CASE FOR RAIL IN THE HIGHLANDS AND ISLANDS

TEE Methodology and Implementation

Technical Report 3

March 2004

Prepared for:

Tony Jarvis
Highlands and Islands Enterprise
Cowall House
Inverness Business and Retail Park
Inverness

Prepared by:

Steer Davies Gleave
68-70 George Street
Edinburgh
EH2 2LR

[t] +44 (0)131 226 9500
[i] www.steerdaviesgleave.com

Contents

Page

TABLES

1. TEE METHODOLOGY

Introduction

1.1 This note sets out the manner that transport economic efficiency (TEE) calculations are usually performed, before explaining the problem in undertaking the calculation for this study. A methodology that will give an underestimate of the dis-benefit associated with losing rail services in the Highlands is proposed as an alternative. This method is illustrated with a numeric example.

Transport Economic Efficiency Calculations

Classic Approach

1.2 The economic efficiency of a transport project is calculated as a sum of four principal components, as set out below.

Overall Transport Economic Efficiency Impact	=	Change in transport user benefits (Consumer Surplus)	+	Change in system operating costs and revenues (Producer Surplus and Government impacts)	+	Change in costs of externalities (Environmental costs, accidents, etc.)	-	Investment costs (including mitigation measures)

1.3 The change in producer surplus and government impacts is calculated by subtracting the change in total costs from the change in total revenues. A similarly simple calculation is required for the calculation of the change in the costs of externalities (environmental and accidents). The change in transport user benefits (or the consumer surplus calculation) is, however, more complex. In situations where demand changes between the Do Minimum and Do Something the consumer surplus calculation is made using the Rule of Half. The formula and description for this method is detailed in Box 1.

BOX 1: CONSUMER SURPLUS AND THE RULE OF A HALF

In Figure 1 an improvement in transport supply conditions, such as an investment in the road infrastructure between locations i and j is shown. The fall in transport costs have effects on two groups of users:

(i) Existing users – these gain the benefit of the cost change ($C^0 - C^1$) each, or area C^0AEC^1.

(ii) New users – these gain a benefit equal to the excess of their willingness to pay over their cost of travel, or area ABE.

User benefits are the sum of (i) and (ii) and can be written:

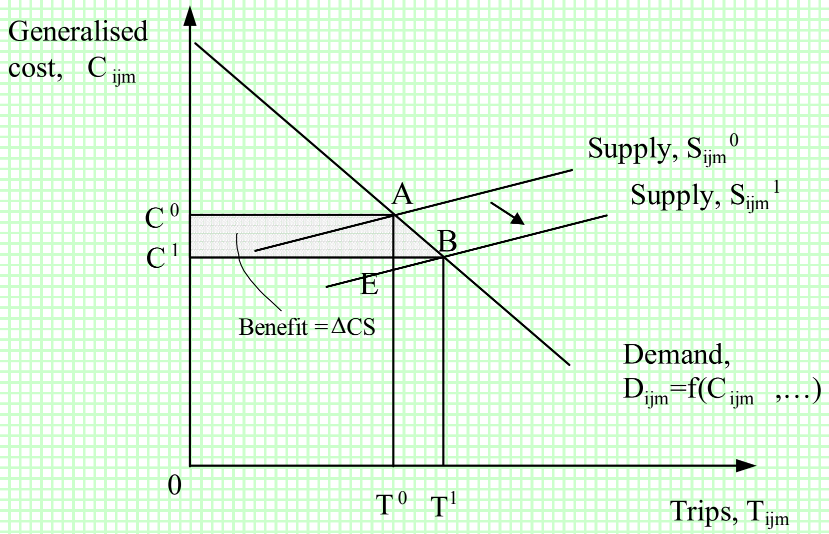
$$(C^0 - C^1)\ T^0 + ½(C^0 - C^1)(T^1 - T^0)$$

or

$$½\ C^0 - C^1)\ (T^0 + T^1)$$

This is rule of a half measure of user benefits. It can be extended to treatments of networks with simultaneous changes in costs on links and across modes.

Figure 1: User benefit (=change in consumer surplus) in the do-something scenario compared with the do-minimum



The rule of a half formula assumes the demand curve is linear between points A and B. Therefore, it is only an approximation to the true benefit – the more convex (or concave) the demand curve, and the larger the cost charge, the less accurate the approximation will be. Given the many sources of error in practical appraisal work, the rule of a half is considered acceptable except in cases such as estuary or mountain crossings, where cost changes may be considered “large” relative to base cost levels or in situations where a new mode or development area is introduced.

Source: Mackie and Nellthorp (2001)

The Problem

1.4 Unfortunately a problem exists with the calculation of consumer surplus (i.e. traveller user benefits - or dis-benefits one should say) associated with losing the rail network in the Highlands and Islands using the classic method. This is because the “after” situation has lost a mode of transport. As indicated in Box 1 this is one of the three situations in which the Rule of Half calculation for consumer surplus breaks down.

There are no such difficulties associated with the calculation of changes in producer surplus, government impacts and accidents and environmental costs in such situations. The reason why the Rule of Half breaks down with the loss of a mode is that the cost of travelling by that mode (rail) is infinite in the Do Something situation.

1.5 In such situations two general options exist for the calculation of the consumer surplus measure:

- Analysis of the rail mode as a public transport route choice option in a public transport model; or
- Direct integration or "numeric integration" of the demand function to travel.

1.6 Both approaches require the specification of a demand forecasting model, something that is not available. An alternative approach therefore has to be developed. This approach, discussed in the following section, will however lead to an underestimation of the consumer surplus dis-benefits.

Rail Study Methodology for calculation of user benefits

A Generalised Cost Approach

1.7 As discussed in Box 2: Consumer Surplus AND Generalised Cost

1.8 the generalised cost of travel is made up of a number of components including time costs, out of pocket costs, reliability costs, convenience costs, comfort costs, safety risk costs and so on. Often only time costs and out of pocket costs (including vehicle operating costs) are included in a generalised cost equation. In a multi-modal demand model the other aspects of generalised cost are often aggregated into what is termed a Mode Specific Constant. The Mode Specific Constant represents the fixed advantage that one mode has over another.

1.9 For any individual or group of individuals (market segment) we also expect that they will choose the travel option that maximises their utility (or minimises the generalised cost of travel). Thus for people who are currently rail travellers within the Highlands we know that:

$$\text{Their generalised cost of travel by rail} \leq \text{Perceived generalised cost of travel by car or by bus}$$

Where:

$$\text{Generalised Cost} = \text{Time Costs} + \text{Out of Pocket costs} + \text{Mode Specific Costs}$$

1.10 We therefore know that for every existing rail traveller that loses the opportunity to travel by rail they will experience an increase in generalised cost (or a dis-benefit).

BOX 2: CONSUMER SURPLUS AND GENERALISED COST

The essential measure of benefits to users is consumer surplus, that is, the excess of consumer willingness to pay over the cost of a trip. Normally, we are interested in the change in consumer surplus resulting from some change in the cost of travel brought about by an improvement in transport conditions. Operationalising this in transport poses some practical problems. For most consumer goods the cost of the good (to the consumer) is its price. When it comes to transport, prices and money costs are only a proportion of the composite cost of travel, which in principle also incorporates the time spent by the individual, access times to public transport, discomfort, perceived safety risk and other elements. Therefore price alone is not an appropriate measure of either the cost of travel or the consumer's WTP, instead generalised cost is used. Generalised cost is an amount of money representing the overall cost and inconvenience to the transport user of travelling between a particular origin and destination by a particular mode. In practice, generalised cost is usually limited to a number of impacts which when summed comprise the components of user benefit:

(i) Time costs (Time in minutes * Value of Time in $/minute);

(ii) User charges (e.g. fares/tolls); and

(iii) Operating costs for private vehicles (VOCs), Non-Motorised Traffic (NMT) and pedestrians.

It is important to note that the components of generalised cost tend to vary by mode. Public transport users (bus, coach, train, air and ferry) will pay a money fare and give up time in order to travel to their destination. Car users and own-account freight users give up time, may be asked to pay an infrastructure access charge or toll, and pay for their own fuel and VOCs. Therefore there is a fundamental difference in the reported user benefits for users of different modes. Additionally, it is important to recognise that Values of Time vary between individuals and even for the same individual, depending on for example trip purpose. There is no unique willingness-to-pay for travel time savings. This has consequences for modelling and appraisal, especially for toll roads or urban mass transit, where suitable market segmentation is needed.

Source: Mackie and Nellthorp (2001)

1.11 The principle underlying the calculation of changes in consumer surplus is that the generalised cost of travel as experienced by an individual (or an homogenous group of individuals) alters as a result of the transport initiative. It is this change, at an aggregate level, that the Rule of Half, direct integration or numeric integration methods measure. For the reasons discussed above these methods cannot be used for this study. A conservative estimate (i.e. an underestimate) of the consumer surplus measure can however be made by directly comparing the generalised cost of travel by the different modes, for those rail travellers that continue to travel in the absence of a rail network. This approach is an underestimate as:

- Dis-benefits to those who do not travel as a result of the loss of the rail network cannot be calculated. This level of dis-benefit is represented by area ABE in Figure 1. It cannot be calculated because we have no information regarding the demand function for rail travel (i.e. no information regarding what value the people who used to travel placed on their trip); and
- We have no information regarding the implicit advantage that rail travel has over other modes (as perceived by the existing rail travellers) and identified as the Mode Specific Constant in the generalised cost equation.

1.12 In practice the Mode Specific Constant can have a significant impact on an individual's (or a group of individuals') generalised cost relative to other modes. For example, it is perfectly possible to envisage a situation within the Highlands where travel times by car are faster than by rail and costs incurred by car users are similar if not less than the fares paid by train users. In such a situation generalised cost based purely on the time and out of pocket costs would imply that car generalised costs are lower than train generalised costs, and that every individual would choose the car mode. However, in reality some people choose the train, thus for these people the Mode Specific Constant for rail above car must be at least equal to or greater than the difference in the time and out of pocket costs of the different modes.

1.13 The above discussion therefore allows us to define a set of rules for the calculation of user dis-benefits associated with the loss of the rail network in the Highlands and Islands.

- For those who no longer travel:
  - As we cannot calculate their dis-benefit we set it equal to zero. In welfare economic terms this is equivalent to saying that non-travellers attach no <u>additional</u> value to travelling to the activity they currently undertake compared to the activity they will undertake in the absence of a rail network (e.g. visiting friends within walking distance of their home) (i.e. they are neutral to change in activity);
- For those who continue to travel but travel by a different mode:
  - Dis-benefit is set equal to the difference in generalised cost between the modes. Generalised cost is calculated from time costs and out of pocket costs only, as we have no information regarding the size of the Mode Specific Constant.

1.14 This is subject to the constraint that existing rail travellers cannot gain benefit by being forced to switch modes. If time and out of pocket cost differences indicate that such a benefit may occur a minimum estimate of the Mode Specific Constant is made that resets the benefit to zero.

1.15 In welfare economic terms this constraint implies that travellers are neutral to a change in mode – that is they value travelling by rail and the alternative mode exactly the same.

1.16 With respect to those who no longer travel we have assumed as our base assumption that they are neutral to travelling by rail or undertaking a different activity. This as has been stated is a conservative assumption. A more optimistic assumption, which is very possibly an overestimate, is that non travellers value their trip at the cost of the fare plus their time costs. We will therefore sensitivity test the TEE to an assumption that non travellers are worse off by the cost of their fare plus time costs. We do however note that this implies that non travellers are unable to replace their train journey with any activity of significant value.

A Worked Example

1.17 For clarity it is worth illustrating the proposed methodology with a worked example:

1.18 For example, 1,000 people per year travel between A and B by rail, of which 90% are leisure (non-work travellers) and other 10% are business travellers. If the rail service was closed all the business travellers will switch to the car. Non-work travellers however would have a mixed response, of the 900 non-work travellers 600 would switch to the car, 200 to the bus and 100 would no longer travel. This is illustrated in Table 1.1 and also illustrates the generalised cost calculation per person.

TABLE 1.1 TRAVEL CHARACTERISTICS AND GENERALISED COST PER PERSON

	Rail (work/non-work)	Work		Non-Work			
		Rail (work)	Car (work)	Rail (non-work)	Car (non-work)	Bus (non-work)	Non-travellers (non-work)
Travel Characteristics							
Demand	1,000	100	100	900	600	200	100
Average fare or vehicle operating cost	£5.00	£5.00	£6.10	£5.00	£4.50	£5.00	N/A
Time (mins)	30	30	25	30	25	33	N/A
Proportion of time spent working on train	N/A	50%	0%	N/A	N/A	N/A	N/A
Generalised Cost calculation							
Value of Time	---	£30.43	£30.43	£4.52	£4.52	£4.52	£4.52
Generalised Cost per person (time and out of pocket costs only)		£12.61	£18.78	£7.26	£6.38	£7.49	£0.00

1.19 Table 1.2 illustrates the user benefit calculation. As can be seen from this table there is a total dis-benefit of £662. This is, however, an underestimate because we have no information regarding the implicit value that existing rail travellers place on travelling by rail (the mode specific constant). The lack of a mode specific constant is most obvious for the 600 non-work travellers who switch to using the car as we have not been able to ascribe any dis-benefits to this user group. However, the issue is also pertinent to the other user groups. Additionally, the lack of information regarding the preferences of those who no longer travel means that total dis-benefits further underestimated.

TABLE 1.2 USER BENEFIT CALCULATION

	Existing	No Rail Network	Mode Specific Constant	Benefit Per Person	Total Benefits
Work: Rail to Car	£12.61	£18.78	Unknown	-£6.17	**-£6.17**
Non-Work: Rail to Car	£7.26	£6.38	Minimum Value of £0.88	£0.00	£0
Non-Work: Rail to Bus	£7.26	£7.49	Unknown	-£0.23	**-£45**
Non-Travellers	£7.26	Unknown	Unknown	£0.00	£0
Total					**-£662**

1.20 Our sensitivity test assumes that non travellers experience a dis-benefit equal to their fare plus their time costs. This would give a further dis-benefit of £726 (=100*(£4.52/2+£5.00)). This would imply that total dis-benefit of losing the rail service would be £1,388.

Summary

1.21 The TEE welfare economic measure comprises of four principal components. The particular characteristic of this study (the closure of the Highlands lines) means that difficulty is experienced in calculating the user benefit (or consumer surplus) measure; particularly as no demand forecasting model exists. An alternative approach, based on generalised cost is therefore needed, unfortunately such an approach only provides an underestimate of the true dis-benefit. The other components of the TEE can still be calculated as normal.

2. TEE IMPLEMENTATION

The Appraisal

Do Minimum and Do Something

2.1 It is necessary to define a Do Minimum and a Do Something in order to undertake a cost benefit analysis. The study aims to value the rail network within the Highlands and Islands. We therefore make this valuation by comparing it to a situation in which no rail service existed within the Highlands and Islands. Thus this leads to the following definitions:

- **Do Minimum:** the existing network, services, fares and travel behaviour; and
- **Do Something:** no rail network within the Highlands and Islands, but a rail network exists outwith the HIE area. This implies that the rail network will terminate at Tyndrum (West Highland Line), Blair Atholl (Highland Main Line) and Keith (Inverness - Aberdeen Line). These stations will form railheads and it is expected that bus services from the Highlands and Islands will integrate into the revised train network and timetable. It is also envisaged that appropriate facilities will be provided at these stations to ensure that sufficient and secure park and ride facilities are available.

Travel Behaviour in the Do Something

2.2 Travel behaviour in the Do Something would differ quite radically from that which currently exists. It is useful to consider trips internal within the Highlands and Islands and those between the Highlands and Islands and other parts of the UK separately.

2.3 For trips internal to the Highlands and Islands we would expect that instead of using the rail network people would use an alternative mode of travel (e.g. bus/coach, car (own, friends or relatives), hire a car, taxi, air or a slow mode) or not travel at all. In general we would expect that only one main mode of transport would be used (accepting the fact that people may walk or taxi to a coach station to catch the bus/coach – as they currently do to catch the train). Additionally, within the Highlands and Islands the other modal networks are in general parallel to the rail network and it is a straight forward process to obtain data regarding their principal characteristics:

- Travel time (from time tables or route planners for cars);
- Fares; and
- Distances.

2.4 For trips between the Highlands and Islands and external areas, the situation is much more complex. Again people have the choice not to travel or to use one of the modes identified above. Additionally, however, people have the choice to park and ride in a number of locations or even bus and train. Park and ride is an important mode option for accessing the centres of large metropolitan areas (e.g. Glasgow or Edinburgh). Thus one may expect that a number of people will choose to park and ride at one of the many available sites between the Highlands and Islands and the metropolitan areas. In addition to existing park and ride sites (e.g. Croy station and sites in the vicinity of the Forth Bridge) people travelling by car from the Highlands and Islands would also be able to use the new rail park and ride sites at Tyndrum, Blair Atholl and Keith or alternative sites at say Perth or Stonehaven). Additionally, such interchange facilities would be available to bus users making a long journey either to the central belt or to England. In fact such options could be very attractive for those travelling long distances and to destinations in congested parts of the network. It is one thing catching a bus from Inverness to Blair Atholl and then a train from Blair Atholl to Leeds, but it is a completely different proposition to catch a bus all the way from Inverness to Leeds. Similarly it is one thing driving from Inverness to Blair Atholl and then catching a train from Blair Atholl to London, whilst it is a completely different proposition to drive all the way to London.

2.5 We can therefore see from these simple examples that travel choices between locations within Highlands and Islands and areas outwith that are quite complex, as the number of travel options become very large. In such situations one normally develops a network model. If a network model were to be developed to it would need to have a specification similar to that of the Transport Model for Scotland (which doesn't in fact cover the Highlands and Islands), currently being developed by the Scottish Executive. Such a model would contain:

- Coverage of the UK (with fine zones in Scotland and coarse zones in England);
- A full specification of travel demand in the core part of the model area;
- A road network with distances and speeds (variable with congestion);
- A full service specification for trains (times, fares, frequencies, etc.);
- A full service specification for buses (times, fares, frequencies, etc.); and
- A full specification of park and ride facilities.

2.6 Such a model would be able to determine the travel costs associated with using each mode or route choice option. Obviously the development of such a model is well outside the scope of this study. Thus an alternative method had to be utilised to obtain travel cost data for trips between the Highlands and Islands and the rest of the UK. Two main options were considered:

2.7 Spreadsheet model containing data for each mode between aggregations of zone pairs. The difficulty with this option was that without a network model there was no consistent mathematical means of calculating average travel times and costs by different modes between the aggregated zone pairs. Additionally, the data requirements would be extremely onerous. There are some 2500 stations within the UK, and to attempt to calculate car travel times between Highlands and Islands stations and these stations (even aggregations of them), let alone bus times and fares would be a very large task. Additionally, one would need to consider the demand for park and ride on the longer distance journeys, and how to calculate such a composite cost.

2.8 To assume that all existing rail travellers who continue to travel outside the HIE area park and ride (i.e. travel by bus or car to their nearest rail park and ride station (Tyndrum, Blair Atholl or Keith) and then continue to travel by train from there. This is not completely realistic, as we would in fact expect only a subset of the travellers to park and ride. From a Highlands and Islands rail user perspective this approach may in fact overestimate the dis-benefit of losing the rail service as we are forcing all users to park and ride when in fact some may in fact prefer to drive all the way to their destination. However, we are also underestimating the impact as we do not include the impact of closing the Highlands and Islands rail network on transport users outside the Highlands and Islands (e.g. through increased congestion and reduced fare revenues for train operating companies in England). Additionally, and importantly, this approach requires a dataset that is achievable to obtain within the context of the scale of this study.

2.9 The approach adopted for the TEE analysis was therefore the latter option (i.e. the park and ride option). The other key assumption that is made is that there will be a smooth and free interchange at the respective rail head (Blair Atholl, Keith and Tyndrum). This implies that:

- There will be no additional waiting time beyond that already experienced at the existing origin (e.g. Inverness). That is if someone typically arrives at Inverness station 5 minutes before their train departs they will arrive at the railhead a similar amount of time before the train will depart (this applies to both bus and car passengers/drivers); and
- Car parking at the railhead is free.

Data

2.10 Table 2.1 details the data used in the TEE, its source and for which component of the TEE analysis it was used for.

TABLE 2.1 TEE DATA AND REQUIREMENTS

DATA	Source	User Benefits	Operator Impact	Accident Environment
Demand				
Travel Demand	CAPRI data	X	X	X
Proportion of demand switching mode	HIE Rail Surveys	X	X	X
Working/Non-working time split	ScotRail & HIE Rail surveys	X		
Rail Growth (over 30 yrs)	SSRS[1] (SDG, 03)			
Average car occupancy	TEN[2] - DfT			X
Travel Times				
Rail journey times	Timetables	X		
Bus journey times	Timetables	X		
Car journey times	Routeplanner: www.theaa.com	X		
Air journey times	British Airways	X		
Time working on train	HIE Rail Surveys	X		
Rail journey times	Timetables	X		
Distances				
Road Distances	Routeplanner: ww.theaa.com	X		X
Fares and Out of Pocket Expenses				
Rail fares	ScotRail	X	X	
Bus Fares	City Link/Stage Coach/Rapsons	X	X	
Vehicle Operating Costs	TEN – DfT	X	X	
Air fares + access costs	Average of British Airways / Easyjet Fares	X	X	
Car Hire costs	Avis	X	X	
Economic				
Travel time	TEN - DfT	X		
Real Growth Rates	Time, accidents: TEN - DfT Environment: zero	X		
Accident Values	NESA Manual (DMRB V 15)			X
Road Maintenance	NESA Manual (DMRB V 15)			X
Environmental Costs	Case For Rail Study			X

[1] Scottish Strategic Rail Study, 2003.

[2] Transport Economic Note.

The surveys undertaken as part of this study allowed a number of key local parameters to be derived:

TABLE 2.2 TRAVEL CHOICE IN ABSENCE OF RAILWAY

	Travel Choice in Absence of Railway						
	Not travel	**Bus or Coach**	**Own/ friends car**	**Hire Car**	**Air**	**Other (Taxi, walk, cycle)**	**Total**
Number of responses							
All Lines	297	326	240	27	32	19	941
Proportions							
All Lines	**32%**	**35%**	**26%**	**3%**	**3%**	**2%**	**100%**
Aberdeen	20%	37%	38%	2%	3%	0%	100%
Mallaig	38%	25%	21%	5%	1%	10%	100%
Oban	33%	42%	20%	3%	3%	0%	100%
Kyle	50%	21%	20%	3%	1%	4%	100%
Wick	42%	34%	18%	3%	2%	1%	100%
Perth	24%	41%	26%	3%	6%	0%	100%

TABLE 2.3 TIME SPENT WORKING ON TRAIN

Line	Average proportion of time spent working on train (employers business)
Aberdeen	16.2%
Kyle	7.5%
Mallaig	0.0%
Oban	6.5%
Perth	28.6%
Wick	3.4%
All Lines	18.7%

TABLE 2.4 WORK/NON-WORK SPLIT: EXISTING USERS AND ALTERNATIVE TRAVEL OPTION

Journey Purpose - Rail							
Purpose	**Average**	**Aberdeen**	**Kyle**	**Mallaig**	**Oban**	**Perth**	**Wick**
Work	13%	21%	4%	2%	8%	18%	12%
Non Work	87%	79%	96%	98%	92%	82%	88%
Journey Purpose - Not travel							
Purpose	**Average**	**Aberdeen**	**Kyle**	**Mallaig**	**Oban**	**Perth**	**Wick**
Work	2%	8%	1%	0%	3%	1%	1%
Non Work	98%	92%	99%	100%	97%	99%	99%
Journey Purpose - Bus-Coach							
Purpose	**Average**	**Aberdeen**	**Kyle**	**Mallaig**	**Oban**	**Perth**	**Wick**
Work	12%	18%	10%	0%	10%	13%	13%
Non Work	88%	82%	90%	100%	90%	87%	88%
Journey Purpose - Car							
Purpose	**Average**	**Aberdeen**	**Kyle**	**Mallaig**	**Oban**	**Perth**	**Wick**
Work	24%	32%	19%	23%	23%	42%	50%
Non Work	76%	68%	81%	77%	77%	58%	50%
Journey Purpose - Air							
Purpose	**Average**	**Aberdeen**	**Kyle**	**Mallaig**	**Oban**	**Perth**	**Wick**
Work	19%	33%	0%	0%	0%	22%	0%
Non Work	81%	67%	100%	100%	100%	78%	100%

2.11 The demand for train travel was assumed to grow with time in line with the national background growth forecasts used in the Scottish Strategic Rail Study (SSRS). The SSRS only provided demand forecasts until 2020 with no growth thereafter. Therefore zero growth was assumed between 2020 and the end of the appraisal period (2032), for rail and other modes. This methodology is consistent with that of the SSRS and also with major road studies, such as the Central Scotland Transport Study. One of the principal reasons for this approach is that it is generally more difficult to forecast economic growth and population over the full length of the appraisal period.

2.12 Economic unit values were derived from the Transport Economic Note (TEN) published by the DfT. These were growthed using the TEN growth rates to give values in the correct forecast year. Accident costs and road maintenance costs were obtained from the NESA Manual (DMRB Volume 15). It should, however, be noted that road maintenance costs associated with additional traffic are assumed zero by NESA if existing roads are in sound stuctural condition. For the Case for Rail type costs economic values were obtained from the Case for Rail study (SDG, 2002), and converted to the correct price and year base. A zero growth rate in the real value of environmental costs was assumed in the absence of other information.

2.13 Rail fares and bus fares are assumed to remain static in real terms over the 30-year evaluation period. However, for inclusion into the evaluation the fares need to be converted into the correct price (market prices) and year (1998). 2003 rail and bus fares were therefore multiplied by the rate of indirect taxation in the economy (DfT, 2002) and factored to reflect general inflationary increases between 1998 and 2003.

Non Travellers

2.14 The number of non travellers is identified across the network using the survey results. However, due to the presence of particular tourist characteristics certain origin-destinations pairs will experience a much higher proportion of non travellers in the absence of a railway. These and the volumes of tourists who will not travel are detailed in Table 2.5 and Table 2.6.

TABLE 2.5 COACH EXCURSIONS

Origin	Destination	Line	Number
Arrochar	Fort William	Mallaig	1,000
Arrochar	Oban	Oban	550
Dingwall	Kyle	Kyle	4,650
Fort William	Mallaig	Mallaig	3,750
Golspie	Wick	Wick	3,000
Mallaig	Fort William	Mallaig	900
Total			13,850

TABLE 2.6 HILLWALKING TRIPS TO/FROM CORROUR STATIONS

Origin	Destination	Line	Number
Various	Corrour	Mallaig	4,854
Corrour	Various	Mallaig	346
Total			5,200

2.15 In addition to non travellers who buy normal tickets, as discussed above, there will also be those who travel on unique railway products. These include day excursions on the Jacobite train and those organised by the Scottish Railway Preservation Society and multiday holidays organised by the Rail Scotsman and Pathfinder. Within the TEE analysis we have not included the costs associated with losing the multiday holidays as these, particularly the Royal Scotsman, dominate the appraisal – due to the fact that the fare pays for a lot more than just a train journey.

TABLE 2.7 HERITAGE RAILWAYS PATRONAGE

Operator	No. Passenger Per Year (Estimate)	Average Cost per trip	Cost per annum
Day Trips			
Jacobite	22,500	£25	£562,500
SRPS	2,800	£50	£140,000
Strathspey (assume remains open)	42,300	£8.40	N/A
Keith to Dufftown (assumes remains open)	Unknown	Unknown	N/A
Multi-Day Holidays			
Royal Scotsman	2,772	£2,673	£7,409,556
Pathfinder	360	£600	£216,000
Total	3,132		

Cost Benefit Analysis Parameters

2.16 The TEE analysis used the following parameters which are consistent with GOMMMS and the DfT's advice for appraisal with the new Green Book. These are:

- Discount rate: 3.5%
- Price Base: 1998 market prices
- Appraisal: 30 years (2003 to 2032)
- Demand and Cost Estimates: Base year (2003)
- Design Year (2018)
- End Year (2032)
- Interpolation: Linear interpolation for intervening years between 2003 and 2018 and 2018 and 2032

Application

Transport User Benefits

2.17 Transport user benefits are calculated through a comparison in the generalised cost of travel.

Private Sector Provider Impacts

2.18 Revenue impacts for the operators (rail, bus, air and car hire) are identified.

2.19 Operating cost changes for these sectors have however not been identified, as the full cost structures of the industries are not known, nor is the manner of the operators response to the loss of the rail service (e.g. increase in bus services, increased fleet size for car hire companies, etc.). Similarly the level of subsidy received by the rail operator is not known (the ScotRail subsidy is a block grant and is not disaggregated by line, service). The direction of change in the operating costs has, however, been indicated.

Freight

2.20 Freight impacts are calculated using the SRA's Sensitive Lorry Miles methodology.

Public Accounts (Government Impacts)

2.21 The public accounts are affected by the change in subsidies and grants as well as taxation. For the reasons discussed above, we do not know how the ScotRail subsidy will be affected by the closure of the lines within the Highlands and Islands, therefore we cannot estimate the scale of this impact. The direction of change has, however, been identified.

Accidents, Road Maintenance and Environmental Impacts

2.22 Dis-benefits to society have been calculated using the published rates and costs in the NESA Manual. Environmental costs and rates from the Case for Rail study have also been utilised to calculate the welfare economic impact of increased vehicle traffic.

3. REFERENCES

3.1 Department for Transport, UK (2000), *Guidance on Methodology for Multi-Modal Studies (GOMMMS)* Volume 2, Appendix F "Transport Cost benefit Analysis Background Material". London: DfT. [Also available online at http://www.dft.gov.uk/stellent/groups/dft_control/documents/contentservertemplate/dft_index.hcst?n=7923andl=3].

3.2 Mackie, P.J. and Nellthorp, J. (2001) "Cost-Benefit Analysis in Transport" in K.J.Button and D.A.Hensher (eds) *Handbook of Transport Systems and Traffic Control*, Pergamon, 2001, pp143-174.

3.3 Nellthorp, J. and Hyman, G. (2001), 'Alternatives to the RoH in Matrix based Appraisal', *Proceedings of European Transport Conference 10-12 September 2001.* London: Association of European Transport.

3.4 Department for Transport (2003) Transport Economic Note. London DfT. [Also available online at: http://www.dft.gov.uk/stellent/groups/dft_transstrat/documents/page/dft_transstrat_504865.hcsp]

3.5 Department for Transport (2003) Transport Appraisal and the New Green Book. London DfT. [Also available online at: http://www.dft.gov.uk/stellent/groups/dft_transstrat/documents/page/dft_transstrat_507971.hcsp]

3.6 Scottish Executive Development Department (2003) *The NESA Manual*, DMRB Volume 15. The Stationary Office, London. [Also available online at: http://www.official-documents.co.uk/document/deps/ha/dmrb/index.htm].

3.7 Steer Davies Gleave (2003) *Scottish Strategic Rail Study* Report to the Scottish Executive [Also available online at: http://www.scotland.gov.uk/library5/transport/ssrs-00.asp]

3.8 Steer Davies Gleave (2002*) Case for Rail* Report to Transport 2000 [Also available online at: http://www.transport2000.org.uk/].

CONTROL SHEET

Project/Proposal Name:	CASE FOR RAIL IN THE HIGHLANDS AND ISLANDS
Document Title:	TEE Methodology and Implementation
Client Contract/Project Number:	
SDG Project/Proposal Number:	205487

ISSUE HISTORY

Issue No.	Date	Details
	8th March 2004	

REVIEW

Originator:	Anne McGregor	
Other Contributors:	James Laird, John Stephens	
Review By:	Print:	John Stephens
	Sign:	....

DISTRIBUTION

Clients:	Highlands and Islands Enterprise
Steer Davies Gleave:	