# Evaluation of Standard Gauge Rail Connections to Selected Ports

## Report

This report is on the economic and financial benefits and costs of providing standard gauge railway lines to the ports of Brisbane, Melbourne and Geelong. The terms of reference for the study also required the BTE to examine the possible standardisation of the Tocumwal-Mangalore railway line because of the interdependence between the proposed Tocumwal-Mangalore and Melbourne-Geelong links. As a result, the study covered standard gauge links to Fisherman Islands (Brisbane), Swanson Dock (Melbourne) and Geelong, with the latter project including a standard gauge connection between Tocumwal and Mangalore.

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# Evaluation of Standard Gauge Rail Connections to Selected Ports

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## FOREWORD

In August 1981, the then Minister for Transport directed the BTE to investigate and report on the economic and financial benefits and costs of providing standard gauge railway lines to the ports of Brisbane, Melbourne and Geelong. The reference of this study to the BTE followed the February 1981 meeting of the Australian Transport Advisory Council, where State and Commonwealth Transport Ministers had agreed that a study of standard gauge rail access into these ports should be undertaken by the BTE.

This report presents the results of the study.

In carrying out this study, the BTE contacted many organisations which might be affected by the proposed links. The Bureau acknowledges the co-operation of these organisations and in particular the assistance provided by the Queensland Railways, the State Rail Authority of New South Wales and the Victorian Railways (now V/Line). These organisations provided much of the capital cost data used to assess the economic viability of the links.

The study was carried out in the Bureau's Financial Assessment Branch under the direction of Mr A.J. Shaw. The principal component of the research was undertaken by Mr R.K. Starr who was assisted by Mr P. McQuin and Ms L. Vincenzi.

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Canberra
December 1983

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## SUMMARY

In August 1981, the then Minister for Transport, the Hon. R.J. Hunt MP, directed the Bureau of Transport Economics (BTE) to investigate and report on the economic and financial benefits and costs of providing standard gauge railway lines to the ports of Brisbane, Melbourne and Geelong. The referral of this study to the BTE followed the February 1981 meeting of the Australian Transport Advisory Council (ATAC) where State and Commonwealth Transport Ministers had agreed that a study of standard gauge rail access to these ports should be undertaken by the BTE. The terms of reference for the study also required the BTE to examine the possible standardisation of the Tocumwal-Mangalore railway line because of the interdependence between the proposed Tocumwal-Mangalore and Melbourne-Geelong links. As a result, the study covered standard gauge links to Fisherman Islands (Brisbane), Swanson Dock (Melbourne) and Geelong, with the latter project including a standard gauge connection between Tocumwal and Mangalore.

### FISHERMAN ISLANDS

The new port area at Fisherman Islands in Brisbane currently contains two container terminals and a coal loader, and significant expansion of facilities in this area is envisaged. Fisherman Islands is connected to the narrow gauge rail network, and all freight traffic moved to or from interstate locations using the standard gauge connection between Brisbane and New South Wales is currently transhipped at Acacia Ridge.

Five alignment and track options for the provision of standard gauge rail access to Fisherman Islands were considered in the study. Estimated construction costs range from $7.2 million (June 1982 prices) for dual gauging of a new narrow gauge track via Parkinson marshalling yard to $44.1 million for a new and separate standard gauge track along the same general alignment. Branch lines from the proposed link to the Gibson Island factory of Consolidated Fertilizers Ltd ($1.5-$3.0 million) and the Ampol refinery at Lytton ($0.6 million) were also investigated.

A number of potential traffics along the proposed standard gauge connection to Fisherman Islands were considered during the study. The major traffic would be overseas containers centralised between Fisherman Islands and interstate locations (mainly Sydney). Provision of a standard gauge link to Fisherman Islands would not be expected to result in any significant generation of export cargoes from north-eastern New South Wales or diversion of existing export traffic originating in that region from New South Wales ports to Fisherman Islands. A standard gauge branch line to Gibson Island would probably attract some urea traffic while a branch to the Ampol refinery at Lytton could be used to transport petroleum products to north-eastern New South Wales.

A standard gauge link to Fisherman Islands would result in a number of benefits associated with overseas container traffic. Elimination of transhipment at Acacia Ridge would yield resource cost savings of $23.42 per container while faster transit times would provide a benefit to shippers valued at up to $2.74 per container. Other potential benefits from standardisation include greater flexibility in shipping operations, improved defence capability and a reduction of any current or potential congestion on the narrow gauge rail network. A standard gauge link would not be expected to result in any significant train capital or operating cost savings. There could also

be some benefits associated with interstate movements of urea and petroleum products.

The results of the economic evaluation clearly indicate that the only construction option that should be seriously considered on economic grounds is dual gauging of a new narrow gauge line from Parkinson marshalling yard via Eight Mile Plains. The benefit-cost ratio estimates for this option are less than 1 for various discount rate combinations but construction costs would be relatively low and performance of the project is improved if the unquantified benefits are included. It was concluded that standardisation under this option would probably be acceptable on economic grounds. Timing of construction would be determined by the date of an independent decision (if any) to proceed with a new narrow gauge track along this alignment. A branch line to Gibson Island would not be warranted on the basis of economic criteria.

Queensland Railways would be the only rail or port authority whose financial situation would be significantly affected by a standard gauge link to Fisherman Islands. Dual gauging of a link between Parkinson marshalling yard and Fisherman Islands would probably have a negative effect on the financial position of Queensland Railways unless the congestion savings were significant. If Queensland Railways were required to finance construction of the link, the project would be even less attractive to this organisation in financial terms.

## GEELONG

The Port of Geelong is a major centre for the shipment of bulk commodities. Several industrial and port facilities in Geelong are currently connected to the broad gauge rail network which provides links to various locations in Victoria, South Australia and southern New South Wales.

Under current arrangements, the only operationally acceptable option for the proposed standard gauge link between Melbourne and Geelong is a new standard gauge track which is estimated to cost $75.5 million (June 1982 prices). Two options for the proposed link between Tocumwal and Mangalore were considered in detail in the study, namely a new standard gauge track ($89.2 million) and dual gauging of the existing broad gauge track ($18 million).

Standardisation of the Melbourne-Geelong and Tocumwal-Mangalore links would permit direct running of trains along several major transport corridors which currently involve a change of gauge. Significant quantities of wheat, rice, barley and consumer items would be railed between Geelong/Melbourne and southern New South Wales. Steel, cement, aluminium inputs and product and refined salt could be railed between Geelong and other parts of New South Wales or Brisbane. There might also be some movements of processed food between northern Victoria and various interstate locations. Some adjustment of railway freight rates would be required to promote the freight movement patterns on which the economic evaluation was based.

The construction of standard gauge links between Melbourne and Geelong and from Tocumwal to Mangalore could result in various benefits. These include deferral of seaboard grain terminal development in New South Wales (valued at up to $46 million), elimination of grain transhipment at Tocumwal (48 cents per tonne), savings in train capital and operating costs (1.3 to 1.7 cents per tonne-kilometre), resource savings from road/rail diversion (2.8 to 3.0 cents per tonne-kilometre) and bogie exchange savings. There could also be some defence and transport flexibility benefits.

The project would involve increases in some costs. Annual maintenance costs for the proposed links are estimated at almost $1 million with new standard gauge tracks and $416 000 with a new track between Melbourne and Geelong and dual gauge from Tocumwal to Mangalore. Upgrading of the track and facilities between Tocumwal and Narrandera would also be necessary under the conditions specified in the study,

and this would involve undiscounted costs of $8.5 million. No costs associated with replacement of the Tocumwal bridge, conversion of rolling stock or upgrading of the Geelong grain terminal were included in the evaluation.

The evaluation results indicate that construction of the proposed links as an integral project would not be warranted on the basis of the quantified benefits and costs. Under the various base case conditions used in the evaluation, the benefit-cost ratio for new standard gauge tracks on both line sections does not exceed 0.49. Net present value with the most favourable result is -$79.4 million.

The evaluation results are better with dual gauging between Tocumwal and Mangalore and new track from Melbourne to Geelong. However, even with this lower cost construction option, the benefit-cost ratio is below 1 in all cases. In addition, the evaluation was undertaken using optimistic values for some benefits and included benefits which could be realised from alterations to pricing and operating policies alone. The adoption of more realistic estimates would result in significantly lower benefit-cost ratio and net present value figures. It was therefore concluded that construction of standard gauge links between Melbourne and Geelong and from Tocumwal to Mangalore would not be warranted on economic grounds alone.

If an independent decision was taken to construct a standard gauge connection between Melbourne and Geelong as part of an Adelaide-Melbourne link, standardisation of the Tocumwal-Mangalore line would probably not be justified under the current least cost option. This is because a significant proportion of the potential benefits from diverting grain grown in the Tocumwal catchment area from New South Wales terminals to Geelong could be realised with the existing facilities by altering pricing and operating policies.

The financial positions of several organisations could be affected by standardisation of the Melbourne-Geelong and Tocumwal-Mangalore links. Under the traffic forecasts used in the evaluation, the Victorian Railways, the Grain Elevators Board of Victoria and the Port of Geelong Authority would be expected to gain revenue while the Grain Handling Authority of New South Wales, the State Rail Authority and the Maritime Services Board would lose revenue. The impact of the links on the net financial positions of these authorities would be determined by the pricing policies followed, underlying cost structures and effects on capital expenditure requirements.

**SWANSON DOCK**

Swanson Dock is the major area for the handling of overseas containers in the Port of Melbourne. Several container terminals on the east and west sides of the dock are connected to the broad gauge rail system.

Under current circumstances, standard gauge rail access could be provided to Swanson Dock by either dual gauging the existing broad gauge track between Footscray Road and the dock area (with a short section of new standard gauge track near South Dynon) or constructing a new standard gauge track. Estimated construction costs for standardisation of the link are $2.0 million (June 1982 prices) for dual gauge and $3.5 million for a new standard gauge track.

The major potential traffic over a standard gauge link to Swanson Dock with current interstate track arrangements is overseas containers moving to and from Sydney or Brisbane. This traffic does not involve a regular centralisation operation but rather is a response to factors such as strikes or port congestion.

A standard gauge link to Swanson Dock would provide a number of benefits. Under current arrangements, overseas containers moved between Swanson Dock and interstate locations using the standard gauge rail system are transferred by road to or from the standard gauge railhead at South Dynon and transhipped there between road and rail. Standardisation would therefore eliminate the transhipment operation at a resource cost saving estimated at $10 per container and the road transfer operation

at a saving of around $19 per container. These savings would, however, be slightly offset by an increase in train operating costs of 28 cents per container. Other benefits that could not be quantified in the study were improved flexibility in container ship operations, improved defence capability and reduced road congestion.

In addition to construction costs, standardisation would involve increased track maintenance costs of $9890 per annum under the dual gauge option and $48 410 per annum for a new standard gauge track.

The evaluation results indicate that, on the basis of the quantified and unquantified benefits and costs, dual gauging of the existing broad gauge track to Swanson Dock (with a short section of new standard gauge track) would just be acceptable on economic grounds. As the benefits from direct standard gauge access to Swanson Dock could be obtained at lower cost with dual gauging of the existing broad gauge link, this option would always be preferred on economic grounds to a separate standard gauge track.

The financial positions of several organisations would be slightly affected by the provision of standard gauge rail access to Swanson Dock. Under current freight rating practices, the Victorian Railways would probably be adversely affected. Road transport operators would lose revenue due to the reduction in transfer traffic but the shipping companies which currently bear this and the transhipment cost would be expected to receive a net saving. If the Victorian Railways revised their pricing policies to capture the benefits from having a standard gauge link to Swanson Dock, the distribution of financial benefits could be altered in favour of this organisation.

# CHAPTER 1—INTRODUCTION

## TERMS OF REFERENCE

In August 1981, the then Minister for Transport, the Hon R.J. Hunt MP, directed the Bureau of Transport Economics (BTE) to investigate and report on the economic and financial benefits and costs of providing standard gauge rail links to the ports of Brisbane, Melbourne and Geelong.

The referral of this study to the BTE followed the February 1981 meeting of the Australian Transport Advisory Council (ATAC) where State and Commonwealth Transport Ministers had agreed that a study of standard gauge rail access into these ports should be undertaken by the BTE. This matter had previously been referred to ATAC by the Marine and Ports Council of Australia which had requested it to initiate a study into the economic feasibility of providing standard gauge rail access to the principal Australian ports which currently did not have such connections.

The terms of reference also required the BTE to examine the possible standardisation of the Tocumwal-Mangalore railway line as part of its study. It was initially intended that this link would be the subject of a separate evaluation by a joint Commonwealth, New South Wales and Victorian study team. However, at the suggestion of the then Commonwealth Minister for Transport and with the agreement of the New South Wales and Victorian Transport Ministers, it was included in the present study because of the interdependence between the Tocumwal-Mangalore and Melbourne-Geelong links.

The BTE was directed to consider the following matters in the study:

(a) Possible interdependencies between standard gauge rail links to Melbourne and those to Geelong, and between those options and the possible construction of a standard gauge line between Mangalore and Tocumwal and/or provision of additional standard gauge capacity between Mangalore and Melbourne, including strategies for future operation of broad gauge lines affected by the standard gauge proposal.

(b) The specific major traffics that are likely to be affected by the provision of such links, distinguishing between normal or existing traffics and possible generated traffic.

(c) Consequential investment requirements in the event of increased rail traffic, such as upgrading of existing tracks, additional rolling stock, and upgrading of port facilities.

(d) The financial effects on individual rail systems and on port authorities.

(e) Major environmental impacts such as the effects of reduced road transport and the resumption of residential/recreational land to construct rail lines.

Early BTE work indicated that the subject matter fell logically into three easily identifiable projects:

- A standard gauge rail link from the existing Brisbane-Sydney line into Fisherman Islands, the new port area in Brisbane.
- A standard gauge rail link from the existing Sydney-Melbourne line into Swanson Dock, the major overseas container handling facility in the Port of Melbourne.
- Standard gauge rail links from Melbourne to the Port of Geelong and between

Tocumwal and Mangalore. These two links were considered to require a joint evaluation as the major potential traffic along a standard gauge link into Geelong is grain from southern New South Wales. A significant proportion of this grain would require a Tocumwal-Mangalore link for economical rail transport from New South Wales to Geelong.

The locations of the proposed standard gauge links considered in this study, together with relevant existing standard gauge and other main line railway facilities in Australia, are illustrated in Figure 1.1.

## OUTLINE OF REPORT

The report is divided into three main parts, each of which covers one of the proposed port links. The structure of each section follows the same general pattern, commencing with a chapter outlining the development of the port under consideration, its current facilities and trade.

The second chapter in each part contains a description of the current transport links into the port in question and the various options for providing standard gauge rail access, together with the estimated construction costs. In the third chapter potential traffics over the proposed standard gauge link(s) are identified and the expected tonnages involved are discussed.

The economic evaluation which draws on the traffic estimates and construction cost data is presented in the fourth chapter of each part. This chapter includes a detailed discussion of the benefits and costs that would be expected to result from construction of the rail link(s).

The fifth chapter contains a general discussion of the expected impact of standard gauge access on the financial positions of major transport organisations. The conclusions for the section are presented in the sixth chapter.

## EVALUATION METHODOLOGY

The economic evaluations undertaken in the study are traditional cost-benefit analyses with the estimation of net present values and benefit-cost ratios. This approach is based on a comparison of the real resource costs of alternative courses of action, with the criterion of allocative efficiency being used to assess the desirability of projects from the national viewpoint. However, as some groups in the community may gain and others may lose when a project is undertaken, the expected impacts of the proposed standard gauge links on the financial positions of various transport organisations are also discussed in the report.

For each of the projects, construction was assumed to start at the beginning of 1983–84. Construction time would vary according to the work involved in each construction option and this, together with the commencement date, was used to determine the period in which benefits would begin flowing from each project.

The evaluation period used in the studies was 40 years. In an evaluation of this kind, there is a methodological choice between truncating the series of discounted benefits and costs after a certain period of time and including a residual item to reflect the remaining value of the assets, or continuing the series through to the end of the economic life of the assets and avoiding a specific residual calculation. It is sometimes argued that it is best to truncate the benefit and cost streams associated with long-lived assets because of the uncertainty attached to distant benefits and costs. However, such an approach simply means that any potential net benefits over and above the assumed salvage value of the assets are ignored in deriving the benefit-cost ratio or net present value estimates. The alternative is to examine the likely cost and benefit streams over the whole life of the asset and to test the evaluation results for sensitivity to changes in the net benefit stream towards the end of the project's life.

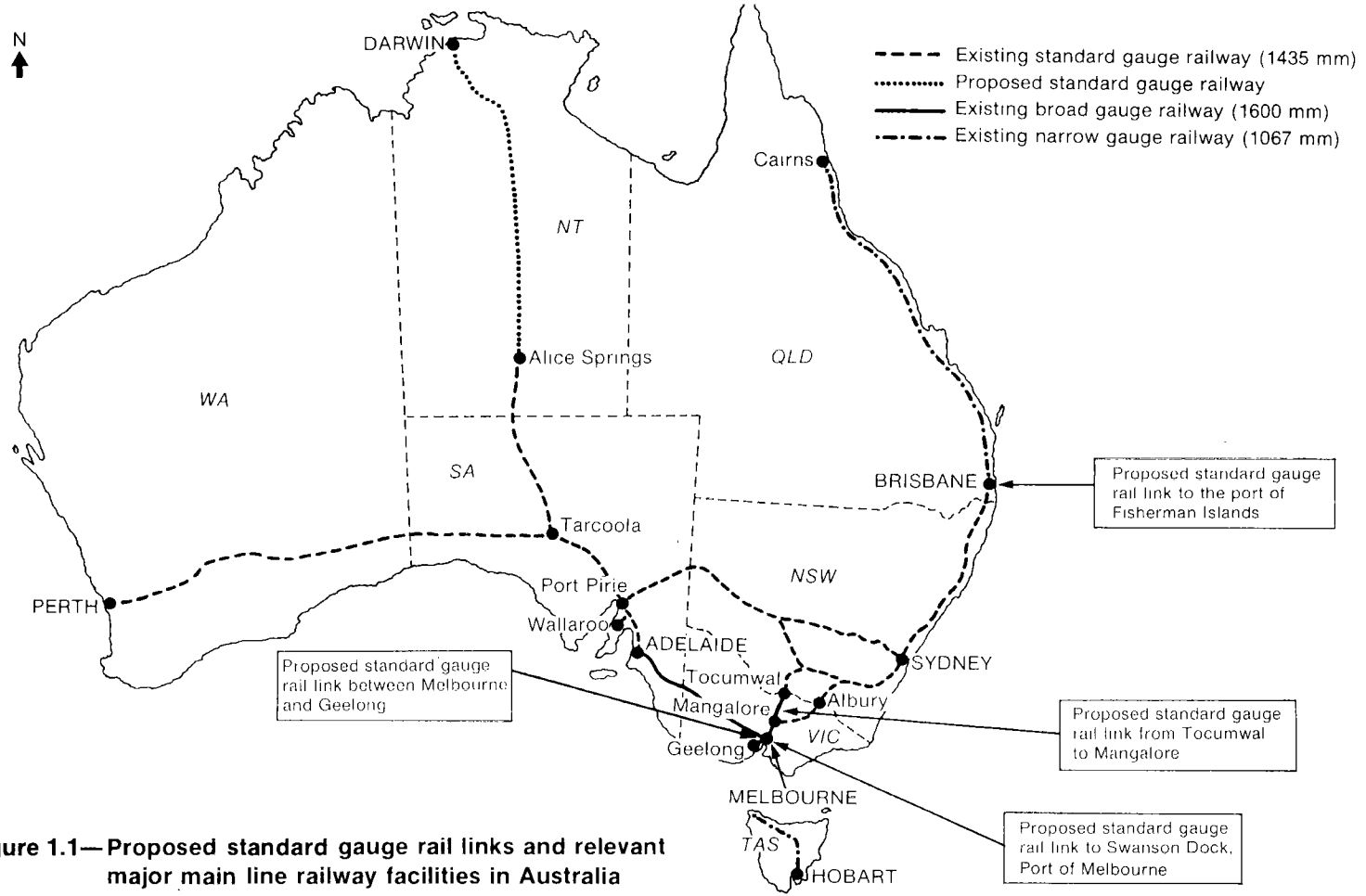


**Figure 1.1—Proposed standard gauge rail links and relevant major main line railway facilities in Australia**

The decision on which approach to adopt is difficult and to some extent arbitrary. Railway tracks have relatively long economic lives under normal conditions, and the evaluation results should not differ markedly under the two approaches if they are correctly implemented. While costs and benefits become more uncertain further into the future, the discounting procedure means that developments after 25 or 30 years do not normally have a substantial impact on the evaluation results. For the purposes of the present studies it was decided to adopt an evaluation period of 40 years with no residual for the rail tracks , mainly because this procedure allowed any net benefits accruing late in the life of the rail links to be taken into account. It also avoided the problems involved in computing realistic residual values for railway infrastructure.

All costs and benefits in the evaluations were expressed in June 1982 prices and market prices were generally used as they were considered to satisfactorily approximate real resource costs. However, various taxes were netted out to derive appropriate estimates of road resource cost savings. The cost and benefit streams over the assumed 40 year life of the projects were compared using discount rates in the range of 4 to 10 per cent.

The traffic forecasts used in the study were prepared after consultations with representatives in affected industries and on the basis of other data, while railway construction cost estimates were provided by the Victorian Railways and Queensland Railways. In some cases where it was found difficult to accurately forecast a particular traffic or to estimate the value of a specific benefit or cost, the practice adopted in the study was to initially use a value which would overstate the estimated economic viability of the project. Under this approach, more refined estimates of benefits and costs would only be necessary if the evaluation based on the optimistic parameters suggested that the project was acceptable on economic grounds.

An important element in an economic evaluation is the specification of a base case which provides the benchmark against which the expected changes associated with the project are assessed. In theory, this benchmark should reflect a situation of minimum national resource costs with existing facilities. In practice, projects can initially be evaluated against a base case involving current operating procedures and pricing policies, and the potential benefits from optimising that base case need only be assessed where either the initial benefit-cost ratio for the project is greater than unity or a decision to implement the project is likely to be taken. In the evaluation of the Melbourne-Geelong and Tocumwal-Mangalore links, several base case options were considered in order to produce a more comprehensive and realistic evaluation. Other options for improving the transport system (ie other than standardisation) were not evaluated in the study.

# PART A—FISHERMAN ISLANDS

# CHAPTER 2—THE PORT OF BRISBANE

The development of the Port of Brisbane and the current facilities in the port area are discussed in this chapter. Particular emphasis is placed on the impact of containerisation and cargo centralisation because overseas containers are a major potential traffic over the proposed link to Fisherman Islands.

## HISTORY AND CURRENT FACILITIES

The first shipping wharves in Brisbane were established during the 1820s on the banks of the Brisbane River near the present city centre. Later facilities were built progressively further downstream as a result of factors such as continuing urban development and the need to accommodate larger ships. Today, the facilities in the Port of Brisbane are spread over a distance of approximately 16 kilometres down to the mouth of the Brisbane River. As a result of the port's river location a dredging programme was initiated in the 1860s, and an active operation for the maintenance and deepening of channels and berths has been continued since that time.

In marked contrast to other major city ports in Australia, the private sector has until recently played a major role in the development of the facilities in the Port of Brisbane. The berths and all facilities were traditionally provided, owned and operated by private enterprise (Wood 1980 p117). There were 36 wharves in the port by 1974, although a number of these were considered redundant even at that stage (Department of Harbours and Marine 1974 pp12-13). Several other wharves have since been closed or demolished. The role of the Department of Harbours and Marine, which administered the port until 1976, was mainly limited to that of landlord and the body responsible for the dredging of channels (Wood 1980 p117). However, the Department also owned the Pinkenba Wharf terminal and the Cairncross Dockyard complex, as well as some reclaimed riverside lands (Department of Harbours and Marine 1974 p13). Public sector involvement in port activities increased substantially with the opening in 1980 of the new port area at Fisherman Islands.

The current layout of the Port of Brisbane is illustrated in Figure 2.1. Most of the traffic through the port is currently handled in five major areas. The Hamilton wharves include the major upstream container facility which is operated by Brisbane Amalgamated Terminals Ltd (BATL) while the Australian National Line (ANL) operates a roll-on/roll-off and container terminal at Newstead. The port's major dry bulk facilities have traditionally been at Pinkenba where the State Wheat Board operates a grain terminal and Maynegrain Pty Ltd operates a loader for coarse grains. The major crude oil and petroleum products berths are located near the mouth of the river. The new port area at Fisherman Islands currently contains two container terminals and a coal loader.

Several major industrial facilities are located adjacent to the port area. These include the Ampol oil refinery at Lytton, the Amoco oil refinery at Bulwer Island, the Consolidated Fertilizers Ltd factories at Gibson Island and Pinkenba, the Cairncross Dockyard ship repair facilities and the Queensland Cement and Lime Company Ltd clinker grinding plant at Bulwer Island.

The Port of Brisbane services the city as well as a hinterland which includes south-west Queensland and parts of northern New South Wales. The pattern of trade through the port reflects this area of influence and is illustrated by the traffic data for the

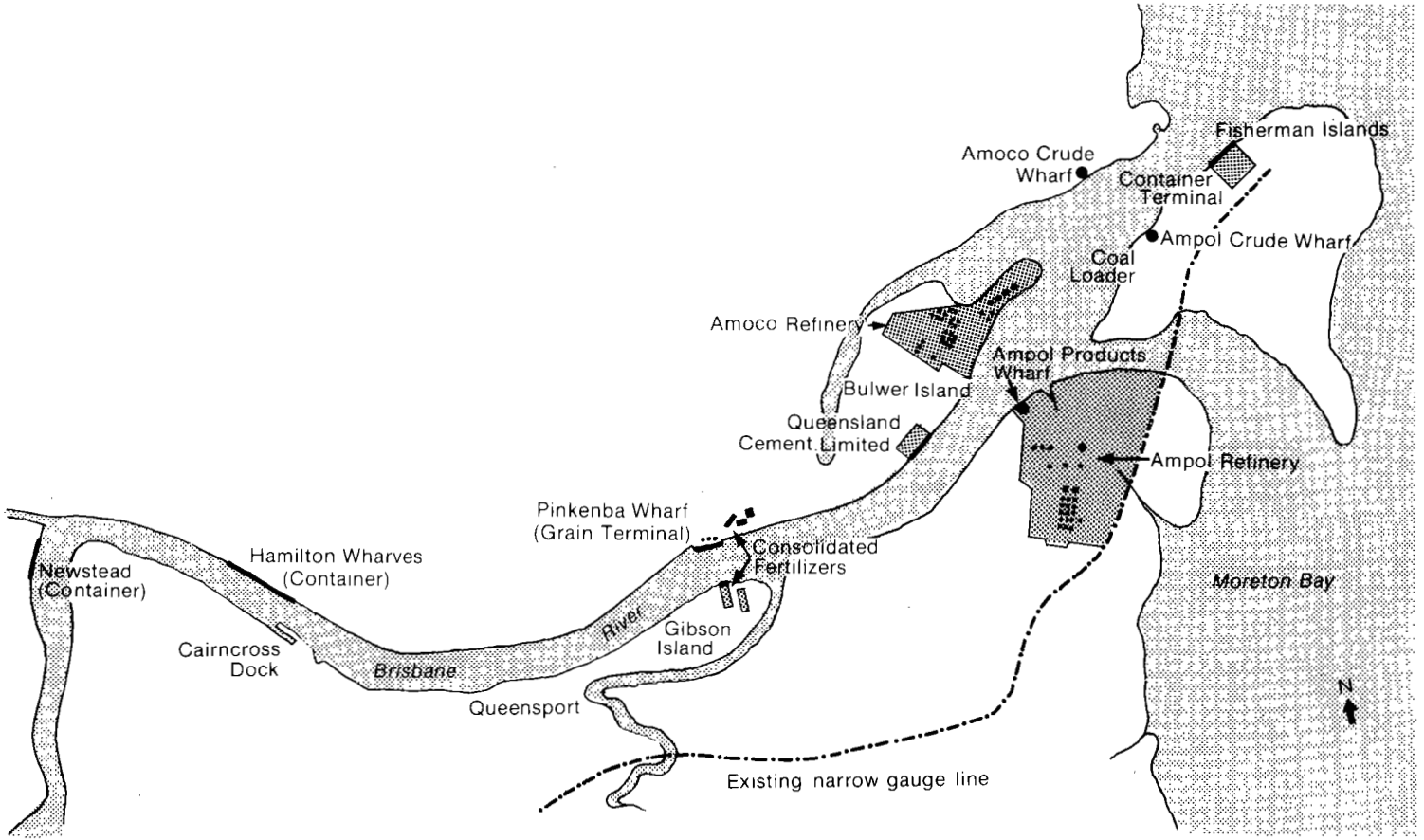


**Figure 2.1—Major facilities in the Port of Brisbane**

period from 1976–77 to 1980–81 presented in Table 2.1. Traffic over this period generally showed an upward trend, and total trade was 9.5 million tonnes in 1980–81. It subsequently increased by approximately 8 per cent to 10.3 million tonnes in 1981–82 (Port of Brisbane Authority 1982a p1). The major commodities exported through the port are petroleum products, grain, general cargo and minerals while the major imports are oil and general cargo. A substantial increase in coal exports through the port is envisaged over the next few years.

A commodity breakdown of containerised trade through the port over the period from 1976–77 to 1980–81 is presented in Table 2.2. This clearly indicates the predominance of meat and general cargo in this traffic.

## IMPACT OF CONTAINERISATION

Containerisation has been an important factor in the recent development of the Port of Brisbane and is of particular relevance to the present study.

The large scale introduction of containerisation into Australia's major overseas shipping trades beginning in the late 1960s encouraged the development of specialised container handling facilities at the Port of Brisbane. By 1969 Brisbane Wharves and Wool Dumping Pty Ltd (later incorporated into BATL) had rebuilt its wharf and infrastructure at Hamilton to create a container terminal which included a twin lift 45 tonne portainer crane and associated stacking areas (Daykin 1973 p814). In the same year ANL opened a terminal further upstream at Newstead with a 25 tonne travelling crane, stern loading ramp and 4 acres of marshalling area (Australian National Line 1969 p15 and 1970 p17). By the late 1970s, 55 per cent of the container traffic through the port was being handled at Hamilton, 30 per cent at Newstead and the remainder at various conventional wharves (Cupitt 1980 p27).

TABLE 2.1—TOTAL TRADE THROUGH THE PORT OF BRISBANE BY MAJOR COMMODITY GROUP, 1976–77 TO 1980–81

*(million tonnes)*[a]

| *Commodity group* | *Year* | | | | |
|---|---|---|---|---|---|
| | *1976–77* | *1977–78* | *1978–79* | *1979–80* | *1980–81* |
| Exports | | | | | |
| Cereal and cereal preparations | 1.32 | 0.71 | 1.30 | 1.79 | 0.50 |
| Petroleum products | 1.06 | 1.04 | 1.00 | 1.18 | 1.30 |
| Meat and meat preparations | 0.28 | 0.32 | 0.38 | 0.30 | 0.27 |
| Metalliferous ores and metal scrap | 0.30 | 0.26 | 0.31 | 0.25 | 0.25 |
| Other | 0.43 | 0.44 | 0.49 | 0.53 | 0.81 |
| Imports | | | | | |
| Crude oil and petroleum products | 4.18 | 4.31 | 4.04 | 4.32 | 4.70 |
| Crude fertilizers, crude minerals and chemicals | 0.29 | 0.38 | 0.40 | 0.47 | 0.44 |
| Metalliferous ores and metal scrap | 0.10 | 0.16 | 0.12 | 0.14 | 0.21 |
| Paper and paper board | 0.14 | 0.11 | 0.11 | 0.11 | 0.13 |
| Other | 0.76 | 0.64 | 0.59 | 0.65 | 0.91 |
| Total | 8.86 | 8.37 | 8.74 | 9.74 | 9.52 |

a. Combined measure incorporating revenue tonnes and mass tonnes.

*Source:* Port of Brisbane Authority (1981b).

TABLE 2.2—CONTAINERISED TRADE THROUGH THE PORT OF BRISBANE BY MAJOR COMMODITY GROUP, 1976-77 TO 1980-81

('000 tonnes)[a]

| Commodity group | Year | | | | |
|---|---|---|---|---|---|
| | 1976-77 | 1977-78 | 1978-79 | 1979-80 | 1980-81 |
| Exports | | | | | |
| Meat | 217 | 252 | 347 | 289 | 263 |
| General cargo | 131 | 165 | 230 | 227 | 189 |
| Wool | 27 | 32 | 31 | 20 | 29 |
| Metal ores | 19 | 19 | 18 | 23 | 22 |
| Grain | 19 | 20 | 37 | 31 | 29 |
| Fertilisers and chemicals | 4 | 4 | 7 | 11 | 13 |
| Oil | 1 | 5 | 9 | 8 | 7 |
| Iron and steel | 0 | 0 | 2 | 4 | 2 |
| Imports | | | | | |
| General cargo | 141 | 129 | 163 | 183 | 201 |
| Fertilisers and chemicals | 16 | 20 | 23 | 30 | 28 |
| Iron and steel | 2 | 2 | 3 | 2 | 4 |
| Metal ores | 1 | 2 | 2 | 3 | 3 |
| Meat | 1 | 0 | 0 | 1 | 0 |
| Oil | 1 | 1 | 1 | 1 | 1 |
| Total | 580 | 651 | 873 | 833 | 791 |

a. Combined measure incorporating revenue tonnes and mass tonnes.

*Source:* Port of Brisbane Authority (1981b).

The amount of containerised cargo handled at the port increased from 394 000 tonnes in 1971-72 to 791 000 tonnes in 1980-81 (Port of Brisbane Authority 1981b). However, over this period there was also a significant change in shipping practices. Substantial quantities of containerised cargo which had previously been exported or imported through the Port of Brisbane were now transferred by land transport for shipment through the Port of Sydney, while some cargo which had previously been handled at northern Queensland ports was now shipped through the Port of Brisbane.

Cargo centralisation in the overseas liner trades has been the subject of a BTE report (BTE 1982). This practice reflects the changes in ship scheduling which accompanied the containerisation of Australia's major overseas trades. Prior to containerisation, conventional vessels operating in the general cargo trade had called at most capital city ports in Australia. However, to gain the maximum operating efficiencies from the highly specialised container vessels introduced into the overseas trades, operators moved to limit the number of calls at ports in Australia by the new vessels. Containers were then centralised from the smaller ports such as Brisbane and Adelaide to the larger ports (mainly Sydney and Melbourne) where the costly port and terminal facilities required to handle these vessels efficiently were concentrated.

The move to centralise overseas containers from Brisbane to Sydney was strengthened by the limitations of facilities at the Port of Brisbane. Channel depths in the Brisbane River in 1979 were only 9.1 metres (at low water) to Hamilton and 8.8 metres to Newstead (Port of Brisbane Authority 1979 p37). This compared with loaded drafts of 9.8 and 12.2 metres respectively for the second and third generation container vessels. These depth limitations, together with channel width and swinging basin dimensions, generally restricted container vessels at Hamilton to 33 000 tonnes deadweight (Wood 1980 p17) or 213 metres maximum length and 9.1 metres draft on any high tide, although on certain tides this was increased to 250 metres and 10.2 metres respectively (Port of Brisbane Authority undated p30). However, use of high tides often meant long delays in Moreton Bay. Further delays were involved in steaming from the mouth of the river to the container terminals, a journey to

Hamilton involving 11 kilometres and taking about two hours (Department of Harbours and Marine 1974 p43). Container handling operations at the upstream terminals were also adversely affected by the limited back-up land available at these sites for storage and handling and the associated delays in the despatch of cargo from the terminals.

The majority of overseas containers centralised from Brisbane to Sydney during the 1970s involved the UK/Europe trade on which the largest vessels operated. Since these vessels usually passed through the Suez Canal and did not travel along the north-eastern Australian coast on either the inward or outward journeys, a call to Brisbane involved an expensive Sydney-Brisbane-Sydney trip. As early as 1976–77 an estimated 21 700 TEUs[1] of loaded overseas containers per annum were being centralised between Brisbane and Sydney, and around three-quarters of these movements reportedly involved the UK/Europe trade (BTE 1982 p33). Containerised import and export cargo through the Port of Brisbane for this trade declined from a peak of 132 353 tonnes in 1973–74 to 28 231 tonnes in 1980–81 (Port of Brisbane Authority 1981b).

Traffic through the Port of Brisbane for other trades has been much less affected by centralisation practices due to the smaller vessels used and the lower diversion costs associated with routes which naturally pass closer to north-eastern Australia. In 1980–81, the overseas origins and destinations of containerised cargo movements through the Port of Brisbane were as follows—Japan/Korea 43.4 per cent, East Asia 10.2 per cent, South-east Asia 4.5 per cent, North America 24.2 per cent, UK/Europe 5.6 per cent, Papua New Guinea 8.2 per cent and Other 3.9 per cent[2].

## DEVELOPMENT OF FISHERMAN ISLANDS

As the limitations of the Port of Brisbane became increasingly evident, action was taken to plan for the future. In 1972 the Queensland Government directed the Department of Harbours and Marine to review the existing role of the Port of Brisbane and to make recommendations about its future development. After a two year study, the Department in 1974 submitted its report to State Cabinet (Department of Harbours and Marine 1974). It was concluded in the report that the practice of private ownership and management of wharf facilities was uneconomic and that the existing wharf and harbour facilities in the port were inadequate for overseas shipping. Further development of the upstream facilities was considered to be neither economically justified nor capable of providing a long-term solution to the port's problems, and it was recommended that a new deep water port be developed as soon as possible. A $35.5 million development at Fisherman Islands near the mouth of the Brisbane River was the recommended option for the new port. The creation of a port authority to manage the port on a commercial and self-supporting basis was also proposed.

The conclusions and recommendations of the report were accepted by State Cabinet in February 1975 (Department of Harbours and Marine 1975 p4). In April of that year consultants were engaged to prepare a master plan for the new port. The *Port of Brisbane Authority Act* 1976, which constituted a port authority and enabled the construction of new port facilities at Fisherman Islands, became operative in December 1976 and the first construction contract was awarded in April of the following year.

Stage 1 of the Fisherman Islands project, involving a 600 metre wharf, two container cranes, facilities for roll-on/roll-off vessels and 26 hectares of paved storage area, was officially opened in November 1980. Initially, only Number 1 container terminal

1. A TEU is a twenty foot container unit. This term is used to describe a 20 foot x 8 foot x 8 foot ISO container, or the number of equivalent twenty foot units.

2. Derived from data supplied by Statistics Section, Ports and Terminals Branch, Department of Transport and Construction. Estimates refer to cargo tonnages.

was operational, the first ship to use the new port arriving in August 1981[1]. Number 2 terminal was leased to a different operator but this agreement was subsequently terminated. It is now reportedly operated on a common user basis as required[2].

Each container terminal is serviced by a single lift crane owned by the Port of Brisbane Authority. With depths of 12 metres at low water at the berths and 11.7 metres in the swinging basin, it is possible to cater for the largest container vessels presently on the Australian overseas trades and bulk carriers up to 80 000 tonnes (Port of Brisbane Authority 1982a pp1–4 and 1981a p24).

A narrow gauge rail connection to Fisherman Islands was completed in November 1980. Road access to the new port area will be substantially improved when the new cross-river Queensport bridge is opened in 1986.

The first large tonnages of export coal through the Port of Brisbane were loaded at Pinkenba in 1980–81 after several trial shipments in earlier years. A substantial increase in this trade was forecast, but capacity at Pinkenba was restricted by the limited scope to upgrade the loader and depth limitations which meant that bulk carriers of the size commonly used in the major coal export trades could not be accommodated. Contracts for the first stage of a coal loader at Fisherman Islands were therefore awarded in October 1981. This facility, which was officially opened in March 1983, has an initial capacity of around 1.5 million tonnes per annum, although later expansion could lift this to 5 million tonnes or higher.

It is also planned to build a new grain terminal at Fisherman Islands and other possible future developments include woodchip loading facilities, a cement works, extensions to the container berths and the provision of general cargo berths. By June 1982 the Port of Brisbane Authority had spent about $50 million (current prices) on the Fisherman Islands port project, and it was estimated that total expenditure would reach $100 million (current prices) by 1995 (Port of Brisbane Authority 1982a p3).

1. Number 1 container terminal was leased by Brisbane Amalgamated Terminals Ltd, which is jointly owned by P & O Australia Ltd and the Australian National Line.

2. The lease for Number 2 container terminal was initially granted to Seatainer Terminals Pty Ltd on behalf of Bulkships Ltd. It is understood that the lease was later terminated by Seatainers due to low traffic volumes

# CHAPTER 3—OPTIONS FOR STANDARD GAUGE RAIL ACCESS INTO FISHERMAN ISLANDS

The current rail link to Fisherman Islands is described in this chapter and the various options for providing standard gauge rail access, together with the estimated construction costs, are discussed.

## CURRENT RAIL LINKS

The Queensland Railways track network is almost completely narrow gauge (1067mm), the only exception being the standard gauge (1435mm) railway between Brisbane and New South Wales. This standard gauge line, which was completed in 1930, crosses the border at Border Tunnel and terminates at South Brisbane station. It carries both interstate freight and passenger traffic. The interstate passenger terminal is located at South Brisbane and the major standard gauge freight facility is at Acacia Ridge, although there are other freight facilities at Clapham and South Brisbane. All of these freight terminals are also connected to the narrow gauge network.

There are a number of rail connections to the Brisbane port area but these are all currently narrow gauge. The major port facilities with rail access are the Ampol refinery, the Hamilton container terminal, the Pinkenba bulk cargo facility, the ANL terminal at Newstead and the new port area at Fisherman Islands. In addition, the Gibson Island factory of Consolidated Fertilizers Ltd is connected to the narrow gauge network by a branch from the Park Road—Lytton Junction line at Murarrie. These rail connections, together with the major existing standard gauge facilities in Brisbane, are illustrated in Figure 3.1.

Freight traffic moving by standard gauge rail between interstate locations and the Brisbane port area (or other facilities on the narrow gauge track network in Queensland) is currently subject to a change of gauge. For operations using rail transport all the way, this usually involves transfer of cargo between standard and narrow gauge wagons at Acacia Ridge or Clapham. An alternative is to move cargo between the port area and the standard gauge rail terminal by road. With the exception of Consolidated Fertilizers Ltd, most interstate rail cargo currently travelling to and from the port area appears to move through the Acacia Ridge transhipment facility.

Fisherman Islands was connected to Queensland's narrow gauge rail network in late 1980 when construction of a single track between Lytton Junction and the new port area was completed. A small marshalling area and balloon loops were also built. Lytton Junction is located on the Shorncliffe-Lota suburban line which joins the alignment of the narrow gauge line between Acacia Ridge (located on a branch of the Petrie-Beenleigh line) and central Brisbane/northern Queensland at Park Road. The standard gauge track between Acacia Ridge and South Brisbane also passes through Park Road. Under current arrangements, overseas containers travelling by rail between interstate locations and Fisherman Islands have to be transferred between standard and narrow gauge wagons at Acacia Ridge and railed to or from the port area via Park Road and Lytton Junction. However, most transfers between Acacia Ridge and Fisherman Islands initially involved road transport.

The track between Lytton Junction and Fisherman Islands is only used for freight traffic. The narrow gauge track between Park Road and Lytton Junction carries freight traffic and also contains ten suburban passenger stations. There is also a mixture

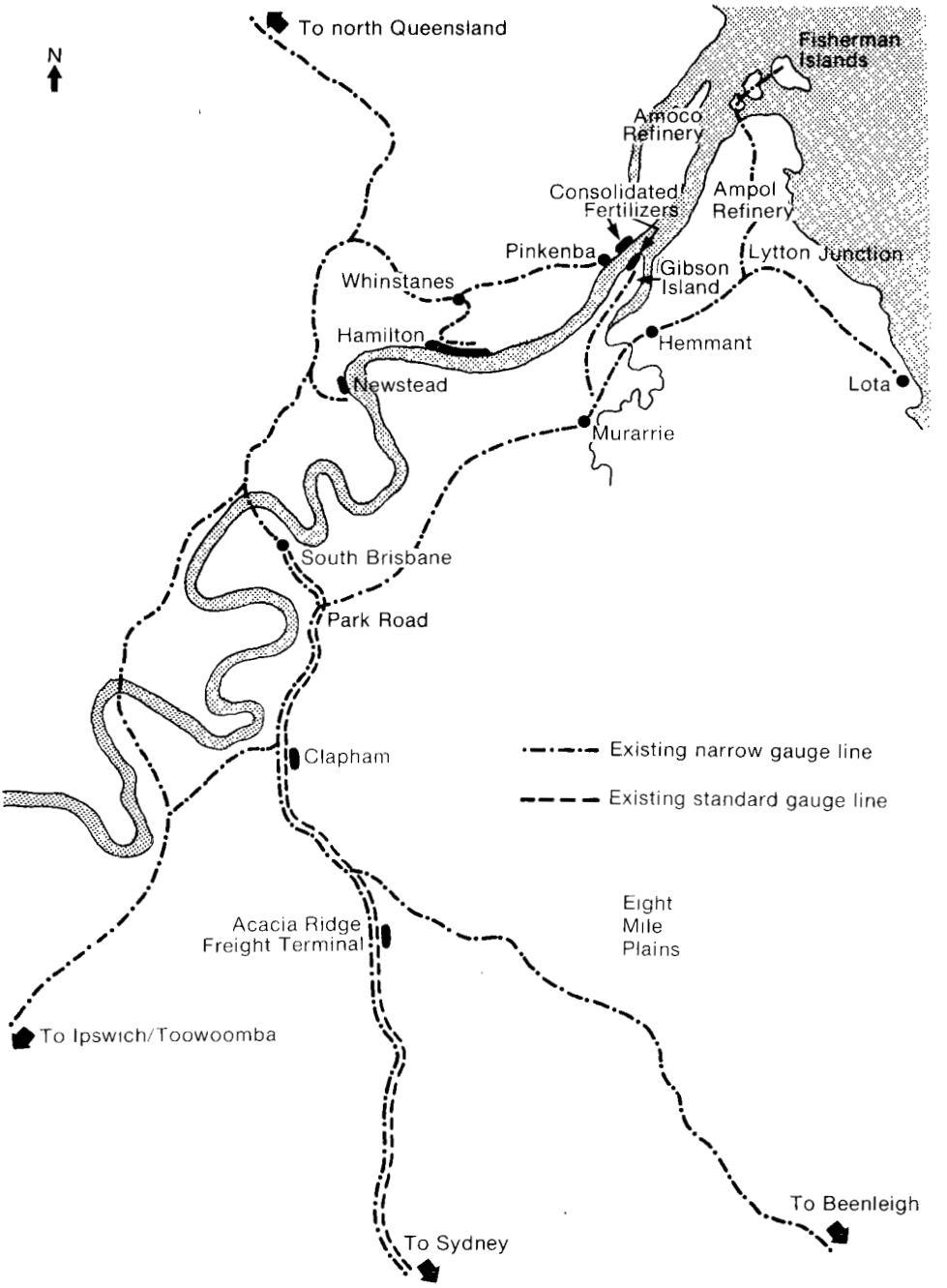


**Figure 3.1—Current rail connections to the Port of Brisbane and major existing standard gauge facilities in Brisbane**

of freight and passenger traffic on the narrow gauge section between Park Road and Acacia Ridge which contains seven passenger stations.

The operation of regular passenger services on the narrow gauge rail link to Lytton Junction and the associated utilisation of the track at peak periods would be expected to involve a conflict with freight services to the new port area when certain traffic levels are achieved. This, in turn, will limit the freight capacity of the line. As the prospective tonnages of wheat and coal on the narrow gauge system for export through Fisherman Islands are likely to exceed the capacity of the existing line at some stage, a new narrow gauge connection to Fisherman Islands may be required in the future to handle this port traffic. The construction options considered in the study therefore included a new narrow gauge line into the port.

## STANDARD GAUGE OPTIONS AND CONSTRUCTION COSTS

A number of possible alignment options for the proposed connection between the Fisherman Islands port area and the current standard gauge rail system in Queensland were identified during discussions with Queensland Railways officials. Several of these options were expected to have substantially higher capital costs than the other alternatives without offering any operational or other advantages. It was therefore decided not to consider these more costly options any further and to examine in detail standard gauge access along three alignments:

- Park Road-Lytton Junction-Fisherman Islands
- Acacia Ridge via Eight Mile Plains to Fisherman Islands
- Parkinson marshalling yard via Eight Mile Plains to Fisherman Islands.

The relative locations of the three alignments are illustrated in Figure 3.2.

All three alignment options include a similar connection between the Lytton Junction area and Fisherman Islands. Provision was made for a future standard gauge track on this alignment when the narrow gauge line between Lytton Junction and Fisherman Islands was constructed in 1980.

A standard gauge link to Fisherman Islands would also potentially allow industries near the new track to gain direct access to the standard gauge system. Possible branch line connections for the alternative alignment options were therefore investigated.

The construction options for the main link to Fisherman Islands and the branch lines are detailed below. The dual gauge track options are included on the assumption that rolling stock with either cylindrical or conical wheels could operate satisfactorily on a dual gauge track. Construction costs for the options considered in the evaluation are summarised in Table 3.1. This table also shows the estimated time required to construct the main link under each option and the track distances involved.

### Park Road to Fisherman Islands via Lytton Junction

Construction of a standard gauge track along the Park Road-Lytton Junction-Fisherman Islands alignment would involve a connection to the existing standard gauge track between Acacia Ridge and South Brisbane at Park Road. There are currently two narrow gauge tracks on the Park Road-Lytton Junction section. On the basis of advice from Queensland Railways officials, it was concluded that conversion of one of the Park Road-Lytton Junction narrow gauge tracks to provide a dual gauge single track on the existing alignment was not an operationally acceptable option. This would require bi-directional running of standard gauge traffic over what is essentially a uni-directional narrow gauge track. Two options along this alignment were therefore considered in detail:

- A new standard gauge single track between Park Road and Lytton Junction (adjacent to the existing narrow gauge track alignment) and between Lytton

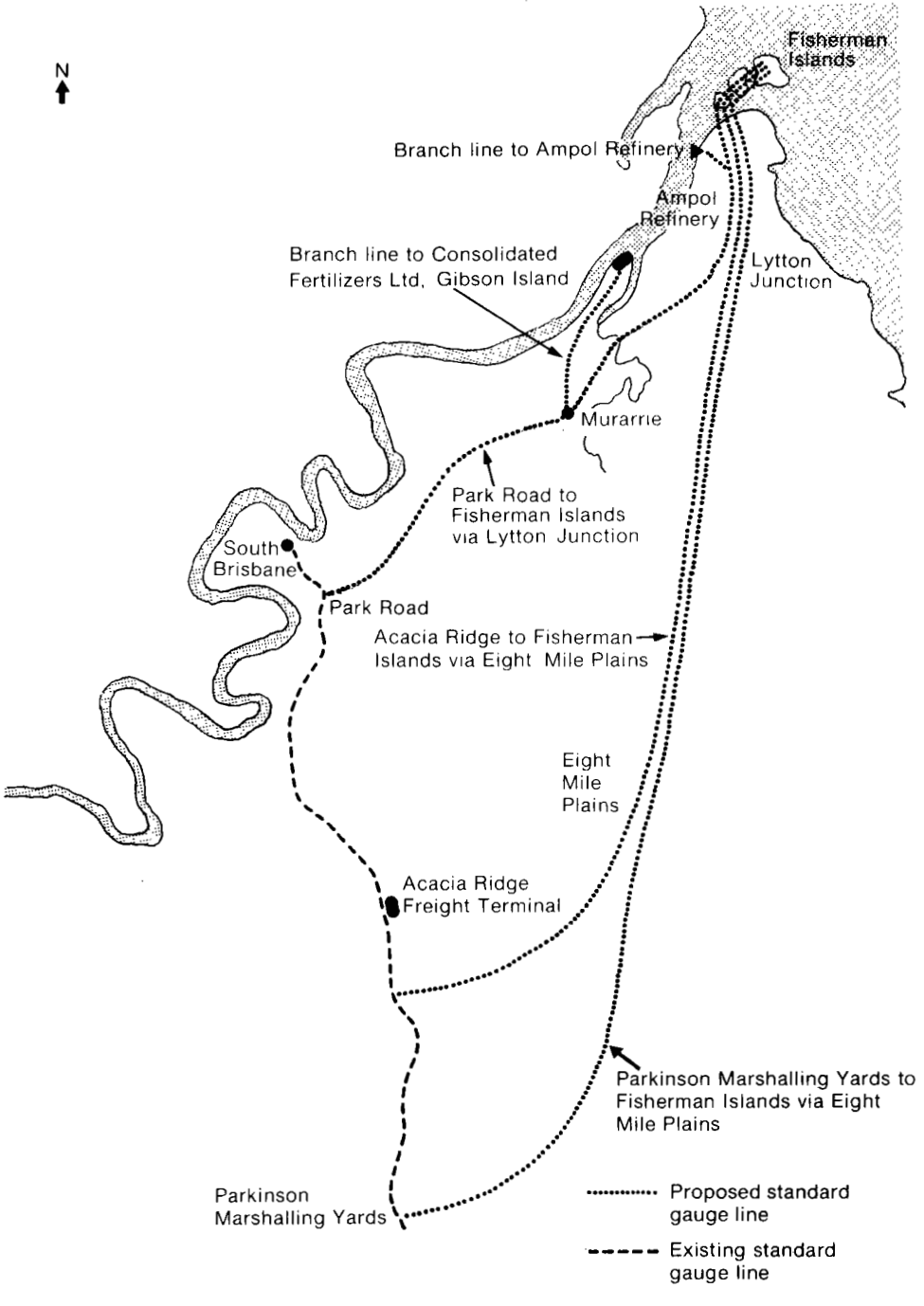


**Figure 3.2—Proposed alignments for provision of standard gauge rail access to Fisherman Islands**

TABLE 3.1—ESTIMATED CONSTRUCTION COSTS AND TIMES FOR STANDARD GAUGE TRACK TO FISHERMAN ISLANDS AND ON SELECTED BRANCHES

| Construction option | Construction cost ($m 1982 prices) | Distance (km) | Construction time (months) |
|---|---|---|---|
| Fisherman Islands link | | | |
| Park Road via Lytton Junction | | | |
| Standard gauge single track | 29.4 | 26.4 | 18 |
| Dual gauge duplicated track | 34.7 | 41.7 | 18 |
| Acacia Ridge via Eight Mile Plains | | | |
| Standard gauge single track | 40.4 | 36.6 | 21 |
| Parkinson via Eight Mile Plains | | | |
| Standard gauge single track | 44.1 | 40.9 | 21 |
| Dual gauge single track | 7.2 | 40.9 | 21 |
| Gibson Island branch | | | |
| Murarrie to Gibson Island | | | |
| Dual gauging existing track | 1.5 | 5.9 | a |
| Lytton Junction area to Gibson Island | | | |
| Standard gauge track | 3.0 | 3.6 | a |
| Ampol refinery branch | | | |
| Lytton Junction area to refinery | | | |
| Dual gauging existing track | 0.6 | 2.1 | a |

a. Construction schedule would be dependent on alignment and track option for Fisherman Islands link.

*Source:* Queensland Railways, personal communication.

Junction and Fisherman Islands. Track length for this option is 26.4 kilometres and estimated cost is $29.4 million.

- A dual gauge duplicated track between Park Road and Lytton Junction plus a standard gauge single track between Lytton Junction and Fisherman Islands. Track length for this option is 41.7 kilometres and estimated cost is $34.7 million. Although this option overcomes the operational problems associated with bi-directional running on a dual gauge single track, it is more expensive than a standard gauge single track and retains the technical problems of dual gauge running.

**Acacia Ridge to Fisherman Islands via Eight Mile Plains**

This alignment would require the construction of a new link between Acacia Ridge and the Lytton Junction area. Only one construction option was considered, namely:

- A new standard gauge single track from Acacia Ridge via Eight Mile Plains to Fisherman Islands. Track length for this option is 36.6 kilometres and estimated cost is $40.4 million.

**Parkinson marshalling yard to Fisherman Islands via Eight Mile Plains**

The third proposed alignment involves a direct link to Fisherman Islands via Eight Mile Plains from the Parkinson marshalling yard which is located 4.8 kilometres south of Acacia Ridge on the existing standard gauge line. This alignment option also has implications for future export traffic railed to Fisherman Islands using the narrow gauge system.

As discussed earlier, a coal loader with an initial capacity of around 1.5 million tonnes per annum has recently been completed at Fisherman Islands. The capacity of this facility could eventually be increased to five million tonnes per annum or more, depending on the output from mines in southern Queensland. It is also planned to build a grain terminal at Fisherman Islands.

Under current arrangements, coal for export through Fisherman Islands is moved along the existing narrow gauge track via Park Road and Lytton Junction. However, as noted earlier in this chapter, the operation of suburban passenger services on this track will contribute to capacity limitations for freight traffic at some level. It appears that a maximum of around three million tonnes per annum of coal and other bulk traffics could be moved to Fisherman Islands along the existing suburban network. Up to five million tonnes per annum of coal and 2.5 million tonnes per annum of grain could conceivably need to be moved to Fisherman Islands for export in the foreseeable future. Traffic of this magnitude would require improved rail transport arrangements in the Brisbane suburban area.

Rail transport arrangements for the movement of bulk traffic to Fisherman Islands are currently the subject of a joint study by Queensland Government agencies. One of the options for bulk traffic is a new narrow gauge line passing through the Parkinson marshalling yard and then to the Lytton Junction area via Eight Mile Plains. This would provide a substantially higher transport capacity for coal and other bulk commodities than the existing suburban rail system. It is not known if or when the results of the joint study will be made publicly available or when a decision for or against the construction of this line will be made by the Queensland Government.

If it was decided to proceed with the narrow gauge track along this alignment, standard gauge access could be provided to Fisherman Islands by adding a third rail and thus providing dual gauge track. Where there was an independent decision to construct the narrow gauge line, the only construction costs that would be attributable to the provision of standard gauge access for the purposes of the current study would be the additional costs resulting directly from the addition of the third rail (ie wider sleepers, the additional rail, any additional requirements for ballast or signalling, etc).

Two options along this alignment were therefore considered in detail:

- Dual gauge single track between Parkinson marshalling yard and the Lytton Junction area plus a standard gauge single track between Lytton Junction and Fisherman Islands. Track length for this option is 40.9 kilometres and estimated cost is $7.2 million which, for the Parkinson-Lytton Junction section, includes only the additional cost of dual gauge over a single narrow gauge track.
- A new standard gauge single track between Parkinson marshalling yard and the Lytton Junction area and between the Lytton Junction area and Fisherman Islands. Track length for this option is 40.9 kilometres and estimated cost is $44.1 million.

**Branch lines from a standard gauge link**

A standard gauge rail link to Fisherman Islands along any of the alignments considered in the study could potentially serve several industrial facilities near the port area. These facilities currently have access to the narrow gauge network but could be linked by branch lines to a Fisherman Islands standard gauge track. The two facilities in the area which could potentially make significant use of a direct standard gauge connection to interstate locations are the Consolidated Fertilizers Ltd factory at Gibson Island and the Ampol oil refinery at Lytton.

As noted earlier, the Consolidated Fertilizers Ltd factory is currently served by a branch line from the Park Road-Lytton Junction narrow gauge track. The cost of a branch to a new standard gauge line would vary according to the alignment of the standard gauge link to Fisherman Islands. The alternatives are:

- Park Road-Lytton Junction alignment. Access to Gibson Island could be provided by dual gauging the present narrow gauge branch from Murarrie. Track length for this option is 5.9 kilometres and estimated cost is $1.5 million.
- Parkinson and Acacia Ridge via Eight Mile Plains. Three options to provide standard gauge access to Gibson Island were identified. The cheapest option is a new

standard gauge single track direct from the Fisherman Islands link to Gibson Island[1]. Track length for this option is 3.6 kilometres and estimated cost is $3.0 million.

The Ampol refinery terminal at Lytton is already linked to the Fisherman Islands narrow gauge track by a branch line from the Lytton Junction area. Standard gauge access could therefore be provided by dual gauging this track which would suit all three alignments for the Fisherman Islands standard gauge link. The track length including runaround loop is 2.1 kilometres and estimated construction cost is $575 000.

1 The other options are dual gauging of both existing narrow gauge tracks between the Fisherman Islands alignment and Murarrie together with dual gauging of the Gibson Island siding ($7.3 million) and a separate standard gauge link adjacent to the existing narrow gauge tracks between the Fisherman Islands alignment and Murarrie together with dual gauging of the Gibson Island siding ($5.1 million).

# CHAPTER 4—POTENTIAL STANDARD GAUGE TRAFFIC TO FISHERMAN ISLANDS AND RELATED LOCATIONS

Construction of a standard gauge rail link to Fisherman Islands would provide a direct rail connection between the new port area and the rest of the standard gauge rail system in Australia. In addition, as noted in the previous chapter, it would be possible to provide standard gauge access to several other facilities further upstream on the southern side of the Brisbane River by constructing branches from the Fisherman Islands link. Connecting these areas to the standard gauge system would provide direct rail access on the same gauge to virtually all stations in New South Wales, Melbourne, Adelaide, Perth and various other locations in South Australia, Western Australia and the Northern Territory (see Figure 1.1).

The only significant potential traffics over the proposed Fisherman Islands link involve interstate movements along several corridors. Intrastate traffic can already move to the port area on the existing narrow gauge connections.

In relation to traffics to and from northern New South Wales, only the area east of the Great Dividing Range would potentially be affected by a Fisherman Islands standard gauge link. Although substantial quantities of wheat and other agricultural products are grown on the western side of the Range, there is no economical rail connection from this area to Brisbane. The rail network in northern and north-western New South Wales is connected to the Sydney-Brisbane line near Maitland which is 25 kilometres from Newcastle. It is therefore cheaper to rail freight to and from north-western New South Wales through Newcastle or Sydney than through Brisbane, which is 794 kilometres from Maitland along the main line[1]. These features of the rail network are illustrated in Figure 4.1.

The BTE is currently undertaking a separate study of the viability of providing a rail connection, through Goondiwindi, between the northern New South Wales standard gauge system and the Queensland Railways narrow gauge network. However, any traffic moving over such a connection to or from Fisherman Islands would almost certainly use the narrow gauge link to the port. Therefore, commodities moving to or from northern and north-western New South Wales would not be potential traffics over the proposed standard gauge link to the port.

The traffic affected by construction of the proposed link would be determined by the nature of activities at Fisherman Islands and in the areas which could be connected by branch lines. A variety of potential traffics were considered during the study, but it was concluded that only four traffics might involve significant tonnages-overseas containers, urea, petroleum and sugar. These are discussed in turn below, and the forecasts of traffic over the proposed link are summarised at the end of the chapter.

## OVERSEAS CONTAINERS

### Cargo centralisation

As discussed in Chapter 3, large numbers of overseas containers with an origin or destination in Queensland are currently exported or imported through Sydney.

1. As an example, Moree is 498 kilometres from Newcastle and 1267 kilometres from Brisbane by standard gauge rail. Road distance from Moree to Brisbane is 394 kilometres.

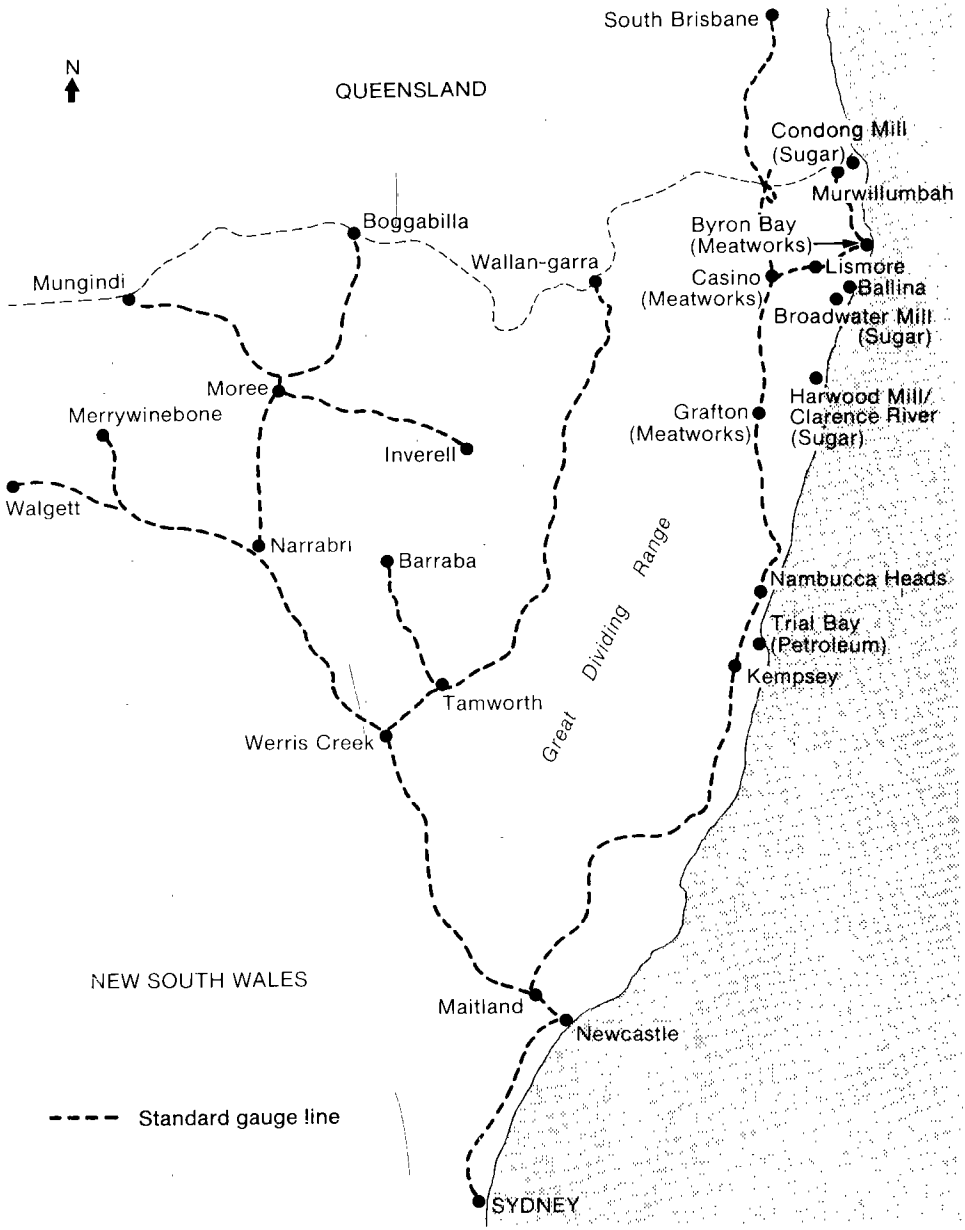


**Figure 4.1—Rail network and relevant processing/terminal facilities in northern NSW**

The interstate transfers comprise both transhipments, where the containers are loaded with overseas cargo, and positioning movements where no overseas cargo is carried. The available information indicates that rail is the major mode used for the interstate transfers, although there are also some movements by road. The extent to which overseas container traffic would move over a standard gauge link to Fisherman Islands would mainly depend on the number of transhipments and positioning movements having an intermediate origin or destination at the new port area, which in turn would be determined by a number of factors which are discussed below. Most of the data on overseas container transfers involving the Brisbane port area cover the period prior to the commencement of full-scale operations at Fisherman Islands and therefore mainly relate to operations at Hamilton.

The level of traffic along the proposed link could be affected by the relative proportions of transhipments which are full container loads (FCL) and less than container loads (LCL). In broad terms, an FCL goes from the consignor to one consignee while an LCL carries cargo directed to more than one consignee or from more than one consignor. Overseas LCLs being transhipped to or from Sydney are packed and unpacked in specialist depots due to the need for centralised consolidation and break-up facilities and to meet customs clearance requirements. The proportion of LCLs in total overseas container traffic has fallen significantly since the introduction of containerisation and is probably now around 15 per cent for transhipments between Brisbane and Sydney.

Most overseas containers loaded with import cargo which are shipped through the Port of Sydney (or any other interstate port) and transferred to Brisbane currently move through the Brisbane port area. This generally involves transport on the standard gauge rail system from Sydney to Acacia Ridge where the containers are transhipped to narrow gauge wagons and then railed to the BATL terminal at Hamilton. LCL containers are unpacked at the BATL facility and the contents are then delivered to consignees while FCL containers are delivered direct to consignees. Movement of this traffic through Hamilton is in line with an agreement apparently reached in the late 1960s between several trade unions with members working at the Hamilton terminal and five shipping companies which account for a substantial proportion of the transhipments between Sydney and Brisbane. The shipping companies which are not party to the agreement tend to deliver direct to consignees by road from the Acacia Ridge area.

Discussions with organisations contacted during the course of the study indicated that the shipping companies and many consignees would generally prefer to have import cargo delivered direct from Acacia Ridge. However, even in the absence of the agreement some of the overseas containers currently transhipped from Sydney would still probably move through Hamilton. There are currently only two depots in Brisbane where customs clearance for LCL containers can be obtained, namely the BATL facility at Hamilton and the Macpak depot which was recently relocated to Hemmant (adjacent to the main access road to Fisherman Islands). In the absence of any new facilities, many LCL containers with import cargo would probably still be unpacked at Hamilton. In addition, Hamilton is conveniently located with respect to some of Brisbane's major industrial and commercial areas and it therefore seems likely that some consignees would prefer to collect their FCL containers there rather than send a truck all the way to Acacia Ridge. In this case, pick-up could be at the small rail facility behind the container terminal and would not necessarily involve movement through the terminal in the absence of an agreement between the trade unions and shipping companies.

The current agreement does not apply to overseas containers loaded with export cargo and centralised from Brisbane through Sydney or other interstate ports. The available information indicates that most of this traffic is delivered direct to Acacia Ridge by road transport from the consignors' premises. However, there seem to be two possible exceptions to this general pattern for export cargo. Firstly, LCL

traffic involving several consignors must initially be delivered to a registered depot for consolidation and loading into containers, and it is likely that some of these containers would be railed from Hamilton to Acacia Ridge. Secondly, the major wool dumping facility in Brisbane is located at the BATL complex at Hamilton and some of the containers loaded with wool for centralisation through Sydney are probably moved to Acacia Ridge by rail.

In addition to transhipments, there are significant numbers of positioning movements between Sydney and Brisbane. Containerised exports from Brisbane have traditionally exceeded containerised imports and hence additional overseas containers must be positioned into Brisbane to provide sufficient capacity for export cargo. For example, it is estimated that, in 1976-77, 13 280 TEUs of overseas containers were positioned from Sydney to Brisbane with only 125 TEUs in the opposite direction, the latter movements presumably being to meet temporary shortfalls of containers in Sydney or elsewhere (BTE 1982 p34).

Discussions with shipping companies revealed that many of the positioning movements are undertaken by freight forwarders or container leasing companies. Under the terms of the Customs Convention on Containers 1972 to which Australia is a signatory, containers granted temporary admission to Australia may be used for the domestic carriage of cargo subject to the conditions that the domestic journey brings the container nearer to the port from which it is to be re-exported and that the container can only be used once for domestic transport of cargo. It is therefore common practice for shipping companies to arrange positioning movements to Brisbane through freight forwarders who load the overseas containers with domestic cargo, deliver them to consignees in Brisbane and, after unloading, transport them to the exporters' facilities or to the Brisbane port area for packing with export cargo[1]. As the final deliveries to the Brisbane port area are from locations in Brisbane or elsewhere in Queensland, they involve road transport or perhaps the narrow gauge rail network.

Although there are some movements of empty containers from Sydney to Hamilton by rail the numbers involved appear to be small, and it was therefore concluded that positioning movements would not constitute a major potential traffic over the proposed standard gauge link to Fisherman Islands.

**Recent traffic and expected growth**

Estimation of potential container traffic was made difficult by the lack of accurate statistics on the numbers of overseas containers which are transported between the Brisbane port area and Sydney (as well as other interstate locations) using the standard gauge rail system. However, records are kept of overseas containers transhipped between the standard and narrow gauge systems at Acacia Ridge, the total number for 1981-82 being 14 588 units. These statistics also include movements to and from points on the narrow gauge system other than the port area, and hence they only establish an upper bound for the purposes of the current exercise.

Queensland Railways officials also record the numbers of overseas containers loaded onto or unloaded from the standard gauge rail system at Acacia Ridge. Transhipment and handling figures for the period from 1977-78 to 1981-82 are presented in Table 4.1.

Discussions were held with various shipping companies, container terminal operators and other industry organisations in order to establish a more specific estimate of overseas container movements to and from the Brisbane port area. As a result of these discussions and with some additional statistics on overseas container

1. For example, the BTE study on cargo centralisation reported the State Rail Authority's estimate that 70 per cent of the empty containers positioned from Sydney to Brisbane during 1976-77 were loaded with domestic cargo. (BTE 1982 p32).

TABLE 4.1—NUMBERS OF CONTAINERS TRANSHIPPED AND HANDLED AT ACACIA RIDGE, 1977-78 TO 1981-82

| Operation/container type | Year | | | | |
|---|---|---|---|---|---|
| | 1977-78 | 1978-79 | 1979-80 | 1980-81 | 1981-82 |
| Transhipped[a] | | | | | |
| Overseas | 11 724 | 15 425 | 14 322 | 14 102 | 14 588 |
| RACE[b] | 641 | 1 624 | 2 019 | 3 450 | 3 282 |
| Handled inwards[c] | | | | | |
| Overseas | 6 154 | 8 593 | 8 420 | 8 767 | 7 796 |
| RACE | 3 922 | 5 122 | 6 923 | 8 007 | 6 672 |
| Handled outwards[c] | | | | | |
| Overseas | 997 | 2 373 | 3 024 | 2 548 | 2 844 |
| RACE | 3 641 | 4 861 | 6 869 | 8 397 | 7 452 |
| Total | 27 079 | 37 998 | 41 577 | 45 271 | 42 634 |

a. Transhipped between standard and narrow gauge rolling stock.
b. Railways of Australia Container Express
c. Handled means loaded onto or unloaded from the standard gauge rail system but not involving the narrow gauge system, ie presumably road transport is involved.

*Source:* Queensland Railways, personal communication.

movements provided by the companies and the Australian Chamber of Shipping, it was concluded that around 12 000 overseas containers represented the best possible estimate of movements in 1980-81 between the Brisbane port area and interstate locations involving the standard gauge rail system. Virtually all of these movements involved the Hamilton container terminal, with only a small number of movements to and from the ANL terminal at Newstead.

As comprehensive statistics on overseas container movements between the Brisbane port area and interstate locations over an extended period are not available, it was necessary to forecast potential traffic growth after 1980-81 without detailed knowledge of past traffic trends. Attention was focused on the likely increase in containers carrying imports as these are the major source of potential traffic over the proposed link. Several sets of data were used to provide information for this exercise.

Table 4.1 provided information on annual numbers of overseas containers transhipped at Acacia Ridge between 1977-78 and 1981-82. However, these statistics are not very useful for estimating past trends in port-related traffic as they include both exports and imports as well as containers having origins or destinations in areas other than the Brisbane port area.

The survey of the movement of overseas containers throughout Australia undertaken by consultants for the BTE study on cargo centralisation contained estimates of import transhipments from Sydney to Brisbane in 1975-76 and 1976-77. These movements reportedly increased from 13 000 to 14 000 TEUs over this period, reflecting a growth rate of 7.7 per cent per annum during a time when the total number of overseas containers handled through Australian ports increased by 17-18 per cent (BTE 1981 unpublished).

Estimates of overseas container movements by rail from New South Wales and Victoria to Queensland in 1980-81 and 1981-82 were provided by the Railways of Australia Systems Planning and Development Committee (SPDC). The figure for 1980-81 was the reconciled estimate from data provided by the relevant rail authorities and the 1981-82 figure was the Australian Chamber of Shipping's best estimate. This information indicated rail movements to Queensland of 15 200 containers in 1980-81 and 14 700 containers in 1981-82, a fall of 3.3 per cent over the period. However, the statistics also included significant numbers of positioning movements and transhipments with destinations other than the Brisbane port area.

The Australian Chamber of Shipping made available more disaggregated estimates of overseas container movements by rail from Sydney/Melbourne to Brisbane in 1981–82 and forecasts for 1982–83. These data indicated movements of 9871 loaded containers in 1981–82 and 10 070 units in 1982–83, involving an expected increase of 2.0 per cent over this period. They excluded north Queensland movements but included containers with a Brisbane destination outside the port area.

Additional information for the estimation of growth in the volume of overseas container transfers by standard gauge rail to Brisbane in recent years was obtained by using port data on imports of containers. Approximately 70 per cent of centralisation movements from Sydney to Brisbane in 1976–77 involved the UK/Europe trade (BTE 1982 p33). Changes in this traffic will therefore be a major determinant of future trends in interstate transhipments of overseas containers to the Brisbane port area.

Statistics compiled by the Port of Brisbane Authority indicate that containerised UK/Europe imports handled at the port declined significantly from 64 077 tonnes in 1974–75 to 14 884 tonnes in 1980–81, the latter year involving 10 230 tonnes of European cargo and 4654 tonnes of UK/Ireland traffic (Port of Brisbane Authority 1981b). Over the same period, total containerised imports through the Port of Brisbane declined from 328 000 tonnes to 237 000 tonnes while exports increased from 309 000 tonnes to 554 000 tonnes. Although some of the decline in UK/Europe containerised imports could possibly be attributed to changes in levels of economic activity and trading patterns, the decline in tonnages handled at the Port of Brisbane was also probably due in part to increased transhipments through the Port of Sydney as containerisation became more widespread and the high volume centralisation operation was consolidated.

Information on total UK and other EEC imports into Australia was obtained from the Australian Bureau of Statistics (ABS). The trend in volumes of imports in recent years was estimated by applying the Implicit Price Deflator for imports of goods and services to data on the value of imports from these countries. The resulting estimates indicated that there was no discernible upward or downward trend in the volume of total UK and other EEC imports into Australia between 1971–72 and 1981–82.

Some additional information on expected growth in containerised trade between Australia and the UK/Europe area was obtained during discussions with shipping industry officials who provided estimates of between 2.0 and 2.5 per cent per annum. However, these figures involved the total trade and the rate for imports could be lower.

On the basis of this information, it was concluded that the number of UK/Europe import containers transhipped through the Brisbane port area would, under favourable conditions, grow at 1.0 per cent per annum over the evaluation period.

For the purposes of the evaluation, the remaining import containers transhipped to Brisbane through Sydney were assumed to grow at the same rate as total container traffic through the Port of Brisbane. The Port of Brisbane Authority has forecast that total container numbers through the port will increase on average by 4.5 per cent compound per annum. This growth rate was therefore used for non-UK/Europe containers transhipped to the Brisbane port area.

On the basis of these growth estimates and the relative importance of the UK/Europe and other trades in total transhipment traffic, the volume of import containers centralised by rail between the Brisbane port area and interstate locations was forecast to grow at 2.0 per cent per annum over the evaluation period. This is considered to be an upper estimate.

Recent work by the Railways of Australia Systems Planning and Development Committee (SPDC) supports the general magnitude of this estimate. SPDC has forecast that northbound overseas container traffic on the Sydney-Brisbane line will remain constant between 1980 and 1990 and then increase at an average compound

rate of approximately 4.0 per cent per annum over the following 10 years (SPDC 1980 p2). This involves an average annual growth rate over the 20 years of approximately 2.0 per cent, although the distribution of growth and the impact in a discounting framework would be different from that of the BTE estimate.

**Fisherman Islands traffic**

The forecast of potential interstate rail movements of overseas containers to the Brisbane port area used in the evaluation is based on cargo volumes and operating practices in the period before the new container terminal at Fisherman Islands became operational. The extent to which this traffic could be transferred to the new port area would depend on several factors.

There are now three container terminals at the Port of Brisbane and it is highly unlikely that the expected level of container traffic through the port could support this number of facilities in the longer term. Continued operation of the wharves at Newstead and Hamilton is dependent on continued dredging of the upstream facilities by the Port of Brisbane Authority, although in the case of the Hamilton area this is influenced by the need to provide access to the nearby Cairncross dry dock. Closure of the two upstream wharf facilities to overseas container vessels would probably be acceptable to P&O and ANL as these companies jointly operate the Number 1 terminal at Fisherman Islands. It is expected that Newstead will probably close around 1988 while the Hamilton wharves will continue operating to 1990, although there are likely to be pressures which may cause the closure of the wharves before these dates.

Closure of the upstream container terminal wharves would not necessarily result in the diversion of the overseas container transhipment traffic to Fisherman Islands. Even in the absence of wharf operations at these locations, some facilities at Hamilton such as the LCL depot and the wool dumping complex would probably continue to operate for some time. In addition, some customers who prefer to collect and deliver containerised cargo at Hamilton because of its convenient location could be expected to resist the closure of all operations there. Movement of FCL traffic through the Hamilton area would only require the continued operation of the rail facilities behind the container terminal and these are unlikely to be closed in the foreseeable future.

A major factor operating against the transfer of interstate container movements to Fisherman Islands is that shipping companies and shippers generally seem to consider that its location is much less convenient than that of either Acacia Ridge or Hamilton. Accordingly, they would prefer to operate out of the latter areas, although this situation may alter in the future if there is a significant reduction in the services provided in the Hamilton area. In addition, it is difficult at this stage to predict the likely pattern of development of facilities such as LCL depots at Fisherman Islands and what impact they may have on interstate container movements.

Perhaps the single most important element in the future pattern of container transfer movements in the Brisbane port area is the industrial relations situation. As discussed earlier, overseas container movement patterns do not necessarily reflect the preferences of shipping companies and shippers or involve the most efficient operation from a purely economic viewpoint. It seems likely that the trade unions associated with the present agreement will attempt to encourage the continued movement of overseas container transhipment traffic through the port area but it is not possible to estimate how this will affect operations at different facilities. There is some evidence to suggest that some unions would prefer to have the traffic directed through Fisherman Islands while others would want it retained at Hamilton to provide maximum advantage to their members. Therefore, the industrial relations situation applying to overseas container transhipments through the Port of Brisbane and the implications for Fisherman Islands cannot be predicted with any confidence.

In view of the uncertainty surrounding the factors that will influence the future pattern

of overseas container transfer movements in the Brisbane port area, it was decided to initially estimate the maximum level of overseas container traffic that could conceivably move between Fisherman Islands and interstate locations using the existing standard and narrow gauge rail connections. This involves the 12 000 containers estimated to have moved through Hamilton (and to some extent Newstead) in 1980–81 plus growth at 2.0 per cent per annum, which would be achieved if all transfers currently moving through the upstream terminals were diverted to Fisherman Islands. In practice, potential movements through Fisherman Islands could be minimal if existing Hamilton traffic either continued through that terminal, was loaded/off-loaded at Acacia Ridge or was split between these two locations. It should also be recognised that the actual growth rate could vary significantly from the 2.0 per cent estimate as a result of factors such as changes in levels of economic activity and movements in foreign exchange rates.

The achievement of a significantly higher growth rate for potential transfer traffic would not necessarily result in a substantial increase in the number of containers centralised to the Brisbane port area. Although an annual growth rate of, say, 5.0 per cent for this traffic would potentially double the volume of containers in 14 years, the increased Brisbane traffic could make it economic for operators to increase direct ship calls at the Port of Brisbane and hence reduce the volume of transhipment traffic through the Port of Sydney. In this respect the BTE report on cargo centralisation concluded that, even with present traffic volumes, resource cost and financial savings could be obtained by increasing direct ship calls at the Port of Brisbane (BTE 1982 pp51–74 and pp81–83). Although these benefits were considered to be marginal in overall economic terms, it is conceivable that they would become more significant or provide a greater incentive to shipowners to change schedules with higher traffic volumes having an origin or destination in Brisbane.

It is also possible that the level of transfer traffic between Brisbane and Sydney could increase as a result of the improvement in the rail service with a standard gauge link to Fisherman Islands. As an example, if a ship in the North American trade had only a small amount of cargo to collect in Sydney but a large load in Brisbane, it could proceed direct to Brisbane with the Sydney cargo being railed direct to Fisherman Islands for loading there. Alternatively, under certain circumstances the improved rail service to Fisherman Islands could result in greater centralisation of containers from Brisbane to Sydney. Discussions with representatives of several shipping companies indicated, however, that construction of the proposed standard gauge link would be unlikely to have any significant effect on either centralisation practices or the Australian port schedules of container vessels.

The improved rail service would not be expected to result in the diversion of any significant traffic from road to rail. The share of the interstate component of the transfer traffic held by road transport appears to be relatively small and is probably underpinned by various quality of service and other considerations which would not be effectively challenged with a standard gauge rail link to Fisherman Islands. In the BTE study on cargo centralisation, it was estimated that road transport accounted for around 1000 of the 21 700 TEUs of transhipments and 2112 of the 13 405 TEUs of positioning movements between Sydney and Brisbane in 1976–77, or about 9 per cent of total overseas container transfers on that corridor (BTE 1982 pp32–35).

Another possible effect of the proposed link to Fisherman Islands involves containerised meat from north-eastern New South Wales. Abattoirs at Casino (two), Byron Bay and Grafton are licensed to export meat, the largest facility being located at Casino. Figures supplied by the Australian Meat and Livestock Corporation indicate that in 1980–81 these four operators exported 9625 tonnes of meat of which 7737 tonnes were delivered to Brisbane and 1888 tonnes to Sydney. Most of the meat is currently delivered by road to shipping companies' facilities in the Port of Brisbane, with meat for final export through Sydney being centralised at the expense of the

shipping companies in line with the pan-Australian freight rates that were introduced with centralisation.

With a standard gauge rail link to Fisherman Islands, it would be possible to rail these containers direct to the new port area. This could also result in transfer and handling cost savings for meat which was subsequently centralised from Brisbane to Sydney. However, a number of factors seem likely to ensure that this traffic would continue to move to Brisbane by road. The road distance from Brisbane to Casino (276 kilometres) and Byron Bay (184 kilometres) together with the relatively small numbers of containers that would be moved on, say, a weekly basis probably make this traffic more suited to road transport than rail[1].

There could also be operational difficulties in moving containers by rail between the abattoirs and the port area as the north-eastern part of the standard gauge system is operated mainly for traffic moving to and from locations further south in New South Wales. An efficient and competitive rail service would probably require block movements of container wagons, but the volume of traffic would probably not be sufficient to warrant dedicated wagons.

Export meat from north-eastern New South Wales would therefore be expected to continue to move by road if a standard gauge link to Fisherman Islands was built.

There is also a large meatworks at Beaudesert in southern Queensland which is currently served by a narrow gauge branch line. The existing rail link provides a connection to Fisherman Islands and access to the meatworks would not be improved if the proposed standard gauge link was constructed. Any traffic currently moving from Beaudesert to interstate locations via the Brisbane port area and the standard gauge system would be included in the overseas container traffic forecast presented earlier (ie 12 000 units in 1980–81).

## UREA AND RELATED PRODUCTS

Consolidated Fertilizers Ltd has two facilities near the Brisbane River, the factory on the southern side being located at Gibson Island where ammonia and urea plants are operated. As noted in Chapter 3, the Gibson Island complex is currently linked to the narrow gauge rail network by a branch from the Park Road-Lytton Junction line at Murarrie. Significant quantities of urea and related products are currently transported between the Gibson Island factory and interstate locations. This traffic could potentially move along a standard gauge rail link to Fisherman Islands if a branch to Gibson Island was also constructed. Information on the potential impact of a standard gauge rail link on transport arrangements for urea traffic was obtained during discussions with officers of Consolidated Fertilizers Ltd, Australian Fertilizers Ltd, the Phosphate Co-operative Company of Australia Ltd and Adelaide and Wallaroo Fertilizers Ltd.

The major products currently transported from the Gibson Island factory to interstate locations are agricultural and industrial urea, with the former also including some ammonium sulphate and mono- and di-ammonium phosphate mixtures. Approximately 90 per cent of this traffic is carried by road transport at present and most of the remainder is sent in narrow gauge rail wagons to Clapham where it is transferred to standard gauge wagons for the journey south. Interstate product movements in 1981–82 totalled 84 500 tonnes.

Nearly 50 per cent of the agricultural urea despatched interstate from the Gibson Island factory is sent to New South Wales, where the major final destinations are the Tamworth/Narrabri and Riverina areas. Some of this urea is delivered direct to rural areas and the remainder is sent to the works of Australian Fertilizers Ltd. Due

1. The Australian Meat and Livestock Corporation data suggest that movements from the north-eastern New South Wales works to Brisbane averaged about 10 containers per week in 1980–81.

to the indirect rail route between Brisbane and the Tamworth/Narrabri area noted earlier in this chapter, it seems probable that this area would continue to be served direct by road even if there was a standard gauge link to Gibson Island. Australian Fertilizers Ltd is also a road-oriented operator, with only 20 per cent of ex-works deliveries being by rail. In view of these considerations, it was estimated that a maximum of 50 per cent of agricultural urea sent to New South Wales might move by rail with a standard gauge link to Gibson Island.

Most of the agricultural urea transported from Gibson Island to Victoria is sent to the Yarraville and Geelong plants of the Phosphate Co-operative Company Ltd, with the remainder moving to the company's Portland facility or direct to rural areas. Urea would probably still be transferred to the Yarraville and Geelong plants for storage and distribution if the standard gauge rail system was used, although delivery to the latter plant could be much easier if a standard gauge link to Geelong was built. As the distance involved in Brisbane-Melbourne movements would tend to favour rail transport for the line-haul, it was concluded that up to 90 per cent of agricultural urea sent to Victoria might move by rail with a standard gauge link to Gibson Island.

The major destinations for agricultural urea sent to South Australia are the Port Adelaide, Wallaroo and Port Lincoln facilities of Adelaide and Wallaroo Fertilizers Ltd. The remaining 15 per cent or so is delivered direct to rural consumers. The Port Adelaide and Wallaroo plants are already close to or connected to the standard gauge system, and it would probably be economic to rail urea to South Australia for final road delivery to Port Lincoln if the need for transfer operations in Brisbane was eliminated. In addition, some of the urea currently delivered direct from Brisbane to rural consumers by road would probably be diverted to rail out of Brisbane. It was therefore concluded that up to 90 per cent of agricultural urea sent to South Australia might move by rail with a standard gauge link to Gibson Island.

Industrial urea movements from Gibson Island are mainly to Victoria where the major destinations are the ICI urea formaldehyde plant at Deer Park and the Borden Chemical works at Laverton. Transport of the urea by standard gauge rail from Gibson Island would require bogie exchange or road transport from Melbourne to the factories, although construction of a standard gauge link to Geelong could improve access to the Laverton facility. Once again, because the distance between Brisbane and Melbourne would tend to favour rail movements for the line-haul, it was decided to assume that all industrial urea movements from Gibson Island to Victoria would be diverted to rail if a standard gauge link was built. All industrial urea traffic to New South Wales would also be expected to move by rail.

The traffic forecasts for a standard gauge link to the Consolidated Fertilizers Ltd factory at Gibson Island were based on the modal share estimates presented above and forecasts of total interstate traffic to 1991-92 prepared by the company. Total interstate traffic after this time was forecast to remain constant for the purposes of the evaluation, and it was assumed that rail would account for 10 per cent of both products transported to each State in the absence of the proposed link. These forecasts are considered to be relatively optimistic.

## PETROLEUM

A standard gauge rail link to Fisherman Islands along any of the three alignments proposed in Chapter 3 would pass close to the Ampol oil refinery at Lytton. This refinery is currently served by a branch from the existing narrow gauge rail link to Fisherman Islands, and the provision of standard gauge access would permit the direct railing of petroleum products to northeastern New South Wales. The potential effect of a standard gauge rail link to the Ampol refinery on the distribution of petroleum products in eastern Australia was estimated after discussions with petroleum industry officials, distributors and operators and with advice from the

Transport Committee of the Australian Institute of Petroleum Ltd.

Various distribution patterns are currently used for the supply of petroleum products to north-eastern New South Wales between Kempsey and the Queensland border. Ampol and Amoco rely heavily on road transport from their Brisbane refineries, and at least two other companies supply some of their outlets in the area by road from terminals in Brisbane. There are also significant shipments by sea to the terminal at Trial Bay near Kempsey, from where the petroleum is distributed by road tankers[1]. The third major network involves distribution by rail and, to a lesser extent, road tankers from Newcastle which is connected to the Sydney refineries by pipeline.

The distribution pattern adopted by each oil company depends on various factors, the most important being the location of the company's refineries, exchange arrangements with other companies and existing receival and handling facilities. In addition, refining capacity in Queensland significantly exceeds that State's current requirements while there is often insufficient output in New South Wales. This encourages movement of petroleum from the Brisbane refineries to north-eastern New South Wales.

If the Trial Bay facility was closed, north-eastern New South Wales would probably be supplied from Brisbane and Newcastle (after piping from the Sydney refineries). The mid-point on the railway line between Newcastle and Brisbane is in the vicinity of Nambucca Heads. Hence, on the least transport cost criterion, the maximum likely catchment area for petroleum products railed along a standard gauge link from the Ampol refinery could extend from as far north as the Queensland/New South Wales border to this town.

Discussions with oil company officials indicated that few companies would supply their outlets in north-eastern New South Wales by rail if a standard gauge connection was provided to the Brisbane refinery. It was estimated that total petroleum traffic into the area from all sources was approximately 150 000 tonnes per annum at recent consumption levels. If this amount of petroleum was supplied using the standard gauge connection, it would entail all companies drawing product from Ampol's refinery to supply their outlets in north-eastern New South Wales, with Ampol presumably receiving offsetting allotments from these companies' refineries in other States.

The available information indicates that companies other than Ampol would be unlikely to supply outlets in New South Wales by using a standard gauge rail link to the Brisbane refinery. There are a variety of reasons for this; a preference by some companies for utilising their own refineries, lack of rail receival facilities in the area for some companies, a basic preference for road distribution in some cases, the additional cost involved with rail transport due to the need for double handling at the railhead and uncompetitive rail freight rates when compared with what is currently perceived to be a reasonably efficient road distribution system.

In view of these factors, it was tentatively concluded that the rail traffic over a standard gauge rail link to the Ampol refinery in Brisbane would initially comprise no more than Ampol's share of the north-eastern New South Wales market. This would amount to 15 000 tonnes per annum, with any future increases tied to changes in per capita consumption and/or market shares in north-eastern New South Wales.

## SUGAR

Substantial quantities of sugar cane are grown in New South Wales in the coastal area north of Grafton. Raw sugar is produced from this cane in mills located at

1. The Trial Bay facility is operated by Shell and Caltex, although other companies also have drawing rights. In 1981-82, 194 816 tonnes of petroleum and petroleum products were shipped into Trial Bay, 176 569 tonnes from other New South Wales ports and 18 247 tonnes from interstate (Maritime Services Board of New South Wales 1982b p27). Much of this product was probably distributed to north-western New South Wales where there is substantial consumption due to large-scale agricultural activities.

Condong on the Tweed River near Murwillumbah, Broadwater on the Richmond River south of Ballina and Harwood on the Clarence River north-east of Grafton. Production at these three mills has grown rapidly in recent years. Statistics on the production of raw sugar in the area over the last 10 years are presented in Table 4.2, and the locations of the mills and other relevant facilities are illustrated in Figure 4.1.

Raw sugar produced at the New South Wales mills is currently refined at two major locations. Output from the Broadwater and Harwood mills is mainly transported by ship from Clarence River to the Pyrmont refinery in Sydney, with small tonnages also being shipped to Melbourne[1]. Raw sugar from Broadwater is transferred to the Clarence River port area by truck. Approximately 35 per cent of the raw sugar produced at the Condong mill is for direct consumption by manufacturers or for domestic purposes, and the remainder is trucked to the New Farm refinery in Brisbane which also services the Moreton and Rocky Point mills in southern Queensland.

Discussions with officers of CSR Ltd indicated that these transport and refining arrangements have become less satisfactory in recent years as a result of increased raw sugar production at the three New South Wales and two southern Queensland mills. Output from the Condong, Moreton and Rocky Point mills has now outstripped the capacity of the New Farm refinery, and production at the Broadwater and Harwood mills is greater than the optimal capacity of the *'Poolta'* which carries the raw sugar from Clarence River to Sydney. In response to this situation, officers of CSR Ltd have undertaken a study of the future transport and refining arrangements for output from the five mills. The final recommendations of this study, which is being prepared for the Sugar Board, were not available at the time the BTE evaluation was completed.

One option for the New South Wales mills is to use a larger ship for the Clarence River-Sydney trip. However, river entry bar and swinging basin limitations at Clarence River restrict the size of vessel that can be used, the *'Poolta'* being only 3170 DWT. Introduction of a larger vessel would require dredging at the port, but it is unlikely

TABLE 4.2—RAW SUGAR OUTPUT AT NEW SOUTH WALES MILLS[a], 1973 to 1982

| *Year*[b] | *Production*[c] *(tonnes 94 nt sugar)* |
|---|---|
| 1973 | 121 154 |
| 1974 | 120 977 |
| 1975 | 104 051 |
| 1976 | 132 344 |
| 1977 | 134 451 |
| 1978 | 152 711 |
| 1979 | 155 774 |
| 1980 | 181 208 |
| 1981 | 184 522 |
| 1982 | 209 386 |

a. Condong, Broadwater and Harwood mills.
b. Refers to season commencing in May of particular year and continuing to December-January of the following year.
c. An overall quota (for peak production) applies to raw sugar production. In 1982 the quota was 183 200 tonnes. The empirical measure 94 nt (net titre) reduces raw sugar of various qualities to a standard or common basis.

*Source:* Queensland Canegrowers (1983). Strand Press Publishing (1977) and (1981) The Sugar Industry Information Service (1982)

1. Statistics published by the Maritime Services Board of New South Wales indicate that 137 979 tonnes of sugar and molasses were exported from Clarence River in 1981–82. This comprised 130 538 tonnes to Sydney and 7441 tonnes to interstate locations (See Maritime Services Board of New South Wales 1982b p27).

that the expenditure required could be justified by the amount of potential sugar traffic involved[1].

The other major option for the transport and refining of raw sugar produced at the three mills in northern New South Wales involves shipment through the Port of Brisbane. Raw sugar from these mills could be shipped through a bulk sugar terminal at the port for refining at either overseas or interstate locations. This traffic could flow to the port area along the proposed standard gauge link to Fisherman Islands if a terminal was built either at Fisherman Islands or further upstream on the southern side of the Brisbane River. However, a number of factors would probably result in road transport being used to carry raw sugar direct from the mills to a Brisbane sugar terminal if a new facility was built at this location.

The Broadwater and Harwood mills are both located a significant distance from the nearest rail facility. Construction of rail connections to these mills would be prohibitively expensive, and in the case of the Harwood facility this would presumably require a new bridge as the mill is located on an island. Condong has a rail connection to Murwillumbah but the link has apparently not been used since the 1960s and is reportedly in poor condition. Use of this link for raw sugar traffic from Condong would therefore probably require significant expenditure on rehabilitation and/or upgrading. It seems likely in these circumstances that use of standard gauge rail facilities for the transport of raw sugar from the New South Wales mills to Brisbane would require road transport from each mill to the nearest rail facility as well as a road/rail transfer operation at the railhead.

Another disadvantage associated with rail transport is the track network in northern New South Wales which is illustrated in Figure 4.1. The closest rail facilities to the Condong and Broadwater mills are located on the Casino-Murwillumbah branch of the Sydney-Brisbane line, and hence any train carrying raw sugar would first have to travel a substantial distance southwards and westwards before reaching the interstate main line at Casino. This indirect route would add significantly to the rail distance involved in movements from the two mills.

The distances between the New South Wales mills and Brisbane by rail (including road transfer to the nearest rail facility) and by the direct road route are presented in Table 4.3. They indicate that the direct road operation involves a significantly shorter distance in each case, particularly for the Condong mill.

Transport of raw sugar on the standard gauge network would also require the provision of a branch line to the bulk sugar terminal from the Fisherman Islands link. This could involve either the construction of a new branch or dual gauging of an existing narrow gauge branch, the exact requirement depending on the location of the terminal and the alignment of the standard gauge track to Fisherman Islands.

In view of the foregoing factors and after consultations with officers of CSR Ltd, it was concluded that road transport would be the preferred mode for moving raw sugar from the New South Wales mills to Brisbane. This traffic would therefore not be expected to move over the proposed standard gauge link to Fisherman Islands.

## TOTAL TRAFFIC ESTIMATES

A standard gauge rail link to Fisherman Islands alone would only affect overseas container traffic. The provision of additional branches to the Ampol refinery and Gibson Island could attract petroleum products and urea traffic. The estimates of potential overseas container and urea traffic over the proposed standard gauge link are presented in Tables 4.4 and 4.5. Traffic in Year 1 (ie 1984–85) would depend

1. The Final Report of the New South Wales Grain Handling Enquiry, issued in February 1981, concluded that a deepwater port on the Clarence River to handle vessels of 30 000 tonnes would cost more than $15 million. Most other coastal sugar traffic is currently carried by the *'Ormiston'* of 16 600 DWT.

on the alignment option for the Fisherman Islands link as construction time would be either 18 or 21 months. This means that traffic could not flow until six or nine months of Year 1 had elapsed. The tables present full year figures for Year 1. Detailed forecasts for petroleum products are not presented because the evaluation included only indicative values for the potential benefits associated with this traffic (see Chapter 5).

TABLE 4.3—DISTANCES INVOLVED IN MOVING NORTHERN NEW SOUTH WALES SUGAR TO BRISBANE AND CLARENCE RIVER

*(km)*

| *Mill* | *Rail to Brisbane* | | | *Direct road, mill to Brisbane* | *Additional distance for road/rail compared with direct road* | *Road to Clarence River port area*[c] |
|---|---|---|---|---|---|---|
| | *Road distance to railhead*[a] | *Railhead to Brisbane*[b] | *Total* | | | |
| Condong | 5 (Murwillumbah) | 315 | 320 | 128 | 192 | 168 |
| Broadwater | 47 (Lismore) | 211 | 258 | 236 | 22 | 59 |
| Harwood | 50 (Grafton) | 291 | 341 | 293 | 48 | .. |

a. Road distances are by main highways, and represent the shortest distance by that route to the nearest major railhead.
b. Distances are from nearest major railhead to South Brisbane.
c. Based on Harwood.
.. not applicable

TABLE 4.4—OPTIMISTIC ESTIMATES OF POTENTIAL OVERSEAS CONTAINER TRAFFIC OVER PROPOSED STANDARD GAUGE LINK TO FISHERMAN ISLANDS (EXCLUDING BRANCHES)

*(Number of overseas containers)*

| *Year* | *Containers* | *Year* | *Containers* |
|---|---|---|---|
| 1983–84 | a | 2003–2004 | 18 923 |
| 1984–85 | 12 989 | 2004–2005 | 19 301 |
| 1985–86 | 13 249 | 2005–2006 | 19 687 |
| 1986–87 | 13 514 | 2006–2007 | 20 081 |
| 1987–88 | 13 784 | 2007–2008 | 20 483 |
| 1988–89 | 14 060 | 2008–2009 | 20 892 |
| 1989–90 | 14 341 | 2009–2010 | 21 310 |
| 1990–91 | 14 628 | 2010–2011 | 21 736 |
| 1991–92 | 14 920 | 2011–2012 | 22 171 |
| 1992–93 | 15 219 | 2012–2013 | 22 614 |
| 1993–94 | 15 523 | 2013–2014 | 23 067 |
| 1994–95 | 15 834 | 2014–2015 | 23 528 |
| 1995–96 | 16 150 | 2015–2016 | 23 999 |
| 1996–97 | 16 473 | 2016–2017 | 24 479 |
| 1997–98 | 16 803 | 2017–2018 | 24 968 |
| 1998–99 | 17 139 | 2018–2019 | 25 468 |
| 1999–2000 | 17 482 | 2019–2020 | 25 977 |
| 2000–2001 | 17 831 | 2020–2021 | 26 496 |
| 2001–2002 | 18 188 | 2021–2022 | 27 026 |
| 2002–2003 | 18 552 | 2022–2023 | 27 567 |

a. Construction period under all options is more than 12 months, and hence there would be no traffic in Year 0 (ie 1983–84).

TABLE 4.5—ESTIMATES OF POTENTIAL UREA TRAFFIC OVER PROPOSED STANDARD GAUGE LINK TO GIBSON ISLAND

*(Number of containers)*[a]

| Year | Urea | |
|---|---|---|
| | *Already on rail* | *Diverted from road* |
| 1983-84 | b | b |
| 1984-85 | 637 | 4 326 |
| 1985-86 | 666 | 4 527 |
| 1986-87 | 700 | 4 767 |
| 1987-88 | 700 | 4 767 |
| 1988-89 | 720 | 4 903 |
| 1989-90 | 753 | 5 130 |
| 1990-91 | 810 | 5 516 |
| 1991-92 to 2022-2023 | 857 | 5 833 |

a. Numbers of containers were estimated assuming 15 tonnes of urea per container.
b. Construction period under all options is more than 12 months, and hence there would be no traffic in Year 0 (ie 1983-84)

*Source:* Estimated from data provided by Consolidated Fertilizers Ltd.

# CHAPTER 5—ECONOMIC EVALUATION OF FISHERMAN ISLANDS LINK

In this chapter, the economic justification for a standard gauge rail link to Fisherman Islands is evaluated using cost-benefit analysis techniques. The evaluation draws on the traffic forecasts and construction cost estimates presented in the preceding chapters.

## BASE CASE

An economic evaluation involves the estimation of the discounted benefits and costs associated with the project case (ie construction of a standard gauge rail link to Fisherman Islands) compared with a base case. A more detailed description of the evaluation methodology was presented in Chapter 1.

The high degree of uncertainty about the future distribution of overseas container transfer traffic in the Brisbane port area was noted in Chapter 4, and it was concluded that specific forecasts of overseas container movements along the proposed Fisherman Islands link could not be prepared with any acceptable degree of confidence. In these circumstances, it was decided to initially adopt an optimistic approach incorporating the estimated maximum potential movements of overseas containers along the proposed link. Under this traffic estimate, all interstate transfers of overseas containers involving the Brisbane port area would move to and from Fisherman Islands, with traffic currently moving through Hamilton and Newstead being diverted to the new port area. It was assumed that the traffic would be diverted to Fisherman Islands by 1984–85 which is the completion time for the standard gauge link incorporated in the evaluation.

It seems quite possible, of course, that there will be only partial transfer of interstate transhipment traffic to Fisherman Islands, particularly in the early part of the evaluation period. The effect of less than complete diversion of transhipment traffic to Fisherman Islands was therefore also considered in the study.

The base case conditions are that the transport arrangements for overseas containers railed between Fisherman Islands and interstate locations would be similar to the current arrangements for Hamilton traffic, ie narrow gauge rail between Fisherman Islands and Acacia Ridge, transhipment between wagons at Acacia Ridge and standard gauge rail between Acacia Ridge and interstate locations.

The base case assumptions for the transport of urea produced by Consolidated Fertilizers Ltd reflect recent practices. Road transport would be used to move 90 per cent of the product sent from Gibson Island to interstate locations, with the remainder being sent on the narrow gauge rail system to Clapham where it would be transferred to standard gauge wagons for the journey south.

## BENEFITS

The following potential benefits from the provision of standard gauge rail access to Fisherman Islands and standardisation of the two branch lines were identified.

### Acacia Ridge transhipment savings

The provision of standard gauge rail access to Fisherman Islands would permit through railing of overseas containers to and from interstate locations. It would

therefore eliminate the transhipment operation at Acacia Ridge for this traffic, with resultant resource cost savings.

It is difficult to estimate the resource cost savings that would be realised if there was a substantial reduction in transhipment traffic through the Acacia Ridge facility. Data provided by Queensland Railways officials indicate that the avoidable costs associated with transhipment involve labour and shunting, and that these costs totalled approximately $411 000 (June 1982 prices) for the 14 102 overseas containers and 3450 RACE containers transhipped at Acacia Ridge in 1980–81. This is an average of $23.42 per container transhipment.

The breakdown of labour and shunting cost savings provided by Queensland Railways officials is reproduced in Table 5.1. The estimates were prepared by allocating the recorded operating costs at Acacia Ridge on a proportional basis, since the container transhipment operations overlap with many other activities at Acacia Ridge such as transhipment of steel products, various shunting movements, transfer of goods to and from road vehicles, general marshalling activities and servicing of sidings. The estimate of potential container transhipment savings was based on the assessment that one-third of the time of staff involved with freight movement and one-sixth of total shunting hours at Acacia Ridge could be attributed to this traffic.

The estimated average transhipment saving of $23.42 per container is for the Acacia Ridge operation in 1980–81. The transhipment operation post 1984 would, however, involve use of upgraded facilities as a result of the completion of Stage 1 of the current development plan. The work undertaken at Acacia Ridge includes the installation of a second gantry crane together with the provision of additional marshalling and container storage facilities. No estimates of the unit transhipment costs that will be associated with these upgraded facilities were available. However, since the new facilities will allow improved shunting procedures and should provide a better rail/rail transfer operation, the avoidable unit transhipment costs should be lower than those incurred with current arrangements.

The estimate of $23.42 refers to savings in the short run when capital such as the

TABLE 5.1—COMPONENTS OF ANNUAL RESOURCE COST SAVINGS AT ACACIA RIDGE IF ALL CONTAINER TRANSHIPMENT ELIMINATED, 1980–81

| *Input* | *Resource cost saving ($ June 1982)* |
|---|---|
| Labour | |
| 33% of Stationmaster time | |
| 1 Clerk | |
| 1 Foreman shunter | |
| 1 Shunter-in-charge | |
| 2 Shunters | |
| 2 Checkers | |
| 1 Crane driver | |
| 2 Slingsmen | |
| 1 Forklift driver | |
| 1 Signalman | |
| Total[a] | 230 000 |
| Shunting costs | 181 000 |
| Total | 411 000 |

a. The magnitude of the individual components of labour costs was not indicated by Queensland Railways.

*Source:* Queensland Railways, personal communication.

cranes used for transhipment represents a sunk cost which cannot realistically be saved. However, in the long run all costs are avoidable and hence a reduction in transhipment traffic resulting from the provision of standard gauge rail access to Fisherman Islands could permit savings or deferrals of future capital expenditure at Acacia Ridge.

Plans have been prepared for a Stage 2 development at Acacia Ridge which would involve the expenditure of $15.75 million (current prices) on roadworks, trackwork, gantry runway and pavement together with additional gantry cranes. The Stage 1 development is expected to more than double annual container transhipment capacity at Acacia Ridge to over 142 000 units. In contrast, total traffic in 1981–82 was 42 634 containers. It therefore seems unlikely that construction of Stage 2 would be warranted in the near future. In view of the substantial surplus capacity that should be available when Stage 1 is completed, it was concluded that construction of the proposed standard gauge link would not result in the realisation of significant discounted benefits through the saving or deferral of capital expenditure at Acacia Ridge.

**Train capital and operating cost savings**

With a standard gauge rail link to Fisherman Islands, interstate container trains could theoretically operate direct to and from the new port area. This could result in savings in train capital and operating costs.

Transhipment of overseas containers requires the retention of both standard and narrow gauge rolling stock at Acacia Ridge during the transhipment operation and the associated shunting activities. Elimination of transhipment for overseas container traffic would therefore potentially improve the utilisation of rolling stock and hence permit capital savings. However, Queensland Railways officials indicated that many of the overseas containers moving between the new port area and interstate locations would probably be on trains carrying freight with Queensland origins and destinations other than Fisherman Islands. Specific transfer operations and train break-up and marshalling activities for overseas containers would therefore still often be required at Acacia Ridge.

In addition, through-running of standard gauge rolling stock to Fisherman Islands would probably involve longer turnaround times at the port area and more empty wagon movements from Fisherman Islands to Acacia Ridge than with a narrow gauge transfer operation. As noted in Chapter 3, the main overseas container traffic moving between interstate locations and the Brisbane port area currently involves import cargo, and this situation would probably continue at Fisherman Islands if significant interstate movements were diverted there. Thus, much of the standard gauge rolling stock bringing these containers to Fisherman Islands would subsequently have to return empty to Acacia Ridge to be loaded with southbound cargo, whereas narrow gauge wagons would be more likely to leave the port area in a loaded condition as they could be used to transport cargo to other locations in Queensland.

Finally, the narrow gauge rolling stock used to transfer overseas containers to and from the port area with the present transhipment operation is not dedicated to this task. Rather, the equipment is usually idle between other activities, and hence the introduction of a through standard gauge operation would not necessarily mean that the narrow gauge rolling stock would be used for other tasks.

In view of these factors and after discussions with Queensland Railways officials, it was concluded that the provision of standard gauge rail access to Fisherman Islands would not lead to any significant increase in overall rolling stock utilisation or savings in rolling stock capital requirements. Indeed, the net result of a standard gauge link could be to increase total narrow and standard gauge rolling stock requirements.

Construction of the proposed link could also result in savings in train operating costs if the distances from interstate locations to Fisherman Islands along the proposed standard gauge alignments were less than the distance along the current

narrow gauge track through Park Road and Lytton Junction. However, the distances from Parkinson marshalling yard to Fisherman Islands along the existing Park Road alignment and along the proposed Acacia Ridge (via Eight Mile Plains) and Parkinson (via Eight Mile Plains) alignments are very similar, being 40.8, 41.4 and 40.9 kilometres respectively[1]. Hence, no significant savings in train operating costs would be realised as a result of reductions in the rail distance to Fisherman Islands due to standardisation.

One other potential source of train operating cost savings involves the current crew change at Acacia Ridge. This corresponds with the change from the standard gauge system run largely by the State Rail Authority of New South Wales to the narrow gauge operation of Queensland Railways. Provision of standard gauge access to Fisherman Islands would potentially permit the use of the same crew right through to the port area. However, the available evidence suggests that the relevant trade unions would require continued working of the section between Parkinson/Acacia Ridge and Fisherman Islands by Queensland Railways crews, and hence it seems probable that a crew change would still be required. Thus, a standard gauge link to Fisherman Islands would not be expected to result in crew cost savings.

In view of the foregoing, it was concluded that the proposed link would not result in any significant savings in train capital or operating costs.

**Overseas container transit time savings**

The elimination of the transhipment operation for overseas containers moving between Fisherman Islands and interstate locations could also remove many of the delays imposed on this traffic by the transhipment process. This could result in faster transit times for overseas containers and hence improve the quality of the rail transport service for this traffic to or from interstate locations.

The value of the faster transit times in economic terms can be measured by estimating the maximum price that rational shippers would be prepared to pay for this benefit. As the primary benefit of faster transit times on shippers' operations is a potential reduction in the inventory costs associated with financing goods in the transport system, it follows that inventory cost savings can be used to value the faster transit times for the purposes of the economic evaluation[2]. These savings can be estimated using the following formula:

$$S = C \times \frac{D}{365} \times i$$

where S = average benefit per container due to reduction in transit time
C = average value of container contents
D = average delay in days caused by transhipment
i = annual interest rate applicable to financing of inventory holdings.

Only approximate estimates were available for most of these variables. On the basis of information on containerised meat and general cargo, the average value of container contents was estimated at $30 000. Queensland Railways officials indicated that consistent eight hour (ie one-third of a day) detention times for overseas containers subject to transhipment would be achievable when Stage 1 of the upgrading programme at Acacia Ridge was completed, and this figure was used as the estimate of the average delay caused by transhipment. The annual interest rate applicable to inventory holdings was set at the relevant discount rate.

1 This assumes that movements along the Parkinson alignment would not require trains to pass through Acacia Ridge. If movement through Acacia Ridge was required with this option, the distance to Fisherman Islands would be increased by 9.6 kilometres.

2. An additional benefit in the form of savings in container capital costs might also be realised as a result of faster transit times. These savings would be very small and have been ignored in the economic evaluation.

The value of overseas container transit time savings was therefore estimated at $1.10, $1.92 and $2.74 per container respectively at the 4, 7 and 10 per cent discount rates. These are considered to be upper estimates of the actual resource savings that would be realised as a result of the improved transit times.

### Clapham transhipment savings

Construction of the standard gauge link to Fisherman Islands and a branch line to Gibson Island would permit the elimination of the transfer operation at Clapham for urea which is currently transported by rail from the Consolidated Fertilizers Ltd factory to interstate locations.

The avoidable transhipment costs at Clapham were estimated using data for Acacia Ridge. Given the nature of the two operations, it is likely that the figure obtained for the Acacia Ridge facility (ie $23.42 per container) provides a reasonable estimate of potential transhipment savings at Clapham. This figure was therefore used in the evaluation.

### Urea transit time savings

The elimination of the transhipment operation at Clapham for agricultural and industrial urea moved by rail between Gibson Island and interstate locations would remove the delays imposed by the transhipment process. This would be expected to result in faster transit times for the urea traffic and hence improve the quality of the rail transport service between Gibson Island and interstate locations.

The estimation of the value of these faster transit times was based on the approach used in calculating overseas container transit time savings (see above). In the absence of specific information on the Clapham operation, the delay associated with urea transhipment was assumed to approximate the situation at Acacia Ridge, ie 8 hours. An official of Consolidated Fertilizers Ltd indicated that the ex-factory price of urea was approximately $260 per tonne, which means that a container load of urea would have a value of about $3900.

On the basis of this information, the value of urea transit time savings was estimated at $0.14, $0.25 and $0.36 per container respectively at the 4, 7 and 10 per cent discount rates.

### Road/rail resource cost savings

The diversion of significant quantities of interstate urea traffic from road transport to the standard gauge rail system would be expected to result in some resource cost savings, as rail would probably be more efficient in the line-haul function over the distances involved. However, as noted in Chapter 4, much of this traffic would have to be transferred by road or broad gauge rail from the standard gauge railheads in the destination States to the consignees' premises if the standard gauge system was used out of Brisbane. This could result in greater handling and distribution costs than with direct road delivery from Gibson Island, and the net resource cost savings that could be realised in practice would therefore be significantly reduced.

It was not possible to obtain reliable estimates of the total resource costs of transporting urea and related products by road and rail from Gibson Island to interstate locations and the increased handling and distribution costs that would be associated with rail transport. An alternative approach was therefore used to estimate the potential net benefits from road/rail diversion.

Urea that is currently transported by road from Gibson Island to interstate locations can already be moved by rail with transhipment at Clapham. Direct road delivery is presumably preferred by Consolidated Fertilizers Ltd at present because the additional financial costs imposed by transhipment and the extra handling and distribution activities associated with rail transport offset any direct line-haul

advantages of the latter mode. With a standard gauge connection to Gibson Island, these transhipment and transit time costs of rail movement would be eliminated.

The upper bound of the net resource cost savings that would result from diversion of this road traffic to rail can be estimated by considering the maximum amount that could be saved if this traffic was all diverted to the proposed standard gauge link. This is equivalent to the transhipment and transit time costs imposed by the current rail transhipment operation. If the potential resource cost savings from standardisation were greater than this, it would already be more economical to rail the urea from Gibson Island because the total costs of rail transport (including transhipment, handling and distribution) would be lower than those for road transport.

It was therefore decided to use the potential transhipment and faster transit time savings as an upper-bound estimate of the net benefits from the diversion of interstate urea traffic from road to rail. This resulted in estimates of $23.56, $23.67 and $23.78 per container respectively at the 4, 7 and 10 per cent discount rates.

**Petroleum transport costs**

It was not possible to estimate the actual resource cost savings, if any, that would result from movements of petroleum by standard gauge rail from the Ampol refinery to north-eastern New South Wales. With the traffic forecasts presented in Chapter 4, this would involve a comparison of road and rail costs including the impact of factors such as the need to distribute by road from regional rail receival facilities and product loss during transfer operations. If construction of the Ampol branch resulted in broader changes to distribution patterns such as closure of the Trial Bay operation, quite complex and interrelated effects would be expected. The forecasts of potential petroleum products traffic are also subject to significant uncertainty.

The petroleum transport benefits that could potentially be obtained with a standard gauge link into the Ampol refinery are, however, small. The possible magnitude of the net benefits can be appreciated when it is considered that a saving of $100 per rail tanker would only result in an annual benefit of $30 000 with traffic at 15 000 tonnes per annum. In practice, the structure of the Commonwealth Government's subsidy scheme for inland petroleum freight costs could make the adoption of more efficient transport arrangements unattractive from the viewpoint of the oil companies.

**Other benefits**

A number of other benefits associated with the provision of standard gauge rail access to Fisherman Islands were identified but could not be quantified in the present study. These benefits are outlined in this section in order to provide a more comprehensive evaluation.

Construction of the proposed link would provide a better rail transport system between Fisherman Islands and interstate ports and hence shipping companies would have greater flexibility in their Australian operations. For example, if the container terminals in Sydney were closed due to strikes or congestion, it would be easier with a standard gauge link to rail the overseas containers awaiting export direct to Fisherman Islands and arrange for container vessels to call there rather than at Sydney. Shipping companies obviously value the greater flexibility in centralisation practices and port schedules in Australia that would result from the provision of standard gauge rail access to Fisherman Islands or other mainland port areas.

The proposed link would also be expected to provide some defence benefits by improving the rail transport system between Fisherman Islands and other locations in Australia, both on and off the standard gauge rail system. For example, if operations at other mainland ports were disrupted it would be quicker and perhaps more efficient to move military equipment through Fisherman Islands using a standard gauge link

than if transhipment at Acacia Ridge was required. Once again, the proposed link would provide greater flexibility in transport arrangements.

A standard gauge rail link to Fisherman Islands could also reduce any current or potential congestion on certain sections of the existing narrow gauge rail system in the Brisbane suburban area. All of the construction options for the Fisherman Islands link presented in Chapter 3, except dual gauging of the existing Park Road-Lytton Junction tracks, would be expected to divert interstate freight traffic from the current narrow gauge track through Park Road and Lytton Junction. This would probably reduce any actual or potential conflict of freight traffic with passenger train operations and result in some time savings and improvements in service reliability for suburban passengers. In addition, some benefits to intrastate rail freight operations to and from Fisherman Islands would be expected. In the long run, reductions in congestion could also result in the deferral of upgrading works such as improved signalling. The crucial factor is, of course, the level of overseas container traffic moving between Fisherman Islands and interstate locations.

## COSTS

The following costs associated with the provision of standard gauge rail access to Fisherman Islands and the two branches were identified and quantified in the evaluation.

### Construction costs

The estimated costs of constructing a standard gauge rail link to Fisherman Islands under the various alignment and track options were presented in Chapter 3, together with estimates for the standardisation of the Gibson Island and Ampol branch lines.

### Track maintenance costs

The movement of interstate freight traffic along the proposed standard gauge link to Fisherman Islands would affect the total track maintenance costs incurred by Queensland Railways. The changes in these costs would be influenced by a number of factors.

The maintenance costs for a standard gauge link would depend on the track option involved. All maintenance costs for a new standard gauge track would be attributable to standardisation as interstate freight would be the only traffic carried. On the other hand, the maintenance costs for a dual gauge track are typically only slightly higher than those associated with a narrow gauge track of similar quality, and in this case the additional maintenance costs directly attributable to standard gauge traffic would be relatively small. In addition, the level of narrow gauge traffic and the quality of the track prior to dual gauging would probably be of some significance with a dual gauge operation.

The estimates of track maintenance costs for standard, narrow and dual gauge links to Fisherman Islands used in the evaluation were based on data provided by Queensland Railways. These data indicated the time profiles of actual resource costs (eg excluding any interest charge) per kilometre that would be incurred for track maintenance over the evaluation period. As the level of standard gauge traffic over the links could be an important factor influencing these costs, the estimates were based on 400 000 tonnes per annum of interstate freight traffic and Queensland Railways' own forecasts of intrastate freight and passenger traffic over the various narrow gauge alignments.

The estimates of the impact of the various standardisation options on total track maintenance costs are presented in Table 5.2. They indicate the average net effect of standardisation on annual maintenance costs under the various options over the relevant operating period. The figures used in the evaluation were obtained by

TABLE 5.2—IMPACT OF STANDARD GAUGE LINK TO FISHERMAN ISLANDS ON TOTAL TRACK MAINTENANCE COSTS (UNDISCOUNTED)

| *Alignment/track option* | *Average net impact on annual track maintenance costs ($)* |
|---|---|
| Park Road via Lytton Junction | |
| Standard gauge single track | 229 700 |
| Dual gauge duplicated track | 129 000 |
| Acacia Ridge via Eight Mile Plains | |
| Standard gauge single track | 319 100 |
| Parkinson via Eight Mile Plains | |
| Standard gauge single track | 356 600 |
| Dual gauge single track | 127 800 |

calculating the net present values of the streams of maintenance costs over the evaluation period.

## EVALUATION RESULTS

For the evaluation exercise, it was assumed that construction of the standard gauge link would commence at the beginning of 1983-84 (ie Year 0) and proceed according to the construction schedules provided by Queensland Railways officials (see Table 3.1). Land resumptions and survey costs were included in expenditure that would be incurred in Year 0 while all other construction costs (ie drainage, earthworks, permanent way, bridge structures, communications and stations) were assumed to be spread evenly over the construction period. As the estimated construction time exceeds 12 months in all cases, the expenditure that would be incurred in 1984-85 (ie Year 1) was discounted at the relevant rate. The detailed breakdown of the construction cost estimates necessary for this exercise was provided by Queensland Railways officials but for confidentiality reasons it is not reproduced in this report.

The variations in construction times among the standard gauge alignment and track options can result in differences in the value of discounted benefits since these benefits can only be realised when construction of the standard gauge link has been completed.

The economic evaluation was undertaken by first considering overseas container traffic and the proposed Fisherman Islands link alone. The marginal impact of a branch line to Gibson Island was then estimated, and the results for the Fisherman Islands link including the branch line were obtained. As noted earlier, insufficient information was available to include an accurate assessment of the impact of a branch to the Ampol refinery, but in discounted terms the benefits (if any) would be unlikely to exceed $600 000 over the evaluation period.

The evaluation results are summarised in Tables 5.3 to 5.5 which incorporate a growth rate for overseas container traffic of 2.0 per cent per annum. The tables present the results for discount rates of 4, 7 and 10 per cent. They are all based on the optimistic traffic estimate which assumes that all interstate transfers of overseas containers to and from the Brisbane port area are moved through Fisherman Islands.

The primary decision rule used in assessing the results of an economic evaluation is that a project is acceptable if the net present value of the discounted flows of benefits and costs is greater than zero (although this does not indicate the optimum time for construction). This simply means that the discounted benefits exceed the discounted costs, ie the benefit-cost ratio is greater than 1. Both of these indicators are included in the evaluation tables.

The results for the Fisherman Islands link excluding branches clearly indicate that

the only option which should be seriously considered on economic grounds is dual gauging of a new narrow gauge coal line along the alignment through the Parkinson marshalling yard. Benefit-cost ratios for the other four options range from 0.02 to 0.17 over the discount rates considered, indicating that on the basis of the quantified

TABLE 5.3—ECONOMIC EVALUATION OF FISHERMAN ISLANDS STANDARD GAUGE LINK AND GIBSON ISLAND BRANCH, OPTIMISTIC TRAFFIC FORECAST, 4 PER CENT DISCOUNT RATE

| | *Track option* | | | | |
|---|---|---|---|---|---|
| *Benefits/costs* | *Park Road standard* | *Park Road dual* | *Acacia Ridge standard* | *Parkinson standard* | *Parkinson dual* |
| Fisherman Islands link without branches | | | | | |
| Benefits ($m) | | | | | |
| Transhipment savings | 7.9 | 7.9 | 7.9 | 7.9 | 7.9 |
| Time savings | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Track maintenance | -4.3 | -2.3 | -5.9 | -6.6 | -2.3 |
| Total | 4.0 | 6.0 | 2.4 | 1.7 | 6.0 |
| Costs ($m) | | | | | |
| Track construction | 29.1 | 34.3 | 40.0 | 43.6 | 7.1 |
| Net present value ($m) | -25.1 | -28.3 | -37.6 | -41.9 | -1.1 |
| Benefit-cost ratio | 0.14 | 0.17 | 0.06 | 0.04 | 0.85 |
| Gibson Island branch | | | | | |
| Net benefits ($m) | 1.2 | 1.2 | -0.7 | -0.7 | -0.7 |
| Fisherman Islands link with Gibson Island branch | | | | | |
| Net present value ($m) | -23.9 | -27.1 | -38.3 | -42.6 | -1.8 |
| Benefit-cost ratio | 0.22 | 0.24 | 0.11 | 0.08 | 0.81 |

TABLE 5.4—ECONOMIC EVALUATION OF FISHERMAN ISLANDS STANDARD GAUGE LINK AND GIBSON ISLAND BRANCH, OPTIMISTIC TRAFFIC FORECAST, 7 PER CENT DISCOUNT RATE

| | *Track option* | | | | |
|---|---|---|---|---|---|
| *Benefits/costs* | *Park Road standard* | *Park Road dual* | *Acacia Ridge standard* | *Parkinson standard* | *Parkinson dual* |
| Fisherman Islands link without branches | | | | | |
| Benefits ($m) | | | | | |
| Transhipment savings | 5.0 | 5.0 | 4.9 | 4.9 | 4.9 |
| Time savings | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Track maintenance | -2.8 | -1.4 | -3.8 | -4.2 | -1.4 |
| Total | 2.6 | 4.0 | 1.5 | 1.1 | 3.9 |
| Costs ($m) | | | | | |
| Track construction | 28.8 | 34.0 | 39.7 | 43.4 | 7.0 |
| Net present value ($m) | -26.2 | -30.0 | -38.2 | -42.3 | -3.1 |
| Benefit-cost ratio | 0.09 | 0.12 | 0.04 | 0.03 | 0.56 |
| Gibson Island branch | | | | | |
| Net benefits ($m) | 0.3 | 0.3 | -1.4 | -1.4 | -1.4 |
| Fisherman Islands link with Gibson Island branch | | | | | |
| Net present value ($m) | -25.9 | -29.7 | -39.6 | -43.7 | -4.5 |
| Benefit-cost ratio | 0.15 | 0.16 | 0.07 | 0.06 | 0.55 |

TABLE 5.5—ECONOMIC EVALUATION OF FISHERMAN ISLANDS STANDARD GAUGE LINK AND GIBSON ISLAND BRANCH, OPTIMISTIC TRAFFIC FORECAST, 10 PER CENT DISCOUNT RATE

| *Benefits/costs* | *Track option* | | | | |
|---|---|---|---|---|---|
| | *Park Road standard* | *Park Road dual* | *Acacia Ridge standard* | *Parkinson standard* | *Parkinson dual* |
| Fisherman Islands link without branches | | | | | |
| Benefits ($m) | | | | | |
| Transhipment savings | 3.5 | 3.5 | 3.4 | 3.4 | 3.4 |
| Time savings | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Track maintenance | -2.0 | -0.9 | -2.7 | -3.0 | -0.9 |
| Total | 1.9 | 3.0 | 1.1 | 0.8 | 2.9 |
| Costs ($m) | | | | | |
| Track construction | 28.6 | 33.8 | 39.4 | 43.1 | 6.9 |
| Net present value ($m) | -26.7 | -30.8 | -38.3 | -42.3 | -4.0 |
| Benefit-cost ratio | 0.07 | 0.09 | 0.03 | 0.02 | 0.42 |
| Gibson Island branch | | | | | |
| Net benefits ($m) | -0.1 | -0.1 | -1.8 | -1.8 | -1.8 |
| Fisherman Islands link with Gibson Island branch | | | | | |
| Net present value ($m) | -26.9 | -31.0 | -40.1 | -44.1 | -5.8 |
| Benefit-cost ratio | 0.11 | 0.12 | 0.05 | 0.04 | 0.40 |

costs and benefits these options are not warranted using economic criteria. The major factor contributing to the unattractive results for these four options is the relatively high construction costs which substantially exceed the present value of the benefits. These results were obtained using relatively optimistic assumptions regarding potential overseas container traffic, and inclusion of the benefits that were not quantified in the evaluation would not be expected to significantly improve the performance of the project under these options.

Under the assumptions of a complete shift of overseas container transfer movements to Fisherman Islands and 2.0 per cent per annum growth in the volume of interstate transfers, the benefit-cost ratio for the dual gauge option through Parkinson marshalling yard is 0.56 at the 7 per cent discount rate and becomes higher as the test discount rate is reduced (eg benefit-cost ratio at 4 per cent is 0.85). The net present value at 7 per cent is -$3.1 million and at 4 per cent it is -$1.1 million. The attractiveness of this option would be significantly improved when the unquantified benefits are taken into account.

If no overseas container transhipment traffic was transferred to Fisherman Islands from Hamilton and Newstead, the net present value of the Parkinson dual gauge option would be -$7 million or less. In this case, it seems unlikely that standardisation would be justified.

The most likely situation in practice is, of course, partial transfer of interstate transfer traffic for the Port of Brisbane to Fisherman Islands, at least in the early part of the evaluation period. Even with only partial transfer of this traffic, the relatively low construction cost under the Parkinson dual gauge option means that the combined impact of the quantified and unquantified benefits would probably still make the project economically acceptable. Timing of construction would be determined by the date of an independent decision (if any) to proceed with a new narrow gauge track along this alignment.

The evaluation results under the optimistic traffic estimates indicate that the second

most favourable option at the three discount rates used is dual gauging of the existing narrow gauge tracks through Park Road. Under this option, additional discounted benefits of $28 million to $31 million would be required before the benefit-cost ratio for the project would reach 1. To achieve these extra benefits from transhipment and time savings would require overseas container movements between four and eight times the level incorporated in the high traffic estimates. It seems highly unlikely that the inclusion of the unquantified benefits would reverse the evaluation results for this or any of the other options excluding the Parkinson dual gauge track. Their performance would be even less attractive if there was only partial transfer of overseas container transhipment traffic to Fisherman Islands.

The evaluation results suggest that the marginal impact of a standard gauge branch to Gibson Island would be negative with a standard gauge link to Fisherman Islands along the alignment through Eight Mile Plains. In the case of a link through Park Road, the results suggest that this branch line would at best be a marginal proposition, the improved performance being due to the cheaper construction option available with a Fisherman Islands link along this alignment. However, the traffic forecasts and benefits for the Gibson Island branch are relatively optimistic.

In view of the foregoing, it was concluded that a standard gauge link to Fisherman Islands would be acceptable on economic grounds if standardisation was undertaken by dual gauging a new narrow gauge track through Parkinson. All other options considered are highly uneconomic. A standard gauge branch line to Gibson Island would not be warranted on economic grounds.

# CHAPTER 6—FINANCIAL EFFECTS OF FISHERMAN ISLANDS LINK

If standard gauge rail access was provided to Fisherman Islands, some organisations could gain and others could lose in financial terms. The likely impact of standardisation on the financial positions of the major transport organisations involved is therefore briefly discussed in this chapter. Recent freight rates for overseas containers and the appropriate approach to pricing policy are also described.

## OVERSEAS CONTAINER FREIGHT RATES

Under current arrangements, revenue and operating costs for the movement of overseas containers between Sydney and Acacia Ridge over the standard gauge rail system are shared between Queensland Railways and the State Rail Authority of New South Wales. Rail/rail transhipments at Acacia Ridge and rail transfers between Acacia Ridge and the Brisbane port area are the responsibility of Queensland Railways.

### Revenue

The published rates as at 1 July 1982 for rail transport of containers between Sydney and Acacia Ridge and for transfer to/from the Hamilton and Fisherman Islands container terminals are presented in Table 6.1. Rates for single containers, which are not included in the table due to the predominance of multiple movements in shipping companies' operations, are higher than wagon load rates which in turn exceed train load rates.

The rates for the movement of containers between Sydney and Acacia Ridge involve both terminal and line-haul components which accrue to the two rail authorities. The terminal charges cover the loading or unloading of containers and for the Acacia Ridge operation include the transhipment of containers between the standard and narrow gauge systems. The charges at Sydney and Acacia Ridge are the same, with revenue from the former accruing to the State Rail Authority of New South Wales and the latter to Queensland Railways.

Revenue from the line-haul operation is divided between the two rail authorities in proportion to the rail distances travelled in each State, namely 877 kilometres in New South Wales and 111 kilometres in Queensland. Total freight rates for northbound traffic are significantly higher than those for southbound traffic due to variations in the line-haul component, reflecting market conditions.

Revenue from the transfer operation between Acacia Ridge and the Brisbane port area accrues to Queensland Railways which operates these services with its narrow gauge rolling stock. Railway freight rates in Australia generally taper with distance and, as the transfer operation involves short intrastate journeys, the charge per kilometre for these services is significantly higher than the average rate per kilometre for the Sydney-Acacia Ridge line-haul.

### Costs

The net financial returns received by the two rail authorities from container movements between Sydney and Acacia Ridge are also influenced by the arrangements with respect to operating costs. Terminal costs at Acacia Ridge and in Sydney are the responsibility of Queensland Railways and the State Rail Authority respectively, and

TABLE 6.1—RAIL FREIGHT RATES FOR MOVEMENT OF CONTAINERS BETWEEN NEW SOUTH WALES AND QUEENSLAND, 1 JULY 1982

*($ per 6.1 metre container)*

| | *Train load rates* | | *Wagon load rates* | |
|---|---|---|---|---|
| *Origin/destination* | *Loaded* | *Empty* | *Loaded* | *Empty* |
| Northbound | | | | |
| Sydney-Acacia Ridge | | | | |
| NSW terminal | 18.40 | 2.30 | 18.40 | 2.30 |
| NSW line-haul | 248.72 | 158.36 | 269.14 | 206.29 |
| Qld line-haul | 31.48 | 20.04 | 34.06 | 26.11 |
| Qld terminal | 18.40 | 2.30 | 18.40 | 2.30 |
| Total | 317.00 | 183.00 | 340.00 | 237.00 |
| Transfer from Acacia Ridge | | | | |
| To Hamilton terminal | 34.00 | 34.00 | 42.00 | 42.00 |
| To Fisherman Is. terminal | 41.00 | 41.00 | 48.00 | 48.00 |
| Southbound | | | | |
| Acacia Ridge-Sydney | | | | |
| Qld terminal | 18.40 | 2.30 | 18.40 | 2.30 |
| Qld line-haul | 17.44 | 15.21 | 19.01 | 19.71 |
| NSW line-haul | 137.76 | 120.19 | 150.19 | 155.69 |
| NSW terminal | 18.40 | 2.30 | 18.40 | 2.30 |
| Total | 192.00 | 140.00 | 206.00 | 180.00 |
| Transfer to Acacia Ridge | | | | |
| From Hamilton terminal | 34.00 | 34.00 | 42.00 | 42.00 |
| From Fisherman Is. terminal | 41.00 | 41.00 | 48.00 | 48.00 |

*Source:* Queensland Railways, personal communication.

all costs for the line-haul in New South Wales are paid by the latter organisation. The situation for the line-haul in Queensland is more complicated.

The 111 kilometres of standard gauge track between Acacia Ridge and the border is owned by Queensland Railways but is operated by the State Rail Authority of New South Wales which levies a charge for this service. The Queensland section is operated with State Rail Authority locomotives and most of the crews are from that organisation. Various measures are used to apportion common costs between the two rail authorities and to estimate the train operating costs that are attributable to the Queensland section.

Operating costs for the transfer of containers between Acacia Ridge and the Brisbane port area are all borne by Queensland Railways.

## PRICING AND FINANCE

Various criteria could be used in the formulation of a pricing policy for a standard gauge rail link to Fisherman Islands but in the context of this report the most appropriate criterion would be either economic efficency or cost recovery. The use of these criteria could result in different price structures, particularly if there was excess capacity on the link. However, they would both require the link to be priced as a separate project rather than being incorporated in general tariff structures. For example, if the criterion of full cost recovery was considered to be paramount, all costs attributable to construction and operation of the link should be recovered from users. They should not be loaded onto charges generally so that they are borne by users throughout the system. Separate pricing of the facility is therefore an important element of an efficient price structure.

The evaluations of the standard gauge link were undertaken on the basis that the

freight rate charged for the rail haul from Parkinson or Acacia Ridge to Fisherman Islands (with standard gauge access) would be lower than the combined financial charge for transhipment at Acacia Ridge and movement to Fisherman Islands using narrow gauge rolling stock or road transport. If this was not the case, there would be little incentive for through railing of containers to Fisherman Islands. Therefore, the cost of alternative transfer arrangements effectively sets an upper bound to the amount that could be charged for the use of a new rail link. It follows that whether the full cost recovery objective could be achieved would depend largely on the traffic volumes involved. With the optimistic forecasts presented in this report. dual gauging of a narrow gauge link through Parkinson would be the only option under which this objective might be achievable over the life of the link.

The discussion in the following sections only considers the impact of standardisation on the revenues and operating costs of various transport authorities. For simplicity, the source of finance for construction and its impact on the financial positions of the organisations is not considered in detail. The attractiveness of the project to various organisations would depend on the results of the economic evaluation presented in Chapter 5 and/or the expected financial impact on these organisations.

## IMPACT ON SELECTED ORGANISATIONS

The operation of a standard gauge rail link to Fisherman Islands would potentially affect the financial situations of several rail and port authorities.

### Queensland Railways

The major financial impact of a standard gauge link would involve Queensland Railways. The discussion is Chapter 5 indicated that standardisation would not result in any significant savings in train capital or operating costs, and hence the financial situation of Queensland Railways would mainly be affected by the elimination of transhipment for some overseas containers and the freight rate structure that would be applied.

In Chapter 5 it was estimated that a substantial reduction in container movements through the Acacia Ridge transhipment facility would result in an average saving of $23.42 per container in labour and shunting costs. However, the discussion of freight rates earlier in this chapter indicated that the transhipment charge levied by Queensland Railways as at 1 July 1982 was only $18.40, $5.02 less than the avoidable transhipment costs. Thus, under current freight rating practices, the construction of a standard gauge rail link to Fisherman Islands would be expected to result in financial benefits through a reduction in transhipment losses.

Freight rating practices could also affect the financial situation of Queensland Railways in another way. Railway rating practices in Australia generally result in rates which taper with distance, and the application of this structure to a Sydney-Fisherman Islands standard gauge service would result in a relatively low charge for the movement between Acacia Ridge/Parkinson and Fisherman Islands. For example, if the current average rate per kilometre between Sydney and Acacia Ridge was applied to the Fisherman Islands transfer operation, the charge would be around $11.35 for northbound loaded containers at train load rates . As the current transfer charge for the narrow gauge operation is $41.00 per container. the extension of the tapered rating system to Fisherman Islands would result in a significant reduction in revenue which would probably not be offset by any significant reductions in train capital or operating costs.

It is difficult to predict what rating system would be applied in practice for movement along a new standard gauge link to Fisherman Islands. However, the traditional treatment of movements to and from the port area as transfers would favour the retention of a separate, though not necessarily the current, charge. As noted above, the achievement of an efficient pricing policy would also require separate treatment of the link.

If it is assumed that a transfer charge similar to that applied to the current narrow gauge operation was retained for the movement between Fisherman Islands and the Acacia Ridge freight terminal or Parkinson marshalling yard, it is possible to prepare an indicative estimate of the impact of standardisation on the net financial position of Queensland Railways in relation to overseas container movements. Under the Parkinson dual gauge option, average track maintenance costs would increase by $128 000 per annum (see Table 5.2). With complete diversion of overseas container transfer traffic to Fisherman Islands over the evaluation period, average movements of overseas containers would be 19 500 units per annum. If the saving from a reduction in transhipment traffic was $5.02 per container, there would be an average saving of around $98 000 per annum. This suggests that Queensland Railways would suffer a net loss of around $30 000 per annum (undiscounted) in June 1982 prices under these conditions, although there could be some offsetting benefits resulting from reductions in congestion on the narrow gauge rail system. Less than complete diversion of container traffic to Fisherman Islands seems likely in practice and, in this situation, the financial position of Queensland Railways would be even more adversely affected.

The financial position (excluding capital costs) with dual gauging between Park Road and Lytton Junction would probably be similar as the impact of standardisation on track maintenance costs would be about the same as that under the Parkinson dual gauge option. Significantly higher track maintenance costs would be incurred if new standard gauge tracks were built, and in these circumstances it seems likely that the financial position of Queensland Railways would be adversely affected by the project.

Given the current arrangements for petroleum and urea traffic and the tonnages likely to move over a standard gauge link, the marginal impact of these traffics on the net financial position of Queensland Railways would be small.

These estimates of the financial impact of standardisation make no allowance for the capital outlay required to construct the link to Fisherman Islands. If Queensland Railways were required to fund the standard gauge link, the project would be even less attractive to that organisation in financial terms.

**State Rail Authority**

The movement of overseas containers along a standard gauge link to Fisherman Islands would not be expected to substantially affect the financial situation of the State Rail Authority of New South Wales unless this organisation received a share of the revenue for the movement between Acacia Ridge/Parkinson and the port area. There would not be any significant generation or diversion of overseas container traffic associated with standardisation or any significant reduction in train capital or operating costs.

Any diversion of petroleum and urea traffic from road transport to the proposed branch lines would result in increased revenue, but the likely impact on the net financial position of the SRA is unclear.

**Port authorities**

The operation of a standard gauge link would probably not have any significant impact on the financial situation of the Port of Brisbane Authority or the Maritime Services Board of New South Wales. Construction of the link would not be expected to result in any substantial changes in centralisation practices or the pattern of container ship calls between Sydney and Brisbane, although there could occasionally be some ad hoc changes to schedules. Overseas container movements across the wharves and hence revenue from this traffic at the two ports would therefore be largely unaffected by the provision of standard gauge access to Fisherman Islands. In addition, it is not expected that there would be any significant generation of export cargo from northern New South Wales or diversion of export cargo originating in

that region from New South Wales ports to Fisherman Islands.

Provision of standard gauge access to Gibson Island would have no implications for the port authorities under the traffic forecasts presented in Chapter 4. Maritime Services Board revenue could be reduced and Port of Brisbane Authority revenue would be increased if petroleum movements through Trial Bay were transferred on a substantial scale to the Brisbane refinery. However, given the traffic volumes expected, it was concluded that the financial positions of the two port authorities would not be significantly affected by the provision of standard gauge rail access to Fisherman Islands and standardisation of the branch lines to Gibson Island and the Ampol refinery.

# CHAPTER 7—CONCLUDING REMARKS: FISHERMAN ISLANDS LINK

The provision of standard gauge rail access to Fisherman Islands would permit the direct railing of overseas containers between the new port area and various interstate locations with the major potential movements involving the Sydney-Brisbane corridor. It is not expected that provision of such a link would result in any significant generation of export cargoes from north-eastern New South Wales, or diversion of export cargoes originating in that region from New South Wales ports to Fisherman Islands. A standard gauge branch line to Gibson Island would, however, probably attract significant urea traffic while a branch to the Ampol refinery at Lytton could be used to transport petroleum products to north-eastern New South Wales.

A number of alignment and track options are available for the provision of standard gauge rail access to Fisherman Islands. Estimated costs for the options considered in the evaluation vary significantly, from $44.1 million for a new standard gauge single track from Parkinson marshalling yard via Eight Mile Plains to $7.2 million for the additional costs involved in dual gauging a new narrow gauge track built specifically for other traffics.

No significant changes in cargo centralisation practices or container ship schedules would be expected with a standard gauge link. However, the estimation of potential overseas container movements along the proposed link is made difficult by the high degree of uncertainty about the future distribution of transhipment traffic in the Brisbane port area. As specific forecasts of this traffic could not be prepared with any acceptable degree of confidence, the evaluation was initially based on optimistic estimates which assumed that all transhipment traffic currently moving through Hamilton and Newstead would be transferred to Fisherman Islands.

A standard gauge link to Fisherman Islands without branches would result in a number of benefits associated with overseas container traffic. Elimination of transhipment at Acacia Ridge would yield resource cost savings of $23.42 per container while faster transit times would provide a benefit to shippers valued at up to $2.74 per container. Other benefits from standardisation would be greater flexibility in shipping operations, improved defence capability and a reduction of any current or potential congestion on the narrow gauge rail network, but it was not possible to quantify these factors in the study. A standard gauge link would not be expected to result in any significant train capital or operating cost savings.

The results of the economic evaluation clearly indicate that the only construction option that should be seriously considered on economic grounds is dual gauging of a new narrow gauge line from Parkinson via Eight Mile Plains. The benefit-cost ratio estimates for this option are less than 1 for various discount rate combinations if complete transfer of interstate movements of overseas containers to Fisherman Islands is assumed. However, performance of the project is improved if the unquantified benefits are included, and it is concluded that standardisation under this option would probably be acceptable on economic grounds. Even with only partial transfer of container traffic to Fisherman Islands, the relatively small construction cost involved with this option means that the additional unquantified benefits would probably still make the project acceptable on economic grounds. Timing of construction would be determined by the date of an independent decision (if any) to proceed with a new narrow gauge track along this alignment.

The available evidence indicates that construction of a branch line to Gibson Island would result in a number of benefits, namely elimination of transhipment, faster transit times and savings from the diversion of urea traffic from road to rail transport. However, the marginal impact of this standard gauge connection on the Fisherman Islands project under the dual gauge option through Parkinson marshalling yard is negative, and hence a branch to Gibson Island would not be warranted on economic grounds.

Queensland Railways would be the only rail or port authority whose financial situation would be significantly affected by a standard gauge link to Fisherman Islands. On the basis of revenues and operating costs, dual gauging of a link between Parkinson marshalling yard and Fisherman Islands would probably have a negative effect on the financial position of Queensland Railways unless the congestion savings were significant. If Queensland Railways were required to finance construction of the link, the project would be even less attractive to that organisation in financial terms.

## PART B—PORT OF GEELONG

# CHAPTER 8—THE PORT OF GEELONG

The history of the Port of Geelong is discussed in this chapter and the current facilities in the port, together with recent traffic flows, are described. There is also a description of the major industries in Geelong and a discussion of the potential catchment area in southern New South Wales.

## HISTORY AND CURRENT FACILITIES

The Port of Geelong is located on Corio Bay and an adjacent arm of Port Phillip Bay. A shipping service across Port Phillip Bay between Melbourne and Geelong was started in 1838 and the first pier at Geelong was established in 1842 (Victorian Transport Study 1980a p1, Bird 1968 p86). The development of the Port of Geelong in the remainder of the nineteenth century was encouraged by the discovery of gold at Ballarat in 1851 and the growth of the Western District of Victoria. General cargo was initially a significant traffic but the completion of a railway line between Melbourne and one of the Geelong wharves in 1857 resulted in the loss of much potential traffic to the Port of Melbourne (Bird 1968 p86). The Geelong Harbor Trust was established in 1905 to adminster and operate the port. It was subsequently renamed the Port of Geelong Authority in 1981 when the Commissioners were given increased operating powers and borrowing ability.

The early development of the Port of Geelong was inhibited by the shallowness of Corio Bay and the adjacent waters. A dredging programme was therefore undertaken to increase depths at the port. However, this did not result in the attraction of substantial general cargo traffic from the Port of Melbourne, partly because of the relatively low charges for the rail movement of various general cargoes between Geelong and Melbourne which encouraged shipment through the latter port (Bird 1968 pp86-88). The Port of Geelong therefore developed mainly as a facility for bulk cargoes. It became one of the two major centres for the export of wheat from Victoria, and between 1913 and 1921 a large proportion of the wheat produced in the Wimmera region of Victoria was exported from Geelong due to the operation of a rail rebate (Bird 1968 p88). Movement of this commodity through the port was further encouraged when Victoria's first seaboard bulk wheat terminal was completed at Geelong in 1937 (Port of Geelong Authority 1983 p7).

The Port of Geelong was extensively modernised in the immediate post-war period (Commission of Inquiry into the Maritime Industry 1976 p353). The completion of an oil refinery in 1953 resulted in substantial movements of crude oil and petroleum products through the port, and further traffic followed the completion of an aluminium smelter in the port area in 1963 (Bird 1968 pp88-90). A major dredging program was undertaken in the mid-1960s when access to the grain and oil refinery berths was improved and a wharf to serve the aluminium smelter was constructed (Commission of Inquiry into the Maritime Industry 1976 p357).

There was an abrupt interruption to traffic growth in the early 1970s when total trade fell from 8.6 million tonnes in 1970 to 5.0 million tonnes in 1974. This decline reflected the effect of a reduction in crude oil imports from 4.6 million tonnes to 1.2 million tonnes which occurred when a new pipeline from Westernport Bay to the oil refinery at Geelong replaced many of the previous tanker movements of crude oil through the port (Commission of Inquiry into the Maritime Industry 1976 p353 and pp368-371). Total trade through the Port of Geelong later partly recovered to reach 7.0 million tonnes in 1982 (Port of Geelong Authority 1982, p3).

The Port of Geelong is now a major centre for the shipment of bulk commodities and these traffics account for most of the trade through the port. A commodity breakdown of total traffic over the period from 1978 to 1982 is contained in Table 8.1. This clearly indicates the predominance of crude oil and petroleum products, bulk grain, fertiliser raw materials and aluminium smelter inputs in port traffic. In 1982 these bulk commodities accounted for approximately 95 per cent of total traffic handled at the Port of Geelong.

A significant proportion of trade through the port is also associated with industries located in the port area. The substantial movements of crude oil and petroleum products involve the Corio oil refinery which is operated by Shell Refining (Australia) Pty Ltd, and alumina is shipped to the smelter at Point Henry which is operated by Alcoa of Australia Ltd. Phosphate rock is utilised by the Phosphate Co-operative Company of Australia Ltd, which produces fertiliser and related products at its North Shore facility. The Grain Elevators Board of Victoria also operates a major seaboard grain terminal at the Port of Geelong.

There are several other major industrial facilities in the Geelong area which do not currently generate substantial amounts of traffic through the port. Cement works are operated by Australian Portland Cement Ltd at Fyansford and by Blue Circle Southern Cement Ltd at Waurn Ponds. The Ford Motor Company of Australia Ltd operates stamping, engine, chassis and foundry facilities near the port area, and Australian Wire Industries Ltd produces wire products from materials supplied by the Broken Hill Proprietary Company Ltd rod mill.

The major industrial facilities in the Geelong area that are of relevance to the present study are illustrated in Figure 8.1. There are, of course, various other industrial facilities in the area. In addition, it is proposed to build a large wool store near the Corio Container Terminal, and a malting plant is also planned for a site next to the grain terminal (Barrett Burston 1983).

The current layout of the Port of Geelong is illustrated in Figure 8.2. The port contains 24 berths which are grouped in a number of separate facilities. There are four berths at Refinery Pier (crude oil, petroleum products, chemicals and gases), two berths

TABLE 8.1—TOTAL TRADE THROUGH THE PORT OF GEELONG BY MAJOR COMMODITY, 1978 TO 1982

*('000 tonnes)*

| | Year | | | | |
|---|---|---|---|---|---|
| *Commodity* | *1978* | *1979* | *1980* | *1981* | *1982* |
| Crude oil and petroleum products | 4 212 | 3 242 | 2 974 | 3 200 | 3 888 |
| Bulk grain[a] | 1 356 | 2 463 | 2 776 | 1 744 | 1 799 |
| Fertiliser raw materials | 543 | 553 | 528 | 506 | 560 |
| Alumina/aluminium raw materials | 266 | 252 | 293 | 424 | 406 |
| Rice | 57 | 185 | 99 | 168 | b |
| General[c] | 152 | 118 | 71 | 145 | 45 |
| Containers | 0 | 0 | 0 | 0 | 25 |
| Liquid and dry bulk imports | 65 | 89 | 122 | 113 | 114 |
| Iron and steel | 62 | 89 | 98 | 99 | 55[d] |
| Meat and livestock | 88 | 42 | 16 | 29 | 30 |
| Other | 30 | 40 | 12 | 7 | 105 |
| Total | 6 831 | 7 073 | 6 989 | 6 435 | 7 027 |

a. Excludes coarse grain exports.
b. Incorporated in bulk grain in 1982.
c. Includes empty returns.
d. Scrap iron included in General category in 1982.

*Source:* Port of Geelong Authority (1982 p3).

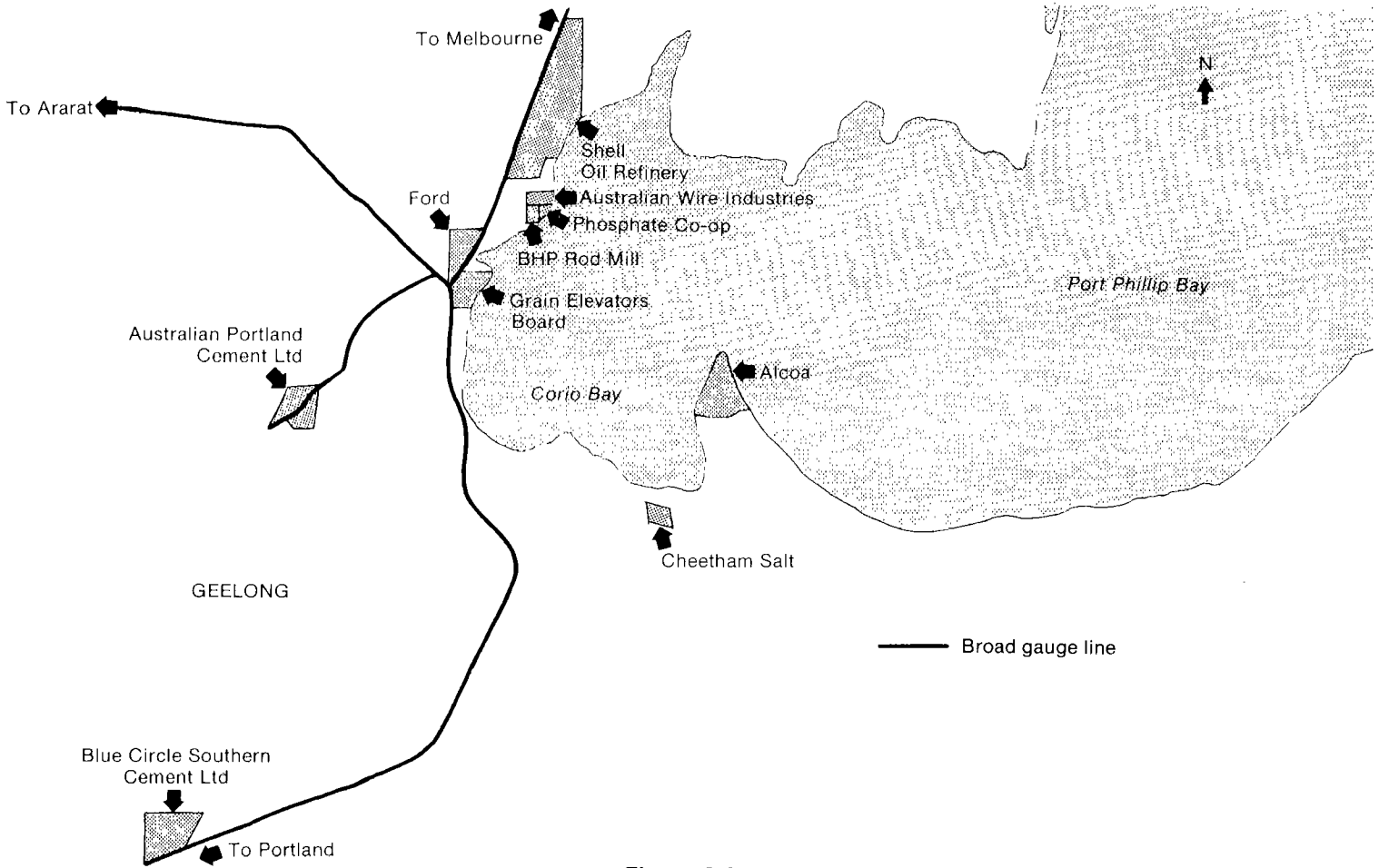


**Figure 8.1—Major industrial and rail facilities in the Geelong area**

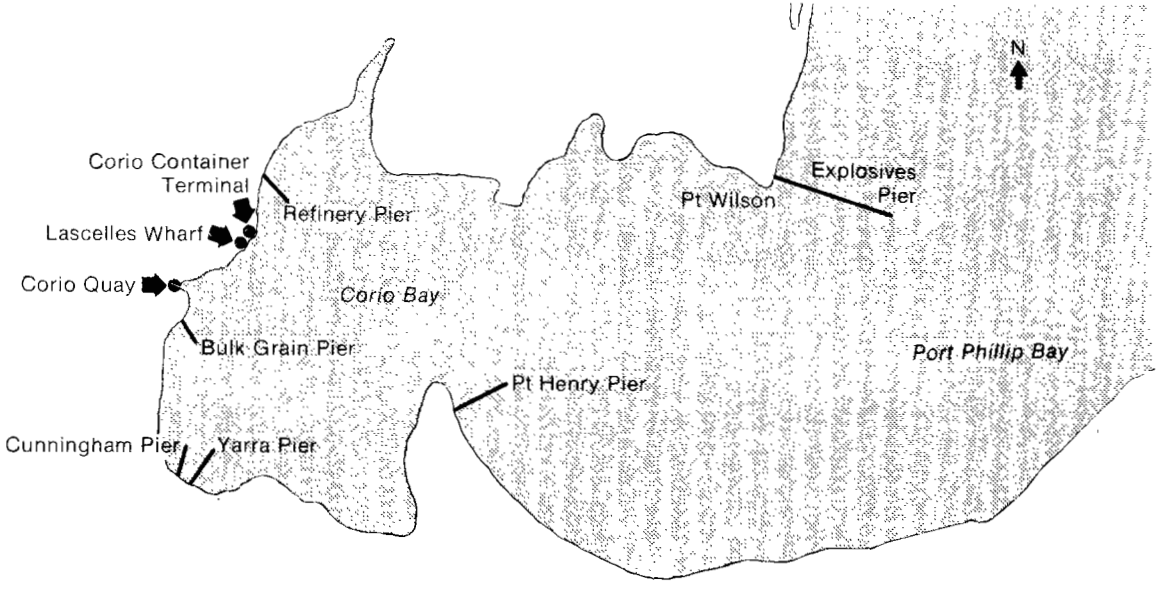


**Figure 8.2—Major facilities in the Port of Geelong**

at the Bulk Grain Pier, three berths at Lascelles Wharf (bulk cargo, general cargo and containers), four berths at Corio Quay (roll-on/roll-off, steel, general cargo and dry bulk cargo), two berths at the Point Wilson Explosives Jetty (explosives), one berth at Point Henry Pier (alumina and allied products), four berths at Cunningham Pier (general cargo, port vessels) and four berths at Yarra Pier (no longer in commercial use). Most of these berths are owned by the Port of Geelong Authority, the only exceptions being the Bulk Grain Pier and associated facilities (Grain Elevators Board of Victoria) and the relatively isolated Point Wilson Explosives Jetty (Commonwealth Government).

The entrance to the Port of Geelong involves 24 kilometres of channel. Navigation regulations impose a maximum draft of 10.5 metres on vessels entering the port and this normally restricts fully loaded vessels to 30 000-35 000 DWT, although larger vessels are regularly accommodated on a part load or part discharge basis (Maxwell 1981 p14). Further limitations on vessel size may arise at individual berths where depths are either 11.0 metres (Refinery Pier, Bulk Grain Pier, Lascelles Wharf), 9.7 metres (Corio Quay, Cunningham Pier) or 9.1 metres (Point Henry Pier, Point Wilson Explosives Jetty).

The only facilities in the port currently connected to the Victorian Railways[1] broad gauge rail system are Cunningham Pier, three berths at Corio Quay and the grain terminal. Several of the industrial facilities in the Geelong area also have their own rail sidings. The major rail lines in the area are illustrated in Figure 8.1.

As noted earlier, the amount of general cargo handled at the Port of Geelong has in the past been limited by a number of factors including the competitive position of the Port of Melbourne. With the large-scale introduction of containerisation, specialist container handling facilities were established at the Port of Melbourne. The Geelong Harbor Trust Commissioners constructed a roll-on/roll-off ramp, together with a cargo shed and an enclosed stacking area, at Corio Quay in 1970 for use by ANL coastal vessels and occasionally by ships engaged in the Australia-Japan trade. However, after a promising beginning, trade through the facilities declined and by 1977 they were practically unused, although there was subsequently some revival in traffic (Geelong Harbor Trust Commissioners 1977 p7).

The port authority continued to work to attract containerised cargo through the Port of Geelong and in January 1982 Stage I of a specialist container and roll-on/roll-off terminal at Lascelles Wharf No 3 was commissioned. The Corio Container Terminal currently comprises a 275 metre berth dredged to 11.0 metres, together with a 40 tonne single-lift container crane and associated terminal facilities (Port of Geelong Authority 1981 p1 and p15). The Port of Geelong Authority expects that, with this facility, significant quantities of wool export traffic will be attracted back to the port. It also considers that container movements will grow substantially as Melbourne's industrial establishments spread further to the west and congestion in and around the Port of Melbourne increases (Victorian Transport Study 1980a, pp25-26).

In March 1983, the Port of Geelong Authority released a report which presented its forward plans for the development of the port over the period to 2010 (Port of Geelong Authority 1983). Projects proposed by the Authority include:

- continued development of the Corio Container Terminal;
- expansion of berthing and other facilities at the grain terminal;
- upgrading of Refinery Pier and Point Henry Pier;

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1. Administration of Victoria's rail system was transferred to V/Line while the Report was being finalised. However, as the information for the study was supplied by officials of Victorian Railways, this name is used in the Report.

- development of a hazardous materials handling facility at Point Wilson; and
- commencement in 1991 of a channel dredging programme to enable the port to handle vessels with a draft of up to 12 metres.

The cost of the complete development programme has been estimated at up to $250 million in 1983 prices.

## SOUTHERN NEW SOUTH WALES CATCHMENT AREA

The region served by the Port of Geelong includes southern New South Wales as many towns in this area are geographically closer to Geelong than to Sydney. There are substantial freight movements between Geelong and southern New South Wales, and this is one of the major transport corridors that would be affected by construction of the proposed standard gauge links from Melbourne to Geelong and between Tocumwal and Mangalore.

During the study, several potential catchment areas in southern New South Wales for the proposed standard gauge links were identified. All of the areas are contained within the Southern Plains and Southern Slopes statistical agricultural areas under the ABS classification system. These areas are illustrated in Figure 8.3.

Agriculture is an important component of the economy of southern New South Wales. Table 8.2 indicates the major commodities grown in the area and production over the period from 1976-77 to 1980-81. Most of these commodities are transported from the area in significant quantities.

Freight transported to and from southern New South Wales currently moves along several major corridors by both road and rail. Large quantities of grain and other agricultural products are transported to Sydney and there are significant movements of grain to Geelong by both road and rail. Substantial tonnages of freight are also moved into the area from Geelong (eg fertiliser, cement) and Melbourne (eg general goods, consumer durables, petroleum). The major existing rail links in south-eastern Australia are illustrated in Figure 8.3.

TABLE 8.2—PRODUCTION OF SELECTED AGRICULTURAL COMMODITIES IN SOUTHERN NEW SOUTH WALES[a], 1976-77 TO 1980-81

('000 tonnes)

| | Year | | | | |
|---|---|---|---|---|---|
| Commodity | 1976-77 | 1977-78 | 1978-79 | 1979-80 | 1980-81 |
| Wheat | 890 | 940 | 1 800 | 1 960 | 1 370 |
| Rice | 520 | 480 | 670 | 590 | 700 |
| Barley | 210 | 180 | 190 | 330 | 240 |
| Hay | 270 | 150 | 330 | 220 | 240 |
| Oats | 140 | 110 | 160 | 200 | 160 |
| Citrus fruit | 70 | 80 | 90 | 90 | 120 |
| Other orchard | 40 | 30 | 40 | 40 | 40 |
| Wine grapes | 80 | 70 | 80 | 90 | 90 |
| Meat slaughtered | 80 | 80 | 60 | 60 | 60 |
| Wool | 40 | 40 | 50 | 50 | 50 |
| Potatoes | 30 | 40 | 50 | 40 | 40 |
| Onions | 20 | 20 | 20 | 20 | 20 |
| Tomatoes | 30 | 20 | 10 | 30 | 20 |
| Maize | 20 | 10 | 0 | 30 | 20 |
| Sorghum | 30 | 20 | 10 | 10 | 10 |

a Comprises ABS Statistical Agricultural Areas of Southern Plains and Southern Slopes.

*Source:* Australian Bureau of Statistics, personal communication.

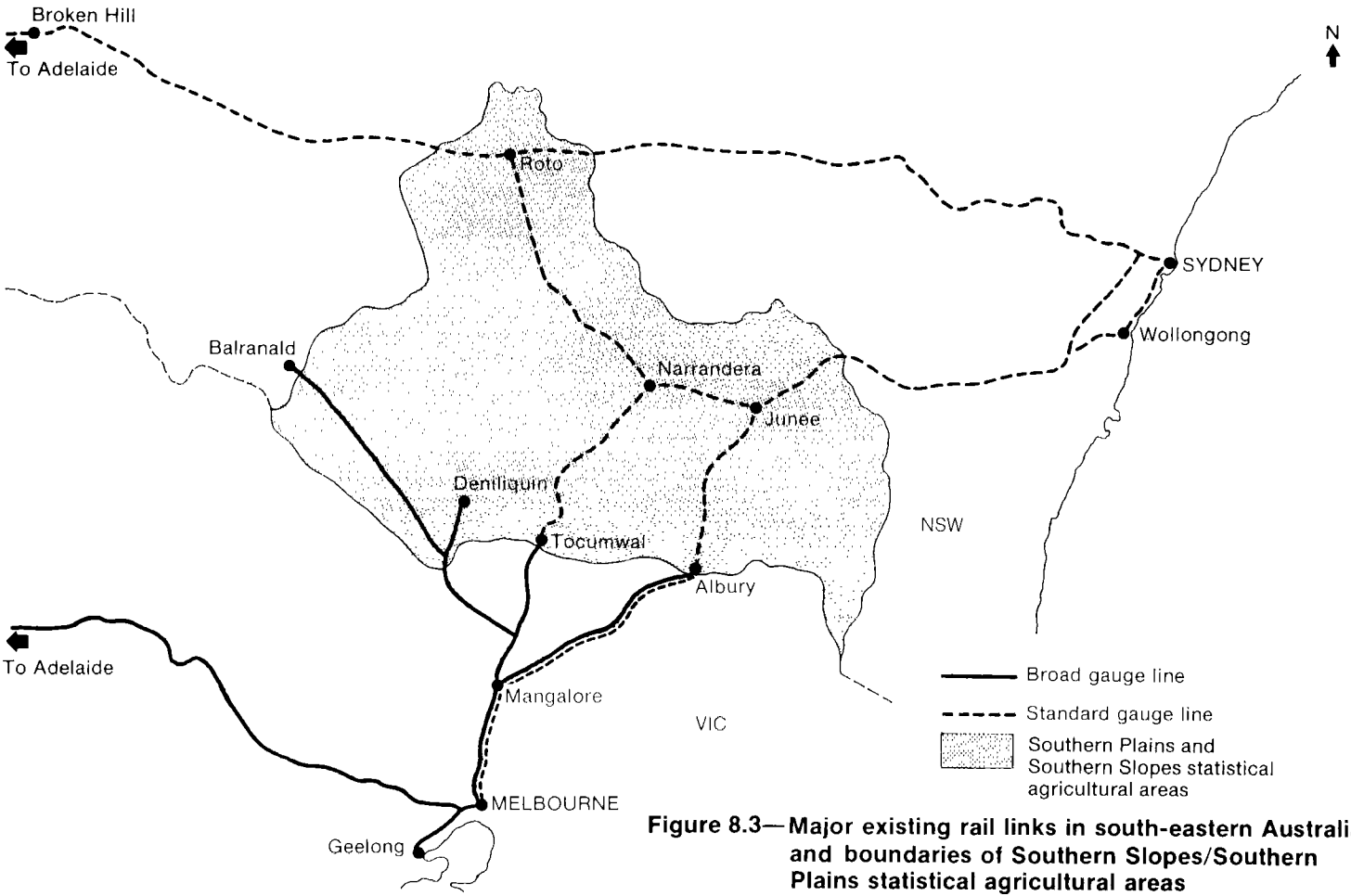


**Figure 8.3—Major existing rail links in south-eastern Australia and boundaries of Southern Slopes/Southern Plains statistical agricultural areas**

# CHAPTER 9—OPTIONS FOR MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS

The current rail links to Geelong and Tocumwal are described in this chapter and the various options for providing the proposed standard gauge rail connections, together with the estimated construction costs, are discussed.

## CURRENT RAIL LINKS

The Victorian Railways track network is predominantly broad gauge (1600mm), the only other track being the standard gauge (1435mm) railway between Melbourne and Albury which provides access to locations on the standard gauge network in New South Wales and other States. The standard gauge track was completed in 1962 and is generally adjacent to the alignment of the broad gauge track between Melbourne and Albury. It carries both interstate freight and passenger traffic.

There are several extensions of the Victorian Railways broad gauge network in southern New South Wales. These lines terminate at Balranald, Deniliquin, Tocumwal and Oaklands. Geelong is also connected to the broad gauge system and hence there is a direct rail link between Geelong and several locations in southern New South Wales. However, the major rail network in the latter area is the standard gauge system operated by the State Rail Authority of New South Wales. This serves most major locations including Oaklands and Tocumwal.

Rail traffic moving between southern New South Wales and Geelong via Tocumwal or Albury is therefore generally subject to a change of gauge unless it is loaded at Tocumwal or Albury. The major features of the rail system in the study area are illustrated in Figure 9.1.

### Geelong

The major broad gauge rail connection to Geelong is the link from Melbourne, although there are also tracks from the west and south which connect Geelong to other parts of the Victorian Railways system. The link between central Melbourne and Geelong covers a distance of 73 kilometres. Duplication of the track was completed in 1981 and traffic comprises both passengers and freight. There are currently about 48 passenger trains per day to and from Geelong and 96 between Melbourne and Werribee. In the peak of a typical grain season freight services account for another 20–25 services per day.

The main rail freight yards in Geelong are located at North Geelong which is approximately three kilometres from the city centre. As noted in Chapter 8, there are rail connections from the yards to a number of port facilities, namely Cunningham Pier, the grain terminal and three berths at Corio Quay. Rail receival facilities at the grain terminal were substantially improved in 1982 with the completion of a balloon loop which replaced parallel, dead-end marshalling tracks.

Several of the major industrial facilities in the Geelong area also have their own broad gauge sidings. The companies with facilities connected to the broad gauge system include Australian Portland Cement Ltd, Blue Circle Southern Cement Ltd, Ford Motor Company of Australia Ltd and the Phosphate Co-operative Company Ltd. Significant industrial facilities in the area currently without direct rail access

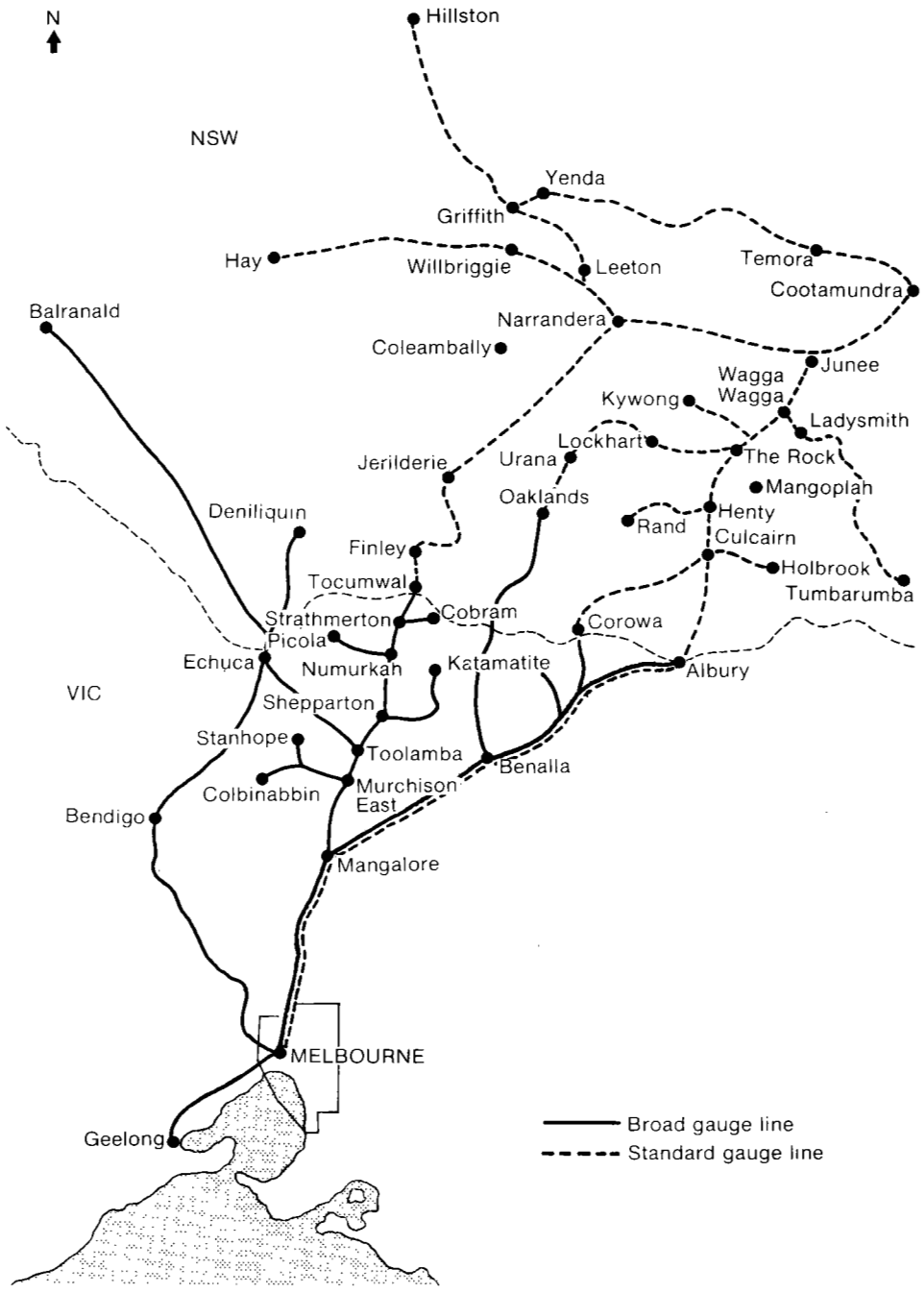


**Figure 9.1—Rail facilities and major centres in study area**

include the Alcoa smelter and the Cheetham Salt Consolidated Ltd factory. The major rail lines at Geelong are illustrated in Figure 8.1.

Geelong is also linked to the Victorian highway system. The road to Melbourne is of a high standard, comprising separated carriageways with two lanes in each direction for much of the distance outside built-up areas.

### Southern New South Wales

Tocumwal is one of several northern termini for Victoria's broad gauge rail network, the total rail distance from Melbourne being 251 kilometres. It is located just across the border in New South Wales and the broad gauge track passes over the River Murray on a bridge which carries both road and rail traffic. Tocumwal is also connected to the New South Wales standard gauge system and is 764 kilometres by rail from Sydney. The rail yards at Tocumwal contain both broad and standard gauge tracks together with transfer facilities for grain and general freight, although the transhipment equipment for the latter traffic did not handle more than 3800 tonnes in any single year over the five years to 1980–81.

The rail link from Melbourne to Tocumwal is part of the Melbourne-Albury broad gauge link as far as Mangalore, which is 109 kilometres from Melbourne. Up to this point, the broad gauge track also closely follows the alignment of the Melbourne-Albury standard gauge track. The line from Mangalore to Tocumwal covers a distance of 142 kilometres and comprises a single broad gauge track. It also services five branch lines, namely Murchison East-Stanhope/Colbinabbin, Shepparton-Katamatite, Numurkah-Picola, Strathmerton-Cobram and Toolamba-Echuca. Information provided by the Victorian Railways indicates that processed food, fertiliser and briquettes are the major traffics along the Toolamba-Echuca line, while the other four branches mainly carry grain and some fertiliser.

Freight traffic along the broad gauge track between Tocumwal and Mangalore comprises substantial quantities of grain with the other major commodities being processed food, fertiliser, cement, briquettes and petroleum. There are also regular passenger services between Melbourne and points as far north as Cobram. The broad gauge line between Melbourne and Mangalore also carries this traffic together with passengers and freight for locations on the broad gauge system between Mangalore and Albury.

The standard gauge rail system in southern New South Wales essentially comprises the main line between Cootamundra and Albury and various secondary lines which extend west to Hillston, Hay and Tocumwal. All links in the area carry freight traffic, particularly grain and other agricultural products, and there are passenger services on the main line and several branches. If the proposed standard gauge links were constructed, only traffic railed to Geelong from the Hillston-Tocumwal section and associated branch lines would be expected to move via Tocumwal while traffic from the Albury-Junee section and its branches would move along the main line through Albury.

## STANDARD GAUGE OPTIONS AND CONSTRUCTION COSTS

The most economical routes for standard gauge rail connections between Melbourne and Geelong and from Tocumwal to Mangalore are along or adjacent to the alignments of the current broad gauge links. As there is already a standard gauge track between Melbourne and Mangalore, it would be possible to provide a direct link between Tocumwal and Geelong by standardising the two links and connecting these to the existing section of standard gauge track.

There are three options available for the provision of standard gauge rail access in the Victorian situation, namely new standard gauge track, dual gauging of existing broad gauge track and direct conversion from broad to standard gauge track by moving one rail across to create a 1435 mm separation.

Construction of a new and separate standard gauge track is the most expensive option as it would require the provision of new earthworks, ballast, sleepers and rails together with signalling that would be additional to existing arrangements on the broad gauge track. Under this option, all existing broad gauge links could be retained.

The second standardisation option involves dual gauging of existing broad gauge links by fastening a third rail at a 1435 mm separation from one of the existing rails. This would utilise existing earthworks, ballast and sleepers but some signalling and other improvements could be required to handle any increased traffic resulting from standardisation. All existing broad gauge links could be retained with this option.

Victorian Railways officials have expressed concern that dual gauge track results in safety problems where high-speed passenger trains are operated. In particular, it is argued that brake shoes or other items lost from passing trains may lodge in the relatively narrow gap between the two closest rails, resulting in derailments and injuries to passengers and crews. Australian National operates some passenger services over dual gauge track with similar clearances in Adelaide, which indicates that this track arrangement is operationally satisfactory at suburban passenger train speeds. In the context of the present study, Victorian Railways officials advised that dual gauge would probably be acceptable where the maximum speed of passenger trains did not exceed 100 kilometres per hour, but that where higher speeds were involved it would not be possible to operate on dual gauge track with adequate safety margins.

The third standardisation option involves the direct conversion of existing broad gauge track by moving one of the rails across to provide a 1435 mm separation. This would utilise existing earthworks, ballast and sleepers but some signalling and other improvements could be required to handle any net increase in traffic resulting from standardisation. However, the direct conversion option would also eliminate current broad gauge connections, thereby reducing broad gauge capacity on the Melbourne-Geelong link (which is duplicated) and eliminating broad gauge access on the single track Tocumwal-Mangalore link and its branches.

The alternative track options for standard gauge links between Melbourne and Geelong and from Tocumwal to Mangalore are discussed below.

**Melbourne to Geelong**

All three standardisation options were initially considered for the track between Melbourne and Geelong. However, Victorian Railways officials indicated that the removal of broad gauge from one of the existing tracks under the direct conversion option would not be acceptable as it would result in inadequate broad gauge capacity between Melbourne and Geelong. Although some current broad gauge freight traffic would be diverted to standard gauge if the proposed links were constructed, there would be no diversion of passenger services (which represent a major part of current traffic). Direct conversion of one of the existing tracks would, in these circumstances, require the provision of additional broad gauge capacity. After discussions with Victorian Railways officials on this matter, it was concluded that direct conversion was not an acceptable standardisation option for the link between Melbourne and Geelong[1].

Victorian Railways officials also advised that it would not be possible to undertake dual gauging on this section as a result of the potential safety problems discussed

1. A decision to provide a standard gauge link between Melbourne and Adelaide using the alignment through Geelong and to standardise parts of the Victorian country rail network could make direct conversion an acceptable option.

earlier. High-speed passenger trains are already operated between Melbourne and Geelong, and maximum running speeds are to be increased to 160 kilometres per hour in the near future. The Victorian Railways would not be prepared to operate dual gauge track under these conditions. The officials also advised that it would not be possible to operate the passenger services on one of the tracks while restricting the other track (which could be dual gauged) to freight train operations only. In addition, it would be difficult to fasten a third rail to the concrete sleepers which are already installed on the newer track. It was therefore concluded that dual gauge was not an operationally acceptable option for standardisation of the link between Melbourne and Geelong.

In view of these problems with the direct conversion and dual gauge options, it appears that a new standard gauge track is the only operationally acceptable option for the provision of a standard gauge connection between Melbourne and Geelong under current conditions.

Construction cost estimates for a new standard gauge track were prepared by Victorian Railways officials. They were based on an alignment from Sunshine (on the existing Melbourne-Albury standard gauge track) via the Brooklyn loop to Newport and thence to Geelong. A connection to the existing standard gauge track at Footscray was rejected as the main line standard gauge track is considerably lower than the Newport line at this point.

The proposed track would run between the existing broad gauge tracks from Sunshine to Newport. A 600 metre section of dual gauge track would be provided at Newport due to the restrictions imposed by the locations of the platform and the Melbourne Road overpass. Crossing loops would be provided near Newport (one) and between Newport and Geelong (two).

Construction costs for a new track from Melbourne to Geelong were estimated at $75.5 million, comprising $58.5 million for civil works and $17.0 million for signalling. This estimate included the cost of providing branch lines to the Grain Elevators Board terminal, the Australian Portland Cement Ltd factory at Fyansford, the Corio Container Terminal and the Phosphate Co-operative Company Ltd sidings at North Shore. The discussion of the traffic forecasts in Chapter 10 indicates that only the first three branch lines would be expected to attract significant standard gauge traffic. However, a link to the Corio Container Terminal would probably be an extension of the existing broad gauge track to the fertiliser works, and hence the savings from not standardising the Phosphate Co-operative Company siding would be minimal.

**Tocumwal to Mangalore via Toolamba**

All three standardisation options were initially considered for the track between Tocumwal and Mangalore. Victorian Railways officials advised that dual gauging the track between Tocumwal and Mangalore would be acceptable as the passenger trains that move along this line section do not travel at the high speeds at which safety problems are considered to be significant. However, the loss of broad gauge access with the direct conversion option would affect Victorian Railways' operations in northern Victoria.

Conversion of the Tocumwal-Mangalore track by repositioning one of the existing rails would remove the connection between locations on this link and the rest of the broad gauge system. This would not affect movements of grain and fertiliser to any significant degree as these traffics are mainly to/from Geelong and the facilities there would also have standard gauge access under the conditions considered in the study. However, there are other traffics such as processed food, livestock, powdered milk, briquettes and beer where the receival and shipment facilities in other parts of Victoria might still only be on broad gauge. In the latter case, a significant proportion of the traffic could be diverted from rail to road if direct conversion was

undertaken and other areas of the Victorian Railways network were not standardised at the same time[1].

In addition, conversion of the Tocumwal-Mangalore track would remove rail access to the five branch lines unless these were also standardised. The track from Toolamba to Echuca is often used to carry traffic for the Echuca-Deniliquin/Balranald lines, and the loss of broad gauge facilities on this branch line would result in increased traffic on the route via Bendigo (which is presumably less preferable in some circumstances).

The other four branches served by the Tocumwal-Mangalore line mainly carry grain and fertiliser, with only very small tonnages of other traffics which would be affected by the loss of broad gauge access. Over the period from 1976–77 to 1980–81 grain movements averaged 42 000 tonnes per annum on the Shepparton-Katamatite line, 41 000 tonnes on the Murchison East-Stanhope/Colbinabbin line, 21 000 tonnes on the Numurkah-Picola line and 5000 tonnes on the Strathmerton-Cobram line. Direct conversion of the Tocumwal-Mangalore line section would eliminate the traffic on these branch lines unless the branches were either converted or dual gauged as well.

Victorian Railways officials advised in late 1982 that it was not proposed at that stage to close any of the branch lines since they generated significant volumes of traffic (mainly wheat). However, it was anticipated that there could be some closures in the longer term as a result of rationalisation of grain receival facilities. As the BTE evaluation is based on construction of the proposed links in the near future, it was concluded that the direct conversion option would require standardisation of both the Tocumwal-Mangalore track and the four branch lines.

Victorian Railways officials indicated that direct conversion of these lines (excluding any upgrading) would cost $14.9 million in June 1982 prices. Significant additional expenditure would also be required for other items such as work at sidings and major freight yards ($4.1 million for the Tocumwal-Mangalore section alone), signalling ($2.8 million for the Tocumwal-Mangalore section alone) and at least some bringing forward of spot resleepering as a result of weaknesses that would be accentuated by reboring[2]. This information suggested that direct conversion would be more expensive than dual gauging (see estimates below). As direct conversion would also result in access problems for certain broad gauge traffics which would not occur with dual gauge, it was decided to exclude this option from the evaluation and to consider in detail only the new standard gauge and dual gauge options[3].

A separate standard gauge track between Tocumwal and Mangalore would require the construction of 142 kilometres of new track. This could be done with little alteration to station yards or branch lines, although earthworks and bridges would have to be duplicated for the additional track and alterations would be required at all level crossings to improve their safety with two-way running on two tracks. Two crossing loops would also be provided. Estimated total cost for this work is $89.2 million.

Dual gauging of the Tocumwal-Mangalore section would involve some alterations, mainly to crossing work, in each of the goods yards and at the junctions with the

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1. The volume of affected traffic would be significantly lower if other parts of the Victorian Railways broad gauge network such as the Swanson Dock link were also standardised. Data provided by Victorian Railways officials indicate that movements to Swanson Dock from the Tocumwal-Mangalore line and branches in 1980–81 totalled 47 319 tonnes, most of which probably involved the main line.

2. Regauging of the main line alone was estimated to cost approximately $6.5 million. The additional costs associated with modifications to freight yards, signalling and spot resleepering would mean that the direct conversion option for the main line alone would involve total expenditure of $16-$17 million (June 1982 prices).

3. Information received after the study had been substantially completed suggested that direct conversion of the Tocumwal-Mangalore line section and branches could possibly be achieved for a cost of $7–$9 million. However, it was not possible to confirm this figure.

branch lines. A short section of standard gauge track would be required at Mangalore so that a high-speed turnout could be obtained, and there would also be some alterations to the signalling equipment.

The track between Tocumwal and Mangalore is currently laid with 40 kilogramme rail. However, the Victorian Railways intend to commence work in 1985–86 on upgrading the track between Mangalore and Numurkah with 47 kilogramme rail. If the track was to be dual gauged earlier, the opportunity would probably be taken to commence the upgrading at the same time. As a third rail would have to be the same weight as the broad gauge rails for continuous long term operations, dual gauging would be with 47 kilogramme rail. Data provided by the Victorian Railways indicate that total costs attributable to dual gauging under these conditions would be $18 million.

**Total construction costs**

On the basis of the estimates provided by Victorian Railways officials, the following construction costs were used in the evaluation of the proposed standard gauge links:

- New standard gauge track on both line sections $164.7 million; and
- New standard gauge track between Melbourne and Geelong and dual gauge between Tocumwal and Mangalore $93.5 million.

# CHAPTER 10—POTENTIAL TRAFFIC ALONG PROPOSED MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS

Construction of the proposed standard gauge rail links would connect Geelong and locations on the Tocumwal-Mangalore line section to the rest of the standard gauge rail system in Australia. The standard gauge system currently includes Brisbane, virtually all stations in New South Wales and various locations in South Australia, Western Australia and the Northern Territory (see Figure 1.1). As noted in Chapter 9, Geelong and stations on the Tocumwal-Mangalore line section are already connected by the broad gauge rail network to other Victorian stations, various locations in South Australia (including Adelaide) and several centres in southern New South Wales.

Standardisation of the Melbourne-Geelong and Tocumwal-Mangalore links would permit direct running of trains along the following major transport corridors which currently involve a change of gauge:

- Geelong-southern New South Wales via Tocumwal or Albury
- Melbourne-southern New South Wales via Tocumwal
- Geelong-other areas of New South Wales/Brisbane via Albury
- Northern Victoria-New South Wales/Brisbane/Western Australia
- Melbourne-interstate locations via Tocumwal as an alternative to existing routes via Albury or Adelaide.

The identification and quantification of potential standard gauge rail traffics along the proposed links was based on an analysis of the economic structures of Geelong, southern New South Wales and northern Victoria and contacts with relevant organisations. These organisations included State and Commonwealth government departments, agricultural producer groups and marketing authorities, manufacturers, grain handling authorities, port authorities, industry associations, rail authorities and the Tocumwal/Mangalore Railway League. The League provided a submission which included the results of a consultant's survey of some current and potential users of the rail link between Tocumwal and Mangalore.

In practice, the level of standard gauge rail traffic along the proposed links would be heavily influenced by the freight rates applied by rail authorities. Railway rating practices in Australia are sometimes designed to encourage the movement of freight through the originating State's ports or to other facilities even where this is less efficient from the national viewpoint than transport to interstate locations.

Under the approach used in the study, a particular commodity was considered to be a potential standard gauge traffic if movement along either or both of the proposed links would result in resource cost savings or other net economic benefits from the national viewpoint. Adjustment of railway freight rates would be required to promote the freight movement patterns on which the economic evaluation was based. If the proposed links were constructed and current freight rating practices were continued, the traffic flows and benefit streams used in the evaluation would only be partially realised. Alternatively, some of the benefits initially assessed as resulting from standardisation could be realised with the existing transport infrastructure by appropriate adjustments to current freight rating practices. This aspect is discussed further in Chapter 11.

It was concluded, on the basis of the resource cost criterion, that the major commodities likely to move along either or both of the proposed standard gauge links were wheat, rice, barley, steel billet, cement, aluminium product and inputs, refined salt, consumer goods and consumer durables, and some northern Victorian traffics. The potential traffics along the major corridors are discussed below, and the traffic forecasts are summarised at the end of the chapter.

## GEELONG/MELBOURNE-SOUTHERN NEW SOUTH WALES

The greatest potential impact of the proposed standard gauge links would be on the movement of commodities between Geelong/Melbourne and southern New South Wales. Geelong is the closest export port for a number of grain receival facilities in southern New South Wales and substantial tonnages of grain from this area have been exported through Geelong in recent years. Agricultural commodities are also sent from the area to Melbourne for both the domestic market and export. In addition, significant quantities of other commodities are transported into southern New South Wales from Geelong and Melbourne. Construction of the proposed standard gauge links could change the transport arrangements for these traffics and increase the tonnages being supplied from or exported through Victorian facilities.

### Wheat

Southern New South Wales is a major wheat growing area. Statistics compiled by the ABS indicate that, over the five years to 1980–81, wheat production in the Southern Plains and Southern Slopes statistical areas averaged almost 1.4 million tonnes per annum, although there was substantial variability in output as a result of climatic and other factors.

New South Wales authorities have traditionally encouraged rail transport of export wheat from the southern part of the State to the seaboard grain terminal at Rozelle in Sydney. However, in recent years there have also been significant movements of wheat to Geelong by both road and rail as a result of a number of factors. These include the greater proximity of Geelong to a number of receival facilities in southern New South Wales, the completion of a rail/rail transfer facility at Tocumwal in 1967, the operation of a Buffer Zone (see below) and some handling problems at the seaboard terminals in New South Wales.

The Australian Wheat Board (AWB), which is the sole trader of wheat in Australia for both export and domestic sales, has on various occasions directed the movement of wheat from southern New South Wales through Geelong. The major principle used by the AWB to determine the direction of transport in Australia is that wheat should be moved to the port which results in the minimum domestic transport cost (based on financial charges), although other factors such as congestion at seaboard terminals and demand for a particular grain quality can also result in the diversion of grain through alternative facilities.

Substantial quantities of wheat are currently moved to Geelong along the extensions of the Victorian Railways broad gauge network which terminate at Balranald, Deniliquin and Oaklands. Receival facilities on these branches are not connected to the standard gauge system in New South Wales but have access to the broad gauge system which provides links to the Victorian terminals at Geelong and Portland. As movements along these interstate extensions of the broad gauge network would not be affected by construction of the proposed standard gauge links, they are not considered further here.

Under current arrangements, wheat can be railed to Geelong (and Portland) from receival facilities connected to the standard gauge network in southern New South Wales by using the grain transfer facility at Tocumwal. This involves movement along the standard gauge rail system from the receival facilities in southern New South Wales to Tocumwal, transhipment between standard and broad gauge wagons and

then movement to Geelong using the existing broad gauge connection. Data provided by the AWB indicate that rail/rail transhipments at Tocumwal averaged 159 000 tonnes per annum over the five years to 1981–82, with a maximum movement of 489 000 tonnes in 1979–80.

The movement of wheat from southern New South Wales to Geelong was also encouraged until recently by the operation of the Buffer Zone which was established in the late 1970s as a result of changes in financial arrangements for the handling of the Australian wheat crop. With the introduction in 1978 of State accounting, each State grain handling authority assumed responsibility for its own costs and imposed a charge on growers delivering to its facilities to cover the costs of storage and handling. This replaced an Australia-wide average charge which had previously operated and involved the Grain Elevators Board (GEB) in Victoria and the predecessor of the Grain Handling Authority (GHA) in New South Wales. The combined effect of the handling charges and freight rates which were imposed by grain handling and rail authorities meant that wheatgrowers in some areas of southern New South Wales were faced with the prospect of paying substantially more to have their wheat exported through Sydney than if it was moved through Geelong.

In response to representations by growers, negotiations were held between the two grain handling authorities under the auspices of the AWB. The result was a three year agreement commencing in 1978–79 which provided that all receival facilities with a 50 cents per tonne or greater freight advantage to Geelong would be incorporated in a Buffer Zone. Under the terms of the agreement, all Buffer Zone export wheat was received into storages operated by the GHA (and its predecessor) and other facilities leased from private operators, and transported to Geelong. The handling charge was set between the charges of the two grain handling authorities. While the initial duration of the Buffer Zone Agreement was three years, it was subsequently extended by a further year to 1981–82. The GHA receival facilities included in the Buffer Zone varied in response to changes in relative transport and handling charges over this period[1]. Export wheat from this area was mainly moved to Geelong by road transport or by road and rail using transhipment facilities on the broad gauge system, although there were some rail movements through Tocumwal in 1978–79.

The Buffer Zone was replaced in 1982–83 by an Adjustment Area which initially included 10 GHA receival facilities. The GHA announced that a reduced handling charge would be applied in this area and that the State Rail Authority of New South Wales would set its freight rates so that charges for movement from storages in the Adjustment Area to Sydney would be the same as those for movement to Geelong (GHA 1982, p5). This policy of equalising freight rates in the Adjustment Area should reduce the proportion of wheat exports from southern New South Wales that are moved through Geelong in future.

There have also been significant movements of wheat by road to Geelong from areas outside the Buffer Zone/Adjustment Area in recent years. Significant tonnages were reportedly transported to Geelong from Holbrook, Lockhart, Henty and Willbriggie in 1978–79 and 1979–80.

Some of the available data on movements of wheat from southern New South Wales to Geelong over the period from 1978–79 to 1980–81 are presented in Table 10.1. Caution should be used in interpreting these data as they incorporate information from different sources which is inconsistent and there may be some omissions and double counting.

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1. In 1978–79 and 1979–80, the Buffer Zone included the GHA storages at Baldale, Berrigan, Brocklesby, Coleambally, Finley, Hopefield, Jerilderie, Rand, Tocumwal and Urana. This was reduced to Berrigan, Coleambally, Finley, Jerilderie, Tocumwal and Hopefield for the 1980–81 season. Up to 10 private storages in the area were also utilised.

TABLE 10.1—ESTIMATED MOVEMENTS OF WHEAT FROM SOUTHERN NEW SOUTH WALES TO GEELONG, 1978-79 to 1980-81[a]

('000 tonnes)

| Year | Rail/rail Tocumwal | | Road | | Road/rail[b] |
|---|---|---|---|---|---|
| | AWB estimate | GEB estimate | Buffer Zone | Outside Buffer Zone | |
| 1978-79 | 142 | 146 | 59 | 11 | 130 |
| 1979-80 | 489 | 459 | 136 | 85 | 85 |
| 1980-81 | 0 | 0 | 49 | 0 | 27 |

a. Excludes movements from storages on Balranald and Deniliquin broad gauge branch lines. Includes movements from private storages in Buffer Zone.

b. Transhipments were at Oaklands, Rutherglen and Tocumwal in 1978-79 and 1979-80 and Tocumwal only in 1980-81. Assumes that all reported road/rail transhipment traffic was sent to Geelong for export.

*Source:* Derived from data provided by the Australian Wheat Board and the Grain Elevators Board of Victoria

Wheat transported from southern New South Wales for export could be railed direct to Geelong if the proposed standard gauge links were constructed. Various approaches can be used to estimate the volume of potential wheat traffic that would be involved. Historical data provide some information but past movements reflect the impact of various factors including short run considerations which may not be relevant in the longer term when there is further development of grain handling facilities in New South Wales and Victoria. In addition, decisions on transport arrangements for wheat moved from southern New South Wales in the past were based on financial costs and charges which probably did not accurately reflect the underlying resource costs. As the evaluation in the study is an economic one, the potential catchment area in southern New South Wales should incorporate the receival facilities from which wheat could be exported through Geelong at lower resource cost than if it was sent to the nearest seaboard terminal in New South Wales. This area was estimated by including all storages that would be closer by rail to Geelong than to the nearest New South Wales terminal if the proposed standard gauge links were constructed.

This approach involves several simplifications and assumptions. It assumes that the unit costs per kilometre for rail transport from southern New South Wales would be the same for movements to the alternative terminals. The incremental operating costs (in resource terms) for handling wheat at the seaboard facilities are also assumed to be the same, although financial charges may vary[1]. Similarly, the methodology used in the evaluation assumes that the real resource costs for receival and handling of wheat at the storages in southern New South Wales would not be affected by any redirection of wheat from the GHA seaboard terminals to Geelong. Although alterations to these assumptions could move the break-even line in southern New South Wales, the catchment areas used in the evaluation are considered to be realistic provided that railway freight rates accurately reflect the underlying transport cost structures. As noted earlier, the volume of traffic along the proposed links could be significantly reduced if current freight rating practices were continued.

The potential volume of wheat traffic from southern New South Wales to Geelong (based on the minimum distance criterion) would be determined by a number of factors. The most important considerations are the future location of seaboard terminal facilities in New South Wales and the volume of exports from the southern part of the State.

1. The impact of standardisation on capital expenditure at the seaboard terminals at Geelong and in New South Wales is considered separately in the evaluation in Chapter 11.

In 1982 the GHA commissioned Coopers & Lybrand Services to prepare an assessment of the various alternatives available for the handling of New South Wales grain exports over the period to the year 2000. The study was based on financial costs and charges to the GHA and other State Government authorities. In an initial report released in October 1982, Coopers & Lybrand considered eight options including long term movement of wheat through Geelong and recommended a new terminal at Port Botany with closure of the existing facility at Rozelle in Sydney. In a supplementary report released in February 1983, it was concluded that construction of a new grain terminal at Port Kembla and closure of the Rozelle facility was the best option. The Port Kembla option was not considered in the original study, but its potential viability was subsequently increased by developments including a proposal to construct a new rail line for coal traffic between Dombarton and Maldon. This would result in improved rail access to Port Kembla for grain traffic.

At the time the present BTE study was completed, no official decision had been announced on future seaboard terminal arrangements for New South Wales grain. Movement of wheat along the proposed standard gauge links to Geelong could be an alternative to a new terminal in New South Wales, at least in the short run, and the location of the nearest seaboard terminal in New South Wales would have a significant impact on the potential catchment area in southern New South Wales. It was therefore decided to prepare the evaluation using two alternative base case conditions for the location of the new terminal in New South Wales, namely Port Botany and Port Kembla (see Chapter 11 below). Prior to commencement of operations at the new facility in New South Wales, the closest seaboard terminal in that State would be at Rozelle. In all cases, a significant number of storages in southern New South Wales would be closer by rail to Geelong than to the nearest New South Wales terminal if the proposed standard gauge links were built.

The potential catchment areas in southern New South Wales were estimated using the following distances for the terminal connections: Rozelle to Cabramatta 29 kilometres; Port Botany to Cabramatta 35 kilometres; Port Kembla to Moss Vale 67 kilometres; and Geelong to Tocumwal along the proposed standard gauge links 320 kilometres. Where the distances from a receival facility to Geelong and to the nearest New South Wales terminal were equal, the storage was included in the Geelong catchment area in line with the approach of using upper estimates in the evaluation. Wheat from the catchment areas would be railed to Geelong via Tocumwal and Albury, the route from each receival facility being determined by the shortest alignment to Geelong. The facilities in the catchment area with the closest New South Wales terminal at Port Kembla and the additional locations that would be included if the terminal was located at Rozelle or Port Botany are shown in Table 10.2. The proposed catchment areas are illustrated on a similar additive basis in Figure 10.1.

The receival facilities in the proposed catchment areas exclude Tocumwal and Oaklands as grain can already be moved to Geelong from these storages using the existing broad gauge connections. The storages at Mangoplah and Coleambally were also excluded as they are located off-rail and it seems likely that direct road transport or a road/rail operation based on the broad gauge system would be used in these cases due to the high costs of building new standard gauge transhipment facilities. Equipment for road/rail transhipment is already available at several points on the broad gauge rail system (including Tocumwal and Oaklands) and duplication of these facilities seems unlikely.

It was estimated that construction of the proposed standard gauge links would potentially permit commencement of work on a new seaboard grain terminal in New South Wales to be delayed by as much as seven years (see Chapter 11). Movement of wheat through the new terminal would commence after four years of construction work (Coopers & Lybrand 1982 Appendix F). The potential catchment areas for movement of wheat along the proposed standard gauge links would therefore change

TABLE 10.2—GHA RECEIVAL FACILITIES IN PROPOSED CATCHMENT AREAS IN SOUTHERN NEW SOUTH WALES FOR RAIL MOVEMENT OF WHEAT ALONG PROPOSED STANDARD GAUGE LINKS TO GEELONG[a]

| *Nearest NSW terminal* | *Tocumwal area* | *Albury area* | |
|---|---|---|---|
| Port Kembla | Finley | Culcairn | Pleasant Hills |
| | Berrigan | Henty | Urangeline East |
| | Jerilderie | Yerong Creek | Ferndale |
| | Morundah | The Rock | Rand |
| | Corobimilla | Walla Walla | Tootool |
| | Narrandera | Burrumbuttock | Milbrulong |
| | Yanco | Brocklesby | Lockhart |
| | Murrami | Balldale | Boree Creek |
| | Whitton | Hopefield | Yuluma |
| | Willbriggie | Holbrook | Cullivel |
| | | Munyabla | Urana |
| Rozelle (additional locations)[b] | Tharbogang | Uranquinty | |
| | Tabbita | Belfrayden | |
| | Goolgowie | Arajoel | |
| | Merriwagga | Kywong | |
| | Hillston | Forest Hill | |
| | Yenda | Ladysmith | |
| | Grong Grong | | |
| | Matong | | |
| Port Botany (additional location)[c] | Binya | | |

a. The receival facilities are listed on the basis of line sections.
b. This area comprises the listed receival facilities plus all locations in the catchment area with the nearest New South Wales terminal at Port Kembla.
c. This area comprises the listed receival facilities plus all locations in the catchment area with the nearest New South Wales terminal at Rozelle (ie all locations in the table).

over the evaluation period. Under the conditions specified for the project case in the evaluation, the existing facility at Rozelle would be the closest New South Wales seaboard terminal to the potential catchment areas until Year 11 (ie 1994-95) when it would be replaced by a new terminal at either Port Botany or Port Kembla.

The estimates of potential wheat traffic over the evaluation period were prepared on the basis of reported receivals at storages in the catchment area over the three years to 1981-82 and information on the ratio of exports to receivals for New South Wales as a whole. Data prepared by the GHA indicate that exports of New South Wales wheat through facilities in that State and interstate terminals were equal to 78.6 per cent of total receivals over the three years to 1980-81 and 78.3 per cent over the 10 years to 1980-81 (GHA 1981 Table 2-1). On the basis of this information, a round figure of 80 per cent was used to calculate average exports from the catchment areas on the assumption that the ratio of exports to receivals in southern New South Wales over the evaluation period would be similar to that for the State as a whole in recent years. This procedure resulted in base figures of 332 000, 526 000 and 528 000 tonnes for total exports in Year 0 (ie 1983-84) from receival facilities in the catchment areas with the nearest New South Wales seaboard terminal located at Port Kembla, Rozelle and Port Botany respectively.

Average wheat exports from New South Wales are generally expected to increase in future, and hence an annual growth factor was applied to these base figures to obtain the forecasts of potential wheat traffic over the evaluation period. No attempt

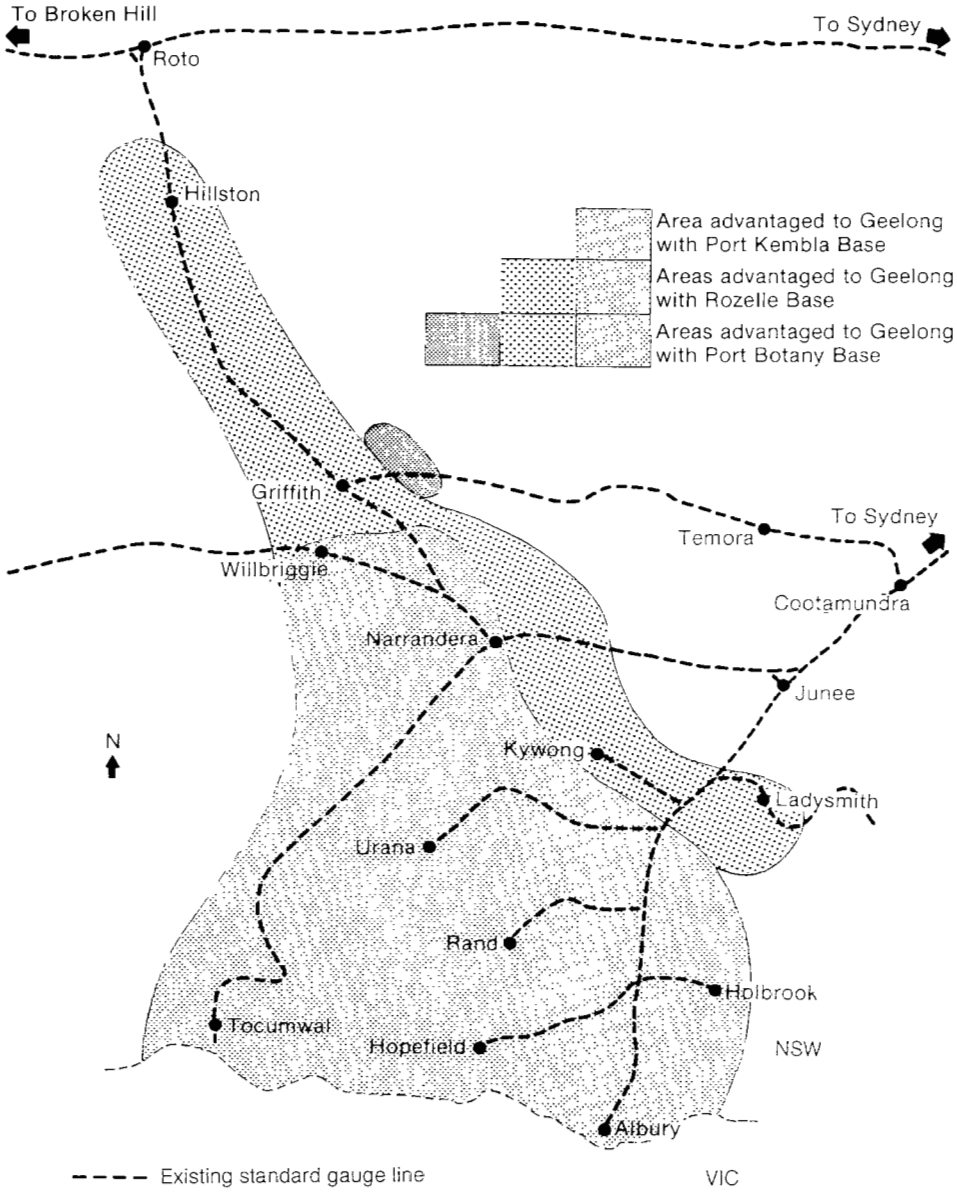


**Figure 10.1—Potential catchment areas in southern NSW for rail movement of wheat to Geelong**

was made to take into account the significant annual variations about the long term trend that would be expected in practice as these seasonal movements, which reflect climatic and other factors, cannot be accurately predicted. Inclusion of a random component in the wheat export forecasts to reflect these influences would not be expected to significantly affect the evaluation results.

The long term trend in wheat exports from southern New South Wales over the evaluation period will be determined by a variety of considerations including the total area under cultivation, the availability of new wheat varieties and improved cultivation techniques, the price of wheat on world markets and relative returns to farmers from alternative land uses such as grazing and other crops. Past trends in production and exports do not necessarily provide a useful guide to future developments. The forecasts were therefore prepared on the basis of published estimates and information provided by officials of several organisations involved in agricultural research, extension and administration activities.

The forecasting of wheat production and exports over an extended period is a difficult exercise, and there is significant diversity among published estimates in Australia. Most forecasts are on a State basis, and there is very little published data relating specifically to southern New South Wales. In an unpublished paper, an officer of the Victorian Department of Agriculture estimated that production in the Southern Slopes and Southern Plains statistical areas would increase at an average rate of around 3.1 per cent per annum over the period to 1990 (Elliot 1981 Table 2). However, this estimate includes some highly promising areas which are north of the potential catchment areas for the proposed standard gauge links. The AWB projected in 1981 that total production in New South Wales would trend upwards at around 2.9 per cent per annum between 1981–82 and 1985–86 (AWB 1981, p27). Officers of the New South Wales Department of Agriculture and the Bureau of Agricultural Economics were also contacted during the present study, and they suggested that the area sown to wheat in southern New South Wales would increase at between 1.0 and 2.0 per cent per annum and that yields would rise by between 0.5 and 1.8 per cent per annum.

Information on expected growth in exports from southern New South Wales was included in the Coopers & Lybrand study of future seaboard terminal arrangements for New South Wales grain exports. The forecasts used in the Coopers & Lybrand study were based on estimates provided to the GHA by the AWB and the New South Wales Department of Agriculture. Data in the interim report indicate an expected growth rate for average exports from Districts 11 and 12 of almost 2.5 per cent per annum between 1982 and 2001 (Coopers & Lybrand 1982 Appendix C). These two districts correspond closely with the southern New South Wales catchment area (with a Sydney terminal) used in the present study.

On the basis of this information, it was concluded that 2.5 per cent per annum was a reasonable estimate for growth in the average volume of export wheat from southern New South Wales over the evaluation period. This figure, together with the base levels of exports from the catchment areas derived earlier, was used to prepare the forecasts of potential movements of export wheat along the proposed standard gauge links over the evaluation period.

It seems unlikely that there would be any significant movements of wheat for domestic consumption along the proposed links. The wheat produced in both Victoria and the catchment areas in southern New South Wales is generally classified as soft, and Victorian producers would probably be better situated to supply users of soft wheat in their State. There is a large mill at Narrandera from which significant quantities of flour are transported by road to facilities at North Altona and Fitzroy in Melbourne. However, these destinations do not have rail facilities and the need for transhipment and road transfer would substantially increase the cost of using the proposed standard gauge links for movements from Narrandera. It was therefore

concluded that transport arrangements for domestic wheat would not be affected by the construction of standard gauge connections from Melbourne to Geelong and between Tocumwal and Mangalore.

**Rice**

Most of the rice produced in Australia is grown in the Murrumbidgee and Coleambally Irrigation Areas and the Murray Valley, all of which are in southern New South Wales. ABS statistics indicate that, over the five years to 1980–81, production of rice in the Southern Plains and Southern Slopes statistical areas averaged 592 000 tonnes per annum. Approximately 85 per cent of the processed rice is exported in a typical year.

Two major organisations are involved in the production and handling of rice in southern New South Wales. Ricegrowers' Co-operative Mills Ltd is responsible for the milling of all rice grown in New South Wales (except seed), the marketing and distribution of the milled rice and by-products on both domestic and export markets, promotional activities and some research and development. The Rice Marketing Board for the State of New South Wales provides bulk storage facilities, receives all paddy rice, sells paddy to Ricegrowers' Co-operative Mills Ltd and undertakes various other activities. Both organisations were contacted during the course of the study.

After harvesting, the paddy is transported by road from the farms to storage depots. Where a storage is not located adjacent to a milling plant, there is a further transfer to one of the rice mills. The transfer to the mill generally involves road transport, the only exception being rail movements to the Echuca mill from the Moulamein, Caldwell and Bunnaloo storages on the Balranald broad gauge branch line. After the milling operation, most of the processed rice is transported to Melbourne, Sydney or Geelong for export and the remainder is distributed for domestic consumption. The mills used to process paddy grown in southern New South Wales are located at Leeton, Griffith, Yenda, Coleambally, Deniliquin and Echuca.

Approximately 220 000 tonnes of milled rice are produced at the Deniliquin and Echuca mills in an average year and most of this is exported through Melbourne and Geelong. Rail transport along these corridors is facilitated by the existence of broad gauge links between the two mills and the port areas. Construction of the proposed standard gauge links would therefore not affect transport arrangements for rice processed at the Deniliquin and Echuca mills.

The Coleambally mill is located off-rail and hence all rice is transported out by road. Approximately 100 000 tonnes of milled rice is produced at Coleambally in an average year and 90 per cent of this is sent to Melbourne and Geelong for export. The remainder is either transported to Deniliquin or Griffith for loading into containers or sent to Geelong in bulk or bagged form. Officials of Ricegrowers' Co-operative Mills Ltd indicated that milled rice from the Coleambally facility is sent by direct road transport wherever possible in order to avoid double handling which imposes significant additional costs.

Any movement of rice from the Coleambally mill along the proposed standard gauge links would require road transfer to a road/rail transhipment facility on the standard gauge network in southern New South Wales. However, transhipment facilities are already available at points on the broad gauge system such as Oaklands, and it seems unlikely that duplication of existing equipment would be warranted. It was therefore concluded that there would be no significant movements of rice from Coleambally along the proposed standard gauge links. In addition, standardisation would not be expected to result in the diversion of paddy from Coleambally to the mills at Leeton, Griffith and Yenda which would have direct standard gauge rail connections to Melbourne and Geelong if the proposed links were constructed.

In view of the foregoing, it was concluded that construction of standard gauge links

from Melbourne to Geelong and between Tocumwal and Mangalore would only potentially affect transport arrangements for rice processed at the Leeton, Griffith and Yenda mills. In a typical year output of processed rice at these mills is around 210 000 tonnes of which 180 000 tonnes is sent to Sydney by rail, mainly for export. A further 10 000 tonnes is transported by road to Melbourne and the remainder is supplied direct to the domestic market or transported by road to Deniliquin for loading into containers.

Construction of the proposed standard gauge rail links would significantly improve rail access from the three mills to facilities in Melbourne and Geelong. The effect of these connections on transport arrangements for rice produced at the mills would be determined by a number of factors including freight rates, port charges and the adequacy of shipping services at various ports. Movement of rice to Melbourne using a link between Tocumwal and Mangalore would involve a reduction of between 99 and 151 kilometres in travel distances compared with the Sydney alternative. Officials of Ricegrowers' Co-operative Mills Ltd were not able to provide definite advice on the likely impact of standardisation on their transport arrangements. It was decided to assume, for the purposes of the study, that 120 000 tonnes per annum of rice would be diverted from Sydney to Melbourne and that a further 5000 tonnes per annum sent to Melbourne would be diverted from road transport. This is considered to be an upper estimate.

Various by-products are obtained during the milling process and these are either sold to domestic users for purposes such as stock feed or burned. By-products are not well-suited to rail transport due to the broad distribution of users and it is expected that they would continue to be transported by road if the proposed standard gauge rail links were built.

Rice production in southern New South Wales is not expected to increase significantly in the foreseeable future in view of anticipated restrictions on the availability of irrigation water and other factors. Rice traffic along the proposed standard gauge links was therefore forecast to remain constant at 125 000 tonnes per annum over the evaluation period.

**Barley**

Southern New South Wales is a major area for the production of barley. ABS statistics indicate that production in the Southern Slopes and Southern Plains statistical areas averaged 230 000 tonnes per annum over the five years to 1980–81 with a maximum crop of 330 000 tonnes in 1979–80. The marketing and transport of barley from this area is undertaken by two organisations, namely the Barley Marketing Board of New South Wales (BMB) and the Victorian Oatgrowers' Pool and Marketing Company Ltd (VOP).

The Barley Marketing Board receives barley in southern New South Wales through a system of private storages and GHA facilities. The grain is mainly exported or sent to brewers and maltsters in Sydney. The latter movements would not be affected by the construction of standard gauge links from Melbourne to Geelong and between Tocumwal and Mangalore.

The BMB currently directs its exports from southern New South Wales through both Geelong and the GHA terminal at Rozelle, and standardisation could result in an increase in the tonnages handled at Geelong. The potential catchment areas for the movement of barley along the proposed standard gauge links were estimated on the basis of minimum distances. Although the areas identified using this approach were the same as those estimated for wheat in the previous section, the receival facilities involved were significantly different. Data provided by the BMB indicate that over the three years to 1981–82 total barley receivals in the catchment area with the nearest New South Wales terminal at Rozelle averaged 72 000 tonnes per annum, of which about 17 per cent was handled at GHA storages.

The private receival facilities in southern New South Wales are generally located off-rail and road transport is therefore used for silo clearances at these locations. A small amount of the barley received at the private storages is sent to brewers and maltsters in Sydney but most is exported through Geelong. The latter movements involve either direct road transport to Geelong or movement to intermediate road/rail transhipment facilities on the Victorian Railways broad gauge rail system.

Reasons for using the broad gauge system include delays at the road receival facilities at the GEB terminal in Geelong. The BMB has established a major road/rail transfer facility with a storage capacity of 13 000 tonnes at Oaklands. This provides storage capacity on the Victorian Railways broad gauge system and facilitates rapid movement by rail of barley transported by road from centres in southern New South Wales, particularly overflow supply from already full storages. Barley has also been transferred between road and rail at Corowa and less frequently at Tocumwal and Yarrawonga in recent years.

BMB officials were not able to provide conclusive advice on the likely impact of standardisation on transport arrangements for export barley received at private facilities in southern New South Wales, although they noted that benefits might be realised if the (financial) costs of transferring barley from the storages to the standard gauge system and the rail journey to Geelong were less than the costs of direct road transport. However, it seems unlikely that any significant quantities of barley received by the BMB at private storages would move along the proposed standard gauge links, for the following reasons.

The Oaklands transfer facility is conveniently located with respect to many of the private storages in the potential catchment areas in southern New South Wales. Over the three years to 1981–82, 56 per cent of the barley received at the private storages in the catchment area (based on a New South Wales seaboard terminal at Rozelle) involved facilities within 65 kilometres of Oaklands and a further 10 per cent was delivered to Oaklands itself. Corresponding figures for the catchment area involving the Port Kembla terminal were 83 per cent and 15 per cent respectively. The BMB intends to use the Oaklands facility to its fullest extent in future and to expand it.

The existing equipment at Oaklands originally involved significant capital costs but these are now effectively sunk, whereas use of the proposed standard gauge links would require the construction of additional storage and transhipment facilities in southern New South Wales. Duplication of existing facilities would probably not be warranted in these circumstances, and continuation of direct road movements and transhipment at facilities connected to the broad gauge network seems likely. It was therefore concluded that there would be no significant flows of barley along the proposed standard gauge links from these private storages.

In contrast to the private receival facilities, all of the GHA storages in southern New South Wales used for the receival of barley by the BMB in recent years are connected to the standard gauge rail system. Data supplied by the BMB indicate that over the three years to 1981–82 barley receivals at GHA facilities in the proposed catchment areas with the nearest New South Wales terminal at Rozelle/Port Botany and Port Kembla averaged 12 000 tonnes and 9400 tonnes per annum respectively[1]. Most of this grain was exported through the GHA terminal in Sydney. As the rail distances from the receival facilities in these areas to Geelong would be shorter than the distances to the nearest New South Wales terminal if the proposed standard gauge links were constructed, there could be savings in rail resource costs if barley from

1. Over the three years to 1981–82, BMB receivals in the catchment area with the nearest New South Wales terminal at Port Kembla involved the GHA storages at Finley, Berrigan, Narrandera, Yanco, Henty, Yerong Creek, The Rock, Brocklesby, Balldale, Urangeline East, Ferndale, Rand, Milbrulong, Cullivel and Urana. With the nearest terminal at Sydney, the catchment area included additional facilities at Grong Grong, Tabbita and Arajoel.

the GHA facilities was diverted to Geelong. It was therefore concluded that this barley could potentially move along the proposed links.

The BMB advised that barley production in southern New South Wales is expected to remain stable in future unless there are substantial changes in relative grain prices. Movements of barley from the catchment areas to Geelong were therefore forecast to remain constant at 12 000 tonnes (closest New South Wales terminal at Sydney) or 9400 tonnes (closest terminal at Port Kembla) over the evaluation period.

The second major organisation involved in the receival and transport of barley in southern New South Wales is the Victorian Oatgrowers' Pool and Marketing Company Ltd (VOP). Barley handled by this organisation is mainly received at VOP facilities but some other private storages are also used. The barley is either supplied to maltsters in Melbourne or exported. As the VOP is not a statutory marketing board, barley independently purchased in New South Wales by the company must be transported across a State border. All exports of New South Wales barley by the VOP are directed through Geelong.

The areas in New South Wales from which barley received by the VOP could potentially be moved along the proposed standard gauge links are significantly larger than those identified for the BMB's operations. The VOP's activities in New South Wales have extended into the central areas of the State in some recent years. Over the three years to 1981–82 receivals of New South Wales barley by the company averaged almost 97 000 tonnes per annum of which 51 000 tonnes were delivered to Geelong for export.

Virtually all of the receival facilities used by the VOP in New South Wales are located off-rail, although in some cases use of the nearest rail facility would only require a short road haul. The storages at Tocumwal and Oaklands are the only facilities with direct rail connections and these involve the Victorian Railways broad gauge system. The Tocumwal facility, which was completed in 1980–81, incorporates transhipment and bulk storage equipment. A further 5000 tonnes of storage capacity is available at Oaklands. Barley received in New South Wales is either transported direct to Melbourne or Geelong by road or moved through the road/rail transfer facilities at Tocumwal, Oaklands or Rennie. Data provided by the VOP indicate that, over the three years to 1981–82, 56 per cent of New South Wales receivals exported through Geelong were transported direct by road and the remainder were transhipped onto the broad gauge rail system.

It seems unlikely that any significant quantities of New South Wales barley received by the VOP would move along the proposed standard gauge links. Use of the links would require road/rail transhipment equipment in New South Wales, but the exisiting facilities on the broad gauge system seem to be well located with respect to many storages in New South Wales. The existing transhipment equipment originally involved significant capital costs but these are now effectively sunk, whereas use of the proposed standard gauge links would require the construction of additional storage and transhipment facilities in southern New South Wales. Duplication of existing facilities would probably not be warranted in these circumstances.

Use of the standard gauge system for domestic traffic would also require transhipment and road transfer operations in Melbourne. The malthouses supplied by the VOP do not have rail facilities, and barley for these customers is currently transported by road to terminals at Glenroy, Newport (both on broad gauge rail but not used), Sunshine and Williamstown (both off rail) and then delivered by road. Movement of domestic barley along the proposed links would therefore require standardisation of the sidings in Melbourne. In addition, transhipment and road delivery would probably still be necessary as only one of the maltsters is prepared to accept barley direct from country areas.

The available information therefore indicates that standardisation would probably not affect transport arrangements for New South Wales barley received by the VOP.

The company also advised that construction of the proposed links would not have a significant effect on its operations.

In view of the foregoing, it was concluded that either 12 000 tonnes or 9400 tonnes per annum of barley might move along the proposed standard gauge links, the volume of traffic depending on the location of the nearest seaboard grain terminal in New South Wales.

**Other coarse grains**

Significant quantities of oats, sorghum and yellow maize are grown in southern New South Wales. Information on the potential impact of the proposed standard gauge links on transport arrangements for these commodities was obtained from officials of relevant marketing authorities and growers.

ABS statistics indicate that average production of oats in the Southern Slopes and Southern Plains statistical agricultural areas over the five years to 1980–81 was 154 000 tonnes per annum. Most of the oats grown in these areas are consumed on-farm but some grain is also received by the Oats Marketing Board of New South Wales (OMB) and the Victorian Oatgrowers' Pool and Marketing Company Ltd.

An official of the Oats Marketing Board indicated that this organisation receives oats through GHA facilities and some private storages. The OMB has mainly directed exports through Sydney in the past but it reportedly intends to use Geelong more in the future. It appears that only small quantities of oats have been transported out of southern New South Wales by the OMB in recent years.

Provision of standard gauge rail connections between Melbourne and Geelong and from Tocumwal to Mangalore would not be expected to significantly affect transport arrangements for oats received at private storages due to their off-rail locations and various other factors that were outlined in the earlier discussion of barley traffic. The only potential movements of oats along the proposed links would therefore involve receivals at GHA facilities. Data provided by the GHA indicate that over the three years to 1981–82 total receivals of oats in the catchment area in southern New South Wales (closest terminal at Sydney) averaged only 206 tonnes per annum. Oats production in the area is not expected to increase substantially, and it was therefore concluded that no significant quantities of oats would be moved along the proposed standard gauge links by the OMB.

The VOP purchases oats in southern New South Wales and has also acted as a handling, marketing and administration contractor for the OMB in the past. Total receivals of New South Wales oats by the VOP averaged 6900 tonnes per annum over the three years to 1981–82 of which 6200 tonnes per annum were exported through Geelong.

As noted earlier, the VOP utilises private storages for its activities in New South Wales. The facilities are located off-rail, and the oats are therefore moved to Victorian centres either by direct road transport or by road and rail with a transhipment operation. These transport arrangements would not be affected by construction of the proposed standard gauge links for a variety of reasons, including the relatively small tonnages involved and the availability of transhipment facilities on the broad gauge rail system. The VOP also advised that standardisation would have little effect on its operations.

It was therefore concluded that there would be no significant movements of oats along the proposed standard gauge links.

ABS statistics indicate that production of sorghum in the Southern Slopes and Southern Plains statistical areas averaged 16 000 tonnes per annum over the five years to 1980–81. An official of the Grain Sorghum Marketing Board of New South Wales advised that export opportunities have recently been very limited due to world market conditions and the need to obtain a significant premium over local prices

to make export activities attractive. Virtually all of the sorghum grown in southern New South Wales is therefore used domestically for stock-feed, the major customer being a company in Victoria. All sorghum from the area is transported by road at present and substantial expansion of production is considered unlikely. It appears that receival facilities in southern New South Wales are generally located off-rail and that the major user of the sorghum would not have a standard gauge rail connection even if the proposed links were built. Use of the rail system would therefore involve road transfer and transhipment operations. In view of these factors and the relatively small tonnages involved, it was concluded that there would be no significant movements of sorghum along the proposed standard gauge links.

Production of yellow maize in the Southern Slopes and Southern Plains statistical areas averaged 16 000 tonnes per annum over the five years to 1980–81. Growers contacted during the study indicated that the industry in southern New South Wales relies on the domestic market which is relatively limited. Most of the output is reportedly used for stock-feed or for grits which are processed into snack foods and breakfast cereals. Road transport is used to move the grain to processing facilities at Albury and locations in Victoria and South Australia. Production in this area is not expected to increase substantially. The movement of yellow maize from southern New South Wales appears to be well-suited to road transport, and it was concluded that there would be no significant use of the proposed standard gauge links.

**Fertiliser**

The Phosphate Co-operative Company of Australia Ltd (PCC) operates manufacturing facilities in Geelong and Melbourne and is the major supplier of fertiliser to farmers in the area south of Hay and Narrandera. It also sends some product to locations further north in New South Wales. Access to the southern New South Wales market is facilitated by the availability of competitive road freight rates from carriers who require backloading after carrying grain to Geelong. The company's major competitor in this area is Australian Fertilizers Ltd which has manufacturing facilities at Port Kembla and Newcastle.

PCC sends significant quantities of fertiliser to southern New South Wales but the tonnages involved cannot be revealed in this report for reasons of commercial confidentiality. Data provided by the company indicate that approximately three-quarters of the fertiliser transported to southern New South Wales in 1980–81 was moved direct by road while the remainder was railed to depots on the broad gauge system and then distributed to users by road. The major depots used for the road/rail operation were the Wodonga and Deniliquin facilities, although small quantities of fertiliser were also sent through Oaklands, Echuca, Yarrawonga and other locations. The company anticipates moderate growth in the southern New South Wales market.

If the proposed standard gauge rail links were constructed, the PCC factory at Geelong could be connected to the standard gauge system by dual gauging the existing broad gauge branch to the plant. Fertiliser could then be railed direct from Geelong to depots in southern New South Wales, although final delivery would still be by road transport due to the broad distribution of on-farm storages. The extent to which fertiliser would be moved along the proposed standard gauge links would be determined by the following considerations.

In recent years, the broad gauge rail system has been used to transport between 55 and 60 per cent of the fertiliser supplied by PCC to its Victorian and interstate markets. The overall rail share appears to have been supported by restrictions on road transport operations for this traffic in Victoria. The PCC submission to the Victorian Transport Study noted that use of the rail system was less attractive than road transport in many cases due to various aspects of rail transport including shortages of suitable wagons, slow turnaround times, poor quality of many existing wagons, significant damage to bagged consignments during shunting, costs of wagon

cleaning and preparation where fertiliser was backloaded in grain wagons, limited provision for palletised loading of bagged product, lack of versatility and inability to provide a direct factory to farm service. Benefits associated with road transport included greater frequency, better quality of service and the ability to provide delivery direct from the factory to farms. The company's submission also noted some advantages of rail transport and disadvantages of road transport, but the overall theme was that direct road transport was preferred by PCC in many cases.

The movement of significant quantities of fertiliser along the proposed standard gauge links to southern New South Wales would require the establishment of regional storages on the standard gauge system in this area. PCC currently operates large regional storages capable of handling high-speed bottom discharge rail wagons at Wodonga and Maryborough, but the establishment costs for such storages are high. The company has for some time been assessing a proposal for a network of major regional storages with rail access in Victoria, but it reportedly considers that this would involve the very costly duplication of plant and equipment already installed at its main factories. A joint working group to consider this proposal was established by the Victorian Railways and PCC, but there has been no decision to proceed with expansion of the regional storage network. Victorian Railways officials have estimated that the phased introduction of a network of regional storages would involve a lag of at least five to ten years before the commencement of substantial capital investment by both organisations (Victorian Railways 1980 p37). In view of the apparent reluctance of PCC to proceed with the construction of regional storages on a large scale in Victoria, it seems doubtful whether the company would be prepared to undertake the expenditure on regional storages in southern New South Wales that would be required if significant quantities of fertiliser were to be moved along the proposed standard gauge links.

In addition, PCC already operates a number of rail depots in southern New South Wales and near the border in northern Victoria which are connected to the broad gauge system. As noted earlier, fertiliser is delivered into southern New South Wales by road from these facilities. As the major market for PCC fertiliser in the area appears to be the southern-most part of New South Wales, it seems likely that any programme for regional storages to serve southern New South Wales could be based on the existing broad gauge rail system operated by the Victorian railways. If greater use of the rail system for movement of fertiliser to this area was required, the established broad gauge depots could well be a more attractive option than movement along the proposed standard gauge links.

The discussion of potential standard gauge traffic in preceding sections of this chapter indicated that significant quantities of barley and possibly other grains would continue to be transported from southern New South Wales to Geelong by road if the proposed standard gauge links were built. It therefore seems reasonable to assume that competitive freight rates would be available for road movement of some fertiliser into the area due to the continued need for backloading. On the other hand, grain moved to Geelong by rail would be carried in hopper wagons which would return empty to southern New South Wales, and hence rail transport of fertiliser would probably require dedicated wagons. In these circumstances, it seems likely that road transport could retain a significant proportion of fertiliser traffic.

In view of these considerations, it was concluded that there would not be any significant movements of fertiliser along the proposed standard gauge links.

**Petroleum**

Substantial quantitites of petroleum products are supplied to southern New South Wales from the Victorian refineries at Corio (Geelong), Altona (Melbourne) and Crib Point (Westernport). These movements reflect several considerations including the proximity of the refineries to the area, the availability of refining capacity in excess

of Victorian requirements and limited refining capacity in New South Wales. Data prepared by the Australian Institute of Petroleum Ltd (AIP) suggest that 233 000 tonnes of petroleum products were transported to New South Wales from Victorian refineries in 1979 (AIP 1980 p11). Petroleum products are also moved into southern New South Wales from other centres including Sydney and Port Kembla.

Most petroleum supplied from the Victorian refineries is currently transported by road. However, there are also some movements along the broad gauge rail system to regional storages at locations such as Wodonga and Shepparton with final distribution into southern New South Wales by road vehicles.

The oil companies have traditionally relied heavily on road transport for the distribution of petroleum products in Victoria due to the virtual absence of State Government restrictions and various advantages of road transport. These advantages include greater flexibility, quicker delivery and faster vehicle turnaround. Road transport also permits direct delivery from the loading terminals to each depot and service station whereas use of the rail system requires transfer to road vehicles for final distribution. Costs associated with the transfer operation include additional investment in storage and transfer equipment, increased inventory holdings and product loss during transhipment. However, rail transport can be more efficient than direct road movement in various situations, particularly over longer distances and where traffic volumes permit the operation of block or unit trains.

Victorian authorities have recently moved to encourage greater use of the rail system for the movement of petroleum products in Victoria. This generally involves the operation of block trains between the Melbourne terminals and major regional storage facilities from which petroleum products are distributed by road. Block trains currently supply storages at Mildura, Shepparton, Wodonga and Swan Hill, and two further regional facilities are planned for Victorian country centres.

The longer term strategy for petroleum products traffic envisaged by the Victorian Railways also includes the operation of block trains to several major storages on the standard gauge network in southern New South Wales. Construction of the proposed standard gauge links from Tocumwal to Mangalore and between Melbourne and Geelong could facilitate rail movements to this area. However, for the reasons set out below, it seems unlikely that there would be any significant movements of petroleum products over the proposed links.

Movement of petroleum products from Victorian centres along the proposed rail links to southern New South Wales would require some expansion of the loading facilities in Melbourne. Broad gauge wagons are currently loaded in the Newport area but the sidings where the block trains are made up are now operating near capacity. Alternative facilities are available in the area but significant cost penalties are incurred as these sidings are not long enough to permit direct running of block trains. Use of the proposed standard gauge links would also require the construction of a connection from Newport to the proposed Melbourne-Geelong link together with standardisation of the terminal sidings.

An alternative to further development at Newport is completion of the proposed loading facility at Somerton on the outskirts of Melbourne. This project has been supported by the Victorian Railways as a means of improving its penetration of the petroleum products market in northern Victoria and southern New South Wales. However, progress on the proposed terminal has been slow and the facilities at Somerton currently comprise only a single storage tank which is an aviation fuel back-up for the Tullamarine branch of the Altona-Somerton pipeline. It would therefore be necessary to construct a rail connection (estimated cost $700 000) and a large filling terminal before block trains could be loaded at Somerton. Significant further development at this location seems unlikely in the foreseeable future.

A number of towns in southern New South Wales already have petroleum products

storages which are connected to the standard gauge rail system. However, rail movement of petroleum products from Victoria on a large scale would require several large regional terminals so that the operating economies available with block trains could be achieved. The proportion of petroleum products transported into the area by rail has traditionally been relatively low, and hence use of the proposed standard gauge links would probably involve significant expenditure on upgrading work or establishment of new regional terminals.

Increased use of the rail system for the movement of petroleum products into southern New South Wales would not necessarily involve the standard gauge network. There are established regional facilities on the broad gauge system in northern Victoria at Wodonga, Shepparton and other locations and Mobil is currently upgrading its terminal at Tocumwal. It could be more efficient to use these existing terminals than to establish new storages in southern New South Wales. The additional costs of longer road distribution journeys with use of the broad gauge system could be more than offset by savings in expenditure on country terminals and elimination of the need to connect a Melbourne loading facility to the standard gauge network.

One oil company contacted during the study indicated that it would prefer to supply southern New South Wales through Shepparton and Wagga Wagga. Movement of petroleum products by rail to the latter location would require provision of standard gauge rail access to a distribution terminal in Melbourne, but if this involved the Somerton facility it would not be dependent on construction of either of the proposed standard gauge links.

Information on the potential impact of standardisation on transport arrangements for the supply of petroleum products to southern New South Wales was also obtained from the Transport Committee of the Australian Institute of Petroleum Ltd. After consulting member oil companies, the AIP advised that a standard gauge rail link to Geelong and loading at the Shell refinery could allow some operational economies of a relatively minor nature by permitting the transportation of some products into southern New South Wales by rail. There could also be a significant effect on the pattern of terminal development in Melbourne with a joint rail facility possibly being transferred from Somerton to Newport with a capital saving of perhaps $2 million.

The AIP also advised that, if standard gauge loading facilities were available in Melbourne and Geelong, construction of the proposed link between Tocumwal and Mangalore could provide a more economic method of transport for parts of southern New South Wales. However, no definite advice on the attractiveness of this option to member oil companies was provided, although it was noted that the structure of the Commonwealth Government's subsidy scheme for inland petroleum freight costs could provide little incentive for the companies to adopt more efficient transport arrangements. The AIP was therefore unable to specifically evaluate the potential effect of standardisation on petroleum transport arrangements. This suggested a lack of strong interest on the part of the oil companies in using the standard gauge rail system to service locations in southern New South Wales.

It was concluded that there would probably be no significant petroleum products traffic along the proposed standard gauge links. This reflects the relative attractiveness of road transport to oil companies in many cases and the alternative ways of using the rail system to service locations in southern New South Wales.

**Other primary products**

The data in Table 8.2 indicated that significant quantities of agricultural commodities other than grain are produced in southern New South Wales. Potential movements of fruit and vegetables, oilseeds, wool, meat and livestock along the proposed links were therefore studied. A major coal field in the Oaklands area was also considered as a possible source of traffic.

Some fruit and vegetables are currently sent from southern New South Wales to Melbourne, although access to this market is apparently limited in many cases by the existence of Victorian producers who are better located. Several major companies operating in southern New South Wales were contacted during the study and they indicated that road transport is the preferred mode for this traffic, although rail is currently used for some of the movements to Sydney. As these commodities are perishable, appropriate transport arrangements are an important consideration.

Several wholesalers of fruit and vegetables indicated that they would not use the proposed standard gauge links unless there was a daily service with refrigerated vans and a reasonably late deadline for loading. In addition, they would require control over the selection of personnel for the loading or unloading of produce. Rail transport was generally considered to be uncompetitive in these and other areas.

Victorian Railways officials also advised that perishable items such as fruit and vegetables are not suited to rail transport due to slow delivery times compared to road vehicles. This is evidenced by the very small percentage of existing traffic that is moved by rail. It was therefore concluded that there would not be any significant movements of fresh fruit and vegetables along the proposed standard gauge links.

Some of the fruit grown in southern New South Wales is processed in the area. Letona Co-operative Ltd operates a cannery at Leeton but movements of product to Melbourne for domestic consumption are reportedly limited to about 3000 tonnes per annum as producers in northern Victoria are better placed to service this market. Exports are railed to Sydney and this movement would probably continue if the proposed links were built. It therefore seems unlikely that there would be significant movements of canned fruit from Leeton along the proposed standard gauge links.

Substantial quantities of grapes grown in southern New South Wales are used by the wine industry. Movements of bulk wine are well suited to road transport due to the broad distribution and off-rail locations of many wineries. It seems unlikely that large quantities of bottled or bulk wine would be moved along the proposed standard gauge links to Melbourne.

Significant quantities of oilseeds are grown in southern New South Wales. Officials of the Oilseeds Marketing Board of New South Wales indicated that most of the output from this area is transported by road to a major customer in Melbourne, with small quantities also being sent to Sydney. No substantial increase in southern New South Wales production is forecast, and this traffic would not be expected to divert to rail as it is essentially road-oriented and involves broadly distributed off-rail loading points.

Information supplied by the Australian Wool Corporation (AWC) indicated that the majority of wool produced in southern New South Wales is sent to selling centres in Melbourne, with the remainder going to Albury, Geelong, Goulburn and Sydney. Traffic moving from southern New South Wales to Melbourne and Geelong would not be expected to divert to the proposed standard gauge links for a number of reasons. Pick-up by road vehicles and transhipment to the rail system would be required in southern New South Wales. In addition, further transhipment operations would be required at Victorian wool selling centres without direct access to the standard gauge system. Victorian Railways officials indicated that road transport would have a strong competitive advantage in this traffic as the widely dispersed origins and destinations preclude the implementation of special bulk freight rates. In view of these factors, it was concluded that construction of the proposed links would not have a significant impact on transport arrangements for wool.

In recent years, some of the abattoirs which traditionally supplied the southern New South Wales market have been closed. The works at Albury have an export licence and the remaining abattoirs in the area mainly supply the regional market. Significant quantities of livestock are transported from southern New South Wales to Victoria for slaughter but this traffic is more suited to road than rail transport. The Victorian

Railways reportedly have no suitable livestock vans available and are unlikely to pursue this traffic as it is financially unattractive. In addition, none of the livestock facilities in Victoria have standard gauge sidings. Livestock and meat would therefore not be expected to move along the proposed links.

Substantial coal deposits are located in the area around Oaklands. This coal is of relatively low quality and hence it is unlikely to be exported. If it was decided to transport coal mined near Oaklands to Melbourne or Geelong, the most economical rail operation would probably involve the use of the Victorian Railways broad gauge system which already serves Oaklands. Movement of coal along the proposed standard gauge links would require either a standard gauge connection to Oaklands or alternatively a long journey back through southern New South Wales along the existing standard gauge tracks in that State. It is therefore unlikely that coal from this deposit would be moved along the proposed links.

In view of the foregoing, it was concluded that there would be no significant movements of other primary products along the proposed standard gauge links.

**Consumer goods and consumer durables**

A significant proportion of the market for consumer goods and consumer durables in southern New South Wales is supplied from Melbourne, although there are also substantial movements from Sydney and other centres in New South Wales. Melbourne suppliers appear to be particularly important in the area south of Narrandera where their geographic advantage is greatest.

Information on the potential impact of standardisation on transport arrangements for consumer goods and consumer durables was obtained from several wholesalers operating in southern New South Wales. They indicated that road transport is preferred to rail for a number of reasons and that this situation would not be affected by construction of the proposed standard gauge links. Delivery within 24 hours of order placement is often required and operation of receival facilities until the afternoon is needed so that orders can be lodged in the morning. Rail transport was not considered to provide adequate service on the basis of these criteria. Double handling would also be necessary if various consumer goods and consumer durables were moved along the proposed links as many of the warehouses in southern New South Wales that are supplied from Melbourne are located off-rail. It seems likely that there would be similar problems in Melbourne as at least some despatching warehouses would not have direct access to the standard gauge system.

An estimate of the maximum volume of consumer goods and consumer durables traffic that could potentially be affected by construction of the proposed standard gauge links was prepared on the basis of population and per capita consumption data. Centres located on the Cootamundra-Albury main line and associated branches already have direct standard gauge links to Melbourne, and construction of the proposed links would not improve the rail connections to these locations. Standardisation would therefore only improve rail access from Melbourne to locations in southern New South Wales that would be supplied through Tocumwal if the proposed link was used. Information provided by the ABS indicated that the population of the relevant local government statistical areas was 51 000 persons in 1981[1]. An average figure for annual consumption of consumer goods and consumer durables (excluding cement, other building materials and petroleum products) of 1.5 tonnes per capita was then applied to the population data, resulting in an estimate of the potential market in southern New South Wales that could be affected by standardisation of 76 500 tonnes per annum.

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1. The local government areas considered were Jerilderie, Murrumbidgee, Hay, Wade, Leeton, Carrathool, and Narrandera. Berrigan and Corowa were excluded because they could be serviced from existing broad gauge facilities, as was Urana which could be serviced by rail via Albury.

Additional information on the likely competitiveness of rail transport was obtained by analysing rail authority data on intrastate movements of consumer goods and consumer durables. This involved movements from Sydney and Melbourne to representative towns in New South Wales and Victoria respectively where the distances were similar to those between Melbourne and locations in southern New South Wales. Population and per capita consumption data were then used to estimate the market for consumer goods and consumer durables in each case, and the proportion carried by rail was calculated. The results of this analysis indicated that the proportion of consumer items carried by rail varied from below 5 per cent in many cases to more than 30 per cent for some Victorian centres[1].

The lack of direct standard gauge access to warehouses noted above and competition from Sydney suppliers would be expected to limit the share of the consumer goods and consumer durables market in southern New South Wales that could be supplied by rail from Melbourne even if the proposed standard gauge links were constructed. An estimate of 10 000 tonnes per annum in Year 0 with growth at 2 per cent per annum was therefore used in the evaluation.

## GEELONG—OTHER NEW SOUTH WALES/BRISBANE

Construction of a standard gauge link between Melbourne and Geelong would permit direct rail movement of commodities between Geelong and locations in New South Wales (outside the southern area discussed above) and Brisbane. Traffic moving along this corridor by rail is currently bogie exchanged at South Dynon in Melbourne. The commodities which could be affected by the link are discussed below.

### Steel

The Broken Hill Proprietary Company Ltd (BHP) rod mill in Geelong supplies feed for the wiredrawing plant of Australian Wire Industries Pty Ltd (AWI). Steel billet for the rod mill was obtained from Whyalla until early 1982 when the source of supply was changed to Newcastle. Approximately 120 000 tonnes per annum of steel billet is currently railed from Newcastle to North Geelong and then transferred by road to the mill. Standardisation of the link between Melbourne and Geelong would remove the need to bogie exchange this traffic at South Dynon and possibly increase the viability of the Newcastle operation.

The source and transport arrangements for steel billet used at the rod mill could be influenced by a number of developments over the evaluation period. BHP has substantially reduced domestic movements of steel products by sea, and it is conceivable that a recovery in local steel production could result in a partial return to this mode at the expense of rail. The future structure and size of the Australian steel industry could also affect movements of steel billet. A significant reduction in the size of the local industry could conceivably lead to some use of imported billet at Geelong and hence reduce the volume of traffic from Newcastle. Any substantial restructuring of the Australian steel industry could adversely affect production at the Newcastle steelworks, although a switching of steel billet supplies from Newcastle to Port Kembla would not affect the level of potential traffic along the proposed link between Melbourne and Geelong.

In early 1983, BHP officials considered a return to the earlier arrangements under which steel billet for Geelong was obtained from Whyalla. However, they subsequently decided to continue with movements from Newcastle. In the absence of a standard gauge link between Adelaide and Geelong, transport of steel billet from Whyalla would involve either sea transport or rail transport with bogie exchange in Adelaide.

1. This approach does not identify specific influences operating on particular corridors, such as low road freight rates for backloading purposes, and has other shortcomings. However, it does show the significance of rail transport for these commodities.

A direct rail service between Whyalla and Geelong could be operated if the Adelaide-Melbourne track was standardised along the alignment recently proposed by the Victorian Railways and Australian National, and any decision to proceed with this project could significantly affect the volume of steel billet traffic from Newcastle.

A number of factors will therefore affect the level of potential steel billet traffic along the proposed Melbourne-Geelong standard gauge link over the evaluation period. However, in line with the optimistic approach adopted in the study, it was decided to assume that all of the steel billet for the rod mill at Geelong would be railed from Newcastle. This would involve an initial volume of 120 000 tonnes per annum, and a growth rate of 2 per cent per annum was adopted for the purposes of the evaluation. As the current capacity of the wiredrawing plant is around 160 000 tonnes per annum, some expansion of the AWI facilities at Geelong would probably be required for the forecast movements of steel billet to be achieved.

Discussions with an official of AWI indicated that there would be no significant movements of wire products along the proposed standard gauge links. The company has a plant in New South Wales and the Geelong factory mainly supplies markets in Victoria and South Australia which are served by the broad gauge rail network.

**Cement**

Portland cement is produced at Geelong by Blue Circle Southern Cement Ltd (BCSC) and Australian Portland Cement Ltd (APC). Both companies send significant quantities of product to New South Wales.

Blue Circle Southern Cement Ltd mainly supplies the New South Wales market from three plants located in that State. However, the company's works at Waurn Ponds near Geelong are used to supply the southern part of the State. These facilities are also used to cover breakdowns at the New South Wales plants, although movements for this purpose are generally small.

The plant at Waurn Ponds regularly supplies New South Wales locations south of Griffith and Hay. Cement for the southern New South Wales market is generally moved by broad gauge rail from Waurn Ponds to a regional depot at Tocumwal and then distributed by road to locations over a radius of 100-150 kilometres. BCSC officials advised that provision of standard gauge rail connections from Melbourne to Geelong and between Tocumwal and Mangalore would not have a significant effect on transport arrangements for the southern New South Wales market because the destinations in this area are too numerous and dispersed to permit final distribution by rail. Provision of a new depot on the standard gauge system would also require duplication of the existing facility at Tocumwal. In addition, the works at Waurn Ponds are located approximately 15 kilometres from the main rail yards at North Geelong, and the relatively small interstate movements from the plant would probably not warrant the cost of standardising the branch. It was therefore concluded that there would be no movements of cement from the BCSC works along the proposed standard gauge links.

Australian Portland Cement Ltd supplies substantial quantities of cement to New South Wales and the Australian Capital Territory from its factory at Fyansford, which is located approximately four kilometres from North Geelong. APC currently rails bulk cement from Fyansford to Sydney and Canberra, bagged cement to Sydney and road-making cement to Wodonga for final road delivery to sites in southern New South Wales. In addition, significant quantities of cement are sent to southern New South Wales by direct road transport or by rail/road through depots in northern Victoria. Information on the potential impact of standardisation on APC's interstate traffic was obtained during discussions with company officials.

The APC factory at Fyansford is relatively close to the alignment of the proposed standard gauge link between Melbourne and Geelong, and the expected level of

interstate cement traffic should justify standardisation of the branch to the company's works.

Cement currently railed on the broad gauge system to Wodonga and then distributed by road to road-making projects in southern New South Wales would not be expected to move along the proposed standard gauge links. APC officials indicated that the construction sites are located off-rail and that the tonnages involved would not warrant the establishment of new depots which would be required if the cement was to be railed further into New South Wales. Similarly, transport arrangements for the other cement sent to southern New South Wales from Fyansford would probably not be affected by standardisation as the final destinations are numerous and dispersed.

Cement transported from Fyansford to Canberra and Sydney would be diverted to the standard gauge rail system because provision of a standard gauge connection between the Fyansford works and Melbourne would remove the need to bogie exchange this traffic at South Dynon. APC and Victorian Railways officials indicated that rail movements of cement from Fyansford to Sydney and Canberra have recently been at the rate of approximately 60 000 tonnes per annum. However, traffic from Fyansford had reportedly fallen substantially as a result of a 25 to 27 per cent downturn in the New South Wales market. It was therefore decided, in line with the methodology of adopting upper estimates for benefit streams in the study, to use an adjusted base figure of 80 000 tonnes per annum for initial cement traffic from Fyansford.

The trend in movements of cement from the Fyansford works to Canberra and Sydney over the evaluation period will be determined by a number of factors including the levels of activity in the building industry and the location of any new plants built by APC. For example, rapid growth in the New South Wales market could initially encourage increased movements from the Fyansford facility, but in the longer term it might be more efficient for the company to build a new factory or expand existing facilities in New South Wales. In the latter cases, the volume of traffic from Fyansford could fall substantially. Movements in particular years could be quite high if the Fyansford plant was required to cover major breakdowns at the New South Wales works.

In view of the foregoing, it was concluded that a base figure of 80 000 tonnes per annum and a growth rate of 2 per cent per annum was a reasonable estimate for movements of cement along the proposed standard gauge links.

**Aluminium inputs and product**

Approximately 170 000 tonnes per annum of aluminium is produced at the smelter operated by Alcoa of Australia Ltd at Point Henry near Geelong. The smelter does not have its own rail siding and all land transport activities involve road transfer to and from the smelter. Provision of direct standard gauge rail access to the Alcoa smelter would require the construction of a new branch line or the reconstruction and extension of a line nearby, but it seems unlikely that the cost of either of these links would be justified by the level of potential standard gauge traffic. Road transport between the smelter and a siding in Geelong would therefore still be necessary if aluminium inputs and product were moved along the proposed standard gauge links.

All of the aluminium produced at the smelter is currently transported by road to Melbourne where it is either boxed for export, supplied to local fabricators or loaded onto the rail system for movement to Sydney, Brisbane or Adelaide. Approximately 10 000 tonnes per annum of bricks and other inputs are transported to the smelter by road from Wollongong, and a further 17 000 tonnes per annum of pitch are railed from Newcastle to Melbourne and then transferred to the smelter by road. Large quantities of alumina are delivered by sea from Western Australia.

Alumina for the smelter is suited to sea transport due to its relatively high volume/low value characteristics, the tonnages involved and the distance between Western Australia and Geelong. Aluminium product which is supplied to fabricators in

Melbourne or exported through the Port of Melbourne can already be moved along the broad gauge rail system to these locations if necessary. It was therefore concluded that these traffics would not be affected by standardisation.

If a standard gauge link was provided between Melbourne and Geelong, the 30 000 tonnes per annum of aluminium ingot and semi-fabricated aluminium products transported to New South Wales and Queensland could be loaded on the standard gauge system at Geelong rather than in Melbourne. In addition, the 10 000 tonnes per annum of bricks and other inputs currently transported by road from Newcastle might be diverted to rail, while the 17 000 tonnes per annum of pitch currently unloaded from the rail system at Melbourne could be railed all the way to Geelong. It was therefore concluded, in line with the optimistic approach adopted in the study, that potential standard gauge traffic could total 57 000 tonnes per annum. This is an upper estimate.

There is reportedly potential to double the capacity of the Point Henry smelter. However, it seems unlikely that there will be any significant expansion of output at this facility in the near future. In view of these considerations, it was decided to use a constant estimate of 57 000 tonnes per annum for potential movements of aluminium inputs and product along the proposed standard gauge links.

**Refined salt**

Cheetham Salt Consolidated Ltd (CSC) extracts, refines and grades salt at its Geelong facilities. The company is consolidating its Australian operations around the Geelong plants which will be used to supply the national market rather than just Victoria. A CSC official indicated that between 10 000 and 12 000 tonnes per annum of refined salt products are currently sent by rail to New South Wales, Queensland and South Australia. The distribution of traffic between the States roughly reflects their relative populations.

Product for these interstate markets is currently loaded onto transiflats or into RACE containers at the company's Geelong facilities and moved to Melbourne by road transport. The transiflats and containers are then transferred to rail wagons for the interstate journeys. With a standard gauge rail link to Geelong, the refined salt sent to New South Wales and Queensland could, under favourable conditions, be loaded onto the rail system at Geelong.

On the basis of the information on total interstate movements provided by the company and the relative populations of the three States, it was estimated that potential salt products traffic along the proposed links would be no more than 10 000 tonnes per annum. Sales in New South Wales and Queensland are expected to remain constant or decline slightly in future, and hence a constant figure of 10 000 tonnes per annum was used in the evaluation. This is an upper estimate.

The only bulk crude salt brought to CSC's facilities in Geelong from outside the immediate area is produced in Victoria. It can therefore be moved along the broad gauge rail system and would not be a potential standard gauge traffic.

**Other Geelong traffic**

A variety of other commodities which could potentially move along the proposed standard gauge links to and from Geelong were considered during the study.

In October 1981, ICI Australia Ltd announced that it would discontinue planning for a proposed petrochemical complex at Point Wilson near Geelong because the project was not considered to be economically supportable in the existing circumstances. However, as some of the conditions underlying this decision could conceivably change over the evaluation period, ICI officials were asked to comment on whether construction of the proposed standard gauge links would have any impact on transport arrangements for the complex if it was built.

They advised that 915 000 tonnes per annum of inputs and product would be transported to and from the site when the first phase of the plant was operational. However, virtually all of these commodities would be moved either by sea tanker, by pipeline to or from associated facilities or by broad gauge rail from another location in Victoria. The officials indicated that construction of the proposed standard gauge links, together with a siding at Point Wilson, would not be expected to affect these transport arrangements. Inputs and product associated with the petrochemical complex would therefore not move along the proposed links.

Construction of a standard gauge connection between Melbourne and Geelong would permit direct rail movement of overseas containers between Geelong and locations in New South Wales/Brisbane. As noted in Chapter 8, a specialised container terminal was opened in Geelong in January 1982. However, the majority of the traffic handled at this facility will probably have an origin or destination in Victoria.

It seems unlikely that significant numbers of other overseas containers would be transhipped between New South Wales/Brisbane and Geelong if the proposed links were built. The Port of Melbourne has larger, established facilities and is closer to Sydney than the Port of Geelong. In addition, the Port of Geelong would probably have a more limited range and frequency of container ship services. The Port of Geelong Authority is reportedly trying to encourage several shipping lines to call at the port and centralise containers from other locations in Australia. However, it appears that the volume of potential standard gauge traffic is relatively small. It was therefore concluded that there would be no significant movements of overseas containers (other than rice discussed earlier) along the proposed standard gauge links on a regular basis.

The Ford Motor Company of Australia Ltd has major stamping, engine, chassis and foundry facilities in Geelong. Ford officials advised that they did not see their company as a major user of interstate rail services.

## NORTHERN VICTORIA—NEW SOUTH WALES/BRISBANE/WESTERN AUSTRALIA

Construction of a standard gauge link between Tocumwal and Mangalore would permit the direct railing of goods between locations on this line section and stations on the standard gauge system in New South Wales, Brisbane and Western Australia. Movements to and from South Australia would probably not be affected as there is already a broad gauge link to Adelaide and, in the absence of a standard gauge link between Melbourne and Adelaide, use of the standard gauge system for this traffic would not provide significant benefits. Under current arrangements, traffic railed from northern Victoria to New South Wales/Brisbane is generally sent on the broad gauge system to Melbourne, where the wagons are bogie exchanged, and then moved along the standard gauge track through Albury. Western Australian traffic is bogie exchanged in Adelaide.

The level of potential rail traffic between locations on the Tocumwal-Mangalore line section and interstate locations connected to the standard gauge network is limited by a number of factors. Agricultural and other exports from northern Victoria are directed through either Melbourne or Geelong as these ports are much closer to the area than facilities in New South Wales. Similarly, major commodities moved into the area such as consumer goods and fertiliser can be more easily supplied from Victorian centres. Construction of the proposed standard gauge links would not eliminate these locational advantages of Victorian ports and suppliers. It was therefore concluded that potential standard gauge traffics involving the Tocumwal-Mangalore line section would be limited to northern Victorian products supplied to the domestic market in New South Wales, Queensland and Western Australia.

The major sources of potential standard gauge traffic in northern Victoria are the large fruit canneries operated by SPC Ltd (Shepparton) and Ardmona Fruit Products Ltd (Mooroopna). Outward movements from these facilities currently total around

150 000 tonnes per annum of which 102 000 tonnes is transported by rail. Most of these rail movements are to Victorian centres. Discussions with officials from the two companies indicated that they currently send about 20 000 tonnes per annum of product to the New South Wales market. Most of these movements are by road transport as this permits afternoon loading with delivery in Sydney the following morning. The rail journey to Sydney currently takes about five days. Further significant tonnages of product are moved from the G.W. Pennell factory at Shepparton to various locations, but virtually all of this traffic is transported by road.

Processed food is also produced at several facilities located near the branches of the Tocumwal-Mangalore line. These include the IXL factory at Kyabram (Toolamba-Echuca branch), the Rosella facility at Tatura (Toolamba-Echuca) and the Campbell's Soups factory at Lemnos (Shepparton-Katamatite). Use of a standard gauge link between Tocumwal and Mangalore by these producers would require road/rail transhipment under the construction options considered in the evaluation as the branches would not be standardised.

The submission to the BTE by the Tocumwal/Mangalore Railway League included the results of a survey of current rail users and potential users of the proposed links that was undertaken by a consultant around July 1982. A total of 12 organisations with facilities in northern Victoria and southern New South Wales provided detailed responses to a series of questions on their transport arrangements. The respondents included SPC Ltd and Ardmona Fruit Products Ltd.

The results of the survey indicated that rail movements into the area are insignificant, but that almost 94 000 tonnes per annum of freight are moved by the respondents to Sydney, Brisbane and Perth. The outward movements to these interstate capitals include 34 000 tonnes of rail traffic, but much of this is barley transported from southern New South Wales to Sydney. Only 10 450 tonnes of this rail traffic would potentially be affected by construction of the proposed link between Tocumwal and Mangalore. It mainly involves movements from the SPC and Ardmona canneries to Brisbane and Perth.

Standardisation of the Tocumwal-Mangalore link would eliminate the need to bogie exchange traffic railed from northern Victoria to Sydney/Brisbane, and this would probably result in a significant reduction in rail transit times. However, rail would still be slower than road transport. An official from one of the canneries also noted that a trial run with RACE containers several years previously had been very unsatisfactory, mainly as a result of trade union requirements for unloading in Sydney. He stated that his company would continue with road movements if the proposed standard gauge link was constructed.

Similarly, standardisation would permit the elimination of bogie exchange for movements to Perth if this traffic was railed through Broken Hill. However, the volume of traffic might not be sufficient to warrant movement along this route, in which case the existing operation (involving bogie exchange in Adelaide) would be continued and there would be no movements along the standard gauge link.

The results of the survey commissioned by the Tocumwal/Mangalore Railway League also indicated that construction of the proposed standard gauge links would not provide any significant benefits to the SPC and Ardmona canneries. Three other respondents with facilities in northern Victoria indicated that standardisation could provide significant benefits, but one of these only moves small quantities of freight. The existing operations of the other two companies are based on road transport and one of these would not have direct access to the standard gauge system unless parts of a branch line were also standardised.

It seems reasonable to assume that the 10 000 tonnes per annum of northern Victorian traffic currently railed to Brisbane and Perth would be moved along a standard gauge link between Tocumwal and Mangalore, although the 7000 tonnes for Perth would

have to be railed through Broken Hill. In addition, the two large canneries are rail-oriented in their current operations and this suggests that some Sydney movements could be diverted to the proposed links. It was therefore decided to assume that 25 per cent of the Sydney traffic would be diverted to rail as a result of standardisation.

In view of the foregoing, a forecast of 15 000 tonnes in Year 0 with a growth rate of 2 per cent per annum was used in the evaluation. This is probably an upper estimate due to the possibility that Perth rail traffic could continue to move through Melbourne and various advantages of road transport for movements to Sydney.

## ALTERNATIVE INTERSTATE ROUTES

Construction of a standard gauge link between Tocumwal and Mangalore would provide an alternative route for traffic currently moving between Melbourne and various interstate locations via Albury or Adelaide. Operations on the Melbourne-Sydney and Melbourne-Western Australia/Northern Territory corridors would potentially be affected.

### Melbourne-Sydney

Under current arrangements, virtually all rail traffic moving between Melbourne and Sydney travels along the standard gauge track through Albury. Some congestion has occurred on the section between Albury and Junee and it has been suggested that, with a standard gauge track between Tocumwal and Mangalore, trains could be diverted from part of the main line. Standardisation would therefore provide an alternative route from Mangalore to Junee through Tocumwal and Narrandera.

Discussions with officials from the Victorian Railways and the State Rail Authority indicated that there would probably be little diversion of traffic from the main line except when there were blockages due to accidents. The route through Tocumwal would involve an extra 62 kilometres of running as well as generally lower standard track which would probably restrict operating speeds. In addition, any congestion problems should be eased by the completion of upgrading work and the installation of centralised traffic control between Junee and Albury. It therefore seems unlikely that significant traffic would be diverted from the main line through Albury on a regular basis.

### Melbourne-Western Australia/Northern Territory

At present, traffic railed from Melbourne to locations on the standard gauge rail network in Western Australia and the Northern Territory is generally moved along the broad gauge system to Adelaide where the wagons are bogie exchanged. Construction of the proposed standard gauge links would permit direct rail movement from Geelong and Melbourne to these interstate locations along an alternative route through Tocumwal, Narrandera, Roto and Broken Hill.

Use of this alternative route would add approximately 465 kilometres to the trip from Melbourne to Western Australia and the Northern Territory, thereby increasing train operating costs. There has reportedly been some movement of wagons from Melbourne through Albury and up the Stockinbingal line to Western Australia in the past. However, this operation apparently resulted from delays at the bogie exchange facilities in South Australia and the tonnages involved were low. The need for this movement through Broken Hill has probably been removed with the completion of the new bogie exchange facility in Adelaide.

It was therefore concluded that no significant amounts of Western Australian or Northern Territory traffic would be diverted through Tocumwal on a regular basis if the proposed standard gauge links were constructed.

## TOTAL TRAFFIC ESTIMATES

The construction of standard gauge links from Melbourne to Geelong and between Tocumwal and Mangalore would be expected to affect transport arrangements for a number of commodities. The estimates of potential traffic along the proposed standard gauge links are presented in Tables 10.3 (grain) and 10.4 (non-grain). As noted in the discussions of specific commodities and pricing policies, these forecasts are considered to be upper estimates.

TABLE 10.3—ESTIMATES OF POTENTIAL GRAIN TRAFFIC ALONG MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS

*('000 tonnes)*

| | *Wheat*[a] | | | | *Barley*[a] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Port Kembla* | | *Port Botany* | | *Port Kembla* | | *Port Botany* | | *Rice*[a] |
| *Year* | *Albury* | *Tocumwal* | *Albury* | *Tocumwal* | *Albury* | *Tocumwal* | *Albury* | *Tocumwal* | |
| 1986–87[b] | 258 | 308 | 258 | 308 | 6 | 6 | 6 | 6 | 125 |
| 1991–92 | 292 | 348 | 292 | 348 | 6 | 6 | 6 | 6 | 125 |
| 1996–97 | 266 | 191 | 331 | 397 | 6 | 4 | 6 | 6 | 125 |
| 2001–02 | 301 | 216 | 374 | 449 | 6 | 4 | 6 | 6 | 125 |
| 2006–07 | 341 | 244 | 423 | 508 | 6 | 4 | 6 | 6 | 125 |
| 2011–12 | 386 | 276 | 479 | 575 | 6 | 4 | 6 | 6 | 125 |
| 2016–17 | 436 | 313 | 542 | 650 | 6 | 4 | 6 | 6 | 125 |
| 2021–22 | 494 | 354 | 613 | 735 | 6 | 4 | 6 | 6 | 125 |

a. The estimates of potential wheat and barley traffic include the two options for a new grain terminal in New South Wales considered in the study, namely Port Kembla and Port Botany. They further indicate tonnages through Albury and Tocumwal. All rice is assumed to move through Tocumwal.

b. The construction period under all options is three years, and hence there would be no traffic along the links in 1983–84, 1984–85 and 1985–86.

TABLE 10.4—ESTIMATES OF POTENTIAL NON-GRAIN TRAFFIC ALONG MELBOURNE-GEELONG/TOCUMWAL-MANGALORE STANDARD GAUGE LINKS

*('000 tonnes)*

| | *Melbourne-Geelong link* | | | | *Tocumwal-Mangalore Link* | |
|---|---|---|---|---|---|---|
| *Year* | *Steel* | *Cement* | *Aluminium and inputs* | *Salt* | *Northern Victoria traffics* | *Consumer goods and consumer durables* |
| 1986–87[a] | 127 | 85 | 57 | 10 | 16 | 11 |
| 1991–92 | 141 | 94 | 57 | 10 | 18 | 12 |
| 1996–97 | 155 | 103 | 57 | 10 | 19 | 13 |
| 2001–02 | 171 | 114 | 57 | 10 | 21 | 14 |
| 2006–07 | 189 | 126 | 57 | 10 | 24 | 16 |
| 2011–12 | 209 | 139 | 57 | 10 | 26 | 17 |
| 2016–17 | 231 | 154 | 57 | 10 | 29 | 19 |
| 2021–22 | 255 | 170 | 57 | 10 | 32 | 21 |

a. The construction period under all options is three years and hence there would be no traffic along the links in 1983–84, 1984–85 and 1985–86.

# CHAPTER 11—ECONOMIC EVALUATION OF MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE LINKS

This chapter presents the economic evaluation of the proposed standard gauge rail links from Melbourne to Geelong and between Tocumwal and Mangalore. The evaluation was undertaken using the traffic forecasts and construction cost estimates presented in the preceding chapters.

The proposal for a standard gauge rail connection between Tocumwal and Mangalore has been considered in several previous studies. Assessments of the Tocumwal-Mangalore link were undertaken by the Victorian Railways in 1962 and by the Commonwealth Railways in conjunction with the Victorian Railways in 1965. In both cases, bogie exchange was recommended as a preferable way of handling the break-of-gauge problem at Tocumwal. A further study was undertaken by G.R. Webb (1977) who concluded that a new and separate standard gauge track between Tocumwal and Mangalore would be completely uneconomic. These studies and other references to the proposed Tocumwal-Mangalore link are discussed in more detail in Appendix I.

## BASE CASE

An economic evaluation involves estimation of the discounted benefits and costs associated with the project case (ie construction of the proposed standard gauge rail links) compared with a base case. A more detailed description of the general evaluation methodology used in the study was presented in Chapter 1.

It was not possible to identify a single set of base case conditions for wheat traffic from southern New South Wales due to the continuing uncertainty about future seaboard terminal arrangements for New South Wales grain and the variability of transport arrangements for export wheat from the southern part of the State in recent years. One of the options considered in the Coopers & Lybrand study involved the movement of some New South Wales grain through Geelong which is the project case in the present study. However, the conclusions reached in the Coopers & Lybrand reports suggest that, in the absence of the proposed standard gauge links, there would be further development of seaboard terminal facilities in New South Wales.

At the time the present study was completed, no formal decision on future seaboard terminal arrangements for New South Wales grain had been announced. However, a new terminal at Port Kembla or Port Botany seemed to be the most likely option. The location of the nearest seaboard terminal in New South Wales has a significant impact on the level of potential benefits in the evaluation of the proposed standard gauge links, and it was therefore decided to use two alternative terminal options in the base case. These involved a new seaboard terminal at Port Kembla or Port Botany with closure of the existing Rozelle facility. Under the conditions specified in the evaluation, grain would start to flow through the new terminal at the beginning of 1994–95 if the proposed links were built (see below).

The discussion in Chapter 10 indicated that transport arrangements for export wheat moved from the potential catchment areas in southern New South Wales have varied significantly in recent years. As the evaluation results could be sensitive to the assumptions regarding transport arrangements in the absence of the proposed links, the evaluation was undertaken using a number of base case options to test the

sensitivity of the results and to estimate the likely upper bound of benefits for wheat traffic as a result of standardisation.

In the initial base case, it was assumed that all wheat from the catchment areas would be transported by rail to the nearest export terminal in New South Wales. A growth rate of 2.5 per cent per annum was applied to the volume of rail movements. This initial base case was adopted because authorities in New South Wales have in the past attempted to encourage movements of grain through terminals in that State, and implementation of the Adjustment Area suggests that this approach will be continued in future. In addition, if a new seaboard grain terminal was constructed in New South Wales, it seems likely that movements through this facility would be maximised so that the substantial capital costs would be spread over as many growers and as much grain as possible.

These initial base case conditions were then modified to include some rail/rail transhipment traffic through Tocumwal to Geelong in place of rail transport to the nearest terminal in New South Wales. As noted in Chapter 10, AWB data indicate that transhipment traffic at Tocumwal averaged 159 000 tonnes per annum over the five years to 1981–82. The base case conditions were therefore changed to include transhipment traffic of 159 000 tonnes per annum in 1983–84 from the catchment areas with the nearest New South Wales seaboard terminal at Rozelle or Port Botany. It was assumed that this tonnage would involve the storages closest to Geelong, with grain from the remaining facilities being railed to the nearest New South Wales terminal. If the closest seaboard terminal in New South Wales was at Port Kembla, the number of receival facilities from which grain could be moved through Tocumwal on the minimum distance criterion would be significantly reduced, with total exports being only 138 000 tonnes at the beginning of the evaluation period. Rail transhipment traffic equivalent to 138 000 tonnes per annum in 1983–84 was therefore specified for the catchment area if the nearest New South Wales terminal was located at Port Kembla. A growth rate of 2.5 per cent per annum was applied to this transfer traffic in line with the forecast expansion of wheat exports from the catchment areas.

The sensitivity of the evaluation results to transport arrangements in the absence of the links was also tested by including some road movements to Geelong in the base case. As discussed in Chapter 10, road movements have been significant in recent years, particularly from storages in the Buffer Zone. There have also been road movements from receival facilities in other parts of southern New South Wales. The initial base case conditions (involving all rail movement to the nearest terminal in New South Wales) were therefore modified to include road transport to Geelong of 100 000 tonnes per annum in 1983–84. This involved storages located in the Albury section of the catchment areas, and a growth rate of 2.5 per cent per annum was applied to the volume of road traffic. This may well be an upper estimate of likely road movements over the evaluation period in view of the replacement of the Buffer Zone by the Adjustment Area.

The two modifications to the initial base case were first applied separately and then at the same time. The four base case conditions considered in the evaluation cover the range of likely developments in the absence of the proposed standard gauge links.

Information supplied by the Barley Marketing Board of New South Wales indicated that in recent years virtually all barley received at GHA facilities in southern New South Wales has been railed to Sydney for export. The base case conditions for barley traffic therefore involved rail movement to the nearest seaboard grain terminal in New South Wales.

As noted in Chapter 10, rice processed at the Griffith, Leeton and Yenda mills has generally been moved by rail to Sydney or by road to Melbourne in recent years. After discussions with officers of Ricegrowers' Co-operative Mills Ltd, it was concluded that this pattern would probably continue in the absence of the proposed

links. The base case conditions in the evaluation therefore involved the movement of rice to Melbourne by road (5000 tonnes per annum) and to Sydney by rail (120 000 tonnes per annum).

Rail movement of steel billet and cement between Geelong and New South Wales/ Canberra would require bogie exchange operations at South Dynon in the absence of the proposed links. This arrangement was therefore incorporated in the base case conditions for these commodities. It was assumed that northern Victorian traffic railed to Brisbane and Perth would be bogie exchanged at South Dynon and Adelaide respectively, while movements to Sydney would involve road transport.

The processed salt, aluminium and semi-fabricated aluminium products considered in the study were assumed to move by road from Geelong to Melbourne where they would be loaded onto the standard gauge rail system. It was assumed that pitch would be unloaded from the rail system at Melbourne and then moved by road transport to Geelong, while bricks and other inputs would be moved by road from Newcastle to Geelong. The base case conditions for consumer goods and consumer durables involved road transport from Melbourne.

## BENEFITS

The following potential benefits from the provision of standard gauge rail links between Melbourne and Geelong and from Tocumwal to Mangalore were identified.

### Seaboard terminal construction delay

Construction of the proposed standard gauge rail links would facilitate the long term diversion to Geelong of significant quantities of export grain which would otherwise be moved through seaboard terminals in New South Wales. A significant reduction in the volume of grain exports through the New South Wales system would potentially enable the GHA to delay the construction of a new seaboard terminal in that State. The cost of the proposed terminal development programme in New South Wales would be reduced in present value terms if construction was delayed, and any savings would be a benefit directly associated with construction of the proposed links.

Eight options for improving terminal facilities in New South Wales were considered by Coopers & Lybrand in their reports to the GHA. All but one of these options involved an immediate start to construction, and the remaining project (a new Port Botany terminal after a five year delay) was not recommended. This suggests that the preferred construction schedule for expansion of seaboard terminal capacity in New South Wales involves an immediate start on upgrading existing facilities or constructing a new terminal. It was therefore assumed in the present study that, in the absence of the proposed standard gauge links, construction of a new seaboard terminal at Port Kembla or Port Botany would commence at the beginning of 1983–84 if all grain from the proposed catchment areas was exported through terminals in New South Wales. It was also assumed, for the purposes of the evaluation, that no additional expenditure would be incurred at the Newcastle terminal as a result of work on a new grain terminal being delayed. This approach resulted in a maximum estimate of the terminal delay benefits that could potentially be obtained if grain was diverted to Geelong. If it was decided to delay construction for reasons other than the standardisation project or if additional expenditure at Newcastle was required, the net savings would be lower because of the discounting procedure.

Forecasts of grain exports from New South Wales and from the catchment areas in the southern part of the State were used to estimate the maximum period by which an upgrading or construction program for New South Wales terminals might be delayed by the diversion of grain along the proposed standard gauge links to Geelong. Data in the first Coopers & Lybrand report indicated grain exports from

New South Wales of 3.6 million tonnes in 1982 (Coopers & Lybrand 1982 Appendix C). As the recommended options involved an immediate start on construction it was concluded that, for the purposes of the evaluation, work on new facilities would begin when movements through the New South Wales seaboard terminal system reached an average of 3.6 million tonnes per annum.

Movement of grain from southern New South Wales along the proposed standard gauge links to Geelong would reduce the level of exports through seaboard terminals in New South Wales. However, average exports from other areas of the State would be expected to eventually increase to 3.6 million tonnes per annum, at which stage an upgrading or construction program for seaboard terminal facilities would again be required. Based on the forecasts of wheat and barley traffic from southern New South Wales presented in Chapter 10, average exports from the proposed catchment area with the existing Rozelle terminal would be 538 000 tonnes in 1983–84. This would leave 3 062 000 tonnes for export through New South Wales terminals in that year if all export grain from that catchment area was moved through Geelong. With a growth rate of 2.5 per cent per annum, average exports through New South Wales terminals would again reach 3.6 million tonnes after 6.6 years. It was therefore concluded that, for the purposes of the evaluation, construction of the proposed standard gauge connections could potentially delay construction of a new grain terminal in New South Wales by as much as seven years.

This delay applies to the base case where all wheat from the catchment area in southern New South Wales would be railed to Rozelle in the absence of the proposed links. However, the transhipment and road transport modifications to the base case discussed earlier would also permit construction of the new terminal to be delayed because average movements through the New South Wales system would be reduced to less than 3.6 million tonnes per annum in 1983–84 with these leakages to Geelong. In this situation, the discounted benefits associated with standardisation would be lower because construction of a new terminal would commence later in the base case. The transhipment, road transport and combined modifications would reduce movements through the New South Wales system by 159 000 tonnes, 100 000 tonnes and 259 000 tonnes respectively in 1983–84, thereby delaying construction of the new terminal in the base case by approximately two years, one year and three years respectively for the purposes of the evaluation. The net delays resulting from standardisation would therefore be reduced to five, six and four years respectively with the transhipment, road transport and combined modifications.

Estimation of the savings that could flow from these delays required information on the streams of capital expenditure that would be incurred by the GHA, the Maritime Services Board and the State Rail Authority in constructing a new seaboard grain terminal and associated facilities. Data on the capital expenditure streams (in constant 1982 prices) over 20 years for terminal construction under the Port Botany and Port Kembla options were obtained from the reports prepared by Coopers & Lybrand. A 10 per cent storage ratio was chosen as the GHA reportedly considers this to be adequate (Coopers & Lybrand 1983, p9).

The net capital expenditure streams for the project case under the Port Kembla and Port Botany seaboard terminal options are presented in Table 11.1. Although these estimates are based on financial costs, they should give an adequate indication of possible resource cost savings for the purposes of the present study.

The potential benefits associated with deferral of a new grain terminal in New South Wales were estimated by subtracting the present value of the stream of costs if construction commenced in 1990–91 (ie project case) from the present value if construction commenced earlier (ie base case). The estimated benefits from delaying construction of a new seaboard grain terminal in New South Wales are presented in Table 11.2. These are upper estimates of the benefits that could be realised in practice (see below).

**Train capital and operating cost savings**

The diversion of grain received at storages in the proposed catchment areas from the nearest New South Wales terminal to Geelong would generally reduce the rail distances from the receival facilities to the export port. Therefore, movement of grain along the proposed standard gauge links to Geelong would be expected to result in some savings in train capital and operating costs. There could also be savings associated with any rice diverted from Sydney to Melbourne.

Lack of data prevented estimation of specific train capital and operating costs for the transport of grain to alternative seaboard terminals from each receival facility in southern New South Wales. The calculation of these potential savings was therefore based on estimates of the average cost per tonne-kilometre for rail movement of grain. The reduction in the traffic task was first calculated by multiplying the distance saving as a result of diversion to Geelong by the estimated export receivals for each receival facility, and summing the figures for all storages in the relevant catchment area. Total train capital and operating cost savings for each year of the evaluation period were then estimated by multiplying the reduction in the total annual traffic task by the appropriate tonne-kilometre train costs, and total savings were calculated by summing the relevant (discounted) annual figures.

TABLE 11.1—CAPITAL EXPENDITURE STREAMS FOR A NEW GRAIN TERMINAL IN NEW SOUTH WALES, 10 PER CENT STORAGE RATIO-PROJECT CASE

*($m, 1982 prices)*

| Year | Capital expenditure[a] | |
|---|---|---|
| | *Port Kembla option* | *Port Botany option* |
| 1983–84 | 0 | 0 |
| 1984–85 | 0 | 0 |
| 1985–86 | 0 | 0 |
| 1986–87 | 0 | 0 |
| 1987–88 | 0 | 0 |
| 1988–89 | 0 | 0 |
| 1989–90 | 0 | 0 |
| 1990–91 | 4.3 | 5.5 |
| 1991–92 | 20.1 | 24.6 |
| 1992–93 | 43.1 | 47.5 |
| 1993–94 | 32.0 | 20.2 |
| 1994–95 | 2.4 | 0 |
| 1995–96 | 2.2 | 0 |
| 1996–97 | 2.2 | 4.6 |
| 1997–98 | 2.2 | 3.8 |
| 1998–99 | 2.2 | 0 |
| 1999–2000 | 2.6 | 4.6 |
| 2000–01 | 2.2 | 0 |
| 2001–02 | 0 | 3.8 |
| 2002–03 | 0 | 0 |
| 2003–04 | 2.1 | 4.6 |
| 2004–05 | 2.6 | 0 |
| 2005–06 | 0 | 3.8 |
| 2006–07 | 2.2 | 4.6 |
| 2007–08 | 0 | 0 |
| 2008–09 | 0 | 0 |
| 2009–10 | 0 | 3.8 |

a. Expenditure by GHA, SRA and MSB.

*Source:* Based on data in Coopers & Lybrand (1982) Appendix D, and Coopers & Lybrand (1983) Appendix B.

TABLE 11.2—ESTIMATES OF POTENTIAL SEABOARD TERMINAL CONSTRUCTION DELAY BENEFITS

($m)

| Base case conditions | Discounted benefits | | |
|---|---|---|---|
| | 4 per cent | 7 per cent | 10 per cent |
| New terminal Port Kembla | | | |
| All rail movement | 25.9 | 37.6 | 45.0 |
| With transhipment modification | 17.8 | 25.0 | 28.9 |
| With road transport modification | 21.8 | 31.0 | 36.6 |
| Both modifications | 14.0 | 19.3 | 22.0 |
| New terminal Port Botany | | | |
| All rail movement | 26.9 | 38.5 | 45.8 |
| With transhipment modification | 18.5 | 25.6 | 29.4 |
| With road transport modification | 22.6 | 31.8 | 37.2 |
| Both modifications | 14.5 | 19.7 | 22.4 |

This approach assumes that the clearance of receival facilities in southern New South Wales and the movement of the grain out of the region would be undertaken at similar resource cost per tonne-kilometre whether the grain was consigned to Geelong or to a New South Wales terminal. In addition, the train capital and operating costs were assumed to be similar for movements from the boundaries of the catchment areas to Geelong, Rozelle, Port Kembla and Port Botany. These assumptions were also used in Chapter 10 to estimate the potential catchment areas in southern New South Wales using the minimum distance criterion.

The estimated cost per tonne-kilometre for rail movement of grain from southern New South Wales to the various seaboard terminals was based on capital and operating cost data for block train operations between Tocumwal and Geelong supplied by the Victorian Railways. A consist of 20 VHGY bogie hopper wagons with a capacity of 1120 tonnes of grain was chosen for the representative train as this is close to the largest consist regularly operated by the Victorian Railways at present. Use of longer trains would probably require modifications at country receival facilities such as lengthening of sidings. Information on the representative train is presented in Table 11.3.

The return journey between Tocumwal and the GEB grain terminal at Geelong using the proposed standard gauge links would involve a total distance of approximately 640 kilometres. After discussions with Victorian Railways officials, it was concluded that a dedicated train operating along this corridor and using the new balloon loop to unload at Geelong could consistently complete a return journey in about 2.5 days. The train was assumed to operate six days per week and attain an average availability of 80 per cent after allowance for maintenance, breakdowns and repairs. It could therefore complete about 100 return journeys and travel 64 000 kilometres per annum. As specialist grain hopper wagons are not backloaded with fertiliser or other commodities, the dedicated train would have an annual capacity of approximately 112 000 tonnes of grain over 320 kilometres (ie 35 840 000 tonne-kilometres per annum).

The costs of hauling grain by rail from Tocumwal to the GEB terminal at Geelong were considered in two categories, namely operating costs and capital costs.

Victorian Railways officials provided information on operating costs for the dedicated train. These costs involved locomotive fuel and maintenance, crew costs, wagon

TABLE 11.3—DETAILS OF REPRESENTATIVE GRAIN TRAIN OPERATED BETWEEN TOCUMWAL AND GEELONG

| *Component* | *Quantity and type* | *Operating costs per return trip ($)* |
|---|---|---|
| Wagons | 20 x VHGY bogie hopper wagons | 456 |
| Brakevan | 1 x bogie brakevan | 35 |
| Locomotives | | |
| Tocumwal-Seymour | 1 x T Class | |
| Seymour-Geelong | 1 x T Class, 1 x X Class | 1 394 |
| Geelong-GEB | 1 x Y Class | |
| Crew | | 1 017 |
| Total | | 2 902 |

*Source:* Victorian Railways, personal communication.

maintenance and brakevan maintenance. Locomotive and crew cost estimates provided on a return trip basis were used directly in the analysis, the latter including allowances for tonnage, night shift, Saturday working and overheads. The return trip estimates for wagon and brakevan maintenance were based on an annual travel distance of 64 000 kilometres and Victorian Railways data which indicated maintenance costs of $1037 per annum plus $0.0194 per kilometre for a VHGY wagon and $2760 per annum plus $0.0115 per kilometre for a bogie brakevan.

On the basis of these data and the capacity of the dedicated train, total operating costs were estimated at 0.8 cents per tonne-kilometre for the movement of grain from Tocumwal to Geelong.

Capital costs for locomotives were calculated using locomotive requirements for the haulage of 20 VHGY wagons between Tocumwal and Geelong as specified by Victorian Railways officials. Several locomotive combinations would be required over different sections of the journey due to variations in terrain and operating conditions. The weighted average capital requirement for the return journey was therefore estimated on the basis of the capital costs of the locomotives required and the distances covered on each section. This approach assumes that average speeds over each section would be similar. It also ignores issues such as the extent to which the provision of banking and shunting locomotives would in fact be attributable to the grain traffic and alternative uses of temporarily idle grain train locomotives. However, the approach was considered to be satisfactory for the purposes of the study.

The weighted average capital cost of locomotives for the journey between Tocumwal and the GEB terminal at Geelong was estimated at $1.5 million in June 1982 prices using this approach. It was assumed that the economic life of a locomotive is 25 years and that residual value after this period would be zero.

Wagon and brakevan capital costs were calculated on the basis of data provided by Victorian Railways officials. The capital cost of 20 VHGY wagons in June 1982 prices was estimated at $1.2 million, and an economic life of 20 years and a zero residual value were assumed for the purposes of the evaluation. The capital cost of a bogie brakevan was estimated at $75 000 in June 1982 prices, and an economic life of 25 years and a residual value of zero were used.

Locomotives, wagons and brakevans are relatively long-lived assets under normal operating conditions, and hence the capital costs for the dedicated train are spread unevenly over the evaluation period. The stream of capital costs was therefore

converted to equivalent annual costs in order to simplify the computation of the capital cost component for rail transport of grain. This resulted in estimates for the annual cost of train capital of $189 120, $248 415 and $314 565 at the 4, 7 and 10 per cent discount rates respectively. As the annual capacity of the dedicated train would be 35 840 000 tonne-kilometres of grain, the capital component was estimated at 0.5, 0.7 and 0.9 cents per tonne-kilometre respectively.

These estimates of the capital and operating costs for a block train running between Tocumwal and the GEB terminal at Geelong indicated resource costs for the transport of grain by rail of 1.3 cents, 1.5 cents and 1.7 cents per tonne-kilometre respectively at the 4,7 and 10 per cent discount rates. The potential resource savings from the reduction in rail haul distances that could be obtained if grain from receival facilities in the proposed catchment areas was diverted from the nearest New South Wales terminal to Geelong were estimated using these figures. They were also used to calculate savings associated with the diversion of traffic from road to rail (see following section) and rice from Sydney to Melbourne. In the latter case, any costs for transfer to the port area were ignored.

**Savings from road/rail diversion**

Construction of the proposed standard gauge rail links could result in the diversion to rail of significant quantities of grain which would otherwise be transported by road from southern New South Wales to Geelong or Melbourne. This would be expected to result in some net resource savings as train capital and operating costs are often lower than road transport costs for the movement of bulk products, particularly where large volumes and long distances are involved. Similarly, the diversion from road to rail of aluminium, inputs for the Alcoa smelter, refined salt, consumer items and some northern Victorian traffic might also provide resource savings.

The potential savings for grain traffic were calculated by applying estimated costs per tonne-kilometre for the movement of grain from southern New South Wales to Geelong by road and rail to the traffic tasks involved. The estimates of the resource costs for rail transport of grain from Tocumwal to Geelong derived in the previous section were used for the rail component. The figures for potential road transport savings were based on the avoidable costs associated with a dedicated truck operating between southern New South Wales and Geelong.

The avoidable costs of a dedicated truck were estimated on the basis of a representative prime mover and trailer, the details of which are presented in Table 11.4. There is, of course, significant diversity in the specifications of the prime movers which are currently used to haul grain from southern New South Wales to Geelong, and the representative prime mover is an average of the current equipment. A 40 foot flat top trailer with curtains and gates was chosen as this appears to be the most common unit at present.

The avoidable costs of the road transport operation were considered in three categories, namely capital, operating costs and road pavement costs. Capital and the tyre component of operating costs involved uneven cost streams over the evaluation period and these streams were converted to equivalent annual costs by computing the annuity which had the same present value as the cost stream at each discount rate. Costs expressed on a kilometre basis were converted to annual costs using the average annual distance that a dedicated vehicle would travel (see details below).

The total annual cost estimates, which are presented on an itemised basis in Table 11.5, were based on information provided by road freight firms operating between southern New South Wales and Geelong, vehicle manufacturers, State Government bodies and suppliers to the road transport industry. The estimation of the various components of road transport costs is discussed in detail in Appendix II.

The capital cost components for the prime mover and trailer were estimated using purchase prices and residual values. Sales tax was netted out to obtain estimates of resource costs, and the periods for which prime movers and trailers would be employed in the grain traffic were estimated at 5 and 12 years respectively. A residual based on an expected economic life of 10 years was applied to the prime mover, but this procedure was not applied to the trailer as it would have only a negligible scrap value after 12 years.

The vehicle operating costs which could be avoided if the dedicated truck was withdrawn excluded registration fees as these are transfer payments which have

TABLE 11.4—DETAILS OF A REPRESENTATIVE PRIME MOVER AND TRAILER FOR GRAIN TRANSPORT BETWEEN SOUTHERN NEW SOUTH WALES AND GEELONG

| *Characteristic* | *Prime mover* | *Trailer* | *Total* |
|---|---|---|---|
| Vehicle type | Bogie drive | 40 foot flat top tri-axle | .. |
| Engine | 300 HP | .. | .. |
| Vehicle capital | | | |
| Purchase price | $74 250 | $22 000 | $96 250 |
| Sales tax | $12 290 | $3 280 | $15 570 |
| Resource cost | $61 960 | $18 720 | $80 680 |
| Vehicle operating costs | | | |
| Labour | .. | .. | $35 100 pa |
| Comprehensive insurance | .. | .. | $3 500 pa |
| Third party insurance | .. | .. | $317 pa |
| Fuel | .. | .. | 15.3 cents/km |
| Tyres | .. | .. | 2.1 cents/km[a] |
| Maintenance | .. | .. | 13.0 cents/km |
| Administration | .. | .. | 1.0 cents/km |
| Separable road pavement costs | .. | .. | 13.4 cents/km |

a. Average undiscounted figure over evaluation period.

.. not applicable

TABLE 11.5—ESTIMATED TOTAL ANNUAL RESOURCE COSTS OF OPERATING A DEDICATED PRIME MOVER AND TRAILER BETWEEN SOUTHERN NEW SOUTH WALES AND GEELONG OVER EVALUATION PERIOD

*($)*

| *Cost component* | *Annual cost* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| Vehicle capital | 10 362 | 12 244 | 14 181 |
| Labour | 35 100 | 35 100 | 35 100 |
| Insurance | 3 817 | 3 817 | 3 817 |
| Fuel | 18 360 | 18 360 | 18 360 |
| Tyres | 2 713 | 2 804 | 2 882 |
| Maintenance | 15 600 | 15 600 | 15 600 |
| Administration | 1 200 | 1 200 | 1 200 |
| Pavement | 16 080 | 16 080 | 16 080 |
| Total | 103 232 | 105 205 | 107 220 |

no relevance to an evaluation based on resource costs. Comprehensive and third party insurance premiums were included as proxies for accident costs on the assumption that the cost of accidents per kilometre for the grain truck would be similar to the average for vehicles of the same specifications[1]. Labour costs were based on reported earnings for company-employed drivers with an allowance for additional non-wage costs, and sales tax was netted out of tyre prices. Diesel fuel prices included the oil well-head levy as this is designed to adjust fuel prices to reflect opportunity costs in international trade and is not a pure transfer payment.

Separable road pavement costs are the road surface costs that could theoretically be avoided if the dedicated truck was not operated. It was not possible to obtain information which specifically related to the route used by the grain trucks, and hence national data for articulated vehicles were used. These involved 1976–77 data prepared by Webber, Both and Ker which were updated to June 1982 prices using the BTE road construction price index. They incorporate the effects of vehicles on routine pavement maintenance, pavement reseal frequency, pavement life and pavement strength requirements.

Information on trip frequency and annual travel distances was also required for the estimation of road transport costs. Operators indicated that a vehicle carrying grain between southern New South Wales and Geelong could typically complete three return trips per week with backloading or five trips if it returned empty. It was decided to assume that the dedicated vehicle would complete three trips per week which, with an average availability of 50 weeks per annum, would involve 150 return trips per annum. The average distance for a return trip between southern New South Wales and Geelong was estimated at 800 kilometres, and hence the dedicated truck would travel 120 000 kilometres per annum.

The level of transport costs that would be saved if grain was diverted from road to the proposed standard gauge links would be heavily influenced by the relative importance of grain and return traffics in road transport operations between southern New South Wales and Geelong. If a truck was carrying grain to Geelong and returning empty to southern New South Wales, all costs incurred in the operation of the prime mover and trailer over the return journey would be saved if the grain traffic was diverted to rail. The other extreme would be a vehicle carrying groceries and other items into southern New South Wales and then returning with grain as backloading. In the latter case, diversion of the grain to rail might result in virtually no savings if the vehicle continued to make the same number of return trips.

The available evidence suggests that, during the harvest season, grain is the major traffic for companies operating on the corridor between southern New South Wales and Geelong. A significant proportion of the return trips undertaken appear to include backloading of fertiliser and building materials into the area. However, outside the grain season, other commodities could be the major traffic for these operators.

After discussions with a number of operators, it was decided to attribute one-half of the avoidable costs for the return trip by the dedicated prime mover and trailer to the grain traffic. Avoidable capital, operating and road pavement costs for the movement of grain from southern New South Wales to Geelong were therefore estimated at $51 600, $52 600 and $53 600 per annum respectively at the 4, 7 and 10 per cent discount rates. This is equivalent to 4.3, 4.4 and 4.5 cents per tonne-kilometre respectively, as the dedicated vehicle has a capacity of 20 tonnes of grain and would complete 150 journeys per annum over an average distance of 400 kilometres (one-way).

1. One of the problems with this approach is that the true cost of accidents will be underestimated (or overestimated) if third party insurance premiums do not reflect the costs of claims. Notwithstanding the problems with using comprehensive and third party insurance premiums to estimate accident costs, they were the best measures available.

The net resource savings as a result of the diversion of grain traffic from road vehicles to the proposed standard gauge rail links were calculated using the train capital and operating costs presented in the previous section and these avoidable road transport cost estimates. The potential resource savings obtained using these data are probably upper estimates because the rail cost figures were based on block train operations between two locations and are not strictly comparable with the road data. In practice, rail costs would probably be higher for operations involving the network of storages in southern New South Wales, and this would reduce the potential savings from the diversion of grain traffic to the proposed standard gauge links.

The methodology used in the study to estimate train capital and operating costs and avoidable road transport costs takes no account of seasonality in the movement of grain to export ports. In practice, some of the capital equipment required for periods of peak movement would not be used for grain transport during off-peak times and this could reduce the savings that would be realised in practice. Some of the bogie hopper wagons specified for rail operations would have no alternative uses outside the peak movement period, and hence the capital cost component per tonne-kilometre could be higher than that used in the study. On the other hand, road transport equipment would probably be more flexible in the tasks for which it could be used, and hence it could more easily be employed to carry alternative traffics outside the harvest time.

The estimates derived for grain traffic were also used to value the resource savings that could potentially result from the diversion from road to rail of aluminium, pitch, bricks and other smelter inputs, refined salt, consumer items and northern Victorian traffic. The upward bias in the estimates would probably be even more marked in these cases, as some of these traffics would only be diverted on the relatively short delivery trip between Melbourne and Geelong where any cost advantages of rail transport might be limited. In addition, the traffic volumes would be relatively small, and an extra transhipment operation would be required if bricks were railed from Newcastle. No allowance was made for this transhipment cost in the evaluation.

**Tocumwal rail/rail transhipment savings**

Construction of the proposed standard gauge links would permit the direct rail movement of wheat that, in the absence of standardisation, would have to be transhipped from standard to broad gauge wagons at Tocumwal if it was railed to Geelong. Elimination of the transfer operation for any of this traffic would result in some resource savings.

The facility at Tocumwal is currently used to receive grain from farms in the surrounding area and to tranship grain from standard to broad gauge wagons. It was built in 1967 and has a permanent storage capacity of 35 300 tonnes comprising 5400 tonnes in two vertical bins and 29 900 tonnes in roundhouse storage. There is an additional 22 000 tonnes of temporary storage capacity in the form of an earthen wall bunker. During periods of peak movement, approximately 3000 tonnes of grain can be received and outloaded into rail wagons each day. Construction of the storage was financed by the AWB and the machinery necessary to move the grain was financed by the then Grain Elevators Board of New South Wales.

Elimination of the rail/rail transhipment operation would not be expected to result in any significant savings in capital costs at the Tocumwal facility. The capital costs of the current storages and transfer equipment are effectively sunk and it is unlikely that any significant items could be relocated elsewhere. In addition, receival facilities will always be required at Tocumwal for wheat grown in the local area, and a significant proportion of the existing capital equipment would be needed for these activities. In the longer term, elimination of rail/rail transhipment operations could permit cost savings when the present facilities are due for replacement because less storage capacity would be required. However, as the vertical concrete storages in particular

are relatively long-lived assets, the savings in present value terms could be quite small.

The major savings from the elimination of the rail/rail transfer operation at Tocumwal would therefore probably be in the area of direct operating costs. Labour requirements could be reduced, although continuation of receival activities for local growers would mean that some of the existing workers would still be required. A reduction in throughput at the facility would also be expected to result in lower expenditure on maintenance and power.

The transhipment facility is located a short distance from the main freight yards in Tocumwal and is serviced by a number of dead-end sidings. During the normal course of transhipment operations, the New South Wales siding holds 13 bogie rail wagons and the Victorian siding has a capacity for 25 four wheel wagons. The wagons are shunted to and replaced from the main yards at Tocumwal. The delays associated with the transhipment operation at Tocumwal reduce rolling stock utilisation and hence increase the level of wagon capital required to carry a specified volume of grain from southern New South Wales to Geelong. Some wagon capital savings might therefore be obtained if the transfer operation was eliminated.

Data on the operating costs of the Tocumwal transhipment facility and any costs imposed by delays to rolling stock were not available during the study. Therefore, the financial charge for the transfer of wheat at Tocumwal was used to value the potential savings in the evaluation. This charge was 48 cents per tonne in June 1982. The annual savings from the elimination of transhipment (where this operation was included in the base case) were estimated at $76 320 (nearest New South Wales terminal at Rozelle) in 1983–84. This annual benefit would increase over the evaluation period in line with growth in transhipment traffic in the base case. In view of the factors considered in this section, it seems unlikely that the potential resource savings from the elimination of transhipment would be substantially higher than the figure used in the evaluation.

**South Dynon bogie exchange savings**

With standard gauge rail links from Melbourne to Geelong and between Tocumwal and Mangalore, freight could be moved along the standard gauge rail system between Geelong/northern Victoria and various locations in New South Wales, the Australian Capital Territory, Brisbane and possibly Western Australia.

Bogie exchange would no longer be required for the interstate movements of cement, steel billet and northern Victorian traffic discussed in Chapter 10. This would result in potential resource savings due to a reduction in bogie exchange activities and improved utilisation of rolling stock.

The Victorian Railways operate bogie exchange facilities at South Dynon and Wodonga. However, most of the wagons are now handled at South Dynon and all of the traffic considered in the present study appears to pass through this facility. The wagons are bogie exchanged at South Dynon by placing hydraulic jacks under the wagons and using mobile cranes to remove and replace the bogies. Tractors are used to move wagons between the immediate exchange area and a pool of wagons placed and cleared by shunting locomotives. The level of mechanisation at South Dynon is quite limited compared to that at other facilities such as the new Dry Creek bogie exchange in South Australia, and the operation is therefore relatively labour intensive.

The number of bogie exchange operations that would be eliminated by standardisation of the two links was estimated using the traffic forecasts presented in Chapter 10. Information provided by Victorian Railways officials indicated that steel billet is transported in wagons with a capacity of 56 tonnes, while the wagons used for bulk and bagged cement can carry 50 tonnes and 34 tonnes of product respectively.

It was assumed that traffic from northern Victoria would be transported in containers, with one wagon carrying two containers each holding 12 tonnes of freight. These data indicated that the equivalent of 4310 wagon journeys in 1983–84 would potentially be affected by the operation of the proposed standard gauge links.

Estimation of the number of bogie exchange operations that could be saved as a result of standardisation required additional information on wagon operating practices. Victorian Railways officials advised that all of the cement wagons and two-thirds of the steel wagons are returned empty to their loading points and that a further one-sixth of the steel wagons are returned to New South Wales in a loaded condition. It was concluded that standardisation would result in the elimination of two bogie exchange operations for each return journey by these wagons. Information on the movements of the remaining steel wagons and the container wagons for northern Victorian traffic indicated that only one bogie exchange operation would be saved on each journey for these traffics. The total number of bogie exchange operations that could potentially be saved in 1983–84 if the standard gauge links were operational was therefore estimated at 7850.

The rail resource savings that could potentially be obtained as a result of a reduction in the volume of traffic at South Dynon were considered in three categories, namely bogie exchange operating costs, bogie pool capital costs and wagon capital costs. Transit time savings for consignors are discussed in the following section.

Data provided by Victorian Railways officials indicated that the operating costs attributable to bogie exchange operations at South Dynon averaged $45.05 per wagon in June 1982 prices. This estimate excludes any capital component and incorporates the costs that are theoretically avoidable. However, it is an average figure and some of these costs may not be avoidable in practice.

On the basis of this information, the potential savings in bogie exchange operating costs as a result of standardisation were estimated at $353 510 in 1983–84. The (undiscounted) benefit was increased at 2.0 per cent per annum over the evaluation period in line with forecast growth in steel billet, cement and northern Victorian traffic.

This estimate refers to savings in the short run when the capital equipment used in the bogie exchange operation represents a sunk cost which cannot realistically be saved. In the long run all costs are avoidable and hence a reduction in bogie exchange traffic could permit savings or deferrals of future capital expenditure at South Dynon. However, Victorian Railways officials advised that a reduction in traffic of the magnitude considered in this study would not have any significant effect on capital expenditure at South Dynon. Therefore, construction of standard gauge rail links between Melbourne and Geelong and from Tocumwal to Mangalore would not be expected to result in significant discounted benefits through the saving or deferral of capital expenditure at South Dynon.

A fall in the volume of traffic at South Dynon could also permit a reduction in the number of bogies that are held in the bogie exchange pool. This would result in lower capital requirements if the released bogies could be deployed elsewhere in the system or if the acquisition of new bogies was delayed.

Potential savings in bogie pool capital costs at South Dynon were estimated using data for the Dry Creek bogie exchange prepared during a joint Victorian Railways/ Australian National assessment of a standard gauge link between Melbourne and Adelaide. The present pool at Dry Creek consists of 240 bogies and total bogie exchange throughput in 1983 was anticipated to be 30 000 wagons. On a simple pro rata basis, this suggests that a reduction of 7850 wagons in throughput at South Dynon could reduce bogie exchange pool requirements at that facility by 63 units. This figure was used in the evaluation although it is, of course, subject to various qualifications.

The savings from a reduction in bogie pool requirements were valued using the equivalent annual cost approach due to the relatively long life of these assets. The capital cost of a bogie in June 1982 prices was estimated at $8500 and an economic life of 25 years was assumed for the purposes of the evaluation. The equivalent annual cost of a bogie was estimated at approximately $540, $730 and $940 at the 4,7 and 10 per cent discount rates respectively. The corresponding total savings in bogie pool requirements in 1983-84 were estimated at $34 000, $46 000 and $59 000. The annual benefit was increased at 2.0 per cent per annum over the evaluation period in line with the forecast growth in steel billet, cement and northern Victorian traffic.

Elimination of the bogie exchange requirement for interstate movements could also result in faster transit times and hence potential savings in rolling stock capital requirements. Information obtained during the joint Victorian Railways/Australian National study of the proposed Melbourne-Adelaide link indicated that the average delay attributable to bogie exchange at South Dynon was about 12 hours per wagon.

The equivalent annual cost approach was again used to estimate the potential wagon capital savings. The weighted average capital cost for the wagons involved in the steel, cement and northern Victorian traffics was estimated at $61 250 per wagon in June 1982 prices. An economic life of 20 years was assumed, and the equivalent annual cost of wagon capital was estimated at approximately $4500, $5800 and $7200 at the 4, 7 and 10 per cent discount rates respectively.

As noted earlier, 7850 wagon movements through the South Dynon bogie exchange could be avoided in 1983-84 if the proposed standard gauge links were operational. With a delay due to bogie exchange of 12 hours, this means that the equivalent of approximately 11 wagons per annum would potentially be released for other duties as a result of the elimination of bogie exchange. The potential wagon capital savings in 1983-84 were therefore estimated at $49 600, $63 600 and $79 200 at the 4, 7 and 10 per cent discount rates respectively. The annual benefit would increase with the growth in steel billet, cement and northern Victorian traffic.

Elimination of the bogie exchange operation for interstate movements could also result in some savings in main line locomotive and brakevan capital costs. However, as these units would normally be detached from the wagons at South Dynon and used on other trains under current arrangements, the delays involved would be much shorter. It was concluded that any net time savings for locomotives and brakevans would probably be insignificant.

In view of the foregoing, potential bogie exchange savings in 1983-84 were estimated at approximately $437 000, $463 000 and $492 000 at the 4, 7 and 10 per cent discount rates respectively.

**Transit time savings for consignors**

Any reduction in transit times as a result of construction of the proposed standard gauge links would improve the quality of the rail transport services available to consignors. These transit time savings would only be significant for wagons containing cement, steel billet and northern Victorian traffic which would no longer require bogie exchange. Standardisation would not be expected to provide significant transit time savings for grain because of other factors affecting the grain handling and distribution system. In addition, the transit time for grain that would otherwise be moved by road transport to Geelong could be increased if it was diverted to the proposed standard gauge links.

The value of the faster transit times in economic terms can be measured by estimating the maximum price that rational consignors would be prepared to pay for this benefit. As the primary benefit of faster transit times on consignors' operations is a potential reduction in the inventory costs associated with financing goods in the transport

system, it follows that inventory cost savings can be used to value the faster transit times for the purposes of the economic evaluation. Following the procedure used in the previous evaluation, these savings were estimated using the formula:

$$S = C \times \frac{D}{365} \times i$$

where S = average benefit per tonne due to reduction in transit time
C = value of one tonne of traffic
D = average reduction in transit time (days)
i = annual interest rate applicable to financing of inventory holdings

Only approximate estimates were available for most of these variables. In the absence of specific information on northern Victorian freight, the value of the traffic was estimated as the weighted average value of steel billet and cement. This resulted in a figure of $204 per tonne. The 12 hour wagon delay caused by bogie exchange at South Dynon was used for the time saving, and the annual interest rate applicable to inventory holdings was set at the discount rate. The value of transit time savings was therefore estimated at 1 cent, 2 cents and 3 cents per tonne at the 4, 7 and 10 per cent discount rates respectively. Total potential savings in 1983–84 were estimated at $2100, $4200 and $6300 respectively, and the benefits were increased at 2.0 per cent per annum over the evaluation period in line with forecast traffic growth. These are considered to be upper estimates of the actual resource savings that would be realised.

### Other benefits

A number of other benefits associated with construction of the proposed standard gauge links were identified but not quantified. These benefits are outlined in this section.

Construction of the proposed links would increase the flexibility of the transport system. A standard gauge connection between Melbourne and Geelong could make it easier for shipping companies to divert containers through Geelong if other ports serviced by the standard gauge system were closed due to strikes, congestion or other factors. A link between Tocumwal and Mangalore would provide an alternative route if the section of the Melbourne-Sydney main line between Mangalore and Junee was blocked as a result of accidents. Construction of the Melbourne-Geelong connection alone or both links together would permit greater flexibility in the allocation of grain from southern New South Wales between ports in New South Wales and Geelong.

The proposed links would also be expected to provide some defence benefits, both by improving the rail transport system between Geelong and other locations in Australia and by providing alternative rail routes. In the former case, it would be quicker and easier to move military equipment through Geelong using a standard gauge link than if bogie exchange at South Dynon was required. In the latter case, a standard gauge connection between Tocumwal and Mangalore would provide an alternative track for part of the link from Melbourne to Sydney. It would also shorten the alternative route to South Australia and Western Australia through Broken Hill which could be used if the direct link between Melbourne and Adelaide was congested or not operational. Once again, the proposed links would result in greater flexibility in transport arrangements.

## COSTS

The following costs associated with the provision of standard gauge rail links from Melbourne to Geelong and between Tocumwal and Mangalore were identified and, where possible, quantified in the evaluation.

### Construction costs

The estimated construction costs for the proposed standard gauge rail links under the various track options were presented in Chapter 9.

### Track maintenance costs

Under the traffic forecasts presented in Chapter 10, there would be a significant redirection of grain traffic from New South Wales ports to Geelong and some diversion of traffic from road transport to the rail system. These changes would be expected to affect the level and pattern of track maintenance costs incurred by the Victorian Railways and the State Rail Authority.

The overall impact of standardisation on the track maintenance costs of the two rail authorities would be quite complex in practice, with reductions in expenditure in some parts of the rail system and increases in other areas. It was not possible to accurately estimate the effects of standardisation on the track network as a whole, and hence attention was focused on the maintenance costs for the proposed links between Melbourne and Geelong and from Tocumwal to Mangalore. It was assumed, for the purposes of the evaluation, that the net impact of standardisation on maintenance costs for other parts of the rail network would be zero. This is probably close to the likely situation in practice.

Victorian Railways officials provided estimates of maintenance costs for standard, broad and dual gauge track. The operation of new standard gauge tracks from Melbourne to Geelong and between Tocumwal and Mangalore would involve annual maintenance costs of $4655 per kilometre under the traffic conditions specified in the study. The existing broad gauge tracks would be retained under this option, and wagons no longer requiring bogie exchange at South Dynon would be diverted from the broad gauge system. However, there would be no significant savings in maintenance costs on the existing broad gauge tracks as a result of the diversion of this traffic, and hence the figure of $4655 per kilometre was used to estimate the net impact of standardisation on annual maintenance costs with new standard gauge tracks.

Standardisation of the track between Tocumwal and Mangalore under the dual gauge option would result in a net increase in track maintenance costs due to the need to maintain an extra rail and the more complicated dual gauge turnouts that would be installed. Maintenance costs for the existing broad gauge track and a dual gauge track were estimated at $4520 and $5122 per kilometre respectively. The net increase in annual track maintenance costs that would be attributable to standardisation with dual gauging was therefore estimated at $602 per kilometre for the Tocumwal-Mangalore line.

The proposed standard gauge link between Melbourne and Geelong would also involve some connections to industrial and port facilities in Geelong and a short section of dual gauge track at Newport. For the purposes of the evaluation, the sections of new standard gauge track and dual gauge track were assumed to involve maintenance costs per kilometre equal to those on the main line sections. Where existing broad gauge track would be converted direct to standard gauge, it was assumed that there would be no net increase in maintenance costs.

The estimated impact of the proposed standard gauge links on total track maintenance costs is indicated in Table 11.6.

### Track upgrading

Under the traffic forecasts and base case conditions used in the evaluation, the direction of movement in New South Wales for some grain already on rail would be changed if the proposed links were constructed. In addition, some further traffic might be diverted from road transport to rail. This could necessitate upgrading of

TABLE 11.6—IMPACT OF STANDARDISATION ON TOTAL TRACK MAINTENANCE COSTS FOR VARIOUS LINE SECTIONS (UNDISCOUNTED)

($)

| *Alignment/track option* | *Net impact on annual track maintenance costs* |
|---|---|
| Melbourne-Geelong | |
| New standard gauge track | 331 000[a] |
| Tocumwal-Mangalore | |
| New standard gauge track | 661 000 |
| Dual gauge track | 85 000 |

a. Includes cost of connections to industrial and port facilities in Geelong and short section of dual gauge track at Newport.

some parts of the existing standard gauge rail system. At the same time, there could be some savings through the deferral or elimination of upgrading work in other parts of the standard gauge network.

Information on the potential impact of the proposed links on the rail network in New South Wales was provided by State Rail Authority officials. They advised that rail transport of signficant quantities of grain from southern New South Wales to Geelong through Tocumwal would necessitate upgrading of the track and facilities between Narrandera and Tocumwal. Expenditure of $3.5 million would be required for work such as track upgrading, extension of crossing loops and improvement of the signalling system. In addition, movement of the forecast tonnages over this line section would require partial re-railing which was conservatively costed at $5 million. The initial upgrading work would need to be completed by the time the links to Geelong were operational. It was therefore assumed, for the purposes of the evaluation, that expenditure of $3.5 million for upgrading of track and facilities in New South Wales would be evenly spread over the period from 1983–84 to 1985–86, and that a further $5 million for re-railing would be spent in 1986–87. Discounted costs for this work were estimated at $7.8 million, $7.4 million and $7.0 million at the 4,7 and 10 per cent discount rates respectively.

Standardisation would also permit the deferral of rail works directly associated with the third grain terminal in New South Wales. This benefit was included in the savings from seaboard terminal construction delay that were discussed earlier.

Increased rail movements of grain through Tocumwal and Albury to Geelong and diversion of other commodities from road transport would also result in greater traffic along the existing standard gauge track betwen Albury and Sunshine, particularly the section south of Mangalore. Victorian Railways officials indicated that congestion has been experienced on the Melbourne-Albury track for a number of years. The track currently handles between 20 and 25 trains per day during peak periods and departures from schedules can quickly result in crossing loop delays.

Construction of six additional crossing loops between Melbourne and Albury has recently been proposed by the Victorian Railways. This project is apparently independent of the proposal to standardise the Melbourne-Geelong and Tocumwal-Mangalore links, and it is anticipated that there will be adequate capacity on the Melbourne-Albury link for at least 20 years if the crossing loops are constructed. In these circumstances, it seems unlikely that any significant upgrading costs (in present value terms) for the track between Albury and Melbourne would be attributable to the proposed standard gauge links.

Standardisation of the track between Tocumwal and Mangalore under the dual gauge option would result in increased traffic along the line as the existing broad gauge

traffic and the additional grain from southern New South Wales would all be carried on one track. However, Victorian Railways officials advised that this would not involve any capacity problems between Tocumwal and Mangalore.

Under the new standard gauge track option, there would be adequate capacity for the forecast levels of traffic between Tocumwal and Mangalore. Similarly, the line section between Sunshine and Geelong would be virtually all separate standard gauge track under the option included in the evaluation and no significant congestion would be expected on this track.

It was noted in Chapter 9 that the Victorian Railways currently intend to upgrade the track between Mangalore and Numurkah over a three year period commencing in 1985-86 by replacing the existing 40 kilogramme rail with 47 kilogramme rail. It was concluded that if the track between Tocumwal and Mangalore was standardised by dual gauging, upgrading with heavier rail would be undertaken at the same time. Under the construction schedules assumed in the study, the upgrading programme would be increased. Advancing re-railing program would, however, also provide the benefits of upgrading two years earlier. Although these effects would be the benefits of upgrading two years earlier. Although these effects would be attributable to standardisation, they were not quantified in the evaluation. The net impact would be small.

In view of the foregoing, additional upgrading costs of $7.8 million, $7.4 million and $7.0 million at the 4,7 and 10 per cent discount rates respectively were included in the evaluation[1].

**Tocumwal bridge**

The operation of trains between Tocumwal and locations in Victoria is currently restricted by the poor condition of the bridge over the River Murray at Tocumwal. This bridge was built in 1908 and is mainly constructed of iron. It carries both road and rail traffic.

The deterioration in the condition of the bridge has resulted in the imposition of speed and loading restrictions on rail traffic. Limitations on axle loadings of trains mean that only light branch line locomotives can cross the bridge and VHGY bogie grain wagons can only be loaded to about one-half of their capacity. The present bridge is beyond economic rehabilitation, and hence a new structure would be required to efficiently handle the tonnages and larger train consists associated with the operation of the proposed standard gauge links.

Planning for the replacement bridge is reportedly underway. It is proposed to build separate road and rail bridges, with the rail facility being several hundred metres upstream of the existing structure. Estimated cost of the new rail bridge and associated facilities is $4 million in June 1982 prices, and an early start to construction is envisaged by Victorian Railways officials. It is anticipated that the new bridge will be built for broad gauge traffic, and the construction schedule would probably not be significantly accelerated if a decision was made to proceed with the proposed standard gauge links. It was therefore concluded that the new structure would be available when the proposed links were completed and hence no costs associated with the new bridge would be attributable to the standardisation project.

If provision of the proposed standard gauge links brought forward the timing for construction of the new bridge, this would increase costs in present value terms but also provide the benefits from improved facilities earlier. The net impact of these two effects would be attributable to construction of the proposed links.

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1. These upgrading costs could be treated either as negative benefits or as part of the capital cost of the links in the evaluation. Both approaches will, however, produce similar overall conclusions about the economic viability of the project.

**Geelong grain terminal**

Under the traffic forecasts presented in Chapter 10, standardisation would result in the diversion of additional quantities of grain to the Geelong terminal. The cost of any new or accelerated upgrading work to permit the Geelong terminal to handle increased traffic from southern New South Wales would be directly attributable to standardisation.

Information supplied by the GEB indicates that annual capacity at the Geelong terminal is currently between 4 and 5 million tonnes per annum. Movements through the terminal in the past have been well below this level, and there have been substantial tonnages from southern New South Wales in certain years.

The Geelong grain terminal has substantial storage facilities and it appears that the major constraint on capacity is the grain movement equipment. The recent completion of a railway balloon loop has significantly improved rail receival facilities and upgrading of road receival equipment is also underway.

Planned developments at Geelong over the next few years are expected to significantly increase grain handling capacity at the port. The GEB intends to upgrade the capacity of the terminal's internal transfer and loading mechanisms and to build an additional loading facility on a new wharf to be constructed by the Port of Geelong Authority. GEB officials indicated that these planned improvements would substantially increase the capacity of the Geelong terminal. These developments would probably provide adequate capacity for the additional quantities of southern New South Wales grain considered in this study.

Conclusive information on the likelihood of these proposed developments at the Geelong terminal and the impact of grain movements from southern New South Wales was not available during the study. However, there may be some excess capacity at Geelong already and, as the basic approach in the study was to be optimistic from the viewpoint of the project where there was uncertainty, it was assumed that any additional grain traffic attracted as a result of standardisation could be handled without further investment. If the grain traffic from southern New South Wales would require accelerated investment in facilities at Geelong, the standardisation project would be less attractive than indicated by the quantified evaluation results.

A major element in the recent debate on future seaboard terminal arrangements for New South Wales grain has been the issue of ship size. Supporters of the proposal to build a new terminal in New South Wales have maintained that the average size of ships used in Australia's grain export trades will increase over the next 20 years and that a new deep water terminal at Port Botany or Port Kembla is needed to adequately cater for these larger vessels. It is argued that the movement of some New South Wales grain through Geelong is not a satisfactory alternative, partly because this port is relatively shallow and the prospects for further deepening are limited by financial considerations and its physical features.

This view on ship sizes has been criticised by other observers who believe that the facilities at Geelong will be adequate for most vessels on the Australian run in the foreseeable future. Detailed consideration of the likely sizes of ships in the international grain trades was beyond the scope of this study, and it was assumed for the purposes of the evaluation that this factor would not militate against the diversion of grain through Geelong.

At least one official contacted during the study also alleged that it would be cheaper to handle grain at Geelong than at a New South Wales terminal due to differences in manning levels, industrial relations performance and other factors. Although financial charges for seaboard terminal operations may differ between States, the appropriate concept for an economic evaluation is incremental resource costs. These costs could not be estimated with any acceptable degree of confidence in the study, and hence they were assumed to be the same at Geelong and the alternative New South Wales terminal.

### Rolling stock conversion

Some conversion of existing broad gauge rolling stock to permit operations on standard gauge track could be required if the proposed links were constructed. However, the equipment most affected by standardisation would be wagons and locomotives used for the movement of grain, and it would technically be possible to use the standard gauge equipment released from grain movements to New South Wales ports on the Geelong route. Therefore, in resource terms the impact of standardisation on standard gauge rolling stock requirements would be small. In terms of the particular scenarios considered in the study, there could be net savings in rolling stock capital requirements.

Similarly, it seems unlikely that there would be any significant net costs associated with providing standard gauge bogies for rolling stock that currently moves over the broad gauge system between South Dynon and Geelong.

In view of these considerations, no rolling stock conversion costs were included in the evaluation.

## EVALUATION RESULTS

### Both links

The evaluation was undertaken assuming that construction of the proposed links would commence at the beginning of 1983–84 (ie Year 0) and take three years. Victorian Railways officials advised that construction of the Melbourne-Geelong link would involve nine months of planning followed by 27 months of construction. As planning would involve only a small part of the total cost, it was assumed that expenditure during the first nine months of the evaluation period would be zero and that the construction costs would be evenly spread over the following 27 months.

Construction time for a new standard gauge track between Tocumwal and Mangalore could be longer than three years due to the greater track distance involved, but the same construction schedule was assumed for the purposes of computational simplicity. This simplifying assumption has no significant effect on the evaluation results.

Dual gauging of the line between Tocumwal and Mangalore could be carried out in less than three years, but in this case no substantial benefits would flow from the project until the new standard gauge track between Melbourne and Geelong was completed. As the Tocumwal-Mangalore track would therefore not need to be ready for three years, it was decided to simplify the computations by assuming the same three year construction profile for dual gauging of the link between Tocumwal and Mangalore.

The results of the evaluation of the proposed links based on the quantified benefits and costs are presented in Tables 11.7 to 11.10 which incorporate discount rates of 4, 7 and 10 per cent. Tables 11.7 and 11.8 present the results for new standard gauge tracks on both links assuming a new grain terminal in New South Wales at Port Kembla and Port Botany respectively. The results in Tables 11.9 and 11.10 are for a new standard gauge track between Melbourne and Geelong and dual gauging of the existing broad gauge track between Tocumwal and Mangalore.

As noted earlier in this chapter, the evaluations were prepared using several assumptions for the base case conditions applying to the movement of grain from southern New South Wales. The initial evaluation results in each table incorporate the assumption that, in the absence of the proposed links, all wheat from the proposed catchment areas in southern New South Wales would be railed to the nearest terminal in New South Wales. The base case conditions are then modified to include some movement of wheat through the transfer facility at Tocumwal, some road movement of wheat to Geelong and then both of these base case modifications together.

The primary decision rule used in assessing the results of an economic evaluation is that a project is acceptable if the net present value of the discounted flows of benefits and costs is greater than zero (although this does not indicate the optimum time for construction). This simply means that the discounted benefits exceed the discounted costs, ie the benefit-cost ratio is greater than 1. Both of these indicators are included for each option presented in the evaluation tables.

Tables 11.7 and 11.8 clearly indicate that construction of two new standard gauge tracks would not be warranted on the basis of the quantified benefits and costs. The highest benefit-cost ratio is obtained under the Port Botany grain terminal option where the base case includes some movement of grain to Geelong by road. However, the ratio of 0.49 is well below acceptable levels. This result was obtained using relatively optimistic assumptions regarding the value of some of the benefits and included potential benefits which could be realised with the existing facilities by adopting revised pricing and operating policies. The unquantified benefits identified in the evaluation would not be expected to significantly improve the performance of the project, and they could well be offset by any unquantified costs. Therefore, construction of new standard gauge tracks from Melbourne to Geelong and between Tocumwal and Mangalore would not be acceptable on economic grounds alone.

The evaluation results for a new standard gauge track from Melbourne to Geelong

TABLE 11.7—ECONOMIC EVALUATION OF MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS, NEW TRACK OPTION AND NEW PORT KEMBLA GRAIN TERMINAL

| *Benefits/costs* | *Discount rate* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| Rail transport of wheat[a] | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 25.9 | 37.6 | 45.0 |
| Train capital and operating cost savings | 12.4 | 8.5 | 6.8 |
| Road/rail diversion savings | 14.2 | 8.5 | 5.6 |
| Bogie exchange savings | 11.0 | 7.1 | 5.1 |
| Faster transit times | 0.1 | 0.1 | 0.1 |
| Track maintenance | -17.5 | -11.4 | -8.0 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 38.3 | 43.0 | 47.6 |
| Costs ($m) | | | |
| Construction | 156.4 | 150.6 | 145.3 |
| Net present value ($m) | -118.1 | -107.6 | -97.7 |
| Benefit-cost ratio | 0.24 | 0.29 | 0.33 |
| Including wheat transhipment[a] | | | |
| Net present value ($m) | -125.1 | -119.8 | -113.7 |
| Benefit-cost ratio | 0.20 | 0.20 | 0.22 |
| Including road transport of wheat[a] | | | |
| Net present value ($m) | -90.6 | -96.0 | -94.8 |
| Benefit-cost ratio | 0.42 | 0.36 | 0.35 |
| Including wheat transhipment/road transport[a] | | | |
| Net present value ($m) | -101.6 | -110.1 | -111.1 |
| Benefit-cost ratio | 0.35 | 0.27 | 0.24 |

a. Base case assumptions for wheat transport.

and dual gauging between Tocumwal and Mangalore are presented in Tables 11.9 and 11.10. They indicate that, with the first base case involving all rail transport of wheat of the nearest New South Wales terminal, the benefit-cost ratio and net present value estimates are still well below acceptable levels. The highest benefit-cost ratio is 0.73 with the Port Botany terminal at the 10 per cent discount rate, the corresponding figure with the Port Kembla terminal being 0.63.

The results are very sensitive to the base case assumptions. Inclusion of some rail/rail transhipment of wheat at Tocumwal significantly reduces the benefit-cost ratio, but the ratio rises when road movement of wheat to Geelong is included in the base case. In the latter situation, the benefit-cost ratio under the Port Botany terminal option is as high as 0.98 at the 4 per cent discount rate, although the ratio falls to 0.81 and 0.74 at the 7 and 10 per cent discount rates respectively[1]. With a new terminal at Port Kembla, the benefit-cost ratios for the scenario involving road

TABLE 11.8—ECONOMIC EVALUATION OF MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS, NEW TRACK OPTION AND NEW PORT BOTANY GRAIN TERMINAL

| *Benefits/costs* | *Discount rate* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| Rail transport of wheat[a] | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 26.9 | 38.5 | 45.8 |
| Train capital and operating cost savings | 26.0 | 17.9 | 13.8 |
| Road/rail diversion savings | 14.2 | 8.5 | 5.6 |
| Bogie exchange savings | 11.0 | 7.1 | 5.1 |
| Faster transit times | 0.1 | 0.1 | 0.1 |
| Track maintenance | -17.5 | -11.4 | -8.0 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 52.9 | 53.3 | 55.4 |
| Costs ($m) | | | |
| Construction | 156.4 | 150.6 | 145.3 |
| Net present value ($m) | -103.5 | -97.3 | -89.9 |
| Benefit-cost ratio | 0.34 | 0.35 | 0.38 |
| Including wheat transhipment[a] | | | |
| Net present value ($m) | -119.6 | -115.8 | -110.5 |
| Benefit-cost ratio | 0.24 | 0.23 | 0.24 |
| Including road transport of wheat[a] | | | |
| Net present value ($m) | -79.4 | -88.3 | -88.9 |
| Benefit-cost ratio | 0.49 | 0.41 | 0.39 |
| Including wheat transhipment/road transport[a] | | | |
| Net present value ($m) | -95.1 | -105.8 | -107.9 |
| Benefit-cost ratio | 0.39 | 0.30 | 0.26 |

a. Base case assumptions for wheat transport.

1. The alternative treatment of upgrading work in New South Wales as part of the construction cost does not change the benefit-cost ratio at the 4 per cent discount rate.

transport are reduced to 0.85, 0.72 and 0.67 at the 4, 7 and 10 per cent discount rates respectively. At the time the present study was completed, the preferred site for a new seaboard grain terminal in New South Wales appeared to be Port Kembla. The benefit-cost ratios with both base case modifications are significantly lower than the ratios with the road transport modification only. Since the benefit-cost ratio is less than 1 in all cases, those benefits which could be realised with existing facilities by modifying pricing and other policies were not separately assessed.

The evaluation results are more favourable when the new grain terminal in New South Wales is sited at Port Botany rather than at Port Kembla. This mainly reflects the greater train operating and capital cost savings that would potentially be obtained with a Port Botany terminal in the base case as the reduction in travel distances due to diversion of grain to Geelong would be much greater if this was the nearest New South Wales terminal.

The evaluation results also fluctuate in response to increases in the discount rate. This reflects the fact that seaboard terminal delay benefits for each base case/terminal combination increase as the discount rate rises, while the absolute levels of all other

TABLE 11.9—ECONOMIC EVALUATION OF MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS, NEW TRACK/DUAL GAUGE OPTION AND NEW PORT KEMBLA GRAIN TERMINAL

| *Benefits/costs* | *Discount rate* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| Rail transport of wheat[a] | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 25.9 | 37.6 | 45.0 |
| Train capital and operating cost savings | 12.4 | 8.5 | 6.8 |
| Road/rail diversion savings | 14.2 | 8.5 | 5.6 |
| Bogie exchange savings | 11.0 | 7.1 | 5.1 |
| Faster transit times | 0.1 | 0.1 | 0.1 |
| Track maintenance | -7.4 | -4.8 | -3.3 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 48.4 | 49.6 | 52.3 |
| Costs ($m) | | | |
| Construction | 88.8 | 85.5 | 82.5 |
| Net present value ($m) | -40.4 | -35.9 | -30.2 |
| Benefit-cost ratio | 0.55 | 0.58 | 0.63 |
| Including wheat transhipment[a] | | | |
| Net present value ($m) | -47.4 | -48.1 | -46.2 |
| Benefit-cost ratio | 0.47 | 0.44 | 0.44 |
| Including road transport of wheat[a] | | | |
| Net present value ($m) | -12.9 | -24.3 | -27.3 |
| Benefit-cost ratio | 0.85 | 0.72 | 0.67 |
| Including wheat transhipment/road transport[a] | | | |
| Net present value ($m) | -23.9 | -38.4 | -43.6 |
| Benefit-cost ratio | 0.73 | 0.55 | 0.47 |

a. Base case assumptions for wheat transport.

benefits and costs considered in the evaluation fall. The change in the benefit-cost ratio in response to discount rate movements is therefore the outcome of these two opposite movements. As a result, the ratios do not follow a consistent upward or downward trend as the discount rate is increased.

Although the figures in Tables 11.9 and 11.10 suggest that the benefit-cost ratio is close to 1 under certain circumstances with the lower cost standardisation option, this only occurs under restrictive base case assumptions regarding transport and seaboard terminal arrangements for wheat. This combination may not occur in practice. Indeed, the most likely situation in the absence of the links probably involves a new Port Kembla terminal with some transhipment and road transport of wheat from southern New South Wales. The benefit-cost ratios for this scenario are 0.73, 0.55 and 0.47 at the 4, 7 and 10 per cent discount rates respectively.

The results should also be considered against the background that they were derived using optimistic assumptions about potential benefits. Some of these benefits may not be realised in practice for the following reasons.

TABLE 11.10—ECONOMIC EVALUATION OF MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE STANDARD GAUGE LINKS, NEW TRACK/DUAL GAUGE OPTION AND NEW PORT BOTANY GRAIN TERMINAL

| *Benefits/costs* | *Discount rate* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| Rail transport of wheat[a] | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 26.9 | 38.5 | 45.8 |
| Train capital and operating cost savings | 26.0 | 17.9 | 13.8 |
| Road/rail diversion savings | 14.2 | 8.5 | 5.6 |
| Bogie exchange savings | 11.0 | 7.1 | 5.1 |
| Faster transit times | 0.1 | 0.1 | 0.1 |
| Track maintenance | -7.4 | -4.8 | -3.3 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 63.0 | 59.9 | 60.1 |
| Costs ($m) | | | |
| Construction | 88.8 | 85.5 | 82.5 |
| Net present value ($m) | -25.8 | -25.6 | -22.4 |
| Benefit-cost ratio | 0.71 | 0.70 | 0.73 |
| Including wheat transhipment[a] | | | |
| Net present value ($m) | -41.9 | -44.1 | -43.0 |
| Benefit-cost ratio | 0.53 | 0.48 | 0.48 |
| Including road transport of wheat[a] | | | |
| Net present value ($m) | -1.7 | -16.6 | -21.4 |
| Benefit-cost ratio | 0.98 | 0.81 | 0.74 |
| Including wheat transhipment/road transport[a] | | | |
| Net present value ($m) | -17.4 | -34.1 | -40.4 |
| Benefit-cost ratio | 0.80 | 0.60 | 0.51 |

a. Base case assumptions for wheat transport.

A major portion of the discounted benefits from standardisation comprises the savings that would result if the construction of a third grain terminal in New South Wales was deferred because of the project. In the evaluation, construction was assumed to be delayed until 1990–91. However, the latest available information suggests that work on the new terminal may be delayed even in the absence of the proposed links. In these circumstances, the benefits from a delay due to standardisation would be less than the figures used in the evaluation. Alternatively, the decision to construct a new grain terminal in New South Wales may not be affected by the provision of standard gauge connections between Melbourne and Geelong and from Tocumwal to Mangalore. In these circumstances, there would be no benefits from deferral as a result of standardisation. In either case, the benefit values used in the evaluation are very much upper estimates.

As noted earlier, the most favourable evaluation results were obtained assuming some movement of wheat from southern New South Wales to Geelong by road in the base case. This would not necessarily be the situation in practice. For example, if a new grain terminal was built in New South Wales there would be substantial pressure to maximise the volume of grain handled at the new facility so that the very substantial capital costs would be spread over as many growers and as much grain as possible. In these circumstances, rail freight rates could be set so as to attract all grain from the receival facilities served by the standard rail system in southern New South Wales to the new terminal. In view of the replacement of the Buffer Zone by the Adjustment Area, such a development is quite possible. At a minimum, this could mean that there would be no diversion from road transport, thereby resulting in the lower benefit-cost ratios detailed in Tables 11.9 and 11.10. The economic performance of the standardisation project would be even worse if the grain from southern New South Wales continued to be directed through the new terminal in that State despite the availability of a shorter standard gauge link to the Geelong terminal.

Even if some of the grain was diverted from road to rail with standardisation, the benefits included in the evaluation are upper estimates of the resource savings that would be expected in practice. As discussed in the sections where these estimates were derived, the train capital and operating cost figures were based on unit train operations between two locations and did not include the additional costs that would be incurred in moving grain from a network of storage facilities. Hence, the data used in the evaluation provide upper estimates of the likely net savings that would be achieved if grain was diverted from road to rail. These optimistic estimates were also applied to other traffics which were forecast to divert from road to rail.

The estimated savings from a reduction in bogie exchange operations are probably upper estimates as they were based on the average cost of operating the South Dynon facility. The relevant concept is the marginal cost and this could be significantly lower than the figures used in the study. In addition, many of the potential bogie pool and wagon capital savings included in the evaluation may not be realised in practice.

The exclusion of several possible costs from the quantified results may also improve the performance of the project. For example, if expansion of the Geelong grain terminal was required as a result of standardisation, the benefit-cost ratios would be further reduced.

The traffic forecasts used in the evaluation are also optimistic. In practice, some of the traffic forecast to move along the proposed links for the purposes of the evaluation might not be affected by standardisation. The associated benefits included in the evaluation would therefore not be realised.

In view of these factors and the figures presented in Tables 11.9 and 11.10, it was concluded that standardisation of the links between Melbourne and Geelong and

from Tocumwal to Mangalore as an integral project would not be acceptable on economic grounds[1].

**Tocumwal-Mangalore link only**

The terms of reference for the present study were largely based on the provision of standard gauge access to ports, and the above evaluation was undertaken on this basis. However, a preliminary financial assessment of a standard gauge link between Melbourne and Adelaide was recently prepared by officers of Australian

TABLE 11.11—ECONOMIC EVALUATION OF NEW STANDARD GAUGE TRACK BETWEEN TOCUMWAL AND MANGALORE, ASSUMING MELBOURNE-GEELONG STANDARD GAUGE LINK INDEPENDENTLY CONSTRUCTED, ALL WHEAT BY RAIL IN BASE CASE

| *Benefits/costs* | *Discount rate* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| New Port Kembla terminal | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 12.0 | 18.3 | 23.0 |
| Train capital and operating cost savings | 9.5 | 6.8 | 5.2 |
| Road/rail diversion savings | 6.5 | 3.8 | 2.4 |
| Bogie exchange savings | 0.6 | 0.4 | 0.3 |
| Track maintenance | -11.7 | -7.6 | -5.3 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 9.1 | 14.3 | 18.6 |
| Costs ($m) | | | |
| Construction | 84.7 | 81.6 | 78.7 |
| Net present value ($m) | -75.6 | -67.3 | -60.1 |
| Benefit-cost ratio | 0.11 | 0.18 | 0.24 |
| New Port Botany terminal | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 12.5 | 18.8 | 23.4 |
| Train capital and operating cost savings | 16.5 | 11.7 | 8.9 |
| Road/rail diversion savings | 6.5 | 3.8 | 2.4 |
| Bogie exchange savings | 0.6 | 0.4 | 0.3 |
| Track maintenance | -11.7 | -7.6 | -5.3 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 16.6 | 19.7 | 22.7 |
| Costs ($m) | | | |
| Construction | 84.7 | 81.6 | 78.7 |
| Net present value ($m) | -68.1 | -61.9 | -56.0 |
| Benefit-cost ratio | 0.20 | 0.24 | 0.29 |

1. It would not be appropriate to merely add any additional benefits (or subtract any cost savings) that could become apparent in future and then use the amended figures to justify the project. This would be inappropriate because of the optimistic approach used to derive the evaluation results presented in this Report. Should significant additional net benefits become apparent in future due to changes in circumstances, it would be necessary to refine all of the estimates used in the present study if the magnitude of the additional benefits exceeded the net present value figures obtained in this study (ie the revised figures indicated a benefit-cost ratio greater than 1). Identification of the potential benefits obtainable with changes in freight rate and operating policies would also be required to assess those benefits specifically associated with standardisation.

National and the Victorian Railways, and the alignment favoured in the report included a connection between Melbourne and Geelong. As the proposal for a standard gauge link between Tocumwal and Mangalore has also been supported as a separate project by various community groups for some time, this link was evaluated using the cost and benefit estimates derived previously and assuming that an independent decision to construct the Melbourne-Adelaide standard gauge link via Geelong is taken. This does not assume that a standard gauge link between Adelaide and Melbourne via Geelong is acceptable on economic grounds, only that a decision to standardise this line is independently reached.

In these circumstances, standardisation of the Tocumwal-Mangalore link would only provide benefits associated with the movement of some grain, consumer items and northern Victorian traffics. The other benefits included in the earlier evaluation of the two links together would be attributable to the Melbourne-Adelaide standardisation project. Grain that could be economically moved from southern New South Wales through Albury to Geelong with a standard gauge link between Melbourne and Geelong would not be affected by construction of the connection between Tocumwal and Mangalore.

The evaluation results for the new standard gauge track and dual gauge options between Tocumwal and Mangalore based on the optimistic assumptions previously outlined (including the benefits potentially realisable with existing facilities and altered pricing and operating policies) are presented in Tables 11.11 and 11.12 respectively. For computational simplicity it was assumed that, in the absence of the proposed links, all wheat would be railed to the nearest New South Wales terminal.

Benefit-cost ratios for the dual gauge option under these optimistic assumptions are significantly above 1, indicating that the net benefits attributable to standardisation could more than outweigh the construction cost of the proposed links[1]. However, preliminary estimates indicate that the adoption of a rail pricing policy which resulted in the diversion of grain grown in the Tocumwal catchment area from New South Wales terminals to Geelong via the Tocumwal transfer facility could by itself produce as much as 64 to 94 per cent of the assessed net benefits included in Tables 11.11 and 11.12.[2] Therefore, it seems unlikely that dual gauging of the track from Tocumwal to Mangalore would be acceptable on economic grounds should a Melbourne-Geelong standard gauge connection be constructed as part of the Melbourne-Adelaide link. If more detailed investigations revealed that a standard gauge connection between Tocumwal and Mangalore could be provided at a lower capital cost (by, for example, direct conversion) this could make the project attractive. The preliminary results here indicate, however, that construction of a new standard gauge track or dual gauging of the existing track between Tocumwal and Mangalore would not be warranted even with a Melbourne-Geelong link in place.

It is important to recognise the limitations of this supplementary evaluation. For allocative efficiency to be achieved, any decision to build the proposed standard gauge link between Adelaide and Melbourne should be based on a comprehensive economic evaluation of the link. The best approach if the links are considered to be interdependent is to include the Tocumwal-Mangalore and Melbourne-Adelaide links in a single evaluation.

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1. The alternative treatment of track upgrading work as part of the construction cost reduces the benefit-cost ratio in all cases. For example, under the Port Botany option, the benefit-cost ratio falls from 1.72 to 1.5 at the 10 per cent discount rate.

2. These results indicate that significant net benefits could be achieved if pricing and operating policies which promoted the movement of grain from the Tocumwal catchment area to Geelong were introduced. There are also a number of other options for improving grain transport and handling operations which could be considered. For example, the grain transhipment facility at Tocumwal could be upgraded or existing broad gauge lines could be extended further into New South Wales. As the terms of reference for this study only required assessment of the construction of standard gauge rail links between Melbourne and Geelong and from Tocumwal to Mangalore, these alternative arrangements for improving the existing situation were not examined.

TABLE 11.12—ECONOMIC EVALUATION OF DUAL GAUGE TRACK BETWEEN TOCUMWAL AND MANGALORE, ASSUMING MELBOURNE-GEELONG STANDARD GAUGE LINK INDEPENDENTLY CONSTRUCTED, ALL WHEAT BY RAIL IN BASE CASE

| *Benefits/costs* | *Discount rate* | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| New Port Kembla terminal | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 12.0 | 18.3 | 23.0 |
| Train capital and operating cost savings | 9.5 | 6.8 | 5.2 |
| Road/rail diversion savings | 6.5 | 3.8 | 2.4 |
| Bogie exchange savings | 0.6 | 0.4 | 0.3 |
| Track maintenance | -1.5 | -1.0 | -0.7 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 19.3 | 20.9 | 23.2 |
| Costs ($m) | | | |
| Construction | 17.1 | 16.5 | 15.9 |
| Net present value ($m) | 2.2 | 4.4 | 7.3 |
| Benefit-cost ratio | 1.13 | 1.27 | 1.46 |
| New Port Botany terminal | | | |
| Benefits ($m) | | | |
| Seaboard terminal delay | 12.5 | 18.8 | 23.4 |
| Train capital and operating cost savings | 16.5 | 11.7 | 8.9 |
| Road/rail diversion savings | 6.5 | 3.8 | 2.4 |
| Bogie exchange savings | 0.6 | 0.4 | 0.3 |
| Track maintenance | -1.5 | -1.0 | -0.7 |
| Track upgrading | -7.8 | -7.4 | -7.0 |
| Total | 26.8 | 26.3 | 27.3 |
| Costs ($m) | | | |
| Construction | 17.1 | 16.5 | 15.9 |
| Net present value ($m) | 9.7 | 9.8 | 11.4 |
| Benefit-cost ratio[a] | 1.57 | 1.59 | 1.72 |

a The benefit-cost ratios were derived assuming that all the benefits from diverting grain in the Tocumwal catchment area from New South Wales terminals to Geelong would be attributable to standardisation However, more than 63 per cent of the assessed net benefits might be obtained with the existing facilities by adopting revised pricing and operating policies. Therefore, the actual benefit-cost ratio associated with standardisation alone would be less than 1 in all cases.

# CHAPTER 12—FINANCIAL EFFECTS OF MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE LINKS

If the proposed standard gauge links between Melbourne and Geelong and from Tocumwal to Mangalore were constructed, some organisations or groups could gain and others could lose in financial terms. The likely impact of standardisation on the financial positions of relevant organisations is discussed in this chapter. Some recent freight rates and the appropriate approach to pricing policy are also described.

## FREIGHT RATES

Under the traffic forecasts presented in Chapter 10, grain would be the major traffic along the proposed links between Melbourne and Geelong and from Tocumwal to Mangalore. Freight rates during the 1981–82 season for the movement of wheat and rice from selected locations in southern New South Wales to Geelong and Sydney are presented in Table 12.1. These data are used below to estimate the potential impact of the proposed links on the financial positions of rail authorities.

As noted in Chapter 11, a charge of 48 cents per tonne applied to rail/rail transhipment of grain at Tocumwal in June 1982. This charge is not included in the rates for rail movement of wheat from southern New South Wales to Geelong presented in Table 12.1 as it is the responsibility of the grain handling authorities.

Inter-system freight rates are often negotiated for interstate rail traffic in Australia, although this practice appears to be less common for movements of grain. Where these rates apply, the procedure for apportioning revenue between participating systems is that agreed incidentals such as terminals, handling and local charges are deducted from the total rate where applicable and the balance is divided on a distance basis. An allowance for bogie exchange at South Dynon is made where applicable in the apportionment of revenue between the Victorian Railways and the State Rail Authority. As noted earlier, some revision of current freight rate structures would probably be required to achieve the traffic flows and benefit streams used in the evaluation.

## PRICING AND FINANCE

The discussion of appropriate pricing policies for the proposed Fisherman Islands connection in Chapter 6 suggested that the link should be priced as a separate project rather than incorporated into general tariff structures. This principle of efficient pricing is also applicable to the proposed Melbourne-Geelong and Tocumwal-Mangalore links.

## IMPACT ON SELECTED ORGANISATIONS

The impact of standardisation on the revenues of various transport and grain handling authorities is considered in the following sections. The attractiveness of the project to individual organisations would mainly depend on the funding arrangements for construction of the proposed links and expected changes in revenues and operating costs. The discussion in the following section is based on the adoption of pricing policies that were discussed in Chapter 10.

TABLE 12.1—FREIGHT RATES FOR MOVEMENT OF WHEAT AND RICE FROM SELECTED LOCATIONS IN SOUTHERN NEW SOUTH WALES, 1981–82 SEASON

*($ per tonne)*

| *Commodity/origin* | *Rail to Sydney* | *Rail to Geelong* | *Road to Geelong* |
|---|---|---|---|
| Wheat | | | |
| Milbrulong | 19.71 | | 20.00 |
| Lockhart | 19.78 | | 21.00 |
| Yuluma | 19.98 | | 20.00 |
| Pleasant Hills | 19.98 | | 20.00 |
| Urangeline East | 19.98 | | 20.00 |
| Ferndale | 20.18 | | 20.00 |
| Walla Walla | 19.78 | | 20.00 |
| Burrumbuttock | 20.18 | | 20.00 |
| Finley | | 17.46 | 17.46 |
| Berrigan | | 17.48 | 17.48 |
| Jerilderie | | 18.17 | 18.17 |
| Tocumwal | | 16.40 | 16.40 |
| Urana | | | 19.00 |
| Rand | | | 19.00 |
| Balldale | | | 19.00 |
| Brocklesby | | | 19.00 |
| Coleambally | | | 20.95 |
| Hopefield | | | 18.00 |
| Rice | | | |
| Leeton | | 23.50 | |
| Griffith | | 23.50 | |
| Yenda | | 23.50 | |

*Source:* Australian Wheat Board, personal communication. Victorian Railways, personal communication.

**Victorian Railways**

The revenue received by the Victorian Railways could increase if the proposed standard gauge links were built and revised pricing policies were adopted. The traffic forecasts presented in Chapter 10 indicated that there could be a significant increase in the volume of grain handled by the Victorian Railways as well as some other traffic diverted from road transport. If average revenue of $17 per tonne for the movement of grain from Tocumwal or Albury to Geelong is assumed on the basis of the freight rates in Table 12.1, the additional revenue from grain could be as high as $11 million per annum at the beginning of the evaluation period (June 1982 rates). Revenue received by the Victorian Railways would also be increased if other commodities were diverted from road transport. The net financial impact on the Victorian Railways would, of course, be influenced by the costs incurred in carrying this additional traffic.

Elimination of the bogie exchange operation for movements of steel, cement and some northern Victorian traffic between Victoria and interstate locations could improve the financial position of the Victorian Railways. There would be some cost savings due to the reduction in activities at South Dynon and improved rolling stock utilisation, but freight rates could be maintained at previous levels in view of the improved quality of service resulting from the elimination of bogie exchange. In this situation, some of the increased net revenue would probably be shared with the State Rail Authority, but it seems likely that there would be a positive effect on the financial position of the Victorian Railways.

The attractiveness of the project to the Victorian Railways would be reduced if this

organisation was required to fund part or all of the construction costs for the proposed links.

**State Rail Authority**

There would probably be a reduction in the revenue received by the State Rail Authority for the transport of grain as a result of standardisation and implementation of a revised pricing policy. Wheat, rice and barley from the southern part of the State could be diverted from Sydney and rail movements from the southern areas to New South Wales ports would therefore be reduced. If average revenue for rail movement to Sydney of $19 per tonne is assumed on the basis of the freight rates in Table 12.1, the initial revenue loss could be as high as $12.5 million (June 1982 rates) per annum at the beginning of the evaluation period. However, the State Rail Authority would probably still receive the revenue for the transport of the grain to the Victorian border and some revenue would be gained if grain was diverted from road transport. These factors would result in a lower revenue loss for grain traffic.

The State Rail Authority could also receive increased revenue from other traffic (eg bricks, northern Victorian commodities) diverted from road transport. In addition, as noted in the previous section, it could receive some extra revenue as a result of the reduction in bogie exchange operations at South Dynon. However, the overall impact of standardisation would probably involve a reduction in revenue received by the State Rail Authority. In addition, significant expenditure on upgrading of the track and facilities between Narrandera and Tocumwal would be required.

**Port authorities**

Any diversion of grain from ports in New South Wales to Geelong would be expected to affect the revenue received by the relevant port authorities. In particular, the Maritime Services Board of New South Wales would lose revenue while the Port of Geelong Authority would benefit. On the basis of the wharfage charges operating in June 1982, the diversion of wheat and barley could result in a revenue loss of more than $700 000 per annum for the Maritime Services Board at the beginning of the evaluation period. The gain to the Port of Geelong Authority could be as high as $215 000 per annum, the difference between this and the Maritime Services Board figure being due to variations in charges. These estimates refer to the situation where all wheat and barley for export would be railed to facilities in New South Wales in the absence of the standard gauge links. The Maritime Services Board would lose further revenue if rice was diverted from Sydney, although in this case many of the benefits would probably be obtained by the Port of Melbourne Authority.

The net impact on these organisations would be influenced by the effect of standardisation on expenditure by the port authorites. For example, any deferral of a new grain terminal in New South Wales would permit the Maritime Services Board to delay upgrading of port facilities in that State, while movement of increased tonnages through Geelong could necessitate increased or accelerated expenditure on facilities at that port.

**Grain handling authorities and growers**

A reduction in the volume of wheat exported through seaboard terminals in New South Wales would lead to a fall in revenue received by the GHA. Revenue from seaboard terminal charges would be the most affected, as receival facilities in the proposed catchment areas could still be operated by this organisation if the grain was railed to Geelong. Any deferral of a new grain terminal in New South Wales would provide some financial benefits to the GHA.

The GEB would receive increased revenue from seaboard terminal charges if grain from southern New South Wales was diverted to Geelong. However, any additional investment expenditure and operating costs at Geelong would have to be considered

in assessing the net financial impact on this organisation.

The financial impact on growers in New South Wales would be determined by several factors including the pricing policies implemented by rail and grain handling authorities and the source of finance for construction of the links. If construction costs were not recovered directly from users, growers in southern New South Wales could be better off if the proposed standard gauge links were constructed.

**Road transport operators**

Any significant diversion of grain or other commodities from road to rail transport would reduce the revenue received by road transport operators. The net impact on the financial positions of these operators would be determined by the relative importance of the diverted grain and other commodities in their overall activities and the relationship between revenue lost and costs saved.

# CHAPTER 13—CONCLUDING REMARKS: MELBOURNE-GEELONG AND TOCUMWAL-MANGALORE LINKS

The Port of Geelong is a major centre for the shipment of bulk commodities, and these traffics currently account for most of the trade through the port. Various industrial and port facilities in Geelong are connected to the broad gauge rail system which provides direct links to locations in Victoria, South Australia and southern New South Wales. All other freight moving by rail between Geelong and interstate locations is subject to a change of gauge which necessitates either transhipment or bogie exchange.

Three options are available for the provision of standard gauge rail access in the Victorian situation, namely new track, dual gauging and direct conversion. The only operationally acceptable option for the proposed link between Melbourne and Geelong with current broad gauge traffic levels is a new standard gauge track at an estimated cost of $75.5 million (June 1982 prices). Two options for the proposed link between Tocumwal and Mangalore were considered in detail in the study, namely a new standard gauge track ($89.2 million) and dual gauging of the existing broad gauge track ($18 million).

Standardisation of the Melbourne-Geelong and Tocumwal-Mangalore links would permit direct running of trains along several major transport corridors which currently involve a change of gauge. Significant quantities of wheat, rice, barley and consumer items could be railed between Geelong/Melbourne and southern New South Wales. Steel, cement, aluminium inputs and product and refined salt could be railed between Geelong and other parts of New South Wales or Brisbane. There might also be some movements of processed food between northern Victoria and various interstate locations by standard gauge rail.

The traffic forecasts used in the evaluation were prepared using the resource cost criterion. In practice, the level of standard gauge rail traffic along the proposed links would be heavily influenced by the freight rates applied by rail authorities. Some adjustment of railway freight rates to more accurately reflect the underlying transport cost structures could therefore be required to promote the freight movement patterns on which the economic evaluation was based.

The operation of standard gauge links between Melbourne and Geelong and from Tocumwal to Mangalore could provide several benefits. The diversion of significant quantities of southern New South Wales grain to Geelong would potentially permit the proposed upgrading of seaboard terminal facilities in New South Wales to be delayed, thereby providing savings (in present value terms) estimated at up to $46 million. Elimination of rail/rail grain transhipment at Tocumwal could result in benefits estimated at 48 cents per tonne. Reductions in rail haul distances to the export port as a result of the diversion of grain to Geelong would provide savings in train capital and operating costs estimated at between 1.3 and 1.7 cents per tonne-kilometre. Diversion of grain and other traffic from road transport to rail could result in resource savings estimated at between 2.8 and 3.0 cents per tonne-kilometre. Elimination of bogie exchange operations for some interstate rail traffic would provide savings in bogie exchange operating costs, bogie pool capital, wagon capital and transit times. Other benefits from standardisation would be increased flexibility in the transport system and improved defence capability.

Standardisation would also result in some cost increases. Annual maintenance costs for the proposed links were estimated at almost $1 million with new standard gauge tracks and $416 000 with a new track between Melbourne and Geelong and dual gauge from Tocumwal to Mangalore. Upgrading of the track and facilities between Tocumwal and Narrandera would also be necessary, and this would involve undiscounted costs of $8.5 million. It was concluded that the costs associated with replacement of the Tocumwal bridge would not be attributable to standardisation, and that there would be no net costs associated with conversion of rolling stock. No costs for upgrading of the Geelong grain terminal were included in the evaluation. If additional investment at Geelong was required to handle the increased grain traffic from New South Wales, the benefit-cost ratios would be lower than those reported in the study.

The evaluation results indicate that construction of the proposed links as an integral project is not warranted on the basis of the quantified benefits and costs. Under the range of base case conditions used in the evaluation, the benefit-cost ratio with new standard gauge tracks on both line sections does not exceed 0.49. Net present value with the most favourable result is -$79.4 million.

The evaluation results are more favourable with dual gauge track between Tocumwal and Mangalore and new track from Melbourne to Geelong. However, even with this lower cost construction option, the benefit-cost ratio is below 1 in all cases. In addition, the evaluation was based on optimistic valuations of the benefits (including potential benefits realisable with existing facilities and altered pricing and operating policies),and the use of more realistic estimates would result in significantly lower benefit-cost ratio and net present value figures. It is therefore concluded that construction of standard gauge links between Melbourne and Geelong and from Tocumwal to Mangalore would not be warranted on economic grounds alone.

If an independent decision was taken to construct a standard gauge track between Melbourne and Geelong as part of an Adelaide-Melbourne link, standardisation of the Tocumwal-Mangalore line would probably not be justified as a separate project under the current least cost option. This is because a significant proportion of the potential benefits from diverting grain grown in the Tocumwal catchment area from New South Wales terminals to Geelong could be realised with the existing facilities by altering pricing and operating policies.

The financial positions of several organisations could be affected by standardisation of the Melbourne-Geelong and Tocumwal-Mangalore links. Revenue received by the Victorian railways would be increased if additional grain and other traffic was transported by that organisation. The impact on revenue received by the State Rail Authority would probably be negative. The Port of Geelong Authority would obtain additional revenue at the expense of the Maritime Services Board due to the diversion of grain to Geelong from ports in New South Wales. The GEB would be expected to receive increased revenue as a result of greater throughput at its Geelong terminal, while the GHA would probably lose revenue. The impact of the links on the net financial positions of these authorities would be determined by the pricing policies followed, underlying cost structures and effects on capital expenditure requirements. For example, the GHA would benefit if construction of the proposed links allowed terminal upgrading work in New South Wales to be deferred.

## PART C—SWANSON DOCK

# CHAPTER 14—THE PORT OF MELBOURNE

The development of the Port of Melbourne and the current facilities in the port area are discussed in this chapter. Particular emphasis is placed on the impact of containerisation because overseas containers are the only potential traffic over the proposed standard gauge rail link to Swanson Dock.

## HISTORY AND CURRENT FACILITIES

The first shipping wharf in Melbourne was constructed in 1841 on the banks of the River Yarra near the present city centre. Subsequent development was initially concentrated on Hobson's Bay near the mouth of the river due to limitations in river dimensions, and by 1886 bayside facilities accounted for 71 per cent of wharfage in the port with the remainder on the river (Bird 1968 pp73–74). However, realignment and dredging of the River Yarra resulted in improved access to locations on the river and by 1893 the balance of berthing space in the port had swung to river-based installations (Bird 1968 p74). Facilities on the River Yarra now account for the majority of wharfage in the port, although new bayside facilities have been constructed at Webb Dock since the late 1950s.

The port's facilities were a mixture of privately-owned and government-operated wharves until 1877 when ownership and responsibility for the operation of the port was vested in one organisation with the establishment of the Melbourne Harbor Trust Commissioners. This was subsequently renamed the Port of Melbourne Authority in 1978.

The Port of Melbourne today services the city as well as an area which includes the rest of Victoria, southern New South Wales, Tasmania and areas of South Australia. Traffic through the port has generally shown an upward trend over the last few years, with total trade of 9.8 million tonnes in 1981–82 being 1.8 per cent above the level recorded in the previous year (Port of Melbourne Authority 1982a p12). The pattern of trade through the Port of Melbourne in 1981–82 is illustrated in Table 14.1 which clearly indicates the importance of general cargo in total traffic.

The Port of Melbourne is the major general cargo port in Victoria and the State's other ports at Geelong, Portland and Westernport mainly handle bulk commodities. It is also the largest container port in Australia, accounting for 42.9 per cent of coastal and overseas containers handled at Australian ports in 1980–81 (Department of Transport and Construction 1982 pp37–38). Substantial numbers of overseas containers are centralised through the port from South Australia and Tasmania, and there are also significant movements of domestic containers to and from Tasmania.

The major bulk cargoes handled at the port are petroleum products, crude oil, chemicals, raw sugar, briquettes and char, gypsum and phosphate rock. Several of these commodities are used as inputs by industrial facilities located adjacent to the port area.

By 1981 the Port of Melbourne contained 61 commercial berths spread along 19 kilometres of riverbank and foreshore (Port of Melbourne Authority 1981a p2 and p3). The current layout of the port is illustrated in Figure 14.1. Swanson Dock is the port's largest overseas container terminal. Other important facilities for roll-on/roll-off and cellular vessels engaged in the coastal and overseas container trades are located at Webb Dock, Victoria Dock, South Wharf and Appleton Dock. The

TABLE 14.1—TOTAL TRADE THROUGH THE PORT OF MELBOURNE BY CARGO TYPE, 1981–82 ('000 tonnes)[a]

| Cargo type | Overseas | Coastal | Total |
|---|---|---|---|
| Containerised general | 3 893 | 1 144 | 5 037 |
| Other general | 1 254 | 417 | 1 671 |
| Empty containers | 164 | 95 | 259 |
| Total general | 5 311 | 1 656 | 6 967 |
| Liquid bulk | 872 | 1 037 | 1 909 |
| Dry bulk | 307 | 586 | 893 |
| Total bulk | 1 179 | 1 623 | 2 802 |
| Total | 6 490 | 3 279 | 9 769 |

a. Mass tonnes.

*Source:* Port of Melbourne Authority (1982a p12).

major facilities for bulk cargoes are located at Yarraville, Maribyrnong River, Williamstown and Appleton Dock.

The distribution of container traffic between the various facilities in the port over the five years to 1979–80 is indicated in Table 14.2. This illustrates the major role played by Swanson Dock in the movement of containerised cargo through the Port of Melbourne in the past.

## SWANSON DOCK

The introduction of containerisation on a large scale into Australia's overseas trades in the late 1960s had a substantial effect on the Port of Melbourne which became one of the major ports in Australia for the overseas container trade. Previously, conventional vessels operating in the general cargo trade had called at most capital city and various other ports in Australia. However, to gain the maximum operating efficiencies from the highly specialised container vessels that were progressively introduced into various overseas trades, many shipping companies moved to limit the number of calls at ports in Australia by the new vessels. Containers were then centralised from the smaller ports, which lost various shipping services, to the larger ports such as Melbourne where the costly port and terminal facilities required to handle these vessels efficiently were concentrated[1].

TABLE 14.2—CONTAINER TRAFFIC THROUGH THE PORT OF MELBOURNE BY MAJOR DOCKS, 1975–76 TO 1979–80[a] (TEUs)

| Dock | 1975–76 | 1976–77 | 1977–78 | 1978–79 | 1979–80 |
|---|---|---|---|---|---|
| Swanson Dock | 214 447 | 246 877 | 216 056 | 227 333 | 258 791 |
| Webb Dock | 95 728 | 96 715 | 96 666 | 110 018 | 114 434 |
| Victoria Dock | 26 717 | 35 503 | 61 027 | 55 337 | 54 751 |
| South Wharf | 41 148 | 36 104 | 43 681 | 54 853 | 54 926 |
| Other | 8 232 | 10 707 | 13 659 | 23 971 | 28 425 |
| Total | 386 272 | 425 906 | 431 089 | 471 512 | 511 327 |

a. Comparable information is not publicly available for later years.

*Source:* Port of Melbourne Authority (1980 p7).

1. For a more detailed discussion of cargo centralisation, see BTE (1982).

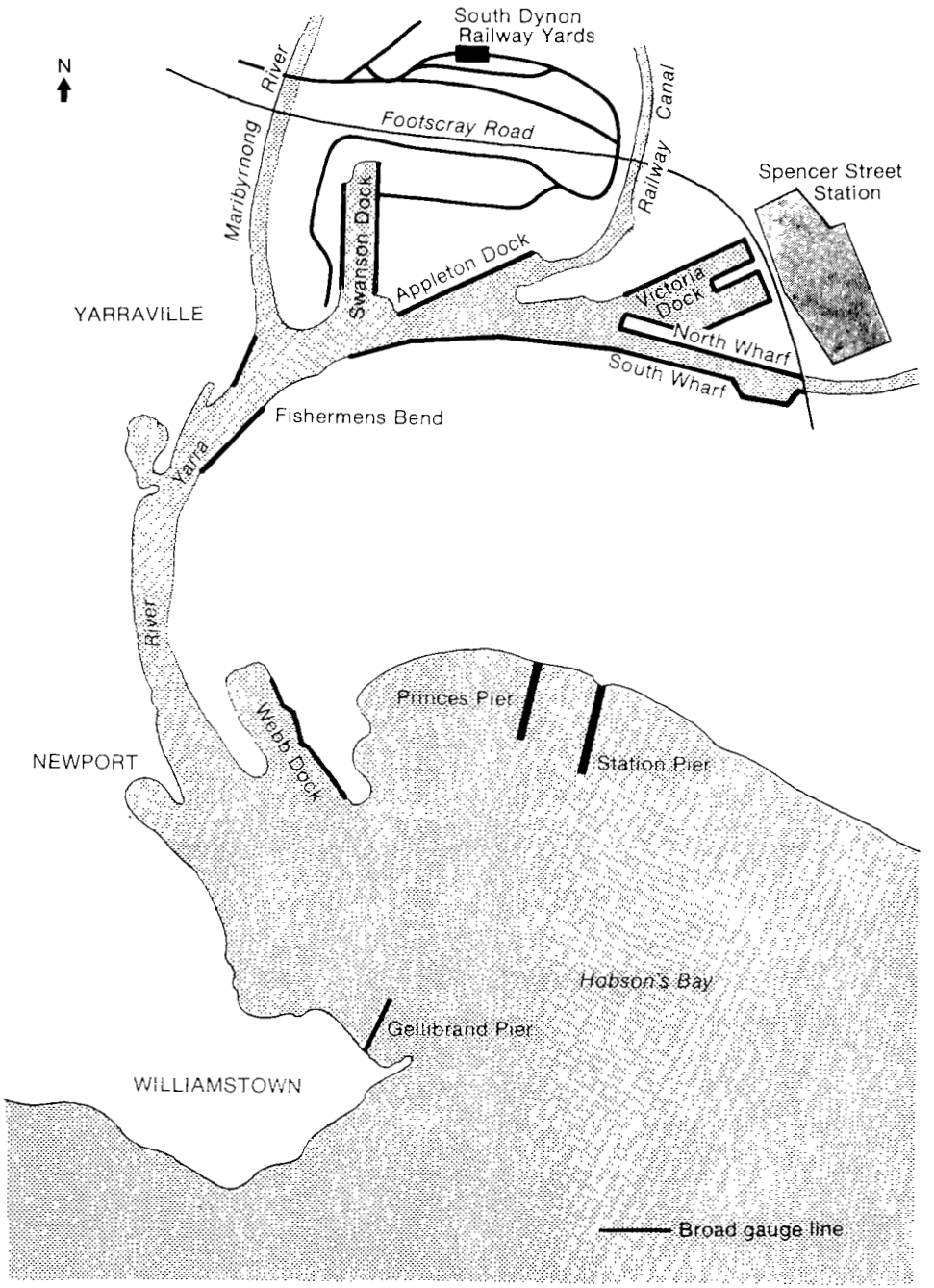


**Figure 14.1—Major facilities in the Port of Melbourne**

The Port of Melbourne Authority developed Swanson Dock as the port's major overseas container facility. Operations at Swanson Dock commenced in 1969 and the terminal has since been progressively expanded to cope with increased traffic. There are now seven berths at Swanson Dock, four on the west side and three on the east side. The current facilities are illustrated in Figure 14.2.

The facilities at West Swanson Dock are operated exclusively by Seatainer Terminals Ltd, who also own the four twin-lift container cranes located there. Major shipping companies and consortia using this terminal include OCL, Seabridge and Columbus.

East Swanson Dock is shared on a common user basis by five operators; Trans Ocean Terminals, Liner Services, Strang, Patrick and Australport. Each of these stevedores may use any berth on the east side and the two largest operators, Trans Ocean Terminals and Liner Services, have invested in terminal facilities (Port of Melbourne Authority 1981b p2). The three twin-lift 45 tonne and two single-lift 35 tonne gantry cranes at East Swanson Dock are owned by the Port of Melbourne Authority (Port of Melbourne Authority 1982b p2). Major shipping companies and consortia using this terminal include ACTA and ANL.

Both sides of Swanson Dock are connected to Victoria's broad gauge (1600 mm) rail network and there is also road access. River channels and the berths at Swanson Dock have been dredged to a depth of 13.1 metres which is sufficient for the largest container vessels regularly used in Australia's overseas trades, and there is a three year programme to widen the Yarra River channel bottom to 152 metres as far as Swanson Dock (Port of Melbourne Authority 1982a p2).

A total of 257 234 TEUs of overseas containers were handled at the Swanson Dock complex in 1980–81. This represented 50.6 per cent of the port's total container traffic and 65.8 per cent of overseas container traffic in that year (Port of Melbourne Authority 1981a p14).

As noted earlier, the practice of cargo centralisation has resulted in significant movements through Swanson Dock of overseas containers with ultimate origins or destinations in other States. Table 14.3 summarises the available information on the origins and destinations of cargo movements through Swanson Dock and the adjacent B and C Appleton berths, the latter being included because they are under a first-call agreement with Liner Services who integrate operations there with their Swanson Dock terminal[1]. Total traffic at the terminals is also included in the table.

TABLE 14.3—ORIGINS AND DESTINATIONS OF CONTAINER MOVEMENTS THROUGH THE SWANSON DOCK AREA, 1976-77 TO 1980-81

*(TEUs)*

| *Origin/destination* | *1976-77* | *1977-78* | *1978-79* | *1979-80* | *1980-81* |
|---|---|---|---|---|---|
| New South Wales | 2 407 | 1 569 | 1 850 | 4 848 | 2 888 |
| Queensland | 501 | 227 | 412 | 1 492 | 825 |
| Northern Territory | 0 | 67 | 235 | 213 | 393 |
| Western Australia | 2 694 | 2 425 | 2 954 | 3 048 | 2 947 |
| South Australia | 28 621 | 23 632 | 24 025 | 25 132 | 26 616 |
| Other (including Victoria) | 220 954 | 199 031 | 216 245 | 241 058 | 236 019 |
| Total | 255 177 | 226 951 | 245 721 | 275 791 | 269 688 |

*Source:* Port of Melbourne Authority, personal communication.

1. The accuracy of the origin/destination data is, of course, dependent on the accuracy of the information provided by shipping companies with the manifests.

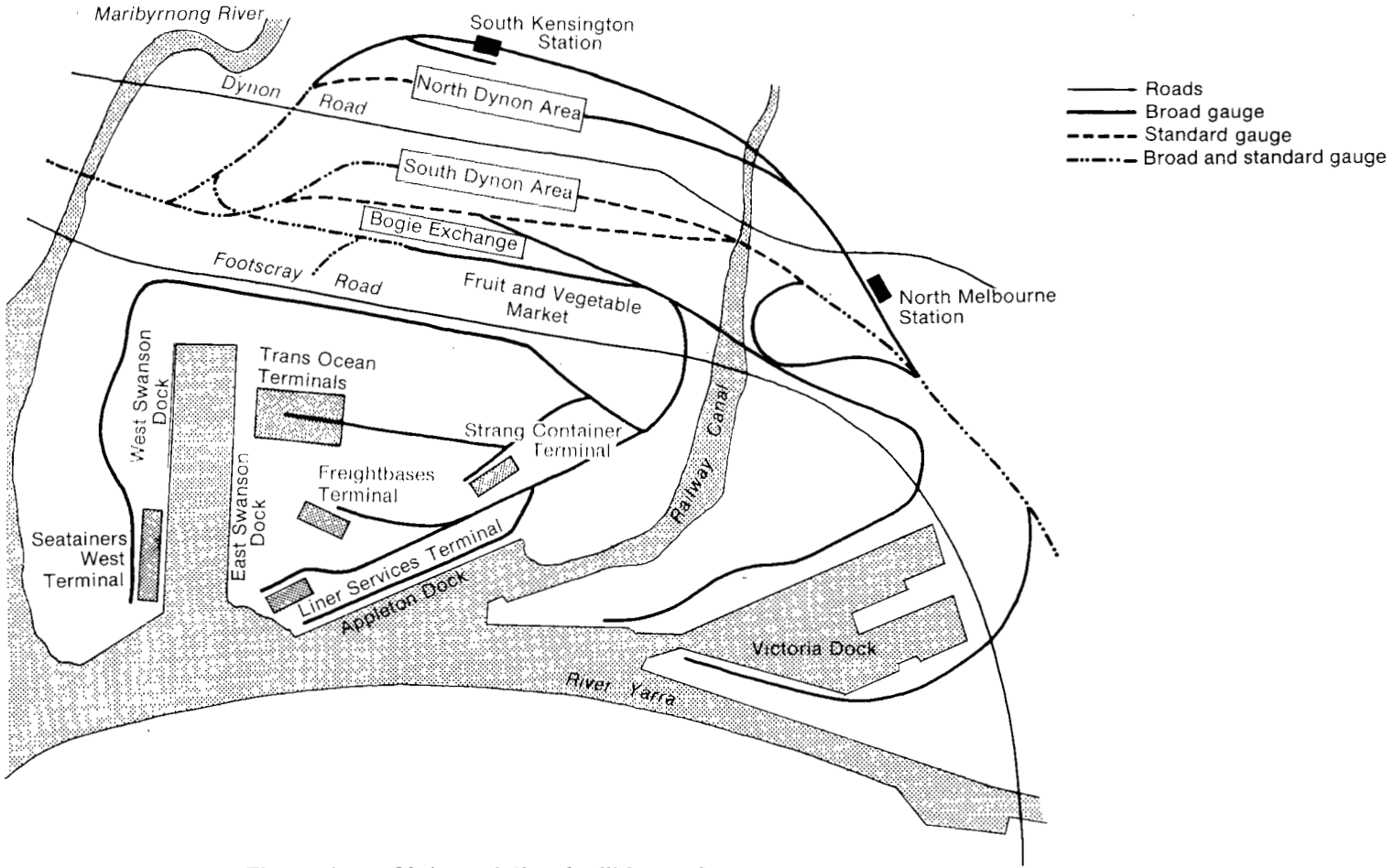


**Figure 14.2—Major existing facilities at Swanson Dock and adjacent areas**

The data in Table 14.3 indicate that the majority of containers handled at Swanson Dock have an Australian origin or destination in Victoria. The major interstate movements on the mainland involve South Australian cargo. The Port of Adelaide was one of the smaller ports which lost a significant number of shipping services when containerisation was introduced into the major overseas trades and, despite the completion of a deepwater container terminal in that port in 1977, substantial tonnages of South Australian import and export cargo are still centralised through the Port of Melbourne. This is a regular, high volume centralisation operation which is based on the broad gauge rail link between Adelaide and Melbourne.

New South Wales cargo handled at Swanson Dock appears to mainly involve overseas containers transferred between Sydney and the Port of Melbourne as well as agricultural exports from southern New South Wales. Containers centralised between Sydney and Swanson Dock using the standard gauge (1435 mm) rail network are currently transferred by road between the South Dynon freight terminal and the port area, as the rail connection to Swanson Dock is broad gauge. Queensland cargo moving to and from Swanson Dock using the standard gauge rail system also follows this pattern as it must pass through Sydney.

It is evident from Table 14.3 that the volume of overseas containers handled at Swanson Dock has not shown any sustained trend in recent years. As a result of improvements completed in 1981, Swanson Dock can handle seven ships continuously and has an annual capacity of at least eight million tonnes of cargo and 450 000 containers (Port of Melbourne Authority 1980 p5). This is significantly greater than current traffic volumes. Future traffic through Swanson Dock will be influenced by various factors including developments at other locations in the port which are discussed in the following section.

## OTHER CONTAINER FACILITIES AND FUTURE DEVELOPMENT

As noted earlier, there are several major container handling facilities at other locations in the Port of Melbourne.

Webb Dock, which is the second largest container terminal in the port, accounted for 22.3 per cent of total container traffic in 1980–81 (Port of Melbourne Authority 1981a p14). This terminal was originally developed in the late 1950s to cater for the coastal passenger and cargo trades with Tasmania but now also handles several overseas services. It currently comprises five roll-on/roll-off berths and associated facilities.

Victoria Dock includes a major roll-on/roll-off terminal operated by the Union Steamship Company of New Zealand and a number of conventional cargo berths. The 16 Victoria Dock berth was recently reconstructed at a cost in excess of $11 million to provide a common user roll-on/roll-off and container berth which includes a new single-lift gantry crane owned by the Port of Melbourne Authority (Port of Melbourne Authority 1981a p5). Work on a second multi-purpose roll-on/roll-off container complex at Victoria Dock commenced during 1981–82 (Port of Melbourne Authority 1982a p5).

Appleton Dock contains three general cargo berths used mainly for container, roll-on/roll-off, quarter ramp and unit load vessels. It also has two other berths which have recently been the subject of a feasibility study for improved bulk cargo facilities (Australian Chamber of Shipping 1981 p44). South Wharf includes berths for roll-on/roll-off vessels (eg PAD, Tasmanian trade) as well as facilities for unit cargoes.

The pattern envisaged for the future development of container handling facilities in the Port of Melbourne was outlined in a revised Forward Development Plan to the Year 2000 that was released in late 1980. Plans for additional overseas container berths at Webb Dock were approved in September 1980. An additional three container berths at Fishermen's Bend were also included in the Forward Development Plan,

although it was anticipated that these would not be required before the turn of the century (Port of Melbourne Authority 1981a pp4-5).

The new Webb Dock facilities will probably attract some traffic from the Swanson Dock and Appleton areas (Port of Melbourne Authority 1981b p18 and State Development Committee 1981 p42). However, the Port of Melbourne Authority expects that the growth rate for total trade through Swanson Dock will still be slightly higher than the 3.5 to 4.0 per cent per annum forecast for general cargo through the port as a whole over the period to 2000.

The only other container facility in Victoria which could affect future traffic through Swanson Dock is the new terminal in the Port of Geelong. The Corio Container Terminal commenced operations in January 1982 and currently includes a 275 metre berth with a depth alongside of 11.0 metres and a 40 tonne single-lift container crane. It is anticipated that the majority of the traffic through this facility will have an origin or destination in Victoria.

# CHAPTER 15—OPTIONS FOR STANDARD GAUGE RAIL ACCESS INTO SWANSON DOCK

The current rail link to Swanson Dock is described in this chapter and the various options for providing standard gauge rail access, together with the estimated construction costs, are discussed.

## CURRENT RAIL LINKS

As discussed in Chapter 9, the Victorian Railways track network is predominantly broad gauge (1600mm), the only other track being the standard gauge (1435mm) railway between Melbourne and Albury in New South Wales. The interstate passenger terminal in Melbourne is located at Spencer Street station and the major standard gauge container terminal is at South Dynon. Both of these facilities are also connected to the broad gauge system and the South Dynon terminal incorporates bogie exchange and transhipment equipment.

There are a number of rail connections to the Port of Melbourne but these are all currently broad gauge. The major port facilities with rail access at present include Swanson Dock, Appleton Dock, Victoria Dock, North Wharf, Princes Pier and Station Pier. In addition, the Victorian State Government announced in December 1982 that it would proceed with construction of a direct rail link from the Spencer Street rail yards to Webb Dock (Minister of Public Works 1982). Provision of rail access to Webb Dock had been under consideration for a number of years, but problems had been encountered in identifying an acceptable alignment for the proposed track.

The current rail link to the Swanson Dock area is illustrated in Figure 14.2. Access to this area is provided by a broad gauge track from South Dynon which crosses Footscray Road between the fruit and vegetable markets and the Railway Canal. Within the port area, the link comprises five major branches which terminate at the Seatainers terminal at West Swanson Dock and at the facilities operated by Trans Ocean Terminals, Liner Services, Freightbases and Strang at East Swanson Dock. These branches provide broad gauge rail access for most of the terminal and depot operators in the Swanson Dock area. There is also an associated connection to the facilities at Appleton Dock.

The broad gauge track to Swanson Dock permits the direct rail transport of cargo between the port area and other broad gauge facilities in Victoria. It also provides a direct link to several locations in southern New South Wales served by across-border extensions of the Victorian Railways network and to various stations on South Australia's broad gauge system, including Adelaide. Statistics collected by the Victorian Railways indicate that 71 600 empty and full containers were moved over the broad gauge links to Swanson Dock and Appleton Dock in 1979–80. Most of this traffic had an Australian origin or destination in Victoria, South Australia or to a lesser extent Western Australia.

Traffic moving by rail between Swanson Dock and locations on the standard gauge system in New South Wales or Brisbane is currently subject to a change of gauge due to the lack of a standard gauge link to Swanson Dock. A complete rail operation could be obtained by either using the bogie exchange facilities at South Dynon or transhipping containers there between broad and standard gauge wagons. However, the Victorian Railways do not currently bogie exchange or rail/rail tranship

this traffic, and the transfer between Swanson Dock and the standard gauge railhead at South Dynon is therefore performed by road transport. This involves an average round trip of approximately six kilometres.

The Port of Melbourne Authority has estimated that rail traffic for the Swanson Dock container terminals is currently equivalent to about 30 per cent of berth throughput at West Swanson Dock and about 20 per cent at East Swanson Dock. Containers are also railed to and from the depots near Swanson Dock which pack and unpack LCL containers, position empty containers to Victorian country areas for loading with export cargo and provide storage facilities for some of the terminal operators. In addition, the Freightbases depot operates as a major broad gauge railhead for Webb Dock traffic due to the current lack of rail facilities at that port area. By 1981 this depot accounted for an estimated 50 per cent of the 12 000 TEU's per annum transferred by road between Webb Dock and railheads in Melbourne (State Development Committee 1981 p41 and p45).

## STANDARD GAUGE OPTIONS AND CONSTRUCTION COSTS

The most economical route for a standard gauge rail link to Swanson Dock involves a connection from the existing standard gauge track which terminates at the fruit and vegetable markets near South Dynon. There are three options available for the provision of standard gauge rail access in the Victorian situation, namely new standard gauge track, dual gauging of existing broad gauge track and direct conversion from broad to standard gauge by moving one rail across to create a 1435mm separation.

Construction of a new and separate standard gauge track is the most expensive option as it would require the provision of new earthworks, ballast, sleepers and rails together with additional signalling. Under this option, the existing broad gauge links to Swanson Dock and Appleton Dock would be retained.

The second standardisation option involves dual gauging of the current broad gauge link by fastening a third rail at a 1435mm separation from one of the rails on the existing sleepers. This would utilise existing earthworks, ballast and sleepers but some signalling and other improvements would be required. Significant expenditure would also be required to dual gauge turnouts. All existing broad gauge links would be retained with this option.

Victorian Railways officials have expressed concern that dual gauge track can result in safety problems where high speed passenger trains are operated. However, this would not apply to the Swanson Dock link as there is no passenger traffic on this line section and the wagons and locomotives travel at low speeds. Dual gauge would therefore be an acceptable option for the provision of standard gauge access to Swanson Dock.

The third standardisation option involves the direct conversion of the existing broad gauge track by moving one of the rails across to provide a 1435mm separation. This would utilise existing earthworks, ballast, sleepers and rails. However, it would eliminate broad gauge access to Swanson Dock with the result that intrastate traffic would be excluded from the link. South Australian rail traffic would also be excluded unless the Melbourne-Adelaide track was standardised. In addition, broad gauge access to the general cargo and bulk facilities at Appleton Dock would be lost. The volume of broad gauge traffic that would either be transhipped at South Dynon or diverted to other modes in these circumstances would be substantial. The level of standard gauge traffic would be only a fraction of this figure unless the Melbourne-Adelaide link and substantial sections of the Victorian country network were also standardised (see Chapter 16). It was concluded, therefore, that direct conversion of the existing Swanson Dock link was not an acceptable standardisation option at this stage, and hence only the new standard gauge track and dual gauge options were examined in detail in the study.

Construction cost estimates for the provision of standard gauge rail access to Swanson Dock were prepared by Victorian Railways officials. The estimates were based on the connection of all sidings at Swanson Dock to the standard gauge system, although in practice several of these sidings do not handle overseas containers moved to and from Sydney. Exclusion of the latter facilities from the project would not be expected to substantially reduce the costs of standardisation under the dual gauge option as the track lengths involved are relatively short and many of the turnouts would still require some modification if dual gauging was undertaken on the main line sections. Similarly, the effect on construction costs under the new standard gauge track option would probably not be substantial. Approximately 10.4 kilometres of track would be involved in complete standardisation of the Swanson Dock branch lines and sidings under the dual gauge option.

A new standard gauge track to Swanson Dock was estimated to cost $3.5 million. This figure was used in the study. Any revision to more accurately reflect the cost of the minimum connections required to handle the overseas container traffic to and from Sydney would not be expected to significantly alter the estimate or the general conclusions of the evaluation.

Victorian Railways officials advised that, under the dual gauge option, a short section of new standard gauge track costing $275 000 would be required between the fruit and vegetable markets and Footscray Road. Dual gauge on this section could reportedly result in the binding up of wheel flanges on bogie rolling stock due to the tight curvature of the existing track. In addition, a large number of turnouts serving existing broad gauge sidings would have to be converted to dual gauge if a third rail was laid on this section, and this would involve significant expenditure. This section of the line is, however, the only part that could not be successfully dual gauged.

The estimates provided by Victorian Railways officals indicated that the predominantly dual gauge option would cost $2.6 million, the major components being $850 000 for conversion of turnouts to dual gauge and $1 million for laying of the additional rail. A further $200 000 would be required for crossing pavement alterations and signalling work, and a 10 per cent contingency allowance was included.

Examination of construction costs for recent railway projects in Australia suggested that this cost estimate was relatively high for what is essentially a low speed branch line. After detailed consideration of the cost estimates and recent experience in Australia, it was concluded that a figure of $2.0 million would more closely approximate the likely cost of dual gauging the link (including a short section of new track).

The following construction costs were therefore used in the evaluation of the proposed standard gauge link to Swanson Dock:

- New standard gauge track $3.5 million;
- Dual gauging with a short section of new track between the fruit and vegetable markets and Footscray Road $2.0 million.

Construction time in both cases was assumed to be 12 months.

# CHAPTER 16—POTENTIAL STANDARD GAUGE TRAFFIC TO SWANSON DOCK

Construction of the proposed standard gauge rail link would provide a direct connection between Swanson Dock and the standard gauge rail system in Australia. The standard gauge system currently includes Brisbane, Adelaide, Perth, virtually all stations in New South Wales and various other locations in South Australia, Western Australia and the Northern Territory. As noted in Chapter 15, Victoria is currently connected to this network by the track from Albury to Melbourne. Major current and proposed standard gauge rail facilities in Australia are illustrated in Figure 1.1.

In the absence of a standard gauge link between Melbourne and Adelaide, a connection to Swanson Dock would only be expected to affect traffic having an origin or destination in New South Wales or Queensland. With the minor exception of the broad gauge extensions into southern New South Wales, this traffic must currently move along the standard gauge system if it is railed to or from Melbourne. There is already a broad gauge connection between Adelaide and Swanson Dock and, under current arrangements, this would continue to carry South Australian cargo centralised by rail through the Port of Melbourne. Similarly, Western Australian and Northern Territory cargo handled at Swanson Dock would also move along the broad gauge system with bogie exchange in Adelaide, as this route would involve a much shorter rail distance than the standard gauge system passing through New South Wales[1].

The New South Wales and Queensland traffic affected by construction of the proposed link would be determined by the nature of port activities in the Swanson Dock area. In practice this would only involve overseas containers, but possible movements of bulk commodities to the adjacent Appleton Dock area were also considered.

## OVERSEAS CONTAINERS

The discussion in Chapter 14 indicated that significant numbers of overseas containers with an origin or destination in New South Wales or Queensland are currently handled in the Swanson Dock area. The transfers between these interstate locations and the Swanson Dock area involve both transhipments, where the containers are loaded with overseas cargo, and positioning movements where no overseas cargo is carried. Both rail and road transport are used for the interstate transfers.

The available information indicates that there has been a significant, though highly variable, volume of transhipment traffic between New South Wales/Queensland and the Swanson Dock area in recent years. This has mainly resulted from strikes or congestion in various ports which necessitate the movement of overseas containers through alternative facilities.

Significant numbers of containers are also positioned between Sydney and Melbourne, with the majority of these movements normally being into Melbourne. As a high proportion of overseas containers exported through the Port of Melbourne carry agricultural commodities which exhibit strong seasonality in production,

1. Even if the proposed Tocumwal-Mangalore standard gauge rail link was also built, movement of Western Australian and Northern Territory cargo through Broken Hill would involve an extra 465 kilometres compared to the Adelaide route. If this link was not constructed, use of the standard gauge system would involve the route through Albury and the differential would be increased to at least 597 kilometres.

additional containers must be positioned into Melbourne to provide adequate capacity for export cargoes during peak times. Sydney is a major source of the additional containers because containerised imports through the Port of Sydney typically exceed containerised exports and the excess containers must either be re-exported or positioned within Australia.

Discussions with shipping companies during the study indicated that many of the positioning movements in Australia are undertaken by freight forwarders or container leasing companies. As discussed in Chapter 4, containers granted temporary admission to Australia may be used for the domestic carriage of cargo subject to the conditions that the domestic journey brings the container nearer to the port from which it is to be re-exported and that the container can only be used once for transport of domestic cargo. It is therefore common practice for shipping companies to arrange positioning movements through freight forwarders who load the containers with domestic cargo, deliver them to consignees in Victoria and after unloading transport them to the exporters' facilities for packing with export cargo. As the final deliveries to the Melbourne port area are from locations in Melbourne or country Victoria, they inevitably involve road transport or the broad gauge rail system. These containers would therefore not move along a standard gauge rail link to the port.

Estimation of the current volume of overseas container transfers between the Swanson Dock area and New South Wales/Queensland is made difficult by the lack of comprehensive statistics detailing these movements. However, an indication of the magnitude of the traffic involved can be obtained by reference to several sets of data, although differences in coverage and collection techniques result in various limitations. The sources of these data are the BTE report on cargo centralisation, the Port of Melbourne Authority port statistics, a Railways of Australia Systems Planning and Development Committee report on main line traffic and the Australian Chamber of Shipping's estimates of overseas container movements.

The BTE report on cargo centralisation in Australia's overseas liner trades, which was published in 1982, included the results of a survey of interstate transfers of overseas containers in Australia in 1976–77 (BTE 1982 pp23–36). The estimates of movements between Sydney and Melbourne are reproduced in Table 16.1.

The results of the survey indicated that a total of 7333 TEUs of overseas containers were transferred between Sydney and Melbourne in 1976–77. These transfers comprised 4000 TEUs of transhipments and 3333 TEUs of positioning movements, with the predominant traffic flow in both cases being from Sydney to Melbourne. The rail system reportedly carried most of the transhipments but this was not the case for positioning movements, where an estimated 66 per cent of the traffic was transported by road and only 32 per cent by rail[1].

The usefulness of the survey results for the purposes of the present study is limited by the absence of any information on the proportion of the transfer traffic that directly involved the Swanson Dock area and possible changes in the volume and pattern of transfer traffic since 1976–77.

Discussions with several major shipping companies confirmed that most transhipments between Sydney and Melbourne are still carried by rail and that road transport is used for a significant proportion of positioning movements, although

1. The survey data presented in the report on cargo centralisation probably underestimate the actual volume of positioning movements, as the practice of loading containers with domestic cargo often results in rail authorities recording the movements as domestic cargo rather than as overseas containers. The statistics therefore understate the true positioning task as well as the proportion of positioning movements on the Sydney-Melbourne corridor carried by the rail system. As an indication of the possible level of underestimation of this traffic, the State Rail Authority noted that around 70 per cent of the 'empty' containers positioned from Sydney to Brisbane in 1976–77 were loaded with domestic cargo (BTE 1982 p32).

in the latter case the market share may be less than that reported in the cargo centralisation study.

The Port of Melbourne Authority prepares statistics on interstate cargo movements through the Swanson Dock area. These were presented in Chapter 14, and the figures for New South Wales and Queensland cargo between 1976–77 and 1980–81 are reproduced in Table 16.2.

The Port of Melbourne Authority statistics indicate that there is a high degree of variability in the annual volumes of New South Wales and Queensland cargo moved through the Swanson Dock area. This reflects the nature of these movements which, apart from some southern New South Wales traffic, generally involve a response to short run problems in the transport system rather than the benefits of regular, high volume cargo centralisation along the lines of the Brisbane-Sydney and Adelaide-Melbourne corridors. The consultant who conducted the survey of container movements in Australia for the BTE study on cargo centralisation noted that movements of overseas containers between Sydney and Melbourne were mostly due to strikes or ship queuing in the respective ports (BTE 1981 unpublished). Similarly, the report of the Commission of Inquiry into the Kyeemagh-Chullora Road stated that industrial disputation was the major reason for the diversion of containerised

TABLE 16.1—ESTIMATED MOVEMENTS OF OVERSEAS CONTAINERS BETWEEN SYDNEY AND MELBOURNE BY TYPE, DIRECTION AND MODE, 1976–77

*(TEUs)*

| *Type/mode* | *Sydney-Melbourne* | *Melbourne-Sydney* | *Total* |
|---|---|---|---|
| Transhipments | | | |
| Rail | Most | Most | Most |
| Road | na | na | na |
| Sea | na | na | na |
| Total | 3 000 | 1 000 | 4 000 |
| Positioning movements | | | |
| Rail | 1 059 | 4 | 1 063 |
| Road | 2 150 | 60 | 2 210 |
| Sea | 60 | 0 | 60 |
| Total | 3 269 | 64 | 3 333 |
| Total | 6 269 | 1 064 | 7 333 |

na not available

*Source:* BTE (1982).

TABLE 16.2—NEW SOUTH WALES AND QUEENSLAND CARGO MOVEMENTS THROUGH THE SWANSON DOCK AREA, 1976–77 TO 1980–81

*(TEUs)*

| *Origin/destination* | *1976–77* | *1977–78* | *1978–79* | *1979–80* | *1980–81* |
|---|---|---|---|---|---|
| New South Wales | 2 407 | 1 569 | 1 850 | 4 848 | 2 888 |
| Queensland | 501 | 227 | 412 | 1 492 | 825 |
| Total | 2 908 | 1 796 | 2 262 | 6 340 | 3 713 |

*Source:* Port of Melbourne Authority, personal communication.

trade from Sydney to Melbourne (Commission of Inquiry into the Kyeemagh-Chullora Road 1980 p177). Discussions with several shipping companies and terminal operators during this study indicated that these are still the major reasons for transhipments of overseas containers along the Sydney-Melbourne corridor.

The traffic data in Table 16.2. indicate that New South Wales cargo accounted for the majority of New South Wales/Queensland traffic handled in the Swanson Dock area over the period from 1976-77 to 1980-81. However, the direction and, in broad terms, the relative magnitude of the variations in annual movements for the two groups of containers were similar in each year. The most likely reason for this similarity in the pattern of movements is that some of the Queensland traffic regularly centralised through the Port of Sydney was redirected through Swanson Dock when facilities in Sydney were affected by factors such as strikes and congestion.

The statistics prepared by the Port of Melbourne Authority may not provide an accurate guide to the traffic that would have passed over a standard gauge link to Swanson Dock during these years. The reliability of the interstate origin/destination breakdown is dependent on the accuracy of the information provided by the shipping companies with the manifests which, in any case, may not be appropriate for the purposes of this study. The statistics may also include some movements of agricultural commodities from southern New South Wales that would not be expected to move along a standard gauge rail link to Swanson Dock. In addition, they do not provide any information on transport arrangements for the interstate transfers.

The final source of data on overseas container movements to and from Swanson Dock is the statistics on interstate rail movements of overseas containers. The information on rail transfers between Sydney/Brisbane and Melbourne is presented in Table 16.3 which incorporates rail authority estimates for 1980-81 (provided by the Railways of Australia Systems Planning and Development Committee) and the Australian Chamber of Shipping's best estimates for 1981-82. These statistics detail numbers of containers but the figures are less than 10 per cent higher if expressed on a TEU basis[1].

The statistics compiled by the Systems Planning and Development Committee and the Australian Chamber of Shipping did not separately identify how many of the overseas containers railed along the Sydney-Melbourne corridor had an origin or destination at Swanson Dock. No organisation collects detailed data on the number of standard gauge rail movements that involve the Swanson Dock area, but discussions with Victorian Railways officials revealed that about 40 per cent of the overseas containers handled at the South Dynon standard gauge freight terminal have an origin or destination at Swanson Dock. On the basis of this proportion, it was estimated that in 1980-81 and 1981-82 approximately 3600 and 2500 overseas containers respectively were transferred between Swanson Dock and Sydney/Brisbane using the standard gauge rail system[2].

These estimates provide further evidence of the substantial variations in the level of interstate transfers of overseas containers along this corridor. The Port of Melbourne Authority statistics on interstate cargo movements through the Swanson Dock area presented in Table 16.2 indicate that New South Wales and Queensland cargo movements in 1980-81 were equal to 109 per cent of the average annual movement over the five years to 1980-81. If it is assumed that the figures for these

1. A detailed breakdown of the 1981-82 estimate by the Australian Chamber of Shipping indicates that only 421 40 foot units were transferred along the corridor in that year and that the TEU figure was only 7 per cent higher than the estimate based on numbers of containers.

2. The practice of using container positioning movements for domestic cargo may cause the rail authorities' statistics to underestimate movements on the Melbourne-Sydney/Brisbane corridor in 1980-81 However, most of these containers would probably be received from or delivered to locations other than Swanson Dock, and hence this should not substantially affect the accuracy of the estimates for Swanson Dock traffic.

TABLE 16.3—INTERSTATE RAIL MOVEMENTS OF OVERSEAS CONTAINERS BETWEEN MELBOURNE AND NEW SOUTH WALES/QUEENSLAND, 1980-81 AND 1981-82

*(Number of containers)*

| *Origin/destination* | *1980-81*[a] | *1981-82*[b] | | |
|---|---|---|---|---|
| | | *Full* | *Empty* | *Total* |
| Melbourne-Sydney | 4 203 | 1 640 | 284 | 1 924 |
| Sydney-Melbourne | 3 202 | 1 825 | 1 039 | 2 864 |
| Melbourne-Brisbane | 800 | 95 | 740 | 835 |
| Brisbane-Melbourne | 700 | 576 | 116 | 692 |
| Total Melbourne traffic | 8 905 | 4 136 | 2 179 | 6 315 |
| Swanson Dock component[c] | 3 562 | | | 2 526 |

a. Estimate provided by Railways of Australia Systems Planning and Development Committee.

b. Australian Chamber of Shipping's best estimate.

c. Computed by applying to the total Melbourne traffic figure the Victorian Railways' estimate that 40 per cent of overseas container traffic moving through the South Dynon standard gauge terminal has an origin or destination at Swanson Dock.

*Source:* Railways of Australia, Australian Chamber of Shipping, Victorian Railways, personal communications.

five years satisfactorily reflect the variability of movements involving the standard gauge rail system, they suggest that over this period an average of around 3270 containers per annum were transferred between Swanson Dock and Sydney/Brisbane using the standard gauge system. The average figure is increased substantially by the very large movements through Swanson Dock that were recorded in 1979-80, and an average of 2560 containers is obtained if this year is deleted from the calculations[1].

Containers moved between Swanson Dock and Sydney or Brisbane are the major potential traffic along the proposed standard gauge connection. However, some containers for Webb Dock could also move along the link. It was noted in Chapter 15 that the Freightbases depot at Swanson Dock handles an estimated 50 per cent of the broad gauge rail traffic which requires road transfer to and from Webb Dock. Under current arrangements, any overseas containers moved between Webb Dock and Sydney/Brisbane using the standard gauge rail system would be transferred by road between Webb Dock and the South Dynon terminal. However, the provision of standard gauge rail access to Swanson Dock could result in some of this traffic being railed to and from the Freightbases depot if the standardisation project included this facility.

A total of 49 482 TEUs of overseas containers were handled at Webb Dock in 1980-81 and this was equivalent to 19.2 per cent of throughput at Swanson Dock in that year (Port of Melbourne Authority 1981b p7 and 1981a p14). If it is assumed that the proportion of overseas containers transferred to and from New South Wales and Queensland is the same for the two port areas, the redirection of 50 per cent of the Webb Dock standard gauge traffic through the Freightbases terminal would only increase potential traffic along the proposed link by a maximum of 10 per cent under recent conditions. In practice, the volume of potential Webb Dock traffic, if any, would probably be much lower than this as it would be quicker for shipping companies to move containers direct to and from South Dynon rather than have

1. The extent to which agricultural exports transported by road or on the broad gauge rail system from southern New South Wales contributed to annual variations in Swanson Dock movements over the five year period is not known. Exclusion of this source of containers could significantly change the pattern of movements and hence the relative position of the 1980-81 figure and the size of the average standard gauge rail movement involving Swanson Dock

them shunted between South Dynon and the Freightbases depot. The situation with respect to any standard gauge traffic for Webb Dock could, of course, be affected by the construction of the proposed rail link to that port area.

The improved rail service for interstate transfers of overseas containers that would result from the provision of standard gauge rail access to Swanson Dock would not be expected to result in any significant diversion of traffic from road to rail in the Melbourne-Sydney/Brisbane corridor. It was noted above that road transport accounts for a significant proportion of positioning movements but only a small proportion of transhipments. Discussions with officials from several major shipping companies indicated that the reasons for using road transport include faster delivery, the ability to respond at short notice, movement of over-dimensional and over-weight cargo and unavailability of sufficient railway rolling stock. As the proportion of transfer traffic on the Melbourne-Sydney/Brisbane corridor carried by road transport is underpinned by various quality of service and other considerations, it seems unlikely that there would be any significant diversion of transfer traffic from road to rail transport following the provision of the short standard gauge rail link into Swanson Dock.

The only other significant source of overseas container traffic that could potentially move along the proposed link involves rice from three mills located on the standard gauge system in southern New South Wales. Most of the containers packed at the Leeton, Griffith and Yenda mills are currently railed to Sydney for export, and in a normal year a further 10 000 tonnes is moved by road to Melbourne. Standardisation of the link to Swanson Dock alone would probably not affect the transport arrangements for this traffic as use of the standard gauge network would involve a long trip through Albury. Only one of the mills would be closer by rail to Swanson Dock than to the Port of Sydney in these circumstances, and the distance saved by diverting rice from this mill to Swanson Dock would be less than 20 kilometres. However, the situation might be different if a standard gauge link was provided between Tocumwal and Mangalore (see below).

It was concluded that the only potential overseas container traffic along the proposed standard gauge link (in the absence of a similar connection between Tocumwal and Mangalore) would be transfers between Swanson Dock and Sydney/Brisbane. These movements have probably averaged around 3500 containers per annum in recent years.

It is difficult to forecast potential container traffic over the evaluation period with an acceptable degree of confidence as the annual movements of overseas containers between Swanson Dock and Sydney/Brisbane have traditionally been highly variable in response to various short term factors and have shown no consistent long term trend. In addition, several recent and prospective developments could have a significant impact on the level of potential traffic along the proposed link.

The volume of potential traffic over the link as a result of congestion in eastern seaboard ports has probably been reduced by the establishment of the new container terminals at Botany Bay. These new facilities have a total capacity of 600 000 containers per annum and have more than doubled the container handling capacity of the Port of Sydney. The first terminal was commissioned in 1979 and the second terminal commenced operations in early 1982 (Maritime Services Board 1980 p10 and 1982a p8). Discussions with officials from shipping companies and container terminal operators indicated that these facilities are expected to reduce the need to divert containerised cargo through Swanson Dock.

The standardisation project considered in Part B of the report included the construction of a link between Tocumwal and Mangalore. Standardisation of the Tocumwal-Mangalore section as well as the link to Swanson Dock would permit the direct railing of containerised agricultural exports from southern New South Wales to the Swanson Dock area. In these circumstances, the rail distances to Swanson

Dock from the three rice mills connected to the standard gauge system would be between 99 and 151 kilometres less than the distances to the Port of Sydney. As approximately 180 000 tonnes of rice is railed from the mills to the Port of Sydney in a normal year, this could result in significant additional standard gauge traffic to Swanson Dock.

Officials of Ricegrowers' Co-operative Mills Ltd were not able to provide definite advice on whether significant quantities of rice would be diverted to Swanson Dock if the two links were constructed. They noted that their decision would be determined by a number of factors including freight rates and port charges.

Standardisation of the existing broad gauge rail link between Adelaide and Melbourne has been suggested on various occasions and is currently the subject of a joint study by Victorian Railways and Australian National officials. More than 37 000 containers were railed along this link to and from facilities in the Port of Melbourne in 1979–80, and hence standardisation of the Adelaide-Melbourne track could result in the movement of large volumes of overseas containers along the proposed standard gauge link to Swanson Dock if the present broad gauge link to Adelaide was eliminated. However, at this stage there has been no decision to proceed with the project.

The provision of standard gauge rail access to Swanson Dock would not be expected to affect the Australian port schedules of overseas container vessels. Officials of several shipping companies indicated that the most economic arrangement in the major overseas trades involves ship calls at both Melbourne and Sydney and that this would not be affected by construction of the proposed link. Thus, the provision of standard gauge access to Swanson Dock would not result in a significant reduction in container ship calls at Sydney or Melbourne accompanied by increased cargo centralisation between the two ports.

Similarly, the new container terminal at the Port of Geelong is not expected to significantly affect shipping schedules in the major overseas trades or interstate transfers of overseas containers through Swanson Dock. It is envisaged that this facility will mainly serve the smaller trades and that the majority of cargo will have an origin or destination in Victoria. The Port of Melbourne is therefore expected to remain the major Victorian centre for overseas containers transferred to or from Sydney and Brisbane.

Although the majority of overseas container transhipments between Swanson Dock and Sydney/Brisbane appear to result from factors such as congestion and strikes, there has also been some regular cargo centralisation along this corridor in the past. Ships operated by one company in the Middle East/Gulf trade for some time only called at Melbourne for eastern States traffic, and cargo from Sydney and Brisbane was regularly centralised through that port. However, in mid-1982 this operator extended its shipping service to include calls at Sydney, thereby reducing interstate transfers through Swanson Dock.

In view of these factors and the variability of overseas container movements between Swanson Dock and Sydney/Brisbane, it was concluded that specific forecasts of overseas container movements along the proposed link over the evaluation period could not be prepared with acceptable confidence limits. The economic evaluation in Chapter 17 is therefore undertaken by estimating the level of traffic that would be required to justify construction of the link and then comparing this with the level of traffic that could reasonably be expected on the basis of recent flows.

## BULK COMMODITIES

The only other possible traffic along a standard gauge rail link to Swanson Dock involves bulk commodities handled at Appleton Dock, since the two port areas are served by a common section of branch line. The Port of Melbourne Authority has

recently investigated the feasibility of providing a new bulk loading facility at Appleton Dock at a cost of between $5 and $8 million. Commodities that could move through this facility include briquettes, char and woodchips (Mayne 1982 p10).

The available information indicates that any bulk cargo loaded at Appleton Dock would probably have an origin in Victoria. It could therefore be transported to the port area along the existing broad gauge link. The major potential interstate traffic is coal from the Oaklands basin in southern New South Wales, but it seems unlikely at this stage that this coal will be exported. In addition, the most economical rail transport arrangement for this traffic would probably involve the extension of the Victorian Railways broad gauge system which already serves Oaklands. If any bulk commodities were to be sent to Appleton Dock using the standard gauge system, the proposed standard gauge link to Swanson Dock would probably also have to be extended to service the bulk handling facility.

In view of these factors, it was concluded that no bulk commodities were likely to move along the proposed link. This assumes that the existing broad gauge links between Appleton Dock and any major sources of bulk traffics in Victoria are retained.

## TOTAL TRAFFIC ESTIMATES

Under current conditions, a standard gauge rail link to Swanson Dock would only affect movements of overseas containers to and from Sydney/Brisbane. Potential traffic in recent years has probably averaged around 3500 containers per annum. If a standard gauge link between Tocumwal and Mangalore was also constructed, some additional containerised rice movements could occur.

# CHAPTER 17—ECONOMIC EVALUATION OF SWANSON DOCK LINK

In this chapter, the desirability of a standard gauge rail link to Swanson Dock is evaluated using cost-benefit analysis techniques. The evaluation draws on the traffic forecasts and construction cost estimates presented in the preceding chapters.

## BASE CASE

The high degree of uncertainty about the future volume of overseas container traffic having an origin or destination at Swanson Dock and moving along the standard gauge track to Sydney and Brisbane was discussed in Chapter 16. It was concluded that specific forecasts of traffic along the proposed link could not be prepared with an acceptable degree of confidence, and hence the approach used in the evaluation involved a comparison of the estimated annual benefits per container at recent traffic levels with the costs (expressed as an annuity) associated with standardisation. The annual volume of interstate container traffic that would result in a benefit-cost ratio of 1 was then derived and compared with recent flows to obtain an indication of whether the project would be acceptable on economic grounds.

The base case conditions are that, in the absence of standardisation, the transport arrangements for overseas containers moving between Swanson Dock and locations on the standard gauge rail system in New South Wales/Brisbane would be the same as the current system—ie road transport between Swanson Dock and the South Dynon freight terminal, transhipment between road and rail at South Dynon and standard gauge rail between South Dynon and interstate locations. The transhipment operation at South Dynon is based on the expected performance of the interstate road/rail container terminal which was completed in 1982 at a cost of $8.5 million. The facility includes two 33 tonne gantry cranes.

The possible impact of rice traffic from southern New South Wales if the proposed Tocumwal-Mangalore standard gauge link was also constructed is addressed separately.

## BENEFITS

The following potential benefits from the provision of standard gauge rail access to Swanson Dock were identified.

### South Dynon transhipment savings

The provision of standard gauge rail access to Swanson Dock would permit direct railing of overseas containers along the standard gauge system to and from interstate locations and hence eliminate the transhipment operation at South Dynon for this traffic. A reduction in transhipment traffic of around 3500 containers per annum would represent less than 10 per cent of the total traffic currently handled at the South Dynon container terminal.

It is difficult to estimate the transhipment costs per container that would actually be saved if there was a significant reduction in transhipment traffic at South Dynon. Discussions with railway officials and private operators engaged in rail/rail and road/rail transhipment operations revealed that potential savings are generally very

dependent on traffic volumes (particularly daily throughput), type of equipment and flexibility in labour usage.

The through-running of standard gauge wagons to Swanson Dock would remove the need to position wagons under the crane for road/rail transhipment of containers at South Dynon. However, similar wagon positioning movements would then be required at Swanson Dock, and hence any savings in shunting costs at South Dynon would be offset by additional activities at the Swanson Dock sidings. No significant net savings in the shunting costs associated with the transhipment operation would therefore be expected as a result of standardisation.

The savings that would be realised in the container transhipment operation (excluding shunting) would mainly involve labour, maintenance and electricity. One container transhipment facility operator suggested that the savings in these items from a marginal reduction in transhipment numbers could be as low as $3 per container. However, other available data indicate that a change in container transhipment volumes of the magnitude considered in this study could result in savings of about $10 per container.

The South Dynon container terminal was the subject of an economic evaluation by the Victorian Railways in 1979 (Victorian Railways 1979). The data in that report indicate that the incremental terminal operating costs for the present terminal operation were expected to be $6.80 per container (1979 prices). If this incremental cost figure also reflects the costs that could be avoided if there was a reduction of 3500 containers per annum in transhipment traffic at South Dynon, then savings in June 1982 prices as a result of standardisation of the Swanson Dock link would amount to $9 per container.

The pattern of overseas container transhipments between Swanson Dock and Sydney/Brisbane would be expected to make the avoidable transhipment costs associated with this traffic higher than the average for containers in general. As movement of the overseas containers is generally a response to random factors such as strikes and congestion, the traffic is lumpy and irregular. Some extra shifts and equipment would probably be required to handle the peaks associated with this traffic, and hence standardisation would be expected to provide greater potential savings in transhipment costs.

The detailed data provided by Queensland Railways officials for the Acacia Ridge operation considered in Chapter 5 also give an indication of the possible magnitude of the savings from a reduction in transhipment traffic. These data indicated that the average avoidable container transhipment cost at Acacia Ridge (including shunting activities) was approximately $23 (June 1982 prices). If shunting costs are excluded, the average avoidable transhipment cost per container for this facility would amount to approximately $9.

On the basis of this information, it was concluded that an avoidable transhipment cost estimate of $10 per container was appropriate for the purposes of the Swanson Dock study.

This estimate refers to savings in the short run when capital such as the cranes used for transhipment represents a sunk cost which cannot realistically be saved. In the long run all costs are avoidable, and hence a reduction in transhipment traffic resulting from the provision of standard gauge rail access to Swanson Dock could potentially permit savings or deferrals of future capital expenditure at the South Dynon container terminal. However, Victorian Railways officials advised that there are currently no significant capacity problems at the transhipment facility. There are no plans at this stage to increase capacity at South Dynon, and it was therefore concluded that elimination of the Swanson Dock transhipment traffic would not result in any significant benefits from the delaying of future capital investment.

**Road transfer savings**

Construction of the proposed link would permit the movement of standard gauge traffic by rail between South Dynon and Swanson Dock, thereby eliminating the current road transfer operation for overseas containers railed to or from Sydney/ Brisbane. This would result in significant savings in truck capital, operating costs and road pavement costs which would only be partly offset by increases in train operating costs.

The estimation of potential road transfer savings was based on the avoidable costs associated with a dedicated truck operating between South Dynon and Swanson Dock. The annual avoidable costs attributable to a dedicated truck were estimated and divided by the annual number of containers that such a vehicle could transfer to arrive at an estimate of potential road transfer savings per container.

This approach can result in an upper estimate of the potential savings. It is, for example, possible that container traffic over the relatively short South Dynon to Swanson Dock corridor could be carried by vehicles which would otherwise be idle between larger jobs, and in this case the capital savings component could be very small. Alternatively, elimination of the road transfer operation might release trucks for use in other tasks and hence reduce or defer the need for new vehicles, thereby providing significant capital savings.

The methodology based on a dedicated truck is considered to be an acceptable approach to the estimation of road transfer savings in the present context provided that these qualifications are appreciated. A large proportion of the container transfer traffic between South Dynon and Swanson Dock is handled by vehicles operated by organisations which are associated with shipping lines and major companies. The operators either use their own vehicles or employ sub-contractors (often on a tow operator basis) and generally confine their operations to the Melbourne docks or the metropolitan area. The transfer of containers between South Dynon and Swanson Dock appears to be a significant, though variable, business for a number of operators.

The avoidable costs attributable to a dedicated truck were estimated on the basis of a representative prime mover and trailer, the details of which are presented in Table 17.1. There is, of course, significant diversity in the specifications of the prime movers which are used in the current transfer operation, and the representative prime mover is to some extent a hybrid vehicle which represents an average of the current equipment.

The avoidable costs of the road transfer operation were considered in three categories, namely capital, operating costs and road pavement costs. Capital and the tyre component of operating costs involved uneven streams of costs over the evaluation period, and these were converted to equivalent annual costs by computing the annuity which had the same present value at each discount rate. Costs expressed on a kilometre basis were converted to annual costs using the average annual distance that a dedicated vehicle would travel (see details below). The annual avoidable resource cost of operating a dedicated vehicle between South Dynon and Swanson Dock over the evaluation period was calculated for discount rates of 4, 7 and 10 per cent.

The annual cost estimates, which are presented on an itemised basis in Table 17.2, were based on information provided by road freight firms currently operating over the route, companies engaged in general container transport and management activities in metropolitan Melbourne, vehicle manufacturers, State Government bodies and suppliers to the road transport industry. As the evaluation was based on resource costs, transfer payments such as sales tax and fuel excise were subtracted from financial cost data where possible. The estimation of the various components of road transfer costs is discussed in detail in Appendix II.

TABLE 17.1—DETAILS OF REPRESENTATIVE PRIME MOVER AND TRAILER FOR CONTAINER TRANSFER BETWEEN SOUTH DYNON AND SWANSON DOCK

| *Characteristic* | *Prime mover* | *Trailer* | *Total* |
|---|---|---|---|
| Vehicle type | Bogie drive | 20 foot skeletal | .. |
| Engine | 250 HP | .. | .. |
| Vehicle capital | | | |
| Purchase price | $55 800 | $11 500 | $67 300 |
| Sales tax | $9 234 | $1 713 | $10 947 |
| Resource cost | $46 566 | $9 787[a] | $56 353 |
| Vehicle operating costs | | | |
| Labour | .. | .. | $20 280 pa |
| Comprehensive insurance | .. | .. | $2 000 pa |
| Third party insurance | .. | .. | $588 pa |
| Fuel | .. | .. | 15.3 cents/km |
| Tyres[b] | .. | .. | 7.9 cents/km |
| Maintenance | .. | .. | 15.0 cents/km |
| Administration | .. | .. | 2.0 cents/km |
| Separable pavement costs[c] | .. | .. | 10.7 cents/km |

a. Excludes mid-life trailer rebuild
b. Average undiscounted figure over evaluation period. Excludes new tyres included in prime mover and trailer purchase prices.
c. Based on estimates prepared by Webber, Both and Ker (1978). See Appendix II
.. not applicable

TABLE 17.2—ESTIMATED ANNUAL AVOIDABLE COST OF OPERATING A DEDICATED PRIME MOVER AND TRAILER BETWEEN SOUTH DYNON AND SWANSON DOCK OVER EVALUATION PERIOD
*($)*

| *Cost component* | *Annual cost*[a] | | |
|---|---|---|---|
| | *4 per cent* | *7 per cent* | *10 per cent* |
| Total cost | | | |
| Vehicle capital[b] | 5 805 | 6 994 | 8 255 |
| Labour | 20 280 | 20 280 | 20 280 |
| Insurance | 2 588 | 2 588 | 2 588 |
| Fuel | 1 586 | 1 586 | 1 586 |
| Tyres[b] | 822 | 823 | 821 |
| Maintenance | 1 555 | 1 555 | 1 555 |
| Administration | 207 | 207 | 207 |
| Pavement | 1 109 | 1 109 | 1 109 |
| Total | 33 952 | 35 142 | 36 401 |
| Cost per container | | | |
| Vehicle capital | 3.10 | 3.74 | 4.41 |
| Vehicle operating | 14.44 | 14.44 | 14.44 |
| Separable pavement | 0.59 | 0.59 | 0.59 |
| Total | 18.14 | 18.77 | 19.44 |

a. Totals may not equal sums of components due to rounding.
b. Estimated on equivalent annual cost basis from uneven cost streams over evaluation period.

The capital cost components for the prime mover and trailer were estimated on the basis of purchase prices and residual values over the evaluation period. Sales tax was netted out of the initial purchase prices to obtain estimates of resource costs, and the lifespans in the transfer operation of prime movers and trailers were estimated at 10 and 20 years respectively. A residual reflecting the value of the capital elsewhere in the economy was applied to prime movers as the economic life of the dedicated unit would be greater than 10 years. This procedure was not applied to trailers as they would only have a negligible scrap value after 20 years, but the cost of a mid-life rebuild was included.

The vehicle operating costs which could be avoided if the transfer operation was eliminated would not include registration fees as these are transfer payments which have no relevance to an evaluation based on resource costs. Comprehensive and third party insurance were included as proxies for accident costs on the assumption that the cost of accidents per kilometre travelled on the South Dynon-Swanson Dock corridor is similar to the Victorian average for vehicles of the same specifications[1]. Labour costs were based on average award wages for drivers in this section of the road transport industry with an allowance for additional non-wage costs. Tyre prices are net of sales tax but diesel fuel prices include the Commonwealth Government's oil well-head levy as this is designed to adjust fuel prices to reflect opportunity costs in international trade. The maintenance cost per kilometre is relatively high due to the greater stress on gearboxes, clutches and brakes on shorthaul routes.

Separable road pavement costs are the road surface costs that could theoretically be avoided over the evaluation period if the road transfer operation was discontinued. It was not possible to obtain information which specifically related to the road between South Dynon and Swanson Dock, and hence national data for articulated vehicles were used. These involved 1976–77 data prepared by Webber, Both and Ker which were updated to June 1982 prices using the BTE road construction price index. They incorporate the effects of vehicles on routine pavement maintenance, pavement reseal frequency, pavement life and pavement strength requirements.

The annual distance that would be travelled by a dedicated vehicle operating between South Dynon and Swanson Dock and the number of containers that it could carry are important elements in the calculation of vehicle operating and separable pavement costs and in deriving the road transfer savings per container. Discussions with officials from a number of road transport companies operating on this route indicated that their vehicles operate six days per week and have an average availability of 48 weeks per annum. Approximately 70 per cent of round trips between South Dynon and Swanson Dock involve an empty movement in one direction and for the remaining trips the vehicle is loaded in both directions. The travel distance between the two areas is about three kilometres, but a dedicated truck would only be able to average five round trips per day due to delays at the container terminals at Swanson Dock. A further daily distance of six kilometres was included as an allowance for the trips to and from the operator's depot. On the basis of this information, it was concluded that a dedicated prime mover and trailer operating between South Dynon and Swanson Dock would transfer 1872 containers per annum and travel 10 368 kilometres per annum.

The estimates of road transfer savings presented in Table 17.2 indicate that the elimination of the road transfer operation between South Dynon and Swanson Dock would result in resource cost savings of $18.14, $18.77 and $19.44 per container at the 4, 7 and 10 per cent discount rates respectively. These figures were used in the evaluation.

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1. As with the evaluation of the other Victorian links, one of the problems with this approach is that the true cost of accidents will be underestimated (or overestimated) if third party insurance premiums do not reflect the costs of claims. Notwithstanding the problems with using comprehensive and third party insurance premiums to estimate accident costs, they were the best measures available.

**Transit time savings**

The elimination of the transhipment operation at South Dynon for overseas containers moving between Swanson Dock and locations on the standard gauge rail system could remove many of the delays imposed on this traffic by the transhipment process. If this resulted in faster transit times for overseas containers, the quality of the rail transport service for this traffic between Swanson Dock and certain interstate locations would be improved.

It was not possible to obtain detailed information on the likely impact of standardisation on transit times. However, some data were available for the present standard gauge operation involving road transfer between Swanson Dock and South Dynon, and for the broad gauge operation involving South Australian traffic which is transferred by rail to and from the port area. This information suggests that standardisation would not result in a net improvement in transit times.

With a standard gauge link to Swanson Dock, standard gauge freight trains would probably still be broken up and remarshalled at South Dynon with the wagons being transferred to and from the port area by pilots. This operation is already required for Swanson Dock broad gauge traffic due to restricted siding lengths at the container terminals. These restrictions would result in some delays to standard gauge traffic even if there was a direct link to Swanson Dock. Road transport appears to be flexible and quick to respond to calls for the movement of containers between South Dynon and Swanson Dock.

It was therefore concluded that standardisation would not result in a net improvement in transit times between Swanson Dock and interstate locations. Indeed, it is conceivable that transit times could be increased with direct rail movement, but for the purposes of the evaluation it was decided to assume that there would be no net change in transit times as a result of standardisation.

**Other benefits**

A number of other potential benefits associated with the provision of standard gauge rail access to Swanson Dock were identified but could not be quantified. These benefits are outlined in this section in order to provide a comprehensive evaluation.

Construction of the proposed link would result in a better rail transport system between Swanson Dock and locations on the standard gauge system, and hence shipping companies could have greater flexibility in their Australian operations. For example, if the container terminals in Sydney were closed due to strikes or congestion, it would be easier with a standard gauge link to rail the overseas containers awaiting export direct to Swanson Dock and issue instructions for container vessels to call there rather than at Sydney. Shipping companies would obviously value any increased flexibility in ship and port schedules in Australia that would result from the provision of standard gauge rail access to Swanson Dock or other mainland port areas. However, as with the standard gauge link to Fisherman Islands, it is difficult to quantify this benefit.

The proposed link would also be expected to provide some defence benefits by improving the rail transport system between Swanson Dock and other locations in Australia, both on and off the standard gauge rail system. For example, if operations at other mainland ports were disrupted it would be easier and perhaps more efficient to move military equipment through Swanson Dock using a standard gauge rail link than if transhipment at South Dynon was required. Once again, the proposed link would provide greater flexibility in transport arrangements.

The replacement of the current road transfer operation between South Dynon and Swanson Dock with a direct standard gauge rail service could also reduce road congestion. Vehicles engaged in the transfer operation use Footscray Road which is heavily trafficked and this, together with the peakiness of the transfer traffic,

suggests that there would be some benefits from reduced road congestion if standard gauge access was provided. In addition, there is significant congestion at various times at some of the Swanson Dock terminals which results in queuing of trucks and this could be eased if some of the traffic was diverted to rail transport.

## COSTS

The following costs associated with the provision of standard gauge rail access to Swanson Dock were identified and, where possible, quantified in the evaluation.

### Construction costs

The estimated costs of constructing a standard gauge rail link to Swanson Dock under the two track options were discussed in Chapter 15. For the purposes of the evaluation, these estimates were converted to equivalent annual costs. This resulted in figures of $176 750, $262 500 and $358 050 for a new standard gauge track and $101 000, $150 000 and $204 600 for the predominantly dual gauge option at the 4, 7 and 10 per cent discount rates respectively.

### Track maintenance costs

Operation of a standard gauge rail link to Swanson Dock and retention of the existing broad gauge connection would result in a net increase in the total track maintenance costs incurred by the Victorian Railways. The impact on maintenance costs would depend on the standardisation option that was chosen.

Data on current and expected track maintenance costs per kilometre for the link between South Dynon and Swanson Dock were provided by Victorian Railways officials. Annual maintenance costs for the current broad gauge link were estimated at $3500 per kilometre and it was expected that this would increase to $4100 if the track was converted to dual gauge. Thus, the provision of standard gauge access to Swanson Dock under the dual gauge option would increase annual track maintenance costs by $600 per kilometre for the dual gauge section. A new standard gauge track was estimated to require annual maintenance costs of $4655 per kilometre.

Total track maintenance costs incurred by the Victorian Railways were therefore estimated to increase by $9890 per annum under the predominantly dual gauge option (includes 0.9 kilometres of new track) and $48 410 per annum for a new standard gauge track. These are probably upper estimates as they appear to be based on main line track maintenance profiles. There would be no offsetting reduction in maintenance expenditure for the existing broad gauge track under either option.

### Train capital and operating costs

The provision of standard gauge rail access to Swanson Dock would result in the extension of certain standard gauge services from South Dynon to the port area. Increased train capital and running costs would therefore be incurred by the Victorian Railways.

If the proposed standard gauge link was constructed, main line locomotives and brakevans would be released or engaged at South Dynon as at present. Pilots would be used for the transfer to and from Swanson Dock. Discussions with Victorian Railways officials indicated that an increase in transfer traffic of 3500 containers per annum would not require an increase in the number of standard gauge pilots. It was therefore concluded that standardisation would not result in any significant effect on capital requirements for locomotives. Similarly, the additional movements of standard gauge wagons between South Dynon and Swanson Dock would not be expected to significantly increase turnaround times, and hence in practice there would be no significant increase in wagon capital requirements as a result of standardisation.

There would, however, be an increase in train operating costs due to the additional locomotive and wagon running between South Dynon and Swanson Dock. As there would be no increased capital requirements for pilots, it was assumed that the additional standard gauge movements would involve the use of locomotives and crews which would otherwise be idle between other work. On this basis, no additional crew costs were attributed to standardisation.

For the purposes of the evaluation, it was also assumed that elimination of the transhipment operation at South Dynon would result in a reduction in shunting activities at South Dynon which would be equal to the additional shunting movements at the Swanson Dock terminals. In these circumstances, the net increase in train costs would only involve locomotive fuel and maintenance and wagon maintenance costs for the additional movement between South Dynon and Swanson Dock.

It was not possible to obtain specific data on the cost of pilot operations in the port area, and hence the additional running costs were calculated using Victorian Railways estimates of operating costs for container trains between Tocumwal and Melbourne.

A consist involving 20 VQCX wagons generally hauled by a T or Y class locomotive was used for this exercise. The data indicated line-haul costs of $1.69 per kilometre for locomotive fuel and maintenance (based on hourly and kilometre components) and 1.06 cents per kilometre per wagon for wagon maintenance (excluding fixed annual component). Two containers per wagon were assumed and the transfer between South Dynon and Swanson Dock would involve an average round trip of six kilometres with loading in one direction only. Using this information, it was estimated that with a standard gauge link to Swanson Dock there would be a net increase in train operating costs (fuel and maintenance only) of 28 cents per container. This may well be a conservative estimate of the additional train operating costs that would be incurred, and hence use of this figure could contribute to an optimistic evaluation result.

**Track congestion**

A new standard gauge track to Swanson Dock would increase the traffic moving over part of the present standard gauge system at South Dynon and the dual gauge option would also increase the volume of traffic along the current broad gauge track to Swanson Dock. This could potentially result in congestion on some of these line sections and impose delay costs on other traffic or necessitate earlier upgrading works.

Eight broad gauge dock pilots are currently scheduled to operate between Swanson Dock and South Dynon on weekdays, and discussions with Victorian Railways officials indicated that current traffic is comfortably handled on the existing broad gauge track. Even a doubling of trains on the Swanson Dock line within 20 years would not be expected to create congestion problems on the line itself. In view of the level of broad and potential standard gauge traffic in recent years, it was concluded that standardisation under either option would not cause significant congestion on the Swanson Dock branch.

There are reportedly some congestion problems in the Railway Canal area. This is the main departure and arrival area for freight traffic on western lines, and the north and south leads also handle movements to and from the Dynon locomotive depot and the bogie exchange. Victorian Railways officials advised that arrival of the dock pilots in the canal area already has to be tightly programmed to avoid conflict with other traffic using the north and south leads into this area. However, an increase in Swanson Dock traffic resulting from the provision of standard gauge access would probably not affect the scheduling of trains through the canal area as there would be a new and separate standard gauge track in this area under both construction options.

It was therefore concluded that operation of a standard gauge link to Swanson Dock would not result in significant congestion of other tracks in the area.

## EVALUATION RESULTS

The evaluation results for the two construction options at discount rates of 4,7 and 10 per cent are summarised in Tables 17.3 and 17.4. It was assumed that construction of the standard gauge link would commence at the beginning of 1983–84 (ie Year 0) and take 12 months. Benefits would only be realised when construction of the link was completed.

As noted earlier, it was not possible to directly compare the present values of the discounted flows of benefits and costs in the Swanson Dock evaluation as there was no acceptable forecast of potential traffic. Instead, the number of containers per annum that would be required over the evaluation period to produce a benefit-cost ratio greater than 1 was estimated. This was done by comparing the benefits per container from standardisation (based on recent traffic levels) with the

TABLE 17.3—ECONOMIC EVALUATION OF SWANSON DOCK STANDARD GAUGE LINK, NEW STANDARD GAUGE TRACK

| | *Discount rate* | | |
|---|---|---|---|
| *Benefits/costs* | *4 per cent* | *7 per cent* | *10 per cent* |
| Benefits per container ($) | | | |
| Transhipment savings | 10.00 | 10.00 | 10.00 |
| Road transfer savings | 18.14 | 18.77 | 19.44 |
| Rail transfer costs | -0.28 | -0.28 | -0.28 |
| Total | 27.86 | 28.49 | 29.16 |
| Annual costs ($) | | | |
| Track construction | 176 750 | 262 500 | 358 050 |
| Track maintenance | 48 410 | 48 410 | 48 410 |
| Total | 225 160 | 310 910 | 406 460 |
| Containers per annum if B/C=1 | 8 082 | 10 913 | 13 939 |

TABLE 17.4—ECONOMIC EVALUATION OF SWANSON DOCK STANDARD GAUGE LINK, PREDOMINANTLY DUAL GAUGE OPTION

| | *Discount rate* | | |
|---|---|---|---|
| *Benefits/costs* | *4 per cent* | *7 per cent* | *10 per cent* |
| Benefits per container ($) | | | |
| Transhipment savings | 10.00 | 10.00 | 10.00 |
| Road transfer savings | 18.14 | 18.77 | 19.44 |
| Rail transfer costs | -0.28 | -0.28 | -0.28 |
| Total | 27.86 | 28.49 | 29.16 |
| Annual costs ($) | | | |
| Track construction | 101 000 | 150 000 | 204 600 |
| Track maintenance | 9 890 | 9 890 | 9 890 |
| Total | 110 890 | 159 890 | 214 490 |
| Containers per annum if B/C=1 | 3 980 | 5 612 | 7 356 |

construction costs (expressed as an equivalent annual charge) and annual track maintenance costs. As the available data indicated that track construction and track maintenance would be the only costs unaffected by traffic volume, these costs were included in the total costs category while rail transfer costs were included as negative benefits per container.

There are a number of problems with this approach. It provides no information on the optimal timing for construction, and assumes that traffic volumes over the evaluation period would be sufficient to provide benefits per container similar to those estimated on the basis of recent traffic levels. In addition, the required number of containers calculated using this approach involves a constant annual movement and would not necessarily apply where variable annual movements resulted in the same annual average. This problem arises because the practice of discounting means that, for a certain average movement, a traffic flow involving relatively high volumes in the early part of the evaluation period would provide higher benefits per container in present value terms than a flow where the high volumes were in the latter part of the period. The former pattern would result in a benefit-cost ratio of 1 at a lower average annual traffic volume.

Notwithstanding these factors, the methodology used in the evaluation does provide a good indicator of the appropriateness of standardisation from an economic viewpoint. The results presented in Tables 17.3 and 17.4 show that, on the basis of the quantified benefits and costs, the dual gauge option would require annual traffic of around 4000, 5600 and 7400 containers respectively at the 4, 7 and 10 per cent discount rates for the benefit-cost ratio to exceed 1. For a new standard gauge track, the required volumes increase to approximately 8100, 10 900 and 13 900 containers per annum respectively.

The discussion in Chapter 16 indicated that potential traffic along a standard gauge link to Swanson Dock in recent years has probably averaged around 3500 containers per annum. The evaluation results therefore suggest that, on the basis of the quantified benefits and costs alone, recent traffic volumes would almost make the dual gauge option economically justifiable if the appropriate discount rate is considered to be 4 per cent or less. The construction costs for this option are relatively low and inclusion of the benefits that could not be quantified in the evaluation would be expected to raise the performance of the project to acceptable levels at this and slightly higher discount rates. It was therefore concluded that construction of a standard gauge link to Swanson Dock under the predominantly dual gauge option would probably be acceptable on economic grounds.

The economic performance of the project could be increased if a standard gauge link was constructed between Tocumwal and Mangalore. In this case, any containerised rice sent from southern New South Wales for export through Swanson Dock could be railed direct instead of being transferred by road from South Dynon. The economic benefits associated with diversion of rice from the Port of Sydney to Swanson Dock could be significant, particularly when compared with the relatively low capital cost for the Swanson Dock link under the dual gauge option.

The evaluation results indicate that provision of standard gauge access with a completely new track would not be economically justifiable, due to the significantly higher construction costs for this option. At the 4 per cent discount rate, the annual volume of containers required for a benefit-cost ratio of 1 on the basis of the quantified benefits and costs is more than twice recent traffic levels, and the required volume increases with upward movements in the discount rate. In addition, the benefits from direct standard gauge rail access to Swanson Dock could be achieved with a lower cost option which does not involve any significant offsetting penalties. The predominantly dual gauge track option would therefore always be preferred on economic grounds to a separate standard gauge track.

The evaluation of this standardisation project is, of course, complicated by the

difficulty in predicting future container movements between Swanson Dock and Sydney/Brisbane and any future developments on the Tocumwal-Mangalore link. This should be considered when interpreting the evaluation results. It is conceivable that future movements could be well below the recent average or alternatively industrial action or congestion could result in very large volumes of potential standard gauge traffic in future years which would quickly justify construction.

The evaluation results for the Swanson Dock link are based on the assumption that a broad gauge link between Melbourne and Adelaide is retained. If this link was standardised and the broad gauge connection was eliminated, a standard gauge link would also have to be provided to Swanson Dock. In these circumstances, the direct conversion option would probably have to be considered if a dual gauge link had not already been constructed. Some broad gauge track could, however, need to be retained to preserve a link between Appleton Dock and the Victorian country network.

# CHAPTER 18—FINANCIAL EFFECTS OF SWANSON DOCK LINK

If standard gauge rail access was provided to Swanson Dock, some organisations or groups could gain and others could lose in financial terms. The likely impact of standardisation on the financial positions of the major transport organisations involved is discussed in this chapter. Recent freight rates for overseas containers and the appropriate approach to pricing policy are also described.

## OVERSEAS CONTAINER FREIGHT RATES

Overseas containers moving between Swanson Dock and Sydney/Brisbane would be the major traffic affected by construction of the proposed link (in the absence of a connection between Tocumwal and Mangalore). Data provided by the Victorian Railways indicate that the published rates for the movement of loaded containers between South Dynon and Sydney in June 1982 were $317 per container northbound and $247 southbound, the variations reflecting market conditions.

Under the agreed method for apportioning revenue between the Victorian Railways and the State Rail Authority, revenue from certain incidentals such as terminals, handling and local charges is deducted from the total rate and distributed to the relevant operating authorities. The balance is divided on a distance basis, the trip from South Dynon to Sydney involving approximately 307 kilometres on Victorian Railways track and 646 kilometres on State Rail Authority track.

Operating costs for items specific to a certain system such as terminals are paid by the responsible authority. Where items such as rolling stock are used on the track of both systems, costs are often shared on a distance basis.

As noted earlier, the trip between Swanson Dock and Sydney currently involves road transfer of containers to and from the port area, with transhipment between road and rail vehicles at South Dynon. The lifting charge for the transhipment operation was $17 per container in June 1982.

## PRICING AND FINANCE

The discussion of appropriate pricing policies for the proposed Fisherman Islands connection in Chapter 6 suggested that the link should be priced as a separate project rather than incorporated into general tariff structures. This principle of efficient pricing is also applicable to the proposed Swanson Dock link.

The discussion in the following sections mainly considers the impact of standardisation on the revenues and operating costs of various transport authorities. The attractiveness of the project to particular organisations would depend on the results of the economic evaluation presented in Chapter 19 and/or the expected financial impact on individual organisations.

## IMPACT ON SELECTED ORGANISATIONS

The construction and operation of a standard gauge rail link to Swanson Dock would potentially affect the financial situations of several organisations. The following discussion is based on a continuation of recent pricing policies by the Victorian Railways. In these circumstances, the financial benefits flowing from standardisation would mainly accrue to shipping companies. However, if the Victorian Railways were

to revise their pricing policies to capture the benefits from having a standard gauge link to Swanson Dock, the distribution of financial benefits would be altered.

**Victorian Railways**

One of the authorities that would be most affected by standardisation is the Victorian Railways. Several factors would determine the overall impact, and these can be illustrated using the situation with traffic of 3500 containers per annum.

In Chapter 17 it was estimated that a reduction in container movements through the South Dynon transhipment facility of the magnitude considered in the study would result in an average saving of $10 per container in transhipment costs. The discussion on freight rates earlier in this chapter indicated that the transhipment charge levied by Victorian Railways in June 1982 was $17 per container, and hence the reduction in transhipment traffic associated with standardisation would result in a net financial loss to the Victorian Railways of around $7 per container or $24 500 per annum for the transhipment operation.

The extension of standard gauge rail services to Swanson Dock would also result in additional railway operating costs estimated at 28 cents per container. The Victorian Railways charged 60 cents per net tonne in June 1982 for the placement of broad gauge wagons between South Dynon and Swanson Dock, and a similar charge would presumably be applied with a standard gauge link. Revenue would therefore average about $7.20 per container, assuming 12 tonnes of cargo in a loaded container, and hence there would be an increase of up to $6.92 per container (or $24 220 per annum) in net revenue associated with the transfer operation.

There would also be an increase in annual track maintenance costs of $9890 per annum under the dual gauge option and $48 410 with a new standard gauge track. Standardisation would not be expected to result in increased revenue from the diversion of traffic to rail on the Sydney-Melbourne corridor.

These figures suggest that, for overseas container transhipment traffic between Swanson Dock and Sydney/Brisbane, the operation of the proposed standard gauge link would adversely affect the financial position of the Victorian Railways by around $10 000 per annum under the dual gauge option and by around $49 000 with a new standard gauge track. If the cost of construction was borne by the Victorian Railways, the adverse financial impact of standardisation would be even greater under existing pricing policies. With the adoption of revised pricing arrangements, the line might just be commercially attractive under the dual gauge option. Any movement of rice from southern New South Wales along the link would improve the financial impact on the Victorian Railways.

**Road transport operators**

Provision of standard gauge rail access to Swanson Dock would eliminate or greatly reduce the road transfer operation for overseas containers moving between that port and various locations on the standard gauge rail system in New South Wales and Queensland. This would result in a loss of traffic by road transport operators involved in the transfer traffic. On the basis of the freight rates in operation in June 1982, the revenue loss would be around $30 for each loaded container.

**Shipping companies**

Under current arrangements, the freight rates charged by shipping companies involved in the major container trades are the same at each Australian port. When cargo centralisation is undertaken, the cost of moving containers between the various Australian ports is, initially at least, borne by the shipping companies. Construction of the proposed link would eliminate the cost of road transfer for standard gauge traffic moving between Swanson Dock and South Dynon as well as one transhipment,

although there would be an offsetting increase in rail charges for the transfer operation. It seems likely that, under existing pricing policies, the increase in rail charges would be less than the transhipment and road transfer costs which would be saved. In these circumstances, a net financial saving would accrue to the shipping companies. Some other financial benefits due to increased flexibility in shipping operations would also be obtained. The financial impact on the shipping companies would be much less favourable if rail authorities adopted revised pricing based on economic criteria.

**State Rail Authority**

The standard gauge rail link would not be expected to significantly affect the financial position of the State Rail Authority under current pricing policies. There would not be any significant generation or diversion of overseas container traffic on the Sydney-Melbourne corridor associated with standardisation, and the operating costs of interstate container trains in New South Wales would not be affected. However, if revised pricing policies were adopted, it is conceivable that the State Rail Authority could receive a share of any additional revenue obtained for rail movement of containers between Swanson Dock and interstate locations.

**Port authorities**

The impact of a standard gauge rail link on the financial situations of the Port of Melbourne Authority and the Maritime Services Board of New South Wales would probably be insignificant. Construction of the link would not be expected to result in any substantial changes in centralisation practices or the pattern of container ship calls between Sydney and Melbourne, although there could occasionally be some ad hoc changes to schedules. Overseas container movements across the wharves, and hence revenue from this traffic at the two ports, would therefore be largely unaffected by the provision of standard gauge access to Swanson Dock. If a link between Tocumwal and Mangalore was also built, any diversion of rice to the Port of Melbourne could have a significant impact on revenue received by the respective port authorities.

## CHAPTER 19—CONCLUDING REMARKS: SWANSON DOCK LINK

Swanson Dock is the major area for the handling of overseas containers in the Port of Melbourne. There are a number of container terminals on the east and west sides of the dock, and these are currently served by road transport and the broad gauge rail system. Containers railed to and from Swanson Dock along the existing broad gauge link generally have an origin or destination elsewhere in Victoria or in South Australia.

Under current circumstances, standard gauge rail access could be provided to Swanson Dock by either dual gauging the existing broad gauge track between Footscray Road and the Dock area (with a short section of new standard gauge track near South Dynon) or constructing a new and separate standard gauge track. Direct conversion by moving one of the rails across to a 1435 mm separation on the existing sleepers would not be an acceptable option under current circumstances as it would remove broad gauge access and hence eliminate most of the current rail traffic on both the Swanson Dock and Appleton Dock branches. Estimated construction costs for standardisation of the link are $2.0 million for dual gauge and $3.5 million for a new standard gauge link.

The major potential traffic over a standard gauge link to Swanson Dock with current interstate track arrangements is overseas containers moving to and from Sydney or Brisbane. This traffic does not involve a regular centralisation operation but rather is a response to factors such as strikes or port congestion. Due to the unpredictable nature of these influences, it is not possible to forecast potential traffic along the proposed link with an acceptable level of confidence. However, the available data indicate that potential traffic in recent years has averaged around 3500 containers per annum. No significant change in cargo centralisation practices or container ship schedules would be expected with a standard gauge link, but several recent developments such as the opening of the new Port Botany container terminal could affect the level of future potential traffic.

A standard gauge link to Swanson Dock would provide a number of benefits. Under current arrangements, overseas containers moved between Swanson Dock and interstate locations using the standard gauge rail system are transferred by road to or from the standard gauge railhead at South Dynon and transhipped there between road and rail. Standardisation would therefore eliminate the transhipment operation at a resource cost saving estimated at $10 per container and the road transfer operation at a saving of around $19 per container. These savings would, however, be slightly offset by an increase in train operating costs of 28 cents per container. Other benefits that could not be quantified in the study were improved flexibility in container ship operations, improved defence capability and reduced road congestion.

In addition to construction costs, standardisation would involve increased track maintenance costs of $9890 per annum under the dual gauge option and $48 410 per annum for a new standard gauge track.

In view of the problems associated with forecasting potential traffic along the proposed link, the economic evaluation was performed by comparing the benefits per container with the annual cost of track construction and maintenance and then estimating the average annual volume of traffic that would be required to give a benefit-cost ratio of 1. This was then compared with estimated traffic volumes in recent years

to obtain an indication of the viability of the project, on the assumption that traffic levels in future will be similar to those in the recent past.

The evaluation results indicate that, on the basis of the quantified and unquantified benefits and costs, dual gauging of the existing broad gauge track to Swanson Dock (with a short section of new standard gauge track) would just be acceptable on economic grounds. Construction of a new standard gauge track would not be justified.

The financial positions of several organisations would be slightly affected by the provision of standard gauge rail access to Swanson Dock. Under current freight rating practices, the Victorian Railways would probably be adversely affected. Road transport operators would lose revenue due to the reduction in transfer traffic but the shipping companies which currently bear this and the transhipment cost would be expected to receive a net saving. If the Victorian Railways were to revise their pricing policies to capture the benefits from having a standard gauge link to Swanson Dock, the distribution of financial benefits described above would be altered in favour of this organisation.

# CHAPTER 20-OVERALL CONCLUSIONS

The economic evaluations undertaken during the study were based on resource costs. The criterion of allocative efficiency was used to assess the desirability of the proposed standard gauge links from the national viewpoint.

## FISHERMAN ISLANDS

The evaluation results clearly indicate that only one construction option for the provision of standard gauge rail access to Fisherman Islands should be seriously considered on economic grounds. This is dual gauging (as an 'add-on' to) a new narrow gauge line from Parkinson marshalling yard via Eight Mile Plains. The benefit-cost ratio estimates for this option are less than 1 for various discount rate combinations but construction costs are relatively low and there are some additional benefits which were not quantified in the evaluation. Standardisation under this option would probably be acceptable on economic grounds. Timing of construction would be determined by the date of an independent decision (if any) to proceed with a new narrow gauge track along this alignment. A branch line to Gibson Island would not be warranted on the basis of economic criteria.

## PORT OF GEELONG

Construction of standard gauge rail links from Melbourne to Geelong and between Tocumwal and Mangalore as an integral project would not be warranted on the basis of the quantified benefits and costs. Under the various base case conditions used in the evaluation, the benefit-cost ratio for new standard gauge tracks on both line sections does not exceed 0.49.

The evaluation results are better with dual gauging between Tocumwal and Mangalore and new track from Melbourne to Geelong. However, even with this lower cost construction option, the benefit-cost ratio is below 1 in all cases. In addition, the evaluation was undertaken using optimistic values for some benefits and included potential benefits that could be realised with existing facilities and altered pricing and operating policies. The adoption of more realistic estimates would result in significantly lower benefit-cost ratio and net present value figures.

If an independent decision is taken to construct a standard gauge connection between Melbourne and Geelong as part of an Adelaide-Melbourne link, standardisation of the Tocumwal-Mangalore line would probably not be justified under the current least cost option.

## SWANSON DOCK

The evaluation results indicate that, on the basis of the quantified and unquantified benefits and costs, dual gauging of the existing broad gauge track to Swanson Dock (with a short section of new standard gauge track) would just be acceptable on economic grounds. As the benefits from direct standard gauge access to Swanson Dock could be obtained at lower cost with dual gauging of the existing broad gauge link, this option would always be preferred on economic grounds to a separate standard gauge track.

# APPENDIX I—PREVIOUS STUDIES OF TOCUMWAL-MANGALORE AND MELBOURNE-GEELONG STANDARD GAUGE LINKS

Representations in favour of a standard gauge rail link between Tocumwal and Mangalore have been made to the Commonwealth Government and other authorities by various organisations over a period of more than 25 years. These organisations include local government bodies in southern New South Wales and northern Victoria, agricultural producer groups, Chambers of Commerce, political representatives. local businessmen and the Tocumwal-Mangalore Railway League. Benefits claimed for the proposed link include the promotion of local primary and secondary industries through improved market access, decreased transport costs for primary producers, a reduction in heavy vehicle traffic on shire roads, creation of a common grain rolling stock pool in Victoria and New South Wales, reduced dependence on the Junee-Albury single track section and improved defence capability.

Three earlier studies specifically assessed the desirability of constructing a standard gauge rail link between Tocumwal and Mangalore, and the issue of standardisation was also raised in several other inquiries. The most detailed assessments were undertaken by the Victorian Railways in 1962, the Commonwealth Railways in conjunction with the Victorian Railways in 1965 and G. R. Webb in 1977. Only the Webb results were publicly released in full.

In the Victorian Railways' 1962 report, it was stated that broad gauge access to northern Victoria would have to be retained if standardisation was undertaken. It was therefore concluded that provision of a standard gauge link between Tocumwal and Mangalore would require a new and separate standard gauge track. The cost of such a connection was estimated at $12 million (current prices), with annual interest and sinking fund charges of $600 000 (current prices). This did not include the cost of the necessary additional connections to ports and other facilities.

Potential traffic along the proposed link was not considered to be significant due to railway rating practices and the perceived advantages of road transport. However, for the purposes of the assessment, potential freight traffic of 100 000 tonnes per annum was assumed, and the cost of transferring this traffic by bogie exchange was compared with the fixed charges of a standard gauge line. As the cost with bogie exchange was estimated to be only one-twelfth of the fixed charges for a standard gauge link, it was concluded that standardisation could not be justified and that a bogie exchange facility would be a far more economical and effective answer to the break-of-gauge problem at Tocumwal.

Further representations by local groups resulted in the preparation in late 1965 of a further report on the proposal. This report was prepared for the then Department of Shipping and Transport by the Commonwealth Railways in consultation with the Victorian Railways. The costs of a new standard gauge line between Tocumwal and Mangalore and the alternative option of dual gauging the existing broad gauge track were estimated at $16 million and $5.2 million respectively (current prices), while the annual maintenance of a new track was costed at $1.1. million per annum (current prices). The construction cost estimates excluded the cost of providing standard gauge access to the Newmarket livestock sidings and ports (including Geelong) which was considered necessary for significant traffic of the type visualised by proponents of the scheme. The approach adopted in the previous Victorian Railways

report was then followed, the annual interest and sinking fund charges on a new track ($800 000) being compared with the cost of bogie exchange. It was again concluded that standardisation could not be justified, and that bogie exchange would be a far cheaper way of handling the break-of-gauge problem.

The methodology adopted in the Victorian Railways and Commonwealth Railways reports is unsatisfactory from the viewpoint of traditional cost-benefit analysis for a number of reasons. These studies did not quantify all of the major benefits and costs that would arise from the project. The acceptability of the project was only considered in financial terms rather than on economic criteria, which meant that the net impact of the project on community resources was not properly considered. Substantial tonnages of grain and other major potential traffics were not incorporated in the traffic estimates and the cost of a link to Geelong, which would be necessary for some of these traffics, was also excluded.

The approach adopted in the Victorian and Commonwealth Railways reports involved a relatively narrow and simple financial cost-effectiveness study which compared the costs of moving interstate rail traffic along the corridor using bogie exchange facilities with some of the costs associated with the proposed standard gauge link. The evaluation methodology used in the present study involves the comparison of discounted benefits and costs under a number of standardisation options with a base case which represents the situation expected in the absence of the proposed links. This is a more appropriate evaluation technique when public funding of a project might be involved.

The third major assessment of the desirability of a standard gauge link between Tocumwal and Mangalore was included in a more general 1977 study by G.R. Webb (Webb 1977). Seven options for the line were initially considered. After closer examination this was reduced to four options for the purposes of the assessment, namely a new standard gauge line between Tocumwal and Mangalore, conversion of the Tocumwal-Narrandera line in southern New South Wales to broad gauge, operation of rolling stock with adjustable axles and a bogie exchange facility at Tocumwal. Webb concluded that a new standard gauge track would be completely uneconomic while all the other options considered would be economic, the most attractive option being the extension of the Victorian Railways broad gauge system to Narrandera. He also emphasised that through freight rates for rail movements between southern New South Wales and Geelong would be a prerequisite to the success of any option.

Webb's study was based on the application of standard cost-benefit techniques. The published articles containing the results are relatively short, but they suggest that a number of potential traffics, benefits and costs that would be associated with the provision of standard gauge links between Tocumwal and Mangalore and into Geelong were not included in the evaluation. In addition, much of the data used in the study appear to involve average system costs and other figures which are not necessarily applicable to the standardisation project.

In addition to these three specific reports on the Tocumwal-Mangalore standardisation proposal, a number of more general studies have commented on the desirability of the proposed link. The Board of Inquiry into the Victorian Land Transport System chaired by Sir Henry Bland received various submissions in favour of the Tocumwal-Mangalore standardisation project. It recommended that the case for standardisation should be kept under continuing review (Board of Inquiry into the Victorian Land Transport System 1972 p145).

Potential freight traffic from New South Wales to Geelong was also examined by the BTE in a study of intersystem railway rating practices that was published in 1976 (BTE 1976). It was noted in the report that a change in rating practices would probably result in the redirection of grain traffic from southern New South Wales to Geelong and that this could require substantial investment in additional rail

facilities. A number of options that would need to be evaluated to determine the best operational strategy were identified, namely standardisation of the Tocumwal-Mangalore and Melbourne-Geelong links and extension of the broad gauge line from Tocumwal into southern New South Wales (BTE 1976 p87).

The Victorian Transport Study undertaken by Mr W.M. Lonie recommended an investigation of standard gauge access to the Geelong and Melbourne port areas (Victorian Transport Study 1980b p23). However, standardisation of the Tocumwal-Mangalore line was not supported. In its submission to the inquiry, the Australian Wheat Board did not support the standardisation proposal and recommended instead that improvements be made to the rail/rail transfer facilities at Tocumwal, the Tocumwal bridge and the transfer facilities at Oaklands (Victorian Transport Study 1980c p10). Passing reference to possible national benefits associated with standardisation of the line from Tocumwal to Geelong was also made in a report on the New South Wales grain handling system chaired by Mr A. Carmichael (New South Wales Handling Enquiry 1981 p81).

## APPENDIX II-AVOIDABLE ROAD TRANSPORT COSTS

Estimation of the vehicle capital and operating costs and the separable pavement costs that could be avoided if a dedicated truck was removed from the Swanson Dock transfer operation or the run between southern New South Wales and Geelong involved a number of assumptions and computations. These were based on information provided by road transport operators and other industry sources. In the case of the transfer operation between South Dynon and Swanson Dock, the information related to vehicles operating mainly around Melbourne and occasionally between South Dynon and Swanson Dock. It was therefore necessary to adjust some of the capital and operating cost data for this route to reflect the different characteristics of a dedicated truck and, in particular, the very low annual distance that it would travel.

### CAPITAL COSTS

*Grain transport*

Operators indicated that the prime movers used for the movement of grain from southern New South Wales to Geelong are generally bogie drive units of about 300 HP. The capital cost of the representative prime mover was estimated from data supplied by a number of manufacturers and operators. A 10 per cent discount off the list price of prime movers is generally available to operators, and this was applied to obtain an estimate of the purchase price. The 17.5 per cent sales tax component applicable in June 1982 was calculated on the undiscounted list price of the vehicle and netted out of the purchase price as it is a transfer payment which does not reflect the real scarcity value of the resources. The resultant capital cost of the prime mover for the evaluation was $61 960.

The prime movers travel a substantial distance each year and they are reportedly replaced on average after about five years' service. This is significantly less than a vehicle's economic life, and hence it was necessary for the purposes of the evaluation to compute a residual which would reflect the value of the asset over the remainder of its economic life to users in other areas of the economy. The residual was estimated on the basis of a 10 year economic life using the straight line depreciation method. This resulted in a residual value of approximately $30 000.

The trailers used in the grain traffic generally have a tri-axle configuration and are of two basic types, namely 40 foot flat top units with curtains and gates and convertible 38 foot tipper trailers with gates and tarpaulins which can be converted to ordinary flat tops for backloading. It was decided to use the flat top unit for the representative vehicle as most of the operating cost data provided by companies referred to this trailer and it appears to be the most commonly used configuration.

The purchase price of a 40 foot flat top tri-axle trailer with curtains and gates was estimated at $22 000 in June 1982 prices. No discount is applicable to these trailers and deduction of the sales tax component resulted in a resource cost estimate of $18 720 for the study. The life of these units appears to average about 12 years and they effectively have no residual value.

The capital component of road transport costs used in the evaluation was obtained by converting the stream of capital costs and residual values associated with the operation of a dedicated truck between southern New South Wales and Geelong

over the evaluation period to equivalent annual costs. The present value of the stream of net capital costs over the evaluation period was estimated and then converted to an equivalent annual cost by computing the annuity which had the same present value at each discount rate. Estimates of $10 362, $12 244 and $14 181 for the annual cost of capital were obtained at the 4, 7 and 10 per cent discount rates respectively.

*Container transfer*

As the potential standard gauge traffic between South Dynon and Swanson Dock involves loaded containers, it was concluded that a 20 foot skeletal unit was the appopriate trailer. The alternative option, a 40 foot skeletal trailer capable of carrying one full or two empty containers, would only be preferable if there was a high volume of empties traffic. The representative prime mover was chosen on the basis of the unit that would be adequate to haul loaded containers on a 20 foot skeletal trailer, ie a 250 HP vehicle.

Capital costs for the prime mover were estimated from data obtained from a number of manufacturers and operators. Netting out of the discount and sales tax components resulted in a capital cost for the evaluation of $46 566. Capital cost of the skeletal trailer was estimated at $9787 on the basis of the list price with no discount.

The prime movers currently used in the transfer operation are generally replaced when they are six or seven years old. There has reportedly been a move away from the purchase of secondhand vehicles previously used on interstate runs to the acquisition of new vehicles which are subsequently sold while they are in good condition. This results in relatively high resale prices. A dedicated prime mover operating between South Dynon and Swanson Dock would travel a much lower annual distance than vehicles which do other suburban or interstate work. This would tend to result in a higher residual value than that applicable to vehicles travelling more widely. On the other hand, a dedicated vehicle would probably be retained longer due to its lower annual travel distance and this would tend to lower the residual due to greater technological obsolescence. In view of these considerations, it was decided to extend vehicle life on the route to 10 years and to adopt a residual of $9000 for the prime mover.

The position for skeletal trailers is different. It is common for operators to rebuild these units after about 10 years at a cost of $2000 each and this extends their life in suburban transfer traffic to 20 years. However, the trailers can only be sold for scrap after this period and it was concluded that there would be no significant residual value for the skeletal trailers at the end of 20 years. The cost of the mid-life rebuild was included in the stream of capital costs as this significantly extends trailer life.

The annual cost of capital was estimated at $5805, $6994 and $8255 at the 4, 7 and 10 per cent discount rates respectively using the equivalent annual cost approach.

## VEHICLE OPERATING COSTS

Operating costs for the dedicated prime movers and trailers were estimated from financial data provided by various operators and other industry sources. Transfer payments including sales tax and fuel excise were deducted from these figures where possible to obtain estimates that were as close as possible to the underlying real resource costs. As noted in Chapters 11 and 17, it was estimated that the dedicated vehicles would travel 120 000 kilometres (grain) and 10 368 kilometres (containers).

### Labour costs

*Grain transport*

The haulage of grain to Geelong is undertaken by owner-drivers, tow operators and company-employed drivers. However, little information on the earnings of the first two categories of drivers was obtained during the study, and it was therefore decided

to base the estimates of labour costs on the reported earnings of company drivers. This probably results in an upper estimate of average costs in this sector of the road transport industry.

Several companies indicated that their drivers earned around $500 per week in June 1982. This included the award wage, overtime and trip allowances. However, this figure underestimates the true resource cost of labour as it excludes other indirect labour costs such as holiday loadings, workers' compensation, insurance and sick pay allowances. The latter items are part of the resource cost of labour, and operators estimated that they are equal to approximately 35 per cent of the direct wage costs in this sector of the industry. The cost of labour used in the study was therefore $675 per week or $35 100 per annum.

*Container transfer*
Drivers employed by companies and owner-drivers engaged in the transfer traffic reportedly tend to receive similar wages. Average weekly wages (including five to seven hours per week of overtime) in June 1982 were approximately $300. Industry sources estimated that other indirect labour costs are equal to approximately 30 per cent of the direct wage costs. The cost of labour used in the study was therefore $390 per week or $20 280 per annum.

**Insurance**

Comprehensive and third party insurance premiums were included in vehicle operating costs as proxies for accident costs.

*Grain transport*
As the majority of road transport operators contacted during the study had their head offices in southern New South Wales, information on third party insurance for grain haulage vehicles was obtained from the Department of Motor Transport in that State. Officials of the Department indicated that the annual third party premium for a prime mover and tri-axle trailer involved in interstate running was $317 in June 1982. This figure was used in the study.

Estimation of the premium for comprehensive insurance was more difficult due to variations in tariff levels between insurers, partial carriage of risk by some operators and the operation of no-claim discounts. Several operators indicated that comprehensive insurance premiums for vehicles operating on interstate runs are set at around six or seven per cent of a unit's market value. On the basis of this information and the purchase and resale prices, the average comprehensive insurance premium for the dedicated prime mover and trailer over the evaluation period was set at $3500 per annum.

*Container transfer*
Information on third party insurance was obtained from personnel at the Motor Registration Branch of the Transport Regulation Board of Victoria who advised that the annual premium for a prime mover and skeletal trailer operating within 20 miles of the GPO was $588 in June 1982. This figure was used in the evaluation.

Estimation of the premium for comprehensive insurance was more difficult. However, an official of the Professional Transport Drivers Association indicated that the annual premium for a vehicle operating in the metropolitan area would be equal to about six per cent of the unit's market value. On the basis of this figure and the purchase and resale prices, the average comprehensive insurance premium for the dedicated prime mover and trailer over the evaluation period was set at $2000 per annum.

## Fuel

*Grain transport and container transfer*
Discussions with road transport operators indicated that fuel consumption for both of the dedicated vehicles would be about 56 litres per 100 kilometres (5 miles per gallon). Fuel consumption for the short haul transfer operation would be expected to exceed that for long distance grain transport, but this was the only information available. Melbourne diesel prices were used in both evaluations.

The average recommended retail price of diesel fuel in Melbourne in June 1982 was 39.61 cents per litre, but discounts of up to 4 cents per litre were reportedly available to fleet owners and owner drivers at that time. A discount of 4 cents per litre was used in the study. The Victorian State fuel excise was 3.33 cents per litre in June 1982 and the Commonwealth fuel excise was 5.155 cents per litre. These taxes were also netted out of the fuel price, resulting in an estimate of 27.125 cents per litre for the resource cost of diesel fuel. The Commonwealth Government's oil levy was not netted out as this is an adjustment to reflect the opportunity cost of oil in international trade rather than a pure transfer payment.

On the basis of these fuel consumption and diesel price data, the fuel cost for the dedicated vehicles was estimated at 15.3 cents per kilometre or $18 360 per annum for the grain truck and $1586 for the vehicle involved in container transfer.

## Tyres

*Grain transport*
Prime movers and trailers operated between southern New South Wales and Geelong are generally fitted with steel belted radial tyres. The steering axle of the prime mover is always fitted with new tyres after about 70 000 kilometres but in all other instances the tyres are usually recapped twice before replacement. It appears that, on average, a new tyre on a non-steering axle is used for around 200 000 kilometres before it requires recapping while a recap needs replacement or a second recap after an interval of about 120 000 kilometres. It was therefore concluded that two new tyres would be fitted to the steering axle of the dedicated vehicle every 70 000 kilometres, while the other 20 tyres would be recapped at 200 000 kilometres and again after a further 120 000 kilometres with new tyres being fitted after another 120 000 kilometres.

Details of the discounted prices for steel belted radial tyres available to fleet operators were obtained from a number of dealers. Resource costs were then estimated by subtracting sales tax from these figures and, in the case of the steering axle tyres, netting out the $45 trade-in allowance for used but unrecapped tyres. This procedure resulted in unit cost estimates of $249.91 for new steering axle tyres with trade-in, $294.91 for other new tyres and $95.22 for recaps. The equivalent annual cost of tyres for the dedicated prime mover and trailer was estimated at $2713, $2804 and $2882 at the 4, 7 and 10 per cent discount rates respectively. New tyres obtained when a new prime mover or trailer was purchased were netted out of the stream of tyre costs.

*Container transfer*
Operators use both new and recapped tyres on their prime movers and skeletal trailers. The steering axle of the prime mover is always fitted with new tyres, but in all other cases the tyres are usually recapped twice before replacement. As a dedicated vehicle operating between South Dynon and Swanson Dock would travel a relatively low annual distance, the time interval between tyre changes would probably be greater than that applicable to vehicles operating more widely in the metropolitan area. However, the nature of the work would be expected to increase the rate of wear per kilometre. It was therefore concluded, after discussions with operators,

that two new tyres would be fitted to the steering axle of the dedicated vehicle every two years, and that the other sixteen tyres would be recapped twice at two year intervals and replaced with new tyres every six years.

Details of the discounted prices for tyres available to fleet operators were obtained from a number of dealers. Resource costs were then estimated by subtracting sales tax from these figures and, in the case of the steering axle tyres, netting out the $45 trade-in allowance for used but unrecapped tyres. This procedure resulted in unit cost estimates of $101.62 for new steering axle tyres with trade-in, $146.62 for other new tyres and $91.99 for recaps. The equivalent annual cost of tyres over the evaluation period was estimated at $822, $823 and $821 at the 4, 7 and 10 per cent discount rates respectively. This excluded the cost of new tyres included in prime mover and trailer purchase prices.

**Maintenance**

*Grain transport*
Most road transport operators contacted during the study were not able to provide specific information on maintenance costs for their prime movers and trailers. However, an official from one company indicated that routine and preventative maintenance costs for prime movers operated by his organisation averaged from $10 000 to $15 000 per annum for each vehicle and that the costs for trailers were between $2500 and $3000 per annum. Another official indicated that the total costs of operating his company's workshop represented an average expenditure of about $20 000 for each vehicle in the fleet, although these costs probably included expenditure on items other than routine maintenance.

It was concluded that 13 cents per kilometre was a reasonable estimate of the average cost of routine and preventative maintenance for a dedicated prime mover and trailer carrying grain between southern New South Wales and Geelong. This represents an annual maintenance cost of $15 600 per annum.

*Container transfer*
After discussions with road transport operators and vehicle manufacturers, it was concluded that 15 cents per kilometres was a reasonable estimate of the average cost of routine and preventative maintenance for a dedicated vehicle transferring containers between South Dynon and Swanson Dock. This represents an annual maintenance cost of $1555. Most of the maintenance would be incurred on the prime mover as the heavy duty skeletal trailers appear to require only $200 to $300 per annum in maintenance expenditure. The major cost of a mid-life rebuild for a skeletal trailer was included in capital costs.

The maintenance costs per kilometre for the dedicated vehicle would be expected to be higher than those required for vehicles operating on long distance routes as the relatively short transfer operation places greater stress on items such as gearbox, clutch and brakes due to greater stop-start driving and manoeuvring.

**Administration**

*Grain transport*
The administration costs relevant to the present study are the expenses that would be avoided if substantial movements of grain to Geelong were diverted from road transport. Operators indicated that the paperwork directly involved in the transport of grain is minimal.

The level of savings in administration costs would, of course, be strongly influenced by the importance of grain traffic in the operations of this sector of the road transport industry. The savings would be relatively small if vehicles which previously carried grain to Geelong continued to transport items such as groceries into southern New

South Wales but then returned empty to Melbourne and Geelong. On the other hand, if the vehicles were already returning empty to southern New South Wales after carrying grain from the region, a large reduction in the grain traffic would lead to a significant fall in overall truck operations and hence greater savings in administration costs.

The administration cost component for the operation of the representative truck should reflect the average impact of a significant reduction in the number of return trips performed by this sector of the road transport industry. After discussions with a number of operators, it was concluded that 1 cent per kilometre or $1200 per annum was a reasonable estimate for avoidable administration costs and this figure was used in the evaluation.

*Container transfer*
The avoidable administration costs for the transfer operation include the cost of documentation for the movement between South Dynon and Swanson Dock. After discussions with several operators and other industry sources, it was concluded that 2 cents per kilometre or $207 per annum was a reasonable estimate of avoidable administration costs.

## SEPARABLE ROAD PAVEMENT COSTS

A reduction in the number of movements by heavy vehicles between southern New South Wales and Geelong and between South Dynon and Swanson Dock would result in some reduction in pavement damage and associated costs. It was not possible to obtain specific information for the road sections used by these vehicles, and hence it was necessary to rely on more general Australian data to estimate the potential savings.

There are very few published estimates of the impact of heavy vehicles on road pavement costs in Australia. It was concluded that the best estimates for the purposes of the present study were those prepared by Webber, Both and Ker (Webber, Both and Ker 1978). Their approach involved the estimation of separable pavement costs for specified vehicle types which were defined as the costs which would not be incurred if that type of vehicle did not use the roads.

*Grain transport*
On the basis of this methodology, the separable pavement costs for an articulated vehicle of the type specified for the grain traffic were estimated at 7.5 cents per vehicle-kilometre in 1976–77 prices. For the purposes of the present study, this figure was converted to June 1982 prices using the BTE's road construction price index which resulted in an estimate of 13.4 cents per kilometre or $16 080 per vehicle per annum.

*Container transfer*
The data prepared by Webber, Both and Ker indicated separable pavement costs of 6.0 cents per truck-kilometre for an articulated vehicle of the type specified for the transfer operation between South Dynon and Swanson Dock. This was updated to 10.7 cents per truck-kilometre or $1109 per annum in June 1982 prices using the BTE's road construction price index.

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