

Croxley Rail Link

Wider Impacts

Report

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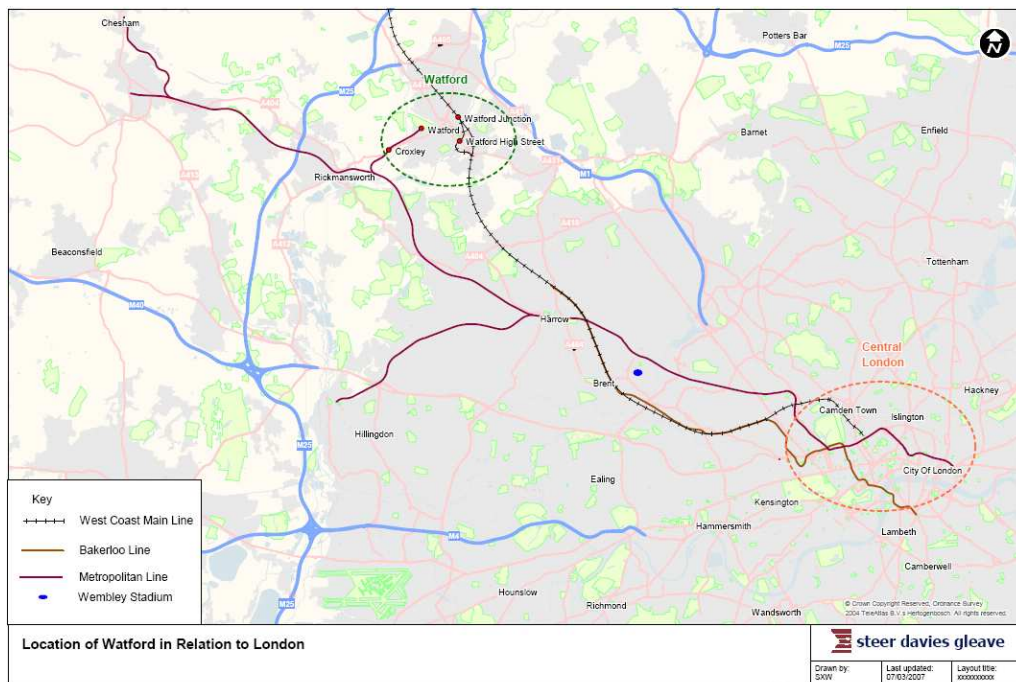
1 Introduction

- 1.1 This report describes our work to quantify the Wider Impacts of the Croyley Rail Link project. We set out the background to the Croyley Rail Link Scheme in Chapter 2 of this report.
- 1.2 We have undertaken an assessment of Wider Impacts following the Department for Transport's guidance on the topic published in 2009. We further elaborate on the Wider Impacts in Chapter 3.
- 1.3 The Department's guidance sets out how transport's impacts on agglomeration, imperfect competition and labour markets can be quantified and the extent to which these impacts are additional to the benefits captured under a conventional transport appraisal. Chapter 4 reports on our findings.

2 Background of Croxley Rail Link Scheme

- 2.1 Watford has enjoyed economic prosperity over recent years, resulting in it becoming established as a major attractor of employment, retail and leisure trips and drawing in visitors from an expanding catchment area. It has a retail centre of regional importance and has been designated within the East of England Plan as a *Key Centre for Development and Change* (KCDC) within the London Arc. There are now signs that the town has started to suffer from its own success, with congestion threatening future growth and the town’s KCDC status, together with a decline in quality of the local environment for residents.
- 2.2 Hertfordshire County Council first acknowledged this issue in the 1990s when it worked alongside major stakeholders to develop and implement the South West Hertfordshire Transportation Strategy. One outcome was the Council’s current role in promoting the Croxley Rail Link; a scheme where the existing Watford branch of the Metropolitan Line will be diverted to the Watford Junction, with intermediate stations at Ascot Road, Watford General Hospital and Watford High Street.
- 2.3 Watford is located within the Borough of Watford which is part of the County of Hertfordshire. The Croxley Rail Link scheme falls entirely within the County of Hertfordshire. Figure 2.1 illustrates the location of Croxley Rail Link with respect to London.

FIGURE 2.1 LOCATION OF CROXLEY RAIL LINK IN RELATION TO LONDON



- 2.4 Operating a high quality London Underground (LUL) service to Watford Junction will contribute towards a number of objectives of local, regional and Central Government policies. Key benefits of this scheme include:

- The provision of an alternative route between Watford and central & north London allowing travellers to reach more destinations seamlessly, whilst relieving crowding on existing rail routes during peak periods;

- Support for Watford’s new role as a *Key Centre for Development and Change* (KCDC) within the London Arc. Improved transport provision will enable sustainable development of the Watford area, including commercial, retail, leisure and residential opportunities;
- The provision of improved connections to local services such as the general hospital and, in particular, the proposed Watford Health Campus major regeneration project (which provides health services and employment) is of importance to both London and Hertfordshire;
- The provision of improved local and regional public transport network connections to Watford, particularly from West Watford and the Metropolitan Line;
- Contribution to the role of Watford Junction as an interchange hub for outer London orbital and West Coast mainline movements;
- A significant improvement in public transport provision enabling the local authorities to manage the highway network and demands on it more effectively; and
- Provision of a direct, mass transit service from Watford Junction to the National Stadium for visitors from Scotland, the north-west and the midlands.

2.5 The scheme has the support of all key stakeholders, makes use of existing under-utilised transport infrastructure and presents a good value for money investment of public money. The proposed Croxley Rail Link clearly supports a number of key themes which were presented in the Eddington Report of December 2006. These include:

- Making the best use of existing infrastructure;
- Filling gaps and pinch points to improve the performance of existing networks;
- Providing investments in areas with economic priority with congested urban areas and catchments;
- Offering more choice of transport modes; and
- Increasing energy efficiency of public transport modes.

2.6 In summary, the Croxley Rail Link increases the population served by the London Underground connection between Watford and London; improves access from the Metropolitan Line into Watford town centre; and creates interchange opportunities between Underground services and National Rail services at Watford Junction. The proposed Croxley Rail Link is forecast to provide significant welfare benefits through travel time savings and improved integration.

Options Taken to Appraisal

2.7 The *DO MINIMUM* option, forming the comparator for the appraisal, is for no change to the current Metropolitan Line, Heavy Rail or bus services and gradual loss of the Croxley Green Branch transport asset for developers. Current public transport links on the Croxley - Watford corridor are provided by bus services. Peak hour journey time reliability on these services is poor, principally due to operational problems

resulting from road traffic congestion. Highway traffic is forecast to continue to increase into the future and therefore reliability will continue to decline.

2.8 The *DO SOMETHING* proposes the diversion of all existing Metropolitan Line services from Watford Station across a double track viaduct to join the Croxley Green Branch terminating at Watford Junction Station (see Figure 2.2). The journey time from Croxley to Watford Junction is estimated at 11 minutes with services operating on a 10 minute headway. Intermediate stations would include Ascot Road, Watford General Hospital and Watford High Street. As the Metropolitan Line operates in complete segregation from traffic, there will be significant passenger reliability benefits in comparison to the *DO MINIMUM*. The proposed Croxley Rail Link provides connections between recent and future developments along the corridor and London/National Rail services at Watford Junction. Future development includes the proposed Watford Health Campus, directly served by the rail link, which is of regional importance. The provision of a high quality fixed track transport system will make enhance the attractiveness of other sites and facilitate future development in a sustainable fashion.

FIGURE 2.2 CROXLEY RAIL LINK ALIGNMENT



3 Wider Impacts

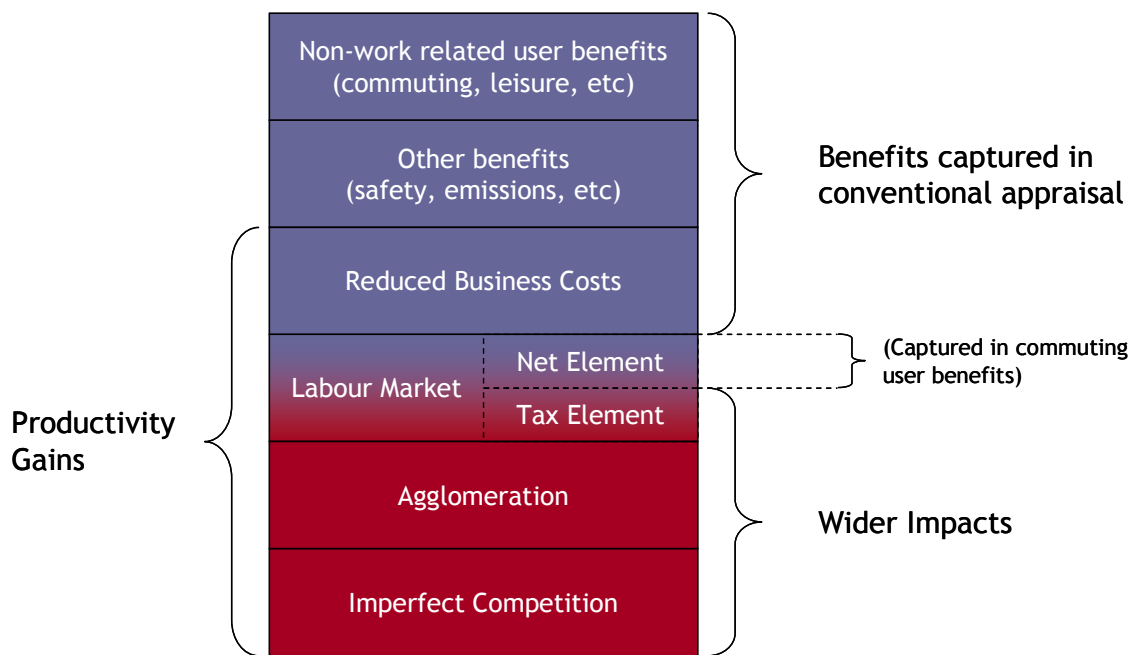
- 3.1 Transport appraisal is a relatively mature discipline. For some 40 years transport professionals have been using economic and modelling techniques to estimate the contribution of transport schemes to society.
- 3.2 The current UK appraisal framework is based on the Department for Transport's 'New Approach to Transport Appraisal', or NATA. This framework aims to capture the full set of benefits that society derives from a scheme under five objectives; the Economy, Environment, Safety, Integration and Accessibility.
- 3.3 The main component of the appraisal framework is the economic assessment. Ideally this should measure what we may call final impacts. These include changes to real output, wages and consumer prices, as well as non-market impacts such as on non-work time savings and safety. For instance, reducing the time it takes for an accountant to reach clients will mean increased productivity as less time is 'wasted' travelling. As a result the accounting firm may increase wages, cut prices, increase output and/or increase its profits. These impacts will have yet another round of impacts on the firm's employees, clients and owners. Hence, the real economic benefits are the final impacts after the initial effects have 'rippled' through the economy.
- 3.4 Accurately tracing these indirect impacts of a scheme as they work through the economy is, however, a very complex task. Transport appraisal therefore only seeks to measure the direct or first round economic impacts e.g., the time and cost savings to users. Given certain assumptions, crucially the existence of perfect competition in all markets, this assumption is valid. The direct benefits do neither magnify nor diminish as they pass through the economy. So the sum of the increase in wage, the reduction in price and any increased profit margin should be exactly identical to the value of the time initially saved by the accountant.
- 3.5 However, over recent years there has been a growing recognition that transport appraisal does not represent well enough the impacts schemes have on the wider economy. Firstly, concerns have been growing that the appraisal assumption of perfect competition is too strict. A significant amount of literature over the last years has addressed the potential for transport to deliver wider impacts - that is, additional benefits on the wider economy beyond the direct impacts. The view is that current approach to appraisal fails to capture these impacts.
- 3.6 These additional benefits may arise where market failures cause the direct transport impacts to be magnified as they pass through the economy. New guidance from the Department for Transport (DfT)¹ enables the quantification of Wider Impacts (WIs) caused by agglomeration economies, imperfect competition and labour market inefficiencies. These have been found to typically add between 5% and 40% to the conventionally measured appraisal benefits.
- 3.7 Secondly, cost-benefit assessments often do not express benefits from transport improvements in terms that are relevant for many stakeholders. Travel time reductions and cost savings are all important, but scheme promoters invariably have

¹TAG Unit 2.8 "Wider Impacts and Regeneration", Department for Transport, 2009.

other objectives - for instance in terms of accessibility, jobs, employment and productivity.

- 3.8 To understand the full set of economic impacts of transport schemes, additional analyses beyond the conventional Cost-Benefit Analysis (CBA) are therefore needed. Figure 3.1 below seeks to illustrate the sources of and relationship between conventional appraisal benefits, wider impacts and productivity impacts. Each of the wider impacts identified by the DfT’s guidance are explained briefly, in turn.

FIGURE 3.1 RELATIONSHIP BETWEEN CONVENTIONALLY MEASURED BENEFITS, WIDER IMPACTS AND PRODUCTIVITY GAINS



Agglomeration Impact

- 3.9 Agglomeration simply means the geographic clustering of firms and workers. Cities are one type of agglomeration. In cities we often find that wages, rents, transport costs and other prices are higher than elsewhere. The explanation for the desire to locate in cities despite the additional costs must be that firms in a wide range of economic sectors are more productive when they are clustered.
- 3.10 Typically, firms are more productive when near to other firms because they have access to a large variety of inputs to their activities. It is also often argued that proximity to other similar firms increases the chance of acquiring new knowledge and of building connections and networks which support or increase productivity. Research shows, for instance, that face to face contact is very important in some type of business environments.
- 3.11 Many firms are also more productive when they have access to a large labour market, since this makes recruitment quicker and it is easier to find workers with the exact skills match that they are after. Evidence supports all of this by showing that, as a city grows and becomes denser, its firms become more productive.
- 3.12 When we talk about density of a city, we really mean the number of firms or workers that are accessible. Rather than number of jobs or worker per square km,

it is more natural to consider the number of jobs or workers located within, say, X generalised minutes. Because the effective density depends on perceived distance, the role of transport in supporting accessibility, and therefore agglomeration, is important. If transport is made cheaper or quicker, more firms and workers will be located within reach and, according to the literature on agglomeration, productivity will increase. Importantly, these agglomeration benefits are additional to those already captured in appraisal.

Time and cost savings to travel in the course of work

- 3.13 This element of appraisal is based on the assumption that travel in the course of work is usually not productive in itself and reducing journey times frees up time for additional productive activity. When an individual saves one hour travelling whilst in work, the appraisal values this time at the gross cost to the firm of the worker's time (i.e. hourly wages plus national insurance contributions and other labour related costs). Identifying the productivity gains from business cost savings is therefore simple - they are identical to the business impacts as identified in the conventional transport appraisal.

Imperfect Competition

- 3.14 Despite the above, what we really seek to measure by time savings in the course of work is the additional value to society of the additional activity the worker now can undertake instead of travelling. However, under the assumption of perfect competition these two values (hourly labour cost and marginal hourly productivity) are identical - so labour costs is a good approximation.
- 3.15 In reality this is not true. On average firms are able to charge more for their products and services than what they cost to produce. This means that the value society places on the worker's output from one hours' additional work (i.e. the price of whatever the worker makes in one hour) is higher than the cost of the workers' time to the firm.
- 3.16 By valuing workers' saved time at the level of costs to the firm rather than the value to society, current transport appraisal underestimates the benefits of in-work travel time savings.

Labour market impacts

Productivity gains of commuting cost reductions

- 3.17 When individuals make decisions about labour supply, e.g. whether to work, how much to work and where to work, they take many factors into account. Importantly they balance the financial gains (i.e. 'take-home wage') against what we may call personal costs (i.e. giving up spare time). If the financial returns to work increase or the personal costs decrease, more individuals are likely to choose to work, whilst some of those who already do will decide to work more or in more productive (and more demanding) jobs. The result is increased productivity (as measured by output per capita).
- 3.18 The monetary costs of travelling to work reduce the financial gains from working, whilst commuting time costs increase the personal costs. The time and cost of commuting are therefore deterrence to productivity. We can measure the productivity impacts of changing commuting costs by assessing the resulting employment changes:

- 'More people working' is assessed using evidence on labour supply responses to changing wages;
- 'More people working in more productive jobs' can be assessed using land use transport interaction (LUTI) models or by a simpler approach treating model forecasts of travel to work as proxy for employment.

3.19 Note that this effect is distinct from any impact that a scheme may have on the rate of unemployment.

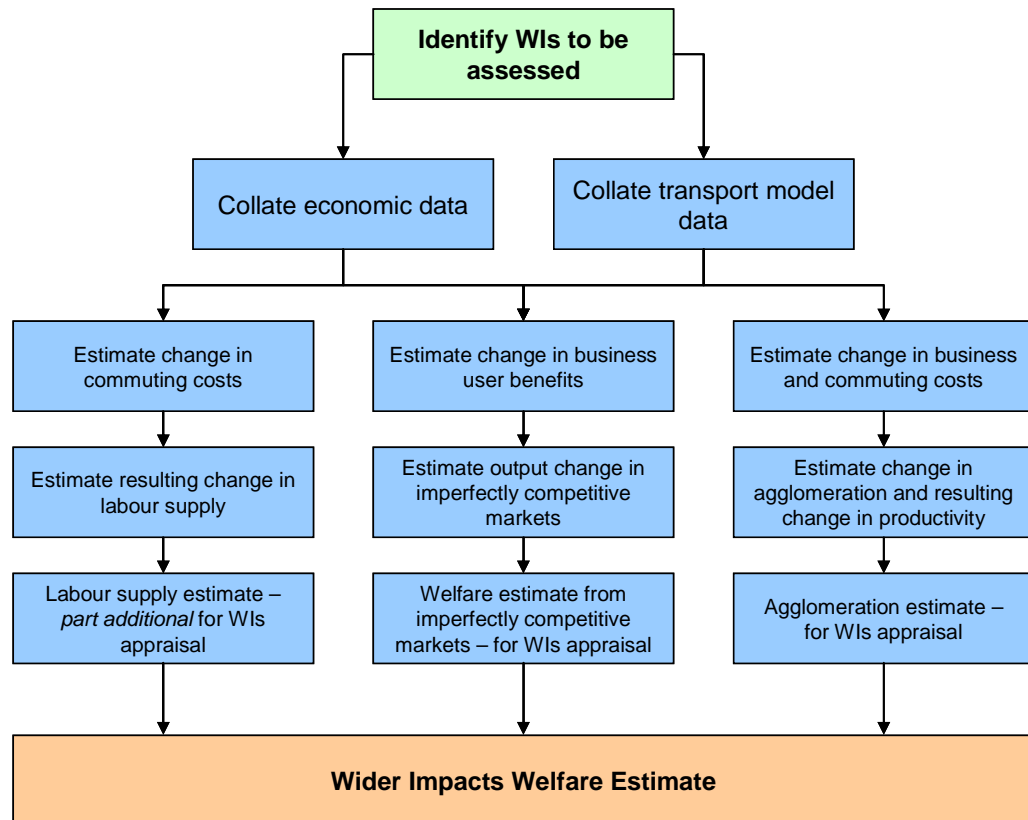
Wider welfare gains of commuting cost reductions

- 3.20 Transport appraisal counts the welfare benefits of commuting time savings by measuring individuals' willingness to pay for them. For those individuals who now decide to work or to work longer, their welfare benefits will be lower than the productivity gains. This is because welfare gains are net of the increased personal costs of giving up spare time. As an example, consider an individual who could earn £1000 by starting to work, but would incur commuting costs (including time) of £110 to do so. Starting work would also mean giving up spare time, which the individual values at £900. This individual would be £10 better off by not working (£900 vs. £1000 - £110 = £890) and would therefore decide not to work. Should commuting costs fall by £20, the situation is reversed; the individual would now be £10 better off by working (£900 vs. £1000 - £90 = £910). The personal impact on the individual of the reduction in commuting costs is £10 (£910 - £900).
- 3.21 We here see an illustration of the important distinction between welfare impacts and productivity impacts. The welfare impact is simply £10, whilst output will increase by much more. The two units of accounts measure two different things and transport appraisal concentrates on counting welfare.
- 3.22 But there is another reason why the individual's willingness to pay for commuting time savings is lower than the productivity gains, which is not taken account of in appraisal. Because of labour related taxation (income tax, national insurance contributions, etc), the return to the worker as a result of extra effort (i.e. net wage) is lower than the value to society (i.e. gross wage). For this reason, where individuals change labour market decisions because of a transport scheme, the consequent tax changes are additional to the benefits currently captured in appraisal.
- 3.23 Returning to the example, say the worker would produce output worth £1500, although the net salary is only £1000. The £500 difference, or tax-wedge, is a benefit to society that is currently not captured in appraisal. If we can identify a £1500 increase in productivity because of labour market impacts, we can therefore add £500 to the benefits identified by conventional appraisal.
- 3.24 Evidence supplied by DfT's guidance suggests that this tax wedge amounts to about 30% to 40% of labour market productivity gains.
- 3.25 The following chapter puts the framework to use in order to quantify the Wider Impacts and productivity impacts of Croyley Rail Link.

4 Methodology and Results

- 4.1 The framework presented by the DfT's guidance aids the quantification of a set of benefits that are additional to what is currently captured in transport appraisal, as well as enables the expression of transport impacts in terms of productivity. Figure 4.1 below shows some of the key steps in estimating Wider Impacts (WIs).

FIGURE 4.1 THE PROCESS OF ESTIMATING WIDER IMPACTS



Source: TAG Unit 2.8 “Wider Impacts and Regeneration”, Department for Transport, 2009

- 4.2 For Croyley Rail Link, three types of Wider Impacts were identified for assessment:

- Agglomeration;
- Imperfectly competitive markets; and
- Labour supply.

- 4.3 The second stage of the analysis relates to the collation of appropriate data inputs. The Wider Impacts appraisal builds on modelled estimates of travel time and cost savings to different users of the transport scheme. The following data was used as inputs for the WIs estimation:

- Transport Model data from the TUBA model: generalised cost and travel demand information for different users (business, commuting and other) and different modes (highway, rail, London Underground and bus) in both scenarios (Do Minimum and Do Something);

- Change in the level of labour supplied - calculated by applying an evidence-based elasticity value to the net wage change;
- Additional productivity that results from the additional labour supplied - determined by multiplying the change in number of people working by the average economic contribution (GDP) of a new worker.

4.11 Experience to date is that agglomeration is usually the largest WI.

Transport Model Data

4.12 The demand forecasting framework employed a spreadsheet based logit model with travel costs derived from a SATURN highway model and TRIPS public transport model. The user benefits of the scheme have been forecast by the software TUBA as recommended by DfT.

4.13 The modelled demand for the proposed Croxley Rail Link, based on the outputs of these models, was calculated for the future year of 2028, which is sufficiently distant to allow the proposals to reach 'mature levels' of demand.

4.14 The demand was also modelled for the AM peak and inter-peak (IP) period and annualisation factors are used to derive annual forecasts from the modelled hours. The annualisation factors employed in this appraisal are derived from a recent independent bus survey conducted on a number of bus services around the Croxley Rail Link corridor in Watford. Based on the survey, the annualisation factors for the AM peak hour and the inter-peak hour forecasts to annual values have been estimated at 950 and 2,794 respectively.

Results

4.15 Table 4-1 summarises the conventional and wider impacts from Croxley Rail Link scheme in 2028. The conventional user benefits of £6.7m in 2028 are the total benefits from the conventional appraisal TEE table.

TABLE 4-1 WIDER IMPACTS AND PRODUCTIVITY GAINS FROM THE CROXLEY RAIL LINK IN 2028 (2002 PRICES)

Benefit	Welfare	GDP
Business	£339,300	£339,300
Commuting	£3,732,300	
Others	£2,714,400	
Conventional User Benefits	£6,786,000	
Agglomeration	£1,636,172	£1,636,172
Imperfect Competition	£33,930	£33,930
Labour Supply	£160,590	£401,476
Wider Impacts	£1,830,692	
Total Benefits	£8,616,692	£2,410,878

- 4.16 Wider Impacts add a further £1.8m, to the figure of £6.8m, the majority of which are from agglomeration (89% of the total of WIs). The Wider Impacts increase the conventional benefits by 27%.
- 4.17 The GDP column shows productivity gains. Croydon Rail Link contributes to UK's economic output by nearly £2.4m per year by increasing the productivity of activity mostly in and around the corridor Watford-London. The main beneficiaries of the scheme, in terms of productivity gains, are the districts of Watford and Three Rivers: together they encompass 84% of productivity gains of the scheme. Other districts that contribute to relevant benefits from the scheme comprise Hertsmere, Harrow London, Islington, City of Westminster, Camden and Hillingdon.
- 4.18 In summary, this analysis shows that including Wider Impacts of the Croydon Rail Link would increase conventionally measured economic benefits by approximately 30%.

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