Keswick to Penrith Railway

Stage 2 Report:

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Keswick to Penrith Railway

Stage 2 Report:

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Keswick to Penrith Railway

Stage 2 Report: Business Case

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Tables and Figures

1 Introduction

Background

1.1 The railway between Keswick and Penrith was part of a longer line linking Penrith, Keswick, Cockermouth and Workington. In 1963 the Beeching Report recommended closure of the line. In 1966 the line west of Keswick was closed: but it was not until 1972 that the passenger service between Penrith and Keswick was withdrawn.

1.2 Although the line has been closed for more than 30 years, much of the trackbed and many of the structures remain in place. After closure, improvement of the A66(T) Penrith to Workington Road severed the trackbed at Beckces near Penruddock; the tunnel under the A66 near Keswick was filled by spoil from the roadworks; and a number of minor over and under bridges were removed. The section of line between Keswick and Threlkeld has been converted by Sustrans into a railway path that forms part of the Coast to Coast National Cycle Route 71.

1.3 In the mid 1990's concern about the impact of road traffic in the Lake District led Cedric Martindale to propose re-opening of the railway between Keswick and Penrith. In 1995 he prepared an Outline Development Plan for Reconstruction of the Railway between Keswick and Penrith. This led to an independent pre-feasibility study funded by Local Authorities.

1.4 In 1998 CKP Railways Ltd (later CKP Railways plc) was formed to develop the rail re-opening project independently. In the last eight years CKP Railways has raised £330,000 through the issue of Bonds and has used this money to fund a series of feasibility, engineering design and environmental studies intended to pave the way for an application for the Transport and Works Act Order necessary to permit reconstruction of the railway.

1.5 A key element of the proposed scheme is the creation of a commercial railway that will form part of the national network with direct services to destinations beyond Penrith. It is not the intention to create a heritage railway. The strategic context of the railway is shown in **Figure F1.1**

1.6 In 2005 the Northwest Regional Development Agency made a decision to fund this investigation to establish whether a commercial business exists for reinstatement of the Keswick to Penrith Railway. JMP Consulting was appointed to undertake the study in July 2006.

1.7 The study brief required the investigations to be undertaken in two stages:

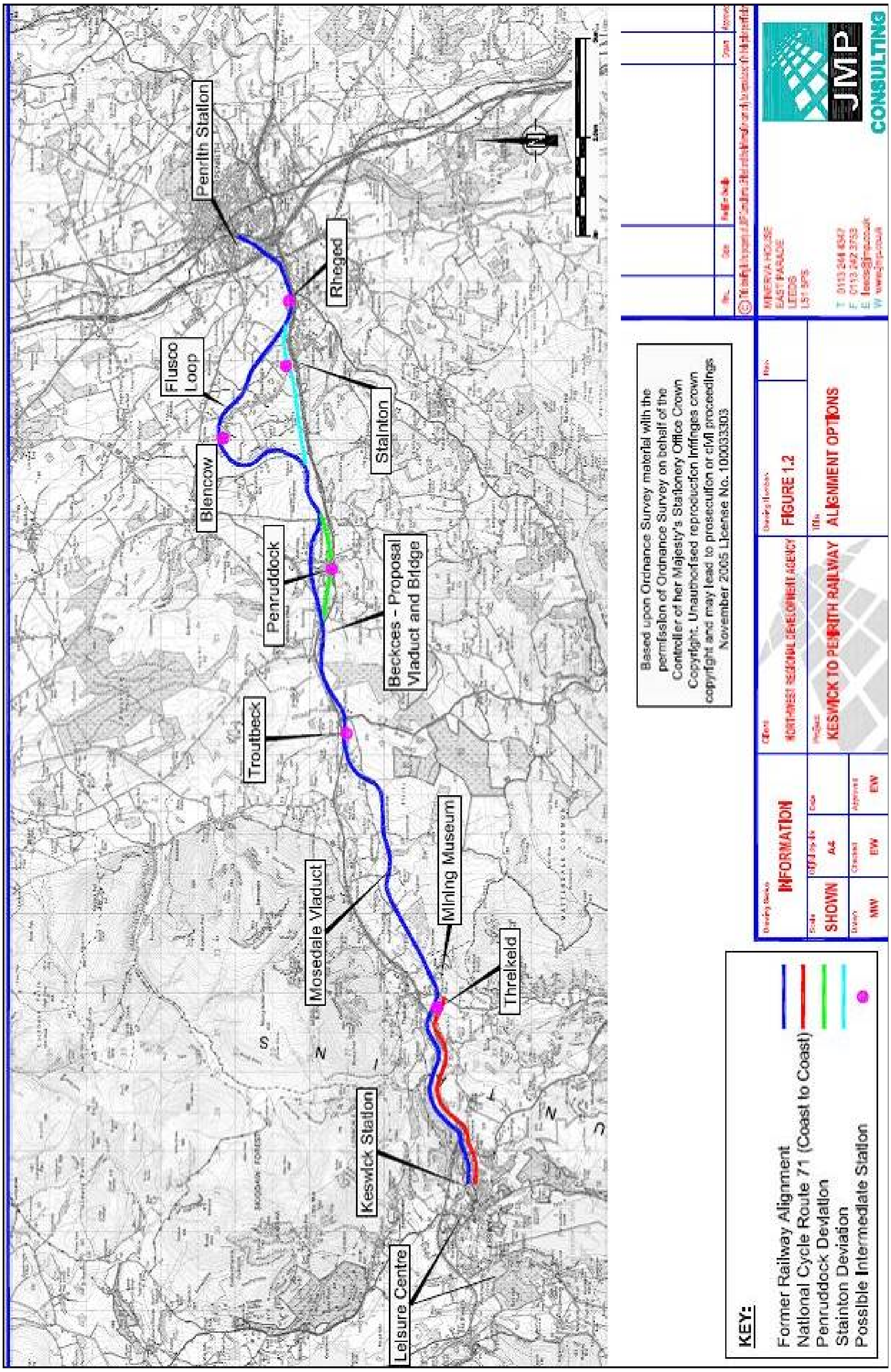
- Stage 1: A preliminary financial and economic appraisal of options for reconstruction of the railway and operation of a rail passenger service;
- Stage 2: (This report) refinement of the initial appraisal and preparation of a Commercial Business Plan.

Stage 1 Findings

1.8 Stage 1 of the study consisted of a number of strands of investigation:

- A consultation exercise undertaken with key stakeholders from local and regional government, tourism and economic development agencies and the rail industry;
- An independent assessment of the engineering analysis conducted to date by Corus Railway Infrastructure Services on behalf of CKP Railways plc;
- A review of the operational feasibility of the proposed railway;

F1.1 Location Plan



- An assessment of the costs of constructing and operating the railway;
- A review of current travel patterns and tourism trends in the North Lakes and the production of forecasts for patronage and revenue for the railway;
- An initial appraisal of the economic viability of the proposals and an understanding of the implications of different assumptions for the results.

Engineering and Operational Feasibility

1.9 CKP Railways plc had previously commissioned Corus Rail Infrastructure Services to undertake investigations of the physical feasibility of reinstating the railway between Keswick and Penrith; to prepare preliminary designs and implementation cost estimates; and to provide other advice needed in advance of an application for an Order under the Transport and Works Act. Most of the design and cost estimation work took place in 2002.

1.10 During Stage 1 we validated the civil, structural and rail engineering design work undertaken by Corus to verify feasibility and provided estimates of cost for the acquisition of land needed for both the reinstatement of the railway and a replacement for National Cycle Route 71 which utilises the former railway route between Keswick and Threlkeld.

1.11 The track bed of the former railway is severed in a number of locations as a result of the construction of a new alignment for the A66(T) between Penrith and Keswick after closure of the railway and development at several locations along the line. The scheme developed for reinstatement of the railway includes feasible proposals to overcome these difficulties. Substantial earthworks and several new structures are needed to bridge the A66 and minor roads where the alignment is severed west of Penruddock. A short deviation of route is proposed to the south of Penruddock to bypass development that has taken place on the site of the old station. A design and cost estimate was prepared for a second deviation of route parallel to the A66(T) between Penruddock and Stainton to avoid development at North Lakes Industrial Park at Flusco. Although the original alignment remains the preferred route between Penruddock and Penrith, the Stainton Deviation is feasible although more costly to construct.

1.12 It was proposed that the rail passenger service on the reinstated railway should take the form of an hourly service between Keswick, Penrith and Carlisle using modern diesel multiple unit rolling stock capable of fast operation on the West Coast Main Line (WCML).

1.13 Timetable assessments show that a Keswick to Carlisle service stopping only at Penrith is feasible via both the original alignment past Flusco and via the Stainton Deviation. Timetable constraints mean that additional intermediate stops between Keswick and Penrith are difficult to accommodate unless measures to build further operational resilience to the timetable are implemented. A comprehensive review of the WCML timetable may ease this position and hence, one of the options tested in Stage 1 of the study involved three intermediate stops between Keswick and Penrith.

Stakeholder Views

1.14 In seeking the views of stakeholders we deliberately sought to consult on the *principle* of reinstatement of the railway rather than the *detail* of the proposals. Our findings showed that there are mixed views from stakeholders. In general, the organisations with a tourism or economic regeneration remit, such as the Cumbria Tourist Board, Keswick Tourism Association and Penrith Partnership were highly supportive of the concept. This was reinforced by tourist attraction operators and by the views of tourists who completed a survey issued to local guesthouses and hotels.

1.15 In contrast, local government and the Regional Assembly were less supportive. In general, with the exception of Cumbria County Council whose transport and spatial planning department confirmed their long held view that a quality bus service was the appropriate transport solution for the corridor, most of the authorities were not opposed to the concept of reinstatement but were sceptical about its feasibility or viability.

1.16 The cycle and sustainable transport charity Sustrans was supportive as long as the proposals accommodated an alternative to their existing Keswick-Threlkeld route and supported the promotion of walking and cycling. The rail industry commented mainly on matters of operational feasibility.

Implementation and Operating Costs

1.17 It is estimated the railway would cost between £91m and £108m to implement, the lower figure being for the alignment proposed by CKP Railways plc. Unlike previous estimates they incorporate an estimate for the cost of acquiring land and re-routing the Keswick-Threlkeld cycle path. These two items alone add between £15m and £18m to the scheme costs.

1.18 Operating costs estimates were derived from a rail operating cost model which predicted that the cost of running the service would range from £1.87m per year for a shuttle service operating between Keswick and Penrith to £2.83m for a service operating between Keswick and Carlisle. The shuttle service would require a single train unit to operate it (plus a spare), but the through service requires two units plus a spare.

Demand and Revenue Forecasts

1.19 A demand and revenue estimating model was developed and populated with data on current traffic volumes derived from existing counts and surveys and from a series of new surveys undertaken for this study. Surveys of current rail and bus travel and of the travel patterns of tourists were also undertaken to support the analysis.

1.20 Our forecasts indicated that the service would attract in the region of 230-320,000 passenger trips per year in 2016. The lower figure is for a shuttle service with no intermediate stations and the higher one is for the Carlisle service with intermediate stations. By way of a comparison the figure of 230,000 is broadly equivalent to current usage of the Windermere branch line.

1.21 The potential for a number of intermediate stations along the route was investigated. Of these, Rheged appears to be the most promising.

1.22 The revenue generated from the service was looked at in two ways – the revenue that would accrue directly to the operator of the service and the revenue that would be accrued to the wider rail network. The latter figure is significant as the expected pattern of travel for the railway shows that it would attract people from throughout the country.

1.23 The revenue accruing directly to the operator from the Keswick-Penrith or Keswick-Carlisle service was estimated to be in the region of £0.45m to £0.72m (in 2016). Compared to operating costs of £1.87m-£2.83m the railway would therefore cover around one quarter of direct operating costs. This is fairly typical of most 'regional' railways in the UK.

1.24 However, when the revenues that would accrue to the entire rail network are considered they are significantly higher, reflecting the fact that people are forecast to travel relatively long distances. The forecasts for total revenue to the rail industry (again in 2016) were between £1.56m to £1.82m. Although not sufficient to fully meet the operating costs of the service the net operating position is that over 80% of the annual costs could be met by additional revenues to the rail industry.

Economic and Financial Viability

1.25 In Stage 1 we conducted a 'traditional' financial and economic (cost benefit) appraisal which looks at the Net Present Value (NPV) of the stream of benefits and costs over a 60 year period from the assumed start of construction in 2011. This is in line with Treasury 'Green Book' transport project appraisal guidance.

1.26 Our analysis shows that the economic benefits of the project would exceed the costs of construction and operation. The scheme would have a Net Present Value of between £23m and £30m and a benefit cost ratio of between 1.20:1 and 1.32:1.

Other Considerations –Sensitivity Tests and Changes to the Policy Environment

1.27 The results reported above concentrated on a central set of economic and demand growth assumptions. As part of Stage 1 we also undertook a number of sensitivity tests on both the costs and benefits of the scheme. These tests included varying some of the key assumptions underpinning the forecasts and considering alternative policy futures.

1.28 The sensitivity tests around the core cost and demand assumptions produced a range of benefit cost ratios from a low of 0.87:1 to a high of 2.59:1 with our most optimistic set of assumptions on the potential capture rate from car journeys.

1.29 We also undertook a test which assumed that some form of road user charging or other equivalent demand management measure is in place to discourage visitors using their cars to access the Lake District. In the context of a transport infrastructure investment which is being appraised over a 60 year period this appears to us to be a scenario that has to be considered.

1.30 We undertook this test in a relatively simple way but the results were nevertheless, interesting as they indicated that ridership could increase from the central scenario estimate of 230,000 in 2016 for the shuttle service option to 480,000 for the same service with a road user charging/ extensive demand management regime in place. The benefit cost ratio in this example would increase from 1.32:1 to 3.29:1

Stage 1 Conclusions and Next Steps

1.31 Re-opening of the Keswick-Penrith Railway appears likely to generate economic benefits in excess of the costs of implementing it. In the context of any future policies to restrict access by private car to our National Parks these benefits could be substantial. Visitors to the North Lakes travel considerable distances to access the area, as do residents travelling out of the area, and as a consequence the railway would have an impact well beyond its immediate environment.

1.32 Stakeholders with an interest in tourism and economic development are generally highly supportive of the proposals although the more ambivalent views of some of the local authorities must be of some concern as the scheme will require their full support if it is to progress smoothly through the Transport and Works Act process. Similarly the financial case for the railway is less clear – the purely financial returns from operating the railway are insufficient to fund its construction. This is unsurprising since this is the case with all of the rail reinstatement projects that are currently in progress in the UK. The scheme does not have, as far as we are aware, any priority status within the DfT's Regional Planning Assessment or Network Rail's Route Utilisation Strategies and as such an innovative funding package will be required if the scheme is to progress.

Stage 2 Approach and Report Structure

1.33 Given that the railway appeared to be capable of generating worthwhile economic benefits we concluded that there was merit in proceeding to Stage 2 to identify whether there is a business case that could attract such a funding package. This report is therefore focused on developing a business case to identify if there is such a package that can be developed, either now, or in the foreseeable future.

1.34 At the end of Stage 1 in discussion with the study steering group it was decided that three infrastructure options should be considered:

- Option 1 - a minimum infrastructure option consisting of the Flusco Loop plus the Penruddock deviation and a simple Keswick station layout;

- Option 2 - as (1) plus three intermediate stations at Rheged, Threlkeld and Penruddock;
- Option 3 - as (2) plus the Stainton deviation plus a passing loop at Keswick station.

1.35 Option (1) is in effect a minimal case option; option (2) increases the railways local area coverage while option (3) delivers additional operational resilience. Each scenario will be tested assuming that the service operated would be the Keswick-Carlisle through-service.

Approach

1.36 Our approach to Stage 2 has been to firstly consider the financial business case for the railway and then expand it to consider the business case for the public sector (which will include other non-financial measures of 'benefit'). We then consider what these benefits would potentially be worth to both the private and public sectors and as a consequence what they would be willing to pay for them. This defines the range of potential funding strategies that appear to be open to the scheme promoters and their backers.

Report Structure

1.37 This report is therefore organised as follows;

- Chapter 2 updates the financial and economic appraisal to cover the three infrastructure options, providing a 'central case' appraisal;
- Chapter 3 then undertakes a detailed risk assessment which considers and quantifies the potential risks and uncertainties surrounding the central case appraisal;
- Chapter 4 looks at the wider 'public sector' business case for the railways – expanding the standard DfT economic appraisal to consider the economic development, environmental and social benefits of the scheme;
- Chapter 5 then considers how these benefits could be funded – considering a range of potential funding strategies and reviewing their implications;
- Chapter 6 summarises the position on funding and considers the implications for programme and next steps for the project.

2 Appraisal of Revised Options

2.1 As previously noted three options were carried forward from the Stage 1 preliminary appraisal:

- Option 1 is designed to be a minimum infrastructure option and consists of the Flusco Loop plus the Penruddock deviation, passing loop and Keswick Junction and a simple Keswick station layout;
- Option 2 builds upon this by adding in three intermediate stations at Rheged, Threlkeld and Penruddock;
- Option 3 includes the more direct, but more expensive, Stainton deviation and provides a passing loop at Keswick Station which provides additional timetabling flexibility.

2.2 Option (1) is in effect a minimal case option; Option (2) increases the railways local area coverage while Option (3) delivers additional operational resilience.

2.3 Each scenario has been tested with the Keswick to Carlisle through-service.

Implementation Cost Estimates

2.4 **Table T2.1** provides a summary of the implementation cost estimates derived from the work undertaken by Corus for CKP Railways, the reviews undertaken by LRR and JMP, and the updating of costs to a 2006 price base[i].

T2.1 Summary of Implementation Costs

Item	Option Costs (£ million)		
	Option 1 Minimal Infrastructure	**Option 2** 1 + Intermediate Stations	**Option 3** 2 + Stainton Deviation, Keswick Passing Loop
Land acquisition	13.67	13.67	10.41
Civil and structural engineering works	47.40	47.40	69.59
Keswick-Threlkeld alternative cycle path route	4.19	4.19	4.19
Track and signalling	21.50	21.50	19.95
Stations	2.25	9.81	10.61[1]
Total	**89.01**	**92.79**	**111.37**

[1] Includes footbridge at Rheged

2.5 The cost estimates shown in Table T2.1 embody the following assumptions:

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[i] It should be noted that CKP consider that a reduction of up to 35% in land acquisition costs and 20% in civil and structural engineering works below those shown in Table 2.1 could be achieved, noting that on other rail re-opening projects on greenfield sites, e.g East-West Rail between Oxford and Milton Keynes, rail maintenance companies such as Grant Rail have quoted costs that are lower than "standard" rail industry rates. Our business case analysis however is based on the costs presented in Table 2.1 as estimated by Corus Rail and validated by both Lloyds Register Rail and JMP Consulting (discussed in detail in the Stage 1 report).

- The land cost estimates include provision for acquiring the land needed for providing an alternative route for the cycle path between Keswick and Threlkeld.
- All of the estimates derived from Corus documents and spreadsheets were at a 2002 price base (with the exception of the 2006 preliminary estimate for an alternative route for the Keswick to Threlkeld cycle path).

Operating Cost Model

General Assumptions and Cost Base

2.6 For the purposes of developing a cost estimate for the service operation a number of general assumptions have been made. It has been assumed that the service would operate 362 days of the year (i.e. it does not operate on Christmas Day, Boxing Day and New Year's Day). It has also been assumed that there will be an hourly service over a 16 hour period, for example 0600 to 2200hours or 0700 to 2300hours and that there will be two cars per train. An analysis of the journey time has shown that two additional units are required to operate each of the three route options.

2.7 Unit costs have been developed from JMP's train operating cost model which contains a database of recent costs developed in conjunction with a number of regional train operators. All costs are in 2006 prices. A summary of the rolling stock, access charges and staff costs are given in **Table T2.2**. A full description of the operating cost model is contained in the Stage 1 report.

T2.2 Summary of Operating Cost Assumptions

Item (£000s)	Cost
Rolling Stock Costs	
Vehicle Lease	£135,000 per vehicle per annum
Heavy Maintenance	£4,826 per vehicle per month
Light Maintenance	£0.45 per vehicle mile
Stabling	£2,000 per vehicle per annum
Fuel	£0.23 per vehicle per mile
Access Charges	
Fixed track access[1]	£5,000 per new track mile per annum
Variable track access[2]	£0.107 per vehicle mile
Station Access	£2 per stop
Station O&M	£15,000 per station
Staff Costs	
Drivers	£34,000 per annum
On board Staff	£20,000 per annum
Station Staff	£20,000 per annum

[1] Typical Network rail figure for rural lines
[2] ORR track usage price list 2001/02 for a Class 165 escalated by RPI

2.8 A summary of the annual operating costs for each of the three options is given in **Table T2.3**.

T2.3 Summary of Operating Costs[ii]

Item	Option Costs (£000s)		
	Option 1 Minimal Infrastructure	**Option 2** 1 + Intermediate Stations	**Option 3** 2 + Stainton Deviation, Keswick Passing Loop
Rolling Stock Costs (inc.Spare)	1,692	1,692	1,669
Staff Costs	641	641	641
Access Charges	236	350	340
Other Fixed Costs[1]	10	10	10
Other Variable Costs[2,3]	200	200	200
Total Annual Costs	**2,779**	**2,893**	**2,860**

[1] Project management, staff recruitment, route learning, marketing/operation costs, legal/set-up costs, safety case
[2] Commission, insurance, administration, British Transport Police, national Train Enquiries, ATOC, Performance and Compensation
[3] Other variable costs are calculated as a percentage of revenues, therefore an indicative value is given

Demand and Revenue Forecasts

Approach to Demand Forecasting

2.9 The potential market for rail travel between Keswick and Penrith is made up of current car users, current users of the Keswick to Penrith bus service and current users of Penrith railway station. It can also be expected that there will be a level of induced demand brought about by the new journey opportunities resulting from re-opening of the rail service.

2.10 The current market for travel between Keswick and Penrith can be segmented into year-round or 'base' trips and the additional tourist journeys which demonstrate a clear seasonal trend. Tourist trips can also be further segmented into day visitors, weekend visitors and long-stay visitor trips. Segmenting the market in this way allows the effects of differing journey origins and destinations, market capture levels and revenue impacts to be determined more accurately. A full description of the methodology employed in the derivation of the demand and revenue forecasts is contained in the Stage 1 report.

Market Capture

2.11 Forecasts were determined by application of typical capture rates to the segmented markets derived for each current mode of travel. Central capture rates were initially selected for a Penrith-Keswick shuttle service analysed during Stage 1. These are shown in **TableT2.4**.

T2.4 Central Capture Rates for Penrith-Keswick Service

Market	Capture Rate
Local	5%
Day Visitors	12%
Weekend Visitors	12%
Long-stay Visitors	12%

[ii] By way of comparison CKP estimate annual operating costs of between £2.4million and £2.6million, Outline Commercial Case, 1995.

2.12 Of the 3 options tested in Stage 2, the Keswick-Carlisle service removes the need for interchange at Penrith for journeys to Carlisle whilst the Stainton Deviation route (option 3) offers reduced distance and journey time between Keswick and Penrith.

2.13 Increased capture rates were therefore applied based on a generalised journey time elasticity model, with an elasticity of -0.9. The resulting capture rates for the three options are shown in **Table 2.5.**

T2.5 Increased Capture Rates for Stage 2 Options

Destination	Percentage Increase in Capture Rate		
	Option 1 Minimal Infrastructure	**Option 2** 1 + Intermediate Stations	**Option 3** 2 + Stainton Deviation, Keswick Passing Loop
Penrith	0.0%	0.0%	4.6%
Carlisle	30.5%	30.5%	34.7%
A66 E	0.0%	0.0%	0.8%
M6 North	0.0%	0.0%	0.9%
M6 South	0.0%	0.0%	0.7%

2.14 In addition to capture of existing bus and rail passengers, a further uplift to the ex-rail and ex-bus demand was added to represent induced demand, as shown in **Table T2.6**.

T2.6 Induced Demand Capture Rates

Market	Capture Rate
Local	15%
Day Visitors	30%
Weekend Visitors	30%
Long-stay Visitors	30%

Market Growth Profile

2.15 Data from the Cumbria Tourist Board STEAM model indicates that total number of visitors to Cumbria has increased from 15.1 million in 2002 to 15.5 million in 2005, an average increase of around 1% per annum. Journeys on regional railways in the UK increased by 3% per annum over the ten year period to 2004 and on long distance trips by over 4% per annum[iii]. Given these growth rates, demand for local trips was assumed to grow by 3% per annum. Demand for visitor trips was assumed to grow at 2% per annum. These growth rates were applied up to 2029, 15 years after the scheme opening. No further growth in demand was assumed after 2029.

2.16 An initial ramp-up of demand in the first two years of operation of the scheme was assumed, with 60% of total forecast demand in the first year and 90% in the second year. Revenue yields are assumed to grow by 1% above RPI per annum.

Passenger Demand Forecasts

2.17 **Table T2.7** shows the total number of single trips forecast in the first full operating year of the service following the initial demand ramp-up period (i.e. Year 3, 2016).

[iii] Ten Year European Rail Growth Trends, ATOC, July 2005

T2.7 Annual Demand Forecasts, 2016

	Option 1 Minimal Infrastructure	Option 2 1 + Intermediate Stations	Option 3 2 + Stainton Deviation, Keswick Passing Loop
Ex-Car	183,904	174,023	177,115
Ex-Bus	6,735	5,957	6,195
Induced	54,282	49,952	50,468
Intermediate Stations	0	85,976	85,976
TOTAL	**243,121**	**315,509**	**319,755**

Revenue Forecasts

2.18 Revenues were calculated by application of an average single journey yield of 8 pence per passenger km travelled (derived from an analysis of rail industry operators accounts for 2006) with the total journey yield split between the Keswick-Penrith Train Operating Company (TOC) and other TOCs.

2.19 A summary of the journey yields and operator splits is shown in **Table T2.8**. For journeys beyond Penrith an assumption has been made that 1/3 of these trips are already made on the rail network, and that the only additional yield is for the Keswick-Penrith section of the journey. Consequently the average yields for these trips are reduced from typical rail industry yield figures for long-distance operators with the assumption that a third of the longer distance journeys may yield only £2.50. For services to Carlisle, all revenues from trips to Carlisle are assigned to the local Keswick-Penrith operator.

T2.8 Rail Fares for New Rail Users (2006)

Flow	Average Single Journey Yield	P K Operator	Other TOCs
Keswick-Penrith	£2.50	100%	0%
Keswick-Carlisle	£4.00	50%	50%
Keswick-A66 East	£8.00	20%	80%
Keswick-M6 North	£8.00	20%	80%
Keswick-M6 South	£8.00	10%	90%

2.20 Application of the journey yields and operator splits give the total revenues for the three options shown in **Table T2.9.**

T2.9 Forecast Revenues (£s), (2016)

	Option 1 Minimal Infrastructure	Option 2 1 + Intermediate Stations	Option 3 2 + Stainton Deviation, Keswick Passing Loop
Total - Keswick-Penrith TOC	557,741	696,851	708,965
Total - Other TOCs	1,045,222	1,081,329	1,088,956
Total Rail	**1,602,963**	**1,778,180**	**1,797,920**

Economic Benefits

Components of Economic Benefits

2.21 In addition to the purely financial components of the appraisal (costs and revenues) there are a number of other economic benefits that the DfT ascribe monetary values to. This section describes the calculation of user and non-user benefits as per standard DfT Rail/SRA cost-benefit appraisal guidance. Benefits considered are:

- User time savings – reduced journey times compared to existing public transport options.
- Reliability benefits – reduction in average journey delay.
- Non-user time savings – reduced car journey times due to reduction in road traffic.
- Non-user accident savings – reductions in accidents due to reductions in road traffic.
- Option values – the value that people attach to having the option of being able to use the railway at some time in the future.

User Time Savings

2.22 User time savings were calculated based on comparisons of in-vehicle and wait times between the new rail service and the existing public transport option, i.e. the Keswick-Penrith bus service, for those switching to rail. Journey times for trips to the A66 East, M6 North and M6 South are based on final destinations taken from the Penrith Rail Passenger Survey, carried out for the Stage 1 Report in August 2006.

2.23 Standard DfT values of time were used to calculate monetary valuations for the resulting changes in in-vehicle time and wait time. Journey purpose splits were assumed to be 40% business, 40% commuter and 20% leisure for local trips, and 100% leisure for visitor trips. Values for user savings for 2016, the assumed first full year of operation following demand build-up, are shown in **Table T2.10**.

T2.10 User Time Savings, 2016 (£s, 2002 prices)

	Option 1 Minimal Infrastructure	Option 2 1 + Intermediate Stations	Option 3 2 + Stainton Deviation, Keswick Passing Loop
Ex-Car	157,987	93,385	121,905
Ex-Bus	6,547	32,466	41,901
TOTAL	**164,534**	**125,851**	**163,806**

Reliability

2.24 Reliability benefits were calculated based on comparisons of estimates of public performance measure (ppm), the standard measure of rail performance published by the Office of the Rail Regulator.

2.25 Options 1 and 2, with minimal infrastructure, are assumed to deliver no additional reliability benefits. Option 3, with the shorter Stainton deviation route and provision of an additional passing loop at Keswick Station provides opportunity for improvements in reliability over and above Options 1 and 2.

2.26 The industry average ppm for Regional operators (moving annual average to 30/9/2006, National Rail Trends, ORR) is 86.4% Option 3 is assumed to deliver a ppm equivalent to the Northern Rail target of 91%. Options 1 and 2, operating with a single track layout without a passing loop at Keswick Station are assumed to deliver a ppm below the average, and 75% is taken as the base value.

2.27 Each service operating with improved reliability under Option 3 is assumed to give an average improvement of journey time reliability of 20 minutes, valued as per the user time savings described above. The resulting additional reliability benefits for 2016 are shown in **Table T2.11**.

T2.11 Reliability Savings, 2016 (£s, 2002 prices)

(£000s)	**Option 1** Minimal Infrastructure	**Option 2** 1 + Intermediate Stations	**Option 3** 2 + Stainton Deviation, Keswick Passing Loop
TOTAL	0	0	35,627

Non-User Benefits

2.28 Non-user time and accident savings were calculated by application of standard SRA Appraisal Guidance values for vehicle-kilometres removed. It was further assumed that 95% of the distance savings were made on uncongested links and 5% on congested links.

2.29 Resulting values for 2016, the first full year of operation following the period of demand build-up are shown in **Table T2.12.**

T2.12 Non-User Benefits, 2016 (£s, 2002 prices)

	Option 1 Minimal Infrastructure	**Option 2** 1 + Intermediate Stations	**Option 3** 2 + Stainton Deviation, Keswick Passing Loop
Time Savings	2,829,548	2,861,182	2,887,798
Accident Savings	348,710	349,649	352,873
TOTAL	**3,178,258**	**3,210,831**	**3,240,671**

Option Value

2.30 An option value (reflecting the benefit that people perceive from having the option of travelling by rail) of £170 per household per annum (2002 prices), taken from Option Values, Non-Use Values and Transport Appraisal [iv] was used. The number of households within 800 metres[v] of the proposed Keswick and intermediate stations was derived from 2001 census data. This shows 2,340 households within 800 metres of Keswick and 284 households within 800metres of the proposed intermediate stations. This results in an option value of £398,000 per annum for Option 1 and £446,000 per annum for Options 2 and 3.

Summary of Economic Benefits

2.31 A summary of the user and non-user benefits is shown in **Table T2.13.** Option 1 delivers over £3.7million of economic benefits in 2016, Option 2 delivers just under £3.8 million and Option 3 nearly £3.9million.

[iv] Option Values, Non-Use Values and Transport Appraisal, Institute for Transport Studies, University of Leeds, September 2006.
[v] An 800m catchment distance was chosen to offset the option value of the existing Keswick-Penrith bus service.

T2.13 Summary of Economic Benefits, 2016 (£s, 2002 prices)

	Option 1 Minimal Infrastructure	Option 2 1 + Intermediate Stations	Option 3 2 + Stainton Deviation, Keswick Passing Loop
User Time Savings	164,534	125,851	163,806
Reliability	0	0	35,627
Non-User Benefits	3,178,258	3,210,831	3,240,671
Option Value	398,000	446,000	446,000
TOTAL	**3,740,792**	**3,782,682**	**3,886,104**

Components of Appraisal and Assumptions

2.32 The appraisal includes the following components

- Capital costs, including structures, civil engineering works, track and signaling, land acquisition and station works;
- Operating costs, including rolling stock lease and maintenance costs, track and station access charges and staff costs;
- Revenues, allocated to the Keswick-Penrith service operator and to other train operating companies;
- Economic Benefits, including;
    - User time savings
    - Reliability Benefits
    - Non-user time and accident savings
    - Option value.

Appraisal Assumptions

2.33 It is assumed that the start of construction on site is 2011, the scheme opening year is 2014 and the 'final' year (for appraisal purposes) is 2070. This gives an appraisal period of 60 years, as per DfT guidance.

2.34 The discount rate from the start year for 30 years is 3.5%, reducing to 3% for the remainder of the appraisal period. The base year for discounting is 2002 and all values are quoted in 2002 prices in accordance with DfT requirements.

2.35 An optimism bias uplift of 15% has been added to the scheme capital costs.

2.36 Total revenues comprise local operator revenues plus any revenues accruing to other operating companies elsewhere on the network.

2.37 Operating subsidy is the difference between operating costs and revenues accruing only to the local operator. Cumulative operating subsidy is the total from the scheme opening year.

2.38 Financial costs to Government include capital grant, operating subsidy and apportioned industry costs (BT police, station access, ATOC and national rail enquiries), net of any additional revenue accruing to other operators. These additional revenues are assumed to transfer to Government through adjusted franchising payments.

2.39 Indirect tax impacts such as road and rail fuel duty and any changes in VAT payments are not considered.

Financial Appraisal

Annual Position

2.40 **Table T2.14** shows the annual position for each of the three options for:

- 2016, the first year of operation of the scheme following initial demand ramp up;
- 2029, fifteen years after opening.

T2.14 Financial Summary (£'000, 2002 prices)

(£'000, 2002 prices)	Option 1 Minimal Infrastructure		Option 2 1 + Intermediate Stations		Option 3 2 + Stainton Deviation, Keswick Passing Loop	
	2016	2029	2016	2029	2016	2029
Total Operating Costs	2,525	2,694	2,646	2,823	2,618	2,796
Keswick-Penrith TOC Revenues	*558*	*838*	*697*	*1,041*	*709*	*1,060*
Other TOC Revenues	*1,045*	*1,569*	*1,081*	*1,622*	*1,089*	*1,633*
Total Revenues	1,603	2,407	1,778	2,663	1,798	2,693
Operating Subsidy Required	1,967	1,856	1,949	1,781	1,909	1,736
Operating Subsidy Required (Cumulative)	6,099	30,970	6,112	30,370	5,997	29,701
Subsidy Required (Cumulative, including capital payments)	90,108	114,979	93,684	117,943	111,084	134,788
Apportioned Industry Costs	56	66	56	67	57	67
Financial Cost(Benefit) to Govt.	978	353	924	227	876	170

2.41 The operating subsidy for each option in 2016 is around £1.9million, with Option 1 requiring the greatest subsidy and Option 3 the lowest. The subsidy required for each option reduces slightly by 2029 as the revenue contribution increases.

2.42 Including capital payments, Option 3 requires the greatest subsidy, £111.1million to 2016 and £134.8million to 2029. Options 1 and 2 have much lower requirements, reflecting the lower initial capital investment.

2.43 Financial cost to government in 2016 is around £0.9million for each option, with Option 3 having the lowest cost. This is reduced to £170,000 for Option 3 in 2029, compared to £353,000 for Option 1 and £227,000 for Option 2.

Cash Flows

2.44 **Table T2.15** shows a summary of the cash flows (total and discounted) to 2070 for the three alternative options.

T2.15 Cash Flows (£'000, 2002 prices)

(£'000, 2002 prices)	Option 1 Minimal Infrastructure		Option 2 1 + Intermediate Stations		Option 3 2 + Stainton Deviation, Keswick Passing Loop	
	Total (2070)	**PV (2070)**	**Total (2070)**	**PV (2070)**	**Total (2070)**	**PV (2070)**
Capital Costs	*83,905*	*57,493*	*87,468*	*59,935*	*104,983*	*71,936*
Operating Costs	*170,626*	*49,773*	*178,542*	*52,106*	*177,185*	*51,617*
Total Costs	254,531	107,266	266,010	112,041	282,168	123,553
Keswick-Penrith Operator revenues	*56,920*	*15,188*	*70,791*	*18,899*	*72,027*	*19,229*
Other Operator revenues	*106,636*	*28,455*	*110,214*	*29,413*	*110,992*	*29,620*
Total Revenues	163,556	43,643	181,004	48,311	183,019	48,849
Operating Subsidy Required	**113,602**	**34,516**	**107,647**	**33,138**	**105,054**	**32,319**
Subsidy Required (including capital payments)	**197,612**	**92,078**	**195,219**	**93,142**	**210,141**	**104,324**
Apportioned Industry Costs	*4,218*	*1,199*	*4,289*	*1,218*	*4,305*	*1,222*
Financial Cost(Benefit) to Govt.	**95,089**	**64,753**	**89,191**	**64,879**	**103,350**	**75,857**

2.45 Option 1 has the greatest operating subsidy requirement, £34.5million (PV to 2070) and Option 3 the lowest, £32.3million (PV to 2070).

2.46 If capital payments are taken into account, Option 3 requires the greatest subsidy, £104.3million (PV to 2070). Options 1 and 2 have rather lower requirements, £92.1million and £93.1million respectively.

2.47 The present value of the Financial Cost to Government to 2070 is just below £65million for both Options 1 and 2, with Option 3 requiring around 15% more at £75.9million.

Economic (Cost-Benefit) Appraisal

2.48 **Table T2.16** presents a full economic evaluation of the three options, including capital and operating costs, revenues to the Keswick-Penrith operating company and to other TOCs and other economic benefits (excluding environmental impacts).

2.49 Benefit-Cost ratio and Net Present Value summary output measures are presented as per DfT Rail guidance (webtag unit 3.13.1, Jan 2007).

T2.16 Economic Evaluation to 2070

(£'000, 2002 prices)	Present Value to 2070 Option 1 Minimal Infrastructure	Option 2 1 + Intermediate Stations	Option 3 2 + Stainton Deviation, Keswick Passing Loop
Capital Costs	*57,493*	*59,935*	*71,936*
Operating Costs	*49,773*	*52,106*	*51,617*
Total Costs	107,266	112,041	123,553
Penrith Keswick operator revenues	*15,188*	*18,899*	*19,229*
Other TOC revenues	*28,455*	*29,413*	*29,620*
Total Revenues	43,643	48,311	48,849
Total Economic Benefits	81,036	82,035	84,336
Financial Cost(Benefit) to Govt.	64,753	64,879	75,857
Net Present Value	**16,283**	**17,156**	**8,479**
BCR[1]	**1.25**	**1.26**	**1.11**

[1] DfT Rail (webtag unit 3.13.1)

BCR = Net private revenues – private costs + subsidies + grants + user benefits + non-user benefits (a) / Present value of cost to government (b)

NPV = (a)-(b)

2.50 Option 2 has the highest Benefit-Cost Ratio of 1.26, slightly higher than that for Option 1 of 1.25. Option 3 has the lowest BCR of the three alternatives at 1.11.

2.51 Option 2 also has the highest Net Present Value of the three schemes, £17.2million. This is around £1million greater than for Option 1 and almost twice that of Option 3 for which the NPV is £8.5million.

3 Risk Analysis

3.1 Experience has shown that for major transport infrastructure projects there is usually a difference between the projections of costs and benefits envisaged in appraisal and what happens after implementation. DfT Rail Guidance (webtag unit 3.13.1) indicates two sources of error in cost and benefit estimation. The first, '*risk*', describes events with known probabilities, to be addressed by Quantitative Risk Analysis. The second, '*optimism bias*', represents the historical tendency to underestimate costs, and is addressed by addition of an optimism bias uplift.

3.2 The results presented in Chapter 2 are based on outputs from an Excel-based spreadsheet model for which the inputs represent single-point estimates and the outputs from the model are based on these 'most likely' estimates. The analysis presented in Chapter 2 addressed the second of the sources of risk, optimism bias, by the addition of a 15% uplift to the capital costs for each option.

3.3 The risk analysis presented in this chapter gives a more complete picture of all possible outcomes. A risk analysis has been performed using the *@RISK* software which is used to carry out a quantitative risk analysis.

3.4 Risk analysis using *@RISK* involves four steps:

- Uncertainty is specified in the model by allowing inputs to the model to be defined in terms of probability distributions rather than single-point estimates. These distributions take the form of a range of values the variable could take (from minimum to maximum) and the likelihood of occurrence of each value within the range. Any dependencies must also be defined where there is correlation between the values taken by one or more input variables.

- Output results are specified by defining those cells which provide the outputs in the standard Excel model. @RISK generates results on these cells in the form of probability distributions of the possible values which could occur.

- @RISK uses Monte Carlo Simulation to perform a risk analysis. The simulation selects sets of values from the probability distributions defined in the input cells (sampling) and recalculates the outputs based on these input values. @RISK generates output probability distributions by consolidating single-value results over many iterations.

- The output distributions generated by the @RISK simulation define the possible range of outputs based on the uncertainty associated with each input, and show the likelihood of occurrence of each possible outcome. This can show the spread of the output distribution, i.e. the level of risk, and also any skewness, where the distribution of positive and negative results is not uniform.

3.5 This form of risk analysis has a key advantage over standard 'sensitivity' tests. Rather than presenting a series of single-point estimates, or worst/expected/best case results, the decision maker can use the output probability distributions to give greater weight to the more likely outcomes during the evaluation.

3.6 The risk analysis described in this Chapter was performed in two stages. The first stage was to carry out a 'disaggregated' risk analysis, for which 25 input variables were considered in order to determine the overall level of uncertainty in the key indicators and those inputs making the largest contribution to this uncertainty. The second stage was to carry out a more aggregated analysis which reduced the set of input variables to seven, representing a set of variables similar to those which may be typically selected for a standard sensitivity analysis.

Disaggregated Risk Analysis

3.7 Probability distributions were defined for 25 input variables covering capital costs, operating costs, demand forecasts, revenues and economic benefits.

3.8 **Table T3.1** shows the minimum, maximum and expected value for the capital costs. These represent percentage uplifts to the total capital costs to address optimism bias, and define a skewed distribution curve.

T3.1 Capital Cost uncertainty

Variable	Expected Value	Minimum Value	Maximum Value
Capital Cost Optimism Bias	15%	0%	40%

3.9 **Table T3.2** shows the expected value for the operating cost variables, i.e. the original single-point estimate, with percentage uplifts representing the level of uncertainty. The distribution for fuel costs is defined by a 40% maximum uplift opposed to a 10% reduction, indicating a degree of skewness in the likely uncertainty. For each of the other inputs a symmetrical distribution curve is defined with the maximum and minimum uplift having equal magnitude.

T3.2 Operating Cost uncertainty

Variable	Expected Value	Minimum Value	Maximum Value
Vehicle lease costs (p.a)	£135,000	-10%	+10%
Light maintenance (per vehicle mile)	£0.45	-10%	+10%
Heavy maintenance (per vehicle per month)	£4826	-10%	+10%
Fuel (per vehicle mile)	£0.23	-10%	+40%
Stabling Charges (per vehicle per annum)	£2000	-10%	+10%
Variable track access (per mile)	£0.107	-10%	+10%
Station access (per stop)	£2	-10%	+10%
Infrastructure maintenance (per mile p.a)	£5000	-10%	+10%
Station cost (p.a.)	£15000	-10%	+10%
Driver wages (p.a)	£34,200	-10%	+10%
On-board staff wages	£20,000	-10%	+10%
Station staff wages	£20,000	-10%	+10%

3.10 **Table T3.3** shows the expected value, minimum and maximum values for the demand forecasting variables. For capture rates the percentage figures represent absolute rates (to be adjusted for each option as described in Chapter 2 based on the generalised journey time elasticity model). Again, uncertainty is defined using a symmetrical distribution curve. Uncertainty in demand from intermediate stations is represented by uplifts to the outputs from the trip rate model.

T3.3 Demand Forecasting uncertainty

Variable	Expected Value			Minimum Value			Maximum Value		
	Ex-Car	Ex-Bus	Induced	Ex-Car	Ex-Bus	Induced	Ex-Car	Ex-Bus	Induced
Local trip capture rate	5%	5%	15%	2.5%	2.5%	7.5%	7.5%	7.5%	22.5%
Day visitor capture rate	12%	12%	30%	6%	6%	15%	18%	18%	45%
Weekend visitor capture rate	12%	12%	30%	6%	6%	15%	18%	18%	45%
Long-stay visitor capture rate	12%	12%	30%	6%	6%	15%	18%	18%	45%
Intermediate stations	From Trip rate model			-50%			+50%		

3.11 **Table T3.4** shows the expected value, minimum and maximum values for the revenue variables. A symmetrical distribution curve is defined for each of the variables with the greater uncertainty in long-distance journey revenues represented by the wider spread in possible uplifts.

T3.4 Revenue uncertainty

Variable	Expected Value	Minimum Value	Maximum Value
Local trip yield	£2.50-£4.00	-10%	+10%
Long-distance trip yield	£8.00	-50%	+50%

3.12 **Table T3.5** shows the expected value, minimum and maximum values for the demand growth variables, indicating the absolute values for each.

T3.5 Demand Growth uncertainty

Variable	Expected Value	Minimum Value	Maximum Value
Local trips (p.a.)	3%	2%	4%
Visitor trips (p.a)	2%	1%	3%

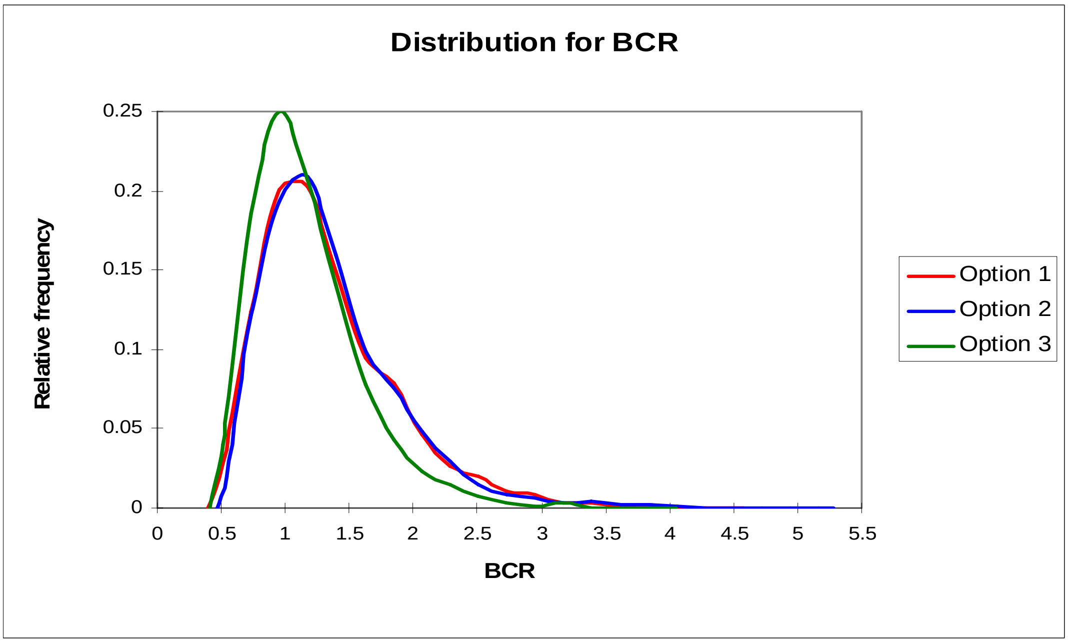
3.13 **Table T3.6** describes the input variables contributing to economic benefits. Probability distributions are defined for in-vehicle time, acting as a proxy for user time saving benefits, and local and long-distance journey lengths, acting as a proxy for decongestion and accident benefits. Greater uncertainty is specified for long-distance journey lengths where the precise origins and destinations are unknown (+/- 50%) than for local trips.

T3.6 Economic Benefits uncertainty

Variable	Minimum Value	Maximum Value
Journey time benefits (in-vehicle time)	-10%	+10%
Non-user benefits – local	-10%	+10%
Non-user benefits – long distance	-50%	+50%

3.14 **Figure F3.1** shows the resulting output distribution for the BCR for each of the three options, given the uncertainty in the input variables described in the tables above. Each option shows a positively skewed distribution around a central value, with Options 1 and 2 showing a very similar result. Option 3 has a lower mean BCR value and a less positively skewed distribution.

F3.1 Output Probability Distribution for BCR



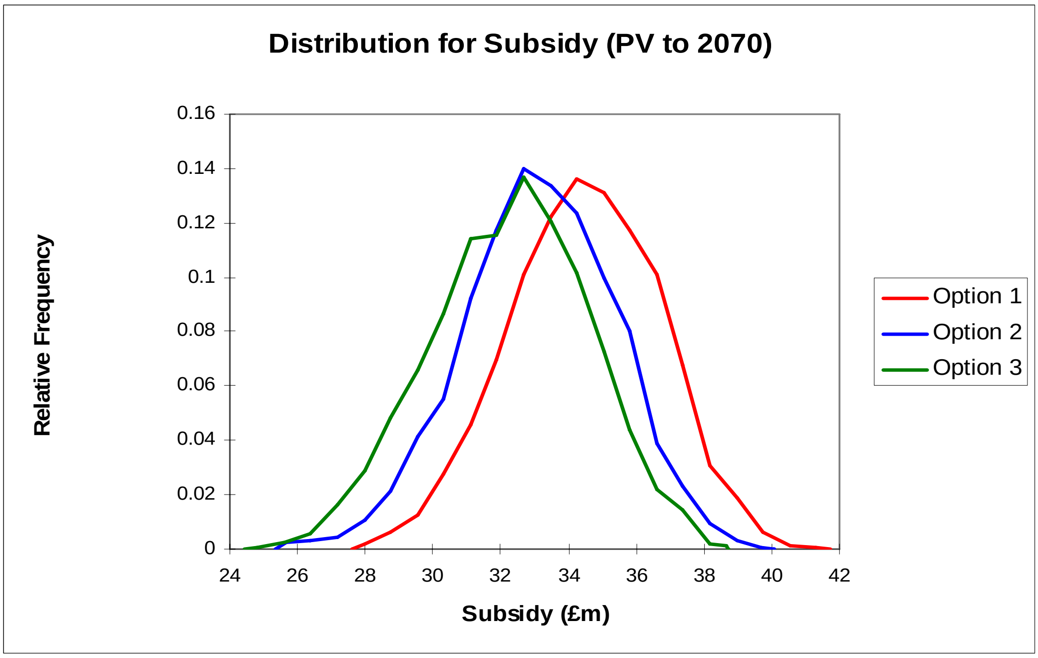
3.15 **Table T3.7** shows the central expected value, the mean value resulting from the risk simulation and a series of bands indicating the likelihood of the BCR falling within the given band, based on the distributions shown in **Figure F3.1**. Options 1 and 2 each have a 10.9% probability of the BCR exceeding 2, whilst Option 3 only has a 4.8% chance. Option 3 also has a much greater probability of the BCR falling below 1.0, 41.3%, as opposed to 28.7% and 26.8% for Options 2 and 3.

T3.7 Risk Analysis results for BCR

BCR	Option 1	Option 2	Option 3
Expected Value	1.25	1.26	1.11
Mean Value	1.34	1.35	1.17
Probability band			
<1.0	28.7%	26.8%	41.3%
1.0-1.5	41.0%	42.9%	40.5%
1.5-2.0	19.4%	19.4%	13.4%
>2.0	10.9%	10.9%	4.8%

3.16 **Figure F3.2** shows the resulting output distribution for the Operating Subsidy required for each of the three options. Each option shows an essentially uniform distribution with Options 1 having the highest subsidy requirement and Option 3 the lowest. Each Option shows a similar level of uncertainty around the central value.

F3.2 Output Probability Distribution for Operating Subsidy



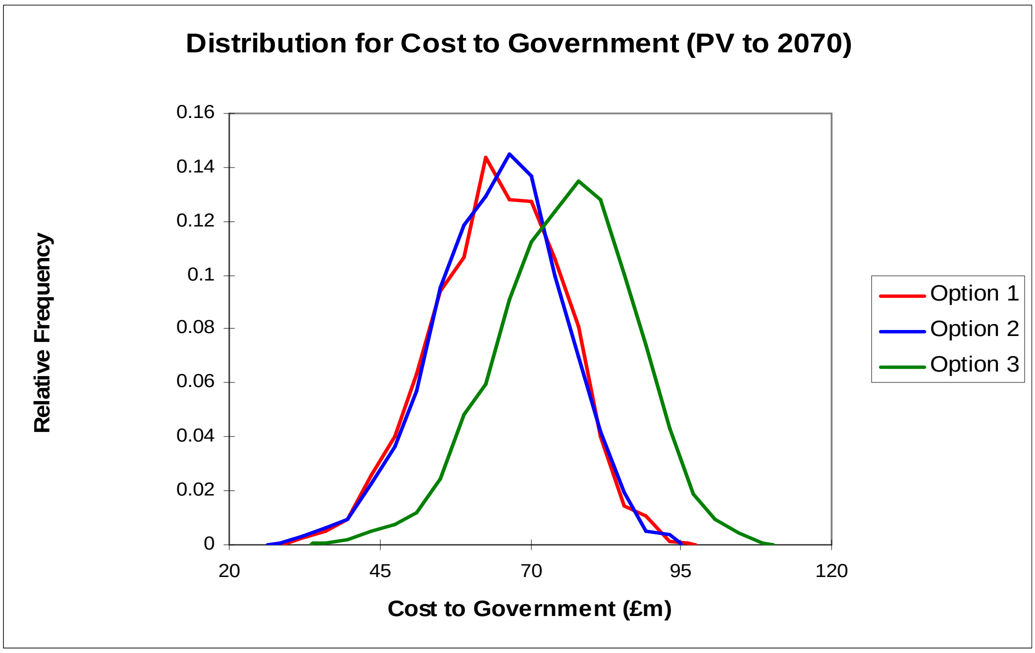
3.17 **Table T3.8** shows the central expected value, the mean value resulting from the risk simulation and a series of probability bands for the Operating Subsidy required, based on the distributions shown in **Figure F3.2**. Option 3 has a 17.5% probability of the subsidy required falling below £30million. This falls to 8.7% for Option 2 and 2.2% for Option 1. Option 3 also has the lowest probability of the required subsidy exceeding £35million, 12.6%, against 21.5% for Option 2 and 41.4% for Option 1.

T3.8 Risk Analysis results for Operating Subsidy

Subsidy (PV to 2070, £m)	Option 1	Option 2	Option 3
Expected Value	£34.5	£33.1	£32.3
Mean Value	£34.5	£33.1	£32.2
Probability band			
<£30m	2.2%	8.7%	17.5%
£30m-£35m	56.4%	69.8%	69.9%
£35m-£40m	41.4%	21.5%	12.6%
>£40m	0.2%	0%	0%

3.18 **Figure F3.3** shows the resulting output distribution for the financial cost to government for each of the three options. Each option shows a uniform distribution with a slight skewness to the left, indicating a higher probability that the cost is lower than the central value. Option 3 has the highest financial cost to Government whilst Options 1 and 2 have broadly similar distributions.

F3.3 Output Probability Distribution for Financial Cost to Government



3.19 **Table T3.8** shows the central expected value, the mean value resulting from the risk simulation and a series of probability bands for the Operating Subsidy required, based on the distributions shown in **Figure F3.3**. For Options 1 and 2 the probability of the cost to Government exceeding £70million is 32.2% and 31.9% respectively. For Option 3 this increases to 70.4%. Option 3 also has a much lower probability of the cost to Government falling below £50m, only 1.7% against around 9% for both Options 1 and 2.

T3.8 Risk Analysis results for Financial Cost to Government

Cost to Govt (PV to 2070, £m)	Option 1	Option 2	Option 3
Expected Value	£64.8	£64.9	£75.9
Mean Value	£64.6	£64.7	£75.8
Probability band			
<£50m	9.1%	8.9%	1.7%
£50m-£70m	58.7%	59.3%	27.9%
£70m-£90m	31.7%	31.4%	60.8%
>£90m	0.5%	0.5%	9.6%

Aggregated Risk Analysis

3.20 The risk analysis presented above has shown the degree of uncertainty in the value of a number of key output indicators based on uncertainty in a large number of disaggregated input variables. This section describes a second stage of analysis which aggregates a number of the input variables in order to demonstrate the degree of sensitivity of the output indicators to these variables.

3.21 Probability distributions were defined for 7 aggregated input variables covering capital costs, operating costs, demand forecasts, revenues and economic benefits. A summary of these is shown in **Table T3.9**. Each variable, other than capital costs, is defined as a uniform distribution about a central value with a maximum and minimum uplift applied. Capital costs are defined by a skewed distribution with a maximum uplift of 40% and minimum of 0%. The increase or decrease in operating costs is limited to 10% reflecting the lower degree of uncertainty associated with the expected values.

T3.9 Input Uncertainty for Aggregated Risk Analysis

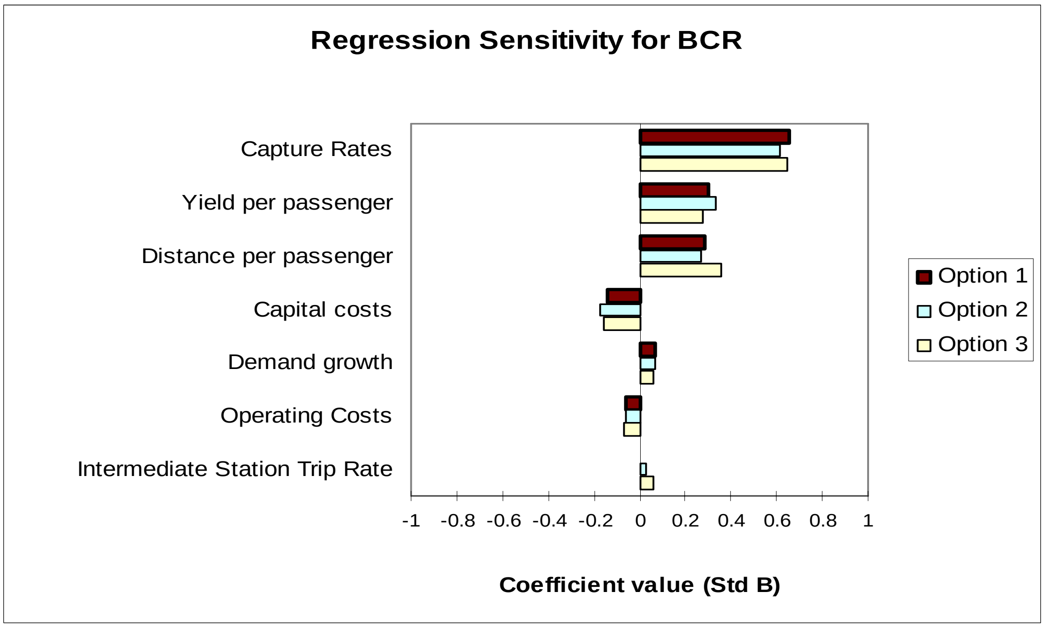
Variable	Minimum Value	Maximum Value
Capital Costs	+0%	+40%
Operating Costs	-10%	+10%
Capture rates	-50%	+50%
Yield per Passenger	-50%	+50%
Distance per Passenger	-50%	+50%
Intermediate station trip rate	-50%	+50%
Demand Growth[1]	*-1%*	*+1%*

[1] Absolute change to expected value

3.22 The identification of the most significant inputs was performed using the *@RISK* sensitivity analysis functions. This performs a stepwise regression analysis of the sampled input variables against the output values, producing a measurement of sensitivity for each input variable. The sensitivity of a particular variable is measured using a normalised regression coefficient (standard beta coefficient), for which a value of zero indicates no significant relationship between input and output and a value of +1 or -1 indicates a +1 or -1 change in standard deviation of the output in response to a +1 or -1 change in standard deviation of the input.

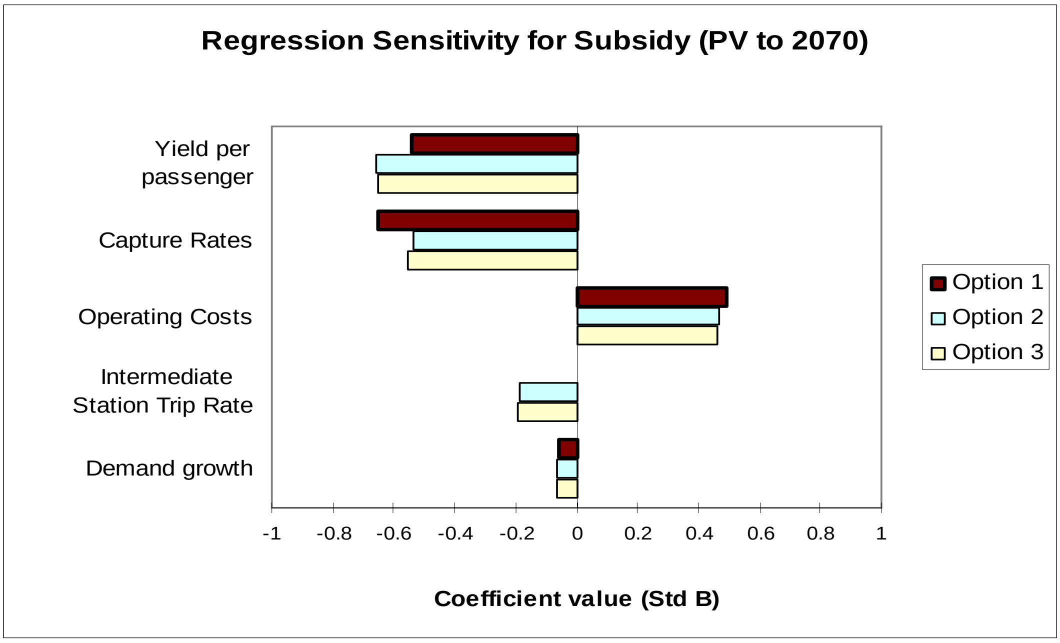
3.23 **Figure F3.4** shows the regression sensitivity for benefit-cost ratio for each of the three options. It is evident that the greatest sensitivity in the output BCR is to market capture rate, a direct determinant of the passenger demand. There is also a high sensitivity to yield per passenger and distance per passenger, and a lower degree of sensitivity to capital costs. Distance per passenger impacts on both the additional revenues for longer distance users, and on the degree of the resulting decongestion benefits. Little sensitivity is demonstrated to assumptions on ongoing demand growth, train operating costs and the trip rate from intermediate stations.

F3.4 Regression Sensitivity for Benefit-Cost Ratio



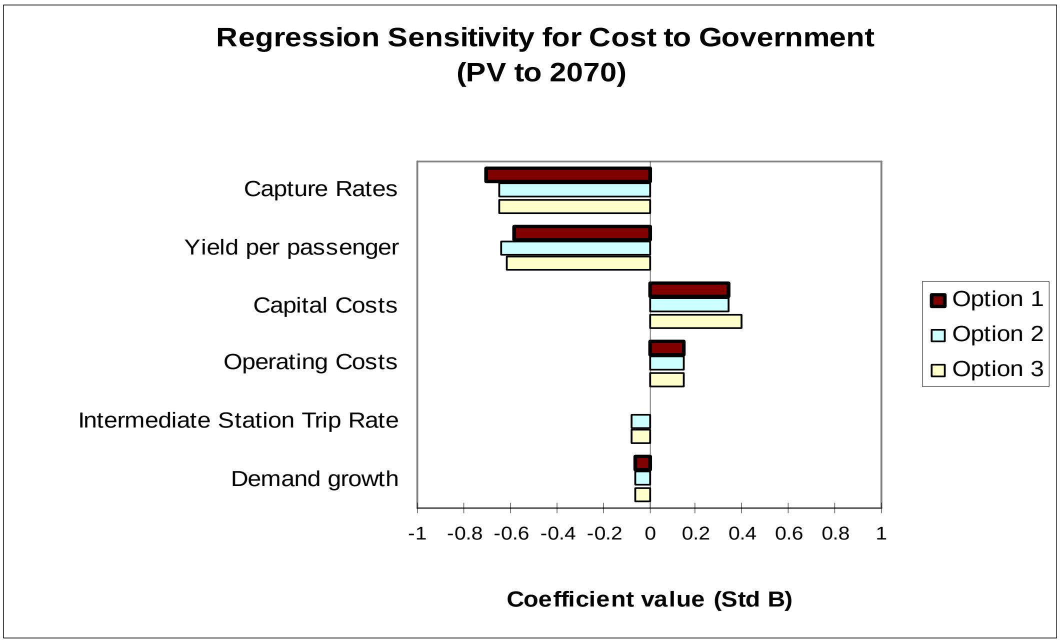
3.24 **Figure F3.5** shows the regression sensitivity for operating subsidy (to 2070) for the three alternative options. Again the greatest sensitivities are to market capture rate and to yield per passenger. Operating subsidy also shows a high sensitivity to the level of operating costs, despite the lower level of uncertainty defined in the input distribution.

F3.5 Regression Sensitivity for Operating Subsidy



3.25 **Figure F3.6** shows the regression sensitivity for financial cost to Government (to 2070) for the three alternative options. Each option again shows the greatest sensitivity to changes in the assumed capture rate and yield per passenger. On the cost side, assuming full Government grant funding, capital costs are of greater significance than the level of ongoing operating costs.

F3.6 Regression Sensitivity for Financial Cost to Government



Summary

3.26 The disaggregated analysis presented above highlights the inherent level of risk. Each Option shows a wide spread in the possible range of the BCR, with Options 1 and 2 having over a 25% probability of the BCR falling below 1.0 and Option 3 an even higher probability of 41%. More positively, Options 1 and 2 show roughly an equal probability of the BCR exceeding 1.5 than falling below 1.0.

3.27 The range of operating subsidy required for each option is approximately +/-£7million from the expected value although each option demonstrates a high probability that the subsidy required will remain within a tighter band of £5million around the central value. Financial cost to Government however shows a high degree of risk with Options 1 and 2 showing a wide spread of outcomes covering the range from approximately £20million to £95million and Option 3 from £30million to £110million.

3.28 The aggregated analysis illustrates the key sensitivities of the appraisal. Assumptions on capture rates, yields per passenger and distance travelled per passenger impact on demand, revenues and economic benefits and are the key factors underlying the BCR. Operating costs assumptions are also key in determining the level of subsidy required whilst uncertainty in capture rates, yields and capital costs produces the wide range in the possible financial cost to Government.

4 The Wider Case

4.1 While the appraisal in Chapter 2 and risk assessment in Chapter 3 has been based around the variables that are normally included in a DfT Rail business case there is a wider public sector case for investment in rail which needs to be considered.

4.2 A key issue when considering investment in assets which will have a life well into the second half of this century is the extent to which rail enables economic development to take place more sustainably. This is clearly of great significance in the context of access to the Lake District National Park when 75% of day visitors and over 85% of staying visitors to Cumbria arrived by car (Stage 1 Report Appendix B Table 2.11) and is vital if the economy is to grow without damaging the quality of life of their residents or compromising the environment which attract visitors in the first place. Rail can also provide additional benefits to other sectors and to social inclusion, in particular by providing good access for rural communities to the new opportunities. It also important if the regions are to play their full part in reducing CO_2 emissions

4.3 In summary there is the potential for the new rail link to contribute to environmental, social and wider economic development policy objectives such as:

- The positive impacts on local air quality and climate change through modal shift from private car and corresponding reduction in pollutants such as CO_2 and particulates;
- Rural communities face a number of barriers when accessing key facilities including availability of transport, cost of transport and limited travel horizons. Improvements to public transport can address all these issues creating a more inclusive society;
- A key priority for the regions is to tackle the ‘skills gap’, which is reflected in the relatively low levels of educational attainment compared with London and the South East and global competitors. The poor availability of public transport can deter people from taking up educational and training opportunities;
- Access to healthcare raises similar issues with inadequate transport provision resulting in delays in diagnosis and/or missed appointments (with their associated costs to the Health Service);
- The promotion of active travel in combination with public transport (for example walking or cycling to and from rail stations) can also help improve health through increasing routine physical activity. The economic effect of improved public health includes increased efficiency for businesses as healthy workers take less sick leave and they are also more productive while at work. Moreover, improved health leads to less NHS expenditure.

Environmental Benefits

4.4 The key element to this argument is that improvements to public transport can have positive impacts on local air quality and climate change, though modal shift from private car and corresponding reduction in pollutants such as CO_2 and particulates. This is illustrated in the **Table T4.1** below which compares the amount of pollution for each mode.

T4.1 Mass of pollutants in grammes emitted per passenger mile of travel

Transport Mode		CO_2	C, Carbon	NO_x	Particulates
Car	Petrol	298	81	0.95	0.10
	Diesel	225	61	2.22	0.30
	Hybrid	200	55	0.3	n/a
Rail		116	32	n/a	n/a
Air		340	93	0.70	n/a

Source: Tyndall Centre for Climate Research

4.5 Statistics from the Department for Transport (2001) quoted in the National Express Group Corporate Responsibility report[vi] reveal that people with company cars, and free fuel, travel 6,000 miles more a year than private motorists who own their own cars and pay for their fuel. The average business miles for someone with a company car are 10,600 a year. To demonstrate the benefits of public transport National Express have made the following calculations.

- If 850,000 company car drivers did not receive free fuel and therefore did not travel 6,000 miles a year then CO_2 comparable to the total emissions of the city of Newcastle would be saved each year.
- If one million company car drivers used the train for 50% of their business mileage instead of a single occupancy car then CO_2 comparable to half the annual total from a power station would be saved.

4.6 Similarly research has shown that taking the equivalent journey by train rather than by car reduces emissions by around a factor of five.

4.7 The provision of the Keswick-Penrith rail service would reduce the total distance travelled by car and therefore reduces consumption of fossil fuels. **Table T4.2** shows the reduction in carbon emissions for each of the three options, based on an assumption of 160g of CO_2 emitted by an average car for every kilometre travelled. This reduction is partially offset by the increase in additional rail $C0_{2.}$

[vi] National Express Group, Corporate Responsibility Report 2002.

T4.2 Greenhouse Gas Savings (£, 2002 prices)

2016	Option 1 Minimal Infrastructure	Option 2 1 + Intermediate Stations	Option 3 2 + Stainton Deviation, Keswick Passing Loop
Vehicle km saved	17,005,477	17,112,491	17,269,712
Vehicle CO_2 saved (tonnes)[1]	2721	2738	2763
Rail km additional	613,970	613,970	587,479
Rail CO_2 additional (tonnes)[2]	686	754	722
CO_2 saved (tonnes)	**2035**	**1984**	**2041**
C saved (tonnes)	**555**	**541**	**557**
Value[3]	**£49,402**	**£48,153**	**£49,554**
Total Value (to 2070)	**£5,627,000**	**£5,547,000**	**£5,668,000**

[1] Average vehicle CO_2 emission 160g/km
[2] Class 156 (2 car) CO_2 emission 2234g/km (SRA Rail Emission Model, 2001), increased by 10% for Options 2 and 3 to represent additional consumption due to reduced station spacing
[3] Social cost per tonne of Carbon £74.52 (2002 price, increased by £1.035 p.a., webtag unit 3.3.5, table 2)

4.8 Table 4.2 also monetarises these carbon savings. Unfortunately, the values provided by the government in webtag are relatively modest such that the valuation of the greenhouse gas savings arising from the railway are small in the context of the economic appraisal. They are, however, only one component of the environmental benefits that rail offer compared with other modes. In particular the provision of the rail service could be expected to have a key role in limiting future growth of car traffic into the North Lakes and could become a vital component of a demand management strategy which, as demonstrated in the Stage 1 report, could result in much greater use of the railway and hence greater environmental benefits than shown here.

The Social Case

4.9 Transport issues are often a fundamental, if not causal factor in the exclusion of many disadvantaged groups and communities. The Social Exclusion Unit (SEU) report *Making the Connections*[vii] outlines the role of transport in social exclusion highlighting three key issues:

- People may not be able to access services **as a result** of social exclusion.
- Problems with transport provision and the location of services can **reinforce** social exclusion.
- The effects of road traffic **disproportionately** impact on socially excluded areas and individuals.

4.10 A lack of transport means that individuals can become cut off from employment and education and training opportunities, perpetuating their low skills base and inability to secure a living wage. People can become housebound, isolated and cut off from friends and family and other social networks. This can seriously undermine their quality of life and, in extreme circumstances, may lead to social alienation, disengagement and, thus, undermine social cohesion."[viii]

[vii] Making the Connections: Final Report on Transport and Social Exclusion, Social Exclusion Unit, 2003
[viii] Transport and Social Exclusion – A survey of the group of seven nations, Dr K. Lucas, Transport Studies Group, University of Westminster, FIA Foundation

4.11 This can be particularly true in rural areas. Improvements to public transport can accrue substantial non-transport benefits across a range of different sectors. This has been investigated in a report for the Rural Transport Partnership[ix] which examined 20 transport projects that generated benefits to employment, education, social care, welfare, culture, and leisure sectors. Although the examples here were primarily bus based many of the benefits delivered would be equally applicable, if not magnified in a rail context. A summary of key findings is included in **Table T4.3**.

T4.3 Benefits to non transport sectors

Sector	Benefit	Value	Initiative
Employment	Saving in unemployment benefit	£237,600 pa	North Lincolnshire travel to work and learning, Wheels 4U
Employment	Potential saving in unemployment benefit and costs of supporting someone back to work	£5,600 pa	Malvern Hills Parish Cluster Group, Herefordshire and Worcestershire
Employment	Saving in unemployment benefit	£7,200 pa	Wymondham Flexibus, Norfolk
Education	Savings in the cost of transport provision	£87,000 pa	Interconnect Feeder Services, Lincolnshire
Education	The number of additional attendances at after school activities	3692 pa	Links for Life, Bridgnorth, Shropshire
Social care	Savings in domiciliary care services	£111,540 pa	Interconnect Feeder Services, Lincolnshire
Social care	Savings in domiciliary care visits	£1,065 pa	Muncaster Microbus, Cumbria
Social care	Savings in domiciliary care services	£324 pa	Muncaster Microbus, Cumbria
Tourism and Leisure	Leisure access (of which 55% would not have been made previously)	3494 trips pa	Malvern Hills Parish Cluster Group, Herefordshire and Worcestershire
Economic	Increasing spend at local facilities	£55,000	Mobile Shopmobility, Lancashire

Health

4.12 According to the Department of Health, 5.2 million hospital outpatient appointments are missed in one year resulting in a cost of £250 million a year[x] [xi]. The Social Exclusion Unit states that over a 12-month period, 1.4 million people miss, turn down or choose not to seek medical help because of transport problems.[xii]

4.13 A critical factor in the location of health care facilities, particularly specialist centre of excellence hospitals, is finding a sufficiently large site. This situation has led to the location of facilities at sites which are often inaccessible by public transport and closure of facilities which are accessible by public transport.[xiii] Access to healthcare is particularly important in the Keswick area where the age of the population is older than the average.

[ix] Transport Solutions – The benefits of providing transport to address social exclusion in rural areas, Paul Beecham and Associates in conjunction with Sheffield Hallam University, 2005
[x] MORI 2002
[xi] BBC1999
[xii] Transport and access to health care: The potential of new information technology. F. Rajé, C. Brand and J. Preston, University of Oxford and M. Grieco, Napier University, 2003
[xiii] Improving patient access to health services: a national review and case studies of current approaches, Lucy Hamer, Health Development Agency, 2004

Active travel and healthy lifestyles

4.14 The wider health impacts of public transport interventions have largely been ignored or at best underplayed. Public transport can contribute to significant improvements in public health in addition to the often cited improved air quality, notably through increased physical activity of public transport users. Moreover, the typical way to report data on multi-modal journeys is to focus on the 'main transport mode'. This leads to an underestimate of the other parts of the trip, such as the walk to the station.

4.15 Rail journeys will almost always involve walking for at least one trip end. The health benefits derived from walking are, however, generally not acknowledged. Yet the health benefits may be significant and substantially contribute to the recommended weekly minimum of 150 minutes of moderate physical activity. For example, research recently conducted in the United States[xiv] has found that Americans who walk to and from public transport obtain an appreciable amount of their weekly 'requirement'. The study suggests that 29% of public transport 'walkers' achieve at least 30 minutes of daily physical activity solely by walking to and from public transport stops.

4.16 Accounting for these associated walking or cycling trips increases the economic value of public transport. There are significant economic benefits associated with physical activity due to its health protective function. Physical activity reduces all-cause mortality and morbidity. This is particularly important given the low levels of physical activity in the UK population.

4.17 The CBI has calculated that 192 million working days were lost to the British economy last year, equivalent to the working population of two counties taking a year off work. Sickness and absenteeism now cost Britain over £11 billion per annum. Moreover, a growing body of research from around the world indicates that people who are active in their daily lives are more productive employees and have better attendance records.

4.18 In general terms healthier employees benefit their employer through:

- reduced absenteeism
- lower turnover rates
- improved productivity
- employee morale
- lower health care costs.

4.19 The more people are active the less they are at risk of major diseases such as coronary heart disease, stroke, diabetes, arthritis, osteoporosis, some cancers, and mental health problems such as depression. The direct annual healthcare costs of heart disease alone in the UK are £1.6 billion (1999 prices)[xv]. Similarly, the costs of obesity are substantial, amounting to £2.6 billion for both direct and indirect costs (2000 prices).[xvi]

4.20 The Government has set a target in England and Wales for 70% of the population to be "reasonably active" by 2020, while in Scotland the target is for 50% of adults to achieve the minimum levels by 2022. Currently the figure is around 30% in each country. The Chief Medical Officer has stated that the target, 30 minutes of moderate intensity activity such as brisk walking on at least 5 days per week, will only be achieved by helping people to build activity into their daily lives. His 2004 report on physical activity says,

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[xiv] Walking to Public Transit. Steps to help meet physical activity recommendations, American Journal of Preventive Medicine, 29(4), pp. 273-280, L. Besser and A. Dannenberg, 2005
[xv] Monitoring of the progress of the 2010 target for coronary heart disease mortality: Estimated consequences of CHD incidence and mortality form changing prevalence of risk factors, A. Britton and K. McPherson, National Heart Forum, 2000
[xvi] Tackling obesity in England, National Audit Office, 2001 (some of the costs will relate to coronary heart disease)

"for most people, the easiest and most acceptable forms of physical activity are those that can be incorporated into everyday life. Examples include walking or cycling instead of driving…"[xvii].

Education

4.21 A priority for the regions, if they are to develop their knowledge economies, is to tackle the 'skills gap', which is reflected in the relatively low levels of educational attainment compared with London and the South East and global competitors.

4.22 The availability and cost of transport are important factors in accessing educational opportunities and the high cost and poor availability of public transport can deter people from taking up educational opportunities. This is exacerbated by the amalgamation and relocation of schools and further education colleges to new locations which are difficult to reach by existing public transport networks. Better access to all these opportunities and facilities is essential if skills are to be improved and social exclusion in the regions is to be reduced. More effective public transport networks have a key role to play in providing that access.

Access to further education

4.23 Research indicates that transport can be a barrier to young people going on into further education. This may be due to the availability or cost of transport. Those participating in post-16 education or training usually do not receive travel discounts and often travel longer distances. This issue is illustrated through the following statistics from the SEU Making the Connections[xviii] report:

- More than one in five students has considered dropping out of further education because of financial difficulties.
- Nearly half of 16-18 year old students say they find their transport costs hard to meet.
- 6% of students have missed college at some point in the previous year because they could not afford transport costs.

Wider Economic Benefits

4.24 While most of the above are relatively difficult to quantify and to attach a direct causal linkage between the rail service and the wider benefits that can attained, the impacts on the local economy arising from the investment in and subsequent operation of the railways can be assessed using standard assessment techniques.

Employment Benefits

4.25 Employment benefits comprise three elements:

- Direct employment arising from railway construction followed by permanent employment during the operational phase.
- Indirect employment arising from employment created in businesses supplying products, materials and services during the construction and operational phase.
- Induced employment arising from persons employed directly and indirectly spending part of their income in the local area leading to further local employment.

4.26 Direct employment benefits during construction of the railway can be estimated by division of the value for gross output per employee for the construction industry into the overall estimate of construction costs to give the total number of person years of employment. This figure is then adjusted to give the total number of full time equivalent (FTE) jobs, using Treasury conventions for the conversion of temporary to full time jobs.

[xvii] At least five a week: Evidence on the impact of physical activity and its relationship to health, Department of Health, 2004
[xviii] SEU, op cit

4.27 A gross output per head for the construction industry of £121,500 per head (Annual Business Inquiry, 2005) was assumed, uplifted by 3.25% to represent the increase in GDP to 2006.

4.28 A value for Gross Value Added (GVA) per employee for the construction sector in Cumbria was taken from 'Cumbria Economic Intelligence Partnership: Gross Value Added by Industrial Sector'. This uses employment data from Office of National Statistics combined with employment data from the Annual Business Inquiry (ABI) to derive a value of £41,645 for the construction sector (2002 prices). This was uplifted by 11.9% to represent GDP increases to 2006.

4.29 The total number of FTEs during construction is 71 and the resulting increase in GVA totals over £3million, as shown in table **Table T4.4**.

T4.4 Direct Employment Benefits during Construction (£s, 2006 prices)

Construction Costs	Gross output per Employee	Person Years of Employment	Construction Jobs (FTE)	GVA per Employee	Total Direct Output (GVA)
£89,010,000	£125,500	709	71	£46,600	£3,308,600

4.30 An assessment of the direct employment benefits during operation can be made through application of the value for gross output per employee for the transport sector for each additional full time person employed. A value of £42,199 for the transport sector was assumed (source: Cumbria Economic Intelligence Partnership). This figure was uplifted by 11.9% to represent GDP increases to 2006.

4.31 With an assumption that a further ten employees are required for station, rolling stock and infrastructure maintenance, in addition to on-train and station staff, total direct output benefits are over £1million GVA, as shown in **Table T4.5**.

T4.5 Annual Direct Employment Benefits during Operation (£s, 2006 prices)

	Number of Employees	GVA per Employee	Total Direct Output (GVA)
On-train	7.69	£47,220	£363,127
Station	3.62	£47,220	£170,936
Infrastructure and Rolling Stock Maintenance	10	£47,220	£472,200
TOTAL	21.31	-	£1,006,263

4.32 Indirect and Induced employment and output benefits during the construction and operational phase can be calculated by application of input-output multipliers to the estimates of direct employment and output changes. Multipliers used were taken from the Scottish Executive input-output tables, (Scottish Executive, 2003)[xix] which provide multipliers by industry group. The Railway Transport industry group was selected as the most relevant industry sector during the operational phase.

[xix] Scottish Executive values were used since the most recently available UK input-output multipliers are dated 1995 (Office of National Statistics Input-Output - United Kingdom National Accounts). 1995 UK multipliers for Output are: Construction 2.09, Railway Transport 2.23.

4.33 Employment multipliers for an industry (Type II) give the ratio of direct, indirect and induced employment to the change in direct employment. Output multipliers (Type II) give the ratio of direct, indirect and induced output change to the direct output effects. Summary results for indirect and induced impacts are shown in **Table T4.6**. Note that these results assume the full employment and output benefits and do not take into consideration any displacement effects.

T4.6 Indirect and Induced Employment and Output Benefits (£s, 2006 prices)

	Number of FTEs	Employment Multiplier	Indirect and Induced Employment (FTEs)	Direct Output	Output Multiplier	Indirect and Induced Output (p.a)
Construction	71	1.9	64	£3,308,000	1.8	£2,646,000
Operation	21	2.8	38	£1,006,000	2.0	£1,006,000

4.34 Summarising the direct, indirect and induced impacts, we estimate the total impact of the railway on GVA as almost £8million and the total number of full time equivalent jobs created as 194. Over a 60 year appraisal period, initial construction and ongoing operational economic benefits total over £127million.

T4.7 Total Employment and Output Benefits (£s, 2006 prices)

	Number of FTEs	Output (GVA)
Direct		
Construction	71	£3,308,000
Operation	21	£1,006,000
Indirect and Induced		
Construction	64	£2,646,000
Operation	38	£1,006,000
TOTAL	**194**	**£7,966,000**

4.35 Given a total financial cost to Government of the railway of £95.1million (Option 1) and an estimate of the additional 194 full time employees, this analysis suggests a total pubic sector cost per job (CPJ) of approximately £490,000. A typical figure for any public investment in job creation would be half the annual salary. Whilst the number of jobs created and increase in GVA due the railway are significant, the scale of job creation is insufficient to deliver good value for money in purely CPJ terms.

Additional Visitor Spend

4.36 The other impact on the local economy would arise from spending by additional visitors to the area. The demand forecasting exercise summarised in **Table T2.7** indicated that there could be around 54,000 ‘induced’ trips to the area per year (in 2016) as a consequence of the introduction of the new rail service. If we assume the mix of local, day visitor and overnight visitors used in the induced demand forecasting exercise (10% local, 60% overnight, 30% day visitors)[xx] and average spend rates per head of £76 for staying visitors

[xx] Stage 1 Report table T5.11

and £20 for day visitors[xxi] and zero for local residents then the average spend per induced (additional) traveller is £51.60.

4.37 Not all of this would be additional income to the local economy, some may well be displaced from expenditure that would have occurred elsewhere in the North Lakes or Lake District economy. If we assume that 10% of it is displaced expenditure then the direct impact on the local economy of the *gross* additional visitor expenditure would be in the region of £2.51m per year in 2016 to which an income scalar (typically about 1/3 in rural areas such as Allerdale) needs to be applied. As with the construction spend we would expect a further 'multiplier' effect as the businesses benefiting from the additional visitor spend. Applying a relatively conservative multiplier of 1.3 would bring the *net* additional spend to somewhere in the region of **£1.1m pa** and almost **£80million** over the 60 year appraisal period.

4.38 To put this in context, the tourism revenue for Allerdale was £215m in 2005[xxii] - the additional spend in 2016 would therefore be equivalent to around an additional 0.5% visitor revenue over the level seen in the District in 2005.

[xxi] Stage 1 Report Appendix B Tables 2.19 and Table 2.20– sources Strategy for Tourism 2005-2015 (Allerdale figures) and Keswick Visitor Survey 2005
[xxii] STEAM Model: Tourism Volume and Value Trends 2000-2005 reported in Stage 1 Report Appendix B

5 Funding Options

5.1 In Chapter 2 we set out the key financial parameters of the project and considered the robustness (risks) surrounding them in Chapter 3. They indicate a position whereby the railway would not make any contribution towards the scheme capital costs since it would require revenue support once in operation, a position exacerbated by the fact that much of the additional revenue would accrue as a 'windfall' to other train operators and could therefore not easily be 'captured' for the project.

5.2 Nevertheless these benefits accrue to 'UK railways plc' and are ultimately identifiable to DfT. Furthermore there are wider economic benefits that are not captured by the farebox (identified in the cost benefit appraisal in Chapter 2) and additional potential benefits to the economy, environment and society in general (Chapter 4) that would be recognised as worthwhile contributions to national, regional and sub-regional policy. Even without these latter benefits we have shown that the quantifiable benefits exceed the costs.

5.3 With this in mind, this chapter considers how this combination of financial, economic and intangible benefits can be used to lever-in funding for the railway's construction and operation. We begin by looking at how other railway re-opening projects are being funded in the UK before going on to consider alternative mechanisms.

Funding Arrangements for Other Re-opening Schemes

5.4 There have been very few comparable rail re-opening projects in England in the last 15 years – high profile scheme such as the Robin Hood Line in Nottinghamshire opened in the early 1990's whilst a smaller scheme such as Halifax – Huddersfield in West Yorkshire in the late 1990's was merely a reopening of an existing freight route to passenger services. Elsewhere it has been the heritage sector that has had most success in restoring former rail railways for leisure uses. We therefore have to look to Scotland and Wales where, supported by devolved national government, a number of schemes have come, or are coming, forward.

Waverley (Borders) route

5.5 The 35 mile Waverley route is arguably the highest profile major rail re-opening project currently being progressed in the UK. The scheme has obtained powers and is currently estimated to have a cost of £175m (2011 prices). A breakdown of the funding sources is shown below.

T5.1 Waverley Route Funding

Source	Value
Scottish Executive	£154.84m
Scottish Borders Enterprise	£1m
Shawfair Developers Contribution	£4.8m
Offset against Landfill Tax	£2.08m
Currie Road Development Galashiels	£1.8m
Section 75—Scottish Borders Council	£7.5m
Section 75—Midlothian Council	£1.8m
Cities Growth Fund—City of Edinburgh Council	£2m
Total funding	**£175.82m**

5.6 In addition the Scottish Executive had earlier provided the Waverley Railway Project (through Scottish Borders Council) with £1.865m capital borrowing consent from its Public Transport Fund to take the scheme forward and local authority partners had also undertaken work valued at not less than £600k in support of the present stage of work.

5.7 What is clear from the above is that whilst a varied funding package including private sector developer contribution has been assembled, most of the contribution is coming from the public sector and almost 90% is in the form of a capital grant from the Scottish Executive.

5.8 On-going revenue support for the service will be the subject of a separate negotiation with the ScotRail franchise holder.

Larkhall-Milngavie

5.9 The recently completed Larkhall to Milngavie rail link, supported by £16 million from the Scottish Executive's Integrated Transport Fund, provides a half hourly service between Larkhall and Dalmuir, via Hamilton, Glasgow and Partick. It enhances the frequency of cross-city services between the south east and north west of Glasgow with additional new stations at Merryton and Chatelherault on the Larkhall line and Dawsholm on the Maryhill line. The scheme involved reintroducing passenger trains services between Hamilton and Larkhall, the four new stations and just over 6.5kms of new track.

T5.2 Larkhall-Milngavie Funding

Source	Value
Scottish Executive	£16m
SPT and South Lanarkshire Council	£19m
Total funding	**£35m**

5.10 At £35m the scheme was wholly funded by Scottish Executive grants with local authority and PTE support. Operating support is provided within the terms of the ScotRail franchise.

Airdrie –Bathgate

5.11 This major project, the first phase of which involves double-tracking and electrifying the Edinburgh-Bathgate line will include;

- A re-opened 23km railway line between Drumgelloch and Bathgate
- Upgrading the existing railway line between Bathgate and Edinburgh and between Airdrie and Drumgelloch
- New stations at Caldercruix and Armadale; relocated stations at Bathgate and Drumgelloch; and upgraded stations at Airdrie, Livingstone North and Uphall Station
- Four passenger services per hour in each direction between Glasgow and Edinburgh
- A new relocated cycle track between Airdrie and Bathgate

5.12 It is anticipated that services will be running the length of the new railway from December 2010. Passenger benefits will include four more trains per hour in each direction between Glasgow and Edinburgh, shorter travel times and improved reliability of existing services.

5.13 Transport Scotland has committed funding for the project to a maximum of **£299.7m** on the basis of benefits claimed to be of "*improved access to education and employment, £716m of benefits to the economy, and a reliable service to Scotland's two biggest cities* *whilst the environmental benefits include offering a public transport alternative to travelling by car via the M8 and reducing congestion*[xxiii]".

5.14 Again, this is another example of a scheme being funded (wholly in this case) by direct government grant on the back of wider economic benefits.

Stirling Alloa Kincardine

5.15 This 18km rail link, due to open in summer 2007, will see the introduction of passenger services between Stirling and Alloa, reconnecting Alloa to the national rail network. It will also allow the transportation of freight to Kincardine and Dunfermline via Longannet. This will take freight off the Forth Bridge leading to an improved passenger services between Edinburgh and Fife. Costs have increased substantially since the original announcement of a £37.5m ceiling. Outturn cost is now expected to be £64.75m.

5.16 Funding is coming almost entirely from the Scottish Executive/Transport Scotland.

T5.3 Stirling Alloa Kincardine Funding

Source	Value
Scottish Executive Integrated Transport Fund	£30m
Scottish Executive/Transport Scotland	£27.6m
Clackmannanshire Council PTF Award	£6.5m
Other	£0.65m
Total funding	**£64.75m**

Ebbw Vale and Vale of Glamorgan

5.17 The Ebbw Valley Railway Scheme is a major project in south Wales currently close to completion. It involves the re-opening of an existing freight railway line to passenger services. Passenger services last operated on the line in 1962. The project is a key part of plans to regenerate the Valley following the closure of the Corus Works in Ebbw Vale in 2002.

5.18 The project includes the construction of six stations (at Rogerstone, Risca and Pontymister, Crosskeys, Newbridge, Llanhilleth and Ebbw Vale Parkway) to serve the communities in the Valley. Services are planned to commence with an hourly passenger service from Ebbw Vale – Cardiff in July 2007 followed by an hourly service from Ebbw Vale – Newport. Dedicated feeder bus services will link the line to Ebbw Vale and Abertillery town centres.

5.19 The current cost of the scheme is estimated at £30m and funding comes from the European Regional Development Fund (ERDF) Objective 1 funding, the Corus Steelworks Regeneration Fund, with the remainder of the funding is being provided by Welsh Assembly Government Transport Grant.

[xxiii] Transport Minister Tavish Scott 28th March 2007

T5.4Ebbw Vale Funding

Source	Value
Welsh Assembly Transport Grant	£15.5m
EU Objective 1	£7.5m
Corus Steelworks Regeneration Fund	£7m
Total funding	**£30m**

5.20 The Welsh Assembly government will also provide 3 years funding towards the operational costs in the form of support for train crew and rolling stock leases. Besides having a benefit-cost ratio of around 1.5 to 1, justification for the support is based upon the premise that re-opening the Ebbw Valley line to passenger trains will encourage inward investment and hence employment opportunities, because the railway will increase the size of the labour pool who will be able to access jobs within the valley.

5.21 **The Vale of Glamorgan** line, also in South Wales, re-opened in June 2005 when final work was completed to enable 18 miles of the Vale of Glamorgan line to reopen to allow a passenger rail service on the Vale of Glamorgan for the first time in 41 years. Regular services now run between Bridgend and Barry and then along existing track into Cardiff. The Welsh Assembly provided the support for the £17million project which included two reopened stations – Rhoose, for Cardiff International Airport, and Llantwit Major.

Innovative Funding Mechanisms

5.22 The common feature of all of the recent Scottish and Welsh re-opening schemes described above is that they have been almost wholly funded by public sector grants –in some cases to the tune of 100% of the capital costs. The Ebbw Vale scheme also has a commitment (albeit short term) to fund some of the operating deficit while all of the Scottish schemes that have opened to date have been absorbed into existing franchise support regimes.

5.23 There are other schemes that are less well advanced in terms of securing funding (although have been under consideration by their promoters for many years) which are looking at more innovative mechanisms.

5.24 The East West Rail Consortium (ERWC) has recently published proposals to fund the first phase (Oxford- Milton Keynes) of their pan –regional scheme between Ipswich and the South West of England through the use of either a Supplementary Tariff or through Planning Gain Supplement whilst the E-rail Consortium in Edinburgh is promoting a land value capture mechanism to fund the re-opening of the Edinburgh South Suburban route.

Land Value Capture

5.25 Outside of Scotland it is generally the case that even when central government may be persuaded to contribute towards construction of a new, local transport system it is rarely for the full amount. Alternative or supplementary funding mechanisms may be available. These may range from:

- supplementary borrowing approvals
- road tolls
- road user charging
- workplace parking levies
- supplementary business rates
- PFI

- planning gain contributions (Section 106 or 75)

5.26 Each of these alternative mechanisms has specific implications for a local authority or transport sponsor but in the eyes of those promoting land value capture mechanisms all share two significant drawbacks. These are:

- All are either unpopular or contentious with those expected to contribute, and
- none carries the early assurance of producing the capital needed to cover the 'funding gap' to initiate the new transport project.

5.27 The Land Uplift Capture methodology has been developed by E-Rail Ltd (below) and works as follows;

- They identify the land and property likely to benefit from the provision of the transport system and establish the current and estimated value of the property;
- Detail the level of contributions from land uplift associated with the transport project and submit a report setting out the above to the Client;
- A dedicated mechanism to capture private funds is established;
- E-Rail is commissioned to negotiate contributions with land and property owners;
- E-Rail secures agreements for contributions from property and landowners on a one-to-one basis;
- Contributions are due when: (a) the landowner receives planning permission, and (b) the contract for the transport project is signed;
- At the appropriate time and when key criteria are met, payments are made to the transport project.

Edinburgh South Suburban Rail – E-Rail Ltd

5.28 To date, the highest profile example of attempting to use land value uplift to fund a transport project has been by E-Rail Ltd who are aiming to re-open the Edinburgh South Suburban Railway through the development of land and buildings adjacent to the line. This development and the re-opening of the line are potentially mutually supportive (the development helping to fund and provide patronage for the railway and the accessibility provided by the railway making the development more attractive).

5.29 The Company through its development partner, Kilmartin Limited, has begun the process of purchasing land and buildings which are considered strategic, where development opportunities might arise or where there is an anticipation of increased value as a result of the reopening of the railway.

5.30 E-Rail will partner The City of Edinburgh Council and it is claimed that it has 'an understanding' with Railtrack and ScotRail. Assistance is also being sought from Scottish Enterprise Edinburgh & Lothian and it is the Company's intention to approach Central Government, the EU and other organisations involved in transportation in the event of there being a shortfall in the funding exercise.

5.31 E-Rail has claimed that nearly half of the estimated £18m required to reopen the passenger railway line in south Edinburgh has been secured by a private consortium. It is understood that the funding will come from Edinburgh University, and the Cameron Toll and Fort Kinnaird shopping centres, among others. E-Rail estimate that properties within 100 metres of stations on the line are expected to increase in value by around ten per cent, and development land will be more sought-after as a result.

East West Rail –Supplementary Tariff and/or Planning Gain Supplement

5.32 A recent variant on the principle of extracting value from increased land and property value has emerged from the promoters of the East West Rail link in southern England. They are proposing either;

- A supplementary tariff levied on all new dwellings within a zone (possibly 5 miles) either side of the route – the consortium estimate that 65,000 new dwellings come within this zone and hence with a suggested tariff of £1,500 per dwelling £100m could be raised:
- Using the possibility of Planning Gain Supplement (the proposed replacement for current S106 agreements) being levied at a regional level, possibly enhanced by a small scale local PGS within proximity of the route to raise finance.

5.33 The supplementary tariff route is preferred by the consortium since the PGS route suffers from both uncertainty as to whether or not it will go ahead and the knowledge that if it does then the receipts raised will initially go the Treasury before being allocated back to both the local authority and the region (to form a fund for regionally significant infrastructure). There is clearly a risk with this that the scheme promoter will not receive the required level of funding.

5.34 Both the supplementary tariff option and PGS clearly require a planning environment in which substantial development is expected and encouraged to occur. Both approaches also require the capital cost to be covered initially (bridge funding) which is then recouped over time as the developments are constructed. With the PGS 30% of the funds will be allocated by the Treasury to the region in the form of a Regional Infrastructure Fund which could be used to provide the bridge funding –but Keswick-Penrith would then be bidding against other regional priority schemes for the money and given its current lack of status as a regional priority it is unlikely to be successful.

5.35 However, more fundamentally, it is likely to be the lack of realisable land value gain or realisable housing development pressure which realistically militates against the development of funding options based upon land scarcity.

PFI Approaches

5.36 This leads us to consider the possibilities for utilising the Private Finance Initiative to fund the project.

5.37 In this case the private sector investor is responsible for raising finance for PFI projects. Although this effectively enables the public sector to gain access to private finance, the terms are very unlikely to match those available to a government, for which borrowing is typically regarded as near risk-free. The public sector client still needs to ensure that the finance structure is suitable, as it represents a key component of achieving value for money.

5.38 Bank debt can be a flexible source of funding, and is often structured such that refinancing is more readily achievable than with other funding options, should that occur. However, bonds are likely to be a cheaper option for large projects. The bond market tends to have more capacity, but the timing of fund raising in relation to that capacity and other projects in the market can be an issue. There may be insufficient liquidity in the banking market to procure attractive margins for the most substantial projects, and PFI bidders therefore are increasingly seeking long-term debt from the bond market. The types of bond available are ‘fixed’ (interest) and ‘indexed linked’ (interest).

5.39 The cost of debt will vary case by case, depending mainly on the associated risk. Applying this we need to start from first principles. Obtaining commercial capital for expensive infrastructure projects requires that the organisation needing the money provides the investor with a reasonable rate of return on his investment. If the pure commercial considerations show that this is not likely, there must be some sort of guarantee for the investor. If money is borrowed, the guarantee must provide that the interest will be paid and that the amount borrowed will be repaid. Guarantees for public infrastructure projects usually have to be provided by the government.

5.40 One way to get a project involved with private finance is to reduce the level of capital expenditure to be supplied by the commercial market. This will require the public sector to pay for part of the cost of the infrastructure. For a new rail route, how much the public sector government will pay depends on the scope and type of railway being built.

Analysis of the Options

5.41 In the remainder of this section we quantify how this could work in practice.

5.42 The appraisal presented in Chapter 2 is based on the capital costs and operating shortfall being met entirely through Government grants and subsidy. This removes any financing costs of the railway and hence gives the most positive view of the benefit-cost ratio and other summary measures.

5.43 This section takes forward Option 1 from the previous analysis and demonstrates the financial and economic outcomes when funding costs are taken into consideration. Option 1 was selected as the least-cost option, having a BCR of 1.25 against the best performing option, Option 2, with a BCR of 1.26.

Funding through Access Charges

5.44 The first stage of the analysis demonstrates the impact of funding the initial capital investment required entirely through access charges. This corresponds to a situation where initial investment by a Keswick-Penrith Infrastructure Company, Network Rail or another private sector construction company is re-paid by the train operating company over a 60 year period.

5.45 Three rates of return are tested, **5%,** close to current LIBOR, **6.5%,** Network Rail's permitted rate of return on the Regulatory Asset Base to 2009 and **8%,** the previous rate of return on investment for Railtrack determined by the Rail Regulator.

5.46 **Table T5.5** shows the impact of these financing costs on the financial position in 2029. With capital costs funded through Government grant, the operating subsidy required is £1.86million and the costs to Government £353,000.

5.47 If capital costs are repaid through access charges at a rate of return of 5% per annum, operating subsidy increases to £6.51million and cost to Government to £5.01million.

5.48 A rate of return of 8% further increases operating subsidy to £8.19million and cost to Government to £7.69million.

T5.5 Financial Summary 2029 (£'000, 2002 prices)

Funding Option	Total Revenues	Operating Costs (inc. Access Charges)	Operating Subsidy	Financial Cost to Government
100% Government Capital Grant				
Capital Grant				
83,905	2,407	2,694	1,856	353
Capital Repayments through Access Charges				
Rate of return				
5.0%	2,407	7,352	6,514	5,011
6.5%	2,407	8,646	7,808	6.305
8.0%	2,407	10,030	9,192	7,689

5.49 **Table T5.6** presents the resulting cash flows to 2070. With capital grant funding the present value of operating subsidy is £34.5million and financial cost to Government is £64.8million.

5.50 A 5% rate of return increases subsidy requirements to £118.9million and financial cost to Government to £91.7million.

5.51 Repayment at 8% increases required operating subsidy to £167.5million and financial cost to Government to £140.3million.

T5.6 Cash Flows (Present Value to 2070, £'000, 2002 prices)

Funding Option	Total Operating Costs (inc. Access Charges)	Operating Subsidy	Financial Cost to Government
100% Government Capital Grant			
Capital Grant			
57,492	49,773	34,516	64,753
Capital Repayments through Access Charges			
Rate of return			
5.0%	134,197	118,940	91,683
6.5%	157,654	142,397	115,140
8.0%	182,741	167,484	140,227

5.52 **Table T5.7** demonstrates the impact of financing costs on the resulting BCR and NPV. Without financing costs, the BCR for Option 1 is 1.25 and the NPV £16.3million.

5.53 Financing at 5% delivers a BCR of less than 1, reducing further to 0.70 at 6.5% and 0.58 at 8.0%.

T5.7 Economic Summary (Present Value to 2070, £'000, 2002 prices)

Funding Option	Financial Cost to Government	NPV	BCR
100% Government Capital Grant			
Capital Grant			
57,492	64,753	16,285	1.25
Capital Repayments through Access Charges			
Rate of return			
5.0%	91,683	(10,647)	0.88
6.5%	115,140	(34,104)	0.70
8.0%	140,227	(59,191)	0.58

Partial Funding from Non-Government Sources

5.54 The following tables demonstrate the impact of securing part-funding from other non-Government sources.[xxiv] Additional grant funding of **£10million** and **£50million** are each tested with the remaining capital investment re-paid through access charges at 5% and 8% per annum.

5.55 **Table T5.8** shows the resulting financial position in 2029. Securing £10million of grant funding reduces the financial cost to Government from £5.0million to £4.4million at a rate of 5% and £7.7million to £6.8million at a rate of 8%.

5.56 If the secured funding increases to £50million, cost to Government reduces to £2.1million at 5% and £3.0million at 8%.

T5.8 Financial Summary 2029 (£'000, 2002 prices)

Funding Option		Total Revenues	Operating Costs	Operating Subsidy	Financial Cost to Government
100% Government Capital Grant					
Capital Grant					
83,905		2,407	2,694	1,856	353
Capital Repayments through Access Charges					
Rate of return	Other Grant Funding				
5.0%	10,000	2,407	6,769	5,932	4,429
8.0%	10,000	2,407	9,088	8,250	6.747
5.0%	50,000	2,407	4,440	3,602	2,099
8.0%	50,000	2,407	5,318	4,480	2,977

5.57 **Table T5.9** shows the resulting cash flows to 2070.

5.58 With £10million of grant funding the total financial cost to Government reduces from £91.7million to £81.1million at a 5% rate of return and from £140.2million to £123.1million at an 8% rate.

[xxiv] Similar results would be achieved through an equivalent reduction in construction costs.

5.59 With £50million of additional funding the cost to Government is lower than the £64.8million required with full Government capital grant funding, reducing to £54.8million at an 8% rate and £38.9million at a 5% rate.

T5.9 Cash Flows (Present Value to 2070, £'000, 2002 prices)

Funding Option		Total Operating Costs	Operating Subsidy	Financial Cost to Government
100% Government Capital Grant				
Capital Grant				
57,492		49,773	34,516	64,753
Capital Repayments through Access Charges				
Rate of return	Other Grant Funding			
5.0%	7,089	123,640	108,383	81,127
8.0%	7,089	165,659	150,402	123,145
5.0%	35,446	81,413	66,156	38,900
8.0%	35,446	96,331	82,074	54,818

5.60 **Table T5.10** shows the impact on the summary measures. With a funding investment of £10million, the BCR remains below 1.0 at a finance rate of 8% but reaches exactly 1.0 at the lower 5% rate.

5.61 With a £50million investment, the resulting BCR increases over and above the BCR with full Government grant funding, reaching 1.48 at a repayment rate of 8.0% and 2.08 at a rate of 5%.

T5.10 Economic Summary (Present Value to 2070, £'000, 2002 prices)

Funding Option		Financial Cost to Government	NPV	BCR
100% Government Capital Grant				
Capital Grant				
57,492		64,753	16,285	1.25
Capital Repayments through Access Charges				
Rate of return				
5.0%	7,089	81,127	(91)	1.00
8.0%	7,089	123,145	(42,109)	0.73
5.0%	35,446	38,900	42,137	2.08
8.0%	35,446	54,818	26,218	1.48

6 Conclusions and Way Forward

The Business Case

6.1 Our conclusion, reached at the end of Stage 1, that re-opening the Keswick-Penrith Railway appears likely to generate economic benefits in excess of its costs still stands. The risk analysis conducted during Stage 2 confirms this, whilst highlighting where the key areas of risk lie.

6.2 The economic performance is however, relatively modest, being positive and not dissimilar to other re-opening schemes in Scotland and Wales, but falling short of the DfT's 1.5:1 threshold which would move it from the 'low' to 'medium' value for money category. Any expenditure with a BCR over 1 might be considered as worthwhile pursuing. But financial constraints will mean that in practice not all proposals over this threshold will be fundable and the general advice from DfT is that few transport schemes in the low category will be funded unless there are substantial non-monetised benefits.

Funding Options

6.3 The option of a private sector infrastructure provider levying an access charge to recoup all of the costs of the scheme appears difficult to formulate. At even the lowest interest charge that we have considered, 5%, the BCR would fall from 1.25:1 to 0.88:1 and the financial cost to government over the lifetime of the appraisal would rise from £65m (pv) to £92m.

6.4 At an 8% return the BCR would fall to 0.58:1 and the cost to government increases to £140m (pv). The attraction of the scheme to the private sector would, ironically be, that since so little of the required revenue would be coming from the train operators farebox, the income stream would be relatively low risk (since it would be largely provided by support payments to the operator by DfT Rail). Conversely, the likelihood of that support being obtained is considerably weakened by the impact on the financial and economic performance of the scheme of the requirement to provide a return to the infrastructure provider.

6.5 A more realistic option is to consider a combination of grant funding from non-central government funds and an access charge arrangement for the remainder. We have looked at a relatively modest grant, or some other form of non-refundable local/regional source of funding, to the value of £10m (not dissimilar to what has been obtained for some of the Scottish re-opening schemes) and a more extensive option whereby £50m of non-repayable funding is procured from non-DfT sources.

6.6 The £10m option does not change the general conclusion that a PFI based access charge mechanism is unlikely to be attractive or affordable.

6.7 With a £50m injection of non-DfT funds however the scheme begins to look more attractive in that the BCR (at 5% return) rises to 2.08:1 and the cost to government in support over the appraisal period falls to £39m (pv). This would actually move the scheme into the DfT's 'high' category of value for money (>2.0:1) although this is simply a result of the BCR being calculated on the costs that accrue to central government (which have fallen by £50m in this scenario).

6.8 It should also be noted that the economic performance of the scheme would improve even further if the remainder of the capital cost was funded by central government grant as there would be no requirement to make a return for the infrastructure provider.

6.9 Therein lies the key to any funding vehicle for taking the project forward. The project will require a substantial local or regional injection of funding to reduce the requirement on DfT funding and improve its 'fundability' against other calls on their funds. Providing 100% of the funding purely by the suggested PFI route of an infrastructure provider charging for access to the track is not viable at the level of capital cost implied by our central analysis as the DfT value for money position worsens significantly once a margin for the infrastructure provider is built in to the equation.

6.10 The local funding would need to be justified on the wider social, environmental and economic grounds that we have considered in this report. Unfortunately these benefits are currently unlikely to be valued at a level that would lever in the scale of local or regional funding required. The most useful indicator of local economic value – the number of new jobs created and the cost of providing these new jobs – shows that the cost per new job created would be of an order of magnitude higher than what would normally be considered acceptable, whilst the additional tourism spend in the local economy, whilst valuable, would make only a modest contribution.

6.11 We need to look at the bigger picture to see how the railway could potentially be funded locally. In the context of the on-going failure of the government to make any inroads towards its own key sustainability indicators (greenhouse gas emissions, greater walking/cycling and public transport use) and growing concern about car based access to our National Parks it must be considered distinctly possible that within the next ten to fifteen years some form of policy to charge or in someway restrict access by private car to the Lake District will come onto the agenda as a serious prospect.

6.12 Visitors to the North Lakes travel considerable distances to access the area, as do residents travelling out of the area, and as a consequence the railway would have an impact well beyond its immediate environment. In this scenario, rail access to the heart of the North Lakes and the excellent public transport network which radiates out from Keswick as a complement to the existing facility at Windermere for the South Lakes would be highly attractive. As we showed in the Stage 1 report such a policy could result in a much improved BCR (making the central government case for investment stronger) whilst opening up the possibility of a revenue stream against which to raise the local funding component.

6.13 All of which points to a conclusion that whilst the funding climate does not appear to offer a short term prospect of implementing the scheme the medium term environment may well be much more favourable and as a consequence it is very important that decisions are not taken which could preclude its future development.

Immediate Steps

6.14 There are some key short term hurdles to overcome here. Despite the efforts of CKP Railways in successfully engendering sufficient support and funds to continue progressing the scheme design and the requirements of an Environmental Statement the proposals lack critical support at local authority and regional level.

6.15 Stakeholders with an interest in tourism and economic development are generally highly supportive of the proposals but the more ambivalent views of some of the local authorities must be of some concern as the scheme will require their full support if it is to progress smoothly through business case approval and Transport and Works Act process.

6.16 Furthermore the scheme does not have any priority status within the DfT's Regional Planning Assessment, the Regional Spatial Strategy or Network Rail's Route Utilisation Strategy. This militates against its potential fundability.

6.17 A key priority therefore is to use the findings of this report to engage with the key local stakeholders, particularly the planning authorities, to confirm that the proposal can bring worthwhile economic benefits and that the remaining alignment should be safeguarded against further incursion.

6.18 At a regional level the scheme needs to be considered for inclusion in the Regional Transport Strategy. It is not currently a priority scheme but, if as expected, rail schemes come in to the Regional Funding Allocations (RFA) process in the next year or two the scheme needs to be 'in the pot' for consideration in this context. It will not be possible to get it into consideration unless it has a public sector promoter, whether at local or regional level.

6.19 With this in mind the immediate priority for CKP railways must be to use the generally positive conclusions and the evidence base behind this report to actively engage in discussion with the public sector with a view to obtaining support in principle to firstly, safeguard the alignment and secondly, to bring the scheme into the appropriate regional and national strategies.

Appendix A

Economic Appraisal Summary Tables

appendix A

Option 1 Economic Appraisal

Penrith Keswick Option 1																										
ECONOMIC BENEFITS																										
(£ 000 real)																										
Year	**TOTAL**	**NPV 3.5%**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2039**	**2049**	**2059**	**2069**
		NPV 3.0%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
FINANCIAL EVALUATION																									
Govt Capital grant	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Capital grant	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK TOC Capital Costs	83,905	**57,493**	27,968	27,968	27,968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PK TOC operating costs	170,626	**49,773**	0	0	104	2,436	2,496	2,525	2,536	2,548	2,560	2,572	2,585	2,597	2,610	2,623	2,637	2,651	2,665	2,679	2,694	2,791	2,897	3,014	3,144
PK TOC revenues	56,920	**15,188**	0	0	0	314	487	558	575	594	613	632	652	673	694	716	739	762	787	812	838	925	1,022	1,129	1,247
Other TOC revenues	106,636	**28,455**	0	0	0	589	912	1,045	1,078	1,113	1,148	1,184	1,222	1,261	1,301	1,342	1,385	1,429	1,474	1,521	1,569	1,733	1,915	2,115	2,336
Total UK Rail revenue	163,556	**43,643**	0	0	0	904	1,398	1,603	1,654	1,706	1,760	1,816	1,874	1,933	1,995	2,058	2,123	2,191	2,261	2,333	2,407	2,659	2,937	3,244	3,584
Subsidy required	113,602	**34,516**	0	0	0	2,121	2,010	1,967	1,961	1,954	1,947	1,940	1,933	1,924	1,916	1,907	1,898	1,888	1,878	1,867	1,856	1,865	1,875	1,885	1,896
Apportioned industry costs	4,218	**1,199**	0	0	0	47	53	56	56	57	58	58	59	60	61	62	62	63	64	65	66	69	73	77	81
Financial cost/(benefit) to Government (pre tax)	95,089	**64,753**	27,968	27,968	27,968	1,579	1,151	978	939	899	857	814	770	724	676	627	576	523	468	412	353	201	33	-153	-358
ECONOMIC EVALUATION																									
Net economic cost	250,313	**106,067**	27,968	27,968	28,073	2,389	2,443	2,469	2,480	2,491	2,502	2,514	2,525	2,537	2,549	2,562	2,574	2,587	2,601	2,614	2,628	2,721	2,824	2,937	3,062
Benefits captured through fares	163,556	**43,643**	0	0	0	904	1,398	1,603	1,654	1,706	1,760	1,816	1,874	1,933	1,995	2,058	2,123	2,191	2,261	2,333	2,407	2,659	2,937	3,244	3,584
GJT benefits																									
New users	12,868	**3,719**	0	0	0	94	145	165	169	173	177	181	186	190	195	200	205	210	215	220	225	225	225	225	225
Road decongestion benefits	215,232	**62,415**	0	0	0	1,626	2,492	2,830	2,892	2,955	3,020	3,087	3,155	3,224	3,295	3,368	3,442	3,518	3,596	3,675	3,757	3,757	3,757	3,757	3,757
Road accident benefits																									
Non users	26,525	**7,692**	0	0	0	200	307	349	356	364	372	380	389	397	406	415	424	434	443	453	463	463	463	463	463
Option Value	23,868	**7,210**	0	0	0	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398
Environmental Benefits	0	**0**																							
Economic Development Benefits	0	**0**																							
Total Benefits	278,493	**81,036**	0	0	0	2,318	3,341	3,741	3,814	3,890	3,967	4,046	4,127	4,209	4,294	4,380	4,469	4,559	4,652	4,746	4,843	4,843	4,843	4,843	4,843
Total Benefits (inc Revenues)	442,049	**124,680**	0	0	0	3,222	4,740	5,344	5,468	5,596	5,727	5,862	6,000	6,143	6,288	6,438	6,592	6,750	6,912	7,079	7,250	7,502	7,780	8,087	8,427
Net Benefits	191,736	**18,612**	-27,968	-27,968	-28,073	832	2,296	2,874	2,988	3,105	3,225	3,348	3,475	3,605	3,739	3,876	4,018	4,163	4,312	4,465	4,622	4,781	4,956	5,150	5,365
Gross Benefit:Cost Ratio		**1.18**																							
NPV/K		**0.29**																							
DfT Rail BCR		**1.25**																							
DfT NPV		**16283**																							

Option 2 Economic Appraisal

Penrith Keswick Option 2

ECONOMIC BENEFITS
(£ 000 real)

Year	TOTAL	NPV 3.5%	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2039	2049	2059	2069
		NPV 3.0%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
FINANCIAL EVALUATION																									
Govt Capital grant	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Capital grant	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK TOC Capital Costs	87,468	**59,935**	29,156	29,156	29,156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PK TOC operating costs	178,542	**52,106**	0	0	104	2,549	2,615	2,646	2,658	2,670	2,682	2,695	2,708	2,721	2,735	2,749	2,763	2,777	2,792	2,807	2,823	2,922	3,031	3,151	3,284
PK TOC revenues	70,791	**18,899**	0	0	0	393	608	697	719	741	764	788	813	839	865	892	920	949	979	1,010	1,041	1,150	1,271	1,404	1,550
Other TOC revenues	110,214	**29,413**	0	0	0	610	943	1,081	1,115	1,151	1,187	1,225	1,263	1,303	1,345	1,387	1,431	1,477	1,524	1,572	1,622	1,791	1,979	2,186	2,415
Total UK Rail revenue	181,004	**48,311**	0	0	0	1,003	1,552	1,778	1,834	1,892	1,952	2,013	2,077	2,142	2,210	2,279	2,351	2,426	2,502	2,581	2,663	2,942	3,249	3,589	3,965
Subsidy required	107,647	**33,138**	0	0	0	2,156	2,007	1,949	1,939	1,929	1,918	1,907	1,895	1,883	1,870	1,857	1,843	1,828	1,813	1,798	1,781	1,771	1,760	1,748	1,734
Apportioned industry costs	4,289	**1,218**	0	0	0	47	54	56	57	58	58	59	60	61	62	62	63	64	65	66	67	71	74	78	83
Financial cost/(benefit) to Government (pre tax)	89,191	**64,879**	29,156	29,156	29,156	1,593	1,117	924	880	836	789	741	691	640	587	532	475	416	355	292	227	51	-144	-359	-598
ECONOMIC EVALUATION																									
Net economic cost	261,721	**110,823**	29,156	29,156	29,260	2,502	2,561	2,589	2,601	2,612	2,624	2,636	2,648	2,660	2,673	2,686	2,699	2,713	2,727	2,741	2,755	2,851	2,957	3,073	3,201
Benefits captured through fares	181,004	**48,311**	0	0	0	1,003	1,552	1,778	1,834	1,892	1,952	2,013	2,077	2,142	2,210	2,279	2,351	2,426	2,502	2,581	2,663	2,942	3,249	3,589	3,965
GJT benefits																									
New users	10,051	**2,898**	0	0	0	72	110	126	129	133	136	140	143	147	151	155	159	163	168	172	177	177	177	177	177
Road decongestion benefits	218,447	**63,319**	0	0	0	1,643	2,519	2,861	2,925	2,990	3,057	3,125	3,195	3,266	3,339	3,414	3,491	3,569	3,649	3,731	3,815	3,815	3,815	3,815	3,815
Road accident benefits																									
Non users	26,674	**7,732**	0	0	0	201	308	350	357	365	373	382	390	399	408	417	426	436	446	456	466	466	466	466	466
Option Value	26,765	**8,085**	0	0	0	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446
Environmental Benefits	0	**0**																							
Economic Development Benefits	0	**0**																							
Total Benefits	281,937	**82,035**	0	0	0	2,361	3,383	3,783	3,858	3,934	4,012	4,093	4,175	4,258	4,344	4,432	4,522	4,614	4,708	4,805	4,903	4,903	4,903	4,903	4,903
Total Benefits (inc Revenues)	462,941	**130,346**	0	0	0	3,364	4,935	5,561	5,692	5,826	5,964	6,106	6,251	6,401	6,554	6,712	6,874	7,040	7,211	7,386	7,566	7,845	8,153	8,493	8,868
Net Benefits	201,220	**19,524**	-29,156	-29,156	-29,260	862	2,373	2,972	3,091	3,214	3,340	3,470	3,603	3,740	3,881	4,025	4,174	4,327	4,484	4,645	4,811	4,994	5,196	5,420	5,667
Gross Benefit:Cost Ratio		**1.18**																							
NPV/K		**0.30**																							
DfT Rail BCR		**1.26**																							
DfT NPV		**17156**																							

Option 3 Economic Appraisal

Penrith Keswick Option 3

ECONOMIC BENEFITS
(£ 000 real)

Year	TOTAL	NPV 3.5%	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2039	2049	2059	2069
		NPV 3.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FINANCIAL EVALUATION																									
Govt Capital grant	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Capital grant	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK TOC Capital Costs	104,983	**71,936**	34,994	34,994	34,994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PK TOC operating costs	177,185	**51,617**	0	0	104	2,520	2,587	2,618	2,630	2,642	2,654	2,667	2,680	2,694	2,707	2,721	2,735	2,750	2,765	2,780	2,796	2,895	3,005	3,126	3,259
PK TOC revenues	72,027	**19,229**	0	0	0	400	619	709	731	754	778	802	827	853	880	908	936	966	996	1,027	1,060	1,170	1,293	1,428	1,577
Other TOC revenues	110,992	**29,620**	0	0	0	614	950	1,089	1,123	1,159	1,196	1,233	1,272	1,313	1,354	1,397	1,441	1,487	1,534	1,583	1,633	1,804	1,993	2,201	2,432
Total UK Rail revenue	183,019	**48,849**	0	0	0	1,014	1,569	1,798	1,855	1,913	1,973	2,035	2,100	2,166	2,234	2,305	2,378	2,453	2,530	2,610	2,693	2,974	3,286	3,629	4,009
Subsidy required	105,054	**32,319**	0	0	0	2,120	1,968	1,909	1,898	1,888	1,877	1,865	1,853	1,840	1,827	1,814	1,799	1,784	1,769	1,753	1,736	1,725	1,712	1,697	1,681
Apportioned industry costs	4,305	**1,222**	0	0	0	47	54	57	57	58	59	59	60	61	62	63	64	64	65	66	67	71	75	79	83
Financial cost/(benefit) to Government (pre ta	103,350	**75,857**	34,994	34,994	34,994	1,553	1,072	876	832	787	740	691	641	589	535	479	421	362	300	236	170	-9	-206	-425	-667
						1,506																			
ECONOMIC EVALUATION																									
Net economic cost	277,863	**122,330**	34,994	34,994	35,098	2,473	2,533	2,561	2,572	2,584	2,596	2,608	2,620	2,633	2,645	2,658	2,672	2,685	2,699	2,714	2,728	2,824	2,930	3,047	3,175
Benefits captured through fares	183,019	**48,849**	0	0	0	1,014	1,569	1,798	1,855	1,913	1,973	2,035	2,100	2,166	2,234	2,305	2,378	2,453	2,530	2,610	2,693	2,974	3,286	3,629	4,009
GJT benefits																									
New users	15,728	**4,541**	0	0	0	114	175	199	204	210	215	220	226	232	237	243	250	256	262	269	276	276	276	276	276
Road decongestion benefits	220,472	**63,906**	0	0	0	1,658	2,542	2,888	2,952	3,018	3,085	3,154	3,225	3,297	3,370	3,446	3,523	3,602	3,683	3,766	3,850	3,850	3,850	3,850	3,850
Road accident benefits																									
Non users	26,919	**7,804**	0	0	0	203	311	353	361	369	377	385	394	403	412	421	430	440	450	460	470	470	470	470	470
Option Value	26,765	**8,085**	0	0	0	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446	446
Environmental Benefits	0	**0**																							
Economic Development Benefits	0	**0**																							
Total Benefits	289,883	**84,336**	0	0	0	2,421	3,474	3,886	3,963	4,042	4,123	4,206	4,290	4,377	4,465	4,556	4,649	4,744	4,841	4,941	5,042	5,042	5,042	5,042	5,042
Total Benefits (inc Revenues)	472,902	**133,185**	0	0	0	3,435	5,043	5,684	5,818	5,955	6,096	6,241	6,390	6,543	6,700	6,861	7,026	7,197	7,371	7,551	7,735	8,017	8,328	8,672	9,051
Net Benefits	195,039	**10,855**	-34,994	-34,994	-35,098	961	2,510	3,123	3,245	3,371	3,501	3,633	3,770	3,910	4,054	4,202	4,355	4,511	4,672	4,837	5,007	5,193	5,398	5,625	5,876
Gross Benefit:Cost Ratio		**1.09**																							
NPV/K		**0.14**																							
DfT Rail BCR		**1.11**																							
DfT NPV		**8479**																							

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