

Croxley Rail Link

Value for Money Annex

Report

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1 Introduction

Background

- 1.1 The Croxley Rail Link project was modelled and appraised as part of the 2009 Major Scheme Business Case (MSBC) Submission, in which it was estimated to provide a Net Present Value of £193.6m and a Benefit Cost Ratio of 2.55:1, therefore providing good value for money.
- 1.2 Since then, the scheme has been selected as one of several projects in the Department for Transport (DfT) 'Development Pool' and has undergone additional development, modelling and appraisal work as part of the Best and Final Funding Bid (BAFB) process. This document provides a summary of this process setting out the final appraisal of the scheme, how and why the appraisal has changed from the previous submission and the overall Value for Money Case for the project.

Objectives

- 1.3 The objectives of the report are to:
- Summarise the costs of the scheme, including the capital and operational costs, the quantitative risk allowance and optimism bias applied in appraisal;
 - Explain the economic benefits of the scheme, including both monetised and non-monetised benefits;
 - Document and explaining any assumptions used in appraisal; and
 - Provide the information required by the DfT for the assessment of Development Pool schemes in a manner consistent with the *Major Scheme Business Cases: Value for Money Guidance Development Pool Schemes* document.

Structure of the Report

- 1.4 The rest of the report is structured as follows:
- **Section Two - Overview** - provides a high level description of the scheme and summarises the changes that have been made through the BAFB process.
 - **Section Three - Scheme Costs** - provides a summary of the changes to the scheme capital & operating costs, quantified risk and optimism bias applied to the project in appraisal.
 - **Section Four - Scheme Benefits** - provides a general description of the changes to the scheme benefits including the modelling process and the impact of these changes on the monetised, non-monetised and wider benefits of the project;
 - **Section Five - Appraisal** - provides a summary appraisal of the scheme against national and local policy objectives describing how the changes to the scheme have affected these objectives. This section also contains the **Value for Money Statement** and summarises the results of a series of sensitivity tests.
 - **Section Six - Checklist** - provides a checklist of the Value for Money Case requirements, including cost-benefit analysis requirements, economic case requirements and modelling requirements.

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1.5 This report is supported by a series of documents which provide additional detail on scheme development, the appraisal process and results including the cost-benefit analysis and modelling assumptions. These include the following documents:

- Local Model Validation Report - Public Transport - (LMVR);
- Local Model Validation Report - Highway - (LMVR);
- Alternatives Review Report;
- Demand Model & Forecasting Report;
- Economic Appraisal Report;
- Economic Impacts Report;
- Social & Distributional Impact Report;
- Scheme Development Report, and
- Cost Report.

2 Overview

- 2.1 The Croxley Rail Link project will provide significant benefits to individuals and businesses in Watford and the surrounding area by linking Watford town centre to the London Underground Metropolitan Line via Watford High Street and Watford Junction stations. The project will also provide two new stations at Watford Hospital and Ascot Road.
- 2.2 The rail link will provide up to six Metropolitan Line services per hour in the peak, and four in the off-peak to Watford Junction. The project will require the closure of Watford Metropolitan station for passenger use with these services redirected to serve the rail link.
- 2.3 The following points summarise the scope of the work required to deliver the project:
- A viaduct and embankment linking the current Metropolitan Line 1.3km south of the existing Watford terminus to the disused rail alignment between Croxley and Watford High Street;
 - The reinstatement of double track on the disused Croxley alignment, including a new junction with the Watford Junction to London Euston DC route at Watford High Street;
 - Work to bring the bridges, cuttings and embankments on the disused Croxley alignment into operational use;
 - New stations at Ascot Road and Watford General Hospital and material improvements to Watford Junction and Watford High Street stations; and
 - An additional rolling stock unit to deliver the extended services.

Scheme Development

- 2.4 The fundamental scope of the project remains unchanged. The main impact of the development process has been a significant reduction in costs and greater certainty over the project plan and design. Full details of the scheme development process are provided within the Scheme Development Report.
- 2.5 The scheme has been developed through the BAFB process. The scope and specification of the project has been examined and a value engineering exercise undertaken to reduce the costs and maximise value for money. In summary the scheme has changed in the following ways since the MSBC submission:
- Cost savings secured through a reduction in the level of facilities, finish quality and design specification for new stations and station improvements.
 - Progress to a more advanced design stage; RIBA stage C and GRIP stage 3 for the London Underground and Network Rail sections of the project resulting in greater cost certainty.
 - A revised project timescale, and inflation forecasts. Construction of the rail link will begin in 2014 and the scheme will become operational in 2016.

Re-Appraisal

2.6 Between the MSBC and BAFB, the appraisal of the project has been updated to take account of feedback from the DfT on the previous submission, and incorporate new developments that affect the economic case for the project. These changes include the following points:

- An updated modelling framework incorporating a more detailed zoning system and the latest data and population & employment projections.
- An updated benefits assessment using the latest version of TUBA v1.8.
- The incorporation of non-user economic benefits related to reductions in vehicle kilometres and associated externalities including noise, accidents, carbon emission and infrastructure costs.
- Renewed capital and operating cost estimates and a new construction profile and project opening date.
- Updated core and project specific inflation forecasts based on the latest forecasts.

2.7 As a result of these changes, the overall benefits of the scheme have fallen to £169m Present Value (PV). This reduction is primarily the result of a new modelling process which has significantly improved the accuracy of the benefits estimate. The costs of the project have also fallen to £65m PV, meaning that the overall economic case for the project remains similar to the MSBC. Table 2.1 shows the effect of the changes to the project across key categories of benefit and cost.

TABLE 2.1 ANALYSIS OF MONETISED COSTS & BENEFITS - MSBC TO BAFB

£m	MSBC (Original)	MSBC (Updated) ¹	BAFB	Change
Consumer Users	260.6	260.6	84.7	-175.9
Business Users and Providers	39.6	39.6	67.9	28.3
Option Values	18.3	18.3	18.7	0.4
Non User Benefits	0.0	0.0	2.8	2.8
Indirect Tax Impacts (Increase)	-4.4	-4.4	-4.9	-0.5
Present Value of Benefits	318.6	314.2	169.3	-144.9
Present Value of Costs	125.0	120.6	64.7	-55.9
Net Present Value	193.6	193.6	104.5	-89.1
Benefit Cost Ratio	2.55	2.61	2.61	0.01

2.8 These changes and the effects on the projects value for money are described in the rest of this report and are explained in more detail in the Economic Appraisal Report.

¹ Update appraisal guidance includes Indirect Tax Impacts as a benefit rather than a cost.

3 Scheme Costs

Capital Costs

- 3.1 The revised design specification and value engineering has identified a variety of cost savings which in combination have reduced the net capital cost of the project by £18.6m (@ 2011 prices). relative to the MSBC cost estimates
- 3.2 Table 3.1 shows the original MSBC cost estimates in 2007 and 2011 price bases, and the more recent BAFB estimates incorporating the reductions in project costs. The table shows that whilst there have been some increases in costs for example as a result of the unforeseen need to provide an electrical substation as part of the project (this is classified as an infrastructure cost), overall capital costs have been significantly reduced.

TABLE 3.1 MSBC &BAFB CAPITAL COSTS (£000S)

	MSBC (2007)	MSBC (2011)	BAFB (2011)	Increase / Saving
Infrastructure costs	£51,873	£57,060	£65,895	£8,835
Preliminaries	£11,023	£12,125	£10,320	-£1,805
Profit and overhead	£4,717	£5,189	£2,965	-£2,224
Design	£4,000	£4,400	£3,300	-£1,100
Project Management	£3,354	£3,690	£2,150	-£1,540
Assurance	£1,887	£2,076	£500	-£1,576
Third Party Costs	£7,781	£8,559	£0	-£8,559
Possession Costs	£500	£550	£540	-£10
Land costs	£2,500	£2,750	£4,240	£1,490
Land transfer from BRB	£1,500	£1,650	£0	-£1,650
Other service costs to TWA	£1,000	£1,100	£0	-£1,100
LRVs	£8,301	£9,132	£9,000	-£132
Third Party Compensation	£250	£275	£160	-£115
Operational Monitoring	£426	£468	£200	-£268
Quantified Risk Assessment	£12,700	£13,970	£5,100	-£8,870
Total Capital Costs	£111,813	£122,994	£104,370	-£18,624

- 3.3 The largest areas of saving include an £8.9m reduction in the level of Risk Adjustment, an £8.5m reduction in Third Party costs, and a £2.2m reduction in the level of Profit and Overheads. The reduction in the design specification of the station has also reduced costs across a variety of other items. The Cost and Scheme

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Development Reports provides a detailed explanation of the changes to the project and theBAFB capital cost estimates.

Cost Profile

3.4 The opening year of the project has been brought forward from 2018 to 2016. Accordingly the construction profile has changed with project costs expected to occur sooner than described within the MSBC. The construction period has also been condensed taking place over a shorter period of time. Table 3.2 shows the total capital cost spend profile for the MSBC and BAFB proposals.

TABLE 3.2 CAPITAL COST PROFILE - MSBC TO BAFB

% of Total	2011	2012	2013	2014	2015	2016	2017	2018	2019
BAFB	0%	10%	20%	29%	40%	1%	0%	0%	0%
MSBC	1%	2%	2%	2%	1%	1%	47%	43%	1%

Inflation

3.5 Inflation projections have changed reflecting new economic forecasts from the Treasury and Franklin and Andrews rail price indices. The MSBC assumed that capital costs would increase by 4.5% pa in nominal terms against RPI growth of 2.5% pa, implying real cost inflation of 2.5% pa. Table 3.3 shows the inflation assumptions that have been used in the BAFB submission.

TABLE 3.3 BAFBINFLATION ASSUMPTIONS

	2012	2013	2014	2015	2016	2017 - On
RPI Index ^{1&2}	243	251	259	267	274	-
RPI % Change ^{1&2}	3.4%	3.1%	3.3%	3.2%	2.5%	2.5%
Station & Civils ³	2.0%	4.3%	4.9%	5.0%	4.9%	2.5%
Permanent Way ³	1.9%	4.5%	5.5%	5.6%	5.7%	2.5%
Electrification ₃	2.2%	4.4%	5.5%	5.6%	5.6%	2.5%
Signalling ³	2.5%	4.5%	5.5%	5.5%	5.5%	2.5%
Telecomms ³	2.6%	4.6%	5.5%	5.5%	5.5%	2.5%
Rail Tender Index ³	2.4%	4.3%	5.2%	5.2%	5.0%	2.5%
Fares ⁴	6.4%	6.1%	4.3%	4.2%	3.5%	3.5%

¹ ONS RPO2 Table July 2011

² HM Treasury Forecasts for the UK economy: a comparison of independent forecasts (August 2011)

³ F&A Rail tender indices July 2011

⁴ Assumption

- 3.6 The table shows that the level of RPI inflation is initially higher than assumed in the MSBC, returning to 2.5%pa in 2016. The inflation rates applied to the different elements of scheme costs are generally lower than RPI in 2012, but increase in later years, this implies real cost deflation relative to the MSBC assumptions.
- 3.7 In combination, the change in base costs, spend profile and inflation assumptions has had a significant effect on the outturn costs of the project. Overall the outturn costs have fallen from £172m in the MSBC to £117m in the BAFB. The forecast outturn costs are shown in Table 3.4.

TABLE 3.4 FORECAST OUTTURN COSTS - MSBC TO BAFB (£M)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
BAFB	0	10,612	22,119	33,243	48,783	1,798	20	150	21
MSBC	1,503	2,308	2,587	2,630	2,106	2,465	81,420	75,220	1,221

Optimism Bias

- 3.8 Despite the development of the design and the greater confidence in project costs that have resulted, the level of optimism bias applied to the capital costs remains the same in the BAFB proposal at 22%.

Operating Costs

- 3.9 The scheme development process has also resulted in a significant reduction in the operating costs of the project. Overall operating costs have been reduced by £700,000 per year @2011 prices. Table 3.5 shows the incremental MSBC operating cost estimates @2009 and 2011 prices bases, and the more recent BAFB estimates.

TABLE 3.5 MSBC AND BAFB INCREMENTAL OPERATING COSTS (£000S)

	MSBC @2009	MSBC @2011	BAFB @2011	Change
Station Staffing	£553	£608	£173	-£435
Station Maintenance	£53	£59	£52	-£7
Energy	£17	£19	£17	-£2
Station Comms	£0	£0	£0	£0
Gateline	£45	£50	£40	-£10
Running trains/track	£475	£522	£899	£376
Train Operations	£453	£499	£110	-£389
Track Access Charges	£95	£104	£64	-£40
Station Access Charges	£475	£522	£326	-£196
Uniforms	£3	£4	£1	-£2
Total Operating Costs	£2,171	£2,387	£1,681	-£706

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- 3.10 The largest area of cost saving is in station staffing costs as a result of reduced staffing specification. Other major savings include lower station access charges and train operation costs as a result of fewer services to Watford Junction over Network Rail Infrastructure. There has been an increase in the cost of operating the trains as part of the service, specifically the estimated cost of infrastructure maintenance.

4 Scheme Benefits

- 4.1 The scope of the project has not changed significantly from the MSBC and the core proposal remains the same. As described within the Cost section there have been some modifications to the specification of the project design to reduce costs. These do not materially change the valuation of benefits. The assessment of the benefits of the scheme has however been updated to reflect the latest guidance, data and economic forecasts. These changes and their effects are described below.

Modelling

- 4.2 Since the MSBC submission, the demand model and benefits estimation process has been updated to take account of feedback from the DfT on the previous modelling process and to address 'red' and 'amber' concerns. This has involved developing a more detailed zoning system to improve the accuracy of the model for trips to, from and within Watford and the incorporation of more recent demand data.
- 4.3 The model has been validated in a 2010 base year with demand forecast years 2016 and 2031. It includes two modelled time periods; the AM peak (0700-1000) and an interpeak period (1000-1600) and segmentation by journey purpose (Business, Commuting and Other). The modelling structure and process is fully described within the Local Model Validation and the Demand Model and Forecasting Reports.

Population and Employment Growth

- 4.4 The future year demand matrices have been changed to reflect new population and employment growth. These new forecasts have a slightly higher rate of long term population growth than included within the MSBC, however employment growth is lower. As a result overall trip growth rates are lower and this change will slightly decrease the benefits of the project relative to the MSBC.

Updated Model Data

- 4.5 The model has been developed to incorporate the latest available data, including more recent stations usage statistics and an existing user survey at Watford Metropolitan station. These changes will increase the accuracy and reliability of the model results relative to the MSBC case.

Economic Factors

- 4.6 Since the MSBC was submitted there has been a significant deterioration in the economic outlook, with a recession in 2008/2009 and significantly lower rates of economic growth expected over the medium term. This has had several effects on the economic context of the project. Values of time growth, which is correlated with earnings and GDP growth will be lower than expected at the MSBC stage. Inflation is also likely to be lower than expected over the medium term and the impact of this effect has been described within the cost section.
- 4.7 In addition to economic factors there have been some changes to transport policy. Following the McNulty value for money review of the rail industry, the

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DfT announced that rail fares would increase at RPI+3% in January 2012-14, reverting to RPI+1% thereafter. This policy has been incorporated in the CRL demand model meaning that fares will increase more rapidly than assumed within the MSBC. This change will discourage use of the rail link but increase revenues for rail providers.

TUBA

- 4.8 The scheme has been appraised using the latest version of TUBA (v1.8). This version incorporates several changes from the version used to appraise the MSBC (v1.7), including:
- New values of time growth reflecting lower economic growth;
 - New breakpoint analysis outputs; and
 - Other changes to vehicle fuel consumption parameters and carbon values which have not been used in this appraisal.
- 4.9 The effect of these changes is to reduce the overall value of time growth applied to journey time savings and reduce the overall level of benefits relative to the MSBC.

Non-User Benefits

- 4.10 The development process will not materially affect the non-user benefits of the project, however an estimate of these benefits was not included within the MSBC. The BAFB includes an estimate of the non-user benefits of the project. These have been estimated based on the abstraction of car use and annual vehicle kilometres caused by the project, multiplied by per kilometre decongestion values provided in WebTAG unit 3.9.5 MSA Road Decongestion Benefits (we have applied the average road type values). Table 4.1 provides a summary of the value of these benefits which total £2.8m in present value over the appraisal period.

TABLE 4.1 NON USER BENEFITS

Non-User Benefit	Present Value £(000s)
Noise	18
Local Air Quality	73
Greenhouse Gases	55
Journey Ambience	0
Accidents	275
Infrastructure	18
Congestion	2,405
Total	2,846

Option & Non Use Values

- 4.11 The project is estimated to provide an additional 2,700 households with walking access to a rail station (including the negative impact from the closure of Watford

Metropolitan to passenger services. This benefit has not changed since the MSBC, although new values of inflation and value of time growth, and an earlier opening year mean that the overall benefit has increased slightly. Overall this impact is expected to generate £18.6m in present value.

Monetised Benefits

- 4.12 As a result of these changes the present value of benefits estimate has fallen overall from the £318m described in the MSBC to £169m in the BAFB. This reduction is primarily the result of the modelling update which has produced a more reliable estimate of the time and cost savings generated by the project. Changes to economic factors and appraisal parameters have had a minor effect. The largest change in the benefit estimate is a result of a reduction in consumer user time savings, which have fallen significantly as a result of the new modelling process. Table 4.2 provides a summary of the MSBC and BAFB benefit estimates showing the main changes.

TABLE 4.2 MSBC AND BAFBECONOMIC CASE

<u>Consumer User Benefits</u>	MSBC	BAFB	Change
Travel time	290,371	74,838	-215,533
Vehicle operating costs	0	0	0
User charges	-29,718	9,837	39,555
During Construction & Maintenance	0	0	0
Net Consumer Benefits	260,653	84,675	-175,978
<u>Business User Benefits</u>			
Travel time	44,531	79,571	35,040
Vehicle operating costs	0	0	
User charges	-178	6,251	6,429
During Construction & Maintenance	0	0	0
Subtotal	44,352	85,822	41,470
<u>Private Sector Provider Impacts</u>			
Revenue	-4,737	-17,914	-13,177
Operating costs	0	0	0
Investment costs	-106,501	0	106,501
Grant/subsidy	106,501	0	-106,501
Subtotal	-4,737	-17,914	-13,177
<i>Other business impacts</i>			
Developer contributions	0	0	0
Net Business Impact	39,615	67,908	28,293
Non User Benefits	0	2,846	2,846
Option & Non Use Values	18,300	18,686	386
Indirect Tax Impacts	-4,442	-4,863	-421
Present Value of Benefits	318,568	169,252	-149,316
Present Value of Costs	124,962	64,737	-60,225
Net Present Value	193,606	104,515	-89,091
BCR	2.55	2.61	0.07

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- 4.13 Changes to project and appraisal parameters including value of time growth and opening year have had a small effect on some elements of benefit. For example Option and Non-Use values have increased by £386k in net value. A more detailed explanation of the benefits assessment is provided with the Economic Appraisal report.

Wider Impacts

- 4.14 The wider economic impact of the project have been assessed as a potential upside of the project benefits case. Wider impacts were modelled as part of the MSBC process, we have assumed that they will generate the same proportional impact on the BAFB proposal generating a 24.8% uplift on conventional benefits through agglomeration impacts, and a 0.5% uplift through labour market impacts.
- 4.15 Imperfect competition benefits have been estimated as a 10% uplift on business user benefits in line with guidance in WebTAG 3.5.14 - The Wider Impacts Sub Objective. Overall wider economic impacts generate £45m in net present value, and increase the BCR of the project to 3.32.

Non Monetised Benefits

- 4.16 The project will also provide a range of benefits which have not been monetised as part of the appraisal. These remain the same as described within the MSBC and include:
- Improving the quality of public transport provision within Watford;
 - Improving the quality of public transport interchange at Watford Junction station;
 - Improving the level of journey reliability for public transport users;
 - Supporting the delivery of strategic developments sites within Watford including the Health Campus and Watford Business Park; and
 - Providing a significant improvement in accessibility of Watford.

5 Appraisal

- 5.1 The changes to the project have resulted in a significant reduction in project costs, this has been offset by a reduction in the estimate of quantified benefits. Overall, the monetised economic appraisal of the project remains broadly the same as described in the MSBC with a BCR of 2.61.
- 5.2 The re-appraisal of the project has resulted in a fall in the estimated level of both benefits and costs. On the benefits side, this change is the result of a more accurate and detailed transport modelling framework incorporating the latest data and forecasts, and a more detailed zoning system.
- 5.3 On the costs side the reduction is the result of several factors including;
- Lower base capital costs;
 - Lower base operating costs;
 - Lower inflation assumptions;
 - An earlier and more condensed construction period relative to the MSBC; and
 - An earlier opening year.
- 5.4 The project also provides important non-quantified benefits and contributes to the objectives of a range of groups including central government, Hertfordshire County Council, Watford Borough Council, London Underground, Network Rail and local businesses and developers who will directly benefit from the project.
- 5.5 The overall appraisal against objectives remains the same as described in the MSBC however some of the quantified estimates have changed to reflect the new model analysis. This appraisal has been updated and is summarised in the Appraisal Summary Table (AST) on the following page.
- 5.6 The table provides additional information including updated quantitative and monetised values and breakpoint analysis which is fully detailed within the Economic Appraisal report. The summary impact and qualitative assessment of each criteria objective remains the same as described within the MSBC.

Appraisal Summary Table		Date produced:	03/09/2011		Contact:		
Name of scheme:	Croxley Rail Link				Name	Mike Younghusband	
Description of scheme:	A new rail link joining Watford town centre to the London underground Metropolitan line . The link will join Watford Junction and Croxley station via Watford High street and significantly improve public transport access in Watford. The project also includes the construction of two new stations; Ascot Road and Watford Hospital.				Organisation	Hertfordshire CC	
					Role	Promoter	
Impacts	Summary of key impacts	Assessment					
		Quantitative		Qualitative	Monetary £m(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business Users & Transport Providers	Value of journey time changes(£m)		79.8	67.9	✓✓✓	
		Net journey time changes (£m)					
		0 to 2min	2 to 5min	>5min			
	1	8	71				
Reliability Impact on Business Users	The Metropolitan Line operates in complete segregation from all highway traffic and will offer significant business passenger reliability benefits in comparison with the current situation. The project will also reduce congestion on the road network.	n/a		Strong Beneficial			
Regeneration	The project has overwhelming support from the business community within Watford and will significantly contribute to the expansion of development and employment at sites including Croxley Green business park and the Watford Health Campus.	Croxley Green Business park estimate the link will reduce transport costs by around £150,000 per year increase employment on the site by up to 1,000 jobs.		Strong Beneficial			
Wider Impacts	The project will strengthen the links between businesses and employees in Watford and London and generate wider economic impacts through creating thicker labour markets and improving access to customers, clients and suppliers along the Metropolitan line.	n/a		Moderate Beneficial			
Environmental	Noise	There will be some temporary noise impacts along the route during construction. The introduction of frequent rail services along a currently disused route will have a significant noise impact, although mitigation measures will reduce this. The project will reduce car use, traffic and noise.		n/a	0.0		
	Air Quality	Positive long term impacts on air quality from reduced car use. There will be some temporary dust production during construction.		n/a	0.1		
	Greenhouse gases	There will be a significant reduction in car travel, which will reduce levels of carbon emissions. This will be partially offset by an increase from increased power consumption from the train services.		Change in non-traded carbon over 60y (CO2e tonnes)	68,368	0.1	
				Change in traded carbon over 60y (CO2e tonnes)	0		
	Landscape	Construction of the required viaduct will have an moderate visual impact on the landscape of the area.		n/a		Slight Adverse	
	Townscape	The Preferred Scheme will improve the townscape directly surrounding the existing rail line and associated stations that are to be brought back into use. The Croxley Green Branch has formed part of the local townscape since the 1920s.		n/a		Slight Beneficial	
	Heritage of Historic resources	This option will have no impact on the historic buildings within the vicinity of the existing infrastructure and the site for the construction of the viaduct/link to the Metropolitan Line. There may be potential adverse impacts on the setting of Estcourt conservation area.		n/a		Slight Adverse	
Biodiversity	There are some protected species of wildlife within the vicinity of the rail corridor. Engineering works are not expected to have any significant impact upon the biodiversity of the area.		n/a		Neutral		
Water Environment	Providing sufficient precautionary measures are followed regarding the use of substances during construction and maintenance, this option will have little impact on the water environment.		n/a		Neutral		
Social	Commuting and Other users	Value of journey time changes(£m)		74.8	84.7		
		Net journey time changes (£m)					
		0 to 2min	2 to 5min	>5min			
	0	1	74				
	Reliability Impact on Commuting and Other users	The Metropolitan Line operates in complete segregation from all highway traffic and will offer significant consumer passenger reliability benefits in comparison with the current situation. The project will also reduce congestion on the road network.	n/a		Strong Beneficial		
	Physical activity	The reduction in car use will slightly increase walking and cycling to and from the stations.		n/a		Neutral	
	Journey quality	The standard LUL vehicles used along the Croxley Rail Link will provide an improvement to passenger ride quality, offering an improved level of journey ambience over the current public transport alternative. The quality of public transport stations will also be improved.		n/a		Strong Beneficial	
	Accidents	There will be a slight reduction in vehicle accidents because of the reduction in car travel.		n/a		Slight Beneficial	0.3
	Security	This option will see the implementation of measures including CCTV, passenger help and information points, and lighting. Passenger security will be further increased by the presence of staff on vehicles and at stations.		n/a		Strong Beneficial	
Access to Services	The rail link and new stations will greatly improve access to the transport system for households within Watford.		n/a		Strong Beneficial	✓	
Affordability	Fares structures will not change as part of the project, but travellers will have a greater range of travel options, and accessing London will become cheaper for many users.		n/a		Slight Beneficial	✓✓✓	
Severance	The viaduct will cause some visual and physical severance.		n/a		Slight Adverse		
Option Values	The project will provide a significant improvement in the travel options for residents of Watford.		2,700 households will gain walking access to a rail station as a result of the project.		18.7		
Public Accounts	Cost to Broad Transport Budget	The project has significant capital costs. Operating costs will be offset by ticket and station revenues with a small revenue surplus.		n/a		64.7	
	Indirect Tax Revenues	The project will reduce indirect tax income by redirecting spending from taxable items. The project will also reduce income from fuel duty.		n/a		4.9	

Value for Money Statement

- 5.7 The Croxley Rail link provides a unique opportunity to deliver a major improvement to the level of public transport provision within a major town utilising a currently disused rail link with minimal environmental damage and long term positive externalities. The project will provide significant transport and wider economic benefits by improving the accessibility of Watford town centre, supporting the delivery of new developments in the area and strengthening public transport links between Watford, London, and other destinations along the Metropolitan Line. The project will deliver journey time savings to business and consumer users, encourage mode shift away from private car reducing congestion, accidents, noise and carbon emissions in the local area.
- 5.8 The project has the full support of all stakeholders, local business and developers and will provide positive distributional impacts. The project has been significantly progressed from the previous MSBC submission and costs have been scrutinised to maximise value for money wherever possible.
- 5.9 The project has a strong economic case and represents high value for money with a net present value of £104.3m and a BCR of 2.61:1.

Sensitivity Tests

- 5.10 As part of project appraisal several tests have been undertaken to examine the sensitivity of the economic case to key assumptions and variables. These tests are summarised in the table below.

TABLE 5.1 SENSITIVITY TEST RESULTS

Scenario	Uplift	NPV (£m)	BCR
Central Case		104.3	2.61
Central Case + Wider Impacts		149.7	3.31
Capital Cost	+20%	94.9	2.10
Capital Cost	+135%	0	1.00
Operating Cost	+20%	94.1	2.25
Operating Cost	+490%	0	1.00
A - 7tph DM, 7tph DS		105.1	2.53
B - 7tph DM, 6tph DS		95.4	2.57
C- 10tph DM, 6tph DS		78.0	2.23
Split Service Option		30.7	1.43

- 5.11 The table shows that the project has a very robust economic case. The project will provide good value for money in a range of scenarios including increases in capital and operating cost, and different London Underground operating frequencies.

Uncertainty

- 5.12 The appraisal is based on a range of assumptions which reflect our assessment of the most likely outcomes of the project. There are however a range of uncertainties which could have an impact on the economic case. These uncertainties, their likelihood and the possible effect on the project are described within Table 5.2.

TABLE 5.2 UNCERTAINTY LOG

Input	Uncertainty	Comments
Factors affecting underlying demand		
Development of Watford Health Campus	Near certain	Watford Hospital station will serve the development.
Large housing development near Watford Junction (c1500 units)	Reasonably foreseeable	Site to the immediate east side of the station. Development necessitates new road access which is not yet committed. Will be served directly by CRL.
Uncertainty over background growth rates	Hypothetical	Inherent uncertainty over TEMPRO forecasts means growth rate subject to some degree of uncertainty. Use of sensitivity testing (+/- 2.5%/pa rising with the square root of the number of years).
Factors affecting supply for transport		
HLOS capacity improvement to London Midland rail services	More than likely	Options under development, so cannot test directly. Focus is on increasing capacity, rather than train service frequency and hence main impact will be on LM crowding levels. CRL testing assumed unchanged crowding levels; HLOS will counter increases in crowding arising from increased demand.
Bakerloo Line extension to Watford	Unlikely	TfL's plans to extend the Bakerloo Line to Watford Junction are on hold indefinitely due to funding and business case constraints.
London Overground frequency increase to 4tph	Reasonably foreseeable	Longer term options for development of the system include a frequency increase to 4tph, but this is on hold due to a lack of system capacity between Queen's Park and Stonebridge Park.
Factors affecting cost of transport		
Bus fares may increase above RPI.	Reasonably foreseeable	Model assumes bus fares rise in line with RPI; if fares increase at a greater rate, then this will marginally enhance case for CRL.
Parking charges may increase above RPI.	Reasonably foreseeable	Model assumes parking charges rise in line with RPI. If the rate of increase is higher, then this will marginally enhance case for CRL, given the lower parking charges at LUL stations.

6 Value for Money Checklist

6.1 The following tables provide a checklist of appraisal and modelling requirements as set out in the document; *Major Scheme Business Cases: Value for Money Guidance for Development Pool Schemes*. The tables list where each item requirement can be found within the BAFB documentation.

TABLE 6.1 COST BENEFIT ANALYSIS CHECKLIST

Item	Report/ Section
A clear explanation of the underlying assumptions used in the Cost Benefit Analysis.	Economic Appraisal - Section 3
Information on local factors used. For example the derivation of growth factors, M factors in COBA and annualisation factors in TUBA(to include full details of any calculations).	Economic Appraisal - Section 3
A diagram of the network (if COBA is used).	n/a
Information on the number of junctions modelled (if COBA is used).	n/a
Details of assumptions about operating costs and commercial viability (e.g public transport, park & ride, etc.)	Economic Appraisal - Section 2
Full appraisal inputs / outputs (TUBA output files)	Economic Appraisal - Appendix 5
Evidence that TUBA warning messages have been checked and found to be acceptable.	Economic Appraisal - Section 4
Spatial analysis of TEE benefits	Economic Appraisal - Section 4
Details of the maintenance delay costs and savings	Economic Appraisal - Section 2
Details of the delays during construction	Economic Appraisal - Section 2

TABLE 6.2 ECONOMIC CASE ASSESSMENT CHECKLIST

Item	Report/ Section
Assessment of Environmental impacts, to include an environmental constraints map.	2009 MSBC
Assessment of Safety impacts and the assumed accident rates presented.	2009 MSBC
Assessment of Economic impacts	2009 MSBC
Assessment of Accessibility impacts	2009 MSBC
Assessment of Integration impacts	2009 MSBC
A comprehensive Appraisal Summary Table	Value for Money Annex -

	Section 5
AST Worksheets	

TABLE 6.3 MODELLING CHECKLIST

Item	Report/ Section
A existing Data and Traffic Survey Report to include:	
- Details of the sources, locations (illustrated on a map), method of collection, dates, days of week, durations, sample factors, estimation of accuracy etc.	PT - LMVR - Section 3 HW - LMVR - Section 2
- Details of any specialist surveys	PT - LMVR - Section 3 HW - LMVR - Section 2
- Traffic and passenger flows; including daily, hourly and seasonal profiles, including details by vehicle class where appropriate.	HW - LMVR - Section 2
- Journey times by mode, including variability if appropriate.	PT - LMVR - Section 4 HW - LMVR - Section 4
- Details of the pattern and scale of traffic delays and queues.	
- Desire line diagrams for important parts of the network.	
- Diagrams of existing traffic flows, both in the immediate corridor and other relevant corridors	
An Assignment Model Validation Report to include:	
- Description of the road traffic and public transport passenger assignment model development , including model network and zone plans, details of the treatment of congestion on the road system and crowding on the public transport system.	PT - LMVR - Section 2 & 4 HW - LMVR - Section 3
- Description of the data used in model building and validation with a clear distinction made for any independent validation data.	PT - LMVR - Section 3-5 HW - LMVR - Section 2
- Evidence of the validity of the networks employed, including the rationale for that chosen.	PT - LMVR - Section 4 HW - LMVR - Section 2
- Validation of the trip matrices, including estimation of measurement and sample error.	
- Details of any ‘matrix estimation techniques’ used and evidence of the effect of the estimation process on the scale and pattern of the base travel matrices.	HW - LMVR - Section 4
- Validation of the trip assignment , including comparisons of flows and turning movements at key junctions.	PT - LMVR - Section 5 HW - LMVR - Section 5
- Journey time validation, including for road traffic models, checks on queue pattern and magnitudes of delays / queues.	HW - LMVR - Section 4
- Detail of the assignment convergence	HW - LMVR - Section 5

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- Present year validation if the model is more than five years old	
A Demand Model Report to Include:	
- Where no Variable Demand Model has been developed evidence should be provided to support this decision (e.g follow guidance in WebTAG Unit 3.10.1 Variable Demand Modelling - Preliminary Assessment Procedures)	Demand & Forecasting Report, Mode choice only - see Section 2
- Description of the demand model	Demand & Forecasting Report - Section 2
- Description of the data used in the model building and validation	PT - LMVR - matrix development in Section 3
- Details of segmentation used , including the rationale for that chosen. This should include justification for any segments remaining fixed.	Demand & Forecasting Report - Section 1
- Evidence of model calibration and validation and details of any sensitivity tests.	Demand & Forecasting Report - Section 2 & 5
- Details of any imported model components and rationale for their use.	Demand & Forecasting Report - Section 5
- Validation of the supply model sensitivity in cases where the detailed assignment models do not iterate directly with the demand model.	Demand & Forecasting Report - Section 5
- Details of the realism testing, including outturn elasticities of demand with respect to fuel cost and public transport fares.	Demand & Forecasting Report - Section 5
- Details of the demand / supply convergence.	
A Forecasting Report to include:(combined with Demand Model Report)	
- Description of the models used in forecasting future traffic demand.	Demand & Forecasting Report - Section 2 and respective LMVRs
- Description of the future year demand assumptions (e.g. land use and economic growth - for the do minimum, core and variant scenarios)	Demand & Forecasting Report - Section 3
- An uncertainty log providing a clear description of the planning status of local developments	Demand & Forecasting Report - Section 6
- Description of the future year transport supply assumptions (i.e. networks examined for the do minimum, core scenario and variant scenarios).	Demand & Forecasting Report - Section 4
- Description of the travel cost assumptions (e.g, fuel costs, PT fares, parking)	Demand & Forecasting Report - Section 4
- Comparison of the local forecast results to national forecasts , at an overall and sectoral level.	
Presentation of the forecast travel demand and conditions for the core scenario and variant scenarios including a diagram of forecast flows for the do-minimum, and an explanation of how these are accounted for in modelling and appraisal.	Demand & Forecasting Report - Section 6

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-
- Presentation of the sensitivity tests carried out (to include high and low demand tests)
-

Demand & Forecasting
Report - Section 6

