

EAST WEST RAIL ROUTING OPTIONS & STATION CHOICE



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IDENTIFICATION TABLE

Client/Project owner	Bedford Borough Council
Project	East West Rail
Study	East West Rail Routing Options & Station Choice
Type of document	Report
Date	11/01/2024
File name	
Number of pages	23

APPROVAL

Version	Name	Position	Date	Modifications
1	Author	James Jackson	Associate Director	19/12/2023
	Checked by			DD/MM/YY
	Approved by	James Jackson	Associate Director	19/12/2023
2	Author	James Jackson	Associate Director	11/01/2024
	Checked by			DD/MM/YY
	Approved by	James Jackson	Associate Director	11/01/2024

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1. INTRODUCTION

- 1.1.1 In November 2023 SYSTRA was commissioned by Bedford Borough Council (BBC) to revisit the Wider Economics Impacts on Bedford, of the planned development of East West Rail (EWR) Connection Stage 2 (Bletchley – Bedford) and Connection Stage 3 (Bedford – Cambridge), which together with the committed Connection Stage 1 (linking Oxford and Bletchley) will provide a direct link between Oxford and Cambridge significantly improving connectivity by rail from Bedford.
- 1.1.2 This work has been triggered by a review of the proposed route for Connection Stage 3 (CS3). The route preferred by East West Rail for this section involves EWR trains departing from Bedford Midland northwards on a new alignment parallel and adjacent to the existing Midland Mainline, before the route turns eastwards. The route is a source of concern to BBC as it requires the demolition of residential property.
- 1.1.3 Two alternative options have been developed by third parties and the purpose of this modelling work is to consider the Wider Economic Impacts on Bedford of these alternative routes.
- 1.1.4 This work builds on two previous studies. The first examined the impact of station locations on Bedford in 2019, prior to a preferred route being identified for CS3. The second study in 2022 examined the impact of EWR on Bedford in the light of the impact on business and commuter travel after COVID-19.
- 1.1.5 This work primarily builds on the 2022 study which explored the following three areas:
- Agglomeration impacts
 - Labour supply impacts and the impact of hybrid working
 - Direct impact on households and commuting patterns attributable to hybrid working
- 1.1.6 Within this work we have updated the modelling above, but have also placed a greater emphasis on the impact on route choice. As will be demonstrated below the three different service options being considered are likely to result in different approaches to station choice in Bedford depending on the true origin or destination of the passenger.
- 1.1.7 The key findings of the work on service options are that with three stations serving Bedford (Midland, St. Johns and Stewartby), the overall impact of alternative service options, whilst negative is also limited. The work has evidenced that the Option 3 service specification is preferable to Option 2 from a Bedford perspective. Whilst Option 3 performs more poorly than Option 1 the difference in benefits is only around 2%, whilst the difference between Option 2 and Option 1 is only 4%.
- 1.1.8 The remainder of this report explores our methodological approach and presents the results of modelling work.

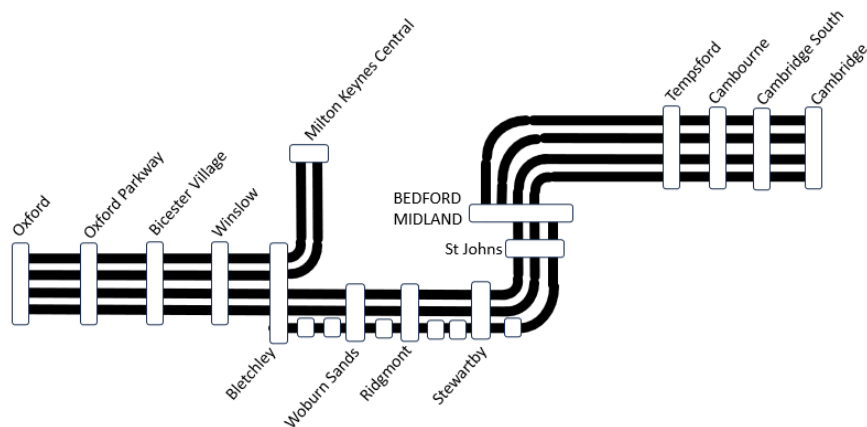
2. SERVICE & ROUTE OPTIONS

2.1.1 Two alternative service options have been developed for comparison with the current EWR preferred option. The two alternative options are both predicated on the use of an alignment that runs to the south of Bedford, which would mean that services from both Cambridge and Oxford would arrive from the south. As will be shown in the figures below this has two main impacts operationally:

- All services running from Cambridge to Oxford (and vice versa calling at Bedford are required to reverse at Bedford Midland station
- There is now an opportunity for services to run direct from Oxford to Cambridge without calling at Bedford (Midland or St. Johns) with the result that the service specification at Bedford is susceptible to being reduced.

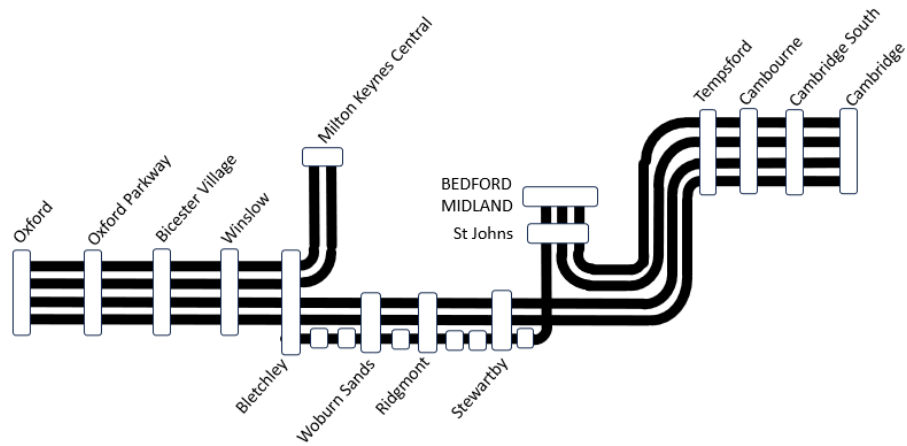
2.1.2 Figure 1 below presents Option 1 which is the current EWR proposed service pattern. The key feature of this service pattern are two direct services each hour between Bedford Midland and Oxford and four between Bedford Midland and Cambridge. Stewartby and Bedford St. Johns both enjoy two trains per hour to each of Oxford and Cambridge.

Figure 1. Option 1 – EWR proposed service pattern



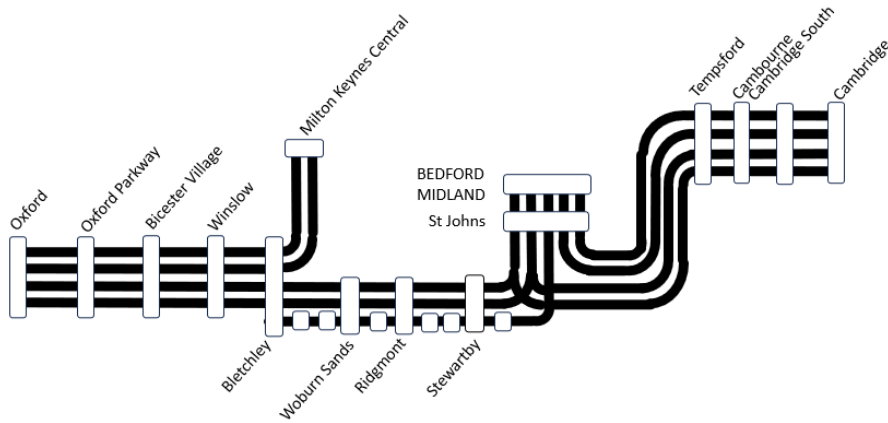
2.1.3 Figure 2 shows the first alternative service pattern – Option 2. In this service pattern Stewartby retains the service planned in Option 1, though it loses two trains per hour to Bedford, whereas both Bedford Midland and St. Johns see service reductions. Both stations lose direct services to Oxford with the journey only achievable by using existing Marston Vale stopping service and interchanging at Stewartby or Bletchley. Bedford Midland also loses two trains per hour to Cambridge.

Figure 2. Option 2 – Alternative service pattern



2.1.4 Figure 3 presents the service pattern for Option 3. Within Option 3, Option 1 routing and frequencies are retained but with a requirement for all Oxford – Cambridge services to reverse at Bedford Midland, introducing a journey time increase for through passengers. The only notable change for Bedford is a slight journey time change to Cambridge.

Figure 3. Option 3 – Alternative service pattern



3. IMPACT ON STATION CATCHMENTS

3.1.1 One of the main impacts on potential EWR passengers of the different service options is the effect it will have on station choice. The bulk of the BBC area is served by three stations under EWR:

- Bedford Midland – main station in central Bedford served by East Midlands Railway and GTR services. The station has a large charged car park, though access to the station involves using congested routes at peak times
- Bedford St. Johns – local station to the south of central Bedford, currently only served by Marston Vale trains. The station lacks a car park but there is significant third part parking available in the surrounding area. As with Bedford Midland access by car can be congested
- Stewartby – existing station on the Marston Vale line to the south west of Bedford and close to significant new housing development. The station will enjoy direct services to both Oxford and Cambridge and is likely to be provided with a larger car park making it an attractive Park & Ride location. It is possible that the station site will be relocated to be more optimal for local development, however we have modelled the existing location in this study.

The three different service options impact the station choice of passengers. To reflect this we have undertaken modelling work to forecast station choice. This has been undertaken from Middle Super Output Areas (MSOAs) in the BBC area to three key EWR destinations:

- Cambridge
- Oxford
- Milton Keynes

3.1.2 We estimated generalised cost (GC) from each MSOA to each destination using the following process:

1. TRACC software was used to estimate journey times from the centroid of each MSOA to each of the three stations by car and on foot
2. Access time generalised costs were estimated by applying values of time to the access time for both modes and vehicle operating costs and car park charges for access by car
3. Average access GC was estimated using the following rules:
 - All trips under 2km were assumed to cycle or walk
 - All trips between 2km and 5km were averaged between car and cycle/walk
 - All trips over 5km were assumed to drive
4. Rail GC was estimated for each service option
5. The Rail GCs were added to access GC giving a combined GC for each MSOA to destination station and service level combination
6. For each service option the lowest GC was allocated for each MSOA – destination pair which allowed the preferred station for each flow to be identified

3.1.3 The table on the following page presents the allocation of stations by served option to each MSOA. A series of maps in Appendix A also present these results.

Table 1. Allocation of MSOAs to Station by Option

	OPTION 1			OPTION 2			OPTION 3		
	Cambridge	Oxford	Milton Keynes	Cambridge	Oxford	Milton Keynes	Cambridge	Oxford	Milton Keynes
Castle & Kingsway	Bedford Mid	St. Johns	St. Johns	St. Johns	Stewartby	Stewartby	Bedford Mid	Bedford	Stewartby
Queens Park	Bedford Mid	Bedford Mid	Bedford Mid	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Bedford Mid	Bedford Mid
Kempston North	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby
Cauldwell	St. Johns	St. Johns	St. Johns	St. Johns	Stewartby	Stewartby	St. Johns	St. Johns	Stewartby
Wilstead & Shortstown	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Brickhill	Bedford Mid	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Kempston Central & East	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby
Bromham & Biddenham	Bedford Mid	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Wixams & Elstow	Bedford Mid	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Wootton & Stewartby	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Newnham	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby
Kempston West & South	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby
Goldington	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Clapham/Oakley & Thurleigh	St. Johns	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby
Kingsbrook	St. Johns	St. Johns	St. Johns	St. Johns	Stewartby	Stewartby	St. Johns	St. Johns	Stewartby
De Parys	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby

	OPTION 1			OPTION 2			OPTION 3		
Harrod, Chellington & Turvey	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Riseley & Sharnbrook	Bedford Mid	Bedford Mid	Bedford Mid	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Bedford Mid	Bedford Mid
Putnoe	Bedford Mid	Stewartby	Stewartby	Stewartby	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Wyboston, Great Barford & Cople	Bedford Mid	Stewartby	Stewartby	St. Johns	Stewartby	Stewartby	Bedford Mid	Stewartby	Stewartby
Harpur	Bedford Mid	Bedford Mid	Bedford Mid	Bedford Mid	Stewartby	Stewartby	Bedford Mid	Bedford Mid	Bedford Mid

3.1.4 There are a number of points that emerge from the table:

- The dominance of Stewartby for access to Oxford and Milton Keynes in all options. This reflects both its good road access but also the reduced journey time towards Oxford by rail in all option relative to central Bedford stations. There is around a 10 minute journey time saving compared to Bedford Midland.
- In Option 2 Stewartby has an increased role reflecting the much porter connectivity from central Bedford.
- Bedford St. Johns has an increased role in access to Cambridge in Option 3 as a result of its reduced journey time relative to Bedford Midland, though noting that the frequency from St. Johns is lower

4. AGGLOMERATION IMPACTS

- 4.1.1 Prior to the COVID-19 pandemic agglomeration impacts (which describe the productivity and output benefits associated with businesses being located close together), were seen as one of the major wider economic benefits of transport investment. SYSTRA has previously undertaken modelling work to examine the agglomeration impacts of EWR on the economy of Bedford. In this study we examine how changes in service options and station choice influence agglomeration impacts.
- 4.1.2 The scale and relevance of agglomeration impacts in relation to transport investment has unsurprisingly been brought into question by the impacts of virtual meetings. The Department for Transport has begun to explore this issue with a research paper, “**Agglomeration under Covid**”. Whilst the paper identifies that more empirical research is required, it also highlights that agglomeration impacts will continue to exist, though the scale of those impacts needs reviewing. The report also highlights that the rise in home working and thus reduction in the capacity each company requires in a given location (in terms of office space) may actually increase agglomeration opportunities as more companies can be accommodated in smaller areas than in the past. This implied increase in the density of towns and cities is of relevance to public transport schemes such as EWR which serve town and city centres more effectively than a road network can.
- 4.1.3 In the EWR context this would imply that key nodes on EWR such as Cambridge, Bedford, Milton Keynes and Oxford would see an increase in the density of companies based in them and thus an overall increase in the level of output within the catchment area of stations, and as described in the following chapter this will also impact on skills matching in the labour market.
- 4.1.4 Based on this we believe that agglomeration impacts are still valid as there are both up and down sides associated with hybrid working.
- 4.1.5 The following section sets out methodology for estimating agglomeration impacts.

4.2 Methodology

- 4.2.1 We have assessed the agglomeration impact on the wider economy of East West Rail in terms of the impact on Gross Value Added.
- 4.2.2 We have carried out this work using a model based on an approach developed by Network Rail as part of their series of Market Studies. The model produces an estimated change in the GVA as a result of changes to rail services. These results are based largely on the impacts of agglomeration between economies. For example, if Bedford and Milton Keynes are brought closer together then there will be an increase in the level of interaction between the two economies.
- 4.2.3 Given the context of this modelling we have applied a more disaggregate approach than in earlier modelling work, using the outputs of the station choice work described above.

Agglomeration Economies

4.2.4 At their broadest level, agglomeration economies occur when individuals benefit from being “near” to other individuals, and exist when the spatial concentration of economic activity gives rise to increasing returns in production. Transport and communications play a crucial role because, in most contexts, speed and low costs in transportation and communication provide a direct substitute for physical proximity .

4.2.5 Research has identified where improved rail connectivity between places of different size may provide economic benefits. The obvious example in UK terms is the difference between London and provincial cities where better connectivity will enable the smaller centre to become “a more attractive location; it starts off with lower wages and rents, and improved connectivity means that it will get better access to London’s large economic market and large base of suppliers”.

The Modelling Work

4.2.6 The model used by SYSTRA has been adapted to incorporate the impact of different economic sectors. The importance of this segmentation by economic sector has been highlighted in research on agglomeration and the ‘connectedness’ of locations; “there is some evidence that suggests that the strength of these relationships changes by economic sector, with some sectors likely to benefit more from concentration of activity than others”¹ .

4.2.7 The data incorporated into the modelling to define economic sectors was taken from Department for Transport WebTAG guidance on wider impacts (WebTAG Unit A2-1 & A2-4). The four sectors of the economy defined within the modelling are:

- Construction;
- Manufacturing;
- Consumer services;
- Producer Services

4.2.8 While the first two sectors are relatively self-explanatory, the components of the last two perhaps require further definition, as provided in the table below:

¹ Daniel Graham & Patricia Melo, *Advice on the Assessment of Wider Economic Impacts: a report for HS2*, March 2010

Table 2. Definition of Consumer & Producer Services Segments

CONSUMER SERVICES	PRODUCER SERVICES
Motor trade	Computer programming
Wholesale	Information services
Retail	Financial
Land transport	Insurance
Water transport	Auxiliary financial
Transport support	Legal and accounting activities
Post and courier	Activities of head offices
Accommodation	Architectural and engineering
Food and beverage service	R&D
Programming and broadcasting	Advertising and market research
Telecommunications	Other professional
Travel and related activities	Rental and leasing
Education Consumer Services	Employment activities
Repair of computers and goods	Security and investigation
Other personal service activities	Services to buildings
	Office administrative

4.2.9 As well as economic inputs the model also utilises information on in-vehicle journey times, frequency, the need for interchange and access time to and from stations, as well as fares. The approach taken to estimating the frequency and interchange penalties follows the Rail Delivery Group Passenger Demand Forecasting Handbook guidance.

Interpreting Outputs

4.2.10 The outputs of the work are presented for 2023 prices. It should also be noted that values are presented for a single year (i.e. £ per annum) rather than being cumulative over a number of years.

4.2.11 The values are presented as two way flows, meaning that the aggregate value includes both the impact on the origin and the destination. It is possible to divide the results into origins and destinations, however it must be noted that in practice the distribution of the impacts will depend on individual circumstances and linkages within the economy. Even with the best quality of data this is a representation of how the economy might respond and in practice individual companies will respond to reduced transport costs in different ways.

4.3 Results

4.3.1 The table below presents the results of this updated analysis for flows to / from Bedford as well as East-West Rail internal flows. These flows are presented as 2023 values at 2023 prices.

Table 3. GVA Impact per annum of Options 1 to 3 (£ 2023 prices)

	CAMBRIDGE	OXFORD	MILTON KEYNES	TOTAL
Option 1	£6.28m	£3.43m	£2.99m	£12.70m
Option 2	£6.09m	£3.32m	£2.87m	£12.28m
Difference	-£0.19m	-£0.11m	-£0.12m	-£0.42m
% Difference	-3%	-3%	-4%	-3.3%
Option 3	£6.20m	£3.43m	£2.92m	£12.55m
Difference	-£0.08m	-	-£0.08m	-£0.16m
% Difference	-1%	0%	-3%	-1.3%

- 4.3.2 It can be seen that in all options there is very substantial benefit to the Bedford economy of the construction of EWR which is consistently around £12m per annum., the majority of which is generated from improved connectivity to Cambridge. It is the transformational impact of new links to Oxford and Cambridge rather than the detail of service specifications that drive this.
- 4.3.3 It can be seen that the overall impact on GVA of changes to the service specification is comparatively limited. The reason for this is that the most significant change is the provision of a direct route from Bedford to Cambridge and Oxford and it is this that generates the majority of the GVA impact. The ability of passengers to reroute to alternative stations within the Bedford area limits the impact of service changes.
- 4.3.4 Option 2 has the larger negative impact with an overall reduction in GVA of between 3 and 4%. The impact of Option 3 is more limited with no reduction in impact towards Oxford and a modest reduction in the impact on Milton Keynes and Cambridge flows.

5. LABOUR SUPPLY IMPACTS

5.1 Introduction

5.1.1 SYSTRA has undertaken an assessment of labour impacts in line with *TAG Unit A2.3 Employment Effects*. This TAG unit provides guidance on quantifying and valuing the employment effects of transport investment, this is focussed on labour supply impacts.

5.1.2 Labour supply impacts are an area which will be impacted by hybrid working going forward. Labour supply impacts in relation to transport investment are based on the idea that by improving transport connectivity employers will have access to a wider labour market (and thus be able to better match jobs with individuals with suitable skills), and that also employees will have access to more jobs. Ultimately this leads to a trickledown effect where those not participating in the economy may move to being economically active.

5.1.3 For those jobs where hybrid working is a realistic option there are likely to be significant labour supply benefits. In extremis full time virtual working makes home location in relation to job location irrelevant. A more realistic, and emerging scenario, is one where the catchment area for labour supply for a job expands to a point which is acceptable to the labour force for travelling at the frequency at which they are required (or wish) to physically attend a work location. This will vary for individuals and economic sectors, but if it is assumed that employees attend work physically between two and three times per week it implies that a doubling of previous generalised costs for a journey on a single day would be the upper limit of a catchment (i.e. the same amount is spent on the time and cost of transport as pre-hybrid working, but it is spread over fewer days). These types of scenarios are linked to the following sections on housing and commuting costs.

5.1.4 In such a scenario car use may well become less attractive for commuting if a car in a household (especially a second car) is required solely for commuting as making fewer trips increases the cost per trip by spreading the fixed cost of ownership over fewer trips. Similarly the impact of congestion and journey time reliability means that the increase in the catchment area for jobs when travelling by car is unlikely to have a linear relationship to distance

5.1.5 In contrast, where direct rail services are provided, the increase in catchment area for jobs is likely to be more linear in nature.

5.1.6 In the following sections we deploy the TAG methodology to explore the impact on Bedford of EWR across the three service options.

Methodology

5.1.7 Labour supply impacts have been quantified as specified in *TAG Unit A2.3 Equations 2 and 3*. These formulae take account of the generalised cost of travel between an origin and a destination in the do minimum and do something scenarios. The following origin – destination pairs were used in the analysis:

- Bedford – Oxford
- Bedford – Milton Keynes Central
- Bedford – Cambridge

5.1.8 We have undertaken model runs that examine the impact of EWR with and without hybrid working. To achieve this we have undertaken the following tests:

- Test 1: Change in labour supply impact with opening of EWR **without** hybrid working (assume rail mode share of 50% after EWR opens)
- Test 2: Change in labour supply with EWR and hybrid working with an assumption that rail generalised cost falls by 50% and car generalised cost falls by 25% (assumes that savings relating to car are non-linear)
- Test 3: Change in labour supply impacts with EWR and hybrid working and an assumption that weekly commuting costs fall by 50% for rail but remain constant for car (isolates rail impact from combined car and rail impact in Test 2)

5.1.9 The 50% rail mode share is felt to be a reasonable assumption for longer distance commuter flows where rail is competing against a relatively congested road network. The assumption about hybrid working is felt to be robust as many office workers have returned for between 2 and 3 days per week. It is likely the EWR will be most attractive to those in office/ home working based roles.

5.2 Results

5.2.1 The table below presents the results of the three tests and three service options for each of Cambridge, Oxford and Milton Keynes.

Table 4. Labour supply impact on Bedford – Cambridge (£ per annum GVA 2023 prices)

	OPTION 1	OPTION 2	% DIFFERENCE	OPTION 3	% DIFFERENCE
Test 1	£53,233	£36,801	-31%	£48,383	-9%
Test 2	£321,352	£313,136	-3%	£318,927	-1%
Test 3	£301,199	£ 216,264	-28%	£222,055	-26%

Table 5. Labour supply impact on Bedford – Oxford (£ per annum GVA 2023 prices)

	OPTION 1	OPTION 2	% DIFFERENCE	OPTION 3	% DIFFERENCE
Test 1	£5,731	£5,298	-8%	£5,731	0%
Test 2	£23,463	£23,246	-1%	£23,463	0%
Test 3	£16,591	£16,375	-1%	£16,591	0%

Table 6. Labour supply impact on Bedford – Milton Keynes (£ GVA 2023 prices)

	OPTION 1	OPTION 2	% DIFFERENCE	OPTION 3	% DIFFERENCE
Test 1 ²	N/A	N/A	N/A	N/A	N/A
Test 2	£1,423,642	£1,261,383	-11%	£1,273,836	-11%
Test 3	£959,296	£748,101	-22%	£760,555	-21%

5.2.2 The results of Test 1 show only modest labour supply impacts for Bedford without hybrid working in place, irrespective of service level. This is in line with similar types of modelling work undertaken pre COVID on other schemes. Values often appear low as they are measuring the change in the level of output and employment triggered by improved labour supply. Milton Keynes is notable in that even with EWR in place on average car retains the lowest generalised cost for all but a handful of MSOAs in Bedford and therefore the impact should be seen as neutral.

5.2.3 The results for test 2 and 3 are important as they highlight that hybrid working with an assumed reduction in generalised cost per job per week bring much greater benefits through increased catchment areas for jobs. In these circumstance rail has an increased role as passengers have greater ability to realise costs savings than those travelling by car.

5.2.4 As with the agglomeration modelling Option 2 generates the greatest negative impact relative to Option 1. The scale of the impacts varies by location reflecting the distances involved and the changes to service levels to different stations. Option 3 also generates negative impacts but these are smaller than Option 2.

5.3 Summary

5.3.1 This section has explored the scale of the labour supply impact of EWR on the Bedford area both with and without the impacts of hybrid working. The modelling work has highlighted that hybrid working has the potential to **increase** the benefits of EWR by increasing labour market catchments, supporting the direct high quality connectivity that EWR provides to town and city centres.

5.3.2 The modelling also highlights that Option 2 has the most negative impact on labour supply. This suggests that if the alignment of EWR is to be altered then the timetable structure proposed in Option 3 would be preferable (i.e. services reversing at Bedford Midland rather bypassing the station).

² The results for Milton Keynes in Test 1 have been suppressed as they indicated a negative impact on GVA. This was due to rail having a higher generalised cost than car. When the mode share for rail was increased this resulted in a higher average generalised cost. This is a function of the service proposed for Milton Keynes which requires an interchange at Bletchley to reach Milton Keynes from Bedford and indicates that the mode share for frequent commuting may not increase significantly for those people commuting five days per week.

6. HYBRID WORKING & BENEFITS TO HOUSEHOLDS

- 6.1.1 The COVID-19 pandemic has radically shifted working patterns for employees who were previously office based. After a sustained period of home working through the pandemic a longer term pattern of hybrid working with time split between home and offices is emerging. Different organisations and occupations are taking different approaches to this but home working in some form for most previously office based workers has been normalised.
- 6.1.2 Across the existing rail network this change has triggered a series of difficulties with large fixed costs of operation for intensive commuter services no longer being matched by previous levels of demand and revenue.
- 6.1.3 The context of the East West Rail route and the service that will be operated is very different to intensive commuter operations such as those radiating from London. A hybrid working environment may help strengthen the benefits of EWR. The rationale for this hypothesis is that hybrid working allows individuals to live further from their work without incurring the level of cost and journey time disbenefit that they would have previously. Travelling less frequently allows individuals to locate in locations that have a lower living cost or allows them to live in larger homes for the amount they may be paying elsewhere.
- 6.1.4 On the EWR route housing costs in Oxford and Cambridge are notably high, whilst they are lower in Milton Keynes and Bedford. The connectivity improvements that EWR will bring will make living in Bedford and working in Oxford or Cambridge more practical and attractive. However hybrid working brings an added dimension to this.
- 6.1.5 In a pre-hybrid working scenario with workers based full time in an office, commuting costs (both financial and time costs) would offset the benefit of lower housing costs. With hybrid working an assumption that desk based workers are typically based at home half the time means that commuting costs fall and the benefits of living in Bedford and working in Cambridge and Oxford are greater. Thus housing development proposed along the length of the Oxford – Cambridge Arc can have a greater role in reducing pressure on housing costs in centres such as Oxford and Cambridge.
- 6.1.6 Those workers who enjoy a combined lower housing cost and lower commuting costs will have a greater disposable income that in turn will be spent within the local economy. Again hybrid working brings an added dimension to this, with more individuals spending time working from home they are more likely to spend their disposable income in the economy of Bedford rather than spending it in the area in which their job is based.
- 6.1.7 In the following section we explore the scale of these benefits.

6.2 Modelling the impact of hybrid working

- 6.2.1 The modelling work we have completed attempts to quantify the benefits to households of living in Bedford in lieu of Oxford, Cambridge or Milton Keynes with and without EWR and with and without hybrid working in place.
- 6.2.2 The main sources of data for our work have been ONS data on house prices at MSOA level, and ONS data on the average size of mortgages. We have also used estimates from our

work in the previous section to estimate typical financial and generalised costs (i.e. inclusive of time penalties) for key flows on EWR, by road and rail.

6.2.3 To understand the impacts we have completed the following steps:

- Obtained average house price data for MSOAs in Bedford, Oxford and Cambridge
- Obtained data on average mortgage advances as a proportion of sale prices as the basis for estimating housing costs
- Estimated monthly mortgage payments in each location based on as assumed interest rate of 5.6% and a repayment period of 25 years. This is a typical rate for a five year fixed rate mortgage with an average loan to value ratio (68%) in December 2023
- Estimate cash costs of rail services on EWR from Bedford to Cambridge, Oxford and Milton Keynes
- Estimate access time to stations from each MSOA in the BBC area
- Estimate generalised costs (cash costs + time costs)
- Annualise the cash and generalised costs for pre-hybrid and hybrid working scenarios. (pre-hybrid assumes five day per week travel and hybrid assumes an average of 2.5 days travel)
- Add travel costs to mortgage costs in Bedford versus mortgage costs in destinations to estimate change in living costs and establish if a net saving is achievable

6.3 Results

6.3.1 In the following tables we present the average savings per annum per household from the BBC area to Cambridge, Oxford and Milton Keynes, for each service option. Results are presented for rail cash, and rail generalised costs.

Table 7. Changes in household and commute costs BBC area to Cambridge

	PRE COVID		POST COVID	
	RAIL CASH	RAIL GC	RAIL CASH	RAIL GC
Option 1	£3,939	-£5,013	£6,955	£2,479
Option 2	£3,971	-£5,625	£6,971	£2,173
% Difference	1%	-12%	0%	-12%
Option 3	£3,939	-£5,193	£6,955	£2,389
% Difference	0%	-4%	0%	-4%

Green = Living in Bedford and commuting to Cambridge is cheaper than living in Cambridge. **Red** = Living in Bedford and working in Cambridge costs more than living in Cambridge

- 6.3.2 The table above shows that on a pre COVID assumption of commuting five days a week living in Bedford and working in Cambridge would reduce cash costs when travelling by rail, but this would be offset by the values of travel time held by passengers. With hybrid working in a post COVID scenario there are real savings for the passengers both in cash and generalised cost terms.
- 6.3.3 The Option 2 timetable specification reduces the benefits by around 12% due to increased travel time and changes in station choice as a result of the reduced service specification. This reduces to 4% in Option 3.
- 6.3.4 With hybrid working and EWR, Bedford would remain an attractive place to locate for people working in Cambridge due to the relatively low journey time and the high cost of housing in Cambridge relative to Bedford, irrespective of which of the three service options were chosen.

Table 8. Changes in household and commute costs BBC area to Oxford

	PRE COVID		POST COVID	
	RAIL CASH	RAIL GC	RAIL CASH	RAIL GC
Option 1	£6,230	-£7,175	£9,850	£3,147
Option 2	£6,230	-£7,388	£9,850	£3,041
% Difference	0%	-3%	0%	-3%
Option 3	£6,230	-£7,175	£9,850	£3,147
% Difference	0%	0%	0%	0%

Green = Living in Bedford and commuting to Oxford is cheaper than living in Cambridge. Red = Living in Bedford and working in Oxford costs more than living in Oxford

- 6.3.5 The results for Oxford are comparable to those for Cambridge, with Bedford being most attractive for hybrid workers. Option 2 reduces the benefit of locating in Bedford by around 3%. Whilst Option 2 removes the direct Oxford service from Bedford Midland station, Stewartby retains the service, meaning that commuters would be more likely to use this station. The use of Stewartby therefore mitigates the loss of a direct Oxford service from the centre of Bedford. Option 3 has no impact on Oxford as the service planned in Option 1 is retained.

Table 9. Changes in household and commute costs BBC area to Milton Keynes

	PRE COVID		POST COVID	
	RAIL CASH	RAIL GC	RAIL CASH	RAIL GC
Option 1	-£3,427	-£15,086	-£1,827	-£7,657
Option 2	-£3,427	-£15,243	-£1,827	-£7,735
% Difference	0%	-1%	0%	-1%
Option 3	-£3,541	-£15,150	-£1,884	-£7,689
% Difference	-3%	0%	-3%	0%

Green = Living in Bedford and commuting to Milton Keynes is cheaper than living in Milton Keynes. Red = Living in Bedford and working in Milton Keynes costs more than living in Milton Keynes

6.3.6 Table 9 shows that there are no circumstances where living in Bedford and commuting to Milton Keynes would reduce costs relative to living in Milton Keynes. This reflects the comparable housing costs between the two settlements, which are markedly lower than both Cambridge and Oxford.

6.4 Summary

6.4.1 This analysis has shown that the introduction of hybrid working has the scope to expand the benefits of EWR by increasing the attractiveness of commuting from locations such as Bedford to Cambridge and Oxford. There is increased scope for reducing pressure on housing markets in Cambridge and Oxford whilst increasing spend in the economy of Bedford from those households who benefit from reduced mortgage or rental costs and thus have greater disposable income.

6.4.2 It has also been shown that alternative service patterns have only a limited negative impact on the overall results. This finding is driven largely by the scale of difference in house prices between Bedford and Oxford / Cambridge, coupled to the role that Stewartby in particular has in serving Oxford.

7. CONCLUSION

7.1.1 Within this note we have explored three different of areas of wider economic impacts that the opening of East West Rail in full between Oxford and Cambridge would deliver. This has been in the context of three different possible service option for the Bedford area after the opening of EWR, and also within the context of hybrid working opening new opportunities for employment and also commuting patterns.

7.1.2 Our modelling work has shown that in two areas, labour supply and direct benefits to households, the rise of hybrid working may in fact increase the benefits that East West Rail can bring, through a combination of improved connectivity and increased commuting catchments. For the third area, agglomeration benefits, we believe that whilst the nature of agglomeration benefits may changes there both positive and negative impacts, which in combination with the character of the knowledge based economy in within the Oxford – Cambridge arc, means that the overall level of agglomeration benefits remains comparable to pre pandemic values.

7.1.3 The table below summarises the total agglomeration and labour supply impacts for each option, in a single year (at 2023 prices) and the a 60 year discounted present value at a 2010 base year in line with DfT TAG guidance. Household benefits have not been included as we lack evidence on the volume of households that would be impacted that are required to aggregate the figures.

Table 10. Summary Table

	OPTION 1	OPTION 2	OPTION 3
GVA (Single Year)	£12.70m	£12.28m	£12.55m
Labour Supply (Single Year)	£1.77m	£1.60m	£1.61m
Single Year Total	£14.4m	£13.9m	£14.1m
60 Year Discounted Present Value	£268.72m	£257.57m	£262.96m

7.1.4 The key message form the table above is that in all options EWR would represent a sizeable boost to the economy in Bedford worth between £257m and £268m over 60 years. The difference between options is comparatively limited. Options 2 and 3 both show a reduction in overall benefits, with Option 2 (which involves the most significant reduction in train service at Bedford) having the greatest impact, but the difference from Option 1 only represents 4% of benefits.. Option 3 is only worth 2% less than Option 1, which is negligible impact over 60 years.

7.1.5 It is notable that Stewartby has a very strong role in supporting EWR in the Bedford area, and it provides considerable mitigation in Option 2 when Bedford Midland loses direct services to Oxford and this station appears critical delivering the benefits of EWR to the Bedford borough as whole.

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