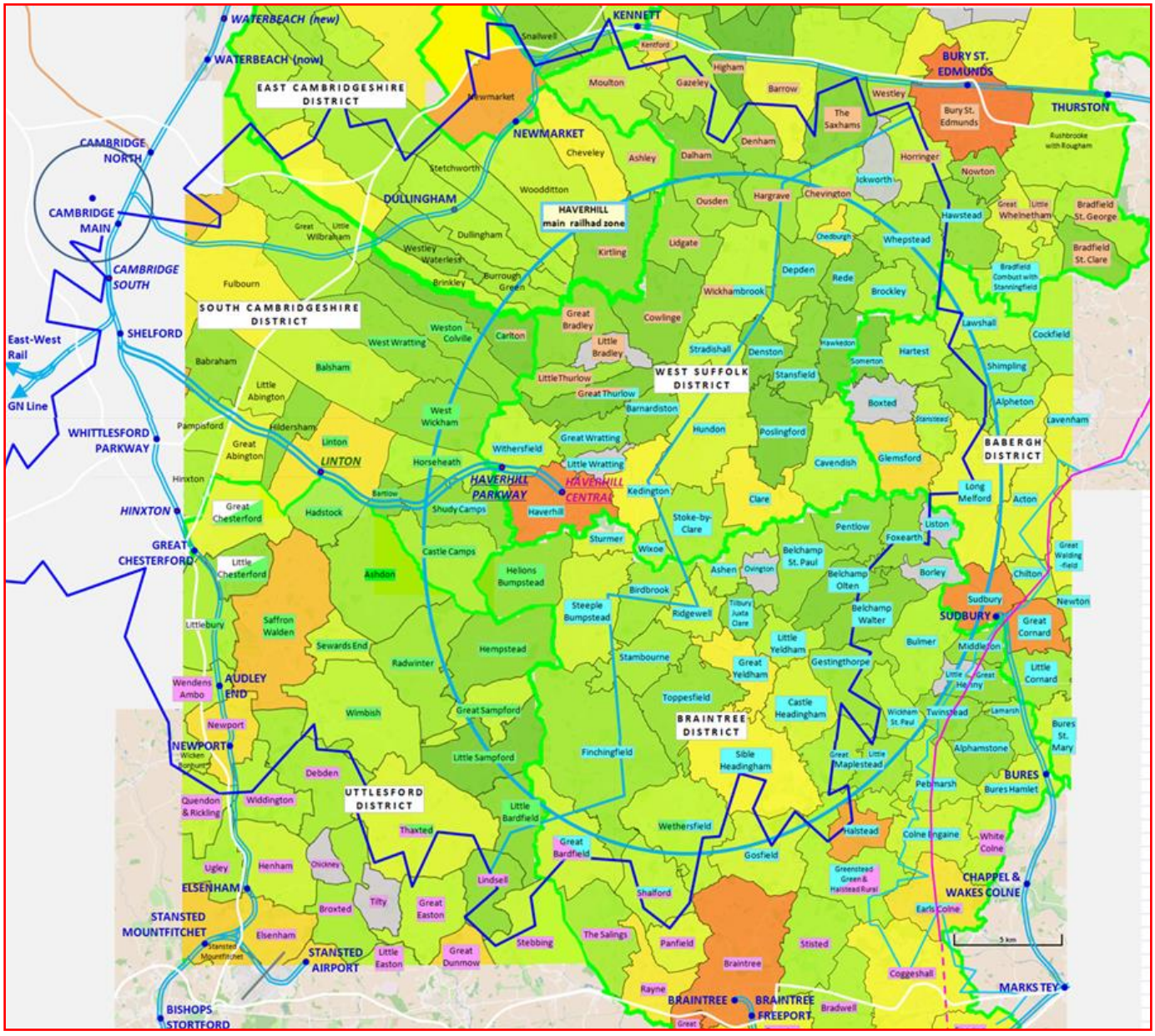
railfuture

JRC

A big role for a Haverhill Railway

Analysis of potential rail passenger demand on the route corridor between Haverhill and Cambridge South



including policy actions for Railfuture East Anglia

Jonathan Roberts, JRC, February 2024

JRC report on rail travel potential for Haverhill and the policy actions arising

Contents

Summary of findings and policy actions to address

Context for Haverhill and Cambridge

The following extract from "*About Cambridge City*" summarises the city region context:

- Cambridge lies approximately 50 miles north of London, is at the heart of several key growth corridors and is well connected to London by road and rail – this has a significant influence on the economy and demography of the city.
- Cambridge is home to the world-class University of Cambridge, which is also a major employer and, alongside its colleges, land owner and developer in the area. Internationally renowned Addenbrooke's hospital is also located in the city and is now the epicentre of a rapidly developing bio-medical campus. The city also hosts the Cambridge campus of Anglia Ruskin University.
- **Cambridge is a key growth engine for the UK economy. The combination of a well-connected location, a world-leading research university, an attractive setting and an entrepreneurial ecosystem have created a science-based innovation cluster in and around the city over the last 50 years. [Including South Cambs, 'Greater Cambridge' has a 308,000 population and 195,000 jobs.]**
- This now includes several world-leading companies in ICT and life sciences. As a result, the area is characterised by low unemployment, high GVA per worker and high skills.
- The city receives 7 million visitors each year, drawn by its architecture, museums, open spaces and cultural offer. The city provides culture and leisure facilities for the surrounding sub-region, and has a thriving night-time economy…
- **Housing affordability is a real issue for the city and this pressure forces those who cannot find suitable, affordable housing in the city to live further out, and then travel back in to the city to work. Around 50,000 people commute into the city each day, contributing to over 200,000 vehicle movements in and out of the city each day. This exacerbates issues around congestion, which in turn create poor air quality in parts of the city.**

Haverhill is a 27,000-population town, 18 miles from central Cambridge and over an hour's congested travel at peak times. Many people now live in Haverhill and use the A1307 to Cambridge – in a classic commuting context – as Haverhill housing is more affordable than closer to Cambridge. This trend continues, of economic growth and housing pressures.

There is no railway at Haverhill. Because of the city region's success there are proposals to re-establish the former railway which closed in 1967. JRC was asked to assess various aspects of this proposal in summer 2023, and the main findings are summarised below.

JRC main findings

Large populations served; the economy supported:

- A railway will reach Central Haverhill directly and can serve intermediate populations via principal stops at Granta Park, Linton and Haverhill Parkway.
- Rail heading via Linton and Parkway can serve over 100 parishes, as far as Thaxted, Braintree, Halstead, Sudbury and towards Bury St. Edmunds.
- **The Haverhill Line total populations will be 90-165,000, three to six times more than Haverhill on its own. A further 12% population growth is foreseen to 2041.**
- Transport capacity offered by the railway will underpin and enable continuing economic growth in and around 'Greater Cambridge'.

Big passenger numbers:

- A railway between Haverhill and Cambridge will address the large passenger flows already travelling via the A1307.
- **Foreseen passenger numbers are considerable, 2,000 and more per peak period out of present commuting numbers, if good transfer can be achieved from car.**
- Over time, such commuting could double, with Cambridge City car restraint policies, the stimulus of Cambridge North and South stations, and more dormitory area populations.

Fast, frequent service:

- Demand modelling shows that if the railway offers a quick journey and good frequency, then it will compete with off-peak car and be much faster than road at peak times.
- A 21-minute journey time between Haverhill and Cambridge South – where the railway meets the main line – is a target, and points to under 40 minutes to central Cambridge.
- The wider catchment is sensitive to longer journey times, so a limited stop service is preferred if possible for Haverhill, and a Parkway railhead is essential.
- There could be a separate local service for catchments closer to Cambridge such as Sawston and Stapleford, or compromises on journey time vs. scale of outer catchment.

Other Cambridge commuting will benefit:

- Scope for other rail heading was considered parish by parish.
- Modelling shows time-saving benefits with Cambridge outer railheads also at Dullingham, Stansted Airport (for Cambridge travel), and Audley End.
- **Numbers are reported and show at least another 150,000 people who might benefit.**

Technical standards inform route options:

- A tram-train operational standard looks the most compatible for either the A1307 corridor, or an alternative route via Six Mile Bottom which could need less construction.
- Tram-train combines rail speeds and passenger capacities with more choices of alignment.
- Research campuses at Granta Park and Babraham can be served directly with a modified route via the A1307, as might parts of Sawston.
- A separate local service close to Cambridge may be feasible, with bottlenecks solved more easily near Shelford and through the Cambridge urban rail corridor.

Research background

1. Jonathan Roberts Consulting (JRC) was commissioned by RfEA and the Haverhill Rail campaign in June 2023 to undertake analysis of potential rail passenger demand on the route corridor between Haverhill and Cambridge South.

2. This followed previous large-scale JRC research on the strategic case for rail to do more for East Anglia over the next thirty years, to become a core part of area growth and development in this rapidly urbanising sub-region.

3. This report sets the context for appraisal, and the indicative outcomes. It includes a critique on assumptions about what a Haverhill railway might achieve.

4. Several critical policy actions for RfEA to consider before agreeing its public campaigning material and priorities were identified and provided in another report.

Influential geography

5. Haverhill is a large town of 27,000 people in West Suffolk, on the borders with Essex and Cambridgeshire. Cambridge is its strongest work destination. The city centre is 18 miles away and at least 40 minutes by road, up to double that in peak times. Many people live in Haverhill as the cost of housing is less than in or near Cambridge.

6. Cambridge is polycentric with its central universities, offices near the main station, and dispersed research parks and multiple destinations. Travel options are increasingly influenced by this combination of geography, and the availability of strongly promoted active travel modes, walking and cycling. Two other major conurbations are further away, at Chelmsford and Colchester. They are 30+ miles and 55 minutes by road from Haverhill, also with longer peak journey times.

7. The arrival of two new major stations improves the ability to distribute rail passengers to more work destinations, in addition to Cambridge ‘Main’:

   - Cambridge North, open since 2017 serving the northern research campuses.
   - Cambridge South, to open in 2025 serving the 25,000-jobs bio-medical Campus, also to be an interchange for West Anglia, Kings Cross and East-West Rail services.

8. Haverhill is 17 miles from Cambridge South, along the same A1307 used by most Cambridge commuters from south-east of the city. Journeys take over an hour in peaks while a policy of large-scale car parking has been rejected for the Campus.

9. The challenge is how Haverhill can best be served in future decades by a combination of public transport and active travel. The A1307 has significant research establishments along the route and nearby, and other potential destinations. The former railway through Haverhill was closed in 1967 though most of its solum is still unused, parallels the A1307 and could be adapted for use by future rail services.

JRC research topics

10. Research topics have been:

A. **To help understand the underlying travel demand case in a normative direction (to the main city):**
JRC assessment of residential population from now to the future, on a broad corridor. Also, railhead influence on travel demand where rail potential is strong.

B1. **The comparative effect of journey time to work, at least as far as Cambridge:**
Long commuting distances and times aren't necessarily the norm outside the Greater London area. Cheaper housing at Haverhill provides stimulus for travel to and from Cambridge, however not all communities will be geared to long journeys. This requires assessment to factor down the possible travel volumes.

B2. **The existence of a wider spread of work and non-work origins & destinations:**
Not only is Cambridge polycentric, but there are other potential destinations within an equivalent distance or travel time when it will be unwise to assume simple proportioning of passenger flows by different modes. There's also contra-flow travel to Haverhill businesses, to anticipate.

B3. **How Net Zero and travel policies will strengthen public transport demand**:
Cambridge City has begun to set limits on car usage, for example with parking restraints. In future, bus, rail and active travel will have larger shares of total travel.

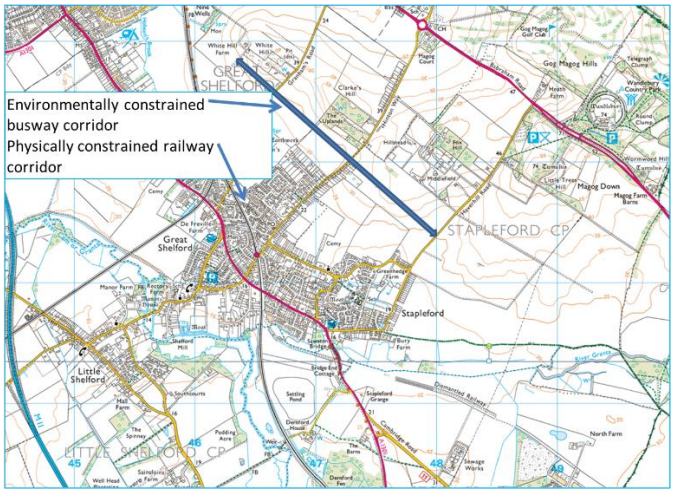
C. **Route Options between Haverhill and Cambridge**:
This includes consideration of the former railway alignment which parallels the A1307 corridor, variations to serve intermediate places better, location of research Campuses and new 'garden communities', and a potentially lower-capital cost option towards the Mid-Anglia Line at Six Mile Bottom. Factors influencing the merits of different routes will include type of train operation, and outline timetabling.

11. Any final demand matrix could be complex. JRC has committed just to highlight some key components. Extensive modelling work was undertaken during the summer, and concluding research has been taken forward this autumn and winter. This report provides a summary compilation of the work to date. It is intended to set out the multiple layers of information – and probable knowledge gaps.

Definition of possible rail corridors

12. There was early discussion on possible alignments. Basically, a starting action is to see how available and fit for purpose is the solum of the former railway. This had already been considered in some detail by the Haverhill Rail campaign. Options for heavy rail, light rail or busway routes past Shelford or Stapleford are also a matter requiring care as they incur practical assessment of operability, land take and environmental impact.

13. A busway adjoining the Gog Magog hills is objected to strongly in the locality, and use of a similar alignment for rail is unlikely to be supported. Rail or light rail via Shelford appears to be the most supportable option providing it can use the rail corridor there, possibly with changes to the station location. See map below.



Map 1 – Constraints for new infrastructure in the Gog Magog and Shelford areas

14. Use of light rail gives more routeing options though with a risk of slower journeys. JRC has subsequently reviewed other route variations:

- To reach new or foreseen housing areas.
- To reach centres of economic activity such as research Campuses.
- To thread past the expanded A11/A505 interchange which blocks the former line.

15. For research into travel volume, it is the route accessibility which matters most. This in turn depends on the location of local stops or railheads and their convenience, with access journey times, travel times, distances and service levels. The same would apply to any busway scheme. Assessment of comparative journey times and the end-to-end ease of journey has followed that logic.

16. Also, the proximity of Haverhill to the nearest points on the existing Network Rail system suggests that a Haverhill-Cambridge railway could adopt a different route compared to the former line. Both Littlebury on the WAML, and Six Mile Bottom on the Newmarket Line, are about 10 miles distant in a straight line. JRC has researched this recently, as it is probable that a Strategic Outline Business Case would ask some fundamental questions about other possible transport options, such as a bus-only proposal or a rail route involving less construction than its historic alignment.

Population catchments

17. On the A1307 corridor, area geography points to two groups of catchments with different scales of population assessment and demand modelling:

- Stand-alone towns and villages along the A1307 east of the A11. These are principally Linton, and the large town of Haverhill, though there are nearby villages

which also need to be assessed for travel demand as they may use the A1307 or other main roads. This zone does not have dense population except at Haverhill.

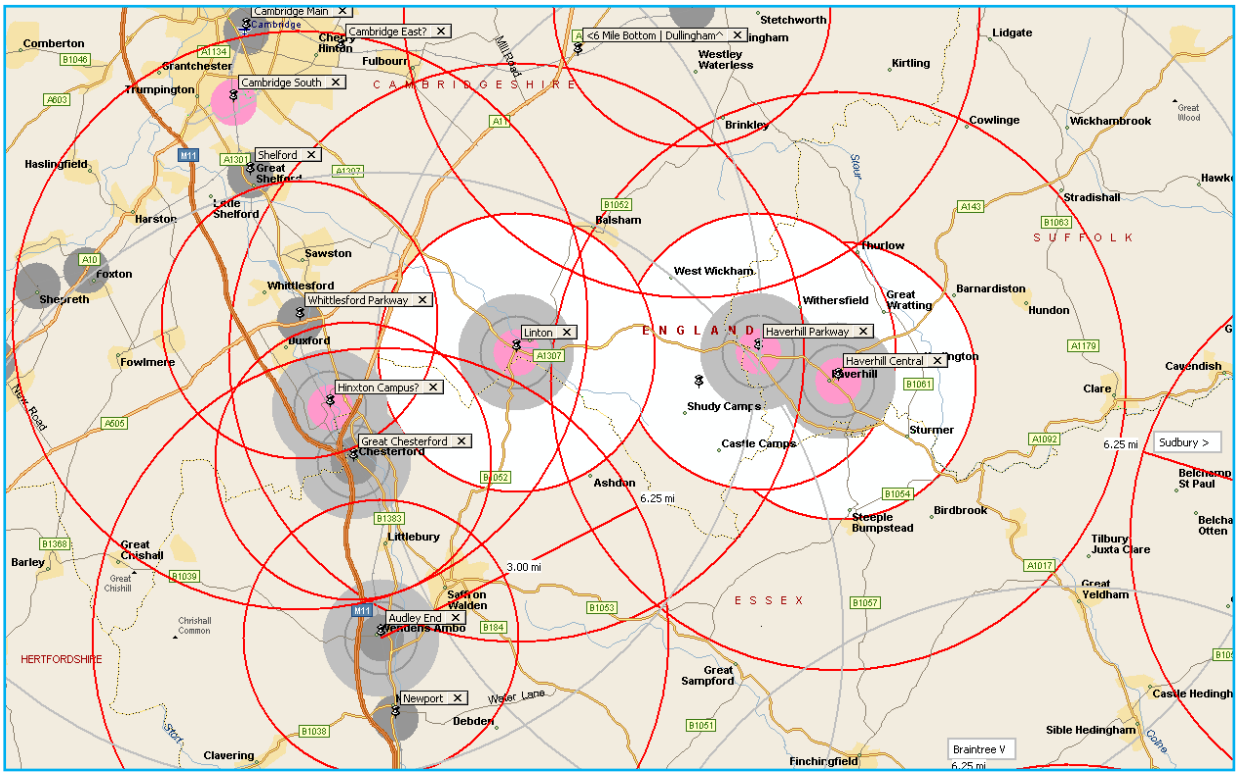
- A zone of research parks, and expanding housing areas, mostly west of the A11 towards Cambridge South but also just east of the A11 at Granta Park and Abington. This creates more options for stops and requires a finer measure for modelling as distances to destinations are shorter and the general population volume is denser.

Stand-alone populations east of A11

18. The map below shows the three possible stop catchments aimed at existing and future populations east of the A11. They are at Linton, Central Haverhill, and on Haverhill's outskirts as a Parkway for traffic from further afield. [1]

19. Station catchments on existing railways are shown where these overlap with Haverhill or Linton catchments. Stations at Audley End, Great Chesterford and Whittlesford Parkway (and a possible station at Hinxton Campus) overlap from WAML. Other lines such as the Braintree and Sudbury branches do not offer access to Cambridge. Dullingham's catchment on the Newmarket line overlaps with Linton and Haverhill. Comparative distances and times in such overlap areas are considered.

Map 2 - Possible stops and catchments on eastern sector of A1307 corridor



[1] Catchment circles (straight-line from a stop) are shown in red at 5 km/3 miles and 10km/6¼ miles. Closer-in coloured zones are shown at 2km/1¼ miles and 1.3km/0.8 mile (active travel distances), and 800m/½ mile of (easy walking). A 16 km/10 miles circle is in grey outline, this will be less effective in gaining users but rail heading via Haverhill or Linton may be worthwhile because of traffic congestion nearer Cambridge.

20. JRC has considered options for stop locations, with the results shown.

21. At **Linton**, the ex-station site to the west of the village (or west of that) might offer adequate space for car parking from further catchments, and good proximity to Linton Village College. An alternative is to the east of The Grip and Linton Road, also enabling car parking, and is closer to the bulk of the village. This is preferred at this initial stage of option selection, it is also closer to Linton Zoo for visitors, while the most likely distant catchments would have shorter car access. Precise locations need to be determined, but the preference helps assessment of distances and times.

22. At **Haverhill**, the former rail corridor can be used, so a town centre station close to Tesco is an obvious choice. The station can be dovetailed with town centre amenities and with good bus and active travel interchange. However, there could much rail heading from outlying villages, and it is proposed that a specific **Parkway** station on the NW edge of Haverhill should also be considered in modelling. That will offer convenient access from outer urban areas of Haverhill, via the bypass, and attract other passing A1307 users to rail who might otherwise drive most of the way, such as to the bio-medical Campus or other research zones.

23. There is the possibility of further stops in Haverhill, depending on the nature of the rail offer. Much industry and business parks are to the south-east, so that an aim of offering contra-flow travel to these jobs might merit a local continuation of the railway to a Haverhill SE stop. Light rail might give more opportunity. This won't be researched here in detail, as a basic rail proposition is itself a big task. There may be scope to consider add-on elements once initial analyses have been undertaken.

24. Basic assessment of access distances and times from distant catchments is now complete for the three stops at Linton, Haverhill Parkway and Haverhill Central.

Geography and potential for a rail option

25. This report shows what a focussed railway could do. A new line will not replicate the former which was slow and infrequent. Nor can it be a standard commuter service because it has to serve major places along the route but is in danger of taking too long to get to Cambridge if it tries to stop everywhere with the same service.

26. It has become clear that the line comprises inner and outer sections with different sets of locations and potential destinations / calling points. This differential, and defining workable solutions, are building blocks for research in Part A.

- **Heavy rail:** Assumptions about heavy rail – few stops and lowish frequency – might be unacceptable inwards to Cambridge from Granta Park/Abington. A weak service offer would lead to that being scored downwards in demand and with less merit over that section, in competition with a busway, even if heavy rail has some advantages on the stand-alone eastern section. Would the overall case for heavy rail stand up?

- **Light rail or tram-train:** Is there a reasonable, alternative view that lighter rail can be valid over the whole route east of Granta Park as well as west of the A11 towards Cambridge? Haverhill might be argued to have the internal characteristic of an urban area, particularly in the case of a tram-train or bus able to/inclined to stop more often or go further than heavy rail. However, it would need to be competitive in capacity, comfort and convenience, including journey time, over the total distance.

27. It is evident that much of the Haverhill-Cambridge corridor catchment would have multiple destinations as choices, not simplistically a single 'Greater Cambridge' via Cambridge South. There is also a 'no rail' backcloth where there is less clarity about proportioning volumes of travel demand to gauge a realistic potential for a stronger rail offer in that corridor. These issues arise with research in Part B.

Role of a railway

28. The travel demand modelling, reported in Part A, shows sensitivity about the overall time it would take by rail, particularly if you desire the railway to provide congestion relief in the A1307 corridor through modal shift, taking account of the time cost of driving cars to a station and changing to the train. The work points to clarity being needed on routeing and alignment near the research parks, permitted line speeds, and stopping frequency plus service mix.

29. JRC's guidance is that this could be addressed with two service specifications. One for an inner service between Granta Park and a park & ride interchange, and Cambridge South and beyond, calling at all stops on this section. An outer service running all the way from Haverhill can be limited stop, to offer an acceptable overall journey time.

30. However, there might need to be some compromise between effectiveness in attracting car travel to rail from the Haverhill Parkway stop, which is best if fast and limited stop, and effectiveness at busy intermediate locations whether research parks or residential. Operational considerations might allow only a single service, in which case choices would have to be made about intermediate stops. Route optioneering is discussed further in Part C below.

Part A - Assessment of residential population along a broad corridor

Potential catchment areas for a Haverhill Line

31. We have to understand what the catchment capability is, to understand the reality for rail's prospects for serving Haverhill and its rural hinterland. This section focuses on defining that and the potential implications for travel demand.

32. The completed basic parish density mapping for Haverhill covers the remoter stand-alone areas eastwards of Fourwentways. It is not appropriate to deal in this way with the catchments at Granta Park and west towards Shelford (or equivalent).

33. The maps below have the following lines drawn. Faint light blue line is 60 mins off-peak drive from Cambridge South, **thick light blue line** is 40 mins off-peak drive time from Cambridge South. Overlaid is a **dark blue** 30-minute off-peak drive time from Haverhill Parkway.

34. The strongest scope for this rail corridor is the 'delta' between the **dark blue** 30-minute Haverhill Parkway railhead time and the **light blue** 40-minute Cambridge South isochrone, plus other areas closer to the Parkway station. The **light blue egg shape** summarises the primary catchment area. Linton can also attract car users from many nearby parishes.

35. While more parishes possibly attracted to Haverhill are shown beyond the egg shape, the journey times to Haverhill Parkway are also getting extended. Other destinations such as Chelmsford, Colchester and Ipswich may have greater importance.

36. So, we now have a good idea which parishes can be Haverhill rail corridor catchments in the relevant District Council areas of Suffolk, Cambridgeshire and Essex. However, mapping those has proved complex as there are many parishes that could look to more than one station to access a train service to Cambridge.

37. The parish populations in the Haverhill Line catchment zones have been allocated to the station / railhead providing the fastest journey to Cambridge South. The fastest journey combining car and rail is likely to be a key criterion for travel to work. Each parish name has been colour-coded with the relevant railhead colour (shown below):

Haverhill Central serves much of the Haverhill urban area.
Haverhill Parkway serves parishes coded light blue.
Linton serves parishes coded green.
Dullingham serves parishes coded light brown.
Stansted Airport or Audley End serve parishes coded pink.

Cambridge South as the timing yardstick

38. Cambridge South is adopted as the timing yardstick. This is because a railway paralleling the A1307 is a continuation of the Restoring your Railway proposals, while the corridor also experiences substantial traffic congestion. Heading this way, Cambridge South is the first main interface with the national rail network – Cambridge Main station would be 4-5 minutes further. Cambridge South is also the first main destination within Cambridge if using the A1307, so is directly comparable, with headline road vs. rail comparisons available at the first port of call.

39. Onwards to Central Cambridge and other destinations around Greater Cambridge would require a much larger spread of comparative times. For that, rail offers a good run on to Cambridge Main station (Itself a substantial business zone) and to Cambridge North research zone but is less convenient than car to reach campuses and business parks on the western rim of Cambridge. Central Cambridge is not quickly reached by either mode.

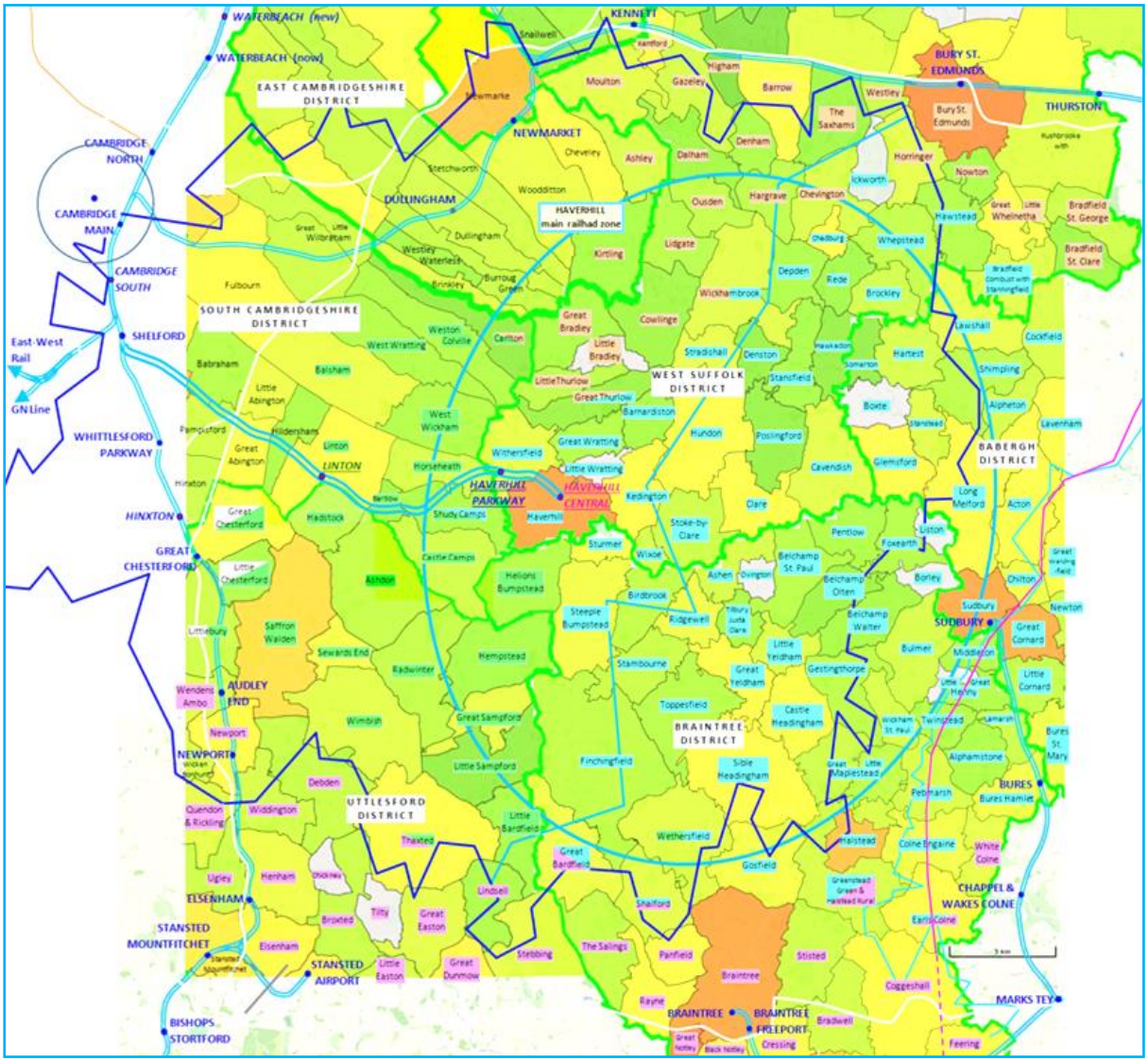
40. However, the main line is busy, and will be busier still with East West Rail. In one scenario, a shared light rail/bus corridor might be required between Cambridge South, Cambridge Main, and Coldham Lane or Cambridge North, or to the new Cambridge East development.

41. In the case of a rail route between Haverhill and Cambridge via Six Mile Bottom, it would reach eastern Cambridge first, then Cambridge Main. Cambridge South would be third. So, there would be other journey time and travel demand comparisons to make, for a multi-mode and destination analysis. This is appropriate for SOBC research, rather than for first outputs of a Haverhill railway case.

Catchment spread with best timings Haverhill to Cambridge South

42. Map 3 below shows the potential for a Haverhill line via the A1307 corridor with limited stop rail timings from parishes east of the A11, and assuming people prioritise the fastest timings not the closest stations. The aggregate railhead populations are reported in Table 1.

Map 3 – Parish catchments with best timings Haverhill to Cambridge South



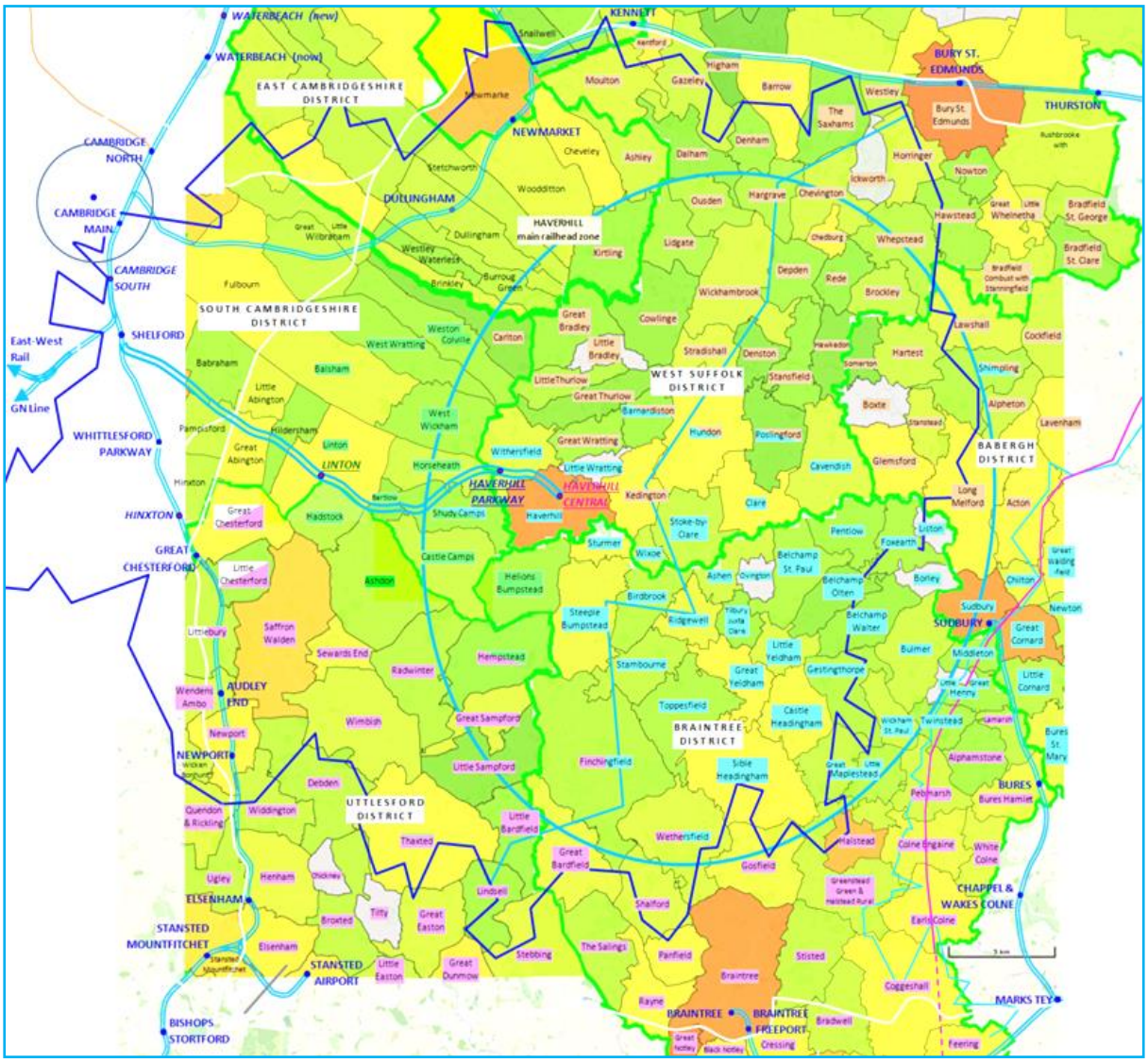
43. Project mapping reveals that over 100 rural parishes would benefit from Linton and Haverhill railheads – and that several existing stations could serve other catchments if those railheads could be better geared to support commuting to Cambridge.

44. Dullingham on the Mid-Anglia Line is a strong candidate if it had a better service (it is only 2-hourly now, modelling allows half-hourly and through trains to Cambridge South). Stansted Airport would be effective if the station were required to facilitate accessible, low-cost car parking for travel from the A120 corridor towards Cambridge.

Catchment spread with slower timings Haverhill to Cambridge South

45. Map 4 shows the difference if there were a 5 minute longer end to end rail journey. A 5-minute time increase is consistent with making two additional stops in the Sawston/Stapleford/Shelford area. Dullingham, Stansted and Audley End then have stronger claims for travel to Cambridge South, with about 60 parishes using Linton and Haverhill Parkway. The change in aggregate railhead populations is reported in Table 2.

Map 4 – Parish catchments if 5 minutes longer rail journey on Haverhill Line



46. The core external catchments beyond Haverhill are shown here as the Stour Valley between Haverhill and Sudbury, and SE towards Halstead and Braintree.

47. Mapping has also been undertaken for the longer-term potential of an R120 railhead at **Braintree Parkway**. This is not shown, as it makes little impact on these core catchments, and mostly replaces travel via A120 and Stansted Airport.

Nominal catchment population for a Haverhill railway

48. Table 1 reports the aggregated parish populations relevant to the Haverhill Line and its hinterland, and their distribution to railheads based on fastest journey time to Cambridge South by combination of car and rail. Parishes are from the following districts: Essex – Braintree, Uttlesford; Cambridgeshire: East Cambs, South Cambs; Suffolk - Babergh, West Suffolk. [2]

49. The outline timings for a Haverhill Line and other modes are set out in a separate spreadsheet. Car timings are based on off-peak Autoroute Express timings, plus a peak time factor, based on one or more population nodes within each parish.

Table 1 – Total railhead catchment zone populations

based on fastest overall time to Cambridge South	2021	2041
Railheads		
Haverhill area urban wards	27,005	28,551
External parishes, via Haverhill Parkway	100,105	114,375
Linton	37,791	41,897
Bury St. Edmunds (local catchment only)	41,291	41,649
Dullingham	11,384	13,281
Stansted Airport	91,139	104,379
Audley End	6,705	8,004
TOTALS	**315,420**	**352,135**
Total Haverhill Line catchment population	**164,901**	**184,823**
% of total population	**52%**	**52%**
Notes: Haverhill urban as % of Line population	**16%**	**15%**

Some parish populations have been shared between 2 or 3 railheads.

2041 parish population growth is based on past 10-20 year growth history.

50. Table 2 reports the re-distribution of catchment populations between railheads if the Haverhill Line journey were 5 minutes slower. Some parishes external to Haverhill and Linton could shift their allegiance to different railheads if services there were competitive with overall journey time and service frequency to Cambridge South.

51. This shows the sensitivity to overall journey timings and the importance of running fast services between Haverhill and Cambridge South with limited stops, only at main origins and destinations. It also highlights what will be the core external catchments for a Haverhill Line, which as stated earlier are the Stour Valley between Haverhill and Sudbury, and SE towards Braintree and Halstead.

[2] These cover a nominal 60–70-minute time to Cambridge South, centred on Haverhill. Put simply, allowing roundly ~30 minutes for travel by rail, offers scope for another ~30 minutes railhead access time by car. The catchments defined are also bounded by the primary road network (A120, M11, A11, A14), and by the West Anglia and Mid-Anglia Lines, which also help to set the practical limits to any Linton and Haverhill railheads.

52. It implies that any line via the A1307 corridor should aim to serve Granta Park and Babraham Campuses as directly as possible, to maximise the attractiveness of rail for these intermediate destinations, with only a short walk from a station. A separate stopping service is suggested, if possible, to serve the inner communities on the western section towards Cambridge South.

Table 2 – Revised railhead catchment zone populations

based on 5 min slower journey on Haverhill Line	2021	2041
Railheads		
Haverhill area urban wards	27,005	28,551
External parishes, via Haverhill Parkway	53,198	61,221
Linton	10,901	10,921
Bury St. Edmunds (local catchment only)	41,291	41,649
Dullingham	35,991	40,392
Stansted Airport	116,659	134,324
Audley End	30,376	35,077
TOTALS	**315,420**	**352,135**
Total Haverhill Line catchment population	**91,104**	**100,693**
% of total population	**29%**	**29%**
Haverhill urban as % of Line population	**30%**	**28%**

Notes:
Some parish populations have been shared between 2 or 3 railheads.
2041 parish population growth is based on past 10-20 year growth history.

53. These numbers are large and exciting news which demonstrate the relevance of a new Haverhill Line – and scope for rail-based initiatives elsewhere to support the economic growth of Greater Cambridge.

54. The potential catchment population for the Haverhill Line is three to six times larger than if just based on the Haverhill urban area.

Population growth and economic development

55. Tables 1 and 2 compare a notional population for the catchment zone by 2041, which shows an average 12% growth over the twenty-year period, based on the previous 10-20 years' track record of population change in each parish. The population of Haverhill could rise to 28,600, which is in line with the nominal plan from the early 70s for Haverhill to grow to a population of just under 30,000 and then possibly stop.

56. Or Haverhill may just carry on growing, as it is going to be easier for West Suffolk District Council or Suffolk County Council to provide for more people by expanding an existing urban zone. For example, might Withersfield to the north become part of a Greater Haverhill built up area within the next 10 or 15 years?

57. The Greater Cambridge economy can be well served by three further actions:

- Investment in the Mid-Anglia Line, including designating a quality railhead with strong services in the Dullingham area [Six Mile Bottom might also be relevant].
- Changes in access and parking rules at Stansted Airport station would help that interchange to become a railhead for Cambridge. Audley End could also be more effective for travel northwards as well as towards the Lea Valley and London.
- At these last two stations, parking capacity, availability and parking charges should be considered with Cambridge destinations in mind, not just for airport parking and London commuting [car park availability and pricing could be linked to rail tickets].

The potential impact on the Haverhill ridership of service improvements on other lines

58. The differential proximity to railheads shown above will vary with improvements to service frequency and / or overall journey times on other lines. Many parishes have other travel options only a minute or two different, so that journey quality could be a significant influence as well as end-to-end times.

59. Dullingham, Stansted and Audley End all serve parishes in a Haverhill Line catchment. We must be aware of the knock-on effects on other lines, and campaigns to improve services on those lines, of the modelling assumptions made for Haverhill.

60. A review of development options around East Cambridgeshire and West Suffolk, reveals that Six Mile Bottom is likely to become a major development site. There is a proposal for between 7,000 - 10,000 new houses at 'Westley Green', adding up to 24,000 population increase there. This development has proposed a station near Six Mile Bottom and would be a candidate for rail heading.

61. A new station at Six Mile Bottom will focus the Haverhill and Linton catchment parishes further south, so the outreach from the Haverhill Line will not go as far as it might have done had the Newmarket line stations not been there.

62. The loss of numbers from the intervening parish populations nearer Six Mile Bottom and Dullingham is not going to dent the case for a Haverhill railway. It is more that the extra passenger growth from rural catchments will be less than if all Cambridge travel was allocated via the A1307 corridor.

Part B - Likelihood of travel by rail

Factors influencing willingness to travel

63. The next stage of the research has been to qualify these catchment area populations, by recognising that people have many options for work locations, not just polycentric Cambridge. There are lifestyle preferences, including post-Covid to opt for a different work-life balance. A higher priority given to leisure time, and a population which lives longer and has more time for other activities, will also influence (favourably) the demand for off-peak and weekend travel vs peak-time.

64. We don't assume that 100% of the people who would be attracted to travel for work will head towards Cambridge. It is a more dynamic picture, and for rail demand the nominal population must be proportioned to reflect:

- Local disinclination to travel long distances / times (it varies by parish).
- Range of job choices not just around Greater Cambridge.
- Willingness to use rail.
- Peak / off-peak travel proportions.

Part B1: Employment Issues

65. Cambridge City has the largest regional jobs requirement, and its average rates of pay are higher than elsewhere. However, the parishes / wards accessible via the Haverhill-Cambridge corridor show:

(i) After analysis of the available statistics, differing pre-dispositions to short or long distances for travel to workplace.
(ii) A significant scale of employment elsewhere which must be factored in.

(i) Assessing willingness to travel as far as Cambridge

66. **First** is to judge each parish's willingness to travel distances to work which are equal to as far as Cambridge. Plugging in Travel to Work (TTW) mileages, creates an estimate of 'interested population'. See technical summary below for how this was derived. [3]

67. There are multiple employment sites around Cambridge. However, Haverhill itself has many jobs, which was a starting basis for overspill towns. People may be able to go

[3] Usually, willingness to travel distances to work should be fairly simple, looking at Travel to Work (TTW) tables in the decennial Census. However, the 2021 Census was during Covid lock-down – OK for population numbers, but with spurious data for propensity to travel to work in the English TTW. [Scotland was wiser and did its TTW survey in 2022.] So JRC took the ward 2011 TTW data. Matching those with the 2021 wards (some are now different areas and names…!) gives a data base, in rounded numbers, to proportion distances for travel-to-work by *parishes* in each ward. A scale was developed to reflect those who demonstrated in 2011 that they travelled to work on average as far as Cambridge, or further or shorter. The sliding scale started at 100%, if on average (or better) 50% of ward travel-to-work went as far as **a Cambridge-equivalent** distance. The percentage reduced as average TTW mileages dropped. [The Census relies on a straight-line TTW estimate of mileage.]

easily by car to workplaces like Stansted and Bury St Edmunds. Newmarket's equestrian economy and job market tend to be internalised, but some people go there. Colchester and Chelmsford can be longer journeys, exerting a weaker pull. So, for travel planning purposes, how do you reduce the population from each parish to that proportion likely to seek work in Cambridge? Then, who are willing to use rail?

(ii) Choice of destination

68. **Second** is to adjust possible travel demand, to reflect alternative choices for equivalent distance travel. Income matters, so this should **weight the economic merit of competing destinations**. Cambridge City and its enveloping area South Cambridgeshire offer higher value average earnings, compared to other possible destinations. For estimation details, see footnote. [4] Table 3 shows the output.

Table 3 – 2021 Jobs, rail-mode feasibility and economic value

	Cambridge City	South Cambs	Greater Cambridge	Braintree	W. Suffolk NO public data	East Cambs	Babergh	Colchester		
Total jobs	118,000	98,000	216,000	66,000	*73,000*	39,000	39,000	94,000		
Gross week's pay median	£748.60	£767.70	£757.27	£574.90	*£600.00*	£637.80	£587.50	£699.70		
Gross area income (£m)	£4,609	£3,926	£8,535	£1,980	*£2,285*	£1,298	£1,196	£3,432		
Total Employee Jobs	*109,560*	*85,660*	195,220	*52,300*	*63,235*	*31,960*	*32,150*	*81,280*		
% of population	75.2%	52.8%	63.4%	33.7%	35.1%	36.4%	34.8%	42.2%		
Full-Time (proportioned to	*76,001*	63,747	139,748	34,538	*42,614*	21,973	20,094	50,173		
Part-Time (proportioned to	*33,559*	21,913	55,472	17,762	*20,621*	9,988	12,056	31,107	Gtr CBG %	Other %
Rail-feasible jobs £m value	3,330	2,183	5,522	799	1,025	561	452	1,725	55%	45%
Rail-feasible jobs	85,250	54,500	139,750	26,650	32,751	16,850	14,750	47,250	50%	50%
Other mode jobs	24,310	31,160	55,470	25,650	30,483	15,110	17,400	34,030	31%	69%

69. Understanding such proportioning has enabled an approximation to be made of the jobs potential for rail travel using the proposed Cambridge to Haverhill corridor. The income-focused share of possible rail-feasible jobs is 55% towards Greater Cambridge, and 45% for non-Greater Cambridge jobs (though the actual number of non-Greater Cambridge jobs that are really feasible by rail will be much smaller).

70. Taking this spread to reflect the economic worth and applying only the Cambridge City share (60%) of rail-feasible jobs within Greater Cambridge, further reduces the parish populations willing to go by rail. A post-Covid factor has then been applied, to reduce the effective commuting population by an average 30% to reflect fewer journeys to work each week (equivalent to 3-4 days per week in work premises). Manual and service jobs and specialist research work will require higher attendance rates; however, 30% off-work gives a cautious estimate.

[4] Defining the initial proportioning numbers has been tackled by:

- Collating the employment numbers by type of job across the Districts from Cambridge City to Colchester, including the Haverhill corridor (West Suffolk data estimated from proportioning).
- Distinguishing between types of job that are well suited to rail commuting, and those which aren't.

These jobs are then valued in three ways:

- Total jobs in each group, with their relative worth measured as yearly gross average income per job (based on the theory that people commute to where money talks) – ratio 55:45 for Greater Cambridge.
- Measured as rail-feasible jobs, without income skew, puts the ratio at 50:50 between Greater Cambridge and elsewhere.
- Measuring non-rail feasible jobs gives Greater Cambridge only 31% of such travel, 69% to elsewhere.

71. All the preceding points summarise as: Willingness to travel as far as Cambridge; then Value of jobs linked to Cambridge; then Rail-feasible jobs; then a post-Covid factor. This brings us to the big point, that **rail to Cambridge will help Haverhill and its neighbouring rural economies, by 'bringing home' valuable earnings from Greater Cambridge.**

72. The rail-feasible travel numbers for this estimation are set out below, for 2021 and nominal 2041 populations, and for the fastest overall journey or for a 5-minute slower journey. They do not specify a precise modal share but show the potential demand for rail *if all the factors aligned favourably*. The better the rail service, the closer the actual outcome could be. However, the practical modal split will initially be much less, and this is discussed in Part B3.

Table 4 - Economically active parish populations

with rail commuting potential to Cambridge City (based on fastest overall time to Cambridge South)	2021	2041
Railheads		
Haverhill area urban wards	2,621	2,770
External parishes, via Haverhill Parkway	5,536	6,251
Linton	4,083	4,467
Bury St. Edmunds (local catchment only)	785	792
Dullingham	828	956
Stansted Airport	5,097	5,945
Audley End	753	896
TOTALS	19,701	22,075

Table 5 - Economically active parish populations

with rail commuting potential to Cambridge City (based on 5 minute slower journey on Haverhill Line)	2021	2041
Railheads		
Haverhill area urban wards	2,621	2,770
External parishes, via Haverhill Parkway	2,792	3,169
Linton	1,311	1,314
Bury St. Edmunds (local catchment only)	785	792
Dullingham	2,379	2,629
Stansted Airport	6,405	7,469
Audley End	3,409	3,933
TOTALS	19,701	22,075

73. The difference in demand between Tables 4 and 5 is because some potential for commuting to Cambridge City by rail has been displaced from the Haverhill Line with the slower journey time then modelled.

74. The rail potential does not go away, and Table 4 shows that it re-emerges at other railheads, which are still faster than car or park-and-bus ride options. Demand could of course re-emerge as commuting by car and bus, as less efficient use of time, however the modelling demonstrates that rail can become an effective way of getting to Cambridge (modelled in this analysis as Cambridge South).

75. Note that the estimates above have excluded workplaces in South Cambridgeshire, some of which are rail-accessible with jobs suited to travel by main-flow and reverse-flow commuting by rail, such as Babraham and Granta Park; also, Haverhill itself, which is within West Suffolk.

76. For the Haverhill Line, the potential points towards a desirable frequency of at least 4 trains or tram-trains per hour in peak periods, with high passenger capacities and potentially some standee accommodation. Required car parking capacities could be considerable, along with related access road and junction improvements. Implied passenger numbers also point towards significant rail travel from the other nominated railheads, requiring increases in their service levels and train capacities.

77. The potential demand is in a different league to that which could be achieved by any practical bus service options. Also, the bus services would be slower than even a slow rail journey, so would not have the same competitive strength vs. the car to attract the passenger volume which appears possible for rail.

Part B2: General propensity to travel or commute

78. The principle of a 'time budget' for activities every weekday, week or month is well established. People balance their use of time across activities. For general travel, an hour's journey might not be liked but is often tolerated, and longer can be acceptable if there are perceived benefits from the extra time (and/or distance).

79. In a previous JRC modelling scenario, nominal times by road to and from the principal regional city were nearly 1 hour in off-peak periods (longer in peaks), while the rail journey varied between 70 and 85 minutes and the actual door-to-door journey using public transport could be up to 2 hours. Adoption of a 1-hour time budget gave a measurable baseline of likelihood of travel – and of willingness to travel by different modes depending on their variation from a 1 hour 'norm'. Travel from individual parishes could be proportioned against this baseline. The modelled results for passenger demand were credible, for railway planning.

80. JRC proposes that a 1-hour baseline time budget is adopted also for the Greater Cambridge catchment. Many journeys *within* the City are much shorter – and walking and cycling journey times are much less at risk of delays from congestion (though cycle parking can be a problem!). However, car travel, and bus and rail, suffer from considerable congestion either navigating round the City's built-up areas, or during travel to the multiple, polycentric destinations around the city region.

81. A 1-hour time budget for general travel fits Haverhill well, as it can reflect the variability of typical journey times to Greater Cambridge. Changes in journey time can be reflected in gains or reductions in willingness to travel. To take extreme examples, if Haverhill were only about a half hour door-to-door from destinations within Cambridge, and had a good service, one might expect a considerable increase in travel between the two communities, subject to GJT modelling rules. [5] The reverse if it were 2 hours' travel and low frequency.

82. Evidence for variability in travel preference is summarised in Table 6 which shows usage of stations, the straight-line distance to Cambridge, and the service frequency and passenger numbers. There is much variability, particularly with differences between catchment towns which have a large 'dormitory' population who work elsewhere, and those whose main travel to work is more local.

83. Lower numbers of total 'rides per head' are evident at many Anglian towns. However, the Cambridge 'pull' is evident on the Fen Line and the West Anglia and Great Northern Lines, and close by on the Mid-Anglia Line which has a weaker service.

Table 6 – Spread of rail travel demand, and specific Cambridge travel during 2021-22

ROUTE	Railhead	Nearby pop 2021	Rail jnys. 2018-19	Rail rides 1819/head	Rail jnys. 2021-22	Rail rides 2122/head	Rail jnys. 2022-23	Rail rides 2223/head	Camb(CM,CN 2122 rail jny	CBG trains typical/hr.	Miles to Ctl.Cbridge Straight line	Jny. time mins.	Camb.rides per head	Cambridge % rail jnys	CBG jnys 2021-22	CMB jnys 2021-22	CBG rank	CMB rank	Difference Blue>CBG Red>CMB	Commentary
Fen Line	King's Lynn	50,846	991,252	19	683,706	13	757,034	15	166,538	1-2	40		3.3	24%	155,452	11,086	4	5	1	Ranking = stronger proportionate demand at Cambridge North, probably related to shorter journey time by direct trains
	Watlington	4,162	153,782	37	105,886	25	107,724	26	26,436	1-2	34		6.4	25%	23,970	2,466	29	22	-7	
	Downham Mkt	14,549	549,562	38	341,550	23	386,270	27	98,126	1-2	30		6.7	29%	91,626	6,500	17	9	-8	
	Littleport	9,911	248,808	25	153,660	16	186,752	19	75,742	1-2	19		7.6	49%	69,708	6,034	19	10	-9	
Norwich Line	Norwich	237,084	4,250,834	18	3,213,504	14	3,963,948	17	125,892	1	58		0.5	4%	110,284	15,608	10	2	-8	
	Wymondham	17,496	200,332	11	150,466	9	196,452	11	15,336	1	49		0.9	10%	13,612	1,724	39	28	-11	
	Attleborough	13,428	163,062	12	131,918	10	168,896	13	9,672	1	44		0.7	7%	8,502	1,170	47	34	-13	
	Thetford	26,128	299,752	11	226,022	9	276,522	11	25,764	1	30		1.0	11%	23,294	2,470	31	21	-10	
	Brandon	12,880	117,798	9	93,682	7	115,102	9	18,678	1	27		1.5	20%	15,844	2,834	36	19	-17	
X-Country	Peterborough	191,899	5,059,576	26	3,719,850	19	4,519,016	24	102,930		30		0.5	3%	98,740	4,190	13	16	3	Mixed results, line not pulling its weight at intermediate stations
	Whittlesea	8,594	31,986	4	26,436	3	33,738	4	1,528		27		0.2	6%	1,386	142	62	53	-9	
	Wisbech ?	38,551	0	0	0	0	0	0	0		32		0.0	0%						
	March	25,340	407,914	16	251,638	10	305,354	12	55,530		24		2.2	22%	53,960	1,570	21	29	8	
	Manea	2,810	18,950	7	16,192	6	21,038	7	3,610		19		1.3	22%	3,512	98	55	58	3	
Fen Line	Ely	20,576	2,386,744	116	1,634,548	79	1,894,014	92	922,984	4+	15	14-21 /	44.9	56%	851,000	71,984	1	1	0	Strong demand where direct trains
	Soham (NEW)	12,336	0	0	14,196	1	55,518	5	3,560	½	13		0.3	25%	3,290	270	56	47	-9	
	Waterbeach	5,594	407,650	73	265,180	47	309,130	55	157,384	4+	5	14-21 /	28.1	59%	146,000	11,384	6	4	-2	
Mid-Anglia Line	Ipswich	176,903	3,416,026	19	2,125,686	12	2,682,574	15	46,642	1	45		0.3	2%	45,180	1,462	23	31	8	Less convenient to reach Cambridge North, as have to change at Cambridge Main
	Needham M.	6,012	102,320	17	79,196	13	94,148	16	4,806	1	40		0.8	6%	4,770	36	53	65	12	
	Stowmarket	28,430	967,114	34	615,232	22	764,552	27	15,856	1	37		0.6	3%	15,476	380	37	43	6	
	Elmswell	5,003	71,078	14	67,164	13	91,892	18	8,530	1	34		1.7	13%	8,228	302	49	45	-4	
	Thurston	4,894	77,592	16	76,036	16	95,720	20	10,734	1	29		2.2	14%	10,546	188	44	51	7	
	Bury St. Ed.	48,574	665,112	14	564,972	12	698,282	14	120,818	1	25		2.5	21%	118,068	2,750	8	20	12	
	Kennett	8,036	42,684	5	36,538	5	43,782	5	23,680	½	16		2.9	65%	23,354	326	30	44	14	
	Newmarket	20,913	355,068	17	255,860	12	303,332	15	150,880	1	12	19-26 x	7.2	59%	148,426	2,454	5	23	18	
	Dullingham	1,986	41,832	21	22,798	11	25,314	13	18,230	½	11		9.2	80%	18,150	80	34	60	26	
CAMB	CAMBRIDGE N.		812,972		659,478		1,074,602				excl. travel									**Camb. travel is ½ of origin stations' volume**
	CAMBRIDGE M	178,217	11,983,320	72	6,878,646	42	9,341,600	58	3,755,112		CMB < >			50%						
	CAMBRIDGE S.		0		0		0				CBG (74,134)									
West Anglia Main Line	Shelford	7,309	207,478	28	140,840	19	170,262	23	99,438	1-2	4		13.6	71%	93,632	5,806	15	11	-4	Variable demand at Cambridge North, and lack of through services - more through trains would be further help
	Whittlesford	8,000	558,134	70	291,808	36	376,432	47	115,866	2-4	7		14.5	40%	105,458	10,408	11	7	-4	
	Gt. Chest'ford	3,066	110,120	36	77,954	25	86,096	28	42,948	1-2	10		14.0	55%	39,652	3,296	25	17	-8	
	Audley End	21,344	979,414	46	502,644	24	623,570	29	145,650	3-5	14		6.8	29%	140,364	5,286	7	12	5	
	Newport	4,456	188,094	42	167,346	38	198,334	45	42,904	1-2	16		9.6	26%	41,376	1,528	24	30	6	
	Elsenham	6,655	252,716	38	155,610	23	191,746	29	17,292	1-2	20		2.6	11%	16,044	1,248	35	32	-3	
	Stansted Apt.	80,000	9,773,870	122	3,368,742	42	7,906,474	99	190,750	1-2	23		2.4	6%	177,294	13,456	3	3	0	
	Stansted Mft.	9,341	599,478	64	406,316	43	455,236	49	32,388	1-2	21		3.5	8%	30,634	1,754	28	27	-1	
Great Northern Line	Foxton	3,649	101,990	28	75,252	21	87,794	24	51,394		6		14.1	68%	49,590	1,804	22	26	4	Proportionately stronger demand via Cambridge Main, mainly from Stevenage northwards
	Shepreth	3,171	115,600	36	68,718	22	91,082	29	39,700		7		12.5	58%	37,850	1,850	26	25	-1	
	Meldreth	7,014	295,470	42	181,362	26	217,158	31	117,402		9		16.7	65%	112,554	4,848	9	13	4	
	Royston	21,656	1,467,154	68	835,428	39	1,081,014	50	257,096	2-4	12	14-21 x	11.9	31%	246,332	10,764	2	6	4	
	Ashwell & M.	5,349	156,490	29	104,212	19	140,696	26	38,294		16		7.2	37%	37,542	752	27	38	11	
	Baldock	10,617	637,664	60	387,170	36	502,586	47	57,776		20		5.4	15%	56,532	1,244	20	33	13	
	Letchworth	34,324	1,856,558	54	1,189,236	35	1,471,004	43	93,972		22		2.7	8%	89,162	4,810	18	14	-4	
	Hitchin	40,826	3,265,142	80	1,981,466	49	2,512,254	62	105,856		24		2.6	5%	102,710	3,146	12	18	6	
	Stevenage	96,727	4,794,974	50	3,384,604	35	4,050,328	42	96,500		25		1.0	3%	91,864	4,636	16	15	-1	

[5] Generalised Journey Time (GJT) projects a 60% proportionate effect on demand over several years, for a measured change of journey time.

84. JRC has proportioned the Haverhill catchments' door-to-door times, as set out in the core analyses for each mode of travel (and, for car, the travel period, peak or off-peak). Journeys taking over 1 hour door-to-door are reduced in number, in proportion to the 'excess travel time' over the 1-hour budget.

85. There is a reasonable question, whether the proportioning should be linear to the change in travel time (as modelled), or also linked to other factors. This will require extensive research, comparing different towns and cities, to see which other factors, including demography, local jobs availability and ease of travel, are most influential. Meanwhile JRC makes an underlying presumption that Haverhill will have an attractive service frequency, so that rail service quality is not a hindrance.

86. As a precaution, the preceding Cambridge-proportioning data has been applied to the total population in each parish, recognising that some parishes do have a strong disinclination to travel a similar distance as Cambridge. This is intended as a broad indicator how the parish generally fits in with the wider regional disposition of workplaces, and other travel-intensive activities such as health and education, primary shopping centres and main leisure destinations. The revised estimates reduce the risks of over-estimating travel to or via Cambridge. [6]

87. The adjusted parish populations are summarised below, by railhead, and can be compared with Tables 1 and 2.

Table 7 - Parish populations with time budget limit and rail travel potential to Cambridge City (based on fastest overall time to Cambridge South)	**2021**	**2041**
Railheads		
Haverhill area urban wards	5,674	6,002
External parishes, via Haverhill Parkway	15,707	17,988
Linton	6,763	7,459
Bury St. Edmunds (local catchment only)	6,062	6,114
Dullingham	1,828	2,131
Stansted Airport	13,142	15,096
Audley End	1,089	1,302
TOTALS (represent evening / weekend population)	**50,266**	**56,092**
Implied off-peak railhead pop. (incl. 30% non-commute)	**30,565**	**34,016**
Haverhill Line inter-peak population (outer service)	**15,905**	**17,961**

[6] As commented in para.81, in a scenario which includes total journey times quicker than 1 hour, places which are closer in time might stimulate people to travel more often. This would be represented by a nominally larger population, as an inverse of the time ratio, to then be multiplied by a standard travel rate such as rides per head. This could arise at locations closer to Cambridge.

Table 8 - Parish populations with time budget limit and rail travel potential to Cambridge City (based on 5 minute slower journey on Haverhill Line)	2021	2041
Railheads		
Haverhill area urban wards	5,273	5,576
External parishes, via Haverhill Parkway	7,946	9,175
Linton	2,023	2,026
Bury St. Edmunds (local catchment only)	5,756	5,806
Dullingham	5,469	6,143
Stansted Airport	16,166	18,665
Audley End	4,844	5,590
TOTALS	47,475	52,980
Implied off-peak railhead pop. (incl. 30% non-commute)	28,559	31,696
Haverhill Line inter-peak population (outer service)	8,517	9,524

88. These numbers are credible for modelling off-peak hourly travel volumes on a Haverhill Line service. For example, only 5% of Haverhill Line inter-peak population, per hour, would be required for a slower service to attract 400 people to a rail journey. JRC recommends that analysis is developed to measure the proportions of local rail travel to/from Cambridge, allied to residential catchment populations.

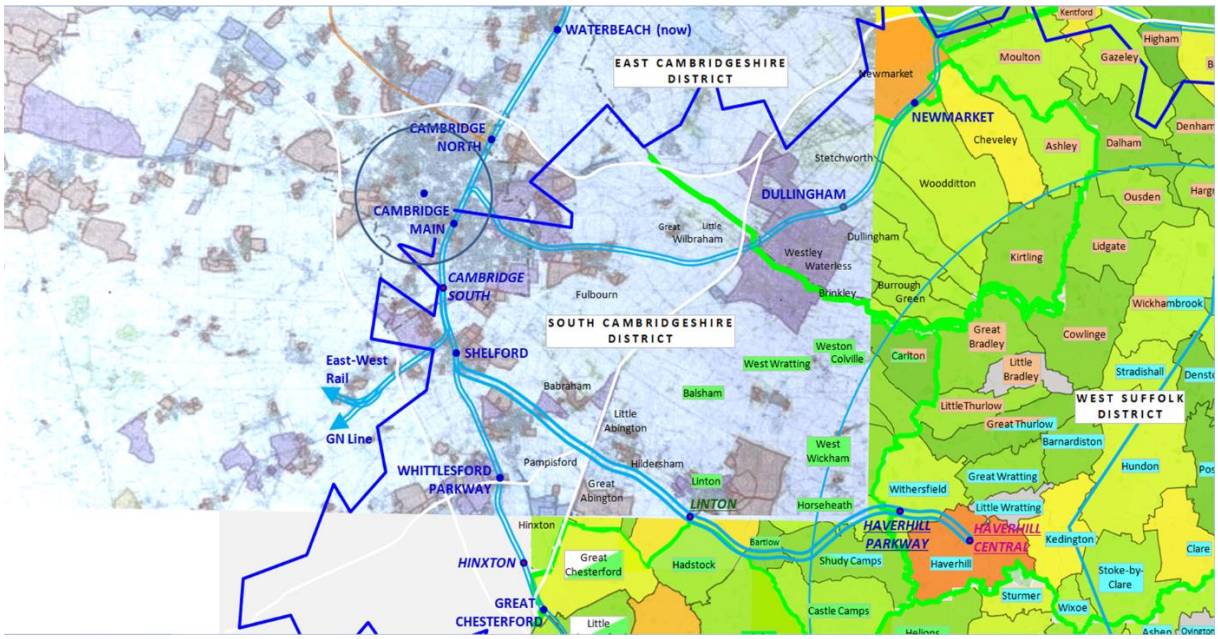
Comparative populations with travel by car or park & ride

89. Applying time budget rules to car journeys between parishes and Cambridge South, either direct or via a park & ride interchange at Fourwentways, will show that, for journeys where rail is suitable, car is weaker as a travel mode. This is because of road congestion and overall journey time in peak periods. This will not apply to every peak journey, because rail isn't suitable for all of them. Overall proportioning of job types by catchment Districts, suggested 55% in Cambridge City and South Cambs. were potentially rail-feasible, 60% of those within Cambridge City. There, rail could provide the opportunity for the maximum number of people from catchment parishes to secure good earnings in the City and return that income into the rural areas, as more people could find it quicker to make the work journey to and from Cambridge.

Influence of new housing proposals in railhead catchments

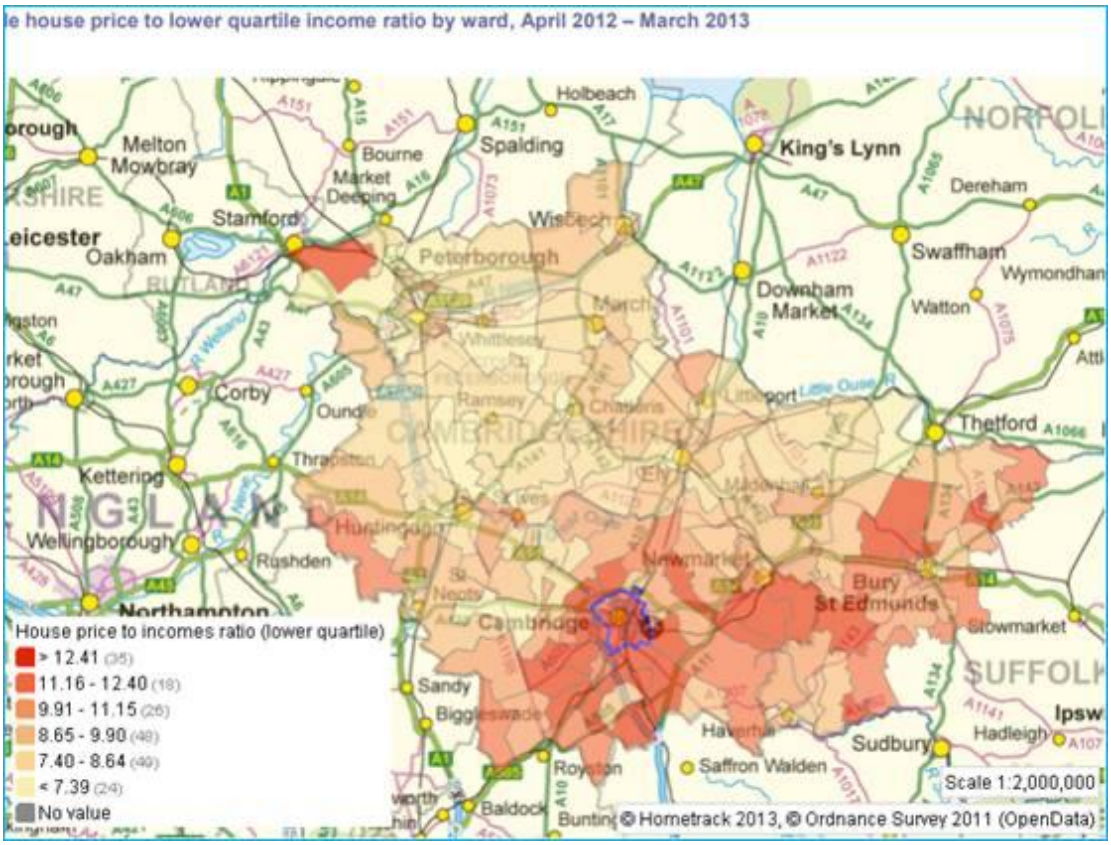
90. There is the 'chicken and egg' reality, that strengthening the Haverhill-Cambridge corridor by opening a new rail link will influence peoples' willingness to move home to that corridor, and/or to travel further than they did before. This generative effect will increase the propensity to travel to work in Greater Cambridge, and to intermediate jobs locations such as the various research Campuses. The map overleaf shows multiple development proposals that were current pre-Covid around Greater Cambridge. Railheads discussed in this report are overlaid. Significant locations are at Abington, Babraham, Linton, Sawston, Shelford and Six Mile Bottom.

Map 5 – Development proposals around Greater Cambridge in the pre-Covid period



91. House prices on the Cambridge-Haverhill corridor will also encourage people to move house and stimulate future demand for rail travel. The 2012-13 mapping below is from a report analysing Cambridgeshire economic factors.

Map 6 – Cambridgeshire economic context – house prices in 2012-13



92. All this strengthens the probability of the Haverhill-Cambridge corridor having a greater-than-average influence on where people will live and work in future years.

Part B3: Cambridge travel demand: practical and policy trends, and rail implications

93. Better access to Cambridge will stimulate parishes outside Cambridge City to compete for jobs currently filled by local Cambridge people who can walk, cycle or take the bus to work. This doesn't help Net Zero – but Cambridge City also needs lots of extra housing for working people, where Haverhill is already part of that solution.

94. So, there is a 'free market' – really a loosely directed one – where people travel from varying distances and journey times, from locations and by modes not necessarily of their choice. It can be argued that it is the unfortunate ones who can only afford a house outside high-priced Cambridge and have no realistic alternative but to waste several hours a day incurring congested, resource-consuming travel, with no other practical time-efficient choice, who would indeed benefit from a more-sustainable travel option.

95. We see that Cambridge City policies are starting to bite on car commuting. Strong restraints on additional car parking – not yet cutting back the present car parking supply - are now in force for Cambridge South. The current political proposal is an option for park-&-ride at Fourwentways on the A1307 corridor, with people effectively required to leave their cars mid-way between home and the bio-medical Campus. This faces considerable opposition because of the busway's environmental impact on the Gog Magog Hills.

Park-&-ride, or travel corridors further into catchments

96. This is a situation where vehicle pollution and traffic congestion could be played off against landscape pollution – not a great choice! In terms of travel choice, a park-&-ride limits the travel benefits of an alternative to cars, from catchments further east from Linton, Haverhill and beyond. Lengthy car commuting wasted time and poor sustainability would still be the order of the day outside Cambridge City, in South Cambridgeshire, West Suffolk and other local authorities.

97. Greater Cambridge's economic growth – people, and jobs – is expected to continue. This will lead to further car restraint policies at other pressure points around Cambridge City. Park-&-rides already have a considerable presence. However, a P&R 'ring' merely defends Cambridge City from the car pressures. It does not provide an inclusive approach which enables management of sustainable corridors for the commuting hinterland, by aiming economic growth at designated locations and planned housing and transport capacity on corridors which can absorb it.

Rail well placed to support Cambridge growth

98. Cambridge is well positioned to adopt such priority corridors as a core policy. The railway is investing, with regional support, in extra transport hubs at **Cambridge North** near the Science Park, and by the bio-medical Campus at **Cambridge South**. The main north-south rail corridor between them, via Cambridge Main station, can be developed to become a strong 'Metro' with frequent services, with routes radiating from that. [7]

- **Cambridge North** opened in 2017 and can develop its catchment fully post-Covid. It was already handling more than one million passengers in 2022-23, and further growth is foreseen.
- **Cambridge Main** station handled 12 million passengers in 2018-19 and recovered to 9+ million passengers by 2022-23. It will get busier.
- The new **Cambridge S**outh station will open in 2025 and serve expanding southern residential catchments and the enlarged bio-medical Campus which offers 25,000+ jobs and has a high volume of visitors.

99. Giving high priority to these interchange hubs is a key strategic action, which will unlock practical constraints faced by rail travel in the city region. This is because time budgets are sensitive to the time costs of interchange, waiting and onwards travel. The Cambridge area rail demand analysis poses a question whether the shortfall at Cambridge Main (over a mile from the city centre and the main University) could be a reason for mostly low rail 'rides per head' rates in the wider region. [8]

100. With these hubs, and additional distribution from them, the railways can reach much of Cambridge City for commuting and leisure travel, with a positive scenario for the 2030s. This is important, to support and stimulate regional economic growth.

- The railways are still recovering from commuting losses during Covid, so usage numbers are lower than normal though the trend is back towards a 3½-4-day week, more in manual and service industries such as scientific establishments. Better accessibility will stimulate a general willingness to travel to work again.

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[7] Eventually, service capacity needs along that corridor might require full 4-tracking, or supplementary light rail/busway 'tracks. Either way, evidence is emerging from the Cambridge area demand analysis that rail services should go the full distance to the transport hub at the further end, to maximise rail's scope to achieve good distribution capability around and across Cambridge City.

This is because, with any scale of time budget, interchange and distribution travel times are a significant penalty, and travel volumes are impaired. Good quality hubs minimise penalties, while trains running through to the further hub on the other side of the city will avoid further penalties of interchange and waiting at Cambridge Main – and simplify train operating complexities there. A high-capacity corridor will also underpin the proposal for a tram-based Cambridge Metro into and beyond the city centre (as a CAM replacement).

[8] Modelling based on Cambridge South as a destination has avoided those penalties, which may arise particularly with travel to the city centre and to research Campuses on the city's western fringe. Current travel to/from Haverhill has already factored travel time penalties into that journey, as part of an explicit choice that housing costs in or near Cambridge are a greater penalty.

- 50,000 commuting into Cambridge City is the current baseline, of which rail in 2021-22 carried about 10%. That might be closer to 15% with full recovery from Covid. Additional jobs allied to economic growth, will require more households who generally will be located elsewhere in the Cambridge commuting catchment. [9]
- Car restraint policies and lack of new road capacity will require new housing to be planned to enable extensive use of bus, rail and active travel. These modes should plan for rapid growth in frequency and capacity, not a marginal growth as if there were a 'free market'. In turn, this will ensure that the Anglian economic engine maintains good progress.

101. The rail network in the Cambridge region already links populations of over 420,000 to Cambridge, with six railways. [10] Railway proposals under active consideration are the lines from Haverhill, and from Wisbech, which would join towns with another 70,000. The St Ives busway serves 60,000, including the new town of Northstowe. JRC research into a Haverhill Line has shown a rural parish catchment population accessible to this railway using outer railheads, of over 120,000. Rural accessibility is achievable elsewhere, using similar access investment in outer railheads.

102. Cumulatively there is a town-based catchment population of 550,000 in the Cambridge city region, served by existing and proposed public transport corridors. Half of this population is economically active. Town population growth of at least 10% in the next two decades would ensure availability of another 28,000 employees – 35,000 and more if including rural catchments – who, as discussed above, will rely more than now on public transport for their journey to work. That points to a quadrupling of current train and busway capacity – not necessarily line capacity! – to have a strong starting proposition, plus the bonus of the catchments opened from Haverhill and Wisbech.

103. To this should be added the new orbital 'economic belt' intended by the government with the support of sub-national transport bodies. This is the East West Rail (EWR) project, which is to be combined with new large-scale housing and business expansion. East West Rail will run from Oxford to MK, Bedford and Cambridge, and beyond in both directions if this proves possible. [11] Within Greater Cambridge, EWR would serve Cambourne new town, and join the main rail corridor at Cambridge South before reaching Cambridge Main. This reinforces Cambridge South as a hub and national railway interchange, and in turn helps the demand case for a Haverhill railway, which via Cambridge South would secure quick access to a national transport corridor bypassing London, serving large regional cities, and connecting with northern and western main lines.

[9] Cambridge Airport is the last major site which would allow extra housing within the City.

[10] Fen Line to Ely and King's Lynn, 120,000; Norwich Line as far as Thetford, 40,000; Cross-Country Line as far as March, 30,000; Mid-Anglia Line as far as Elmswell, 70,000; West Anglia Main Line as far as Stansted Mountfitchet, 60,000; Great Northern Line as far as Letchworth, 86,000.

[11] EWR Phase 1 (Oxford-MK) is nearing completion. The EWR Central section between MK and Cambridge has now been defined. Subject to funding and powers being granted, it might open around 2030. A minimum of 4 trains per hour each way is planned for.

Part C – Route options between Haverhill and Cambridge

104. Assessment of a route between Haverhill and Cambridge began with consideration of the former railway alignment, as set out in para. 12 onwards. Options could include heavy rail or tram/train (which gives some light rail characteristics and might be important to accommodate on non-main line tracks northwards from Cambridge South interchange – see footnote 7).

105. This led quickly to a requirement for a basic route specification, selection of possible stations, and outline train timings which could accommodate possible changes to routeing, line speeds, etc. Station choices for the A1307 routeing were set out in detail in paras.18-27. The timing model is now described briefly and is available separately.

Haverhill-Cambridge timetable model

106. JRC has developed a spreadsheet-based timing model which allows determination of the running time over a rail system, using rolling stock performance characteristics to assess permitted or prospective line speeds, running times between stops, and other network features such as junctions, restrictions, etc.

107. Network Rail's Sectional Appendix data is used where relevant, and equivalent data has been created for the proposed new sections of railway. A modern line speed of 75 mph has been assumed except for the curviest section limited to 60 mph, and a further timing allowance at Shelford Junction (which might not be a junction!). This gives a first estimate for possible 'heavy rail' timings of 20½ minutes (rounded to 21) for Haverhill Parkway to Cambridge South, and another 3 from Haverhill Central. A slower speed is allowed for, from Shelford to Cambridge South.

108. Some assumptions and modelling consequences are enlarged on below – they are important.

- Firstly, adding in/rounding up to 30+ minutes for interchange and waiting time at Haverhill Parkway creates a further, nominal 30-minute isochrone to show the comparable effective rural catchment for Haverhill Parkway compared to direct drive-time to/from Cambridge South.
- There is trade-off between a large rural population catchment with a quick journey, or a smaller catchment because of a slower journey which includes outer urban stops. This is clear from the modelling of residential populations in Part A. It becomes more important if a time budget penalty were also applied.
- In consequence, no Haverhill trains are modelled to call at Shelford in this first estimation. A stop would reduce the effectiveness of the Haverhill railway for the primary (though not the only) purpose which is getting people to Cambridge South/Main/City via Main/North in a competitive time vs car.
- Many Haverhill Line passengers wanting to travel south on WAML are in any event likely either to travel by car to Audley End / Whittlesford or change to fast WAML trains at Cambridge South (note that Central London is quicker still via Cambridge South and KX trains). Basically, Cambridge South becomes the interchange hub,

replacing any Shelford option. Shelford-Cambridge travel needs can be met by WAML trains and/or options for inner services on the Haverhill Line.

- A further implication is that an alignment giving fast timings is important west of Linton, including (if adopted) allowance for local stops and at Granta Park, Babraham Campus and elsewhere on the Haverhill 'main line' without any additional speed restrictions.

109. It is accepted that there is merit in researching the local travel demand requirements from Granta Park and west, for a judgment then to be taken about the right balance of alignment / service volume / fast & slow trains (or tram/trains) and net demand / revenue / benefit implications of different service and journey time mixes. This is not going to be easy or quick to do and is beyond the scope of this project.

110. The right specification for rail vehicles will also be essential – for example, to consider large capacity, high acceleration/ braking tram/trains, capable of at least 75 mph.

Differences between a service for Haverhill, and closer to Cambridge

111. The timetable modelling exposes the differences between serving the further-afield catchment and serving communities closer to Cambridge who may need a service that can be regarded as a rail equivalent to the busway if a rail option is chosen.

112. The latest timetable modelling and route alignment within the Greater Cambridge urban area point to only a 1 minute longer journey time for a Haverhill service running via the research Campuses, providing that the Haverhill trains if routed via the A1307 corridor are not required to stop west of Babraham Campus – which is a matter for the inner/outer assessment, already mentioned.

113. The potential separation of the service into inner and outer elements also raises the question of whether the outer section could adopt a different route than the former railway. Haverhill is only about 10 miles from the nearest points on the existing Network Rail system (Littlebury or Six Mile Bottom), and somebody will look at the map and ask that such an option should be considered. This was noted in para.16.

114. JRC has researched this as it is probable that a Strategic Outline Business Case would ask fundamental questions about other transport options, such as a bus-only proposal or a rail route involving less railway construction than its historic alignment.

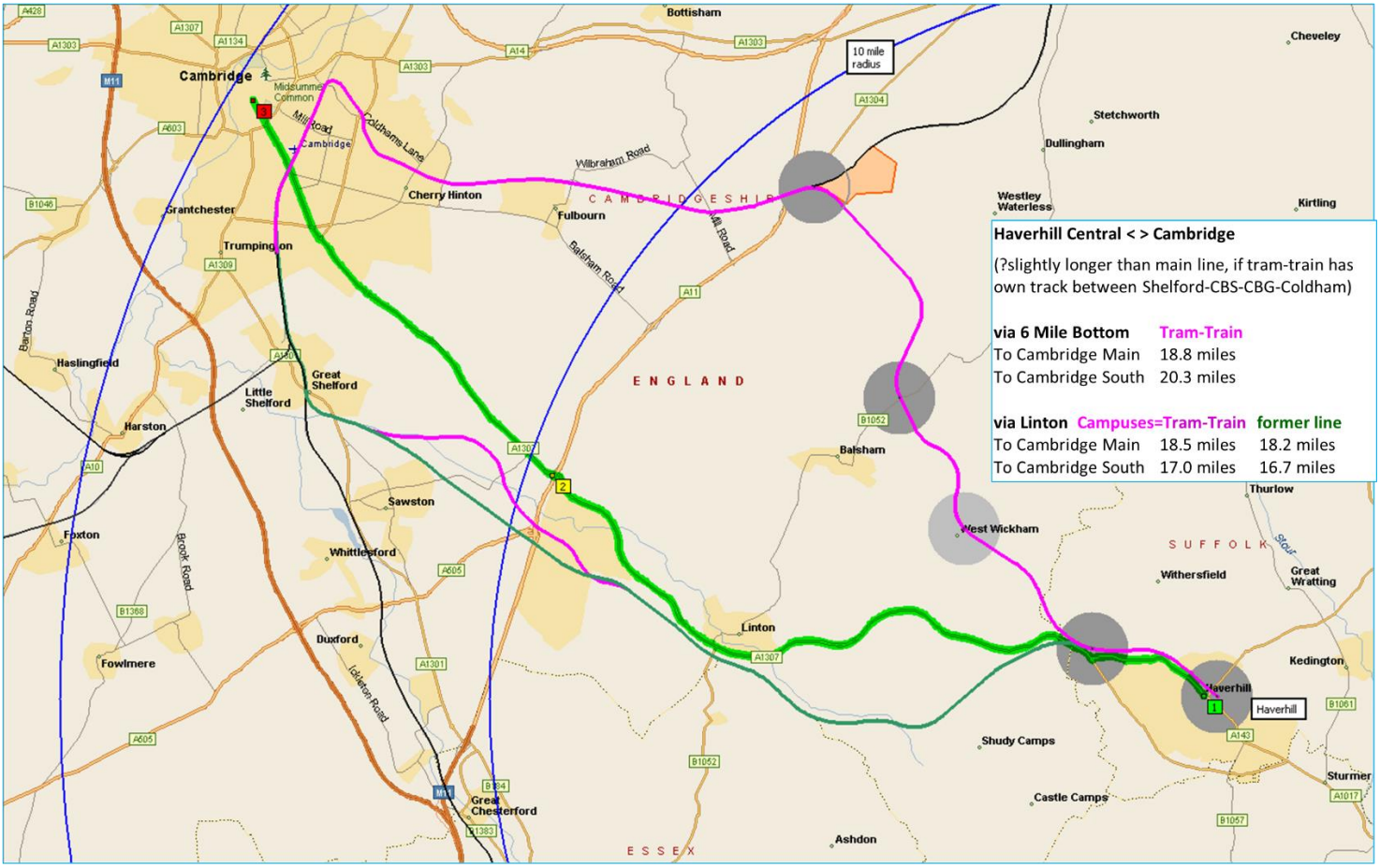
115. Mapping overleaf shows three rail options, the first two via the A1307 corridor with a variant to serve research Campuses directly, and a third testing a shorter new rail route via Six Mile Bottom.

116. They are all shown as having a terminus in Haverhill close to the site of the former Town Station, plus a new Haverhill Parkway. This station could be sited on the former railway alignment close to the north-west end of the Haverhill by-pass. This will give good road access to rail for both Haverhill and its large rural hinterland to the east

and south-east, being convenient for the Stour Valley from Clare, Long Melford and Sudbury, and for people travelling to Cambridge from Sible Hedingham and Halstead.

117. The Parkway station provides an effective rail based, outer park-&-ride station to minimise congestion on the A1307 (shown in bright green) between Linton, Addenbrookes Hospital and the intermediate business parks. That stretch of road is increasingly busy and adds a minimum of 20 minutes to car journey times in peaks.

Map 7 – Comparison of possible rail-based corridors for Haverhill



Route Option 1 – former rail line via A1307 corridor (dark green line**)**

118. This re-creates a rail link using the former railway alignment via Linton and Pampisford to Great Shelford and Cambridge. This route is 18.2 miles long of which 14.6 miles will be restored railway as far as Great Shelford. It will have to bridge across both the A11 and A505 roads in the Granta Park area. The original solum is largely intact save for being lost to the construction of the two dual carriageways.

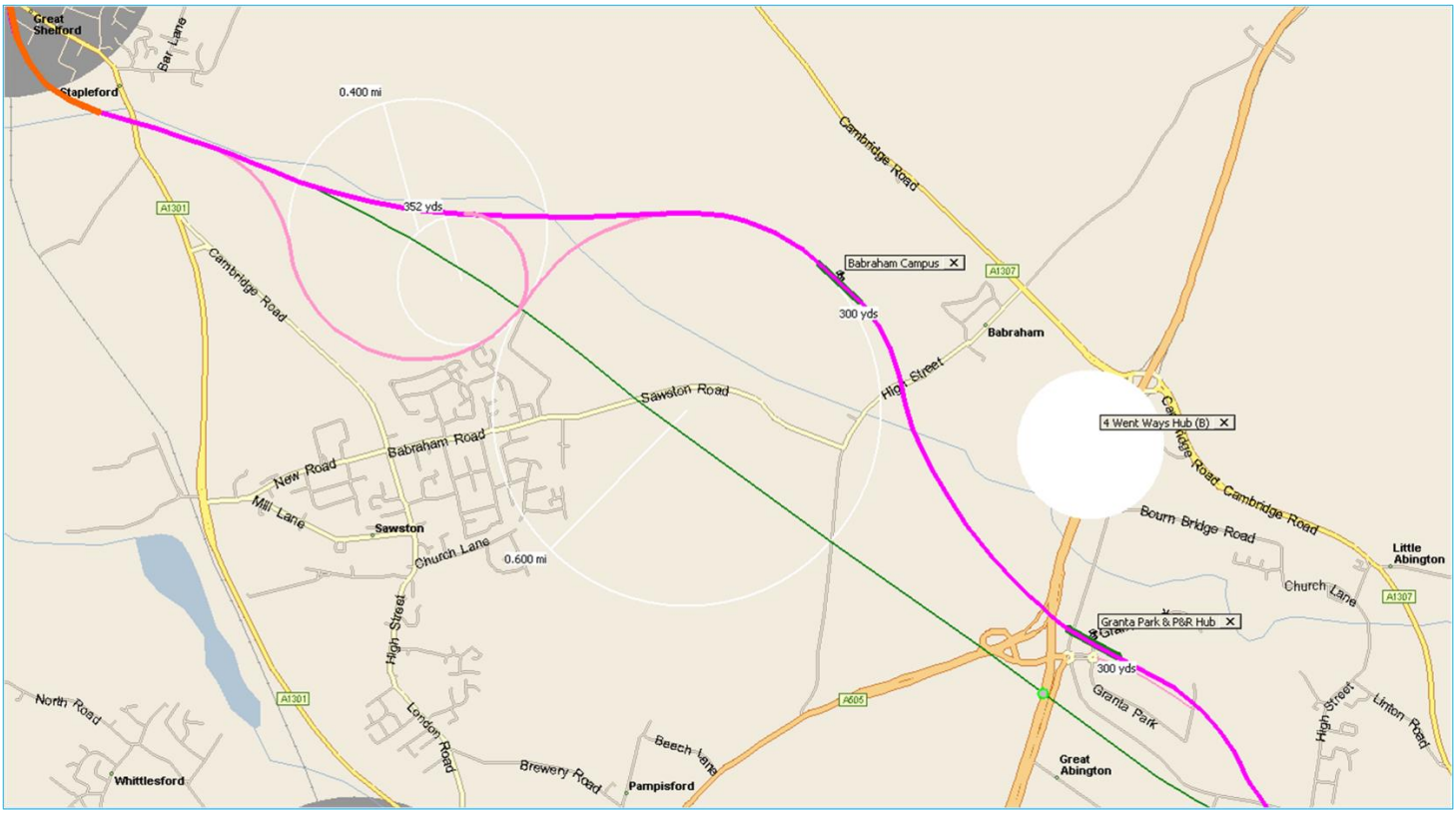
119. It does not provide good access to either Babraham Campus (at least a mile walks along a small, local road), or Granta Park where the former railway alignment will still mean a 15-minute walk to many businesses located across this busy site.

Route Option 2 – deviation from the former railway, via research parks (shown in pink)

120. This route follows the former railway to just beyond Linton where it diverts as a Light Rail option still enabling 75 mph, to run through Granta Park before heading in a north westerly direction to Babraham Campus before turning westwards to regain the original route before Great Shelford.

121. The Light Rail diversion adds 0.3 miles to the route length but only requires one bridge across the A11 whilst providing significantly better access to both major research Campuses, bringing thousands of jobs within a 5-minute walk of a tram-train stop.

Map 8 - More detail for a Light Rail alignment on the Shelford – A11 section



122. Map 8 shows a possible alignment for light rail between Shelford and Granta Park. It has been designed to include a possible local loop route via Cambridge City Amateur Football ground and North Sawston which would suit an LRT stopping service. The loop offers potential for a stopping service to be overtaken while on that loop by the up (to Cambridge) Haverhill fast, or leaving the Park & Ride earlier, routeing that way and still ahead of the up Haverhill fast when going through the possible Shelford single-track. The timetable must ensure adequate margin for return flighting.

123. If there were a large crowd demand from the Cambridge direction, then maybe a loop chord could be added for a quick insert tram-train on match days, which might conveniently fit in any flighting as the last out from the City and the first back in.

124. The A11 P&R hub should be located by the tram-train stop rather than at Fourwentways. Granta Park if with tram-train not heavy rail might benefit from a 2nd stop at the eastern end of the Campus where there are more research buildings.

125. JRC undertook additional mapping to model where it may be practicable to have a station or tram-train stops around the research park. The pink route is a result of having gone through detailed optioneering of possible routes relative to what's built on, what's not built on, locations of the car parks and entrances to buildings.

126. The railway will be the more effective if its proposed route can get closest to where businesses are sited within the research Campuses.

127. The research parks alignment is based on 0.6 mile radius curves (48 chains) which would permit 75 mph with modern cant standards so that tram-train speeds aren't affected by the curvier route compared to the former railway. The proposed stations would be significantly closer to the main work destinations in Granta Park and Babraham (and with Granta Park also doubling up as the A11/A1307 P&R hub interchange). JRC assumed a tram-train approach on the leg to Cambridge South.

128. Total rail journey time might be 25 minutes from Haverhill Central to Cambridge South via research Campuses, compared to 24 via old railway route. This is likely to favour a research Campus option as walking times savings will be far more than a minute, for stations much closer to the core work destinations.

Route Option 3 – new Light Rail line from Haverhill Parkway to Six Mile Bottom (pink)

129. Map 7 illustrates a possible corridor for a Haverhill-Cambridge rail link to the Mid-Anglia Line at Six Mile Bottom. This is a test option for a shorter 'new build' alignment between Haverhill and the existing railway network. A routeing towards the other nearby railway, WAML, doesn't look realistic in overall journey time or occupation of WAML line capacity.

130. The topography includes an intermediate hilly zone where for heavy rail several valleys could cause engineering issues in terms of gradients / curvature / tunnel or embankments / viaducts – so heavy rail is not an option.

131. There appears to be scope for a light rail corridor to Six Mile Bottom, using some tram-capable gradients, and curvatures at 40 chains radius (allows 70 mph with modern cant) and others at easier radius where at least 75 mph is feasible. This would allow competitive journey times, given that tram-trains would have fast acceleration and braking. While the largest village (Balsham) cannot be served directly, it can be within the 2 km catchment of an intermediate stop at West Wrattting. Another stop at West Wickham might be merited in return for a light rail corridor being permitted close by.

132. The junction with the Newmarket Line could be at Six Mile Bottom, on a 400-500 metre radius curve, so enabling a high frequency of service for the proposed Westley

Green development (all within 2km). Passengers to/from Haverhill could change there to reach Newmarket, Bury St. Edmunds, etc. Alternatively, the junction could be further east, with no interchange station, and a Westley Green station dependent on the Newmarket Line frequency could be located more centrally for the development as shown in orange with most housing within 800m of a station (within 1km, in terms of practical walking distances).

133. The route via Six Mile Bottom is comparable in timing to via the A1307, if heading to Cambridge Main and central Cambridge, but is longer if going to Cambridge South. Granta Park and Babraham Campuses are only served usefully via Linton.

134. The new track would be 4.3 miles less (could be £100-200m cheaper if £25-50m per mile) via 6 Mile Bottom, which needs to be contrasted against any savings feasible via Linton by using part of a former alignment, and against the potential net modal split and environmental gains of a Linton route which relieves congestion on the A1307 and serves Granta Park and Babraham Campuses directly.

135. We can at least anticipate questions about what could be the shortest new railway construction to reach Haverhill, and which might be cheapest. Clearly the whole-life value of capital, and operational costs and passenger benefits and wider gains would be relevant.

Strengths and weaknesses of the Route Options

136. The shorter new alignment supports the case for a railhead at Haverhill Parkway, and then goes to Six Mile Bottom. The mapping shows the former line is 14.6 miles to Shelford (or 14.9 on the Light Rail diversion route through Granta Park) versus 10.3 to Six Mile Bottom.

137. The shorter route should be significantly cheaper to construct and avoids the cost of the civil engineering to cross the A11. The A1307 alignment will need to cross the A11, which will mean building a new light rail bridge across the dual carriageway on a different alignment from the former route which is also compromised by the A505 and its slip road on to the A11.

138. We're talking of tram-train here and that would also reduce the capital cost. Effective journey time to central Cambridge via Cambridge Main station would be similar. If the role of the railway is to provide Haverhill and its hinterland the fastest access to Cambridge, which must be the most important objective just in terms of potential catchment population volume, then having to construct 10 miles ought to be nearly 30% better than 14 miles if it is possible to reduce the capital costs proportionately.

139. The shorter route is not great for Linton but there is a road to West Wratting that will offer a good journey time for both Linton and Balsham into central Cambridge. The railway would miss Granta Park, Babraham and Shelford, and only serve Cambridge South with a longer timing via Cambridge Main. Each route, via Cambridge South or east Cambridge, might require new capacity via Cambridge Main – see footnote 7.

140. It will help to establish how much of the A1307 road congestion is due to traffic heading to central Cambridge or to the bio-medical Campus and the outer research sites, to gauge the strategic importance of serving the A1307 with a new rail service.

141. This report is not directly advocating the corridor via Six Mile Bottom, but simply pointing out that there is a case to be answered and, if it looks feasible in engineering terms, an option to be tested. There is even a scenario in which a busway is built to Fourwentways whilst accepting the strong case for a rail link to Haverhill and its wider catchment area resulting in building the shortest light railway route. Why should politicians need to worry about the expense and difficulty in restoring a rail link via Linton?

142. It is true that the former railway solum is largely intact apart from where it has been breached by the A505 and A11 in the Pampisford and Granta Park area. This should help a campaign for the line of least environmental impact, whereas a route from Haverhill Parkway to the Mid-Anglia Line is virgin territory with all that involves. However, if the essence of the case for rail is simply Haverhill to Cambridge, then there is a case to be answered.

143. Whilst one railway option may be cheaper and quicker, what does it do for traffic volumes and for Greater Cambridge's traffic restraint strategies and economic growth policies? The other is potentially more expensive but does give access to more immediate and significant employment destinations along the former line of route.

144. Either way there is a strong and valid argument for a new Haverhill Parkway becoming an outer Cambridge park-&-ride as a first defence against congestion anywhere closer in.