

IDENTIFYING THE ECONOMIC VALUE OF RAIL SERVICES

ISSUES IN TRANSPORT ASSESSMENT AND EVALUATION



ABSTRACT

Following a literature review of international practice, the authors' main research concluded that New Zealand procedures fell short of good international practice, which typically incorporates 'strategic assessment' followed by proposal-specific 'detailed evaluation' procedures. The original research was supplemented by further (as yet unpublished) research work in this field to develop more complete and detailed evaluation procedures for rail proposals. This paper explores why rail often appears to perform poorly on the basis of current procedures, and concludes that this is partly due to New Zealand's history of transport funding. The hypothecation of road transport taxation, has led to a 'user-pays' perception of accountability to motorised road users. One of the consequences of this is that some benefits are either inadequately or inappropriately valued within current evaluation procedures.

Boulter R, Wignall D,

CONTENTS

- 1 BACKGROUND
 - 2 ISSUES RAISED BY THE RESEARCH
 - 3 RESEARCH FINDINGS
 - 4 RECOMMENDED RESPONSES
- REFERENCES

1 BACKGROUND

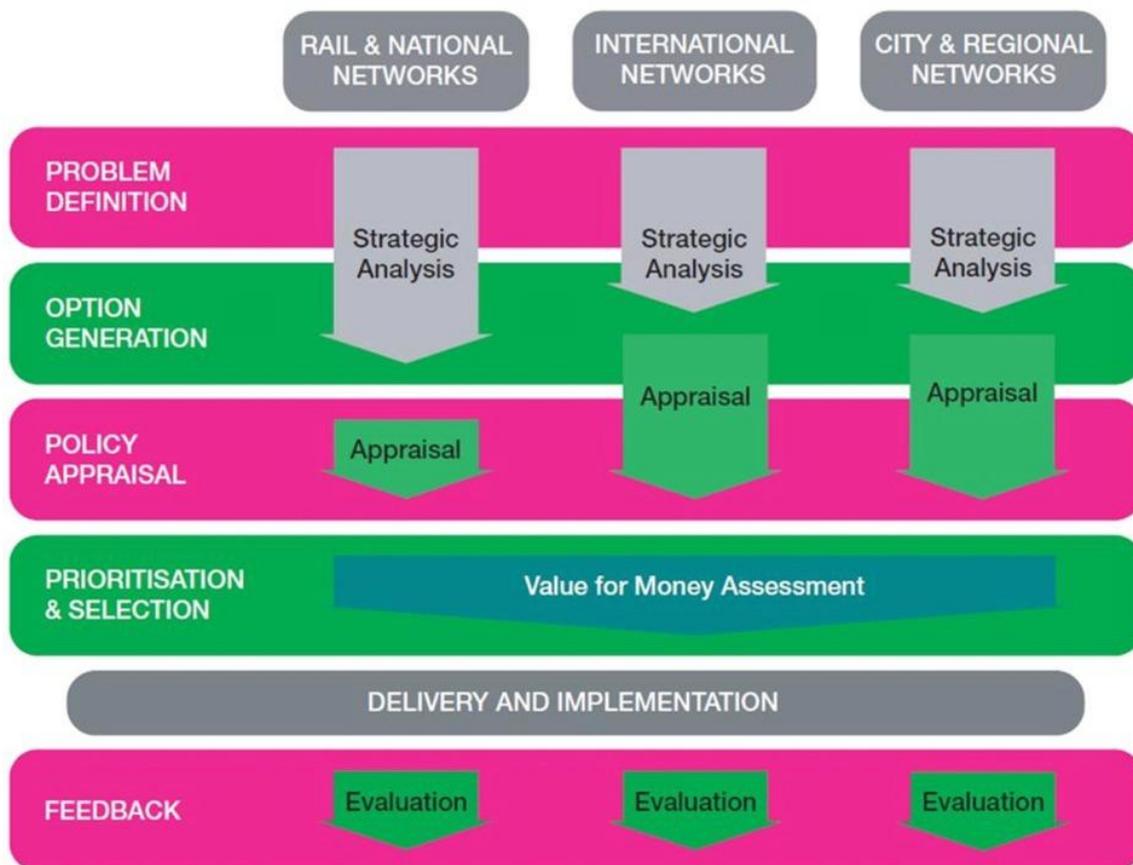
Review of International Practice

The original research involved a review of 120 international studies and practice examples in the field of rail assessment and evaluation, and a comparison of this with New Zealand practice and procedures. The resulting paper was peer-reviewed by Professor Chris Nash and James Jackson of Leeds Institute of Transport Studies (UK), and published by the Canadian Victoria Transport Policy Institute (Boulter-Wignall, June 2008)

The research was presented in July 2008, at the NZ Land Transport Funding Summit in Auckland (Boulter-Wignall, July 2008). Since this time it has been reported in several publications (Boulter, July 2008, Oct 2008, Boulter-Wignall, September 2008, December 2008, April 2009).

The review found that internationally, the role of passenger rail is typically considered within an overall strategic framework, supported by a comprehensive and detailed evaluation of particular options and proposals. An example of this type of approach is provided below:

Figure 1: A recommended three stage UK approach, beginning with strategic analysis, followed by policy appraisal and then by detailed evaluation (DfT, 2007)



The research also reviewed practice and procedures in New Zealand for the consideration of rail proposals, and found that these were often out of step with good international practice.

Since the original research was undertaken, the NLTF funding assessment criteria have been adjusted to replace the former 'seriousness and urgency' assessment category with a new one of 'strategic fit'. The other two former assessment categories of 'effectiveness' and 'efficiency' have been retained, as described below:

***“Strategic fit:** Assessment of strategic fit considers how well the transport activity aligns with the NZTA’s strategic direction as set out in the Investment and Revenue Strategy. For example, this includes ‘public transport making significant contributions to easing severe congestion’.*

***Effectiveness:** The effectiveness rating is about the contribution the proposed investment will make towards achieving a particular strategic outcome. Higher ratings are provided for those proposals that provide long term, integrated and enduring solutions.*

***Economic efficiency:** Greater emphasis on economic efficiency as a key factor in obtaining value for money..., particularly but not exclusively, through the benefit cost ratio (BCR).....*

The prioritisation process has also been revised and places the greatest weight on strategic fit, followed by economic efficiency and then effectiveness.” (NZTA, July 2009)

The revised process has some similarity to the Australian three stage filtering approach, which begins with a strategic merit test, followed by a rapid outline evaluation and then by more detailed evaluation (ATC, 2006).

The revised New Zealand process sets a clear direction for the sector and specifies required outcomes. However, the process remains focussed on individual projects, and it is not clear how the strategic fit is defined and measured. This approach could be improved through: a) more quantified strategic assessment (to ensure that outcomes are achieved) and b) more comprehensive cost benefit analysis (to represent 'total economic value').

Following the original research, further work has been undertaken by the authors to investigate detailed evaluation procedures for rail proposals. This has involved the use of worked examples to demonstrate a comprehensive approach to cost benefit analysis, as recommended in the original research paper.

The later research involved the development of modelling techniques in support of detailed evaluation and cost benefit analysis, to test a range of options for urban, regional and longer distance passenger rail services (TFL, 2009).

2 ISSUES RAISED BY THE RESEARCH

Comparing Rail and Road Proposals

A question asked by the research, in fact, one of the motivations behind it, was a common one raised frequently in discussions with professional colleagues, namely: *'why do rail proposals seem to perform poorly in evaluations compared to road proposals?'*

Firstly, this type of question serves to emphasise how much New Zealand transport funding decisions are dominated by the detailed evaluation of specific proposals, rather than being placed in a strategic context.

Secondly, the later research work undertaken by the authors has shown that the apparent difference between rail and road evaluation performance has often been overstated in New Zealand, due to the limitations of the cost-benefit analysis methodologies in current use.

The issue with respect to cost-benefit analysis is not so much that that rail actually delivers lower levels of benefit for a given level of investment, but that there has historically been an underlying tension, rarely made explicit, between the 'user pays' type cost-benefit analysis used in New Zealand procedures and 'social' or 'comprehensive' cost-benefit analysis which estimates the overall public benefit of proposals. Having said this, it needs also to be emphasised that although comprehensive cost-benefit analysis is very important, it should not be over-relied on, and there is a need to consider strategic issues and non-monetised factors, within the decision-making process.

New Zealand Funding Rationale

The nature of national transport investment in New Zealand has often been ambiguous. For example, the 'National Roothing Fund' was changed in 2002 to a 'National Land Transport Fund', without any change to the dedicated funding sources. This change also appeared to occur without any clear examination of the implications, as is implied by the funds title change, from investment in roading to investment in transport in general. From 2002 onwards, the uses to which the fund has been put have been broadened, firstly with the addition of public transport and walking / cycling funding categories, and later with the addition of funding for travel demand management and travel behaviour change. In parallel with this, funding of the road safety activities were transferred to the fund from the former Land Transport Safety Authority, and funding for rail freight and sea freight transferred from a former 'Alternatives to Roothing' Fund (which had predated 2002 and been justified not on the basis of general public benefit, but of benefits to motorists). In the most recent, 2009 Government Policy Statement, most future rail freight and sea freight funding support has been withdrawn. Despite these additional expenditure categories, the overwhelming majority of NLTF expenditure remains directed towards general roading.

Decisions on whether petrol should be taxed (and by how much) need to be made according to quite separate criteria than how much money is required to pay for roading. In fact, Governments of both political persuasions, left-of-centre 1999-2008 and right-of-centre prior to 1999 and since late 2008, have often pragmatically departed from the prevailing

logic of hypothecation, by either transferring to roading or to transport, less than the amount raised from the dedicated sources (leading to the popular charge of petrol taxes being “*siphoned off into the Consolidated Fund*”), or through additional funding from the general Crown account.

One of the reasons that ‘user pays’ CBA has been so dominant in New Zealand is that the allocation and hypothecation of petrol taxes has historically been based on an assumption that these taxes ‘belong to’ motorists, and so procedures have placed a heavy emphasis on benefits to motorists and these have been used to value transport investments. However, the authors suggest that this approach is problematic for several reasons:

- Roading is a public asset rather than a private good, and it seems logical that it is funded in the same way that other public assets are funded, namely on an objectives basis in order to achieve required outcomes.
- The hypothecation of taxation sources (i.e. fuel duties and road user charges) and vehicle excise duty) to certain forms of transport investment, contrasts with the absence of such dedication between many other forms of taxation and other specific areas of investment in public services.
- Even leaving to one side the questionable logic behind hypothecation, there is little reason to conclude that continuing to use the majority of NLTF resources to increase road capacity for general traffic will actually help motorists. This is because continued investment in road capacity (for general traffic) is likely to ‘induce’ further traffic growth, leading to increased congestion and higher travel times. Induced traffic, although imperfectly understood, has been known to exist for many years, and is included within current NZ procedures (SACTRA, 1994; EEM, 2009). However, in practice, induced traffic is rarely adequately allowed for in modelling methodologies used to support the evaluation of roading proposals for funding purposes.
- A number of other underlying problems with NZ cost-benefit procedures are also evident, including the high valuation of travel time by private car and the consequent effect of this in funding allocation.

We suggest that this has resulted in a mix of transport activities funded from the National Land Transport Fund somewhere between a ‘user-pays’ outcome and ‘social benefit cost analysis’ outcome. This finds practical expression as the inclusion of some activities where benefits arguably do not accrue to dedicated-funding-payers (i.e. motorists and road freight), but excluding some which logically should be funded were the fund allocated on the basis of ‘comprehensive cost benefit analysis.’ We suggest that all transport proposals, including those for passenger rail, should be evaluated using the latter category.

It should be explained that local passenger rail within the Auckland and Wellington conurbations is funded from the National Land Transport Fund, this deriving from the ‘user-pays’ logic that motorists could be expected to benefit from mitigated congestion through some level of modal shift. However, the level of funding for urban rail is low in New Zealand in comparison with international practice and the potential for other urban rail services, especially in Christchurch, remains unfulfilled.

Other forms of passenger rail, such as 'regional' rail' (i.e. between a conurbation and its rural regional hinterland) and 'long-distance' rail (inter-regional, or at national level, such as Wellington-Auckland), do not receive funding from the National Land Transport Fund. This is partly due to a longstanding (but unjustified) policy that such services are 'not funded' (MoT, 2005) and partly due to the limited nature of evaluation and cost benefit analysis procedures (LTNZ, 2008).

This ambiguity in the treatment of different types of transport investment, we suggest, is reflected in the incomplete assessment and the inconsistent evaluation of transport proposals for funding, and that this in turn is one reason why urban, regional and long-distance rail in New Zealand have persistently appeared (wrongly) to be 'poor performers'. As our research found, a different approach is taken to this issue in almost all overseas jurisdictions.

Relationship with Economic Development

Clearly there is a need for transport investment to, in the words of the NZ Government Policy Statement on Land Transport Funding (its paragraph 25), to "*support national economic growth and productivity*". Whilst the Policy Statement develops this further through an emphasis on the pivotal role of State Highways and especially named "*roads of national significance*", this depends for its justification on a thorough and comprehensive analysis of the full range of costs and benefits

As we have already argued, the analysis used in New Zealand is not comprehensive, since it has evolved incrementally from what was originally a 'user-pays roading' system. Furthermore, in spite of efforts over past years to promote integrated 'packages' concept of 'linked and complementary' projects from diverse parts of a land transport programme, a programme-wide 'strategic assessment' is not yet undertaken in New Zealand.

The integration of rail with other transport investments has been affected by the fact that rail has been in the private sector from 1993 until 2002 (Auckland passenger rail services), 2004 (rail infrastructure) and 2008 (rail operations). This has meant the Government's relationship with the system's owners has been a contractual one and this has not always allowed the full range of public costs and benefits to be accounted for.

The current assessment and evaluation processes in New Zealand are not equipped to identify which form of transport investment will give best 'value for money' in terms of the '*support [for] national economic growth and productivity*' (MoT, 2009) sought by the Government's Policy Statement (GPS). This means that a reasoned justification is lacking to support the pivotal role accorded in the GPS to State Highways, and more specifically to '*roads of national significance*' (significantly 'roads' as distinct from 'corridors' which could include rail). It could equally be the case (again, if this could be justified) that a more targeted approach to road investment, together with significantly increased investment in non-road modes, could better deliver the '*support [for] national economic growth and productivity*' sought by the Government.

Put simply, there are only two nationwide land transport networks, namely, the road and rail systems. The road network is highly valued, and invested in comprehensively. In contrast, over many years the rail network in New Zealand has been allowed to run down, and is under-valued in current assessment procedures and funding evaluation methodologies.

There is a strong case for an improved approach to the integrated planning of road and rail networks in New Zealand, along the lines of the 'strategic assessment' used in international practice that was identified during the course of our research. This is needed to identify the combination of transport investments which will give greatest 'value for money' in achieving the GPS objectives (MoT, 2009).

In our research we also identified some specific aspects of economic growth attributable to rail investment:

- Agglomeration benefits are primarily related to rail rather than road projects. This is because of rail's ability to provide high capacity passenger flows into centralised termini, facilitates highly intensive economic activity. In contrast, most road networks have the effect of encouraging a geographical spreading of urban land uses, and notably in the context of agglomeration, of commercial land use activities.
- Urban form benefits also arise when a network of rail-station-based 'transit-oriented development' hubs are developed. This produces a more efficient and safer land use arrangement for larger conurbations than the highly-dispersed low density activities generated by purely road-based networks.
- Freestanding local economies at some distance from the main conurbations can also derive significant economic benefits from rail connections in terms of expenditure and increased employment opportunities. Corby in the UK provides a useful case study of the impact that rail can have on a local economy. The town had a freight only single track rail line for 42 years, between 1967 when passenger services were declared 'uneconomic', and earlier this year when a passenger service (on the formerly freight-only line) was restarted. Corby has a population of 50,000 and is 120 km from London and one estimate of the effects of the new rail service has forecast the attraction of: *... 'commercial investment worth £200m to the town, creating more than 1,200 jobs...'* (Planning, 2009)
- Integrated passenger and freight planning is needed to deliver more viable and competitive rail corridors.
- Tourism benefits from the availability of rail hubs, rail networks and longer-distance rail routes, which are attractive to international tourists who want to experience rail based travel, who do not have their own transport or who want to cycle in different parts of the country. A good example of this is provided by the Scottish rail network, where the comprehensive assessment and evaluation of transport investments, including tourism benefits, has identified the degree of support required for the operation and further development of passenger rail services (HIE, 2004: Network Rail, 2007)
- Not all potential economic benefits associated with rail are necessarily immediate and direct. The image created of New Zealand overseas, through positive experience of the rail system, carries with it potential future economic benefits through

migration and investment effects. It is not simply about high value tourism, today's backpackers may be tomorrow's business migrants.

Very few of the above benefits are taken into account in current assessment and evaluation procedures applicable to rail in New Zealand. As one example of this, the value of tourism is acknowledged in many other transport investment decisions, for example, NLTF funds are used for a number of predominantly tourist State Highways, additional funding has been recommended for a series of great cycle rides to stimulate tourism, Air NZ has been lobbying for Government funding support ...*'to subsidise marginal international routes as tourist numbers are knocked by the economic downturn..'* (Dompost, 2009) and support for flights to the Cook Islands has been agreed to by Government, tourist cruise ship facilities on the Auckland waterfront are also to be part funded by central Government. The tourism benefits from rail use are also potentially significant, but as yet, have not been specifically acknowledged in New Zealand procedures.

3 RESEARCH FINDINGS

Original Research

National and multi-regional transport planning is most effective if undertaken on an integrated multi-modal basis and if it is supported by appropriate data, techniques and resources. Presently, rail planning tends to be undertaken in isolation from mainstream transport planning and this situation is unlikely to change unless a more open and transparent approach to strategic assessment is taken.

All modes have their own inherent strengths and weaknesses, which give them a particular place in an optimal mix within a transport investment programme. It is important to ensure that longer distance rail network, within the overall transport system, is able to fulfil its potential, deriving from its own particular strengths. In order to explore fully how this may be achieved, appropriate assessment and evaluation procedures are needed to identify the potential value of rail, and to assist in optimising rail's contribution to national transport objectives.

Strategic assessment needs to be used to explore options to improve and support rail passenger services as well as to test possible synergies with the rail freight network. An example of this would be to explore how rail could be developed as a long-term strategic alternative to inter-urban private car travel, because of future fuel uncertainties, the potential to reduce emissions and to provide more reliable, more efficient and higher quality travel choice options.

Detailed evaluation is also important, especially if it takes place within the context of an appropriate strategic context, in order to prevent an overly narrow and project-focussed approach being adopted. The detailed evaluation of longer distance rail services, taking into account all relevant factors, would assist in maximising the value of the national rail network by improving usage, optimising outcomes and demonstrating value for money.

In cost benefit analysis terms, the research found that the evaluation of rail proposals in New Zealand (LTNZ, 2008) could usefully be broadened to reflect good international practice, see Figure 2 and following discussion below.

Figure 2: Review of 25 European countries, showing a range of monetised factors used in international cost benefit analysis practice (ITS, 2007)

		Construction costs	Disruption from construction	Costs for maintenance, operation and administration	Passenger transport time savings	User charges and revenues	Vehicle operating costs	Benefits to goods traffic	Safety	Noise	Air pollution - local/regional	Climate Change	Indirect socio-economic effects
North/West	Austria (*)												
	Belgium (*+)												
	Denmark (*)												
	Finland (*)												
	France (*)												
	Germany (*)												
	Ireland (*)												
	Netherlands (*)												
	Sweden (*)												
	Switzerland (*)												
	UK (*)												
East	Czech Republic (*)												
	Estonia (+)												
	Hungary (*)												
	Latvia (+)												
	Lithuania (*)												
	Poland (+)												
	Slovak Republic (*)												
	Slovenia (*)												
South	Cyprus (+)												
	Greece (+)												
	Italy (+)												
	Malta (*)												
	Portugal (+)												
	Spain (*)												

Colour codes:
 : Included with a money value
 : Measured quantitatively, qualitatively or not included

New Zealand cost benefit analysis procedures are dominated by the valuation of travel time, vehicle operating cost and safety for road based projects, in part reflecting their historical development from what was originally a 'user-pays' roading methodology (as outlined above). This means that public transport benefits, under current procedures, heavily depend on their ability to relieve road congestion. There are a number of other aspects that are awarded specific monetary valuation in current New Zealand procedures, as follows:

- User benefits: such as comfort, convenience, utility and the positive health effects of walking and cycling.
- Externalities: such as noise effects on property, emissions effects through CO₂ value per tonne, air pollution health effects due to PM₁₀.

However, these aspects tend to be awarded small valuations, are often omitted from project evaluation and therefore tend to be insignificant in terms of decision making and programming.

New Zealand could very usefully adopt some aspects of international practice, for example in terms of: the more equitable treatment of modes, adopting increased values for

externalities and acknowledging the wider potential benefits of public transport, including option values and tourism benefits.

The original research also found a disconnect between different funding methodologies for the evaluation of rail proposals used by different organisations within New Zealand, together with a lack of transparency. All of this has resulted in a lack of consistency and co-ordination across the transport sector when dealing with rail issues.

Later research

Following publication of the original research findings, discussions with a number of organisations, including the Ministry of Transport, Land Transport NZ, and the Ministry for the Environment, helped confirm the best way forward for the work.

The outcome was to undertake a more detailed review of cost benefit analysis techniques, and their potential application in testing rail proposals.

In order to apply this review to New Zealand, the detailed techniques were based, as far as possible, on the current NZTA Economic Evaluation Manual (NZTA, 2009), supplemented by established international practice where required.

In undertaking this work, techniques to calculate a number of benefits (including consumer surplus and option values) were developed, along with a prototype fares policy testing capability and a prototype cost benefit assessment model. This later research was also peer-reviewed by Leeds Institute for Transport Studies and a number of changes to the methodology were made as a result.

The results from this work indicated that the benefit cost ratios obtained for the rail proposals tested, were substantially (typically 25 to 50%) greater than could be expected if only the more limited EEM procedures had been applied (and without incorporating other relevant international practice).

4 RECOMMENDED RESPONSES

The Authors recommended responses to the research findings are as follows:

- Adopt a two stage process, commencing with quantified and objectives based strategic assessment, followed by the more detailed and comprehensive evaluation of specific proposals.
- Ensure that assessment and evaluation procedures are consistent with good international practice.
- Undertake comprehensive cost benefit analysis and consider non-monetised factors (suitably quantified or scaled) within detailed evaluation
- Develop methodologies, techniques and models for the assessment and evaluation of rail proposals within a multi-modal framework, leading to the more equitable treatment of different modes.

- Decouple transport revenue considerations from decision-making regarding the scale and nature of transport expenditure.

Economic growth is the primary objective of the New Zealand Government elected in late 2008. To support economic growth, rail needs to be much better integrated into national transport planning and associated investment programmes. Optimal overall economic performance will not necessarily be achieved primarily through a focus on enhancement of the road network.

In the final analysis the research was not only about rail. In fact, the approach could have taken as its starting point almost any specific modal topic.

The research concluded that the approach to transport investment, including rail and road investments, is most effective if it is based on clearly-defined higher-level objectives for the nation as a whole, worked into an objectives-based and quantified strategic assessment, and then followed by the detailed evaluation of individual proposals. Within this, it is important that cost benefit analysis is comprehensive.

REFERENCES

ATC, (Australian Transport Council), *'National Guidelines for Transport System Management in Australia'* Volume 1, Introduction to the Guidelines and Framework, January 2006

Boulter R, *'Land Transport Programmes Under Changing Legislation,'* Planning Law Update Conference, Wellington, October 2008.

Boulter R, *'Urban Form, Passenger Rail and Transport Programmes – Mind The Gap,'* NZ Planning Institute Planning Quarterly Journal, June 2009.

Boulter R, Wignall D, *'Identifying the Value of Long Distance Rail Services,'* Victoria Transport Policy Institute, June 2008 http://www.vtpi.org/rail_evaluation.pdf

Boulter R, Wignall D, *'Research Findings: Identifying the Value of Long Distance Rail Services,'* Land Transport Funding Summit, Auckland, July 2008

Boulter R, Wignall D, *'Identifying the Value of Long Distance Rail Services,'* IPENZ Transportation Group Roundabout Newsletter, September 2008

Boulter R, Wignall D, *'Identifying the Value of Long Distance Rail Services,'* CILT Logistics and Transport Journal, December 2008

Boulter R, Wignall D, *'The Value of Long-Distance Passenger Rail Services,'* NZ Railway Observer Magazine, April 2009.

DfT, (Department for Transport), *'The NATA Refresh: Reviewing the New Approach to Appraisal,'* Staged Framework For Decision-Making, October 2007

Dompost, (Dominion Post), *'Call for subsidies on airline routes,'* June 2009 <http://www.stuff.co.nz/business/industries/2486618/Call-for-subsidies-on-airline-routes>

HIE (Highlands and Islands Enterprise), *'The case for rail in the Highlands and Islands,'* March 2004

ITS, (Institute for Transport Studies), UK, '*Transport Appraisal in other Countries Lessons for the NATA Refresh*,' Mackie P, Kelly C, for the UK Department for Transport, October 2007

LTNZ, (Land Transport New Zealand), '*Economic Evaluation Manuals*,' Volumes 1 and 2, 2008 (Note: later research used NZTA, 2009)

MoT, (Ministry of Transport), '*National Rail Strategy*,' 2005

MoT, (Ministry of Transport), '*Government Policy Statement on Land Transport Funding*,' 2009

Network Rail, '*Scotland Route Utilisation Strategy*,' March 2007

NZTA, (New Zealand Transport Agency), '*Stepping Forward Newsletter*,' July 2009, <http://www.ltsa.govt.nz/funding/stepping-forward/docs/stepping-forward-newsletter10.pdf>

Planning, '*Train services sets Corby back on Economic Track*,' 19 June 2009

SACTRA, '*Trunk Roads and the Generation of Road Traffic*,' 1994

TFL, (Transport Futures Limited), 2009 <http://www.transportfutures.net/modelling.html> & <http://www.transportfutures.net/appraisal.html>

Correspondence: roger@boulter.co.nz (planning) don.wignall@xtra.co.nz (analysis)