

railfuture

Route options for Cambridge to Bedford

2nd edition December 2014

Route options for Cambridge to Bedford (East West Rail Central Section)

Executive Summary

The Government has approved and funded a new railway, using former and existing rail routes, between Bedford and Oxford via Milton Keynes with a spur to Aylesbury and High Wycombe. This is the Western Section of East West Rail. The government also supports, in principle, a Central Section linking Cambridge with Bedford by a new cross-country line. This report outlines Railfuture's concept for a fast high quality, high capacity route right across this fast developing national economic powerhouse.

We present three options for the routing of the line across Cambridgeshire to the Bedford area. A key Railfuture principle is that the route should run between the existing main stations of Cambridge and Bedford. Therefore we present alternatives for routes from the Cambridge station to the main route options, and two alternatives for routes from Bedford station.

We believe that the new railway should be routed to be of the greatest use to Cambridge and Cambridgeshire in that it should be routed to help alleviate some of the south of the county's transport problems as it expands into new settlements. Our conclusion is that the optimum route would be north-westerly from Cambridge, enabling it to serve Cambourne and the proposals for development at Bourn Airfield and on the east side of St Neots.

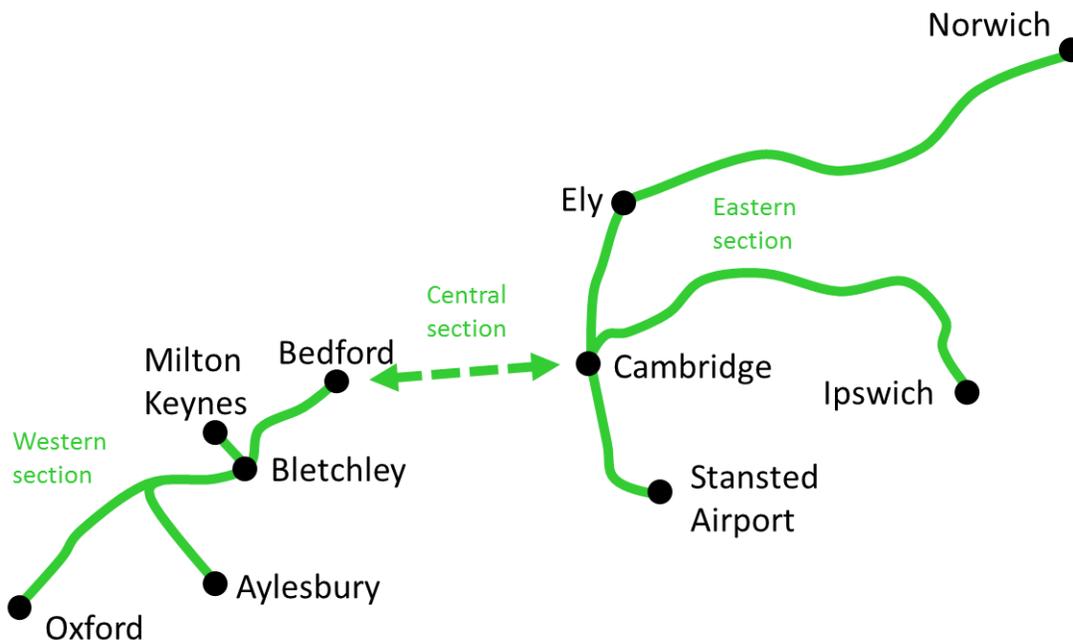
The northern route would have a junction with the high speed East Coast Mainline in the St Neots area. We recommend that services be developed that take advantage of this route's speed attributes with high volume trains linking Peterborough, Alconbury, Huntingdon, and St Neots to Cambourne and Cambridge.

The results of the Conditional Outputs Statement (COS) have been incorporated into our report. The Statement demonstrates that Northampton, Luton and Stevenage – in addition to Cambridge, Oxford and Bedford - are important regional destinations. Maps in Appendix 2 of the report show how current Thameslink and Great Northern services could be extended on to EWR to provide the desired links. However, we suggest that southern COS links, such as between Luton, Stevenage, St Albans, Hatfield and Harlow would be better served, not by the current EWR, but by a new project linking those places directly.

Railfuture understands that Network Rail and the East West Rail Consortium are currently assessing several options for the Cambridge – Bedford route. We hope that this report will help inform stakeholders and the wider public in making their views known.

INTRODUCTION

The government and the Office of Rail Regulation have approved the upgrading and rebuilding of the railway between Oxford and Bedford, the Western Section of East West Rail. The Western Section also serves Milton Keynes and includes new line to Aylesbury. Railfuture is a long-term campaigner for the completion of the East West Rail project to Cambridge and into East Anglia. The Eastern Section of the route is already in use from Norwich and Ely to Cambridge; from Ipswich via Bury St Edmunds and Newmarket to Cambridge; and from Stansted Airport to Cambridge.



Map 1: East West Rail: stations and sections

Between Cambridge and Bedford some of the original route is lost to development and population growth in the region has occurred away from the original stations. The question of corridor and route selection is therefore a key factor in making the case for the Cambridge to Bedford (Central) section of East West Rail. Railfuture is assessing the candidate corridors that have been identified by the East West Rail (EWR) Consortium. An early conclusion is that routes for possible approaches to the two key centres, Cambridge and Bedford, should be agreed and protected at an early stage, such is the pace of growth and development.

Purpose

The purpose of this document is to set out the options for the central section, particularly the approach to Cambridge from the west, and Bedford from the east. The intention is that the options should be reviewed by the local planning and transport authorities and appropriate protection from development incorporated into Local Plans. An important principle is not to view the Central Section in isolation, but to take into account the potential use of East West Rail by passengers from all over the region shown in Map 1. The Conditional Outputs Statement, issued by the EWR Consortium in August 2014, is our main tool for adhering to that principle.

Assumptions

Generally, routes that use part of an existing main line are not considered. This is because of the view in the industry that the main lines (including slow or relief lines where available) are either currently used to capacity in peak periods, or will be by the time the Central Section is in operation. The exceptions are the approaches to Cambridge and Bedford stations. Here it is assumed that over the 'last few miles' new capacity for Oxford to Cambridge trains can be provided by signalling / train control, track improvements and new platforms (if necessary) within the right of way.

Key to maps

Note that the maps to illustrate the route options are only indicative and do not show or imply the exact route that a particular option will take, but instead show the route corridors.

	Existing line to be used for East West Rail services.
	Existing lines connecting to EWR
	New line for East West Rail.
	Alternative route for new line
	Main destination or interchange on East West Rail (existing station)
	Other existing station
	Proposed new station on East West Rail

Abbreviations

COS	Conditional Outputs Statement
ECML	East Coast Main Line
EWRC	East West Rail Consortium
MML	Midland Main Line
WCML	West Coast Main Line

ROUTE OPTIONS SUMMARY

Compared to the first edition of the report, the route options have been simplified. This is because of the revised assumptions, particularly the need to avoid existing mainlines.

We now present three basic options:

- A Northern – via Cambourne and St Neots using the A428 / A421 corridor;
- B Central – via Sandy using the corridor of the original route;
- C Southern – via Shepreth using the existing route, and then a new corridor directly towards Bedford.

Options A and B can be combined with two alternatives for the route out of Cambridge (option C uses the existing line for its route out of Cambridge):

- 1 Trumpington – using the existing route to Addenbrookes, then sharing the route of the guided bus to Trumpington P&R, then connecting with A or B after passing under the M11;
- 2 Little Shelford – using the existing route to Addenbrookes, then taking the Hitchin line, but shortly branching at Little Shelford via a new junction to connect with A or B after passing under the M11.

Options A, B and C can be combined with two alternatives for the approach to Bedford:

- N A semi orbital route to the north of Bedford, joining the Midland Main Line in the xxx area, and using the existing route south into Bedford station.
- E A route running east from Bedford, starting from new platform(s) at Bedford station and running via Bedford St Johns, possibly using some or all of the original route. The new alignment is likely to be in cuttings or shallow tunnels to facilitate road crossings and reduce noise.

COMMON FEATURES

Railfuture recommends some important feature of the new line which apply regardless of the option chosen. These are:

The railway will consist two tracks designed for line speeds of 100 – 125 mph. The line will be electrified to match the final phase of the Western Section of EWR.

The primary origin / destination of passenger trains will be Cambridge and Bedford stations. We have not considered alternative destinations to Cambridge as the main Central / Eastern section node, as Cambridge is the key regional destination and interchange. Cambridge Science Park is another important

station in Cambridge (opening 2016), but we take this as a secondary destination; it can be served by EWR trains en route from Norwich. We assume that Cambridge station has the capacity for the new EWR services, or could be expanded into the sidings on the east side of the station.

Similarly, Bedford is the key interchange and commuter town in the west. Milton Keynes is arguably more important as a regional destination, and also an important interchange. Although the route options concentrate on Cambridge to Bedford, an extension to Milton Keynes is also within the scope of our study. It is an aim of our campaign that Bedford station will be rebuilt with extra platforms and tracks to accommodate frequent east-west services.

All the options use a southern route from Cambridge station. Routes from the north side of the station have a number of significant disadvantages:

- number of road crossings;
- continuous built-up areas making it difficult to find a route;
- longer distance to Bedford;
- need for trains from Norwich or Ipswich, which enter Cambridge station from the north, to reverse in the station to proceed west. However, a northerly route out of Cambridge would be convenient for the continuation of trains from Stansted Airport.

A station within two miles of the new town of Cambourne, Cambs. This is a quickly growing community and considering that about 60% of a station's passengers travel at most 2 miles to the station, a nearby station is important.

A station or a junction on the East Coast Main Line. One of the important benefits of East West Rail is the additional opportunities provided by the crossings of the main lines radiating from London. Opportunities provided by interchange with the ECML were highlighted by the Conditional Outputs Report and include Peterborough to Bedford and Milton Keynes, and Cambridge to Bedford and Luton (see Conclusions section for a full description).

Level crossings on existing lines used by Cambridge – Bedford trains will be upgraded or replaced by a road bridge or road tunnel. It has been confirmed that Foxton level crossing will be treated in this way. Other minor pedestrian and farm crossings will require similar upgrade or replacement.

COMPLEMENTARY PROJECTS

As well as the new line from Cambridge to Bedford, upgrades will be needed to existing infrastructure to take full advantage of the line and ensure trouble-free integration with trains on other lines.

Cambridge area

The main complementary project is a new station at Addenbrookes. This is already suggested in the Cambridgeshire Long Term Transport Strategy. Between Cambridge and Addenbrookes track and signalling systems may need to be upgraded for the new services. Cambridge station itself was expanded in 2012, but additional platforms may be necessary. Some enhancements to the tracks, signalling and power supplies may be necessary between Cambridge station and the turn-off towards Bedford owing to the increased frequency of trains.

Upgrading of minor level crossing may be addressed under the Thameslink project which involves an increase in the frequency of trains between Cambridge and London via Shepreth.

Bedford – Milton Keynes area

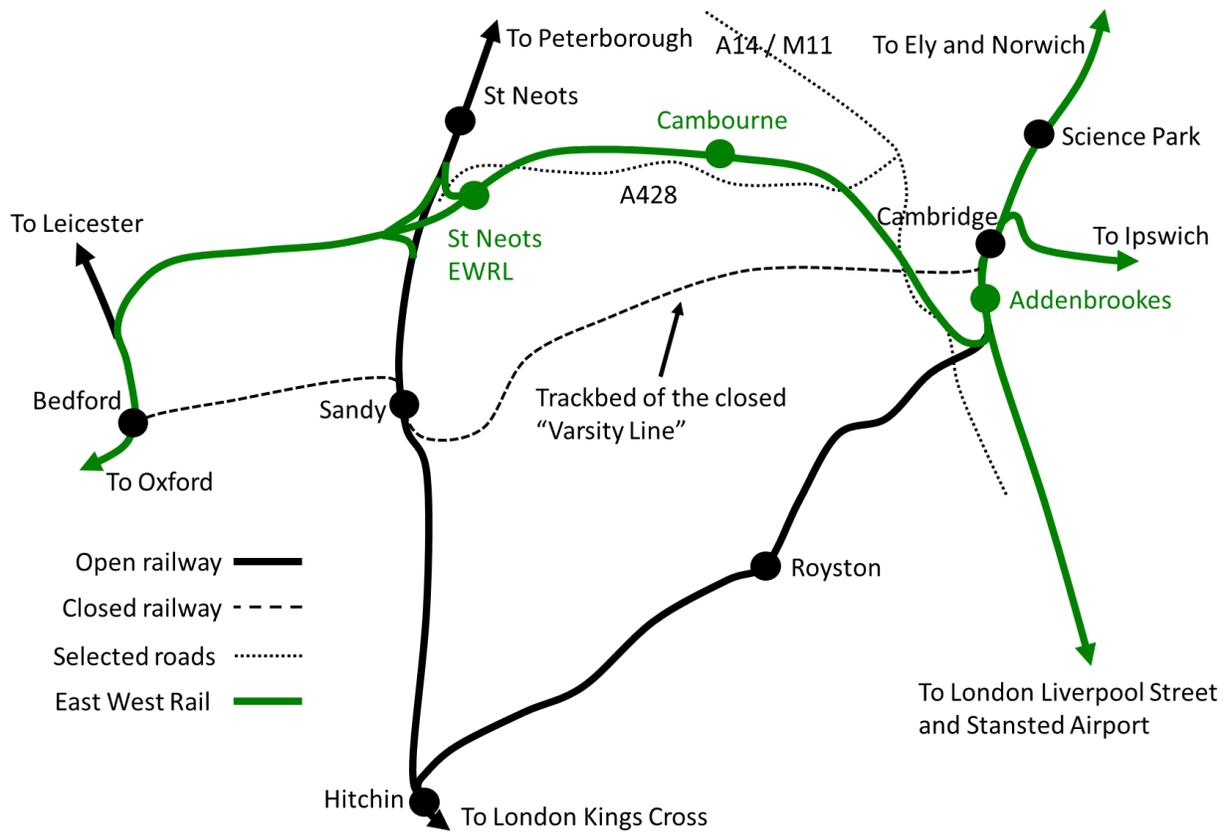
Bedford station is due to be rebuilt from 2019 under the final phase of the Western Section of EWR. Additional tracks, signalling and platforms may be needed for services from Cambridge. In 2010 the Bedford Borough Council plans for regeneration of the station area reserved space for new platforms for EWR services.

The line between Bedford and Bletchley is due to be electrified / upgraded for EWR and new cross country trains in 2019-24. The upgrade should include a new curve or junction at Bletchley station to allow a fast service between Bedford and Milton Keynes and possibly on to Northampton (see Conclusions section). The curve or junction would also allow freight trains to move easily between the Midland Main Line and the West Coast Main Line.

MAIN ROUTE OPTIONS WITH MAPS

Option A – Northern- a new railway along the A428 Corridor via Cambourne/Bourn Airfield and St Neots

This route leaves Cambridge station by option 1 or 2 and heads in a northwest direction towards Cambourne. A tunnel is required to take the line up to the Bourne Airfield where the line would emerge on the north side of the A428. It runs west along the A428 serving Cambourne/Bourn Airfield developments by a new station within 2 miles of Cambourne. It follows the alignment of the new A428 dual carriageway to a new junction, possibly with station, just south of Little Barford power station. After crossing the A1, the route runs on the north side of the A421 towards Bedford where the station is accessed



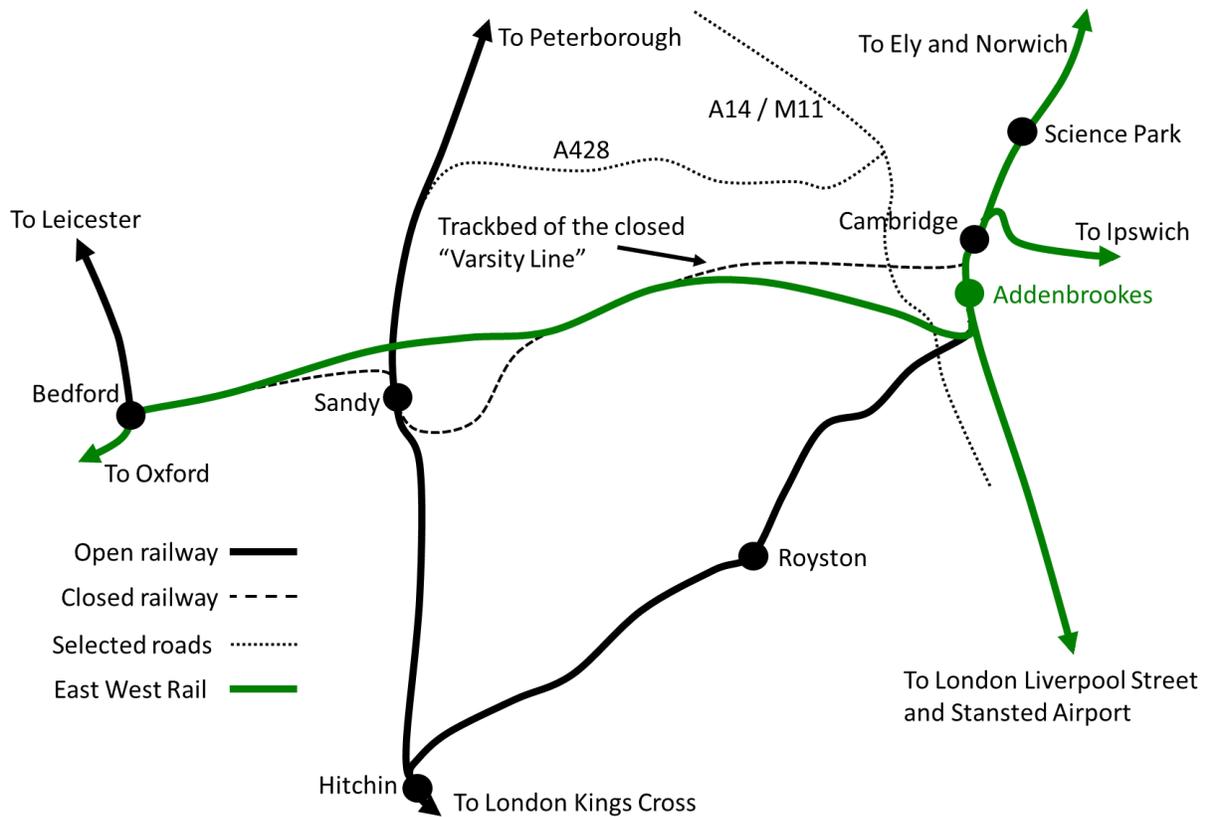
Map 2: OPTION A north-west from Cambridge along the A428 corridor

The following would need to be protected for option A:

- Site for replacement of Foxton Level Crossing by a road bridge or road tunnel;
- Site near Shepreth for a junction and new alignment west towards Bedford.
- Route across South Cambs and Central Bedfordshire

Option B - Route in the same corridor as the original 'Varsity Line' to Sandy

After leaving Cambridge by option 1 or 2, this route uses the same corridor as the former Varsity line, before by-passing Sandy to the north and then approaching Bedford by the Ouse Valley and option E for gaining access to Bedford station. The option includes a junction with the ECML similar to option A. New station(s) could be established south of Cambourne, near Sandy or on the east side of Bedford. This option does not run near populated areas, but runs through some environmentally sensitive areas, leisure areas, and villages.



Map 3: *OPTION B Varsity Line Corridor route*

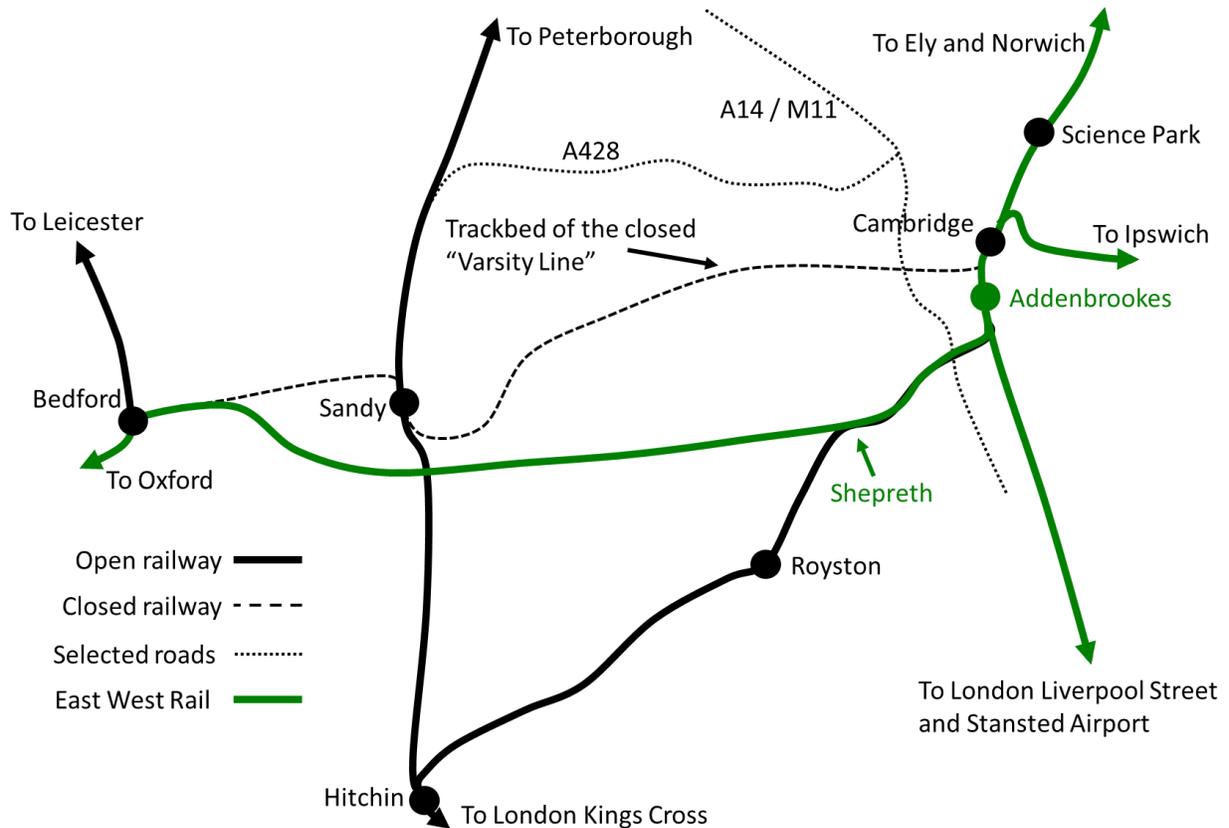
The following would need to be protected for option B:

- Site near Shepreth for a junction and new alignment west towards Bedford;
- An alignment for a new railway across South Cambs and Central Bedfordshire;

Option C – Southern – via Shepreth using the existing route, and then a new corridor directly towards Bedford.

In Option C the existing Cambridge to Royston and Kings Cross line is used as far as a new junction near to Shepreth station. At this location a new line takes the route north-west across open agricultural country towards Biggleswade. The junction with the East Coast Main Line is between Arlesey and Sandy and this is a similar design to Option A giving a number of routing opportunities. From the ECML the route is directly towards Bedford and Bedford station is accessed by option E.

This corridor is based mainly on land currently designated mainly for agricultural purposes. There are some environmentally sensitive areas around Sandy and Bedford; and west of Sandy, in the Ouse valley, the corridor includes several villages.



Map 4: *OPTION C: Southern corridor route accessed via the existing Cambridge – Hitchin railway*

The following would need to be protected:

- Site for replacement of Foxton Level Crossing by a road bridge or road tunnel;
- Site near Shepreth for a junction and new alignment west towards Bedford.
- Route across South Cambs and Central Bedfordshire.

ROUTE OPTIONS FROM CAMBRIDGE

Option 1 – Trumpington – sharing the route of the guided busway to Trumpington P&R

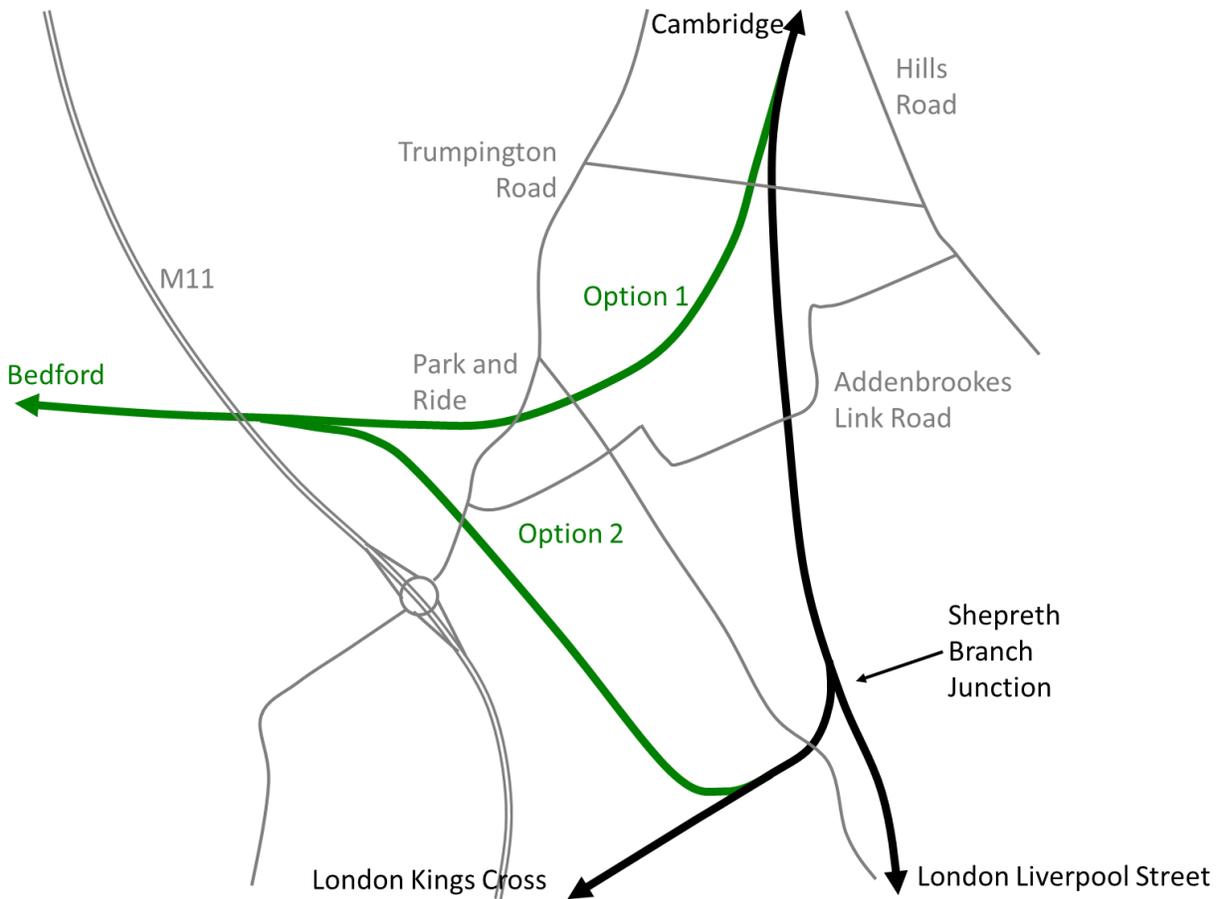
This option is based on a new railway diverging from the existing southbound line from Cambridge station a short distance south of Hills Road bridge. The new line runs on the same alignment as the existing guided busway. The busway alignment would need to be widened in order to accommodate a twin track railway at about the same level. Measures to reserve land for this widening should be considered.

Approaching Trumpington, the line continues at a low level in the existing cutting with the bus / cycle ways re-routed over it at ground level. The cutting may have to be deepened and boxed in to achieve this. The rail route enters the Trumpington Park and Ride site via this shallow box and this could be designed as a station.

West of the Park and Ride site the alignment is due west to a crossing of the M11 by bridge or tunnel. There is both an existing tunnel under the M11, for the River Cam, and an existing bridge for a by-way. Either could be expanded or replaced to accommodate the tracks. After crossing the M11, the route connects with main line option A or B.

Option 2 – Little Shelford – a new junction on the Hitchin line

This option leaves the Great Northern Route (Hitchin line) about a mile south of Shepreth Branch Junction. The track here is straight with open fields on the north side, so a new junction can be easily accommodated. The line then crosses the M11 by a short tunnel before connecting with main line Option A or B. This scheme would put pressure on the already busy Shepreth Branch Junction, so a major upgrade of the junction and its signalling system may be necessary; some improvement work is expected to be done as part of the Thameslink project.



Map 5: Route options 1 and 2 out of Cambridge

ROUTE OPTIONS FROM BEDFORD

Option N – Northern – orbital route to the north of Bedford

There are indications that a route will be preferred which runs north from Bedford station on the MML (avoiding a reversal there), branches to the north-east from the MML in the xxx area and continues in an arc around Bedford through the countryside, before joining the main route to Cambridge near the A421. This route would require an additional upgrade (to what is currently planned) of the MML north of Bedford.

Option E – Southern – shallow tunnel / cuttings on the line of the original route

An alignment heading south and east from Bedford has often been suggested. It could be aligned with the original route which is now occupied by a series of roads, car parks, and light industrial areas. It would run in cuttings or shallow tunnels to avoid road crossings; it would emerge on the surface east of Priory Park where there is a potential station site on the south side of the A4280. This Bedford East station has a substantial catchment area including the Viking and Elm Farm light industrial / retail areas, and the Aspire housing developments.

The following would need to be protected:

- A linear site from the existing railway south of Cambridge station, to the Trumpington cutting, wide enough to allow co-location of a new railway and busway;
- Protection of the Trumpington cutting from crossings by utilities to ease the construction of a deeper cutting or shallow tunnel;
- Land near or on the Trumpington Park and Ride site for use as a temporary construction base.
- A linear site west from the Park and Ride site to a crossing of the M11;
- A linear site west of the M11 following the designated route running along the A428 corridor.

CONCLUSION

Option A provides the most benefits to Cambridgeshire by following an alignment focused on emerging needs from population growth, increased economic activity, and capacity pressures on other roads and railways.

Benefits of Option A

Option A, combined with either of the alternatives for the routes from the centres of Cambridge and Bedford, provides important basic benefits:

It relieves passenger and freight traffic on the A14, A428 and A421 trunk roads.

It is co-located with the A428 and A421 between Bourne Airfield and the outskirts of Bedford, including the new A428 between Caxton and the A1 at Wyboston. Using this corridor minimizes cost and environmental impact which will be particularly important with the new dual carriageway A428.

New stations at Addenbrookes hospital and Cambourne park and ride station would significantly improve public transport provision to the west of Cambridge, including the new Cambridge University developments to the west of the city.

It provides additional freight train paths from Felixstowe docks, and other origins in East Anglia, to Peterborough, relieving the Ely to Peterborough route; and, via Bedford, provides easier access to the MML, WCML, and GWML – to the Daventry freight terminals, in particular.

In an age when the rail network is increasingly busy, new routes to provide easier access to the network will be invaluable as will be the possibility of more network flexibility in times of planned and unplanned disruption.

Option A also provides additional connectivity benefits:

Option A for the Central Section provides a large number of potential new services and connections, for both freight and passenger. The EWR Conditional Outputs report [ref] identifies the best links – see Appendix 2 for a complete analysis of the report. The following new services and connections are based on Option A and the Conditional Output report:

Cambridge to Bedford and Milton Keynes / Oxford, the distance between Cambridge and Bedford being just under 35 miles. Fast limited stop express trains could run to Oxford and Milton Keynes via Bedford.

Cambridge – Bedford – Milton Keynes – Northampton. This was identified as one of the highest priorities in the Conditional Outputs report. Passengers could reach / start from Northampton either by direct train from Cambridge or by changing at Northampton. The upgrade planned for 2019-24 between Bedford and Milton Keynes should allow for this service.

Cambridge – Bedford – Luton. Another high scorer from the Conditional Outputs report. The service could be run as part of the Thameslink service from Luton southwards; if not, an upgrade of track and signalling in the Luton area would be required.

Stevenage – Bedford – Milton Keynes – Northampton. This service requires additional platform capacity at Stevenage. It would use the EWR / ECML junction at St Neots to route to Bedford. Trains could originate from the Thameslink line at Stevenage.

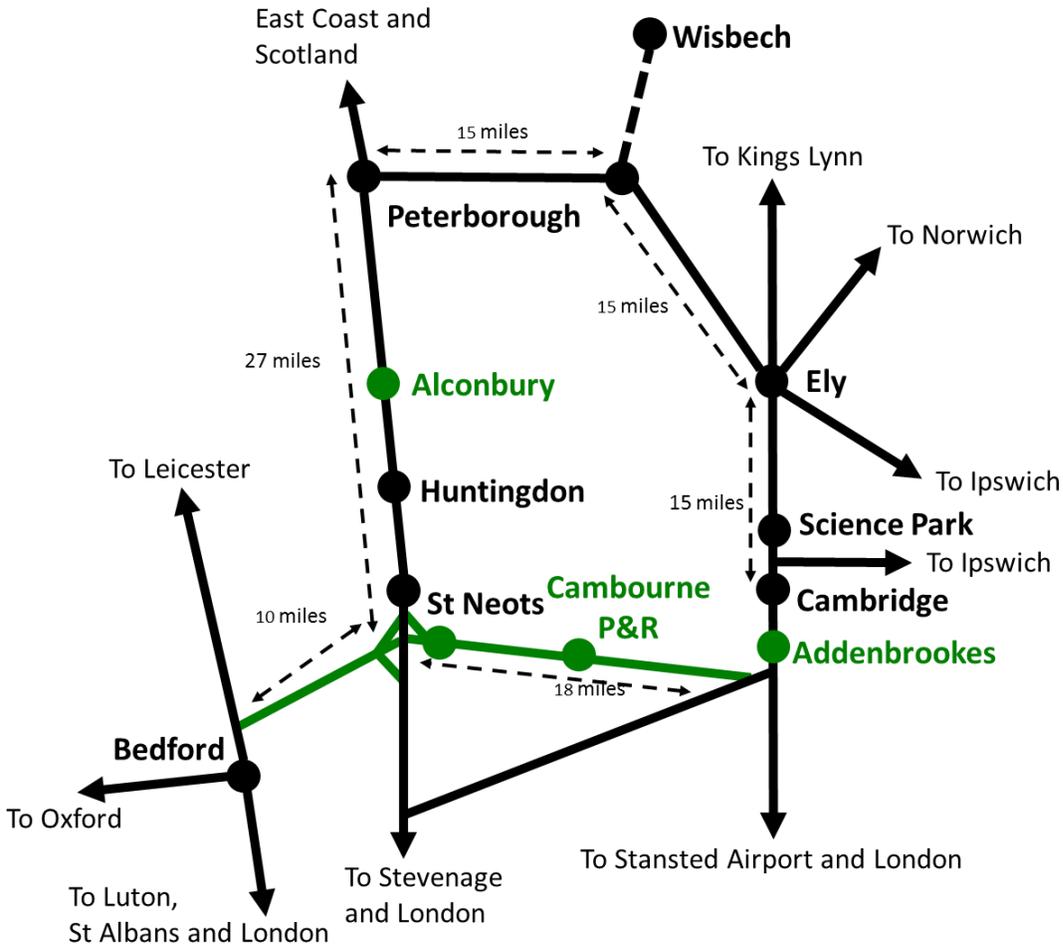
Peterborough - Alconbury Weald – Huntingdon – St Neots – Bedford – other destinations. The train service could extend to Milton Keynes, Oxford, or London Thameslink. The new service provides excellent connection between the MML and ECML. Provision of four tracks between Huntingdon and Peterborough and a new station at Alconbury Weald would be required for the service. This route has strong freight potential.

Finally, a further network opportunity is **Cambridge – St Neots – Huntingdon – Peterborough.** This connection is not suggested by the conditional outputs. It would, however, be a faster route than the current one via Ely and March - a Cambridge to Peterborough timing of about 35 - 40 minutes is expected. It provides a high volume / speed passenger train route. In particular, the link between St Neots, Huntingdon and Cambridge provides an important supplement to the A1, A14 and A428 roads.

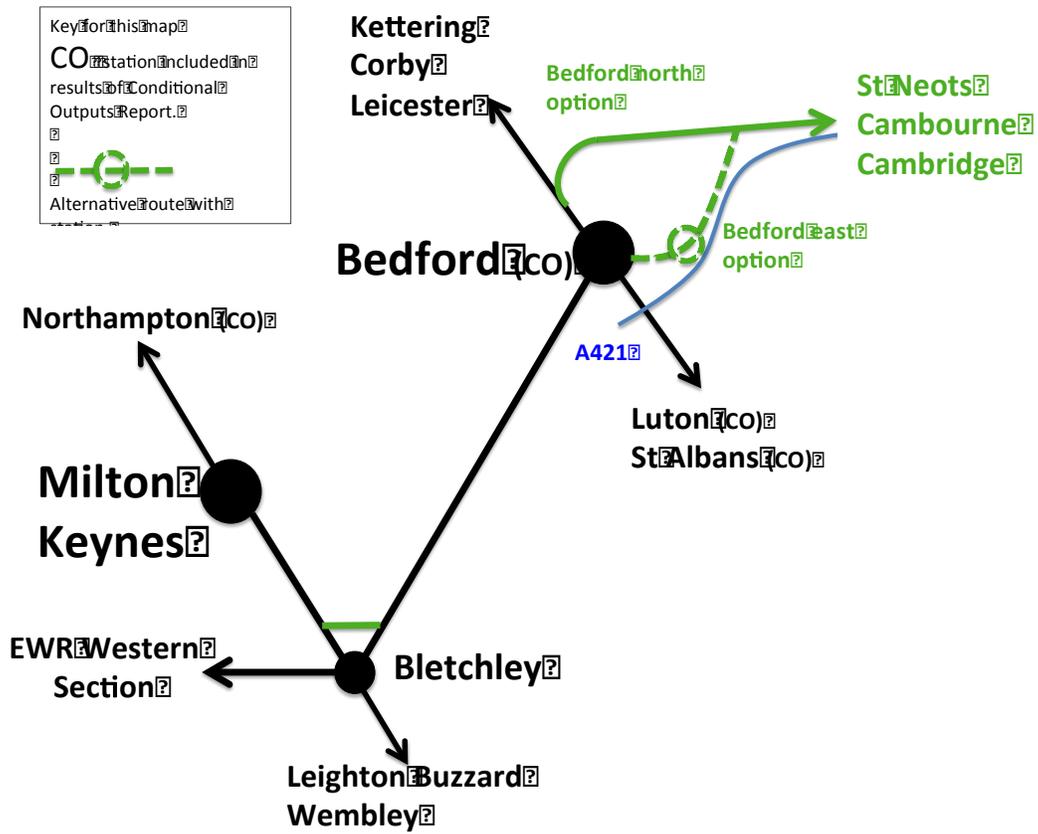
The corridor for option A is shown in the map below together with the opportunities it presents for regional connectivity.

The map shows the junctions needed to support the service at Milton Keynes to allow services from Northampton to join EWRL heading East, at Bedford allowing services from Luton to join EWRL heading East, and near St Neots allowing services from Welwyn and Stevenage to join EWRL heading West, and similarly from Peterborough in the North. A direct service from

Northampton to Luton is also identified although this may be more practically provided by changing at Bedford.



Map 6: Connectivity map 1 of 2: Cambridge to Bedford

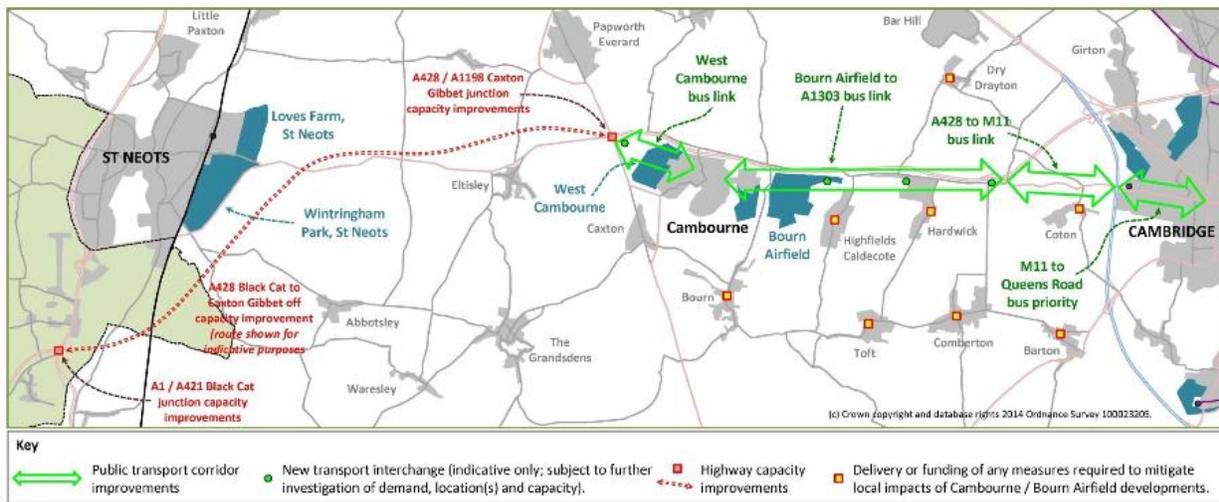


Map 7: Connectivity map 2 of 2: Cambridge to Bedford

APPENDIX 1: Relationship of Option A to the Cambridgeshire Long Term Transport Strategy

The Cambridgeshire County Council Long Term Transport Strategy identifies both East West Rail and the need for a "High quality public transport corridor (possibly including increased park and ride capacity, rural interchange, guided bus, bus priority or rail)" following the A428.

Option A would not only provide the East West Rail Link, but would also provide high quality public transport for the A428 corridor.



Map 8: From the Cambridgeshire Long Term Transport Strategy: Cambridge – St Neots corridor.

APPENDIX 2: Central Section Conditional Outputs Statement

The East West Rail Consortium's 'Conditional Outputs Statement' is a fascinating exercise in statistics that makes a strong case for new railways across the Oxford to Cambridge arc.

<http://www.eastwestrail.org.uk/news/new-study-supports-economic-case-investment-east-west-rail-central-section-rail-link>

The study examines the potential for linking 25 existing stations plus one new one – Wixams near Bedford. However, the analysis is made in terms of the 650 (26 x 25) possible journeys between the stations; no new lines or stations are described explicitly. All the journeys are ranked according to economic criteria. Media reports focused on the high ranking of Bedford to Cambridge, but Cambridge to Northampton, and Luton to Stevenage also come out strongly in the numbers.

The most important pairings are shown on diagrams in the concluding chapter of the study. Railfuture has mapped these diagrams on to maps of the region, and aligned the links to existing lines and possible future routes. You can see these maps on the following pages.

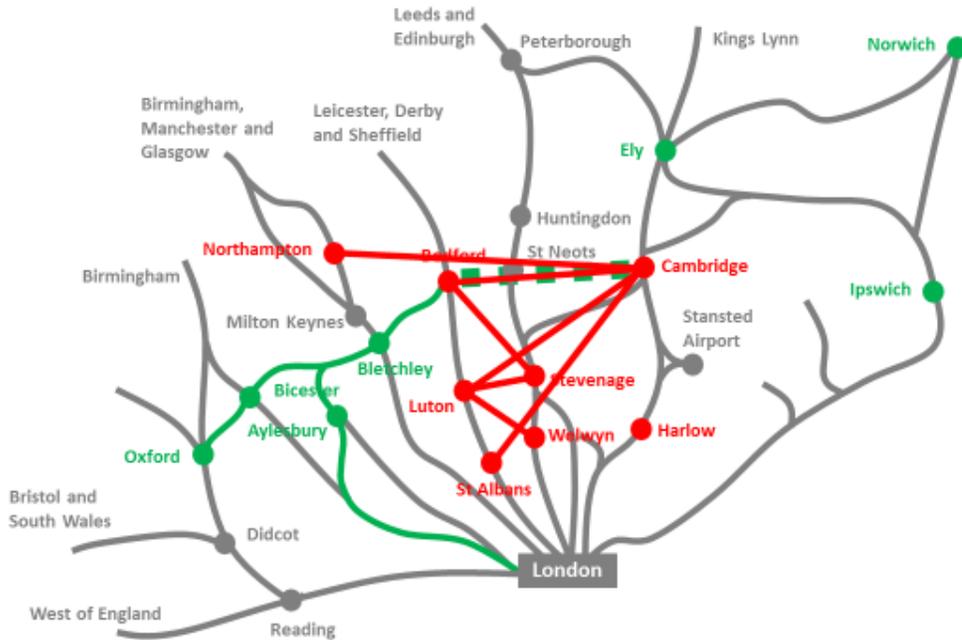
The study will now be developed by EWRC and Network Rail to arrive at some route options. Railfuture's immediate recommendations are:

- New links for the 'southern arc' such as Luton to Stevenage and St Albans to Welwyn should be developed as a separate project from the project to link the 'northern arc' such as Cambridge to Bedford.
- The best way of joining a station on one main line from London to one on a different main line, e.g. St Albans to Cambridge, would be to divert and / or extend existing services rather than widening the existing mainlines which would be very expensive. New signalling systems and longer trains will make the best use of new lines.

KEY TO MAPS

	Very high priority journeys defined by the Conditional Outputs Report
	High priority journeys defined by the Conditional Outputs Report
	East West Rail – Western Section.
	East West Rail – Central Section
	Station on East West Rail
	Station included in results of Conditional Outputs Report but currently not on East West Rail.

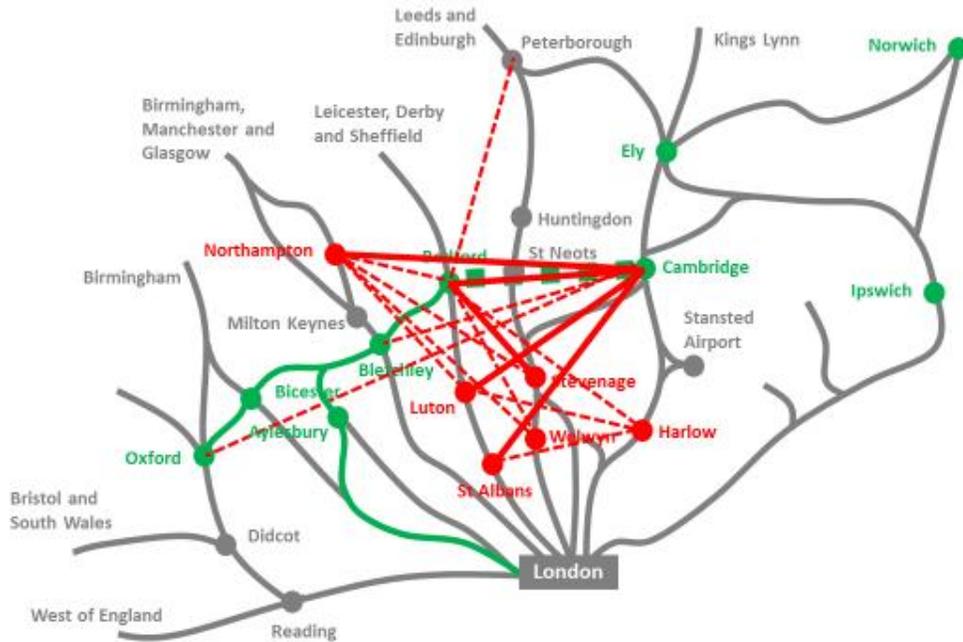
Map A1: EWR with the journeys identified as Very High Priority shown as straight lines.



Map A2: Redrawn version of map A1 showing individual journey pairs following existing lines and EWR.



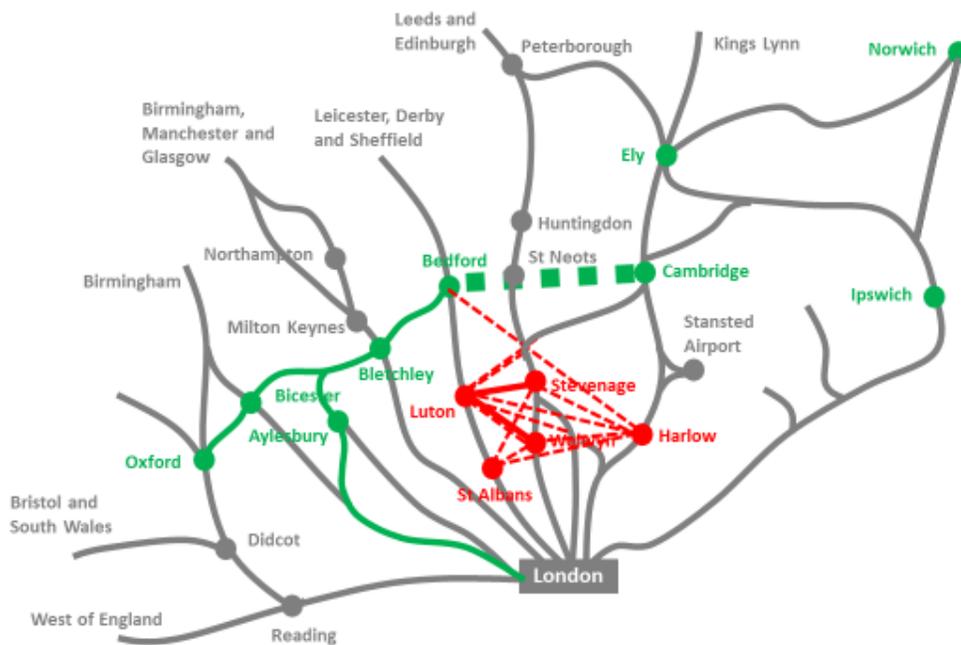
Map A3: Overlaid with the journey pairs identified as Very High Priority as solid lines and High Priority as dotted lines for journeys over 30 mins.



Map A4: Redrawn version of map 4 showing individual journey pairs following existing lines and EWRL.



Map A5: Showing all the very high priority (solid lines) and high priority (dashed lines) within the southern cluster of stations. This indicates that there would be merit in a study for a second rail link for this area.



Railfuture

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