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A1307 HAVERHILL TO CAMBRIDGE CORRIDOR

DRAFT CONCEPTS REPORT

PUBLIC

JANUARY 2016

WSP | PARSONS BRINCKERHOFF

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Cambridgeshire County Council

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1.1.2 This work has been undertaken on behalf of the Greater Cambridge City Deal to inform the first tranche of the City Deal infrastructure programme. This work is part of a wider package of major public transport improvements across the city and out into South Cambridgeshire, based on a corridor approach, as set out in the Authority's adopted Transport Strategy for Cambridge and South Cambridgeshire (TSCSC). The Greater Cambridge City Deal has successfully secured a first tranche of Government's City Deal funding to unlock major growth and economic potential in the greater Cambridge area.

1.2 THE A1307 CORRIDOR

1.2.1 The A1307 Haverhill to Cambridge corridor is one of the key radial routes into Cambridge and suffers from congestion during peak periods, particularly at the Cambridge end, at the junction with the A11 and around the village of Linton, the largest settlement on the corridor.

1.2.2 The corridor is over 20km in length and connects a large number of important settlements and key employment areas including Haverhill, Horseheath, Linton, Great Abington / Little Abington / Hildersham, Granta Park, Babraham & Babraham Research Campus and Addenbrooke's Hospital / Cambridge Biomedical Campus.

1.2.3 The Cambridge and South Cambridgeshire submitted Local Plans have identified future growth in housing and employment along the corridor, both immediately to the south of Cambridge, to the north-east of Haverhill as well as key employment areas within the corridor.

1.2.4 The committed developments alone proposed for the area alongside the corridor need to cater for over 8,500 new homes and nearly 20,000 additional jobs through to 2031. Whilst considering the forecast growth, it has been recognised that the current Cambridge Sub Regional Model (CSRM) model land-use assumptions should be revisited and updated to provide a more robust prediction of the future baseline conditions in the A1307 corridor, particularly in the Haverhill area.

1.3 CORRIDOR PERFORMANCE

1.3.1 The main destinations along the Corridor identified from 2011 Census data are Cambridge city centre, Addenbrooke's Hospital / Cambridge Biomedical Campus, Granta Park and the Babraham Research Campus. An analysis of the travel to work data shows increases between 2001 and 2011 of Haverhill residents working in Addenbrooke's Hospital / Cambridge Biomedical Campus, Cambridge city centre, Cambridge Northern Fringe East (CNFE) and Granta Park.

1.3.2 The corridor experiences congestion inbound to Cambridge in the AM peak and outbound in the PM peak, with regular queuing and delay occurring through Linton and Little Abington / Great Abington with significant congestion on approach to the Hinton Way Roundabout and through to Addenbrooke's. Average speeds for buses in weekday peak periods are relatively low in these areas.

1.3.3 The car is the main mode of travel for Haverhill residents using the corridor. Where bus options were available for travel from Haverhill to Addenbrooke's Hospital / Cambridge Biomedical Campus and Cambridge, they were used for around 35% of those trips.

1.3.4 Walking and cycling facilities from Cambridge to Babraham Research Campus along the corridor are relatively good, however facilities from Babraham Research Campus to Haverhill are poor and dis-connected. There is also a lack of use of public transport and active modes for some relatively short trips, for instance circa 80% of trips between Granta Park and Babraham Research Campus are by car, which highlights the relatively poor walking and cycling links between the two.

1.3.5 The corridor is likely to experience significant further problems up to 2031 should no improvement work be undertaken.

1.4 RECOMMENDED CONCEPTS

1.4.1 This study has undertaken a significant engagement exercise with the client project team and key stakeholders in developing potential transport options and sifting these from a concept long list to an ambitious concept short list, which is the basis of this report.

1.4.2 A number of strategic major concepts were assessed at a high level and discounted as not being deliverable within the City Deal including:

- Rail – reopening of the disused railway corridor between Haverhill and Cambridge. The assessment concluded that the scheme would represent poor value for money, with either a new single track or double track railway having a Benefit to Cost Ratio of less than 1.0;
- Bus Rapid Transit (BRT) – use of the disused railway corridor between Haverhill and Cambridge for BRT. The assessment concluded that the scheme would represent low value for money with a Benefit Cost Ratio of 1.27; and
- Road Improvements – various road improvements were considered including road widening, dualing and a bypass of Linton. The assessment concluded that the schemes would represent poor value for money with a Benefit Cost Ratio of 0.3 or less.

1.4.3 The following concept short list (see Figure 1-1) is recommended for further consideration and to be taken forward for engagement (with indicative costs at 2015 prices including optimism bias noting that these may change once feasibility designs have been prepared, following consultation and further consideration):

- **Park & Ride**
  - **Concept 1A - Babraham Road Park & Ride** – redevelopment and expansion of the Park & Ride site to cater for committed and future growth within the Addenbrooke's Hospital / Cambridge Biomedical Campus area. The indicative cost is £2.5m; and
  - **Concept 1B – A11 Park & Ride Site** – new Park & Ride adjacent to the A11 Fourwentways junction. The indicative cost is £12m.
- **Rapid Transit**
  - **Concept 2A – Granta Park to Addenbrooke's Hospital / Cambridge Biomedical Campus (off highway)** – segregated, off highway rapid transit from Granta Park via a new A11 Park & Ride, Babraham Research Campus to Addenbrooke's Hospital / Cambridge Biomedical Campus. Potential for guided Busway, dedicated public transport road or other method of rapid transit. Additional walking, cycling and equestrian improvements provided alongside. The indicative cost is £98m;
  - **Concept 2B – Granta Park to Addenbrooke's Hospital / Cambridge Biomedical Campus (on highway)** – segregated, on highway rapid transit from Granta Park via new A11 Park & Ride, Babraham Research Campus, Babraham Road Park & Ride to

Addenbrooke's Hospital / Cambridge Biomedical Campus. Additional walking, cycling an equestrian improvements provided alongside. The indicative cost is £25m;

- **Concept 2C – Linton Bus Priority** – on highway bus priority improvements through Linton. Additional transport and public realm improvements alongside. The indicative cost is £5m;
- **Concept 2D – Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus (off highway)** – segregated, off highway, rapid transit from Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus from the west. Additional walking, cycling and equestrian improvements alongside. The indicative cost is £30m; and
- **Concept 2E – Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus (on highway)** – segregated, on highway, rapid transit from Babraham to Addenbrooke's Hospital / Cambridge Biomedical Campus from the east. Additional transport and public realm improvements alongside. The indicative cost is £15m.

→ **Walking & Cycling**

- **Concept 3A – Three Campus Cycling & Walking Route (off highway)** – segregated, off highway, route from Granta Park via new A11 Park & Ride, Babraham Research Campus with a connection to National Cycle Network (NCN) 11. The indicative cost is £10m;
- **Concept 3B – Three Campus Cycling & Walking Route (on highway)** – segregated, off highway, route from Granta Park via new A11 Park & Ride, Babraham Research Campus and along the A1307 through to Babraham Road Park & Ride and Addenbrooke's Hospital / Cambridge Biomedical Campus. The indicative cost is £6m;
- **Concept 3C – Haverhill to Three Campus Route (on highway)** – segregated, on highway route from Haverhill via Horseheath and Linton linking to the Three Campus cycle route at Granta Park. The indicative cost is £8m; and
- **Concept 3D – Haverhill to Three Campus Route (off highway)** – segregated, on highway route from Haverhill along the disused railway corridor to Linton and Granta Park linking to the Three Campus cycle route at Granta Park. The indicative cost is £13m.

→ **Other Schemes**

- **Public Realm Improvements -** Ensure all schemes incorporate appropriate public realm improvements to meet with the objectives of the City Deal (included within the concept costs);
- **Bus Stop Accessibility Improvements -** Ensure all bus stops along the corridor are fully accessible and meet the latest guidance for bus stops. The indicative cost is £1m; and
- **Road Safety Improvements -** Additional road safety improvements are proposed for a number of locations on the corridor, outside the major concept areas, to deliver a consistent route length approach to the road (e.g. junctions, speed limits etc). The indicative cost is £5m.

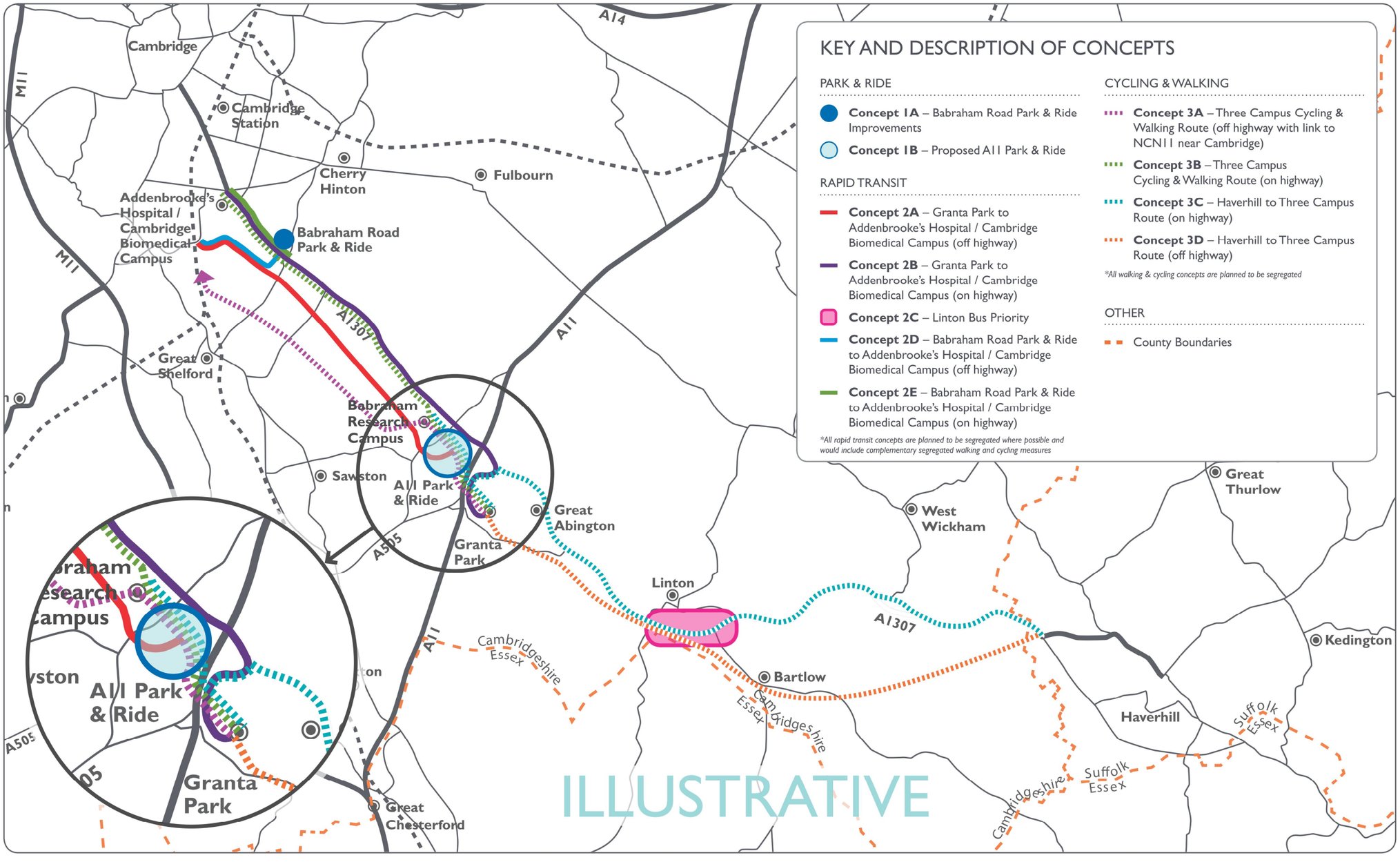
1.4.4 As part of the rapid transit options, we would also promote the concept of making improvements through a High Quality Passenger Transport (HQPT) corridor upgrade along the A1307 proper, in addition to / within the proposals here. This could include more frequent bus services with the enhanced use of technology. For example, this could include electric vehicles with on route charging facilities and better transport information.

1.5 WAY FORWARD

1.5.1 Following public consultation and subsequent amendments resulting from that, the concept short list will be taken forward to form a final options short list, with feasibility designs, for assessment as part of the outline business case.

Figure 1-1 Concept Short List for the A1307 Corridor

A1307 (HAVERHILL TO CAMBRIDGE) CORRIDOR – CONCEPT SHORT LIST



2 INTRODUCTION

2.1 OVERVIEW

2.1.1 WSP | Parsons Brinckerhoff has been commissioned by Cambridgeshire County Council (CCC) to undertake a study establishing options to deliver the most effective corridor-based transport schemes (complemented by comprehensive cycling and walking routes) covering the A1307 Haverhill to Cambridge corridor (the corridor). Figure 1-1 provides an overview of the corridor.

2.1.2 This work has been undertaken on behalf of the Greater Cambridge City Deal to inform the first tranche of the City Deal infrastructure programme. This work is part of a wider package of major transport improvements across the city and out into South Cambridgeshire, based on a corridor approach, as set out in the Authority's adopted Transport Strategy for Cambridge and South Cambridgeshire (TSCSC). The Greater Cambridge City Deal has successfully secured a first tranche of Government's City Deal funding to unlock major growth and economic potential in the greater Cambridge area.

2.1.3 The study area covers the A1307 corridor from the roundabout outside Addenbrooke's Hospital / Cambridge Biomedical Campus (where Babraham Road, Hills Road and Fendon Road meet) to the north-west edge of the town of Haverhill, at the junction with the A1017, just over the county border into Suffolk. Additionally, we have considered the wider interaction the corridor has with the A505, A11, M11 and other towns and villages that link to the corridor.

2.2 PROJECT OBJECTIVES

2.2.1 Our commission for this first phase of work includes the following core tasks:

- → Policy review;
- → Study of existing conditions including problem identification;
- → Scheme option identification and appraisal;
- → Feasibility design and modelling; and
- → Outline business case including non-technical summary.

2.2.2 The project objectives are:

1. **To identify a variety of options which will improve the reliability, safety and speed of movement along this corridor, and ultimately reduce the number of vehicles driving into the city of Cambridge;**
2. **To investigate whether combinations of schemes will provide the greatest benefit;**
3. **To ensure provision for cyclists and pedestrians is inherent in all proposals (and where appropriate, consideration of other non-motorised users, such as equestrians);**
4. **To generate options capable of maintaining traffic levels at today's levels in Cambridge;**
5. **To consider the potential for enhancing the environment, streetscape and air quality in this corridor;**

6. **To assess the impacts on existing residents and highway capacity for each option;**
7. **To identify areas along the corridor, and measures, where safety for all modes of travel can be improved; and**
8. **To improve the connectivity with surrounding villages and places of employment along the corridor.**

2.3 REPORT STRUCTURE

2.3.1 This Draft Concepts Report details the proposed concept long list and the concept short list, including high level details of their performance, feasibility and key issues which have emerged from a feasibility study of the A1307 Haverhill to Cambridge corridor to the south of Cambridge. The report will enable the Greater Cambridge City Deal Executive Board to decide on whether to proceed to consultation with the concepts proposed.

2.3.2 The report structure is set out as follows:

- **Corridor Overview** including project objectives, alignment with the City Deal outcomes, summary of the current and future conditions and key corridor issues;
- **Concept Development & Appraisal** which sets out the approach to the development of the concept long list and how the concept short list was arrived at;
- **Concept Short List** which details the concept short list identified along with their description, benefits and opportunities; and
- **Conclusions and Next Steps**.

2.3.3 Following consultation on the concept short list, this will be further assessed to produce an options short list with preferred options then identified, designed (to a feasibility standard) and assessed in the Outline Business Case.

2.3.4 Extensive descriptions of the existing and future corridor conditions are included within the separately available WSP | Parsons Brinckerhoff '**A1307 Haverhill to Cambridge Corridor - Draft Audit Report**' dated January 2016. Included within this report is an overview of the policy context and the key stakeholder engagement undertaken in July 2015.

2.3.5 In addition, the following reports and notes are included in the appendices:

- Appendix A contains a summary of the Early Appraisal and Sift Tool (EAST) assessment undertaken;
- Appendix B contains the '**Draft Rail Viability Report**' which is a high level report produced to assess the potential for reopening the previous railway line between Haverhill and Cambridge;
- Appendix C contains a draft technical note on publically available Bus Rapid Transit (BRT) costs in the UK; and
- Appendix D contains an overview map of the environmental, heritage and habitat constraints within the A1307 corridor.

3 CORRIDOR OVERVIEW

3.1 CORRIDOR DESCRIPTION

3.1.1 The A1307 Haverhill to Cambridge corridor is one of the key radial routes into Cambridge and suffers from congestion during peak periods, particularly at the Cambridge end, at the junction with the A11 and around the village of Linton, the largest settlement on the corridor.

3.1.2 The corridor is over 20km in length and connects a large number of important settlements and key employment areas including:

- Haverhill (a major town in Suffolk with substantial industry and business parks including the future Haverhill Research Park);
- Horseheath;
- Linton (near the Cambridgeshire border with Essex);
- Great Abington / Little Abington / Hildersham;
- Granta Park (a major employment area for science, technology and biopharmaceuticals);
- Babraham and the Babraham Research Campus (a major bioscience employment area);
- Near to the route is Sawston, Great Shelford & Stapleford; and
- Addenbrooke's Hospital / Cambridge Biomedical Campus.

3.1.3 Additionally, the A505, A11 and M11 have a wider interaction with the corridor. By creating more capacity for sustainable trips along the A1307 corridor, the project will provide the potential to mitigate the impact of further transport demand arising from developments within the Greater Cambridge area, thereby supporting the transport viability of development proposals.

3.2 PROJECT OUTCOMES & CITY DEAL CRITERIA

3.2.1 To ensure alignment with the project objectives and the City Deal criteria, the key outcomes of the proposals required for the corridor are:

- More reliable journey times, particularly for passenger transport;
- Safer conditions for all modes;
- Significant improvements in walking, cycling and equestrian networks along the corridor;
- Increases in public transport provision / services / usage;
- Additional capacity for sustainable trips to support future planned housing and employment development;
- Maintain or reduce general traffic levels; and
- Positively impact on air quality.

3.3 ECONOMIC GROWTH

3.3.1 The submitted Cambridge and South Cambridgeshire Local Plans have identified future growth in housing and employment along the A1307 Haverhill to Cambridge corridor, both immediately to the south of Cambridge, to the north-east of Haverhill as well as key employment areas within the corridor. Table 3-1 provides the currently available expected housing and employment growth numbers.

3.3.2 Extensive descriptions of the existing and future corridor conditions are included within the separately available WSP | Parsons Brinckerhoff '**A1307 Haverhill to Cambridge Corridor - Draft Audit Report**' dated January 2016. Included within this report is an overview of the policy context and the key stakeholder engagement undertaken in July 2015.

3.3.3 The committed developments alone proposed for the area alongside the A1307 Haverhill to Cambridge corridor need to cater for over 8,500 new homes and nearly 20,000 additional jobs through to 2031. Whilst considering the forecast growth, it has been recognised that the current CSRM model land-use assumptions should be revisited and updated to provide a more robust prediction of the future baseline conditions in the A1307 corridor, particularly in the Haverhill zone. Table 3-1 provides an overview of the current housing and employment growth numbers currently in place.

Table 3-1 Current Housing & Employment Growth – A1307 Corridor

SITE LOCATION	HOUSING GROWTH NUMBERS	EMPLOYMENT GROWTH NUMBERS
Cambridge Biomedical Campus / Laboratory of Molecular Biology / AstraZeneca / Papworth Hospital / Energy Innovation Centre	-	Up to 6,000 new jobs in the next 3 to 5 years with further growth follow
Trumpington Meadows / Bell School / Clay Farm / Glebe Farm	Up to 4,056 homes	-
Sawston	Up to 540 homes	Not available
Granta Park	-	Up to 3,200 new jobs
Babraham Research Campus	-	Up to 1,000 new jobs
Haverhill Research Park	-	Up to 1,000 new jobs
Haverhill	Up to 4,260 homes (2009 - 2013)	Not available
Genome Campus	-	Not available

Source: Cambridge & South Cambridgeshire Local Plans (2011 – 2031) and St Edmundsbury Local (2009 – 2031)

3.4 CURRENT CORRIDOR CONDITIONS

3.4.1 Table 3-2 provides an overview of the following key characteristics of the A1307 corridor:

- 2014 AADT (Annual Average Daily Traffic) taken from actual observed traffic count surveys;
- 2031 AADT modelled flows from the 2031 SATURN model;
- 2014 Inbound / Outbound Journey Times taken from Trafficmaster data; and
- 2014 Inbound / Outbound Journey Times taken from bus journey time data.

3.4.2 The most critical information to note is the expected change in AADT from 2014 to 2031, with AADT increases ranging from 21% to 46% on sections along the corridor. The key increases to note are those to the west of the A11 and further into Cambridge.

3.4.3 For general traffic, in the AM peak, the current journey time inbound is over six minutes longer than that outbound in the PM peak. The key congestion points are at Linton, around the A11 Fourwentways junction and from the Hinton Way Roundabout into Addenbrooke's Hospital / Cambridge Biomedical Campus.

3.4.4 For buses, as the mainstay of the public transport provision along the corridor, the AM peak / PM Peak journey time is substantially longer with key congestion points including Linton (owing to the non-express services passing through Linton proper), again around the A11 Fourwentways junction and from the Hinton Way Roundabout into Addenbrooke's Hospital / Cambridge Biomedical Campus.

Table 3-2 A1307 Corridor (Haverhill to Cambridge) – Summary AADT^ and Journey Times

DESCRIPTION	2014 AADT*	2031 AADT**	% CHANGE (AADT)	2014 INBOUND CAR JOURNEY TIME (AM PEAK)	2014 OUTBOUND CAR JOURNEY TIME (PM PEAK)	2014 INBOUND BUS JOURNEY TIME (AM PEAK)	2014 OUTBOUND BUS JOURNEY TIME (PM PEAK)
Haverhill (A1017 Junction – Horseheath	14,969	18,532	+24%	112.27	117.75	189.97	194.71
Horseheath - Linton	13,670	17,233	+26%	153.86	147.8	372.09	350.9
Bartlow Road – High Street (Linton)	16,796	20,570	+22%	341.21	174.19	585.12	592.62
Linton to Great Abington	17,756	21,662	+22%	78.97	77.31	341.33	560.9
Great Abington to Granta Park Junction	18,459	22,365	+21%	129.23	130.72	437.15	466.74
Granta Park Junction to A11 Junction	20,112	24,292	+21%	47.16	41.14	228.48	282.58
A11 Junction to Babraham Research Campus	17,592	22,188	+39%	104.11	97.98	256.97	241.54
Babraham Research Campus to Wandlebury	15,505	21,697	+40%	150.34	134.08	226.3	217.85
Wandlebury to Hinton Way Roundabout	16,910	23,300	+38%	109.74	62.14	104.06	114.78
Hinton Way Roundabout to Addenbrooke's / Cambridge Biomedical Campus	13,900	20.273	+46%	186.6	50.46	325.2	223.1
TOTALS	-	-	-	23.56mins	17.2mins	51.11mins	54.10mins

^ AADT is the total volume of traffic for a day
* Based on observed traffic count data
** Observed traffic count data + SATURN 2011-2031 change in vehicle flows
*** Excludes journey time variability analysis (average journey times only)

3.4.5 Travel Demand & Mode

- The main destination of Haverhill residents and those using the corridor is the Addenbrooke's Hospital / Cambridge Biomedical Campus. Key destinations aside from this include central Cambridge, Granta Park and Babraham Research Campus; and
- Between 2001 and 2011 there has been a significant increase in the number of Haverhill residents working at Addenbrooke's Hospital / Cambridge Biomedical Campus, with smaller increases in trips to central Cambridge, Cambridge Northern Fringe and Granta Park.
- Haverhill residents have a relatively high level of car dependency for travel to work trips (68.8%) which has been increasing between 2001 and 2011;
- The car is the main mode of travel by Haverhill residents to destinations along the corridor;
- A relatively high level of bus use by Haverhill residents does occur to destinations along the corridor, in particular, Addenbrooke's Hospital / Cambridge Biomedical Campus (31%) and central Cambridge (37%); and
- Trips to the Babraham Research Campus and Granta Park are predominately by car (76% and 84% respectively) with relatively low levels of public transport and travel by active modes to both these destinations.

3.4.6 Walking and Cycling

- The quality of the pedestrian and cycle infrastructure between Cambridge and the Babraham Research Campus is exceptionally variable (poor to reasonable);
- It is noted that work is progressing on providing a cycling and walking path from the A1307 via Babraham Research Park and onto Babraham which needs to be considered further as part of any concepts; and
- Between the Babraham Research Campus and Haverhill the pedestrian and cycle infrastructure provision is of poor quality, predominately sub-standard and disconnected.

3.4.7 Public Transport

- A commercial bus service (route 13 and its derivatives) is provided along the corridor which currently operates at good frequencies during the peak commuting periods; and
- A private commuter bus service operates to / from Granta Park during peak periods.

3.4.8 Road Network

- The corridor between Haverhill and Cambridge is predominately a derestricted rural single carriageway with three main sections of dual carriageway;
- Reduced speed limits (40mph-50mph) occur through Linton, Little Abington and on approach to Cambridge;
- Three accident cluster sites have been recorded at the A1307 junctions with Hinton Way, Haverhill Road and Granta Park junction; and
- The number of accidents within the corridor has remained relatively stable reducing from a peak of 30 in 2012 to 25 in 2014 with a small proportion involving pedestrians or cyclists (2 in 2014).

3.4.9 Road Conditions

- The corridor is dominated by tidal flows inbound to Cambridge in the AM peak and outbound towards Haverhill in the PM peak;

- The A1307 highway links through Linton and Little Abington have CRF (Congestion Reference Flow – an estimate of the total annual average daily flow at which the carriageway is likely to be congested in the peak periods) ratios exceeding 100%, suggesting these sections are suffering from significant levels of queuing and delay on a regular basis;
- The Traffic Master data shows that in the AM pea, the eastbound flows are most susceptible to variability in journey times, and in the PM peak, the westbound flows are most susceptible;
- Relatively low average traffic speeds occur through Linton, on approach to the A1307/A11 roundabout and A1307/Hinton Way Road roundabout;
- Weekday peak hour average speeds are 4%-20% higher in the AM peak and 4%-15% higher in the PM peak compared to weekend periods (free flow conditions); and
- Bus average speeds in the weekday peak periods are relatively low on approach to the A1307/Hinton Way roundabout, along the Hills Road corridor and through Linton in the PM peak hour.

3.5 FUTURE CORRIDOR CONDITIONS

3.5.1 In assessing the future performance of the corridor, a summary of the existing CSRM model runs has been undertaken as developed for the Cambridge and South Cambridgeshire Local Plans, along with a high level assessment of future congestion levels.

3.5.2 It has been identified that the CSRM model currently includes low increases in residential dwellings along the A1307 (particularly in Haverhill where no increase in dwellings has been included). The A1307 is included in the CSRM SATURN highway model, but is located at the periphery of the network and therefore may not be well validated compared to observed traffic data. As a result, the CSRM and SATURN modelling results presented in this are likely to be under predicting future flows along the corridor. Improvements to the CSRM and SATURN models, which are outside the scope of this study, are recommended.

3.5.3 CSRM analysis shows that between 2011 and 2031, car travel is predicted to increase from land-use zones along the corridor, with slight reductions in percentage of trips undertaken by Park and Ride and active modes.

3.5.4 The analysis of the AM and PM SATURN peak hour flows show that increases in flows are predicted along the corridor from 2011 to 2031 (ranging from 27% to 49% on some sections). The largest increases are predicted to occur between Cambridge and the Babraham Research Campus, with the section east of the A11 accommodating a lower increase in flows.

3.5.5 The Congestion Reference Flow (CRF) analysis has shown that the predicted increase in vehicle flows along the corridor between 2011 and 2031 will result in additional sections of the corridor operating over capacity. The Reference Flow to Capacity (RFC) analysis shows that all the single carriageway sections of the A1307 are predicted to be operating over capacity in 2031 except the section west of Hinton Way. All the dual carriageway sections are predicted to continue to operate with spare capacity.

3.5.6 The 2031 CRF analysis shows that significant congestion and delays are predicted through Linton, Abington and on approach to the Babraham Research Campus. The additional demand would therefore result in a significant worsening of journey times for general traffic and buses along the corridor.

3.6 ADDITIONAL KEY ISSUES

OVERVIEW

3.6.1 The corridor currently experiences several other issues, set out below, which are likely to become more significant in the years to 2031 as development along the corridor and surrounding area continues.

SAFETY

3.6.2 Road safety on the corridor is identified as a priority for Cambridgeshire County Council. During the five years from January 2010 to December 2014, 156 accidents occurred along the corridor, with 115 occurring on the A1307 itself. Of those on the A1307, 3 were fatal accidents, 23 were serious and the remaining 89 were slight in severity. The majority of accidents occurred at junctions (90/156 or 73/115) with T or staggered junctions having the highest number of accidents (46/156 or 37/115). The remaining accidents occurred on road links (66/156 or 42/115), including 2 of the fatalities.

PEDESTRIAN, CYCLING & EQUESTRIAN

3.6.3 The provision of pedestrian and cycle facilities between Cambridge and the Babraham Research Campus is relatively direct and of variable quality (poor to reasonable). Several issues were noted from stakeholder events regarding safety at private accesses along this section. Between the Babraham Research Campus and Haverhill, the pedestrian and cycle infrastructure provision is of relatively low quality and the network is disconnected and substandard.

3.6.4 Equestrian provision along the corridor has been noted as a current problem, with a lack of direct connections to bridleways a particular issue.

3.6.5

PUBLIC TRANSPORT

3.6.6 Public transport provision along the corridor is by bus only. The bus service from Haverhill to Cambridge experiences several issues, including congestion on the approaches to Linton, to the Hinton Way roundabout, Cambridge and Haverhill. Bus services which travel through Linton High Street experience unpredictable and at times significant delays through this stretch of the route. These factors combine to make the bus service less attractive than it should be. Improving bus journey time and journey time reliability, whilst providing additional services, have been identified as important through stakeholder discussions. There are also issues with bus stop accessibility at several stops along the route which potentially discourage use, particularly by people with mobility issues.

GENERAL TRAFFIC

3.6.7 The corridor is generally performing under capacity as a traffic link. Delays currently occur on the approaches to Cambridge in the AM peak and out of Cambridge in the PM peak. Significant delays are noted through Linton and Little Abington and around the A11 Fourwentways junction on a frequent basis as well as north of the Babraham Road Park & Ride through to Addenbrooke's Hospital / Cambridge Biomedical Campus.

4 CONCEPT DEVELOPMENT & APPRAISAL

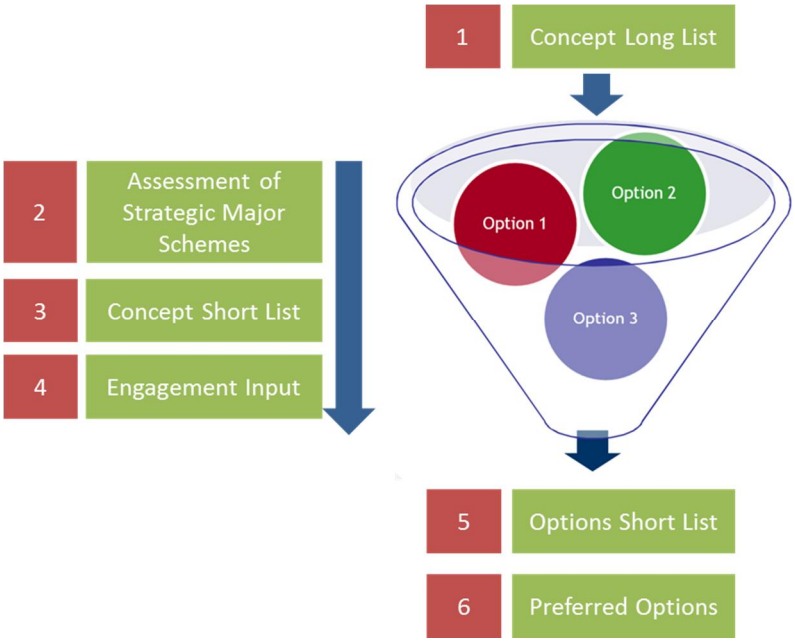
4.1 OVERVIEW

4.1.1 The overall objective for concept development and appraisal was to develop concepts that supported the project objectives. We therefore developed concepts across a wide range of transport modes and issues including public transport, cycling, road improvements, equestrian and walking improvements, road safety and congestion.

4.1.2 The options appraisal process used in this study (a summary diagram is shown in Figure 4-1) is as follows (this draft report is currently at the end of stage 3 of the process):

1. **Concept Long List** – development of a long list of concepts including key stakeholder engagement input to provide challenge to improve the long list of concepts;
2. **Assessment of Strategic Major Schemes** – early assessment of the strategic major schemes identified to allow the refinement of the long list of concepts;
3. **Concept Short List** – use of the Department for Transport (DfT) Early Appraisal & Sift Tool (EAST), to sift the refined Concept Long List into the Concept Short List;
4. **Engagement Input** – consultation and engagement on the short list of concepts with the public and stakeholders to provide for their input into the concepts. Amendments to the existing concepts and/or the provision of new concepts into the assessment will take place after engagement;
5. **Options Short List** – amendment of the concept short list to provide a final short list of options with further scheme development & feasibility design taking place; and
6. **Preferred Options** – identification of the preferred options to be taken forward for outline business case assessment.

Figure 4-1 Options Appraisal Process



4.2 CONCEPT LONG LIST DEVELOPMENT

4.2.1 The long list of concepts was developed through our initial assessment (as reported on in our Draft Audit Report) of the corridor now and through to 2031. We took into consideration those schemes identified from the Cambridge & South Cambridgeshire Transport Strategy, the City Deal, other studies and also the aspirations of the client project team as well as other potential schemes.

4.2.2 An initial long list of 29 concepts was developed and discussed with the client project team during early July 2015. The options were split by mode, including rail, Bus Rapid Transit (BRT), bus priority, park & ride, cycle/walking/equestrian and general traffic as well as concepts covering road capacity and safety. In addition, location specific schemes were identified, for example, local interventions to improve transport or public realm improvements.

4.2.3 A number of 'smarter travel' options were also considered including demand management options such as car clubs, school travel, real-time passenger information and smartphone apps.

4.2.4 The initial concepts were discussed with the client project team, who agreed to use them as the basis for project development, but asked that stakeholder issues be incorporated into the concept long list.

4.2.5 Three key stakeholder events were subsequently held in July 2015 at Granta Park, Linton Village Hall and Babraham Research Campus. A separate meeting was held at Addenbrooke's Hospital / Cambridge Biomedical Campus. These events were attended by invited local businesses, local councillors and other interest groups.

4.2.6 The key stakeholder events focussed on identifying corridor issues whilst discussing emerging scheme options. This was to ensure that stakeholders could raise any issues they felt needed to be raised whilst not being constrained by any ideas being put forward.

4.2.7 Using the information gathered from the stakeholder events, a further thirteen potential concepts were identified to form a final concept long list of 42 proposals. These are shown in Table 4-6.

4.3 WHOLE CORRIDOR STRATEGIC CONCEPTS

OVERVIEW

4.3.1 A number of whole route corridor strategic concepts were identified in the concept long list and required further assessment of their viability. Such major schemes would need a positive business case to be taken forward within the current City Deal timescales and local plan period to 2031. In this context, three of the concepts that were explored were:

- Re-opening the disused rail corridor as single or twin-track railway (noting that the majority of the disused rail corridor will need to be of new construction);
- Utilising the disused rail corridor to implement a busway scheme along the whole route; and
- Widening all or part of the A1307 to widened single carriageway standard, dual carriageway standard and/or introducing a bypass at Linton.

ASSESSMENT

4.3.2 These potential schemes have been the subject of a high level assessment to consider estimated costs and likely benefits in terms of such aspects as passenger numbers, journey times and traffic flows. These schemes have also been considered in the context and location of the level of growth anticipated within the corridor through to 2031.

4.3.3 Note that all capital costs have been produced to an indicative level only and would require more detailed assessment, if taken further, subject to the production of an appropriate feasibility design.

4.3.4 In undertaking the modelling of these concepts, we have reviewed the potential of the current Cambridge Sub-Regional Model (CSRM) and associated SATURN model. The CSRM covers the whole of this corridor, although Haverhill is modelled as an external zone with no explicit land use or growth through to 2031 modelled. CSRM is calibrated using 2006 highway data and 2009 public transport studies, and draws extensively on 2001 Census data. This gives rise to a risk that the model may not fully replicate the current conditions in the detail needed, particularly with the 2011 Census data now available.

4.3.5 For this reason, to understand the potential success of the proposed options, our work references CSRM, but does not make exclusive use of it. For instance, we have used other data gathering exercises undertaken (i.e. traffic counts from 2014, Census 2011 information, trafficmaster and bus journey time information). When the concepts arising from this study are taken forward for further development, we will be making further use of this information to inform the outline business case.

RAIL

4.3.6 Appendix B contains a copy of the Draft Rail Viability Report produced for the potential reopening of the disused rail corridor from Haverhill to Cambridge. The high level assessment of the business case for the railway determined that the proposal would achieve a Benefit Cost Ratio (BCR) of less than 1.0. This was not only due to the potential high outturn cost of reopening the disused railway but the low patronage expected.

Table 4-1 Rail Viability

Estimated Capital Cost	£650m (double track) £390m (single track)
Journey Time	Haverhill to Cambridge (over 20km) – Approx. 30 minutes
Passenger Numbers	Circa 1774 daily passengers with a factored annual base demand of 1,810,000 trips in 2031
BCR Assessment	Less than 1.0 (poor value for money) – as journey time benefits and revenue do not outweigh the significant costs

4.3.7 In any case, the reopening of the disused railway corridor could not take place within the current timescale (through to 2020) allowed for tranche 1 of the City Deal funding or during the period to 2031. Although the reopening of the disused rail line is not judged to be viable as part of the current A1307 Haverhill to Cambridge corridor study, a Cambridge-Haverhill railway line could ultimately form part of a more strategic rail link from Cambridge to Colchester, via Haverhill and Sudbury, including the existing Sudbury to Marks Tey branch.

BUS RAPID TRANSIT (BRT)

4.3.8 As an alternative to rail within the Draft Rail Viability Report, an end to end BRT scheme, which would use the disused railway corridor, was considered. Although the potential outturn cost was less than a railway, this option was also discounted due to the low BCR of 1.27 which represented low value for money.

Table 4-2 BRT Viability

Estimated Capital Cost	£150m to£200m (subject to alignment and crossing A11)
Journey Time	Haverhill to Cambridge (over 20km) – Approx. 40 minutes
Passenger Numbers	Circa 1774 daily passengers with a factored annual base demand of 1,397,000 trips in 2031
BCR Assessment	1.27 (low value for money) – as journey time benefits and revenue do not outweigh the significant costs

4.3.9 However, this is the best of the major schemes along the entire route length. A full length BRT scheme through to Haverhill could be more easily developed in the future if one of the rapid transit schemes through to Granta Park (as shown in the concept short list was potentially taken forward).

ROAD IMPROVEMENTS

4.3.10 Three scenarios were considered for potential road improvements:

- Scenario 1 – widening of the single carriageway sections of the A1307 between Haverhill & Cambridge where the carriageway is narrow (i.e. an S2 carriageway) to a Type WS2 carriageway (10m wide including 1m hardstrips);
- Scenario 2 – dualing of all the single carriageway sections of the A1307 between Haverhill & Cambridge;
- Scenario 3 – provision of a single carriageway bypass (for example, to the south) of Linton.

4.3.11 These three scenarios were developed with a high level assessment undertaken using the current SATURN model available for the Cambridge sub-region in the 2031 future year.

Table 4-3 Road Improvements Viability – Scenario 1

Estimated Capital Cost	£25m
Existing Modelled Journey Time (2011)	25 minutes (AM Peak)
Modelled Journey Time (2011) - with Intervention	24 minutes (AM Peak)
Scenario 1 Journey Time (2031) – with Intervention	28 minutes (AM Peak)
BCR Assessment	0.30

Table 4-4 Road Improvements Viability – Scenario 2

Estimated Capital Cost	£100m
Existing Modelled Journey Time (2011)	25 minutes (AM Peak)
Modelled Journey Time (2011) - with Intervention	23 minutes (AM Peak)
Scenario 2 Journey Time (2031) – with Intervention	27 minutes (AM Peak)
BCR Assessment	0.26

Table 4-5 Road Improvements Viability – Scenario 3

Estimated Capital Cost	£15m
Existing Journey Time through Linton on the A1307 (2014)	6 minutes (AM Peak – car only)
Existing Modelled Journey Time (2011)	5.5 minutes (AM Peak)
Modelled Journey Time (2011) - with Intervention	4.2 minutes (AM Peak)
Scenario 3 Journey Time (2031) – with Intervention	4.5 minutes (AM Peak)
BCR Assessment	0.28

4.3.12 In providing any road scheme, the most direct benefit is that of congestion relief and the journey time savings made. Each option above was discounted in the assessment undertaken. The potential journey time improvements along with the expected traffic flows in relation to the road capacity improvements were not judged sufficient enough for a case to be made. Each option represented poor value for money with an average BCR of 0.30.

4.3.13 Scenario 1 and Scenario 2 are both unlikely to improve road safety and unlikely to significantly reduce journey times, as there will still be a need for a number of junctions (in the form of roundabouts or signalled junctions) to maintain access to/from local communities.

4.3.14 However, if significant further development occurs along the corridor outside the expected Local Plan through to 2031, then a case for road improvements could be revisited.

CONCLUSION

4.3.15 As a result of the assessment undertaken, with the concepts ranging from low to very poor value for money, these concepts are recommended to be discounted in the context of the current City Deal. While the findings show that there is not a viable business case for such major schemes up to 2031, there may be a case for such schemes outside of the current period.

4.4 CONCEPT SHORT LIST DEVELOPMENT

4.4.1 The refined concept long list, following the assessment of the whole corridor strategic concepts, was then assessed using the Early Appraisal and Sift Tool (EAST) developed by the Department for Transport (DfT) to produce the concept short list.

4.4.2 EAST is a decision support tool that has been developed to allow users to summarise and present evidence on potential concepts (or options) in a clear and consistent manner against the key elements of the DfT Transport Analysis Guidance (WebTAG). It allows option appraisal and sifting to occur, using available high level information and to help decision makers form an early view on option performance and how they compare with each other.

4.4.3 Table 4-6 outlines the refined Long List of Options developed (including the initial EAST rating) with Appendix A containing a summary of the EAST assessment.

4.4.4 Following on from the development of the concept long list and the high level assessment of the major road, rail and BRT concepts, a further examination of the other concepts was then carried out to develop a shortlist of concepts for further consultation. These shortlisted options focus on tackling the challenges along the corridor and meeting the study objectives while delivering maximum benefits and value for money. They are therefore considered viable at this stage and deliverable, and will manage increased travel demand from the scale of growth in the corridor, significantly improving passenger transport, cycling whilst reducing demand for car travel.

Table 4-6 Concept Long List / Short List Assessment

CONCEPT ID	CONCEPT DESCRIPTION	INITIAL EAST RATING	INITIAL CONCEPT SHORT LIST (Y/N)	FINAL CONCEPT SHORT LIST (Y/N)	COMMENTS
Rail					
01 Rail A	Use disused rail corridor from Haverhill town centre to Cambridge	2.54	N	N	See Rail Viability Technical Note
29 Rail B	Use of disused rail corridor from a parkway to the west of Haverhill to Cambridge connecting into current railway	2.91	N	N	See Rail Viability Technical Note
Bus Rapid Transit					
02 Bus Rapid Transit A	Use disused rail corridor from Haverhill to Cambridge. On highway from Stapleford via A1301 to connect to busway at Trumpington P&R or via Addenbrooke's Hospital (at junction with Addenbrooke's Road)	3.69	N	N	See Rail Viability Technical Note. A1301 corridor outside of study scope
03 Bus Rapid Transit B	Use disused rail corridor from Haverhill to Cambridge with route (to be identified) to connect to Busway near Addenbrooke's Hospital	3.29	Y	N	See Rail Viability Technical Note.
04 Bus Rapid Transit C	On highway (A1307) from Haverhill to Linton. Use disused rail corridor from Linton to Cambridge. On highway from Stapleford via A1301 to connect to busway at Trumpington P&R (two way segregated busway) or to Addenbrooke's Hospital / Cambridge Biomedical Campus (at junction with Addenbrooke's Road)	3.90	Y	N	Disused rail corridor not viable for BRT in this study
05 Bus Rapid Transit D	On highway (A1307) from Linton to Haverhill. Use disused railway corridor from Linton to Cambridge. Run alongside existing railway to connect to Busway near Addenbrooke's Hospital (two way segregated busway)	3.93	Y	N	Disused rail corridor not viable for BRT in this study
06 Bus Rapid Transit E	Segregated route within A1307 highway corridor from Haverhill to Cambridge	3.29	Y	Part	Use of route in part from A11 to Cambridge with bus priority at Linton
07 Bus Rapid Transit F	On highway from Haverhill to Linton; Segregated route within highway corridor from Linton to Cambridge	4.02	Y	Part	Use of route in part from A11 to Cambridge with bus priority at Linton
30 Bus Rapid Transit G	Use of disused rail corridor between Linton and a Haverhill station outside the town centre; On highway from Haverhill Parkway site into Haverhill town centre; Segregated route within A1307 highway corridor from Linton to Cambridge	3.21	Y	Part	
31 Bus Rapid Transit H	On highway from Haverhill to Cambridge	3.55	Y	Part	Use of route in part from A11 to Cambridge with bus priority at Linton
32 Bus Rapid Transit I	Segregated route within A1307 highway corridor from Linton to a Haverhill station outside the town centre; On highway from Haverhill site into the town centre; On highway (A1307) from Linton to Cambridge	3.58	Y	Part	Use of route in part from A11 to Cambridge with bus priority at Linton
33 Bus Rapid Transit J	Use of disused rail corridor from Haverhill to Granta Park; Off road (new corridor) from Granta Park to Babraham Research Campus; Segregated route within A1307 highway corridor from Babraham Research Campus to Cambridge	3.63	Y	Part	Use of route in part from Granta Park to Cambridge
34 Bus Rapid Transit K	Use of disused rail corridor from Haverhill to Granta Park; Off road (new corridor) from Granta Park to Babraham Research Campus; On highway bus priority (A1307) from Babraham Research Campus to Cambridge	3.63	Y	Part	Use of route in part from Granta Park to Cambridge
Cycling, Walking & Equestrian					
08 Cycle A	Cycle route segregated / shared footway within A1307 from Haverhill to Cambridge with links to Granta Park, Babraham Research Campus, Hinxton, Stapleford & Sawston	3.46	Y	Y	
09 Cycle B	Segregated cycle route within former rail corridor, with on-street sections to link with destinations as required	3.36	Y	Part	
17 Cycle, Walking & Equestrian A	Link from A1307 to Granta Park with improved links over A11 and surrounding fields and through Babraham and Babraham Science Park	3.31	Y	Part	
35 Cycle C	Cycle route segregated within A1307 highway from Haverhill to Linton. Use of disused rail corridor as a cycle route from Linton to Cambridge (joining National Cycle Route 11 at Stapleford). Additional link into Babraham Research Campus	3.69	Y	Part	Use of route from Haverhill to Linton and part use of disused cycle corridor from Linton to Granta Park
36 Cycle D	Use of disused rail corridor as a cycle route from Haverhill to Granta Park, with a cycle link through fields between Granta Park and Babraham Research Campus and a cycle route segregated within A1307 from Babraham Research Campus to Cambridge	3.69	Y	Y	
40 Cycle, Walking & Equestrian B	Improvements to route between Trumpington Meadows and Cambridge; Biomedical Campus; Include facilities through Glebe Farm and Clay Farm	3.32	Y	Y	
41 Cycle E	Filling gaps in current cycling network; High quality connection from A1307 (E of Great Abington), via Granta Park, across A11, to Babraham and reconnecting to A1307; Additional connection from Granta Park to the recent cycleway on Causeway, providing connection to Whittlesford Parkway	4.20	Y	Part	All cycle routes will fill in gaps across the A1307 corridor
Bus Priority					
10 Bus Priority A	Linton Bus Priority Improvements	4.06	Y	Y	
22 Bus Interchange	Addenbrook's Hospital Bus Station Improvements	3.58	Y	N	To be further considered as part of works from Babraham to Addenbrooke's
23 Bus Campus Service	Dedicated bus service linking campus and key population centres	2.77	N	N	
24 Bus Stop Accessibility	General bus stop improvements to latest accessibility standards; provision of safe journey routes to/from bus stops; incorporation of RTPI Better wayfinding provision	4.04	Y	Part	Minor work to be undertaken as part of other bus stop upgrade work or as part of schemes taken forward
37 Bus Priority B	Babraham Road Park & Ride – Bus Lane on eastern & western approach to roundabout, provide separate right turn for cars; Babraham Road Park & Ride – Bus Lane on western approach to P&R access junction; Bus Lane between P&R and Wort's Causeway junction (eastern approach only); Bus Lane between Wort's Causeway and Hospital Roundabout	3.78	Y	Y	
38 Bus Priority C	Linton Bus Priority Improvements	3.84	Y	Y	
Road					
11 Car A	Dualling of A1307 along sections of the route	2.47	N	N	
12 Car B	Dualling of A1307 along sections of the route with Linton Bypass	2.65	N	N	
13 Car C	Bypass of Linton	3.31	Y	N	

CONCEPT ID	CONCEPT DESCRIPTION	INITIAL EAST RATING	INITIAL CONCEPT SHORT LIST (Y/N)	FINAL CONCEPT SHORT LIST (Y/N)	COMMENTS
18 Granta Park & Babraham Link	New road link from Granta Park to Babraham Campus Link from A1307 / A505	3.49	Y	N	Road link is not judged to be viable given existing road links exist
Park & Ride					
14 P&R A	Babraham Road Park & Ride Improvements	3.70	Y	Y	
15 Babraham Road Park & Ride to Addenbrooke's	Improved bus (bus lanes on highway or Busway off highway), cycle and walking facilities	3.52	Y	Y	
39 P& R B	Park & Ride to the east of Linton; Bus priority scheme in Linton	3.28	N	N	Park & Ride site near Linton is not judged to viable
42 P&R C	Park & Ride near the A11 with BRT links	3.70	Y	Y	BRT link to be on A1307 or via new segregated route to the south of the A1307
Road Safety, Public Realm & Other Transport Improvements					
19 Road Safety Improvements	Schemes to address accident clusters	4.05	Y	Y	Minor scheme to be taken forward either as part of City Deal or other funding
20 Linton Improvements	General transport improvements within Linton including road safety, cycling, walking & parking	3.66	Y	Part	Work to be taken forward as part of Bus Priority, Cycling/Walking & Road Safety works
21 Abington Improvements	General transport improvements within Linton including road safety, cycling, walking & parking	3.78	Y	Part	Work to be taken forward as part of Road Safety & Cycling/Walking works
25 Car Clubs & Sharing	Support local car clubs or use of national car share schemes	3.23	Y	N	Outside scope of A1307 Corridor study
26 Pubic Transport Info & IT	Additional information technology to provide real time passenger information to increase patronage	3.62	Y	N	Outside scope of A1307 Corridor study
27 School Transport	Measures to focus on reducing private car journeys to schools	3.79	Y	N	Outside scope of A1307 Corridor study
28 Electric Vehicles	Encourage use of electric vehicles to reduce harm of car use with possible ultra-low emission zones	3.27	Y	N	Outside scope of A1307 Corridor study
16 Traffic Signalling	Improved signalling across all schemes	2.99	N	N	Implicitly built into any scheme taken forward

4.4.5 Each remaining option in the concept long list was also qualitatively assessed against the EAST Criteria and Weighting and taken forward or discounted where appropriate. As the key objective of improvements along the corridor is to support future economic growth, the sifting criteria was weighted to favour options which complemented the economic case. The five criteria assessed in EAST, as well as the weighting assigned is shown in Table 4-7.

Table 4-7 EAST Criteria and Weighting

Sifting Criteria	
Strategic Case **(12.5%)**	Scale of impact
	Fit with wider transport and government objectives
	Fit with other objectives
	Degree of consensus over outcomes
Economic Case **(50%)**	Economic growth
	Carbon emissions
	Socio-distributional impacts and the regions
	Local environment
	Well being
	Expected value for money

Sifting Criteria	
Managerial Case **(12.5%)**	Implementation timetable
	Public acceptability
	Practical acceptability
Commercial Case **(12.5%)**	Flexibility of option
	Income generated
Financial Case **(12.5%)**	Affordability
	Capital cost
	Revenue cost
	Cost risk

4.4.6 Under the economic case assessment, EAST identifies at a high level, the economic, environmental and social impacts of options. This is in line with the Treasury's Green Book, "Appraisal and Evaluation in Central Government". The economic case considers how a scheme will impact economic growth, carbon emissions, socio-distributional impacts, the local environment and the well-being of locals. The weightings were applied to each of the assessment criteria.

4.4.7 The best performing schemes were then shortlisted for further consideration to form the draft concept short list shown in Table 4-8. Each of the proposals taken forward at this point was then further discussed in detail with the client project team with the final concept short list identified.

Table 4-8 Concept Short List

INTERVENTION TYPE	GENERAL DESCRIPTION
Park & Ride	
Concept 1A	Babraham Road Park & Ride Improvements
Concept 1B	Proposed A11 Park & Ride
Rapid Transit	
Concept 2A	Granta Park to Addenbrooke's Hospital / Cambridge Biomedical Campus (off Highway)
Concept 2B	Granta Park to Addenbrooke's Hospital / Cambridge Biomedical Campus (on highway)
Concept 2C	Linton Bus Priority
Concept 2D	Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus (off highway)
Concept 2E	Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus (on highway)
Cycling & Walking	
Concept 3A	Three Campus Cycling & Walking Route (off highway with link to NCN11 near Cambridge)

INTERVENTION TYPE	GENERAL DESCRIPTION
Concept 3B	Three Campus Cycling & Walking Route (on highway)
Concept 3C	Haverhill to Three Campus Route (on highway)
Concept 3D	Haverhill to Three Campus Route (off highway)
Other Schemes – Public Realm & Road	
Public Realm Improvements	
Bus Stop Accessibility Improvements	
Bus Service Improvements	
Road Safety Improvements	

5 CONCEPT SHORT LIST

5.1 OVERVIEW

5.1.1 This section describes the concept short list that has been progressed to form a package of potential improvements along the corridor. These measures provide for those not only travelling to/from Haverhill and Cambridge but for those using the corridor, whether from outside the area or those that live locally.

5.1.2 The package of proposals for the concept short list is described via a number of transport themes which are shown in Figure 5-1. Given the complex nature of the corridor, with no one scheme able to solve all the issues arising, these themes are complementary to each other and attempt to address the wide range of issues. Figure 5-2 and Table 5-1 provide summaries of the proposed concept short list.

Figure 5-1 A1307 Corridor Transport Themes

5.1.3 These themes and their core objectives are:

- **Park & Ride – New or improved facilities to reduce the number of travellers (whether for commuting, leisure or other purposes) not only driving into Cambridge, but to also serve as a transport hub;**
- **Rapid Transit – New or additional rapid transit (this may include Bus Rapid Transit, Bus Priority or the use of another transport mode), to provide reliable and, where possible, fast journeys to where people want to go;**
- **Cycling & Walking – New and improved infrastructure for healthy and sustainable journeys to link key employment sites, towns & villages along the corridor;**
- **Road –To improve road capacity (where absolutely needed) and improve road safety; and**
- **Public Realm – New and improved public realm to improve the design quality of any proposals whilst ensuring the concepts of the City Deal are adhered to.**

Figure 5-2 Concept Short List for the A1307 Corridor

A1307 (HAVERHILL TO CAMBRIDGE) CORRIDOR – CONCEPT SHORT LIST

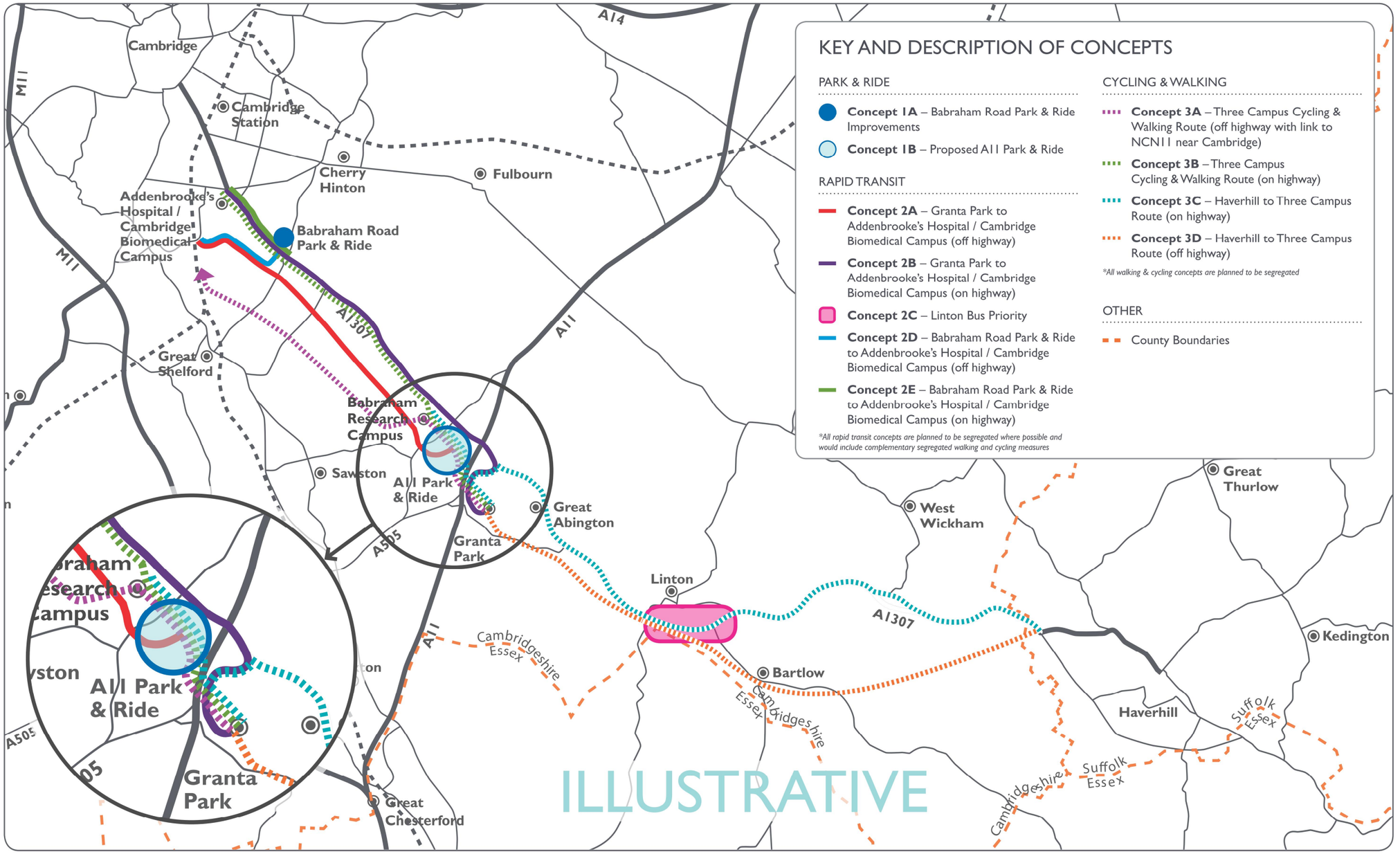


Table 5-1 Concept Short List Summary Table

Number	Description	Key Benefits & Opportunities	Key Delivery Challenges	Indicative Cost
Park & Ride				
Concept 1A	Expand the Babraham Road Park & Ride site to cater for committed and future growth Potential for additional facilities including cycle parking, park & cycle, business hub and rest / coffee shop facilities	Potential to assist future committed developments Enable new rapid transit links to the Addenbrooke's Hospital / Cambridge Biomedical Campus development area, the Busway and potential new Park & Ride near the A11 along with high quality local bus connections	No significant engineering challenges currently anticipated Depending on feasibility design, some land purchase / compensation may be required Improvements may require planning consent	£2.5m
Concept 1B	New Park & Ride site adjacent to the A11 near the Fourwentways junction Potential improvements to the Fourwentways junction Potential for additional facilities including cycle parking, park & cycle, business hub / conferencing facilities and rest / coffee shop facilities	Better caters for demand from M11 / A505 / A11 / A1307 corridors and better servicing of Granta Park, Babraham Research Campus and the Genome Campus Enables new rapid transit links to the Addenbrooke's Hospital / Cambridge Biomedical Campus development area and the Busway including local connections to/from Linton & Haverhill as well as local employment sites Potential integration into the proposed Park & Ride of the local services currently located off the A11 and act as a transport hub for the area and the A1307 corridor	The identification of a suitable site will be a challenge with no significant engineering challenges currently anticipated Depending on feasibility design, land purchase and compensation will be highly likely Planning consent would be required Potential location within Green Belt area	£12m
Rapid Transit				
Concept 2A	New segregated off highway Rapid Transit link from Granta Park via the proposed A11 Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus Link to Babraham Research Campus Potential for new Busway, public transport road or other method of rapid transit Would require a new bridge over the A11 to serve Granta Park	Walking / Cycling / Equestrian route alongside Enable new rapid transit link to/from Addenbrooke's Hospital / Cambridge Biomedical Campus, Cambridge, Granta Park & Babraham Research Campus Potential for buses from Haverhill and other local services to use a rapid transit route Journey time potentially reduced from 28 minutes to 15 minutes in the AM Peak	Potential engineering challenge in the identification and design of a new rapid transit route including bridge over the A11 Planning consent would be required with land purchase and compensation also likely Potential route within Green Belt area and runs near to Wandlebury Country Park Scheduled Monument area	£98m
Concept 2B	New segregated on highway Rapid Transit link from Granta Park via the proposed A11 Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus Link to Babraham Research Campus	Walking / Cycling / Equestrian route alongside Enable new rapid transit link to/from Addenbrooke's Hospital / Cambridge Biomedical Campus, Cambridge, Granta Park & Babraham Research Campus Potential for buses from Haverhill and other local services to use rapid transit route Journey time potentially reduced from 28 minutes to 18 minutes in the AM Peak	No significant engineering challenges currently anticipated given the route would be on highway (with some widening expected) Planning consent may be required with land purchase and compensation also likely Route runs near to Wandlebury Country Park Scheduled Monument area	£25m
Concept 2C	New bus lanes and/or bus priority improvements through the Linton area	Could include public realm and transport corridor improvements from east of the Village (Horseheath Road) to the west of Linton (beyond Granta School / Linton Village College / Community Sports Centre) with general improvements in the Village proper including along the High Street Provision of high quality walking / cycling environment Journey time potentially reduced from 10 minutes to 4 minutes in the AM Peak	No significant engineering challenges currently anticipated Land purchase and compensation would be required Numerous listed buildings within the Linton village area need to be considered	£5m
Concept 2D	New segregated, off highway rapid transit link from Babraham Road Park & Ride site to Addenbrooke's Hospital / Cambridge Biomedical Campus and the Busway Potential for a new Busway, public transport road or other method of rapid transit Linked to either Concept 2A or 2B	Provides for a new rapid transit link to the Addenbrooke's Hospital / Cambridge Biomedical Campus development area, the Busway and potential new Park & Ride near the A11 along with high quality local bus connections Walking / Cycling / Equestrian route alongside Potential for buses from Haverhill and other local services to use rapid transit route Journey time potentially reduced from 10 minutes to 4 minutes in the AM Peak	Potential engineering challenges in the identification and design of a new rapid transit route Planning consent would be required with land purchase and compensation also likely	£30m
Concept 2E	New segregated, on highway rapid transit link from Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus	Public realm and transport corridor improvements from south of the junction of Hinton Way / Babraham Road / Hinton Way through to the Addenbrooke's area New 'Gateway' into Cambridge from the south-east Walking / Cycling / Equestrian route alongside Journey time reduced from 10 minutes to 5 minutes in the AM Peak	No major engineering challenges anticipated at this time Land purchase and compensation may be required Likely to be undertaken within existing permitted development rights	£15m

Number	Description	Key Benefits & Opportunities	Key Challenges	Indicative Cost
Cycling & Walking				
Concept 3A	Segregated, walking, cycling & equestrian route (off highway) from Granta Park via the Babraham Research Campus and potential new Park & Ride at the A11 to Addenbrooke's Hospital / Cambridge Biomedical Campus Additional ink from Linton using part of the disused railway corridor Upgrade of the existing footway bridge over the A11 to cater for cycling and equestrian use Connection to the National Cycle Network Route 11 north of Great Shelford Provision of walking, cycling and equestrian links from Concept 3A to Sawston, Stapleford and Great Shelford Potential for additional on highway links via the use of the Concept 3B proposals to the Wandlebury Country Park area	Substantial opportunities for the integration of improved and new facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network, connecting Haverhill and Stapleford, linking to the existing National Cycle Route 11 between Stapleford and central Cambridge via Addenbrooke's, offering health and modal shift benefits Provision of walking, cycling and equestrian links from this proposal through to Sawston, Stapleford and Great Shelford. Additionally, if Concept 3C and/or 3D are not progressed, links should be made to the existing off road cycling path adjacent to the A1307 to connect Linton to the business parks Potential for additional on highway links via the use of the Concept 3B proposals to the Wandlebury Country Park area	No major engineering challenges anticipated at this time Planning consent would be required Land purchase and compensation would be required Potential route within Green Belt Could be progressed if Concept 2A is not progressed	£10m
Concept 3B	Improved segregated, walking, cycling & equestrian route (on highway for the most part) from Granta Park to the Babraham Research Campus via potential new Park & Ride at the A11 to Addenbrooke's Hospital / Cambridge Biomedical Campus Upgrading of the existing footway bridge over the A11 to cater for cycling and equestrian use Use of the A1307 from the Babraham Institute onwards through to Addenbrooke's Hospital / Cambridge Biomedical Campus with new and upgraded facilities (where appropriate)	Substantial opportunities for new and improved facilities on the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as new routes linking the major employment sites The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network Provision of walking, cycling and equestrian links from this proposal through to Sawston, Stapleford and Great Shelford and other settlements	No major engineering challenges anticipated at this time Planning consent may be required but there is potential for the use of permitted development rights Land purchase and compensation may be required Route runs near to Wandlebury Country Park Scheduled Monument area Could be progressed if Concept 2B is not progressed	£6m
Concept 3C	Segregated, walking, cycling & equestrian route (on highway) from Haverhill to the Three Campus Route at Linton Would make use of the existing facilities available and fill in the gaps in the network Route would link Haverhill, Horseheath, Linton and Great Abington / Little Abington through to Granta Park, Babraham Research Campus and also the proposed A11 Park & Ride The route would then use the Three Campus route to link to Addenbrooke's Hospital / Cambridge Biomedical Campus and Cambridge with links to local vilages	Substantial opportunities for the integration of improved and new facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network Potential to use either Concept 3A or 3B to link through to Cambridge plus additional road crossings for settlements such as Hildersham, Great Abington & Little Abington	No major engineering challenges anticipated at this time Planning consent may be required but could mostly be done through permitted development rights Land purchase and compensation may be required	£8m
Concept 3D	Segregated, walking, cycling & equestrian route (off highway via the disused railway corridor) from Haverhill to the Three Campus Route at Linton Route would link Haverhill, Horseheath, Linton and Great Abington / Little Abington through to Granta Park, Babraham Research Campus and also the proposed A11 Park & Ride The route would then use a Three Campus route to link to Addenbrooke's Hospital / Cambridge Biomedical Campus and Cambridge with links to local villages	Substantial opportunities for the integration of improved and new facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network Potential to use either Concept 3A or 3B to link through to Cambridge plus additional links / road crossings for settlements such as Hildersham, Great Abington & Little Abington and also through to Linton Village College	Route would need to use the disused railway corridor which is a potential engineering challenge depending on the current state of the corridor Would likely require planning consent Land purchase and compensation would be required	£13m
Other Schemes – Public Realm & Road				
Public Realm Improvements	Ensure all schemes incorporate appropriate public realm improvements to meet with the objectives of the City Deal			Included in indicative scheme costs
Bus Stop Accessibility Improvements	Ensure all bus stops along the corridor are fully accessible and meet the latest guidance for bus stop s	Refer to the bus stop accessibility review undertaken in the Draft Audit Report. Also allows for mini-interchange facilities for cyclists at key bus stops along the corridor		£1m
Bus Service Improvements	Increased bus services and increased use of technology (e.g. electric vehicles with potential on-route charging facilities / better transport information and ITS / RTPI facilities and the like)	Engagement and further work to be undertaken in conjunction with local bus operator		To be confirmed
Road Safety Improvements	Additional road safety improvements are proposed for a number of locations on the corridor, outside the major concept areas			£5m

5.2 PARK & RIDE CONCEPTS

CONCEPT 1A - BABRAHAM ROAD PARK & RIDE IMPROVEMENTS

DESCRIPTION

- Potential expansion of the Babraham Road Park & Ride site to cater for current and future growth including for the Addenbrooke's Hospital and Cambridge Biomedical Campus area; and
- Potential for additional interchange and technology facilities including cycle parking, park & cycle, business hub and rest / coffee shop facilities.

5.2.1 With the employment opportunities along the corridor as well as the growth and nature of commuting patterns, particularly with the Addenbrooke's Hospital / Cambridge Biomedical Campus area being a key destination from Haverhill, there is a need for increased Park & Ride capacity across the whole corridor.

5.2.2 The expansion of the existing Babraham Road Park & Ride site (along with the introduction of Concept 1B), is the most effective way of intercepting trips undertaken by car to allow interchange onto public transport or onto cycling.

5.2.3 To facilitate this, the existing Babraham Road Park & Ride site would likely require upgrading to cater for this role along with the potential provision of additional facilities (e.g. business hub / park & cycle / coffee shop). The current constrained access to the site along with the current lack of bus stop space and layover space would need to be addressed.

5.2.4 Any further improvements would most likely be linked to the provision of highway improvements from south of the Hinton Way Roundabout through to Addenbrooke's Hospital / Cambridge Biomedical Campus (discussed further within this chapter). This would include improvements to the Hinton Way Roundabout to deliver improved Park & Ride car access, thereby bypassing queues.

5.2.5 The improved Babraham Road Park & Ride site could additionally be connected to the Addenbrooke's Hospital / Cambridge Biomedical Campus by means of a new rapid transit connection, set out in either/or Concept 2A, 2B, 2D and 2E.

BENEFITS & OPPORTUNITIES

5.2.6 Potential benefits and opportunities for this proposal include:

- New rapid transit links (described elsewhere in this report), could provide better connectivity into Addenbrooke's Hospital / Cambridge Biomedical Campus and onto the Busway / local bus routes;
- Changes to the Babraham Road Park & Ride site could be linked to providing supporting transport facilities and additional support for the Addenbrooke's Hospital / Cambridge Biomedical Campus development area;
- Potential for relocation of the existing Addenbrooke's Hospital bus station to this site to provide a southern transport hub with the additional rapid transit links; and
- Provision of supporting facilities for park & cycle, provision of a business hub and convenience facilities (coffee shop etc).

CONCEPT 1B – PROPOSED A11 PARK & RIDE

DESCRIPTION

- New Park & Ride site adjacent to the A11 near the Fourwentways junction, potentially on the south-western quadrant;
- Potential associated improvements to the Fourwentways junction; and
- Potential for additional facilities including cycle parking, park & cycle, business hub / conferencing facilities and rest / coffee shop facilities.

5.2.7 The potential provision of a new Park & Ride site has been previously identified as part of the A1307 corridor through the City Deal 2014 bid. Having reviewed the proposal, we have further considered the provision of a Park & Ride site at a strategic site near the A11 as part of the concept short list.

5.2.8 The provision of a Park & Ride site near the Fourwentways junction of the A11 would better cater for traffic demand from the M11 / A505 / A11 / A1307 corridors to / from Cambridge and provide increased Park & Ride capacity for the wider Cambridge area. It would also service the local employment areas including Babraham Science Park, Granta Park and the Genome Campus. It could also reduce traffic to / from Cambridge within the south-east area.

5.2.9 The provision of a high quality bus corridor / rapid transit links into key employment centres and Cambridge city centre from this site would offer an attractive alternative to driving into Cambridge. High quality walking / cycling links both to the adjacent employment areas and villages on the corridor are proposed. For example, a new walking and cycling link is proposed to connect to the National Cycle Network (NCN) Route 11 with an upgrade to the existing footbridge nearby over the A11 to cater for cyclists.

5.2.10 There is also potential for bus shuttle services to be provided to Babraham Science Park and Granta Park as well as to the Genome Campus. These would be subject to viability assessments and discussions with the key employment sites, local bus operator and/or potential Park & Ride operator.

BENEFITS

5.2.11 From the initial analysis undertaken, a Park & Ride site catering for over 600 to 1100 spaces could be considered which is based upon a 2031 AADT circa 22,118 (excluding any abstraction and growth associated with the existing Babraham Road Park & Ride site).

5.2.12 There is also potential for the existing services area located to the south-east of the Fourwentways junction to be integrated with a new Park & Ride site. With further consideration of the site not just as a Park & Ride but as a transport and business hub for the area, as well as potential moving of the existing services site to this area, the number of spaces required could substantially increase.

5.2.13 Further, detailed assessment on the provision of a Park & Ride site through the CSRM model would need to be undertaken in conjunction with a detailed site selection study on the most appropriate site location.

OPPORTUNITIES

5.2.14 Potential opportunities for this concept include:

- High quality, rapid transit links along with complementary walking, cycling and equestrian links to Granta Park, Babraham Research Campus, Haverhill and other settlements & employment sites within the A1307 corridor and surrounding area;
- Potential integration of the existing services currently located to the south-east of the Fourwentways junction into a new Park & Ride site; and
- The provision of a new Park & Ride site at this location would provide additional Park & Ride capacity along the corridor in conjunction with the Babraham Road Park & Ride site.

5.3 RAPID TRANSIT CONCEPTS

CONCEPT 2A – GRANTA PARK TO ADDENBROOKE'S HOSPITAL / CAMBRIDGE BIOMEDICAL CAMPUS (OFF HIGHWAY)

DESCRIPTION

- Provision of a new segregated rapid transit link (off highway) from Granta Park via the proposed Park & Ride near the A11 and Babraham Research Campus through to Addenbrooke's Hospital / Cambridge Biomedical Campus;
- Link to or directly via the Babraham Research Campus;
- Would likely require a new bridge over the A11;
- Provided on a dedicated alignment, either on a new physically guided busway / other method of guidance or a new road for rapid transit only; and
- Any proposal would include a dedicated walking / cycling / equestrian route alongside.

5.3.1 A Park & Ride site adjacent to the A11 would be ideally served by reliable, high frequency and high quality rapid transit services. With nearby Granta Park and the Babraham Research Campus in the area, a new rapid transit linking these to Addenbrooke's Hospital / Cambridge Biomedical Campus and into the existing Busway / Public Transport network in Cambridge would be advantageous.

5.3.2 There is potential for the provision of a route wide HQPT upgrade east of Granta Park (albeit on highway) through to Haverhill which could be further considered as part of this concept.

BENEFITS

5.3.3 The existing bus journey time from Granta Park to Addenbrooke's Hospital / Cambridge Biomedical Campus (on highway) has been produced using a combination of existing bus journey times on the A1307 through to Addenbrooke's Hospital and an expected on highway journey time from Granta Park to the A1307.

Table 5-2 Concept 2A – Existing & Potential Journey Time (Approximate)

EXISTING JOURNEY TIME (AM PEAK)	POTENTIAL JOURNEY TIME (AM PEAK)
28 minutes (inc bus stop dwell times)	15 minutes (inc. bus stop dwell times)

5.3.4 This concept could take approximately 15 minutes to reach Addenbrooke's Hospital / Cambridge Biomedical Campus and the existing Busway if implemented. This would result in a potential journey time saving of up to 13 minutes per individual journey (excluding walk times) as well as provide direction public transport connections to Granta Park, Babraham Research Campus, Babraham Road Park & Ride, Addenbrooke's Hospital / Cambridge Biomedical Campus and the Busway.

OPPORTUNITIES

5.3.5 Potential opportunities for this proposal include:

- Potential future link to a potential railway station in the Addenbrooke's area;
- Potential for buses from Haverhill and other local services to use rapid transit route; and
- Potential link to the existing Babraham Road Park & Ride site.

CONCEPT 2B – GRANTA PARK TO ADDENBROOKE'S HOSPITAL / CAMBRIDGE BIOMEDICAL CAMPUS (ON HIGHWAY)

DESCRIPTION

- Provision of a new, segregated rapid transit link from Granta Park via the proposed Park & Ride near the A11 and Babraham Research Campus through to Addenbrooke's Hospital / Cambridge Biomedical Campus within or immediately adjacent to the existing highway;
- An on highway alignment would be segregated, most likely through the provision of bus lanes / rapid transit lanes; and
- Any proposal would include a dedicated walking / cycling / equestrian route alongside.

5.3.6 A Park & Ride site adjacent to the A11 would ideally be served by reliable, high frequency and high quality rapid transit services. With nearby Granta Park and the Babraham Research Campus in the area, a new rapid transit linking these to Addenbrooke's Hospital / Cambridge Biomedical Campus and into the existing Busway / Public Transport network in Cambridge would be advantageous.

5.3.7 There is potential for the provision of a route wide HQPT upgrade east of Granta Park (albeit on highway) through to Haverhill which could be further considered as part of this concept.

BENEFITS

5.3.8 The existing bus journey time from Granta Park to Addenbrooke's (on highway) has been produced using a combination of existing bus journey times on the A1307 through to Addenbrooke's and an expected on highway time from Granta Park to the A1307.

Table 5-3 Concept 2B – Existing & Potential Journey Time (Approximate)

EXISTING JOURNEY TIME (AM PEAK)	POTENTIAL JOURNEY TIME (AM PEAK)
28 minutes (inc bus stop dwell times)	18 minutes (inc. bus stop dwell times)

5.3.9 This concept could take approximately 18 mins to reach Addenbrooke's Hospital / Cambridge Biomedical Campus with the additional time to access the Busway being additional. This would result in a potential journey time saving of 10 mins per individual journey excluding walk times.

5.3.10 The provision of an on-highway route would still require buses to slow to pass through junctions and at bus stops and is heavily dependent on the amount of segregation able to be provided along the proposed route.

OPPORTUNITIES

5.3.11 Potential opportunities for this proposal include:

- Potential future link to a potential railway station in the Addenbrooke's Hospital / Cambridge Biomedical Campus area;
- Potential for buses from Haverhill and other local services to use the rapid transit route; and
- Potential link to the existing Babraham Road Park & Ride site.

CONCEPT 2C – LINTON BUS PRIORITY

DESCRIPTION

- Public realm and transport corridor improvements from east of the Village (near Horseheath Road) to the west of Linton (beyond Granta School / Linton Village College / Community Sports Centre);
- Potential provision of bus lanes on approaches to signalled junctions / bus priority improvements including signalling of the A1307 / High Street junction;
- Provision of high quality walking / cycling improvements; and
- Additional improvements within the village, focussed particularly on the High Street public realm.

BENEFITS

5.3.12 The current bus journey time through Linton is approximately 10 minutes inbound for the AM Peak along the A1307 proper (express services only) with the time through the village being much longer. The provision of this option could potentially reduce the bus journey time to 4 minutes for an individual journey which is a considerable saving. Any bus priority improvements would need to be considered within the context of additional express services for commuters during the weekday peaks.

Table 5-4 Concept 2C – Existing & Potential Journey Time (Approximate)

EXISTING JOURNEY TIME (AM PEAK)	POTENTIAL JOURNEY TIME (AM PEAK)
10mins (inc bus stop dwell times)	4mins (inc. bus stop dwell times)

5.3.13 The provision of an on-highway route with bus priority would still require buses to slow to pass through junctions and at bus stops. This option assumes that bus lanes are provided along the A1307 within Linton on the approaches to junctions. The proposed journey time is heavily dependent on the amount of segregation able to be provided along the proposed route.

OPPORTUNITIES

5.3.14 A review of the current situation through the village of Linton highlighted that congestion was significantly impacting on general traffic and bus journey times on this part of the corridor. The proposals would also address road safety issues in the area which have been identified as part of this study. Further opportunities as part of this proposal include:

- Additional pedestrian crossings where needed;
- High quality walking / cycling provision through the village;
- Public realm improvements more generally on the High Street; and
- Further road safety and public realm improvements at the A1307/Little Abington High Street/Hildersham Road junction to complement currently planned road safety interventions by CCC.

CONCEPT 2D – BABRAHAM ROAD PARK & RIDE LINK TO ADDENBROOKE'S HOSPITAL / CAMBRIDGE BIOMEDICAL CAMPUS (OFF HIGHWAY)

DESCRIPTION

- Provision of a new segregated, off highway rapid transit link from the Babraham Road Park & Ride site to Addenbrooke's Hospital / Cambridge Biomedical Campus and the Busway; and
- Potential for new a Busway, public transport road or other method of rapid transit.

5.3.15 The provision of a dedicated route to link the Babraham Road Park & Ride into the Busway network would provide for reliable, high frequency and high quality rapid transit services.

BENEFITS

5.3.16 The existing bus journey time from the Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus is approximately 10 minutes in the inbound AM Peak. The provision of this option would reduce the journey time for an individual journey to approximately 4 minutes. It should be noted, that during the peak hours, the on-highway journey time from the Park & Ride through to Addenbrooke's Hospital is highly variable and the introduction of a segregated link would provide for a much more reliable journey.

Table 5-5 Concept 2D – Existing & Potential Journey Time (Approximate)

EXISTING JOURNEY TIME (AM PEAK)	POTENTIAL JOURNEY TIME (AM PEAK)
10mins (inc bus stop dwell times)	4mins (inc. bus stop dwell times)

5.3.17 A further key benefit would be a direct link to the Busway on the western side which would substantially enhance connectivity into the Busway network.

OPPORTUNITIES

5.3.18 Potential opportunities for this proposal include:

- Provision of a new rapid transit link to the Addenbrooke's Hospital / Cambridge Biomedical Campus with a direct link to the Busway. Additionally, this would link to a potential Park & Ride near the A11 with additional high quality local bus connections;
- Potential for buses from Haverhill and other local services to use the rapid transit route to access the Busway;
- Any proposal would include a dedicated walking / cycling / equestrian route alongside; and
- Potential future link to a potential railway station in the Addenbrooke's Hospital / Cambridge Biomedical Campus area.

5.3.19 There is also additional potential for experimentation around a new rapid transit mode into the Addenbrooke's Hospital / Cambridge Biomedical Campus, for example, the use of Personal Rapid Transit (PRT) / autonomous transit vehicles.

CONCEPT 2E – BABRAHAM ROAD PARK & RIDE LINK TO ADDENBROOKE'S (ON HIGHWAY)

DESCRIPTION

- Provision of new a high quality rapid transit link and high quality walking / cycling links to / from Cambridge and the Addenbrooke's Hospital / Cambridge Biomedical Campus area.
- Public realm and transport corridor improvements from south of the junction of Hinton Way / Babraham Road / Hinton Way through to the Addenbrooke's area; and
- New public realm 'Gateway' into Cambridge from the south-east.

5.3.20 The provision of transport corridor improvements in the area from south of the junction of Hinton Way / Babraham Road / Hinton Way through to the Addenbrooke's Hospital / Cambridge Biomedical Campus would allow for the provision of public realm improvements and the provision of high quality walking and cycling links to link into the Cambridge network.

5.3.21 The corridor improvements could be linked to the proposals for the Babraham Road Park & Ride and a potential future Park & Ride near the A11 as already described in this chapter. The provision of these improvements would create a new gateway into Cambridge from the south-east and allow for more efficient movements to/from Cambridge along the A1307. The proposals would also address road safety issues in the area which have been identified as part of this study.

5.3.22 A review of the current situation highlighted that congestion was impacting on bus journey times along this section of the corridor. This area of the A1307 is therefore in need of transport improvement to reduce bus journey times. Subject to feasibility design and further modelling assessment, these improvements are extremely likely to substantially reduce journey times for public transport and allow for future rapid transit links to / from Cambridge and Addenbrooke's Hospital / Cambridge Biomedical Campus.

5.3.23 Additionally, the bus station at Addenbrooke's Hospital has been identified as being very constrained / cramped by stakeholders. Improvements to the bus station would allow for reconfiguration of the existing site or potential extensions subject to third party agreements. Improvements would aim to increase the mode share of bus by providing excellent waiting and bus stop facilities. Improvements would also aim to encourage modal shift through providing better exchange options from bike to bus.

BENEFITS

5.3.24 The existing bus journey time from the Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus is approximately 5-10 mins in the inbound AM Peak (excluding the Park & Ride service via Wort's Causeway). The provision of this option would reduce the journey time for an individual journey to approximately 5 mins. However, the journey time from the Park & Ride through to Addenbrooke's is highly variable in this area, particularly during the AM Peak and the introduction of segregated bus lanes / bus priority would provide for a much more reliable journey.

Table 5-6 Concept 2E – Existing & Potential Journey Time (Approximate)

EXISTING JOURNEY TIME (AM PEAK)	POTENTIAL JOURNEY TIME (AM PEAK)
10mins (inc bus stop dwell times)	5mins (inc. bus stop dwell times)

5.3.25 The journey time to access the Busway across the Addenbrooke's Hospital / Cambridge Biomedical Campus would be additional.

OPPORTUNITIES

5.3.26 Potential opportunities for this proposal include (aside from the links to the proposals for the Babraham Road Park & Ride listed in Concept 1A):

- Upgrade of the existing corridor to provide a new public realm environment into Cambridge and Addenbrooke's Hospital / Cambridge Biomedical Campus; and
- Potential for experimentation around a new rapid transit mode / infrastructure into the Addenbrooke's Hospital / Cambridge Biomedical Campus, for example, use of PRT / autonomous transit vehicles, central running tidal flow bus lane or other innovative concepts.

5.4 WALKING & CYCLING CONCEPTS

CONCEPT 3A – THREE CAMPUS CYCLING & WALKING ROUTE (OFF HIGHWAY)

DESCRIPTION & BENEFITS

- Provision of a segregated walking, cycling & equestrian route from Granta Park via the Babraham Research Campus (including via a potential new Park & Ride near the A11) to Addenbrooke's Hospital / Cambridge Biomedical Campus. This could be progressed if Concept 2A is not progressed;
- Potential to link into Concept 3C and/or 3D. Additionally, if Concept 3C and/or 3D are not progressed, links should be made to the existing off road cycling path adjacent to the A1307 to connect Linton to the business parks;
- Upgrading of the existing footway bridge over the A11 to cater for cycling and equestrian use including the potential use of existing PROWs (where appropriate); and
- Connection to the National Cycle Network Route 11 north of Great Shelford near the existing railway to provide a link into Cambridge.

5.4.1 There are substantial opportunities here for the integration of improved and new sustainable transport modes facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites.

5.4.2 The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network, connecting Haverhill and Stapleford, linking to the existing National Cycle Route 11 between Stapleford and central Cambridge via Addenbrooke's Hospital / Cambridge Biomedical Campus, offering health and modal shift benefits.

OPPORTUNITIES

5.4.3 Potential opportunities for this proposal include:

- Provision of walking, cycling and equestrian links from this proposal through to Sawston, Stapleford and Great Shelford; and
- Potential for additional on highway links via the use of the Concept 3B proposals to the Wandlebury Country Park area.

5.4.4 Our understanding of the current situation from site visits and stakeholder engagement identified significant gaps in the strategic cycling/walking/equestrian network. This represents a barrier to walking/cycling/equestrian use and filling the gap, as identified in this option, would make these mode choices more viable and therefore increase cycling/walking/equestrian activities.

CONCEPT 3B – THREE CAMPUS CYCLING & WALKING ROUTE (ON HIGHWAY)

DESCRIPTION & BENEFITS

- Provision of an improved segregated walking, cycling & equestrian on highway route from Granta Park to the Babraham Research Campus (via a potential Park & Ride near the A11). This could be progressed if Concept 2B is not progressed;
- Upgrading of the existing footway bridge over the A11 to cater for cycling and equestrian use including use of existing PROWs (where appropriate); and
- Use of the A1307 from the Babraham Research Campus onwards through to Addenbrooke's Hospital / Cambridge Biomedical Campus with new and upgraded facilities (where appropriate).

5.4.5 There are substantial opportunities for the integration of improved and new facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites.

5.4.6 The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network offering health and modal shift benefits.

OPPORTUNITIES

5.4.7 Potential opportunities for this proposal include:

- Provision of walking, cycling and equestrian links from this proposal through to Sawston, Stapleford and Great Shelford and other settlements.

5.4.8 Our understanding of the current situation from site visits and stakeholder engagement identified significant gaps in the strategic cycling/walking/equestrian network. This represents a barrier to walking/cycling/equestrian use and filling the gap, as identified in this option, would make these mode choices more viable and therefore increase cycling/walking/equestrian activities.

CONCEPT 3C – HAVERHILL TO THREE CAMPUS ROUTE (ON HIGHWAY)

DESCRIPTION & BENEFITS

- Provision of a dedicated walking, cycling & equestrian route from Haverhill through to the proposed Three Campus Route (Concept 3A/3B);
- Would make use of the existing facilities available yet fill in the gaps in the cycling, walking & equestrian network;
- The route would link Haverhill, Horseheath, Linton and Great Abington / Little Abington through to Granta Park, Babraham Research Campus and also the proposed A11 Park & Ride; and
- The route would then use the Three Campus route (Concept 3A/3B) to link to Addenbrooke's Hospital / Cambridge Biomedical Campus and also Cambridge with links to local villages.

5.4.9 There are substantial opportunities for the integration of improved and new facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites.

5.4.10 The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network offering health and modal shift benefits.

OPPORTUNITIES

5.4.11 Potential opportunities for this proposal include:

- Provide a high quality cycling, walking & equestrian route between Haverhill & Cambridge for commuters and leisure users; and
- Provide sustainable links to key developments and employment sites along the A1307 corridor;
- Potential to use either Concept 3A or 3B to link through to Cambridge plus additional road crossings for settlements such as Hildersham, Great Abington & Little Abington and at Linton Village College; and
- Potential for additional on highway links via the use of the Concept 3B proposals to the Wandlebury Country Park area.

5.4.12 Our understanding of the current situation from site visits and stakeholder engagement identified significant gaps in the strategic cycling/walking/equestrian network. This represents a barrier to walking/cycling/equestrian use and filling the gap, as identified in this option, would make these mode choices more viable and therefore increase cycling/walking/equestrian activities.

CONCEPT 3D – HAVERHILL TO THREE CAMPUS ROUTE (OFF HIGHWAY)

DESCRIPTION & BENEFITS

- Provision of a dedicated walking, cycling & equestrian route from Haverhill through to the proposed Three Campus Route using the disused railway corridor through to Linton (with link to Linton);
- The route would then link into Concept 3A from Granta Park;
- Route would then link Haverhill, Horseheath, Linton and Great Abington / Little Abington through to Granta Park, Babraham Research Campus and also the proposed A11 Park & Ride; and
- The route would then use a Three Campus route to link to Addenbrooke's Hospital / Cambridge Biomedical Campus and then Cambridge with links to local villages.

5.4.13 There are substantial opportunities for the integration of improved and new facilities across the A1307 corridor including a high quality link along the A1307 itself from Haverhill to Cambridge linking the key villages as well as a new route linking the major employment sites.

5.4.14 The provision of a new high quality cycling route could substantially improve the number of users and further increase sustainable transport use. The recommended improvements throughout this section will fill in the gaps in the network offering health and modal shift benefits.

OPPORTUNITIES

5.4.15 Potential opportunities for this proposal include:

- Provide a high quality cycling, walking & equestrian route between Haverhill & Cambridge for commuters and leisure users;
- Provide sustainable links to key developments and employment sites;
- Potential to use either Concept 3A or 3B to link through to Cambridge plus additional links / road crossings for settlements such as Hildersham, Great Abington & Little Abington and also through to Linton Village College; and
- Potential for additional on highway links via the use of the Concept 3B proposals to the Wandlebury Country Park area.

5.4.16 Our understanding of the current situation from site visits and stakeholder engagement identified significant gaps in the strategic cycling/walking/equestrian network. This represents a barrier to walking/cycling/equestrian use and filling the gap, as identified in this option, would make these mode choices more viable and therefore increase cycling/walking/equestrian activities.

5.5 OTHER IMPROVEMENTS

5.5.1 Further improvements have been identified along the corridor which include:

- **Public Realm Improvements** – in all schemes, we would aim to ensure that the public realm is appropriately treated to meet with the objectives of the City Deal;

- **Bus Stop Accessibility Improvements** – we would seek to ensure that all bus stops are fully accessible with additional improvements. From site visits we found that some bus stops needed remedial work to achieve the highest levels of accessibility (please see the Draft Audit Report). Additionally we would also consider the provision of mini-interchange facilities for cyclists at key bus stop locations along the corridor; and
- **Road Safety Improvements** – Additional road safety improvements are proposed for a number of locations on the corridor, outside the major proposals areas. The key road safety issues are highlighted within the Draft Audit Report.

5.6 DELIVERY CHALLENGES

5.6.1 The key delivering challenges are highlighted in Table 5-1 for each concept, where appropriate.

5.7 COST SUMMARY

5.7.1 The costs shown in this report are indicative only pending feasibility design and final scheme confirmation. Where appropriate, the costs for each of the proposals are based on previous similar schemes. These costs do not include optimism bias and are shown in Table 5-1.

5.7.2 No land acquisition costs have been included at this stage. Land costs may cause a significant increase in overall scheme costs. Land acquisition is likely to be required along sections of the cycle route and bus lane proposals and at the site of the proposed A11 Park & Ride. Additionally, the cost of the proposed A11 Park & Ride may increase significantly depending on the nature of the scheme chosen; the current estimate is for a typical Park & Ride with modest facilities.

5.8 CORRIDOR ENVIRONMENTAL CONSTRAINTS

5.8.1 The Department for Environment, Food and Rural Affairs' (DEFRA) Multi-Agency Geographic Information for the Countryside (MAGIC) tool was used to conduct an assessment of the environmental constraints along the corridor, and consider the environmental impacts that any proposed option may have. Table 5-6 summarises the key environmental constraints.

Table 5-7 Summary of Environmental, Heritage & Habitat Constraints

Constraint	Description	Options Affected
Green Belt	The Cambridge Green Belt, which encompasses Cambridge, extends as far as Fourwentways roundabout on the A1307.	Bus Private Vehicles, Public Realm Improvements & Road Safety Walking / Cycling / Equestrians & other Non-Motorised Units
SSSI	The Old Course, and holes 1, 2, 3, 15, 16, 17 and 18 of the Wandlebury Course, of Gog Magog Golf Course are designated as an SSSI in order to protect a rare chalk grassland habitat.	All
Scheduled Monument Area 1	Wandlebury Country Park Area	All – any design needs to be further considered within the context of the two scheduled monument areas here
Listed Buildings	There are a number of listed buildings in close proximity to sites that may require works under the proposals in this report, including: Thatched Cottage (off Hinton Way); The Lodge (off the dualled section near Gog Magog); 8 Cambridge Road (near the A1307 / Hildersham Rd junction); South Lodge to Hildersham Hall (near the A1307 / Pampisford Rd junction), and Multiple listed buildings in Linton and in Horseheath	Bus Private Vehicles, Public Realm Improvements & Road Safety Walking / Cycling / Equestrians & other Non-Motorised Units
Scheduled Monument Area 2	Roman Road - The Roman Road runs to the north of the A1307 roughly parallel for the entirety of the route	Currently none – any potential options north of the corridor would have be affected by this if considered

6 CONCLUSIONS & NEXT STEPS

6.1 CONCLUSIONS

6.1.1 The following key conclusions have been made from this Draft Concepts Report for the A1307 Corridor:

- The current A1307 Haverhill to Cambridge corridor is experiencing congestion in a number of key locations, particularly to/from Cambridge at the Babraham Road Park & Ride to Addenbrooke's Hospital / Cambridge Biomedical Campus, as well as at Linton and the Foutwentways junction on the A11.
- With the current committed developments in the Cambridge and South Cambridgeshire Local Plans and the St Edmundsbury Local Plan comprising some 8,500 new homes and nearly 20,000 additional jobs through to 2031, corridor wide multi-modal transport improvements are needed to allow for this growth, particularly via sustainable transport modes, to prevent conditions worsening;
- The concept short list developed has recognised the need for innovative, enhanced multi-modal transport infrastructure and technologies to provide for increased transport usage between Haverhill and Cambridge. The key is to reduce congestion and non-sustainable trips within the corridor and within Cambridge whilst providing for the travel demand from sustainable transport modes. This includes enhanced public transport through both Rapid Transit and bus, additional Park & Ride facilities as well as enhanced cycling, walking and equestrian facilities to provide other options for transport users;
- The transport links will be not just for employment but also for other transport trips including leisure, shopping, commercial and essential trips. Enhanced walking, cycling and equestrian facilities are essential along this diverse corridor;
- Future housing and employment growth along the corridor should be monitored. If further housing and employment growth takes place beyond the expectations of the current Local Plan, there may be additional transport requirements beyond those identified within this study.
- Following the assessment of the Viability of Rail and BRT, these two options are not seen as viable, both within the current foreseeable timeframe of the City Deal and within the Local Plan to 2031.
- Our initial assessments of the concepts put forward as part of this multi-mode transport study for the A1307 Haverhill to Cambridge Corridor, suggest that they can provide the for development and the corridor growth expected whilst adhering to the project objectives and outcomes.

6.2 NEXT STEPS & FURTHER WORK

6.2.1 The concepts proposed within this report for further consideration should now be taken forward for public consultation. The public consultation should inform the further development of the concepts by incorporating the views of the public and stakeholders. This will ensure that the concepts put forward here are then further developed into a robust short list of option and hence, the preferred options.

6.2.2 All work has been undertaken in accordance with the DfT Transport Analysis Guidance (WebTAG) and the information presented will provide a sufficient level of detail to proceed to public consultation.

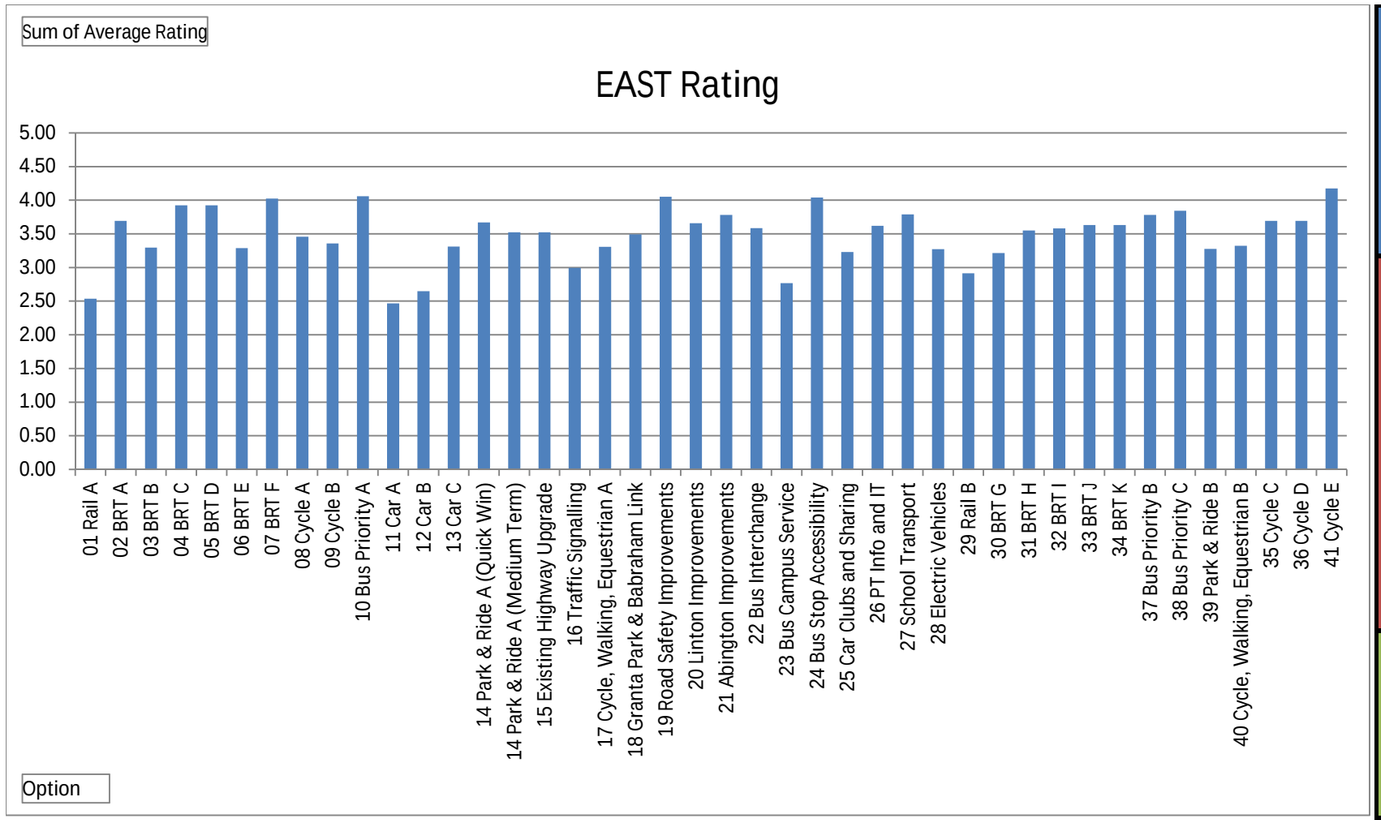
6.2.3 Additional work to be undertaken following public consultation should include:

- Engineering feasibility design and further modelling of the concept short list, option short list and preferred options;
- Exploration of the current levels of cycling, walking and equestrian usage within the A1307 corridor area for outline business case development;
- Site selection study and modelling of a potential Park & Ride near the Fourwentways junction at the A11;
- Further consideration of the development links to the schemes proposed along with the potential for additional funding / development opportunities;
- Undertaking more detailed environmental assessments for each concept to ensure these aspects are properly considered; and
- Further development of the costs in accordance with the engineering feasibility designs.

6.2.4 It has been identified that the CSRM model currently includes low increases in residential dwellings along the A1307 (particularly in Haverhill where no increase in dwellings has been included). The A1307 is included in the CSRM SATURN highway model, but is located at the periphery of the network and therefore may not be well validated compared to observed traffic data. As a result, the CSRM and SATURN modelling results presented in this are likely to be under predicting future flows along the corridor. Improvements to the CSRM and SATURN models, which are outside the scope of this study, are recommended.

Appendix A

SUMMARY OF EAST ASSESSMENT



Group
BRT
Bus
Car
Cycle
Rail

Package
1. Quick Win
2. Medium Term
3. Long Term
4. Discounted

Strategic Overall Weighting (%)	**12.5**	
		Scale of Impact: 29
		Fit with wider transport and government objectives: 29
		Fit with other objectives: 21
		Degree of consensus over outcomes?: 21
Economic Overall Weighting (%)	**50**	
		Economic Growth: 36
		Carbon emissions: 11
		Socio-distributional impacts and the regions: 11
		Local environment: 11
		Well being: 11
		Expected VfM: 20
Managerial Overall Weighting (%)	**12.5**	
		Implementation timetable: 33
		Public acceptability: 33
		Practical acceptability: 33
Financial Overall Weighting (%)	**12.5**	
		Affordability: 37
		Capital Cost: 21
		Revenue Cost: 21
		Cost Risk: 21
Commercial Overall Weighting (%)	**12.5**	
		Flexibility of option: 50
		Income Generated: 50

Appendix B

DRAFT RAIL VIABILITY TECHNICAL NOTE

PROJECT N^{O} 70012014-002

CAMBRIDGE-HAVERHILL CORRIDOR STUDY

DRAFT RAIL VIABILITY TECHNICAL NOTE

PUBLIC

JANUARY 2016

WSP | PARSONS BRINCKERHOFF

CAMBRIDGE-HAVERHILL CORRIDOR STUDY

DRAFT RAIL VIABILITY TECHNICAL NOTE

Cambridgeshire County Council

Public

Project No: 70012014
Date: January 2016

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QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	DRAFT	UPDATE WITH PATRONAGE AND ECONOMIC ASSESSMENT	DRAFT FOR COMMENT	FINAL DRAFT FOR ISSUE
Date	07-09-15	23-10-15	27-11-15	15-01-16
Prepared by	Graham James	Graham James / Andrew Dundas / Ating Liu	Graham James / Andrew Dundas / Ating Liu	Graham James / Andrew Dundas / Ating Liu
Signature				
Checked by	Oliver Stanyon / Niall Sunderland	Oliver Stanyon / Niall Sunderland / Graham James	Oliver Stanyon / Niall Sunderland / Graham James	Oliver Stanyon / Niall Sunderland / Graham James / Darren Pacey
Signature				
Authorised by	Dan Jenkins / Darren Pacey	Dan Jenkins / Darren Pacey	Dan Jenkins / Darren Pacey	Dan Jenkins / Darren Pacey
Signature				
Project number	70012014	70012014	70012014	70012014
Report number	002	002	002	
File reference	Rail viability tech note 2015-07-30	Rail viability tech note 2015-10-23	Rail viability tech note 2015-11-27	Rail Viability Note – A1307 Corridor v7.0 15-01-16

PRODUCTION TEAM

WSP | PARSONS BRINCKERHOFF

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1 BACKGROUND

1.1 INTRODUCTION

1.1.1 This technical note has been produced to assess the viability of reopening the former Cambridge to Haverhill railway line. It is an initial assessment only, undertaken as part of the A1307 Haverhill to Cambridge Corridor Study commissioned by Cambridgeshire County Council. The objective of this technical note is to assist the Greater Cambridge City Deal in determining whether the reopening should move forward to a more detailed study, either within the present Cambridge-Haverhill corridor study or as a separate exercise.

1.2 TECHNICAL NOTE SCOPE

1.2.1 The scope of the assessment undertaken for this technical note included:

- Identifying the strategic rationale for rail;
- A desk assessment of aerial images and OS Mastermap, supplemented by targeted site visits to key areas, to identify at a high level, the current physical status of the former alignment;
- Where the corridor is physically blocked, identifying (at a high level) a potential solution, which may involve relocating the existing use or diverting the railway away from the former alignment;
- Identifying potential station locations along the alignment at each of Haverhill, Linton, Granta Park, and Babraham/Sawston amongst others. This has included identifying the scope for park-and-ride at each of these;
- Identifying (again at a high level) an assumed service/stopping pattern, along with the passenger capacity it may provide, broad journey times, the diagram(s) and loop(s) likely to be required, and the potential operating arrangements;
- Estimating the capital cost on an order-of-magnitude basis; and
- Carrying out a high level economic appraisal, including indicative estimates of demand and revenue.

1.2.2 The economic appraisal also included appraisal of a bus rapid transit (BRT) alternative on the disused rail corridor. This is also included in the technical note, for ease of reference.

2 RATIONALE, SERVICE PATTERN AND OPERATING ARRANGEMENTS

2.1 RATIONALE

2.1.1 In the context of the Cambridge-Haverhill corridor study, within which this technical note has been commissioned, the key reasons for considering the Cambridge-Haverhill reopening are seen as:

- Providing rail access from Haverhill and other locations along the corridor to employment, public services and leisure in Cambridge. This notably includes the Biomedical Campus at Addenbrooke's, the city centre and the Cambridge Science Park; and
- Providing access to employment along the reopened branch, principally at Granta Park but potentially also at Babraham Research Campus and in Haverhill. This includes reverse-commuting by Cambridge residents.

2.1.2 In both of these cases, the rail line would support growth in the Cambridge city region by:

- Increasing the amount of capacity available on the corridor, both overall and (if modal shift is secured) by creating capacity 'headroom' on the A1307;
- Providing users with an alternative to road or bus;
- Potentially offering improved journey times and reliability compared to existing alternatives; and
- Improved interchange opportunities for public transport.

2.1.3 Other potential benefits include:

- Improved access to other key destinations such as Peterborough, and indeed to the wider national rail network;
- Improved rail access to London – although existing stations, particularly Whittlesford Parkway and Audley End, already serve this need to some extent;
- Additional park-and-ride access to Cambridge - although the existing Babraham Road park-and-ride already serves this need along the corridor;
- Improved service levels at Shelford, Cambridge North (proposed) and/or Addenbrooke's (proposed); and
- Providing (at Haverhill) a railhead for residents of west Suffolk, particularly those along the A143, A1092 and A1017 (east of Haverhill) corridors.

2.2 POTENTIAL FOR EXTENSION TO SUDBURY AND BEYOND

2.2.1 A Cambridge-Haverhill railway line could also ultimately form part of a more strategic rail link from Cambridge to Colchester, via Haverhill and Sudbury, including the existing Sudbury to Marks Tey branch. However, this strategic option is beyond the scope of this technical note and the current study.

2.3 ASSUMED SERVICE PATTERN

2.3.1 Based on the rationale described previously in this chapter, the required service pattern is assumed to be half-hourly all day between Haverhill and Cambridge, calling (at a minimum) at intermediate stations at Linton, Granta Park, Sawston and Babraham.

2.3.2 The ideal location for Haverhill station in catchment terms is in the town centre. Due to physical constraints along the former railway corridor route through Haverhill (see further within this technical note), an alternative terminus at 'Haverhill North Gateway' station is also considered.

2.3.3 Services may call at, or omit, Shelford. This is not seen as a key issue at this stage. For journey time purposes, it is conservatively assumed that they do call at Shelford. The ultimate decision would depend mainly on:

- operational and timetabling feasibility;
- the potential market for changing at Shelford for points south to London Liverpool Street;
- the journey time penalty for through passengers; and
- the ridership and revenue benefit from additional services at Shelford (the current service there is broadly half-hourly at peak periods, hourly at other times).

2.3.4 Services may call at the proposed Addenbrooke's Hospital station if a future station was provided there. Again, for journey time purposes, it is conservatively assumed that they do call there. The ultimate decision would depend mainly on:

- operational and timetabling feasibility;
- the role of Addenbrooke's Hospital as a demand generator;
- the journey time penalty for through passengers; and
- the potential market for changing at Addenbrooke's Hospital for points south to London King's Cross, compared to changing at Cambridge.

2.3.5 An extension to Cambridge North (the proposed station formerly known as Cambridge Science Park or Chesterton) is desirable if operationally feasible and convenient, as this would connect the Haverhill line to Cambridge Science Park.

2.3.6 An extension beyond Cambridge North is also assumed to be desirable if operationally feasible and convenient. It may result from interworking with other routes (see below).

2.3.7 For the purposes of this assessment, there are assumed to be no requirements for charter or freight services. However, opportunities to support those services could be considered at a later stage of assessment.

2.4 ASSUMED CAPACITY

2.4.1 Table 1 shows the potential capacity provided by this service pattern. This is based on typical existing rolling stock operating locally, but the actual capacity would depend on the rolling stock available at the time of opening. The table assumes single-unit formations, but additional capacity could be provided through additional units per train if necessary.

Table 1: Potential capacity

Option	Nominal rolling stock *	Seats per unit	Trains per hour	Total seats per hour †
DMU – 2-car	2-car 170/2 (eg by extending Ipswich-Cambridge service)	119	2	238
DMU – 3-car	3-car 170/2 (eg by extending Norwich-Cambridge service)	180	2	360
EMU – 4-car	317/6	268	2	536
EMU – 4-car	379	209	2	418

** For purposes of estimating capacity, based on existing local fleets. Actual rolling stock used would depend on available fleets at the time.*

† Additional capacity, if required, could be provided by using one or more additional units per train, subject to infrastructure and operational feasibility

Source for seating numbers: British Railways Locomotives & Coaching Stock 2015, Platform 5 Publishing

2.4.2 For the purposes of this assessment, capacity is assumed to be seated capacity in first and standard accommodation, with no allowance for standing.

2.5 ESTIMATED JOURNEY TIMES

2.5.1 At this initial stage, the journey time estimates are generic and do not relate to specific rolling stock. The estimates are made for an all-stations run between Cambridge North and Haverhill (town centre or North Gateway), but the relevant elements are also applicable to Cambridge-Haverhill alone. No allowance at this stage is made for potential waits at crossing loops (if any are required on the reinstated branch) or any other pathing requirements.

2.5.2 The estimates assume stations at Haverhill (town centre or North Gateway), Linton, Granta Park, and Sawston & Babraham, with trains then calling at Shelford, Addenbrooke's, Cambridge and (if required) Cambridge North.

2.5.3 Journey times were estimated on the following basis:

- Cambridge North to/from Coldham's Lane Junction (pass): Estimated based on the distance run and the potential allowances/adjustments needed;
- Coldham's Lane Junction (pass) to Shelford: Existing Sectional Running Times (SRTs) exist for a range of relevant DMU and EMU timing loads. Nominal SRTs have been assumed based on the slowest of these. Dwell times have also been assumed, based on existing Timetable Planning Rules (TPRs). The time penalty for calls at the proposed Addenbrooke's station has been estimated and overlaid onto this;
- Shelford to the new Shelford Junction (pass): Estimated based on the distance run; and
- Shelford Junction (pass) to Haverhill: Estimated based on a conservatively assumed 70mph typical linespeed, typical time penalties for calling at stations, and the potential allowances/adjustments needed.

2.5.4 The estimates for Cambridge-Haverhill were then benchmarked against a range of comparable journeys in the region and elsewhere, to confirm their reasonableness.

2.5.5 Table 2 summarises the estimated journey times, assuming a Haverhill Town Centre station. These are based on working times, but rounded up to whole minutes as an approximation to advertised times.

Table 2: Estimated journey times (minutes) (assuming Haverhill Town Centre station)

Up (to Haverhill)

From (below) to (right)	Cambridge	Addenbrooke's	Shelford	Sawston & Babraham	Granta Park	Linton	Haverhill Town Centre
Cambridge North	6	10	14	19	22	26	37
Cambridge	3	7	12	15	19	30	
Addenbrooke's	4	8	12	16	27		
Shelford	4	8	12	23			
Sawston & Babraham	3	7	18				
Granta Park	4	15					
Linton	11						

Down (from Haverhill)

From (below) to (right)	Linton	Granta Park	Sawston & Babraham	Shelford	Addenbrooke's	Cambridge	Cambridge North
Haverhill	9	13	16	21	25	29	37
Linton	4	7	12	16	20	28	
Addenbrooke's	3	8	12	16	24		
Granta Park	4	9	12	21			
Sawston & Babraham	4	8	16				
Shelford	3	12					
Cambridge	7						

2.5.6 Table 3 summarises the alternative estimate assuming a station at Haverhill Northern Gateway, instead of the town centre. The journey times to/from Haverhill would be 1-2 minutes less in this case.

Table 3: Estimated journey times (minutes) (assuming Haverhill Northern Gateway station)

Up (to Haverhill)

From (below) to (right)	Cambridge	Addenbrooke's	Shelford	Sawston & Babraham	Granta Park	Linton	Haverhill North Gateway
Cambridge North	6	10	14	19	22	26	35
Cambridge	3	7	12	15	19	28	
Addenbrooke's	4	8	12	16	25		
Shelford	4	8	12	21			
Sawston & Babraham	3	7	16				
Granta Park	4	13					
Linton	9						

Down (from Haverhill)

From (below) to (right)	Linton	Granta Park	Sawston & Babraham	Shelford	Addenbrooke's	Cambridge	Cambridge North
Haverhill	7	11	15	19	24	27	36
Linton	4	7	12	16	20	29	
Addenbrooke's	3	8	12	16	25		
Granta Park	4	9	12	21			
Sawston & Babraham	4	8	17				
Shelford	3	12					
Cambridge	8						

Note: Certain down journey times to Cambridge North may appear as slightly longer in this scenario than in the Haverhill Town Centre scenario (Table 2). This is for technical reasons related to TPRs and the rounding-up process applied. There is no substantive difference between the two scenarios north of Linton.

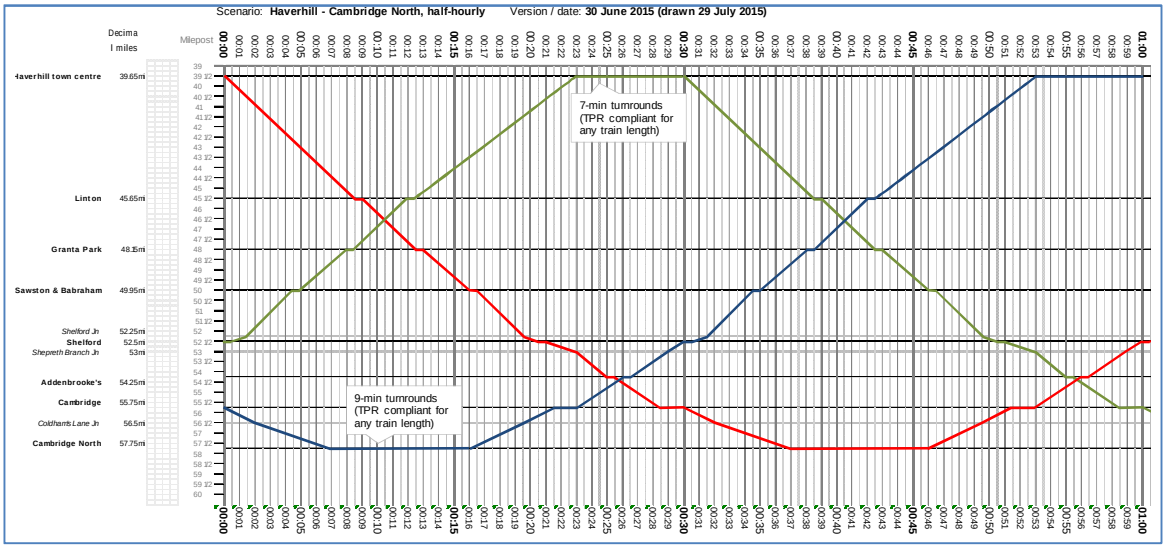
2.6 ROLLING STOCK AND INFRASTRUCTURE REQUIREMENTS

2.6.1 The timetabling exercise described below is solely for the purpose of understanding the main rolling stock and infrastructure requirements. A full timetabling exercise, reflecting other services on the network, is beyond the scope of this study and indeed would not be appropriate at this very early stage. It must be stressed that if the reopening is taken forward, a more detailed exercise, including consideration of pathing along the main line and performance implications, would be required at a later stage to confirm feasibility.

HAVERHILL-CAMBRIDGE NORTH (2TPH, EVEN INTERVALS)

2.6.2 Figure 1 shows a standard hour timetable graph based on the journey times described above, assuming a Haverhill Town Centre terminus and a self-contained 2tph even-interval Haverhill - Cambridge North service. The 'minutes past the hour' are arbitrary and the entire pattern could be rotated around the hour as required.

Figure 1: Timetable graph



For ease of calculation and reference, mileages along the branch are extended back from the existing BGK mileage trail on the main line, and do not correspond to any historic mileage trail along the branch.

In relation to existing Sectional Running Times (SRTs), this graph contains information of Network Rail Infrastructure Limited licensed under the following licence: www.networkrail.co.uk/data-feeds/terms-and-conditions

2.6.3 The graph shows that:

- This service pattern can be accommodated with three diagrams (90-minute cycle);
- The turnround times are reasonable at each end (totalling 18% of the 90-minute cycle);
- Trains on the branch itself would cross between Linton and Granta Park. This in turn suggests that the branch could be built, at least initially, as single-track with a mid-point passing loop;
- The timings shown would imply a dynamic loop between Linton and Granta Park. However, other permutations, such as a static loop at one or other of those stations, could arise from further timetable development; and
- While it would be desirable for Haverhill trains to pass the new Shelford Junction in parallel, this is not feasible on this service pattern.

2.6.4 A more frequent, 4tph even-interval service can be assessed by interpolation between the trains shown. Such a service would require trains to additionally cross on the branch between Shelford Junction and Sawston, and also between Linton and Haverhill. While this could in theory be accommodated with additional loops in these locations, performance considerations may require the branch to be built as double-track between Shelford Junction and Sawston, and potentially as double-track for all but the last section into Haverhill.

HAVERHILL-CAMBRIDGE (EXISTING CAMBRIDGE STATION ONLY) (2TPH, EVEN INTERVALS)

2.6.5 The graph also helps to understand how a 2tph service running only Haverhill–Cambridge (i.e. the existing Cambridge station) could operate. On the journey time assumptions used (approximately 30 minutes end-to-end), it would require three diagrams (90-minute cycle) with relatively inefficient rolling stock usage. It is possible that a more detailed engineering study, changing the assumed stopping pattern or rolling stock, and/or changing the assumed Haverhill station location could identify ways to reduce this to two diagrams and thus be more cost-effective.

INTERWORKING WITH NORWICH/IPSWICH SERVICES

2.6.6 The timings shown here for the Haverhill route are indicative, and existing services would alter over time[1], so only the broad potential for interworking can be identified at this stage.

2.6.7 The timetable graph shows 8.5 minutes between a Cambridge arrival from the north and a Cambridge departure to the north. This can be compared to the existing turnround times (based on standard off-peak hours) of 13 minutes for Norwich services and 5 minutes for Ipswich services. There may be potential for interworking if these timings can be made to match and if the Haverhill service can pivot around the hour to suit the service it interworks with.

2.6.8 If this becomes feasible, then the diagramming needs to be considered. An arrival from Norwich or Ipswich currently terminating at Cambridge could continue to Haverhill, and return to form a down (northbound) departure from Cambridge just over an hour later. This provides one of the two trains per hour to/from Haverhill, at the cost of one diagram. The other Haverhill train would need to be provided by one of the following options:

- → Another interworking service (30 minutes away from the first). Unfortunately the existing Norwich and Ipswich services are not evenly spaced from each other, so it is not possible for both of these to interwork to Haverhill to provide an evenly spaced service ;and
- → A self-contained shuttle. This would require two diagrams (plus the additional diagram on the interworking service) and the shuttle diagrams would have long turnround times, in some cases nearly an hour. This would counteract the advantages of interworking.

2.6.9 If either of the existing Norwich or Ipswich services were to be enhanced to half-hourly in the future, that service could interwork to Haverhill, requiring two additional diagrams, if the timings were compatible as noted above.

CONCLUSION

2.6.10 For the purposes of this study, it is assumed that a self-contained Haverhill-Cambridge North service would operate. This would be 2tph and require three diagrams. The assumed minimum infrastructure is a single track with a dynamic loop between Linton and Granta Park.

[1] As an illustration of this, since the timetabling analysis was undertaken, it has been announced that the Norwich-Cambridge services are to be extended to Stansted Airport from 2018, in part replacing the existing Cambridge-Stansted Airport service. This reinforces the fact that only the broad potential for interworking can be identified at this early stage.

2.7 OPERATING ARRANGEMENTS

2.7.1 It is assumed that a Haverhill service would be operated by Greater Anglia or any relevant successor franchise. Traincrew, cleaning, stabling and maintenance are all assumed to be provided from existing locations. The following operational arrangements have been assumed:

- Traincrew and cleaning staff would be based at Cambridge;
- Trains would be part of the existing Ilford (EMU) or Norwich Crown Point (DMU) fleet, with appropriate interworking and/or ECS moves to take units to/from the depot; and
- Stabling is available at Cambridge. Units could also be stabled overnight at Haverhill but stabling at unstaffed locations is discouraged because of potential vandalism.

2.7.2 For the purposes of this study, it is assumed that only incremental operating and maintenance costs would be incurred. However, at a more detailed stage it would be necessary to confirm whether any additional facilities (e.g. new maintenance capacity or additional stabling sidings) would be required.

3 PHYSICAL CONSTRAINTS

3.1 OVERVIEW

3.1.1 Figure 2 summarises the current status of, and physical constraints along, each section of the corridor, giving a red/amber/green status to each segment. The RAG status can be summarised as follows, whilst considering that the railway corridor is not merely disused in most parts, it is physically not there or has been appropriated for another use:

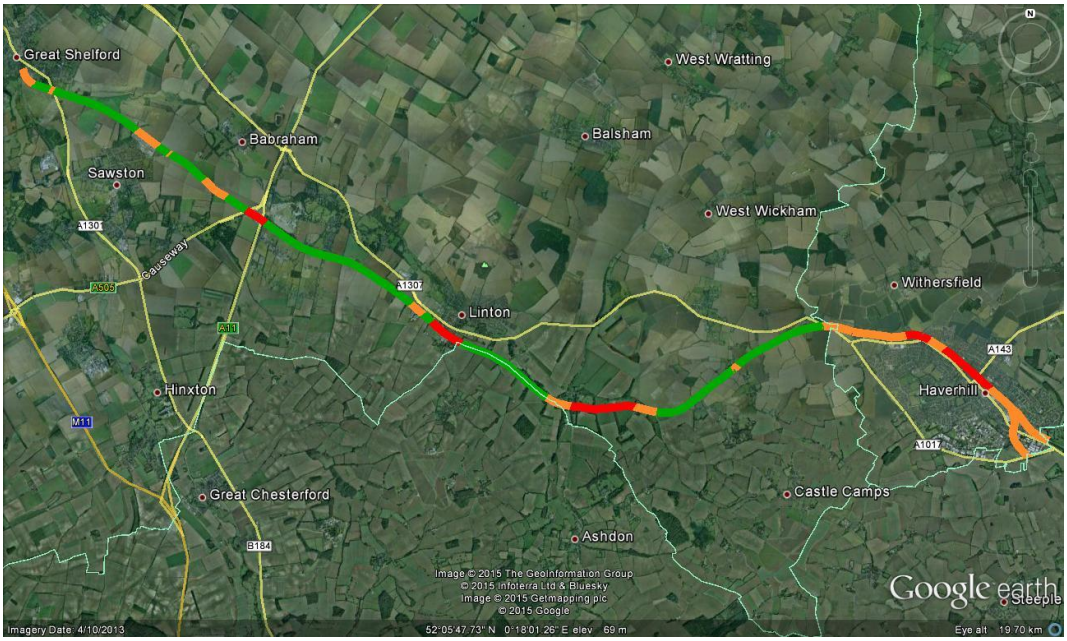
- Red – significant issue and/or risk which would most likely require a significant piece of infrastructure / significant solution including realignment (where the original alignment cannot be achieved);
- Amber – major issue and/or risk which may require additional consideration including realignment; and
- Green – generally no major physical constraints but further review is required.

3.1.2 This assessment of the physical constraints is based upon an initial desk study plus a limited site visit at targeted sites where needed, and would need to be developed further if the rail option is taken forward. Appendix A includes a detailed description of each segment shown in Figure 2.

3.1.3 The following sections pick out the key areas of physical constraint, particularly those that are likely to require decisions about route alignment and extent. Where potential realignments are suggested, these are to indicate the level of realignment that might be required and the resulting impacts; their feasibility would need to be tested. There is no presumption at this stage that any of those options are desirable or deliverable.

3.1.4 Historical mapping and photographs suggest that the line was originally single-track except at stations. It was grade-separated at main highways but not necessarily at farm accesses and footpath crossings.

Figure 2: Rail RAG status



3.2 SAWSTON

3.2.1 Figure 3 shows the former alignment at Sawston. Part of the old alignment is now an industrial estate. The route could be adjusted slightly away from the old alignment to use adjacent fields instead. The industrial estate is also one option for a station serving Sawston and Babraham.

Figure 3: Sawston

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations.

3.3 A505 / A11 AND GRANTA PARK

3.3.1 Figure 4 shows the former alignment at Granta Park. The old alignment, including the former Pampisford station site (A), is blocked by the A11, A505, A505 slip roads, and development. The potential options for resolving this are:

- Re-use the old alignment. Some or all of the business premises, and what appears to be a private residence (B), would be required. New viaduct(s) over the highways would be required;
- Re-route south of the old alignment, avoiding (but with impacts on) most of the existing development. New viaduct(s) over the highways would be required. The Lodge (at the north-east corner of the Pampisford Hall grounds (C)) would be affected. Visual intrusion for Pampisford Hall grounds and New Road properties (D) might also constrain this option; and
- Re-route to the north of the old alignment, avoiding (but with impacts on) the existing development. New viaduct(s) over the highways would be required. This alignment should pass to the north of the A505 slip roads (E). The bridge work will inevitably be extensive.

3.3.2 In addition to land-take and environmental factors, other key factors affecting the decision would be:

- buildability (worksite access and minimising highway disruption during construction);

- the need to accommodate the horizontal and vertical geometry requirements for Granta Park station, assumed to be east of the A11 close to Pampisford Road and the southern pedestrian access to Granta Park (F); and
- the potential need for a dynamic loop to start at this location (see Section 2.6 previously).

Figure 4: A505 / A11 and Granta Park

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations

3.4 LINTON

3.4.1 Figure 5 shows the former alignment at Linton.

FORMER STATION SITE

3.4.2 The former station site is now commercial premises, with the station building in commercial use and a new building across the former trackbed (A). The former station approach road (Station Road) (Figure 6) displays a 'no intention to dedicate' notice (Highways Act 1980 Section 31) in the name of Network Rail, suggesting that Station Road might remain in Network Rail ownership, although this would be an unusual arrangement so far away from an operational railway.

3.4.3 To avoid the need to purchase the former station site, the route could be adjusted onto adjacent fields to the south (B) (Figure 7), if this can be tied in to the required alignment at The Grip / Hadstock Road (see below) (C).

3.4.4 The station could be placed on this adjusted alignment, close to the original site. Adjoining areas to the north are commercial or undeveloped and offer scope for station access and car parking. Road access would logically be from the A1307, but given the existing highway congestion concerns here, this would need to be carefully assessed.

3.4.5 However, this is not necessarily the only option for a station location. Future patterns of development and site allocations may influence, or be influenced by, the choice of station location in Linton.

THE GRIP / HADSTOCK ROAD

3.4.6 Either side of The Grip / Hadstock Road, the alignment is broadly undeveloped but has closely adjacent commercial and residential premises (C). This includes residential properties (D) west of The Grip and immediately north of the former alignment, where the embankment remains in situ.

Figure 5: Linton

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations

Figure 6: Station Road, Linton

Left: view north along Station Road towards A1307. Right: Section 31 notice in the name of Network Rail.

Figure 7: Field adjoining former station site, Linton

Left: view to west. Former station site on right behind vegetation. Right: view to east. Former station site on left behind vegetation. Photos taken from public footpath.

3.5 BARTLOW

3.5.1 Figure 8 shows the former alignment at Bartlow.

FORMER STATION

3.5.2 The former station building and platforms are now a private residence (A). The abutments, but not the deck, of the adjoining rail-over-road bridge (B) still exist (Figure 9).

BARTLOW HILLS

3.5.3 Bartlow Hills Roman barrow cemetery (C), a Scheduled Monument, is bisected by the former alignment. MAGIC mapping suggests the railway formation is not part of the Scheduled Monument, but it may still be a significant constraint in terms of impacts and construction access.

3.5.4 An interpretation board on site (Figure 10, left) states that the Bartlow Hills are owned by Cambridgeshire County Council. The ownership of the former railway alignment is not clear.

3.5.5 A site visit and review of historical maps and photographs have established that the formation at this point is mainly in a cutting. There is a short section of retained cut, with a footbridge over the railway, still in existence (D) (Figure 10, right), which takes the formation narrowly between two of the tumuli[2]. Most of the formation through Bartlow, either side of the footbridge, included a loop or siding and therefore originally had two or more tracks. However, only a single track went under the footbridge, which appears to have been built to single-track width. It is possible that the original design intent was to minimise interference with the tumuli, within the given broad alignment.

[2] See http://maps.nls.uk/geo/explore/#zoom=18&lat=52.0799&lon=0.3115&layers=176

3.5.6 It should be assumed that, if the railway were to be reinstated on the original alignment, double track could not realistically be provided alongside Bartlow Hills. The timetabling analysis above suggested that a single track would be acceptable on this part of the route in the context of a Cambridge-Haverhill service as assumed for this study. However, the issue would need to be reconsidered if the goal were to reopen Cambridge-Sudbury in its entirety as a strategic and broadly double-track route. There are examples elsewhere of short sections of single track on otherwise double-track routes, but they represent an operating constraint.

Figure 8: Bartlow

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations. Former alignment of Bartlow-Saffron Walden route (not part of this study) omitted for clarity.

Figure 9: Bartlow

View south-west, showing abutments

Figure 10: Bartlow Hills

Bartlow Hills. Left: Interpretation board. Right: Former railway cutting, looking south-east towards footbridge.

ALTERNATIVE ALIGNMENTS

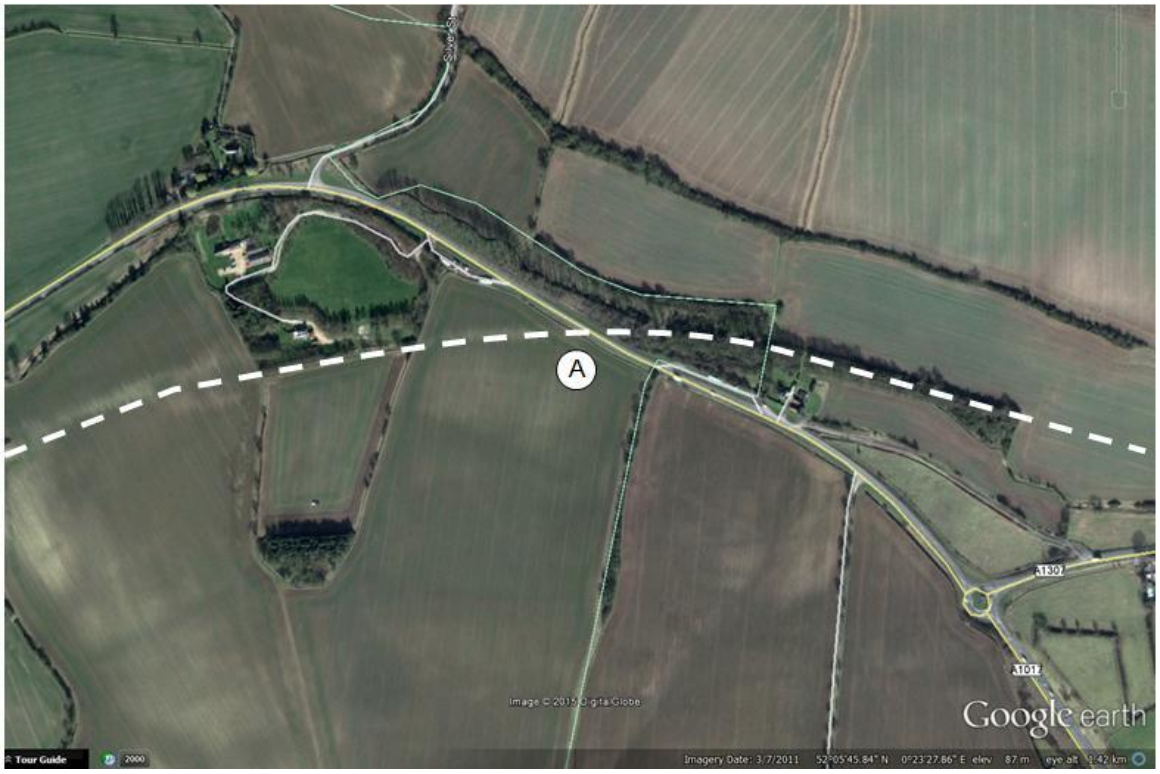
3.5.7 If the two constraints described above are unresolvable, a new alignment could be considered. This would probably be to the south of the village, leaving the former alignment west of the former station site, and passing between Bartlow Hills and Hills Farm. Options for re-joining the former alignment are:

- West of Westoe Farm. This would be a relatively short realignment, but (even if feasible) would create reverse curvature that might limit linespeeds (further design and performance simulation would be required to confirm whether this would be the case); and
- Between Westoe Farm and Shudy Camps, having passed to the north of Main Street. This would be a longer realignment and would probably require significant amounts of both cut and fill. However, if feasible, it might present opportunities for higher linespeeds.

3.6 A1307 WEST OF HAVERHILL

3.6.1 Figure 11 shows the former alignment where it crosses the A1307 west of Haverhill. A new bridge over the A1307 would be required (A), possibly with the A1307 realigned to minimise skew.

Figure 11: A1307 west of Haverhill



Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations.

3.7 HAVERHILL (HANCHET END TO WITHERSFIELD ROAD)

3.7.1 Figure 12 shows the former alignment from Hanchet End to Withersfield Road.

3.7.2 The former alignment has been breached by Meldham Washland (A) and by gardens of dwellings on Withersfield Road that are immediately alongside the old alignment (B). The main options for reinstating this part of the railway are:

- Replicate the former alignment, with significant residential property take and with new construction over Meldham Washland; and
- A new alignment, immediately north of the A1307 (perhaps forming a widened or additional southern embankment of Meldham Washland), continuing over Withersfield Road roundabout to re-join the former alignment near Alderton Close. There would be consequential commercial land take and business relocation required west of the roundabout. Residential and/or open space land take is likely to be required east of the roundabout, depending on the geometric requirements (which would need to be tested).

3.7.3 In addition to cost, both options could raise flood management, noise and/or visual intrusion issues. Given these and other constraints in Haverhill, Section 3.10 below reviews alternative options.

Figure 12: Haverhill (Hanchet End to Withersfield Road)

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations.

3.8 HAVERHILL (WITHERSFIELD ROAD TO WRATTING ROAD)

3.8.1 Figure 13 shows the former alignment from Withersfield Road to A143 Wratting Road.

3.8.2 Much of this section is now a Local Nature Reserve and a key off-road pedestrian route through the town. If this land-take were acceptable, exchange land would probably be required as compensation. A number of highways and footpaths cross or feed into the route. The vertical alignment would need to be reviewed in detail to identify a preferred approach. There would be noise and visual impacts on adjoining properties. It may be possible to retain a footpath alongside a reinstated single-track railway along all or part of the corridor, but this would need to be examined further and in any case the character of the route as a nature reserve would be highly compromised.

3.8.3 The impacts associated with a station on the former station site south of Wratting Road (see Section 3.9 below) could be avoided if the line terminated at a station north of Wratting Road. This would require a suitable site with vehicular access to be found. It would be less convenient for the town centre and bus station and would have closely adjacent residential properties.

Figure 13: Haverhill (Withersfield Road)

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations

3.9 HAVERHILL (TOWN CENTRE)

3.9.1 Figure 14 shows the former alignment south of A143 Wratting Road.

3.9.2 The former station site south of Wratting Road is now a superstore and car park. It may be possible to thread a single-track terminus into this area (and accommodate station parking and drop-off requirements) by using part of the car park. The site is adjacent to residential property, a school and a playground, with potential impacts accordingly. The pedestrian route on the former trackbed links in with several pedestrian connections to adjoining residential areas and the town centre, and these connections would need to be replicated (passing over, under or around the railway) to avoid or minimise severance. As with the section north of Wratting Road, the amenity value of what is effectively a 'greenway' route would also be compromised even if a parallel pedestrian route can be retained.

Figure 14: Haverhill (Town Centre)

Former alignment shown in white. This is for ease of reference and does not necessarily imply that a reopened railway would follow that alignment in all locations

Figure 15: Haverhill (near Tesco) photographs

(a) (Left) View north-west along footpath behind Tesco, looking towards Wratting Lane. Residential properties on right.

(b) (Right) Near photo 'a', showing residential properties adjoining.

(c) (Left) View north from footpath towards Jaywick Road. This is one of several pedestrian links that would need to be altered if the railway were reinstated here.

(d) (Right) Near photo 'c', looking west towards Tesco.

(e)View east from footpath towards playing field and Ingham Road. Tesco car park is out of view to right.

(f) View west from a similar location to 'e'. Tesco car park on left.

3.10 ALTERNATIVE HAVERHILL OPTIONS

3.10.1 As described previously, the route through Haverhill to the town centre presents multiple constraints. Two alternative options for serving Haverhill have therefore been identified. In addition to the engineering feasibility and impacts, the demand issues associated with these options would need to be considered further if they were taken forward.

NORTHERN GATEWAY

3.10.2 The route could terminate at a 'gateway' station on the north-west edge of the town, close to the Haverhill Science Park. This is likely to reduce construction costs, compared to continuing into the town centre. However, it would be less convenient for much of the residential area, the town centre and the bus station. This would act to reduce rail demand, although the opportunity to provide a station with convenient road access might recover some of this reduction. Potential variations on this option are described as part of Table 4 below.

WESTERN GATEWAY

3.10.3 A further option would be to create a new alignment to the west of the A1017 Haverhill by-pass, terminating at a station near Hazel Stub. As with the northern gateway option, it would act as a parkway station with convenient road access, rather than directly serving the town centre.

3.10.4 This option could allow passive provision for a later continuation south of Haverhill alongside the bypass, towards Sturmer, as part of a reopened through route to Sudbury and beyond. It might also allow opportunities for rail freight access to the industrial areas of southern Haverhill. Consideration of these further opportunities is beyond the scope of this study.

4 STATIONS

4.1.1 Table 4 summarises the potential options for station locations that have been identified during this assessment. These are based on an initial desktop study with limited confirmation on site, and there is no presumption that any of these options are desirable or deliverable. They should be seen as a long-list input to any further phase of study if appropriate.

Table 4: Station options

Note: The proposed Addenbrooke's Hospital station is a separate project, and is therefore not assessed as part of this study.

Station	Option	Comments	Scope for park and ride
Sawston & Babraham	East Way	Within or adjoining industrial estate	Some potential
	Sawston Rd	Greenfield site. Served by off-carriageway cycle route to Babraham.	Some potential
	High St	Greenfield site. Although relatively close to the A505, road access is less suitable here than at Sawston Rd for significant traffic volumes	Some potential
Granta Park	Pampisford Rd	Between the A11 and Cutting Road, with access from Pampisford Road and linking in to the pedestrian entrance to Granta Park. See comments in main text regarding the interaction with the A11/A505 bridges.	High potential, given the location close to main roads from several directions, if local highway access and impacts are acceptable.
Linton	Station Rd	At, or immediately to the south of, the former station site. See main text.	Some potential, but would need to avoid adding to existing congestion in this area
	The Grip / Hadstock Rd (B1052)	Taking account of the adjoining occupiers, a location east of The Grip would be preferable to a location west of The Grip	Some potential, but would need to avoid adding to existing congestion in this area
Haverhill	North Gateway	See main text. Could be an alternative to, or in addition to, a town centre station.	High potential
	North-West Roundabout	A similar concept to the North Gateway site, but using a new alignment west of the A1307 to a greenfield station site accessed from the roundabout. Not compatible with a town centre station.	High potential
	Sainsbury	Similar to the North Gateway site, but further east, close to the superstore. Would be closer to residential areas but would have impacts on the washes. Could be an alternative to, or in addition to, a town centre station. Site constraints may lead to parking and drop-off being less conveniently sited than for other options	Some potential but site constraints may limit this

Station	Option	Comments	Scope for park and ride
	Western Gateway	See main text. Not compatible with a town centre station.	High potential
	Withersfield Road	This option represents a search area for a site that would provide a terminus near the town centre while avoiding the impacts associated with continuing the line beyond Wratting Road.	Limited potential
	Town Centre – Tesco car park	See main text	Some potential, if traffic impact and parking management arrangements are satisfactory
	Town Centre – south of Tesco car park	This is a relatively open-ended option that would provide a station to the south of the Tesco car park, possibly associated with a wider reconfiguration of adjoining sites to the west if that were considered desirable.	Some potential, if traffic impact and parking management arrangements are satisfactory

5 DEMAND FORECAST AND ECONOMIC APPRAISAL

5.1 INTRODUCTION

5.1.1 This section summarises the economic appraisal assessment of the rail option, along with a similar appraisal of an alternative BRT option. This is an indicative assessment only based upon the information available.

5.1.2 The methodology, key assumptions, and appraisal results are all detailed as well as the risks and further data required to undertake a more detailed assessment.

5.1.3 The structure of this section is as follows:

- Methodology;
- Demand Forecast;
- Costs;
- Benefits;
- Appraisal results; and
- Risks

5.2 METHODOLOGY

5.2.1 The economic appraisal methodologies are compliant with DfT WebTAG, the appraisal guidance for transport related schemes, as well as the Green Book. The appraisal has assessed three Base Case vs Do Something options, with a Benefit Cost Ratio (BCR) determined for each.

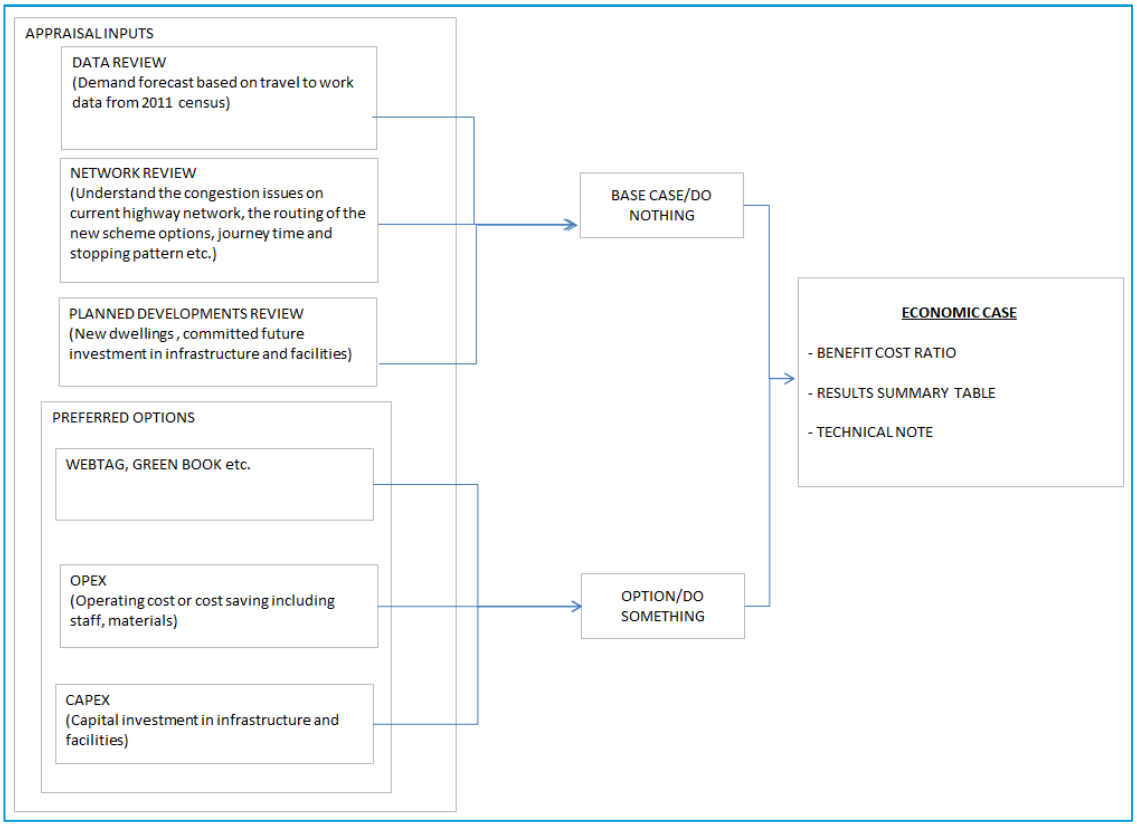
5.2.2 The Base Case is the do nothing case, which is the same as today's scenario, without any further transport intervention at the Haverhill to Cambridge corridor, but with planned development at Haverhill.

5.2.3 Three option scenarios have been assessed as follows:

- Option1: Reopen the rail line between Haverhill and Cambridge, double track option;
- Option2: Reopen the rail line between Haverhill and Cambridge, single tack option; and
- Option3: New BRT route

5.2.4 We have previously developed appraisal models in spreadsheet template consistent with DfT's WebTAG approach. The template has been adapted to assess the business case for this specific study. The process is shown in Figure 16.

Figure 16: Appraisal approach



5.2.5 The key parameters, assumptions such as the Value of Time (VoT), discounting rate, optimism bias etc. are in line with the most up to date WebTAG values from November 2014. The key modelling assumptions have been listed in Table 5 below.

Table 5: Key Appraisal Parameters

Criterion	Assumption	Source
Discount Rate	3.5%	WebTAG
Opening Year	2025	General assumption
Base Year	2010	DfT Base Year
Appraisal years	60 years	Based on asset life
Forecast Year	2084	60 years from the opening
Value of time	Commuting: £ 6.81 / hr	WebTAG Nov 2014 update
Capital cost	Option 1: £651m Option 2: £388m Option 3: £224m	Rail Schemes Project cost estimation; Includes 60% optimism bias and 60% risk contingency. BRT Project costs estimation based on assumed cost of £10m per km which includes risk and contingency.
Capital expenditure	100% in 2024	General assumption
Average fare	£5.00 per trip	General assumption with reference to similar studies

5.3 DEMAND FORECAST

RAIL

BASE DEMAND

5.3.1 2011 census travel to work data along the Haverhill to Cambridge corridor was used to identify how many people lived and worked within the corridor.

5.3.2 This was undertaken by selecting output area catchments at each potential station location identified and using that area as a place of residence, determining the number of people travelling to another catchment area around each other station location for work. This produced the following origin-destination (O-D) demand matrix for work trips (see Table 6).

Table 6: O-D Matrix for all commuters living and travelling within Corridor

	Cambridge	Sawston & Babraham	Granta Park	Linton	Haverhill	Total
Cambridge	-	985	411	132	109	1,637
Sawston & Babraham	1,256	-	95	30	23	1,404
Granta Park	166	41	-	12	10	229
Linton	641	91	67	-	73	872
Haverhill	1,708	276	148	311	-	2,443
Total	3,771	1,393	721	485	215	6,585

5.3.3 A rail mode share was also determined using 2011 census travel to work data for similar proxy routes as a useful comparator. Two routes were selected:

- Royston - Cambridge (2 trains/hr); and
- Baldock - Cambridge (2.2 trains/hr).

5.3.4 The mode share was derived in both directions, and the average used to determine a mode share for this analysis. This was determined as follows:

- Haverhill to Cambridge: 28% of total demand travel by rail; and
- Cambridge to Haverhill: 20% of total demand travel by rail.

5.3.5 It was considered unlikely that commuters travelling short distances between intermediate stops would use rail as a means of travel when it would be more efficient to travel by bicycle or car. The current congestion levels along the A1307 between Linton and Haverhill suggest that car travel may continue to be the primary mode of choice between these stations.

5.3.6 Rail demand between the O-Ds identified, matching the criteria above, was assumed to be negligible.

5.3.7 Table 7 below shows the calculated daily demand, based on the stated assumptions and analysis.

Table 7: Base Demand O-D Matrix

O\D	Cambridge	Sawston & Babraham	Granta Park	Linton	Haverhill	Total
Cambridge	-	198	83	27	22	330
Sawston & Babraham	351	-	-	-	5	356
Granta Park	46	-	-	-	2	48
Linton	179	-	-	-	-	179
Haverhill	478	77	41	-	-	596
Total	1,054	276	124	27	29	1,509

5.3.8 This demand was annualised using an assumed factor of 255 work days per annum.

5.3.9 Analysis of the Office of Rail and Road Annual Station Count showed stations in the surrounding area of this corridor to have a similar split of Leisure trips and Season trips. Therefore, Leisure base demand was assumed to be the same as Season demand.

5.3.10 Assuming all people on the system would make return trips, the annual base demand has been estimated at 1,540,000 trips.

DEMAND ON OPENING OF SCHEME – 2025

SCHEMES

5.3.11 The proposed Haverhill Research Park, located just outside of Haverhill is to provide 47,613sqm of B1 development, 150 homes, a hotel and public houses/restaurants. Using the assumption of 2.5 persons per dwelling and 1 job per 210sqm, an estimate of 375 residents and 2,400 jobs has been assumed. This has been assumed to be delivered by 2025.

5.3.12 Consultation has taken place for 3,500 homes to the North West and North East of Haverhill. Using the same dwelling occupancy assumption, this would add 8,750 residents to Haverhill. This has also been assumed to be delivered by 2025.

DEMAND

5.3.13 Analysis of the census 2011 journey to work data shows that around 3% of commuters living in Cambridge, Sawston & Babraham, Linton or Granta Park work in Haverhill. Applying this percentage to the estimated future working population gives a future increase of 72 people who would use the rail link to commute to Haverhill.

5.3.14 Assuming 70% of this future population are of working age and 70% are employed, the proposed residential dwellings give a future working population of 4,471.

5.3.15 The census 2011 journey to work data shows that around 20% of the current Haverhill population work in Cambridge, Sawston & Babraham, Linton or Granta Park. Applying this percentage to the estimated future working population gives a future increase of 894 people who would use the rail link to commute to work from Haverhill.

5.3.16 Using the same mode split assumptions and split of demand between O-D pairs, Table 8 below shows the 2025 future rail demand along the Corridor.

Table 8: 2025 O-D Demand Matrix

O\D	Cambridge	Sawston & Babraham	Granta Park	Linton	Haverhill	Total
Cambridge		198	83	27	29	337
Sawston & Babraham	351				6	357
Granta Park	46				3	49
Linton	179					179
Haverhill	652	105	57			814
Total	1,229	304	139	27	38	1,737

5.3.17 Using the same work days, Leisure trips and return trips assumption, the 2025 scheme opening demand has been estimated at 1,770,000 trips per annum.

FUTURE DEMAND – 2031

5.3.18 The Haverhill Vision 2031 states a need for 4,260 open market and affordable homes. Taking into consideration the schemes listed above, this means a further 610 houses would be built within Haverhill, which under the same assumptions for occupancy, working age, employment and travel behaviour, gives a future increase of 149 people who would use the rail link to commute to work from Haverhill.

5.3.19 Using the same mode split assumptions and split of demand between O-D pairs, Table 9 below shows the 2031 future rail demand along the Corridor.

Table 9: 2031 O-D Demand Matrix

O\D	Cambridge	Sawston & Babraham	Granta Park	Linton	Haverhill	Total
Cambridge		198	83	27	29	337
Sawston & Babraham	351				6	357
Granta Park	46				3	49
Linton	179					179
Haverhill	682	110	59			851
Total	1,259	309	142	27	38	1,774

5.3.20 Using the same work days, Leisure trips and return trips assumption, a 2031 demand has been estimated at 1,810,000 trips per annum.

BUS RAPID TRANSIT

BASE DEMAND

5.3.21 The appraisal assumptions underpinning the BRT scheme are identical to the rail scheme. Therefore, its demand has been assessed assuming it would provide the same conditions as the rail scheme, albeit with a longer journey time.

5.3.22 A journey time of approximately 30 minutes between Haverhill – Cambridge centre has been identified for the rail schemes.

5.3.23 BRT demand has been estimated based on the impact of increased journey time on demand compared to the rail scheme. Two key factors have been taken into consideration for the BRT journey time:

- → The assumed top speed of the BRT system would be lower than that of the rail scheme; and
- → Buses would likely have to use the existing road infrastructure for stops/stations between Great Shelford and Cambridge.

5.3.24 A journey time of 40 minutes has therefore been assumed, and a factored annual base demand of 1,188,000 was calculated for the BRT system based on the journey time difference between rail and BRT.

DEMAND ON OPENING OF SCHEME – 2025

5.3.25 Under the same assumptions used to calculate annual base demand, a factored annual base demand of 1,1368,000 has been calculated for the BRT system.

FUTURE DEMAND – 2031

5.3.26 Under the same assumptions used to calculate annual base demand, a factored annual base demand of 1,1397,000 has been calculated for the BRT system.

5.4 COSTS

CAPITAL AND OPERATING COSTS

5.4.1 Rail capital costs have been estimated at high level (indicative costs only) on the basis of 21 route-km. Single-track and double-track options were estimated. The estimates are for construction costs only, with reasonable allowances for ecological or land surveys, land purchase, design fees and consents. BRT capital costs were estimated at high level based on costs of existing BRT projects.

5.4.2 Operating costs have been assumed annually as 1% of the full capital costs.

5.4.3 Table 10 below gives the estimated costs for each scheme. Appendix C contains a cost overview.

Table 10: Estimated Capital and Operating Costs by Scheme

Scheme	Capital Costs (£m)	Annual Operating Costs (£m)
Rail – Double Track	£654	£6.5m
Rail – Single Track	£390	£3.9m
Bus Rapid Transit	£224	£2.2m

INDIRECT TAXATION

5.4.4 Indirect Taxation is calculated as the loss in revenue from fuel taxation as a result of removed car km through new users of the rail system.

5.5 BENEFITS

REVENUE

5.5.1 Direct Revenue Benefits were calculated using assuming an average fare of £5 per trip on each system based on similar studies.

IN VEHICLE JOURNEY TIME BENEFITS

5.5.2 In vehicle journey time benefits were assumed for Season/commuter trips only i.e. 50% of demand using the standard WebTAG commuting value of time of £6.81 per/hr. The analysis assumes that all users of the scheme would be new users, split by 50% cars and 50% bus users. Comparative journey times for existing bus and car journeys were estimated using live travel information.

NON USER BENEFITS

5.5.3 Non user benefits arise from the impact of car miles removed from the road network as a result of the proposed scheme. This assesses the reduction in congestion, accidents, noise and air pollution as well as climate change and increased life of infrastructure.

5.6 APPRAISAL RESULTS

5.6.1 Table 11 below provides the 60 year socio-economic Benefit Cost Ratio for each scheme based on all of the above.

Table 11: Estimated Capital and Operating Costs by Scheme (£m)

	Rail - Double	Rail - Single	Bus Rapid Transit
Benefits			
Revenue	268.8	268.8	207.5
Journey Time	31.2	31.2	16.1
Non User	32.3	32.3	24.9
Total Benefits (a)	**332.2**	**332.2**	**248.4**
Costs			
Capital	438.0	261.3	150.6
Operating	115.2	68.7	39.6
Indirect Taxation	6.34	6.34	4.89
Total Costs (b)	**559.6**	**336.3**	**195.1**
Net Present Value (a-b)			
Net Present Value	**-227.3**	**-4.1**	**53.4**
Benefit Cost Ratio (a/b)			
Benefit Cost Ratio	**0.59**	**0.99**	**1.27**

5.6.2 The table shows that both rail schemes achieve a BCR of less than 1.0, and are therefore considered to represent Poor Value for Money under DfT guidelines.

5.6.3 The BRT option achieves a BCR value of 1.27, which is considered to represent Low Value for Money.

5.6.4 A scheme is considered to be financially viable if it achieves a BCR of 2.0 and above. Based on this high level economic appraisal, no scheme assessed represents High Value for Money.

5.7 RISKS

This appraisal has been undertaken at a high level, and several refinements could be undertaken in the future to look at more detailed costs or benefits:

- More detailed capital cost (subject to production of a feasibility design) and operating cost estimation;
- Multi modal travel data for the study area may be incorporated to inform a more accurate demand forecast and modal split;
- A detailed assessment of future infrastructure renewal costs; and
- Detailed multi modal journey time, fare, station access as well as well as local origin and destination travel data by journey purpose to inform a more accurate generalised journey time (GJT) analysis.

6 CONCLUSIONS & NEXT STEPS

6.1 CONCLUSIONS

6.1.1 This high level technical note of the rail viability of the disused rail corridor between Haverhill and Cambridge has made the following key conclusions:

- The initial high level assessment shows that both rail schemes would achieve a BCR of less than 1.0. This represents Poor Value for Money under DfT guidelines. The BRT scheme would achieve a BCR of 1.27, representing Low Value for Money. Substantial further work would be required to refine the economic assessment in more detail;
- The indicative capital cost of the options presented for Rail (and alternative BRT option), based upon our assessment, are substantial and cannot be funded within the current City Deal allocation;
- The reopening of the disused railway corridor cannot take place within the current timescale (through to 2020) allowed for tranche 1 of the City Deal funding; and
- Extensive land acquisition and one or more deviations from the historic alignment are likely to be required along with significant new structures and refurbishment of disused / existing structures.

6.2 NEXT STEPS

6.2.1 Although the reopening of the disused rail line is not judged to be viable as part of the current A1307 Haverhill to Cambridge corridor study, a Cambridge-Haverhill railway line could ultimately form part of a more strategic rail link from Cambridge to Colchester, via Haverhill and Sudbury, including the existing Sudbury to Marks Tey branch.

6.2.2 It may be appropriate for further work to be undertaken by the relevant local authorities and central government to determine the wider viability of the railway through other decision and funding mechanisms.

Appendix A

RAG ASSESSMENT

Sequence no.	Length (m)	Grid ref start	Grid ref end	Original formation	Original use (if not plain line)	Ownership (if known)	Existing use / buildings	Adjoining use / buildings to north	Adjoining use / buildings to south	Environmental and planning constraints	Earthworks and structures - original	Earthworks and structures - extant	Existing access across or along	Corridor width (if constrained)	Commentary	RAG status
001	140	TL 46561 51772	TL 46783 51472	Single track			Industrial	Industrial/warehousing	Cambridge mainline	Situated in a green belt	Small bridge over narrow River Granta	Runs close to industrial buildings; crossing over River Granta appears to have been removed			This section runs through the back of an industrial area (including a car park) and merges with the existing West Anglia main line	
002	248	TL 46783 51472	TL 46783 51472	Single track			Field	Appears to be farm storage buildings	Agriculture	Situated in a green belt		There is a ditch on the southern edge of the alignment	Access to farm buildings near old track path	Roughly 20m between ditch/trench and stream	The section appears to have previously crossed at narrow section of the River Granta; this part of the river appears to have been diverted.	
003	370	TL 46783 51472	TL 47138 51363	Single track			Field - trees	Agriculture with nearby stream	Agriculture	Trees/shrubs along old track path; Situated in a green belt	Embankment	There is a ditch on the southern edge of the alignment		Roughly 15m between ditch/trench and stream		
004	91	TL 47138 51363	TL 47225 51339	Single track			Road - A1301	Crosses A1301	Crosses A1301	Situated in a green belt	Embankment; Passed beneath bridge on A1301	Crosses beneath bridge on A1301	Footway/cycleway adjacent to A1301	This is likely to be constrained by the narrow width of the existing bridge, although it is not possible to measure exact width from aerial mapping	Crosses A1301 Cambridge Road and foot/cycleway	
005	450	TL 47225 51339	TL 47657 51211	Single track			Field	Agriculture	Agriculture	Situated in a green belt	Embankment, with small section of cutting	None			Original embankment appears to have been filled in	
006	1534	TL 47657 51211	TL 49030 50557	Single track			Field boundary - trees	Agriculture	Agriculture	Trees/shrubs along old track path; Situated in a green belt	Embankment	Embankment likely still present, although this cannot be seen from the aerial imagery	Access from the A1301 Cambridge Road, via Sawston Waste Water Treatment Plant, towards fields			
007	577	TL 49030 50557	TL 49502 50225	Single track		Dales Manor Business Park	Industrial	Agriculture	Industrial	Situated in a green belt		Warehousing and storage for industries	Access throughout industrial site, including West Way and East Way		The industrial estate provides an option for a potential station site. The route could potentially be adjusted slightly away from the old alignment to use adjacent fields.	
008	264	TL 49502 50225	TL 49724 50084	Single track			Edge of field	Agriculture	Agriculture	Situated in a green belt						
009	48	TL 49724 50084	TL 49764 50061	Single track			Road - Babraham/Sawston Road	Crosses Babraham/Sawston Road	Crosses Babraham/Sawston Road	Situated in a green belt	Bridge over the rail line on the Babraham/Sawston Road	None - the bridge has been removed and the road straightened				
010	912	TL 49764 50061	TL 50510 49546	Single track			Edge of field	Agriculture	Agriculture	Situated in a green belt						
011	625	TL 50510 49546	TL 51003 49191	Single track			Field boundary - trees; High Street road	Agriculture	Agriculture	Trees/shrubs along old track path; Situated in a green belt	Embankment	Embankment likely still present, although this cannot be seen from the aerial imagery	High Street previously ran over the railway, and currently runs across the old lines path		A crossing at High Street would need to be provided	
012	505	TL 51003 49191	TL 51430 48921	Single track			Field boundary	Agriculture	Agriculture	Trees/shrubs along old track path; Situated in a green belt	Cutting	Cutting possibly still present, although this cannot be seen from the aerial imagery				
013	501	TL 51430 48921	TL 51858 48661	Single track; double track with sidings at Pampisford Station	Pampisford Station	Industrial park includes Solopark plc and Ridgeons	Major junction between the A505 and A11, and an industrial site	Major road and industrial site	Major road, industrial site and a private dwelling	Situated in a green belt	Pampisford Station; Embankments	Industrial site, major junction, private dwelling	Access into both the industrial site and private dwelling		Land-take and environmental factors would need to be overcome, The viability and buildability of any option to cross the road junction would also need to be seriously considered.	
014	2056	TL 51858 48661	TL 53724 47859	Single track			Field boundary - trees	Agriculture; Granta Industrial Park about 80m north; Old path comes close to the Pampisford Road; A number of private dwellings	Agriculture; Some private dwellings / farm buildings	The cottage to the west of Newhouse farmhouse and the South Lodge are Grade 2 listed buildings	Embankment, with small section of cutting	Embankment likely still present, although this cannot be seen from the aerial imagery	Cutting Road and Chalky Road			
015	1546	TL 53724 47859	TL 55028 47033	Single track			Field boundary - trees	Agriculture; Private dwelling	Agriculture		Embankment, with small section of cutting	Embankment likely still present, although this cannot be seen from the aerial imagery	Access route off of Pampisford Road			
016	335	TL 55028 47033	TL 55286 46821	Single track		Camgrain Stores	Boundary	Agriculture; Access route	Industrial - Camgrain Stores		Embankment	Embankment	Access to Camgrain Stores on Little Linton Road		Access would need to be provided into the Camgrain Stores	

Sequence no.	Length (m)	Grid ref start	Grid ref end	Original formation	Original use (if not plain line)	Ownership (if known)	Existing use / buildings	Adjoining use / buildings to north	Adjoining use / buildings to south	Environmental and planning constraints	Earthworks and structures - original	Earthworks and structures - extant	Existing access across or along	Corridor width (if constrained)	Commentary	RAG status
017	250	TL 55286 46821	TL 55479 46666	Single track			Field boundary	Agriculture	Agriculture		Cutting; Goods sheds	Cutting likely still present, although this cannot be seen from the aerial imagery	Linton Zoo Path; access to what appears to be a scrap yard			
018	791	TL 55479 46666	TL 56135 46227	Single track; with railways sidings at Linton Station	Buildings, including Linton Station, goods sheds and a railway siding	Signage indicates that Station Road may be under Network Rail ownership	Gap between buildings, and crosses the Hadstock Road	Buildings making up the southern side of Linton, including residential and commercial	Buildings making up the southern side of Linton, including residential and an industrial park	There are a large number of listed buildings in close proximity in Linton - the nearest being Ditches Close (Grad 2) and the barn to the south south east of Grip Farmhouse (Grade 2). Visual and noise impacts on residences adjacent to the rail would need to be considered.	Embankment; Some buildings, including Linton Station and goods sheds	Multiple structures, including an industrial park and private dwellings	Crosses Hadstock Road	Width of roughly 30m between back of industrial park buildings and a private dwelling	The route could be slightly realigned onto fields to the south to avoid the need to purchase the former station site.	
019	2194	TL 56135 46227	TL 58008 45121	Single track			Through fields and along field boundaries	Agriculture	Agriculture	The Grade 2 listed Windmill is in close proximity	Cutting; There seems to have previously been a crossing beneath Chalky Road	Cutting likely still present in some areas, although this cannot be seen from the aerial imagery	The former Chalky Road appears to now form part of a trail			
020	527	TL 58008 45121	TL 58505 44962	Sidings at Bartlow Station; junction with the Saffron Walden branch, with double track at places	Bartlow Station and former Bartlow junction		Field boundary and private property to the side of a residential dwelling	Property of residents of Bartlow	Property of residences of Bartlow and fields	There are a large number of listed buildings in close proximity in Bartlow - the nearest being the Forge and the two adjoining cottages (Grade 2)	Bartlow station	Bartlow station (which is now a private dwelling)	Crosses the Bartlow Road at two locations			
021	1388	TL 58505 44962	TL 59884 44989	Single track			Field boundary	Agriculture	Agriculture	There are a large number of listed buildings in close proximity in Bartlow - the nearest being the the west walled garden bartlow park including teak glass house, potting shed, boiler room, tunnel and bunker (Grade 2); The old track runs through Bartlow Hills Roman barrow cemetery, which is a scheduled monument	Embankment; Original footbridge (which still exists) provides width for a single track.		Access to fields		A new alignment could be considered although these could involve long realignments or large curvatures, which could impact line speed, journey time and construction cost.	
022	465	TL 59884 44989	TL 60340 44899	Single track			Field boundary	Agriculture	Agriculture		Embankment; Bridge over River Granta and road	Embankment	Crosses Camps Road			
023	1491	TL 60340 44899	TL 61597 45581	Single track			Field boundary	Agriculture	Agriculture	Trees/shrubs along old track path	Embankment	Embankment likely still present in some areas, although this cannot be seen from the aerial imagery	Multiple access routes into fields, and some private dwellings			
024	452	TL 61597 45581	TL 62672 46384	Single track			Field boundary	Agriculture	Agriculture	Trees/shrubs along old track path	Cutting	Cutting possibly still present in some areas, although this cannot be seen from the aerial imagery				
025	130	TL 62672 46384	TL 60340 44899	Single track			Road - Mill Green Road	Crosses Mill Green Road	Private dwelling; Crosses Mill Green Road		Cutting; Farmyard	Alongside a private dwelling	Mill Green Road		Old mapping shows a moat roughly 100m north of the former rail path, although it is not clear whether this is still here	
026	762	TL 60340 44899	TL 62672 46384	Single track			Field boundary	Agriculture	Agriculture	Trees/shrubs along old track path	Cutting	Cutting possibly still present in some areas, although this cannot be seen from the aerial imagery				
027	1272	TL 62672 46384	TL 63846 46838	Single track and Withersfield siding	Withersfield Siding		Field boundary and through fields	Agriculture	Agriculture; Runs approx 30m from a private dwelling		Cutting with small section of embankment; Siding		Access paths between fields			
028	639	TL 63846 46838	TL 64472 46736	Single track			Road - A1307; Field boundary	Crosses A1307; Agriculture	Crosses A1307; Agriculture; Runs approx 20m from Spring Grove Farm	Trees/shrubs along old track path	Embankment	Embankment possibly still present in some areas, although this cannot be seen from the aerial imagery	A1307			

Sequence no.	Length (m)	Grid ref start	Grid ref end	Original formation	Original use (if not plain line)	Ownership (if known)	Existing use / buildings	Adjoining use / buildings to north	Adjoining use / buildings to south	Environmental and planning constraints	Earthworks and structures - original	Earthworks and structures - extant	Existing access across or along	Corridor width (if constrained)	Commentary	RAG status
029	1147	TL 64472 46736	TL 65612 46694	Single track			Through fields	Agriculure; Lake; Roman Road	Agriculture	Site where human remains, spear heads and urns found in A.D. 1757-58; Crosses the 'supposed site' of the old Roman Road; There is a floodplain with a small lake along this section of the old route	Small section of cutting		'Supposed site' of the old Roman Road			
030	150	TL 65612 46694	TL 65758 46724	Single track		Partially private	Road, Stour Brook (stream) and private dwellings	Private dwelling; Road	Private land	Trees/shrubs along old track path		Private dwelling	Existing road	Approx. 35m wall to wall (approx. 15m from fence to fence)	This would need to cross Stour Brook (stream) and Queen Street, as well as run through the back gardens of private dwellings	
031	190	TL 65758 46724	TL 65944 46688	Single track		Private	Back gardens of private dwellings	Agriculture	Private land	Trees/shrubs along old track path		Private dwelling				
032	200	TL 65944 46688	TL 66131 46614	Single track			Back of a private dwelling; Hales Barn Road and Stour Brook (stream)	Close proximity to a housing estate and playground	Stour Brook (stream) and back garden of a private dwelling	Trees/shrubs along old track path		Private dwellings	Hales Barn Road which provides access to the housing estate	Approx 35m between Stour Brook (stream) and houses in estate (approx. 25m from stream to fence)		
033	335	TL 66131 46614	TL 66437 46432	Single track			Haverhill railway walk	Fields near housing estates	Stour Brook (stream) and a private dwelling	The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve		Private dwelling				
034	485	TL 66437 46432	TL 66827 46144	Single track			Mixture; Mostly private,or backing onto private land	Private dwellings	Stour Brook (stream); Green space; Close to some dwellings	The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment		Access to residential dwellings via Howe Road and Waters Edge	Approx 30m between Stour Brook (stream) and houses in estate (approx. 25m from fence to fence)		
035	391	TL 66827 46144	TL 67128 45896	Double track with sidings at the station			Haverhill railway walk between private dwellings	Private dwellings	Private dwellings	The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment	Embankment		Approx 25m wall to wall between private dwellings (approx. 20m from fence to fence)		
036	429	TL 67128 45896	TL 67455 45617	Double track		Possibly Tesco	Haverhill railway walk between private dwellings and Tesco; Pedestrian crossing over the A143	Private dwellings	Tesco superstore and car park	The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment	Embankment; pedestrian bridge	A143 and a pedestrian bridge over the A143	Approx 20m wall to wall between private dwellings and Tesco (approx. 15m from fence to fence)		
037	593	TL 67455 45617	TL 67909 45235	Double track			Haverhill railway walk between private dwellings and leisure facilities	Private dwellings	Haverhill leisure centre, football pitch, tennis courts, car park, cricket pitch and garden plots	Trees/shrubs along old track path; The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment	Embankment; pedestrian bridge	A143 and a pedestrian bridge over the A143	Approx 45m wall to wall between private dwellings and leisure centre (approx. 35m from fence to fence)		
038	463	TL 67909 45235	TL 67982 44792	Single track	Adjacent to sewage plant		Haverhill railway walk between industrial land and sewage plant	Sewage plant	Industrial	Trees/shrubs along old track path; The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment	Embankment		Approx 40m wall to wall between industrial building and sewage plant (approx. 30m from fence to fence)		
039	716	TL 67982 44792	TL 68293 44185	Single track			Haverhill railway walk between industrial land, housing and fields	Industrial	Private dwellings and green fields	Trees/shrubs along old track path; The Sturmer Arches are a Grad 2 listed building; The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment	Embankment; pedestrian bridge	A143 Sturmer Road and a pedestrian bridge over the A143	Approx 45m wall to wall betweeen private dwellings and industrial buildings (approx. 40m from fence to fence)		
040	587	TL 67909 45235	TL 68309 44808	Single track	Adjacent to sewage plant		Haverhill railway walk between sewage plant, housing and fields	Fields with some private dwellings	Sewage plant	The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Cutting; crossing at what is now Coupals Close; sewage plant	Sewage plant; some private dwellings	Old railway corridor runs across Chalkstone Way			
041	498	TL 68309 44808	TL 68733 44555	Single track			Haverhill railway walk between fields, a football pitch and some private dwellings	Fields	Football pitches and the backyard of some private dwellings	Trees/shrubs along old track path; The Haverhill Railway Walks along the disused railway line for part of a Local Nature Reserve	Embankment	Embankment				

Appendix B

OPTION AREAS AND POTENTIAL REALIGNMENTS

Cambridge North station (under construction)

Cambridge station (existing)

Addenbrooke's station (proposed – separate scheme)

Shelford station (existing)

Former alignment now part of industrial estate. Potential realignment shown indicatively.

Former alignment now interrupted by A505, A11 and development. Potential alternative new alignments shown indicatively.

Sawston & Babraham station (options)

Site of former Pampisford station (not proposed for re-opening)

Former alignment now interrupted by commercial building. Former station now in commercial use. Potential realignment to avoid these, shown indicatively.

Granta Park station

Linton station (options)

Site of former Barlow station (not proposed for re-opening)

Former Bartlow – Saffron Walden – Audley End route

Former alignment bisects Bartlow Hills tumuli (ancient monument). Former station now a private residence. Potential alternative new alignments are shown indicatively.

Haverhill Gateway station (options) (station may be omitted if line reopens to town centre)

Former alignment through Haverhill now a combination of washland, residential and Local Nature Reserve. Potential realignment to reduce impacts, and/or reach some options for a Haverhill Gateway terminus, is shown indicatively.

Haverhill Town Centre station (options)

Former routes, beyond the scope of this study

LEGEND

- Former railway – core section for potential re-opening under this study
- Former railway – option for potential re-opening
- Other former routes – outside scope of this study
- Potential realignment (shown indicatively only)
- Station options
- Former station, assumed not to reopen

Appendix C

INDICATIVE CAPITAL COST SUMMARY

Cambridgeshire County Council

Project Nr 70012014 : Cambridge-Haverhill Corridor Study

Shelford to Haverhill Gateway (DRAFT INDICATIVE COSTS)

Ref.Nr	Description	Quantity	Unit	Unit Rate	Total Amount
	FOR SINGLE (ONE-WAY) TRACK				
	Temporary Works				
	Temporary Access Roads				£3,500,000
	Permament Works				
1	**Class D : Demolition and Site Clearance**				
	General Clearance				£500,000
2	**Class E : Excavation**				
	General Excavation & Excavation Ancillaries.				£10,000,000
3	**Class S : Rail Track**				
	Track Foundations				£10,000,000
	Lifting, Packing and Slewing				£3,000,000
	Standard Guage Railtrack : Supply and Laying				£38,000,000
4	**Building Works In Connection with Rail Works**				
	Sub - Total : Stations (Platforms & Facilities, Car Parking).				£10,000,000
5	**Bridges, Viaducts, Underpasses, etc**				£53,000,000
6	**Overhead Power Lines**				
	All works In Connection with OHL Including : -				
	Twin Lines, Support Gantries, Etc				£7,000,000
7	**Underground Cabling**				
	All works In Connection with UG Cabling Including : -				
	High Power, Earthing, Etc.				£3,000,000
8	**Miscellaneous Electrical**				
	All Misc Works Including : -				
	Lighting, Earthing & small power to Car parks and Stations				£1,000,000
9	**Control and Instrumentation**				
	All works in connectioh with signalling, traffic control, road crossings, etc	Prov Sum			£10,000,000
	Sub - Total *1				**£149,000,000**
	Contractor's Preliminaries				£37,000,000
	Fee				£14,000,000
	Prep Costs				£30,000,000
	Contingency				£45,000,000
	Risk				£115,000,000
					£390,000,000
			Per Km Track		£18,571,429

Cambridgeshire County Council

Project Nr 70012014 : Cambridge-Haverhill Corridor Study

Shelford to Haverhill Gateway (DRAFT INDICATIVE COSTS)

Ref.Nr	Description	Quantity	Unit	Unit Rate	Total Amount
	FOR DOUBLE (TWO-WAY) TRACK				
	Temporary Works				
	Temporary Access Roads				£4,000,000.00
	Permament Works				
1	**Class D : Demolition and Site Clearance**				
	General Clearance				£1,000,000.00
2	**Class E : Excavation**				
	General Excavation & Excavation Ancillaries.				£13,000,000.00
3	**Class S : Rail Track**				
	Track Foundations				£19,000,000.00
	Lifting, Packing and Slewing				£6,000,000.00
	Standard Guage Railtrack : Supply and Laying				£76,000,000.00
4	**Building Works In Connection with Rail Works**				
	Sub - Total : Stations (Platforms & Facilities, Car Parking).				£14,000,000.00
5	**Bridges, Viaducts, Underpasses, etc**				£97,000,000.00
6	**Overhead Power Lines**				
	All works In Connection with OHL Including : -				
	Twin Lines, Support Gantries, Etc				£13,000,000.00
7	**Underground Cabling**				
	All works In Connection with UG Cabling Including : -				
	High Power, Earthing, Etc.				£3,000,000.00
8	**Miscellaneous Electrical**				
	All Misc Works Including : -				
	Lighting, Earthing & small power to Car parks and Stations				£1,000,000.00
9	**Control and Instrumentation**				
	All works in connectioh with signalling, traffic control, road crossings, etc	Prov Sum			£10,000,000.00
	Sub - Total				**£257,000,000.00**
	Contractors Preliminaries				£64,000,000.00
	Fee				£24,000,000.00
	Prep Costs				£51,000,000.00
	Contingency				£119,000,000.00
	Risk				£129,000,000.00
					£654,000,000.00
			Per Km Track		£31,142,857.14

Appendix C

DRAFT BUS RAPID TRANSIT SYSTEM COSTS TECHNICAL NOTE

REPORT N^{O} 70012014-004

A1307 HAVERHILL TO CAMBRIDGE CORRIDOR

DRAFT BUS RAPID TRANSIT SYSTEM COSTS TECHNICAL NOTE

PUBLIC

DECEMBER 2015

WSP | PARSONS BRINCKERHOFF

A1307 HAVERHILL TO CAMBRIDGE CORRIDOR

DRAFT BUS RAPID TRANSIT SYSTEMS COST TECHNICAL NOTE

Cambridgeshire County Council

DRAFT
Public

Project no: 70012014
Date: December 2015

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QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	DRAFT			
Date	24/12/15			
Prepared by	Tom Hacker			
Signature				
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Signature				
Authorised by	Darren Pacey			
Signature				
Project number	70012014			
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PRODUCTION TEAM

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 OVERVIEW

1.1.1 This note has been prepared to provide a summary of recent scheme costs for a potential Bus Rapid Transit (BRT) system on the A1307 Haverhill to Cambridge Corridor.

1.2 OFF HIGHWAY BUS RAPID TRANSIT

1.2.1 Several Bus Rapid Transit (BRT) schemes across the UK feature off highway, fully segregated busways. These allow buses to deliver journey times and reliability levels comparable with light rail services. They can demonstrate permanence and deliver improved ride quality, both of which can help deliver modal shift from private car to bus.

1.2.2 BRT systems across the globe are often entirely segregated, sometimes with two lanes in each direction allowing for express services to operate alongside local services and for buses to overtake those stopping to collect or drop off passengers. This is often the case in South American cities, such as Bogota, Columbia, where the Transmilenio, one of the most extensive BRT systems in the world.[1] European BRT systems with busways tend to have only one lane in each direction and where entirely segregated make use of disused railway lines.

1.2.3 Unguided busways can be constructed in the same manner as an ordinary road. In order to stop non authorised vehicles entering the busway bus gates or other forms of barrier are often used at each end.

1.2.4 Many different forms of guided busway exist in operation around the world. Guided busways steer the vehicle by external means leaving the driver in control of the vehicles speed. Guided busways can offer the following advantages above and beyond unguided busways:

- → Limit the width of carriageway required for two way operation. This can reduce land costs and allow two way operation under constrained structures like bridges;
- → Deliver ride quality similar to that of a light rail service; and
- → Ensure vehicles dock effectively at each stop, maximising accessibility.

[1] Transmilenio SA, 25 June 2014, http://www.transmilenio.gov.co/en/articles/history-0

1.2.5 Kerb guided busways use small guide wheels attached to the bus to engage vertical concrete kerbs on either side of the busway. They are traditionally constructed using pre cast concrete sections accurately positioned within tiny margins. More recently, guideways have been built using a continuous single concrete structure and a process known colloquially as slipforming. Many UK cities have kerb guided busways stretching from only a few hundred metres to up to 25km.[2]

1.2.6 Guided light transit systems use a central guiderail to control the vehicles lateral movements. Unlike light rail they operate on rubber tyres with the rail used only for guidance and not to carry the weight of the vehicle itself. Although they often cost less and are easier to construct than a light rail system they are uncommon with no systems of this nature in the UK.

1.2.7 Optical guidance systems use cameras on the front of the vehicles to scan the road surface, identify and following a reference path or line. Although these are popular across Europe, there are no UK systems with this type of technology.

1.2.8 Magnetic guidance systems operate in a similar manner to optical guidance but instead of the vehicle following a simple demarcated path they follow magnets buried in the roadway. Less popular than optical guidance, there are no systems of this nature in the UK.

1.3 ON HIGHWAY BUS RAPID TRANSIT

1.3.1 In the UK, off highway busways are not always appropriate, deliverable or financially viable. Many of the UK's quality bus corridors attempt to make the best use of the limited road space available, providing bus lanes within a widened highway and bus priority at junctions along the route.

[2] TRL, Leeds guided busway study, Daugherty and Balcombe, 1 September 1999, Abstract, http://www.trl.co.uk/reports-publications/trl-reports/road-safety/report/?reportid=2569

2 OFF HIGHWAY BRT COSTS

2.1 OVERVIEW

2.1.1 Unsurprisingly, the cost of constructing different types of off highway BRT systems differs a great deal from country to country and from city to city. Various factors can influence the cost of building a segregated busway (guided or unguided), most notably the land purchase cost. Many South American BRT systems run in a central reservation located between 4-6 lanes of traffic. UK cities tend to be more constrained with little road space available for fully segregated busways. The UK does however have a vast network or disused railway lines. Several of the higher profile BRT systems implemented in the UK in the last 10 years use disused railway lines. The costs associated with converting these routes to busways depends on the extent it has been maintained and a number of other key factors.

2.1.2 BRT systems often or almost always feature infrastructure indirectly associated with the busway itself. This could include Park and Ride sites along the route, improvements to junctions at either end of the route or different vehicle types. Systems being implemented in different areas of the country may involve significant mitigation measures in order to protect the environment or to meet certain planning requirements. These measures/requirements can and often do significantly increase the costs of a project.

2.2 LEIGH SALFORD MANCHESTER BUSWAY

2.2.1 Due for completion in 2016 it will feature a 7km section of dual carriageway kerb guided busway running along a disused railway line. Alongside the busway there will be a 4.5m pathway which can be used by walkers, cyclists and horse riders. The scheme was originally estimated to cost £68m, which for the 21km route equates to £3.2m per km.[3]

2.2.2 This particular guided busway will be the first slipform guide way in the UK. It is hoped this approach will deliver improved ride quality, require less maintenance, emit less noise and deliver significant cost savings in comparison to the traditional pre cast concrete sections approach used elsewhere in the UK.

[3] TfGM, 'Work Starts of Greater Manchester's first Guided Busway,' 17 September 2013, Busway – frequently asked questions, 17 October 2014, http://www.tfgm.com/Corporate/media_centre/Pages/News.aspx?articleId=314;

2.3 CAMBRIDGESHIRE BUSWAY

2.3.1 Opened in 2011 at an initial cost of £181m (£7.2 m per km) this is the longest guided busway in the world, with 25km of pre-cast concrete guideway.[4] The initial total scheme costs included over 2,000 Park and Ride spaces across three different sites each with their own facilities, as well as include land purchased, legal assistance, planning and development. The Cambridgeshire Guided Busway was the subject of a legal dispute between the busway owner, Cambridgeshire County Council, and the contractor, BAM Nutall. The disagreement was triggered by delays in the delivery of the scheme and structural defects on the busway, relating to the foundations and the joints between the concrete beams, which were impaired the experience of riding on the busway. Both sides issued claims, but in September 2013, BAM Nutall agreed to pay £33m to Cambridgeshire County Council in an out-of-court settlement.[5] In 2014, a Cambridgeshire County Council report recommended that £31m would be needed to resolve structural problems.[6] In September 2015, the county council and BAM Nutall reached an agreement to fund a joint investigation into the problems.[7] The costs of this work and the final budget for remedying the problems remain unclear but legal action was put on hold pending the surveys. As a result, the final cost of the scheme is unknown.

2.4 LUTON DUNSTABLE BUSWAY

2.4.1 Opened in 2013 at a total cost of £91m (£6.7m per KM including land, legal fees etc) it features 13.4km of guided busway along a disused railway line.[8] The scheme costs included significant improvements to the Luton bus/rail interchange. This busway was the subject of a legal dispute between Luton Borough Council and the contractor, BAM Nutall, over cost overruns.[9]

2.5 ASHTON VALE TO TEMPLE MEADS METROBUS

2.5.1 Due for completion in 2016/17 this route forms part of the wider West of England Metrobus project. Costing £49.621m (about £5.6m per kilometre including land, legal fees etc at the time of Full Approval being granted by the DfT in September 2014) the 8km route features a mixture of guided busway, unguided busway and on highway operation.

2.5.2 It should be noted that the cost of Contract 1, which comprises the guideway, is £25,347,867 (at the time of the Full Approval submission to the DfT in June 2014) which equates to approximately £5.96m per km based upon approximately 3.4km of guideway). However, this excludes any preparatory costs. Contract 1 was awarded to Balfour Beatty, who are using the same construction method as used for the Leigh Salford Busway.

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[4] *Cambridge News,* 'Guided bus cost 'may hit £187m,'' 29 April 2011, http://www.cambridge-news.co.uk/Guided-bus-costmay-hit187m/story-22353630-detail/story.html

[5] Mark Hansford, *New Civil Engineer,* 'Cambridgeshire guided busway dispute costs Bam Nutall £33m,' 5 September 2013, http://www.nce.co.uk/cambridgeshire-guided-busway-dispute-costs-bam-nuttall-33m/8652504.article

[6] *Cambridge News,* 'More than £30m needed to bring guided busway up to scratch,' 1 October 2014, http://www.cambridge-news.co.uk/30m-needed-bring-guided-busway-scratch/story-23020580-detail/story.html

[7] *Cambridge News,* 'Cambridgeshire guided busway to be dug up for investigations by county council and BAM Nutall,' 25 September 2015, http://www.cambridge-news.co.uk/Cambridgeshire-guided-busway-dug-investigations/story-27868295-detail/story.html

[8] *Bus and Coach,* 'Luton Dunstable Busway begins operation,' 26 September, 2013, http://www.busandcoach.com/news/articles/luton-dunstable-busway-begins-operation

[9] Mark Hansford, *New Civil Engineer,* 'Cambridgeshire guided busway dispute costs Bam Nutall £33m,' 5 September 2013, http://www.nce.co.uk/cambridgeshire-guided-busway-dispute-costs-bam-nuttall-33m/8652504.article

2.6 SOUTH EAST HAMPSHIRE BUS RAPID TRANSIT PHASE 1A

2.6.1 Opened in 2012 at a cost of £20m (£4.4m per KM including land, legal fees etc) running along 4.5km of disused railway line.[10] The busway is unguided and wide enough for a single carriageway to be shared by buses and cyclist.

[10]Hampshire County Council, 'South East Hampshire BRT Future Phases Study,' May 2012, 4, http://www3.hants.gov.uk/getdecisiondocumentfile?item_doc_ID=8916&file=Item%208%20Appendix.pdf&type=pdf

3 ON HIGHWAY BRT COSTS

3.1 OVERVIEW

3.1.1 As with off highway busways the cost of on highway bus priority measures depends largely on the availability and cost of land outside the highway boundary. The higher the proportion of the route with segregated bus lanes the greater the requirement for road widening/third party land and the higher the scheme costs. Although available, land adjacent to the highway may not be easily used with steep gradients.

3.2 TRANSPORT FOR GREATER MANCHESTER BUS PRIORITY PACKAGE

3.2.1 The above mentioned Leigh Salford Manchester forms part of this wider package of bus priority measures, which has a total budget of £122m.[11] The package covers schemes improving 25 miles of network over three major radial corridors leading into Manchester city centre, serving Swinton, Leigh, Atherton, Didsbury, Middleton, Blackley and the Oxford Road.[12] Part of the package involves work on the East Lancs Road (A580) between Ellenbrook and Manchester city centre where key sections of the highway will be widened to allow for a new bus lane, segregated from general traffic.[13] Along other sections existing road space will be allocated to buses away from general traffic. All the junctions along the route will be remodelled to provide priority for buses yet maintain the efficiency of an important radial route into both Salford and Manchester. The cost of the works associated with the A580 are estimated to be approximately £14m or £1.1m per KM (including land, legal fees etc). The total cost of the Salford section of the scheme is £10.4m for six miles of bus lane between Newearth Road and Frederick Road.[14]

3.3 A3 ZIP BUS PRIORITY CORRIDOR – PORTSMOUTH

3.3.1 Opened in 2008 at a cost of £33.8m (or £2.1m per KM including land, legal fees etc.).[15] The bus route runs along a length of 16km and includes 6.5km of bus and cycle lanes and 65 new bus stops with 51 new shelters. It also included 11km of renewed road and footway surfaces, drainage improvements and new lighting columns.

3.4 BELFAST BRT

3.4.1 Three routes totalling 24.5km of mainly on highway bus only lanes and junctions re designed to provide priority for bus operations. Due to open in 2018 at a cost of £98.5m (£4m per KM including land, legal fees etc.).[16]

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[11] TfGM, Report for Information, 14 February 2014, http://www.transportforgreatermanchestercommittee.gov.uk/tfgmc/download/downloads/id/4774/item_08_quality_partnership_scheme_update.pdf
[12] TfGM, http://www.tfgm.com/buspriority/Pages/website/default.html
[13] TfGM, A580, 2015, http://www.tfgm.com/buspriority/routes/Pages/A580.aspx
[14] TfGM A580 East Lancashire Road Bus Priority Proposals, Salford City Council Report, 27 February 2014, http://services.salford.gov.uk/solar_documents/5%20report%20a580%20cross%20city.docx
[15] Hantsweb, ZIP Bus Priority Corridor, 19 March 2015, http://www3.hants.gov.uk/tfsh/tfsh-what-tfsh-does/tfsh-projects-zip.htm
[16] Northern Ireland Roads Site, Belfast Rapid Transit System, November 2015, http://www.wesleyjohnston.com/roads/belfastrapidtransit.html

3.5 A65 QUALITY BUS SCHEME - LEEDS

3.5.1 A65 Quality Bus Scheme – Leeds: Featuring 4km of new dedicated bus lanes covering inbound and outbound journeys, 6 additional pedestrian crossings, 11 new bus shelters, 5km of new footpaths and significant landscaping along the route. Finished in 2012, the total costs of the scheme were £21.2m (of which the DfT provided £19.8m) including land, legal fees etc.[17]

[17] Margaret Jackson, Head of DfT Northern England Engagement Team, Presentation to TPS and CILT, 4 May 2011, http://www.tps.org.uk/files/Yorkshire_humber/110504_presentation_to_yh_transport_planners_society.ppt.

Appendix D

ENVIRONMENTAL, HERITAGE AND HABITAT CONSTRAINTS MAPS

Date Modified: 02/12/2015 14:49

Drawn By: UKDJP003

Key

- Listed Building - Point
- Scheduled Monument - Area
- Ancient Woodland Inventory
- Natural Area
- Coastal and Floodplain Grazing Marsh
- Deciduous Woodland
- No Main Habitat but Additional Habitat Present
- Listed Building - Area
- Local Nature Reserve
- Good Quality Semi-Improved Grassland
- Lowland Calcareous Grassland
- Lowland Meadows
- Lowland Fens
- Traditional Orchards
- Site of Special Scientific Interest

0 0.5 1 1.5 2 km

File: Created using iGIS, WSP's Online Mapping System

WSP | PARSONS BRINCKERHOFF

TITLE:

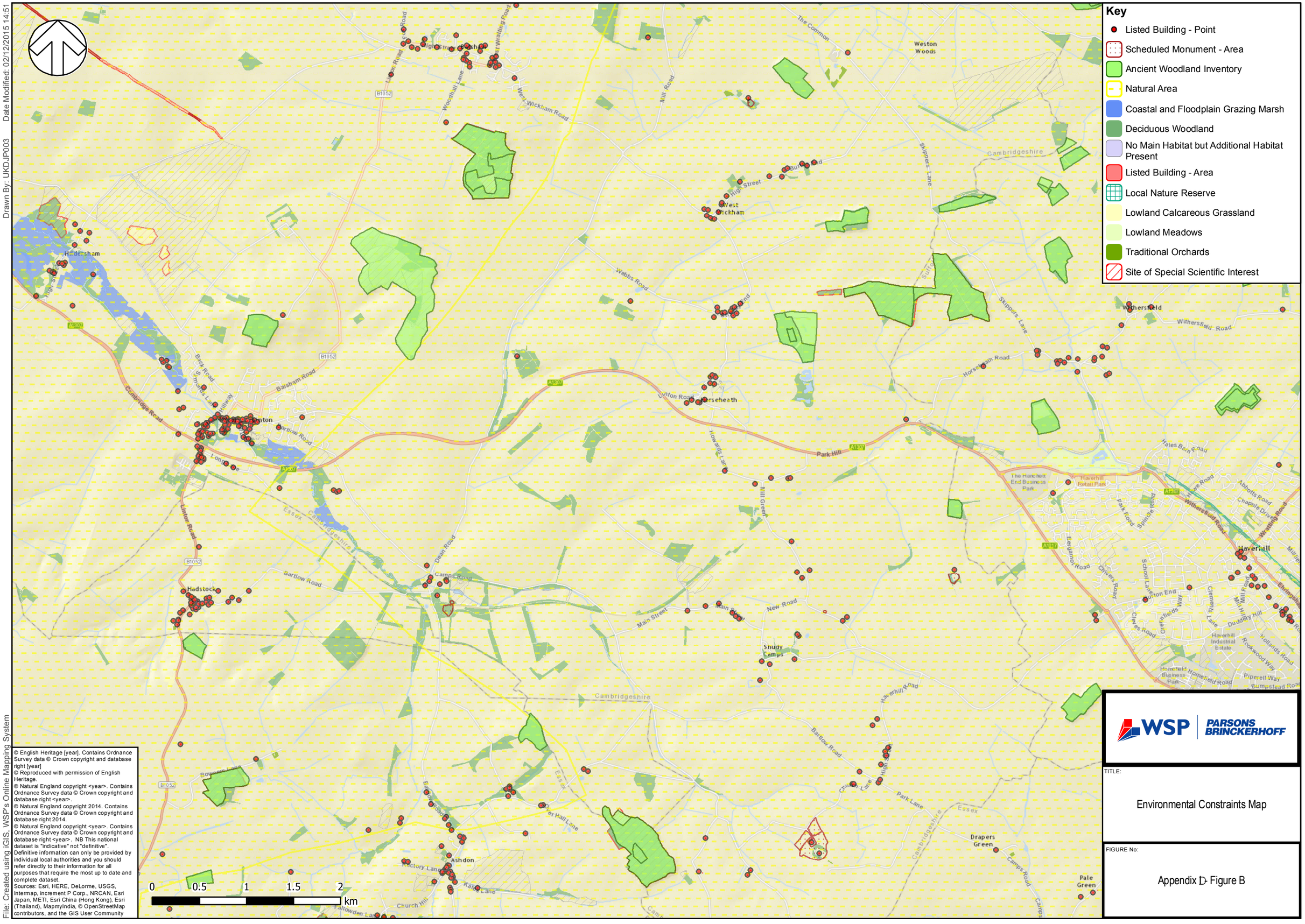
Environmental Constraints Map

FIGURE No:

Appendix D- Figure A

Drawn By: UKDJP003 Date Modified: 02/12/2015 14:51

File: Created using iGIS, WSP's Online Mapping System



WSP | PARSONS BRINCKERHOFF

TITLE:

Environmental Constraints Map

FIGURE No:

Appendix D- Figure B