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**CROXLEY RAIL LINK  
ORDER**

**Stephen Edwin Hunter**

**Associate, Steer Davies Gleave**

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**Proof of Evidence**

**Transport Case**

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## **1 INTRODUCTION**

### **1.1 Personal details**

1.1.1 My name is Steve Hunter. I am an Associate with Steer Davies Gleave, an independent transport consultancy, with seventeen years' experience. I specialise in business case development and appraisal of major transport schemes. I played a leading role in the applications which secured funding for projects including the Blackpool and Fleetwood tramway upgrade, Aylesbury Vale Parkway station, Liverpool South Parkway station and the reopening of the Ebbw Valley Railway. I am a Chartered Engineer, a Member of the Chartered Institution of Highways and Transportation, a Member of the Association for Project Management and I hold the Transport Planning Professional qualification.

### **1.2 Current Role and Responsibilities**

1.2.1 I am Project Director for Steer Davies Gleave's commission to develop the transport case supporting this application for TWAO powers for the Croxley Rail Link. This has included forecasting demand, revenue and economic benefits and developing the business case documents which function as the applications for Central Government funding for the scheme. I have been involved in the project since 2007, initially as Project Manager for business case submissions to the Department for Transport (DfT) in 2008 and 2010, and then as Technical Director (Funding and Appraisal) for the Expression of Interest (EOI) and Best and Final Funding Bid (BAFB) which successfully secured a DfT funding commitment earlier this year. Following this I became Project Director.

## **2 SCOPE OF EVIDENCE**

2.1.1 My evidence covers the transport case of the Croxley Rail Link, summarising DfT's Major Scheme Funding Process, describing the scheme's transport impacts, and then presenting the forecasts of the resulting impact on passengers and transport

operators. I summarise the social and economic impacts of the scheme and finally I set out the justification for promoting the scheme both in terms of its fit with relevant objectives and comparative performance against alternative options.

### **3 MAJOR TRANSPORT SCHEME FUNDING PROCESS**

#### **3.1 DfT Major Scheme Process**

- 3.1.1 In November 2009 a business case was submitted to the UK Department for Transport (DfT) demonstrating the compelling justification for the public sector to fund the Croxley Rail Link scheme (MSBC – APP 34). The scheme was included within the East of England Regional Assembly’s agreed Funding Allocation, a pre-requisite for DfT to consider the submission.
- 3.1.2 The business case submission was structured in line with DfT guidance on Local Transport Plan (LTP) Major Schemes<sup>1</sup>. Following the submission DfT officers started their review of the business case and supplied a list of clarification questions to Hertfordshire County Council (HCC).
- 3.1.3 DfT publishes Transport Appraisal Guidance<sup>2</sup> which sets out its requirements for forecasting demand for and appraising transport schemes. This guidance sets out DfT’s application of the framework specified within Her Majesty’s Treasury’s Green Book<sup>3</sup>, which applies to all public sector investment.
- 3.1.4 The aim of DfT Guidance is to achieve consistency between appraisals of different interventions being considered for funding. This includes comparisons between its

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<sup>1</sup> DfT specifies that a Major Scheme is one with a total implementation cost of more than £5 million

<sup>2</sup> [www.dft.gov.uk/webtag](http://www.dft.gov.uk/webtag)

<sup>3</sup> [www.hm-treasury.gov.uk/greenbook](http://www.hm-treasury.gov.uk/greenbook)

own schemes and those promoted by others; national schemes and those in any part of the country; highway and public transport schemes. To achieve the required level of consistency the guidance prescribes which impacts can be included within a scheme appraisal - including those which can be monetised – and how those impacts should be assessed and presented. Some flexibility allows promoters to take an approach to appraisal proportionate to the scale of the impacts of their scheme.

3.1.5 The appraisal of the Croxley Rail Link presented within this evidence is based on the successful funding application to DfT, which satisfied its review and approval processes as demonstrated by the funding commitment received.

### **3.2 Best and Final Bid**

3.2.1 In October 2010 DfT invited the promoters to submit an Expression of Interest (EOI) for Croxley Rail Link. In February 2011 this resulted in the project's inclusion within the list of 45 schemes invited by DfT to submit an interim submission in July 2011 and a Best and Final Funding Bid (BAFB – APP 33) in September of the same year. DfT advised all promoters that it expected reductions to be made in the total scheme costs and Central Government funding requirements.

3.2.2 In advance of submitting the BAFB a scheme review and value engineering exercise was completed, with the aim of reducing the cost of the scheme. Material changes in scope were not practical, however a net reduction in cost was achieved without affecting the eventual service which could be operated over the infrastructure (BAFB – APP 33-4). In addition the delivery timescale and inflation projections were updated, further reducing the total scheme cost and Central Government funding requirements.

3.2.3 In common with all previous CRL submissions to DfT the BAFB included the closure of Watford Metropolitan station (known as Watford Met), analysis having

consistently shown that this option has a better economic and financial performance than any option retaining the existing station.

- 3.2.4 The scheme includes the purchase of one additional train, with an allowance in the BAFB of £9 million (before the application of inflation APP 2 8).
- 3.2.5 A major update of the demand forecasting and appraisal framework was undertaken in advance of the BAFB submission, paying attention to comments received from DfT on acceptance of the EOI.

### **3.3 Funding Certainty**

- 3.3.1 The major scheme funder is the DfT, which in December 2011 announced that the Croxley Rail Link BAFB had been accepted. This acceptance signifies DfT commitment to funding the scheme, on condition that the specification and value for money of the scheme do not materially change (CRL/2/3/Appendix Two). The scheme being promoted at this inquiry has not changed from the BAFB submission. As is set out in my evidence, a decision to keep Watford Met station open would amount to a material change to the scheme and would require a resubmission to be made to the DfT.
- 3.3.2 The BAFB submission included the required commitment from Hertfordshire County Council to underwrite all non Central Government funding for the scheme.
- 3.3.3 These two commitments provide a high level of certainty that the required funding will be available for the Croxley Rail Link scheme. The DfT approval demonstrates that there has already been a high level of scrutiny of the business and transport cases for the scheme.



## **4 TRANSPORT CASE**

### **4.1 Overview of the Transport Case**

- 4.1.1 The Croxley Rail Link scheme connects the Met Line to Watford Junction increasing the number of residents and businesses conveniently served by London Underground. The scheme improves connections across the public transport system enabling more people to access a wider range of jobs and services more easily. At Watford Junction opportunities for interchange with National Rail services are created. The proposals will increase the number of passengers using the Met Line, including attracting some trips which were previously likely to have been made by car, such as Pinner to central Watford. Met Line services have a high level of reliability, particularly in comparison to journeys currently made by bus or otherwise on the highway network in peak traffic periods.
- 4.1.2 The new stations at Ascot Road and Watford Hospital serve areas which have some of the highest population densities, lowest car ownership levels and lowest household incomes within Watford. Improved access to public transport will contribute to addressing some of the current disadvantages faced by residents of these areas.
- 4.1.3 The proposed alignment of the scheme serves a number of the major development projects within Watford, including the proposed Health Campus. The project will increase the potential employee catchment area of both existing and future Watford businesses thus enhancing the attractiveness of sites along the corridor and encouraging regeneration.

4.1.4 Figure 1 shows an illustrative 800 m catchment area around each station – broadly equivalent to a ten minute walk<sup>4</sup> and therefore within convenient access of the station. The catchment areas derived are based on the surrounding transport network and so take account of barriers to movement such as railway lines and watercourses. This figure includes key education, health, retail and employment destinations and shows that these sites are better served by public transport following implementation of the scheme.

4.1.5 The proposals make a material contribution to achieving the three aims for the project described in Ms Glaud’s proof (CRL/1/2).

## **4.2 Service Pattern Operated**

4.2.1 The transport appraisal is based on discussions with London Underground Limited and assumptions of what would be a reasonably likely service pattern over the sixty year assessment period specified in Treasury guidance<sup>3</sup>. The central case is based on an assumed existing service of six trains per hour to Watford Met station at peak times and four trains per hour off peak, all of which would in the future terminate at Watford Junction on implementation of the Croxley Rail Link.

4.2.2 Alternative service patterns with and without the Croxley Rail Link have also been tested and I present the results of these in my evidence. More information on the operational service pattern is included within Mr Foley’s proof (CRL/3/2). However, it is important to note that the service pattern will be determined by LUL, in accordance with its operational decisions, and is not in itself a matter for this inquiry.

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<sup>4</sup> For the purposes of the economic appraisal an average speed of 4.8 km/h (approximately 3 mph) is used

4.2.3 The current Met Line terminus station is located at a significant distance from Watford town centre. Services currently take around 44 minutes from Baker Street Station to Watford Met. With the Croxley Rail Link in place the Met Line would serve Watford at the two newly built stations and at the existing Watford High Street and Junction stations. From Baker Street the forecast journey times are as follows:

- Ascot Road 43 minutes
- Watford Hospital 45 minutes
- Watford High Street 47 minutes
- Watford Junction 50 minutes

4.2.4 Provision of a Met Line service to these stations increases the population served by this route. The change in the number of people within twenty minute catchment bands of Baker Street station is shown within Table 1 of the promoters' Statement of Case. This table shows that the number of passengers benefitting from a reduced journey time considerably exceeds the relatively small number of existing passengers whose overall journey time increases because of the closure of Watford Met station. For example 28,333 additional residents would have Met Line journey times of between 60-80 minutes, whereas 2,215 who previously were within this time band would now have longer journey times. This impact is shown graphically on Figures 3(a) and 3(b) of the promoters' Statement of Case.

### **4.3 TRANSPORT NETWORK IMPACTS**

4.3.1 Overall the result of the Croxley Rail Link scheme is a forecast net increase of 730,000 Met Line annual trips by 2016 (an increase of around 50% on current Watford Met usage). Around 20% of these trips, 140,000 annually, were previously making equivalent journeys by car, mostly complete trips (rather than rail or LUL access legs) within the wider Watford area. Around 30% of the increase in Met Line

use is forecast to be from passengers currently using bus services and the remaining 50% from passengers currently using other rail services.

- 4.3.2 These impact forecasts are based on the transport modelling framework developed in support of the September 2011 BAFB (APP 33). This comprises a 'demand model' which forecasts changes in travel mode informed by separate models representing highway vehicles and public transport passengers. In developing the modelling framework we considered the requirements of DfT guidance<sup>2</sup> and also comments received from DfT on the October 2010 business case.
- 4.3.3 Details of the development of the demand model can be found in the BAFB Demand Model and Forecast Report (APP 33-16). This includes the sensitivity testing which was undertaken to demonstrate the robustness of the forecast response of the demand model to public transport fares and additional testing to understand the sensitivity of the forecasts to key parameters.
- 4.3.4 Details of the development of the underlying public transport model can be found in the PT Validation Report (APP 33-15). The model validation exercise undertaken is summarised in this report including network checks and comparison of assigned flows with independent observed passenger counts, in this case station entry and exit data.
- 4.3.5 Details of the development of the highway model can be found in the Highway Validation Report (APP 33-14). This report includes the results of the model validation exercise, which considers the robustness of the model in terms of how well forecast link flows compare with an independent set of traffic counts.
- 4.3.6 The data and transport models used in the forecasting of the impacts of the Croxley Rail Link scheme are robust. The impacts I present are based on the BAFB submission made to DfT in September 2011, which satisfied its review and approval

processes. The results from these models form the basis of the economic and social impact assessment which I present in this proof.

#### **4.4 Highway Impacts**

4.4.1 The Transport Assessment of the Croxley Rail Link submitted with the TWAO application (APP 7-10) considered the impact of the scheme on the local highway and cycle/walking networks and users. The assessment identified locations where a material change occurred in either forecast traffic flows or delays at key junctions as a result of the scheme. Forecasts of changes in local traffic flows were also used in the Environmental Statement for the assessment of noise and air quality impacts.

4.4.2 The material changes in traffic flows identified in the Transport Assessment can be summarised as follows:

- One section of highway (Gade Avenue) has an peak hour increase of 19%, noting that this is a modest increase in traffic on a relatively low base flow
- One section of highway (Tolpits Lane south west of Hagden Lane) has an increase of just over 5%
- On 20 sections of highway traffic flows increase by less than 5%
- On 76 sections of highway traffic flows decrease by less than 5%
- There are eight sections of highway where traffic flows decrease by between 5% and 10%
- Modest reductions are seen in traffic queuing at the key Rickmansworth Road/Ascot Road and Ascot Road/Whippendell Road roundabouts
- Overall a little under 300 peak hour journeys are removed from the local road network

4.4.3 The Transport Assessment took into account the relocation of formal and on-street car parking to the new Ascot Road Station from the current Watford Met car park

Croxley Rail Link Order. Transport Case Proof of Evidence. Mr S E Hunter and Cassiobury Park estate. It included the forecast net mode shift from private car use to public transport use resulting from the Croxley Rail Link. The overall net impact on the highway network is assessed as being a modest benefit.

#### **4.5 Pedestrian and Cyclist Impacts**

4.5.1 A passenger survey at Watford Met (APP 31) found that 83% of users walk to/from the station and around 2% cycle and this pattern of behaviour is expected to continue. HCC is committed to funding reasonable measures to ensure that routes to the new stations are safe and secure extending into the residential area served by Watford Met. The new station buildings include step-free access to platforms improving travel opportunities for Persons of Restricted Mobility (PRMs). Both new stations have been specified to promote access by sustainable modes.

4.5.2 Facilities are being provided for existing and future pedestrian and cyclist users of the Met Line. Overall the scheme is assessed as having a net beneficial impact on these users.

#### **4.6 Existing Passenger Impacts**

4.6.1 A survey of Watford Met station passengers was undertaken from mid-June to early July in 2010, including interviews across five days<sup>5</sup> and manual counts on three of these (Saturday, Monday and Tuesday) at the station gateline and on the approaches to the station (APP 31). The survey was programmed for days when there were no published events which might have influenced passenger demand and surveyors recorded no material service interruptions. The survey data was compared with LUL records and was found to be representative of typical conditions, with one exception that I deal with in paragraph 4.6.5 of this proof. The

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<sup>5</sup> Saturday 19 June, Monday 21 June, Tuesday 22 June, Thursday 24 June and Thursday 1 July

data recorded through this survey is a robust record of passenger usage which is suitable as a basis for deriving the likely impact on existing users and for forecasting demand and revenue.

4.6.2 Each survey response was allocated a number up to 1042. In total 945 passengers (815 on weekdays and 130 at the weekend) provided enough information when interviewed for their responses to be included in the general analysis presented in the report of survey, and 811 sufficient data for use in the economic appraisal. For comparison TfL's published average entries and exits<sup>6</sup> gives a weekday average of 2,540 passengers and weekend of 895 passengers. A response rate of 32% was therefore achieved for weekday passengers and 14% for weekend passengers assuming that all daily passengers make two way trips. Weighting these rates by the number of week and weekend days in a year gives an average response rate of 27%. This response rate is higher than would usually be expected in a public transport passenger survey and I therefore consider it to be a robust representation of passenger behaviour.

4.6.3 The passenger interviews captured information including journey origin and destination, whether the London Underground portion of the trip started or finished at Watford Met, and the transport mode for the trip to/from the station. In total 764 of the survey records provided appropriate verifiable data to be included in analyses of impacts on the journey times of existing Watford Met users<sup>7</sup>.

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<sup>6</sup> <http://www.tfl.gov.uk/tfl/corporate/modesoftransport/tube/performance/entriesandexits.asp?id=280&agekey=2010>

Weekday passengers given is the average of weekday entries and exits, weekend the average of Saturday and Sunday entries and exits.

<sup>7</sup> 810 passenger records contained sufficient data for the economic appraisal which included grouping data into model zones, whereas the "Winners and Losers" analyses were based on individual postcodes.

- 4.6.4 Separate analyses were undertaken for trips made by 'Watford residents'<sup>8</sup> using the station to access Met Line destinations (480 interviews), and 'non-Watford residents'<sup>9</sup> using Watford Met station to access Watford destinations (284 interviews). To remove any potential bias from over or under representation of a particular group of passengers or time period a weighting factor was derived for each survey response. This weighting reflected whether the interview was for an adult or under 16 user of the station, and whether the passenger was travelling in the morning peak, interpeak, afternoon peak or evening. The sum of the weighting factors equals the TfL records for the relevant period to represent an equivalent full annual average day of traveller activity<sup>10</sup>. This process is consistent with DfT economic appraisal guidance.
- 4.6.5 The data from the survey was also used in a separate analysis to seek to establish how many users of Watford Met were pupils at Watford Grammar School for Boys. This information was sought primarily in relation to the Watford Met station closure process, but was then included within Section 11 of the promoters' Statement of Case (which deals with that issue). A figure of 70 people using Watford Met station to get to and from the Grammar School on a daily basis was extrapolated from the (unweighted) survey data by multiplying the average weekday passengers exiting the station by the proportion of interview respondees that gave the school as their destination.

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<sup>8</sup> Defined as passengers starting their journey at, and returning to, an address with a Watford postcode served by Watford Met station.

<sup>9</sup> Passengers for whom Watford Met was their destination station.

<sup>10</sup> Following the weighting process the data includes records for an annual average flow of 2,098 passengers, with 1,384 passengers being classified as Watford Residents and 714 Non-Watford Residents (very broadly a 70%, 30% split).



- 4.6.6 At the station closure hearing in June 2012 the figure of 70 passengers was disputed and, in particular, London TravelWatch (LTW) reported its own count of over 200 Grammar School pupils leaving the station over a relatively short period during the morning of 15 May 2012.
- 4.6.7 As a result of this discrepancy, a review was undertaken of the survey results and methodology; not simply to look into the difference in the number of Grammar School trips but to understand whether what appeared to be an under-representation in the survey results might have had an impact on the reliability of other analysis based on survey data which had been used in the case for Croxley Rail Link.
- 4.6.8 When the method of calculating Grammar School Met station users was re-examined, it was concluded that the use of the unweighted data and the fact that the survey was conducted in part at a weekend would inevitably reduce the number of respondees giving the Grammar School as their destination. Also, since the survey was conducted by interviewers approaching passengers, it was reasonable to assume that a combination of factors such as the clustering of pupils arriving together over a relatively short period, wanting to get to school on time, and the proximity of the school to the station, would result in pupils being under-represented in the survey responses. Further, the survey was carried out at a time of year when some pupils may have been on study leave in preparation for the examination period. These were matters that, with the benefit of hindsight, should have been anticipated and addressed.
- 4.6.9 The result is that little reliance can be given to the figure of 70 Grammar School users. On the other hand, the survey methodology used is well-established and gave rise to a large number of interview records; meaning that the data for other destinations (where these particular factors did not arise) remains robust.

- 4.6.10 In response to the LTW evidence, LUL extracted Watford Met gateline data showing the number of under 18 year olds using Watford Met station from Monday 30 April to Friday 4 May 2012. This shows an average of 329 under 18 year olds arriving at the station between 07:00 and 09:00 and an average of 275 leaving by the station between 15:00 and 17:00. The average of the two values is 302, or about 600 trips per weekday during term time. Whilst it is not possible to identify with certainty the proportion of those trips associated with the Grammar School, it is prudent to assume that most of them were.
- 4.6.11 As the survey data was used in other elements of the analysis presented in the business case for the Croxley Rail Link project as a whole, a critical review has been undertaken to understand to what extent the under-sampling of Watford Grammar School pupils would have affected the results of the case. The conclusion was that the robustness of the other analyses using survey data, including the benefit cost ratio is unaffected by this issue, largely because the number of trips made by under 18 year old passengers (even if one assumes they are all Grammar School pupils) remains a low percentage of total demand, meaning that any error would fall well within the expected tolerance for such results.
- 4.6.12 An analysis of the impact of Croxley Rail Link on existing non-Watford resident Met station passengers is included in my proof at Figure 3 and paragraph 4.6.22. In it, the number of Grammar School pupils is taken from recent gateline data whilst survey data is used for all other destinations. This analysis represents an annual average day which is consistent with the economic appraisal.
- 4.6.13 Figure 2 shows the recorded Watford residential origins of current passengers, who make up around 70% of the trips from the station. The size of the dot represents the annual average number of passengers by individual postcodes. This map shows a wide distribution of Watford residents using the existing station with many

passengers accessing services from some distance away, including some for whom Watford Junction and/or High Street would be closer.

- 4.6.14 Figure 3 shows destinations of non-Watford residents currently using the Met station to access Watford for an annual average day. An annual average day is used for the analysis as it is directly proportional to the total impact for each year included in the economic appraisal.
- 4.6.15 Figure 4 illustrates the impact on existing Watford resident users of Watford Met, based on the postcodes recorded in the passenger survey. The analysis behind this figure compares existing journey times from Watford Met station with the lowest journey time using any of the newly served stations on the Croxley Rail Link scheme. The journey times compared include station access time, wait time and time spent on the Met Line service.
- 4.6.16 The right hand side of the figure shows (in red) existing Watford Met passengers who will experience longer journey times as a result of the project. The analysis shows that no user would have an increase in journey time of more than fifteen minutes – around 65 passengers out of 1,384 are shown to experience a fifteen minute increase. In total a little over half of existing passengers will experience some disbenefit, receiving an average increase in journey time of 5.6 minutes.
- 4.6.17 The left hand side of the figure, in green, shows the 677 existing Watford Met passengers who would benefit from the scheme. The maximum time saving received is 24 minutes – with the average time saving received by benefitting passengers being 7.5 minutes.
- 4.6.18 Taking into account both those who benefit and disbenefit the average impact per existing Watford resident passenger is a gain of around 50 seconds, showing an overall net benefit. This net benefit forms just part of the positive impact of the scheme. It must of course be remembered, that this analysis relates only to existing

Watford Met users, there is a much larger number of people who do not currently use Watford Met who will benefit from Croxley Rail Link and the new stations.

4.6.19 A similar analysis has been undertaken for the broadly 30% of existing non-Watford resident passengers who use the Met Line to access locations within Watford. As I have explained, this analysis uses under 18s gateline data to represent the number of Watford Grammar School pupils (paragraph 4.6.12) and thus to compensate for the under-sampling of these trips in the passenger survey.

4.6.20 Changes in station access times were derived based on a walk network including roads and key footpath links and representing the distance between each existing and proposed Met Line station and the destination (based on its postcode or a representative point where the destination is not a single building). For example Ascot Road station to Watford Boys Grammar School is around 1,000 m, around twice the distance from Watford Met station to the school entrance on Shepherds Road<sup>11</sup> which is around 500 m. The analysis, consistent with the economic appraisal, assumes an average walking speed of 4.8 km/h (around 3 mph). The walk time for pupils of the Grammar School who use the Met Line would therefore increase by a little over six minutes (from 6¼ to 12½ minutes). However this increase would be partially offset by the train journey from Ascot Road being around one minute quicker than that from the existing Watford Met station.

4.6.21 The following bullet points summarise the impact for key destinations:

- Watford Grammar School (22% of trips) 6 minute increase
- Watford Town Centre (14% of trips) 19 minute saving

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<sup>11</sup> The increase in journey time to Watford Grammar School from Watford Met was originally calculated to the entrance off Rickmansworth Road but has been updated as part of the review of the use of Grammar School pupil records from the survey

- Around Cassiobury Park (10% of trips) 14 minute increase
- Watford General Hospital (5% of trips) 10 minute saving
- West Hertfordshire College (2% of trips) 4 minute saving
- Watford Grammar School for Girls (1% of trips) 17 minute saving
- All other destinations (46% of trips) 5 minute average saving

4.6.22 Overall the demand weighted average impact on those existing Watford Met station users living outside Watford is a time saving of 3.23 minutes.

4.6.23 This analysis shows that the scheme's impact on existing Watford Met passengers, both those resident in Watford and those making trips into Watford, is positive overall. Although the impact on existing Watford Met passengers forms only one part of the compellingly positive case for the Croxley Rail Link, nonetheless the fact that even existing passengers receive a net benefit in the economic appraisal underpins both the economic and transport cases. In the overall analysis it is critical to have in mind the passenger benefits for those residents and employees who do not currently have good access to Met Line services. For example the Girls Grammar School is within 5 minutes of Watford High Street Station, providing a major benefit for that group of potential users.

## **5 OPERATOR IMPACTS**

### **5.1 Forecast Revenue**

5.1.1 Additional Met Line farebox revenue is calculated based on the passenger demand forecast and fares as follows: the new stations at Ascot Road and Watford Hospital are proposed to be within TfL fare zone 7, the same zone as the existing Watford Met station; there would be no change to ticket prices from Watford High Street, which is in TfL zone 8, or Watford Junction, which is in its own dedicated fare zone.

- 5.1.2 On opening of the Croxley Rail Link in 2016, an additional £3.6 million of Met Line revenue is forecast in 2011 prices – before the application of any factor to represent ‘ramp-up’ of demand and revenue in the first years of operation. By 2031 the equivalent value has increased to £4.6 million of Met Line revenue in 2011 prices. Around 17% of this revenue is forecast to be abstracted from London Overground services (which are TfL sponsored) and 30% from other heavy rail services. The remainder, a little over 50%, is new to rail revenue from abstraction from bus services or from private car use.
- 5.1.3 An additional approximately £0.1 million of additional station revenue in 2011 prices is forecast for advertising, cash machines and Metro racks. This estimate is based on current income for Watford Met provided by LUL.

## **5.2 Operating and Maintenance Costs**

- 5.2.1 The costs of operating the scheme have been estimated for the project by London Underground Limited. These include the costs of annual maintenance activities and annual payments to cover the less frequent but larger scale renewal activities.
- 5.2.2 The total net cost of operating and maintaining the Croxley Rail Link scheme is calculated to be £1.8 million in 2011 prices. This figure includes savings from no longer running passenger services between Croxley and Watford Met.

## **5.3 Net Operator Impact**

- 5.3.1 Forecast revenue for the first year has been reduced by 30%, based on common industry practice to reflect the expected ramp-up of demand. The resulting additional Met Line revenue forecast of £2.5 million and additional overall TfL revenue (taking into account London Overground abstraction) of £2.1 million exceed operating costs from the first year. By the fourth year of operations, when revenue is expected to have matured, forecast Met Line additional revenue of

£3.8 million or TfL net revenue of £3.2 million exceed operating costs by some margin.

- 5.3.2 The financial agreement between Hertfordshire County Council and London Underground Limited includes the transfer of the revenue surplus for an agreed period in return for HCC's initial capital contribution to the project. The forecast revenue exceeds the operating costs by sufficient margin that there can be a high probability that HCC's investment will be repaid.

## **6 ECONOMIC AND SOCIAL IMPACTS**

### **6.1 Economic Appraisal Framework**

- 6.1.1 A key indicator used by DfT in considering whether they should fund transport projects is the benefit cost ratio (BCR), the summary result from economic appraisal. As I described in Section 3 of my proof, DfT economic appraisal guidance<sup>2</sup> prescribes an approach which ensures that BCRs are comparable between different types and locations of projects and in line with HM Treasury's Green Book<sup>3</sup>. The economic appraisal for the Croxley Rail Link scheme is in line with this guidance.
- 6.1.2 Public transport user benefits and revenues have been calculated using DfT's TUBA (Transport User Benefit Appraisal) software as required by its guidance. For highway user impacts the alternative 'external costs of highway use' approach set out in DfT guidance was used. This is robust and appropriate given the limited contribution that highway economic benefits make to the overall assessment.
- 6.1.3 DfT's specified BCR calculation and a more detailed description of the economic appraisal of the Croxley Rail Link scheme submitted to DfT within the BAFB can be found in the Economic Appraisal Report (APP 33-3).
- 6.1.4 The specification of the Croxley Rail Link has not changed from the BAFB made to DfT and therefore remains an appropriate assessment of the impact of the scheme.

The BCR of 2.61 for the scheme submitted, places the scheme within the range specified within DfT guidance to be 'High' value for money (BCR > 2). I believe that the performance of the project submitted to this inquiry justifies the powers requested and represents a good use of public funds. The proposal before this inquiry meets the terms and conditions specified in the DfT's funding approval letter (CRL/2/3/Appendix Two). On this basis, there is no reason to doubt that the funding committed to the project by DfT will be available.

## **6.2 Social Impacts**

- 6.2.1 My proof sets out the social impacts which have been monetised within the economic appraisal. The assessment of other social impacts of the Croxley Rail Link has been set out by Ms Glaud in her proof (CRL/1/2).
- 6.2.2 As a result of net mode shift from private car to public transport use the scheme will result in reductions in noise, local air quality and greenhouse gas emissions, accidents and highway infrastructure investment. The impact of these savings equates to a present value<sup>12</sup> benefit of £0.4 million.
- 6.2.3 As I set out within paragraph 5.1.1 of this proof, fares charged at existing stations will not change as a result of the project and the new stations at Ascot Road and Watford Hospital are proposed to be within the same fare zone as the current Watford Met station. However, following implementation of the project the closest Met Line served station for some existing Watford Met passengers may be within a different fare zone. Walking further to one of the new stations where the fare would remain at the same value as the current station remains an option for these passengers.

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<sup>12</sup> Discounted total over the sixty year appraisal period



6.2.4 The economic appraisal takes account of any change in fare paid in addition to the change in journey access time. Overall there is a balance in the user charge impact; for example residents close to the new stations who may currently be travelling to central London from Watford High Street on London Overground Services would now have the option of a lower fare if they went on the Met Line.

### **6.3 Economic Impacts**

6.3.1 The economic impacts of the scheme include the benefits to consumer travellers, comprising commuters and others who are not on employers' business. The main impact of the Croxley Rail Link scheme is a material public transport journey time saving, totalling nearly £75 million in appraisal present values.

6.3.2 As a result of net mode shift from private car to public transport use the scheme will result in reductions in congestion over the wider highway network and the consequent economic benefits are captured within the appraisal. The impact of these savings equates to a present value benefit of £2.4 million.

6.3.3 The final economic impact is an improvement in passenger journey time reliability, a result of Met Line services being significantly more reliable than the bus journeys previously made by a proportion of the new passengers. This benefit has prudently not been monetised within the economic appraisal.

### **6.4 Business Impacts**

6.4.1 The monetised impacts of the scheme include benefits to travellers on employers' business. The main impact of the Croxley Rail Link scheme is a material public transport journey time saving, totalling nearly £80 million in appraisal present values.

6.4.2 The economic appraisal includes the impact of the scheme on private transport operators. In the local context revenue risk on bus services is taken by the private sector while revenue risk on Met Line services is taken by the public sector. In

present value terms this impact is a transfer from the 'benefits' to the 'costs' (as represented in the BCR) of around £18 million. No response is assumed from the local bus operators in terms of the service operated and therefore no changes in private sector operating cost are included in the economic appraisal.

6.4.3 The scheme significantly improves the connectivity of existing businesses and potential development sites along the corridor, including Croxley Green Business Park and Watford Health Campus. The project has support from the Watford business community and will make a significant contribution to regeneration of the area.

6.4.4 By increasing potential employee catchment areas and improving access to customers, clients and suppliers the scheme will generate economic benefits for businesses including in Watford and London. These 'Wider Impacts' were quantified for the November 2009 Major Scheme Business Case (APP 34). It was assumed in a sensitivity test for the BAFB that they would generate the same proportional impact on the economic appraisal. On this basis Wider Impacts would account for an additional £45 million of present value benefits – the illustrative BCR of the proposals including this being 3.31.

## **6.5 Appraisal Robustness**

6.5.1 A series of sensitivity tests was undertaken for the BAFB submission and is detailed in Table 5.1 of the Value for Money Annex (APP 33-6). This analysis shows that with either the construction or operating costs increasing by 20% - a material increase - the BCR for the project remains over 2. This demonstrates a high level of robustness to cost increases.

6.5.2 A range of tests of the impact of alternative service frequencies was also completed. The core economic appraisal is based on an assumed service pattern of six trains per peak hour per direction and four trains per off peak hour to Watford

Met in the base case; all of which are diverted to Watford Junction in the future. However, the future service pattern may differ from this assumption and therefore a range of potential service options have been considered. Further information on this matter is included within Mr Foley's proof (CRL/3/2). The tests undertaken are as follows:

- Central Case            BCR = 2.62  
(Base: 6 tph<sup>13</sup> Watford Met; Future: 6 tph Watford Junction)
- Alternative A            BCR = 2.53  
(Base: 7 tph Watford Met; Future: 7 tph Watford Junction)
- Alternative B            BCR = 2.57  
(Base: 7 tph Watford Met; Future: 6 tph Watford Junction)
- Alternative C            BCR = 2.23  
(Base: 10 tph Watford Met; Future: 6 tph Watford Junction)

6.5.3 These tests demonstrate that the scheme is robust to the service pattern assumption. The BCR remains above two even in a comparison of a more frequent service at Watford Met than is possible with the rail link – because the extended service requires more resources (including an extra train) to operate which constrains the service which can be run. Further information on this is provided by Mr Foley (CRL/3/2).

6.5.4 The economic appraisal presented of the Croxley Rail Link scheme is robust, as demonstrated through the range of sensitivity test results presented. Of particular note is that even under different service pattern alternatives the BCR remains firmly over two and therefore within DfT's 'High' value for money category.

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<sup>13</sup> Trains per hour (in each direction)

## 7 FIT WITH PROMOTERS' AND WIDER OBJECTIVES

### 7.1 Croxley Rail Link

*(a) To **enhance sustainable links** to, and between, residents and employment, business, education, health and leisure opportunities within Watford and across Hertfordshire, and to key external attractors in London and the national rail network, reinforcing Watford's role as a key transport hub*

7.1.1 The promoted scheme increases the number of residents within walking distance of the Met Line and creates public transport links from Met Line served communities to new destinations including Watford Hospital, Watford town centre and Watford Junction station where there are interchange opportunities with the national rail network. It delivers a direct, frequent and reliable connection between Watford and central London and to Met Line stations in between.

*(b) To **improve local connectivity** within Watford between current and potential employees, the town centre and the key development areas of Watford Junction, Watford Business Park/Ascot Road and the Health Campus providing a catalyst for both economic and housing development*

7.1.2 The Croxley Rail Link increases the potential employee catchment area for existing and potential businesses within the town centre and the key development areas of Watford Junction, Watford Business Park/Ascot Road and the Watford Health Campus. Although some existing users will have a longer walk to a Met Line station, the offer of an equivalent frequency of service at one of the newly served stations, in many cases for the same fare, limits any disbenefit received. The net impact of the scheme on existing users is beneficial.

*(c) To **provide a sustainable and value-for-money alternative** to car travel, with inherently lower environmental impacts per trip including noise and greenhouse gas emissions*

7.1.3 London Underground services are a proven attractive alternative to private car use, with materially lower environmental emissions per passenger. The opportunity to divert an existing service to provide an enhanced public transport offer is a cost effective way of improving local transport.

7.1.4 The promoted scheme makes a material contribution to addressing the transport problems affecting the Watford area described in Ms Glau's proof (CRL/1/2) and is in line with planning and transport policy. I consider that DfT's funding commitment to the project demonstrates that it is affordable and a justified use of public sector funds.

## **7.2 Strategic Alternatives**

7.2.1 The most recent presentation of the wide range of strategic alternatives which have been considered during the evolution of the Croxley Rail Link scheme is set out within Section 10 of the promoters' Statement of Case. At all stages of scheme development the option to divert all Met Line services to Watford Junction and close Watford Met station has been shown to represent the strongest option, based on value for money and deliverability criteria.

7.2.2 Two alternative routes connecting the Met Line to Watford Junction have been considered, a tunnel from Watford Met station under the town centre and the more southerly Croxley Moor alignment. Both of these options would be more expensive to deliver than the preferred option and therefore do not meet the affordability criteria. Additionally neither option performs particularly well against the objectives for the scheme as they do not serve the residential or regeneration areas along the former Croxley Green Branch.

7.2.3 A range of alternative ways of providing a connection along the disused Croxley Green Branch has been considered including: heavy rail; bus; and light rail. What these options have in common is that they do not provide the direct service between Watford and London which provides much of the economic benefit of the preferred option. Few passengers are expected to use a service which requires an interchange with Met Line services rather than accessing those services direct in the same way they currently do. Even though the cost of such options could be materially less than the cost of the preferred scheme, analysis has shown that they would not offer the same level of Value for Money and therefore would not be a justifiable use of public sector funding.

### **7.3 Alternatives to Closing Watford Met**

7.3.1 The central case proposal for all Met Line trains to serve Watford Junction has been consistently demonstrated to deliver higher value for money than options which maintain some level of service at Watford Met. My evidence includes further explanation of why the various options which split services between Watford Junction and Watford Met deliver materially less transport and economic benefit than the preferred scheme. Mr Foley deals with the operational constraints that a split service would impose on the Met Line in his proof (CRL/3/2). My evidence should be read in light of that proof.

7.3.2 Figure 1 illustrates the increase in the direct Met Line catchment area resulting from the scheme. The Croxley Rail Link scheme brings an additional 5,100 residents to within 800 m of a new Met Line station or 14,300 including Watford High Street and Watford Junction. 3,700 residents who are currently within 800 m of Watford Met would now be more than 800 m from a Met Line station – although the access distance to Ascot Road station for these passengers is less than many Met Line users currently travel. The total number of residents within easy reach of Met Line services increases with the introduction of the scheme.

- 7.3.3 The analysis of existing passenger impacts presented in my proof shows that no individual's journey would increase by more than fifteen minutes, with the increase for the majority of passengers with a longer journey being three minutes or less. This analysis is valid only where the service frequency on the Croxley Rail Link is similar to that at Watford Met.
- 7.3.4 The main impact of splitting the service between Watford Met and Watford Junction is that the frequency on both branches would reduce and therefore average passenger wait times would increase. For example an even split in the 6 trains per hour service would increase the average wait time from five minutes to ten. Analysis of existing Watford Met station passengers shows that at least 80% have journey times which increase, after the closure of that station, by less than five minutes. These existing passengers would be worse off if the service was split, significantly reducing the scheme's economic benefits. There would be a further loss of benefit to new passengers who would also have to wait longer for trains on the CRL, further reducing the scheme's overall economic benefits.
- 7.3.5 This additional journey time is the main reason that the BCR for a split service is shown in the Value for Money Annex (APP 33-6) to be 1.43, materially less than the central case and below the level which would be considered for funding by DfT. In effect the result of this proposal to mitigate the extended access time for some existing passengers is to disbenefit all passengers by increasing the amount of time spent waiting for Met Line services. This includes passengers continuing to use Watford Met who would still disbenefit, being offered a lower frequency of service. The total disbenefit to all passengers considerably exceeds the benefit to the passengers closest to Watford Met, the consequence being the material reduction in the BCR.
- 7.3.6 The alternative option of a non-even split has been considered, with four trains per hour to Watford Junction and two to Watford Met. The BCR of this option is 1.68,

derived on a comparable basis to the even split service. Although the economic performance of this option is better than the even split it still falls well short of the preferred option. It is also noted that in order to maintain an even spacing between services on the Met Line south of Croxley, the services to Watford Junction would have alternately ten and twenty minute gaps between them further reducing the attractiveness of the service to passengers. An even interval service pattern is an important part of providing an attractive service and can have a material impact on the level of usage of a service.

- 7.3.7 The net costs of operating either split service option are around 30% higher than the operating costs of the preferred option. As a result of the reduced service frequency offered to existing and potential Watford Met Line passengers the net demand for the split options is also lower and therefore there is less additional revenue. The forecast revenue surplus (revenue – operating costs) would therefore be less for the split service options, reducing the probability that HCC's initial capital investment will be repaid in reasonable time.
- 7.3.8 London TravelWatch at page 7 of its report, made the following comment: *“The Panel asked LUL to tell them the effect on passenger flows of changing the off-peak frequency from 6 tph to 4 tph in December 2011 as this could give some indication of the effect of reducing the frequency to Watford Junction station from 6 tph to 4 tph if the 4:2 split of services proposed above were adopted. TfL have looked at the drop in demand at Watford station before and after the timetable change by comparing gateline data in June 2011 to that in June 2012. TfL tell us there was only a slight fall in 2012. The reasons for this slight fall are unknown.”*
- 7.3.9 A comparison of the reduction in forecast total Met Line passenger numbers at Watford stations with the impact of the reduction in off-peak service (from six trains an hour to four) in December 2011 is not a useful exercise. At the date of the service reduction Watford Met station users did not have a choice between stations



(or between services in the reverse direction) as they would do with CRL. Therefore for someone who wanted to travel off-peak from Watford Met the reduction of service could have been irritating but would have been reasonably unlikely to lead to them changing their travel pattern. The situation will be different with the introduction of CRL, because existing users of Watford Met would have the choice of going instead to one of the CRL stations. Therefore (a) a number of existing users will actually be nearer to one of the CRL stations; and (b) the reduction of service at Watford Met by reason of a split service would be likely to further reduce the number of people using the existing station. The comparison sought by Travel Watch therefore does not give any useful indication of travel patterns post CRL.

7.3.10 Further, a reduction from six to two or three trains per hour at Watford Met is a materially greater reduction in service frequency than was the case with the December 2011 service change and would affect all passengers, rather than just the off-peak market. It should also be noted that the net result of the change in service pattern in December 2011 was net beneficial to Met Line passengers, the gains on the Uxbridge branch and in service reliability exceeding the disbenefits. Splitting the CRL service would not have any equivalent compensating benefits elsewhere on the network.

7.3.11 It is the increase in passenger wait times rather than the reduction in operating surplus to which the BCR is sensitive. The London TravelWatch proposal to determine the *“the real passenger numbers and issues involved in the running of a split service prior to a final decision on the closure of Watford [Met] Station”* therefore misses the point. Regardless of the number of passengers at Watford Met the disbenefit to all Watford stations Met Line passengers arising from the reduction in service frequency is known; and will always exceed any passenger time benefit of retaining Watford Met.

- 7.3.12 Delaying the closure of Watford Met for two years could result in the DfT withholding the next stage of funding approval required and place very considerable doubt over the future of the scheme.
- 7.3.13 I have been advised that the imposition of a condition on the TWA Order of a trial period to relieve hardship caused by the closure of Watford Met cannot legally be made. Furthermore I understand that legal submissions will be made to the Secretary of State on this matter.
- 7.3.14 Options which include the use of the 'north curve' section of track between Croxley and Rickmansworth would require two additional trains for a minimal twice hourly service. LUL origin-destination data shows less than 500 passengers per weekday currently make journeys between stations that would be connected by such a service. This option is also therefore neither affordable nor value for money.

## **8 CONCLUSIONS**

- 8.1 My evidence to the inquiry covers the transport and funding case for the Croxley Rail Link scheme. It describes the derivation of the positive case for the scheme which successfully obtained DfT funding approval. I have set out why this case is robust and why implementation of the project is justified and beneficial. I believe that the performance of the project submitted to this inquiry justifies the powers requested, represents a good use of public funds and therefore there is no reason to doubt that the funding committed to the project by DfT will be available.

## **9 WITNESS DECLARATION**

- 9.1 I hereby declare as follows:
- This proof of evidence includes all facts which I regard as being relevant to the opinions that I have expressed and that the inquiry's attention has been drawn to any matter which would affect the validity of that opinion

- I believe the facts that I have stated in this proof of evidence are true and that the opinions expressed are correct
- I understand my duty to the inquiry to help it with matters within my expertise and I have complied with that duty