The Future of the Tasmanian Railway System: A Cost - Benefit Assessment of Options

Report

This study provides financial and social cost-benefit analyses of options for the Australian National railways operation in Tasmania (Tasrail).

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FOREWORD

In October 1990, the Federal government asked the Bureau of Transport and Communications Economics to undertake a study of the costs and benefits of the retention of Tasrail. The Bureau completed a similar study in 1987 which has been published as Report 62. The aim of the present study is to undertake economic and financial analyses of options available to Tasrail management and the Federal government. The emphasis in this report, based on social cost-benefit analysis, is on evaluating the implications of the options to close or to retain the Tasrail network.

The successful completion of this study considerably depended on the cooperation of the railway management, the unions, the Tasrail customers and other levels of government. The contribution and support that was provided by all those who willingly made their time available to the Bureau's staff during the course of the study, particularly staff at Australian National and Tasrail as well as at the Tasmanian Department of Roads and Transport, is greatly appreciated.

The report published here is essentially the same as that presented by the study team to the Minister for Land Transport. Following agreement reached between the Bureau, Australian National, Fay, Richwhite consultants and firms cooperating with the study, all commercial-in-confidence information has been deleted from this report.

The study team was led by Mr D. Tsolakis. Dr M. Harvey had most of the responsibility for developing the model which was used to derive the cost-benefit results. Mr T. Carmody and Ms L. Colley also made significant contributions. Estimation of road pavement damage costs was undertaken by Mr J. Miller.

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Canberra
August 1991

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ABSTRACT

This study provides financial and social cost-benefit analyses of options for the Australian National railways operation in Tasmania (Tasrail). With the current financial support arrangements due to expire at the end of June 1993, the Federal government referred the issue of the future of Tasrail to the Bureau of Transport and Communications Economics. The aim of the study is to identify the options available to Tasrail management and the Federal government, and to undertake economic and financial analyses of these options. The two basic options are closure and retention with actions taken to improve financial performance. For the retention option there are three scenarios considered involving differing rates of reduction in the Tasrail work force and substitution of capital for labour. The financial assessment examines the impact of the options on the Federal government as shareholder and payer of subsidies. The social cost-benefit analysis essentially estimates the value of the resources released to alternative uses if Tasrail is closed, less the value of the resources required to move the freight task by alternative modes. Unpriced social effects of rail closure on the environment and redundant rail workers are discussed separately. On balance the social cost-benefit analysis in this study suggests that society would benefit from retention of Tasrail. However, the full realisation of potential benefits available would depend on a restructuring of Tasrail.

SUMMARY

Background

June 1993 marks the end of the present commitment by the Federal government to provide financial support to Tasrail. In 1985–86 the Federal government agreed to a contractual arrangement to finance the operating losses incurred by Tasrail for the three-year period 1985–86 to 1987–88. A total sum of $65.9 million (in 1989–90 prices) was allocated for this purpose. Based on the findings of the BTE (1987a) assessment, in May 1988 the Federal government agreed to continue to support Tasrail for the five-year period 1988–89 to 1992–93. A revenue supplement of $44.2 million (in 1989–90 prices) was provided by the government over the first three years (1988–89 to 1990–91) of this agreement. In view of the current arrangement being subject to review by July 1993, the government asked the Bureau of Transport and Communications Economics (BTCE) to undertake a study of the costs and benefits of the retention of Tasrail. The aim of this study has been to identify the options available to Tasrail management and the Federal government, and to undertake economic and financial analyses of these options.

Tasrail

The Federal government assumed full operational and financial responsibility for the Tasmanian Railways in early 1978. Since then, the Australian National Railways Commission (AN) management has undertaken a range of initiatives to improve railway productivity and efficiency.

The Tasmanian railway system has operated at a loss for a long time. Tasrail's deficit remained above $20 million per year (in real terms) over the period 1977–78 to 1985–86. There have been some improvements in Tasrail's financial performance in recent years. For the three years ending 1989–90 the average operating loss (about $15 million) was 37 per cent below that for the previous three-year period.

Furthermore, between 1984–85 and 1989–90 real revenue per net tonne-kilometre (NTK) increased by about 17 per cent, and expenditure per NTK decreased by about 60 per cent. The number of Tasrail employees declined by 58 per cent from 1686 in 1978 to 706 at 1 March 1991. Over the same period

employee productivity, measured by NTK per employee, increased by 258 per cent.

Tasrail's primary goal, as set out in its corporate plan, is to achieve a financial 'break-even' outcome by 1995–96, that is, covering accounting costs including interest and depreciation. However, as pointed out in the corporate plan, this goal will not be achieved without reduction of interest expenses through conversion of debt to equity. In order to provide a realistic target, the present study redefined 'break-even' as covering labour, fuel, materials, sundries and overhead costs. Financing costs and capital costs (net of in-house labour capitalised in Tasrail's accounts) are excluded. An advantage of this definition of break-even is that it removes the effects of the capital structure (the debt to equity ratio via the level of interest expenses), a factor over which Tasrail management has no control.

The analysis contained in this study suggests that, with employment numbers continuing to fall at the same rate as in the recent past and with capital expenditures as planned, the break-even point under this definition could be reached by 1997–98. It is also estimated that a break-even position could be achieved by 1993–94 or 1994–95 under planning scenarios with more rapid rates of work force reduction. Besides being dependent on the rate at which Tasrail is able to restructure its operations, these results are subject to considerable variation depending on the level of the freight task achieved.

Alternative modes

Tasrail's competitor for freight services is road transport. Since most of the Tasmanian intrastate freight task is bulk freight, about 80 per cent of the total truck fleet is registered at a gross combination mass (GCM) of 41 tonnes. Over the three years ending 1989–90 heavy road vehicle traffic in Tasmania increased by about 25 per cent. A full or partial closure of Tasrail would further increase heavy truck volumes and this would, among other things, accelerate road damage. It is estimated that closure of Tasrail would affect 967 kilometres of road sections and result in increased road reconstruction and maintenance costs. In present value terms at a 10 per cent discount rate, these are estimated to amount to $13 million.

Relatively large sections of Tasmanian roads are approaching the limit of their design life. As at 1990, over 50 per cent of the total length of the National Highway was 20 years or more old with a mean pavement age of 15.5 years. The condition of the State arterial and local roads is worse. An increase in road investment may be needed to rehabilitate these roads to accommodate any increase in heavy truck traffic following rail closure.

Although road is by far rail's main competitor, sea transport may also compete with rail and road especially for container freight between Hobart and the mainland via northern ports. As a proportion of Tasrail's total freight task, the amount open to competition in this way is relatively small.

Freight task

Woodchip and pulpwood logs account for about half of the total Tasrail freight task in NTK and a substantial part of its revenue. Thus the future expansion of Tasrail's task depends heavily upon what is essentially an export industry. Other major commodities carried by Tasrail include coal, cement, containers, fertiliser, sulphuric acid and minerals.

Between 1977–78 and 1988–89 Tasrail's freight task increased by 87 per cent from 246 million NTK to a peak of 459.4 million NTK in 1988–89. However, in 1989–90 the freight task declined by about 10 per cent to 413 million NTK. Also in 1989–90, Tasrail experienced a loss of $16.5 million which was, in real terms, 4.4 per cent more than in 1988–89. The general downturn in business activity and the growth of interest costs appear to be the contributing factors for the increased losses in 1989–90.

The freight task and revenue projections developed by the consultants Fay, Richwhite, indicate that, in the medium to longer term, rail freight demand in Tasmania is expected to remain at levels similar to those of the late 1980s. However, there are some important potential opportunities and threats that may cause this forecast to vary. The product-by-product demand projections were derived using univariate analysis because of data, time and resource constraints. In this respect, the consultants adopted a similar approach to that used in the previous Bureau Tasrail study (BTE 1987a). The consultants' analysis was performed with reference to historic trends and expected economic scenarios as well as information provided to the consultants by Tasrail's customers.

The analysis of freight task and revenue forecasts focused on economic variables likely to impact on Tasrail through to 1995–96. Total freight demand is forecast to increase up to 1994–95 and then experience a moderate decline in 1995–96. Following 1995–96, the freight task forecasts for the remainder of the projection period up to the year ending 2010–11 are assumed constant and the revenue forecasts are assumed constant in real terms. To undertake sensitivity tests of the results with the aim of ascertaining the effects of variations in the forecasts, 'high' and 'low' scenario forecasts were constructed by taking 110 per cent and 90 per cent respectively of the 'medium' forecast.

On balance, there seems to be a number of positive developments that may increase the level of Tasrail freight in the medium to longer terms. The key opportunities include the possibilities of an increased export quota for woodchips, a new pulp mill and expansion plans in woodpulp production. It is envisaged, however, that the potential threat of increased road freight competition is likely to offset some of the optimism for a positive shift in freight demand for rail. The introduction of new technology in road transport (for example, increase in truck weight limits), changes in the Road Permit Scheme and changes in road user charges for heavy vehicles have the potential to significantly affect the rail–road modal split.

Assessment

Financial and social cost-benefit analyses were undertaken of the options to close or to retain Tasrail. For the retention option, three scenarios were considered involving differing rates of reduction in the Tasrail work force and substitution of capital for labour. The financial assessment examined the impact of the options on the Federal government as shareholder and provider of subsidies. This differs from the net impact on the government's budget which would take into account effects on taxation receipts and unemployment benefits.

The social cost-benefit analysis estimated the value of the resources released to alternative uses if Tasrail is shut down, less the value of the resources required to move the freight task by alternative modes. Ideally, a social cost-benefit analysis would take into account all the costs and benefits to society but, in practice, there will be particular costs and benefits to which it is difficult to attach dollar values. Hence, the likely unpriced environmental and employment effects of closure of Tasrail are discussed separately.

Two of the scenarios under the retention option examined in this study are those provided to the BTCE by AN and the consultants (Fay, Richwhite), who were engaged by the Department of Transport and Communications and AN. The consultants have analysed a business plan identified by Tasrail, referred to as 'restructure', which Tasrail believe is likely to produce the best possible financial result. As indicated by the consultants, implementation of this plan will only be possible if there are substantial cuts in employment. AN's draft Corporate Plan 14, referred to as CP14, proposes less labour reductions, with the substitution of capital for labour occurring more gradually. A third scenario was examined, referred to as 'base case', which assumes a continuation of the recent trend in work force reduction of 5 per cent attrition per year.

The BTCE makes no assumption as to whether the employment targets, the investment proposals and other key data contained in these scenario descriptions are technically feasible or whether they are industrially realistic.

The financial analysis, which was based on discounted present values of cash flows, indicated that the government loses under closure and all three retention scenarios. However, the government's losses are estimated to be smaller under closure when compared with the two higher labour cost retention scenarios, the base case and CP14. Only when the comparison is made with the restructure scenario which involves dramatic cuts in the Tasrail work force will the Federal government be relatively better off by retaining Tasrail.

When compared to the retention options of the base case and CP14, the net financial gain from closure (net cash flow under closure minus net cash flow under retention) is estimated to be $13.2 million and $9.7 million respectively, at a 10 per cent discount rate. However, this result is reversed under the restructure scenario, where a net financial loss of $7 million is estimated.

In the social cost-benefit analysis, the benefits of rail closure include the savings in future rail operating and capital costs, the release of capital resources currently tied up in Tasrail and level crossing accidents avoided. The costs associated with carrying the rail task by road include truck costs, road pavement damage, and additional road accidents. The analysis estimated the net cost to society of closure compared to three retention options. In all cases the results indicated that society would be better off if Tasrail was retained and that the benefit to society would be greater the more Tasrail is able to improve its efficiency.

Using a discount rate of 10 per cent, under the base case scenario society would be worse off by $18 million compared to about $25 million under the CP14 scenario and $34 million under the restructure scenario. These findings are based on a set of assumptions about key parameters depicting a 'medium' or most probable situation. The three key factors that are likely to have the most influence on the results are: (i) the freight task projections; (ii) the labour/capital adjustments required to improve the efficiency of Tasrail's operations; and (iii) the shadow prices of rail and road haulage labour. It is estimated that a markedly better or worse result could obtained due to variations in these factors. Nevertheless, under the most probable set of assumptions, the estimated net gain to society from closure (under the 'base case' scenario compared with closure) is sufficiently negative to conclude that Australia would be better off if Tasrail was retained.

Unpriced social and environmental factors

The current Tasrail work force would be directly affected by the closure of Tasrail. It was estimated that more than half of the employees would experience difficulty in finding suitable employment in an economy characterised by high levels of unemployment, as currently exist in Tasmania. Those employees located in the north of the State would have greater difficulties finding employment. In addition to the labour cost quantified in the analysis, there may be considerable costs imposed on redundant Tasrail workers unable to find work and on their families due to difficulties in finding alternative employment and due to social dislocation.

The additional heavy truck traffic on Tasmanian roads as a result of rail closure is expected to increase the levels of traffic noise, vibration and pollution which would be felt most strongly by communities that at present experience very little truck traffic. The level of carbon dioxide emissions would be half as great again than from rail. However, as a proportion of the national level, the increase in carbon dioxide emissions would be minimal.

Conclusion

On balance the social cost-benefit analysis suggests that society would benefit from retention of Tasrail. However, the full realisation of potential benefits available would depend on a restructuring of Tasrail. The restructuring program would greatly depend on: (i) access to sufficient funds to undertake the capital investments identified in the consultants' report; and (ii) continued cooperation of unions in the introduction of new work practices.

Broader social costs of closure which have not been evaluated in the cost-benefit analysis, also appear to add weight to the conclusion that Australia would be better off by retaining Tasrail. These costs include those imposed on redundant Tasrail employees unable to find work and on their families and the deleterious environmental consequences of noise, pollution, vibration and traffic volume caused by the increase in the number of heavy vehicles using the roads.

CHAPTER 1 INTRODUCTION

The Federal government assumed full operational and financial responsibility for the Tasmanian Government Railways in 1978, following an agreement reached between the Federal and State governments in 1975. Tasmanian rail passenger services were terminated in 1978 and the Commonwealth agreed to finance a major track rehabilitation program over a ten-year period.

The Tasmanian railway system (Tasrail) has consistently operated at a loss for a long period of time. Since the takeover in 1978, these losses have been covered by the Federal government through the administration of railway deficits by the Australian National Railways Commission (AN). In 1985–86 the Federal government agreed to a contractual arrangement to finance the operating losses incurred by Tasrail. Over the three-year period 1985–86 to 1987–88, a total sum of $65.9 million (in 1989–90 prices) was allocated for this purpose. Based on the findings of the Federal Bureau of Transport Economics (BTE 1987a) assessment (described below), in May 1988 the Federal government agreed to continue to support Tasrail for the five-year period 1988–89 to 1992–93. A revenue supplement of $44.2 million (in 1989–90 prices) was provided by the government over the first three years (1988–89 to 1990–91) of this agreement.

In response to the Federal government's involvement, AN has undertaken a range of initiatives to improve railway productivity, including provision of modern locomotives and rolling stock, the refurbishing of some existing rolling stock, track rehabilitation, modernisation of maintenance facilities and changes in operating practices. Staff numbers have been reduced considerably and further reductions are planned. A program of planned freight rate increases has also been implemented.

In the context of the July 1993 deadline for Commonwealth support, the Government asked the Bureau of Transport and Communications Economics (BTCE) to undertake a study of the costs and benefits of the retention of Tasrail. The terms of reference required the BTCE to:

- identify options for future Tasrail operations;
- examine the financial costs and benefits of those options for AN, the Federal and Tasmanian governments, as well as the costs and benefits to the community;

- consider whether financial break-even is an achievable corporate objective for Tasrail in the medium term, and if so, under what conditions, including changes to Tasrail's capital structure and investment in infrastructure, it might be achievable;
- if break-even is not a viable objective, examine what would be the minimum achievable level of annual loss; and
- assess the Tasmanian out-of-area permit scheme, including its impact on Tasrail's financial performance.

The BTCE completed a similar assessment of costs and benefits of Tasrail in 1987 (BTE 1987a). In summary, the 1987 report showed that there had been substantial progress in improving the efficiency of Tasrail since 1975. On balance the economic analysis of that study had suggested that there was not a strong case to support closing Tasrail. The 1987 study compared closure of the Tasrail system with a retention scenario provided by AN. In the present study, closure is compared with three retention scenarios developed to model Tasrail's future performance with differing degrees of success in restructuring to improve efficiency.

The characteristics of Tasrail are covered in the following chapter. This includes a brief historical perspective of railways in Tasmania, as well as competing transport modes (that is, road and shipping) together with some performance indicators. The key question of the future traffic task for Tasrail is addressed in chapter 3. Road cost recovery is also discussed in this chapter. Since Tasrail competes with road and sea transport, any changes to the operation of Tasrail are likely to have important implications for these competing modes of transport and for Tasrail's freight customers.

The possibilities available to Tasrail and the Federal government for improving Tasrail's business prospects are discussed in chapter 4. Chapters 4 and 5 analyse economic, financial, social and environmental aspects of the options examined. Each of these two chapters explains the methodology and presents the results for each option being analysed. Finally, chapter 6 summarises the findings of the study and provides a set of conclusions and recommendations. Technical aspects of the analysis and some support material are presented in appendices I to VI. In particular, appendix I contains the report by consultants Fay, Richwhite Australia Limited and presents a financial analysis of Tasrail and the methodology used for the demand projections.

CHAPTER 2 CHARACTERISTICS OF THE TASMANIAN INTERURBAN FREIGHT TRANSPORT SYSTEM

INTRODUCTION

This chapter provides a description of the key characteristics of the Tasmanian interurban freight transport system. Tasmanian transport infrastructure comprises elements of all transport modes. Sea and air are both used for interstate freight movements. Intrastate transport is mostly carried out by road and rail.

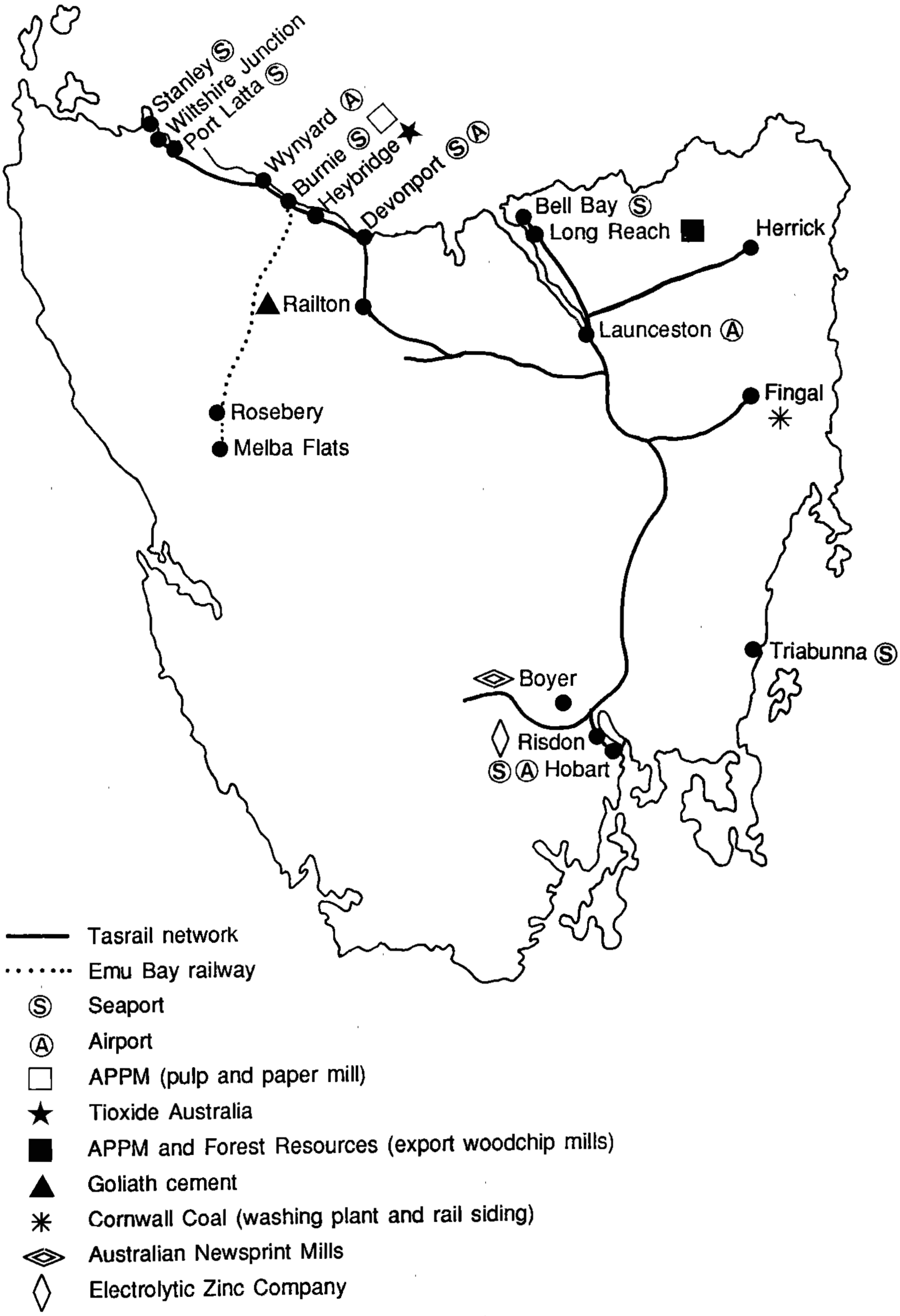
A brief account of the major events since the Commonwealth takeover and the recent performance and current situation of the railway are first presented. This is followed by a similar description of the characteristics of other transport modes in Tasmania, with the emphasis being directed to the road system — the major competitor of Tasrail for transport services. The major features of the rail and road networks, and major seaports and airports are illustrated in figures 2.1 and 2.6.

RAIL IN TASMANIA — THE PRESENT

Since 1978 when the last passenger service, the Tasman Limited from Hobart to Wynyard, was withdrawn, Tasmanian railways have operated solely as a freight railway. The Tasrail network as it currently exists is illustrated in figure 2.1. A brief description of the history of physical development of the rail system in Tasmania is presented in the previous Bureau report of Tasmanian railways (BTE 1987a).

Tasrail's 787.4 kilometres of track[1] runs from Wiltshire in the north-west, Bell Bay in the north, and Herrick and Fingal in the east to Hobart and Maydena in the south. The main route connects the northern seaboard ports of Burnie, Devonport and Launceston (Bell Bay) with the southern port of Hobart and approximately parallels the Midland and Bass Highways. Table 2.1 describes

1. Excludes 17.4 kilometres of track between Duncan and St Marys which has not been officially closed.



Source BTCE.

Figure 2.1 Tasrail network and major industry locations

TABLE 2.1 GOVERNMENT-OWNED LINES AND LENGTH OF TRACK OPEN, 1991, TASMANIA

Line	*From*	*To*	*Length (km)*
South Line	Hobart	Western Junction	199.2
Derwent Valley Line	Bridgewater Junctiona	Florentine	70.3
Fingal Line	Conara Junction	Duncan	57.6[b]
Western Line	Launceston	Wiltshire Junction	259.3
Bell Bay Line	Launceston	Bell Bay	56.5
North-Eastern Line	Coldwater Creek Junction[a]	Herrick	124.0
Mole Creek Line	Lemana Junction	Mole Creek	20.5[c]
Route distance open			787.4

a. The following section of these lines have chemically treated sleepers: North-Eastern Line from Tonganah to Herrick (51 kilometres) and the Derwent Valley Line from Boyer to Florentine (56.6 kilometres). This represents a total of 107.6 kilometres. However, future replacements with untreated sleepers is intended.
b. Sleepers and tracks for the line between Duncan and St Marys (17.4 kilometres) are in storage at Fingal. Tasrail still owns the land over which the railway ran and the line could be rebuilt if there was a demand for it.
c. While not currently in use, the Mole Creek Line is considered to be open on an 'on demand' basis, although AN representatives have expressed the view that the likelihood of the line being used is remote.

Source AN (1990 pers. comm.).

the major line network of Tasrail and length of track open as of 1991. Tasrail is important in terms of heavy freight transport in Tasmania. For 1989–90 Tasrail carried about 2 million tonnes of freight (approximately 413 million tonne-kilometres). The traffic consisted of eight major commodities. The most important traffic on a 'revenue-earned' basis was woodchip logs. Woodchip logs plus pulpwood and other logs comprised nearly half of Tasrail's traffic task. Other significant commodities carried by Tasrail include cement, coal, minerals, fertiliser and containers. Tonnages of these commodities are shown in table 2.2.

Ownership of the Tasmanian railway

In the period from 1920 to 1939 the Tasmanian Government Railways, hindered by a serious decline in revenue due mainly to increasing competition from road transport, obsolete rolling stock, deteriorating track and limited access to capital for rebuilding, struggled to adapt the system to changing needs. In 1939 the railway system was taken over by the Tasmanian Transport Commission (TTC), which was established by the Tasmanian government and had wide powers to coordinate and improve land transport in the State. The Commission's policy was

TABLE 2.2 TONNAGE OF COMMODITIES CARRIED BY TASRAIL BETWEEN 1978–79 AND 1990–91
('000 tonnes)

	Year ending 30 June												
Commodity	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*
Woodchip	471	780	890	694	705	809	737	739	871	820	754	635	696
Cement	366	300	369	366	303	322	337	336	301	330	376	326	358
Pulpwood	256	232	239	232	213	201	192	195	133	265	270	214	173
Containers	222	248	257	219	229	270	325	333	297	290	247	198	221
Coal	175	169	196	261	310	277	310	336	365	375	375	369	392
Sulphuric acid	100	89	98	103	99	105	106	109	117	132	131	126	157
Fertiliser	91	111	73	70	75	76	77	67	57	61	73	91	89
Sawn timber	39	76	55	59	48	16	57	20	24	21	9	.5	5
Other	128	137	146	126	50	121	72	51	49	67	57	64	78
Total	1 849	2 142	2 323	2 130	2 032	2 197	2 213	2 186	2 214	2 361	2 292	2 024	2 169

Source Tasrail (1991 pers. comm.).

to encourage the use of railways wherever reasonably possible. Subsequently, Tasmania was divided into nine road transport zones and truck operators were obliged to pay penalty fees for journeys crossing zone boundaries if they were in direct competition with rail service.

On 23 May 1975, the Federal and Tasmanian governments agreed to the acquisition of the Tasmanian Government Railways by the Commonwealth. The agreement was approved by the *Railways (Tasmania) Act 1975* in the Federal Parliament, and the *Railways (Transfer to Commonwealth) Act 1975* was passed by the Tasmanian Parliament. The acquisition of the Tasmanian Government Railways by the Commonwealth was to become effective from the 1 July 1975 as part of a wider Commonwealth program to form a single national railway organisation to be operated by AN.

With its passenger services in particular being poorly patronised, the Tasmanian system had been in decline for years. As from July 1975, the assets[2], financial liabilities and responsibility, and operations of the Tasmanian Government Railways were all taken over by AN. For transfer of the railway's assets the Federal government agreed to pay the Tasmanian government $5 million. Tasmania also received additional Financial Assistance Grants through the established Commonwealth–State revenue sharing arrangements. The initial increase in the grants was to be $3.3 million and this, in turn, increased according to the formula used to calculate these grants (ABS 1978).

Provision was made in the agreement for the TTC to continue to operate the railways, subject to direction of AN, for a period of time during which final arrangements, particularly those relating to transfer of employees, were to be made. The transfer of Tasmania's railway from the TTC to AN was completed in February 1978 when the TTC relinquished control of the railway and handed over administration of the system as of 1 March 1978. The State was granted representation on the Australian National Railways Commission and the Australian Shipping Commission for an initial period of five years (ABS 1978). All regular passenger services in Tasmania ceased in that year as the railways had relatively few passengers and budget constraints forced cutbacks in public expenditure. In January 1986 Tasrail stopped carrying less-than-car-load freight.

From 1975–76 to 1984–85 the Commonwealth subsidised the full cash operating deficit of the railway and funded a redevelopment plan in line with the findings of the Committee of Inquiry into the Tasmanian Rail System (the Joy Report). During the period up to 1984–85 the level of subsidy for AN's Tasmanian operations remained at over $20 million per year in real terms. In August 1985, the Commonwealth and AN agreed on a three-year revenue supplement package totalling $52.4 million (see table 2.3). A new business name, AN Tasrail, was also introduced to enable the railway to establish its own identity.

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2. Except for some land and minor buildings, and the plant, equipment and materials in the precision tool annexe at Launceston.

Prior to the expiry of the three-year contract in 1988, the Federal government commissioned the Bureau of Transport Economics to investigate the economic, financial and social consequences of closing Tasrail. Based on the findings of this study, in May 1988 it was announced that the Commonwealth would continue to support Tasrail for the five-year period to 1992–93 to ensure a measure of stability and predictability which was to assist Tasrail to achieve higher productivity and greater efficiency. It was also announced that beyond 1992–93 support would depend on continuing improvement in Tasrail's operational performance.

Under the Railways (Tasmania) ACT, AN operates Tasrail as a commercial enterprise.[3] Under the agreement, AN benefits from being exempt from any State fees, taxes (excluding payroll tax since 1988), and other charges in connection with the operation of Tasrail. Furthermore, the ownership of all land and property associated with the Tasmanian Government Railways passed to AN, and AN has the power to construct and extend railways in Tasmania. As part of the May 1988 Government Business Enterprise Reform Package, the *Australian National Railways Commission Act 1983* was amended in 1989 to remove a number of constraints on day-to-day management and to improve provisions for accountability. In general AN is independent of direction from the Federal government.

The Tasmanian government continues to have a working relationship with Tasrail but has no input into the day-to-day operation of the railway, and has no direct control over the future development of railways in Tasmania. Today the relationship between the Tasmanian government and AN is informal and non-interventionist. While the Tasmanian government does not intervene in the operation of Tasrail it provides assistance through exemption from State charges and a policy of preferring that certain goods travel by rail (that is, the Road Permit Scheme which is discussed in chapter 3).

Tasrail's financial performance

Tasrail is a small railway system. It also operates with some severe handicaps, such as Tasmania's difficult topography, a small population and industrial base, isolation from the mainland and an inheritance of run-down infrastructure, transferred from the State in 1975, which has since resulted in large debt incurred for rehabilitation and other maintenance costs.

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3. Under the agreement, and the *Railways (Tasmania) Act 1975,* AN has the power to ... 'administer, maintain and operate railways (in Tasmania) ... and any services (including passenger and freight road services) incidental or supplementary to, or associated with those railways.' The only conditions specified under the Act and the Agreement are that, at the request of the Tasmanian government, there should be consultation on matters regarding the operation of the railways which are of concern to the State, in particular on freight rates which should not be higher than those applying to railways of the Commonwealth outside the State. The State can dispute the closure of any service by AN and the matter will be determined by arbitration.

AN operates the Tasmanian railway system under community service obligation arrangements. At present, these arrangements provide for revenue supplementation to meet the cash component of Tasrail's cash operating losses, which is provided by the Federal government out of general revenue. The Tasrail deficit has a direct bearing on the amount of Commonwealth funding for Tasmania from tax sharing grants, in terms of revenue forgone; the State government has therefore argued that it indirectly funds the Tasrail deficit (Government of Tasmania 1990). Only part of the subsidy, however, would be recovered by the Tasmanian government through the Commonwealth Grants Commission's tax sharing arrangements if the Federal government no longer funded the operating deficit of the Tasrail.

Table 2.3 summarises Tasrail's financial performance for the period 1977–78 to 1989–90. As is shown in this table, the deficit of AN's Tasmanian operations remained at over $20 million per year in real terms up to 1985–86. However, there has been some noticeable improvement in Tasrail's operations over recent years. Average operating loss over the three-year period 1987–88 to 1989–90, compared to the three years 1984–85 to 1986–87, was reduced by about 37 per cent. Up to 1984–85 the government subsidy was determined by the level of the realised operating loss. In more recent years the subsidy has been a predetermined amount that can be above or below the realised operating loss as shown in table 2.3.

Figure 2.2 illustrates the changes in revenue and expenditure expressed in cents per net tonne-kilometre at 1989–90 constant prices. Tasrail's revenue per net tonne-kilometre decreased by 37 per cent from 9.6 cents in 1977–78 to 6.0 cents in 1983–84. This is primarily due to Tasrail freight rates not increasing in line with inflation over this period of time, in part owing to a number of pre–1978 contracts which limited rate increases. However, between 1984–85 and 1989–90, real revenue per net tonne-kilometre has steadily recovered to just under 7.0 cents per net tonne-kilometre, an increase of about 17 per cent. For the same period, expenditure per net tonne-kilometre decreased by about 60 per cent from 26.6 cents to 11.0 cents, a result of increased efficiency by Tasrail.

Over the 13 years to 1989–90 Tasrail's freight task, shown in figure 2.3, increased by 87 per cent from 246 million net tonne-kilometres to a peak of 459.4 million net tonne-kilometres in 1988–89. However, in 1989–90 Tasrail carried 2.025 million tonnes for a traffic task of 412.9 million net-tonne kilometres, a drop of about 10 per cent on the previous year. Tasrail's loss of $16.5 million in 1989–90, before receipt of the Federal government's revenue supplement, was 4.4 per cent more than in 1988–89 in real terms. This increase in the loss would seem to reflect both the business downturn and the growth of interest due to past borrowing for capital projects required to increase productivity and to cater for new business opportunities (AN 1990a). The pattern of Tasrail's performance over the three-year period 1987–88 to 1989–90 appears to be consistent with the forecasts contained in BTE (1987a).

TABLE 2.3 TASRAIL FINANCIAL PERFORMANCE, AT REAL 1989–90 PRICES, FOR THE PERIOD 1977–78 TO 1989–90[a]
($ million)

Year	*Revenue*	*Expenditure*	*Operating profit*	*Government supplement*	*Surplus or deficit*	*Revenue/ expenditure ratio*
1977–78	23.4	65.3	–41.9	41.9	0.00	0.36
1978–79	23.6	59.7	–36.1	36.1	0.00	0.40
1979–80	27.6	56.3	–28.7	28.7	0.00	0.49
1980–81	28.7	59.8	–31.1	31.1	0.00	0.48
1981–82	25.6	57.4	–31.8	31.8	0.00	0.45
1982–83	24.6	57.7	–33.1	33.1	0.00	0.43
1983–84	24.0	54.3	–30.3	30.3	0.00	0.44
1984–85	24.9	54.0	–29.1	29.1	0.00	0.46
1985–86	25.1	51.5	–26.4	25.0	–1.40	0.48
1986–87	27.4	47.1	–19.7	22.1	2.40	0.59
1987–88	29.9	44.5	–14.6	18.8	4.20	0.68
1988–89	31.3	47.1	–15.9	11.8	–4.10	0.66
1989–90	28.8	45.3	–16.5	16.6	0.10	0.64

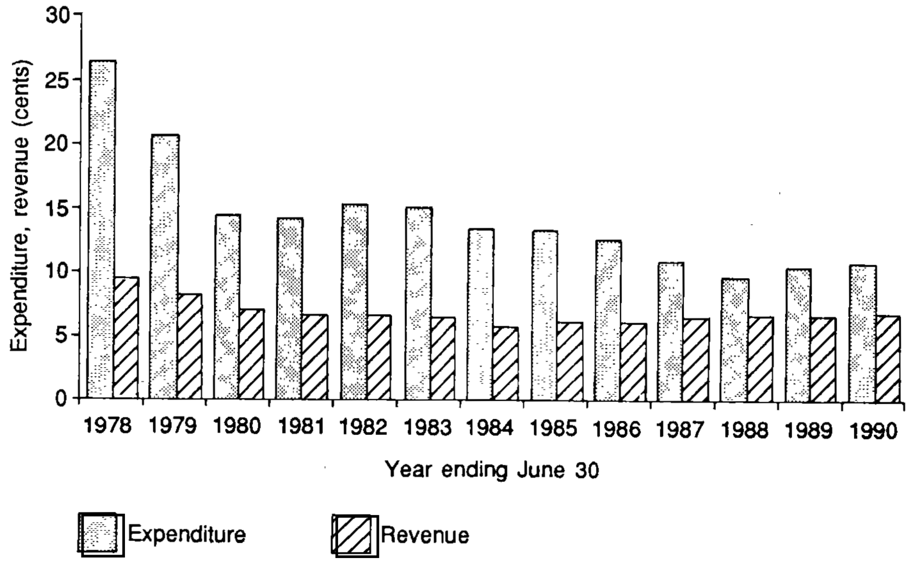
a. The price deflator used was the Australian Bureau of Statistics price deflator for expenditure on gross domestic product.

Note The method of providing the government subsidy changed after 1984–85. The subsidy is now a predetermined amount rather than the realised deficit. The figures shown in the surplus or deficit column are the net result. (For a detailed itemisation of expenditure and related adjustments see table 4.5 in appendix I).

Source AN (1991 pers. comm.).

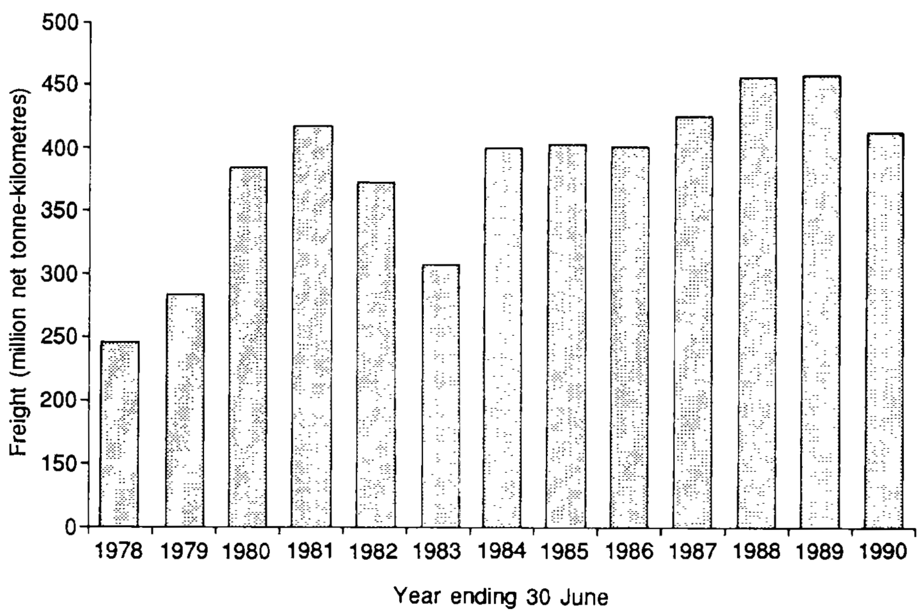
According to Tasrail, the May 1988 Government Business Enterprise Reform Package will assist AN in its progress to become a fully commercial organisation. A major goal for progress towards break-even for Tasrail is to contain the level of operating loss within the limits of the community service obligation contract, and eventually to fund asset replacement from revenue.

The primary goal for Tasrail is to achieve break-even by 1995–96, that is, covering accounting costs including interest and depreciation. Initiatives to improve efficiency and productivity developed during 1989–90, including additional multi-skilling and the use of new technologies, were designed to ensure Tasrail's performance is on target. For example, progress during the year was made on improving communications on the Western Line, but poor train communication on the remainder of the network continued to cause inefficiencies in train operation. Tasrail recorded a deficit of $16.5 million (excluding government



Source Tasrail (pers. comm. 1991).

Figure 2.2 Expenditure and revenue per net tonne-kilometre, 1977-78 to 1989-90 (real 1989-90 prices)



Source Tasrail (pers. comm. 1991).

Figure 2.3 Tasrail freight task

supplements), or $60 000 better than target despite a decline in revenue. The main thrust of capital investment continued to be directed at permanent way improvement, which will bring major efficiency benefits. These benefits can be expected from increased haulage per trip, reductions in time travelled and a decline in the frequency of derailments (AN 1990a).

Since Tasrail was formed in 1978, changes have been made improving the operational efficiency, productivity and financial viability of the Tasmanian railway system. This effort was continued in 1989–90 although the final result reflected difficult economic conditions that restricted the level of business of major customers.

Infrastructure and equipment

The resources used by Tasrail are land, track, structures (that is, buildings and bridges), communications equipment, rolling stock, plant and equipment, and labour. Tasrail owns approximately 1736 hectares of land throughout Tasmania of which 1680 hectares is reserved for the track. The railway reserve is generally 20 metres wide along the 787.4 kilometres of track owned by Tasrail. Other major land holdings include 33 hectares in Launceston, 9 hectares in Hobart, 9 hectares in Devonport and 5 hectares in Burnie.

The Joy Report concluded that only 6 per cent of Tasmania's railway track was laid to a 'high standard'. The remainder of the State's track ranged from fair to very poor condition. As a result of these findings, in 1978 the Federal government undertook to provide funds for the rehabilitation of the permanent way. Since 1976–77, $38.4 million have been spent on track rehabilitation. Of this, $22.5 million (including $20 million provided by the Federal government) was spent over the period up to 1986–87 while the balance of $15.9 million was spent over the last three years 1987–88 to 1989–90.

The overall condition of the track has been improved mainly by replacing timber sleepers with steel sleepers, and continuous welding of track lines. At 30 June 1990, track rated as 'very good' was 36.8 per cent and 'good' was 38 per cent. Track rated 'fair' was 16.1 per cent with the remaining 9.1 per cent of the track — a portion rarely used — was rated 'poor'. The percentage of track under speed restrictions was reduced in 1989–90 to 5.6 per cent from 6.8 per cent in 1988–89.

Other new works completed since 1975 include new container terminals in Hobart and Launceston, major track deviations at Latrobe and Fingal, the building of a new Perth viaduct, four new bridges, reconstruction of yards and major crossing loops at Devonport and Hagley (AN 1986), and a new 'one spot' wagon repair centre at East Tamar Junction.

In 1950 Tasmania was the first Australian State to replace its steam locomotives with main line diesel electric locomotives. In June 1987 Tasrail's operational locomotive fleet totalled 47. Included in the total were 4 locomotives purchased from Queensland Railways. In March 1991 this fleet totalled 49 locomotives that included 33 additional locomotives purchased from Queensland Railways. The average age of the fleet is about 18 years and the expected total life is 30 years. The current rolling stock fleet consists of 728 wagons of which 400 (55 per cent) are log wagons, thus reflecting the importance of woodchip and pulpwood logs to Tasrail.

In the early 1980s investment in infrastructure was kept to a minimum. Keeping costs down was the strategy of Tasrail's break-even plan. Tasrail has now reached the point where operations in several areas have to be upgraded if the company is to remain competitive. During 1989–90 rationalisation of the Tasrail network and operations continued. Closure of the Smithton and Stanley rail lines has made Wiltshire Junction the rail terminus for the north-west coast.

Employment situation

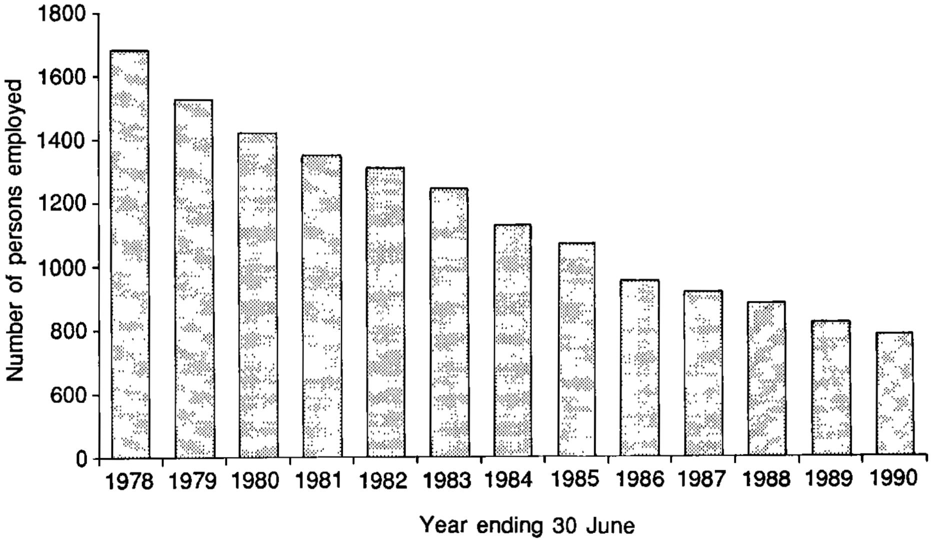
Figure 2.4 shows that Tasrail's employment levels have fallen from 1686 staff in 1978 to 706 by 1 March 1991. This represents a fall of 58 per cent. The decline in staff levels has been achieved through attrition — the natural decline in staff employment levels through voluntary resignation, retirement or death — and voluntary early retirement schemes. Over the same period employee productivity, measured as output in net tonne-kilometres per employee, increased by 258 per cent.[4] The increase in employee productivity is shown in figure 2.5.

TASMANIA'S ROAD SYSTEM

The first road in Tasmania was built in 1807. It was a four-kilometre link between Hobart and New Town. Just 11 years later, the 199-kilometre Great North Road from Hobart to Launceston was completed. Today Tasmania has about 22 000 kilometres of roads and highways of which some 40 per cent or about 9000 kilometres are sealed. Tasmanian roads are divided into three main categories: the National Highway System, which represents about 3.5 per cent of the Tasmanian sealed road system and is under the responsibility of the Federal government; the State arterial roads, which represent about 42 per cent and are under the jurisdiction of the State government; and the balance of council arterial and local roads (including the unsealed roads) that are looked after by the local governments and other authorities. Figure 2.6 illustrates Tasmania's main road network and the locations of the major industries.

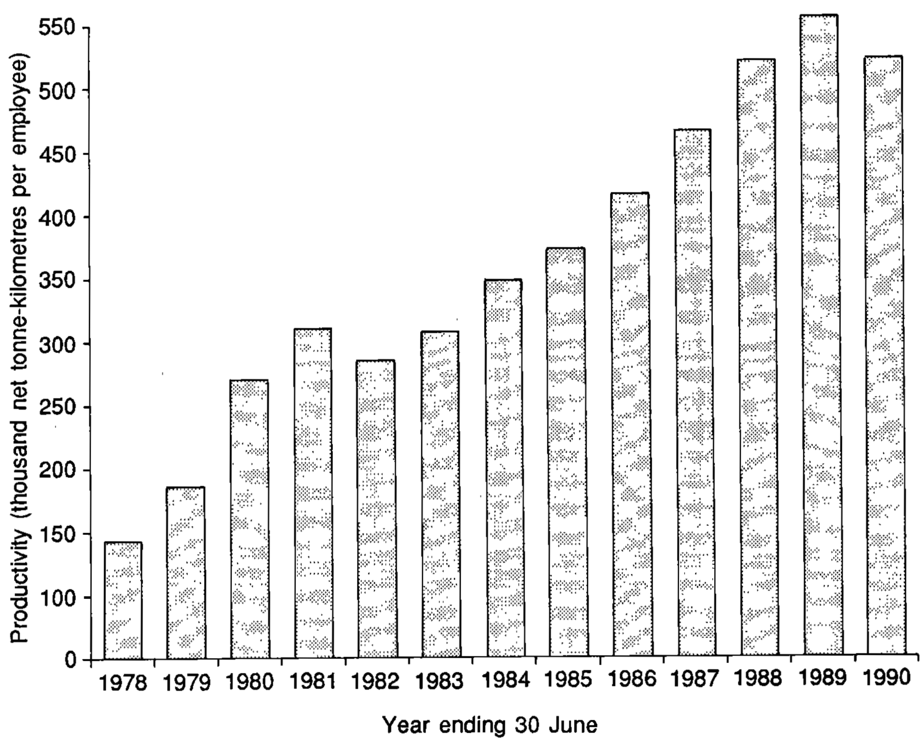
Because of Tasmania's small size, road distances between the major centres of population are short by comparison with other Australian states. No major centre is further than 420 kilometres from the capital (ABS 1988a).

4. The decline in employee productivity for the years ended June 1982 and June 1990 reflects the reduced freight task for those years.



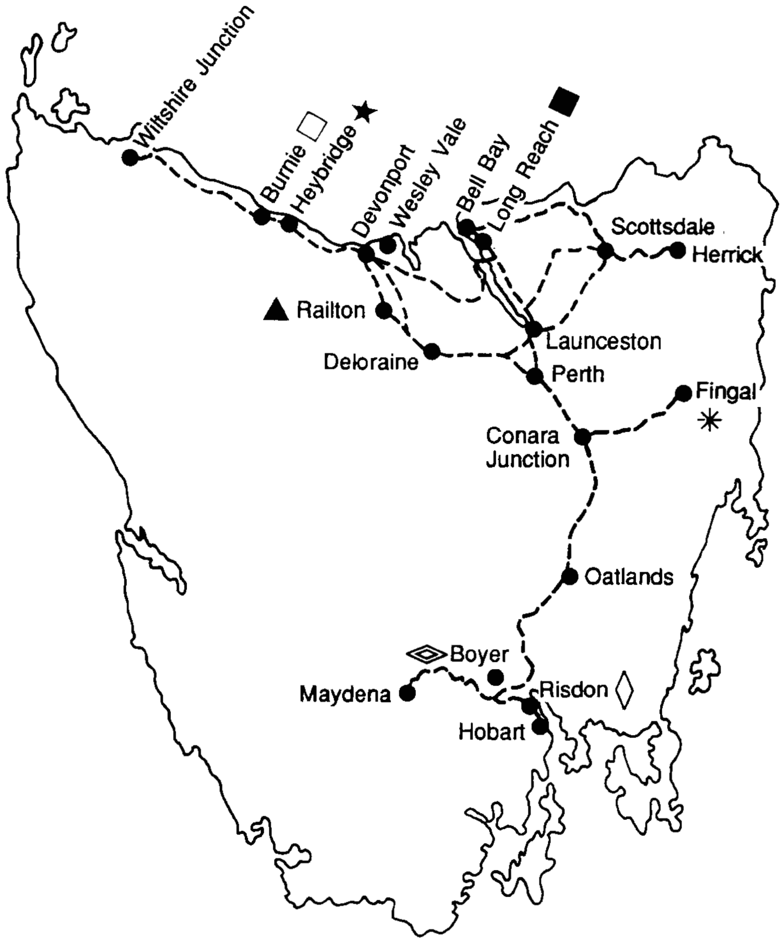
Source Tasrail (pers. comm. 1991).

Figure 2.4 Tasrail workforce



Source Tasrail (pers. comm. 1991).

Figure 2.5 Employee productivity



- - - - Highway

□ APPM (pulp and paper mill)

★ Tioxide Australia

■ APPM and Forest Resources (export woodchip mills)

▲ Goliath Cement

✳ Cornwall Coal (washing plant and rail siding)

◈ Australian Newsprint Mills

◊ Electrolytic Zinc Company

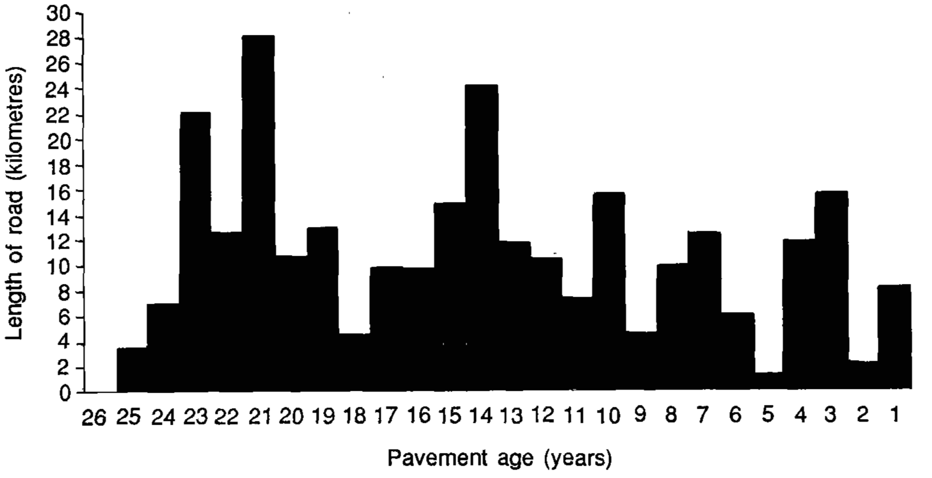
Source BTCE.

Figure 2.6 Tasmanian road system and major industry locations

The National Highway System

The National Highway System in Tasmania extends for 319 kilometres from Granton in the south via Launceston's Southern Outlet and Prospect By-pass, to West Park, Burnie on the north-west coast. It includes the Midland and Bass Highways and a short length of the Brooker Highway. Since 1974, when the National Highway System was introduced, expenditure on the development and maintenance of the 319 kilometres of road which comprise the National Highway has exceeded $365 million in 1990–91 prices. With this level of expenditure about 42 per cent (134 kilometres) has been upgraded to the required National Highway standards (DRT 1991 pers. comm.).

The pavement of a small proportion (over 10 per cent) of the National Highway is now approaching 30 years of age. In fact, 160.2 kilometres or 50 per cent of its total length is 20 years or more old. The mean pavement age in 1990 was estimated at 15.5 years. This represents an increase of almost 10 per cent in mean pavement age from 1988. At the present rate of reconstruction the average age at the end of the decade will be approximately 23 years (DRT 1991 pers. comm.). An increase in heavy truck traffic is likely to lead to an increase in pavement damage of the 'ageing' Tasmanian roads. Whilst heavy asphalt overlays will strengthen the old pavements and help to increase their life, it is evident that increasing emphasis on pavement reconstruction by complete rehabilitation will be necessary in future years. Figure 2.7 illustrates pavement conditions of National Highways in Tasmania in 1989.



Source DRT (pers. comm. 1991).

Figure 2.7 National highway pavement age, 1989

Under the *Australian Land Transport Development Act 1988,* certain roads not part of the National Highway System are classified as National Arterial roads for funding purposes. In Tasmania the National Arterial roads which have been classified are short sections of the East Tamar Highway in Launceston, the Brooker Highway in the Hobart area and the Bass Highway to the west of Burnie towards Wynward. National Arterial roads are selected on the basis that upgrading would improve access to:

- areas of manufacturing concentration or major economic production;
- areas of major transport terminals including termini of National Highways, ports, airports, freight forwarding centres and major rail heads;
- areas that carry high volumes of commercial and/or international or interstate tourist or export traffic;
- areas that help reduce shore-based shipping costs; and
- areas that meet all Federal and State environmental, heritage and Aboriginal land and sacred site requirements (DTC 1989).

The State roads

In Tasmania the Department of Roads and Transport (DRT) is responsible for the State classified road network which comprises 3792 kilometres of State roads, 12 234 kilometres of council roads and approximately 5670 kilometres of roads managed by other authorities (the Forestry Department and the Hydro-Electric Commission contribute substantially to road funding in Tasmania). DRT in conjunction with the Department of Construction (Tasmania) is the principal agency responsible for the management of the road system. It is also responsible for traffic control and the provision and maintenance of traffic facilities and traffic lights.

Together with National Highways and National Arterial roads, the State classified roads form the arterial road network of the State. The State arterial road system is frequently categorised into the urban arterial roads and the rural arterial roads. Excluding the National Highway there are 3410 kilometres of arterial roads of which 3111 kilometres are sealed and 299 kilometres have a gravel surface. Of these State classified roads, only 2702 kilometres are characterised by the Commonwealth as arterial roads. These are the routes used mainly by heavy transport. Details of classified roads by length and surface condition are presented in table 2.4.

The distribution of the State road network by type (that is, single or dual carriageway), width and length is shown in table 2.5. The Tasmanian DRT (1991 pers. comm.) calculates that only 976.7 kilometres or 36.15 per cent of the total length of the State roads characterised as arterial by the Commonwealth, which include the top three road types as shown in table 2.5, are suitable for the mix of commercial and private vehicles that need to use them.

In comparison with the National Highway System, the pavement strength on the State's arterial roads is far less satisfactory. Figure 2.8 indicates that Tasmania

TABLE 2.4 DISTRIBUTION OF STATE CLASSIFIED ROADS IN TASMANIA, 1989
(kilometres)

Road type	*Sealed*	*Unsealed*	*Total*
State highways	1 849.5	83.8	1 933.3
Main roads	1 215.2	54.3	1 269.5
Secondary roads	258.5	33.7	292.2
Tourist roads	158.6	52.5	211.1
Development roads	43.3	42.7	86.0
Total	3 525.1	267.0	3 792.1

Source DRT (1990a).

TABLE 2.5 DISTRIBUTION OF STATE CLASSIFIED ARTERIAL ROAD BY TYPE, WIDTH AND LENGTH IN TASMANIA, 1987

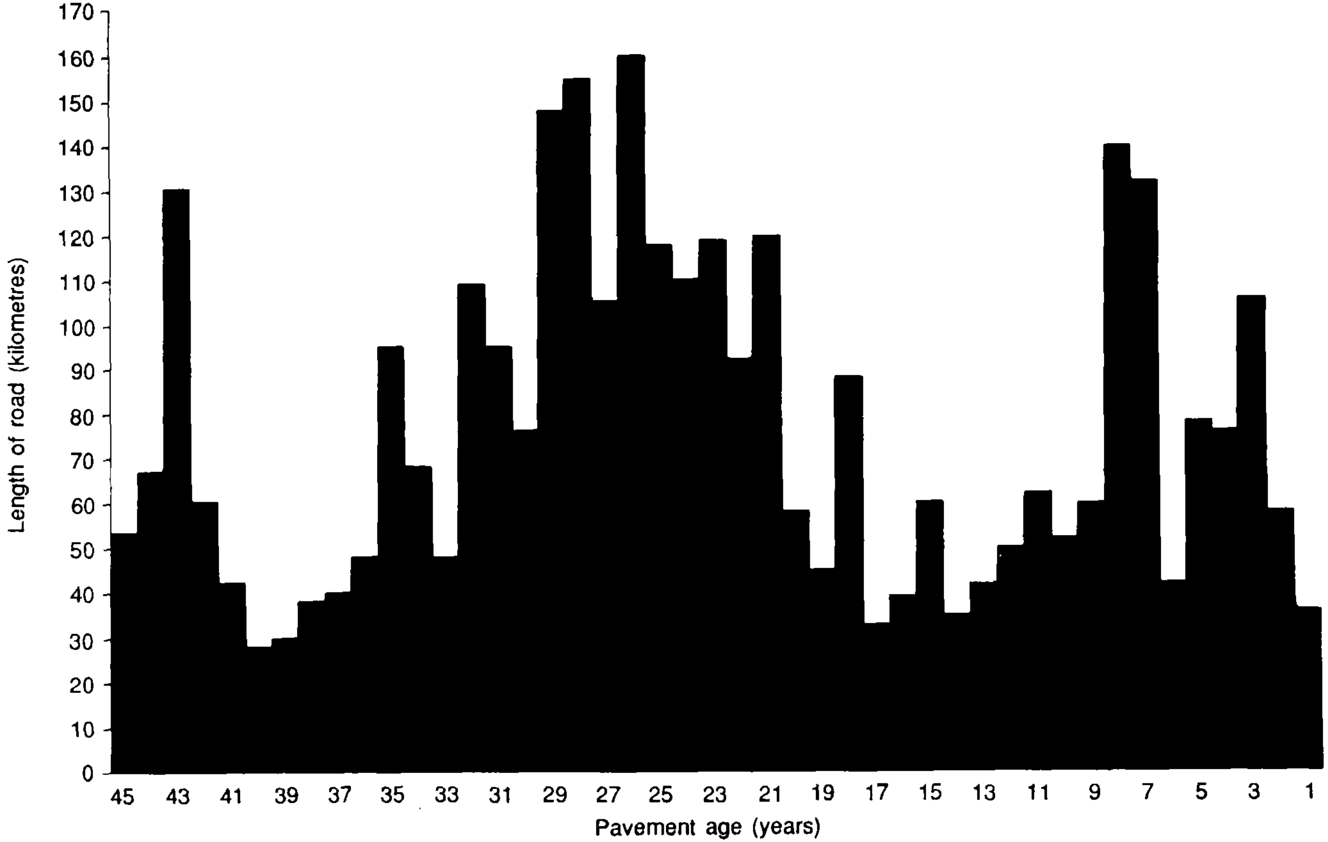
Road type	*Length (kilometres)*	*Proportion (per cent)*
Dual carriageway	46.7	1.73
Single carriageway		
greater than 6.7 m wide	453.6	16.79
6.1 — 6.7 m wide	476.4	17.63
5.5 — 6.0 m wide	1 525.8	56.47
less than 5.5 m wide	199.5	7.38

Note Includes only State roads characterised as arterial by the Commonwealth.

Source DRT (1991 pers. comm.).

is maintaining (at 1989 reconstruction rates) a State classified road network which has an average age of 20.6 years — slightly in excess of the 20-year 'design' life of the pavements as defined by the DRT (1991, pers. comm.). It is also worth noting that the average age of the pavements where reconstruction is now taking place is in excess of 26 years. Unfortunately this road network would be prone to rapid pavement failure if major changes took place in transport patterns.[5]

5. In recent years this was observed on the Lyell Highway and Fenton Main Road when Australian Newsprint Mills switched from rail to road transport of logs. It has also happened on the Waratah Main Road with the cartage of ore from Que River to Luina and on the Colebrook Main Road during the construction of the Craigebourne Dam.



Source DRT (pers. comm. 1991).

Figure 2.8 Tasmanian State road network: pavement age

The situation for the State road network is more serious if council or local roads are considered in the changing patterns of road transport in Tasmania. DRT has indicated that a large proportion of council or local roads are narrow gravel roads which are not adequate to provide for or support the larger trucks now permitted on Tasmanian roads. There are about 2100 bridges on the council roads. Most of these bridges are single-lane timber bridges. The increase of vehicle mass limits from 38 to 41 tonnes has had a major effect on the standard design and maintenance for these bridges. A major program of upgrading may be required to increase the condition of these bridges to the appropriate standard that is needed to accommodate heavy truck traffic.

Previous analysis of road damage assessment

Three studies have reported on the road damage consequences of the closure of Tasrail. These studies were completed in 1986 as part of an earlier assessment of the Tasmanian railway system by the Federal Bureau of Transport Economics (BTE 1987a) and included the consultants Nicholas Clark and Associates (1987), Transport Tasmania (1986) and the Department of Main Roads (1987). There appear to be major differences in the assessments presented in these studies.

The consultants' report concluded that out of 1000 kilometres of road likely to be affected by rail closure in 1988, 470 kilometres would require additional maintenance and only 250 kilometres would require advanced reconstruction. In 1987 prices, it was estimated that over the period of analysis (1988–2008) the total discounted value for road construction would be $10 million to $20 million and no additional road maintenance cost would be incurred. The Tasmanian Transport Department estimated that the corresponding cost for road construction would be $49.5 million to $60.5 million and that there would be a road maintenance cost of $5.5 million to $6.5 million per year. However, the Tasmanian Department of Main Roads (1987) estimated that 940 kilometres would be affected by rail closure. Their total undiscounted estimated cost for road construction was $124 million over nine years and that for road maintenance was $12.5 million per year. The Department of Main Roads estimates are not directly comparable to these other studies and appear to refer to total reconstruction of affected roads and not the cost attributable to increased truck traffic.

A recent BTCE evaluation of road damage costs, using the life cycle costing model (BTCE 1990a), has shown that 967 kilometres would be affected by closing Tasrail. It is estimated that over the period 1991–2011 a discounted net present value of about $14 million would be required for increased road reconstruction and maintenance (attributed to the increased traffic). More detailed explanation of this evaluation, and the assumptions used, are presented in appendix V.

Road funding

Funding for the maintenance and improvements of Tasmanian roads is derived from three general sources: Federal government grants under the *Australian*

Land Transport Development Act 1988 to both DRT and local government, State government dedicated motor tax and fuel franchise and loan funds to DRT, and finally council rates for local government roads. The State government now absorbs all funds, excluding funds provided under the Australian Land Transport Development (ALTD) program, into consolidated revenue. Funds provided to DRT for expenditure on State and local government roads come from this consolidated fund. There is no separately identified loan funds program. The Federal government has allocated more than $15 million to 46 Tasmanian local government authorities in 1990–91. In 1989–90 Federal funds comprised 46.4 per cent of the total roads budget for Tasmania. The DRT estimates that the corresponding figure in 1990–91 will be 51.3 per cent.

With respect to State road funding for the seven-year period 1982–83 to 1988–89, expenditure exceeded revenue in five of the years. Over this period, there was a complete change in the relativities between excise payments and road funds allocated to Tasmania. From August 1986, 50 per cent of the fuel franchise receipts were paid into general revenue, and a loan fund component of the State funds was allocated to the road program. In 1982–83 and 1983–84 payment exceeded revenue in the roads program by 17.2 per cent and 20.4 per cent, respectively. From 1985–86 to 1988–89 revenue has exceeded expenditure by increasing margins annually. However, in the last two years revenue came into line with expenditure as indicated in figure 2.9.

The National Arterial Roads Program in Tasmania proposes a continuation of current projects generally in accordance with approved priorities until 1993. It is estimated that funding will remain at $11 million (in 1989–90 values).

The *Australian Land Transport Development Act 1988* provides grants to the States and the territories for road construction and maintenance (including engineering improvements at locations with a poor safety record — the so-called black spots). The program also provides funds for urban public transport projects and mainline railway projects that yield high economic returns, as well as to approved organisations for land transport research and road safety programs. However, the ALTD program does not include provisions for rail in Tasmania.

The distribution of capital grants by the Federal government for road programs in Tasmania, as shown in the Commonwealth Budget Papers 1989–90, is presented in table 2.6.

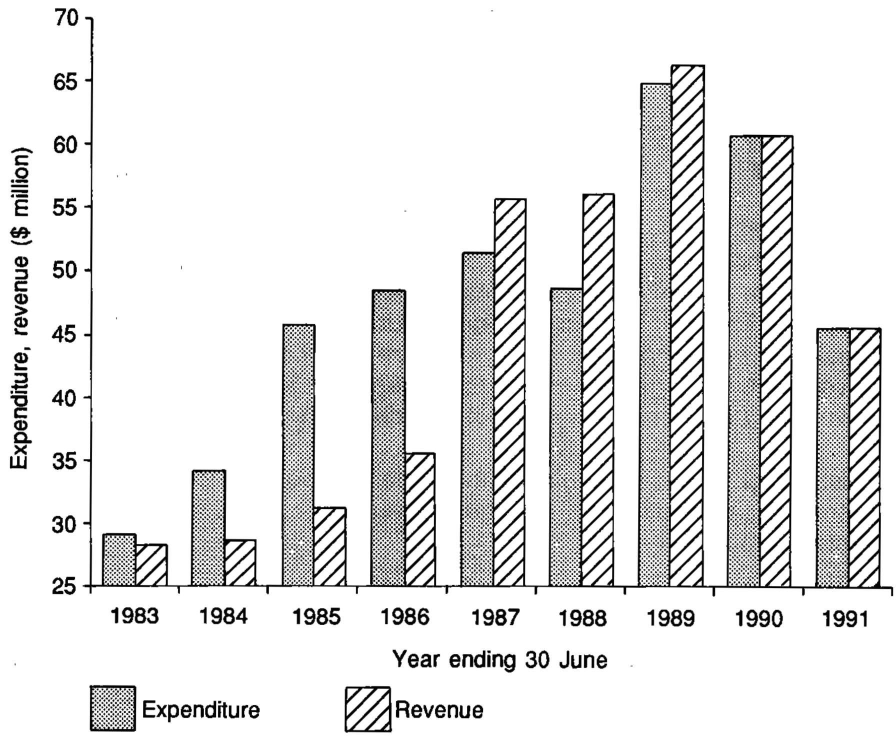
Currently the three major sources of revenue for Tasmanian roads are the National Highways Program, the National Arterial Road Program and the Provincial Cities and Rural Highways (PCRH) program. The last is specifically designed to assist in the upgrading of rural roads. Its aim is to facilitate the flow of goods and services to major cities and ports, which would ultimately increase exports and economic activity.

Under the Federal government's PCRH, Tasmania is to receive payment on a sliding scale over the next three years, 1990–91 to 1992–93. Out of a total of $9 million over these three years, $3.5 million will be allocated in 1990–91, $3.57 million in 1991–92 and the balance of $1.93 million in 1992–93. Over the same period, the whole of Australia is to receive $300 million under the PCRH program.

The road freight industry

A survey of trucking operations carried out by the Bureau of Transport Economics in early 1984, and covering the financial year 1982–83, revealed that 660 firms in Tasmania operated trucks for hire and reward. From the survey it was estimated that 1600 full-time jobs were associated with Tasmania's hire and reward trucking operations for that year (BTE 1986a). There are presently 855 firms in Tasmania operating trucks for hire and reward (DRT April 1991 pers. comm.).

This survey showed that the majority of trucks registered in Tasmania comprises small delivery vans and the number of trucks tends to decrease with increasing gross combination mass (GCM). There is a second peak in the 40–41 tonne category which constitutes the majority of large articulated vehicles. This category represents the public perception of heavy road transport and is the target of most public interest and concern.



Source Department of Roads and Transport (pers. comm. 1991).

Figure 2.9 State road funding, Tasmania

TABLE 2.6 FEDERAL CAPITAL GRANTS FOR ROAD PROGRAMS IN TASMANIA BY ROAD CATEGORY
($ million)

Type	*1987–88*	*1988–89*	*1989–90*	*1990–91*
National Highways Program and National Arterial Roads Program	18.4	16.1	21.3	20.0
State arterials	16.8	18.3	13.8	11.8
Local roads	11.7	13.4	14.7	15.7
Black spots	na	na	na	2.7
Provincial Cities and Rural Highway program	na	na	na	1.9
Urban Public Transport program	na	na	na	3.5
Total	46.9	47.8	49.8	51.7

na Not available.

Note A total of $50 million will be allocated to rail from the land transport programs of which none will be spent in Tasmania.

Source Commonwealth of Australia (1990).

Given that most of the freight task in Tasmania is bulk freight, the only vehicles that provide an alternative to rail transport are those in the higher GCM categories. In December 1990 there were 1790 registered trucks with a GCM of at least 30 tonnes, with at least 85 per cent of them registered at the nominal maximum GCM of more than 38 tonnes. The number of heavy vehicles in Tasmania over the period 1986 to 1990 has grown steadily at an average rate of about 5 per cent per annum. This growth in numbers, coupled with an increase in load limits potentially affecting over 80 per cent of heavy trucks, has generated an increase of almost 25 per cent in heavy road vehicle capacity over this period.

The transportation of timber logs dominates the long distance road freight task in Tasmania. The major road freight corridors for timber logs consist of routes designated by the woodchip companies. As stated by BTE (1987a), the average distance travelled in Australia by prime movers was 131 000 kilometres per annum (in comparison with the Australian Bureau of Statistics estimate of about 90 000 kilometres per annum).

It is also argued in BTE (1987a) that: (i) road haulage operations in Tasmania are generally profitable, with log and livestock haulage being more profitable than general freight haulage; and (ii) there is little incentive for log hauliers to purchase the most efficient trucks for the required task due to restrictions on entry into the industry and indexation of freight rates.

The Tasmanian government 'rail' protection policy, administered by the Tasmanian Transport Commission, provides for the payment of a Rail Protection

Levy (RPL) by road transport operators, when in competition with Tasrail, for specified bulk traffics. Under normal conditions of operation RPLs can add about 18 to 28 per cent to road freight rates. The RPL scheme and its impact on both the road and rail transport industries is further discussed in chapter 3.

Road traffic volumes are measured in terms of average annual daily traffic levels (AADTs) — the total number of vehicles passing a given point in a year divided by 365. A full list of AADTs for the road segments over which Tasrail freight would be expected to travel in the event of rail closure is presented in appendix VI. These figures are averages over the segment lengths. Much higher AADTs would be expected where segments pass through major towns due to the added local traffic.

The segment with the highest AADT level of 29 308 vehicles per day is the six-lane Brooker Highway between Hobart and Granton. Along the Midland Highway between Bridgewater and Launceston, traffic volumes for segments range from 3800 to 8200 vehicles per day. For Tasmania's other major highway, the Bass Highway, AADTs between Launceston and Somerset, west of Burnie, range from 4600 to 15 300 vehicles per day. The other segments included in the study, with the exception of part of the East Tamar Highway passing through Launceston suburbs, have AADTs between 550 and 5800 vehicles per day. Percentages of commercial vehicles in these AADTs range between 8 and 24 per cent.

About 3 per cent more traffic used the National Highway System in 1990 compared with 1989. On specific sections the increase in volume varied from 1.4 to 5.0 per cent. The greatest increase occurred on the Midland Highway north of the Lake Highway while the next highest of 4.4 per cent occurred on the Victoria Bridge at Devonport.

An increase of freight task on the road system adds to pavement damage and requires suitable road charges to recover the cost of such damage. However, there are a number of other costs which must be addressed before any road pricing scheme is considered. These include the cost of congestion, environmental pollution (noise and emissions) and road accidents. The implications of these key factors for road cost recovery are discussed in more detail in chapter 3. The social effects of increased traffic are discussed in chapter 5.

SEA TRANSPORT IN TASMANIA

Although road is undoubtedly the main competitor of rail in Tasmania, sea transport may also compete with rail and road, especially for freight northbound out of Hobart. Competition between sea and land transport centres on movements of interstate container cargo between north and south Tasmania and intrastate movements of acid and minerals. However, the freight task for which Tasrail may directly compete with shipping is relatively small as indicated in chapter 3. The possibility of increased shipping out of Hobart in the case of Tasrail closure is evaluated in chapter 4. In this section a brief account of sea transport in Tasmania is presented and some of the key characteristics of the Tasmanian port system are discussed.

Over the past five years there have been significant changes in shipping services to, from, and around Tasmania. The Australian National Line (ANL), which once dominated the trade with three vessels serving the entire east coast of Australia out of northern Tasmanian ports, now operates a single vessel on a shuttle service between Bell Bay (and on demand Devonport) and Melbourne. ANL added a second ship to its Tasmanian operations in April 1991. The Union Steamship company, which at the start of this period seemed committed to serving Hobart only, has now rearranged its services to include northern ports. William Holyman and Sons Pty. Ltd., a long-term participant in the trade, has ceased operations, while Brambles has entered trade and expanded to a two-ship operation. Another relatively small new participant that entered trade in December 1990 is the Bass Express Service. The passenger ferry service, which was not extensively used for freight purposes under ANL's management, has now become an important Tasmanian government-owned freight carrier of trailer cargoes under the name of TT-Line.

New operators and new techniques have helped to modernise the cargo handling technology employed in Tasmanian services and a more competitive market has developed. However, the pace of change has increased uncertainty and made planning far more difficult for individual companies, government and ports. TT-Line's innovative approaches to shipping and a new entrant to the industry (Brambles) have not only provided a degree of competition in Bass Strait shipping but also introduced new technology cargo handling arrangements. TT-Line revitalised the use of road trailers as the cargo carrying unit, while Brambles used low rigid trailers (MAFI) that help to greatly speed up cargo handling. MAFI trailers, also known as dock trailers, are not legal for road movements. ANL is in the process of introducing a similar system of trailers called cassettes.

Tasmania's general (non-bulk freight) sea cargo is handled at four main ports: Hobart, Bell Bay, Devonport and Burnie. During 1989–90 a total of 1850 ship visits were made to these ports. Tasmania has a number of ports capable of accommodating overseas vessels. In addition to these there is a minor general cargo port at Stanley and two special purpose ports at Triabunna and Port Latta. Hobart, Bell Bay, Devonport and Burnie are all served by regular interstate general cargo services and are also served by the Tasrail network. Burnie is Tasmania's major international container port. It is said to be the fifth largest and the fastest growing non capital city container port in Australia (Port of Burnie 1991 pers. comm.).

The Triabunna port was built for the export of woodchips and is not serviced by the railway network. This necessitates the transportation of logs by road to Triabunna where they are chipped and loaded for export. Woodchips and woodchip pellets for export are also loaded at Long Reach on the Tamar River and Port Huon south of Hobart. Port Latta is used solely for the export of iron ore in pellet form. Risdon is a private port in the Hobart area used by Pasminco Metals. In terms of capacity, it is possibly one of the major private container ports in the southern hemisphere (Pasminco 1991 pers. comm.).

The nature and tonnage (or mass) of cargo handled by the major ports for the year 1989–90 are shown in table 2.7. Interstate and intrastate trade passes through the main ports of Hobart, Bell Bay, Devonport and Burnie, and to a lesser degree through Stanley (Circular Head).

Bell Bay is the largest of the Tasmanian ports in terms of annual freight throughput. Freight loaded out of Bell Bay, mainly for export, consists of woodchips, ferro-manganese alloys, aluminium, timber and agricultural commodities. While Bell Bay is the major port in terms of total cargo handled, Hobart is also an important port in terms of interstate cargo. Of the outbound task from Hobart newsprint is the major bulk commodity handled. This is followed by mainly export commodities such as woodchip, woodpulp, and other primary industry commodities.

In recent years the Port of Devonport, which was originally a general cargo port, has seen a concentration on servicing a few major users. These include TT-Line's *Abel Tasman* which carried about 20 per cent of visitors to the State, the building of cold stores to facilitate the trade of frozen vegetables and canned food, and increased bulk handling facilities for cement. The major freight commodities out of Devonport are cement, wood products and frozen food exports. The fourth major Tasmanian port of Burnie is important for container trans-shipment and large quantities of the interstate general goods trade. The major exports from Burnie are minerals, paper, and agricultural commodities.

Port authority cargo movements

Tasmanian port administration is decentralised. The major ports (Hobart, Bell Bay, Devonport and Burnie) are run by independent port authorities. There are five port authorities in Tasmania: Hobart, Launceston, Devonport, Burnie and

TABLE 2.7 TASMANIAN PORT TRADE 1989–90
(tonnes)

Port	*Mass inwards*	*Mass outwards*	*Total*
Hobart	1 516 778	1 819 167	3 335 945
Bell Bay	1 694 443	3 067 472	4 761 915
Devonport	967 968	1 006 997	1 974 965
Burnie	1 597 782	1 614 241	3 212 023
Total	5 776 971	7 507 877	13 284 848

Source ABS (1990a).

Circular Head. However, overall coordination is effected through the Tasmanian Ports Association (on which the Tasmanian government is represented) which oversees financial and trade operations, budgets and capital works proposals prior to approval. This is designed to reduce the likelihood of duplication of capital investment. Board members are usually elected from local government areas.

The proportion of non-bulk coastal freight accounted for by cargoes to and from Tasmania in 1986–87 can be calculated from statistics on tonnages loaded and discharged and freight flows published by the Department of Transport and Communications as shown in table 2.8.

Competition and infrastructure

Traditionally Tasmanian ports have not competed solely on port charges, which represent only a minor component of costs, but also on service and by providing a relative abundance of facilities at ports in aggregate so as to achieve fast turnaround times and minimal waiting times for berths. Encouraged by operators, ports have built new berths and constructed large container cranes at every port. Initially these were to handle the coastal trade but in the last eight years each port has constructed special facilities to deal with international services.

The Commonwealth Waterfront Strategy was announced following the Inter-State Commission report in 1989 (ISC 1989). The Inter-State Commission report outlined a number of actions that the States could undertake to improve waterfront efficiency. In response to this the Tasmanian Department of Roads and Transport established the Tasmanian Waterfront Industry Reform Program inviting representatives of industry, the unions and the ports, and chaired by the senior transport economist from the DRT.

The formation of the Northern Tasmanian Ports Authority was seen by its proponents as a move to break with tradition, promote efficiency and lead to

TABLE 2.8 COASTAL FREIGHT FLOWS, AUSTRALIA 1987–88
('000 tonnes)

	Destination							
Origin	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*Total*
NSW	1 633	810	234	564	79	545	–	3 865
Vic	2 876	325	4 199	351	166	1 345	–	9 262
Qld	2 084	377	8 409	773	66	232	–	11 941
SA	2 261	560	880	2 123	56	428	4	6 312
WA	5 662	866	39	215	1 267	168	172	8 389
Tas	1 266	1 252	40	31	55	203	–	2 847
NT	70	10	–	–	3	337	47	467
Total	15 852	4 200	13 801	4 057	1 692	3 258	223	43 083

Source DTC (1989).

further reform. The amendment to section 73 of the Marine Act will remove from the authorities their ability to finance new capital works without government approval.

Tasmanian government involvement in shipping

The Tasmanian government has been involved in the provision of sea cargo services around the coast of Tasmania for several decades. Its major involvement in coastal shipping began in 1985 with the acquisition of the passenger services by TT-Line. The basis for government involvement was stated:

> ....to stimulate competitive forces. The objectives of this Government involvement were to reduce shipping rates and to promote innovation in more efficient forms of handling cargo. (Government of Tasmania 1988)

Under the *Transport Act 1981*, the government established the Tasmanian Transport Commission (TTC) with powers to 'regulate and control transport by road, water or air within the State' (Transport Tasmania 1987a). The powers of the TTC include the operation and conduct of shipping services between places in Tasmania and between Tasmania and other parts of Australia. However, the TTC together with the Department of Main Roads and the Metropolitan Transport Trust were amalgamated in the 1989 reorganisation of Tasmanian government departments to form the Department of Roads and Transport. DRT has since then assumed responsibility of the Tasmanian shipping services (DRT 1989).

SUMMARY

Over the period that Tasrail has been under AN's management, the performance of Tasmanian railways has improved considerably. Physical upgrading of the system and improvements in staff and operating efficiency have contributed to these positive changes. The key factors in this surge of performance include:

- An increase in the freight task by 87 per cent for the period 1977–78 to 1988–89. In 1989–90 which was a 'low' year, Tasrail carried a freight task of about 413 million net tonne-kilometres compared with 246 million net tonne-kilometres in 1977–78.
- Employee levels have fallen from 1686 staff in 1978 to 705 at March 1991, a fall of 58 per cent. Over the same period, employee productivity, measured as output in net tonne-kilometres per employee, increased by 258 per cent.
- As a direct result of these improvements, the level of the operating loss has been reduced by about 37 per cent. However, the operating loss of Tasrail has still averaged in recent years (1987–88 to 1989–90) about $15.5 million.

Relatively large sections of roads in Tasmania are approaching the limit of their design life. An increase in heavy truck traffic is likely to accelerate road damage given the current rate at which the road pavement is ageing. Since most of the freight task in Tasmania is bulk freight, about 80 per cent of the total truck fleet is registered at a GCM of 41 tonnes. Heavy road vehicle capacity in Tasmania has increased in the past three years by about 25 per cent.

The freight task for which Tasrail may compete with shipping is relatively small. New techniques have helped to modernise the cargo handling technology employed in Tasmanian ports and a more competitive sea freight market has developed. However, these improvements have increased uncertainty and made planning more difficult for Tasrail.

CHAPTER 3 FREIGHT TASK PROJECTIONS

This chapter describes Tasrail's freight task and provides details of the projected rail traffic for the 20-year period, 1991–92 to 2010–2011. (The *freight task* is measured in net tonne-kilometres.) These rail traffic demand projections are employed to carry out the financial and economic analyses required to evaluate the expected performance of Tasrail. Issues of road cost recovery in Tasmania, which are likely to affect Tasrail's freight task projections, are also discussed in this chapter.

THE TASRAIL FREIGHT TASK

The eight major commodities (in order of freight task size) carried by Tasrail in 1989–90 were:

- woodchip logs
- coal
- pulpwood logs
- containers
- fertiliser
- sulphuric acid
- cement
- minerals

Container traffic is the only non-bulk traffic handled by Tasrail following the cessation of less-than-car-load traffic in 1986. Small amounts of timber and sawlogs as well as mineral commodities such as quartz and clay are also carried by Tasrail.

It is important to note that Tasrail is very dependent upon the transportation of timber logs for a substantial part of its revenue. Therefore the future requirements of the woodchip and the paper and paper product industries are expected to have a significant bearing on the viability of Tasrail. Only a considerable expansion in these industries and/or a major restructuring of the organisation would enable

Tasrail to cover the cost of its operations. As is discussed in detail in appendix I[1], changes particularly in the supply source of pulpwood logs (that is a shift in pulpwood log supply from northern to southern concessions) may further undermine the viability of the Tasrail freight operations.

Figure 3.1 illustrates the commodity shares of the Tasrail freight tonnage for 1989–90 while, the importance of the four major commodities in terms of net tonne-kilometres is shown in figure 3.2. A comparison of figures 3.1 and 3.2 indicates the relationship between freight volume measured in tonnes and freight task measured in net tonne-kilometres. This further points out the relative significance of these commodities. While logs (pulpwood and woodchip), coal, containers and cement represented 86.1 per cent of Tasrail tonnage in 1989–90, logs, coal and containers together accounted for 80.5 per cent of the task in 1989–90 as indicated in figure 3.1. This is because, although cement is particularly significant in tonnage terms, the short-haul nature of the majority of movements reduces its contribution to 3.6 per cent of the total task measured in tonne-kilometres.

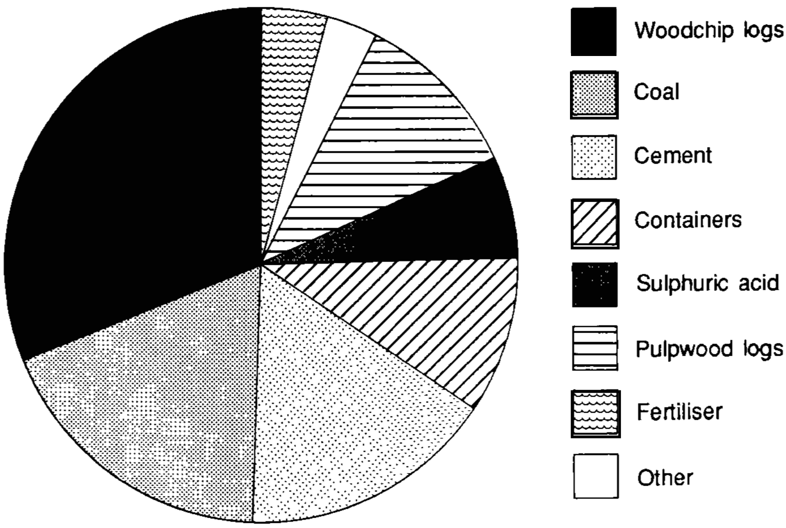
The dominance of a small number of commodities in the task is also reflected in the small number of firms that are major customers of Tasrail. Six firms, namely, Australian Pulp and Paper Mills (APPM), Australian Newsprint Mills (ANM), Forest Resources, Goliath Cement, Cornwall Coal and the Electrolytic Zinc Company either received or dispatched about 90 per cent of the freight task in 1989–90.

Historical performance

The Tasrail freight task remained relatively static between 1981–82 and 1986–87 following strong growth over the three-year period 1978–79 to 1980–81 as is shown in figure 2.3. Commodities other than woodchip logs which experienced growth in tonnage over this period were sulphuric acid and coal. Tasrail experienced a decline in pulpwood tonnage in 1986–87, recovered strongly in the following two years and in 1989–90 total pulpwood tonnage declined again. Sawn timber traffic, although a relatively small part of Tasrail's freight task, experienced a dramatic decline from about 11 million net tonne-kilometres in 1984–85 to 157 000 net tonne-kilometres in 1989–90. Fertiliser and cement, on the other hand, experienced small fluctuations around a stable level.

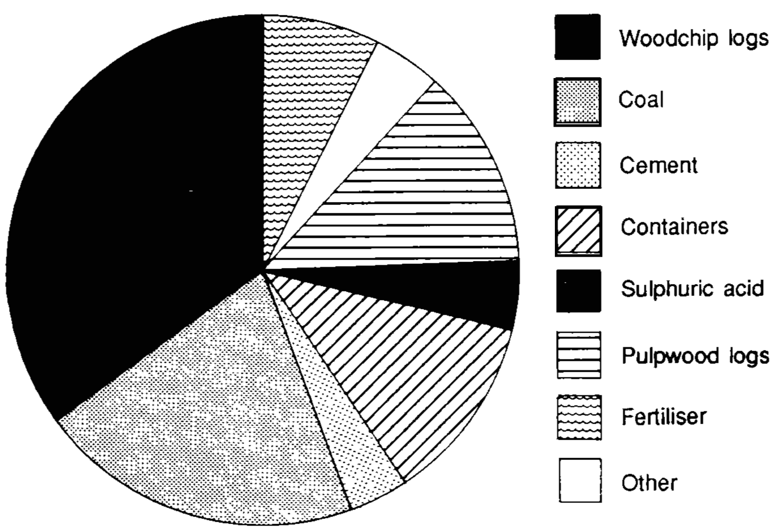
Tasrail's freight task was 413 net tonne-kilometres for 1989–90 compared with the peak of 459 net tonne-kilometres in 1988–89. An increase in the aggregate freight task of about 14 per cent over the two years from 1987–88 brought the freight task to this peak level. This increase was mainly due to growth in cement,

1. Appendix I contains the consultants' final report of analyses of demand projections and Tasrail's financial assessment.



Source Tasrail 1991 pers. comm.

Figure 3.1 Major commodities, freight tonnage, 1989-90



Source Tasrail 1991 pers. comm.

Figure 3.2 Major commodities, net tonne-kilometres, 1989-90

fertiliser and pulpwood logs traffic. A decline in tonnage is forecast for 1990–91 as is discussed in appendix I. This decline can be mainly attributed to developments with the Wesley Vale Pulp Mill project, the general level of economic activity, the opening of the Merrywood Colliery and the decline in the acid task.

Freight task projections

Tasrail freight task forecasts were developed for the 20–year period 1991–92 to 2010–2011 to facilitate the economic and financial analyses presented in chapters 4 and 5 of the report. The forecasts presented in this chapter (and in appendix I) set out revenue for each major product.

Methodology

Fay, Richwhite Australia Limited, who developed the demand projections, analysed detailed forecasts for the 11 years ending 30 June 2001 provided by Tasrail. Their analysis was performed with reference to historic trends and expected economic scenarios as well as information provided to them by Tasrail and Tasrail's customers.

Where discussions with these customers and the consultants' analysis led them to conclude that Tasrail's own forecasts were inappropriate, they were modified accordingly by the consultants. Figures used in this chapter are the adjusted forecasts. All forecasts and historical revenue information are in real 1990 dollars. From that analysis the consultants determined for each major commodity group the most likely task and real revenue rates in the short, medium and longer term.

The demand projections were derived using univariate analysis because of data, time and resource constraints. However given the dominant role of these products in the Tasmanian economy the product-by-product analysis provided opportunities to assess the cross-product consistency of the forecasts and macro-economic parameters underlying the various projections. In this regard the consultants adopted a similar approach to that used in the BTE (1987a) study. The product-by-product approach in these forecasts, however, would imply that total demand considerations related to any Tasrail capacity constraints are assumed away or, at least, not binding. The consultants have argued, however, that the assumption of capacity constraints has been considered in their analysis and it appears to be reasonable.

A study of past forecasts indicates the distortions that arise from uncertainties of major capital investment projects such as pulp mills. With a small number of large customers these uncertainties make forecasting Tasrail revenues relatively difficult. However, there is nothing unusual in this case since forecasting, at best of times, is characterised by a high degree of uncertainty. Given that several customers are producing commodities for a world market, the demand for freight services is correlated with economic conditions in these markets.

The consultants expect that their forecasts for Tasrail may have large standard errors and therefore suggest that they be interpreted with caution. Emphasis was placed on determining single realistic estimates for each year. Where opportunities were identified that may result in significant deviations from those estimates, these were noted and where possible their likely effect quantified.

Clearly forecasts for the immediate future have the greatest degree of confidence. The analysis focuses on economic variables likely to impact on Tasrail through to 1995–96. Thereafter projections become more uncertain, and unless there was clear evidence of major variations it was assumed that the 1995–96 freight levels will continue in real terms.

The revenue forecasts assume that forecasts of both tonnage and freight rate charges will hold. For most products this involves an assumption that the level of real freight rate increases or decreases will allow Tasrail to maintain its current market share vis-a-vis other forms of transport, primarily road.

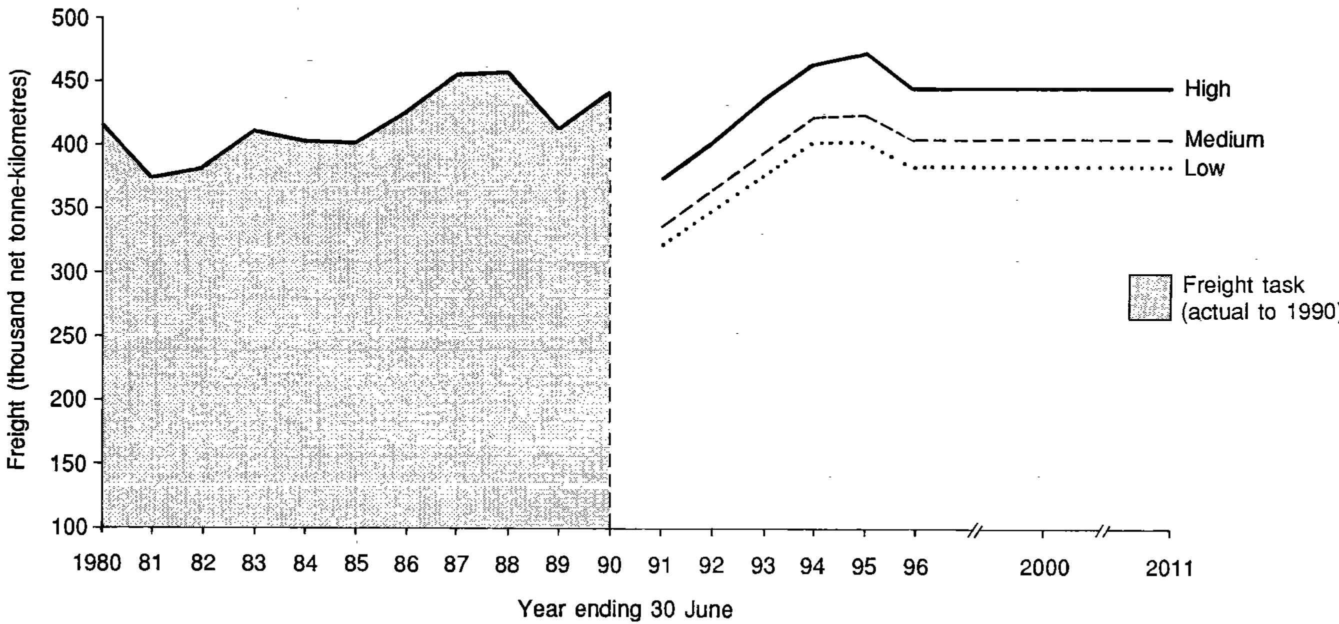
The forecasts do, however, incorporate comments on relative transport costs made to the consultants by Tasrail customers during discussions. The likelihood of changes in the relative costs of rail and road transport are also addressed later in the chapter. These relativities, however, and their impact on the pricing of rail or its competitors have not been explicitly taken into consideration in producing the forecasts. Aside from general comments, the subject of permits currently paid by Tasmanian road hauliers on certain bulk goods has also not been considered.

Total freight task estimates

Trends in the quantities carried by Tasrail in the last decade indicate that only woodchip logs, coal and sulphuric acid have grown in tonnage. The only one of these commodities which uses the rail system extensively is woodchip logs. It therefore follows that future expansion of Tasrail's task seems to depend upon what is essentially an export industry. On the other hand coal and sulphuric acid are a part of the local economy, as they are inputs to the local manufacturing industry. If coal is being used as a substitute for electric power at present, it may be replaced by hydro-electric power in the future and this has certain implications for the Tasrail coal freight task.

Changes in the Tasrail task between 1979–80 and 1989–90 and forecasts to the year 2010–11 are illustrated in figure 3.3. Details of the revenue projections are contained in table 3.1. As indicated by the forecasts in table 3.1 Tasrail's freight task and revenue is expected to increase up to 1994–95 and then experience a moderate decline. Predictions for the 16 years that follow 1994–95 are assumed constant in real terms. The average rate per thousand net tonne-kilometres is also forecast to peak in 1994–95.

For the purposes of figure 3.3 a 'high' scenario forecast was assumed by calculating 110 per cent of the 'medium' (described) forecast. The 'low' scenario was similarly attained by calculating a forecast equal to 90 per cent of this medium



Source See appendix 1.

Figure 3.3 Tasrail freight task: historical performance and forecast

TABLE 3.1 TASRAIL REVENUE FORECASTS 1990–91 to 2010–11

($'000)[a]

Product	*1990–91*	*1991–92*	*1992–93*	*1993–94*	*1994–95*	*1995–96*	*1999–2000*	*2010–11*
Woodchip logs	5 526	6 790	8 395	8 395	8 395	8 395	8 395	8 395
Coal	5 520	5 066	5 074	6 413	6 571	6 296	6 296	6 296
Pulpwood logs	2 681	3 036	3 214	3 214	3 214	3 214	3 214	3 214
Containers	2 866	3 039	3 039	3 039	3 039	3 039	3 039	3 039
Cement	1 464	1 884	2 425	3 357	3 531	3 537	3 537	3 537
Fertiliser	1 407	1 502	1 502	1 502	1 502	1 502	1 502	1 502
Acid	1 329	1 067	1 069	1 465	1 466	60	60	60
Other	1 922	2 053	2 080	2 107	2 155	2 161	2 161	2 161
Total	22 715	24 437	26 798	29 492	29 873	28 204	28 204	28 204

a. In 1990 dollar values.

Source See appendix I.

forecast. These alternative scenario forecasts indicate upper and lower bounds and were used to perform sensitivity analysis of the projected total demand level that provides an assessment of possible future demand changes.

Commodity-by-commodity forecasts

In this section a brief summary of forecasts for each commodity is presented.

Woodchip logs
Tasrail carries woodchip logs for two major customers, APPM and Forest Resources. It transports woodchip logs from various concessions and private forests within Tasmania to the Long Reach mills. Woodchip is mainly exported and export volumes are constrained by licences issued by the Federal government. Since January 1989 woodchip exporters have held licences to export 2.825 million tonnes. Tasrail's freight task peaked in 1986–87 at 191 million net tonne-kilometres (NTK). Task carried during 1989–90 totalled 146 million NTK, a decrease of 23.5 per cent on the 1986–87 peak.

Forecasts of woodchip revenue for the six years to 1995–96 are shown in table 3.1. After a further decline in 1990–91 to 92 million NTK, the woodchip task is expected to grow to 135 million NTK by 1993–94. It should be noted that this level of task is 29 per cent below the peak level of 1986–87. The woodchip task for Tasrail is unlikely to return to 1987–88 levels due mainly to changes in sources of woodchip log supply. Forecasts for the years following 1993–94 assume zero growth in both freight task and real revenues. However, there may be some opportunities for woodchip task growth to be achieved beyond 1993–94. Some of the reasons pointing to such growth are discussed in the next section.

Tasrail has secured some real increase in woodchip freight rates per NTK in recent years after long-term contracts, which held the rates at relatively low levels, expired in the mid 1980s. A further real increase is forecast for 1991–92 and 1992–93 followed by zero real growth for the remainder of the forecast period. However, relatively poor cost recovery suggests that Tasrail is vulnerable to competition from road on the movement of woodchip logs.

Multiple handling of logs carried by Tasrail, which are initially loaded onto trucks, increases the cost of freight considerably. An additional cost of about $5 per tonne is estimated due to multiple handling (Tasrail 1991 pers. comm.). No estimates of demand elasticities for woodchip freight exist. However, it may be speculated that road freight is a 'good' substitute for rail freight, which may point to a relatively elastic demand for woodchip freight. This, in turn, may mean greater competition from road and reduced scope for further real freight rate increases by Tasrail.

The woodchip market outlook would critically depend on a number of currently developing policy issues. These issues relate to the increasing pressure on forest resources and increasing conflict between wood users and conservation concerns. ABARE (1989a) concluded that Australia will continue to export woodchip and woodpulp, and that such exports would depend on the future world market conditions for these products and Australia's relative competitiveness given domestic cost structures and constraints. ABARE also concluded that Australia is a cost-competitive producer of forest products. Another recent ABARE study (1990) has pointed out that:

> while regulation of forestry activities may serve as an appropriate way of maintaining some forms of conservation in forests, processes need to be established so that: (i) there is explicit recognition of the costs of regulation and that there is explicit trading off of those costs against perceived benefits; and (ii) there is a process of review of regulations to ensure that the changes in costs and benefits over time are considered.

The National Association of Forest Industries (1990) has also concluded that Australian forest industries must be internationally competitive and must have secure access to wood resources. There have been some moves by the Federal government to introduce resource security legislation, which is likely to assist investment in forest industries around the country including woodchip and pulpwood exports (National Association of Forest Industries 1991).

Pulpwood logs

Pulpwood logs are used by ANM as an input to their paper mill at Boyer. This mill produces approximately 230 000 tonnes per annum of newsprint and other related products. This requires 370 000 tonnes of pulpwood input per annum. Tasrail's pulpwood freight task has increased substantially since 1986–87, and peaked in 1988–89 at 57 million NTK. After a decline in 1990–91 to about 41 million NTK the pulpwood task is forecast to increase to 49 million NTK by 1992–93 and to remain there for the remainder of the forecast period. A summary of the revenue forecasts for pulpwood is presented in table 3.1.

Intermodal considerations and policy developments that are likely to affect Tasrail's pulpwood freight task are similar to those described for woodchip above. Some threats and opportunities for the pulpwood task in the medium to longer term are presented in the next section.

Coal

The major producer of coal in Tasmania is Cornwall, a wholly owned subsidiary of Goliath. Cornwall's major customers are Goliath, APPM and ANM. These customers purchased 80 per cent of Cornwall's coal production in 1989–90. APPM and ANM have developed a strong affiliation with Cornwall over the years whilst the common ownership links with Goliath ensure coal demand from Cornwall's collieries. Mainland coal suppliers occasionally attempt to penetrate the Tasmanian market in years of low world demand. However, supplier affiliations and security of supply have meant Cornwall's major customers have resisted the use of mainland coal, which is regarded of somewhat better quality. Increased competition from the mainland is also unlikely as shipping costs across Bass Strait effectively isolate the Tasmanian coal market.

Total coal task for Tasrail is forecast at 80.6 million NTK for 1995–96. This represents a decrease of 3 per cent on 1989–90 when a peak task of 83.4 million NTK was carried. However, the 1995–96 level is reached after a considerable decline is forecast for the early 1990s. This decline reflects a short-term decrease in coal requirements for cement production as plant expansion activities are undertaken, the loss of Cornwall's smaller customers to Merrywood and the possibility of Tioxide's relocation out of Tasmania. The substantial increase of Tasrail's coal task in the two years to 1994–95 reflects Goliath's cement expansion plans (see appendix I). Zero growth in task and real freight rates is assumed for the forecast period after 1995–96. A summary of the coal revenue forecasts is presented in table 3.1.

There are no estimates of coal freight demand elasticities which would help to determine the degree of competition with road freight. However, coal traffic in Tasmania appears to fulfil those characteristics that ensure a comparative advantage for rail transport. Coal is transported over long distances in large quantities to a small number of customers all of whom have operations geared toward receiving coal by rail. For this type of transport, rail is probably the more efficient mode as indicated by its good cost recovery rate. The small elasticity of coal freight demand implied by these factors may point to some scope for real freight rate growth for Tasrail in the medium to longer term. The consultants have forecast that real revenue rates per NTK would show a small real increase in the two years to 1992–93 and would remain constant for the rest of the forecasting period. Some threats and opportunities for coal traffic in the medium to longer term are discussed in the next section.

Cement

Goliath is the only producer of cement in Tasmania. A recently announced expansion of this company is expected to increase cement production in the State by 100 per cent to 1 million tonnes in 1992–93. Most of the cement produced in Tasmania is exported to the mainland. These sales, however, contribute comparatively less to the cement rail task due to the short haul between Railton and the Port of Devonport. The cement task peaked in 1988–89 at 16.8 million NTK. A relative decline is expected in the first two years of the forecasting period before a new peak in 1995–96 due to expansion plans. Subsequent to the 1995–96, a zero growth in cement task is forecast.

The cement freight task consists of a bulk interstate market and a bulk intrastate market. Lack of estimates of freight demand elasticity for cement makes it very difficult to assess the degree of substitution between rail and road transport. However, developing patterns of demand suggest that cement traffic to Devonport for shipping to the mainland is relatively inelastic, while intrastate freight demand is relatively elastic. It is argued by the consultants that carriage of bulk cement, for the interstate market, by road is not a 'viable option'. However, Tasrail's ability to retain market share in the local cement market will be dependent on competitive pricing with road transport. Some future developments that may affect Tasrail's cement task are presented in the next section.

Containers

Container traffic is the only non-bulk freight carried by Tasrail. It is defined to include general container traffic carried for freight forwarders, paper carried for ANM and metals carried for Pasminco and Comalco Aluminium. Tasrail carries container freight primarily between the ports of Bell Bay and Burnie and the major population centres Launceston and Hobart. The container revenue forecasts are presented in table 3.1. The container task was approximately 52 million NTK in 1988–89. It declined to about 47 million NTK in 1989–90 and is forecast to increase and be maintained at around 56 million NTK. Zero real growth is assumed after 1991–92.

Although some real increases in the total container traffic are forecast by the consultants, a relatively elastic container freight demand, implied in their analysis, is likely to lead to further losses in Tasrail's market share in favour of road transport. It appears that container traffic is the most price-sensitive of Tasrail's product groups. Tasrail's ability to maintain its current market share of container traffic would depend on its ability to overcome the advantage in flexibility and speed currently held by road operators. Also, expected future improvements in the efficiency of carrying containers by road (that is, increases in gross weight limits for trucks and the introduction of B-doubles — double semitrailers with between seven and nine axles) would have to be combated by rail.

At present, rail has a relatively competitive situation for containers above the 13-tonne range. Another important factor influencing the relative competitiveness of rail is the ability of road transport operators to obtain a back-load. Tasrail has some advantage over road in handling the large container traffic presently shipped through the port of Hobart if it is redirected to the northern port of Bell Bay from 1991. However, the comparatively low rate of cost recovery achieved by Tasrail on the movement of containers is a major factor that needs to be assessed against all these possibilities.

Sulphuric acid

Tasrail has historically carried sulphuric acid from Pasminco at Risdon to Tioxide at Heybridge. About 50 per cent of Tioxide's requirements is carried direct from Risdon to Heybridge by Tasrail. The other 50 per cent is shipped to Burnie for a short haul by Tasrail to Heybridge. The forecasts for Tasrail's sulphuric acid revenue are shown in table 3.1. This task peaked in 1987–88 at 23.6 million NTK and subsequently declined by 23 per cent to just above 18 million NTK in 1989–90.

It is forecast that this task will further decline to about 13 million NTK by 1992–93 before climbing back to just under 18 million NTK in 1993–94 and 1994–95. There is a possibility that Tioxide will close its current plant and build a new more 'environment friendly' plant, not necessarily within Tasmania. Under this assumption, it is forecast that Tasrail's sulphuric acid task will be reduced to a minimum of 93 000 NTK for the remaining of the forecast period to the year 2011.

Tasrail does not compete with road in the freighting of sulphuric acid. Road is not considered to be a viable transport alternative for acid due to safety reasons (that is, consequences of a possible road acid spill). The current allocation to sea and rail is considered to provide a much more suitable method of transport. A lack of shipping capacity has precluded the transportation by sea of all the sulphuric acid destined for Tioxide. However, it is always possible that in the future Tasrail may have to compete with sea for this cargo. This implies a relatively elastic transport demand for acid and thus limited scope for real freight rate increases. A zero increase in real terms is forecast for freight rates after 1994–95.

Fertiliser

Pasminco is the sole producer of fertiliser in Tasmania. Pasminco mainly produces superphosphate fertiliser. Its production of fertiliser has averaged around 130 000 tonnes per year of which approximately 100 000 tonnes has been supplied in bulk form to the north of the State. Tasrail's current market share is about 90 per cent of the northern bulk market. Tasrail has been able to establish a dominant market share in this market through the creation of a system of 'bottom dump' fertiliser bulk depots.

Forecasts for Tasrail's fertiliser freight task and revenue are shown in table 3.1. The fertiliser freight task peaked in 1989–90 at just over 30 million NTK. A decline of about 20 per cent from this level is forecast for 1990–91 before this task settles at 25.7 million NTK in 1991–92 and for the remainder of the forecast period. Zero growth in both task and real revenues is assumed from 1995–96 to 2010–11. These forecasts are significantly lower than those put forward by Tasrail. A discussion of Tasrail's forecasts and the reasons they differ from the consultants' projections is presented in appendix I.

It appears that Tasrail has captured the bulk of the market in fertiliser traffic in Tasmania. The depot system has provided Tasrail with a distinct advantage over road in the northern fertiliser market. If this is so, then the demand for fertiliser traffic may be relatively inelastic. This could suggest, at least, a maintained modal share for rail and some real increases in fertiliser freight rates to improve on the relatively low rate of cost recovery. This view, however, is at variance with the 'medium' forecast produced by the consultants.

Other commodities

Other commodities carried by Tasrail include clay, quartz, sawlogs and timber. The contribution of these commodities to Tasrail's freight task is about 8 per cent and it is not expected to greatly change over the forecast period. The freight task for these commodities peaked in 1987–88 at 32.7 million NTK and after a relatively small decline in recent years is expected to peak again by 1994–95 at 33.8 million NTK. It is expected to stay at this level for the remainder of the forecast period. A more detailed discussion of the forecasts for each of these commodities and some of the main assumptions employed in these forecasts are presented in appendix I.

Special circumstances

The forecasts developed by the consultants for the individual commodities have, as far as possible, included probable rail task gains and losses. Some of the possible developments that could generate variations in the composition of the future rail task are outlined below.

Potential opportunities for Tasrail's future freight task

- Potential quota increases in the woodchip industry.
- The new stand-alone pulp mill proposed by APPM.
- The half pulp mill proposed by Forest Resources which would offer limited scope for rail sourcing, although opportunities could exist for finished product freight.
- Goliath's commitment to expanding cement capacity.
- Mooted ANM plant expansion plans.
- The continuation of Tioxide's operation in Tasmania after 1994–95.

Potential threats to Tasrail's future freight task

- The loss of Cornwall's smaller coal customers to Merrywood.
- Increasing road and road operator efficiency.
- Changes to shipping capacity that are likely to increase the number of roll-on roll-off trailers that can be transported to Tasmania, thus improving road efficiency and posing a large threat to Tasrail.
- The mooted introduction of B-doubles which would further increase road efficiency allowing a payload of 38 tonnes to be carried.
- The possibility that Tioxide might relocate out of Tasmania. Although Tioxide has not indicated that closure is imminent, it is felt that prudent forecasts would recognise this possibility.

Carriage of the rail task by alternative modes

In the case of closure of Tasrail, which is one of the options considered in the analysis, Tasrail's freight task would probably be carried by alternative modes. All of the commodities carried by rail, with the exception of sulphuric acid, are presently moved, some in significant volumes and some in small volumes, by road transport. Therefore it can be expected that road transport would carry the bulk of the Tasrail freight task in the event of rail closure. The one probable exception would be Tasrail's share of sulphuric acid, which for public safety reasons would be all carried by sea transport.

The immediate transfer of all the rail freight task to road (excluding acid) in the event of Tasrail's closure would increase the road task by about 17 per cent or around 330 to 360 million NTK. This is based on an estimate of 1 988 million NTK of the road freight task for 1990 derived from ABS survey data of motor vehicle use (ABS 1988b). The road task is considerably smaller than the corresponding rail task as presented in table 3.1, because of shorter road distances between origin-destination pairs. For example, the Wiltshire – Long

Reach rail distance is 300 kilometres, while the equivalent road distance is 210 kilometres.

SOME ROAD COST RECOVERY ASPECTS IN TASMANIA

The relative cost recovery and efficiency of equivalent services of alternative transport modes, especially those competing closely with Tasrail, are important factors in assessing future changes to Tasrail's operations. The extent to which these relativities are considered in the assessment of Tasrail depends on the degree of competition between the various modes. This section provides a discussion of the more important road transport cost recovery issues in Tasmania. The emphasis is on road pricing principles on the assumption that road is the main competing mode for rail in the State.

The economic principles underlying road pricing are well documented in the economic literature and are not dealt with here. Detailed discussions of road pricing principles and road pricing experiences in various countries can be found in BTE (1986b) and BTCE (1988).

As already mentioned, the possibility of full or even partial closure of the Tasrail system means that freight which was previously carried by rail would in the main be transfered to road or sea transport. If the freight task in Tasmania carried by the road system increased then this would have implications for road cost recovery. Similarly the present permit system which regulates certain parts of the task to rail would have to change. New technology in the form of the larger truck trailers known as B-doubles must also be considered. If freight was transferred to cargo ships it would be important to consider the effect upon ports and the present shipping task in Tasmania.

The financial and economic analyses in this study must include the cost of the damage caused to the roads if there is an increase in truck traffic. This is to allow for the added cost of road maintenance and the truck share of the cost in providing the road infrastructure. The components of road cost categories that are considered in this analysis are outlined in table 3.2. This table is based on BTCE analysis and is presented in BTCE (1988).

In order for the full cost of the provision of roads to be recovered from specific classes of users, in this case heavy trucks, it is necessary for each user and class of user to meet the short-run and long-run avoidable costs of this provision. The short-run avoidable cost refers to the costs of road damage which would not result if the particular traffic ceased. The long-run avoidable costs include the costs of the provision of roads as such. In the case of short-run costs, there is also a social cost resulting from accidents, the need for policing, and environmental pollution. The social cost is not generally included in the cost recovery of road truck costs but must be included in any social cost-benefit analysis.

TABLE 3.2 COMPONENT COSTS OF ROAD USE CONSIDERED IN THE ANALYSIS

Cost component	*Short-term relationship to output*	*Affected party*
Pavement damage repair cost	Mainly variable; some fixed	Government (outlay on road pavement maintenance, resealing, etc.)
Increased vehicle operating cost from driving on damaged roads	Variable	Road users
Increased vehicle operating cost from road congestion delay	Variable	Vehicle operator and other road users
Vehicle operating cost	Mainly variable; some fixed	Vehicle operator
Traffic administration and policing	Variable and fixed	Government
Road accidents	Variable	Vehicle operator, other road users, government (hospitals, courts, police, ambulance)
Other externalities	Mainly variable; some fixed	Other road users, non-road users, government (pollution control, etc.)
Requirement for pavement upgrading and construction	Fixed	Government (outlay on new roads)

Source BTCE (1988).

The basic distinction between short-run and long-run costs is that in the long run road capacity can be varied whereas in the short run it cannot. For example, if there is an increase in traffic output in the short run, it must be accommodated within the constraints of the existing system. As stated in BTCE (1988), the long-run (investment) decisions affect the short-run (user) decisions and vice versa. An example of the former is that *investment* in stronger pavements will allow heavier vehicles to *use* a road without causing excessive damage. An example of the latter is that if numerous vehicles *use* a particular road, perhaps causing congestion, then this excess demand provides a signal and an incentive to expand the infrastructure through new *investment.*

Measurement of avoidable costs

Avoidable cost includes all cost that could be avoided if a given vehicle were not to undertake a particular trip. In practice an average avoidable cost per unit is used, such as the cost per tonne-kilometre. Avoidable cost is an imprecise concept that requires specification of the subject or item that will be avoided. Avoidable costs will vary depending on, for example, time or distance. Avoidable cost per kilometre, for instance, will be much lower than that of a particular trip. Short-run cost usually refers to the operating cost which is avoided, whereas long-run avoidable cost also includes the capital cost avoided. (For a more detailed account and specific examples of variations in measuring avoidable cost see BTCE (1988)).

A major element of avoidable cost is the cost of damage caused by vehicles to road pavements and bridges. Other cost components may include traffic control, congestion, pollution, accident cost and increases in vehicle operating costs. Pavement damage varies with road type, different vehicle suspensions and vehicle speed and tyre pressures. An engineering concept has been extensively used to evaluate pavement damage. Pavement damage to a given road is related to the fourth power of the axle load. An equivalent standard (or single) axle load (ESAL) is used to compare the damage caused by different vehicle axle loads (BTCE 1990a).

Repair costs attributed to pavement damage include routine maintenance cost (that is, for minor cracking, pothole repair), pavement resealing cost and road reconstruction cost. Each of these cost components is related to the life of a road. Essentially, a road is designed to accommodate a given number of standard axle passes. With each vehicle passage, the effective life of the road is reduced and its required repair is brought forward. The evaluation of road damage cost due to an increase in truck traffic following the possible closure of Tasrail is carried out in this study using the life cycle costing model (BTCE 1990a), as discussed in the next chapter.

Road pricing in Tasmania

In Tasmania as elsewhere in Australia the construction and maintenance of roads is funded by all three levels of government, Federal, State and local. The State government raises funds from registration charges for vehicles and driver licences and from fuel levies for the construction and maintenance of roads. Almost all Federal funds raised from road users is fuel related. Local government pays for roads from its revenue base, most of which is land taxes. A system of Federal and State government grants covers the distribution of funds. As noted by the Inter-State Commission (ISC 1990) this method of raising money does not match road revenue or expenditure to the actual use made of roads in an equitable manner.

The Inter-State Commission recommended that the majority of motor vehicles only pay a fuel charge and that where the fuel charge does not cover all road use costs, heavy vehicles pay a mass-distance charge based on actual distance travelled and nominated gross vehicle mass. The intention is to address the problem that it is the vehicle mass of individual road users which is responsible for road damage. Another important recommendation is that certain roads should be designated as being required of high standard for heavily loaded vehicles. This suggests that in the future the Tasmanian government may designate specific roads for this purpose. It is most likely that they would be the present National Highways which have been constructed to a relatively 'high' standard.

Present and future cost recovery charges in Tasmania

The intention of the Inter-State Commission recommendations is to charge prime movers by their fuel consumption and charge trailers on the basis of their mass and distance travelled. This is so that the actual beneficiary from transportation pays for the cost of the service. The information provided in table 3.3 enables charges for heavy vehicles to be calculated either for existing arrangements in Tasmania or from the recommendations. The charges can be calculated once the vehicle type, mass and distance are known.

The special Premiers Conference in November 1990 agreed to the establishment of a national heavy vehicle registration scheme together with uniform technical and operating regulations and nationally consistent charges. The intention is to develop charges with regard to the principles established by the Inter-State Commission and with a view to full and consistent levels of cost recovery.

Heavy vehicles operating on Tasmanian roads in the future are likely to be affected by these decisions.

For example, under the present system in Tasmania a six-axle articulated truck, which is the type shown in figure 3.4 having a twin-drive prime mover and a three-axle trailer, with a total gross combination mass of 38 tonnes would pay $33 048 per year if it travelled 200 000 kilometres. Under the ISC recommendations the same combination and mass would pay a total amount of

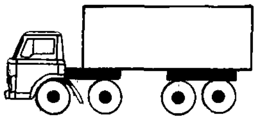
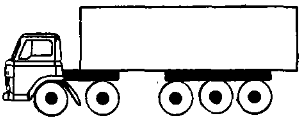
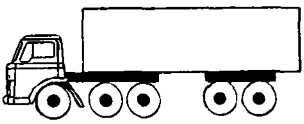
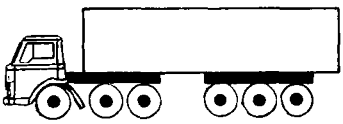
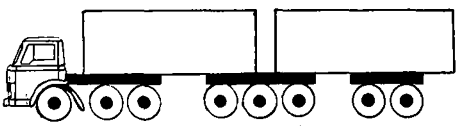
TABLE 3.3 POSSIBLE ROAD COST RECOVERY CHARGES FOR THE TASMANIAN ROAD FREIGHT INDUSTRY

(Based on a distance of 200 000 km)

Vehicle type	*Mass (tonnes)*	*Registration and other charges ($ per vehicle)*	*Charge per km (cents)*	*Mass-distance charge: total($)*	*Fuel charge: total($)*	*Total all charges ($)*
Present fees						
4 axles[a]	..	1 288	15.69	31 380	..	32 668[b]
5 axles[a]	..	1 288	13.30	26 600	..	27 888[b]
6 axles[a]	..	1 288	15.88	31 760	..	33 048[b]
ISC proposed fees						
Prime mover	..	..	0	0	17 600	
Trailer						
2 axles	28.0	..	7.38	14 760	1 333	33 693[c]
3 axles	28.0	..	3.27	6 540	1 333	25 473[c]

a. Prime mover plus trailer.
b. Registration and other charges plus distance charge.
c. Distance charge plus fuel charge (prime mover plus semitrailer).
.. Not applicable.

Source ISC (1990).

Prime mover trailer combinations	*Gross combination mass*	*Total towed mass*
	(tonnes)	
	31.5	23.5
	35.5	27.0
	38.0	28.0
	38.0	28.0
	59.0	49.0

Source Standards Association of Australia (1990).

Figure 3.4 Trailer combinations for heavy road freight vehicles

$25 473 per year. The total ISC charge is made up of $17 600 for the prime mover plus a mass-distance charge of $6 540 and a $1 333 imputed fuel charge for the trailer. The mass-distance charge in this case is 3.27 cents per kilometre.

The important difference between the present system and the ISC recommendations, is that under the present system the same prime mover as in the previous example, with a two-axle trailer also of the same mass as in the previous example, would pay $27 888 per year. Under the ISC recommendations the same combination would pay $33 693 per year. The additional payment is related to the fourth power rule which means that greater damage is done to the road by a two-axle trailer than a three-axle trailer. Conversely the prime mover with the three-axle trailer as discussed in the previous paragraph would pay less than under the present system.

B-doubles — two trailers with a shared bogie
The use of B-doubles has important implications for road cost recovery. It also affects the operating costs of road haulage by increasing labour productivity. B-doubles cannot be registered for use on Tasmanian roads at present. The overall length of truck-trailer and prime mover-semitrailer combinations permitted is 17.5 metres, whereas a B-double is about 23 metres. Similarly the gross load limit is 41 tonnes, while a B-double has a gross load limit of 56 tonnes. The configuration for these vehicles is shown in figure 3.4.

The Road Permit Scheme

The terms of reference for this study require the Bureau to make an assessment of the Tasmanian Road Permit Scheme including its impact on Tasrail's financial performance. This is a system of road charges administered by the Tasmanian government and intended to ensure that certain 'rail preferred' goods are, as far as practical, carried by rail rather than by road. The scheme, known also as Rail Protection Fees (RPF), is administered under the *Tasmanian Traffic Act 1925* concurrently with a system of Public Vehicle Licence fees.

For the purpose of the licensing system, the State is divided into three areas. Vehicles must be licensed to operate in one of these areas. Licences are issued 'as of right' for a fee of $6 per annum. A licence entitles the holder to carry freight or passengers within the area for which the vehicle is licensed and between that area and another area. To carry freight within an area other than the one for which the licence is held or between the other two areas, a permit must be obtained. The permit costs $250 and is valid for one year.

Prior to September 1987, the RPF scheme was administered as the Out-of-Area Permit Fees Scheme. At that time, the stipulation that only out-of-area journeys require permits was removed. The scheme as it now stands applies to:

- vehicles with a gross vehicle mass (GVM) in the case of rigid vehicles or a gross combination mass (GCM) in the case of articulated vehicles exceeding 12 tonnes;

- loads of more than 7 tonnes of bulk cement, bulk fertilisers, logs, timber, coal, sulphuric acid or limestone;
- journeys exceeding 50 kilometres for timber logs and 100 kilometres for other commodities.

Licence holders or consignors can apply for exemption from the requirement to pay RPF for individual trips or for all trips over a set period. Following consultation with Tasrail, the Tasmanian Department of Roads and Transport may grant exemptions where:

- there is no rail service which could reasonably be used;
- rail cannot handle the goods because of lack of facilities or equipment;
- industrial disputation or derailments (for example) prevent rail from operating; or
- the goods are unsuited to carriage by rail (Transport Tasmania 1987b).

The current RPF is 1.4 cents per tonne GVM or GCM per kilometre which must be prepaid to the Tasmanian Department of Roads and Transport. The effectiveness of the permit scheme has been gradually eroded by reducing the number of commodities requiring permits and not increasing the fees in line with inflation. While there have been some changes in the way that the fee is levied, the basic rate of payment has not changed in more than 25 years. The fee is now worth less than a sixth of its real value in 1964 when rates were last revised (Government of Tasmania 1990).

For the commodities and origin-destination pairs used for the analyses in the next chapter, excluding commodities exempt from the fees, it is estimated that the permit fees add between 18 and 28 per cent to road freight rates. The weighted average, using 1991–92 forecast rail tonnages for weights, is 23 per cent.

According to the Government of Tasmania (1990):

> over this period [since the last revision in 1964], the objectives of the scheme have also changed. Whereas the original aim was to limit modal competition and ensure a base level of freight and revenue for rail, the emphasis has changed to social objectives. These include limiting road damage by heavy vehicles, reducing the social and environmental impacts associated with heavy vehicle traffic in sensitive areas, and most importantly, discouraging an increase in heavy vehicle traffic on Tasmanian roads. Therefore the current title 'Rail Protection Fees' is somewhat of a misnomer.

Revenues collected by the Tasmanian Government from the scheme over the period 1985–86 to 1989–90 are shown in table 3.4. For individual commodities, revenues have fluctuated widely over the period. These fluctuations do not always represent changes in the quantities carried by road but are sometimes due to changes in the level of policing. In the case of fertiliser, however, the dramatic decline is due to the introduction by Tasrail of a system of bulk depots enabling it to capture most of the long-haul transport of fertiliser from road. Also, in the case of coal, fee increases reflect the entry into the marketplace of the Merrywood colliery which services many of its clients by road.

TABLE 3.4 REVENUE FROM ROAD PERMIT FEES BY COMMODITY
($'000)

Commodity	*1985–86*	*1986–87*	*1987–88*	*1988–89*	*1989–90*
Cement	0.0	0.1	39.0	49.5	47.9
Fertiliser	124.4	141.2	176.3	66.8	6.4
Logs	0.5	4.1	1.4	0.5	17.7
Timber	41.2	11.7	13.9	71.3	62.8
Coal	0.0	0.1	1.1	0.4	36.7
Sulphuric acid	0.0	4.8	2.8	0.0	0.0
Limestone	9.8	3.0	0.7	1.1	0.0
Total	144.5	164.0	235.1	189.5	171.6

Source DRT (pers. comm.).

Avoidance of RPF, conscious and unconscious, may be considerable. Allowing for the costs of administering and policing the scheme, it is clear that the scheme is *not* a significant net generator of revenue for the State government. As is pointed out in Government of Tasmania (1990), the scheme is used as an instrument to influence modal split rather than as a means of collecting revenue from road transport operators.

As part of its program of micro-economic reform the Tasmanian government is proposing to partially dismantle the scheme. The proposal is to:

- remove fees on sawn timber, limestone, fertiliser, cement and acid;
- introduce regulations under the Traffic Act to control the movement of acid by road;
- retain a mass-distance charge on the movement of coal and logs by road where rail offers a viable alternative, initially at the existing level;
- rename the scheme to remove any direct association with rail — the primary objective of the scheme will be to limit the growth of heavy vehicle movements on environmental and social grounds; and
- remove the mass-distance charge when full road cost recovery from heavy vehicles has been implemented.

The Tasmanian government considers that the exclusion of all but logs and coal from the scheme will have little effect on modal shares.

AN has put forward a counterproposal. It supports removal of fees for sawn timber, limestone and intrastate cement because rail carries very little of these. However, fees on the remaining commodities should be increased to 5.0 cents per gross kilometre and phased out over ten years. Fees on fertiliser and acid would be removed at the end of 1995–96 and the scheme would be abandoned altogether in 2001 eliminating fees for logs and coal. At present, the Tasmanian government is holding off making any decision pending the decisions on road charging pursuant to the 1990 Inter-State Commission report and release of the findings of the present report.

Comparisons between rail revenues per tonne and estimated truck costs were undertaken to assess the likely impact of abolishing the permit scheme. Rail revenues per tonne are well below road costs for intrastate cement, sawn timber and fertiliser. Indeed for fertiliser, rail revenues per tonne appear to be 40 to 50 percent below road costs.[2] Rail revenues per tonne are nearly always below road costs for timber and coal but the margins are much smaller than for fertiliser and cement, suggesting that removal of permit fees could have greater impact. The costs of the additional handling through use of two modes instead of one accounts for some of the difference between rail and road rates. The comparisons suggest that abolition of permit fees would have a significant impact on logs and coal and a smaller impact on intrastate cement, sawn timber and fertiliser.

It is not clear how this impact will be split between modal shares and freight rates. Tasrail will have to make choices as to whether to reduce rates or lose freight. Tasrail's ability to sustain existing freight rates will be greater on the longer routes since rail's advantage over road increases with distance.

As for the remaining commodities to which the permit system applies, rail carries no limestone and acid is unlikely to be transferred to road for safety reasons. It appears therefore that this analysis supports the view that abolition of permit fees on all but coal and logs is likely to have little effect on modal shares.

SUMMARY

Tasrail's freight task and revenue projections presented in this chapter indicate that, in the medium to longer term, rail freight demand in Tasmania is expected to remain at levels similar to those of the late 1980s. However, it is forecast that the decline in demand observed in 1989–90 would continue into 1990–91 before the trend is gradually reversed in the two to three years following 1990–91. There is a considerable degree of uncertainty surrounding these forecasts due to a number of opportunities and threats that may materialise in the medium to longer term. This uncertainty appears more critical when the sensitivity of the results from this analysis (see chapter 4) to variations of freight demand is considered.

Trends in the quantities carried by Tasrail in the 1980s indicate that only woodchip logs, coal and sulphuric acid have increased in volume freighted.

It is important to note that Tasrail is very dependent upon the transportation of timber logs for a substantial part of its revenue. Therefore the future expansion of Tasrail's task appears to depend upon what is essentially an export industry. The consultants (see appendix I) have identified threats and possibilities that may

2. This is due in part to the assumption of no back-loading for trucks. Tasrail has informed the BTCE that trucks carrying fertiliser are sometimes able to obtain back-loads of lime. However the quantity of back-loading available is limited.

influence Tasrail's future of timber log task, which are likely to affect the level of demand forecasts developed by them. These include (i) the possibilities of an increased export quota for woodchip, a new pulp mill and expansion plans in woodpulp production; and (ii) the threats of significant shifts in sources of supply from southern concessions and the increased competition from road transport.

Coal and sulphuric acid, on the other hand, are a part of the local economy, as they are 'value-adding' inputs to the local manufacturing industry. Coal is, at present, being used as a substitute for electric power. However, there are possibilities for future replacement by hydro-electric power and/or gas pipeline from the mainland. There is also a certain degree of uncertainty regarding the future of Tioxide operation in Tasmania. Both of these developments could have adverse implications for the future of Tasrail's freight task. However, an uninterrupted operation of Tioxide in Tasmania beyond 1994–95 would lessen this adverse impact.

On balance there seem to be a number of positive developments that may increase the level of Tasrail's freight task in the medium to longer term. However, the potential threat of road freight competition brought about by new technologies in road transport and changes in the regulatory environment (that is, permit system) is likely to counteract some of the optimism for a positive shift in freight demand for rail. There may be some offsetting effects if some or all of the ISC proposals are implemented.

Two key developments in the area of road cost recovery are expected to significantly influence freight shares between rail and road in Tasmania. They are changes to the Road Permit Scheme and the approach that may be taken for the recovery of road costs attributable to heavy vehicles.

First, the modal split between road and rail in Tasmania is influenced by the form and size of the Rail Protection Fees. The permit scheme is currently used to limit growth of heavy vehicle movements on environmental and social grounds. It is estimated to add between 18 and 28 per cent to road freight rates. Changes to the permit scheme are expected to considerably affect modal shares. However, such changes would closely depend on future policy developments about road cost recovery.

Second, the approach taken for road cost recovery for heavy vehicles depends upon the recommendations which are adopted and become government policy. Two important ISC recommendations are the proposed charge for vehicle mass of individual road users, which is responsible for road damage, and the need to designate certain roads as being required of high construction standard for heavily loaded vehicles.

It is both the uncertainty of future developments and the expected degree of road versus rail competition that have influenced the consultants to forecast a level of demand not different from that of the late 1980s. It is also important for Tasrail in this environment to develop mechanisms that could make the freight demand for timber logs less sensitive to road competition, so as to secure a larger share of this freight in the future.

CHAPTER 4 ASSESSMENT OF OPTIONS

The basic options facing Tasrail are closure or retention with actions being taken to reduce losses. Tasrail management have identified a business plan, hereinafter referred to as 'restructuring', which, if Tasrail is to be retained, is likely to produce the best possible financial result. Implementation of this plan will only be possible if there are substantial cuts in employment, and so is contingent on the outcome of negotiations with unions. Since it is not known whether full implementation of the restructuring plan is feasible, two other retention scenarios involving less severe labour reductions are examined in addition to restructuring. The intermediate one in terms of employment reductions is taken from CP14. The other, which will be referred to as the 'base case', involves a continuation of the trend of the last few years whereby labour has fallen by about 5 per cent per year.

The methodologies and results of two different types of analyses are described in this chapter. The first is financial with the results being discounted cash flows. These will indicate the present values of cash flows under the different options to the Federal government as shareholder and provider of subsidies. The second type of assessment undertaken for the options in this chapter is social cost-benefit analysis. With this approach, the aim is to estimate the sum total of the values of all the costs and benefits to society regardless of to whom they accrue. In practice there will be particular costs and benefits which are difficult to evaluate in dollar terms. These will be discussed in the next chapter.

METHODOLOGY

Financial analysis

The aim in the financial analysis undertaken is to estimate discounted cash flows and hence the value to Tasrail's owner, the Federal government, of the various options. This differs from the value to AN which would take into account government subsidies paid to cover Tasrail's losses. It also differs from the net budgetary implications for the Federal government which would include increases in fuel excise receipts, import duties and sales taxes as a result of the shift to road transport following closure of Tasrail, and the unemployment benefits paid to Tasrail workers. A list of the items included in the financial analyses under the retention and closure options is set out in table 4.1.

TABLE 4.1 CASH FLOW ITEMS INCLUDED IN FINANCIAL ANALYSES

Cash inflows	*Cash outflows*
Retention options	
Revenue	Operating costs
Operating	labour
Other	fuel
	other
	Redundancy and other severance costs
	Capital expenditures
Closure option	
Cash inflows and outflows same as for retention for 1991–92 and 1992–93 on the assumption that Tasrail is closed on 30 June 1993.	
Sale of assets	Redundancy and other severance costs

For each of the retention scenarios and for closure, a discounted present value of cash flows is obtained. The difference between the present values for any two options gives the gain (or loss) to the government as shareholder of pursuing one option over the other.

Payments of principal and interest on outstanding loans[1] and interest expenses for any new loans have not been included, so as to provide a picture of Tasrail's prospects independent of the method of financing. Exclusion of interest expenses on new loans is equivalent to assuming that all new capital expenditures by Tasrail are financed from equity. Provided the real interest rate at which Tasrail could borrow was close to the discount rate (see below for discussion) it would make little difference to the result if capital expenditures were financed by borrowing instead.

Tasrail's cash balance and accounts receivable minus accounts payable at time of closure should be included as inflows under the closure option. However, no information on these is available because AN's accounting system does not separate them out for Tasrail. In any case they would be expected to be small.

1. As at 5 June 1991, AN estimates Tasrail's total borrowings at $48.8 million consisting of the Tasmanian Rehabilitation Loan of $19.5 million, other Commonwealth loans totalling $10.0 million and commercial borrowings of $19.4 million. Except for the rehabilitation loan these are not specific to Tasrail but represent an allocated share of AN's total borrowings. The average interest rate on these is of the order of 14 per cent. No repayments are made on these loans. They are refinanced on maturity.

TABLE 4.2 BENEFITS AND COSTS OF RAIL CLOSURE INCLUDED IN THE SOCIAL COST-BENEFIT ANALYSIS

Benefits	*Costs*
Release of capital resources (sale of assets)	Road vehicle capital and operating costs:
	prime movers
Saving in future capital resources	trailers
	labour
	fuel
	tyres
Saving of rail operating costs:	repairs and maintenance
	insurance
labour	administration
fuel	other
other	
	Road pavement damage costs:
	maintenance
	investment
Rail accidents avoided	Road accidents incurred
	Cost of shipping sulphuric acid
	User costs
Additional revenue earned by producers:	Revenue lost by railways
road hauliers	
shipowners	
suppliers of additional user requirements	
	Net losses in consumers' surpluses

Another item which would normally appear in a list of financial costs of closure is the cost of terminating contracts extending beyond the closure date. Tasrail has no such contracts at present.

Social cost-benefit analysis

Social cost-benefit analysis aims to include all the costs and benefits to members of society. In practice there will be costs and benefits to which it is difficult to attach dollar values; however, these can at least be pointed out and sometimes quantified in other ways. These unpriced costs and benefits need to be weighed up alongside those which have been assigned dollar values when making decisions. Table 4.2 is a list of the benefits and costs included in the social cost-benefit analysis of the closure option.

If Tasrail was to be closed down, the value of Tasrail assets released to alternative uses, and the savings in future operating costs and capital expenditures, must be counted among the benefits. Offsetting these benefits are the costs of transporting by road and sea the freight that would otherwise be carried by Tasrail, including the damage to roads caused by the additional trucks and any costs incurred by users in switching transport modes. Railway accidents will be avoided but the increase in truck numbers may result in higher road accident costs.

An important difference between the financial and social cost-benefit analyses is the exclusion of transfer payments from the latter. These occur where money changes hands without any good or service being offered in return. The cost to the party paying the sum of money is exactly offset by the benefit to the receiver so there is no net change in the total of benefits and costs to society. Thus redundancy and other severance payments and fuel taxes enter into the financial analysis but not the cost-benefit analysis.

The list in table 4.2 is similar to that in BTE (1987a) but with the major exception that changes in revenues and consumers' surpluses have been included. This is in line with the social welfare function proposed by Harberger (1971) whereby social welfare in a market is said to be equal to consumers' surplus plus total revenue minus total costs. Consumers' surplus is defined as the total amount that consumers would be willing to pay for a given quantity of an output (rather than do without the output altogether) above what they are actually paying. In other words, it is the sum of money that a monopolist able to practice perfect price discrimination could extract from consumers in excess of the amount of revenue with all consumers paying the same price. Thus the Harberger social welfare function takes into account the net benefit consumers receive after deducting the money spent by them, plus the net benefit to producers given by revenue minus costs.

The treatment of consumers' surplus in the present study is based on the assumption that road and rail transport are competing in the same market offering services that are perfect substitutes in all respects except for storage and handling costs. Thus, once these user costs are added on to freight rates, users make their modal choices solely on the basis of cost. For each transport task there is then a *single* demand curve for transport, not two less-than-infinitely-elastic demand curves, one for rail and one for road. In this way the need to evaluate areas under demand curves is avoided. This assumption is considered acceptable on the grounds that, having taken into account differences in storage and handling costs, differences in service qualities are unlikely to be significant determinants of modal split in this particular case. Tasrail's freight consists mostly of low value bulk commodities which are not time-sensitive, and the routes are short so the difference in time taken between road and rail is less in absolute terms than on the mainland.

Closure of rail services will generally result in higher costs for users (if the cost by road, including handling costs, was lower they would already be using road unless there were important quality differences or regulatory constraints), so users, as 'consumers' of transport services, will incur a loss of consumers' surplus. If the freight task remained unchanged following closure of Tasrail, under the assumptions made in this study, the total revenue paid by users for sending Tasrail freight by road and sea is estimated to be 18 per cent higher for 1993–94 and 1994–95, and 19 per cent higher thereafter. These percentages are increased to 23 and 24 per cent respectively when other user costs (for example, to modify existing or to purchase new handling equipment or storage facilities) are added on. By omitting consumers' surpluses and revenues BTE (1987a) was implicitly assuming that user demands for transport were perfectly 'price inelastic', that is, the quantities users wish to transport remain unchanged as prices increase. Where this is the case, the increase in road, shipping and other supplier revenues on the benefits side of the ledger is exactly cancelled out by the losses of consumers' surplus and rail revenue on the cost side. There is no change in total 'willingness-to-pay', defined as the sum of revenue and consumers' surplus in a market.

Valuation of the benefits and costs

To assess changes in consumers' surplus, it is necessary to have estimates of freight rates to be paid by users for road and sea transport. In estimating these freight rates, and also in conducting the financial analysis of rail, *private* costs are employed. Private cost is the amount actually paid by the purchaser. Inputs are valued at market prices. However, for social cost-benefit analysis, resources are valued at their cost to *society*. The cost to society of consuming a unit of a resource is given by the benefit forgone by not using that unit in its next best alternative use, in other words, its opportunity cost. This definition is based on the premise that resources are not unlimited and consequently there may be a sacrifice by society when resources are applied to one use instead of another.

In an economy where markets were competitive and there were no externalities and no taxes or subsidies, market prices and opportunity costs would coincide. The existence of 'distortions' such as monopolistic supply of inputs, taxes on inputs, and unemployment in labour markets may necessitate adjustments to market prices to derive 'shadow prices' equal to opportunity costs.

General assumptions

Both the financial and cost-benefit analyses produce results expressed as discounted present values. Discounting is a way of aggregating dollar amounts gained or expended in different years taking into account the fact that individuals and society value income and expenditures differently depending on their timing. Inflation aside, a dollar received today is worth more than a dollar to be received one year from now. The concept is analogous to the payment of interest on borrowed funds. The formula used is:

$$\text{Present value} = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1 + r)^t}$$

where: n is the life of the project in years; B is the benefit to be received in year t; C is the cost to be incurred in year t; and r is the discount rate.

A higher discount rate implies a stronger preference for consumption sooner rather than later, and will be more favourable to projects yielding benefits earlier rather than later in their economic lives. A lower discount rate indicates greater preparedness to defer consumption to the future and will favour projects which yield more of their benefits later in their economic lives.

The 'correct' discount rate involves issues at both the theoretical and practical levels that are as yet unresolved among economists. The issue of riskiness of projects also arises in the context of discount rates because the private sector allows for risk by demanding higher rates of return from more risky projects. Similarly, more risky projects in the public sector could be discounted at higher rates.[2] In the present study the results are derived using three discount rates, 7, 10 and 15 per cent in real terms. There appears to be some consensus that rates of these orders of magnitude are reasonable. The 7 per cent rate might be regarded as the risk free rate as it is close to the real rate of interest obtainable from government bonds. The discount rate of 15 per cent represents a high risk rate and, in view of the highly uncertain nature of forecasts of future revenues and costs, the results under this high rate should probably be given the most weight.

Both the financial and cost-benefit analyses are carried out in real terms at 1989–90 prices. If Tasrail was to be shut down, it is assumed that this would occur on 30 June 1993, the date when the current arrangements for financial support expire. The period of the analysis is 20 years extending from 1 July 1991 to 30 June 2011. Benefits and costs accruing after this date are ignored because they are highly uncertain and in any case would be so heavily discounted as to have little effect on the result.

Having the starting time for the analysis at 1 July 1991 means that the cash flows, benefits and costs of Tasrail's continued operation during the two years 1991–92 and 1992–93 enter into the discounted present value calculations for closure. These two years have been included due to an assumption that the government

2. Alternative methods of dealing with risk in public sector project evaluation include placing higher values on more uncertain costs and lower values on more uncertain benefits, and assigning probability distributions to particular costs and benefits from which the probability distribution for the net present value can be derived.

will make a decision about the future of Tasrail during 1991 and that such a decision will affect capital expenditure plans, revenues and operating costs. If it is decided to close Tasrail, capital expenditures during these two years would be at the absolute minimum necessary to keep the railway running over this period. This in turn affects the rate of employment reduction, as with no labour saving investment under the closure scenario, employee numbers are assumed to fall only by normal attrition, 5 per cent per annum, up to the closure date. Furthermore, some of Tasrail's revenue will be lost as users begin switching to road and sea transport ahead of time to ensure a smooth transition in July 1993. Estimates of traffic and revenue losses, based on an assumption that the Government announced on 30 June 1991 that Tasrail would be closed in two years, were supplied by Tasrail. For 1991–92 and 1992–93, the revenue losses were estimated at 7.6 and 32.1 per cent respectively. Details are provided in appendix II.

The net present value obtained from the social cost-benefit analysis represents the net benefit to society from closing Tasrail compared with retaining it under a given retention scenario. A negative result would indicate that, ignoring the unquantified costs and benefits, society would be worse off as a result of closure of Tasrail. In theory, it would be possible to estimate the net benefits in all affected markets under the closure option and each of the three retention scenarios and to present the results in the same manner as for the financial analysis. The value to society of pursuing one course of action over another could be seen as the difference between the net present values of the two options. In practice, this would require estimation of the full benefits and costs, including estimating the total areas under demand curves, for Tasrail customers and all other affected markets including that for road capacity. The only practical way to undertake the cost-benefit analysis is to focus on *changes* in benefits and costs arising from closure compared with a given retention option.

For many of the costs and benefits the comparison is with zero. For instance, there are zero rail operating costs following closure. However, for 1991–92 and 1992–93, there are rail operating costs, capital costs and revenues under both retention and closure options and these differ for the two options being compared. Hence, for these two years, operating costs and capital expenditures for retention minus these under closure are counted among the benefits while, on the cost side, the loss of rail revenue following announcement of closure is included.

There are three retention scenarios. The most extreme in terms of employment reductions is the 'restructure' plan developed by AN and analysed by the consultant whereby staff levels are reduced to 350 employees by 1999. The intermediate scenario is taken from CP14 and sees employment falling to 394 by 2000. Capital expenditures are more spread out over time in this scenario so the substitution of capital for labour occurs more gradually. In the scenario with the least impact on labour numbers, the base case, employment is projected to continue to fall at the same rate as it has over the last few years, that is, 5 per cent per annum until 2003 when it reaches 394 employees. Capital expenditures are assumed to be the same as for CP14.

ESTIMATION OF CASH FLOWS, COSTS AND BENEFITS

Detailed information on how the cash flows and values of costs and benefits were estimated is provided in appendices III, IV and V. The main points are summarised below.

Sales of assets — release of capital resources

Estimates of the realisable value of Tasrail's assets were provided by Tasrail. Specialised rail equipment such as locomotives, wagons, tamping machines and ballast regulators only have a value in excess of their scrap value if another railway is willing to buy them. Rolling stock and locomotives were estimated to be worth $18.25 million if sold to other railways but $1.15 million at scrap value. In the present study the scrap value has been used. The scrap value of the rails and sleepers was estimated to be worth $13.287 million. Land and buildings were valued at $15.70 million and other plant, equipment and infrastructure was estimated to be worth $11.80 million. These figures had to be reduced by the costs of disposal including recovery costs for the rails and sleepers, preparation costs (such as surveys) and commissions for land, freight and administration costs. After deduction of disposal costs and spreading the sales over two years, the net proceeds from sale of assets was estimated to be $15.4 million in 1994–95 and $12.1 million in 1995–96.

There are a number of Tasrail properties which are leased to customers and the rentals from these are included in the financial analysis under the heading of 'other revenue'. In most cases the properties are leased to Tasrail customers, mainly freight forwarders, and are used for storage and handling of freight. If Tasrail was closed these properties would, for the most part, still be used for transport purposes and so would not become available for other uses. Thus there is no benefit to society from their sale following rail closure, only a change of ownership. The value of these, $4.3 million, was deducted from sales of assets when estimating the release of capital resources for the cost-benefit analysis.

There is also an asset sale under the retention option. When Tasrail relocates its maintenance workshops from Invermay, a suburb of Launceston, to East Tamar Junction just south of Launceston, sale of the Invermay site is estimated to net $4.0 million in 1997–98 under the base case and corporate plan scenarios and in 1993–94 under restructuring. In the cost-benefit analysis, this amount is deducted from capital resources released since the land will be sold in any case. Only the timing will differ as between closure and retention.

Future capital expenditures

Table 4.3 sets out the capital expenditure projections under the three retention and the closure options. Under the restructuring scenario, Tasrail's capital expenditure plan includes $13.8 million spread over the two years 1991–92 and 1992–93 for relocation of maintenance workshops, upgrading of locomotives, level crossing protection and upgrading of the communications system.

TABLE 4.3 CAPITAL EXPENDITURE PROJECTIONS
($ million)

Year ending 30 June	*Closure*	*Retention*		
		Base case	*CP14*[a]	*Restructure*
1992	2.1	7.7	7.7	10.4
1993	1.6	8.3	8.3	10.9
1994		6.8	6.8	5.0
1995		7.1	7.1	5.7
1996		7.6	7.6	6.4
1997		7.3	7.3	7.1
1998		6.0	6.0	6.8
1999		5.5	5.5	6.3
2000		4.8	4.8	5.2
2001		3.5	3.5	3.6
2002		2.7	2.7	2.8
2003		2.1	2.1	2.2
2004		1.6	1.6	1.7
2005 and onwards		1.5	1.5	1.6

a. AN Corporate Plan number 14.

Total capital expenditures over the 20 year period of the analysis amount to $81.6 million in the base case and feature an extensive track rehabilitation program and purchase of second-hand locomotives.[3]

The capital expenditure program for the base case has been assumed to be identical to the corporate plan scenario. The main difference between the restructuring and the CP14 capital programs is that the expenditures to relocate Tasrail's maintenance workshops are delayed in CP14 by spreading them out over six years. The capital expenditures under the closure option are for permanent way works necessary to keep tracks at an adequate standard to permit trains to run over them.

Rail operating costs

Labour costs for Tasrail in the future will be determined as much by progress in negotiations with unions and by labour saving investment as by freight volumes. Negotiations with unions are expected to cover early retirement schemes and abolition of demarcations to improve labour flexibility and so permit operations with fewer employees. The capital expenditure programs under the retention scenarios are primarily aimed at reducing labour costs. Relocation of the

3. The capital costs used in the present study exclude Tasrail labour. In Tasrail's accounts, costs of in-house labour employed on projects of a capital nature, that is, with benefits accruing over a number of years, are treated as capital expenditures.

workshops will mean a drop in workshop staff from 171 (the level as at January 1991) to 75. Upgrading locomotives will significantly reduce ongoing maintenance costs. Upgrading the communications system will eliminate the need for trains to stop every time the crew makes a communication, thereby speeding up operations and reducing the number of train crews required. In addition, the need to maintain the existing pole system is removed. Continuation of the programs of welding up joints in tracks and replacement of timber with steel sleepers will cut maintenance costs (some 50 per cent of track maintenance is joint related) and, through allowing longer, heavier trains to operate, lessen the number of locomotive crews required to undertake the freight task.

Tasrail believes (Tasrail 1991 pers. comm.) that, following these capital expenditures and with changes in work practices, the business could be run with a staff of 338 employees for operations plus those required for the ongoing sleeper replacement program (long term level of 12).[4] The BTCE is not in a position to comment on whether this target is technically feasible nor whether it is industrially realistic.

Employment projections under the two options are set out in table 4.4. These employment levels are assumed to remain constant with respect to freight volume when undertaking the sensitivity analysis discussed below.

Labour has to be evaluated at shadow prices in the social cost-benefit analysis because, in the event that Tasrail was shut down, it is considered that some 50 per cent of redundant railway workers would be unable to find new employment. This estimate was arrived at by two independent methods which are discussed in the next chapter. A survey of redundant rail workers carried out by the BTCE found that those respondents who did not find new employment quickly were likely to experience prolonged periods of unemployment (BTCE 1990b). Thus the situation where 50 per cent of redundant Tasrail workers are unable to find new employment is likely to continue for some time.

Determining the correct shadow price for Tasrail labour involves complex issues and would require data which are unavailable. All that has been attempted here is to note the issues and to put forward an estimate based on a set of reasonable assumptions. The opportunity cost of the redundant Tasrail workers finding employment would be the value of their services in that alternative employment less relocation costs. It has been assumed that their value in alternative employment would equal their cost of employment in Tasrail. In the absence of information and because it would be relatively small, relocation costs have been ignored. The opportunity cost of workers finding new employment is also affected by the time taken to find new employment as there is no production forgone during this period. No allowance has been made for this on the grounds that the period of unemployment is likely to be short. That rail workers finding new employment after redundancy do so quickly, is supported by BTCE (1990b). It is found that

4. Under the restructure scenario, the level of 338 employees needed to operate the system is reached by 1993. The employees in excess of this number are engaged in the sleeper replacement program.

TABLE 4.4 EMPLOYMENT PROJECTIONS
(employee numbers)

Year ending 30 June	*Closure*	*Retention*		
		Base case	*CP14*[a]	*Restructure*
1991	698	698	698	698
1992	663	663	621	502
1993	630	630	563	400
1994		598	516	400
1995		569	480	390
1996		540	456	380
1997		513	424	365
1998		487	403	355
1999		463	395	350
2000		440	394	350
2001		418	394	350
2002		397	394	350
2003 and onwards		394	394	350

a. AN Corporate Plan number 14.

75 per cent of re-employed respondents had found employment within three months of becoming redundant and less than 5 per cent took more than 12 months.

For workers unemployed, the opportunity cost of labour would be the value to them of the disutility of work measured by the minimum sum of money that they would be willing to accept to undertake employment. Expressed another way, the opportunity cost of unemployed workers is given by the value they place on their increased leisure time. The level of unemployment benefits will affect this. The value of the increased leisure time of unemployed workers has been ignored in this study.

Assuming that half of Tasrail's workers are unable to find new employment and that the other half find employment quickly, the opportunity cost of Tasrail's work force must be at least 50 per cent of its financial cost. It is at least 50 per cent based on the assumption that the opportunity cost of the unemployed workers is zero with no allowance for the value of leisure. The shadow price of rail labour in the results presented below was derived by applying an adjustment factor of 50 per cent to financial costs. Sensitivity tests are undertaken to show the effects of the varying the adjustment factor.

The average cost per person including on-costs was taken to be $35 210. A slightly higher amount was used in the financial analyses of retention under the restructure and CP14 scenarios due to an assumption by the consultant that Tasrail would have to pay more to reflect increased work value of the remaining positions.

Fuel consumption was estimated as being proportional to gross tonne-kilometres as does AN's 'Railcost' model. Conversion factors were used to derive gross tonne-kilometres from net tonne-kilometres for each commodity. The price of fuel to Tasrail was adjusted by removing the excise tax and State fuel franchise fee, which Tasrail's fuel supplier is required to pay after 1 January 1991, to derive its resource cost. The resource cost of fuel used was 22.845 cents per litre. Under the retention options, an efficiency factor was applied to take account of the fuel savings resulting from operation of longer, heavier trains as the track is improved and the communications system is upgraded eliminating the need to stop trains in order to communicate. This factor was set at 0.975 in 1991–92, falling each year by 0.025 to reach a long term level of 0.9. In estimating private costs it is necessary to deduct the rebate of fuel excise Tasrail receives for certain freight. The remaining costs are 'materials and sundries', insurance and corporate overheads. Estimates of these for each year were provided by the consultants. They have been assumed to be the same under all three retention scenarios. Sundries comprises work contracted out and services such as power and water. For the purposes of the sensitivity tests with respect to demand and the fall off in demand in 1991–92 and 1992–93 under the closure option, it was assumed that 70 per cent of materials and sundries are fixed and the remaining 30 per cent are variable, proportional to gross tonne-kilometres. Since Tasrail is exempt from sales taxes there was no need to make any adjustments to obtain resource costs. Corporate overheads are charged to Tasrail by AN's mainland headquarters to meet the costs of services provided to Tasrail. Annual amounts of $1.4 million were allowed for corporate overheads and $50 000 for insurance expenses.

Truck operating costs

Estimates of truck operating costs were obtained using the Austway Data Pty Ltd Truck Cost model. The many assumptions made are listed in appendix IV. To give a broad overview, for each commodity and origin-destination pair, a route over which trucks would carry Tasrail freight in the event of rail closure was identified and the distance worked out. In each case assumptions were made concerning such details as the type of trailer, number of drivers, average speed, number of round trips per day, back-loading, tonnes carried per truck and the proportions of owner and company employed drivers. The capital costs of prime movers and trailers were annuitised at a 15 per cent real interest rate for the private cost calculation and the relevant discount rate in the resource cost case. A cost per vehicle trip was derived for each commodity and route.

To carry the road task forecast for 1993–94 of 359 million net tonne-kilometres of freight, it is estimated that an additional 181 prime movers and 289 trailers would be required providing employment for 210 drivers. There would also be employment created in areas which service trucking, for example, mechanics, clerical staff, forklift drivers, and staff engaged in sales of fuel and tyres. A BTE survey of trucking operations (BTE 1986a) found that the ratio of full-time truck drivers to staff engaged in other functions in the road transport industry was approximately 1.5:1. Using this ratio, an additional 140 people would gain direct employment in the road transport industry in 1993–94 as a result of closure of Tasrail.

The total annual private cost of a carrying the 1993–94 forecast increase in the road task following rail closure was estimated to be $33.9 million (or $1.21 per kilometre travelled). To convert this to a resource cost, import duties and sales taxes had to be deducted from the costs of prime movers, trailers and tyres, registration charges and third party insurance costs were excluded, and fuel was priced at the same resource cost per litre as for rail. The total resource cost for the year 1993–94 was between $24.1 million and $25.7 million depending on the discount rate ($0.86 to $0.91 per kilometre travelled).

These resource costs assume that the shadow price of the additional Tasmanian labour needed to expand the trucking industry is the same as its financial cost. This was the assumption made in BTE (1987a). However, it is more than likely that some of the new trucking industry employees would be persons who would otherwise have been unemployed. It is not known what the proportion of otherwise unemployed people would be, so it is not possible to arrive at a shadow price adjustment factor in the same manner as for rail. The shadow price adjustment factor for road haulage is likely to be significantly higher than for rail because the skills required for expansion of the road haulage industry would be less industry specific than for rail. In the absence of data on the employability of truck industry workers, a shadow price of 80 per cent of the labour costs was assumed. The 1993–94 total resource cost for truck operations then becomes $21.9 million to $23.4 million, depending on the discount rate ($0.78 to $0.83 per kilometre travelled). Sensitivity tests are undertaken with shadow price adjustment factors of 60 and 100 per cent.[5]

To make the shadow price adjustment, an estimate is needed of the financial cost of the additional non-driver labour in the Tasmanian road haulage industry. This cost is embedded in the various operating costs estimated by the Austway model. The number of employees was estimated as noted above, using the ratio of 1.5 drivers to one other person employed, and the average cost per person including on-costs was taken as being identical to the average for truck drivers, about $32 000 per person.

Road pavement damage costs

The increase in the cost of preserving the road pavement asset was estimated by comparing road maintenance requirements at existing traffic levels and growth rates with maintenance requirements with the additional trucks resulting from rail closure. From the forecast rail task, average numbers of additional loaded and

5. It could be argued that the expansion of the trucking industry will result in a higher number of rail workers finding employment than otherwise. This could come about directly through former railway workers entering the trucking industry or indirectly as people finding employment in road haulage create vacancies in other industries which are filled by former Tasrail employees. The effect of this on the cost-benefit analysis would be to increase the net benefit to society from rail closure because employment of individuals having shadow prices of labour of 0.5 times their values of output instead of individuals with higher shadow prices, represents a benefit to society. As redundant rail workers would represent a minute fraction of the total number of unemployed persons in Tasmania, creation of 350 new jobs in the road haulage industry would have a minimal effect on the employment prospects of the Tasrail workers.

empty trucks per day were estimated for each road segment. These were fed into the BTCE pavement life cycle costing (LCC) model (BTCE 1990a) along with data on existing traffic (level, growth rate and percentage of commercial vehicles for each segment) and estimates of average costs per square metre for road maintenance and reconstruction supplied by the Tasmanian Department of Roads and Transport.

The LCC model uses an algorithm developed by the World Bank which relates the rate of increase in road roughness to pavement conditions, road characteristics and traffic volumes and compositions. It was assumed that pavements would be reconstructed once the level of roughness reached a specified level. The model was employed to estimate the net present value of maintenance and reconstruction costs with Tasrail retained, and the net present value with the additional trucks resulting from rail closure. The difference between the two is the cost of road damage arising from the additional trucks using the roads. The present values derived were $14.8 million, $13.2 million and $7.5 million at the 7, 10 and 15 per cent discounts rates respectively.

Increase in vehicle costs of existing vehicles

There would also be costs imposed on existing traffic on the Tasmanian roads concerned after rail closure. The additional trucks increase the rate at which road pavements deteriorate, and vehicle operating costs rise with pavement roughness. Although, as the LCC model assumes, it would be expected that roads would be reconstructed as soon as they reach the specified level of roughness, the extra costs imposed on existing traffic would be brought forward in time. With discounting, a dollar amount brought forward in time creates a positive present value.

The Austway model does not have the capability of estimating changes in vehicle operating costs arising from small variations in road roughness. However, the LCC model incorporates equations for estimating truck and car resource operating costs as functions of road roughness. In the present study, the truck operating cost equation was scaled so that costs at the average level of roughness matched the average resource cost per kilometre obtained using the Austway model. At the 7, 10 and 15 per cent discount rates, the additional costs imposed on existing cars and trucks were estimated to be $8.8 million, $5.3 million and $4.4 million respectively.

Rail accidents avoided and road accidents generated

The costs of Tasrail industrial accidents are covered out of insurance. Over a long period, premiums would reflect the average cost of these accidents. Loss of earnings and other costs incurred by workers injured are met by Comcare (Commission for the Safety, Rehabilitation and Compensation of Commonwealth Employees) to which Tasrail makes regular contributions. The costs of insurance and workers' compensation have therefore been used a proxy for industrial accident costs.

This leaves only level crossing accidents which are regarded as road accidents. From statistics on level crossing accidents for the last five years provided by Tasrail, it appears that, on average, there is one fatality and 2.4 injuries per year. Work undertaken by the BTCE indicates that the average cost of a fatal accident in Australia in 1988, including medical costs and loss of future earnings, was $550 600. This was inflated by the rise in average weekly earnings to $608 000 in 1989–90 dollars. It was assumed that the distribution of level crossing injuries between 'serious' and 'minor' was 30:70, the same as for all road crashes Australia. Using BTCE estimates of 1988 costs for serious and minor injuries of $102 900 and $6 000 respectively, an average annual 1989–90 cost of level crossing injuries of $92 800 was obtained (BTCE 1989a, 1989b).

To estimate the cost of additional road accidents generated by the higher truck numbers following rail closure, crash costs per vehicle kilometre travelled were applied to the forecast increases in the road haulage task. Numbers of fatalities, serious injuries and minor injuries arising from crashes involving heavy vehicles were obtained from New South Wales statistics for 1988 and expressed as rates per kilometre travelled by heavy vehicles. Data from New South Wales had to be used because suitable Tasmanian data were not available. Using BTCE estimates of crash costs, the resultant average cost per vehicle-kilometre in 1989–90 dollars was 7.6 cents. Further details on the derivation of accident rates are provided in the next chapter.

Costs of property damage arising from road accidents were not explicitly estimated but are taken into account through the insurance costs (not third party which has been excluded from resource costs) in vehicle operating costs. It was estimated that closure of Tasrail would result in an additional 28 million kilometres being travelled by heavy trucks per year from which an annual accident cost of about $2.2 million was obtained.

Cost of transporting sulphuric acid

As discussed in chapter 3, the Tioxide plant at Heybridge may close in 1995. If Tasrail was closed on 30 June 1993, there would be two years during which Tioxide would have to be supplied with sulphuric acid from Risdon. As this freight is considered unsafe to carry long distances by road, it has been assumed that the acid that would otherwise be carried by rail would instead be carried by sea. BTE (1987a) assumed this and also that a pipeline would be constructed over the 8 kilometres from Burnie to Heybridge.[6] A pipeline is out of the question given that supply is only required for two years, so the present study assumes that the acid would be carried by road over the short distance from Burnie to Heybridge. The shipping cost from Risdon to Burnie was taken from BTE (1987a) and inflated

6. Another possibility is that Tioxide might lease the 8 kilometres of track between Burnie and Heybridge along with some Tasrail rolling stock for two years. Operation of the service could be contracted out to Pasminco to run in conjunction with the Emu Bay railway line.

to 1989–90 dollars. For the private cost, $21 per tonne was used and for the resource cost, $18 per tonne.

User costs

Additional costs will be imposed on some current Tasrail customers due to necessary changes in handling facilities, as all the major customers have been geared towards long term continuing use of rail transport. The BTE (1987a) study was unable to obtain detailed information on the capital expenditure to modify these facilities and assumed $5 million to be a reasonable estimate. Tasrail has supplied estimates for the present study and based on these, $8.44 million has been assumed for additional capital costs imposed on users, split 25 per cent in 1991–92 and 75 per cent in 1992–93. The bulk of this, $6.5 million, is associated with the road haulage of cement from Railton to Devonport. According to Tasrail, additional storage capacity of up to 5000 tonnes will be required at Devonport and the unloading hopper and conveyer there would have to be duplicated. No allowance has been made for increased operating costs for users except for 20 cents per tonne for coal to cover increased maintenance costs arising from the additional switching on and off of loading equipment due to the much higher number of smaller deliveries.

In order to estimate losses in consumer surplus and changes in demand when undertaking sensitivity tests with non-zero elasticities, user capital costs had to be incorporated into the transport costs per tonne to be incurred by users after rail closure. Capital costs were therefore annuitised at 15 per cent real over 18 years starting in 1993–94 and expressed as amounts per tonne. These amounts were then added to the estimates of road freight rates and, in the case of sulphuric acid, sea freight rates.

Redundancy and other severance payments

Payments to redundant workers and workers' compensation expenses are transfer payments and so are excluded from the social cost-benefit analysis. However, they are major costs in the financial analysis.

Currently Tasrail operates a voluntary redundancy scheme whereby employees accepting redundancy receive two weeks' pay for each year of service. In order to achieve the higher rates of labour attrition required under the CP14 and restructure scenarios, the study assumes that changes would have to be made to the existing redundancy package. The details assumed for the compulsory redundancy scheme under the closure scenario were adopted from the Australian Airlines compulsory redundancy scheme.[7]

The following costs will be incurred on top of redundancy payments:

- annual and long service leave liabilities;
- Retiring and Death Allowance[8]; and
- superannuation costs for redundant employees.[9]

These costs were averaged over all Tasrail employees, which is equivalent to assuming the employees made redundant have the same characteristics as the average Tasrail employee, as far as these costs are concerned. The amounts of the redundancy and other severance costs per employee are as follows:

$61 400 base case
$66 100 CP14
$68 100 restructure
$77 300 closure

In the retention scenarios, redundancy payments, leave, Retiring and Death Allowances and superannuation costs are not allowed for explicitly for employees who are replaced when they accept voluntary redundancy or retire. Amounts are included in labour costs per person which, averaged over time, would cover these costs.

Under the closure option a large proportion of workers' compensation liabilities will continue to exist past 1993 and so must be included in the analysis of closure. In the retention scenarios these are included in labour on-costs.

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7. AN has requested that the details of the redundancy schemes assumed in the study and average payments estimated not be disclosed so as not to prejudice future negotiations with unions. It is emphasised that the schemes assumed in the present study are nothing more than assumptions devised to indicate probable orders of magnitude.

8. Former Tasmanian Government Railway employees who were not eligible to join a superannuation fund receive the Retiring and Death Allowance (Queen's Grant) upon retirement. This is one week's pay for every year of service. These employees are also eligible for the allowance if they are retrenched prior to the age of 55 years.

9. Employees made redundant, whether voluntarily or compulsorily, are entitled to receive three and a half times their contributions plus interest. The additional two and half times must be paid by the employer. The AN superannuation scheme is 'unfunded', which means that AN pays out its contributions as they are required and is not paying regular amounts into a superannuation scheme. Thus there are no reserves built up to meet these liabilities.

RESULTS

Financial analysis

To give some idea of the orders of magnitude involved, tables of single-year cash flows, costs and benefits are provided. Table 4.5 does this for the financial analysis for the base case scenario covering the first six years of the analysis period. The discounted present values are presented in table 4.6 for the 7, 10 and 15 per cent discount rates. They indicate that the government as shareholder loses money under both the retention and closure options but it would lose less by adopting the closure option. The last line of table 4.6, which is the difference between the discounted cash flows for retention and for closure, shows for the base case scenario, that the amount saved by closing Tasrail would be between $9.4 million and $15.4 million depending on the discount rate.

Social cost-benefit analysis

The single-year social costs and benefits of closure compared with the base case retention scenario are set out for the first six years in table 4.7 and the discounted present values are shown in table 4.8. Under the assumption of zero elasticities of demand for transport, the inclusion of revenues and consumers surpluses has no net effect. The interpretation of the bottom line results in table 4.8 is that, ignoring costs and benefits not quantified in the analysis, society would be $24.5 million, $18.0 million or $11.0 million worse off at the 7, 10 and 15 per cent discount rates respectively, if Tasrail was shut down.

Sensitivity tests

Tables 4.9 and 4.10 provide sensitivity tests for the financial and social cost-benefit analyses respectively. These are undertaken with respect to changes in work force reduction projections (that is, CP14 and restructure scenarios), demand forecasts, demand elasticities and shadow prices of labour — the assumptions in the study about which there is the greatest uncertainty.

The financial analyses indicate that both the CP14 and restructure options produce negative discounted cash flows, but, under restructuring, losses are reduced to the point where the government, as shareholder, would be better off retaining the railway. The results are quite sensitive to changes in the level of demand. This would be due to the high proportion of rail costs assumed to be invariant with respect to freight carried over the relevant range. A 10 per cent increase is sufficient to make retention more financially advantageous for the government under the base case scenario.

Turning to table 4.10, where results of the sensitivity tests on the cost-benefit analysis are displayed, the net cost to society of closure of Tasrail is higher under the CP14 and restructure scenarios. As with the financial analysis, the result is fairly sensitive to changes in demand. A drop of 10 per cent in demand is sufficient to increase the net benefit of closure to around zero in the base case.

TABLE 4.5 FINANCIAL ANALYSIS OF RAIL CLOSURE: BASE CASE AND CLOSURE OPTIONS: SINGLE-YEAR CASH FLOWS
(1989–90 $ million)

Item	*1991–92*	*1992–93*	*1993–94*	*1994–95*	*1995–96*	*1996–97*
Retention						
Operating revenue	24.4	26.8	29.5	29.9	28.2	28.2
Other revenue	0.3	0.3	0.3	0.3	0.3	0.3
Capital expenditure	–7.7	–8.3	–6.8	–7.1	–7.6	–7.3
Rail operating costs	–34.3	–33.6	–32.4	–31.2	–30.0	–29.0
Redundancy and other severance costs	–2.1	–2.0	–1.9	–1.8	–1.7	–1.7
Net cash flow	–19.5	–16.9	–11.3	–10.0	–10.8	–9.5
Closure						
Operating revenue	22.6	18.2				
Other revenue	0.3	0.3				
Sales of assets			16.0	12.7		
Capital expenditure	–2.1	–1.6				
Rail operating costs	–34.1	–32.3				
Redundancy and other severance costs	–2.1	–48.7				
Workers' compensation liability			–0.4	–0.4	–0.3	–0.1
Net cash flow	–15.5	–64.0	15.6	12.3	–0.3	–0.1

Increasing the elasticity of demand raises the cost to society of rail closure but changes in elasticity are shown to be relatively unimportant over the relevant range. It is not known just what the long-run elasticity of demand for transport would be for each Tasrail traffic, but given the small proportion that transport costs comprise of final good costs, the elasticities for transport would, in most cases, be expected to be small. Exceptions could occur for traffics where there are alternative sources of supply or where changes in transport costs affect the location of production.

Changes in the shadow price of labour strongly affect results but the sensitivity tests show that over a plausible range of values, net present values remain predominately on the side of retention of Tasrail.

Likelihood of financial break-even

The study's terms of reference required consideration of whether financial break-even is a realistic corporate objective for Tasrail. Table 4.11 shows the

TABLE 4.6 FINANCIAL ANALYSIS OF RAIL CLOSURE: BASE CASE AND CLOSURE OPTIONS: DISCOUNTED CASH FLOWS
(1989–90 $ million)

	Discount rate		
Discounted cash flows	*7%*	*10%*	*15%*
Retention			
Operating revenue	296.6	237.8	174.1
Other revenue	3.0	2.4	1.8
Capital expenditure	–53.3	–45.9	–36.9
Operating costs	–300.4	–245.7	–185.5
Redundancy and other severance costs	–13.1	–11.5	–9.4
Net cash flow	–64.7	–60.9	–54.5
Closure			
Operating revenue	37.0	35.6	33.4
Other revenue	0.5	0.5	0.5
Sale of assets	22.7	20.6	17.7
Capital expenditure	–3.4	–3.2	–3.0
Operating costs	–60.0	–57.7	–54.0
Redundancy and other severance costs	44.5	42.2	38.7
Workers compensation liability	1.6	1.3	1.0
Net cash flow	–49.3	–47.6	–45.1
Net financial gain from closure[a]	15.4	13.2	9.4

a. Net cash flow under closure minus net cash flow under retention.

single-year net cash flows for closure and retention. These suggest that, provided there are no interest expenses, Tasrail, if retained, will begin to experience positive cash flows early next decade. It needs to be understood that cash flows are not the same as accounting profits. The main differences between the cash flows in table 4.11 and Tasrail's accounting profits would be amortisation of capital costs and inclusion of financing costs in the profit and loss account.

If, as is sometimes done for railways, 'break-even' is defined as covering operating costs (labour, fuel, materials and sundries, corporate overheads and insurance; excluding capital and redundancy and other severance costs), then Tasrail would break even for the first time in 1997–98, 1994–95 and 1993–94 under the base case, CP14 and restructure scenarios respectively. Revenues minus operating costs for each year under the retention scenarios are set out in table 4.12. The financial analysis suggests that break-even, under this definition, is an achievable financial target provided Tasrail is able to undertake the capital

TABLE 4.7 SOCIAL COST-BENEFIT ANALYSIS OF RAIL CLOSURE: BASE CASE VERSUS CLOSURE: SINGLE-YEAR COSTS AND BENEFITS[a]

(1989–90 $ million)

Benefits and costs	*1991–92*	*1992–93*	*1993–94*	*1994–95*	*1995–96*	*1996–97*
Benefits						
Rail capital expenditure saved	5.5	6.8	6.8	7.1	7.6	7.3
Rail operating costs saved	0.2	1.1	20.0	19.4	18.8	18.3
Release of capital[b]			13.1	11.2		
Rail level crossing accidents			0.7	0.7	0.7	0.7
Road revenue	2.3	9.8	33.9	34.2	33.7	33.7
Shipowner revenue (sulphuric acid)		0.8	1.1	1.1		
Input supplier revenue		0.1	1.3	1.3	1.3	1.3
Costs						
Truck costs[c,d]	1.5	6.5	22.4	22.7	22.3	22.3
Road accident costs	0.1	0.6	2.1	2.2	2.1	2.1
Shipping costs (sulphuric acid)		0.6	0.9	0.9		
User costs	2.1	6.3				
Rail revenue forgone	1.8	8.6	29.5	29.9	28.2	28.2
Net loss of consumers' surplus	0.4	2.0	6.8	6.8	6.7	6.7

a. Assumes zero elasticities of demand, hence the sum of road, ship and input supplier revenue on the benefit side equals the sum of rail revenue and consumers' surplus on the cost side.
b. A negative benefit not shown here occurs under the heading of release of capital of $4.0 million in 1997–98 under the base case scenario and in 1993–94 under the corporate plan and restructuring scenario from sale of the Invermay workshops site.
c. Resource costs for trucks are for the 10 per cent discount rate.
d. The costs of pavement damage are not provided because the results from the life cycle costing model are available only as present values.

expenditures assumed in the study.[10] The faster Tasrail is able to reduce its labour force the sooner break-even will be achieved, but even if reductions were to continue at the present rate of 5 per cent per annum, break-even could be attained before the year 2000. While covering operating costs would represent a significant milestone for Tasrail, it is not grounds for complacency if returns on government investment are at issue.

10. The revenues minus operating costs in table 4.12 differ considerably from those derived by the consultant for a number of reasons, the most important of which is that the consultant included recurring capital costs in operating costs. Also the consultant was using Tasrail's definition of capital costs, which includes costs of in-house labour expended on projects of a capital nature. Any targets set for Tasrail in terms of achievement of break-even will have to be accompanied by a precise definition of operating costs. The BTCE considers that its own definition is likely to be more useful to the Government for this purpose because operating costs defined thus can be derived from Tasrail's accounts without having to make judgements about whether particular capital expenditures are recurring. Capital costs are clearly defined in Tasrail's accounting system and in-house labour costs can readily be separated out from them for inclusion in operating costs under the BTCE definition.

TABLE 4.8 SOCIAL COST-BENEFIT ANALYSIS OF RAIL CLOSURE: BASE CASE VERSUS CLOSURE: DISCOUNTED PRESENT VALUES[a]
(1989–90 $ million)

	Discount rate		
Benefits and costs	*7%*	*10%*	*15%*
Benefits			
Rail capital expenditure saved	49.9	42.6	33.9
Rail operating costs saved	154.2	120.3	83.8
Release of capital	16.8	15.5	13.5
Rail level crossing accidents	6.2	4.7	3.2
Road revenue	307.1	238.9	165.9
Shipowner revenue (acid)	2.3	2.1	1.9
Input supplier revenue	11.3	8.8	6.0
Costs			
Truck costs	198.3	158.1	114.5
Road damage costs	14.8	13.2	7.5
Increase in other vehicle costs	8.8	5.3	4.4
Road accident costs	19.4	15.1	10.5
Shipping costs (acid)	2.0	1.8	1.6
User costs	8.2	7.7	7.0
Rail revenue forgone	259.5	202.2	140.7
Net loss of consumers' surplus	61.2	47.6	33.1
Net benefit from closure of Tasrail	–24.5	–18.0	–11.0

a. Assumes zero elasticities of demand, hence the sum of road and ship revenue on the benefit side equals the sum of rail revenue and consumers' surplus on the cost side.

Some qualifications

Besides the unquantified costs and benefits discussed in the next chapter, there are a number of factors which would have affected the results one way or the other had they been taken into account in the study. It is possible that a new pulp mill will be constructed by APPM which, according to the consultants' report, would increase Tasrail's annual profit by $1.2 million to $2.4 million. The sensitivity analysis shows that increases in demand will raise the cost to society of closure of Tasrail and that this cost is fairly sensitive to changes in demand.

The assumption that all rail freight other than sulphuric acid would be carried by road following closure of Tasrail could bias the results in favour of retention. If Tasrail was closed it may be economic to keep the 22-kilometre Railton to Devonport segment open to carry the large quantities of cement produced at Railton for export to the mainland. This was not examined because of the difficulties in estimating the costs of operating a short segment of rail line by itself. The discounted present value of the resource costs of undertaking the task by road is $13.0 million, $10.4 million and $7.5 million under the 7, 10 and 15 per

TABLE 4.9 RESULTS OF SENSITIVITY TESTS: FINANCIAL ANALYSIS: DISCOUNTED CASH FLOWS

(1989–90 $ million)

	Discount rate		
Alternative assumption	*7%*	*10%*	*15%*
Net cash flows			
Closure	–49.3	–47.6	–45.1
Base case	–64.7	–60.9	–54.5
CP14[b]	–58.3	–55.6	–50.8
Restructure	–39.4	–40.7	–40.7
Base case:			
Demand forecasts plus 10%	–40.3	–41.4	–40.3
Demand forecasts minus 10%	–89.0	–80.4	–68.8
Net financial gain from closure[a]			
Base case	15.4	13.2	9.4
CP14[b]	9.1	7.9	5.7
Restructure	–9.9	–6.9	–4.4
Base case:			
Demand forecasts plus 10%	–6.0	–3.5	–2.2
Demand forecasts minus 10%	36.8	29.9	21.0

a. Net cash flow under closure minus net cash flow under retention.
b. AN Corporate Plan number 14.

TABLE 4.10 RESULTS OF SENSITIVITY TESTS: COST-BENEFITANALYSIS: DISCOUNTED PRESENT VALUES OF BENEFITS OF CLOSURE[a]

(1989–90 $ million)

	Discount rate		
Alternative assumption	*7%*	*10%*	*15%*
Base case[a]	–24.5	–18.0	–11.0
CP14[b]	–32.7	–25.1	–16.7
Restructure	–43.6	–34.4	–24.0
Base case:			
Demand forecasts plus 10%	–46.0	–35.2	–23.4
Demand forecasts minus 10%	–3.0	–0.8	1.4
Elasticities of demand –1.0	–27.7	–19.7	–11.4
Labour shadow price adjustment factors:			
Rail 60%	–9.9	–6.5	–2.8
Rail 40%	–39.2	–29.5	–19.1
Road haulage 100%	–44.8	–33.8	–21.9
Road haulage 60%	–4.2	–2.2	0.0

a. Base case with zero elasticities of demand for transport and shadow prices of labour at 50 per cent or financial costs for rail and 80 per cent for road.
b. AN Corporate Plan number 14.

TABLE 4.11 NET CASH FLOW PROJECTIONS
($ million)

Year ending 30 June	Closure	Retention		
		Base case	CP14[a]	Restructure
1992	–15.5	–19.4	–21.6	–31.6
1993	–64.0	–16.9	–17.3	–18.3
1994	15.6	–11.3	–10.8	3.2
1995	12.3	–10.0	–8.4	–1.5
1996	–0.3	–10.8	–8.4	–3.3
1997	–0.1	–9.5	–7.7	–3.8
1998	–0.1	–3.2	–0.7	–2.8
1999	–0.1	–5.7	–2.7	–1.6
2000	–0.1	–4.1	–1.4	–0.1
2001	–0.1	–1.9	0.0	1.5
2002	–0.1	–0.3	0.8	2.3
2003	–0.1	1.8	1.4	2.9
2004	–0.1	2.6	1.9	3.4
2005	–0.1	2.6	1.9	3.4
2006	–0.1	2.6	1.9	3.4
2007	–0.1	2.6	1.9	3.4
2008	–0.1	2.6	1.9	3.4
2009	–0.1	2.6	1.9	3.4
2010	–0.1	2.6	1.9	3.4
2011	–0.1	2.6	1.9	3.4

a. AN Corporate Plan number 14.

cent discount rates respectively. In addition there is the estimated $6.5 million for increased storage capacity and duplication of the unloading hopper and conveyor at Devonport, which increases the respective present values to $18.8 million, $15.9 million and $12.6 million. From these estimates, it can be seen that if the cost of continuing to transport cement by rail from Railton to Devonport was zero, the negative present value of the net benefit to society of closure of Tasrail in the base case would be brought to around zero, but would not become significantly positive. Of course, the cost of transporting cement by rail from Railton to Devonport is not free and it would be more expensive undertaken on its own than as part of the Tasrail system.

The other case where the assumption that all rail freight other than sulphuric acid would be carried by road may not hold is interstate containers into or out of the southern part of Tasmania. Between Hobart and the mainland there is competition between sea plus rail via northern ports, and sea transport all the way. With the rail competition removed, there may be an increase in shipping services out of Hobart taking some of the former Tasrail task away from road. Containers between Hobart-Boyer and northern Tasmanian centres account for 9.9 per cent of the 1993–94 forecast net tonne-kilometres and the present value

TABLE 4.12 EXTENT OF BREAK-EVEN[a]
($ million)

Year ending 30 June	*Base case*	*CP14[b]*	*Restructure*
1992	-9.6	-8.8	-7.8
1993	-6.5	-5.1	-0.4
1994	-2.6	-0.9	4.2
1995	-1.1	1.0	4.9
1996	-1.5	0.7	3.8
1997	-0.5	1.8	4.3
1998	0.4	2.7	4.7
1999	1.3	3.3	5.0
2000	2.1	3.4	5.1
2001	2.9	3.5	5.1
2002	3.7	3.5	5.1
2003	4.1	3.5	5.1
2004	4.2	3.5	5.1
2005	4.2	3.5	5.1
2006	4.2	3.5	5.1
2007	4.2	3.5	5.1
2008	4.2	3.5	5.1
2009	4.2	3.5	5.1
2010	4.2	3.5	5.1
2011	4.2	3.5	5.1

a. Operating revenue plus other revenue less operating costs.
b. AN Corporate Plan number 14.

of the resource costs of transporting this traffic by road (excluding pavement damage, which would be small as north-south containers represent a small proportion of total vehicle kilometres and the trucks are, on average, lighter than for other commodities) is $17.9 million, $14.0 million and $10.8 million under the 7, 10 and 15 per cent discount rates respectively. Only a proportion of the north-south containers would be switched to sea instead of road, so it can be safely concluded that even if sea transport was free, the sign of the bottom line result would not change.

SUMMARY

Financial and social cost-benefit analyses were undertaken of the options to close and to retain Tasrail. For the retention option there were three scenarios considered involving differing rates of reduction in the Tasrail work force and substitution of capital for labour.

The financial analysis estimated discounted net present values of cash flows for closure and the three retention scenarios. Under closure and all three retention scenarios the discounted cash flows are negative indicating that the government loses. However, the government loses less under some options or scenarios than under others. The difference between the present value for closure and for any retention scenario gives the gain (or loss) to the government as shareholder and payer of subsidies from closing Tasrail compared with retention under that particular scenario. The Federal government will lose less under closure than under the two higher labour cost retention scenarios, the base case and CP14. Only when the comparison is with the restructuring scenario with its dramatic cuts in the Tasrail work force, will the Federal government be better off by retaining Tasrail.

The social cost-benefit analysis aimed to estimate the net present value of the benefits and costs to society of closing Tasrail compared with retaining it. The benefits of rail closure included the savings in future rail operating and capital costs, the release of capital resources currently tied up in Tasrail, and level crossing accidents avoided. The costs of shutting down Tasrail were primarily those associated with carrying the rail freight traffic by road, namely truck costs, road pavement damage and additional road accidents. The analysis estimated the net benefit to society of closure compared with the three retention scenarios. For all three cost-benefit calculations the result was significantly negative indicating that society would be worse off if the railway was discontinued. The more Tasrail is able to improve its efficiency, the greater would be the disbenefit to society from closure. A range of sensitivity tests were performed showing that the results are fairly sensitive to changes in demand and to the shadow price of labour.

As the sensitivity tests show, it is possible to vary the assumptions so as to reverse the conclusion of the cost-benefit analysis and still remain within the bounds of realism. Nevertheless, the net benefit from closure in the base case under the set of assumptions considered most plausible, is sufficiently negative to conclude that, on balance, society is likely to be better off if Tasrail is retained. It must be added that the benefit will be greater the more Tasrail is able to improve its efficiency.

CHAPTER 5 THE SOCIAL AND ENVIRONMENTAL EFFECTS

This chapter presents an analysis of the social and environmental effects of the closure of Tasrail. The social cost-benefit analysis in the previous chapter attached monetary values to a number of social variables. This chapter looks at the broader social effects of closure and also attempts to quantify unemployment and some of the environmental effects.

SOCIAL EFFECTS

The main social effect of closure of the Tasrail system would result from the redundancy of the workers in that industry. These effects would be felt by those workers and their dependants particularly if they were unable to find alternative employment or had their income reduced. Reduction in income may result from accepting a lower paid job in another industry or receiving payment of the unemployment benefit from government. Income would also depend upon redundancy payments. Closure of the system may also result in the redeployment of rail workers to other jobs within Australian National railways on the mainland.

Another important social effect would be the number of road accidents in Tasmania if these increased markedly as a result of the increase in heavy trucks on the roads.

EFFECTS OF REDEPLOYMENT AND REDUNDANCY

The effects of redeployment and redundancy in the railway industry in Australia have been presented in a recent BTCE study, BTCE (1990b). The previous BTE (1987a) report on the Tasmanian railway system also looked at the social effects of the full closure of the railway, as did the BTCE report on AN passenger services (BTCE 1991).

The BTE report

The 1987 BTE report assumed full closure of Tasrail on June 30, 1988. It noted that redundancy of the approximately 869 employees of Tasrail in 1988 would have a significant social impact in Tasmania. The reason was that there had been very few new jobs created in Tasmania in the previous decade. Also the job market was very narrowly based. The primary finding was that re-employment prospects for these redundant workers were poor. The main reasons given were:

- mismatched skills,
- older age profile, and
- the labour market situation.

These reasons have been re-examined for the present study.

The structure, size and distribution of the Tasrail work force

Comparison with the Tasmanian work force

The Tasrail work force is predominantly male. There were only 11 females employed in 1990. Because the employment rate and the structure of the female work force in Tasmania is different from the male work force, the statistics used in this section refer to male employees. Table 5.1 compares the proportions of total male employees of Tasrail by Australian Standard Classification of Occupations (ASCO) category in 1990, with the Tasmanian work force as a whole in 1990. The possible effect of redundancy on female railway workers is discussed in the context of general employment prospects in Tasmania.

The figures in table 5.1 indicate that Tasrail has a much higher proportion of plant or machine operators and labourers than the Tasmanian work force as a whole. It also has a higher proportion of tradespersons. The high proportion of labourers is normal for the railway industry where the maintenance of the permanent way, even with technological innovation, still requires considerable labouring work. The higher proportion of tradespersons is probably a reflection of the industrial structure of Tasmania where there are fewer large employers of skilled labour than on the mainland.

Changes in the staffing structure of Tasrail

Table 5.2 compares the actual numbers of male Tasrail employees in 1988 and 1990, by their skill grouping. There were 962 employees when the BTE study was undertaken in 1986. This number had been reduced to 817 in 1989 and to 705 in November 1990. Over that period there was an average reduction in the work force of 6 per cent per annum. If closure occurred in 1992–93 the number of employees may be less than 705. The employment effects in this study are based on the November 1990 employment figure of 705.

Table 5.2 indicates that the employment categories in Tasrail which have undergone the biggest reduction since 1988 were plant or machine operators and labourers and related workers.

The age profile of the Tasrail work force

Table 5.3 shows the age profile of the Tasrail work force in November 1990. Table 5.3 shows that 52 per cent of the Tasrail work force are in the age group 40 years and over. Thirty-seven per cent of these are labourers and related workers. Twenty-one per cent are over 55 years. This is considerably more than for

TABLE 5.1 PROPORTION OF TOTAL MALE EMPLOYEES OF TASRAIL BY EMPLOYMENT CATEGORY IN 1990 COMPARED WITH THE TOTAL TASMANIAN WORK FORCE IN NOVEMBER 1990

(per cent)

ASCO employment category	*Tasrail*	*Tasmania*
Managers	3	10
Professionals	0	11
Para-professionals	3	5
Tradespersons	25	15
Clerks	6	15
Salespersons or personal services	1	15
Plant or machine operators	30	11
Labourers and related workers	32	18

ASCO Australian Standard Classification of Occupations

Sources AN (1990b); ABS (1986); ABS (1990a).

TABLE 5.2 STAFFING STRUCTURE OF TASRAIL IN 1988 AND 1990[a]

(employee numbers)

Major group	*Employees 1988*	*Employees 1990*
Managers	28	19
Professionals	6	3
Para-professionals	10	25
Tradespersons	166	178
Clerks	63	41
Salespersons or personal services	4	6
Plant or machine operators	280	210
Labourers and related workers	260	223
Total	817	705

a. Male employees.

Note There were also 11 female employees in Tasrail in both 1988 and 1990. In 1990 ten were employed as clerks and one as a cleaner.

Sources ABS (1986); AN (1989); AN (1990b).

TABLE 5.3 AGE PROFILE OF THE TASRAIL WORK FORCE IN NOVEMBER 1990 BY EMPLOYMENT CATEGORY
(employee numbers)

ASCO employment category	*20–39 years*	*40–54 years*	*55–64 years*
Managers	7	12	0
Professionals	0	2	1
Para-professionals	4	14	7
Tradespersons	98	68	12
Clerks	17	18	6
Salespersons or personal services	1	3	2
Plant or machine operators	123	74	13
Labourers and related workers	85	91	47
Total	335	282	88

ASCO Australian Standard Classification of Occupations

Sources ABS (1986); AN (1990b).

TABLE 5.4 AVERAGE UNEMPLOYMENT RATES IN TASMANIA AND AUSTRALIA BY EMPLOYMENT CATEGORY IN NOVEMBER 1990
(per cent)

ASCO employment category	*Australian rate*	*Tasmanian rate*
Managers	1.11	0.34
Professionals	1.91	0.65
Para-professionals	2.18	1.32
Tradespersons	5.58	2.80
Clerks	3.01	2.96
Salespersons or personal services	5.33	5.48
Plant or machine operators	5.41	5.62
Labourers and related workers	9.25	10.41

ASCO Australian Standard Classification of Occupations

Source ABS (1990b).

workers in the other large employment categories of plant and machine operators and tradespersons.

The distribution of the Tasrail work force

Figure 5.1 shows the distribution of employment in Tasrail throughout Tasmania in November 1990. At the end of November 1990 a total of 705 Tasrail employees were distributed throughout the rail network. The major concentrations were in Launceston, Devonport and Hobart. Over 350 were employed at the railway workshops and other locations in Launceston. Sixty-six per cent were in the ABS Northern Statistical Division, 17 per cent in the North Western Division and 17 per cent in the Southern Division.

Employment prospects in Tasmania at present

The unemployment rate

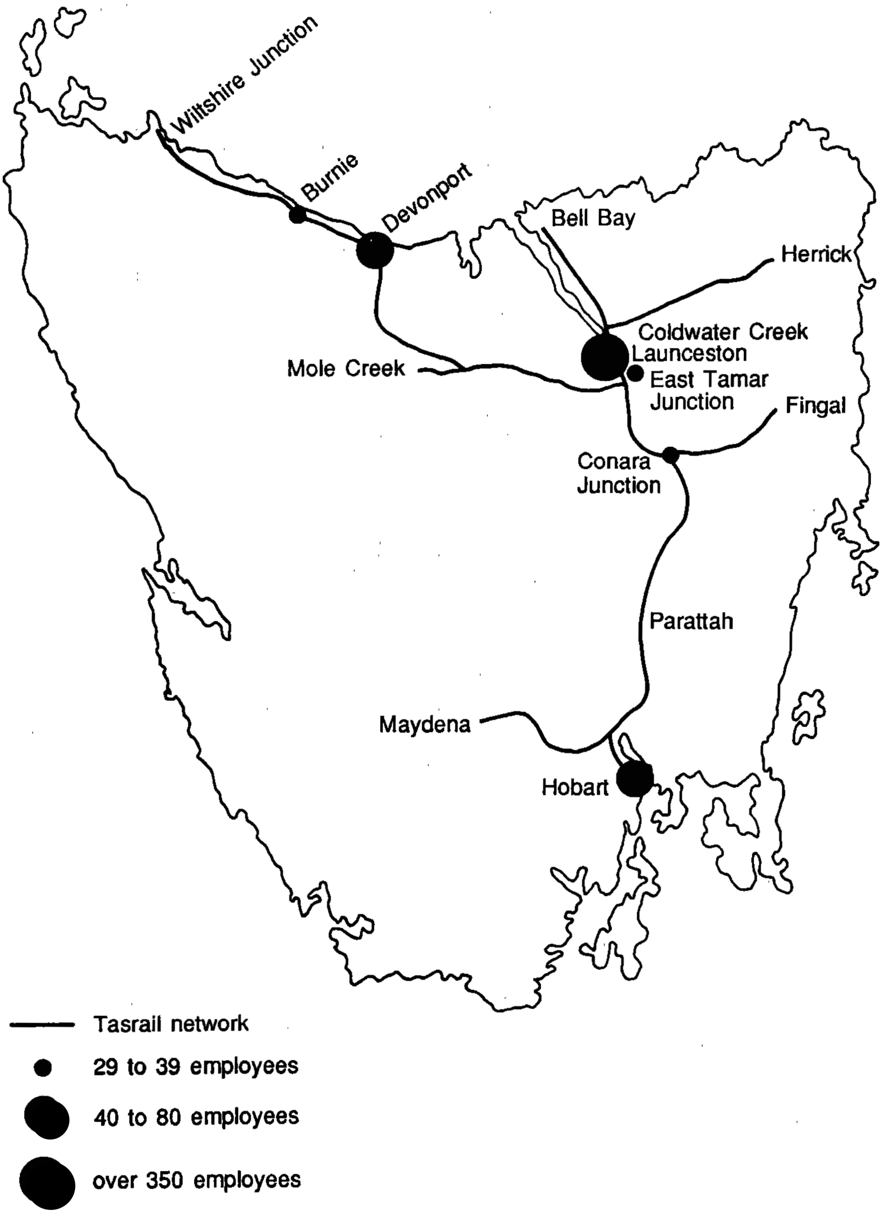
The unemployment rate in Tasmania has been consistently higher than for Australia as a whole between 1986 and 1989. In 1989 it was 8.5 per cent of the work force while for Australia it was 5.9 per cent, on a seasonally adjusted basis. In December 1989 there were 19 900 Tasmanians unemployed out of a labour force of 218 800. There were also another 21 160 people who have been described as the 'hidden unemployed'. Job vacancies have remained at around 1000 for several years. Most new job formation has been in the female job market over this period. Between 1984 and 1989 the female participation rate increased from 40 per cent to 50 per cent (ABS 1990b).

Regional unemployment

At the June 1986 census 27 per cent of employment was in the Northern Statistical Division, 24 per cent in the North Western and 48 per cent in the Southern. The unemployment rate fell only in the Northern Statistical Division of Tasmania between 1988 and 1989 (ABS 1990b). This is an important consideration when examining the regional effects of redundancy in Tasrail, which provides employment in both the northern and southern regions of Tasmania. It is likely therefore that Tasrail redundancies would have a greater effect in the north than the south of Tasmania and that finding employment in the north would be more difficult.

Occupational unemployment

Table 5.4 compares the unemployment rates in Tasmania and Australia by employment category for November 1990. The unemployment rates shown in table 5.4 indicate that the unemployment rate in Tasmania in November 1990 was marginally higher than the national average for workers in the categories of salespersons and plant and machine operators and more than 1 per cent higher for labourers. It was considerably lower than the national average in the other categories, with the exception of clerical workers.



Source BTCE.

Figure 5.1 The major employment centres for Tasrail in November 1990

BTCE survey of redundant rail workers

The BTCE survey of redeployed and redundant rail workers presents results for the unemployment rates of redundant rail workers by occupation and age. These results were used in calculating the unemployment rates for the closure option.

Unemployment rate by employment category
The figures from the BTCE (1990b) study for the unemployment rate by employment category are shown in table 5.5. The BTCE survey results suggest that unemployment rates by employment category for redundant rail workers are much higher than those in the work force as a whole shown in table 5.4. This seems to be related to the fact that all of the workers surveyed had become redundant, while many workers in the total labour force may never have been made redundant. Thus the measure of unemployment among redundant workers in a particular industry may not be directly comparable with unemployment industry-wide occupational by employment category. The implication is that the rate of unemployment among redundant Tasrail workers may be much higher than the Tasmanian averages shown in table 5.4. The figures in table 5.5 are for those redundant workers who said they were unemployed at the time of responding to the BTCE survey. They do not include any estimate of 'discouraged' redundant workers among those who said they had retired. If they were included the unemployment rate would be higher.

Labourers and related workers had an unemployment rate of 10.41 per cent in Tasmania in November 1990. The BTCE survey suggests that it might become as high as 60 per cent for the 223 rail workers in this category, if they became redundant in the near future.

TABLE 5.5 UNEMPLOYMENT RATES FOR REDUNDANT RAIL WORKERS BY EMPLOYMENT CATEGORY IN THE BTCE RAIL SYSTEMS SURVEY 1987–88

ASCO employment category	*Redundant*	*Unemployed*	*Percentage*
Managers	30	9	30.0
Professionals	11	3	27.3
Para-professionals	11	3	27.3
Tradespersons	90	36	40.0
Clerks	112	36	32.1
Salespersons or personal services	13	8	61.5
Plant or machine operators	82	41	50.0
Labourers and related workers	128	77	60.2
Total	477	213	44.6

ASCO Australian Standard Classification of Occupations

Sources BTCE (1990b).

Unemployment rate by age
The BTCE survey also looked at the effect which age had on the unemployment rates of redundant rail workers. These figures are shown in table 5.6. Not unexpectedly the age category 55–65 years of age had the largest percentage of unemployed.

The post-redundancy employment prospects of Tasrail workers

Employment prospects have been estimated taking into consideration the age and skill of the Tasrail work force as well as the unemployment rate in Tasmania for November 1990. The regional effect of redundancy has also been estimated.

TABLE 5.6 UNEMPLOYMENT RATES FOR REDUNDANT RAIL WORKERS BY AGE IN THE BTCE RAIL SYSTEMS SURVEY 1987–88

Age group (years)	*Redundant*	*Unemployed*	*Percentage*
20–39	214	66	30.8
40–54	200	96	48.0
55–64	67	48	71.6
Total	481	210	43.7

Source BTCE (1990b).

TABLE 5.7 POST-REDUNDANCY EMPLOYMENT PROSPECTS OF THE TASRAIL WORK FORCE

ASCO employment category	*Number of employees*		
	Estimated November 1990	*Likely to be re-employed*	*Likely to be unemployed*
Managers	19	13	6
Professionals	3	2	1
Para-professionals	25	18	7
Tradespersons	178	107	71
Clerks	41	28	13
Salespersons or personal services	6	2	4
Plant or machine operators	210	105	105
Labourers and related workers	223	89	134
Total	705	364	341

Sources ABS (1986); ABS (1990b); AN (1990b); BTCE (1990b).

Estimation of post redundancy employment prospects
Table 5.7 shows estimates of the post-redundancy employment prospects of the major occupational groups of workers employed by Tasrail in 1990. The percentage of rail workers likely to remain unemployed, shown by age in the BTCE survey (table 5.6), was compared with age category in the Tasrail work force for November 1990 as shown in table 5.3. This showed that the age profiles were very similar. If age was the sole determinant of employment prospects then the rate of unemployment among redundant Tasrail employees would be very similar to the BTCE survey age profile. This would give an unemployment rate of 42.7 per cent. However because the age profiles are very similar, but the ASCO category profiles are different, a more accurate assessment is given by using the unemployment rate by ASCO employment category in the BTCE survey. The total unemployment rate in this case is 48.3 per cent. The unemployment rate for each of these categories of the Tasmanian work force for November 1990, shown in table 5.4 must also be taken into consideration. The average unemployment rate in Tasmania at the time of the BTCE survey was two percentage points higher than the Australian average. Historically unemployment in Tasmania has been higher than on the mainland. It would therefore be expected that the unemployment rate is slightly higher than suggested by the calculations. It may be closer to 50 per cent.

The results using the ASCO employment categories are shown in table 5.7.

Table 5.7 suggests that approximately 48.3 per cent of Tasrail employees would have difficulty finding new employment if they had been made redundant in November 1990. Those groups most affected are plant and machine operators and labourers. Labourers would make up 39 per cent of the estimated unemployed. Female clerks could be expected to have better prospects than male clerks.

Employment prospects by region
Another method of estimating the overall impact of redundancy in Tasrail is to use the regional reabsorption coefficients provided in a BTCE study of the social impacts of rail systems rationalisation (BTCE, forthcoming). This provides absorption coefficients for the regions designated as Burnie, Hobart and Launceston. The boundaries of these regions are not exactly the same as the ABS Statistical Divisions. A map of the BTCE study regions is shown in figure 5.2. Table 5.8 gives the results of these calculations.

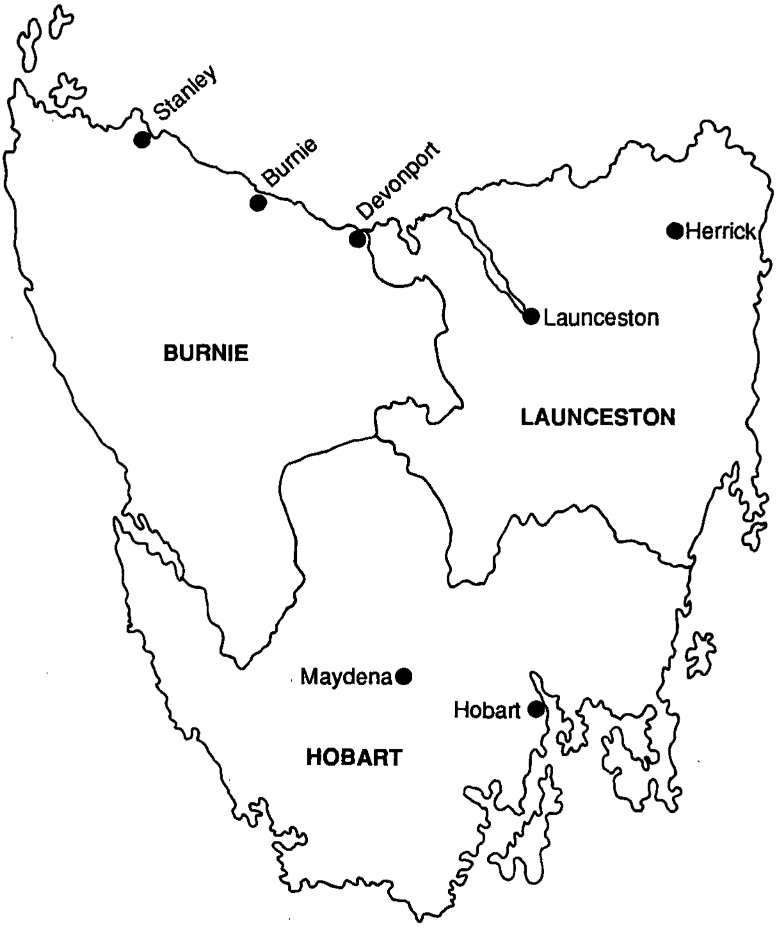
These calculations produce a 47 per cent unemployment rate which compares with 48.3 per cent obtained by the preceding method. The region most affected would be Launceston.

The effect of Tasrail redundancies on local communities

Table 5.9 indicates the location of the Tasrail work force by municipality. The impact of redundancy upon the rate of unemployment in those areas can be estimated by comparing the Tasrail work force in 1990 by municipality with the total work force and the unemployment rate in that area. If the unemployment rates obtained from the 1986 census still prevail in these municipalities, then those areas which would be relatively most affected by Tasrail redundancies are Evandale and Campbelltown. Those most affected in terms of numbers are Ulverstone, Launceston and Hobart. The small number of Tasrail employees in places such as Fingal, with an unemployment rate of 20.8 per cent in 1986, means a relatively small increase in local unemployment.

Other factors affecting employment prospects

There are a number of other factors which would also have an important bearing on the employment prospects of redundant Tasrail workers. The BTCE (1990b) study and other labour market studies have found that age, schooling, occupation and length of service are important in determining employment prospects. The



Source BTCE.

Figure 5.2 The employment regions used in the BTCE (1991) study.

TABLE 5.8 POST-REDUNDANCY EMPLOYMENT PROSPECTS OF THE TASRAIL WORK FORCE BY REGION

Region	*Work force November 1990*	*Reabsorption coefficient*	*Likely to be unemployed*
Burnie	128	0.49	65
Launceston	455	0.56	200
Hobart	122	0.44	68
Total	705		333

Sources BTCE (1990b); AN (1990b).

category of railway workers most likely to be unemployed was labourers over 40 having highest schooling at fourth form and no post-school qualifications. In 1986 labourers made up 36.2 per cent of the Tasrail work force.

Other social effects of redundancy and unemployment

The social effects of redundancy and unemployment stem from the unemployment of individuals and bread winners. They include the disruption of community ties if redundant workers move to new locations in search of employment. Family stability is put under pressure by the need to find new accommodation and to move away from other family members and relatives. The education of children is disrupted as is their social development. It may be necessary for breadwinners to leave their families and local communities, to provide for their well-being. These changes combined with a possible decline in income may also affect the health both physical and psychological of redundant workers and their families. A rise in unemployment in a community may increase the crime rate. All these effects are well documented in numerous studies, for example Aldwin (1986), Larson (1984), O'Brien (1986), Rones (1983) and Shelton (1985).

EFFECT ON ROAD ACCIDENTS

Another social effect may result from an increase in road accidents both for vehicle operators and other members of the community. The immediate health impact is obvious but there are also the social problems associated with caring for accident victims and their rehabilitation as well as the effect upon their families. These additional accidents are given a monetary value in chapter 4.

The BTE (1987a) report on Tasrail found that rail closure may result in more injuries on the roads but fewer fatalities. If the result of rail closure is an additional 28 million truck-kilometres in 1993–94, then there would be three additional fatalities and five serious and nine minor additional injuries on the roads. These results were obtained by using the 1988 truck accident rates for New South Wales (Roads and Traffic Authority 1988). The accident statistics for New South Wales were used because those for Tasmania were not reliable. In 1988 there were

TABLE 5.9 THE TASRAIL WORK FORCE AND REGIONAL UNEMPLOYMENT RATES IN TASMANIA

Municipality	*Tasrail work force 1990*	*Total work force 1986*	*Unemployment rate 1986 (per cent)*
Circular Head (Wiltshire Junction)	3	3 233	8.5
Wynward (Wynward)	12	4 621	11.9
Burnie (Heybridge, Burnie South Burnie)	36	7 656	13.4
Ulverstone (Devonport)	60	5 118	10.5
Kentish (Railton)	5	1 669	15.3
Deloraine (Deloraine)	9	1 877	14.3
Westbury (Westbury)	5	3 269	8.0
Longford (Longford)	3	2 461	9.5
Evandale (Western Junction, East Tamar Junction)	29	977	7.4
Launceston (Launceston, Karoola)	368	24 407	10.7
Georgetown (Longreach, Bell Bay)	2	2 485	12.4
Scottsdale (Scottsdale)	11	1 808	5.9
Ringarooma (Legerwood)	2	819	11.0
Campbelltown (Campbelltown, Conara Junction)	30	533	11.9
Fingal (Fingal)	8	809	20.8
Oatlands (Parattah)	8	711	16.6
Richmond (Colebrook, Campania)	7	929	8.2
New Norfolk (Boyer, Westerway)	14	3 608	11.4
Glenorchy (Derwent Park)	6	17 157	9.0
Hobart (Hobart)	65	20 938	8.0
Brighton (Bridgewater, Granton)	22	3 171	23.0
Total	705		

Note The names in brackets refer to AN stations.

Sources AN (1990b); Tasmanian Employment Summit (1990b).

nine fatalities, 17 serious and 31 minor injuries per 100 million vehicle-kilometres for semitrailers. These were made proportionate to the additional truck task for Tasmania.

There was an average of three level crossing accidents per year between 1986 and 1990, resulting in a yearly average of 2.4 injuries and one fatality (AN 1991 pers. comm.). It has been assumed that 30 per cent of these injuries were serious in nature. This is based on the Australian average. On the basis of the estimates discussed in the previous paragraph, if Tasrail was closed there would be three fatalities on the road system as a result of the increase in truck-kilometres. Although there would be no more rail accidents as a result of rail closure, this would be offset by the increase in road accidents. There would be two additional fatalities, 4.3 additional serious and 7.3 minor injuries resulting from road accidents. This result means that over a ten-year period there would be 20 fatalities, 43 serious and 73 minor injuries. This finding differs from the previous study by the BTE (1987a), in that the number of fatalities increases rather than decreases, but agrees with the prediction of increased injuries on the roads.

These results should be qualified by noting that the closure of Tasrail would also result in no more accidents in the railway industry. On the other hand there may be an increase in accidents in the trucking industry, which do not actually occur on the roads, as a result of taking over the rail task.

ENVIRONMENTAL EFFECTS

The main environmental effects of the closure of Tasrail would be increased traffic noise and air pollution from the additional trucks on Tasmanian roads. Much of these effects are of a local nature; however, the emission of greenhouse gases is a global problem and is therefore important wherever it occurs.

The impact of noise can be estimated from the increase in traffic volumes and their location. Air pollution can be measured by converting the net increase or decrease in fuel consumption into energy and then into the quantity of gases emitted by vehicle engines. This was done by using the conversion factors provided by ABARE (1989b) and BTCE (1990c).

Table 5.10 shows the increase in road traffic in 1995–96, by road segment, which would result from the closure of Tasrail. These estimates have been derived from the average annual daily traffic (AADT) figures provided by the Tasmanian Department of Roads and Transport which are shown in appendix VI. This increased traffic would result in increased noise and pollution along the routes traversed by the trucks which would replace the Tasrail freight task.

Heavy truck frequency

The frequency of passing truck traffic has been calculated by assuming a ten-hour day and distributing the truck AADTs over that period. For example on the Bass Highway the total AADTs of 137 for six-axle trucks in 1995–96 is divided into 600 minutes giving an interval between trucks of 4.4 minutes. The change in the

TABLE 5.10 THE TIME INTERVAL FOR PASSING TRUCK TRAFFIC ON TASMANIAN ROADS AS A RESULT OF THE CLOSURE OF TASRAIL

	Total AADTs for six-axle trucks		Time interval between trucks (minutes)	
Road segment	*1991*	*1995*	*1991*	*1995*
Bass Highway				
1 Sisters Creek–Wiltshire Junction	84	137	7.1	4.4
2 Somerset–Sisters Creek	120	173	5.0	3.5
3 Burnie–Somerset	295	349	2.0	1.7
4 Burnie–Devonport	259	398	2.3	1.5
5 Port Sorell–Devonport	315	460	1.9	1.3
6 Railton–Port Sorell	227	311	2.6	1.9
7 Deloraine–Railton	170	306	3.5	2.0
8 Carrick–Deloraine	229	367	2.6	1.6
9 Carrick–Launceston	223	249	2.7	2.4
10 Devonport–Mersey	117	286	5.1	2.1
11 Mersey–Railton	40	209	15.0	2.9
12 Railton–Devonport	148	317	4.1	1.9
13 Railton–Bass Highway	15	67	40.0	9.0
14 Bass Highway–Frankford	144	206	4.2	2.9
15 Port Sorell–West Tamar Junction	80	142	7.5	4.2
West Tamar Highway				
16 Frankford–Batman Highway	117	179	5.1	3.4
17 West Tamar–East Tamar	93	155	6.5	3.9
18 Perth–Carrick	156	268	3.8	2.2
East Tamar Highway				
19 Lilydale–Launceston	38	120	15.8	5.0
20 Lilydale–Batman Highway	104	175	5.8	3.4
21 Batman Highway–Bridgeport	190	323	3.2	1.9
22 Bridgeport–Bell Bay	139	153	4.3	3.9
23 East Tamar Highway–Bell Bay	113	127	5.3	4.7
Tasman Highway				
24 Gladstone–Scottsdale	27	51	22.2	11.7
25 Launceston–Scottsdale	44	64	13.6	9.3
26 Scottsdale–East Tamar	63	73	9.5	8.2
27 Scottsdale–Blumont	na	na	na	na
28 East Tamar–Lilydale	69	81	8.7	7.4
29 Blumont–Lilydale	na	na	na	na
Midland Highway				
30 Launceston–Perth	248	340	2.4	1.8
31 Perth–Conara Junction	165	369	3.6	1.6
32 Oatlands–Conara Junction	115	272	5.2	2.2
33 Oatlands–Bridgewater	141	290	4.3	2.1
34 Granton–Bridgewater	396	446	1.5	1.3

TABLE 5.10 (CONT.) THE TIME INTERVAL FOR PASSING TRUCK TRAFFIC ON TASMANIAN ROADS AS A RESULT OF THE CLOSURE OF TASRAIL

Road segment	*Total AADTs for six-axle trucks* 1991	1995	*Time interval between trucks (minutes)* 1991	1995
Brooker Highway				
35 Hobart–Granton	1 063	1 126	0.6	0.5
36 Oatlands–Parattah	13	21	46.2	28.6
37 Avoca–Fingal	27	148	22.2	4.1
38 Conara Junction–Avoca	26	147	23.1	4.1
39 National Park–Maydena	19	26	31.6	23.1
40 Lyell Highway–National Park	34	41	17.6	14.6
Lyell Highway				
41 Fenton–Granton	131	138	4.6	4.3
42 Bridgewater–Boyer	70	146	8.6	4.1

a. The trucks in this table are six-axle trucks, because it has been assumed in the cost-benefit analysis that the rail task is transferred to trucks of this size.
AADT Average annual daily traffic levels

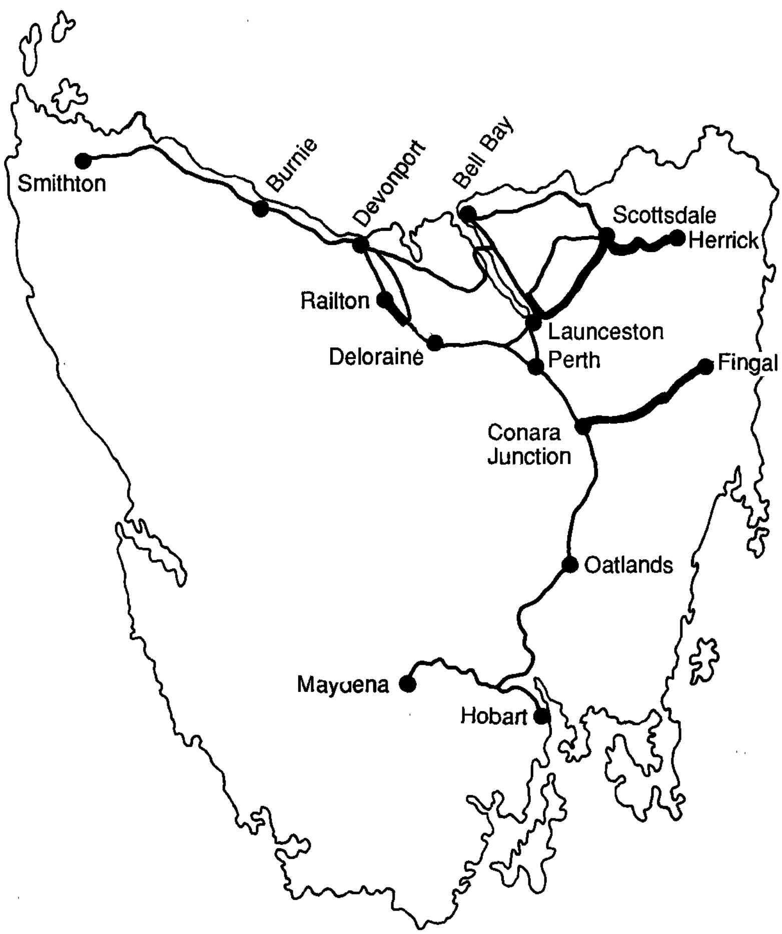
Note It is assumed in calculating the time intervals of passing trucks that this occurs over a ten-hour period on any one day.

Sources DRT (1991).

frequency of passing trucks as it would be perceived by the inhabitants of a town along the route is indicated by comparing the time interval in 1991 with that likely in 1995.

Table 5.10 shows the level and frequency of increased truck traffic passing through local communities. Those sections of road where the increase in traffic would be most noticeable are shown in figure 5.3. The frequency of heavy truck traffic on these sections means that whereas before closure only several trucks passed through a town in an hour, after closure trucks would pass every few minutes. For example the frequency of trucks passing through Fingal and Avoca would increase from one every 22 or 23 minutes to one every four minutes. Similarly on the road between Railton and Bass Highway, the frequency of truck traffic passing through Mersylea, Kimberley, Moltema and Elizabeth Town would increase from one every 40 minutes to one every nine minutes. The section of the East Tamar Highway which passes through the Launceston suburbs of Mayfield, Alanvale and Newham would have trucks increasing their frequency from one every 16 minutes to one every five minutes. The towns of Derby, Branxholm, Scottsdale, Springfield, Nunamara and Waverley on the Tasman highway would also experience a noticeable increase in truck traffic.

As shown in table 5.10 virtually all sections of the Tasmanian road system would experience increases in heavy truck traffic if the rail task was transferred to road. Most of the increases in traffic however would only result in marginal increases in frequency. For example the average frequency of trucks on the Bass Highway would increase from one truck every three minutes to one every two minutes and on the Midland Highway from a truck traffic interval of three to two minutes. However, the impact of increased truck traffic would be relatively large on the communities identified in this section since they experience very little heavy truck traffic in the presence of the railway.



Source BTCE.

Figure 5.3 Road segments most affected by the increase in heavy truck traffic resulting from the closure of Tasrail

Noise pollution

The relative increase in traffic noise energy is indicated by the AADTs for six-axle trucks shown in table 5.10. The increase in noise would be noticeable where there is a large increase in passing traffic. The increases in traffic volume and resultant noise energy, however, are not directly proportional to increases in noise level. The noise energy takes the form of sound waves carried by the air. For example, doubling the energy output increases noise level by only 3 decibels weighted by A, (dBA), where A is a weighting scale which identifies those sounds to which the human ear is most sensitive. Thus on a dBA scale a heavy truck at 7 metres distance travelling at 40 kilometres per hour, produces a noise level of 90 dBA, which is injurious to hearing with continuous exposure (Road Construction Authority 1985).

However, two trucks passing together would produce only a marginally greater noise level. When actual measurements are made of traffic noise levels, the fact that traffic is not passing continuously means the level would be less than 90 dBA.

An indication of the noise levels associated with heavy vehicles is provided by the Environmental Impact Statement for the Yass Traffic Relief Route in New South Wales (Department of Main Roads 1988). It found that the sound levels at positions in the Yass township were dominated by the noise of heavy vehicles. In 1987 the 18-hour ambient noise levels varied from 69 dBA at midday to 75 dBA in the late evening. The New South Wales Department of Main Roads guideline level is 68 dBA. The noise level for a busy general office is 60 dBA (Road Construction Authority 1985). The number of heavy vehicles contributing to these levels is indicated by the AADT for articulated trucks in 1987. Between 0600 and 2400 hours there were 1407 trucks and between 0600 and 1800 hours there were 669. The 24-hour total was 2122.

If a comparison is made with the truck AADTs for 1995 in table 5.10, the numbers passing through the Tasmanian local communities identified are considerably smaller than the 24-hour Yass figure of 2122. For example the highest number on the segment Mersey main road to Railton main road is 209. If a comparison is made with the highest heavy truck AADTs predicted after the closure of Tasrail, it must be made with segment 35, Hobart–Granton (1126) and segment 5, Port Sorell–Devonport (460). The latter road segment passes through Northdown and Wesley Vale. If it was assumed that these figures related to a ten-hour day then comparison could be made with the 0600 and 1800 figures for Yass where the vehicles passed through towns with two-lane roads. However, even in these cases, it is probable that the noise level would be below 68 dBA.

Other effects

Another effect upon the quality of life of local communities would be damage to buildings caused by vibration and coal or cement dust deposited on the roadside from passing trucks. The vibration caused by heavy vehicles can cause damage to buildings near highways (OECD 1983). Ground vibrations are propagated up to about 60 metres. They are dependent upon the gross weight of vehicles and their speed. The main source of vibration is considered to be random surface roughness.

There is also a cultural dimension to environmental damage, where the increase in truck traffic results in damage to historical buildings, especially those registered as part of the National Estate. The Midland Highway for example passes through Oatlands which is an historic town and through Franklin Village which contains a number of buildings on the National Estate Register (Australian Heritage Commission 1981). There would be numerous other buildings of historical interest along the routes travelled by heavy trucks. Some other historic towns such as Ross are bypassed by the Midland Highway. The section of the Midland Highway which passes through Oatlands was reconstructed as a National Highway in 1974 with a 12-metre pavement width (DRT 1990b). The closure of Tasrail would result in the number of heavy trucks passing through Oatlands doubling. The AADTs between Oatlands and Bridgewater would increase from 141 to 290. The effect of heavy truck traffic would vary from place to place depending upon the road width, the road structure and upon local perceptions of the traffic. The community response may be to build further road bypasses for historic towns.

Air pollution

Air pollution results from vehicle emissions and the effect on the atmosphere and the climate of the release of polluting gases. The social effect of air pollution is on public health and on the general quality of life.

The increase in traffic volumes shown in table 5.10 provides an indication of the increases in vehicle emissions as they would be felt in local communities. Thus where the frequency of passing traffic increases, the cumulative effect of emissions is more noticeable. However, the overall numbers of trucks passing through local communities is small by urban traffic standards.

An important effect is that of the increase in the emission of greenhouse gases. Table 5.11 compares the emission of carbon dioxide, which is a greenhouse gas, from Tasrail locomotives, with the emission of the diesel trucks which would

TABLE 5.11 GREENHOUSE EFFECT FROM TASRAIL CLOSURE IN 1993–94 BY MODE
(tonnes CO_2 per annum)

Mode	*Carbon dioxide*
Rail	–24 132
Road	+37 408
Net impact	+13 276

Note The entries under rail refer to tonnes of carbon dioxide per annum no longer emitted by rail.

Sources ABARE (1989b); BTCE (1990c).

replace rail freight operations if Tasrail were closed. The effect of these emissions is global rather than local on account of the contribution which additional carbon dioxide makes to the greenhouse effect worldwide. This section notes the addition which the actual physical amount of carbon dioxide emitted by the replacement trucks would make to the overall emission of carbon dioxide from domestic transport in Australia.

If Tasrail were closed in 1993–94 there would be an increase in the emission of carbon dioxide of 13 276 tonnes per annum. In 1987–88 67 million tonnes of carbon dioxide were emitted by domestic transport in Australia (BTCE 1990c). This means that the increase at the national level would be in the vicinity of 0.02 per cent.

SUMMARY

Approximately 50 per cent of Tasrail employees would have difficulty finding employment if Tasrail were closed. The re-employment prospects of Tasrail workers are probably worse now than at the time of the BTE study in 1987, particularly for labourers and related workers. Those employees located in the north of Tasmania would have greater difficulty finding employment. The impact on particular communities is not likely to be very great on account of the wide dispersion of many Tasrail jobs and also the concentrations in the major population centres. However, this is partly related to the high levels of unemployment which already exist.

Fatalities and injuries would increase as a result of additional heavy trucks on the roads. There would be no rail accidents but additional road accidents.

If trucks took over the rail task there would be an increase in traffic frequency, noise, vibration and pollution. These effects would be felt in many local communities throughout Tasmania. The effects would be most noticeable in those communities which have little heavy truck traffic at present. The level of carbon dioxide emissions would increase. While this would amount to half as much again as the present emissions from rail, the effect at the national level would be very small.

CHAPTER 6 CONCLUDING REMARKS

In this chapter the major findings of the analysis are summarised and discussed. The discussion of the results and their implications is undertaken in the context of the threats and opportunities that may affect the future of Tasrail. The various options open to the funding authority, the Federal government, and to AN management have been assessed both from financial and social cost-benefit viewpoints. The financial analysis was based on cash flows and showed how the government as shareholder and provider of subsidies, would be affected by possible decisions about Tasrail's future.

The social cost-benefit analysis aimed to estimate the sum total of all the costs and benefits to society regardless of to whom they accrue. The bottom-line result is the discounted net present value of the benefits minus costs of rail closure. The benefits to society of closing Tasrail include the value of its assets released to alternative uses and the savings in future operating costs and capital expenditures. Offsetting these benefits are the costs of transporting by road and sea the freight that would otherwise be carried by rail. Vehicle operating costs are the main consideration but there are also costs of damage to roads and increased road accidents caused by the additional trucks and costs incurred by users in switching transport modes.

Financial performance of Tasrail

There has been a consistent improvement in the financial performance of Tasrail since AN took over Tasmanian Government Railways. The previous Bureau report (BTE 1987a) described the improvement in Tasrail's financial performance over the 1977–78 to 1986–87 period as 'impressive'. This trend of improving performance has been maintained over the last three years. Over the thirteen-year period since 1977–78, there have been:

- an 87 per cent increase in the freight task;
- a 58 per cent reduction in staff levels coupled with rise in employee productivity, measured as output in NTK/employee, of more than 250 percent; and
- a reduction of the operating loss by about 37 per cent.

Despite these achievements, Tasrail operating losses have averaged more than $15 million a year in recent years. There is scope for further improvements in

Tasrail's performance in the future. However, this will depend on a number of uncertain factors including:

- continued growth in the freight task;
- availability of funds to undertake labour saving capital investments; and
- success in negotiations with unions to change work practices and bring about work force reductions of up to 50 per cent.

Major findings

This study has considered the financial, economic and social consequences of the options to close or to retain the Tasrail network. The evaluation of these options is based on the assumption that any Federal government decision will be taken in 1991–92. For the retention option, three scenarios were considered. The differences between the scenarios were in the rates of reduction in the Tasrail workforce and the rate at which capital is substituted for labour. The employment levels and associated capital expenditures were provided by AN. Assuming retention occurs, Tasrail has identified a business plan, referred to as 'restructuring', which it believes is likely to produce the best possible financial result. This involves halving the Tasrail work force by 1999. The other scenarios, involving less severe cuts in employee numbers were AN's draft Corporate Plan Number 14 (CP14) and a continuation of the recent trend in work force reduction of 5 per cent attrition per year, called the 'base case'.

The BTCE makes no assumption as to whether the employment targets, the investment proposals and other key data contained in these scenario descriptions are technically feasible or whether they are industrially realistic.

The major findings of the study can be summarised as follows:

- The Bureau estimates that Tasrail would break even (defined as covering operating costs) by 1993–94 under the restructure scenario, by 1994–95 under the CP14 scenario and by 1997–98 under the base case scenario.
- The Federal government as shareholder will lose money under both the retention and closure options but compared with the base case and CP14 retention scenarios, it would lose less by adopting the closure option. Only under the restructure scenario would the government be better off by retaining Tasrail.
- If a decision was taken to close Tasrail instead of retaining it, society would be worse off as indicated by the results under all three retention scenarios examined. Using a discount rate of 10 per cent, under the base case scenario, society would be worse off by $18 million compared to about $25 million under the CP14 scenario and $34 million under the restructure scenario. Higher (lower) national economic welfare losses can be expected if the discount rate is lower (higher).
- It needs to be emphasised that these results exclude a number of costs and benefits not quantified in the analysis. For example, the cost-benefit analysis does not place monetary values on any adverse environmental impacts due

to increased pollution and traffic volume as a result of closure. A relatively large increase is estimated for these effects in volume terms.

Comparing the results for the three scenarios, on both financial and social cost-benefit grounds, the case for retention is stronger the more Tasrail is able to improve its efficiency.

Sensitivity analysis

The findings outlined above are based on a set of assumptions about key parameters aimed at depicting a 'medium' or most probable situation. The sets of parameters about which there is the greatest uncertainty are (i) the freight task projections; (ii) the labour/capital adjustments required to improve the efficiency of Tasrail's operations; and (iii) the shadow prices of rail and road haulage labour.

A 10 per cent increase (decrease) in the freight task forecast is estimated to give a markedly better (worse) financial and social cost-benefit result. For example, under the 10 per cent discount rate, the $13.2 million net financial *gain* from closure compared with the base case retention scenario, is estimated to be reduced by about $17 million and to become a net *loss* of $3.5 million if the freight forecast is increased by 10 per cent. If demand is reduced by 10 per cent, however, it is estimated that the net financial gain from closure will increase to about $30 million. In the corresponding social cost-benefit analysis, the loss to society from closure (compared to the base case scenario) of $18 million is increased to $35 million when the freight forecasts are augmented by 10 per cent. The corresponding reduction in demand produces only a $0.8 million net loss to society from closure and the result in favour of retention is almost reversed.

The effects of varying the rate of labour reduction were examined through the analysis of the three retention scenarios. The shadow price of rail labour depends, in the main, on the proportion of redundant workers likely to remain unemployed. There is reason to believe that this proportion would be of the order of 50 per cent. Because about half of Tasrail's workers would not be engaged in economic activities if made redundant, their opportunity cost is about half of their financial cost to Tasrail. In the cost-benefit analysis, a shadow price adjustment factor of 50 per cent was applied to labour costs. At the 10 per cent discount rate, variation of this adjustment factor of rail to 40 and 60 per cent changes the net benefit of rail closure in the base case from minus $18 million to minus $29.5 million and minus $6.5 million respectively.

The shadow price of road haulage labour is a much more uncertain quantity. The primary determinants of this are the proportions of the additional truck drivers and associated labour that would be drawn from other productive employment in the economy and from the unemployed. A shadow price of 80 per cent of financial costs was selected as being reasonable. It was considered that the factor for road haulage should be higher than for rail because the mix of skills required is less industry specific. Altering the truck labour shadow price adjustment factor to 100 per cent and 60 per cent changes the final result for closure to minus $34 million and minus almost $2 million respectively.

Threats and opportunities

The demand projections provided by the consultants indicate that, in the medium to long term, rail freight demand in Tasmania is expected to remain at levels similar to those of the late 1980s. However, there are a number of possible circumstances that may lead to markedly better or worse outcomes. The opportunities, or positive circumstances that may increase Tasrail's future freight task include:

- potential quota increases in the woodchip industry including the construction of a new stand-alone wood pulp mill proposed by APPM and an expansion of a wood pulp facility proposed by Forest Resources;
- mooted ANM plant expansion plans;
- the continuation of Tioxide's operation in Tasmania after 1994–95; and
- any deterioration in the competitiveness of the road transport industry due to a sharp rise in fuel prices or the introduction of a road pricing system that fully recovers road damage costs caused by heavy trucks.

Among the negative circumstances, or threats, are:

- the possibility that Tioxide might relocate out of Tasmania;
- the loss of Cornwall's smaller coal customers to Merrywood; and
- any significant improvement in the competitiveness of the road transport industry. This could come about as a result of liberalisation of the Rail Protection Fee system by the Tasmanian government or through increases in vehicle weight limits (for example, B-doubles).

The number of possible positive developments and their anticipated impacts on Tasrail are greater than for the negative possibilities, which leads to the conclusion that the demand forecasts assumed in the study are on the conservative side. Any increase in the freight task above the forecast levels will substantially reduce the amounts of the subsidy and bring forward in time Tasrail's attainment of the break-even objective.

Implications

The continuing need to fund Tasrail deficits may make the closure option attractive to the Federal government. However, a continuing deficit does not, by itself, mean that Australia as a whole will be better off by closing the railway. This is particularly the case where financial costs fail to reflect fully the economic value of the resources employed by the railway, or the costs of undertaking the rail task by the alternative modes.

The economic analysis in this study indicates that, in all probability, Australia would be worse off if Tasrail was shut down. This result in favour of retention is strengthened if freight demand is increased or Tasrail is able to improve its efficiency through a program of restructuring.

As the sensitivity tests have shown it is possible to vary the assumptions so as to reverse the conclusion of the cost-benefit analysis that Tasrail should be retained. Nevertheless, the net gain to society from closure in the base case under the most probable set of assumptions is sufficiently negative to conclude that Australia would be better off if Tasrail was retained. Even where the sensitivity analysis produced small positive values for the net benefit of closure, the margins of error inherent in the study are such that the outcome could only be described as inconclusive. It could be interpreted as implying that there is little difference to the national economic welfare whether the railway is closed or retained.

All this ignores the broader social costs of closure which have not been evaluated in the cost-benefit analysis, for example, the costs imposed on redundant Tasrail employees unable to find work and on their families. The loss of jobs would be severest in regions already experiencing higher than average levels of unemployment, such as Launceston. Then there are the deleterious environmental consequences of noise, pollution, vibration and traffic volume caused by the increase in the number of heavy vehicles using the roads. These factors appear to add weight to the conclusion of the study in favour of retention of Tasrail.

The previous BTE study of the costs and benefits of closure of Tasrail completed in 1987 arrived at an inconclusive result. The results of the present study, based on social cost-benefit analysis, suggest that society would be better off by retaining Tasrail. This would be due in part to the continued improvement in Tasrail's operational and financial performance in the intervening few years and to the further improvements projected in all three retention scenarios. Two conditions are necessary if the benefits to Australia of retaining the railway are to be fully realised. Tasrail will need access to sufficient funds to undertake the capital investments identified in the consultants' report. Equally important will be the continued cooperation of unions in the introduction of new work practices necessary to implement the restructuring program.

APPENDIX I CONSULTANTS' REPORT

TASRAIL:

A Financial Analysis of Its Past Performance and Future Prospects

Prepared for

The Department of Transport & Communications Economics

Prepared by

FAY, RICHWHITE AUSTRALIA LIMITED

DISCLAIMER

In preparing this report Fay, Richwhite Australia Limited ('Fay, Richwhite') has been reliant on information supplied by Tasrail and detailed in the sources of information set out in section 2 of this report. We have not verified this information and whilst we believe it to be given in good faith do not warrant its accuracy.

This report contains forecasts of revenue prepared by Fay, Richwhite. These forecasts are based on the findings contained in Fay, Richwhite's 'Final Report on Twenty Year Revenue Forecasts.'

In addition to forecasts of revenue our report contains forecasts of expected expenditure levels. These forecasts are based on strategic plans developed by Tasrail and as such are largely based on judgement and individual opinion upon numerous factors which may influence the various components of these forecasts. Events may not happen in the future as predicted by Tasrail. Accordingly we do not express an opinion as to whether actual performance will approximate our forecasts nor can we confirm, underwrite or guarantee the achievability of these forecasts.

Our report has been prepared solely for the purpose of assisting the BTCE in its economic analysis of the costs and benefits of the retention of Tasrail and to advise Australian National and the Department of Transport and Communications on aspects of future policy in respect of Tasrail. Accordingly no part of this report should be transmitted in any way to anyone who is not an employee of the BTCE, the Department of Transport and Communications, or the Managing Director of Australian National or other authorised Australian National employees without prior written permission of Fay, Richwhite Australia Limited.

CONTENTS

1. INTRODUCTION

AN Tasrail ('Tasrail') is a freight only operation of the Australian National Railways Commission ('AN'). The Bureau of Transport and Communications Economics ('BTCE') has been directed by the Federal Government to undertake an economic analysis of the costs and benefits of the retention of Tasrail ('The BTCE Study'). The Federal Department of Transport and Communications and AN have requested Fay, Richwhite Australia Limited ('Fay, Richwhite') to provide certain inputs to the BTCE Study. In this regard Fay, Richwhite's Terms of Reference, which are included in this report as Appendix B, may be summarised as follows.

(a) to review historical financial and operating performance;

(b) to provide detailed revenue forecasts for the 20 years ending 2010;

(c) to determine if a breakeven result is achievable and to identify strategic options available to Tasrail in attempting to achieve breakeven;

(d) to advise on the sustainable capital structure for Tasrail given the most likely strategy; and

(e) to define the investment program required to support Tasrail's operations over the forecast period.

Detailed revenue forecasts for the twenty years ending 2010, Task (b), were provided to the BTCE in 'Interim Report on Twenty Year Revenue Forecasts' dated 26 February 1991 ('The Interim Forecast'). The Interim Forecast has been amended and updated and separately issued as 'Final Report on Twenty Year Revenue Forecasts' ('Final Revenue Forecast').

2. SOURCES OF INFORMATION

In compiling this report Fay, Richwhite has been provided with the following sources of information:

- Tasrail Corporate Plans 1986 to 1990 comprising plans numbered 1 through 4 and 13.
- AN Annual Report for the year ended 30 June 1990.
- Tasrail statements of profit and loss for the 6 years ended 30 June 1990.
- Supporting working papers to the statements of profit and loss for the 6 years ended 30 June 1990.
- Budgeted results for the year ended 30 June 1991 and actual results to 2 February 1991 (period 8 of the 13 period 1991 reporting period).
- Tasrail preferred strategic plan for the 20 years ending 2010 including employee levels and expected steady state costs by major cost centre. These major cost centres are defined on the basis of the tasks their employees perform; maintenance, operations, etc. These cost centres are hereafter referred to as branches.
- Railcost information for the base year ended 30 June 1990. This information includes revenue, task, resource and expenditure data by product.
- AN Tasrail, 'Economic Evaluation for Permanent Way Upgrading', October 1990.
- AN Tasrail 'Sleeper Requirements and the Economics of Alternative Sleeper Types for AN Tasrail', 16 July 1990.
- Federal Bureau of Transport Economics Information Paper 24, 'Tasmanian Industry Outlook Implications for Tasrail', December 1987 ('BTCE Paper 24').
- Federal Bureau of Transport Economics Report 62, 'The Tasmanian Rail System', December 1987 ('BTCE Report 62').

3. METHODOLOGY

The BTCE's Terms of Reference require a comprehensive study of the costs and benefits of the retention of Tasrail. An important factor in this study is the expected future financial performance of Tasrail.

The primary purpose of this current report is to examine the expected future financial performance and as a result of this examination determine the likely shareholder funding that will be required to support Tasrail's future operation. The report considers forecasts of Tasrail's expected financial performance for the 20 years to 30 June 2010.

The Final Revenue Forecast notes the difficulties of long term forecasting especially of revenues for an operation such as Tasrail which is subject to the demand levels of a few large customers. In the absence of any discernable trends, the Final Revenue Forecast has assumed steady state levels of task and real revenue for the fourteen year period from 1996 to 2010.

In contrast, the analysis of Tasrail's operating expenditure does not assume a steady level of real expenditure beyond 1996. Tasrail has commenced a long term permanent way rehabilitation plan which they consider is necessary to allow the current level and quality of operations to continue in the longer term. This plan, together with other permanent way rehabilitation alternatives discussed below, envisages varying annual levels of civil maintenance expenditure until 2006 after which a steady annual expenditure is predicted.

A key measure of Tasrail's future financial performance is the probability that it will achieve breakeven. We have examined Tasrail's ability to breakeven with reference to the Final Revenue Forecast and Tasrail's own preferred strategic plan. We consider that the Final Revenue Forecast represents a conservative and achievable level of future revenues. The preferred strategic plan sets out cost reductions Tasrail consider can be achieved over the forecast period. We have reviewed the preferred strategic plan and assessed its achievability.

In defining breakeven we have adopted a before interest, cash based methodology. In this way we have attempted to remove distortions created by accounting policies and gearing levels.

In accordance with the Terms of Reference we have investigated alternative options for Tasrail. These options are discussed in Section 6 and consider the implications of changes to forecast revenues, product base and permanent way expenditure. In addition an alternative strategic plan with a lower rate of decrease in employee levels is also considered.

Section 4 contains a historical analysis of Tasrail's financial and operating performance. As well as providing a 'report card' on Tasrail's recent operations this section highlights certain trends that are useful in considering forecasts of future performance. The Final Revenue Forecast includes a product by product analysis of historical revenues and accordingly Section 4 contains only a brief summary of historical revenue.

In both the historical analysis and the review of expected future performance we have relied on AN's cost allocation model, Railcost, which allocates costs over individual traffics and allows performance analysis by product. In the review of expected future performance Railcost has been used in order to assess strategic options available to Tasrail on a product by product basis.

The content of the report is summarised below.

Section 4: Historical analysis of Tasrail's financial and operating performance.

Section 5: Forecast profitability and achievability of breakeven.

Section 6: Review of strategic options.

Section 7: Recommended capital structure.

4. REVIEW OF HISTORICAL PERFORMANCE

Part (a) of the Terms of Reference requires an examination of the past financial and operating performance of Tasrail including a comparison of this with AN's forecasts and plans. The purpose is to identify any trends in this past performance.

The review of historical performance examines the 6 years ended 30 June 1990. Prior to the year ended 30 June 1985, changes in accounting systems prevented the collection of suitable financial data.

In analysing Tasrail's historical performance the emphasis has been on cashflows and profit from operations. We have attempted to eliminate distortions created by changes in accounting policy and by increasing levels of gearing. Distortions created by inflation have been eliminated by adjusting all reported actuals to 1990 dollar equivalents using annual average CPI figures for each of the 5 years ended 30 June 1990. All forecasts are also in real 1990 dollars.

Tasrail's performance over the 6 years to 30 June 1990 has been compared to forecasts included in AN's corporate plans. In considering whether Tasrail has achieved these forecasts we have focused specifically on corporate plans 1 and 2 dated 1986 and 1987 respectively.

Section 4.1 contains the statements of profit and loss and capital expenditure for Tasrail for the six years ended 30 June 1990. The components of these statements are analysed individually as follows:

Section 4.2	Revenue
Section 4.3	Expenditure
Section 4.4	Abnormal and extraordinary items
Section 4.5	Capital expenditure
Section 4.6	Commonwealth Supplement

In section 4.3 adjustments have been made to total expenditure to remove the impact of accounting policy changes, changing gearing levels and expenses that were not consistently reported over the review period. This adjusted expenditure has been defined as operating expenditure. Operating expenditure should not be taken as a measure of future maintainable expenditure, some eliminated items are recurring but were not incurred throughout the review period. The purpose of the operating expenditure calculation is to identify trends in expenditure over the 6 years to 30 June 1990. These trends are useful in considering relationships between costs and employee levels as well as in considering performance against previous forecasts.

Section 4.7 analyses expenditure at a branch level whilst section 4.8 utilises Railcost to analyse the contribution margin of each product group. Section 4.9 considers certain non financial indicators of Tasrail's performance.

4.1 Profit and Loss for the 6 Years to 30 June 1990

Table 4.1 below summarises the profit and loss statements for Tasrail for the 6 years to 30 June 1990. These statements of profit and loss have been extracted from Tasrail's period 13 profit and loss reports for each year. In addition, we have set out capital expenditure information provided by Tasrail for the 6 years to 30 June 1990.

TABLE 4.1 TASRAIL PROFIT AND LOSS AND CAPITAL EXPENDITURE FOR THE 6 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
Revenue	24 871	25 091	27 423	29 899	31 262	28 813
Expenditure	53 978	51 526	47 085	44 512	47 140	45 337
Operating profit/(loss)	(29 107)	(26 435)	(19 662)	(14 613)	(15 878)	(16 524)
Abnormal and extraordinary items	–	–	(434)	(2 205)	(1 529)	(397)
Profit/(loss) after abnormals and extraords	(29 107)	(26 435)	(20 096)	(16 818)	(17 407)	(16 921)
Other items						
Commonwealth Government supplement	–	25 007	22 133	18 773	11 772	16 590
Capital expenditure	5 778	8 354	9 195	18 266	12 382	8 050

Tasrail's operating loss improved from $29.1 million in the year ended 30 June 1985 to $16.5 million in the year ended 30 June 1990. The minimum loss of $14.6 million was achieved in the year ended 30 June 1988. Sections 4.2 and 4.3 below consider the components of the operating loss.

4.2 Revenue

4.2.1 Freight Revenue

Historical freight revenue for Tasrail is analysed on a product by product basis in the Final Revenue Forecast in Appendix A.

The summarised revenues by product for the 5 years ended 30 June 1990 are presented in table 4.2 which also sets out total tonnes carried and total task expressed in terms of net tonne kilometres (NTK).

TABLE 4.2 REVENUE AND TASK FOR THE 5 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June	*1986*	*1987*	*1988*	*1989*	*1990*
Revenue ($'000)					
Woodchip	7 890	9 981	9 975	9 918	44
Coal	5 282	5 830	6 023	6 031	5 963
Pulp logs	2 311	1 997	3 548	4 097	3 364
Containers	3 095	2 913	3 122	3 062	2 860
Cement	2 042	1 784	1 829	2 052	1 775
Fertiliser	1 401	1 227	1 362	1 414	1 696
Acid	1 221	1 449	1 779	1 725	1 457
Other	1 450	1 475	1 558	1 328	1 373
Total Revenues	24 692	26 656	29 196	29 627	27 232
Total tonnes (000)	2 185	2 215	2 359	2 294	2 0 26
Total NTK (000)	401 948	428 872	455 436	459 354	412 757
Average rate/ thousand NTK ($)	61.43	62.15	64.11	64.49	65.98

4.2.2 Non Operating Revenue

Non operating revenue increased 28 per cent per annum in the 6 years to 30 June 1990 with the largest increase occurring in the year ended 30 June 1989. A review of the accounts for the 6 years ended 30 June 1990 indicates relatively constant increases in revenue from rental property and rolling stock hire, while there have been substantial increases in profit on disposals and in the category of miscellaneous revenue.

TABLE 4.3 NON OPERATING REVENUE FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Rental from properties	202	130	242	251	261	284
Rolling stock hire	0	4	50	21	81	33
Profit on asset disposal	68	170	429	360	525	705
Miscellaneous	184	95	46	71	768	559
	454	399	767	703	1 635	1 581

The large miscellaneous non operating revenue for the year ended 30 June 1989 included a settlement of $650,000 received for a collision, and for the year ended 30 June 1990 it represents prior year fuel rebates of $359,000 and railway relocation incentives of $90,000.

4.3 Total Expenditure

Table 4.4 sets out total expenditure in 1990 dollars for the 6 years ended 30 June 1990.

TABLE 4.4 TOTAL EXPENDITURE THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Expenditure ($m)	54.0	51.5	47.0	44.5	47.1	45.3
Annual growth (%)		(4.5)	(8.7)	(5.3)	5.8	(3.8)
Cumulative average rate (%)						(3.4)

This table shows that in real terms expenditure has fallen at an average annual rate of 3.4 per cent. Only in the year ended 30 June 1989 was a real increase recorded. In section 4.3.1 total expenditure has been adjusted to calculate operating expenditure. As was discussed previously operating expenditure is a measure derived for trend measurement and should not be considered as an approximation of maintainable expenditure.

4.3.1 Operating Expenditure

Total expenditure has been adjusted to calculate operating expenditure in Table 4.5. The adjustments are discussed below.

TABLE 4.5 OPERATING EXPENDITURE FOR THE 6 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Total expenditure	54.0	51.5	47.0	44.5	47.1	45.3
Less:						
Depreciation	2.2	2.2	2.1	2.6	5.0	5.9
Interest	4.9	5.1	5.3	5.4	5.3	6.0
Mainland overhead	–	–	–	–	2.2	1.8
Payroll tax	–	–	–	–	1.6	1.5
Capitalised overhead	(0.9)	(0.4)	(1.2)	(1.3)	(3.1)	(2.8)
Other	–	–	–	–	–	(1.0)
Total adjustments	6.2	6.9	6.2	6.7	11.0	11.4
Operating expenditure	47.8	44.6	40.8	37.8	36.1	33.
Annual growth rate (%)		(6.5)	(8.5)	(7.4)	(4.5)	(6.1)
Average growth rate						(6.6)

Depreciation

Depreciation is a method of allocating the cost of a fixed asset over the years in which it is expected that the asset will be used. Tasrail calculate depreciation on a straight line basis currently using useful life limits provided by AN. Currently track is depreciated on a useful life of 20 years, locomotives 22 years and wagons 25 years.

During the year ended 30 June 1988 depreciation expense in 1990 dollars totalled $2.6 million whilst for the year ended 30 June 1989 it was $5.0 million, an increase of 92 per cent. In the year ended 30 June 1990 depreciation expense was $5.9 million.

The large increases in depreciation expense reflect a change in accounting policy from 1 July 1987, when the useful life of track was reduced from 90 years to 20 years, and the increased value of Tasrail's fixed assets as a result of significant capital expenditure in the three years to 30 June 1990. Section 4.4 indicates that the large increase in depreciation was deferred into the year ended 30 June 1989 by recognising the increase as an abnormal item in 30 June 1988.

Table 4.5 eliminates depreciation expense from the six year historical expenditure data in order to focus on trends in operating expenditure.

Interest

Interest expense in real terms increased at an average rate of 4 per cent per annum in the 5 years to 30 June 1990 primarily reflecting a steady worsening of Tasrail's gearing levels. As at 30 June 1990 Tasrail's borrowings totalled $44.9 million with interest expense for the year ended 30 June 1990 equalling $5.9 million.

The methodology in this report, as set out in Section 3, is to consider Tasrail's historical and expected future financial performance on a before interest basis. Given that Tasrail has required a financial injection each year and there is no record of profit, the notion of debt versus equity capital is not at issue. If breakeven is the best outcome, the debt holders can consider themselves effectively shareholders. The optimal capital structure is only an issue if there is an expected profit. This is discussed in more detail in section 7.

Mainland Overhead

Mainland overhead represents a management charge from AN to Tasrail for head office expenses. These include an allocation of the time of AN's senior executives as well as corporate planning, accounting, treasury, payroll and information services. For the year ended 30 June 1990 this charge totalled $1.8 million.

This charge was first introduced for the year ended 30 June 1989 presumably in response to alterations in government funding of AN's operations. We understand that prior to this AN did not charge Tasrail for the abovementioned services. We have not investigated the validity of this charge and as such are unable to comment as to whether the current levels of mainland overhead reflect a fair value of the head office services provided by AN. We accept that Tasrail does rely on AN to provide certain services which result in AN incurring additional costs. In the analysis below we have eliminated mainland overhead to allow a consistent analysis of expenditure trends in the 6 years to 30 June 1990.

Payroll Tax

Payroll tax was first charged to Tasrail in the year ended 30 June 1989 and is currently approximately $1.5 million per annum. We have eliminated payroll tax from our analysis set out below for consistency purposes.

Capitalised Overhead

The annual capital expenditures presented earlier in table 4.1 consist of costs incurred by Tasrail on work undertaken to improve the permanent way and to increase the value of the locomotives and rolling stock. These costs are not treated as operating expenses for profit and loss purposes and are capitalised. The amounts are depreciated over the useful lives of the relevant assets. A non trivial proportion of these costs are for labour and reflect the designation of these employee services as being to improve the value of the underlying assets and not as part of the operational activities.

The impact on the financial statements is to amortise these costs over time rather than charge them to profit as incurred.

In addition, Tasrail capitalises certain overhead expenses on the basis that the direct costs charged to items classified as capital should also include a proportion of total overhead. We set out below branch overhead debited to capital for our review period.

TABLE 4.6 CAPITALISED OVERHEAD FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
($'000)						
Civil	432	46	218	176	1 999	1 700
Mechanical	136	46	727	774	764	325
Finance	–	–	–	3	–	694
Supply	286	279	295	326	324	134
Signals & Communications	24	10	–	–	–	–
Total	878	381	1 240	1 279	3 087	2 853

It can be seen from the above table that overhead allocated from expense to capital increased dramatically in the year ended 30 June 1989. We understand that this was the result of a change in AN's group accounting policy. Information provided by Railcost indicates that if overhead allocation were performed on the basis of direct expenditure then overhead was over capitalised by approximately $800,000 in the year ended 30 June 1990.

To facilitate the comparative analysis, capitalised overhead has been added back to provide a consistent definition of operating expenditure.

4.3.2 Employee Levels

We have reviewed Tasrail's expenditure reconciliations which indicate that labour costs (excluding capitalised labour) comprised $23.8 million for the year ended 30 June 1990, 53 per cent of total expenditure for that year. Adjusting expenditure to exclude depreciation, interest and mainland overhead result in labour costs representing 75 per cent of operating costs.

Table 4.7 sets out employee levels by major branch as at 30 June for the six years to 30 June 1990. Note that these numbers include all employees and comprise those working on capital as well as operational activities.

TABLE 4.7 EMPLOYEE LEVELS BY BRANCH FOR THE 6 YEARS TO 30 JUNE 1990

As at 30 June	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Civil	253	234	223	210	199	187
Mechanical (including signals)	294	260	253	248	244	237
Operations	486	425	389	368	335	324
Other	49	48	53	49	47	42
	1 082	967	918	875	825	790
Growth rate		(10.6)	(5.1)	(4.7)	(5.7)	(4.2)
Average growth						(6.1)

Total Labour Costs

We have calculated the average annual wage per employee for the 6 years ended 30 June 1990 based on total labour cost data provided by Tasrail. Total employees for each year has been calculated by averaging the year end data provided in Table 4.7. Total employees as at 30 June 1984 were 1,137.

TABLE 4.8 AVERAGE ANNUAL WAGE FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
Total labour costs ($'000)	33 207	31 425	28 686	26 891	27 097	23 814
Average employees	1 109.5	1 024.5	942.5	896.5	850.0	807.5
Average wage ($'000)	29.9	30.7	30.4	30.1	31.9	29.5

The use of averaging in calculating employee numbers may distort yearly calculations as employees may not be reduced evenly throughout the year. Furthermore, changes in staff mix may also impact average wage levels. Allowing for these possibilities it would appear that total wage increases have tended to approximate CPI.

4.3.3 Activity Levels

A standard measure of the activity level of a railway operation is net tonne kilometres (NTK). NTK are calculated by multiplying for each traffic tonnes carried by kilometres travelled and then adding the NTK for each traffic to give a total. In general, revenues generated by the railway operation will be closely correlated with total NTK.

We have compared operating expenditure results to total NTK for the 6 years ended 30 June 1990 in Table 4.9 below.

TABLE 4.9 OPERATING EXPENDITURE AND TASK FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Operating expenditure ($M)	47.8	44.6	40.8	37.8	36.1	33.9
Growth rate		(6.5)	(8.5)	(7.4)	(4.5)	(6.1)
NTK (m)	403	402	429	455	459	413
Growth rate		(0.25)	6.7	6.1	0.9	(10.0)

Our analysis indicates that decreases in operating expenditure have been relatively independent of activity. During 1987 and 1988 activity increased rapidly at the same time as expenditure was decreasing. A large fall in activity in the 1990 year was not reflected in expenditure levels with the decrease for the 1990 year being below the 5 year average of 6.6 per cent.

4.3.4 Employee Efficiency

Using the data set out in tables 4.7 and 4.9 we have calculated NTK per employee for the six years ended 30 June 1990.

TABLE 4.10 NTK PER EMPLOYEE FOR THE 6 YEARS TO 30 JUNE 1990

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
NTK/employee ('000)	372	416	467	520	556	522
Growth rate (%)		11.8	12.2	11.3	6.9	(6.1)
Average growth rate (%)						7.0

Table 4.10 indicates that employee level reductions achieved by Tasrail have been largely independent of freight task. The large productivity increase in the year to 30 June 1987, for example, was the result of a 6.7 per cent increase in NTK and a 5.1 per cent decrease in employee numbers. In the year ended 30 June 1990 employees fell 4.2 per cent but this was more than offset by a 10 per cent reduction in task.

4.3.5 Conclusion

We have adjusted total expenditure to remove distortions created by accounting policies, gearing and new charges. In this way we have been able to analyse trends in operating expenditure.

This analysis indicates that Tasrail has achieved an average 6.6 per cent per annum reduction in operating expenditure in the 5 years to 30 June 1990. This reduction is in line with reductions in employee levels achieved by Tasrail which has seen the number of employees reduced at an average rate of 6.1 per cent per annum in the 5 years to 30 June 1990. During this period total wages have increased approximately in line with CPI.

Comparisons between operating expenditure and task expressed in NTK, indicate that reductions in expenditure have occurred independently of movements in Tasrail's task.

4.4 Abnormal and Extraordinary Items

We have set out below abnormal and extraordinary items for the 4 years ended 30 June 1990. Prior to the year ended 30 June 1987 these items were not split between the mainland and Tasmania. The reference to abnormal items is somewhat misleading as for Tasrail's own reporting purposes both abnormal and extraordinary items are not included in operating profit.

TABLE 4.11 ABNORMAL AND EXTRAORDINARY ITEMS FOR THE 4 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June ($'000)	*1987*	*1988*	*1989*	*1990*
Redundancy gratuities		(211)	(817)	(369)
Prior year adjustments				359
Payroll tax penalty				(227)
Loco crew adjustments				(189)
Workers comp adjustments			(1 620)	
Capitalisation of insurance spares			687	
Additional depreciation — perway		(1 846)		
Superannuation rate increase		(148)		
Other	(434)			30
	(434)	(2 205)	(1 750)	(396)
Extraordinary item				
Disposal of land & buildings	–	–	221	–
Total abnormal and extraordinary	(434)	(2 205)	(1 529)	(396)

4.5 Capital Expenditure

We have set out below total capital expenditure by branch for the 6 years to 30 June 1990. These figures include capitalised overhead and labour costs as discussed above.

TABLE 4.12 CAPITAL EXPENDITURE FOR THE 6 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
Civil	5 417	5 077	6 631	5 898	7 523	6 928
Mechanical	323	3 263	2 504	12 366	4 108	836
Signals	38	14	60	1	352	201
Other	–	–	–	1	489	85
Total	5 778	8 354	9 195	18 266	12 382	8 050

Civil

During the 6 years to 30 June 1990 civil expenditure classified as capital averaged $6.25 million per annum. This expenditure reflects Tasrail's ongoing commitment to track upgrade. Section 5.2.1 analyses the forecast expenditure required to maintain the track in an acceptable condition over the forecast period.

Mechanical

Capital expenditure for the year ended 30 June 1987 includes the $1.8 million ($2.45 million in 1990 dollars) purchase cost of 16 locomotives from Queensland Railways. For the year ended 30 June 1988 capital expenditure includes the purchase price of 45 locomotives also from Queensland Railways for $4.32 million ($5.36 million in 1990 dollars). In addition capital expenditure for the year ended 30 June 1988 includes costs involved with commissioning the locomotives purchased totalling $1.2 million ($1.5 million in 1990 dollars).

During the 5 years to 30 June 1990 Tasrail converted 148 wagons to air brakes and commissioned 152 second hand wagons from the mainland.

4.6 Commonwealth Supplement

Following from the recommendations in BTCE Report 62 the Minister for Transport and Communications announced on 24 May 1988 that the Federal Government would continue to support Tasrail's operations until 30 June 1993.

This support is provided under a Community Service Obligation contract (CSO) and is the second such contract; the first expired on 30 June 1988. We have set out below Commonwealth Supplements provided to Tasrail for the 6 years to 30 June 1990, as calculated from AN's 1990 annual report.

TABLE 4.13 COMMONWEALTH SUPPLEMENT FOR THE 6 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

($'000)	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Commonwealth supplement	–	25 007	22 133	18 773	11 772	16 590
Average annual growth						(9.8)

Under the current CSO contract the supplement is negotiated between AN and the Federal Government each year. We have been informed that the supplement for the year ending 30 June 1991 will be $18.1 million (equivalent to $17.1 million in 1990 dollars based on a 6 per cent inflation rate).

4.7 Operating Expenditure by Branch

Tasrail's statements of profit and loss provide expenditure data by major category which in turn is reported by branch. We have utilised this data to consider operating expenditure on a more detailed basis. Note that branch operating expenditure includes capitalised overhead but not the capitalised direct labour. As discussed earlier this avoids the distortion from a change in accounting policy.

TABLE 4.14 OPERATING EXPENDITURE BY BRANCH FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
Operation of services	22 758	21 136	20 390	19 586	19 323	18 397
Maintenance of services	22 058	20 491	17 858	15 652	15 809	15 088
Administration	2 850	2 810	2 478	2 381	2 328	2 180
Insurance	159	151	187	206	312	(96)
Total	47 825	44 588	40 913	37 825	37 772	35 569

4.7.1 Operation of Services

Table 4.15 below sets out the components of the operation of services expenditure category.

TABLE 4.15 OPERATING OF SERVICES EXPENDITURE FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

$'000	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Growth %*
Traffic operations	17 546	16 511	15 757	14 876	15 207	14 348	(3.9)
Locomotive running	5 212	4 625	4 633	4 710	4 116	4 049	(4.9)
Total operation of services	22 758	21 136	20 390	19 586	19 323	18 397	(4.2)

Traffic Operations

Traffic operations is the largest branch cost centre for Tasrail and incorporates expenses associated with linehaul, terminals and marshalling. Table 4.7 above shows that in the 6 years to 30 June 1990 employee levels in the operations branch were reduced from 486 to 324, an average annual decrease of 7.7 per cent. Traffic operations is a primarily labour based category. Discussions with Tasrail management indicated that a number of inefficient work practices continue to exist and that if these can be resolved further reductions in labour levels, and therefore costs, can be achieved. Tasrail's plans to achieve this are further discussed in section 5.2.4.

Locomotive Running

Locomotive running costs totally comprise fuel purchases. During the 6 years to 30 June 1990 fuel costs fell at an average rate of 4.9 per cent per annum. In the same period average fuel prices paid by Tasrail increased at an average rate of 3.8 per cent per annum whilst activity levels, expressed as a function of NTK, remained virtually constant.

Section 4.9.3 shows that during the 6 years to 30 June 1990 Tasrail was able to increase the net tonnes carried per train from 344 to 461. This enabled a constant level of NTK to be carried by less trains. This is the most likely cause of the above mentioned fuel efficiencies.

4.7.2 Maintenance of Services

Table 4.16 below sets out the branches comprising the maintenance of services category.

TABLE 4.16 MAINTENANCE OF SERVICES EXPENDITURE FOR THE 6 YEARS TO 30 JUNE 1990 (IN 1990 DOLLARS)

	1985	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Growth %*
Civil engineering	8 873	6 790	6 912	5 347	5 049	4 688	(12.0)
Mechanical engineering	11 541	12 332	9 704	8 972	9 311	8 808	(5.3)
Signals	1 644	1 369	1 242	1 333	1 449	1 592	(0.6)
Total maintenance of services	22 058	20 491	17 858	15 652	15 809	15 088	(7.3)

Civil Engineering

This expense account comprises costs associated with track maintenance. Civil engineering costs fell in real terms from $8.9 million to $4.7 million in the 6 years to 30 June 1990, an average decrease of 12.0 per cent per year. This decrease is primarily explained by the capital expenditure on the track in recent years. Since 1978 Tasrail have spent approximately $56 million on track capital works, $36 million since 1985.

In October 1990 Tasrail conducted a study of required capital expenditure. This study concluded that further employee cost reductions could be achieved and maintained if this capital upgrade process were to continue. This study is further discussed in section 5.2.1.

Mechanical Engineering

Mechanical engineering expenses relate primarily to maintenance and repair of locomotives and rolling stock. These expenses decreased at an average rate of 5.3% per annum in real terms for the 6 years to 30 June 1990.

Mechanical engineering expenses tend to vary with fleet size, fleet age and the efficiency of work practices within the repair shops. We have set out below active locomotive and wagon numbers for the 6 years to 30 June 1990.

TABLE 4.17 TASRAIL FLEET FOR THE 6 YEARS ENDED 30 JUNE 1990

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
Locomotives	55	49	47	50	68	52
Wagons	1 277	1 191	1 025	954	847	733

As is discussed in section 4.5 the increase in locomotives in the year ended 30 June 1989 was the result of the purchase of second hand locomotives from the mainland and as such these locomotives did not greatly decrease Tasrail's average locomotive age. They have however provided Tasrail with surplus locomotives, and approximately eleven of Tasrail's locomotives are in storage. This surplus fleet allows Tasrail to extend locomotive lives and defer major maintenance. Accordingly, despite increases in the locomotive fleet, locomotive costs have been contained.

Wagon maintenance is considerably cheaper than locomotive maintenance. Railcost data for the 1990 year indicates maintenance costs per wagon are 5-6 per cent of maintenance costs per locomotive. Tasrail have informed us that wagon maintenance costs have not reduced in line with the large decreases in the wagon fleet. It may be expected that as a result of the decrease in derailments discussed in section 4.9.1. maintenance costs per wagon would have decreased. However, inability to implement workforce reductions at the same pace as wagon disposals has resulted in surplus costs.

Our review of Tasrail's expenditure reconciliation for the year ended 30 June 1990 indicated that labour comprised 65 per cent of mechanical engineering expenses. Accordingly, Tasrail's ability to reduce the mechanical branch costs is closely linked to workshop efficiencies. Tasrail have informed us that considerable inefficiencies still exist within the repair workshops. Section 5.2.2 discusses Tasrail's strategy to reduce these inefficiencies and thus considerably reduce maintenance costs per fleet unit.

Signals

Signal maintenance includes repair costs of both signals and other communications systems.

Signal maintenance expenditure decreased 0.6 per cent per annum over the 6 years to 30 June 1990 reflecting the relatively constant nature of this expense.

4.7.3 Administration

This category contains overhead branches such as supply, finance and general administration. In the 6 years to 30 June 1990 expenditure in this category decreased at an average rate of 5.2 per cent per annum. This primarily reflects a reduction in employee numbers from 49 in the year ended 30 June 1985 to 42 in the year ended 30 June 1990.

4.7.4 Insurance

This expenditure category relates to insurance against general and freight claims. The negative result for the year ended 30 June 1990 of $96,000 reflects decreases in the provision following a review which determined that Tasrail had overprovided in prior years. Discussions with Tasrail indicated a future level of $50,000 per annum should be sufficient to cover expected payouts on an annualised basis.

4.8 Contribution Margin Analysis

An important aspect in the review of Tasrail's operating performance is an assessment of the profitability of Tasrail's various traffics. We have utilised cost allocation data provided by Railcost in order to calculate contribution margins for selected traffics.

4.8.1 Railcost

AN use a system known as RAILCOST in order to allocate costs over various traffics and product groups. Railcost provides profitability estimates on a disaggregated basis to a product line level. A product line being defined as the carriage of one product such as woodchip logs between a pair of specified source and destination points.

Railcost achieves this cost allocation by the use of a unit cost process. Railcost divides each cost by a relevant resource to give a cost per resource unit. For example, for train crew a cost per train hour. Having achieved this for a particular product line or group the applicable resources can be utilised to determine the avoidable cost for that product line or group. This is done by calculating a modified costing with the product line resources excluded. This is then compared to the base case and the difference is considered to be the avoidable cost for that product line.

These costs are set out in groupings hereafter referred to as Railcost categories. Railcost classifies these Railcost categories as either linehaul, terminal, fixed corridor or overhead expenses. AN employees when considering the ability of one particular traffic to cover its costs will generally add linehaul and terminal costs together as an approximation of marginal costs.

We have set out below as table 4.18 a summary of the Railcost categories and their classification within the Railcost system. Also set out is our classification of each category as either variable or fixed.

TABLE 4.18 CLASSIFICATION OF COSTS BY RAILCOST CATEGORY

Railcost category	*Railcost classification*	*Linehaul and terminal costs*		*Variable costs direct %*	*Unit cost multiplied by resource*
		Variable	*Fixed*		
Train crew	L	X		100	Train hour
Train fuel	L	X		100	'000 GTK
Locomotive repair	L	X		50	Loc. km & Loco hr
Locomotive capital	L	X		50	Loco hour
Cleaning and fuel	L	50%	50%	100	Loco hour
Wagon maintenance	L	X		50	'000 wagon km
Wagon capital	L	X		50	'000 wagon km
Track expensed	L31%,F69%	40%	60%	50	'000 GTK
Track capital	L	40%	60%		'000 GTK
Cap adjustment factor	L	N/A	N/A		'000 GTK
Train examination	T	X		75	'000 wagon km
Marshalling	T	75%	25%	75	By location
Terminal costs	T	75%	25%	75	By location
Accounting	T		X		'000 GTK
Signal maintenance	C		X		Train km
Safeworking staff	C		X		Train km
Train control	C		X		Train km
Communications	C		X		Train km
Departmental	B		X		'000 GTK
Tasrail overheads	B90%,CO 10%		X		'000 GTK
O/head not capitalised	CO		X		'000 GTK
Mainland corp. o/heads	CO		X		'000 GTK

legend
l = linehaul
T = terminal
C = corridor
B = business overhead
CO = corporate overhead

4.8.2 Methodology

We have reviewed the logic incorporated within the Railcost system and consider that it provides an effective framework for estimating marginal costs.

Table 4.18 sets out our classification of the Railcost categories between variable and fixed costs. A comparison with the Railcost classifications shows that variable costs primarily relate to those categories classified as linehaul or terminal costs.

Variable and Fixed Costs

'A variable cost is a cost that changes in total in direct proportion to changes in the related total activity or volume. A fixed cost is a cost that remains unchanged in total for a given time period despite wide changes in the related total activity or volume.' Horngren & Foster, 'Cost Accounting — A Managerial Emphasis'. (Prentice Hall, 1987, p. 22).

In the case of Tasrail there are very few costs that may be seen as truly variable, particularly in the shorter term. Furthermore whilst Railcost attempts to relate unit costs to appropriate resources it is likely that other resources may also impact a particular cost. Accordingly despite the extensive studies undertaken by AN in relating cost structures to resources the variability of costs with secondary resources may not be adequately accounted for.

In classifying the various Railcost categories as variable and fixed we have discussed each category with Tasrail management. Our emphasis has been placed on major alterations in volume and on a medium term, 3 to 4 years, timeframe. In this regard we have determined the variability of each cost category on the basis of its behaviour where large changes in volume occur and where the alteration of costs in response to these changes is measured over the medium term.

Direct cost percentages have been calculated by reviewing the 1990 base case categories and determining the percentage that direct labour, material and sundry costs comprise of the total variable cost category. The residual costs in these variable cost categories comprise variable overheads and have been classified accordingly.

Contribution Margin Analysis

Railcost calculates the resources and costs associated with a particular traffic on the basis of avoidable costs. The base case is compared to a modified case without the particular traffic included and the difference represents the avoidable costs of that particular traffic. This method eliminates the effects of common costs.

We have identified in table 4.18 those Railcost categories that include variable costs. By taking the variable proportion of the total avoidable costs identified by Railcost for a particular traffic and subtracting them from the revenue generated by that traffic a contribution margin can be calculated for that traffic.

The contribution margin of any one traffic may be thus defined as the revenues provided by that traffic less the variable expenses associated with those revenues. By analysing Tasrail's various traffics on a contribution margin basis cost, volume and profit relationships can be estimated and the contribution of each traffic to the recovery of fixed costs determined.

4.8.3 Railcost Analysis of 1990 Operating Results

Our Railcost based contribution margin analysis utilises results for the year ended 30 June 1990. We have adjusted four Railcost categories; locomotive, wagon, track and capital adjustment. Currently these accounts relate to total depreciation and interest expense for the year ended 30 June 1990. The need to differentiate between accounting allocations and actual capital replacement requirements was discussed earlier in section 4.3.1.

We have ignored the abovementioned Railcost categories and substituted our estimate of the annual economic charge applicable to each fixed asset category. These adjustments are set out below.

(a) Locomotives. Tasrail have 63 locomotives of which 52 are currently in use. The excess stock is used as a buffer, when an active locomotive requires a major repair it is retired and replaced with a spare locomotive. Whilst this results in a gradual reduction in the standard of the locomotive fleet it allows Tasrail to delay further major locomotive capital expenditure.

The average age of Tasrail's locomotive fleet is currently between 16 and 20 years. Tasrail consider that given the buffer stock, up to 50 replacement locomotives will be required in the next 20 years. Although it is expected that no purchases will be required in the first ten years.

Tasrail has in the past been able to purchase second hand locomotives from mainland railways at an average cost of $100,000 per locomotive (in 1990 dollars). Should replacement locomotives be unavailable at this price engine replacement on current locomotives may be achievable at a similar cost.

Whilst it is considered that locomotive purchase costs will not be relevant for ten years we have conservatively applied an annual charge reflecting an imputed total cost of $5 million over the twenty years. Our contribution margin analysis accordingly includes an additional $0.25 million in locomotive expenditure.

(b) Wagons. Tasrail has an excess of wagons. Unlike locomotives the current maintenance program will mean that the current wagon stock will be adequate to service Tasrail's requirements in the foreseeable future. In specific cases such as cement where a large increase in volumes may occur additional wagons may be required. However, these will either be paid for by the customer directly or through rate increases. Accordingly we have not increased wagon expenditure to reflect an economic charge for capital replacement of wagons.

(c) Track. We have been provided by Tasrail with the additional expenditure, currently classified as capital, that will be required to maintain the track and train services at their current operational level. Track expenditure forecasts are discussed more fully in section 5. This expenditure is forecast to total approximately $80 million. Due to the scope for alteration of track expenditure time frames we have allocated this expenditure on a straight line basis over 20 years.

4.8.4 Product Group Analysis

We have set out as table 4.19 below contribution margin analyses for Tasrail's major product groups.

Table 4.19 shows that for the year ended 30 June 1990 both Fertiliser and Containers provided a negative contribution. This indicates that for any given volume these traffics will not be profitable. Containers, in particular, has a negative contribution representing almost 13 per cent of revenues.

As in any contribution margin analysis assumptions as to variability and avoidability of cost need to be tested before strong conclusions and strategic decisions are made. The ongoing profitability of certain traffics is further discussed in section 6 where our forecasts are subjected to contribution margin analysis.

A review of the other major products shows that coal is the most profitable traffic per unit carried by Tasrail with contribution margin equalling 46 per cent of revenues. Woodchip, the largest traffic carried by Tasrail in revenue terms is only sixth in contribution margin per unit.

Coal also has the single largest contribution of $2.7 million. Due to its volume Woodchip provided the second highest contribution in dollar terms with $1.6 million.

TABLE 4.19 CONTRIBUTION MARGIN BY PRODUCT FOR THE YEAR ENDED 30 JUNE 1990

Summary	*Acid*	*Woodchip*	*Cement*	*Container*	*Fertiliser*	*Coal*	*Timb/oth*	*Timb/saw*	*Minerals*	*Total*
Profit statement ($'000)										
Revenue	1 475	8 751	1 780	2 889	1 694	5 973	3 366	9	1 293	27 230
Less: Direct costs	691	4 879	890	2 435	1 258	2 298	1 348	8	694	14 501
Direct margin	783	3 872	889	455	436	3 675	2 018	1	599	12 728
Less: Variable overhead	237	2 248	267	835	547	925	652	3	254	5 968
CONTRIBUTION	546	1 624	622	–381	–111	2 750	1 366	–2	345	6 760
Fixed costs										20 600
Operating profit/loss										–13 840
Revenue/Total revenue	5.42%	32.14%	6.54%	10.61%	6.22%	21.94%	12.36%	0.03%	4.75%	100.00%
Analysis										
Direct margin/revenue	53.08%	44.25%	49.94%	15.75%	25.74%	61.53%	59.95%	11.11%	46.33%	
Contribution/revenue	37.02%	18.56%	34.94%	–13.19%	–6.55%	46.04%	40.58%	–22.22%	26.68%	
Contribution/NTK ($'000)	30.33	10.83	41.62	–7.63	–3.75	33.21	25.00	–12.74	19.62	
Revenue/NTK ($'000)	81.93	58.38	119.10	57.86	57.20	72.14	61.61	57.32	73.55	
Var. cost/NTK ($'000)	51.55	47.55	77.41	65.49	60.95	38.92	36.61	70.06	53.92	

4.9 Non Financial Indicators

The following section analyses certain non financial indicators of Tasrail's performance.

4.9.1 Measures of Track Quality

Derailments

During the year ended 30 June 1990 Tasrail incurred 30 derailments. This compared with an average of 31 derailments per year for the previous 5 years.

Prior to 1985 derailments were considerably more frequent. In the 5 years to 30 June 1984 derailments averaged 58 per annum peaking at 71 during the year to 30 June 1982.

Level Crossing Accidents

In the 5 years to 30 June 1990 5 deaths and 12 injuries were caused at level crossing accidents, the last fatality occurring in 1988. Level crossing accidents in the year to 30 June 1990 totalled 15. This is slightly higher than the average of 12 accidents per annum in the 5 years to 30 June 1989 and the average 10 accidents per annum in the previous 5 years to 30 June 1984.

Speed Restrictions

As at 30 June 1990 speed restrictions were in place on 5.6 per cent of the track. This compares to the average percentage for the 5 years to 30 June 1989 of 7.36 per cent. The minimum level of speed restrictions at year end was achieved in 1988 at which time 5.05 per cent of the track was subject to speed restrictions.

Prior to 1985 speed restrictions were significantly greater. In the 5 years to 30 June 1984 speed restrictions were in place on an average of 20.1 per cent of the track peaking at 26.3 per cent as at 30 June 1982.

The above measures indicate that Tasrail's track rehabilitation program has had a significant impact on reducing speed restrictions and derailments. Level crossing improvement programs have been identified by Tasrail but the current quality is considered by management to be acceptable in relation to the cost of implementing these programs.

4.9.2 Rolling Stock Efficiency

We have set out below NTK per wagon and per locomotive for the six years to 30 June 1990.

TABLE 4.20 NTK PER WAGON AND PER LOCOMOTIVE FOR THE SIX YEARS TO 30 JUNE 1990

('000)	1985	1986	1987	1988	1989	1990
NTK per wagon	320	340	420	480	540	563
NTK per locomotive	7 330	8 200	9 130	9 100	6 750	6 560

NTK per wagon has increased steadily as the wagon fleet has declined from 1,277 as at 30 June 1995 to 733 as at 30 June 1990. NTK per locomotive however was reduced significantly by the increase in locomotives from 50 to 68 in the year ended 30 June 1989.

The decrease in NTK from 459 million in the year ended 30 June 1989 to 413 million in the year ended 30 June 1990 exacerbated this decrease in locomotive efficiency. As was discussed in section 4.5 the bulk purchase of locomotives in 1989 was undertaken in order to take advantage of an opportunity which will minimise locomotive replacement expenses in future years. A number of these locomotives are not in operation. Based on the number of active locomotives for the year to 30 June 1990 of 52 the NTK per active locomotive was 7.95 million.

4.9.3 Load Efficiencies

In the 6 years to 30 June 1990 train kilometres fell 5.5 per cent per annum whilst total tonnes fell at an average rate of 2 per cent per annum. Despite this net tonne kilometres remained virtually steady. These trends indicate that Tasrail is carrying heavier loads further than in 1985. Table 4.21 sets out average haul (NTK/tonne) and average load (NTK/train kilometre) data for the six years to 30 June 1990.

TABLE 4.21 AVERAGE HAUL AND LOAD FOR THE 6 YEARS TO 30 JUNE 1990

	1985	1986	1987	1988	1989	1990
Average haul (km)	182	184	194	193	200	204
Average load (tonnes)	344	316	385	386	443	461

The increase in average haul is primarily a function of product mix and customer sourcing. However, as road operators have become increasingly efficient it is possible that increasing average hauls reflect a general trend with rail being forced to concentrate on longer hauls where it has a larger comparative advantage. Intermodal competition considerations are more fully discussed in the Final Revenue Forecast and in studies currently being undertaken by the BTCE.

The increase in average load is the result of increasing train lengths. In the year to 30 June 1985 train lengths averaged 23 wagons while in the year to 30 June 1990 train length increased to 35 wagons. Reduction in the number of train kilometres travelled for a given NTK provides efficiency gains as not all costs vary with NTK while revenue may be seen as largely variable with NTK. Section 4.8 analyses the variability of certain costs and in particular identifies a number of costs that vary with train kilometres rather than NTK.

4.10 Comparison to Previous Forecasts

Tasrail's Corporate Plans 1 and 2 dated 1986 and 1987 ('CP1' and 'CP2') respectively detail a number of key result areas where forecast performance targets have been set.

Analysis of each of the target performances with actual historical data is provided below, along with a description of assumptions made:

4.10.1 Assumptions

(i) Tasrail's forecasts appearing in CP1 and CP2 have been inflated using assumed future CPI values. In this analysis we have converted CP1 and CP2 forecasts to real 1990 dollars using actual historical CPI data.

(ii) The 'other revenue' component of total revenue appearing in the historical revenue (section 4.2) has been removed. The unpredictable nature and the difficulty associated in foreseeing its extent when CP1 and CP2 were compiled means that it probably was not incorporated into the forecasts. Similarly, forecast revenue does include a component of miscellaneous revenue (approximately $400,000 was forecast for 1986). Correspondingly, this component has been removed from all forecasts.

4.10.2 Profit and Loss

We have set out below annual operating deficit forecasts as contained in CP1 and CP2 (adjusted to 1990 dollars) as well as actual deficits, again in 1990 dollars.

TABLE 4.22 ACTUAL AND FORECAST DEFICITS FOR THE 5 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June ($'000)	*1986*	*1987*	*1988*	*1989*	*1990*	*Av. Growth Rate*
Actual deficit	26 834	20 429	15 316	17 513	18 105	-9.37
CP1 forecast	27 462	21 247	15 864	12 708	11 026	-20.40
CP2 forecast		23 534	16 451	11 068	9 895	-25.08

CP1 forecast that the deficit would decline at an average rate of 20.4 per cent per annum over the 4 years to 30 June 1990, while CP2 forecasts were for a decline of 25.1 per cent over 3 years. The actual deficit (difference between freight revenue and reported total expenditure) declined at a rate of 9.4 per cent over the 4 years to 30 June 1990 and 3.9 per cent over the 3 year period.

4.10.3 Revenue

We have set out below revenue forecasts as contained in CP1 and CP2 (represented in 1990 dollars) as well as actual freight revenue as set out in section 4.2.1.

TABLE 4.23 ACTUAL REVENUE AND CORPORATE PLAN FORECASTS FOR THE 5 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June ($'000)	*1986*	*1987*	*1988*	*1989*	*1990*	*Av. Growth Rate (%)*
Freight revenue	24 692	26 652	29 199	29 618	27 230	2.50
CP1 forecast	24 920	29 178	31 996	32 334	31 762	6.25
CP2 forecast		26 892	31 410	33 974	32 894	6.95

CP1 forecast a growth in real revenue of 6.25 per cent per annum on average for the 4 years ended 30 June 1990. Actual revenue grew at only 2.5 per cent per annum on average over the same period, well below forecast.

CP2 forecast a growth in real revenue of 6.95 per cent per annum on average for the 3 year period to 30 June 1990. Actual revenue grew at only 0.72 per cent per annum over the same period, well below forecast.

An analysis of the factors which effect revenue are set out below and provide some insight as to why real revenue did not perform to forecasts.

NTK

Set out below are NTK forecasts as contained in CP1 and CP2 as well as actual NTK detailed in section 4.3.3

TABLE 4.24 ACTUAL AND FORECAST NTK FOR THE 5 YEARS ENDED 30 JUNE 1990

Year ended 30 June (m)	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a.)*
Actual NTKs	402	429	455	459	413	0.7
CP1 forecast NTKs	402	462	467	471	476	4.3
CP2 forecast NTKs		429	490	514	514	7.6

A dramatic reduction in NTKs in the year ended 30 June 1990 has resulted in an average increase of 0.7 per cent per annum in actual NTKs against a forecasted average annual increase of 4.3 per cent in CP1 and 7.6 per cent in CP2.

An analysis of the components of NTK (tonnes and haulage) gives a clearer picture as to the resulting decline in actual NTKs and its variance from forecasts.

Tonnes

We have set out below forecast freight tonnes as incorporated into CP1 and CP2 as well as actual freight tonnes as calculated in the Final Revenue Report. The Final Revenue Report analyses the variances between actual tonnages and forecasts.

TABLE 4.25 ACTUAL TONNES AND CORPORATE PLAN FORECASTS FOR THE 4 YEARS ENDED 30 JUNE 1990

Year ended 30 June ('000)	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a.)*
Actual	2 215	2 360	2 293	2 025	–3.0
CP1 forecast	2 436	2 474	2 511	2 489	0.7
CP2 forecast	2 221	2 499	2 776	2 692	6.6

The decline in actual freight tonnes against forecast freight tonnes provides some explanation of the decline in revenue however the other important component in NTK is the haulage. Given NTK and tonnes it is possible to calculate actual and forecast haulage as below.

TABLE 4.26 ACTUAL AVERAGE HAUL AND CORPORATE PLAN FORECASTS FOR THE 4 YEARS ENDED 30 JUNE 1990

Year ended 30 June (km)	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a.)*
Actual haulage	194	193	200	204	1.74
CP1 forecast	190	189	188	191	0.28
CP2 forecast	195	196	185	201	0.93

The decline in tonnes has been mitigated by an increase in actual haulage, ie. Tasrail is carrying less payload further, on average. This has had the effect of increasing NTKs and thus minimising the decline in revenues.

Revenue/NTK

Revenue/NTK shows Tasrail's average rates charged per NTK. Set out below is a comparison of actual revenue/NTK and revenue/NTK forecasts from CP1 and CP2 (adjusted to 1990 dollars).

TABLE 4.27 ACTUAL REVENUE PER NTK AND CORPORATE PLAN FOR THE 5 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June ($/000)	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a).*
Actual revenue/NTK	6.14	6.21	6.42	6.45	6.59	1.8%
CP1 forecast	6.36	7.64	7.55	7.52	7.57	4.5%
CP2 forecast		6.35	6.52	6.50	6.55	1.0%

CP1 forecast an increase of 4.5 per cent in revenue/NTK on average over the 5 years ended 30 June 1990. Tasrail could foresee the possibility of significant rate increases given their decision to recover fully distributed costs detailed in CP1. However, this was optimistic and actual revenue/NTK was able to be increased only by 1.8 per cent per annum on average over the period.

CP2 forecast a more realistic increase of 1.0 per cent per annum on average over the 3 year period to 30 June 1990. Actual freight revenue/NTK increased 2.0 per cent per annum over this period.

4.10.4 Expenditure

We have set out below total expenditure forecasts as contained in CP1 and CP2 as well as operating expenditure in 1990 dollars as calculated in section 4.3.1.

TABLE 4.28 ACTUAL OPERATING EXPENDITURE AND CORPORATE PLAN FORECASTS OF TOTAL EXPENDITUREFOR THE 5 YEARS ENDED 30 JUNE 1990 (IN 1990 DOLLARS)

Year ended 30 June ($'000)	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a).*
Actual operating expenditure	44 600	40 800	37 800	36 100	33 900	–6.6%
CP1 total expenditure	52 382	50 425	47 861	45 042	42 789	–4.9%
CP2 total expenditure		50 121	48 212	45 370	41 349	–6.21%

Tasrail's 1986 and 1987 forecasts did not foresee the application of payroll tax, the charging of mainland overheads, nor the accounting policy changes which affected the treatment of depreciation and capitalised overhead. Although the annual operational expenditures resulting from the adjustments for these items are not directly comparable on a yearly basis to the CP1 and CP2 forecast total expenditures, the presumption in the analysis is that the trend in actual is relevant for comparison with the forecast trend. CP1 forecast a decline in total expenditure at an average rate of 4.9 per cent per annum. The trend in actual operating expenditure is a real decline of 6.6 per cent per annum on average.

CP2 forecast a decline in total expenditure from the year ended 30 June 1987 to the year ended 30 June 1990 of 6.2 per cent per annum on average. An actual decline of 6.0 per cent was achieved.

Expenditure/NTK

We have set out below the percentage change in total expenditure/NTK forecasts as contained in CP1 and CP2 (adjusted to 1990 dollars) as well as the percentage change in actual operating expenditure/NTK as calculated from table 4.9 in section 4.3.3.

TABLE 4.29 ACTUAL OPERATING EXPENDITURE PER NTK AND CORPORATE PLAN FORECASTS OF TOTAL EXPENDITUREFOR THE 4 YEARS ENDED 30 JUNE 1990

Year ended 30 June ($'000)	*1987*	*1988*	*1989*	*1990*
Operating expenditure/NTK (% change)	–14.3	–12.7	–5.3	–4.4
Total expenditure/NTKCP1 forecast (% change)	–16.2	–4.9	–4.1	–3.1
CP2 forecast (% change)		–14.9	–4.0	–3.1

CP1 forecast a 16.2 per cent decrease in total expenditure per NTK for the year to 30 June 1987 and then an average decrease of 4 per cent per annum to 30 June 1990.

CP2 forecast a decrease of 14.9 per cent in the year to 30 June 1988 followed by an average decrease of 3.6 per cent per annum in the 2 years to 30 June 1990.

Actual operating expenditure/NTK decreased in the year to 30 June 1987 by 14.3 per cent, less than the forecast. However actual operating expenditure/NTK continued to decline at a rate of 4.5 per annum on average over the 3 years to 30 June 1990, better than forecast.

In the year to 30 June 1988 operating expenditure/NTK decreased by 12.7 per cent per annum which was not as optimistic as the CP2 forecast. This was followed by an average decrease of 9 per cent per annum again much better than forecast.

4.10.5 Manpower Levels and Productivity

Staffing

TABLE 4.30 ACTUAL STAFFING LEVELS AND CORPORATE PLAN FORECASTS FOR 5 YEARS ENDED 30 JUNE 1990

Year ended 30 June	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a.)*
Actual staff	967	918	875	825	790	–4.9%
CP1 staffing	978	929	883	839	797	–5.0%
CP2 staffing		929	869	799	705	–8.8%

Actual staff reduction was well within CP1 forecasts, however early achievements in this area resulted in an optimistic forecast in CP2. Actual results fell short of CP2 by 92 staff resulting in a required reduction rate of 8.8 per cent per annum for the 3 years ended 30 June 1990 for actuals to match CP2 forecasts.

NTK/Employee

TABLE 4.31 ACTUAL NTK/EMPLOYEE AND CORPORATE PLAN FORECASTS FOR 5 YEARS ENDED 30 JUNE 1990

Year ended 30 June	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a.)*
Actual NTK/Employee	416	467	520	556	523	5.90%
CP1 forecast	411	499	549	604	664	12.75%
CP2 forecast		499	614	675	743	7.60%

NTK/employee ratios have failed to meet forecasts due mainly to depressed growth in NTKs, particularly in the year to 30 June 1990 as described above.

4.10.6 Fleet Utilisation

NTK/Locomotive

TABLE 4.32 ACTUAL NTK/LOCOMOTIVE AND CORPORATE PLAN FORECASTS FOR 5 YEARS ENDED 30 JUNE 1990

Year ended 30 June ('000)	*1986*	*1987*	*1988*	*1989*	*1990*	*Av Rate (p.a.)*
Actual NTK/locomotive	8 200	9 130	9 100	6 750	6 560	(5.45%)
CP1 forecast	8 200	9 240	9 330	9 430	9 520	3.76%
CP2 forecast		8 680	9 620	9 720	9 810	4.18%

The increase in locomotive fleet of 5.5 per cent per annum on average in the 5 years to 30 June 1990 was not matched by NTKs. NTKs only increased by 0.7 per cent per annum on average over this period, hence the poor performance of NTK/locomotive. As stated previously a number of locomotives were placed in storage during the year ended 30 June 1990. NTK per active locomotive was 7.95 million.

NTK/Wagon

TABLE 4.33 ACTUAL NTK/WAGON AND CORPORATE PLAN FORECASTS FOR 5 YEARS ENDED 30 JUNE 1990

Year ended 30 June	1986	1987	1988	1989	1990	*Av Rate* (p.a.)
Actual NTK/Wagon	340	420	480	540	560	13.67%
CP1 forecast	400	470	500	530	560	8.65%
CP2 forecast		430	480	480	490	4.23%

A reduction in freight wagons of 11.4 per cent per annum on average in the five years ended 30 June 1990 has resulted in wagon productivity performing to CP1 forecasts and better than CP2 forecasts.

5. FORECAST EARNINGS

5.1 Methodology

Part (c) of the Terms of Reference requires an assessment of the probability that Tasrail will be able to achieve breakeven within the forecast period. In this section we have analysed Tasrail's preferred strategic plan in order to determine a forecast level of operating expenditure for the 20 years ended 2010. This has been compared to the Final Revenue Forecast in order to determine whether Tasrail can be expected to achieve a breakeven position with its preferred strategy.

We have defined breakeven as the point at which revenues are equal to operating expenditure. Operating expenditure has been calculated before interest, non-recurring capital items and abnormal items such as redundancy costs. Our breakeven analysis is contained in section 5.5.

Section 5.8 considers the total cashflow position of Tasrail over the forecast period based on the results of the breakeven analysis. Once again this has been calculated on a before interest basis. In section 6 we have considered specific alternative scenarios.

5.2 Preferred Strategic Plan

Tasrail have provided us with their preferred strategic plan for the twenty years ending 30 June 2010. This plan primarily focuses on labour force reductions which are to be achieved via Voluntary Redundancy Schemes and labour efficiencies created by capital investment programs and alterations to work practices.

During the preparation of this report the preferred strategic plan has been subjected to detailed financial evaluation. As a result the capital expenditure programs have been reviewed and reflect the minimal level of expenditure to enable the forecast operating cost saving.

In section 4 above it was noted that Tasrail's total expenditure was dominated by labour costs. Accordingly, the strategic plan focuses on employee levels.

Tasrail's preferred strategic plan envisages a steady state level of 350 employees to maintain operations. It is considered that this level can be achieved by 30 June 1993 although additional employees will be required in order to continue track rehabilitation. The continuing track rehabilitation is discussed in Section 5.2.1 below.

We have set out as table 5.1 actual employee numbers by branch as at 30 June 1990 and as at 2 February 1991 as well as the planned employee levels under the preferred strategic plan as at 30 June 1993.

Note that the planned 350 level in 1993 excludes a contingent of employees who will be required to complete the capital works program. The 350 represents the expected complement to maintain operations after the capital works program is completed.

TABLE 5.1 ACTUAL EMPLOYEE LEVELS AND FORECASTS UNDER PREFERRED STRATEGIC PLAN

Branch	*Actual 30.6.90*	*Actual 12.2.91*	*Forecast 30.6.93*
Executive	2	3	3
Administration	13	11	9
Civil	187	171	72
Finance	13	13	9
Mechanical	191	171	75
Operations	324	289	159
Supply	14	10	8
Signals & Communication	46	41	15
	790	709	350

The reductions in signals and communications, operations, civil and mechanical branches represent 98 per cent of the total planned reduction. Tasrail's ability to achieve these reductions is dependent upon completion of certain capital expenditure projects and work practice alterations. Furthermore, having achieved labour efficiencies the continuation and amendment of the current Voluntary Redundancy Scheme will be required in order to translate these efficiencies to labour force reductions.

We have analysed Tasrail's preferred strategic plan for each of the major branches in sections 5.2.1 to 5.2.6 below.

An overriding assumption to the target staff levels in the preferred strategic plan is that agreement is reached with the relevant unions. We have been informed that discussions are currently being held with union representatives but as yet no agreement has been reached.

Average wage rates per employee have been calculated on a full cost basis by dividing total labour costs per branch by average employees. We have averaged the results for the 3 years ended 30 June 1990 in order to reduce discrepancies caused by uneven employee reductions in individual years. We consider this approach reflects current wage rates as our analysis is in 1990 dollars. As set out in section 4.3.2, average wages for Tasrail have tended to remain constant in real dollar terms.

We have set out below the forecast average wage, including on costs, for each of the main branches. It has been assumed that these wage levels will remain constant, in real terms, througout the forecast period.

TABLE 5.2 FORECAST AVERAGE WAGE PER BRANCH FOR THE 20 YEARS ENDING 2010 (IN 1990 DOLLARS)

Branch	*Average Wage*
Civil	35 000
Mechanical	34 400
Signals	35 800
Operations	40 000
Other	32 500

5.2.1 Civil Branch

Tasrail have forecast that once current capital projects are completed a steady state workforce of 72 will be required in the civil operations branch. Based on the abovementioned labour rates and expected materials and sundries requirements this equates to an ongoing cost of approximately $4.9 million in 1990 dollars.

This base cost level is dependent upon the implementation of most of the proposals set out in a recent study prepared for Tasrail titled 'Economic Evaluation for Permanent Way Upgrading' and dated October 1990 ("The Study"). The Study recommends a series of interlinked capital investment projects that should be undertaken so as to ensure a reasonable quality of track with continuously welded rail, long life sleepers and bridges.

The Study calculated that the total investment required in the recommended capital projects over the 20 years to 2010 is $92 million and concludes that at a discount rate of 14 per cent the total project has a net present value ('NPV') of negative $2.3 million. The preferred strategic plan incorporates fully two of these capital projects: the sleeper replacement program and the continuous welding of the track whilst the other projects have been significantly scaled down. Current estimates indicate that at present 1.1 million sleepers will need to be replaced by the year 2003 whilst track welding is currently 40 per cent incomplete.

Tasrail consider that other projects incorporated in The Study such as bridge repairs and ballasting can be deferred without a reduction in current services or a marked increase in derailments. The deferral of these projects however does increase the possibility of major problems such as a bridge collapse.

Table 5.3 contains forecasts of annual civil expenditure for the 16 years ending 30 June 2006 after which time the steady state level of expenditure of $4.9 million will be required. These forecasts, which are included in our breakeven analysis in section 5.5 include the above capital investment projects. If these projects were not undertaken we understand that Tasrail's revenue generating ability would be severely diminished.

It is accepted that the steel sleeper project represents an improvement in the track, however, it is effectively a maintenance program. Using untreated wooden sleepers would more clearly approximate maintenance as they are initially cheaper. However as their useful life is considerably shorter NPV analyses have indicated that this is not a cost effective procedure. The impact of using untreated wooden sleepers on Tasrail's breakeven position is discussed in section 6.5.1.

TABLE 5.3 TASRAIL CIVIL EXPENDITURE TO 30 JUNE 2006 (IN 1990 DOLLARS)

Year ending 30 June	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Civil expenditure ($m)	8.40	8.95	9.75	10.55	10.87	11.25
Year ending 30 June	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*
Civil expenditure ($m)	11.40	10.79	10.05	8.97	6.82	6.07
Year ending 30 June	*2003*	*2004*	*2005*	*2006*		
Civil expenditure ($m)	5.46	4.97	4.96	4.90		

Table 5.3 shows that a significant investment is required, particularly in the years to 30 June 2000, in order to achieve the steady state civil expenditure level of $4.9 million. In the 10 years to 30 June 2000, the average annual civil expenditure has been forecast at $10.1 million. Thus the capital works program requires incremental annual expenditure of approximately $5.2 million through the year 2000.

5.2.2 Mechanical Branch

The mechanical division is primarily responsible for the maintenance of locomotives and wagons. Tasrail estimate that following certain capital projects and work practice alterations an employee level of 75 for the mechanical division will be achievable.

Essential Capital Expenditure

The plan assumes the present maintenance workshops are moved to East Tamar Junction and current locomotives and rolling stock are upgraded to a level where ongoing maintenance costs are significantly reduced. Tasrail estimate that the relocation of workshops will cost $7 million whilst the locomotive upgrading will require $2 million. These costs would be split over the two years ending 30 June 1993.

In addition to these capital projects it is expected that Tasrail will need to purchase replacement locomotives and rolling stock over the forecast period. It is expected that this will not involve other costs beyond the relevant purchase prices which were discussed in section 4.8.3 above.

Based on a staff level of 75 employees and the average wage levels set out in table 5.2, ongoing mechanical branch expenditure is estimated at $5.25 million. This amount includes approximately $1.3 million for contract work by third parties on specialised overhaul and non routine maintenance work. The ongoing expenditure should be combined with the additional locomotive replacement charge of $0.25 million per annum identified in section 4.8.3 to give a steady state mechanical branch expenditure of $5.5 million.

We understand that this ongoing expenditure level is only achievable if the above capital projects are undertaken and certain current work practices are eliminated.

5.2.3 Signals and Communications Branch

The Tasrail preferred strategic plan envisages a reduction in staff levels in the signals and communications branch from 41 as at 2 February 1991 to 15 as at 30 June 1993. These reductions in staff numbers will result in Tasrail reducing its ongoing signals and communication expenditure to $0.84 million per annum. In order to achieve these reductions the following capital expenditure is considered to be essential and would be split over the two years ending 30 June 1992.

TABLE 5.4 NON-RECURRING CAPITAL — EXPENDITURE FOR SIGNALS AND COMMUNICATIONS (IN 1990 DOLLARS)

	$M
Purchase of cellular phones, VHF radios and a PABX telephone system	1.0
Upgrade of 65 level crossings	2.5
Upgrade of yard signalling	0.5
	4.0

The forecast expenditure for the signals and communication branch represents a $0.76 million reduction in current expenditure.

5.2.4 Operations Branch

The operations branch comprises all linehaul, terminal and marshalling activities. As at 2 February 1991 it was the largest branch with 289 employees representing 41 per cent of Tasrail's workforce.

Tasrail's preferred strategic plan envisages that the employee level of the operations branch will be reduced by 45 per cent to 159 by 30 June 1993. This will result in traffic operations expenditure reducing from $14.3 million in the year ended 30 June 1990 to a maintainable level of $7.36 million post 30 June 1993 (in 1990 dollars).

The strategic plan assumes the implementation of significant operational and work practice changes. Tasrail intends to reduce its main shunting depots to three being East Tamar Junction, Derwent Park and Burnie utilising communications improvements discussed above.

Additional major efficiencies are expected to result from industrial award restructuring. Currently all shunting processes involve three employees; the driver, an observer and a person at the depot who operates the switches. Tasrail consider that this process can be reduced to two employees without any reduction in safety. This would involve either the observer performing shunt operations or implementing driver only trains with mobile shunt crews.

Efficiencies may also be achieved by restructuring current operations so that crews are not required to return to their home depot at the end of each shift. This requirement limits the number of hours that the crew can work. The Burnie/Hobart freight currently takes 15 hours but requires 5 different crews, an average shift of only 3 hours per crew.

5.2.5 Fuel Costs

Fuel costs have been calculated based on the average cost per litre for the year ended 30 June 1990 being 46.3 cents. Whilst various arguments could be made as to the long term price of oil and the impact of this on Tasrail's fuel costs the base cost per litre has been assumed to remain constant in real dollar terms throughout the forecast period.

On 1 January 1991 the Tasmanian State Government levied a franchise tax on fuel purchases with the result that Tasrail's base fuel cost was increased 6.1 cents per litre. The fuel costs calculated in this report are thus based on a total cost of 52.4 cents per litre.

Total forecast litre usage has been calculated on the basis of the Litres per NTK ratios achieved in the year ended 30 June 1990. This ratio has been adjusted to reflect expected fuel efficiencies which may decrease litres per NTK by 2.5 per cent per annum in the four years ending 30 June 1995. Multiplying by the forecast NTK for each year provides a forecast of fuel usage in litres. The forecast fuel costs for each year for the 20 years ending 30 June 2010 have been set out in table 5.5.

5.2.6 Other Branches

Other branches include finance, supply and administration. These branches collectively employed 34 people as at 2 February 1991, equivalent to 5 per cent of the workforce at that time. In line with efficiencies in other areas and the Voluntary Redundancy Scheme it is forecast that by 30 June 1993 employee levels will be reduced to 26, a reduction of 24 per cent.

For the year ended 30 June 1990 administration expense including mainland overhead totalled $4.0 million. The expenditure projections set out in section 5.3 below include $2.8 million for administration expense. Mainland overhead is included in administration expense and has been set at $1.4 million.

5.3 Expenditure Forecasts

Assuming that the abovementioned labour force efficiencies are achieved we have calculated the projected expenditure levels for the 20 years ending 30 June 2010. For the year ending 30 June 1991 the projected expenditure is based on actual data to 2 February 1991 (period 8) plus revised budgets for the last 5 periods. For all branches except civil a steady state level of expenditure is assumed to be achievable by 30 June 1993.

The projections include civil expenditure based on the replacement program of steel sleeper for general track and treated sleepers for insulated track. In section 6 we consider the impact to expenditure forecasts of the use of alternative materials.

Table 5.5 below sets out Tasrail's forecast total expenditure under the preferred strategy for the 20 years ending 30 June 2010. In general no distinction has been made between capital and operating expenditure as under our assumption that operations will be maintained at their current level all expenditure is deemed to be recurring. Initial capital projects and redundancy payments required to achieve the strategic plan have been separated, however. The impact of these items is considered in section 5.8.

The projected expenditures are based on the assumption that Tasrail freight task and revenue will remain relatively stable. In section 6 we have used Railcost to test this assumption.

In the Final Revenue Forecast it is argued that a steady state scenario should be assumed post 30 June 1996. Whilst we consider this appropriate for revenues we consider that the expenditure projections should be detailed through 2010. This is due to the significant amount of civil expenditure on replacement sleepers and welding after 1996 which can be accurately estimated.

TABLE 5.5 EXPENDITURE FORECASTS FOR THE 20 YEARS ENDING 2010

	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
	$'000	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*
Traffic operations	12 300	10 500	8 100	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360	7 360
Fuel cost	3 058	3 132	3 233	3 406	3 337	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127	3 127
Total operations	15 358	13 632	11 333	10 766	10 697	10 487	10 487	10 487	10 487	10 487	10 487	10 487	10 487	10487	10 487	10 487	10 487	10 487	10 487	10 487
Civil engineering	8 400	8 950	9 750	10 550	10 870	11 250	11 400	10 790	10 050	8 970	6 820	6 070	5 460	4 970	4 960	4 900	4 900	4 900	4 900	4 900
Mech. engineering	8 000	7 000	6 000	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500
Signals	1 600	1 600	1 100	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840
Total maintenance	18 000	17 550	16 850	16 890	17 210	17 590	17 740	17 130	16 390	15 310	13 160	12 410	11 800	11 310	11 300	11 240	11 240	11 240	11 240	11 240
Admin and general	3 000	3 200	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800
Non functional exp.	500	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Total other	3 500	3 250	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850	2 850
Total expenses	36 858	34 432	31 033	30 506	30 757	30 927	31 077	30 467	29 727	28 647	26 497	25 747	25 137	24 647	24 637	24 577	24 577	24 577	24 577	24 577

5.4 Revenue Forecasts

Twenty year revenue forecasts for Tasrail are set out in the Final Revenue Forecast and are summarised below.

TABLE 5.6 FORECASTS OF TASRAIL FREIGHT REVENUE FOR THE 20 YEARS ENDING 30 JUNE 2010 (IN 1990 DOLLARS)

($'000) 1990 Equivalent	1991	1992	1993	1994	1995	1996–2010
Woodchip	5 526	6 790	8 395	8 395	8 395	8 395
Coal	5 520	5 066	5 074	6 413	6 571	6 296
Pulp logs	2 681	3 036	3 214	3 214	3 214	3 214
Containers	2 866	3 039	3 039	3 039	3 039	3 039
Cement	1 464	1 884	2 425	3 357	3 531	3 537
Fertiliser	1 407	1 502	1 502	1 502	1 502	1 502
Acid	1 329	1 067	1 069	1 465	1 466	60
Other	1 922	2 053	2 080	2 107	2 155	2 161
Total Revenue	22 715	24 437	26 798	29 492	29 873	28 204
Total NTK (000)	339 444	365 487	397 400	424 253	427 735	407 029
Average rate per thousand NTK ($)	66.92	66.86	67.43	69.52	69.84	69.29

5.4.1 Other Revenue

As set out in our historical analysis in section 4.2.2 over the 6 years to 30 June 1990 Tasrail received certain other income which is considered by its nature maintainable. As at 30 June 1990 these amounts were:

TABLE 5.7 MAINTENABLE OTHER REVENUE AS AT 30 JUNE 1990

	$'000
Rent	284
Equipment hire	1
	285

In addition Tasrail have indicated that as a result of the workshop relocation to East Tamar the land on which the workshop is currently situated at Invermay will be surplus. The estimated proceeds from the sale of this land of $4 million have been included as a credit to capital expenditure in the year ending 30 June 1994.

5.5 Breakeven analysis

We have set out as table 5.8 below operating revenue and expense forecasts for Tasrail for the 20 years ending 30 June 2010. These forecasts incorporate freight revenue forecasts from section 5.4, forecast operating expenditures consistent with the preferred strategic plan as set out in Section 5.3 and maintainable other income as set out in Section 5.4.1.

Table 5.8 shows that under our base case forecasts Tasrail is unlikely to achieve breakeven before the year ending 30 June 2001. Breakeven is defined in section 5.1 and is calculated before interest, non recurring capital items (ie. signals and mechanical) and abnormal items such as redundancy payments.

Forecasts for the years ending 30 June 1994 and 1995 indicate operating losses of less than $1 million. However, the expected decline in acid revenues in combination with a slight increase in civil expenditure result in a deficit of approximately $2.4 million being forecast for the year ending 30 June 1996. Civil branch expenditure is forecast to level off during the year ended 30 June 2006. From this point onwards a steady state profit of approximately $3.9 million has been forecast.

TABLE 5.8 BREAKEVEN ANALYSIS FOR THE 20 YEARS ENDING 30 JUNE 2010 (IN 1990 DOLLARS)

	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
	$'000	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*
Revenue																				
Freight	22 723	24 435	26 798	29 495	29 876	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230	28 230
Other	285	285	285	285	285	285	285	285	285	285	285	285	285	285	285	285	285	285	285	285
Total revenue	23 008	24 720	27 083	29 780	30 161	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515
Expenditure	36 858	34 432	31 033	30 506	30 757	30 927	31 077	30 467	29 727	28 647	26 497	25 747	25 137	24 647	24 637	24 577	24 577	24 577	24 577	24 577
Operating profit	−13 850	−9 712	−3 950	−726	−596	−2 412	−2 562	−1 952	−1 212	−132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938

5.6 Voluntary Redundancy Scheme

We have been informed by Tasrail management that in order to implement the preferred strategy the present voluntary redundancy scheme will need to be amended and continued.

Tasrail estimate that the average redundancy cost per employee will be $35,000 for the years after 30 June 1991, compared with the average projected costs per employee for the year ending 30 June 1991 of $16,000. The preferred strategic plan discussed above envisages the following annual employee reductions.

TABLE 5.9 EMPLOYEE REDUCTION FIGURES AND THE COST OF REDUNDANCY

Year	*Reduction in employees*	*Cost $'000*
1991	93	1 500
1992	196	6 860
1993	102	3 570
1994	–	–
1995	10	350
1996	10	350
1997	15	525
1998	10	350
1999	5	175
		13 680

Note that these amounts include expected cash payouts for annual leave and long service leave accrued by retrenched employees.

5.7 Additional Capital Costs

Tasrail have identified certain capital costs which will need to be incurred in addition to the expenditure discussed in section 5.2 above. These costs relate primarily to plant and vehicle replacement and are forecast as follows:-

Year ending 30 June	$'000
1992	1200
1993	400
1994	225
1995–2010 (per annum)	200

5.8 Required Investment Program

We have set out below as table 5.10 before interest cashflows for the 20 years ended 2010. These cashflows include the required investment program to support Tasrail's forecast operations.

Note the $54 million forecast negative cashflows for the 3 years ending 30 June 1993.

TABLE 5.10 CASHFLOWS FOR THE 20 YEARS ENDING 30 JUNE 2010 (IN 1990 DOLLARS)

	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
	$'000	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*
Operating profit	–13 850	–9 712	–3 950	–726	–596	–2 412	–2 562	–1 952	–1 212	–132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Redundancy	1 500	6 860	3 570		350	350	525	350	175											
Profit after extraord	–15 350	–16 572	–7 520	–726	–946	–2 762	–3 087	–2 302	–1 387	–132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Capital expenditure		7 700	6 900	-3 775	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Cashflow	–15 350	–24 272	–14 420	3 049	–1 146	–2 962	–3 287	–2 502	–1 587	–332	1 818	2 568	3 178	3 668	3 678	3 738	3 738	3 738	3 738	3 738

6. STRATEGIC ANALYSIS

In accordance with part (c) of our Terms of Reference we have identified four factors or options that could impact the preferred strategic plan discussed in section 5. These items are as follows:

1. Utilisation of alternative materials in Tasrail's sleeper maintenance program.
2. The cessation of unprofitable business segments.
3. A large increase in forecast revenues as a result of the construction of a new pulp mill in Tasmania.
4. Tasrail being unable to implement its preferred strategic plan and as a result being forced to accept a slower rate of decrease in employee levels. ("Gradual redundancy plan").

6.1 Sleeper Maintenance Options

6.1.1 Untreated Wooden Sleepers

Implicit in Tasrail's projected civil expenditure is the assumption that the use of steel sleepers for track and treated wooden sleepers for insulation is the most cost effective method of replacing sleepers over the forecast period. This assumption is based on the findings of an internal Tasrail study prepared in July 1990 ('Sleeper study'). The Sleeper study concludes that for general track steel sleepers provide the most cost effective method of sleeper replacement whilst in replacing insulating sleepers treated wood sleepers are the most appropriate. This conclusion is based on a net present value ('NPV') analysis contained within the report. We have set out below a summary of this NPV analysis based on a discount rate of 10%.

TABLE 6.1 NET PRESENT VALUE OF SLEEPER REPLACEMENT OPTIONS AT A DISCOUNT RATE OF 10% PER ANNUM

Period to 30 June ($m)	*1996*	*2010*	*2035*
General Track			
Untreated wood	–11.8	–26.3	–31.0
Oil treated wood	–14.7	–23.2	–26.7
Fully treated wood	–15.4	–20.5	–23.5
Steel	–16.8	–22.1	–22.2
Insulated Track			
Untreated wood	–2.6	–6.2	–7.4
Oil treated wood	–3.3	–5.8	–6.5
Fully treated wood	–3.5	–5.2	–6.0
Steel	–5.0	–7.4	–7.5

The Sleeper study also provides information based on a 14% discount rate. We have set out in table 6.2 a comparison of untreated wood to the preferred options selected by the Sleeper study.

TABLE 6.2 NET PRESENT VALUE OF SLEEPER REPLACEMENT OPTIONS AT A DISCOUNT RATE OF 14% PER ANNUM

Period to 30 June ($m)	*1996*	*2010*	*2035*
General			
Untreated wood	–10.6	–20.1	–21.9
Steel	–15.1	–19.0	–19.0
Insulated Track			
Untreated wood	–2.3	–4.7	–5.1
Fully treated wood	–3.1	–4.3	–4.6

The figures set out in tables 6.1 and 6.2 for all sleeper types assume mechanical installation. This provides significant cost advantages for all sleeper types except steel. The Sleeper study states that the cost of acquiring the machinery for mechanised installation is $600,000. As this machinery is of limited benefit in steel sleeper installation this extra capital expenditure should be considered in analysing the above stated NPVs.

Table 6.1 shows that over the 6 year period to 30 June 1996 the use of untreated sleepers for general track provides a $5 million cost benefit over the recommended steel sleepers while for insulated track they provide $0.9 million advantage over the preferred treated sleepers. Table 6.2 shows that this benefit is relatively independent of discount rate. A 4 per cent increase in discount rate leads to a reduction of the benefit for general track to $4.5 million and $0.8 million for insulated track.

Table 6.1 shows that if the relative costs are discounted at 10% over the period to 2010 untreated woods cost advantages are reversed. In general track the preferred steel sleepers have a $4.2 million advantage while fully treated sleepers have a $1.0 million advantage in insulated track. In table 6.2 the 14% discount rate focuses the analysis on earlier costs reducing the advantage of the preferred options although the combined benefit of the preferred options over untreated wood is still $1.5 million. Thus when the sleeper replacement program is viewed in the longer term untreated wood is a less efficient alternative.

The difficulties with long term revenue forecasting were discussed in our Final Revenue Forecast. In light of these uncertainties it may be considered desirable that costs are reduced in the shorter term enabling a better chance of breakeven in earlier years. As shown above, this will obviously have detrimental effects in later years as wood sleepers need to be replaced.

We have set out below the adjustment to total civil branch costs as a result of using untreated sleepers. The adjustments have been calculated by subtracting the untreated wood costs from the preferred option costs for each year.

TABLE 6.3 ADJUSTMENT TO BREAKEVEN ANALYSIS THROUGH USING UNTREATED SLEEPERS

Year ending 30 June	1991	1992	1993	1994	1995	1996
Benefit/(cost) ($m)	0.8	1.0	1.3	1.3	1.4	1.4
Year ending 30 June	1997	1998	1999	2000	2001	2002
Benefit/(cost) ($m)	(2.9)	(3.1)	(0.2)	(0.9)	(1.7)	(2.4)
Year ending 30 June	2003	2004	2005	2006		
Benefit/(cost) ($m)	(3.5)	(3.2)	(4.4)	(4.4)		

The steady state labour force number for civil of 72 is based on 12 employees for capital projects and 60 for operating expenditure. These numbers equate to a combined civil expenditure of $4.9 million. To the extent that the forecast total expenditure for the untreated wood option exceeds the steady state expenditure extra employees will be required. It should be noted that if the untreated sleeper option were to be chosen this base level would not be reached within the forecast period.

6.1.2 Used Steel Sleepers

We understand that Tasrail may have the opportunity to purchase second hand steel sleepers previously used in the Northern Territory. Tasrail estimate that 150,000 of these sleepers exist and that they would be $30 cheaper per sleeper. On this basis if Tasrail were able to obtain all these second hand steel sleepers for their replacement program total cost savings would be $4.5 million. Assuming this benefit could be realised over the next 3 years this would represent civil expenditure savings of $1.5 million per year for the 3 years to 30 June 1995.

Tasrail have not included these benefits in their strategic plan due to uncertainty as to the eventual destination of these sleepers.

6.2 Business Segment Analysis

The contribution margin framework set out in section 4.8 provides a useful tool for examining Tasrail's strategic options on a product by product basis. Where it is determined that a product has a negative contribution margin, this product will by definition be unprofitable at all volume levels within the range set for the analysis. As such the profitability of Tasrail will be increased if transport of products with negative contributions ceases.

6.2.1 Railcost Simulation

The analysis set out in section 4.8 uses the 1990 version of Railcost to determine product by product contribution margins. The time constraints of this report and the required commitment of AN staff to the National Freight Initiative, prevented a revised Railcost model being constructed to analyse forecast revenue, task and cost structures. In order to analyse the contribution margins of the various products after Tasrail's strategic plan has been implemented we have, in liaison with AN and Tasrail employees, created a Railcost simulation model.

The Railcost simulation model uses expenditure, resource and revenue data from our forecasts for the year ending 30 June 1996. We have set out in section 6.2.2 the process used in creating the Railcost simulation model.

6.2.2 Railcost Simulation Process

Stage 1

Resource data from the 1990 Railcost model were utilised to determine the relationship of various resources on a product by product basis. For example the relationship of train kilometres to NTK. As our Final Revenue Forecast included NTK per product we were able to apply the calculated ratios to the forecast NTK to determine new resource levels. This analysis implicitly assumes a constant relationship between the various resources. The validity of this assumption was interrogated via discussions with Tasrail management and adjustments made where evidence existed of a relationship change between resources.

Stage 2

Utilising the 1990 Railcost model reconciliation schedules were set up linking Railcost accounts to Railcost categories. Railcost categories were defined in section 4.8 and are set out in table 4.18 in that section. Using these reconciliation schedules we were able to recalculate unit costs for all categories except marshalling, terminals, departmental and overhead capitalised. These categories are discussed separately below.

Stage 3

Railcost accounts were linked to the profit and loss at a branch level. This was required as the expenditure forecasts set out in section 5 are on a branch by branch basis and have not been dissected at a Railcost account level. By assuming that each Railcost account within a branch was equally effected by changes in branch expenditure as a result of the implementation of the strategic plan we were able to calculate an adjustment factor for each Railcost account. This factor represents the ratio of 1996 expenditure to 1990 expenditure.

Stage 4

Using the new Railcost account values and the reconciliation spreadsheet new unit costs were calculated for all Railcost categories except marshalling, terminals, departmental and capitalised overhead. By applying new resource levels calculated in stage 1 Railcost category values per product were calculated.

Marshalling and Terminals

These Railcost categories are calculated with reference to locations rather than resources. Discussions with Tasrail management indicated that these costs formed part of the operational branch and that they would most likely reduce at a rate similar to other operational branch expenditure. Tasrail management informed us that the expenditure reductions under the strategic plan could be assumed to effect all products equally. Accordingly we have pro rated expenditure reductions across terminal and marshalling costs for each product. Volume effects have been recognised by multiplying the new cost structures for each product by 1996 NTK over 1990 NTK.

Capital Items

The expenditure forecasts set out in section 5 do not differentiate between capital and operating expenditure. Accordingly, as in section 4.8, all capital categories of Railcost have been eliminated with their costs being absorbed in expenditure categories. As in section 4.8 the additional costs associated with the sleeper replacement program have been set at $4 million.

Departmental Costs and Capitalised Overhead and Other Capital Expenditure

As these costs have been classified as fixed for the purposes of our analysis they have no impact on our contribution margin calculations.

6.2.3 Contribution Margins

We have set out as table 6.4 forecast contribution margins for Tasrail's products. Our analysis shows no product group has a negative contribution. However, the relatively poor profitability of Containers and Fertilisers indicates that once sufficient resources are available a new Railcost model should be run using the forecast expenditures and revenues. Our simulation model has been constructed only as a guide and a more formal analysis should be conducted of each product's contribution.

Our analysis does not take account of opportunity costs in continuing a particular freight. We understand that the Container operation uses a substantial depot in Hobart which may be worth $5 million. Obviously container operations would need to increase profitability dramatically to support this land holding on a net present value basis.

TABLE 6.4 CONTRIBUTION MARGIN BY PRODUCT BASED ON FORECAST RESULTS

Summary	*Acid*	*Woodchip*	*Cement*	*Container*	*Fertiliser*	*Coal*	*Timb/oth*	*Timb/saw*	*Minerals*	*Total*
Profit statement ($'000)										
Revenue	60	8 385	3 559	3 051	1 500	6 282	3 212	370	1 877	28 296
Less: Direct costs	3	3 261	1 206	2 096	844	1 770	776	181	873	11 010
Direct margin	57	5 124	2 353	955	656	4 512	2 436	189	1 004	17 286
Less: Variable overhead	1	1 505	383	707	350	667	372	69	309	4 363
CONTRIBUTION	56	3 620	1 969	248	305	3 844	2 064	120	695	12 923
Total fixed costs										13 907
Operating profit/loss										–984
Revenue/total revenue	0.21%	29.63%	12.58%	10.78%	5.30%	22.20%	11.35%	1.31%	6.63%	100.00%
Analysis										
Direct margin/revenue	95.00%	61.11%	66.11%	31.30%	43.73%	71.82%	75.84%	51.08%	53.49%	
Contribution/revenue	93.33%	43.17%	55.32%	8.13%	20.33%	61.19%	64.26%	32.43%	37.03%	
Contrib./NTK ($'000)	602.15	26.82	72.56	4.46	11.86	47.70	42.08	27.26	23.40	
Revenue/NTK ($'000)	645.16	62.12	131.15	54.84	58.33	77.96	65.49	84.05	63.19	
Var. Cost/NTK ($'000)	43.01	35.31	58.56	50.38	46.43	30.24	23.41	56.79	39.80	

6.3 Pulp Mill

Our Final Revenue Forecast considers the possibility of a new pulp mill being constructed by APPM. At the time of this report no commitment had been made by either APPM or the relevant authorities to this idea nor had a definite site been decided upon.

Nevertheless recent Federal Government announcements concerning resource security legislation have cast a favourable light on a new Tasmanian pulp mill. If the new mill is agreed to it is possible that it will commence operation in the year ending 30 June 1996.

As is set out in section 5.5 of the Final Revenue Forecast it is estimated that a new mill may provide an additional 200,000 to 400,000 tonnes of freight for Tasrail. In order to quantify possible effects of a new pulp mill on Tasrail's profitability we have calculated below the likely increase in woodchip contribution margin. This has been achieved by applying average haul, average rate and average variable cost data for woodchip based on information contained in our forecasts for the year ending 30 June 1996.

TABLE 6.5 ADDITIONAL CONTRIBUTION CALCULATIONS

Average haul	221km
Average rate per thousand NTK	$62.19
Variable cost as a percentage of revenue	56.8%

6.3.1 Profitability Scenarios

TABLE 6.6 PROFITABILITY SCENARIOS GIVEN ADDITIONAL CONTRIBUTION

	Scenario 1	*Scenario 2*
Additional tonnes	200 000	400 000
Additional NTK (m)	44.2	88.4
Additional revenue ($'000)	2 749	5 498
Variable cost ($'000)	1 561	3 122
Contribution margin for additional revenue ($'000)	1 188	2 376

Accordingly profit increases created by the new pulp mill may be in the range of $1.2 to $2.4 million. It is stressed that this analysis is by definition preliminary. A more exact analysis should be undertaken once items such as location and export license effects are available.

At the current preliminary stage no study has been undertaken of non-recurring capital costs that may be required for Tasrail to capture this freight.

6.4 Gradual Redundancy Plan

The gradual redundancy plan represents an alternative to the preferred strategic plan and assumes a continuation of existing staff reduction policies. Under the gradual redundancy plan the work force is to be steadily reduced reflecting changes in work practices and technology improvements.

6.4.1 Employee Levels

Table 6.7 contains forecast employee levels under the preferred strategic plan discussed in Section 5 and estimated employee levels under the gradual redundancy plan.

TABLE 6.7 FORECAST EMPLOYEE LEVELS UNDER GRADUAL REDUNDANCY PLAN AND PREFERRED STRATEGIC PLAN

As at 30 June	*Gradual Plan*	*Preferred Plan*
1991	697	697
1992	621	501
1993	563	399
1994	516	399
1995	480	389
1996	456	379
1997	424	364
1998	403	354
1999	395	349
2000–2010	394	349

The additional employees under the gradual plan in the years after 30 June 2000 have been allocated to permanent way rehabilitation. In this regard they have been assumed to a degree to be direct substitutes for third party contractors which would have been required under the preferred strategic plan. However, the inability to reduce employee levels under the gradual plan is likely to lead to additional labour costs particularly in later years when perway expenditure has been forecast to decline to $1.4 million. Accordingly, perway expenditure has been increased $1 million per annum in the years subsequent to 30 June 2000. It is expected that these additional costs would not be totally surplus and will allow additional perway upgrades to be implemented.

6.4.2 Average Wage

Average wage rates included in the preferred strategic plan as set out in table 5.2 above represent an increase in real terms on historical rates. Tasrail have indicated that the effect of the gradual plan would be to defer any increase into the year ending 30 June 1995. Accordingly the gradual plan incorporates historical wage rates up to 30 June 1994 and in line with those set out in table 5.2 thereafter.

6.4.3 Materials and Sundries

Material and sundry expenses have been calculated based on expense profiles provided by Tasrail. To some degree these costs have been assumed to reduce in line with employee levels thus reflecting work practice efficiencies. Sundries, however, have been increased in the years after 30 June 1995 to reflect increased contracting out as a result of employee level reductions. Mainland overhead has been held constant, in real terms, at $1.4 million.

6.4.4 Capital Program

The perway rehabilitation program discussed in section 5.2.1 and the locomotive replacement requirements discussed in section 5.2.2 have been assumed to be unaffected by any changes to strategic plan employee levels. These capital expenditures have been included in the civil and mechanical branches respectively for the purposes of the revised breakeven analysis in section 6.5.3.

In addition Tasrail have identified other capital expenditure that will be required under the gradual redundancy alternative. This expenditure reflects motor vehicle and plant replacement requirements as well as $5.5 million in non recurring mechanical and signals expenditure. This latter amount has been split over the two years to 30 June 1993 and is directly comparable to the $13 million of essential capital expenditure identified in sections 5.2.2 and 5.2.3. The amount under the gradual plan is less than under the preferred strategic plan as Tasrail's inability to reduce employee levels under the gradual plan reduces the cost efficiencies created by the capital expenditure making certain projects non viable.

6.4.5 Voluntary Redundancy Scheme

Under the preferred strategic plan an average redundancy cost per employee of $35,000 was estimated. Under the gradual plan it is considered that the incentive rates will not need to be as large and accordingly the average cost per employee has been reduced by 5.7 per cent to $33,000. This amount includes estimated cash payments from accrued provisions for long service leave and annual leave. It does not however include superannuation payouts as these will be provided by various government employee funds.

6.4.6 Other Revenue

Other revenue has been included as for the preferred strategic plan, however the proeeds from the sale of the Invermay land have been deferred into the year ending 30 June 1998. The sale proceeds have been included in table 6.10 as a credit to capital expenditure.

6.5 Breakeven Scenarios

6.5.1 Alternative Sleeper Replacement Plans

Utilising data set out in 6.1 we have set out below as scenario 1 the estimated impact of utilising wooden sleepers for sleeper replacement rather than the preferred steel and treated wood combination. Scenario 2 sets out the estimated impact of Tasrail obtaining second hand steel sleepers.

TABLE 6.8 CASHFLOWS ADJUSTED FOR SLEEPER OPTIONS FOR THE 20 YEARS ENDING 30 JUNE 2010 (IN 1990 DOLLARS)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	$'000	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*
Scenario 1 Use of wooden sleepers for sleeper replacement																				
Operating profit	−13 850	−9 712	−3 950	−726	−596	−2 412	−2 562	−1 952	−1 212	−132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Sleeper adjustment	800	1 000	1 300	1 300	1 400	1 400	−200	−900	−1 700	−2 400	−2 900	−3 100	−3 500	−3 200	−4 400	−4 400	−4 400	−4 400	−4 400	−4 400
Adjusted profit	−13 050	−8 712	−2 650	574	804	−1 012	−2 762	−2 852	−2 912	−2 532	−882	−332	−122	668	−522	−462	−462	−462	−462	−462
Redundancy	1 500	6 860	3 570	0	350	350	525	350	175	0	0	0	0	0	0	0	0	0	0	0
Profit after extraord	−14 550	−15 572	−6 220	574	454	−1 362	−3 287	−3 202	−3 087	−2 532	−882	−332	−122	668	−522	−462	−462	−462	−462	−462
Capital expend	0	7 700	6 900	−3 775	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Additional cap.	600																			
Total capital	600	7 700	6 900	−3 775	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Cashflow	−15 150	−23 272	−13 120	4 349	254	−1 562	−3 487	−3 402	−3 287	−2 732	−1 082	−532	−322	468	−722	−662	−662	−662	−662	−662
Scenario 2 Use of second hand steel sleepers																				
Operating profit	−13 850	−9 712	−3 950	−726	−596	−2 412	−2 562	−1 952	−1 212	−132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Sleeper adjustment	1 500	1 500	1 500																	
Adjusted profit	−12 350	−8 212	−2 450	−726	−596	−2 412	−2 562	−1 952	−1 212	−132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Redundancy	1 500	6 860	3 570	0	350	350	525	350	175	0	0	0	0	0	0	0	0	0	0	0
Profit after extraord	−13 850	−15 072	−6 020	−726	−946	−2 762	−3 087	−2 302	−1 387	−132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Capital expend	0	7 700	6 900	−3 775	200	200	200	200	200	200	200	200	200	200	200	200	2000	200	200	200
Cashflow	−13 850	−22 772	−12 920	3 049	−1 146	−2 962	−3 287	−2 502	−1 587	−332	1 818	2 568	3 178	3 668	3 678	3 738	3 738	3 738	3 738	3 738

6.5.2 New Pulp Mill

We set out below forecast profitability and cashflows for Tasrail including estimated additional profits resulting from the construction of a new pulp mill. Scenario 1 includes an additional $1.2 million whilst scenario 2 includes an additional contribution of $2.4 million.

TABLE 6.9 CASHFLOWS ADJUSTED FOR ADDITIONAL PULP MILL CONTRIBUTION FOR THE 20 YEARS ENDING 30 JUNE 2010 (IN 1990 DOLLARS)

	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
	$'000	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*
Scenario 1 Additional woodchip profits: low case																				
Operating profit	–13 850	–9 712	–3 950	–726	–596	–2 412	–2 562	–1 952	–1 212	–132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Woodchip adj.						1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200	1 200
Adjusted profit	–13 850	–9 712	–3 950	–726	–596	–1 212	–1 362	–752	–12	1 068	3 218	3 968	4 578	5 068	5 078	5 138	5 138	5 138	5 138	5 138
Redundancy	1 500	6 860	3 570	0	350	350	525	350	175	0	0	0	0	0	0	0	0	0	0	0
Profit after extraord	–15 350	–16 572	–7 520	–726	–946	–1 562	–1 887	–1 102	–187	1 068	3 218	3 968	4 578	5 068	5 078	5 138	5 138	5 138	5 138	5 138
Capital expend	0	7 700	6 900	–3 775	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Cashflow	–15 350	–24 272	–14 420	3 049	–1 146	–1 762	–2 087	–1 302	–387	868	3 018	3 768	4 378	4 868	4 878	4 938	4 938	4 938	4 938	4 938
Scenario 2 Addiitional woodchip profits: high case																				
Operating profit	–13 850	–9 712	–3 950	–726	–596	–2 412	–2 562	–1 952	–1 212	–132	2 018	2 768	3 378	3 868	3 878	3 938	3 938	3 938	3 938	3 938
Woodchip adj.						2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400
Adjusted profit	–13 850	–9 712	–3 950	–726	–596	–12	–162	448	1 188	2 268	4 418	5 168	5 778	6 268	6 278	6 338	6 338	6 338	6 338	6 338
Redundancy	1 500	6 860	3 570	0	350	350	525	350	175	0	0	0	0	0	0	0	0	0	0	0
Profit after extraord	–15 350	–16 572	–7 520	–726	–946	–362	–687	98	1 013	2 268	4 418	5 168	5 778	6 268	6 278	6 338	6 338	6 338	6 338	6 338
Capital expend	0	7 700	6 900	–3 775	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Cashflow	–15 350	–24 272	–14 420	3 049	–1 146	–562	–887	–102	813	2 068	4 218	4 968	5 578	6 068	6 078	6 138	6 138	6 138	6 138	6 138

6.5.3 Gradual Redundancy Plan

We have set out below forecast profitability and cashflows for Tasrail under the gradual redundancy plan.

TABLE 6.10 CASHFLOW UNDER GRADUAL REDUNDANCY PLAN FOR THE 20 YEARS ENDING 30 JUNE 2010 (IN 1990 DOLALRS)

	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
	$'000	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*	*$'000*
Expenditure																				
Traffic operations	12 300	11 610	10 602	9 572	9 202	8 845	8 453	8 078	7 880	7 791	7 769	7 769	7 769	7 769	7 769	7 769	7 769	7 769	7 769	7 769
Fuel costs	3 100	3 100	3 200	3 400	3 300	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100
Total operations	15 400	14 710	13 802	12 972	12 502	11 945	11 553	11 178	10 980	10 891	10 869	10 869	10 869	10 869	10 869	10 869	10 869	10 869	10 869	10 869
Civil engineering	8 400	8 999	9 923	10 919	11 522	11 779	11 929	11 442	10 579	9 130	7 734	6 984	6 374	5 884	5 874	5 814	5 814	5 814	5 814	5 814
Mech. engineering	8 000	7 927	6 942	6 109	5 686	5 601	5 563	5 405	5 526	5 736	5 736	5 736	5 736	5 736	5 736	5 736	5 736	5 736	5 736	5 736
Signals	1 600	1 604	1 298	1 085	966	917	877	873	913	943	943	943	943	943	943	943	943	943	943	943
Total maintenance	18 000	18 531	18 162	18 113	18 174	18 297	18 369	17 719	17 017	15 808	14 412	13 662	13 052	12 562	12 552	12492	12 492	12 492	12 492	12 492
Admin and general	3 000	3 203	3 022	2 868	2 776	2 668	2 614	2 560	2 533	2 533	2 533	2 533	2 533	2 533	2 533	2 533	2 533	2 533	2 533	2 533
Non functional exp.	500	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
	3 500	3 253	3 072	2 918	2 826	2 718	2 664	2 610	2 583	2 583	2 583	2 583	2 583	2 583	2 583	2 583	2 583	2 583	2 583	2 583
Total expenditure	36 900	36 494	35 036	34 003	33 502	32 960	32 586	31 507	30 579	29 282	27 864	27 114	26 504	26 014	26 004	25 944	25 944	25 944	25 944	25 944
Revenue	23 008	24 720	27 083	29 780	30 161	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515	28 515
Expenditure	36 900	36 494	35 036	34 003	33 502	32 960	32 586	31 507	30 579	29 282	27 864	27 114	26 504	26 014	26 004	25 944	25 944	25 944	25 944	25 944
Operating profit	−13 892	−11 774	−7 953	−4 223	−3 341	−4 445	−4 071	−2 992	−2 064	−767	651	1 401	2 011	2 501	2 511	2 571	2 571	2 571	2 571	2 571
Redundancy	1 500	2 508	1 914	1 551	1 188	792	1 056	693	264	33	0	0	0	0	0	0	0	0	0	0
Profit after redundancy	−15 392	−14 282	−9 867	−5 774	−4 529	−5 237	−5 127	−3 685	−2 328	−800	651	1 401	2 011	2 501	2 511	2 571	2 571	2 571	2 571	2 571
Capital expenditure		5 550	5 200	2 625	2 325	2 275	1 400	−3 650	300	300	300	300	300	300	300	300	300	300	300	300
Net expenditure	−15 392	−19 832	−15 067	−8 399	−6 854	−7 512	−6 527	−35	−2 628	−1 100	351	1 101	1 711	2 201	2 211	2 271	2 271	2 271	2 271	2 271

7. CAPITAL STRUCTURE

Earlier in this report the financial projections and breakeven potential of Tasrail were estimated. That analysis was on the basis of pre-tax pre-interest operating cash flows. The presumption is that if those cash flows are not positive in the foreseeable future the business does not have a positive value. The conclusions from the breakeven analysis is that there is potential for positive operating cash flows to be achieved, but this will require significant capital contributions in the early years and the positive cash flows are dependent upon those capital investment projects and major efficiency measures being undertaken. Whether or not the business has a positive net present value has not been estimated and is not in the Terms of Reference, however the forecast operating cash flows indicate the commitment required by the owner and the eventual payoff to that commitment. This analysis is critical to any recommendation as to capital structure but before addressing the specifics of that question the next section discusses the determinants of capital structure in the private sector. This discussion will provide a background for recommendations on Tasrail's capital concerns.

7.1 Determinants of Capital Structure of Private Sector Firms

In discussing capital structure it is also important to note that dividend policy is equally a part of the financing decisions of the firm. As such it is important to consider the determinants of dividend policy when also considering the determinants of capital structure. A number of factors are relevant to these choices.

1. **The taxation advantages of various funding instruments.** The objective of private sector firms in deciding capital structure is to issue a combination of securities which provides funds at the lowest overall cost. Relative to equity, debt securities have a lower risk and a lower required rate of return. Ignoring tax for the moment, the introduction of debt to replace some equity does not reduce the overall cost of funds. While debt is lower cost, the introduction of debt increases the risk of the equity and as such the required rate of return on the equity rises and the overall cost of funds remains unchanged. When taxes are considered the analysis must be extended to include the consequences of payments made to the taxation authority. There are now three parties that have claims on the operating surplus of the firm; equity investors; debt investors; and the taxation authority. If the taxation authority can be made worse off, the equity and debt investors will generally be made better off which may result (if the gains are shared) in these investors requiring lower rates of return on securities issued by the firm. When determining whether the taxation authority has been made worse off it is important to consider all the taxation consequences and not just the taxation paid by the firm. For example, the reduction in corporate tax associated with tax deductible debt securities may be offset by the tax paid by debt holding investors receiving taxable interest income. As such the required rate of return before tax to the debt securities will be increased accordingly and there is no tax benefit to debt even though the level of corporate tax is lower. There is no

increased value of equity as a result, and hence no advantage to using debt funding.

In some cases a particular class of investor faces a lower rate of tax than the firm, resulting in lower overall taxes being paid. Whether this translates to a gain for equity holders depends upon whether the lower tax is shared with the company. If the advantage lies solely with the investor and can be achieved by investing debt in any firm, the tax benefit will remain with the investor and there is no incremental value to the equity holders and the cost of funds to the firm remains unchanged.

At various times there are discrete opportunities for a company to share a particular (and usually short term) tax advantage and corporate treasuries are constantly seeking such opportunities.

So long as management believes there is a tax advantage to having debt, its capital structure will be affected by tax consideration.

The taxation consequences facing Government Trading Enterprises are generally quite different from their private sector counterparts and any capital structure choices that are driven by tax planning within private sector firms will provide inappropriate benchmarks for the capital structure choices in Government owned businesses. Further, it is extremely difficult for outside analysts to identify and eliminate capital structure choices that are motivated by taxation planning as opposed to those decisions motivated by non-tax reasons.

Even if Government businesses are subject to tax equivalent payments, private sector comparisons will be inappropriate. Tax equivalents are paid to the Government which is also the equity investor and thus there is no purpose in minimising the payment of tax equivalents without exactly compensating the shareholder. The Government would prefer its managements did not incur costs in attempting to minimise tax equivalents as such costs represent deadweight losses.

2. The consequences of potential corporate distress, ie. the cost of bankruptcy. The contractual conditions that apply to debt provide a mechanism which allows debt investors (ie. lenders) to take over the management of a firm's assets whenever the performance of the existing management falls below some target rate. If the firm is unable to meet its interest payments the debtholders are able to force significant changes on the management of the firm. These rights of debtholders are clearly apparent in private sector firms in Australia in the 1990s and these rights of debtholders will generally serve to prevent management funding a very high proportion of their assets by way of traditional debt.

The specific problem with high debt levels is the likelihood that the asset value will fall and erode the value of the equity. In that case the lenders use their rights to step in to protect their investment.

The decline in asset value is independent of the debt level and reflects the lower expected operating cashflows to these assets. When such an asset decline occurs to firms with high debt, the dissipation in shareholders equity is proportionately higher and the assets will be transfered to the creditors sooner. It does not necessarily follow that the asset values will decline further because the creditors take control, but there are undoubtedly some losses when the firm is broken up or auctioned as is common in receivership. It is these subsequent value declines that are the costs of bankruptcy and to the extent that these are significant, lenders and Boards and managements are reluctant to set too high a level of debt in the capital structure.

It follows that the prudent level of debt is dependent upon the uncertainty and volatility of the underlying operating cashflow of the business. It is also a function of the type of assets in the firm since some assets lose little value if the firm faces bankruptcy while others decline significantly.

With a Government guarantee on debt, the probability of bankruptcy of a business is zero and lenders will provide more debt funds than if the guarantee was not there. Of course if the Government guarantee is removed, including any implicit guarantee, the debt capacity will be determined in the same manner as in the private sector.

The pricing of the Government guarantee and the practice of charging agencies for it may not alter the probability of bankruptcy if these agencies view the Government as more lenient than outside lenders and therefore it may not significantly affect the level of debt carried by agencies.

3. Agency costs and debt financing. One of the risks facing shareholders who invest in companies is that the managers will not always act in the shareholders best interests. As agents for the shareholders, managers will sometimes see personal advantages in pursuing actions that do not maximise the value of the shares. These agency costs arise from the discretion that management has over the operating cash flows of the company. It is important that managers have independence to utilise their professional skills, however it is costly for shareholders to monitor managers who may see personal gains from featherbedding, gold plating, etc. This balance between allowing professional management to manage and at the same time providing adequate protection of shareholders, is the nub of the corporate control dilemma.

Shareholders often require higher levels of debt to reduce the discretionary cash flows available to management. Since lenders can be expected to be brutally commercial with managers and Boards that fail to cover interest obligations, a high level of debt can focus the attention on maintaining an efficient operation to ensure that interest obligations are met.

While the tax and bankruptcy motives for capital structures in the private sector do not apply in the public sector, the impact of debt financing on agency costs will be equally applicable so long as managements and Boards of Government owned businesses believe that the likely penalties for failing to meet interest obligations will be equally as severe in the public sector as they are in the private sector. The imposition of large interest commitments can substantially reduce the discretionary cash flow available.

7.2 Determinants of Dividend Policy of Private Sector Firms

1. The taxation consequences of dividends versus retention. Investors are concerned with their returns after the payment of all taxes. If the personal taxation consequences to investors are different with respect to dividends versus retained earnings and capital gains, investors will have clear preferences for return in one form versus the other. Insofar as the taxation on capital gains is lower than the taxation on dividends, firms that are able to provide investors a return in the form of capital gains may be able to attract funds with lower required rates of return.

In Australia the imputation tax system permits Australian corporate tax paid by Australian resident companies to be set off against any personal Australian income tax liabilities facing Australian residents who receive franked dividends from these companies. Firms in the private sector may therefore set their dividend payout ratios as a function of the Australian corporate tax paid to permit their investors to obtain immediate access to the imputation tax credits generated within the firm. For example, on November 15 1990, Westpac announced that it would maintain its 52.5c fully franked annual dividend in the face of a 39% fall in net profit. This raised the dividend payout ratio to 87% of net profit. This dividend policy may have been an attempt to fool investors concerning the financial health of Westpac (as suggested by some media commentators), but it is more likely to have been motivated by the desire to pass on the benefits of the imputation tax credits to institutional investors. Any excess of imputation tax credit over the tax liability arising from the franked dividend for the investor represents an interest free loan from the investor to the Government. The longer the time delay between the payment of corporate taxand the distribution of franked dividends, the longer the period the Government has access to this interest free loan.

Many companies have increased their dividend payout ratios subsequent to the introduction of imputation tax. When equity funds are required for capital expenditure the companies have introduced dividend reinvestment schemes or used rights issues.

Given that the Government is indifferent, for tax reasons alone, between dividends and capital gains the dividend policies of private sector companies are not valid comparisons for Government owned businesses.

2. The information content of dividends or dividends as signals. Generally management and Boards are expected to have a better fix on the prospects and underlying value of the firm than shareholders who are not involved in day to day operating activities.

To shareholders the maintenance of dividends is a signal that the firms prospects are continuing as expected. An increased dividend generally suggests improved prospects and decreased dividends bode poorly. Moreover shareholders can be confused by fluctuating dividends and the credibility of dividend signals is eroded if a dividend increase is followed quickly by a subsequent dividend decrease.

In this scenario dividend changes are viewed as signals of a change in the future prospects and Boards are reluctant to change dividends unless they are confident that the change is somewhat permanent and reliable. Dividends then become a credible signal to investors and not surprisingly stock markets react accordingly.

The signalling aspect is not important within 100% owned subsidiaries of holding companies or within divisions of companies because there is not the same degree of information asymmetry or a separation of ownership and control. With only one investor, the information flows between management and shareholder may take many other forms.

Although there is an apparent similarity with 100% owned subsidiaries of holding companies and divisions of companies, information flows between management of Government Trading Enterprises and the Government can be inefficient and historically there has not been the same line of command. However, the history of dividends suggests that signalling changes in underlying value and future prospects has not been a motive.

3. Agency and control aspects of dividends. One of the factors that affects both the capital structure and dividend decisions within firms in the private sector is the role that these policies can play in controlling sub-optimal decision making by unconstrained management.

Management self interest will, unconstrained, lead to two general types of sub-optimal decisions:

1. Sub-optimal operating decisions.

2. Sub-optimal investment decisions.

Executive incentive compensation schemes and performance measurement are usually adopted to help control sub-optimal operating decisions. The executive incentive compensation scheme will give managers the incentive to increase operating efficiency by linking personal rewards with successful performance. Poor performance will result in a lack of personal rewards and a variety of penalties on executives. However, it must be recognised that the ability for outsiders to validly distinguish between 'good' and 'poor' managerial performance is very limited. One reason is the difficulty in establishing valid benchmarks against which actual performance should be measured. A second reason is the difficulty in separating skill from luck. Often managers will be able to argue cogently that poor outcomes have been the result of factors outside their control even when this is not the case.

Nevertheless monitoring schemes are used in divisions and 100% subsidiary situations to constrain management, but they are not used mechanically nor unilaterally by Head Office.

Sub-optimal capital expenditures are associated with management and Board desires for growth and larger scale businesses. The problem lies in the capital expenditure appraisal process where investment decisions are evaluated. Although a formal process of discounted cash flow analysis is usually a central part of the process it is well known that capital expenditure proposals can be reconfigured to meet hurdle rates and other formal benchmarks.

The capital expenditure approval process is critical since the future value of the firm is tied to those decisions. Since dividend payout is the residual earnings not earmarked for capital expenditure, the payout decision can reduce the discretion of the Board and management to undertake capital investments using internally generated funds.

This discretion can be reduced by imposing a higher dividend payout policy. The same capital expenditure can be made but the funds must then be provided by debt and equity injections where the investors have the opportunities to scrutinise the intended projects. On the other hand to the extent it is more difficult to convince those investors of legitimate value creating opportunities the imposition of a higher dividend payout and the consequent lack of discretion on the use of earnings, can result in some positive value projects being foregone.

Removing discretion will not necessarily eliminate agency costs and in effect shifts the monitoring burden to the capital expenditure appraisal process. For this to be effective there must be rigorous evaluation techniques but there must also be the correct incentives for the assessors to act diligently.

Nevertheless dividend payout is one means of constraining sub-optimal capital expenditure.

This does highlight, however, that the problem is not so much one of optimal dividend policy but one of establishing an optimal capital expenditure approval process.

7.3 Specific Recommendations for Tasrail

The first issue is to recognise the relationship of Tasrail to AN and to the Government. Irrespective of the historical designation of cash contributions to Tasrail the facts are that Tasrail is a wholly owned Government Trading Enterprise within the AN umbrella. Moreover Tasrail has no capacity to raise debt capital on its own account and all debt raisings are recourse to the Government if not directly raised by Government.

It makes no sense to consider Tasrail's capital structure as being any more than totally Government funded: the Government is the shareholder and the Government raises debt to inject into Tasrail. From the Government's perspective it is entitled to 100% of the operating cash flows unless it has committed those cash flows to third party lenders. While the Government may designate some or all of these past cash contributions as being loans and not equity injections, the economic reality is that its entitlement is to receive 100% of the operating cash flows, nothingmore and nothing less. Apart from incentive factors which were discussed above, the distinction on the Tasrail balance sheet (if there was one) of debt and equity contributions from the Government is totally arbitrary.

It follows that the Government concern should not be with imposing a debt/equity structure on Tasrail but on ensuring it maximises the operating cash flows generated by Tasrail. If the Government imposes an annual interest cost on Tasrail this will equivalently reduce the cash flows available for distribution as dividend to the Government. Moreover whether the Government decides to take the operating cash flows in the form of dividends or interest or indeed taxes is somewhat irrelevant.

The Government controls the total distribution from Tasrail and the classification of that distribution has no impact on the underlying value of Tasrail, which is determined by the performance of the management in the use of the assets.

On the other hand, as noted above, the Government as owner will be concerned at the discretion allowed management with the use of the operating cash flows. If the Government is concerned at discouraging operating inefficiencies the use of debt and a consequent interest charge imposes a discipline on management to at least meet that target in its operating income.

Of course an interest obligation to a shareholder is quite different to an interest obligation to an independent third party and it is unclear that management will respond differently to having an interest obligation than it would to a dividend payout obligation. Since it is unlikely that third party debt could be raised on the back of the cash flows of Tasrail alone, the Government should focus its attention on the dividend payout policy and the discretion that management has to reinvest operating cash flows in capital projects.

In sum, the optimal capital structure for Tasrail is a moot question given the ownership structure and the financial position of Tasrail. The Government's interests would be better served by designing incentive mechanisms that ensure the operating income of Tasrail was maximised and that the reinvestment of positive operating cash flows or capital contributions for investment projects is scrutinised to ensure such projects have positive net present value and are designed to maximise the value of the business.

APPENDIX II FORECAST LOSSES OF TRAFFIC AND REVENUE IN 1991–92 AND 1992–93

For the closure scenario analysed in chapter 4, it was assumed that the government would announce its decision in 1991 and that closure would occur on 30 June 1993. Tasrail customers could not be expected to maintain demand at the levels that would prevail if they believed the railway would be retained after 1993. They will begin entering arrangements with trucking operators to acquire the additional trucks necessary, and commence modifying handling equipment, well before the closure date to ensure a smooth transition. Traffics most vulnerable to road competition such as those on shorter distances would be first to be lost.

Modified forecasts of tonnages and revenues for 1991–92 and 1992–93 following announcement of closure were provided to the BTCE by Tasrail. Revenue forecasts used are summarised in table II.1.

The main assumptions underlying these forecasts are as follows:

- Containers — very limited loss of freight in the first year with greater impact in the second.
- Cement — intrastate cement will shift to road in increments but cement for export to the mainland will stay on rail as long as possible due to the environmental problems in shifting the large quantities of cement involved onto road.
- Fertiliser — some depots would be switched to road, taking advantage of back-loading of lime; the other depots would remain with rail until shortly before closure.
- Pulpwood logs — ANM is unlikely to change to road until shortly before closure.
- Woodchip logs — APPM would quickly switch to road for transport of logs from Herrick which is close to the chip mill at Longreach. Within 6 to 12 months logs from Malahide and South Burnie would be shifted to road. Wiltshire is likely to remain until the last six months of the two-year period before closure. Forest Resources would immediately switch Conara from rail to road, followed by Parattah within 6 to 12 months. Florentine and Wiltshire would remain with rail until just before closure because Forest Resources needs the storage capacity provided at railheads.

- Sulphuric acid — Tioxide is likely to change from long haul of acid by rail from Risdon to Heybridge to shipping from Risdon to Burnie and rail from there to Heybridge as soon as shipping capacity could be found. This is assumed to occur in 1992–93.

TABLE II.1 FORECAST RAIL REVENUES UNDER CLOSURE AND RETENTION SCENARIOS FOR 1991-92 AND 1992–93
($'000)

	1991–92		*1992–93*	
Commodity	*Retention*	*Closure*	*Retention*	*Closure*
Containers	3 051	2 959	3 051	2 731
Cement	1 884	1 884	2 437	1 862
Fertiliser	1 500	1 404	1 500	1 096
Coal	5 057	5 057	5 064	4 000
Minerals	1 771	1 550	1 792	1 299
Pulpwood logs	3 302	3 269	3 485	3 169
Woodchip logs	6 788	5 384	8 385	3 711
Sawn timber	15	13	15	11
Sulphuric acid	1 066	1 066	1 068	327
Total	24 435	22 587	26 798	18 206

Note Owing to rounding, figures may not add to totals.

APPENDIX III REALISABLE VALUE OF TASRAIL'S ASSETS

Estimates of the realisable values of its assets were provided by Tasrail. Since most of the moveable assets, including those being sold for scrap, would have to sold on the mainland, allowances of 10 per cent of realisable values have been made for freight costs. Proceeds from sales of plant and equipment have been split equally over the two years following closure. In the case of land and buildings, the larger, more valuable properties are likely to be sold first, so two-thirds of the proceeds have been assigned to 1993–94 and one-third to 1994–95. Table III.1 summarises the list of assets and their values, separating out the larger ones, and showing how the figures used in the analysis were derived.

TABLE III.1 REALISABLE VALUE OF TASRAIL ASSETS
(1989–90 $'000)

		Proceeds	
Item	*Value*	*1993–94*	*1994–95*
Scrap value of rollingstock	1 150		
Less freight (10 per cent)	–115		
	1 035	518	518
Land and buildings			
Main Centres	13 830		
Houses	250		
Land occupied by tracks	1 620		
Total	15 700		
Less costs of preparation for sale and commissions	–5 800		
	9 900	6 600	3 300
Scrap value of rails and sleepers			
Steel rail	7 212		
Steel sleepers	1 575		
Hardwood sleepers	4 500		
Total	13 287		
Less recovery cost	–4 874		
Less freight (10 per cent)	–841		
	7 571	3 786	3 786
Other plant and equipment			
Civil branch	5 500		
Mechanical branch	4 300		
Signals and communications	2 000		
Total	11 800		
Less freight (10 per cent)	–1 180		
	10 620	5 310	5 310
Less sale coordination costs	–500	–250	–250
Year totals		15 963	12 663

APPENDIX IV TRUCK COSTS

If Tasrail was closed in 1993, it is estimated that an additional 359 million tonne-kilometres of freight would be transferred to road in 1993–94 with little change thereafter. Details of the projected road task are shown in table IV.1. The costs of purchasing and operating the prime movers and trailers necessary to perform this task are the primary costs to society of shutting down Tasrail.

RESOURCE REQUIREMENTS OF TRUCKING OPERATIONS

To derive the truck and labour requirements the following operational assumptions were made:

- All the additional freight task would be handled by six-axle articulated trucks with tare weights of approximately 15 tonnes, gross combination masses of up to 41 tonnes and payloads of up to 26 tonnes.
- The new freight task would be carried both by owner-drivers and trucking firms or contractors in the proportions 50:50 for log traffic and 30:70 for the remainder — the same assumption as made in BTE (1987a). The trucking firms or contractors would employ salaried drivers and would operate trucks for two shifts per day for container freight, cement from Railton to Devonport and sulphuric acid from Burnie to Heybridge, and one shift per day for the remainder. The particular cement and acid tasks included in the two shifts per day category entail carriage of large volumes of freight over very short distances.
- Prime movers were assumed to function for 50 weeks per year. Company-employed drivers were assumed to work for 46 weeks per year and owner-drivers for 50 weeks per year.
- Owner-drivers work 6 days per week and company employees 5 days per week.
- All trucks except those used for container cartage have no back-load. In the case of containers the total number of trucks needed on each route was calculated, including those required to carry empty containers, and the surplus or deficit of trucks at each origin or destination was obtained. The routes and numbers of empty trucks necessary to even up the imbalances while minimising the total kilometres travelled empty were then ascertained. On the 1993–94 forecast a total of 461 000 vehicle-kilometres would be performed by empty trucks representing 12.3 per cent of the total needed to

carry out the container task. A further 744 000 vehicle kilometres representing 19.1 per cent of the task would be devoted to carriage of empty containers.

- Prime movers would require replacement every eight years and trailers after 12 years. For every prime mover there would be 1.6 trailers (BTE 1987b).
- Rail protection fees would be abolished following the railway closure.
- The average payload for trucks carrying loaded containers is 18 tonnes, for fertiliser and sawn timber 20 tonnes, and 26 tonnes for the remainder.
- The average speed is 75 kilometres per hour.
- Loading and unloading time is one hour per trip except for:
  - logs to mills other than Forest Resources; and
  - coal from Merrywood to Burnie;

  where no loading and handling time has been assumed because the road trip currently ending at the rail siding is assumed to continue on to the final destination.[1]
- All roads travelled on are bitumen with flat to undulating terrain.[2]

On the basis of these assumptions, for each route, a number of possible round trips per day was worked out. This was done taking into account the legal maximum driving time in Tasmania of 11 hours per day and reasonable total hours per day including loading and unloading time. The average hours worked per week based on the 1989–90 rail task mix of commodities and routes is 44.4 for company employees and 52.9 for owner-drivers and the average annual distance travelled by a prime mover is 152 000 kilometres for company owned operations and 161 000 for owner-driver operations. These average hours and distances figures were not assumed but are the outcome of the assumptions mentioned already.

Table IV.2 shows truck and labour forecasts for the years shown in the previous table. The estimates of 'other labour' refer to employment created in areas which service the trucking industry. These include mechanics, clerical staff, forklift drivers and other support service staff engaged in fuel sales and tyre supplies. Following BTE (1987a), the ratio of full-time truck drivers to staff engaged in other functions in the road transport industry was taken to be 1.5:1. These estimates are not used in costing truck operations but are relevant for assessing the net employment consequences of closure of Tasrail.

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1. Currently, APPM, Forest Resources and ANM effectively use Tasrail's facilities for stockpiling. Forest Resources does not have room at its Longreach mill to hold the necessary stockpile. It would have to purchase land elsewhere and still incur the cost of double handling. Merrywood coal has to be trucked to the rail siding so there would be a saving in handling costs changing from rail to road.

2. It might be though that this assumption is inappropriate for log trucks taking logs out of the bush. However, we are only interested in road in so far as it is a substitute for rail. Transport by road from the bush has to occur no matter which mode delivers the logs to the mill. The part of the journey where road is a substitute for rail is over main roads and highways.

TABLE IV.1 FORECAST ROAD TASK

Freight task	*1991–92*	*1992–92*	*1993–94*	*1994–95*	*1995–96 and onwards*
Thousand tonnes	165	613	2 496	2 558	2 441
Million tonne-kilometres	25	104	359	362	357

TABLE IV.2 VEHICLE AND LABOUR REQUIREMENTS AND ASSOCIATED COSTS FOR CONVEYING THE FORECAST FREIGHT TASK

Item	*1991–92*	*1992–92*	*1993–94*	*1994–95*	*1995–96 and onwards*
Number of trucks	12	54	181	183	179
Number of trailers	19	86	289	292	286
Number of employees:					
Owner-drivers	5	23	71	72	71
Company drivers	8	35	139	141	137
Other labour	9	39	140	141	138
Total private costs ($ million)[a]	2.3	9.8	33.9	34.2	33.7

a. 1989–90 dollars; excludes 'other labour' costs.

PRIVATE COSTS OF TRUCKING OPERATIONS

To estimate costs the Austway Data Pty Ltd Truck Cost model was employed. The cost categories identified in the model are capital costs, registration, administration, drivers' remuneration, other overheads, fuel, repairs and maintenance, and tyres.

Capital costs

The Austway model is able to provide purchase prices of prime movers and trailers. Purchase prices all expressed in 1989–90 dollars were $168 000 for a prime mover, $27 000 for skeletal trailers used for logs and containers, $91 000 for tankers used for clay, cement and acid, and $41 000 for tippers used for fertiliser, coal and quartz.

Following BTE (1987a), prime movers and trailers were assumed to have residual values of 20.0 and 0.0 per cent respectively and capital costs were annuitised over the lives of the equipment using a 15 per cent real interest rate. Under these assumptions, the annual capital cost is 20.8 and 18.4 per cent of the purchase price for prime movers and trailers respectively.

Insurance, motor tax and registration

The prime movers and trailers were assumed to have comprehensive insurance and to be registered in Tasmania. According to the Austway model the annual charges are $1371 for prime movers and $121 for trailers.

Administration

This covers such items as accountancy, bank charges, postage, rates and taxes, stationary, telephone and faxes.

Drivers' remuneration and other overheads

The wage received by the company-employed drivers consists of the basic wage for a 38-hour week set out in the Transport Workers Award plus overtime. Given trip details including the number of round trips per day, the Austway model calculates wages and overtime on the basis of the award. For company employees the heading 'other overheads' includes workcover, payroll tax, superannuation, annual leave, annual leave loading, sick leave, bereavement leave, long service leave provision and public holidays.

In the absence of any recent data on the average earnings per hour for owner-drivers they were assumed to receive the same remuneration after overheads as though they were working under the award. For owner-drivers, 'other overheads' consist of workcover, personal sickness and accident insurance, holidays and superannuation. Overheads for owner-drivers are less than half those for company employees. The average hourly remuneration for owner-drivers including overheads worked out at $14.33. This is not widely divergent from the rate of $11.80 in 1986–87 dollars used in BTE (1987a).

In both the company and owner-driver cases, drivers were assumed to participate in loading and unloading so that hours spent in this way would be taken into consideration in costing the operation.

Fuel, repairs and maintenance, and tyres

Fuel consumption and repairs and maintenance in the Austway model increase with the age of vehicle by use of indexes. The discounted present value of these indexes at a 15 per cent real discount rate was taken and annuitised over the life of the prime mover or trailer for the purpose of estimating private costs.

The purchase price of fuel for 1989–90 was taken as 60 cents per litre.

The Austway model assumes that all steer tyres are new. The other tyres were assumed to be retreads. Austway offers a choice of a several brands of tyres and tyre sizes as well the option of choosing the 'average' brand and size. The average was selected here.

Summary of private costs

Table IV.3 summarises the private costs per kilometre of operating the average company and owner operated trucks. The costs shown here are for the average vehicle carrying the 1993–94 task mix of commodities.

RESOURCE COSTS OF TRUCKING OPERATIONS

The private cost estimates in table IV.3 were based on retail prices which included various taxes and transfer payments. These usually have to be excluded to obtain the true cost to society of resources actually expended.[3] The following adjustments were made to private costs to obtain resource costs:

- deduction of 20 per cent sales tax and 17 per cent import duty from the purchase prices of trailers and prime movers;
- exclusion of 23.49 cents per litre fuel excise and 6.7 cents per litre State fuel franchise tax (the average levels for 1989–90) from the price of distillate;
- deduction of 20 per cent sales tax and 19 per cent import duty from the price of tyres; and
- exclusion of registration and third party insurance costs.

The *resource costs obtained after deducting taxes from purchase prices* were annuitised over the lives of the equipment at the discount rate. Conversion to annual costs would be unnecessary but for the fact that failure to do so would result in costs of equipment with lives extending beyond the period of the analysis being included without being offset by the associated benefits.

Registration and third party insurance are also transfer payments. Although funds raised from registration, as well as from taxes on fuel, contribute towards the upkeep of roads, the nexus between amounts raised from individual trucks and the road pavement damage costs imposed by those trucks is far too tenuous for registration and taxes to be used as a proxy for road damage costs. Road damage costs are estimated separately in appendix V. Similarly, third party insurance pays for some accident costs but costs of road fatalities and injuries are estimated directly. Even though insurance costs are transfer payments, they have been left in as a proxy for the property damage costs of accidents because there is inadequate data to permit direct estimation.

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3. The exception, where none or only part of a tax would be deducted from a retail price, occurs where all or part of the resources are made available through a reduction in domestic consumption instead of from increased domestic production or through international trade. Where the resources are acquired at the expense of domestic consumption, the value of those resources to society is given by their market price. Since trucks, fuel and tyres are internationally traded goods which can reasonably be assumed to be available in infinitely elastic supply over the relevant range, this complication was not considered relevant to the present study.

TABLE IV.3 AVERAGE FINANCIAL COSTS FOR OPERATING A SIX-AXLE ARTICULATED TRUCK[a]
(cents per vehicle-kilometre travelled)

Cost item	*Employee-driver*	*Owner-driver*
Prime mover	23.1	21.8
Trailer	8.2	6.8
Insurance	7.9	7.2
Registration and third party	1.0	0.9
Administration	6.7	6.7
Wages and overheads	22.9	22.2
Repairs and maintenance	16.5	16.5
Tyres	8.6	8.6
Fuel	27.9	27.9
Total	122.6	118.2

a. Averages for 1993–94 forecast freight task.

TABLE IV.4 AVERAGE RESOURCE COSTS FOR OPERATING A SIX-AXLE ARTICULATED TRUCK[a]
(cents per vehicle-kilometre travelled)

Cost item	*Employee-driver*	*Owner-driver*
Prime mover	13.4	12.7
Trailer	4.6	3.8
Insurance	7.9	7.2
Registration and third party	–	–
Administration	6.7	6.7
Wages and overheads	22.9	22.2
Repairs and maintenance	17.1	17.0
Tyres	6.0	6.0
Fuel	10.6	10.6
Total	89.2	86.1

a. Averages for the 1993–94 forecast freight task. Capital, fuel and repairs and maintenance costs estimated at a discount rate of 10 per cent.

For estimating social costs the fuel and repairs and maintenance cost age indexes from the Austway model were discounted to present and annuitised using the assumed discount rate.

The shadow price of labour in the road haulage industry was discussed in chapter 4.

Summary of resource costs

Table IV.4 summarises resource costs per vehicle-kilometre for the average vehicle carrying the 1993–94 task mix of commodities. The shadow price of labour in the table is assumed to equal its financial cost.

REVENUE

The road haulage industry tends to be highly competitive due to the relative ease of entry. Profits therefore could reasonably be expected to be 'normal' in the economic sense with revenue being equal to private costs as determined by the above assumptions. Estimated revenues per truck for the three years following the assumed rail closure, 1993–94, 1994–95 and 1995–96, were $187 500, $187 600 and $188 200 respectively.

APPENDIX V LIFE CYCLE COSTING ANALYSIS TO ASSESS THE ROAD ASSET PRESERVATION REQUIREMENT AND VEHICLE OPERATING COST IMPLICATIONS

The cost-benefit analysis presented in chapter 4 included among the costs of closing Tasrail, the additional costs of preserving the road pavement asset, and the extra vehicle operating costs imposed on existing road users by increased road roughness. This appendix outlines the methodology used to estimate these costs.

THE BTCE LIFE CYCLE COSTING MODEL

Expenditure on maintenance and rehabilitation of Australia's road system is representing an increasing proportion of road funds. To facilitate economic evaluation of road asset preservation works, the Bureau has developed a pavement life cycle costing (LCC) model. The LCC technique can be used to analyse interactions between the traffic and road pavement for differing environmental conditions over time. Both routine maintenance and other forms of pavement asset maintenance including reseals, overlays and pavement reconstruction are evaluated. Routine maintenance and rehabilitation can be assessed against road construction options to minimise total costs.

The model has drawn on the results of extensive research undertaken by the World Bank (1986). The pavement deterioration algorithm which is used in the model is an Australian adaptation of the algorithm used in the World Bank Highway Design and Maintenance Standards Model (HDM-III). The Bureau model has incorporated Australian road conditions and pavement measurement characteristics as well as vehicle operating costs as a function of pavement roughness.

This model has a number of applications including the optimisation of construction, maintenance and vehicle operating costs and an estimation of benefit-cost ratios. It can also be used to examine pavement damage caused by heavy vehicles and also cost recovery issues. One of the strengths of the model is its flexibility, which has enabled it to be restructured to suit the Tasrail examination.

The deterioration algorithm used in the model

The LCC model is a spreadsheet based computer model which iterates through a period of 40 years to examine the life of a road pavement. The deterioration algorithm recalculates the incremental change for each of those years. Various maintenance and rehabilitation options can also be tested during that simulated period. Cracking and rutting of the pavements can also be considered. The algorithm deteriorates pavement roughness over time using a truck traffic — pavement strength component, and also an environmental deterioration function. A simplified version of the deterioration relationship is given below:

$$dRGH = C_1*dTRCK*(PVSTR)^{-5} + C_2*dCRRUT + C_3*EXRGH$$

where dRGH is the change in roughness, dTRCK is the change in equivalent standard truck axles per year travelling over the pavement, PVSTR is the pavement strength, dCRRUT is a function relating to cracks and ruts in the pavement and EXRGH is the existing roughness. C_1, C_2 and C_3 are constants.

Vehicle operating cost algorithm

The LCC model contains a relationship between vehicle operating costs and pavement roughness which was developed using regression analysis of the World Bank Vehicle Operating Cost Model (World Bank 1986). The resulting equations were calibrated against truck costs derived from the Austway model (see appendix IV), and against the results published in NRMA (1989) for cars. In both cases resource costs (excluding fuel excise, sales and other taxes) were used.

The equation relating vehicle operating costs to roughness for cars has the following form:

$$VOC = C_4 + C_5*(EXRGH)^2$$

where VOC is the vehicle operating costs, EXRGH is the existing roughness, and C_4 and C_5 are constants.

The equation relating vehicle operating costs to roughness for trucks has the following form:

$$VOC = C_6 + C_7*EXRGH$$

with the components as described above.

Any relationship between vehicle operating costs and roughness, including the above, should only be considered as approximate as the impact of roughness on vehicle operating costs is an area requiring considerably more research.

Further details of the deterioration and the vehicle operating cost algorithms are contained in BTCE (1990a) which describes the development and the use of the LCC model.

DATABASE OF THE TASMANIAN ROAD SEGMENTS AFFECTED

To estimate the implications of the closure of the rail system on the roads the Bureau firstly created an inventory of the 42 road segments likely to be affected. Each segment inventory included road length, width, car and truck traffic before and after closure, current condition and unit costs for construction and maintenance. On those 42 segments totalling 967 kilometres in length, there are 1185 million kilometres driven annually by cars and 181 million annually by trucks. The inventory was checked and supplemented using the detailed Bass and Midland National Highway inventories. Secondly, the resulting data base was processed using the Bureau LCC model as described below.

ROAD MAINTENANCE IMPLICATIONS

To calculate the rail closure implications on road pavement maintenance and rehabilitation, the model was used to process the 42 segments to examine the existing annual maintenance and rehabilitation requirements for the pavements. Pavement rehabilitation was scheduled at 130 NAASRA roughness counts. After closure, with an increase in truck traffic, the resulting maintenance and rehabilitation was again calculated. Terminal roughness was also set at 130 NAASRA counts. The difference between the net present values produced by the two runs of the model is the cost of the road damage attributable to the extra trucks. The results under the 7, 10 and 15 per cent discount rates were $14.8 million, $13.2 million and $7.5 million respectively.

VEHICLE OPERATING COSTS IMPLICATIONS

After rail closure with the increase in the number of trucks causing the pavements to deteriorate more rapidly, the net present value of the vehicle operating costs would be expected to be higher for all vehicles using these pavements. To estimate this increase the model was used to examine the before and after vehicle operating costs for both cars and trucks on all segments.

The vehicle operating costs obtained in the after closure case also included the extra vehicle operating costs associated with the increase in truck traffic. The results were normalised to test the impact of the roughness increase on the same vehicle fleet. The increase in net present values of the car and truck operating costs under the 7, 10 and 15 per cent discount rates were $8.8 million, $5.3 million and $4.4 million respectively.

APPENDIX VI ESTIMATION OF THE PROJECTED INCREASE IN SIX-AXLE TRUCKS

To estimate the additional average annual daily traffic (AADT) levels of six-axle trucks which would result from closure of Tasrail, the routes over which trucks would carry Tasrail freight were identified. The roads concerned were divided into 42 segments. Numbers of vehicle trips over each segment were derived using the assumptions detailed in appendix IV concerning tonnages carried by the average truck and back-loading for each commodity.

The existing average annual daily traffic for six-axle trucks were estimated by using the AADTs for all vehicles on each of the 42 segments. This information was supplied by the Tasmanian Department of Roads and Transport (DRT 1991). Percentages of all commercial vehicles (cvs) by segment were also provided with these data. The estimate of six-axle trucks was derived for each segment by using the Nicholas Clark and Associates (1987) methodology: AADT * %cv/4. They estimated that the approximate equivalent number of fully loaded six-axle trucks carrying 38 tonnes gross could be obtained by dividing the total number of commercial vehicles both loaded and unloaded by four. This is because they found that in Tasmania approximately half the commercial vehicles were fully loaded and half that number were fully loaded six-axle trucks. If the AADT for all vehicles on a particular segment of road was multiplied by the percentage which was commercial vehicles and this in turn was divided by four, then the result would be the AADT of fully loaded six-axle trucks on that particular segment.

The results are shown in table VI.1. This table enables a comparison to be made between the existing AADTs for six-axle trucks and the projected increase in 1995–96 by road segment.

TABLE VI.1 THE INCREASE IN TRUCK TRAFFIC ON TASMANIAN ROADS AS A RESULT OF THE CLOSURE OF TASRAIL

	Existing AADTs 1991			*AADTs 1995*
		Commercial vehicles		
Segment	*All vehicles*	*All trucks*	*Six-axle trucks*[a]	*Estimated increase six-axle trucks*[a]
Bass Highway				
1 Sisters Creek–Wiltshire Junction	1 640	338	84	53
2 Somerset–Sisters Creek	3 412	481	120	53
3 Burnie–Somerset	15 332	1 181	295	54
4 Burnie–Devonport	9 945	1 034	259	139
5 Port Sorell–Devonport	11 231	1 259	315	145
6 Railton–Port Sorell	6 568	906	227	84
7 Deloraine–Railton	4 577	682	170	136
8 Carrick–Deloraine	7 049	916	229	138
9 Carrick–Launceston	8 236	890	223	26
10 Devonport–Mersey	4 959	466	117	169
11 Mersey–Railton	1 759	158	40	169
12 Railton–Devonport	5 766	594	148	169
13 Railton–Bass Highway	677	62	15	52
14 Bass Highway–Frankford	5 557	578	144	62
15 Port Sorell–West Tamar Junction	1 731	319	80	62
West Tamar Highway				
16 Frankford–Batman Highway	2 896	466	117	62
17 West Tamar–East Tamar	1 811	371	93	62
18 Perth–Carrick	5 826	623	156	112
East Tamar Highway				
19 Lilydale–Launceston	20 031	152	38	82
20 Lilydale–Batman Highway	3 570	414	104	71
21 Batman Highway–Bridgeport	3 604	760	190	133
22 Bridgeport–Bell Bay	3 127	557	139	14
23 East Tamar Highway–Bell Bay	3 197	451	113	14
Tasman Highway				
24 Gladstone–Scottsdale	824	110	27	24
25 Launceston–Scottsdale	1 387	176	44	20
26 Scottsdale–East Tamar	1 047	250	63	10
27 Scottsdale–Blumont	792	na	na	na
28 East Tamar–Lilydale	2 203	275	69	12
29 Blumont–Lilydale	1 211	na	na	12

TABLE VI.1 (CONT.) THE INCREASE IN TRUCK TRAFFIC ON TASMANIAN ROADS AS A RESULT OF THE CLOSURE OF TASRAIL

	Existing AADTs 1991			*AADTs 1995*
		Commercial vehicles		
Segment	*All vehicles*	*All trucks*	*Six-axle trucks*[a]	*Estimated increase six-axle trucks*[a]
Midland Highway				
30 Launceston–Perth	8 258	991	248	92
31 Perth–Conara Junction	4 335	659	165	204
32 Oatlands–Conara Junction	3 296	458	115	157
33 Oatlands–Bridgewater	3 808	564	141	149
34 Granton–Bridgewater	13 646	1 583	396	70
Brooker Highway				
35 Hobart–Granton	29 308	4 250	1 063	63
36 Oatlands–Parattah	637	50	13	8
37 Avoca–Fingal	863	106	27	121
38 Conara Junction–Avoca	949	105	26	121
39 National Park–Maydena	551	77	19	7
40 Lyell Highway–National Park	984	138	34	7
Lyell Highway				
41 Fenton–Granton	4 005	525	131	7
42 Bridgewater–Boyer	1 890	278	70	76

a. Six-axle trucks are referred to in this table because it has been assumed in the cost-benefit analysis that the rail task is transferred to trucks of this size.

Sources DRT (1991).

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ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AN	Australian National Railways Commission
BTCE	Bureau of Transport and Communications Economics
BTE	Bureau of Transport Economics
DRT	Tasmanian Department of Roads and Transport
DTC	Department of Transport and Communications
ISC	Inter-State Commission
NRMA	National Roads and Motorists Association
OECD	Organisation for Economic Co-operation and Development

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ABBREVIATIONS

AADT	Average annual daily traffic level
ABS	Australian Bureau of Statistics
ALTD	Australian Land Transport Development program
AN	Australian National Railways Commission
ANL	Australian National Line
ANM	Australian Newsprint Mills
APPM	Australian Pulp and Paper Mills
ASCO	Australian Standard Classification of Occupations
BTCE	Bureau of Transport and Communications Economics
BTE	Bureau of Transport Economics
CSO	Community service obligation
cvs	Commercial vehicles
dBA	Decibels of sound weighted by A, where A is a weighting scale which identifies those sounds to which the human ear is most sensitive
DCF	Discounted cash flows
DRT	Tasmanian Department of Roads and Transport
ESAL	Equivalent standard (or single) axle load
GBE	Government business enterprise
GCM	Gross combination mass
GVM	Gross vehicle mass
HDM-III	Highway Design and Maintenance Standards Model
ISC	Inter-State Commission
LCC	Life cycle costing (model)
MAFI	Low rigid trailers (also known as dock trailers)
NTK	Net tonne-kilometre
OECD	Organisation for Economic Co-operation and Development
PCRH	Provincial Cities and Rural Highways program
RPF	Rail Protection Fees
RPL	Rail Protection Levy
Tasrail	The Tasmanian railway system
TGR	Tasmanian Government Railway
TTC	Tasmanian Transport Commission
UPT	Urban Public Transport program