EAST WEST RAIL WIDER IMPACTS

BEDFORD BOROUGH COUNCIL

SYSTRA

EAST WEST RAIL

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1. INTRODUCTION

1.1.1 In May 2022 SYSTRA was commissioned by Bedford Borough Council 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 Work is currently underway to reopen the railway between Bicester and Bletchley. This report focusses on understanding the benefits associated with work to the Marston Vale Line between Bletchley and Bedford and the continued development of the proposed new alignment between Bedford and Cambridge.

1.1.3 There have been changes to rail demand precipitated by the COVID-19 pandemic and the associated rise in hybrid working which has reduced demand for commuting trips, and also an associated reduction in business trips. It is these changes that have driven this latest study which builds upon earlier work.

1.1.4 Whilst these changes in the nature of travel demand need to be considered as part of the planning of East West Rail, overstating them risks undermining EWR as a transformational scheme which links the economies of the Oxford – Cambridge arc and which supports economic growth along the length of the route including Bedford. As this report shows there may be potential upsides associated with hybrid working such as improved access to labour markets and opportunities to reduce pressure on overheated housing markets such as those in Oxford and Cambridge.

1.1.5 This report explores three different areas of non-transport benefits focusing on the Bedford area. These include:

- Agglomeration impacts in the post COVID environment
- Labour supply impacts and the impact on hybrid working
- Direct impact on households and commuting patterns attributable to hybrid working

1.1.6 Our work, set out below, suggests that the case for agglomeration impacts remains, whilst the impact of hybrid working may increase labour supply impacts, and in combination with EWR bring direct benefits to households. At 2022 prices £23.76m would be added to the economy of Bedford alone, equivalent to £1.42 Billion over 60 years.

1.1.7 The remainder of this report explores our methodological approach and presents the results of modelling work.

2. AGGLOMERATION IMPACTS

2.1.1 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. In 2016 and 2019 SYSTRA undertook modelling work to examine the agglomeration impacts of EWR on the economy of Bedford.

2.1.2 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.

2.1.3 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.

2.1.4 Based on this we believe that agglomeration impacts are still valid as there are both up and down sides associated with hybrid working.

2.1.5 The following section sets out methodology for estimating agglomeration impacts.

2.2 Methodology

2.2.1 We have assessed the agglomeration impact on the wider economy of East West Rail in terms of the impact on Gross Value Added.

2.2.2 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.

Agglomeration Economies

2.2.3 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 .

2.2.4 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

2.2.5 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] .

2.2.6 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

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

Table 1. Definition of Consumer & Producer Services Segments

CONSUMER SERVICES	PRODUCER SERVICES
Motor Trade	Financial
Wholesale	Insurance
Retail	Auxiliary/Financial
Hotels/Restaurants	Machinery Renting
Land Transport	Computer Services
Water Transport	Research & Development
Travel Support	Other business services
Post Telecom	

2.2.8 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.

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

The approach taken to estimating the frequency and interchange penalties follows the ATOC Passenger Demand Forecasting Handbook guidance.

Interpreting Outputs

2.2.9 The outputs of the work are presented for 2022 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.

2.2.10 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 be 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.

2.3 Train Service

2.3.1 The train service included in the modelling work assumes a two train per hour service between Oxford and Cambridge supported by a two train per hour Bletchley – Cambridge service.

2.4 Results

2.4.1 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 2022 values at 2022 prices.

Table 2. GVA Impact, East West Rail (2TPH Oxford – Cambridge) 2022 values and prices

FLOW	GVA IMPACT (£M)
Bedford – Oxford	£2.76
Bedford – Oxford Parkway	£0.27
Bedford – Bicester	£0.92
Bedford – Aylesbury Vale Parkway	£0.17
Bedford – Aylesbury	£0.72
Bedford – Milton Keynes Central	£0.54
Bedford – Bletchley	£0.70
Bedford – Sandy	£0.42
Bedford – Cambridge	£5.19
BEDFORD TOTAL	**£11.68**
Other EWR Internal flows	**£21.99**

2.4.2 The table above indicates that East West Rail will have a significant impact particularly for flows between Bedford and Cambridge / Oxford. Over a 60 year period this would add £700m to the economy of Bedford (undiscounted values).

2.4.3 Retaining the pre COVID modelling approach without modification, may still provide a robust estimate of the impact of EWR as the reduction in the need for office space for each company presents opportunities for economic centres to become denser with more companies in a smaller area. This will allow a greater level of local agglomeration and presents greater opportunities for agglomeration benefits between centres, offsetting the impact of workers visiting offices less frequently. Rail services with low and consistent journey times are in a stronger position to deliver and enhance these benefits than a congested road network can. The economy of the Oxford – Cambridge Arc, which is heavily dependent on the knowledge economy, is any case likely to generate agglomeration impacts much greater than the averages estimated using modelling techniques.

3. LABOUR SUPPLY IMPACTS

3.1 Introduction

3.1.1 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 employment effects of transport investment, this is focussed on labour supply impacts.

3.1.2 The analysis undertaken here considers the local impact only and **does not** consider displacement between locations.

3.1.3 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 job 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.

3.1.4 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, 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).

3.1.5 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

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

3.1.7 In the following sections we deploy the TAG methodology to explore the impact on Bedford of EWR both with and without hybrid working.

Methodology

3.1.8 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 – Oxford Parkway
- Bedford – Bicester
- Bedford – Aylesbury Vale parkway
- Bedford – Aylesbury
- Bedford – Milton Keynes Central
- Bedford – Bletchley
- Bedford – Sandy
- Bedford – Cambridge

3.1.9 We have undertaken model runs that examine the impact of EWR with a 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)

3.2 Results

3.2.1 The table below presents the aggregated results for Bedford for the three tests.

Table 3. Labour supply impacts on Bedford (£m GVA 2022 prices)

TEST	£M GVA
Test 1	£0.61m
Test 2	£3.48m
Test 3	£2.43m

3.2.2 The results show only modest labour supply impacts for Bedford without hybrid working in place. 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.

3.2.3 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. The results for Test 3 suggest that in isolation improving rail connectivity would increase GVA benefits by £1.82m compared to a pre hybrid working scenario.

3.3 Summary

3.3.1 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.

3.3.2 The combined role of EWR and hybrid working will be of greater importance, if as discussed in the agglomeration chapter, the density of town and city centres increases with more companies based in central locations as individual companies choose to rent less office space. Rail travel is in a stronger position to provide connectivity to these centres than road travel is, and thus is a pre requisite for delivering enhanced labour supply impacts.

4. HYBRID WORKING & BENEFITS TO HOUSEHOLDS

4.1.1 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 is some form for most previously office based workers has been normalised.

4.1.2 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.

4.1.3 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.

4.1.4 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.

4.1.5 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.

4.1.6 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.

4.1.7 In the follwing section we explore the scale of these benefits.

4.2 Modelling the impact of hybrid working

4.2.1 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.

4.2.2 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.

4.2.3 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 2.63% 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 (67%) in June 2022
- Estimate cash costs of car travel from Bedford to the centres of Oxford, Cambridge and Milton Keynes including fuel costs, non-fuel costs and parking charges (the latter being significant in Oxford and Cambridge)
- Estimate cash costs of rail services on EWR to the same locations
- Estimate generalised costs (cash costs + time costs) rail and road options
- 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

4.3 Results

4.3.1 In the following tables we present the savings per annum per household achievable under the following scenarios:

- Pre Hybrid working:
  - Car (monetary and generalised cost)
  - EWR (monetary and generalised cost)
- Post Hybrid working:
  - Car (monetary and generalised cost)
  - EWR (monetary and generalised cost)

4.3.2 We present results based on individuals living in Bedford and working in Cambridge, Oxford and Milton Keynes. To simplify the results we have grouped them into three areas within Bedford:

- Current Bedford urban area (where 1,250 homes are proposed in the centre of the town
- Kempston Hardwick catchment (where 4,000 new homes are associated with the proposed upgraded station at this location
- Proposed Little Barford station catchment (where a further 4,000 homes are proposed, associated with a new interchange station between EWR and East Coast Mainline)

4.3.3 The tables below presents the results for commuting trips between Bedford and Cambridge, by rail and road.

Table 4. Change in household and rail costs (Bedford v Cambridge) £ per annum

MODE	SCENARIO	BEDFORD	KEMPSTON HARDWICK	LITTLE BARFORD
Rail Cash	Pre Hybrid	£4,547	£2,432	£655
	Post Hybrid	£6,133	£4,018	£1,924
	Difference	£1,586	£1,586	£1,269
Rail Generalised Cost	Pre Hybrid	£1,059	-£1,056	-£2,135
	Post Hybrid	£4,389	£2,274	£529
	Difference	£3,330	£3,330	£2,664

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

4.3.4 The table above demonstrates that in purely financial terms living in Bedford and commuting to Cambridge by train on EWR would have lower costs than living in Cambridge, both with and without hybrid working. However when the time penalty of travel is monetised the benefits are considerably reduced, with a new disbenefit when travelling either from Kempston Hardwick or Little Barford in a pre hybrid scenario. In contrast in a post hybrid scenario there are still benefits from living in the Bedford area. It should be noted that the poorer results presented for Little Barford (despite it being closer to Cambridge), reflect the higher house prices in this area.

4.3.5 These results suggest that hybrid working moves commuting from Bedford to Cambridge from having a marginal case to a much stronger case with the benefits offsetting the disbenefits of travel time.

4.3.6 Table 5 below, looking at the journey by car shows a contrasting picture. Travel by car from Bedford in a pre-hybrid world to the centre of Cambridge is always more expensive than living in Cambridge (in part reflecting the impact of congestion and parking charges in Cambridge). In a post hybrid working world living in Bedford and travelling to Cambridge becomes cheaper than living in Cambridge but the generalised cost tables shows that it is not possible to offset the monetised impact of the time penalty of travel.

4.3.7 Where benefits do exist for car they may be overstated as the fixed costs associated with cars may not be fully accounted for in the calculation of car operating costs.

4.3.8 In combination with the rail table this shows that it requires a combination of the connectivity benefits of EWR and hybrid working to show a strong case for commuting

between Bedford and Cambridge rather than living in Cambridge. It is this combination of circumstances that in turn triggers the release of additional spend into the local economy.

Table 5. Change in household and car costs (Bedford v Cambridge) £ per annum

MODE	SCENARIO	BEDFORD	KEMPSTON HARDWICK	LITTLE BARFORD
Car Cash	Pre Hybrid	-£2,334	-£4,449	-£4,849
	Post Hybrid	£2,693	£578	-£828
	Difference	£5,027	£5,027	£4,021
Car Generalised Cost	Pre Hybrid	-£10,634	-£12,749	-£11,489
	Post Hybrid	-£1,457	-£3,572	-£4,148
	Difference	£9,177	£9,177	£7,341

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

4.3.9 The tables below presents the results for Oxford.

Table 6. Change in household and rail costs (Bedford v Oxford) £ per annum

MODE	SCENARIO	BEDFORD	KEMPSTON HARDWICK	LITTLE BARFORD
Rail Cash	Pre Hybrid	£2,153	£38	-£2,373
	Post Hybrid	£4,990	£2,875	£464
	Difference	£2,836	£2,836	£2,836
Rail Generalised Cost	Pre Hybrid	-£2,754	-£4,869	-£7,280
	Post Hybrid	£2,536	£421	-£1,990
	Difference	£5,290	£5,290	£5,290

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

Table 7. Change in household and car costs (Bedford v Oxford) £ per annum

MODE	SCENARIO	BEDFORD	KEMPSTON HARDWICK	LITTLE BARFORD
Car Cash	Pre Hybrid	-£7,176	-£9,291	-£11,702
	Post Hybrid	£325	-£1,790	-£4,201
	Difference	£7,501	£7,501	£7,501
Car Generalised Cost	Pre Hybrid	-£18,804	-£20,919	-£23,330
	Post Hybrid	-£5,489	-£7,604	-£10,015
	Difference	£13,315	£13,315	£13,315

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

4.3.10 Being located further from Bedford the results for commuting towards Oxford show a different pattern. In a pre-hybrid working scenario only travel from Bedford and Kempston Hardwick to Oxford by rail would generate a financial improvement for households, and when time penalties are included there are no positive impacts.

4.3.11 In contrast in a hybrid working scenario rail generates financial benefits to households living in the Bedford area but working in Oxford. By car this is achieved for only one settlement and as described above this benefit may be overstated. When time penalties are valued rail still generates a saving to households from Kempston and Bedford, whereas car does not.

4.3.12 Inevitably the results for Oxford are less smaller than those for Cambridge, but together they demonstrate that hybrid working will improve access to employment from Bedford, and with the existing rail service to London, Bedford will have access to a large number of high value jobs by a sustainable mode.

4.4 Summary

4.4.1 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.

4.4.2 In contrast to expectations hybrid working has the scope to enhance the case for EWR and the railway orientated sustainable development the Bedford Borough Council have planned along side it. Across the sites at Kempston Hardwick, Bedford and Little Barford there are proposals for 9,250 new homes which are associated with the EWR. The table

below presents an estimate of annual financial benefits to associated with each of these development if 25% of households held a job in Cambridge and 10% in Oxford.

Table 8. Annualised benefits to households (new development sites)

SITE	DWELLINGS	CAMBRIDGE BENEFIT	OXFORD BENENFIT	TOTAL
Bedford	1,250	£1.91m	£0.56m	£2.47m
Kempston Hardwick	4,000	£4.01m	£1.07m	£5.08m
Little Barford	4,000	£1.92m	£0.18m	£2.1m
TOTAL	**9,250**	**£7.84m**	**£1.81m**	**£9.65m**

5. CONCLUSION

5.1.1 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.

5.1.2 These have been explored within the context of a post pandemic environment where hybrid working has changed the demand for commuting and business trips.

5.1.3 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.

5.1.4 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.

5.1.5 In combination the three areas of benefits would bring an additional **£23.76m per annum** to the economy of Bedford at 2022 prices. Annualised over 60 years (without discounting or inflation impacts) this would add **£1.42 Billion** to the economy of Bedford.

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