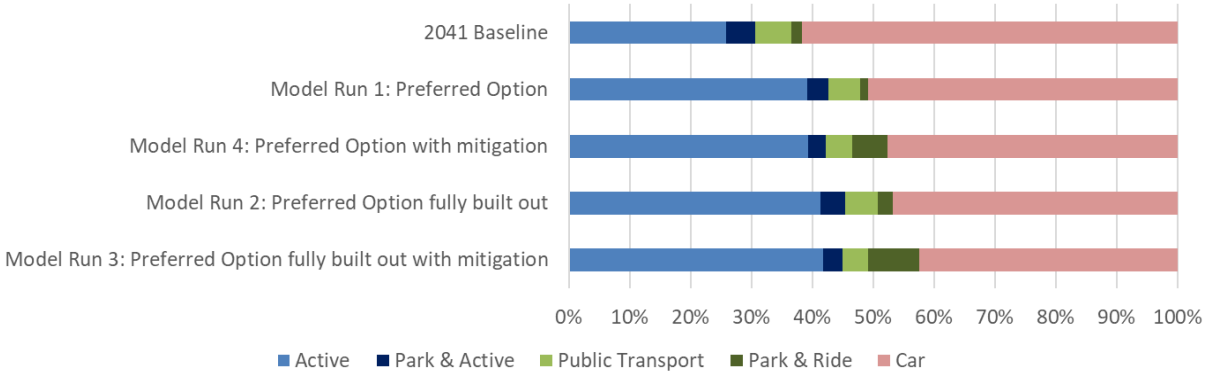


Table 75 Mode shares of trips from Waterbeach in the 2041 Baseline, and of additional trips from Waterbeach generated by development in the Preferred Option

Baseline / Model Run	Dwellings : Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	7,536	9,270	25.9%	4.7%	6.0%	1.8%	61.6%
1: Preferred Option to 2041	850	470	39.2%	3.5%	5.2%	1.2%	50.9%
4: Preferred Option with mitigation	850	470	39.4%	2.9%	4.3%	5.8%	47.6%
2: Preferred Option Fully Built Out	850	470	41.4%	4.1%	5.4%	2.5%	46.7%
3: Preferred Option Fully built out with mitigation	850	470	41.7%	3.2%	4.3%	8.3%	42.5%

Figure 77 Mode shares of trips from Waterbeach in the 2041 Baseline, and of additional trips from Waterbeach generated by development in the Preferred Option



Commentary on the performance of the additional dwellings delivered by 2041

Model Run 1: Preferred Option

14.6.7 The additional housing in the plan period at Northstowe generates 1.66 car trips per additional dwelling. This is lower than the level seen at Cambridge East without mitigation (1.9 trips per dwelling). The accelerated Northstowe development also achieves high levels of Public Transport and Active Travel use, with close to 60% of additional trips made by non-car modes. This reflects that:

- A full set of mitigation measures is already in place at Northstowe, in the form of the Busway linking the town to Cambridge and St Ives, the parallel bridleway / cycle route, and active modes links to neighbouring villages which also provide for many local trips.
- The increased scale of Northstowe by 2041 (reflecting accelerated delivery rates in comparison with the 2041 Baseline) is likely to be contributing to the opportunity for more trips accessing services and jobs to be made locally.
- New settlements of an appropriate scale can achieve levels of car use that approach those seen at the edge of Cambridge sites.

14.6.8 The additional housing in the plan period at Waterbeach (reflecting accelerated delivery rates in comparison with the 2041 Baseline) sees higher car use than seen at Northstowe, but lower than seen at the extension of Cambourne.

- Extension of Cambourne
- Build out of 1,950 dwellings by 2041
- 2.79 car trips per additional dwelling

- Northstowe
- Build out of 7,022 dwellings by 2041
- 1.66 car trips per additional dwelling
- Waterbeach
- Build out of 5,330 dwellings by 2041
- 2.44 car trips per additional dwelling

14.6.9 This is likely to be in large part due to the settlement at Waterbeach, and the extension of Cambourne being less built out than Northstowe in 2041, with less opportunity to access local jobs and services.

Model Run 4: Preferred Option with mitigation

14.6.10 Northstowe performs very similarly with the addition of the mitigation package in Model Run 4 compared to Model Run 1, with a slight reduction in the level of car trips per dwelling and Public Transport trips per dwelling, and an increase in Park & Ride trips per dwelling. The small level of change is not unexpected, as the package of mitigation does not provide any new capacity that directly serves Northstowe.

14.6.11 In Model Run 4, Waterbeach sees a slight drop in the level of trips per dwelling for Active Modes and Public Transport, while the level of trips per dwelling for Park & Ride increases from 0.06 to 0.27. The level of car trips decreases from 2.44 to 2.23 per dwelling, reflecting the role of the mitigation measures. The overall level of trip making per dwelling decreases, as shown in Figure 76, suggesting that a higher proportion of the trips being made are linked trips – those addressing more than one purpose.

Potential change to phasing of Cambridge Eastern Access proposals

14.6.12 As noted in paragraphs 14.4.9 and 14.4.10 above, in July 2021 the Executive Board of the Greater Cambridge Partnership considered Cambridge Eastern Access. They agreed that the development of an Outline Business Case for the Park & Ride provision would be brought forward ahead of Phase B.

14.6.13 In relation to Waterbeach, the inclusion of the Park & Ride site in the 2041 Baseline rather than the mitigation package would have probably have resulted in changes to the performance of the Preferred Option in Model Runs 1 and 4, with the likelihood of higher Park & Ride numbers at Waterbeach as seen in Model Run 3 and

discussed in Section 14.10 below. However, this would not change the conclusions drawn in this report, as it is a phasing issue, rather than a substantive change to the transport mitigation package.

14.7 South Cambridgeshire Villages

14.7.1 Table 76 and Figure 78 show trips per dwelling generated by the additional dwellings in the Preferred Option at villages in South Cambridgeshire, and Figure 79 shows the total daily trip generation. 0 Figure 80 show the mode shares of the additional trips generated by the development in the Preferred Option.

Table 76 Daily trips per additional dwelling at villages in South Cambridgeshire in the Preferred Option model runs

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	34,238	32,974	1.23	0.07	0.20	0.09	3.68
1: Preferred Option to 2041	1,900	1,400	1.35	0.07	0.21	0.05	3.20
4: Preferred Option with mitigation	1,900	1,400	1.32	0.05	0.13	0.31	2.90
2: Preferred Option Fully Built Out	1,900	1,400	1.47	0.11	0.18	0.16	3.09
3: Preferred Option Fully built out with mitigation	1,900	1,400	1.39	0.07	0.12	0.44	2.67

Figure 78 Daily trips per dwelling for the 2041 Baseline, and for the additional dwellings at villages in South Cambridgeshire in the Preferred Option

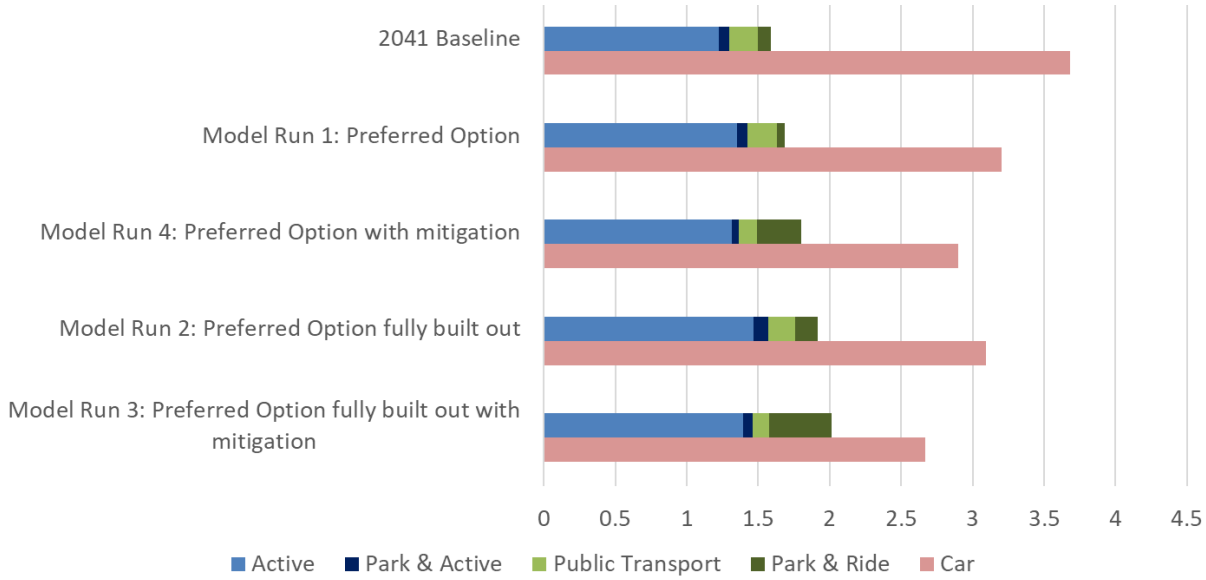


Figure 79 Daily trip generation of development at villages in South Cambridgeshire in the Preferred Option

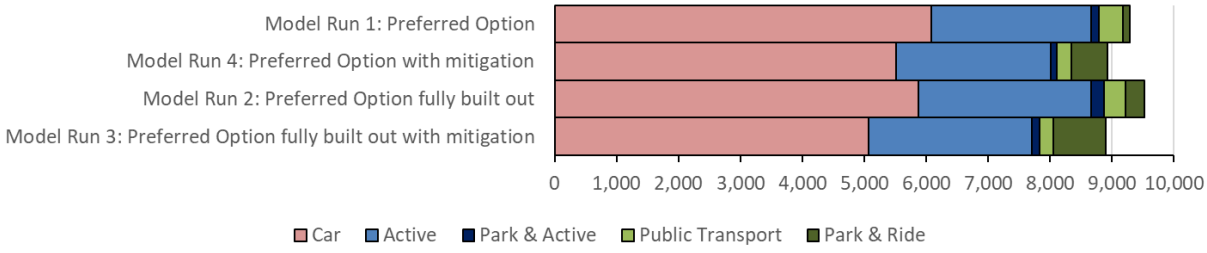
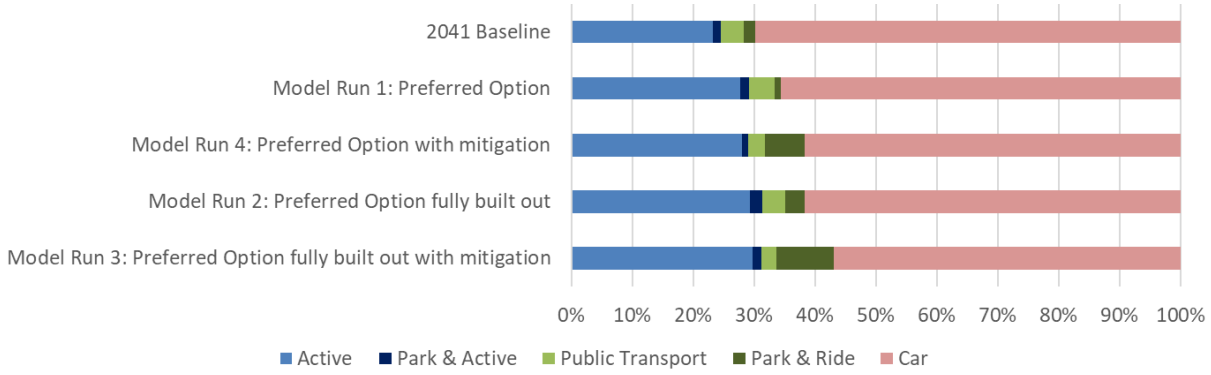


Table 77 Mode shares of trips from villages in South Cambridgeshire in the 2041 Baseline, and of additional trips from the villages generated by development in the Preferred Option

Baseline / Model Run	Dwellings: Existing (2041 Baseline) / Change (Model Runs)	Jobs: Existing (2041 Baseline) / Change (Model Runs)	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	34,238	32,974	23.2%	1.3%	3.8%	1.8%	69.8%
1: Preferred Option to 2041	1,900	1,400	27.7%	1.5%	4.2%	1.1%	65.5%
4: Preferred Option with mitigation	1,900	1,400	28.0%	1.0%	2.7%	6.5%	61.7%
2: Preferred Option Fully Built Out	1,900	1,400	29.3%	2.1%	3.7%	3.2%	61.7%
3: Preferred Option Fully built out with mitigation	1,900	1,400	29.7%	1.4%	2.5%	9.4%	57.0%

Figure 80 Mode shares of trips from villages in South Cambridgeshire in the 2041 Baseline, and of additional trips from the villages generated by development in the Preferred Option



Model Run 1: Preferred Option

14.7.2 As expected, development in South Cambridgeshire villages will see relatively high levels of car use (3.2 trips per dwelling), which confirms the assessment of similar sites in previous Local Plans, and as demonstrated in the assessment of the Strategic Spatial Options in Part 1 of this report. The 3.2 car trips per dwelling for these locations is at the lower end of the range achieved by the wider sample of village locations tested in the Strategic Spatial Options, which achieved between 2.7 and 5.4 trips per dwelling, as detailed in Table 13. This reflects that the villages assessed in the Preferred Option (which included all Rural Centres, Minor Rural Centres and Group Villages with very good Public Transport as a proxy for the purposes of transport modelling) were among the best performing villages in transport terms, of those villages assessed in the Strategic Spatial Option tests.

Model Run 4: Preferred Option with mitigation

14.7.3 Table 76 shows the level of car trips reduces from 3.2 in Model Run 1 to 2.90 in Model Run 4, with Public Transport trips per dwelling also showing a reduction. This model run sees an increase in Park & Ride trips per dwelling due to the introduction of the mitigation package and a very slight fall in Active Modes trips per dwelling. This is likely due to the due to improvements to general accessibility across the area as a result of the increased levels of jobs and services and the transport mitigation measures at the major strategic sites, as there is no specific mitigation proposed for the sites in the rural area.

Model Run 2: Preferred Option, fully built out

14.7.4 Table 76 and Figure 78 show that the level of car trips per dwelling from development in the villages slightly decreases to 3.09 trips per dwelling when the Preferred Option is fully built out and there is an increase in Active Mode and Park and Ride trips per dwelling. As none of the village development locations tested are assumed to continue delivering beyond 2041, these changes are likely to be due to the major strategic sites included in the preferred option being fully built out and thereby providing local services and facilities within short distances of villages. These shorter trips may be more easily made by sustainable modes.

Model Run 3: Preferred Option, fully built out with mitigation

14.7.5 Table 76 and Figure 78 show that the level of trips per dwelling from development in the villages reduces overall when mitigation is introduced to the full build out scenario, as tested in Model Run 3. Trips per dwelling by car drops from 3.09 to 2.67 and there is also a decrease in Active Mode and Public Transport trips per dwelling, but there is an increase in Park & Ride usage. Although Park & Ride usage would still involve car journeys, this would generally comprise car journeys of a shorter length.

14.7.6 It should be noted that Model Runs 3 and 4 do not include any mitigation specifically focussed on development at the village locations, largely due to the relatively low level of development at each site modelled. There may be scope to provide some mitigation that would enable more trips from these locations to be made by non-car modes, reflecting that only the more sustainable village locations were chosen for testing – a judgement which included consideration of their proximity to Cambridge and to High Quality Public Transport corridors.

14.8 Employment growth at the Cambridge Biomedical Campus

14.8.1 The Cambridge Biomedical Campus (CBC) is included in the 2041 Baseline, with the level of development assumed as 1,072 Dwellings and 23,615 Jobs.

14.8.2 The level of development above is for the model zone that the CBC is located in, and therefore includes a wider range of land uses than are found solely at the CBC. The 2041 Baseline mode share for the CBC Zone indicates that 33% of trips are made by active modes of travel and 36% of trips are made by car.

14.8.3 Additional development at the Cambridge Biomedical Campus is included in the working assumption preferred option, but as set out in Paragraph 9.4.3 there is uncertainty associated with the likely scale of development and phasing of delivery for this site. 8,000 jobs have therefore been identified at full build out as a proxy for the purposes of testing at this stage, but no jobs figure has been identified to 2041. As such CBC is included in the Full Build Out tests (Model Runs 2 and 3), but not in the Preferred Option to 2041 test (Model Runs 1 and 4).

14.8.4 For the Full Build Out Model Runs (Model Runs 2 and 3) it was assumed that there would be an additional 8,000 jobs situated at CBC. Figure 81 shows the increase in trip making that would be seen as a result of this growth in the Full Build Out scenarios. Table 78 and Figure 82 show the mode share of all trips to the CBC model zone in the 2041 Baseline, and in the Preferred Option fully built out, and fully built out with mitigation.

Figure 81 All trips in the Cambridge Biomedical Campus model zone in the 2041 Baseline, and in the Preferred Option, fully built out, and fully built out with mitigation

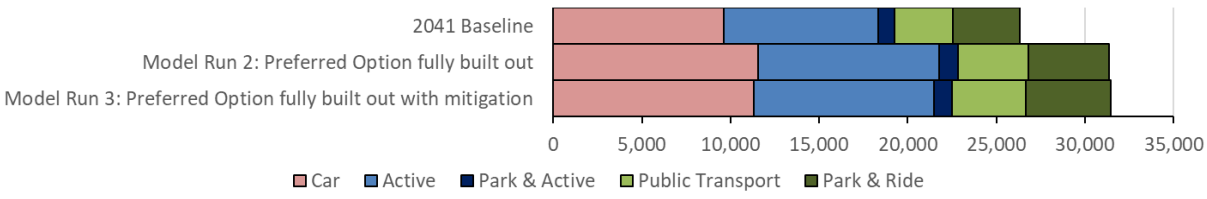
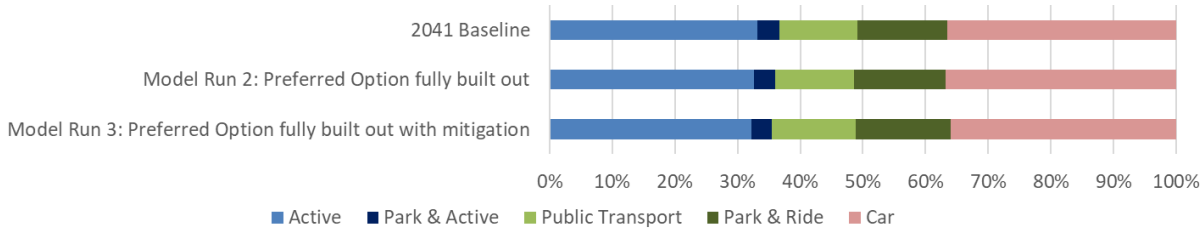


Table 78 Mode shares of all trips in the Cambridge Biomedical Campus model zone in the 2041 Baseline, and in the Preferred Option, fully built out, and fully built out with mitigation

Model Run	Dwellings	Jobs	Active Modes	Park & Active	Public Transport	Park & Ride	Car
2041 Baseline	1,072	23,615	33.2%	3.5%	12.5%	14.4%	36.5%
2: Preferred Option Fully Built Out	1,072	31,615	32.6%	3.4%	12.6%	14.6%	36.8%
3: Preferred Option Fully built out with mitigation	1,072	31,615	32.3%	3.2%	13.3%	15.2%	36.0%

Figure 82 Mode shares of all trips in the Cambridge Biomedical Campus model zone in the 2041 Baseline, and in the Preferred Option, fully built out, and fully built out with mitigation



14.8.5 Positively, the mode share of non-car use from trips in and out of the CBC starts from a very high base in comparison to most edge of city employment sites, including other sites on the edge of Cambridge. Edge of city sites will often attract trips from a very wide area, with less opportunity for use of Active Modes and Public Transport in many cases. The low 2015 Baseline and 2041 Base Year mode shares of car trips reflect very significant efforts by the Planning Authority, Highway Authority and the Campus partners to ensure that the growth of the campus to date was supported by very robust travel planning, significant investment in public transport and active modes, and trip generation targets and limits to car parking that effectively formed a trip budget approach in all but name.

Model Run 1: Preferred Option and Model Run 4: Preferred Option with Mitigation

14.8.6 Development at the CBC has not been included in the Preferred Option to 2041 (Model Runs 1 and 4) as explained in Paragraph 14.8.3, and there is no significant change in the level of trip making and mode share in the CBC zone as a result of the introduction of the Preferred Option to 2041.

Model Run 2: Preferred Option, fully built out

14.8.7 Analysis of Model Run 2 (fully built out without mitigation) shows that the additional employment at the CBC in the 2041 fully built out scenario generates around 5,050 additional person trips in the CBC zone compared to the 2041 Baseline, as shown in Figure 81. Around 1,950 of these additional trips (38.6%) are by car.

14.8.8 As seen in Table 78 and Figure 82, mode shares of all trips are very similar to those seen in the 2041 Baseline. Without mitigation, the expansion of employment on the campus does not increase in the proportion of car trips to and from the area. This is due to the efforts noted in Paragraph 14.8.5 above and the additional enhancements to the connectivity of the CBC in the 2041 Baseline which includes both Cambridge South Station and the Greater Cambridge Partnership Cambridge South East Transport Scheme. The CBC therefore continues to perform very well in terms of maintaining a high levels of non-car mode shares.

Model Run 3: Preferred Option, fully built out with mitigation

14.8.9 Model Run 3 demonstrates that when fully built out, the preferred option with mitigation would lead to a slight reduction in overall car mode share from 36.5% in the 2041 Baseline to 36.0%. The combined mode share of trips by Public Transport and Park and Ride increases by 1.4% with the addition of mitigation from 27.2% to 28.6% in the CBC zone. This shows that the mitigation package, which is not specifically designed to cater for trips to and from the CBC, still results in a reduction in car trips to and from the CBC.

14.8.10 However, the additional growth at the site would still lead to additional car trips without further measures to manage demand or provide non-car capacity. Consideration to date of development on the CBC has successfully focussed on reducing the mode share of car trips to and from the site and has involved very strong travel plan measures including controls on the levels of car parking provision on the CBC, as noted in Paragraph 14.8.5 above. The need for a trip budget is identified as required for CBC. The approach to this, and to maintaining strong travel plan measures, will need to be explored further if additional development on the CBC site is brought forward in the Greater Cambridge Local Plan.

14.8.11 Paragraph 11.1.3 noted that orbital Public Transport services between Cambridge East and North East Cambridge, and between Cambridge East and the CBC were

considered for inclusion in Model Runs 3 and 4 but were not ultimately included at this stage of the assessment. A link between Cambridge East and the CBC would have potential to reduce car trips to and from the CBC further and the merits of this additional mitigation will be considered as the Local Plan is developed further.

14.9 Sector Analysis Summary

Trip generation

14.9.1 Figure 83 shows the trip generation of the strategic locations in the Preferred Option to 2041 with and without mitigation, as tested in Model Runs 1 and 4, and Figure 84 shows the trip generation of the same locations when fully built out with and without mitigation, as tested in Model Runs 2 and 3.

Figure 83 Daily trip generation of strategic locations included in the Preferred Option to 2041 and Preferred Option with mitigation

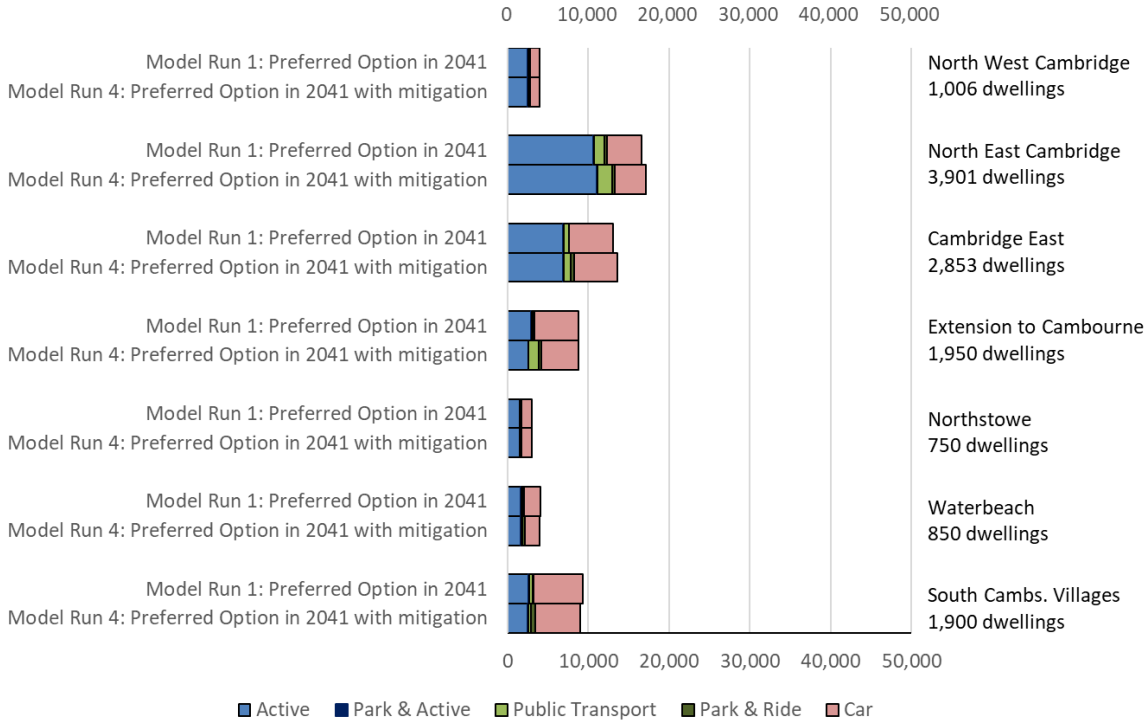
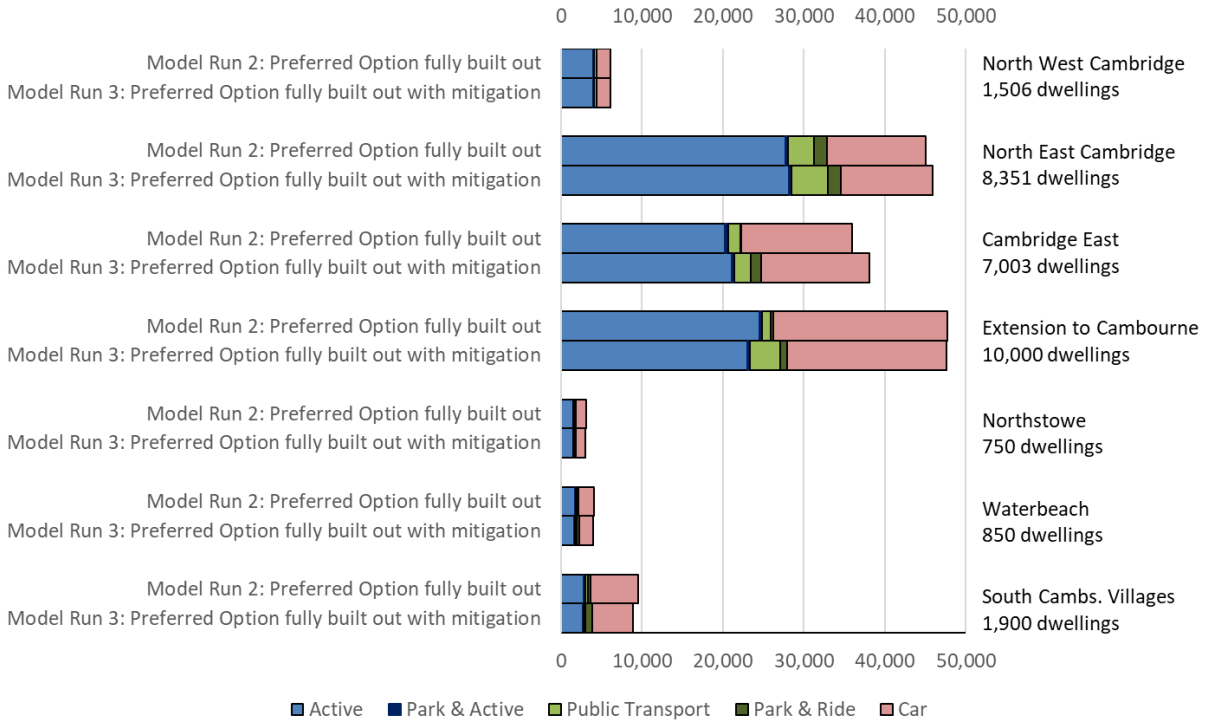


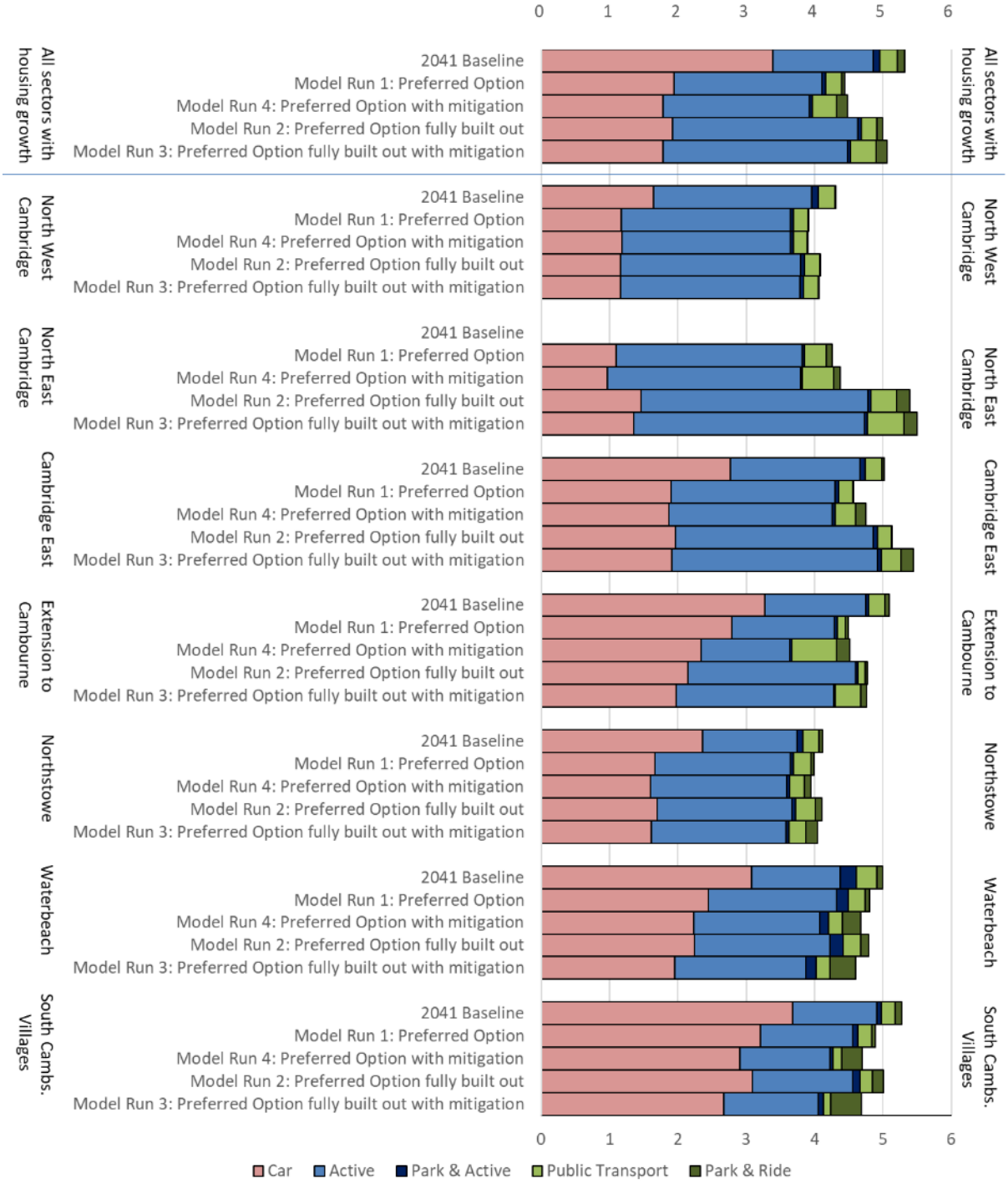
Figure 84 Daily trip generation of strategic locations included in the Preferred Option fully built out and Preferred Option fully built out with mitigation



14.9.2 The dwelling numbers quoted in Figure 83 and Figure 84 are those used in the modelling to inform development of the Preferred Option, and differ slightly from the actual Preferred Option numbers shown in Table 37 in Section 9.4. Figure 84 data for Northstowe and Waterbeach does not include any further development beyond 2041, as detailed in Section 9.4 above. This also applies to Model Run 2 and 3 data for Northstowe and Waterbeach in Figure 85, Figure 86 and Figure 87 below.

14.9.3 The all modes daily trip generation of the sites is broadly proportional to the level of development, but it can be seen from Figure 83 and Figure 84 that the level of car trip generation varies significantly as a proportion of all trips by site. Figure 85 shows this more clearly, detailing daily trips per dwelling generated by the strategic locations in the Preferred Option.

Figure 85 Daily trips per dwelling of the additional trips generated by the strategic locations included in the Preferred Option, compared to the trips per dwelling of all trips in the 2041 Baseline



14.9.4 In terms of car trips generated, North West Cambridge and North East Cambridge perform best. Cambridge East and the Extension to Cambourne perform similarly when fully built out, but the early stages of development at Cambridge East perform better than the extension to Cambourne, due to the proximity of the site to services, jobs and facilities in Cambridge which are not available in the same proximity to Cambourne. While this indicates that a settlement that achieves relatively low levels

of car usage in the Cambourne area is achievable, it needs to be at a scale that allows for local services and jobs to form, to give the opportunity for trips by non-car modes.

14.9.5 For the larger sites – North East Cambridge, Cambridge East and the Extension to Cambourne – one of the impacts of a higher level of development as tested in the full build out Model Runs is that the level of overall trip making increases. In all three cases, this is primarily due to increases in Active Modes and Public Transport trips.

14.9.6 The level of car trip making at Waterbeach is higher than that seen at Northstowe in all four model runs. This reflects that Northstowe, at around 7,000 dwellings in 2041, is more fully built out than Waterbeach, at around 5,300 dwellings. A trip budget approach is being progressed for Waterbeach as part of the planning permission and should assist in reducing the mode share of car use further.

Mode share of car and non-car modes

14.9.7 Figure 86 shows the changes in mode share of all trips in the Greater Cambridge area in the 2041 Baseline, and in Model Runs 1 to 4, which test the Preferred Option. Across Greater Cambridge, the mode share of non-car modes of transport increases with each test, with the highest total non-car mode shares seen in the test of the fully built out Preferred Option with mitigation.

14.9.8 Figure 87 shows the mode share of the additional trips generated on the Greater Cambridge transport network over and above the trips already on the network in the 2041 Baseline. The mode share of non-car modes of transport increases with each test, with the highest total non-car mode shares of 64% seen in the test of the fully built out Preferred Option, with mitigation.

14.9.9 The new locations in the Preferred Option, with mitigation, would be able to provide almost two thirds of their trip making by non-car modes – by walking, cycling and Public Transport use. This compares to a figure of just over a third of trips by non-car modes across Greater Cambridge in the 2041 Baseline, which includes all existing commitments. This indicates highly sustainable travel patterns, particularly for the new large strategic sites which benefit from high levels of accessibility to nearby services and jobs, resulting in more opportunity for short trips by Active Travel and Public Transport.

14.9.10 There is good reason to believe that even lower levels of car use are achievable from the new sites in the Preferred Option than has been already demonstrated by the modelling, as policy approaches such as vehicular trip budgets have not been tested as mitigation. Trip budgets are being considered with a presumption that they will be needed for North East Cambridge, Cambridge East and Cambridge Biomedical Campus, and is to be explored for Cambourne as the draft Local Plan is prepared.

Figure 86 Mode share, all trips, 2041 Baseline and Preferred Option Model Runs 1 to 4

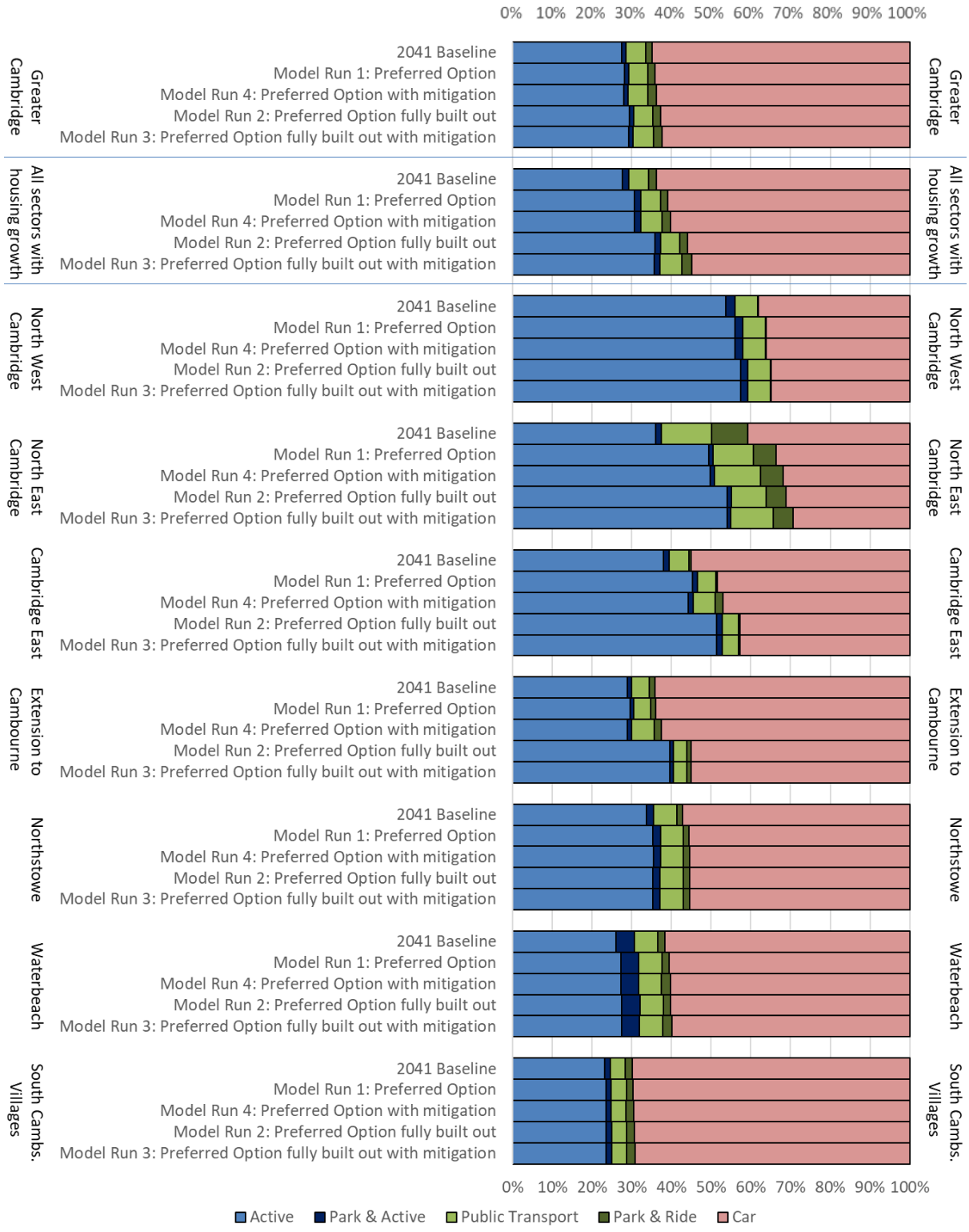
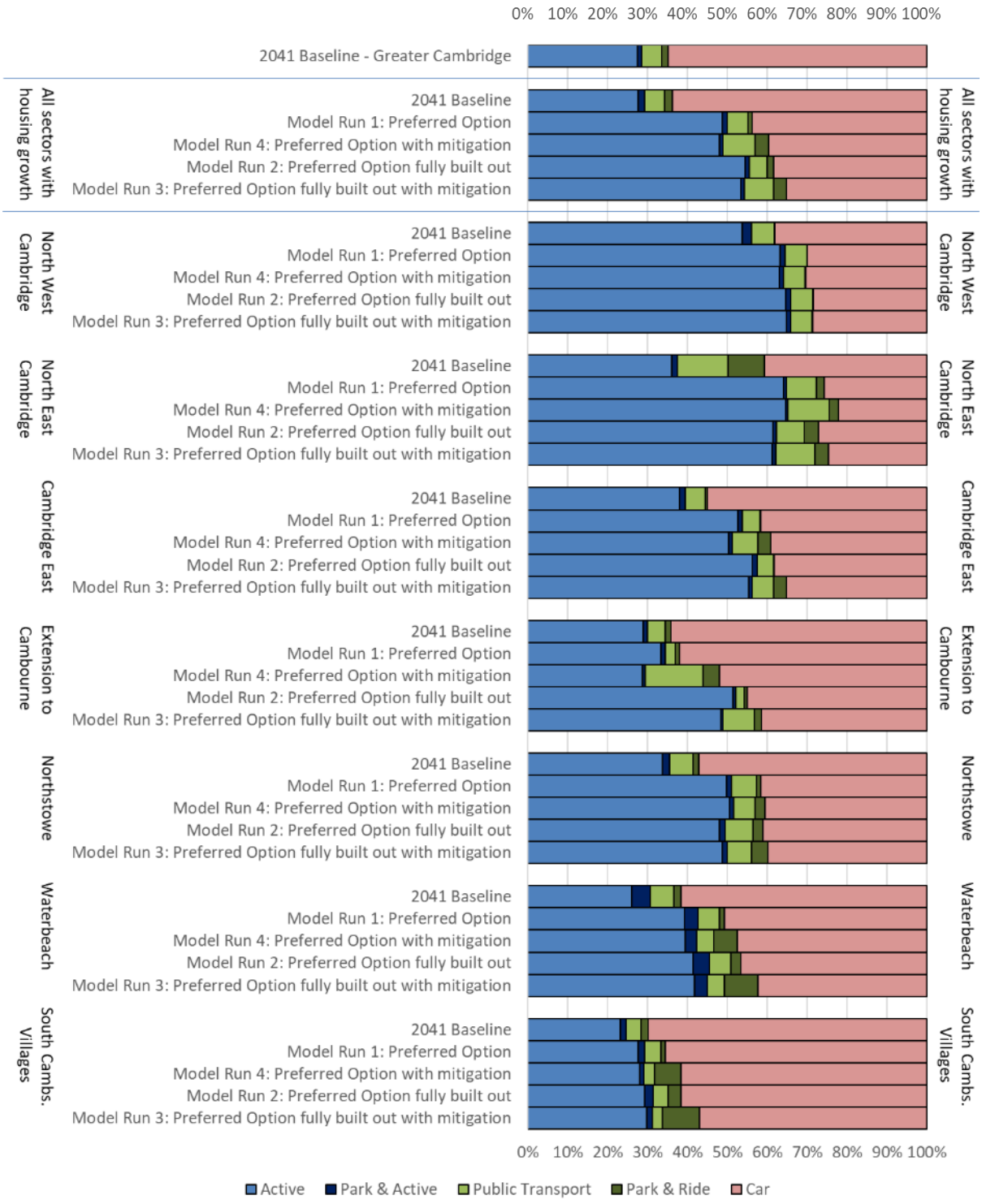


Figure 87 Mode shares, 2041 Baseline and new trips in Preferred Option Model Runs 1 to 4



Impact of mitigation measures

14.9.11 For all locations in the Preferred Option apart from North West Cambridge the provision of the mitigation package leads to a reduction in car trip making, both in 2041 and when fully built out. At North West Cambridge with mitigation, car trip making stays at the low level seen in Model Run 1.

14.9.12 Considering the three larger sites:

- For North East Cambridge, the mitigation measures increase the mode share of non-car modes in Model Run 4 and Model Run 3, with over 70% of additional trips made by non-car modes when the site is fully built out with mitigation.
- For Cambridge East, the mode share of non-car modes for the additional trips is 60% in Model Run 4, with increases seen in the level of Park & Ride and Public Transport trips per dwelling.
- For the extension to Cambourne, the introduction of the mitigation measures leads to a significant reduction in the level of car trips per household, and a marked increase in the level of Public Transport usage, with mode share for additional trips reaching almost 50% for non-car modes in Model Run 4, and over 55% in Model Run 3.

14.9.13 As noted in Paragraph 14.4.7, the increased level of Park & Ride trips as a result of the mitigation package in the sector containing Cambridge East is not unexpected or unwanted, but further analysis of the Cambridge Eastern Access scheme may be of value to understand whether some of these trips are generated by development at Cambridge East directly. Higher proportions of trips using direct Public Transport services, as opposed to driving to a Park & Ride site are more sustainable in transport / carbon terms.

14.9.14 Further refinement of the package of mitigation measures will be required as the Local Plan develops. This will include the identified requirement for vehicular trip budgets at North East Cambridge, Cambridge East and Cambridge Biomedical Campus and consideration of their use at the expansion of Cambourne, to further increase opportunities for sustainable travel, and to also ensure that any released highway capacity is not taken up by additional car trips.

Conclusions from the Sector Analysis of Model Run 1: Preferred Option to 2041

14.9.15 The assessment of the edge of Cambridge locations included in the Preferred Option further supports the inference drawn in Part 1 of this report that the larger sites, particularly those close to or within Cambridge, achieve the most sustainable transport patterns, with higher non-car mode shares and lower level of car trips.

14.9.16 The assessment of the accelerated delivery of development at Northstowe demonstrates that a new settlement of appropriate size more distant from

Cambridge can also achieve low levels of car use. Waterbeach does not perform quite as well as Northstowe given it its smaller scale by 2041, but opportunities to further reduce car trips from the settlement through the use of a trip budget are discussed in Paragraphs 14.9.6 above.

14.9.17 As shown in Figure 85 the level of car trips per dwelling for the additional trips resulting from development in the South Cambridgeshire villages, is considerably higher than all the other larger development sites included in the Preferred Option.

Conclusions from the Sector Analysis of Model Run 4: Preferred Option with mitigation

14.9.18 The assessment of the edge of Cambridge locations in the Preferred Option with mitigation clearly demonstrates the positive impact of the mitigation package on the use of non-car modes. Indeed, there is scope to further increase the level of trips made by sustainable modes through the refinement of the mitigation measures, including application of transport policies in addition to physical infrastructure.

14.9.19 As set out in Figure 83, Model Run 4 shows more trips at North East Cambridge and Cambridge East once the mitigation package is introduced, compared to Model Run 1 (without mitigation). The extra trips are linked to the general increase in accessibility across the city brought about by the transport improvements included in the mitigation package, indicating an increase in activity.

14.9.20 As shown in Figure 87, the introduction of the mitigation package in Model Run 4 makes a considerable difference to the mode share of the additional trips resulting from total level of development tested at Cambourne. In particular, the mode share for Public Transport increases while car mode share decreases. This indicates that the mitigation package is having a positive impact in switching trips away from car modes.

Conclusions from the Sector Analysis of Model Run 2: Preferred Option, full build out

14.9.21 The analysis above suggests that the major sites included within the Preferred Option, when fully built out and without mitigation, all perform well in sustainable transport terms. The data in Figure 87 further supports the conclusions drawn already within this report that larger sites, with their higher levels of jobs, homes and services, result in fewer out-commuting trips and therefore more shorter trips, better

able to be made by Active Modes. This can also be seen in the increased Active Travel trips per dwelling from the three major development sites (North East Cambridge, Cambridge East, Extension of Cambourne) when fully built out shown in Figure 85.

Conclusions from the Sector Analysis of Model Run 3: Preferred Option, full build out with mitigation

14.9.22 This analysis suggests that the major sites included within the Preferred Option, when fully built out and with mitigation, all perform well in sustainable transport terms. The data further underpins the conclusions drawn already within this report that larger sites, with their increased jobs, homes and services, result in lower levels of out-commuting and therefore shorter trips, in particular by non-car modes.

14.9.23 As set out in Figure 84, Model Run 3 shows more trips at North East Cambridge and Cambridge East when fully built out once the mitigation package is introduced, compared to Model Run 2 (without mitigation). The extra trips are linked to the general increase in accessibility across the city brought about by the transport improvements included in the mitigation package, resulting in an increase in activity in the whole modelled area.

14.9.24 Figure 86 shows that an extension to Cambourne fully built out (10,000 dwellings tested as a proxy) performs similarly to Northstowe (7,000 dwellings in Model Run 3), in terms of car mode share for all trips, despite being further from Cambridge. It should be noted that Northstowe generates less trips per dwelling, so the similar car mode share at the extension to Cambourne generates more car trips per dwelling than seen at Northstowe. Not all of the car trips in the model sector containing the extension to Cambourne will be generated by the development. Some will be externally generated trips, such as people accessing the new East West Rail Station at Cambourne and Park & Ride sites, by car, as is discussed in Paragraph 14.10.6 below.

14.9.25 The data, when compared against the corresponding table for the Full Build Out without mitigation (Model Run 2), also underlines the earlier conclusions drawn that the mitigation measures increase use of Public Transport (and Park & Ride) at Cambourne at the expense of both new car and Active Travel trips. Furthermore, as shown in Figure 85, the number of car trips per dwelling for the additional trips

resulting from the extension at Cambourne is very similar to the level seen at Cambridge East, which highlights how well the Cambourne extension performs when fully built out with mitigation.

14.9.26 While Waterbeach has 5,330 dwellings built out in Model Run 3, the high non-car mode shares seen for this location in Model Run 4 in Figure 87 confirm the conclusions that this site is capable of achieving low mode shares of car use that supported its inclusion in the South Cambridgeshire Local Plan 2018. Further they strongly suggest that full build out of the site will lead to even lower levels of car use.

14.9.27 There is also evidence that the build out of the larger sites along with the mitigation measures offers opportunity for trips from other areas to switch mode away from the car, as observed with full build out with mitigation of the Preferred Option at Northstowe, Waterbeach and in the villages, as shown in Figure 87.

14.10 Sector Analysis Addendum: Impact of the Preferred Option on the new towns at Northstowe and Waterbeach

14.10.1 As noted in Section 14.6, the analysis of the Preferred Option only directly assesses the impact of the acceleration of development at Northstowe and Waterbeach to 2041, as the rate of delivery to 2041 is the only aspect of these settlements that changes in the Preferred Option. This results in an additional 750 dwellings by 2041 at each new settlement. The consistent level of development at these two settlements in all four of the Preferred Option Model Runs does however allow the impact of the new locations in the Preferred Option, and the mitigation measures identified for them, on Northstowe and Waterbeach to be considered. The full build out of Northstowe and Waterbeach is not included in Runs 2 and 3 as they are not new sites to be tested.

14.10.2 In more detail, analysis of the data for Northstowe and Waterbeach in Model Runs 2 and 3 compared to Model Runs 1 and 4 provides:

- an indication of whether the mitigation package for the new locations in the Preferred Option might lead to any changes in travel patterns from Northstowe and Waterbeach, despite the measures included in the package not being focussed on these locations
- as comparator data against which performance of other locations in the Preferred Option can be considered.

Change in level and mode shares of trip making at Northstowe as a result of the full build-out of new development locations in the Preferred Option.

14.10.3 Figure 88 shows the daily trip generation of the additional development at Northstowe in the four Preferred Option Model Runs, and Figure 89 shows the mode shares of the additional trips from Northstowe by 2041 included in the Preferred Option.

Figure 88 Daily trip generation of the accelerated delivery of dwellings at Northstowe in the Preferred Option

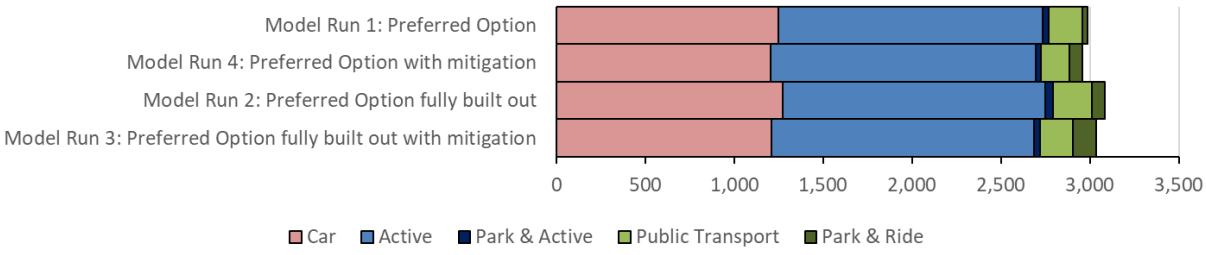
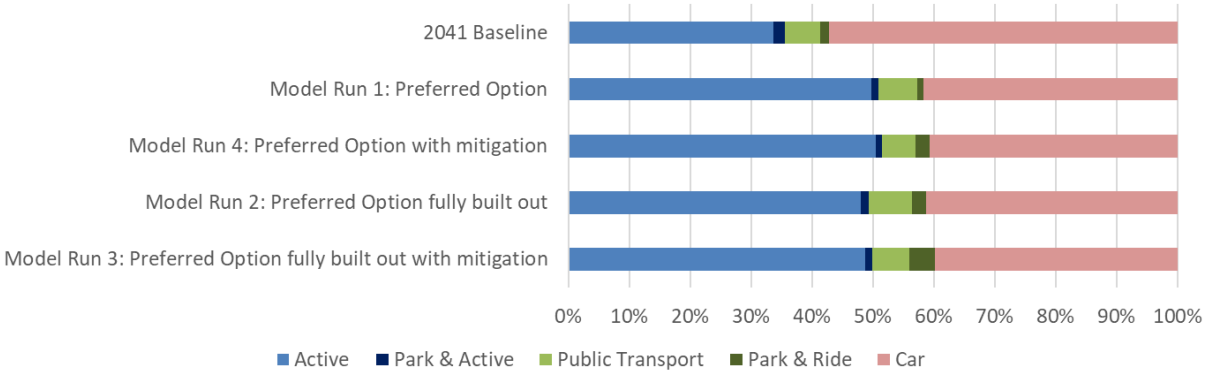


Figure 89 Mode shares of trips from Northstowe in the 2041 Baseline, and of additional trips from Northstowe generated by development in the Preferred Option



14.10.4 The additional development to achieve full build out at new locations in the Preferred Option leads to small increases in overall levels of trip making at Northstowe, both without mitigation (Model Run 2 compared to Model Run 1) and with mitigation (Model Run 4 compared to Model Run 3). The level of car use remains broadly constant in both the without mitigation and with mitigation scenarios, with the additional trips being made by non-car modes.

14.10.5 In Model Run 2, the level of Park & Ride and Park & Active trips increases compared to Model Run 1. As the modelling assumes no additional dwellings or jobs at Northstowe beyond 2041, these changes are likely to be associated with development at North East Cambridge, which is 9 km from Northstowe, and directly accessible from Northstowe on the Busway and its parallel bridleway / cycle path. Use of Busway services from Northstowe is likely to be an attractive option for accessing jobs and other services located at North East Cambridge.

14.10.6 In Model Run 3 there is an increase in trip making by Park & Ride from Northstowe due to the introduction of the package of mitigation measures. Analysis of the highway model outputs indicates that some of this may be due to people from

Northstowe accessing East West Rail at Cambourne. Depending on the trip being made, it would be preferable to cater for at least some of this demand by accessing East West Rail via the Busway link to Cambridge North station. The modelling suggests an opportunity to achieve a further improvement in the performance of Northstowe in terms of reduced car trips and is something to explore with the East West Rail Company and Network Rail.

Change in level and mode shares of trip making at Waterbeach as a result of the full build-out of development in the Preferred Option.

14.10.7 Figure 90 shows the daily trip generation of the additional development at Waterbeach in the four Preferred Option Model Runs, and Figure 91 shows the mode shares of the additional trips from Waterbeach by 2041 included in the Preferred Option.

Figure 90 Daily trip generation of the accelerated delivery of dwellings at Waterbeach in the Preferred Option

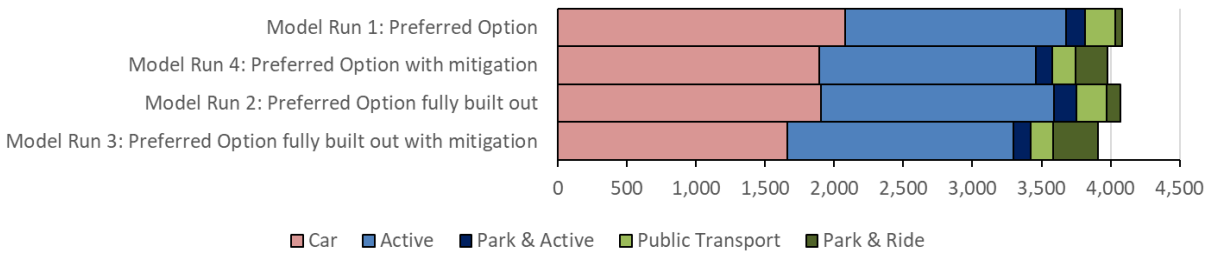
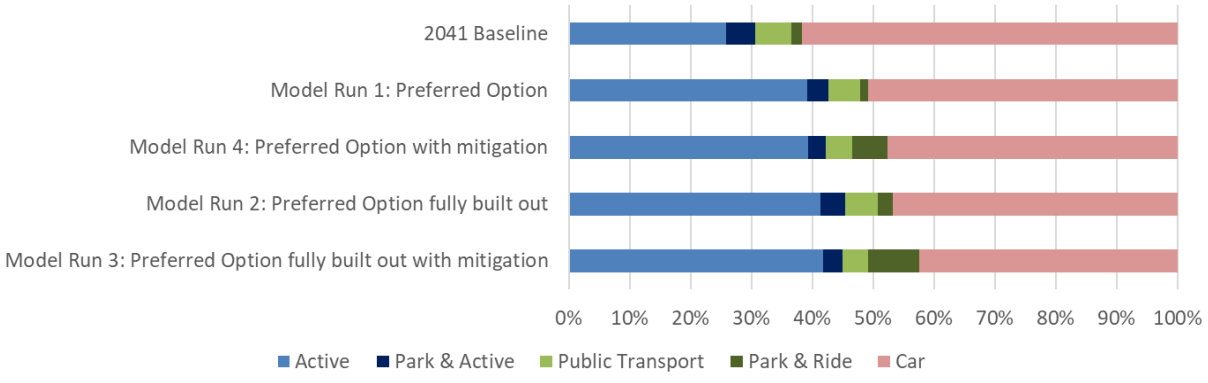


Figure 91 Mode shares of trips from Waterbeach in the 2041 Baseline, and of additional trips from Waterbeach generated by development in the Preferred Option



14.10.8 Unlike at Northstowe, the additional development to achieve full build out at new locations in the Preferred Option leads to small reductions in overall levels of trip making at Waterbeach, both without mitigation (Model Run 2 compared to Model Run 1) and with mitigation (Model Run 4 compared to Model Run 3). More

noticeably, the level of car use at Waterbeach markedly reduces in both the without mitigation and with mitigation scenarios. It needs to be emphasised that this result is despite there being no additional growth at Waterbeach in Model Runs 2 and 3.

14.10.9 In Model Run 2, increases in Active Travel trips account for most of the reduction in car trips. This is likely to be due to trips to and from development at North East Cambridge, which is around 6 km from the new town north of Waterbeach, and accessible from Waterbeach by at least two high quality cycle routes that are included in the 2041 Baseline and in Model Runs 1 and 2. The increased scale of development at North East Cambridge, the additional jobs and services available, and the good accessibility by Active Modes and Public Transport lead to positive impacts on trip making from Waterbeach.

14.10.10 In Model Run 3, there is a significant increase in the use of Park & Ride from Waterbeach as a result of the introduction of the package of mitigation measures. This is likely to be as a result of residents of Waterbeach accessing the Park & Ride site that forms part of the Cambridge Eastern Access Phase B to access to jobs and facilities at Cambridge East and also the eastern side of the city. Paragraph 11.1.3 above notes that:

> "In addition, orbital public transport services between Cambridge East and North East Cambridge, and between Cambridge East and the Cambridge Biomedical Campus were considered for inclusion in Model Runs 3 and 4 but were not ultimately included at this stage of the assessment. As the Local Plan is developed further the merits of additional mitigation will be considered."

14.10.11 The case for direct Public Transport capacity linking Waterbeach with Cambridge East, potentially via North East Cambridge will be considered further through the development of the Local Plan in the context of the increase in Park & Ride trip making and decrease in Public Transport trip making from Waterbeach in Model Run 3.

Potential change to phasing of Cambridge Eastern Access proposals

14.10.12 As noted in paragraphs 14.4.9 and 14.4.10 above, in July 2021 the Executive Board of the Greater Cambridge Partnership considered Cambridge Eastern Access. They agreed that the development of an Outline Business Case for the Park & Ride provision would be brought forward ahead of Phase B.

14.10.13 In relation to Waterbeach, the inclusion of the Park & Ride site in the 2041 Baseline rather than the mitigation package would have probably have resulted in changes to the performance of the Preferred Option in Model Runs 1 and 4, with the likelihood of higher Park & Ride numbers at Waterbeach as seen in Model Run 3 as discussed above. However, this would not change the conclusions drawn in this report, as it is a phasing issue, rather than a substantive change to the transport mitigation package.

15 Preferred Option Tests: Summary and Conclusions

15.1 Overall conclusions

15.1.1 The transport impacts of the Preferred Option for the emerging Greater Cambridge Local Plan have been assessed using the Cambridge Sub Region Model 2, and the results of that assessment are set out and analysed in Part 3 of this report.

15.1.2 The overall conclusions from that testing are that:

- The Preferred Option is capable of being accommodated on the local transport network in Greater Cambridge with appropriate mitigation.
- Model Runs 1 and 2 demonstrated the transport demand of the Preferred Option and showed that the new development locations in it will inherently, without mitigation, achieve much lower proportions of trips made by car than currently seen on the Greater Cambridge transport network from existing homes (see Section 10.2).
- Model Runs 3 and 4 demonstrated that the mitigation planned will further increase the levels of Active Travel and Public Transport use from the new development (also see Section 10.2).
- The Preferred Option achieves a reasonable balance between new homes and jobs overall, with similar proportions of overall in and out-commuting across the CSRM2 model boundary in 2041 to those seen in the 2015 Base Year as shown in Table 51.

15.1.3 The following sections summarise the performance of the Preferred Option overall on the metrics discussed in Part 3 of this report.

Travel patterns

- The scale of development at individual sites is important. In transport terms the strategic sites contained in the Preferred Option, when fully built out are of a scale that gives a good opportunity for trips to be internalised to the development, due to the easy accessibility of employment opportunities and of local services and amenities.
- In this context, the sooner the strategic sites reach a level of development where those opportunities occur, the better they are likely to perform in minimising the need for travel by car (see Chapter 14).

- The introduction of the mitigation package leads to significant shifts from car to non-car modes of transport, and to some extent, reduces congestion and delay for highway trips. The new sites in the Preferred Option, with mitigation, would be able to provide almost two thirds of their trip making by non-car modes – by walking cycling and Public Transport use (see Paragraph 14.8.9). This compares to a figure of just over a third of trips by non-car modes across Greater Cambridge in the 2041 Baseline, which includes all existing commitments.
- Climate and carbon are of fundamental importance in planning for future transport patterns. There is scope for levels of car traffic associated with the development of sites included within the Preferred Option to be reduced even further than has been demonstrated by the modelling to date. Introducing vehicular trip budgets, car parking limits and facilitating and incentivising Public Transport and Active Travel will be essential.

Highway Impacts – Congestion and delay

- Travel distance, travel time and delay all increase above the 2041 Baseline with the addition of the Preferred Option. This is particularly the case for delay. For all three metrics, the increase is higher in the PM peak than in the AM peak and Inter-Peak periods. However, as a proportion of the distance already travelled by car on the Greater Cambridge transport network, the increases in travel distances due to the new locations in the Preferred Option are small (see Paragraph 10.3.2).
- When the mitigation measures are introduced, traffic levels are similar to those seen in the Preferred Option without mitigation, and slight increases in travel time and delay are seen in the AM peak and Inter-Peak periods (see Section 11.3). The mitigation package reduces delay in the PM peak period. Overall, the mitigation package has a positive impact on travel patterns and conditions on the highway network. In the context of the decreased car mode shares seen as a result of the mitigation package (see Section 11.2), the model indicates that the capacity released on the highway network as a result of this mode shift is being taken up by other traffic on the network in the AM peak and interpeak, and potentially by a reduction in peak spreading in the morning peak.
- Conversely, the PM peak is busier than the AM Peak, with greater levels of travel distance (see Figure 34), travel time (see Figure 36) and delay (see Figure 38) and sees reductions against all three metrics with mitigation provided.

- As noted in Section 10.3, for all three metrics the levels of change are proportionally lower than the increases in dwellings included in the Preferred Option, and in terms of travel distance and travel time, they are considerably lower.
- Therefore, there is scope for more refinement of mitigation measures to further address congestion and delay. Emerging proposals for the management of traffic within Cambridge are already seeking to address this issue. Policy mitigation for the strategic sites such as setting vehicular trip budgets has also been identified as required, but not yet included in the mitigation runs. This is particularly important where reduced congestion – due to some switching away from the car – results in 'backfilling' of the freed-up highway capacity by others whose trips become easier by car. Any mitigation measures that seek to address highway congestion will need to be carefully considered with regard to their potential impact on sustainable travel behaviours, noting the Councils' net zero carbon aims.

Impact of mitigation measures

- The Preferred Option must include mitigation measures in order for the transport network to function. The mitigation measures need to provide additional Public Transport capacity and support Active Travel trips. This will help minimise the negative impacts of increased travel demand, particularly in the context of national and local government commitments on carbon, air quality and health and consistent with the Local Transport Plan's vision that "supports the transition to a net zero carbon economy and protects or enhances the environment".
- The new trips generated by the Preferred Option with mitigation as tested in Model Run 3 (see Chapter 13), will achieve significantly lower levels of car use as a proportion of overall trips than seen for existing trips on the transport network. This is without applying further policy mitigation, including vehicular trip budgets – which are being progressed for Waterbeach as part of its planning permission, and are identified as required for North East Cambridge, Cambridge East and Cambridge Biomedical Campus – which would reduce the mode share of car use even further. This will also be considered for other large sites as the draft Local Plan is prepared, including the expansion of Cambourne.
- There is further work needed to refine the mitigation package for inclusion in the draft Local Plan, but there is nothing in the modelling results to suggest that the

development locations and quantum included in the Preferred Option cannot be accommodated on the transport network and achieve high levels of travel by sustainable modes.

15.2 Site Specific conclusions

15.2.1 The following sections summarise the performance of the development locations included in the Preferred Option overall on the metrics discussed in Part 3 of this report.

North West Cambridge

- The additional development at North West Cambridge is likely to achieve low levels of trip making by private car, and high levels of travel by sustainable modes.
- The proposed mitigation does not include any measures targeted at North West Cambridge, however this location continues to perform well with high levels of trips by Active Modes and a low level of car trips.

North East Cambridge

- North East Cambridge was included in a number of the Strategic Spatial Options and performed consistently well in the testing of all of those options.
- Testing of the Preferred Option confirmed the findings that this development would perform particularly well in transport terms, especially once transport infrastructure mitigation is applied, and noting that this is before applying the trip budget that has been identified as being required. This is particularly the case when considering the level of car trips generated and the high level of use of Active Modes from the site.

Cambridge East

- Cambridge East was also included in a number of the Strategic Spatial Options and performed consistently well in the testing of all of those options.
- The proposed mitigation, particularly the Cambridge Eastern Access Phase B scheme, enables high levels of trip making by Public Transport. Cambridge East and Cambourne perform similarly in terms of the level of car trips generated. A trip budget for the Cambridge East site has also been identified as being required (see Paragraph **Error! Reference source not found.**).

Extension to Cambourne

- The testing of the Extension to Cambourne in Chapters 11 and 13 shows that with mitigation, dwellings at the fully built out location, using a proxy for a strategic scale development, would generate levels of trip making by car similar to those seen at Cambridge East.
- The testing of the Preferred Option demonstrated that the introduction of East West Rail would lead to a significant uptake of Public Transport use from the expansion of Cambourne. People from outside the area would access the new railway station by car, resulting in additional car trips in and around Cambourne. The potential requirement for a trip budget approach will be considered as the draft Local Plan is prepared.

Northstowe

- The acceleration of delivery of the Northstowe development in the period to 2041 achieves high levels of Public Transport and Active Travel use due to the Busway and its parallel cycle route / bridleway, as well as the increased opportunity for local trip making through the increased scale of the site, reflecting the substantial amount of development that is expected to be delivered by 2041.

Waterbeach

- The acceleration of delivery of the Waterbeach development in the period to 2041 performs moderately well in terms of car trips generated. This is likely to an extent reflect the lower level of development delivered in the plan period compared to Northstowe. This is also without applying the vehicular trip budget that is being progressed for Waterbeach as part of its planning permission.
- While there is no mitigation specifically targeted at this location outside of schemes already included in the 2041 Baseline, the Preferred Option mitigation still results in an increase in the level of trips made by non-car modes, and particularly by Park & Ride.

South Cambridgeshire Villages

- Development of new sites at villages in South Cambridgeshire is located at those villages served by High Quality Public Transport. Compared to most of the village locations tested in Part 1 of this report, relatively low levels of car use are

achieved at the Preferred Option sites. However, these levels of car use are still higher than seen at any of the other locations in the Preferred Option.

Employment growth at Cambridge Biomedical Campus

- Employment growth at the Cambridge Biomedical Campus (CBC) at full build out (see Section 14.8) performs well, including similar non-car mode shares to Cambridge East. Without mitigation, the expansion of employment on CBC does not lead to an increase in the proportion of car trips to and from the area. This is due to the good level of connectivity assumed for the CBC in the 2041 Baseline which includes both Cambridge South Station and the Greater Cambridge Partnership's Cambridge South East Transport Scheme. This is before inclusion of a trip budget for the CBC that has also been identified as being required.
- A link between Cambridge East and CBC would have potential to reduce car trips to and from the CBC further and the merits of this additional mitigation will be considered as the Local Plan is developed further.