Chiltern Railways

CRCL/P/5/A

PROOF OF EVIDENCE OF LEO EYLES

DEMAND FORECASTS AND ECONOMIC APPRAISAL

THE CHILTERN RAILWAYS (BICESTER TO OXFORD IMPROVEMENTS) ORDER

TRANSPORT AND WORKS ACT 1992

TRANSPORT AND WORKS (APPLICATIONS AND OBJECTIONS PROCEDURE) (ENGLAND AND WALES) RULES 2006

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The Chiltern Railways (Bicester to Oxford Improvements) Order

Demand Forecasts and Economic Appraisal

CRCL/P/5/A Proof of Evidence - Leo Eyles

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1 Introduction and Scope of Evidence

Personal Statement

1.1 I am Leo Eyles and I am a consultant Transport Economist. I have a BA in Economics from Warwick University and an MSc in Transport from Imperial College London.

1.2 I have twenty five years experience in the planning and appraisal of public transport systems. I am an Associate of Steer Davies Gleave based in London.

1.3 I am Market Leader of the Transport Economics team within the Policy and Planning business group at Steer Davies Gleave. I have personally overseen or undertaken a wide range of economic appraisals of major public transport investment projects on behalf of public authorities including the provision of expert advice to the Department for Transport on the economic appraisal of major public transport projects.

Scope of Evidence

1.4 My evidence demonstrates how the expected patronage for the Order scheme has been derived and how this underpins the economic case for the scheme. It focuses on the Phase 1 scheme alone. Mr O'Sullivan and Mr Gibson are giving evidence on the proposals for East West Rail for which there is a published and positive business case. I do not present evidence on the business case for East West Rail.

Statement of Matters

1.5 The Secretary of State for Transport ['the Secretary of State'] issued a Statement of Matters (CD/X/4) for the TWA Inquiry on 25 August 2010. In this Proof of Evidence, I address, in particular, the following matters from that Statement of Matters, in whole or in part:

'2 The justification for the particular proposals in the draft TWA Order, including the anticipated transportation, regeneration, environmental and socio-economic benefits of the scheme.'

2 Demand Forecasts

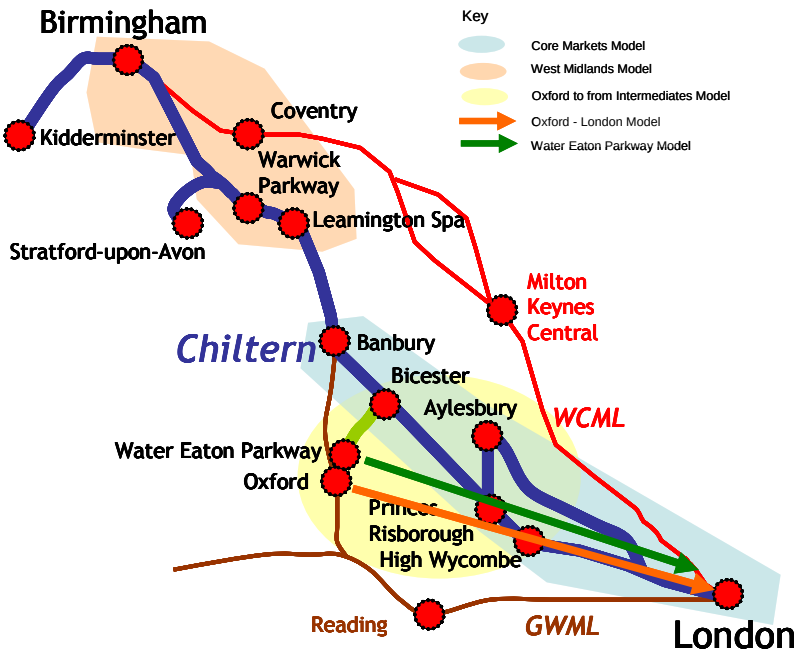
Scope

2.1 This section of my evidence sets out the expected additional rail passenger usage for the London – Bicester – Water Eaton Parkway – Oxford service. More detail on the technical approach to forecasting is set out in CD 2/30, " Demand and Revenue Forecasting for Evergreen 3 Bicester - Oxford Scheme".

2.2 Project Evergreen 3 comprises mainline improvements between London and Birmingham and three main components relevant to the Order scheme, as illustrated in Figure 2.1. The three service opportunities relevant to the order scheme are:

- The provision of a new service for the existing Oxford to London market, via Bicester;
- The opening up of the North Oxfordshire to London market, with a new station at Water Eaton and a step change in service levels at Bicester Town; and
- The provision of new direct rail journey opportunities, such as from Oxford to High Wycombe.

FIGURE 2.1 FULL EVERGREEN 3 SCHEME



2.3 Each of the above markets would be facilitated by the investment for which powers are being sought. The needs for demand and revenue forecasting for these components are fourfold:

- To demonstrate the commercial case for Chiltern Railways;
- To underpin the transport/economic case for the scheme;

- To underpin the potential highway impacts of the scheme; and
- To underpin the requirements for car parks at stations.

2.4 My evidence focuses on the second and fourth of these. The first is dealt with in the evidence submitted by Mr Cross and the third in the evidence submitted by Mr Tregear.

Modelling Framework

2.5 Because of the disparate nature of these component markets, a different modelling approach has been taken for each.

2.6 The core demand and revenue forecasting is undertaken in three models:

- MOIRA[1] for the market between Oxford and London;
- A hexcell-based catchment analysis for the markets between Bicester Town, Water Eaton Parkway, Islip and London, where there is a step change (or completely new) service; and
- An intermediate flows model, for non-London flows.

2.7 Growth forecasts are then undertaken using standard Passenger Demand Forecasting Handbook (PDFH[2]) methodologies and applied to the results. These results were used to produce three main outputs:

- An assessment of the likely impact on local traffic, to be supplied as a layer to the traffic modelling team;
- An assessment of the likely car park requirements at key local stations; and
- The economic appraisal, which sets out the economic case for the scheme.

2.8 All modelling was carried out using a common base year of 2007.

Model Methodologies

2.9 This section presents a brief overview of the approaches used in the demand and revenue forecasting. Further detail can be found in CD/2.30.

Oxford to London demand - MOIRA

2.10 MOIRA is the industry standard software for forecasting changes in demand and revenue driven by incremental timetable changes on existing markets. For this reason it was the appropriate tool to use for forecasting demand and revenue changes for the Oxford to London market. In order to disaggregate trips to the station level, the LENNON[3] database was used.

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[1] MOIRA is the rail industry standard forecasting model

[2] The Passenger Demand Forecasting Handbook (PDFH) is the standard rail industry guidance document covering all aspects of rail demand forecasting in Britain. The current version 5 has been used.

[3] LENNON is the national database of all rail tickets sold.

2.11 The **Do Something** passenger service is outlined below and described in more detail in the evidence of Mr Dare:

- Chiltern Railways passenger service Oxford to London Marylebone, via Bicester, 2 trains each way per hour.

2.12 In order that the benefits of the service change to Oxford can be isolated, the **Do Minimum** for this part of the modelling is taken to be the Do Something service with the Oxford service terminating at Bicester. This ensures that all the benefits of the online improvements described in the first market described at the beginning of this chapter are not included in this analysis.

Water Eaton Parkway and Bicester Town to London – Catchment Analysis

2.13 Where there has been a step change in rail service or new stations the standard MOIRA-based approach is not appropriate, as there is either no existing demand or the improvement is more than incremental. The largest part of the market for which detailed modelling is required is for travel to London.

2.14 The approach taken for all flows to and from London involves the use of a GIS-based utility and related demand analysis developed in-house and widely applied by Steer Davies Gleave over the last ten years. This utility involves covering the study area with tessellating 500m-sided hexagons (known as hexcells), as a base for the creation of catchment areas.

2.15 This process was undertaken for three scenarios:

- The Do Nothing scenario, as a validation of the methodology, the resulting catchments were assessed for plausibility and compared to observed catchment areas from the Chiltern Census data from 2005 for local Chiltern stations;
- A Do Minimum scenario with the mainline Evergreen 3 timetable improvements to existing Chiltern stations and with the service improvements at Oxford, as modelled in MOIRA; and
- A Do Something scenario including the whole scheme with the service improvements at Bicester Town and the introduction of Water Eaton Parkway station.

2.16 Hexcells are small zones and they define the default catchments for stations by comparing the components of (generalised) travel time. This includes a component representing time spent accessing the rail network, a fixed penalty to represent the overheads of car use and a generalised journey time for the rail component. As defined in the PDFH, generalised journey time (GJT) is a specific measure characterising the timetabled rail service between two rail stations. It is defined as the sum of three components: an in-vehicle time, a service frequency penalty and an interchange penalty. This approach is described in more detail in Appendix LAE2 and in CD/2.30.

2.17 It is worth noting that, while Bicester North sees a substantial improvement in journey time (and hence GJT) between the Do Nothing and the Do Something, the service frequency (and hence GJT) is actually worsened between the assumed Do Minimum (5 trains per hour) and the Do Something (3 trains per hour) cases, as services (2 trains per hour) are effectively diverted to Oxford, via Bicester Town – which itself sees a substantial improvement in GJT.

Mode Split

2.18 The catchment analysis assumes that rail passengers access the station by either car or walking. This is a simplifying assumption used to generate catchment areas. In reality there will be a distribution of access modes. Given that we are interested in knowing this mode split at the hexcell level for highway modelling purposes, a relationship between access mode and distance from the station has been established. This relationship was based on surveyed mode splits derived for South West Trains, and a study comparing St Albans, Ashford and Leighton Buzzard stations. These two existing relationships were combined and controlled to produce a best fit for known car mode shares at Bicester North and surrounding Chiltern stations.

2.19 The resulting relationship between distance from station and access mode are shown in Table 2.1. Only car modes are required for the traffic modelling and car park requirement forecast.

TABLE 2.1 ESTIMATED ACCESS MODE SPLITS BY DISTANCE

Mode Split	Distance from Station (km)					
	0-1	1-2	2-3	3-5	5-10	10+
Car Park & Ride	16%	24%	45%	60%	71%	100%
Car Kiss & Ride	4%	5%	10%	13%	16%	0%
Total Car	20%	29%	55%	73%	87%	100%
Bus/cycle/walk	80%	71%	45%	27%	13%	0%

2.20 A plot of the catchment areas for the Do Minimum scenario compared to the Do Something are given in Appendix LAE1, together with the distribution of demand in the Do Minimum case.

Intermediate Flows – Mode Split Analysis

2.21 As well as improving the service from North Oxfordshire to and from London, the Order scheme service on the Bicester to Oxford route section facilitates much improved connections between Bicester and Oxford and other local flows. The following flows have been considered:

- Bicester – Oxford, which is much improved service both in terms of frequency and speed;
- Oxford/Water Eaton Parkway – High Wycombe, which is a new direct service where no rail service currently exists; and
- Bicester – Reading, which will still require an interchange, but involves the major demand attractor in the wider area.

2.22 The forecast has been undertaken using a mode split model based on Census Journey to Work data expanded to match the observed base annual demand, where relevant. In the absence of any more evidence, and as the logic of the

relationship should equally apply, we have used the same mode split by distance relationship derived for the London flows.

Results – Base Year Forecasts

2.23 The result of the MOIRA analysis of the improvement in the timetable between Oxford and London is a net increase in National Rail journeys of 57,000 in the 2007 base year. The overall demand results for the catchment analysis are shown in Table 2.2.

TABLE 2.2 SUMMARY OF CHANGE IN ANNUAL LONDON FLOW DEMAND FORECAST (2007 BASE YEAR)

	Annual Jnys
London to/from Bicester Town	
Total Abstracted	141,600
Generated	22,700
Total	**164,300**
London to/from Bicester North	
Total Abstracted	-174,000
Generated	-32,200
Total	**-206,200**
London to/from Islip	
Total Abstracted	5,400
Generated	1,100
Total	**6,500**
London to/from Water Eaton Parkway	
Total Abstracted	446,000
Generated	123,400
Total	**569,400**

2.24 Generated trips in Table 2.2 total 115,000 in the base year and consist of a combination of completely new trips and trips which have transferred from other modes, particularly car. Over 20% of the 570,000 journeys forecast for Water Eaton Parkway are shown to be new to rail. As discussed in Chapter 4, over half of these trips are forecast to transfer from car.

2.25 Table 2.3 shows the equivalent for the non-London flows.

TABLE 2.3 SUMMARY OF ANNUAL INTERMEDIATE FLOW DEMAND FORECAST (2007 BASE YEAR)

		Annual Trips
Do Minimum	Bicester – Oxford	72,000
	Bicester – Reading	17,000
	Oxford - High Wycombe	9,000
	Total	**98,000**
Do Something	Bicester – Oxford	188,000
	Bicester – Reading	35,000
	Bicester - Water Eaton	24,900
	Water Eaton - High Wycombe	32,400
	Oxford - High Wycombe	64,700
	Total	**345,000**
Do Something - Do Minimum		**247,000**

2.26 Table 2.3 shows a total forecast increase in annual demand of 247,000 journeys. Over half of that new demand (140,000 journeys) is between Bicester and Oxford/Water Eaton Parkway. The majority of the rest of the demand increase is on the new rail service between Oxford/Water Eaton Parkway and High Wycombe. Nearly all of this demand is shown to switch from car.

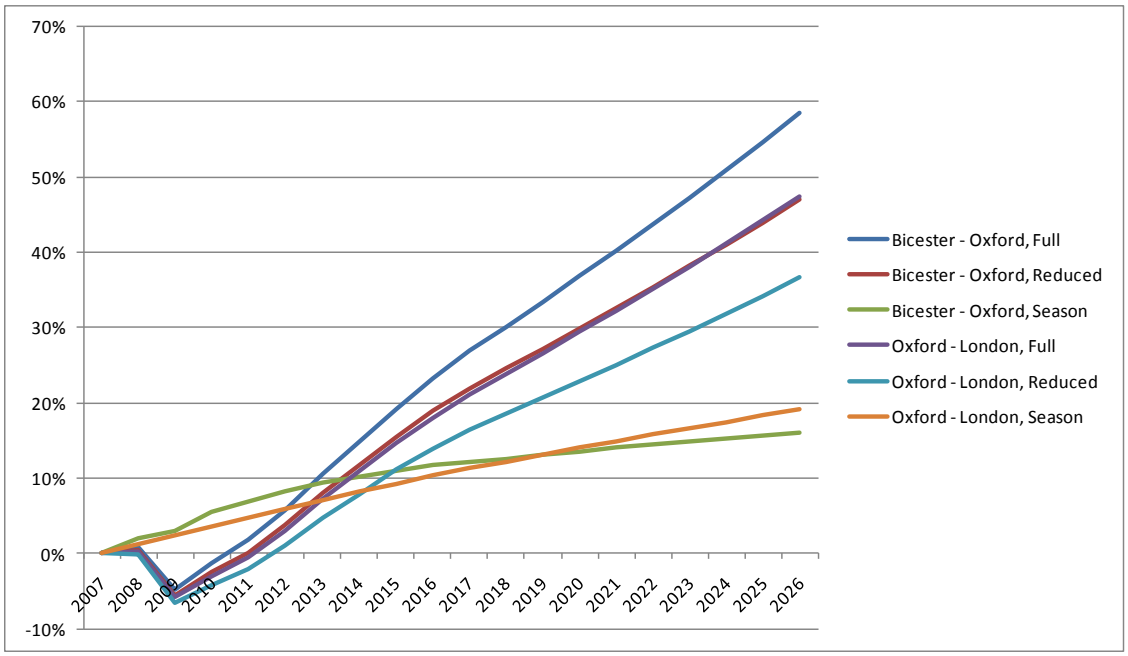
Growth Forecasts

Approach

2.27 The preceding sections describe forecasts of one-off specific changes brought about by the Order scheme derived using 2007 base data. Growth forecasts were used in order to take these forecasts forward to the year of introduction to the end of the franchise and beyond. These forecasts were obtained using the standard PDFH elasticity-based methodology for estimating exogenous growth, which is consistent with the Government's approach to assessing schemes.

2.28 The results are illustrated in Figure 2.2 and clearly reflect the recent downturn although the actual Chiltern performance has held up better than projected through the standard PDFH approach. Indeed Chiltern report that demand has out-performed PDFH-based forecasts since the start of the franchise (as indicated within Mr Cross's evidence compared to National Rail growth), so these forecasts could be regarded as conservative.

FIGURE 2.2 JOURNEYS GROWTH FORECASTS FOR BICESTER – OXFORD AND OXFORD – LONDON BY TICKET TYPE



2.29 The impact of the application of the growth forecasts are such that the base year additional journeys of 429,000 described above, rises to 499,000 (a growth of 16% over 2007) in 2016 and 597,000 (a growth of 39% over 2007)in 2026.

3 Interface with Highway Traffic Modelling

Approach

3.1 As well as providing rail demand forecasts for the commercial and business case, the rail demand modelling was required to provide an estimate of the impact of the scheme on traffic levels to facilitate the work described in Mr Tregear's evidence. It was also used to produce an estimate of the car parking capacity required at the three key stations affected by the Order scheme: Bicester North, Bicester Town and Water Eaton Parkway.

3.2 The methodology used is based on that outlined in the mode split sections of the catchment analysis and the intermediate flows modelling described previously whereby car parked and car passenger mode splits have been estimated using a distance-based relationship. In addition, growth factors have been applied to give future year estimates.

Highway Traffic Modelling

3.3 The traffic modelling impact of the rail scheme has been forecast by:

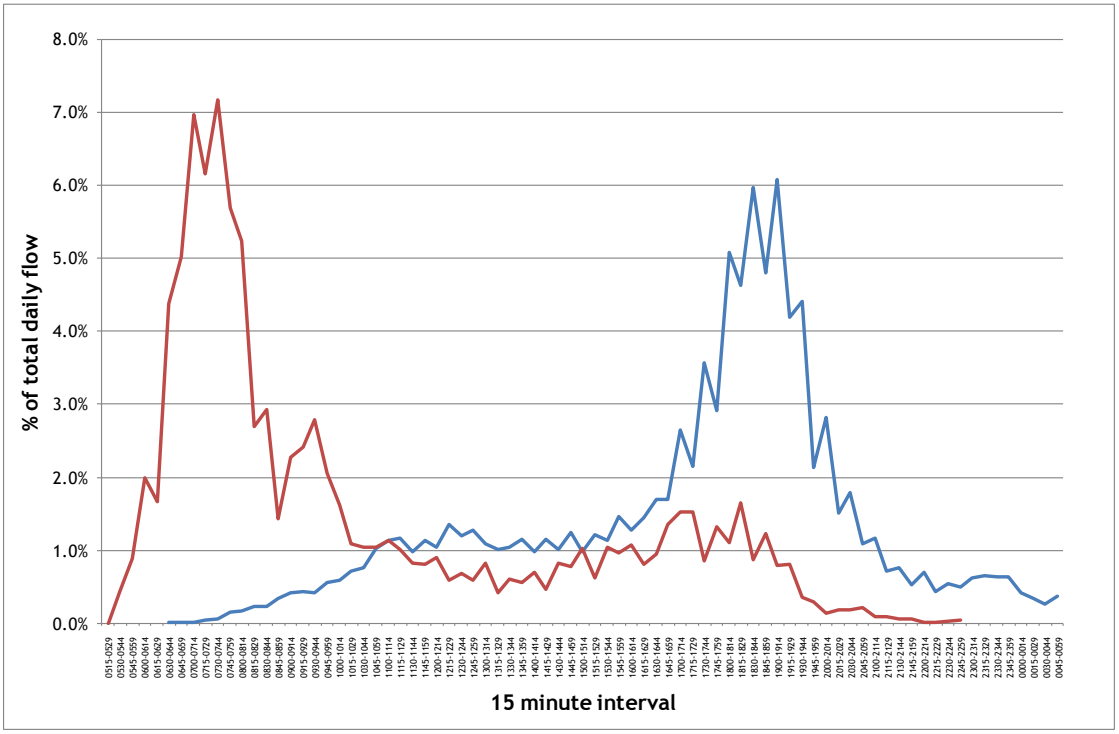
- Reducing the annual forecast of those accessing the scheme by car to a typical weekday (described in CD/2.30); and then
- Using a daily demand profile to reduce demand to the peak hours required as an input to the traffic modelling.

3.4 The de-annualisation factor has been calculated from a combination of LENNON ticket sales data (to give a 'typical' 4 week period) and gateline data for an example week, which gives the split between the days of the week. The calculated factor of 294 converts annual demand to a typical average weekday.

3.5 The gateline data described above counts those travelling between Banbury / Bicester North and London using gates at Marylebone for each quarter hour of the day. This data has also been used to break down the typical weekday into Departures and Arrivals by quarter hour, from which suitable peak periods have been aggregated. The resulting station departure and arrival profiles are illustrated in Figure 3.1.

3.6 For the intermediate flows the forecasting work was undertaken for the AM peak period. 3 Hour peak period demand was reduced to peak hour demand using an assumed factor of 50%.

FIGURE 3.1 STATION DEPARTURE AND ARRIVAL PROFILES (TO/FROM LONDON)



3.7 These forecasts are available at the hexcell (in the case of demand to London) or ward (intermediate demand) level for the Do-minimum and Do Something cases. The difference is mapped to an appropriate zoning system and applied as an overlay to base case traffic levels as described in Mr Tregear's evidence.

Car Parking Requirement

Approach

3.8 The estimate of car parking requirement builds on this approach to give an estimate of the total car park spaces required on a typical day and then to the maximum spaces required at any one time.

3.9 The approach described above is tailored by only considering trips with a home end at the station and by only using the car parked mode split. Using the de-annualisation factor described above gives the total car park spaces required on a typical day. However, this is more than the maximum required at any one time. To give this figure a car park accumulation approach has been applied. This has been based on observations undertaken at Bicester North car park, as described in an accompanying technical note (CD/2.30).

3.10 In addition to estimating the maximum car parking requirements on a typical weekday, it has been necessary to produce an estimate of the maximum requirement on a Saturday. This has been estimated using observed ratios of Saturday to weekday maximum requirement for both the London and Intermediate markets. The London ratio (83%) was taken from counts at Bicester North station in 2010. This was supported by a similar percentage from the gateline data described above. The ratio for the Intermediate flows was taken from counts at Water Eaton

bus-based Park and Ride (2008), as this was thought to best represent the market between Bicester Town and Oxford – the key intermediate flow.

Results

3.11 Table 3.1 details the weekday car park requirements estimated for the base year of 2007.

TABLE 3.1 BASE YEAR WEEKDAY CAR PARK REQUIREMENTS

Station	Do Minimum 2007			Do Something 2007				Spaces		
	London	Other	Total	London	Other	Total	Car %	Total	DM %ge	DS %ge
Bicester North*	378	80	458	254	80	334	50%	735	62%	45%
Bicester Town	-	-	-	65	140	205	47%	291	-	71%
Water Eaton Parkway	-	-	-	529	30	559	78%	842	-	66%

**NB Bicester North includes a high level estimate for non-London destinations, such as Birmingham*

3.12 Table 3.2 illustrates future year required capacities based on the growth rates described previously. Car park capacities are shown without decking until 2016 and then with decking, as demand increases over time. 2013 opening year forecasts are shown without including the ramp up of demand that will be a feature of the early years.

TABLE 3.2 FUTURE YEAR WEEKDAY CAR PARK REQUIREMENTS

Station	Do Minimum 2013			Do Something 2013				Spaces		
	London	Other	Total	London	Other	Total	Car %	Total	DM %ge	DS %ge
Bicester North*	417	89	506	280	89	369	50%	735	69%	50%
Bicester Town	-	-	-	72	155	227	47%	291	-	78%
Water Eaton Parkway	-	-	-	585	32	617	78%	842	-	73%
Station	**Do Minimum 2016**			**Do Something 2016**				**Spaces**		
	London	Other	Total	London	Other	Total	Car %	Total	DM %ge	DS %ge
Bicester North*	466	99	565	313	99	412	50%	735	77%	56%
Bicester Town	-	-	-	81	173	254	47%	291	-	87%
Water Eaton Parkway	-	-	-	653	35	688	78%	842	-	82%
Station	**Do Minimum 2026**			**Do Something 2026**				**Spaces**		
	London	Other	Total	London	Other	Total	Car %	Total	DM %ge	DS %ge
Bicester North*	604	127	731	406	127	533	50%	735	99%	72%
Bicester Town	-	-	-	105	222	327	47%	503	-	65%
Water Eaton Parkway	-	-	-	849	44	893	78%	1,036	-	86%

**NB Bicester North includes a high level estimate for non-London destinations, such as Birmingham*

3.13 Table 3.3 illustrates the equivalent Do Something capacities for a typical Saturday. This was achieved by examining the relationship between average weekday and Saturday parking at Bicester North (for flows to London) and Water Eaton Park and Ride (for flows to other stations on Chiltern services).

TABLE 3.3 SATURDAY CAR PARK REQUIREMENTS

Station	London	Other	Total
2013			
Bicester Town	60	71	131
Water Eaton Parkway	485	15	500
2016			
Bicester Town	67	80	147
Water Eaton Parkway	542	16	558
2026			
Bicester Town	87	102	189
Water Eaton Parkway	705	20	725

3.14 The Order scheme is forecast to reduce car parking requirement at Oxford Station and therefore improves the long term car parking provision at this station.

East West Rail

3.15 As has been described by Mr O' Sullivan's evidence, the completion of the scheme between Oxford and Bicester will facilitate the introduction of East-West Rail (EWR) services to Bletchley and beyond. An Outline Business Case for such a scheme has been produced for the East-West Rail Consortium by consultants Atkins and is in the public domain. The full 'Preferred Option' outlined in that document included an additional 2 trains per hour (tph) between Oxford and Bicester (travelling between Reading and Milton Keynes/Bedford). This option could be operational by 2026, with a reduced 'Core Option' introduced from 2017.

3.16 I do not seek to present or justify the EWR business case, but we have assessed the potential impact of the scheme to feed into the traffic modelling and car park requirements, particularly at Water Eaton Parkway and Bicester Town stations. The results are then presented as a sensitivity test from the central forecast presented elsewhere in this evidence for the later forecast year of 2026.

3.17 To make this assessment we have used a combination of outputs provided by Atkins and an independent assessment of the breakdown of the forecast by geography, time of day and trip end location.

Traffic Impact

3.18 The EWR forecasts do not have any geographical basis of ultimate origins and destinations beyond the stations themselves. The demand generated by the EWR scheme is to a variety of destinations from local (such as Oxford) to further afield (such as Bedford). In order to provide an appropriate layer of demand to apply to the traffic modelling we have therefore assumed that the new EWR demand is distributed around Bicester Town and Water Eaton Parkway stations in the same way as the total demand forecast in the Central Case.

3.19 As such, the information provided to those undertaking the traffic modelling was a percentage peak demand uplift in 2026 demand. The figures for the two stations of interest are as follows:

- Bicester Town 53%
- Water Eaton Parkway 23%

Car Parking Requirements

3.20 Similarly for car parking requirements, without any geographical information available for the EWR forecasts, we have applied a percentage uplift on home end demand to the existing total car parking requirement. This effectively assumes that the geographical distribution, and hence mode split, of those accessing the stations to use EWR services will be the same as for those using Chiltern services.

3.21 In this case additional 2026 car parking requirements for the two stations of interest are as follows:

- Bicester Town 145
- Water Eaton Parkway 214

3.22 The impact of EWR on Saturday car parking requirements has also been examined. The additional 2026 car parking requirements for the two stations of interest are as follows:

- Bicester Town 67
- Water Eaton Parkway 99

Summary

3.23 It is my opinion that the forecasts used to inform the highway traffic modelling analysis are reasonable and that the approach to forecasting car parking requirements is sound.

4 Economic Assessment

Overview

4.1 The Order scheme is not dependent on public funding and therefore does not strictly need to meet any value for money test. However, my evidence demonstrates that the scheme is in the public interest through the use of cost:benefit analysis in line with guidance from the Department for Transport.

4.2 In strategic terms, the scheme helps to bring forward transport, economic and environmental benefits, including:

- Enhancing the environmental capacity of Oxford, via:
  - Improved connectivity to/from the city;
  - Enhanced sustainable capacity; and
  - Addressing traffic congestion through mode shift of journeys accessing Oxford and switching of those accessing the rail network by car at Oxford to more sustainable station locations;
- Complementary to mainline Evergreen 3 improvements – extending benefits to a wider catchment;
- Providing a competitive choice for Oxford rail passengers to/from London;
- Providing new/restored direct rail links, thus improving accessibility especially for those without access to a car;
- Offering station choice at Bicester and therefore encouraging non-car access to a local station;
- Facilitating future transport investment, noticeably the East West Rail project;
- Encouraging strategic growth plans such as at North Bicester;
- Reducing traffic congestion and carbon emissions through reduced car use;
- Improving road safety; and
- Improving economic productivity through agglomeration and labour market efficiency improvements.

4.3 In this section I have set out evidence in relation to Statement of Matters 2 and my conclusions are that there are significant benefits of the scheme in terms of transportation impacts and wider socio-economic and regeneration benefits, and that these outweigh the costs of the project by 3.8 to 1 when measured using standard Department for Transport guidance.

Cost Benefit Analysis

4.4 My evidence relies on an economic assessment that considers the impacts of the proposed scheme, both benefits (in terms of demand, revenue, time savings and highway user benefits) and costs, that are monetised. This Cost Benefit analysis assesses the economic value of the project. The benefits of the scheme are derived from a number of sources:

4.5 The economic assessment has been undertaken in accordance with current DfT Rail guidance[4]. The key assumptions for the analysis are:

- A 60 year appraisal period from 2013 to 2072;
- Using standard discount rates of 3.5% for the first 30 years and 3.0% thereafter;
- Appraisal base year of 2002, to which all costs and benefits have been discounted;
- Costs and benefits capped at 2030 levels; and
- Use of standard values of time over the appraisal period.

4.6 The opening year for the Order scheme is assumed to be 2013 with construction beginning in 2011.

Results

4.7 The results of the appraisal are shown in Table 4.1. As can be seen, the scheme demonstrates high value for money with a Benefit:Cost Ratio (BCR) of 3.8:1.

4.8 The biggest source of benefits is to rail users:

- Existing ones who carry on using their existing stations but get a time saving;
- Those who transfer stations, for example to Water Eaton Parkway; and
- Newly generated rail users, who also contribute additional rail revenue.

4.9 Highway decongestion as a result of the mode shift also makes a significant contribution.

[4] http://www.dft.gov.uk/webtag/

TABLE 4.1 TRANSPORT ECONOMIC EFFICIENCY (TEE) TABLE

	£m, 2002 prices*
PV Benefits	
User Benefits	£222.3
Non-User Benefits	
Congestion	*£116.3*
Accident	*£9.2*
Local Air Quality	*£0.6*
Noise	*£0.7*
Greenhouse Gases	*£0.5*
Total	£127.2
Revenue	£88.5
Operating Costs	-£44.1
Total	**£393.9**
PV Costs	
Capital cost	-£81.6
Indirect tax	-£22.8
Total	**-£104.4**
NPV	**£289.5**
Benefit : Cost Ratio	**3.8:1**

Note *: Use of 2002 as base year is consistent with DfT WebTAG guidance. All figures above have been rebased to 2002 accordingly.

Source: SDG Model

Benefits

4.10 The scheme benefits are summarised in Table 4.1.

Rail Passenger (User) Benefits

4.11 These are the largest source of benefits, equal to £222.3m across a 60 year period.

4.12 Existing rail passengers benefit through making quicker and more comfortable journeys. For example, passengers travelling from Oxford to London now have a more frequent service and the opportunity of accessing London via Marylebone, rather than Paddington, station. Likely crowding benefits are not explicitly measured and represent an upside to the monetised benefits.

4.13 New rail passengers also experience benefits. As standard practice these are derived by using the 'rule of a half': the more attractive rail service encourages them to change their behaviour (be it travelling by a different mode, or not travelling at all) and it is assumed on average that they perceive one half of the benefits to existing passengers.

4.14 The largest group of beneficiaries are those who would use Water Eaton Parkway station. They benefit from a more convenient access to a new station, for a similar journey time (as at Oxford) to/from London.

4.15 Passengers travelling to/from Oxford benefit from a more frequent and quicker (e.g. to Bicester) service as well as a choice of stations in London. They also have a new direct rail service to High Wycombe which currently requires either an inconvenient walk across Bicester or a long journey time via Banbury.

4.16 Bicester passengers have a new link from Bicester Town station to High Wycombe and London which is more convenient for those on the south side of the town. This will enable more to cycle or walk to this station, rather than drive to Bicester North. The frequency and journey time to Oxford and beyond is also much improved.

Non User Benefits

4.17 Non user benefits provide a significant part of the economic case for the project, equal to £127.2m across the 60 year period.

4.18 Non user benefits are attributable to the 'second order' effects that accrue from an improved rail service. Many of the users attracted to the service will have switched from using cars which have more severe externalities causing congestion, traffic accidents, and higher levels of noise, air pollution and green house gas emissions.

4.19 With a better choice of stations, the distances driven to car parks are reduced. In addition the station at Water Eaton Parkway reduces the numbers driving into congested central Oxford. These benefits are offset slightly by an increase in the numbers of car trips to access the rail network. Overall the project is estimated to divert 12.0 million car kms in the opening year.

4.20 The largest source of non user benefit is reduced congestion worth a net £116.3m NPV equivalent to 91% of the total non user benefit component. The next largest source is from a reduction in the total numbers of accidents which is worth £9.2m NPV.

4.21 Beneficial changes in the levels of noise, air quality and green house gases also show small but positive levels of benefit.

Additional Rail Revenue

4.22 The change in rail revenue has been calculated from the demand forecast. The additional 429,000 generated trips per annum are projected to generate £2.95m additional revenue per annum. This additional revenue more than covers the estimate of additional operating costs, ultimately leaving a surplus benefit to the Government through the rail franchising process.

Costs

Capital Costs

4.23 The capital costs of the project are as reported in the evidence of Mr Barker, and total £138.9m for Phases 1 and 2a of the work. The relevant capital costs to be included in the economic assessment are those associated with the benefits from the Order scheme train service – namely Phase 1 costs totalling £122.3m.

4.24 These costs are quoted in outturn prices and phased 66%:34% between 2011 and 2012 . In the appraisal a contingency of 10% has been added, as well as an optimism bias of 6% consistent with the Network Rail GRIP Stage 5 (Design

Development) The £81.6m quoted in Table 4.1 shows the impact of discounting to 2002 and quoting in 2002 prices.

Operating Costs

4.25 The incremental costs of the Phase 1 services have been estimated as a proportion of the total operating cost changes for the full Evergreen 3 scheme, including the online improvements. The operating cost changes include a proportion of the increase in the following costs:

- The leasing of new rolling stock;
- The cost of maintaining the new rolling stock;
- The cost of drivers and on-train staff to run the service;
- The cost of diesel to run the trains;
- The Variable Track Access Charge (VTAC), payable to Network Rail to help meet the cost of operating the line;
- The Maintenance, Repair and Renewal (MRR) Charge, payable to Network Rail; and
- The costs of operating the stations at Oxford, Bicester Town, Islip and Water Eaton Parkway.

Indirect Tax

4.26 A tax adjustment is necessary under appraisal rules to allow for the loss of petrol duty as car use is reduced.

Comparing Costs and Benefits

4.27 When costs and benefits are discounted to a common base (Present Value in 2002 prices), the Net Present Value (NPV) is £289.5m. This represents the net economic benefit of the investment to society as a whole. In terms of value for money the project is forecast to generate £3.77 of benefits for every £1 of cost.

Sensitivity Tests

Wider Economic Benefits

4.28 In addition to the user and non user benefits calculated in standard appraisals, draft guidance from the DfT[5] provides a rationale for estimating the wider economic benefits (WEBs) of transport investments.

4.29 There is evidence to show that by bringing businesses together in time and convenience, productivity benefits can be expected to accrue through agglomeration effects, imperfect competition benefits, and positive labour market impacts, and these benefits are additional to the conventional measures of transport benefits included as part of the economic appraisal of transport schemes. Appendix LAE3 provides additional detail on WEBs.

[5]Unit 3.5.14 (Draft Consultation) Guidance on the Wider Impacts Sub-Objective, Transport Analysis and Guidance Unit, Department for Transport.

4.30 The wider economic benefits of the Order scheme have not been included as part of the economic appraisal, but we suggest that they could be an important and significant upside to the equation.

4.31 In this case the potential WEBs have not been estimated from first principles, but applied as a 20% 'mark up ' to transport user benefits. This is an assumption derived from a benchmarking exercise detailed in Appendix LAE3.

4.32 If WEB benefits were to be included as part of the economic appraisal we would estimate that they would be worth around £44m NPV. This would raise the NPV of the scheme to £334m, and increase the BCR from 3.8:1 to 4.2:1.

Growth

4.33 This economic assessment uses the growth forecasts outlined in Chapter 2 of this report. Figure 2.2 shows the resulting demand growth to 2026 of between 20% and 60%. Whilst this growth is consistent with historical growth we have tested the robustness of the business case by reducing the rate of growth by 50%.

4.34 This had the effect of reducing total benefits to a PV of £311.7m, the NPV to £212.1m and the BCR to 3.1:1, which is still very good value for money.

Impacts on Employment

Construction

4.35 The Order scheme will involve significant amounts of building and construction work and increases in operational activity that will generate new employment in the local area.

4.36 Based only on the £122.3m capital spending of the project, we estimate that the scheme will directly generate the equivalent of 71 full time equivalent jobs (FTEs) and 14 indirect FTEs, meaning that the scheme could generate around 85 FTEs in total. These jobs will be available for the period of construction only in 2011 and 2012.

4.37 This calculation is based on aggregate information on the capital costs of the project and some standard assumptions about the job creation process. The key assumptions about the job creation of the scheme are as follows;

- Approximately 50% of the total capital costs goes towards employment generating activities;
- 70% of this spending is concentrated in the local area (30% leakage);
- Every £60k of effective spending generates one job for one year;
- One FTE is equivalent to 10 job years, and;
- An indirect employment multiplier effect of 1.2.

5 Objector Issues

5.1 This section of my proof addresses the relevant concerns of Oxfordshire County Council (OCC) [Obj 131]. I have been party to the discussions and meetings held with OCC.

5.2 Concern 1 of its case relates to the Green Belt and *'why there has to be such a large amount of car parking at the Water Eaton site'*. Table 3.2 above demonstrates that 82% of the parking capacity at Water Eaton in 2016 would be full. This rises to 86% in 2026 when the expanded car park design would be required. It is normal practice to design for some spare capacity to allow for forecasting uncertainty and day-to-day variation.

5.3 With East West Rail, forecast parking demand would exceed this capacity, as demonstrated in CD/2.30. When East West Rail comes forward, it would be prudent to review parking capacity in light of actual usage.

5.4 Concern 3 of OCC's case relates to car parking at Bicester. OCC '*notes that the number of car parking spaces at Bicester Town is substantially greater than the number of expected car trips to the station, at least in the early years of operation'*. OCC also calls for '*a phased approach to parking provision'*. Table 3.2 of my evidence, which supersedes the analysis seen by OCC when drafting their Statement of Case, illustrates the phased approach to car park provision which is proposed. In 2016, demand for parking is scheduled to meet 87% of planned capacity at the station. By 2026, the phased introduction of a larger car park would be required even without provision for East West Rail demand. With East West rail, demand would be close to capacity, as demonstrated in CD/2.30.

5.5 In my view, the amount of car parking planned is consistent with the likely demand for spaces at both Bicester North and Water Eaton Parkway.

6 Conclusions

6.1 I conclude that the demand for the proposed services on the Oxford-Bicester route underpins the need for the planned infrastructure for which powers are being sought.

6.2 I also conclude that the projected transport and wider benefits of the proposed services project are substantial and would outweigh the proposed costs by 3.8:1. Sensitivity analysis suggests that this is a robust finding.