Greater Cambridge Partnership

A1307 STUDY

Options Report Addendum

OPTIONS REPORT ADDENDUM, NOV 2017
Confidential

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EXECUTIVE SUMMARY

The Options Report for the A1307 Haverhill to Cambridge Study was published in February 2017 and accepted by the Executive Board of the Greater Cambridge City Deal (now Greater Cambridge Partnership) in March 2017. The Executive Board also recommended that the public consultation should be delayed until additional workshops with the Local Liaison Forum were carried out.

This report documents the process followed since March 2017 and the Local Liaison Forum (LLF) input to the project that has generated new options and changed and shaped the emerging three transport strategies for the corridor.

It is now recommended that the three strategies should be taken forward for public consultation in early 2018.

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. The A1307 Options report was originally produced by WSP in February 2017 and accepted by the Greater Cambridge Partnership (GCP) Executive Board in March 2017. However the Executive Board also recommended that public consultation should be delayed until a series of workshops had been held involving the Local Liaison Forum to develop the options.

1.1.2. The Local Liaison Forum (LLF) was convened in January 2017 and an inaugural meeting was held in February 2017 and five subsequent LLF workshops were also held between April and September 2017. The workshops sought to review previous options that formed the basis of the February 2017 report and also to identify whether any new options should also be considered.

1.1.3. This Options Report Addendum documents the process that was followed involving the LLF since February 2017 and explains how a revised set of options have been drawn out of the process and developed into three emerging transport strategies that are now recommended to be taken forward to public consultation in early 2018 (subject to Executive Board approval in November 2017).

1.2 ROLE OF LOCAL LIAISON FORUM

1.2.1. The inaugural LLF meeting was held on 20 February 2017 to review and discuss the proposals for the A1307 study. The LLF formally comprises local councillors (County, District, Parish) plus two residents associations that were co-opted at the first meeting (Queen Ediths and Trumpington). The LLF and these organisations have continued to provide support and input to the workshops held in spring and summer 2017. A variety of stakeholder groups were subsequently invited to join the workshops (including Cambridge University Hospital Trust (CUHT), The Magog Trust, Cambridge Past Present and Future, British Horse Society, Save the Greenbelt and FECRA amongst others) and were co-opted to the LLF in September.

1.2.2. LLF workshops were held in April, June and September 2017, with a final LLF meeting in late September which gave members of the public an opportunity to view the outputs produced by the LLF and emerging transport strategies. The LLF events held can be summarised as follows:

- 6 April – Ideas Generation Workshop: 210 comments & questions
- 12 June - Option Scoring & Prioritisation Workshop 1 East of A11 options
- 15 June - Option Scoring & Prioritisation Workshop 2 Route-wide and A11 options
- 20 June – Option Scoring & Prioritisation Workshop 3 West of A11 options
- 6th September – Workshop to review emerging strategies shaped by previous workshops
- 26th September – LLF meeting

1.2.3. As a result of the LLF input to the study, several changes have been made to the proposals for A1307 and new ideas have been considered and evaluated. These changes are documented in this report.

1.3 GREATER CAMBRIDGE PARTNERSHIP TRANSPORT OBJECTIVES

1.3.1. The February options report was produced with the Greater Cambridge City Deal transport objectives in mind. However, in July 2017 the City Deal became the Greater Cambridge Partnership and revised transport objectives were published as follows:

- Ease congestion and prioritise greener and active travel, making it easier for people to travel by bus, rail, cycle or on foot to improve average journey time (4.87 minutes per mile in the peak hour in 2015/6)
- Keep the Greater Cambridge area well connected to the regional and national transport network, opening up opportunities by working closely with strategic partners
- Reallocate limited road space in the city centre and invest public transport (including Park & Ride) to make bus travel quicker and more reliable
- Build an extensive network of new cycle-ways, directly connecting people to homes, jobs, study and opportunity, across the city and neighbouring villages
- Help make people's journeys and lives easier by making use of research and investing in cutting-edge technology
- Connect Cambridge with strategically important towns and cities by improving our rail stations, supporting the creation of new ones and financing new rail links

1.3.2. In order to work towards these objectives, the emerging transport strategies for the A1307 have been developed with improving sustainable travel as the key focus in order to facilitate economic growth. The options presented in this report therefore focus on the provision of better bus infrastructure but has measures to improve the safety of non-motorised users (pedestrians, cyclists and equestrian use) have also been considered.

1.4 FUNDING AND DELIVERY TIMESCALES

1.4.1. The February 2017 options report was produced with the former Greater Cambridge City Deal objectives at the heart of the strategy and options were identified which sought to adhere to an initial budget estimate of £39m for the A1307 corridor. At the time, it was also envisaged that any schemes identified within the A1307 package should be deliverable by 2021. This approach was based on the first tranche City Deal funding stream requirements.

1.4.2. The options developed with the LLF have been through an assessment and prioritisation process. The total cost of the options exceed the initial budget estimate of £39m. At the preferred options stage an increased budget may be required to support the adopted strategy.

1.4.3. RELATIONSHIP WITH OTHER PROJECTS

1.4.4. One of the key points raised during the inaugural LLF meeting in February 2017 was the need to consider the relationship with other strategic transport studies and growth within the wider area for a more holistic approach. This includes other GCP Schemes and wider strategic projects as shown below:

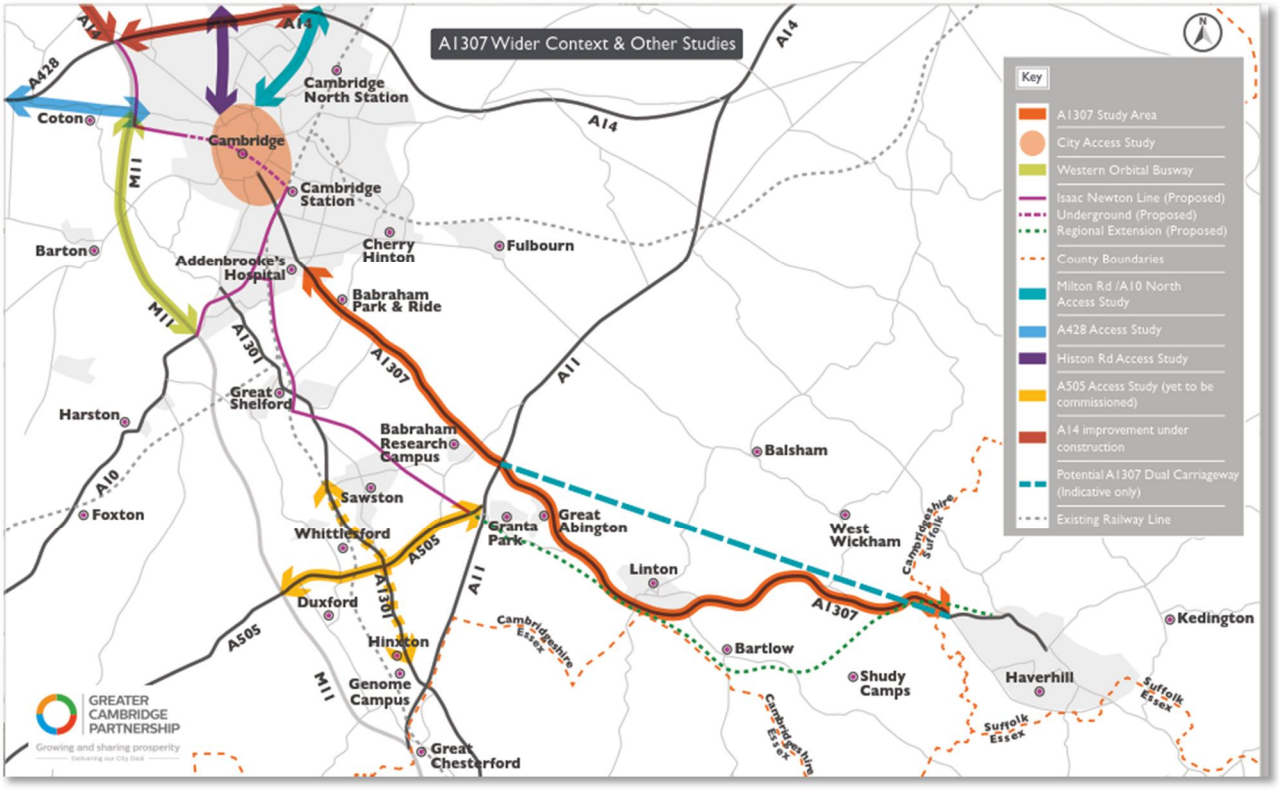


Figure 1 - A1307 in Context with Wider Transport Initiatives

1.4.5. This more recent work on the project also recognises that work is being carried out on behalf of Mayor of the Combined Authority for example to consider light rail options; and Rail Futures are progressing separate studies looking at re-introduction of heavy rail services along the disused railway or conversion to light rail.

1.4.6. Haverhill Chamber of Commerce has also commissioned a feasibility study for a new road link from Haverhill to A11. This is being undertaken by Suffolk County Council, with partial funding from CCC. Emerging options include a bypass of Linton or a direct road from Haverhill to the A11, although the exact alignment has yet to be confirmed. Work on this strategic highway route does not preclude the development of measures to encroach mode shift to public transport and improvements to public transport infrastructure over the existing A1307 route that caters for local catchments and onwards journeys to the west of the A11.

1.4.7. The proposed strategies for the A1307 route identified within this addendum report do not preclude the implementation of the above schemes and, where possible, are complementary to the wider long term transport strategy that is now emerging in respect of these studies.

1.4.8. The study area is based around the A1307, primarily considering measures on the A1307 itself. At the request of the LLF, a busway option was re-examined on a new alignment closer to villages in the A1301 corridor (including Sawston, Great Shelford and Stapleford).

1.5 REPORT STRUCTURE

The remainder of the report is structured as follows:

- **Chapter 2**
  Summarises the LLF process undertaken since March 2017, how ideas were generated, how they were assessed, and the output in terms of shortlisted options.

- **Chapter 3**
  Offers a brief resume of each of the shortlisted additional options and their likely effects

- **Chapter 4**
  Explains how the options were assembled into the three strategies and provides a summary of key performance indicators for each strategy (cost, mode shift, traffic changes etc).

- **Chapter 5**
  Explains the transport modelling which has been undertaken to inform the development of the three proposed strategies.

- **Chapter 6**
  Summarises feedback provided by the LLF and stakeholder consultation opinions on relevant options and the strategies as a whole.

- **Chapter 7**
  Concludes the report recommending the strategies that should be taken forward for public consultation and next steps required to be undertaken.

2 LLF OPTION GENERATION & ASSESSMENT

2.1 ADDITIONAL OPTION GENERATION

2.1.1. The first Local Liaison Forum workshop, Workshop 1, was held on 6th April 2017 at Linton Village College. The aim of this workshop was to identify any missing opportunities for sustainable transport interventions along the A1307 corridor and for LLF members to raise any queries about the work which had been undertaken to date which need to be answered.

2.1.2. This initial workshop focussed on four topics relating to the City Deal Objectives (Non-Motorised Users, Bus, Park and Ride as well as road safety). The participants were split into small groups of 6-8 representatives. Each group was facilitated by a member of the project team and the February 2017 options were explained. LLF members were then asked to comment on what is missing and what questions need answering for each topic. The workshop led to 210 comments and queries being provided by the LLF.

2.2 FILTERING OF OPTIONS

2.2.1. The 210 comments were reviewed and placed into a matrix. Where new ideas had been raised these were translated into potential scheme options that incorporated several ideas to be considered along with the previously identified options from the February 2017 options report.

2.2.2. A filtering process was then used to prioritise, refine and reduce the long list options to a practical number to be dealt with in the workshops, ideas that could be dealt with in design development were put to one side. These will be picked in developing the project as they are variations of other designs or measures. The sifting process sought to rationalise the list into options that were likely to be dealt with via a separate project and those which were sufficiently affordable and deliverable to be realistic for consideration as part of the A1307 scheme.

The filtering was based on the following criteria:

- Can they be dealt with in design development?
- Have they been considered previously?
- Do they belong in other projects/initiatives?
- Do they require higher level policy decisions?
- Are they deliverable?

2.3 NEW OPTIONS IDENTIFIED

2.3.1. The initial workshop generated many new ideas and some which were variants of previously considered options presented in February 2017. Furthermore, some additional options, which were not proposed by the LLF directly, came from other stakeholders. The sifting process concluded that the following new options were worth further discussion and consideration in addition to the February 2017 options which were also discussed and appraised at the workshops:

- A busway via Sawston
- A roundabout at Bartlow Road
- Junction improvements at Horseheath Road junction
- Dual Carriageway around Linton
- Signalisation of B1052 junction south of Linton
- Eastbound bus lanes on approach to Linton
- Eastbound bus lanes on approach to A11
- Tidal flow bus lanes
- Conversion of dual carriageway sections to bus lane or HGV lanes
- A roundabout at Dean Road Crossroads
- NMU routes accessible by Equestrian users (not just cycle and pedestrian routes)
- Alternative options for the Gog Farm Shop junction
- Improved access to the Roman Road for NMUs
- A bridge at Wandlebury
- An underpass at Wandlebury
- Signalised crossing at BRC access roundabout
- Alternative CBC link alignments

2.3.2. Various Park and Ride options were also suggested in addition to those previously considered. This included Park and Ride options at Linton and Haverhill plus the suggestion of a hub based strategy with local buses operating to smaller format car parks close to villages including cycle parking and a modest car park of c500 spaces. The Park and Ride options considered are summarised in Figure 2 below:

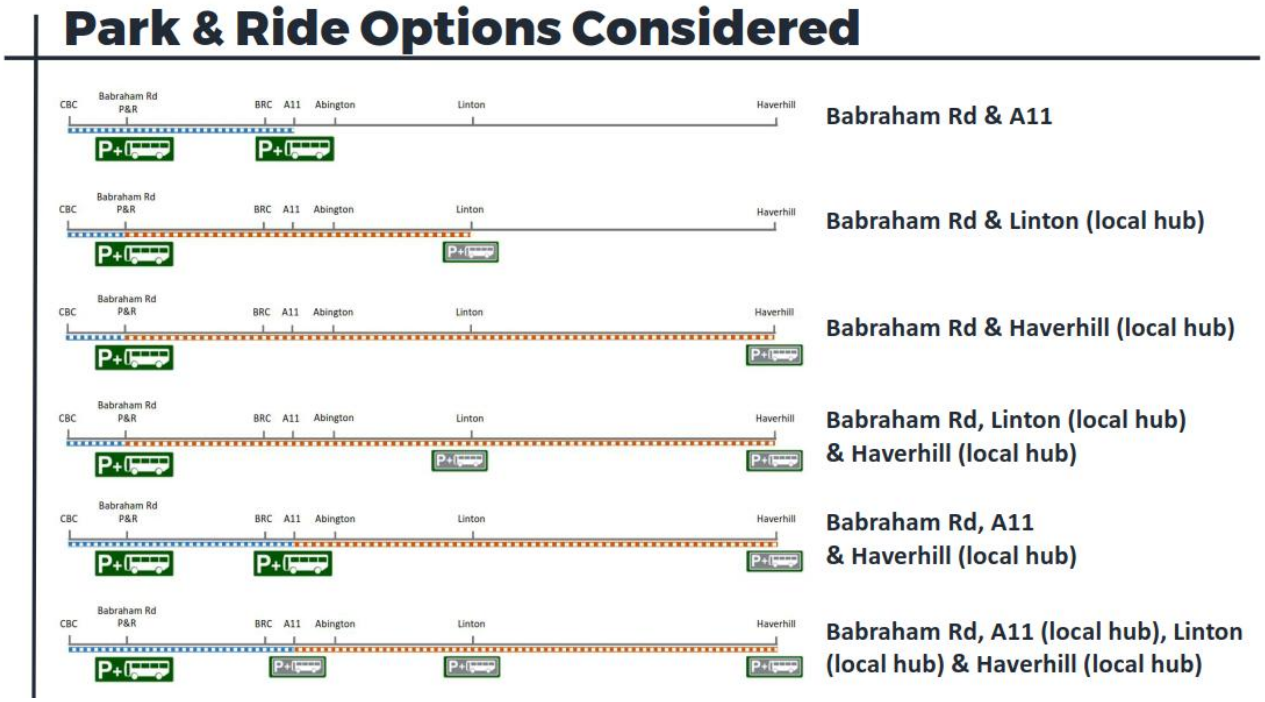


Figure 2 - Park and Ride Options Overview

2.3.3. The results of the sifting process reduced the list to a total of 49 options (some of which were entirely new options or sub-options/variants of previously considered ideas) which fed into the next three workshops, looking at location-specific issues east and west of A11 and route-wide options and Park and Ride. An overview of the scheme options is shown below in Figure 3.

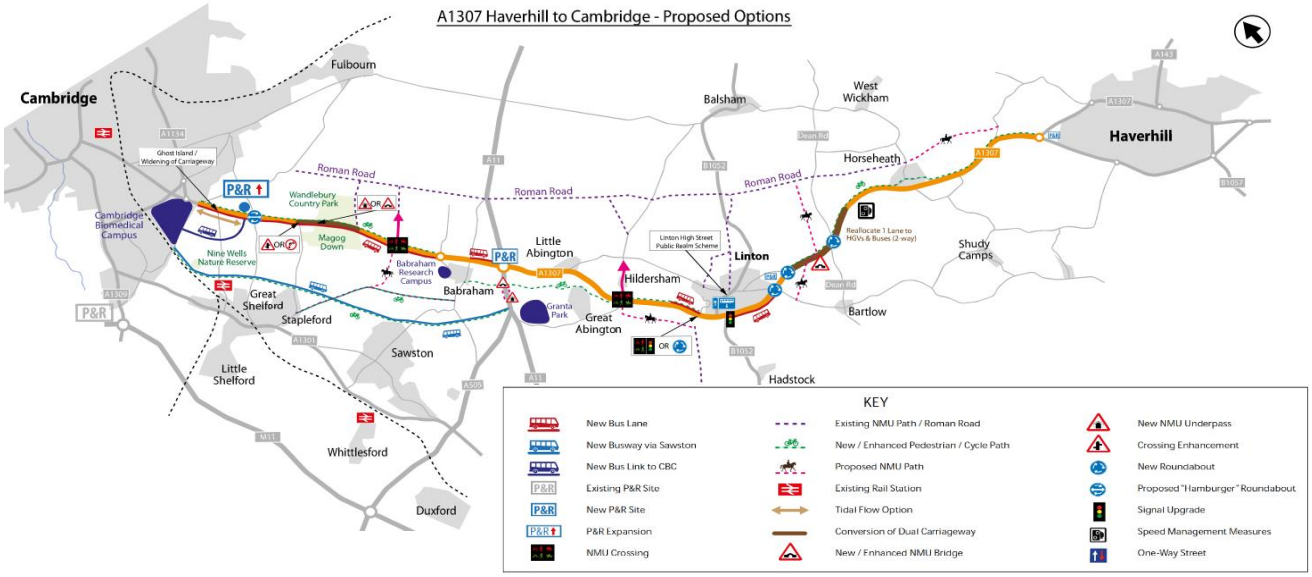


Figure 3 - Scheme Option Overview Plan

2.4 OPTIONS DISCOUNTED

2.4.1. The following options were discounted or referred to others as a result of the sifting process:

- Linton bypass – this is being considered via another study
- Rail options – these far exceed budget allowances and cannot be delivered in the timescale allocated for the project and had been previously discounted. However, they continue to be investigated by others.
- A14/A11 junction alterations – these were considered to be too remote from the study area
- New road schemes beyond the study area (eg links from Haverhill to Bury St Edmunds). This is unlikely to reduce traffic travelling to central Cambridge, the scheme would not be deliverable by GCP.
- Bus service pattern changes – these ideas are being referred to bus operators.
- Park and Ride price reductions – this has already been addressed as a policy change.
- Maintenance issues (such as potholes) – these issues have been referred to highway maintenance.

2.5 LLF OPTION SCORING AND PRIORITISATION

2.5.1. Three location specific workshops were held in June 2017, each focussing on a section of the A1307 route in more detail. A scheme option pro-forma was produced for each of the 49 shortlisted options, seeking to provide a similar level of information for each option and this was used to guide LLF participants on scheme costs and benefits, environmental considerations, feasibility constraints and packaging with other options.

2.5.2. The three workshop sessions were led by a team of independent facilitators. The participants were divided in to small groups of 6-8 representatives with an independent facilitator supervising each group. LLF attendees were given time to read and discuss the pro-formas for each option and then were asked to score the options allocating a score of 0-5 to each, based on how important the option was to meeting the GCP objectives overall, where a score of 5 denotes very important, and 0 indicates that the option is not at all important.

Figure 4 LLF Option Scoring Workshops – June 2017

2.5.3. The objectives for the project were summarised as follows for the purposes of the LLF workshops:

- Securing future economic growth and quality of life in Cambridge and South Cambridgeshire, and facilitating movement between major employment and residential areas.
- Enhancing transport infrastructure that makes it easier for people to travel between places of work, home or study using sustainable modes of transport.
- Making it easier to travel in, out and around Cambridge and South Cambridgeshire by public transport, cycle or on foot, and reduce and maintain lower traffic levels to ease congestion.

2.5.4. The individual score allocated by each individual LLF member was recorded as well as an agreed group score for each table (the average score of all group participants added together). The total agreed score was considered most representative of the LLF views.

2.5.5. In a small number of cases, additional options or further variants were added by the groups where they found a consensus existed in support of an alternative that had not previously been suggested. For example one group suggested to include a non-roundabout option for Dean Road Crossroads during Workshop 2. The groups were also asked to rank the options in order of priority.

2.5.6. The series of workshops in June 2017 are listed below:

- Workshop 2 (options between Haverhill and Great Abington).
- Workshop 3 (Great Abington to Babraham plus route wide Park and Ride options)
- Workshop 4 (options west of Babraham village)

2.5.7. Workshop 3 considered route wide Park and Ride options as well as location specific options close to the A11 junction. The Park and Ride scenarios considered were presented and the expected park and ride usage for each option was estimated based on early stage CSRM1 modelling. Additional modelling using the CSRM1 model was also undertaken for Linton and Haverhill Park and Ride options to provide equivalent data for these two new options suggested in Workshop 1

2.6 SCHEME ASSESSMENT FRAMEWORK

2.6.1. The results from the workshop scoring process were then input into a multi-criteria assessment framework as shown below in Table 1. The LLF agreed score was included as a measure of public acceptability. Other factors were also considered based on information in the pro-formas such as feasibility, environmental effects and cost. Negative scoring was applied for costs and dis-benefits and positive scoring was used for scheme benefits, safety enhancements and contributions toward local objectives. All criteria were scored using a similar 0-5 point scale for consistency with the LLF participant scoring to give the LLF scoring equal weight. This approach also accords with the methodology set out in the DfT approved transport analysis guidance known as WebTAG.

2.6.2. The final list was prioritised based on the overall aggregate scoring for each option. This resulted in a prioritised list of scheme options with the preferred options which scored highest near the top of the list and those which received lower overall scores at the bottom of the list (as illustrated below in Table 1).

Delegates to the first three workshops were asked to score the options on a scale of 0 to 5 as to how important they were to achieving the project objectives. The agreed score from those workshops has been taken and combined with indicators of:

- How well the option supports economic growth
- How well the option contributes to quality of life
- How well the option contributes to connectivity
- How well the option addresses congestion
- How well the option reduces traffic
- How significant the environmental impact is
- How much land is needed
- How well the option contributes to road safety

The results are in the table below.

ID	Option	GCP Objectives			Traffic		Environment		LLF Support		Safety	Overall
		Economic Impact	Quality of Life Impact	Connectivity Impact	Congestion Impact	Traffic Impact	Impact	Land Take	LLF Agreed Score	LLF Agreed Priority		
30a	Busway via Sawston with A505 P+R	5	5	5	5	5	-5	-5	3.4	6	4	22.4
42	On-Highway Bus Lane Hinton Way to CBC	3	3	3	4	5	-2	-1	3.3	8	3	21.3
35a	Bus Only Road - Option 1 Long Route	5	5	3	4	3	-3	-2	3	4	3	21
30b	Busway via Sawston with A1307 P+R	5	5	5	5	5	-5	-5	2.5	10	3	20.5
35b	Bus Only Road - Option 2	4	3	4	5	3	-3	-3	2.2	17	3	18.2
35d	Bus Only Road - Via Ninewells	4	3	4	5	3	-3	-3	2	13	3	18
35c	Bus Only Road - Option 3	4	3	4	5	3	-3	-3	1.8	14	3	17.8
1	Eastbound bus lanes on western approach to Linton	3	3	3	2	0	0	0	2.7	11	4	17.7
21	A11 P+R and retain existing Babraham Rd P+R	4	3	3	3	4	-3	-2	2.7	3	3	17.7
32	Eastbound bus lane on approach to A11	2	2	2	2	2	0	0	3.3	7	4	17.3
13	Speed reduction measures Horseheath to Linton	2	2	2	2	0	0	0	4	3	5	17
18	Improve Dean Road Junction (not a roundabout)	0	5	3	0	0	0	-1	4.5	5	5	16.5
2	Improve B1052 Junction	0	5	3	5	0	-2	-1	2.3	11	4	16.3
25	Haverhill P+R and A11 P+R and retain existing	3	3	3	3	4	-3	-2	2.2	3	3	16.2
18	Cycleway from Granta Park/Abingtons to Babraham Research Campus	2	3	4	2	0	0	-2	2.8	1	4	15.8
17	Cycle route upgrade Linton to A11 P&R	1	3	3	3	1	-2	-1	3.8	8.8	4	15.8
37	Cycleway Addenbrookes to BRC	1	3	3	2	1	-2	-1	3.3	6	4	14.3
36	Tidal flow bus lane Wandlebury to CBC	3	3	3	0	2	0	-1	2.1	13	2	14.1
23	Haverhill P+R and retain existing	3	3	3	3	3	-3	-2	1	4	3	14
19	Equestrian Crossing provision via underpass at A11	0	4	4	2	0	-2	-2	3.7	1	4	13.7
15	Westbound bus lanes at Linton	3	3	3	0	3	-3	-2	2.5	12	4	13.5
22	Linton P+R and retain existing P+R	3	3	3	2	3	-3	-2	1.5	5	3	13.5

ID	Option	GCP Objectives			Traffic		Environment		LLF Support		Safety	Overall
		Economic Impact	Quality of Life Impact	Connectivity Impact	Congestion Impact	Traffic Impact	Impact	Land Take	LLF Agreed Score	LLF Agreed Priority		
38	Granhams Road Junction Improvement	1	2	1	2	0	0	-1	4.5	2	4	13.5
14	Traffic Signals at Linton High St Junction with A1307	1	2	1	2	0	0	0	4	7.8	3	13
11A	Signal upgrade to Linton Village College Junction	1	2	1	2	0	0	0	3	8.3	4	13
41	On-Highway Bus Lane BRC to Hinton Way	3	2	2	0	2	0	-2	2.9	10	3	12.9
24	Linton + Haverhill P+R and retain existing	3	3	3	2	3	-3	-3	1.5	4	3	12.5
40	Off-Highway Cycleway via Sawston	1	4	2	2	1	-2	-2	3.3	7	3	12.3
34a	Improvement of Gog Farm Shop Junction	1	4	1	0	0	0	-2	3.2	8	5	12.2
20	Bridleway connectivity to Roman Road at A11	0	3	1	2	0	0	0	2.1	2	4	12.1
12	Signalise Hildersham High Street Junction	0	2	3	0	3	-2	-1	3	4.5	4	12
26	Rural Hubs	3	3	3	2	2	-3	-2	1	2	3	12
3	Roundabout at Bartlow Rd	0	3	3	2	0	-2	-2	3.8	5.5	4	11.8
39	Hinton Way Hamburger	0	3	2	2	0	0	-1	2.1	13	3	11.1
5	Dean Road Junction improvement (Roundabout)	2	2	2	0	0	-3	-1	3.8	3.5	5	10.8
7	Improve bridleway connectivity to Roman Rd East of A11	0	3	1	2	0	0	-1	1.2	15.3	4	10.2
9	Cycle route east of Linton	0	3	2	2	1	-2	-1	2	15	3	10
16	Linton High St measures to improve flow of buses	1	3	2	0	1	-2	0	1.7	14	3	9.7
31	Conversion of Dual to Single at Wandlebury	0	3	0	0	0	0	0	3.3	6	2	8.3
33	Enhance Babraham Rd P+R	3	2	2	2	2	-5	-2	3.2	8	1	8.2
11B	Linton Village College roundabout	1	3	2	2	0	-3	-2	1	12	4	8
4	Grade Separated NMU crossings	0	3	2	0	0	0	-2	0.7	14	4	7.7
29b	Underpass at Wandlebury	0	3	2	0	0	-3	-2	2.3	11	5	7.3
34b	No Right Turns at Gog Farm shop and Haverhill Road	-1	2	-1	0	0	0	0	1.9	14	5	6.9
10	Convert dual carriageways to single lane	0	2	0	0	0	0	0	1.7	14	2	5.7
8	Horseheath Road junction enhancement	0	2	2	0	0	-2	-1	1.7	10.3	3	5.7
6	Linton High St one way (from A1037 junc)	-1	2	-1	2	0	-2	0	2	12.5	3	5
29a	Bridge at Wandlebury	0	3	3	0	0	-5	-2	1.5	17	4	4.5

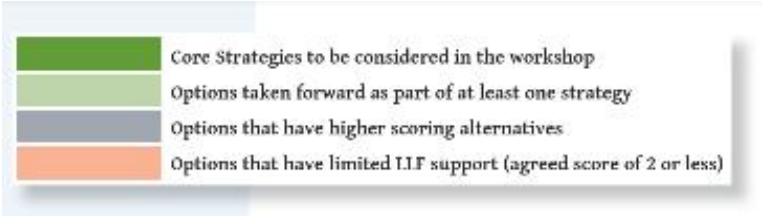


Table 1 LLF Scheme Appraisal Framework Results

2.7 DEVELOPING SUSTAINABLE TRANSPORT STRATEGIES

2.7.1. A review of the scheme appraisal framework results in comparison with the LLF scoring and ranking results indicates that the majority of the top scoring options from the assessment framework, were consistent with those in the top 10 ranking according to the LLF feedback. This indicates that the options which have been selected to go forward to the next stage of the process are those which were most strongly supported by the LLF and those which best meet the GCP objectives.

2.7.2. The top scoring three options were generally the more strategic concepts such as a Busway via Sawston, the longer CBC bus link option and the on highway bus lanes from Hinton Way to CBC.

Option	GCP Objectives			Traffic		Environment		LLF Support			
	Economic Impact	Quality of Life Impact	Connectivity Impact	Congestion Impact	Traffic Impact	Impact	Land Take	LLF Agreed Score	LLF Agreed Priority	Safety	Overall
Busway via Sawston with A505 P+R	5	5	5	5	5	-5	-5	3.4	6	4	22.4
On-Highway Bus Lane Hinton Way to CBC	3	3	3	4	5	-2	-1	3.3	8	3	21.3
Bus Only Road - Option 1 Long Route	5	5	3	4	3	-3	-2	3	4	3	21

Figure 5 - Extract of Appraisal Framework showing top scoring options to form basis of strategies

2.7.3. These main strategy options were then combined with other localised enhancement measures (taking the higher scoring options where more than one variant existed for the same location) were then also packaged with the relevant strategic options to create the scenarios set out below. The City Access proposals are also included with each strategy as well as bus frequency enhancements to encourage uptake of bus services.

- **Strategy 1a: Busway + A505 P&R**
  A new guided busway connecting a new Park and Ride site (west of the A11) to the Cambridge Biomedical Campus via Pampisford, Sawston, Stapleford and Shelford.
- **Strategy 1b: Busway + A11 (E) P&R**
  A new guided busway connecting the proposed A11 Park and Ride site (east of the A11) to the Cambridge Biomedical Campus via Sawston, Stapleford and Shelford. Strategy 1b is the same as Strategy 1a, except the new Park and Ride site is located east of the A11.
- **Strategy 2 : Bus Lanes + CBC BUS Link + A11 (W) P&R**
  A dedicated bus link between Babraham Park and Ride site and the Cambridge Biomedical Campus, plus the provision of bus lanes along the A1307.
- **Strategy 3a : Bus Lanes + A11 (W) P&R**
  Strategy 3 is the same as Strategy 2 except this includes on highway bus lanes westbound along the A1307 between Hinton Way and Addenbrooke's roundabout on Hills Road instead of an off-highway bus link to the CBC campus.
- **Strategy 3b: Bus Lanes + A11 (W) P&R + Haverhill P&R**
  Bus lanes westbound along the A1307 between the Babraham Research Campus and Addenbrooke's, plus the addition of a Haverhill P&R site.
- **Strategy 3c: Bus Lanes + A11 (E) P&R**
  Bus lanes westbound along the A1307 between the Babraham Research Campus and Addenbrooke's, plus the A11 P&R site is situated east of the A11. There is also a bus lane on the eastbound approach to the A11/A1307 junction. Strategy 3c is the same as Strategy 3a but with the A11 P&R site moved east and additional bus lanes provided.
- **Strategy 3d: Bus Lanes + Linton P&R**
  Bus lanes westbound along the A1307 between the Babraham Research Campus and Addenbrooke's with a P&R site at Linton. Strategy 3d is the same as Strategy 3a, but with the proposed P&R site at Linton, rather than at the A11.
- **Strategy 3e: Bus Lanes + Hub-based P&R sites (A11, Linton & Haverhill P&R sites)**
  Bus lanes westbound along the A1307 between the Babraham Research Campus and Addenbrooke's plus P&R sites at A11 (west), Linton and Haverhill. Strategy 3e is the same as Strategy 3a, but it also includes rural hub sites at Linton and Haverhill.

3 TRANSPORT MODELLING & ASSESSMENT

3.1 CSRM2 MODELLING

3.1.1. The initial Options Report was informed by strategic transport modelling using the County Council's strategic transport computer model referred to as the Cambridge Sub-Regional Model (CSRM) model. In July 2017, the first iteration of the CSRM, version 1 (CSRM1), was superseded by a new updated strategic transport model known as CSRM2. This is a new variant with updated base data and a revised approach to land use modelling and travel demand forecasting.

3.1.2. The top scoring options described in 2.7.3 above formed the starting point for a variety of transport strategies to be modelled and tested with the updated CSRM2, seeking to identify the best performing strategies to be presented at the LLF workshop 5 in early September 2017. The strategies considered at this stage are explained below.

3.1.3. Additional CSRM2 modelling has therefore been carried out during summer 2017 to test the three main strategies and understand the likely impacts and benefits. Other lower scoring strategies were also tested for completeness as a comparison with those that were higher ranking based on the LLF feedback and results from the Scheme Assessment Framework.

3.1.4. The modelling included:

- Extend and validate CSRM2 in the A1307 study area
- Agree a set of 2031 land use assumptions to indicate where jobs and dwellings will be located in 2031, specific to the A1307 study area.
- Produce a 2031 Do-minimum model to act as a reference case for comparison with Do Something scenarios.
- Produce a series of 2031 'do-something' models to capture the impact of each of the proposed strategies
- Analyse the performance of the 'do-something' models.

3.2 BASE YEAR MODEL AND MODELLING STUDY AREA

3.2.1. CSRM2 is validated to a 2015 base year. This formed the starting point for the base year modelling. The base year model was extended within the study area, with more detailed network coverage close to the A1307.

3.2.2. The core model area within CSRM2 covers central Cambridge, with a detailed SATURN model simulation network for peak hour highway assignment. The model is underpinned by a wider land use and travel demand model covering the majority of districts within Cambridgeshire with a further network of external zones covering Fenland and neighbouring authorities for example within Suffolk, Essex, Norfolk, Herts etc.

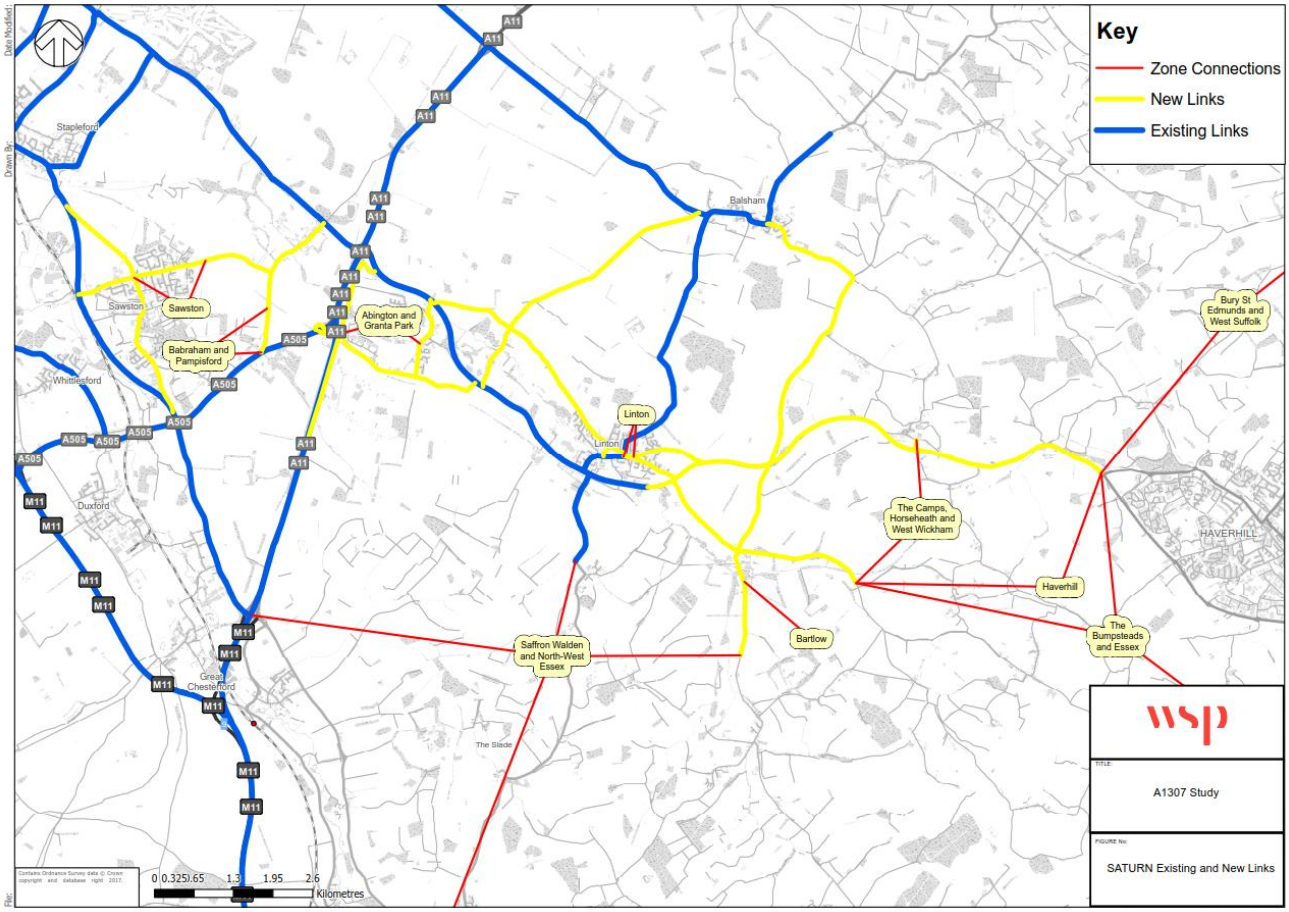


Figure 6 - CSRM2 Network Modifications within A1307 Study Area

3.3 FORECAST BACKGROUND GROWTH TO 2031

3.3.1. The CSRM2 foundation case model has been taken as the starting point for all GCP projects. This gives a common set of minimum background land use changes (eg housing and employment growth) as well as transport assumptions. The Foundation Case is consistent with the Local plans within Cambridgeshire and uses NTEM 7.0 background growth for external zones (beyond the Cambridgeshire boundary). This approach accords with the requirements of WebTAG guidance

3.3.2. Within the study area, local adjustments have been made, where committed development is likely to exceed the Local Plan and project-specific requirements need to be taken into account. Additional developments were therefore included in addition to the Local Plan growth within the Foundation Case.

3.3.3. The A1307 travel demand modelled within the initial Options Report was based on a certain set of development assumptions which included a subset of what is now the committed development at CBC (Cambridge Biomedical Campus), employment expansion at Granta Park and Babraham Research Campus (BRC) and significant housing growth in Haverhill totalling 4260 dwellings by 2031 as set out within the St Edmundsbury Adopted Local Plan.

3.3.4. The LLF were concerned that the traffic modelling should include development outside Cambridgeshire, including in Uttlesford, and did not include all aspirations for growth at CBC. The developments shown in Figure 7 below have therefore been considered in the CSRM2 modelling work over and above the Local Plan Foundation Case scenario which forms the starting point for all GCP projects.

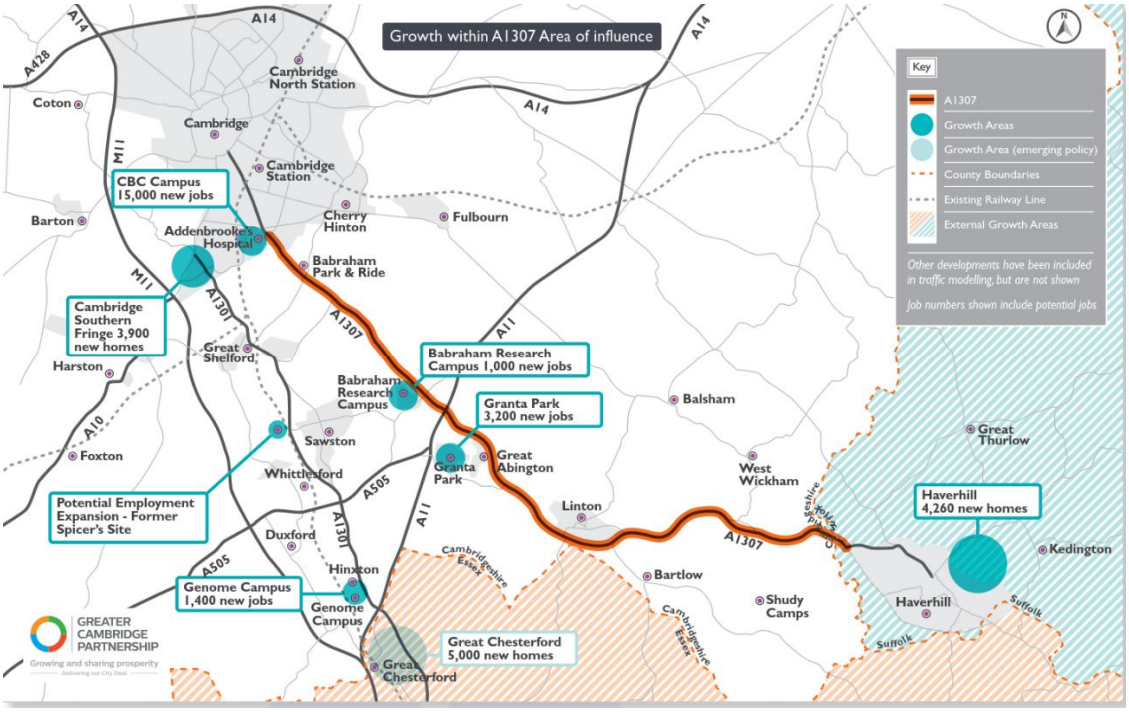


Figure 7 - Committed and non-committed growth considered within A1307 area of Influence

3.3.5. The high growth scenarios considered above will be included as sensitivity tests in the business case.

3.4 SCENARIOS TESTED

3.4.1. A total of 8 potential strategy options were tested within the CSRM2 model (as listed in Section 2.7 above). All strategies are assumed to be implemented alongside the City Access measures being promoted by GCP. The objectives of the City Access study are to reduce traffic in central Cambridge by 1% below 2011 levels by 2031. The Do-Minimum (2031 forecast without implementation strategies) scenario does not include the City Access measures as the demand management measures proposed need to be supported by public transport and/or active mode alternatives such as those proposed for the A1307 route.

3.5 SUMMARY OF MODEL RESULTS

3.5.1. Key indicators based on the headline statistics output from the CSRM2 modelling undertaken in summer 2017 have been assessed for each of the 8 scenarios tested. A summary of how well each performs is provided in **Table 2** below:

	Individual result by metric (based on 2031 forecast)			
	Public transport mode share (%)	Bus patronage (people)	P&R site entries (vehicles)	Bus travel time - A11 to Addenbrooke's (mins)
Do minimum	51%	1091	772	20
Strategy 1a	67%	3171	1389	8.3
Strategy 1b	68%	3088	1386	10.5
Strategy 2	65%	2387	1320	9.6
Strategy 3a	64%	2197	1284	8.6
Strategy 3b	67%	2279	1319	8.5
Strategy 3c	64%	2160	1318	9.3
Strategy 3d	65%	1976	1258	11.0
Strategy 3e	66%	2022	1290	11.4

Table 2 - Strategy performance by metric

3.6 COMPARING PERFORMANCE OF THE STRATEGIES

3.6.1. An equal interval ranking system from 1 to 8 was felt to be unfair for assessing the performance of the strategies due to the similarity of performance for a number of metrics. For this reason each metric has been converted into a score out of 25 relative to the minimum and maximum values recorded, as shown in Table 3. This method of scoring allocates a score of zero to the minimum value ('before'), a score of 25 to the maximum value and a score relative to 25 for the strategies ranking in between.

3.6.2. The four scores are then summed to produce a total score out of 100. The bus travel time scores have been inverted to produce a higher score for a lower (shorter) travel time to make sure a higher total score represents better performance.

	Score by metric (out of 25)				TOTAL SCORE (out of 100)
	Public transport mode share	Bus patronage	P&R site entries	Bus travel time - A11 to Addenbrooke's	
Strategy 1a	24.2	25.0	25.0	25.0	99.2
Strategy 1b	25.0	24.0	24.9	20.1	94.0
Strategy 3b	23.5	14.3	22.2	24.4	84.4
Strategy 2	20.9	15.6	22.2	22.1	80.8
Strategy 3a	19.0	13.3	20.8	24.2	77.2
Strategy 3c	19.4	12.8	22.1	22.7	77.1
Strategy 3d	21.7	11.2	21.0	18.2	72.0
Strategy 3e	21.3	10.6	19.7	19.0	70.6

Table 3 - Strategy performance scoring (relative to the do-minimum) by metric

3.7 KEY FINDINGS

3.7.1. The key findings of the modelling work are also summarised below:

- The busway located close to existing villages in the A1301 corridor enables additional settlements to benefit from faster journey times in addition to improving journey times for the existing Babraham P&R service due to the segregated route and higher bus speed owing to the guidance system.
- The bus link mainly improves the existing Babraham P&R service.
- Enhancing the X13 service frequency substantially helps to improve the level of mode shift being achieved from settlements east of the A11. This could be further supported by a rural hub at Linton.
- The busway option with A1307 P&R is also a high performing option in all aspects but is less effective at delivering reduced bus journey time savings. This is due to the remote location of the Park and Ride site (east of A11 junction) in comparison with the start of busway (west of A11 junction).
- Strategy 3b is shown to out-perform strategy 3a. However, this is related to the X13 bus frequency assumptions within the model which are increased in strategy 3b. Despite this the model indicates that the presence of a park and ride site at Haverhill is not considered to offer good value for money based on the very low number of car park entries and exits evident at the Haverhill end of the route. Even with increased bus frequency, users prefer to travel to Park and Ride locations closer to Cambridge as many of the car trips originating from Haverhill access the wider strategic network at A11 and do not continue into central Cambridge.
- The provision of a new P&R site near the A11 / A505 helps to increase the captive audience that the bus infrastructure improvements are able to cater for. However, with the Babraham Road P&R site still in place, an additional outer P&R site would need to be supported by a VMS strategy to advise users of availability of spaces on approach. The model assumes that parking capacity at the existing P&R site is unlimited so over estimates how many users would be able to access the Babaraham Road site. This leads to a corresponding underestimation of the utilisation of the new P&R site at A11.
- Introducing a new P&R site at Haverhill or Linton, however, does not contribute much benefit with very low uptake seen at these sites which is likely to be because there are other P&R sites available with a shorter bus travel time. Also, the enhanced X13 service has been assumed to serve most of the settlements in the area around Haverhill and Linton so bus users do not need to travel to a P&R site to utilise the service and can board from their place of residence instead.

4 RECOMMENDED SCHEME OPTION COMPONENTS

4.1 SCHEME OPTIONS

4.1.1. The higher scoring options which have been taken forward for inclusion in at least one of the main transport strategies are summarised below. The options receiving LLF agreed scores of 2 or less (out of 5) were not considered to be strongly supported by the LLF and therefore discounted. Some options scoring marginally higher were also dropped based on secondary criteria. The full scoring and prioritisation results are provided in Appendix E.

4.1.2. Note that scheme cost ranges have been used to allow for design development and optimisation.

4.2 BUSWAY VIA SAWSTON WITH A505 P&R

4.2.1. This options involves the creation of an 8km segregated busway from a new Park and Ride site close to the A505 connecting with the CBC campus at its wester extent. The proposed route follows the disused railway line from A505 to the River Granta passing close to Pampisford, via the south Cambridge Business Park in Sawston, then traversing along the northern edge of A1301 villages Stapleford and Great Shelford. The route then diverts west and follows the railway line, avoiding Nine Wells Nature reserve to its connection with the CBC campus in the vicinity of the Roundabout at the junction Dame Mary Archer Way and Francis Crick Avenue. An indicative sketch of the route is provided below in Figure 8. The route would also include an NMU path alongside to facilitate pedestrian, cycle and equestrian access.

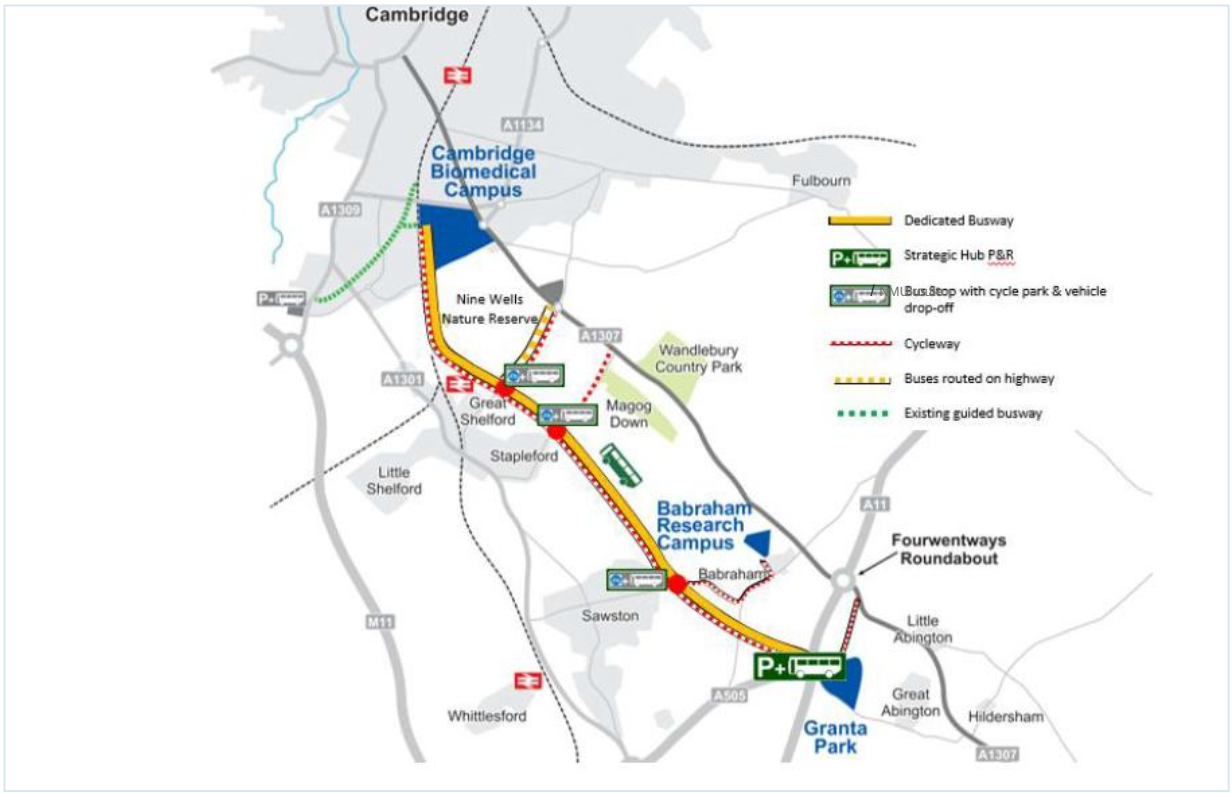


Figure 8 - Busway via Sawston with A505 Park and Ride

4.2.2. This options was well received by the Local Liaison Forum as it offers a segregated and reliable bus route to the CBC with good connectivity with the strategic road network as well as providing traffic relief to the A1307 and A1301 routes. However, this is a higher cost option at £90m-£100m and requires significant land take to construct the new busway, albeit part of the route re-uses the former railway line.

4.2.3. This option offers the most opportunity for mode shift and improved bus journey times but would also have more environmental impact than other on-highway options. Further details of scheme costs and benefits, as presented at the Local Liaison Forum, are provided in the Table **4** below.

Benefits	**Disbenefits**
§ Provides uncongested route to central Cambridge for buses. § Potential to reduce traffic into Cambridge City from origins south east of the City. § Segregated busway will reduce journey times. § Encourages mode shift to sustainable forms of transport, particularly if linked with cycle schemes at the P&R site. § Will include a cycleway alongside the busway. § Allows for economic growth by better connecting homes to jobs and schools; especially CBC and Long Road 6th Form College. § Approximate bus journey time savings of 8-12 mins. § This option provides more traffic relief to A1301 than option 30b.	§ Connection with A505/A11 requires northbound slip off the A505, which would require further earthworks on greenfield sites. This adds cost in comparison with Option 30b. § This is likely to require considerable land take and earthworks on greenfield sites along the route, including Greenbelt land. § Passes close to a small number of listed buildings § Passes through River Granta flood plain. § Passes close to Nine Wells Nature Reserve and priority habitats. § Potential visual impact on landscape at Magog Down. § Traffic Regulation Orders needed to prevent ad-hoc indiscriminate parking on local roads. § This option is likely to provide less relief to A1307 than option 30b.
Programme	**Cost**
Deliverable by: 2023-2026 (city Deal Tranche 2)	Estimated Cost: £90m-£100m

Table 4 **– Option Overview: Busway via Sawston**

4.3 ON HIGHWAY BUS LANES HINTON WAY TO CBC

4.3.1. This option is as set out in the original options report, with westbound bus lanes added alongside the existing single lane carriageway between Hinton Way roundabout and Addenbrookes Hills Road roundabout, connecting directly with the hospital bus station, minimising delay to buses at the traffic signals on approach.

4.3.2. The option is expected to cost in the region of £3.8m and can be achieved within the highway boundary, although the works to install a 4m wide bus lane would require utility diversions or protection works and are likely to require several street trees and highway verge land to be lost. The proposed scheme option is explained further in the Table 5 and with an indicative sketch shown below in Figure **9**.

Benefits	**Disbenefits**
§ Increased attractiveness and opportunities for bus travel. § Improved bus journey times and reliability. § Reduced congestion between Hinton Way and CBC/Addenbrookes particularly in the AM peak. § Supports peak hour mode shift which may help to reduce vehicle trips to/from central Cambridge. § Bus lane can be used by emergency services, improving response times. § Priority for buses to enter Addenbrookes bus station ahead of signals. § The majority of the bus lane can be provided within existing highway boundaries (subject to detailed survey).	§ Improvements for westbound traffic only. § Road widening for the bus lane may require some loss of hedgerows and trees in places, and in others will require crown lifting of trees to clear buses. § Likely to affect below ground utilities. Services may require relocation or protection.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £3.8m

Table 5 – Option Overview: On highway bus lanes Hinton Way to CBC

Figure 9 **- On highway bus lanes Hinton Way to CBC**

4.4 BUS ONLY ROAD LINK TO CBC - OPTION 1

4.4.1. This option was also one of three similar concepts identified within the February 2017 options report, involving a new bus only road link from Babraham Road Park and Ride site to Dame Mary Archer Way. Three route options were considered previously and an additional route alongside Nine Wells development was also suggested by the LLF. However, the longer route (Option 1) was preferred by the LLF as it is likely to have more benefit in terms of bus journey time savings as buses can travel at higher speed on uncongested corridor for longer and bypass a longer section of congested road network.

4.4.2. Option 1 also has more direct connectivity to the Babraham Road Park and Ride site than other CBC link options and bus movement between the two sites can be easily integrated at the existing signalised junction access to the P&R site. This option offers a two way benefit (Westbound and Eastbound), so is helpful to buses in both peak periods and therefore likely to influence increased mode shift as compared to an on-highway option.

4.4.3. The cost of this option is higher than the on highway westbound bus lanes (at £5m-7m depending on the extent of utility diversions required) and relies on land take outside of the public highway but offers reduced impacts on street trees in Hills Road. The route follows an existing public footpath and would be coupled with an NMU route alongside the bus link to facilitate walking, cycling and equestrian access to the CBC and Nine Wells nature reserve.

4.4.4. This option is proposed to be controlled by signalised junctions with an additional arm added to the existing bus access junction to Babraham Road P&R and a busway crossing at Granhams Road with Wig Wag controls. The affected land is predominantly agricultural land which is already in CCC control, although the final connection into the CBC site requires discussion and agreement with third party land owners at CUH Trust, so that a route can be achieved which maximises synergy with the evolving CBC masterplan.

4.4.5. The internal routing of the service within the CBC site is also to be agreed with the landowners. The new bus route would help to support employment growth on the south west edge of the CBC site which is further from the existing Addenbrookes hospital bus station, so would improve pedestrian access to bus services for new employees, patients and visitors at the Campus. Further details are provided in Table 6 and an indicative alignment is shown in Figure 10 below.

Benefits	**Disbenefits**
§ Would reduce bus traffic on A1307 between Babraham P&R and Addenbrookes/CBC. § Journey time savings for buses of c. 2-3 min, which will improve attractiveness of bus for commuters. § Improved connectivity to major employment sites (CBC, Addenbrookes). § Bus link would be attractive for services to CBC, Astra Zenica, New Papworth Hospital, etc. § Potential for services to link to future Southern Station as well as to existing busway via Francis Crick Avenue (for single deck services only). § Bus link could be used by emergency services, improving response times of ambulances. § Includes segregated NMU route to CBC following existing footpath to be upgraded to bridleway.	§ Requires earthworks in Greenbelt on agricultural land. § Buses turning in and out of bus link will put added pressure on junctions.
Programme	**Cost**
Deliverable by: 2020/21 (City Deal Tranche 1)	Estimated Cost: £5m-£7m

Table 6 – Option Overview: Bus only road link to CBC

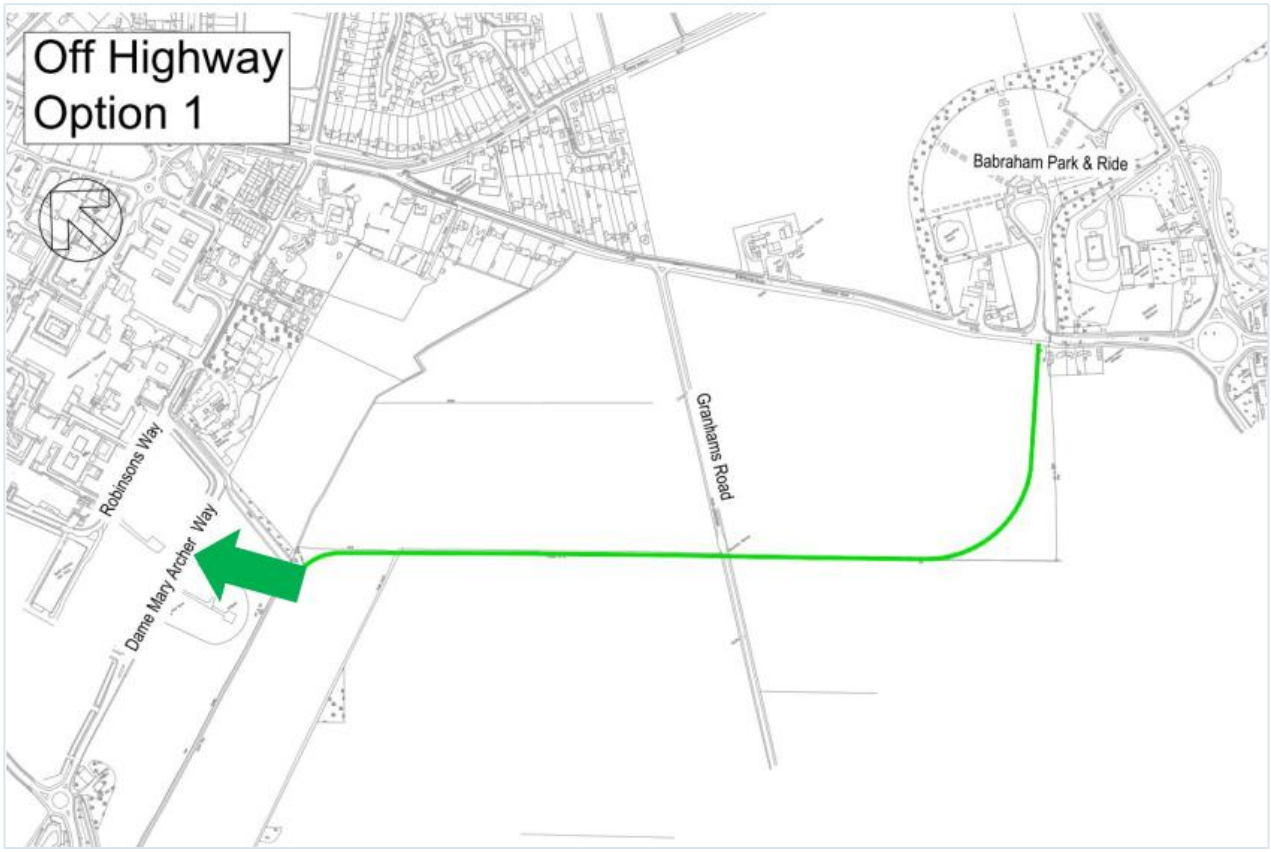


Figure 10 - Off-highway Bus link to CBC Option 1

4.5 EASTBOUND BUS LANES ON APPROACH TO LINTON

4.5.1. This is a new option created in response to LLF requests for bus improvements in the eastbound direction as well as westbound since there are also pinch points which experience congestion in an eastbound direction during the PM peak period. The western approach to Linton was one location where queue lengths and delays in the eastbound direction are noticeable and cause delays to bus services.

Figure 11 - Eastbound Bus Lanes on the Western Approach to Linton

4.5.2. This option reallocates existing road space to buses travelling eastbound from the Dalehead Food access junction and also includes junction safety improvements at the grain Store junction and Dalehead Foods access. The option is relatively low cost (approximately £250k-£500K) and simple to implement as the existing hatched lane (former dual carriageway section) on approach to Linton Village College can be remarked and surfaced as a bus lane. Further details are provided in Table 7.

Benefits	Disbenefits
§ Increased attractiveness and opportunities for bus travel. § Improved bus journey times and reliability. § Supports peak hour mode shift which may help to reduce vehicle trips to/from central Cambridge. § Within the existing carriageway, requiring no extra land take. § Easy to implement, with minimal disruption § Approximate PM peak bus journey time saving of 1-2 mins per bus.	§ Loss of opportunity for overtaking other cars

Programme	Cost
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £250K-£500K

Table 7 – Option Overview: Eastbound bus lane on approach to Linton

4.6 A11 P+R AND ENHANCE EXISTING BABRAHAM RD P+R

4.6.1. As identified within the February 2017 options report the concept of a new additional Park and Ride site close to the A11 junction was supported by the LLF and the CSRM2 modelling explained in chapter 3 above also indicates that with the City Access proposals in place and additional growth as a result of increased pressure for housing within neighbouring authorities, there is expected to be a significant increase in uptake of Park and Ride spaces within the A1307 corridor and a site close to the A11 junction would help to capture traffic from the strategic routes (A11 and A505 as well as A1307).

4.6.2. Further details of the option are provided in Table 8 below.

Benefits	**Disbenefits**
§ Reduces traffic into Cambridge City which will reduce congestion on the A1307. § Proximity to A11 catchment as well as A1307. Short diversion from A505. § Located on key desire line towards Cambridge. § Encourages mode shift and uptake of sustainable forms of transport. § Improved air quality and less noise pollution. § Opportunities for linkage with cycle schemes crossing A11 for options south of A1307. § Close to residents within walking and cycle distance at Babraham and Great Abington. Could also improve access to jobs at BRC and Granta Park. § Potential to address safety issues at existing junctions.	§ Likely to require considerable land take and earthworks (in the Greenbelt if located west of A11) § Proximity to High Pressure strategic gas main west of A11 § Loss of good quality agricultural land. § Likely to generate crossing movement of pedestrians if located north of A1307. § Proximity to River Granta Flood plain (if located south of A1307)
Programme	**Cost**
Deliverable by: 2020/21 (City Deal Tranche 1)	Estimated Cost: £11.5m

Table 8 – Option Overview: P+R and enhance existing Babraham Rd P+R

4.6.3. This option would also potentially provide downstream traffic relief to the congested approaches to Hinton Way and BRC roundabouts. The existing Babaraham Road site would be retained as it serves a localised catchment and this would become more CBC focused with increased park and stride and Park and cycle usage. However, the modelling indicates that a VMS strategy would be needed to support this option, to inform users about availability of spaces on approach to the A11 junction.

4.6.4. However, the modelling also indicates that the extent of traffic relief and usage of the A11 site is reliant on the provision of a frequent bus service of at least 15 minute headway in each direction at the A11 site, which is essential to attract sufficient patronage. A further viability assessment is required in consultation with bus operators.

4.6.5. The modelling indicates that with the City Access proposals included and extra background growth assumed additional spaces are needed over and above the 1000 extra spaces identified in the February options report. Therefore the locations identified previously for Park and Ride site options close to Babraham Village or Great Abington south of A1307 are unlikely to provide sufficient capacity to support the additional demand now considered in the latest CSRM2 model tests.

4.6.6. Therefore a wider review of potential site options is required to be undertaken, also seeking to identify a less sensitive location which has good access from the strategic routes as well as additional opportunity for future expansion capacity in the context of emerging policy which will require larger sites of 2000-3000 space to be sought. Appendix H includes a high level review of potential alternative site options in the context of the revised P&R demand forecasts and emerging policy requirements.

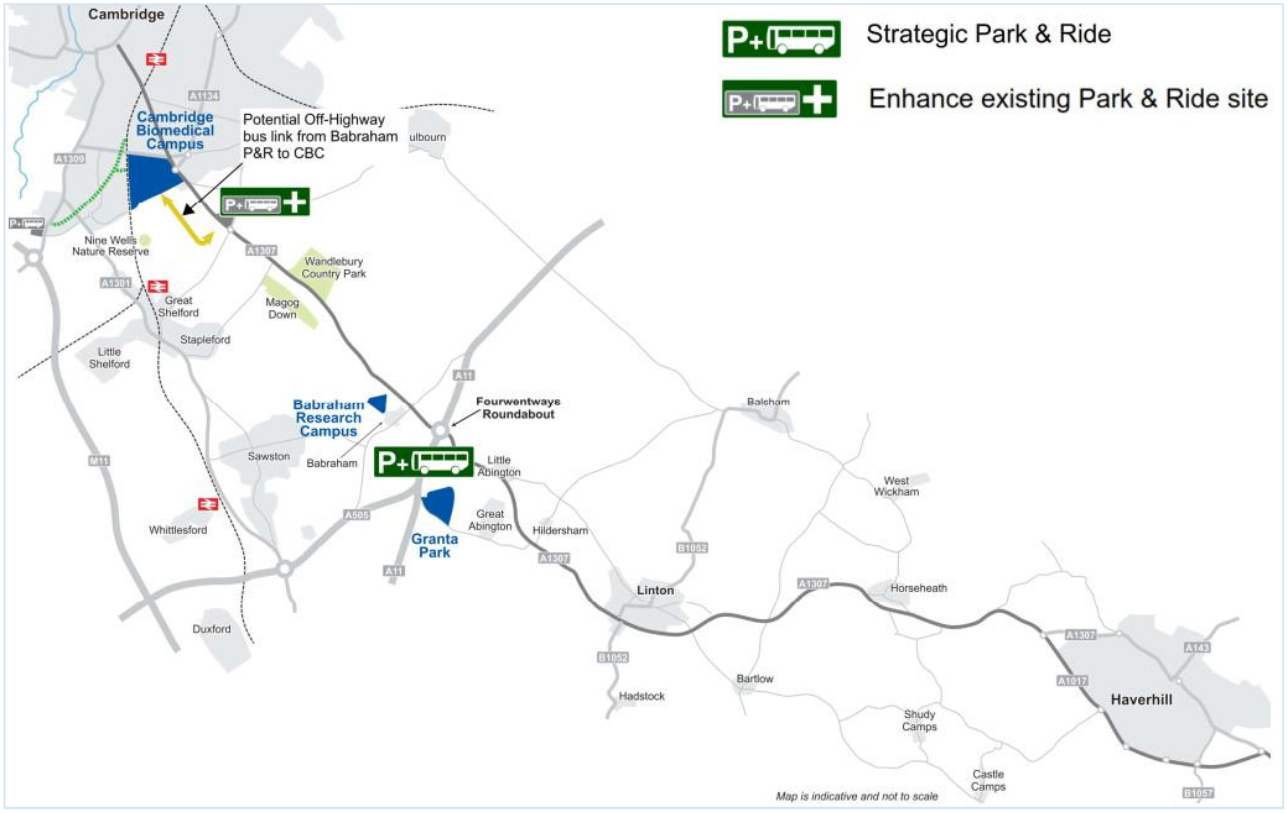


Figure 12 - A11 Park and Ride site

4.7 EASTBOUND BUS LANE ON APPROACH TO A11

4.7.1. As set out above, the LLF requested additional eastbound bus lane sections where possible to assist with reliability and improvement of PM peak bus journey times. Therefore a new option was suggested with additional eastbound bus lanes on approach to the A11 junction close to Babraham Village. This option would be relatively low cost and can be implemented by reallocating existing roadspace where there are two lanes on approach to the A11.

4.7.2. It should be noted that a Local Highway Initiative promoted by Babraham Parish Council is currently being progressed to reduce this section of the road to a single lane. The residual roadspace can therefore be reallocated to bus.

This option is shown below in Figure 13 and also in Table 9 and would potentially also assist with reducing risk of accidents at the Babraham Village High Street junction by reducing the carriageway to single lane on the north side which would reduce opportunity for overtaking at the junction.

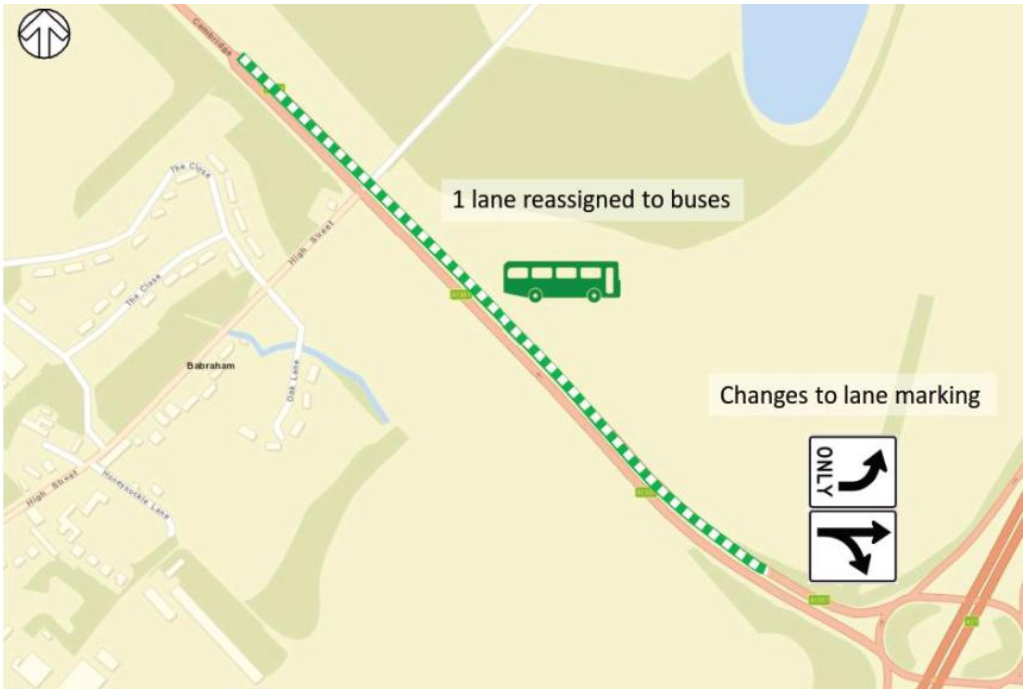


Figure 13 - Eastbound bus lanes on approach to A11 junction

Benefits	Disbenefits
§ Increased attractiveness and opportunities for bus travel with improved bus journey times and reliability. Improved road safety at Babraham High Street. § Supports peak hour mode shift which may help to reduce vehicle trips to/from central Cambridge. § Within the existing carriageway, requiring no extra land take. Easy to implement, with minimal disruption § Approximate PM peak bus journey time saving of 1-2 mins per bus.	§ Loss of opportunity for overtaking other cars. § Slight increase in delay to left turning vehicles approaching A11 North.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £250K-£500K

Table 9 – Option Overview: Eastbound bus lane on approach to A11

4.8 SPEED REDUCTION MEASURES & DEAN ROAD JUNCTION

4.8.1. This option, as identified previously, seeks to reduce the risk of accidents between Horseheath and Linton by controlling the speed of vehicles through the section of route where there are bends on approach to minor road junctions. The scheme would consist of improved road markings, additional signage to warn drivers of hazards and interactive signs supported by enforcement measures where appropriate (to be agreed with the road safety team and Cambridgeshire Police).

4.8.2. This would also be coupled with Dean Road junction improvements to reduce right turning movements. The SATURN modelling undertaken using CSRM2 indicated that there is a tendency for westbound vehicles to turn right towards Balsham to avoid the Linton section of the A1307. A roundabout was considered but has been discounted since it would increase delay, requires additional land take and enables rat running through villages. However, the proposal to close the central reserve would reduce conflicts at Dean Road crossroads and placing a roundabout at Bartlow Road junction would cater for right turning safely from Bartlow whilst minimising the attractiveness of rat running through villages at peak times.

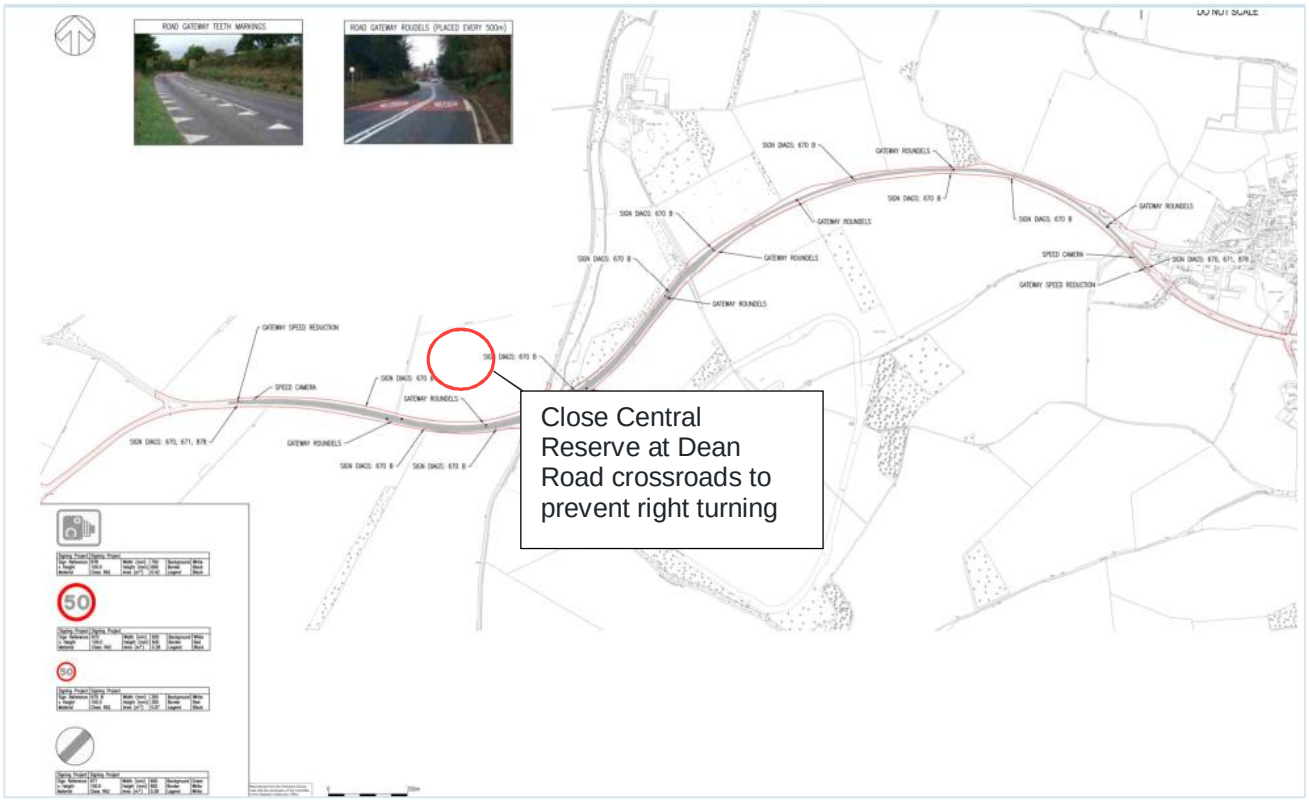


Figure 14 - Speed Reduction Measures and Dean Road Crossroads (not a roundabout)

Benefits	Disbenefits
§ Seeks to address existing accident issue § Reduces risk of accidents and will improve reliability of journeys.	§ Slower speeds may increase journey times slightly.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £500K-£1m

Table 10 – Option Overview: Speed reduction measures & Dean Road Crossroads

4.9 CYCLEWAY AND NMU PROPOSALS

4.9.1. Previously, following the Linton greenways study, a new and enhanced cycle route alongside the A1307 was proposed connecting the A11 with CBC on the north side of the main carriageway, crossing to the south side at BRC campus and travelling through Babraham village to the existing A11 footbridge/underpass, then continuing onwards through Great Abington to the High Street junction at Hildersham and connecting with Linton at the western edge of the village to facitiate access to Linton Village College.

4.9.2. Part of the route has recently opened connecting Babraham Research Campus (BRC) with the existing cycleway on the north verge of A1307. This has permissive NMU rights. Any new cycle routes would need to be developed in accordance with IAN 195/16.

4.9.3. Feedback gleaned during the LLF process has led to additional sections of route being made available to NMU's, with Pegasus crossing facilities added at key junctions where signalisation is existing or proposed (eg at High Street Hildersham junction).

4.9.4. Via the Local Access forum, options for NMU improvements were discussed and it was agreed that equestrian users could potentially be routed via the A11 Highway boundary to the existing underpass of the A11. Pedestrians and cyclists can continue to use the existing stepped A11 footbridge, which would be modified to add ramps to create an improved step-free access..

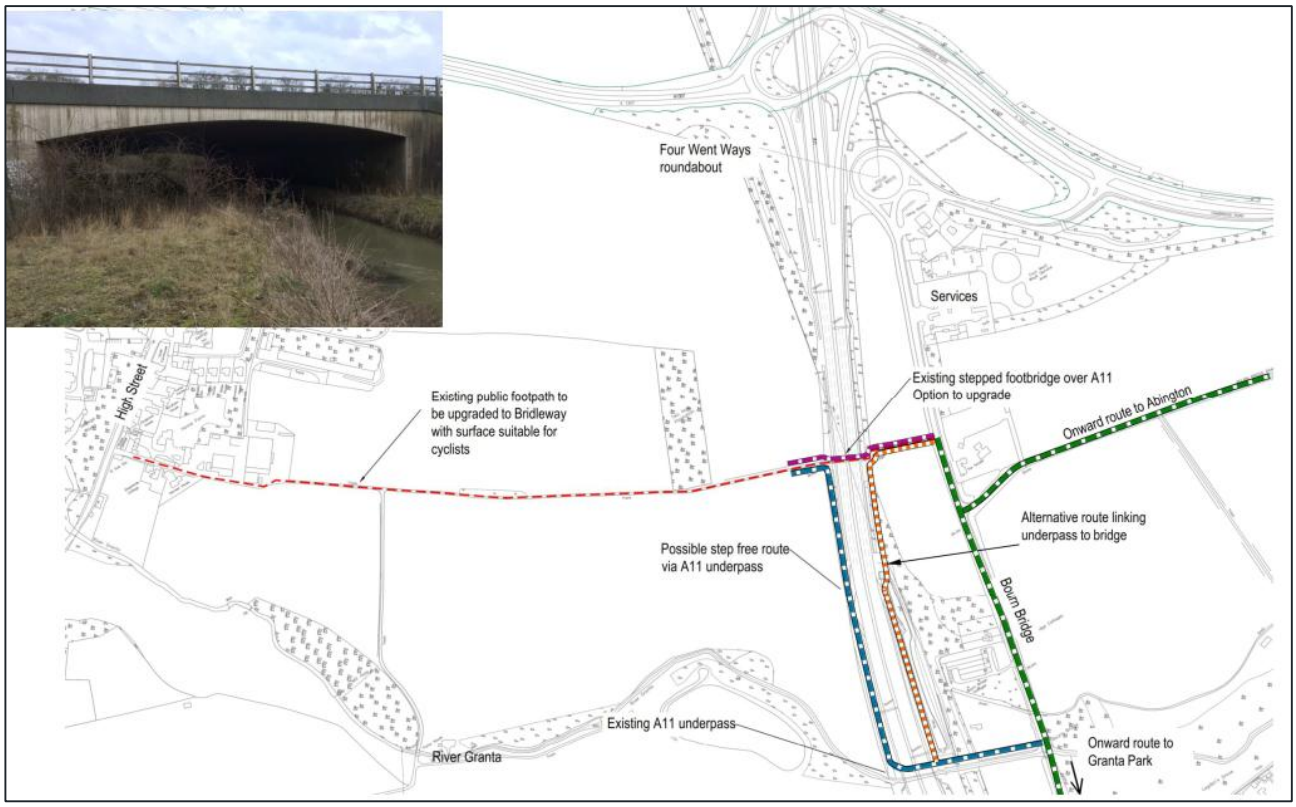


Figure 15 - A11 underpass and footbridge improvements for NMUs

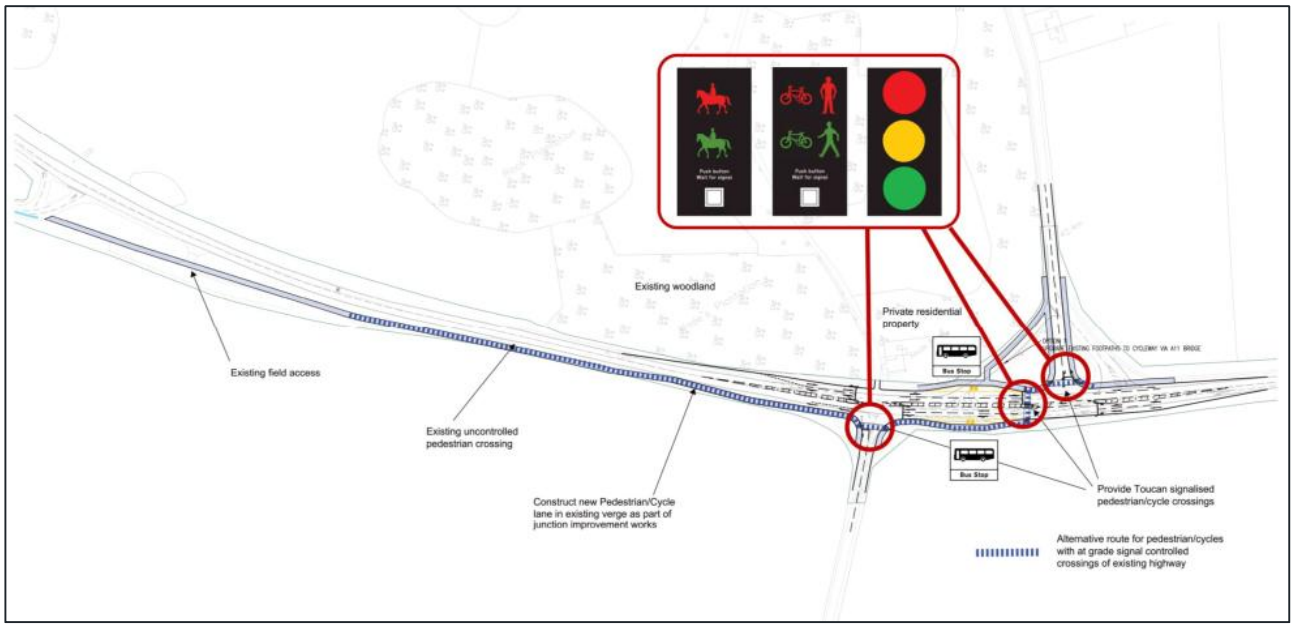


Figure 16 - Hildersham High Street junction signalisation

Table 11, Table 12, Table 13, Table 14 and Table 15 below provide an overview of the different options originally presented.

Benefits	**Disbenefits**
§ Promoting easier, more sustainable, healthier way of travel to schools and jobs. § Improved connectivity for cyclists, pedestrians and equestrians. § Improved access to buses for cyclists. § Encourages mode shift. § Improves safety for vulnerable users crossing A1307.	§ May require loss of vegetation and ecology.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost range: £2m-£3m

Table 11 – Option Overview: Cycle route upgrade Linton to A11 P+R

Benefits	Disbenefits
§ Promoting more sustainable & healthier travel. § Potential to encourage mode shift on journeys to and from Cambridge. § Improved sustainable connectivity between major employment sites (i.e. Granta Park & Babraham Research Campus) and residential areas. § Improved safety for vulnerable users by segregating them from traffic. § Opportunity for linkage to P&R depending on adopted strategy.	§ Depending on the exact routing of the path, it could lead to loss of vegetation and may have ecology impacts (particularly in Greenbelt west of the A11). § Both the modification to existing A11 footbridge and the underpass would require earthworks in the Greenbelt and may affect priority habitat. § The A11 footbridge would not be suitable for equestrians.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £2m-3m

Table 12 – Option Overview: Cycleway from Granta Park/ Abingtons to Babraham Research Campus via existing A11 footbridge with ramps added

Benefits	Disbenefits
§ Promoting easier, more sustainable, healthier travel. § Potential to encourage mode shift on journeys to and from Cambridge. § Improved sustainable connectivity between major employment sites (i.e. Granta Park & Babraham Research Campus) and residential areas. § Improved safety for vulnerable users by segregating them from traffic. § Opportunity for linkage to P&R depending on adopted strategy. § Avoids the requirement to replace or modify the existing A11 footbridge to create NMU accessible route.	§ Not all users may feel comfortable using an underpass as it is a secluded route. § Includes works within the floodplain of the River Granta. Flood modelling data from the Environment Agency indicates that the route may experience slight flooding under a 1 in 5 year storm. § Some additional vegetation clearance would be required to create accessible paths on approach to the underpass.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £500K-£750K

Table 13 – Option Overview: Review NMU crossing provision – underpass option at A11

Benefits	Disbenefits
§ Promoting easier, more sustainable and healthier travel. § Potential to encourage mode shift on journeys to and from Cambridge. § Improved sustainable connectivity between major employment sites (i.e. Addenbrookes, CBC & Babraham Research Campus), residential areas and Wandlebury Country Park. § Improved safety for vulnerable users by segregating them from traffic and provision of signal controlled crossing over A1307. § Improves linkage from P&R to Addenbrookes for increased park and cycle or park and stride. § Development would be within highway boundary.	§ Cycling alongside high speed sections of A1307. § Utilities diversions may be required in places to enable widening.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £1m-£2m

Table 14 – Option Overview: Cycleway Addenbrookes to Babraham Campus

Benefits	Disbenefits
§ Safety improvements and decrease in congestion. § Improves ease of crossing for pedestrians, cycles and potentially equestrians. § Enhances access to bus stops. § Encourages mode shift. § Improves safety for school access by foot or cycle to Linton Village College.	§ The introduction of signals at this junction may increase delay for vehicle journeys.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £200K-£300k

Table 15 – Option Overview: Signalise Hildersham High Street junction with A1307

4.10 GRANHAMS ROAD JUNCTION IMPROVEMENT

4.10.1. This option as identified previously, involves creating a ghost island right turning lane at Granhams Road junction to improve safety and reduce congestion in the eastbound direction as currenlty queuing traffic blocks the passage of straight on movements. The minor road arm would also be altered to remove the existign Y-shaped junction to create a standard T junction bell mouth.

4.10.2. The feasibility and cost of this option is dependent on the extent of utility diversions required as there are substantial services in the highway, including strategic gas mains and water mains.

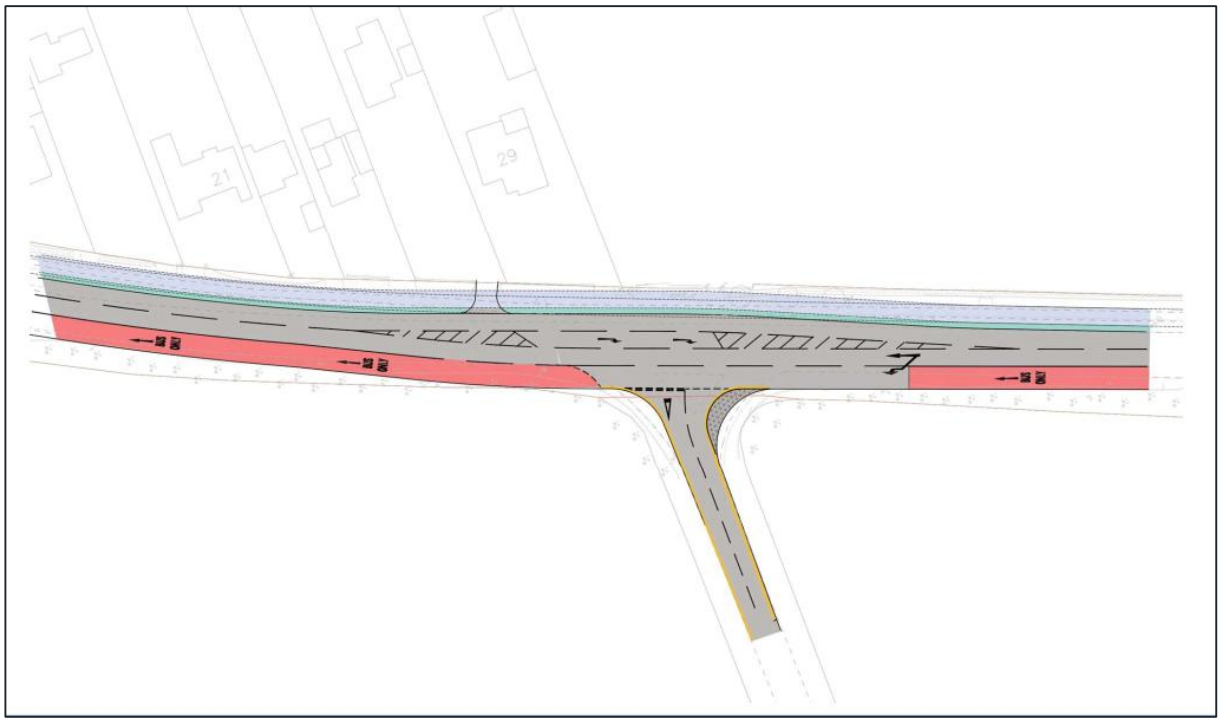


Figure 17 - Granhams Road Junction Improvement

Benefits	Disbenefits
§ Reduces eastbound traffic congestion in the PM peak hour on the A1307 by allowing vehicles to pass traffic queuing to turn right into Granhams Road. § Should reduce the instances of vehicles overrunning the northern verge in close proximity to cyclists and pedestrians. § Should improve road safety for vehicles, pedestrians and cyclists. § Improves visibility on exit from Granham's Road. § Makes turning right easier and the ghost island will minimise risk of collisions.	§ Requires land take in Greenbelt (but likely to be within highway boundary). § There are several utilities crossing through this junction which may require diversion or protection during the proposed works.
Programme	**Cost**
2020	£350k-£500k

Table 16 – Option Overview: Granhams Road junction improvement

4.11 WESTBOUND BUS LANES AT LINTON, BARTLOW ROAD ROUNDABOUT LINTON & RURAL HUB

4.11.1. On the western approach to Linton village new westbound bus lanes are proposed to alleviate delays to buses on approach to the High street junction. This would be predominantly of benefit to the X13 service which is the express service from Haverhill to Cambridge which is not routed via the High Street. However, would also support a new rural hub proposal close to Bartlow Road junction which would alleviate parking congestion in the High Street (coupled with short stay parking restrictions).

4.11.2. The works would widen the carriageway within the public highway and allocate road space to bus with priority on approach to the signals at High Street. Ideally this proposal may improve the commercial attractiveness of increased frequency of X13 services from Haverhill. This would also support housing growth in Haverhill where 4260 new dwellings are allocated via the St Edmundsbury Local Plan.

4.11.3. In response to comments from the LLF, this scheme will be developed further in liaison with the Parish Council of Linton in order to identify a suitable site for the rural hub and also to consider loss of vegetation alongside the road and understand environmental issues such as traffic noise in more detail. A Traffic Regulation Order (TRO) would also be required to support the High Street parking restrictions.

Figure 18 - Westbound bus lanes at Linton

Benefits	Disbenefits
§ Increases opportunities and priority for bus travel. § Improved bus journey times by about 2-3 mins per X13 service and about 1 min per bus for Linton High Street services. § Improved bus reliability. § Supports peak hour mode shift and journey time saving which may lead to economic growth at Haverhill. § Enables buses to bypass queuing traffic.	§ Localised road widening requires vegetation clearance and may have ecology impacts.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £500K-£1.5m

Table 17 – Option Overview: Westbound bus lane at Linton

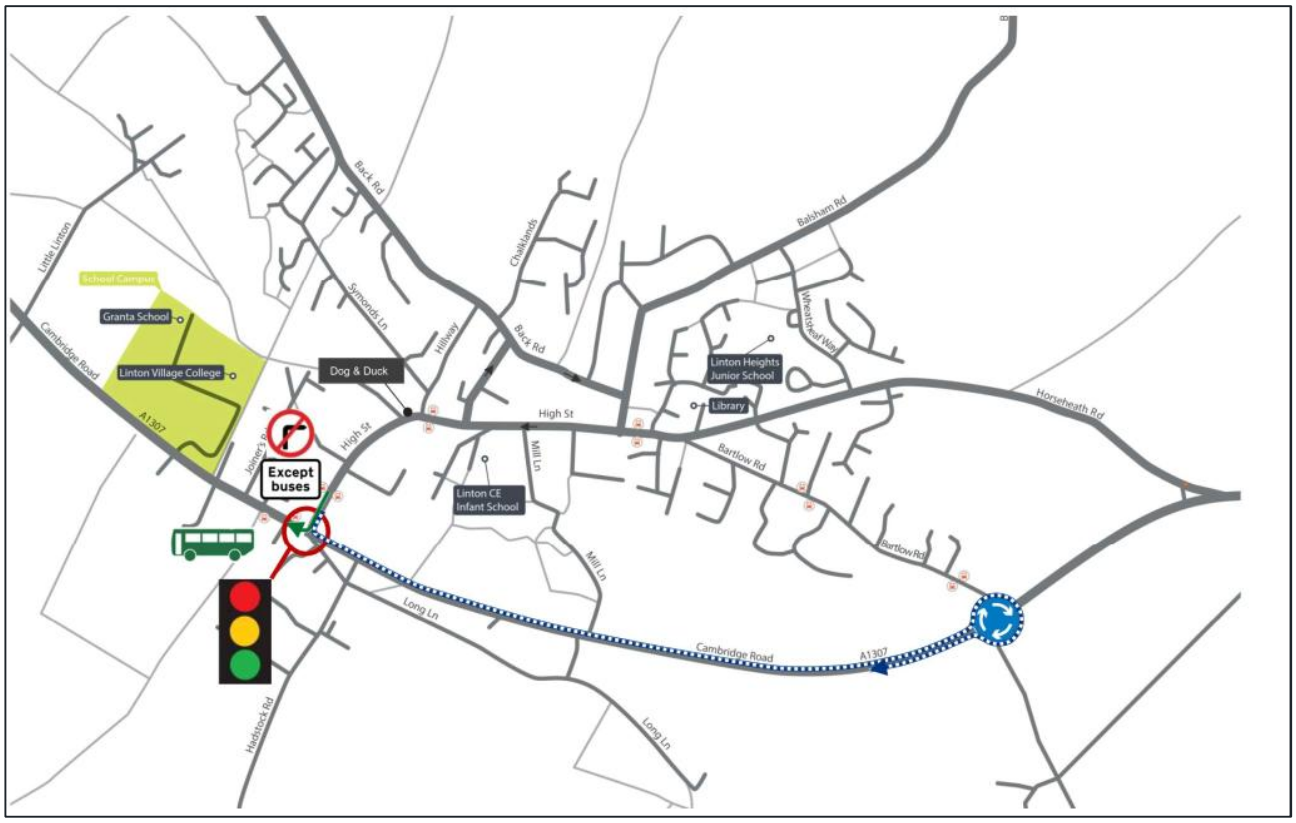


Figure 19 - Bartlow Road Roundabout

Benefits	Disbenefits
§ Safety improvements. § Less congestion. § Traffic improvements on Bartlow Rd / High Street. § By improving access from Bartlow village, may reduce demand at Dean Road crossroads. § Retains two-way traffic flow along High Street whilst preventing Rat-Running. May result in fewer vehicle trips along High Street § Reduces delay to bus service joining A1307	§ Construction of roundabout may result in loss of habitat. § No Right Turn to private vehicles will introduce a long diversion and U turn manoeuvre at roundabout. § May displace vehicle trips to other routes § May encourage more vehicle trips along less suitable routes. § Possible reduction in passing trade to local businesses. § Roundabouts are less ideal for bus movement and rider comfort.
Programme	**Cost**
Deliverable by: 2020/21 (City Deal Tranche 1)	Estimated Cost: £1m-£2m

Table 18 – Option Overview: Bartlow Road roundabout

4.12 TRAFFIC SIGNALS AT LINTON HIGH STREET JUNCTION

4.12.1. Traffic signals at the High Street junction would be modified to assist buses on exit from the High Street. This could be coupled with a right turn ban to minimise queue lengths at the junction.

4.12.2. A review has been carried out to consider whether this should also be coupled with proposals for the B1052 south of Linton which was an idea suggested via the LLF process. However, a capacity assessment indicates that this is not required, unless on highway safety grounds. The highway safety record at the B1052 junction has also improved in recent years, so at present it is considered that this is not required. Linking the signals to create a staggered junction has also been tested but this was found to increase delays and queue lengths as the separation between the junctions causes the inter-green periods in the signal plan to be very long.

4.12.3. Modelling indicates that additional traffic calming may be required on Back Road, to support this option to prevent rat running. However, the model assumes additional housing growth at appeal sites in Linton over and above the committed allocations, so this effect may be less pronounced if the developments do not go ahead. This type of intervention could be provided by the developer.

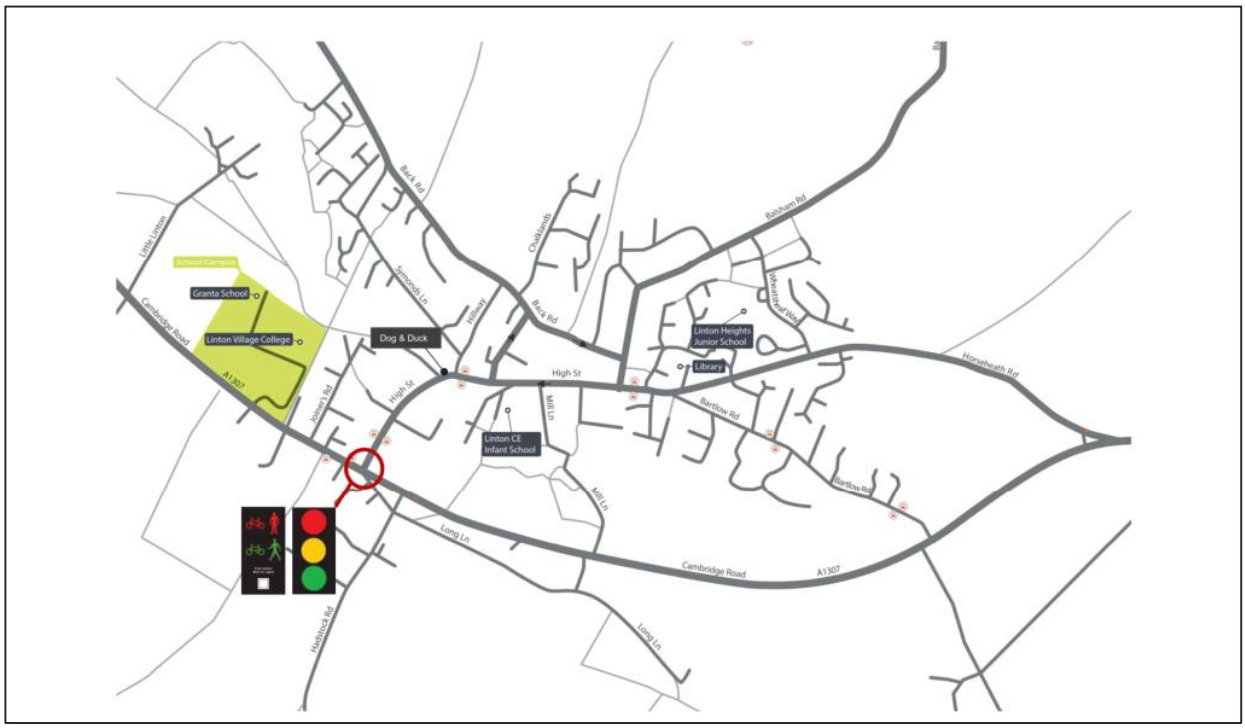


Figure 20 - High Street Signals Linton

Benefits	Disbenefits
§ Improved highway safety. § May reduce traffic in Linton. § Facilitates ease of exit onto A1307 and bus access to village. § Signalisation potentially enables priority to be offered to bus.	§ Re-routing of traffic increases trip length for some drivers. § Minor heritage impact on neighbouring properties.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £100K-£200K

Table 19 – Option Overview: High Street signals Linton

4.13 SIGNAL UPGRADE TO LINTON VILLAGE COLLEGE JUNCTION

4.13.1. As proposed previously, a MOVA signal upgrade could be applied to the existing Linton Village College junction to enhance the efficiency of this junction. This is a simple and cost effective measure that requires minimal disruption to traffic during installation and minimises land take. The proposed option also allows the existing signalised layout to be retained which is preferable for pedestrian access to the Village College.

4.13.2. A roundabout option has also been considered. This is likely to offer a longer term solution, and may become a requirement if signal upgrades do not provide sufficient betterment, so may be needed in the future but is more costly (c£1.3m) and disruptive to install. The roundabout works also require land take within the village college site, removal of trees on approach and significant earthworks as there are level differences on the north side of the road.

Figure 21 - Signal upgrade at Linton Village College

Benefits	Disbenefits
§ Improves junction efficiency without detriment to pedestrians. § Reduces queues and delays for buses and car traffic on approach to Village College. § Improves access to school and jobs. § Slight reduction in air pollution and noise due to reduced queue lengths. § Low cost and easy to implement with minimal disruption. Avoids land take and ecology impact. § MOVA signal control makes exit from LVC easier for buses. Approx. 10% reduction in delay	§ May encourage more vehicle trips due to greater ease of movement. § May provide shorter term benefit in comparison with a roundabout.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £40K-£60K

Table 20 – Option Overview: Signal upgrade at Linton Village College

4.14 SAFETY & BUS IMPROVEMENTS BRC TO HINTON WAY

4.14.1. On highway bus lanes are proposed from BRC roundabout to Hinton Way to allocate clear priority to bus services and assist with reliable journey times for westbound bus services. This would also allow buses to bypass queues at the Hinton Way roundabout which often reach Wandlebury in the AM peak in the current situation. The modelling study indicates that queue lengths would increase at times when blocking back occurs from Addenbookes roundabout (although further modelling of the Addenbrookes roundabout is recommended to understand this in more detail prior to public consultation).

4.14.2. Various options were also considered for improving highway safety at the Gog Farm Shop junction which is classified as an accident cluster location as there were more than 6 accidents in years. Based on feedback from the LLF and appraisal results, a priority layout was preferred as a no right turn option was also considered but found to be overly restrictive and would increase turning movements at the Hinton Way roundabout.

4.14.3. The proposals would be coupled with conversion of the westbound dual carriageway section passing Wandlebury to single lane with the additional lane allocated to bus services. This would potentially help to influence lower traffic speeds which would further improve highway safety.

4.14.4. An underpass is also proposed to improve safety for non-motorised users (NMUs) crossing the A1307 between the Magog Down and Wandlebury country Park. This is a costly option but given the landscape and visual effects expected to be associated with a footbridge, it is considered that an underpass is justified. As well as supporting recreational access to Wandlebury, this option would enhance access to cycleways on the north side of A1307.

Westbound bus lanes BRC to Hinton Way – conversion of dual carriageway

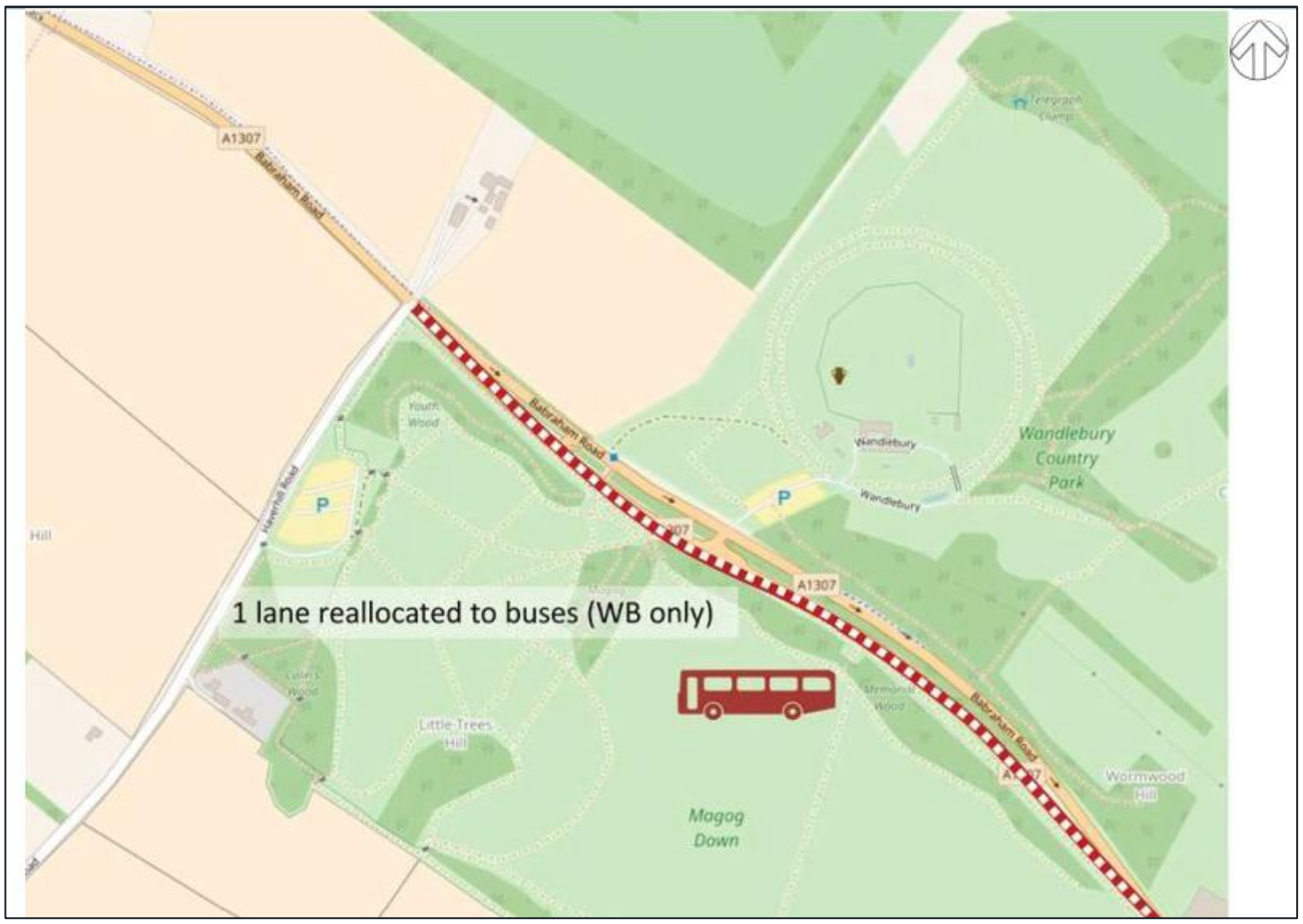


Figure 22 - Westbound bus lanes BRC to Hinton Way – conversion of dual carriageway

Benefits	Disbenefits
§ Re-use of dual carriageway does not require additional land beyond the public highway. § Improves image of bus travel by reallocating road space. § Priority to buses may help to influence mode shift. § Buses have dedicated free flow lane for continuity on approach to Hinton Way roundabout. § May improve road safety by minimising conflicts caused by overtaking vehicles. § Allows cars to overtake buses and HGVs on uphill section of road in the eastbound direction.	§ Reallocation of road space to bus may increase peak hour queue lengths for vehicles. § Removal of dual carriageway reduces opportunity for overtaking other cars.
Programme	**Cost**
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £500K-£1m

Table 21 – Option Overview: Conversion of dual carriageway to single lane (with westbound bus lanes passing Wandlebury)

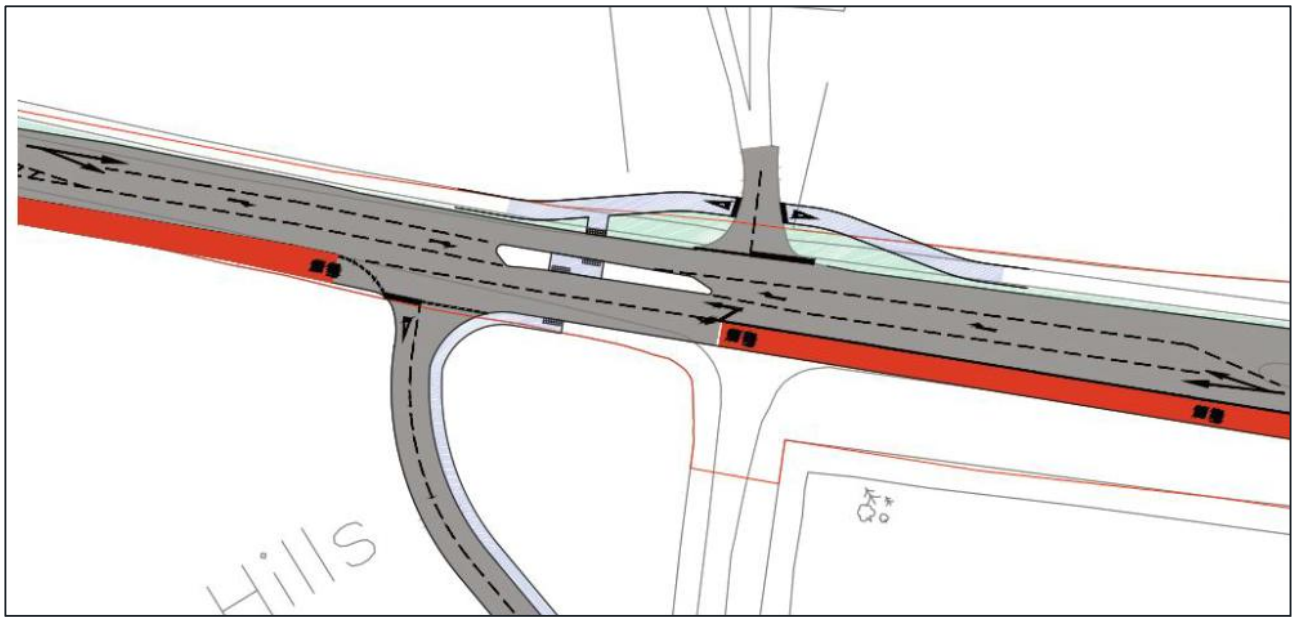


Figure 23 - The Gog Farm Shop Safety Improvements

Benefits	Disbenefits
§ Improves safety at an accident cluster location. § Staggered layout would reduce likelihood of collisions. § Moves Haverhill Road away from crest of hill, improving approach visibility to junction. § Would improve visibility for vehicles exiting the minor arms of the junction at Haverhill Road and the Gog Farm shop. § Relatively simple to implement § Enables unrestricted turning – all movements retained in the new junction layout. § At grade crossing less intrusive in the landscape than other grade separated options.	§ Requires acquisition of third party land to achieve staggered layout. § Works in close proximity to sensitive historic landscape setting at Wandlebury and Magog Down. § For safety reasons an at grade crossing requires slower approach speeds, so would need to be combined with speed reducing measures.

Programme	Cost
Deliverable by: 2020 (City Deal Tranche 1)	Estimated Cost: £350K-500K

Table 22 – Option Overview: Improvement of Gog Farm Shop / Haverhill Road junction

NMU underpass at Wandlebury

Figure 24 - NMU underpass at Wandlebury

Benefits	Disbenefits
§ Promoting easier, more sustainable, healthier travel. § Inclusive design – accessible for all users including pedestrians, cycles, equestrians and mobility impaired users. § Improved safety for vulnerable users by segregating them from traffic. § Improved connectivity between Magog Down and Wandlebury Country Park.	§ Requires significant site clearance, excavation, earthworks and vegetation clearance within in Greenbelt. § Located in close proximity to historic and ecological assets at Wandlebury & Magog Down. § Underpass Option: not all users may feel comfortable using an underpass as it is secluded. § May require pumped drainage solution. § Major disruption to highway during construction
Programme	**Cost**
Deliverable by: 202/21 (City Deal Tranche 1)	Estimated Cost: £4m-£5m

Table 23 – Option Overview: Underpass for NMU at Wandlebury

4.14.5. Various options had been considered for achieving a suitable crossing facility at Wandlebury. Initially a more formalised at grade crossing was identified as part of the Gog Farm Shop junction upgrade as shown above. However, on review of new guidance (Highways England Interim Advice Note IAN 195/16), it was identified that grade separation is advisable for roads at a speed limit of 40-50mph or carrying more than 6,000 vehicles AADT.

4.14.6. IAN 195/16 also sets out that a signalised crossing would be acceptable for 40-50mph two lane roads carrying between 6,000-10,000 vehicles AADT. Although this was considered to be less suitable for the location due to the proximity to the brow of a hill with a blind summit for vehicles approaching from the east. The blind summit constrains the forward visibility of the back of the queue on approach and the visibility of signals on approach.

4.14.7. An NMU over-bridge option was considered but discounted given the sensitive landscape adjacent to the Gog Magog Hills and Wandlebuy Country Park scheduled monuments. Hence the underpass option emerged as the preferred option in this location, despite this being the more expensive option with an expected cost of c£4-5m.

(AADT = Annual Average Daily Traffic Flow. This measure of daily traffic flow is calculated from the total annual traffic flow divided by 365.)

5 DEVELOPING SUSTAINABLE TRANSPORT STRATEGIES

5.1 OVERVIEW

5.1.1. Following the LLF scoring process, CSRM2 modelling and option prioritisation using the Scheme Appraisal Framework as set out in section 2.7.4 above, three main strategies emerged as the best performing and well supported of the 8 strategy variants considered. These are listed below. All strategies have the same package of measures east of A11 and incorporate longer and shorter term elements that offer a package which maximise opportunity to achieve the GCP and project objectives within the A1307 corridor.

5.2 STRATEGY 1 BUSWAY VIA SAWSTON WITH A11 P&R

5.2.1. Figure 25 below shows the Strategy 1 scenario which consists of a new 8km Busway via Sawston connecting a new P&R site near the A11/A505 with an NMU path alongside. This is also coupled with the package of measures around Linton and highway safety enhancements along the A1307.

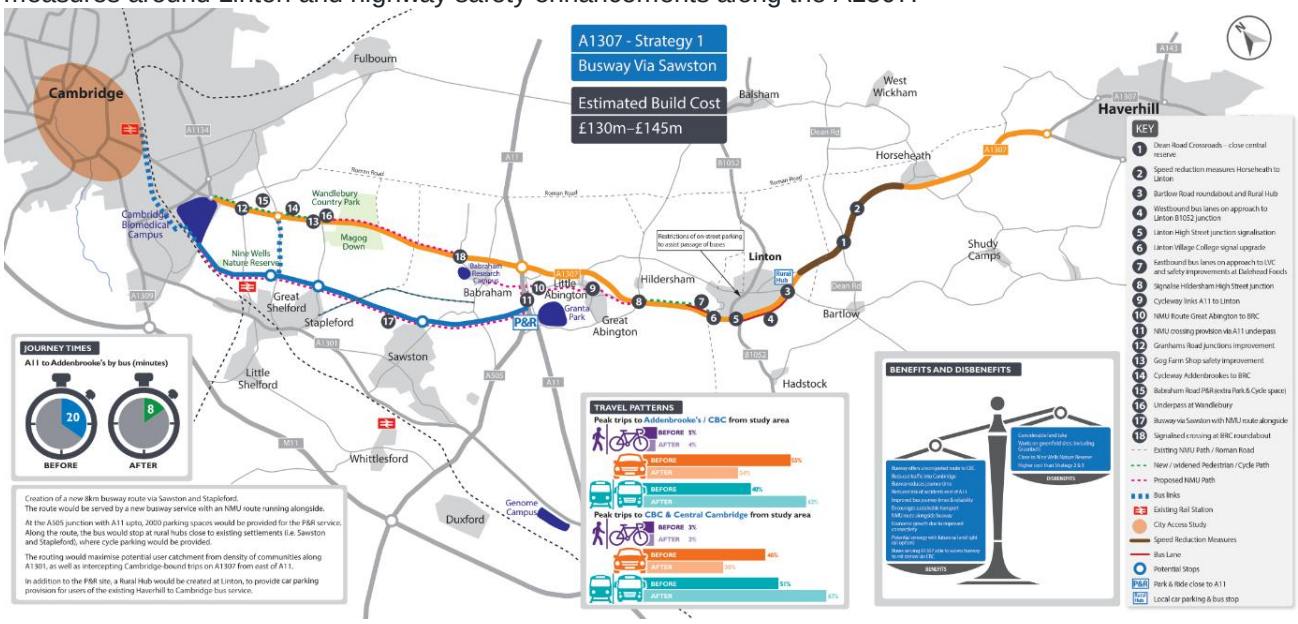


Figure 25 - Strategy 1 Busway via Sawston

5.2.2. This is the highest cost strategy. However it is also likely to have the most beneficial effect on travel patterns. The combined cost of this option is likely to be in the region of £130m-£145m, depending on the extent of environmental mitigation requirements and utilities diversions required to support the strategy.

5.2.3. Key benefits of the Strategy 1 scenario include:

- Dedicated free flow bus and cycle corridor with reliable journey times for bus – able to avoid congestion
- Significant transfer from car to public transport and active travel modes from study area
- 12 minute journey time savings from A11 to CBC
- 40% reduction in car use to CBC and 35% reduction to Cambridge City
- 55% increase in Public Transport use to CBC and 31% increase to Cambridge City
- Substantial uptake of Park and Ride usage in the corridor (more than double)
- Provides benefit to A1307 and A1301 corridors
- Economic return approx. £280m - £320m
- Can Future-Proof this option for other modes (bus/light rail)

5.2.4. The final points above highlight the opportunity for this option to integrate with other emerging proposals such as Light Rail schemes which are being promoted by The Mayor of the Combined Authority, which could follow a similar route if this proves to be a viable option as the outcome of a separate study. The busway option is considered at this stage to represent a high quality public transport route which connects with onward infrastructure such as the Cambridgeshire guided Busway and is likely to be lower cost than a light rail

scheme. The scheme alignment does not preclude the light rail option, although it is acknowledged that an alternative tie in to the rail network may be required for a rail based scheme.

5.2.5. Figure 26 below shows the changes in traffic flow predicted for Strategy 1.

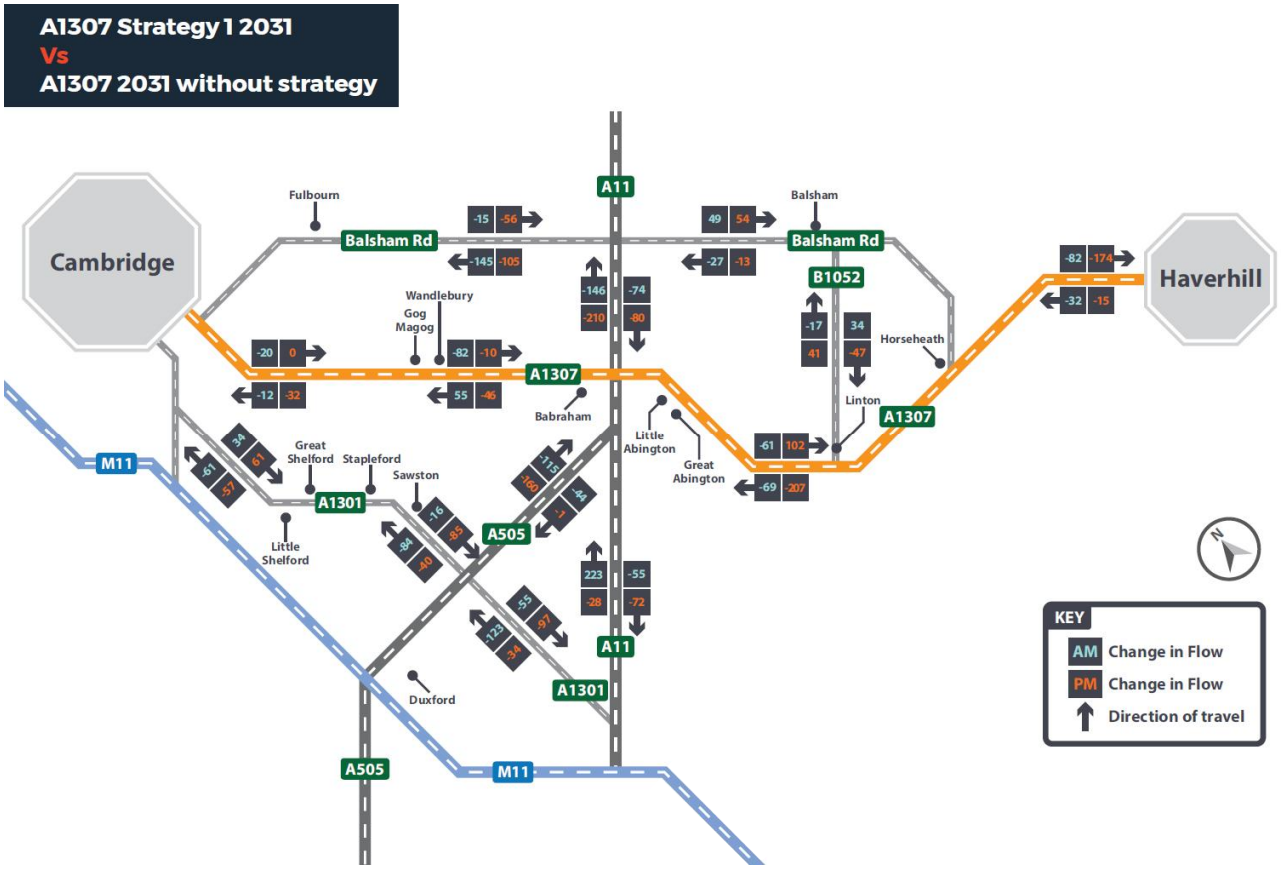


Figure 26 – Strategy 1 traffic flow diagram

5.2.6. A high level BCR has been calculated for this strategy based on peak period bus journey time improvements and patronage from the CSRM2 model. The estimated return on investment is expected to be in region of £280m (based on a BCR of 2.2 and scheme cost of £130m). However it should be noted that this assumes all of the modelled growth which goes beyond the extent of committed development occurs within the current timeframe to 2031.

5.2.7. The model outputs and patronage forecasts are also derived from increased bus service frequency. Further detail on operational costs and whole life costs are required going forward to the business case. NMU benefits were also not directly included in the BCR calculation at this stage.

5.3 STRATEGY 2 – ON-HIGHWAY BUS LANES WITH A11 PARK AND RIDE PLUS BUS ONLY LINK TO CBC

5.3.1. Figure 27 below shows the Strategy 2 scenario which consists of on highway bus lanes (westbound at Linton and between BRC and Hinton Way, with eastbound sections on approav to Linton Village College and A11 junctions). The scheme includes a new Park and Ride site at the A11 junction (location to be confirmed via a separate study) and a new bus only road link from Babarahm Road Park and Ride to CBC. This is also coupled with the package of measures around Linton, NMU enhancements and highway safety enhancements along the A1307 route.

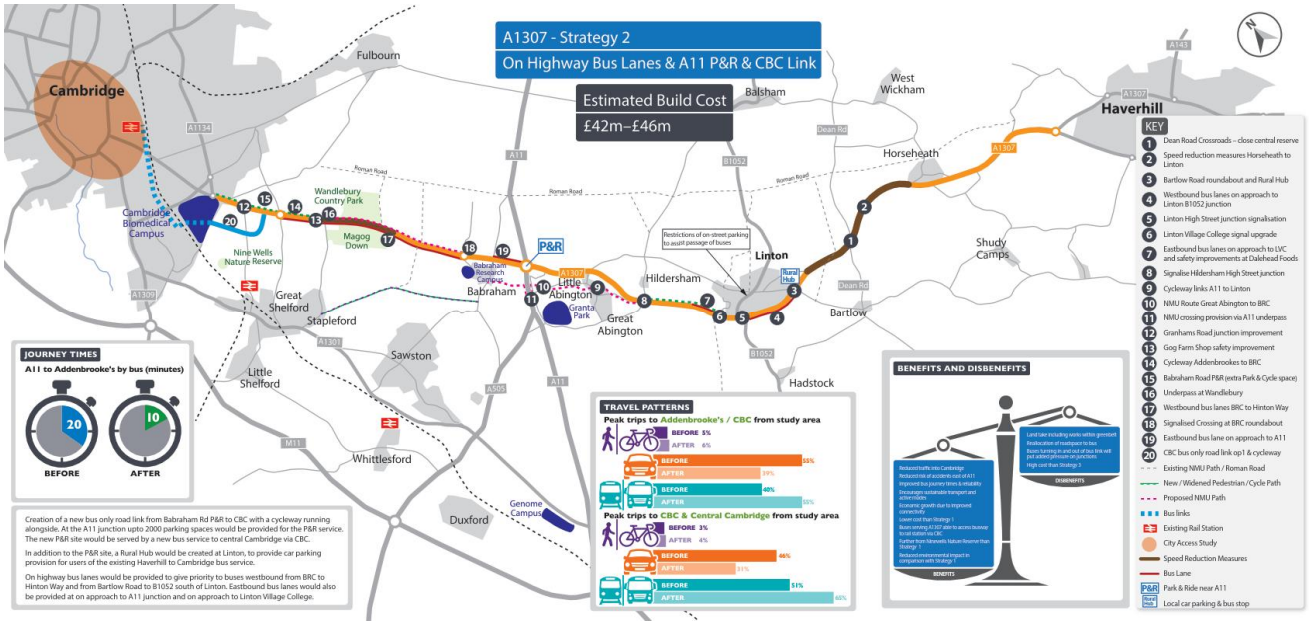


Figure 27 - Strategy 2 On Highway Bus Lanes with A11 Park and Ride and CBC Link

5.3.2. Key benefits of the Strategy 2 scenario include:

- Clear priority to buses with road space allocated on the highway.
- Good connectivity to the new expansion of CBC development
- Onward access to the Cambridgeshire guided busway
- 10 minute journey time saving for journeys from A11 to CBC
- Improved journey time reliability and performance.
- Reallocation of road space to minimise land take and environmental effects
- Reduced impact of works on street trees on approach to Addenbrookes.
- Less disruption during construction
- Good levels of transfer from car to public transport and active travel modes:
- 30% reduction in car trips to CBC and 33% reduction to Cambridge City
- 40% increase in public transport to CBC and 27% increase to Cambridge City
- Good uptake of Park and Ride usage in the corridor (almost double)

5.3.3. **Figure 28** below shows the changes in traffic flows predicted for Strategy 2 by the traffic model.

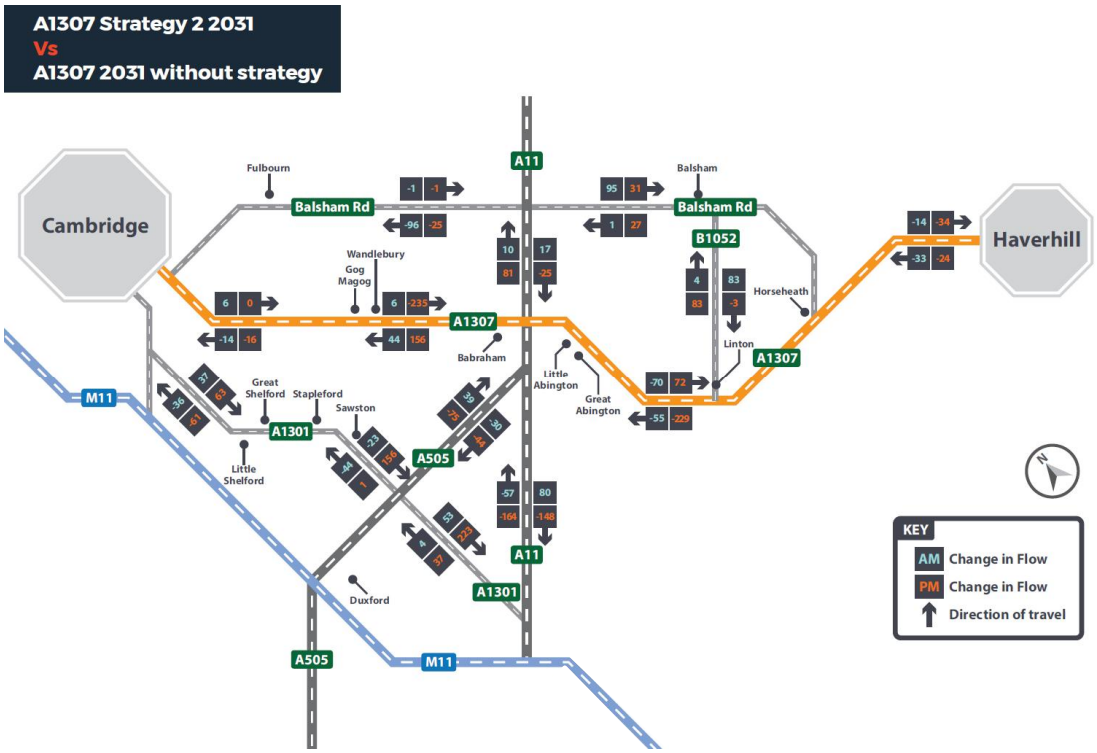


Figure 28 – Strategy 2 traffic flow diagram

5.3.4. This option offers a lower environmental impact that strategy 1 as there is less land take. It is significantly lower cost and closer to the initial budget estimate of £39m. The estimated high level BCR at this stage is 3.85 (based on peak period bus only benefits only and assuming a high growth scenario which exceeds committed growth in the study area). The City Access proposals are taken into account in the mode shift assumptions and increased bus frequency for the new Park and Ride service. This option therefore could offer an economic return of £165m - £180m, assuming a scheme cost of £39-£44m.

5.4 STRATEGY 3 – ON HIGHWAY BUS LANES WITH A11 PARK AND RIDE.

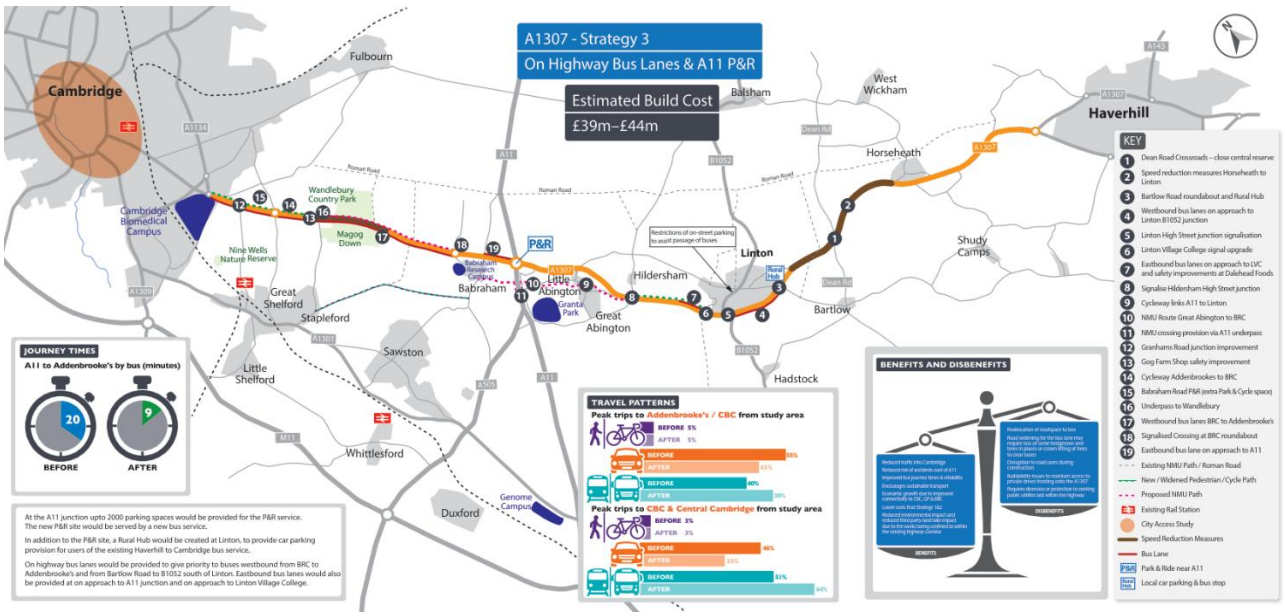


Figure 29 - Strategy 3 – On highway bus lanes with A11 P&R

5.4.1. Figure 29 shows the Strategy 3 scenario which is very similar to Strategy 2, although this strategy includes on-highway westbound bus lanes from Hinton Way to CBC instead of the off-highway bus only link. All other components are the same.

5.4.2. Key benefits of strategy 3 include:

- Clear priority to buses with road space allocated on the highway.
- Good connectivity to the new expansion of CBC development
- Onward access to the Cambridgeshire guided busway
- 10 minute journey time saving for journeys from A11 to CBC
- Improved journey time reliability and performance.
- Reallocation of road space to minimise land take and environmental effects
- Good levels of transfer from car to public transport and active travel modes:
- 20% reduction in car use to CBC and 28% reduction to Cambridge City
- 25% increase in Public Transport to CBC and Cambridge City
- >70% increase in Park and Ride usage
- Potential economic return of £145m - £165m

5.4.3. Figure 30 below highlights the changes in traffic flow predicted for Strategy 3.

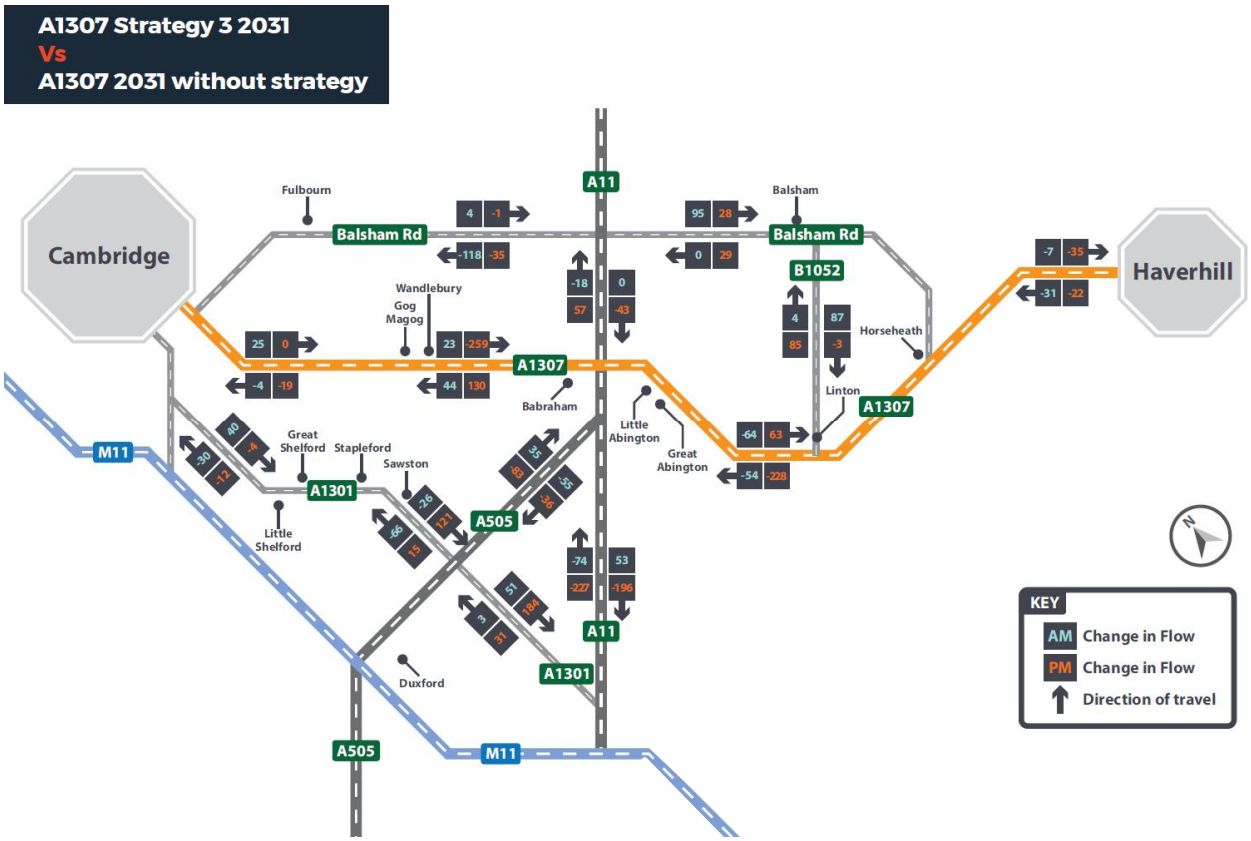


Figure 30 – Strategy 3 traffic flow diagram

5.4.4. Overall Strategy 3 is the most cost effective strategy which can potentially be delivered without extra funding. However, has less impact on mode shift and reduction in car usage than strategy 1 and 2. The benefits again based on a BCR of 3.75) are only realistic if additional bus services are implemented to support the new Park and Ride site, along with City Access proposals and high level of housing and employment growth occur beyond the committed developments in Cambridge and South Cambridgeshire Local Plans.

5.5 KEY PERFORMANCE INDICATORS

5.5.1. The CSRM2 model results enable the performance of the three strategies to be compared in terms of mode shift, journey time savings and P&R uptake. A summary of the model results relating to the three strategies is provided below.

Bus Journey Times

5.5.2. Each of the A1307 strategies includes at least one new park and ride site. A new bus service has been provided to serve these new sites which is assumed to have a 10 minute frequency and fall within the dayrider+ Stagecoach fare zone. In the do-minimum scenario, the bus travel time is that of the X13 service.

Table 24 Journey times in the A1307 study area

	Journey Time (minutes): A11 to Addenbrooke's			
AM peak period	Do-minimum	Strategy 1	Strategy 2	Strategy 3
Westbound by bus	20	8	10	9
Westbound by car	17	12	14	13

5.5.3. Strategy 1 provides the best journey time for buses due to the higher reliable speeds that can be achieved on a busway. Despite the fact this route provides a greater number of stops, it is still the quickest option.

5.5.4. Strategy 2 provides a slightly longer journey time (still significantly better than the do-min) because a larger number of people wish to remain in their cars from the A11 to Babraham in order to use Babraham P&R where a new bus link has been provided to Addenbrooke's in Strategy 2. This causes congestion between the A11 and Babraham research campus where a bus lane is not currently proposed but we could extend the proposed bus lane to the A11 if a bus lane is the preferred solution.

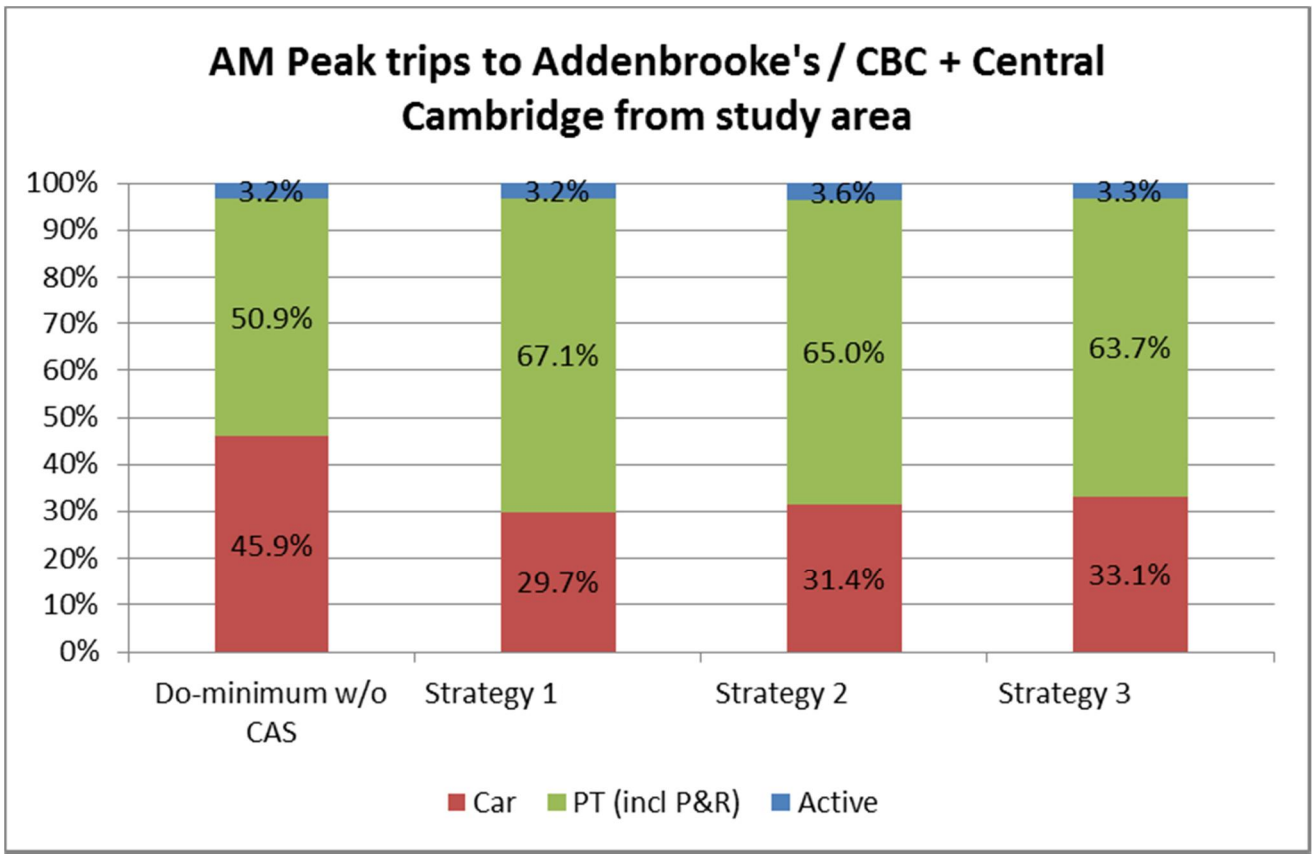
5.5.5. Strategy 3 is very similar to strategy 2 (bus lanes but no Hinton Way to CBC bus link) but it does not attract additional vehicles to Babraham P&R and therefore the bus journey time on the A1307 between A11 and Babraham Research Campus is not affected.

5.5.6. Notably, in the do-minimum scenario the car journey time is shorter than the bus journey time which helps to make car the preferred mode. In the do-something scenarios, however, the bus journey time becomes shorter than the car journey time. This is partly due to the bus lanes / busway improving bus journey times but also relates to the level of mode shift being achieved due to the introduction of the City Access Scheme (CAS). Car mode shift is highest in Strategy 2 which means there are a larger number of vehicles in the study area and consequently a longer car travel time.

Mode Share

5.5.7. Initial indications of the level of mode shift expected in the A1307 study area are in the region of 12-15% from car to public transport. Given that the three core strategies all focus on improving public transport trips and penalising car trips to Cambridge (CAS / City Access Scheme) this is a logical response.

Figure 31 Mode share before and after implementation of the core strategies



5.5.8. Strategy 1 is expected to attract the most bus patronage as it offers the faster bus journey into Cambridge (8 minutes). The proposed bus service in Strategy 2 has a journey time of 10 minutes however it is more popular than Strategy 3 which has a bus journey time of 9 minutes. This is due to the added convenience of improving Babraham Park and Ride due to the provision of the bus link (shortcut from Babraham P&R to Addenbrooke's) which enables the existing Babraham service to achieve a higher patronage and therefore a higher PT mode share overall.

5.5.9. Strategy 3 does increase the use of public transport by offering a faster service for the new bus route but does not give Babraham P&R the extra boost that both Strategies 1 and 2 manage to due to the busway / bus link shortcut to Addenbrooke's.

Bus Patronage

5.5.10. CSRM2 can be interrogated to look at the number of people boarding and alighting by bus service and bus stop. Running this analysis for the existing Babraham P&R service enables us to see that the key location for boarding the bus, regardless of strategy, is the P&R site in the AM peak which is not surprising. The key location for alighting the bus is Addenbrooke's which is logical as many AM peaks trips into Cambridge will be commuter trips and Addenbrooke's is a key workplace.

Table 25 AM Peak Babraham P&R bus service patronage

Inbound Babraham P&R service	Bus Patronage (people)							
	Do-minimum		Strategy 1		Strategy 2		Strategy 3	
Bus Stop			Busway		Bus lanes + CBC link		Bus lanes	
	BOARD	ALIGHT	BOARD	ALIGHT	BOARD	ALIGHT	BOARD	ALIGHT
Babraham P&R	745	-	1929	-	1975	-	1451	-
Addenbrooke's	81	570	43	1612	31	1578	91	1038
Hills Road Sixth Form	92	86					118	214
Cambridge Station	42	50	104	210	99	259	56	139
Grafton Centre	127	110	173	137	173	163	169	126
Cambridge North Station	4	18	4	18	4	19	4	21
Science Park	0	253	0	269	0	257	0	344
Milton P&R	-	5	-	6	-	7	-	7
TOTAL	1091		2253		2282		1889	

5.5.11. The new P&R bus services show a large amount of variability in patronage levels, unlike the existing Babraham Park and Ride service which is also more popular. Strategy 1 offers the best solution in terms of attracting patronage to a new service as the service serves a new catchment area rather than competing with the existing Babraham service. Strategies 2 and 3 serve a similar sequence of stops and therefore struggle to compete against the Busway service which has a cheaper fare zone and improved journey times.

Table 26 AM Peak Proposed P&R bus service patronage

Inbound proposed P&R service	Do-minimum		Bus Patronage (people)					
			Strategy 1		Strategy 2		Strategy 3	
Bus Stop			Busway		Bus lanes + CBC link		Bus lanes	
	BOARD	ALIGHT	BOARD	ALIGHT	BOARD	ALIGHT	BOARD	ALIGHT
New P&R			263	-	18	-	235	-
Pampisford			37	0				
Sawston			327	8				
Stapleford			182	4				
Shelford			0	0				
Addenbrooke's			25	373	41	9	36	99
Hills Road Sixth Form					21	23	21	50
Cambridge Railway Station			23	220	25	8	15	45
St Andrew's Street			-	249	-	66	-	114
TOTAL			856		105		308	

6 LLF FEEDBACK ON EMERGING STRATEGIES

6.1.1. The final LLF workshop 5 in September included a mini exhibition of the three transport strategies and sought feedback from participants on each strategy using a similar scoring process as had been used within the Assessment Framework, again using a 0-5 point scoring system. Participants were requested to complete a feedback form with opportunity for open ended comments as well as scoring in the same way as the Scheme Appraisal Framework. The response form for each strategy was as shown in Table 6-1

Transport Objectives	Poor					Good
Contribution to Economic Growth	0	1	2	3	4	5
Contribution to Quality of Life	0	1	2	3	4	5
Contribution to Improved Connectivity	0	1	2	3	4	5
Contribution to Reducing Congestion	0	1	2	3	4	5
Contribution to Reducing Traffic	0	1	2	3	4	5
Environmental Objectives	Low					High
Environmental Impact	0	-1	-2	-3	-4	-5
Land Take	0	-1	-2	-3	-4	-5
Road Safety Objectives	Low					High
Contribution to Road Casualty Reduction	0	1	2	3	4	5

Table 27 - Feedback response form for LLF Participants

6.1.2. The scoring feedback results are summarised in the bar charts below and total scores for each strategy are shown in the pie chart below. A summary of the feedback is provided in Appendix E.

Strategy	Economic Growth	Quality of Life	Improved Connectivity	Reducing Congestion	Reducing Traffic	Environmental Impact	Land Take	Casualty Reduction
Strategy 1	55	41	52	49	53	-55	-50	40
Strategy 2	38	33	36	34	31	-41	-40	31
Strategy 3	31	32	25	29	29	-28	-26	28

Figure 32 - bar chart showing LLF scoring against the scheme assessment criteria for each strategy

6.1.3. As shown in the pie chart below (Figure 33), in overall terms (based on the sum of all points allocated to each strategy) Strategy 1 received the highest score in all assessed categories, including greatest environmental and land-take impact. Strategies 2 & 3 received broadly similar scores, with Strategy 2 marginally higher than Strategy 3. Almost half of respondents (43%) supported the strategy 1 option, whereas the support for strategy 2 was less pronounced with 29% and strategy 3 only 28%.

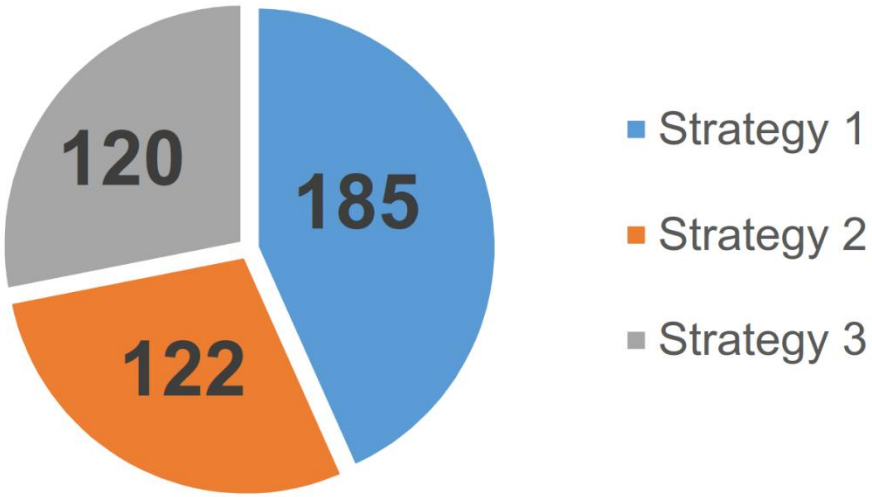


Figure 33 - Pie chart showing total LLF scoring against the three A1307 transport strategies

6.1.4. Although not all participants provided numerical scores, a total of 17 responses were received and more than half of the respondents provided scoring which was broadly consistent with the assessment results. This indicates that the participants of the LLF are in broad agreement with the scoring and assessment process that has been carried out.

6.1.5. Textual responses were also received from many of the participants. Key themes include

- Support for all three options especially the new busway option in terms of the benefits delivered
- Concern about environmental impact and land take associated with the busway option
- Sensitivity of works within the Greenbelt west of A11, especially the busway
- The feasibility of bus lanes west of Linton and specific comments on the detail of key junctions
- Concern over removal of street trees especially around Linton.
- Concern over volumes of HGV traffic on A1307 route
- Concern regarding the cost of the busway option in comparison with other options
- Importance of including equestrians and provision of NMU routes, especially alongside the busway
- Interest in how the strategies fit with the light rail and other scheme proposals emerging in parallel
- Concern over Park and Ride locations around the A11 junction

6.1.6. Many of the above comments will be addressed during the design development, environmental impact assessment and outline business case stages of the project going forward. More detailed liaison with Parish Councils and relevant key stakeholders will also be undertaken to fully understand the extent of additional mitigation requirement associated with the three strategies.

6.1.7. Given that there was evidence of support for the three strategies proposed, the strategies presented at the final LLF meeting held on 26 September 2017 remained virtually unchanged. A presentation was given by the project team to the LLF summarising the process followed and findings of the modelling study as well as the outputs of the summer 2017 LLF workshops. The LLF concluded that all three strategies should be taken forward for further development in advance of public consultation in early 2018.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 KEY FINDINGS

7.1.1. As set out above, the LLF process carried out over summer 2017 resulted in the development of three main transport strategies.

7.1.2. At the LLF meeting on 26 September 2017 it was recognised that all three strategies, when coupled with the City Access proposals in the future year of 2031, potentially offer a significant benefit in terms of:

7.1.3. All three strategies offer some redistribution of traffic on the A1307 and delivering mode shift, improved bus journey times and increased bus patronage.

7.1.4. All of the strategies are reliant on increased Park and Ride capacity. The inclusion of the City Access demand restraint measures alongside the sustainable travel interventions increases Park and Ride demand significantly within the A1307 and at other P&R sites around Cambridge. The effects of the City Access study were not considered in the February 2017 report and this increases demand above and beyond the capacity of the sites identified previously to the south of A1307 at Babraham village and Great Abington. A wider review of available larger sites is also required

7.1.5. It was therefore concluded that the LLF support the recommendation that all three options should be taken forward for further evaluation and design development prior to public consultation in early 2018.

7.1.6. The modelling results set out in Chapter 3 above are also broadly consistent with this conclusion as the three main strategies 1 and 2 are amongst the best performing in terms of journey time savings, bus patronage, mode shift and P&R usage.

7.1.7. The options with Park and Ride sites west of A11 offer similar benefits to those with a park and ride site north east of the A11 junction, with only a 1% difference in mode shift for these options.

7.2 NEXT STEPS

7.2.1. Subject to Executive Board approval, it is recommended that all three strategies should be taken forward to public consultation in early 2018. The selection of a preferred option would then be guided by feedback from members of the public and key stakeholders. Further modelling of the preferred option would then take place to inform the development of an outline business case.

7.2.2. The modelling demonstrates that delivery of the potential scheme benefits identified within this report and the strategic economic case for any of the three strategies is very much dependent on increased bus service frequency. The options tested with lower service frequency (or current service patterns maintained only with no increase), show much less uptake of park and ride spaces and Therefore the commercial viability of bus service enhancements is required to be understood in more detail. It is clear that frequency enhancements and procurement of new services to support the A11/A505 park and ride proposals as well as additional evening services for Park and Ride to enable more flexible working are required to maximise the potential of the three strategies, so that bus is seen as a reliable and attractive service for residents in key settlements along the A1307 and A1301 corridors as well as shift working employees at CBC, BRC and Granta Park.

7.2.3. The busway option will require more detailed assessment and design to achieve the same level of detail as strategies 2 and 3. Due to the additional cost of infrastructure and environmental impact, a major scheme business case is likely to be required to be developed in order to support any request for additional funding to enable delivery of this strategy. However, this options is well placed to respond to additional demand generated by future (uncommitted) housing and employment growth in neighbouring authorities and it may be possible to seek developer contributions towards this new scheme or to procure new bus services to operate on the busway if additional subsidy is required to support this initially.

7.2.4. Strategy 1 would also take longer to deliver than strategies 2 and 3 due to the requirement to secure third party private land using compulsory powers such as a Transport and Works Act Order (TWAO). This requires approval via the Secretary of State for Transport.

7.2.5. The highway safety elements of the proposed strategy, particularly interventions east of A11 are common to all options and could potentially be implemented ahead of the main busway or bus lanes and Park and Ride site components, so that some early benefits to the local network can be realised in the short term.

7.2.6. Once a preferred strategy emerges following public consultation, a full Environmental Impact Assessment (EIA) is required to be carried out to fully consider and mitigate any significant effects which might arise as a result of the proposals.

7.3 FURTHER STAKEHOLDER ENGAGEMENT

7.3.1. Further discussions with bus operators will be required to understand the bus operational implications and viability in more detail. A partnership-based approach is recommended to secure appropriate operator buy-in to the proposals to maximise scheme benefits.

7.3.2. Work with the Combined Authority is also recommended to enable a holistic and joined up approach regarding other major scheme options which are being developed in parallel such as A505 study, Light Rail and heavy rail options and also road schemes being progressed by Haverhill Chamber of Commerce.

7.3.3. The Greater Cambridge Partnership team will need to continue working closely with the affected Parish Councils and Residents associations along the route to identify sites for Park and Ride, rural hubs as well as discuss the land take implications of the various options with affected landowners.

7.4 EMERGING STRATEGIC CASE

7.4.1. The strategic case for interventions in the study area is based on the analysis of the existing network performance, stakeholder feedback, the form and function of the local economy and the growth aspirations of the area south of Cambridge including the three campuses and in particular CBC. The analysis has considered how transport interventions and the three strategies could positively contribute to the Greater Cambridge Partnership City Deal objectives.

Existing Transport Infrastructure

7.4.2. The study area and routes within it suffer from congestion, such as the A1307, A1301, A505 and A11. There is also traffic re-routeing on local roads to avoid these congestion points on the road network. This also impacts on the reliability and journey times for bus journeys reducing their attractiveness for increasing patronage. Cycle and walking provision is often not joined up and there are key points of severance. Future committed and aspirational growth in housing and jobs within this part of South Cambridgeshire and across the borders in Essex and Suffolk will increase congestion and reduce accessibility by non-car modes.

Economy and Growth

7.4.3. Given the important economic assets (such as the Three Campuses, Cambridge City, and workers living along the routes) identified in the study area, the crucial question concerns what more could be achieved if connectivity was significantly improved. The analysis of the influence of the existing transport network and the intrinsic economic assets of the study area provides the evidence that transport investment could help address existing transport issues, trigger positive changes to the economic connectivity and help unlock local access to cater for growth.

Local Access

7.4.4. The three strategies will improve local access and reduce car travel across the study area and on key routes. They will overcome constraints on the local transport network, improve safety and increase local trips by cycle, walking and passenger transport.

7.4.5. As a result of the LLF workshops and modelling carried out during Summer 2017 three transport strategies have been identified which all offer good benefits to residents and workers within the study area and improved local access. They also provide an improved opportunity for travel by non-car modes which helps take pressure off the road network at peak times and provides improved journeys across the whole day to key destinations, such as key worker shift patterns at Addenbrooke's Hospital and access across the route for retail and services.

Addressing the area challenges

7.4.6. The evidence shows the individually and collectively the study area is important to the Greater Cambridge region. This successful location is well placed to continue to grow if the key challenges of increased pressure on transport infrastructure, demand for local housing and access to jobs and services can be addressed.

7.4.7. The strong economic and population growth across the region places increasing demands on the existing transport infrastructure and housing supply. Rising congestion and increasing journey times threatens further economic growth. These constraints also negatively impact on the study area as a place to live and work.

Case for Intervention

7.4.8. The investment in infrastructure such as bus lanes and busways options, is essential to secure reliable journey times and frequent services leading to mode shift. Given the context of the surrounding area Park and Ride is also an essential part of the strategies as this makes bus services accessible from a much wider catchment and enables traffic relief to the highway network. A site location close to the A11/A505 appears to offer an effective catchment which is able to attract a wider demand and minimises impacts downstream junctions on A1307 west of A11.

7.4.9. The busway option also provides relief to the A1301 corridor as this has an enhanced catchment with the proposed alignment alongside key villages, placing many more residents and workplaces in walking and cycling distance of the scheme. Similar to the northern busway this is expected to cater for housing growth and further stimulate investment in the area by enhancing accessibility.

7.4.10. Investment in bus-based infrastructure is also likely to be the most cost effective approach and is immediately compatible with the existing transport system in Cambridge as well as offering the flexibility of on-road and off-road travel. The connectivity with the CBC is essential to support economic growth and connect housing to the south and east of Cambridge with jobs, this also assists with providing streamlined journey times to the City.

7.4.11. The strategic case for all of the strategies is significantly enhanced by the City Access proposals which focus on reducing car trips to central Cambridge. To complement the City Access proposals investment in passenger transport in the form of extra Park and Ride capacity, increased bus service frequency and affordable bus fares/parking charges as well as new high profile infrastructure and bus priority measures are required.

7.4.12. The alignment currently identified for the Strategy 1 busway option also has some synergy with other emerging strategies and does not preclude the major investment proposals being promoted by others in relation to light rail and heavy rail in the future. All the strategies provide a sound basis for developing passenger transport patronage to support future additional investment in transit schemes.

Summary

7.4.13. The evidence shows that the study area and routes within in are important for the local and regional economy with key strengths in knowledge-research industries, supported by a skilled workforce.

7.4.14. In order to maximise the areas effectiveness in contributing to the Cambridge economy and City Deal, transport connectivity must be addressed to enable reduced business costs, and enable improved access for all to key jobs and services.

7.4.15. The interventions are critical to overcoming the existing local and regional infrastructure challenges, connecting skilled people with jobs, linking employment clusters and creating an efficient transport network that enables housing and jobs growth to be delivered in way the supports the efficient movement of goods and people. The interventions within the three strategies will ensure that a lack of transport connectivity and capacity does not prevent the area from successfully delivering sustainable growth.

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