Greater Cambridge Local Plan

Transport Evidence Report

Cambridgeshire County Council

Transport Strategy and Funding Team

November 2020

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	8th Draft

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Executive Summary

Introduction

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 (GCLP) that runs to 2041.

This report forms the Transport Evidence that supports the emerging local plan. The results reported below represent the initial phase of the testing which focuses on the strategic spatial options identified by GCSP.

This Transport Evidence 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.

The Spatial Scenarios Tested

The levels of growth and strategic spatial options tested in this initial phase of the transport evidence were informed by the initial spatial options set out in the First Conversation consultation (Issues and Options, held January-February 2020), and subsequent evidence which identified three growth level options for homes and jobs and eight strategic (non-site specific) spatial options.

The three growth level options being tested through the local plan are:

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

The spatial scenarios tested through this report are:

- 1 Densification of existing urban areas (Densification)
- 2 Edge of Cambridge – outside the Green Belt (Edge – non-GB)
- 3 Edge of Cambridge – Green Belt (Edge – GB)
- 4 Dispersal – new settlements (New Settlements)
- 5 Dispersal – villages (Villages)
- 6 Public transport corridors (PT Corridors)
- 7 Supporting a high-tech corridor by integrating homes and jobs (Integrating Homes and Jobs)
- 8 Expanding a growth area around transport nodes (Expanding Growth Area)

Modelling Methodology

The modelling undertaken in this initial phase of the preparation of the Local Plan Transport evidence report made use of Cambridgeshire County Council's Cambridge Sub Regional Model (CSRM). CSRM has a single 2015 base year as this is the latest set of observed traffic counts on the network that have been validated.

In order to undertake the tests set out in this report it was necessary to create a 2041 Baseline. This new baseline was created by adding completed developments 2015-2020 and planned development 2020-2041 (planning permissions and adopted 2018 Local Plan allocations and Background Growth within the modelled area) to the 2015 Base year.

The new 2041 Baseline model also included transport schemes that are assumed to be in place by 2041. The development assumed for the spatial options along with the levels of in- and out-commuting set out in this report were then added to the Baseline.

The modelling undertaken in this initial phase of the assessment tests the maximum growth level option. The purpose of this is to understand the maximum possible transport impacts generated by each of the eight strategic spatial options.

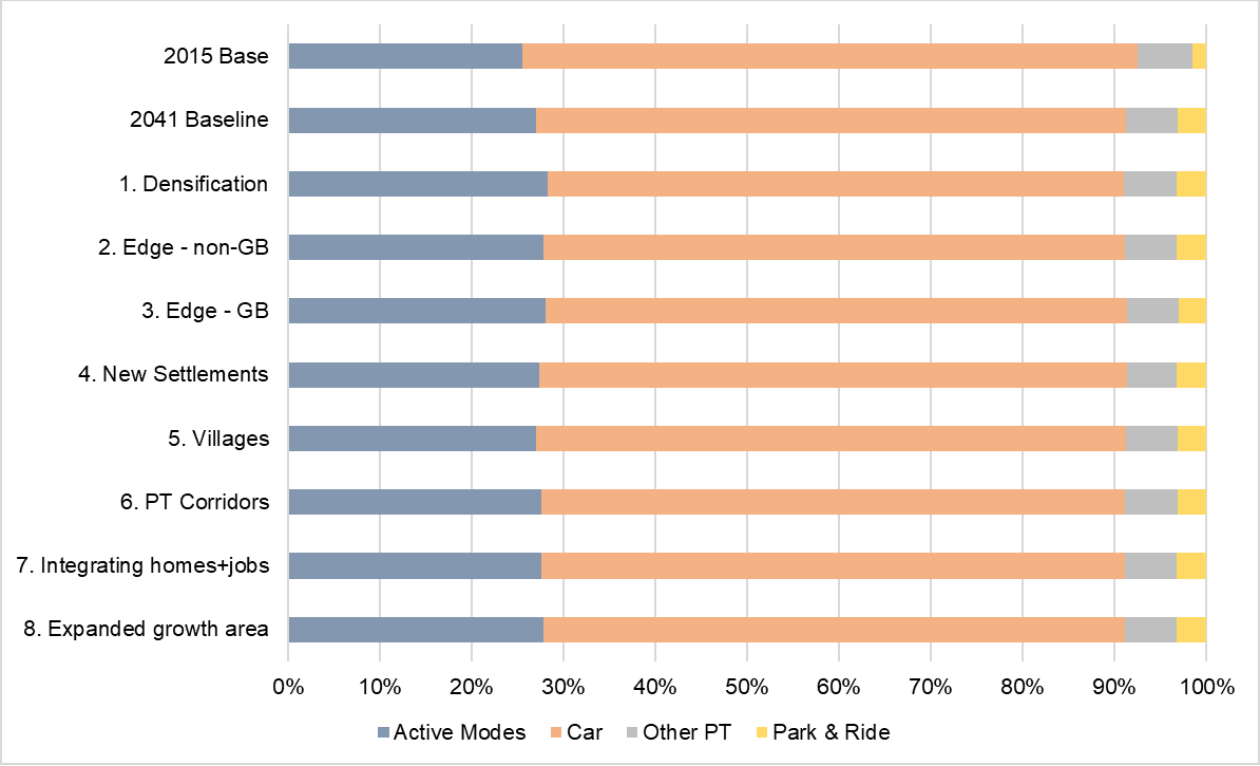
Results

The results below incorporate trip data from the 2015 base, the additional trips incorporated from the new 2041 baseline, and the eight strategic spatial options.

Trip Volumes and Mode Share

This information is from the Transport Demand Model (TDM) and enable the changes in mode shares across all modes to be assessed for each spatial option to be measured.

Percentage Transport Mode Share of Total Trips



Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

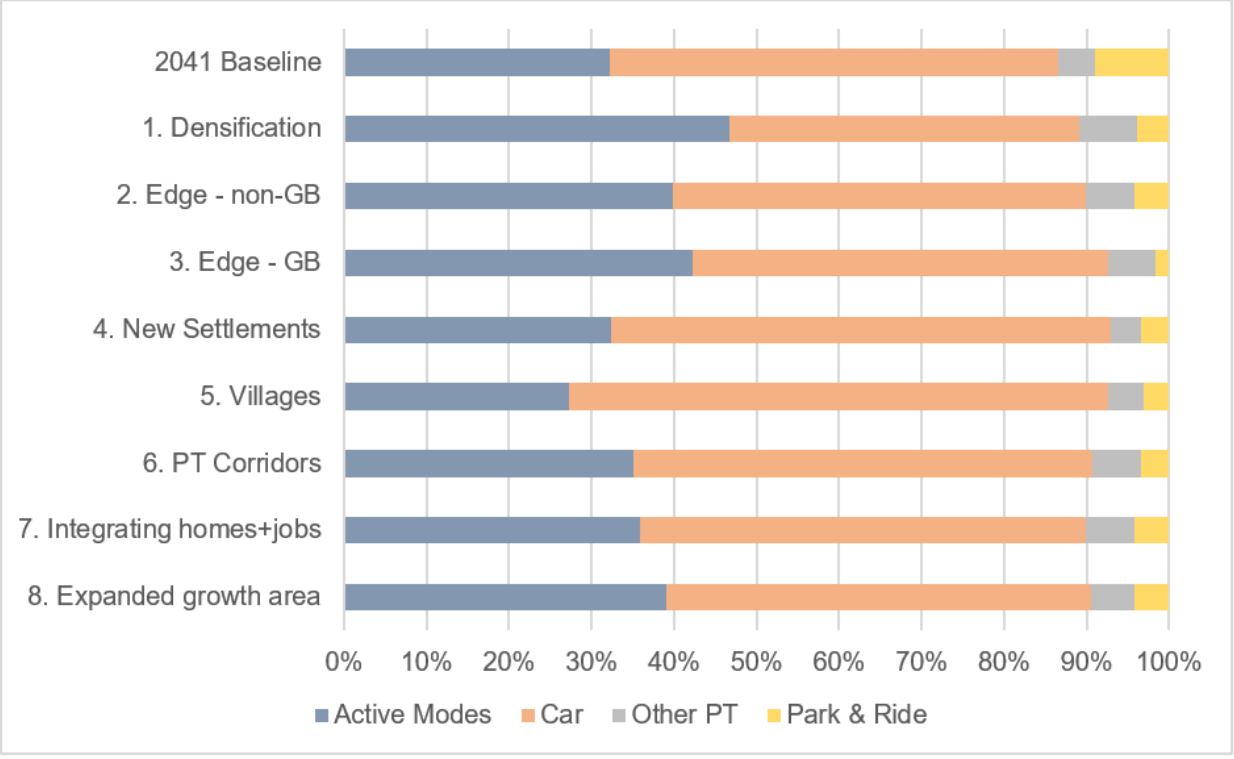
When we look at this graph we can see that the mode shares are fairly consistent across all the spatial options with very small differences shown. This is because the graph includes the trip data from the 2015 base and the new 2041 baseline.

The 2015 base includes a total of 1,568,824 trips whilst the addition of the 2041 Baseline results in an additional 437,765 trips, with each of the eight Strategic Spatial Options adding an additional 151,000 trips on top of the 2041 baseline. Thereby the cumulative total number of trips in the 2041 baseline is 2,006,589 and with the addition of the eight strategic spatial options is 2,157,589 trips.

The relatively small increases in trips in the 2041 Baseline and the eight strategic spatial options means that some of the impacts of the 2041 Baseline and spatial options in terms of mode share are masked by the volume of trips already in the 2015 Base Year.

Therefore in order to enable comparison of the changes in mode shares as a result of the introduction of each of the eight strategic spatial options the figure below sets out the change in mode shares for each spatial option compared to the 2041 Baseline. It is important to note that the results set out below do not include any site-specific mitigation above that assumed in the 2041 Baseline.

Percentage Transport Mode Share of Trip Growth



The best performing spatial option in terms of non-car modes is Option 1 Densification but all the options with the exception of Option 5 Villages have active mode share higher than that indicated in the 2041 Baseline. The results above do not include any additional mitigation over that in the 2041 Baseline. Therefore from this information it is

possible to conclude that all of the spatial options apart from option 5 Villages has the potential to increase use of active travel modes and reduce reliance on the car, as long as the exact location of the development sites is carefully considered. It is also possible to conclude that it should be possible to achieve additional levels of mode shift from all the options if the appropriate level of mitigation was introduced. This means that none of the strategic spatial options are completely ruled out using this metric, although the level of mitigation required to secure significant mode shift for option 5 villages is likely to be of such a scale as to render this option unviable.

Highway Model outputs

The reported statistics in this section use the standard Passenger Car Unit (PCU) of measurement. 1 PCU = 1 Car.

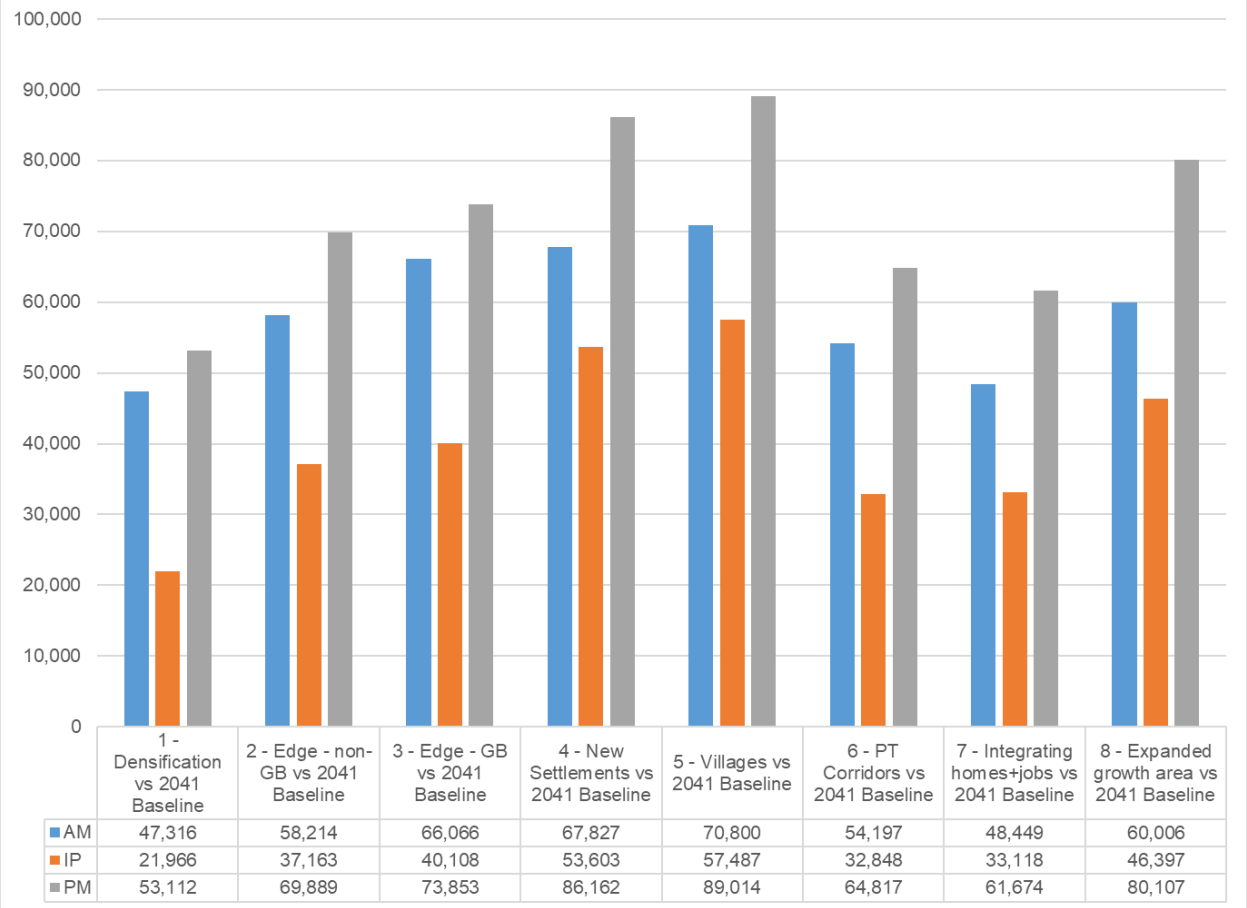
- **Travel distance** – the total distance (in PCU kilometres) travelled by all trips assigned to the network.
- **Travel time** – the total time (in PCU hours) taken for all trips assigned to the network.
- **Delay** – the total delay (which is total time minus free-flow[1] time) (in PCU hours) experienced by all trips assigned to the network.

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 each spatial option on the Highway Network.

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

Travel Distance

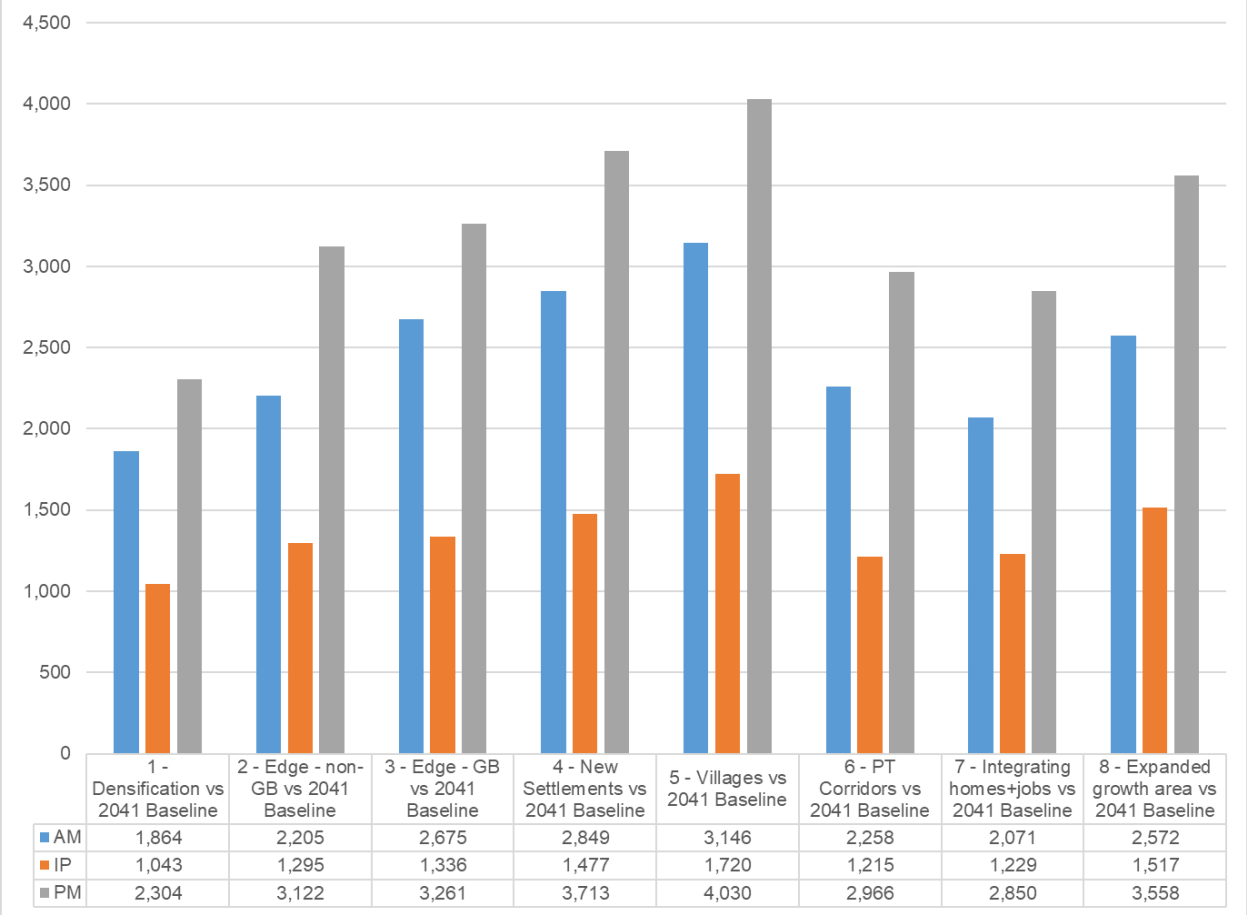
Change in travel distance (Total pcu-kms) (Strategic Options vs 2041 Baseline)



	1 - Densification vs 2041 Baseline	2 - Edge - non-GB vs 2041 Baseline	3 - Edge - GB vs 2041 Baseline	4 - New Settlements vs 2041 Baseline	5 - Villages vs 2041 Baseline	6 - PT Corridors vs 2041 Baseline	7 - Integrating homes+jobs vs 2041 Baseline	8 - Expanded growth area vs 2041 Baseline
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

Travel Time

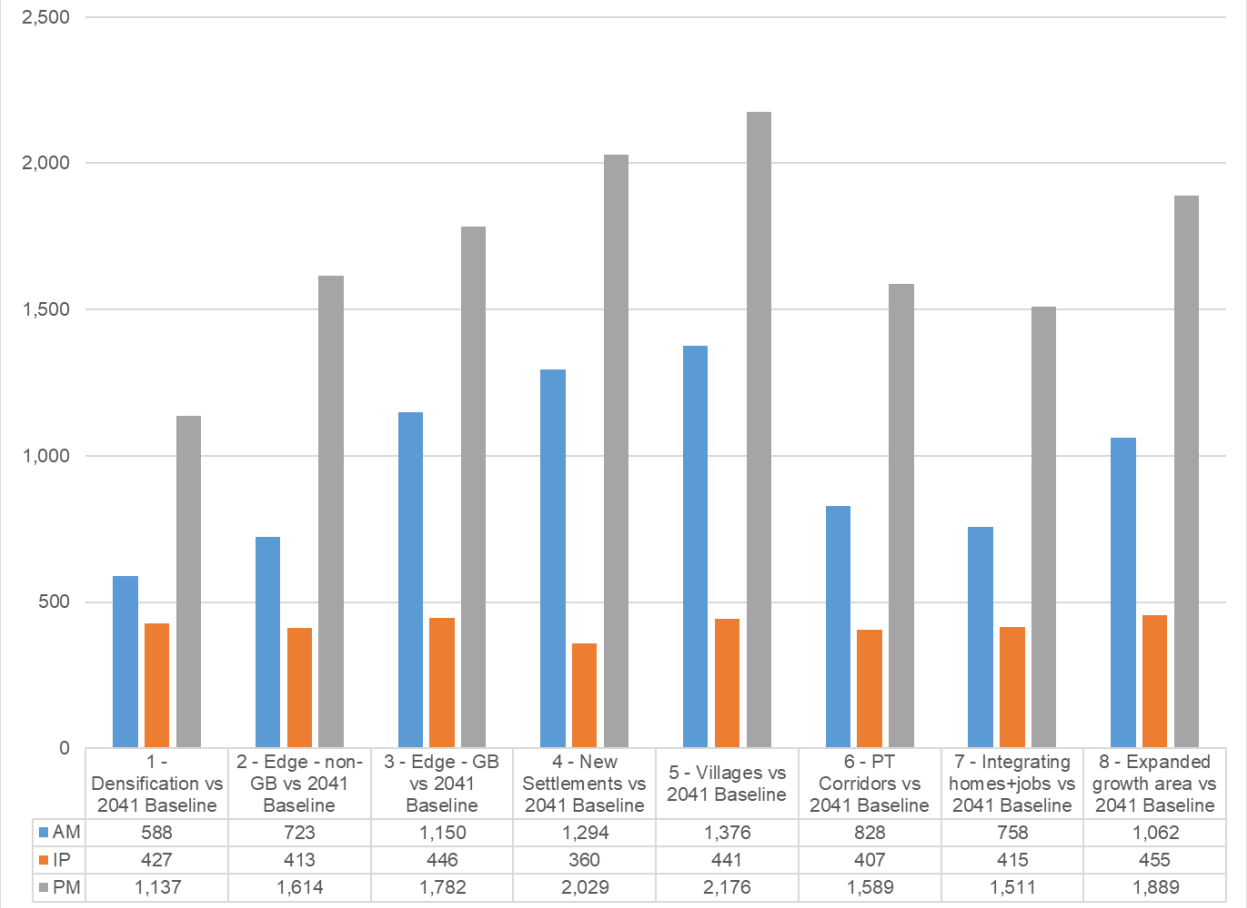
Change in total travel time (Total - pcu.hrs) (Strategic Options vs 2041 Baseline)



	1 - Densification vs 2041 Baseline	2 - Edge - non-GB vs 2041 Baseline	3 - Edge - GB vs 2041 Baseline	4 - New Settlements vs 2041 Baseline	5 - Villages vs 2041 Baseline	6 - PT Corridors vs 2041 Baseline	7 - Integrating homes+jobs vs 2041 Baseline	8 - Expanded growth area vs 2041 Baseline
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

Delay

Change in total delay (Total - pcu.hrs) (Strategic Options vs 2041 Baseline)



	1 - Densification vs 2041 Baseline	2 - Edge - non-GB vs 2041 Baseline	3 - Edge - GB vs 2041 Baseline	4 - New Settlements vs 2041 Baseline	5 - Villages vs 2041 Baseline	6 - PT Corridors vs 2041 Baseline	7 - Integrating homes+jobs vs 2041 Baseline	8 - Expanded growth area vs 2041 Baseline
AM	588	723	1,150	1,294	1,376	828	758	1,062
IP	427	413	446	360	441	407	415	455
PM	1,137	1,614	1,782	2,029	2,176	1,589	1,511	1,889

The best performing spatial option in terms of the level of additional Travel distance, time and delay is Option 1 Densification. Off the remaining spatial options the majority have very similar levels of impacts that indicate that any of these options could be acceptable in transport terms if the right package of measures were to come forward. The exception to this is Option 5 Villages where the level of mitigation needed would be out of keeping with the scale of development within this option and therefore this might render this option unviable.

Conclusion

The tests undertaken to date indicate that all of the spatial options see changes in the mode shares of trips with the majority seeing an increase in the use of active modes for journeys meaning that the proportion of non-car travel increases from that indicated in the 2041 Baseline, this is despite the fact that there is no additional mitigation included in these tests over that included in the 2041 Baseline.

All of the spatial options show an increase in the number of trips, the time taken and the delays but as previously stated none of these tests include any specific mitigation over that in the 2041 Baseline. The results set out in this report indicate that all of the spatial

options will require additional mitigation to be introduced over that already assumed in the model, but the testing done to date does not indicate that any of the spatial options is likely to be undeliverable., It is, however, possible that the level of mitigation required to deliver option 5 villages might mean that this option would not be viable.

1 Introduction

1.1 Study Background

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 (GCLP) that runs to 2041.

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.

The results reported below represent the initial phase of the testing which focuses on the impact of the strategic spatial options on the level of trip making and mode shares in the Greater Cambridge Area.

1.2 Report Purpose

The purpose of this report is as follows;

- Set out the modelling methodology used in the assessment of the identified 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 spatial options
- Set out the assumptions made for each of the spatial options, including the quantum and location of development
- Provide high level results setting out the impact of each spatial option on transport networks
- Provide a high level indication of the deliverability of each option in transport terms.

1.3 Report Structure

The report is structured as follows:

Chapter 2: Assessment of strategic (non-site specific) spatial options

Chapter 3: Modelling Methodology

Chapter 4: Comparison of Strategic Spatial Options

Chapter 5: Strategic Spatial Option Tests Conclusion

Chapter 6: Spatial Option Sensitivity Tests

2 Assessment of Strategic (Non-Site Specific) Spatial Options

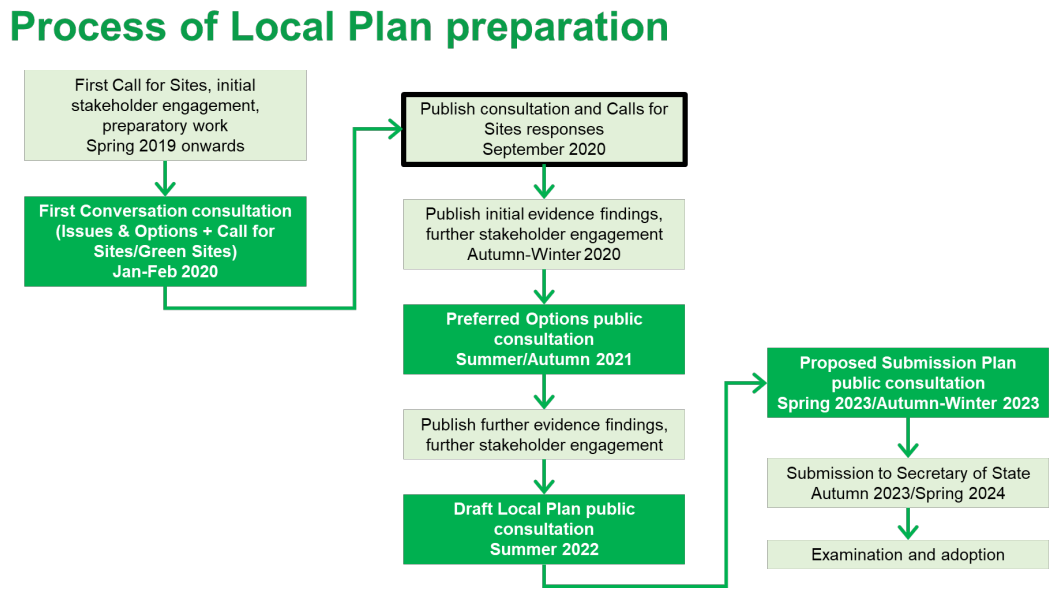
Cambridge City Council and South Cambridgeshire District Council completed public consultation on the Greater Cambridge Local Plan First Conversation (Issues and Options) in early 2020. Building on the initial options set out in the First Conversation, the Councils have identified three growth level options for homes and jobs and eight strategic (non-site specific) spatial options for testing. Description of the options and explanation of how they were developed is set out in the Greater Cambridge Local Plan: strategic spatial options for testing – methodology document.

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

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

Preferred Options public consultation is planned for summer/autumn 2021, including a preferred strategy and draft allocations. The process of Local Plan preparation is set out below in Figure 1.

Figure 1: Process of Local Plan Preparation



2.1 The Strategic Options

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

The spatial scenarios tested through this report are:

- 1 Densification of existing urban areas
- 2 Edge of Cambridge – outside the Green Belt
- 3 Edge of Cambridge – Green Belt
- 4 Dispersal – new settlements
- 5 Dispersal – villages
- 6 Public transport corridors
- 7 Supporting a high-tech corridor by integrating homes and jobs
- 8 Expanding a growth area around transport nodes

3 Modelling Methodology

3.1 Introduction

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.

3.2 Model Tools

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.

The CSRM 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). https://www.gov.uk/guidance/transport-analysis-guidance-tag

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

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.

3.3 Model Assumptions

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 is 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 (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.

Whilst the 2015 base year is not consistent with the start of the plan period, being 2020, the key outputs from the study relate to transport impacts at 2041 from all jobs and homes in Greater Cambridge, rather than the transport impacts from only the new homes and jobs delivered between 2020 and 2041, and as such there being a difference between the model base year and the start of the plan period does not affect the validity of the report's findings.

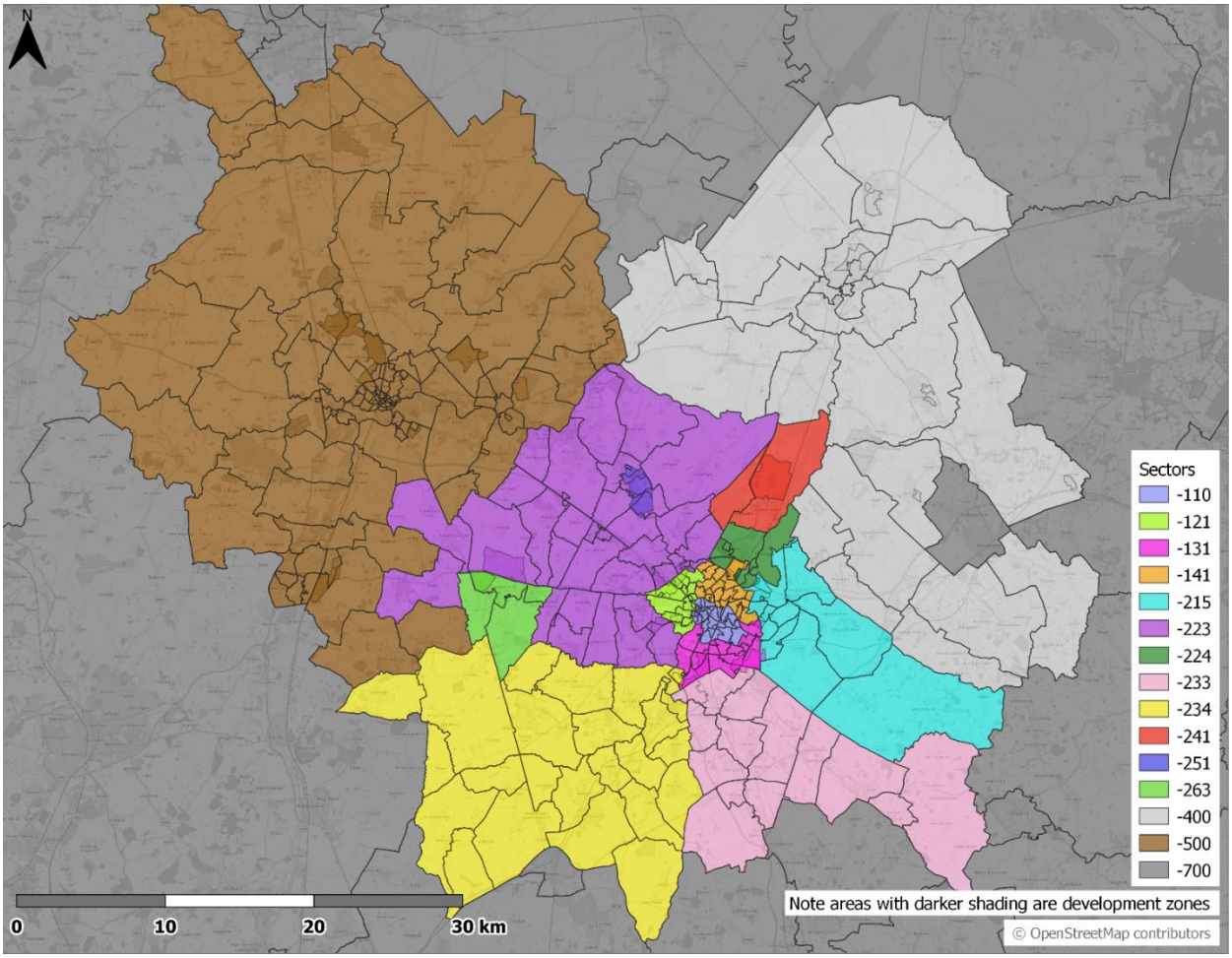
This 2041 baseline model includes the development that is assumed to be in place by 2041 and provides a consistent starting point for testing the eight strategic spatial options identified for the local plan. For clarity the analysis in this report compares the 2041 Baseline to the 2015 Base. Whilst the eight strategic spatial options are compared against the 2041 Baseline.

3.3.1 2041 Baseline Development Assumptions

CSRM2 explicitly includes growth in dwellings and jobs as agreed with GCSP and CCC, which are taken as direct inputs to the process. 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 existing Local Plans 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 cater for the levels of development, bringing the total number of jobs to the overall totals supplied. 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 in the 2041 Baseline.

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 in to larger sectors and these sectors have been used to assess the impact of the eight strategic spatial options identified at this stage of the Local Plan process, as they provide for a consistent reference for each of the eight strategic spatial options. The sectors used in this report are set out in Figure 2 below;

Figure 2: GC Local Plan sector system



Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

The resulting quantum of development assumed in each sector for the 2041 Baseline is as follows:

Table 1: 2041 Baseline Development Distribution by Sector

Sector Number	Sector Description	Dwellings	Employment
-110	Cambridge Central	19,093	40,114
-121	Cambridge NW+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
Grand Total	=	**305,673**	**357,326**

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

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.

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 follows:

Table 2: Total Dwellings and Jobs 2041

Development type	2041
Dwellings	305,673
Jobs	375,326

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

3.3.2 2041 Baseline In- and out-commuting

Separately, in- and out-commuters are considered. In-commuters are defined as people who live outside the CSRM2 study 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 (I.e. jobs within the modelled area)
- Out-commuters as a percentage of internal workers

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 follows:

Table 3: 2041 Baseline In and Out Commuting

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 CSRM Outputs_v0.4

From this it can be seen that in the 2041 baseline it is assumed that there are 81,429 in-commuters and 60,821 out-commuters.

3.3.3 2041 Transport Schemes

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 included in the 2041 baseline are as follows:

- Greater Cambridge Partnership (GCP) schemes:
  - Cambourne to Cambridge;
  - Cambridge South East Transport Study;
  - Cambridge South West Travel Hub;
  - Waterbeach to North East Cambridge;
  - Eastern Access scheme;
  - City Access;
  - Foxton Rural Travel Hub; and
  - GCP Cycle Schemes
- The A428 Black Cat to Caxton Gibbet;

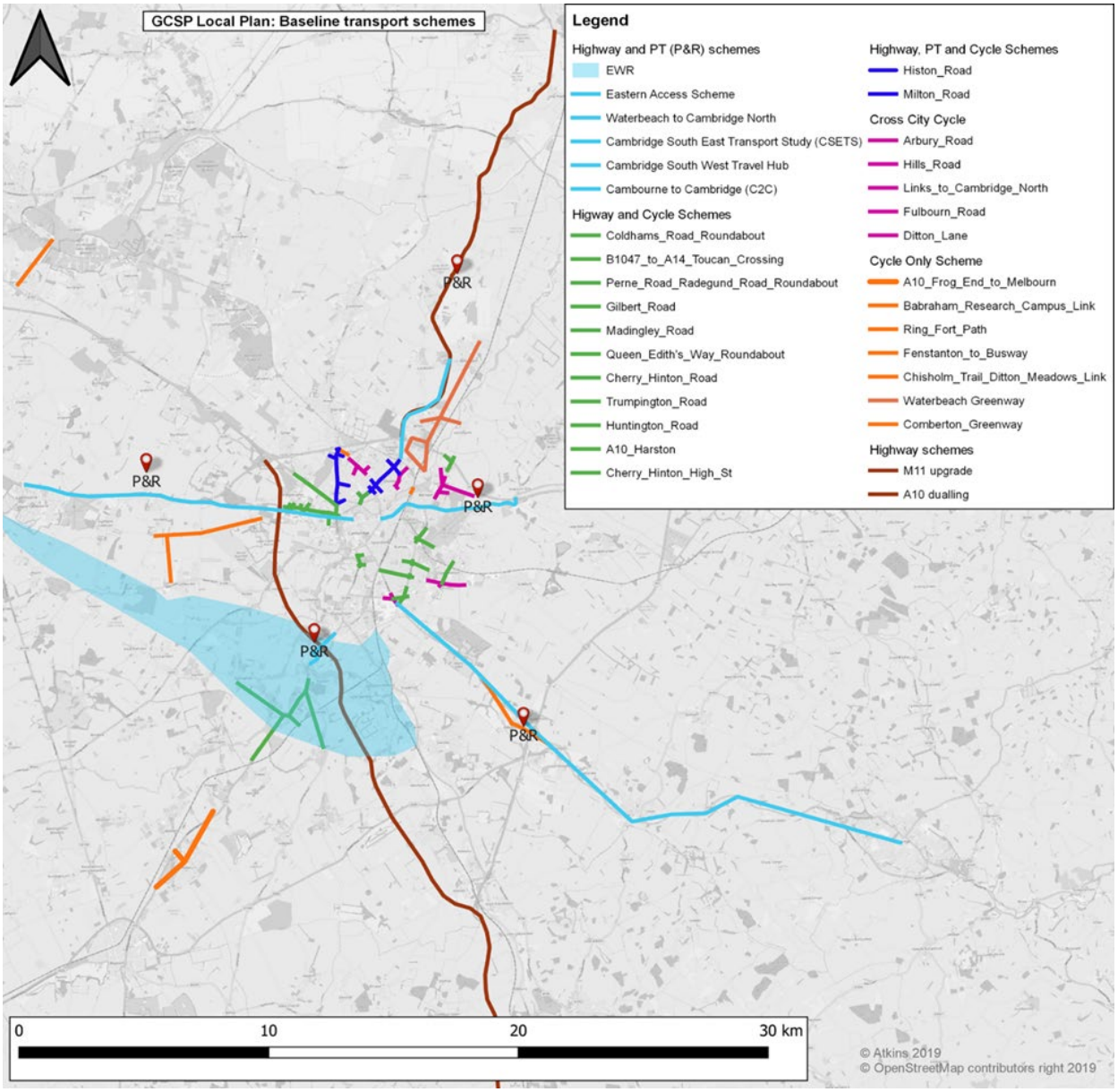
- Cambridge South Station;
- The A10 (Ely to Cambridge) highway improvements.

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.

Note: 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.

The Royston to Granta Park Strategic Growth and Transport Study, East West Rail (EWR) and the 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 these EWR and CAM schemes, these will be included in sensitivity tests that will follow on from the main spatial option tests.

Figure 3: Transport Schemes included in the 2041 Baseline



Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

3.4 Strategic Spatial Option Tests

This section sets out the details of the eight 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 spatial options, so as to give a fair comparison of the impacts of each option on the transport networks within the Greater Cambridge area.

3.4.1 Growth Scenarios

As stated in Section 2 above 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

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 of the likelihood 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 6).

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. This is in order 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 6).

3.5 Strategic Spatial Options

3.5.1 Introduction

This section sets out the assumptions made for each of the eight strategic spatial options.

3.5.2 In-Commuting Assumptions

Table 4: Development Quantum (Maximum Method) for Strategic Spatial Options Table 4 below shows the level of development included in each of the eight strategic spatial options tested in 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 CSRM Outputs_v0.4

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. Note that CSRM2's study area covers the whole of Cambridge City, South Cambridgeshire, 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 City and South Cambridgeshire vary.

The levels of in- and out-commuting assumed in the 2041 Baseline were taken from 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 Table 5 below;

Table 5: Level of In- and Out-Commuting

	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[12])	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[23])	81,429	76,442	76,442
Out-commuters (absolute) (calculated)	60,821	82,153	73,092

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

From the information in Table 5 it is possible to see that the percentage of in-commuters remains the same in 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 minimum Standard Method.

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.

[2] 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").

[3] 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).

3.5.3 Development Assumptions

The following tables set out the number of dwellings and jobs in each sector in each of the spatial options tested at this stage of the process:

Table 6: Sectored Dwelling Changes 2015-41

Sector	2041 Baseline	1 - Densification	2 - Edge - non-GB	3 - Edge - GB	4 - New Settlements	5 - Villages	6 - PT Corridors	7 - Integrating homes+ jobs	8 - Expanded growth area
-110 Cambridge Central	3,182	1,599	-8	0	0	0	-5	-5	-5
-121 Cambridge NW+West	4,073	740	-5	1,239	0	0	-3	-3	-3
-131 Cambridge South	4,511	1,081	-6	4,248	0	0	-4	-4	-4
-141 Cambridge North East	1,571	8,192	7,170	0	0	0	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	0	7,116	1,269	-8	3,501
-224 S Cambs North	195	3,050	2,822	0	0	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	0	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
-400 East Cambridgeshire	11,390	-10	-20	0	0	0	-13	-13	-13
-500 Huntingdonshire	23,693	-21	-41	0	0	0	-26	-26	-26
Grand Total	**79,432**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**	**26,389**

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

NB: 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 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 i.e. dwellings that have not been built yet.

Table 7: Sectored Job Changes

Sector	2041 Baseline	1 - Densification	2 - Edge - non-GB	3 - Edge - GB	4 - New Settlements	5 - Villages	6 - PT Corridors	7 - Integrating homes+ jobs	8 - Expanded growth area
-110 Cambridge Central	1,819	362	-3	0	0	0	-2	-2	-2
-121 Cambridge NW+West	8,256	167	-2	560	0	0	-1	-1	-1
-131 Cambridge South	8,892	245	-3	1,920	0	0	-2	-2	-2
-141 Cambridge North East	1,300	3,619	2,883	0	0	0	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	0	3,216	288	-2	794
-224 S Cambs North	3,322	2,759	1,861	0	0	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	0	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	-0	-0	0	-2	-2	-2
-500 Huntingdonshire	12,337	-4	-8	0	0	0	-5	-5	-5
Grand Total	**69,825**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**	**11,810**

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

NB: 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 the table above represent a redistribution of jobs locations in 2041 when the spatial options are added compared to those in the 2041 Baseline.

4 Comparison of Strategic Spatial Options

4.1 Introduction

To recap, the Strategic Spatial options tested include those set out below, (the titles have had to be shortened for presentational purposes);

- 1 Densification of existing urban areas - (Densification)
- 2 Edge of Cambridge – outside the Green Belt – (Edge - non-GB)
- 3 Edge of Cambridge – Green Belt – (Edge – GB)
- 4 Dispersal – new settlements – (New Settlements)
- 5 Dispersal – villages – (Villages)
- 6 Public transport corridors - (PT Corridors)
- 7 Supporting a high-tech corridor by integrating homes and jobs – (Integrating homes + jobs)
- 8 Expanding a growth area around transport nodes – (Expanded growth area)

The first set of statistics presented in this section looks at the results for the whole model network. The statistics that are used in the assessment in this report are as follows:

Transport Demand Model outputs

- Change in the Active travel Mode Share (see below definitions at 5.2)
- Change in the Public Transport Mode Share
- Change in the Car Mode Share

These three metrics are from the Transport Demand Model (TDM) and enable the changes in mode shares across all modes and the total number of vehicles on the road network to be assessed for each spatial option.

Highway Model outputs

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

These metrics from the highway model 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 each spatial option on the highway network.

Together these two sets of metrics enable the impact of each spatial option on all modes of transport to be assessed.

The following sections set out the results for each Scenario.

4.2 Trip Volumes and Mode Share

The information in Table 8 below shows the total number of trips in the model for the 2015 base year, the 2041 Baseline and each of the eight spatial options.

Mode shares are presented for;

- active mode (walk and cycle),
- car,
- Public Transport (bus, Guided Bus and Rail (no car) and
- Park & Ride (including rail Park & Ride).

Table 8: Total Trip Volumes by Transport Mode

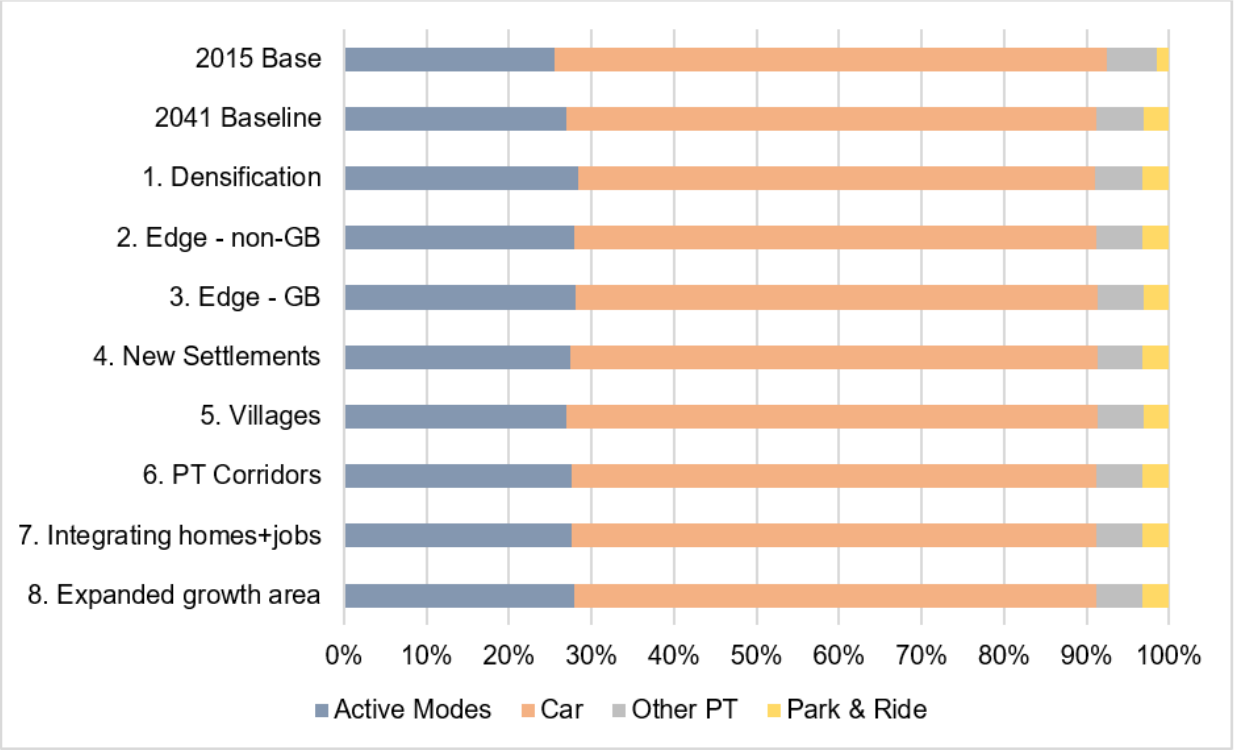
Row Labels	Active mode	Car	Public Transport	Park & Ride	Grand Total
Base Year (2015)	400,924	1,050,496	93,649	23,756	1,568,824
2041 Baseline	541,823	1,288,332	113,035	63,399	2,006,589
1. Densification	609,469	1,349,738	123,129	69,081	2,151,418
2. Edge - non-GB	600,276	1,361,583	121,864	69,465	2,153,188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

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

In the analysis that follows the 2041 Baseline is compared against the 2015 Base Year, whilst each of the eight 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 spatial options.

Figure 4: Percentage Transport Mode Share of Total Trips



Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

From this we can see that the mode shares are fairly consistent across all the spatial options with very small differences shown. This is because Figure 4 includes all the trips including those from the 2015 base year, in which there were a total of 1,568,824 trips. The addition of the 2041 Baseline growth resulted in an additional 437,765 trips, with each of the eight Strategic Spatial Options adding an additional 151,000 trips. The result is that some of the impacts of the 2041 Baseline and spatial options are masked by the 2015 Base Year trips.

Table 9 below sets out the change in mode shares for each spatial option.

Table 9: Change in percentage mode share of total trips

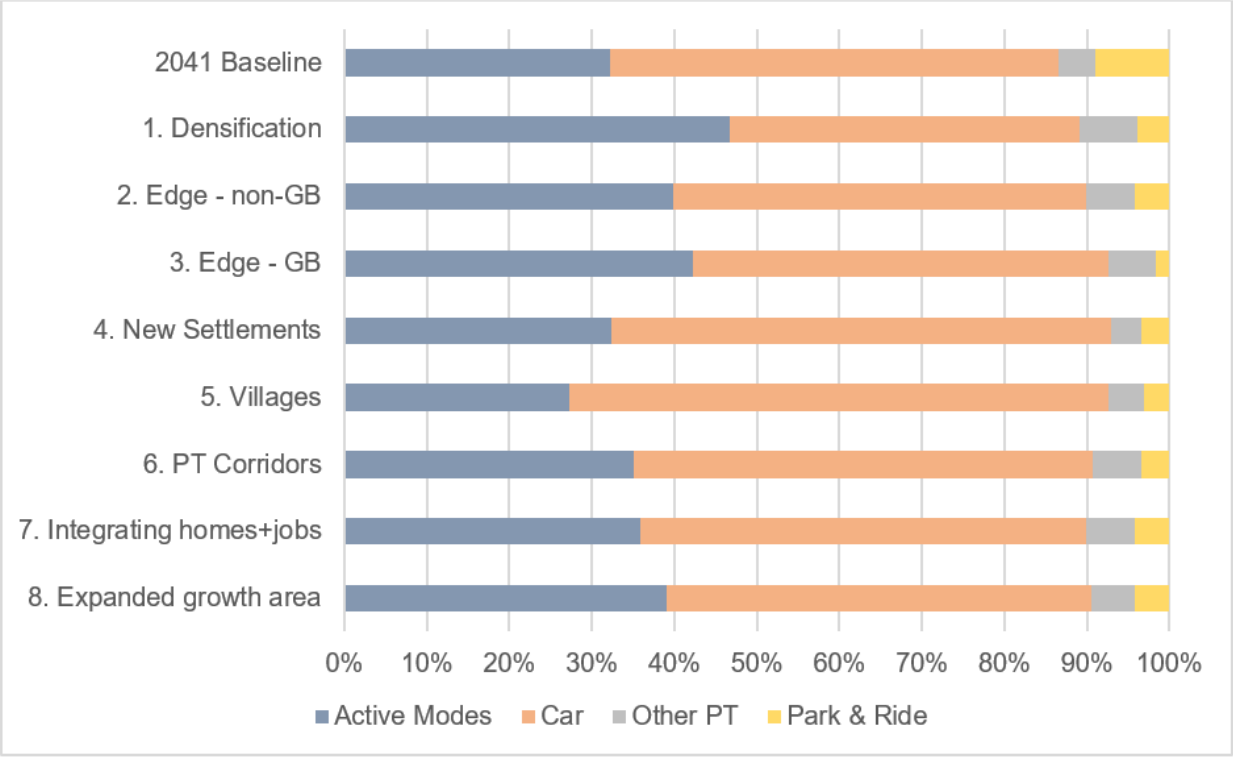
Scenario	Active mode	Car	Other Public Transport	Park & Ride
2041 Baseline	1.4%	-2.8%	-0.3%	1.6%
1. Densification	1.3%	-1.5%	0.1%	0.1%
2. Edge - non-GB	0.9%	-1.0%	0.0%	0.1%
3. Edge - GB	1.0%	-0.9%	0.0%	-0.1%
4. New Settlements	0.4%	-0.3%	-0.1%	0.0%
5. Villages	0.0%	0.1%	-0.1%	0.0%
6. PT Corridors	0.6%	-0.6%	0.0%	0.0%
7. Integrating homes+jobs	0.6%	-0.7%	0.0%	0.1%
8. Expanded growth area	0.8%	-0.9%	0.0%	0.1%

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

The information in Table 9 indicates that the car mode share for the 2041 Baseline is 2.8 % lower than the 2015 Base Year, which is due to the inclusion of the transport schemes in the 2041 Baseline run (see 3.3.3). It is also possible to see that all of the spatial options except option 5 - Villages show a further reduction in the car mode share, beyond that seen in the 2041 Baseline. The biggest increase in mode share is seen in the use of active modes of travel in all spatial options except option 5 Villages.

However, as set out above due to the inclusion of the 2015 base year trips the changes in mode shares appear to be very small. Therefore, in order to gain a better understanding of the performance of each of the eight spatial options tested, Figure 5 below sets out the mode share for each of the spatial options without the 2015 Base Year trips. This enables the mode shift of growth associated with just the eight spatial options to be assessed against the 2041 Baseline.

Figure 5: Percentage Transport Mode Share of Trip Growth



Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

From the information in Figure 5 we can see that the mode shares for the 2041 Baseline and the eight spatial options vary much more in isolation than when considered with the 2015 base year. It is important to note that there is no additional mitigation included in the option tests over that included in the 2041 Baseline.

Best Performing Options

Options 1 Densification, 2 Edge – non-GB, 3 Edge – GB and 8 Expanded Growth Area perform the best in terms of reducing reliance on car for travel.

Option 1 Densification performs particularly well in generating the highest percentage of active mode trips with 46.7% of trips, in addition the Public transport mode share is 7.0% and a further 3.9% of trips using park and ride giving a total of 57.6% of trips by non-car modes.

Option 2 Edge – non-GB shows an active mode share of 39.9%, 6% public transport and 4.1% park and ride giving a total of 50.0% of trips by non-car modes.

Option 3 Edge – GB shows an active mode share of 42.2%, 5.7% public transport and 1.6% park and ride giving a total of 49.5% of trips by non-car modes.

Option 8 Expanded Growth Area shows an active mode share of 39.1%, 5.2% public transport and 4.2% park and ride giving a total of 48.6% of trips by non-car modes.

Medium Performing Options

The majority of the remaining options show larger proportions in non-active mode shares than the options above.

Option 7 Integrated homes and jobs shows an active mode share of 35.8%, 5.8% public transport and 4.2% park and ride giving a total of 45.9% of trips by non-car modes.

Option 6 PT Corridors shows an active mode share of 35.1%, 5.9% public transport and 3.4% park and ride giving a total of 44.4% of trips by non-car modes.

Option 4 New Settlements shows an active mode share of 32.4%, 3.7% public transport and 3.5% park and ride giving a total of 39.5% of trips by non-car modes.

Poorly Performing Options

Option 5 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 and ride giving a total of 34.7% of trips by non-car modes.

Mode Share Conclusion

From this it is possible to see that option 1 Densification would require the least amount of additional mitigation whilst option 5 villages would require the most mitigation to facilitate additional mode shift over that indicated as being achievable utilising the 2041 Baseline transport schemes. The level of mitigation required to facilitate the delivery of option 5 villages is likely to be of such a scale that it would render the development sites within this option unviable.

4.3 Highway Impact

These figures are taken from the CSRM2 Highway Assignment Model (HAM). The statistics are reported separately for each of the HAM model periods, which are:

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

The reported statistics use the standard Passenger Car Unit (PCU) of measurement. 1 PCU = 1 Car.

The following statistics are reported across the full modelled area:

- **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[4] time) (in PCU hours) experienced by all trips assigned to the network.

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

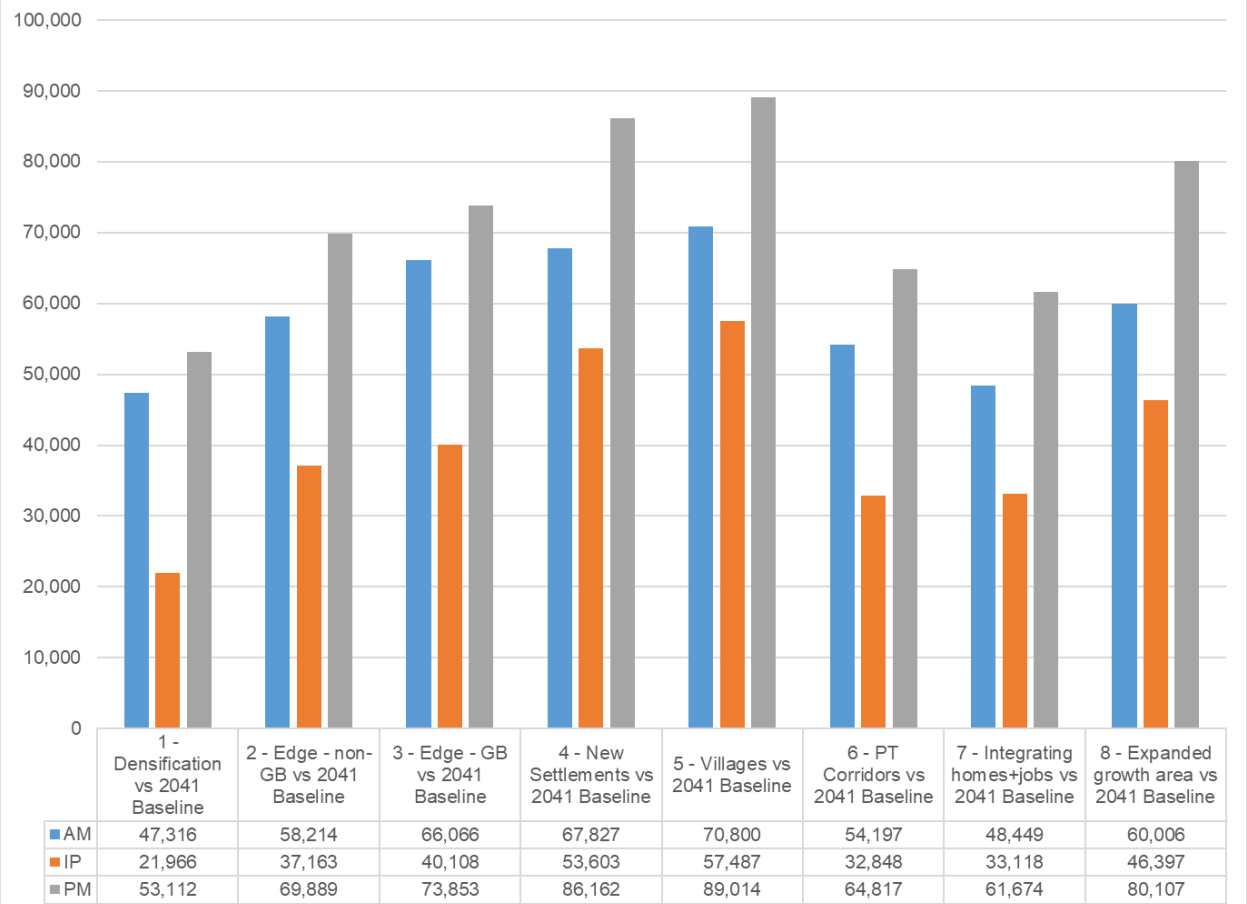
The figures below show each of the Spatial Options against the 2041 Baseline to illustrate the differences between Options.

It is important to note that the model tests a neutral day and therefore, does not take into account any unexpected events (such as car accidents on the road or bad weather conditions) which may occur.

4.3.1 Travel Distance

This metric shows the change in the distances travelled as a result of the distribution of growth in each of the eight strategic spatial options. 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 by each of the eight spatial options to be quantified and assessed.

Figure 6: Change in travel distance (Total pcu-kms) (Spatial Options vs 2041 Baseline)



	1 - Densification vs 2041 Baseline	2 - Edge - non-GB vs 2041 Baseline	3 - Edge - GB vs 2041 Baseline	4 - New Settlements vs 2041 Baseline	5 - Villages vs 2041 Baseline	6 - PT Corridors vs 2041 Baseline	7 - Integrating homes+jobs vs 2041 Baseline	8 - Expanded growth area vs 2041 Baseline
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 CSRM Outputs_v0.4

As shown in Figure 6, all the options result in an increase in the total distance travelled. It is interesting to see that the profile for all the spatial options is very similar with each showing that the PM Peak has the highest increase and the inter peak the lowest, with the AM peak for all options higher than the inter peak but lower that the PM peak.

However, when the detailed information for each option is assessed we can see the following:

Best Performing Options

Options 1 Densification, 6 PT Corridors and 7 Integrating homes and Jobs perform the best in terms of the least vehicle kilometres travelled.

Option 1 Densification is shown to generate the lowest number of additional vehicle kilometres across all time periods. This is due to the proximity of the development in this option to the edge of the existing urban area of Cambridge, therefore putting the residents of these dwellings close to centres of employment where the residents of the proposed developments might be looking to work. The inter peak level is very low indicating that the development provides the required facilities close to dwellings thus reducing the distances needed to access day to day requirements.

Option 6 PT Corridors generates circa 8,000 more vehicle Kilometres in the AM peak and circa 11,000 more in the PM peak which highlights the greater distance of the development in this option from Cambridge, but this level of increased vehicle kilometres is relatively small and therefore indicates that this scenario offers a realistic prospect to further reduce vehicle kilometres with the introduction of the right package of mitigation.

Option 7 Integrating homes and Jobs generates circa 1,000 more vehicle Kilometres in the AM peak and circa 8,000 more in the PM peak which highlights the greater distance from Cambridge of the development in this option but this level of increased vehicle kilometres is relatively small and therefore indicates that this scenario offers a realistic prospect to further reduce vehicle kilometres with the right package of mitigation especially as the AM peak figures are so close to that of option 1 Densification.

Medium Performing Options

The remaining options show bigger increases in vehicle kilometres than the options above.

Option 2 Edge – non-GB is shown to generate circa 1,000 more vehicle kilometres in the AM peak and 16,000 more in the PM peak than option 1 Densification. This indicates that this strategic spatial option relies on car travel more than option 1 Densification and therefore the level of mitigation required to reduce the need to travel by car for this option would be significantly higher than for option 1 densification.

Option 3 Edge – GB is shown to generate more trips in the AM peak than option 2 Edge - non-GB (circa 8,000) but the difference in the PM peak is much less marked (circa 4,000) which is due to the increased distance from Cambridge of the development in this option. Therefore addition mitigation will be needed for this option to ensure that the trips that need to be made have viable alternatives to the private car. However, it is considered that the level of mitigation required would be deliverable given the scale of the developments included in this option.

Option 4 New Settlements is shown to have a similar level of vehicle kilometres in the AM peak period as the Edge of Cambridge options (options 2 and 3) but the inter and PM peaks show significant increases over either of the Edge options. This indicates that there are potentially trips accessing the new settlements by car that were going elsewhere in the 2041 Baseline due to the facilities on offer in the new settlement. The level of mitigation needed is likely to be greater than for options 2 and 3 but is still considered to be deliverable due to the scale of development proposed in the New Settlement option.

Option 8 Expanded Growth Area indicates a lower level of vehicle kilometres than either of the edge options (options 2 and 3) in the AM peak but a higher level in the PM peak (circa 7,000). However, it important to note that there is no additional mitigation included in the model over that in the 2041 Baseline which is key for this option as it is aligned along the line of the proposed East West Rail scheme. These results indicate that this option would still be deliverable even without the introduction of East West Rail with the right package of mitigation to reduce reliance on the private car.

Poorly Performing Options

Option 5 Villages shows the largest increase in all three time periods indicating that the dispersal of development 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 the option would generate, as the individual sites are quite small and therefore the level of mitigation could render the sites in this option unviable.

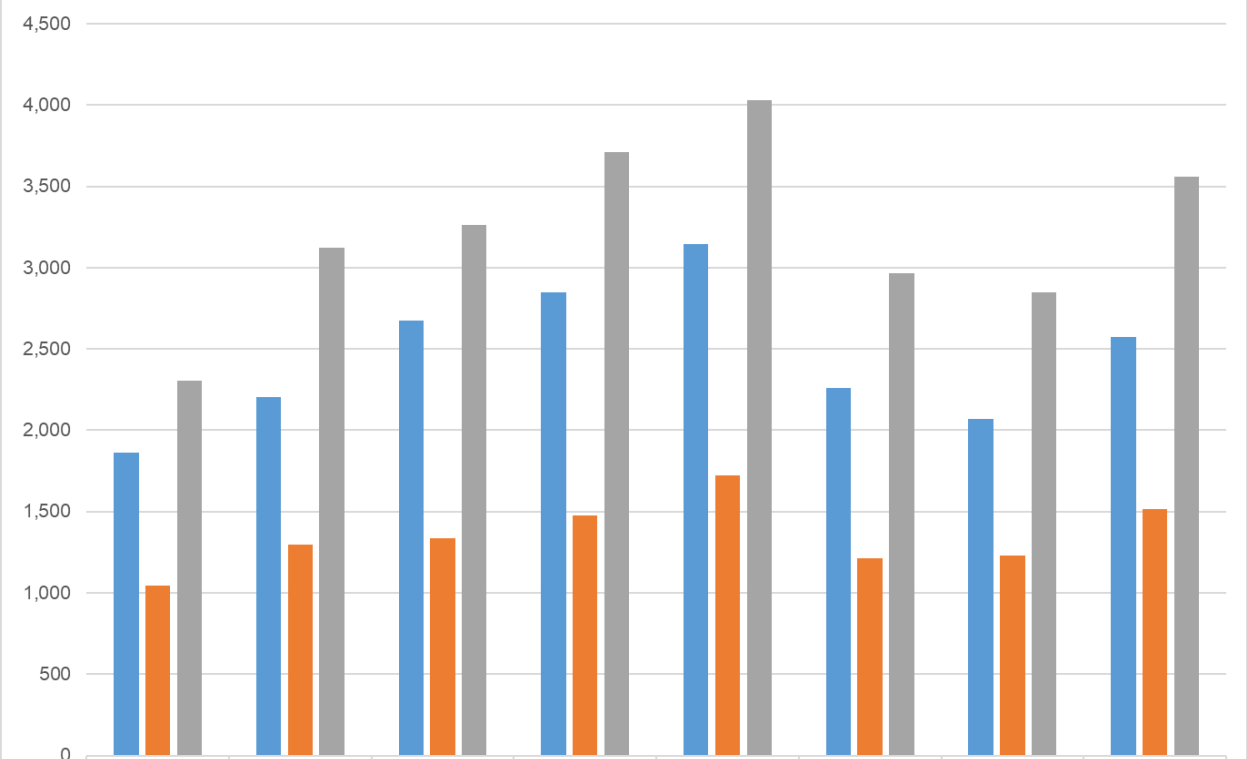
Distanced Travelled Conclusion

From this it is possible to see that option 1 Densification would require the least amount of additional mitigation whilst villages would require the most to reduce the total number of vehicle kilometres travelled and encourage use of active modes and public transport. The level of mitigation required to facilitate the delivery of option 5 villages is likely to be of such a scale that it would render the development sites within this option unviable.

4.3.2 Travel Time

This metric shows the change in the travel time as a result of the distribution of growth in each of the eight strategic spatial options. The travel distance is divided by the speed to give the travel time.

Figure 7: Change in total travel time (Total - pcu.hrs) (Spatial Options vs 2041 Baseline)



	1 - Densification vs 2041 Baseline	2 - Edge - non-GB vs 2041 Baseline	3 - Edge - GB vs 2041 Baseline	4 - New Settlements vs 2041 Baseline	5 - Villages vs 2041 Baseline	6 - PT Corridors vs 2041 Baseline	7 - Integrating homes+jobs vs 2041 Baseline	8 - Expanded growth area vs 2041 Baseline
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 CSRM Outputs_v0.4

As shown in Figure 7, all the options result in an increase in the total time travelled, measures in PCU/hours. It is interesting to see that the profile for all the spatial options is very similar with each showing that the PM Peak has the highest increase and the inter peak the lowest with the AM peak for all options being higher than the inter peak but lower that the PM peak. However, when the detailed information for each option is assessed we can see the following:

Best Performing Options

Options 1 Densification and 7 Integrating homes and Jobs perform the best in terms of the least additional total travel time.

Option 1 Densification is shown to generate the lowest level of additional travel time across all time periods, which is due to the fact that the level of additional vehicle kilometres generated as set out in Figure 6 is the lowest of any of the eight strategic spatial options. The travel time is also affected by the proximity of the development in this option to Cambridge and the major employment areas.

Option 7 Integrating homes and Jobs generates circa 300 more PCU/hrs in the AM peak and circa 500 more in the PM peak than the option 1 densification. This level of

change indicates that this scenario offers a realistic prospect to further reduce travel time with the right package of mitigation especially as the AM peak figures are so close to that of option 1 Densification.

Medium Performing Options

The remaining options show bigger increases in travel time than the options above.

Option 2 Edge – non-GB is shown to generate circa 300 more hours travelled in the AM peak and 800 more in the PM peak than option 1 Densification. This indicates the need to provide additional mitigation to reduce the need to travel by car for this option.

Option 3 Edge – GB is shown to generate circa 800 more hours travelled in the AM peak and 1,000 more in the PM peak than option 1 Densification. This is similar to that indicated for Option 2.

Option 4 New Settlements is shown to have a similar level of vehicle kilometres in the AM peak as the Edge options (options 2 and 3) but the PM peak shows an increase over either of the Edge options. This indicates that there are potentially trips accessing the new settlements by car that were going elsewhere in the 2041 Baseline, due to the facilities on offer in the new settlement. The level of mitigation needed is likely to be greater than for the Edge options but still considered to be deliverable due to the scale of development proposed in the New Settlement option.

Option 6 PT Corridors the level of vehicle hours indicated as a result of this option is less than for either of the edge options (options 2 and 3) indicating that this option although generating more trips, results in less time spent travelling.

Option 8 Expanded Growth Area indicates a higher level of travel time than the other edge (option 2 and 3) and PT corridor (option 6) options, but the level of travel time could be mitigated due to the mass of development proposed for this option. It is important to note that there is no additional mitigation included in this test which is key for the option as this is aligned along the line of the proposed East West Rail scheme. These results indicate that this option would still be deliverable even without the introduction of East West Rail with the right package of mitigation to reduce reliance of the private car.

Poorly Performing Options

Option 5 Villages shows the largest increase in all three time periods indicating that the dispersal of development leads to increased travel time, whilst it would be possible to mitigate this impact if the right mitigation package were put forward. However, 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 in this option as the individual sites are quite small and therefore the level of mitigation could render the sites in this option unviable..

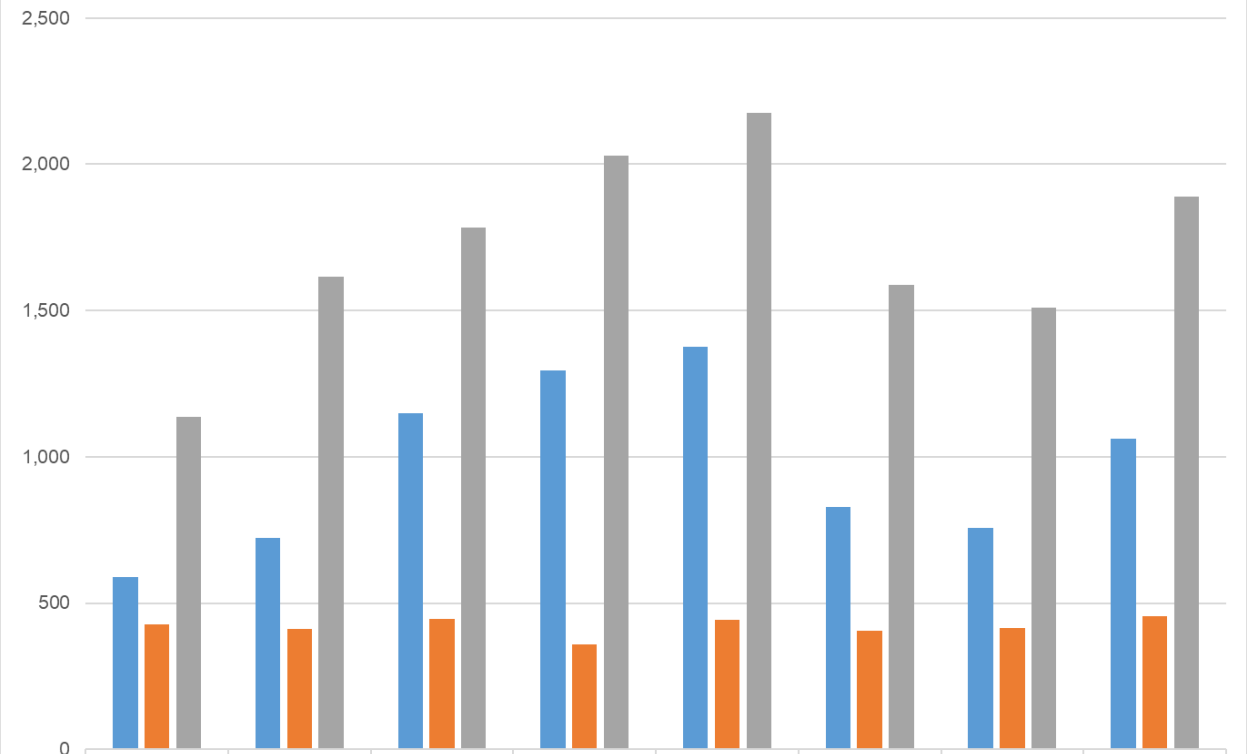
Distance Travelled Conclusion

From this it is possible to see that option 1 Densification would require the least amount of additional mitigation whilst option 5 villages would require the most to reduce the travel time and encourage use of active modes and public transport. However, the level of mitigation required to facilitate the delivery of option 5 villages is likely to be of such a scale that it would render the development sites within this option unviable.

4.3.3 Delay

This metric shows the change in the delay as a result of the eight spatial options. This is calculated by taking the actual vehicle-hours experienced in the model minus the vehicle-hours that would be experienced at the free flow speed.

Figure 8: Change in total delay (Total - pcu.hrs) (Spatial Options vs 2041 Baseline)



	1 - Densification vs 2041 Baseline	2 - Edge - non-GB vs 2041 Baseline	3 - Edge - GB vs 2041 Baseline	4 - New Settlements vs 2041 Baseline	5 - Villages vs 2041 Baseline	6 - PT Corridors vs 2041 Baseline	7 - Integrating homes+jobs vs 2041 Baseline	8 - Expanded growth area vs 2041 Baseline
AM	588	723	1,150	1,294	1,376	828	758	1,062
IP	427	413	446	360	441	407	415	455
PM	1,137	1,614	1,782	2,029	2,176	1,589	1,511	1,889

Source: GCSP Local Plan_DRAFT CSRM Outputs_v0.4

From Figure 8 we can see that all the options lead to an increase in delay over and above that seen in the 2041 Baseline, with the Villages option (option 5) showing the largest increase in delay in all time periods, the New Settlements option (option 4) next and Edge of Cambridge Green Belt option (option 3) third. As with the earlier metrics none of these results indicate that there is an option that could not be mitigated with the right package of interventions.

Best Performing Options

Options 1 Densification and 7 Integrating homes and Jobs perform the best in terms of the least additional total delay.

Option 1 Densification is shown to generate the lowest level of additional delay across all time periods. This is due to the fact that the level of additional vehicle kilometres generated as set out in Figure 6 above is the lowest of any of the spatial options tested. Therefore this option generates the lowest number of additional trips than any of the other options.

Option 7 Integrating homes and Jobs generates circa 200 more PCU/hrs in the AM peak and circa 400 more in the PM peak than the densification option. This level of change indicates that this scenario offers a realistic prospect to further reduce delay with the right package of mitigation, especially as the AM peak figures are so close to that of option 1 Densification.

Medium Performing Options

The remaining options show bigger increases in delay than the options above.

Option 2 Edge – non-GB is shown to generate circa 150 more hours delay in the AM peak and 500 more in the PM peak than option 1 Densification. This indicates the need to provide additional mitigation to reduce the need to travel by car for this option.

Option 3 Edge – GB is shown to generate circa 600 more hours delay in the AM peak and 600 more in the PM peak than option 1 Densification. This this is similar to that indicated for Option 2.

Option 4 New Settlements is shown to have a similar level of hours delay in the AM peak period as the Edge options but PM peak shows an increase over either of the Edge options. This indicates that there are potentially trips accessing the new settlements by car that were going elsewhere in the 2041 Baseline due to the facilities on offer in the new settlement. The level of mitigation needed is likely to be greater than for the Edge options but still considered to be deliverable due to the scale of development proposed in the New Settlement option.

Option 6 PT Corridors shows a level of delay less than for either of the edge options in the AM and PM Peak periods indicating that this option although generating more trips results in less time spent travelling.

Option 8 Expanded Growth Area indicates a higher level of delay than the other medium performing options but that this level of impact could still be mitigated due to the mass of development proposed for this option. It is important to note that there is no additional mitigation included in this test which is key for the option as this is aligned along the line of the proposed East West Rail scheme. These results indicate that this option could be made to work in transport terms even without the introduction of East West Rail.

Poorly Performing Options

Option 5 Villages shows the largest increase in all three time periods indicating that the dispersal of development leads to increased delay across the day. Whilst it would be possible to mitigate this impact if the right mitigation package were put forward it is very likely that the scale of this mitigation would render this spatial option unviable.

Delay Conclusion

From this it is possible to see that option 1 Densification would require the least amount of additional mitigation, whilst Option 5 Villages would require the most to reduce the level of delay to that shown by the Baseline. However, the level of mitigation required to facilitate the delivery of Option 5 Villages is likely to be of such a scale that it would render the development sites within this option unviable.

5 Strategic Spatial Option Tests Conclusion

The Strategic Spatial Options have been assessed against a consistent set of transport metrics.

It is important to remember that the tests in this report do not include any additional mitigation (over that assumed to be in place by 2041 as set out in Section 3.3.3).

The following section summarises the results of all the transport metrics and sets out which of the spatial options tested perform best, and also assesses whether the level of additional mitigation required for each spatial option is likely to be deliverable.

Best Performing Options

Overall, the Best Performing options were Options 1 (Densification) and 7 (Integrating homes and jobs).

Option 1 Densification performs best consistently over all transport metrics with the highest non-car mode share together with the lowest distance travelled, time travelled and delay. The projected mode share of 57.6% by non-car modes suggests that the level of additional mitigation for this option would be reasonable and in keeping with the scale of development assumed, and therefore is likely to be deliverable.

Option 7 Integrating homes and jobs was shown to have a non-car mode share of just 45.9% and therefore this option was in the medium performing category for mode share. This option also performs very well in terms of highway model outputs, with the highway metrics showing low levels of additional travel distance, time and delay, meaning that the co-location of homes and jobs leads to reduced impacts on the highway network compared to many of the other options tested. The results indicate that this option would require more mitigation than option 1 Densification. The focus of this mitigation should be on increasing the share of trips made by non-car modes as it would be necessary to try and reduce reliance on the car for those trips that are made if this option were taken forward.

In conclusion it is possible to say that both of these options could be made to work if the right package of mitigation were brought forward and the level of mitigation likely to be required would be in keeping with the scale of the development proposed.

Medium Performing Options

Of the remaining options all but one indicated that they would generate lower non-car mode shares than Option 1 Densification. However, when looking at the proportion of this mode share that utilises active modes the following Options 2 Edge - non-GB, Option 3 Edge – GB, Option 4 New Settlements, Option 6 PT Corridors, Option 8 Expanded Growth Areas were all shown to be higher than the Baseline. All of these options were shown to generate more distance travelled, travel time and delay than the best performing options above, but it is still considered possible to mitigate the impact of these spatial options on the transport networks. The level of mitigation required for these options, whilst greater than for either of the best performing options, is still

considered to be in keeping with the scale of development within these options and, therefore, should be deliverable.

Poorly Performing Options

The only option shown to generate a lower active travel mode share than the Baseline is Option 5 Villages. This option was shown to have the largest car mode share of all the options tested and was also shown to lead to the largest increase in vehicle kilometres, travel time and delay. For this option it would be possible to mitigate the impact seen, but it is likely that the scale of mitigation required could be out of keeping with the size of the development sites within this option and therefore this might render the development sites unviable.

6 Spatial Option Sensitivity Tests

The results of this report will be used to help inform the selection of a preferred option (which could be an amalgam of one or more options tested in this report), with specific site allocations, that will be taken forward in the Local Plan.

As set out above, the tests set out in Chapter 4 of this report include certain assumptions, including around growth levels, transport schemes, and commuting patterns. Therefore a range of sensitivity tests are planned in order to understand the sensitivity of the transport networks in the Greater Cambridge area to the core test assumptions. These tests will help nuance and refine understanding of which options perform better or worse in transport terms.

The results of these sensitivity tests will be reported in the next iteration of this Transport Evidence Report.

The list of sensitivity tests is set out in Table 10 below:

Table 10 List of Sensitivity Tests

Test	Description	Growth Scenario	Commuting assumption
1a	Full build out of Spatial Option 2 Edge non-GB	Maximum	Fixed In-commuting
1b	Full build out of Spatial Option 4 New Settlements	Maximum	Fixed In commuting
2a	Spatial Option 2 Edge non-GB + CAM	Maximum	Fixed In commuting
2b	Spatial Option 2 Edge non-GB + EWR	Maximum	Fixed In commuting
2c	Spatial Option 2 Edge non-GB + CAM & EWR	Maximum	Fixed In commuting
3a	Medium growth Spatial Option 2 Edge non-GB	Medium	EEFM
3b	Medium growth Spatial Option 4. New Settlements	Medium	EEFM
3c	Minimum Growth	Minimum	EEFM
4a	In/Out commuting Spatial Option 2 Edge non-GB	Maximum	EEFM
4b	In/Out commuting Spatial Option 4 New Settlements	Maximum	EEFM
5a	Housing scenario excluding 10% buffer Spatial Option 2 Edge non-GB	Maximum	Fixed In commuting
5b	Housing scenario excluding 10% buffer Spatial Option 4 New Settlements	Maximum	Fixed In commuting

Spatial Options 2 Edge non-Green Belt and Option 4 New Settlements are being used to provide a consistent set of sensitivity tests. Within the analysis of these sensitivity tests, inferences will be made as to the effects of each sensitivity assumption for the other spatial options. Descriptions of the sensitivity tests that are to be undertaken are as follows:

Full Build Out – Sensitivity Tests 1a and 1b

The level of development involved in several of the strategic spatial options is greater than would come forward in the life-time of this local plan (e.g. a number of options include new settlements which take a long time to be built out). This issue is particularly relevant to Options 2 and 4, which is why these options were selected for sensitivity testing. To understand the impact of this development once built out in full, this sensitivity test will assume that all development included in the options is built out by 2041. To be consistent with the tests in Chapter 4 it will retain the Fixed In-commuting approach described at 3.5.2.

CAM and EWR – Sensitivity Tests 2a, 2b and 2c

The list of transport schemes included in the 2041 Baseline did not include either the Cambridge Autonomous Metro (CAM) or East West Rail (EWR) as neither of these schemes are sufficiently well defined. To this end sensitivity tests will be undertaken using the latest publicly available information on these schemes with a view to understanding the impact of CAM and EWR on the performance of the transport networks for each of the strategic spatial options. To be consistent with the tests in Chapter 4 it will retain the Fixed In-commuting approach described at 3.5.2.

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

As noted in previous chapters, the tests set out in Chapter 4 tested the maximum growth option. The next set of sensitivity tests will look at the impact of the medium and minimum levels of development on the trip making and mode share of the strategic spatial options, so as to provide a comprehensive understanding of growth and spatial options. In line with the commuting assumptions made when identifying these growth options, the level of in-commuting is assumed to revert to that indicated by EEFM (see Greater Cambridge Local Plan Housing & Employment Relationships Report for more detail on commuting assumptions associated with the growth options).

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

As set out at 3.5.2, the tests included in Chapter 4 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.

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

To address the national planning policy requirement to prepare a flexible local plan which is responsive to rapid change, 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 4 these will retain the Fixed In-commuting approach described at 3.5.2.